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# SCHEINBARE ÖRTER DER FUNDAMENTALSTERNE

1986

Enthaltend die 1535 Sterne  
des Vierten Fundamental-Katalogs (FK4)

Hergestellt unter der Schirmherrschaft der  
Internationalen Astronomischen Union

HEIDELBERG: ASTRONOMISCHES RECHEN-INSTITUT

1985

# APPARENT PLACES OF FUNDAMENTAL STARS

1986

Containing the 1535 stars in the  
Fourth Fundamental Catalogue (FK4)

Produced under the auspices of the  
International Astronomical Union

HEIDELBERG: ASTRONOMISCHES RECHEN-INSTITUT

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This issue is the forty-sixth annual volume in a series which was started with the year 1941 under the auspices of the International Astronomical Union. The compilation and publication of the first nineteen volumes was undertaken by H. M. Nautical Almanac Office, Royal Greenwich Observatory. In accordance with a recommendation of the I.A.U. (Dublin meeting 1955) this task was taken over by the Astronomisches Rechen-Institut, Heidelberg, from the twentieth volume onwards. The apparent and mean places that are given in this volume are based upon the Fourth Fundamental Catalogue (FK 4).

The volume was produced with the assistance of Miss M. Fleischer and Mrs. M. Erbach.

W. FRICKE  
T. LEDERLE  
H. SCHWAN

Astronomisches Rechen-Institut  
Heidelberg, June 1985

### Important Note Changes carried out from 1984 onwards

According to the resolutions adopted by the IAU in 1976 and 1982, the following changes concerning the mean and apparent places of stars are recommended from 1984 January 1 onwards:

(1) The FK 4 representing the fundamental reference frame in common use shall be replaced by the FK 5 (*Trans. I.A.U 16B, 59*).

(2) A correction to the zero point of right ascensions of the FK 4 (equinox correction) and a correction to the motion of the equinox of the FK 4 shall be applied; this involves a corresponding amendment of the expression for Greenwich mean sidereal time at 0<sup>h</sup> UT (*Trans. I.A.U 16B, 59; 18B, 72*).

(3) The IAU (1976) System of Astronomical Constants shall be used, in particular the new values of precession, aberration and obliquity of the ecliptic (*Trans. I.A.U 16B, 58*).

(4) The 1980 IAU Theory of Nutation shall be introduced (*Trans. I.A.U 18B, 72*).

(5) Stellar aberration shall be computed from the total velocity of the Earth referred to the barycentre of the Solar System; furthermore, the terms depending on the ellipticity of the Earth's orbit (the so-called E-terms) shall be no longer included in the mean places, but rather in the reduction from mean to apparent places (*Trans. I.A.U 16B, 59*).

(6) Reductions to apparent places shall be computed rigorously and directly without the intermediary of the place for the beginning of the year (*Trans. I.A.U. 18B*, 72); the rigorous computation also includes relativistic effects.

From the 1984 volume onwards, items (2) — (6) are introduced in the computation of the apparent places. Item (1) cannot be applied, because the FK 5 has not yet been completed in time for introduction in this volume. The star positions as given in this and the following volumes will still be based on the FK 4 except for the equinox correction as mentioned in item (2), which is applied to all right ascensions in APFS from 1984.0 onwards. The equinox correction is

$$\Delta\alpha = E_0 + \dot{E}(T-19.50) = 0^{\circ}035 + 0^{\circ}085(T-19.50)$$

where  $T$  is counted in centuries; it was determined by Fricke (*Astron. Astrophys.* 107, L13 — L16, 1982).

When the FK 5 will be introduced in the “Apparent Places of Fundamental Stars”, tables will be given for reducing the apparent places from FK 4 to FK 5 for the preceding volumes from 1984 onwards.

The following remarks referring to the content of this volume deserve particular attention:

(i) Pages IX—XLIII (formerly VII—XLI): The wording of the five-language Introduction will not be changed until the first volume based on FK 5, although some statements have now become obsolete or should be modified according to items (2) — (6) above.

(ii) Pages 1—475: Because of the effect of the relativistic light deflection, the apparent places of a star when approaching very closely the Sun, cannot be interpolated by the user; but these exceptional cases are of no practical interest in normal applications.

(iii) Pages 476—477: As formerly, for less accurate calculations of apparent places for non-fundamental stars, the Besselian Day Numbers are still given to be used in the classical Besselian formula. But because these Day Numbers have been computed in accordance with items (2) — (5) above, it has to be noted that they are to be combined with mean places for the middle of the year (e.g. J1984.5), and which do not contain the so-called E-terms of aberration; these mean places have also to be derived by using proper motions which had been modified by applying the corrections of the precession in right ascension and declination with the opposite sign so that the apparent places would practically not be affected by the change of the precession. Furthermore,  $\dot{E} = 0^{\circ}085$  has to be added to the centennial proper motions in right ascension.

(iv) Pages 478—479, Table I:  $dp$  and  $d\epsilon$  are based on the 1980 IAU Theory of Nutation, see item (4) above.

(v) Pages 480—483, Table II: The Sidereal times have been calculated according to the new I.A.U. resolution (*Trans. I.A.U. 18B*, 72).

(vi) Pages 484—510: The content remains unchanged.

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## INTRODUCTION

This volume, containing the mean and apparent places for 1986 of the 1535 stars in the *Fourth Fundamental Catalogue*<sup>1</sup> (referred to throughout by its abbreviation FK4), has been produced through the co-operation of the Astronomisches Rechen-Institut, Heidelberg, and the Bureau des Longitudes, Paris, under the auspices of the International Astronomical Union. The proposal that the question of duplicate printing in the almanacs should be considered was made at the 1932 meeting of the Union; after the adoption in 1935 of FK3 as the fundamental catalogue for the mean places of stars in astronomical ephemerides, an opportunity arose for fulfilling the practical implications of that proposal, leading to the present publication of a single volume of apparent places of stars<sup>2</sup>.

During the years 1941—1959 the preparation of this volume was shared by the six principal almanac offices. At the 1955 (Dublin) meeting of the International Astronomical Union agreement was reached on a redistribution of astronomical computation for the ephemerides, the leading principle being to concentrate work of the same character in a small number of ephemeris offices. As a consequence of this agreement the Astronomisches Rechen-Institut in Heidelberg is, beginning with 1960, responsible for the production of the volume „Apparent Places of Fundamental Stars”; the ephemerides of all the 1483 10-day stars of the FK4 are also computed by the Astronomisches Rechen-Institut. The Bureau des Longitudes, Paris, has undertaken the computation of all the 52 circumpolar stars of the FK4, so that the whole work is now shared by only two ephemeris offices.

However, the totality of astronomical computation covered by international agreement includes the calculation and production of the various national ephemerides and of the „Ephemerides of the Minor Planets”, as well as of the „Apparent Places of Fundamental Stars”. The work for all these publications is shared between the six ephemeris offices at Heidelberg, Herstmonceux, Leningrad, Paris, San Fernando and Washington.

All the data in the volume “Apparent Places of Fundamental Stars” are based on the FK4, to which reference should be made for details of the star places. The 1535 stars for which mean and apparent places are given consist of 853 10-day and 20 circumpolar Auwers’ stars, and 630 10-day and 32 circumpolar additional stars.

In the reduction to apparent place the constants of precession, nutation and aberration involved are those adopted by the twelfth General Assembly of the International Astronomical Union (Resolution No. 4, Hamburg, September 1964). The Day Numbers used are based on the recommendations of the International Astronomical Union (*Trans. I.A.U.* 8, 90) and are calculated from the same formulae as the data published in “The Astronomical Ephemeris” and other national ephemerides; details of the fundamental computations are given in the Explanations.

<sup>1</sup> Fourth Fundamental Catalogue (FK4). *Veröffentlichungen des Astronomischen Rechen-Instituts Heidelberg* Nr. 10 (1963).

<sup>2</sup> For further details of the origin of the volume and of the relevant recommendations of the I.A.U. see *Transactions of the International Astronomical Union*, 4, 20, 222 (1932); 5, 29, 287, 370 (1935); 6 357 (1938), where a detailed account of the events leading to the present volume is given.

Little explanation of the quantities tabulated is necessary, but all essential details are given below.

*Apparent Places of 10-Day Stars (Pages 1—371)*

The apparent positions of the 1483 stars with declinations between  $\pm 81^\circ$  are given for every tenth upper transit at Greenwich on pages 1—371. The choice of data is fixed by the moments for which on pages 476—477 the Day Numbers are tabulated (integral part of the Greenwich Sidereal Date divisible by 10). From 1960 onwards, the tabulation is given continuously for a period greater than the calendar year. The stars are arranged generally four to a page, in the order of their mean right ascension for the beginning of the year.

The number, name, magnitude and spectrum are taken generally from the FK4. In all cases where the star name does not normally contain the constellation name (such as B.D. stars), this has been appended; the constellation boundaries are in accordance with *Délimitation Scientifique des Constellations* by Delporte (Cambridge, 1930). Selected proper names are included; a list of the proper names adopted is given in the *Index to Apparent Places of Stars*, page 501. Some alternative names are given in the list on page XLVI. In the case of certain double stars an indication of the component for which the position is tabulated is given by the letters *p.* (preceding), and *f.* (following); asterisks indicate double stars for which notes are given on the pages XLIV—XLV. Variability of a star is indicated, either by giving limiting magnitudes or merely “var”, if the total amplitude reaches or exceeds  $0^m.3$ .

The column U.T. gives the approximate time of transit for all the stars on the page; it is rounded to the nearest tenth of a day. For transits over meridians other than that of Greenwich the column U.T. can be regarded as the (local) mean solar date.

The right ascension and declination are referred to the true equator and equinox of date, but with the omission of the short-period terms of nutation. The mean places of the FK4-stars — in common with the positions in all star catalogues — are not freed from the constant term of aberration. Accordingly in calculating the reduction to the apparent place the term in the aberration depending on the eccentricity of the Earth's orbit has not been included. Corrections for orbital motion have been applied to seven stars. The values of these corrections, together with information about the orbital elements and mass-ratios, are given on page XLIV. Beginning with 1960 corrections for parallax have been applied to 721 stars, being those in the *General Catalogue of Trigonometric Stellar Parallaxes* (Yale, 1952) that have parallaxes equal to or greater than  $0''.010$  (*Trans. I.A.U.* 7, 76, 82; 8, 67). The adopted values of the parallaxes have been taken unchanged from the Yale Catalogue, column “Absolute  $\pi$ ”.

The hours and minutes of right ascension and the degrees and minutes of declination given at the head of the columns are adjusted so that the seconds never change sign, though this may involve their exceeding 60. First differences of the co-ordinates are given in smaller type, with algebraic signs.

Immediately below the tabulated right ascension and declination are given:

- (I) the mean place 1986.5 which is that of the tabulated star.
- (II)  $\sec \delta$  and  $\tan \delta$  corresponding to the mean place.
- (III) the four quantities  $d\alpha(\psi)$ ,  $d\alpha(\epsilon)$ ,  $d\delta(\psi)$ ,  $d\delta(\epsilon)$  required for the application of short-period terms of nutation.
- (IV) the day upon which the star transits twice.

For interpolating the right ascension and declination to intermediate transits at Greenwich and to transits over other meridians, second differences must be used. With the following notation

Argument	Function	Differences	
0	$f_0$	$\Delta_0''$	
		$\Delta_1'$	
1	$f_1$		$\Delta_1''$

the formula to be used is Bessel's

$$f_n = f_0 + n\Delta_1' + B_n''(\Delta_0'' + \Delta_1'')$$

Table VI (pages 492—498) gives directly, with arguments interpolating factor,  $n$ , and double second difference,  $\Delta_0'' + \Delta_1''$ , the third term of the above formula; an example is given on page XIV. For intermediate transits at Greenwich the interpolating factor is always an exact tenth, and other observatories can easily construct special tables for the ten interpolating factors they require. It should be noted that  $\Delta_0'' + \Delta_1''$  can be obtained directly as the difference between the two first differences  $\Delta_{\frac{1}{2}}'$  and  $\Delta_{\frac{3}{2}}'$ ; additional first differences are tabulated at the beginning and end of the year, so that  $\Delta_0'' + \Delta_1''$  can thus be found throughout.

The correction for the effect of the short-period terms of nutation is made by means of the formulae

$$\begin{aligned} \Delta\alpha &= d\alpha(\psi) \cdot d\psi + d\alpha(\epsilon) \cdot d\epsilon && \text{seconds of time} \\ \Delta\delta &= d\delta(\psi) \cdot d\psi + d\delta(\epsilon) \cdot d\epsilon && \text{seconds of arc} \end{aligned}$$

where  $d\psi$  and  $d\epsilon$ , the short-period terms of nutation in longitude and obliquity,  $\epsilon$ , respectively, are tabulated for every day in Table I (pages 478—479) and

$$\begin{aligned} d\alpha(\psi) &= \frac{1}{15}(\cos \epsilon + \sin \alpha \tan \delta \sin \epsilon) && d\delta(\psi) = \cos \alpha \sin \epsilon \\ d\alpha(\epsilon) &= -\frac{1}{15} \cos \alpha \tan \delta && d\delta(\epsilon) = \sin \alpha \end{aligned}$$

are tabulated under each star.

All the above quantities are given to the same number of decimals as the corresponding right ascension and declination.  $d\psi$  and  $d\epsilon$  are tabulated, for  $0^h$  E.T., to  $0''.001$ ; it will be found difficult to interpolate them to full accuracy to the time of transit. It is advisable to calculate first the corrections  $\Delta\alpha$  and  $\Delta\delta$  for  $0^h$  E.T. on two successive days and then to interpolate these  $\Delta\alpha$ ,  $\Delta\delta$  to the time of transit. The approximate time of transit is given by

$$\alpha + \lambda - \text{sidereal time at } 0^h$$

where  $\lambda$  is the west longitude; in most cases for interpolating  $\Delta\alpha$  and  $\Delta\delta$  the rough estimate of the time of transit, given by the fraction of the day in the U.T. column, will however suffice for  $\alpha - \text{sidereal time at } 0^h$ .

As an example consider the calculation of the correction for short-period terms of nutation for  $\alpha$  Cassiopeiae (No. 21) on 1986 Jan. 7.6

From page 10	$d\alpha(\psi) = +0.068$	$d\delta(\psi) = +0.39$
	$d\alpha(\epsilon) = -0.099$	$d\delta(\epsilon) = +0.17$

1986	From page 478		$d\alpha(\psi) \cdot d\psi$	$d\alpha(\epsilon) \cdot d\epsilon$	$\Delta\alpha$	$d\delta(\psi) \cdot d\psi$	$d\delta(\epsilon) \cdot d\epsilon$	$\Delta\delta$
	$d\psi$	$d\epsilon$						
Jan. 7.0	-0".277	-0".048	-0.0188	+0.0048	-0.0014	-0.108	-0.008	-0".12
8.0	-0.172	-0.097	-0.0117	+0.0096	-0.002	-0.067	-0.016	-0.08

$$\text{Jan. 7.6:} \quad \Delta\alpha = -0.007 \quad \Delta\delta = -0".10$$

### *Apparent Places of Circumpolar Stars (Pages 372–475)*

The apparent positions of the 52 circumpolar stars with declinations greater than  $\pm 81^\circ$  are given for every upper transit at Greenwich on pages 372–475; the northern stars are given first in order of right ascension followed by the southern stars. Two facing pages are devoted to each star, the name, magnitude, catalogue number and spectrum being repeated on both pages. In the left hand column only the day of the month is given, without the fraction of the day. The right ascension and declination are referred to the true equator and equinox of date, and short-period terms of nutation are included; two decimals of a second only are given for the right ascension. On the one day during the year when there are two upper transits at Greenwich both are given.

The values of  $\sec \delta$  and  $\tan \delta$  are given for every month and refer to the apparent place on the 16th day of the month; they can normally be used without interpolation. The footnotes, repeated on each page, give the mean right ascension and declination and the date of double lower transit.

### *Besselian Day Numbers (Pages 476–477)*

On these pages are given, for 12<sup>h</sup> Greenwich Sidereal Time, the Besselian Day Numbers without short-period terms of nutation. At an interval of ten sidereal days are given  $A, B, C, D$  to 0".001, and  $E$  to 0.0001. These values are the fundamental data from which the apparent places of the 10-day stars in this volume have been computed; they are also needed for the computation of ephemerides of non-fundamental stars. The omission of the short-period terms of nutation makes interpolation possible at intervals of ten days. Hourly variations of  $A, B, C, D$  are given to 0".0001; by means of these variations the Day Numbers may be interpolated to the time of transit for each tenth transit.

Beginning with 1960, the Day Numbers are referred to the nearest beginning of a year; the corresponding equinox is given in the last column of both pages. The apparent place is obtained with these Day Numbers from the mean place at the beginning of either the current Besselian year or the next following year, according to the tabulated equinox. For any tabulated date,  $\tau$  denotes the fraction of the tropical year that has elapsed since the date to which the tabulated values of the Day Numbers are referred. The hourly variation of  $\tau$  is + 0.00011.

On the right page, in the last column but one the Greenwich Sidereal Date is given; the time-arguments of the tabulated Day Numbers are those dates on which the integral part of the Greenwich Sidereal Date is a multiple of 10. By this choice the arguments of the 10-day ephemerides are also fixed.

### *Table I (Pages 478–479)*

#### *Short-period terms of Nutation*

In this table are tabulated, for 0<sup>h</sup> E.T. on each day of the year, the short-period terms of nutation in longitude ( $d\psi$ ) and in obliquity ( $d\epsilon$ ), required for the correction of



the apparent places of 10-day stars. The terms from which they are computed are given in the volume *Improved Lunar Ephemeris* 1952–1959, pages IX–X (1954). An example for using these values is given on page X.

Table II (Pages 480–483)

*Sidereal Time at 0<sup>h</sup> U.T.*

On these pages are given in order for 0<sup>h</sup> U.T. on each day of the year:

- (I) the apparent (or true) sidereal time to 0<sup>s</sup>.001
- (II) the mean (or uniform) sidereal time, given as seconds and decimals only, the hours and minutes being the same as in the first column
- (III) the long-period terms of the Equation of Equinoxes to 0<sup>s</sup>.001
- (IV) the short-period terms of the Equation of Equinoxes to 0<sup>s</sup>.001

The apparent sidereal time is the sum of the other three columns. In the volumes preceding 1960, the equation of equinoxes was designated as the nutation in right ascension.

Tables III and IV (Pages 484–489)

*Conversion of Mean Solar to Sidereal Time*

*Conversion of Sidereal to Mean Solar Time*

These tables are based on the following relations derived from Newcomb's value of the tropical year:

$$1 \text{ mean solar day} = 24^{\text{h}} 03^{\text{m}} 56^{\text{s}}.55536 \text{ in mean sidereal time}$$

$$1 \text{ mean sidereal day} = 23^{\text{h}} 56^{\text{m}} 04^{\text{s}}.09054 \text{ in mean solar time}$$

Table III gives, with argument mean solar time, the quantity to be *added* to the solar time interval to convert it to an equivalent interval of mean sidereal time; similarly Table IV gives, with argument mean sidereal time, the quantity to be *subtracted* from the sidereal time interval to convert it to an equivalent interval of mean solar time.

In using these tables to pass from mean solar time or from U.T. to apparent sidereal time and vice versa, if the apparent sidereal time at 0<sup>h</sup> is taken from Table II, it must be remembered that a correction should be applied for the change in the equation of equinoxes between 0<sup>h</sup> and the given U.T.

Thus the local apparent sidereal time at Washington at U.T. 7<sup>h</sup> 21<sup>m</sup> 36<sup>s</sup>.572 on 1986 January 11 is obtained as:

Mean solar interval from 0 <sup>h</sup>			7 <sup>h</sup> 21 <sup>m</sup> 36 <sup>s</sup> .572
Corrections to mean solar time	}	(Table III)	+ 1 12.445
to give sidereal time			+ 0.100
Apparent sidereal time at 0 <sup>h</sup> (Table II)			7 20 49.706
Change in the equation of equinoxes from 0 <sup>h</sup> to 7 <sup>h</sup> (Table II)			+ 0.002
Sum = Greenwich apparent sidereal time			14 43 38.825
Longitude, Washington – Greenwich			+ 5 08 15.750*
Difference = Washington apparent sidereal time			9 35 23.075

(The quantity marked \* is approximate only.)

Similarly the U.T. on 1986 January 11 corresponding to a local apparent sidereal time at Washington of  $9^{\text{h}} 35^{\text{m}} 23^{\text{s}}.075$  is obtained as:

Washington apparent sidereal time	9 <sup>h</sup>	35 <sup>m</sup>	23 <sup>s</sup> .075
Longitude, Greenwich – Washington	– 5	08	15.750*
Difference = Greenwich apparent sidereal time	14	43	38 <sup>s</sup> .825
Apparent sidereal time at 0 <sup>h</sup> (Table II)	7	20	49.706
Sidereal interval	7	22	49.119
Corrections to sidereal time	–	1	12.411
to give mean solar time (Table IV)	–		0.134
Change in the equation of equinoxes from 7 <sup>h</sup> to 0 <sup>h</sup> (Table II)	–		0.002
Sum = required U.T.	7	21	36.572

(The quantity marked \* is approximate only.)

Table V (Pages 490–491)

*Conversion of hours, minutes and seconds to decimals of a day*

No explanation of this table is necessary.

Table VI (Pages 492–498)

*Second difference correction*

This table gives, with arguments interpolating factor,  $n$ , and double second difference,  $\Delta_0'' + \Delta_1''$ , the correction to be applied to the linear interpolate. The correction is always of the opposite sign to  $\Delta_0'' + \Delta_1''$ , and interpolation is unnecessary; the quantity is tabulated in units of the last figure of the function.

For example, the apparent position of  $\beta$  Eridani (No. 188) is required at upper transit at Washington ( $\lambda = +5^{\text{h}} 08^{\text{m}} = +0^{\text{d}}.21$ ) on 1986 April 17 (local date).

The tabulated upper transits at Greenwich are on April 10 and April 20, and the interpolating factor is thus  $\frac{1}{10} (7 + 0.21) = 0.721$ . Referring to page 82, the double second differences of right ascension and declination are seen to be +65 and +42 respectively in units of the last figure tabulated; thus

$$\begin{aligned} \alpha &= 5^{\text{h}} 07^{\text{m}} 09^{\text{s}}.176 + (-0^{\text{s}}.112) (0.721) - 0^{\text{s}}.003 = 09^{\text{s}}.092 \\ \delta &= -5^{\circ} 06' 14''.35 + (+0''.79) (0.721) - 0''.02 = 13''.80 \end{aligned}$$

Table VII (Page 499)

*Diurnal Aberration*

This table gives, with arguments latitude,  $\varphi$ , and declination,  $\delta$ , the correction to be applied to the time of transit for the effect of diurnal aberration. This correction (which is tabulated without sign) is to be *subtracted* from the observed time of transit, or alternatively *added* to the right ascension of the star, in the case of transits above pole. In the case of transits below pole, the sign of the correction must be reversed. The values are calculated from the formula

$$\text{Diurnal aberration} = 0^{\text{s}}.0213 \cos \varphi \sec \delta$$

*Index to Apparent Places of Stars (Pages 501—510)*

This index enables the page upon which the apparent place of any star is tabulated to be found from a knowledge of the star's name alone. In order to make the index as complete as possible, all names given to stars in this volume have been included in the index, the alternative names given in the Notes on Stars on page XLVI being distinguished by an asterisk (\*) against the catalogue number. A list of the proper names used precedes the index proper.

The general method of arrangement and the order of the stars under each heading can easily be seen by reference to the pages concerned. Since all stars have been allotted a constellation name, they all appear under one of the 88 standard constellations (*Trans. I.A.U.* 4, 221, 1932), although their main name may appear under one of the other headings.

## INTRODUCTION

Ce volume, fournissant les positions moyennes et apparentes pour 1986 des 1535 étoiles du *Fourth Fundamental Catalogue*<sup>1</sup> (désigné partout ici par son abréviation FK4), résulte de la coopération de l'Astronomisches Rechen-Institut, Heidelberg, et du Bureau des Longitudes, Paris, sous les auspices de l'Union Astronomique Internationale (U.A.I.).

La question concernant la double impression dans les diverses éphémérides fut soulevée à la Réunion de 1932 de l'Union; après l'adoption, en 1935, du FK3 comme catalogue fondamental pour les positions moyennes des étoiles dans les Éphémérides astronomiques, l'opportunité devint évidente de réaliser pratiquement cette résolution par la présente publication d'un volume unique contenant les positions apparentes des étoiles<sup>2</sup>.

Pendant les années 1941—1959 la préparation de ce volume a été répartie entre les six principaux bureaux de calcul. Lors de l'Assemblée de l'U.A.I. tenue en 1955 à Dublin, il fut décidé de modifier cette répartition et de concentrer les travaux similaires sur un plus petit nombre de bureaux de calcul. Conformément à cette décision l'Astronomisches Rechen-Institut de Heidelberg est responsable de la publication du volume «Apparent Places of Fundamental Stars» à partir de 1960. Cet institut calculera les éphémérides des 1483 étoiles de 10 jours du FK4, tandis que le Bureau des Longitudes de Paris se chargera du calcul des 52 étoiles polaires du FK4.

L'entente internationale s'étend à la publication des différents annuaires nationaux, des «Ephemerides of Minor Planets» et des «Apparent Places of Fundamental Stars». Les travaux de calcul nécessaires sont répartis entre les six bureaux de calcul suivants: Heidelberg, Herstmonceux, Leningrad, Paris, San Fernando et Washington.

Toutes les données dans le volume Apparent Places of Fundamental Stars sont basées sur le FK4, auquel on peut se référer pour les détails des positions stellaires. Les 1535 étoiles, dont les positions moyennes et apparentes sont fournies, comprennent 853 étoiles de 10 jours et 20 étoiles circompolaires d'Auwers, plus 630 étoiles de 10 jours et 32 circompolaires additionnelles.

Dans les réductions aux positions apparentes les constantes de précession, nutation et aberration utilisées sont celles adoptées par la XII<sup>e</sup> assemblée générale de l'Union astronomique internationale (Résolution No 4, Hambourg, septembre 1964). Pour les constantes de réduction utilisées, les bases sont les mêmes que pour celles publiées par l'Astronomical Ephemeris et l'American Ephemeris. On trouvera dans ces éphémérides les explications nécessaires concernant les bases de calcul.

<sup>1</sup> Fourth Fundamental Catalogue (FK4). *Veröffentlichungen des Astronomischen Rechen-Instituts Heidelberg* Nr 10 (1963).

<sup>2</sup> Pour plus de détails concernant l'origine du volume et les résolutions de l'U.A.I., consulter: *Transactions of the International Astronomical Union*, 4, 20, 222 (1932); 5, 29, 287, 370 (1935); 6, 357 (1938), où se trouve un compte-rendu circonstancié des discussions conduisant à la publication actuelle.

Les quantités mises en tables exigent peu d'explication, néanmoins tous les détails essentiels des diverses sections sont fournis ci-après.

*Positions apparentes des étoiles de 10 jours (p. 1—371)*

Les positions apparentes des 1483 étoiles de déclinaisons entre  $\pm 81^\circ$  sont données pour chaque dixième passage supérieur à Greenwich, pages 1—371. Le choix des dates est déterminé par les époques pour lesquelles les constantes pour la réduction des étoiles sont données aux pages 476—477 (dates sidérales de Greenwich étant divisibles par 10). A partir de 1960, l'intervalle de dix culminations sera maintenu de façon continue au passage d'une année à la suivante. Les étoiles sont disposées généralement à raison de quatre par page, dans l'ordre de leur ascensions droites moyennes pour le commencement de l'année.

Les No, nom, magnitude et spectre sont empruntés généralement au FK4. Dans tous les cas où la dénomination de l'étoile ne contient pas le nom de la constellation (par exemple, étoiles de B.D.), celui-ci a été ajouté; les limites des constellations sont conformes à la *Délimitation Scientifique des Constellations*, par Delporte (Cambridge, 1930). Certains noms propres sont ajoutés; un relevé de ces noms propres adoptés se trouve dans l'*Index to Apparent Places of Stars (Index aux positions apparentes des étoiles)*, page 501. Quelques noms alternatifs sont indiqués dans la page XLVI. Dans le cas de certaines étoiles doubles l'indication de la composante à laquelle se rapportent les positions données est fournie par les lettres *p.* (preceding = précédente) et *f.* (following = suivante); on a indiqué par un astérisque les étoiles doubles pour lesquelles on donne des notes dans les pages XLIV—XLV. Les étoiles variables dont l'amplitude est égale ou supérieure à  $0^m.3$  sont signalées par l'indication des magnitudes limites ou par l'adjonction "var".

La colonne U.T. donne l'heure approchée de passage pour toutes les étoiles de la page; elle est arrondie au dixième de jour le plus proche. Pour les passages aux méridiens autres que celui de Greenwich la colonne U.T. peut être regardée comme l'instant solaire moyen (local).

L'ascension droite et la déclinaison sont rapportées à l'équateur et à l'équinoxe vrais de la date, mais sans tenir compte des termes à courte période de la nutation. Comme dans les autres catalogues, les positions moyennes des étoiles du FK4 ne sont pas affranchies du terme constant de l'aberration. Par conséquent, dans les réductions aux positions apparentes le terme de l'aberration provenant de l'excentricité de l'orbite terrestre n'a pas été pris en considération. Les corrections dues au mouvement orbital ont été appliquées à sept étoiles. Les valeurs de ces corrections, ainsi que les références concernant les éléments d'orbite et les rapports des masses, sont données p. XLIV. A partir de l'an 1960 des corrections pour la parallaxe ont été appliquées à 721 étoiles, à savoir à celles dont la parallaxe donnée par le *General Catalogue of Trigonometric Stellar Parallaxes* (Yale 1952) atteint ou dépasse  $0^".10$ . Les valeurs utilisées sont tirées sans modification de la colonne intitulée «Absolute  $\pi$ » du Catalogue Jenkins.

Les heures et minutes d'ascension droite ainsi que les degrés et minutes de déclinaison figurant en tête de colonnes sont choisies de manière que les secondes ne changent jamais de signe; celles-ci peuvent donc dépasser 60. Les différences premières des coordonnées sont imprimées en caractères plus petits, avec signe.

Immédiatement au-dessous des ascensions droites et déclinaisons on trouve:

- 1) — la position moyenne de l'astre pour 1986.5.
- 2) —  $\sec \delta$  et  $\tan \delta$  ( $\text{tang} \delta$ ) correspondant à la position moyenne.

- 3) — les quatre quantités  $d\alpha(\psi)$ ,  $d\alpha(\varepsilon)$ ,  $d\delta(\psi)$ ,  $d\delta(\varepsilon)$  nécessaires pour calculer les termes à courte période de la nutation.  
 4) — la date où l'astre a deux passages supérieurs.

Pour interpoler l'ascension droite et la déclinaison aux instants des passages intermédiaires à Greenwich ou aux heures des passages à d'autres méridiens, on doit tenir compte des différences secondes. Avec la notation suivante

Argument	Fonction	Différences	
0	$f_0$	$\Delta'_0$	$\Delta''_0$
1	$f_1$	$\Delta'_1$	$\Delta''_1$

il convient d'employer la formule de Bessel

$$f_n = f_0 + n\Delta'_1 + B'_n(\Delta''_0 + \Delta''_1)$$

La table VI (p. 492—498), ayant comme arguments le facteur d'interpolation,  $n$ , et la somme des différences secondes,  $\Delta''_0 + \Delta''_1$ , donne directement le troisième terme de la formule ci-dessus; un exemple est donné p. XXI. Pour les passages intermédiaires à Greenwich le facteur d'interpolation est toujours un dixième exact et les autres observatoires peuvent aisément construire les tables spéciales pour les dix facteurs d'interpolation dont ils ont besoin. Il faut remarquer qu'on peut obtenir  $\Delta''_0 + \Delta''_1$  directement de la différence entre les deux différences premières  $\Delta'_0$  et  $\Delta'_1$ ; des différences premières additionnelles sont tabulées au début et à la fin de l'année, de sorte qu'on peut obtenir  $\Delta''_0 + \Delta''_1$  partout.

La correction pour l'effet des termes à courte période de la nutation est obtenue au moyen des formules suivantes

$$\begin{aligned} \Delta\alpha &= d\alpha(\psi) \cdot d\psi + d\alpha(\varepsilon) \cdot d\varepsilon && \text{en secondes de temps} \\ \Delta\delta &= d\delta(\psi) \cdot d\psi + d\delta(\varepsilon) \cdot d\varepsilon && \text{en secondes d'arc} \end{aligned}$$

où  $d\psi$  et  $d\varepsilon$ , termes à courte période respectifs de la nutation en longitude et obliquité,  $\varepsilon$ , sont donnés pour chaque jour dans la table I (pages 478—479) et

$$\begin{aligned} d\alpha(\psi) &= \frac{1}{15} (\cos \varepsilon + \sin \alpha \operatorname{tang} \delta \sin \varepsilon) && d\delta(\psi) = \cos \alpha \sin \varepsilon \\ d\alpha(\varepsilon) &= -\frac{1}{15} \cos \alpha \operatorname{tang} \delta && d\delta(\varepsilon) = \sin \alpha \end{aligned}$$

sont fournis au-dessous du tableau de chaque étoile.

Toutes ces quantités sont données avec le même nombre de décimales que l'ascension droite et la déclinaison correspondantes.  $d\psi$  et  $d\varepsilon$  sont publiés, pour  $0^h$  T.E., à  $0^m.001$ . L'interpolation de ces grandeurs étant malaisée, il est recommandé de calculer les produits  $\Delta\alpha$  et  $\Delta\delta$  pour deux jours consécutifs à  $0^h$  T.E., puis d'interpoler ces valeurs pour l'heure du passage. Le moment approximatif de passage est exprimé par

$$\alpha + \lambda - \text{temps sidéral à } 0^h$$

où  $\lambda$  désigne la longitude; pour interpoler les  $\Delta\alpha$  et  $\Delta\delta$  l'estimation très grossière du temps du passage, donnée par la fraction du jour dans la colonne U.T., suffit cependant pour  $\alpha$ —temps sidéral à  $0^h$  dans la plupart des cas.

Comme exemple, considérons le calcul de la correction due à ces termes à courte période pour  $\alpha$  Cassiopeiae (No 21), le 1986 Janvier 7.6.

De la page 10  $d\alpha(\psi) = +0.068$   $d\delta(\psi) = +0.39$   
 $d\alpha(\varepsilon) = -0.099$   $d\delta(\varepsilon) = +0.17$

1986	De la page 478		$d\alpha(\psi) \cdot d\psi$	$d\alpha(\varepsilon) \cdot d\varepsilon$	$\Delta\alpha$	$d\delta(\psi) \cdot d\psi$	$d\delta(\varepsilon) \cdot d\varepsilon$	$\Delta\delta$
	$d\psi$	$d\varepsilon$						
Janvier 7.0	-0".272	-0".048	-0.0188	+0.0048	-0.014	-0.108	-0.008	-0".12
8.0	-0.172	-0.097	-0.0117	+0.0096	-0.002	-0.067	-0.016	-0.08

Jan. 7.6:  $\Delta\alpha = -0.007$   $\Delta\delta = -0".10$

*Positions apparentes des étoiles circumpolaires (p. 372-475)*

Les positions apparentes des 52 étoiles circumpolaires de déclinaisons supérieures à  $\pm 81^\circ$  sont fournies, pour chaque culmination supérieure à Greenwich, pages 372-475; classées par ordre d'ascension droite se trouvent d'abord les étoiles boréales, puis les étoiles australes. Deux pages en regard sont consacrées à chaque étoile, le nom, la magnitude, le No du catalogue et le spectre étant répétés sur les deux pages. Dans la colonne de gauche le jour du mois est seul fourni, sans fraction de jour. L'ascension droite et la déclinaison se rapportent à l'équateur et à l'équinoxe vrais de la date, et les termes à courte période de la nutation sont inclus; deux décimales de seconde seulement sont données en ascension droite. Pour le seul jour de l'année où se produisent deux culminations supérieures à Greenwich, celles-ci sont données toutes deux.

Les valeurs de sec  $\delta$  et tang  $\delta$  sont indiquées pour chaque mois et se rapportent à la position apparente correspondant au 16<sup>e</sup> du mois; elles peuvent être utilisées sans interpolation. Les notes au bas, répétées à chaque page, donnent: l'ascension droite et la déclinaison moyennes et la date de la double culmination inférieure.

*Constantes pour la réduction des étoiles (p. 476-477)*

Ces pages contiennent, pour 12<sup>h</sup> de temps sidéral à Greenwich, les constantes de Bessel sans les termes à courte période de la nutation. Les tables donnent de dix en dix jours *A*, *B*, *C*, *D* à 0".001 et *E* à 0.0001. Ces grandeurs sont nécessaires lors du calcul de la position apparente d'étoiles ne figurant pas dans les APFS. L'élimination des termes à courte période permet l'interpolation exacte dans les intervalles de dix jours. L'interpolation des constantes de réduction pour l'heure du passage est facilitée par l'emploi des variations horaires de *A*, *B*, *C*, *D*, qui sont données à 0".0001.

Dès 1960, les constantes de réduction sont référées au début d'année le plus proche de l'instant considéré. L'équinoxe correspondant est donné dans la dernière colonne de chaque page et indique si ce sont les positions moyennes du début de l'année en cours, ou celles du début de l'année suivante qui doivent être utilisées pour le calcul des coordonnées apparentes. La grandeur  $\tau$  est la fraction d'année tropique écoulée depuis le commencement d'année auquel les valeurs des constantes de réduction se rapportent. La variation de  $\tau$  pour 1<sup>h</sup> est + 0.00011.

L'avant-dernière colonne de la page de droite fournit la date sidérale de Greenwich (Greenwich Sidereal Date). Les constantes de réduction sont données par la table pour les dates sidérales de Greenwich dont la partie entière est un multiple de 10. Ce choix fixe également les dates des éphémérides des étoiles de dix jours.

## Table I (p. 478—479)

*Termes à courte période de la nutation*

Dans cette table on trouve, pour  $0^h$  T.E. de chaque jour de l'année, les termes à courte période de la nutation en longitude ( $d\psi$ ) et en obliquité ( $d\varepsilon$ ) nécessaires pour la correction des positions apparentes des étoiles de 10 jours. Les expressions à l'aide desquelles ils sont calculés figurent dans le volume *Improved Lunar Ephemeris 1952—1959*, p. IX—X (1954). Un exemple pour l'usage de ces valeurs est donné p. XVII.

## Table II (p. 480—483)

*Temps sidéral à  $0^h$  T.U.*

Dans ces pages sont donnés pour  $0^h$  T.U., chaque jour de l'année:

- 1) — le temps sidéral apparent (ou vrai) à  $0^s001$
- 2) — le temps sidéral moyen (ou uniforme) fourni en secondes et décimales seulement, les heures et minutes étant les mêmes que dans la première colonne
- 3) — les termes à longue période de la nutation en ascension droite («Equation of Equinoxes»), à  $0^s001$
- 4) — les termes à courte période de la nutation en ascension droite («Equation of Equinoxes»), à  $0^s001$

Le temps sidéral apparent est la somme des trois autres colonnes.

## Tables III et IV (p. 484—489)

*Conversion du temps solaire moyen en temps sidéral et vice-versa*

Ces tables sont basées sur les relations suivantes déduites de la valeur de l'année tropique conclue par Newcomb:

$$\begin{aligned} 1 \text{ jour solaire moyen} &= 24^h 03^m 56^s 55536 \text{ de temps sidéral moyen} \\ 1 \text{ jour sidéral moyen} &= 23^h 56^m 04^s 09054 \text{ de temps solaire moyen} \end{aligned}$$

La table III fournit, l'argument étant le temps solaire moyen, la quantité à *ajouter* à cet intervalle de temps pour le convertir en un intervalle équivalent de temps sidéral moyen; la table analogue IV, où l'argument est le temps sidéral moyen, donne la quantité qu'il faut *retrancher* de l'intervalle considéré de temps sidéral pour convertir celui-ci en un intervalle équivalent de temps solaire moyen.

En utilisant ces tables pour passer du temps solaire moyen (ou du T.U.) au temps sidéral apparent ou vice-versa, il faut se souvenir que, si le temps sidéral apparent à  $0^h$  est pris dans la table II, une correction devra être appliquée pour tenir compte du changement de la nutation en ascension droite («equation of equinoxes») entre  $0^h$  et l'heure T. U. envisagée.

Ainsi le temps sidéral apparent (local) à Paris a  $7^h 21^m 36^s 572$  T.U. le 11 janvier 1986, s'obtient comme il suit:

Intervalle solaire moyen, à partir de $0^h$		$7^h$	$21^m$	$36^s 572$		
Corrections au temps solaire moyen	}	(table III)	{	+	1	12.445
pour passer au temps sidéral				+		0.100
Temps sidéral apparent à $0^h$ (table II)			7	20	49.706	
Variation en nutation de $0^h$ à $7^h$ (table II)			+		0.002	
<hr/>						
Somme = temps sidéral apparent à Greenwich			14	43	38.825	
Longitude, Paris — Greenwich			— 0	9	20.910	
<hr/>						
Différence = temps sidéral apparent à Paris			14	52	59.735	



D'une façon analogue le T.U., le 11 janvier 1986, correspondant à un temps sidéral apparent (local) à Paris de  $14^{\text{h}} 52^{\text{m}} 59^{\text{s}}735$  s'obtient ainsi:

Temps sidéral apparent à Paris		$14^{\text{h}} 52^{\text{m}} 59^{\text{s}}735$
Longitude, Greenwich — Paris		+ 0 9 20.910
<hr/>		
Différence = temps sidéral apparent à Greenwich		14 43 38.825
Temps sidéral apparent à $0^{\text{h}}$ (table II)		7 20 49.706
<hr/>		
Intervalle sidéral.		7 22 49.119
Corrections au temps sidéral pour } (table IV)	}	- 1 12.411
passer au temps solaire moyen }		- 0.134
Variation en nutation de $7^{\text{h}}$ à $0^{\text{h}}$ (table II)		- 0.002
<hr/>		
Somme = T.U.		7 21 36.572

Table V (p. 490—491)

*Conversion des heures, minutes et secondes en fraction décimale de jour*

Cette table n'appelle aucune explication.

Table VI (p. 492—498)

*Correction due aux différences secondes*

Cette table donne, les arguments étant le facteur d'interpolation,  $n$ , et la somme des différences secondes,  $\Delta_0'' + \Delta_1''$ , la correction qui doit être appliquée à l'interpolation linéaire. La correction est toujours de signe contraire à celui de  $\Delta_0'' + \Delta_1''$  et l'interpolation est inutile; la quantité est exprimée en unités de la dernière décimale de la fonction.

Par exemple, on se propose de calculer la position apparente de  $\beta$  Eridani ( $N^{\circ} 188$ ), lors de son passage supérieur à Washington ( $\lambda = +5^{\text{h}} 8^{\text{m}} = +0.21$ ) le 17 avril 1986 (date locale).

Les passages supérieurs à Greenwich figurant dans le tableau sont avril 10 et avril 20, de sorte que le facteur d'interpolation est  $\frac{1}{10} (7 + 0.21) = 0.721$ . Se reportant à la page 82, on trouve que les doubles différences secondes en ascension droite et déclinaison sont respectivement  $+65$  et  $+42$  unités de la dernière décimale fournie.

Il en résulte

$$\begin{aligned}\alpha &= 5^{\text{h}} 7^{\text{m}} 9^{\text{s}}176 + (-0^{\text{s}}112)(0.721) - 0^{\text{s}}003 = 9^{\text{s}}092 \\ \delta &= -5^{\circ} 6' 14''35 + (+0''79)(0.721) - 0''02 = 13''80\end{aligned}$$

Table VII (p. 499)

*Aberration diurne*

Cette table, dans laquelle on entre avec la latitude,  $\varphi$ , et la déclinaison,  $\delta$ , comme arguments, donne la correction qui doit être appliquée au temps du passage pour tenir compte de l'aberration diurne. Cette correction (mise en table sans signe) est à *retrancher* du temps observé du passage ou, si l'on préfère, à *ajouter* à l'ascension droite de l'étoile, dans le cas des passages au-dessus du pôle. Dans le cas des passages au-dessous du pôle, on doit inverser le signe de la correction. Les quantités résultent de la formule

$$\text{Aberration diurne} = 0^{\text{s}}0213 \cos \varphi \sec \delta$$

*Index aux positions apparentes des Étoiles* (p. 501—510)

Cet index indique, dès que l'on connaît simplement le nom de l'astre, la page sur laquelle se trouve la position apparente d'une étoile quelconque.

Afin de réaliser un index aussi complet que possible, tous les noms attribués aux étoiles dans ce volume ont été insérés dans l'index; les autres noms figurant dans les «Notes on Stars» à la page XLVI étant distingués, par un astérisque (\*), des numéros du catalogue.

Une liste des noms propres utilisés précède l'index proprement dit.

La méthode générale de disposition et l'ordre des étoiles sous chaque rubrique se reconnaissent aisément en se reportant aux pages correspondantes. Puisque toutes les étoiles ont été pourvues d'un nom de constellation, elles figurent toutes dans l'une des 88 constellations standard (*Trans. I.A.U.* 4, 221, 1932), bien que leur nom principal puisse figurer sous l'une des autres dénominations.

## EINLEITUNG

Dieser Band, der für das Jahr 1986 die mittleren und scheinbaren Örter der 1535 Sterne des *Vierten Fundamental-Katalogs*<sup>1</sup> (FK4) enthält, ist aus der Zusammenarbeit zwischen dem Astronomischen Rechen-Institut, Heidelberg, und dem Bureau des Longitudes, Paris, hervorgegangen. — Auf der Tagung der Internationalen Astronomischen Union im Jahre 1932 wurde zum ersten Mal der Plan erörtert, bei der Berechnung und Veröffentlichung von Sternephemeriden unnötige Mehrfacharbeit zu vermeiden; eine Möglichkeit, diese Gedanken in die Tat umzusetzen, ergab sich, als 1935 der FK3 als Grundlage für die Fixsternörter aller astronomischen Jahrbücher angenommen wurde. So entstand das Ephemeridenwerk „Apparent Places of Fundamental Stars“, das die scheinbaren Örter aller Fundamentalsterne in einem Bande vereinigt<sup>2</sup>.

Während der Jahre 1941 bis 1959 waren die sechs großen Ephemeriden-Institute an der Berechnung der in diesem Band enthaltenen Sternephemeriden beteiligt. Auf der IAU-Tagung in Dublin 1955 wurde ein Beschluß über die Neuverteilung der Vorausberechnungen gefaßt; leitend war dabei der Gesichtspunkt, gleichartige Arbeiten auf eine möglichst kleine Zahl von Instituten zu verteilen. Aufgrund dieses Beschlusses trägt ab Jahrgang 1960 das Astronomische Rechen-Institut in Heidelberg die Verantwortung für die Herausgabe des Bandes „Apparent Places of Fundamental Stars“; in diesem Institut werden die Ephemeriden aller 1483 10-Tage-Sterne des FK4 berechnet. Das Bureau des Longitudes hat die Berechnung der scheinbaren Örter der 52 Polsterne übernommen.

Die internationale Übereinkunft umfaßt im ganzen die Berechnung und Herausgabe der verschiedenen nationalen Ephemeriden-Werke, sowie der „Ephemerides of Minor Planets“ und der „Apparent Places of Fundamental Stars“. Die für diese Jahrbücher notwendigen Rechnungen sind auf die sechs Ephemeriden-Institute in Heidelberg, Herstmonceux, Leningrad, Paris, San Fernando und Washington verteilt.

Die in den „Apparent Places of Fundamental Stars“ gegebenen Daten beruhen auf dem FK4. Die Gesamtzahl von 1535 Sternen, für die mittlere und scheinbare Örter gegeben sind, setzt sich zusammen aus 873 Auwers-Sternen (darunter 20 Polsterne) und 662 Zusatz-Sternen (mit 32 Polsternen).

Für die in die Reduktion auf den scheinbaren Ort eingehenden Konstanten der Präzession, Nutation und Aberration sind die auf der 12. Generalversammlung der Internationalen Astronomischen Union (Hamburg, September 1964, Resolution Nr. 4) angenommenen Werte benutzt. Die verwendeten Reduktionsgrößen beruhen auf den gleichen Grundlagen wie die in der *Astronomical Ephemeris* veröffentlichten Daten; Einzelheiten über diese Berechnungsgrundlagen sind in den Erläuterungen der *Astronomical Ephemeris* und der *American Ephemeris* gegeben.

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<sup>1</sup> Fourth Fundamental Catalogue (FK4). *Veröffentlichungen des Astronomischen Rechen-Instituts Heidelberg* Nr. 10 (1963).

<sup>2</sup> Wegen weiterer Einzelheiten über den Ursprung dieses Bandes und über die diesbezüglichen Beschlüsse der I.A.U. vgl. *Transactions of the International Astronomical Union*, 4, 20, 222 (1932); 5, 29, 287, 370 (1935); 6, 357 (1938)

Die für den Gebrauch der Ephemeriden und Tafeln notwendigen Erläuterungen sind in den folgenden Abschnitten gegeben.

### *Scheinbare Örter der 10-Tage-Sterne (Seite 1–371)*

Auf den Seiten 1–371 sind die scheinbaren Örter der 1483 Sterne mit Deklinationen zwischen  $\pm 81^\circ$  für jede zehnte obere Kulmination Greenwich gegeben. Die Wahl der Daten ist durch die Zeitpunkte festgelegt, für die die Reduktionsgrößen auf Seite 476–477 tabuliert sind (volle Zehner-Werte des Sternzeitdatums Greenwich). Das Intervall von 10 Kulminationen wird ab 1960 kontinuierlich über die Jahre hinweggeführt. Die Sterne (je vier auf einer Seite) sind nach der mittleren Rektaszension des Jahresanfangs geordnet.

Stern-Nummer, Name, Helligkeit und Spektrum sind dem FK4 entnommen. In allen Fällen, in denen der Stern-Name nicht die Bezeichnung des Sternbildes enthält (z. B. bei den B. D.-Sternen), ist diese Sternbildangabe hinzugefügt; die Sternbildergrenzen entsprechen der *Délimitation Scientifique des Constellations* von Delporte (Cambridge 1930). Für einige helle Sterne sind die gebräuchlichen Eigennamen mit angegeben; ein Verzeichnis dieser Eigennamen findet sich im Register, Seite 501. Einige Alternativ-Namen sind auf Seite XLVI gegeben. Bei einigen Doppelsternen ist durch die Buchstaben *p.* (preceding = vorangehend), und *f.* (following = nachfolgend), die Komponente gekennzeichnet, auf die sich der tabulierte Ort bezieht; ein Stern hinter dem Namen eines Doppelsterns weist auf eine Angabe in den „Notes on Stars“, Seite XLIV–XLV, hin. Veränderliche Sterne, deren Amplitude gleich oder größer  $0^m_3$  ist sind durch Angabe der Helligkeitsgrenzen oder durch den Zusatz „var.“ gekennzeichnet

Die mit U.T. überschriebene Spalte enthält die genäherte Kulminationszeit für alle auf der Seite aufgeführten Sterne. Für Kulminationen in anderen Meridianen als dem von Greenwich kann diese Zeitangabe als örtliche mittlere Sonnenzeit betrachtet werden. Die Zeit ist auf das nächstliegende Zehntel eines Tages abgerundet.

Die Rektaszensionen und Deklinationen sind auf den wahren momentanen Äquator und das wahre Äquinoktium bezogen, jedoch unter Ausschluß der kurzperiodischen Nutationsglieder. Die mittleren Örter der FK4-Sterne sind — wie die Örter aller Sternkataloge — von dem konstanten Glied der Aberration nicht befreit. In Übereinstimmung damit ist bei der Reduktion auf den scheinbaren Ort das von der Exzentrizität der Erdbahn abhängige Aberrationsglied nicht berücksichtigt. Korrekturen wegen Bahnbewegung sind bei sieben Doppelsternen angebracht worden. Die Werte dieser Reduktionen vom Schwerpunkt auf die Komponenten finden sich — zusammen mit Quellen-Angaben für die Bahnelemente und Massenverhältnisse — auf Seite XLIV. Ab 1960 wird der Einfluß der jährlichen Parallaxe bei allen Sternen berücksichtigt, bei denen der im *General Catalogue of Trigonometric Stellar Parallaxes* (Yale 1952) gegebene Wert gleich oder größer  $0^{\prime}010$  ist (*Trans. I.A.U.* 7, 76, 82; 8, 67). Dies ist bei 721 Sternen der Fall; die Parallaxenwerte sind ungeändert dem Yale-Katalog, Spalte „Absolute  $\pi$ “, entnommen.

Die Stunden und Minuten der Rektaszension und die Grade und Minuten der Deklination, die im Kopf jeder Spalte stehen, sind so gewählt, daß bei den Sekunden keine Vorzeichenänderungen vorkommen, wohl aber Beträge, die 60 übersteigen. Die ersten Differenzen der Koordinaten sind, mit ihren Vorzeichen, in kleinerem Druck gegeben.

Unmittelbar unter der Rektaszension und Deklination ist für jeden Stern gegeben

1. Der mittlere Ort für 1986.5; bei Doppelsternen, bei denen Bahnbewegung berücksichtigt ist, ist der mittlere Ort der Komponente gegeben, für die die Ephemeride gilt.

2. Die Werte von  $\sec \delta$  und  $\operatorname{tg} \delta$  für den mittleren Ort.
3. Die Größen  $d\alpha(\psi)$ ,  $d\alpha(\varepsilon)$ ,  $d\delta(\psi)$ ,  $d\delta(\varepsilon)$ , die bei der Berechnung der kurzperiodischen Nutationsglieder gebraucht werden.
4. Das Datum der Doppelkulmination.

Bei der Interpolation der Sternörter auf dazwischenliegende Kulminationen und auf Kulminationen in anderen Meridianen als dem von Greenwich müssen zweite Differenzen berücksichtigt werden. Es empfiehlt sich, mit folgenden Bezeichnungen

Argument	Funktion	Differenzen
0	$f_0$	$\Delta_0''$
		$\Delta_1'$
1	$f_1$	$\Delta_1''$

nach der Besselschen Formel zu rechnen:

$$f_n = f_0 + n\Delta_1' + B_n'' (\Delta_0'' + \Delta_1'')$$

Das dritte Glied dieser Formel ist in Tafel VI (Seite 492–498) gegeben; Argumente: Interpolationsfaktor  $n$  und doppelte zweite Differenz  $\Delta_0'' + \Delta_1''$ . Ein Beispiel für den Gebrauch dieser Tafel findet sich auf Seite XXVIII. Für Kulminationen in Greenwich ist der Interpolationsfaktor  $n$  immer ein genaues Zehntel; andere Sternwarten können sich leicht spezielle Hilfstafeln für die zehn von ihnen gebrauchten Faktoren herstellen. Der Wert von  $\Delta_0'' + \Delta_1''$  kann am einfachsten als Differenz zwischen den zwei ersten Differenzen  $\Delta_{\frac{1}{10}}'$  und  $\Delta_{\frac{9}{10}}'$  erhalten werden; zusätzliche erste Differenzen sind am Anfang und Ende des Jahres gegeben, so daß  $\Delta_0'' + \Delta_1''$  auch hier berechnet werden kann.

Die Korrektion wegen der kurzperiodischen Nutationsglieder geschieht nach den Formeln

$$\begin{aligned} \Delta\alpha &= d\alpha(\psi) \cdot d\psi + d\alpha(\varepsilon) \cdot d\varepsilon && \text{in Zeitsekunden} \\ \Delta\delta &= d\delta(\psi) \cdot d\psi + d\delta(\varepsilon) \cdot d\varepsilon && \text{in Bogensekunden} \end{aligned}$$

Die Werte von  $d\psi$  und  $d\varepsilon$  (kurzperiodische Nutationsglieder in Länge bzw. Schiefe  $\varepsilon$ ) sind für jeden Tag in Tafel I (Seite 478–479) gegeben. Die Größen

$$\begin{aligned} d\alpha(\psi) &= \frac{1}{15} (\cos \varepsilon + \sin \alpha \operatorname{tg} \delta \sin \varepsilon) && d\delta(\psi) = \cos \alpha \sin \varepsilon \\ d\alpha(\varepsilon) &= -\frac{1}{15} \cos \alpha \operatorname{tg} \delta && d\delta(\varepsilon) = \sin \alpha \end{aligned}$$

stehen für jeden Stern unter der Ephemeride; sie haben die gleiche Stellenzahl wie die zugehörige scheinbare Rektaszension und Deklination.  $d\psi$  und  $d\varepsilon$  sind auf 0,001 für 0<sup>h</sup> E.T. gegeben. Die Interpolation dieser Größen ist unbequem; es empfiehlt sich daher, zunächst die beiden Produkte  $\Delta\alpha$  und  $\Delta\delta$  für 0<sup>h</sup> E.T. zweier aufeinander folgender Tage zu berechnen und dann diese  $\Delta\alpha$ ,  $\Delta\delta$  für die Durchgangszeit zu interpolieren. Der Zeitpunkt des Durchgangs ist genähert gegeben durch

$$\alpha + \lambda - \text{Sternzeit für } 0^h$$

dabei ist  $\lambda$  die geographische Länge; bei der Interpolation der  $\Delta\alpha$  und  $\Delta\delta$  genügt es jedoch in den meisten Fällen, für „ $\alpha$ —Sternzeit für 0<sup>h</sup>“ den Wert einzusetzen, der als Tagesbruch in der Datumspalte der 10-Tage-Ephemeriden gegeben ist.

Beispiel: Berechnung der Korrekturen  $\Delta\alpha$  und  $\Delta\delta$  für  $\alpha$  Cassiopeiae (Nr. 21), 1986 Januar 7.6.

Von Seite 10

$$\begin{aligned} d\alpha(\psi) &= +0.068 \\ d\alpha(\epsilon) &= -0.099 \end{aligned}$$

$$\begin{aligned} d\delta(\psi) &= +0.39 \\ d\delta(\epsilon) &= +0.17 \end{aligned}$$

1986	Von Seite 478		$d\alpha(\psi) \cdot d\psi$	$d\alpha(\epsilon) \cdot d\epsilon$	$\Delta\alpha$	$d\delta(\psi) \cdot d\psi$	$d\delta(\epsilon) \cdot d\epsilon$	$\Delta\delta$
	$d\psi$	$d\epsilon$						
Jan. 7.0	-0".277	-0".048	-0.0188	+0.0048	-0.0014	-0.108	-0.008	-0".12
8.0	-0.172	-0.097	-0.0117	+0.0096	-0.002	-0.067	-0.016	-0.08
Jan. 7.6:			$\Delta\alpha = -0.0007$	$\Delta\delta = -0".10$				

### Scheinbare Örter der Polsterne (Seite 372–475)

Die scheinbaren Örter der 52 Polsterne mit Deklinationen über  $\pm 81^\circ$  sind auf den Seiten 372–475 für jede obere Kulmination in Greenwich gegeben. Zuerst kommen die nördlichen Sterne in der Reihenfolge der Rektaszension, dann die südlichen. Auf zwei gegenüberstehenden Seiten findet sich je ein Stern; Nummer, Name, Helligkeit und Spektrum sind auf beiden Seiten gegeben. In der Datumspalte links sind nur die ganzen Tage, ohne Tagesbruch, gegeben. Rektaszension und Deklination beziehen sich auf den wahren momentanen Äquator und das wahre Äquinoktium; die kurzperiodischen Glieder der Nutation sind in den Koordinaten enthalten. Die Rektaszensionen sind auf 0.01 gegeben. Für den Tag der Doppelkulmination sind beide Werte angeführt.

Die Werte von  $\sec \delta$  und  $\operatorname{tg} \delta$  sind für jeden Monat gegeben; sie gelten streng für den scheinbaren Ort am 16. des Monats, Interpolation ist fast niemals notwendig. In der untersten Zeile jeder Seite stehen die mittlere Rektaszension und Deklination für den Jahresanfang und das Datum der doppelten unteren Kulmination.

### Reduktionsgrößen (Seite 476–477)

Auf diesen Seiten sind die Besselschen Reduktionsgrößen, ohne die kurzperiodischen Nutationsglieder, für 12<sup>h</sup> Sternzeit Greenwich gegeben. Im Intervall von 10 Sterntagen sind  $A, B, C, D$  auf 0.001,  $E$  auf 0.0001 tabuliert. Diese Werte werden bei der Ephemeridenrechnung für Nicht-Fundamentalsterne gebraucht; durch die Ausschaltung der kurzperiodischen Nutationsglieder wird die exakte Interpolation innerhalb des 10-Tage-Intervalls ermöglicht. Die stündlichen Änderungen von  $A, B, C, D$  sind auf 0.0001 gegeben; sie sollen zur Interpolation der Reduktionsgrößen für die Durchgangszeit dienen.

Ab 1960 sind die Reduktionsgrößen auf den jeweils nächstgelegenen Jahresanfang bezogen; das zugehörige Äquinoktium ist auf beiden Seiten in der letzten Spalte gegeben. Bei der Übertragung auf den scheinbaren Ort muß also – entsprechend diesen Werten für das Äquinoktium – der mittlere Ort zum Beginn des laufenden oder des folgenden Jahres als Ausgangswert genommen werden.  $\tau$  bezeichnet für jedes tabulierte Datum den seit dem Jahresanfang, auf den die zugehörigen Werte der Reduktionsgrößen bezogen sind, vergangenen Bruchteil des tropischen Jahres. Die stündliche Änderung von  $\tau$  beträgt +0.00011.

In der vorletzten Spalte der rechten Seite ist das Sternzeitdatum Greenwich (Greenwich Sidereal Date) gegeben; als Zeitargumente für die hier tabulierten Reduktionsgrößen sind diejenigen Daten gewählt, für die die Sternzeitdaten Greenwich auf volle Zehnerwerte enden. Durch diese Wahl sind auch die Argumente der 10-Tage-Ephemeriden festgelegt.

Tafel I (Seite 478—479)

*Kurzperiodische Nutationsglieder*

Diese Tafel enthält, für  $0^h$  E.T. jedes Tages, die kurzperiodischen Nutationsglieder in Länge ( $d\psi$ ) und Schiefe ( $de$ ), die für die Berechnung der an die 10-Tage-Ephemeriden anzubringenden Korrekturen gebraucht werden. Die Formeln und numerischen Grundlagen, nach denen diese Nutationsterme berechnet sind, sind in dem Band *Improved Lunar Ephemeris* 1952—1959, Seite IX—X (1954), gegeben. Ein Beispiel für den Gebrauch dieser Werte findet sich auf Seite XXIV.

Tafel II (Seite 480—483)

*Sternzeit für  $0^h$  Weltzeit*

Auf diesen Seiten sind für  $0^h$  Weltzeit (U. T.) jedes Tages gegeben:

1. Die wahre Sternzeit (apparent sidereal time) auf  $0^s001$ .
2. Die sich gleichförmig ändernde mittlere Sternzeit; es sind nur die Sekunden und deren Dezimalen angegeben, Stunden und Minuten stimmen mit der ersten Spalte überein.
3. Die langperiodischen Glieder der Gleichung der Äquinoktien auf  $0^s001$ .
4. Die kurzperiodischen Glieder der Gleichung der Äquinoktien auf  $0^s001$ .

Die wahre Sternzeit ist die Summe der anderen drei Größen. Die ab 1960 „Gleichung der Äquinoktien“ genannte Nutations-Größe  $d\psi \cos \epsilon$  wurde bis 1959 als „Nutation in Rektaszension“ bezeichnet.

Tafeln III und IV (Seite 484—489)

*Umwandlung von mittlerer Sonnenzeit in Sternzeit und umgekehrt*

Diese Tafeln basieren auf folgenden, von dem Newcomb'schen Wert des tropischen Jahres abgeleiteten, Beziehungen:

$$\begin{aligned} 1 \text{ mittlerer Sonnentag} &= 24^h 03^m 56^s 55536 \text{ mittlerer Sternzeit} \\ 1 \text{ mittlerer Sterntag} &= 23^h 56^m 04^s 09054 \text{ mittlerer Sonnenzeit} \end{aligned}$$

Tafel III gibt die Größe an, die einem als Argument gegebenen Intervall mittlerer Sonnenzeit zuzuaddieren ist, um das entsprechende Intervall mittlerer Sternzeit zu erhalten; ähnlich gibt Tafel IV die Größe an, die von einem als Argument gegebenen Intervall mittlerer Sternzeit zu subtrahieren ist, um das entsprechende Intervall mittlerer Sonnenzeit zu erhalten.

Bei Benutzung dieser Tafeln zu dem Zweck, von mittlerer Sonnenzeit auf wahre Sternzeit, bzw. umgekehrt überzugehen, ist darauf zu achten, daß falls die wahre Sternzeit für  $0^h$  aus Tafel II entnommen wird, eine Korrektur wegen Änderung der Nutation in der zwischen  $0^h$  und der gegebenen Welt-Zeit (U.T.) verflossenen Zeit anzubringen ist. Man erhält z. B. für 1986 Januar 11,  $7^h 21^m 36^s 572$  Welt-Zeit die wahre örtliche Sternzeit in Potsdam-Babelsberg wie folgt:

Intervall seit $0^h$ Welt-Zeit (mittl. Sonnenzeit)		$7^h 21^m 36^s 572$	
Korrekturen für Umrechnung	}	+	1 12.445
auf mittlere Sternzeit		+	0.100
Wahre Sternzeit für $0^h$ (Tafel II)		7 20	49.706
Änderung der Nutation von $0^h$ auf $7^h$ (Tafel II)		+	0.002
Summe = wahre Sternzeit Greenwich		14 43	38.825
Länge, Babelsberg — Greenwich		— 0 52	25.490
Differenz = wahre Sternzeit Babelsberg		15 36	4.315

In ähnlicher Weise erhält man die Welt-Zeit am 11. Januar 1986, der die wahre Sternzeit  $15^{\text{h}} 36^{\text{m}} 4^{\text{s}} 315$  Potsdam-Babelsberg entspricht:

Wahre Sternzeit Babelsberg		$15^{\text{h}}$	$36^{\text{m}}$	$4^{\text{s}} 315$
Länge, Greenwich — Babelsberg		+	0	52 25.490
Differenz = wahre Sternzeit Greenwich			14	43 38.825
Wahre Sternzeit für $0^{\text{h}}$ (Tafel II)			7	20 49.706
Sternzeitintervall seit $0^{\text{h}}$ U.T.			7	22 49.119
Korrekturen für Umrechnung	} (Tafel IV)	}	-	1 12.411
auf mittlere Sonnenzeit			-	0.134
Änderung der Nutation von $7^{\text{h}}$ auf $0^{\text{h}}$ (Tafel II)			-	0.002
Summe = Welt-Zeit (U.T.)			7	21 36.572

*Tafel V (Seite 490—491)*

*Umwandlung von Stunden, Minuten und Sekunden in Dezimalteile des Tages*

Diese Tafel bedarf keiner Erläuterung.

*Tafel VI (Seite 492—498)*

*Korrektion wegen zweiter Differenzen*

Diese Tafel gibt — mit den Argumenten Interpolationsfaktor  $n$  und doppelter zweiter Differenz  $\Delta_0'' + \Delta_1''$  — das zweite Glied der Besselschen Interpolationsformel  $B''(\Delta_0'' + \Delta_1'')$ ; vgl. oben Seite XXV die Angaben über Interpolation mit zweiten Differenzen. Die Werte der Tafel VI sind in Einheiten der letzten Stelle der betreffenden Funktion gegeben; sie können der Tafel ohne Interpolation entnommen werden. Das Vorzeichen der Korrektur  $B''(\Delta_0'' + \Delta_1'')$  ist immer dem Vorzeichen von  $\Delta_0'' + \Delta_1''$  entgegengesetzt.

Beispiel: Gesucht sei der scheinbare Ort von  $\beta$  Eridani (Nr. 188) für die obere Kulmination in Washington ( $\lambda = +5^{\text{h}} 8^{\text{m}} = +0^{\text{d}} 21$ ) am 17. April 1986 (Ortsdatum).

Tabuliert sind die Kulminationen in Greenwich am 10. und 20. April; der Interpolationsfaktor ist daher  $\frac{1}{10}(7 + 0.21) = 0.721$ . Die doppelten zweiten Differenzen in Rektaszension und Deklination (siehe Seite 82) betragen +65 und +42 in Einheiten der letzten gedruckten Stelle. Es ist also

$$\begin{aligned}\alpha &= 5^{\text{h}} 7^{\text{m}} 9^{\text{s}} 176 + (-0^{\text{s}} 112)(0.721) - 0^{\text{s}} 003 = 9^{\text{s}} 092 \\ \delta &= -5^{\circ} 6' 14'' 35 + (+0'' 79)(0.721) - 0'' 02 = 13'' 80\end{aligned}$$

*Tafel VII (Seite 499)*

*Tägliche Aberration*

Diese Tafel gibt die Korrektur, die wegen der täglichen Aberration an die Durchgangszeit anzubringen ist, mit den beiden Argumenten geographische Breite  $\varphi$  und Deklination  $\delta$ . Die Korrektur ist ohne Vorzeichen tabuliert; sie wird, für die oberen Kulminationen, von der beobachteten Durchgangszeit *abgezogen*, bzw. zu der Rektaszension des Sterns *addiert*. Für die unteren Kulminationen ist das Vorzeichen umzukehren. Die Werte sind nach der folgenden Formel berechnet:

$$\text{Tägliche Aberration} = 0^{\text{s}} 0213 \cos \varphi \sec \delta$$



*Register für die Stern-Ephemeriden (Seite 501—510)*

Das Register ist alphabetisch nach Sternbilder-Namen geordnet; es soll das Auffinden einer Ephemeride nach dem Namen des Sternes ermöglichen. Auch die in den „Notes on Stars“ auf Seite XLVI angegebenen Alternativ-Namen sind in das Register aufgenommen; sie sind hier durch einen \* vor der FK4-Nummer gekennzeichnet. Die Reihenfolge, in der die Sterne innerhalb eines Bildes aufgeführt sind, ist leicht zu überschauen. Da alle Sterne mit Sternbilder-Namen versehen sind, erscheint jeder Stern hier in einer der 88 Standard-Konstellationen (*Trans. I. A. U.* 4, 221, 1932). — Am Anfang des Registers ist eine alphabetische Liste der Stern-Eigennamen gegeben.

## INTRODUCCION

Este volumen, que contiene las posiciones medias y aparentes para 1986 de las 1535 estrellas del *Fourth Fundamental Catalogue*<sup>1</sup> (designado en adelante por FK4), es el producto de la colaboración entre el Astronomisches Rechen-Institut de Heidelberg y el Bureau des Longitudes de París. En la conferencia de la Unión Astronómica Internacional en 1932 se discutió por primera vez un plan para evitar trabajo innecesario en el cálculo y publicación de los almanaques; la primera posibilidad de traducir en hechos este proyecto se presentó en 1935, cuando el FK3 se adoptó como base para las posiciones de las estrellas fijas en todos los Anuarios astronómicos. De esta manera se formó el «Apparent Places of Fundamental Stars», que agrupa en un volumen las posiciones aparentes de todas las estrellas fundamentales<sup>2</sup>.

En el cálculo de las efemérides contenidas en este volumen habían participado de los años 1941 a 1959 las seis Oficinas principales de Almanaque. En la Conferencia de la IAU 1955, celebrada en Dublín, se tomó un acuerdo sobre un nuevo reparto de las predicciones; el criterio adoptado fué el de repartir un trabajo igual entre el menor número posible de Oficinas. En virtud de este acuerdo y a partir del año 1960 el Astronomisches Rechen-Institut de Heidelberg asumió la responsabilidad de la edición del volumen «Apparent Places of Fundamental Stars»; en este Instituto fueron calculadas las efemérides de las 1483 estrellas de diez días del FK4. El Bureau des Longitudes se ha encargado del cálculo de las posiciones aparentes de las 52 estrellas circumpolares.

El acuerdo internacional comprendía el cálculo y edición de diferentes Almanaxes nacionales, de las «Ephemerides of Minor Planets» y de las «Apparent Places of Fundamental Stars». Los cálculos necesarios para éstos anuarios han sido encomendados a las seis Oficinas de Almanaque de Heidelberg, Herstmonceux, Leningrado, París, San Fernando y Washington.

Los datos contenidos en el «Apparent Places of Fundamental Stars» están basados en el FK4. Las 1535 estrellas para las cuales se dan las posiciones medias y aparentes son: 853 a intervalos de 10 días, 20 circumpolares de Auwers, y 630 de 10 días más 32 circumpolares adicionales.

Las constantes de precesión, nutación y aberración, empleadas en la reducción de las posiciones aparentes, son las adoptadas por la XII Asamblea General de la Unión Astronómica Internacional (Hamburgo, septiembre 1964, resolución 4.<sup>a</sup>). Los números diarios de Bessel utilizados se apoyan en los acuerdos de la I.A.U. y están calculados sobre las mismas bases que los datos publicados en la *Astronomical Ephemeris* y otros Almanaxes nacionales; los detalles sobre estas bases de cálculo se indican en las introducciones a los Anuarios.

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<sup>1</sup> Fourth Fundamental Catalogue (FK4). *Veröffentlichungen des Astronomischen Rechen-Instituts Heidelberg* Nr. 10 (1963).

<sup>2</sup> Para otros detalles de origen del volumen y de las recomendaciones importantes de la I.A.U. véase *Transactions of the International Astronomical Union*, 4, 20, 222 (1932); 5, 29, 287, 370 (1935); 6, 357 (1938), donde se da relación detallada sobre las particularidades conducentes al presente volumen.

Las explicaciones necesarias para el uso de las efemérides y de las tablas se dan a continuación.

*Posiciones aparentes de las estrellas de 10 días* (páginas 1—371)

Las posiciones aparentes de las 1483 estrellas con declinación entre  $\pm 81^\circ$  se dan para cada décimo tránsito por el meridiano superior de Greenwich en las páginas 1—371. La elección de las fechas está determinada por las épocas, para las cuales se dan las constantes para la reducción de las estrellas en las págs. 476—477 (siendo los días sidéreos de Greenwich divisibles por 10). A partir de 1960 el intervalo de 10 culminaciones se continua sin interrupción a través de todo el año. Cada página comprende cuatro estrellas, ordenadas segun sus ascensiones rectas medias a principio de año.

El número, nombre, magnitud y espectro están tomados del FK4. En todos los casos en que el nombre de la estrella no contenga normalmente el de la constelación, (tal como las estrellas del B.D.), éste se ha añadido; los límites de las constelaciones están de acuerdo con la *Délimitation Scientifique des Constellations* de Delporte (Cambridge, 1930). En el caso de algunas estrellas de gran magnitud se dan los nombres propios más corrientes; una relación de estos nombres se encuentra en el índice de la página 501. Algunos otros nombres están en la pág. XLVI. En el caso de algunas estrellas dobles, la componente para la cual su posición está tabulada se indica con las letras *p*. (preceding = precedente), y *f*. (following = siguiente). Un asterisco trás el nombre de una estrella doble hace referencia a una indicación en «Notes on Stars», páginas XLIV—XLV. Las estrellas variables cuya amplitud es igual o superior a  $0^m.3$  se indican por sus márgenes de magnitud o por el añadido „var.”

En la columna U.T. se indica, en días y décimos de día, el tiempo del tránsito aproximado de todas las estrellas de la página. Para pasos sobre meridianos distintos del de Greenwich la columna U.T. ha de considerarse como fecha solar media local del tránsito. La cifra decimal es la más próxima.

La ascensión recta y la declinación están referidas al ecuador y equinoccio verdaderos de la fecha, pero con la omisión de los términos de corto período de nutación. Las posiciones medias de las estrellas del FK4, están afectadas del término constante de la aberración, al igual que ocurre en todos los catálogos de estrellas. De acuerdo con esto, en la reducción a las posiciones aparentes no se incluye el término de la aberración, que depende de la excentricidad de la órbita terrestre. Se han tenido en cuenta los movimientos orbitales en siete estrellas dobles. Los valores de las reducciones del centro de gravedad a las componentes se encuentran en la página XLIV en unión de las referencias sobre los elementos de las orbitas y las relaciones de las masas. A partir de 1960 se tiene en cuenta la influencia del paralaje anual en todas las estrellas que en el *General Catalogue of Trigonometric Stellar Parallaxes* (Yale, 1952) tienen un valor igual o mayor que  $0''.010$  (*Trans. I.A.U.* 7, 76, 82; 8, 67). Esto sucede con 721 estrellas; el valor de paralaje ha sido tomado sin variar de columna «Absolute  $\pi$ » del catálogo de Yale.

Las horas y minutos en ascensión recta y los grados y minutos en declinación contenidos en cabeza de columnas están ajustados de modo que nunca cambien de signo los segundos, aunque sea necesario para ello que estos excedan de 60. Las primeras diferencias entre las coordinadas se dan en tipo pequeño y con su signo.

Inmediatamente por debajo de las tablas de ascensión recta y declinación se da:

- (I) La posición media, para 1986.5, de la estrella tabulada; en el caso de estrellas dobles, en las cuales se tiene en cuenta la órbita, se da la posición media de los componentes para los que vale la efeméride.

(II)  $\sec \delta$  y  $\tan \delta$  correspondientes a la posición media.

(III) Las cantidades  $d\alpha(\psi)$ ,  $d\alpha(\varepsilon)$ ,  $d\delta(\psi)$ ,  $d\delta(\varepsilon)$ , que se requieren para la aplicación de los términos de corto período de la nutación.

(IV) El día en que la estrella tiene dos pasos.

Para interpolar la ascensión recta y declinación para pasos intermedios por Greenwich, o pasos por otros meridianos, debe hacerse uso de las segundas diferencias. Con la siguiente notación

Argumento	Función	Diferencias	
0	$f_0$	$\Delta'_1$	$\Delta''_0$
1	$f_1$		$\Delta''_1$

debe usarse la fórmula de Bessel:

$$f_n = f_0 + n\Delta'_1 + B''_n (\Delta''_0 + \Delta''_1)$$

La Tabla VI (páginas 492-498) da directamente, con los argumentos factor de interpolación,  $n$ , y doble diferencia segunda,  $\Delta''_0 + \Delta''_1$ , el tercer término de la fórmula anterior; un ejemplo se da en la página XXXV. Para pasos intermedios por Greenwich el factor de interpolación siempre es de una décima exacta; los demás observatorios pueden construir fácilmente tablas especiales para los diez factores de interpolación que ellos necesitan. Obsérvese que  $\Delta''_0 + \Delta''_1$  puede obtenerse directamente de la diferencia entre las dos primeras diferencias  $\Delta'_1$  y  $\Delta'_2$ ; primeras diferencias adicionales se dan al principio y fin de año, para que  $\Delta''_0 + \Delta''_1$  pueda hallarse todo el año.

La corrección por el efecto de los términos de corto periodo de a nutación se obtiene por medio de las fórmulas

$$\begin{aligned} \Delta\alpha &= d\alpha(\psi) \cdot d\psi + d\alpha(\varepsilon) \cdot d\varepsilon && \text{segundos de tiempo} \\ \Delta\delta &= d\delta(\psi) \cdot d\psi + d\delta(\varepsilon) \cdot d\varepsilon && \text{segundos de arco} \end{aligned}$$

en las que  $d\psi$  y  $d\varepsilon$  son los términos de corto período de la nutación en longitud y oblicuidad  $\varepsilon$ , respectivamente, tabulados para cada día en la Tabla I (páginas 478-9), y

$$\begin{aligned} d\alpha(\psi) &= \frac{1}{15} (\cos \varepsilon + \sen \alpha \tan \delta \sen \varepsilon) && d\delta(\psi) = \cos \alpha \sen \varepsilon \\ d\alpha(\varepsilon) &= -\frac{1}{15} \cos \alpha \tan \delta && d\delta(\varepsilon) = \sen \alpha \end{aligned}$$

se hallan tabuladas bajo cada estrella. Todas estas cantidades se dan con el mismo número de decimales que a la ascensión recta y declinación corresponden.  $d\psi$  y  $d\varepsilon$  están dados con 0".001 a 0<sup>h</sup> E.T. La interpolación de estas dos cantidades es incómoda; por eso es mejor calcular primeramente ambos productos  $\Delta\alpha$  y  $\Delta\delta$  a 0<sup>h</sup> E.T. en dos días seguidos, y después interpolar  $\Delta\alpha$ ,  $\Delta\delta$  para el tiempo de paso. El momento de paso está aproximadamente dado por

$$\alpha + \lambda - \text{tiempo sidéreo a } 0^h$$

donde  $\lambda$  es la longitud geográfica; en la interpolación de  $\Delta\alpha$  y  $\Delta\delta$  basta, sin embargo, en la mayoría de los casos utilizar como valor de « $\alpha$ —tiempo sidéreo a 0<sup>h</sup>» el tiempo aproximado dado por la fracción de día en la columna U.T. de las efemérides de 10 días.

Ejemplo: cálculo de las correcciones  $\Delta\alpha$  y  $\Delta\delta$  para  $\alpha$  Cassiopeiae (Nr. 21), 1986, Enero 7.6.

De la pág. 10	$d\alpha(\psi) = +0.068$	$d\delta(\psi) = +0.39$
	$d\alpha(\varepsilon) = -0.099$	$d\delta(\varepsilon) = +0.17$

1986	De la páge 478		$d\alpha(\psi) \cdot d\psi$	$d\alpha(\epsilon) \cdot d\epsilon$	$\Delta\alpha$	$d\delta(\psi) \cdot d\psi$	$d\delta(\epsilon) \cdot d\epsilon$	$\Delta\delta$
	$d\psi$	$d\epsilon$						
Enero 7.0	-0".272	-0".048	-0.0188	+0.0048	-0.014	-0.108	-0.008	-0".12
8.0	-0.172	-0.097	-0.0117	+0.0096	-0.002	-0.067	-0.016	-0.08

Enero 7.6:  $\Delta\alpha = -0.007$        $\Delta\delta = -0".10$

*Posiciones aparentes de las estrellas circumpolares (páginas 372-475)*

Las posiciones aparentes de 52 estrellas circumpolares con declinaciones mayores de  $\pm 81^\circ$  se dan para cada paso superior por Greenwich en las páginas 372-475. Primero las estrellas septentrionales en la serie de su ascensión recta, después las meridionales. A cada estrella se dedican dos páginas, expresándose en ambas el nombre, magnitud, número en el catálogo y espectro. En la columna de la izquierda sólo se da el día del mes sin la fracción de día. La ascensión recta y declinación están referidas al ecuador y equinoccio verdaderos de la fecha e incluidos los términos de corto período de nutación. Para la ascensión recta se dan sólo dos cifras decimales de segundo. En el día del año en el cual se verifican dos pasos superiores en Greenwich, se dan ambos.

Los valores de  $\sec \delta$  y  $\tan \delta$  son para cada mes, referidos a la posición aparente a día 16° del mes; generalmente se pueden usar sin interpolación. Las notas al pie, repetidas en cada página, dan la ascensión recta y declinación medias y la fecha del doble paso inferior.

*Números diarios de Bessel (páginas 476-477)*

En estas páginas se dan los números diarios de Bessel para 12<sup>h</sup> tiempo sidéreo en Greenwich, sin los términos nutacionales de corto período. En intervalos de 10 días sidéreos son tabulados *A, B, C, D*, con 0".001 y *E* con 0.0001. Estos valores son los utilizados en el cálculo de las posiciones aparentes contenidas en este volumen. Se usan también en las reducciones de estrellas no fundamentales. La exclusión de los términos de la nutación de corto período, permite la interpolación exacta en intervalos de 10 días. Las variaciones por hora de *A, B, C, D*, son dadas con 0.0001; sirven para la interpolación de los números diarios en los tiempos de paso.

Desde 1960 las constantes de reducción están referidas al principio de año más próximo al instante considerado; el equinoccio al cual ellas están relacionadas está dado en la última columna de cada página. Su valor indica si deben utilizarse las posiciones medias del año en curso ó las del año siguiente para el cálculo de las posiciones aparentes. La magnitud  $\tau$  es la fracción de año trópico que hay desde el comienzo del año al cual se refieren las constantes de reducción. La variación de  $\tau$  por 1<sup>h</sup> es +0.00011.

La penúltima columna de la página de la derecha proporciona el Día Sidereo Greenwich correspondiente; los argumentos para los que se dan las constantes de reducción tabuladas son los días Sidereos de Greenwich, cuya parte entera sea múltiplo de 10 y corresponden a los argumentos para las efemérides de las estrellas.

*Tabla I (páginas 478-479)*

*Términos de corto período de la Nutación*

Esta tabla contiene para 0<sup>h</sup> E.T. en cada día los términos de corto período de nutación en longitud ( $d\psi$ ) y en oblicuidad ( $d\epsilon$ ), que son necesarios para la corrección de las posiciones aparentes de las estrellas de 10 días. Las fórmulas y bases numéricas según las

cuales han sido calculados estos términos de nutación están dados en el volumen *Improved Lunar Ephemeris* 1952-1959, páginas IX-X (1954). Un ejemplo del uso de esos valores se encuentra en la página XXXI.

Tabla II (páginas 480-483)

*Tiempo sidéreo á 0<sup>h</sup> T.U.*

En estas páginas se da á 0<sup>h</sup> T.U. para cada día sucesivo del año:

- (I) el tiempo sidéreo aparente (ó verdadero) á la 0<sup>o</sup>001
- (II) el tiempo sidéreo medio (ó uniforme), los segundos y decimales solamente, puesto que las horas y minutos son los mismos de la primera columna
- (III) los términos de largo período de nutación en ascensión recta («Equation of Equinoxes») á la 0<sup>o</sup>001
- (IV) los términos de corto período de nutación en ascensión recta («Equation of Equinoxes») á la 0<sup>o</sup>001

El tiempo sidéreo aparente es la suma de las otras tres columnas.

Tablas III y IV (páginas 484-489)

*Conversión de Tiempo solar medio a sidéreo y vice versa*

Estas tablas están basadas en las siguientes relaciones derivadas del valor del año trópico de Newcomb:

$$\begin{aligned} 1 \text{ día solar medio} &= 24^{\text{h}} 03^{\text{m}} 56^{\text{s}} 55536 \text{ de tiempo sidéreo medio} \\ 1 \text{ día sidéreo medio} &= 23^{\text{h}} 56^{\text{m}} 04^{\text{s}} 09054 \text{ de tiempo solar medio} \end{aligned}$$

La Tabla III da, con argumento tiempo solar medio, la cantidad que ha de *sumarse* al intervalo de tiempo solar para convertirlo en un intervalo equivalente de tiempo sidéreo medio; de igual manera la Tabla IV da, con argumento tiempo sidéreo medio, la cantidad que ha de *restarse* del intervalo de tiempo sidéreo para convertirlo en un intervalo equivalente de tiempo solar medio.

En el caso en que se usen estas Tablas para pasar de tiempo solar medio (o de T.U.) a tiempo sidéreo aparente, y se haya tomado de la Tabla II el tiempo sidéreo aparente a 0<sup>h</sup>, debe recordarse que ha de aplicarse una corrección por la variación de la nutación en ascensión recta entre 0<sup>h</sup> y el T.U. dado.

Así el tiempo sidéreo local aparente en San Fernando á T.U. 7<sup>h</sup> 21<sup>m</sup> 36<sup>s</sup> 572 en 11 de Enero de 1986 se obtiene de este modo:

Intervalo solar medio desde 0 <sup>h</sup>		7 <sup>h</sup> 21 <sup>m</sup> 36 <sup>s</sup> 572	
Correcciones al tiempo solar medio	}	+	1 12.445
para obtener el tiempo sidéreo		+	0.100
Tiempo sidéreo aparente a 0 <sup>h</sup> (Tabla II)		7 20	49.706
Variación de la nutación entre 0 <sup>h</sup> y 7 <sup>h</sup> (Tabla II)		+	0.002
Suma = tiempo sidéreo aparente en Greenwich		14 43	38.825
Longitud, San Fernando - Greenwich		+	0 24 49.300
Diferencia = tiempo sidéreo aparente en San Fernando		14 18	49.525

De igual manera se obtiene el T.U. en 11 de Enero de 1986 que corresponde a un tiempo sidéreo aparente en San Fernando de  $14^h 18^m 49^s 525$

Tiempo sidéreo aparente en San Fernando	$14^h 18^m 49^s 525$
Longitud, Greenwich — San Fernando	$- 0 24 49.300$
Diferencia = tiempo sidéreo aparente en Greenwich	$14 43 38.825$
Tiempo sidéreo aparente á 0 <sup>h</sup> (Tabla II)	$7 20 49.706$
Intervalo sidéreo	$7 22 49.119$
Correcciones al tiempo sidéreo para } obtener el tiempo solar medio } (Tabla IV)	$- 1 12.411$
Variación de la nutación entre 7 <sup>h</sup> y 0 <sup>h</sup> (Tabla II)	$- 0.134$
Suma = T.U. requerido	$7 21 36.572$

Tabla V (páginas 490—491)

*Conversión de horas, minutos y segundos a decimales de día*

Esta tabla no requiere explicación.

Tabla VI (páginas 492—498)

*Corrección por segundas diferencias*

Esta tabla da, con los argumentos factor de interpolación,  $n$ , y doble diferencia segunda,  $\Delta_0'' + \Delta_1''$ , la corrección por segunda diferencia. La corrección siempre es de signo contrario á  $\Delta_0'' + \Delta_1''$  y para hallarla es innecesaria una interpolación; la cantidad está tabulada en unidades del último orden de las de la función.

Se requiere por ejemplo la posición aparente de  $\beta$  Eridani (No. 188) al paso superior por Washington ( $\lambda = +5^h 8^m = +0^d 21$ ) el 17 de Abril de 1986 (fecha local).

Los pasos superiores tabulados para Greenwich lo están en Abril 10 y Abril 20, por ello el factor de interpolación es  $\frac{1}{10} (7 + 0.21) = 0.721$ . Refiriéndonos a la página 82, las dobles segundas diferencias en ascensión recta y declinación se ve que son +65 y +42 respectivamente, en unidades de la última cifra tabulada; y por tanto

$$\alpha = 5^h 7^m 9^s 176 + (-0^s 112) (0.721) - 0^s 003 = 9^s 092$$

$$\delta = -5^\circ 6' 14'' 35 + (+0'' 79) (0.721) - 0'' 02 = 13'' 80$$

Tabla VII (página 499)

*Aberración diurna*

Esta tabla da, con argumentos latitud,  $\varphi$ , y declinación,  $\delta$ , la corrección que debe aplicarse al tiempo del paso meridiano por efecto de la aberración diurna. Esta corrección (que está tabulada sin signo) debe *restarse* del tiempo observado del paso o *sumarse* a la ascensión recta de la estrella, para pasos superiores. Para pasos inferiores el signo de la corrección debe ser cambiado. Los valores se han calculado por la fórmula

$$\text{Aberración diurna} = 0^s 0213 \cos \varphi \sec \delta$$

*Indice de las Posiciones Aparentes de las Estrellas* (páginas 501—510)

El índice da a conocer la página en la cual se halla tabulada la posición aparente de cualquier estrella, con sólo conocer el nombre de ella. Con el fin de que el índice sea lo más completo posible, todos los nombres dados en este volumen a las estrellas se han incluido en él, los nombres alternos dados en «Notes on Stars» en la página XLVI se distinguen por un asterisco (\*) frente al número del catálogo. Precede al índice una lista de los nombres propios utilizados.

El método general de colocación y orden de las estrellas bajo cada encabezamiento, es fácil verlo por referencia en las páginas concernientes. Puesto que a todas las estrellas se les ha asignado un nombre de constelación, todas aparecen con el de una de las 88 constelaciones tipo (*Trans. I.A.U.* 4, 221, 1932), aun cuando su nombre principal aparezca también bajo una de las otras denominaciones.



## ВВЕДЕНИЕ

Настоящее издание, содержащее средние и видимые места 1535 звезд каталога *Fourth Fundamental Catalogue* (FK4)<sup>1</sup> на 1986 год, является результатом сотрудничества между *Astronomisches Rechen-Institut*, Гейдельберг, и *Bureau des Longitudes*, Париж. На сессии Международного Астрономического Союза (I. A. U.) в 1932 г. впервые обсуждался план о том, как избежать лишней работы при вычислении и опубликовании астрономических эфемерид. Возможность претворения этого плана в жизнь явилась в 1935 г., когда каталог FK3 был принят в качестве основы для положений звезд всех астрономических ежегодников. Таким образом возник ежегодник „Видимые места фундаментальных звезд”, объединяющий в одном томе видимые места всех фундаментальных звезд.<sup>2</sup>

В течение 1941 — 1959 гг. в вычислении содержащихся в этом томе астрономических эфемерид участвовали шесть крупных служб ежегодников. В 1955 г. на сессии МАС в Дублине было принято решение о новом распределении предварительных вычислений. При этом руководствовались идеей распределить однородные работы по возможности между немногими службами. На основе этого решения, начиная с 1960 г. *Astronomisches Rechen-Institut* в Гейдельберге несет ответственность за издание ежегодника „Видимые места фундаментальных звезд”. В этом институте вычисляются эфемериды всех 1483 десятидневных звезд каталога FK4. Видимые места 52 близполюсных звезд вычисляются *Bureau des Longitudes*.

Международное соглашение касается вычисления и издания различных национальных ежегодников, Эфемерид малых планет и Видимых мест фундаментальных звезд. Необходимые для этих ежегодников вычисления распределены между шестью эфемеридными службами в Вашингтоне, Гейдельберге, Ленинграде, Париже, Сан-Фернандо и Херстмонсу.

Данные ежегодника „Видимые места фундаментальных звезд” основаны на каталоге FK4. В общее число 1535 звезд, для которых даются средние и видимые места входят 873 звезды Auwers'a (в том числе 20 близполюсных звезд) и 662 дополнительных звезды (в том числе 32 близполюсных звезды).

В качестве постоянных прецессии, нутации и аберрации, используемых для приведения на видимое место, применяются значения, принятые на XII съезде МАС (Гамбург, сентябрь 1964, революция 4). Употребляемые редуцированные величины

<sup>1</sup> *Fourth Fundamental Catalogue* (FK4). *Veröffentlichungen des Astronomischen Rechen-Instituts Heidelberg* Nr. 10 (1963)

<sup>2</sup> Относительно деталей возникновения этого издания и содействия со стороны I.A.U. см *Transactions of the International Astronomical Union*, 4, 20, 222 (1932); 5, 29, 287, 370 (1935); 6, 357 (1938), где приводится подробный отчет об обстоятельствах возникновения настоящего издания.

опираются на рекомендации МАС и вычислены с помощью те же самых основных данных, что и редуцированные величины, опубликованные в ежегоднике *Astronomical Ephemeris* и других национальных ежегодниках.

Все объяснения, необходимые для пользования эфемерисами и таблицами приводятся в следующих разделах.

### Видимые места десятидневных звезд (стр. 1 — 371)

На страницах 1 — 371 приводятся видимые места 1483 звезд со склонениями от  $+ 81^{\circ}$  до  $- 81^{\circ}$  на момент каждой десятой верхней кульминации в Гриниче. Выбор дат определяется моментами, на которые даются редуцированные величины на страницах 476 — 477. (Звездные Гриничские даты, целая часть которых оканчивается на „0"). Начиная с 1960 г. интервал в 10 кульминаций будет непрерывно переходить на следующий год. Звезды (по четыре на одной странице) расположены в порядке их прямых восхождений на начало года.

Номер звезды, название, величина и спектр взяты из каталога FK4. Во всех случаях, когда название звезды не содержит названия созвездия (напр., звезды B. D.), последнее прибавляется; границы созвездий соответствуют *Délimitation Scientifique des Constellations* Дельпорта (Кембридж, 1930). Указаны наиболее принятые собственные имена некоторых ярких звезд; список этих собственных имен находится в оглавлении, на стр. 501. Некоторые двойные названия приводятся в списке „Notes on Stars”, стр. XLVI. Для двойных звезд указывается та точка системы, среднее место которой приводится в таблице, причем буква *p.* означает — preceding = предшествующая, *f.* — following = последующая. Звездочка за названием двойной звезды указывает на примечание в „Notes on Stars” стр. XLIV—XLV.

В столбце U. T. указывается приближенный момент кульминации всех приведенных на этой странице звезд. Что касается кульминаций на других, отличных от гриничского меридианах, то за этот момент можно принять местное среднее солнечное время. Время округляется на ближайшую десятую долю суток.

Прямые восхождения и склонения отнесены к истинному экватору и равноденствию даты, но без учета коротко-периодических членов нутации. Средние места звезд каталога FK4 — равно как и всех каталогов — не освобождены от постоянного абберационного члена. В соответствии с этим в приведение на видимое место не включен абберационный член, зависящий от эксцентриситета земной орбиты. Поправки за орбитальное движение учтены у семи двойных звезд. Значения этих приведений от центра тяжести к компонентам указываются на стр. XLIV. Начиная с 1960 г. влияние годичного параллакса будет учитываться у всех звезд, если параллакс согласно каталогу *General Catalogue of Trigonometric Stellar Parallaxes* (Yale 1952) равен или больше  $0.010$  (*Trans. I. A. U.* 7, 76, 82; 8, 67). Это касается 721 звезды; параллаксы взяты без изменений из столбца „Absolute  $\pi$ ”, Йельского каталога.

Часы и минуты прямых восхождений, а также градусы и минуты склонений, указанные в заголовках столбцов, выбраны так, чтобы секунды никогда не меняли

знака; вследствие этого число секунд может превышать 60. Первые разности координат печатаются мелким шрифтом с указанием знака.

Непосредственно под прямыми восхождениями и склонениями для каждой звезды указываются:

1. Среднее место 1986.5; для двойных звезд, у которых учтено орбитальное движение, дается среднее место компоненты, к которой относится эфемериды.
2.  $\sec \delta$  и  $\tan \delta$ , соответствующие среднему месту.
3. Величины  $d\alpha(\psi)$ ,  $d\alpha(\epsilon)$ ,  $d\delta(\psi)$ ,  $d\delta(\epsilon)$ , необходимые для вычисления коротко-периодических членов нутации.
4. Дата двойной кульминации.

При интерполяции звездных мест на промежуточные моменты кульминации и на кульминации на меридианах, отличных от гриничского, необходимо учитывать вторые разности. Рекомендуется пользоваться обозначениями

Аргумент	Функция	Разности
0	$f_0$	$\Delta'_0$ $\Delta''_0$
1	$f_1$	$\Delta'_1$ $\Delta''_1$

согласно формуле Бесселя:

$$f_n = f_0 + n\Delta'_1 + B''_n (\Delta''_0 + \Delta''_1)$$

Таблица VI (стр. 492 — 498) дает непосредственно, для аргументов интерполяционного множителя  $n$  и удвоенной второй разности  $\Delta''_0 + \Delta''_1$ , третий член вышеуказанной формулы; пример приводится на стр. XLII. Для промежуточных кульминаций в Гриниче интерполяционный множитель всегда выражается точно в десятых долях; другие обсерватории легко могут построить таблицы для требующихся им десяти интерполяционных множителей. Следует отметить, что  $\Delta''_0 + \Delta''_1$  можно получить непосредственно в виде разности между двумя первыми разностями  $\Delta'_1$  и  $\Delta'_0$ ; в начале и в конце года даются дополнительные первые разности, так что  $\Delta''_0 + \Delta''_1$  можно определять этим способом во всех случаях.

Поправка за влияние коротко-периодических членов нутации вычисляется при помощи формул

$$\begin{aligned} \Delta\alpha &= d\alpha(\psi) \cdot d\psi + d\alpha(\epsilon) \cdot d\epsilon && \text{в сек. времени} \\ \Delta\delta &= d\delta(\psi) \cdot d\psi + d\delta(\epsilon) \cdot d\epsilon && \text{в сек. дуги} \end{aligned}$$

$d\psi$  и  $d\epsilon$  (коротко-периодические члены нутации по долготе и наклонности) табулированы на каждый день в табл. I (стр. 478 — 479).

$$\begin{aligned} d\alpha(\psi) &= \frac{1}{15} (\cos \epsilon + \sin \alpha \tan \delta \sin \epsilon) && d\delta(\psi) = \cos \alpha \sin \epsilon \\ d\alpha(\epsilon) &= -\frac{1}{15} (\cos \alpha \tan \delta) && d\delta(\epsilon) = \sin \alpha \end{aligned}$$

находятся для каждой звезды под эфемеридой. Они даются с тем же самым числом десятичных знаков, что и соответствующие видимые прямые восхождения и склонения.  $d\psi$  и  $d\epsilon$  даются с точностью до 0.001 для 0<sup>h</sup> Е. Т. (эфемеридное время). Интерполяция этих величин неудобна; поэтому рекомендуется сначала вычислять оба

произведения  $\Delta\alpha$  и  $\Delta\delta$  для  $\alpha^b$  Е. Т. двух последовательных суток, а затем интерполировать  $\Delta\alpha$ ,  $\Delta\delta$  на момент кульминации. Приближенный момент кульминации

$$\alpha + \lambda - \text{звездное время в } \alpha^b$$

причем  $\lambda$  — долгота; при интерполяции  $\Delta\alpha$  и  $\Delta\delta$  все же достаточно, в большинстве случаев, для „ $\alpha$  — звездное время в  $\alpha^b$ ” пользоваться значением, которое дается как дробь суток в столбце У. Т.

В качестве примера рассмотрим вычисление поправок  $\Delta\alpha$  и  $\Delta\delta$  для  $\alpha$  Cassiopeiae (№ 21) на январь 7.6, 1986 г.

$$\begin{aligned} \text{Стр. 10} \quad d\alpha(\psi) &= +0.068 & d\delta(\psi) &= +0.39 \\ d\alpha(\epsilon) &= -0.099 & d\delta(\epsilon) &= +0.17 \end{aligned}$$

1986	Стр 478		$d\alpha(\psi) \cdot d\psi$	$d\alpha(\epsilon) \cdot d\epsilon$	$\Delta\alpha$	$d\delta(\psi) \cdot d\psi$	$d\delta(\epsilon) \cdot d\epsilon$	$\Delta\delta$
	$d\psi$	$d\epsilon$						
янв. 7.0	-0".272	-0".048	-0.0188	+0.0048	-0.014	-0.108	-0.008	-0".12
8.0	-0.172	-0.097	-0.0117	+0.0096	-0.002	-0.067	-0.016	-0.08
	янв. 7.6:		$\Delta\alpha = -0.007$		$\Delta\delta = -0".10$			

Видимые места близполюсных звезд (стр. 372 — 475)

На стр. 372 — 475 даются видимые места 52 близполюсных звезд со склонениями, большими  $\pm 81^\circ$ , для каждой верхней кульминации в Гриниче. Сначала даются северные близполюсные звезды в порядке прямого восхождения, а за ними следуют южные звезды. На каждую звезду отводятся две смежные страницы, причем название, номер по каталогу, величина и спектр повторяются на обеих страницах. В левом столбце дается только день месяца без дроби суток. Прямое восхождение и склонение отнесены к истинному экватору и истинному равноденствию даты, причем коротко-периодические члены нутации включены в координаты. Прямые восхождения даются лишь с двумя десятичными знаками. Для суток с двойной кульминацией приводятся обе кульминации.

Значения  $\sec \delta$  и  $\tan \delta$  даются для каждого месяца и относятся строго к видимому месту на 16-ое число каждого месяца; обычно ими можно пользоваться без интерполяции. На последней строке каждой страницы приводятся среднее прямое восхождение и склонение для начала года и дата двойной нижней кульминации.

Редукционные величины (стр. 476 — 477)

На этих страницах даются редукционные величины Бесселя для  $12^b$  звездного времени в Гриниче без коротко-периодических членов нутации. С интервалом 10 звездных суток табулированы  $A, B, C, D$ , до 0".001,  $E$  до 0".0001. Эти значения нужны для вычисления эфемерид нефундаментальных звезд. Коротко-периодические члены нутации исключены для возможности точного интерполирования внутри 10-дневного интервала. Часовые изменения  $A, B, C, D$  даются до 0".0001; они служат для интерполяции редукционных величин на момент кульминации.

Начиная с 1960 г. редукционные величины относятся к ближайшему началу года; соответствующее равноденствие указывается на каждой странице в последнем столбце. В соответствии с этим при вычислении видимого места пользуются средним местом на начало либо текущего, либо следующего года. Величина  $\tau$  означает дробь тропического года, считаемую от начала года, к которой относятся соответствующие редукционные величины. Часовое изменение  $\tau$  составляет  $+0.00011$ .

В предпоследнем столбце правой страницы дается звездная гринвичская дата (Greenwich Sidereal Date); в качестве аргумента табличных значений редуцированных величин выбраны звездные гринвичские даты, целая часть которых оканчивается на „0”. Такой выбор определяет аргументы 10-дневных эфемерид.

## Таблица I (стр. 478 — 479)

## Коротко-периодические члены нутации

В этой таблице даются для  $\text{о}^h$  Е. Т. (эфемеридное время) каждого дня коротко-периодические члены нутации по долготе ( $d\psi$ ) и по наклонности ( $d\epsilon$ ), необходимые для вычисления поправок видимых мест десятидневных звезд. Формулы и численные постоянные, с помощью которых они вычислены, даны в *Improved Lunar Ephemeris 1952 — 1959*, стр. IX — X (1954). Пример пользования этими значениями приводится на стр. XXXVIII.

## Таблица II (стр. 480 — 483)

Звездное время в  $\text{о}^h$  У. Т.

На этих страницах даны на  $\text{о}^h$  каждых суток года:

- (1) видимое (или истинное) звездное время до  $\text{о}^{\circ}001$
- (2) среднее (или равномерное) звездное время, причем даются только секунды и десятые секунды, т. е. часы и минуты остаются те же, что и в первом столбце
- (3) долго-периодические члены нутации по прямому восхождению (*equation of equinoxes*) до  $\text{о}^{\circ}001$
- (4) коротко-периодические члены нутации по прямому восхождению (*equation of equinoxes*) до  $\text{о}^{\circ}001$ .

Видимое звездное время теоретически представляет собою сумму остальных трех столбцов, хотя расхождения в последнем знаке могут иметь место.

## Таблицы III и IV (стр. 484 — 489)

## Перевод среднего солнечного в звездное время

## Перевод звездного в среднее солнечное время

Эти таблицы основаны на следующих соотношениях, выведенных из значений Ньюкома для тропического года:

- 1 средние солнечные сутки =  $24^h 03^m 56^s 55536$  среднего звездного времени
- 1 средние звездные сутки =  $23^h 56^m 04^s 09054$  среднего солнечного времени

Таблица III с аргументом среднее солнечное время дает величину, которую надо прибавить к интервалу солнечного времени, чтобы перевести его в соответствующий интервал среднего звездного времени; подобно этому, таблица IV с аргументом среднее звездное время дает величину, которую надо вычесть из интервала звездного времени, чтобы перевести его в соответствующий интервал среднего солнечного времени.

При пользовании этими таблицами для перехода от среднего солнечного времени или от Всемирного времени к видимому звездному времени, и обратно, следует помнить, что необходимо прибавить поправку за изменение нутации по прямому восхождению между  $\text{о}^h$  и заданным всемирным временем.

Так, местное видимое звездное время в Пулкове, в  $7^{\text{h}} 21^{\text{m}} 36^{\text{s}}.572$  всемирного времени 11-го января 1986 г. получается следующим образом:

Интервал среднего солнечного времени от $0^{\text{h}}$	$7^{\text{h}} 21^{\text{m}} 36^{\text{s}}.572$
Поправка к среднему солнечному времени для перехода к звездному времени (Табл. III)	+ 1 12.445
Видимое звездное время в $0^{\text{h}}$ (Табл. II)	+ 7 20 49.706
Изменение нутации от $0^{\text{h}}$ до $7^{\text{h}}$ (Табл. II)	+ 0.002
Сумма = Гриничское видимое звездное время	14 43 38.825
Долгота Пулково — Гринич	- 2 1 18.570
Равность = Пулковское видимое звездное время	16 44 57.395

Подобно этому, всемирное время 10 января 1984 года, соответствующее местному звездному времени в Пулкове  $16^{\text{h}} 44^{\text{m}} 57^{\text{s}}.395$  получается следующим образом:

Пулковское видимое звездное время	$16^{\text{h}} 44^{\text{m}} 57^{\text{s}}.395$
Долгота Гринич — Пулково	+ 2 1 18.570
Равность = Гриничское видимое звездное время	14 43 38.825
Видимое звездное время в $0^{\text{h}}$ (Табл. II)	7 20 49.706
Звездный интервал	7 22 49.119
Поправки к звездному времени для получения среднего солнечного времени (Табл. IV)	- 1 12.411
Изменение нутации от $7^{\text{h}}$ до $0^{\text{h}}$ (Табл. II)	- 0.134
Сумма = искомое всемирное время	- 0.002
	7 21 36.572

#### Таблица V (стр. 490 — 491)

Перевод часов, минут и секунд в доли суток

Эта таблица не требует пояснений.

#### Таблица VI (стр. 492 — 498)

##### Поправки за вторые разности

Эта таблица с аргументами: интерполяционный множитель  $n$  и удвоенная вторая разность  $\Delta_0'' + \Delta_1''$ , дает поправки, которые следует прибавить к значению, полученному при линейной интерполяции. Поправка дается в единицах последнего знака функции и всегда имеет знак, противоположный знаку величины  $\Delta_0'' + \Delta_1''$ .

Для примера вычислим видимое положение  $\beta$  Eridani (№ 188) в момент верхней кульминации в Вашингтоне ( $\lambda = +5^{\text{h}} 08^{\text{m}} = +0^{\text{s}}.21$ ) 17 апреля 1986 года (местная дата).

Эфемерида дает верхние кульминации в Гриниче на 10 и 20 апреля, так что интерполяционный множитель равен  $\frac{1}{10} (7 + 0.21) = 0.721$ . Обращаясь к стр. 82, находим, что удвоенные вторые разности по прямому восхождению и склонению равны соответственно + 65 и + 42 в единицах последнего знака; таким образом

$$\alpha = 5^{\text{h}} 07^{\text{m}} 09^{\text{s}}.176 + (-0^{\text{s}}.112) (0.721) - 0^{\text{s}}.003 = 09^{\text{s}}.092$$

$$\delta = -5^{\circ} 06' 14''.35 + (+0''.79) (0.721) - 0''.02 = 13''.80$$

#### Таблица VII (стр. 499)

##### Суточная абберация

Эта таблица с аргументами: широта  $\varphi$  и склонение  $\delta$ , дает поправку, которую необходимо прибавить к моменту кульминации, чтобы учесть суточную абберацию.

Эта поправка (которая дается без знака) вычитается из наблюденного времени кульминации или же прибавляется к прямому восхождению звезды в случае верхних кульминаций. В случае нижних кульминаций знак поправок меняется на обратный. Значения вычислены по формуле

$$\text{Суточная аберрация} = 0^{\circ}0213 \cos \varphi \sec \delta$$

#### Указатель к видимым местам звезд (стр. 501 — 510)

Этот указатель позволяет найти страницу, на которой помещается видимое место какой-нибудь звезды, по ее названию. Чтобы сделать указатель как можно более полным, в него были включены все названия звезд, встречающиеся в этом издании, причем двойные названия, даваемые в „Notes on Stars” на стр. XLVI, отмечаются звездочками против номера по каталогу. В начале указателя дается список собственных имен звезд.

Общий метод расположения и порядок, в каком звезды следуют под каждым заголовком, легко усматривается из соответствующих страниц. Так как для всех звезд прибавлено название созвездия, то все они встречаются под одним из 88 названий созвездий (*Trans. I. A. U.* 4, 221, 1932), хотя главное их название может находиться под одним из других заголовков.

## COMPONENTS OF DOUBLE STARS, CORRECTIONS FOR ORBITAL MOTION

For seven double-star systems the FK4 gives the positions and proper motions of the centre of gravity; cf. *Veröffentlichungen des Astronomischen Rechen-Instituts Heidelberg* No. 10, p. 125. In producing the ephemerides of these stars the reductions from the centre of gravity to the components have been computed from the orbital elements and mass-ratios quoted in the following table. These reductions include the secular changes of the elements caused by precession and, in the case of the stars 538 and 793, by the space motion of the binary system. For the star 339 the meridian observations and, consequently, the ephemeris on page 140 refer not to the A-component (mass-ratio  $f = 0.375$ ) but to the centre of the integrated light (c. l.,  $f = 0.24$ ). For the double star No. 462  $\alpha$  Crucis, which has so far no detectable curvature of orbit, the FK4 gives the mean place and proper motion of the brighter component (1<sup>m</sup>6). The transition from the apparent place of this A-component to the B-component (2<sup>m</sup>1) has to be made by means of a linear formula.

The following tables contain the data on components and ephemerides of these eight double stars.

## Components, whose ephemerides are given in APFS

## Reductions from the centre of gravity (FK4) to the component

No	Name	Magni- tude	Reduction component minus c. g. 1986.0 1987.0		Elements	Mass- ratio $f =$ $\frac{M_B}{M_A + M_B}$
			R. A.	Dec.		
257	$\alpha$ Canis Majoris A	-1 <sup>m</sup> 6	-0 <sup>s</sup> 074 -0.057	- 1 <sup>''</sup> 88 - 1.72	Volet 1931	0.282
287	$\alpha$ Geminorum A	2.0	-0.104 -0.106	- 0.21 - 0.26	Rabe 1957	0.50
291	$\alpha$ Canis Minoris A	0.5	+0.001 -0.010	- 1.38 - 1.38	Strand 1951	0.268
339	Bradley 1268 Lyncis c. l.	4.1	+0.006 +0.007	- 0.11 - 0.08	Baize 1954	0.24
538	$\alpha$ Centauri A	0.3	+0.693 +0.693	+ 7.98 + 7.84	Heintz 1959	0.449
616	$\alpha$ Scorpii A	1.2	+0.028 +0.028	- 0.04 - 0.04	Heintz 1959	0.152
793	61 Cygni A	5.6	-0.668 -0.666	+12.11 +12.16	Strand 1952	0.487



Reduction from A-component to B-component

No	Name	Magni- tude	B - A		Position angle P and Distance d of the B-component	
			1986.0		1986.0	
			1987.0		1987.0	
			R. A.	Dec.	P	d
287	$\alpha$ Geminorum B	2 <sup>m</sup> .8	+0 <sup>s</sup> .207 +0.212	+ 0 <sup>''</sup> .42 + 0.52	81 <sup>o</sup> 79	2 <sup>''</sup> .7 2.8
462	$\alpha$ Crucis B	2.1	+0.545 +0.544	- 1.60 - 1.60	113 113	4.0 4.0
538	$\alpha$ Centauri B	1.7	-1.543 -1.544	-17.78 -17.45	212 213	21.1 20.8
616	$\alpha$ Scorpii B	5.2	-0.186 -0.184	+ 0.26 + 0.26	276 276	2.5 2.5
793	61 Cygni B	6.3	+1.379 +1.369	-24.87 -24.98	147 147	29.6 29.7

NOTES ON DOUBLE STARS

MAGNITUDE, POSITION ANGLE P AND DISTANCE d OF THE COMPANION

No.	Magn.	P	d	No.	Magn	P	d	No.	Magn.	P	d
37	9 <sup>m</sup> 0	254 <sup>o</sup>	17 <sup>''</sup>	335	8 <sup>m</sup> .8	24 <sup>o</sup>	5 <sup>''</sup>	1421	6 <sup>m</sup> .5	12 <sup>o</sup>	29 <sup>''</sup>
1033	6.5	63	23	1233	7.0	75	40	1424	5.2	11	103
61	8.3	30	4.7	1241	9.4	147	18	1426	6.4	319	23
73	5.1	63	10	402	6.6	105	52	1428	8.5	19	34
1072	9.6	83	8	428	5.4	166	0.4	1436	9.3	90	23
1078	9.0	192	12	431	8.0	94	5	641	8.1	278	10
105	9.8	230	4.8	1296	7.9	150	29	670	6.1	15	30
106	4.4	89	8	458	8.0	259	11	683	9.2	105	4
122	9.0	161	2.4	473	6.7	271	20	686	8.6	154	3.5
147	7.9	9	9	1334	9.0	294	23	707	7.6	330	34
165	6.6	308	10	485	5.4	228	20	709	5.4	104	22
172	7.0	1	1.1	490	8.2	341	7	1497	9.1	344	14
1141	8.2	27	12	1347	6.5	343	60	720	6.2	122	0.4
191	8.7	130	20	497	4.0	150	15	1502	7.1	77	28
204	7.5	347	2.6	1354	9.7	353	31	1504	6.9	239	70
209	7.3	142	11	518	4.3	258	1.3	732	5.4	54	35
1167	7.0	217	11	1367	9.5	45	18	736	9.1	166	2.7
244	6.5	27	13	528	7.5	33	38	759	8.0	122	7
1189	5.8	299	14	532	9.4	280	4.2	1541	5.5	269	10
279	8.5	224	6	533	9.5	110	5	1551	9.3	353	20
280	6.5	315	15	539	8.8	235	16	1560	8.4	301	48
294	8.5	237	7	1391	8.9	300	20	809	7.8	250	14
309	4.8	220	41	1398	6.0	144	27	813	7.5	120	12
1221	7.9	87	41	1401	7.6	170	13	847	6.6	192	41
328	6.6	307	31	568	6.7	171	109	1592	7.8	172	30
1231	6.3	149	67	597	5.1	23	13	900	9.0	280	1.5

No.	Name	No.	Name	No.	Name
30	19 Ceti	315	$\varepsilon$ Argus	485	12 Canum Venaticorum <sup>f</sup>
52	v Persei	324	e Velorum	492	43 Comae Berenices
77	6 Persei	1227	o Argus	506	i Centauri
119	e Eridani	336	c Carinae	511	i Draconis
125	f Tauri	339	10 Ursae Majoris	522	d Bootis
130	y Eridani	342	c Velorum	544	c <sup>1</sup> Centauri
138	5 H. Camelopardi	345	$\lambda$ Argus	546	b Lupi
143	g Eridani	348	$\beta$ Argus	548	$\alpha$ Librae
152	c Persei	351	t Argus	556	$\gamma$ Scorpii
178	9 Camelopardi	352	40 Lyncis	579	3 H. Scorpii
182	10 Camelopardi	353	$\kappa$ Argus	624	24 Scorpii
244	8 Monocerotis	355	h Ursae Majoris	646	d Ophiuchi
245	$\alpha$ Argus	357	d Ursae Majoris	650	x Herculis
252	v Argus	375	$\varphi$ Argus	659	f Draconis
263	$\tau$ Argus	382	q Velorum	696	2 H. Scuti
1187	22 Monocerotis	385	$\omega$ Argus	702	5 H. Scuti
278	$\pi$ Argus	390	31 Leonis Minoris	710	$\xi$ Sagittarii
1194	$\sigma$ Argus	393	s Carinae	722	d Sagittarii
290	f Puppis	397	p Carinae	736	h Sagittarii
293	26 Monocerotis	402	x Velorum	753	c Sagittarii
1204	$\xi$ Argus	406	$\theta$ Argus	757	31 Cygni
301	a Puppis	409	l Leonis	801	4 Piscis Austrini
303	$\chi$ Argus	415	i Velorum	807	g Cygni
306	$\zeta$ Argus	419	$\chi$ Hydrae	844	3 Lacertae
308	t Navis	454	4 H. Draconis	848	7 Lacertae
309	$\gamma$ Argus	470	8 Canum Venaticorum	873	c <sup>2</sup> Aquarii
311	20 Navis	1328	d <sup>2</sup> Virginis		
313	q Puppis	482	n Centauri		

# APPARENT PLACES OF STARS, 1986

1

## AT UPPER TRANSIT AT GREENWICH

No.	904		1630		905		1001	
	9 Octantis		30 Piscium		2 Ceti		45 G. Tucanae	
Mag.Spect.	4.73	K0	4.66	M3	4.62	A0	5.64	B9
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	0 00	-77 08	0 01	- 6 05	0 03	-17 24	0 03	-71 30
1	0.7	54 826 - 871	13 906 - 101	37 40 - 68	00 869 - 110	60 65 - 69	60 106 - 576	77 56 - 2
1	0.7	53 980 - 846	13 806 - 100	38 00 - 60	00 761 - 108	61 15 - 50	59 546 - 560	76 98 + 58
1	10.7	53 173 - 807	13 709 - 97	38 52 - 52	00 655 - 106	61 45 - 30	59 010 - 536	75 83 +115
1	20.7	52 439 - 734	13 620 - 89	38 93 - 41	00 559 - 96	61 51 - 6	58 521 - 489	74 08 +175
1	30.6	51 799 - 640	13 543 - 77	39 20 - 27	00 476 - 83	61 34 + 17	58 094 - 427	71 84 +224
2	9.6	51 259 - 540	13 480 - 63	39 33 - 13	00 408 - 68	60 94 + 40	57 733 - 361	69 16 +268
2	19.6	50 848 - 411	13 439 - 41	39 27 + 6	00 363 - 45	60 29 + 65	57 458 - 275	66 07 +309
3	1.6	50 570 - 278	13 424 + 15	39 02 + 25	00 344 - 19	59 40 + 89	57 273 - 185	62 71 +336
3	11.5	50 426 - 144	13 439 + 15	38 58 + 44	00 354 + 10	58 28 +112	57 181 - 92	59 11 +360
3	21.5	50 437 + 11	13 484 + 45	37 94 + 64	00 400 + 46	56 89 +139	57 196 + 15	55 36 +375
3	31.5	50 591 + 154	13 568 + 84	36 96 + 98	00 483 + 83	55 28 +161	57 313 + 117	51 57 +379
4	10.4	50 891 + 300	13 693 + 125	35 78 +118	00 606 + 123	53 46 +182	57 534 + 221	47 78 +379
4	20.4	51 342 + 451	13 858 + 165	34 35 +143	00 772 + 166	51 45 +201	57 863 + 329	44 09 +369
4	30.4	51 922 + 580	14 061 + 203	32 73 +162	00 975 + 203	49 31 +214	58 286 + 423	40 58 +351
5	10.4	52 632 + 710	14 300 + 239	30 91 +182	01 216 + 241	47 05 +226	58 804 + 518	37 30 +328
5	20.3	53 457 + 825	14 571 + 271	28 94 +197	01 491 + 275	44 72 +233	59 407 + 603	34 36 +294
5	30.3	54 370 + 913	14 865 + 294	26 87 +207	01 790 + 299	42 40 +232	60 074 + 667	31 80 +256
6	9.3	55 363 + 993	15 179 + 314	24 73 +214	02 111 + 321	40 11 +229	60 801 + 727	29 67 +213
6	19.3	56 405 +1042	15 504 + 325	22 59 +214	02 444 + 333	37 94 +217	61 564 + 763	28 04 +163
6	29.2	57 465 +1060	15 830 + 326	20 50 +209	02 779 + 335	35 92 +202	62 342 + 778	26 93 +111
7	9.2	58 529 +1064	16 151 + 321	18 51 +199	03 110 + 331	34 10 +182	63 123 + 781	26 37 + 56
7	19.2	59 554 +1025	16 457 + 306	16 67 +184	03 427 + 317	32 55 +155	63 876 + 753	26 40 - 3
7	29.1	60 516 + 962	16 741 + 284	15 04 +163	03 723 + 296	31 27 +128	64 585 + 709	26 96 - 56
8	8.1	61 392 + 876	16 999 + 258	13 62 +142	03 992 + 269	30 31 + 96	65 232 + 647	28 07 -111
8	18.1	62 144 + 752	17 222 + 223	12 47 +115	04 225 + 233	29 70 + 61	65 791 + 559	29 69 -162
8	28.1	62 759 + 615	17 410 + 188	11 59 + 88	04 422 + 197	29 40 + 30	66 253 + 462	31 72 -203
9	7.0	63 217 + 458	17 559 + 149	10 98 + 61	04 579 + 157	29 43 - 3	66 604 + 351	34 14 -242
9	17.0	63 496 + 279	17 668 + 109	10 65 + 33	04 693 + 114	29 76 - 33	66 828 + 224	36 84 -270
9	27.0	63 600 + 104	17 740 + 72	10 56 + 9	04 768 + 75	29 76 - 58	66 828 + 102	36 84 -285
10	7.0	63 521 - 79	17 775 + 35	10 70 - 14	04 804 + 36	31 14 - 80	66 904 - 26	42 63 -294
10	16.9	63 262 - 269	17 777 + 2	11 04 - 34	04 804 + 0	32 11 - 97	66 752 - 152	45 50 -287
10	26.9	62 846 - 416	17 753 - 24	11 52 - 48	04 776 - 28	33 17 -106	66 493 - 259	48 18 -268
11	5.9	62 281 - 565	17 704 - 49	12 13 - 61	04 720 - 56	34 30 -113	66 130 - 363	50 60 -242
11	15.8	61 595 - 686	17 636 - 68	12 82 - 69	04 644 - 76	35 40 -110	65 685 - 445	52 61 -201
11	25.8	60 822 - 773	17 555 - 81	13 53 - 71	04 554 - 90	36 44 -104	65 179 - 506	54 14 -153
12	5.8	59 979 - 843	17 462 - 93	14 26 - 73	04 452 - 102	37 39 - 95	64 625 - 554	55 15 -101
12	15.8	59 110 - 869	17 365 - 97	14 95 - 69	04 346 - 106	38 17 - 78	64 052 - 573	55 54 - 39
12	25.7	58 242 - 868	17 266 - 99	15 59 - 64	04 237 - 109	38 79 - 62	63 478 - 574	55 35 + 19
12	35.7	57 396 - 846	17 167 - 99	16 17 - 58	04 130 - 107	39 21 - 42	62 918 - 560	54 54 + 81
		57 396 - 783	17 167 - 92	16 17 - 46	04 130 - 101	39 21 - 19	62 918 - 521	54 54 +141
Mean Place	55 033	24 50	16 092	20 64	02 942	39 93	60 867	43 36
sec δ, tan δ	+4.493	-4.380	+1.006	-0.107	+1.048	-0.314	+3.154	-2.991
dα(ψ), dδ(ψ)	+0.061	+0.40	+0.061	+0.40	+0.061	+0.40	+0.060	+0.40
dα(ε), dδ(ε)	+0.292	+0.00	+0.007	+0.01	+0.021	+0.01	+0.199	+0.02
Dble.Trans.	September 21		September 21		September 22		September 22	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1002		1003		1		2		
	33 Piscium		9 G. Ceti		α Andromedae		β Cassiopeiae		
Mag. Spect.	4.68	K0	6.06	F0	2.15	A0p	2.42	F5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	0 04	- 5 46	0 06	- 23 10	0 07	+ 29 00	0 08	+ 59 04	
1 <sup>d</sup>	-9.2	36.519 -100	75.65 -68	06.719 -119	79.42 -70	38.810 -130	53.23 -27	24.124 -304	34.80 +41
1 <sup>s</sup>	0.7	36.419 -100	76.25 -60	06.603 -116	79.85 -116	38.678 -132	52.67 -56	23.811 -313	34.68 -12
1	10.7	36.321 -98	76.78 -53	06.489 -114	80.03 -18	38.543 -135	51.82 -85	23.495 -316	34.02 -66
1	20.7	36.230 -91	77.20 -42	06.385 -104	79.92 +11	38.415 -128	50.69 -113	23.191 -304	32.83 -119
1	30.6	36.150 -80	77.48 -28	06.294 -91	79.53 +39	38.299 -116	49.37 -132	22.913 -278	31.18 -165
2	9.6	36.084 -66	77.63 -15	06.219 -75	78.87 +66	38.199 -100	47.88 -149	22.668 -245	29.13 -206
2	19.6	36.040 -44	77.58 -44	06.168 -51	77.92 +95	38.125 -74	46.31 -157	22.475 -193	26.76 -237
2	1.6	36.021 -19	77.35 +23	06.143 -25	76.71 +121	38.082 -43	44.73 -158	22.342 -133	24.19 -257
3	11.5	36.032 +11	76.93 +42	06.148 +5	75.24 +147	38.075 -7	43.20 -153	22.277 -65	21.51 -268
3	21.5	36.074 +42	76.31 +62	06.191 +43	73.52 +172	38.111 +36	41.82 -138	22.292 +15	18.85 -266
3	31.5	36.153 +79	75.35 +96	06.271 +80	71.59 +193	38.191 +80	40.66 -116	22.385 +93	16.34 -251
4	10.5	36.274 +121	74.17 +118	06.392 +121	69.46 +213	38.318 +127	39.76 -90	22.559 +174	14.03 -231
4	20.4	36.436 +162	72.77 +140	06.557 +165	67.17 +229	38.495 +177	39.21 -55	22.813 +254	12.08 -195
4	30.4	36.635 +199	71.16 +161	06.762 +205	64.78 +239	38.715 +220	39.02 -19	23.138 +325	10.53 -155
5	10.4	36.871 +236	69.35 +181	07.005 +243	62.30 +248	38.976 +261	39.21 +19	23.527 +389	09.42 -111
5	20.3	37.139 +288	67.38 +197	07.283 +278	59.82 +248	39.273 +297	39.82 +61	23.971 +444	08.85 -57
5	30.3	37.432 +293	65.31 +207	07.587 +304	57.38 +213	39.596 +323	40.80 +98	24.453 +482	08.79 -6
6	9.3	37.744 +312	63.17 +214	07.914 +327	55.03 +235	39.939 +343	42.14 +134	24.963 +510	09.26 +47
6	19.3	38.068 +324	61.02 +215	08.255 +341	52.84 +219	40.293 +354	43.83 +169	25.486 +523	10.27 +101
6	29.2	38.394 +326	58.93 +209	08.598 +343	50.86 +198	40.646 +353	45.78 +195	26.005 +519	11.75 +148
7	9.2	38.715 +321	56.92 +201	08.939 +341	49.13 +173	40.993 +347	47.98 +220	26.513 +508	13.69 +194
7	19.2	39.022 +307	55.06 +186	09.266 +327	47.72 +141	41.322 +329	50.36 +238	26.991 +478	16.05 +236
7	29.2	39.308 +286	53.40 +166	09.572 +306	46.64 +108	41.627 +305	52.85 +249	27.431 +440	18.74 +269
8	8.1	39.568 +260	51.96 +144	09.851 +279	45.90 +74	41.903 +276	55.42 +257	27.826 +395	21.73 +299
8	18.1	39.794 +226	50.78 +118	10.094 +243	45.55 +35	42.142 +239	57.99 +257	28.164 +338	24.94 +321
8	28.1	39.984 +190	49.87 +91	10.299 +205	45.54 +1	42.343 +201	60.51 +252	28.444 +280	28.29 +335
9	7.0	40.137 +153	49.23 +64	10.463 +164	45.88 -34	42.503 +160	62.96 +245	28.663 +219	31.75 +346
9	17.0	40.249 +112	48.88 +35	10.583 +120	46.54 -66	42.621 +118	65.26 +230	28.814 +151	35.22 +347
9	27.0	40.325 +76	48.76 +12	10.662 +79	47.45 -91	42.701 +80	67.39 +213	28.904 +90	38.63 +341
10	7.0	40.364 +39	48.88 -12	10.700 +38	48.58 -113	42.742 +41	69.34 +195	28.931 +27	41.95 +332
10	16.9	40.370 +6	49.20 -32	10.700 +0	49.85 -127	42.747 +5	71.03 +169	28.897 -34	45.06 +311
10	26.9	40.349 -21	49.67 -47	10.669 -31	51.20 -135	42.722 -25	72.49 +146	28.810 -87	47.93 +287
11	5.9	40.303 -46	50.27 -60	10.610 -59	52.58 -138	42.669 -53	73.68 +119	28.669 -141	50.51 +258
11	15.9	40.238 -65	50.94 -67	10.529 -81	53.89 -131	42.592 -77	74.55 +87	28.669 -188	52.68 +217
11	25.8	40.159 -79	51.64 -70	10.432 -97	55.09 -120	42.497 -95	75.15 +60	28.481 -225	54.45 +177
12	5.8	40.068 -91	52.37 -73	10.322 -110	56.14 -105	42.386 -111	75.41 +26	27.994 -262	55.74 +129
12	15.8	39.971 -97	53.06 -69	10.207 -115	56.96 -82	42.264 -122	75.36 -5	27.707 -287	56.50 +76
12	25.7	39.873 -98	53.70 -64	10.090 -117	57.56 -60	42.135 -129	75.00 -36	27.404 -303	56.74 +24
12	35.7	39.773 -100	54.28 -58	09.973 -117	57.90 -34	42.002 -133	74.32 -68	27.091 -313	56.42 -32
		39.773 -94	54.28 -47	09.973 -109	57.90 -5	42.002 -129	74.32 -95	27.091 -307	56.42 -86
Mean Place	38.681	59.06	08.716	56.85	41.273	57.40	27.126	31.17	
sec δ, tan δ	+1.005	-0.101	+1.088	-0.428	+1.144	+0.555	+1.946	+1.669	
dα(ψ), dδ(ψ)	+0.061	+0.40	+0.061	+0.40	+0.062	+0.40	+0.063	+0.40	
dα(ε), dδ(ε)	+0.007	+0.02	+0.029	+0.03	-0.037	+0.03	-0.111	+0.04	
Dble. Trans.	September 22		September 22		September 23		September 23		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	3		4		5		6	
	ε Phoenicis		22 Andromedae		κ <sup>2</sup> Sculptoris		9 Sculptoris	
Mag. Spect.	3.94	K0	5.08	F0	5.56	K0	5.19	F5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	0 08	-45 49	0 09	+45 59	0 10	-27 52	0 11	-35 12
1 -9.2	42.102 <sup>s</sup> -196	47.98 -53	34.262 <sup>s</sup> -194	50.58 +12	51.498 <sup>s</sup> -128	53.63 -71	01.096 <sup>s</sup> -149	57.14 -66
1 0.7	41.911 -191	48.05 -7	34.062 -200	50.26 -32	51.371 127	54.03 -40	00.950 -146	57.42 -28
1 10.7	41.726 -185	47.67 +38	33.859 -203	49.49 -77	51.247 124	54.12 -9	00.807 -143	57.33 +9
1 20.7	41.557 -169	46.81 +86	33.663 196	48.28 -121	51.247 115	54.12 +24	00.676 -131	56.84 +49
1 30.6	41.409 -148	45.52 +129	33.484 -179	46.73 -155	51.031 101	53.32 +56	00.561 -115	55.98 +86
2 9.6	41.285 -124	43.83 +169	33.327 -157	44.86 -187	50.946 85	52.45 +87	00.464 -97	54.78 +120
2 19.6	41.195 -90	41.76 +207	33.205 -122	42.76 -210	50.885 -61	51.27 +118	00.393 -71	53.22 +156
3 1.6	41.141 -54	39.39 +237	33.125 -203	40.55 -77	50.852 -33	49.81 +146	00.353 -143	51.37 +185
3 11.5	41.127 -14	36.73 +266	33.092 -33	38.29 -226	50.850 -2	48.08 +173	00.346 -7	49.23 +214
3 21.5	41.161 +34	33.84 +289	33.116 +24	36.10 219	50.885 +35	46.10 +198	00.381 +35	46.85 +238
3 31.5	41.243 +82	30.81 +303	33.198 +82	34.10 -200	50.961 +76	43.91 +219	00.457 +76	44.29 +256
4 10.5	41.376 +133	27.66 +315	33.339 +141	32.33 -177	51.078 +117	41.53 +238	00.578 +121	41.56 +273
4 20.4	41.563 +187	24.46 +310	33.542 +203	30.92 -141	51.240 +162	39.02 +251	00.747 +169	38.73 +283
4 30.4	41.799 +236	21.31 +325	33.797 +255	29.90 -102	51.443 +203	36.42 +260	00.959 +212	35.87 +286
5 10.4	42.083 +284	18.22 +309	34.104 +307	29.31 -59	51.687 +244	33.78 +264	01.214 +255	33.00 +287
5 20.3	42.411 +328	15.30 +292	34.454 +350	29.22 -9	51.967 +280	31.16 +262	01.508 +294	30.22 +278
5 30.3	42.772 +361	12.61 +269	34.833 +379	29.59 +37	52.276 +309	28.62 +254	01.832 +324	27.59 +263
6 9.3	43.164 +392	10.19 +242	35.238 +405	30.43 +84	52.609 +333	26.21 +241	02.182 +350	25.13 +246
6 19.3	43.573 +409	08.13 +206	35.653 +415	31.74 +131	52.956 +347	24.00 +221	02.549 +367	22.95 +218
6 29.2	43.990 +417	06.45 +168	36.066 +413	33.44 +170	53.308 +352	22.04 +196	02.920 +371	21.08 +187
7 9.2	44.406 +416	05.20 +125	36.472 +406	35.52 +208	53.659 +351	20.37 +167	03.291 +371	19.56 +152
7 19.2	44.807 +401	04.44 +76	36.856 +384	37.94 +242	53.996 +337	19.06 +131	03.649 +358	18.45 +111
7 29.2	45.183 +376	04.14 +30	37.211 +355	40.59 +265	54.313 +317	18.10 +96	03.985 +336	17.75 +70
8 8.1	45.528 +345	04.32 -18	37.531 +320	43.46 +287	54.603 +290	17.54 +56	04.293 +309	17.48 +27
8 18.1	45.829 +301	04.99 -67	37.807 +276	46.47 +301	54.856 +253	17.38 +16	04.562 +268	17.66 -18
8 28.1	46.083 +254	06.07 -108	38.038 +231	49.54 +307	55.072 +216	17.59 -21	04.790 +228	18.23 -57
9 7.0	46.283 +200	07.55 -148	38.222 +184	52.65 +311	55.245 +173	18.17 -58	04.973 +183	19.18 -95
9 17.0	46.425 +142	09.36 -181	38.354 +132	55.70 +305	55.372 +127	19.08 -91	05.106 +133	20.47 -129
9 27.0	46.511 +86	11.41 -205	38.440 +86	58.64 +294	55.456 +84	20.24 -116	05.192 +86	22.01 -154
10 7.0	46.542 +31	13.63 -222	38.478 +38	61.45 +281	55.498 +42	21.62 -138	05.232 +40	23.76 -175
10 16.9	46.519 -23	15.91 -228	38.471 -7	64.03 +258	55.500 +2	23.14 -152	05.227 -5	25.62 -186
10 26.9	46.452 -67	18.15 -224	38.426 -45	66.36 +233	55.468 -32	24.71 -157	05.185 -42	27.49 -187
11 5.9	46.342 -110	20.27 -212	38.343 -83	68.39 +203	55.406 -62	26.29 -158	05.109 -76	29.33 -184
11 15.9	46.200 -142	22.16 -189	38.228 -115	70.06 +167	55.320 -86	27.77 -148	05.006 -103	31.00 -167
11 25.8	46.034 -166	23.75 -159	38.087 -141	71.36 +130	55.217 -103	29.10 -133	04.885 -121	32.47 -147
12 5.8	45.849 -185	24.99 -124	37.921 -166	72.23 +87	55.099 -118	30.24 -114	04.746 -139	33.68 -121
12 15.8	45.656 -193	25.78 -79	37.739 -182	72.64 +41	54.974 -125	31.10 -86	04.601 -145	34.54 -86
12 25.7	45.462 -194	26.14 -36	37.546 -193	72.62 -2	54.847 -127	31.69 -59	04.454 -147	35.06 -52
12 35.7	45.270 -192	26.04 +10	37.345 -201	72.12 -50	54.720 -127	31.98 -29	04.307 -147	35.20 -14
	45.270 -178	26.04 +59	37.345 -196	72.12 -93	54.720 -120	31.98 +5	04.307 -138	35.20 +26
Mean Place	43.772	18.82	36.930	49.89	53.398	29.65	02.910	30.83
sec δ, tan δ	+1.435	-1.029	+1.439	+1.035	+1.131	-0.529	+1.224	-0.706
dα(ψ), dδ(ψ)	+0.060	+0.40	+0.062	+0.40	+0.060	+0.40	+0.060	+0.40
dα(ε), dδ(ε)	+0.069	+0.04	-0.069	+0.04	+0.035	+0.05	+0.047	+0.05
Dble. Trans.	September 23		September 23		September 24		September 24	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	7		1004		1005		1006	
	γ Pegasi		χ Pegasi		σ Andromedae		Piazzī 0 <sup>h</sup> 38 (Andromedae)	
Mag. Spect.	2.87	B2	4.94	M0	4.51	A2	5.80	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ′	h m	° ′	h m	° ′	h m	° ′
	0 12	+ 15 06	0 13	+ 20 07	0 17	+ 36 42	0 17	+ 31 26
1 <sup>d</sup> -9.2	30.077 <sup>s</sup> -106	22.06 <sup>o</sup> -47	51.830 <sup>s</sup> -111	47.06 <sup>o</sup> -38	34.681 <sup>s</sup> -150	36.29 <sup>o</sup> -3	53.388 <sup>s</sup> -133	29.26 <sup>o</sup> -14
1 <sup>s</sup> 0.7	29.969 -108	21.44 -62	51.715 -115	46.47 -59	34.526 -155	35.91 -38	53.249 -139	28.81 -45
1 10.7	29.859 -110	20.67 -77	51.598 -117	45.68 -79	34.366 -160	35.15 -76	53.107 -142	28.04 -77
1 20.7	29.754 -105	19.78 -89	51.486 -112	44.72 -96	34.210 -156	34.05 -110	52.968 -139	26.97 -107
1 30.6	29.659 -95	18.82 -96	51.383 -103	43.64 -108	34.066 -144	32.67 -138	52.840 -128	25.69 -128
2 9.6	29.577 -82	17.82 -100	51.294 -89	42.47 -117	33.939 -127	31.05 -162	52.727 -113	24.20 -149
2 19.6	29.517 -60	16.85 -97	51.228 -66	41.28 -119	33.839 -100	29.27 -178	52.639 -88	22.59 -161
3 1.6	29.483 -34	15.95 -90	51.189 -39	40.14 -114	33.772 -67	27.42 -185	52.582 -57	20.96 -163
3 11.5	29.479 -4	15.18 -77	51.181 -8	39.09 -105	33.745 -27	25.56 -186	52.561 -21	19.34 -162
3 21.5	29.513 +34	14.60 -58	51.213 +32	38.22 -87	33.766 +21	23.81 -175	52.584 +23	17.85 -149
3 31.5	29.585 +72	14.24 -36	51.285 +72	37.57 -65	33.836 +70	22.25 -156	52.653 +69	16.56 -129
4 10.5	29.700 +115	14.12 -12	51.400 +115	37.16 -41	33.957 +121	20.92 -133	52.771 +118	15.51 -105
4 20.4	29.861 +161	14.33 +21	51.562 +162	37.08 -8	34.133 +176	19.93 -99	52.939 +168	14.80 -71
4 30.4	30.061 +200	14.85 +52	51.766 +204	37.33 +25	34.356 +223	19.31 -62	53.153 +214	14.44 +36
5 10.4	30.300 +239	15.69 +84	52.009 +243	37.92 +59	34.626 +270	19.09 -22	53.411 +258	14.46 +2
5 20.3	30.573 +273	16.85 +116	52.287 +278	38.87 +95	34.935 +309	19.31 +22	53.706 +295	14.91 +45
5 30.3	30.870 +297	18.28 +143	52.591 +304	40.12 +125	35.274 +339	19.94 +63	54.030 +324	15.74 +83
6 9.3	31.189 +319	19.98 +170	52.916 +325	41.68 +156	35.636 +362	20.99 +105	54.377 +347	16.94 +120
6 19.3	31.519 +330	21.88 +190	53.252 +336	43.50 +182	36.011 +375	22.45 +146	54.735 +358	18.51 +157
6 29.2	31.850 +331	23.94 +206	53.590 +338	45.50 +200	36.386 +375	24.23 +178	55.095 +360	20.37 +186
7 9.2	32.178 +328	26.11 +217	53.923 +333	47.68 +218	36.756 +370	26.32 +209	55.451 +356	22.49 +212
7 19.2	32.490 +312	28.34 +223	54.241 +318	49.96 +228	37.109 +353	28.68 +236	55.790 +339	24.83 +234
7 29.2	32.782 +292	30.55 +221	54.538 +297	52.27 +231	37.438 +329	31.20 +252	56.107 +317	27.30 +247
8 8.1	33.047 +265	32.73 +218	54.808 +270	54.59 +232	37.737 +299	33.89 +269	56.395 +288	29.88 +258
8 18.1	33.278 +231	34.80 +207	55.044 +236	56.85 +226	37.997 +260	36.64 +275	56.647 +252	32.49 +261
8 28.1	33.475 +197	36.73 +193	55.244 +200	59.00 +215	38.219 +222	39.40 +276	56.861 +214	35.07 +258
9 7.0	33.634 +159	38.51 +178	55.407 +163	61.02 +202	38.399 +180	42.15 +275	57.036 +175	37.60 +253
9 17.0	33.754 +120	40.08 +157	55.529 +122	62.87 +185	38.533 +134	44.80 +265	57.167 +131	40.01 +241
9 27.0	33.837 +83	41.44 +136	55.615 +86	64.52 +165	38.626 +93	47.32 +252	57.260 +93	42.27 +226
10 7.0	33.885 +48	42.59 +115	55.664 +49	65.96 +144	38.679 +53	49.68 +236	57.314 +54	44.36 +209
10 16.9	33.900 +15	43.49 +90	55.680 +16	67.17 +121	38.691 +12	51.81 +213	57.330 +16	46.21 +185
10 26.9	33.888 -12	44.19 +70	55.667 -13	68.15 +98	38.671 -20	53.70 +189	57.315 -15	47.83 +162
11 5.9	33.849 -39	44.66 +47	55.628 -39	68.89 +74	38.618 -53	55.32 +162	57.270 -45	49.17 +134
11 15.9	33.789 -60	44.91 +25	55.566 -62	69.38 +49	38.537 -81	56.61 +129	57.200 -70	50.22 +105
11 25.8	33.714 -75	44.96 +5	55.488 -78	69.64 +26	38.435 -102	57.58 +97	57.109 -91	50.97 +75
12 5.8	33.624 -90	44.80 -16	55.394 -94	69.65 +1	38.310 -125	58.18 +60	56.999 -110	51.39 +42
12 15.8	33.525 -99	44.45 -35	55.290 -104	69.42 -23	38.171 -139	58.40 +22	56.875 -124	51.47 +8
12 25.7	33.421 -104	43.94 -51	55.180 -110	68.98 -44	38.022 -149	58.26 -14	56.743 -132	51.23 -24
12 35.7	33.312 -109	43.26 -68	55.064 -116	68.31 -67	37.866 -156	57.73 -53	56.603 -140	50.65 -58
	33.312 -106	43.26 -81	55.064 -112	68.31 -85	37.866 -156	57.73 -88	56.603 -138	50.65 -87
Mean Place	32.374	30.82	54.170	54.05	37.179	37.88	55.825	32.43
sec δ, tan δ	+1.036	+0.270	+1.065	+0.367	+1.247	+0.746	+1.172	+0.611
dα(ψ), dδ(ψ)	+0.062	+0.40	+0.062	+0.40	+0.063	+0.40	+0.062	+0.40
dα(ε), dδ(ε)	-0.018	+0.05	-0.024	+0.06	-0.050	+0.08	-0.041	+0.08
Dble. Trans.	September 24		September 24		September 25		September 25	

APPARENT PLACES OF STARS, 1986

5

AT UPPER TRANSIT AT GREENWICH

No.	9		1007		10		1008	
	ι Ceti		B.D. -18° 41 (Ceti)		ζ Tucanae		41 Piscium	
Mag.Spect.	3.75	K0	6.88	K0	4.34	F8	5.58	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	0 18	- 8 53	0 19	-17 46	0 19	-64 56	0 19	+ 8 06
1 <sup>d</sup>	42.356 <sup>s</sup> -101	72.34 -72	20.010 <sup>s</sup> -109	51.49 -76	21.498 <sup>s</sup> -397	108.02 -31	51.941 <sup>s</sup> -99	44.26 -55
1	0.7 42.254 -102	72.95 -61	19.900 -110	52.05 -56	21.107 -391	107.75 +27	51.839 -102	43.64 -62
1	10.7 42.151 -103	73.46 -34	19.789 -111	52.40 -35	20.727 -380	106.92 +83	51.734 -105	42.94 -70
1	20.7 42.053 -98	73.80 -34	19.685 -104	52.51 -11	20.374 -353	105.50 +142	51.633 -101	42.21 -73
1	30.7 41.964 -89	73.99 -19	19.591 -94	52.37 +14	20.060 -314	103.58 +192	51.541 -92	41.48 -73
2	9.6 41.888 -76	74.00 -1	19.510 -81	51.99 +38	19.789 -271	101.19 +239	51.460 -81	40.76 -72
2	19.6 41.831 -57	73.81 +19	19.449 -61	51.34 +65	19.576 -213	98.37 +282	51.399 -61	40.13 -63
3	1.6 41.798 -33	73.40 +41	19.413 -36	50.45 +89	19.427 -149	95.25 +312	51.362 -37	39.61 -52
3	11.5 41.794 -4	72.79 +61	19.406 -7	49.32 +113	19.344 -83	91.84 +341	51.354 -8	39.24 -57
3	21.5 41.823 +29	71.95 +84	19.434 +28	47.92 +140	19.341 -3	88.23 +361	51.383 +29	39.10 -14
3	31.5 41.887 +64	70.84 +111	19.498 +64	46.30 +162	19.414 +73	84.54 +369	51.443 +60	39.17 +7
4	10.5 41.993 +106	69.49 +135	19.604 +106	44.44 +186	19.567 +153	80.78 +376	51.551 +108	39.43 +26
4	20.4 42.141 +148	67.91 +158	19.753 +149	42.40 +204	19.805 +238	77.07 +371	51.702 +151	40.04 +61
4	30.4 42.328 +187	66.15 +174	19.941 +188	40.22 +218	20.118 +313	73.49 +358	51.892 +190	40.92 +88
5	10.4 42.554 +226	64.21 +196	20.169 +228	37.91 +231	20.507 +389	70.07 +342	52.120 +228	42.08 +116
5	20.4 42.813 +259	62.13 +208	20.432 +263	35.53 +238	20.965 +458	66.94 +313	52.383 +263	43.51 +143
5	30.3 43.099 +286	59.97 +216	20.723 +291	33.16 +237	21.477 +512	64.15 +279	52.671 +288	45.15 +164
6	9.3 43.408 +309	57.76 +221	21.038 +315	30.81 +235	22.040 +563	61.73 +242	52.982 +311	47.00 +185
6	19.3 43.730 +322	55.58 +218	21.367 +329	28.56 +225	22.636 +596	59.79 +194	53.305 +323	48.99 +199
6	29.2 44.057 +327	53.47 +200	21.701 +334	26.48 +208	23.248 +612	58.33 +146	53.631 +326	51.07 +208
7	9.2 44.382 +325	51.47 +200	22.035 +334	24.60 +188	23.866 +618	57.40 +93	53.955 +324	53.20 +213
7	19.2 44.695 +313	49.66 +181	22.357 +322	22.98 +162	24.468 +602	57.04 +36	54.266 +311	55.32 +212
7	29.2 44.989 +294	48.06 +160	22.660 +303	21.65 +133	25.040 +572	57.22 -18	54.557 +291	57.36 +204
8	8.1 45.259 +270	46.71 +135	22.939 +279	20.64 +101	25.569 +529	57.95 -73	54.824 +267	59.31 +195
8	18.1 45.497 +238	45.65 +106	23.184 +245	19.98 +66	26.034 +465	59.21 -126	55.059 +235	61.10 +179
8	28.1 45.700 +203	44.88 +77	23.395 +211	19.65 +33	26.428 +394	60.91 -170	55.260 +201	62.70 +160
9	7.1 45.867 +167	44.40 +48	23.567 +172	19.66 -1	26.741 +313	63.04 -213	55.426 +166	64.11 +141
9	17.0 45.993 +126	44.22 +18	23.697 +130	19.99 -33	26.960 +219	65.49 -245	55.552 +126	65.28 +117
9	27.0 46.083 +90	44.30 -8	23.789 +92	20.58 -59	27.088 +128	68.15 -266	55.643 +91	66.23 +95
10	7.0 46.136 +53	44.61 -31	23.841 +52	21.42 -84	27.122 +34	70.95 -280	55.699 +56	66.95 +72
10	16.9 46.155 +19	45.13 -52	23.858 +17	22.43 -101	27.063 -59	73.75 -280	55.721 +22	67.45 +50
10	26.9 46.146 -9	45.79 -66	23.844 -14	23.56 -113	26.922 -141	76.43 -268	55.717 -4	67.75 +30
11	5.9 46.110 -36	46.56 -77	23.802 -42	24.75 -119	26.703 -219	78.90 -247	55.686 -31	67.85 +10
11	15.9 46.053 -57	47.40 -84	23.737 -65	25.93 -118	26.420 -283	81.03 -213	55.635 -51	67.85 -8
11	25.8 45.980 -73	48.24 -84	23.656 -81	27.06 -113	26.089 -331	82.74 -171	55.567 -68	67.77 -21
12	5.8 45.893 -87	49.07 -83	23.560 -96	28.08 -102	25.718 -371	83.97 -123	55.484 -83	67.19 -37
12	15.8 45.798 -95	49.84 -77	23.456 -104	28.95 -87	25.328 -390	84.63 -66	55.392 -92	66.72 -47
12	25.8 45.698 -100	50.51 -67	23.347 -109	29.63 -68	24.931 -397	84.73 -10	55.294 -98	66.15 -57
12	35.7 45.595 -103	51.09 -58	23.236 -111	30.11 -48	24.537 -394	84.24 +49	55.191 -103	65.49 -66
12	45.595 -100	51.09 -43	23.236 -107	30.11 -25	24.537 -372	84.24 +108	55.191 -101	65.49 -70
Mean Place	44.396	55.17	21.956	31.20	22.480	74.62	54.134	55.28
sec δ, tan δ	+1.012	-0.157	+1.050	-0.321	+2.362	-2.140	+1.010	+0.143
dα(ψ), dδ(ψ)	+0.061	+0.40	+0.060	+0.40	+0.056	+0.40	+0.061	+0.40
dα(ε), dδ(ε)	+0.010	+0.08	+0.021	+0.08	+0.142	+0.08	-0.009	+0.09
Dbles.Trans.	September 26		September 26		September 26		September 26	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1009		1010		11		12	
	g Andromedae		44 Piscium		β Hydri		α Phoenicis	
Mag. Spect.	5.20	F5	5.99	G5	2.90	G0	2.44	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ′	h m	° ′	h m	° ′	h m	° ′
	0 20	+ 37 53	0 24	+ 1 51	0 24	- 77 19	0 25	- 42 22
1 <sup>d</sup>	21.935 <sup>s</sup>	36.99 <sup>o</sup>	40.544 <sup>s</sup>	40.79 <sup>o</sup>	64.119 <sup>s</sup>	82.90 <sup>o</sup>	35.631 <sup>s</sup>	72.77 <sup>o</sup>
1	-9.2	-152	-35	-97	-876	-15	-177	-75
1	0.7	-160	-35	-99	-870	+46	-178	-30
1	10.7	-164	-72	-103	-849	+107	-176	+12
1	20.7	-161	-108	-100	-793	+169	-166	+59
1	30.7	-149	-137	-91	-712	+220	-150	+102
2	9.6	-133	-163	-82	-623	+269	-131	+142
2	19.6	-105	-180	-62	-503	+310	-103	+181
3	1.6	-72	-188	-39	-376	+341	-70	+214
3	11.5	-32	-190	-10	-244	+367	-35	+244
3	21.5	+17	-190	+27	-91	+383	+10	+270
3	31.5	+67	-163	+49	+56	+389	+56	+288
4	10.5	+120	-139	+105	+206	+391	+105	+304
4	20.4	+174	-106	+144	+363	+382	+157	+312
4	30.4	+224	-69	+184	+502	+363	+206	+313
5	10.4	+271	-30	+221	+643	+341	+254	+310
5	20.4	+311	+15	+257	+771	+309	+298	+297
5	30.3	+342	+57	+283	+872	+270	+333	+279
6	9.3	+365	+99	+306	+968	+227	+365	+257
6	19.3	+379	+141	+319	+1034	+176	+386	+223
6	29.2	+380	+174	+324	+1069	+124	+395	+189
7	9.2	+376	+206	+323	+1089	+68	+399	+148
7	19.2	+358	+233	+311	+1068	+8	+388	+102
7	29.2	+334	+252	+293	+1020	-47	+368	+57
8	8.1	+305	+269	+269	+950	-105	+341	+8
8	18.1	+267	+276	+238	+838	-157	+302	-40
8	28.1	+226	+279	+205	+711	-201	+260	-83
9	7.1	+185	+279	+170	+563	-244	+212	-125
9	17.0	+140	+269	+131	+388	-273	+158	-161
9	27.0	+98	+258	+95	+214	-292	+107	-188
10	7.0	+56	+242	+60	+29	-303	+54	-210
10	16.9	+16	+219	+27	-158	-298	+4	-221
10	26.9	-18	+197	+0	-323	-283	-39	-221
11	5.9	-51	+168	-27	-486	-257	-80	-215
11	15.9	-80	+136	-48	-623	-217	-113	-196
11	25.8	-103	+104	-64	-727	-170	-139	-171
12	5.8	-125	+66	-80	-816	-116	-160	-140
12	15.8	-141	+28	-89	-863	-54	-172	-99
12	25.8	-152	-9	-96	-880	+7	-177	-59
12	35.7	-161	-49	-101	-878	+70	-180	-14
	-160	-86	-100	-61	-832	+133	-171	+32
Mean Place	24.440	38.15	42.651	53.88	63.592	48.76	37.163	45.27
sec δ, tan δ	+1.267	+0.778	+1.001	+0.033	+4.559	-4.448	+1.354	-0.912
dα(ψ), dδ(ψ)	+0.063	+0.40	+0.061	+0.40	+0.048	+0.40	+0.058	+0.40
dα(ε), dδ(ε)	-0.052	+0.09	-0.002	+0.11	+0.295	+0.11	+0.060	+0.11
Dble. Trans.	September 26		September 27		September 27		September 27	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1011		1012		13		14		
	Piazzi 0 <sup>h</sup> 78 (Ceti)		48 Piscium		12 Ceti		49 G. Ceti		
Mag. Spect.	7.54	M3	6.46	K2	6.05	K5	5.23	A3	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	0 27	- 11 43	0 27	+ 16 21	0 29	- 4 01	0 29	- 23 51	
1	-9.2	17 503 - 101	78 11 - 77	28.306 - 103	65.89 - 40	18 980 - 96	69.53 - 70	40.441 - 118	65.96 - 84
1	0.7	17 398 - 105	78 73 - 62	28 197 - 109	65.34 - 55	18 880 - 100	70.17 - 64	40 320 - 121	66 52 - 56
1	10.7	17 292 - 106	79 21 - 48	28 084 - 113	64.63 - 71	18 776 - 104	70.75 - 58	40 198 - 122	66.80 - 2
1	20.7	17 189 - 103	79 50 - 29	27 972 - 112	63.78 - 85	18 675 - 101	71.22 - 47	40 080 - 118	66.78 + 28
1	30.7	17 094 - 95	79 59 - 9	27 868 - 104	62.86 - 92	18 582 - 93	71.57 - 35	39.972 - 108	66.46 + 32
2	9.6	17 011 - 83	79 50 + 9	27 775 - 93	61.87 - 99	18 499 - 83	71.80 - 23	39.877 - 95	65.85 + 61
2	19.6	16 946 - 65	79 17 + 33	27 702 - 73	60.89 - 98	18 434 - 65	71.85 - 5	39.802 - 75	64.92 + 93
3	1.6	16 905 - 41	78 62 + 55	27 653 - 49	59.97 - 92	18 392 - 42	71.71 + 14	39.752 - 50	63.72 + 120
3	11.5	16 891 - 14	77 84 + 78	27 634 - 19	59.15 - 82	18 377 - 15	71.38 + 33	39.730 - 22	62.25 + 147
3	21.5	16 911 + 20	76.82 + 102	27.653 + 19	58.51 - 64	18.397 + 20	70.84 + 54	39.745 + 15	60.50 + 175
3	31.5	16 967 + 56	75.55 + 127	27.710 + 57	58.08 - 43	18.449 + 52	70.06 + 78	39.797 + 52	58.54 + 196
4	10.5	17 064 + 97	74.04 + 151	27 810 + 100	57.88 - 20	18 544 + 95	68.98 + 108	39.892 + 95	56.35 + 219
4	20.4	17 203 + 139	72.30 + 174	27 957 + 147	57.98 + 10	18 682 + 138	67.67 + 131	40.031 + 139	54.00 + 235
4	30.4	17 383 + 180	70.40 + 190	27 957 + 188	58.39 + 41	18 860 + 178	66.15 + 152	40.212 + 181	51.53 + 247
5	10.4	17 602 + 219	68.33 + 207	28.374 + 229	59.12 + 73	19.077 + 217	64.43 + 172	40.434 + 222	48.97 + 256
5	20.4	17 856 + 254	66.14 + 219	28 639 + 265	60.17 + 105	19 329 + 252	62.52 + 191	40 695 + 261	46.38 + 259
5	30.3	18 139 + 283	63.89 + 225	28 931 + 292	61.50 + 133	19 609 + 280	60.50 + 202	40 985 + 290	43.84 + 254
6	9.3	18 445 + 306	61.62 + 227	29 247 + 316	63.10 + 160	19 912 + 303	58.38 + 212	41.301 + 316	41.37 + 247
6	19.3	18 767 + 322	59.39 + 223	29 576 + 329	64.93 + 183	20 230 + 318	56.23 + 215	41.635 + 334	39.06 + 231
6	29.2	19 095 + 328	57.26 + 213	29 909 + 333	66.91 + 198	20 554 + 324	54.10 + 213	41.977 + 342	36.96 + 210
7	9.2	19 422 + 327	55.27 + 199	30 241 + 332	69.04 + 213	20 878 + 324	52.04 + 206	42.320 + 343	35.11 + 185
7	19.2	19 740 + 318	53.50 + 177	30 560 + 319	71.23 + 219	21 191 + 313	50.12 + 192	42.653 + 333	33.58 + 153
7	29.2	20 039 + 293	51.96 + 154	30 860 + 300	73.43 + 220	21 487 + 296	48.37 + 175	42.969 + 316	32.39 + 119
8	8.1	20 316 + 277	50.69 + 127	31.136 + 276	75.61 + 218	21 760 + 273	46.82 + 155	43.262 + 293	31.56 + 83
8	18.1	20 562 + 246	49.74 + 95	31 380 + 244	77.69 + 208	22 003 + 243	45.54 + 128	43.522 + 260	31.13 + 43
8	28.1	20 774 + 212	49.09 + 65	31 590 + 210	79.66 + 197	22 213 + 210	44.51 + 103	43.747 + 225	31.07 + 6
9	7.1	20 950 + 176	48.75 + 34	31 764 + 174	81.48 + 182	22 388 + 175	43.75 + 76	43.934 + 187	31.37 - 30
9	17.0	21 085 + 135	48.72 + 3	31 900 + 136	83.11 + 163	22 523 + 135	43.28 + 47	44.077 + 143	32.03 - 66
9	27.0	21 184 + 99	48.96 - 24	32 000 + 100	84.54 + 143	22 623 + 100	43.06 + 22	44.180 + 103	32.96 - 93
10	7.0	21 246 + 62	49.45 - 49	32 064 + 64	85.76 + 122	22 688 + 65	43.08 - 2	44.243 + 63	34.14 - 118
10	16.9	21 272 + 26	50.14 - 69	32 095 + 31	86.74 + 98	22 719 + 31	43.32 - 24	44.266 + 23	35.49 - 135
10	26.9	21 270 - 2	50.96 - 82	32 097 - 2	87.52 + 78	22 721 + 2	43.73 - 41	44.257 - 9	36.94 - 145
11	5.9	21 239 - 31	51.90 - 94	32 073 - 24	88.08 + 56	22 697 - 24	44.28 - 55	44.217 - 40	38.44 - 150
11	15.9	21 186 - 53	52.87 - 97	32 025 - 48	88.41 + 33	22 650 - 47	44.92 - 64	44.152 - 65	39.89 - 145
11	25.8	21 117 - 69	53.83 - 96	31.959 - 66	88.55 + 14	22 587 - 63	45.62 - 70	44.067 - 85	41.23 - 134
12	5.8	21 031 - 86	54.76 - 93	31 876 - 83	88.47 - 8	22 508 - 79	46.35 - 73	43.965 - 102	42.43 - 120
12	15.8	20 936 - 95	55.59 - 83	31 782 - 94	88.20 - 27	22 418 - 90	47.06 - 71	43.853 - 112	43.40 - 97
12	25.8	20 835 - 101	56.30 - 71	31 679 - 103	87.76 - 44	22 322 - 96	47.73 - 67	43.735 - 118	44.13 - 73
12	35.7	20 729 - 106	56.87 - 57	31 568 - 111	87.14 - 62	22 220 - 102	48.35 - 62	43.612 - 123	44.59 - 46
		20 729 - 104	56.87 - 40	31 568 - 110	87.14 - 75	22 220 - 100	48.35 - 53	43.612 - 119	44.59 - 15
Mean Place	19.456	60.23	30.539	73.72	21.000	54.49	42.228	44.00	
sec δ, tan δ	+1.021	-0.208	+1.042	+0.294	+1.002	-0.070	+1.093	-0.442	
da(ψ), dδ(ψ)	+0.061	+0.39	+0.062	+0.39	+0.061	+0.39	+0.060	+0.39	
da(ε), dδ(ε)	+0.014	+0.12	-0.019	+0.12	+0.005	+0.13	+0.029	+0.13	
Dble. Trans.	September 28		September 28		September 28		September 28		

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	15		16		1013		1014	
	$\lambda'$ Phoenicis		$\alpha$ Cassiopeiae		77 G. Sculptoris		58 G. Phoenicis	
Mag. Spect.	4.88	A2	4.24	B0	5.62	K0	5.55	F5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	0 30	-48 52	0 32	+62 51	0 32	-29 37	0 33	-52 26
1 <sup>d</sup>	44.767	-215	10.499	-339	59.401	-131	48.278	-241
1	44.551	-216	10.139	-360	59.267	-134	48.035	-243
1	44.337	-214	09.766	-373	59.132	-135	47.793	-242
1	44.133	-204	09.396	-370	59.001	-131	47.562	-231
1	43.948	-185	09.047	-349	58.881	-120	47.352	-210
2	43.784	-164	08.728	-319	58.774	-107	47.165	-187
2	43.652	-132	08.461	-267	58.689	-85	47.012	-153
3	43.557	-95	08.257	-204	58.629	-60	46.898	-114
3	43.501	-56	08.126	-131	58.589	-30	46.828	-70
3	43.496	-5	08.083	-43	58.607	+8	46.812	-16
3	43.542	+46	08.129	+46	58.655	+48	46.850	+38
4	43.641	+99	08.266	+137	58.746	+91	46.946	+96
4	43.798	+157	08.498	+232	58.883	+137	47.103	+157
4	44.009	+211	08.812	+314	59.064	+181	47.318	+215
5	44.273	+264	09.204	+392	59.288	+224	47.591	+273
5	44.588	+315	09.665	+461	59.552	+264	47.917	+326
5	44.942	+354	10.174	+509	59.848	+296	48.286	+369
6	45.332	+390	10.723	+549	60.172	+324	48.695	+409
6	45.747	+415	11.295	+572	60.515	+343	49.131	+436
6	46.174	+427	11.871	+576	60.867	+352	49.581	+450
7	46.607	+433	12.443	+572	61.222	+355	50.039	+458
7	47.031	+424	12.990	+547	61.568	+346	50.488	+449
7	47.434	+403	13.502	+512	61.897	+329	50.918	+430
8	47.810	+376	13.972	+470	62.203	+306	51.319	+401
8	48.145	+335	14.385	+413	62.476	+273	51.677	+358
8	48.433	+288	14.738	+353	62.712	+236	51.986	+309
9	48.669	+236	15.028	+290	62.908	+196	52.240	+254
9	48.845	+176	15.245	+217	63.059	+151	52.430	+190
9	48.965	+120	15.396	+151	63.168	+109	52.558	+128
10	49.024	+59	15.477	+81	63.234	+66	52.622	+64
10	49.026	+2	15.487	+10	63.257	+23	52.623	+1
10	48.978	-48	15.434	-53	63.246	-11	52.569	-54
11	48.881	-97	15.317	-117	63.201	-45	52.461	-108
11	48.745	-136	15.141	-176	63.128	-73	52.309	-152
11	48.579	-166	14.915	-226	63.034	-94	52.123	-186
12	48.386	-193	14.639	-276	62.921	-113	51.907	-216
12	48.178	-208	14.325	-314	62.797	-124	51.673	-234
12	47.962	-216	13.983	-342	62.666	-131	51.431	-242
12	47.744	-218	13.618	-366	62.529	-137	51.184	-247
		-211		-366		-132		-238
Mean Place	46.069	40.76	13.455	26.70	61.075	57.62	49.426	51.50
sec $\delta$ , $\tan \delta$	+1.521	-1.145	+2.192	+1.951	+1.150	-0.569	+1.641	-1.301
$\Delta\alpha(\psi)$ , $d\delta(\psi)$	+0.057	+0.39	+0.068	+0.39	+0.059	+0.39	+0.056	+0.39
$\Delta\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.076	+0.13	-0.129	+0.14	+0.038	+0.14	+0.086	+0.15
Dble. Trans.	September 29		September 29		September 29		September 30	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	18		17		19		20	
	π Andromedae		ζ Cassiopeiae		ε Andromedae		δ Andromedae	
Mag. Spect.	4.47	B3	3.72	B3	4.52	G5	3.49	K2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	0 36	+ 33 38	0 36	+ 53 49	0 37	+ 29 14	0 38	+ 30 46
1 -9.2	07.056 -132	40.57 + 5	10.137 -233	25.18 + 61	48.089 -121	15.85 - 7	33.895 -123	71.59 - 1
1 0.7	06.914 -142	40.29 -28	09.888 -249	25.30 + 12	47.958 -131	15.51 -34	33.761 -134	71.27 -32
1 10.7	06.764 -150	39.68 -61	09.627 -261	24.92 -38	47.820 -138	14.87 -64	33.620 -141	70.66 -61
1 20.7	06.613 -151	38.74 -94	09.367 -260	24.04 -88	47.682 -138	13.96 -91	33.478 -142	69.75 -91
1 30.7	06.471 -142	37.56 -118	09.120 -247	22.72 -132	47.550 -132	12.84 -112	33.343 -135	68.62 -113
2 9.6	06.339 -132	36.15 -141	08.893 -227	21.00 -172	47.428 -122	11.53 -131	33.218 -125	67.28 -134
2 19.6	06.231 -108	34.57 -158	08.702 -191	18.95 -205	47.328 -100	10.10 -143	33.114 -104	65.81 -147
3 1.6	06.153 -78	32.93 -164	08.557 -145	16.69 -226	47.256 -72	08.64 -146	33.039 -75	64.29 -152
3 11.6	06.109 -44	31.28 -165	08.466 -195	14.29 -240	47.216 -40	07.18 -146	32.998 -41	62.77 -152
3 21.5	06.111 + 2	29.71 -157	08.442 -24	11.86 -243	47.218 + 2	05.83 -135	32.999 + 1	61.35 -142
3 31.5	06.159 + 48	28.30 -141	08.485 + 43	09.54 -232	47.265 + 47	04.66 -117	33.045 + 46	60.09 -126
4 10.5	06.258 + 99	27.11 -119	08.600 + 115	07.37 -217	47.359 + 94	03.70 -96	33.140 + 95	59.05 -104
4 20.4	06.409 + 151	26.22 -89	08.788 + 188	05.50 -187	47.504 + 145	03.04 -66	33.287 + 147	58.31 -74
4 30.4	06.609 + 200	25.67 -55	09.043 + 255	03.98 -152	47.696 + 192	02.72 -32	33.481 + 194	57.91 -40
5 10.4	06.856 + 247	25.49 -18	09.360 + 317	02.86 -112	47.933 + 237	02.74 + 2	33.720 + 239	57.85 -6
5 20.4	07.145 + 289	25.72 + 23	09.733 + 373	02.22 -64	48.211 + 278	03.16 + 42	34.001 + 281	58.20 + 35
5 30.3	07.465 + 320	26.33 + 61	10.146 + 413	02.05 -17	48.519 + 308	03.94 + 78	34.313 + 312	58.91 + 71
6 9.3	07.812 + 347	27.34 +101	10.594 + 448	02.37 + 32	48.853 + 334	05.07 +113	34.652 + 339	59.99 +108
6 19.3	08.174 + 362	28.71 +137	11.061 + 467	03.20 + 83	49.203 + 350	06.55 +148	35.006 + 354	61.43 +144
6 29.3	08.542 + 368	30.40 +169	11.533 + 472	04.47 +127	49.558 + 355	08.29 +174	35.366 + 360	63.15 +172
7 9.2	08.908 + 366	32.38 +198	12.002 + 469	06.18 +171	49.912 + 354	10.30 +201	35.725 + 359	65.13 +198
7 19.2	09.261 + 353	34.60 +222	12.454 + 452	08.29 +211	50.254 + 342	12.50 +220	36.072 + 347	67.33 +220
7 29.2	09.593 + 332	36.97 +237	12.878 + 424	10.71 +242	50.577 + 323	14.82 +232	36.399 + 327	69.67 +234
8 8.1	09.900 + 307	39.49 +252	13.268 + 390	13.44 +273	50.876 + 299	17.25 +243	36.702 + 303	72.13 +246
8 18.1	10.173 + 273	42.07 +258	13.614 + 346	16.39 +295	51.141 + 265	19.70 +245	36.971 + 269	74.62 +249
8 28.1	10.410 + 237	44.66 +259	13.912 + 298	19.48 +309	51.372 + 231	22.12 +242	37.206 + 235	77.10 +248
9 7.1	10.608 + 198	47.23 +257	14.160 + 248	22.70 +322	51.565 + 193	24.50 +238	37.403 + 197	79.54 +244
9 17.0	10.763 + 155	49.70 +247	14.351 + 191	25.93 +323	51.718 + 153	26.76 +226	37.559 + 156	81.87 +233
9 27.0	10.880 + 117	52.05 +235	14.489 + 138	29.14 +321	51.833 + 115	28.87 +211	37.676 + 117	84.07 +220
10 7.0	10.957 + 77	54.25 +220	14.574 + 85	32.28 +314	51.911 + 78	30.83 +196	37.756 + 80	86.11 +204
10 17.0	10.995 + 38	56.23 +198	14.604 + 30	35.25 +297	51.951 + 40	32.56 +173	37.798 + 42	87.94 +183
10 26.9	11.001 + 6	58.00 +177	14.586 - 18	38.02 +277	51.960 + 9	34.08 +152	37.808 + 10	89.55 +161
11 5.9	10.975 - 26	59.52 +152	14.520 - 66	40.53 +251	51.939 - 21	35.35 +127	37.787 - 21	90.92 +137
11 15.9	10.919 - 56	60.75 +123	14.410 - 110	42.70 +217	51.890 - 49	36.35 +100	37.738 - 49	92.00 +108
11 25.8	10.841 - 78	61.68 + 93	14.263 - 147	44.52 +182	51.819 - 71	37.08 + 73	37.667 - 71	92.81 + 81
12 5.8	10.738 - 103	62.29 + 61	14.078 - 185	45.92 +140	51.726 - 93	37.52 + 44	37.572 - 95	93.32 + 51
12 15.8	10.619 - 119	62.56 + 27	13.865 - 213	46.83 + 91	51.617 - 109	37.65 + 13	37.461 - 111	93.51 + 19
12 25.8	10.486 - 133	62.50 - 6	13.630 - 235	47.28 + 45	51.496 - 121	37.50 - 15	37.337 - 124	93.40 - 11
12 35.7	10.342 - 144	62.09 - 41	13.377 - 253	47.21 - 7	51.363 - 133	37.03 - 47	37.201 - 136	92.97 - 43
	10.342 - 147	62.09 - 73	13.377 - 256	47.21 - 57	51.363 - 136	37.03 - 74	37.201 - 138	92.97 - 73
Mean Place	09.433	42.50	12.830	21.89	50.399	18.96	36.234	74.27
sec δ, tan δ	+1.201	+0.666	+1.694	+1.367	+1.146	+0.560	+1.164	+0.596
dα(ψ), dδ(ψ)	+0.064	+0.39	+0.067	+0.39	+0.064	+0.39	+0.064	+0.39
dα(ε), dδ(ε)	-0.044	+0.16	-0.090	+0.16	-0.037	+0.16	-0.039	+0.17
Dble. Trans.	September 30		September 30		October 1		October 1	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	21		1015		1016		23		
	$\alpha$ Cassiopeiae		$\mu$ Phoenicis		Lacaille 181 (Sculptoris)		$\eta$ Phoenicis		
Mag.Spect.	2.47	K0	4.65	K0	7.21	M0	4.53	A0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° /	h m	° /	h m	° /	h m	° /	
	0 39	+56 27	0 40	-46 09	0 41	-36 05	0 42	-57 31	
1	-9.2	41.382 -254	52.39 +72	40.176 -196	60.09 -87	56.910 -150	71.17 -93	44.276 -290	103.43 -77
1	0.7	41.110 -272	52.61 +22	39.975 -201	60.48 -39	56.756 -154	71.70 -53	43.980 -296	103.66 -23
1	10.7	40.823 -287	52.32 -29	39.772 -203	60.42 +6	56.599 -157	71.85 +27	43.683 -297	103.35 +31
1	20.7	40.537 -286	51.50 -82	39.577 -195	59.85 +57	56.446 -153	71.58 +15	43.398 -285	102.47 +88
1	30.7	40.263 -274	50.22 -128	39.397 -180	58.82 +103	56.304 -142	70.90 +68	43.135 -263	101.08 +139
2	9.6	40.011 -252	48.52 -170	39.234 -163	57.35 +147	56.175 -129	69.84 +106	42.898 -237	99.21 +187
2	19.6	39.797 -214	46.46 -206	39.099 -135	55.46 +189	56.068 -107	68.39 +145	42.699 -199	96.88 +233
3	1.6	39.632 -165	44.17 -229	38.997 -102	53.22 +224	55.989 -79	66.62 +177	42.544 -155	94.20 +268
3	11.6	39.525 -107	41.71 -246	38.932 -65	50.65 +257	55.941 -48	64.53 +209	42.438 -106	91.18 +302
3	21.5	39.489 -36	39.21 -250	38.914 -18	47.81 +284	55.933 -8	62.16 +237	42.392 -46	87.90 +328
3	31.5	39.525 +36	36.79 -242	38.944 +30	44.77 +304	55.967 +34	59.57 +259	42.408 +16	84.46 +344
4	10.5	39.638 +113	34.51 -228	39.025 +81	41.57 +320	56.046 +79	56.78 +279	42.487 +79	80.88 +358
4	20.4	39.829 +191	32.51 -200	39.163 +138	38.28 +329	56.175 +129	53.86 +292	42.637 +150	77.27 +361
4	30.4	40.091 +262	30.87 -164	39.353 +190	34.99 +329	56.351 +176	50.89 +297	42.852 +215	73.72 +355
5	10.4	40.421 +330	29.61 -126	39.595 +242	31.72 +327	56.573 +222	47.88 +301	43.131 +279	70.24 +348
5	20.4	40.810 +389	28.83 -78	39.887 +292	28.58 +314	56.839 +266	44.93 +295	43.472 +341	66.97 +327
5	30.3	41.242 +432	28.53 -30	40.219 +332	25.64 +294	57.140 +301	42.10 +283	43.863 +391	63.97 +300
6	9.3	41.712 +470	28.72 +19	40.587 +368	22.94 +270	57.473 +333	39.44 +266	44.300 +437	61.27 +270
6	19.3	42.203 +491	29.43 +71	40.980 +393	20.58 +236	57.828 +355	37.04 +240	44.771 +471	58.99 +228
6	29.3	42.700 +497	30.60 +117	41.388 +408	18.59 +199	58.195 +367	34.94 +210	45.261 +490	57.14 +185
7	9.2	43.195 +495	32.22 +162	41.803 +415	17.02 +157	58.567 +372	33.18 +176	45.762 +501	55.78 +136
7	19.2	43.672 +477	34.27 +205	42.212 +409	15.94 +108	58.933 +366	31.85 +133	46.257 +495	54.97 +81
7	29.2	44.121 +449	36.65 +238	42.603 +391	15.34 +60	59.283 +350	30.94 +91	46.734 +477	54.68 +29
8	8.1	44.536 +415	39.35 +270	42.969 +366	15.24 +10	59.610 +327	30.48 +46	47.182 +448	54.94 -26
8	18.1	44.904 +368	42.30 +295	43.298 +329	15.66 -42	59.904 +294	30.49 -1	47.584 +402	55.75 -81
8	28.1	45.223 +319	45.41 +311	43.585 +287	16.53 -87	60.161 +257	30.93 -44	47.935 +351	57.04 -129
9	7.1	45.489 +266	48.66 +325	43.823 +238	17.86 -133	60.376 +215	31.80 -87	48.225 +290	58.80 -176
9	17.0	45.695 +206	51.96 +330	44.006 +183	19.57 -171	60.543 +167	33.06 -126	48.444 +219	60.95 -215
9	27.0	45.846 +151	55.25 +329	44.135 +129	21.58 -201	60.665 +122	34.60 -154	48.594 +150	63.37 -242
10	7.0	45.939 +93	58.48 +323	44.209 +74	23.83 -225	60.741 +76	36.41 -181	48.672 +78	66.02 -265
10	17.0	45.974 +35	61.56 +308	44.228 +19	26.20 -237	60.770 +29	38.38 -197	48.675 +3	68.75 -273
10	26.9	45.958 -16	64.45 +289	44.199 -29	28.59 -239	60.760 -10	40.41 -203	48.614 -61	71.45 -270
11	5.9	45.889 -69	67.10 +265	44.123 -76	30.92 -233	60.712 -48	42.44 -203	48.490 -124	74.05 -260
11	15.9	45.772 -117	69.40 +230	44.009 -114	33.07 -215	60.632 -80	44.35 -191	48.312 -178	76.38 -233
11	25.8	45.613 -159	71.35 +195	43.864 -145	34.95 -188	60.527 -105	46.07 -172	48.092 -220	78.38 -200
12	5.8	45.413 -200	72.88 +153	43.693 -171	36.51 -156	60.400 -127	47.54 -147	47.834 -258	79.97 -159
12	15.8	45.181 -232	73.92 +104	43.504 -189	37.64 -113	60.258 -142	48.68 -114	47.554 -280	81.06 -109
12	25.8	44.925 -256	74.47 +55	43.306 -198	38.33 -69	60.108 -150	49.46 -78	47.260 -294	81.64 -58
12	35.7	44.648 -277	74.50 +3	43.102 -204	38.56 -23	59.950 -158	49.86 -40	46.959 -301	81.66 -2
		-282	-50	-200	+28	-155	+3	-293	+54
Mean Place	44.119	48.45	41.416	32.14	58.382	45.99	45.056	73.07	
sec $\delta$ , tan $\delta$	+1.810	+1.509	+1.444	-1.041	+1.238	-0.729	+1.863	-1.572	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.068	+0.39	+0.056	+0.39	+0.058	+0.39	+0.053	+0.39	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.099	+0.17	+0.068	+0.18	+0.048	+0.18	+0.103	+0.19	
Dble. Trans.	October 1		October 1		October 2		October 2		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	22		26		25		1017	
	β Ceti		λ <sup>2</sup> Sculptoris		ο Cassiopeiae		70 G. Phoenicis	
Mag.Spect.	2.24	K0	5.97	K0	4.70	B2	6.00	A5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	0 42	- 18 03	0 43	- 38 29	0 43	+ 48 12	0 44	- 42 44
1 -9.2	52 972 <sup>s</sup> - 105	57 50 - 87	31 589 <sup>s</sup> - 158	71 06 - 93	55 561 <sup>s</sup> - 188	40 62 + 52	17 588 <sup>s</sup> - 178	87 17 - 92
1 0.8	52 860 - 112	58 16 - 66	31 426 - 163	71 58 - 52	55 357 - 204	40 70 + 8	17 405 - 183	87 66 - 49
1 10.7	52 745 - 115	58 60 - 44	31 260 - 166	71 70 - 12	55 140 - 217	40 33 - 37	17 220 - 185	87 70 - 4
1 10.7	52 745 - 115	58 60 - 18	31 260 - 161	71 70 + 34	55 140 - 219	40 33 - 84	17 220 - 181	87 70 + 44
1 30.7	52 630 - 107	58 78 + 7	31 099 - 151	71 36 + 75	54 921 - 210	39 49 - 122	17 039 - 168	87 26 + 88
1 30.7	52 523 - 107	58 71 + 7	30 948 - 151	70 61 + 75	54 711 - 210	38 27 - 122	16 871 - 168	86 38 + 88
2 9.6	52 425 - 98	58 38 + 33	30 812 - 136	69 47 + 114	54 516 - 195	36 68 - 159	16 718 - 153	85 08 + 130
2 19.6	52 344 - 81	57 77 + 61	30 698 - 114	67 92 + 155	54 350 - 166	34 79 - 189	16 591 - 127	83 36 + 172
3 1.6	52 286 - 58	56 90 + 87	30 613 - 85	66 03 + 189	54 222 - 128	32 73 - 206	16 494 - 97	81 29 + 207
3 11.6	52 255 - 31	55 77 + 113	30 559 - 54	63 83 + 220	54 140 - 82	30 53 - 220	16 431 - 63	78 90 + 239
3 21.5	52 258 + 3	54 37 + 140	30 547 - 12	61 34 + 249	54 115 - 25	28 34 - 219	16 412 - 19	76 22 + 268
3 31.5	52 297 + 39	52 74 + 163	30 578 + 31	58 64 + 270	54 150 + 35	26 24 - 210	16 438 + 26	73 33 + 289
4 10.5	52 378 + 81	50 87 + 187	30 656 + 78	55 74 + 290	54 248 + 98	24 31 - 193	16 514 + 76	70 26 + 307
4 20.5	52 503 + 125	48 79 + 208	30 785 + 129	52 72 + 302	54 412 + 164	22 66 - 165	16 644 + 130	67 09 + 317
4 30.4	52 669 + 166	46 57 + 222	30 962 + 177	49 66 + 306	54 636 + 224	21 36 - 130	16 823 + 179	63 89 + 320
5 10.4	52 877 + 208	44 21 + 236	31 186 + 224	46 57 + 309	54 918 + 282	20 43 - 93	17 053 + 230	60 69 + 320
5 20.4	53 123 + 246	41 78 + 243	31 456 + 270	43 55 + 302	55 252 + 334	19 95 - 48	17 331 + 278	57 59 + 310
5 30.3	53 400 + 277	39 33 + 245	31 761 + 305	40 68 + 287	55 624 + 372	19 92 - 3	17 647 + 316	54 67 + 292
6 9.3	53 704 + 304	36 90 + 243	32 100 + 339	37 99 + 269	56 029 + 405	20 36 + 44	17 998 + 351	51 95 + 272
6 19.3	54 026 + 322	34 58 + 232	32 462 + 362	35 57 + 242	56 454 + 425	21 26 + 90	18 375 + 377	49 55 + 240
6 29.3	54 358 + 332	32 41 + 217	32 837 + 375	33 48 + 209	56 885 + 431	22 57 + 131	18 764 + 389	47 49 + 206
7 9.2	54 692 + 334	30 43 + 198	33 218 + 381	31 75 + 173	57 317 + 432	24 29 + 172	19 162 + 396	45 83 + 166
7 19.2	55 019 + 327	28 72 + 171	33 593 + 375	30 46 + 129	57 734 + 417	26 37 + 208	19 553 + 391	44 63 + 120
7 29.2	55 331 + 312	27 30 + 142	33 951 + 358	29 60 + 86	58 127 + 393	28 74 + 237	19 929 + 376	43 90 + 73
8 8.2	55 622 + 291	26 20 + 110	34 288 + 337	29 21 + 39	58 493 + 366	31 37 + 263	20 281 + 352	43 65 + 25
8 18.1	55 884 + 262	25 47 + 73	34 591 + 303	29 30 - 9	58 819 + 326	34 18 + 281	20 598 + 317	43 92 - 27
8 28.1	56 113 + 229	25 09 + 38	34 856 + 265	29 83 - 53	59 103 + 284	37 11 + 293	20 876 + 278	44 63 - 71
9 7.1	56 306 + 193	25 06 + 3	35 078 + 222	30 81 - 98	59 342 + 239	40 14 + 303	21 108 + 232	45 79 - 116
9 17.0	56 458 + 152	25 37 - 31	35 251 + 173	32 16 - 135	59 531 + 189	43 17 + 303	21 288 + 180	47 35 - 156
9 27.0	56 573 + 115	25 97 - 60	35 377 + 126	33 82 - 166	59 674 + 143	46 15 + 298	21 418 + 130	49 20 - 186
10 7.0	56 650 + 77	26 83 - 86	35 455 + 78	35 74 - 192	59 769 + 95	49 05 + 290	21 497 + 79	51 32 - 212
10 17.0	56 690 + 40	27 90 - 107	35 484 + 29	37 81 - 207	59 815 + 46	51 77 + 272	21 523 + 26	53 57 - 225
10 26.9	56 698 + 8	29 09 - 119	35 473 - 11	39 93 - 212	59 820 + 5	54 30 + 253	21 505 - 18	55 86 - 229
11 5.9	56 677 - 21	30 37 - 128	35 423 - 50	42 05 - 212	59 781 - 39	56 59 + 229	21 444 - 61	58 12 - 226
11 15.9	56 629 - 48	31 66 - 129	35 338 - 85	44 03 - 198	59 704 - 77	58 56 + 197	21 346 - 98	60 22 - 210
11 25.9	56 562 - 67	32 89 - 123	35 227 - 111	45 81 - 178	59 594 - 110	60 19 + 163	21 219 - 127	62 09 - 187
12 5.8	56 477 - 85	34 04 - 115	35 093 - 134	47 33 - 152	59 450 - 144	61 43 + 124	21 066 - 153	63 66 - 157
12 15.8	56 379 - 98	35 01 - 97	34 943 - 150	48 48 - 115	59 280 - 170	62 24 + 81	20 897 - 169	64 83 - 117
12 25.8	56 272 - 107	35 81 - 80	34 784 - 159	49 26 - 78	59 090 - 190	62 62 + 38	20 718 - 179	65 60 - 77
12 35.7	56 158 - 114	36 39 - 58	34 617 - 167	49 63 - 37	58 882 - 208	62 52 - 10	20 531 - 187	65 92 - 32
	56 158 - 114	36 39 - 33	34 617 - 164	49 63 + 7	58 882 - 214	62 52 - 55	20 531 - 183	65 92 + 16
Mean Place	54.746	38.05	33.003	45.22	58.110	38.38	18.875	60.34
sec δ, tan δ	+1.052	-0.326	+1.278	-0.795	+1.501	+1.119	+1.362	-0.924
dα(ψ), dδ(ψ)	+0.060	+0.39	+0.057	+0.39	+0.067	+0.39	+0.056	+0.39
dα(ε), dδ(ε)	+0.021	+0.19	+0.052	+0.19	-0.073	+0.19	+0.060	+0.19
Dble.Trans.	October 2		October 2		October 2		October 2	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	24		27		1018		1019		
	21 Cassiopeiae		ζ Andromedae		79 G. Ceti		96 G. Piscium		
Mag.Spect.	5.61 var.	A2	4.30	K0	5.45	B9	5.82	G5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° /	h m	° /	h m	° /	h m	° /	
	0 44	+74 54	0 46	+24 11	0 47	-21 47	0 47	+ 5 12	
1	-9.2	40.885 -663	58.79 +132	35.057 -107	33.54 -14	19.345 -111	66.10 -93	38.396 -90	30.09 -60
1	0.8	40.178 -707	59.53 +74	34.939 -118	33.17 -37	19.228 -117	66.77 -67	38.299 -97	29.46 -63
1	10.7	39.439 -739	59.67 +14	34.813 -126	32.57 -60	19.105 -123	67.19 -42	38.194 -105	28.80 -66
1	20.7	38.701 -705	59.16 -51	34.684 -129	31.75 -82	18.984 -121	67.31 -12	38.088 -106	28.14 -66
1	30.7	37.996 -705	58.08 -108	34.559 -125	30.77 -98	18.869 -115	67.14 +17	37.987 -101	27.51 -63
2	9.6	37.342 -654	56.46 -162	34.443 -116	29.64 -113	18.762 -107	66.69 +45	37.892 -95	26.93 -58
2	19.6	36.779 -563	54.34 -212	34.345 -98	28.43 -121	18.674 -88	65.92 +77	37.814 -78	26.45 -48
3	1.6	36.329 -450	51.87 -247	34.272 -73	27.22 -121	18.608 -66	64.87 +105	37.757 -57	26.10 -35
3	11.6	36.007 -322	49.11 -276	34.229 -43	26.04 -118	18.568 -40	63.55 +132	37.726 -31	25.89 -21
3	21.5	35.840 -167	46.20 -291	34.226 -3	24.98 -106	18.564 -4	61.95 +160	37.731 +5	25.89 +0
3	31.5	35.829 -11	43.29 -291	34.264 +38	24.09 -89	18.597 +33	60.12 +183	37.780 +49	26.17 +28
4	10.5	35.978 +149	40.44 -285	34.347 +83	23.42 -67	18.671 +74	58.05 +207	37.846 +66	26.52 +35
4	20.5	36.291 +313	37.80 -264	34.479 +132	23.03 -39	18.790 +119	55.78 +227	37.974 +128	27.26 +74
4	30.4	36.748 +457	35.49 -231	34.657 +178	22.95 -8	18.952 +162	53.39 +239	38.141 +167	28.23 +97
5	10.4	37.340 +592	33.53 -196	34.880 +223	23.21 +26	19.156 +204	50.87 +252	38.348 +207	29.46 +123
5	20.4	38.051 +711	32.06 -147	35.142 +262	23.82 +61	19.400 +244	48.30 +257	38.593 +245	30.93 +147
5	30.3	38.848 +797	31.09 -97	35.436 +294	24.75 +93	19.676 +276	45.75 +255	38.868 +275	32.59 +166
6	9.3	39.718 +870	30.64 -45	35.756 +320	26.01 +126	19.980 +304	43.24 +300	39.168 +300	34.43 +184
6	19.3	40.632 +914	30.77 +13	36.094 +338	27.56 +155	20.305 +325	40.87 +237	39.485 +317	36.39 +196
6	29.3	41.559 +927	31.43 +66	36.438 +344	29.34 +178	20.639 +334	38.67 +220	39.810 +325	38.41 +202
7	9.2	42.486 +927	32.62 +119	36.783 +345	31.34 +200	20.978 +339	36.71 +196	40.136 +326	40.46 +205
7	19.2	43.381 +895	34.33 +171	37.119 +336	31.48 +214	21.311 +333	35.04 +167	40.455 +319	42.48 +202
7	29.2	44.226 +845	36.48 +215	37.437 +318	33.48 +223	21.629 +318	33.70 +134	40.758 +303	44.40 +192
8	8.2	45.009 +783	39.05 +257	37.733 +296	38.00 +229	21.927 +298	32.71 +99	41.040 +282	46.20 +180
8	18.1	45.704 +695	42.00 +295	37.998 +265	40.28 +228	22.196 +269	32.11 +60	41.294 +254	47.82 +162
8	28.1	46.306 +602	45.21 +321	38.231 +233	42.50 +222	22.432 +236	31.88 +23	41.518 +224	49.25 +143
9	7.1	46.806 +500	48.68 +347	38.429 +198	44.64 +214	22.632 +200	32.02 -14	41.708 +190	50.45 +120
9	17.0	47.188 +382	52.31 +363	38.588 +159	46.64 +200	22.792 +160	32.53 -51	41.861 +153	51.41 +96
9	27.0	47.457 +269	56.02 +371	38.711 +123	48.48 +184	22.912 +120	33.33 -80	41.980 +119	52.13 +70
10	7.0	47.605 +148	59.77 +375	38.798 +87	50.14 +166	22.994 +82	34.40 -107	42.064 +84	52.63 +52
10	17.0	47.626 +21	63.44 +367	38.850 +52	51.59 +145	23.037 +43	35.67 -127	42.114 +50	52.89 +26
10	26.9	47.532 -94	66.98 +354	38.871 +21	52.83 +124	23.047 +10	37.06 -139	42.137 +23	52.97 +8
11	5.9	47.317 -215	70.33 +335	38.862 -9	53.85 +102	23.026 -21	38.54 -148	42.132 -5	52.86 -11
11	15.9	46.987 -330	73.34 +301	38.827 -35	54.61 +76	22.978 -48	39.99 -145	42.103 -29	52.60 -26
11	25.9	46.556 -431	76.00 +266	38.770 -57	55.14 +53	22.908 -70	41.37 -138	42.055 -48	52.23 -37
12	5.8	46.024 -532	78.22 +222	38.691 -79	55.42 +28	22.819 -89	42.62 -125	41.988 -67	51.74 -49
12	15.8	45.413 -611	79.89 +167	38.595 -96	55.45 +3	22.716 -103	43.68 -106	41.908 -80	51.19 -55
12	25.8	44.742 -671	81.02 +113	38.487 -108	55.24 -21	22.604 -112	44.51 -83	41.817 -91	50.58 -61
12	35.7	44.022 -720	81.54 +52	38.366 -121	54.77 -47	22.484 -120	45.10 -59	41.717 -100	49.93 -65
		-730	-11	-125	-68	-121	-30	-103	-65
Mean Place	44.444	52.02	37.274	38.05	21.021	45.65	40.441	40.55	
sec δ, tan δ	+3.842	+3.710	+1.096	+0.449	+1.077	-0.400	+1.004	+0.091	
dα(ψ), dδ(ψ)	+0.080	+0.39	+0.064	+0.39	+0.059	+0.39	+0.062	+0.39	
dα(ε), dδ(ε)	-0.243	+0.19	-0.029	+0.20	+0.026	+0.21	-0.006	+0.21	
Dble.Trans.	October 2		October 3		October 3		October 3		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	28		31		1020		1021		
	δ Piscium		λ Hydri		64 Piscium		ν Andromedae		
Mag.Spect.	4.55	K5	4.96	K5	5.23	F5	4.42	B3	
U.T.	R.A.		R.A.		R.A.		R.A.		
	Dec.		Dec.		Dec.		Dec.		
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	0 47	+ 7 30	0 48	- 74 59	0 48	+ 16 51	0 49	+ 41 00	
1	-9.2	56 830 - 91	32 23 - 52	08 850 - 736	80 78 - 56	13 920 - 97	57 51 - 32	01 531 - 151	20 50 + 35
1	0.8	56 730 - 100	31 65 - 58	08 103 - 747	80 73 + 5	13 813 - 107	57 04 - 47	01 367 - 164	20 47 - 3
1	10.7	56 624 - 106	31 01 - 64	07 356 - 747	80 08 + 65	13 698 - 115	56 41 - 63	01 190 - 177	20 05 - 42
1	20.7	56 515 - 109	30 35 - 66	06 638 - 718	78 79 +129	13 581 - 117	55 64 - 77	01 009 - 181	19 23 - 82
1	30.7	56 410 - 105	29 70 - 65	05 973 - 665	76 95 +184	13 468 - 113	54 79 - 85	00 835 - 174	18 09 -114
2	9.6	56 312 - 98	29 07 - 63	05 369 - 604	74 61 +234	13 362 - 106	53 87 - 92	00 671 - 164	16 64 -145
2	19.6	56 231 - 81	28 52 - 55	04 853 - 516	71 80 +281	13 272 - 90	52 94 - 93	00 531 - 140	14 96 -168
3	1.6	56 170 - 61	28 07 - 45	04 436 - 417	68 64 +316	13 206 - 66	52 05 - 89	00 422 - 109	13 13 -183
3	11.6	56 136 - 34	27 76 - 31	04 123 - 313	65 16 +348	13 167 - 39	51 23 - 82	00 352 - 70	11 22 -191
3	21.5	56 137 + 1	27 65 - 11	03 935 - 188	61 46 +370	13 166 - 1	50 58 - 65	00 332 - 20	09 34 -188
3	31.5	56 178 + 41	27 82 + 17	03 871 - 64	57 64 +382	13 203 + 37	50 13 - 45	00 363 + 31	07 57 -177
4	10.5	56 247 + 69	28 06 + 24	03 935 + 64	53 74 +390	13 281 + 78	49 89 - 24	00 450 + 87	05 98 -159
4	20.5	56 373 + 126	28 66 + 60	04 137 + 202	49 87 +387	13 408 + 127	49 91 + 2	00 596 + 146	04 67 -131
4	30.4	56 539 + 166	29 53 + 87	04 463 + 326	46 13 +374	13 579 + 171	50 23 + 32	00 796 + 200	03 68 - 99
5	10.4	56 745 + 206	30 66 +113	04 917 + 454	42 55 +358	13 792 + 213	50 86 + 63	01 049 + 253	03 06 - 62
5	20.4	56 989 + 244	32 05 +139	05 491 + 574	39 25 +330	14 044 + 252	51 81 + 95	01 349 + 300	02 87 - 19
5	30.3	57 262 + 273	33 65 +160	06 162 + 671	36 29 +296	14 327 + 283	53 04 +123	01 685 + 336	03 09 + 22
6	9.3	57 562 + 300	35 44 +179	06 928 + 766	33 71 +258	14 635 + 308	54 53 +149	02 052 + 367	03 73 + 64
6	19.3	57 878 + 316	37 38 +194	07 764 + 836	31 62 +209	14 961 + 326	56 26 +173	02 439 + 387	04 79 +106
6	29.3	58 203 + 325	39 40 +202	08 644 + 880	30 02 +160	15 294 + 333	58 15 +189	02 833 + 394	06 22 +143
7	9.2	58 529 + 326	41 48 +208	09 557 + 913	28 97 +105	15 628 + 334	60 18 +203	03 228 + 395	08 00 +178
7	19.2	58 848 + 319	43 54 +206	10 467 + 910	28 52 + 45	15 954 + 326	62 30 +212	03 612 + 384	10 08 +208
7	29.2	59 151 + 303	45 54 +200	11 350 + 883	28 63 - 11	16 263 + 309	64 43 +213	03 976 + 364	12 40 +232
8	8.2	59 434 + 283	47 44 +190	12 188 + 838	29 33 - 70	16 552 + 289	66 56 +213	04 314 + 338	14 93 +253
8	18.1	59 688 + 254	49 18 +174	12 944 + 756	30 59 -126	16 811 + 259	68 60 +204	04 618 + 304	17 59 +266
8	28.1	59 912 + 224	50 73 +155	13 604 + 660	32 34 -175	17 039 + 228	70 54 +194	04 884 + 266	20 32 +273
9	7.1	60 102 + 190	52 09 +136	14 147 + 543	34 55 -221	17 233 + 194	72 34 +180	05 111 + 227	23 10 +278
9	17.0	60 256 + 154	53 21 +112	14 549 + 402	37 13 -258	17 389 + 156	73 96 +162	05 293 + 182	25 84 +274
9	27.0	60 375 + 119	54 11 + 90	14 809 + 260	39 97 -284	17 511 + 122	75 39 +143	05 433 + 140	28 51 +267
10	7.0	60 460 + 85	54 78 + 67	14 915 + 106	42 99 -302	17 598 + 87	76 62 +123	05 531 + 98	31 07 +256
10	17.0	60 512 + 52	55 22 + 44	14 861 - 54	46 03 -304	17 650 + 52	77 63 +101	05 587 + 56	33 44 +237
10	26.9	60 535 + 23	55 48 + 26	14 663 - 198	48 98 -295	17 674 + 24	78 43 + 80	05 605 + 18	35 63 +219
11	5.9	60 530 - 5	55 54 + 6	14 322 - 341	51 76 -278	17 669 - 5	79 02 + 59	05 586 - 19	37 57 +194
11	15.9	60 502 - 28	55 43 - 11	13 855 - 467	54 19 -243	17 639 - 30	79 40 + 38	05 534 - 52	39 21 +164
11	25.9	60 454 - 48	55 20 - 23	13 288 - 567	56 20 -201	17 589 - 50	79 59 + 19	05 452 - 82	40 55 +134
12	5.8	60 387 - 67	54 83 - 37	12 631 - 657	57 73 -153	17 518 - 71	79 58 - 1	05 341 - 111	41 54 + 99
12	15.8	60 306 - 81	54 37 - 46	11 918 - 713	58 66 - 93	17 432 - 86	79 38 - 20	05 208 - 133	42 14 + 60
12	25.8	60 214 - 92	53 84 - 53	11 174 - 744	59 01 - 35	17 334 - 96	79 01 - 37	05 055 - 153	42 37 + 23
12	35.7	60 112 - 102	53 23 - 61	10 414 - 760	58 73 + 28	17 224 - 110	78 47 - 54	04 887 - 168	42 19 - 18
		60 112 - 106	53 23 - 64	10 414 - 741	58 73 + 92	17 224 - 113	78 47 - 68	04 887 - 175	42 19 - 58
Mean Place	58.866	42.40	07.586	48.27	16.054	64.35	03.946	19.93	
sec δ, tan δ	+1.009	+0.132	+3.863	-3.731	+1.045	+0.303	+1.325	+0.869	
δα(ψ), δδ(ψ)	+0.062	+0.39	+0.041	+0.39	+0.063	+0.39	+0.066	+0.39	
δα(ε), δδ(ε)	-0.009	+0.21	+0.243	+0.21	-0.020	+0.21	-0.057	+0.21	
Dble.Trans.	October 3		October 3		October 3		October 3		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	30		29		1022		34	
	φ <sup>2</sup> Ceti		Bradley 82 (Cassiopeiae)		20 Ceti		λ <sup>2</sup> Tucanae	
Mag.Spect.	5.24	F5	5.45	F2, A2	4.92	K0	5.34	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	0 49	-10 42	0 49	+64 10	0 52	- 1 12	0 54	-69 35
1 <sup>d</sup>	25.207 <sup>s</sup> - 96	77.01 - 84	50.985 <sup>s</sup> - 343	32.85 - 107	17.158 <sup>s</sup> - 90	75.85 - 69	30.788 <sup>s</sup> - 513	91.28 - 75
1	0.8 - 104	77.70 - 69	50.615 - 370	33.39 + 54	17.060 - 98	76.50 - 65	30.263 - 525	91.43 - 15
1	10.7 - 110	78.25 - 55	50.223 - 392	33.37 - 2	16.955 - 105	77.11 - 61	29.733 - 530	91.00 + 43
1	20.7 - 110	78.62 - 37	49.827 - 396	32.76 - 61	16.847 - 108	77.64 - 53	29.219 - 514	89.93 + 107
1	30.7 - 106	78.80 - 18	49.445 - 382	31.65 - 111	16.743 - 104	78.08 - 44	28.740 - 479	88.32 + 161
2	9.6 - 98	78.78 + 2	49.088 - 357	30.04 - 161	16.645 - 98	78.41 - 33	28.300 - 440	86.20 + 212
2	19.6 - 82	78.53 + 25	48.780 - 308	28.00 - 204	16.563 - 82	78.58 - 17	27.921 - 379	83.59 + 261
3	1.6 - 62	78.05 + 48	48.533 - 247	25.66 - 234	16.500 - 63	78.59 - 1	27.612 - 309	80.62 + 297
3	11.6 - 35	77.35 + 70	48.359 - 174	23.09 - 257	16.463 - 37	78.42 + 17	27.377 - 235	77.30 + 332
3	21.5 - 2	76.40 + 95	48.275 - 84	20.40 - 269	16.461 - 2	78.03 + 39	27.234 - 143	73.73 + 357
3	31.5 + 33	75.22 + 118	48.284 + 9	17.75 - 265	16.493 + 32	77.46 + 57	27.182 - 52	70.02 + 371
4	10.5 + 73	73.78 + 144	48.388 + 104	15.18 - 257	16.562 + 69	76.57 + 89	27.227 + 45	66.19 + 383
4	20.5 + 117	72.10 + 168	48.593 + 205	12.85 - 233	16.678 + 116	75.43 + 114	27.377 + 150	62.36 + 383
4	30.4 + 159	70.25 + 185	48.887 + 294	10.85 - 200	16.836 + 158	74.08 + 135	27.623 + 246	58.61 + 375
5	10.4 + 199	68.22 + 203	49.267 + 380	09.21 - 164	17.034 + 198	72.50 + 158	27.966 + 343	54.99 + 362
5	20.4 + 238	66.05 + 217	49.723 + 456	08.05 - 116	17.270 + 236	70.73 + 177	28.402 + 436	51.62 + 337
5	30.3 + 269	63.82 + 223	50.235 + 512	07.37 - 68	17.537 + 267	68.81 + 192	28.915 + 513	48.55 + 307
6	9.3 + 295	61.53 + 229	50.796 + 561	07.19 - 18	17.830 + 293	66.77 + 204	29.502 + 587	45.84 + 271
6	19.3 + 314	59.28 + 225	51.386 + 590	07.56 + 37	18.142 + 312	64.66 + 211	30.144 + 642	43.59 + 225
6	29.3 + 323	57.11 + 217	51.987 + 601	08.42 + 86	18.463 + 321	62.55 + 211	30.821 + 677	41.81 + 178
7	9.2 + 327	55.07 + 204	52.590 + 603	09.77 + 135	18.787 + 324	60.47 + 208	31.524 + 703	40.56 + 125
7	19.2 + 320	53.22 + 185	53.174 + 584	11.60 + 183	19.104 + 317	58.49 + 198	32.227 + 703	39.90 + 66
7	29.2 + 306	51.60 + 162	53.727 + 553	13.81 + 221	19.408 + 304	56.66 + 183	32.911 + 684	39.80 + 10
8	8.2 + 286	50.25 + 135	54.243 + 516	16.40 + 259	19.692 + 284	55.00 + 166	33.562 + 651	40.28 - 48
8	18.1 + 258	49.21 + 104	54.703 + 460	19.30 + 290	19.948 + 256	53.58 + 142	34.153 + 591	41.34 - 106
8	28.1 + 227	48.47 + 74	55.106 + 403	22.43 + 313	20.175 + 227	52.40 + 118	34.672 + 519	42.89 - 155
9	7.1 + 193	48.05 + 42	55.446 + 340	25.76 + 333	20.369 + 194	51.48 + 92	35.106 + 434	44.94 - 205
9	17.0 + 155	47.96 + 9	55.714 + 268	29.20 + 344	20.526 + 157	50.84 + 64	35.435 + 329	47.37 - 243
9	27.0 + 119	48.14 - 18	55.914 + 200	32.67 + 347	20.648 + 122	50.46 + 38	35.660 + 225	50.08 - 271
10	7.0 + 83	48.58 - 44	56.041 + 127	36.15 + 348	20.737 + 89	50.32 + 14	35.772 + 112	53.02 - 294
10	17.0 + 48	49.24 - 66	56.094 + 53	39.52 + 337	20.791 + 54	50.41 - 9	35.766 - 6	56.01 - 299
10	26.9 + 18	50.06 - 82	56.080 - 14	42.74 + 322	20.816 + 25	50.68 - 27	35.656 - 110	58.96 - 295
11	5.9 - 11	51.01 - 95	55.996 - 84	45.74 + 300	20.814 - 2	51.11 - 43	35.439 - 217	61.76 - 280
11	15.9 - 36	52.01 - 100	55.847 - 149	48.42 + 268	20.787 - 27	51.66 - 55	35.139 - 309	64.26 - 250
11	25.9 - 55	53.01 - 100	55.640 - 207	50.75 + 233	20.740 - 47	52.28 - 62	34.747 - 383	66.39 - 213
12	5.8 - 75	53.99 - 98	55.376 - 264	52.65 + 190	20.674 - 66	52.96 - 68	34.297 - 450	68.05 - 166
12	15.8 - 87	54.89 - 90	55.065 - 311	54.05 + 140	20.595 - 79	53.64 - 67	33.802 - 495	69.16 - 111
12	25.8 - 98	55.67 - 78	54.717 - 348	54.95 + 90	20.504 - 91	54.31 - 68	33.282 - 520	69.69 - 53
12	35.7 - 107	56.31 - 64	54.339 - 378	55.27 + 32	20.402 - 102	54.96 - 65	32.746 - 536	69.62 + 7
	- 108	- 48	- 388	- 24	- 104	- 57	- 527	+ 69
Mean Place	27.015	60.52	53.890	27.30	19.069	62.76	30.296	59.75
sec δ, tan δ	+1.018	-0.189	+2.295	+2.066	+1.000	-0.021	+2.869	-2.689
dα(ψ), dδ(ψ)	+0.060	+0.39	+0.073	+0.39	+0.061	+0.39	+0.044	+0.39
dα(ε), dδ(ε)	+0.012	+0.21	-0.134	+0.22	+0.001	+0.23	+0.174	+0.24
Dble.Trans.	October 3		October 4		October 4		October 5	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	32		33		1023		35	
	$\gamma$ Cassiopeiae		$\mu$ Andromedae		68 Piscium		$\alpha$ Sculptoris	
Mag.Spect.	2.8 var.	B0p	3.94	A2	5.64	K0	4.39	B5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	0 55	+ 60 38	0 55	+ 38 25	0 57	+ 28 54	0 57	- 29 25
1 -9.2	50.384 - 285	42.92 +102	57.691 - 137	34.76 +33	03.938 - 111	67.17 + 6	55.921 - 125	71.45 -104
1 0.8	50.072 - 334	43.44 + 52	57.539 - 152	34.73 - 3	03.813 - 125	66.95 - 22	55.787 - 134	72.17 - 72
1 10.7	49.738 - 340	43.42 - 2	57.374 - 165	34.34 - 39	03.677 - 136	66.45 - 50	55.646 - 141	72.56 - 39
1 20.7	49.398 - 340	42.84 - 58	57.204 - 170	33.58 - 76	03.537 - 140	65.69 - 76	55.506 - 140	72.57 - 1
1 30.7	49.068 - 330	41.76 -108	57.038 - 166	32.51 -107	03.398 - 139	64.72 - 97	55.371 - 135	72.21 + 36
2 9.7	48.757 - 311	40.22 -154	56.880 - 158	31.16 -135	03.267 - 131	63.55 -117	55.244 - 127	71.51 + 70
2 19.6	48.486 - 271	38.27 -195	56.743 - 137	29.59 -157	03.153 - 114	62.24 -131	55.136 - 108	70.45 +106
3 1.6	48.268 - 218	36.03 -224	56.636 - 107	27.89 -170	03.064 - 89	60.89 -135	55.050 - 86	69.06 +139
3 11.6	48.112 - 156	33.56 -247	56.565 - 71	26.11 -178	03.006 - 58	59.51 -138	54.992 - 58	67.37 +169
3 21.5	48.034 - 78	30.99 -257	56.540 - 25	24.36 -175	02.988 - 18	58.23 -128	54.970 - 22	65.37 +200
3 31.5	48.038 + 4	28.45 -254	56.565 + 25	22.73 -163	03.014 + 26	57.09 -114	54.987 + 17	63.14 +223
4 10.5	48.128 + 90	26.00 -245	56.643 + 78	21.27 -146	03.087 + 73	56.14 - 95	55.047 + 60	60.68 +246
4 20.5	48.308 + 180	23.79 -221	56.778 + 135	20.08 -119	03.212 + 125	55.46 - 68	55.155 + 108	58.04 +264
4 30.4	48.568 + 260	21.89 -190	56.967 + 189	19.20 - 88	03.385 + 173	55.08 - 38	55.307 + 152	55.30 +274
5 10.4	48.907 + 339	20.34 -155	57.207 + 240	18.67 - 53	03.605 + 220	55.04 - 4	55.505 + 198	52.47 +283
5 20.4	49.315 + 408	19.26 -108	57.494 + 287	18.55 - 12	03.868 + 263	55.37 + 33	55.746 + 241	49.63 +284
5 30.4	49.776 + 461	18.65 - 61	57.817 + 323	18.83 + 28	04.165 + 297	56.04 + 67	56.022 + 276	46.86 +277
6 9.3	50.283 + 507	18.53 - 12	58.172 + 355	19.51 + 68	04.491 + 326	57.06 +102	56.330 + 308	44.19 +267
6 19.3	50.819 + 536	18.93 + 40	58.547 + 375	20.59 +108	04.836 + 345	58.41 +135	56.661 + 331	41.71 +248
6 29.3	51.366 + 547	19.81 + 88	58.931 + 384	22.02 +143	05.190 + 354	60.04 +163	57.006 + 345	39.47 +224
7 9.2	51.916 + 550	21.17 +136	59.317 + 386	23.78 +176	05.546 + 356	61.92 +188	57.358 + 352	37.52 +195
7 19.2	52.452 + 536	22.98 +181	59.694 + 377	25.83 +205	05.895 + 349	64.00 +208	57.358 + 348	35.93 +159
7 29.2	52.961 + 509	25.16 +218	60.052 + 358	28.09 +226	06.227 + 332	66.21 +221	57.706 + 336	34.72 +121
8 8.2	53.437 + 476	27.71 +255	60.387 + 335	30.54 +245	06.538 + 311	68.53 +232	58.359 + 317	33.92 + 80
8 18.1	53.865 + 428	30.54 +283	60.690 + 303	33.11 +257	06.820 + 282	70.88 +235	58.647 + 288	33.57 + 35
8 28.1	54.243 + 378	33.59 +305	60.957 + 269	35.73 +262	07.069 + 249	73.22 +234	58.902 + 255	33.64 - 7
9 7.1	54.564 + 321	36.82 +323	61.186 + 227	38.39 +266	07.283 + 214	75.53 +231	59.121 + 219	34.12 - 48
9 17.1	54.822 + 258	40.15 +333	61.373 + 187	41.01 +262	07.458 + 175	77.72 +219	59.297 + 176	34.99 - 87
9 27.0	55.018 + 196	43.51 +336	61.519 + 146	43.54 +253	07.597 + 139	79.79 +207	59.432 + 135	36.18 -119
10 7.0	55.152 + 134	46.87 +336	61.625 + 106	45.96 +242	07.699 + 102	81.72 +193	59.525 + 93	37.66 -148
10 17.0	55.219 + 67	50.11 +324	61.690 + 65	48.21 +225	07.764 + 65	83.44 +172	59.576 + 51	39.34 -188
10 26.9	55.227 + 8	53.21 +310	61.720 + 30	50.26 +205	07.797 + 33	84.96 +152	59.591 + 15	41.13 -179
11 5.9	55.174 - 53	56.09 +288	61.713 - 7	52.08 +182	07.797 + 1	86.26 +130	59.570 - 21	42.97 -184
11 15.9	55.062 - 112	58.66 +257	61.673 - 40	53.61 +153	07.798 - 27	87.30 +104	59.570 - 51	44.76 -179
11 25.9	54.899 - 163	60.89 +223	61.605 - 68	54.87 +126	07.771 - 52	88.10 + 80	59.519 - 76	46.43 -167
12 5.8	54.684 - 215	62.72 +183	61.508 - 97	55.79 + 92	07.642 - 77	88.63 + 53	59.343 - 100	47.91 -148
12 15.8	54.428 - 256	64.06 +134	61.388 - 120	56.35 + 21	07.545 - 97	88.86 + 23	59.228 - 115	49.13 -122
12 25.8	54.137 - 291	64.91 + 85	61.249 - 139	56.56 + 56	07.432 - 113	88.83 - 3	59.100 - 128	50.06 - 93
12 35.8	53.818 - 319	65.23 + 32	61.092 - 157	56.39 - 17	07.304 - 128	88.50 - 33	59.100 - 138	50.66 - 60
	53.818 - 331	65.23 - 24	61.092 - 163	56.39 - 53	07.304 - 135	88.50 - 60	58.962 - 140	50.66 - 23
Mean Place	53.147	37.80	60.047	34.72	06.161	69.85	57.376	49.12
sec $\delta$ , tan $\delta$	+2.040	+1.778	+1.276	+0.793	+1.142	+0.552	+1.148	-0.564
$da(\psi)$ , $d\delta(\psi)$	+0.073	+0.39	+0.066	+0.39	+0.065	+0.39	+0.057	+0.39
$da(\epsilon)$ , $d\delta(\epsilon)$	-0.115	+0.24	-0.051	+0.24	-0.036	+0.25	+0.036	+0.25
Dble.Trans.	October 5		October 5		October 5		October 6	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1024		1025		1027		1026		
	98 G. Ceti		101 G. Ceti		80 G. Phoenicis		$\sigma$ Sculptoris		
Mag.Spect.	6.70	K0	6.58	G5	6.00	K0	5.52	A2	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° /	h m	° /	h m	° /	h m	° /	
	0 58	- 5 57	1 00	-16 20	1 01	-57 04	1 01	-31 37	
1	<sup>d</sup> -9.2	<sup>s</sup> 02.898 - 90	<sup>s</sup> 33.34 - 78	<sup>s</sup> 56.815 - 99	<sup>s</sup> 33.58 - 95	<sup>s</sup> 27.220 - 281	<sup>s</sup> 58.56 - 101	<sup>s</sup> 46.410 - 130	<sup>s</sup> 51.04 - 108
1	0.8	02.799 - 99	34.04 - 70	56.707 - 108	34.33 - 75	26.928 - 292	59.03 - 47	46.270 - 140	51.78 - 74
1	10.7	02.692 - 107	34.64 - 60	56.591 - 116	34.88 - 55	26.628 - 300	58.97 + 6	46.123 - 147	52.16 - 38
1	20.7	02.582 - 110	35.11 - 47	56.473 - 118	35.18 - 30	26.333 - 295	58.33 + 64	45.975 - 148	52.15 + 1
1	30.7	02.475 - 107	35.42 - 31	56.358 - 115	35.23 - 5	26.054 - 279	57.17 +116	45.833 - 142	51.76 + 39
2	9.7	02.373 - 102	35.59 - 17	56.248 - 110	35.03 + 20	25.795 - 259	55.51 +166	45.699 - 134	51.00 + 76
2	19.6	02.286 - 87	35.56 + 3	56.154 - 94	34.55 + 48	25.569 - 226	53.36 +215	45.583 - 116	49.86 +114
3	1.6	02.218 - 68	35.34 + 22	56.080 - 74	33.82 + 73	25.384 - 185	50.83 +253	45.490 - 93	48.38 +148
3	11.6	02.175 - 43	34.91 + 43	56.030 - 50	32.82 +100	25.243 - 141	47.94 +289	45.424 - 66	46.59 +179
3	21.5	02.166 - 9	34.24 + 67	56.014 - 16	31.56 +126	25.161 - 82	44.75 +319	45.396 - 28	44.49 +210
3	31.5	02.191 + 25	33.36 + 88	56.033 + 19	30.05 +151	25.138 - 23	41.37 +338	45.407 + 11	42.16 +233
4	10.5	02.255 + 64	32.21 +115	56.093 + 60	28.30 +175	25.178 + 40	37.81 +356	45.462 + 55	39.59 +257
4	20.5	02.364 + 109	30.81 +140	56.198 + 105	26.32 +198	25.289 + 111	34.19 +362	45.565 + 103	36.85 +274
4	30.4	02.515 + 151	29.21 +160	56.345 + 147	24.18 +214	25.465 + 176	30.58 +361	45.714 + 149	34.02 +283
5	10.4	02.707 + 192	27.40 +181	56.534 + 189	21.89 +229	25.708 + 243	27.03 +355	45.909 + 195	31.10 +292
5	20.4	02.938 + 231	25.43 +197	56.764 + 230	19.49 +240	26.016 + 308	23.64 +339	46.149 + 240	28.19 +291
5	30.4	03.201 + 263	23.35 +208	57.027 + 263	17.07 +242	26.376 + 360	20.49 +315	46.425 + 276	25.35 +284
6	9.3	03.491 + 290	21.17 +218	57.319 + 292	14.63 +244	26.787 + 411	17.62 +287	46.734 + 309	22.63 +272
6	19.3	03.801 + 310	18.98 +219	57.632 + 313	12.27 +236	27.236 + 449	15.14 +248	47.068 + 334	20.11 +252
6	29.3	04.121 + 320	16.83 +215	57.957 + 325	10.04 +223	27.709 + 473	13.08 +206	47.416 + 348	17.86 +225
7	9.2	04.445 + 324	14.75 +208	58.288 + 331	07.98 +206	28.199 + 490	11.49 +159	47.773 + 357	15.90 +196
7	19.2	04.764 + 319	12.82 +193	58.615 + 327	06.17 +181	28.689 + 490	10.45 +104	48.127 + 354	14.33 +157
7	29.2	05.070 + 306	11.07 +175	58.930 + 315	04.63 +154	29.166 + 477	09.93 + 52	48.469 + 342	13.15 +118
8	8.2	05.359 + 289	09.55 +152	59.227 + 297	03.41 +122	29.621 + 455	09.97 - 4	48.793 + 324	12.39 + 76
8	18.1	05.620 + 261	08.30 +125	59.497 + 270	02.54 + 87	30.036 + 415	10.59 - 62	49.088 + 295	12.11 + 28
8	28.1	05.852 + 232	07.32 + 98	59.737 + 240	02.02 + 52	30.404 + 368	11.70 -111	49.350 + 262	12.24 - 13
9	7.1	06.051 + 199	06.64 + 68	59.944 + 207	01.86 + 16	30.717 + 313	13.31 -161	49.576 + 226	12.81 - 57
9	17.1	06.214 + 163	06.27 + 37	60.113 + 169	02.05 - 19	30.963 + 246	15.34 -203	49.758 + 182	13.78 - 97
9	27.0	06.342 + 128	06.16 + 11	60.246 + 133	02.53 - 48	31.143 + 180	17.70 -236	49.899 + 141	15.07 -129
10	7.0	06.436 + 94	06.31 - 15	60.342 + 96	03.30 - 77	31.252 + 109	20.32 -262	49.997 + 98	16.66 -159
10	17.0	06.494 + 58	06.70 - 39	60.401 + 59	04.29 - 99	31.289 + 37	23.07 -275	50.051 + 54	18.45 -179
10	26.9	06.524 + 30	07.25 - 55	60.428 + 27	05.43 -114	31.260 - 29	25.83 -276	50.068 + 17	20.35 -190
11	5.9	06.524 + 0	07.95 - 70	60.425 - 3	06.68 -125	31.167 - 93	28.54 -271	50.048 - 20	22.30 -195
11	15.9	06.500 - 24	08.75 - 80	60.394 - 31	07.97 -129	31.017 - 150	31.02 -248	49.996 - 52	24.18 -188
11	25.9	06.455 - 45	09.58 - 83	60.342 - 52	09.22 -125	30.821 - 196	33.20 -218	49.918 - 78	25.93 -175
12	5.8	06.390 - 65	10.44 - 86	60.269 - 73	10.41 -119	30.583 - 238	35.01 -181	49.815 - 103	27.49 -156
12	15.8	06.310 - 80	11.25 - 81	60.180 - 89	11.45 -104	30.316 - 267	36.33 -132	49.695 - 120	28.76 -127
12	25.8	06.219 - 91	11.99 - 74	60.079 - 101	12.33 - 88	30.029 - 287	37.15 - 82	49.562 - 133	29.72 - 96
12	35.8	06.116 - 103	12.66 - 67	59.967 - 112	13.01 - 68	29.729 - 300	37.43 - 28	49.418 - 144	30.33 - 61
		- 107	- 54	- 116	- 44	- 299	+ 30	- 147	- 22
Mean Place	04.715	18.88	58.473	15.69	27.711	29.43	47.789	28.25	
sec $\delta$ , tan $\delta$	+1.005	-0.104	+1.042	-0.293	+1.840	-1.544	+1.174	-0.616	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.060	+0.39	+0.059	+0.38	+0.050	+0.38	+0.057	+0.38	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.007	+0.25	+0.019	+0.26	+0.099	+0.26	+0.040	+0.27	
Dble.Trans.	October 6		October 6		October 7		October 7		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	36		37		1028		1029	
	ε Piscium		26 Ceti*		72 Piscium		106 G. Ceti	
Mag. Spect.	4.45	K0	6.18	F0	5.65	F2	6.29	G5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	1 02	+ 7 48	1 03	+ 1 17	1 04	+ 14 52	1 05	- 24 03
1 -9.2	12 546 <sup>s</sup> - 87	54 01 - 50	05 394 <sup>s</sup> - 86	29 05 - 65	20 480 <sup>s</sup> - 88	18 46 - 31	27 049 <sup>s</sup> - 111	72 53 - 106
1 0.8	12 449 - 97	53 45 - 56	05 299 - 95	28 41 - 64	20 379 - 101	18 02 - 44	26 928 - 121	73 31 - 78
1 10.7	12 341 - 108	52 85 - 60	05 193 - 106	27 79 - 62	20 266 - 113	17 45 - 57	26 799 - 129	73 81 - 50
1 20.7	12 229 - 112	52 21 - 64	05 083 - 110	27 23 - 56	20 148 - 118	16 77 - 68	26 667 - 118	73 98 - 17
1 30.7	12 119 - 110	51 59 - 62	04 975 - 108	26 74 - 49	20 031 - 117	16 02 - 75	26 539 - 128	73 84 + 14
2 9.7	12 013 - 106	50 98 - 61	04 871 - 104	26 33 - 41	19 919 - 112	15 23 - 79	26 417 - 122	73 38 + 46
2 19.6	11 921 - 92	50 44 - 54	04 781 - 90	26 05 - 28	19 820 - 99	14 43 - 80	26 310 - 107	72 58 + 80
3 1.6	11 864 - 73	50 01 - 43	04 710 - 71	25 92 - 13	19 742 - 78	13 68 - 75	26 224 - 86	71 48 + 110
3 11.6	11 801 - 47	49 70 - 31	04 663 - 47	25 96 + 4	19 689 - 53	13 01 - 67	26 164 - 80	70 09 + 139
3 21.5	11 788 - 13	49 58 - 12	04 650 - 13	26 20 + 24	19 672 - 17	12 48 - 53	26 138 - 26	68 40 + 169
3 31.5	11 814 + 26	49 68 + 10	04 674 + 24	26 64 + 44	19 693 + 21	12 16 - 32	26 149 + 11	66 47 + 193
4 10.5	11 864 + 50	49 94 + 26	04 730 + 56	27 31 + 67	19 754 + 61	12 06 - 10	26 201 + 52	64 29 + 218
4 20.5	11 981 + 117	50 51 + 57	04 837 + 107	28 31 + 100	19 863 + 109	12 15 + 9	26 300 + 99	61 91 + 238
4 30.4	12 134 + 153	51 34 + 83	04 985 + 148	29 51 + 120	20 017 + 154	12 55 + 40	26 443 + 143	59 40 + 251
5 10.4	12 328 + 194	52 43 + 109	05 176 + 191	30 94 + 143	20 215 + 198	13 25 + 70	26 630 + 187	56 77 + 263
5 20.4	12 562 + 234	53 77 + 134	05 405 + 229	32 59 + 165	20 453 + 238	14 24 + 99	26 859 + 229	54 09 + 268
5 30.4	12 827 + 265	55 32 + 155	05 666 + 261	34 40 + 181	20 723 + 270	15 49 + 125	27 123 + 264	51 42 + 267
6 9.3	13 120 + 293	57 07 + 175	05 955 + 289	36 35 + 195	21 021 + 298	16 98 + 149	27 419 + 296	48 81 + 261
6 19.3	13 432 + 312	58 97 + 190	06 264 + 309	38 40 + 205	21 340 + 319	18 70 + 172	27 738 + 319	46 34 + 247
6 29.3	13 754 + 322	60 96 + 199	06 583 + 319	40 48 + 208	21 668 + 328	20 56 + 186	28 070 + 332	44 07 + 227
7 9.2	14 081 + 327	63 01 + 205	06 908 + 325	42 55 + 207	22 001 + 333	22 55 + 199	28 411 + 341	42 03 + 204
7 19.2	14 402 + 321	65 05 + 204	07 227 + 319	44 55 + 200	22 328 + 327	24 60 + 205	28 748 + 337	40 31 + 172
7 29.2	14 709 + 307	67 03 + 198	07 533 + 306	46 43 + 188	22 641 + 313	26 66 + 206	29 074 + 326	38 92 + 139
8 8.2	14 999 + 290	68 91 + 188	07 822 + 289	48 16 + 173	22 937 + 296	28 70 + 204	29 384 + 310	37 92 + 100
8 18.1	15 262 + 263	70 65 + 174	08 085 + 263	49 67 + 151	23 206 + 269	30 65 + 195	29 666 + 282	37 32 + 60
8 28.1	15 496 + 234	72 21 + 156	08 320 + 235	50 96 + 129	23 445 + 239	32 48 + 183	29 918 + 252	37 12 + 20
9 7.1	15 699 + 203	73 57 + 136	08 522 + 202	52 00 + 104	23 653 + 208	34 17 + 169	30 136 + 218	37 32 - 20
9 17.1	15 865 + 166	74 69 + 112	08 690 + 168	52 78 + 78	23 825 + 172	35 66 + 149	30 314 + 178	37 90 - 58
9 27.0	15 999 + 134	75 60 + 91	08 823 + 133	53 31 + 53	23 964 + 139	36 97 + 131	30 453 + 139	38 80 - 90
10 7.0	16 098 + 99	76 28 + 68	08 923 + 100	53 59 + 28	24 068 + 104	38 07 + 110	30 554 + 101	39 99 - 119
10 17.0	16 164 + 66	76 73 + 45	08 989 + 66	53 64 + 5	24 138 + 70	38 96 + 89	30 615 + 61	41 41 - 142
10 26.9	16 201 + 37	76 99 + 26	09 026 + 37	53 51 - 13	24 179 + 41	39 65 + 69	30 642 + 27	42 96 - 155
11 5.9	16 210 + 9	77 06 + 7	09 035 + 9	53 20 - 31	24 191 + 12	40 14 + 49	30 635 - 7	44 60 - 164
11 15.9	16 193 - 17	76 97 - 9	09 018 - 17	52 76 - 44	24 177 - 14	40 43 + 29	30 599 - 36	46 22 - 162
11 25.9	16 156 - 37	76 75 - 22	08 980 - 38	52 24 - 52	24 141 - 36	40 56 + 13	30 539 - 60	47 77 - 155
12 5.8	16 097 - 59	76 40 - 35	08 922 - 58	51 64 - 60	24 082 - 59	40 50 - 6	30 456 - 83	49 19 - 142
12 15.8	16 023 - 74	75 96 - 44	08 848 - 74	51 01 - 63	24 006 - 76	40 29 - 21	30 355 - 101	50 39 - 120
12 25.8	15 934 - 89	75 45 - 51	08 761 - 87	50 37 - 64	23 915 - 91	39 94 - 35	30 242 - 113	51 35 - 96
12 35.8	15 833 - 101	74 87 - 58	08 661 - 100	49 73 - 64	23 810 - 105	39 44 - 50	30 116 - 126	52 03 - 68
	15 833 - 107	74 87 - 62	08 661 - 105	49 73 - 59	23 810 - 112	39 44 - 61	30 116 - 129	52 03 - 37
Mean Place	14.504	63.53	07.275	40.76	22.508	25.47	28.541	52.32
sec δ, tan δ	+1.009	+0.137	+1.000	+0.023	+1.035	+0.266	+1.095	-0.447
dα(ψ), dδ(ψ)	+0.062	+0.38	+0.061	+0.38	+0.063	+0.38	+0.058	+0.38
dα(ε), dδ(ε)	-0.009	+0.27	-0.001	+0.27	-0.017	+0.28	+0.029	+0.28
Dble. Trans.	October 7		October 7		October 7		October 8	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	39		1031		1030		40		
	ι Tucanae		υ Phoenicis		μ Cassiopeiae		η Ceti		
Mag.Spect.	5.32	K0	5.15	A3	5.26	G5	3.60	K0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° '	h m	° '	h m	° '	h m	° '	
	1 06	-61 50	1 07	-41 33	1 07	+54 50	1 07	-10 14	
	<sup>d</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	
1	-9.2	46.707	-342	79.35	-102	09.880	-177	57.82	-72
1	0.8	46.350	-357	79.81	+9	09.703	-186	58.54	-29
1	10.7	45.985	-365	79.72	+70	09.517	-186	58.83	+19
1	20.7	45.624	-361	79.02	+125	09.331	-179	58.64	+65
1	30.7	45.282	-342	77.77	+175	09.152	-170	57.99	+108
2	9.7	44.962	-320	76.02	+226	08.982	-148	56.91	+189
2	19.6	44.681	-281	73.76	+265	08.834	-122	55.40	+224
3	1.6	44.447	-183	71.11	+301	08.712	-91	53.51	+255
3	11.6	44.264	-116	68.10	+332	08.621	-50	51.27	+279
3	21.5	44.148	-116	64.78	+350	08.571	-5	48.72	+301
3	31.5	44.099	-49	61.28	+367	08.566	+43	45.93	+315
4	10.5	44.122	+23	57.61	+373	08.609	+96	42.92	+321
4	20.5	44.226	+104	53.88	+370	08.705	+147	39.77	+325
4	30.4	44.404	+178	50.18	+363	08.852	+199	36.56	+318
5	10.4	44.657	+253	46.55	+370	09.051	+249	33.31	+304
5	20.4	44.985	+328	43.10	+319	09.300	+290	30.13	+287
5	30.4	45.374	+447	39.91	+290	09.590	+328	27.09	+258
6	9.3	45.821	+47	37.01	+248	09.918	+358	24.22	+226
6	19.3	46.313	+492	34.53	+204	10.276	+375	21.64	+188
6	29.3	46.836	+523	32.49	+156	10.651	+328	19.38	+143
7	9.2	47.380	+544	30.93	+99	11.039	+387	17.50	+98
7	19.2	47.927	+547	29.94	+45	11.426	+375	16.07	+48
7	29.2	48.462	+535	29.49	-12	11.801	+358	15.09	+402
8	8.2	48.975	+513	29.61	-71	12.159	+328	14.61	-5
8	18.1	49.445	+470	30.32	-122	12.487	+293	14.65	-98
8	28.1	49.864	+419	31.54	-173	12.780	+252	23.036	+312
9	7.1	50.221	+357	33.27	-216	13.032	+204	23.348	+259
9	17.1	50.503	+282	35.43	-248	13.236	+156	23.607	+207
9	27.0	50.709	+206	37.91	-275	13.392	+107	23.814	+153
10	7.0	50.834	+125	40.66	-287	13.499	+56	23.967	+98
10	17.0	50.873	+39	43.53	-288	13.555	+12	24.065	+48
10	26.9	50.837	-36	46.41	-281	13.567	-32	24.113	-5
11	5.9	50.724	-113	49.22	-257	13.535	-72	24.108	-54
11	15.9	50.542	-182	51.79	-226	13.463	-103	24.054	-97
11	25.9	50.304	-238	54.05	-186	13.360	-133	23.957	-143
12	5.8	50.015	-289	55.91	-134	13.227	-154	23.814	-179
12	15.8	49.690	-325	57.25	-83	13.073	-170	23.635	-211
12	25.8	49.342	-348	58.08	-26	12.903	-183	23.424	-239
12	35.8	48.976	-365	58.34	+35	12.720	-186	23.185	-252
Mean Place	46.777	49.73		10.950	32.58	22.022	76.26	54.636	72.84
sec δ, tan δ	+2.119	-1.869		+1.336	-0.887	+1.737	+1.420	+1.016	-0.181
dα(ψ), dδ(ψ)	+0.047	+0.38		+0.054	+0.38	+0.072	+0.38	+0.060	+0.38
dα(ε), dδ(ε)	+0.119	+0.29		+0.057	+0.29	-0.091	+0.29	+0.012	+0.29
Dbles.Trans.	October 8		October 8		October 8		October 8		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	42		1032		43		41	
	β Andromedae		χ Piscium		τ Piscium		44 H. Cephei	
Mag.Spect.	2.37	M0	4.89	K0	4.70	K0	5.68	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	1 08	+35 32	1 10	+20 57	1 10	+30 00	1 10	+79 35
1 -9.2	56 127 <sup>s</sup> -120	56 88 +33	41 489 <sup>s</sup> -92	42 52 -13	52 683 <sup>s</sup> -106	63 64 +16	60 500 <sup>s</sup> -928	76 87 +179
1 0.8	55 990 -137	56 89 +1	41 383 -106	42 22 -30	52 561 -122	63 53 -11	59 483 -1017	78 09 +122
1 10.7	55 837 -153	56 56 -33	41 264 -119	41 72 -50	52 424 -137	63 14 -39	58 394 -1089	78 71 +62
1 20.7	55 677 -160	56 56 -67	41 264 -127	41 72 -67	52 424 -145	63 14 -66	58 394 -1114	78 71 -5
1 30.7	55 516 -161	55 89 -94	41 137 -126	41 05 -80	52 279 -144	62 48 -89	57 280 -1090	78 66 -65
2 9.7	55 362 -154	54 95 -121	41 011 -124	40 25 -92	52 135 -141	61 59 -110	56 190 -1037	78 01 -125
2 19.6	55 224 -138	53 74 -141	40 887 -109	39 33 -99	51 994 -125	60 49 -126	55 153 -926	76 76 -180
3 1.6	55 113 -111	52 33 -153	40 778 -89	38 34 -98	51 869 -102	59 23 -133	54 227 -975	74 96 -223
3 11.6	55 033 -90	50 80 -161	40 689 -63	37 36 -96	51 767 -73	57 90 -137	53 448 -607	72 73 -260
3 21.6	54 998 -35	49 19 -159	40 626 -25	36 40 -85	51 694 -32	56 53 -131	52 841 -393	70 13 -284
3 31.5	55 009 +11	47 60 -147	40 601 -14	35 55 -68	51 662 +11	55 22 -118	52 448 -171	67 29 -294
4 10.5	55 009 +62	46 13 -132	40 615 +14	34 87 -48	51 673 +59	54 04 -102	52 277 +56	64 35 -296
4 20.5	55 071 +118	44 81 -107	40 672 +57	34 39 -25	51 732 +111	53 02 -76	52 333 +296	61 39 -282
4 30.4	55 189 +171	43 74 -78	40 777 +105	34 14 +2	51 843 +161	52 26 -48	52 629 +510	58 57 -259
5 10.4	55 360 +221	42 96 -45	40 929 +198	34 16 +34	52 004 +210	51 78 -17	53 139 +714	55 98 -228
5 20.4	55 581 +269	42 51 -7	41 127 +241	34 50 +66	52 214 +255	51 61 +20	53 853 +900	53 70 -187
5 30.4	55 850 +306	42 44 +31	41 368 +274	35 16 +95	52 469 +291	51 81 +54	54 753 +1040	51 83 -139
6 9.3	56 156 +339	42 75 +68	41 642 +304	36 11 +124	52 760 +322	52 35 +89	55 793 +1164	50 44 -91
6 19.3	56 495 +361	43 43 +106	41 946 +325	37 35 +150	53 082 +344	53 24 +122	56 957 +1250	49 53 -34
6 29.3	56 856 +373	44 49 +138	42 271 +336	38 85 +171	53 426 +355	54 46 +151	58 207 +1291	49 19 +18
7 9.3	57 229 +377	45 87 +169	42 607 +341	40 56 +190	53 781 +361	55 97 +176	59 498 +1315	49 37 +72
7 19.2	57 606 +371	47 56 +196	42 948 +336	42 46 +202	54 142 +355	57 73 +198	60 813 +1295	50 09 +128
7 29.2	57 977 +355	49 52 +215	43 284 +324	44 48 +208	54 497 +340	59 71 +213	62 108 +1245	51 37 +173
8 8.2	58 332 +335	51 67 +232	43 608 +305	46 56 +213	54 837 +322	61 84 +225	63 353 +1180	53 10 +221
8 18.1	58 667 +306	53 99 +243	43 913 +279	48 69 +209	55 159 +294	64 09 +231	64 533 +1076	55 31 +263
8 28.1	58 973 +273	56 42 +247	44 192 +250	50 78 +203	55 453 +263	66 40 +230	65 609 +961	57 94 +296
9 7.1	59 246 +238	58 89 +249	44 442 +218	52 81 +193	55 716 +230	68 70 +229	66 570 +831	60 90 +327
9 17.1	59 484 +197	61 38 +244	44 660 +182	54 74 +178	55 946 +191	70 99 +220	67 401 +674	64 17 +351
9 27.0	59 681 +160	63 82 +236	44 842 +149	56 52 +162	56 137 +156	73 19 +209	68 075 +519	67 68 +365
10 7.0	59 841 +121	66 18 +225	44 991 +113	58 14 +145	56 293 +119	75 28 +196	68 594 +351	71 33 +377
10 17.0	59 962 +82	68 43 +207	45 104 +79	59 59 +125	56 412 +82	77 24 +177	68 945 +167	75 10 +370
10 27.0	60 044 +47	70 50 +190	45 183 +49	60 84 +105	56 494 +50	79 01 +158	69 112 -3	78 87 +377
11 5.9	60 091 +12	72 40 +168	45 232 +18	61 89 +85	56 544 +17	80 59 +138	69 109 -188	82 57 +358
11 15.9	60 103 -20	74 08 +142	45 250 -9	62 74 +63	56 561 -14	81 97 +112	68 921 -369	86 15 +331
11 25.9	60 083 -49	75 50 +116	45 241 -33	63 37 +43	56 547 -40	83 09 +90	68 552 -532	89 46 +302
12 5.8	60 034 -79	76 66 +87	45 208 -58	63 80 +22	56 507 -68	83 99 +62	68 020 -699	92 48 +262
12 15.8	59 955 -103	77 53 +53	45 150 -77	64 02 +2	56 439 -89	84 61 +35	67 321 -836	95 10 +212
12 25.8	59 852 -123	78 06 +22	45 073 -95	64 04 -18	56 350 -109	84 96 +7	66 485 -949	97 22 +160
12 35.8	59 729 -142	78 28 -12	44 978 -110	63 86 -39	56 241 -127	85 03 -22	65 536 -1045	98 82 +100
	59 587 -153	78 16 -46	44 868 -120	63 47 -66	56 114 -138	84 81 -50	64 491 -1088	99 82 +35
Mean Place	58.387	57.17	43.557	47.25	54.860	65.52	64.392	69.14
sec δ, tan δ	+1.229	+0.715	+1.071	+0.383	+1.155	+0.578	+5.541	+5.450
da(ψ), dδ(ψ)	+0.067	+0.38	+0.064	+0.38	+0.066	+0.38	+0.105	+0.38
da(ε), dδ(ε)	-0.045	+0.30	-0.024	+0.30	-0.037	+0.30	-0.346	+0.31
Dble. Trans.	October 8		October 9		October 9		October 9	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	44			1033			1034			45						
	102 G. Sculptoris			ζ Piscium* ρ.			89 Piscium			υ Piscium						
Mag. Spect.	5.91	A5		5.57	A5		5.28	A2		4.67	A2					
U.T.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.				
	h	m	° ' "	h	m	° ' "	h	m	° ' "	h	m	° ' "				
	1	12	-37 55	1	12	+ 7 30	1	17	+ 3 32	1	18	+27 11				
1 <sup>d</sup>	<sup>s</sup> 07.039	-149	64.15	-120	<sup>s</sup> 59.591	-82	06.01	-50	<sup>s</sup> 04.275	-80	26.73	-60	<sup>s</sup> 41.221	-96	33.82	+11
1	0.8	-160	64.94	-79	59.497	-94	05.47	-54	04.182	-93	26.12	-61	41.108	-113	33.69	-13
1	10.7	-170	65.34	-40	59.390	-107	04.87	-60	04.077	-105	25.51	-61	40.979	-129	33.32	-37
1	20.7	-173	65.34	+7	59.277	-113	04.26	-61	03.964	-113	24.93	-58	40.840	-139	32.70	-62
1	30.7	-168	64.78	+49	59.164	-113	03.66	-60	03.850	-114	24.41	-52	40.700	-140	31.88	-82
2	9.7	-160	63.87	+91	59.053	-111	03.08	-58	03.739	-111	23.95	-46	40.562	-138	30.88	-100
2	19.6	-141	62.53	+134	58.954	-99	02.57	-51	03.638	-101	23.59	-36	40.437	-125	29.75	-113
3	1.6	-118	60.83	+170	58.874	-80	02.17	-40	03.555	-83	23.37	-22	40.333	-104	28.56	-119
3	11.6	-88	58.78	+205	58.817	-87	01.88	-29	03.496	-59	23.29	-8	40.257	-76	27.35	-121
3	21.6	-50	56.41	+237	58.794	-23	01.78	-10	03.469	-27	23.41	+12	40.219	-38	26.20	-115
3	31.5	-8	53.80	+261	58.809	+15	01.88	+10	03.479	+10	23.73	+32	40.223	+4	25.17	-103
4	10.5	+38	50.96	+284	58.825	+16	01.73	-15	03.524	+45	24.18	+45	40.273	+50	24.32	-85
4	20.5	+89	47.95	+301	58.956	+131	02.74	+101	03.615	+91	25.07	+89	40.373	+100	23.70	-62
4	30.4	+139	44.86	+309	59.099	+143	03.57	+83	03.751	+136	26.13	+106	40.523	+150	23.35	-35
5	10.4	+189	41.71	+315	59.284	+185	04.65	+108	03.930	+179	27.42	+129	40.721	+198	23.31	-4
5	20.4	+237	38.60	+311	59.510	+226	05.98	+133	04.149	+219	28.93	+151	40.964	+243	23.61	+30
5	30.4	+277	35.59	+301	59.768	+258	07.51	+153	04.402	+253	30.62	+169	41.244	+280	24.23	+62
6	9.3	+314	32.74	+285	60.056	+288	09.24	+173	04.684	+282	32.48	+186	41.555	+311	25.18	+95
6	19.3	+344	30.13	+261	60.365	+309	11.12	+188	04.989	+305	34.46	+198	41.890	+335	26.44	+126
6	29.3	+360	27.82	+231	60.685	+320	13.08	+196	05.305	+316	36.48	+202	42.236	+346	27.96	+152
7	9.3	+373	25.85	+197	61.011	+326	15.10	+202	05.629	+324	38.53	+206	42.590	+354	29.71	+175
7	19.2	+373	24.31	+154	61.334	+323	17.12	+202	05.950	+321	40.52	+199	42.940	+350	31.66	+195
7	29.2	+362	23.21	+110	61.645	+311	19.07	+195	06.260	+310	42.43	+191	43.277	+337	33.72	+206
8	8.2	+347	22.58	+63	61.940	+295	20.93	+186	06.555	+295	44.20	+177	43.597	+320	35.89	+217
8	18.1	+318	22.45	+13	62.209	+269	22.64	+171	06.825	+270	45.78	+158	43.891	+294	38.10	+221
8	28.1	+285	22.78	-33	62.452	+243	24.17	+153	07.069	+244	47.16	+138	44.156	+265	40.28	+218
9	7.1	+247	23.58	-80	62.664	+212	25.50	+133	07.283	+214	48.31	+115	44.389	+233	42.43	+215
9	17.1	+202	24.81	-123	62.841	+177	26.60	+110	07.463	+180	49.19	+88	44.585	+196	44.48	+205
9	27.0	+158	26.38	-157	62.985	+144	27.47	+87	07.610	+147	49.84	+65	44.747	+162	46.40	+192
10	7.0	+112	28.26	-188	63.096	+111	28.12	+65	07.724	+114	50.25	+41	44.874	+127	48.19	+179
10	17.0	+63	30.35	-209	63.173	+77	28.54	+42	07.804	+80	50.43	+18	44.964	+90	49.79	+160
10	27.0	+23	32.54	-219	63.222	+49	28.77	+23	07.856	+52	50.42	-1	45.023	+59	51.21	+142
11	5.9	-20	34.78	-224	63.242	+20	28.82	+5	07.878	+22	50.22	-20	45.050	+27	52.43	+122
11	15.9	-56	36.92	-214	63.235	-7	28.70	-12	07.874	-4	49.89	-33	45.046	-4	53.42	+99
11	25.9	-87	38.91	-199	63.207	-28	28.46	-24	07.848	-26	49.45	-44	45.017	-29	54.19	+77
12	5.8	-115	40.66	-175	63.156	-51	28.10	-36	07.799	-49	48.93	-52	44.960	-57	54.72	+53
12	15.8	-137	42.07	-141	63.087	-69	27.65	-45	07.732	-67	48.35	-58	44.880	-80	54.99	+27
12	25.8	-153	43.13	-106	63.002	-85	27.14	-51	07.649	-83	47.75	-60	44.780	-100	55.02	+3
12	35.8	-166	43.78	-65	62.903	-99	26.56	-58	07.551	-98	47.14	-61	44.661	-119	54.79	-23
		-171		-21		-107		-59		-106		-60		-130		-47
Mean Place	08.167		40.22		61.495		15.13		06.099		37.02		43.324		36.29	
sec δ, tan δ	+1.268		-0.779		+1.009		+0.132		+1.002		+0.062		+1.124		+0.514	
dα(ψ), dδ(ψ)	+0.055		+0.38		+0.062		+0.38		+0.062		+0.38		+0.066		+0.37	
dα(ε), dδ(ε)	+0.049		+0.31		-0.008		+0.31		-0.004		+0.33		-0.032		+0.34	
Dble. Trans.	October 9			October 9			October 10			October 11						

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1035		1036		47		1037	
	ξ Andromedae		109 G. Sculptoris		9 Ceti		138 G. Ceti	
Mag. Spect.	4.99	K0	5.82	K5	3.83	K0	6.38	G5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	1 21	+ 45 27	1 22	- 31 00	1 23	- 8 14	1 24	- 2 54
1 -9.2	30.120 <sup>s</sup> - 146	32.62 <sup>o</sup> + 76	52.144 <sup>s</sup> - 122	77.86 <sup>o</sup> - 125	19.266 <sup>s</sup> - 83	84.23 <sup>o</sup> - 90	05.777 <sup>s</sup> - 79	79.29 <sup>o</sup> - 77
1 0.8	29.950 - 170	33.00 + 38	52.009 - 135	78.77 - 91	19.170 - 96	85.01 - 78	05.685 - 92	80.00 - 71
1 10.8	29.758 - 194	32.97 - 3	51.861 - 148	79.33 - 56	19.061 - 109	85.67 - 66	05.579 - 106	80.64 - 64
1 20.7	29.554 - 202	32.50 - 47	51.708 - 153	79.50 - 17	18.945 - 116	86.15 - 48	05.465 - 114	81.17 - 53
1 30.7	29.347 - 207	31.66 - 84	51.556 - 152	79.27 + 23	18.827 - 118	86.46 - 31	05.350 - 115	81.58 - 41
2 9.7	29.145 - 202	30.46 - 120	51.409 - 147	78.68 + 59	18.711 - 116	86.59 - 13	05.235 - 115	81.86 - 28
2 19.6	29.962 - 183	28.94 - 152	51.275 - 134	77.68 + 100	18.606 - 105	86.50 + 9	05.131 - 104	81.98 - 12
3 1.6	28.808 - 154	27.22 - 172	51.162 - 113	76.35 + 133	18.517 - 89	86.19 + 31	05.043 - 88	81.91 + 7
3 11.6	28.690 - 118	25.32 - 190	51.074 - 88	74.67 + 168	18.451 - 66	85.67 + 52	04.977 - 66	81.65 + 26
3 21.6	28.623 - 67	23.36 - 196	51.021 - 53	72.68 + 199	18.416 - 35	84.89 + 78	04.943 - 34	81.17 + 48
3 31.5	28.611 - 12	21.45 - 191	51.006 - 15	70.42 + 226	18.416 + 0	83.89 + 100	04.944 + 1	80.48 + 69
4 10.5	28.657 + 46	19.63 - 182	51.035 + 29	67.92 + 250	18.454 + 38	82.64 + 125	04.982 + 38	79.57 + 91
4 20.5	28.769 + 112	18.02 - 161	51.111 + 76	65.22 + 270	18.536 + 82	81.13 + 151	05.065 + 83	78.37 + 120
4 30.5	28.941 + 172	16.69 - 133	51.235 + 124	62.39 + 283	18.662 + 126	79.43 + 170	05.191 + 126	76.95 + 142
5 10.4	29.173 + 232	15.67 - 102	51.406 + 171	59.47 + 292	18.831 + 169	77.52 + 191	05.361 + 170	75.32 + 163
5 20.4	29.460 + 287	15.04 - 63	51.624 + 218	56.52 + 295	19.042 + 211	75.46 + 206	05.572 + 211	73.50 + 182
5 30.4	29.791 + 331	14.81 - 23	51.880 + 256	53.62 + 290	19.287 + 245	73.30 + 216	05.817 + 245	71.55 + 195
6 9.3	30.162 + 371	14.99 + 18	52.172 + 292	50.81 + 281	19.563 + 276	71.07 + 223	06.093 + 276	69.48 + 207
6 19.3	30.560 + 398	15.61 + 62	52.492 + 320	48.19 + 262	19.862 + 299	68.82 + 225	06.393 + 300	67.35 + 213
6 29.3	30.973 + 413	16.61 + 100	52.830 + 338	45.81 + 238	20.176 + 314	66.62 + 220	06.706 + 313	65.23 + 212
7 9.3	31.395 + 422	17.99 + 138	53.181 + 351	43.72 + 209	20.499 + 323	64.51 + 211	07.028 + 322	63.14 + 209
7 19.2	31.811 + 416	19.73 - 174	53.532 + 351	41.99 + 173	20.820 + 321	62.57 + 194	07.348 + 320	61.17 + 197
7 29.2	32.213 + 402	21.74 + 201	53.875 + 343	40.65 + 134	21.133 + 313	60.83 + 174	07.659 + 311	59.35 + 182
8 8.2	32.596 + 383	24.02 + 228	54.205 + 330	39.74 + 91	21.431 + 298	59.33 + 150	07.957 + 298	57.72 + 163
8 18.2	32.948 + 352	26.50 + 248	54.510 + 305	39.30 + 44	21.707 + 276	58.13 + 120	08.231 + 274	56.34 + 138
8 28.1	33.265 + 317	29.11 + 261	54.785 + 275	39.29 + 1	21.956 + 249	57.22 + 91	08.480 + 249	55.21 + 113
9 7.1	33.545 + 280	31.83 + 272	55.027 + 242	39.74 - 45	22.175 + 219	56.63 + 59	08.699 + 219	54.36 + 85
9 17.1	33.781 + 236	34.59 + 276	55.229 + 202	40.61 - 87	22.360 + 185	56.37 + 26	08.884 + 185	53.82 + 54
9 27.0	33.976 + 195	37.32 + 273	55.391 + 162	41.83 - 122	22.512 + 152	56.39 - 2	09.037 + 153	53.53 + 29
10 7.0	34.127 + 151	40.02 + 270	55.511 + 120	43.37 - 154	22.630 + 118	56.70 - 31	09.157 + 120	53.52 + 1
10 17.0	34.233 + 106	42.59 + 257	55.589 + 78	45.15 - 178	22.713 + 83	57.25 - 55	09.243 + 86	53.74 - 22
10 27.0	34.298 + 65	45.02 + 243	55.630 + 41	47.07 - 192	22.766 + 53	57.98 - 73	09.299 + 56	54.16 - 42
11 5.9	34.321 + 23	47.26 + 224	55.632 + 2	49.08 - 201	22.789 + 23	58.87 - 89	09.326 + 27	54.73 - 57
11 15.9	34.303 - 18	49.24 + 198	55.601 - 31	51.05 - 197	22.784 - 5	59.84 - 97	09.326 + 0	54.73 - 70
11 25.9	34.250 - 53	50.95 + 171	55.541 - 60	52.92 - 187	22.756 - 28	60.85 - 101	09.303 - 23	55.43 - 75
12 5.9	34.159 - 91	52.33 + 138	55.453 - 88	54.62 - 170	22.705 - 51	61.86 - 101	09.256 - 47	56.98 - 80
12 15.8	34.035 - 124	53.34 + 101	55.344 - 109	56.04 - 142	22.634 - 71	62.80 - 84	09.190 - 66	57.77 - 79
12 25.8	33.884 - 151	53.97 + 63	55.218 - 126	57.17 - 113	22.548 - 86	63.66 - 96	09.108 - 82	58.52 - 75
12 35.8	33.706 - 178	54.19 + 22	55.076 - 142	57.96 - 79	22.447 - 101	64.40 - 74	09.010 - 98	59.21 - 69
	33.706 - 193	54.19 - 20	55.076 - 149	57.96 - 40	22.447 - 111	64.40 - 59	09.010 - 107	59.21 - 60
Mean Place	32.450	30.00	53.348	56.60	20.893	70.32	07.478	67.14
sec δ, tan δ	+1.426	+1.016	+1.167	-0.601	+1.010	-0.145	+1.001	-0.051
dα(ψ), dδ(ψ)	+0.071	+0.37	+0.056	+0.37	+0.060	+0.37	+0.061	+0.37
dα(ε), dδ(ε)	-0.063	+0.35	+0.037	+0.35	+0.009	+0.36	+0.003	+0.36
Dble. Trans.	October 12		October 12		October 12		October 12	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1038		48		46		1039	
	9 G. Hydrī		δ Cassiopeiae		ψ Cassiopeiae		94 Piscium	
Mag. Spect.	5.82	K5	2.80	A5	4.97	K0	5.63	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ′	h m	° ′	h m	° ′	h m	° ′
	1 24	-64 26	1 24	+60 09	1 24	+68 03	1 25	+19 10
1 <sup>d</sup>	s	"	s	"	s	"	s	"
1 -9.2	37.939	-377	52.865	-245	55.173	-365	55.827	-82
1 0.8	37.538	-401	52.583	-282	62.28	-414	55.728	-99
1 10.8	37.120	-418	52.270	-313	62.61	-456	55.614	-114
1 20.7	36.701	-419	51.939	-331	62.39	-478	55.489	-125
1 30.7	36.296	-405	51.606	-333	61.66	-477	55.361	-128
2 9.7	35.910	-386	51.282	-324	60.46	-464	55.233	-128
2 19.6	35.562	-348	50.987	-295	58.81	-422	55.117	-116
3 1.6	35.261	-301	50.736	-251	56.83	-380	55.018	-99
3 11.6	35.013	-248	50.539	-197	54.57	-286	54.944	-74
3 21.6	34.834	-179	50.415	-124	52.14	-188	54.905	-39
3 31.5	34.728	-106	50.369	-46	49.69	-83	54.904	-1
4 10.5	34.700	-28	50.406	+37	47.25	+27	54.946	+42
4 20.5	34.759	+59	50.533	+127	44.98	+147	55.033	+87
4 30.5	34.899	+140	50.744	+211	42.97	+255	55.170	+137
5 10.4	35.124	+225	51.036	+292	41.25	+361	55.352	+182
5 20.4	35.433	+309	51.404	+368	39.94	+459	55.579	+227
5 30.4	35.811	+378	51.832	+428	39.06	+536	55.840	+261
6 9.3	36.258	+447	52.312	+480	38.64	+604	56.134	+294
6 19.3	36.760	+502	52.831	+519	38.71	+654	56.450	+316
6 29.3	37.301	+541	53.370	+539	39.25	+680	56.780	+330
7 9.3	37.873	+572	53.922	+552	40.26	+697	57.118	+338
7 19.2	38.456	+583	54.469	+547	41.72	+692	57.454	+336
7 29.2	39.033	+577	54.998	+529	43.57	+670	57.779	+325
8 8.2	39.593	+560	55.503	+506	45.79	+640	58.090	+311
8 18.2	40.115	+522	55.968	+465	48.33	+580	58.376	+286
8 28.1	40.587	+472	56.390	+422	51.11	+535	58.635	+259
9 7.1	40.998	+411	56.763	+373	54.11	+472	58.865	+230
9 17.1	41.332	+334	57.077	+314	57.25	+396	59.061	+196
9 27.0	41.586	+254	57.335	+258	60.46	+323	59.224	+163
10 7.0	41.753	+167	57.532	+197	63.72	+242	59.353	+129
10 17.0	41.827	+74	57.666	+134	66.91	+157	59.449	+96
10 27.0	41.816	-11	57.741	+75	70.00	+77	59.514	+65
11 5.9	41.718	-98	57.753	+12	72.95	-9	59.549	+35
11 15.9	41.540	-178	57.704	-49	75.63	-94	59.555	+6
11 25.9	41.295	-245	57.600	-104	78.03	-170	59.536	-19
12 5.9	40.987	-308	57.439	-161	80.07	-250	59.492	-44
12 15.8	40.633	-354	57.228	-211	81.67	-319	59.425	-67
12 25.8	40.245	-388	56.974	-254	82.83	-376	59.340	-85
12 35.8	39.831	-414	56.681	-293	83.47	-429	59.235	-105
		-420		-315		-459		-116
Mean Place	37.403	22.19	55.471	55.68	58.003	35.77	57.800	14.70
sec δ, tan δ	+2.318	-2.091	+2.010	+1.744	+2.676	+2.483	+1.059	+0.348
dα(ψ), dδ(ψ)	+0.041	+0.37	+0.078	+0.37	+0.085	+0.37	+0.065	+0.37
dα(ε), dδ(ε)	+0.130	+0.36	-0.108	+0.36	-0.154	+0.36	-0.022	+0.37
Dble. Trans.	October 12		October 12		October 12		October 13	



AT UPPER TRANSIT AT GREENWICH

No.	1041		1040		49		1043	
Name	47 Ceti		ω Andromedae		γ Phoenicis		48 Ceti	
Mag.Spect.	5.68	F0	4.96	F5	3.40	K5	5.13	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	1 26	-13 07	1 26	+45 19	1 27	-43 22	1 28	-21 41
1 -9.2	10.059 - 86	50.86 -101	48.259 - 141	77.37 + 80	46.054 - 168	97.81 -137	55.925 - 98	74.02 -118
1 0.8	09.959 - 100	51.70 - 84	48.094 - 165	77.79 + 42	45.870 - 184	98.74 - 93	55.813 - 112	74.93 - 91
1 10.8	09.846 - 113	52.36 - 66	47.905 - 189	77.80 + 1	45.672 - 198	99.22 - 48	55.687 - 126	75.59 - 66
1 20.7	09.725 - 121	52.80 - 44	47.703 - 202	77.80 - 41	45.468 - 204	99.20 + 2	55.554 - 133	75.94 - 35
1 30.7	09.603 - 122	53.01 - 21	47.497 - 206	76.60 - 79	45.268 - 200	98.71 + 49	55.420 - 134	75.98 - 4
2 9.7	09.482 - 121	53.00 + 1	47.294 - 203	75.44 -116	45.074 - 194	97.76 + 95	55.288 - 132	75.71 + 27
2 19.6	09.372 - 110	52.72 + 28	47.108 - 186	73.98 -146	44.897 - 177	96.34 +142	55.167 - 121	75.11 + 60
3 1.6	09.279 - 93	52.19 + 53	46.951 - 157	72.29 -169	44.745 - 152	94.52 +182	55.064 - 103	74.20 + 91
3 11.6	09.207 - 72	51.42 + 77	46.829 - 122	70.43 -186	44.622 - 123	92.33 +219	54.982 - 82	73.00 +120
3 21.6	09.167 - 40	50.37 +105	46.756 - 73	68.49 -194	44.539 - 83	89.79 +254	54.933 - 49	71.50 +150
3 31.5	09.162 - 5	49.09 +128	46.738 - 18	66.59 -190	44.501 - 38	87.00 +279	54.920 - 13	69.74 +176
4 10.5	09.195 + 33	47.55 +154	46.779 + 41	64.78 -181	44.511 + 10	83.96 +304	54.947 + 27	67.73 +201
4 20.5	09.273 + 78	45.77 +178	46.884 + 105	63.16 -162	44.577 + 66	80.76 +320	55.020 + 73	65.49 +224
4 30.5	09.395 + 122	43.80 +197	47.050 + 166	61.82 -134	44.696 + 119	77.47 +329	55.138 + 118	63.08 +241
5 10.4	09.560 + 165	41.65 +215	47.276 + 226	60.77 -105	44.869 + 173	74.13 +334	55.300 + 162	60.53 +255
5 20.4	09.768 + 208	39.37 +228	47.558 + 282	60.11 - 66	45.096 + 227	70.84 +329	55.507 + 207	57.90 +263
5 30.4	10.011 + 243	37.02 +235	47.886 + 328	59.84 - 27	45.368 + 272	67.68 +316	55.751 + 244	55.25 +265
6 9.3	10.286 + 275	34.63 +239	48.253 + 367	59.97 + 13	45.682 + 314	64.67 +301	56.028 + 277	52.62 +263
6 19.3	10.585 + 299	32.27 +236	48.649 + 396	60.54 + 57	46.030 + 348	61.95 +272	56.333 + 305	50.10 +252
6 29.3	10.900 + 315	30.00 +227	49.062 + 413	61.49 + 95	46.401 + 371	59.54 +241	56.653 + 320	47.74 +236
7 9.3	11.225 + 325	27.86 +214	49.483 + 421	62.82 +133	46.790 + 389	57.50 +204	56.986 + 333	45.58 +216
7 19.2	11.549 + 324	25.93 +193	49.902 + 419	64.50 +168	47.182 + 392	55.93 +157	57.320 + 334	43.72 +186
7 29.2	11.866 + 317	24.25 +168	50.307 + 405	66.46 +196	47.568 + 386	54.82 +111	57.646 + 326	42.17 +155
8 8.2	12.168 + 302	22.85 +140	50.693 + 386	68.68 +222	47.941 + 373	54.22 + 60	57.959 + 313	40.98 +119
8 18.2	12.449 + 281	21.79 +106	51.050 + 357	71.11 +243	48.287 + 346	54.15 + 7	58.250 + 291	40.19 + 79
8 28.1	12.703 + 254	21.07 + 72	51.373 + 323	73.67 +256	48.602 + 315	54.58 - 43	58.514 + 264	39.79 + 40
9 7.1	12.927 + 224	20.69 + 38	51.660 + 287	76.35 +268	48.878 + 276	55.51 - 93	58.747 + 233	39.80 - 1
9 17.1	13.116 + 189	20.66 + 3	51.904 + 244	79.06 +271	49.108 + 230	56.90 -139	58.944 + 197	40.20 - 40
9 27.0	13.272 + 156	20.95 - 29	52.107 + 203	81.77 +271	49.291 + 183	58.67 -177	59.106 + 162	40.94 - 74
10 7.0	13.393 + 121	21.53 - 58	52.266 + 159	84.44 +267	49.425 + 134	60.77 -210	59.230 + 124	41.99 -105
10 17.0	13.478 + 85	22.35 - 82	52.381 + 115	86.99 +255	49.506 + 81	63.09 -232	59.316 + 86	43.30 -131
10 27.0	13.533 + 55	23.36 -101	52.456 + 75	89.41 +242	49.541 + 35	65.54 -245	59.369 + 53	44.78 -148
11 5.9	13.556 + 23	24.51 -115	52.488 + 32	91.65 +224	49.529 - 12	68.03 -249	59.387 + 18	46.38 -160
11 15.9	13.550 - 6	25.73 -122	52.478 - 10	93.63 +198	49.474 - 55	70.43 -240	59.375 - 12	48.01 -163
11 25.9	13.520 - 30	26.95 -122	52.433 - 45	95.35 +172	49.383 - 91	72.65 -222	59.337 - 38	49.58 -157
12 5.9	13.467 - 53	28.14 -119	52.349 - 84	96.76 +141	49.257 - 126	74.63 -198	59.273 - 64	51.07 -149
12 15.8	13.393 - 74	29.22 -108	52.232 - 117	97.80 +104	49.103 - 154	76.23 -160	59.188 - 85	52.37 -130
12 25.8	13.303 - 90	30.17 - 95	52.086 - 146	98.47 + 67	48.930 - 173	77.45 -122	59.086 - 102	53.45 -108
12 35.8	13.197 - 106	30.95 - 78	51.913 - 173	98.73 + 26	48.738 - 192	78.22 - 77	58.968 - 118	54.28 - 83
	- 114	- 57	- 191	- 15	- 200	- 28	- 128	- 54
Mean Place	11.593	35.38	50.578	74.57	46.837	73.65	57.288	55.94
sec δ, tan δ	+1.027	-0.233	+1.423	+1.012	+1.376	-0.945	+1.076	-0.398
dα(ψ), dδ(ψ)	+0.059	+0.37	+0.071	+0.37	+0.052	+0.37	+0.057	+0.37
dα(ε), dδ(ε)	+0.014	+0.37	-0.063	+0.37	+0.058	+0.37	+0.025	+0.38
Dble.Trans.	October 13		October 13		October 13		October 14	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1042		1044		50		53	
	38 Cassiopeiae		$\delta$ Phoenicis		$\eta$ Piscium		14 G. Hydr	
Mag. Spect.	5.95	F5	3.96	K0	3.72	G5	6.06	G5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "
	1 30	+ 70 11	1 30	- 49 08	1 30	+ 15 16	1 33	- 78 34
1 <sup>d</sup>	<sup>s</sup> - 405	" +172	<sup>s</sup> - 201	" -139	<sup>s</sup> - 77	" - 24	<sup>s</sup> - 962	" -113
1	-9.2	09 648	51.38	40 939	58.69	43 668	29.59	37 880
1	0.8	09 188	52.57	40 720	59.60	43 575	29.23	36 861
1	10.8	08 678	53.20	40 486	60.03	43 465	28.75	35 802
1	20.7	08 141	53.23	40 247	59.91	43 345	28.16	34 740
1	30.7	07 604	52.69	40 011	59.28	43 221	27.51	33 714
2	9.7	07 079	51.59	39 783	58.17	43 096	26.79	32 737
2	19.6	06 599	49.97	39 575	56.56	42 980	26.07	31 846
3	1.6	06 186	47.95	39 394	54.54	42 882	25.37	31 064
3	11.6	05 853	45.57	39 246	52.13	42 807	24.73	30 399
3	21.6	05 629	42.96	39 143	49.36	42 764	24.22	29 884
3	31.5	05 518	40.25	39 089	46.35	42 760	23.87	29 523
4	10.5	05 529	37.51	39 087	43.09	42 797	23.74	29 324
4	20.5	05 671	34.88	39 146	39.68	42 875	23.81	29 306
4	30.5	05 933	32.47	39 262	36.22	43 005	24.09	29 457
5	10.4	06 312	30.35	39 438	32.72	43 180	24.68	29 782
5	20.4	06 800	28.61	39 673	29.29	43 398	25.56	30 282
5	30.4	07 373	27.31	39 957	26.02	43 652	26.69	30 930
6	9.3	08 023	26.47	40 289	22.94	43 937	28.06	31 725
6	19.3	08 730	26.16	40 659	20.18	44 246	29.64	32 644
6	29.3	09 467	26.34	41 055	17.77	44 569	31.38	33 654
7	9.3	10 226	27.04	41 472	15.76	44 902	33.26	34 744
7	19.2	10 982	28.24	41 894	14.25	45 232	35.20	35 871
7	29.2	11 716	29.88	42 311	13.23	45 554	37.17	37 003
8	8.2	12 420	31.96	42 716	12.75	45 861	39.12	38 116
8	18.2	13 073	34.43	43 093	12.83	46 146	41.00	39 164
8	28.1	13 666	37.20	43 436	13.42	46 405	42.77	40 120
9	7.1	14 193	40.27	43 738	14.54	46 636	44.41	40 957
9	17.1	14 638	43.55	43 989	16.13	46 833	45.86	41 635
9	27.0	15 003	46.95	44 188	18.10	46 998	47.14	42 144
10	7.0	15 281	50.47	44 332	20.41	47 131	48.23	42 464
10	17.0	15 463	53.98	44 417	22.93	47 229	49.10	42 576
10	27.0	15 558	57.43	44 449	25.57	47 299	49.80	42 492
11	5.9	15 557	60.77	44 427	28.23	47 338	50.30	42 204
11	15.9	15 460	63.86	44 356	30.78	47 350	50.61	41 726
11	25.9	15 278	66.69	44 243	33.12	47 336	50.77	41 086
12	5.9	15 004	69.16	44 090	35.18	47 297	50.77	40 294
12	15.8	14 653	71.17	43 906	36.83	47 236	50.62	39 386
12	25.8	14 235	72.70	43 699	38.05	47 156	50.34	38 397
12	35.8	13 756	73.69	43 471	38.79	47 057	49.92	37 345
Mean Place	12.540	44.06	41.453	33.21	45.570	35.35	33.370	23.22
sec $\delta$ , tan $\delta$	+2.952	+2.777	+1.529	-1.156	+1.037	+0.273	+5.048	-4.947
da( $\psi$ ), d $\delta$ ( $\psi$ )	+0.089	+0.37	+0.049	+0.37	+0.064	+0.37	+0.009	+0.37
d $\alpha$ ( $\epsilon$ ), d $\delta$ ( $\epsilon$ )	-0.171	+0.38	+0.071	+0.39	-0.017	+0.39	+0.303	+0.40
Dble. Trans.	October 14		October 14		October 14		October 15	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1045		1046		52		54	
	υ Andromedae		π Piscium		51 Andromedae		α Eridani (Achernar)	
Mag.Spect.	4.18	G0	5.63	F0	3.77	K0	0.60	B5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	1 35	+41 20	1 36	+12 04	1 37	+48 33	1 37	-57 17
1 -9.2	57.846 -120	19.98 +71	21.068 -73	15.78 -33	07.224 -147	40.52 +101	12.925 -268	104.56 -144
1 0.8	57.702 -144	20.34 +36	20.979 -89	15.36 -42	07.048 -176	41.13 +61	12.633 -292	105.48 -92
1 10.8	57.534 -168	20.34 +0	20.873 -106	14.85 -51	06.845 -203	41.32 +19	12.322 -311	105.87 -39
1 20.7	57.351 -183	19.95 -39	20.754 -119	14.28 -57	06.624 -221	41.05 -27	12.004 -318	105.67 +20
1 30.7	57.162 -189	19.23 -72	20.632 -122	13.68 -60	06.397 -227	40.38 -67	11.692 -312	104.92 +75
2 9.7	56.973 -189	18.18 -105	20.507 -125	13.05 -63	06.170 -227	39.32 -106	11.389 -303	103.64 +128
2 19.7	56.798 -175	16.85 -133	20.391 -116	12.44 -61	05.960 -210	37.90 -142	11.111 -278	101.84 +180
3 1.6	56.646 -152	15.32 -153	20.291 -106	11.88 -56	05.777 -183	36.22 -168	10.866 -245	99.61 +223
3 11.6	56.526 -120	13.63 -169	20.213 -78	11.41 -47	05.632 -145	34.33 -189	10.661 -205	96.97 +284
3 21.6	56.451 -75	11.88 -175	20.167 -46	11.07 -34	05.537 -95	32.32 -201	10.508 -153	93.97 +300
3 31.5	56.426 -25	10.18 -170	20.157 -10	10.91 -16	05.500 -37	30.32 -200	10.414 -94	90.72 +325
4 10.5	56.455 +29	08.56 -162	20.189 +32	10.96 +5	05.524 +24	28.36 -196	10.382 -32	87.24 +348
4 20.5	56.545 +90	07.13 -143	20.254 +65	11.20 +24	05.618 +94	26.58 -178	10.421 +39	83.62 +362
4 30.5	56.693 +148	05.95 -118	20.382 +128	11.69 +49	05.776 +158	25.04 -154	10.528 +107	79.96 +366
5 10.4	56.898 +205	05.06 -89	20.549 +167	12.45 +76	05.998 +222	23.78 -126	10.705 +177	76.29 +367
5 20.4	57.158 +260	04.53 -53	20.759 +210	13.49 +104	06.282 +284	22.89 -89	10.953 +248	72.73 +356
5 30.4	57.461 +303	04.37 -16	21.005 +246	14.74 +125	06.614 +332	22.39 -50	11.260 +307	69.36 +337
6 9.4	57.804 +343	04.59 +22	21.283 +278	16.22 +148	06.990 +376	22.30 -9	11.625 +365	66.21 +315
6 19.3	58.177 +373	05.21 +62	21.586 +303	17.89 +167	07.400 +410	22.65 +35	12.037 +412	63.42 +279
6 29.3	58.566 +389	06.19 +98	21.904 +318	19.69 +180	07.828 +428	23.39 +74	12.484 +447	61.01 +241
7 9.3	58.966 +400	07.51 +132	22.232 +328	21.59 +190	08.269 +441	24.54 +115	12.957 +473	59.05 +196
7 19.2	59.365 +399	09.15 +164	22.559 +327	23.53 +194	08.708 +439	26.06 +152	13.442 +485	57.62 +143
7 29.2	59.752 +387	11.04 +189	22.878 +319	25.47 +194	09.136 +428	27.88 +182	13.925 +483	56.71 +91
8 8.2	60.124 +372	13.17 +213	23.185 +307	27.36 +189	09.547 +411	30.00 +212	14.396 +471	56.38 +33
8 18.2	60.469 +345	15.47 +230	23.470 +285	29.14 +178	09.930 +383	32.36 +236	14.838 +442	56.64 -26
8 28.1	60.784 +315	17.88 +241	23.730 +260	30.79 +165	10.279 +349	34.89 +253	15.242 +404	57.43 -79
9 7.1	61.066 +282	20.38 +250	23.962 +232	32.29 +150	10.592 +313	37.57 +268	15.599 +357	58.77 -134
9 17.1	61.308 +242	22.90 +252	24.162 +200	33.58 +129	10.861 +269	40.32 +275	15.897 +298	60.60 -183
9 27.1	61.512 +204	25.40 +250	24.330 +168	34.67 +109	11.087 +226	43.09 +277	16.133 +236	62.82 -222
10 7.0	61.676 +164	27.84 +244	24.467 +137	35.57 +90	11.270 +183	45.86 +277	16.302 +169	65.38 -256
10 17.0	61.798 +122	30.17 +233	24.570 +103	36.24 +67	11.404 +134	48.55 +269	16.398 +96	68.16 -278
10 27.0	61.883 +85	32.36 +219	24.644 +74	36.73 +49	11.496 +92	51.11 +256	16.428 +30	71.03 -287
11 5.9	61.928 +45	34.38 +202	24.689 +45	37.03 +30	11.542 +46	53.53 +242	16.390 -38	73.92 -289
11 15.9	61.934 -6	36.16 +178	24.705 +16	37.16 +13	11.543 +1	55.70 +217	16.288 -102	76.65 -273
11 25.9	61.907 +27	37.71 +155	24.696 -9	37.15 -1	11.504 -39	57.62 +192	16.133 -155	79.16 -251
12 5.9	61.842 -65	38.96 +125	24.662 -34	37.00 -15	11.422 -82	59.23 +161	15.925 -208	81.34 -218
12 15.8	61.745 -97	39.89 +93	24.606 -56	36.73 -27	11.302 -120	60.48 +125	15.678 -247	83.08 -174
12 25.8	61.621 -124	40.48 +59	24.529 -77	36.37 -36	11.148 -154	61.35 +87	15.400 -278	84.34 -126
12 35.8	61.468 -153	40.70 +22	24.434 -95	35.90 -47	10.963 -185	61.80 +45	15.097 -303	85.07 -73
	61.468 -170		24.434 -109				15.097 -315	
Mean Place	60.042	17.75	22.899	22.36	09.528	36.70	12.849	78.09
sec δ, tan δ	+1.332	+0.880	+1.023	+0.214	+1.511	+1.133	+1.851	-1.558
dα(ψ), dδ(ψ)	+0.071	+0.36	+0.063	+0.36	+0.074	+0.36	+0.044	+0.36
dα(ε), dδ(ε)	-0.054	+0.41	-0.013	+0.41	-0.069	+0.41	+0.095	+0.41
Dble.Trans.	October 15		October 15		October 16		October 16	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	51		56		1047		55	
	40 Cassiopeiae		v Piscium		B.D. +34° 297 (Trianguli)		43 Cassiopeiae	
Mag. Spect.	5.50	K0	4.68	K0	5.45	B8	5.54	A0p
U.T.	R.A.		R.A.		R.A.		R.A.	
	h	Dec.	h	Dec.	h	Dec.	h	Dec.
	m	'	m	'	m	'	m	'
	1 37	+ 72 58	1 40	+ 5 24	1 41	+ 35 10	1 41	+ 67 58
1 -9.2	22 028	25 88	41 944	62 10	14 361	40 77	16 984	38 06
1 0.8	21 489	27 24	41 858	61 54	14 241	41 00	16 594	39 32
1 10.8	20 888	28 05	41 755	60 95	14 097	40 92	16 155	40 05
1 20.7	20 253	28 23	41 640	60 39	13 938	40 52	15 684	40 19
1 30.7	19 612	27 83	41 520	59 86	13 772	39 85	15 206	39 77
2 9.7	18 984	26 86	41 398	59 38	13 605	38 91	14 733	38 81
2 19.7	18 404	25 34	41 283	58 98	13 447	37 74	14 294	37 33
3 1.6	17 899	23 38	41 183	58 70	13 310	36 42	13 910	35 44
3 11.6	17 485	21 04	41 104	58 54	13 200	34 98	13 595	33 18
3 21.6	17 194	18 43	41 055	58 57	13 130	33 53	13 372	30 68
3 31.5	17 034	15 69	41 042	58 78	13 105	32 13	13 252	28 07
4 10.5	17 013	12 89	41 070	59 17	13 130	30 84	13 240	25 41
4 20.5	17 143	10 18	41 134	59 80	13 210	29 74	13 347	22 84
4 30.5	17 412	07 66	41 249	60 75	13 344	28 88	13 564	20 47
5 10.4	17 817	05 39	41 408	61 89	13 531	28 31	13 889	18 35
5 20.4	18 349	03 51	41 610	63 26	13 770	28 07	14 317	16 60
5 30.4	18 982	02 04	41 847	64 82	14 051	28 17	14 827	15 27
6 9.4	19 705	01 03	42 118	66 56	14 370	28 62	15 410	14 38
6 19.3	20 497	00 54	42 413	68 43	14 717	29 43	16 049	14 00
6 29.3	21 329	00 55	42 724	70 37	15 081	30 55	16 722	14 11
7 9.3	22 189	01 07	43 046	72 35	15 456	31 97	17 418	14 70
7 19.2	23 051	02 12	43 368	74 31	15 831	33 66	18 116	15 80
7 29.2	23 892	03 62	43 684	76 20	16 197	35 54	18 799	17 33
8 8.2	24 703	05 58	43 987	77 98	16 550	37 61	19 458	19 28
8 18.2	25 459	07 94	44 271	79 59	16 878	39 80	20 075	21 63
8 28.1	26 152	10 64	44 530	81 01	17 179	42 06	20 640	24 27
9 7.1	26 771	13 65	44 762	82 22	17 449	44 36	21 149	27 21
9 17.1	27 299	16 90	44 962	83 18	17 683	46 63	21 586	30 37
9 27.1	27 736	20 31	45 132	83 90	17 883	48 85	21 953	33 66
10 7.0	28 075	23 85	45 269	84 39	18 045	50 99	22 242	37 07
10 17.0	28 303	27 42	45 374	84 65	18 170	53 00	22 447	40 48
10 27.0	28 429	30 95	45 450	84 72	18 260	54 86	22 573	43 86
11 5.9	28 442	34 39	45 496	84 61	18 314	56 54	22 613	47 13
11 15.9	28 342	37 61	45 514	84 35	18 333	58 01	22 566	50 19
11 25.9	28 140	40 58	45 508	83 98	18 320	59 26	22 440	53 00
12 5.9	27 828	43 21	45 477	83 52	18 274	60 25	22 230	55 47
12 15.8	27 422	45 39	45 423	82 99	18 198	60 96	21 946	57 52
12 25.8	26 935	47 10	45 350	82 44	18 096	61 38	21 598	59 11
12 35.8	26 373	48 25	45 257	81 85	17 967	61 49	21 190	60 17
Mean Place	24.978	18.17	43.668	70.64	16.458	40.17	19.690	30.85
sec $\delta$ , tan $\delta$	+3.415	+3.265	+1.004	+0.095	+1.223	+0.705	+2.667	+2.472
$d\alpha(v)$ , $d\delta(v)$	+0.097	+0.36	+0.062	+0.36	+0.069	+0.36	+0.089	+0.36
$d\alpha(e)$ , $d\delta(e)$	-0.198	+0.41	-0.006	+0.43	-0.042	+0.43	-0.149	+0.43
Dble. Trans.	October 16		October 16		October 17		October 17	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	58		1048		1049		57	
	129 G. Sculptoris		π Sculptoris		175 G. Ceti		φ Persei	
Mag.Spect.	5.64	A0	5.28	K0	5.27	G5	4.19	B0p
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	1 41	-36 53	1 41	-32 23	1 42	- 3 45	1 42	+50 37
1 -9.2	26 411 -133	82 51 -146	31 028 -119	61.42 -141	00.940 -72	39.94 -84	46.215 -152	20.36 +113
1 0.8	26 259 -152	83 58 -107	30 892 -136	62.48 -106	00.852 -88	40.69 -75	46.031 -184	21.09 +73
1 10.8	26 091 -168	84 26 -68	30.740 -152	63.19 -71	00.748 -104	41.36 -67	45.817 -214	21.39 +30
1 20.7	25 913 -178	84 49 -23	30.578 -162	63.49 -30	00.633 -115	41.91 -55	45.582 -235	21.22 -17
1 30.7	25 734 -179	84.28 +21	30.415 -163	63.37 +12	00.512 -121	42.33 -42	45.340 -242	20.63 -59
2 9.7	25 557 -177	83 64 +64	30.252 -163	62.87 +50	00.390 -122	42.60 -27	45.098 -242	19.62 -101
2 19.7	25 392 -165	82 56 +108	30 100 -152	61.95 +92	00.274 -116	42.70 -10	44.871 -227	18.24 -138
3 1.6	25 247 -145	81 09 +147	29.966 -134	60.66 +129	00.174 -100	42.61 +9	44.672 -199	16.57 -167
3 11.6	25 126 -121	79 25 +184	29.856 -110	59.01 +165	00.092 -82	42.32 +29	44.511 -161	14.67 -190
3 21.6	25 041 -85	77 06 +219	29.779 -77	57.03 +198	00.041 -51	41.81 +51	44.402 -109	12.63 -204
3 31.5	24 996 -45	74 59 +247	29.740 -39	54.76 +227	00.024 -17	41.08 +73	44.353 -49	10.56 -207
4 10.5	24 995 -1	71 86 +273	29.744 +4	52.24 +252	00.045 +21	40.13 +95	44.368 +15	08.52 -204
4 20.5	25 045 +50	68 92 +121	29.797 +53	49.49 +121	00.109 +64	38.92 +121	44.455 +87	06.64 -188
4 30.5	25 145 +100	65 86 +306	29.897 +100	46 62 +287	00.218 +109	37.48 +144	44.609 +154	04.98 -166
5 10.4	25 296 +151	62.70 +316	30.047 +150	43.62 +300	00.371 +153	35.83 +165	44.831 +222	03.60 -138
5 20.4	25 498 +202	59 53 +317	30.246 +199	40 59 +303	00.566 +195	33.99 +184	45 116 +285	02.58 -102
5 30.4	25 743 +245	56 44 +309	30 485 +239	37.61 +298	00.798 +232	32.02 +197	45 454 +338	01.95 -63
6 9.4	26 029 +286	53 44 +300	30.764 +279	34.70 +291	01.063 +265	29.94 +208	45 838 +384	01.72 -23
6 19.3	26 348 +319	50 67 +277	31 074 +310	31.97 +273	01.354 +291	27.80 +214	46 258 +420	01.93 +21
6 29.3	26 690 +342	48 16 +251	31 405 +331	29.48 +249	01.661 +307	25.67 +213	46 698 +440	02.56 +63
7 9.3	27 050 +360	45 97 +219	31 753 +348	27 27 +221	01 979 +318	23 58 +209	47 153 +455	03 59 +103
7 19.2	27 415 +365	44 19 +178	32 105 +352	25 44 +183	02 300 +321	21 60 +198	47 609 +456	05 01 +142
7 29.2	27 776 +361	42 83 +136	32 453 +348	24 00 +144	02 613 +313	19 78 +182	48 053 +444	06 75 +174
8 8.2	28 127 +351	41 93 +90	32 791 +338	23 00 +100	02 916 +303	18 16 +162	48 482 +429	08 81 +206
8 18.2	28 456 +329	41 55 +38	33 107 +316	22 48 +52	02 919 +283	16 79 +137	48 882 +400	11 13 +232
8 28.1	28 757 +301	41 65 -10	33 397 +290	22 41 +7	03 458 +259	15 69 +110	49 249 +367	13 64 +251
9 7.1	29 027 +270	42 23 -58	33 656 +259	22 82 -41	03 691 +233	14 87 +82	49 580 +331	16 32 +268
9 17.1	29 255 +228	43 29 -106	33 876 +220	23 68 -86	03 891 +200	14 36 +51	49 866 +286	19 09 +277
9 27.1	29 443 +188	44 72 -143	34 058 +182	24 91 -123	04 060 +169	14 13 +23	50 109 +243	21 91 +282
10 7.0	29 587 +144	46 52 -180	34 200 +142	26 50 -159	04 197 +137	14 17 -4	50 306 +197	24 74 +283
10 17.0	29 685 +98	48 57 -205	34 298 +98	28 35 -185	04 301 +104	14 47 -30	50 454 +148	27 50 +276
10 27.0	29 743 +58	50 78 -221	34 358 +60	30 37 -202	04 375 +74	14 96 -49	50 557 +103	30 16 +266
11 5.9	29 758 +15	53 09 -231	34 379 +21	32 49 -212	04 419 +44	15 62 -66	50 612 +55	32 68 +252
11 15.9	29 733 -25	55 37 -228	34 363 -16	34 61 -212	04 434 +15	16 40 -78	50 619 +7	34 98 +230
11 25.9	29 675 -58	57 52 -215	34 316 -47	36 63 -202	04 425 -9	17 23 -83	50 583 -36	37 03 +205
12 5.9	29 584 -91	59 48 -196	34 238 -78	38 49 -186	04 391 -34	18 11 -88	50 501 -82	38 77 +174
12 15.8	29 466 -118	61 14 -186	34 135 -103	40 08 -159	04 334 -57	18 96 -85	50 377 -124	40 14 +137
12 25.8	29 326 -140	62 47 -133	34 010 -125	41 37 -129	04 259 -75	19 77 -81	50 218 -159	41 14 +100
12 35.8	29 166 -160	63 41 -94	33 866 -144	42 32 -95	04 164 -107	20 51 -74	50 023 -195	41 70 +56
Mean Place	27.284	60.94	32.035	41.08	02.525	28.48	48.520	16.02
sec δ, tan δ	+1.250	-0.751	+1.184	-0.634	+1.002	-0.066	+1.576	+1.218
da(ψ), dδ(ψ)	+0.053	+0.36	+0.054	+0.36	+0.060	+0.36	+0.075	+0.36
da(ε), dδ(ε)	+0.045	+0.43	+0.038	+0.43	+0.004	+0.43	-0.073	+0.43
Dble.Trans.	October 17		October 17		October 17		October 17	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	59		60		61		1050		
	τ Ceti		ο Piscium		ε Sculptoris*		4 Arietis		
Mag.Spect.	3.65	K0	4.50	K0	5.42	F0	5.73	A0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° /	h m	° /	h m	° /	h m	° /	
	1 43	- 16 00	1 44	+ 9 05	1 44	- 25 06	1 47	+ 16 53	
1	-9.2	25.140 - 88	45.49 - 111	39.013 - 66	17.22 - 43	59.678 - 98	89.26 - 133	25.034 - 68	14.77 - 15
1	0.8	25.036 - 104	46.40 - 91	38.927 - 86	16.74 - 48	59.563 - 115	90.31 - 105	24.946 - 88	14.50 - 27
1	10.8	24.917 - 119	47.10 - 70	38.824 - 103	16.21 - 53	59.431 - 132	91.07 - 76	24.838 - 108	14.10 - 40
1	20.7	24.787 - 130	47.54 - 44	38.708 - 116	15.65 - 56	59.289 - 142	91.47 - 40	24.716 - 122	13.57 - 53
1	30.7	24.654 - 133	47.72 - 18	38.586 - 122	15.09 - 56	59.143 - 146	91.54 - 7	24.587 - 129	12.97 - 60
2	9.7	24.520 - 134	47.63 + 9	38.461 - 125	14.54 - 55	58.997 - 146	91.26 + 28	24.455 - 132	12.29 - 68
2	19.7	24.394 - 126	47.26 + 37	38.343 - 118	14.04 - 50	58.859 - 138	90.61 + 65	24.329 - 126	11.57 - 72
3	1.6	24.284 - 110	46.60 + 66	38.240 - 103	13.62 - 42	58.738 - 121	89.64 + 97	24.218 - 111	10.87 - 70
3	11.6	24.193 - 91	45.68 + 92	38.156 - 84	13.29 - 33	58.637 - 101	88.34 + 130	24.128 - 90	10.19 - 68
3	21.6	24.134 - 59	44.47 + 121	38.103 - 53	13.12 - 17	58.568 - 69	86.71 + 163	24.070 - 58	09.62 - 57
3	31.5	24.109 - 25	43.01 + 146	38.086 - 17	13.13 + 1	58.535 - 33	84.82 + 189	24.049 - 21	09.19 - 43
4	10.5	24.122 + 13	41.30 + 171	38.111 + 25	13.33 + 20	58.542 + 7	82.66 + 216	24.069 + 20	08.94 - 25
4	20.5	24.181 + 59	39.34 + 196	38.169 + 58	13.64 + 31	58.595 + 53	80.27 + 239	24.134 + 65	08.95 + 1
4	30.5	24.284 + 103	37.20 + 214	38.285 + 116	14.42 + 78	58.694 + 99	77.72 + 255	24.246 + 112	09.07 + 12
5	10.4	24.431 + 147	34.88 + 232	38.443 + 158	15.34 + 92	58.840 + 146	75.01 + 271	24.407 + 161	09.52 + 45
5	20.4	24.623 + 192	32.45 + 243	38.645 + 202	16.51 + 117	59.033 + 193	72.24 + 277	24.613 + 206	10.25 + 73
5	30.4	24.852 + 229	29.96 + 249	38.882 + 237	17.89 + 138	59.265 + 232	69.46 + 278	24.857 + 244	11.23 + 98
6	9.4	25.115 + 263	27.45 + 251	39.153 + 271	19.46 + 157	59.533 + 268	66.71 + 275	25.134 + 277	12.46 + 123
6	19.3	25.405 + 290	24.98 + 247	39.449 + 296	21.20 + 174	59.831 + 296	64.08 + 263	25.438 + 304	13.91 + 145
6	29.3	25.712 + 307	22.63 + 235	39.762 + 313	23.04 + 184	60.149 + 318	61.62 + 246	25.759 + 321	15.53 + 162
7	9.3	26.033 + 321	20.43 + 220	40.086 + 324	24.96 + 192	60.482 + 333	59.40 + 222	26.091 + 332	17.29 + 176
7	19.2	26.356 + 323	18.47 + 196	40.411 + 325	24.96 + 194	60.820 + 338	57.49 + 191	26.424 + 333	19.16 + 187
7	29.2	26.673 + 317	16.77 + 170	40.729 + 318	26.90 + 190	61.153 + 333	55.91 + 158	26.751 + 327	21.05 + 189
8	8.2	26.979 + 306	15.39 + 138	41.037 + 308	30.62 + 182	61.476 + 323	54.72 + 119	27.067 + 316	22.96 + 191
8	18.2	27.265 + 286	14.37 + 102	41.324 + 287	32.32 + 170	61.779 + 303	53.97 + 75	27.362 + 295	24.81 + 185
8	28.1	27.526 + 261	13.70 + 67	41.587 + 263	33.85 + 153	62.057 + 278	53.63 + 34	27.634 + 272	26.57 + 176
9	7.1	27.759 + 233	13.41 + 29	41.824 + 237	35.20 + 135	62.307 + 250	53.72 - 9	27.879 + 245	28.22 + 165
9	17.1	27.959 + 200	13.50 - 9	42.029 + 205	36.34 + 114	62.520 + 213	54.24 - 52	28.092 + 213	29.70 + 148
9	27.1	28.125 + 166	13.92 - 42	42.204 + 175	37.26 + 92	62.699 + 179	55.13 - 89	28.275 + 183	31.02 + 132
10	7.0	28.257 + 132	14.66 - 74	42.348 + 144	37.96 + 70	62.841 + 142	56.35 - 122	28.426 + 151	32.16 + 114
10	17.0	28.353 + 96	15.66 - 100	42.459 + 111	38.44 + 48	62.943 + 102	57.85 - 150	28.543 + 117	33.10 + 94
10	27.0	28.417 + 64	16.84 - 118	42.540 + 81	38.73 + 29	63.011 + 68	59.53 - 168	28.632 + 89	33.87 + 77
11	5.9	28.449 + 32	18.18 - 134	42.592 + 52	38.84 + 11	63.043 + 32	61.35 - 182	28.690 + 58	34.46 + 59
11	15.9	28.450 + 1	19.58 - 140	42.616 + 24	38.78 - 6	63.042 - 1	63.18 - 183	28.718 + 28	34.86 + 40
11	25.9	28.425 - 25	20.97 - 139	42.614 - 2	38.61 - 17	63.012 - 30	64.97 - 179	28.720 + 2	35.11 + 25
12	5.9	28.374 - 51	22.31 - 134	42.587 - 27	38.32 - 29	62.953 - 59	66.65 - 168	28.694 - 26	35.20 + 9
12	15.8	28.301 - 73	23.51 - 120	42.536 - 51	37.93 - 39	62.870 - 83	68.13 - 148	28.643 - 51	35.14 - 6
12	25.8	28.209 - 92	24.55 - 104	42.465 - 71	37.49 - 44	62.767 - 103	69.36 - 123	28.570 - 73	34.94 - 20
12	35.8	28.098 - 111	25.40 - 85	42.373 - 92	36.98 - 51	62.644 - 123	70.32 - 96	28.475 - 95	34.61 - 33
		- 122	- 60	- 106	- 54	- 134	- 62	- 111	- 45
Mean Place	26.463	29.57	40.768	24.38	60.855	71.26	26.875	19.29	
sec δ, tan δ	+1.040	-0.287	+1.013	+0.160	+1.104	-0.469	+1.045	+0.304	
da(ψ), dδ(ψ)	+0.058	+0.36	+0.063	+0.36	+0.056	+0.36	+0.065	+0.35	
da(ε), dδ(ε)	+0.017	+0.44	-0.010	+0.44	+0.028	+0.44	-0.018	+0.45	
Dble.Trans.	October 17		October 17		October 18		October 18		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1051		62		1052		64	
	χ Ceti		ζ Ceti		2 Persei		α Trianguli	
Mag. Spect.	4.77	F0	3.92	K0	5.64	B9	3.58	F5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 1 48	<sup>o</sup> <sup>'</sup> - 10 44	<sup>h</sup> <sup>m</sup> 1 50	<sup>o</sup> <sup>'</sup> - 10 23	<sup>h</sup> <sup>m</sup> 1 51	<sup>o</sup> <sup>'</sup> + 50 43	<sup>h</sup> <sup>m</sup> 1 52	<sup>o</sup> <sup>'</sup> + 29 30
1 -9.2	53.851 - 75	83.66 -105	46.188 - 72	78.20 -104	15.198 - 143	40.14 +121	16.577 - 79	48.13 + 35
1 0.8	53.760 - 91	84.55 - 89	46.097 - 91	79.09 - 89	15.020 - 178	40.95 + 81	16.475 - 102	48.24 + 11
1 10.8	53.651 - 109	85.29 - 74	45.990 - 107	79.84 - 75	14.810 - 210	41.34 + 39	16.350 - 125	48.10 - 14
1 20.7	53.530 - 121	85.83 - 54	45.869 - 121	80.38 - 54	14.577 - 233	41.26 - 8	16.207 - 143	47.71 - 39
1 30.7	53.403 - 127	86.16 - 33	45.743 - 126	80.72 - 34	14.333 - 244	40.77 - 49	16.056 - 151	47.10 - 61
2 9.7	53.274 - 129	86.28 - 12	45.614 - 129	80.85 - 13	14.087 - 246	39.85 - 92	15.901 - 155	46.28 - 82
2 19.7	53.152 - 122	86.14 + 14	45.491 - 123	80.73 + 12	13.854 - 233	38.55 - 130	15.752 - 149	45.29 - 99
3 1.6	53.043 - 109	85.78 + 36	45.381 - 110	80.38 + 35	13.647 - 207	36.96 - 159	15.621 - 131	44.19 - 110
3 11.6	52.953 - 90	85.16 + 62	45.290 - 91	79.79 + 59	13.476 - 171	35.11 - 185	15.512 - 109	43.02 - 117
3 21.6	52.893 - 60	84.29 + 87	45.229 - 61	78.94 + 85	13.356 - 120	33.12 - 199	15.440 - 72	41.85 - 117
3 31.6	52.866 - 27	83.18 +111	45.201 - 28	77.84 +110	13.295 - 61	31.08 - 204	15.408 - 32	40.75 - 110
4 10.5	52.877 + 11	81.81 +137	45.210 + 9	76.51 +133	13.297 + 2	29.05 - 203	15.423 + 15	39.77 - 98
4 20.5	52.933 + 56	80.20 +161	45.264 + 54	74.92 +159	13.371 + 74	27.15 - 190	15.489 + 66	38.98 - 79
4 30.5	53.032 + 99	78.39 +181	45.362 + 98	73.12 +180	13.514 + 143	25.47 - 168	15.606 + 117	38.42 - 56
5 10.4	53.176 + 144	76.37 +202	45.505 + 143	71.13 +199	13.724 + 210	24.04 - 143	15.775 + 169	38.11 - 31
5 20.4	53.364 + 188	74.21 +216	45.691 + 186	68.98 +215	14.000 + 276	22.96 - 108	15.993 + 218	38.12 + 1
5 30.4	53.589 + 225	71.95 +226	45.915 + 224	66.74 +224	14.330 + 330	22.25 - 71	16.253 + 260	38.43 + 31
6 9.4	53.848 + 259	69.62 +233	46.173 + 258	64.42 +232	14.707 + 377	21.93 - 32	16.550 + 297	39.06 + 63
6 19.3	54.135 + 287	67.30 +232	46.459 + 286	62.10 +232	15.123 + 416	22.06 + 13	16.876 + 326	40.00 + 94
6 29.3	54.440 + 306	65.04 +226	46.764 + 305	59.84 +226	15.561 + 438	22.58 + 52	17.220 + 344	41.21 +121
7 9.3	54.758 + 318	62.88 +216	47.082 + 318	57.68 +216	16.016 + 455	23.51 + 93	17.577 + 357	42.67 +146
7 19.3	55.079 + 321	60.90 +198	47.403 + 321	55.69 +199	16.474 + 458	24.83 +132	17.936 + 359	44.35 +168
7 29.2	55.396 + 317	59.14 +176	47.720 + 317	53.93 +176	16.922 + 448	26.48 +165	18.288 + 352	46.18 +183
8 8.2	55.703 + 307	57.64 +150	48.027 + 307	52.41 +152	17.357 + 435	28.44 +196	18.628 + 340	48.14 +196
8 18.2	55.990 + 287	56.46 +118	48.316 + 289	51.22 +119	17.766 + 409	30.67 +223	18.948 + 320	50.17 +203
8 28.1	56.255 + 265	55.59 + 87	48.582 + 266	50.34 + 88	18.143 + 377	33.10 +243	19.243 + 295	52.22 +205
9 7.1	56.494 + 239	55.07 + 52	48.822 + 240	49.80 + 54	18.485 + 342	35.71 +261	19.510 + 267	54.27 +205
9 17.1	56.700 + 206	54.91 + 16	49.030 + 208	49.61 + 19	18.784 + 299	38.42 +271	19.744 + 234	56.26 +199
9 27.1	56.875 + 175	55.05 - 14	49.207 + 177	49.73 - 12	19.041 + 257	41.18 +276	19.945 + 201	58.17 +191
10 7.0	57.018 + 143	55.50 - 45	49.352 + 145	50.17 - 44	19.252 + 211	43.98 +280	20.113 + 168	59.98 +181
10 17.0	57.126 + 108	56.22 - 72	49.462 + 110	50.86 - 69	19.415 + 163	46.72 +274	20.245 + 132	61.64 +166
10 27.0	57.203 + 77	57.13 - 91	49.542 + 80	51.75 - 89	19.533 + 118	49.37 +265	20.345 + 100	63.14 +150
11 6.0	57.249 + 46	58.21 - 08	49.590 + 48	52.82 - 107	19.603 + 70	51.90 +253	20.411 + 66	64.49 +135
11 15.9	57.265 + 16	59.38 - 117	49.609 + 19	53.97 - 115	19.624 + 21	54.22 +232	20.444 + 33	65.63 +114
11 25.9	57.256 - 9	60.58 - 120	49.602 - 7	55.16 - 119	19.601 - 23	56.30 +208	20.447 + 3	66.58 + 95
12 5.9	57.220 - 36	61.77 - 119	49.568 - 34	56.34 - 118	19.531 - 70	58.10 +180	20.418 - 29	67.31 + 73
12 15.8	57.161 - 59	62.87 - 110	49.511 - 57	57.44 - 110	19.418 - 113	59.53 +143	20.360 - 58	67.80 + 49
12 25.8	57.082 - 79	63.87 - 100	49.433 - 78	58.43 - 99	19.266 - 152	60.61 +108	20.276 - 84	68.07 + 27
12 35.8	56.983 - 99	64.72 - 85	49.336 - 97	59.28 - 85	19.077 - 189	61.26 + 65	20.166 - 110	68.08 + 1
	- 112	- 66	- 111	- 67	- 215	+ 20	- 129	- 24
Mean Place	55.279	70.37	47.617	65.11	17.460	35.56	18.554	48.61
sec δ, tan δ	+1.018	-0.190	+1.017	-0.184	+1.580	+1.223	+1.149	+0.566
dα(ψ), dδ(ψ)	+0.059	+0.35	+0.059	+0.35	+0.076	+0.35	+0.068	+0.35
dα(ε), dδ(ε)	+0.011	+0.46	+0.011	+0.46	-0.072	+0.47	-0.033	+0.47
Dble. Trans.	October 19		October 19		October 19		October 19	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	65			67		63		1053									
	ξ Piscium			ψ Phoenicis		ε Cassiopeiae		φ Phoenicis									
Mag.Spect.	4.84	K0		4.41	M3	3.44	B3	5.00	B9								
U.T.	R.A.	Dec.		R.A.	Dec.	R.A.	Dec.	R.A.	Dec.								
	h m	° ' "		h m	° ' "	h m	° ' "	h m	° ' "								
	1 52	+ 3 07		1 53	-46 21	1 53	+63 35	1 53	-42 33								
1 <sup>d</sup>	-9.2	49.714	-62	05.977	-172	89.14	-163	22.287	-245	47.884	-152	68.59	-161				
1 <sup>s</sup>	0.8	49.632	-82	05.781	-196	90.33	-119	21.990	-297	47.711	-173	69.79	-120				
1	10.8	49.531	-101	05.566	-215	91.05	-72	21.647	-343	47.517	-194	70.55	-76				
1	20.7	49.417	-114	05.338	-228	91.26	-21	21.272	-375	47.312	-205	70.82	-27				
1	30.7	49.295	-122	05.108	-230	90.95	+31	20.884	-388	47.103	-209	70.60	+22				
2	9.7	49.169	-126	05.17	-43	04.879	-229	90.16	+79	20.494	-390	82.72	-85	46.894	-209	69.92	+68
2	19.7	49.049	-120	04.86	-31	04.663	-216	88.87	+129	20.126	-368	81.38	-134	46.697	-197	68.76	+116
3	1.6	48.941	-108	04.67	-19	04.469	-194	87.15	+172	19.799	-327	79.65	-173	46.520	-177	67.17	+159
3	11.6	48.853	-88	04.63	-4	04.302	-167	85.02	+213	19.525	-274	77.56	-209	46.367	-153	65.18	+199
3	21.6	48.793	-60	04.77	+14	04.175	-127	82.50	+252	19.326	-199	75.23	-233	46.252	-115	62.82	+236
3	31.6	48.768	-25	05.10	+33	04.093	-82	79.70	+280	19.210	-116	72.78	-245	46.179	-73	60.17	+265
4	10.5	48.781	+13	05.63	+53	04.060	-33	76.63	+307	19.185	-25	70.27	-251	46.153	-26	57.24	+293
4	20.5	48.836	+55	06.39	+76	04.084	+24	73.36	+327	19.261	+76	67.85	-242	46.181	+28	54.10	+314
4	30.5	48.936	+100	07.43	+104	04.165	+81	69.98	+338	19.432	+171	65.60	-225	46.262	+81	50.85	+325
5	10.4	49.082	+146	08.69	+126	04.303	+138	66.52	+346	19.697	+265	63.59	-201	46.399	+137	47.50	+335
5	20.4	49.272	+190	10.15	+146	04.500	+197	63.09	+343	20.052	+355	61.92	-167	46.591	+192	44.15	+335
5	30.4	49.499	+227	11.79	+164	04.747	+247	59.77	+332	20.480	+428	60.65	-127	46.830	+239	40.90	+325
6	9.4	49.760	+261	13.59	+180	05.043	+296	56.59	+318	20.975	+495	59.79	-86	46.830	+285	37.76	+314
6	19.3	50.048	+288	15.51	+192	05.380	+337	53.68	+291	21.522	+547	59.42	-37	47.439	+324	34.87	+289
6	29.3	50.353	+305	17.47	+196	05.745	+365	51.08	+260	22.101	+579	59.50	+8	47.790	+351	32.27	+260
7	9.3	50.671	+318	19.47	+200	06.134	+389	48.86	+222	22.704	+603	60.05	+55	48.163	+373	30.01	+226
7	19.3	50.992	+321	21.42	+195	06.535	+401	47.09	+177	23.313	+609	61.08	+103	48.163	+382	28.19	+182
7	29.2	51.308	+316	23.28	+186	06.934	+399	45.81	+128	23.912	+599	62.52	+144	48.545	+382	26.83	+136
8	8.2	51.615	+307	25.01	+173	07.327	+393	45.04	+77	24.495	+583	64.37	+185	49.302	+375	25.97	+86
8	18.2	51.902	+287	26.55	+154	07.699	+372	44.84	+20	25.044	+549	66.58	+221	49.656	+354	25.65	+32
8	28.1	52.168	+266	27.88	+133	08.043	+344	45.16	-32	25.552	+508	69.08	+250	49.984	+328	25.85	-20
9	7.1	52.408	+240	28.98	+110	08.352	+309	46.01	-85	26.014	+462	71.85	+277	50.280	+296	26.57	-72
9	17.1	52.618	+210	29.82	+84	08.617	+265	47.37	-136	26.418	+404	74.83	+298	50.533	+253	27.78	-121
9	27.1	52.798	+180	30.41	+59	08.836	+219	49.15	-178	26.763	+345	77.95	+312	50.744	+211	29.40	-162
10	7.0	52.948	+150	30.76	+35	09.005	+169	51.30	-215	27.046	+283	81.17	+322	50.908	+164	31.41	-201
10	17.0	53.064	+116	30.86	+10	09.120	+115	53.73	-243	27.258	+212	84.40	+323	51.023	+115	33.69	-228
10	27.0	53.152	+88	30.78	-8	09.185	+65	56.31	-258	27.405	+147	87.60	+320	51.091	+68	36.14	-245
11	6.0	53.210	+58	30.51	-27	09.199	+14	58.99	-268	27.480	+75	90.71	+311	51.113	+22	38.70	-256
11	15.9	53.239	+29	30.10	-41	09.164	-35	61.61	-262	27.483	+3	93.63	+292	51.089	-24	41.21	-251
11	25.9	53.243	+4	29.59	-51	09.087	-77	64.07	-246	27.418	-65	96.31	+268	51.027	-62	43.59	-238
12	5.9	53.220	-23	29.01	-58	08.969	-118	66.30	-223	27.282	-136	98.69	+238	50.926	-101	45.77	-218
12	15.8	53.174	-46	28.39	-62	08.816	-153	68.18	-188	27.081	-201	100.67	+198	50.792	-134	47.61	-184
12	25.8	53.106	-68	27.76	-63	08.635	-181	69.66	-148	26.823	-258	102.24	+157	50.633	-159	49.08	-147
12	35.8	53.017	-89	27.12	-64	08.429	-206	70.69	-103	26.509	-314	103.31	+107	50.449	-184	50.13	-105
			-104		-59		-220		-51		-350		+53		-198		-57
Mean Place	51.342	16.54		06.357	66.27	24.782	74.81	48.433	46.62								
sec δ, tan δ	+1.001	+0.055		+1.449	-1.049	+2.249	+2.015	+1.358	-0.918								
da(ψ), dδ(ψ)	+0.062	+0.35		+0.048	+0.35	+0.087	+0.35	+0.050	+0.35								
da(ε), dδ(ε)	-0.003	+0.47		+0.062	+0.47	-0.118	+0.47	+0.054	+0.48								
Dble.Trans.	October 20			October 20		October 20		October 20									



# APPARENT PLACES OF STARS, 1986

31

## AT UPPER TRANSIT AT GREENWICH

No.	66		69		68		72	
	β Arietis		η <sup>2</sup> Hydri		χ Eridani		α Hydri	
Mag. Spect.	2.72	A5	4.72	K0	3.73	G5	3.02	F0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	1 53	+ 20 44	1 54	- 67 42	1 55	- 51 40	1 58	- 61 37
1 -9.2	51.667 - 67	29.59 + 0	37.192 - 423	75.06 - 157	25.927 - 205	56.84 - 166	21.562 - 307	92.19 - 167
1 0.8	51.578 - 89	29.45 - 14	36.728 - 464	76.07 - 101	25.697 - 230	58.01 - 117	21.220 - 342	92.34 - 115
1 10.8	51.468 - 110	29.13 - 32	36.231 - 497	76.53 + 46	25.444 - 253	58.69 - 68	20.850 - 370	93.94 - 60
1 20.7	51.342 - 126	28.66 - 47	35.719 - 512	76.35 + 18	25.178 - 266	58.82 - 13	20.464 - 386	93.94 + 0
1 30.7	51.207 - 135	28.07 - 59	35.212 - 507	75.59 + 76	24.911 - 267	58.41 + 41	20.079 - 385	93.37 + 57
2 9.7	51.068 - 139	27.36 - 71	34.715 - 497	74.26 + 133	24.646 - 265	57.49 + 92	19.699 - 380	92.24 + 113
2 19.7	50.935 - 133	26.57 - 79	34.251 - 464	72.38 + 188	24.396 - 250	56.04 + 145	19.341 - 358	90.56 + 168
3 1.6	50.816 - 119	25.76 - 81	33.834 - 417	70.04 + 234	24.172 - 224	54.14 + 190	19.017 - 324	88.42 + 214
3 11.6	50.718 - 98	24.94 - 82	33.468 - 366	67.27 + 277	23.978 - 194	51.83 + 231	18.734 - 283	85.84 + 258
3 21.6	50.653 - 65	24.19 - 75	33.176 - 292	64.13 + 314	23.828 - 150	49.12 + 271	18.508 - 226	82.87 + 297
3 31.6	50.625 - 28	23.55 - 64	32.962 - 214	60.72 + 341	23.726 - 102	46.13 + 299	18.344 - 164	79.63 + 324
4 10.5	50.640 + 15	23.07 - 48	32.833 - 129	57.08 + 364	23.679 - 47	42.88 + 325	18.249 - 95	76.12 + 351
4 20.5	50.702 + 62	22.82 - 25	32.801 - 32	53.31 + 377	23.695 + 16	39.43 + 345	18.233 - 16	72.46 + 366
4 30.5	50.809 + 107	22.75 - 7	32.863 + 62	49.49 + 382	23.772 + 77	35.90 + 353	18.294 + 61	68.73 + 373
5 10.4	50.969 + 160	22.94 + 19	33.023 + 160	45.68 + 381	23.912 + 140	32.30 + 360	18.434 + 140	64.97 + 376
5 20.4	51.174 + 205	23.43 + 49	33.281 + 258	41.99 + 369	24.117 + 205	28.75 + 355	18.656 + 222	61.29 + 368
5 30.4	51.418 + 244	24.19 + 76	33.625 + 344	38.50 + 349	24.377 + 260	25.34 + 341	18.948 + 292	57.79 + 350
6 9.4	51.698 + 280	25.22 + 103	34.053 + 428	35.25 + 325	24.690 + 313	22.09 + 325	19.310 + 362	54.50 + 329
6 19.3	52.005 + 307	26.49 + 127	34.555 + 502	32.37 + 288	25.049 + 359	19.14 + 295	19.731 + 421	51.55 + 295
6 29.3	52.330 + 325	27.97 + 148	35.111 + 556	29.90 + 247	25.441 + 392	16.53 + 261	20.197 + 466	48.98 + 257
7 9.3	52.668 + 338	29.62 + 165	35.715 + 604	27.90 + 200	25.861 + 420	14.32 + 221	20.702 + 505	46.85 + 213
7 19.3	53.008 + 340	31.41 + 179	36.346 + 631	26.45 + 145	26.294 + 433	12.61 + 171	21.227 + 525	45.25 + 160
7 29.2	53.341 + 333	33.27 + 186	36.984 + 638	25.56 + 89	26.728 + 434	11.39 + 122	21.758 + 531	44.19 + 106
8 8.2	53.664 + 323	35.17 + 190	37.618 + 634	25.26 + 30	27.156 + 428	10.72 + 67	22.285 + 527	43.71 + 48
8 18.2	53.968 + 304	37.06 + 189	38.222 + 604	25.58 - 32	27.563 + 407	10.64 + 8	22.789 + 504	43.85 - 14
8 28.1	54.248 + 280	38.90 + 184	38.783 + 561	26.46 - 88	27.939 + 376	11.09 - 45	23.256 + 467	44.55 - 70
9 7.1	54.502 + 254	40.66 + 176	39.287 + 504	27.92 - 146	28.279 + 340	12.10 - 101	23.679 + 423	45.82 - 127
9 17.1	54.725 + 223	42.28 + 162	39.713 + 426	29.89 - 197	28.569 + 290	13.62 - 152	24.039 + 360	47.61 - 179
9 27.1	54.917 + 192	43.77 + 149	40.055 + 342	32.27 - 238	28.808 + 239	15.57 - 195	24.334 + 295	49.83 - 222
10 7.0	55.077 + 160	45.10 + 133	40.305 + 250	35.01 - 274	28.992 + 184	17.89 - 232	24.555 + 221	52.43 - 260
10 17.0	55.204 + 127	46.26 + 116	40.450 + 145	37.98 - 297	29.115 + 123	20.49 - 260	24.695 + 140	55.29 - 286
10 27.0	55.300 + 96	47.24 + 98	40.496 + 46	41.06 - 308	29.181 + 66	23.23 - 274	24.758 + 63	58.27 - 304
11 6.0	55.366 + 66	48.05 + 81	40.440 - 56	44.16 - 310	29.189 + 8	26.05 - 282	24.741 - 17	61.31 - 298
11 15.9	55.400 + 34	48.05 + 62	40.285 - 155	47.10 - 294	29.141 - 48	26.05 - 274	24.741 - 94	64.23 - 292
11 25.9	55.408 + 8	49.14 + 47	40.045 - 240	49.80 - 270	29.045 - 96	31.35 - 256	24.486 - 161	66.94 - 271
12 5.9	55.386 - 22	49.42 + 28	39.722 - 323	52.16 - 236	28.901 - 144	33.66 - 231	24.260 - 226	69.35 - 241
12 15.8	55.337 - 49	49.53 + 11	39.332 - 390	54.04 - 188	28.718 - 183	35.58 - 192	23.981 - 279	71.31 - 196
12 25.8	55.265 - 72	49.48 - 5	38.892 - 440	55.43 - 139	28.503 - 215	37.07 - 149	23.660 - 321	72.81 - 150
12 35.8	55.169 - 96	49.26 - 22	38.408 - 484	56.25 - 82	28.261 - 242	38.07 - 100	23.301 - 359	73.77 - 96
	55.169 - 114	49.26 - 37	38.408 - 506	56.25 - 20	28.261 - 258	38.07 - 46	23.301 - 377	73.77 - 36
Mean Place	53.532	32.63	35.578	48.56	26.034	32.83	20.761	66.90
sec δ, tan δ	+1.069	+0.379	+2.637	-2.440	+1.613	-1.265	+2.105	-1.852
dα(ψ), dδ(ψ)	+0.066	+0.35	+0.030	+0.35	+0.045	+0.35	+0.037	+0.35
dα(ε), dδ(ε)	-0.022	+0.48	+0.143	+0.48	+0.074	+0.48	+0.107	+0.49
Dbie. Trans.	October 20		October 20		October 20		October 21	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	71		1054		70		73	
	υ Ceti		4 Persei		50 Cassiopeiae		γ Andromedae* p.	
Mag.Spect.	4.18	M0	4.99	B8	4.06	A2	2.28	K0
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	° /	h m	° /	h m	° /	h m	° /
	1 59	-21 08	2 01	+54 25	2 02	+72 21	2 03	+42 15
	<sup>s</sup> - 83	" - 135	<sup>s</sup> - 153	" +143	<sup>s</sup> - 392	" +212	<sup>s</sup> - 97	" +94
1 -9.2	20.972 -103	50.21 -110	21.477 -193	27.60 +103	13.012 -471	32.04 +163	01.902 -129	58.50 +62
1 0.8	20.869 -121	51.31 -85	21.284 -231	28.63 +60	12.541 -543	33.67 +111	01.773 -158	59.12 +27
1 10.8	20.748 -136	52.16 -53	21.053 -259	29.23 +10	11.998 -594	34.78 +51	01.615 -182	59.39 -11
1 20.8	20.612 -142	52.69 -23	20.794 -273	29.33 -34	11.404 -615	35.29 -7	01.433 -194	59.28 -45
1 30.7	20.470	52.92	20.521	28.99	10.789	35.22	01.239	58.83
2 9.7	20.325 -145	52.83 +9	20.242 -279	28.20 -79	10.171 -618	34.58 -64	01.038 -201	58.03 -80
2 19.7	20.185 -140	52.40 +43	19.975 -267	26.98 -122	09.584 -587	33.36 -122	00.844 -194	56.93 -110
3 1.6	20.058 -127	51.65 +75	19.735 -240	25.42 -156	09.055 -529	31.68 -168	00.669 -175	55.60 -133
3 11.6	19.950 -108	50.60 +105	19.532 -203	23.57 -185	08.603 -452	29.58 -210	00.521 -148	54.06 -154
3 21.6	19.871 -79	49.22 +138	19.383 -149	21.52 -205	08.260 -343	27.16 -242	00.414 -107	52.42 -164
3 31.6	19.826 -45	47.58 +164	19.297 -86	19.39 -213	08.039 -221	24.55 -261	00.356 -58	50.76 -166
4 10.5	19.819 -7	45.67 +191	19.279 -18	17.23 -216	07.947 -92	21.82 -273	00.351 -5	49.14 -162
4 20.5	19.859 +40	43.51 +216	19.339 +60	15.17 -206	08.002 +55	19.11 -271	00.408 +57	47.65 -149
4 30.5	19.943 +84	41.16 +235	19.474 +135	13.29 -188	08.193 +191	16.54 -257	00.524 +116	46.36 -129
5 10.4	20.074 +131	38.65 +251	19.682 +208	11.64 -165	08.520 +327	14.17 -237	00.700 +176	45.31 -105
5 20.4	20.251 +177	36.02 +263	19.963 +281	10.32 -132	08.978 +458	12.11 -206	00.934 +234	44.58 -73
5 30.4	20.468 +217	33.36 +266	20.302 +339	09.37 -95	09.543 +565	10.44 -167	01.217 +283	44.19 -39
6 9.4	20.722 +254	30.69 +267	20.696 +394	08.80 -57	10.205 +662	09.17 -127	01.544 +327	44.15 -4
6 19.3	21.007 +285	28.09 +260	21.133 +437	08.68 -12	10.946 +741	08.40 -77	01.906 +362	44.50 +35
6 29.3	21.313 +306	25.64 +245	21.596 +463	08.97 +29	11.738 +792	08.10 -30	02.291 +385	45.18 +68
7 9.3	21.636 +323	23.36 +228	22.081 +485	09.68 +71	12.570 +832	08.30 +20	02.693 +402	46.22 +104
7 19.3	21.965 +329	21.37 +199	22.071 +490	10.81 +113	13.417 +847	09.01 +71	03.099 +406	47.58 +136
7 29.2	22.292 +327	19.67 +170	22.551 +484	12.29 +148	14.256 +839	10.18 +117	03.500 +401	49.20 +162
8 8.2	22.612 +320	18.32 +135	23.055 +472	12.29 +183	14.256 +823	11.81 +163	03.500 +391	49.20 +188
8 18.2	22.914 +302	17.38 +94	23.973 +446	14.12 +213	15.079 +781	13.86 +205	03.891 +369	51.08 +207
8 28.1	23.194 +280	16.84 +54	24.389 +416	18.61 +236	16.588 +728	16.26 +240	04.603 +343	55.36 +221
9 7.1	23.448 +254	16.71 +13	24.769 +380	21.18 +257	17.257 +669	19.01 +275	04.918 +315	57.68 +232
9 17.1	23.670 +222	17.00 -29	25.104 +335	23.91 +273	17.844 +587	22.02 +301	05.196 +278	60.06 +238
9 27.1	23.859 +189	17.66 -66	25.395 +291	26.72 +281	18.351 +507	25.23 +321	05.439 +243	62.45 +239
10 7.0	24.014 +155	18.66 -100	25.638 +243	29.60 +288	18.768 +417	28.61 +338	05.644 +205	64.83 +238
10 17.0	24.132 +118	19.95 -129	25.829 +191	32.46 +286	19.081 +313	32.07 +346	05.807 +163	67.14 +231
10 27.0	24.217 +85	21.44 -149	25.972 +143	35.26 +280	19.297 +216	35.54 +347	05.934 +127	69.34 +220
11 6.0	24.268 +51	23.10 -166	26.061 +89	37.97 +271	19.404 +107	38.97 +343	06.019 +85	71.41 +207
11 15.9	24.285 +17	24.81 -171	26.096 +35	40.48 +251	19.399 -5	42.24 +327	06.064 +45	73.30 +189
11 25.9	24.274 -11	26.51 -170	26.081 -15	42.78 +230	19.290 -109	45.31 +307	06.071 +7	74.98 +168
12 5.9	24.233 -41	28.14 -163	26.012 -69	44.80 +202	19.069 -221	48.09 +278	06.038 -33	76.41 +143
12 15.8	24.167 -66	29.60 -146	25.894 -118	46.46 +166	18.746 -323	50.47 +238	05.967 -71	77.54 +113
12 25.8	24.078 -89	30.87 -127	25.732 -162	47.76 +130	18.334 -412	52.42 +195	05.862 -105	78.37 +83
12 35.8	23.967 -111	31.89 -102	25.525 -207	48.62 +86	17.837 -497	53.86 +144	05.723 -139	78.85 +48
	-126	-73	-238	+40	-557	+87	-164	+11
Mean Place	22.136	34.43	23.748	22.10	15.705	24.02	03.990	55.47
sec δ, tan δ	+1.072	-0.387	+1.719	+1.398	+3.299	+3.144	+1.351	+0.909
dα(ψ), dδ(ψ)	+0.056	+0.35	+0.080	+0.34	+0.104	+0.34	+0.073	+0.34
dα(ε), dδ(ε)	+0.022	+0.50	-0.080	+0.51	-0.180	+0.51	-0.052	+0.51
Dbble.Trans.	October 21		October 22		October 22		October 22	

AT UPPER TRANSIT AT GREENWICH

No.	1055		74		75		1056	
	v Fornacis		α Arietis		β Trianguli		15 Arietis	
Mag.Spect.	4.74	A0p	2.23	K2	3.08	A5	5.92	M0
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	2 03	- 29 21	2 06	+ 23 23	2 08	+ 34 55	2 09	+ 19 26
1 -9.2	52.238 <sup>s</sup> - 99	58.48 <sup>"</sup> - 154	22.758 <sup>s</sup> - 60	54.74 <sup>"</sup> + 15	42.232 <sup>s</sup> - 74	27.36 <sup>"</sup> + 66	50.799 <sup>s</sup> - 54	10.74 <sup>"</sup> - 1
1 0.8	52.118 - 120	59.71 - 123	22.673 - 85	54.72 - 2	42.129 - 103	27.75 + 39	50.720 - 79	10.61 - 13
1 10.8	51.978 - 140	60.61 - 90	22.564 - 109	54.52 - 20	41.998 - 131	27.86 + 11	50.616 - 104	10.33 - 28
1 20.8	51.823 - 155	61.12 - 51	22.436 - 128	54.13 - 39	41.845 - 153	27.67 - 19	50.494 - 122	09.92 - 41
1 30.7	51.661 - 162	61.24 - 12	22.296 - 140	53.60 - 53	41.678 - 167	27.21 - 46	50.360 - 134	09.40 - 52
2 9.7	51.495 - 166	60.98 + 26	22.150 - 146	52.93 - 67	41.504 - 174	26.48 - 73	50.219 - 141	08.78 - 62
2 19.7	51.336 - 159	60.32 + 66	22.007 - 143	52.14 - 79	41.335 - 169	25.52 - 96	50.080 - 139	08.09 - 69
3 1.6	51.191 - 145	59.29 + 103	21.877 - 130	51.29 - 85	41.180 - 155	24.39 - 113	49.953 - 127	07.38 - 71
3 11.6	51.065 - 126	57.90 + 139	21.767 - 110	50.41 - 88	41.048 - 132	23.12 - 127	49.844 - 109	06.67 - 71
3 21.6	50.969 - 96	56.16 + 174	21.688 - 79	49.57 - 84	40.952 - 96	21.78 - 134	49.765 - 79	06.02 - 65
3 31.6	50.909 - 60	54.12 + 204	21.647 - 41	48.81 - 76	40.898 - 54	20.47 - 131	49.722 - 43	05.47 - 55
4 10.5	50.889 - 20	51.81 + 231	21.649 + 2	48.18 - 63	40.892 - 6	19.22 - 125	49.720 - 2	05.06 - 41
4 20.5	50.917 + 28	49.25 + 256	21.700 + 51	47.75 - 43	40.942 + 50	18.12 - 110	49.766 + 46	04.88 - 18
4 30.5	50.992 + 75	46.53 + 272	21.796 + 96	47.52 - 23	41.045 + 103	17.22 - 90	49.854 + 88	04.88 + 0
5 10.5	51.116 + 124	43.65 + 288	21.945 + 149	47.51 - 1	41.203 + 158	16.56 - 66	49.996 + 142	05.08 + 20
5 20.4	51.289 + 173	40.70 + 295	22.143 + 198	47.80 + 29	41.416 + 213	16.19 - 37	50.186 + 190	05.58 + 50
5 30.4	51.504 + 215	37.76 + 294	22.381 + 238	48.36 + 56	41.674 + 258	16.14 - 5	50.415 + 229	06.34 + 76
6 9.4	51.760 + 256	34.84 + 292	22.657 + 276	49.19 + 83	41.973 + 299	16.40 + 26	50.681 + 266	07.34 + 100
6 19.3	52.049 + 289	32.07 + 277	22.963 + 306	50.28 + 109	42.305 + 332	17.00 + 60	50.978 + 297	08.58 + 124
6 29.3	52.362 + 313	29.49 + 258	23.288 + 325	51.60 + 132	42.659 + 354	17.90 + 90	51.294 + 316	10.01 + 143
7 9.3	52.695 + 333	27.16 + 233	23.628 + 340	53.11 + 151	43.030 + 371	19.09 + 119	51.626 + 332	11.60 + 159
7 19.3	53.036 + 341	25.17 + 199	23.973 - 345	54.78 + 167	43.406 + 376	20.54 + 145	51.963 + 337	13.31 + 171
7 29.2	53.376 + 340	23.54 + 163	24.313 + 340	56.55 + 177	43.777 + 371	22.20 + 166	52.296 + 333	15.09 + 178
8 8.2	53.711 + 335	22.32 + 122	24.645 + 332	58.40 + 185	44.140 + 363	24.04 + 184	52.622 + 326	16.91 + 182
8 18.2	54.029 + 318	21.57 + 75	24.959 + 314	60.26 + 186	44.484 + 344	26.01 + 197	52.931 + 309	18.70 + 179
8 28.2	54.324 + 295	21.27 + 30	25.252 + 293	62.10 + 184	44.805 + 321	28.05 + 204	53.219 + 288	20.43 + 173
9 7.1	54.593 + 269	21.44 - 17	25.520 + 268	63.88 + 178	45.101 + 296	30.16 + 211	53.484 + 265	22.08 + 165
9 17.1	54.827 + 234	22.07 - 63	25.757 + 237	65.56 + 168	45.363 + 262	32.26 + 210	53.719 + 235	23.59 + 151
9 27.1	55.028 + 201	23.10 - 103	25.965 + 208	67.13 + 157	45.593 + 230	34.33 + 207	53.925 + 206	24.96 + 137
10 7.0	55.191 + 163	24.50 - 140	26.141 + 176	68.57 + 144	45.789 + 196	36.34 + 201	54.102 + 177	26.18 + 122
10 17.0	55.313 + 122	26.21 - 171	26.284 + 143	69.84 + 127	45.949 + 160	38.25 + 191	54.245 + 143	27.22 + 104
10 27.0	55.400 + 87	28.11 - 190	26.397 + 113	70.96 + 112	46.075 + 126	40.04 + 179	54.360 + 115	28.10 + 88
11 6.0	55.448 + 48	30.17 - 206	26.478 + 81	71.92 + 96	46.165 + 90	41.69 + 165	54.443 + 83	28.81 + 71
11 15.9	55.460 + 12	32.26 - 209	26.527 + 49	72.70 + 78	46.218 + 53	43.16 + 147	54.495 + 52	29.35 + 54
11 25.9	55.440 - 20	34.30 - 204	26.547 + 20	73.32 + 62	46.238 + 20	44.44 + 128	54.519 + 24	29.75 + 40
12 5.9	55.387 - 53	36.23 - 193	26.536 - 11	73.75 + 43	46.221 - 17	45.51 + 107	54.512 - 7	29.98 + 23
12 15.9	55.305 - 82	37.92 - 169	26.496 - 40	74.01 + 26	46.171 - 50	46.32 + 81	54.477 - 35	30.07 + 9
12 25.8	55.200 - 105	39.36 - 144	26.430 - 66	74.10 + 9	46.090 - 81	46.89 + 57	54.416 - 61	30.02 - 5
12 35.8	55.071 - 129	40.48 - 112	26.336 - 94	74.00 - 10	45.977 - 113	47.16 + 27	54.329 - 87	29.81 - 21
	55.071 - 146	40.48 - 75	26.336 - 114	74.00 - 27	45.977 - 137	47.16 - 1	54.329 - 109	29.81 - 33
Mean Place	53.158	40.70	24.601	56.47	44.206	25.95	52.569	13.53
sec δ, tan δ	+1.147	-0.563	+1.090	+0.433	+1.220	+0.698	+1.060	+0.353
dα(ψ), dδ(ψ)	+0.053	+0.34	+0.067	+0.34	+0.071	+0.34	+0.066	+0.34
dα(ε), dδ(ε)	+0.032	+0.51	-0.025	+0.52	-0.039	+0.53	-0.020	+0.54
Dble.Trans.	October 22		October 23		October 24		October 24	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1058		78		1057		77		
	ξ <sup>1</sup> Ceti		μ Fornacis		19 Arietis		Bradley 299 (Andromedae)		
Mag.Spect.	4.54	G5	5.24	A0	5.99	K5	5.40	K0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	2 12	+ 8 46	2 12	- 30 46	2 12	+ 15 12	2 12	+ 51 00	
1	-9.2	15.366	56.06	18.029	89.99	17.302	57.31	39.921	18.41
1	0.8	15.293	55.59	17.907	91.29	17.227	57.04	39.762	19.41
1	10.8	15.197	55.08	17.764	92.25	17.128	56.67	39.565	20.01
1	20.8	15.083	54.56	17.604	92.82	17.011	56.22	39.338	20.17
1	30.7	14.957	54.05	17.436	92.98	16.881	55.71	39.095	19.90
2	9.7	14.824	53.56	17.263	92.75	16.744	55.14	38.842	19.21
2	19.7	14.693	53.11	17.095	92.09	16.609	54.55	38.596	18.13
3	1.6	14.572	52.74	16.940	91.06	16.484	53.97	38.372	16.72
3	11.6	14.468	52.46	16.804	89.66	16.377	53.43	38.178	15.04
3	21.6	14.392	52.33	16.698	87.89	16.298	52.98	38.033	13.16
3	31.6	14.349	52.35	16.627	85.82	16.255	52.66	37.943	11.19
4	10.5	14.345	52.55	16.596	83.47	16.251	52.49	37.916	09.19
4	20.5	14.388	52.93	16.613	80.86	16.296	52.56	37.960	07.28
4	30.5	14.466	53.56	16.678	78.09	16.372	52.78	38.074	05.53
5	10.5	14.598	54.46	16.792	75.16	16.513	53.25	38.258	03.99
5	20.4	14.775	55.58	16.957	72.15	16.696	53.99	38.510	02.77
5	30.4	14.991	56.88	17.165	69.15	16.919	54.96	38.819	01.88
6	9.4	15.244	58.38	17.415	66.18	17.178	56.15	39.180	01.36
6	19.3	15.525	60.04	17.700	63.36	17.467	57.55	39.585	01.25
6	29.3	15.827	61.79	18.011	60.73	17.776	59.11	40.017	01.53
7	9.3	16.144	63.63	18.342	58.35	18.100	60.79	40.471	02.21
7	19.3	16.467	65.48	18.684	56.32	18.431	62.56	40.933	03.27
7	29.2	16.787	67.30	19.027	54.67	18.758	64.34	41.392	04.67
8	8.2	17.101	69.05	19.365	53.43	19.078	66.13	41.842	06.38
8	18.2	17.399	70.66	19.688	52.67	19.383	67.85	42.270	08.38
8	28.2	17.677	72.12	19.990	52.37	19.667	69.47	42.671	10.59
9	7.1	17.933	73.41	20.267	52.56	19.928	70.97	43.042	13.00
9	17.1	18.160	74.46	20.510	53.22	20.161	72.30	43.372	15.54
9	27.1	18.359	75.31	20.719	54.29	20.365	73.47	43.663	18.16
10	7.0	18.529	75.94	20.891	55.74	20.540	74.45	43.911	20.84
10	17.0	18.668	76.35	21.022	57.51	20.683	75.24	44.112	23.50
10	27.0	18.778	76.57	21.117	59.50	20.798	75.85	44.268	26.11
11	6.0	18.858	76.62	21.173	61.64	20.881	76.30	44.376	28.63
11	15.9	18.908	76.51	21.190	63.82	20.935	76.58	44.434	30.98
11	25.9	18.932	76.29	21.175	65.96	20.961	76.73	44.446	33.13
12	5.9	18.927	75.96	21.125	67.98	20.956	76.74	44.407	35.03
12	15.9	18.894	75.56	21.045	69.77	20.925	76.63	44.321	36.62
12	25.8	18.838	75.10	20.939	71.28	20.867	76.42	44.191	37.86
12	35.8	18.756	74.60	20.808	72.48	20.784	76.10	44.019	38.71
Mean Place	16.978	61.90	18.847	72.49	19.006	61.22	42.099	13.22	
sec δ, tan δ	+1.012	+0.155	+1.164	-0.596	+1.036	+0.272	+1.589	+1.235	
dα(ψ), dδ(ψ)	+0.063	+0.33	+0.053	+0.33	+0.065	+0.33	+0.079	+0.33	
dα(ε), dδ(ε)	-0.009	+0.55	+0.033	+0.55	-0.015	+0.55	-0.069	+0.55	
Dble.Trans.	October 24		October 24		October 24		October 25		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	76		1060		1059		82	
	55 Cassiopeiae		135 G. Phoenicis		21 Arietis		φ Eridani	
Mag. Spect.	6.15	F5, A2	5.86	K0	5.64	F5	3.78	B8
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 2 13	<sup>°</sup> <sup>'</sup> +66 27	<sup>h</sup> <sup>m</sup> 2 13	<sup>°</sup> <sup>'</sup> -41 13	<sup>h</sup> <sup>m</sup> 2 14	<sup>°</sup> <sup>'</sup> +24 58	<sup>h</sup> <sup>m</sup> 2 15	<sup>°</sup> <sup>'</sup> -51 34
1 -9.2	22.243 - 248	50.18 +201	58.744 - 133	65.39 -180	54.855 - 56	50.62 + 24	61.857 - 191	49.69 -189
1 0.8	21.930 - 373	51.74 +156	58.584 - 160	66.79 -140	54.773 - 82	50.69 + 7	61.635 - 222	51.12 -143
1 10.8	21.557 - 373	52.81 +107	58.584 - 183	67.77 - 98	54.664 - 109	50.57 - 12	61.384 - 251	52.07 - 95
1 20.8	21.140 - 417	52.81 + 52	58.401 - 202	67.77 - 50	54.664 - 129	50.57 - 31	61.115 - 269	52.46 - 39
1 30.7	20.700 - 440	53.33 - 3	58.199 - 209	68.27 - 2	54.535 - 143	50.26 - 47	61.115 - 278	52.33 + 13
2 9.7	20.249 - 451	52.74 - 56	57.777 - 213	67.84 + 45	54.240 - 152	49.15 - 64	60.557 - 280	51.67 + 66
2 19.7	19.815 - 434	51.64 -110	57.570 - 207	66.91 + 93	54.091 - 149	48.38 - 77	60.287 - 270	50.47 +120
3 1.7	19.419 - 396	51.64 -153	57.570 - 191	66.91 +137	54.091 - 138	48.38 - 85	60.287 - 250	50.47 +167
3 11.6	19.419 - 344	50.11 -194	57.379 - 169	65.54 +178	53.953 - 120	47.53 - 91	60.037 - 224	48.80 +211
3 21.6	18.909 - 266	48.17 -224	57.210 - 136	63.76 +218	53.833 - 88	46.62 - 88	59.813 - 183	46.69 +253
3 31.6	18.633 - 176	45.93 -243	57.074 - 97	61.58 +249	53.745 - 51	45.74 - 83	59.630 - 136	44.16 +285
4 10.5	18.554 - 79	43.50 -254	56.977 - 52	59.09 +279	53.694 - 9	44.91 - 71	59.494 - 85	41.31 +314
4 20.5	18.586 + 32	40.96 -252	56.925 + 2	56.30 +303	53.685 + 41	44.20 - 53	59.409 - 22	38.17 +337
4 30.5	18.586 + 139	38.44 -239	56.927 + 54	53.27 +318	53.726 + 89	43.67 - 33	59.387 + 40	34.80 +349
5 10.5	18.969 + 244	36.05 -221	56.981 + 108	50.09 +331	53.815 + 140	43.34 - 13	59.427 + 103	31.31 +359
5 20.4	19.317 + 348	33.84 -191	57.089 + 165	46.78 +334	53.955 + 191	43.21 + 16	59.530 + 169	27.72 +357
5 30.4	19.750 + 433	31.93 -156	57.254 + 213	43.44 +329	54.146 + 233	43.37 + 43	59.699 + 226	24.15 +349
6 9.4	20.263 + 513	30.37 -117	57.467 + 261	40.15 +319	54.379 + 271	43.80 + 71	59.925 + 283	20.66 +334
6 19.4	20.263 + 577	29.20 - 70	57.728 + 301	36.96 +299	54.650 + 303	44.51 + 98	60.208 + 333	17.32 +308
6 29.3	20.840 + 620	28.50 - 25	58.029 + 332	33.97 +273	54.953 + 325	45.49 +120	60.541 + 370	14.24 +277
7 9.3	22.115 + 655	28.46 + 21	58.717 + 356	28.83 +241	55.619 + 341	48.11 +142	61.313 + 402	11.47 +239
7 19.3	22.784 + 669	29.16 + 70	59.088 + 371	26.84 +199	55.965 + 346	49.69 +158	61.734 + 421	09.08 +191
7 29.2	23.451 + 667	30.28 +112	59.462 + 374	25.28 +156	56.309 + 344	51.39 +170	62.161 + 427	07.17 +143
8 8.2	24.107 + 656	31.83 +155	59.833 + 371	24.22 +106	56.646 + 337	53.19 +180	62.589 + 428	05.74 + 88
8 18.2	24.734 + 627	33.78 +195	60.189 + 356	23.70 + 52	56.967 + 321	55.02 +183	62.589 + 411	04.86 + 29
8 28.2	25.323 + 589	36.05 +227	60.522 + 333	23.69 + 1	57.267 + 300	56.84 +182	63.387 + 387	04.83 - 26
9 7.1	25.868 + 545	38.63 +258	60.828 + 306	24.22 - 53	57.544 + 277	58.63 +179	63.387 + 355	05.66 - 83
9 17.1	26.354 + 486	41.47 +284	61.096 + 268	25.26 -104	57.790 + 246	60.34 +171	63.742 + 310	05.66 -137
9 27.1	26.780 + 426	44.48 +301	61.325 + 229	26.74 -148	58.008 + 218	61.94 +160	64.052 + 264	07.03 -183
10 7.0	27.139 + 359	47.65 +317	61.511 + 186	28.64 -190	58.196 + 188	63.43 +149	64.316 + 211	08.86 -225
10 17.0	27.422 + 283	50.88 +323	61.649 + 138	30.85 -221	58.350 + 154	64.77 +134	64.527 + 151	11.11 -257
10 27.0	27.633 + 211	54.13 +325	61.744 + 95	33.27 -242	58.474 + 124	65.97 +120	64.678 + 96	13.68 -276
11 6.0	27.764 + 131	57.34 +321	61.792 + 48	35.83 -256	58.566 + 92	67.02 +105	64.774 + 38	16.44 -288
11 15.9	27.811 + 47	60.40 +306	61.795 + 3	38.40 -257	58.624 + 58	67.89 + 87	64.812 - 20	19.32 -285
11 25.9	27.780 - 31	63.27 +287	61.758 - 37	40.87 -247	58.653 + 29	68.60 + 71	64.792 - 72	22.17 -272
12 5.9	27.664 - 116	65.89 +262	61.680 - 78	43.17 -230	58.650 - 3	69.14 + 54	64.598 - 122	27.39 -250
12 15.9	27.470 - 194	68.13 +224	61.567 - 113	45.18 -201	58.615 - 35	69.50 + 36	64.432 - 166	27.39 -213
12 25.8	27.205 - 265	69.98 +185	61.425 - 142	46.84 -166	58.553 - 62	69.68 + 18	64.230 - 202	29.52 -174
12 35.8	26.870 - 335	71.36 +138	61.254 - 171	48.11 -127	58.461 - 92	69.67 - 1	64.230 - 237	31.26 -127
							63.993 - 258	32.53 - 74
Mean Place	24.669	42.63	59.162	45.52	56.667	51.60	61.694	27.87
sec δ, tan δ	+2.504	+2.296	+1.330	-0.876	+1.103	+0.466	+1.609	-1.261
dα(ψ), dδ(ψ)	+0.095	+0.33	+0.048	+0.33	+0.068	+0.33	+0.042	+0.33
dα(ε), dδ(ε)	-0.128	+0.55	+0.049	+0.55	-0.026	+0.56	+0.070	+0.56
Dble. Trans.	October 25		October 25		October 25		October 25	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	80		79		1062		1061	
	67 Ceti		γ Trianguli		21 G. Fornacis		232 G. Ceti	
Mag.Spect.	5.70	G5	4.07	A0	6.74	G5	5.82	F8
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	2 16	- 6 28	2 16	+ 33 46	2 16	- 36 02	2 17	+ 1 41
1	17.233 - 54	72.38 - 101	28.590 - 66	68.51 + 64	44.985 - 111	60.98 - 175	17.778 - 48	32.02 - 71
1	17.156 - 77	73.28 - 90	28.494 - 96	68.90 + 39	44.849 - 136	62.37 - 139	17.707 - 71	31.35 - 67
1	17.057 - 99	74.07 - 79	28.370 - 124	69.03 + 13	44.689 - 160	63.39 - 102	17.613 - 94	30.72 - 63
1	16.941 - 116	74.70 - 63	28.221 - 149	68.87 - 16	44.511 - 178	63.96 - 57	17.501 - 112	30.15 - 57
1	16.814 - 127	75.15 - 45	28.059 - 162	68.46 - 41	44.325 - 186	64.09 - 13	17.377 - 124	29.68 - 47
2	16.679 - 135	75.42 - 27	27.886 - 173	67.80 - 66	44.133 - 192	63.79 + 30	17.245 - 132	29.29 - 39
2	16.546 - 133	75.49 - 7	27.716 - 170	66.91 - 89	43.945 - 188	63.02 + 77	17.114 - 131	29.03 - 26
3	16.422 - 124	75.34 + 15	27.560 - 156	65.85 - 106	43.772 - 173	61.84 + 118	16.993 - 121	28.91 - 12
3	16.314 - 108	74.99 + 35	27.424 - 136	64.66 - 119	43.617 - 155	60.27 + 157	16.887 - 106	28.94 + 3
3	16.231 - 83	74.38 + 61	27.323 - 101	63.41 - 125	43.494 - 123	58.32 + 195	16.808 - 79	29.16 + 22
3	16.181 - 50	73.55 + 83	27.263 - 60	62.17 - 124	43.407 - 87	56.05 + 227	16.760 - 48	29.57 + 41
4	16.168 - 13	72.49 + 106	27.250 - 13	60.99 - 118	43.363 - 44	53.48 + 257	16.750 - 10	30.18 + 61
4	16.197 + 29	71.18 + 131	27.291 + 41	59.95 - 104	43.368 + 5	50.66 + 282	16.784 + 34	31.01 + 83
4	16.271 + 74	69.65 + 153	27.385 + 94	59.11 - 84	43.423 + 55	47.68 + 298	16.860 + 76	32.07 + 106
5	16.389 + 118	67.91 + 174	27.533 + 148	58.49 - 62	43.530 + 107	44.55 + 313	16.983 + 123	33.37 + 130
5	16.554 + 165	65.99 + 192	27.736 + 203	58.15 - 34	43.690 + 160	41.36 + 319	17.151 + 168	34.88 + 151
5	16.757 + 203	63.94 + 205	27.984 + 248	58.10 - 5	43.896 + 206	38.20 + 316	17.359 + 208	36.54 + 166
6	16.997 + 240	61.79 + 215	28.274 + 290	58.37 + 27	44.147 + 251	35.09 + 311	17.603 + 244	38.36 + 182
6	17.268 + 271	59.59 + 220	28.599 + 325	58.97 + 60	44.436 + 289	32.15 + 294	17.877 + 274	40.28 + 192
6	17.560 + 292	57.41 + 218	28.946 + 347	59.84 + 87	44.753 + 317	29.45 + 270	18.172 + 295	42.24 + 196
7	17.870 + 310	55.29 + 212	29.311 + 365	61.00 + 116	45.093 + 340	27.02 + 243	18.484 + 312	44.23 + 199
7	18.186 + 316	53.29 + 200	29.682 + 371	62.41 + 141	45.447 + 354	24.98 + 204	18.802 + 318	46.16 + 193
7	18.502 + 316	51.47 + 182	30.051 + 369	64.01 + 160	45.803 + 356	23.34 + 164	19.119 + 317	47.99 + 183
8	18.812 + 310	49.86 + 161	30.412 + 361	65.78 + 177	46.156 + 353	22.15 + 119	19.431 + 312	49.69 + 170
8	19.108 + 296	48.53 + 133	30.756 + 344	67.68 + 190	46.495 + 339	21.48 + 67	19.727 + 296	51.18 + 149
8	19.385 + 277	47.50 + 103	31.079 + 323	69.65 + 197	46.813 + 318	21.30 + 18	20.005 + 278	52.46 + 128
9	19.641 + 256	46.77 + 73	31.377 + 298	71.67 + 202	47.105 + 292	21.64 - 34	20.261 + 256	53.49 + 103
9	19.867 + 226	46.38 + 39	31.643 + 266	73.69 + 202	47.363 + 258	22.47 - 83	20.490 + 229	54.24 + 75
9	20.066 + 199	46.30 + 8	31.879 + 236	75.66 + 197	47.585 + 222	23.73 - 126	20.691 + 201	54.74 + 50
10	20.235 + 169	46.52 - 22	32.082 + 203	77.58 + 192	47.767 + 182	25.41 - 168	20.863 + 172	54.98 + 24
10	20.372 + 137	47.01 - 49	32.249 + 167	79.40 + 182	47.907 + 140	27.40 - 199	21.003 + 140	54.97 - 1
10	20.479 + 107	47.71 - 70	32.383 + 134	81.10 + 170	48.006 + 99	29.61 - 221	21.115 + 112	54.76 - 21
11	20.556 + 77	48.60 - 89	32.481 + 98	82.67 + 157	48.063 + 57	29.61 - 238	21.197 + 82	54.37 - 39
11	20.602 + 46	49.61 - 101	32.544 + 63	84.07 + 140	48.079 + 16	31.99 - 239	21.997 + 52	53.84 - 53
11	20.621 + 19	50.68 - 107	32.573 + 29	85.29 + 122	48.058 - 21	34.38 - 234	21.249 + 26	53.22 - 62
12	20.611 - 10	51.78 - 110	32.566 - 42	86.31 + 102	48.000 - 58	38.92 - 220	21.271 - 4	52.53 - 69
12	20.574 - 37	52.83 - 105	32.524 - 7	87.10 + 79	47.908 - 92	40.85 - 193	21.241 - 30	51.82 - 71
12	20.513 - 61	53.81 - 98	32.450 - 74	87.65 + 55	47.789 - 119	42.49 - 164	21.187 - 54	51.12 - 70
12	20.428 - 85	54.69 - 88	32.344 - 106	87.94 + 29	47.642 - 147	43.76 - 127	21.107 - 80	50.44 - 68
Mean Place	18.587	62.21	30.512	67.13	45.596	42.55	19.275	39.94
sec δ, tan δ	+1.006	-0.114	+1.203	+0.669	+1.237	-0.728	+1.000	+0.030
dα(ψ), dδ(ψ)	+0.059	+0.33	+0.071	+0.33	+0.050	+0.33	+0.062	+0.33
dα(ε), dδ(ε)	+0.006	+0.56	-0.037	+0.56	+0.040	+0.56	-0.002	+0.56
Dble.Trans.	October 26		October 26		October 26		October 26	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	81		1063		1064		1065	
	♁ Arietis		62 Andromedae		239 G. Ceti		♁ Hydri	
Mag. Spect.	5.69	A0	5.12	A0	5.99	K0	4.26	A2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	2 17	+19 50	2 18	+47 18	2 21	-17 43	2 21	-68 42
1 -9.2	20 621 - 50	18.70 + 3	22.136 - 99	70 16 +125	25 709 - 65	36 81 -139	32 853 - 420	98 00 -190
1 0.8	20 546 - 75	18 59 - 11	21 999 - 137	71.08 + 92	25 621 - 88	37.98 - 117	32 378 - 475	99 36 -136
1 10.8	20 445 - 101	18 35 - 24	21 826 - 173	71.63 + 55	25 510 - 111	38.93 - 95	31.857 - 521	100.17 - 81
1 20.8	20.323 - 122	17 98 - 37	21 624 - 202	71.76 + 13	25 381 - 129	39 61 - 68	31.308 - 549	100 36 - 19
1 30.7	20.189 - 134	17 50 - 48	21.404 - 220	71.51 - 25	25.241 - 140	40.00 - 39	30.750 - 558	99.96 + 40
2 9.7	20.045 - 144	16 90 - 60	21.174 - 230	70 87 - 64	25.092 - 149	40.10 - 10	30.194 - 566	98 99 + 97
2 19.7	19 902 - 143	16 24 - 66	20 948 - 226	69 87 -100	24 946 - 146	39 88 + 22	29 660 - 534	97 43 +156
3 1.7	19 770 - 132	15 55 - 69	20 740 - 208	68 57 -130	24 809 - 137	39 36 + 52	29 166 - 494	95 38 +205
3 11.6	19 655 - 115	14 84 - 71	20 558 - 182	67 02 -155	24 687 - 122	38 55 + 81	28 718 - 448	92 88 +250
3 21.6	19 569 - 86	14 19 - 65	20 420 - 138	65 29 -173	24 591 - 96	37 42 +113	28 340 - 378	89 95 +293
3 31.6	19 519 - 50	13 64 - 55	20 333 - 87	63 49 -180	24 527 - 64	36 02 +140	28 039 - 301	86 73 +322
4 10.5	19 510 - 9	13 21 - 43	20 303 - 30	61.67 -182	24 501 - 26	34.35 +167	27 823 - 216	83 22 +351
4 20.5	19 548 + 38	12 99 - 22	20 339 + 36	59 94 -173	24 518 + 17	32 43 +192	27 706 - 117	79 53 +369
4 30.5	19 629 + 81	12 99 + 0	20 441 +102	58 37 -157	24 580 + 62	30 30 +213	27 687 - 19	75 75 +378
5 10.5	19 764 + 135	13 12 + 13	20 608 + 167	57 00 -137	24 689 + 109	27 97 +233	27 771 + 84	71 92 +383
5 20.4	19 947 + 183	13 57 + 45	20 839 + 231	55 93 -107	24 844 + 155	25 51 +246	27 961 + 190	68 17 +375
5 30.4	20 171 + 224	14 27 + 70	21 125 + 286	55 19 - 74	25 040 + 196	22 98 +253	28 245 + 284	64 56 +361
6 9.4	20 432 + 261	15 22 + 95	21 461 + 336	54 79 - 40	25 275 + 235	20 39 +259	28 623 + 378	61 16 +340
6 19.4	20 725 + 293	16 41 +119	21 838 + 377	54 79 + 0	25 544 + 269	17 85 +254	29 087 + 464	58 08 +308
6 29.3	21 039 + 314	17 78 +137	22 242 + 404	55 15 + 36	25 835 + 291	15 40 +245	29 616 + 529	55 38 +270
7 9.3	21 369 + 330	19 32 +154	22 668 + 426	55 88 + 73	26 146 + 311	13 10 +230	30 206 + 590	53 11 +227
7 19.3	21 705 + 336	20 99 +167	23 103 + 435	56 97 +109	26 466 + 320	11 03 +207	30 836 + 630	51 38 +173
7 29.2	22 040 + 335	22 72 +173	23 535 + 432	58 36 +139	26 788 + 322	09 23 +180	31 485 + 649	50 19 +119
8 8.2	22 368 + 328	24 49 +177	23 960 + 425	60 05 +169	27 105 + 317	07 74 +149	32 143 + 658	49 59 + 60
8 18.2	22 680 + 312	26 25 +176	24 366 + 406	61 98 +193	27 410 + 305	06 63 +111	32 783 + 640	49 62 - 3
8 28.2	22 972 + 292	27 96 +171	24 747 + 381	64 11 +213	27 696 + 286	05 90 + 73	33 389 + 606	50 23 - 61
9 7.1	23 243 + 271	29 58 +162	25 100 + 353	66 40 +229	27 960 + 264	05 57 + 33	33 948 + 559	51 44 -121
9 17.1	23 484 + 241	31 08 +150	25 417 + 317	68 81 +241	28 195 + 235	05 66 - 9	34 435 + 487	53 20 -176
9 27.1	23 698 + 214	32 45 +137	25 697 + 280	71 27 +246	28 401 + 206	06 11 - 45	34 843 + 408	55 42 -222
10 7.1	23 882 + 184	33 66 +121	25 939 + 242	73 78 +251	28 575 + 174	06 91 - 80	35 160 + 317	58 06 -264
10 17.0	24 034 + 152	34 71 +105	26 136 + 197	76 26 +248	28 715 + 140	08 03 -112	35 372 + 212	60 99 -293
10 27.0	24 157 + 123	35 59 + 88	26 293 + 157	78 67 +241	28 823 + 108	09 37 -134	35 482 + 110	64 09 -310
11 6.0	24 248 + 91	36 32 + 73	26 405 + 112	81 00 +233	28 898 + 75	10 89 -152	35 483 + 1	67 27 -318
11 15.9	24 308 + 60	36 88 + 56	26 405 + 67	83 16 +216	28 941 + 43	12 51 -162	35 377 - 106	70 37 -310
11 25.9	24 340 + 32	37 29 + 41	26 495 + 23	85 14 +198	28 953 + 12	14 15 -164	35 175 - 202	73 27 -290
12 5.9	24 340 + 0	37 55 + 26	26 472 - 23	86 88 +174	28 935 - 18	15 76 -161	34 878 - 297	75 89 -262
12 15.9	24 310 - 30	37 67 + 12	26 404 - 68	88 33 +145	28 888 - 47	17 24 -148	34 501 - 377	78 08 -219
12 25.8	24 254 - 56	37 65 - 2	26 296 - 108	89 46 +113	28 817 - 71	18 56 -132	34 059 - 442	79 80 -172
12 35.8	24 169 - 86	37 48 - 17	26 147 - 149	90 24 + 78	28 719 - 98	19 67 -111	33 559 - 500	80 98 -118
	24 169 - 106	37 48 - 30	26 147 - 181	90 24 + 38	28 719 - 117	19 67 - 85	33 559 - 535	80 98 - 56
Mean Place	22.360	21.06	24.214	65.67	26.807	23.69	30.488	74.17
sec δ, tan δ	+1.063	+0.361	+1.475	+1.084	+1.050	-0.320	+2.755	-2.568
dα(ψ), dδ(ψ)	+0.067	+0.33	+0.077	+0.33	+0.056	+0.32	+0.022	+0.32
dα(ε), dδ(ε)	-0.020	+0.56	-0.060	+0.57	+0.017	+0.58	+0.140	+0.58
Dble. Trans.	October 26		October 26		October 27		October 27	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	83		1067		84		1066	
	κ Fornacis		κ Hydri		λ Horologii		ρ Ceti	
Mag. Spect.	5.37	F5	6.00	K0	5.47	F2	4.90	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	2 21	-23 52	2 22	-73 42	2 24	-60 21	2 25	-12 20
1 <sup>d</sup>	54 546	53 27	50 910	48 91	32 359	101 96	16 631	74 75
1 <sup>s</sup>	54 446	54 55	50 260	50 22	32 049	103 45	16 552	75 82
1	54 324	55 56	49 551	50 98	31 702	104 43	16 450	76 72
1	54 183	56 23	48 805	51 10	31 329	104 81	16 328	77 40
1	54 031	56 55	48 051	50 62	30 948	104 62	16 195	77 84
2	53 872	56 54	47 301	49 57	30 563	103 87	16 053	78 05
2	53 716	56 15	46 582	47 93	30 191	102 56	15 911	77 98
3	53 569	55 41	45 916	45 81	29 844	100 75	15 777	77 66
3	53 439	54 34	45 311	43 23	29 530	98 47	15 659	77 07
3	53 336	52 93	44 796	40 24	29 265	95 77	15 565	76 20
3	53 265	51 23	44 380	36 95	29 057	92 75	15 503	75 09
4	53 233	49 24	44 071	33 40	28 912	89 42	15 477	73 71
4	53 246	47 00	43 889	29 67	28 843	85 88	15 494	72 08
4	53 305	44 56	43 831	25 87	28 847	82 22	15 556	70 25
5	53 411	41 94	43 903	22 03	28 930	78 48	15 663	68 20
5	53 566	39 20	44 109	18 27	29 093	74 77	15 816	65 99
5	53 763	36 43	44 436	14 68	29 328	71 17	16 010	63 69
6	54 000	33 64	44 884	11 30	29 634	67 74	16 242	61 30
6	54 272	30 94	45 441	08 26	30 004	64 60	16 507	58 92
6	54 569	28 38	46 084	05 60	30 422	61 80	16 794	56 59
7	54 886	26 01	46 808	03 39	30 885	59 41	17 101	54 36
7	55 213	23 93	47 586	01 72	31 377	57 52	17 417	52 31
7	55 542	22 16	48 392	00 60	31 881	56 15	17 734	50 48
8	55 869	20 76	49 213	00 07	32 391	55 35	18 048	48 92
8	56 181	19 79	50 015	00 18	32 886	55 17	18 348	47 70
8	56 475	19 24	50 777	00 86	33 355	55 57	18 631	46 80
9	56 746	19 14	51 481	02 15	33 789	56 56	18 893	46 28
9	56 987	19 48	52 093	03 99	34 169	58 11	19 128	46 13
9	57 197	20 22	52 605	06 27	34 493	60 13	19 334	46 32
10	57 374	21 33	52 999	08 97	34 751	62 59	19 511	46 85
10	57 515	22 77	53 255	11 95	34 934	65 37	19 655	47 68
10	57 621	24 43	53 377	15 09	35 045	68 34	19 768	48 73
11	57 693	26 28	53 356	18 30	35 079	71 43	19 850	49 97
11	57 729	28 20	53 192	21 41	35 036	74 48	19 900	51 32
11	57 734	30 11	52 901	24 31	34 926	77 37	19 922	52 72
12	57 706	31 96	52 484	26 92	34 748	80 02	19 913	54 11
12	57 649	33 63	51 960	29 08	34 511	82 27	19 876	55 42
12	57 566	35 09	51 352	30 76	34 226	84 10	19 814	56 60
12	57 457	36 30	50 669	31 88	33 897	85 42	19 726	57 64
Mean Place	55 502	38 45	47 057	24 77	31 290	79 60	17 822	63 41
sec δ, tan δ	+1.094	-0.443	+3.564	-3.421	+2.023	-1.758	+1.024	-0.219
dα(ψ), dδ(ψ)	+0.054	+0.32	+0.008	+0.32	+0.034	+0.32	+0.058	+0.32
dα(ε), dδ(ε)	+0.024	+0.58	+0.185	+0.58	+0.095	+0.59	+0.012	+0.59
Dble. Trans.	October 27		October 27		October 28		October 28	



APPARENT PLACES OF STARS, 1986

39

AT UPPER TRANSIT AT GREENWICH

No.	86		1068		85		1069	
	κ Eridani		12 Trianguli		ξ <sup>2</sup> Ceti		27 Arietis	
Mag.Spect.	4.44	B5	5.38	F0	4.34	A0	6.41	G5
U.T.	R.A.		R.A.		R.A.		R.A.	
	h	m	h	m	h	m	h	m
	2	26	2	27	2	27	2	30
	°		°		°		°	
	47	45	29	36	8	23	17	38
	'		'		'		'	
	"		"		"		"	
1 -9.1	29 50 <sup>s</sup> - 158	70 95 - 198	20 498 <sup>s</sup> - 50	35 28 + 50	24 842 <sup>s</sup> - 41	54 97 - 46	07 686 <sup>s</sup> - 39	38 26 - 5
1 0.8	29 313 - 190	72 49 - 154	20 417 - 81	35 57 + 29	24 777 - 65	54 49 - 48	07 619 - 67	38.11 - 15
1 10.8	29 095 - 218	73 59 - 110	20 417 - 110	35 57 + 7	24 777 - 91	54 49 - 50	07 619 - 93	38.11 - 27
1 20.8	29 095 - 241	73 59 - 57	20 307 - 135	35 64 - 16	24 686 - 111	53 99 - 51	07 526 - 117	37.84 - 36
1 30.7	28 854 - 251	74 16 - 6	20 172 - 151	35 48 - 37	24 575 - 125	53 48 - 49	07 409 - 131	37.48 - 45
2 9.7	28 603 - 258	74 22 + 45	20 021 - 163	35.11 - 58	24 450 - 136	52.99 - 47	07 135 - 143	36.50 - 53
2 19.7	28 345 - 251	73 77 + 99	19 858 - 164	34 53 - 77	24 314 - 137	52 52 - 41	07 135 - 145	36.50 - 57
3 1.7	28 094 - 235	72 78 + 145	19 694 - 153	33 76 - 89	24 177 - 128	52 11 - 33	06 990 - 136	35.93 - 59
3 11.6	27 859 - 214	71 33 + 189	19 541 - 135	32 87 - 100	24 049 - 115	51 78 - 25	06 854 - 121	35.34 - 59
3 21.6	27 645 - 177	69 44 + 232	19 406 - 105	31 87 - 104	23 934 - 88	51 53 - 11	06 733 - 95	34.75 - 53
3 31.6	27 468 - 135	67 12 + 265	19 301 - 66	30 83 - 101	23 846 - 56	51 42 + 4	06 638 - 60	34.22 - 43
4 10.6	27 333 - 88	64 47 + 296	19 235 - 23	29 82 - 95	23 790 - 18	51 46 + 22	06 578 - 22	33 79 - 30
4 20.5	27 245 - 30	61 51 + 321	19 212 + 29	28 87 - 81	23 772 + 27	51 68 + 41	06 556 + 27	33 49 - 11
4 30.5	27 215 + 28	58 30 + 336	19 241 + 79	28 06 - 61	23 799 + 67	52 09 + 58	06 583 + 69	33 38 + 22
5 10.5	27 243 + 88	54 94 + 349	19 320 + 131	27 45 - 42	23 866 + 115	52 67 + 91	06 652 + 116	33 60 + 13
5 20.4	27 331 + 150	51 45 + 352	19 451 + 185	27 03 - 16	23 981 + 164	53 58 + 110	06 768 + 171	33.73 + 53
5 30.4	27 481 + 204	47 93 + 344	19 636 + 230	26 87 + 12	24 145 + 204	54 68 + 128	06 939 + 210	34.26 + 77
6 9.4	27 685 + 259	44 49 + 335	19 866 + 272	26 99 + 40	24 349 + 241	55 96 + 146	07 149 + 250	35.03 + 100
6 19.4	27 944 + 306	41 14 + 312	20 138 + 306	27 39 + 69	24 590 + 272	57 42 + 162	07 399 + 282	36.03 + 121
6 29.3	28 250 + 343	38 02 + 283	20 444 + 330	28 08 + 95	24 862 + 295	59 04 + 172	07 681 + 304	37.24 + 138
7 9.3	28 593 + 374	35 19 + 250	20 774 + 349	29 03 + 119	25 157 + 312	60 76 + 180	07 985 + 322	38.62 + 152
7 19.3	28 967 + 393	32 69 + 204	21 123 + 357	30 22 + 140	25 469 + 320	62 56 + 180	08 307 + 332	40.14 + 164
7 29.3	29 360 + 401	30 65 + 158	21 480 + 357	31 62 + 156	25 789 + 321	64 36 + 178	08 639 + 331	41.78 + 168
8 8.2	29 761 + 403	29 07 + 106	21 837 + 351	33 18 + 170	26 110 + 315	66 14 + 170	08 970 + 327	43 46 + 170
8 18.2	30 164 + 390	28 01 + 48	22 188 + 337	34 88 + 178	26 425 + 303	67 84 + 157	09 297 + 313	45 16 + 167
8 28.2	30 554 + 368	27 53 - 6	22 525 + 317	36 66 + 182	26 728 + 285	69 41 + 141	09 610 + 296	46.83 + 159
9 7.1	30 922 + 342	27 59 - 63	22 842 + 296	38 48 + 184	27 013 + 265	70 82 + 123	09 906 + 276	48 42 + 150
9 17.1	31 264 + 302	28 22 - 118	23 138 + 266	40 32 + 190	27 278 + 238	72 05 + 101	10 182 + 249	49 92 + 136
9 27.1	31 566 + 261	29 40 - 165	23 404 + 238	42 12 + 174	27 516 + 212	73 06 + 80	10 431 + 222	51 28 + 121
10 7.1	31 827 + 214	31 05 - 208	23 642 + 208	43 86 + 167	27 728 + 184	73 86 + 57	10 653 + 195	52 49 + 106
10 17.0	32 041 + 160	33 13 - 242	23 850 + 174	45 53 + 155	27 912 + 153	74 43 + 35	10 848 + 163	53 55 + 87
10 27.0	32 201 + 111	35 55 - 265	24 024 + 143	47 08 + 143	28 065 + 126	74 78 + 17	11 011 + 135	54 42 + 72
11 6.0	32 312 + 57	38 20 - 280	24 167 + 110	48 51 + 131	28 191 + 96	74 95 - 1	11 146 + 104	55 14 + 56
11 15.9	32 369 + 4	41 00 - 280	24 277 + 75	49 82 + 114	28 287 + 65	74 94 - 16	11 250 + 73	55 70 + 40
11 25.9	32 373 - 43	43 80 - 271	24 352 + 43	50 96 + 98	28 352 + 38	74 78 - 27	11 323 + 44	56 10 + 28
12 5.9	32 330 - 91	46 51 - 253	24 395 + 7	51 94 + 81	28 390 + 7	74 51 - 37	11 367 + 12	56 38 + 14
12 15.9	32 239 - 133	49 04 - 220	24 402 - 27	52 75 + 62	28 397 - 21	74 14 - 43	11 379 - 18	56 52 + 1
12 25.8	32 106 - 170	51 24 - 184	24 375 - 58	53 37 + 42	28 376 - 47	73 71 - 46	11 361 - 46	56 53 - 9
12 35.8	31 936 - 204	53 08 - 140	24 317 - 91	53 79 + 19	28 329 - 75	73 25 - 51	11 315 - 77	56 44 - 21
	31 732 - 227	54 48 - 89	24 226 - 117	53 98 - 2	28 254 - 96	72 74 - 51	11 238 - 100	56 23 - 31
Mean Place	29 473	50 90	22 316	34 57	26 381	60 13	09 340	40 62
sec δ, tan δ	+1.488	-1.101	+1.150	+0.568	+1.011	+0.148	+1.049	+0.318
dα(ψ), dδ(ψ)	+0.044	+0.32	+0.070	+0.32	+0.064	+0.32	+0.066	+0.32
dα(ε), dδ(ε)	+0.059	+0.60	-0.030	+0.60	-0.008	+0.60	-0.017	+0.61
Dble.Trans.	October 28		-October 28		October 28		October 29	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1070		1071		90		88	
	14 Trianguli		σ Ceti		μ Hydri		λ <sup>1</sup> Fornacis	
Mag. Spect.	5.35	K0	4.82	F5	5.29	K0	5.88	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	2 31	+ 36 05	2 31	- 15 17	2 31	- 79 09	2 32	- 34 42
1 <sup>d</sup>	14.633	18.99	25.712	84.05	63.650	89.23	32.717	48.96
1 <sup>s</sup>	- 56	+ 81	- 55	- 136	- 904	- 189	- 97	- 186
1	0.8	14.543	19.56	85.23	62.633	90.57	32.593	50.49
1	10.8	- 122	+ 30	- 104	- 1111	- 79	- 151	- 116
1	20.8	14.421	19.86	86.21	61.522	91.36	32.442	51.65
1	30.7	- 151	+ 0	- 125	- 1171	- 16	- 173	- 73
1	30.7	14.270	19.86	86.93	60.351	91.52	32.269	52.38
1	30.7	- 168	- 27	- 137	- 1185	+ 44	- 184	- 30
1	30.7	14.102	19.59	87.38	59.166	91.08	32.085	52.68
2	9.7	- 181	- 55	- 148	- 1184	+ 102	- 194	+ 13
2	19.7	13.921	19.04	87.57	57.982	90.06	31.891	52.55
2	19.7	- 182	- 80	- 148	- 1139	+ 161	- 192	+ 59
2	19.7	13.739	18.24	87.46	56.843	88.45	31.699	51.96
3	1.7	- 171	- 100	- 140	- 1063	+ 209	- 182	+ 100
3	11.6	13.568	17.24	87.07	55.780	86.36	31.517	50.96
3	11.6	- 153	- 117	- 126	- 974	+ 255	- 165	+ 140
3	21.6	13.415	16.07	86.39	54.806	83.81	31.352	49.56
3	21.6	- 119	- 126	- 102	- 844	+ 296	- 137	+ 180
3	21.6	13.296	14.81	85.41	53.962	80.85	31.215	47.76
3	31.6	- 78	- 129	- 70	- 700	+ 326	- 102	+ 212
3	31.6	13.218	13.52	84.16	53.262	77.59	31.113	45.64
3	31.6	- 32	- 127	- 35	- 545	+ 353	- 62	+ 244
4	10.6	13.186	12.25	82.65	52.717	74.06	31.051	43.20
4	10.6	+ 24	- 116	+ 9	- 361	+ 370	- 13	+ 270
4	20.5	13.210	11.09	80.88	52.356	70.36	31.038	40.50
4	20.5	+ 79	- 99	+ 54	- 181	+ 376	+ 36	+ 289
4	30.5	13.289	10.10	78.90	52.175	66.58	31.074	37.61
4	30.5	+ 134	- 79	+ 99	+ 8	+ 381	+ 87	+ 306
4	30.5	13.423	09.31	76.72	52.183	62.77	31.161	34.55
5	20.4	+ 191	- 54	+ 146	+ 207	+ 374	+ 140	+ 314
5	20.4	13.614	08.77	74.38	52.390	59.03	31.301	31.41
5	20.4	+ 240	- 25	+ 188	+ 385	+ 357	+ 188	+ 315
5	30.4	13.854	08.52	71.95	52.775	55.46	31.489	28.26
5	30.4	+ 284	+ 6	+ 226	+ 566	+ 337	+ 232	+ 311
6	9.4	14.138	08.58	69.46	53.341	52.09	31.721	25.15
6	9.4	+ 322	+ 37	+ 261	+ 734	+ 303	+ 273	+ 297
6	19.4	14.460	08.95	66.98	54.075	49.06	31.994	22.18
6	19.4	+ 347	+ 67	+ 285	+ 868	+ 265	+ 302	+ 277
6	29.3	14.807	09.62	64.58	54.943	46.41	32.296	19.41
7	9.3	+ 369	+ 96	+ 305	+ 229	+ 995	+ 221	+ 251
7	9.3	15.176	10.58	26.069	62.29	55.938	44.20	32.624
7	9.3	+ 378	+ 122	+ 316	+ 208	+ 1087	+ 167	+ 344
7	19.3	15.554	11.80	26.385	60.21	57.025	42.53	32.968
7	19.3	+ 377	+ 144	+ 318	+ 183	+ 1141	+ 114	+ 348
7	29.3	15.931	13.24	26.703	58.38	58.166	41.39	33.316
7	29.3	+ 374	+ 163	+ 316	+ 154	+ 1176	+ 54	+ 350
8	8.2	16.305	14.87	27.019	56.84	59.342	40.85	33.666
8	8.2	+ 359	+ 178	+ 304	+ 118	+ 1160	- 10	+ 337
8	18.2	16.664	16.65	27.323	55.66	60.502	40.95	34.003
8	18.2	+ 339	+ 188	+ 267	+ 83	+ 1112	- 67	+ 321
8	28.2	17.003	18.53	27.610	54.83	61.614	41.62	34.324
8	28.2	+ 317	+ 197	+ 267	+ 44	+ 1036	- 127	+ 297
9	7.1	17.320	20.50	27.877	54.39	62.650	42.89	34.621
9	7.1	+ 287	+ 198	+ 240	+ 3	+ 910	- 182	+ 267
9	17.1	17.607	22.48	28.117	54.36	63.560	44.71	34.888
9	17.1	+ 257	+ 198	+ 212	- 32	+ 765	- 228	+ 233
9	27.1	17.864	24.46	28.329	54.68	64.325	46.99	35.121
9	27.1	+ 226	+ 195	+ 183	- 68	+ 594	- 270	+ 197
10	7.1	18.090	26.41	28.512	55.36	64.919	49.69	35.318
10	7.1	+ 189	+ 187	+ 149	- 99	+ 389	- 298	+ 156
10	17.0	18.279	28.28	28.661	56.35	65.308	52.67	35.474
10	17.0	+ 157	+ 179	+ 119	- 123	+ 186	- 314	+ 117
10	27.0	18.436	30.07	28.780	57.58	65.494	55.81	35.591
10	27.0	+ 120	+ 168	+ 86	- 142	- 31	- 323	+ 76
11	6.0	18.556	31.75	28.866	59.00	65.463	59.04	35.667
11	6.0	+ 82	+ 152	+ 54	- 153	- 253	- 312	+ 35
11	16.0	18.638	33.27	28.920	60.53	65.210	62.16	35.702
11	16.0	+ 48	+ 137	+ 24	- 156	- 451	- 294	- 2
11	25.9	18.686	34.64	28.944	62.09	64.759	65.10	35.700
11	25.9	+ 8	+ 118	- 7	- 155	- 647	- 263	- 41
12	5.9	18.694	35.82	28.937	63.64	64.112	67.73	35.659
12	5.9	- 30	+ 96	- 37	- 145	- 815	- 219	- 75
12	15.9	18.664	36.78	28.900	65.09	63.297	69.92	35.584
12	15.9	- 65	+ 72	- 63	- 130	- 951	- 171	- 106
12	25.8	18.599	37.50	28.837	66.39	62.346	71.63	35.478
12	25.8	- 101	+ 46	- 90	- 113	- 1069	- 116	- 137
12	35.8	18.498	37.96	28.747	67.52	61.277	72.79	35.341
12	35.8	- 130	+ 17	- 111	- 88	- 1143	- 54	- 159
Mean Place	16.516	16.64	26.804	72.41	56.379	65.80	33.250	32.35
sec δ, tan δ	+1.237	+0.729	+1.037	-0.274	+5.321	-5.226	+1.216	-0.693
dα(ψ), dδ(ψ)	+0.073	+0.31	+0.057	+0.31	-0.024	+0.31	+0.050	+0.31
dα(ε), dδ(ε)	-0.038	+0.61	+0.014	+0.61	+0.275	+0.62	+0.036	+0.62
Dbie. Trans.	October 29		October 29		October 30		October 30	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1072		1074		1073		87	
	v Ceti*		80 Ceti		268 G. Ceti		36 H. Cassiopeiae	
Mag.Spect.	5.04	G5	5.71	K5	5.92	K0	5.34	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	2 35	+ 5 31	2 35	- 7 53	2 35	+ 6 49	2 36	+ 72 45
1 -9.1	08 407 - 35	59 78 - 58	18 898 - 44	32.92 -113	18.799 - 33	16.93 - 49	41.266 - 309	45.04 +243
1 0.8	08 345 - 62	59 20 - 58	18 828 - 70	33.92 -100	18.740 - 59	16.43 - 50	40.859 - 407	47.04 +200
1 10.8	08 258 - 87	58 62 - 54	18 734 - 94	34.79 - 87	18.655 - 85	15.93 - 50	40.359 - 500	48.57 +153
1 20.8	08.148 - 110	58.08 - 58	18 619 - 115	35.48 - 69	18.548 - 107	15.45 - 48	39.787 - 572	49.53 + 96
1 30.7	08.023 - 125	57.59 - 49	18.490 - 129	35.97 - 49	18.427 - 121	15.01 - 44	39.172 - 615	49.93 + 40
2 9.7	07 887 - 136	57 16 - 43	18 349 - 141	36.28 - 31	18.294 - 133	14.61 - 40	38.532 - 640	49.75 - 18
2 19.7	07 748 - 139	56 81 - 35	18 207 - 142	36.35 - 7	18.158 - 136	14.28 - 33	37.901 - 631	48.98 - 77
3 1.7	07.617 - 119	56.56 - 25	18 072 - 135	36.20 + 15	18 030 - 128	14.05 - 23	37.312 - 589	47.70 - 128
3 11.6	07 498 - 131	56 43 - 13	17 949 - 123	35.83 + 37	17.915 - 115	13.91 - 14	36.783 - 529	45.95 - 175
3 21.6	07.404 - 94	56.45 + 2	17.851 - 98	35.19 + 64	17.825 - 90	13.92 + 1	36.350 - 433	43.81 - 214
3 31.6	07 341 - 63	56 64 + 19	17 783 - 68	34.33 + 86	17.767 - 58	14.09 + 17	36.031 - 319	41.41 - 240
4 10.6	07 314 - 27	57 00 + 36	17 750 - 33	33.23 +110	17.745 - 22	14.44 + 35	35.837 - 194	38.80 - 261
4 20.5	07 332 + 18	57 58 + 58	17.760 + 10	31.87 +136	17.768 + 23	14.99 + 55	35.789 - 48	36.12 - 268
4 30.5	07 391 + 59	58 34 + 76	17 813 + 53	30.31 +156	17 833 + 65	15.71 + 72	35.882 + 93	33.50 - 262
5 10.5	07.497 + 106	59.37 +103	17.912 + 99	28.52 +179	17.944 + 111	16.72 +101	36.117 + 235	30.98 - 252
5 20.4	07 651 + 154	60.61 +124	18.058 + 146	26.56 +196	18.104 + 160	17.93 +121	36.494 + 377	28.70 - 228
5 30.4	07 845 + 194	62.02 +141	18.244 + 186	24.47 +209	18.304 + 200	19.32 +139	36.990 + 496	26.73 - 197
6 9.4	08 078 + 233	63.60 +158	18.469 + 225	22.28 +219	18.542 + 238	20.88 +156	37.599 + 609	25.11 - 162
6 19.4	08 343 + 265	65.31 +171	18.727 + 258	20.05 +223	18.813 + 271	22.59 +171	38.304 + 705	23.93 - 118
6 29.3	08.631 + 288	67.10 +179	19.009 + 282	17.84 +221	19.106 + 293	24.37 +178	39.077 + 773	23.18 - 75
7 9.3	08.937 + 306	68.95 +185	19.310 + 301	15.68 +216	19.418 + 312	26.22 +185	39.908 + 831	22.91 - 27
7 19.3	09.254 + 317	70.78 +183	19.622 + 312	13.66 +202	19.739 + 321	28.07 +185	40.773 + 865	23.13 + 22
7 29.3	09.571 + 317	72.55 +177	19.937 + 315	11.83 +183	20.061 + 322	29.87 +180	41.647 + 874	23.80 + 67
8 8.2	09.886 + 315	74.22 +167	20.249 + 312	10.21 +162	20.380 + 319	31.58 +171	42.522 + 875	24.93 +113
8 18.2	10.189 + 303	75.74 +152	20.550 + 301	08.89 +132	20.686 + 306	33.15 +157	43.372 + 850	26.51 +158
8 28.2	10.475 + 286	77.07 +133	20.835 + 285	07.87 +102	20.976 + 290	34.54 +139	44.184 + 812	28.46 +195
9 7.1	10.742 + 267	78.19 +112	21.100 + 265	07.17 + 70	21.247 + 271	35.74 +120	44.949 + 765	30.79 +233
9 17.1	10.984 + 242	79.07 + 88	21.340 + 240	06.83 + 34	21.492 + 245	36.70 + 96	45.644 + 695	33.44 +265
9 27.1	11.201 + 217	79.72 + 65	21.554 + 214	06.81 + 2	21.712 + 220	37.43 + 73	46.268 + 624	36.33 +289
10 7.1	11.390 + 189	80.12 + 40	21.739 + 185	07.11 - 30	21.904 + 192	37.94 + 51	46.809 + 541	39.45 +312
10 17.0	11.549 + 159	80.29 + 17	21.893 + 154	07.70 - 59	22.066 + 162	38.21 + 27	47.250 + 441	42.72 +327
10 27.0	11.681 + 132	80.27 - 2	22.019 + 126	08.51 - 81	22.201 + 135	38.30 + 9	47.596 + 346	46.06 +334
11 6.0	11.783 + 102	80.07 - 20	22.113 + 94	09.52 -101	22.305 + 104	38.21 - 9	47.832 + 236	49.44 + 338
11 16.0	11.855 + 72	79.72 - 35	22.177 + 64	10.65 -113	22.380 + 75	37.97 - 24	47.951 + 119	52.75 +331
11 25.9	11.898 + 43	79.27 - 45	22.212 + 35	11.85 -120	22.426 + 46	37.63 - 34	47.959 + 8	55.92 +317
12 5.9	11.912 + 14	78.74 - 53	22.216 + 4	13.08 -123	22.442 + 16	37.20 - 43	47.845 - 114	58.89 +297
12 15.9	11.896 - 16	78.16 - 58	22.191 - 25	14.25 -117	22.429 - 13	36.73 - 47	47.615 - 230	61.53 +264
12 25.8	11.853 - 43	77.57 - 59	22.140 - 51	15.34 -109	22.389 - 40	36.23 - 50	47.279 - 336	63.81 +228
12 35.8	11.782 - 94	76.98 - 57	22.061 - 101	16.31 - 97	22.320 - 91	35.71 - 50	46.838 - 441	65.64 +183
Mean Place	09.863	65.31	20.122	23.61	20.346	22.92	43.660	36.58
sec δ, tan δ	+1.005	+0.097	+1.010	-0.139	+1.007	+0.120	+3.374	+3.223
dα(ψ), dδ(ψ)	+0.063	+0.31	+0.059	+0.31	+0.063	+0.31	+0.115	+0.31
dα(ε), dδ(ε)	-0.005	+0.63	+0.007	+0.63	-0.006	+0.63	-0.167	+0.63
Dble.Trans.	October 30		October 30		October 30		October 31	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	89		91		95		1075										
	v Arietis		δ Ceti		ε Hydri		ι Eridani										
Mag. Spect.	5.36	A2	4.04	B2	4.26	B9	4.06	K0									
U.T.	R.A.		R.A.		R.A.		R.A.										
	h m	Dec.	h m	Dec.	h m	Dec.	h m	Dec.									
	2 37	+21 54	2 38	+ 0 16	2 39	-68 19	2 40	-39 54									
1	-9.1	61.173	-35	11.83	+16	45.998	-36	08.00	-81	25.431	-385	49.84	-211	07.808	-110	62.97	-201
1	0.8	61.108	-65	11.86	+3	45.937	-61	07.24	-76	24.984	-447	51.45	-161	07.667	-141	64.62	-165
1	10.8	61.015	-93	11.74	-12	45.850	-87	06.53	-71	24.484	-500	52.53	-108	07.497	-170	65.87	-125
1	20.8	60.896	-119	11.48	-26	45.740	-110	05.92	-61	23.946	-538	53.00	-47	07.304	-193	66.65	-78
1	30.7	60.759	-137	11.10	-38	45.615	-125	05.42	-50	23.392	-554	52.88	+12	07.096	-208	66.96	-31
2	9.7	60.610	-149	10.60	-50	45.478	-137	05.03	-39	22.830	-562	52.18	+70	06.878	-218	66.81	+15
2	19.7	60.458	-152	09.99	-61	45.339	-139	04.78	-25	22.283	-547	50.89	+129	06.662	-216	66.16	+65
3	1.7	60.313	-145	09.33	-66	45.205	-134	04.69	-9	21.767	-516	49.09	+180	06.456	-206	65.07	+109
3	11.6	60.182	-131	08.63	-70	45.084	-121	04.75	+6	21.292	-475	46.81	+228	06.266	-190	63.55	+152
3	21.6	60.078	-104	07.94	-69	44.987	-97	05.01	+26	20.879	-413	44.08	+273	06.106	-160	61.61	+194
3	31.6	60.008	-70	07.32	-62	44.920	-67	05.46	+45	20.538	-341	41.02	+306	05.982	-124	59.33	+228
4	10.6	59.978	-30	06.80	-52	44.888	-32	06.11	+65	20.277	-261	37.65	+337	05.900	-82	56.72	+261
4	20.5	59.996	+18	06.43	-37	44.899	+11	06.99	+88	20.112	-165	34.05	+360	05.869	-31	53.84	+288
4	30.5	60.062	+66	06.28	-15	44.954	+55	08.07	+108	20.043	-69	30.34	+371	05.889	+20	50.77	+307
5	10.5	60.172	+110	06.27	-1	45.054	+100	09.39	+132	20.075	+32	26.53	+381	05.964	+75	47.54	+323
5	20.4	60.339	+167	06.51	+24	45.201	+147	10.92	+153	20.214	+139	22.75	+378	06.095	+131	44.23	+331
5	30.4	60.548	+209	07.01	+50	45.388	+187	12.59	+167	20.447	+233	19.09	+366	06.276	+181	40.93	+330
6	9.4	60.798	+250	07.75	+74	45.614	+226	14.42	+183	20.777	+330	15.59	+350	06.506	+230	37.68	+325
6	19.4	61.082	+284	08.73	+98	45.873	+259	16.33	+191	21.196	+419	12.38	+321	06.780	+274	34.60	+308
6	29.3	61.389	+307	09.91	+118	46.156	+283	18.29	+196	21.685	+489	09.52	+286	07.087	+307	31.74	+286
7	9.3	61.716	+327	11.26	+135	46.458	+302	20.26	+197	22.240	+555	07.06	+246	07.423	+336	29.17	+257
7	19.3	62.054	+338	12.76	+150	46.771	+313	22.17	+191	22.841	+601	05.12	+194	07.778	+355	26.98	+219
7	29.3	62.392	+338	14.35	+159	47.085	+314	23.97	+180	23.470	+629	03.71	+141	08.141	+363	25.21	+177
8	8.2	62.727	+335	16.00	+165	47.398	+313	25.62	+165	24.114	+644	02.87	+84	08.507	+366	23.91	+130
8	18.2	63.050	+323	17.66	+166	47.699	+301	27.07	+145	24.751	+637	02.67	+20	08.864	+357	23.15	+76
8	28.2	63.357	+307	19.29	+163	47.985	+286	28.28	+121	25.361	+610	03.06	-39	09.203	+339	22.90	+25
9	7.1	63.643	+286	20.87	+158	48.252	+267	29.23	+95	25.933	+572	04.06	-100	09.521	+318	23.20	-30
9	17.1	63.904	+261	22.35	+148	48.495	+243	29.90	+67	26.442	+509	05.64	-158	09.806	+285	24.04	-84
9	27.1	64.139	+235	23.71	+136	48.712	+217	30.30	+40	26.879	+437	07.71	-207	10.057	+251	25.34	-130
10	7.1	64.346	+207	24.95	+124	48.902	+190	30.42	+12	27.232	+353	10.24	-253	10.269	+212	27.10	-176
10	17.0	64.522	+176	26.04	+109	49.062	+160	30.29	-13	27.485	+253	13.10	-286	10.437	+168	29.21	-211
10	27.0	64.669	+147	26.99	+95	49.195	+133	29.95	-34	27.640	+155	16.17	-307	10.564	+127	31.58	-237
11	6.0	64.785	+116	27.80	+81	49.297	+102	29.42	-53	27.689	+49	19.38	-321	10.645	+81	34.15	-257
11	16.0	64.868	+83	28.46	+66	49.370	+73	28.74	-68	27.631	-58	22.55	-317	10.681	+36	36.77	-262
11	25.9	64.922	+54	28.98	+52	49.414	+44	27.99	-75	27.475	-156	25.58	-303	10.677	-4	39.35	-258
12	5.9	64.942	+20	29.36	+38	49.427	+13	27.16	-83	27.222	-253	28.36	-278	10.629	-48	41.81	-246
12	15.9	64.929	-13	29.60	+24	49.412	-15	26.34	-82	26.883	-339	30.75	-239	10.542	-87	44.01	-220
12	25.8	64.886	-43	29.71	+11	49.369	-43	25.54	-80	26.474	-409	32.70	-195	10.422	-120	45.90	-189
12	35.8	64.811	-75	29.67	-4	49.298	-71	24.78	-76	26.000	-474	34.14	-144	10.268	-154	47.43	-153
			-101	29.67	-17		-94		-67		-519		-84		-179		-107
Mean Place	62.848	12.74		47.355	14.80	22.831	28.12	08.078	45.92					08.078	45.92		
sec δ, tan δ	+1.078	+0.402		+1.000	+0.005	+2.707	-2.516	+1.304	-0.837								
dα(ψ), dδ(ψ)	+0.068	+0.31		+0.061	+0.31	+0.018	+0.31	+0.047	+0.30					+0.047	+0.30		
dα(ε), dδ(ε)	-0.021	+0.64		-0.000	+0.64	+0.129	+0.64	+0.043	+0.64					+0.043	+0.64		
Dble. Trans.	October 31		October 31		October 31		November 1										

AT UPPER TRANSIT AT GREENWICH

No.	1076		94		1077		93	
	ζ Horologii		35 Arietis		14 Persei		9 Persei	
Mag.Spect.	5.26	F2	4.58	B3	5.58	G5	4.22	F8
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	2 40	- 54 36	2 42	+ 27 38	2 43	+ 44 14	2 43	+ 49 10
1 9.1	15.127 - 195	46.45 - 215	37.690 - 36	61.77 + 45	10.195 - 61	29.36 + 126	14.318 - 75	24.83 + 148
1 0.8	14.892 - 235	48.15 - 170	36.930 - 67	62.05 + 28	10.094 - 101	30.33 + 97	14.199 - 119	25.99 + 116
1 10.8	14.621 - 271	49.38 - 123	37.525 - 98	62.13 + 8	09.953 - 141	30.98 + 65	14.035 - 164	26.80 + 81
1 20.8	14.322 - 299	50.05 - 67	37.399 - 126	62.02 - 11	09.777 - 176	31.27 + 29	13.835 - 200	27.21 + 41
1 30.8	14.008 - 314	50.16 - 11	37.253 - 146	61.72 - 30	09.579 - 198	31.22 - 5	13.611 - 224	27.23 + 2
2 9.7	13.686 - 322	49.74 + 42	37.093 - 160	61.24 - 48	09.364 - 215	30.81 - 41	13.368 - 243	26.86 - 37
2 19.7	13.368 - 318	48.75 + 99	36.930 - 163	60.60 - 64	09.146 - 218	30.06 - 75	13.123 - 245	26.09 - 77
3 1.7	13.068 - 300	47.27 + 148	36.773 - 157	59.84 - 76	08.938 - 208	29.03 - 103	12.891 - 232	24.99 - 110
3 11.6	12.790 - 278	45.31 + 196	36.632 - 141	58.97 - 87	08.751 - 187	27.74 - 129	12.681 - 210	23.60 - 139
3 21.6	12.552 - 238	42.90 + 241	36.517 - 115	58.08 - 89	08.598 - 153	26.27 - 147	12.512 - 169	21.98 - 162
3 31.6	12.361 - 191	40.15 + 275	36.439 - 78	57.20 - 88	08.491 - 107	24.71 - 156	12.392 - 120	20.23 - 175
4 10.6	12.222 - 139	37.07 + 308	36.402 - 37	56.38 - 82	08.436 - 55	23.09 - 162	12.328 - 64	18.41 - 182
4 20.5	12.148 - 74	33.72 + 335	36.415 + 13	55.69 - 69	08.442 + 6	21.53 - 156	12.332 + 4	16.61 - 180
4 30.5	12.139 + 59	30.22 + 350	36.478 + 63	55.17 - 52	08.510 + 68	20.09 - 144	12.403 + 71	14.92 - 169
5 10.5	12.198 + 59	26.60 + 362	36.591 + 113	54.84 - 33	08.640 + 130	18.82 - 127	12.543 + 140	13.39 - 153
5 20.5	12.328 + 130	22.95 + 365	36.758 + 167	54.73 - 11	08.834 + 194	17.79 - 103	12.751 + 208	12.11 - 128
5 30.4	12.522 + 194	19.37 + 358	36.972 + 214	54.88 + 15	09.083 + 249	17.04 - 75	13.019 + 268	11.12 - 99
6 9.4	12.779 + 257	15.90 + 347	37.227 + 255	55.30 + 42	09.383 + 300	16.60 - 44	13.342 + 323	10.44 - 68
6 19.4	13.093 + 314	12.66 + 324	37.519 + 292	55.98 + 68	09.726 + 343	16.51 - 9	13.712 + 370	10.13 - 31
6 29.3	13.452 + 359	09.73 + 293	37.837 + 318	56.90 + 92	10.100 + 374	16.75 + 24	14.115 + 403	10.17 + 4
7 9.3	13.852 + 400	07.15 + 258	38.175 + 338	58.04 + 114	10.500 + 400	17.31 + 56	14.546 + 431	10.58 + 41
7 19.3	14.280 + 428	05.04 + 211	38.524 + 349	59.37 + 133	10.913 + 413	18.21 + 90	14.992 + 446	11.34 + 76
7 29.3	14.721 + 441	03.42 + 162	38.875 + 351	60.84 + 147	11.330 + 417	19.38 + 117	15.441 + 449	12.42 + 108
8 8.2	15.170 + 449	02.34 + 108	39.224 + 349	62.43 + 159	11.744 + 414	20.82 + 144	15.888 + 447	13.81 + 139
8 18.2	15.609 + 439	01.87 + 47	39.562 + 338	64.09 + 166	12.145 + 401	22.49 + 167	16.321 + 433	15.47 + 166
8 28.2	16.029 + 420	01.97 - 10	39.882 + 320	65.78 + 169	12.527 + 382	24.34 + 185	16.734 + 413	17.34 + 187
9 7.2	16.423 + 394	02.66 - 69	40.183 + 301	67.47 + 169	12.887 + 360	26.34 + 200	17.123 + 389	19.42 + 208
9 17.1	16.775 + 352	03.93 - 127	40.458 + 275	69.11 + 164	13.216 + 329	28.45 + 211	17.479 + 356	21.65 + 223
9 27.1	17.081 + 306	05.69 - 176	40.707 + 249	70.69 + 158	13.514 + 298	30.62 + 217	17.801 + 322	23.97 + 232
10 7.1	17.334 + 253	07.92 - 223	40.928 + 221	72.19 + 150	13.778 + 264	32.84 + 222	18.086 + 285	26.37 + 240
10 17.0	17.527 + 193	10.51 - 259	41.116 + 188	73.57 + 138	14.003 + 225	35.04 + 220	18.327 + 241	28.79 + 242
10 27.0	17.660 + 133	13.34 - 283	41.275 + 159	74.84 + 127	14.191 + 188	37.21 + 217	18.528 + 201	31.19 + 240
11 6.0	17.730 + 70	16.34 - 300	41.401 + 126	75.99 + 115	14.338 + 147	39.31 + 210	18.684 + 156	33.55 + 236
11 16.0	17.736 + 6	19.35 - 301	41.493 + 92	76.99 + 100	14.442 + 104	41.29 + 198	18.791 + 107	35.78 + 223
11 25.9	17.684 - 52	22.26 - 291	41.553 + 60	77.85 + 86	14.504 + 62	43.12 + 183	18.852 + 61	37.88 + 210
12 5.9	17.572 - 112	24.99 - 273	41.577 + 24	78.57 + 72	14.519 + 15	44.77 + 165	18.861 + 9	39.78 + 190
12 15.9	17.407 - 165	27.38 - 239	41.566 - 11	79.11 + 54	14.490 - 29	46.18 + 141	18.821 - 40	41.42 + 164
12 25.9	17.197 - 210	29.39 - 201	41.523 - 43	79.50 + 39	14.419 - 71	47.33 + 115	18.734 - 87	42.79 + 137
12 35.8	16.945 - 252	30.94 - 155	41.444 - 79	79.69 + 19	14.304 - 115	48.17 + 84	18.599 - 135	43.81 + 102
	16.945 - 283	30.94 - 101	41.444 - 107	79.69 + 0	14.304 - 152	48.17 + 50	18.599 - 174	43.81 + 65
Mean Place	14.460	26.63	39.420	61.05	12.121	24.92	16.326	19.39
sec δ, tan δ	+1.727	-1.408	+1.129	+0.524	+1.396	+0.974	+1.530	+1.157
da(ψ), dδ(ψ)	+0.037	+0.30	+0.070	+0.30	+0.078	+0.30	+0.081	+0.30
da(ε), dδ(ε)	+0.072	+0.64	-0.026	+0.65	-0.049	+0.65	-0.058	+0.65
Dble.Trans.	November 1		November 1		November 1		November 1	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	97		1078		92		98	
	π Ceti		43 G. Fornacis*		Bradley 366 (Cassiopeiae)		μ Ceti	
Mag. Spect.	4.39	B5	6.87	G0	5.84	A2	4.36	F0
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	Dec.	h m	Dec.	h m	Dec.	h m	Dec.
	2 43	- 13 54	2 43	- 25 32	2 43	+ 67 45	2 44	+ 10 03
	<sup>s</sup>	<sup>°</sup>	<sup>s</sup>	<sup>°</sup>	<sup>s</sup>	<sup>°</sup>	<sup>s</sup>	<sup>°</sup>
1 -9.1	27 709 - 45	65 94 -137	37 854 - 65	81 62 -173	36 863 - 202	73 28 +230	11 150 - 28	23 81 - 39
1 0.8	27 637 - 72	67.13 -119	37 762 - 92	83.08 -146	36.582 - 281	75.17 +189	11 094 - 56	23.39 - 42
1 10.8	27 539 - 98	68.15 -102	37 642 - 120	84.27 -119	36.225 - 357	76.62 +145	11 011 - 83	22.94 - 45
1 20.8	27 418 - 121	68.92 - 77	37 500 - 142	85.10 - 83	35 807 - 418	77.53 + 91	10 903 - 108	22.47 - 47
1 30.8	27 282 - 136	69.44 - 52	37 343 - 157	85.57 - 47	35 351 - 456	77.92 + 39	10 778 - 125	22.01 - 46
2 9.7	27 134 - 148	69.70 - 26	37 174 - 169	85.68 - 11	34 869 - 482	77.76 - 16	10 640 - 138	21.56 - 45
2 19.7	26 983 - 151	69.67 + 3	37 003 - 171	85.40 + 28	34 389 - 480	77.05 - 71	10 498 - 142	21.15 - 41
3 1.7	26 839 - 144	69.37 + 30	36 840 - 163	84.75 + 65	33 937 - 452	75.86 -119	10 362 - 136	20.79 - 39
3 11.6	26 705 - 134	68.79 + 58	36 689 - 151	83.75 +100	33 527 - 410	74.22 -161	10 237 - 125	20.50 - 26
3 21.6	26 596 - 109	67.91 + 88	36 563 - 126	82.38 +137	33 189 - 338	72.21 -204	10 136 - 101	20.33 - 17
3 31.6	26 516 - 90	66.77 +114	36 468 - 95	80.71 +167	32 938 - 251	69.95 -226	10 067 - 69	20.29 - 4
4 10.6	26 470 - 46	65.37 +140	36 409 - 59	78.73 +198	32 784 - 154	67.49 -246	10 033 - 34	20.41 + 12
4 20.5	26 468 - 2	63.70 +167	36 396 - 13	76.47 +226	32 744 - 40	64.98 -251	10 045 + 12	20.72 + 31
4 30.5	26 510 + 42	61.82 +188	36 428 + 32	74.01 +246	32 817 + 73	62.51 -247	10 102 + 97	21.17 + 45
5 10.5	26 598 + 88	59.73 +209	36 509 + 81	71.35 +266	33 002 + 185	60.15 -236	10 199 + 57	21.92 + 75
5 20.5	26 733 + 135	57.48 +225	36 639 + 130	68.56 +279	33 301 + 299	58.02 -213	10 349 + 150	22.89 + 97
5 30.4	26 909 + 176	55.12 +236	36 814 + 175	65.72 +284	33 697 + 396	56.19 -183	10 541 + 192	24.03 +114
6 9.4	27 126 + 217	52.68 +244	37 031 + 217	62.86 +286	34 184 + 487	54.68 -151	10 772 + 231	25.36 +133
6 19.4	27 378 + 252	50.24 +244	37 286 + 255	60.06 +280	34 750 + 566	53.60 -108	11 036 + 264	26.84 +148
6 29.3	27 655 + 277	47.87 +237	37 569 + 283	57.41 +265	35 371 + 621	52.94 - 66	11 324 + 288	28.44 +160
7 9.3	27 953 + 298	45.58 +229	37 876 + 307	54.93 +248	36 041 + 670	52.72 - 22	11 632 + 308	30.13 +169
7 19.3	28 265 + 312	43.49 +209	38 198 + 322	52.74 +219	36 698 + 698	52.97 + 25	11 951 + 319	31.85 +172
7 29.3	28 580 + 315	41.63 +186	38 526 + 328	50.87 +187	37 339 + 707	53.64 + 67	12 272 + 321	33.55 +170
8 8.2	28 896 + 316	40.04 +159	38 855 + 329	49.38 +149	37 446 + 709	54.76 +112	12 592 + 320	35.20 +165
8 18.2	29 201 + 305	38.79 +125	39 175 + 320	48.32 +106	38 155 + 691	56.28 +152	12 901 + 309	36.73 +153
8 28.2	29 492 + 291	37.90 + 89	39 479 + 304	47.70 + 62	39 507 + 661	58.16 +188	13 194 + 293	38.13 +140
9 7.2	29 764 + 272	37.38 + 52	39 765 + 286	47.54 + 16	40 133 + 626	60.39 +223	13 470 + 276	39.36 +123
9 17.1	30 011 + 247	37.26 + 12	40 023 + 258	47.85 - 31	40 573 + 573	62.90 +251	13 721 + 251	40.39 +103
9 27.1	30 232 + 221	37.50 - 24	40 253 + 230	48.59 - 74	40 706 + 517	65.65 +275	13 948 + 227	41.21 + 82
10 7.1	30 426 + 194	38.10 - 60	40 452 + 199	49.73 -114	41 223 + 454	68.60 +295	14 149 + 201	41.83 + 62
10 17.0	30 587 + 161	39.01 - 91	40 615 + 163	51.22 -149	42 056 + 379	71.68 +308	14 319 + 170	42.23 + 40
10 27.0	30 718 + 131	40.17 -116	40 745 + 130	52.97 -175	42 361 + 305	74.83 +315	14 463 + 144	42.46 + 23
11 6.0	30 818 + 100	41.53 -136	40 839 + 94	54.93 -196	42 583 + 222	78.02 +319	14 578 + 115	42.51 + 5
11 16.0	30 885 + 67	43.02 -149	40 897 + 58	56.99 -206	42 715 + 132	81.13 +311	14 661 + 83	42.42 - 9
11 25.9	30 922 + 37	44.55 -153	40 921 + 24	59.06 -207	42 761 + 46	84.12 +299	14 716 + 55	42.22 - 20
12 5.9	30 927 + 5	46.09 -154	40 910 - 11	61.09 -203	42 713 - 48	86.91 +279	14 740 + 24	41.92 - 30
12 15.9	30 902 - 25	47.54 -145	40 866 - 44	62.95 -186	42 573 - 140	89.40 +249	14 733 - 7	41.55 - 37
12 25.9	30 848 - 54	48.86 -132	40 793 - 73	64.59 -164	42 349 - 224	91.55 +215	14 697 - 36	41.14 - 41
12 35.8	30 766 - 82	50.01 -115	40 689 - 104	65.98 -139	42 041 - 308	93.28 +173	14 631 - 66	40.69 - 45
	- 106	- 93	- 128	- 105	- 375	+ 123	- 91	- 46
Mean Place	28.768	55.56	38.624	68.21	39.099	65.21	12.648	27.59
sec δ, tan δ	+1.030	-0.248	+1.108	-0.478	+2.643	+2.447	+1.016	+0.177
da(ψ), dδ(ψ)	+0.057	+0.30	+0.053	+0.30	+0.104	+0.30	+0.064	+0.30
da(ε), dδ(ε)	+0.012	+0.65	+0.024	+0.65	-0.123	+0.65	-0.009	+0.66
Dble. Trans.	November 1		November 1		November 1		November 2	

AT UPPER TRANSIT AT GREENWICH

No.	101		100		99		102	
Name	β Fornacis		41 Arietis		η Persei		τ <sup>+</sup> Eridani	
Mag.Spect.	4.50	K0	3.68	B8	3.95	K0	4.81	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>
	2 48	-32 27	2 49	+27 12	2 49	+55 50	2 50	-21 03
1 -9.1	<sup>s</sup> 31.039 -79	58.68 -194	<sup>s</sup> 09.489 -29	20.64 +44	<sup>s</sup> 40.259 -93	" +183	<sup>s</sup> 24.695 -52	" -164
1 0.8	30.931 -108	60.30 -162	09.427 -62	20.91 +27	40.112 -147	31.24 +148	24.615 -80	44.89 -141
1 10.8	30.793 -138	61.59 -129	09.333 -94	21.01 +10	39.912 -200	33.84 +112	24.507 -108	46.30 -117
1 20.8	30.631 -162	62.46 -87	09.210 -123	20.91 -10	39.667 -245	+66	24.376 -131	47.47 -86
1 30.8	30.453 -178	62.92 -46	09.066 -144	20.65 -26	39.393 -274	+22	24.228 -148	48.33 -54
2 9.7	30.263 -190	62.97 -5	08.907 -159	20.20 -45	39.096 -297	-23	24.067 -161	49.09 -22
2 19.7	30.071 -192	62.57 +40	08.743 -164	19.60 -60	38.796 -300	-69	23.903 -164	48.94 +15
3 1.7	29.886 -185	61.76 +81	08.585 -158	18.87 -73	38.510 -286	-108	23.744 -159	48.47 +47
3 11.6	29.715 -171	60.55 +121	08.440 -145	18.06 -81	38.248 -262	-144	23.597 -147	47.66 +81
3 21.6	29.569 -146	58.94 +161	08.322 -118	17.20 -86	38.032 -216	-173	23.472 -125	46.51 +115
3 31.6	29.456 -113	56.99 +195	08.239 -83	16.36 -84	37.873 -159	-192	23.378 -94	45.07 +144
4 10.6	29.380 -76	54.73 +226	08.196 -43	15.57 -79	37.779 -94	-205	23.318 -60	43.33 +174
4 20.5	29.352 -28	52.18 +255	08.203 +7	14.90 -67	37.762 -17	-207	23.303 -15	41.32 +201
4 30.5	29.371 +19	49.42 +276	08.260 +57	14.41 -49	37.823 +61	-199	23.332 +29	39.09 +223
5 10.5	29.441 +70	46.48 +294	08.366 +106	14.09 -32	37.962 +139	-187	23.408 +76	36.66 +243
5 20.5	29.563 +122	43.42 +306	08.527 +161	13.98 -11	38.181 +219	-164	23.533 +125	34.08 +258
5 30.4	29.733 +170	40.33 +309	08.734 +207	14.12 +14	38.468 +287	-136	23.701 +168	31.42 +266
6 9.4	29.948 +215	37.25 +308	08.984 +250	14.52 +40	38.820 +352	-105	23.911 +210	28.71 +271
6 19.4	30.204 +256	34.27 +298	09.271 +287	15.19 +67	39.227 +407	-66	24.158 +247	26.03 +268
6 29.3	30.490 +286	31.47 +280	09.584 +313	16.08 +89	39.675 +448	-30	24.433 +275	23.47 +256
7 9.3	30.804 +314	28.90 +257	09.919 +335	17.18 +110	40.156 +481	+10	24.732 +299	21.04 +243
7 19.3	31.136 +332	26.65 +225	10.266 +347	18.47 +129	40.657 +501	+50	25.047 +315	18.87 +217
7 29.3	31.476 +340	24.78 +187	10.616 +350	19.90 +143	41.164 +507	+85	25.367 +320	16.97 +190
8 8.2	31.818 +342	23.32 +146	10.965 +349	21.44 +154	41.672 +508	+121	25.688 +321	15.41 +156
8 18.2	32.152 +334	22.35 +97	11.303 +338	23.05 +161	42.166 +494	+155	26.001 +313	14.25 +116
8 28.2	32.472 +320	21.86 +49	11.625 +322	24.68 +163	42.640 +474	+181	26.301 +300	13.50 +75
9 7.2	32.773 +301	21.88 -2	11.929 +304	26.31 +163	43.090 +450	+208	26.583 +282	13.18 +32
9 17.1	33.046 +273	22.41 -53	12.208 +279	27.90 +159	43.503 +413	+228	26.840 +257	13.31 -13
9 27.1	33.289 +243	23.40 -99	12.462 +254	29.42 +152	43.878 +375	+244	27.070 +230	13.85 -54
10 7.1	33.499 +210	24.82 -142	12.688 +226	30.86 +144	44.213 +335	+258	27.271 +201	14.78 -93
10 17.0	33.670 +171	26.62 -180	12.882 +194	32.18 +132	44.497 +284	+264	27.439 +168	16.05 -127
10 27.0	33.805 +135	28.68 -206	13.048 +166	33.40 +122	44.734 +237	+267	27.575 +136	17.59 -154
11 6.0	33.900 +95	30.96 -228	13.181 +133	34.50 +110	44.918 +184	+267	27.678 +103	19.34 -175
11 16.0	33.956 +56	33.32 -236	13.280 +99	35.45 +95	45.044 +126	+257	27.746 +68	21.21 -187
11 25.9	33.974 +18	35.69 -237	13.347 +67	36.28 +83	45.115 +71	+245	27.782 +36	23.11 -190
12 5.9	33.954 -20	37.98 -229	13.378 +31	36.97 +69	45.124 +9	+227	27.784 +2	25.00 -189
12 15.9	33.898 -56	40.07 -209	13.373 -5	37.49 +52	45.072 -52	+200	27.753 -31	26.74 -174
12 25.9	33.810 -88	41.90 -183	13.336 -37	37.87 +38	44.965 -107	+170	27.692 -61	28.32 -158
12 35.8	33.688 -146	43.43 -153	13.262 -74	38.06 +19	44.799 -166	+135	27.601 -91	29.67 -135
		-113	-103	+2	-214	+92	-116	-105
Mean Place	31.550	44.01	11.189	19.73	42.292	24.64	25.544	33.22
sec δ, tan δ	+1.185	-0.636	+1.124	+0.514	+1.781	+1.474	+1.072	-0.385
da(ψ), dδ(ψ)	+0.050	+0.30	+0.070	+0.29	+0.088	+0.29	+0.054	+0.29
da(ε), dδ(ε)	+0.031	+0.67	-0.025	+0.67	-0.073	+0.67	+0.019	+0.68
Dble.Trans.	November 3		November 3		November 3		November 3	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1079		103		104		1080	
	σ Arietis		τ Persei		η Eridani		40 G. Eridani	
Mag. Spect.	5.46	B5	4.06	G0, A5	4.05	K0	5.27	A2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	2 50	+ 15 01	2 53	+ 52 42	2 55	- 8 56	2 55	- 3 45
1 <sup>d</sup>	43 234	34.93	15 670	34.80	44 917	73.07	55 565	64.85
1 <sup>s</sup>	43 181	34.71	15 545	36.19	44 858	74.19	55 511	65.78
1	43 099	34.41	15 370	37.22	44 771	75.16	55 428	66.62
1	42 990	34.05	15 152	37.83	44 659	75.93	55 321	67.32
1	42 863	33.65	14 906	38.03	44 529	76.50	55 195	67.87
2	42 721	33.20	14 637	37.80	44 385	76.86	55 055	68.26
2	42 573	32.73	14 364	37.14	44 236	76.98	54 909	68.45
3	42 430	32.27	14 101	36.13	44 090	76.86	54 766	68.46
3	42 298	31.83	13 860	34.77	43 955	76.50	54 633	68.27
3	42 190	31.46	13 661	33.14	43 840	75.87	54 522	67.86
3	42 113	31.19	13 513	31.34	43 755	75.01	54 439	67.24
4	42 073	31.03	13 425	29.42	43 703	73.90	54 390	66.40
4	42 079	31.06	13 408	27.49	43 693	72.54	54 383	65.32
4	42 134	31.26	13 464	25.63	43 726	70.97	54 420	64.03
5	42 220	31.61	13 593	23.90	43 805	69.18	54 501	62.53
5	42 370	32.28	13 796	22.40	43 931	67.20	54 629	60.82
5	42 561	33.12	14 063	21.17	44 099	65.10	54 800	58.98
6	42 791	34.16	14 392	20.24	44 307	62.89	55 010	57.00
6	43 056	35.40	14 773	19.68	44 551	60.64	55 255	54.95
6	43 346	36.77	15 192	19.48	44 820	58.41	55 526	52.89
7	43 657	38.28	15 643	19.64	45 113	56.24	55 818	50.84
7	43 980	39.86	16 113	20.19	45 419	54.21	56 125	48.89
7	44 305	41.47	16 589	21.07	45 730	52.36	56 436	47.08
8	44 631	43.08	17 067	22.28	46 043	50.73	56 748	45.44
8	44 946	44.63	17 533	23.80	46 348	49.41	57 052	44.06
8	45 247	46.08	17 979	25.57	46 640	48.39	57 342	42.94
9	45 531	47.42	18 404	27.57	46 915	47.72	57 617	42.11
9	45 791	48.61	18 795	29.77	47 168	47.41	57 870	41.61
9	46 028	49.62	19 151	32.09	47 397	47.43	58 098	41.41
10	46 239	50.47	19 470	34.54	47 600	47.79	58 302	41.51
10	46 420	51.14	19 743	37.04	47 772	48.45	58 476	41.89
10	46 574	51.64	19 973	39.55	47 917	49.36	58 622	42.50
11	46 699	51.99	20 154	42.06	48 032	50.48	58 740	43.31
11	46 792	52.19	20 282	44.47	48 114	51.73	58 826	44.27
11	46 856	52.28	20 359	46.76	48 167	53.05	58 883	45.30
12	46 888	52.26	20 379	48.87	48 188	54.40	58 909	46.38
12	46 887	52.14	20 344	50.74	48 178	55.70	58 903	47.44
12	46 856	51.96	20 255	52.33	48 139	56.91	58 869	48.44
12	46 793	51.69	20 113	53.57	48 069	57.99	58 804	49.37
Mean Place	44.765	37.05	17.647	28.64	46.026	65.05	56.771	58.09
sec δ, tan δ	+1.035	+0.268	+1.650	+1.313	+1.012	-0.158	+1.002	-0.066
dα(ψ), dδ(ψ)	+0.066	+0.29	+0.085	+0.29	+0.058	+0.29	+0.060	+0.29
dα(ε), dδ(ε)	-0.013	+0.68	-0.064	+0.69	+0.008	+0.69	+0.003	+0.69
Dble. Trans.	November 3		November 4		November 5		November 5	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1081		106		1082		1083	
	47 Arietis		♁ Eridani* <i>p.</i>		24 Persei		λ Ceti	
Mag.Spect.	5.85	F0	3.42	A2	4.97	K0	4.69	B5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	2 57	+20 36	2 57	-40 21	2 58	+35 07	2 58	+8 51
1 -9.1	17.136 - 18	54.26 + 12	44.846 - 98	45.60 -217	11.525 - 28	49.70 + 86	57.997 - 17	11.61 - 46
1 0.8	17.086 - 50	54.27 + 1	44.714 - 132	47.41 -181	11.459 - 66	50.36 + 66	57.950 - 47	11.14 - 47
1 10.8	17.004 - 82	54.18 - 9	44.548 - 166	48.85 -144	11.356 - 103	50.79 + 43	57.873 - 77	10.66 - 48
1 20.8	16.893 - 111	53.96 - 22	44.355 - 193	49.81 - 96	11.220 - 136	50.95 + 16	57.770 - 103	10.18 - 48
1 30.8	16.762 - 131	53.65 - 31	44.143 - 212	50.31 - 50	11.060 - 160	50.87 - 8	57.647 - 123	09.73 - 45
2 9.7	16.614 - 148	53.23 - 42	43.918 - 225	50.34 - 3	10.881 - 179	50.53 - 34	57.508 - 139	09.30 - 43
2 19.7	16.459 - 155	52.72 - 51	43.690 - 228	49.86 + 48	10.695 - 186	49.94 - 59	57.362 - 146	08.93 - 37
3 1.7	16.308 - 151	52.17 - 55	43.469 - 221	48.92 + 94	10.514 - 181	49.15 - 79	57.219 - 143	08.62 - 31
3 11.7	16.168 - 140	51.58 - 58	43.262 - 207	47.55 +137	10.347 - 167	48.19 - 96	57.086 - 133	08.39 - 23
3 21.6	16.052 - 116	51.00 - 58	43.082 - 180	45.73 +182	10.207 - 140	47.10 -109	56.974 - 112	08.28 - 11
3 31.6	15.968 - 84	50.48 - 52	42.936 - 146	43.56 +217	10.105 - 102	45.95 -115	56.892 - 82	08.30 + 2
4 10.6	15.921 - 47	50.04 - 44	42.830 - 106	41.04 +252	10.046 - 59	44.80 -115	56.844 - 48	08.48 + 18
4 20.5	15.921 + 0	49.75 - 29	42.774 - 56	38.23 +281	10.040 - 6	43.72 -108	56.840 - 4	08.84 + 36
4 30.5	15.969 + 48	49.64 - 11	42.770 + 4	35.21 +302	10.089 + 49	42.76 - 96	56.881 + 41	09.37 + 53
5 10.5	16.057 + 88	49.75 + 11	42.820 + 50	32.00 +321	10.192 + 103	41.96 - 80	56.964 + 83	10.11 + 74
5 20.5	16.206 + 149	49.94 + 19	42.927 + 107	28.69 +331	10.352 + 160	41.38 - 58	57.098 + 134	11.11 +100
5 30.4	16.398 + 192	50.43 + 49	43.086 + 159	25.37 +332	10.563 + 211	41.04 - 34	57.275 + 177	12.28 +117
6 9.4	16.631 + 233	51.15 + 72	43.296 + 210	22.08 +329	10.822 + 259	40.97 - 7	57.492 + 217	13.62 +134
6 19.4	16.901 + 270	52.09 + 94	43.552 + 256	18.92 +316	11.121 + 299	41.19 + 22	57.744 + 252	15.11 +149
6 29.4	17.196 + 295	53.20 +111	43.843 + 291	15.98 +294	11.450 + 329	41.68 + 49	58.022 + 278	16.69 +158
7 9.3	17.514 + 318	54.48 +128	44.168 + 325	13.29 +269	11.804 + 354	42.43 + 75	58.322 + 300	18.36 +167
7 19.3	17.845 + 331	55.89 +141	44.514 + 346	10.98 +231	12.173 + 369	43.43 +100	58.635 + 313	20.05 +169
7 29.3	18.179 + 334	57.38 +149	44.872 + 358	09.08 +190	12.546 + 373	44.63 +120	58.952 + 317	21.71 +166
8 8.2	18.514 + 335	58.92 +154	45.237 + 365	07.65 +143	12.920 + 374	46.02 +139	59.270 + 318	23.32 +161
8 18.2	18.841 + 327	60.45 +153	45.596 + 359	06.75 + 90	13.285 + 365	47.56 +154	59.581 + 311	24.80 +148
8 28.2	19.153 + 312	61.95 +150	45.942 + 346	06.37 + 38	13.635 + 350	49.19 +163	59.878 + 297	26.13 +133
9 7.2	19.449 + 296	63.39 +144	46.270 + 328	06.55 - 18	13.967 + 332	50.91 +172	60.159 + 281	27.29 +116
9 17.1	19.721 + 272	64.73 +134	46.568 + 298	07.28 - 73	14.274 + 307	52.66 +175	60.419 + 260	28.23 + 94
9 27.1	19.970 + 249	65.94 +121	46.835 + 267	08.50 -122	14.555 + 281	54.41 +175	60.656 + 237	28.96 + 73
10 7.1	20.194 + 224	67.03 +109	47.066 + 231	10.19 -169	14.808 + 253	56.16 +175	60.868 + 212	29.48 + 52
10 17.1	20.388 + 194	67.97 + 94	47.255 + 189	12.28 -209	15.027 + 219	57.84 +168	61.052 + 184	29.78 + 30
10 27.0	20.555 + 167	68.78 + 81	47.402 + 147	14.65 -237	15.216 + 189	59.46 +162	61.209 + 157	29.89 + 11
11 6.0	20.691 + 136	69.46 + 68	47.505 + 103	17.26 -261	15.370 + 154	61.00 +154	61.338 + 129	29.84 - 5
11 16.0	20.795 + 104	69.99 + 53	47.561 + 56	19.94 -268	15.486 + 116	62.43 +143	61.436 + 98	29.64 - 20
11 25.9	20.869 + 74	70.41 + 42	47.575 + 14	22.62 -268	15.567 + 81	63.73 +130	61.505 + 69	29.34 - 30
12 5.9	20.908 + 39	70.71 + 30	47.544 - 31	25.20 -258	15.607 + 40	64.89 +116	61.541 + 36	28.95 - 39
12 15.9	20.913 + 5	70.89 + 18	47.471 - 73	27.55 -235	15.607 + 0	65.86 + 97	61.546 + 5	28.51 - 44
12 25.9	20.886 - 27	70.97 + 8	47.361 - 110	29.61 -206	15.568 - 39	66.65 + 79	61.520 - 26	28.04 - 47
12 35.8	20.825 - 91	70.92 - 5	47.214 - 147	31.31 -170	15.490 - 78	67.20 + 65	61.463 - 57	27.54 - 50
		- 15	- 177	-126	- 114	+ 32	- 85	- 49
Mean Place	18.725	54.67	44.956	30.25	13.277	46.76	59.403	14.90
sec δ, tan δ	+1.068	+0.376	+1.312	-0.850	+1.223	+0.704	+1.012	+0.156
da(ψ), dδ(ψ)	+0.068	+0.28	+0.045	+0.28	+0.074	+0.28	+0.064	+0.28
da(ε), dδ(ε)	-0.018	+0.70	+0.040	+0.70	-0.033	+0.70	-0.007	+0.70
Dble.Trans.	November 5		November 5		November 5		November 5	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1084		107		1085		113	
	B.D. -18° 516 (Eridani)		α Ceti		τ <sup>2</sup> Eridani		δ Hydri	
Mag Spect.	7.40	F0	2.82	M0	4.16	A3	5.52	B8
U.T.	R.A.		R.A.		R.A.		R.A.	
	Dec.		Dec.		Dec.		Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	3 01	- 18 15	3 01	+ 4 02	3 01	- 23 40	3 02	- 71 56
1 <sup>d</sup>	<sup>s</sup> - 39	" - 161	<sup>s</sup> - 17	" - 69	<sup>s</sup> - 49	" - 179	<sup>s</sup> - 444	" - 234
1	-9.1	24.393	47.59	33.036	09.98	47.071	48.06	17.487
1	0.8	24.324	49.00	32.990	09.32	46.992	49.61	16.959
1	10.8	24.226	50.19	32.914	08.68	46.883	50.90	16.356
1	20.8	24.103	51.10	32.811	08.11	46.748	51.86	15.696
1	30.8	23.961	51.71	32.689	07.61	46.594	52.46	15.007
2	9.7	23.804	52.02	32.550	07.19	46.426	52.73	14.300
2	19.7	23.641	52.00	32.405	06.87	46.252	52.61	13.598
3	1.7	23.481	51.66	32.262	06.67	46.083	52.13	12.927
3	11.7	23.331	51.01	32.128	06.59	45.923	51.30	12.294
3	21.6	23.202	50.03	32.015	06.68	45.785	50.11	11.728
3	31.6	23.102	48.76	31.930	06.92	45.677	48.60	11.242
4	10.6	23.035	47.21	31.880	07.35	45.603	46.79	10.843
4	20.5	23.011	45.38	31.871	07.98	45.572	44.70	10.555
4	30.5	23.031	43.32	31.907	08.79	45.587	42.38	10.378
5	10.5	23.097	41.06	31.986	09.82	45.648	39.85	10.318
5	20.5	23.212	38.62	32.114	11.08	45.760	37.17	10.384
5	30.4	23.370	36.10	32.285	12.50	45.916	34.42	10.566
6	9.4	23.570	33.49	32.495	14.08	46.116	31.61	10.866
6	19.4	23.808	30.91	32.741	15.77	46.355	28.85	11.277
6	29.4	24.074	28.40	33.013	17.54	46.623	26.20	11.780
7	9.3	24.365	26.00	33.307	19.35	46.918	23.71	12.372
7	19.3	24.672	23.82	33.615	21.14	47.229	21.47	13.031
7	29.3	24.987	21.90	33.928	22.86	47.549	19.53	13.734
8	8.2	25.304	20.28	34.243	24.47	47.873	17.94	14.471
8	18.2	25.616	19.05	34.550	25.91	48.191	16.78	15.213
8	28.2	25.915	18.19	34.844	27.16	48.497	16.03	15.937
9	7.2	26.199	17.75	35.124	28.19	48.787	15.75	16.630
9	17.1	26.460	17.75	35.382	28.96	49.053	15.93	17.259
9	27.1	26.696	18.14	35.617	29.48	49.293	16.54	17.813
10	7.1	26.905	18.93	35.828	29.76	49.506	17.57	18.275
10	17.1	27.083	20.06	36.011	29.79	49.684	18.96	18.622
10	27.0	27.231	21.45	36.168	29.61	49.832	20.63	18.855
11	6.0	27.347	23.08	36.296	29.26	49.945	22.53	18.962
11	16.0	27.429	24.84	36.393	28.75	50.022	24.56	18.936
11	25.9	27.479	26.65	36.461	28.16	50.065	26.62	18.790
12	5.9	27.495	28.46	36.498	27.49	50.073	28.67	18.519
12	15.9	27.477	30.17	36.502	26.79	50.046	30.57	18.136
12	25.9	27.429	31.72	36.477	26.10	49.988	32.29	17.659
12	35.8	27.349	33.08	36.420	25.42	49.897	33.77	17.093
Mean Place	25.256	37.59	34.354	14.31	47.783	36.78	13.430	78.42
sec δ, tan δ	+1.053	-0.330	+1.002	+0.071	+1.092	-0.438	+3.228	-3.069
dα(ψ), dδ(ψ)	+0.055	+0.28	+0.062	+0.28	+0.053	+0.28	+0.003	+0.28
dα(ε), dδ(ε)	+0.015	+0.71	-0.003	+0.71	+0.021	+0.71	+0.143	+0.71
Dble.Trans.	November 6		November 6		November 6		November 6	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1086		110		108		105	
	58 G. Eridani		μ Horologii		γ Persei		47 H. Cephei*	
Mag. Spect.	5.66	K0	5.16	F0	3.08	F5, A3	5.72	M0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	3 02	-47 01	3 03	-59 46	3 03	+53 27	3 04	+79 21
1 -9.1	<sup>s</sup> 28.447 -124	" -232	<sup>s</sup> 19.187 -220	" -241	<sup>s</sup> 46.804 -62	" +179	<sup>s</sup> 14.579 -432	" +286
1 0.8	28.284 -163	57 07 -192	18.914 -273	103 19 -196	46.688 -116	+149	13.970 -609	68.72 +246
1 10.8	28.084 -200	58 59 -152	18.594 -320	104.68 -149	46.519 -169	+115	13.193 -777	71.18 +203
1 20.8	27.853 -231	59 59 -100	18.235 -359	105.61 -93	46.304 -215	+73	12.276 -917	73.21 +147
1 30.8	27.603 -250	60 09 -50	17.853 -382	105.96 -35	46.057 -247	+33	11.269 -1007	74.68 +90
2 9.7	27.337 -266	60 08 +1	17.455 -398	105.77 +19	45.783 -274	-10	10.198 -1071	75.88 +30
2 19.7	27.068 -269	59 52 +56	17.057 -398	104.98 +79	45.502 -281	-54	09.119 -1079	75.54 -34
3 1.7	26.808 -260	58 48 +104	16.673 -384	103.67 +131	45.228 -274	-92	08.085 -1034	74.64 -90
3 11.7	26.562 -246	56 97 +151	16.311 -362	101.86 +181	44.974 -254	-127	07.126 -959	73.20 -144
3 21.6	26.345 -217	55.00 +197	15.989 -322	99.57 +229	44.760 -214	-156	06.303 -823	71.27 -193
3 31.6	26.166 -179	52 66 +234	15.716 -273	96.91 +266	44.596 -164	-175	05.646 -657	68.98 -229
4 10.6	26.030 -136	49 95 +271	15.499 -217	93.88 +303	44.491 -105	-190	05.175 -471	66.40 -258
4 20.5	25.949 -81	46 95 +300	15.353 -146	90.56 +332	44.458 -33	-194	04.927 -248	63.65 -275
4 30.5	25.923 -26	43 73 +322	15.279 -74	87.06 +40	44.498 +40	-188	04.901 -26	60.85 -280
5 10.5	25.956 +33	40.34 +339	15.281 +2	83.40 +366	44.612 +114	-178	05.098 +197	58.08 -277
5 20.5	26.053 +97	36.85 +349	15.365 +84	79.69 +371	44.802 +190	-158	05.525 +427	55.46 -262
5 30.4	26.206 +153	33.37 +348	15.523 +158	76.03 +366	45.059 +257	-133	06.150 +625	53.08 -238
6 9.4	26.416 +210	29.94 +343	15.755 +232	72.45 +358	45.379 +320	-104	06.966 +816	50.99 -209
6 19.4	26.678 +262	26.67 +327	16.058 +303	69.09 +336	45.755 +376	-69	07.953 +987	49.29 -170
6 29.4	26.981 +303	23.63 +304	16.416 +358	66.01 +308	46.171 +416	-35	09.066 +1113	48.01 -128
7 9.3	27.322 +341	20.88 +275	16.828 +412	63.27 +274	46.623 +452	+2	10.294 +1228	47.17 -84
7 19.3	27.690 +368	18.54 +234	17.280 +452	60.99 +228	47.096 +473	+40	11.602 +1308	46.83 -34
7 29.3	28.073 +383	16.63 +191	17.756 +476	59.20 +179	47.579 +483	+73	12.950 +1348	46.96 +13
8 8.2	28.466 +393	15.23 +140	18.249 +493	57.95 +125	48.065 +486	+107	14.326 +1376	47.56 +60
8 18.2	28.856 +390	14.39 +84	18.741 +492	57.32 +63	48.543 +478	+139	15.690 +1364	48.66 +110
8 28.2	29.233 +377	14.10 +29	19.220 +479	57.28 +4	49.003 +460	+164	17.017 +1327	50.17 +151
9 7.2	29.592 +359	14.40 -30	19.676 +456	57.85 -57	49.443 +440	+189	18.294 +1277	52.11 +194
9 17.1	29.920 +328	15.29 -89	20.093 +417	59.04 -119	49.852 +409	+209	19.480 +1186	54.44 +233
9 27.1	30.213 +293	16.68 -139	20.463 +370	60.75 -171	50.228 +376	+224	20.567 +1087	57.08 +264
10 7.1	30.467 +254	18.57 -189	20.777 +314	62.96 -221	50.567 +339	+238	21.537 +970	60.04 +296
10 17.1	30.672 +205	20.86 -229	21.024 +247	65.58 -282	50.861 +294	+245	22.356 +819	63.22 +318
10 27.0	30.830 +158	23.45 -259	21.204 +180	68.49 -291	51.112 +251	+249	23.025 +669	66.56 +334
11 6.0	30.938 +108	26.27 -282	21.310 +106	71.61 -312	51.314 +202	+249	23.520 +495	70.03 +347
11 16.0	30.992 +54	29.17 -290	21.310 +29	74.78 -317	51.461 +147	+243	23.822 +302	73.50 +347
11 25.9	30.996 +4	32.05 -288	21.298 -41	77.88 -310	51.557 +96	+232	23.936 +114	76.92 +342
12 5.9	30.950 -46	34.82 -277	21.184 -114	80.84 -296	51.594 +37	+218	23.843 -93	80.22 +330
12 15.9	30.854 -96	37.33 -251	21.002 -182	83.48 -284	51.573 -21	+194	23.546 -297	83.25 +303
12 25.9	30.717 -137	39.52 -219	20.762 -240	85.74 -266	51.496 -77	+168	23.063 -483	85.97 +272
12 35.8	30.538 -179	41.32 -180	20.467 -295	87.56 -182	51.362 -134	+135	22.392 -671	88.28 +231
	-213	-132	-337	-128	-183	+98	-821	+179
Mean Place	28.146	39.11	17.706	83.38	48.736	15.63	16.805	59.67
sec δ, tan δ	+1.467	-1.073	+1.987	-1.717	+1.679	+1.349	+5.419	+5.326
dα(ψ), dδ(ψ)	+0.041	+0.28	+0.028	+0.28	+0.087	+0.28	+0.163	+0.28
dα(ε), dδ(ε)	+0.050	+0.71	+0.080	+0.72	-0.063	+0.72	-0.246	+0.72
Dble. Trans	November 6		November 6		November 7		November 7	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	109		1087		111		112		
	♁ Persei		♄ 63 G. Eridani		β Persei (Algol)		♁ Persei		
Mag.Spect.	3.3 to 4.1	M3	7.16	G0	2.2 to 3.5	B8	4.17	G0	
U.T.	R.A.		R.A.		R.A.		R.A.		
	h m	Dec.	h m	Dec.	h m	Dec.	h m	Dec.	
	3 04	+ 38 47	3 06	- 13 48	3 07	+ 40 54	3 08	+ 49 33	
	<sup>s</sup> <sup>d</sup>	<sup>s</sup> <sup>d</sup>	<sup>s</sup> <sup>d</sup>	<sup>s</sup> <sup>d</sup>	<sup>s</sup> <sup>d</sup>	<sup>s</sup> <sup>d</sup>	<sup>s</sup> <sup>d</sup>	<sup>s</sup> <sup>d</sup>	
1	-9.1	16.681 - 27	23.03 +107	39.369 - 28	52.72 -148	15.406 - 27	20.06 +119	03.273 - 41	51.20 +162
1	0.8	16.615 - 66	23.87 + 84	39.310 - 59	54.03 -131	15.338 - 68	21.01 + 95	03.182 - 91	52.54 +134
1	10.8	16.508 - 107	24.47 + 60	39.222 - 88	55.16 -113	15.227 - 111	21.71 + 70	03.042 - 140	53.56 +102
1	20.8	16.365 - 143	24.77 + 30	39.107 - 115	56.06 - 90	15.078 - 149	22.10 + 39	02.858 - 184	54.21 + 65
1	30.8	16.196 - 169	24.80 + 3	38.972 - 135	56.69 - 63	14.901 - 177	22.19 + 9	02.643 - 215	54.48 + 27
2	9.7	16.005 - 191	24.54 - 26	38.822 - 150	57.07 - 38	14.703 - 198	21.98 - 21	02.403 - 240	54.37 - 11
2	19.7	15.806 - 199	23.99 - 55	38.664 - 158	57.15 - 8	14.495 - 208	21.45 - 53	02.153 - 250	53.86 - 51
3	1.7	15.612 - 194	23.20 - 79	38.509 - 155	56.95 + 20	14.291 - 204	20.66 - 79	01.910 - 243	53.00 - 86
3	11.7	15.430 - 182	22.18 -102	38.361 - 148	56.48 + 47	14.101 - 190	19.63 -103	01.682 - 228	51.82 -118
3	21.6	15.278 - 152	21.01 -117	38.235 - 126	55.70 + 78	13.939 - 162	18.42 -121	01.490 - 192	50.38 -144
3	31.6	15.163 - 115	19.76 -125	38.135 - 100	54.65 +105	13.817 - 122	17.10 -132	01.343 - 147	48.77 -161
4	10.6	15.093 - 70	18.45 -131	38.069 - 66	53.34 +131	13.741 - 76	15.72 -138	01.250 - 93	47.03 -174
4	20.5	15.079 - 14	17.19 -126	38.044 - 25	51.75 +159	13.721 - 20	14.36 -136	01.223 - 27	45.27 -176
4	30.5	15.121 + 42	16.03 -116	38.062 + 18	49.95 +180	13.760 + 39	13.09 -127	01.263 + 40	43.57 -170
5	10.5	15.221 + 100	15.01 -102	38.127 + 65	47.93 +202	13.858 + 98	11.95 -114	01.372 + 109	41.97 -160
5	20.5	15.381 + 160	14.20 - 81	38.239 + 112	45.73 +220	14.018 + 160	11.02 - 93	01.552 + 180	40.57 -140
5	30.4	15.593 + 212	13.63 - 57	38.394 + 155	43.42 +231	14.232 + 214	10.32 - 70	01.793 + 241	39.42 -115
6	9.4	15.856 + 263	13.32 - 31	38.590 + 196	41.01 +241	14.498 + 266	10.89 - 43	02.094 + 301	38.54 - 88
6	19.4	16.162 + 306	13.31 - 1	38.824 + 234	38.59 +242	14.809 + 311	09.76 - 13	02.446 + 352	37.99 - 55
6	29.4	16.500 + 338	13.58 + 27	39.086 + 262	36.21 +238	15.153 + 344	09.92 + 16	02.837 + 391	37.77 - 22
7	9.3	16.865 + 365	14.14 + 56	39.373 + 287	33.92 +229	15.525 + 372	10.38 + 46	03.261 + 424	37.89 + 12
7	19.3	17.247 + 382	14.97 + 83	39.675 + 302	31.80 +212	15.916 + 391	11.12 + 74	03.706 + 445	38.36 + 47
7	29.3	17.634 + 387	16.04 +107	39.986 + 311	29.90 +190	16.313 + 397	12.11 + 99	04.159 + 453	39.14 + 78
8	8.2	18.025 + 391	17.32 +128	40.299 + 313	28.27 +163	16.713 + 400	12.11 +123	04.616 + 457	40.23 +109
8	18.2	18.406 + 381	18.78 +146	40.608 + 309	26.97 +130	17.105 + 392	14.77 +143	05.065 + 449	41.59 +136
8	28.2	18.774 + 368	20.38 +160	40.904 + 296	26.02 + 95	17.483 + 378	16.34 +157	05.499 + 434	43.18 +159
9	7.2	19.124 + 350	22.10 +172	41.187 + 283	25.46 + 56	17.844 + 361	18.07 +173	05.915 + 416	44.99 +181
9	17.1	19.449 + 325	23.88 +178	41.448 + 261	25.30 + 16	18.180 + 336	19.88 +181	06.302 + 387	46.97 +198
9	27.1	19.748 + 299	25.70 +182	41.685 + 237	25.51 - 21	18.489 + 309	21.74 +186	06.658 + 356	49.08 +211
10	7.1	20.019 + 271	27.55 +185	41.898 + 213	26.10 - 59	18.770 + 281	23.65 +191	06.982 + 324	51.29 +221
10	17.1	20.255 + 236	29.37 +182	42.080 + 182	27.01 - 91	19.016 + 246	25.55 +190	07.264 + 282	53.55 +226
10	27.0	20.459 + 204	31.15 +178	42.234 + 154	28.19 -118	19.228 + 212	27.43 +188	07.508 + 244	55.84 +229
11	6.0	20.628 + 169	32.87 +172	42.357 + 123	29.60 -141	19.403 + 175	29.26 +183	07.708 + 200	58.12 +228
11	16.0	20.756 + 128	34.50 +163	42.447 + 90	31.14 -154	19.537 + 134	29.26 +174	07.858 + 150	60.33 +221
11	25.9	20.846 + 90	36.01 +151	42.507 + 60	32.75 -161	19.632 + 95	32.63 +163	07.961 + 103	62.44 +211
12	5.9	20.893 + 47	37.37 +136	42.533 + 26	34.39 -164	19.682 + 50	34.12 +149	08.011 + 50	64.40 +196
12	15.9	20.897 + 4	38.55 +118	42.525 - 8	35.94 -155	19.687 + 5	35.42 +130	08.007 - 4	66.15 +175
12	25.9	20.860 - 37	39.54 + 99	42.488 - 37	37.37 -143	19.649 - 38	36.52 +110	07.953 - 54	67.67 +152
12	35.8	20.780 - 80	40.28 + 74	42.418 - 70	38.65 -128	19.565 - 84	37.37 + 85	07.845 - 108	68.88 +121
		- 119	+ 47	- 98	-104	- 123	+ 56	- 154	+ 87
Mean Place	18.458	19.11	40.316	44.36	17.190	15.71	05.217	45.25	
sec δ, tan δ	+1.283	+0.804	+1.030	-0.246	+1.323	+0.866	+1.542	+1.173	
dα(ψ), dδ(ψ)	+0.077	+0.28	+0.056	+0.27	+0.078	+0.27	+0.084	+0.27	
dα(ε), dδ(ε)	-0.037	+0.72	+0.011	+0.73	-0.040	+0.73	-0.053	+0.73	
Dble.Trans.	November 7		November 7		November 7		November 8		

# APPARENT PLACES OF STARS, 1986

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## AT UPPER TRANSIT AT GREENWICH

No.	1088		114		116		118	
	55 Arietis		δ Arietis		94 Ceti		38 G. Horologii	
Mag.Spect.	5.60	B9	4.53	K0	5.14	F8	5.72	N0
U.T.	R.A.		R.A.		R.A.		R.A.	
	Dec.		Dec.		Dec.		Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	3 08	+29 01	3 10	+19 40	3 12	- 1 14	3 12	-57 21
1 -9.1	46.206 - 12	36.21 + 57	49.797 - 6	34.50 + 8	03.849 - 13	50.61 - 96	13.811 - 185	95.13 - 250
1 0.9	46.158 - 48	36.63 + 42	49.757 - 40	34.50 + 0	03.807 - 42	51.50 - 89	13.811 - 236	97.19 - 206
1 10.8	46.073 - 85	36.88 + 25	49.683 - 74	34.40 - 10	03.734 - 73	52.31 - 81	13.575 - 284	97.19 - 162
1 20.8	45.955 - 118	36.93 + 5	49.579 - 104	34.21 - 19	03.633 - 101	53.00 - 69	13.291 - 323	98.81 - 107
1 30.8	45.813 - 142	36.81 - 12	49.451 - 128	33.93 - 28	03.511 - 122	53.56 - 56	12.968 - 348	99.88 - 51
2 9.7	45.651 - 162	36.50 - 31	49.304 - 147	33.56 - 37	03.371 - 140	53.98 - 42	12.253 - 367	100.36 + 3
2 19.7	45.479 - 172	36.00 - 50	49.148 - 156	33.12 - 44	03.223 - 148	54.24 - 26	11.882 - 371	99.74 + 62
3 1.7	45.310 - 169	35.37 - 63	48.994 - 154	32.64 - 48	03.076 - 147	54.33 - 9	11.882 - 360	99.74 + 114
3 11.7	45.150 - 160	34.61 - 76	48.847 - 147	32.12 - 52	03.076 - 139	54.33 + 8	11.522 - 343	98.60 + 165
3 21.6	45.015 - 135	33.77 - 84	48.723 - 124	31.62 - 50	02.937 - 121	54.25 + 29	11.179 - 308	96.95 + 213
3 31.6	44.913 - 102	32.92 - 85	48.628 - 95	31.17 - 45	02.723 - 93	53.48 + 48	10.608 - 263	92.30 + 252
4 10.6	44.850 - 63	32.08 - 84	48.570 - 58	30.80 - 37	02.662 - 61	52.79 + 69	10.396 - 212	89.40 + 230
4 20.6	44.836 - 14	31.34 - 74	48.556 - 14	30.55 - 25	02.642 + 20	51.89 + 90	10.250 - 146	86.19 + 321
4 30.5	44.873 + 37	30.72 - 62	48.591 + 35	30.47 - 8	02.665 + 23	50.78 + 111	10.171 - 79	82.78 + 341
5 10.5	44.961 + 88	30.27 - 45	48.674 + 83	30.75 + 28	02.733 + 68	49.46 + 132	10.163 - 8	79.18 + 360
5 20.5	45.101 + 140	30.00 - 27	48.799 + 125	30.83 + 8	02.849 + 116	47.93 + 153	10.232 + 69	75.52 + 366
5 30.4	45.292 + 191	29.94 - 6	48.978 + 179	31.33 + 50	03.007 + 158	46.26 + 167	10.372 + 140	71.87 + 365
6 9.4	45.529 + 237	30.14 + 20	49.198 + 220	32.04 + 71	03.206 + 199	44.44 + 182	10.582 + 210	68.28 + 359
6 19.4	45.805 + 276	30.59 + 45	49.456 + 258	32.95 + 91	03.441 + 235	42.53 + 191	10.860 + 278	64.88 + 340
6 29.4	46.111 + 306	31.27 + 68	49.742 + 286	34.03 + 108	03.704 + 263	40.59 + 194	11.191 + 331	61.74 + 314
7 9.3	46.441 + 330	32.16 + 89	50.052 + 310	35.27 + 124	03.990 + 286	38.64 + 195	11.574 + 383	58.92 + 282
7 19.3	46.787 + 346	33.25 + 109	50.376 + 324	36.62 + 135	04.292 + 302	36.76 + 188	11.995 + 421	56.55 + 237
7 29.3	47.140 + 353	34.49 + 124	50.707 + 331	38.04 + 142	04.601 + 309	34.99 + 177	12.441 + 446	54.63 + 192
8 8.3	47.494 + 354	35.86 + 137	51.040 + 333	39.50 + 146	04.913 + 312	33.38 + 161	12.441 + 464	53.26 + 178
8 18.2	47.842 + 348	37.32 + 146	51.367 + 327	40.96 + 146	05.219 + 306	31.98 + 140	12.905 + 466	52.48 + 137
8 28.2	48.177 + 335	38.82 + 150	51.682 + 315	42.37 + 141	05.515 + 296	30.83 + 115	13.826 + 455	52.29 + 19
9 7.2	48.497 + 320	40.35 + 163	51.983 + 301	43.71 + 134	05.797 + 282	29.95 + 88	14.263 + 437	52.72 - 43
9 17.1	48.794 + 297	41.85 + 150	52.263 + 280	44.94 + 123	06.059 + 262	29.37 + 58	14.665 + 402	53.76 - 104
9 27.1	49.068 + 274	43.32 + 147	52.520 + 257	46.06 + 112	06.299 + 240	29.08 + 29	15.025 + 360	55.34 - 150
10 7.1	49.317 + 249	44.73 + 141	52.755 + 235	47.04 + 98	06.516 + 217	29.08 + 0	15.337 + 312	57.44 - 218
10 17.1	49.536 + 219	46.05 + 132	52.961 + 206	47.88 + 84	06.706 + 190	29.35 - 27	15.587 + 250	59.96 - 252
10 27.0	49.726 + 190	47.29 + 124	53.140 + 179	48.58 + 70	06.869 + 163	29.85 - 50	15.776 + 189	62.80 - 284
11 6.0	49.885 + 159	48.44 + 115	53.290 + 150	49.15 + 57	07.004 + 135	30.55 - 70	15.899 + 123	65.87 - 307
11 16.0	50.009 + 124	49.47 + 103	53.408 + 118	49.60 + 45	07.108 + 104	31.40 - 85	15.950 + 51	69.02 - 315
11 26.0	50.099 + 90	50.39 + 92	53.496 + 88	49.94 + 34	07.183 + 75	32.34 - 94	15.935 - 15	72.14 - 312
12 5.9	50.152 + 53	51.18 + 79	53.548 + 52	50.17 + 23	07.225 + 42	33.33 - 99	15.852 - 83	75.13 - 299
12 15.9	50.167 + 15	51.84 + 66	53.566 + 18	50.30 + 13	07.235 + 10	34.32 - 99	15.704 - 148	77.84 - 271
12 25.9	50.145 - 22	52.35 + 51	53.550 - 16	50.34 + 4	07.214 - 21	35.26 - 94	15.501 - 203	80.20 - 236
12 35.8	50.084 - 61	52.69 + 34	53.498 - 52	50.29 - 5	07.160 - 54	36.15 - 89	15.243 - 258	82.13 - 193
	- 95	+ 16	- 83	- 15	- 83	- 77	- 301	- 141
Mean Place	47.846	34.24	51.317	34.56	05.042	45.61	12.535	78.66
sec δ, tan δ	+1.144	+0.555	+1.062	+0.358	+1.000	-0.022	+1.855	-1.562
dα(v), dδ(v)	+0.072	+0.27	+0.068	+0.27	+0.061	+0.27	+0.030	+0.27
dα(ε), dδ(ε)	-0.025	+0.73	-0.016	+0.74	+0.001	+0.74	+0.070	+0.74
Dble.Trans.	November 8		November 8		November 9		November 9	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1089		1090		1091		1095		
	ζ Arietis		79 G. Fornacis		ζ Eridani		ι Hydri		
Mag. Spect.	4.95	A0	6.85	G0	4.90	A3	5.53	F2	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	
	3 14	+ 20 59	3 14	- 35 36	3 15	- 8 51	3 16	- 77 25	
1 <sup>d</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	
1	-9.1	05.898 - 4	42.62 + 15	07.982 <sup>68</sup> - 103	39.97 <sup>221</sup> - 189	09.594 <sup>17</sup> - 131	76.29 <sup>131</sup> - 117	23.987 <sup>648</sup> - 777	94.47 <sup>243</sup> - 196
1	0.9	05.860 - 38	42.68 + 6	07.879 - 103	41.86 - 156	09.547 - 78	77.46 - 104	23.210 - 891	96.43 - 146
1	10.8	05.787 - 73	42.64 - 15	07.742 - 137	43.42 - 113	09.469 - 107	78.50 - 84	22.319 - 979	97.89 - 87
1	20.8	05.682 - 105	42.49 - 25	07.574 - 168	44.55 - 70	09.362 - 127	79.34 - 63	21.340 - 1027	98.76 - 26
1	30.8	05.554 - 128	42.24	07.385 - 189	45.25	09.235	79.97	20.313	99.04
2	9.7	05.405 - 149	41.89 - 35	07.179 - 206	45.51 - 26	09.090 - 145	80.40 - 43	19.252 <sup>1061</sup> - 1061	98.75 + 29
2	19.7	05.247 - 158	41.46 - 43	06.965 - 214	45.29 + 22	08.936 - 154	80.57 - 17	18.195 <sup>1057</sup> - 1057	97.85 + 90
3	1.7	05.089 - 158	40.97 - 49	06.755 - 210	44.63 + 66	08.782 - 154	80.51 + 6	17.175 <sup>1020</sup> - 1020	96.43 + 142
3	11.7	04.940 - 149	40.43 - 16	06.555 - 200	43.54 + 109	08.636 - 146	80.20 + 31	16.203 <sup>972</sup> - 972	94.50 + 193
3	21.6	04.811 - 129	39.89 - 54	06.377 - 178	42.02 + 152	08.508 - 128	79.63 + 57	15.320 <sup>883</sup> - 883	92.09 + 241
3	31.6	04.713 - 98	39.38 - 51	06.229 - 148	40.15 + 187	08.407 - 101	78.82 + 81	14.544 <sup>776</sup> - 776	89.31 + 278
4	10.6	04.650 - 63	38.95 - 43	06.118 - 111	37.91 + 224	08.338 - 69	77.76 + 106	13.886 <sup>658</sup> - 658	86.18 + 313
4	20.6	04.634 - 16	38.63 - 32	06.053 - 65	35.37 + 254	08.310 - 28	76.45 + 131	13.377 <sup>509</sup> - 509	82.78 + 340
4	30.5	04.664 + 30	38.47 - 16	06.037 - 16	32.59 + 278	08.324 + 14	74.93 + 152	13.021 <sup>356</sup> - 356	79.21 + 357
5	10.5	04.744 + 80	38.57 + 10	06.071 + 34	29.60 + 299	08.383 + 59	73.19 + 174	12.826 <sup>195</sup> - 195	75.50 + 371
5	20.5	04.867 + 123	38.66 + 9	06.161 + 90	26.47 + 313	08.490 + 107	71.25 + 194	12.807 <sup>19</sup> - 19	71.76 + 374
5	30.4	05.044 + 177	39.06 + 40	06.300 + 139	23.30 + 317	08.640 + 150	69.19 + 206	12.952 <sup>145</sup> + 145	68.08 + 368
6	9.4	05.263 + 219	39.68 + 62	06.488 + 188	20.10 + 320	08.832 + 192	67.00 + 219	13.265 <sup>313</sup> + 313	64.52 + 356
6	19.4	05.521 + 258	40.51 + 83	06.721 + 233	17.00 + 310	09.060 + 228	64.78 + 222	13.741 <sup>613</sup> + 613	61.19 + 333
6	29.4	05.806 + 285	41.51 + 100	06.990 + 269	14.06 + 294	09.317 + 257	62.56 + 222	14.354 <sup>613</sup> + 613	58.16 + 303
7	9.3	06.116 + 310	42.67 + 116	07.292 + 302	11.34 + 272	09.599 + 282	60.38 + 218	15.100 <sup>746</sup> + 746	55.48 + 268
7	19.3	06.442 + 326	43.96 + 129	07.616 + 324	08.95 + 239	09.897 + 298	58.34 + 204	15.955 <sup>855</sup> + 855	53.29 + 219
7	29.3	06.774 + 332	45.33 + 137	07.954 + 338	06.92 + 203	10.204 + 307	56.47 + 187	16.885 <sup>930</sup> + 930	51.60 + 169
8	8.3	07.109 + 335	46.76 + 143	08.300 + 346	05.32 + 160	10.515 + 311	54.82 + 165	17.878 <sup>993</sup> + 993	50.46 + 114
8	18.2	07.439 + 330	48.19 + 143	08.644 + 344	04.22 + 110	10.821 + 306	53.47 + 135	18.891 <sup>1013</sup> + 1013	49.95 + 51
8	28.2	07.757 + 318	49.59 + 140	08.978 + 334	03.62 + 60	11.117 + 296	52.42 + 105	19.896 <sup>1005</sup> + 1005	50.03 - 8
9	7.2	08.061 + 304	50.94 + 135	09.298 + 320	03.56 + 6	11.401 + 284	51.71 + 71	20.868 <sup>972</sup> + 972	50.74 - 71
9	17.1	08.345 + 284	52.19 + 125	09.594 + 296	04.04 - 48	11.664 + 263	51.38 + 33	21.763 <sup>895</sup> + 895	52.07 - 133
9	27.1	08.607 + 262	53.33 + 114	09.862 + 268	05.01 - 97	11.906 + 242	51.38 + 0	22.559 <sup>796</sup> + 796	53.91 - 184
10	7.1	08.845 + 238	54.36 + 103	10.100 + 238	06.47 - 146	12.124 + 218	51.73 - 35	23.233 <sup>674</sup> + 674	56.27 - 236
10	17.1	09.056 + 211	55.24 + 88	10.301 + 201	08.33 - 186	12.314 + 190	52.39 - 66	23.748 <sup>515</sup> + 515	59.02 - 275
10	27.0	09.240 + 184	56.01 + 77	10.465 + 164	10.50 - 217	12.477 + 163	53.31 - 92	24.100 <sup>352</sup> + 352	62.06 - 304
11	6.0	09.395 + 155	56.65 + 64	10.589 + 124	12.93 - 243	12.610 + 133	54.45 - 114	24.271 <sup>171</sup> + 171	65.29 - 323
11	16.0	09.517 + 122	57.16 + 51	10.670 + 81	15.49 - 256	12.712 + 102	55.74 - 129	24.248 <sup>23</sup> - 23	68.57 - 328
11	26.0	09.609 + 92	57.58 + 42	10.712 + 42	18.08 - 259	12.784 + 72	57.11 - 137	24.046 <sup>202</sup> - 202	71.76 - 319
12	5.9	09.665 + 56	57.88 + 30	10.711 - 1	20.62 - 254	12.823 + 39	58.52 - 141	23.659 <sup>387</sup> - 387	74.78 - 302
12	15.9	09.686 + 21	58.09 + 21	10.669 - 42	22.98 - 236	12.828 + 5	59.88 - 136	23.103 <sup>556</sup> - 556	77.46 - 268
12	25.9	09.672 - 14	58.20 + 11	10.589 - 80	25.09 - 211	12.802 - 26	61.15 - 127	22.405 <sup>698</sup> - 698	79.74 - 228
12	35.8	09.622 - 50	58.20 + 0	10.472 - 117	26.89 - 180	12.743 - 59	62.30 - 115	21.571 <sup>834</sup> - 834	81.54 - 180
		- 83	- 9	- 149	- 140	- 88	- 97	- 932	- 124
Mean Place	07.416	42.19	08.206	27.33	10.615	69.63	16.800	76.67	
sec δ, tan δ	+1.071	+0.384	+1.230	-0.716	+1.012	-0.156	+4.598	-4.488	
dα(ψ), dδ(ψ)	+0.069	+0.26	+0.047	+0.26	+0.058	+0.26	-0.029	+0.26	
dα(ε), dδ(ε)	-0.017	+0.75	+0.032	+0.75	+0.007	+0.75	+0.196	+0.76	
Dble. Trans.	November 9		November 9		November 9		November 10		

AT UPPER TRANSIT AT GREENWICH

No.	1092		115		1093		119	
	Lacaille 1044 (Fornacis)		48 H. Cephei		κ Ceti		82 G. Eridani	
Mag.Spect.	6.89	A0	5.50	F0	4.96	G5	4.30	G5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	3 16	-31 23	3 18	+77 40	3 18	+ 3 19	3 19	-43 06
1 -9.1	21.499 - 54	75.63 -211	32.688 - 296	80.71 +288	37.876 - 4	13.09 - 75	23.360 - 84	88.89 -237
1 0.9	21.410 - 89	77.46 -183	32.232 - 456	83.24 +253	37.840 - 36	12.37 - 72	23.236 - 124	90.91 -202
1 10.8	21.288 - 122	78.99 -153	31.622 - 610	30.878 +212	37.773 - 67	11.70 - 67	23.074 - 162	92.56 -165
1 20.8	21.136 - 152	80.12 -113	30.878 - 744	86.95 +159	37.676 - 97	11.10 - 60	22.879 - 195	93.72 -116
1 30.8	20.963 - 173	80.85 - 73	30.044 - 834	87.99 +104	37.556 - 120	10.60 - 50	22.661 - 218	94.40 - 68
2 9.7	20.772 - 191	81.17 - 32	29.141 - 903	88.45 + 46	37.418 - 138	10.18 - 42	22.425 - 236	94.60 - 20
2 19.7	20.573 - 199	81.04 + 13	28.217 - 924	88.29 - 16	37.270 - 148	09.88 - 30	22.181 - 244	94.27 + 33
3 1.7	20.377 - 196	80.49 + 55	27.318 - 899	87.56 - 73	37.122 - 148	09.70 - 18	21.941 - 162	93.46 + 81
3 11.7	20.189 - 188	79.54 + 95	26.473 - 845	86.29 -127	36.981 - 141	09.66 - 4	21.712 - 229	92.19 +127
3 21.6	20.022 - 167	78.18 +136	25.733 - 740	84.52 -177	36.858 - 123	09.77 + 11	21.508 - 204	90.45 +174
3 31.6	19.884 - 138	76.47 +171	25.130 - 603	82.38 -214	36.761 - 97	10.05 + 28	21.337 - 171	88.33 +212
4 10.6	19.781 - 103	74.41 +206	24.680 - 450	79.92 -246	36.697 - 64	10.50 + 45	21.204 - 133	85.84 +249
4 20.6	19.722 - 59	72.05 +236	24.420 - 260	77.25 - 27	36.675 - 22	11.16 + 66	21.122 - 82	83.03 +281
4 30.5	19.710 - 12	69.45 +260	24.351 - 69	74.52 -273	36.696 + 21	12.00 + 84	21.093 - 29	79.99 +304
5 10.5	19.747 + 37	66.63 +282	24.475 + 124	71.78 -274	36.761 + 65	13.04 +104	21.118 + 25	76.73 +326
5 20.5	19.837 + 90	63.66 +297	24.802 + 327	69.16 -262	36.873 + 112	14.30 +126	21.204 + 86	73.36 +337
5 30.4	19.975 + 138	60.63 +303	25.305 + 503	66.75 -241	37.030 + 157	15.72 +142	21.344 + 140	69.95 +341
6 9.4	20.160 + 185	57.56 +307	25.979 + 674	64.59 -216	37.227 + 197	17.29 +157	21.538 + 194	66.55 +340
6 19.4	20.389 + 229	54.56 +300	26.808 + 829	62.81 -178	37.461 + 234	18.98 +169	21.783 + 245	63.28 +327
6 29.4	20.651 + 262	51.70 +286	27.756 + 948	61.41 -140	37.723 + 262	20.73 +175	22.068 + 285	60.20 +308
7 9.3	20.944 + 293	49.02 +268	28.811 +1055	60.43 - 98	38.010 + 287	22.52 +179	22.390 + 322	57.37 +283
7 19.3	21.259 + 315	46.65 +237	29.943 +1132	59.93 - 50	38.312 + 302	24.28 +176	22.740 + 350	54.91 +246
7 29.3	21.587 + 328	44.62 +203	31.120 +1177	59.88 - 5	38.622 + 310	25.97 +169	23.106 + 366	52.85 +206
8 8.3	21.922 + 335	42.98 +164	32.330 +1210	60.30 + 42	38.936 + 314	27.55 +158	23.485 + 379	51.26 +159
8 18.2	22.255 + 333	41.83 +115	33.538 +1208	61.20 + 90	39.244 + 308	28.95 +140	23.863 + 378	50.22 +104
8 28.2	22.578 + 323	41.14 + 69	34.722 +1184	62.51 +131	39.543 + 299	30.16 +121	24.231 + 368	49.72 + 50
9 7.2	22.888 + 310	40.96 + 18	35.871 +1149	64.25 +174	39.829 + 286	31.13 + 97	24.586 + 355	49.79 - 7
9 17.1	23.176 + 288	41.31 - 35	36.950 +1079	66.39 +214	40.096 + 267	31.85 + 72	24.915 + 329	50.44 - 65
9 27.1	23.438 + 262	42.13 - 82	37.949 + 999	68.84 +245	40.342 + 246	32.31 + 46	25.215 + 300	51.60 -116
10 7.1	23.671 + 233	43.42 -129	38.855 + 906	71.61 +277	40.566 + 224	32.51 + 20	25.480 + 265	53.28 -188
10 17.1	23.870 + 199	45.12 -170	39.636 + 781	74.63 +302	40.763 + 197	32.46 - 5	25.703 + 223	55.38 -210
10 27.0	24.034 + 164	47.12 -200	40.292 + 656	77.82 +319	40.935 + 172	32.20 - 26	25.884 + 181	57.80 -242
11 6.0	24.161 + 127	49.38 -226	40.802 + 510	81.17 +335	41.079 + 144	31.76 - 44	26.019 + 135	60.50 -270
11 16.0	24.249 + 88	51.78 -240	41.147 + 345	84.55 +338	41.192 + 113	31.17 - 59	26.105 + 86	63.31 -281
11 26.0	24.299 + 50	54.22 -244	41.331 + 184	87.90 +335	41.276 + 84	30.49 - 68	26.145 + 40	66.14 -283
12 5.9	24.309 + 10	56.64 -242	41.335 + 4	91.16 +326	41.327 + 51	29.73 - 76	26.136 - 9	68.90 -276
12 15.9	24.279 - 30	58.89 -225	41.159 - 176	94.19 +303	41.345 + 18	28.97 - 76	26.080 - 56	71.44 -254
12 25.9	24.214 - 65	60.92 -203	40.817 - 342	96.95 +276	41.332 - 13	28.22 - 75	25.983 - 97	73.70 -226
12 35.8	24.112 - 102	62.67 -175	40.305 - 512	99.33 +238	41.284 - 48	28.22 - 73	25.983 - 140	75.62 -192
	24.112 - 133	62.67 -137	40.305 - 654	99.33 +189	41.284 - 77	27.49 - 65	25.843 - 176	75.62 -146
Mean Place sec δ, tan δ	21.879 +1.172	64.09 -0.610	34.723 +4.689	71.69 +4.581	39.127 +1.002	16.66 +0.058	23.331 +1.370	74.96 -0.936
da(ψ), dδ(ψ) da(ε), dδ(ε)	+0.049 +0.027	+0.26 +0.76	+0.154 -0.198	+0.26 +0.76	+0.062 -0.003	+0.26 +0.76	+0.042 +0.040	+0.26 +0.76
Dble.Trans.	November 10		November 10		November 10		November 11	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1094		120		1096		121	
	τ Arietis		α Persei		Piazzi 3 <sup>h</sup> 27 (Camelopardi)		ο Tauri	
Mag.Spect.	5.17	B3	1.90	F5	5.55	K2	3.80	G5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	3 20	+ 21 05	3 23	+ 49 48	3 23	+ 64 32	3 24	+ 8 58
1 -9.1	25.245 + 1	57 06 + 16	19 422 2/3	56 43 + 169	27 639 - 81	27 67 + 239	03 815 + 3	53 28 - 49
1 0.9	25.212 - 33	57 14 + 8	19 346 1/2	57 88 + 145	27 477 - 162	29 75 + 208	03 785 - 30	52 80 - 48
1 10.8	25.143 - 69	57 12 - 2	19 218 1/2	59 03 + 115	27 236	31 48 + 173	03 722 - 63	52 32 - 48
1 20.8	25.042 - 101	56 99 13	19 041 1/1	59 83 + 80	26 924 312	32 74 + 126	03 627 - 95	51 86 - 46
1 30.8	24.915 - 127	56 77 - 22	18 829 2/12	60 26 + 43	26 562 362	33 54 + 80	03 509 - 118	51 43 - 43
2 9.8	24.767 - 148	56 45 - 32	18 587 - 242	60 31 + 5	26 160 402	33 84 + 30	03 371 - 138	51.03 - 40
2 19.7	24.608 - 159	56 05 - 40	18 330 - 257	59 97 - 34	25 739 421	33 61 23	03 220 - 151	50 68 - 35
3 1.7	24.448 - 160	55 58 - 47	18 076 - 254	59 27 - 70	25 326 413	32 90 71	03 069 - 151	50 40 - 28
3 11.7	24.296 - 152	55 06 - 52	17 834 - 242	58 23 - 104	24 934 392	31 73 117	02 924 - 145	50 19 - 21
3 21.6	24.163 - 133	54 54 - 52	17 623 - 211	56 92 - 131	24 590 - 344	30 15 - 158	02 796 - 128	50.10 - 9
3 31.6	24.060 - 103	54 05 - 49	17 456 - 167	55 40 - 152	24 312 - 278	28 27 - 188	02 695 - 101	50 12 + 2
4 10.6	23.992 - 68	53 62 - 43	17 339 - 117	53 73 - 167	24 110 - 202	26 13 - 214	02 626 - 69	50 28 + 16
4 20.6	23 969 - 23	53 30 - 32	17 287 - 52	52 01 - 172	24 003 - 107	23 85 - 228	02 599 - 27	50 61 + 33
4 30.5	23 994 + 25	53 12 - 18	17 302 + 15	50 31 - 170	23 994 - 9	21 54 - 231	02 617 + 18	51 11 + 50
5 10.5	24.069 + 75	53 17 + 5	17 386 + 84	48 68 - 163	24 084 + 90	19 25 - 229	02 678 + 61	51.78 + 67
5 20.5	24.183 + 114	53 28 + 11	17 541 + 155	47 23 - 145	24 279 + 195	17 10 - 215	02 787 + 109	52 68 + 90
5 30.5	24.355 + 172	53 65 + 37	17 760 + 219	45 98 - 125	24 566 + 287	15 16 - 194	02 941 + 154	53 77 + 109
6 9.4	24 569 + 214	54 23 + 58	18 039 + 279	44 98 - 100	24 942 + 376	13 47 - 169	03 138 + 197	55 02 + 125
6 19.4	24 822 + 253	55 02 + 79	18 374 + 335	44 30 - 68	25 397 + 455	12 12 - 135	03 372 + 234	56 41 + 139
6 29.4	25 103 + 281	55 98 + 96	18 749 + 375	43 92 - 38	25 913 + 516	11 13 - 99	03 634 + 262	57 89 + 148
7 9.3	25 410 + 307	57 11 + 113	19 161 + 412	43 86 - 6	26 483 + 570	10 52 - 61	03 921 + 287	59 46 + 157
7 19.3	25 734 + 324	58 35 + 124	19 598 + 437	44 15 + 29	27 093 + 610	10 33 - 19	04 225 + 304	61 05 + 159
7 29.3	26 065 + 331	59 68 + 133	20 046 + 448	44 74 + 59	27 722 + 629	10 53 + 20	04 538 + 313	62 61 + 156
8 8.3	26 400 + 335	61 07 + 139	20 503 + 457	45 63 + 89	28 367 + 645	11 13 + 60	04 854 + 316	64 12 + 151
8 18.2	26 731 + 331	62 46 + 139	20 955 + 452	46 80 + 117	29 008 + 641	12 13 + 100	05 167 + 313	65 52 + 140
8 28.2	27 051 + 320	63 82 + 136	21 395 + 440	48 21 + 141	29 636 + 628	13 48 + 135	05 471 + 304	66 77 + 125
9 7.2	27 358 + 307	65 14 + 132	21 820 + 425	49 84 + 163	30 244 + 608	15 16 + 168	05 763 + 292	67 84 + 107
9 17.2	27 646 + 288	66 35 + 121	22 220 + 400	51 65 + 181	30 817 + 573	17 15 + 199	06 036 + 273	68 71 + 87
9 27.1	27 913 + 267	67 47 + 112	22 592 + 372	53 61 + 196	31 350 + 533	19 39 + 224	06 290 + 254	69 37 + 66
10 7.1	28 158 + 245	68 47 + 100	22 934 + 342	55 69 + 208	31 838 + 488	21 88 + 249	06 522 + 232	69 81 + 44
10 17.1	28 375 + 217	69 33 + 86	23 237 + 303	57 84 + 215	32 267 + 429	24 53 + 265	06 728 + 206	70 04 + 23
10 27.0	28 566 + 191	70 08 + 75	23 502 + 265	60 04 + 220	32 637 + 370	27 31 + 278	06 910 + 182	70 09 + 5
11 6.0	28 728 + 162	70 70 + 62	23 724 + 222	62 26 + 222	32 940 + 303	30 19 + 288	07 064 + 154	69 97 - 12
11 16.0	28 857 + 129	71 21 + 51	23 898 + 174	64 44 + 215	33 165 + 225	33 07 + 288	07 187 + 123	69 71 - 26
11 26.0	28 956 + 99	71 62 + 41	24 023 + 125	66 55 + 211	33 315 + 150	35 91 + 284	07 281 + 94	69 35 - 36
12 5.9	29 019 + 63	71 92 + 30	24 095 + 72	68 54 + 199	33 379 + 64	38 64 + 273	07 341 + 60	68 92 - 43
12 15.9	29 046 + 27	72 13 + 21	24 110 + 15	70 35 + 181	33 357 22	41 17 + 253	07 367 + 26	68 44 - 48
12 25.9	29 038 - 8	72 25 + 12	24 073 - 37	71 95 + 160	33 252 105	43 45 + 228	07 361 - 6	67 95 - 49
12 35.9	28 992 - 46	72 27 + 2	23 978 - 95	73 28 + 133	33 062 190	45 40 + 195	07 319 - 42	67 44 - 51
	28 992 - 79	72 27 - 7	23 978 - 144	73 28 + 100	33 062 263	45 40 + 153	07 319 74	67 44 - 48
Mean Place	26.742	56.36	21.227	50.26	29.557	19.67	05 122	55.09
sec δ, tan δ	+1.072	+0.386	+1.550	+1.184	+2.326	+2.100	+1 012	+0.158
dα(ψ), dδ(ψ)	+0.069	+0.26	+0.086	+0.25	+0.104	+0.25	+0 064	+0.25
dα(ε), dδ(ε)	-0.016	+0.77	-0.050	+0.78	-0.088	+0.78	-0.007	+0.78
Dble.Trans.	November 11		November 12		November 12		November 12	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	123		122		126		124	
	ξ Tauri		2 H. Camelopardi*		χ Reticuli		σ Persei	
Mag.Spect.	3.75	B8	4.44	B9p	4.80	F5	4.55	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	3 26	+ 9 41	3 27	+59 53	3 29	-62 58	3 29	+47 56
1 <sup>d</sup> -9.1	24 857 <sup>s</sup> + 5	09.12 - 45	56 204 <sup>s</sup> - 48	46 51 <sup>"</sup> +221	10.615 <sup>s</sup> - 221	80.88 <sup>"</sup> -265	35.330 <sup>s</sup> - 10	64.01 <sup>"</sup> +162
1 0.9	24 830 - 27	08.67 - 45	56 088 - 116	48 42 +191	10.328 - 287	83.12 -224	35.268 - 62	65.40 +139
1 10.8	24 768 - 62	08.21 - 46	55 902 - 186	50.01 +159	09.981 - 347	84.91 -179	35.154 - 114	66.53 +113
1 20.8	24 675 - 93	07.77 - 44	55 654 - 248	51.18 +117	09.582 - 399	86.14 -123	34.992 - 162	67.32 +79
1 30.8	24 558 - 117	07.36 - 41	55 360 - 294	51.91 +73	09.151 - 431	86.81 - 67	34.794 - 198	67.77 +45
2 9.8	24 419 - 139	06.96 - 40	55 028 - 332	52.19 +28	08.693 - 458	86.93 - 12	34.565 - 229	67.86 +9
2 19.7	24 269 - 150	06.62 - 34	54 678 - 350	51.97 - 22	08.227 - 466	86.44 +49	34.321 - 244	67.57 - 29
3 1.7	24 117 - 152	06.33 - 29	54 332 - 346	51.31 - 66	07.769 - 458	85.41 +103	34.076 - 245	66.94 - 63
3 11.7	23 970 - 147	06.11 - 22	54 001 - 331	50.22 -109	07.329 - 440	83.86 +155	33.841 - 235	65.99 +79
3 21.6	23 841 - 129	05.99 - 12	53 710 - 291	48.75 -147	06.926 - 403	81.80 +206	33.635 - 206	64.77 -122
3 31.6	23 739 - 102	05.98 - 1	53 473 - 237	47.01 -174	06.572 - 354	79.34 +246	33.468 - 167	63.36 -141
4 10.6	23 668 - 71	06.11 +13	53 301 - 172	45.03 -198	06.274 - 298	76.47 +287	33.351 - 117	61.79 -157
4 20.6	23 640 - 28	06.40 +29	53 211 - 90	42.93 -210	06.051 - 223	73.28 +319	33.294 - 57	60.17 -162
4 30.5	23 655 +15	06.86 +46	53 205 - 6	40.80 -213	05.904 - 147	69.87 +341	33.302 +7	58.57 -160
5 10.5	23 716 +61	07.48 +62	53 285 +80	38.71 -209	05.838 - 66	66.26 +361	33.375 +8	57.03 -154
5 20.5	23 822 +106	08.34 +86	53 455 +170	36.74 -197	05.862 +24	62.55 +371	33.518 +143	55.66 -137
5 30.5	23 975 +153	09.38 +104	53 706 +251	34.99 -175	05.969 +107	58.85 +370	33.724 +206	54.48 -118
6 9.4	24 170 +195	10.58 +120	54 034 +328	33.47 -152	06.160 +191	55.19 +366	33.988 +264	53.54 -94
6 19.4	24 403 +233	11.93 +135	54 432 +398	32.28 -119	06.432 +272	51.71 +348	34.307 +319	52.89 -65
6 29.4	24 665 +262	13.37 +144	54 884 +452	31.43 -85	06.773 +341	48.48 +323	34.666 +359	52.54 -35
7 9.3	24 952 +287	14 91 +154	55 383 +499	30.93 -50	07.178 +405	45.55 +293	35.061 +395	52.49 -5
7 19.3	25 256 +304	16.47 +156	55 916 +533	30.83 -10	07.636 +458	43.06 +249	35.481 +420	52.77 +28
7 29.3	25 568 +312	18.01 +154	56 467 +551	31.09 +26	08.130 +494	41.04 +202	35.915 +434	53.33 +56
8 8.3	25 886 +318	19.50 +149	57 031 +564	31.73 +64	08.653 +523	39.54 +150	36.357 +442	54.18 +85
8 18.2	26 200 +314	20.89 +139	57 593 +562	32.72 +99	09.185 +532	38.66 +88	36.796 +439	55.30 +112
8 28.2	26 505 +305	22.14 +125	58 143 +550	34.03 +131	09.713 +528	38.37 +29	37.225 +429	56.63 +133
9 7.2	26 799 +294	23.22 +108	58 678 +535	35.64 +161	10.227 +514	38.71 -34	37.641 +416	58.17 +154
9 17.2	27 074 +275	24.10 +88	59 182 +504	37.54 +190	10.706 +479	39.69 -98	38.033 +392	59.89 +172
9 27.1	27 330 +256	24.78 +68	59 653 +471	39.64 +210	11.141 +435	41.22 -153	38.400 +367	61.73 +184
10 7.1	27 565 +235	25.25 +47	60 086 +433	41.97 +233	11.522 +381	43.30 -208	38.739 +339	63.70 +197
10 17.1	27 775 +210	25.51 +26	60 469 +383	44.44 +247	11.832 +310	45.83 -253	39.041 +302	65.73 +203
10 27.0	27 959 +184	25.59 +8	60 804 +335	47.02 +258	12.072 +240	48.70 -287	39.308 +267	67.80 +207
11 6.0	28 116 +157	25.50 -9	61 082 +278	49.68 +266	12.231 +159	51.84 -314	39.534 +226	69.89 +209
11 16.0	28 242 +126	25.28 -22	61 296 +214	52.33 +265	12.304 +73	55.09 -325	39.713 +179	71.95 +206
11 26.0	28 340 +98	24.97 -31	61 446 +150	54.95 +262	12.295 -9	58.32 -323	39.847 +134	73.95 +200
12 5.9	28 403 +63	24.57 -40	61 523 +77	57.47 +252	12.202 -93	61.46 -314	39.928 +81	75.84 +189
12 15.9	28 432 +29	24.13 -44	61 527 +4	59.80 +233	12.027 -175	64.32 -286	39.956 +28	77.57 +173
12 25.9	28 428 -4	23.67 -46	61 460 -67	61.90 +210	11.782 -245	66.85 -253	39.931 -25	79.10 +153
12 35.9	28 388 -40	23.19 -48	61 319 -141	63.69 +179	11.468 -314	68.95 -210	39.851 -80	80.39 +129
Mean Place	26.171	10.65	58.065	38.97	08.420	65.71	37.086	58.05
sec δ, tan δ	+1.014	+0.171	+1.994	+1.725	+2.202	-1.961	+1.493	+1.109
da(ν), dδ(ν)	+0.065	+0.25	+0.097	+0.24	+0.020	+0.24	+0.084	+0.24
da(ε), dδ(ε)	-0.007	+0.78	-0.071	+0.79	+0.080	+0.79	-0.045	+0.79
Dble.Trans.	November 12		November 13		November 13		November 13	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1097		125		1098		128	
	17 Eridani		5 Tauri		B.D. +34° 674 (Persei)		45 G. Horologii	
Mag.Spect.	4.80	B9	4.28	K0	5.80	B3	5.60	K0
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	3 29	- 5 06	3 30	+ 12 53	3 31	+ 35 24	3 32	- 50 25
1 -9.1	55 756 - 1	79.66 -120	06 229 + 10	27.26 - 28	46 627 + 8	63.33 + 96	11 287 - 112	40.11 -262
1 0.9	55.722 - 34	80.75 -109	06 204 - 25	26.95 - 31	46 592 - 35	64.12 + 79	11.128 - 159	42.36 -225
1 10.8	55.656 - 66	81.73 - 98	06.145 - 59	26.62 - 33	46 514 - 78	64.73 + 61	10.922 - 206	44.22 -186
1 20.8	55.558 - 98	82.55 - 82	06.053 - 92	26.27 - 35	46 396 - 119	65.11 + 38	10.676 - 246	45.57 -135
1 30.8	55.437 - 121	83.20 - 65	05.935 - 118	25.92 - 35	46 247 - 148	65.27 + 16	10.403 - 273	46.41 - 84
2 9.8	55.296 - 141	83.66 - 46	05.796 - 139	25.56 - 36	46 072 - 175	65.18 - 9	10.106 - 297	46.73 - 32
2 19.7	55.143 - 153	83.92 - 26	05.643 - 153	25.21 - 35	45 882 - 190	64.85 - 33	10.079 - 307	46.49 + 24
3 1.7	54.988 - 155	83.97 - 5	05.489 - 154	24.89 - 32	45 690 - 192	64.30 - 55	09.799 - 304	45.73 + 76
3 11.7	54.837 - 151	83.82 + 15	05.339 - 150	24.59 - 30	45 505 - 185	63.56 - 74	09.200 - 295	44.48 +125
3 21.6	54.703 - 134	83.43 + 39	05.207 - 132	24.37 - 22	45 341 - 164	62.66 - 90	08.931 - 269	42.73 +175
3 31.6	54.593 - 110	82.82 + 61	05.101 - 106	24.24 - 13	45 210 - 131	61.66 -100	08.697 - 234	40.57 +216
4 10.6	54.515 - 78	81.98 + 84	05.027 - 74	24.21 - 3	45 118 - 92	60.61 -105	08.504 - 193	38.01 +256
4 20.6	54.476 + 39	80.91 +107	04.996 - 31	24.33 + 12	45 077 - 41	59.57 -104	08.365 - 139	35.11 +290
4 30.5	54.479 + 3	79.63 +128	05 009 + 13	24.60 + 27	45 089 + 12	58.60 - 97	08.284 - 81	31.96 +315
5 10.5	54.527 + 48	78.14 +149	05.069 + 60	25.02 + 42	45 156 + 67	57.74 - 86	08.264 - 20	28.59 +337
5 20.5	54.622 + 95	76.44 +170	05.172 + 103	25.67 + 65	45 280 + 124	57.05 - 69	08.311 + 47	25.09 +350
5 30.5	54.760 + 138	74.61 +183	05.325 + 153	26.52 + 85	45 456 + 176	56.55 - 50	08.419 + 108	21.55 +354
6 9.4	54.940 + 180	72.64 +197	05.520 + 195	27.54 +102	45 684 + 228	56.26 - 29	08.589 + 170	18.01 +354
6 19.4	55.159 + 219	70.59 +205	05.520 + 234	28.71 +117	45 957 + 273	56.23 - 3	08.819 + 230	14.61 +340
6 29.4	55.406 + 247	68.53 +206	06.017 + 263	30.00 +129	46 264 + 307	56.44 + 21	09.097 + 278	11.40 +321
7 9.3	55.680 + 274	66.49 +204	06 306 + 289	31.39 +139	46 601 + 337	56.90 + 46	09.421 + 324	08.46 +294
7 19.3	55.973 + 293	64.53 +196	06 612 + 306	32.84 +145	46 959 + 358	57.59 + 69	09.781 + 360	05.90 +256
7 29.3	56.275 + 302	62.72 +181	06.927 + 315	34.30 +146	47 327 + 368	58.47 + 88	10.164 + 383	03.76 +214
8 8.3	56.584 + 309	61.09 +163	07.248 + 321	35.74 +144	47 702 + 375	59.53 +106	10.567 + 403	02.11 +165
8 18.2	56.890 + 306	59.71 +138	07.566 + 318	37.10 +136	48 075 + 373	60.75 +122	10.974 + 407	01.04 +107
8 28.2	57.188 + 298	58.61 +110	07.875 + 309	38.36 +126	48 438 + 363	62.07 +132	11.376 + 402	00.52 + 52
9 7.2	57.476 + 288	57.81 + 80	08.174 + 299	39.48 +112	48 790 + 352	63.49 +142	11.766 + 390	00.62 - 10
9 17.2	57.746 + 270	57.36 + 45	08.454 + 280	40.44 + 96	49 122 + 332	64.96 +147	12.132 + 366	01.32 - 70
9 27.1	57.997 + 251	57.22 + 14	08.716 + 262	41.22 + 78	49 433 + 311	66.45 +149	12.467 + 335	02.58 -126
10 7.1	58.227 + 230	57.40 - 18	08.957 + 241	41.81 + 59	49 720 + 287	67.96 +151	12.765 + 298	04.38 -180
10 17.1	58.430 + 203	57.89 - 49	09.173 + 216	42.22 + 41	49 978 + 258	69.44 +148	13.016 + 251	06.64 -226
10 27.0	58.608 + 178	58.63 - 74	09.364 + 191	42.47 + 25	50 207 + 229	70.90 +146	13.219 + 203	09.25 -261
11 6.0	58.758 + 150	59.59 - 96	09.527 + 163	42.57 + 10	50 403 + 196	72.31 +141	13.369 + 150	12.15 -304
11 16.0	58.877 + 119	60.70 -111	09.660 + 133	42.53 - 4	50 563 + 160	73.65 +134	13.369 + 92	15.19 -290
11 26.0	58.967 + 90	61.91 -121	09.763 + 103	42.41 - 12	50 686 + 123	74.91 +126	13.498 + 37	18.27 -308
12 5.9	59.023 + 56	63.17 -126	09.832 + 69	42.20 - 21	50 767 + 81	76.08 +117	13.477 - 21	21.28 -301
12 15.9	59.044 + 21	64.40 -123	09.866 + 34	41.93 - 27	50 805 + 38	77.11 +103	13.399 - 78	24.07 -279
12 25.9	59.034 - 10	65.57 -117	09.866 + 0	41.63 - 34	50 801 - 4	78.01 + 90	13.270 - 129	26.58 -251
12 35.9	58.988 - 46	66.65 -108	09.829 - 37	41.29 - 30	50 751 - 34	78.72 + 71	13.091 - 179	28.72 -214
	58.988 - 77	66.65 - 93	09.829 - 71	41.29 - 35	50 751 - 91	78.72 + 50	13.091 - 222	28.72 -167
Mean Place	56.794	75.02	07.576	27.90	48.250	59.38	10.521	27.03
sec $\delta$ , tan $\delta$	+1.004	-0.090	+1.026	+0.229	+1.227	+0.711	+1.570	-1.210
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.059	+0.24	+0.066	+0.24	+0.076	+0.24	+0.036	+0.24
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.004	+0.79	-0.009	+0.79	-0.029	+0.80	+0.048	+0.80
Dble.Trans.	November 13		November 13		November 14		November 14	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	127		1099		1100		1101	
Name	ε Eridani		τ <sup>1</sup> Eridani		20 Eridani		10 Tauri	
Mag. Spect.	3.81	K0	4.32	B8	5.32	A0p	4.40	G5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>
	3 32	- 9 29	3 33	- 21 40	3 35	- 17 30	3 36	+ 0 21
1 -9.1	16.717 - 8	77.83 -140	10.829 - 19	47.34 -191	39.706 - 12	47.16 -176	09.853 + 8	31.17 - 96
1 0.9	16.676 - 41	79.09 -126	10.775 - 54	49.03 -169	39.662 - 44	48.74 -158	09.827 - 26	30.27 - 90
1 10.8	16.602 - 74	80.20 -111	10.686 - 89	50.50 -147	39.582 - 80	50.11 -137	09.767 - 60	29.45 - 82
1 20.8	16.498 -104	81.12 - 92	10.686 -120	51.66 -116	39.472 -110	51.22 -111	09.676 - 91	28.73 - 72
1 30.8	16.370 -128	81.80 - 68	10.423 -143	52.49 - 83	39.336 -136	52.03 - 81	09.559 -117	28.15 - 58
2 9.8	16.222 -148	82.27 - 47	10.258 -165	52.99 - 50	39.180 -156	52.55 - 52	09.421 -138	27.68 - 47
2 19.7	16.063 -159	82.47 + 20	10.081 -177	53.12 - 13	39.011 -169	52.73 - 18	09.269 -152	27.37 - 31
3 1.7	15.903 -160	82.43 + 4	10.081 -177	53.12 + 22	39.011 -171	52.73 + 13	09.269 -154	27.37 + 16
3 11.7	15.747 -156	82.43 + 29	09.904 -174	52.90 + 57	38.840 -167	52.60 + 45	09.115 -151	27.21 + 0
3 21.7	15.608 -139	81.58 + 56	09.730 -156	52.33 + 93	38.673 -151	52.15 + 78	08.964 -135	27.21 + 19
3 31.6	15.494 -114	80.77 + 81	09.574 -131	51.40 +125	38.522 -126	51.37 +108	08.829 -111	27.40 + 36
4 10.6	15.410 - 84	79.72 +105	09.443 -100	50.15 +156	38.396 - 96	50.29 +138	08.718 - 81	27.76 + 56
4 20.6	15.367 - 43	78.41 +131	09.343 - 60	48.59 +186	38.300 - 56	48.91 +166	08.637 - 40	28.32 + 76
4 30.5	15.366 - 1	78.41 +153	09.283 - 16	46.73 +210	38.244 - 13	47.25 +189	08.597 + 1	29.08 + 95
5 10.5	15.409 + 43	75.14 +174	09.267 + 30	44.63 +234	38.231 + 31	45.36 +213	08.598 + 46	30.03 +116
5 20.5	15.501 + 92	73.21 +193	09.297 + 80	42.29 +252	38.262 + 81	43.23 +232	08.644 + 92	31.19 +136
5 30.5	15.635 +134	71.14 +207	09.377 +125	39.77 +262	38.343 +125	40.91 +243	08.736 +137	32.55 +151
6 9.4	15.812 +177	68.96 +218	09.502 +169	37.15 +272	38.468 +168	38.48 +254	08.873 +179	34.06 +166
6 19.4	16.028 +216	66.73 +223	09.671 +211	34.43 +270	38.636 +209	35.94 +255	09.052 +217	35.72 +177
6 29.4	16.273 +245	64.51 +222	09.882 +243	31.73 +264	38.845 +241	33.39 +251	09.269 +246	37.49 +180
7 9.4	16.545 +272	62.34 +217	10.125 +272	29.09 +252	39.086 +269	30.88 +242	09.515 +273	39.29 +184
7 19.3	16.836 +291	60.29 +205	10.397 +295	26.57 +231	39.355 +291	28.46 +223	09.788 +292	41.13 +178
7 29.3	17.137 +307	58.43 +186	10.692 +307	24.26 +204	39.646 +303	26.23 +200	10.080 +302	42.91 +169
8 8.3	17.444 +307	56.79 +164	10.999 +316	22.22 +172	39.949 +311	24.23 +171	10.382 +309	44.60 +156
8 18.2	17.749 +305	55.44 +135	11.315 +315	20.50 +132	40.260 +311	22.52 +135	10.691 +307	46.16 +136
8 28.2	18.046 +297	54.41 +103	11.630 +309	19.18 + 92	40.571 +304	21.17 + 98	10.998 +299	47.52 +113
9 7.2	18.333 +287	53.72 + 69	11.939 +299	18.26 + 48	40.875 +295	20.19 + 57	11.297 +290	48.65 + 88
9 17.2	18.601 +268	53.41 + 31	12.238 +280	17.78 + 0	41.170 +278	19.62 + 12	11.587 +273	49.53 + 58
9 27.1	18.850 +249	53.46 - 5	12.518 +260	17.78 - 43	41.448 +258	19.50 - 29	11.860 +256	50.11 + 31
10 7.1	19.077 +227	53.85 - 39	12.778 +237	18.21 - 87	41.706 +235	19.79 - 70	12.116 +234	50.42 + 3
10 17.1	19.277 +200	54.58 - 73	13.015 +207	19.08 -126	41.941 +208	20.49 -107	12.350 +210	50.45 - 25
10 27.0	19.450 +173	55.57 - 99	13.222 +178	20.34 -156	42.149 +181	21.56 -137	12.560 +186	50.20 - 47
11 6.0	19.596 +146	56.79 -122	13.400 +148	21.90 -183	42.330 +150	22.93 -163	12.746 +158	49.73 - 68
11 16.0	19.709 +113	58.17 -138	13.548 +111	23.73 -201	42.480 +117	24.56 -180	12.904 +128	49.05 - 83
11 26.0	19.792 + 83	59.64 -147	13.659 + 79	25.74 -207	42.597 + 85	26.36 -188	13.032 + 99	48.22 - 92
12 5.9	19.841 + 49	61.14 -150	13.738 + 42	27.81 -210	42.682 + 49	28.24 -192	13.131 + 65	47.30 - 98
12 15.9	19.855 + 14	62.60 -146	13.780 + 4	29.91 -200	42.731 + 13	30.16 -184	13.196 + 31	46.32 - 99
12 25.9	19.837 - 18	63.97 -137	13.784 - 30	31.91 -185	42.744 - 21	32.00 -171	13.227 - 3	45.33 - 95
12 35.9	19.784 - 84	65.21 -124	13.754 - 68	33.76 -165	42.723 - 59	33.71 -153	13.224 - 38	44.38 - 89
			13.686 - 99	35.41 -135	42.664 - 90	35.24 -128	13.186 - 70	43.49 - 80
Mean Place	17.630	72.25	11.453	39.46	40.437	40.35	10.967	33.93
sec δ, tan δ	+1.014	-0.167	+1.076	-0.397	+1.049	-0.316	+1.000	+0.006
dα(ψ), dδ(ψ)	+0.058	+0.24	+0.053	+0.24	+0.054	+0.23	+0.061	+0.23
dα(ε), dδ(ε)	+0.007	+0.80	+0.016	+0.80	+0.012	+0.81	-0.000	+0.81
Dble. Trans.	November 14		November 14		November 15		November 15	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	130		1102		1103		129		
	110 G. Eridani		$\tau$ Fornacis		11 Tauri		Groombridge 716 (Camelopardi)		
Mag.Spect.	4.58	K0	6.08	A0	6.15	A0	5.32	M0	
U.T.	R.A.		R.A.		R.A.		R.A.		
	h	Dec.	h	Dec.	h	Dec.	h	Dec.	
	3 36	- 40 18	3 38	- 27 58	3 39	+ 25 17	3 40	+ 63 10	
1 <sup>d</sup>	s	"	s	"	s	"	s	"	
1	-9.1	36.684	-62	77.54	-248	13.546	-28	80.37	-215
1	0.9	36.580	-104	79.71	-183	13.482	-64	82.28	-191
1	10.8	36.436	-144	81.54	-138	13.382	-100	83.93	-165
1	20.8	36.255	-181	82.92	-133	13.249	-133	85.21	-128
1	30.8	36.049	-206	83.85	-93	13.090	-159	86.12	-91
2	9.8	35.819	-230	84.31	-46	12.909	-181	86.65	-53
2	19.7	35.578	-241	84.26	+5	12.716	-193	86.75	-10
3	1.7	35.337	-241	83.74	+52	12.522	-194	86.46	+29
3	11.7	35.102	-235	82.76	+98	12.331	-191	85.77	+69
3	21.7	34.887	-215	81.31	+145	12.157	-174	84.68	+109
3	31.6	34.701	-186	79.46	+185	12.009	-148	83.24	+144
4	10.6	34.551	-150	77.23	+223	11.892	-117	81.45	+179
4	20.6	34.447	-104	74.66	+257	11.818	-74	79.34	+211
4	30.5	34.392	-55	71.84	+282	11.787	-31	76.98	+236
5	10.5	34.391	-1	68.77	+307	11.804	+17	74.38	+260
5	20.5	34.447	+56	65.54	+323	11.872	+68	71.60	+278
5	30.5	34.556	+109	62.25	+329	11.988	+116	68.73	+287
6	9.4	34.718	+162	58.93	+332	12.150	+162	65.78	+295
6	19.4	34.930	+212	55.68	+325	12.356	+206	62.86	+292
6	29.4	35.183	+253	52.59	+309	12.597	+241	60.04	+282
7	9.4	35.474	+291	49.72	+287	12.870	+273	57.36	+268
7	19.3	35.794	+320	47.17	+255	13.168	+298	54.94	+242
7	29.3	36.134	+340	44.99	+218	13.480	+312	52.82	+212
8	8.3	36.487	+353	43.26	+173	13.803	+323	51.06	+176
8	18.2	36.844	+357	42.04	+122	14.127	+324	49.75	+131
8	28.2	37.196	+352	41.35	+69	14.446	+319	48.88	+87
9	7.2	37.539	+343	41.22	+13	14.756	+310	48.50	+38
9	17.2	37.861	+322	41.67	-45	15.048	+292	48.64	-14
9	27.1	38.157	+296	42.64	-97	15.318	+270	49.25	-61
10	7.1	38.425	+268	44.14	-150	15.565	+247	50.34	-109
10	17.1	38.655	+230	46.09	-195	15.780	+215	51.84	-150
10	27.1	38.848	+193	48.39	-230	15.966	+186	53.67	-183
11	6.0	38.999	+104	51.00	-261	16.117	+151	55.80	-213
11	16.0	39.103	+61	53.76	-276	16.230	+113	58.10	-230
11	26.0	39.164	+13	56.59	-283	16.308	+78	60.47	-237
12	5.9	39.177	+34	59.39	-280	16.346	+38	62.85	-238
12	15.9	39.143	-76	62.02	-263	16.344	-2	65.12	-227
12	25.9	39.067	-121	64.41	-239	16.305	-39	67.20	-208
12	35.9	38.946	-158	66.49	-208	16.226	-79	69.05	-185
					-166		-112		-151
Mean Place	36.552	66.59	13.944	71.74	57.798	11.83	58.458	26.58	
sec $\delta$ , tan $\delta$	+1.312	-0.849	+1.132	-0.531	+1.106	+0.472	+2.216	+1.977	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.043	+0.23	+0.050	+0.23	+0.071	+0.23	+0.104	+0.23	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.033	+0.81	+0.021	+0.81	-0.018	+0.82	-0.075	+0.82	
Dble.Trans.	November 15		November 15		November 16		November 16		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	133		131		135		137	
	δ Fornacis		δ Persei		δ Eridani		24 Eridani	
Mag.Spect.	4.93	B5	3.10	B5	3.72	K0	5.09	B8
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 3 41	<sup>o</sup> <sup>'</sup> -31 58	<sup>h</sup> <sup>m</sup> 3 41	<sup>o</sup> <sup>'</sup> +47 44	<sup>h</sup> <sup>m</sup> 3 42	<sup>o</sup> <sup>'</sup> - 9 48	<sup>h</sup> <sup>m</sup> 3 43	<sup>o</sup> <sup>'</sup> - 1 12
1 -9.1	42.446 -33	60.55 -230	55.843 +8	49.01 +165	35.153 +3	35.78 -144	48.224 +14	20.95 -104
1 0.9	42.374 -72	62.59 -204	55.797 -46	50.44 +143	35.123 -30	37.08 -130	48.203 -21	21.92 -97
1 10.8	42.265 -109	64.34 -175	55.697 -100	51.64 +120	35.058 -65	38.24 -116	48.148 -55	22.81 -89
1 20.8	42.120 -145	65.70 -136	55.546 -151	52.51 +87	34.960 -98	39.19 -95	48.060 -88	23.57 -76
1 30.8	41.950 -170	66.66 -96	55.357 -189	53.07 +56	34.837 -123	39.91 -72	47.945 -115	24.19 -62
2 9.8	41.757 -193	67.22 -56	55.134 -223	53.27 +20	34.692 -145	40.42 -51	47.807 -138	24.67 -48
2 19.7	41.550 -207	67.31 -9	54.891 -243	53.10 -17	34.533 -159	40.66 -24	47.655 -152	24.98 -31
3 1.7	41.342 -208	66.98 +33	54.645 -246	52.59 -51	34.370 -163	40.65 +1	47.499 -156	25.11 -13
3 11.7	41.137 -205	66.23 +75	54.405 -240	51.76 -83	34.211 -159	40.39 +26	47.345 -154	25.08 +3
3 21.7	40.950 -187	65.05 +118	54.191 -214	50.65 -111	34.066 -145	39.85 +54	47.205 -140	24.85 +23
3 31.6	40.789 -161	63.50 +155	54.014 -177	49.32 -133	33.945 -121	39.06 +79	47.089 -116	24.42 +43
4 10.6	40.659 -130	61.59 +191	53.884 -130	47.83 -149	33.853 -92	38.02 +104	47.002 -87	23.80 +62
4 20.6	40.572 -87	59.35 +224	53.813 -71	46.26 -157	33.800 -53	36.72 +130	46.953 -49	22.96 +84
4 30.5	40.531 +204	56.85 +250	53.805 -8	44.69 -157	33.789 -11	35.20 +152	46.947 -6	21.93 +103
5 10.5	40.538 +7	54.10 +275	53.862 +57	43.16 -153	33.821 +32	33.47 +173	46.984 +37	20.69 +124
5 20.5	40.598 +60	51.17 +293	53.989 +127	41.76 -140	33.902 +81	31.53 +194	47.068 +84	19.26 +143
5 30.5	40.707 +109	48.16 +301	54.178 +189	40.54 -122	34.026 +124	29.47 +206	47.197 +129	17.67 +159
6 9.4	40.864 +157	45.08 +308	54.427 +249	39.54 -100	34.193 +167	27.27 +220	47.367 +170	15.93 +174
6 19.4	41.068 +204	42.03 +305	54.732 +306	38.80 -74	34.400 +207	25.02 +225	47.577 +210	14.10 +183
6 29.4	41.307 +239	39.10 +293	55.079 +347	38.35 -45	34.637 +237	22.78 +224	47.817 +240	12.23 +187
7 9.4	41.582 +275	36.34 +276	55.464 +385	38.19 -16	34.903 +266	20.58 +220	48.084 +267	10.35 +188
7 19.3	41.882 +300	33.85 +249	55.877 +413	38.34 +15	35.189 +286	18.50 +208	48.372 +288	08.52 +183
7 29.3	42.199 +317	31.68 +217	56.305 +428	38.76 +42	35.487 +298	16.60 +190	48.670 +298	06.80 +172
8 8.3	42.528 +329	29.90 +178	56.745 +440	39.47 +71	35.793 +306	14.91 +169	48.977 +307	05.22 +158
8 18.2	42.860 +332	28.59 +131	57.184 +439	40.43 +96	36.099 +306	13.52 +139	49.284 +307	03.85 +137
8 28.2	43.188 +328	27.75 +84	57.616 +432	41.62 +119	36.399 +300	12.44 +108	49.584 +300	02.72 +113
9 7.2	43.507 +319	27.43 +32	58.037 +421	43.01 +139	36.691 +292	11.71 +73	49.876 +292	01.86 +86
9 17.2	43.808 +301	27.65 -22	58.438 +401	44.58 +157	36.967 +276	11.37 +34	50.153 +277	01.31 +55
9 27.1	44.088 +280	28.36 -71	58.815 +377	46.29 +171	37.224 +257	11.38 -1	50.412 +259	01.05 +26
10 7.1	44.342 +254	29.57 -121	59.167 +352	48.12 +183	37.461 +237	11.75 -37	50.653 +241	01.09 -4
10 17.1	44.565 +223	31.21 -164	59.484 +317	50.04 +192	37.673 +212	12.46 -71	50.869 +216	01.41 -32
10 27.1	44.756 +191	33.20 -199	59.767 +283	52.01 +197	37.860 +187	13.44 -98	51.061 +192	01.96 -55
11 6.0	44.911 +155	35.49 -229	60.011 +244	54.02 +201	38.018 +158	14.67 -123	51.227 +166	02.73 -77
11 16.0	45.026 +115	37.96 -247	60.208 +197	56.01 +199	38.145 +127	16.06 -139	51.362 +135	03.65 -92
11 26.0	45.103 +77	40.51 -255	60.361 +153	57.97 +196	38.242 +97	17.55 -149	51.468 +106	04.67 -102
12 5.9	45.138 +35	43.06 -255	60.462 +101	59.84 +187	38.304 +62	19.08 -153	51.540 +72	05.76 -109
12 15.9	45.131 -7	45.48 -242	60.507 +45	61.58 +174	38.331 +27	20.57 -149	51.578 +38	06.83 -107
12 25.9	45.085 -46	47.71 -223	60.500 -7	63.14 +156	38.324 -7	21.98 -141	51.581 +3	07.87 -104
12 35.9	44.999 -86	49.68 -197	60.435 -65	64.48 +134	38.280 -44	23.26 -128	51.548 -33	08.84 -97
Mean Place	42.676	51.57	57.545	42.87	36.045	30.69	49.288	18.17
sec δ, tan δ	+1.179	-0.624	+1.487	+1.101	+1.015	-0.173	+1.000	-0.021
dα(ψ), dδ(ψ)	+0.048	+0.23	+0.085	+0.23	+0.057	+0.22	+0.061	+0.22
dα(ε), dδ(ε)	+0.024	+0.82	-0.042	+0.82	+0.007	+0.83	+0.001	+0.83
Dble.Trans.	November 16		November 16		November 16		November 17	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	141		136		134		1104										
	$\beta$ Reticuli		17 Tauri		v Persei		29 Tauri										
Mag.Spect.	3.80	K0	3.81	B5p	3.93	F5	5.36	B3									
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.									
	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "									
	3 43	-64 50	3 44	+24 04	3 44	+42 32	3 44	+6 00									
1	-9.1	64.394	-221	70.74	-280	02.852	+24	20.23	+33	14.740	+16	17.52	+137	56.123	+20	29.13	-67
1	0.9	64.098	-296	73.15	-241	02.837	-15	20.48	+25	14.708	-32	18.71	+119	56.108	-15	28.48	-65
1	10.8	63.733	-365	75.13	-198	02.783	-54	20.64	+16	14.626	-82	19.68	+97	56.057	-51	27.87	-61
1	20.8	63.308	-425	76.56	-143	02.691	-92	20.68	+4	14.497	-129	20.39	+71	55.972	-85	27.32	-55
1	30.8	62.843	-465	77.44	-88	02.569	-122	20.61	-7	14.332	-165	20.82	+43	55.860	-112	26.84	-48
2	9.8	62.345	-498	77.76	-32	02.420	-149	20.43	-18	14.135	-197	20.95	+13	55.725	-135	26.43	-41
2	19.7	61.833	-512	77.48	+28	02.256	-164	20.13	-30	13.919	-216	20.76	-19	55.574	-151	26.11	-32
3	1.7	61.325	-508	76.65	+83	02.087	-169	19.74	-39	13.699	-220	20.28	-48	55.419	-155	25.88	-23
3	11.7	60.832	-493	75.29	+136	01.921	-166	19.26	-48	13.483	-216	19.53	-75	55.266	-153	25.76	-12
3	21.7	60.373	-459	73.40	+189	01.771	-150	18.74	-52	13.290	-193	18.54	-99	55.127	-139	25.77	+1
3	31.6	59.963	-410	71.09	+231	01.649	-122	18.20	-54	13.131	-159	17.39	-115	55.012	-115	25.91	+14
4	10.6	59.610	-353	68.37	+272	01.559	-90	17.68	-52	13.013	-118	16.10	-129	54.926	-86	26.21	+30
4	20.6	59.332	-278	65.29	+308	01.514	-45	17.22	-46	12.950	-63	14.77	-133	54.881	-45	26.68	+47
4	30.5	59.134	-198	61.97	+332	01.516	+2	16.87	-35	12.944	-6	13.45	-132	54.877	-4	27.31	+63
5	10.5	59.021	-113	58.43	+354	01.568	+52	16.66	-21	12.998	+54	12.19	-126	54.918	+41	28.13	+82
5	20.5	59.002	-19	54.76	+367	01.667	+99	16.69	+3	13.116	+118	11.07	-112	55.006	+88	29.14	+101
5	30.5	59.072	+70	51.07	+369	01.816	+149	16.71	+2	13.292	+176	10.13	-94	55.138	+132	30.33	+119
6	9.4	59.232	+160	47.40	+367	02.014	+198	17.01	+30	13.523	+231	09.39	-74	55.314	+176	31.68	+135
6	19.4	59.482	+250	43.88	+352	02.252	+238	17.52	+51	13.805	+282	08.90	-49	55.529	+215	33.14	+146
6	29.4	59.807	+325	40.58	+330	02.523	+271	18.20	+68	14.127	+322	08.68	-22	55.774	+245	34.69	+155
7	9.4	60.205	+398	37.57	+301	02.823	+300	19.05	+85	14.484	+357	08.72	+4	56.046	+272	36.30	+161
7	19.3	60.664	+459	34.98	+259	03.143	+320	20.04	+99	14.866	+382	09.03	+31	56.338	+292	37.90	+160
7	29.3	61.166	+502	32.83	+215	03.474	+331	21.13	+109	15.263	+397	09.59	+56	56.641	+303	39.46	+156
8	8.3	61.706	+540	31.20	+163	03.813	+339	22.30	+117	15.670	+407	10.38	+79	56.952	+311	40.94	+148
8	18.2	62.263	+557	30.18	+102	04.152	+339	23.52	+122	16.076	+406	11.39	+101	57.263	+311	42.27	+133
8	28.2	62.821	+558	29.75	+43	04.483	+331	24.73	+121	16.476	+400	12.57	+118	57.567	+304	43.44	+117
9	7.2	63.371	+550	29.95	-20	04.806	+323	25.92	+119	16.866	+390	13.91	+134	57.863	+296	44.40	+96
9	17.2	63.889	+518	30.80	-85	05.112	+306	27.06	+114	17.237	+371	15.38	+147	58.144	+281	45.13	+73
9	27.1	64.367	+478	32.23	-143	05.400	+288	28.12	+106	17.587	+350	16.95	+157	58.408	+264	45.62	+49
10	7.1	64.791	+424	34.22	-199	05.669	+269	29.11	+99	17.913	+326	18.60	+165	58.654	+246	45.88	+26
10	17.1	65.144	+353	36.69	-247	05.913	+244	29.99	+88	18.208	+295	20.29	+169	58.875	+221	45.90	+2
10	27.1	65.422	+278	39.53	-284	06.131	+218	30.78	+79	18.473	+265	22.01	+172	59.073	+198	45.72	-18
11	6.0	65.617	+195	42.67	-314	06.322	+191	31.49	+71	18.703	+230	23.74	+173	59.245	+172	45.37	-35
11	16.0	65.719	+102	45.95	-328	06.481	+159	32.10	+61	18.891	+188	25.44	+170	59.387	+142	44.87	-50
11	26.0	65.733	+14	49.26	-331	06.607	+126	32.63	+53	19.039	+148	27.09	+165	59.500	+113	44.27	-60
12	5.9	65.653	-80	52.50	-324	06.697	+90	33.08	+45	19.140	+101	28.67	+158	59.579	+79	43.61	-66
12	15.9	65.484	-169	55.49	-299	06.748	+51	33.44	+36	19.191	+51	30.11	+144	59.622	+43	42.93	-68
12	25.9	65.236	-248	58.17	-268	06.761	+13	33.74	+30	19.193	+2	31.41	+130	59.632	+10	42.25	-68
12	35.9	64.908	-328	60.46	-229	06.732	-29	33.93	+19	19.143	-50	32.51	+110	59.604	-28	41.59	-66
			-390		-177		-67		+10		-97		+86		-63		-60
Mean Place	61.700	57.56		04.303	17.96	16.387	12.11	57.312	30.37								
sec $\delta$ , tan $\delta$	+2.353	-2.130		+1.095	+0.447	+1.357	+0.918	+1.006	+0.105								
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.014	+0.22		+0.071	+0.22	+0.081	+0.22	+0.063	+0.22								
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.079	+0.83		-0.017	+0.83	-0.034	+0.83	-0.004	+0.83								
Dble.Trans.	November 17		November 17		November 17		November 17										

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	140			139			146			142						
	τ <sup>*</sup> Eridani			η Tauri			γ Hydri			27 Tauri						
Mag.Spect.	4.33		F8	2.96		B5p	3.17		M0	3.80		B8				
U.T.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.				
	h	m	°	h	m	°	h	m	°	h	m	°				
	3	46	-23 16	3	46	+24 03	3	47	-74 16	3	48	+24 00				
1 <sup>d</sup> -9.1	15 481	- 13	87 25	-205	39 365	+ 26	53 12	+ 33	32 202	- 416	63 20	-278	20 017	+ 29	48 82	+ 32
1 0.9	15 433	- 48	89 09	-184	39 353	- 12	53 37	+ 25	31 667	- 535	65 57	-237	20 006	- 11	49 08	+ 26
1 10.9	15 348	- 85	90 70	-161	39 301	- 52	53 53	+ 16	31 025	- 642	67 51	-194	19 955	- 51	49 24	+ 16
1 20.8	15 229	- 119	91 98	-128	39 210	- 91	53 58	+ 5	30 291	- 734	68 89	-138	19 866	- 89	49 29	+ 5
1 30.8	15 084	- 145	92 93	- 95	39 089	- 121	53 53	- 5	29 498	- 793	69 70	- 81	19 745	- 121	49 24	- 5
2 9.8	14 916	- 168	93 53	- 60	38 942	- 147	53 36	- 17	28 658	- 840	69 96	- 26	19 598	- 147	49 08	- 16
2 19.7	14 734	- 182	93 75	- 22	38 777	- 165	53 07	- 29	27 799	- 859	69 61	+ 35	19 434	- 164	48 80	- 28
3 1.7	14 548	- 186	93 60	+ 15	38 608	- 169	52 69	- 38	26 951	- 848	68 71	+ 90	19 264	- 170	48 43	- 37
3 11.7	14 365	- 183	93 09	+ 51	38 441	- 167	52 23	- 46	26 126	- 825	67 28	+143	19 097	- 167	47 97	- 46
3 21.7	14 198	- 167	92 20	+ 89	38 290	- 151	51 71	- 52	25 355	- 771	65 33	+195	18 945	- 152	47 47	- 50
3 31.6	14 054	- 144	90 98	+122	38 166	- 124	51 18	- 53	24 658	- 697	62 96	+237	18 820	- 125	46 94	- 53
4 10.6	13 940	- 114	89 44	+154	38 074	- 92	50 66	- 52	24 046	- 612	60 19	+277	18 727	- 93	46 43	- 51
4 20.6	13 866	- 74	87 58	+186	38 026	- 48	50 21	- 45	23 547	- 499	57 08	+311	18 678	- 49	45 99	- 44
4 30.6	13 835	- 31	85 47	+211	38 025	+ 1	49 86	- 35	23 167	- 380	53 73	+335	18 675	- 3	45 64	- 35
5 10.5	13 849	+ 14	83 12	+235	38 074	+ 49	49 65	- 21	22 912	- 255	50 17	+356	18 722	+ 47	45 42	- 22
5 20.5	13 914	+ 65	80 58	+254	38 171	+ 97	49 67	+ 2	22 801	- 111	46 50	+367	18 819	+ 97	45 45	+ 3
5 30.5	14 024	+ 110	77 92	+266	38 316	+ 145	49 68	+ 1	22 825	+ 24	42 82	+368	18 961	+ 142	45 46	+ 1
6 9.4	14 180	+ 156	75 18	+274	38 512	+ 196	49 97	+ 29	22 987	+ 162	39 17	+365	19 155	+ 194	45 74	+ 28
6 19.4	14 379	+ 199	72 43	+275	38 748	+ 236	50 46	+ 49	23 289	+ 302	35 68	+349	19 390	+ 236	46 23	+ 49
6 29.4	14 612	+ 233	69 75	+268	39 017	+ 269	51 13	+ 67	23 709	+ 420	32 43	+325	19 657	+ 267	46 89	+ 66
7 9.4	14 876	+ 264	67 19	+256	39 315	+ 298	51 96	+ 83	24 248	+ 539	29 47	+296	19 954	+ 297	47 71	+ 82
7 19.3	15 164	+ 288	64 84	+235	39 634	+ 319	52 94	+ 98	24 888	+ 640	26 93	+254	20 272	+ 318	48 68	+ 97
7 29.3	15 466	+ 302	62 77	+207	39 964	+ 330	54 01	+107	25 601	+ 713	24 85	+208	20 601	+ 329	49 74	+106
8 8.3	15 780	+ 314	61 01	+176	40 302	+ 338	55 16	+115	26 382	+ 781	23 29	+156	20 940	+ 339	50 88	+114
8 18.3	16 096	+ 316	59 66	+135	40 641	+ 339	56 35	+119	27 196	+ 814	22 34	+ 95	21 278	+ 338	52 06	+118
8 28.2	16 407	+ 311	58 72	+ 94	40 973	+ 332	57 55	+120	28 021	+ 825	21 99	+ 35	21 610	+ 332	53 24	+118
9 7.2	16 711	+ 304	58 24	+ 48	41 296	+ 323	58 72	+117	28 838	+ 817	22 27	- 28	21 934	+ 324	54 40	+116
9 17.2	16 998	+ 287	58 25	- 1	41 604	+ 308	59 84	+112	29 612	+ 774	23 19	- 92	22 242	+ 308	55 51	+111
9 27.1	17 267	+ 269	58 71	- 46	41 894	+ 290	60 89	+105	30 323	+ 711	24 68	-149	22 533	+ 291	56 54	+103
10 7.1	17 513	+ 246	59 62	- 91	42 165	+ 271	61 85	+ 96	30 953	+ 630	26 74	-206	22 805	+ 272	57 50	+ 96
10 17.1	17 731	+ 218	60 94	-132	42 411	+ 246	62 72	+ 87	31 469	+ 516	29 27	-253	23 052	+ 247	58 35	+ 85
10 27.1	17 922	+ 191	62 58	-164	42 632	+ 221	63 50	+ 78	31 864	+ 395	32 15	-288	23 275	+ 223	59 12	+ 77
11 6.0	18 081	+ 159	64 52	-194	42 826	+ 194	64 19	+ 69	32 124	+ 260	35 33	-318	23 471	+ 196	59 80	+ 68
11 16.0	18 204	+ 123	66 64	-212	42 987	+ 161	64 79	+ 60	32 231	+ 107	38 64	-331	23 634	+ 163	60 39	+ 59
11 26.0	18 294	+ 90	68 84	-220	43 117	+ 130	65 32	+ 53	32 194	- 37	41 96	-332	23 766	+ 132	60 91	+ 52
12 6.0	18 345	+ 51	71 08	-224	43 210	+ 93	65 76	+ 44	32 006	- 188	45 20	-324	23 860	+ 94	61 35	+ 44
12 15.9	18 358	+ 13	73 23	-215	43 264	+ 54	66 13	+ 37	31 672	- 334	48 19	-299	23 916	+ 56	61 71	+ 36
12 25.9	18 334	- 24	75 22	-199	43 280	+ 16	66 42	+ 29	31 211	- 461	50 84	-265	23 933	+ 17	62 00	+ 29
12 35.9	18 272	- 62	77 01	-179	43 253	- 27	66 62	+ 20	30 627	- 584	53 09	-225	23 908	- 25	62 19	+ 19
	18 272	- 98		-149		- 65		+ 10		- 683		-173		- 64		+ 11
Mean Place	15.997		80.56		40.807		50.74		26.390		49.85		21.452		46.39	
sec δ, tan δ	+1.089		-0.430		+1.095		+0.447		+3.691		-3.553		+1.095		+0.445	
dα(ψ), dδ(ψ)	+0.052		+0.22		+0.071		+0.22		-0.018		+0.22		+0.071		+0.22	
dα(ε), dδ(ε)	+0.016		+0.83		-0.016		+0.84		+0.129		+0.84		-0.016		+0.84	
Dbble.Trans.	November 17			November 17			November 18			November 18						

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	138		143		1106		1107						
	γ Camelopardi		138 G. Eridani		Piazz 3 <sup>h</sup> 187 (Tauri)		145 G. Eridani						
Mag.Spect.	4.67	A0	4.24	K0	5.96	F0	6.55	B9					
U.T.	R.A.		R.A.		R.A.		R.A.						
	h m	Dec.	h m	Dec.	h m	Dec.	h m	Dec.					
	3 48	+ 71 17	3 48	- 36 14	3 52	+ 17 17	3 52	- 6 40					
1 <sup>d</sup>	-9.1	53 290 - 68	39.74	+278	56 903 - 38	35.20	-247	22.292 + 31	16.66	- 6	27.703 + 16	27.28	-134
1 <sup>s</sup>	0.9	53.105 - 185	42.25	+251	56.824 - 79	37.40	-220	22.285 - 7	16.57	- 9	27.684 - 19	28.52	-124
1	10.9	52.807 - 298	44.43	+218	56.704 - 120	39.28	-188	22.240 - 45	16.43	- 14	27.630 - 54	29.64	-112
1	20.8	52.403 - 404	46.17	+174	56.547 - 157	40.76	-148	22.158 - 82	16.26	- 17	27.541 - 89	30.57	- 93
1	30.8	51.921 - 482	47.42	+125	56.362 - 185	41.81	-105	22.046 - 112	16.05	- 21	27.425 - 116	31.31	- 74
2	9.8	51.374 - 547	48.16	+ 74	56.152 - 210	42.42	- 61	21.908 - 138	15.79	- 26	27.285 - 140	31.86	- 55
2	19.7	50.790 - 584	48.33	+ 17	55.928 - 224	42.55	- 13	21.752 - 156	15.50	- 29	27.129 - 156	32.18	- 32
3	1.7	50.203 - 587	47.97	- 36	55.701 - 227	42.22	+ 33	21.590 - 162	15.19	- 31	26.967 - 162	32.27	- 9
3	11.7	49.633 - 570	47.08	- 89	55.477 - 224	41.44	+ 78	21.430 - 160	14.86	- 33	26.806 - 161	32.14	+ 13
3	21.7	49.116 - 517	45.70	-138	55.270 - 207	40.21	+123	21.283 - 147	14.55	- 31	26.659 - 147	31.76	+ 38
3	31.6	48.677 - 439	43.93	-177	55.089 - 181	38.60	+161	21.161 - 122	14.28	- 27	26.534 - 125	31.15	+ 61
4	10.6	48.330 - 347	41.82	-211	54.940 - 149	36.60	+200	21.070 - 91	14.07	- 21	26.436 - 98	30.31	+ 84
4	20.6	48.102 - 228	39.47	-235	54.835 - 105	34.25	+235	21.019 - 51	13.97	- 10	26.377 - 59	29.22	+109
4	30.6	47.999 - 103	37.00	-247	54.777 - 58	31.63	+262	21.013 - 6	13.99	+ 2	26.358 - 19	27.93	+129
5	10.5	48.024 + 25	34.46	-254	54.768 - 9	28.76	+287	21.055 + 42	14.14	+ 15	26.383 + 25	26.41	+152
5	20.5	48.189 + 165	31.99	-247	54.814 + 46	25.70	+306	21.146 + 91	14.33	+ 19	26.456 + 73	24.70	+171
5	30.5	48.477 + 288	29.66	-233	54.911 + 97	22.56	+314	21.276 + 130	14.95	+ 62	26.572 + 116	22.84	+186
6	9.4	48.887 + 410	27.53	-213	55.059 + 148	19.35	+321	21.458 + 182	15.63	+ 68	26.731 + 159	20.85	+199
6	19.4	49.410 + 523	25.69	-184	55.256 + 197	16.19	+316	21.680 + 222	16.47	+ 84	26.930 + 199	18.78	+207
6	29.4	50.022 + 612	24.18	-151	55.492 + 236	13.15	+304	21.934 + 254	17.45	+ 98	27.160 + 230	16.70	+208
7	9.4	50.716 + 694	23.03	-115	55.765 + 273	10.29	+286	22.216 + 282	18.55	+110	27.420 + 260	14.63	+207
7	19.3	51.475 + 759	22.30	- 73	56.068 + 303	07.72	+257	22.519 + 303	19.73	+118	27.700 + 280	12.66	+197
7	29.3	52.273 + 798	21.97	- 33	56.389 + 321	05.49	+223	22.834 + 315	20.96	+123	27.994 + 294	10.83	+183
8	8.3	53.105 + 832	22.06	+ 9	56.726 + 337	03.67	+182	23.158 + 324	22.21	+125	28.297 + 303	09.19	+164
8	18.3	53.948 + 843	22.59	+ 53	57.068 + 342	02.34	+133	23.483 + 325	23.43	+122	28.602 + 305	07.81	+138
8	28.2	54.785 + 837	23.50	+ 91	57.406 + 338	01.50	+ 84	23.802 + 319	24.58	+115	28.903 + 301	06.72	+109
9	7.2	55.610 + 825	24.81	+131	57.738 + 332	01.21	+ 29	24.114 + 312	25.65	+107	29.197 + 294	05.94	+ 78
9	17.2	56.400 + 790	26.49	+168	58.053 + 315	01.48	- 27	24.412 + 298	26.60	+ 95	29.476 + 279	05.52	+ 42
9	27.1	57.147 + 747	28.48	+199	58.346 + 293	02.27	- 79	24.693 + 281	27.41	+ 81	29.739 + 263	05.44	+ 8
10	7.1	57.843 + 696	30.80	+232	58.614 + 268	03.59	-132	24.956 + 263	28.09	+ 68	29.984 + 245	05.70	- 26
10	17.1	58.466 + 623	33.36	+256	58.849 + 235	05.36	-177	25.195 + 239	28.61	+ 52	30.205 + 221	06.29	- 59
10	27.1	59.015 + 549	36.13	+277	59.050 + 201	07.49	-213	25.412 + 217	29.00	+ 39	30.402 + 197	07.13	- 84
11	6.0	59.476 + 461	39.07	+294	59.213 + 163	09.95	-246	25.603 + 191	29.28	+ 28	30.573 + 171	08.22	-109
11	16.0	59.834 + 358	42.10	+303	59.334 + 121	12.59	-264	25.762 + 159	29.44	+ 16	30.713 + 140	09.48	-126
11	26.0	60.088 + 254	45.16	+306	59.414 + 80	15.32	-273	25.892 + 130	29.52	+ 8	30.823 + 110	10.84	-136
12	6.0	60.225 + 137	48.19	+303	59.450 + 36	18.05	-273	25.986 + 94	29.53	+ 1	30.899 + 76	12.26	-142
12	15.9	60.239 + 14	51.06	+287	59.440 - 10	20.65	-260	26.043 + 57	29.48	- 5	30.940 + 41	13.65	-139
12	25.9	60.137 - 102	53.74	+268	59.388 - 52	23.04	-239	26.064 + 21	29.40	- 8	30.945 + 5	14.97	-132
12	35.9	59.911 - 226	56.13	+239	59.293 - 95	25.16	-212	26.044 - 20	29.27	- 13	30.913 - 32	16.20	-123
		- 334	+199	-134	-174			- 58	- 17	- 66			-105
Mean Place	55.030	31.15	56.913	26.33	23.632	15.31	28.629	24.06					
sec δ, tan δ	+3.118	+2.953	+1.240	-0.733	+1.047	+0.311	+1.007	-0.117					
da(ψ), dδ(ψ)	+0.127	+0.22	+0.045	+0.22	+0.068	+0.21	+0.059	+0.21					
da(ε), dδ(ε)	-0.107	+0.84	+0.026	+0.84	-0.011	+0.85	+0.004	+0.85					
Dble.Trans.	November 18		November 18		November 19		November 19						



AT UPPER TRANSIT AT GREENWICH

No.	1105		1108		144		147	
	B.D. +57° 752 (Cameiopardi)		55 G. Horologii		ζ Persei		ε Persei*	
Mag.Spect.	5.79	A0	5.77	K0	2.91	B1	2.96	B1
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>
	3 52	+57 56	3 53	-46 55	3 53	+31 50	3 56	+39 58
1 <sup>d</sup> -9.1	<sup>s</sup> 35.398 + <sup>5</sup> 65	17.01 +219	<sup>s</sup> 08.827 - <sup>71</sup> 119	68.34 -274	<sup>s</sup> 15.348 + <sup>33</sup> 10	43.35 + <sup>78</sup> 10	<sup>s</sup> 55.096 + <sup>34</sup> 14	24.33 +124
1 0.9	35.353 - <sup>66</sup> 135	18.97 +196	08.708 - <sup>119</sup> 167	70.76 -242	15.338 - <sup>10</sup> 54	44.02 + <sup>67</sup> 53	55.082 - <sup>63</sup> 111	25.43 +110
1 10.9	35.198 - <sup>201</sup> 135	20.66 +169	08.541 - <sup>167</sup> 209	72.83 -207	15.284 - <sup>54</sup> 97	44.55 + <sup>53</sup> 37	55.019 - <sup>63</sup> 111	26.35 +92
1 20.8	34.997 - <sup>252</sup> 135	21.99 +133	08.332 - <sup>209</sup> 242	74.43 -160	15.187 - <sup>97</sup> 130	44.92 + <sup>37</sup> 19	54.908 - <sup>111</sup> 149	26.35 +69
1 30.8	34.745 - <sup>252</sup> 135	22.92 +93	08.090 - <sup>242</sup> 285	75.54 -111	15.057 - <sup>130</sup> 180	45.11 + <sup>19</sup> 1	54.759 - <sup>149</sup> 183	27.04 +45
2 9.8	34.448 - <sup>297</sup> 323	23.43 +51	07.822 - <sup>268</sup> 323	76.16 -62	14.897 - <sup>160</sup> 180	45.10 - <sup>1</sup> 20	54.576 - <sup>183</sup> 204	27.68 +19
2 19.7	34.125 - <sup>329</sup> 323	23.48 +5	07.537 - <sup>285</sup> 323	76.24 -8	14.717 - <sup>180</sup> 186	44.90 - <sup>37</sup> 21	54.372 - <sup>204</sup> 211	27.57 -11
3 1.7	33.796 - <sup>329</sup> 323	23.10 -38	07.250 - <sup>287</sup> 323	75.80 +44	14.531 - <sup>186</sup> 184	44.53 - <sup>37</sup> 55	54.161 - <sup>211</sup> 209	27.21 -36
3 11.7	33.473 - <sup>323</sup> 293	22.29 -81	06.966 - <sup>284</sup> 264	74.87 +93	14.347 - <sup>184</sup> 167	43.98 - <sup>55</sup> 68	53.952 - <sup>209</sup> 192	27.21 -62
3 21.7	33.180 - <sup>293</sup> 248	21.10 -119	06.702 - <sup>264</sup> 234	73.44 +143	14.180 - <sup>167</sup> 140	43.30 - <sup>68</sup> 77	53.760 - <sup>192</sup> 124	26.59 -83
3 31.6	32.932 - <sup>248</sup> 192	19.61 -149	06.468 - <sup>234</sup> 199	71.58 +186	14.040 - <sup>140</sup> 106	42.53 - <sup>82</sup> 82	53.599 - <sup>161</sup> 124	24.76 -100
4 10.6	32.740 - <sup>192</sup> 120	17.86 -175	06.269 - <sup>199</sup> 149	69.31 +227	13.934 - <sup>106</sup> 58	41.71 - <sup>82</sup> 82	53.475 - <sup>124</sup> 72	23.63 -113
4 20.6	32.620 - <sup>120</sup> 42	15.94 -192	06.120 - <sup>149</sup> 97	66.67 +264	13.876 - <sup>58</sup> 10	40.89 - <sup>82</sup> 76	53.403 - <sup>72</sup> 18	22.45 -118
4 30.6	32.578 + <sup>42</sup> 39	13.95 -199	06.023 - <sup>97</sup> 41	63.75 +292	13.866 - <sup>10</sup> 44	40.13 - <sup>76</sup> 67	53.385 + <sup>18</sup> 39	22.45 -117
5 10.5	32.617 + <sup>39</sup> 125	11.94 -201	05.982 - <sup>41</sup> 20	60.58 +317	13.910 + <sup>44</sup> 98	39.46 - <sup>67</sup> 52	53.424 + <sup>39</sup> 100	20.16 -112
5 20.5	32.742 + <sup>203</sup> 125	10.01 -193	06.004 + <sup>22</sup> 80	57.23 +335	14.008 + <sup>98</sup> 148	38.94 - <sup>52</sup> 37	53.524 + <sup>100</sup> 157	19.16 -100
5 30.5	32.945 + <sup>278</sup> 125	08.24 -177	06.084 + <sup>80</sup> 140	53.80 +343	14.156 + <sup>148</sup> 199	38.57 - <sup>37</sup> 20	53.681 + <sup>157</sup> 210	18.32 -84
6 9.4	33.223 + <sup>349</sup> 405	06.66 -130	06.224 + <sup>140</sup> 197	50.33 +347	14.355 + <sup>199</sup> 245	38.37 - <sup>20</sup> 3	53.891 + <sup>210</sup> 262	17.65 -67
6 19.4	33.572 + <sup>405</sup> 454	05.36 -101	06.421 + <sup>197</sup> 244	46.93 +340	14.600 + <sup>245</sup> 281	38.40 + <sup>3</sup> 23	54.153 + <sup>262</sup> 302	17.22 -43
6 29.4	33.977 + <sup>454</sup> 493	04.35 -70	06.665 + <sup>244</sup> 289	43.69 +324	14.881 + <sup>281</sup> 312	38.63 + <sup>23</sup> 44	54.455 + <sup>302</sup> 336	17.01 -21
7 9.4	34.431 + <sup>493</sup> 516	03.65 -34	06.954 + <sup>289</sup> 327	40.67 +302	15.193 + <sup>312</sup> 336	39.07 + <sup>44</sup> 63	54.791 + <sup>336</sup> 364	17.05 +4
7 19.3	34.924 + <sup>516</sup> 535	03.31 +0	07.281 + <sup>327</sup> 351	37.99 +268	15.529 + <sup>336</sup> 349	39.70 + <sup>63</sup> 79	55.155 + <sup>364</sup> 379	17.34 +29
7 29.3	35.440 + <sup>535</sup> 540	03.31 +33	07.632 + <sup>351</sup> 374	35.69 +230	15.878 + <sup>349</sup> 360	40.49 + <sup>79</sup> 94	55.534 + <sup>379</sup> 391	17.84 +50
8 8.3	35.975 + <sup>540</sup> 534	03.64 +69	08.006 + <sup>374</sup> 382	33.84 +185	16.238 + <sup>360</sup> 360	41.43 + <sup>94</sup> 105	55.925 + <sup>391</sup> 394	17.84 +71
8 18.3	36.515 + <sup>540</sup> 525	04.33 +97	08.388 + <sup>382</sup> 376	32.54 +130	16.598 + <sup>360</sup> 348	42.48 + <sup>105</sup> 119	56.319 + <sup>394</sup> 382	18.55 +90
8 28.2	37.049 + <sup>525</sup> 504	05.30 +128	08.769 + <sup>381</sup> 357	31.79 +75	16.953 + <sup>355</sup> 331	43.60 + <sup>112</sup> 121	56.708 + <sup>389</sup> 366	20.50 +105
9 7.2	37.574 + <sup>504</sup> 477	06.58 +155	09.145 + <sup>376</sup> 333	31.62 +17	17.301 + <sup>348</sup> 315	44.79 + <sup>119</sup> 121	57.090 + <sup>382</sup> 347	21.70 +120
9 17.2	38.078 + <sup>477</sup> 447	08.13 +177	09.502 + <sup>357</sup> 304	32.08 -46	17.632 + <sup>331</sup> 295	46.00 + <sup>119</sup> 121	57.456 + <sup>366</sup> 347	22.99 +129
9 27.1	38.555 + <sup>447</sup> 405	09.90 +200	09.835 + <sup>333</sup> 263	33.09 -101	17.947 + <sup>315</sup> 269	47.21 + <sup>121</sup> 117	57.803 + <sup>347</sup> 327	22.99 +138
10 7.1	39.002 + <sup>405</sup> 363	11.90 +216	10.139 + <sup>304</sup> 223	34.66 -157	18.242 + <sup>295</sup> 244	48.42 + <sup>121</sup> 114	58.130 + <sup>327</sup> 271	24.37 +145
10 17.1	39.407 + <sup>363</sup> 313	14.06 +230	10.402 + <sup>263</sup> 175	36.73 -207	18.511 + <sup>269</sup> 215	49.59 + <sup>117</sup> 110	58.429 + <sup>299</sup> 239	27.30 +148
10 27.1	39.770 + <sup>313</sup> 254	16.36 +241	10.625 + <sup>223</sup> 123	39.18 -245	18.755 + <sup>244</sup> 180	50.73 + <sup>114</sup> 98	58.700 + <sup>271</sup> 162	28.81 +151
11 6.0	40.083 + <sup>254</sup> 195	18.77 +245	10.800 + <sup>175</sup> 73	41.97 -279	18.970 + <sup>215</sup> 145	51.83 + <sup>110</sup> 98	58.939 + <sup>239</sup> 162	28.81 +151
11 16.0	40.337 + <sup>195</sup> 127	21.22 +245	10.923 + <sup>123</sup> 17	44.94 -297	19.150 + <sup>180</sup> 63	52.88 + <sup>105</sup> 82	59.139 + <sup>200</sup> 68	30.32 +150
11 26.0	40.532 + <sup>127</sup> 55	23.67 +245	10.996 + <sup>73</sup> 37	48.00 -306	19.295 + <sup>145</sup> 20	53.86 + <sup>98</sup> 82	59.301 + <sup>162</sup> 21	31.82 +146
12 6.0	40.659 + <sup>55</sup> 227	26.08 +241	11.013 + <sup>17</sup> 37	51.05 -305	19.401 + <sup>106</sup> 63	54.78 + <sup>92</sup> 82	59.417 + <sup>116</sup> 68	34.68 +140
12 15.9	40.714 + <sup>15</sup> 210	28.35 +227	10.976 - <sup>37</sup> 88	53.94 -289	19.464 + <sup>63</sup> 20	55.60 + <sup>82</sup> 73	59.485 + <sup>68</sup> 21	35.99 +131
12 25.9	40.699 - <sup>90</sup> 186	30.45 +186	10.888 - <sup>88</sup> 139	56.58 -264	19.484 - <sup>25</sup> 68	56.33 + <sup>60</sup> 45	59.506 - <sup>32</sup> 79	37.17 +118
12 35.9	40.609 - <sup>157</sup> 153	32.31 +153	10.749 - <sup>139</sup> 183	58.91 -190	19.459 - <sup>68</sup> 68	56.93 + <sup>45</sup> 45	59.474 - <sup>79</sup> 79	38.19 +102
Mean Place	37.120	09.50	08.199	58.43	16.856	39.42	56.672	19.05
sec δ, tan δ	+1.884	+1.596	+1.464	-1.070	+1.177	+0.621	+1.305	+0.838
dα(ψ), dδ(ψ)	+0.097	+0.21	+0.037	+0.21	+0.075	+0.21	+0.080	+0.20
dα(ε), dδ(ε)	-0.056	+0.85	+0.037	+0.85	-0.022	+0.85	-0.029	+0.86
Dbles.Trans.	November 19		November 19		November 19		November 20	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	149		148		1109		1110		
	$\gamma$ Eridani		$\xi$ Persei		17 G. Reticuli		$\delta$ Reticuli		
Mag. Spect.	3.19	K5	4.05	Oe5	6.14	F2	4.41	M0	
U.T.	R.A.		R.A.		R.A.		R.A.		
	h	m	h	m	h	m	h	m	
	3 57	- 13 32	3 58	+ 35 45	3 58	- 57 07	3 58	- 61 25	
	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	
1	-9.1	23 171 + 12	50 88 -170	03 648 + 37	15 40 +101	27 090 - 122	96 03 -291	34 048 - 159	88 22 -293
1	0.9	23 148 - 23	52.42 -154	03 640 - 8	16.28 + 88	26 907 - 183	98.59 -256	33 820 - 228	90.80 -258
1	10.9	23 089 - 59	53.80 -138	03 585 - 56	17.01 + 73	26 664 - 243	100.76 -217	33 526 - 294	92.97 -217
1	20.8	22 994 - 95	54.94 -114	03 484 - 101	17.55 + 54	26 368 - 296	102.44 -168	33 172 - 354	94.63 -166
1	30.8	22 871 - 123	55.82 - 88	03 348 - 136	17.88 + 33	26 034 - 334	103.59 -115	32 777 - 395	95.76 -113
2	9.8	22 724 - 147	56.45 - 63	03 179 - 169	17.99 + 11	25 668 - 366	104.21 - 62	32 346 - 431	96.34 - 58
2	19.7	22 560 - 164	56.78 - 33	02 990 - 189	17.85 - 14	25 283 - 385	104.24 - 3	31 896 - 450	96.33 + 1
3	1.7	22 390 - 170	56.82 - 4	02 793 - 197	17.50 - 35	24 895 - 388	103.74 + 50	31 445 - 451	95.77 + 56
3	11.7	22 220 - 170	56.57 + 25	02 596 - 197	16.94 - 56	24 513 - 382	102.71 +103	31 000 - 445	94.68 +109
3	21.7	22 063 - 157	56.02 + 55	02 417 - 179	16.20 - 74	24 154 - 359	101.14 +157	30 582 - 418	93.05 +163
3	31.6	21 928 - 135	55.19 + 83	02 266 - 151	15.34 - 86	23 831 - 323	99.14 +200	30 204 - 378	90.98 +207
4	10.6	21 820 - 108	54.08 +111	02 150 - 116	14.38 - 96	23 550 - 281	96.70 +244	29 874 - 330	88.48 +250
4	20.6	21 749 - 71	52.69 +139	02 082 - 68	13.39 - 99	23 328 - 222	93.88 +282	29 609 - 265	85.59 +289
4	30.6	21 720 - 29	51.07 +162	02 066 - 16	12.43 - 96	23 169 - 159	90.78 +310	29 414 - 195	82.43 +316
5	10.5	21 735 + 15	49.22 +185	02 105 + 39	11.55 - 88	23 076 - 93	87.42 +336	29 293 - 121	79.01 +342
5	20.5	21 797 + 62	47.17 +205	02 201 + 96	10.79 - 76	23 060 - 16	83.90 +352	29 258 - 35	75.43 +358
5	30.5	21 903 + 106	44.98 +219	02 349 + 148	10.18 - 61	23 115 + 55	80.30 +360	29 302 + 44	71.80 +363
6	9.4	22 053 + 150	42.66 +232	02 550 + 201	09.74 - 44	23 243 + 128	76.68 +362	29 428 + 126	68.14 +366
6	19.4	22 244 + 191	40.30 +236	02 800 + 250	09 52 - 22	23 443 + 200	73.15 +353	29 635 + 207	64.59 +355
6	29.4	22 469 + 225	37.95 +235	03 087 + 287	09 53 + 1	23 703 + 260	69.80 +335	29 911 + 276	61.23 +336
7	9.4	22 723 + 254	35.65 +230	03 408 + 321	09 75 + 22	24 023 + 320	66.69 +311	30 255 + 344	58.11 +312
7	19.3	23 000 + 277	33.50 +215	03 754 + 346	10 19 + 44	24 392 + 369	63.95 +274	30 656 + 401	55.38 +273
7	29.3	23 292 + 292	31.53 +197	04 115 + 361	10 81 + 62	24 796 + 404	61.62 +233	31 098 + 442	53.07 +231
8	8.3	23 596 + 304	29 81 +172	04 488 + 373	11 61 + 80	25 232 + 436	59 77 +185	31 577 + 479	51 25 +182
8	18.3	23 902 + 306	28 41 +140	04 862 + 374	12 57 + 96	25 683 + 451	58 50 +127	32 076 + 499	50 03 +122
8	28.2	24 205 + 303	27 35 +106	05 232 + 370	13 63 +106	26 138 + 455	57 81 + 69	32 579 + 503	49 38 + 65
9	7.2	24 502 + 297	26 67 + 68	05 596 + 364	14 79 +116	26 589 + 451	57 74 + 7	33 080 + 501	49 37 + 1
9	17.2	24 785 + 283	26 40 + 27	05 944 + 348	16 02 +123	27 020 + 431	58 31 - 57	33 558 + 478	50 00 - 63
9	27.1	25 052 + 267	26 52 - 12	06 275 + 331	17 29 +127	27 422 + 402	59 47 -116	34 003 + 445	51 23 -123
10	7.1	25 301 + 249	27 04 - 52	06 587 + 312	18 59 +130	27 788 + 366	61 21 -174	34 407 + 404	53 04 -181
10	17.1	25 526 + 225	27 93 - 89	06 872 + 285	19 89 +130	28 102 + 314	63 47 -226	34 752 + 345	55 36 -232
10	27.1	25 726 + 200	29 12 -119	07 131 + 259	21 19 +130	28 362 + 260	66 12 -265	35 035 + 283	58 09 -273
11	6.0	25 898 + 172	30 58 -146	07 360 + 229	22 48 +129	28 562 + 200	69 12 -300	35 246 + 211	61 15 -306
11	16.0	26 039 + 141	32 22 -164	07 552 + 192	23 73 +125	28 692 + 130	72 31 -319	35 378 + 132	64 40 -325
11	26.0	26 149 + 110	33 96 -174	07 709 + 157	24 93 +120	28 756 + 64	75 58 -327	35 432 + 54	67 72 -332
12	6.0	26 224 + 75	35 77 -181	07 823 + 114	26 08 +115	28 747 - 9	78 83 -325	35 403 - 29	71 02 -330
12	15.9	26 261 + 37	37 53 -176	07 892 + 69	27 14 +106	28 668 - 79	81 90 -307	35 293 - 110	74 12 -310
12	25.9	26 263 + 2	39 18 -165	07 917 + 25	28 09 + 95	28 524 - 144	84 70 -280	35 110 - 183	76 94 -282
12	35.9	26 226 - 37	40 70 -152	07 892 - 25	28 90 + 81	28 315 - 209	87 16 -246	34 853 - 257	79 41 -247
		- 72	-130	- 70	+ 64	- 265	-199	- 319	-198
Mean Place	23 925	46 83	05 179	10 73	25 472	85 60	31 823	77 42	
sec $\delta$ , tan $\delta$	+1.029	-0.241	+1.232	+0.720	+1.843	-1.548	+2.092	-1.837	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.056	+0.20	+0.078	+0.20	+0.026	+0.20	+0.019	+0.20	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.008	+0.86	-0.024	+0.86	+0.052	+0.86	+0.062	+0.86	
Dble. Trans.	November 20		November 20		November 20		November 20		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	150		1114		1111		151	
	λ Tauri		63 G. Hydri		35 Eridani		ν Tauri	
Mag.Spect.	3.8 to 4.1	B3	6.72	A0	5.25	B5	3.94	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> <b>3 59</b>	<sup>°</sup> <sup>'</sup> <b>+12 27</b>	<sup>h</sup> <sup>m</sup> <b>4 00</b>	<sup>°</sup> <sup>'</sup> <b>-71 11</b>	<sup>h</sup> <sup>m</sup> <b>4 00</b>	<sup>°</sup> <sup>'</sup> <b>- 1 34</b>	<sup>h</sup> <sup>m</sup> <b>4 02</b>	<sup>°</sup> <sup>'</sup> <b>+ 5 57</b>
<sup>d</sup> 1 -9.1	<sup>s</sup> 54.619 + 36	11.36 - 35	<sup>s</sup> 52.793 - 297	86.68 - 293	<sup>s</sup> 49.918 + 28	74.28 - 112	<sup>s</sup> 25.074 + 34	08.99 - 71
1 10.9	54.618 - 39	11.02 - 34	52.392 - 401	89.24 - 256	49.911 - 7	75.32 - 104	25.073 - 1	08.31 - 68
1 20.8	54.579 - 77	10.67 - 35	51.893 - 499	91.38 - 214	49.866 - 45	76.26 - 94	25.034 - 39	07.67 - 64
1 30.8	54.502 - 107	10.33 - 34	51.310 - 583	92.99 - 161	49.786 - 80	77.08 - 82	24.958 - 76	07.10 - 57
	54.395 - 107	10.01 - 32	50.669 - 641	94.05 - 106	49.677 - 109	77.74 - 66	24.852 - 106	06.61 - 49
2 9.8	54.261 - 134	09.69 - 32	49.980 - 689	94.56 - 51	49.542 - 135	78.26 - 52	24.720 - 132	06.20 - 41
2 19.8	54.109 - 152	09.40 - 29	49.267 - 713	94.47 + 9	49.390 - 152	78.60 - 34	24.569 - 151	05.88 - 32
3 1.7	53.950 - 159	09.14 - 26	48.555 - 712	93.82 + 65	49.230 - 160	78.60 - 16	24.412 - 157	05.67 - 21
3 11.7	53.790 - 160	08.91 - 23	47.855 - 700	92.64 + 118	49.070 - 160	78.75 + 1	24.253 - 159	05.55 - 12
3 21.7	53.642 - 148	08.75 - 16	47.195 - 660	90.91 + 173	48.922 - 148	78.53 + 22	24.106 - 147	05.56 + 1
3 31.6	53.517 - 125	08.66 - 9	46.593 - 602	88.75 + 216	48.795 - 127	78.13 + 40	23.980 - 126	05.70 + 14
4 10.6	53.421 - 96	08.67 + 1	46.058 - 535	86.16 + 259	48.695 - 100	77.52 + 61	23.882 - 98	05.99 + 29
4 20.6	53.364 + 168	08.80 + 13	45.616 - 442	83.20 + 296	48.633 - 62	76.70 + 82	23.822 - 60	06.44 + 45
4 30.6	53.350 - 14	09.07 + 27	45.031 - 344	83.20 + 322	48.611 - 22	75.69 + 101	23.804 - 18	07.06 + 62
5 10.5	53.381 + 31	09.49 + 42	45.035 - 237	76.51 + 347	48.633 + 22	74.48 + 121	23.829 + 25	07.84 + 78
5 20.5	53.460 + 79	10.05 + 56	44.918 - 117	72.89 + 362	48.701 + 68	73.07 + 141	23.901 + 72	08.81 + 97
5 30.5	53.582 + 122	10.83 + 78	44.915 - 3	69.23 + 366	48.813 + 112	71.51 + 156	24.017 + 116	09.94 + 113
6 9.5	53.750 + 168	11.78 + 95	45.031 + 116	65.56 + 367	48.813 + 155	69.80 + 171	24.177 + 160	11.24 + 130
6 19.4	53.959 + 209	12.85 + 107	45.266 + 235	62.02 + 354	48.968 + 195	68.00 + 180	24.378 + 201	12.65 + 141
6 29.4	54.200 + 241	14.03 + 118	45.604 + 338	58.68 + 334	49.390 + 227	66.16 + 184	24.610 + 232	14.14 + 149
7 9.4	54.470 + 270	15.30 + 127	46.045 + 441	55.60 + 308	49.647 + 257	64.30 + 186	24.871 + 261	15.69 + 155
7 19.3	54.762 + 292	16.63 + 133	46.574 + 529	52.92 + 268	49.925 + 278	62.49 + 181	25.155 + 284	17.23 + 154
7 29.3	55.067 + 305	17.95 + 132	47.170 + 596	50.67 + 225	50.217 + 292	60.79 + 170	25.451 + 296	18.74 + 151
8 8.3	55.381 + 314	19.26 + 131	47.826 + 656	48.92 + 175	50.519 + 302	59.23 + 156	25.758 + 307	20.16 + 142
8 18.3	55.698 + 317	20.48 + 122	48.516 + 690	47.78 + 114	50.824 + 305	57.88 + 135	26.067 + 309	21.44 + 128
8 28.2	56.010 + 312	21.60 + 112	49.220 + 704	47.21 + 57	51.125 + 301	56.78 + 110	26.373 + 306	22.55 + 111
9 7.2	56.317 + 307	22.59 + 99	49.925 + 705	47.29 - 8	51.421 + 296	55.94 + 84	26.673 + 300	23.46 + 91
9 17.2	56.610 + 293	23.40 + 81	50.599 + 674	48.03 - 74	51.704 + 283	55.42 + 52	26.960 + 287	24.13 + 67
9 27.2	56.888 + 278	24.04 + 64	51.226 + 627	49.34 - 131	51.972 + 268	55.18 + 24	27.233 + 273	24.58 + 45
10 7.1	57.150 + 262	24.49 + 45	51.792 + 566	51.25 - 191	52.224 + 252	55.26 - 8	27.490 + 257	24.78 + 20
10 17.1	57.389 + 239	24.76 + 27	52.268 + 476	53.66 - 241	52.453 + 229	55.63 - 37	27.724 + 234	24.74 - 4
10 27.1	57.606 + 217	24.87 + 11	52.648 + 380	56.46 - 280	52.659 + 206	56.24 - 61	27.937 + 213	24.51 - 23
11 6.0	57.798 + 193	24.84 - 3	52.918 + 270	59.60 - 314	52.841 + 182	57.07 - 83	28.125 + 188	24.10 - 41
11 16.0	57.961 + 162	24.68 - 16	53.064 + 146	62.91 - 331	52.992 + 151	58.06 - 99	28.284 + 159	23.54 - 56
11 26.0	58.094 + 133	24.44 - 24	53.090 + 26	66.27 - 336	53.115 + 123	59.15 - 109	28.414 + 130	22.89 - 65
12 6.0	58.193 + 99	24.13 - 31	52.988 - 102	69.59 - 332	53.203 + 88	60.31 - 116	28.510 + 96	22.17 - 72
12 15.9	58.254 + 61	23.78 - 35	52.762 - 226	72.70 - 311	53.256 + 53	61.46 - 115	28.569 + 59	21.44 - 73
12 25.9	58.280 + 26	23.42 - 36	52.426 - 336	75.52 - 282	53.273 + 17	62.57 - 111	28.593 + 24	20.72 - 72
12 35.9	58.265 - 52	23.05 - 37	51.981 - 445	77.97 - 245	53.252 - 21	63.60 - 103	28.578 - 15	20.03 - 69
		23.05 - 36	51.981 - 535	77.97 - 194	53.252 - 57	63.60 - 91	28.578 - 52	20.03 - 62
Mean Place	55.860	10.52	48.160	75.46	50.921	72.64	26.207	09.17
sec δ, tan δ	+1.024	+0.221	+3.104	-2.938	+1.000	-0.028	+1.005	+0.104
dα(ψ), dδ(ψ)	+0.066	+0.20	-0.006	+0.20	+0.061	+0.20	+0.064	+0.20
dα(ε), dδ(ε)	-0.007	+0.87	+0.097	+0.87	+0.001	+0.87	-0.003	+0.87
Dble.Trans.	November 21		November 21		November 21		November 21	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1112		153		1113		152		
	37 Tauri		174 G. Eridani		λ Persei		48 Persei		
Mag. Spect.	4.50	K0	5.57	A5	4.33	A0	4.03	B3p	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m 4 03	° ′ + 22 02	h m 4 05	° ′ - 27 40	h m 4 05	° ′ + 50 18	h m 4 07	° ′ + 47 40	
1 <sup>d</sup>	52.358 <sup>s</sup> + 43	47.57 <sup>°</sup> + 21	03.709 <sup>s</sup> - 2	83.34 <sup>°</sup> - 231	32.802 <sup>s</sup> + 38	62.72 <sup>°</sup> + 182	39.045 <sup>s</sup> + 44	45.15 <sup>°</sup> + 168	
1	0.9	47.73 + 16	03.667 - 42	85.42 - 208	32.782 - 20	64.38 + 166	39.033 - 12	46.68 + 153	
1	10.9	47.82 + 9	03.585 - 82	87.25 - 183	32.701 - 81	65.82 + 144	38.962 - 71	48.01 + 133	
1	20.8	47.84 + 2	03.465 - 120	88.74 - 149	32.561 - 140	66.96 + 114	38.836 - 126	49.07 + 106	
1	30.8	47.79 - 5	03.315 - 150	89.87 - 113	32.374 - 187	67.79 + 83	38.664 - 172	49.83 + 76	
2	9.8	47.66 - 140	03.139 - 176	90.62 - 75	32.146 - 228	68.27 + 48	38.453 - 211	50.27 + 44	
2	19.8	47.44 - 160	02.944 - 195	90.95 - 33	31.891 - 255	68.37 + 10	38.215 - 238	50.35 + 8	
3	1.7	47.15 - 169	02.744 - 200	90.88 + 7	31.626 - 265	68.10 - 27	37.966 - 249	50.10 - 25	
3	11.7	46.79 - 169	02.543 - 201	90.41 + 47	31.362 - 264	67.48 - 62	37.718 - 248	49.51 - 59	
3	21.7	46.39 - 157	02.355 - 188	89.53 + 88	31.118 - 244	66.53 - 95	37.488 - 230	48.62 - 89	
3	31.6	45.99 - 133	02.188 - 167	88.28 + 125	30.909 - 209	65.32 - 121	37.290 - 198	47.49 - 113	
4	10.6	45.60 - 103	02.050 - 138	86.68 + 160	30.744 - 165	63.89 - 143	37.134 - 156	46.16 - 133	
4	20.6	45.27 - 61	01.951 - 99	84.74 + 194	30.637 - 107	62.32 - 157	37.033 - 101	44.70 - 146	
4	30.6	45.02 - 17	01.894 - 57	82.53 + 221	30.595 - 42	60.69 - 163	36.994 - 39	43.19 - 151	
5	10.5	44.90 + 31	01.884 - 10	80.05 + 248	30.620 + 25	59.05 - 164	37.018 + 24	41.68 - 151	
5	20.5	44.96 + 87	01.924 + 40	77.38 + 267	30.717 + 97	57.48 - 157	37.110 + 92	40.25 - 143	
5	30.5	45.09 + 116	02.011 + 87	74.57 + 281	30.880 + 163	56.05 - 143	37.267 + 157	38.95 - 130	
6	9.5	45.43 + 179	02.146 + 135	71.67 + 290	31.108 + 228	54.78 - 127	37.484 + 217	37.81 - 114	
6	19.4	45.95 + 219	02.326 + 180	68.76 + 291	31.397 + 289	53.76 - 102	37.760 + 276	36.91 - 90	
6	29.4	46.62 + 253	02.543 + 217	65.92 + 284	31.734 + 337	52.98 - 78	38.082 + 322	36.24 - 67	
7	9.4	47.44 + 282	02.795 + 252	63.20 + 272	32.116 + 382	52.47 - 51	38.446 + 364	35.83 - 41	
7	19.3	48.37 + 306	03.075 + 280	60.70 + 250	32.531 + 415	52.27 - 20	38.443 + 397	35.71 - 12	
7	29.3	49.38 + 320	03.374 + 299	58.49 + 221	32.967 + 436	52.35 + 8	38.863 + 417	35.71 + 14	
8	8.3	50.46 + 330	03.687 + 313	56.60 + 189	33.421 + 454	52.70 + 35	39.694 + 434	35.85 + 40	
8	18.3	51.55 + 333	04.007 + 320	55.16 + 144	33.881 + 480	53.34 + 64	40.133 + 439	36.25 + 66	
8	28.2	52.62 + 330	04.326 + 319	54.14 + 102	34.338 + 457	54.21 + 87	40.570 + 437	37.78 + 87	
9	7.2	53.65 + 324	04.641 + 315	53.62 + 52	34.790 + 452	55.32 + 111	41.002 + 432	38.86 + 108	
9	17.2	54.62 + 310	04.943 + 302	53.62 + 0	35.225 + 435	56.64 + 132	41.418 + 416	38.86 + 127	
9	27.2	55.49 + 296	05.228 + 285	54.10 - 48	35.641 + 416	58.12 + 148	41.817 + 399	40.13 + 142	
10	7.1	56.28 + 280	05.493 + 265	55.08 - 98	36.034 + 393	59.78 + 166	42.194 + 377	41.55 + 156	
10	17.1	56.95 + 257	05.731 + 238	56.50 - 142	36.395 + 361	61.57 + 179	42.541 + 347	44.79 + 168	
10	27.1	57.54 + 234	05.941 + 210	58.28 - 178	36.723 + 328	63.45 + 188	42.857 + 316	46.54 + 175	
11	6.0	58.03 + 209	06.120 + 179	60.39 - 211	37.012 + 289	65.42 + 197	43.137 + 280	48.37 + 183	
11	16.0	58.43 + 177	06.262 + 142	62.71 - 232	37.254 + 242	67.43 + 201	43.373 + 236	48.37 + 186	
11	26.0	58.78 + 147	06.369 + 107	65.15 - 244	37.450 + 196	69.44 + 201	43.564 + 191	50.23 + 186	
12	6.0	59.05 + 110	06.435 + 66	67.63 - 248	37.590 + 140	71.42 + 198	43.704 + 140	53.92 + 183	
12	15.9	59.28 + 71	06.459 + 24	70.02 - 239	37.670 + 80	73.31 + 189	43.787 + 83	55.66 + 174	
12	25.9	59.45 + 33	06.444 - 15	72.26 - 224	37.692 + 22	75.07 + 176	43.815 + 28	57.28 + 162	
12	35.9	59.57 - 11	06.387 - 57	74.29 - 203	37.650 - 42	76.63 + 156	43.782 - 33	58.72 + 144	
	53.722	44.86	04.019	77.51	34.420	55.99	40.641	38.70	
Mean Place	sec δ, tan δ	+1.079	+0.405	+1.129	-0.525	+1.566	+1.205	+1.485	+1.098
dα(ψ), dδ(ψ)	+0.071	+0.19	+0.049	+0.19	+0.089	+0.19	+0.087	+0.19	
dα(ε), dδ(ε)	-0.013	+0.87	+0.017	+0.88	-0.038	+0.88	-0.034	+0.88	
Dble. Trans.	November 22		November 22		November 22		November 23		

# APPARENT PLACES OF STARS, 1986

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## AT UPPER TRANSIT AT GREENWICH

No.	1115			1116			154		155								
	43 Tauri			44 Tauri			o' Eridani		α Horologii								
Mag. Spect.	5.67	G5		5.55	F0		4.14	F2	3.83	K0							
U.T.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.					
	h m		° ' "	h m		° ' "	h m		° ' "	h m		° ' "					
	4 08		+ 19 34	4 09		+ 26 26	4 11		- 6 52	4 13		- 42 19					
1 <sup>d</sup>	-9.1	21.368	+ 47	29.85	+ 5	59.022	+ 51	50.87	+ 46	11.469	+ 32	21.61	-142	33.647	- 30	45.03	-279
1	0.9	21.376	+ 8	29.88	+ 3	59.030	+ 8	51.27	+ 40	11.464	- 5	22.93	-132	33.568	- 79	47.56	-253
1	10.9	21.343	- 33	29.86	- 2	58.995	- 35	51.59	+ 32	11.422	- 42	22.93	-118	33.442	- 126	49.77	-221
1	20.8	21.269	- 74	29.79	- 7	58.918	- 77	51.80	+ 21	11.342	- 80	24.11	-102	33.271	- 171	51.57	-180
1	30.8	21.162	- 107	29.68	- 11	58.805	- 113	51.91	+ 11	11.233	- 109	25.13	- 80	33.066	- 205	52.91	-134
2	9.8	21.026	- 136	29.52	- 16	58.660	- 145	51.89	- 2	11.096	- 137	26.55	- 62	32.830	- 236	53.79	- 88
2	19.8	20.869	- 157	29.29	- 23	58.494	- 166	51.74	- 15	10.940	- 156	26.92	- 37	32.574	- 256	54.15	- 36
3	1.7	20.704	- 165	29.03	- 26	58.318	- 176	51.47	- 27	10.776	- 164	26.92	- 15	32.311	- 263	54.02	+ 13
3	11.7	20.536	- 168	28.72	- 31	58.140	- 178	51.09	- 38	10.609	- 167	27.07	+ 8	32.046	- 265	53.41	+ 61
3	21.7	20.380	- 156	28.40	- 32	57.975	- 165	50.62	- 47	10.453	- 156	26.99	+ 34	31.795	- 251	52.30	+111
3	31.6	20.247	- 133	28.09	- 31	57.833	- 142	50.09	- 53	10.317	- 136	26.09	+ 56	31.569	- 226	50.77	+153
4	10.6	20.143	- 104	27.81	- 28	57.721	- 112	49.54	- 55	10.206	- 111	25.29	+ 80	31.373	- 196	48.81	+196
4	20.6	20.078	- 65	27.60	- 21	57.651	- 70	49.02	- 52	10.131	- 75	24.25	+104	31.221	- 152	46.47	+234
4	30.6	20.058	- 20	27.49	- 11	57.628	- 23	48.55	- 47	10.097	- 34	23.00	+125	31.116	- 105	43.83	+264
5	10.5	20.085	+ 27	27.50	+ 1	57.654	+ 26	48.17	- 38	10.105	+ 8	21.53	+147	31.062	- 54	40.90	+293
5	20.5	20.166	+ 81	27.65	+ 15	57.733	+ 79	47.96	- 21	10.160	+ 55	19.86	+167	31.067	+ 5	37.76	+314
5	30.5	20.276	+ 110	27.93	+ 28	57.854	+ 121	47.86	- 10	10.259	+ 99	18.04	+182	31.126	+ 59	34.51	+325
6	9.5	20.448	+ 172	28.44	+ 51	58.030	+ 176	47.88	+ 2	10.400	+ 141	16.09	+195	31.241	+ 115	31.16	+335
6	19.4	20.660	+ 212	29.08	+ 64	58.250	+ 220	48.12	+ 24	10.583	+ 183	14.05	+204	31.410	+ 169	27.85	+331
6	29.4	20.905	+ 245	29.86	+ 78	58.506	+ 256	48.52	+ 40	10.799	+ 216	11.99	+206	31.625	+ 215	24.65	+320
7	9.4	21.181	+ 276	30.77	+ 91	58.793	+ 287	49.09	+ 57	11.046	+ 247	09.94	+205	31.883	+ 258	21.61	+304
7	19.3	21.480	+ 299	31.77	+100	59.105	+ 312	49.81	+ 72	11.316	+ 270	07.98	+196	32.178	+ 295	18.86	+275
7	29.3	21.793	+ 313	32.83	+106	59.432	+ 327	50.63	+ 82	11.602	+ 296	06.16	+182	32.499	+ 321	16.46	+240
8	8.3	22.117	+ 324	33.93	+110	59.771	+ 339	51.56	+ 93	11.900	+ 298	04.52	+164	32.842	+ 343	14.46	+200
8	18.3	22.444	+ 327	35.03	+110	60.114	+ 343	52.54	+ 98	12.202	+ 302	03.14	+138	33.197	+ 355	12.98	+148
8	28.2	22.769	+ 325	36.08	+105	60.454	+ 340	53.54	+100	12.503	+ 301	02.04	+110	33.556	+ 359	12.01	+ 97
9	7.2	23.089	+ 320	37.07	+ 99	60.789	+ 335	54.55	+101	12.799	+ 296	01.27	+ 77	33.913	+ 357	11.62	+ 39
9	17.2	23.396	+ 307	37.96	+ 89	61.113	+ 324	55.54	+ 99	13.085	+ 286	00.85	+ 42	34.257	+ 344	11.83	- 21
9	27.2	23.690	+ 294	38.75	+ 79	61.422	+ 309	56.48	+ 94	13.357	+ 272	00.77	+ 8	34.583	+ 326	12.59	- 76
10	7.1	23.967	+ 277	39.42	+ 67	61.715	+ 293	57.38	+ 90	13.613	+ 256	01.05	- 28	34.886	+ 303	13.92	-133
10	17.1	24.223	+ 256	39.96	+ 54	61.985	+ 270	58.20	+ 82	13.848	+ 235	01.65	- 60	35.157	+ 271	15.76	-184
10	27.1	24.457	+ 234	40.39	+ 43	62.233	+ 248	58.97	+ 77	14.060	+ 212	02.53	- 88	35.393	+ 236	18.02	-226
11	6.0	24.667	+ 210	40.72	+ 33	62.455	+ 222	59.68	+ 71	14.248	+ 188	03.67	-114	35.589	+ 196	20.64	-262
11	16.0	24.845	+ 178	40.96	+ 24	62.645	+ 190	60.32	+ 64	14.405	+ 157	04.98	-131	35.738	+ 149	23.50	-286
11	26.0	24.994	+ 149	41.14	+ 18	62.804	+ 159	60.92	+ 60	14.534	+ 129	06.40	-142	35.842	+ 104	26.48	-298
12	6.0	25.107	+ 113	41.25	+ 11	62.924	+ 120	61.46	+ 54	14.627	+ 93	07.89	-149	35.896	+ 54	29.51	-303
12	15.9	25.181	+ 74	41.31	+ 6	63.004	+ 80	61.94	+ 48	14.684	+ 57	09.36	-147	35.898	+ 2	32.42	-291
12	25.9	25.217	+ 36	41.34	+ 3	63.042	+ 38	62.37	+ 43	14.705	+ 21	10.76	-140	35.851	- 47	35.14	-272
12	35.9	25.210	- 7	41.33	- 5	63.035	- 49	62.71	+ 26	14.686	- 55	12.06	-130	35.753	- 98	37.59	-245
Mean Place	22.688	27.38		60.415	47.25		12.334	19.77		33.232	38.33						
sec δ, tan δ	+1.061	+0.356		+1.117	+0.497		+1.007	-0.121		+1.353	-0.911						
dα(ψ), dδ(ψ)	+0.069	+0.19		+0.073	+0.18		+0.058	+0.18		+0.040	+0.18						
dα(ε), dδ(ε)	-0.011	+0.88		-0.015	+0.89		+0.004	+0.89		+0.027	+0.89						
Dble. Trans.	November 23			November 23			November 24		November 24								



APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	166		159		158		1119									
	δ Mensae		γ Tauri		54 Persei		208 G. Eridani									
Mag. Spect.	5.62	K0p	3.86	K0	5.10	G5	6.65	B9								
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.								
	<sup>h</sup> <sup>m</sup> 4 18	<sup>o</sup> / - 80 14	<sup>h</sup> <sup>m</sup> 4 18	<sup>o</sup> / + 15 35	<sup>h</sup> <sup>m</sup> 4 19	<sup>o</sup> / + 34 32	<sup>h</sup> <sup>m</sup> 4 19	<sup>o</sup> / - 16 27								
1	-9.1	63.648	- 601	-298	60.195	+ 56	47.03	- 20	30.457	+ 63	11.04	+ 94	31.741	+ 29	71.13	-192
1	0.9	62.837	- 811	-264	60.212	+ 17	46.83	- 20	30.472	+ 15	11.89	+ 85	31.731	- 10	72.90	-177
1	10.9	61.834	-1003	-225	60.187	- 25	46.63	- 20	30.439	- 33	12.63	+ 74	31.682	- 49	74.49	-159
1	20.8	60.661	-1173	-174	60.122	- 65	46.42	- 21	30.358	- 81	13.22	+ 59	31.595	- 87	75.83	-134
1	30.8	59.370	-1291	-122	60.023	- 99	46.21	- 21	30.237	- 121	13.63	+ 41	31.476	- 119	76.89	-106
2	9.8	57.982	-1388	- 68	59.894	- 129	45.98	- 23	30.080	- 157	13.86	+ 23	31.328	- 148	77.66	- 77
2	19.8	56.539	-1443	- 9	59.742	- 152	45.76	- 22	29.898	- 182	13.86	+ 0	31.160	- 168	78.11	- 45
3	1.7	55.091	-1448	+ 46	59.579	- 163	45.53	- 23	29.704	- 194	13.67	- 19	30.983	- 177	78.24	- 13
3	11.7	53.656	-1435	+ 99	59.413	- 166	45.30	- 23	29.506	- 198	13.27	- 40	30.802	- 181	78.06	+ 18
3	21.7	52.284	-1372	+152	59.256	- 157	45.10	- 20	29.320	- 186	12.70	- 57	30.631	- 171	77.55	+ 51
3	31.7	51.010	-1274	+196	59.120	- 136	44.94	- 16	29.157	- 163	11.99	- 71	30.478	- 153	76.73	+ 82
4	10.6	49.847	-1163	+239	59.010	- 110	44.83	- 11	29.027	- 130	11.18	- 81	30.350	- 128	75.61	+112
4	20.6	48.844	-1003	+277	58.938	- 72	44.82	- 1	28.941	- 86	10.31	- 87	30.258	- 92	74.20	+141
4	30.6	48.014	- 830	+305	58.908	- 30	44.91	+ 9	28.904	- 37	09.45	- 86	30.205	- 53	72.54	+166
5	10.5	47.369	- 645	+331	58.923	+ 15	45.13	+ 22	28.919	+ 15	08.63	- 82	30.195	- 10	70.62	+192
5	20.5	46.942	- 427	+348	58.988	+ 65	45.48	+ 35	28.991	+ 72	07.92	- 71	30.233	+ 38	68.50	+212
5	30.5	46.725	-1163	+354	59.092	+ 104	45.96	+ 48	29.115	+ 124	07.33	- 59	30.315	+ 82	66.24	+226
6	9.5	46.728	+ 3	+358	59.246	+ 154	46.68	+ 72	29.291	+ 176	06.86	- 47	30.442	+ 127	63.84	+240
6	19.4	46.959	+ 231	+348	59.443	+ 197	47.51	+ 83	29.517	+ 226	06.59	- 27	30.612	+ 170	61.38	+246
6	29.4	47.392	+ 433	+331	59.674	+ 231	48.44	+ 93	29.782	+ 265	06.51	- 8	30.816	+ 204	58.94	+244
7	9.4	48.029	+ 637	+307	59.936	+ 262	49.48	+104	30.083	+ 301	06.62	+ 11	31.054	+ 238	56.55	+239
7	19.4	48.852	+ 823	+271	60.222	+ 286	50.58	+110	30.412	+ 329	06.92	+ 30	31.317	+ 263	54.30	+225
7	29.3	49.822	+ 970	+231	60.523	+ 301	51.72	+114	30.759	+ 347	07.39	+ 47	31.599	+ 282	52.25	+205
8	8.3	50.928	+1106	+183	60.837	+ 314	52.85	+113	31.121	+ 362	08.02	+ 63	31.895	+ 296	50.45	+180
8	18.3	52.127	+1199	+125	61.156	+ 319	53.94	+109	31.489	+ 368	08.78	+ 76	32.199	+ 304	48.99	+146
8	28.2	53.375	+1248	+ 68	61.473	+ 317	54.95	+101	31.856	+ 367	09.63	+ 85	32.503	+ 304	47.89	+110
9	7.2	54.649	+1274	+ 6	61.788	+ 315	55.85	+ 90	32.220	+ 364	10.58	+ 95	32.804	+ 301	47.18	+ 71
9	17.2	55.888	+1239	- 59	62.092	+ 304	56.62	+ 77	32.572	+ 352	11.58	+ 100	33.096	+ 292	46.92	+ 26
9	27.2	57.058	+1170	-117	62.384	+ 292	57.25	+ 63	32.912	+ 340	12.62	+104	33.375	+ 279	47.08	- 16
10	7.1	58.124	+1066	-177	62.662	+ 278	57.73	+ 48	33.235	+ 323	13.70	+108	33.638	+ 263	47.66	- 58
10	17.1	59.030	+ 906	-228	62.920	+ 258	58.04	+ 31	33.536	+ 301	14.78	+108	33.880	+ 242	48.65	- 99
10	27.1	59.758	+ 728	-269	63.158	+ 238	58.23	+ 19	33.813	+ 277	15.86	+108	34.098	+ 218	49.96	-131
11	6.1	60.278	+ 520	-305	63.372	+ 214	58.29	+ 6	34.063	+ 250	16.94	+108	34.291	+ 193	51.57	-161
11	16.0	60.554	+ 276	-325	63.557	+ 185	58.24	- 5	34.279	+ 216	18.01	+107	34.452	+ 161	53.40	-183
11	26.0	60.595	+ 41	-333	63.712	+ 155	58.13	- 11	34.460	+ 181	19.06	+105	34.581	+ 129	55.35	-195
12	6.0	60.384	- 211	-332	63.833	+ 121	57.96	- 17	34.600	+ 140	20.08	+102	34.675	+ 94	57.37	-202
12	15.9	59.924	- 460	-315	63.916	+ 83	57.76	- 20	34.694	+ 94	21.05	+ 97	34.729	+ 54	59.36	-199
12	25.9	59.244	- 680	-288	63.961	+ 45	57.55	- 21	34.743	+ 49	21.94	+ 89	34.746	+ 17	61.24	-188
12	35.9	58.346	- 898	-253	63.963	+ 2	57.33	- 22	34.741	- 49	22.74	+ 80	34.722	- 24	62.98	-174
			-1078	-207		- 38		- 23			+ 66		- 63		-151	
Mean Place	52.251	47.29			61.431	44.69	31.904	06.03	32.351	68.56			32.351	68.56		
sec δ, tan δ	+5.903	-5.818			+1.038	+0.279	+1.214	+0.688	+1.043	-0.296			+1.043	-0.296		
dα(ψ), dδ(ψ)	-0.078	+0.17			+0.068	+0.17	+0.078	+0.17	+0.054	+0.17			+0.054	+0.17		
dα(ε), dδ(ε)	+0.166	+0.90			-0.008	+0.90	-0.019	+0.91	+0.008	+0.91			+0.008	+0.91		
Dble. Trans.	November 26		November 26		November 26		November 26									

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	161		163		162		1120	
	212 G. Eridani		η Reticuli		δ Tauri		ξ Eridani	
Mag. Spect.	5.31	A0	5.18	K0	3.93	K0	5.23	A2
U.T.	R.A.		R.A.		R.A.		R.A.	
	h	Dec.	h	Dec.	h	Dec.	h	Dec.
	4	-20	4	-63	4	+17	4	-3
	20	39	21	24	22	30	22	46
	<sup>s</sup>	<sup>o</sup>	<sup>s</sup>	<sup>o</sup>	<sup>s</sup>	<sup>o</sup>	<sup>s</sup>	<sup>o</sup>
	+	-	-	-	+	-	+	-
1	03.153	79 70	47.206	73.64	08.042	44.47	59.557	33.98
1	03.138	81.63	46.989	76.43	08.062	44.37	59.565	35.19
1	03.082	83.37	46.695	78.87	08.040	44.26	59.534	36.30
1	02.987	84.83	46.331	80.82	07.976	44.13	59.464	37.26
1	02.860	85.97	45.915	82.25	07.878	43.99	59.363	38.04
2	02.704	86.80	45.455	83.16	07.748	43.81	59.232	38.64
2	02.528	87.26	44.965	83.48	07.595	43.62	59.080	39.04
3	02.343	87.37	44.468	83.24	07.431	43.40	58.917	39.24
3	02.154	87.13	43.970	82.46	07.262	43.16	58.750	39.25
3	01.975	86.53	43.493	81.12	07.103	42.92	58.591	39.03
3	01.814	85.59	43.054	79.32	06.964	42.71	58.451	38.60
4	01.679	84.33	42.658	77.06	06.851	42.54	58.334	37.96
4	01.579	82.76	42.327	74.39	06.776	42.44	58.253	37.10
4	01.520	80.92	42.066	71.41	06.744	42.44	58.211	36.04
5	01.504	78.82	41.881	68.12	06.757	42.55	58.210	34.77
5	01.537	76.50	41.785	64.64	06.821	42.79	58.257	33.31
5	01.615	74.04	41.772	61.06	06.923	43.10	58.346	31.70
6	01.738	71.46	41.847	57.41	07.076	43.73	58.479	29.94
6	01.905	68.83	42.011	53.82	07.273	44.44	58.654	28.09
6	02.108	66.23	42.251	50.38	07.504	45.25	58.862	26.20
7	02.345	63.69	42.567	47.14	07.767	46.18	59.101	24.30
7	02.609	61.33	42.950	44.24	08.054	47.19	59.365	22.47
7	02.893	59.19	43.385	41.74	08.357	48.24	59.645	20.75
8	03.192	57.33	43.867	39.71	08.674	49.31	59.939	19.18
8	03.498	55.84	44.379	38.24	08.995	50.34	60.239	17.84
8	03.806	54.74	44.905	37.35	09.316	51.32	60.540	16.75
9	04.111	54.07	45.437	37.08	09.634	52.22	60.838	15.95
9	04.407	53.88	45.955	37.48	09.942	53.00	61.127	15.49
9	04.690	54.13	46.446	38.48	10.239	53.65	61.404	15.34
10	04.956	54.84	46.900	40.10	10.521	54.17	61.667	15.52
10	05.200	55.98	47.298	42.27	10.784	54.55	61.911	16.01
10	05.420	57.46	47.634	44.88	11.027	54.81	62.134	16.77
11	05.613	59.26	47.899	47.88	11.246	54.96	62.334	17.76
11	05.773	61.29	48.078	51.12	11.437	55.02	62.505	18.94
11	05.900	63.45	48.176	54.49	11.597	55.01	62.647	20.22
12	05.990	65.67	48.183	57.88	11.723	54.95	62.755	21.57
12	06.040	67.85	48.100	61.14	11.810	54.86	62.826	22.92
12	06.051	69.92	47.934	64.16	11.858	54.76	62.860	24.21
12	06.020	71.82	47.684	66.87	11.863	54.63	62.854	25.43
Mean Place	03.642	76.56	44.489	65.86	09.296	41.70	60.452	33.63
sec δ, tan δ	+1.069	-0.377	+2.235	-1.999	+1.049	+0.316	+1.002	-0.066
dα(ψ), dδ(ψ)	+0.052	+0.17	+0.013	+0.17	+0.069	+0.16	+0.060	+0.16
dα(ε), dδ(ε)	+0.011	+0.91	+0.055	+0.91	-0.009	+0.91	+0.002	+0.91
Dble. Trans.	November 26		November 26		November 26		November 27	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1121		164		1123		1122		
	43 Eridani		ε Tauri		Bradley 615 (Tauri)		B.D. +69° 258 (Camelopardi)		
Mag.Spect.	4.06	K5	3.63	K0	5.50	B8	7.02	K0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	4 23	-34 02	4 27	+19 09	4 27	+1 21	4 28	+69 20	
1	-9.1	31 754 + 3	56 51 -262	48 358 + 66	07.71 + 0	49.194 + 54	06.41 -104	24.749 + 59	66.43 +279
1	0.9	31 712 - 42	58 91 -240	48 383 + 25	07.70 - 1	49.211 + 17	05.44 - 97	24.694 - 55	69.04 +261
1	10.9	31 626 - 86	61 05 -214	48 366 - 17	07.68 - 2	49.188 - 23	04.54 - 90	24.526 - 168	71.42 +238
1	20.8	31 497 - 129	62 82 -177	48 306 - 60	07.62 - 6	49.125 - 63	03.76 - 78	24.526 - 280	73.45 +203
1	30.8	31 334 - 163	64 19 -137	48 210 - 96	07.54 - 8	49.030 - 95	03.12 - 64	23.877 - 369	75.08 +163
2	9.8	31 140 - 194	65 15 - 96	48 081 - 129	07.42 - 12	48 903 - 127	02.59 - 53	23 429 - 448	76.25 +117
2	19.8	30 925 - 215	65 65 - 50	47 927 - 154	07.26 - 16	48 755 - 148	02.23 - 36	22 927 - 502	76.90 + 65
3	1.7	30 699 - 226	65 69 - 4	47 962 - 165	07.06 - 20	48 595 - 160	02.01 - 22	22 401 - 526	77.03 + 13
3	11.7	30 471 - 228	65 30 + 39	47 762 - 171	07.06 - 23	48 595 - 166	02.01 - 7	22 401 - 533	77.03 - 39
3	21.7	30 252 - 219	64 45 + 85	47 591 - 163	06.83 - 25	48 429 - 157	01.94 + 11	21 868 - 504	76.64 - 90
3	31.7	30 054 - 198	63 20 +125	47 285 - 143	06.33 - 25	48 132 - 140	02.31 + 26	20 913 - 451	74.40 -134
4	10.6	29 882 - 172	61 55 +165	47 167 - 118	06.11 - 22	48 015 - 117	02.75 + 44	20 532 - 381	72.68 -172
4	20.6	29 749 - 133	59 53 +202	47 088 - 79	05.94 - 17	47 934 - 81	03.38 + 63	20 247 - 285	70.64 -204
4	30.6	29 659 - 90	57 20 +233	47 050 - 38	05.86 - 8	47 892 - 42	04.18 + 80	20 068 - 179	68.41 -223
5	10.5	29 616 - 43	54 59 +261	47 058 + 8	05.87 + 1	47 891 - 1	05.17 + 99	20 002 - 66	66.02 -239
5	20.5	29 625 + 9	51 75 +284	47 118 + 60	06.02 + 15	47 937 + 46	06.33 +116	20 060 + 58	63.60 -242
5	30.5	29 684 + 59	48 78 +297	47 218 + 100	06.13 + 11	48 026 + 89	07.64 +131	20 235 + 175	61.23 -237
6	9.5	29 793 + 109	45 69 +309	47 365 + 147	06.72 + 59	48 159 + 133	09.11 +147	20 524 + 289	58.97 -226
6	19.4	29 951 + 158	42 59 +310	47 560 + 195	07.31 + 59	48 333 + 174	10.68 +157	20 924 + 400	56.92 -205
6	29.4	30 151 + 200	39 56 +303	47 789 + 229	08.01 + 70	48 541 + 208	12.31 +163	21 415 + 491	55.12 -180
7	9.4	30 390 + 239	36 65 +291	48 050 + 261	08.83 + 82	48 780 + 239	13.98 +167	21 992 + 577	53.60 -152
7	19.4	30 662 + 272	33 98 +267	48 336 + 296	09.73 + 90	49 045 + 265	15.61 +163	22 642 + 650	52.43 -117
7	29.3	30 957 + 295	31 60 +238	48 639 + 303	10.69 + 96	49 326 + 281	17.17 +156	23 341 + 699	51.62 - 81
8	8.3	31 273 + 316	29 58 +202	48 957 + 318	11.68 + 99	49 621 + 295	18.62 +145	24 086 + 745	51.18 - 44
8	18.3	31 600 + 327	28 01 +157	49 280 + 323	12.65 + 97	49 922 + 301	19.88 +126	24 856 + 770	51.15 - 3
8	28.2	31 930 + 330	26 92 +109	49 604 + 324	13.58 + 93	50 224 + 302	20.94 +106	25 635 + 779	51.47 + 32
9	7.2	32 260 + 330	26 35 + 57	49 926 + 322	14.44 + 86	50 524 + 300	21.76 + 82	26 419 + 784	52.19 + 72
9	17.2	32 580 + 320	26 35 + 0	50 239 + 313	15.21 + 77	50 816 + 292	22.30 + 54	27 187 + 768	53.27 +108
9	27.2	32 886 + 306	26 87 - 52	50 540 + 301	15.86 + 65	51 097 + 281	22.56 + 26	27 929 + 742	54.69 +142
10	7.1	33 175 + 289	27 93 -106	50 829 + 289	16.40 + 54	51 365 + 268	22.54 - 2	28 639 + 710	56.44 +175
10	17.1	33 436 + 261	29 49 -156	51 099 + 270	16.81 + 41	51 615 + 250	22.24 - 30	29 296 + 657	58.49 +205
10	27.1	33 669 + 233	31 45 -196	51 349 + 250	17.12 + 31	51 845 + 230	21.71 - 53	29 896 + 600	60.78 +229
11	6.1	33 869 + 200	33 78 -233	51 576 + 227	17.33 + 21	52 052 + 207	20.97 - 74	30 427 + 531	63.31 +253
11	16.0	34 030 + 161	36 36 -258	51 774 + 198	17.46 + 13	52 231 + 179	20.07 - 90	30 870 + 443	66.01 +270
11	26.0	34 153 + 123	39 08 -272	51 942 + 168	17.53 + 7	52 382 + 151	19.07 -100	31 225 + 355	68.81 +280
12	6.0	34 231 + 78	41 87 -279	52 076 + 134	17.56 + 3	52 500 + 118	18.00 -107	31 475 + 250	71.68 +287
12	15.9	34 263 + 32	44 59 -272	52 169 + 93	17.56 + 0	52 580 + 80	16.92 -108	31 611 + 136	74.49 +281
12	25.9	34 252 - 11	47 15 -256	52 224 + 55	17.54 - 2	52 623 + 43	15.89 -103	31 636 + 25	77.21 +272
12	35.9	34 193 - 59	49 49 -234	52 234 + 10	17.50 - 4	52 626 + 3	14.91 - 98	31 540 - 96	79.74 +253
		34 193 - 102	49 49 -201	52 234 - 32	17.50 - 5	52 626 - 37	14.91 - 87	31 540 - 207	79.74 +222
Mean Place	31.740	51.91	49.618	04.46	50.179	05.68	26.204	58.16	
sec δ, tan δ	+1.207	-0.676	+1.059	+0.347	+1.000	+0.024	+2.836	+2.653	
dα(ψ), dδ(ψ)	+0.045	+0.16	+0.070	+0.16	+0.062	+0.16	+0.126	+0.15	
dα(ε), dδ(ε)	+0.018	+0.91	-0.009	+0.92	-0.001	+0.92	-0.069	+0.92	
Dble.Trans.	November 27		November 28		November 28		November 28		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	167		165		1124		1125										
	δ Caeli		1 Camelopardi* f.		57 Persei		α Tauri										
Mag.Spect.	5.16	B3	5.86	B1	6.07	F0	4.75	A5									
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.									
	h m	° /	h m	° /	h m	° /	h m	° /									
	4 30	- 44 58	4 30	+ 53 52	4 32	+ 43 02	4 33	+ 14 49									
1	-9.1	25 926	- 19	61.05	-296	55 879	+ 78	64.37	+204	26 253	+ 80	15 80	+143	03 668	+ 69	03 32	- 27
1	0.9	25 854	- 72	63.76	-271	55 889	+ 10	66.28	+191	26 279	+ 26	17.14	+134	03 697	+ 29	03 06	- 26
1	10.9	25 730	- 124	66.16	-240	55 830	- 59	68.01	+173	26 248	- 31	18.35	+121	03 683	- 14	02 81	- 25
1	20.9	25 557	- 173	68.16	-200	55 702	- 128	69.47	+146	26 161	- 87	19.36	+101	03 628	- 55	02 58	- 23
1	30.8	25 345	- 212	69.71	-155	55 517	- 185	70.63	+116	26 027	- 134	20.15	+ 79	03 536	- 92	02 36	- 22
2	9.8	25 098	- 247	70.79	-108	55 282	- 235	71.44	+ 81	25 851	- 176	20.68	+ 53	03 412	- 124	02 14	- 22
2	19.8	24 826	- 272	71.34	- 55	55 009	- 273	71.85	+ 41	25 643	- 208	20.92	+ 24	03 263	- 149	01 94	- 20
3	1.7	24 544	- 282	71.39	- 5	54 719	- 290	71.88	+ 3	25 419	- 224	20.88	- 4	03 101	- 162	01 74	- 20
3	11.7	24 257	- 287	70.95	+ 44	54 423	- 296	71.51	- 37	25 189	- 230	20.54	- 34	02 933	- 168	01 56	- 18
3	21.7	23 980	- 277	69.98	+ 97	54 140	- 283	70.76	- 75	24 969	- 220	19.94	- 60	02 772	- 161	01 40	- 16
3	31.7	23 726	- 254	68.57	+141	53 890	- 250	69.70	-106	24 774	- 195	19.11	- 83	02 629	- 143	01 29	- 11
4	10.6	23 501	- 225	66.72	+185	53 680	- 210	68.35	-135	24 613	- 161	18.09	-102	02 511	- 118	01 23	- 6
4	20.6	23 318	- 183	64.46	+226	53 530	- 150	66.79	-156	24 499	- 114	16.93	-116	02 428	- 83	01 27	+ 4
4	30.6	23 183	- 135	61.88	+258	53 445	- 85	65.11	-168	24 438	- 61	15.71	-122	02 387	- 41	01 40	+ 13
5	10.6	23 099	- 84	58.99	+289	53 429	- 16	63.35	-176	24 435	- 3	14.46	-125	02 389	+ 2	01 65	+ 25
5	20.5	23 074	- 25	55 86	+313	53 491	+ 62	61.60	-175	24 495	+ 60	13.27	-119	02 440	+ 51	02 03	+ 38
5	30.5	23 106	+ 32	52.59	+327	53 625	+ 134	59.92	-168	24 613	+ 118	12.16	-111	02 534	+ 94	02 50	+ 47
6	9.5	23 195	+ 89	49.21	+338	53 829	+ 204	58.36	-156	24 790	+ 177	11.18	- 98	02 672	+ 138	03 21	+ 71
6	19.4	23 342	+ 147	45.84	+337	54 101	+ 272	57.00	-136	25 022	+ 232	10.37	- 81	02 856	+ 184	04 03	+ 82
6	29.4	23 538	+ 196	42.56	+328	54 429	+ 328	55.85	-115	25 300	+ 278	09.75	- 62	03 075	+ 219	04 94	+ 91
7	9.4	23 781	+ 243	39.42	+314	54 808	+ 379	54.95	- 90	25 619	+ 319	09.34	- 41	03 325	+ 250	05 95	+101
7	19.4	24 065	+ 284	36.56	+286	55 230	+ 422	54.33	- 62	25 973	+ 354	09.17	- 17	03 602	+ 277	07 02	+107
7	29.3	24 380	+ 315	34.03	+253	55 680	+ 450	53.99	- 34	26 349	+ 376	09.20	+ 3	03 895	+ 293	08 10	+108
8	8.3	24 722	+ 342	31.90	+213	56 156	+ 476	53.94	- 5	26 744	+ 395	09.45	+ 25	04 203	+ 308	09 17	+107
8	18.3	25 081	+ 359	30.28	+162	56 645	+ 489	54.18	+ 24	27 150	+ 406	09.90	+ 45	04 518	+ 315	10 20	+103
8	28.3	25 447	+ 366	29.18	+110	57 137	+ 492	54.68	+ 50	27 557	+ 407	10.52	+ 62	04 833	+ 315	11 13	+ 93
9	7.2	25 817	+ 370	28.65	+ 53	57 630	+ 493	55.44	+ 76	27 965	+ 408	11.31	+ 79	05 148	+ 315	11 96	+ 83
9	17.2	26 177	+ 360	28.75	- 10	58 112	+ 482	56.45	+101	28 363	+ 398	12.25	+ 94	05 455	+ 307	12 64	+ 68
9	27.2	26 522	+ 345	29.42	- 67	58 578	+ 466	57.68	+123	28 748	+ 385	13.31	+106	05 751	+ 296	13 18	+ 54
10	7.1	26 848	+ 326	30.68	-126	59 026	+ 448	59.12	+144	29 119	+ 371	14.48	+117	06 036	+ 285	13 55	+ 37
10	17.1	27 141	+ 293	32.48	-180	59 444	+ 418	60.74	+162	29 466	+ 347	15.75	+127	06 302	+ 266	13 77	+ 22
10	27.1	27 401	+ 260	34.72	-224	59 830	+ 386	62.52	+178	29 788	+ 322	17.09	+134	06 550	+ 248	13 85	+ 8
11	6.1	27 620	+ 172	37.37	-265	60 178	+ 348	64.44	+192	30 080	+ 292	18.51	+142	06 775	+ 225	13 80	- 5
11	16.0	27 792	+ 124	40.28	-291	60 477	+ 299	66.46	+202	30 334	+ 254	19.96	+145	06 972	+ 197	13 65	- 15
11	26.0	27 916	+ 124	43.35	-307	60 726	+ 249	68.54	+208	30 550	+ 216	21.45	+149	07 141	+ 169	13 44	- 21
12	6.0	27 988	+ 72	46.50	-315	60 915	+ 189	70.65	+211	30 719	+ 169	22.94	+149	07 276	+ 135	13 17	- 27
12	16.0	28 003	+ 15	49.56	-306	61 039	+ 124	72.71	+206	30 835	+ 116	24.40	+146	07 372	+ 96	12 89	- 28
12	25.9	27 966	- 37	52.45	-289	61 097	+ 58	74.69	+198	30 899	+ 64	25.78	+138	07 429	+ 57	12 61	- 28
12	35.9	27 873	- 93	55.09	-264	61 082	- 15	76.53	+184	30 905	+ 6	27.06	+128	07 443	+ 14	12 33	- 28
			-142		-227		- 83		+160		- 50		+111		- 28		- 26
Mean Place	25.278	56.11		57.403		57.16		27.726		09.59		04.857		00.42			
sec δ, tan δ	+1.414	-0.999		+1.697		+1.370		+1.368		+0.934		+1.034		+0.265			
dα(ψ), dδ(ψ)	+0.037	+0.15		+0.095		+0.15		+0.084		+0.15		+0.068		+0.15			
dα(ε), dδ(ε)	+0.025	+0.92		-0.035		+0.93		-0.023		+0.93		-0.007		+0.93			
Dble.Trans.	November 29			November 29				November 29				November 29					

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	171		170		168		169	
	$\alpha$ Doradus		$\nu^2$ Eridani		$\alpha$ Tauri (Aldebaran)		$\nu$ Eridani	
Mag.Spect.	3.47	A0p	3.88	K0	1.06	K5	4.12	B2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	4 33	-55 03	4 34	-30 34	4 35	+16 28	4 35	-3 22
1 -9.1	43 800 <sup>s</sup> - 57	86 84 <sup>"</sup> -315	61 437 <sup>s</sup> + 21	84 98 <sup>"</sup> -257	07 487 <sup>s</sup> + 72	61 72 <sup>"</sup> - 17	37 738 <sup>s</sup> + 58	45 13 <sup>"</sup> -133
1 0.9	43 678 - 185	89 71 -287	61 415 - 22	87 35 -237	07 518 + 31	61 54 - 18	37 757 + 19	46 37 -124
1 10.9	43 493 - 245	92 26 -210	61 348 - 67	89 49 -180	07 506 - 55	61 37 - 16	37 736 - 61	47 50 -113
1 20.9	43 248 - 291	94 36 -162	61 237 - 111	91 29 -143	07 451 - 91	61 21 - 17	37 675 - 95	48 49 - 80
1 30.8	42 957	95 98	61 092	92 72	07 360	61 04	37 580	49 29
2 9.8	42 625 - 332	97 10 -112	60 914 - 178	93 77 -105	07 236 - 124	60 87 - 17	37 453 - 127	49 92 - 63
2 19.8	42 265 - 360	97 66 - 56	60 712 - 202	94 38 - 61	07 086 - 150	60 69 - 18	37 304 - 149	50 35 - 43
3 1.7	41 893 - 372	97 67 - 1	60 498 - 214	94 56 - 18	06 923 - 163	60 50 - 19	37 141 - 163	50 59 - 24
3 11.7	41 517 - 376	97 16 + 51	60 279 - 219	94 33 + 23	06 753 - 170	60 30 - 20	36 972 - 169	50 62 + 3
3 21.7	41 153 - 364	96 10 +106	60 067 - 212	93 65 + 68	06 591 - 162	60 12 - 18	36 809 - 163	50 44 + 18
3 31.7	40 816 - 337	94 56 +154	59 873 - 194	92 58 +107	06 446 - 145	59 96 - 16	36 663 - 146	50 06 + 38
4 10.6	40 513 - 303	92 57 +199	59 704 - 169	91 12 +146	06 325 - 121	59 84 - 12	36 540 - 123	49 47 + 59
4 20.6	40 259 - 254	90 14 +243	59 570 - 134	89 30 +182	06 241 - 84	59 80 - 4	36 450 - 90	48 65 + 82
4 30.6	40 061 - 198	87 38 +276	59 478 - 92	87 17 +213	06 198 - 43	59 85 + 5	36 398 - 52	47 64 +101
5 10.6	39 923 - 138	84 30 +308	59 430 - 48	84 75 +242	06 199 + 1	60 00 + 15	36 387 - 11	46 43 +121
5 20.5	39 855 - 68	80 99 +331	59 432 + 2	82 09 +266	06 250 + 51	60 28 + 28	36 422 + 35	45 03 +140
5 30.5	39 855 + 0	77 54 +345	59 483 + 51	79 29 +280	06 344 + 94	60 63 + 35	36 500 + 78	43 48 +155
6 9.5	39 924 + 69	73 99 +355	59 582 + 99	76 34 +295	06 481 + 137	61 24 + 61	36 622 + 122	41 78 +170
6 19.4	40 063 + 139	70 46 +353	59 729 + 147	73 37 +297	06 665 + 184	61 96 + 72	36 785 + 163	39 99 +179
6 29.4	40 264 + 201	67 04 +342	59 917 + 188	70 44 +293	06 885 + 220	62 77 + 81	36 983 + 198	38 15 +184
7 9.4	40 524 + 260	63 78 +326	60 142 + 225	67 60 +284	07 136 + 251	63 68 + 91	37 213 + 230	36 30 +185
7 19.4	40 838 + 314	60 82 +296	60 401 + 259	64 97 +263	07 414 + 278	64 65 + 97	37 470 + 257	34 50 +180
7 29.3	41 192 + 354	58 23 +259	60 683 + 282	62 60 +237	07 709 + 295	65 66 +101	37 744 + 274	32 81 +169
8 8.3	41 583 + 391	56 06 +217	60 986 + 303	60 56 +204	08 019 + 310	66 67 +101	38 033 + 289	31 26 +155
8 18.3	41 999 + 416	54 43 +163	61 302 + 316	58 95 +161	08 336 + 317	67 65 + 98	38 330 + 297	29 94 +132
8 28.3	42 427 + 428	53 35 +108	61 622 + 320	57 79 +116	08 654 + 318	68 55 + 90	38 629 + 299	28 86 +108
9 7.2	42 861 + 434	52 88 + 47	61 944 + 322	57 12 + 67	08 971 + 317	69 36 + 81	38 928 + 299	28 07 + 79
9 17.2	43 287 + 426	53 06 - 18	62 258 + 314	57 00 + 12	09 281 + 310	70 05 + 69	38 928 + 292	27 61 + 46
9 27.2	43 695 + 408	53 85 - 79	62 561 + 303	57 39 - 39	09 581 + 300	70 60 + 55	39 220 + 282	27 46 + 15
10 7.1	44 078 + 383	55 25 -140	62 849 + 288	58 31 - 92	09 869 + 288	71 01 + 41	39 502 + 270	27 64 - 18
10 17.1	44 421 + 343	57 22 -197	63 113 + 264	59 72 -141	10 139 + 270	71 27 + 26	40 024 + 252	28 13 - 49
10 27.1	44 721 + 300	59 65 -243	63 352 + 239	61 54 -182	10 390 + 251	71 41 + 14	40 258 + 234	28 89 - 76
11 6.1	44 969 + 248	62 49 -284	63 562 + 210	63 73 -219	10 620 + 230	71 44 + 3	40 469 + 211	29 89 -100
11 16.0	45 155 + 186	65 62 -313	63 735 + 173	66 18 -245	10 821 + 201	71 44 - 7	40 651 + 182	29 89 -118
11 26.0	45 279 + 124	68 90 -328	63 872 + 137	68 79 -261	10 993 + 172	71 37 - 12	40 651 + 155	31 07 -130
12 6.0	45 336 + 57	72 26 -336	63 967 + 95	71 49 -270	11 131 + 138	71 07 - 18	40 927 + 121	33 74 -137
12 16.0	45 322 - 14	75 52 -326	64 017 + 50	74 14 -265	11 230 + 99	70 88 - 19	41 010 + 83	35 11 -137
12 25.9	45 242 - 80	78 59 -307	64 025 + 8	76 66 -252	11 290 + 60	70 69 - 19	41 057 + 47	36 42 -131
12 35.9	45 094 - 148	81 39 -280	63 985 - 40	78 99 -233	11 306 + 16	70 50 - 19	41 061 + 4	37 66 -124
	- 209	-239	- 83	-203	- 27	- 19	- 35	-109
Mean Place	42.254	81.44	61.536	82.14	08.693	58.42	38.613	45.76
sec $\delta$ , tan $\delta$	+1.747	-1.432	+1.162	-0.591	+1.043	+0.296	+1.002	-0.059
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.026	+0.15	+0.047	+0.14	+0.068	+0.14	+0.060	+0.14
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.035	+0.93	+0.014	+0.93	-0.007	+0.93	+0.001	+0.93
Dble.Trans.	November 29		November 30		November 30		November 30	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	172			1127			1129		1126								
	53 Eridani*			258 G. Eridani			α Caeli		Piazzi 4 <sup>h</sup> 148 (Tauri)								
Mag.Spect.	3.98	K0		5.59	K0		4.52	F2	5.68	A0							
U.T.	R.A.	Dec.		R.A.	Dec.		R.A.	Dec.		R.A.	Dec.						
	h m	° /		h m	° /		h m	° /		h m	° /						
	4 37	- 14 19		4 39	- 24 30		4 40	- 41 52		4 40	+ 28 35						
1	-9.1	33 056	+ 48	47.96	-190	32 778	+ 36	31.21	-236	08 013	+ 0	84.45	-294	27 622	+ 84	27 60	+ 56
1	0.9	33 064	+ 8	49.73	-177	32 772	- 6	33.40	-219	07 963	- 50	87 17	-272	27 662	+ 40	28 13	+ 53
1	10.9	33 031	- 33	51.34	-161	32 724	- 48	35 38	-198	07 862	- 101	89 61	-244	27 653	- 9	28 60	+ 47
1	20.9	32 958	- 73	52 72	-138	32 632	- 92	37 07	-169	07 712	- 150	91 67	-206	27 597	- 56	28 99	+ 39
1	30.8	32 850	- 108	53 83	-111	32 506	-126	38 43	-136	07 522	- 190	93 29	-162	27 500	- 97	29 29	+ 30
2	9.8	32 711	- 139	54 68	- 85	32 347	- 159	39 45	-102	07 296	- 226	94 47	-118	27 365	- 135	29 47	+ 18
2	19.8	32 549	- 162	55 22	- 54	32 164	- 183	40 07	- 62	07 045	- 251	95 15	- 68	27 202	- 163	29 51	+ 4
3	1.8	32 374	- 175	55 47	- 25	31 969	- 195	40 31	- 24	06 780	- 265	95 33	+ 18	27 023	- 179	29 41	- 10
3	11.7	32 193	- 181	55 41	+ 6	31 766	- 203	40 17	+ 14	06 509	- 271	95 03	+ 30	26 836	- 187	29 18	- 23
3	21.7	32 018	- 175	55 04	+ 37	31 570	- 196	39 63	+ 54	06 246	- 263	94 22	+ 81	26 656	- 180	28 83	- 35
3	31.7	31 859	- 159	54 37	+ 67	31 391	- 179	38 74	+ 89	06 003	- 243	92 97	+125	26 495	- 161	28 39	- 44
4	10.6	31 723	- 136	53 42	+ 95	31 234	- 157	37 48	+126	05 786	- 217	91 29	+168	26 360	- 135	27 87	- 52
4	20.6	31 620	- 103	52 18	+124	31 112	- 122	35 88	+160	05 608	- 178	89 19	+210	26 264	- 96	27 33	- 54
4	30.6	31 555	- 65	50 69	+149	31 029	- 83	34 00	+188	05 475	- 133	86 76	+243	26 212	- 52	26 79	- 54
5	10.6	31 532	- 23	48 96	+173	30 988	- 41	31 84	+216	05 391	- 84	84 02	+274	26 208	- 4	26 30	- 49
5	20.5	31 555	+ 23	47 01	+195	30 996	+ 8	29 44	+240	05 363	- 28	81 02	+300	26 257	+ 49	25 90	- 40
5	30.5	31 622	+ 67	44 91	+210	31 050	+ 54	26 89	+255	05 389	+ 26	77 88	+314	26 355	+ 98	25 64	- 26
6	9.5	31 733	+ 111	42 66	+225	31 150	+ 100	24 19	+270	05 469	+ 80	74 60	+328	26 498	+ 143	25 44	- 20
6	19.5	31 888	+ 155	40 35	+231	31 295	+ 145	21 44	+275	05 605	+ 136	71 31	+329	26 693	+ 195	25 38	- 6
6	29.4	32 078	+ 190	38 02	+233	31 479	+ 184	18 72	+272	05 788	+ 183	68 09	+322	26 927	+ 234	25 50	+ 12
7	9.4	32 301	+ 223	35 72	+230	31 700	+ 221	16 06	+266	06 016	+ 228	64 98	+311	27 196	+ 269	25 76	+ 26
7	19.4	32 553	+ 252	33 55	+217	31 951	+ 251	13 57	+249	06 285	+ 269	62 13	+285	27 494	+ 298	26 16	+ 40
7	29.3	32 824	+ 271	31 55	+200	32 224	+ 273	11 31	+226	06 583	+ 298	59 58	+255	27 812	+ 318	26 68	+ 52
8	8.3	33 112	+ 288	29 77	+178	32 517	+ 293	09 33	+198	06 908	+ 325	57 41	+217	28 146	+ 334	27 29	+ 61
8	18.3	33 409	+ 297	28 30	+147	32 822	+ 305	07 75	+158	07 250	+ 342	55 73	+168	28 490	+ 344	27 97	+ 68
8	28.3	33 709	+ 300	27 17	+113	33 131	+ 309	06 57	+118	07 600	+ 350	54 55	+118	28 835	+ 345	28 70	+ 73
9	7.2	34 010	+ 301	26 42	+ 75	33 442	+ 311	05 84	+ 73	07 956	+ 356	53 92	+ 63	29 181	+ 346	29 46	+ 76
9	17.2	34 304	+ 294	26 10	+ 32	33 746	+ 304	05 63	+ 21	08 304	+ 348	53 91	+ 1	29 520	+ 339	30 21	+ 75
9	27.2	34 588	+ 284	26 18	- 8	34 040	+ 294	05 88	- 25	08 640	+ 336	54 46	- 55	29 850	+ 330	30 95	+ 74
10	7.1	34 859	+ 271	26 68	- 50	34 322	+ 282	06 63	- 75	08 959	+ 319	55 60	-114	30 168	+ 318	31 68	+ 73
10	17.1	35 112	+ 253	27 57	- 89	34 581	+ 259	07 85	-122	09 251	+ 292	57 28	-168	30 467	+ 299	32 36	+ 68
10	27.1	35 344	+ 232	28 80	-123	34 819	+ 238	09 44	-159	09 512	+ 261	59 40	-212	30 747	+ 280	33 02	+ 66
11	6.1	35 552	+ 208	30 33	-153	35 030	+ 211	11 40	-196	09 737	+ 225	61 94	-254	30 104	+ 257	33 66	+ 64
11	16.0	35 730	+ 178	32 08	-175	35 208	+ 178	13 61	-221	09 918	+ 181	64 77	-283	31 004	+ 226	33 66	+ 61
11	26.0	35 878	+ 148	33 97	-189	35 353	+ 145	15 97	-236	10 055	+ 137	67 77	-300	31 230	+ 195	34 27	+ 59
12	6.0	35 991	+ 113	35 95	-198	35 459	+ 106	18 44	-247	10 143	+ 88	70 86	-309	31 583	+ 158	35 44	+ 58
12	16.0	36 065	+ 74	37 91	-196	35 523	+ 64	20 86	-242	10 177	+ 34	73 90	-304	31 697	+ 114	36 00	+ 56
12	25.9	36 101	+ 36	39 78	-187	35 546	+ 23	23 19	-233	10 161	- 16	76 78	-288	31 769	+ 72	36 53	+ 53
12	35.9	36 094	- 7	41 53	-175	35 524	- 22	25 34	-215	10 090	- 71	79 44	-266	31 791	+ 22	37 02	+ 49
			- 48		-154		- 64		-189		- 120		-231		- 25		+ 42
Mean Place	33.676	47.40		33.092	29.54		07.534	81.05		28.955	22.74						
sec δ, tan δ	+1.032	-0.255		+1.099	-0.456		+1.343	-0.897		+1.139	+0.545						
dα(ψ), dδ(ψ)	+0.055	+0.14		+0.050	+0.14		+0.039	+0.14		+0.075	+0.14						
dα(ε), dδ(ε)	+0.006	+0.94		+0.010	+0.94		+0.020	+0.94		-0.012	+0.94						
Dble.Trans.	November 30			December 1			December 1		December 1								

AT UPPER TRANSIT AT GREENWICH

No.	174		1130		1128		177		
	τ Tauri		β Caeli		Groombridge 866 (Persei)		μ Mensae		
Mag.Spect.	4.33	B5	5.08	F5	5.77	B8	5.69	B9	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	4 41	+ 22 55	4 41	- 37 09	4 42	+ 49 56	4 43	- 70 56	
1 <sup>d</sup>	-9.1	24 732 + 82	58 82 + 21	34 988 + 15	75 85 - 281	18 346 + 95	63 28 + 182	16 756 - 185	86 30 - 325
1	0.9	24 772 + 40	59 02 + 20	34 988 - 34	75 85 - 260	18 346 + 33	63 28 + 173	16 756 - 302	86 30 - 298
1	10.9	24 766 - 6	59 19 + 17	34 954 - 81	78 45 - 235	18 379 - 32	65 01 + 159	16 454 - 411	89 28 - 264
1	20.9	24 714 - 52	59 32 + 13	34 744 - 129	80 80 - 198	18 347 - 97	66 60 + 136	16 043 - 513	91.92 - 219
1	30.8	24 623	59 41 + 9	34 577 - 167	82 78 - 158	18 250 - 152	67 96 + 111	15 530 - 590	94.11 - 169
2	9.8	24 496 - 127	59 43 + 2	34 376 - 201	85 52 - 116	17 897 - 201	69 87 + 80	14 284 - 656	96.97 - 117
2	19.8	24 342 - 154	59 38 - 5	34 149 - 227	86 19 - 67	17 657 - 240	69 87 + 46	14 284 - 702	96.97 - 59
3	1.8	24 172 - 170	59 25 - 13	33 909 - 240	86 40 - 21	17 657 - 259	70 33 + 10	13 582 - 720	97.56 - 3
3	11.7	23 995 - 177	59 05 - 20	33 663 - 246	86 16 + 24	17 398 - 269	70 43 - 24	12 862 - 728	97.59 + 51
3	21.7	23 823 - 172	58 79 - 26	33 423 - 240	85 42 + 74	17 129 - 259	70 19 - 60	12 134 - 707	97.08 + 107
3	31.7	23 670 - 153	58 48 - 31	33 202 - 221	84 27 + 115	16 636 - 234	68 70 - 89	10 762 - 665	94.45 + 156
4	10.6	23 541 - 129	58 16 - 32	33 006 - 196	82 69 - 197	16 439 - 197	67 55 - 115	10 148 - 614	92.42 + 203
4	20.6	23 449 - 92	57 85 - 31	33 006 - 159	82 69 + 197	16 439 - 146	67 55 - 135	10 148 - 536	92.42 + 247
4	30.6	23 399 - 50	57 85 - 26	32 847 - 117	80 72 + 230	16 293 - 87	66 20 - 148	09 612 - 448	89.95 + 281
5	10.6	23 394 - 5	57 40 - 19	32 730 - 70	78 42 + 261	16 206 - 24	64 72 - 155	09 164 - 353	87.14 + 313
5	20.5	23 441 + 47	57 32 - 8	32 643 - 17	72 96 + 285	16 228 + 46	61.61 - 156	08 573 - 238	80.65 + 336
5	30.5	23 541 + 100	57 39 + 7	32 672 + 33	69 95 + 301	16 341 + 113	60 12 - 115	08 445 - 128	77.15 + 350
6	9.5	23 667 + 126	57 49 + 10	32 766 + 86	66 80 + 315	16 519 + 178	58 72 - 140	08 434 - 11	73.55 + 360
6	19.5	23 855 + 188	57 79 + 30	32 766 + 137	66 80 + 317	16 519 + 241	57 49 - 123	08 434 + 111	73.55 + 358
6	29.4	24 078 + 223	58 22 + 43	33 899 + 181	63 63 + 312	16 760 + 294	57 49 - 104	08 545 + 218	69.97 + 347
7	9.4	24 335 + 257	58 77 + 55	33 304 + 224	57 49 + 302	17 397 + 343	55 63 - 82	09 091 + 328	63.21 + 329
7	19.4	24 620 + 285	59 42 + 65	33 564 + 260	54 71 + 278	17 780 + 383	55 06 - 57	09 529 + 429	60.22 + 299
7	29.3	24 923 + 303	60 15 + 73	33 852 + 288	52 21 + 250	18 191 + 411	54 74 - 32	10 029 + 509	57.59 + 263
8	8.3	25 243 + 320	60 93 + 78	34 164 + 312	52 21 + 214	18 191 + 435	54 74 - 8	10 029 + 586	57.59 + 218
8	18.3	25 571 + 328	61 74 + 81	34 492 + 328	50 07 + 168	18 626 + 450	54 84 + 18	10 615 + 641	55 41 + 163
8	28.3	25 901 + 330	62 53 + 79	34 827 + 335	47 18 + 121	19 531 + 455	55 24 + 40	11 930 + 674	52.70 + 108
9	7.2	26 232 + 331	63 30 + 77	35 166 + 339	46 51 + 67	19 989 + 458	55 87 + 63	12 627 + 697	52.25 + 45
9	17.2	26 556 + 324	64 00 + 70	35 326 + 332	46 51 + 8	19 989 + 450	55 87 + 85	12 627 + 689	52.25 - 21
9	27.2	26 871 + 315	64 64 + 64	35 498 + 322	46 43 - 46	20 439 + 438	56 72 + 103	13 316 + 685	52.46 - 83
10	7.2	27 175 + 304	65 20 + 56	36 126 + 306	46 89 - 103	20 877 + 423	57 75 + 122	13 981 + 625	53.29 - 147
10	17.1	27 461 + 286	65 67 + 47	36 406 + 280	49 47 - 155	21 698 + 396	60 35 + 138	15 160 + 554	56 80 - 204
10	27.1	27 729 + 268	66 08 + 41	36 660 + 254	51 47 - 200	22 069 + 371	61 86 + 151	15 634 + 474	59.31 - 251
11	6.1	27 974 + 245	66 41 + 33	36 881 + 221	53 86 - 239	22 069 + 339	61 86 + 165	16 013 + 379	62.25 - 294
11	16.0	28 191 + 217	66 69 + 28	37 062 + 181	56 54 - 268	22 408 + 295	63 51 + 174	16 013 + 262	62.25 - 324
11	26.0	28 379 + 188	66 94 + 25	37 203 + 141	59 38 - 284	22 703 + 251	65 25 + 181	16 275 + 147	65 49 - 339
12	6.0	28 531 + 152	67 16 + 22	37 298 + 95	62 33 - 295	23 152 + 198	68 91 + 185	16 443 + 21	72 35 - 347
12	16.0	28 642 + 111	67 36 + 20	37 343 + 45	65 23 - 290	23 290 + 138	70 74 + 183	16 334 - 109	75 72 - 337
12	25.9	28 711 + 69	67 56 + 20	37 342 - 1	67 99 - 276	23 367 + 77	72 52 + 178	16 106 - 228	78 90 - 318
12	35.9	28 735 - 22	67 72 + 16	37 290 - 52	70 55 - 256	23 367 + 10	74 18 + 166	15 758 - 348	81 80 - 290
			67 72 + 14	37 290 - 99	70 55 - 222	23 377 - 54	74 18 + 148	15 758 - 454	81 80 - 248
Mean Place	26.000	54.57	34.777	72.93	19.816	56.35	11.890	81.37	
sec δ, tan δ	+1.086	+0.423	+1.255	-0.758	+1.554	+1.190	+3.065	-2.897	
dα(ψ), dδ(ψ)	+0.072	+0.13	+0.042	+0.13	+0.091	+0.13	-0.011	+0.13	
dα(ε), dδ(ε)	-0.009	+0.94	+0.017	+0.94	-0.026	+0.94	+0.064	+0.94	
Dbles. Trans.	December 1		December 1		December 2		December 2		

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1131		176		1132		175		
	56 Eridani		$\mu$ Eridani		268 G. Eridani		4 Camelopardi		
Mag. Spect.	5.87	B5	4.18	B5	5.97	A2	5.35	A2	
U.T.	R.A.		R.A.		R.A.		R.A.		
	Dec.		Dec.		Dec.		Dec.		
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	4 43	- 8 31	4 44	- 3 16	4 45	- 28 06	4 46	+ 56 44	
1	-9.1	25 580 + 60	40 86 -163	48 728 + 66	41.93 -135	53 241 + 37	42 38 -253	51 088 + 106	11.25 +218
1	0.9	25 601 + 21	42 38 -152	48 756 + 28	43.20 -127	53 234 - 7	44 74 -236	51 120 + 32	13.33 +208
1	10.9	25 580 - 21	43 77 -139	48 742 - 14	44.36 -116	53 183 - 51	46 88 -214	51 075 - 45	15.26 +193
1	20.9	25 519 - 61	44 97 -120	48 687 - 55	45.37 -101	53 087 - 96	48 71 -183	50 953 -122	16.94 +168
1	30.8	25 423 - 96	45 96 - 99	48 597 - 90	46.20 - 83	52 954 -133	50 19 -148	50 768 -185	18.31 +137
2	9.8	25 294 -129	46 73 - 77	48 474 -123	46.86 - 66	52 788 -166	51.31 -112	50 523 -245	19.35 +104
2	19.8	25 141 -153	47 24 - 51	48 326 -148	47.31 - 45	52 596 -192	52.01 - 70	50 235 -288	19.98 + 63
3	1.8	24 974 -167	47 50 - 26	48 164 -162	47.57 - 26	52 391 -205	52 29 - 28	49 922 -313	20.20 + 22
3	11.7	24 800 -174	47 52 - 2	47 994 -170	47.63 - 6	52 178 -213	52 18 + 11	49 598 -324	20.00 - 20
3	21.7	24 630 -170	47 27 + 25	47 828 -166	47.47 + 16	51 970 -208	51.63 + 55	49 284 -314	19.39 - 61
3	31.7	24 476 -154	46 78 + 49	47 678 -150	47.11 + 36	51 778 -192	50 71 + 92	49 000 -284	18.43 - 96
4	10.6	24 343 -133	46 04 + 74	47 549 -129	46.55 + 56	51 608 -170	49 41 +130	48 756 -244	17.14 -129
4	20.6	24 243 -100	45 05 + 99	47 453 - 96	45.76 + 79	51 473 -135	47 74 +167	48 571 -185	15.59 -155
4	30.6	24 181 - 62	43 83 +122	47 394 - 59	44.79 + 97	51 377 - 96	45 77 +197	48 453 -118	13.87 -172
5	10.6	24 158 - 23	42 39 +144	47 376 - 18	43.61 +118	51 323 - 54	43 50 +227	48 408 - 45	12.03 -184
5	20.5	24 182 + 24	40 75 +164	47 403 + 27	42.24 +137	51 319 - 4	40 99 +251	48 444 + 36	10.15 -188
5	30.5	24 249 + 67	38 96 +179	47 473 + 70	40.73 +151	51 362 + 43	38 32 +267	48 557 +113	08.31 -184
6	9.5	24 359 +110	37 01 +195	47 586 +113	39 07 +166	51 451 + 89	35 50 +282	48 746 +189	06.55 -176
6	19.5	24 511 +152	34 98 +203	47 741 +155	37 30 +177	51 589 +138	32 63 +287	49 009 +263	04.94 -161
6	29.4	24 699 +188	32 92 +206	47 932 +191	35 50 +180	51 765 +176	29 79 +284	49 333 +324	03 54 -140
7	9.4	24 920 +221	30 86 +206	48 155 +223	33 67 +183	51 981 +216	27 01 +278	49 715 +382	02 36 -118
7	19.4	25 169 +249	28 88 +198	48 405 +250	31 89 +178	52 229 +248	24 42 +259	50 146 +431	01 46 - 90
7	29.3	25 437 +268	27 04 +184	48 674 +269	30 22 +167	52 501 +272	22 06 +236	50 616 +466	00 83 - 63
8	8.3	25 721 +284	25 38 +166	48 959 +285	28 69 +153	52 794 +293	20 01 +205	51 108 +496	00 49 - 34
8	18.3	26 015 +294	23 99 +139	49 254 +295	27 39 +130	53 101 +307	18 37 +164	51 623 +515	00 45 - 4
8	28.3	26 313 +298	22 87 +112	49 552 +298	26 32 +107	53 414 +313	17 15 +122	52 147 +524	00 69 + 24
9	7.2	26 612 +299	22 09 + 78	49 851 +299	25 53 + 79	53 731 +317	16 41 + 74	52 675 +528	01 21 + 52
9	17.2	26 905 +293	21 69 + 40	50 144 +293	25 08 + 45	54 043 +312	16 20 + 21	53 197 +522	02 01 + 80
9	27.2	27 189 +284	21 64 + 5	50 429 +285	24 93 + 15	54 345 +302	16 49 - 29	53 706 +509	03 05 +104
10	7.2	27 462 +273	21 97 - 33	50 704 +275	25 12 - 19	54 634 +289	17 30 - 81	54 198 +492	04 33 +128
10	17.1	27 718 +256	22 65 - 68	50 961 +257	25 62 - 50	54 903 +269	18 60 -130	54 662 +464	05 84 +151
10	27.1	27 955 +237	23 64 - 99	51 201 +240	26 39 - 77	55 148 +245	20 30 -170	55 095 +433	07 54 +189
11	6.1	28 171 +216	24 90 -126	51 420 +219	27 41 -102	55 367 +219	22 38 -208	55 488 +393	09 43 +179
11	16.0	28 357 +186	26 37 -147	51 611 +191	28 61 -120	55 551 +184	24 74 -236	55 831 +343	11 45 +202
11	26.0	28 516 +159	27 97 -160	51 775 +164	29 92 -131	55 701 +150	27 26 -252	56 122 +291	13 57 +212
12	6.0	28 640 +124	29 65 -168	51 905 +130	31 32 -140	55 811 +110	29 90 -264	56 349 +227	15 77 +220
12	16.0	28 726 + 86	31 33 -168	51 997 + 92	32 71 -139	55 877 + 66	32 50 -260	56 504 +155	17 95 +218
12	25.9	28 774 + 48	32 94 -161	52 052 + 55	34 06 -135	55 900 + 23	34 99 -249	56 588 + 84	20 09 +214
12	35.9	28 780 + 6	34 46 -152	52 064 + 12	35 32 -126	55 876 - 24	37 31 -232	56 593 + 5	22 10 +201
		- 35	-133	- 28	-112	- 68	-204	- 72	+181
Mean Place	26.330	41.45	49 587	43.27	53 416	41.01	52 547	03.76	
sec $\delta$ , tan $\delta$	+1.011	-0.150	+1.002	-0.057	+1.134	-0.534	+1.823	+1.524	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.057	+0.13	+0.060	+0.13	+0.048	+0.13	+0.100	+0.12	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.003	+0.94	+0.001	+0.95	+0.011	+0.95	-0.032	+0.95	
Dble. Trans.	December 2		December 2		December 2		December 3		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	173		1133		1134		179	
	Groombridge 848 (Camelopardi)		Bradley 658 (Persei)		$\pi^3$ Orionis		$\pi^4$ Orionis	
Mag.Spect.	6.04	F0	5.10	K2	3.31	F8	3.78	B3
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	4 46	+75 54	4 48	+37 27	4 49	+6 56	4 50	+5 34
1 -9.1	59 185 +114	74.96 +306	58 615 +99	61.10 +109	05 328 +78	21.29 -79	28.157 +79	60.58 -87
1 0.9	59 131 -54	77.88 +292	58 663 +48	62.14 +104	05 367 +39	20.56 -73	28.197 +40	59.77 -81
1 10.9	58 907 -224	80.61 +273	58 658 -5	63.11 +97	05 364 -3	19.89 -67	28.194 -3	59.03 -74
1 20.9	58 517 -390	83.00 +239	58 598 -60	63.94 +83	05 318 -46	19.31 -58	28.149 -45	58.38 -65
1 30.8	57 990 -527	84.99 +199	58 492 -106	64.62 +68	05 236 -82	18.82 -49	28.067 -82	57.83 -55
2 9.8	57 341 -649	86.52 +153	58 344 -148	65.10 +48	05 119 -117	18.41 -41	27.951 -116	57.38 -45
2 19.8	56 603 -738	87.50 +98	58 162 -182	65.37 +27	04 977 -142	18.10 -31	27.951 -143	57.05 -33
3 1.8	55 820 -783	87.93 +43	57 962 -200	65.41 +4	04 819 -158	17.90 -20	27.650 -158	56.83 -22
3 11.7	55 017 -803	87.80 -13	57 751 -211	65.22 -19	04 653 -166	17.78 -12	27.482 -168	56.72 -11
3 21.7	54 242 -775	87.10 -70	57 546 -205	64.82 -40	04 490 -163	17.78 +0	27.319 -163	56.73 +1
3 31.7	53 533 -709	85.91 -119	57 361 -185	64.23 -59	04 343 -147	17.89 +11	27.170 -149	56.87 +14
4 10.6	52 912 -621	84.26 -165	57 203 -158	63.48 -75	04 218 -125	18.12 +23	27.042 -128	57.13 +26
4 20.6	52 419 -493	82.22 -204	57 087 -116	62.62 -86	04 126 -92	18.50 +38	26.947 -95	57.55 +42
4 30.6	52 071 -348	79.91 -231	57 019 -68	61.70 -92	04 071 -55	19.00 +50	26.889 -58	58.11 +56
5 10.6	51 876 -195	77.38 -253	57 001 -18	60.76 -94	04 058 -13	19.65 +65	26.871 -18	58.83 +72
5 20.5	51 857 -19	74.74 -264	57 042 +41	59.86 -90	04 091 +33	20.46 +81	26.900 +29	59.70 +87
5 30.5	52 002 +145	72.11 -263	57 137 +95	59.04 -82	04 168 +77	21.39 +93	26.972 +72	60.70 +100
6 9.5	52 312 +310	69.53 -258	57 285 +148	58.67 -72	04 287 +119	22.47 +108	27.087 +115	61.85 +115
6 19.5	52 786 +474	67.11 -242	57 485 +200	57.74 -58	04 450 +163	23.67 +120	27.245 +158	63.12 +127
6 29.4	53 397 +611	64.91 -220	57 730 +245	57.31 -43	04 648 +198	24.95 +128	27.438 +193	64.46 +134
7 9.4	54 139 +742	62.97 -194	58 015 +285	57.06 -25	04 878 +230	26.28 +133	27.664 +226	65.86 +140
7 19.4	54 996 +857	61.37 -160	58 333 +318	56.98 -8	05 136 +258	27.61 +133	27.917 +253	67.25 +139
7 29.3	55 936 +940	60.12 -125	58 333 +341	57.08 +10	05 412 +276	28.91 +130	28.189 +272	68.59 +134
8 8.3	56 955 +1019	59.26 -86	59 035 +361	57.33 +25	05 704 +292	30.14 +123	28.478 +289	69.86 +127
8 18.3	58 024 +1069	58.81 -45	59 408 +373	57.73 +40	06 005 +301	31.24 +110	28.777 +299	70.99 +113
8 28.3	59 121 +1097	58.76 -5	59 785 +377	58.24 +51	06 310 +305	32.19 +95	29.078 +301	71.95 +96
9 7.2	60 237 +1116	59.13 +37	60 165 +380	58.87 +63	06 616 +306	32.94 +75	29.382 +304	72.71 +76
9 17.2	61 343 +1106	59.92 +79	60 539 +374	59.60 +73	06 917 +301	33.48 +54	29.681 +299	73.23 +52
9 27.2	62 422 +1079	61.08 +116	60 904 +365	60.39 +79	07 209 +292	33.79 +31	29.973 +292	73.52 +29
10 7.2	63 465 +1043	62.64 +156	61 258 +354	61.26 +87	07 492 +283	33.86 +7	30.255 +282	73.56 +4
10 17.1	64 438 +973	64.56 +192	61 593 +335	62.18 +92	07 759 +267	33.71 -15	30.521 +266	73.36 -20
10 27.1	65 335 +897	66.78 +222	61 908 +315	63.15 +97	08 009 +250	33.36 -35	30.771 +250	72.96 -40
11 6.1	66 135 +800	69.32 +254	62 198 +290	64.16 +101	08 239 +230	32.83 -53	31.001 +230	72.36 -60
11 16.0	66 811 +676	72.07 +275	62 455 +257	65.21 +105	08 442 +203	32.17 -66	31.204 +203	71.62 -74
11 26.0	67 358 +547	75.00 +293	62 677 +222	66.29 +108	08 618 +176	31.42 -75	31.381 +177	70.79 -83
12 6.0	67 752 +394	78.06 +306	62 858 +181	67.39 +110	08 760 +142	30.61 -81	31.524 +143	69.90 -89
12 16.0	67 979 +227	81.11 +305	62 991 +133	68.47 +108	08 865 +105	29.80 -81	31.630 +106	69.00 -90
12 25.9	68 043 +64	84.11 +300	63 075 +84	69.53 +106	08 932 +67	29.02 -78	31.697 +67	68.14 -86
12 35.9	67 927 -116	86.96 +285	63 104 +29	70.53 +100	08 956 +24	28.28 -74	31.722 +25	67.32 -82
	67 927 -283	86.96 +257	63 104 -24	70.53 +89	08 956 -18	28.28 -66	31.722 -18	67.32 -72
Mean Place	60.254	66.57	59.998	55.19	06.380	18.55	29.165	57.86
sec $\delta$ , tan $\delta$	+4.110	+3.987	+1.260	+0.766	+1.007	+0.122	+1.005	+0.098
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.162	+0.12	+0.081	+0.12	+0.064	+0.12	+0.064	+0.12
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.083	+0.95	-0.016	+0.95	-0.002	+0.95	-0.002	+0.95
Dble.Trans.	December 3		December 3		December 3		December 4	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1135		1136		178		180	
	97 Tauri		o <sup>1</sup> Orionis		α Camelopardi		π <sup>1</sup> Orionis	
Mag.Spect.	5.12	F0	5.19	M0	4.38	B0	3.87	B3
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ′	h m	° ′	h m	° ′	h m	° ′
	4 50	+ 18 49	4 51	+ 14 13	4 52	+ 66 19	4 53	+ 2 25
1 <sup>d</sup>	33 809 <sup>s</sup>	07.73 <sup>°</sup>	44.933 <sup>s</sup>	47.72 <sup>°</sup>	40.742 <sup>s</sup>	23.97 <sup>°</sup>	31.885 <sup>s</sup>	11.91 <sup>°</sup>
1	33 856	07.67	44.979	47.40	40.765	26.52	31.925	10.92
1	33 859	07.63	44.982	47.10	40.683	28.90	31.923	10.00
1	33 816	07.58	44.939	46.84	40.496	31.00	31.878	09.21
1	33 733	07.53	44.859	46.61	40.222	32.76	31.796	08.55
2	33 615	07.45	44.743	46.40	39.868	34.12	31.681	08.01
2	33 467	07.36	44.599	46.22	39.455	35.00	31.538	07.62
3	33 304	07.23	44.439	46.07	39.009	35.41	31.379	07.38
3	33 131	07.08	44.269	45.92	38.546	35.32	31.211	07.27
3	32 962	06.90	44.103	45.81	38.095	34.72	31.046	07.33
3	32 808	06.73	43.952	45.75	37.683	33.70	30.896	07.54
4	32 677	06.56	43.823	45.73	37.322	32.27	30.765	07.90
4	32 581	06.44	43.727	45.80	37.038	30.50	30.667	08.44
4	32 525	06.38	43.670	45.95	36.844	28.50	30.605	09.14
5	32 512	06.41	43.655	46.22	36.744	26.31	30.583	10.01
5	32 549	06.54	43.688	46.60	36.753	24.03	30.607	11.05
5	32 633	06.75	43.766	47.08	36.864	21.76	30.674	12.22
6	32 752	07.11	43.885	47.72	37.077	19.54	30.784	13.54
6	32 926	07.66	44.050	48.52	37.390	17.47	30.936	14.97
6	33 135	08.27	44.252	49.38	37.788	15.60	31.124	16.47
7	33 378	08.99	44.487	50.33	38.267	13.97	31.344	18.01
7	33 649	09.78	44.750	51.33	38.814	12.63	31.592	19.52
7	33 939	10.61	45.032	52.33	39.412	11.61	31.860	20.97
8	34 246	11.46	45.330	53.32	40.057	10.91	32.144	22.33
8	34 563	12.29	45.639	54.26	40.731	10.58	32.439	23.51
8	34 883	13.08	45.951	55.10	41.421	10.59	32.738	24.50
9	35 206	13.79	46.265	55.82	42.123	10.95	33.040	25.26
9	35 523	14.41	46.574	56.40	42.818	11.66	33.337	25.75
9	35 833	14.91	46.876	56.82	43.499	12.69	33.627	25.98
10	36 133	15.30	47.169	57.09	44.160	14.05	33.908	25.93
10	36 417	15.56	47.446	57.18	44.782	15.72	34.173	25.61
10	36 684	15.73	47.707	57.14	45.362	17.64	34.423	25.06
11	36.931	15.80	47.948	56.97	45.887	19.82	34.652	24.30
11	37.151	15.80	48.162	56.71	46.342	22.19	34.856	23.38
11	37.342	15.76	48.349	56.39	46.723	24.72	35.032	22.36
12	37.499	15.69	48.502	56.02	47.015	27.36	35.175	21.27
12	37.616	15.60	48.616	55.65	47.208	30.00	35.281	20.17
12	37.693	15.53	48.691	55.29	47.302	32.61	35.349	19.12
12	37.725	15.45	48.722	54.95	47.288	35.09	35.374	18.12
Mean Place	35.010	03.56	46.069	43.97	42.088	16.08	32.834	09.33
sec δ, tan δ	+1.056	+0.341	+1.032	+0.254	+2.490	+2.280	+1.001	+0.042
dα(ψ), dδ(ψ)	+0.070	+0.12	+0.068	+0.12	+0.119	+0.12	+0.062	+0.11
dα(ε), dδ(ε)	-0.007	+0.95	-0.005	+0.96	-0.044	+0.96	-0.001	+0.96
Dble.Trans.	December 4		December 4		December 4		December 4	



AT UPPER TRANSIT AT GREENWICH

No.	1138		181		183		1137	
	η Mensae		ι Aurigae		ε Aurigae		ζ Aurigae	
Mag. Spect.	5.28	K0	2.90	K2	3.1 to 3.8	F5p	3.94 var.	K0, B1
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	Dec.	h m	Dec.	h m	Dec.	h m	Dec.
	4 55	-74 57	4 56	+33 08	5 00	+43 48	5 01	+41 03
1	40.975 <sup>s</sup> -228	32.32 <sup>"</sup> -330	05.429 <sup>s</sup> +105	49.88 <sup>"</sup> +82	58.495 <sup>s</sup> +120	22.01 <sup>"</sup> +145	30.571 <sup>s</sup> +118	31.87 <sup>"</sup> +128
1	40.599 -376	35.37 -305	05.485 +56	50.66 +78	58.557 +62	23.42 +141	30.634 +63	33.12 +125
1	40.081 -650	38.11 -274	05.490 +5	51.40 +74	58.560 +3	24.75 +133	30.640 +6	34.30 +118
1	39.431 -650	40.41 -230	05.443 -47	52.05 +65	58.501 -59	25.92 +117	30.588 -52	35.35 +105
1	38.681 -750	42.23 -182	05.350 -93	52.59 +54	58.390 -111	26.91 +99	30.484 -104	36.23 +88
2	37.844 -837	43.56 -133	05.216 -134	52.98 +39	58.230 -160	27.68 +77	30.334 -150	36.91 +68
2	36.944 -900	44.30 -74	05.049 -167	53.20 +22	58.031 -199	28.17 +49	30.146 -188	37.35 +44
3	36.017 -927	44.51 -21	04.862 -187	53.24 +4	57.810 -221	28.38 +21	29.936 -210	37.53 +18
3	35.076 -941	44.17 +34	04.664 -198	53.10 -14	57.574 -236	28.31 -7	29.712 -224	37.45 -8
3	34.154 -922	43.26 +91	04.470 -194	52.79 -31	57.342 -232	27.94 -37	29.492 -220	37.10 -35
3	33.278 -876	41.87 +139	04.292 -178	52.33 -46	57.129 -213	27.32 -62	29.289 -203	36.53 -57
4	32.460 -818	40.00 +187	04.140 -152	51.75 -58	56.944 -185	26.47 -85	29.113 -176	35.76 -77
4	31.733 -727	37.68 +232	04.026 -114	51.08 -67	56.802 -142	25.44 -103	28.979 -134	34.83 -93
4	31.109 -624	35.01 +267	03.957 -69	50.37 -71	56.711 -91	24.30 -114	28.893 -86	33.80 -103
5	30.600 -509	32.01 +300	03.936 -21	49.66 -71	56.674 -37	23.08 -122	28.859 -34	32.71 -109
5	30.228 -372	28.75 +326	03.969 +33	49.00 -66	56.700 +26	21.85 -123	28.885 +26	31.62 -109
5	29.993 -235	25.33 +342	04.055 +86	48.42 -58	56.784 +84	20.66 -119	28.968 +83	30.59 -103
6	29.900 -93	21.79 +354	04.189 +134	47.94 -48	56.927 +143	19.55 -111	29.107 +139	29.63 -96
6	29.961 +61	18.25 +354	04.374 +185	47.55 -39	57.128 +201	18.56 -99	29.301 +194	28.78 -85
6	30.159 +198	14.79 +346	04.602 +228	47.32 -23	57.377 +249	17.72 -84	29.541 +240	28.09 -69
7	30.497 +338	11.49 +330	04.869 +267	47.24 -8	57.672 +295	17.05 -67	29.826 +285	27.55 -54
7	30.967 +470	08.46 +303	05.168 +299	47.31 +7	58.005 +333	16.58 -47	30.147 +321	27.21 -34
7	31.546 +579	05.78 +268	05.490 +322	47.52 +21	58.366 +361	16.30 -28	30.494 +347	27.03 -18
8	32.228 +682	03.51 +227	05.831 +341	47.85 +33	58.751 +385	16.21 -9	30.865 +371	27.03 +0
8	32.989 +761	01.78 +173	06.185 +354	48.28 +43	59.152 +401	16.31 +10	31.251 +386	27.21 +18
8	33.801 +812	00.60 +118	06.543 +358	48.80 +52	59.560 +408	16.59 +28	31.643 +392	27.53 +32
9	34.652 +851	00.02 +58	06.905 +362	49.38 +58	59.974 +414	17.03 +44	32.041 +398	27.99 +46
9	35.503 +861	00.11 -9	07.263 +358	50.02 +64	60.384 +410	17.63 +60	32.436 +395	28.58 +59
9	36.331 +828	00.81 -70	07.613 +350	50.68 +66	60.787 +403	18.37 +74	32.823 +387	29.28 +70
9	37.116 +785	02.15 -134	07.954 +341	51.38 +70	61.181 +394	19.24 +87	33.202 +379	30.09 +81
10	37.819 +703	04.08 -193	08.278 +324	52.09 +71	61.555 +374	20.22 +98	33.562 +360	30.99 +90
10	38.425 +606	06.50 -242	08.583 +305	52.82 +73	61.909 +354	21.32 +110	33.903 +341	31.98 +99
11	38.914 +489	09.37 -287	08.867 +284	53.57 +75	62.237 +328	22.53 +121	34.219 +316	33.05 +107
11	39.256 +342	12.55 -318	09.119 +252	54.33 +76	62.530 +293	23.82 +129	34.502 +283	33.05 +115
11	39.453 +197	15.92 -337	09.340 +221	55.12 +79	62.785 +255	25.18 +136	34.749 +247	34.20 +120
12	39.490 +37	19.40 -348	09.522 +182	55.92 +80	62.995 +210	26.60 +142	34.953 +204	36.66 +126
12	39.360 -130	22.80 -340	09.659 +137	56.72 +80	63.151 +156	28.03 +143	35.107 +154	37.93 +127
12	39.079 -281	26.04 -324	09.749 +90	57.51 +79	63.254 +103	29.45 +142	35.208 +101	39.18 +125
12	38.642 -437	29.02 -298	09.788 +39	58.26 +75	63.295 +41	30.81 +136	35.252 +44	40.39 +121
12		-573		+69		+125		+111
Mean Place	34.142	29.11	06.761	44.17	59.881	15.43	31.943	25.46
sec δ, tan δ	+3.853	-3.721	+1.194	+0.653	+1.386	+0.959	+1.326	+0.871
dα(ψ), dδ(ψ)	-0.034	+0.11	+0.078	+0.11	+0.086	+0.10	+0.084	+0.10
dα(ε), dδ(ε)	+0.069	+0.96	-0.012	+0.96	-0.016	+0.97	-0.015	+0.97
Dbble. Trans.	December 5		December 5		December 6		December 6	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1139		182		184		1140		
	26 G. Caeli		$\beta$ Camelopardi		$\iota$ Tauri		11 Orionis		
Mag. Spect.	6.00	K0	4.22	G0p	4.70	A5	4.65	B9	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	
	5 01	-31 47	5 02	+60 25	5 02	+21 34	5 03	+15 23	
<b>1</b>	-9.0	52.116 + 47	25.73 -274	11.417 + 139	33.08 +237	16.046 + 103	22.23 + 8	46.672 + 100	14.15 - 31
<b>1</b>	0.9	52.118 + 2	28.31 -258	11.472 + 55	35.36 +228	16.106 + 60	22.33 + 10	46.730 + 58	13.87 - 28
<b>1</b>	10.9	52.071 - 47	30.67 -236	11.441 - 31	37.52 +216	16.120 + 14	22.43 + 10	46.744 + 14	13.63 - 24
<b>1</b>	20.9	51.977 - 94	32.72 -205	11.321 - 120	39.45 +193	16.085 - 35	22.52 + 9	46.711 - 33	13.42 - 21
<b>1</b>	30.8	51.843 - 134	34.41 -169	11.127 - 194	41.08 +163	16.009 - 76	22.60 + 8	46.638 - 73	13.25 - 17
<b>2</b>	9.8	51.672 - 171	35.72 -131	10.864 - 263	42.37 +129	15.894 - 115	22.64 + 4	46.527 - 111	13.09 - 16
<b>2</b>	19.8	51.472 - 200	36.59 - 87	10.548 - 316	43.24 + 87	15.749 - 145	22.63 - 1	46.387 - 140	12.95 - 14
<b>3</b>	1.8	51.255 - 217	37.02 - 43	10.200 - 348	43.68 + 44	15.584 - 165	22.58 - 5	46.228 - 159	12.83 - 12
<b>3</b>	11.7	51.027 - 228	37.04 + 2	09.834 - 366	43.68 - 45	15.407 - 177	22.46 - 12	46.057 - 171	12.72 - 11
<b>3</b>	21.7	50.803 - 224	36.59 + 45	09.474 - 360	43.23 - 45	15.233 - 174	22.30 - 16	45.888 - 169	12.62 - 10
<b>3</b>	31.7	50.592 - 211	35.74 + 85	09.141 - 333	42.38 - 85	15.072 - 161	22.10 - 20	45.732 - 156	12.55 - 7
<b>4</b>	10.7	50.401 - 191	34.48 +126	08.848 - 293	41.16 -122	14.933 - 139	21.88 - 22	45.596 - 136	12.52 - 3
<b>4</b>	20.6	50.244 - 157	32.83 +165	08.616 - 232	39.62 -154	14.827 - 106	21.68 - 20	45.492 - 104	12.55 + 3
<b>4</b>	30.6	50.124 - 120	30.86 +197	08.456 - 160	37.86 -176	14.761 - 66	21.50 - 18	45.426 - 66	12.66 + 11
<b>5</b>	10.6	50.047 - 77	28.56 +230	08.372 - 84	35.93 -193	14.738 - 23	21.38 - 12	45.402 - 24	12.85 + 19
<b>5</b>	20.5	50.019 - 28	26.01 +255	08.377 + 5	33.92 -201	14.765 + 27	21.35 - 3	45.424 + 22	13.16 + 31
<b>5</b>	30.5	50.039 + 20	23.27 +274	08.466 + 89	31.90 -202	14.839 + 74	21.41 + 6	45.493 + 69	13.56 + 40
<b>6</b>	9.5	50.107 + 68	20.37 +290	08.639 + 173	29.92 -198	14.942 + 103	21.45 + 4	45.601 + 108	14.06 + 50
<b>6</b>	19.5	50.225 + 118	17.40 +297	08.895 + 256	28.07 -185	15.115 + 173	21.87 + 42	45.756 + 155	14.75 + 69
<b>6</b>	29.4	50.384 + 159	14.45 +295	09.221 + 326	26.39 -168	15.318 + 203	22.28 + 41	45.949 + 193	15.51 + 76
<b>7</b>	9.4	50.584 + 200	11.55 +290	09.613 + 392	24.92 -147	15.556 + 238	22.78 + 50	46.176 + 227	16.34 + 83
<b>7</b>	19.4	50.820 + 236	08.84 +271	10.063 + 450	23.71 -121	15.824 + 268	23.37 + 59	46.433 + 257	17.22 + 88
<b>7</b>	29.4	51.084 + 264	06.36 +248	10.556 + 493	22.77 - 94	16.112 + 288	24.02 + 65	46.709 + 276	18.12 + 90
<b>8</b>	8.3	51.373 + 289	04.19 +217	11.087 + 531	22.12 - 65	16.419 + 307	24.70 + 68	47.004 + 295	19.01 + 89
<b>8</b>	18.3	51.678 + 305	02.44 +175	11.644 + 557	21.79 - 33	16.738 + 319	25.38 + 68	47.310 + 306	19.85 + 84
<b>8</b>	28.3	51.994 + 316	01.12 +132	12.214 + 570	21.76 - 3	17.062 + 324	26.05 + 67	47.622 + 312	20.60 + 75
<b>9</b>	7.2	52.317 + 323	00.29 + 83	12.796 + 582	22.02 + 26	17.389 + 327	26.66 + 61	47.938 + 316	21.26 + 66
<b>9</b>	17.2	52.637 + 320	00.02 + 27	13.375 + 579	22.60 + 58	17.714 + 325	27.21 + 55	48.250 + 312	21.77 + 51
<b>9</b>	27.2	52.951 + 314	00.27 - 25	13.945 + 570	23.45 + 85	18.032 + 318	27.67 + 46	48.557 + 307	22.15 + 38
<b>10</b>	7.2	53.255 + 304	01.07 - 80	14.501 + 556	24.60 +115	18.343 + 311	28.05 + 38	48.857 + 300	22.37 + 22
<b>10</b>	17.1	53.539 + 284	02.39 -132	15.028 + 527	26.00 +140	18.640 + 297	28.33 + 28	49.143 + 286	22.44 + 7
<b>10</b>	27.1	53.801 + 262	04.15 -176	15.523 + 495	27.64 +164	18.921 + 281	28.54 + 21	49.414 + 271	22.39 - 5
<b>11</b>	6.1	54.037 + 236	06.33 -218	15.979 + 456	29.51 +187	19.182 + 261	28.68 + 14	49.666 + 252	22.22 - 17
<b>11</b>	16.1	54.238 + 201	08.81 -248	16.379 + 400	31.56 +205	19.417 + 235	28.77 + 9	49.892 + 226	22.22 - 26
<b>11</b>	26.0	54.404 + 166	11.48 -267	16.723 + 344	33.75 +219	19.624 + 207	28.84 + 7	50.092 + 200	21.66 - 30
<b>12</b>	6.0	54.528 + 124	14.30 -282	16.997 + 274	36.06 +231	19.796 + 172	28.89 + 5	50.258 + 166	21.32 - 34
<b>12</b>	16.0	54.606 + 78	17.10 -280	17.190 + 193	38.40 +234	19.928 + 132	28.95 + 6	50.385 + 127	20.98 - 34
<b>12</b>	25.9	54.639 + 33	19.80 -270	17.305 + 115	40.72 +232	20.019 + 91	29.02 + 7	50.473 + 88	20.66 - 32
<b>12</b>	35.9	54.622 - 17	22.35 -255	17.329 + 24	42.96 +224	20.063 + 44	29.09 + 7	50.515 + 42	20.66 - 29
		- 64	-226	- 62	+205	- 4	+ 8	- 3	- 25
Mean Place	52.118	25.79	12.785	25.53	17.255	17.34	47.801	09.74	
sec $\delta$ , tan $\delta$	+1.176	-0.620	+2.026	+1.762	+1.075	+0.395	+1.037	+0.275	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.045	+0.10	+0.106	+0.10	+0.071	+0.10	+0.068	+0.10	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.010	+0.97	-0.029	+0.97	-0.007	+0.97	-0.004	+0.97	
Dble. Trans.	December 7		December 7		December 7		December 7		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	187		186		189		185	
	η <sup>1</sup> Pictoris		ε Leporis		ζ Doradus		η Aurigae	
Mag.Spect.	4.92	K5	3.29	K5	4.76	F8	3.28	B3
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 5 04	<sup>o</sup> <sup>'</sup> -49 35	<sup>h</sup> <sup>m</sup> 5 04	<sup>o</sup> <sup>'</sup> -22 22	<sup>h</sup> <sup>m</sup> 5 05	<sup>o</sup> <sup>'</sup> -57 28	<sup>h</sup> <sup>m</sup> 5 05	<sup>o</sup> <sup>'</sup> +41 13
1 -9.0	38.041 + 11	45.54 -324	52.979 + 65	77.55 -238	18.616 - 21	88.62 -335	32.602 + 123	08.45 +129
1 0.9	37.990 - 51	48.58 -304	53.001 + 22	79.80 -225	18.522 - 94	91.76 -314	32.671 + 69	09.70 +125
1 10.9	37.879 - 111	51.37 -279	52.978 - 23	81.87 -207	18.355 - 167	94.62 -286	32.681 + 10	10.90 +120
1 20.9	37.708 - 171	53.78 -241	52.909 - 69	83.67 -180	18.119 - 236	97.09 -247	32.682 - 49	11.97 +107
1 30.9	37.489 - 219	55.75 -197	52.802 - 107	85.17 -150	17.826 - 293	99.10 -201	32.532 - 100	12.87 + 90
2 9.8	37.225 - 264	57.27 -152	52.659 - 143	86.35 -118	17.483 - 343	100.64 -154	32.384 - 148	13.58 + 71
2 19.8	36.927 - 298	58.26 - 99	52.488 - 171	87.15 - 80	17.101 - 382	101.62 - 98	32.198 - 186	14.05 + 47
3 1.8	36.610 - 317	58.73 - 47	52.299 - 189	87.59 - 44	16.698 - 403	102.06 - 44	31.988 - 210	14.26 + 21
3 11.7	36.281 - 329	58.69 + 4	52.100 - 199	87.59 - 8	16.283 - 415	101.98 + 8	31.764 - 224	14.21 - 5
3 21.7	35.955 - 326	58.11 + 58	51.902 - 198	87.35 + 32	15.873 - 410	101.32 + 66	31.542 - 222	13.90 - 31
3 31.7	35.647 - 308	57.04 +107	51.717 - 185	86.69 + 66	15.483 - 390	100.17 +115	31.338 - 204	13.36 - 54
4 10.7	35.364 - 283	55.50 +154	51.550 - 167	85.67 +102	15.122 - 361	98.53 +164	31.159 - 179	12.61 - 75
4 20.6	35.119 - 245	53.50 +200	51.415 - 135	84.31 +136	14.806 - 316	96.42 +211	31.021 - 138	11.69 - 92
4 30.6	34.921 - 198	51.14 +236	51.316 - 99	82.67 +164	14.544 - 262	93.94 +248	30.931 - 90	10.67 - 102
5 10.6	34.773 - 148	48.42 +272	51.256 - 60	80.73 +194	14.341 - 203	91.09 +285	30.893 - 38	09.58 -109
5 20.6	34.686 - 87	45.40 +302	51.243 - 13	78.55 +218	14.209 - 132	87.96 +313	30.914 + 21	08.49 -109
5 30.5	34.657 - 29	42.20 +320	51.274 + 31	76.19 +236	14.146 - 63	84.64 +332	30.993 + 79	07.44 -105
6 9.5	34.690 + 33	38.84 +336	51.350 + 76	73.66 +253	14.155 + 9	81.16 +348	31.127 +134	06.46 - 98
6 19.5	34.786 + 96	35.42 +342	51.472 +122	71.06 +260	14.239 + 84	77.63 +353	31.317 +190	05.59 - 87
6 29.4	34.938 + 152	32.05 +337	51.633 +161	68.45 +261	14.390 +151	74.17 +346	31.554 +237	04.86 - 73
7 9.4	35.144 + 206	28.76 +329	51.831 +198	65.87 +258	14.609 +219	70.80 +337	31.835 +281	04.29 - 57
7 19.4	35.401 + 257	25.71 +306	52.061 +230	63.42 +245	14.889 +280	67.69 +311	32.154 +319	03.90 - 39
7 29.4	35.697 + 296	22.96 +275	52.316 +255	61.18 +224	15.218 +329	64.88 +281	32.499 +345	03.68 - 22
8 8.3	36.030 + 333	20.57 +239	52.593 +277	59.18 +200	15.595 +377	62.47 +241	32.868 +369	03.63 - 5
8 18.3	36.391 + 361	18.67 +190	52.885 +292	57.54 +164	16.007 +412	60.56 +191	33.253 +385	03.76 +13
8 28.3	36.768 + 377	17.28 +139	53.186 +301	56.28 +126	16.441 +434	59.18 +138	33.646 +393	04.03 + 27
9 7.3	37.159 + 391	16.47 + 81	53.492 +306	55.45 + 83	16.893 +452	58.40 + 78	34.044 +398	04.44 + 41
9 17.2	37.549 + 390	16.29 + 18	53.797 +305	55.11 + 34	17.345 +452	58.27 + 13	34.440 +396	04.98 + 54
9 27.2	37.931 + 382	16.71 - 42	54.095 +298	55.23 - 12	17.788 +443	58.76 - 49	34.830 +390	05.64 + 66
10 7.2	38.300 + 369	17.76 -105	54.386 +291	55.85 - 62	18.215 +427	59.90 -114	35.212 +382	06.40 + 76
10 17.1	38.642 + 342	19.41 -165	54.659 +273	56.93 -108	18.607 +392	61.64 -174	35.575 +363	07.27 + 87
10 27.1	38.952 + 310	21.55 -214	54.915 +256	58.40 -147	18.959 +352	63.89 -225	35.921 +346	08.22 + 95
11 6.1	39.223 + 271	24.16 -261	55.147 +232	60.26 -186	19.261 +302	66.63 -274	36.242 +321	09.27 +105
11 16.1	39.445 + 222	27.12 -296	55.350 +203	62.38 -212	19.501 +240	69.71 -308	36.529 +287	10.39 +112
11 26.0	39.616 + 171	30.30 -318	55.522 +172	64.70 -232	19.677 +176	73.01 -330	36.782 +253	11.58 +119
12 6.0	39.729 + 113	33.63 -333	55.656 +134	67.13 -243	19.781 +104	76.46 -345	36.991 +209	12.82 +124
12 16.0	39.779 + 50	36.94 -331	55.749 + 93	69.57 -244	19.808 + 27	79.89 -343	37.150 +159	14.08 +126
12 26.0	39.769 - 74	40.13 -319	55.800 + 51	71.93 -236	19.762 - 46	83.19 -330	37.257 +107	15.34 +126
12 35.9	39.695 - 135	43.13 -300	55.805 + 5	74.16 -223	19.639 -123	86.27 -308	37.305 + 48	16.56 +122
		-265	-40	-198	-195	-273	-10	+113
Mean Place	36.966	44.78	53.324	78.77	16.694	87.41	33.965	01.96
sec δ, tan δ	+1.543	-1.175	+1.082	-0.412	+1.861	-1.569	+1.329	+0.876
dα(ψ), dδ(ψ)	+0.031	+0.10	+0.051	+0.09	+0.021	+0.09	+0.084	+0.09
dα(ε), dδ(ε)	+0.019	+0.97	+0.007	+0.97	+0.025	+0.97	-0.014	+0.97
Dble.Trans.	December 7		December 7		December 7		December 7	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1143		188		190		1142	
	13 G. Pictoris		$\beta$ Eridani		$\lambda$ Eridani		16 Orionis	
Mag.Spect.	7.10	A0	2.92	A3	4.34	B2	5.42	A2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	5 06	-44 49	5 07	- 5 05	5 08	- 8 45	5 08	+ 9 48
1	<sup>d</sup> -9.0 <sup>s</sup> 62.659 + 27	80.16 -315	<sup>s</sup> 10.317 + 85	68.69 -153	<sup>s</sup> 29.265 + 84	72.05 -173	<sup>s</sup> 33.982 + 101	51.04 -67
1	0.9 62.630 - 29	83.13 -297	10.362 + 45	70.14 -145	29.308 + 43	73.69 -164	34.041 + 59	50.43 -61
1	10.9 62.545 - 85	85.86 -273	10.364 + 2	71.47 -133	29.308 + 0	75.20 -151	34.057 + 16	49.87 -56
1	20.9 62.404 -141	88.22 -236	10.323 - 41	72.63 -116	29.263 - 45	76.52 -132	34.026 - 31	49.39 -48
1	30.9 62.217 -187	90.17 -195	10.243 - 80	73.59 - 96	29.181 - 82	77.62 -110	33.957 - 69	48.99 -40
2	9.8 61.987 -230	91.69 -152	10.128 -115	74.37 - 78	29.063 -118	78.50 - 88	33.850 -107	48.66 -33
2	19.8 61.725 -262	92.70 -101	09.984 -144	74.92 - 55	28.916 -147	79.12 - 62	33.713 -137	48.41 -25
3	1.8 61.444 -283	93.20 - 50	09.822 -162	75.25 - 33	28.752 -164	79.49 - 37	33.557 -156	48.23 -18
3	11.7 61.151 -291	93.22 - 2	09.650 -172	75.37 -12	28.575 -177	79.61 -12	33.389 -168	48.12 -11
3	21.7 60.860 -291	92.70 + 52	09.478 -172	75.24 + 13	28.400 -175	79.45 + 16	33.222 -167	48.08 - 4
3	31.7 60.585 -275	91.72 + 98	09.318 -160	74.91 + 33	28.236 -164	79.05 + 40	33.066 -156	48.13 + 5
4	10.7 60.332 -253	90.28 +144	09.176 -142	74.35 + 56	28.090 -146	78.40 + 65	32.929 -137	48.27 +14
4	20.6 60.116 -216	88.39 +189	09.064 -112	73.56 + 79	27.974 -116	77.50 + 90	32.823 -106	48.51 +24
4	30.6 59.942 -174	86.14 +225	08.987 - 77	72.58 + 90	27.892 - 82	76.37 +113	32.754 - 69	48.86 +35
5	10.6 59.815 -127	83.53 +261	08.949 - 38	71.38 +120	27.849 - 43	75.01 +136	32.724 - 30	49.33 +47
5	20.6 59.744 - 71	80.63 +290	08.955 + 6	70.00 +138	27.850 + 1	73.45 +156	32.739 + 15	49.94 +61
5	30.5 59.729 - 15	77.55 +308	09.004 + 49	68.46 +154	27.894 + 44	71.73 +172	32.799 + 60	50.65 +71
6	9.5 59.769 + 40	74.29 +326	09.095 + 91	66.77 +169	27.980 + 86	69.86 +187	32.900 +101	51.49 +84
6	19.5 59.867 + 98	70.97 +332	09.229 +134	64.99 +178	28.110 +130	67.89 +197	33.045 +145	52.46 +97
6	29.4 60.016 +149	67.68 +329	09.399 +170	63.15 +184	28.275 +165	65.88 +201	33.227 +182	53.51 +105
7	9.4 60.215 +199	64.47 +321	09.603 +204	61.30 +185	28.476 +201	63.86 +202	33.444 +217	54.62 +111
7	19.4 60.460 +245	61.48 +299	09.836 +233	59.51 +179	28.706 +230	61.91 +195	33.689 +245	55.74 +112
7	29.4 60.740 +280	58.76 +272	10.091 +255	57.82 +169	28.958 +252	60.08 +183	33.955 +266	56.85 +111
8	8.3 61.054 +314	56.40 +236	10.364 +273	56.27 +155	29.229 +271	58.43 +165	34.239 +284	57.91 +106
8	18.3 61.392 +338	54.50 +190	10.650 +286	54.96 +131	29.515 +286	57.03 +140	34.536 +297	58.87 +96
8	28.3 61.745 +353	53.10 +140	10.943 +293	53.89 +107	29.806 +291	55.91 +112	34.839 +303	59.70 +83
9	7.3 62.110 +365	52.25 + 85	11.240 +297	53.13 + 76	30.104 +298	55.12 + 79	35.146 +307	60.37 +67
9	17.2 62.474 +364	52.02 + 23	11.536 +296	52.70 + 43	30.399 +295	54.71 + 41	35.451 +305	60.84 +47
9	27.2 62.832 +358	52.38 - 36	11.826 +290	52.61 + 9	30.690 +291	54.65 + 6	35.752 +301	61.13 +29
10	7.2 63.178 +346	53.35 - 97	12.109 +283	52.86 - 25	30.974 +284	54.98 - 33	36.046 +294	61.20 + 7
10	17.1 63.501 +323	54.90 -155	12.378 +269	53.45 - 59	31.244 +270	55.68 - 70	36.326 +280	61.07 -13
10	27.1 63.796 +295	56.94 -204	12.632 +254	54.33 - 88	31.498 +254	56.69 -101	36.593 +267	60.77 -30
11	6.1 64.057 +261	59.45 -251	12.867 +235	55.48 -115	31.733 +235	57.99 -130	36.842 +249	60.31 -46
11	16.1 64.274 +217	62.30 -285	13.076 +209	56.83 -135	31.942 +209	59.52 -153	37.065 +223	60.73 -58
11	26.0 64.446 +172	65.37 -307	13.258 +182	58.31 -148	32.124 +182	61.19 -167	37.263 +198	59.08 -65
12	6.0 64.567 +121	68.60 -323	13.408 +150	59.88 -157	32.272 +148	62.96 -177	37.428 +165	58.38 -70
12	16.0 64.630 + 8	71.81 -321	13.519 +111	61.46 -158	32.382 +110	64.74 -178	37.556 +128	57.68 -70
12	26.0 64.638 + 63	74.93 -312	13.592 + 73	62.98 -152	32.453 + 71	66.46 -172	37.644 + 88	57.02 -66
12	35.9 64.588 - 50	77.85 -292	13.622 + 30	64.42 -144	32.481 + 28	68.09 -163	37.688 + 44	56.39 -63
	-107	-261	-14	-129	-16	-145	-1	-55
Mean Place	61.947	79.99	11.099	71.55	29.969	74.69	35.027	46.88
sec $\delta$ , $\tan \delta$	+1.410	-0.994	+1.004	-0.089	+1.012	-0.154	+1.015	+0.173
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.035	+0.09	+0.059	+0.09	+0.057	+0.09	+0.066	+0.09
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.015	+0.97	+0.001	+0.97	+0.002	+0.97	-0.003	+0.97
Dble.Trans.	December 8		December 8		December 8		December 8	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1141		1144		192		196	
	B.D. +27° 732' ρ. (Tauri)		μ Leporis		μ Aurigae		δ Doradus	
Mag.Spect.	5.97	A3	3.30	A0p	4.78	A3	4.78	K0
U.T.	R.A. Dec.		R.A. Dec.		R.A. Dec.		R.A. Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	5 08	+28 00	5 12	-16 12	5 12	+38 28	5 13	-67 11
1 -9.0	52.897 +116	56.54 +47	18.922 +79	72.85 -213	28.845 +129	16.25 +111	49.660 -64	62.25 -344
1 0.9	52.966 +69	57.02 +48	18.960 +38	74.86 -201	28.922 +77	17.35 +110	49.493 -167	65.49 -324
1 10.9	52.986 +20	57.48 +46	18.953 -7	76.72 -186	28.942 +20	18.40 +105	49.226 -267	68.46 -297
1 20.9	52.955 -31	57.90 +42	18.901 -52	78.35 -163	28.905 -37	19.35 +95	48.863 -363	71.04 -258
1 30.9	52.879 -76	58.26 +36	18.810 -91	79.71 -136	28.817 -88	20.18 +83	48.423 -440	73.17 -213
2 9.8	52.761 -118	58.54 +28	18.683 -127	80.80 -109	28.681 -136	20.84 +66	47.914 -509	74.83 -166
2 19.8	52.609 -152	58.71 +17	18.527 -156	81.57 -77	28.507 -174	21.29 +45	47.352 -562	75.92 -109
3 1.8	52.436 -173	58.77 +6	18.527 -175	82.01 -44	28.309 -198	21.51 +22	46.762 -590	76.47 -55
3 11.7	52.250 -186	58.70 -7	18.352 -187	82.01 -14	28.096 -213	21.51 +0	46.154 -608	76.47 +0
3 21.7	52.065 -185	58.51 -19	18.165 -186	81.94 +21	27.883 -213	21.27 -24	45.550 -604	75.91 +56
3 31.7	51.893 -172	58.21 -30	17.803 -176	81.43 +51	27.685 -198	20.82 -45	44.971 -579	74.83 +108
4 10.7	51.742 -151	57.84 -37	17.645 -158	80.61 -175	27.510 -137	20.19 -63	44.426 -545	73.26 +157
4 20.6	51.626 -116	57.41 -43	17.645 -128	80.61 +113	27.510 -175	20.19 -79	44.426 -488	73.26 +206
4 30.6	51.551 -75	57.41 -45	17.517 -94	79.48 +139	27.373 -91	19.40 -88	43.938 -419	71.20 +244
5 10.6	51.521 -30	56.96 -44	17.423 -56	78.09 +166	27.282 -42	18.52 -94	43.519 -344	68.76 +282
5 20.6	51.521 +21	56.52 -39	17.367 -11	76.43 +189	27.240 +15	17.58 -94	43.175 -252	65.94 +313
5 30.5	51.542 +70	56.13 -30	17.356 +33	74.54 +206	27.255 +70	16.64 -91	42.923 -161	62.81 +332
6 9.5	51.612 +115	55.83 -16	17.389 +76	72.48 +232	27.325 +123	15.73 -83	42.762 -64	59.49 +349
6 19.5	51.727 +163	55.67 -19	17.465 +120	70.26 +222	27.448 +177	14.90 -75	42.698 +40	56.00 +355
6 29.4	51.890 +207	55.48 -1	17.585 +157	67.94 +234	27.625 +222	14.15 -62	42.738 +132	52.45 +350
6 29.4	52.097 +244	55.47 +11	17.742 +194	65.60 +234	27.847 +266	13.53 -47	42.870 +228	48.95 +341
7 9.4	52.341 +276	55.58 +23	17.936 +225	63.26 +222	28.113 +302	13.06 -31	43.098 +317	45.54 +316
7 19.4	52.617 +298	55.81 +32	18.161 +248	61.04 +207	28.415 +329	12.75 -17	43.415 +392	42.38 +287
7 29.4	52.915 +319	56.13 +41	18.409 +270	58.97 +286	28.744 +352	12.58 -1	43.807 +463	39.51 +248
8 8.3	53.234 +333	56.54 +45	18.679 +285	57.11 +155	29.096 +369	12.57 +12	44.270 +520	37.03 +197
8 18.3	53.567 +339	56.99 +49	18.964 +293	55.56 +122	29.465 +377	12.69 +25	44.790 +558	35.06 +145
8 28.3	53.906 +344	57.48 +51	19.257 +300	54.34 +83	29.842 +384	12.94 +36	45.348 +588	33.61 +84
9 7.3	54.250 +342	57.99 +50	19.557 +299	53.51 +39	30.226 +383	13.30 +47	45.936 +597	32.77 +19
9 17.2	54.592 +337	58.49 +49	19.856 +294	53.12 -3	30.609 +377	13.77 +55	46.533 +588	32.58 -45
9 27.2	54.929 +330	58.98 +46	20.150 +288	53.15 -47	30.986 +371	14.32 +63	47.121 +568	33.03 -110
10 7.2	55.259 +316	59.44 +44	20.438 +274	53.62 -91	31.357 +355	14.95 +72	47.689 +522	34.13 -172
10 17.1	55.575 +301	59.88 +42	20.712 +257	54.53 -126	31.712 +339	15.67 +78	48.211 +466	35.85 -225
10 27.1	55.876 +281	60.30 +41	20.969 +237	55.79 -162	32.051 +316	16.45 +86	48.677 +397	38.10 -274
11 6.1	56.157 +253	60.71 +40	21.206 +210	57.41 -187	32.367 +286	17.31 +93	49.074 +307	40.84 -311
11 16.1	56.410 +225	61.11 +41	21.416 +181	59.28 -204	32.653 +252	18.24 +99	49.381 +216	43.95 -336
11 26.0	56.635 +188	61.52 +43	21.597 +146	61.32 -217	32.905 +212	19.23 +104	49.597 +113	47.31 -352
12 6.0	56.823 +146	61.95 +44	21.743 +107	63.49 -217	33.117 +163	20.27 +108	49.710 +3	50.83 -350
12 16.0	56.969 +102	62.39 +45	21.850 +66	65.66 -212	33.280 +114	21.35 +108	49.713 -100	54.33 -340
12 26.0	57.071 +53	62.84 +45	21.916 +22	67.78 -199	33.394 +57	22.43 +107	49.613 -208	57.73 -319
12 35.9	57.124 +2	63.29 +42	21.938 -24	69.77 -180	33.451 +0	23.50 +99	49.405 -307	60.92 -284
Mean Place sec δ, tan δ	54.158 +1.133	50.92 +0.532	19.441 +1.041	75.24 -0.291	30.173 +1.277	09.85 +0.795	45.910 +2.581	62.04 -2.379
dα(ψ), dδ(ψ) dα(ε), dδ(ε)	+0.075 -0.008	+0.09 +0.98	+0.054 +0.004	+0.08 +0.98	+0.082 -0.011	+0.08 +0.98	-0.001 +0.032	+0.08 +0.98
Dble.Trans.	December 8		December 9		December 9		December 10	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	194		193		195		197		
	$\beta$ Orionis (Rigel)		$\alpha$ Aurigae (Capella)		$\tau$ Orionis		$\sigma$ Columbae		
Mag.Spect.	0.34	B8p	0.21	G0	3.68	B5	4.91	K0	
U.T.	R.A.		R.A.		R.A.		R.A.		
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	5 13	- 8 12	5 15	+45 59	5 16	- 6 51	5 16	-34 54	
1 -9.0	52.594 + 90	56.62 -173	40.061 + 141	14.36 +154	56.275 + 94	26.46 -167	59.966 + 59	27.00 -292	
1 0.9	52.642 + 48	58.25 -163	40.142 + 81	15.88 +152	56.327 + 52	28.03 -157	59.977 + 11	29.78 -278	
1 10.9	52.647 + 5	59.75 -150	40.161 + 19	17.33 +145	56.337 + 10	29.48 -145	59.936 - 41	32.35 -257	
1 20.9	52.608 - 39	61.07 -132	40.114 - 47	18.66 +133	56.301 - 36	30.75 -127	59.936 - 91	34.61 -226	
1 30.9	52.529 - 79	62.17 -110	40.010 -104	19.80 +114	56.226 - 75	31.82 -107	59.845 -135	36.51 -190	
2 9.8	52.415 -114	63.06 - 89	39.853 -157	20.73 + 93	56.114 -112	32.68 - 86	59.536 -174	38.02 -151	
2 19.8	52.270 -145	63.70 - 64	39.653 -200	21.38 + 65	55.972 -142	33.30 - 62	59.329 -207	39.08 -106	
3 1.8	52.107 -163	64.08 - 38	39.426 -227	21.73 + 35	55.811 -161	33.68 - 38	59.102 -227	39.69 - 61	
3 11.7	51.932 -175	64.22 -175	39.181 -245	21.78 + 5	55.637 -174	33.84 - 16	58.862 -240	39.85 - 16	
3 21.7	51.756 -176	64.10 +12	38.936 -245	21.52 - 26	55.462 -175	33.73 +11	58.622 -240	39.54 + 31	
3 31.7	51.591 -165	63.73 + 37	38.708 -228	20.97 - 55	55.298 -164	33.40 + 33	58.394 -228	38.80 + 74	
4 10.7	51.443 -148	63.12 + 61	38.505 -203	20.17 - 80	55.150 -148	32.83 + 57	58.184 -210	37.64 +116	
4 20.6	51.324 -119	62.25 + 87	38.344 -161	19.15 -102	55.031 -119	32.02 + 81	58.006 -178	36.05 +159	
4 30.6	51.239 - 85	61.16 +109	38.234 -110	17.97 -118	54.945 - 86	31.00 +102	57.865 -141	34.13 +192	
5 10.6	51.192 - 47	59.85 +131	38.178 - 56	16.69 -128	54.897 - 48	29.76 +124	57.765 -100	31.86 +227	
5 20.6	51.189 - 3	58.34 +151	38.186 + 8	15.35 -134	54.893 - 4	28.32 +144	57.714 - 51	29.31 +255	
5 30.5	51.229 + 40	56.67 +167	38.254 + 68	14.03 -132	54.931 + 38	26.73 +159	57.712 - 2	26.56 +275	
6 9.5	51.311 + 82	54.84 +183	38.383 +129	12.75 -128	55.012 + 81	24.98 +175	57.759 + 47	23.62 +294	
6 19.5	51.436 +125	52.91 +193	38.572 +189	11.57 -105	55.135 +123	23.13 +185	57.857 + 98	20.60 +302	
6 29.4	51.597 +161	50.94 +197	38.812 +240	10.52 -105	55.294 +159	21.24 +189	57.999 +142	17.59 +301	
7 9.4	51.793 +196	48.96 +198	39.101 +289	09.62 - 90	55.489 +195	19.33 +191	58.184 +185	14.61 +298	
7 19.4	52.020 +227	47.04 +192	39.431 +330	08.91 - 71	55.713 +224	17.47 +186	58.408 +224	11.81 +280	
7 29.4	52.268 +248	45.24 +180	39.792 +361	08.39 - 52	55.960 +247	15.73 +174	58.663 +255	09.24 +257	
8 8.3	52.537 +269	43.61 +163	40.181 +389	08.06 - 33	56.228 +268	14.14 +159	58.946 +283	06.97 +227	
8 18.3	52.820 +283	42.23 +138	40.589 +408	07.93 - 13	56.509 +281	12.79 +135	59.250 +304	05.11 +186	
8 28.3	53.110 +290	41.12 +111	41.008 +419	07.98 + 5	56.799 +290	11.70 +109	59.567 +317	03.70 +141	
9 7.3	53.407 +297	40.32 + 80	41.436 +428	08.22 + 24	57.095 +296	10.92 + 78	59.895 +328	02.79 + 91	
9 17.2	53.703 +296	39.91 + 41	41.863 +427	08.63 + 41	57.391 +296	10.50 + 42	60.224 +329	02.45 + 34	
9 27.2	53.994 +291	39.84 + 7	42.285 +422	09.19 + 56	57.683 +292	10.42 + 8	60.548 +324	02.65 - 20	
10 7.2	54.280 +286	40.16 - 32	42.700 +415	09.92 + 73	57.969 +286	10.71 - 29	60.866 +318	03.42 - 77	
10 17.1	54.552 +272	40.84 - 68	43.097 +397	10.79 + 87	58.243 +274	11.35 - 64	61.165 +299	04.74 -132	
10 27.1	54.810 +258	41.83 - 99	43.476 +379	11.80 +101	58.503 +260	12.30 - 95	61.444 +279	06.53 -179	
11 6.1	55.050 +240	43.12 -129	43.830 +354	12.95 +115	58.745 +242	13.53 -123	61.698 +254	08.77 -224	
11 16.1	55.263 +213	44.63 -151	44.149 +319	14.22 +127	58.962 +217	14.99 -146	61.916 +218	11.34 -257	
11 26.0	55.450 +187	46.28 -165	44.430 +281	15.59 +137	59.153 +191	16.58 -159	62.098 +182	14.14 -280	
12 6.0	55.604 +154	48.04 -176	44.665 +235	17.04 +145	59.311 +158	18.27 -169	62.237 +139	17.10 -296	
12 16.0	55.720 +116	49.81 -177	44.845 +180	18.54 +150	59.431 +120	19.98 -171	62.328 + 91	20.07 -297	
12 26.0	55.797 + 77	51.52 -171	44.969 +124	20.06 +152	59.512 + 81	21.63 -165	62.372 + 44	22.97 -290	
12 35.9	55.830 + 33	53.15 -163	45.028 + 59	21.54 +148	59.549 + 37	23.20 -157	62.363 - 9	22.97 -275	
		-11	-145	- 4	+138	- 7	-140	- 59	-247
Mean Place	53.304	59.73	41.416	07.31	57.010	29.91	59.818	28.83	
sec $\delta$ , tan $\delta$	+1.010	-0.144	+1.439	+1.035	+1.007	-0.120	+1.219	-0.698	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.057	+0.08	+0.088	+0.08	+0.058	+0.07	+0.043	+0.07	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.002	+0.98	-0.013	+0.98	+0.001	+0.98	+0.009	+0.98	
Dble.Trans.	December 10		December 10		December 10		December 10		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1145		198		1146		199	
	λ Aurigae		12 G. Columbae		λ Leporis		ζ Pictoris	
Mag.Spect.	4.85	G0	5.75	A0	4.29	B1	5.52	F8
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	5 18	+ 40 05	5 18	- 27 22	5 18	- 13 11	5 18	- 50 36
1 -9.0	10.056 + 139	23 92 +118	51 231 + 72	53 84 -265	56 555 + 89	21 09 -201	63 367 + 27	71.46 -332
1 0.9	10.140 + 84	25 09 +117	51 258 + 27	56 35 -251	56 603 + 48	22.98 -189	63 331 - 36	74.60 -314
1 10.9	10.167 + 27	26 22 +113	51 238 - 20	58 69 -234	56 606 + 3	24.74 -176	63 232 - 99	77.52 -292
1 20.9	10.134 - 33	27 25 +103	51 169 - 69	60 75 -206	56 564 - 42	26.29 -155	63 069 - 163	80.08 -256
1 30.9	10.049 - 85	28 15 + 90	51 059 - 110	62 47 -172	56 483 - 81	27.59 -130	62 854 - 215	82.21 -213
2 9.8	09.914 - 135	28 88 + 73	50 911 - 148	63 86 -139	56 364 - 119	28 64 -105	62 591 - 263	83.91 -170
2 19.8	09.739 - 175	29 40 + 52	50 731 - 180	64 84 - 98	56 215 - 149	29 39 - 75	62 290 - 301	85.08 -117
3 1.8	09.539 - 200	29 67 + 27	50 531 - 200	65 42 - 58	56 046 - 169	29 85 - 46	61 967 - 323	85.74 - 66
3 11.8	09.321 - 218	29 71 + 4	50 318 - 213	65 60 - 18	55 864 - 182	30 02 - 17	61 628 - 339	85 88 - 14
3 21.7	09.103 - 218	29 48 - 23	50 104 - 214	65 35 + 25	55 681 - 183	29 88 + 14	61 289 - 339	85 87 + 41
3 31.7	08 899 - 204	29 04 - 44	49 901 - 203	64 72 + 63	55 509 - 172	29 45 + 43	60 965 - 324	84 58 + 89
4 10.7	08 718 - 143	28 38 - 66	49 715 - 186	63 71 +101	55 352 - 157	28 74 + 71	60 663 - 302	83 20 +138
4 20.6	08 575 - 98	27 56 - 82	49 559 - 156	62 31 +140	55 224 - 128	27 74 +100	60 397 - 266	81 34 +186
4 30.6	08 477 - 48	26 62 - 94	49 438 - 121	60 60 +171	55 130 - 94	26 49 +125	60 177 - 220	79 10 +271
5 10.6	08 429 - 48	25 60 -102	49 356 - 82	58 57 +203	55 073 - 57	24 99 +150	60 006 - 171	76 49 +261
5 20.6	08 440 + 11	24 56 -104	49 321 - 35	56 27 +230	55 060 - 13	23 27 +172	59 894 - 112	73 56 +293
5 30.5	08 505 + 65	23 55 -101	49 331 + 10	53 78 +249	55 090 + 30	21 37 +190	59 842 - 52	70 42 +314
6 9.5	08 625 + 120	22 59 - 96	49 387 + 56	51 10 +268	55 162 + 72	19 32 +205	59 851 + 9	67 09 +333
6 19.5	08 800 + 175	21 72 - 87	49 490 + 103	48 34 +276	55 278 + 116	17 16 +216	59 925 + 74	63 68 +341
6 29.5	09 022 + 222	20 97 - 75	49 634 + 144	45 57 +277	55 431 + 153	14 97 +219	60 055 + 130	60 30 +338
7 9.4	09 289 + 267	20 36 - 61	49 817 + 183	42 82 +275	55 620 + 189	12 78 +219	60 243 + 188	56 97 +333
7 19.4	09 594 + 305	19 90 - 46	50 037 + 220	40 21 +261	55 840 + 220	10 67 +211	60 484 + 241	53 86 +311
7 29.4	09 926 + 332	19 60 - 30	50 283 + 246	37 80 +241	56 084 + 244	08 70 +197	60 767 + 283	51 02 +284
8 8.3	10 284 + 358	19 46 - 14	50 555 + 272	35 66 +214	56 350 + 266	06 92 +178	61 091 + 324	48 53 +249
8 18.3	10 659 + 375	19 47 + 1	50 845 + 290	33 90 +176	56 630 + 280	05 42 +150	61 446 + 355	46 51 +202
8 28.3	11 043 + 384	19 60 + 13	51 147 + 302	32 53 +137	56 920 + 290	04 24 +118	61 821 + 375	44 98 +153
9 7.3	11 436 + 393	19 87 + 27	51 459 + 312	31 62 + 91	57 217 + 297	03 41 + 83	62 214 + 393	44 03 + 95
9 17.2	11 829 + 393	20 25 + 38	51 771 + 312	31 24 + 38	57 514 + 297	02 99 + 42	62 611 + 397	43 72 + 31
9 27.2	12 217 + 382	20 74 + 49	52 079 + 308	31 35 - 11	57 808 + 294	02 98 + 1	63 003 + 392	44 01 - 29
10 7.2	12 599 + 388	21 33 + 59	52 382 + 303	31 99 - 64	58 096 + 288	03 38 - 40	63 385 + 382	44 93 - 92
10 17.2	12 967 + 368	22 01 + 68	52 669 + 287	33 14 -115	58 372 + 276	04 19 - 81	63 743 + 358	46 47 -154
10 27.1	13 318 + 351	22 78 + 77	52 938 + 269	34 72 -158	58 633 + 261	05 35 -116	64 071 + 328	48 52 -205
11 6.1	13 647 + 329	23 65 + 87	53 185 + 247	36 72 -200	58 875 + 242	06 85 -150	64 363 + 292	51 07 -255
11 16.1	13 945 + 298	24 60 + 95	53 401 + 216	39 03 -231	59 091 + 216	08 59 -174	64 605 + 242	54 00 -293
11 26.0	14 210 + 265	25 62 +102	53 586 + 185	41 56 -253	59 280 + 189	10 50 -191	64 797 + 192	57 18 -318
12 6.0	14 433 + 223	26 72 +110	53 731 + 145	44 23 -267	59 435 + 155	12 53 -203	64 930 + 133	60 54 -336
12 16.0	14 606 + 173	27 85 +113	53 833 + 102	46 93 -270	59 551 + 116	14 58 -205	64 999 + 69	63 91 -337
12 26.0	14 729 + 123	29 01 +116	53 891 + 58	49 55 -262	59 628 + 77	16 57 -199	65 005 + 6	67 19 -328
12 35.9	14 794 + 65	30 15 +114	53 901 + 10	52 05 -250	59 660 + 32	18 46 -189	65 005 - 61	70 30 -311
	+ 6	+107	- 38	-225	- 14	-169	- 124	-280
Mean Place	11.403	17.03	51.391	56.15	57.144	24.28	62.189	72.47
sec δ, tan δ	+1.307	+0.842	+1.126	-0.518	+1.027	-0.234	+1.576	-1.218
dα(ψ), dδ(ψ)	+0.083	+0.07	+0.048	+0.07	+0.055	+0.07	+0.029	+0.07
dα(ε), dδ(ε)	-0.010	+0.98	+0.006	+0.98	+0.003	+0.98	+0.014	+0.98
Dble.Trans.	December 11		December 11		December 11		December 11	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	191		1147		201		202	
	19 H. Camelopardi*		22 Orionis		γ Orionis (Bellatrix)		β Tauri	
Mag. Spect.	5.24	F8	4.65	B3	1.70	B2	1.78	B8
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> 5 <sup>m</sup> 20	<sup>o</sup> + 79 <sup>'</sup> 12	<sup>h</sup> 5 <sup>m</sup> 21	<sup>o</sup> - 0 <sup>'</sup> 23	<sup>h</sup> 5 <sup>m</sup> 24	<sup>o</sup> + 6 <sup>'</sup> 20	<sup>h</sup> 5 <sup>m</sup> 25	<sup>o</sup> + 28 <sup>'</sup> 35
<sup>d</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>
1 -9.0	18.601 + 292	72.43 +315	03.491 + 104	38.28 -132	23.399 + 112	22.27 - 93	25.024 + 135	55.02 + 46
1 0.9	18.670 + 69	75.53 +310	03.553 + 62	39.51 -123	23.470 + 71	21.41 - 86	25.111 + 87	55.50 + 48
1 10.9	18.509 - 161	78.51 +298	03.572 + 19	40.65 -114	23.497 + 27	20.63 - 78	25.147 + 36	55.99 + 49
1 20.9	18.117 - 392	81.23 +272	03.546 - 26	41.65 -100	23.478 - 19	19.95 - 68	25.131 - 16	56.46 + 47
1 30.9	17.529 - 588	83.61 +238	03.480 - 66	42.48 - 83	23.417 - 61	19.39 - 56	25.067 - 64	56.89 + 43
2 9.8	16.761 - 768	85.58 +197	03.376 - 104	43.16 - 68	23.318 - 99	18.93 - 46	24.959 - 108	57.25 + 36
2 19.8	15.849 - 912	87.03 +145	03.241 - 135	43.65 - 49	23.187 - 131	18.60 - 33	24.814 - 145	57.51 + 26
3 1.8	14.850 - 999	87.94 + 91	03.085 - 156	43.96 - 31	23.034 - 153	18.38 - 22	24.645 - 169	57.66 + 15
3 11.8	13.795 -1055	88.28 + 34	02.916 - 169	44.11 - 15	22.867 - 167	18.26 - 12	24.458 - 187	57.68 + 2
3 21.7	12.743 -1052	88.01 - 27	02.746 - 170	44.06 + 5	22.698 - 169	18.26 + 0	24.270 - 188	57.57 - 11
3 31.7	11.747 - 996	87.21 - 80	02.585 - 161	43.84 + 22	22.538 - 160	18.37 + 11	24.092 - 178	57.35 - 22
4 10.7	10.837 - 910	85.89 -132	02.440 - 145	43.45 + 39	22.395 - 143	18.60 + 23	23.933 - 159	57.03 - 32
4 20.6	10.067 - 770	84.10 -179	02.324 - 116	42.86 + 59	22.279 - 116	18.96 + 36	23.805 - 128	56.64 - 39
4 30.6	09.465 - 602	81.97 -213	02.241 - 83	42.10 + 83	22.198 - 81	19.44 + 48	23.717 - 88	56.20 - 44
5 10.6	09.045 - 420	79.53 -244	02.196 - 45	41.17 + 93	22.154 - 44	20.06 + 62	23.672 - 45	55.76 - 44
5 20.6	08.841 - 204	76.89 -264	02.194 - 2	40.06 +111	22.155 + 1	20.82 + 76	23.677 + 5	55.34 - 42
5 30.5	08.846 + 5	74.16 -273	02.234 + 40	38.82 +124	22.198 + 43	21.69 + 87	23.731 + 54	54.97 - 37
6 9.5	09.063 + 217	71.40 -276	02.317 + 83	37.43 +139	22.283 + 85	22.69 +100	23.833 + 102	54.71 - 26
6 19.5	09.497 + 434	68.71 -269	02.442 + 125	35.94 +149	22.410 + 127	23.79 +110	23.977 + 144	54.48 - 23
6 29.5	10.119 + 652	66.18 -253	02.603 + 161	34.38 +156	22.575 + 165	24.97 +118	24.169 + 192	54.34 - 14
7 9.4	10.925 + 806	63.83 -235	02.798 + 195	32.79 +159	22.774 + 199	26.21 +124	24.400 + 231	54.32 - 2
7 19.4	11.897 + 972	61.78 -205	03.024 + 226	31.24 +155	23.004 + 230	27.43 +122	24.664 + 264	54.41 + 9
7 29.4	12.999 +1102	60.03 -175	03.272 + 248	29.75 +149	23.256 + 252	28.62 +119	24.952 + 288	54.58 + 17
8 8.3	14.225 +1226	58.63 -140	03.540 + 268	28.38 +137	23.528 + 272	29.74 +112	25.263 + 311	54.82 + 24
8 18.3	15.543 +1318	57.63 -100	03.823 + 283	27.20 +283	23.814 + 286	30.73 + 99	25.590 + 327	55.12 + 30
8 28.3	16.921 +1378	57.02 - 61	04.113 + 290	26.23 + 97	24.108 + 294	31.56 + 83	25.926 + 336	55.46 + 34
9 7.3	18.351 +1430	56.82 - 20	04.410 + 297	25.51 + 72	24.410 + 302	32.20 + 64	26.270 + 344	55.81 + 35
9 17.2	19.793 +1442	57.07 + 25	04.707 + 297	25.08 + 43	24.712 + 302	32.61 + 41	26.614 + 344	56.16 + 35
9 27.2	21.225 +1432	57.71 + 64	05.001 + 294	24.94 + 14	25.011 + 299	32.79 + 18	26.956 + 342	56.50 + 34
10 7.2	22.633 +1408	58.79 +108	05.291 + 290	25.11 - 17	25.306 + 295	32.73 - 6	27.295 + 339	56.83 + 33
10 17.2	23.973 +1340	60.28 +149	05.569 + 278	25.59 - 48	25.591 + 285	32.44 - 29	27.621 + 326	57.14 + 31
10 27.1	25.231 +1258	62.13 +185	05.834 + 265	26.31 - 72	25.863 + 272	31.94 - 50	27.934 + 313	57.44 + 30
11 6.1	26.382 +1151	64.36 +223	06.083 + 249	27.28 - 97	26.119 + 256	31.26 - 68	28.230 + 296	57.75 + 31
11 16.1	27.384 +1002	66.89 +253	06.307 + 224	28.43 -115	26.352 + 233	30.43 - 83	28.500 + 270	58.07 + 32
11 26.0	28.228 + 844	69.66 +277	06.506 + 199	29.69 -126	26.560 + 208	29.52 - 91	28.743 + 243	58.42 + 35
12 6.0	28.882 + 654	72.66 +300	06.674 + 168	31.04 -135	26.737 + 177	28.55 - 97	28.950 + 207	58.80 + 38
12 16.0	29.320 + 438	75.75 +309	06.804 + 130	32.39 -135	26.876 + 139	27.59 - 96	29.115 + 165	59.21 + 41
12 26.0	29.544 + 224	78.86 +311	06.895 + 91	33.70 -131	26.976 + 100	26.66 - 93	29.115 + 120	59.65 + 44
12 35.9	29.530 - 14	81.92 +306	06.942 + 47	34.94 -124	27.032 + 56	25.79 - 87	29.235 + 70	59.65 + 47
	- 245	+286	+ 3	-110	+ 10	- 76	+ 18	+ 46
Mean Place	18.946	64.66	04.350	42.46	24.368	17.47	26.256	48.87
sec δ, tan δ	+5.345	+5.251	+1.000	-0.007	+1.006	+0.111	+1.139	+0.545
da(ψ), dδ(ψ)	+0.198	+0.07	+0.061	+0.07	+0.064	+0.06	+0.075	+0.06
da(ε), dδ(ε)	-0.060	+0.99	+0.000	+0.99	-0.001	+0.99	-0.005	+0.99
Dble. Trans.	December 11		December 11		December 12		December 12	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1148		1149		204		203	
	115 Tauri		18 G. Columbae		β Leporis*		17 Camelopardi	
Mag. Spect.	5.31	B3	5.85	A2	2.96	G0	5.75	K5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	5 26	+17 57	5 26	-40 56	5 27	-20 45	5 28	+63 03
1 -9.0	21 663 +125	10 42 -21	39 723 +60	74.92 -314	39 608 +90	67.21 -241	52 310 +202	33.76 +244
1 0.9	21 745 +82	10 25 -17	39 730 +7	77.91 -299	39 653 +45	69.49 -228	52 420 +110	36.18 +242
1 10.9	21 780 +35	10 12 -13	39 681 -49	80.70 -279	39 653 +0	71.63 -214	52 433 +13	38.54 +236
1 20.9	21 766 -14	10 04 -8	39 577 -104	83.17 -249	39 606 -47	73.52 -189	52 345 -88	40.71 +217
1 30.9	21 709 -57	09 99 -5	39 425 -152	85.26 -209	39 517 -89	75.12 -160	52 170 -175	42.64 +193
2 9.8	21 610 -99	09 95 -4	39 229 -196	86.95 -169	39 389 -128	76.43 -131	51 913 -257	44.25 +161
2 19.8	21 477 -133	09 93 -2	38 998 -231	88.16 -121	39 229 -160	77.37 -94	51 588 -325	45.46 +121
3 1.8	21 322 -155	09 90 -3	38 745 -253	88.90 -74	39 048 -181	77.96 -59	51 220 -368	46.24 +78
3 11.8	21 150 -172	09 85 -5	38 475 -270	89.16 -26	38 853 -195	78.21 -25	50 822 -398	46.57 +33
3 21.7	20 976 -174	09 80 -5	38 204 -271	88.91 +25	38 655 -198	78.07 +14	50 419 -403	46.43 -14
4 31.7	20 811 -165	09 74 -6	37 944 -260	88.20 +71	38 466 -189	77.60 +47	50 037 -382	45.84 -59
4 10.7	20 664 -147	09 68 -6	37 701 -243	87.03 +117	38 293 -173	76.78 +82	49 688 -349	44.85 -99
4 20.6	20 545 -119	09 65 -3	37 490 -211	85.42 +161	38 147 -146	75.61 +117	49 397 231	43.47 -138
4 30.6	20 463 -82	09 66 +1	37 317 -173	83.43 +199	38 035 -112	74.16 +145	49 176 -221	41.82 -165
5 10.6	20 420 -43	09 72 +6	37 187 -130	81.08 +235	37 959 -76	72.42 +174	49 033 -143	39.92 -190
5 20.6	20 423 +3	09 87 +15	37 107 -80	78.42 +266	37 928 -31	70.42 +200	48 982 -51	37.87 -205
5 30.5	20 472 +49	10 09 +22	37 079 -28	75.54 +288	37 940 +12	68.23 +219	49 020 +38	35.75 -212
6 9.5	20 566 +94	10 37 +28	37 103 +24	72.46 +308	37 996 +56	65.87 +236	49 148 +128	33.60 -215
6 19.5	20 697 +131	10 81 +44	37 181 +78	69.28 +318	38 097 +101	63.40 +247	49 367 +219	31.52 -208
6 29.5	20 873 +176	11 34 +53	37 308 +127	66.10 +318	38 237 +140	60.90 +250	49 666 +299	29.56 -196
7 9.4	21 085 +212	11 93 +59	37 482 +174	62.96 +314	38 414 +177	58.40 +250	50 040 +374	27.76 -180
7 19.4	21 328 +243	12 57 +64	37 700 +218	59.99 +297	38 626 +212	56.02 +238	50 483 +443	26.18 -158
7 29.4	21 594 +266	13 23 +66	37 953 +253	57.25 +274	38 863 +237	53.80 +222	50 978 +495	24.85 -133
8 8.3	21 880 +286	13 89 +66	38 240 +287	54.83 +242	39 125 +262	51.81 +199	51 522 +544	23.78 -107
8 18.3	22 182 +302	14 52 +63	38 552 +312	52.84 +199	39 404 +279	50.14 +167	52 103 +581	23.02 -76
8 28.3	22 492 +310	15 09 +57	38 881 +329	51.30 +154	39 695 +291	48.83 +131	52 707 +604	22.55 -47
9 7.3	22 809 +317	15 58 +49	39 225 +344	50.29 +101	39 996 +301	47.93 +90	53 332 +625	22.39 -16
9 17.2	23 127 +318	15 96 +38	39 573 +348	49.88 +41	40 299 +303	47.50 +43	53 962 +630	22.56 +17
9 27.2	23 443 +316	16 22 +26	39 918 +345	50.04 -16	40 599 +300	47.53 -3	54 590 +628	23.03 +47
10 7.2	23 756 +313	16 36 +14	40 258 +340	50.81 -77	40 896 +297	48.04 -51	55 211 +621	23.81 +78
10 17.2	24 057 +301	16 38 +2	40 579 +321	52.16 -135	41 180 +284	49.02 -98	55 809 +598	24.90 +109
10 27.1	24 347 +290	16 30 -8	40 879 +300	54.01 -165	41 449 +269	50.40 -138	56 379 +570	26.27 +137
11 6.1	24 620 +273	16 12 -18	41 152 +273	56.34 -233	41 699 +250	52.17 -177	56 912 +533	27.92 +165
11 16.1	24 870 +250	15 89 -23	41 386 +234	59.04 -270	41 922 +223	54.23 -206	57 390 +478	29.81 +189
11 26.0	25 095 +225	15 62 -27	41 581 +195	62.00 -296	42 116 +194	56.50 -227	57 810 +420	31.91 +210
12 6.0	25 287 +192	15 35 -27	41 729 +148	65.15 -315	42 274 +158	58.91 -241	58 157 +347	34.18 +227
12 16.0	25 440 +153	15 09 -26	41 824 +95	68.33 -318	42 392 +118	61.35 -244	58 418 +261	36.56 +238
12 26.0	25 553 +113	14 87 -22	41 866 +42	71.44 -311	42 468 +76	63.74 -239	58 592 +174	38.97 +241
12 35.9	25 618 +65	14 69 -18	41 852 -14	74.41 -297	42 497 +29	66.02 -228	58 668 +76	41.37 +240
	+18	-13	-70	-268	-18	-206	-24	+226
Mean Place	22.787	04.87	39.249	77.42	39.983	70.82	53.521	26.40
sec δ, tan δ	+1.051	+0.324	+1.324	-0.868	+1.070	-0.379	+2.207	+1.967
dα(ψ), dδ(ψ)	+0.070	+0.06	+0.038	+0.06	+0.051	+0.06	+0.113	+0.05
dα(ε), dδ(ε)	-0.003	+0.99	+0.008	+0.99	+0.004	+0.99	-0.018	+0.99
Dble. Trans.	December 13		December 13		December 13		December 13	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1152		206		1150		1151										
	20 G. Pictoris		$\delta$ Orionis		18 Camelopardi		$\chi$ Aurigae										
Mag. Spect.	5.54	G5	2.48	B0	6.46	G0	4.88	B1									
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.									
	h m	$^{\circ}$ /	h m	$^{\circ}$ /	h m	$^{\circ}$ /	h m	$^{\circ}$ /									
	5 29	-47 04	5 31	- 0 18	5 31	+57 12	5 31	+32 10									
1	-9.0	48 053	+ 52	70 33	-330	18 122	+ 114	25 27	-135	23 043	+ 188	53 52	+213	49 651	+ 146	65 11	+ 67
1	1.0	48 045	- 8	73 49	-316	18 194	+ 72	26 53	126	23 155	+ 112	55 64	+212	49 748	+ 97	65 81	+ 70
1	10.9	47 977	- 68	76 44	-295	18 222	+ 28	27 70	117	23 185	+ 30	57 72	+208	49 792	+ 44	66 51	+ 70
1	20.9	47 847	- 130	79 07	-263	18 204	18	28 72	102	23 130	- 55	59 64	+192	49 780	- 12	67 19	+ 68
1	30.9	47 666	- 181	81 29	-222	18 145	- 59	29 58	86	23 000	- 130	61 35	+171	49 719	- 61	67 81	+ 62
2	9.8	47 437	- 229	83 10	-181	18 047	- 98	30 28	- 70	22 799	- 201	62 78	+143	49 611	- 108	68 33	+ 52
2	19.8	47 169	- 268	84 40	-130	17 916	- 131	30 79	- 51	22 541	- 258	63 87	+109	49 463	- 148	68 73	+ 40
3	1.8	46 878	- 291	85 21	- 81	17 763	- 153	31 13	- 34	22 244	- 297	64 57	+ 70	49 288	- 175	68 98	+ 25
3	11.8	46 569	- 309	85 51	+ 20	17 595	- 168	31 29	- 16	21 920	- 324	64 88	+ 31	49 095	- 193	69 08	+ 10
3	21.7	46 257	- 312	85 28	- 33	17 423	- 172	31 26	+ 3	21 592	- 328	64 76	- 12	48 898	- 197	69 00	- 8
3	31.7	45 957	- 300	84 56	+ 72	17 260	- 163	31 07	+ 19	21 279	- 313	64 25	- 51	48 711	- 187	68 78	- 22
4	10.7	45 676	- 281	83 36	+120	17 112	- 148	30 69	+ 38	20 994	- 285	63 37	- 88	48 542	- 169	68 41	- 37
4	20.7	45 427	- 249	81 69	+167	16 990	- 122	30 13	+ 56	20 758	- 236	62 15	- 122	48 405	- 137	67 93	- 48
4	30.6	45 219	- 208	79 64	+205	16 900	- 90	29 40	+ 73	20 581	- 177	60 69	- 146	48 308	- 97	67 38	- 55
5	10.6	45 056	- 163	77 19	+245	16 847	- 53	28 50	+ 90	20 470	- 111	59 01	- 168	48 254	- 54	66 79	- 59
5	20.6	44 949	- 107	74 43	+276	16 837	- 10	27 42	+108	20 436	- 34	57 20	- 181	48 252	- 2	66 19	- 60
5	30.5	44 896	- 53	71 43	+300	16 869	+ 32	26 22	+120	20 477	+ 41	55 34	- 186	48 300	+ 48	65 62	- 57
6	9.5	44 901	+ 5	68.23	+320	16 942	+ 73	24 87	+135	20 595	+ 118	53 46	- 188	48 397	+ 97	65 12	- 50
6	19.5	44 965	+ 64	64.93	+330	17 058	+ 116	23 42	+145	20 789	+ 194	51 64	- 182	48 541	+ 144	64 69	- 43
6	29.5	45 083	+ 118	61.63	+330	17 210	+ 152	21 90	+152	21 050	+ 261	49 94	- 170	48 731	+ 190	64 32	- 37
7	9.4	45 254	+ 171	58.37	+326	17 397	+ 187	20 35	+155	21 374	+ 324	48 38	- 156	48 962	+ 231	64 06	- 26
7	19.4	45 475	+ 221	55.28	+309	17 615	+ 218	18 82	+153	21 756	+ 382	47 02	- 136	49 229	+ 267	63 93	- 13
7	29.4	45 737	+ 262	52.45	+283	17 856	+ 241	17 37	+145	22 180	+ 424	45 88	- 114	49 522	+ 293	63 89	- 4
8	8.3	46 037	+ 300	49.93	+252	18 118	+ 262	16.03	+134	22 646	+ 466	44 97	- 91	49 839	+ 317	63 94	+ 5
8	18.3	46 367	+ 330	47.86	+207	18 396	+ 278	14.87	+116	23 141	+ 495	44.33	- 64	50 174	+ 335	64 07	+ 13
8	28.3	46 718	+ 351	46.27	+159	18 683	+ 287	13.92	+ 95	23 655	+ 514	43.94	- 39	50 519	+ 345	64 27	+ 20
9	7.3	47 087	+ 369	45 23	+104	18 978	+ 295	13 22	+ 70	24 187	+ 532	43 82	- 12	50 873	+ 354	64 51	+ 24
9	17.2	47 462	+ 375	44.81	+ 42	19 275	+ 297	12.81	+ 41	24 723	+ 536	43 98	+ 16	51 230	+ 357	64 79	+ 28
9	27.2	47 836	+ 374	44.98	- 17	19 570	+ 295	12 69	+ 12	25 257	+ 534	44 39	+ 41	51 585	+ 355	65 10	+ 31
10	7.2	48 203	+ 367	45 79	- 81	19 863	+ 293	12 88	- 19	25 787	+ 530	45 06	+ 67	51 937	+ 352	65 43	+ 33
10	17.2	48 550	+ 347	47 20	-141	20 146	+ 283	13 37	- 49	26 298	+ 511	46 00	+ 94	52 279	+ 342	65 78	+ 35
10	27.1	48 873	+ 323	49 14	-194	20 417	+ 271	14 12	- 75	26 787	+ 489	47 17	+117	52 607	+ 328	66 16	+ 38
11	6.1	49 165	+ 292	51 58	-244	20 673	+ 256	15 11	- 99	27 247	+ 460	48 59	+142	52 919	+ 312	66 58	+ 42
11	16.1	49 413	+ 248	54 41	-283	20 905	+ 232	16 28	- 117	27 663	+ 416	50 21	+162	53 204	+ 285	67 04	+ 46
11	26.0	49 617	+ 204	57 52	-311	21 114	+ 209	17 57	- 129	28 031	+ 368	52 02	+181	53 462	+ 258	67 55	+ 51
12	6.0	49 767	+ 150	60 82	-330	21 291	+ 177	18 95	- 138	28 340	+ 309	53 99	+197	53 683	+ 221	68 12	+ 57
12	16.0	49 857	+ 90	64 16	-334	21 431	+ 140	20 33	- 138	28 578	+ 238	56 05	+206	53 860	+ 177	68 74	+ 62
12	26.0	49 889	+ 32	67 44	-328	21 532	+ 101	21 67	- 134	28 744	+ 166	58 16	+211	53 991	+ 131	69 39	+ 65
12	35.9	49 858	- 31	70 58	-314	21 589	+ 57	22 94	- 127	28 827	+ 83	60 26	+210	54 070	+ 79	70 07	+ 68
			- 92		-284		+ 11		- 113		- 1		+199		+ 24		+ 67
Mean Place	47.169	73.13		18.973	30.15	24.324	46.21	50.899	58.76								
sec $\delta$ , tan $\delta$	+1.469	-1.076		+1.000	-0.005	+1.847	+1.552	+1.182	+0.629								
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.033	+0.05		+0.061	+0.05	+0.102	+0.05	+0.078	+0.05								
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.009	+0.99		+0.000	+0.99	-0.013	+0.99	-0.005	+0.99								
Dble. Trans.	December 14		December 14		December 14		December 14										

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	207		214		212		208	
	α Leporis		γ Mensae		β Doradus		φ' Orionis	
Mag.Spect.	2.69	F0	5.06	K0	3.81 var.	F5p	4.53	B0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	5 32	-17 49	5 32	-76 20	5 33	-62 29	5 34	+ 9 28
1 -9.0	07 578 + 97	48 64 -228	32 684 -120	61 93 -346	33 162 + 10	52 11 -352	03 727 + 125	57 79 -76
1 1.0	07 633 + 55	50 82 -218	32 391 -293	65 23 -330	33 082 -80	55 47 -336	03 810 + 83	57 08 -71
1 10.9	07 641 + 8	52 85 -203	31 930 -461	68 31 -308	32 916 -166	58 62 -315	03 848 + 38	56 45 -63
1 20.9	07 603 -38	54 65 -180	31 308 -622	71 03 -272	32 662 -254	61 42 -280	03 839 -9	55 92 -53
1 30.9	07 523 -80	56 18 -153	30 557 -751	73 33 -230	32 337 -325	63 80 -238	03 786 -53	55 48 -44
2 9.8	07 403 -120	57 44 -126	29 690 -867	75 19 -186	31 947 -390	65 74 -194	03 694 -92	55 13 -35
2 19.8	07 251 -152	58 36 -92	28 733 -957	76 51 -132	31 505 -442	67 14 -140	03 567 -127	54 88 -25
3 1.8	07 078 -173	58 94 -58	27 724 -1009	77 30 -79	31 031 -474	68 01 -87	03 417 -150	54 71 -17
3 11.8	06 889 -189	59 21 -27	26 676 -1048	77 57 -27	30 534 -497	68 35 -34	03 251 -166	54 61 -10
3 21.7	06 697 -192	59 12 + 9	25 627 -1049	77 26 + 31	30 034 -500	68 11 + 24	03 081 -170	54 61 + 0
3 31.7	06 513 -184	58 71 + 41	24 607 -1020	76 45 + 81	29 550 -484	67 35 + 76	02 919 -162	54 68 + 7
4 10.7	06 344 -169	57 97 + 74	23 631 -976	75 14 +131	29 088 -462	66 09 +126	02 771 -148	54 83 + 15
4 20.7	06 201 -143	56 91 +106	22 734 -897	73 33 +181	28 671 -417	64 32 +177	02 651 -120	55 08 + 25
4 30.6	06 091 -110	55 58 +133	21 934 -800	71 12 +221	28 308 -363	62 14 +218	02 564 -87	55 43 + 35
5 10.6	06 017 -74	53 96 +162	21 244 -690	68 52 +260	28 005 -303	59 55 +259	02 514 -50	55 89 + 46
5 20.6	05 986 -31	52 10 +186	20 693 -551	65 59 +293	27 778 -227	56 63 +292	02 508 -6	56 47 + 58
5 30.5	05 998 + 12	50 06 +204	20 283 -410	62 44 +315	27 627 -151	53 46 +317	02 544 + 36	57 14 + 67
6 9.5	06 053 + 55	47 84 +222	20 024 -259	59 07 +337	27 555 -72	50 08 +338	02 623 + 79	57 93 + 79
6 19.5	06 153 + 100	45 51 +233	19 930 -94	55 62 +345	27 571 + 16	46 60 +348	02 744 + 121	58 82 + 89
6 29.5	06 290 + 137	43 15 +236	19 990 + 60	52 17 +345	27 665 + 94	43 12 +348	02 903 + 159	59 80 + 98
7 9.4	06 465 + 175	40 77 +238	20 210 + 220	48 78 +339	27 839 + 174	39 69 +343	03 097 + 194	60 82 +102
7 19.4	06 673 + 208	38 50 +227	20 586 + 376	45 59 +319	28 091 + 252	36 45 +324	03 322 + 225	61 86 +104
7 29.4	06 906 + 233	36 37 +213	21 094 + 508	42 67 +292	28 406 + 315	33 47 +298	03 570 + 248	62 87 +101
8 8.4	07 164 + 258	34 45 +192	21 735 + 641	40 09 +258	28 785 + 379	30 83 +264	03 840 + 270	63 83 + 96
8 18.3	07 439 + 275	32 84 +161	22 484 + 749	37 98 +211	29 215 + 430	28 66 +217	04 125 + 285	64 68 + 85
8 28.3	07 726 + 287	31 56 +128	23 313 + 829	36 37 +161	29 682 + 467	27 00 +166	04 420 + 295	65 41 + 73
9 7.3	08 023 + 297	30 66 + 90	24 210 + 897	35 34 +103	30 180 + 498	25 91 +109	04 723 + 303	65 97 + 56
9 17.2	08 323 + 300	30 22 + 44	25 137 + 927	34 96 + 38	30 690 + 510	25 48 + 43	05 028 + 305	66 34 + 37
9 27.2	08 622 + 299	30 21 + 1	26 064 + 927	35 20 -24	31 201 + 511	25 68 -20	05 332 + 304	66 50 + 16
10 7.2	08 917 + 295	30 66 -45	26 971 + 907	36 09 -89	31 703 + 502	26 53 -85	05 633 + 301	66 46 -4
10 17.2	09 200 + 283	31 56 -90	27 813 + 842	37 61 -152	32 174 + 471	28 03 -150	05 925 + 292	66 21 -25
10 27.1	09 471 + 271	32 85 -129	28 569 + 756	39 68 -207	32 607 + 433	30 09 -206	06 207 + 282	65 79 -42
11 6.1	09 723 + 252	34 51 -166	29 215 + 646	42 27 -259	32 988 + 381	32 68 -259	06 473 + 266	65 20 -59
11 16.1	09 950 + 227	36 46 -195	29 714 + 499	45 26 -289	33 300 + 312	35 67 -289	06 718 + 245	64 50 -70
11 26.1	10 149 + 199	38 60 -214	30 061 + 347	48 53 -327	33 540 + 240	38 96 -329	06 938 + 220	63 72 -78
12 6.0	10 314 + 165	40 88 -228	30 236 + 175	52 00 -347	33 697 + 157	42 47 -351	07 127 + 189	62 91 -81
12 16.0	10 439 + 125	43 20 -232	30 227 -9	55 50 -350	33 763 + 66	46 02 -355	07 279 + 152	62 10 -81
12 26.0	10 523 + 84	45 47 -227	30 045 -182	58 93 -343	33 742 -21	49 51 -349	07 392 + 113	61 33 -77
12 35.9	10 561 + 38	47 63 -216	29 683 -362	62 20 -327	33 628 -114	52 85 -334	07 459 + 67	60 62 -71
		-197	-528	-296	-201	-303	+ 21	-61
Mean Place	08 037	52 79	24 906	64 25	30 458	54 95	04 732	52 30
sec δ, tan δ	+1.050	-0.322	+4.238	-4.118	+2.166	-1.921	+1.014	+0.167
dα(ψ), dδ(ψ)	+0.053	+0.05	-0.047	+0.05	+0.011	+0.05	+0.066	+0.04
dα(ε), dδ(ε)	+0.003	+0.99	+0.033	+0.99	+0.015	+0.99	-0.001	+0.99
Dble.Trans.	December 14		December 14		December 15		December 15	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	209		210		211		1153	
	ι Orionis*		ε Orionis		ζ Tauri		35 G. Columbae	
Mag. Spect.	2.89	Oe5	1.75	B0	3.00	B3p	6.75	K2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	+21 08	h m	° /
	5 34	- 5 54	5 35	- 1 12	5 36		5 37	- 27 12
1 -9.0	45 57.5 +111	60.12 -167	30 83.7 +116	30 32 -141	49 09.2 +140	12 54 -5	34 50.5 +93	60 97 -272
1 1.0	45 64.5 +70	61.71 -159	30 91.3 +76	31.65 -133	49 18.6 +94	12 55 +1	34 55.1 +46	63.57 -260
1 10.9	45 67.1 +26	63.18 -147	30 94.4 +31	32.88 -123	49 23.3 +47	12 55 +5	34 59.7 -2	66.01 -244
1 20.9	45 65.0 -21	64.48 -130	30 92.8 -16	33.96 -108	49 22.9 -4	12 60 +8	34 54.9 -52	68.19 -218
1 30.9	45 58.8	65.58 -110	30 87.1 -57	34.87 -91	49 17.9 -50	12 68 +10	34 49.7 -96	70.05 -186
2 9.8	45 48.7 -101	66.48 -90	30 77.5 -96	35.61 -74	49 08.5 -94	12 89 +11	34 26.4 -137	71.59 -154
2 19.8	45 35.3 -134	67.15 -67	30 64.5 -130	36.16 -55	48 95.5 -130	12 98 +9	34 09.2 -172	72.73 -114
3 1.8	45 19.7 -156	67.58 -43	30 69.3 -152	36.52 -36	48 79.9 -156	13 04 +6	33 89.7 -195	73.47 -74
3 11.8	45 02.5 -172	67.79 -21	30 32.5 -168	36.70 -18	48 62.6 -173	13 05 +1	33 68.6 -211	73.82 -35
3 21.7	44 85.0 -175	67.75 +4	30 15.3 -172	36.67 +3	48 44.8 -178	13 03 -2	33 47.1 -215	73.74 +8
3 31.7	44 68.2 -168	67.49 +26	29 98.8 -165	36.47 +20	48 27.8 -170	12 96 -7	33 26.3 -208	73.27 +47
4 10.7	44 52.8 -154	67.00 +49	29 83.8 -150	36.09 +38	48 12.4 -154	12 86 -10	33 07.0 -193	72.42 +85
4 20.7	44 40.0 -128	66.28 +72	29 71.3 -125	35.51 +58	47 99.8 -126	12 86 -11	32 90.3 -167	71.17 +125
4 30.6	44 30.4 -96	65.36 +92	29 62.1 -92	34.76 +75	47 90.7 -91	12 64 -11	32 76.9 -134	69.60 +157
5 10.6	44 24.4 -60	64.22 +114	29 56.4 -57	33.83 +93	47 85.5 -52	12 56 -8	32 67.2 -97	67.71 +189
5 20.6	44 22.6 -18	62.89 +133	29 55.0 -14	32.72 +111	47 85.0 -5	12 54 -2	32 62.0 -52	65.53 +218
5 30.5	44 25.0 +24	61.41 +148	29 57.7 +27	31.48 +124	47 89.1 +41	12 57 +3	32 61.2 -8	63.14 +239
6 9.5	44 31.5 +65	59.77 +164	29 64.6 +69	30.10 +138	47 97.8 +87	12 67 +10	32 65.0 +38	60.56 +258
6 19.5	44 42.3 +108	58.03 +174	29 75.7 +111	28.61 +149	48 09.7 +119	12 82 +15	32 73.4 +84	57.86 +270
6 29.5	44 56.8 +145	56.24 +179	29 90.4 +147	27.06 +155	48 27.1 +174	13 16 +34	32 85.9 +125	55.13 +273
7 9.4	44 74.8 +180	54.42 +182	30 08.7 +183	25.48 +158	48 47.8 +207	13 52 +36	33 02.4 +165	52.40 +273
7 19.4	44 95.9 +211	52.64 +178	30 30.1 +214	23.92 +156	48 71.8 +240	13 41 +31	33 02.4 +202	49.79 +261
7 29.4	45 19.4 +235	50.97 +167	30 53.8 +237	22.44 +148	48 98.2 +264	14 38 +45	33 22.6 +231	47.37 +242
8 8.4	45 45.1 +257	49.43 +154	30 79.7 +259	21.08 +136	49 26.8 +286	14 45 +47	33 45.7 +258	45.18 +219
8 18.3	45 72.5 +274	48.12 +131	31 07.2 +275	19.90 +118	49 57.1 +303	15 31 +46	33 99.5 +280	43.35 +183
8 28.3	46 00.9 +284	47.06 +106	31 35.7 +285	18.94 +96	49 88.3 +312	15 73 +42	34 28.8 +293	41.91 +144
9 7.3	46 30.2 +293	46.30 +76	31 65.1 +294	18.24 +70	50 20.5 +322	16 11 +38	34 59.5 +307	40.91 +100
9 17.2	46 59.7 +295	45.88 +42	31 94.8 +297	17.83 +41	50 53.0 +325	16 40 +29	34 90.6 +311	40.44 +47
9 27.2	46 89.1 +294	45.80 +8	32 24.3 +295	17.73 +10	50 85.3 +323	16 61 +21	35 21.6 +310	40.45 -1
10 7.2	47 18.3 +292	46.08 -28	32 53.6 +293	17.94 -21	51 17.5 +322	16 73 +12	35 52.4 +308	41.00 -55
10 17.2	47 46.5 +282	46.71 -63	32 82.0 +284	18.46 -52	51 48.8 +313	16 76 +3	35 82.0 +296	42.07 -107
10 27.1	47 73.6 +271	47.65 -94	33 09.3 +273	19.24 -78	51 79.0 +302	16 72 -4	36 10.1 +281	43.58 -151
11 6.1	47 99.1 +255	48.87 -122	33 35.1 +258	20.28 -104	52 07.7 +287	16 62 -10	36 36.3 +262	45.53 -195
11 16.1	48 22.3 +232	50.31 -144	33 58.7 +236	20.28 -122	52 34.1 +264	16 62 -13	36 36.3 +233	47.81 -228
11 26.1	48 43.0 +207	51.90 -159	33 79.8 +211	22.86 -136	52 58.0 +239	16 49 -14	36 59.6 +203	50.34 -253
12 6.0	48 60.5 +175	53.60 -170	33 97.8 +180	24.30 -144	52 78.7 +207	16 22 -13	36 96.5 +166	53.04 -270
12 16.0	48 74.3 +138	55.31 -171	34 12.1 +143	25.74 -144	52 95.5 +168	16 12 -10	37 08.7 +122	55.78 -274
12 26.0	48 84.2 +99	56.97 -166	34 22.6 +105	27.15 -141	53 08.1 +126	16 07 -5	37 16.6 +79	58.48 -270
12 35.9	48 89.6 +54	58.56 -159	34 28.6 +60	28.48 -133	53 15.9 +78	16 07 +0	37 19.4 +28	61.07 -259
		-143	+14	-119	+28	+3	-20	-236
Mean Place	46.317	64.99	31.669	35.45	50.236	06.47	34.666	65.31
sec δ, tan δ	+1.005	-0.104	+1.000	-0.021	+1.072	+0.387	+1.125	-0.514
da(ψ), dδ(ψ)	+0.058	+0.04	+0.061	+0.04	+0.071	+0.04	+0.048	+0.04
da(ε), dδ(ε)	+0.001	+0.99	+0.000	+0.99	-0.003	+0.99	+0.003	+1.00
Dble. Trans.	December 15		December 15		December 15		December 16	

# APPARENT PLACES OF STARS, 1986

91

## AT UPPER TRANSIT AT GREENWICH

No.	205		215		217		1154	
	Groombridge 966 (Camelopardi)		α Columbae		γ Leporis		δ Doradus	
Mag. Spect.	6.36	K5	2.75	B5p	3.80	F8	4.52	A5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	5 37	+75 02	5 39	-34 04	5 43	-22 26	5 44	-65 43
1 -9.0	54.345 +313	20 01 +295	09.701 +86	46.80 -298	53.694 +103	62.82 -254	48.322 +18	81.71 -356
1 1.0	54.495 -150	22 95 +294	09.738 +37	49.65 -285	53.752 +58	65.26 -244	48.239 -83	85.14 -343
1 10.9	54.477 -18	25 83 +288	09.722 -16	52.34 -269	53.762 +10	67.55 -229	48.056 -183	88.39 -325
1 20.9	54.284 -193	28 51 +268	09.654 -68	54.75 -241	53.724 -38	69.61 -206	47.774 -282	91.31 -292
1 30.9	53.939 -345	30.90 +239	09.539 -115	56.81 -206	53.641 -83	71.37 -176	47.411 -363	93.82 -251
2 9.8	53.452 -487	32.94 +204	09.381 -158	58.51 -170	53.518 -123	72.83 -146	46.973 -438	95.91 -209
2 19.8	52.848 -604	34.52 +158	09.187 -194	59.78 -127	53.360 -158	73.92 -109	46.474 -499	97.47 -156
3 1.8	52.166 -682	35.59 +107	08.969 -218	60.60 -82	53.179 -181	74.65 -73	45.937 -537	98.50 -103
3 11.8	51.430 -736	36.13 +54	08.734 -235	61.00 -40	52.981 -198	75.02 -37	45.370 -567	99.01 -51
3 21.7	50.682 -748	36.10 -3	08.495 -239	60.91 +9	52.778 -203	75.00 +2	44.797 -573	98.93 +8
3 31.7	49.962 -720	35.55 -55	08.263 -232	60.40 +51	52.581 -197	74.62 +38	44.237 -560	98.34 +59
4 10.7	49.294 -668	34.49 -106	08.046 -217	59.47 +93	52.398 -183	73.88 +74	43.699 -538	97.23 +111
4 20.7	48.718 -576	32.96 -153	07.856 -190	58.10 +137	52.240 -158	72.79 +109	43.206 -493	95.60 +163
4 30.6	48.256 -462	31.06 -190	07.701 -172	56.38 +172	52.114 -126	71.39 +140	42.770 -436	93.55 +205
5 10.6	47.922 -334	28.85 -221	07.584 -117	54.30 +208	52.023 -91	69.69 +170	42.398 -372	91.08 +247
5 20.6	47.740 -182	26.40 -245	07.514 -70	51.92 +238	51.976 -47	67.71 +198	42.106 -292	88.25 +283
5 30.5	47.710 -30	23.84 -266	07.490 -24	49.31 +261	51.971 -5	65.54 +217	41.898 -208	85.17 +308
6 9.5	47.832 +122	21.20 -264	07.513 +23	46.50 +281	52.010 +39	63.18 +236	41.777 -121	81.84 +333
6 19.5	48.114 +282	18.59 -261	07.587 +74	43.57 +293	52.094 +84	60.70 +248	41.752 -25	78.40 +344
6 29.5	48.534 +420	16.10 -249	07.705 +118	40.61 +296	52.217 +123	58.19 +251	41.815 +63	74.93 +347
7 9.4	49.090 +556	13.75 -235	07.866 +161	37.66 +295	52.379 +162	55.66 +253	41.969 +154	71.48 +345
7 19.4	49.773 +683	11.64 -211	08.067 +201	34.84 +282	52.576 +197	53.24 +242	41.969 +243	68.20 +328
7 29.4	50.554 +781	09.81 -183	08.300 +233	32.23 +261	52.801 +225	50.97 +227	42.530 +318	65.17 +303
8 8.4	51.430 +876	08.26 -155	08.565 +265	29.88 +235	53.053 +252	48.92 +205	42.923 +393	62.45 +272
8 18.3	52.379 +949	07.09 -117	08.853 +288	27.92 +196	53.325 +272	47.20 +172	43.377 +454	60.19 +226
8 28.3	53.379 +1000	06.26 -83	09.158 +305	26.38 +154	53.610 +285	45.84 +136	43.878 +501	58.42 +177
9 7.3	54.424 +1045	05.81 -45	09.477 +319	25.32 +106	53.908 +298	44.89 +95	44.419 +541	57.22 +120
9 17.2	55.487 +1063	05.78 -3	09.802 +325	24.82 +50	54.211 +303	44.42 +47	44.980 +561	56.67 +55
9 27.2	56.551 +1064	06.12 +34	10.128 +326	24.86 -4	54.514 +303	44.41 +1	45.546 +566	56.74 -7
10 7.2	57.609 +1058	06.87 +75	10.450 +322	25.47 -61	54.816 +302	44.91 -50	46.105 +559	57.48 -74
10 17.2	58.627 +1018	08.02 +115	10.759 +309	26.64 -117	55.108 +292	45.89 -98	46.635 +530	58.88 -140
10 27.1	59.597 +970	09.53 +151	11.052 +293	28.30 -166	55.386 +278	47.30 -141	47.124 +489	60.84 -196
11 6.1	60.501 +904	11.42 +189	11.324 +272	30.42 -212	55.648 +262	49.11 -181	47.557 +433	63.35 -251
11 16.1	61.306 +805	13.62 +220	11.563 +239	32.91 -249	55.883 +235	51.24 -213	47.915 +358	66.30 -295
11 26.1	62.005 +699	16.09 +247	11.769 +206	35.66 -275	56.090 +207	53.60 -236	48.192 +277	69.57 -327
12 6.0	62.574 +569	18.80 +271	11.934 +165	38.61 -295	56.262 +172	56.13 -253	48.377 +185	73.08 -351
12 16.0	62.991 +417	21.66 +286	12.051 +117	41.61 -300	56.393 +131	58.70 -257	48.458 +81	76.66 -358
12 26.0	63.254 +263	24.58 +292	12.122 +71	44.57 -296	56.482 +89	61.24 -254	48.441 -17	80.21 -355
12 35.9	63.344 +90	27.50 +292	12.139 +17	47.42 -285	56.523 +41	63.67 -243	48.319 -122	83.63 -342
Mean Place	55.004	12.62	09.585	51.12	54.006	68.06	44.967	86.14
sec δ, tan δ	+3.873	+3.742	+1.207	-0.677	+1.082	-0.413	+2.434	-2.219
da(ψ), dδ(ψ)	+0.160	+0.04	+0.043	+0.04	+0.050	+0.03	+0.002	+0.03
da(ε), dδ(ε)	-0.024	+1.00	+0.004	+1.00	+0.002	+1.00	+0.010	+1.00
Dble. Trans.	December 16		December 16		December 17		December 17	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	216		219		218		220		
	o Aurigae		ζ Leporis		130 Tauri		κ Orionis		
Mag.Spect.	5.52	A0	3.67	A2	5.51	F0	2.20	B0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ′	h m	° ′	h m	° ′	h m	° ′	
	5 44	+49 49	5 46	-14 49	5 46	+17 43	5 47	-9 40	
1 <sup>d</sup>	<sup>s</sup> -9.0	49.947 +192	24.32 +168	20.044 +114	29.54 -218	37.835 +146	35.77 -30	06.276 +120	20.00 -192
1	1.0	50.074 +127	26.04 +172	20.115 +71	31.63 -209	37.937 +102	35.54 -23	06.354 +78	21.83 -183
1	10.9	50.132 +58	27.75 +171	20.141 +26	33.59 -196	37.991 +54	35.37 -17	06.387 +33	23.54 -171
1	20.9	50.116 -16	29.37 +162	20.118 -23	35.34 -175	37.995 +4	35.26 -11	06.372 -15	25.07 -153
1	30.9	50.034 -82	30.85 +148	20.053 -65	36.84 -180	37.954 -41	35.21 -5	06.315 -57	26.38 -131
2	9.9	49.890 -144	32.13 +128	19.947 -106	38.09 -125	37.869 -85	35.19 -2	06.217 -98	27.46 -108
2	19.8	49.692 -198	33.13 +100	19.806 -141	39.02 -93	37.746 -123	35.20 +1	06.085 -132	28.27 -81
3	1.8	49.458 -234	33.84 +71	19.642 -164	39.02 -63	37.597 -149	35.21 +1	05.929 -156	28.81 -54
3	11.8	49.197 -261	34.21 +37	19.460 -182	39.98 -33	37.428 -169	35.22 +1	05.754 -175	29.10 -29
3	21.7	48.928 -269	34.24 +3	19.273 -187	39.98 +0	37.254 -174	35.23 +1	05.575 -179	29.11 -1
3	31.7	48.669 -259	33.94 -30	19.092 -181	39.68 +30	37.085 -169	35.23 +0	05.400 -175	28.86 +25
4	10.7	48.430 -239	33.32 -62	18.923 -169	39.08 +60	36.930 -155	35.23 +0	05.238 -162	28.35 +51
4	20.7	48.229 -201	32.42 -90	18.778 -145	38.17 +91	36.801 -129	35.24 +1	05.100 -138	27.58 +77
4	30.6	48.076 -153	31.29 -113	18.664 -114	37.01 +116	36.706 -95	35.28 +4	04.993 -107	26.58 +100
5	10.6	47.977 -99	29.98 -131	18.585 -79	35.57 +144	36.648 -58	35.37 +9	04.920 -73	25.35 +123
5	20.6	47.942 -35	28.54 -144	18.548 -37	33.90 +167	36.634 -14	35.51 +14	04.888 -32	23.90 +145
5	30.6	47.970 +28	27.05 -149	18.552 +4	32.05 +185	36.664 +30	35.72 +21	04.897 +9	22.29 +161
6	9.5	48.062 +92	25.54 -151	18.598 +46	30.03 +202	36.738 +74	35.99 +27	04.948 +51	20.51 +178
6	19.5	48.219 +157	24.07 -147	18.687 +89	27.89 +214	36.852 +114	36.31 +32	05.041 +93	18.62 +189
6	29.5	48.432 +213	22.68 -139	18.814 +127	25.70 +219	37.007 +155	36.81 +50	05.171 +130	16.68 +194
7	9.4	48.699 +267	21.40 -128	18.977 +163	23.48 +222	37.201 +194	37.33 +52	05.337 +166	14.70 +198
7	19.4	49.016 +317	20.28 -112	19.175 +198	21.35 +201	37.427 +226	37.87 +54	05.535 +198	12.79 +191
7	29.4	49.370 +354	19.32 -96	19.398 +223	19.34 +213	37.678 +251	38.43 +56	05.535 +224	10.98 +181
8	8.4	49.759 +389	18.54 -78	19.646 +248	17.51 +183	37.951 +273	38.99 +56	06.759 +248	09.33 +165
8	18.3	50.175 +416	17.97 -57	19.913 +267	15.96 +155	38.242 +291	39.50 +51	06.273 +266	07.92 +141
8	28.3	50.608 +433	17.58 -39	20.193 +280	14.71 +125	38.544 +302	39.95 +45	06.552 +279	06.78 +114
9	7.3	51.058 +450	17.39 -19	20.484 +291	13.83 +88	38.857 +313	40.31 +36	06.841 +289	05.96 +82
9	17.3	51.058 +456	17.32 +3	20.484 +297	13.83 +46	38.857 +317	40.31 +25	06.841 +295	05.96 +43
9	27.3	51.514 +458	17.42 +20	20.781 +297	13.37 +5	39.174 +317	40.56 +13	07.136 +295	05.53 +8
9	27.2	51.972 +456	17.62 +42	21.078 +296	13.32 -38	39.491 +317	40.69 +1	07.431 +295	05.45 -33
10	7.2	52.428 +445	18.04 +61	21.374 +288	13.70 -82	39.808 +310	40.70 -12	07.726 +287	05.78 -71
10	17.2	52.873 +429	18.65 +80	21.662 +277	14.52 -119	40.118 +300	40.58 -22	08.013 +276	06.49 -105
10	27.1	53.302 +408	19.45 +100	21.939 +261	15.71 -155	40.418 +287	40.36 -30	08.289 +263	07.54 -138
11	6.1	53.710 +375	20.45 +118	22.200 +238	17.26 -184	40.705 +266	40.06 -36	08.552 +240	08.92 -162
11	16.1	54.085 +338	21.63 +134	22.438 +213	19.10 -203	40.971 +243	39.70 -38	08.792 +216	10.54 -179
11	26.1	54.423 +290	22.97 +150	22.651 +180	21.13 -217	41.214 +211	39.32 -39	09.008 +184	12.33 -193
12	6.0	54.713 +233	24.47 +160	22.831 +141	23.30 -221	41.425 +174	38.93 -34	09.192 +147	14.26 -195
12	16.0	54.946 +173	26.07 +168	22.972 +101	25.51 -218	41.599 +133	38.59 -30	09.339 +107	16.21 -191
12	26.0	55.119 +102	27.75 +170	23.073 +55	27.69 -209	41.732 +85	38.29 -24	09.446 +63	18.12 -184
12	36.0	55.221 +32	29.45 +166	23.128 +8	29.78 -190	41.817 +37	38.05 -17	09.509 +15	19.96 -166
Mean Place	51.215	17.38	20.580	35.06	38.931	29.46	06.934	25.72	
sec δ, tan δ	+1.550	+1.184	+1.034	-0.265	+1.050	+0.320	+1.014	-0.170	
da(ψ), dδ(ψ)	+0.093	+0.03	+0.054	+0.02	+0.070	+0.02	+0.057	+0.02	
da(ε), dδ(ε)	-0.005	+1.00	+0.001	+1.00	-0.001	+1.00	+0.001	+1.00	
Dble.Trans.	December 17		December 18		December 18		December 18		

AT UPPER TRANSIT AT GREENWICH

No.	1155		1156		223		221	
	142 G. Orionis		γ Pictoris		β Columbae		ν Aurigae	
Mag. Spect.	5.95	G5	4.38	K0	3.22	K0	4.18	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	5 47	- 4 05	5 49	-56 09	5 50	- 35 45	5 50	+39 08
1 -9.0	53 867 + 126	44 77 -162	36 607 + 61	65.92 -352	29 181 + 97	77.19 -305	31 956 + 178	50.65 +104
1 1.0	53 952 + 85	46 31 -154	36 594 - 13	69.33 -341	29 226 + 45	80.15 -296	32 080 + 124	51.73 +108
1 10.9	53 992 + 40	47.74 -143	36 505 - 89	72.56 -323	29 219 - 63	82.94 -279	32 147 + 67	52.84 +111
1 20.9	53 984 - 8	49.02 -128	36 341 -164	-292	29 156 - 63	85.47 -253	32 150 + 3	53.92 +108
1 30.9	53 934 - 50	50.09 -107	36 112 -229	78.02 -254	29 045 -111	87.66 -219	32 098 - 52	54.92 +100
2 9.9	53 842 - 92	50 98 - 89	35 824 -288	80.14 -212	28 888 -157	89.49 -183	31 992 -106	55.81 + 89
2 19.8	53 716 -126	51 65 - 67	35 486 -338	81.75 -161	28 694 -194	90.87 -138	31 839 -153	56.53 + 72
3 1.8	53 566 -150	52 10 - 45	35 116 -370	82.85 -110	28 473 -221	91.82 - 95	31 655 -184	57.05 + 52
3 11.8	53 398 -168	52 34 - 24	34 722 -394	83.43 - 58	28 233 -240	92.33 - 51	31 446 -209	57.35 + 30
3 21.7	53 224 -174	52.36 - 2	34.320 -402	83.45 - 2	27 986 -247	92.35 - 2	31 228 -218	57.41 + 6
3 31.7	53 055 -169	52.16 + 20	33.927 -393	82.95 + 50	27 745 -241	91.93 + 42	31 018 -210	57.25 -16
4 10.7	52 898 -157	51.76 + 40	33 551 -376	81.94 +101	27 517 -228	91.07 + 86	30 823 -196	56.86 -39
4 20.7	52 766 -132	51 14 + 62	33 208 -343	80.43 +151	27 315 -202	89.78 +129	30 659 -164	56.28 -58
4 30.6	52 664 -102	50 33 + 81	32 908 -300	78.49 +194	27 146 -169	88.11 +167	30 536 -123	55.56 -72
5 10.6	52 596 - 68	49 32 +101	32 658 -250	76.13 +236	27 014 -132	86.07 +204	30 456 - 80	54.71 +86
5 20.6	52 570 - 26	48 13 +119	32 469 -189	73.40 +273	26 928 - 86	83.71 +236	30 431 - 25	53.79 -92
5 30.6	52 584 + 14	46 79 +134	32 343 -126	70.41 +299	26 889 - 39	81.11 +260	30 459 + 28	52.85 -94
6 9.5	52 639 + 55	45 30 +149	32 283 - 60	67.18 +323	26 898 + 9	78 29 +282	30 539 + 80	51.92 -93
6 19.5	52 737 + 98	43 71 +159	32 295 + 12	63.81 +337	26 957 + 59	75 34 +295	30 674 +135	51.03 -89
6 29.5	52 871 +134	42.06 +165	32 372 + 77	60.41 +340	27 060 +103	72.34 +300	30 855 +181	50.20 -83
7 9.4	53 040 +169	40 37 +169	32 515 +143	57.01 +340	27 209 +149	69 34 +300	31 082 +227	49 45 -75
7 19.4	53 242 +202	38 72 +165	32 723 +208	53 77 +324	27 399 +190	66 46 +288	31 350 +268	48 82 -63
7 29.4	53 468 +226	37 15 +157	32 984 +261	50 76 +301	27 624 +225	63 77 +269	31 650 +300	48 30 -52
8 8.4	53 718 +250	35 71 +144	33 299 +315	48 04 +272	27 881 +257	61 34 +243	31 978 +328	47 90 -40
8 18.3	53 985 +267	34 47 +124	33 657 +358	45 77 +227	28 165 +284	59 30 +204	32 329 +351	47 63 -27
8 28.3	54 264 +279	33 47 +100	34 048 +391	43 97 +180	28 467 +302	57 66 +164	32 694 +365	47 45 -18
9 7.3	54 554 +290	32 75 + 72	34 468 +420	42 72 +125	28 787 +320	56 51 +115	33 074 +380	47 39 - 6
9 17.3	54 849 +295	32 35 + 40	34 903 +435	42 11 + 61	29 115 +328	55 92 + 59	33 459 +385	47 42 + 3
9 27.2	55 144 +295	32 27 + 8	35 342 +439	42 12 - 1	29 446 +331	55 88 + 4	33 846 +387	47 55 +13
10 7.2	55 440 +296	32 54 - 27	35 779 +437	42 78 - 66	29 775 +329	56 42 - 54	34 233 +387	47 77 +22
10 17.2	55 727 +287	33 15 - 61	36 197 +418	44 09 -131	30 094 +319	57 54 -112	34 612 +379	48 10 +33
10 27.1	56 005 +278	34 05 - 90	36 588 +391	45 97 -188	30 398 +304	59 16 -162	34 980 +368	48 52 +42
11 6.1	56 270 +265	35 23 -118	36 943 +355	48 40 -243	30 681 +283	61 26 -210	35 332 +352	49 05 +53
11 16.1	56 514 +244	36 62 -139	37 246 +303	51 27 -287	30 933 +252	63 76 -250	35 658 +326	49 69 +64
11 26.1	56 733 +219	38 16 -154	37 493 +247	54 47 -320	31 151 +218	66 54 -278	35 955 +297	50 44 +75
12 6.0	56 923 +190	39 80 -164	37 676 +183	57 91 -344	31 329 +178	69 54 -300	36 214 +259	51 31 +87
12 16.0	57 075 +152	41 46 -166	37 784 +108	61 44 -353	31 457 +128	72 61 -307	36 426 +212	52 27 +96
12 26.0	57 189 +114	43 08 -162	37 820 + 36	64 95 -361	31 538 + 81	75 66 -305	36 588 +162	53 30 +103
12 36.0	57 258 + 69	44 62 -154	37 778 - 42	68 35 -340	31 564 + 26	78 61 -295	36 692 +104	54 37 +107
	57 258 + 22	44 62 -139	37 778 -119	68 35 -313	31 564 - 29	78 61 -271	36 692 + 44	54 37 +108
Mean Place	54.642	50.78	34.878	71.20	28.995	82.56	33.205	43.87
sec δ, tan δ	+1.003	-0.072	+1.796	-1.492	+1.233	-0.721	+1.289	+0.814
dα(ψ), dδ(ψ)	+0.059	+0.02	+0.022	+0.02	+0.042	+0.02	+0.083	+0.02
dα(ε), dδ(ε)	+0.000	+1.00	+0.005	+1.00	+0.002	+1.00	-0.002	+1.00
Dble. Trans.	December 18		December 19		December 19		December 19	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1159			222			1158			1157		
	37 G. Pictoris			δ Leporis			136 Tauri			ξ Aurigae		
Mag Spect.	4.98	K0		3.90	K0		4.54	A0		4.92	A2	
U.T.	R.A.	Dec.		R.A.	Dec.		R.A.	Dec.		R.A.	Dec.	
	h m	° ' "		h m	° ' "		h m	° ' "		h m	° ' "	
	5 50	- 52 06		5 50	- 20 52		5 52	+ 27 36		5 53	+ 55 42	
1 -9.0	36.221 <sup>s</sup> + 72	36.69	-347	44.040 <sup>s</sup> + 114	40.70	-250	27.530 <sup>s</sup> + 163	42.30	+ 31	41.625 <sup>s</sup> + 224	25.18	+197
1 1.0	36.225 + 4	40.04	-335	44.109 + 69	43.11	-241	27.646 + 116	42.66 + 36		41.774 + 149	27.20	+202
1 10.9	36.160 - 65	43.23	-319	44.130 + 21	45.38	-227	27.711 + 65	42.66 + 42		41.844 + 70	29.23	+203
1 20.9	36.026 - 134	46.11	-288	44.103 - 27	47.43	-205	27.722 + 11	43.52 + 44		41.829 - 15	31.17	+194
1 30.9	35.832 - 194	48.62	-251	44.031 - 72	49.20	-177	27.682 - 40	43.97 + 45		41.738 - 91	32.94	+177
2 9.9	35.582 - 250	50.72	-210	43.918 - 113	50.68	-148	27.595 - 87	44.38 + 41		41.575 - 163	34.50	+156
2 19.8	35.287 - 295	52.32	-160	43.768 - 150	51.80	-112	27.466 - 129	44.72 + 34		41.349 - 226	35.75	+125
3 1.8	34.961 - 326	53.41	-109	43.594 - 174	52.58	-78	27.308 - 158	44.99 + 27		41.080 - 269	36.66	+ 91
3 11.8	34.612 - 349	54.00	- 59	43.402 - 192	53.01	- 43	27.129 - 179	45.15 + 16		40.778 - 302	37.20	+ 54
3 21.7	34.255 - 357	54.03	- 3	43.204 - 198	53.05	- 4	26.941 - 188	45.19 + 4		40.464 - 314	37.33	+ 13
3 31.7	33.907 - 348	53.56	+ 47	43.010 - 194	52.76	+ 29	26.760 - 181	45.13 - 6		40.159 - 305	37.08	- 25
4 10.7	33.573 - 334	52.59	+ 97	42.829 - 181	52.11	+ 65	26.591 - 169	44.96 - 17		39.874 - 285	36.45	- 63
4 20.7	33.271 - 302	51.11	+148	42.671 - 158	51.12	+ 99	26.450 - 141	44.71 - 25		39.629 - 245	35.48	- 97
4 30.6	33.008 - 263	49.22	+189	42.545 - 126	49.83	+129	26.344 - 106	44.40 - 31		39.437 - 192	34.23	-125
5 10.6	32.791 - 217	46.91	+231	42.452 - 93	48.23	+160	26.278 - 66	44.06 - 34		39.303 - 134	32.75	-148
5 20.6	32.631 - 160	44.24	+267	42.402 - 50	46.37	+186	26.258 - 20	43.71 - 35		39.241 - 62	31.09	-166
5 30.6	32.529 - 102	41.31	+293	42.394 - 8	44.31	+206	26.285 + 27	43.38 - 33		39.249 + 8	29.33	-176
6 9.5	32.487 - 42	38.14	+317	42.428 + 34	42.06	+225	26.360 + 75	43.11 - 27		39.340 + 81	27.52	-181
6 19.5	32.510 + 23	34.82	+332	42.507 + 79	39.68	+238	26.479 + 119	42.97 - 14		39.330 + 154	25.72	-180
6 29.5	32.592 + 82	31.47	+335	42.625 + 118	37.25	+243	26.638 + 159	42.71 - 26		39.703 + 219	24.00	-172
7 9.4	32.735 + 143	28.13	+334	42.781 + 156	34.81	+244	26.842 + 204	42.60 - 11		39.985 + 282	22.37	-163
7 19.4	32.935 + 200	24.93	+320	42.973 + 192	32.45	+236	27.080 + 238	42.58 - 2		40.324 + 339	20.90	-147
7 29.4	33.183 + 248	21.95	+298	43.192 + 219	30.24	+221	27.345 + 265	42.61 + 3		40.708 + 384	19.60	-130
8 8.4	33.479 + 296	19.27	+268	43.438 + 246	28.23	+201	27.636 + 291	42.70 + 9		41.135 + 427	18.50	-110
8 18.3	33.813 + 334	17.02	+225	43.705 + 267	26.53	+170	27.945 + 309	42.82 + 12		41.595 + 460	17.64	- 86
8 28.3	34.176 + 363	15.23	+179	43.986 + 281	25.17	+136	28.268 + 323	42.95 + 13		42.078 + 483	16.99	- 65
9 7.3	34.565 + 389	13.99	+124	44.281 + 295	24.21	+ 96	28.602 + 334	43.08 + 13		42.582 + 504	16.59	- 40
9 17.3	34.967 + 402	13.37	+ 62	44.582 + 301	23.72	+ 49	28.942 + 340	43.20 + 12		43.096 + 514	16.44	- 15
9 27.2	35.373 + 406	13.36	+ 1	44.885 + 303	23.69	+ 3	29.284 + 342	43.30 + 10		43.614 + 518	16.53	+ 9
10 7.2	35.778 + 405	14.00	- 64	45.188 + 303	24.14	- 45	29.626 + 342	43.38 + 8		44.133 + 519	16.88	+ 35
10 17.2	36.165 + 387	15.28	-128	45.482 + 294	25.07	- 93	29.961 + 335	43.44 + 6		44.640 + 507	17.48	+ 60
10 27.1	36.530 + 365	17.12	-184	45.765 + 283	26.42	-135	30.287 + 326	43.49 + 5		45.132 + 492	18.33	+ 85
11 6.1	36.863 + 333	19.51	-239	46.032 + 267	28.17	-175	30.600 + 313	43.49 + 5		45.600 + 468	19.43	+110
11 16.1	37.151 + 288	22.33	-282	46.274 + 242	30.24	-207	30.891 + 291	43.54 + 8		46.031 + 431	20.76	+133
11 26.1	37.390 + 239	25.47	-314	46.490 + 216	32.54	-230	31.158 + 267	43.62 + 13		46.021 + 389	22.30	+154
12 6.0	37.570 + 180	28.86	-339	46.672 + 182	35.02	-248	31.391 + 233	43.75 + 17		46.420 + 336	24.04	+174
12 16.0	37.685 + 115	32.34	-348	46.814 + 142	37.54	-252	31.584 + 193	43.92 + 24		46.756 + 270	25.92	+188
12 26.0	37.734 + 49	35.79	-345	46.913 + 99	40.04	-250	31.733 + 149	44.16 + 31		47.026 + 201	27.89	+197
12 36.0	37.711 - 23	39.14	-335	46.965 + 52	42.45	-241	31.832 + 99	44.47 + 36		47.227 + 121	29.91	+202
	37.711 - 92	39.14	-309	46.965 + 4	42.45	-220	31.832 + 45	44.83 + 41		47.348 + 39	29.91	+197
Mean Place	34.927	42.13		44.420	46.86		28.713	35.63		42.834	18.24	
sec δ, tan δ	+1.628	-1.285		+1.070	-0.381		+1.129	+0.523		+1.775	+1.466	
da(ψ), dδ(ψ)	+0.027	+0.02		+0.051	+0.02		+0.075	+0.01		+0.100	+0.01	
da(ε), dδ(ε)	+0.004	+1.00		+0.001	+1.00		-0.001	+1.00		-0.003	+1.00	
Dble.Trans.	December 19			December 19			December 19			December 20		



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	224		226		1160		1161	
	$\alpha$ Orionis (Betelgeuse)		$\eta$ Leporis		$\gamma$ Columbae		60 Orionis	
Mag.Spect.	0.1 to 1.2	M0	3.77	F0	4.36	B3	5.25	A0
U.T.	R.A.		R.A.		R.A.		R.A.	
	Dec.		Dec.		Dec.		Dec.	
	h m	$^{\circ}$ /	h m	$^{\circ}$ /	h m	$^{\circ}$ /	h m	$^{\circ}$ /
	5 54	+ 7 24	5 55	- 14 09	5 57	- 35 16	5 58	+ 0 33
1 <sup>d</sup> -9.0	25.477 <sup>s</sup> + 143	25.67 <sup>s</sup> - 97	46.797 <sup>s</sup> + 124	64.29 <sup>s</sup> - 217	03.637 <sup>s</sup> + 106	57.00 <sup>s</sup> - 307	07.047 <sup>s</sup> + 141	15.41 <sup>s</sup> - 138
1 <sup>s</sup> 1.0	25.578 + 101	24.78 - 89	46.878 + 81	66.38 - 209	03.691 + 54	59.97 - 297	07.145 + 98	14.10 - 131
1 10.9	25.634 + 56	23.98 - 80	46.913 + 35	68.35 - 197	03.692 + 1	62.81 - 284	07.199 + 54	12.89 - 121
1 20.9	25.640 + 6	23.29 - 69	46.899 - 14	70.12 - 177	03.637 - 55	65.38 - 257	07.204 + 5	11.83 - 106
1 30.9	25.603 - 37	22.73 - 56	46.842 - 57	71.64 - 152	03.534 - 103	67.62 - 224	07.165 - 39	10.93 - 90
2 9.9	25.523 - 80	22.29 - 44	46.743 - 99	72.91 - 127	03.384 - 150	69.51 - 189	07.084 - 81	10.20 - 73
2 19.8	25.406 - 117	21.97 - 32	46.608 - 135	73.87 - 96	03.195 - 189	70.97 - 146	06.966 - 118	09.65 - 55
3 1.8	25.263 - 143	21.76 - 21	46.448 - 160	74.54 - 67	02.979 - 216	72.00 - 103	06.822 - 144	09.28 - 37
3 11.8	25.100 - 163	21.65 - 11	46.269 - 179	74.91 - 37	02.743 - 236	72.59 - 59	06.659 - 163	09.08 - 20
3 21.7	24.930 - 170	21.65 + 0	46.082 - 187	74.95 - 4	02.498 - 245	72.69 - 10	06.488 - 171	09.05 - 3
3 31.7	24.765 - 165	21.75 + 10	45.901 - 181	74.70 + 25	02.258 - 240	72.36 + 33	06.321 - 167	09.20 + 15
4 10.7	24.612 - 153	21.94 + 19	45.730 - 171	74.16 + 54	02.030 - 228	71.59 + 77	06.164 - 157	09.50 + 30
4 20.7	24.481 - 131	22.26 + 32	45.582 - 148	73.32 + 84	01.826 - 204	70.38 + 121	06.030 - 134	09.50 + 48
4 30.6	24.382 - 99	22.67 + 41	45.464 - 118	72.21 + 111	01.654 - 172	68.80 + 158	05.926 - 104	10.62 + 64
5 10.6	24.317 - 65	23.20 + 53	45.380 - 84	70.85 + 136	01.519 - 135	66.84 + 196	05.855 - 71	11.42 + 80
5 20.6	24.294 - 23	23.84 + 64	45.336 - 44	69.25 + 160	01.428 - 91	64.56 + 228	05.825 - 30	12.38 + 96
5 30.6	24.312 + 18	24.59 + 75	45.333 - 3	67.46 + 179	01.383 - 45	62.03 + 253	05.835 + 10	13.46 + 108
6 9.5	24.371 + 59	25.44 + 85	45.371 + 38	65.50 + 196	01.385 + 2	59.27 + 276	05.885 + 50	14.67 + 121
6 19.5	24.472 + 101	26.38 + 94	45.452 + 81	63.42 + 208	01.437 + 52	56.37 + 290	05.977 + 92	15.99 + 132
6 29.5	24.610 + 138	27.39 + 101	45.571 + 119	61.29 + 213	01.534 + 97	53.42 + 295	06.106 + 129	17.37 + 138
7 9.4	24.784 + 174	28.46 + 107	45.727 + 156	59.12 + 217	01.675 + 141	50.45 + 297	06.270 + 164	18.79 + 142
7 19.4	24.990 + 206	29.52 + 106	45.916 + 189	57.03 + 209	01.858 + 183	47.59 + 286	06.467 + 197	20.19 + 140
7 29.4	25.221 + 231	30.54 + 102	46.132 + 216	55.05 + 198	02.075 + 217	44.91 + 268	06.688 + 221	21.52 + 133
8 8.4	25.476 + 255	31.50 + 96	46.374 + 242	53.24 + 181	02.326 + 251	42.48 + 243	06.934 + 246	22.76 + 124
8 18.3	25.748 + 272	32.34 + 84	46.635 + 261	51.70 + 154	02.603 + 277	40.42 + 206	07.198 + 264	23.83 + 107
8 28.3	26.032 + 284	33.04 + 70	46.911 + 276	50.46 + 124	02.901 + 298	38.76 + 166	07.475 + 277	24.70 + 87
9 7.3	26.328 + 296	33.55 + 51	47.199 + 288	49.57 + 89	03.217 + 316	37.59 + 117	07.764 + 289	25.33 + 63
9 17.3	26.629 + 301	33.85 + 30	47.494 + 295	49.09 + 48	03.542 + 325	36.96 + 63	08.058 + 294	25.68 + 35
9 27.2	26.931 + 302	33.93 + 8	47.791 + 297	49.02 + 7	03.871 + 329	36.88 + 8	08.356 + 298	25.75 + 7
10 7.2	27.235 + 304	33.78 - 15	48.088 + 297	49.38 - 36	04.201 + 330	37.38 - 50	08.654 + 298	25.53 - 22
10 17.2	27.532 + 297	33.39 - 39	48.379 + 291	50.17 - 79	04.521 + 320	38.46 - 108	08.947 + 293	25.00 - 53
10 27.1	27.822 + 290	32.82 - 57	48.660 + 281	51.33 - 116	04.827 + 306	40.04 - 158	09.232 + 285	24.22 - 78
11 6.1	28.099 + 277	32.06 - 76	48.928 + 268	52.86 - 153	05.115 + 288	42.12 - 208	09.506 + 274	23.19 - 103
11 16.1	28.357 + 258	31.17 - 89	49.173 + 245	54.66 - 180	05.372 + 257	44.59 - 247	09.760 + 254	21.98 - 121
11 26.1	28.592 + 235	30.20 - 97	49.393 + 220	56.67 - 201	05.598 + 226	47.36 - 277	09.991 + 231	20.65 - 133
12 6.0	28.798 + 206	29.18 - 102	49.583 + 190	58.83 - 216	05.783 + 185	50.35 - 299	10.194 + 203	19.23 - 142
12 16.0	28.967 + 169	28.17 - 101	49.733 + 150	61.04 - 221	05.920 + 137	53.43 - 308	10.360 + 166	17.81 - 142
12 26.0	29.098 + 131	27.21 - 96	49.844 + 111	63.21 - 217	06.009 + 89	56.49 - 306	10.488 + 128	16.43 - 138
12 36.0	29.184 + 86	26.32 - 89	49.909 + 65	65.30 - 209	06.044 + 35	59.47 - 298	10.571 + 83	15.12 - 131
	29.184 + 38	26.32 - 78	49.909 + 17	65.30 - 191	06.044 - 20	59.47 - 276	10.571 + 36	15.12 - 118
Mean Place	26.439	19.19	47.350	70.56	03.479	63.36	07.901	08.76
sec $\delta$ , tan $\delta$	+1.008	+0.130	+1.031	-0.252	+1.225	-0.708	+1.000	+0.010
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.065	+0.01	+0.054	+0.01	+0.042	+0.01	+0.061	+0.00
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.000	+1.00	+0.000	+1.00	+0.001	+1.00	-0.000	+1.00
Dble.Trans.	December 20		December 20		December 21		December 21	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	225		227		229		1162		
	δ Aurigae		β Aurigae		η Columbae		B.D. +33° 1209 (Aurigae)		
Mag.Spect.	3.88	K0	2.07	A0p	4.03	K0	6.80	A2	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	5 58	+54 17	5 58	+44 56	5 58	-42 48	5 59	+33 08	
1 <sup>d</sup>	-9.0	23 689 +227	12.32 +187	31.045 +200	56.45 +135	44.539 +98	49.53 -330	19.931 +179	19.56 +63
1 <sup>s</sup>	1.0	23 843 +154	14.26 +194	31.185 +140	57.86 +141	44.580 +41	52.73 -320	20.061 +130	20.25 +69
1	10.9	23 922 +79	16.21 +195	31.262 +77	59.30 +144	44.563 -17	55.79 -306	20.136 +75	21.00 +75
1	20.9	23 917 -5	18.08 +187	31.271 +9	60.70 +140	44.484 -79	58.57 -278	20.152 +16	21.75 +74
1	30.9	23 839 -78	19.81 +173	31.217 -54	62.01 +131	44.353 -131	61.00 -243	20.116 -36	22.49
2	9.9	23 690 -149	21.35 +154	31.104 -113	63.18 +117	44.172 -181	63.06 -206	20.028 -88	23.16 +67
2	19.8	23 479 -211	22.59 +124	30.938 -166	64.13 +95	43.949 -223	64.66 -160	19.895 -133	23.72 +56
3	1.8	23 224 -255	23.51 +92	30.736 -202	64.85 +72	43.696 -253	65.78 -112	19.730 -165	24.16 +44
3	11.8	22 937 -287	24.08 +57	30.506 -230	65.29 +44	43.421 -275	66.44 -66	19.541 -189	24.44 +28
3	21.8	22 637 -300	24.25 +17	30.265 -241	65.43 +14	43.138 -283	66.58 -14	19.342 -199	24.54 +10
3	31.7	22 343 -294	24.05 -20	30.030 -235	65.29 -14	42.860 -278	66.24 +34	19.148 -194	24.48 -6
4	10.7	22 067 -276	23.49 -56	29.810 -220	64.87 -42	42.593 -267	65.42 +82	18.967 -181	24.26 -22
4	20.7	21 830 -237	22.58 -91	29.622 -188	64.20 -67	42.353 -240	64.13 +129	18.813 -154	23.89 -37
4	30.6	21 642 -188	21.41 -117	29.476 -146	63.32 -88	42.146 -207	62.44 +169	18.695 -118	23.42 -47
5	10.6	21 510 -132	20.00 -141	29.377 -99	62.27 -105	41.978 -168	60.35 +209	18.617 -78	22.86 -56
5	20.6	21 446 -64	18.41 -159	29.335 -42	61.10 -117	41.859 -119	57.91 +244	18.588 -29	22.25 -61
5	30.6	21 451 +5	16.73 -168	29.351 +16	59.87 -123	41.789 -70	55.21 +200	18.608 +20	21.63 -62
6	9.5	21 524 +73	14.99 -174	29.424 +73	58.61 -126	41.770 -19	52.26 +295	18.677 +69	21.02 -61
6	19.5	21 669 +145	13.25 -174	29.556 +132	57.37 -124	41.806 +36	49.16 +310	18.795 +118	20.48 -54
6	29.5	21 877 +208	11.57 -168	29.739 +183	56.19 -118	41.891 +85	46.01 +315	18.955 +160	19.95 -53
7	9.5	22 145 +268	09.98 -159	29.973 +234	55.08 -111	42.026 +135	42.84 +317	19.160 +205	19.48 -47
7	19.4	22 469 +324	08.53 -145	30.252 +279	54.10 -98	42.209 +183	39.79 +305	19.404 +244	19.11 -37
7	29.4	22 837 +368	07.25 -128	30.567 +315	53.24 -86	42.431 +222	36.94 +285	19.676 +272	18.83 -28
8	8.4	23 247 +410	06.15 -110	30.915 +348	52.52 -72	42.692 +261	34.35 +259	19.976 +300	18.61 -22
8	18.3	23 689 +442	05.27 -88	31.289 +374	51.96 -56	42.985 +293	32.15 +220	20.298 +322	18.47 -14
8	28.3	24 154 +465	04.60 -67	31.681 +392	51.54 -42	43.302 +317	30.39 +176	20.635 +337	18.38 -9
9	7.3	24 641 +487	04.15 -45	32.090 +409	51.27 -27	43.640 +338	29.13 +126	20.985 +350	18.34 -4
9	17.3	25 138 +497	03.95 -20	32.507 +417	51.16 -11	43.990 +350	28.46 +67	21.343 +358	18.34 +0
9	27.2	25 640 +502	03.97 +2	32.928 +421	51.19 +3	44.344 +354	28.37 +9	21.703 +360	18.37 +3
10	7.2	26 144 +504	04.23 +26	33.351 +423	51.38 +19	44.700 +356	28.90 -53	22.066 +363	18.44 +7
10	17.2	26 638 +494	04.74 +51	33.766 +415	51.72 +34	45.045 +345	30.04 -114	22.422 +356	18.54 +10
10	27.2	27 118 +480	05.49 +75	34.170 +404	52.22 +50	45.374 +329	31.72 -168	22.770 +348	18.70 +16
11	6.1	27 577 +459	06.48 +99	34.558 +388	52.89 +67	45.680 +306	33.92 -220	23.105 +335	18.91 +21
11	16.1	28 001 +424	07.70 +122	34.918 +360	53.72 +83	45.951 +271	36.56 -264	23.417 +312	19.20 +29
11	26.1	28 386 +385	09.12 +142	35.247 +329	54.70 +98	46.185 +234	39.51 -295	23.704 +267	19.57 +37
12	6.0	28 720 +334	10.75 +163	35.534 +287	55.84 +114	46.373 +188	42.71 -320	23.957 +253	20.03 +46
12	16.0	28 991 +271	12.52 +177	35.771 +237	57.09 +125	46.507 +134	46.01 -330	24.167 +210	20.58 +55
12	26.0	29 196 +205	14.40 +188	35.953 +182	58.44 +135	46.586 +79	49.30 -329	24.332 +165	21.21 +69
12	36.0	29 324 +128	16.33 +193	36.072 +119	59.85 +141	46.606 +20	52.50 -320	24.442 +110	21.90 +63
		29 324 +48	16.33 +190	36.072 +52	59.85 +140	46.606 -41	52.50 -297	24.442 +54	21.90 +72
Mean Place	24.902	05.36	32.285	49.58	43.979	56.07	21.141	12.74	
sec δ, tan δ	+1.713	+1.391	+1.413	+0.998	+1.363	-0.927	+1.194	+0.653	
dα(ψ), dδ(ψ)	+0.098	+0.00	+0.088	+0.00	+0.037	+0.00	+0.078	+0.00	
dα(ε), dδ(ε)	-0.001	+1.00	-0.000	+1.00	+0.000	+1.00	-0.000	+1.00	
Dble. Trans.	December 21		December 21		December 21		December 21		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1163		231		230		1164	
	1 Geminorum		1 G. Puppis		66 Orionis		74 G. Columbae	
Mag. Spect.	4.30	G5	6.22	F8	5.70	K0	5.72	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	6 03	+ 23 15	6 04	- 45 01	6 04	+ 4 09	6 05	- 29 44
1 -9.0	16.822 +170	60.76 - 1	05.774 +102	63.09 -336	14.614 +149	43.48 -120	34.229 +121	76.26 -290
1 1.0	16.945 +123	60.83 + 7	05.817 + 43	66.36 -327	14.722 +108	42.36 -112	34.301 + 72	79.08 -282
1 10.9	17.019 + 74	60.96 +13	05.799 - 18	66.36 -313	14.784 + 62	41.34 -102	34.323 + 22	81.77 -269
1 20.9	17.040 + 21	61.15 +19	05.717 - 82	69.49 -287	14.798 + 14	40.46 - 88	34.291 - 32	84.23 -246
1 30.9	17.012 - 28	61.38 +23	05.580 -137	74.87 -251	14.766 - 32	39.72 - 74	34.211 - 80	86.38 -215
2 9.9	16.936 - 76	61.62 +24	05.391 -189	77.02 -215	14.691 - 75	39.12 - 60	34.086 -125	88.21 -183
2 19.8	16.818 -118	61.85 +23	05.158 -233	78.69 -167	14.579 -112	38.68 - 44	33.922 -164	89.64 -143
3 1.8	16.671 -147	62.05 +20	04.894 -264	79.90 -121	14.439 -140	38.39 - 29	33.730 -192	90.66 -102
3 11.8	16.501 -170	62.19 +14	04.606 -288	80.62 - 72	14.278 -161	38.23 -16	33.516 -214	91.29 - 63
3 21.8	16.321 -180	62.27 + 8	04.309 -297	80.82 - 20	14.109 -169	38.21 - 2	33.293 -223	91.47 - 18
3 31.7	16.145 -176	62.29 + 2	04.015 -294	80.53 + 29	13.942 -167	38.33 +12	33.074 -219	91.24 + 23
4 10.7	15.980 -165	62.24 - 5	03.733 -262	79.76 + 77	13.786 -156	38.57 +24	32.863 -211	90.60 + 64
4 20.7	15.839 -141	62.14 -10	03.476 -257	78.50 +126	13.651 -135	38.96 + 39	32.676 -187	89.55 +105
4 30.6	15.730 -109	62.01 -13	03.253 -223	76.83 +167	13.545 -106	39.46 + 50	32.518 -158	88.15 +140
5 10.6	15.658 - 72	61.87 -14	03.069 -184	74.74 +209	13.472 - 73	40.11 + 65	32.393 -125	86.40 +175
5 20.6	15.631 - 27	61.75 -12	02.934 -135	72.30 +244	13.440 - 32	40.89 + 78	32.311 - 82	84.33 +207
5 30.6	15.648 + 17	61.64 -11	02.850 - 84	69.58 +272	13.447 + 7	41.77 + 88	32.272 - 39	82.03 +230
6 9.5	15.710 + 62	61.58 - 6	02.817 - 33	66.61 +297	13.495 + 48	42.78 +101	32.277 + 5	79.49 +254
6 19.5	15.826 +116	61.57 - 1	02.841 + 24	63.48 +313	13.585 + 90	43.87 +109	32.329 + 52	76.82 +267
6 29.5	15.956 +130	61.62 + 5	02.917 + 76	60.28 +320	13.711 +126	45.02 +115	32.422 + 93	74.07 +275
7 9.5	16.144 +188	61.73 +11	03.044 +127	57.07 +321	13.873 +162	46.23 +121	32.558 +136	71.30 +277
7 19.4	16.365 +221	61.89 +16	03.221 +177	53.96 +311	14.068 +195	47.43 +120	32.732 +174	68.61 +269
7 29.4	16.612 +247	62.07 +18	03.440 +219	51.05 +291	14.288 +220	48.57 +114	32.939 +207	66.09 +252
8 8.4	16.885 +273	62.27 +20	03.700 +260	48.39 +266	14.533 +245	49.64 +107	33.177 +238	63.78 +231
8 18.3	17.178 +293	62.47 +20	03.994 +294	46.13 +226	14.796 +263	50.56 + 92	33.441 +264	61.80 +198
8 28.3	17.484 +306	62.64 +17	04.315 +321	44.30 +183	15.073 +277	51.31 + 75	33.724 +263	60.20 +160
9 7.3	17.803 +319	62.78 +14	04.659 +344	42.98 +132	15.362 +289	51.85 + 54	34.024 +300	59.05 +115
9 17.3	18.130 +327	62.85 + 7	05.017 +358	42.25 + 73	15.658 +296	52.15 + 30	34.335 +311	58.41 + 64
9 27.2	18.459 +329	62.86 + 1	05.381 +364	42.11 + 14	15.958 +300	52.20 + 5	34.651 +316	58.28 + 13
10 7.2	18.791 +332	62.80 - 6	05.747 +366	42.59 - 48	16.260 +302	51.99 -21	34.969 +318	58.70 - 42
10 17.2	19.118 +327	62.68 -12	06.103 +356	43.70 -111	16.557 +297	51.51 - 48	35.280 +311	59.67 - 97
10 27.2	19.438 +320	62.51 -17	06.443 +340	45.36 -166	16.847 +290	50.81 - 70	35.581 +301	61.13 -146
11 6.1	19.747 +309	62.31 -20	06.760 +317	47.56 -220	17.128 +261	49.89 - 92	35.861 +265	63.05 -192
11 16.1	20.037 +290	62.11 -20	07.042 +282	50.21 -265	17.389 +261	48.82 -107	36.125 +259	65.36 -231
11 26.1	20.303 +266	61.93 -18	07.284 +242	53.19 -298	17.629 +240	47.65 -117	36.356 +231	67.95 -259
12 6.0	20.539 +236	61.78 -15	07.479 +195	56.43 -324	17.840 +211	46.40 -125	36.550 +194	70.76 -281
12 16.0	20.736 +197	61.70 - 8	07.618 +139	59.78 -335	18.015 +175	45.17 -123	36.701 +151	73.67 -291
12 26.0	20.892 +156	61.69 - 1	07.701 + 83	63.13 -335	18.153 +138	43.97 -120	36.806 +105	76.57 -290
12 36.0	20.999 +107	61.76 + 7	07.721 + 20	66.41 -328	18.245 + 92	42.85 -112	36.860 + 54	79.39 -282
	20.999 + 55	61.76 +13	07.721 - 43	66.41 -305	18.245 + 44	42.85 - 99	36.860 + 2	79.39 -262
Mean Place	17.958	53.81	05.075	70.14	15.526	36.47	34.315	83.60
sec δ, tan δ	+1.089	+0.430	+1.415	-1.001	+1.003	+0.073	+1.152	-0.572
dα(ψ), dδ(ψ)	+0.073	-0.01	+0.035	-0.01	+0.063	-0.01	+0.046	-0.01
dα(ε), dδ(ε)	+0.000	+1.00	-0.001	+1.00	+0.000	+1.00	-0.001	+1.00
Dbie. Trans.	December 22		December 22		December 22		December 23	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	232		1165		1166		235										
	v Orionis		94 G. Leporis		v Doradus		δ Pictoris										
Mag.Spect.	4.40	B2	5.46	A0	5.21	B9	4.84	B1									
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.									
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "									
	6 06	+ 14 46	6 08	- 22 25	6 08	- 68 49	6 09	- 54 57									
1 <sup>d</sup> 1 <sup>s</sup>	-9.0 1.0	47.001 47.121	+163 +120	22.21 21.74	-56 -47	23.453 23.538	+130 +85	20.39 22.92	-261 -253	53.596 53.544	+64 -52	78.18 81.73	-362 -355	63.638 63.663	+98 +25	47.06 50.55	-355 -349
1	10.9	47.194	+73	21.34	-40	23.575	+37	25.33	-241	53.377	-167	85.15	-342	63.614	-49	53.90	-335
1	20.9	47.215	+21	21.04	-30	23.560	-15	27.52	-219	53.092	-285	88.30	-315	63.488	-126	56.99	-309
1	30.9	47.190	-25	20.84	-20	23.500	-60	29.44	-192	52.710	-382	91.09	-279	63.296	-192	59.73	-274
2	9.9	47.120	-70	20.70	-14	23.395	-105	31.07	-163	52.236	-474	93.49	-240	63.042	-254	62.08	-235
2	19.8	47.009	-111	20.63	-7	23.252	-143	32.35	-128	51.685	-551	95.40	-191	62.734	-308	63.95	-187
3	1.8	46.870	-139	20.62	-1	23.081	-171	33.27	-92	51.083	-602	96.80	-140	62.391	-343	65.32	-137
3	11.8	46.709	-161	20.63	+1	22.889	-192	33.83	-56	50.440	-643	97.68	-88	62.018	-373	66.20	-88
3	21.8	46.538	-171	20.68	+5	22.687	-202	34.00	-17	49.778	-662	98.00	-32	61.632	-386	66.51	-31
3	31.7	46.369	-169	20.75	+7	22.488	-199	33.81	+19	49.123	-655	97.79	+21	61.250	-382	66.31	+20
4	10.7	46.210	-159	20.84	+9	22.298	-190	33.27	+54	48.482	-641	97.05	+74	60.879	-371	65.59	+72
4	20.7	46.074	-136	20.96	+12	22.129	-169	32.36	+91	47.883	-599	95.79	+126	60.535	-344	64.36	+123
4	30.6	45.968	-106	21.13	+17	21.989	-140	31.13	+123	47.339	-544	94.07	+172	60.230	-305	62.68	+168
5	10.6	45.896	-72	21.34	+21	21.881	-108	29.60	+153	46.858	-481	91.89	+218	59.968	-262	60.56	+212
5	20.6	45.865	-31	21.63	+23	21.813	-68	27.77	+183	46.461	-397	89.33	+256	59.763	-205	58.05	+251
5	30.6	45.877	+12	21.96	+39	21.786	-27	25.73	+204	46.153	-308	86.46	-146	59.617	-146	55.25	+280
6	9.5	45.930	+53	22.37	+41	21.801	+15	23.48	+225	45.938	-215	83.30	+316	59.532	-85	52.16	+309
6	19.5	46.026	+96	22.83	+46	21.860	+59	21.10	+238	45.830	-108	79.97	+333	59.516	-16	48.90	+326
6	29.5	46.158	+132	23.38	+55	21.959	+99	18.64	+246	45.821	-9	76.56	+341	59.562	+46	45.56	+334
7	9.5	46.329	+171	23.99	+61	22.096	+137	16.15	+249	45.916	+95	73.12	+344	59.672	+110	42.19	+337
7	19.4	46.534	+205	24.61	+62	22.270	+174	13.74	+241	46.115	+199	69.79	+333	59.846	+174	38.93	+326
7	29.4	46.764	+230	25.21	+60	22.474	+204	11.46	+228	46.405	+290	66.66	+313	60.074	+228	35.86	+307
8	8.4	47.019	+255	25.79	+58	22.706	+232	09.36	+210	46.786	+381	63.79	+287	60.356	+282	33.04	+282
8	18.3	47.294	+275	26.29	+50	22.962	+256	07.57	+179	47.247	+461	61.33	+246	60.684	+328	30.63	+241
8	28.3	47.582	+288	26.71	+42	23.235	+273	06.12	+145	47.771	+524	59.33	+200	61.048	+364	28.66	+197
9	7.3	47.883	+301	27.01	+30	23.524	+289	05.06	+106	48.351	+580	57.86	+147	61.445	+397	27.22	+144
9	17.3	48.192	+309	27.17	+16	23.823	+299	04.48	+58	48.966	+615	57.02	+84	61.862	+417	26.40	+82
9	27.2	48.504	+312	27.18	+1	24.127	+304	04.36	+12	49.598	+632	56.80	+22	62.290	+428	26.18	+22
10	7.2	48.819	+315	27.03	-15	24.434	+307	04.73	-37	50.235	+637	57.25	-45	62.721	+431	26.62	-44
10	17.2	49.130	+311	26.73	-30	24.735	+301	05.61	-88	50.849	+614	58.37	-112	63.140	+419	27.72	-110
10	27.2	49.435	+305	26.30	-43	25.028	+293	06.92	-131	51.425	+576	60.08	-171	63.540	+400	29.41	-169
11	6.1	49.729	+294	25.77	-53	25.307	+279	08.66	-174	51.948	+523	62.39	-231	63.909	+369	31.67	-226
11	16.1	50.005	+276	25.15	-62	25.564	+257	10.75	-209	52.390	+442	65.17	-278	64.234	+325	34.41	-274
11	26.1	50.260	+255	24.51	-64	25.795	+231	13.09	-234	52.746	+356	68.33	-316	64.508	+274	37.51	-310
12	6.0	50.487	+227	23.85	-66	25.994	+199	15.63	-254	53.000	+254	71.79	-346	64.722	+214	40.91	-340
12	16.0	50.676	+189	23.24	-61	26.152	+158	18.25	-262	53.137	+137	75.39	-360	64.866	+144	44.44	-353
12	26.0	50.826	+150	22.68	-56	26.268	+116	20.86	-261	53.162	+25	79.01	-362	64.940	+74	48.00	-356
12	36.0	50.930	+104	22.20	-48	26.336	+68	23.40	-254	53.065	-97	82.58	-357	64.937	-3	51.49	-349
		54		-38		18		-234		-215		-333		-79		-328	
Mean Place	48.052	15.14		23.792	27.95	49.521	86.17	62.100	55.13								
sec δ, tan δ	+1.034	+0.264		+1.082	-0.413	+2.770	-2.584	+1.742	-1.426								
dα(ψ), dδ(ψ)	+0.068	-0.01		+0.050	-0.01	-0.007	-0.02	+0.023	-0.02								
dα(ε), dδ(ε)	+0.001	+1.00		-0.001	+1.00	-0.007	+1.00	-0.004	+1.00								
Dble.Trans.	December 23		December 23		December 23		December 24										

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	239		233		1168		1167	
	$\alpha$ Mensae		36 Camelopardi		$\times$ Aurigae		Bradley 904* f. (Aurigae)	
Mag.Spect.	5.14	K0	5.39	K0	4.45	K0	6.42	F0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	6 10	-74 44	6 11	+65 43	6 14	+29 30	6 14	+36 09
1 -9.0	45.190 <sup>s</sup> +40	47.54 <sup>o</sup> -360	28.651 <sup>s</sup> +314	27.84 <sup>o</sup> +239	29.899 <sup>s</sup> +190	21.20 <sup>o</sup> +32	43.223 <sup>s</sup> +203	20.05 <sup>o</sup> +75
1 1.0	45.070 -120	51.07 -353	28.864 +213	30.32 +248	30.041 +142	21.62 +42	43.373 +150	20.89 +84
1 11.0	44.793 -277	54.47 -340	28.969 +105	32.84 +252	30.131 +90	22.11 +49	43.468 +95	21.80 +91
1 20.9	44.357 -436	57.61 -314	28.958 -11	35.28 +244	30.164 +33	22.66 +55	43.501 +33	22.73 +93
1 30.9	43.791 -566	60.39 -278	28.842 -116	37.55 +227	30.144 -20	23.22 +56	43.477 -24	23.65 +92
2 9.9	43.103 -688	62.79 -240	28.625 -217	39.59 +204	30.072 -72	23.77 +55	43.399 -78	24.51 +86
2 19.8	42.314 -789	64.69 -190	28.319 -306	41.28 +169	29.956 -116	24.26 +49	43.271 -128	25.26 +75
3 1.8	41.458 -856	66.10 -141	27.949 -370	42.57 +129	29.805 -151	24.67 +41	43.107 -164	25.86 +60
3 11.8	40.547 -911	67.00 -90	27.949 -421	42.57 +86	29.629 -176	24.97 +30	42.916 -191	26.29 +43
3 21.8	39.613 -934	67.34 -34	27.084 -444	43.81 +38	29.440 -189	25.14 +17	42.711 -205	26.52 +23
3 31.7	38.687 -926	67.15 +19	26.644 -440	43.71 -10	29.253 -187	25.18 +4	42.507 -204	26.55 +3
4 10.7	37.780 -907	66.45 +70	26.222 -422	43.15 -56	29.075 -178	25.09 -9	42.313 -194	26.39 -16
4 20.7	36.926 -854	65.21 +124	25.847 -375	42.15 -100	28.921 -154	24.88 -21	42.145 -168	26.04 -35
4 30.7	36.145 -781	63.53 +168	25.537 -310	40.78 -137	28.799 -122	24.58 -30	42.011 -134	25.53 -51
5 10.6	35.447 -698	61.40 +213	25.298 -239	39.07 -171	28.713 -86	24.21 -37	41.916 -95	24.91 -62
5 20.6	34.860 -587	58.88 +252	25.151 -147	37.11 -196	28.673 -40	23.79 -42	41.870 -46	24.19 -72
5 30.6	34.391 -469	56.05 +283	25.096 -55	34.98 -213	28.680 +7	23.36 -43	41.874 +4	23.43 -76
6 9.5	34.049 -342	52.95 +310	25.136 +40	32.72 -226	28.732 +52	22.94 -42	41.927 +53	22.64 -79
6 19.5	33.851 -198	49.66 +329	25.276 +140	30.42 -230	28.834 +102	22.57 -37	42.031 +104	21.88 -76
6 29.5	33.788 -63	46.30 +336	25.505 +229	28.16 -226	28.970 +136	22.22 -35	42.179 +148	21.14 -74
7 9.5	33.870 +82	42.90 +340	25.821 +316	25.96 -220	29.154 +184	21.86 -36	42.372 +193	20.44 -70
7 19.4	34.096 +226	39.61 +329	26.220 +399	23.91 -205	29.375 +221	21.60 -26	42.607 +235	19.81 -63
7 29.4	34.450 +354	36.51 +310	26.686 +466	22.04 -187	29.625 +250	21.38 -22	42.874 +267	19.25 -56
8 8.4	34.932 +482	33.67 +284	27.216 +530	20.38 -166	29.904 +279	21.21 -17	43.171 +297	18.78 -47
8 18.4	35.528 +596	31.23 +244	27.799 +583	18.99 -139	30.204 +300	21.08 -13	43.493 +322	18.38 -40
8 28.3	36.212 +684	29.24 +199	28.420 +621	17.86 -113	30.521 +317	20.96 -12	43.832 +339	18.05 -33
9 7.3	36.978 +766	27.79 +145	29.078 +658	17.03 -83	30.853 +332	20.85 -11	44.188 +356	17.79 -26
9 17.3	37.794 +816	26.95 +84	29.758 +680	16.52 -51	31.194 +341	20.74 -11	44.554 +366	17.59 -20
9 27.2	38.634 +840	26.73 +22	30.448 +690	16.33 -19	31.541 +347	20.63 -11	44.926 +372	17.46 -13
10 7.2	39.481 +847	27.17 -44	31.146 +698	16.48 +15	31.892 +351	20.52 -11	45.303 +377	17.39 -7
10 17.2	40.295 +814	28.28 -111	31.833 +687	16.98 +50	32.240 +348	20.41 -11	45.676 +373	17.39 +0
10 27.2	41.055 +760	29.98 -170	32.502 +669	17.80 +82	32.582 +342	20.31 -10	46.043 +367	17.47 +8
11 6.1	41.737 +682	32.26 -228	33.143 +641	18.97 +117	32.915 +333	20.25 -6	46.399 +356	17.65 +18
11 16.1	42.305 +568	35.03 -277	33.736 +593	20.46 +149	33.228 +313	20.24 -1	46.734 +335	17.94 +29
11 26.1	42.751 +446	38.16 -313	34.273 +537	22.23 +177	33.518 +290	20.30 +6	47.045 +311	18.34 +40
12 6.1	43.053 +302	41.60 -344	34.738 +465	24.29 +206	33.777 +259	20.44 +14	47.322 +277	18.87 +53
12 16.0	43.193 +140	45.17 -357	35.115 +377	26.55 +226	33.996 +219	20.68 +24	47.556 +234	19.51 +64
12 26.0	43.177 -16	48.77 -360	35.398 +283	28.95 +240	34.172 +176	21.02 +34	47.743 +187	20.27 +76
12 36.0	42.995 -182	52.32 -355	35.573 +175	31.44 +249	34.297 +125	21.44 +42	47.874 +131	21.11 +84
	42.995 -341	52.32 -332	35.573 +62	31.44 +246	34.297 +69	21.44 +49	47.874 +72	21.11 +90
Mean Place	38.688	55.84	29.608	21.17	31.068	13.98	44.422	13.08
sec $\delta$ , tan $\delta$	+3.802	-3.668	+2.432	+2.217	+1.149	+0.566	+1.238	+0.731
$d\alpha(\psi)$ , $d\delta(\psi)$	-0.036	-0.02	+0.120	-0.02	+0.076	-0.03	+0.081	-0.03
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.011	+1.00	+0.007	+1.00	+0.002	+1.00	+0.003	+1.00
Dble.Trans.	December 24		December 24		December 25		December 25	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1169		238		234		237		
	74 Orionis		α Columbae		22 H. Camelopardi		2 Lyncis		
Mag. Spect.	5.11	F5	4.51	K0	4.73	A0	4.42	A0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	6 15	+ 12 16	6 16	- 35 07	6 17	+ 69 19	6 18	+ 59 00	
1	-9.0	40.102 +169	43.51 -74	04.353 +128	59.62 -312	20.857 +365	40.79 +252	24.866 +282	68.08 +203
1	1.0	40.228 +126	42.86 -65	04.429 +76	62.66 -304	21.104 +247	43.41 +262	25.067 +201	70.21 +213
1	11.0	40.307 +79	42.29 -57	04.451 +22	65.59 -293	21.226 +122	46.08 +267	25.181 +114	72.40 +219
1	20.9	40.335 +28	41.84 -45	04.417 -34	68.29 -270	21.214 -12	48.69 +261	25.202 +21	74.56 +216
1	30.9	40.317 -18	41.50 -34	04.331 -86	70.68 -239	21.079 -135	51.12 +243	25.136 -66	76.58 +202
2	9.9	40.253 -64	41.26 -24	04.197 -134	72.73 -205	20.826 -253	53.31 +219	24.986 -150	78.43 +185
2	19.8	40.148 -105	41.11 -15	04.021 -176	74.37 -164	20.469 -357	55.15 +184	24.763 -223	79.98 +155
3	1.8	40.013 -135	41.04 -7	03.814 -207	75.58 -121	20.036 -433	56.57 +142	24.485 -278	81.20 +122
3	11.8	39.856 -157	41.03 -1	03.583 -231	76.36 -78	19.543 -493	57.54 +97	24.164 -321	82.05 +85
3	21.8	39.687 -169	41.08 +5	03.341 -242	76.67 -31	19.019 -524	58.00 +46	23.821 -343	82.46 +41
3	31.7	39.519 -168	41.18 +10	03.101 -240	76.53 +14	18.497 -522	57.96 -4	23.479 -342	82.46 +0
4	10.7	39.360 -159	41.33 +15	02.868 -233	75.96 +57	17.993 -504	57.43 -53	23.150 -329	82.05 -41
4	20.7	39.221 -139	41.53 +20	02.657 -211	74.94 +102	17.540 -453	56.42 -101	22.858 -292	81.25 -80
4	30.7	39.112 -109	41.79 +26	02.475 -182	73.53 +141	17.158 -382	55.02 -140	22.616 -242	80.11 -114
5	10.6	39.034 -78	42.11 +32	02.326 -149	71.75 +178	16.858 -300	53.25 -177	22.431 -185	78.67 -144
5	20.6	38.997 -37	42.50 +39	02.220 -106	69.61 +214	16.660 -198	51.20 -205	22.320 -111	76.99 -168
5	30.6	39.001 +4	42.97 +47	02.157 -63	67.22 +239	16.569 -91	48.95 -225	22.283 -37	75.95 -184
6	9.5	39.045 +44	43.50 +53	02.140 -17	64.57 +265	16.585 +16	46.55 -240	22.321 +38	73.20 -195
6	19.5	39.132 +87	44.10 +60	02.172 +32	61.76 +281	16.718 +133	44.09 -246	22.439 +118	71.20 -200
6	29.5	39.255 +123	44.75 +65	02.248 +76	58.87 +289	16.954 +236	41.65 -244	22.628 +189	69.23 -197
7	9.5	39.415 +160	45.48 +73	02.368 +120	55.94 +293	17.293 +339	39.27 -238	22.888 +260	67.30 -193
7	19.4	39.609 +194	46.20 +72	02.531 +163	53.09 +285	17.730 +437	37.03 -224	23.151 +325	65.49 -181
7	29.4	39.830 +221	46.90 +70	02.729 +198	50.39 +270	18.246 +516	34.97 -206	23.213 +378	63.83 -166
8	8.4	40.076 +246	47.55 +65	02.963 +234	47.91 +248	18.840 +584	33.13 -184	24.021 +430	62.35 -148
8	18.4	40.342 +266	48.12 +57	03.226 +263	45.78 +213	19.498 +658	31.56 -157	24.492 +471	61.08 -127
8	28.3	40.622 +280	48.57 +45	03.511 +285	44.03 +175	20.203 +705	30.27 -129	24.995 +503	60.03 -105
9	7.3	40.916 +294	48.89 +32	03.818 +307	42.74 +129	20.954 +751	29.29 -98	25.527 +532	59.23 -80
9	17.3	41.219 +303	49.03 +14	04.137 +319	41.99 +75	21.733 +779	28.66 -63	26.077 +550	58.69 -54
9	27.2	41.527 +308	49.01 -2	04.465 +328	41.78 +21	22.527 +794	28.36 -30	26.638 +561	58.42 -27
10	7.2	41.839 +312	48.80 -21	04.797 +332	42.15 -37	23.332 +805	28.44 +8	27.206 +568	58.43 +1
10	17.2	42.149 +310	48.42 -38	05.123 +326	43.11 -96	24.125 +793	28.89 +45	27.769 +563	58.73 +30
10	27.2	42.453 +304	47.88 -54	05.440 +317	44.58 -147	24.899 +774	29.69 +80	28.319 +550	59.32 +59
11	6.1	42.749 +296	47.21 -67	05.741 +301	46.56 -198	25.642 +743	30.87 +118	28.851 +532	60.21 +89
11	16.1	43.027 +278	46.45 -76	06.015 +274	48.97 -241	26.328 +686	32.40 +153	29.347 +496	61.38 +117
11	26.1	43.285 +258	45.63 -82	06.259 +244	51.69 -272	26.951 +623	34.25 +185	29.802 +455	62.81 +143
12	6.1	43.516 +231	44.80 -83	06.465 +206	54.68 -299	27.491 +540	36.40 +215	30.202 +400	64.51 +170
12	16.0	43.710 +194	44.00 -80	06.624 +159	57.78 -310	27.928 +437	38.77 +237	30.533 +331	66.40 +189
12	26.0	43.866 +156	43.26 -74	06.735 +111	60.89 -311	28.256 +328	41.31 +254	30.790 +257	68.44 +204
12	36.0	43.976 +110	42.61 -65	06.792 +57	63.95 -306	28.459 +203	43.95 +264	30.961 +171	70.59 +215
		43.976 +61	42.61 -54	06.792 +1	63.95 -286	28.459 +72	43.95 +262	30.961 +80	70.59 +215
Mean Place	41.124	36.16	04.232	68.10	21.639	34.22	25.958	61.48	
sec δ, tan δ	+1.023	+0.218	+1.223	-0.704	+2.832	+2.650	+1.943	+1.665	
dα(ψ), dδ(ψ)	+0.067	-0.03	+0.043	-0.03	+0.131	-0.03	+0.105	-0.03	
dα(ε), dδ(ε)	+0.001	+1.00	-0.003	+1.00	+0.013	+1.00	+0.009	+1.00	
Dble. Trans.	December 25		December 25		December 26		December 26		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1170		240		243		241	
	7 Monocerotis		ζ Canis Majoris		β Canis Majoris		μ Geminorum	
Mag.Spect.	5.13	B3	3.10	B3	1.99	B1	3.19	M0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	6 19	- 7 48	6 19	- 30 02	6 22	- 17 56	6 22	+ 22 31
1 -9.0	<sup>s</sup> 03.039 + 153	51 64 -192	<sup>s</sup> 47.580 + 137	75.72 -294	<sup>s</sup> 05.788 + 148	46.51 -244	<sup>s</sup> 07.500 + 188	24.31 -14
1 1.0	03.150 + 111	53.49 -185	47.667 + 87	78.61 -289	05.892 + 104	48.88 -237	07.643 + 143	24.26 - 5
1 11.0	03.215 + 65	55.24 -175	47.704 + 37	81.38 -277	05.948 + 56	51.15 -227	07.737 + 94	24.31 + 5
1 20.9	03.230 + 15	56.81 -157	47.686 - 18	83.93 -255	05.953 + 5	53.22 -207	07.776 + 39	24.44 + 13
1 30.9	03.200 - 30	58.17 -136	47.618 - 68	86.19 -226	05.912 - 41	55.04 -182	07.765 - 11	24.64 + 20
2 9.9	03.126 - 74	59.31 -114	47.503 -115	88.14 -195	05.826 - 86	56.60 -156	07.704 - 61	24.88 + 24
2 19.8	03.013 -113	60.21 - 90	47.347 -156	89.70 -156	05.700 -126	57.84 -124	07.600 -104	25.13 + 25
3 1.8	02.872 -141	60.85 - 64	47.161 -186	90.86 -116	05.545 -155	58.75 - 91	07.463 -137	25.36 + 23
3 11.8	02.708 -164	61.25 - 40	46.951 -210	91.62 - 76	05.367 -178	59.34 - 59	07.300 -163	25.56 + 20
3 21.8	02.532 -176	61.38 - 13	46.729 -222	91.94 - 32	05.177 -190	59.58 - 24	07.124 -176	25.72 + 16
3 31.7	02.358 -174	61.27 + 11	46.507 -222	91.84 + 10	04.987 -190	59.49 + 9	06.948 -176	25.81 + 9
4 10.7	02.190 -168	60.92 + 35	46.293 -214	91.34 + 50	04.804 -183	59.07 + 42	06.780 -168	25.84 + 3
4 20.7	02.042 -148	60.32 + 60	46.099 -194	90.41 + 93	04.640 -164	58.32 + 75	06.632 -148	25.83 - 1
4 30.7	01.920 -122	59.51 + 81	45.933 -166	89.13 +128	04.502 -138	57.29 +103	06.514 -118	25.77 - 6
5 10.6	01.829 - 91	58.48 +103	45.798 -135	87.48 +165	04.394 -108	55.96 +133	06.430 - 84	25.70 - 7
5 20.6	01.776 - 53	57.24 +124	45.704 - 94	85.51 +197	04.325 - 69	54.37 +159	06.387 - 43	25.62 - 8
5 30.6	01.761 - 15	55.83 +141	45.651 - 53	83.29 +222	04.295 - 30	52.57 +180	06.388 + 1	25.55 - 7
6 9.5	01.785 + 24	54.27 +156	45.642 - 9	80.82 +262	04.304 + 9	50.57 +200	06.431 + 43	25.50 - 5
6 19.5	01.851 + 66	52.59 +168	45.679 + 37	78.20 +247	04.356 + 52	48.42 +215	06.522 + 91	25.49 - 1
6 29.5	01.954 +103	50.84 +175	45.757 + 78	75.49 +271	04.446 + 90	46.21 +221	06.632 +110	25.47 - 2
7 9.5	02.092 +138	49.05 +179	45.877 +120	72.73 +276	04.574 +128	43.95 +226	06.808 +176	25.60 +13
7 19.4	02.265 +173	47.30 +175	46.037 +160	70.05 +268	04.737 +163	41.73 +222	07.011 +203	25.70 +10
7 29.4	02.464 +199	45.63 +167	46.230 +193	67.50 +255	04.930 +193	39.63 +210	07.242 +231	25.82 +12
8 8.4	02.689 +225	44.09 +154	46.456 +226	65.16 +234	05.151 +221	37.69 +194	07.499 +257	25.94 +12
8 18.4	02.937 +248	42.76 +133	46.710 +254	63.13 +203	05.396 +245	36.02 +167	07.778 +279	26.03 + 9
8 28.3	03.200 +263	41.68 +108	46.984 +274	61.47 +186	05.658 +262	34.65 +137	08.072 +294	26.10 + 7
9 7.3	03.478 +278	40.90 + 78	47.279 +295	60.24 +123	05.938 +280	33.64 +101	08.383 +311	26.11 + 1
9 17.3	03.766 +288	40.47 + 43	47.587 +308	59.53 + 71	06.229 +291	33.07 + 57	08.703 +320	26.05 - 6
9 27.2	04.060 +294	40.39 + 8	47.902 +315	59.31 + 22	06.527 +298	32.92 + 15	09.029 +326	25.91 -14
10 7.2	04.359 +299	40.69 - 30	48.222 +320	59.65 - 34	06.831 +304	33.24 - 32	09.361 +332	25.70 -21
10 17.2	04.655 +296	41.37 - 68	48.538 +316	60.55 - 90	07.131 +300	34.03 - 79	09.692 +331	25.42 -28
10 27.2	04.946 +291	42.38 -101	48.846 +308	61.94 -139	07.426 +295	35.22 -119	10.018 +326	25.09 -33
11 6.1	05.228 +282	43.71 -133	49.141 +295	63.81 -187	07.711 +285	36.83 -161	10.336 +318	24.73 -36
11 16.1	05.492 +264	45.30 -159	49.412 +271	66.09 -228	07.976 +265	38.76 -193	10.637 +301	24.36 -37
11 26.1	05.735 +243	47.07 -177	49.656 +244	68.67 -258	08.219 +243	40.94 -218	10.918 +281	24.01 -35
12 6.1	05.949 +214	48.98 -191	49.865 +209	71.49 -282	08.432 +213	43.31 -237	11.170 +252	23.72 -29
12 16.0	06.128 +179	50.92 -194	50.031 +166	74.43 -294	08.606 +174	45.76 -245	11.385 +215	23.50 -22
12 26.0	06.268 +140	52.85 -193	50.031 +121	77.38 -295	08.740 +134	48.20 -244	11.560 +175	23.37 -13
12 36.0	06.363 + 95	54.70 -185	50.152 + 70	80.27 -289	08.827 + 87	50.59 -239	11.686 +126	23.33 - 4
	06.363 + 48	54.70 -170	50.222 + 16	80.27 -271	08.827 + 38	50.59 -221	11.686 + 74	23.33 + 6
Mean Place	03.747	59.81	47.678	84.56	06.269	55.21	08.621	16.84
sec δ, tan δ	+1.009	-0.137	+1.155	-0.579	+1.051	-0.324	+1.083	+0.415
dα(ψ), dδ(ψ)	+0.058	-0.03	+0.046	-0.03	+0.053	-0.04	+0.072	-0.04
dα(ε), dδ(ε)	-0.001	+1.00	-0.003	+1.00	-0.002	+1.00	+0.003	+1.00
Dble.Trans.	December 26		December 26		December 27		December 27	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	244		1171		245		242	
	ε Monocerotis*		23 G. Canis Majoris		α Carinae (Canopus)		ψ <sup>1</sup> Aurigae	
Mag. Spect.	4.48	A5	5.39	K0	-0.86	F0	5.10 var.	K2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	6 23	+ 4 36	6 23	- 11 30	6 23	- 52 40	6 23	+ 49 17
1 <sup>d</sup> -9.0	02 229 <sup>s</sup> +168	09 72 <sup>o</sup> -123	31 870 <sup>s</sup> +154	71 60 <sup>o</sup> -213	40 431 <sup>s</sup> +123	66 84 <sup>o</sup> -354	50 354 <sup>s</sup> +249	52 02 <sup>o</sup> +147
1 <sup>s</sup> 1.0	02 355 +126	08 56 -116	31 981 +111	73 66 -206	40 484 +53	70 34 -350	50 539 +185	53 61 +159
1 11.0	02 435 +80	07 51 -105	32 046 +65	75 62 -196	40 466 -18	73 74 -340	50 655 +116	55 28 +167
1 20.9	02 465 +30	06 60 -91	32 061 +15	77 39 -177	40 374 -92	76 91 -317	50 695 +40	56 95 +167
1 30.9	02 449 -16	05 84 -76	32 031 -30	78 94 -155	40 216 -158	79 74 -283	50 665 -30	58 55 +160
2 9.9	02 388 -61	05 23 -61	31 955 -76	80 26 -132	39 997 -219	82 22 -248	50 568 -97	60 03 +148
2 19.9	02 286 -102	04 78 -45	31 840 -115	81 30 -104	39 725 -272	84 23 -201	50 409 -159	61 31 +128
3 1.8	02 155 -131	04 48 -30	31 696 -144	82 06 -76	39 414 -311	85 76 -153	50 204 -205	62 34 +103
3 11.8	02 000 -155	04 31 -17	31 529 -167	82 54 -48	39 072 -342	86 81 -105	49 964 -240	63 08 +74
3 21.8	01 833 -167	04 29 -2	31 350 -179	82 73 -19	38 714 -358	87 30 -49	49 704 -260	63 49 +41
3 31.7	01 666 -167	04 39 +10	31 170 -180	82 64 +9	38 356 -358	87 29 +1	49 443 -261	63 57 +8
4 10.7	01 506 -160	04 62 +23	30 998 -172	82 28 +36	38 006 -350	86 77 +52	49 192 -251	63 32 -25
4 20.7	01 364 -142	04 98 +36	30 843 -155	81 64 +64	37 680 -326	85 72 +105	48 969 -223	62 76 -56
4 30.7	01 250 -114	05 45 +47	30 715 -128	80 76 +88	37 387 -293	84 22 +150	48 786 -183	61 93 -83
5 10.6	01 166 -84	06 05 +60	30 617 -98	79 63 +113	37 134 -253	82 28 +194	48 648 -138	60 86 -107
5 20.6	01 120 -46	06 77 +72	30 556 -61	78 27 +136	36 932 -202	79 93 +235	48 569 -79	59 60 -126
5 30.6	01 114 -6	07 59 +82	30 533 -23	76 73 +154	36 785 -147	77 27 +266	48 548 -21	58 22 -138
6 9.6	01 146 +32	08 52 +93	30 550 +17	75 01 +172	36 694 -91	74 31 +296	48 586 +38	56 74 -148
6 19.5	01 220 +74	09 53 +101	30 608 +58	73 17 +184	36 667 -27	71 15 +316	48 688 +102	55 23 -151
6 29.5	01 330 +110	10 59 +106	30 703 +95	71 26 +191	36 699 +32	67 89 +326	48 847 +159	53 73 -150
7 9.5	01 475 +145	11 71 +112	30 834 +131	69 30 +196	36 792 +93	64 57 +332	49 059 +212	52 26 -147
7 19.4	01 654 +179	12 81 +110	31 000 +166	67 38 +192	36 945 +153	61 33 +324	49 059 +265	50 89 -137
7 29.4	01 860 +206	13 87 +106	31 194 +194	65 55 +183	37 149 +204	58 25 +308	49 324 +307	50 89 -127
8 8.4	02 091 +231	14 85 +98	31 194 +221	65 55 +168	37 406 +257	55 41 +284	49 631 +346	49 62 -115
8 18.4	02 344 +253	15 69 +84	31 658 +243	62 41 +146	37 708 +302	52 93 +248	49 977 +379	48 47 -99
8 28.3	02 611 +267	16 37 +68	31 918 +260	61 23 +118	38 046 +338	50 89 +204	50 759 +403	46 64 -84
9 7.3	02 894 +283	16 84 +47	32 195 +277	60 36 +87	38 418 +372	49 34 +155	51 186 +427	45 97 -67
9 17.3	03 186 +292	17 08 +24	32 483 +288	59 88 +48	38 812 +394	48 40 +94	51 628 +442	45 48 -49
9 27.3	03 485 +299	17 07 -1	32 777 +294	59 77 +11	39 219 +407	48 05 +35	52 079 +451	45 48 -31
10 7.2	03 788 +303	16 79 -28	33 076 +299	60 08 -31	39 634 +415	48 35 -30	52 538 +459	45 05 -12
10 17.2	04 091 +303	16 26 -53	33 374 +298	60 80 -72	40 042 +408	49 32 -97	52 994 +456	45 14 +9
10 27.2	04 389 +298	15 51 -75	33 667 +293	61 88 -108	40 435 +393	50 87 -155	53 443 +449	45 43 +29
11 6.1	04 679 +290	14 55 -96	33 950 +283	63 32 -144	40 804 +369	53 01 -214	53 880 +437	45 95 +52
11 16.1	04 953 +274	13 43 -112	34 216 +266	65 04 -172	41 134 +330	55 65 -264	54 291 +411	46 69 +74
11 26.1	05 208 +255	12 20 -123	34 461 +245	66 97 -193	41 420 +286	58 67 -302	54 672 +381	47 64 +95
12 6.1	05 436 +228	10 91 -129	34 677 +216	69 07 -210	41 651 +231	62 01 -334	55 012 +340	48 80 +116
12 16.0	05 629 +193	09 63 -128	34 857 +180	71 22 -215	41 816 +165	65 52 -351	55 298 +286	50 14 +134
12 26.0	05 784 +155	08 40 -123	34 998 +141	73 35 -213	41 916 +100	69 08 -356	55 528 +230	51 64 +150
12 36.0	05 894 +110	07 24 -116	35 094 +96	75 42 -207	41 943 +27	72 60 -352	55 689 +161	53 24 +160
	+63	-102	+47	-191	-46	-333	+89	+164
Mean Place	03.149	01.70	32.503	80.23	39.181	76.67	51.534	45.33
sec δ, tan δ	+1.003	+0.080	+1.021	-0.204	+1.650	-1.312	+1.533	+1.162
dα(ψ), dδ(ψ)	+0.063	-0.04	+0.056	-0.04	+0.027	-0.04	+0.092	-0.04
dα(ε), dδ(ε)	+0.001	+0.99	-0.001	+0.99	-0.009	+0.99	+0.008	+0.99
Dble. Trans.	December 27		December 27		December 27		December 27	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1172		246		1173		1174		
	Groombridge 1156 (Aurigae)		10 Monocerotis		v Geminorum		13 Monocerotis		
Mag.Spect.	7.14	G5	4.98	B3	4.06	B5	4.50	A0p	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	6 25	+41 58	6 27	- 4 44	6 28	+20 13	6 32	+ 7 20	
1 <sup>d</sup>	-9.0	22 779 +228	11 48 +104	16 769 +164	62 43 -179	08 596 +191	24 89 -31	09 462 +179	45.24 -111
1 <sup>s</sup>	1.0	22 952 +173	12 63 +115	16 891 +122	64 14 -171	08 743 +147	24 68 -21	09 600 +138	44.22 -102
1	11.0	23 064 +112	13 87 +124	16 967 +76	65 74 -160	08 841 +98	24 57 -11	09 691 +91	43.31 -91
1	20.9	23 109 +45	15 14 +127	16 993 +26	67 19 -145	08 885 +44	24 56 -1	09 732 +41	42.53 -78
1	30.9	23 092 -17	16 38 +124	16 973 -20	68 43 -124	08 879 -6	24 64 +8	09 726 -6	41.89 -64
2	9.9	23 014 -78	17 55 +117	16 908 -65	69 48 -105	08 825 -54	24 77 +13	09 673 -53	41.39 -50
2	19.9	22 882 -132	18 57 +102	16 804 -104	70 29 -81	08 726 -99	24 94 +17	09 579 -94	41.04 -35
3	1.8	22 709 -173	19 41 +84	16 669 -135	70 88 -59	08 594 -132	25 13 +19	09 453 -126	40.81 -23
3	11.8	22 503 -206	20 03 +62	16 511 -158	71 25 -37	08 436 -158	25 30 +17	09 302 -151	40.70 -11
3	21.8	22 280 -223	20 39 +36	16 340 -171	71 38 -13	08 263 -173	25 45 +15	09 136 -166	40.71 +1
3	31.7	22 057 -223	20 49 +10	16 168 -172	71 30 +8	08 090 -173	25 57 +12	08 970 -166	40.81 +10
4	10.7	21 841 -216	20 33 -16	16 002 -166	71 00 +8	07 923 -167	25 65 +8	08 809 -161	41.01 +20
4	20.7	21 650 -191	19 93 -40	15 855 -147	70 49 +51	07 775 -148	25 71 +6	08 665 -144	41.31 +30
4	30.7	21 494 -156	19 32 -61	15 732 -123	69 78 +71	07 656 -119	25 74 +3	08 547 -118	41.70 +39
5	10.6	21 379 -115	18 52 -80	15 639 -93	68 88 +90	07 569 -87	25 76 +2	08 459 -88	42.19 +49
5	20.6	21 315 -64	17 58 -94	15 584 -55	67 79 +109	07 522 -47	25 79 +3	08 408 -51	42.77 +58
5	30.6	21 303 -12	16 54 -104	15 566 -18	66 55 +124	07 517 -5	25 84 +5	08 396 -12	43.44 +67
6	9.6	21 343 +40	15 45 -109	15 587 +21	65 16 +139	07 554 +37	25 92 +8	08 422 +26	44.21 +77
6	19.5	21 439 +96	14 33 -112	15 648 +61	63 67 +149	07 636 +82	26 02 +10	08 490 +68	45.03 +82
6	29.5	21 584 +145	13 23 -110	15 746 +98	62 11 +156	07 749 +113	26 05 +3	08 594 +104	45.91 +88
7	9.5	21 776 +192	12 16 -107	15 879 +133	60 50 +161	07 907 +158	26 37 +32	08 733 +139	46.84 +93
7	19.4	22 014 +238	11 15 -101	16 047 +168	58 92 +158	08 101 +194	26 58 +21	08 907 +174	47.77 +93
7	29.4	22 289 +275	10 23 -92	16 047 +194	57 41 +151	08 101 +221	26 58 +21	08 907 +200	47.77 +88
8	8.4	22 597 +308	09 39 -84	16 241 +221	57 41 +139	08 322 +248	26 79 +20	09 107 +227	48.65 +82
8	18.4	22 935 +338	08 67 -72	16 462 +243	56 02 +120	08 570 +270	26 99 +16	09 334 +249	49.47 +69
8	28.3	23 293 +358	08 04 -63	16 964 +259	53 84 +98	09 126 +286	27 25 +10	09 848 +265	50.71 +55
9	7.3	23 671 +378	07 53 -51	17 240 +276	53 14 +70	09 429 +303	27 29 +4	10 129 +281	51.08 +37
9	17.3	24 063 +392	07 13 -40	17 240 +286	53 14 +38	09 429 +313	27 29 -7	10 129 +292	51.08 +16
9	27.3	24 463 +400	06 84 -29	17 526 +293	52 76 +6	09 742 +320	27 22 -15	10 421 +300	51.24 -7
10	7.2	24 870 +407	06 67 -17	17 819 +299	52 70 -30	10 062 +327	27 07 -26	10 721 +307	51.17 -30
10	17.2	25 276 +406	06 64 -3	18 417 +299	53 64 -64	10 715 +326	26 45 -36	11 334 +306	50.34 -53
10	27.2	25 676 +400	06 75 +11	18 711 +294	54 60 -96	11 038 +323	26 02 -43	11 638 +304	49.62 -72
11	6.1	26 066 +390	07 01 +26	18 711 +287	55 85 -125	11 354 +316	25 54 -48	11 936 +298	48.70 -92
11	16.1	26 066 +369	07 01 +43	18 998 +270	55 85 -149	11 354 +300	25 54 -50	11 936 +283	48.70 -104
11	26.1	26 435 +343	07 44 +59	19 268 +251	57 34 -166	11 654 +281	25 04 -50	12 219 +264	47.66 -113
11	26.1	26 778 +309	08 03 +77	19 519 +224	59 00 -178	11 935 +254	24 54 -45	12 483 +239	46.53 -118
12	6.1	27 087 +261	08 80 +92	19 743 +189	60 78 -181	12 189 +217	24 09 -39	12 722 +205	45.35 -117
12	16.0	27 348 +212	09 72 +106	19 932 +150	62 59 -178	12 406 +178	23 70 -30	12 927 +167	44.18 -110
12	26.0	27 560 +152	10 78 +117	20 082 +106	64 37 -172	12 584 +130	23 40 -20	13 094 +122	43.08 -102
12	36.0	27 712 +88	11 95 +122	20 188 +59	66 09 -156	12 714 +78	23 20 -9	13 216 +73	42.06 -89
Mean Place	23.977	04.60	17.542	71.06	09.693	17.23	10.423	36.87	
sec δ, tan δ	+1.345	+0.899	+1.003	-0.083	+1.066	+0.368	+1.008	+0.129	
dα(w), dδ(w)	+0.085	-0.04	+0.059	-0.05	+0.071	-0.05	+0.065	-0.06	
dα(ε), dδ(ε)	+0.007	+0.99	-0.001	+0.99	+0.003	+0.99	+0.001	+0.99	
Dbles.Trans.	December 28		December 28		December 28		December 29		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1175		249		247		251	
	56 G. Monocerotis		ξ <sup>2</sup> Canis Majoris		8 Lyncis		γ Geminorum	
Mag. Spect.	5.02	B3	4.54	A0	6.05	G0	1.93	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	6 32	- 1 12	6 34	- 22 56	6 36	+ 61 29	6 36	+ 16 24
1 -9.0	55 926 + 172	24 48 -160	29 023 + 157	62 78 -269	26 524 + 331	46 00 +204	54 876 + 195	49 89 -58
1 1.0	56 056 + 130	26 01 -153	29 134 + 111	65 43 -265	26 770 + 246	48 18 +218	55 027 + 151	49 41 -48
1 11.0	56 141 + 85	27 44 -143	29 197 + 63	67 98 -255	26 923 + 153	50 46 +229	55 130 + 103	49 04 -37
1 20.9	56 176 + 35	28 71 -127	29 206 + 9	70 33 -235	26 973 + 50	52 75 +228	55 181 + 51	48 79 -25
1 30.9	56 164 - 12	29 80 -109	29 168 - 38	72 43 -210	26 929 - 44	54 94 +219	55 183 + 2	48 64 -15
2 9.9	56 107 - 57	30 70 - 90	29 082 - 86	74 25 -182	26 792 - 137	56 97 +203	55 136 - 47	48 59 - 5
2 19.9	56 009 - 98	31 40 - 70	28 954 - 128	75 72 -147	26 571 - 221	58 74 +177	55 044 - 92	48 61 + 2
3 1.8	55 880 - 129	31 90 - 50	28 795 - 159	76 84 -112	26 286 - 285	60 18 +144	54 920 - 124	48 69 + 8
3 11.8	55 726 - 154	32 21 - 31	28 611 - 184	77 61 - 77	25 949 - 337	61 25 +107	54 768 - 152	48 80 + 11
3 21.8	55 558 - 168	32 31 - 10	28 611 - 199	77 61 - 37	25 582 - 367	61 88 + 63	54 600 - 168	48 93 + 13
3 31.7	55 390 - 168	32 23 + 8	28 212 - 200	77 99 - 1	25 209 - 373	62 08 + 20	54 431 - 169	49 06 + 13
4 10.7	55 226 - 164	31 98 + 25	28 016 - 196	77 64 + 35	24 844 - 365	61 84 - 24	54 266 - 165	49 20 + 14
4 20.7	55 079 - 147	31 54 + 44	27 838 - 178	76 91 + 73	24 511 - 333	61 17 - 67	54 119 - 147	49 35 + 15
4 30.7	54 957 - 122	30 94 + 60	27 684 - 154	75 87 +104	24 226 - 285	60 13 -104	53 998 - 121	49 50 + 15
5 10.6	54 864 - 93	30 16 + 78	27 560 - 124	74 49 +138	23 997 - 229	58 74 -139	53 907 - 91	49 67 + 17
5 20.6	54 808 - 56	29 23 + 93	27 472 - 88	72 82 +167	23 843 - 154	57 07 -167	53 855 - 52	49 87 + 20
5 30.6	54 789 - 19	28 17 +106	27 423 - 49	70 92 +190	23 764 - 79	55 19 -188	53 855 - 12	50 10 + 23
6 9.6	54 809 + 20	26 98 +119	27 413 - 9	68 78 +214	23 765 + 1	53 15 -204	53 843 + 28	50 37 + 27
6 19.5	54 869 + 60	25 68 +130	27 448 + 34	66 49 +229	23 851 + 86	51 03 -212	53 942 + 71	50 68 + 31
6 29.5	54 965 + 96	24 33 +135	27 521 + 73	64 10 +239	24 013 + 162	48 88 -215	54 049 + 107	50 98 + 30
7 9.5	55 096 + 131	22 93 +140	27 632 + 111	61 66 +244	24 251 + 238	46 75 -213	54 191 + 142	51 40 + 42
7 19.4	55 261 + 165	21 55 +138	27 781 + 149	59 26 +240	24 562 + 311	44 70 -205	54 371 + 180	51 80 + 40
7 29.4	55 453 + 192	20 23 +132	27 961 + 180	56 97 +229	24 933 + 371	42 77 -193	54 579 + 208	52 18 + 38
8 8.4	55 672 + 219	19 01 +122	28 172 + 211	54 85 +212	25 362 + 429	41 00 -177	54 814 + 235	52 52 + 34
8 18.4	55 913 + 241	17 97 +104	28 410 + 238	53 00 +185	25 841 + 479	39 43 -157	55 072 + 258	52 79 + 27
8 28.3	56 170 + 257	17 12 + 85	28 668 + 258	51 47 +153	26 358 + 517	38 08 -135	55 347 + 275	52 99 + 20
9 7.3	56 445 + 275	16 51 + 61	28 946 + 278	50 32 +115	26 911 + 553	36 97 -111	55 638 + 291	53 07 + 8
9 17.3	56 731 + 286	16 20 + 31	29 238 + 292	49 64 + 68	27 490 + 579	36 14 - 83	55 942 + 304	53 02 - 5
9 27.3	57 024 + 293	16 19 + 1	29 539 + 301	49 41 + 23	28 084 + 594	35 57 - 57	56 253 + 311	52 84 - 18
10 7.2	57 324 + 300	16 49 - 30	29 848 + 309	49 68 - 27	28 693 + 609	35 31 - 26	56 572 + 319	52 52 - 32
10 17.2	57 625 + 301	17 11 - 62	30 156 + 308	50 47 - 79	29 300 + 607	35 37 + 6	56 892 + 320	52 06 - 46
10 27.2	57 922 + 297	18 00 - 89	30 460 + 304	51 70 -123	29 900 + 600	35 73 + 36	57 210 + 318	51 49 - 57
11 6.1	58 213 + 291	19 17 -117	30 755 + 295	53 39 -169	30 484 + 584	36 43 + 70	57 523 + 313	50 83 - 66
11 16.1	58 489 + 276	20 54 -137	30 755 + 276	55 45 -206	31 034 + 550	37 45 +102	57 822 + 299	50 11 - 72
11 26.1	58 746 + 257	22 06 -152	31 031 + 254	57 79 -234	31 543 + 509	38 78 +133	58 102 + 280	49 38 - 73
12 6.1	58 978 + 232	23 68 -162	31 508 + 223	60 37 -258	31 997 + 454	40 40 +162	58 357 + 255	48 66 - 72
12 16.0	59 175 + 197	25 32 -164	31 692 + 184	63 05 -268	32 379 + 382	42 27 +187	58 577 + 220	48 01 - 65
12 26.0	59 334 + 159	26 93 -161	31 835 + 143	65 75 -270	32 684 + 305	44 34 +207	58 758 + 181	47 43 - 58
12 36.0	59 449 + 115	28 46 -153	31 929 + 94	68 41 -266	32 898 + 214	46 55 +221	58 893 + 135	46 96 - 47
	56 764 + 67	33 33 -139	29 387 + 43	72 80 -250	27 497 + 115	39 63 +226	55 940 + 85	41 78 - 35
Mean Place	56.764	33.33	29.387	72.80	27.497	39.63	55.940	41.78
sec δ, tan δ	+1.000	-0.021	+1.086	-0.424	+2.095	+1.841	+1.042	+0.295
da(ψ), dδ(ψ)	+0.061	-0.06	+0.050	-0.06	+0.109	-0.06	+0.069	-0.06
da(ε), dδ(ε)	-0.000	+0.99	-0.004	+0.99	+0.019	+0.99	+0.003	+0.99
Dble. Trans.	December 30		December 30		December 31		December 31	

APPARENT PLACES OF STARS, 1986

105

AT UPPER TRANSIT AT GREENWICH

No.	252		250		264		254	
	v Puppis		51 Aurigae		ζ Mensae		ε Geminorum	
Mag. Spect.	3.18	B8	5.71	K0	5.64	A2	3.18	G5
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	Dec.	h m	Dec.	h m	Dec.	h m	Dec.
	6 37	-43 10	6 37	+39 24	6 41	-80 47	6 43	+25 08
1 9.0	21.319 +149	49 89 -338	42 256 +237	20 32 +82	22 800 +172	48 78 -353	04.978 +214	50.93 -8
1 1.0	21 410 +91	53 24 -335	42 440 +184	21 27 +95	22 708 -92	52 33 -355	05.146 +168	50.98 +5
1 11.0	21 441 +31	56 52 -328	42 565 +125	22 33 +106	22 355 -353	55 84 -351	05.264 +118	51.14 +16
1 20.9	21 408 -33	59 58 -306	42 625 +60	23 45 +112	21 735 -620	59 17 -333	05.326 +62	51.41 +27
1 30.9	21 316 -92	62 36 -278	42 625 +0	24 58 +113	20 889 -846	62 22 -305	05.335 +9	51.75 +34
2 9.9	21 170 -146	64 80 -244	42 564 -61	25 66 +108	19 833 -1056	64 96 -274	05.292 -43	52.15 +40
2 19.9	20 975 -195	66 82 -202	42 449 -115	26 65 +99	18 591 -1242	67 28 -232	05.201 -91	52.56 +41
3 1.8	20 743 -232	68 40 -158	42 292 -157	26 65 +84	17 219 -1372	69 14 -186	05.073 -128	52.95 +39
3 11.8	20 481 -262	69 52 -112	42 102 -190	27 49 +65	17 219 -1484	70 54 -140	04.916 -157	53.29 +34
3 21.8	20 203 -278	70 14 -62	41 892 -210	28 14 +43	15 735 -1550	71 41 -87	04.741 -175	53.57 +28
3 31.8	19 922 -281	70 27 -13	41 678 -214	28 77 +20	12 619 -1566	71 76 -35	04 562 -179	53.76 +19
4 10.7	19 645 -277	69 93 +34	41 470 -208	28 73 -4	11 055 -1564	71 60 +16	04 388 -174	53.86 +10
4 20.7	19 386 -259	69 09 +84	41 283 -187	28 73 -27	09 544 -1511	70 91 +69	04 230 -158	53.88 +2
4 30.7	19 155 -231	67 83 +126	41 127 -156	28 00 -46	08 123 -1421	69 74 +117	04 099 -131	53.82 -6
5 10.6	18 956 -199	66 13 +170	41 009 -118	27 35 -65	06 807 -1316	68 10 +164	04 000 -99	53.70 -12
5 20.6	18 800 -156	64 04 +209	40 938 -71	26 57 -78	05 646 -1161	66 02 +208	03 940 -60	53.53 -17
5 30.6	18 689 -111	61 64 +240	40 915 -23	25 68 -89	04 655 -991	63 59 +243	03 922 -18	53.34 -19
6 9.6	18 625 -64	58 94 +270	40 943 +28	24 73 -95	03 850 -805	60 82 +277	03 946 +24	53.15 -19
6 19.5	18 613 -12	56 04 +290	41 023 +80	24 73 -99	03 269 -581	57 80 +302	04 017 +71	52.96 -19
6 29.5	18 650 +37	53 02 +302	41 150 +127	22 76 -98	02 905 -364	54 62 +318	04 132 +115	52.87 -9
7 9.5	18 737 +87	49 91 +311	41 322 +172	21 77 -99	02 774 -131	51 33 +329	04 267 +135	52.64 -23
7 19.5	18 873 +136	46 86 +305	41 540 +218	21 77 -94	02 889 +115	48 07 +326	04 454 +187	52.47 -17
7 29.4	19 051 +178	43 94 +292	41 792 +252	19 95 -88	03 225 +336	44 91 +316	04 670 +216	52.33 -14
8 8.4	19 271 +220	41 21 +273	42 079 +287	19 13 -82	03 792 +567	41 93 +298	04 914 +244	52.19 -14
8 18.4	19 529 +258	38 82 +239	42 395 +316	18 39 -74	04 569 +777	39 28 +265	05 183 +269	52.04 -15
8 28.3	19 817 +288	36 81 +201	42 732 +337	17 73 -66	05 521 +952	37 01 +227	05 471 +288	51.86 -18
9 7.3	20 135 +318	35 27 +154	43 091 +359	17 14 -59	06 639 +1118	35 21 +180	05 777 +306	51 64 -22
9 17.3	20 472 +337	34 29 +98	43 464 +373	16 64 -50	07 874 +1235	33 98 +123	06 097 +320	51 37 -27
9 27.3	20 823 +351	33 87 +42	43 848 +384	16 23 -41	09 183 +1309	33 34 +64	06 426 +329	51 05 -32
10 7.2	21 185 +362	34 07 -20	44 241 +393	15 90 -33	10 539 +1356	33 34 +0	06 764 +338	50 68 -37
10 17.2	21 544 +359	34 89 -82	44 634 +393	15 69 -21	11 872 +1333	34 00 -66	07 104 +340	50 27 -41
10 27.2	21 896 +352	36 29 -140	45 025 +391	15 60 -9	13 144 +1272	35 28 -128	07 444 +340	49 83 -44
11 6.2	22 233 +337	38 25 -196	45 409 +384	15 64 +4	14 315 +1171	37 16 -188	07 779 +335	49 39 -44
11 16.1	22 542 +309	40 70 -245	45 775 +366	15 84 +20	15 320 +1005	39 59 -243	08 099 +320	48 97 -42
11 26.1	22 819 +277	43 53 -283	46 118 +343	16 19 +35	16 138 +818	42 44 -285	08 402 +303	48 62 -35
12 6.1	23 055 +236	46 69 -316	46 430 +312	16 72 +53	16 733 +595	45 67 -323	08 678 +276	48 34 -28
12 16.0	23 239 +184	50 02 -333	46 698 +268	17 41 +69	17 066 +333	49 12 -345	08 918 +240	48 16 -18
12 26.0	23 369 +130	53 41 -339	46 919 +221	18 25 +84	17 146 +80	52 69 -357	09 118 +200	48 11 -5
12 36.0	23 439 +70	56 79 -338	47 083 +164	19 22 +97	16 953 -193	56 28 -359	09 269 +151	48 17 +6
	+7	-322	+102	+106	-461	-347	+98	+18
Mean Place	20.842	61.17	43.438	13.29	11.088	61.62	06.110	43.17
sec δ, tan δ	+1.371	-0.939	+1.294	+0.822	+6.255	-6.174	+1.105	+0.469
dα(ψ), dδ(ψ)	+0.037	-0.06	+0.083	-0.07	-0.100	-0.07	+0.073	-0.07
dα(ε), dδ(ε)	-0.010	+0.99	+0.009	+0.99	-0.074	+0.98	+0.006	+0.98
Dbble. Trans.	December 31		Jan. 0, Dec. 31		Jan. 0, Dec. 32		Jan. 1, Dec. 32	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	248		256		257		255						
	23 H. Camelopardi		ξ Geminorum		α Canis Majoris A* (Sirius)		ψ* Aurigae						
Mag.Spect.	5.60	F8	3.40	F5	-1.58	A0	5.34	G0					
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.					
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "					
	6 43	+79 34	6 44	+12 54	6 44	-16 41	6 45	+43 35					
1	-9.0	57.542 + 742	60.38	+274	30.878 + 197	47.89	-83	32.617 + 166	40.17	-248	44.843 + 258	37.43	+103
1	1.0	58.061 + 519	63.29	+291	31.032 + 154	47.16	-73	32.740 + 123	42.59	-242	45.044 + 201	38.60	+117
1	11.0	58.342 + 281	66.31	+302	31.140 + 108	46.54	-62	32.815 + 75	44.91	-232	45.184 + 140	39.90	+130
1	20.9	58.362 + 20	69.32	+301	31.196 + 56	46.06	-48	32.839 + 24	47.04	-213	45.254 + 70	41.27	+137
1	30.9	58.142 - 220	72.19	+287	31.202 + 6	45.70	-36	32.815 - 24	48.94	-190	45.259 + 5	42.63	+136
2	9.9	57.689 - 453	74.85	+266	31.160 - 42	45.47	-23	32.745 - 70	50.58	-164	45.200 - 59	43.95	+132
2	19.9	57.022 - 667	77.15	+230	31.074 - 86	45.34	-13	32.633 - 112	51.91	-133	45.082 - 118	45.15	+120
3	1.8	56.193 - 829	79.02	+187	30.955 - 119	45.30	-4	32.489 - 144	52.92	-101	44.918 - 164	46.18	+103
3	11.8	55.227 - 966	80.41	+139	30.807 - 148	45.33	+3	32.319 - 170	53.62	-70	44.717 - 201	46.99	+81
3	21.8	54.178 - 1049	81.23	+82	30.643 - 164	45.42	+9	32.135 - 184	53.97	-35	44.493 - 224	47.54	+55
3	31.8	53.106 - 1072	81.50	+27	30.476 - 167	45.55	+13	31.948 - 187	54.01	-4	44.264 - 229	47.82	+28
4	10.7	52.041 - 1065	81.20	-30	30.312 - 164	45.72	+17	31.765 - 183	53.74	+27	44.038 - 226	47.82	+0
4	20.7	51.045 - 996	80.34	-86	30.165 - 147	45.93	+21	31.597 - 168	53.14	+60	43.833 - 206	47.54	-28
4	30.7	50.160 - 885	78.99	-135	30.042 - 123	46.18	+25	31.454 - 143	52.26	+88	43.660 - 173	47.03	-51
5	10.6	49.406 - 754	77.19	-180	29.947 - 95	46.47	+29	31.338 - 116	51.10	+116	43.525 - 135	46.29	-74
5	20.6	48.830 - 576	74.99	-220	29.890 - 57	46.82	+35	31.258 - 80	49.68	+142	43.438 - 87	45.37	-92
5	30.6	48.443 - 387	72.52	-247	29.871 - 19	47.20	+38	31.216 - 42	48.06	+162	43.403 - 35	44.32	-105
6	9.6	48.253 - 190	69.81	-271	29.891 + 20	47.65	+45	31.211 - 5	46.23	+183	43.420 + 17	43.16	-116
6	19.5	48.283 + 30	66.96	-285	29.952 + 61	48.13	+48	31.248 + 37	44.27	+196	43.493 + 73	41.94	-122
6	29.5	48.514 + 231	64.07	-289	30.050 + 98	48.63	+50	31.322 + 74	42.22	+205	43.615 + 122	40.71	-123
7	9.5	48.949 + 435	61.18	-289	30.182 + 132	49.19	+56	31.433 + 111	40.11	+211	43.787 + 172	39.47	-124
7	19.5	49.584 + 635	58.38	-280	30.350 + 168	49.76	+57	31.580 + 147	38.05	+206	44.006 + 219	38.27	-120
7	29.4	50.389 + 805	55.74	-264	30.547 + 197	50.29	+53	31.756 + 176	36.07	+198	44.264 + 258	37.12	-115
8	8.4	51.361 + 972	53.29	-245	30.771 + 224	50.77	+48	31.962 + 206	34.25	+182	44.559 + 295	36.05	-107
8	18.4	52.481 + 1120	51.13	-216	31.018 + 247	51.16	+39	32.193 + 231	32.67	+158	44.886 + 327	35.08	-97
8	28.3	53.715 + 1234	49.25	-188	31.283 + 265	51.44	+28	32.443 + 250	31.37	+130	45.238 + 352	34.20	-88
9	7.3	55.060 + 1345	47.71	-154	31.565 + 282	51.59	+15	32.714 + 271	30.41	+96	45.613 + 375	33.42	-78
9	17.3	56.481 + 1421	46.56	-115	31.860 + 295	51.56	-3	32.997 + 283	29.88	+53	45.606 + 393	32.76	-66
9	27.3	57.953 + 1472	45.79	-77	31.860 + 304	51.37	-19	32.997 + 294	29.75	+13	46.006 + 405	32.22	-54
10	7.2	59.465 + 1512	45.45	-34	32.477 + 313	51.01	-36	33.291 + 302	30.08	-33	46.411 + 416	31.82	-40
10	17.2	60.972 + 1507	45.57	+12	32.792 + 315	50.47	-54	33.895 + 302	30.87	-79	47.245 + 418	31.57	-25
10	27.2	62.454 + 1482	46.11	+54	33.106 + 314	49.78	-69	34.195 + 300	32.07	-120	47.662 + 417	31.47	-10
11	6.2	63.889 + 1435	47.11	+100	33.416 + 310	48.97	-81	34.488 + 293	33.67	-160	48.072 + 410	31.56	+9
11	16.1	65.225 + 1336	48.55	+144	33.712 + 296	48.07	-90	34.765 + 277	35.61	-194	48.464 + 392	31.84	+28
11	26.1	66.446 + 1221	50.39	+184	33.992 + 280	47.13	-94	35.021 + 256	37.80	-219	48.833 + 369	32.32	+48
12	6.1	67.515 + 1069	52.62	+223	34.248 + 256	46.18	-95	35.250 + 229	40.18	-238	49.169 + 336	33.01	+69
12	16.0	68.390 + 875	55.16	+254	34.469 + 221	45.28	-90	35.442 + 192	42.66	-248	49.459 + 290	33.89	+88
12	26.0	69.062 + 672	57.94	+278	34.653 + 184	44.46	-82	35.595 + 153	45.14	-248	49.700 + 241	34.94	+105
12	36.0	69.495 + 433	60.89	+295	34.792 + 139	43.74	-72	35.701 + 106	47.57	-243	49.880 + 180	36.15	+121
		+182	+299	+89			-59			-228	+115		+130
Mean Place	56.914	54.37	31.905	39.23	33.151	51.08	46.013	30.74					
sec δ, tan δ	+5.530	+5.439	+1.026	+0.229	+1.044	-0.300	+1.381	+0.952					
dα(ψ), dδ(ψ)	+0.203	-0.08	+0.067	-0.08	+0.053	-0.08	+0.086	-0.08					
dα(ε), dδ(ε)	+0.069	+0.98	+0.003	+0.98	-0.004	+0.98	+0.013	+0.98					
Dble.Trans.	Jan. 1, Dec. 32		January 1		January 1		January 2						

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1177		1176		1178		258	
	16 Monocerotis		ψ <sup>a</sup> Aurigae		31 G. Puppis		18 Monocerotis	
Mag.Spect.	5.84	B3	5.28	K0	5.25	B9	4.70	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	6 45	+ 8 36	6 46	+ 48 48	6 46	- 37 54	6 47	+ 2 25
1 -9.0	47.259 + 194	16 74 - 109	36 737 + 279	24 05 +131	53.777 + 162	39 81 -324	08 489 + 189	48 93 -145
1 1.0	47.411 + 152	15 75 - 99	36 953 + 216	25 52 +147	53 887 + 110	43 05 -324	08 636 + 147	47 56 -137
1 11.0	47.517 + 106	14 87 - 88	37 103 + 150	27.11 +159	53 941 + 54	46 21 -316	08 738 + 102	46 30 -126
1 20.9	47.572 + 55	14 12 - 75	37 176 + 73	28 77 +166	53 934 - 7	49 19 -298	08 788 + 50	45 19 -111
1 30.9	47.578 + 6	13 53 - 59	37 178 + 2	30 40 +163	53 873 - 61	51 89 -270	08 792 + 4	44 26 - 93
2 9.9	47.537 - 41	13 07 - 46	37 110 - 68	31.96 +156	53 757 - 116	54 29 -240	08 748 - 44	43 49 - 77
2 19.9	47.452 - 85	12 76 - 31	36 977 - 133	33 37 +141	53 594 - 163	56 29 -200	08 662 - 86	42 91 - 58
3 1.8	47.334 - 118	12 57 - 19	36 977 - 183	33 37 +119	53 594 - 199	56 29 -158	08 662 - 119	42 91 - 41
3 11.8	47.188 - 146	12 57 - 8	36 794 - 224	34 56 + 93	53 395 - 229	57 87 -115	08 543 - 147	42 50 - 24
3 21.8	47.026 - 162	12 49 + 3	36 570 - 249	35 49 + 62	53 166 - 247	59 02 - 67	08 396 - 162	42 26 - 8
3 31.8	46 860 - 166	12 63 + 11	36 065 - 256	36 41 + 30	52 668 - 251	59 91 - 22	08 068 - 166	42 26 + 8
4 10.7	46 698 - 162	12 82 + 19	35 813 - 252	36 39 - 2	52 419 - 249	59 67 + 24	07 905 - 163	42 47 + 21
4 20.7	46 551 - 147	12 82 + 28	35 813 - 231	36 39 - 35	52 419 - 233	59 67 + 71	07 905 - 149	42 47 + 37
4 30.7	46 428 - 123	13 10 + 36	35 582 - 196	36 04 - 64	52 186 - 208	58 96 +112	07 756 - 125	42 84 + 49
5 10.6	46 432 - 96	13 46 + 43	35 386 - 156	35 40 - 90	51 978 - 179	57 84 +153	07 631 - 98	43 33 + 62
5 20.6	46 273 - 59	13 89 + 52	35 230 - 102	34 50 - 113	51 799 - 140	56 31 +192	07 533 - 62	43 95 + 76
5 30.6	46 251 - 22	14 41 + 59	35 128 - 48	33 37 -128	51 659 - 99	54 39 +221	07 471 - 27	44 71 + 86
6 9.6	46 267 + 16	15 00 + 59	35 080 + 10	32 09 -142	51 560 - 56	52 18 +251	07 444 + 11	45 57 + 98
6 19.5	46 324 + 57	15 67 + 72	35 090 + 71	30 67 -150	51 504 - 7	49 67 +272	07 455 + 51	46 55 +105
6 29.5	46 417 + 93	16 39 + 76	35 161 + 126	29 17 -152	51 497 + 36	46 95 +285	07 506 + 87	47 60 +110
7 9.5	46 544 + 127	17 15 + 81	35 287 + 179	27 65 -153	51 533 + 82	44 10 +293	07 593 + 121	48 70 +116
7 19.5	46 707 + 163	17 96 + 81	35 466 + 233	26 12 -148	51 615 + 128	41 17 +290	07 714 + 156	49 86 +114
7 29.4	46 897 + 190	18 77 + 77	35 699 + 275	24 64 -142	51 743 + 166	38 27 +279	07 870 + 183	51 00 +109
8 8.4	47 114 + 217	19 54 + 70	35 974 + 318	23 22 -133	51 909 + 205	35 48 +262	08 053 + 210	52 09 +100
8 18.4	47 355 + 241	20 24 + 58	36 292 + 353	21 89 -120	52 114 + 240	32 86 +231	08 263 + 234	53 09 + 86
8 28.3	47 613 + 258	20 82 + 45	36 645 + 380	20 69 -108	52 354 + 267	30 55 +194	08 497 + 252	53 95 + 68
9 7.3	47 889 + 276	21 27 + 28	37 025 + 408	19 61 - 93	52 621 + 296	28 61 +152	08 749 + 270	54 63 + 46
9 17.3	48 178 + 289	21 55 + 7	37 433 + 427	18 68 - 77	52 917 + 315	27 09 + 98	09 019 + 283	55 09 + 21
9 27.3	48 477 + 299	21 62 - 13	37 860 + 441	17 91 - 61	53 232 + 330	26 11 + 45	09 302 + 292	55 30 - 6
10 7.2	48 784 + 307	21 49 - 35	38 301 + 453	17 30 - 42	53 562 + 341	25 66 - 15	09 594 + 302	55 24 - 34
10 17.2	49 094 + 310	21 14 - 58	38 754 + 456	16 88 - 22	53 903 + 342	25 81 - 75	09 896 + 304	54 90 - 62
10 27.2	49 403 + 309	20 56 - 76	39 210 + 454	16 66 - 2	54 245 + 338	26 56 -130	10 200 + 304	54 28 - 86
11 6.2	49 708 + 305	19 80 - 93	39 664 + 448	16 64 + 22	54 583 + 327	27 86 -185	10 504 + 300	53 42 -111
11 16.1	50 000 + 292	18 87 -106	40 112 + 426	16 86 + 46	54 910 + 304	29 71 -232	10 804 + 286	52 31 -128
11 26.1	50 276 + 276	17 81 -113	40 538 + 401	17 32 + 69	55 214 + 277	32 03 -270	11 090 + 270	51 03 -140
12 6.1	50 528 + 252	16 68 -117	41 033 + 364	18 01 + 93	55 491 + 242	34 73 -302	11 360 + 246	49 63 -149
12 16.0	50 746 + 218	15 51 -115	41 303 + 315	18 94 +116	55 733 + 194	37 75 -320	11 606 + 213	48 14 -150
12 26.0	50 927 + 181	14 36 -108	41 618 + 259	20 10 +134	55 927 + 147	40 95 -326	11 819 + 176	46 64 -144
12 36.0	51 064 + 137	13 28 - 99	41 877 + 194	21 44 +150	56 074 + 90	44 21 -327	11 995 + 132	45 20 -137
	51 064 + 87	12 29 - 85	42 071 + 122	22 94 +159	56 164 + 31	47 48 -312	12 127 + 83	43 83 -123
Mean Place	48 244	07.83	37.883	17.56	53.617	51.93	09.395	39.52
sec δ, tan δ	+1.011	+0.151	+1.518	+1.142	+1.268	-0.779	+1.001	+0.042
dα(ψ), dδ(ψ)	+0.065	-0.08	+0.091	-0.08	+0.041	-0.08	+0.062	-0.08
dα(ε), dδ(ε)	+0.002	+0.98	+0.015	+0.98	-0.011	+0.98	+0.001	+0.98
Dble.Trans.	January 2		January 2		January 2		January 2	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	262		1179		1180		263		
	α Pictoris		80 G. Monocerotis		κ Canis Majoris		τ Puppis		
Mag.Spect.	3.30	A5	5.65	A0	3.78	B2p	2.83	K0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° '	h m	° '	h m	° '	h m	° '	
	6 48	-61 55	6 48	- 2 15	6 49	-32 29	6 49	-50 35	
1	-9.0	05.457 +163	23.06 -363	34.754 +186	11.75 -171	20.101 +168	20.66 -307	37.001 +164	40.71 -353
1	1.0	05.532 + 75	26.72 -366	34.898 +144	13.39 -164	20.219 +118	23.73 -307	37.100 + 99	44.25 -354
1	11.0	05.515 - 17	30.33 -361	34.997 + 99	14.93 -154	20.285 + 66	26.72 -299	37.129 + 29	47.74 -349
1	21.0	05.402 -113	33.77 -344	35.046 + 49	16.32 -139	20.293 + 8	29.53 -281	37.086 - 43	51.06 -332
1	30.9	05.204 -198	36.92 -315	35.047 + 1	17.51 -119	20.249 - 44	32.07 -254	36.976 -110	54.09 -303
2	9.9	04.927 -277	39.76 -284	35.001 - 46	18.51 -100	20.153 - 96	34.33 -226	36.803 -173	56.80 -271
2	19.9	04.577 -350	42.15 -239	34.913 - 88	19.29 - 78	20.011 -142	36.20 -187	36.574 -229	59.09 -229
3	1.8	04.175 -402	44.08 -193	34.791 -122	19.86 - 57	19.834 -177	37.68 -148	36.302 -272	60.92 -183
3	11.8	03.728 -447	45.54 -147	34.643 -148	20.23 -37	19.629 -205	38.76 -108	35.996 -306	62.30 -138
3	21.8	03.255 -473	46.43 - 89	34.479 -164	20.39 -16	19.405 -224	39.39 - 63	35.667 -329	63.14 - 84
3	31.8	02.774 -481	46.81 - 38	34.311 -168	20.35 + 4	19.178 -227	39.59 - 20	35.333 -334	63.48 - 34
4	10.7	02.294 -480	46.66 +15	34.146 -165	20.13 +22	18.952 -226	39.37 +22	35.000 -333	63.31 +17
4	20.7	01.835 -459	45.96 + 70	33.995 -151	19.71 +42	18.741 -211	38.71 +66	34.684 -316	62.62 +69
4	30.7	01.409 -426	44.78 +118	33.866 -129	19.13 +58	18.554 -187	37.66 +105	34.396 -288	61.47 +115
5	10.6	01.025 -384	43.11 +167	33.764 -102	18.37 +76	18.395 -159	36.23 +143	34.140 -256	59.85 +162
5	20.6	00.697 -328	40.99 +212	33.697 - 67	17.44 +93	18.272 -123	34.44 +179	33.929 -211	57.80 +205
5	30.6	00.432 -265	38.51 +248	33.666 - 31	16.38 +106	18.189 - 83	32.36 +208	33.767 -162	55.42 +238
6	9.6	00.233 -199	35.68 +283	33.672 + 6	15.19 +119	18.146 - 43	30.01 +235	33.655 -112	52.70 +272
6	19.5	00.111 -122	32.60 +308	33.718 + 46	13.90 +129	18.149 + 3	27.46 +255	33.602 - 53	49.73 +297
6	29.5	00.063 - 48	29.35 +325	33.799 + 81	12.54 +136	18.193 + 44	24.79 +267	33.603 + 1	46.62 +311
7	9.5	00.092 + 29	26.00 +335	33.915 +116	11.14 +140	18.279 + 86	22.03 +276	33.661 + 58	43.41 +321
7	19.5	00.201 +109	22.66 +334	34.065 +150	09.75 +139	18.407 +128	19.30 +273	33.777 +116	40.21 +320
7	29.4	00.380 +179	19.43 +323	34.243 +178	08.42 +133	18.571 +164	16.68 +262	33.943 +166	37.13 +308
8	8.4	00.633 +253	16.39 +304	34.448 +205	07.19 +123	18.770 +199	14.22 +246	34.160 +217	34.23 +290
8	18.4	00.952 +319	13.68 +271	34.678 +230	06.14 +105	19.002 +232	12.05 +217	34.424 +264	31.65 +258
8	28.3	01.325 +373	11.36 +232	34.925 +247	05.28 + 96	19.259 +257	10.22 +183	34.726 +302	29.45 +220
9	7.3	01.752 +427	09.51 +185	35.192 +267	04.68 + 60	19.541 +282	08.80 +142	35.066 +340	27.72 +173
9	17.3	02.217 +465	08.25 +126	35.472 +280	04.37 +31	19.842 +301	07.89 + 91	35.433 +367	26.55 +117
9	27.3	02.709 +492	07.59 + 66	35.762 +290	04.36 + 1	20.157 +315	07.49 + 40	35.819 +386	25.97 + 58
10	7.2	03.219 +510	07.58 + 1	36.061 +299	04.68 -32	20.483 +326	07.64 -15	36.219 +400	26.01 - 4
10	17.2	03.728 +509	08.26 - 68	36.363 +302	05.33 - 65	20.810 +327	08.38 - 74	36.621 +402	26.72 - 71
10	27.2	04.223 +495	09.56 -130	36.664 +301	06.27 - 94	21.135 +325	09.63 -125	37.015 +394	28.04 -132
11	6.2	04.694 +471	11.49 -193	36.962 +298	07.49 -122	21.451 +316	11.41 -178	37.394 +379	29.96 -192
11	16.1	05.118 +424	13.98 -249	37.246 +284	08.93 -144	21.747 +296	13.63 -222	37.741 +347	32.41 -245
11	26.1	05.487 +369	16.90 -292	37.514 +268	10.53 -160	22.019 +272	16.21 -258	38.053 +312	35.28 -287
12	6.1	05.788 +301	20.22 -332	37.757 +243	12.25 -172	22.259 +240	19.08 -287	38.316 +263	38.52 -324
12	16.0	06.006 +218	23.77 -355	37.967 +210	13.99 -174	22.457 +198	22.12 -304	38.520 +204	41.98 -346
12	26.0	06.140 +134	27.44 -367	38.140 +173	15.71 -172	22.609 +152	25.22 -310	38.663 +143	45.54 -356
12	36.0	06.181 + 41	31.15 -371	38.270 +130	17.36 -165	22.709 +100	28.31 -309	38.737 + 74	49.12 -358
		- 54	-357	+ 80	-150	+ 44	-295	+ 2	-345
Mean Place	03.194	36.31	35.593	21.58	20.182	32.71	36.063	53.86	
sec δ, tan δ	+2.125	-1.875	+1.001	-0.039	+1.186	-0.637	+1.575	-1.217	
dα(ψ), dδ(ψ)	+0.013	-0.08	+0.060	-0.08	+0.045	-0.08	+0.030	-0.09	
dα(ε), dδ(ε)	-0.026	+0.98	-0.001	+0.98	-0.009	+0.98	-0.017	+0.98	
Dbble.Trans.	January 2		January 2		January 3		January 3		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	267		261		259		266	
	♄ Volantis		♊ Geminorum		♏ Camelopardi		♁ Canis Majoris	
Mag.Spect.	5.52	B8	3.64	A2	5.13	B5	4.25	K2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	6 51	-70 56	6 51	+33 58	6 52	+68 54	6 53	-12 00
1 -9.0	40 811 +183	34.57 -362	52 824 +240	49 58 +41	14 566 +449	25.33 +228	33 069 +182	65.06 -223
1 1.0	40 866 +55	38.25 -368	53 014 +190	50 14 +56	14 903 +337	27.79 +246	33 209 +140	67.25 -219
1 11.0	40 791 -75	41.89 -364	53 151 +137	50 84 +70	15 120 +217	30.39 +260	33 303 +94	69.34 -209
1 21.0	40 580 -211	45.38 -349	53 226 +75	51.63 +79	15 202 +82	33.02 +263	33 346 +43	71.27 -193
1 30.9	40 251 -329	48.60 -322	53 244 +18	52.47 +84	15 159 -43	35.57 +255	33 341 -5	72.97 -170
2 9.9	39 810 -441	51.51 -291	53 204 -40	53.33 +86	14 993 -166	37.98 +241	33 289 -52	74.45 -148
2 19.9	39 270 -540	54.00 -249	53 110 -94	54.15 +82	14 712 -281	40.10 +212	33 193 -96	75.65 -120
3 1.8	38 658 -612	56.03 -203	52 976 -134	54.88 +73	14 342 -370	41.87 +177	33 064 -129	76.57 -92
3 11.8	37 983 -675	57.58 -155	52 808 -168	55.50 +62	14 342 -444	43.24 +137	32 908 -156	77.21 -64
3 21.8	37 270 -713	58.59 -101	52 618 -190	55.95 +45	13 898 -491	44.12 +88	32 735 -173	77.55 -34
3 31.8	36 545 -725	59.08 -49	52 423 -195	56.24 +29	12 900 -507	44.52 +40	32 558 -177	77.61 -6
4 10.7	35 817 -728	59.04 +4	52 229 -194	56.34 +10	12 394 -506	44.43 -9	32 382 -176	77.40 +21
4 20.7	35 115 -702	58.45 +59	52 053 -176	56.26 -8	11 921 -473	43.83 -60	32 220 -162	76.90 +50
4 30.7	34 457 -658	57.36 +109	51 904 -149	56.02 -24	11 503 -418	42.80 -103	32 079 -141	76.15 +75
5 10.7	33 851 -606	55.79 +157	51 787 -117	55.63 -39	11 503 -351	41.36 -144	31 964 -115	75.16 +99
5 20.6	33 321 -530	53.75 +204	51 713 -74	55.12 -51	10 890 -262	39.55 -181	31 884 -80	73.92 +124
5 30.6	32 876 -445	51.34 +241	51 683 -30	54.52 -60	10 725 -165	37.49 -206	31 839 -45	72.50 +142
6 9.6	32 522 -354	48.56 +278	51 698 +15	53.86 -66	10 658 -67	35.20 -229	31 830 -9	70.89 +161
6 19.5	32 277 -245	45.52 +304	51 762 +64	53.17 -69	10 702 +44	32.77 -243	31 861 +31	69.15 +174
6 29.5	32 138 -139	42.31 +321	51 869 +107	52.48 -69	10 847 +145	30.29 -248	31 928 +67	67.33 +182
7 9.5	32 110 -28	38.96 +335	52 016 +147	51.76 -72	11 093 +246	27.78 -251	32 031 +103	65.44 +189
7 19.5	32 200 +90	35.62 +334	52 207 +191	51.05 -71	11 438 +345	25.33 -245	32 169 +138	63.57 +187
7 29.4	32 395 +195	32.37 +325	52 431 +224	50.37 -68	11 867 +429	22.99 -234	32 336 +167	61.78 +179
8 8.4	32 700 +305	29.29 +308	52 688 +257	49.72 -65	12 378 +511	20.80 -219	32 532 +196	60.11 +167
8 18.4	33 106 +406	26.54 +275	52 972 +284	49.10 -62	12 961 +583	18.83 -197	32 754 +222	58.65 +146
8 28.4	33 596 +490	24.15 +239	53 279 +307	48.51 -59	13 600 +639	17.09 -174	32 996 +242	57.45 +120
9 7.3	34 168 +572	22.24 +191	53 606 +327	47.94 -57	14 296 +696	15.61 -148	33 258 +262	56.55 +90
9 17.3	34 800 +632	20.90 +134	53 950 +344	47.40 -54	15 031 +735	14.46 -115	33 535 +277	56.03 +52
9 27.3	35 472 +672	20.16 +74	54 306 +356	46.89 -51	15 793 +762	13.62 -84	33 824 +289	55.88 +15
10 7.2	36 172 +700	20.07 +9	54 673 +367	46.42 -47	16 580 +787	13.12 -50	34 123 +299	56.15 -27
10 17.2	36 870 +698	20.66 -59	55 043 +370	46.01 -41	17 371 +791	13.02 -10	34 425 +302	56.84 -69
10 27.2	37 548 +678	21.88 -122	55 414 +371	45.65 -36	18 155 +784	13.27 +25	34 727 +302	57.91 -107
11 6.2	38 187 +639	23.75 -187	55 781 +367	45.39 -26	18 924 +769	13.92 +65	35 024 +297	59.35 -144
11 16.1	38 754 +567	26.17 -242	56 133 +352	45.24 -15	19 650 +726	14.97 +105	35 309 +285	61.09 -174
11 26.1	39 240 +486	29.06 -289	56 467 +334	45.22 -2	20 326 +676	16.38 +141	35 575 +266	63.07 -198
12 6.1	39 624 +384	32.34 -328	56 774 +307	45.35 +13	20 933 +607	18.15 +177	35 817 +242	65.23 -216
12 16.1	39 885 +261	35.88 -354	57 041 +267	45.63 +28	21 446 +513	20.22 +207	36 024 +207	67.47 -224
12 26.0	40 025 +140	39.55 -367	57 266 +225	46.07 +44	21 859 +413	22.54 +232	36 194 +170	69.71 -224
12 36.0	40 031 +6	43.28 -373	57 439 +173	46.66 +59	22 154 +295	25.05 +251	36 318 +124	71.91 -220
Mean Place	36.450	48.73	53.991	42.24	15.219	19.71	33.735	75.98
sec δ, tan δ	+3.063	-2.895	+1.206	+0.674	+2.778	+2.592	+1.022	-0.213
dα(ψ), dδ(ψ)	-0.014	-0.09	+0.079	-0.09	+0.128	-0.09	+0.056	-0.09
dα(ε), dδ(ε)	-0.043	+0.97	+0.010	+0.97	+0.039	+0.97	-0.003	+0.97
Dble.Trans.	January 3		January 3		January 3		January 4	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	268		260		1181		1183	
	ε Canis Majoris		24 H. Camelopardi		101 G. Monocerotis		σ Canis Majoris	
Mag. Spect.	1.63	B1	4.75	K5	5.84	A0	3.68	K5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	6 58	-28 56	6 57	+76 59	6 59	- 8 22	7 01	-27 54
1 -9.0	05 472 +179	58 73 -296	66 888 +676	53 19 +255	44 033 +191	63 76 -208	10 592 +182	41 09 -293
1 1.0	05 604 +132	61 69 -296	67 389 +501	55 95 +276	44 183 +150	65 77 -201	10 727 +135	44 01 -292
1 11.0	05 684 +80	64 58 -289	67 699 +310	58 86 +291	44 287 +104	67 69 -192	10 812 +85	46 87 -286
1 21.0	05 708 +24	67 30 -272	67 798 +99	61 80 +294	44 340 +53	69 45 -176	10 841 +29	49 57 -270
1 30.9	05 681 -27	69 77 -247	67 700 -98	64 66 +286	44 345 +5	71 00 -155	10 819 -22	52 01 -244
2 9.9	05 603 -78	71 97 -220	67 408 -292	67 34 +268	44 303 -42	72 34 -134	10 746 -73	54 19 -218
2 19.9	05 479 -124	73 81 -184	66 936 -472	69 72 +238	44 217 -86	73 42 -108	10 627 -119	56 02 -183
3 1.8	05 319 -160	75 27 -146	66 323 -613	71 71 +199	44 096 -121	74 24 -82	10 472 -155	57 47 -149
3 11.8	05 129 -190	76 36 -109	65 590 -733	73 25 +154	43 948 -148	74 82 -58	10 287 -185	58 56 -105
3 21.8	04 921 -208	77 01 -65	64 778 -812	74 26 +101	43 782 -166	75 12 -30	10 083 -204	59 23 -67
3 31.8	04 708 -213	77 27 -26	63 936 -842	74 74 +48	43 610 -172	75 17 -5	09 873 -210	59 50 -27
4 10.7	04 495 -213	77 12 +15	63 090 -846	74 66 -8	43 439 -171	74 99 +18	09 664 -209	59 37 +13
4 20.7	04 294 -201	76 55 +57	62 288 -802	74 02 -64	43 281 -158	74 54 +45	09 466 -198	58 83 +54
4 30.7	04 116 -178	75 62 +93	61 567 -721	72 90 -112	43 143 -138	73 89 +65	09 290 -176	57 94 +89
5 10.7	03 964 -152	74 32 +130	60 943 -624	71 32 -158	43 030 -113	73 01 +88	09 139 -151	56 68 +126
5 20.6	03 846 -118	72 68 +164	60 456 -487	69 32 -200	42 951 -79	71 91 +110	09 023 -116	55 07 +161
5 30.6	03 766 -80	70 76 +192	60 116 -340	67 03 -229	42 906 -45	70 66 +125	08 943 -80	53 20 +187
6 9.6	03 724 -42	68 57 +219	59 930 -186	64 47 -256	42 897 -9	69 23 +143	08 901 -42	51 06 +214
6 19.5	03 726 +2	66 18 +239	59 918 -12	61 75 -272	42 927 +30	67 68 +155	08 902 +1	48 72 +234
6 29.5	03 767 +41	63 67 +251	60 067 +149	58 95 -280	42 992 +65	66 05 +163	08 942 +40	46 27 +245
7 9.5	03 848 +81	61 06 +261	60 378 +311	56 11 -284	43 093 +101	64 36 +169	09 022 +80	43 71 +256
7 19.5	03 969 +121	58 48 +258	60 852 +474	53 33 -278	43 228 +135	62 69 +167	09 141 +119	41 17 +254
7 29.4	04 125 +156	55 98 +250	61 463 +611	50 67 -266	43 292 +164	61 09 +160	09 294 +153	38 72 +245
8 8.4	04 315 +190	53 63 +235	62 212 +749	48 17 -250	43 584 +192	59 59 +150	09 481 +187	36 41 +231
8 18.4	04 536 +221	51 55 +208	63 083 +871	45 91 -226	43 802 +218	58 29 +130	09 699 +218	34 36 +205
8 28.4	04 782 +246	49 79 +176	64 050 +967	43 91 -200	44 040 +238	57 22 +107	09 942 +243	32 62 +174
9 7.3	05 054 +272	48 42 +137	65 113 +1063	42 21 -170	44 299 +259	56 43 +79	10 210 +268	31 26 +136
9 17.3	05 345 +291	47 53 +89	66 244 +1131	40 88 -133	44 574 +275	55 99 +44	10 120 +288	30 38 +88
9 27.3	05 649 +304	47 12 +41	67 423 +1179	39 91 -97	44 860 +286	55 90 +9	10 800 +302	29 98 +40
10 7.2	05 967 +218	47 25 -13	68 644 +1221	39 34 -57	45 157 +297	56 18 -28	11 115 +315	30 10 -12
10 17.2	06 288 +321	47 93 -68	69 871 +1227	39 20 -14	45 459 +302	56 86 -68	11 434 +319	30 77 -67
10 27.2	06 608 +320	49 12 -119	71 089 +1218	39 49 +29	45 762 +303	57 88 -102	11 754 +320	31 93 -116
11 6.2	06 922 +314	50 81 -169	72 280 +1191	40 23 +74	46 063 +301	59 24 -136	12 068 +314	33 60 -167
11 16.1	07 220 +298	52 93 -212	73 402 +1122	41 41 +118	46 351 +288	60 89 -165	12 366 +298	35 70 -210
11 26.1	07 496 +276	55 40 -247	74 442 +1040	43 00 +159	46 623 +272	62 74 -185	12 643 +277	38 14 -244
12 6.1	07 742 +246	58 16 -276	75 370 +928	44 99 +199	46 872 +249	64 76 -202	12 892 +249	40 86 -272
12 16.1	07 949 +207	61 09 -293	76 148 +778	47 33 +234	47 087 +215	66 84 -208	13 101 +209	43 75 -289
12 26.0	08 113 +164	64 08 -299	76 768 +620	49 93 +260	47 266 +179	68 92 -208	13 269 +168	46 71 -296
12 36.0	08 227 +114	67 06 -298	77 200 +432	52 75 +282	47 400 +134	70 94 -202	13 387 +118	49 66 -295
	+60	-285	+230	+290	+86	-189	+65	-283
Mean Place	05.710	71.40	66.720	47.91	44.786	74.80	10.874	53.95
sec δ, tan δ	+1.143	-0.553	+4.444	+4.330	+1.011	-0.147	+1.132	-0.530
dα(ψ), dδ(ψ)	+0.047	-0.10	+0.172	-0.10	+0.057	-0.10	+0.048	-0.10
dα(ε), dδ(ε)	-0.009	+0.97	+0.072	+0.97	-0.003	+0.97	-0.009	+0.96
Dble. Trans.	January 5		January 5		January 5		January 6	



APPARENT PLACES OF STARS, 1986

111

AT UPPER TRANSIT AT GREENWICH

No.	1182		270		271		269	
	ω Geminorum		α <sup>s</sup> Canis Majoris		γ Canis Majoris		ζ Geminorum	
Mag.Spect.	5.21	K0	3.12	B5p	4.07	B5	3.7 to 4.1	G0p
U.T.	R.A.		Dec.		R.A.		Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	7 01	+24 14	7 02	-23 48	7 03	-15 36	7 03	+20 35
1 <sup>d</sup>	34.331 <sup>s</sup> +230	16.04 -22	27.223 <sup>s</sup> +185	34.40 <sup>s</sup> -278	08.211 <sup>s</sup> +190	33.61 <sup>s</sup> -243	17.407 <sup>s</sup> +225	35.70 <sup>s</sup> -45
1	34.517 +186	15.95 -9	27.364 +141	37.16 -276	08.358 +147	36.00 -239	17.590 +183	35.38 -32
1	34.653 +136	16.00 +5	27.455 +91	39.85 -269	08.458 +100	38.31 -231	17.725 +135	35.19 -19
1	34.734 +81	16.18 +18	27.492 +37	42.38 -253	08.507 +49	40.46 -215	17.805 +80	35.14 -5
1	34.761 +27	16.46 +28	27.479 -13	44.67 -229	08.507 +0	42.38 -192	17.833 +28	35.21 +7
2	34.735 -26	16.82 +36	27.416 -63	46.70 -203	08.458 -49	44.07 -169	17.810 -23	35.37 +16
2	34.660 -75	17.23 +41	27.307 -109	48.39 -169	08.365 -93	45.46 -139	17.737 -73	35.61 +24
3	34.545 -115	17.64 +41	27.164 -143	49.74 -135	08.238 -127	46.55 -109	17.627 -110	35.89 +28
3	34.398 -147	18.03 +39	26.991 -173	50.74 -100	08.081 -157	47.34 -79	17.484 -143	36.17 +28
3	34.231 -167	18.37 +34	26.799 -192	51.35 -61	07.906 -175	47.80 -46	17.321 -163	36.45 +28
3	34.056 -175	18.64 +27	26.600 -199	51.59 -24	07.725 -181	47.95 -15	17.151 -170	36.69 +24
4	33.881 -175	18.83 +19	26.402 -198	51.46 +13	07.544 -181	47.80 +15	16.982 -169	36.89 +20
4	33.721 -160	18.94 +11	26.216 -186	50.95 +51	07.375 -169	47.33 +47	16.825 -157	37.05 +16
4	33.584 -137	18.97 +3	26.051 -165	50.10 +85	07.227 -148	46.58 +75	16.691 -134	37.16 +11
5	33.475 -109	18.93 -4	25.910 -141	48.92 +118	07.102 -125	45.56 +102	16.584 -107	37.24 +8
5	33.403 -72	18.84 -9	25.803 -107	47.42 +150	07.011 -91	44.27 +129	16.513 -71	37.29 +5
5	33.371 +3	18.71 -13	25.731 -72	45.67 +175	06.954 -57	42.78 +149	16.480 -33	37.33 +4
5	33.378 +7	18.56 -15	25.697 -34	43.67 +200	06.933 -21	41.07 +171	16.486 +6	37.37 +4
5	33.430 +52	18.40 -16	25.704 +7	41.48 +219	06.951 +18	39.21 +186	16.535 +49	37.40 +3
5	33.523 +93	18.24 -16	25.749 +45	39.18 +230	07.006 +55	37.26 +195	16.623 +88	37.42 +2
7	33.638 +115	18.14 -10	25.831 +82	36.80 +238	07.097 +91	35.23 +203	16.733 +110	37.39 -3
7	33.810 +172	17.90 -24	25.952 +121	34.42 +238	07.223 +126	33.22 +201	16.899 +166	37.52 +13
7	34.007 +197	17.71 -19	26.053 +153	32.13 +229	07.380 +157	31.28 +194	17.089 +190	37.54 +2
8	34.234 +227	17.51 -20	26.105 +186	29.97 +216	07.566 +186	29.46 +182	17.307 +218	37.53 -1
8	34.486 +252	17.28 -23	26.506 +215	28.06 +191	07.780 +214	27.86 +160	17.552 +245	37.47 -6
8	34.759 +273	17.01 -27	26.745 +239	26.44 +162	08.016 +236	26.53 +133	17.816 +264	37.34 -13
9	35.053 +294	16.69 -32	27.008 +263	25.19 +125	08.273 +257	25.51 +102	18.100 +284	37.12 -22
9	35.362 +309	16.29 -40	27.282 +282	24.39 +80	08.548 +275	24.90 +61	18.401 +301	36.81 -31
9	35.362 +322	16.29 -45	27.290 +295	24.39 +35	08.548 +288	24.90 +22	18.401 +313	36.81 -41
9	35.684 +333	15.84 -52	27.585 +308	24.04 -15	08.836 +300	24.68 -22	18.714 +324	36.40 -51
10	36.017 +339	15.32 -58	27.893 +313	24.19 -66	09.136 +304	24.90 -67	19.038 +331	35.89 -60
10	36.356 +340	14.74 -60	28.206 +314	24.85 -114	09.440 +306	25.57 -108	19.369 +332	35.29 -67
10	36.697 +341	14.14 -61	28.520 +309	25.99 -161	09.746 +304	26.65 -149	19.701 +332	34.62 -72
11	37.037 +328	13.53 -59	28.829 +295	27.60 -202	10.050 +290	28.14 -183	20.033 +321	33.90 -73
11	37.365 +314	12.94 -54	29.124 +275	29.62 -232	10.340 +274	29.97 -210	20.354 +306	33.17 -71
11	37.679 +289	12.40 -45	29.399 +249	31.94 -260	10.614 +249	32.07 -231	20.660 +284	32.46 -65
12	37.968 +255	11.95 -33	29.648 +212	34.54 -275	10.863 +214	34.38 -241	20.944 +250	31.81 -55
12	38.223 +170	11.62 -21	29.860 +171	37.29 -279	11.077 +177	36.79 -244	21.194 +213	31.26 -43
12	38.440 +217	11.41 -6	30.031 +124	40.08 -279	11.254 +132	39.23 -241	21.407 +167	30.83 -31
12	38.610 +116	11.35 +7	30.155 +71	42.87 -266	11.386 +81	41.64 -228	21.574 +115	30.52 -16
Mean Place	35.459	07.88	27.634	47.04	08.827	45.56	18.515	27.19
sec δ, tan δ	+1.097	+0.450	+1.093	-0.441	+1.038	-0.279	+1.068	+0.376
dα(ψ), dδ(ψ)	+0.073	-0.11	+0.050	-0.11	+0.054	-0.11	+0.071	-0.11
dα(ε), dδ(ε)	+0.008	+0.96	-0.008	+0.96	-0.005	+0.96	+0.007	+0.96
Dble.Trans.	January 6		January 6		January 6		January 6	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1184		272		1185		273	
	C Puppis		27 G. Carinae		2 G. Canis Minoris		δ Canis Majoris	
Mag.Spect.	5.26	A2	5.30	A0	5.92	K0	1.98	F8p
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	7 03	-42 18	7 04	-56 43	7 07	+ 7 29	7 07	-26 21
1	-9.0	37.395 +183	04.673 +190	29.33 -360	04.698 +212	45.14 -124	50.173 +190	63.01 -288
1	1.0	37.522 +127	04.787 +114	32.98 -365	04.869 +171	44.00 -114	50.317 +144	65.89 -288
1	11.0	37.589 + 6	04.823 + 36	36.62 -364	04.995 +126	42.98 -102	50.411 + 94	68.71 -282
1	21.0	37.592 + 37	04.774 - 49	40.12 -319	05.070 + 75	42.11 -87	50.450 + 39	71.37 -266
1	30.9	37.535 - 57	04.649 -125	43.35 -323	05.095 + 25	41.40 -71	50.438 - 12	73.80 -243
2	9.9	37.421 -114	04.451 -198	46.30 -295	05.071 - 24	40.85 -55	50.375 - 63	75.96 -216
2	19.9	37.254 -167	04.187 -264	48.84 -254	05.002 - 69	40.47 -38	50.265 -110	77.78 -182
3	1.9	37.047 -207	03.873 -314	50.93 -209	04.896 -106	40.23 -24	50.119 -146	79.25 -147
3	11.8	36.806 -241	03.516 -357	52.56 -163	04.761 -135	40.11 -12	49.942 -177	80.35 -110
3	21.8	36.543 -263	03.131 -385	53.66 -110	04.606 -155	40.12 + 1	49.746 -196	81.05 -70
3	31.8	36.272 -271	02.736 -395	54.25 -59	04.443 -163	40.23 +11	49.542 -204	81.36 -31
4	10.7	36.001 -271	02.337 -399	54.31 -6	04.281 -162	40.43 +20	49.337 -205	81.29 + 7
4	20.7	35.742 -259	01.953 -384	53.83 +48	04.130 -151	40.73 +30	49.144 -193	80.82 +47
4	30.7	35.505 -237	01.596 -357	52.87 +96	04.000 -130	41.10 +37	48.970 -174	79.99 +83
5	10.7	35.296 -209	01.271 -325	51.42 +145	03.894 -106	41.55 +45	48.821 -149	78.81 +118
5	20.6	35.125 -171	00.993 -278	49.51 +191	03.822 -72	42.09 +54	48.704 -117	77.30 +151
5	30.6	34.994 -131	00.767 -226	47.22 +229	03.785 -37	42.70 +61	48.623 -81	75.51 +179
6	9.6	34.907 -87	00.595 -172	44.57 +265	03.783 -2	43.38 +68	48.579 -44	73.46 +205
6	19.6	34.869 -38	00.489 -106	41.64 +293	03.821 + 38	44.11 +73	48.577 -2	71.22 +224
6	29.5	34.878 + 9	00.443 -46	38.53 +311	03.894 + 73	44.87 +76	48.613 +36	68.84 +238
7	9.5	34.934 + 56	00.463 + 20	35.28 +325	04.001 +107	45.66 +79	48.687 + 74	66.37 +247
7	19.5	35.038 +104	00.550 + 87	32.02 +326	04.143 +142	46.45 +79	48.801 +114	63.91 +246
7	29.4	35.185 +147	00.697 +147	28.83 +319	04.313 +170	47.20 +75	48.947 +146	61.52 +239
8	8.4	35.375 +190	00.907 +210	25.80 +303	04.512 +199	47.88 +68	49.128 +181	59.26 +226
8	18.4	35.605 +230	01.174 +267	23.06 +274	04.735 +223	48.44 +56	49.339 +211	57.26 +200
8	28.4	35.868 +263	01.489 +315	20.69 +237	04.978 +243	48.85 +41	49.576 +237	55.55 +171
9	7.3	36.163 +295	01.853 +364	18.76 +193	05.241 +263	49.08 +23	49.838 +262	54.21 +134
9	17.3	36.484 +321	02.253 +400	17.39 +137	05.520 +279	49.09 +1	50.120 +282	53.33 +88
9	27.3	36.824 +340	02.679 +426	16.61 +78	05.812 +292	48.90 -19	50.417 +297	52.92 +41
10	7.3	37.179 +355	03.126 +447	16.46 +15	06.116 +304	48.46 -44	50.729 +312	53.02 -10
10	17.2	37.539 +360	03.579 +453	16.99 -53	06.425 +309	47.80 -66	51.046 +317	53.65 -63
10	27.2	37.898 +359	04.026 +447	18.15 -116	06.738 +313	46.93 -87	51.364 +318	54.78 -113
11	6.2	38.248 +350	04.458 +432	19.94 -179	07.049 +311	45.88 -105	51.679 +315	56.40 -162
11	16.1	38.577 +329	04.857 +399	22.30 -236	07.351 +302	44.70 -118	51.979 +300	58.45 -205
11	26.1	38.878 +301	05.214 +357	25.12 -282	07.640 +289	43.42 -128	52.261 +282	60.83 -238
12	6.1	39.142 +264	05.518 +304	28.35 -323	07.906 +266	42.10 -132	52.515 +254	63.50 -267
12	16.1	39.358 +216	05.753 +235	31.85 -350	08.142 +236	40.81 -129	52.731 +216	66.34 -284
12	26.0	39.524 +166	05.919 +166	35.49 -364	08.342 +200	39.58 -123	52.907 +176	69.24 -290
12	36.0	39.630 +106	06.005 + 86	39.20 -371	08.498 +156	38.44 -114	53.034 +127	72.15 -291
		56.34 -332	06.005 + 3	39.20 -361	08.498 +107	38.44 -99	53.034 + 74	72.15 -279
Mean Place	37.082	61.15	03.239	44.57	05.692	35.23	50.526	76.36
sec δ, tan δ	+1.352	-0.910	+1.823	-1.524	+1.009	+0.132	+1.116	-0.496
dα(ψ), dδ(ψ)	+0.038	-0.11	+0.022	-0.11	+0.065	-0.11	+0.049	-0.12
dα(ε), dδ(ε)	-0.017	+0.96	-0.028	+0.96	+0.003	+0.96	-0.010	+0.96
Dble.Trans.	January 6		January 6		January 7		January 7	

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	1189		1186		274		1187	
	$\gamma^2$ Volantis*		20 Monocerotis		63 Aurigae		$\delta$ Monocerotis	
Mag.Spect.	3.87	K0	5.02	K0	5.07	K2	4.09	A0
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "
	7 08	- 70 28	7 09	- 4 12	7 10	+ 39 20	7 11	- 0 27
1 <sup>d</sup> -9.0	56 024 <sup>s</sup> + 232	21.63 <sup>"</sup> -361	32 592 <sup>s</sup> + 203	44 28 <sup>"</sup> -188	42 514 <sup>s</sup> + 274	43.46 <sup>"</sup> + 61	09 585 <sup>s</sup> + 208	60.01 <sup>"</sup> -169
1 1.0	56 132 + 108	25 32 -369	32 754 + 162	46 10 -182	42 738 + 224	44.25 + 79	09 752 + 167	61.63 -162
1 11.0	56 113 - 19	29 03 -371	32 871 + 117	47 82 -172	42 904 + 166	45.21 + 96	09 875 + 123	63.14 -151
1 21.0	55 959 - 154	32 63 -360	32 938 + 67	49 37 -155	43 005 + 101	46.30 + 109	09 946 + 71	64.50 -136
1 30.9	55 687 - 272	35 99 -336	32 956 + 18	50 73 -136	43 044 + 39	47.46 + 116	09 969 + 23	65.66 -116
2 9.9	55 302 - 385	39 08 -309	32 926 - 30	51 90 -117	43 019 - 25	48.63 + 117	09 944 - 25	66.64 - 98
2 19.9	54 814 - 488	41 78 -270	32 851 - 75	52 82 -92	42 936 - 83	49.76 + 113	09 873 - 71	67.41 - 77
3 1.9	54 249 - 565	44 04 -226	32 741 - 110	53 52 -70	42 805 - 131	50.78 + 102	09 767 - 106	67.97 - 56
3 11.8	53 617 - 632	45 85 -181	32 602 - 139	54 00 -48	42 635 - 170	51.66 + 88	09 631 - 136	68.34 - 37
3 21.8	52 940 - 677	47 13 -128	32 443 - 159	54 24 -24	42 438 - 197	52.34 + 68	09 475 - 156	68.51 - 17
3 31.8	52 244 - 696	47 89 - 76	32 277 - 166	54 27 - 3	42 230 - 208	52.79 + 45	09 312 - 163	68.50 + 1
4 10.7	51 538 - 706	48 12 - 23	32 110 - 167	54 10 + 17	42 020 - 210	53.02 + 23	09 148 - 164	68.32 + 18
4 20.7	50 850 - 688	47 79 + 33	31 955 - 155	53 71 + 39	41 824 - 196	53.00 - 2	08 995 - 153	67.97 + 35
4 30.7	50 198 - 652	46 97 + 82	31 819 - 136	53 14 + 57	41 653 - 171	52.75 - 25	08 861 - 134	67.47 + 50
5 10.7	49 589 - 609	45 64 + 133	31 706 - 113	52 39 + 75	41 513 - 140	52.30 - 45	08 750 - 111	66.81 + 66
5 20.6	49 050 - 539	43 82 + 182	31 626 - 80	51 46 + 93	41 415 - 98	51.66 - 64	08 672 - 78	66.01 + 80
5 30.6	48 587 - 463	41 61 + 221	31 579 - 47	50 39 + 107	41 362 - 53	50.88 - 78	08 627 - 45	65.09 + 92
6 9.6	48 209 - 378	39 00 + 261	31 567 - 12	49 17 + 122	41 362 - 8	49.98 - 90	08 627 - 9	64.05 + 104
6 19.6	47 932 - 277	36 09 + 291	31 594 + 27	47 85 + 132	41 354 + 44	48.99 - 99	08 618 + 28	64.05 + 113
6 29.5	47 755 - 177	32 98 + 311	31 655 + 61	46 46 + 139	41 398 + 89	47.95 - 104	08 646 + 63	62.92 + 118
7 9.5	47 685 - 70	29 69 + 329	31 750 + 95	45 02 + 144	41 620 + 133	46.88 - 107	08 806 + 97	60.51 + 123
7 19.5	47 730 + 45	26 37 + 332	31 880 + 130	43 59 + 143	41 799 + 179	45.79 - 109	08 937 + 131	59.29 + 122
7 29.4	47 878 + 148	23 10 + 327	31 880 + 158	43 59 + 138	41 799 + 216	44.71 - 108	08 937 + 160	58.13 + 116
8 8.4	48 135 + 257	19 96 + 314	32 038 + 187	42 21 + 128	42 015 + 252	44.71 - 105	09 097 + 188	57.04 + 109
8 18.4	48 494 + 359	17 10 + 296	32 225 + 213	40 93 + 110	42 267 + 285	43.66 - 101	09 285 + 214	56.12 + 92
8 28.4	48 940 + 446	14 59 + 251	32 671 + 233	38 93 + 90	42 862 + 310	41.68 - 97	09 733 + 234	55.39 + 73
9 7.3	49 472 + 532	12 51 + 208	32 925 + 254	38 29 + 64	43 199 + 337	40.77 - 91	09 987 + 254	54.88 + 51
9 17.3	50 069 + 597	10 98 + 153	33 195 + 270	37 95 + 34	43 555 + 356	39.92 - 85	10 259 + 272	54.66 + 22
9 27.3	50 714 + 645	10 03 + 95	33 479 + 284	37 93 + 2	43 927 + 372	39.14 - 78	10 543 + 284	54.72 - 6
10 7.3	51 396 + 682	09 73 + 30	33 776 + 297	38 25 - 32	44 315 + 388	38.44 - 70	10 841 + 296	55.08 - 36
10 17.2	52 085 + 689	10 11 - 38	34 078 + 302	38 92 - 67	44 709 + 394	37.86 - 58	11 144 + 303	55.76 - 68
10 27.2	52 763 + 678	11 12 - 101	34 383 + 305	39 90 - 98	45 108 + 399	37.39 - 47	11 451 + 307	56.72 - 96
11 6.2	53 412 + 649	12 80 - 168	34 688 + 305	41 19 - 129	45 506 + 398	37.07 - 32	11 758 + 307	57.94 - 122
11 16.1	54 000 + 588	15 06 - 226	34 982 + 294	42 72 - 153	45 892 + 386	36.92 - 15	12 054 + 296	59.38 - 144
11 26.1	54 515 + 515	17 81 - 275	35 262 + 280	44 44 - 172	46 260 + 368	36.96 + 4	12 338 + 284	60.97 - 159
12 6.1	54 937 + 422	21 00 - 319	35 520 + 258	46 29 - 185	46 603 + 343	37.20 + 24	12 600 + 262	62.67 - 170
12 16.1	55 244 + 307	24 49 - 349	35 746 + 226	48 19 - 190	46 906 + 303	37.65 + 45	12 830 + 230	64.40 - 173
12 26.0	55 435 + 191	28 15 - 366	35 937 + 191	50 08 - 189	47 165 + 259	38.30 + 65	13 026 + 196	66.09 - 169
12 36.0	55 496 + 61	31 92 - 377	36 085 + 148	51 90 - 182	47 369 + 204	39.14 + 84	13 179 + 153	67.71 - 162
Mean Place	52.051	38.07	33.435	55.40	43.679	36.52	10.486	70.93
sec $\delta$ , tan $\delta$	+2.992	-2.820	+1.003	-0.074	+1.293	+0.820	+1.000	-0.008
$d\alpha(\psi)$ , $d\delta(\psi)$	-0.010	-0.12	+0.059	-0.12	+0.082	-0.12	+0.061	-0.12
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.056	+0.96	-0.001	+0.95	+0.017	+0.95	-0.000	+0.95
Dble.Trans.	January 7		January 8		January 8		January 8	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	275		1188		1190		278	
	J Puppis		51 Geminorum		Groombridge 1281 (Lyncis)		π Puppis	
Mag.Spect.	4.47	F0	5.31 var.	M3	5.55	G0	2.74	K5
U.T.	R.A.		R.A.		R.A.		R.A.	
	h	m	h	m	h	m	h	m
	-46 43		+16 10		+47 15		-37 03	
	°	'	°	'	°	'	°	'
1 <sup>d</sup>	11.046	+194	34.704	+227	48.988	+308	39.939	+198
1 <sup>s</sup>	11.181	+135	34.891	+187	49.238	+250	39.968	+147
1	11.252	+71	35.031	+140	49.425	+187	40.086	+92
1	11.253	+1	35.117	+86	49.538	+113	40.178	+30
1	11.191	-62	35.152	+35	49.579	+41	40.208	-26
2	11.067	-124	35.137	-15	49.550	-29	40.101	-81
2	10.886	-181	35.073	-64	49.454	-96	39.968	-133
3	10.661	-225	34.971	-102	49.304	-150	39.795	-173
3	10.399	-262	34.836	-135	49.107	-197	39.588	-207
3	10.112	-287	34.680	-156	48.880	-227	39.358	-230
3	09.815	-297	34.516	-164	48.639	-241	39.118	-240
4	09.515	-300	34.351	-165	48.395	-244	38.875	-243
4	09.227	-288	34.197	-154	48.164	-231	38.642	-233
4	08.960	-267	34.063	-139	47.961	-203	38.429	-213
5	08.719	-241	33.954	-104	47.791	-170	38.239	-190
5	08.517	-202	33.879	-75	47.667	-124	38.084	-155
5	08.358	-159	33.840	-39	47.593	-74	37.965	-119
6	08.242	-116	33.837	-3	47.571	-22	37.885	-80
6	08.178	-64	33.875	+38	47.606	+35	37.850	-35
6	08.164	-14	33.951	+76	47.693	+87	37.857	+7
7	08.200	+36	34.058	+107	47.832	+139	37.907	+50
7	08.289	+89	34.202	+144	48.022	+190	38.002	+95
7	08.424	+135	34.377	+175	48.256	+234	38.135	+133
8	08.608	+184	34.582	+205	48.531	+275	38.308	+173
8	08.836	+228	34.811	+229	48.845	+314	38.518	+210
8	09.102	+266	35.061	+250	49.189	+344	38.759	+241
9	09.405	+303	35.333	+272	49.564	+375	39.032	+273
9	09.738	+333	35.621	+288	49.962	+398	39.330	+298
9	10.093	+355	35.922	+301	50.379	+417	39.647	+317
10	10.467	+374	36.236	+314	50.814	+435	39.981	+334
10	10.848	+381	36.558	+322	51.258	+444	40.323	+342
10	11.229	+381	36.883	+325	51.706	+448	40.667	+344
11	11.602	+373	37.209	+326	52.153	+447	41.007	+340
11	11.952	+350	37.526	+317	52.587	+434	41.331	+324
11	12.273	+321	37.830	+304	53.001	+414	41.632	+301
12	12.555	+282	38.113	+283	53.386	+385	41.903	+271
12	12.785	+230	38.364	+251	53.726	+340	42.131	+228
12	12.961	+176	38.580	+216	54.017	+291	42.313	+182
12	13.073	+112	38.750	+170	54.245	+228	42.441	+128
		+45		+121		+160		+69
Mean Place	10.510	71.32	35.787	57.49	50.116	54.04	39.944	82.00
sec δ, tan δ	+1.459	-1.063	+1.041	+0.290	+1.474	+1.082	+1.253	-0.756
dα(ψ), dδ(ψ)	+0.034	-0.12	+0.068	-0.12	+0.088	-0.13	+0.042	-0.13
dα(ε), dδ(ε)	-0.022	+0.95	+0.006	+0.95	+0.023	+0.95	-0.017	+0.94
Dbles.Trans.	January 8		January 8		January 9		January 9	

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	281		276		277		279			
	δ Volantis		64 Aurigae		λ Geminorum		δ Geminorum*			
Mag.Spect.	4.02	F5	5.75	A3	3.65	A2	3.52	F0		
U.T.	R.A.		R.A.		R.A.		R.A.			
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "		
	7 16	-67 55	7 17	+40 54	7 17	+16 33	7 19	+22 00		
1	-8.9	53 56.4 +242	40.22	-360	04.812 +287	36.78 +66	17.959 +231	65.03 -76	17.912 +242	37.44 -46
1	1.0	53 69.6 +132	43.93	-371	05.047 +235	37.63 +85	18.150 +191	64.39 -64	18.112 +200	37.13 -31
1	11.0	53 71.5 +19	47.67	-374	05.224 +177	38.66 +103	18.295 +145	63.90 -49	18.264 +152	36.98 -15
1	21.0	53 61.4 -101	51.31	-364	05.334 +110	39.83 +117	18.386 +91	63.56 -34	18.361 +97	36.98 +0
1	30.9	53 40.4 -210	54.74	-343	05.381 +47	41.08 +125	18.425 +39	63.38 -18	18.405 +44	37.12 +14
2	9.9	53 09.2 -312	57.91	-317	05.362 -19	42.35 +127	18.413 -12	63.31 -7	18.396 -9	37.36 +24
2	19.9	52 68.5 -407	60.69	-278	05.283 -79	43.57 +122	18.353 -60	63.37 +6	18.336 -60	37.69 +33
3	1.9	52 20.5 -480	63.05	-236	05.154 -129	44.68 +111	18.253 -100	63.50 +13	18.235 -101	38.05 +36
3	11.8	51 66.3 -542	64.96	-191	04.984 -170	45.65 +97	18.121 -132	63.69 +19	18.100 -135	38.43 +38
3	21.8	51 07.8 -585	66.35	-139	04.784 -200	46.40 +75	17.967 -154	63.92 +23	17.942 -158	38.79 +36
3	31.8	50 47.2 -606	67.22	-87	04.572 -212	46.93 +53	17.803 -164	64.15 +23	17.774 -168	39.11 +32
4	10.8	49 85.6 -616	67.56	-34	04.357 -215	47.20 +27	17.637 -166	64.39 +24	17.603 -171	39.37 +26
4	20.7	49 25.3 -603	67.34	+22	04.154 -203	47.22 +2	17.482 -155	64.63 +24	17.443 -160	39.57 +20
4	30.7	48 67.9 -574	66.62	+72	03.976 -178	46.99 -23	17.347 -135	64.85 +22	17.302 -141	39.70 +13
5	10.7	48 14.3 -536	65.39	+123	03.827 -149	46.53 -46	17.236 -111	65.07 +22	17.187 -115	39.78 +8
5	20.6	47 66.7 -476	63.67	+172	03.720 -107	45.87 -86	17.158 -78	65.29 +22	17.106 -81	39.81 +3
5	30.6	47 25.7 -410	61.54	+213	03.658 -62	45.04 -63	17.116 -42	65.50 +21	17.062 -44	39.80 -1
6	9.6	46 92.0 -337	59.01	+253	03.642 -16	44.08 -96	17.110 -6	65.73 +23	17.055 -7	39.76 -4
6	19.6	46 67.3 -247	56.16	+285	03.677 +35	43.01 -107	17.145 +35	65.96 +23	17.090 +35	39.70 -6
6	29.5	46 51.3 -160	53.09	+307	03.759 +82	41.89 -112	17.216 +71	66.19 +23	17.163 +73	39.62 -8
7	9.5	46 44.7 -66	49.83	+326	03.886 +127	40.71 -118	17.321 +105	66.37 +18	17.294 +131	39.45 -17
7	19.5	46 48.2 +35	46.53	+330	04.059 +173	39.51 -120	17.460 +139	66.64 +27	17.411 +117	39.44 -1
7	29.5	46 60.8 +126	43.26	+327	04.271 +212	38.31 -120	17.632 +172	66.85 +21	17.590 +179	39.30 -14
8	8.4	46 83.0 +222	40.11	+315	04.521 +250	37.14 -117	17.833 +201	66.99 +14	17.797 +207	39.13 -17
8	18.4	47 14.4 +314	37.21	+290	04.804 +283	36.00 -114	18.059 +226	67.05 +6	18.031 +234	38.90 -23
8	28.4	47 53.6 +392	34.66	+255	05.115 +311	34.92 -108	18.307 +248	67.01 -4	18.286 +255	38.61 -29
9	7.3	48 00.5 +469	32.52	+214	05.452 +337	33.89 -103	18.576 +269	66.86 -15	18.564 +278	38.24 -37
9	17.3	48 53.5 +530	30.93	+159	05.812 +360	32.93 -96	18.862 +286	66.57 -29	18.859 +295	37.78 -46
9	27.3	49 11.0 +575	29.91	+102	06.189 +377	32.06 -87	19.162 +300	66.15 -42	19.170 +311	37.23 -55
10	7.3	49 72.2 +612	29.52	+39	06.583 +394	31.28 -78	19.477 +315	65.57 -58	19.494 +324	36.59 -64
10	17.2	50 34.5 +623	29.83	-31	06.985 +402	30.62 -66	19.798 +321	64.87 -70	19.827 +333	35.87 -72
10	27.2	50 96.3 +618	30.77	-94	07.392 +407	30.10 -52	20.125 +327	64.05 -82	20.165 +338	35.10 -77
11	6.2	51 56.0 +597	32.38	-161	07.800 +408	29.75 -35	20.452 +327	63.14 -91	20.504 +339	34.29 -81
11	16.2	52 107 +547	34.59	-221	08.197 +397	29.58 -17	20.772 +320	62.18 -96	20.835 +331	33.50 -79
11	26.1	52 59.3 +486	37.29	-270	08.578 +381	29.62 +4	21.079 +307	61.22 -96	21.154 +319	32.74 -76
12	6.1	53 00.1 +408	40.45	-316	08.933 +355	29.88 +26	21.365 +286	60.29 -93	21.452 +298	32.06 -68
12	16.1	53 30.8 +307	43.93	-348	09.248 +315	30.36 +48	21.620 +255	59.43 -86	21.718 +266	31.50 -56
12	26.0	53 51.4 +206	47.60	-367	09.519 +271	31.06 +70	21.840 +220	58.69 -74	21.948 +230	31.07 -43
12	36.0	53 60.5 +91	51.38	-378	09.735 +216	31.96 +90	22.015 +175	58.08 -61	22.132 +184	30.79 -28
		53 60.5 -28	51.38	-373	09.735 +152	31.96 +106	22.015 +125	58.08 -46	22.132 +132	30.79 -12
Mean Place	50.409	57.66	05.969	30.02	19.047	55.76	19.037	28.75		
sec δ, tan δ	+2.662	-2.467	+1.323	+0.866	+1.043	+0.297	+1.079	+0.404		
dα(ψ), dδ(ψ)	-0.001	-0.13	+0.083	-0.13	+0.069	-0.13	+0.071	-0.13		
dα(ε), dδ(ε)	-0.054	+0.94	+0.019	+0.94	+0.007	+0.94	+0.009	+0.94		
Dble.Trans.	January 10		January 10		January 10		January 10			

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	280		1191		283		1192		
	19 Lyncis* f.		66 Aurigae		η Canis Majoris		169 G. Canis Maj.		
Mag.Spect.	5.61	B8	5.28	K0	2.43	B5p	5.82	F0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° '	h m	° '	h m	° '	h m	° '	
	7 21	+55 18	7 23	+40 41	7 23	-29 16	7 24	-13 43	
1	-8.9	45.132 +362	34.19 +139	11.309 +292	63.99 +60	33.317 +205	19.56 -299	30.377 +210	16.38 -238
1	1.0	45.426 +294	35.82 +163	11.551 +242	64.80 +81	33.477 +160	22.58 -302	30.545 +168	18.73 -235
1	11.0	45.646 +220	37.65 +183	11.736 +185	65.79 +99	33.585 +108	25.57 -289	30.669 +124	21.02 -229
1	21.0	45.779 +133	39.62 +197	11.854 +118	66.93 +114	33.638 +53	28.42 -285	30.740 +71	23.15 -213
1	30.9	45.829 +50	41.62 +200	11.908 +54	68.16 +123	33.636 -2	31.04 -262	30.762 +22	25.07 -192
2	9.9	45.794 -35	43.60 +198	11.897 -11	69.43 +127	33.583 -53	33.42 -238	30.735 -27	26.77 -170
2	19.9	45.680 -114	45.46 +186	11.824 -73	70.67 +124	33.480 -103	35.45 -203	30.661 -74	28.19 -142
3	1.9	45.501 -179	47.10 +164	11.702 -122	71.81 +114	33.338 -142	37.13 -168	30.550 -111	29.32 -113
3	11.8	45.265 -236	48.49 +139	11.536 -166	72.80 +99	33.163 -175	38.44 -131	30.408 -142	30.16 -84
3	21.8	44.991 -274	49.54 +105	11.341 -195	73.60 +80	32.965 -198	39.33 -89	30.244 -164	30.69 -53
3	31.8	44.698 -293	50.22 +68	11.132 -209	74.17 +57	32.757 -208	39.82 -49	30.071 -173	30.93 -24
4	10.8	44.398 -300	50.53 +31	10.918 -214	74.49 +32	32.546 -211	39.90 -8	29.894 -177	30.89 +4
4	20.7	44.111 -287	50.43 -10	10.824 -203	74.55 +6	32.343 -203	39.57 +33	29.726 -168	30.54 +35
4	30.7	43.854 -257	49.97 -46	10.715 -203	74.37 -18	32.157 -186	38.86 +71	29.576 -150	29.93 +61
5	10.7	43.632 -222	49.16 -81	10.535 -152	73.96 -41	31.993 -164	37.78 +108	29.446 -130	29.06 +87
5	20.6	43.464 -168	48.02 -114	10.272 -111	73.34 -62	31.861 -132	36.33 +145	29.346 -100	27.94 +112
5	30.6	43.352 -112	46.63 -139	10.205 -67	72.54 -80	31.762 -99	34.60 +173	29.279 -67	26.61 +133
6	9.6	43.301 -51	45.02 -161	10.183 -22	71.60 -94	31.699 -63	32.58 +202	29.244 -35	25.08 +153
6	19.6	43.316 +15	43.24 -178	10.211 +28	70.55 -105	31.677 -22	30.33 +225	29.248 +4	23.40 +168
6	29.5	43.393 +77	41.36 -188	10.286 +75	69.43 -112	31.693 +16	27.93 +240	29.286 +38	21.62 +178
7	9.5	43.532 +139	39.39 -197	10.406 +120	68.26 -117	31.747 +54	25.41 +252	29.359 +73	19.76 +186
7	19.5	43.734 +202	37.42 -197	10.571 +165	67.04 -122	31.842 +95	22.88 +253	29.466 +107	17.90 +186
7	29.5	43.987 +253	35.47 -195	10.775 +204	65.83 -121	31.972 +130	20.40 +248	29.604 +138	16.10 +180
8	8.4	44.293 +306	33.56 -191	11.016 +241	64.62 -121	32.137 +165	18.04 +216	29.772 +168	14.39 +171
8	18.4	44.646 +353	31.77 -179	11.293 +277	63.45 -117	32.335 +198	15.92 +232	29.969 +197	12.89 +150
8	28.4	45.037 +391	30.09 -168	11.596 +303	62.32 -113	32.561 +226	14.08 +184	30.188 +219	11.62 +127
9	7.3	45.467 +430	28.56 -153	11.928 +332	61.23 -109	32.816 +255	12.60 +148	30.432 +244	10.66 +96
9	17.3	45.927 +460	27.22 -134	12.283 +355	60.22 -101	33.093 +277	11.59 +101	30.695 +263	10.06 +60
9	27.3	46.411 +484	26.07 -115	12.655 +372	59.28 -94	33.390 +297	11.05 +54	30.975 +280	09.84 +22
10	7.3	46.918 +507	25.15 -92	13.046 +391	58.43 -85	33.703 +313	11.03 +2	31.269 +294	10.05 -21
10	17.2	47.436 +518	24.49 -66	13.447 +401	57.70 -73	34.026 +323	11.57 -54	31.573 +304	10.69 -64
10	27.2	47.960 +524	24.10 -39	13.853 +406	57.10 -60	34.352 +326	12.62 -105	31.881 +308	11.72 -103
11	6.2	48.485 +525	24.01 -9	14.262 +409	56.67 -43	34.678 +326	14.19 -157	32.190 +309	13.16 -144
11	16.2	48.993 +508	24.24 +23	14.661 +399	56.43 -24	34.991 +313	16.22 -203	32.490 +300	14.93 -177
11	26.1	49.479 +486	24.78 +54	15.044 +383	56.39 -4	35.286 +295	18.62 -240	32.777 +287	16.96 -203
12	6.1	49.931 +452	25.65 +87	15.403 +359	56.58 +19	35.556 +270	21.35 -273	33.042 +265	19.21 -225
12	16.1	50.330 +399	26.83 +118	15.724 +321	57.01 +43	35.788 +232	24.28 -293	33.275 +233	21.58 -237
12	26.0	50.672 +342	28.28 +145	16.001 +277	57.65 +64	35.980 +192	27.30 -302	33.473 +198	23.98 -240
12	36.0	50.941 +269	29.98 +170	16.224 +223	58.51 +86	36.122 +142	30.37 -307	33.627 +154	26.36 -238
		50.972 +187	29.98 +186	16.224 +160	58.51 +103	36.122 +88	30.37 -296	33.627 +104	26.36 -225
Mean Place	46.156	28.63	12.467	57.23	33.642	34.64	31.084	29.66	
sec δ, tan δ	+1.757	+1.445	+1.319	+0.860	+1.146	-0.561	+1.029	-0.244	
da(ψ), dδ(ψ)	+0.097	-0.14	+0.082	-0.14	+0.047	-0.14	+0.055	-0.14	
da(ε), dδ(ε)	+0.034	+0.94	+0.020	+0.93	-0.013	+0.93	-0.006	+0.93	
Dble.Trans.	January 11		January 11		January 11		January 11		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	282		285		286		1194	
Name	ι Geminorum		β Canis Minoris		ρ Geminorum		σ Puppis	
Mag. Spect.	3.89	K0	3.09	B8	4.18	F0	3.28	K5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup> <sup>"/</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup> <sup>"/</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup> <sup>"/</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup> <sup>"/</sup>
	7 24	+ 27 49	7 26	+ 8 19	7 28	+ 31 48	7 28	- 43 15
1 <sup>d</sup> -8.9	<sup>s</sup> 52.199 + 259	40.72 - 16	<sup>s</sup> 24.097 + 229	12.61 - 127	<sup>s</sup> 13.473 + 271	" + 6	<sup>s</sup> 48.370 + 215	68.38 - 336
1 <sup>s</sup> 1.0	52.414 + 215	40.74 + 2	24.287 + 190	11.44 - 117	13.699 + 226	+ 26	48.530 + 160	68.38 - 344
1 11.0	52.579 + 165	40.94 + 20	24.432 + 145	10.40 - 104	13.874 + 175	+ 43	48.630 + 100	71.82 - 345
1 21.0	52.687 + 108	41.29 + 35	24.526 + 94	09.52 - 88	13.989 + 115	+ 60	48.664 + 34	75.27 - 334
1 30.9	52.739 + 52	41.76 + 47	24.570 + 44	08.82 - 70	14.046 + 57	+ 72	48.636 - 28	78.61 - 312
2 9.9	52.735 - 4	42.33 + 57	24.563 - 7	08.28 - 54	14.045 - 1	+ 80	48.548 - 88	84.60 - 287
2 19.9	52.677 - 58	42.95 + 62	24.509 - 54	07.92 - 36	13.988 - 57	+ 83	48.403 - 145	87.11 - 251
3 1.9	52.576 - 101	43.57 + 62	24.417 - 92	07.70 - 22	13.886 - 102	+ 80	48.214 - 189	87.11 - 211
3 11.8	52.438 - 138	44.16 + 59	24.292 - 125	07.61 - 9	13.744 - 142	+ 75	47.987 - 227	89.22 - 170
3 21.8	52.275 - 163	44.68 + 52	24.144 - 148	07.64 + 3	13.575 - 169	+ 64	47.733 - 254	90.92 - 122
3 31.8	52.099 - 176	45.10 + 42	23.987 - 157	07.77 + 13	13.393 - 182	+ 49	47.466 - 267	92.89 - 75
4 10.8	51.920 - 179	45.40 + 30	23.825 - 162	07.98 + 21	13.207 - 186	+ 35	47.192 - 274	92.89 - 28
4 20.7	51.751 - 169	45.58 + 18	23.673 - 152	08.27 + 29	13.030 - 177	+ 17	47.192 - 265	93.17 + 23
4 30.7	51.601 - 150	45.63 + 5	23.538 - 135	08.63 + 36	12.872 - 158	+ 1	46.927 - 248	92.94 + 67
5 10.7	51.476 - 125	45.58 - 5	23.425 - 113	09.06 + 43	12.741 - 131	- 14	46.679 - 226	92.27 + 113
5 20.6	51.387 - 89	45.41 - 17	23.342 - 83	09.56 + 50	12.644 - 97	- 28	46.261 - 192	89.57 + 157
5 30.6	51.334 - 53	45.16 - 25	23.293 - 49	10.10 + 54	12.587 - 57	- 41	46.107 - 154	89.57 + 192
6 9.6	51.321 - 13	44.84 - 32	23.277 - 16	10.71 + 61	12.569 - 18	- 50	45.992 - 115	87.65 + 229
6 19.6	51.351 + 30	44.47 - 37	23.300 + 23	11.35 + 64	12.597 + 28	- 58	45.925 - 67	85.36 + 256
6 29.5	51.421 + 70	44.06 - 41	23.357 + 57	12.02 + 67	12.665 + 68	- 62	45.902 - 23	82.80 + 276
7 9.5	51.529 + 108	43.67 - 39	23.447 + 90	12.70 + 68	12.773 + 108	- 66	45.925 + 23	77.12 + 292
7 19.5	51.670 + 141	43.16 - 51	23.571 + 124	13.37 + 67	12.919 + 146	- 72	45.998 + 73	77.12 + 296
7 29.5	51.849 + 179	42.64 - 52	23.725 + 154	14.01 + 64	13.101 + 182	- 75	45.998 + 116	74.16 + 292
8 8.4	52.060 + 211	42.11 - 53	23.907 + 182	14.58 + 57	13.316 + 215	- 76	46.114 + 160	71.24 + 281
8 18.4	52.300 + 240	41.56 - 55	24.116 + 209	15.02 + 44	13.563 + 247	- 77	46.274 + 160	68.43 + 281
8 28.4	52.562 + 262	40.97 - 59	24.346 + 230	15.32 + 30	13.833 + 270	- 79	46.478 + 204	65.86 + 257
9 7.3	52.849 + 287	40.34 - 63	24.598 + 252	15.45 + 13	14.129 + 296	- 80	46.718 + 240	63.60 + 226
9 17.3	53.155 + 306	39.66 - 68	24.869 + 271	15.36 - 9	14.446 + 317	- 81	46.996 + 278	61.73 + 187
9 27.3	53.477 + 322	38.95 - 71	25.154 + 285	15.07 - 29	14.779 + 333	- 82	47.303 + 307	61.73 + 136
10 7.3	53.816 + 339	38.20 - 75	25.455 + 301	14.56 - 51	15.130 + 351	- 81	47.635 + 332	60.37 + 84
10 17.2	54.163 + 347	37.44 - 76	25.764 + 309	13.82 - 74	15.491 + 361	- 78	47.989 + 354	59.28 + 25
10 27.2	54.517 + 354	36.68 - 76	26.080 + 316	12.88 - 94	15.859 + 388	- 75	48.354 + 365	59.66 - 38
11 6.2	54.873 + 356	35.95 - 73	26.398 + 318	11.77 - 111	16.229 + 370	- 67	48.722 + 368	60.64 - 98
11 16.2	55.221 + 348	35.29 - 66	26.709 + 311	10.52 - 125	16.592 + 363	- 56	49.089 + 367	62.21 - 157
11 26.1	55.558 + 337	34.72 - 57	27.009 + 300	09.20 - 132	16.943 + 351	- 43	49.438 + 349	62.21 - 213
12 6.1	55.873 + 315	34.28 - 44	27.290 + 281	07.83 - 137	17.273 + 330	- 27	49.765 + 327	64.34 - 257
12 16.1	56.156 + 283	34.00 - 28	27.542 + 252	06.50 - 133	17.569 + 296	- 8	50.058 + 293	69.90 - 299
12 26.0	56.402 + 246	33.88 - 12	27.760 + 218	05.24 - 126	17.827 + 258	+ 10	50.306 + 248	69.90 - 325
12 36.0	56.601 + 199	33.94 + 6	27.935 + 175	04.08 - 116	18.036 + 209	+ 30	50.504 + 198	73.15 - 342
	+ 144	+ 23	+ 127	- 100	+ 153	+ 47	+ 75	80.07 - 344
Mean Place	53.349	32.58	25.127	02.05	14.644	43.32	48.146	85.34
sec δ, tan δ	+1.131	+0.528	+1.011	+0.146	+1.177	+0.620	+1.373	-0.941
da(ψ), dδ(ψ)	+0.074	-0.14	+0.065	-0.15	+0.076	-0.15	+0.038	-0.15
da(ε), dδ(ε)	+0.013	+0.93	+0.004	+0.93	+0.016	+0.93	-0.024	+0.93
Dble. Trans.	January 12		January 12		January 12		January 13	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1193		284		288		287		
	6 Canis Minoris		Groombridge 1308 (Camelopardi)		108 G. Puppis		$\alpha$ Geminorum A* (Castor)		
Mag.Spect.	4.85	K0	5.80	K0	4.52	F8	1.99	A0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	7 29	+12 02	7 29	+68 29	7 33	-22 15	7 33	+31 55	
1	-8.9	01.657 +236	16.97 -108	28.356 +526	45.32 +194	27.918 +216	44.32 -274	43.106 +276	15.41 +3
1	1.0	01.854 +197	16.02 -95	28.780 +424	47.53 +221	28.090 +172	47.08 -276	43.337 +231	15.63 +22
1	11.0	02.005 +151	15.20 -82	29.091 +311	49.97 +244	28.216 +126	49.80 -272	43.517 +180	16.04 +41
1	21.0	02.105 +100	14.55 -65	29.271 +180	52.55 +258	28.287 +71	52.38 -258	43.638 +121	16.62 +58
1	31.0	02.153 +48	14.06 -49	29.325 +54	55.15 +260	28.307 +20	54.75 -237	43.700 +62	17.33 +71
2	9.9	02.151 -2	13.73 -33	29.253 -72	57.70 +255	28.276 -31	56.89 -214	43.704 +4	18.13 +80
2	19.9	02.100 -51	13.55 -18	29.058 -195	60.06 +236	28.197 -79	58.72 -183	43.651 -53	18.97 +84
3	1.9	02.010 -90	13.50 -5	28.764 -294	62.14 +208	28.079 -118	60.22 -150	43.553 -98	19.79 +82
3	11.8	01.887 -123	13.54 +4	28.383 -381	63.89 +175	27.927 -152	61.39 -117	43.414 -139	20.56 +77
3	21.8	01.740 -147	13.68 +14	27.937 -446	65.20 +131	27.752 -175	62.18 -79	43.247 -167	21.22 +66
3	31.8	01.582 -158	13.87 +19	27.459 -478	66.05 +85	27.566 -186	62.62 -44	43.066 -181	21.74 +52
4	10.8	01.420 -162	14.11 +24	26.964 -495	66.41 +36	27.376 -190	62.72 -10	42.879 -187	22.11 +37
4	20.7	01.266 -154	14.39 +28	26.484 -480	66.27 -14	27.192 -184	62.43 +29	42.700 -179	22.31 +20
4	30.7	01.131 -135	14.70 +31	26.041 -443	65.65 -62	27.024 -168	61.83 +60	42.541 -159	22.34 +3
5	10.7	01.016 -115	15.05 +35	25.647 -394	64.59 -106	26.876 -148	60.90 +93	42.405 -136	22.22 -12
5	20.7	00.933 -83	15.42 +37	25.329 -318	63.11 -148	26.756 -120	59.64 +126	42.305 -100	21.94 -28
5	30.6	00.883 -50	15.82 +40	25.094 -235	61.30 -181	26.669 -87	58.14 +150	42.243 -62	21.54 -40
6	9.6	00.867 -16	16.26 +44	24.947 -147	59.19 -211	26.615 -54	56.37 +177	42.220 -23	21.03 -51
6	19.6	00.889 +22	16.71 +45	24.902 -45	56.86 -233	26.598 -17	54.41 +196	42.241 +21	20.44 -59
6	29.5	00.947 +58	17.16 +45	24.952 +50	54.39 -247	26.618 +20	52.31 +210	42.303 +62	19.80 -64
7	9.5	01.038 +91	17.61 +45	25.100 +148	51.81 -258	26.673 +55	50.11 +220	42.404 +101	19.11 -69
7	19.5	01.162 +124	18.06 +45	25.346 +246	49.21 -260	26.765 +92	47.88 +223	42.544 +140	18.36 -75
7	29.5	01.317 +155	18.49 +43	25.678 +332	46.65 -256	26.889 +124	45.71 +217	42.719 +175	17.57 -79
8	8.4	01.502 +185	18.84 +35	26.094 +416	44.15 -250	27.046 +157	43.64 +207	42.929 +210	16.77 -80
8	18.4	01.713 +211	19.08 +24	26.590 +496	41.80 -235	27.235 +189	41.77 +187	43.169 +240	15.94 -83
8	28.4	01.945 +232	19.20 +12	27.149 +559	39.63 -217	27.449 +214	40.17 +160	43.435 +266	15.11 -83
9	7.4	02.200 +255	19.17 -3	27.772 +623	37.67 -196	27.690 +241	38.89 +128	43.726 +291	14.25 -86
9	17.3	02.473 +273	18.95 -22	28.447 +675	35.98 -169	27.954 +264	38.03 +86	44.039 +313	13.38 -87
9	27.3	02.762 +289	18.57 -38	29.161 +714	34.57 -141	28.236 +282	37.60 +43	44.369 +330	12.50 -88
10	7.3	03.067 +305	17.99 -58	29.913 +752	33.49 -108	28.537 +301	37.65 -5	44.718 +349	11.63 -87
10	17.2	03.380 +313	17.22 -77	30.683 +770	32.79 -70	28.847 +310	38.20 -55	45.078 +360	10.78 -85
10	27.2	03.701 +321	16.30 -92	31.462 +779	32.44 -35	29.164 +317	39.22 -102	45.445 +367	09.98 -80
11	6.2	04.024 +323	15.24 -106	32.240 +778	32.51 +7	29.482 +318	40.71 -149	45.816 +371	09.25 -73
11	16.2	04.341 +317	14.08 -116	32.993 +753	33.00 +49	29.791 +309	42.61 -190	46.181 +365	08.63 -62
11	26.1	04.648 +307	12.88 -120	33.710 +717	33.89 +89	30.087 +296	44.84 -223	46.535 +354	08.14 -49
12	6.1	04.936 +288	11.67 -121	34.373 +663	35.21 +132	30.360 +273	47.37 -253	46.868 +333	07.83 -31
12	16.1	05.194 +258	10.52 -115	34.956 +583	36.90 +169	30.600 +240	50.06 -269	47.168 +300	07.70 -13
12	26.1	05.419 +225	09.46 -106	35.450 +494	38.90 +200	30.803 +203	52.84 -278	47.431 +263	07.76 +6
12	36.0	05.601 +182	08.52 -94	35.834 +384	41.20 +230	30.960 +157	55.64 -280	47.645 +214	08.03 +27
		05.601 +132	08.52 -78	35.834 +261	41.20 +247	30.960 +106	55.64 -289	47.645 +159	08.03 +45
Mean Place	02.727	06.83	28.913	40.75	28.476	59.32	44.265	07.65	
sec $\delta$ , tan $\delta$	+1.022	+0.213	+2.728	+2.538	+1.081	-0.409	+1.178	+0.623	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.066	-0.15	+0.123	-0.15	+0.051	-0.16	+0.076	-0.16	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.005	+0.93	+0.064	+0.92	-0.011	+0.92	+0.017	+0.92	
Dble.Trans.	January 13		January 13		January 14		January 14		



APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	1196		1198		1195		1197	
	♃ Geminorum		♈ Carinae		B.D. +46° 1286 (Lycis)		125 G. Puppis	
Mag. Spect.	4.22	K5	4.92	K5	5.80	K5	5.66	B3
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ′	h m	° ′	h m	° ′	h m	° ′
	7 35	+26 55	7 35	-52 29	7 35	+46 12	7 36	-19 39
1 -8.9	04.341 +267	43.84 -27	20.445 +235	53.91 -350	31.840 +328	45.70 +80	04.782 +219	63.11 -264
1 1.0	04.565 +224	43.76 -8	20.614 +169	57.52 -361	32.114 +274	46.74 +104	04.960 +178	65.76 -265
1 11.0	04.740 +175	43.85 +9	20.713 +99	61.19 -367	32.327 +213	48.01 +127	05.091 +131	68.37 -261
1 21.0	04.859 +119	44.11 +26	20.734 +21	64.77 -358	32.468 +141	49.45 +144	05.168 +77	70.85 -248
1 31.0	04.922 +63	44.52 +41	20.683 -51	68.16 -339	32.539 +71	50.98 +153	05.195 +27	73.11 -226
2 9.9	04.929 +7	45.04 +52	20.562 -121	71.30 -314	32.539 +0	52.55 +157	05.171 -24	75.15 -204
2 19.9	04.881 -48	45.63 +59	20.376 -186	74.09 -279	32.470 -69	54.08 +153	05.099 -72	76.88 -173
3 1.9	04.790 -91	46.24 +61	20.137 -239	76.48 -239	32.344 -126	55.50 +142	04.989 -110	78.30 -142
3 11.8	04.660 -130	46.84 +60	19.854 -283	78.44 -196	32.170 -174	56.74 +124	04.845 -144	79.41 -111
3 21.8	04.503 -157	47.38 +54	19.537 -317	79.91 -147	31.960 -210	57.75 +101	04.677 -168	80.17 -76
3 31.8	04.333 -170	47.84 +46	19.204 -333	80.88 -97	31.732 -228	58.48 +73	04.498 -179	80.58 -41
4 10.8	04.156 -177	48.19 +35	18.862 -342	81.35 -47	31.496 -236	58.92 +44	04.313 -185	80.67 -9
4 20.7	03.988 -168	48.43 +24	18.525 -337	81.28 +7	31.267 -229	59.04 +12	04.135 -178	80.41 +26
4 30.7	03.837 -151	48.54 +11	18.206 -319	80.73 +55	31.061 -206	58.86 -18	03.972 -163	79.84 +57
5 10.7	03.710 -127	48.55 +1	17.910 -296	79.68 +105	30.882 -179	58.40 -46	03.829 -143	78.95 +89
5 20.7	03.615 -95	48.44 -11	17.651 -259	78.16 +152	30.745 -137	57.66 -74	03.714 -115	77.77 +118
5 30.6	03.556 -99	48.25 -19	17.433 -218	76.24 -47	30.653 -92	56.70 -96	03.629 -85	76.35 +142
5 9.6	03.535 -21	47.99 -26	17.259 -174	73.92 +232	30.608 -45	55.55 -115	03.578 -51	74.69 +166
5 19.6	03.555 +20	47.66 -33	17.139 -120	71.29 +263	30.618 +10	54.23 -132	03.563 -15	72.83 +186
5 29.5	03.615 +60	47.29 -37	17.072 -67	68.43 +286	30.677 +59	52.82 -141	03.584 +21	70.85 +198
7 9.5	03.713 +98	46.92 -37	17.060 -12	65.37 +306	30.786 +109	51.31 -151	03.639 +55	68.77 +208
7 19.5	03.840 +127	46.46 -46	17.107 +47	62.24 +313	30.945 +159	49.76 -155	03.731 +92	66.67 +210
7 29.5	04.008 +168	45.94 -52	17.207 +100	59.13 +311	31.146 +201	48.19 -157	03.854 +123	64.61 +206
8 8.4	04.207 +199	45.41 -53	17.364 +157	56.11 +302	31.391 +245	46.63 -156	04.009 +155	62.65 +196
8 18.4	04.435 +228	44.83 -58	17.575 +211	53.32 +279	31.674 +283	45.10 -153	04.194 +185	60.89 +176
8 28.4	04.687 +252	44.22 -61	17.832 +257	50.84 +248	31.990 +316	43.64 -146	04.405 +211	59.39 +150
9 7.4	04.964 +277	43.55 -67	18.137 +305	48.75 +209	32.338 +348	42.24 -140	04.643 +238	58.19 +120
9 17.3	05.262 +298	42.82 -73	18.344 +344	47.17 +158	32.713 +375	40.95 -129	04.903 +260	57.40 +79
9 27.3	05.576 +314	42.04 -78	18.481 +376	46.13 +104	32.713 +397	39.77 -118	04.903 +279	57.01 +39
10 7.3	05.909 +333	41.22 -82	19.260 +403	45.70 +43	33.110 +419	38.73 -104	05.182 +296	57.09 -8
10 17.2	06.253 +344	40.37 -85	19.677 +417	45.94 -24	33.961 +432	37.86 -87	05.786 +308	57.65 -56
10 27.2	06.604 +351	39.51 -86	20.100 +423	46.79 -85	34.402 +441	37.17 -69	06.100 +314	58.66 -101
11 6.2	06.960 +356	38.67 -84	20.419 +419	46.79 -150	34.847 +445	36.70 -47	06.417 +317	60.12 -146
11 16.2	07.310 +350	38.67 -77	20.519 +398	48.29 -210	35.284 +437	36.49 -21	06.725 +308	61.97 -185
11 26.1	07.650 +340	37.21 -69	21.287 +370	52.98 -259	35.707 +423	36.53 +4	07.021 +296	64.14 -217
12 6.1	07.971 +321	36.64 -57	21.616 +329	56.03 -305	36.104 +397	36.85 +32	07.296 +275	66.58 -244
12 16.1	08.261 +290	36.24 -40	21.890 +274	59.39 -336	36.461 +357	37.45 +60	07.539 +243	69.19 -261
12 26.1	08.515 +254	36.01 -23	22.104 +214	62.96 -357	36.773 +312	38.31 +86	07.746 +207	71.86 -267
12 36.0	08.723 +208	35.96 -5	22.249 +145	66.65 -369	37.026 +253	39.42 +111	07.908 +162	74.55 -269
	+155	+13	+69	-366	+187	+131	+111	-258
Mean Place	05.500	35.49	19.670	72.57	32.965	39.61	05.413	78.01
sec δ, tan δ	+1.122	+0.508	+1.643	-1.303	+1.445	+1.043	+1.062	-0.357
dα(ψ), dδ(ψ)	+0.073	-0.16	+0.030	-0.16	+0.086	-0.16	+0.053	-0.16
dα(ε), dδ(ε)	+0.014	+0.92	-0.035	+0.91	+0.028	+0.91	-0.010	+0.91
Dble. Trans.	January 14		January 14		January 14		January 14	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	289		290		291		293						
	25 Monocerotis		127 G. Puppis		$\alpha$ Canis Minoris A* (Procyon)		$\alpha$ Monocerotis						
Mag.Spect.	5.17	F5	4.62	B8	0.48	F5	4.07	K0					
U.T.	R.A.		R.A.		R.A.		R.A.						
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "					
	7 36	- 4 04	7 36	- 34 55	7 38	+ 5 15	7 40	- 9 30					
1	-8.9	35 496 + 226	36.19	-195	51.904 + 221	58.60	-316	34.751 + 232	47.51	-151	35.291 + 227	55.03	-222
1	1.0	35 684 + 188	38.08	-189	52.076 + 172	61.82	-322	34.945 + 194	46.10	-141	35.478 + 187	57.22	-219
1	11.0	35 828 + 144	39.89	-181	52.195 + 119	65.05	-323	35.094 + 149	44.81	-129	35.621 + 143	59.33	-211
1	21.0	35 921 + 93	41.54	-165	52.254 + 59	68.16	-311	35.193 + 99	43.69	-112	35.713 + 92	61.30	-197
1	31.0	35 964 + 43	42.99	-145	52.257 + 3	71.07	-291	35.242 + 49	42.76	-93	35.756 + 43	63.06	-176
2	9.9	35 959 - 5	44.24	-125	52.205 - 52	73.74	-267	35.241 - 1	42.00	-76	35.749 - 7	64.62	-156
2	19.9	35.906 - 53	45.25	-101	52.099 - 106	76.07	-233	35.192 - 49	41.45	-55	35.694 - 55	65.91	-129
3	1.9	35.814 - 92	46.02	-77	51.952 - 147	78.03	-196	35.104 - 88	41.07	-38	35.601 - 93	66.94	-103
3	11.8	35.690 - 124	46.58	-56	51.768 - 184	79.61	-158	34.982 - 122	40.85	-22	35.474 - 127	67.72	-78
3	21.8	35.543 - 147	46.90	-32	51.558 - 210	80.74	-113	34.837 - 145	40.78	-7	35.324 - 150	68.21	-49
3	31.8	35.384 - 159	47.01	-11	51.335 - 223	81.45	-71	34.681 - 156	40.84	+ 6	35.162 - 162	68.44	-23
4	10.8	35.221 - 163	46.92	+ 9	51.106 - 229	81.73	-28	34.520 - 161	41.01	+ 17	34.994 - 168	68.43	+ 1
4	20.7	35.064 - 157	46.62	+ 30	50.882 - 224	81.55	+ 18	34.365 - 155	41.30	+ 29	34.832 - 162	68.15	+ 28
4	30.7	34.923 - 141	46.14	+ 48	50.675 - 207	80.96	+ 59	34.227 - 138	41.67	+ 37	34.685 - 147	67.66	+ 49
5	10.7	34.801 - 122	45.48	+ 66	50.487 - 188	79.96	+ 100	34.109 - 118	42.14	+ 47	34.556 - 129	66.93	+ 73
5	20.7	34.707 - 94	44.65	+ 83	50.329 - 158	78.56	+ 140	34.020 - 89	42.70	+ 56	34.455 - 101	65.98	+ 95
5	30.6	34.644 - 63	43.68	+ 97	50.204 - 125	76.83	+ 173	33.963 - 57	43.32	+ 62	34.384 - 71	64.86	+ 112
6	9.6	34.613 - 31	42.57	+ 111	50.115 - 89	74.77	+ 206	33.938 - 25	44.01	+ 69	34.344 - 40	63.56	+ 130
6	19.6	34.618 + 5	41.35	+ 122	50.067 - 48	72.45	+ 232	33.950 + 12	44.76	+ 75	34.340 - 4	62.12	+ 144
6	29.5	34.656 + 38	40.07	+ 128	50.058 - 9	69.96	+ 249	33.966 + 46	45.53	+ 77	34.370 + 30	60.60	+ 152
7	9.5	34.727 + 71	38.73	+ 134	50.090 + 32	67.31	+ 265	34.075 + 79	46.32	+ 79	34.432 + 62	59.00	+ 160
7	19.5	34.832 + 105	37.40	+ 133	50.164 + 74	64.61	+ 270	34.187 + 112	47.08	+ 76	34.529 + 97	57.40	+ 160
7	29.5	34.966 + 134	36.12	+ 128	50.276 + 112	61.96	+ 265	34.327 + 140	47.82	+ 74	34.655 + 126	55.85	+ 155
8	8.4	35.129 + 163	34.92	+ 120	50.427 + 151	59.40	+ 256	34.497 + 170	48.47	+ 65	34.811 + 156	54.38	+ 147
8	18.4	35.320 + 191	33.88	+ 104	50.615 + 188	57.06	+ 234	34.694 + 197	48.99	+ 52	34.995 + 184	53.09	+ 129
8	28.4	35.533 + 213	33.04	+ 84	50.834 + 219	55.01	+ 205	34.913 + 219	49.35	+ 36	35.203 + 208	52.01	+ 108
9	7.4	35.770 + 237	32.44	+ 60	51.087 + 253	53.32	+ 169	35.155 + 242	49.52	+ 17	35.436 + 233	51.19	+ 82
9	17.3	36.027 + 257	32.14	+ 30	51.366 + 279	52.10	+ 122	35.416 + 261	49.45	- 7	35.690 + 254	50.72	+ 47
9	27.3	36.300 + 273	32.15	- 1	51.668 + 302	51.37	+ 73	35.693 + 277	49.16	- 29	35.961 + 271	50.59	+ 13
10	7.3	36.591 + 291	32.50	- 35	51.991 + 323	51.19	+ 18	35.987 + 294	48.60	- 56	36.251 + 290	50.84	- 25
10	17.2	36.891 + 300	33.19	- 69	52.326 + 335	51.59	- 40	36.291 + 304	47.80	- 80	36.551 + 300	51.49	- 65
10	27.2	37.199 + 308	34.20	- 101	52.668 + 342	52.54	- 95	36.602 + 311	46.76	- 104	36.859 + 308	52.50	- 101
11	6.2	37.511 + 312	35.52	- 132	53.010 + 342	54.06	- 152	36.917 + 315	45.52	- 124	37.172 + 313	53.87	- 137
11	16.2	37.817 + 306	37.10	- 158	53.341 + 331	56.08	- 202	37.227 + 310	44.11	- 141	37.478 + 306	55.56	- 169
11	26.1	38.113 + 296	38.86	- 176	53.654 + 313	58.53	- 245	37.527 + 300	42.60	- 151	37.775 + 297	57.48	- 192
12	6.1	38.390 + 277	40.77	- 191	53.941 + 287	61.34	- 281	37.809 + 282	41.03	- 157	38.053 + 278	59.59	- 211
12	16.1	38.639 + 249	42.74	- 197	54.189 + 248	64.41	- 307	38.063 + 254	39.46	- 157	38.301 + 248	61.81	- 223
12	26.1	38.854 + 215	44.70	- 196	54.395 + 206	67.61	- 320	38.284 + 221	37.96	- 150	38.517 + 216	64.04	- 223
12	36.0	39.027 + 173	46.61	- 191	54.549 + 154	70.89	- 328	38.463 + 179	36.55	- 141	38.690 + 173	66.25	- 221
		39.027 + 126	46.61	- 176	54.549 + 98	70.89	- 322	38.463 + 132	36.55	- 125	38.690 + 124	66.25	- 209
Mean Place	36.402	48.87	52.099	75.55	35.739	35.65	36.127	68.77					
sec $\delta$ , tan $\delta$	+1.003	-0.071	+1.220	-0.699	+1.004	+0.092	+1.014	-0.168					
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.059	-0.16	+0.044	-0.16	+0.063	-0.17	+0.057	-0.17					
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.002	+0.91	-0.019	+0.91	+0.003	+0.91	-0.005	+0.91					
Dble.Trans.	January 14		January 15		January 15		January 16						

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	292			297			294			295			
	24 Lyncis			ζ Volantis			κ Geminorum*			β Geminorum (Pollux)			
Mag.Spect.	4.96	A2		3.89	K0		3.70	G5		1.21	K0		
U.T.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.	
	h	m	°	h	m	°	h	m	°	h	m	°	
	7 41		+ 58 44	7 41		- 72 33	7 43		+ 24 25	7 44		+ 28 03	
1	-8.9	51.242	+ 419	39.97	+ 138	63.746	- 350	36.861	+ 268	60.82	- 47	28.314	+ 275
1	1.0	51.589	+ 347	41.64	+ 167	63.958	- 367	37.089	+ 228	60.54	- 28	28.314	+ 233
1	11.0	51.858	+ 269	43.56	+ 192	64.033	- 378	37.270	+ 181	60.44	- 10	28.547	+ 185
1	21.0	52.032	+ 174	45.66	+ 210	63.956	- 277	37.395	+ 125	60.53	+ 9	28.732	+ 128
1	31.0	52.116	+ 84	47.83	+ 217	63.744	- 212	37.466	+ 71	60.77	+ 24	28.860	+ 32
2	9.9	52.107	- 9	50.01	+ 218	63.401	- 343	37.481	+ 15	61.14	+ 37	28.931	+ 15
2	19.9	52.007	- 100	52.10	+ 209	62.935	- 466	37.442	- 39	61.61	+ 47	28.946	- 41
3	1.9	51.833	- 174	53.99	+ 189	62.372	- 563	37.360	- 82	62.14	+ 53	28.905	- 87
3	11.9	51.594	- 239	55.63	+ 164	61.723	- 649	37.238	- 122	62.67	+ 53	28.818	- 126
3	21.8	51.304	- 290	56.93	+ 130	61.009	- 714	37.089	- 149	63.18	+ 51	28.692	- 156
3	31.8	50.989	- 315	57.85	+ 92	60.260	- 749	36.926	- 163	63.63	+ 45	28.536	- 170
4	10.8	50.658	- 331	58.37	+ 52	59.484	- 776	36.755	- 171	64.01	+ 38	28.366	- 178
4	20.7	50.334	- 324	58.46	+ 9	58.710	- 774	36.590	- 165	64.30	+ 29	28.188	- 172
4	30.7	50.036	- 298	58.14	- 32	57.960	- 750	36.441	- 149	64.49	+ 19	28.016	- 155
5	10.7	49.771	- 265	57.43	- 71	57.243	- 717	36.314	- 127	64.58	+ 9	27.861	- 134
5	20.7	49.557	- 214	56.34	- 109	56.585	- 658	36.217	- 97	64.59	+ 1	27.727	- 102
5	30.6	49.401	- 156	54.95	- 139	55.999	- 586	36.155	- 62	64.59	- 7	27.625	- 67
6	9.6	49.306	- 95	53.28	- 167	55.494	- 505	36.127	- 28	64.52	- 14	27.558	- 30
6	19.6	49.281	- 25	51.40	- 188	55.091	- 403	36.140	+ 13	64.38	- 20	27.528	+ 11
6	29.6	49.323	+ 42	49.37	- 203	54.791	- 300	36.191	+ 51	64.18	- 24	27.539	+ 50
7	9.5	49.431	+ 108	47.21	- 216	54.603	- 188	36.191	+ 51	63.94	- 24	27.589	+ 50
7	19.5	49.608	+ 177	45.00	- 221	54.541	- 176	36.280	+ 89	63.67	- 27	27.677	+ 88
7	29.5	49.843	+ 235	42.79	- 221	54.595	+ 54	36.394	+ 114	63.41	- 26	27.798	+ 121
8	8.4	50.138	+ 295	40.59	- 220	54.773	+ 178	36.550	+ 156	63.41	- 45	27.998	+ 158
8	18.4	50.487	+ 349	38.48	- 211	55.072	+ 299	36.737	+ 187	62.96	- 43	27.956	+ 191
8	28.4	50.881	+ 394	36.49	- 199	55.478	+ 406	36.953	+ 216	62.53	- 49	28.147	+ 194
9	7.4	51.322	+ 441	34.63	- 186	55.992	+ 514	37.193	+ 240	62.04	- 49	28.368	+ 221
9	17.3	51.800	+ 478	32.96	- 167	55.995	+ 603	37.458	+ 265	61.49	- 55	28.613	+ 245
9	27.3	52.309	+ 509	31.50	- 146	57.268	+ 673	37.458	+ 265	60.86	- 63	28.885	+ 272
10	7.3	52.848	+ 539	30.27	- 123	58.000	+ 732	37.744	+ 304	60.16	- 70	29.179	+ 294
10	17.3	53.405	+ 557	29.34	- 93	58.759	+ 759	38.048	+ 323	59.38	- 78	29.491	+ 312
10	27.2	53.973	+ 568	28.70	- 64	59.525	+ 766	38.371	+ 336	58.52	- 86	29.823	+ 332
11	6.2	54.547	+ 574	28.39	- 31	60.277	+ 701	38.707	+ 344	57.61	- 91	30.167	+ 344
11	16.2	55.109	+ 562	28.44	+ 5	60.978	+ 634	39.051	+ 351	56.67	- 94	30.520	+ 353
11	26.1	55.651	+ 542	28.85	+ 41	61.612	+ 634	39.402	+ 346	55.72	- 95	30.880	+ 360
12	6.1	56.160	+ 509	29.63	+ 78	62.156	+ 544	39.748	+ 338	54.80	- 92	31.235	+ 355
12	16.1	56.616	+ 456	30.77	+ 114	62.582	+ 426	40.086	+ 338	53.96	- 84	31.581	+ 346
12	26.1	57.012	+ 396	32.22	+ 145	62.884	+ 302	40.406	+ 320	53.22	- 74	31.909	+ 328
12	36.0	57.333	+ 321	33.98	+ 176	63.048	+ 15	40.697	+ 291	52.63	- 59	32.207	+ 298
			+ 233		+ 196		+ 15	40.954	+ 212	52.20	- 24	32.470	+ 217
								41.166	+ 161	51.96	- 5	32.687	+ 164
Mean Place	52.168	35.12		59.620	85.74			38.022	52.08			29.459	34.47
sec δ, tan δ	+1.927	+1.648		+3.339	-3.186			+1.098	+0.454			+1.133	+0.533
dα(ψ), dδ(ψ)	+0.101	-0.17		-0.015	-0.17			+0.072	-0.17			+0.074	-0.18
dα(ε), dδ(ε)	+0.047	+0.90		-0.091	+0.90			+0.013	+0.90			+0.016	+0.90
Dble.Trans.	January 16			January 16			January 16			January 16			

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1202		1200		1201		1199		
	4 Puppis		81 Geminorum		11 Canis Minoris		B.D. +37° 1769 (Lyncis)		
Mag. Spect.	5.11	F0	5.02	K2	5.30	A0	5.45	M0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° /	h m	° /	h m	° /	h m	° /	
	7 45	- 14 31	7 45	+ 18 32	7 45	+ 10 48	7 45	+ 37 33	
	<sup>d</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	
1	-8.9	18.766 +228	34.76 -244	19.476 +259	46.87 -80	30.568 +249	17.68 -122	44.152 +306	10.32 +26
1	1.0	18.955 +189	37.20 -244	19.696 +220	46.23 -64	30.778 +210	16.58 -110	44.410 +258	10.80 +48
1	11.0	19.099 +144	39.59 -239	19.871 +175	45.75 -48	30.944 +166	15.62 -96	44.616 +206	11.50 +70
1	21.0	19.191 +92	41.84 -225	19.933 +122	45.46 -29	31.059 +115	14.84 -78	44.759 +143	12.40 +90
1	31.0	19.233 +42	43.88 -204	20.061 +68	45.33 -13	31.123 +64	14.24 -60	44.839 +80	13.44 +104
2	9.9	19.225 -8	45.71 -183	20.077 +16	45.36 +3	31.136 +13	13.81 -43	44.856 +17	14.56 +112
2	19.9	19.169 -56	47.26 -155	20.041 -36	45.52 +16	31.099 -37	13.56 -25	44.812 -44	15.71 +115
3	1.9	19.073 -96	48.52 -126	19.962 -79	45.52 +25	31.021 -78	13.44 -12	44.717 -95	16.83 +112
3	11.9	18.943 -130	49.50 -98	19.847 -115	45.77 +31	30.908 -113	13.45 +1	44.578 -139	17.85 +102
3	21.8	18.789 -154	50.16 -66	19.704 -143	46.08 +34	30.769 -139	13.56 +11	44.405 -173	18.73 +88
3	31.8	18.622 -167	50.52 -36	19.548 -156	46.77 +35	30.617 -152	13.74 +18	44.215 -190	19.43 +70
4	10.8	18.449 -173	50.60 -8	19.384 -164	47.10 +33	30.459 -158	13.99 +25	44.015 -200	19.92 +49
4	20.7	18.280 -169	50.36 +24	19.226 -158	47.40 +30	30.305 -154	14.30 +31	43.822 -193	20.17 +25
4	30.7	18.126 -154	49.87 +49	19.084 -142	47.66 +26	30.167 -138	14.64 +34	43.645 -177	20.21 +4
5	10.7	17.989 -137	49.10 +77	18.961 -123	47.89 +23	30.048 -119	15.02 +38	43.492 -153	20.02 -19
5	20.7	17.879 -110	48.07 +103	18.867 -94	48.08 +19	29.956 -92	15.44 +42	43.373 -119	19.63 -39
5	30.6	17.799 -80	46.83 +124	18.806 -61	48.23 +15	29.896 -60	15.88 +44	43.293 -80	19.06 -57
6	9.6	17.750 -49	45.38 +145	18.779 -27	48.36 +13	29.868 -28	16.35 +47	43.254 -39	18.33 -73
6	19.6	17.736 -14	43.76 +162	18.790 +11	48.47 +11	29.876 +8	16.84 +49	43.260 +6	17.47 -86
6	29.6	17.756 +20	42.04 +172	18.836 +46	48.54 +7	29.918 +42	17.33 +49	43.309 +49	16.52 -95
7	9.5	17.809 +53	40.22 +182	18.919 +83	48.57 +3	29.994 +76	17.81 +48	43.400 +91	15.49 -103
7	19.5	17.897 +88	38.38 +184	19.024 +105	48.50 -7	30.102 +108	18.26 +45	43.533 +133	14.39 -110
7	29.5	18.015 +118	36.59 +179	19.175 +151	48.58 +8	30.239 +137	18.71 +45	43.703 +170	13.24 -115
8	8.4	18.164 +149	34.89 +170	19.352 +177	48.48 -10	30.407 +168	19.07 +36	43.910 +207	12.07 -117
8	18.4	18.343 +179	33.36 +153	19.557 +205	48.30 -18	30.602 +195	19.31 +24	44.153 +243	10.89 -118
8	28.4	18.546 +203	32.07 +129	19.785 +228	48.03 -27	30.820 +218	19.42 +11	44.423 +270	09.71 -118
9	7.4	18.776 +230	31.06 +101	20.038 +253	47.64 -39	31.062 +242	19.36 -6	44.722 +299	08.54 -117
9	17.3	19.028 +252	30.41 +65	20.311 +273	47.13 -51	31.324 +262	19.12 -24	45.047 +325	07.39 -115
9	27.3	19.299 +271	30.14 +27	20.602 +291	46.49 -64	31.604 +280	18.69 -43	45.392 +345	06.28 -111
10	7.3	19.589 +290	30.29 -15	20.912 +310	45.72 -77	31.902 +298	18.06 -63	45.758 +366	05.22 -106
10	17.3	19.891 +302	30.88 -59	21.234 +322	44.83 -89	32.212 +310	17.22 -84	46.138 +380	04.24 -98
10	27.2	20.202 +311	31.88 -100	21.565 +331	43.85 -98	32.531 +319	16.22 -100	46.529 +391	03.36 -88
11	6.2	20.517 +315	33.28 -140	21.902 +337	42.79 -106	32.856 +325	15.06 -116	46.926 +397	02.61 -75
11	16.2	20.827 +310	35.05 -177	22.236 +334	41.71 -108	33.177 +321	13.79 -127	47.319 +393	02.03 -58
11	26.1	21.126 +299	37.09 -204	22.561 +325	40.65 -106	33.490 +313	12.46 -133	47.701 +382	01.64 -39
12	6.1	21.406 +280	39.37 -228	22.870 +309	39.63 -102	33.787 +297	11.12 -134	48.064 +363	01.47 -17
12	16.1	21.657 +251	41.79 -242	23.151 +281	38.73 -90	34.056 +269	09.82 -130	48.394 +330	01.54 +7
12	26.1	21.874 +217	44.26 -247	23.399 +248	37.96 -77	34.294 +238	08.62 -120	48.685 +291	01.85 +31
12	36.0	22.049 +175	46.73 -247	23.605 +206	37.34 -62	34.490 +196	07.54 -108	48.926 +241	02.40 +55
		+125	-236	+155	-43	+148	-92	+183	+75
Mean Place	19.535	49.53	20.613	37.24	31.656	06.87	45.324	03.38	
sec $\delta$ , tan $\delta$	+1.033	-0.259	+1.055	+0.335	+1.018	+0.191	+1.261	+0.769	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.055	-0.18	+0.069	-0.18	+0.066	-0.18	+0.079	-0.18	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.008	+0.90	+0.010	+0.90	+0.006	+0.90	+0.023	+0.90	
Dble. Trans.	January 17		January 17		January 17		January 17		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	296		1203		1204		1206	
	$\pi$ Geminorum		187 G. Puppis		$\xi$ Puppis		61 G. Carinae	
Mag. Spect.	5.29	K2	5.26	B2	3.47	G0p	5.82	F2
U.T.	R.A.		R.A.		R.A.		R.A.	
	Dec.		Dec.		Dec.		Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	7 46	+33 26	7 47	-46 34	7 48	-24 49	7 48	-60 14
1 -8.9	37.037 <sup>s</sup> +293	66.18 +2	07.296 <sup>s</sup> +242	09.36 <sup>"</sup> -339	43.009 <sup>s</sup> +230	14.76 <sup>"</sup> -284	60.935 <sup>s</sup> +278	38.45 <sup>"</sup> -350
1 1.0	37.286 +249	66.42 +24	07.481 +185	12.87 -351	43.197 +188	17.64 -288	61.133 +198	42.12 -367
1 11.0	37.484 +198	66.87 +45	07.604 +123	16.44 -357	43.338 +141	20.51 -287	61.248 +115	45.89 -377
1 21.0	37.623 +139	67.51 +64	07.657 +53	19.95 -351	43.423 +85	23.27 -276	61.269 +21	49.63 -374
1 31.0	37.702 +79	68.30 +79	07.645 -12	23.26 -331	43.457 +34	25.82 -255	61.203 -66	53.21 -358
2 9.9	37.721 +19	69.19 +89	07.569 -76	26.36 -310	43.438 -19	28.16 -234	61.053 -150	56.58 -337
2 19.9	37.681 -40	70.14 +95	07.432 -137	29.12 -276	43.368 -70	30.18 -202	60.823 -230	59.63 -305
3 1.9	37.592 -89	71.07 +93	07.432 -186	29.12 -237	43.368 -110	30.18 -170	60.823 -294	59.63 -286
3 11.9	37.461 -131	71.96 +89	07.246 -230	31.49 -198	43.258 -146	31.88 -137	60.529 -350	62.29 -225
3 21.8	37.299 -162	72.73 +77	07.016 -261	33.47 -150	43.112 -172	33.25 -97	60.179 -392	64.54 -175
3 31.8	37.120 -179	73.36 +63	06.477 -278	35.99 -102	42.755 -185	34.84 -62	59.370 -417	67.55 -126
4 10.8	36.932 -188	73.83 +47	06.188 -289	35.99 -55	42.562 -193	35.09 -25	58.937 -433	68.30 -75
4 20.7	36.750 -182	74.11 +28	05.903 -285	36.54 -3	42.373 -189	35.09 +14	58.506 -431	68.50 -20
4 30.7	36.584 -166	74.20 +9	05.903 -271	36.57 +43	42.373 -176	34.95 +49	58.506 -415	68.50 +31
5 10.7	36.441 -143	74.11 -9	05.632 -252	36.14 +91	42.197 -158	34.46 +84	58.091 -394	68.19 +83
5 20.7	36.330 -111	73.85 -26	05.159 -221	33.86 +137	41.907 -132	32.45 +117	57.341 -356	66.02 +134
5 30.6	36.256 -74	73.44 -41	04.974 -185	32.10 +176	41.805 -102	31.00 +145	57.030 -311	64.26 +176
6 9.6	36.220 -36	72.90 -54	04.827 -147	29.95 +215	41.734 -71	29.26 +174	56.769 -261	62.06 +220
6 19.6	36.228 +8	72.24 -66	04.727 -100	27.49 +246	41.701 -33	27.31 +195	56.570 -199	59.49 +257
6 29.6	36.277 +49	71.51 -73	04.672 -55	24.80 +269	41.702 +1	25.20 +211	56.432 -138	56.67 +282
7 9.5	36.365 +88	70.72 -79	04.665 -7	21.90 +290	41.739 +37	22.96 +224	56.361 -71	53.60 +307
7 19.5	36.492 +127	69.85 -87	04.709 +44	18.93 +297	41.813 +74	20.68 +228	56.362 +1	50.42 +318
7 29.5	36.654 +162	68.93 -92	04.798 +89	15.96 +297	41.920 +107	18.43 +225	56.430 +68	47.22 +320
8 8.4	36.852 +198	67.97 -96	04.937 +139	13.06 +290	42.061 +141	16.26 +217	56.569 +139	44.07 +315
8 18.4	37.083 +231	67.00 -97	05.123 +186	10.37 +269	42.235 +174	14.30 +196	56.779 +210	41.11 +296
8 28.4	37.340 +257	66.00 -100	05.350 +227	07.96 +241	42.436 +201	12.58 +172	57.050 +271	38.43 +268
9 7.4	37.625 +285	64.98 -102	05.620 +270	05.92 +204	42.668 +232	11.17 +141	57.384 +334	36.12 +231
9 17.3	37.934 +309	63.95 -103	05.926 +306	04.37 +155	42.925 +257	10.19 +98	57.771 +387	34.30 +182
9 27.3	38.263 +329	62.93 -102	06.261 +335	03.33 +104	43.203 +278	09.63 +56	58.201 +430	33.02 +128
10 7.3	38.612 +349	61.91 -102	06.624 +363	02.87 +46	43.502 +299	09.56 +7	58.669 +468	32.34 +68
10 17.3	38.975 +363	60.93 -98	07.002 +378	03.06 -19	43.814 +312	10.02 -46	59.159 +490	32.33 +1
10 27.2	39.348 +373	60.02 -91	07.390 +388	03.85 -79	44.135 +321	10.96 -94	59.657 +498	32.97 -64
11 6.2	39.728 +380	59.19 -83	07.778 +388	05.27 -142	44.461 +326	12.39 -143	60.155 +498	34.27 -130
11 16.2	40.104 +376	58.49 -70	08.153 +375	07.27 -200	44.780 +319	14.27 -188	60.628 +473	36.20 -193
11 26.1	40.470 +366	57.94 -55	08.507 +354	09.75 -248	45.087 +307	16.51 -224	61.068 +440	38.67 -247
12 6.1	40.818 +348	57.58 -36	08.828 +321	12.69 -294	45.374 +287	19.08 -257	61.460 +392	41.64 -297
12 16.1	41.135 +317	57.44 -14	09.103 +275	15.94 -325	45.628 +254	21.85 -277	61.785 +325	44.98 -334
12 26.1	41.415 +280	57.51 +7	09.328 +225	19.40 -346	45.846 +218	24.73 -288	62.038 +253	48.57 -359
12 36.0	41.647 +232	57.80 +29	09.492 +164	23.00 -360	46.018 +172	27.66 -293	62.207 +169	52.34 -377
	41.647 +177	57.80 +50	09.492 +97	23.00 -357	46.018 +121	27.66 -285	62.207 +79	52.34 -379
Mean Place	38.214	58.69	07.021	28.68	43.573	31.36	59.523	59.24
sec $\delta$ , tan $\delta$	+1.199	+0.661	+1.455	-1.057	+1.102	-0.463	+2.015	-1.750
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.077	-0.18	+0.036	-0.18	+0.050	-0.18	+0.020	-0.18
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.020	+0.89	-0.032	+0.89	-0.014	+0.89	-0.053	+0.89
Dbble. Trans.	January 17		January 17		January 18		January 18	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1205		301		1207		299	
	ζ Canis Minoris		213 G. Puppis		φ Geminorum		26 Lyncis	
Mag.Spect.	5.11	B8	3.76	G5	4.99	A2	5.69	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	7 50	+ 1 48	7 51	-40 32	7 52	+26 48	7 53	+47 35
1 -8.9	58 959 +244	19.56 -171	45 099 +240	07.22 -327	39 131 +282	13.81 -39	42 781 +355	67.51 +72
1 1.0	59.165 +206	17.93 -163	45 288 +189	10.60 -338	39 372 +241	13.62 -19	43 083 +302	68.51 +100
1 11.0	59.328 +163	16.42 -151	45 422 +134	14.03 -343	39 566 +194	13.63 +1	43 324 +241	69.76 +125
1 21.0	59.440 +112	15.07 -135	45 491 +69	17.38 -335	39 703 +137	13.84 +21	43 493 +169	71.23 +147
1 31.0	59.503 +63	13.91 -116	45 501 +10	20.55 -317	39 785 +82	14.21 +37	43 590 +97	72.82 +159
2 9.9	59.516 +13	12.95 -96	45 450 -51	23.50 -295	39 811 +26	14.72 +51	43 613 +23	74.49 +167
2 19.9	59.480 -36	12.20 -75	45 343 -107	26.12 -262	39 780 -31	15.32 +60	43 564 -49	76.15 +166
3 1.9	59.404 -76	11.65 -55	45 189 -154	28.38 -226	39 704 -76	15.97 +65	43 455 -109	77.71 +156
3 11.9	59.293 -131	11.29 -36	44 995 -194	30.25 -187	39 587 -117	16.63 +66	43 292 -163	79.12 +141
3 21.8	59.157 -116	11.12 -17	44 771 -224	31.66 -141	39 440 -147	17.24 +61	43 089 -203	80.31 +119
3 31.8	59.006 -151	11.10 -2	44 531 -240	32.62 -96	39 276 -164	17.78 +54	42 862 -227	81.22 +91
4 10.8	58.849 -157	11.24 +14	44 280 -251	33.14 -52	39 104 -172	18.23 +45	42 622 -240	81.83 +61
4 20.7	58.696 -153	11.52 +28	44 033 -247	33.16 -2	38 935 -169	18.55 +32	42 386 -236	82.11 +28
4 30.7	58.556 -140	11.93 +41	43 798 -235	32.74 +42	38 782 -153	18.76 +21	42 167 -219	82.08 -3
5 10.7	58.434 -122	12.46 +53	43 581 -217	31.88 +86	38 648 -134	18.84 +8	41 973 -194	81.73 -35
5 20.7	58.339 -95	13.11 +65	43 393 -188	30.58 +130	38 544 -104	18.81 -3	41 816 -157	81.07 -66
5 30.6	58.272 -67	13.84 +73	43 237 -156	28.92 +166	38 473 -71	18.67 -14	41 703 -113	80.17 -90
6 9.6	58.236 -36	14.68 +84	43 116 -121	26.89 +203	38 438 -35	18.44 -23	41 636 -67	79.03 -114
6 19.6	58.235 -1	15.59 +91	43 037 -79	24.56 +233	38 442 +4	18.13 -31	41 621 -15	77.69 -134
6 29.6	58.266 +31	16.53 +94	42 999 -38	22.02 +254	38 484 +42	17.75 -38	41 656 +35	76.22 -147
7 9.5	58.329 +63	17.51 +98	43 003 +4	19.29 +273	38 564 +80	17.33 -42	41 741 +85	74.62 -160
7 19.5	58.426 +97	18.47 +96	43 053 +50	16.48 +281	38 676 +112	16.89 -44	41 876 +135	72.95 -167
7 29.5	58.550 +124	19.39 +92	43 144 +91	13.68 +280	38 822 +146	16.29 -60	42 056 +180	71.23 -172
8 8.4	58.704 +154	20.23 +84	43 277 +133	10.94 +274	39 002 +180	15.68 -61	42 280 +224	69.49 -174
8 18.4	58.887 +183	20.94 +71	43 453 +176	08.41 +253	39 213 +211	15.01 -67	42 547 +267	67.77 -172
8 28.4	59.092 +205	21.47 +53	43 665 +212	06.15 +226	39 449 +236	14.30 -71	42 847 +300	66.09 -168
9 7.4	59.322 +230	21.80 +33	43 915 +250	04.24 +191	39 712 +263	13.51 -79	43 184 +337	64.47 -162
9 17.3	59.573 +251	21.86 +6	44 197 +282	02.80 +144	39 997 +285	12.66 -85	43 552 +368	62.94 -153
9 27.3	59.842 +269	21.68 -18	44 507 +310	01.86 +94	40 302 +305	11.75 -91	43 945 +393	61.53 -141
10 7.3	60.130 +288	21.20 -48	44 842 +335	01.47 +39	40 628 +326	10.78 -97	44 364 +419	60.25 -128
10 17.3	60.431 +301	20.43 -77	45 193 +351	01.70 -23	40 968 +340	09.78 -100	44 800 +436	59.15 -110
10 27.2	60.742 +311	19.40 -103	45 554 +361	02.51 -81	41 318 +350	08.78 -100	45 249 +449	58.25 -90
11 6.2	61.059 +317	18.12 -128	45 918 +364	03.92 -141	41 676 +358	07.79 -99	45 707 +458	57.57 -68
11 16.2	61.373 +314	16.64 -148	46 272 +354	05.88 -196	42 032 +356	06.86 -93	46 160 +453	57.17 -40
11 26.1	61.679 +306	15.02 -162	46 609 +337	08.30 -242	42 380 +348	06.03 -83	46 602 +442	57.04 -13
12 6.1	61.970 +291	13.29 -173	46 919 +310	11.15 -285	42 712 +332	05.32 -71	47 023 +421	57.23 +19
12 16.1	62.234 +264	11.55 -174	47 189 +270	14.29 -314	43 016 +304	04.79 -53	47 406 +383	57.73 +50
12 26.1	62.467 +233	09.85 -170	47 414 +225	17.63 -334	43 286 +270	04.44 -35	47 745 +339	58.52 +79
12 36.0	62.659 +192	08.22 -163	47 584 +170	21.09 -346	43 511 +225	04.30 -14	48 026 +281	59.59 +107
	62.659 +145	08.22 -148	47 584 +110	21.09 -342	43 511 +174	04.30 +6	48 026 +214	59.59 +132
Mean Place	59.977	07.12	45.160	26.26	40.309	05.36	43.891	61.87
sec δ, tan δ	+1.000	+0.031	+1.316	-0.855	+1.120	+0.505	+1.483	+1.095
da(w), dδ(w)	+0.062	-0.19	+0.041	-0.19	+0.073	-0.19	+0.087	-0.19
da(e), dδ(e)	+0.001	+0.88	-0.027	+0.88	+0.016	+0.88	+0.035	+0.88
Dbble.Trans.	January 18		January 18		January 19		January 19	

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	1208		303		1210		1209	
	1 Cancri		χ Carinae		225 G. Puppis		Groombridge 1384 (Lyncis)	
Mag. Spect.	5.96	K0	3.60	B3	4.85	A2	6.47	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	7 56	+ 15 49	7 56	- 52 56	7 57	- 30 17	7 57	+ 44 00
1 -8.9	12.361 +264	47.51 -101	26.736 +267	23.49 -344	07.338 +239	33.78 -301	18.686 +342	57.70 +50
1 1.1	12.588 +227	46.66 -85	26.939 +203	27.10 -361	07.534 +196	36.86 -308	18.978 +292	58.47 +77
1 11.0	12.771 +183	45.97 -69	27.072 +133	30.79 -369	07.680 +146	39.96 -310	19.213 +235	59.50 +103
1 21.0	12.901 +130	45.47 -50	27.127 +55	34.46 -367	07.769 +89	42.97 -301	19.380 +167	60.75 +125
1 31.0	12.979 +78	45.15 -32	27.109 -18	37.96 -350	07.804 +35	45.79 -282	19.479 +99	62.14 +139
2 9.9	13.005 +26	45.00 -15	27.019 -90	41.27 -331	07.784 -20	48.40 -261	19.509 +30	63.62 +148
2 19.9	12.978 -67	45.01 +1	26.860 -159	44.26 -299	07.711 -73	50.70 -230	19.470 -39	65.12 +150
3 1.9	12.910 +183	45.14 +13	26.645 -215	46.87 -261	07.596 -115	52.66 -196	19.375 -147	66.56 +144
3 11.9	12.803 -107	45.35 +21	26.381 -264	49.08 -221	07.443 -153	54.26 -160	19.228 -95	67.87 +131
3 21.8	12.668 -135	45.64 +29	26.079 -302	50.81 -173	07.261 -182	55.46 -120	19.043 -185	69.00 +113
3 31.8	12.518 -150	45.95 +31	25.756 -323	52.06 -125	07.064 -197	56.26 -80	18.835 -208	69.88 +88
4 10.8	12.359 -159	46.28 +33	25.419 -337	52.82 -76	06.858 -206	56.67 -41	18.614 -221	70.51 +63
4 20.8	12.204 -155	46.61 +33	25.082 -337	53.05 +23	06.654 -204	56.64 +3	18.396 -218	70.84 +33
4 30.7	12.062 -142	46.92 +31	24.758 -324	52.78 -27	06.462 -192	56.24 +40	18.194 -202	70.88 +4
5 10.7	11.938 -124	47.23 +31	24.452 -306	52.01 +77	06.287 -175	55.44 +80	18.014 -180	70.63 -25
5 20.7	11.841 -97	47.51 +28	24.177 -275	50.75 +126	06.136 -151	54.27 +117	17.869 -145	70.11 -52
5 30.6	11.774 -67	47.77 +26	23.939 -238	49.07 +168	06.016 -120	52.79 +148	17.765 -104	69.36 -75
6 9.6	11.739 +2	48.03 +26	23.742 -197	46.97 +210	05.926 -90	50.99 +180	17.703 -62	68.39 -97
6 19.6	11.741 +35	48.26 +23	23.596 -146	44.52 +245	05.874 -52	48.93 +206	17.690 -13	67.23 -116
6 29.6	11.776 +35	48.46 +20	23.500 -96	41.80 +272	05.858 -16	46.69 +224	17.724 +34	65.95 -128
7 9.5	11.845 +69	48.64 +18	23.457 -43	38.86 +294	05.878 +20	44.29 +240	17.803 +79	64.54 -141
7 19.5	11.947 +102	48.71 +7	23.472 +15	35.80 +306	05.937 +59	41.83 +246	17.929 +126	63.05 -149
7 29.5	12.076 +129	48.87 +16	23.541 +69	32.72 +308	06.031 +94	39.38 +245	18.097 +168	61.52 -153
8 8.5	12.240 +164	48.91 +4	23.666 +125	29.68 +304	06.162 +131	37.00 +238	18.306 +209	59.94 -158
8 18.4	12.431 +191	48.83 -8	23.848 +182	26.83 +285	06.328 +166	34.82 +218	18.554 +248	58.36 -158
8 28.4	12.646 +215	48.64 -19	24.080 +232	24.24 +259	06.525 +197	32.88 +194	18.835 +281	56.81 -155
9 7.4	12.886 +240	48.32 -32	24.362 +282	22.01 +223	06.754 +229	31.27 +161	19.150 +315	55.29 -152
9 17.3	13.148 +262	47.84 -48	24.689 +327	20.26 +175	07.012 +258	30.09 +118	19.494 +344	53.83 -146
9 27.3	13.429 +281	47.22 -62	25.052 +363	19.02 +124	07.294 +282	29.36 +73	19.862 +368	52.45 -138
10 7.3	13.730 +301	46.44 -78	25.449 +397	18.38 +64	07.600 +306	29.14 +22	20.256 +394	51.17 -128
10 17.3	14.045 +315	45.50 -94	25.867 +418	18.39 -1	07.920 +320	29.47 -33	20.667 +411	50.04 -113
10 27.2	14.371 +326	44.45 -105	26.295 +428	19.02 -63	08.252 +332	30.33 -86	21.091 +424	49.07 -97
11 6.2	14.705 +334	43.29 -116	26.726 +431	20.31 -129	08.589 +337	31.73 -140	21.525 +434	48.29 -78
11 16.2	15.037 +332	42.08 -121	27.142 +416	22.22 -191	08.920 +331	33.61 -188	21.955 +430	47.75 -54
11 26.2	15.362 +325	40.86 -122	27.535 +393	24.64 -242	09.238 +318	35.90 -229	22.376 +421	47.46 -29
12 6.1	15.673 +311	39.66 -120	27.892 +357	27.56 -292	09.536 +298	38.57 -267	22.778 +402	47.46 +0
12 16.1	15.958 +285	38.56 -110	28.196 +304	30.84 -328	09.801 +265	41.48 -291	23.145 +367	47.75 +29
12 26.1	16.211 +253	37.58 -98	28.443 +247	34.36 -352	10.027 +226	44.54 -306	23.471 +326	48.32 +57
12 36.0	16.424 +213	36.75 -83	28.622 +179	38.06 -370	10.206 +179	47.69 -315	23.745 +274	49.17 +85
	+163	-64	+104	-371	+126	-309	+209	+109
Mean Place	13.505	37.26	26.117	44.46	07.798	51.84	19.832	51.69
sec δ, tan δ	+1.039	+0.283	+1.660	-1.324	+1.158	-0.584	+1.391	+0.966
dα(ψ), dδ(ψ)	+0.068	-0.19	+0.030	-0.19	+0.048	-0.19	+0.084	-0.19
dα(ε), dδ(ε)	+0.009	+0.87	-0.043	+0.87	-0.019	+0.87	+0.032	+0.87
Dble. Trans.	January 19		January 20		January 20		January 20	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	300		304		1212		1211	
	Groombridge 1374 (Camelopardi)		27 Monocerotis		232 G. Puppis		ω Cancri	
Mag. Spect.	5.56	K0	5.06	K0	4.64	A2	5.88	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	7 58	+ 73 57	7 59	- 3 38	7 59	- 18 21	8 00	+ 25 25
	<sup>s</sup> + 740	" + 186	<sup>s</sup> + 246	" - 199	<sup>s</sup> + 240	" - 261	<sup>s</sup> + 285	" - 51
1	-8.9	35.870	23.21	+221	02.700	+208	18.35	-194
1	1.1	36.485	25.42	+251	02.908	+166	20.29	-185
1	11.0	36.960	27.93	+272	03.074	+116	22.14	-169
1	21.0	37.266	30.65	+280	03.190	+65	23.83	-150
1	31.0	37.409	33.45	+281	03.255	+16	25.33	-130
2	9.9	37.384	36.26	+267	03.271	-33	26.63	-106
2	19.9	37.192	38.93	+243	03.238	-73	27.69	-82
3	1.9	36.860	41.36	+212	03.165	-109	28.51	-61
3	11.9	36.402	43.48	+169	03.056	-135	29.12	-36
3	21.8	35.842	45.17	+122	02.921	-150	29.48	-16
3	31.8	35.222	46.39	+71	02.771	-158	29.64	+4
4	10.8	34.560	47.10	+16	02.613	-155	29.60	+24
4	20.8	33.895	47.26	-35	02.458	-143	29.36	+41
4	30.7	33.261	46.91	-86	02.315	-127	28.95	+59
5	10.7	32.673	46.05	-135	02.188	-103	28.36	+75
5	20.7	32.166	44.70	-174	02.085	-74	27.61	+88
5	30.6	31.755	42.96	-212	02.011	-45	26.73	+102
6	9.6	31.448	40.84	-242	01.966	-11	25.71	+112
6	19.6	31.266	38.42	-262	01.955	+20	24.59	+119
6	29.6	31.206	35.80	-280	01.975	+52	23.40	+123
7	9.5	31.270	33.00	-289	02.027	+85	22.17	+124
7	19.5	31.466	30.11	-290	02.112	+113	20.93	+119
7	29.5	31.778	27.21	-288	02.225	+143	19.74	+112
8	8.5	32.208	24.33	-277	02.368	+171	18.62	+96
8	18.4	32.750	21.56	-244	02.539	+196	17.66	+117
8	28.4	33.386	18.94	-216	02.735	+221	16.88	+55
9	7.4	34.118	16.50	-187	02.956	+243	16.33	+26
9	17.3	34.930	14.34	-154	03.199	+264	16.07	-4
9	27.3	35.807	12.47	-115	03.463	+283	16.11	-37
10	7.3	36.746	10.93	-74	03.746	+308	16.48	-72
10	17.3	37.723	09.78	-30	04.043	+316	17.20	-134
10	27.2	38.724	09.04	+18	04.351	+314	18.22	-159
11	6.2	39.738	08.74	+64	04.667	+306	19.56	-179
11	16.2	40.732	08.92	+112	04.981	+292	21.15	-194
11	26.2	41.691	09.56	+156	05.287	+266	22.94	-200
12	6.1	42.591	10.68	+195	05.579	+235	24.88	-195
12	16.1	43.397	12.24	+232	05.845	+195	26.88	-182
12	26.1	44.097	14.19	+257	06.080	+148	28.88	-137
12	36.0	44.663	16.51	+257	06.275	+148	30.83	-137
Mean Place	35.866	19.87	03.678	32.06	15.717	42.29	06.927	49.65
sec δ, tan δ	+3.618	+3.477	+1.002	-0.064	+1.054	-0.332	+1.107	+0.475
dα(ψ), dδ(ψ)	+0.141	-0.20	+0.060	-0.20	+0.054	-0.20	+0.072	-0.20
dα(ε), dδ(ε)	+0.115	+0.87	-0.002	+0.87	-0.011	+0.87	+0.016	+0.87
Dble. Trans.	January 20		January 20		January 20		January 20	



APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	302		1213		305		306	
	53 Camelopardi		161 G. Monocerotis		χ Geminorum		ζ Puppis	
Mag.Spect.	6.00	A2p	6.30	G0	5.04	K0	2.27	Od
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	8 00	+ 60 21	8 01	- 6 17	8 02	+ 27 49	8 03	- 39 57
1 -8.9	32.676 <sup>s</sup> + 462	48 58 +128	45.211 <sup>s</sup> + 246	42.14 -212	40.229 <sup>s</sup> + 293	66.87 -40	06.410 <sup>s</sup> + 253	33.02 -323
1 1.1	33.067 + 391	50.17 +159	45.421 + 210	44.22 -208	40.481 + 252	66.68 -19	06.613 + 203	36.38 -336
1 11.0	33.379 + 312	52.07 +190	45.588 + 167	46.23 -201	40.687 + 206	66.71 + 3	06.762 + 149	39.81 -343
1 21.0	33.594 + 215	54.18 +211	45.704 + 116	46.23 -185	40.837 + 150	66.95 + 24	06.848 + 86	43.17 -336
1 31.0	33.714 + 120	56.42 +224	45.771 + 67	49.74 -166	40.930 + 93	67.36 + 41	06.874 + 26	46.38 -321
2 9.9	33.737 + 23	58.71 +229	45.787 + 16	51.20 -146	40.966 + 36	67.93 + 57	06.840 -34	49.38 -300
2 19.9	33.663 -74	60.93 +222	45.755 -32	52.41 -121	40.945 -21	68.60 + 67	06.748 -92	52.06 -268
3 1.9	33.507 -156	63.00 +207	45.682 -73	53.37 -96	40.877 -68	69.32 + 72	06.609 -139	54.40 -234
3 11.9	33.278 -229	64.83 +183	45.573 -109	54.09 -72	40.766 -111	70.04 + 72	06.428 -181	56.36 -196
3 21.8	32.991 -287	66.34 +151	45.438 -135	54.56 -47	40.624 -142	70.73 + 69	06.216 -212	57.87 -151
3 31.8	32.670 -321	67.48 +114	45.287 -151	54.80 -24	40.463 -161	71.34 + 61	05.985 -231	58.95 -108
4 10.8	32.327 -343	68.22 + 74	45.128 -159	54.81 -1	40.291 -172	71.85 + 51	05.742 -243	59.58 -63
4 20.8	31.984 -343	68.50 + 28	44.971 -157	54.60 + 21	40.121 -170	72.23 + 38	05.500 -242	59.73 -15
4 30.7	31.661 -323	68.36 -14	44.826 -145	54.19 + 41	39.965 -156	72.47 + 24	05.268 -232	59.44 + 29
5 10.7	31.366 -295	67.80 -56	44.696 -130	53.59 + 60	39.827 -138	72.58 + 11	05.052 -216	58.71 + 73
5 20.7	31.118 -248	66.84 -96	44.591 -105	52.79 + 80	39.716 -111	72.56 -2	04.862 -190	57.53 +118
5 30.6	30.926 -192	65.53 -131	44.512 -79	51.85 + 94	39.639 -77	72.41 -15	04.703 -159	55.99 +154
6 9.6	30.794 -132	63.92 -161	44.463 -49	50.75 +110	39.595 -44	72.15 -26	04.576 -127	54.08 +191
6 19.6	30.732 -62	62.03 -189	44.447 -16	49.53 +130	39.590 -5	71.80 -35	04.489 -87	51.85 +223
6 29.6	30.737 + 5	59.96 -207	44.463 + 16	48.23 +130	39.623 + 33	71.36 -44	04.441 -48	49.40 +245
7 9.5	30.810 + 73	57.73 -223	44.510 + 47	46.87 +136	39.692 + 69	70.86 -50	04.434 -7	46.74 +266
7 19.5	30.955 + 145	55.40 -233	44.590 + 80	45.51 +136	39.797 + 105	70.33 -53	04.471 + 37	44.00 +274
7 29.5	31.162 + 207	53.04 -236	44.698 + 108	44.18 +133	39.932 + 135	69.66 -67	04.549 + 78	41.24 +276
8 8.5	31.431 + 269	50.67 -237	44.837 + 139	42.92 +126	40.104 + 172	68.93 -73	04.669 + 120	38.53 +271
8 18.4	31.761 + 330	48.34 -233	45.004 + 167	41.83 +109	40.307 + 203	68.16 -77	04.831 + 162	36.00 +253
8 28.4	32.141 + 380	46.12 -222	45.196 + 192	40.92 + 91	40.536 + 229	67.33 -83	05.030 + 199	33.73 +227
9 7.4	32.572 + 431	44.00 -212	45.414 + 218	40.26 + 66	40.792 + 256	66.43 -90	05.268 + 238	31.78 +195
9 17.3	33.047 + 475	42.07 -193	45.655 + 241	39.90 + 36	41.073 + 281	65.47 -96	05.540 + 272	30.29 +149
9 27.3	33.558 + 511	40.34 -173	45.916 + 261	39.86 + 4	41.375 + 302	64.45 -102	05.840 + 300	29.28 +101
10 7.3	34.106 + 548	38.84 -150	46.198 + 282	40.17 -31	41.699 + 324	63.39 -106	06.169 + 329	28.81 + 47
10 17.3	34.678 + 572	37.64 -120	46.495 + 297	40.84 -67	42.039 + 340	62.30 -109	06.515 + 346	28.96 -15
10 27.2	35.266 + 588	36.73 -91	46.803 + 308	41.86 -102	42.391 + 352	61.21 -109	06.874 + 359	29.67 -71
11 6.2	35.867 + 601	36.18 -55	47.119 + 316	43.20 -134	42.753 + 362	60.14 -107	07.239 + 365	30.99 -132
11 16.2	36.460 + 593	36.00 -18	47.433 + 314	44.84 -164	43.114 + 361	59.15 -99	07.597 + 358	32.86 -187
11 26.2	37.038 + 578	36.21 + 21	47.740 + 307	46.69 -185	43.469 + 355	58.27 -88	07.940 + 343	35.21 -235
12 6.1	37.587 + 549	36.82 + 61	48.033 + 293	48.72 -203	43.810 + 341	57.53 -74	08.259 + 319	37.99 -278
12 16.1	38.085 + 498	37.82 +100	48.300 + 267	50.84 -212	44.123 + 313	56.98 -55	08.540 + 281	41.09 -310
12 26.1	38.525 + 440	39.18 +136	48.535 + 235	52.97 -213	44.404 + 281	56.62 -36	08.778 + 238	44.39 -330
12 36.0	38.889 + 364	40.88 +170	48.731 + 196	55.07 -210	44.641 + 237	56.49 -13	08.964 + 186	47.84 -345
	38.889 + 275	40.88 +196	48.731 + 149	55.07 -197	44.641 + 186	56.49 + 8	08.964 + 125	47.84 -343
Mean Place	33.540	44.39	46.168	56.48	41.422	58.53	06.575	53.04
sec δ, tan δ	+2.022	+1.758	+1.006	-0.110	+1.131	+0.528	+1.305	-0.838
da(ψ), dδ(ψ)	+0.101	-0.20	+0.059	-0.20	+0.073	-0.20	+0.042	-0.20
da(ε), dδ(ε)	+0.059	+0.86	-0.004	+0.86	+0.018	+0.86	-0.029	+0.86
Dble.Trans.	January 21		January 21		January 21		January 21	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	308		307		309		1214		
	♁ Puppis		♄ Lyncis		γ Velorum*		Piazzī 7 <sup>h</sup> 308 (Lyncis)		
Mag.Spect.	2.88	F5	4.87	A2	1.92	Oap	6.64	F8	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° '	h m	° '	h m	° '	h m	° '	
	8 06	-24 15	8 07	+51 32	8 09	-47 17	8 09	+35 29	
1	-8.9	57.470 +247	35.50 -281	25.687 +394	52.25 +79	07.139 +271	25.81 -334	17.671 +320	53.22 -5
1	1.1	57.676 +206	38.38 -288	26.025 +338	53.35 +110	07.355 +216	29.31 -350	17.949 +278	53.42 +20
1	11.0	57.836 +160	41.25 -287	26.300 +275	54.74 +139	07.510 +155	32.91 -360	18.177 +228	53.87 +45
1	21.0	57.942 +106	44.04 -279	26.497 +197	56.38 +164	07.595 +85	36.49 -358	18.344 +167	54.56 +69
1	31.0	57.995 +53	46.64 -260	26.618 +121	58.16 +178	07.614 +19	39.93 -344	18.451 +107	55.42 +86
2	10.0	57.996 +1	49.03 -239	26.659 +41	60.04 +188	07.566 -48	43.19 -326	18.497 +46	56.43 +101
2	19.9	57.945 -51	51.13 -210	26.622 -37	61.92 +188	07.455 -111	46.14 -295	18.480 -17	57.51 +108
3	1.9	57.851 -94	52.91 -178	26.517 -105	63.71 +179	07.291 -164	48.73 -259	18.411 -69	58.61 +110
3	11.9	57.721 -130	54.38 -147	26.352 -165	65.34 +163	07.081 -210	50.95 -115	18.296 -115	59.66 +105
3	21.8	57.561 -160	55.46 -108	26.139 -213	66.72 +138	06.834 -247	52.71 -176	18.144 -152	60.62 +96
3	31.8	57.386 -175	56.19 -73	25.899 -240	67.81 +109	06.566 -268	54.01 -130	17.971 -173	61.42 +80
4	10.8	57.200 -186	56.57 -38	25.639 -260	68.58 +77	06.283 -283	54.84 -83	17.784 -187	62.06 +64
4	20.8	57.015 -185	56.56 +1	25.379 -260	68.98 +40	05.998 -285	55.16 -32	17.598 -186	62.48 +42
4	30.7	56.840 -175	56.21 +35	25.134 -245	69.03 +5	05.722 -276	55.00 +16	17.424 -174	62.69 +21
5	10.7	56.680 -160	55.51 +70	24.910 -224	68.72 -31	05.461 -261	54.37 +63	17.269 -155	62.69 +0
5	20.7	56.543 -137	54.48 +103	24.725 -185	68.05 -67	05.227 -234	53.25 +112	17.142 -127	62.48 -21
5	30.6	56.433 -110	53.16 +132	24.583 -142	67.10 -95	05.024 -203	51.73 +152	17.050 -92	62.08 -40
6	9.6	56.353 -80	51.57 +159	24.487 -96	65.87 -123	04.856 -168	49.80 +193	16.993 -57	61.52 -56
6	19.6	56.307 -46	49.74 +183	24.447 -40	64.40 -147	04.732 -124	47.52 +228	16.979 -14	60.79 -73
6	29.6	56.294 -13	47.75 +199	24.459 +12	62.75 -165	04.650 -82	44.98 +254	17.003 +24	59.95 -84
7	9.5	56.315 +21	45.61 +214	24.524 +65	60.95 -180	04.614 -36	42.20 +278	17.068 +65	59.01 -94
7	19.5	56.372 +57	43.42 +219	24.644 +120	59.04 -191	04.628 +14	39.30 +290	17.172 +104	57.97 -104
7	29.5	56.462 +90	41.24 +218	24.812 +168	57.08 -196	04.688 +60	36.36 +294	17.312 +140	56.86 -111
8	8.5	56.585 +123	39.13 +211	25.030 +218	55.07 -201	04.798 +110	33.45 +291	17.488 +176	55.67 -119
8	18.4	56.741 +156	37.19 +194	25.294 +264	53.07 -200	04.957 +159	30.71 +274	17.699 +211	54.45 -122
8	28.4	56.927 +186	35.47 +172	25.597 +303	51.12 -195	05.159 +202	28.21 +250	17.939 +240	53.19 -126
9	7.4	57.143 +216	34.06 +141	25.941 +344	49.22 -190	05.408 +249	26.04 +217	18.211 +272	51.91 -128
9	17.3	57.387 +244	33.04 +102	26.321 +380	47.44 -178	05.697 +269	24.32 +172	18.211 +298	50.61 -130
9	27.3	57.655 +268	32.43 +61	26.731 +410	45.79 -165	06.020 +323	23.10 +122	18.509 +322	49.32 -129
10	7.3	57.946 +291	32.30 +13	27.172 +441	44.29 -150	06.376 +356	22.44 +66	19.177 +346	48.04 -128
10	17.3	58.254 +308	32.68 -38	27.635 +463	43.00 -129	06.754 +378	22.41 +3	19.541 +364	46.82 -122
10	27.2	58.574 +320	33.54 -86	28.114 +479	41.94 -106	07.146 +392	22.99 -58	19.920 +379	45.68 -114
11	6.2	58.902 +328	34.90 -136	28.605 +491	41.15 -79	07.545 +399	24.20 -121	20.310 +390	44.64 -104
11	16.2	59.227 +325	36.71 -181	29.094 +489	40.67 -48	07.935 +390	26.01 -181	20.700 +390	43.76 -88
11	26.2	59.543 +316	38.88 -217	29.574 +480	40.50 -17	08.309 +374	28.34 -233	21.084 +384	43.05 -71
12	6.1	59.842 +299	41.40 -252	30.033 +459	40.69 +19	08.656 +347	31.15 -281	21.454 +370	42.57 -48
12	16.1	60.112 +270	44.13 -273	30.455 +422	41.23 +54	08.959 +303	34.32 -317	21.796 +342	42.33 -24
12	26.1	60.346 +234	46.99 -286	30.832 +377	42.10 +87	09.213 +254	37.74 -342	22.103 +307	42.34 +1
12	36.0	60.538 +192	49.92 -293	31.149 +317	43.30 +120	09.409 +196	41.34 -360	22.365 +262	42.61 +27
		+140	-287	+246	+146	+129	-363	+205	+52
Mean Place	58.133	53.30	26.747	47.34	07.008	47.38	18.876	46.00	
sec δ, tan δ	+1.097	-0.451	+1.608	+1.259	+1.474	-1.084	+1.228	+0.713	
dα(w), dδ(ψ)	+0.051	-0.21	+0.090	-0.21	+0.037	-0.21	+0.077	-0.21	
dα(ε), dδ(ε)	-0.016	+0.85	+0.044	+0.85	-0.039	+0.85	+0.025	+0.84	
Dbie.Trans.	January 22		January 22		January 23		January 23		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	1215		311		312		1216	
	3 H. Ursae Majoris		20 Puppis		β Cancri		B.D. +4° 1945 (Hydrae)	
Mag. Spect.	5.48	G5	5.05	G5	3.76	K2	6.68	G0, A2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	8 11	+ 68 30	8 12	- 15 44	8 15	+ 9 13	8 16	+ 4 15
1 -8.9	28.409 + 609	57.34 +150	41.849 + 252	32.63 -252	45.891 + 271	51.92 -144	34.738 + 266	54.20 -168
1 1.1	28.926 + 517	59.21 +187	42.063 + 214	35.17 -254	46.126 + 235	50.61 -131	34.969 + 231	52.62 -158
1 11.0	29.339 + 413	61.41 +220	42.233 + 170	37.68 -251	46.319 + 193	49.44 -117	35.158 + 189	51.16 -146
1 21.0	29.627 + 288	63.86 +245	42.353 + 120	40.07 -239	46.462 + 143	48.46 -98	35.298 + 140	49.88 -128
1 31.0	29.789 + 162	66.44 +258	42.422 + 69	42.28 -221	46.555 + 93	47.68 -78	35.388 + 90	48.79 -109
2 10.0	29.822 + 33	69.07 +263	42.439 + 17	44.28 -200	46.596 + 41	47.10 -58	35.427 + 39	47.91 -88
2 19.9	29.725 - 97	71.64 +257	42.407 - 32	46.01 -173	46.586 - 10	46.71 -39	35.416 - 11	47.24 -67
3 1.9	29.518 - 207	74.01 +237	42.407 - 74	46.01 -144	46.586 - 53	46.71 -21	35.416 - 54	47.24 -47
3 11.9	29.210 - 308	74.01 +212	42.333 - 112	47.45 -117	46.533 - 91	46.50 -6	35.362 - 92	46.77 -29
3 21.8	28.821 - 389	76.13 +176	42.221 - 139	48.62 -83	46.442 - 122	46.44 +7	35.270 - 121	46.48 -11
3 31.8	28.381 - 440	79.21 +132	41.925 - 157	49.99 -54	46.181 - 139	46.68 +17	35.011 - 138	46.39 +2
4 10.8	27.904 - 477	80.09 +88	41.758 - 167	50.24 -25	46.031 - 150	46.94 +26	34.861 - 150	46.55 +16
4 20.8	27.420 - 484	80.45 +36	41.592 - 166	50.16 +8	45.881 - 150	47.27 +33	34.712 - 149	46.84 +29
4 30.7	26.955 - 465	80.33 -12	41.435 - 157	49.82 +34	45.741 - 140	47.64 +37	34.572 - 140	47.21 +37
5 10.7	26.521 - 434	79.73 -60	41.291 - 144	49.19 +63	45.615 - 126	48.06 +42	34.446 - 126	47.68 +47
5 20.7	26.144 - 377	78.65 -108	41.170 - 121	48.30 +89	45.512 - 103	48.52 +46	34.342 - 104	48.24 +56
5 30.7	25.836 - 308	77.18 -147	41.075 - 95	47.18 +112	45.436 - 76	49.00 +48	34.264 - 78	48.86 +62
6 9.6	25.603 - 233	75.34 -184	41.007 - 68	45.84 +134	45.388 - 48	49.51 +51	34.214 - 50	49.55 +69
6 19.6	25.462 - 141	73.19 -215	40.972 - 35	44.32 +152	45.373 - 15	50.03 +52	34.196 - 18	50.29 +74
6 29.6	25.411 - 51	70.81 -238	40.968 - 4	42.67 +165	45.389 + 16	50.54 +51	34.208 + 12	51.05 +76
7 9.5	25.450 + 39	68.23 -258	40.995 + 27	40.90 +177	45.436 + 47	51.05 +51	34.251 + 43	51.82 +77
7 19.5	25.587 + 137	65.54 -269	41.057 + 62	39.11 +179	45.516 + 80	51.50 +45	34.327 + 76	52.56 +74
7 29.5	25.809 + 222	62.79 -275	41.148 + 91	37.34 +177	45.622 + 106	51.91 +41	34.429 + 102	53.26 +70
8 8.5	26.119 + 310	60.03 -276	41.270 + 122	35.63 +171	45.759 + 137	52.27 +36	34.561 + 132	53.90 +64
8 18.4	26.514 + 395	57.33 -270	41.423 + 153	34.08 +155	45.925 + 166	52.50 +23	34.722 + 161	54.40 +50
8 28.4	26.980 + 466	54.74 -259	41.604 + 181	32.74 +134	46.116 + 191	52.57 +7	34.908 + 186	54.74 +34
9 7.4	27.519 + 539	52.29 -245	41.812 + 208	31.66 +108	46.333 + 217	52.48 -9	35.120 + 212	54.88 +14
9 17.4	28.122 + 603	50.06 -223	42.047 + 235	30.94 +72	46.574 + 241	52.18 -30	35.356 + 236	54.79 -9
9 27.3	28.777 + 655	48.07 -199	42.305 + 258	30.59 +35	46.836 + 262	51.68 -50	35.613 + 257	54.46 -33
10 7.3	29.483 + 706	46.36 -171	42.585 + 280	30.65 -6	47.120 + 284	50.95 -73	35.892 + 279	53.87 -59
10 17.3	30.225 + 742	45.00 -136	42.883 + 298	31.16 -51	47.420 + 300	50.01 -94	36.189 + 297	53.01 -86
10 27.2	30.991 + 766	44.00 -100	43.193 + 310	32.09 -93	47.735 + 315	48.88 -113	36.498 + 309	51.91 -110
11 6.2	31.774 + 783	43.41 -59	43.513 + 320	33.44 -135	48.060 + 325	47.57 -131	36.819 + 321	50.58 -133
11 16.2	32.550 + 776	43.27 -14	43.832 + 319	35.17 -173	48.387 + 327	46.13 -144	37.142 + 323	49.07 -151
11 26.2	33.307 + 757	43.57 +30	44.145 + 313	37.21 -204	48.711 + 324	44.62 -151	37.461 + 319	47.43 -164
12 6.1	34.027 + 720	44.33 +76	44.444 + 299	39.51 -230	49.023 + 312	43.08 -154	37.768 + 307	45.72 -171
12 16.1	34.682 + 655	45.54 +121	44.716 + 272	41.98 -247	49.312 + 289	41.57 -151	38.053 + 285	43.99 -173
12 26.1	35.261 + 579	47.14 +160	44.957 + 241	44.54 -256	49.572 + 260	40.15 -142	38.308 + 255	42.32 -167
12 36.1	35.742 + 481	49.13 +199	45.157 + 200	47.11 -257	49.794 + 222	38.85 -130	38.526 + 218	40.75 -157
	35.742 + 364	49.13 +227	45.157 + 153	47.11 -250	49.794 + 175	38.85 -112	38.526 + 172	40.75 -142
Mean Place sec δ, tan δ	28.884 +2.730	54.15 +2.541	42.708 +1.039	49.28 -0.282	47.038 +1.013	40.03 +0.162	35.853 +1.003	41.33 +0.075
dα(ψ), dδ(ψ) dα(ε), dδ(ε)	+0.118 +0.092	-0.22 +0.84	+0.055 -0.010	-0.22 +0.84	+0.065 +0.006	-0.22 +0.83	+0.063 +0.003	-0.22 +0.83
Dble. Trans.	January 23		January 24		January 24		January 25	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	310 Bradley 1147 (Camelopardi)			313 289 G. Puppis		1218 7 G. Hydrae		1217 $\chi$ Cancri									
	Mag.	Spect.															
	5.73	G5		4.43	A5	6.32	A5	5.16	F5								
U.T.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.								
	h	m	°	h	m	°	h	m	°								
	8	17	+75 47	8	18	-36 36	8	18	-10 07								
	s	"	'	s	"	'	s	"	'								
1	-8.9	52.337	+873	61.21	+171	02.577	+264	40.88	-313	35.273	+258	07.49	-231	13.529	+304	52.17	-56
1	1.1	53.077	+740	63.30	+209	02.796	+219	44.14	-326	35.495	+222	09.78	-229	13.795	+266	51.84	-33
1	11.0	53.667	+590	65.75	+245	02.964	+168	47.47	-333	35.675	+180	12.03	-225	14.016	+221	51.74	-10
1	21.0	54.074	+407	68.46	+271	03.072	+108	50.76	-329	35.805	+130	14.14	-211	14.182	+166	51.87	+13
1	31.0	54.298	+224	71.30	+284	03.122	+50	53.91	-315	35.885	+80	16.07	-193	14.292	+110	52.21	+34
2	10.0	54.335	+37	74.19	+289	03.114	-8	56.86	-295	35.915	+30	17.79	-172	14.345	+53	52.72	+51
2	19.9	54.181	-154	77.00	+281	03.049	-65	59.53	-267	35.894	-21	19.26	-147	14.341	-4	53.36	+64
3	1.9	53.863	-318	79.60	+260	02.937	-112	61.86	-233	35.832	-62	20.46	-120	14.288	-53	54.07	+71
3	11.9	53.394	-469	81.92	+232	02.782	-155	63.84	-198	35.732	-100	21.41	-95	14.191	-97	54.82	+75
3	21.8	52.801	-593	83.83	+191	02.595	-187	65.40	-156	35.603	-129	22.07	-66	14.060	-131	55.55	+73
3	31.8	52.126	-675	85.28	+145	02.388	-207	66.54	-114	35.457	-146	22.47	-40	13.908	-152	56.21	+66
4	10.8	51.391	-735	86.24	+96	02.167	-221	67.25	-71	35.300	-157	22.62	-15	13.742	-166	56.79	+58
4	20.8	50.637	-754	86.63	+39	01.944	-223	67.51	-26	35.142	-158	22.51	+11	13.576	-166	57.24	+45
4	30.7	49.903	-734	86.50	-13	01.730	-214	67.35	+16	34.993	-149	22.17	+34	13.419	-157	57.56	+32
5	10.7	49.207	-696	85.84	-66	01.528	-202	66.75	+60	34.856	-137	21.60	+57	13.278	-141	57.75	+19
5	20.7	48.588	-619	84.66	-118	01.348	-180	65.73	+102	34.741	-115	20.81	+79	13.161	-117	57.79	+4
5	30.7	48.066	-522	83.04	-162	01.196	-152	64.36	+137	34.651	-90	19.84	+97	13.075	-86	57.71	-8
6	9.6	47.650	-416	81.02	-202	01.073	-123	62.62	+174	34.588	-63	18.68	+116	13.020	-55	57.50	-21
6	19.6	47.367	-283	78.65	-237	00.986	-87	60.57	+205	34.556	-32	17.39	+129	13.002	-18	57.18	-32
6	29.6	47.216	-151	76.03	-262	00.935	-51	58.30	+227	34.554	-2	15.99	+140	13.019	+17	56.77	-41
7	9.5	47.200	-16	73.19	-284	00.922	-13	55.82	+248	34.583	+29	14.50	+149	13.072	+53	56.27	-50
7	19.5	47.332	+132	70.21	-298	00.949	+27	53.23	+259	34.645	+62	13.00	+150	13.072	+90	55.71	-56
7	29.5	47.594	+262	67.19	-302	01.014	+65	50.62	+261	34.735	+90	11.52	+148	13.168	+116	55.05	-66
8	8.5	47.991	+397	64.14	-305	01.119	+105	48.03	+259	34.854	+119	10.10	+142	13.431	+153	54.27	-78
8	18.4	48.519	+528	61.18	-296	01.264	+145	45.61	+242	35.004	+150	08.84	+126	13.617	+186	53.43	-84
8	28.4	49.158	+639	58.33	-285	01.444	+180	43.41	+220	35.180	+176	07.77	+107	13.829	+212	52.53	-90
9	7.4	49.911	+753	55.64	-269	01.662	+218	41.52	+189	35.384	+204	06.94	+83	14.070	+241	51.54	-99
9	17.4	50.763	+852	53.21	-243	01.915	+253	40.05	+147	35.614	+230	06.44	+50	14.337	+267	50.47	-107
9	27.3	51.695	+932	51.05	-216	02.196	+281	39.04	+101	35.866	+252	06.27	+17	14.626	+289	49.34	-113
10	7.3	52.707	+1012	49.21	-184	02.507	+311	38.55	+49	36.141	+275	06.47	-20	14.940	+314	48.15	-119
10	17.3	53.773	+1066	47.78	-143	02.839	+332	38.64	-9	36.434	+293	07.07	-60	15.273	+333	46.92	-123
10	27.2	54.875	+1102	46.74	-104	03.186	+347	39.28	-64	36.741	+307	08.04	-97	15.620	+347	45.68	-124
11	6.2	56.004	+1129	46.16	-58	03.542	+356	40.51	-123	37.059	+318	09.38	-134	15.981	+361	44.46	-122
11	16.2	57.121	+1117	46.07	-9	03.895	+353	42.29	-178	37.377	+318	11.06	-168	16.343	+362	43.30	-116
11	26.2	58.210	+1089	46.46	+39	04.238	+343	44.52	-223	37.691	+314	12.99	-193	16.702	+359	42.26	-104
12	6.1	59.245	+1035	47.36	+90	04.562	+324	47.20	-268	37.993	+302	15.15	-216	17.050	+348	41.35	-91
12	16.1	60.185	+940	48.75	+139	04.852	+290	50.19	-299	38.270	+277	17.43	-228	17.374	+324	40.64	-71
12	26.1	61.015	+830	50.57	+182	05.103	+251	53.38	-319	38.518	+248	19.76	-233	17.666	+292	40.14	-50
12	36.1	61.702	+687	52.79	+222	05.306	+203	56.73	-335	38.726	+208	22.08	-232	17.918	+252	39.87	-27
			+518		+253		+146		-335		+163		-223		+201		-4
Mean Place	52.028	58.70		02.969	61.57			36.241	23.34			14.747	43.53				
sec $\delta$ , $\tan \delta$	+4.076	+3.952		+1.246	-0.743			+1.016	-0.179			+1.125	+0.515				
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.148	-0.23		+0.045	-0.23			+0.057	-0.23			+0.072	-0.23				
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.149	+0.82		-0.028	+0.82			-0.007	+0.82			+0.020	+0.82				
Dbie.Trans.	January 25			January 25		January 25		January 25									

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	1219		318		314		315	
	294 G. Puppis		♄ Chamaeleontis		♁ 31 Lyncis		ε Carinae	
Mag.Spect.	4.94	K0	4.26	K0	4.43	K5	1.74	K0, B
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	8 20	-33 00	8 20	-77 26	8 21	+43 13	8 22	-59 27
1 <sup>d</sup>	-8.9	" -304	69.398 <sup>s</sup>	" -324	53.713 <sup>s</sup>	" +24	15.191 <sup>s</sup>	" -336
1 <sup>s</sup>	50.571 +264	18.99 -316	69.811 +413	03.12 -352	53.713 +315	61.76 +54	15.191 +260	32.68 -359
1	1.1	22.15 -322	70.045 +234	06.64 -373	54.028 +263	62.30 +84	15.451 +181	36.27 -377
1	11.0	25.37 -317	70.045 +32	10.37 -381	54.291 +197	63.14 +110	15.632 +91	40.04 -381
1	21.0	28.54 -303	70.077 -155	14.18 -377	54.488 +130	64.24 +129	15.723 +6	43.85 -372
1	31.0	31.57	69.922	17.95	54.618	65.53	15.729	47.57
2	10.0	34.40 -283	69.586 -336	21.63 -368	54.680 +62	66.97 +144	15.650 -79	51.16 -359
2	19.9	36.95 -255	69.072 -514	25.07 -344	54.672 -8	68.48 +151	15.489 -161	54.47 -331
3	1.9	39.17 -222	68.413 -659	28.22 -315	54.605 -67	69.97 +149	15.260 -229	57.46 -299
3	11.9	41.05 -188	67.622 -791	31.03 -281	54.484 -121	71.40 +143	14.969 -291	60.08 -262
3	21.9	42.53 -148	66.721 -901	33.41 -238	54.321 163	72.66 +126	14.629 -340	62.25 -217
3	31.8	43.60 -107	65.748 -973	35.33 192	54.130 191	73.72 +106	14.257 -372	63.95 -170
4	10.8	44.27 -205	64.714 1034	36.77 144	53.921 -209	74.55 +83	13.860 -397	65.16 -121
4	20.8	44.50 -208	63.654 1066	37.67 90	53.709 212	75.09 +54	13.456 -404	65.83 -67
4	30.7	44.34 -200	62.598 1041	38.06 39	53.507 -202	75.34 +25	13.057 -399	65.99 -16
5	10.7	43.77 -188	61.557 1041	37.91 +15	53.321 -186	75.30 -4	12.671 -386	65.63 +36
5	20.7	42.79 +98	60.568 989	37.21 +70	53.166 -155	74.97 -33	12.311 -360	64.74 +89
5	30.7	41.48 +131	59.651 -917	36.04 +117	53.045 -121	74.38 -59	11.988 -323	63.39 +135
6	9.6	39.82 +166	58.819 -832	34.37 +167	52.962 -83	73.56 -82	11.704 -284	61.58 +181
6	19.6	37.87 +195	58.105 -714	32.26 +211	52.924 -38	72.51 -105	11.473 -231	59.36 +222
6	29.6	35.71 +216	57.516 -589	29.79 +247	52.929 +5	71.30 -121	11.296 -177	56.82 +254
7	9.6	33.35 +236	57.067 -449	27.00 +279	52.977 +48	69.94 -136	11.178 -118	53.99 +283
7	19.5	30.89 +246	56.783 -284	23.98 +302	53.071 +94	68.45 -149	11.127 -51	50.97 +302
7	29.5	28.41 +248	56.656 -127	20.85 +313	53.071 +134	66.88 -157	11.127 +12	47.87 +310
8	8.5	25.96 +245	56.700 +44	17.64 +321	53.205 +174	65.23 -165	11.139 +81	47.87 +313
8	18.4	23.67 +229	56.922 +222	14.53 +311	53.379 +215	63.53 -170	11.220 +151	44.74 +301
8	28.4	21.60 +207	57.304 +382	11.59 +294	53.842 +248	61.83 -170	11.371 +213	41.73 +279
9	7.4	19.83 +177	57.851 +547	08.92 +267	54.126 +284	60.13 -170	11.584 +280	38.94 +251
9	17.4	18.47 +136	58.544 +693	06.66 +226	54.126 +317	60.13 -167	11.864 +340	36.43 +206
9	27.3	17.54 +93	59.357 +813	04.87 +179	54.443 +344	58.46 -162	12.204 +390	34.37 +158
10	7.3	17.12 +42	60.279 +922	03.62 +125	54.787 +373	56.84 -154	12.594 +437	32.79 +102
10	17.3	17.26 -14	61.269 +990	03.02 +60	55.556 +396	53.88 -142	13.500 +469	31.41 +36
10	27.2	17.94 -68	62.297 +1028	03.05 -3	55.969 +413	52.61 -127	13.990 +490	31.68 -27
11	6.2	19.18 -124	63.335 +1038	03.76 -71	56.396 +427	51.53 -108	13.990 +501	31.68 -94
11	16.2	18.18 -176	63.335 +996	03.76 138	56.396 +430	51.53 -85	14.491 +490	32.62 -160
11	26.2	20.94 -220	64.331 +929	05.14 -196	56.826 +427	50.68 -60	14.981 +468	34.22 -216
11	26.2	23.14	65.260	07.10	57.253	50.08	15.449	36.38
12	6.1	25.76 -262	66.088 +828	09.64 -254	57.665 +412	49.77 -31	15.880 +431	39.10 -272
12	16.1	28.67 -291	66.772 +684	12.65 -301	58.048 +383	49.78 +1	16.254 +374	42.25 -315
12	26.1	31.78 -311	67.302 +530	16.02 -337	58.395 +347	50.10 +32	16.564 +310	45.72 -347
12	36.1	35.02 -324	67.654 +352	19.67 -365	58.693 +298	50.74 +64	16.798 +234	49.44 -372
	51.098	39.35 -323	63.994 +156	28.66 -380	54.878 +238	55.96 +91	14.299 +147	56.97 -381
Mean Place	51.098	39.35	63.994	28.66	54.878	55.96	14.299	56.97
sec δ, tan δ	+1.193	-0.650	+4.599	-4.489	+1.373	+0.940	+1.968	-1.695
da(ψ), dδ(ψ)	+0.047	-0.23	-0.036	-0.23	+0.081	-0.23	+0.025	-0.23
da(ε), dδ(ε)	-0.025	+0.82	-0.173	+0.82	+0.036	+0.81	-0.066	+0.81
Dble.Trans.	January 26		January 26		January 26		January 26	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1220		1221		316		319		
	20 Cancri		302 G. Puppis* p.		Bradley 1197 (Hydrae)		$\beta$ Volantis		
Mag. Spect.	5.88	F0	5.55	K5	3.95	A0	3.65	K0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	8 22	+ 18 22	8 24	- 23 59	8 24	- 3 51	8 25	- 66 05	
1	-8.9	34.304 + 288	44.60 - 102	27.979 + 263	47.99 - 279	58.095 + 266	27.72 - 206	37.315 + 387	05.23 - 333
1	1.1	34.557 + 253	43.76 - 84	28.202 + 223	50.86 - 287	58.326 + 231	29.74 - 202	37.610 + 295	08.83 - 360
1	11.0	34.768 + 211	43.11 - 65	28.381 + 179	53.75 - 289	58.516 + 190	31.68 - 194	37.809 + 199	12.62 - 379
1	21.0	34.928 + 160	42.68 - 43	28.506 + 125	56.57 - 178	58.657 + 141	33.46 - 178	37.896 + 87	16.48 - 386
1	31.0	35.035 + 107	42.46 - 22	28.580 + 74	59.22 - 265	58.748 + 91	35.06 - 160	37.879 - 17	20.28 - 380
2	10.0	35.088 + 53	42.42 - 4	28.600 + 20	61.67 - 245	58.789 + 41	36.44 - 138	37.759 - 120	23.97 - 369
2	19.9	35.087 - 1	42.56 + 14	28.568 - 32	63.85 - 218	58.780 - 9	37.59 - 115	37.539 - 220	27.40 - 343
3	1.9	35.041 - 46	42.83 + 27	28.492 - 76	65.72 - 187	58.728 - 52	38.50 - 91	37.235 - 304	30.52 - 312
3	11.9	34.953 - 88	43.19 + 36	28.376 - 116	67.29 - 157	58.639 - 89	39.18 - 68	36.856 - 379	33.29 - 379
3	21.9	34.833 - 120	43.62 + 43	28.230 - 146	68.49 - 120	58.519 - 120	39.62 - 44	36.856 - 442	35.61 - 232
3	31.8	34.693 - 140	44.06 + 44	28.065 - 165	69.33 - 84	58.382 - 137	39.85 - 23	35.933 - 481	37.46 - 185
4	10.8	34.540 - 153	44.50 + 44	27.887 - 178	69.83 - 50	58.232 - 150	39.88 - 3	35.419 - 514	38.82 - 136
4	20.8	34.386 - 154	44.92 + 42	27.707 - 180	69.95 - 12	58.081 - 151	39.70 + 18	34.892 - 527	39.64 - 82
4	30.7	34.241 - 145	45.30 + 38	27.534 - 173	69.74 + 21	57.938 - 143	39.36 + 34	34.370 - 522	39.94 - 30
5	10.7	34.109 - 132	45.62 + 32	27.373 - 161	69.17 + 57	57.807 - 131	38.84 + 52	33.859 - 511	39.71 + 23
5	20.7	34.001 - 108	45.90 + 28	27.232 - 141	68.27 + 90	57.697 - 110	38.16 + 68	33.378 - 481	38.93 + 78
5	30.7	33.920 - 81	46.11 + 21	27.116 - 116	67.09 + 118	57.611 - 86	37.36 + 80	32.939 - 439	37.68 + 125
6	9.6	33.867 - 53	46.27 + 16	27.062 - 90	65.63 + 146	57.550 - 61	36.42 + 94	32.547 - 392	35.94 + 174
6	19.6	33.848 - 19	46.38 + 11	26.969 - 57	63.92 + 171	57.521 - 29	35.38 + 104	32.218 - 329	33.78 + 216
6	29.6	33.862 + 14	46.43 + 5	26.942 - 27	62.04 + 188	57.521 + 0	34.27 + 111	31.957 - 261	31.27 + 251
7	9.6	33.908 + 46	46.42 - 1	26.948 + 6	60.00 + 204	57.551 + 30	33.10 + 117	31.768 - 189	28.45 + 282
7	19.5	33.990 + 82	46.34 - 8	26.989 + 41	57.89 + 211	57.612 + 61	31.94 + 116	31.664 - 104	25.42 + 303
7	29.5	34.082 + 92	46.20 - 14	26.989 + 73	55.78 + 211	57.701 + 89	30.82 + 112	31.642 - 22	22.29 + 313
8	8.5	34.230 + 148	46.00 - 20	27.167 + 105	53.70 + 208	57.819 + 118	29.76 + 106	31.707 + 65	19.10 + 319
8	18.4	34.400 + 170	45.67 - 33	27.307 + 140	51.78 + 192	57.967 + 148	28.84 + 92	31.862 + 155	16.02 + 308
8	28.4	34.595 + 195	45.23 - 44	27.476 + 169	50.07 + 171	58.140 + 173	28.10 + 74	32.100 + 238	13.13 + 289
9	7.4	34.817 + 222	44.66 - 57	27.678 + 202	48.64 + 143	58.341 + 201	27.57 + 53	32.423 + 323	10.52 + 261
9	17.4	35.064 + 247	43.95 - 71	27.909 + 231	47.58 + 106	58.567 + 226	27.34 + 23	32.823 + 400	08.33 + 219
9	27.3	35.333 + 269	43.10 - 85	28.165 + 256	46.93 + 65	58.815 + 248	27.39 - 5	33.288 + 465	06.62 + 171
10	7.3	35.626 + 293	42.11 - 99	28.448 + 283	46.73 + 20	59.088 + 273	27.77 - 38	33.813 + 525	05.47 + 115
10	17.3	35.938 + 312	40.99 - 112	28.751 + 303	47.04 - 31	59.378 + 290	28.50 - 73	34.379 + 566	04.98 + 49
10	27.3	36.264 + 326	39.77 - 122	29.069 + 318	47.82 - 78	59.683 + 305	29.54 - 104	34.970 + 591	05.12 - 14
11	6.2	36.603 + 339	38.47 - 130	29.399 + 330	49.10 - 128	60.001 + 318	30.90 - 136	35.573 + 603	05.94 - 82
11	16.2	36.945 + 342	37.15 - 132	29.729 + 330	50.83 - 173	60.320 + 319	32.52 - 162	36.161 + 588	07.43 - 149
11	26.2	37.285 + 340	35.83 - 132	30.053 + 324	52.95 - 212	60.637 + 317	34.34 - 182	36.720 + 559	09.51 - 208
12	6.1	37.614 + 329	34.58 - 125	30.364 + 311	55.41 - 246	60.944 + 307	36.33 - 199	37.231 + 511	12.16 - 265
12	16.1	37.921 + 307	33.45 - 113	30.647 + 283	58.11 - 270	61.227 + 283	38.40 - 207	37.669 + 438	15.27 - 311
12	26.1	38.200 + 279	32.46 - 99	30.898 + 251	60.96 - 285	61.483 + 256	40.47 - 207	38.028 + 359	18.72 - 345
12	36.1	38.440 + 240	31.66 - 80	31.107 + 209	63.89 - 293	61.701 + 218	42.51 - 204	38.291 + 263	22.45 - 373
		38.440 + 192	31.66 - 59	31.107 + 160	63.89 - 289	61.701 + 173	42.51 - 190	38.291 + 157	22.45 - 385
Mean Place	35.514	34.43	28.745	66.93	59.161	42.57	35.618	30.57	
sec $\delta$ , tan $\delta$	+1.054	+0.332	+1.095	-0.445	+1.002	-0.068	+2.467	-2.256	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.068	-0.23	+0.052	-0.23	+0.060	-0.24	+0.013	-0.24	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.013	+0.81	-0.017	+0.81	-0.003	+0.81	-0.089	+0.80	
Dble. Trans.	January 26		January 27		January 27		January 27		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1222		317		321		320	
	29 Cancri		o Ursae Majoris		η Cancri		Groombridge 1450 (Lycnis)	
Mag.Spect.	5.90	A2	3.47	G0	5.52	K0	6.05	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	8 27	+ 14 15	8 29	+ 60 45	8 31	+ 20 29	8 32	+ 38 03
1 -8.9	50 980 + 286	33.11 -125	08 196 + 504	54.71 + 98	54.500 + 299	25.35 - 98	01.264 + 347	54.84 - 11
1 1.1	51.231 + 251	32.02 -109	08.635 + 439	56.07 +136	54.764 + 264	24.58 - 77	01.571 + 307	55.02 + 18
1 11.0	51.442 + 211	31.10 - 92	08.999 + 364	57.78 +171	54.987 + 223	24.01 - 57	01.829 + 258	55.50 + 48
1 21.0	51.602 + 160	30.39 - 71	09.270 + 271	59.79 +201	55.156 + 171	23.68 - 33	02.027 + 198	56.24 + 74
1 31.0	51.711 + 109	29.89 - 50	09.445 + 175	61.98 +219	55.276 + 118	23.56 - 12	02.164 + 137	57.20 + 96
2 10.0	51.767 + 56	29.59 - 30	09.523 + 78	64.30 +232	55.340 + 64	23.64 + 8	02.236 + 72	58.34 +114
2 19.9	51.771 + 4	29.49 - 10	09.499 - 24	66.63 +233	55.348 + 8	23.90 + 26	02.244 + 8	59.59 +125
3 1.9	51.729 - 42	29.54 + 5	09.388 - 111	68.85 +222	55.310 - 38	24.28 + 38	02.195 - 49	60.87 +128
3 11.9	51.647 - 82	29.71 + 17	09.197 - 191	70.91 +206	55.229 - 81	24.75 + 47	02.096 - 99	62.13 +126
3 21.9	51.532 - 115	29.99 + 28	08.939 - 258	72.68 +177	55.114 - 115	25.28 + 53	01.955 - 141	63.30 +117
3 31.8	51.398 - 134	30.32 + 33	08.638 - 301	74.11 +143	54.977 - 137	25.81 + 53	01.787 - 168	64.31 +101
4 10.8	51.250 - 148	30.70 + 38	08.305 - 333	75.16 +105	54.826 - 151	26.33 + 52	01.601 - 186	65.14 + 83
4 20.8	51.100 - 150	31.09 + 39	07.962 - 343	75.77 + 61	54.671 - 155	26.80 + 47	01.410 - 191	65.74 + 60
4 30.7	50.958 - 142	31.48 + 39	07.628 - 334	75.94 + 17	54.524 - 147	27.20 + 40	01.227 - 183	66.10 + 36
5 10.7	50.829 - 129	31.86 + 38	07.313 - 315	75.67 - 27	54.389 - 135	27.53 + 33	01.058 - 169	66.22 + 12
5 20.7	50.721 - 108	32.23 + 37	07.036 - 277	74.97 - 70	54.276 - 113	27.79 + 26	00.914 - 144	66.09 - 13
5 30.7	50.639 - 82	32.57 + 34	06.807 - 229	73.89 -108	54.189 - 87	27.95 + 16	00.801 - 113	65.73 - 36
6 9.6	50.584 - 55	32.89 + 32	06.632 - 175	72.45 -144	54.130 - 59	28.05 + 10	00.721 - 80	65.15 - 58
6 19.6	50.561 - 23	33.18 + 29	06.521 - 111	70.69 -176	54.104 - 26	28.07 + 2	00.681 - 40	64.37 - 78
6 29.6	50.570 + 9	33.44 + 26	06.474 - 47	68.69 -200	54.110 + 6	28.01 - 6	00.680 - 1	63.44 - 93
7 9.6	50.609 + 39	33.65 + 21	06.492 + 18	66.47 -222	54.149 + 39	27.88 - 13	00.718 + 38	62.35 -109
7 19.5	50.682 + 73	33.79 + 14	06.581 + 89	64.10 -237	54.222 + 73	27.67 - 21	00.796 + 78	61.14 -121
7 29.5	50.778 + 96	33.81 + 2	06.731 + 150	61.63 -247	54.315 + 93	27.63 - 4	00.911 + 115	59.83 -131
8 8.5	50.907 + 129	33.90 + 9	06.946 + 215	59.10 -253	54.449 + 134	27.02 - 61	01.062 + 151	58.42 -141
8 18.4	51.068 + 161	33.80 - 10	07.224 + 278	56.57 -253	54.612 + 163	26.52 - 50	01.252 + 190	56.94 -148
8 28.4	51.253 + 185	33.56 - 24	07.555 + 331	54.08 -249	54.801 + 189	25.92 - 60	01.472 + 220	55.42 -152
9 7.4	51.465 + 212	33.17 - 39	07.942 + 387	51.67 -241	55.018 + 217	25.20 - 72	01.727 + 255	53.86 -156
9 17.4	51.703 + 238	32.61 - 56	08.380 + 438	49.40 -227	55.261 + 243	24.35 - 85	02.012 + 285	52.28 -158
9 27.3	51.963 + 260	31.88 - 73	08.860 + 480	47.30 -210	55.528 + 267	23.37 - 98	02.325 + 313	50.72 -156
10 7.3	52.247 + 284	30.97 - 91	09.383 + 523	45.41 -189	55.819 + 291	22.27 -110	02.666 + 341	49.17 -155
10 17.3	52.549 + 302	29.90 -107	09.940 + 557	43.80 -161	56.131 + 312	21.05 -122	03.030 + 364	47.70 -147
10 27.3	52.868 + 319	28.68 -122	10.521 + 581	42.48 -132	56.459 + 328	19.76 -129	03.413 + 383	46.32 -138
11 6.2	53.200 + 332	27.33 -135	11.124 + 603	41.51 - 97	56.802 + 343	18.41 -135	03.811 + 398	45.06 -126
11 16.2	53.536 + 336	25.91 -142	11.728 + 604	40.92 - 59	57.149 + 347	17.05 -136	04.215 + 404	43.99 -107
11 26.2	53.870 + 334	24.46 -145	12.326 + 598	40.74 - 18	57.496 + 347	15.74 -131	04.617 + 402	43.13 - 86
12 6.1	54.195 + 325	23.04 -142	12.904 + 578	40.99 + 25	57.834 + 338	14.50 -124	05.009 + 392	42.52 - 61
12 16.1	54.499 + 304	21.69 -135	13.439 + 535	41.67 + 68	58.150 + 316	13.40 -110	05.377 + 368	42.20 - 32
12 26.1	54.775 + 276	20.47 -122	13.923 + 484	42.75 +108	58.439 + 289	12.47 - 93	05.712 + 335	42.17 - 3
12 36.1	55.013 + 238	19.40 -107	14.337 + 414	44.23 +148	58.690 + 251	11.74 - 73	06.002 + 290	42.43 + 26
	+ 193	- 86	+ 328	+181	+ 204	- 50	+ 236	+ 56
Mean Place	52.188	22.04	09.031	51.37	55.736	15.52	02.474	48.32
sec δ, tan δ	+1.032	+0.254	+2.047	+1.787	+1.068	+0.374	+1.270	+0.783
da(ψ), dδ(ψ)	+0.067	-0.24	+0.099	-0.24	+0.069	-0.24	+0.078	-0.24
da(ε), dδ(ε)	+0.010	+0.80	+0.072	+0.80	+0.015	+0.79	+0.032	+0.79
Dble.Trans.	January 28		January 28		January 29		January 29	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1223		324		1224		322	
	δ Hydrae		48 G. Velorum		σ Hydrae		Groombridge 1446 (Camelopardi)	
Mag.Spect.	4.18	A0	4.13	A5	4.54	K0	6.29	K0
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	8 36	+ 5 45	8 37	-42 56	8 38	+ 3 23	8 38	+ 73 40
1 <sup>d</sup> -8.9	55.336 <sup>s</sup> +281	18.02 <sup>"</sup> -168	09.806 <sup>s</sup> +295	06.13 <sup>"</sup> -317	01.961 <sup>s</sup> +280	35.35 <sup>"</sup> -179	13.846 <sup>s</sup> +818	43.15 <sup>"</sup> +138
1 <sup>s</sup> 11.1	55.585 +249	16.44 -158	10.053 +247	09.49 -336	02.208 +247	33.65 -170	14.557 +711	44.95 +180
1 11.1	55.794 +209	15.00 -144	10.246 +193	13.00 -351	02.416 +208	32.06 -159	15.143 +586	47.16 +221
1 21.0	55.954 +160	13.74 -126	10.376 +130	16.51 -351	02.575 +159	30.66 -140	15.575 +432	49.68 +252
1 31.0	56.065 +111	12.69 -105	10.443 +67	19.93 -342	02.685 +110	29.46 -120	15.849 +274	52.38 +270
2 10.0	56.125 +60	11.84 -85	10.448 +5	23.19 -326	02.745 +60	28.47 -99	15.959 +110	55.20 +282
2 19.9	56.133 +8	11.22 -62	10.390 -58	26.20 -301	02.753 +8	27.71 -76	15.898 -61	58.01 +281
3 1.9	56.097 -36	10.80 -42	10.280 -110	28.89 -269	02.717 -36	27.16 -55	15.639 -209	60.66 +265
3 11.9	56.021 -76	10.56 -24	10.123 -157	31.24 -235	02.642 -75	26.80 -36	15.341 -348	63.09 +243
3 21.9	55.914 -107	10.50 -6	09.928 -195	33.16 -192	02.535 -107	26.63 -17	14.874 -467	65.17 +208
3 31.8	55.786 -128	10.57 +7	09.707 -221	34.66 -150	02.407 -128	26.62 -1	14.326 -548	66.83 +166
4 10.8	55.644 -142	10.76 +19	09.468 -239	35.72 -106	02.266 -141	26.75 +13	13.713 -613	68.03 +120
4 20.8	55.499 -145	11.06 +30	09.222 -246	36.30 -58	02.121 -145	27.01 +26	13.073 -640	68.69 +66
4 30.8	55.360 -139	11.43 +37	08.980 -242	36.42 -12	01.982 -139	27.37 +36	12.438 -635	68.83 +14
5 10.7	55.232 -128	11.88 +45	08.747 -233	36.08 +34	01.853 -129	27.84 +47	11.825 -613	68.45 -38
5 20.7	55.122 -110	12.40 +52	08.533 -214	35.28 +80	01.744 -109	28.39 +55	11.267 -558	67.55 -90
5 30.7	55.037 -85	12.96 +19	08.344 -189	34.08 +120	01.657 -87	29.00 +61	10.785 -482	66.19 -136
6 9.6	54.976 -61	13.57 +61	08.182 -162	32.46 +162	01.595 -62	29.69 +69	10.387 -398	64.39 -180
6 19.6	54.945 -31	14.21 +64	08.056 -126	30.49 +197	01.562 -33	30.42 +73	10.097 -290	62.22 -217
6 29.6	54.943 -2	14.86 +65	07.967 -89	28.24 +225	01.558 -4	31.17 +75	09.916 -181	59.76 -246
7 9.6	54.971 +28	15.50 +64	07.916 -51	25.73 +251	01.583 +25	31.93 +76	09.848 -68	57.04 -272
7 19.5	55.029 +58	16.11 +61	07.908 -8	23.07 +266	01.639 +56	32.66 +73	09.905 +57	54.14 -290
7 29.5	55.114 +85	16.65 +54	07.941 +33	20.34 +273	01.639 +82	33.34 +68	10.074 +169	51.14 -300
8 8.5	55.227 +113	17.14 +49	08.019 +78	17.58 +276	01.721 +111	33.34 +62	10.704 +285	48.08 -306
8 18.5	55.370 +143	17.50 +36	08.141 +122	14.95 +263	01.832 +140	33.96 +49	10.359 +400	34.18 -304
8 28.4	55.539 +169	17.70 +20	08.305 +164	12.52 +243	02.139 +167	34.78 +33	11.259 +500	42.08 -296
9 7.4	55.736 +197	17.72 +2	08.513 +208	10.35 +217	02.333 +194	34.91 +13	11.861 +602	39.23 -285
9 17.4	55.958 +222	17.50 -22	08.762 +249	08.60 +175	02.553 +220	34.80 -11	12.556 +695	36.59 -264
9 27.3	56.204 +246	17.06 -44	09.047 +285	07.29 +131	02.796 +243	34.45 -35	13.327 +771	34.18 -241
10 7.3	56.474 +270	16.37 -69	09.367 +320	06.50 +79	03.064 +268	33.83 -62	14.177 +850	32.06 -212
10 17.3	56.764 +290	15.42 -95	09.715 +348	06.31 +19	03.353 +289	32.93 -90	15.084 +907	30.30 -176
10 27.3	57.072 +308	14.25 -117	10.082 +367	06.70 -39	03.658 +305	31.79 -114	16.034 +950	28.93 -137
11 6.2	57.393 +321	12.86 -139	10.464 +382	07.71 -101	03.978 +320	30.40 -139	17.018 +984	27.98 -95
11 16.2	57.720 +327	11.31 -155	10.846 +382	09.31 -160	04.303 +325	28.82 -158	18.005 +987	27.53 -45
11 26.2	58.046 +326	09.64 -167	11.219 +373	11.43 -212	04.628 +325	27.10 -172	18.980 +975	27.55 +2
12 6.2	58.364 +318	07.89 -175	11.575 +356	14.04 -261	04.945 +317	25.29 -181	19.921 +941	28.09 +54
12 16.1	58.663 +299	06.16 -173	11.896 +321	17.03 -299	05.241 +296	23.46 -183	20.790 +869	29.14 +105
12 26.1	58.935 +272	04.49 -167	12.177 +281	20.29 -326	05.512 +271	21.67 -179	21.572 +782	30.64 +150
12 36.1	59.171 +236	02.92 -157	12.407 +230	23.77 -348	05.747 +235	19.98 -169	22.240 +668	32.59 +195
	+192	-140	+170	-353	+191	-154	+525	+230
Mean Place	56.525	04.92	10.130	29.46	03.139	21.68	13.808	41.22
sec δ, tan δ	+1.005	+0.101	+1.366	-0.931	+1.002	+0.059	+3.558	+3.415
dα(ψ), dδ(ψ)	+0.063	-0.25	+0.042	-0.25	+0.062	-0.25	+0.131	-0.25
dα(ε), dδ(ε)	+0.004	+0.77	-0.039	+0.77	+0.003	+0.77	+0.145	+0.77
Dble.Trans.	January 30		January 30		January 30		January 30	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	323		325		1227		1225	
	Groombridge 1460 (Ursae Majoris)		6 Hydrae		o Velorum		34 Lyncis	
Mag. Spect.	6.03	K0	5.15	K2	3.68	B3	5.52	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	8 38	+ 52 45	8 39	- 12 25	8 39	- 52 52	8 40	+ 45 52
1 -8.9	16.845 + 434	39 12 + 53	22.031 + 273	20.50 - 241	54.572 + 328	00 13 - 324	04.141 + 390	60.42 + 19
1 1.1	17.228 + 383	40 01 + 89	22.269 + 238	22.93 - 243	54.841 + 269	03.63 - 350	04.487 + 346	60.96 + 54
1 11.1	17.551 + 323	41 25 + 124	22.467 + 198	25.34 - 241	55.047 + 206	07.30 - 367	04.780 + 293	61.82 + 86
1 21.0	17.799 + 248	42 81 + 156	22.616 + 149	27.63 - 229	55.176 + 129	11.04 - 374	05.007 + 227	62.99 + 117
1 31.0	17.969 + 170	44.58 + 177	22.715 + 99	29.74 - 211	55.232 + 56	14.71 - 367	05.166 + 159	64.39 + 140
2 10.0	18.059 + 90	46.52 + 194	22.764 + 49	31.66 - 192	55.215 - 17	18.25 - 354	05.253 + 87	65.97 + 158
2 19.9	18.065 + 6	48.52 + 200	22.761 - 3	33.32 - 166	55.126 - 89	21.56 - 331	05.267 + 14	67.64 + 167
3 1.9	17.999 - 66	50.48 + 196	22.715 - 46	34.71 - 139	54.975 - 151	24.56 - 300	05.218 - 49	69.32 + 168
3 11.9	17.866 - 133	52.34 + 186	22.629 - 86	35.84 - 113	54.769 - 206	27.22 - 266	05.110 - 108	70.94 + 162
3 21.9	17.677 - 189	54.00 + 166	22.512 - 117	36.67 - 83	54.516 - 253	29.44 - 222	04.954 - 156	72.41 + 147
3 31.8	17.452 - 225	55.38 + 138	22.375 - 137	37.23 - 56	54.234 - 282	31.22 - 178	04.765 - 189	73.67 + 126
4 10.8	17.199 - 253	56.46 + 108	22.224 - 151	37.53 - 30	53.928 - 306	32.53 - 131	04.553 - 212	74.68 + 101
4 20.8	16.936 - 263	57.17 + 71	22.068 - 156	37.53 + 0	53.611 - 317	33.33 - 80	04.333 - 220	75.40 + 72
4 30.8	16.680 - 256	57.51 + 34	21.918 - 150	37.30 + 23	53.297 - 314	33.63 - 30	04.118 - 215	75.79 + 39
5 10.7	16.438 - 242	57.47 - 4	21.778 - 140	36.82 + 48	52.989 - 308	33.44 + 19	03.917 - 201	75.88 + 9
5 20.7	16.225 - 213	57.05 - 42	21.655 - 123	36.10 + 72	52.703 - 286	32.73 + 71	03.741 - 176	75.63 - 25
5 30.7	16.050 - 175	56.29 - 76	21.555 - 100	35.18 + 92	52.443 - 260	31.57 + 116	03.599 - 142	75.09 - 54
6 9.6	15.917 - 133	55.20 - 109	21.478 - 77	34.06 + 112	52.215 - 228	29.96 + 161	03.493 - 106	74.27 - 82
6 19.6	15.834 - 83	53.82 - 138	21.430 - 48	32.78 + 128	52.027 - 188	27.94 + 202	03.430 - 63	73.19 - 108
6 29.6	15.801 - 33	52.21 - 161	21.411 - 19	31.38 + 140	51.883 - 144	25.60 + 234	03.410 - 20	71.90 - 129
7 9.6	15.819 + 18	50.39 - 182	21.420 + 9	29.87 + 151	51.784 - 99	22.95 + 265	03.434 + 24	70.42 - 148
7 19.5	15.891 + 72	48.40 - 199	21.461 + 41	28.33 + 154	51.740 - 44	20.11 + 284	03.504 + 70	68.79 - 163
7 29.5	16.013 + 122	46.30 - 210	21.530 + 69	26.80 + 153	51.746 + 6	17.17 + 294	03.616 + 112	67.04 - 175
8 8.5	16.184 + 171	44.10 - 220	21.629 + 99	25.32 + 148	51.807 + 61	14.18 + 299	03.771 + 155	65.19 - 185
8 18.5	16.406 + 222	41.86 - 224	21.758 + 129	23.98 + 134	51.926 + 119	11.28 + 290	03.968 + 197	63.28 - 191
8 28.4	16.670 + 264	39.63 - 223	21.915 + 157	22.82 + 116	52.097 + 171	08.57 + 271	04.202 + 234	61.34 - 194
9 7.4	16.979 + 309	37.41 - 222	22.101 + 186	21.90 + 92	52.324 + 227	06.12 + 245	04.475 + 273	59.39 - 195
9 17.4	17.330 + 351	35.28 - 213	22.316 + 215	21.29 + 61	52.603 + 279	04.07 + 205	04.784 + 309	57.47 - 192
9 27.3	17.717 + 387	33.25 - 203	22.556 + 240	21.02 + 27	52.927 + 324	02.48 + 159	05.125 + 341	55.60 - 187
10 7.3	18.141 + 424	31.36 - 189	22.822 + 266	21.14 - 12	53.296 + 369	01.43 + 105	05.499 + 374	53.82 - 178
10 17.3	18.595 + 454	29.67 - 169	23.109 + 287	21.66 - 52	53.696 + 400	01.01 + 42	05.899 + 400	52.18 - 164
10 27.3	19.072 + 477	28.21 - 146	23.413 + 304	22.57 - 91	54.121 + 425	01.19 - 18	06.321 + 422	50.70 - 148
11 6.2	19.570 + 498	27.01 - 120	23.731 + 318	23.88 - 131	54.561 + 440	02.03 - 84	06.763 + 442	49.42 - 128
11 16.2	20.074 + 504	26.15 - 86	24.054 + 323	25.55 - 167	55.000 + 439	03.51 - 148	07.211 + 448	48.41 - 101
11 26.2	20.577 + 503	25.61 - 54	24.376 + 322	27.50 - 195	55.426 + 426	05.56 - 205	07.659 + 448	47.67 - 74
12 6.2	21.066 + 489	25.47 - 14	24.689 + 313	29.71 - 221	55.829 + 403	08.15 - 259	08.096 + 437	47.27 - 40
12 16.1	21.524 + 458	25.72 + 25	24.979 + 290	32.08 - 237	56.189 + 380	11.18 - 303	08.508 + 412	47.21 - 6
12 26.1	21.943 + 419	26.34 + 62	25.242 + 263	34.53 - 245	56.499 + 310	14.54 - 336	08.884 + 376	47.50 + 29
12 36.1	22.306 + 363	27.36 + 102	25.469 + 227	36.99 - 246	56.749 + 250	18.16 - 362	09.213 + 329	48.14 + 64
	+ 295	+ 134	+ 180	- 239	+ 177	- 373	+ 268	+ 96
Mean Place	17.899	35.10	23.061	37.82	54.434	25.23	05.301	55.48
sec δ, tan δ	+1.652	+1.316	+1.024	-0.220	+1.657	-1.321	+1.436	+1.031
da(ψ), dδ(ψ)	+0.088	-0.25	+0.057	-0.25	+0.034	-0.26	+0.082	-0.26
da(ε), dδ(ε)	+0.056	+0.77	-0.009	+0.77	-0.057	+0.77	+0.044	+0.77
Dble. Trans.	January 30		January 30		January 31		January 31	

## AT UPPER TRANSIT AT GREENWICH

No.	1226		331		1228		327		
	53 G. Velorum		$\eta$ Chamaeleontis		$\gamma$ Cancri		$\alpha$ Pyxidid		
Mag. Spect.	4.06	F5p	5.62	B9	4.73	A0	3.70	B2	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	8 40	-46 35	8 41	-78 54	8 42	+21 30	8 43	-33 07	
1	-8.9	10.501 +307	37.15 -320	54.267 +738	25.56 -307	29.103 +308	73.26 -99	02.268 +286	52.26 -298
1	1.1	10.757 +256	40.57 -342	54.820 +553	28.95 -339	29.378 +275	72.48 -78	02.512 +244	55.40 -314
1	11.1	10.956 +199	44.14 -357	55.178 +358	32.62 -367	29.612 +234	71.92 -56	02.710 +198	58.63 -323
1	21.0	11.088 +132	47.76 -362	55.315 +137	36.43 -381	29.795 +183	71.61 -31	02.852 +142	61.84 -321
1	31.0	11.154 +66	51.28 -352	55.241 -74	40.25 -382	29.925 +130	71.52 -9	02.938 +86	64.94 -310
2	10.0	11.155 +1	54.67 -339	54.963 -278	44.03 -378	30.000 +75	71.65 +13	02.968 +30	67.87 -293
2	19.9	11.090 -65	57.81 -314	54.479 -484	47.64 -361	30.020 +20	71.96 +31	02.941 -27	70.54 -267
3	1.9	10.970 -120	60.63 -282	53.827 -652	50.99 -335	29.991 -29	72.40 +44	02.866 -75	72.91 -237
3	11.9	10.800 -170	63.12 -249	53.016 -811	54.05 -306	29.919 -72	72.94 +54	02.748 -118	74.96 -206
3	21.9	10.589 -211	65.18 -206	52.070 -946	56.70 -285	29.811 -108	73.54 +60	02.595 -153	76.62 -166
3	31.8	10.351 -238	66.80 -162	51.029 -1041	58.93 -223	29.679 -132	74.13 +59	02.418 -177	77.89 -127
4	10.8	10.093 -258	67.98 -118	49.906 -1123	60.71 -178	29.531 -148	74.71 +58	02.225 -193	78.76 -87
4	20.8	09.826 -267	68.65 -67	48.735 -1171	61.96 -125	29.378 -153	75.23 +52	02.025 -200	79.21 -45
4	30.8	09.562 -264	68.87 +27	47.553 -1182	62.70 -21	29.230 -148	75.68 +45	01.829 -196	79.25 -4
5	10.7	09.306 -256	68.60 +27	46.371 -1182	62.91 -21	29.093 -137	76.04 +36	01.640 -189	78.90 +35
5	20.7	09.069 -237	67.85 +75	45.229 -1142	62.56 +35	28.976 -117	76.30 +26	01.469 -171	78.13 +77
5	30.7	08.858 -211	66.67 +118	44.152 -1077	61.71 +85	28.883 -93	76.47 +17	01.321 -148	77.02 +111
6	9.6	08.675 -183	65.07 +160	43.155 -997	60.35 +136	28.817 -66	76.55 +8	01.197 -124	75.55 +147
6	19.6	08.528 -147	63.09 +198	42.276 -879	58.51 +184	28.783 -34	76.53 -2	01.104 -93	73.77 +178
6	29.6	08.420 -108	60.81 +228	41.526 -750	56.29 +222	28.780 -3	76.42 -11	01.042 -62	71.77 +200
7	9.6	08.352 -68	58.26 +255	40.924 -602	53.69 +260	28.808 +28	76.23 -19	01.013 -29	69.53 +224
7	19.5	08.331 +21	55.53 +273	40.500 -424	50.81 +288	28.871 +63	75.95 -28	01.022 +9	67.18 +235
7	29.5	08.353 +22	52.72 +281	40.249 -251	47.77 +304	28.965 +94	75.68 -27	01.064 +42	64.77 +241
8	8.5	08.422 +69	49.87 +285	40.191 -58	44.61 +316	29.077 +112	75.13 -55	01.144 +80	62.36 +241
8	18.5	08.541 +119	47.13 +274	40.335 +144	41.47 +314	29.231 +154	74.52 -61	01.261 +117	60.08 +228
8	28.4	08.705 +164	44.58 +255	40.664 +329	38.46 +301	29.411 +180	73.82 -70	01.414 +153	57.98 +210
9	7.4	08.916 +211	42.30 +228	41.187 +523	35.66 +280	29.619 +208	73.00 -82	01.603 +189	56.14 +184
9	17.4	09.172 +256	40.42 +188	41.888 +701	33.22 +244	29.855 +236	72.05 -95	01.829 +226	54.69 +145
9	27.3	09.467 +295	39.00 +142	42.737 +849	31.20 +202	30.115 +260	70.97 -108	02.085 +256	53.65 +104
10	7.3	09.801 +334	38.09 +91	43.725 +988	29.70 +150	30.402 +287	69.77 -120	02.374 +289	53.10 +55
10	17.3	10.164 +363	37.80 +29	44.809 +1084	28.82 +88	30.711 +309	68.48 -129	02.687 +313	53.09 +1
10	27.3	10.548 +384	38.10 -30	45.952 +1143	28.55 +27	31.038 +327	67.10 -138	02.687 +333	53.09 -52
11	6.2	10.948 +400	39.03 -93	47.127 +1175	28.96 -41	31.382 +344	65.68 -142	03.369 +349	54.70 -109
11	16.2	11.348 +400	40.58 -155	48.273 +1146	30.05 -109	31.732 +350	64.27 -141	03.720 +351	56.32 -162
11	26.2	11.739 +391	42.66 -208	49.359 +1086	31.74 -169	32.083 +351	62.90 -137	04.068 +348	58.39 -207
12	6.2	12.110 +371	45.26 -260	50.350 +991	34.04 -230	32.428 +345	61.62 -128	04.402 +334	60.90 -251
12	16.1	12.445 +335	48.27 -301	51.192 +842	36.86 -282	32.753 +325	60.49 -113	04.710 +308	63.74 -284
12	26.1	12.737 +292	51.57 -330	51.871 +679	40.07 -321	33.052 +299	59.55 -94	04.983 +273	66.80 -306
12	36.1	12.975 +238	55.11 -354	52.360 +489	43.62 -355	33.313 +261	58.82 -73	05.214 +231	66.80 -323
		+175	-361	+273	-375	+216	-49	+177	-325
Mean Place	10.699	61.31	48.710	53.31	30.365	63.60	02.950	74.23	
sec $\delta$ , tan $\delta$	+1.455	-1.057	+5.201	-5.104	+1.075	+0.394	+1.194	-0.653	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.040	-0.26	-0.042	-0.26	+0.069	-0.26	+0.048	-0.26	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.045	+0.77	-0.221	+0.76	+0.017	+0.76	-0.028	+0.76	
Dble. Trans.	January 31		January 31		January 31		January 31		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	326		1229		328		1230		
Name	δ Cancri		25 G. Pyxidis		ι Cancri*		14 Hydrae		
Mag.Spect.	4.17	K0	6.13	A2	4.20	G5	5.19	B9	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° /	h m	° /	h m	° /	h m	° /	
	8 43	+ 18 12	8 44	- 21 06	8 45	+ 28 48	8 48	- 3 23	
1	-8.9	53 878 + 303	26.70 -116	18 011 + 278	46.53 -268	51.651 + 328	43.98 -66	39.853 + 283	17.14 -209
1	1.1	54 148 + 270	25.72 -98	18 253 + 242	49.30 -277	51.943 + 292	43.56 -42	40 103 + 250	19.19 -205
1	11.1	54 378 + 230	24.96 -76	18 453 + 200	52.09 -279	52.194 + 251	43.41 -15	40 316 + 213	21.17 -198
1	21.0	54.559 + 181	24.43 -53	18 602 + 149	54.82 -273	52.390 + 196	43.54 + 13	40 480 + 164	23.00 -183
1	31.0	54.687 + 128	24.13 -30	18.700 + 98	57.39 -257	52.532 + 142	43.90 + 36	40 596 + 116	24.63 -163
2	10.0	54 763 + 76	24.03 -10	18 746 + 46	59.78 -239	52 615 + 83	44.47 + 57	40 661 + 65	26.06 -143
2	19.9	54 783 + 20	24.14 + 11	18 739 - 7	61.91 -213	52.639 + 24	45.21 + 74	40 676 + 15	27.25 -119
3	1.9	54.756 - 27	24.40 + 26	18 687 - 52	63.75 -184	52.612 - 27	46.05 + 84	40 646 - 30	28.19 -94
3	11.9	54.686 - 70	24.77 + 37	18 595 - 92	65.31 -156	52.538 - 74	46.94 + 89	40 576 - 70	28.91 -72
3	21.9	54 581 - 105	25.23 + 46	18.469 - 126	66.52 -121	52.425 - 113	47.84 + 90	40 474 - 102	29.39 -48
3	31.8	54 454 - 127	25.72 + 49	18 323 - 146	67.40 - 88	52.286 - 139	48.68 + 84	40.351 - 123	29.66 -27
4	10.8	54 310 - 144	26.21 + 49	18 161 - 162	67.96 - 56	52.129 - 157	49.43 + 75	40 212 - 139	29.73 + 103
4	20.8	54.161 - 149	26.69 + 48	17.993 - 168	68.17 - 21	51.965 - 164	50.05 + 62	40.068 - 144	29.60 + 13
4	30.8	54.017 - 144	27.13 + 44	17.830 - 163	68.06 + 11	51.806 - 159	50.52 + 47	39.928 - 140	29.31 + 29
5	10.7	53.883 - 134	27.51 + 38	17.675 - 155	67.64 + 42	51.658 - 148	50.84 + 32	39.796 - 132	28.86 + 45
5	20.7	53 768 - 115	27.83 + 32	17.537 - 138	66.90 + 74	51.530 - 128	50.98 + 14	39.681 - 115	28.25 + 61
5	30.7	53.678 - 90	28.09 + 26	17.421 - 116	65.89 +101	51.428 - 102	50.96 - 2	39.587 - 94	27.52 + 73
6	9.6	53.613 - 65	28.28 + 19	17.327 - 94	64.62 +127	51.353 - 75	50.79 - 17	39.516 - 71	26.66 + 86
6	19.6	53.579 - 34	28.39 + 11	17.263 - 64	63.11 +151	51.313 - 40	50.47 - 32	39.472 - 44	25.71 + 95
6	29.6	53.575 - 4	28.44 + 5	17.227 - 36	61.44 +167	51.305 - 8	50.01 - 46	39.455 - 17	24.70 +101
7	9.6	53.602 + 27	28.42 - 2	17.220 - 7	59.61 +183	51.331 + 26	49.43 - 58	39.466 + 11	23.64 +106
7	19.5	53.661 + 59	28.31 - 11	17.247 + 27	57.70 +191	51.392 + 61	48.74 - 69	39.507 + 41	22.57 +107
7	29.5	53.759 + 98	28.09 - 22	17.303 + 56	55.78 +192	51.392 + 92	47.95 - 79	39.575 + 68	21.54 +103
8	8.5	53.859 + 100	27.87 - 22	17.303 + 87	55.78 +190	51.484 + 123	47.95 - 93	39.575 + 96	20.58 + 96
8	18.5	54.009 + 150	27.45 - 42	17.511 + 121	53.88 +176	51.607 + 158	47.02 -103	39.671 + 125	19.74 + 84
8	28.4	54.184 + 175	26.93 - 52	17.661 + 150	50.54 +158	51.951 + 186	44.87 -112	39.948 + 152	19.06 + 68
9	7.4	54.386 + 202	26.26 - 67	17.844 + 183	49.21 +133	52.169 + 218	43.66 -121	40.129 + 181	18.59 + 47
9	17.4	54.616 + 230	25.44 - 82	18.057 + 213	48.22 + 99	52.169 + 247	42.37 -129	40.337 + 208	18.40 + 19
9	27.3	54.871 + 255	24.49 - 95	18.298 + 241	47.61 + 61	52.416 + 273	42.37 -137	40.337 + 233	18.49 - 9
10	7.3	55.151 + 280	23.37 -112	18.567 + 269	47.42 + 19	52.689 + 301	41.00 -143	40.570 + 260	18.90 - 41
10	17.3	55.453 + 302	22.13 -124	18.859 + 292	47.72 - 30	53.315 + 325	38.11 -146	41.112 + 282	19.65 - 75
10	27.3	55.774 + 321	20.78 -135	19.170 + 311	48.46 - 74	53.659 + 344	36.65 -146	41.412 + 300	20.70 -105
11	6.2	56.111 + 337	19.34 -144	19.496 + 326	49.68 -122	54.021 + 362	35.22 -143	41.729 + 317	22.07 -137
11	16.2	56.455 + 344	17.87 -147	19.827 + 331	51.33 -165	54.390 + 369	33.87 -135	42.052 + 323	23.71 -164
11	26.2	56.800 + 345	16.41 -146	20.156 + 329	53.35 -202	54.761 + 371	32.64 -123	42.376 + 324	25.55 -184
12	6.2	57.138 + 338	15.01 -140	20.475 + 319	55.71 -236	55.125 + 364	31.58 -106	42.694 + 318	27.56 -201
12	16.1	57.458 + 320	13.74 -127	20.772 + 297	58.31 -260	55.470 + 345	30.74 - 84	42.993 + 299	29.66 -210
12	26.1	57.752 + 294	12.62 -112	21.039 + 267	61.05 -274	55.787 + 317	30.13 - 61	43.266 + 273	31.76 -210
12	36.1	58.010 + 258	11.69 - 93	21.269 + 230	63.87 -282	56.066 + 279	29.79 - 34	43.505 + 239	33.83 -207
		58.010 + 212	11.69 - 70	21.269 + 182	63.87 -280	56.066 + 231	29.79 - 6	43.505 + 196	33.83 -194
Mean Place	55.142	16.19	18.946	66.05	52.920	35.87	41.022	32.72	
sec δ, tan δ	+1.053	+0.329	+1.072	-0.386	+1.141	+0.550	+1.002	-0.059	
dα(ψ), dδ(ψ)	+0.068	-0.26	+0.053	-0.26	+0.072	-0.26	+0.060	-0.27	
dα(ε), dδ(ε)	+0.014	+0.75	-0.017	+0.75	+0.024	+0.75	-0.003	+0.74	
Dble.Trans.	February 1		February 1		February 1		February 2		

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	332		1231		334		336		
	$\gamma$ Pyxidid		80 G. Hydrae*		$\zeta$ Hydrae		108 G. Carinae		
Mag. Spect.	4.19	K2	5.90	K0	3.30	K0	3.98	B8	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° /	h m	° /	h m	° /	h m	° /	
	8 49	-27 39	8 54	-18 11	8 54	+ 5 59	8 54	-60 35	
1	-8.9	56.687 +285	12.67 -284	34.138 +285	02.44 -259	39.594 +293	64.19 -174	45.039 +392	06.79 -315
1	1.1	56.935 +248	15.64 -297	34.388 +250	05.10 -266	39.856 +262	62.56 -163	45.363 +324	10.26 -347
1	11.1	57.140 +205	18.69 -305	34.599 +211	07.78 -268	40.081 +225	61.06 -150	45.611 +248	13.97 -371
1	21.0	57.292 +152	21.70 -301	34.761 +162	10.39 -261	40.258 +177	59.76 -130	45.769 +158	17.80 -383
1	31.0	57.390 +98	24.58 -288	34.872 +111	12.84 -245	40.387 +129	58.67 -109	45.840 +71	21.62 -382
2	10.0	57.434 +44	27.30 -272	34.932 +60	15.11 -227	40.464 +77	57.80 -87	45.824 -16	25.37 -375
2	20.0	57.424 -10	29.76 -246	34.939 +7	17.14 -203	40.490 +26	57.16 -64	45.720 -104	28.92 -355
3	1.9	57.367 -57	31.93 -217	34.939 -38	18.88 -174	40.470 -20	56.73 -43	45.542 -178	32.20 -328
3	11.9	57.268 -99	33.80 -187	34.823 -78	20.35 -147	40.410 -60	56.49 -24	45.296 -246	35.17 -297
3	21.9	57.135 -133	35.29 -149	34.711 -112	21.49 -114	40.315 -95	56.43 -6	44.991 -305	37.73 -256
3	31.8	56.978 -157	36.43 -114	34.576 -135	22.33 -84	40.197 -118	56.50 +7	44.646 -345	39.85 -212
4	10.8	56.804 -174	37.21 -78	34.425 -151	22.86 -53	40.063 -134	56.70 +20	44.267 -379	41.51 -166
4	20.8	56.624 -180	37.59 -38	34.266 -159	23.07 -21	39.923 -140	57.01 +31	43.870 -397	42.65 -114
4	30.8	56.446 -178	37.62 -3	34.111 -155	22.99 +8	39.787 -136	57.39 +38	43.470 -400	43.28 -63
5	10.7	56.275 -171	37.27 +35	33.963 -148	22.61 +38	39.658 -129	57.84 +45	43.071 -399	43.39 -11
5	20.7	56.121 -154	36.56 +71	33.829 -134	21.94 +67	39.545 -113	58.35 +51	42.690 -381	42.96 +43
5	30.7	55.987 -134	35.53 +103	33.716 -113	21.03 +91	39.453 -92	58.90 +55	42.337 -353	42.05 +91
6	9.7	55.876 -111	34.19 +134	33.623 -93	19.87 +116	39.384 -69	59.48 +58	42.014 -323	40.64 +141
6	19.6	55.794 -82	32.56 +163	33.558 -65	18.50 +137	39.342 -42	60.09 +61	41.738 -276	38.79 +185
6	29.6	55.741 -53	30.73 +183	33.520 -38	16.98 +152	39.328 -14	60.69 +60	41.509 -229	36.56 +223
7	9.6	55.718 -23	28.71 +202	33.509 -11	15.31 +167	39.340 +12	61.29 +60	41.334 -175	33.98 +258
7	19.5	55.730 +12	26.57 +214	33.530 +21	13.57 +174	39.383 +43	61.84 +55	41.224 -110	31.16 +282
7	29.5	55.773 +43	24.39 +218	33.580 +50	11.82 +175	39.452 +69	62.32 +48	41.176 -48	28.18 +298
8	8.5	55.850 +77	22.22 +217	33.660 +80	10.09 +173	39.548 +96	62.73 +41	41.197 +21	25.09 +309
8	18.5	55.962 +112	20.16 +206	33.772 +112	08.48 +161	39.674 +126	63.04 +31	41.291 +94	22.06 +303
8	28.4	56.107 +145	18.29 +187	33.913 +141	07.05 +143	39.827 +153	63.18 +14	41.452 +161	19.16 +290
9	7.4	56.286 +179	16.66 +163	34.086 +173	05.85 +120	40.008 +181	63.14 -4	41.685 +233	16.48 +268
9	17.4	56.500 +214	15.40 +126	34.290 +204	04.97 +88	40.217 +209	62.87 -27	41.987 +302	14.18 +230
9	27.4	56.743 +243	14.52 +88	34.521 +231	04.45 +52	40.450 +233	62.37 -50	42.348 +361	12.30 +188
10	7.3	57.017 +274	14.11 +41	34.782 +261	04.33 +12	40.711 +261	61.62 -75	42.768 +420	10.94 +136
10	17.3	57.316 +299	14.20 -9	35.067 +285	04.67 -34	40.994 +283	60.62 -100	43.231 +463	10.20 +74
10	27.3	57.635 +319	14.79 -59	35.372 +305	05.43 -76	41.296 +302	59.40 -122	43.727 +496	10.08 +12
11	6.2	57.971 +336	15.91 -112	35.694 +322	06.65 -122	41.616 +320	57.95 -145	44.246 +519	10.63 -55
11	16.2	58.312 +341	17.51 -160	36.023 +329	08.27 -162	41.944 +328	56.34 -161	44.765 +519	11.85 -122
11	26.2	58.651 +339	19.54 -203	36.353 +330	10.25 -198	42.274 +330	54.62 -172	45.273 +508	13.67 -182
12	6.2	58.980 +329	21.97 -243	36.675 +322	12.54 -229	42.600 +326	52.82 -180	45.753 +480	16.09 -242
12	16.1	59.286 +306	24.69 -272	36.977 +302	15.05 -251	42.909 +309	51.04 -178	46.183 +430	19.00 -291
12	26.1	59.560 +274	27.60 -291	37.252 +275	17.69 -264	43.193 +284	49.31 -173	46.556 +373	22.29 -329
12	36.1	59.795 +235	30.65 -305	37.491 +239	20.41 -272	43.444 +251	47.69 -162	46.856 +300	25.90 -361
		59.795 +186	30.65 -306	37.491 +194	20.41 -267	43.444 +208	47.69 -145	46.856 +215	25.90 -379
Mean Place	57.535	33.88	35.178	21.80	40.845	50.80	44.524	34.15	
sec $\delta$ , tan $\delta$	+1.129	-0.524	+1.053	-0.329	+1.006	+0.105	+2.037	-1.774	
$d\alpha(v)$ , $d\delta(v)$	+0.051	-0.27	+0.055	-0.27	+0.063	-0.27	+0.027	-0.27	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.024	+0.74	-0.015	+0.72	+0.005	+0.72	-0.082	+0.72	
Dble. Trans.	February 2		February 3		February 3		February 3		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	1233			337			335			1232			
Name	109 G. Carinae*			α Cancri			ι Ursae Majoris*			64 Cancri			
Mag.Spect.	5.29	B3		4.27	A3		3.12	A5		5.64	G5		
U.T.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.	
	h	m	°	′	h	m	°	′	h	m	°	′	
	8	56	-59	10	8	57	+11	54	8	58	+48	05	
	8	58	+32	28	8	58	+32	28	8	58	+32	28	
1	-8.9	38 946	+385	09 67	-314	43 700	+302	50 03	-151	16 128	+416	47 46	+10
1	1.1	39 266	+320	13 13	-346	43 972	+272	48 68	-135	16 502	+374	47 93	+47
1	11.1	39 513	+247	16 83	-370	44 206	+234	47 49	-119	16 824	+322	48 78	+85
1	21.0	39 674	+161	20 65	-382	44 392	+186	46 53	-96	17 079	+255	49 96	+118
1	31.0	39 751	+77	24 45	-380	44 529	+137	45 80	-73	17 265	+186	51 41	+145
2	10.0	39 745	-6	28 19	-374	44 614	+85	45 28	-52	17 378	+113	53 07	+166
2	20.0	39 653	-92	31 73	-354	44 646	+32	45 00	-28	17 414	+36	54 86	+179
3	1.9	39 490	-163	34 99	-326	44 631	-15	44 90	-10	17 383	-31	56 68	+182
3	11.9	39 261	-229	37 95	-296	44 574	-57	44 96	+6	17 289	-94	58 46	+178
3	21.9	38 975	-286	40 50	-285	44 482	-92	45 17	+21	17 141	-148	60 11	+165
3	31.8	38 651	-324	42 61	-211	44 366	-116	45 47	+30	16 956	-185	61 55	+144
4	10.8	38 293	-358	44 27	-166	44 233	-133	45 84	+37	16 742	-214	62 74	+119
4	20.8	37 918	-375	45 41	-114	44 092	-141	46 26	+42	16 514	-228	63 61	+87
4	30.8	37 539	-379	46 04	-63	43 955	-137	46 69	+43	16 289	-225	64 16	+55
5	10.7	37 163	-376	46 16	-12	43 825	-130	47 14	+45	16 071	-218	64 36	+20
5	20.7	36 802	-361	45 74	+42	43 711	-114	47 58	+44	15 876	-195	64 21	-15
5	30.7	36 468	-334	44 84	+90	43 618	-93	48 01	+43	15 712	-164	63 73	-48
6	9.7	36 164	-304	43 45	+139	43 548	-70	48 42	+41	15 581	-131	62 94	-79
6	19.6	35 903	-261	41 61	+184	43 506	-42	48 80	+38	15 492	-89	61 84	-110
6	29.6	35 688	-215	39 40	+221	43 491	-15	49 14	+34	15 446	-46	60 51	-133
7	9.6	35 523	-165	36 85	+255	43 504	+13	49 43	+29	15 443	-3	58 95	-156
7	19.5	35 421	-102	34 04	+281	43 548	+44	49 66	+23	15 487	+44	57 19	-176
7	29.5	35 377	-44	31 09	+295	43 619	+71	49 78	+12	15 574	+87	55 30	-189
8	8.5	35 398	+21	28 03	+306	43 712	+93	49 82	+4	15 705	+131	53 27	-203
8	18.5	35 489	+91	25 02	+301	43 841	+129	49 80	-2	15 881	+176	51 16	-211
8	28.4	35 645	+156	22 14	+288	43 997	+156	49 60	-20	16 096	+215	49 00	-216
9	7.4	35 869	+224	19 48	+266	44 180	+183	49 22	-38	16 353	+257	46 82	-218
9	17.4	36 159	+290	17 20	+228	44 392	+212	48 65	-57	16 651	+298	44 66	-216
9	27.4	36 506	+347	15 34	+186	44 628	+236	47 89	-76	16 983	+332	42 55	-211
10	7.3	36 909	+403	13 99	+135	44 892	+264	46 92	-97	17 352	+369	40 52	-203
10	17.3	37 356	+447	13 27	+72	45 179	+287	45 76	-116	17 753	+401	38 64	-188
10	27.3	37 834	+478	13 15	+12	45 486	+307	44 43	-133	18 179	+426	36 93	-171
11	6.2	38 335	+501	13 70	-55	45 811	+325	42 94	-149	18 629	+450	35 44	-149
11	16.2	38 838	+503	14 92	-122	46 146	+335	41 35	-159	19 090	+461	34 24	-120
11	26.2	39 331	+493	16 74	-182	46 484	+338	39 71	-164	19 555	+465	33 33	-91
12	6.2	39 799	+468	19 15	-241	46 818	+334	38 05	-166	20 014	+459	32 78	-55
12	16.1	40 220	+421	22 05	-290	47 135	+317	36 46	-159	20 449	+435	32 61	-17
12	26.1	40 586	+366	25 33	-328	47 428	+293	34 98	-148	20 852	+403	32 82	+21
12	36.1	40 883	+216	28 94	-361	47 689	+261	33 65	-133	21 209	+357	33 42	+60
					-377		+217		-112		+297		+95
Mean Place	38.585	37.03		44.991	38.03	17.256	43.11	43.042	17.80				
sec δ, tan δ	+1.952	-1.676		+1.022	+0.211	+1.497	+1.114	+1.185	+0.636				
da(ψ), dδ(ψ)	+0.029	-0.28		+0.065	-0.28	+0.082	-0.28	+0.073	-0.28				
da(ε), dδ(ε)	-0.078	+0.72		+0.010	+0.71	+0.052	+0.71	+0.030	+0.71				
Dble.Trans.	February 4			February 4			February 4			February 4			

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1234		339		1235		338	
	91 G. Velorum		Bradley 1268 c. l.* (Lycnis)		92 G. Hydrae		γ Ursae Majoris	
Mag.Spect.	4.42	F8	4.09	F5	5.80	K0	4.99	M0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	8 59	-41 11	8 59	+41 50	9 01	- 0 25	9 01	+67 40
1 -8.9	34.557 +314	38.68 -305	44.809 +383	18.01 -19	15.365 +292	30.66 -201	19.954 +665	60.89 +87
1 1.1	34.827 +270	41.95 -327	45.153 +344	18.16 +15	15.627 +262	32.61 -195	20.547 +593	62.21 +132
1 11.1	35.048 +221	45.38 -343	45.451 +298	18.66 +50	15.853 +226	34.46 -185	21.054 +507	63.97 +176
1 21.0	35.209 +161	48.86 -348	45.689 +238	19.49 +83	16.031 +178	36.16 -170	21.451 +397	66.10 +213
1 31.0	35.309 +100	52.27 -341	45.864 +175	20.58 +109	16.162 +131	37.65 -149	21.732 +281	68.48 +238
2 10.0	35.348 +39	55.56 -329	45.972 +108	21.89 +131	16.242 +80	38.93 -128	21.892 +160	71.06 +258
2 20.0	35.325 -23	58.63 -307	46.011 +39	23.36 +147	16.270 +28	39.97 -104	21.922 +30	73.71 +265
3 1.9	35.250 -75	61.40 -277	45.989 -22	24.88 +152	16.254 -16	40.78 -81	21.837 -85	76.29 +258
3 11.9	35.126 -124	63.86 -246	45.910 -79	26.41 +153	16.197 -57	41.37 -59	21.643 -194	78.74 +245
3 21.9	34.961 -165	65.93 -207	45.783 -127	27.86 +145	16.106 -91	41.73 -36	21.353 -290	80.93 +219
4 31.8	34.769 -192	67.59 -166	45.623 -160	29.14 +128	15.992 -114	41.91 -18	20.995 -358	82.77 +184
4 10.8	34.554 -215	68.83 -124	45.438 -185	30.24 +110	15.861 -131	41.91 +0	20.582 -413	84.21 +144
4 20.8	34.329 -225	69.61 -78	45.240 -198	31.08 +84	15.722 -139	41.74 +17	20.138 -444	85.18 +97
4 30.8	34.104 -225	69.95 -34	45.045 -195	31.65 +57	15.586 -136	41.43 +31	19.690 -448	85.67 +49
5 10.7	33.883 -221	69.84 +11	44.857 -188	31.93 +28	15.456 -130	40.99 +44	19.250 -440	85.67 +0
5 20.7	33.676 -207	69.27 +57	44.690 -167	31.91 -2	15.341 -115	40.43 +56	18.842 -408	85.16 -51
5 30.7	33.490 -186	68.30 +97	44.550 -140	31.61 -30	15.245 -96	39.78 +65	18.482 -360	84.20 -96
6 9.7	33.326 -164	66.93 +137	44.440 -110	31.04 -57	15.170 -75	39.03 +75	18.177 -305	82.81 -139
6 19.6	33.193 -133	65.18 +175	44.368 -72	30.21 -83	15.121 -49	38.21 +82	17.945 -232	81.01 -180
6 29.6	33.092 -101	63.14 +204	44.333 -35	29.17 -104	15.098 -23	37.35 +86	17.787 -158	78.90 -211
7 9.6	33.026 -86	60.83 +231	44.336 +3	27.92 -125	15.102 +4	36.46 +89	17.707 -80	76.49 -241
7 19.5	32.999 -27	58.33 +250	44.382 +46	26.49 -143	15.134 +32	35.58 +88	17.714 +7	73.86 -263
7 29.5	33.010 +11	55.74 +259	44.464 +82	24.93 -156	15.193 +59	34.74 +84	17.801 +87	71.07 -279
8 8.5	33.062 +52	53.10 +264	44.585 +121	23.23 -170	15.279 +86	33.98 +76	17.970 +169	68.16 -291
8 18.5	33.158 +96	50.53 +257	44.746 +161	21.43 -180	15.394 +115	33.33 +65	18.224 +254	65.20 -296
8 28.4	33.295 +137	48.13 +240	44.941 +195	19.56 -187	15.535 +141	32.84 +49	18.552 +328	62.26 -294
9 7.4	33.475 +180	45.96 +217	45.174 +233	17.64 -192	15.707 +172	32.55 +29	18.956 +404	59.37 -289
9 17.4	33.698 +223	44.16 +180	45.443 +269	15.70 -194	15.906 +199	32.51 +4	19.434 +478	56.61 -276
9 27.4	33.958 +260	42.77 +139	45.744 +301	13.78 -192	16.131 +225	32.74 -23	19.973 +539	54.01 -260
10 7.3	34.257 +299	41.87 +90	46.079 +335	11.88 -190	16.384 +253	33.27 -53	20.577 +604	51.63 -238
10 17.3	34.588 +331	41.55 +32	46.443 +364	10.07 -181	16.661 +277	34.10 -83	21.232 +655	49.56 -207
10 27.3	34.942 +354	41.78 -23	46.830 +387	08.38 -169	16.958 +297	35.22 -112	21.929 +697	47.80 -176
11 6.2	35.316 +374	42.62 -84	47.241 +411	06.84 -154	17.273 +315	36.62 -140	22.663 +734	46.43 -137
11 16.2	35.696 +380	44.05 -143	47.662 +421	05.53 -131	17.598 +325	38.26 -164	23.412 +749	45.51 -92
11 26.2	36.074 +378	46.00 -195	48.087 +425	04.46 -107	17.926 +328	40.08 -182	24.164 +752	45.03 -48
12 6.2	36.440 +366	48.46 -246	48.507 +420	03.69 -77	18.250 +324	42.04 -196	24.902 +738	45.05 +2
12 16.1	36.777 +337	51.31 -285	48.907 +400	03.26 -43	18.557 +307	44.06 -202	25.598 +696	45.58 +53
12 26.1	37.078 +301	54.46 -315	49.278 +371	03.16 -10	18.841 +284	46.08 -202	26.239 +641	46.59 +101
12 36.1	37.334 +256	57.85 -339	49.608 +330	03.42 +26	19.092 +251	48.03 -195	26.803 +564	48.07 +148
	37.334 +199	57.85 -348	49.608 +275	03.42 +61	19.092 +209	48.03 -182	26.803 +464	48.07 +187
Mean Place	35.148	63.30	46.015	12.58	16.609	45.79	20.468	59.40
sec δ, tan δ	+1.329	-0.875	+1.342	+0.895	+1.000	-0.007	+2.633	+2.436
dα(v), dδ(v)	+0.045	-0.28	+0.078	-0.28	+0.061	-0.28	+0.107	-0.28
dα(ε), dδ(ε)	-0.041	+0.71	+0.042	+0.71	-0.000	+0.70	+0.116	+0.70
Dble.Trans.	February 5		February 5		February 5		February 5	

AT UPPER TRANSIT AT GREENWICH

No.	343		341		340		1236	
	$\alpha$ Volantis		$\kappa$ Ursae Majoris		Groombridge 1501 (Ursae Majoris)		93 G. Hydrae	
Mag.Spect.	4.18	A5	3.68	A0	5.68	A2	6.74	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	9 02	-66 20	9 02	+47 12	9 02	+54 20	9 03	-5 06
1	15.280 <sup>s</sup> +463	03 01 -308	41 311 <sup>s</sup> +416	42 62 +1	60.340 <sup>s</sup> +470	19 20 +31	01 829 <sup>s</sup> +291	46 53 -218
1	15.660 +380	06 43 -342	41 685 +374	43 01 +39	60.762 +422	19 93 +73	02 090 +261	48 69 -216
1	15.949 +289	10 13 -370	42 010 +325	43 77 +76	61.128 +366	21 05 +112	02 314 +224	50 78 -209
1	16.131 +182	13 99 -386	42 271 +261	44 88 +111	61.419 +291	22 54 +149	02 491 +177	52 74 -196
1	16.209 +78	17 87 -388	42 463 +192	46 27 +139	61.632 +213	24 31 +177	02 620 +129	54 51 -177
2	16.183 -26	21 71 -384	42 583 +120	47 88 +161	61.763 +131	26 28 +197	02 699 +79	56 08 -157
2	16.052 -131	25 39 -368	42 628 +45	49 63 +175	61 807 +44	28 38 +210	02 726 +27	57 41 -133
2	16.052 -220	25 39 -343	42 628 -23	49 63 +179	61 774 -33	30 49 +211	02 708 -18	58 48 -107
3	15.832 -303	28 82 -314	42 605 -84	51 42 +177	61 668 -106	32 53 +204	02 650 -98	59 33 -85
3	15.529 +182	31 96 -275	42 521 -18	53 19 +165	61 668 -168	32 53 +188	02 650 -52	59 33 -58
3	15.153 -376	34 71 -232	42 383 -176	54 84 +146	61 500 -212	34 41 +162	02 558 -115	59 91 -37
3	14.727 -470	37 03 -187	42 207 -205	56 30 +122	61 288 -248	36 03 +134	02 443 -133	60 28 -15
4	14.257 -496	38 90 -134	42 002 -220	57 52 +92	61 040 -265	37 37 +97	02 310 -140	60 43 +6
4	13.761 -505	40 24 -84	41 782 -218	58 44 +60	60 775 -266	38 34 +58	02 170 -138	60 37 +23
4	13.256 -507	41 08 -31	41 564 -212	59 04 +26	60 509 -259	38 92 +20	02 032 -132	60 14 +42
5	12.749 -490	41 39 +25	41 352 -191	59 30 -8	60 250 -236	39 12 -22	01 900 -118	59 72 +58
5	12.259 -462	41 14 +75	41 161 -162	59 22 -41	60 014 -203	38 90 -60	01 782 -100	59 14 +72
5	11.797 -428	40 39 +126	40 999 -131	58 81 -72	59 811 -167	38 30 -95	01 682 -79	58 42 +85
6	9.7 -376	39 13 +173	40 868 -89	58 09 -103	59 644 -119	37 35 -130	01 603 -53	57 57 +96
6	10.993 -319	37 40 +213	40 779 -49	57 06 -126	59 525 -72	36 05 -157	01 550 -28	56 61 +104
6	10.674 -255	35 27 +251	40 730 -7	55 80 -150	59 453 -22	34 48 -205	01 522 -2	55 57 +110
7	10.419 -177	32 76 +280	40 723 +39	54 30 -170	59 431 +32	32 65 -183	01 520 +28	54 47 +110
7	10.242 -101	29 96 +297	40 762 +80	52 60 -184	59 463 +82	30 60 -220	01 548 +53	53 37 +108
7	29.5 -15	26 99 +311	40 842 +123	50 76 -198	59 545 +132	28 40 -234	01 601 +81	52 29 +103
8	8.5 +76	23 88 +310	40 965 +167	48 78 -208	59 677 +186	26 06 -242	01 682 +111	51 26 +90
8	18.5 +161	20 78 +299	41 132 +206	46 70 -214	59 863 +231	23 64 -245	01 793 +138	50 36 +74
8	28.4 +252	17 79 +279	41 338 +248	44 56 -217	60 094 +280	21 19 -246	01 931 +167	49 62 +54
9	7.4 +339	15 00 +245	41 586 +288	42 39 -216	60 374 +327	18 73 -241	02 098 +197	49 08 +26
9	17.4 +413	12 55 +204	41 874 +322	40 23 -212	60 701 +368	16 32 -232	02 295 +222	48 82 -3
9	27.4 +488	10 51 +153	42 196 +360	38 11 -205	61 069 +411	14 00 -220	02 517 +252	48 85 -35
10	7.3 +543	08 98 +92	42 556 +392	36 06 -192	61 480 +446	11 80 -201	02 769 +275	49 20 -70
10	17.3 +584	08 06 +30	42 948 +419	34 14 -175	61 926 +477	09 79 -178	03 044 +296	49 90 -102
10	27.3 +613	07 76 -36	43 367 +443	32 39 -155	62 403 +504	08 01 -152	03 340 +314	50 92 -136
11	6.3 +614	08 12 -105	43 810 +455	30 84 -128	62 907 +518	06 49 -117	03 654 +324	52 28 -164
11	16.2 +600	09 17 -167	44 265 +460	29 56 -98	63 425 +522	05 32 -82	03 978 +327	53 92 -187
11	26.2 +568	10 84 -229	44 725 +456	28 58 -63	63 947 +516	04 50 -41	04 305 +323	55 79 -206
12	6.2 +508	13 13 -281	45 181 +433	27 95 -26	64 463 +490	04 09 +2	04 628 +306	57 85 -217
12	16.1 +439	15 94 -322	45 614 +403	27 69 +12	64 953 +455	04 11 +44	04 934 +283	60 02 -219
12	26.1 +351	19 16 -359	46 017 +359	27 81 +52	65 408 +403	04 55 +86	05 217 +250	62 21 -218
12	36.1 +250	22 75 -379	46 376 +300	28 33 +87	65 811 +337	05 41 +125	05 467 +207	64 39 -207
Mean Place	14.258	31.68	42.483	38.34	61.386	16.11	03.049	62.95
sec $\delta$ , tan $\delta$	+2.492	-2.283	+1.472	+1.080	+1.715	+1.394	+1.004	-0.090
$d\alpha(v)$ , $d\delta(v)$	+0.019	-0.28	+0.081	-0.28	+0.087	-0.28	+0.060	-0.29
$d\alpha(e)$ , $d\delta(e)$	-0.109	+0.70	+0.052	+0.70	+0.067	+0.70	-0.004	+0.70
Dble.Trans.	February 5		February 5		February 5		February 5	

## AT UPPER TRANSIT AT GREENWICH

No.	342		1237		1238		345		
	97 G. Velorum		Piazzi 8 <sup>h</sup> 245 (Lyncis)		α Cancri		λ Velorum		
Mag. Spect.	3.69	K0	4.71	G5	5.14	B8	2.22	K5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ′	h m	° ′	h m	° ′	h m	° ′	
	9 03	-47 02	9 05	+38 30	9 06	+10 43	9 07	-43 22	
1 <sup>d</sup>	8.9	875 +334	11.32 -308	39.147 +373	30.21 -39	59.681 +306	35.47 -160	29.349 +327	14.13 -303
1	1.1	41.162 +287	14.66 -334	39.485 +338	30.14 -7	59.958 +277	34.02 -145	29.632 +283	17.41 -328
1	11.1	41.395 +233	18.20 -354	39.779 +294	30.42 +28	60.199 +241	32.73 -129	29.866 +234	20.87 -346
1	21.0	41.562 +167	21.83 -363	40.016 +237	31.02 +60	60.393 +194	31.66 -107	30.037 +171	24.41 -354
1	31.0	41.664 +102	25.41 -358	40.194 +178	31.90 +88	60.537 +144	30.82 -84	30.147 +110	27.89 -348
2	10.0	41.700 +36	28.90 -349	40.308 +114	33.01 +111	60.631 +94	30.21 -61	30.195 +48	31.28 -339
2	20.0	41.669 -31	32.18 -328	40.356 +48	34.30 +129	60.672 +41	29.84 -37	30.178 -17	34.46 -318
3	1.9	41.580 -89	35.17 -290	40.345 -11	35.67 +137	60.666 -6	29.66 -18	30.107 -71	37.36 -290
3	11.9	41.439 -141	37.87 -279	40.280 -65	37.08 +141	60.617 -49	29.66 +0	29.986 -121	39.95 -259
3	21.9	41.253 -186	40.16 -229	40.168 -112	38.43 +135	60.532 -85	29.82 +16	29.821 -165	42.16 -221
3	31.9	41.036 -217	42.04 -188	40.023 -145	39.67 +124	60.423 -109	30.08 +26	29.627 -194	43.96 -180
4	10.8	40.794 -242	43.48 -144	39.853 -170	40.75 +108	60.294 -129	30.43 +35	29.409 -218	45.35 -139
4	20.8	40.538 -256	44.44 -96	39.671 -182	41.61 +86	60.158 -136	30.84 +41	29.177 -232	46.26 -91
4	30.8	40.281 -257	44.94 -166	39.490 -181	42.23 +62	60.022 -136	31.27 +43	28.944 -233	46.73 -47
5	10.7	40.026 -255	44.97 -3	39.315 -175	42.60 +37	59.893 -129	31.74 +47	28.713 -231	46.74 -1
5	20.7	39.784 -242	44.49 +48	39.159 -156	42.70 +10	59.778 -115	32.21 +47	28.495 -218	46.28 +46
5	30.7	39.563 -221	43.59 +90	39.027 -132	42.53 -17	59.683 -95	32.66 +45	28.295 -200	45.40 +88
6	9.7	39.366 -197	42.25 +134	38.923 -104	42.12 -41	59.608 -75	33.11 +45	28.118 -177	44.10 +130
6	19.6	39.200 -166	40.50 +175	38.853 -70	41.46 -66	59.560 -48	33.53 +42	27.970 -148	42.41 +169
6	29.6	39.069 -131	38.43 +207	38.818 -35	40.59 -87	59.538 -22	33.92 +39	27.854 -116	40.42 +199
7	9.6	38.975 -94	36.05 +238	38.818 +0	39.53 -106	59.543 +5	34.26 +34	27.772 -82	38.13 +229
7	19.6	38.925 -50	33.46 +259	38.858 +40	38.29 -124	59.578 +35	34.54 +28	27.730 -42	35.63 +250
7	29.5	38.917 -8	30.74 +272	38.932 +74	36.92 -137	59.639 +61	34.72 +18	27.727 -3	33.01 +262
8	8.5	38.955 +38	27.94 +280	39.041 +109	35.40 -152	59.724 +85	34.78 +6	27.766 +39	30.33 +268
8	18.5	39.042 +87	25.20 +274	39.189 +148	33.76 -164	59.841 +117	34.82 +4	27.852 +86	27.71 +262
8	28.4	39.176 +134	22.61 +259	39.370 +181	32.04 -172	59.986 +145	34.66 -16	27.979 +127	25.23 +248
9	7.4	39.359 +183	20.24 +237	39.587 +217	30.24 -180	60.160 +174	34.32 -34	28.153 +174	22.96 +227
9	17.4	39.590 +231	18.24 +200	39.839 +252	28.41 -183	60.362 +202	33.78 -54	28.372 +219	21.06 +190
9	27.4	39.865 +275	16.64 +160	40.122 +283	26.55 -186	60.590 +228	33.04 -74	28.631 +259	19.55 +151
10	7.3	40.183 +318	15.54 +110	40.438 +316	24.69 -186	60.846 +256	32.09 -95	28.931 +300	18.54 +101
10	17.3	40.535 +352	15.03 +51	40.783 +345	22.88 -181	61.127 +281	30.92 -117	29.265 +334	18.09 +45
10	27.3	40.915 +380	15.10 -7	41.153 +370	21.16 -172	61.430 +303	29.58 -134	29.626 +361	18.21 -12
11	6.3	41.317 +402	15.80 -70	41.546 +393	19.55 -161	61.752 +322	28.06 -152	30.009 +383	18.94 -73
11	16.2	41.725 +408	17.12 -132	41.950 +404	18.13 -142	62.084 +332	26.42 -164	30.400 +391	20.27 -133
11	26.2	42.130 +405	19.00 -188	42.360 +410	16.93 -120	62.422 +338	24.72 -170	30.789 +389	22.15 -188
12	6.2	42.521 +391	21.42 -242	42.768 +408	15.99 -94	62.758 +336	22.99 -173	31.168 +379	24.54 -239
12	16.1	42.881 +360	24.28 -286	43.156 +388	15.37 -62	63.078 +320	21.32 -167	31.518 +350	27.36 -282
12	26.1	43.202 +321	27.47 -319	43.519 +363	15.06 -31	63.376 +298	19.74 -158	31.833 +315	30.50 -314
12	36.1	43.472 +270	30.95 -348	43.843 +324	15.10 +4	63.642 +266	18.31 -143	32.101 +268	33.90 -340
		43.472 +210	30.95 -360	43.843 +273	15.10 +38	63.642 +224	18.31 -122	32.101 +212	33.90 -352
Mean Place	41.302	37.33	40.414	24.35	61.000	23.08	29.950	39.70	
sec δ, tan δ	+1.467	-1.074	+1.278	+0.796	+1.018	+0.189	+1.376	-0.945	
dα(ψ), dδ(ψ)	+0.041	-0.29	+0.076	-0.29	+0.065	-0.29	+0.044	-0.29	
dα(ε), dδ(ε)	-0.051	+0.70	+0.038	+0.69	+0.009	+0.69	-0.046	+0.68	
Dble. Trans.	February 6		February 6		February 6		February 7		



AT UPPER TRANSIT AT GREENWICH

No.	1240		1239		1241		1242		
	101 G. Hydrae		ξ Cancri		ε Pyxidis*		107 G. Hydrae		
Mag.Spect.	5.81	K0	5.22	G5	5.63	A3	5.81	K0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	9 08	- 12 17	9 08	+ 22 05	9 09	- 30 18	9 11	- 19 41	
1	-8.9	31.466 +293	50.91 -241	33.727 +326	71.59 -113	21.118 +304	12.37 -284	20.484 +297	11.11 -261
1	1.1	31.729 +263	53.36 -245	34.022 +295	70.68 -91	21.386 +268	15.38 -301	20.749 +265	13.82 -271
1	11.1	31.954 +225	55.80 -244	34.281 +259	70.01 -67	21.612 +226	18.51 -313	20.975 +226	16.56 -274
1	21.0	32.133 +179	58.15 -235	34.490 +209	69.62 -39	21.786 +174	21.64 -313	21.153 +178	19.26 -270
1	31.0	32.262 +129	60.33 -218	34.648 +158	69.49 -13	21.906 +120	24.67 -303	21.281 +128	21.82 -256
2	10.0	32.342 +80	62.32 -199	34.751 +103	69.59 +10	21.971 +65	27.57 -290	21.358 +77	24.22 -240
2	20.0	32.369 +27	64.07 -175	34.798 +47	69.91 +32	21.980 +9	30.24 -267	21.381 +23	26.38 -216
3	1.9	32.351 -18	65.56 -149	34.796 -2	70.40 +49	21.941 -39	32.63 -239	21.359 -22	28.26 -188
3	11.9	32.293 -58	66.79 -123	34.747 -49	71.00 +60	21.857 -84	34.73 -210	21.294 -65	29.87 -161
3	21.9	32.199 -94	67.73 -94	34.659 -88	71.68 +68	21.736 -121	36.46 -173	21.194 -100	31.16 -129
3	31.9	32.081 -118	68.40 -67	34.544 -115	72.38 +70	21.589 -147	37.84 -138	21.069 -125	32.14 -98
4	10.8	31.946 -135	68.81 -41	34.408 -136	73.07 +69	21.421 -168	38.85 -101	20.925 -144	32.81 -67
4	20.8	31.802 -144	68.94 -13	34.263 -145	73.71 +64	21.242 -179	39.45 -60	20.772 -153	33.15 -34
4	30.8	31.659 -143	68.84 +10	34.118 -145	74.26 +55	21.064 -178	39.69 -24	20.619 -153	33.19 -4
5	10.7	31.520 -139	68.49 +35	33.980 -138	74.73 +47	20.888 -176	39.54 +15	20.469 -150	32.92 +27
5	20.7	31.394 -126	67.90 +59	33.856 -124	75.08 +35	20.725 -163	39.00 +54	20.332 -137	32.36 +56
5	30.7	31.287 -107	67.13 +77	33.754 -102	75.31 +23	20.580 -145	38.13 +87	20.211 -121	31.54 +82
6	9.7	31.198 -89	66.15 +98	33.673 -81	75.43 +12	20.454 -126	36.92 +121	20.110 -101	30.46 +108
6	19.6	31.134 -64	65.00 +115	33.622 -51	75.43 +0	20.354 -100	35.40 +152	20.033 -77	29.15 +131
6	29.6	31.095 -39	63.74 +126	33.598 -24	75.32 -11	20.281 -73	33.64 +176	19.982 -51	27.67 +146
7	9.6	31.082 -13	62.36 +138	33.603 +5	75.10 -22	20.237 -44	31.66 +198	19.956 -26	26.03 +164
7	19.6	31.098 +16	60.93 +143	33.640 +37	74.75 -35	20.226 -11	29.54 +212	19.960 +4	24.30 +173
7	29.5	31.140 +42	59.51 +142	33.707 +67	74.32 -43	20.246 +20	27.34 +220	19.993 +33	22.53 +177
8	8.5	31.211 +71	58.11 +140	33.797 +90	73.80 -52	20.301 +55	25.11 +223	20.055 +62	20.78 +175
8	18.5	31.313 +102	56.83 +128	33.922 +125	73.04 -76	20.391 +90	22.98 +213	20.150 +95	19.13 +165
8	28.4	31.442 +129	55.71 +112	34.076 +154	72.20 -84	20.516 +125	20.99 +199	20.274 +124	17.63 +150
9	7.4	31.603 +161	54.81 +90	34.260 +184	71.23 -97	20.677 +161	19.23 +176	20.431 +157	16.36 +127
9	17.4	31.794 +191	54.20 +61	34.473 +213	70.12 -111	20.876 +199	17.81 +142	20.621 +190	15.40 +96
9	27.4	32.013 +219	53.90 +30	34.714 +241	70.12 -124	20.876 +231	16.77 +104	20.841 +220	14.78 +62
10	7.3	32.262 +249	53.98 -8	34.985 +271	67.51 -137	21.373 +266	16.17 +60	21.092 +251	14.56 +22
10	17.3	32.537 +275	54.46 -48	35.281 +296	66.04 -147	21.668 +295	16.09 +8	21.371 +279	14.80 -24
10	27.3	32.833 +296	55.31 -85	35.600 +319	64.49 -155	21.987 +319	16.50 -41	21.672 +301	15.47 -67
11	6.3	33.149 +316	56.57 -126	35.939 +339	62.89 -160	22.327 +340	17.46 -96	21.994 +322	16.60 -113
11	16.2	33.474 +325	58.18 -161	36.290 +351	61.30 -159	22.676 +349	18.94 -148	22.325 +331	18.16 -156
11	26.2	33.804 +330	60.10 -192	36.647 +357	59.75 -155	23.027 +351	20.86 -192	22.660 +335	20.08 -192
12	6.2	34.129 +325	62.28 -218	37.002 +355	58.31 -144	23.371 +344	23.22 -236	22.991 +331	22.35 -227
12	16.1	34.438 +309	64.64 -236	37.342 +340	57.03 -128	23.693 +322	25.91 -269	23.304 +313	24.86 -251
12	26.1	34.723 +285	67.09 -245	37.660 +318	55.95 -108	23.987 +294	28.84 -293	23.592 +288	27.53 -267
12	36.1	34.974 +209	69.58 -249	37.944 +240	55.10 -85	24.243 +256	31.95 -311	23.845 +253	30.30 -277
Mean Place	32.653	69.37	35.064	62.06	22.063	35.32	21.604	31.54	
sec δ, tan δ	+1.024	-0.218	+1.079	+0.406	+1.158	-0.585	+1.062	-0.358	
dα(ψ), dδ(ψ)	+0.057	-0.29	+0.068	-0.29	+0.051	-0.29	+0.055	-0.29	
dα(ε), dδ(ε)	-0.011	+0.68	+0.020	+0.68	-0.029	+0.68	-0.018	+0.67	
Dble.Trans.	February 7		February 7		February 7		February 8		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	346		348		347		351	
	36 Lyncis		β Carinae		γ Hydrae		ι Carinae	
Mag. Spect.	5.30	B8	1.80	A0	3.84	A0	2.25	F0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	9 12	+ 43 16	9 12	- 69 39	9 13	+ 2 22	9 16	- 59 12
1 <sup>d</sup> 1 -8.9	54.212 <sup>s</sup> + 400	31.49 <sup>"</sup> - 27	64.793 <sup>s</sup> + 536	11.75 <sup>"</sup> -295	38.441 <sup>s</sup> + 301	32.94 <sup>"</sup> -195	43.802 <sup>s</sup> + 415	37.41 <sup>"</sup> -300
1 1.1	54.576 + 364	31.60 + 11	65.236 + 443	15.08 -333	38.715 + 274	31.07 -187	44.155 + 363	40.75 -334
1 11.1	54.894 + 318	32.07 + 47	65.579 + 343	18.72 -364	38.953 + 238	29.32 -175	44.440 + 285	44.38 -363
1 21.1	55.154 + 260	32.90 + 83	65.801 + 222	22.55 -383	39.145 + 192	27.73 -159	44.641 + 201	48.17 -379
1 31.0	55.350 + 196	34.02 +112	65.905 + 104	26.44 -389	39.290 + 145	26.36 -137	44.760 + 119	51.99 -382
2 10.0	55.479 + 129	35.39 +137	65.892 - 13	30.34 -390	39.385 + 95	25.21 -115	44.795 + 35	55.79 -380
2 20.0	55.537 + 58	36.93 +154	65.758 - 134	34.10 -376	39.427 + 42	24.30 -91	44.745 - 50	59.43 -364
3 1.9	55.532 - 5	38.55 +162	65.521 - 237	37.64 -354	39.425 - 2	23.62 -68	44.621 - 124	62.84 -341
3 11.9	55.468 - 64	40.19 +164	65.188 - 333	40.92 -328	39.380 - 45	23.15 -47	44.429 - 192	65.97 -313
3 21.9	55.352 - 116	41.77 +158	64.769 - 419	43.83 -291	39.300 - 80	22.90 -25	44.176 - 253	68.71 -274
3 31.9	55.200 - 152	43.19 +142	64.289 - 480	46.33 -250	39.195 - 105	22.81 - 9	43.881 - 295	71.05 -234
4 10.8	55.018 - 182	44.42 +123	63.754 - 535	48.40 -207	39.071 - 124	22.89 + 8	43.548 - 333	72.96 -191
4 20.8	54.822 - 196	45.39 + 97	63.183 - 571	49.95 -155	38.938 - 133	23.10 + 21	43.191 - 357	74.35 -139
4 30.8	54.624 - 198	46.08 + 69	62.598 - 585	51.00 -105	38.806 - 132	23.43 + 33	42.826 - 365	75.26 -91
5 10.7	54.431 - 193	46.48 + 40	62.003 - 595	51.52 - 52	38.678 - 128	23.86 + 43	42.456 - 370	75.65 - 39
5 20.7	54.255 - 176	46.55 + 7	61.421 - 582	51.48 + 4	38.563 - 115	24.38 + 52	42.098 - 358	75.50 + 15
5 30.7	54.104 - 151	46.32 - 23	60.865 - 556	50.93 + 55	38.466 - 97	24.96 + 58	41.759 - 339	74.87 + 63
6 9.7	53.981 - 123	45.79 - 53	60.344 - 521	49.85 +108	38.388 - 78	25.61 + 65	41.444 - 315	73.73 +114
6 19.6	53.894 - 87	44.98 - 81	59.877 - 467	48.27 +158	38.335 - 53	26.30 + 69	41.167 - 277	72.13 +160
6 29.6	53.843 - 51	43.93 -105	59.471 - 406	46.28 +199	38.306 - 29	27.01 + 71	40.931 - 236	70.13 +200
7 9.6	53.829 - 14	42.66 -127	59.135 - 336	43.89 +239	38.302 - 4	27.73 + 72	40.741 - 190	67.76 +237
7 19.6	53.857 + 28	41.17 -149	58.888 - 247	41.17 +272	38.326 + 24	28.43 + 70	40.609 - 132	65.10 +266
7 29.5	53.923 + 66	39.54 -163	58.727 - 161	38.25 +292	38.376 + 50	29.06 + 63	40.533 - 76	62.25 +285
8 8.5	54.027 + 104	37.74 -180	58.664 - 63	35.15 +310	38.453 + 77	29.62 + 56	40.520 - 13	59.26 +299
8 18.5	54.173 + 146	35.83 -191	58.708 + 44	32.04 +311	38.558 + 105	30.06 + 44	40.576 + 56	56.27 +299
8 28.4	54.354 + 181	33.84 -199	58.852 + 144	28.99 +305	38.690 + 132	30.37 + 31	40.697 + 121	53.37 +290
9 7.4	54.575 + 221	31.77 -207	59.103 + 251	26.11 +288	38.852 + 162	30.47 + 10	40.889 + 192	50.64 +273
9 17.4	54.833 + 258	29.69 -208	59.457 + 354	23.54 +257	39.043 + 191	30.33 - 14	41.148 + 259	48.24 +240
9 27.4	55.126 + 293	27.61 -208	59.902 + 445	21.36 +218	39.261 + 218	29.94 - 39	41.469 + 321	46.23 +201
10 7.3	55.455 + 329	25.55 -206	60.435 + 533	19.65 +171	39.507 + 246	29.28 - 66	41.851 + 382	44.71 +152
10 17.3	55.816 + 361	23.59 -196	61.037 + 602	18.54 +111	39.779 + 272	28.33 - 95	42.283 + 432	43.77 + 94
10 27.3	56.204 + 388	21.75 -184	61.690 + 653	18.04 + 50	40.073 + 294	27.13 -120	42.752 + 469	43.43 + 34
11 6.3	56.618 + 414	20.07 -168	62.381 + 691	18.20 - 16	40.388 + 315	25.67 -146	43.252 + 500	43.75 - 32
11 16.2	57.046 + 428	18.62 -145	63.078 + 697	19.05 - 85	40.714 + 326	24.00 -167	43.761 + 509	44.74 - 99
11 26.2	57.482 + 436	17.43 -119	63.762 + 684	20.54 -149	41.045 + 331	22.17 -183	44.266 + 505	46.35 -161
12 6.2	57.915 + 433	16.56 - 87	64.413 + 651	22.65 -211	41.375 + 330	20.23 -194	44.754 + 488	48.56 -221
12 16.1	58.331 + 416	16.04 - 52	64.999 + 586	25.32 -267	41.691 + 316	18.25 -198	45.201 + 447	51.29 -273
12 26.1	58.720 + 389	15.88 - 16	65.507 + 508	28.42 -310	41.985 + 294	16.31 -194	45.598 + 397	54.43 -314
12 36.1	59.070 + 350	16.11 + 23	65.920 + 413	31.92 -350	42.248 + 263	14.44 -187	45.931 + 333	57.94 -351
	+ 296	+ 59	+ 298	-374	+ 221	-171	+ 255	-372
Mean Place	55.450	26.72	63.497	41.52	39.759	18.10	43.757	66.28
sec δ, tan δ	+1.373	+0.941	+2.877	-2.698	+1.001	+0.041	+1.954	-1.679
dα(ψ), dδ(ψ)	+0.078	-0.30	+0.014	-0.30	+0.062	-0.30	+0.032	-0.30
dα(ε), dδ(ε)	+0.047	+0.67	-0.134	+0.67	+0.002	+0.66	-0.085	+0.65
Dble. Trans.	February 8		February 8		February 8		February 9	

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	350		352		1243		353		
	83 Cancri		α Lyncis		♀ Pyxidis		x Velorum		
Mag.Spect.	6.60	F5	3.30	K5	4.93	M0	2.63	B3	
U.T.	R.A.		R.A.		R.A.		R.A.		
	h	m	h	m	h	m	h	m	
	9 18	+ 17 45	9 20	+ 34 26	9 20	- 25 54	9 21	- 54 56	
1	-8.9	12 356 + 323	57 59 -137	12 786 + 366	67 11 - 70	52 609 + 308	04 87 -273	41 450 + 392	41 28 -298
1	1.1	12 650 + 294	56 41 -118	13 121 + 335	66 72 - 39	52 884 + 275	07 75 -288	41 788 + 338	44 59 -331
1	11.1	12 909 + 259	55 45 -96	13 121 + 295	66 67 - 5	53 121 + 237	10 72 -297	42 065 + 277	48 17 -358
1	21.1	13 121 + 212	54 75 - 70	13 416 + 242	66 67 + 28	53 307 + 186	13 68 -296	42 269 + 204	51 91 -374
1	31.0	13 283 + 162	54 31 - 44	13 845 + 187	67 53 + 58	53 443 + 136	16 55 -287	42 397 + 128	55 66 -375
2	10.0	13 393 + 110	54 11 - 20	13 972 + 127	68 36 + 83	53 526 + 83	19 27 -272	42 451 + 54	59 39 -373
2	20.0	13 448 + 55	54 15 + 4	14 035 + 63	69 41 +105	53 554 + 28	21 78 -251	42 427 - 24	62 97 -358
3	1.9	13 454 + 6	54 38 + 23	14 043 + 8	70 59 +118	53 534 - 20	24 01 -223	42 336 - 91	66 30 -333
3	11.9	13 414 - 40	54 76 + 38	13 997 - 46	71 85 +126	53 470 - 64	25 97 -196	42 182 -154	69 36 -306
3	21.9	13 336 - 78	55 26 + 50	13 906 - 91	73 10 +125	53 369 -101	27 58 -161	41 973 -209	72 04 -268
3	31.9	13 231 -105	55 81 + 55	13 781 -125	74 29 +119	53 241 -128	28 86 -128	41 725 -248	74 32 -228
4	10.8	13 105 -126	56 40 + 59	13 631 -150	75 37 +108	53 092 -149	29 80 - 94	41 443 -282	76 18 -186
4	20.8	12 968 -137	56 98 + 58	13 631 -165	75 37 + 91	52 931 -161	30 37 - 57	41 139 -304	77 54 -136
4	30.8	12 830 -138	57 53 + 55	13 466 -166	76 28 + 71	52 931 -162	30 37 - 23	41 139 -312	77 54 - 88
5	10.8	12 696 -134	58 02 + 49	13 300 -163	76 99 + 50	52 769 -161	30 60 + 12	40 827 -315	78 42 - 38
5	20.7	12 576 -120	58 45 + 43	12 989 -148	77 74 + 25	52 457 -151	30 01 + 47	40 205 -307	78 65 + 15
5	30.7	12 474 -102	58 79 + 34	12 861 -128	77 77 + 3	52 322 -135	29 24 + 77	39 917 -288	78 03 + 62
6	9.7	12 392 - 82	59 05 + 26	12 757 -104	77 56 - 21	52 204 -118	28 15 +109	39 649 -268	76 93 +110
6	19.6	12 337 - 55	59 22 + 17	12 683 - 74	77 12 - 44	52 110 - 94	26 79 +136	39 413 -236	75 37 +156
6	29.6	12 307 - 30	59 30 + 8	12 640 - 43	76 49 - 63	52 041 - 69	25 21 +158	39 214 -199	73 43 +194
7	9.6	12 304 - 3	59 30 + 0	12 629 - 11	75 66 - 83	51 997 - 44	23 43 +178	39 055 -159	71 12 +231
7	19.6	12 331 + 27	59 18 - 12	12 653 + 24	74 65 -101	51 984 - 13	21 51 +192	38 946 -109	68 53 +259
7	29.5	12 386 + 55	58 95 - 23	12 708 + 55	73 50 -115	52 000 + 16	19 53 +198	38 885 - 61	65 77 +276
8	8.5	12 475 + 89	58 78 - 17	12 797 + 89	72 18 -132	52 047 + 47	17 52 +201	38 879 - 6	62 86 +291
8	18.5	12 574 + 99	58 16 - 62	12 920 +123	70 73 -145	52 129 + 82	15 60 +192	38 934 + 55	59 96 +290
8	28.5	12 715 +141	57 53 - 63	13 076 +156	69 16 -157	52 242 +113	13 82 +178	39 044 +110	57 14 +282
9	7.4	12 884 +169	56 75 - 78	13 266 +190	67 48 -168	52 390 +148	12 24 +158	39 217 +173	54 50 +264
9	17.4	13 083 +199	55 81 - 94	13 266 +225	65 73 -175	52 575 +185	10 99 +125	39 451 +234	52 18 +232
9	27.4	13 310 +227	54 71 -110	13 491 +255	63 92 -181	52 792 +217	10 08 + 91	39 739 +288	50 25 +193
10	7.3	13 567 +257	53 44 -127	14 036 +290	62 06 -186	53 043 +251	09 59 + 49	40 083 +344	48 79 +146
10	17.3	13 850 +283	52 03 -141	14 355 +319	60 21 -185	53 324 +281	09 59 + 0	40 473 +390	47 91 + 88
10	27.3	14 156 +306	50 49 -154	14 700 +345	58 39 -182	53 631 +307	10 06 - 47	40 898 +425	47 61 + 30
11	6.3	14 485 +329	48 86 -163	15 070 +370	56 65 -174	53 960 +329	11 03 - 97	41 353 +455	47 96 - 35
11	16.2	14 826 +341	47 18 -168	15 455 +385	55 04 -161	54 301 +341	12 49 -146	41 820 +467	48 98 -102
11	26.2	15 175 +349	45 51 -167	15 848 +393	53 61 -143	54 646 +345	14 37 -188	42 286 +466	50 58 -160
12	6.2	15 524 +349	43 89 -162	16 242 +394	52 41 -120	54 988 +342	16 65 -228	42 738 +452	52 79 -221
12	16.2	15 859 +335	42 40 -149	16 621 +379	51 50 - 91	55 312 +324	19 24 -259	43 158 +420	55 50 -271
12	26.1	16 174 +315	41 06 -134	16 977 +356	50 88 - 62	55 611 +299	22 04 -280	43 534 +376	58 62 -312
12	36.1	16 458 +284	39 93 -113	17 300 +323	50 60 - 28	55 875 +264	25 00 -296	43 854 +320	62 09 -347
		16 458 +242	39 93 - 87	17 300 +275	50 60 + 5	55 875 +219	25 00 -299	43 854 +251	62 09 -366
Mean Place	13.719	46.91	14.105	60.63	53.712	27.30	41.745	69.84	
sec δ, tan δ	+1.050	+0.320	+1.213	+0.686	+1.112	-0.486	+1.741	-1.426	
dα(ψ), dδ(ψ)	+0.067	-0.30	+0.073	-0.30	+0.053	-0.31	+0.037	-0.31	
dα(ε), dδ(ε)	+0.016	+0.65	+0.035	+0.64	-0.025	+0.64	-0.073	+0.64	
Dble.Trans.	February 9		February 10		February 10		February 10		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1244		1245		354		356	
	α Leonis		28 Hydrae		α Hydrae		ε Antliae	
Mag. Spect.	4.61	K0	5.81	K5	2.16	K2	4.64	K2
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	9 23	+ 26 14	9 24	- 5 03	9 26	- 8 35	9 28	- 35 53
1 -8.9	50.832 +343	35.96 -107	42.199 +304	14.91 -220	54.123 +304	41.04 -231	40.249 +328	06.41 -284
1 1.1	51.148 +316	35.15 -81	42.476 +277	17.11 -220	54.400 +277	43.36 -232	40.541 +292	09.48 -307
1 11.1	51.426 +278	34.62 -53	42.718 +242	19.25 -214	54.642 +242	45.66 -230	40.792 +251	12.73 -325
1 21.1	51.657 +231	34.40 -22	42.915 +197	21.25 -200	54.839 +197	47.85 -219	40.989 +197	16.04 -331
1 31.0	51.835 +178	34.46 +6	43.065 +150	23.07 -182	54.989 +150	49.87 -202	41.130 +141	19.30 -326
2 10.0	51.958 +123	34.78 +32	43.166 +101	24.69 -162	55.090 +101	51.70 -183	41.215 +85	22.48 -318
2 20.0	52.024 +66	35.34 +56	43.216 +50	26.07 -138	55.139 +49	53.29 -159	41.241 +26	25.45 -297
3 1.9	52.036 +12	36.05 +71	43.219 +3	27.20 -113	55.142 +3	54.62 -133	41.215 -26	28.17 -272
3 11.9	52.001 -35	36.90 +85	43.181 -38	28.09 -89	55.104 -38	55.71 -109	41.141 -74	30.61 -244
3 21.9	51.923 -78	37.80 +90	43.107 -74	28.72 -63	55.029 -75	56.52 -81	41.026 -115	32.70 -209
4 31.9	51.814 -109	38.71 +91	43.007 -100	29.13 -41	54.928 -101	57.09 -57	40.881 -145	34.42 -172
4 10.8	51.682 -132	39.58 +87	42.887 -120	29.33 -20	54.807 -121	57.43 -34	40.712 -169	35.77 -135
4 20.8	51.537 -145	40.36 +78	42.756 -131	29.32 +1	54.675 -132	57.52 -9	40.527 -185	36.68 -91
4 30.8	51.390 -147	41.02 +66	42.624 -132	29.13 +19	54.541 -134	57.41 +11	40.338 -189	37.21 -53
5 10.8	51.246 -144	41.55 +53	42.494 -130	28.77 +36	54.409 -132	57.09 +32	40.148 -190	37.32 -11
5 20.7	51.114 -132	41.92 +37	42.375 -119	28.25 +52	54.287 -122	56.58 +51	39.967 -181	37.00 +32
5 30.7	51.002 -112	42.13 +21	42.272 -103	27.60 +65	54.180 -107	55.90 +68	39.800 -167	36.31 +69
6 9.7	50.910 -92	42.18 +5	42.185 -87	26.81 +79	54.089 -91	55.06 +84	39.649 -151	35.24 +107
6 19.6	50.845 -85	42.06 -12	42.121 -64	25.92 +89	54.021 -68	54.08 +98	39.522 -127	33.81 +143
6 29.6	50.807 -38	41.79 -27	42.080 -41	24.96 +96	53.975 -46	53.01 +107	39.421 -101	32.10 +171
7 9.6	50.798 -9	41.37 -42	42.062 -18	23.93 +103	53.953 -22	51.85 +116	39.347 -74	30.12 +198
7 19.6	50.820 +22	40.80 -57	42.072 +10	22.89 +104	53.958 +5	50.66 +119	39.306 -41	27.94 +218
7 29.5	50.871 +51	40.11 -69	42.106 +34	21.88 +101	53.988 +30	49.47 +119	39.297 -9	25.64 +230
8 8.5	50.951 +80	39.29 -82	42.167 +61	20.92 +96	54.044 +56	48.32 +115	39.324 +27	23.27 +237
8 18.5	51.062 +111	38.28 -101	42.257 +90	20.07 +85	54.131 +87	47.29 +103	39.390 +66	20.95 +232
8 28.5	51.203 +141	37.15 -113	42.374 +117	19.37 +70	54.244 +113	46.39 +90	39.492 +102	18.74 +221
9 7.4	51.376 +173	35.88 -127	42.522 +148	18.87 +50	54.388 +144	45.70 +69	39.636 +144	16.72 +202
9 17.4	51.581 +205	34.49 -139	42.700 +178	18.63 +24	54.564 +176	45.28 +42	39.820 +184	15.02 +170
9 27.4	51.816 +235	33.00 -149	42.906 +206	18.67 -4	54.769 +205	45.15 +13	40.043 +223	13.68 +134
10 7.3	52.082 +266	31.39 -161	43.143 +237	19.02 -35	55.004 +235	45.36 -21	40.306 +263	12.78 +90
10 17.3	52.377 +295	29.71 -168	43.407 +264	19.73 -71	55.268 +264	45.93 -57	40.602 +296	12.41 +37
10 27.3	52.697 +320	27.99 -172	43.696 +289	20.75 -102	55.556 +288	46.86 -93	40.928 +326	12.55 -14
11 6.3	53.041 +344	26.25 -174	44.006 +310	22.10 -135	55.866 +310	48.15 -129	41.279 +351	13.26 -71
11 16.2	53.400 +359	24.57 -168	44.329 +323	23.74 -164	56.190 +324	49.76 -161	41.644 +365	14.52 -126
11 26.2	53.767 +367	22.98 -159	44.659 +330	25.62 -188	56.521 +331	51.64 -188	42.013 +369	16.29 -177
12 6.2	54.136 +369	21.52 -146	44.989 +330	27.69 -207	56.852 +331	53.76 -212	42.378 +365	18.55 -226
12 16.2	54.492 +356	20.28 -124	45.306 +317	29.88 -219	57.169 +317	56.03 -227	42.724 +346	21.19 -264
12 26.1	54.828 +336	19.28 -100	45.603 +297	32.10 -222	57.466 +297	58.37 -234	43.043 +319	24.14 -295
12 36.1	55.132 +304	18.54 -74	45.870 +267	34.32 -222	57.733 +267	60.73 -236	43.323 +280	24.14 -319
	55.132 +261	18.54 -43	45.870 +226	34.32 -211	57.733 +226	60.73 -228	43.323 +232	27.33 -330
Mean Place	52.206	27.52	43.526	31.87	55.438	59.01	41.248	31.61
sec δ, tan δ	+1.115	+0.493	+1.004	-0.089	+1.011	-0.151	+1.234	-0.724
dα(ψ), dδ(ψ)	+0.069	-0.31	+0.060	-0.31	+0.059	-0.31	+0.049	-0.31
dα(ε), dδ(ε)	+0.026	+0.63	-0.005	+0.63	-0.008	+0.62	-0.038	+0.61
Dble. Trans.	February 11		February 11		February 11		February 12	

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	355		361		1246		362	
	23 Ursae Majoris		N Velorum		ξ Leonis		H Carinae	
Mag.Spect.	3.75	F0	3.04	K5	5.12	G5	5.52	K2
U.T.	R.A.		R.A.		R.A.		R.A.	
	h	m	h	m	h	m	h	m
	+ 63 07		- 56 57		+ 11 21		- 73 00	
1 <sup>d</sup>	27 66.5	+ 602	18 74	+ 32	11 73.6	+ 320	32 12.5	+ 659
1 1.1	28 21.5	+ 550	19 55	+ 81	12 03.0	+ 294	32 68.3	+ 568
1 11.1	28 70.2	+ 487	20 83	+128	12 29.0	+ 260	33 12.7	+ 444
1 21.1	29 10.2	+ 400	22 55	+172	12 50.7	+ 217	33 43.5	+ 308
1 31.0	29 40.8	+ 306	24 59	+204	12 67.5	+ 168	33 60.6	+ 171
2 10.0	29 61.3	+ 205	26 90	+231	12 79.4	+ 119	33 64.1	+ 35
2 20.0	29 70.9	+ 96	29 38	+248	12 85.9	+ 65	33 53.5	- 106
3 2.0	29 70.5	- 4	31 88	+250	12 87.7	+ 18	33 30.5	- 230
3 11.9	29 60.6	- 99	34 35	+247	12 85.0	- 27	32 95.9	- 346
3 21.9	29 41.9	- 187	36 64	+229	12 78.5	- 65	32 50.7	- 452
3 31.9	29 16.7	- 252	38 66	+202	12 69.2	- 93	31 97.5	- 532
4 10.8	28 86.0	- 307	40 36	+170	12 57.8	- 114	31 37.1	- 604
4 20.8	28 51.9	- 341	41 65	+129	12 45.1	- 127	30 71.3	- 658
4 30.8	28 16.4	- 355	42 51	+ 86	12 32.1	- 130	30 02.8	- 685
5 10.8	27 80.5	- 359	42 90	+ 39	12 19.4	- 127	29 32.1	- 707
5 20.7	27 46.4	- 341	42 81	- 9	12 07.7	- 117	28 61.6	- 705
5 30.7	27 15.5	- 309	42 27	- 54	11 97.5	- 102	27 93.3	- 683
6 9.7	26 88.2	- 273	41 28	- 99	11 89.1	- 84	27 27.8	- 655
6 19.7	26 66.2	- 220	39 87	-141	11 83.0	- 61	26 67.7	- 601
6 29.6	26 49.7	- 165	38 12	-175	11 79.2	- 38	26 14.1	- 536
7 9.6	26 39.0	- 107	36 02	-210	11 77.8	- 14	25 68.0	- 461
7 19.6	26 35.2	+ 287	33 65	-237	11 79.2	+ 14	25 31.7	- 363
7 29.5	26 37.6	+ 24	31 07	-258	11 83.1	+ 39	25 05.5	- 262
8 8.5	26 46.5	+ 89	28 30	-277	11 89.8	+ 67	24 90.6	- 149
8 18.5	26 62.5	+ 160	25 42	-288	11 98.3	+ 85	24 88.3	- 23
8 28.5	26 84.5	+ 220	22 49	-293	12 10.7	+ 124	24 98.1	+ 98
9 7.4	27 13.2	+ 287	19 53	-296	12 25.8	+ 151	25 21.0	+ 229
9 17.4	27 48.4	+ 352	16 64	-289	12 43.9	+ 181	25 56.7	+ 357
9 27.4	27 89.2	+ 408	13 84	-280	12 64.8	+ 209	26 03.7	+ 470
10 7.4	28 36.1	+ 469	11 18	-266	12 88.8	+ 240	26 62.1	+ 584
10 17.3	28 88.1	+ 520	08 77	-241	13 15.5	+ 267	27 29.6	+ 675
10 27.3	29 44.6	+ 565	06 61	-216	13 44.8	+ 293	28 03.9	+ 743
11 6.3	30 05.3	+ 607	04 78	-183	13 76.4	+ 316	28 83.8	+ 799
11 16.2	30 68.3	+ 630	03 36	-142	14 09.5	+ 331	29 65.5	+ 817
11 26.2	31 32.8	+ 645	02 36	-100	14 43.5	+ 340	30 46.6	+ 811
12 6.2	31 97.3	+ 645	01 84	- 52	14 77.7	+ 342	31 24.7	+ 781
12 16.2	32 59.4	+ 621	01 82	- 2	15 10.8	+ 331	31 96.0	+ 713
12 26.1	33 18.0	+ 586	02 29	+ 47	15 42.1	+ 313	32 58.9	+ 629
12 36.1	33 70.9	+ 529	03 26	+ 97	15 70.6	+ 285	33 11.3	+ 524
		+ 453		+143		+ 244		+ 394
Mean Place	28.467	17.77	48.678	88.64	13.145	36.17	30.728	76.04
sec δ, tan δ	+2.212	+1.973	+1.835	-1.538	+1.020	+0.201	+3.424	-3.275
dα(v), dδ(v)	+0.093	-0.32	+0.036	-0.32	+0.064	-0.32	+0.009	-0.32
dα(ε), dδ(ε)	+0.105	+0.61	-0.082	+0.61	+0.011	+0.60	-0.174	+0.60
Dble.Trans.	February 12		February 12		February 13		February 13	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	358		1247		357		360	
	9 Ursae Majoris		160 G. Hydrae		24 Ursae Majoris		10 Leonis Minoris	
Mag.Spect.	3.26	F8p	5.16	K0	4.57	G0	4.62	G5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	9 31	+ 51 44	9 32	- 21 02	9 33	+ 69 53	9 33	+ 36 27
1 -8.9	<sup>s</sup> 56.473 + 464	24.91 - 13	<sup>s</sup> 33.870 + 311	58.70 -261	<sup>s</sup> 17.874 + 759	25.91 + 53	<sup>s</sup> 22.586 + 381	34.64 - 74
1 1.1	56.900 + 427	25.20 + 29	34.152 + 282	61.42 -272	18.568 + 694	26.95 +104	22.937 + 351	34.23 - 41
1 11.1	57.278 + 378	25.20 + 73	34.397 + 245	-280	19.613 + 613	28.48 +153	23.512 + 314	34.18 - 5
1 21.1	57.592 + 314	25.93 +114	34.397 + 199	64.22 -277	19.181 + 502	28.48 +198	23.251 + 261	34.18 + 32
1 31.0	57.835 + 243	27.07 +148	34.596 + 150	66.99 -266	19.683 + 381	30.46 +231	23.512 + 206	34.50 + 63
2 10.0	58.002 + 167	30.30 +175	34.844 + 98	72.16 -251	20.317 + 253	35.34 +257	23.863 + 145	36.04 + 91
2 20.0	58.087 + 85	32.25 +195	34.890 + 46	74.45 -229	20.429 + 112	38.07 +273	23.944 + 81	37.19 +115
3 2.0	58.098 + 11	32.25 +204	34.888 - 2	76.48 -203	20.411 - 18	40.80 +273	23.967 + 23	38.48 +129
3 11.9	58.037 - 61	34.29 +206	34.843 - 45	78.25 -177	20.268 - 143	43.47 +267	23.935 - 32	39.86 +138
3 21.9	57.914 - 123	36.34 +195	34.760 - 83	79.69 -144	20.010 - 258	45.93 +246	23.854 - 81	41.25 +139
3 31.9	57.743 - 171	40.06 +177	34.650 - 110	80.83 -114	19.665 - 345	48.08 +215	23.737 - 117	42.57 +132
4 10.8	57.533 - 210	41.59 +153	34.518 - 132	81.65 - 82	19.245 - 420	49.88 +180	23.591 - 146	43.79 +122
4 20.8	57.299 - 234	42.80 +121	34.373 - 145	81.65 - 50	18.776 - 469	51.21 +133	23.428 - 163	44.82 +103
4 30.8	57.057 - 242	43.66 + 86	34.225 - 148	82.34 - 19	18.286 - 490	52.07 + 86	23.262 - 167	45.64 + 82
5 10.8	56.814 - 243	44.16 + 50	34.077 - 148	82.22 + 12	17.787 - 499	52.42 + 35	23.094 - 167	46.22 + 58
5 20.7	56.586 - 228	44.25 + 9	33.938 - 139	81.79 + 43	17.308 - 479	52.24 - 18	22.938 - 156	46.55 + 33
5 30.7	56.381 - 205	43.97 - 28	33.813 - 125	81.09 + 70	16.866 - 442	51.58 - 66	22.802 - 136	46.61 + 6
6 9.7	56.204 - 177	43.31 - 66	33.702 - 111	80.13 + 96	16.470 - 396	50.43 -115	22.686 - 116	46.42 - 19
6 19.7	56.065 - 139	42.29 -102	33.614 - 88	78.92 +121	16.142 - 328	48.83 -160	22.600 - 86	45.98 - 44
6 29.6	55.966 - 99	40.96 -133	33.548 - 66	77.53 +139	15.886 - 256	46.85 -198	22.543 - 57	45.30 - 68
7 9.6	55.908 - 58	39.34 -162	33.505 - 43	75.95 +158	15.707 - 179	44.52 -233	22.517 - 26	44.41 - 89
7 19.6	55.898 - 10	37.46 -188	33.491 - 14	74.27 +168	15.619 - 88	41.89 -263	22.526 + 9	43.31 -110
7 29.5	55.931 + 33	35.38 -208	33.503 + 12	72.53 +174	15.614 - 5	39.05 -284	22.566 + 40	42.04 -127
8 8.5	56.011 + 80	33.11 -227	33.544 + 41	70.78 +175	15.698 + 84	36.02 -303	22.640 + 74	40.60 -144
8 18.5	56.139 + 128	30.71 -240	33.617 + 73	69.11 +167	15.875 + 177	32.88 -314	22.750 + 110	39.00 -160
8 28.5	56.311 + 172	28.23 -248	33.721 + 104	67.58 +153	16.136 + 261	29.71 -317	22.892 + 142	37.28 -172
9 7.4	56.530 + 219	25.67 -256	33.858 + 137	66.24 +134	16.486 + 350	26.53 -318	23.070 + 178	35.44 -184
9 17.4	56.795 + 265	23.11 -256	34.030 + 172	65.20 +104	16.921 + 435	23.44 -309	23.285 + 215	33.52 -192
9 27.4	57.102 + 307	20.59 -252	34.233 + 203	64.48 + 72	17.432 + 511	20.49 -295	23.532 + 247	31.54 -198
10 7.4	57.455 + 353	18.13 -246	34.472 + 239	64.15 + 33	18.022 + 590	17.71 -278	23.815 + 283	29.52 -202
10 17.3	57.847 + 392	15.82 -231	34.740 + 268	64.28 - 13	18.679 + 657	15.21 -250	24.131 + 316	27.51 -201
10 27.3	58.274 + 427	13.69 -213	35.035 + 295	64.83 - 55	19.393 + 714	13.02 -219	24.476 + 345	25.55 -196
11 6.3	58.734 + 460	11.78 -191	35.354 + 319	65.85 -102	20.161 + 768	11.21 -181	24.848 + 372	23.67 -188
11 16.2	59.214 + 480	10.19 -159	35.687 + 333	67.32 -147	20.958 + 797	09.85 -136	25.238 + 390	21.94 -173
11 26.2	59.707 + 493	08.93 -126	36.028 + 341	69.17 -185	21.773 + 815	08.94 - 91	25.639 + 401	20.42 -152
12 6.2	60.202 + 495	08.06 - 87	36.367 + 339	71.39 -222	22.588 + 815	08.56 - 38	26.044 + 405	19.13 -129
12 16.2	60.681 + 479	07.62 - 44	36.692 + 325	73.87 -248	23.372 + 784	08.73 + 17	26.436 + 392	18.16 - 97
12 26.1	61.133 + 452	07.61 - 1	36.996 + 304	76.54 -267	24.109 + 737	09.41 + 68	26.809 + 373	17.51 - 65
12 36.1	61.544 + 411	08.06 + 45	37.267 + 271	79.34 -280	24.776 + 667	10.63 +122	27.149 + 340	17.22 - 29
	+ 354	+ 86	+ 229	-281	+ 568	+ 168	+ 294	+ 7
Mean Place	57.563	21.93	35.113	80.27	18.244	25.83	23.935	28.82
sec δ, tan δ	+1.615	+1.268	+1.072	-0.385	+2.909	+2.731	+1.243	+0.739
dα(ψ), dδ(ψ)	+0.081	-0.32	+0.055	-0.32	+0.104	-0.32	+0.073	-0.32
dα(ε), dδ(ε)	+0.068	+0.60	-0.021	+0.60	+0.146	+0.60	+0.040	+0.60
Dble.Trans.	February 13		February 13		February 13		February 13	

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	1248		1249		1250		364	
	17 G. Antliae		Bradley 1352 (Hydrae)		ι Hydrae		κ Hydrae	
Mag. Spect.	5.63	K0	4.78	K0	4.10	K0	4.96	B3
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	9 36	-32 06	9 37	+ 4 42	9 39	- 1 04	9 39	-14 15
1 8.9	33.872 +327	39 13 -276	43.661 +316	52 64 -194	08.591 +313	36 16 -211	38.150 +312	54.59 -245
1 1.1	34.167 +295	42 11 -298	43.952 +291	50.80 -184	08.879 +288	38.23 -207	38.687 +285	57.11 -252
1 11.1	34.422 +255	45.24 -313	44.211 +259	49.09 -171	09.134 +255	40.22 -199	38.435 +252	59.66 -255
1 21.1	34.627 +205	48.43 -319	44.426 +215	47.57 -152	09.347 +213	42.05 -183	38.894 +207	62.14 -234
1 31.0	34.779 +152	51.56 -313	44.595 +189	46.28 -129	09.514 +167	43.68 -163	39.054 +160	64.48 -248
2 10.0	34.876 +97	54.59 -303	44.716 +121	45.22 -106	09.632 +118	45.10 -142	39.165 +111	66.65 -217
2 20.0	34.917 +41	57.43 -284	44.784 +68	44.41 -81	09.698 +66	46.27 -117	39.224 +59	68.60 -195
3 2.0	34.907 -10	60.02 -259	44.805 +21	43.83 -58	09.718 +20	47.20 -93	39.236 +12	70.29 -169
3 11.9	34.851 -56	62.34 -232	44.783 -22	43.47 -36	09.696 -22	47.89 -69	39.206 -30	71.72 -143
3 21.9	34.753 -98	64.31 -197	44.723 -60	43.32 -15	09.636 -46	48.35 -46	39.137 -69	72.86 -114
3 31.9	34.626 -127	65.94 -163	44.636 -87	43.33 +1	09.548 -88	48.60 -25	39.042 -95	73.73 -87
4 10.8	34.475 -151	67.21 -127	44.527 -109	43.49 +16	09.439 -109	48.67 -7	38.924 -118	74.33 -60
4 20.8	34.308 -167	68.08 -87	44.404 -123	43.77 +28	09.317 -122	48.57 +10	38.793 -131	74.65 -32
4 30.8	34.135 -173	68.58 -50	44.279 -125	44.14 +37	09.192 -125	48.32 +25	38.658 -135	74.71 -6
5 10.8	33.962 -173	68.69 -11	44.154 -125	44.59 +45	09.067 -125	47.94 +38	38.523 -135	74.53 +18
5 20.7	33.795 -167	68.40 +29	44.038 -116	45.10 +51	08.951 -116	47.44 +50	38.395 -128	74.09 +44
5 30.7	33.641 -154	67.77 +63	43.937 -101	45.64 +54	08.848 -103	46.85 +59	38.281 -114	73.45 +66
6 9.7	33.502 -139	66.78 +99	43.850 -87	46.23 +59	08.760 -88	46.16 +69	38.180 -101	72.59 +86
6 19.7	33.384 -118	65.45 +133	43.785 -65	46.83 +60	08.692 -68	45.42 +74	38.099 -81	71.55 +104
6 29.6	33.290 -94	63.87 +158	43.742 -43	47.42 +59	08.646 -46	44.63 +79	38.040 -59	70.37 +118
7 9.6	33.221 -69	62.02 +185	43.721 -21	48.00 +58	08.621 -25	43.81 +82	38.002 -38	69.05 +132
7 19.6	33.182 -39	60.00 +202	43.727 +6	48.53 +53	08.623 +2	43.00 +7	37.991 -11	67.67 +138
7 29.5	33.173 -9	57.86 +214	43.756 +29	49.00 +47	08.648 +25	42.23 +77	38.004 +13	66.25 +142
8 8.5	33.197 +24	55.66 +220	43.812 +56	49.37 +37	08.699 +51	41.53 +70	38.044 +40	64.85 +140
8 18.5	33.258 +61	53.50 +216	43.893 +81	49.61 +24	08.778 +79	40.96 +57	38.114 +70	63.54 +131
8 28.5	33.353 +95	51.46 +204	44.002 +109	49.75 +14	08.883 +106	40.50 +46	38.213 +99	62.36 +118
9 7.4	33.487 +134	49.59 +187	44.142 +140	49.68 -7	09.018 +135	40.24 +26	38.344 +131	61.37 +99
9 17.4	33.660 +173	48.03 +156	44.313 +171	49.37 -31	09.185 +167	40.24 +0	38.507 +163	60.66 +71
9 27.4	33.870 +210	46.82 +121	44.511 +198	48.84 -53	09.381 +196	40.48 -24	38.702 +195	60.25 +41
10 7.4	34.119 +249	46.02 +80	44.741 +230	48.04 -80	09.609 +228	41.02 -54	38.930 +228	60.20 +5
10 17.3	34.402 +283	45.73 +29	45.000 +259	46.98 -106	09.865 +256	41.87 -85	39.189 +259	60.55 -35
10 27.3	34.715 +313	45.93 -20	45.284 +284	45.69 -129	10.147 +282	43.01 -114	39.474 +285	61.29 -74
11 6.3	35.053 +338	46.67 -74	45.593 +309	44.15 -154	10.453 +306	44.44 -143	39.784 +310	62.43 -114
11 16.2	35.407 +354	47.94 -127	45.917 +324	42.43 -172	10.776 +323	46.12 -168	40.110 +326	63.96 -153
11 26.2	35.768 +361	49.69 -175	46.251 +334	40.57 -186	11.108 +332	48.00 -188	40.444 +334	65.82 -186
12 6.2	36.127 +359	51.90 -221	46.588 +337	38.61 -196	11.442 +334	50.03 -203	40.780 +336	67.97 -215
12 16.2	36.470 +343	54.48 -258	46.915 +327	36.64 -197	11.766 +324	52.15 -212	41.105 +325	70.34 -237
12 26.1	36.789 +319	57.34 -286	47.224 +309	34.72 -192	12.073 +307	54.27 -212	41.410 +305	72.83 -249
12 36.1	37.073 +284	60.43 -309	47.506 +282	32.89 -183	12.352 +279	56.35 -208	41.686 +276	75.41 -258
	+237	-318	+244	-166	+241	-195	+236	-254
Mean Place	35.010	63.79	45.084	38.28	10.010	52.25	39.501	74.53
sec δ, tan δ	+1.181	-0.628	+1.003	+0.082	+1.000	-0.019	+1.032	-0.254
dα(ψ), dδ(ψ)	+0.051	-0.32	+0.062	-0.32	+0.061	-0.33	+0.057	-0.33
dα(ε), dδ(ε)	-0.034	+0.59	+0.004	+0.58	-0.001	+0.58	-0.014	+0.57
Dble. Trans.	February 14		February 14		February 15		February 15	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	365		363		1251		1252		
	o Leonis		Groombridge 1564 (Ursae Majoris)		15 Leonis		ψ Leonis		
Mag. Spect.	3.76	F5, A3	5.74	K0	5.73	A2	5.62	M0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	9 40	+ 9 57	9 41	+ 69 17	9 42	+ 30 02	9 42	+ 14 04	
1	-8.8	24.421 +323	27.84 -177	05.983 +749	58.81 +39	44.493 +363	20.47 -107	58.396 +329	73.63 -165
1	1.1	24.718 +297	26.20 -164	06.673 +690	59.72 +91	44.830 +337	19.69 -78	58.701 +305	72.16 -147
1	11.1	24.984 +266	24.74 -146	07.286 +613	61.14 +142	45.133 +303	19.24 -45	58.975 +274	70.89 -127
1	21.1	25.206 +222	23.50 -124	07.794 +508	63.01 +187	45.388 +256	19.13 -11	59.204 +229	69.88 -101
1	31.0	25.382 +176	22.51 -99	08.188 +394	65.24 +223	45.591 +203	19.33 +20	59.387 +183	69.12 -76
2	10.0	25.508 +126	21.77 -74	08.457 +269	67.76 +252	45.739 +148	19.83 +50	59.520 +133	68.63 -49
2	20.0	25.582 +74	21.28 -49	08.589 +132	70.45 +269	45.827 +88	20.58 +75	59.599 +79	68.40 -23
3	2.0	25.608 +26	21.02 -6	08.595 +6	73.17 +272	45.861 +34	21.51 +93	59.629 +30	68.39 -1
3	11.9	25.590 -18	20.97 -25	08.478 -117	75.86 +269	45.843 -18	22.58 +107	59.614 -15	68.57 +18
3	21.9	25.532 -58	21.09 +12	08.247 -231	78.35 +249	45.779 -64	23.71 +113	59.559 -55	68.91 +34
3	31.9	25.446 -86	21.35 +26	07.929 -318	80.56 +221	45.681 -98	24.83 +112	59.475 -84	69.35 +44
4	10.9	25.338 -108	21.71 +36	07.535 -394	82.43 +187	45.555 -126	25.90 +107	59.367 -108	69.87 +52
4	20.8	25.216 -122	22.15 +44	07.089 -446	83.85 +142	45.412 -143	26.87 +97	59.244 -123	70.43 +56
4	30.8	25.090 -126	22.62 +47	06.620 -469	84.80 +95	45.264 -148	27.67 +80	59.117 -127	70.99 +56
5	10.8	24.964 -126	23.13 +51	06.138 -482	85.26 +46	45.115 -149	28.32 +65	58.990 -127	71.54 +56
5	20.7	24.848 -116	23.64 +51	05.671 -467	85.19 -7	44.975 -140	28.76 +44	58.872 -118	72.06 +52
5	30.7	24.745 -103	24.14 +50	05.238 -433	84.63 -56	44.851 -124	28.99 +23	58.767 -105	72.51 +45
6	9.7	24.658 -87	24.62 +48	04.845 -393	83.58 -105	44.745 -106	29.02 +3	58.678 -89	72.92 +41
6	19.7	24.592 -66	25.07 +45	04.515 -330	82.07 -151	44.664 -81	28.84 -18	58.611 -67	73.24 +32
6	29.6	24.549 -43	25.46 +39	04.252 -263	80.17 -190	44.609 -55	28.46 -38	58.566 -45	73.49 +25
7	9.6	24.528 -21	25.82 +36	04.062 -190	77.91 -226	44.580 -29	27.89 -57	58.544 -22	73.66 +17
7	19.6	24.534 +6	26.08 +26	03.956 -106	75.33 -258	44.583 +3	27.13 -76	58.548 +4	73.72 +6
7	29.6	24.564 +30	26.26 +18	03.931 -25	72.53 -280	44.614 +31	26.22 -91	58.578 +30	73.67 -5
8	8.5	24.621 +57	26.32 +6	03.991 +60	69.52 -301	44.675 +61	25.14 -108	58.635 +57	73.50 -17
8	18.5	24.698 +77	26.20 -12	04.142 +151	66.39 -313	44.768 +93	23.88 -126	58.701 +66	73.32 -18
8	28.5	24.811 +113	26.08 -12	04.373 +231	63.21 -318	44.891 +123	22.48 -140	58.824 +123	72.76 -56
9	7.4	24.953 +142	25.69 -39	04.691 +318	59.99 -322	45.048 +157	20.94 -154	58.966 +142	72.11 -65
9	17.4	25.124 +171	25.09 -60	05.093 +402	56.85 -314	45.239 +191	19.27 -167	59.138 +172	71.28 -83
9	27.4	25.324 +200	24.28 -81	05.570 +477	53.83 -302	45.462 +223	17.50 -177	59.339 +201	70.27 -101
10	7.4	25.556 +232	23.25 -103	06.126 +556	50.96 -287	45.720 +258	15.64 -186	59.572 +233	69.05 -122
10	17.3	25.816 +260	22.00 -125	06.751 +625	48.37 -259	46.010 +290	13.73 -191	59.835 +263	67.65 -140
10	27.3	26.103 +287	20.56 -144	07.434 +683	46.06 -231	46.328 +318	11.80 -193	59.835 +289	66.09 -156
11	6.3	26.414 +311	18.92 -164	08.172 +738	44.12 -194	46.674 +346	09.88 -192	60.124 +315	66.09 -171
11	16.3	26.742 +328	17.16 -176	08.944 +772	42.63 -149	47.039 +365	08.05 -183	60.439 +333	64.38 -180
11	26.2	27.081 +339	15.31 -185	09.735 +791	41.58 -105	47.417 +378	06.35 -170	60.772 +344	62.58 -183
12	6.2	27.423 +342	13.43 -188	10.532 +797	41.06 -52	47.799 +382	04.83 -152	61.464 +348	58.92 -183
12	16.2	27.756 +333	11.58 -185	11.302 +770	41.09 +3	48.172 +373	03.56 -127	61.803 +339	57.18 -174
12	26.1	28.071 +315	09.84 -174	12.032 +730	41.64 +55	48.528 +356	02.56 -100	62.126 +323	55.57 -161
12	36.1	28.360 +289	08.23 -161	12.696 +664	42.73 +109	48.855 +327	01.88 -68	62.422 +296	54.14 -143
		+250	-140	+571	+158	+286	-34	+257	-119
Mean Place	25.862	15.01	06.419	58.90	45.909	13.19	59.856	62.02	
sec δ, tan δ	+1.015	+0.176	+2.829	+2.646	+1.155	+0.578	+1.031	+0.251	
da(ψ), dδ(ψ)	+0.064	-0.33	+0.101	-0.33	+0.070	-0.33	+0.065	-0.33	
da(ε), dδ(ε)	+0.010	+0.57	+0.145	+0.57	+0.032	+0.56	+0.014	+0.56	
Dble. Trans.	February 15		February 15		February 16		February 16		



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	366		1254		367		1253	
	♁ Antliae		I Carinae		ε Leonis		B.D. +19° 2254 (Leonis)	
Mag. Spect.	4.98	F5p	3.6 to 4.8	G0	3.12	G0p	6.92	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ′	h m	° ′	h m	° ′	h m	° ′
	9 43	-27 42	9 44	-62 26	9 45	+23 50	9 45	+18 44
1 -8.8	34.715 +324	02.86 -268	52.307 +485	12.52 -274	03.758 +348	21.50 -132	05.571 +337	56.52 -150
1 1.1	35.010 +295	05.73 -287	52.731 +424	15.67 -315	04.081 +323	20.44 -106	05.885 +314	55.23 -129
1 11.1	35.268 +258	08.72 -299	53.087 +356	19.17 -350	04.372 +291	19.65 -79	06.166 +281	54.19 -104
1 21.1	35.479 +211	11.75 -303	53.356 +269	22.90 -373	04.618 +246	19.18 -47	06.404 +238	53.43 -76
1 31.0	35.639 +160	14.71 -296	53.538 +182	26.74 -384	04.814 +196	19.00 -18	06.594 +190	52.95 -48
2 10.0	35.746 +107	17.56 -285	53.631 +93	30.62 -388	04.957 +143	19.11 +11	06.733 +139	52.74 -21
2 20.0	35.799 +53	20.21 -265	53.630 -1	34.42 -380	05.044 +87	19.49 +38	06.817 +84	52.79 +5
3 2.0	35.802 +3	22.61 -240	53.547 -83	38.04 -362	05.079 +35	20.06 +57	06.851 +34	53.06 +27
3 11.9	35.760 -42	24.75 -214	53.387 -160	41.44 -340	05.065 -14	20.79 +73	06.838 -13	53.51 +45
3 21.9	35.678 -82	26.55 -180	53.156 -231	44.51 -307	05.008 -57	21.63 +84	06.784 -54	54.09 +58
3 31.9	35.567 -111	28.03 -148	52.871 -285	47.21 -270	04.919 -89	22.51 +88	06.699 -85	54.75 +66
4 10.9	35.431 -136	29.18 -115	52.539 -332	49.51 -230	04.804 -115	23.39 +88	06.589 -110	55.45 +70
4 20.8	35.280 -151	29.95 -77	52.171 -368	51.33 -182	04.673 -131	24.22 +83	06.463 -126	56.14 +69
4 30.8	35.123 -157	30.38 -43	51.786 -385	52.66 -133	04.536 -137	24.95 +73	06.333 -130	56.79 +65
5 10.8	34.963 -160	30.46 -8	51.386 -400	53.50 -84	04.399 -137	25.58 +63	06.203 -130	57.39 +60
5 20.7	34.810 -153	30.17 +29	50.986 -400	53.78 -28	04.270 -129	26.07 +49	06.080 -123	57.90 +51
5 30.7	34.669 -141	29.57 +60	50.599 -387	53.57 +21	04.156 -114	26.41 +34	05.972 -108	58.30 +40
6 9.7	34.541 -128	28.64 +93	50.229 -370	52.83 +74	04.058 -98	26.61 +20	05.879 -93	58.61 +31
6 19.7	34.434 -107	27.41 +123	49.889 -340	51.59 +124	03.983 -75	26.64 +3	05.809 -70	58.80 +19
6 29.6	34.348 -86	25.95 +146	49.588 -301	49.92 +167	03.932 -51	26.51 -13	05.761 -48	58.87 +7
7 9.6	34.285 -63	24.25 +170	49.329 -259	47.83 +209	03.906 -26	26.24 -27	05.737 -24	58.83 -4
7 19.6	34.250 -35	22.40 +185	49.128 -201	45.38 +245	03.909 +3	25.80 -44	05.740 +3	58.66 -17
7 29.6	34.243 -7	20.45 +195	48.984 -144	42.69 +269	03.938 +29	25.23 -57	05.769 +29	58.36 -30
8 8.5	34.266 +23	18.45 +200	48.907 -77	39.79 +290	03.995 +57	24.52 -71	05.826 +57	57.94 -42
8 18.5	34.323 +57	16.50 +195	48.905 -2	36.81 +298	04.080 +85	23.63 -89	05.906 +80	57.40 -54
8 28.5	34.412 +89	14.65 +185	48.975 +70	33.85 +296	04.195 +115	22.57 -106	06.017 +111	56.60 -80
9 7.4	34.539 +127	12.99 +166	49.125 +150	30.99 +286	04.342 +147	21.36 -121	06.160 +143	55.68 -92
9 17.4	34.702 +163	11.62 +137	49.355 +230	28.39 +260	04.522 +180	20.00 -136	06.334 +174	54.59 -109
9 27.4	34.902 +200	10.58 +104	49.657 +302	26.13 +226	04.732 +210	18.50 -150	06.538 +204	53.34 -125
10 7.4	35.139 +237	09.93 +65	50.034 +377	24.29 +184	04.976 +244	16.87 -163	06.775 +237	51.91 -143
10 17.3	35.409 +270	09.77 +16	50.475 +441	23.00 +129	05.251 +275	15.13 -174	07.042 +267	50.34 -157
10 27.3	35.709 +300	10.07 -30	50.965 +490	22.28 +72	05.554 +303	13.32 -181	07.336 +294	48.65 -169
11 6.3	36.036 +327	10.88 -81	51.499 +534	22.20 +8	05.884 +330	11.46 -186	07.657 +321	46.86 -179
11 16.3	36.379 +343	12.18 -130	52.054 +555	22.80 -60	06.232 +348	09.62 -184	07.996 +339	45.04 -182
11 26.2	36.731 +352	13.94 -176	52.614 +560	24.03 -123	06.593 +361	07.84 -178	08.347 +351	43.22 -182
12 6.2	37.084 +353	16.11 -217	53.164 +550	25.90 -187	06.959 +366	06.18 -166	08.702 +355	41.46 -176
12 16.2	37.423 +339	18.63 -252	53.679 +515	28.34 -244	07.317 +358	04.70 -148	09.050 +348	39.83 -163
12 26.1	37.740 +317	21.40 -277	54.147 +468	31.24 -290	07.658 +341	03.45 -125	09.381 +331	38.38 -145
12 36.1	38.024 +284	24.36 -296	54.552 +405	34.57 -333	07.972 +314	02.46 -99	09.686 +305	37.16 -122
	38.024 +242	24.36 -303	54.552 +326	34.57 -362	07.972 +274	02.46 -69	09.686 +265	37.16 -96
Mean Place	35.965	26.59	52.538	43.62	05.206	12.65	07.035	46.24
sec δ, tan δ	+1.130	-0.525	+2.162	-1.917	+1.093	+0.442	+1.056	+0.339
da(ψ), dδ(ψ)	+0.053	-0.33	+0.033	-0.33	+0.068	-0.33	+0.066	-0.33
da(ε), dδ(ε)	-0.029	+0.56	-0.106	+0.56	+0.024	+0.56	+0.019	+0.56
Dbble. Trans.	February 16		February 16		February 16		February 16	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1255		368		370		1256	
	Bradley 1369 (Ursae Majoris)		v Ursae Majoris		6 Sextantis		162 G. Velorum	
Mag. Spect.	5.20	G0	3.89	F0	6.00	A2	5.72	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	9 47	+ 46 04	9 50	+ 59 05	9 50	- 4 10	9 50	- 46 07
1 <sup>d</sup> -8.8	42.115 <sup>s</sup> + 435	67.27 - 52	01.282 <sup>s</sup> + 553	71.06 - 8	31.739 <sup>s</sup> + 317	29.85 - 221	47.371 <sup>s</sup> + 377	21.22 - 276
1 1.1	42.520 + 405	67.17 - 10	01.796 + 514	71.47 + 41	32.033 + 294	32.05 - 210	47.709 + 338	24.31 - 309
1 11.1	42.884 + 364	67.49 + 32	02.258 + 462	72.37 + 90	32.295 + 262	34.19 - 202	48.002 + 293	27.67 - 336
1 21.1	43.193 + 309	68.23 + 74	02.649 + 391	73.73 + 136	32.516 + 221	36.21 - 202	48.236 + 234	31.19 - 352
1 31.0	43.440 + 247	69.33 + 110	02.958 + 309	75.46 + 173	32.692 + 176	38.03 - 182	48.410 + 174	34.75 - 356
2 10.0	43.619 + 179	70.74 + 141	03.181 + 223	77.51 + 205	32.820 + 128	39.66 - 163	48.520 + 110	38.29 - 354
2 20.0	43.725 + 106	72.40 + 166	03.307 + 126	79.79 + 228	32.896 + 76	41.05 - 139	48.564 + 44	41.71 - 342
3 2.0	43.764 + 39	74.19 + 179	03.345 + 38	82.16 + 237	32.926 + 30	42.18 - 113	48.550 - 14	44.91 - 320
3 11.9	43.739 - 25	76.05 + 186	03.295 - 50	84.55 + 239	32.913 - 13	43.07 - 89	48.480 - 70	47.88 - 297
3 21.9	43.655 - 84	77.89 + 184	03.167 - 126	86.85 + 230	32.862 - 51	43.71 - 64	48.360 - 120	50.50 - 262
3 31.9	43.526 - 129	79.61 + 172	02.976 - 191	88.93 + 208	32.783 - 79	44.13 - 42	48.203 - 157	52.76 - 226
4 10.9	43.361 - 165	81.16 + 155	02.733 - 243	90.76 + 183	32.681 - 102	44.35 - 22	48.014 - 189	54.65 - 189
4 20.8	43.171 - 190	82.45 + 129	02.454 - 279	92.22 + 146	32.564 - 117	44.35 + 0	47.803 - 211	56.08 - 143
4 30.8	42.971 - 200	83.45 + 100	02.158 - 296	93.29 + 107	32.442 - 122	44.20 + 15	47.580 - 223	57.08 - 100
5 10.8	42.768 - 203	84.14 + 69	01.854 - 304	93.94 + 65	32.318 - 124	43.88 + 32	47.350 - 230	57.62 - 54
5 20.7	42.574 - 194	84.46 + 32	01.559 - 295	94.13 + 19	32.201 - 117	43.41 + 47	47.122 - 228	57.68 - 6
5 30.7	42.398 - 176	84.45 - 1	01.286 - 273	93.87 - 26	32.095 - 106	42.83 + 58	46.905 - 217	57.31 + 37
6 9.7	42.244 - 154	84.09 - 36	01.039 - 247	93.19 - 68	32.002 - 93	42.13 + 70	46.700 - 185	56.49 + 82
6 19.7	42.120 - 124	83.39 - 70	00.834 - 205	92.08 - 111	31.928 - 74	41.33 + 80	46.517 - 183	55.24 + 125
6 29.6	42.029 - 91	82.39 - 100	00.673 - 161	90.60 - 148	31.874 - 54	40.48 + 85	46.358 - 159	53.63 + 161
7 9.6	41.971 - 58	81.10 - 129	00.558 - 115	88.78 - 182	31.839 - 35	39.56 + 92	46.227 - 131	51.66 + 197
7 19.6	41.954 - 17	79.54 - 156	00.498 - 60	86.64 - 214	31.829 - 10	38.64 + 92	46.131 - 96	49.42 + 224
7 29.6	41.973 + 19	77.78 - 176	00.491 - 7	84.27 - 237	31.843 + 14	37.74 + 90	46.072 - 59	46.98 + 244
8 8.5	42.031 + 58	75.81 - 197	00.538 + 47	81.67 - 260	31.881 + 38	36.90 + 84	46.052 + 20	44.39 + 259
8 18.5	42.131 + 100	73.66 - 215	00.645 + 107	78.92 - 275	31.947 + 66	36.17 + 73	46.080 + 28	41.78 + 261
8 28.5	42.270 + 139	71.40 - 226	00.806 + 161	76.07 - 285	32.039 + 92	35.57 + 60	46.151 + 71	39.22 + 256
9 7.4	42.450 + 180	69.03 - 237	01.025 + 219	73.14 - 293	32.039 + 123	35.14 + 43	46.151 + 122	39.22 + 242
9 17.4	42.674 + 224	66.60 - 243	01.302 + 277	70.22 - 292	32.162 + 155	34.97 + 17	46.273 + 174	36.80 + 216
9 27.4	42.936 + 262	64.16 - 244	01.631 + 329	67.34 - 288	32.503 + 186	35.07 - 10	46.667 + 220	32.82 + 182
10 7.4	43.241 + 305	61.72 - 244	02.018 + 387	64.56 - 278	32.721 + 218	35.47 - 40	46.939 + 272	31.42 + 140
10 17.3	43.585 + 344	59.37 - 235	02.455 + 437	61.96 - 260	32.970 + 249	36.20 - 73	47.254 + 315	30.55 + 87
10 27.3	43.963 + 378	57.14 - 223	02.936 + 481	59.57 - 239	33.246 + 276	37.24 - 104	47.607 + 353	30.22 + 33
11 6.3	44.375 + 412	55.07 - 207	03.461 + 525	57.46 - 211	33.548 + 302	38.61 - 137	47.993 + 386	30.48 - 26
11 16.3	44.810 + 435	53.25 - 182	04.013 + 552	55.72 - 174	33.868 + 320	40.25 - 164	48.398 + 405	31.37 - 89
11 26.2	45.259 + 449	51.71 - 154	04.585 + 572	54.36 - 136	34.200 + 332	42.13 - 188	48.813 + 415	32.82 - 145
12 6.2	45.716 + 457	50.52 - 119	05.165 + 580	53.45 - 91	34.536 + 336	44.21 - 208	49.227 + 414	34.83 - 201
12 16.2	46.162 + 446	49.72 - 80	05.732 + 567	53.03 - 42	34.864 + 328	46.39 - 218	49.622 + 395	37.34 - 251
12 26.1	46.588 + 426	49.32 - 40	06.272 + 540	53.10 + 7	35.175 + 311	48.62 - 223	49.988 + 366	40.24 - 280
12 36.1	46.981 + 393	49.36 + 4	06.770 + 498	53.68 + 58	35.460 + 285	50.84 - 222	50.314 + 326	43.48 - 324
	46.981 + 343	49.36 + 47	06.770 + 434	53.68 + 106	35.460 + 249	50.84 - 212	50.314 + 273	43.48 - 345
Mean Place	43.402	63.87	02.250	70.09	33.207	46.99	48.377	49.71
sec δ, tan δ	+1.442	+1.039	+1.947	+1.671	+1.003	-0.073	+1.443	-1.040
dα(ψ), dδ(ψ)	+0.076	-0.33	+0.085	-0.34	+0.060	-0.34	+0.046	-0.34
dα(ε), dδ(ε)	+0.058	+0.55	+0.094	+0.54	-0.004	+0.54	-0.059	+0.53
Dble. Trans.	February 17		February 17		February 17		February 18	

AT UPPER TRANSIT AT GREENWICH

No.	371		373		1257		375	
	μ Leonis		183 G. Hydrae		18 G. Sextantis		φ Velorum	
Mag.Spect.	4.10	K0	5.16	M0	7.03	K0	3.70	B5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	9 51	+26 04	9 54	-18 56	9 55	- 7 34	9 56	-54 29
1 -8.8	58 418 +356	23 62 -129	12 555 +322	20 72 -252	26 253 +319	33 35 -229	22 425 +427	41.08 -269
1 1.1	58 750 +332	22 60 -102	12 851 +296	23 35 -263	26 548 +295	35 66 -231	22 807 +382	44.16 -308
1 11.1	59 049 +299	21 88 -72	13 115 +264	26 06 -271	26 814 +266	37 95 -229	23 136 +329	47.57 -341
1 21.1	59 305 +256	21 50 -38	13 336 +221	28 75 -269	27 037 +223	40 14 -219	23 398 +262	51.20 -363
1 31.1	59 510 +205	21 43 -7	13 509 +173	31 33 -258	27 216 +179	42 16 -202	23 589 +191	54.92 -372
2 10.0	59 663 +153	21 65 +22	13 633 +124	33 78 -245	27 347 +131	44 00 -184	23 708 +119	58 67 -375
2 20.0	59 758 +95	22 15 +50	13 705 +72	36 01 -223	27 426 +79	45 59 -159	23 751 +43	62 34 -367
3 2.0	59 800 +42	22 85 +70	13 729 +24	38 00 -199	27 459 +33	46 93 -134	23 725 -26	65 82 -348
3 11.9	59 792 -8	23 71 +86	13 709 -20	39 73 -173	27 450 -93	48 03 -110	23 635 -90	69 09 -327
3 21.9	59 740 -52	24 68 +97	13 650 -59	41 16 -143	27 401 -49	48 86 -83	23 486 -149	72 04 -295
3 31.9	59 654 -86	25 67 +99	13 562 -88	42 31 -115	27 324 -77	49 46 -60	23 292 -194	74 62 -258
4 10.9	59 540 -114	26 65 +98	13 450 -112	43 16 -85	27 223 -101	49 83 -37	23 059 -233	76 83 -221
4 20.8	59 409 -131	27 57 +92	13 322 -128	43 70 -54	27 107 -116	49 96 -13	22 797 -262	78 56 -173
4 30.8	59 271 -138	28 37 +80	13 188 -134	43 95 -25	26 986 -121	49 91 +5	22 519 -278	79 85 -129
5 10.8	59 131 -140	29 05 +68	13 050 -138	43 93 +2	26 861 -125	49 66 +25	22 228 -291	80 65 -80
5 20.7	58 998 -133	29 56 +51	12 917 -133	43 61 +32	26 742 -119	49 23 +43	21 937 -291	80 94 -29
5 30.7	58 879 -119	29 90 +34	12 795 -122	43 05 +56	26 634 -108	48 65 +58	21 655 -282	80 75 +19
6 9.7	58 775 -104	30 07 +17	12 684 -111	42 23 +82	26 537 -97	47 92 +73	21 384 -271	80 07 +68
6 19.7	58 694 -81	30 05 -2	12 591 -93	41 19 +104	26 459 -78	47 07 +85	21 136 -248	78 91 +116
6 29.6	58 637 -57	29 86 -19	12 517 -74	39 97 +122	26 399 -60	46 13 +94	20 916 -220	77 35 +156
7 9.6	58 604 -33	29 49 -37	12 463 -54	38 58 +139	26 358 -41	45 11 +102	20 727 -189	75 38 +197
7 19.6	58 599 -5	28 94 -56	12 434 -29	37 08 +150	26 342 -16	44 06 +105	20 580 -147	73 08 +230
7 29.6	58 621 +22	28 24 -70	12 430 -4	35 53 +155	26 348 +6	43 01 +105	20 476 -104	70 54 +254
8 8.5	58 671 +50	27 39 -85	12 452 +22	33 95 +158	26 379 +31	41 99 +102	20 422 -54	67 80 +274
8 18.5	58 750 +79	26 36 -103	12 505 +53	32 43 +152	26 439 +60	41 08 +91	20 424 +2	65 00 +280
8 28.5	58 859 +109	25 16 -120	12 587 +82	31 04 +139	26 525 +86	40 30 +78	20 482 +58	62 21 +279
9 7.4	59 001 +142	23 79 -137	12 703 +116	29 81 +123	26 642 +117	39 69 +61	20 601 +119	59 52 +269
9 17.4	59 176 +175	22 29 -150	12 853 +150	28 85 +96	26 792 +150	39 34 +35	20 783 +182	57 08 +244
9 27.4	59 383 +207	20 66 -163	13 037 +184	28 20 +65	26 972 +180	39 26 +8	21 024 +241	54 96 +212
10 7.4	59 624 +241	18 90 -176	13 257 +220	27 91 +29	27 187 +215	39 50 -24	21 326 +302	53 25 +171
10 17.3	59 897 +273	17 05 -185	13 509 +252	28 04 -13	27 433 +246	40 09 -59	21 681 +355	52 07 +118
10 27.3	60 200 +303	15 14 -191	13 791 +282	28 58 -54	27 707 +274	41 01 -92	22 082 +401	51 44 +63
11 6.3	60 531 +331	13 20 -194	14 101 +310	29 56 -98	28 008 +301	42 29 -128	22 522 +440	51 43 +1
11 16.3	60 882 +351	11 31 -189	14 101 +328	30 97 -141	28 328 +320	43 88 -159	22 522 +462	51 43 -64
11 26.2	61 248 +366	09 50 -181	14 769 +340	32 75 -178	28 660 +332	45 74 -186	23 457 +473	52 07 -124
12 6.2	61 619 +371	07 82 -168	15 112 +343	34 88 -213	28 997 +337	47 84 -210	23 928 +471	55 17 -186
12 16.2	61 984 +365	06 36 -146	15 446 +334	37 28 -240	29 326 +329	50 09 -225	24 376 +448	57 57 -240
12 26.1	62 333 +349	05 14 -122	15 762 +316	39 86 -258	29 639 +313	52 41 -232	24 791 +415	60 42 -285
12 36.1	62 656 +323	04 21 -93	16 050 +288	42 57 -271	29 927 +288	54 75 -234	25 159 +368	63 68 -326
	62 656 +283	04 21 -61	16 050 +248	42 57 -272	29 927 +250	54 75 -228	25 159 +306	63 68 -352
Mean Place	59 873	15.44	13 968	42.37	27 735	51.59	23 260	71.49
sec δ, tan δ	+1.113	+0.489	+1.057	-0.343	+1.009	-0.133	+1.722	-1.402
dα(ψ), dδ(ψ)	+0.068	-0.34	+0.056	-0.34	+0.059	-0.34	+0.042	-0.34
dα(ε), dδ(ε)	+0.028	+0.53	-0.020	+0.52	-0.008	+0.52	-0.080	+0.51
Dble.Trans.	February 18		February 18		February 19		February 19	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	374		372		377		376		
	19 Leonis Minoris		Groombridge 1586 (Ursae Majoris)		η Antliae		12 Sextantis		
Mag. Spect.	5.19	F5	5.96	K0	5.25	F0	6.63	A5	
U.T.	R.A.		R.A.		R.A.		R.A.		
	h m	Dec.	h m	Dec.	h m	Dec.	h m	Dec.	
	9 56	+ 41 06	9 57	+ 72 56	9 58	- 35 49	9 58	+ 3 26	
1	-8.8	50.285 + 411	77.57 - 80	11.550 + 895	38.55 + 29	16.138 + 349	07.76 - 268	59.555 + 324	73.49 - 203
1	1.1	50.670 + 385	77.16 - 41	12.382 + 832	39.38 + 83	16.456 + 318	10.71 - 295	59.858 + 303	71.54 - 195
1	11.1	51.019 + 349	77.16 + 0	13.132 + 750	40.75 + 137	16.737 + 281	13.87 - 316	60.131 + 273	69.71 - 183
1	21.1	51.318 + 299	77.57 + 41	13.132 + 632	42.61 + 186	16.968 + 231	17.14 - 327	60.364 + 233	68.07 - 164
1	31.1	51.560 + 242	78.34 + 77	13.764 + 500	44.87 + 226	17.146 + 178	20.39 - 325	60.552 + 188	66.64 - 143
2	10.0	51.740 + 180	79.44 + 110	14.621 + 357	47.44 + 257	17.269 + 123	23.60 - 321	60.693 + 141	65.45 - 119
2	20.0	51.853 + 113	80.81 + 137	14.817 + 196	50.23 + 279	17.334 + 65	26.65 - 305	60.782 + 89	64.52 - 93
3	2.0	51.903 + 50	82.36 + 155	14.861 + 44	53.07 + 284	17.346 + 12	29.47 - 282	60.824 + 42	63.84 - 68
3	11.9	51.894 - 9	84.01 + 165	14.757 - 104	55.90 + 283	17.309 - 37	32.05 - 258	60.823 - 1	63.38 - 46
3	21.9	51.830 + 64	85.69 + 168	14.511 - 246	58.56 + 266	17.228 - 81	34.31 - 226	60.782 - 41	63.15 - 23
3	31.9	51.724 - 106	87.29 + 160	14.154 - 357	60.94 + 238	17.114 - 114	36.22 - 191	60.711 - 71	63.09 - 6
4	10.9	51.583 - 141	88.78 + 149	13.698 - 456	62.99 + 205	16.971 - 143	37.79 - 157	60.617 - 94	63.20 + 11
4	20.8	51.418 - 165	90.06 + 128	13.169 - 529	64.60 + 161	16.809 - 162	38.94 - 115	60.506 - 111	63.45 + 25
4	30.8	51.243 - 175	91.10 + 104	12.600 - 569	65.72 + 112	16.637 - 172	39.72 - 78	60.389 - 117	63.79 + 34
5	10.8	51.063 - 180	91.87 + 77	12.007 - 593	66.34 + 62	16.459 - 178	40.10 - 38	60.270 - 119	64.23 + 44
5	20.8	50.890 - 173	92.33 + 46	11.420 - 587	66.40 + 6	16.284 - 175	40.05 + 5	60.155 - 115	64.74 + 51
5	30.7	50.732 - 158	92.48 + 15	10.862 - 558	65.95 - 45	16.117 - 167	39.64 + 41	60.052 - 103	65.29 + 55
6	9.7	50.591 - 141	92.32 - 16	10.345 - 517	64.99 - 96	15.961 - 156	38.84 + 80	59.960 - 92	65.88 + 59
6	19.7	50.477 - 114	91.85 - 47	09.893 - 452	63.53 - 146	15.823 - 138	37.68 + 116	59.886 - 74	66.49 + 61
6	29.6	50.391 - 86	91.10 - 75	09.516 - 377	61.65 - 188	15.706 - 117	36.22 + 146	59.831 - 55	67.10 + 61
7	9.6	50.334 - 57	90.07 - 103	09.221 - 295	59.37 - 228	15.611 - 95	34.46 + 176	59.795 - 36	67.71 + 61
7	19.6	50.312 - 22	88.79 - 128	09.221 - 197	56.74 - 263	15.545 - 66	32.47 + 199	59.784 - 11	68.27 + 56
7	29.6	50.323 + 11	87.30 - 149	08.924 - 102	53.86 - 288	15.508 - 37	30.34 + 213	59.784 + 11	68.76 + 49
8	8.5	50.367 + 44	85.59 - 171	08.921 - 1	50.74 - 312	15.504 - 4	28.10 + 224	59.795 + 35	68.76 + 41
8	18.5	50.450 + 83	83.70 - 189	09.029 + 108	47.48 - 326	15.537 + 33	25.85 + 225	59.892 + 62	69.43 + 26
8	28.5	50.567 + 117	81.67 - 203	09.235 + 206	44.13 - 335	15.606 + 69	23.68 + 217	59.977 + 85	69.58 + 15
9	7.5	50.724 + 157	79.49 - 218	09.548 + 313	40.74 - 339	15.716 + 110	21.65 + 203	60.096 + 119	69.56 - 2
9	17.4	50.920 + 196	77.23 - 226	09.965 + 417	37.41 - 333	15.870 + 154	19.89 + 176	60.247 + 151	69.29 - 27
9	27.4	51.152 + 232	74.92 - 231	10.475 + 510	34.18 - 323	16.064 + 194	18.45 + 144	60.427 + 180	68.79 - 50
10	7.4	51.426 + 274	72.57 - 235	11.085 + 610	31.11 - 307	16.301 + 237	17.40 + 105	60.640 + 213	68.02 - 77
10	17.3	51.737 + 311	70.26 - 231	11.782 + 697	28.31 - 280	16.577 + 276	16.85 + 55	60.884 + 244	66.97 - 105
10	27.3	52.082 + 345	68.01 - 225	12.553 + 771	25.80 - 251	16.888 + 311	16.79 + 6	61.157 + 273	65.68 - 129
11	6.3	52.461 + 379	65.87 - 214	13.998 + 845	23.66 - 214	17.230 + 342	17.28 - 49	61.477 + 300	64.14 - 154
11	16.3	52.863 + 402	63.94 - 193	13.288 + 890	21.98 - 168	17.230 + 362	18.33 - 105	61.557 + 320	62.44 - 175
11	26.2	53.281 + 418	62.23 - 171	15.210 + 922	20.77 - 121	17.965 + 373	19.88 - 155	62.110 + 333	60.48 - 191
12	6.2	53.708 + 427	60.81 - 142	16.147 + 937	20.10 - 67	18.341 + 376	21.93 - 205	62.449 + 339	58.46 - 202
12	16.2	54.128 + 420	59.76 - 105	17.061 + 914	20.00 - 10	18.704 + 363	24.41 - 248	62.782 + 333	56.41 - 205
12	26.2	54.532 + 404	59.07 - 69	17.934 + 873	20.46 + 46	19.045 + 341	27.20 - 279	63.101 + 319	54.39 - 202
12	36.1	54.906 + 374	58.79 - 28	18.738 + 804	21.48 + 102	19.354 + 309	30.28 - 308	63.396 + 295	52.44 - 195
		+ 330	+ 14	+ 701	+ 155	+ 284	- 322	+ 259	- 178
Mean Place	51.646	73.35	11.664	39.61	17.413	34.15	61.080	58.66	
sec δ, tan δ	+1.327	+0.873	+3.409	+3.260	+1.233	-0.722	+1.002	+0.060	
dα(ψ), dδ(ψ)	+0.073	-0.34	+0.105	-0.34	+0.051	-0.34	+0.062	-0.34	
dα(ε), dδ(ε)	+0.050	+0.51	+0.187	+0.51	-0.041	+0.51	+0.003	+0.50	
Dble. Trans.	February 19		February 19		February 19		February 20		

AT UPPER TRANSIT AT GREENWICH

No.	378		1258		1259		1260	
	$\pi$ Leonis		20 Leonis Minoris		Piazzi 9 <sup>h</sup> 229 (Ursae Majoris)		193 G. Hydrae	
Mag.Spect.	4.89	M0	5.60	G5	5.74	F5	5.80	F0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	9 59	+ 8 06	10 00	+ 31 59	10 03	+ 53 57	10 03	- 24 12
1 -8.8	28 518 <sup>s</sup> + 329	47 10 -190	12 686 <sup>s</sup> + 374	32 48 -117	41 691 <sup>s</sup> + 503	28 37 -43	42 064 <sup>s</sup> + 332	48 34 -255
1 1.1	28 825 + 307	45 32 -178	13 038 + 352	31 63 -83	42 163 + 472	28 41 + 4	42 370 + 306	51.07 -273
1 11.1	29 103 + 278	43 69 -163	13 357 + 319	31 14 -49	42 594 + 431	28 93 + 52	42 644 + 274	53.93 -286
1 21.1	29 340 + 237	42 29 -140	13 631 + 274	31 02 -12	42 963 + 369	29 94 +101	42 875 + 231	56.81 -288
1 31.1	29 532 + 192	41 13 -116	13 854 + 223	31 25 + 23	43 264 + 301	31 33 +139	43 057 + 182	59.63 -282
2 10.0	29 676 + 144	40 22 -91	14 022 + 168	31 80 + 55	43 489 + 225	33 08 +175	43 190 + 133	62.35 -272
2 20.0	29 768 + 92	39 58 -64	14 130 + 108	32 63 + 83	43 631 + 142	35 09 +201	43 269 + 79	64.87 -252
3 2.0	29 813 + 45	39 18 -40	14 181 + 51	33 65 +102	43 693 + 62	37 25 +216	43 300 + 31	67.15 -228
3 11.9	29 813 + 0	39 00 -18	14 180 -1	34 84 +119	43 680 -13	39 49 +224	43 285 -15	69.20 -205
3 21.9	29 773 -40	39 03 + 3	14 129 -51	36 10 +126	43 595 -85	41 69 +220	43 230 -55	70.93 -173
3 31.9	29 703 -70	39 20 + 17	14 043 -86	37 36 +126	43 454 -141	43 74 +205	43 143 -87	72.36 -143
4 10.9	29 608 -95	39 51 + 31	13 925 -118	38 57 +121	43 265 -189	45 59 +185	43 031 -112	73.48 -112
4 20.8	29 497 -111	39 91 + 40	13 786 -139	39 67 +110	43 042 -223	47 14 +155	42 901 -130	74.26 -78
4 30.8	29 380 -117	40 37 + 46	13 639 -147	40 60 + 93	42 802 -240	48 34 +120	42 763 -138	74.72 -46
5 10.8	29 259 -121	40 88 + 51	13 488 -151	41 35 + 75	42 551 -251	49 17 + 83	42 619 -144	74.86 -14
5 20.8	29 144 -115	41 42 + 54	13 342 -146	41 88 + 53	42 305 -246	49 58 + 41	42 478 -141	74.68 + 18
5 30.7	29 041 -103	41 94 + 52	13 209 -133	42 17 + 29	42 075 -230	49 58 + 0	42 346 -132	74.20 + 48
6 9.7	28 949 -92	42 47 + 53	13 092 -117	42 24 + 7	41 865 -210	49 17 -41	42 223 -123	73.43 + 77
6 19.7	28 875 -74	42 97 + 50	12 997 -95	42 06 -18	41 686 -179	48 35 -82	42 116 -107	72.39 +104
6 29.6	28 821 -54	43 43 + 46	12 926 -71	41 66 -40	41 543 -143	47 17 -118	42 028 -88	71.12 +127
7 9.6	28 787 -34	43 84 + 41	12 880 -46	41 04 -62	41 437 -106	45 64 -153	41 959 -69	69.64 +148
7 19.6	28 777 -10	44 18 + 34	12 864 -16	40 20 -84	41 377 -60	43 79 -185	41 915 -44	68.01 +163
7 29.6	28 790 + 13	44 44 + 26	12 876 + 12	39 17 -103	41 359 -18	41 70 -209	41 895 -20	66.29 +172
8 8.5	28 827 + 37	44 58 + 14	12 916 + 40	37 96 -121	41 386 + 27	39 36 -234	41 903 + 8	64.51 +178
8 18.5	28 893 + 66	44 53 -5	12 990 + 74	36 56 -140	41 463 + 77	36 82 -254	41 942 + 39	62.77 +174
8 28.5	28 977 + 84	44 45 -8	13 093 + 103	35 00 -156	41 587 + 124	34 16 -266	42 012 + 70	61.12 +165
9 7.5	29 100 + 123	44 14 -31	13 231 + 138	33 28 -172	41 760 + 173	31 38 -278	42 117 + 105	59.63 +149
9 17.4	29 252 + 152	43 60 -54	13 405 + 174	31 42 -186	41 986 + 226	28 56 -282	42 259 + 142	58.40 +123
9 27.4	29 434 + 182	42 85 -75	13 613 + 208	29 47 -195	42 258 + 272	25 74 -282	42 436 + 177	57.47 + 93
10 7.4	29 650 + 216	41 85 -100	13 857 + 244	27 42 -205	42 583 + 325	22 95 -279	42 652 + 216	56.91 + 56
10 17.3	29 896 + 246	40 62 -123	14 136 + 279	25 32 -210	42 954 + 371	20 30 -265	42 904 + 252	56.79 + 12
10 27.3	30 171 + 275	39 18 -144	14 446 + 310	23 21 -211	43 369 + 415	17 80 -250	43 188 + 284	57.10 -31
11 6.3	30 473 + 302	37 53 -165	14 788 + 342	21 13 -208	43 825 + 456	15 52 -228	43 501 + 313	57.89 -79
11 16.3	30 796 + 323	35 72 -181	15 152 + 364	19 15 -198	44 311 + 486	13 56 -196	43 835 + 334	59.15 -126
11 26.2	31 132 + 336	33 80 -192	15 532 + 380	17 31 -184	44 818 + 507	11 94 -162	44 182 + 347	60.83 -168
12 6.2	31 475 + 343	31 82 -198	15 921 + 389	15 67 -164	45 338 + 520	10 72 -122	44 534 + 352	62.91 -208
12 16.2	31 812 + 337	29 86 -196	16 303 + 382	14 30 -137	45 850 + 512	09 97 -75	44 877 + 343	65.32 -241
12 26.2	32 135 + 323	27 98 -188	16 672 + 369	13 23 -107	46 343 + 493	09 68 -29	45 202 + 325	67.96 -264
12 36.1	32 434 + 299	26 22 -176	17 014 + 342	12 50 -73	46 803 + 460	09 89 + 21	45 501 + 299	70.78 -282
	32 434 + 264	26 22 -156	17 014 + 303	12 50 -37	46 803 + 406	09 89 + 69	45 501 + 259	70.78 -288
Mean Place	30.047	33.70	14.121	25.82	42.860	27.05	43 507	71.72
sec $\delta$ , tan $\delta$	+1.010	+0.142	+1.179	+0.625	+1.700	+1.374	+1.097	-0.450
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.063	-0.34	+0.069	-0.34	+0.079	-0.35	+0.055	-0.35
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.008	+0.50	+0.036	+0.50	+0.080	+0.49	-0.026	+0.49
Dbble.Trans.	February 20		February 20		February 21		February 21	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1261		379		380		381		
	v <sup>2</sup> Hydrae		η Leonis		α Leonis (Regulus)		λ Hydrae		
Mag.Spect.	4.72	B8	3.58	A0p	1.34	B8	3.83	K0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	10 04	-12 59	10 06	+16 49	10 07	+12 01	10 09	-12 16	
1	-8.8	26 48.1 + 324	36.30 -240	34 31.9 + 343	54.48 -168	37 68.6 + 335	72.95 -183	54 21.9 + 326	53 54 -238
1	1.1	26 78.2 + 301	38.77 -247	34 64.1 + 322	52.99 -149	38 00.1 + 315	71.29 -166	54 52.3 + 304	55 99 -245
1	11.1	27 05.4 + 272	41.26 -249	34 93.5 + 294	51.74 -125	38 28.8 + 287	69.81 -148	54 79.8 + 275	58 46 -247
1	21.1	27 28.4 + 230	43.70 -244	34 93.5 + 253	50.77 -97	38 53.6 + 248	68.58 -123	55 03.2 + 234	60 88 -242
1	31.1	27 46.9 + 185	46.01 -231	35 18.8 + 207	50.09 -68	38 73.8 + 202	67.63 -95	55 22.2 + 190	63.16 -228
2	10.0	27 60.6 + 137	48.16 -215	35 55.4 + 159	49.70 -39	38 89.3 + 155	66.94 -69	55 36.5 + 143	65.28 -212
2	20.0	27 69.2 + 86	50.08 -192	35 65.9 + 105	49.59 -11	38 99.5 + 102	66.53 -41	55 45.7 + 92	67.17 -189
3	2.0	27 73.2 + 40	51.76 -168	35 71.4 + 55	49.72 + 13	39 04.8 + 53	66.36 -17	55 50.2 + 45	68.82 -165
3	11.9	27 72.8 - 4	53.19 -143	35 72.3 + 9	50.05 + 33	39 05.7 + 9	66.41 + 5	55 50.4 + 2	70.23 -141
3	21.9	27 68.4 - 44	54.34 -115	35 68.9 - 34	50.56 + 51	39 02.4 - 33	66.66 + 25	55 46.6 - 38	71.35 -112
3	31.9	27 61.1 - 73	55.22 -88	35 62.3 - 66	51.17 + 61	38 95.9 - 65	67.03 + 37	55 39.8 - 68	72.22 -87
4	10.9	27 51.3 - 98	55.85 -63	35 52.9 - 94	51.84 + 67	38 86.8 - 91	67.52 + 49	55 30.4 - 94	72.83 -61
4	20.8	27 39.9 - 114	56.21 -36	35 41.8 - 111	52.55 + 71	38 76.0 - 108	68.07 + 55	55 19.4 - 110	73.18 -35
4	30.8	27 27.7 - 122	56.34 -13	35 29.8 - 120	53.23 + 68	38 64.4 - 116	68.64 + 57	55 07.5 - 119	73.31 -13
5	10.8	27 15.1 - 126	56.23 + 11	35 17.4 - 124	53.88 + 65	38 52.3 - 121	69.22 + 58	54 95.1 - 124	73.20 + 11
5	20.8	27 02.8 - 123	55.88 + 35	35 05.5 - 119	54.46 + 58	38 40.7 - 116	69.79 + 57	54 83.0 - 121	72.87 + 33
5	30.7	26 91.4 - 114	55.35 + 53	34 94.6 - 109	54.95 + 49	38 30.1 - 106	70.31 + 52	54 71.7 - 113	72.36 + 51
6	9.7	26 81.0 - 104	54.62 + 73	34 84.9 - 97	55.36 + 41	38 20.6 - 95	70.79 + 48	54 61.3 - 104	71.66 + 70
6	19.7	26 72.3 - 87	53.71 + 91	34 77.0 - 79	55.64 + 28	38 12.9 - 77	71.19 + 40	54 52.4 - 89	70.78 + 88
6	29.6	26 65.3 - 70	52.67 + 104	34 71.0 - 60	55.82 + 18	38 07.0 - 59	71.53 + 34	54 45.3 - 71	69.79 + 99
7	9.6	26 60.1 - 52	51.51 + 116	34 67.1 - 39	55.88 + 6	38 03.0 - 40	71.78 + 25	54 39.8 - 55	68.67 + 112
7	19.6	26 57.3 - 28	50.27 + 124	34 65.6 - 15	55.80 - 8	38 01.5 - 15	71.93 + 15	54 36.7 - 31	67.48 + 119
7	29.6	26 56.7 - 6	49.00 + 127	34 66.5 + 9	55.60 - 20	38 02.1 + 6	71.97 + 4	54 35.7 - 10	66.27 + 121
8	8.5	26 58.5 + 18	47.74 + 126	34 69.9 + 34	55.25 - 35	38 05.3 + 32	71.89 - 8	54 35.7 + 14	66.27 + 121
8	18.5	26 63.3 + 48	46.56 + 118	34 76.2 + 63	54.79 - 46	38 11.6 + 63	71.63 - 26	54 41.4 + 43	63.93 + 113
8	28.5	26 70.8 + 75	45.49 + 107	34 84.3 + 81	54.10 - 69	38 18.8 + 72	71.31 - 32	54 48.4 + 70	62.92 + 101
9	7.5	26 81.4 + 106	44.59 + 90	34 96.2 + 119	53.22 - 88	38 30.6 + 118	70.70 - 61	54 58.5 + 101	62.07 + 85
9	17.4	26 95.5 + 141	43.95 + 64	35 11.4 + 152	52.16 - 106	38 45.3 + 147	69.92 - 78	54 72.0 + 135	61.47 + 60
9	27.4	27 12.8 + 173	43.58 + 37	35 29.5 + 181	50.93 - 123	38 62.9 + 176	68.94 - 98	54 88.8 + 168	61.14 + 33
10	7.4	27 33.6 + 208	43.55 + 3	35 51.1 + 216	49.51 - 142	38 84.0 + 211	67.73 - 121	55 09.1 + 203	61.15 - 1
10	17.3	27 57.8 + 242	43.90 - 35	35 76.0 + 249	47.92 - 159	39 08.3 + 243	66.33 - 140	55 32.9 + 238	61.52 - 37
10	27.3	27 85.0 + 272	44.62 - 72	36 03.8 + 278	46.18 - 174	39 35.6 + 273	64.73 - 160	55 59.7 + 268	62.26 - 74
11	6.3	28 15.0 + 300	45.73 - 111	36 34.6 + 308	44.32 - 186	39 65.8 + 302	62.97 - 176	55 89.4 + 297	63.38 - 112
11	16.3	28 47.1 + 321	47.22 - 149	36 67.6 + 330	42.40 - 192	39 98.1 + 323	61.09 - 188	56 21.3 + 319	64.88 - 150
11	26.2	28 80.5 + 334	49.02 - 180	37 02.1 + 345	40.45 - 195	40 31.9 + 338	59.15 - 194	56 54.6 + 333	66.68 - 180
12	6.2	29 14.6 + 341	51.12 - 210	37 37.5 + 354	38.54 - 191	40 66.7 + 348	57.18 - 197	56 88.7 + 341	68.77 - 209
12	16.2	29 47.9 + 333	53.43 - 231	37 72.5 + 350	36.75 - 179	41 00.9 + 342	55.27 - 191	57 22.1 + 334	71.06 - 229
12	26.2	29 79.8 + 319	55.87 - 244	38 06.3 + 338	35.11 - 164	41 34.0 + 331	53.48 - 179	57 54.2 + 321	73.49 - 243
12	36.1	30 09.1 + 293	58.40 - 253	38 37.7 + 314	33.68 - 143	41 64.7 + 307	51.85 - 163	57 83.8 + 296	75.99 - 250
		30 09.1 + 257	58.40 - 249	38 37.7 + 279	33.68 - 116	41 64.7 + 273	51.85 - 140	57 83.8 + 261	75.99 - 247
Mean Place	27.997	56.32	35.870	43.80	39.240	60.82	55.766	73.46	
sec δ, tan δ	+1.026	-0.231	+1.045	+0.302	+1.022	+0.213	+1.023	-0.218	
da(ψ), dδ(ψ)	+0.058	-0.35	+0.065	-0.35	+0.064	-0.35	+0.058	-0.35	
da(ε), dδ(ε)	-0.013	+0.48	+0.018	+0.47	+0.013	+0.47	-0.013	+0.46	
Dble.Trans.	February 21		February 22		February 22		February 22		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	385		382		384		383	
	ω Carinae		191 G. Velorum		ζ Leonis		λ Ursae Majoris	
Mag.Spect.	3.56	B8	4.09	A2	3.65	F0	3.52	A2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	10 13	-69 57	10 14	-42 02	10 15	+23 28	10 16	+42 58
1 -8.8	24 805 <sup>s</sup> + 657	41 25 -235	08 720 <sup>s</sup> + 378	49 38 -259	54 902 <sup>s</sup> + 358	74.22 -155	15 777 <sup>s</sup> + 428	59 15 -95
1 1.1	25 392 + 587	44.08 -263	09 067 + 347	52.30 -292	55 241 + 339	72.93 -129	16 182 + 405	58 62 -53
1 11.1	25 898 + 506	47.34 -326	09 376 + 309	55 50 -320	55 552 + 311	71.93 -100	16 554 + 372	58 53 -9
1 21.1	26 299 + 401	50 93 -359	09 633 + 257	58 87 -337	55 823 + 271	71.97 -66	16 879 + 325	58 88 + 35
1 31.1	26 591 + 292	54 72 -379	09 835 + 202	62 28 -341	56 048 + 225	70.94 -33	17 148 + 269	59 63 + 75
2 10.0	26 770 + 179	58 64 -392	09 980 + 145	65 71 -343	56 223 + 175	70.92 -2	17 356 + 208	60 74 +111
2 20.0	26 829 + 59	62 58 -394	10 062 + 82	69 02 -331	56 343 + 120	71.20 + 28	17 497 + 141	62 16 +142
3 2.0	26 778 - 51	66 42 -384	10 088 + 26	72 14 -312	56 410 + 67	71.73 + 53	17 573 + 76	63 79 +163
3 12.0	26 624 - 154	70 13 -371	10 062 - 26	75 05 -291	56 429 + 19	72.45 + 72	17 587 + 14	65 56 +177
3 21.9	26 371 - 253	73 57 -344	09 986 - 76	77 65 -260	56 402 - 27	73.32 + 87	17 543 - 44	67 37 +181
3 31.9	26 039 - 332	76 70 -313	09 873 - 113	79 92 -227	56 340 - 62	74.26 + 94	17 453 - 90	69 14 +177
4 10.9	25 634 - 405	79 48 -278	09 727 - 146	81 84 -192	56 248 - 92	75.24 + 98	17 324 - 129	70 80 +166
4 20.8	25 169 - 465	81 81 -233	09 557 - 170	83 34 -150	56 135 - 113	76 19 + 95	17 167 - 157	72 26 +146
4 30.8	24 666 - 503	83 68 -187	09 372 - 185	84 44 -110	56 012 - 123	77 06 + 87	16 994 - 173	73 48 +122
5 10.8	24 129 - 537	85 07 -139	09 177 - 195	85 12 -68	55 883 - 129	77.83 + 77	16 812 - 182	74 42 + 94
5 20.8	23 577 - 552	85 91 -84	08 981 - 196	85 35 -23	55 757 - 126	78 47 + 64	16 631 - 181	75 04 + 62
5 30.7	23 025 - 552	86 23 -32	08 789 - 192	85 16 + 19	55 639 - 118	78 95 + 48	16 462 - 169	75 32 + 28
6 9.7	22 479 - 546	86 01 + 22	08 605 - 184	84 56 + 60	55 533 - 106	79 28 + 33	16 306 - 156	75 28 -4
6 19.7	21 960 - 519	85 24 + 77	08 437 - 168	83 54 +102	55 444 - 89	79 42 + 14	16 173 - 133	74 89 -39
6 29.7	21 480 - 480	83 99 +125	08 287 - 150	82 17 +137	55 375 - 69	79 39 -3	16 066 - 107	74 19 -70
7 9.6	21 046 - 434	82 26 +173	08 159 - 128	80 46 +171	55 326 - 49	79 19 -20	15 985 - 81	73 18 -101
7 19.6	20 679 - 367	80 10 +216	08 060 - 99	78 46 +200	55 302 - 24	78 81 -38	15 938 - 47	71 88 -130
7 29.6	20 385 - 294	77 62 +248	07 990 - 70	76 27 +219	55 301 - 1	78 26 -55	15 922 - 16	70 34 -154
8 8.5	20 175 - 210	74 84 +278	07 955 - 35	73 91 +236	55 326 + 25	77 53 -73	15 939 + 17	68 55 -179
8 18.5	20 066 - 109	71 90 +294	07 961 + 6	71 50 +241	55 380 + 54	76 64 -89	15 995 + 56	66 56 -199
8 28.5	20 055 - 111	68 88 +302	08 007 + 46	69 11 +239	55 459 + 79	75 56 -108	16 086 + 91	64 40 -216
9 7.5	20 154 + 99	65 87 +301	08 099 + 92	66 83 +228	55 571 + 112	74 27 -129	16 086 + 131	62 07 -233
9 17.4	20 366 + 212	63 03 +284	08 239 + 140	64 78 +205	55 718 + 147	72 82 -145	16 217 + 173	62 07 -243
9 27.4	20 683 + 317	60 44 +259	08 425 + 186	63 02 +176	55 897 + 179	71 22 -160	16 390 + 212	59 64 -250
10 7.4	21 109 + 426	58 21 +223	08 661 + 236	61 65 +137	56 112 + 215	69 46 -176	16 602 + 256	57 14 -255
10 17.4	21 630 + 521	56 47 +174	08 942 + 281	60 76 + 89	56 361 + 249	67 57 -189	17 155 + 297	52 07 -252
10 27.3	22 228 + 598	55 25 +122	09 262 + 320	60 38 + 38	56 643 + 282	65 60 -197	17 490 + 335	49 62 -245
11 6.3	22 896 + 668	54 65 + 60	09 619 + 357	60 55 -17	56 956 + 313	63 55 -205	17 863 + 373	47 27 -235
11 16.3	23 604 + 708	54 72 -7	10 001 + 382	61 32 -77	56 956 + 338	61 51 -204	18 264 + 401	45 14 -213
11 26.2	24 330 + 726	55 44 -72	10 398 + 397	62 63 -131	57 294 + 355	59 52 -199	18 686 + 422	43 24 -190
12 6.2	25 056 + 726	56 82 -138	10 801 + 403	64 49 -186	58 016 + 367	57 63 -189	19 121 + 435	41 64 -160
12 16.2	25 747 + 691	58 82 -200	11 192 + 391	66 82 -273	58 380 + 364	55 93 -170	19 555 + 434	40 43 -121
12 26.2	26 385 + 638	61 36 -254	11 562 + 370	69 55 -233	58 733 + 353	54 45 -148	19 976 + 421	39 60 -83
12 36.1	26 952 + 567	64 40 -304	11 900 + 338	72 62 -307	59 065 + 332	53 25 -120	20 371 + 395	39 22 -38
	26 952 + 469	64 40 -342	11 900 + 291	72 62 -329	59 065 + 297	53 25 -89	20 371 + 354	39 22 + 6
Mean Place	25.107	74.69	10.073	77.78	56.466	65.66	17.171	55.86
sec δ, tan δ	+2.920	-2.743	+1.347	-0.902	+1.090	+0.434	+1.367	+0.932
dα(ψ), dδ(ψ)	+0.029	-0.36	+0.051	-0.36	+0.066	-0.36	+0.072	-0.36
dα(ε), dδ(ε)	-0.163	+0.45	-0.054	+0.45	+0.026	+0.44	+0.056	+0.44
Dble.Trans.	February 23		February 23		February 24		February 24	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1264		1263		1262		1265	
	187 G. Carinae		ε Sextantis		32 Ursae Majoris		59 G. Antliae	
Mag. Spect.	3.44	K5	5.40	F0	5.74	A3	5.62	B9
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	+ 65 10	h m	° ' "
	10 16	-61 15	10 16	- 7 59	10 17		10 17	-28 55
1 <sup>d</sup> -8.8	36.912 <sup>s</sup> + 510	20.32 -244	55.926 <sup>s</sup> + 328	45.80 -230	03.104 <sup>s</sup> + 668	33.35 -24	28.880 <sup>s</sup> + 346	02.22 -254
1 <sup>s</sup> 1.1	37.373 + 461	23.22 -290	56.233 + 307	48.14 -234	03.736 + 632	33.65 + 30	29.201 + 321	04.98 -276
1 11.1	37.777 + 404	26.50 -328	56.514 + 281	50.46 -232	04.316 + 580	34.49 + 84	29.491 + 290	07.92 -294
1 21.1	38.105 + 328	30.09 -359	56.755 + 241	52.69 -223	04.818 + 502	35.86 + 137	29.738 + 247	10.95 -303
1 31.1	38.353 + 248	33.84 -375	56.953 + 198	54.76 -207	05.231 + 413	37.66 + 180	29.936 + 198	13.94 -299
2 10.0	38.518 + 165	37.68 -384	57.104 + 151	56.66 -190	05.546 + 315	39.84 + 218	30.084 + 148	16.87 -293
2 20.0	38.594 + 76	41.52 -384	57.206 + 102	58.31 -165	05.747 + 201	42.29 + 245	30.178 + 94	19.64 -277
3 2.0	38.590 - 4	45.22 -370	57.261 + 55	59.72 -141	05.841 + 94	44.89 + 260	30.221 + 43	22.20 -256
3 12.0	38.510 - 80	48.77 -355	57.272 + 11	60.89 -117	05.829 - 12	47.55 + 266	30.218 - 3	24.52 -232
3 21.9	38.356 - 154	52.04 -327	57.243 - 29	61.79 - 90	05.715 - 114	50.15 + 260	30.172 - 46	26.54 -202
3 31.9	38.146 - 210	54.99 -295	57.184 - 59	62.44 - 65	05.518 - 197	52.55 + 210	30.093 - 79	28.26 -172
4 10.9	37.884 - 262	57.58 -259	57.099 - 85	62.87 - 43	05.249 - 269	54.70 + 245	29.985 - 108	29.65 -139
4 20.8	37.581 - 303	59.72 -214	56.996 - 103	63.07 - 20	04.924 - 325	56.49 + 179	29.857 - 128	30.69 -104
4 30.8	37.252 - 329	61.41 -169	56.885 - 111	63.08 - 1	04.566 - 358	57.86 + 137	29.717 - 140	31.39 - 70
5 10.8	36.900 - 352	62.63 -122	56.767 - 118	62.89 + 19	04.186 - 380	58.79 + 93	29.570 - 147	31.75 - 36
5 20.8	36.539 - 361	63.31 - 68	56.651 - 116	62.52 + 37	03.803 - 383	59.21 + 42	29.422 - 148	31.74 + 1
5 30.7	36.180 - 359	63.50 - 19	56.543 - 85	62.01 - 43	03.436 - 367	59.15 - 6	29.280 - 142	31.41 + 33
6 9.7	35.827 - 353	63.17 + 33	56.443 - 100	61.34 + 67	03.089 - 347	58.61 - 54	29.145 - 135	30.75 + 66
6 19.7	35.493 - 334	62.31 + 86	56.357 - 86	60.55 + 79	02.782 - 307	57.58 -103	29.023 - 122	29.78 + 97
6 29.7	35.186 - 307	61.02 + 129	56.286 - 71	59.68 + 87	02.521 - 261	56.12 -146	28.919 - 104	28.55 + 123
7 9.6	34.911 - 275	59.26 + 176	56.233 - 53	58.71 + 97	02.309 - 212	54.26 -186	28.832 - 87	27.05 + 150
7 19.6	34.682 - 229	57.11 + 215	56.201 - 32	57.71 + 100	02.160 - 149	52.03 -223	28.768 - 64	25.37 + 168
7 29.6	34.502 - 180	54.67 + 244	56.189 - 12	56.71 + 100	02.071 - 89	49.51 -252	28.729 - 39	23.56 + 181
8 8.5	34.380 - 122	51.96 + 271	56.201 + 12	55.73 + 98	02.047 - 24	46.72 -279	28.718 - 11	21.65 + 191
8 18.5	34.325 - 55	49.11 + 285	56.240 + 39	54.85 + 88	02.094 + 47	43.72 -300	28.738 + 20	19.74 + 191
8 28.5	34.338 + 13	46.22 + 289	56.305 + 65	54.09 + 76	02.208 + 114	40.59 -313	28.791 + 53	17.90 + 184
9 7.5	34.426 + 88	43.36 + 286	56.401 + 96	53.49 + 60	02.394 + 186	37.34 -325	28.881 + 90	16.19 + 171
9 17.4	34.594 + 168	40.68 + 268	56.530 + 129	53.12 + 37	02.654 + 260	34.09 -325	29.011 + 130	14.71 + 148
9 27.4	34.835 + 241	38.28 + 240	56.691 + 161	53.02 + 10	02.982 + 328	30.86 -323	29.178 + 167	13.53 + 118
10 7.4	35.155 + 320	36.23 + 205	56.889 + 198	53.23 - 21	03.382 + 400	27.72 -314	29.387 + 209	12.71 + 82
10 17.4	35.543 + 388	34.68 + 155	57.120 + 231	53.79 - 56	03.850 + 468	24.76 -296	29.636 + 249	12.33 + 38
10 27.3	35.990 + 447	33.66 + 102	57.382 + 262	54.67 - 88	04.378 + 528	22.03 -273	29.919 + 283	12.40 - 7
11 6.3	36.490 + 500	33.25 + 41	57.674 + 292	55.91 -124	04.965 + 587	19.59 -244	30.236 + 317	12.97 - 57
11 16.3	37.023 + 533	33.50 - 25	57.989 + 315	57.47 -156	05.595 + 630	17.54 -205	30.576 + 340	14.04 -107
11 26.2	37.573 + 550	34.37 - 87	58.319 + 330	59.31 -184	06.257 + 662	15.91 -163	30.932 + 356	15.57 -153
12 6.2	38.127 + 554	35.89 -152	58.659 + 340	61.39 -208	06.939 + 682	14.76 -115	31.295 + 363	17.54 -197
12 16.2	38.659 + 532	38.00 -211	58.994 + 335	63.63 -224	07.615 + 676	14.16 - 60	31.651 + 356	19.89 -235
12 26.2	39.157 + 498	40.62 -262	59.317 + 323	65.96 -233	08.270 + 655	14.08 - 8	31.992 + 341	22.53 -264
12 36.1	39.604 + 447	43.71 -309	59.618 + 301	68.33 -237	08.886 + 616	14.58 + 50	32.306 + 314	25.41 -288
	37.834 + 378	52.71 -343	57.529 + 267	64.37 -231	03.894 + 548	34.28 + 103	30.408 + 275	27.25 -299
Mean Place	37.834	52.71	57.529	64.37	03.894	34.28	30.408	27.25
sec δ, tan δ	+2.080	-1.824	+1.010	-0.141	+2.382	+2.162	+1.143	-0.553
dα(ψ), dδ(ψ)	+0.040	-0.36	+0.060	-0.36	+0.086	-0.36	+0.055	-0.36
dα(ε), dδ(ε)	-0.109	+0.44	-0.008	+0.43	+0.130	+0.43	-0.033	+0.43
Dble. Trans.	February 24		February 24		February 24		February 24	



APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	1266		386		1268		1267	
	23 Sextantis		μ Ursae Majoris		204 G. Velorum		27 Leonis Minoris	
Mag. Spect.	6.53	B3	3.21	K5	4.99	K5	5.83	A3
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>
	10 20	+ 2 21	10 21	+ 41 33	10 21	- 41 34	10 22	+ 33 58
1 -8.8	18 561 + 331	43 62 -211	30.268 + 422	67 44 -105	43 294 + 381	26 35 -253	18 323 + 390	41.20 -129
1 1.2	18 874 + 313	41 58 -204	30 668 + 400	66 81 -63	43 647 + 353	29 22 -287	18 693 + 370	40.26 -94
1 11.1	19 161 + 287	39 65 -193	31 038 + 370	66 61 -20	43 963 + 316	32 36 -314	19 035 + 342	39.70 -56
1 21.1	19 411 + 250	37 89 -176	31 361 + 323	66 65 + 24	44 229 + 266	35 70 -334	19 335 + 300	39.55 -15
1 31.1	19 617 + 206	36 35 -154	31 631 + 270	67 49 + 64	44 441 + 212	39 08 -338	19 586 + 251	39.77 + 22
2 10.0	19 778 + 161	35 04 -131	31 842 + 211	68 51 +102	44 597 + 156	42 48 -340	19 782 + 196	40.35 + 58
2 20.0	19 888 + 110	34 00 -104	31 987 + 145	69 84 +133	44 691 + 94	45 79 -331	19 919 + 137	41.24 + 89
3 2.0	19 952 + 64	33 21 -79	32 069 + 82	71 39 +155	44 729 + 38	48 91 -312	19 998 + 79	42.37 +113
3 12.0	19 971 + 19	32 66 -55	32 090 + 21	73 10 +171	44 715 -14	51 83 -292	20 023 + 25	43.69 +132
3 21.9	19 950 -21	32 35 -31	32 054 -36	74 87 +177	44 651 -64	54 45 -262	19 996 -27	45.11 +142
3 31.9	19 898 -52	32 23 -12	31 973 -81	76 61 +174	44 550 -101	56 74 -229	19 929 -67	46.54 +143
4 10.9	19 819 -79	32 29 + 6	31 853 -120	78 26 +165	44 414 -136	58 69 -195	19 828 -101	47.94 +140
4 20.9	19 722 -97	32 50 + 21	31 704 -149	79 73 +155	44 254 -160	60 24 -155	19 701 -127	49.23 +129
4 30.8	19 615 -107	32 81 + 31	31 540 -164	80 97 +124	44 078 -176	61 39 -115	19 561 -140	50.35 +112
5 10.8	19 502 -113	33 23 + 42	31 365 -175	81 95 + 98	43 890 -188	62 13 -74	19 412 -149	51.28 + 93
5 20.8	19 391 -111	33 73 + 50	31 191 -174	82 61 + 66	43 699 -191	62 42 -29	19 264 -148	51.96 + 68
5 30.7	19 288 -103	34 27 + 54	31 027 -164	82 96 + 35	43 512 -187	62 31 + 11	19 125 -139	52 40 + 44
6 9.7	19 192 -96	34 86 + 21	30 876 -151	82 99 + 3	43 331 -181	61 78 + 53	18 997 -128	52 58 + 18
6 19.7	19 111 -81	35 48 + 62	30 745 -131	82 67 -32	43 163 -168	60 84 + 94	18 888 -109	52 48 -10
6 29.7	19 046 -65	36 09 + 61	30 639 -106	82 05 -62	43 013 -150	59 54 +130	18 799 -89	52 12 -36
7 9.6	18 997 -49	36 71 + 62	30 557 -82	81 13 -92	42 882 -131	57 90 +164	18 733 -66	51.52 -60
7 19.6	18 970 -27	37 28 + 57	30 508 -49	79 92 -121	42 779 -103	55 98 +192	18 694 -39	50.65 -87
7 29.6	18 963 -7	37 79 + 51	30 488 -20	78 46 -146	42 705 -74	53 85 +213	18 682 -12	49.57 -108
8 8.6	18 978 + 15	38 22 + 43	30 500 + 12	76 75 -171	42 663 -42	51 54 +231	18 697 + 15	48 28 -179
8 18.5	19 020 + 42	38 51 + 29	30 549 + 49	74 83 -192	42 661 -2	49 17 +237	18 745 + 48	46.77 -151
8 28.5	19 085 + 65	38 64 + 13	30 633 + 84	72 73 -210	42 699 + 38	46 82 +235	18 823 + 78	45.08 -169
9 7.5	19 181 + 96	38 67 + 3	30 755 + 122	70 47 -226	42 781 + 82	44 56 +226	18 936 + 113	43 20 -188
9 17.4	19 311 + 130	38 44 -23	30 919 + 164	68 08 -239	42 912 + 131	42 51 +205	19 087 + 151	41 18 -202
9 27.4	19 471 + 160	37 97 -47	31 121 + 202	65 61 -247	43 089 + 177	40 75 +176	19 273 + 186	39 04 -214
10 7.4	19 666 + 195	37 23 -74	31 366 + 245	63 08 -253	43 316 + 227	39 36 +139	19 498 + 225	36 80 -224
10 17.4	19 895 + 229	36 20 -103	31 653 + 287	60 57 -251	43 589 + 273	38 44 + 92	19 762 + 264	34 51 -229
10 27.3	20 155 + 260	34 93 -127	31 977 + 324	58 10 -247	43 902 + 313	38 01 + 43	20 061 + 299	32 21 -230
11 6.3	20 445 + 290	33 38 -155	32 339 + 362	55 73 -237	44 254 + 352	38 14 -13	20 395 + 334	29 93 -228
11 16.3	20 758 + 313	31 62 -176	32 731 + 392	53 54 -219	44 633 + 379	38 84 -70	20 756 + 361	27 76 -217
11 26.3	21 089 + 331	29 69 -193	33 144 + 413	51 58 -196	45 028 + 395	40 09 -125	21 138 + 382	25 75 -201
12 6.2	21 429 + 340	27 62 -207	33 571 + 427	49 91 -167	45 431 + 403	41 89 -180	21 534 + 396	23 95 -180
12 16.2	21 767 + 338	25 50 -212	33 998 + 427	48 61 -130	45 824 + 393	44 17 -228	21 928 + 394	22 44 -151
12 26.2	22 095 + 328	23 40 -210	34 413 + 415	47 68 -93	46 199 + 375	46 84 -267	22 313 + 385	21 25 -119
12 36.1	22 401 + 306	21 36 -204	34 805 + 392	47 19 -49	46 542 + 343	49 86 -302	22 675 + 362	20 44 -81
	+ 274	-189	+ 352	-4	+ 299	-324	+ 327	-42
Mean Place	20.196	28.41	31.698	63.98	44.747	54.84	19.840	35.76
sec δ, tan δ	+1.001	+0.041	+1.337	+0.887	+1.337	-0.887	+1.206	+0.674
dα(ψ), dδ(ψ)	+0.062	-0.36	+0.071	-0.36	+0.051	-0.36	+0.069	-0.36
dα(ε), dδ(ε)	+0.002	+0.42	+0.054	+0.42	-0.054	+0.42	+0.041	+0.41
Dble. Trans.	February 25		February 25		February 25		February 26	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	388		1269		387		391		
	25 Sextantis		64 G. Antliae		30 H. Ursae Majoris		J Carinae		
Mag.Spect.	6.10	B9	5.40	A3	4.92	A0	4.08	F5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° '	h m	° '	h m	° '	h m	° '	
	10 22	- 4 00	10 22	- 37 56	10 23	+ 65 37	10 24	- 73 57	
1	-8.8	43.885 + 330	02.68 -223	52.235 + 370	00.30 -253	09.332 + 679	65.14 -31	07.579 + 803	12.02 -217
1	1.2	44.197 + 312	04.91 -223	52.578 + 343	03.14 -284	09.977 + 645	65.39 + 25	08.301 + 722	14.70 -268
1	11.1	44.482 + 285	07.09 -218	52.886 + 308	06.23 -309	10.573 + 596	66.18 + 79	08.928 + 627	17.84 -314
1	21.1	44.730 + 248	09.15 -206	53.148 + 262	09.48 -325	11.091 + 518	67.51 + 133	09.430 + 502	21.35 -351
1	31.1	44.935 + 206	11.03 -188	53.358 + 210	12.77 -329	11.521 + 430	69.28 + 177	09.801 + 371	25.09 -374
2	10.0	45.094 + 159	12.71 -168	53.513 + 155	16.05 -328	11.851 + 330	71.44 + 216	10.039 + 238	29.00 -391
2	20.0	45.204 + 110	14.15 -144	53.610 + 97	19.22 -317	12.068 + 217	73.90 + 246	10.130 + 91	32.97 -397
3	2.0	45.267 + 63	15.32 -117	53.653 + 43	22.19 -297	12.175 + 107	76.50 + 260	10.088 - 42	36.87 -390
3	12.0	45.287 + 20	16.26 -94	53.646 - 7	24.96 -277	12.174 - 104	79.19 + 269	09.919 - 169	40.67 -380
3	21.9	45.266 - 21	16.94 -68	53.591 - 55	27.44 -248	12.070 - 104	81.82 + 263	09.626 - 293	44.25 -358
3	31.9	45.214 - 52	17.40 -46	53.500 - 91	29.59 -215	11.880 - 190	84.27 + 245	09.234 - 392	47.53 -328
4	10.9	45.136 - 78	17.65 -25	53.377 - 123	31.41 -182	11.614 - 266	86.47 + 220	08.747 - 487	50.49 -296
4	20.9	45.039 - 97	17.70 -5	53.230 - 147	32.83 -142	11.289 - 325	88.32 + 185	08.181 - 566	53.02 -253
4	30.8	44.933 - 106	17.59 + 11	53.069 - 161	33.88 -105	10.929 - 360	89.75 + 143	07.562 - 619	55.11 -209
5	10.8	44.820 - 113	17.32 + 27	52.896 - 173	34.53 -65	10.544 - 385	90.74 + 99	06.893 - 669	56.72 -161
5	20.8	44.708 - 112	16.90 + 42	52.721 - 175	34.76 -23	10.153 - 391	91.23 + 49	06.197 - 696	57.78 -106
5	30.7	44.602 - 106	16.38 + 52	52.550 - 171	34.60 + 16	09.776 - 377	91.22 - 1	05.495 - 702	58.32 -54
6	9.7	44.504 - 98	15.75 + 63	52.385 - 165	34.05 + 55	09.418 - 358	90.73 - 49	04.793 - 702	58.32 + 0
6	19.7	44.420 - 84	15.04 + 71	52.233 - 152	33.11 + 94	09.097 - 321	89.74 - 99	04.118 - 675	57.75 + 57
6	29.7	44.351 - 69	14.27 + 77	52.097 - 136	31.85 + 126	08.821 - 276	88.33 - 141	03.484 - 634	56.69 + 106
7	9.6	44.297 - 54	13.45 + 82	51.979 - 118	30.26 + 159	08.594 - 227	86.50 - 183	02.903 - 581	55.12 + 157
7	19.6	44.264 - 33	12.62 + 83	51.888 - 91	28.42 + 184	08.429 - 165	84.28 - 222	02.401 - 502	53.10 + 202
7	29.6	44.252 - 12	11.82 + 80	51.823 - 65	26.38 + 204	08.325 - 104	81.77 - 251	01.987 - 414	50.73 + 237
8	8.6	44.261 + 9	11.05 + 77	51.788 - 35	24.19 + 219	08.285 - 40	78.97 - 280	01.675 - 312	48.02 + 271
8	18.5	44.297 + 36	10.40 + 65	51.791 + 3	21.95 + 224	08.318 + 33	75.95 - 302	01.488 - 187	45.11 + 291
8	28.5	44.358 + 61	09.89 + 51	51.830 + 39	19.74 + 221	08.418 + 100	72.80 - 315	01.423 - 65	42.09 + 302
9	7.5	44.449 + 91	09.52 + 37	51.912 + 82	17.63 + 211	08.592 + 174	69.52 - 328	01.495 + 72	39.04 + 305
9	17.4	44.574 + 125	09.38 + 14	52.038 + 126	15.74 + 189	08.841 + 249	66.22 - 330	01.711 + 216	36.12 + 292
9	27.4	44.730 + 156	09.50 - 12	52.209 + 171	14.13 + 161	09.159 + 318	62.95 - 327	02.059 + 348	33.42 + 270
10	7.4	44.922 + 192	09.91 - 41	52.426 + 217	12.88 + 125	09.553 + 394	59.75 - 320	02.543 + 484	31.04 + 238
10	17.4	45.149 + 227	10.65 - 74	52.688 + 262	12.10 + 78	10.016 + 463	56.73 - 302	03.149 + 606	29.13 + 191
10	27.3	45.406 + 257	11.68 -103	52.988 + 300	11.80 + 30	10.541 + 525	53.93 - 280	03.856 + 707	27.72 + 141
11	6.3	45.695 + 289	13.04 -136	53.968 + 338	12.04 - 24	11.128 + 587	51.42 - 251	04.651 + 795	26.91 + 81
11	16.3	46.007 + 312	14.67 -163	53.620 + 364	12.84 - 80	11.761 + 633	49.29 - 213	05.500 + 849	26.76 + 15
11	26.3	46.336 + 329	16.55 -188	54.070 + 380	14.15 -131	12.428 + 667	47.59 - 170	06.376 + 876	27.26 - 50
12	6.2	46.675 + 339	18.62 -207	54.459 + 389	15.99 -184	13.118 + 690	46.37 - 122	07.256 + 880	28.43 -117
12	16.2	47.012 + 337	20.82 -220	54.840 + 381	18.28 -229	13.805 + 687	45.70 - 67	08.098 + 842	30.24 -181
12	26.2	47.338 + 326	23.07 -225	55.204 + 364	20.94 -266	14.473 + 688	45.56 - 14	08.880 + 782	32.61 -237
12	36.1	47.643 + 305	25.32 -225	55.538 + 334	23.92 -298	15.102 + 629	46.00 + 44	09.578 + 698	35.50 -289
		+ 273	-216	+ 293	-318	+ 564	+ 99	+ 583	-331
Mean Place	45.532	19.98	53.734	27.95	10.116	66.35	07.788	46.26	
sec δ, tan δ	+1.002	-0.070	+1.268	-0.780	+2.424	+2.208	+3.620	-3.479	
dα(ψ), dδ(ψ)	+0.060	-0.36	+0.053	-0.36	+0.085	-0.36	+0.024	-0.36	
dα(ε), dδ(ε)	-0.004	+0.41	-0.047	+0.41	+0.134	+0.41	-0.212	+0.41	
Dble.Trans.	February 26		February 26		February 26		February 26		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	389		392		390		393	
	μ Hydrae		α Antliae		β Leonis Minoris		196 G. Carinae	
Mag. Spect.	4.06	K5	4.42	K5	4.41	K0	4.08	F0
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	10 25	- 16 45	10 26	- 30 59	10 27	+ 36 46	10 27	- 58 39
1 <sup>d</sup>	-8.8	+335		+354		+401		+492
1	24.570	-241	30.404	-250	04.840	-125	21.671	-236
1	24.884	-254	30.735	-275	05.222	+382	22.122	+451
1	25.171	-260	31.035	-295	05.576	+354	22.522	+400
1	25.419	-248	31.292	-307	06.888	+312	22.855	+333
1	25.624	-205	31.501	-305	06.150	+262	23.114	+259
2	25.781	+157	31.659	+158	06.357	+207	23.298	+184
2	25.888	+107	31.763	+104	06.501	+144	23.399	+101
3	25.948	+60	31.816	+53	06.587	+86	23.426	+27
3	25.963	+15	31.821	+5	06.617	+30	23.380	-46
3	25.938	-25	31.782	-215	06.592	-25	23.266	-114
3	25.881	-57	31.709	-73	06.526	-66	23.098	-168
4	25.796	-85	31.606	-103	06.422	-104	22.880	-218
4	25.693	-103	31.481	-125	06.292	-130	22.623	-257
4	25.578	-115	31.343	-138	06.146	-146	22.339	-284
5	25.456	-122	31.194	-149	05.991	-155	22.032	-307
5	25.334	-122	31.044	-150	05.835	-156	21.714	-318
5	25.216	-118	30.898	-146	05.687	-148	21.395	-319
6	25.106	-110	30.756	-142	05.550	-137	21.079	-316
6	25.007	-99	30.628	-128	05.431	-119	20.778	-301
6	24.924	-83	30.514	-114	05.334	-97	20.499	-279
7	24.855	-69	30.417	-97	05.258	-76	20.246	-253
7	24.808	-47	30.342	-75	05.211	-47	20.033	-213
7	24.781	-27	30.292	-50	05.191	-20	19.862	-171
8	24.778	-3	30.268	-24	05.199	+8	19.741	-121
8	24.803	+25	30.278	+10	05.241	+42	19.681	-60
8	24.855	+52	30.319	+41	05.315	+74	19.681	+0
9	24.940	+85	30.399	+80	05.424	+109	19.750	+69
9	25.060	+120	30.520	+121	05.573	+149	19.892	+142
9	25.214	+154	30.680	+160	05.757	+184	20.104	+212
10	25.407	+193	30.883	+203	05.983	+226	20.389	+285
10	25.635	+228	31.128	+245	06.249	+266	20.740	+351
10	25.898	+263	31.409	+281	06.552	+303	21.149	+409
11	26.192	+294	31.726	+317	06.891	+339	21.611	+462
11	26.511	+319	32.069	+343	07.259	+368	22.108	+497
11	26.846	+335	32.429	+360	07.649	+390	22.626	+518
12	27.192	+346	32.798	+369	08.054	+405	23.151	+525
12	27.534	+342	33.162	+364	08.459	+405	23.662	+511
12	27.864	+330	33.511	+349	08.855	+396	24.144	+482
12	28.172	+308	33.835	+324	09.230	+375	24.583	+439
		+274		+285		+339		+377
Mean Place	26.211	61.64	31.996	55.55	06.342	36.32	22.891	73.33
sec δ, tan δ	+1.044	-0.301	+1.167	-0.601	+1.248	+0.747	+1.923	-1.643
dα(ψ), dδ(ψ)	+0.058	-0.36	+0.055	-0.37	+0.069	-0.37	+0.044	-0.37
dα(ε), dδ(ε)	-0.018	+0.40	-0.037	+0.40	+0.046	+0.39	-0.101	+0.39
Dbble. Trans.	February 26		February 27		February 27		February 27	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1270		1271		394		1272	
	δ Sextantis		B.D. + 29° 2057 (Leonis Minoris)		36 Ursae Majoris		46 Leonis	
Mag. Spect.	5.24	B9	6.92	K0	4.84	F5	5.74	M0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 10 28	<sup>o</sup> <sup>'</sup> - 2 39	<sup>h</sup> <sup>m</sup> 10 29	<sup>o</sup> <sup>'</sup> + 28 38	<sup>h</sup> <sup>m</sup> 10 29	<sup>o</sup> <sup>'</sup> + 56 02	<sup>h</sup> <sup>m</sup> 10 31	<sup>o</sup> <sup>'</sup> + 14 12
1 -8.8	<sup>s</sup> 45 877 + 333	54.18 -221	<sup>s</sup> 06 826 + 375	69.04 -150	<sup>s</sup> 44 958 + 531	60.63 -69	<sup>s</sup> 26 937 + 346	35.63 -188
1 1.2	46.191 + 314	56.38 -220	07.183 + 357	67.85 -119	45.465 + 507	60.46 -17	27.266 + 329	33.93 -170
1 11.1	46.481 + 290	58.52 -214	07.514 + 331	66.99 -86	45.936 + 471	60.80 + 34	27.572 + 306	32.44 -149
1 21.1	46.734 + 253	60.53 -201	07.806 + 292	66.52 -47	46.349 + 413	61.66 + 86	27.840 + 268	31.22 -122
1 31.1	46.945 + 211	62.35 -182	08.052 + 246	66.41 -11	46.696 + 347	62.97 +131	28.067 + 227	30.30 -92
2 10.0	47.111 + 166	63.97 -162	08.247 + 195	66.65 + 24	46.968 + 272	64.68 +171	28.247 + 180	29.66 -64
2 2.0	47.227 + 116	65.33 -136	08.385 + 138	67.21 + 56	47.155 + 187	66.71 +203	28.375 + 128	29.33 -33
3 20.0	47.297 + 70	66.44 -111	08.470 + 85	68.02 + 81	47.260 + 105	68.94 +223	28.455 + 80	29.27 -6
3 12.0	47.324 - 27	67.31 -87	08.502 + 32	69.04 +102	47.284 + 24	71.30 +237	28.489 - 10	29.43 + 37
3 21.9	47.309 - 15	67.92 -61	08.486 - 16	70.21 +117	47.230 - 54	73.67	28.479 - 10	29.80
3 31.9	47.263 - 46	68.31 -39	08.432 - 54	71.42 +121	47.113 - 117	75.92 +225	28.436 - 43	30.31 + 51
4 10.9	47.190 - 73	68.50 -19	08.345 - 87	72.65 +123	46.941 - 172	78.01 +209	28.363 - 73	30.93 + 62
4 20.9	47.098 - 92	68.50 + 0	08.233 - 112	73.82 +117	46.725 - 216	79.81 +180	28.269 - 94	31.61 + 68
4 30.8	46.995 - 103	68.35 + 15	08.108 - 125	74.87 +105	46.484 - 241	81.27 +146	28.164 - 105	32.29 + 68
5 10.8	46.885 - 110	68.06 + 29	07.974 - 134	75.79 + 92	46.224 - 260	82.36 +109	28.051 - 113	32.98 + 69
5 20.8	46.775 - 110	67.63 + 43	07.841 - 133	76.51 + 72	45.961 - 263	83.02 + 66	27.937 - 114	33.62 + 64
5 30.7	46.671 - 104	67.12 + 51	07.714 - 127	77.03 + 52	45.706 - 255	83.24 + 22	27.830 - 107	34.19 + 57
6 9.7	46.573 - 98	66.50 + 62	07.596 - 118	77.34 + 31	45.466 - 240	83.03 - 21	27.730 - 100	34.69 + 50
6 19.7	46.488 - 85	65.82 + 68	07.495 - 101	77.41 + 7	45.251 - 215	82.38 - 65	27.644 - 86	35.09 + 40
6 29.7	46.417 - 71	65.10 + 72	07.412 - 83	77.26 - 15	45.067 - 184	81.32 - 106	27.573 - 71	35.38 + 29
7 9.6	46.361 - 56	64.33 + 77	07.348 - 64	76.90 - 36	44.917 - 150	79.88 -144	27.518 - 55	35.57 + 19
7 19.6	46.325 - 36	63.57 + 76	07.309 - 39	76.30 - 60	44.810 - 107	78.07 -181	27.485 - 33	35.63 + 6
7 29.6	46.309 - 16	62.84 + 73	07.293 - 16	75.50 - 80	44.745 - 65	75.97 -210	27.472 - 13	35.55 - 8
8 8.6	46.314 + 5	62.16 + 68	07.304 + 11	74.50 -100	44.724 - 21	73.58 -239	27.481 + 9	35.33 - 22
8 18.5	46.345 + 31	61.60 + 56	07.344 + 40	73.29 -121	44.755 + 31	70.96 -262	27.518 + 37	34.95 - 38
8 28.5	46.401 + 56	61.17 + 43	07.411 + 67	71.89 -140	44.833 + 78	68.17 -279	27.577 + 59	34.49 - 46
9 7.5	46.486 + 85	60.90 + 27	07.512 + 101	70.29 -160	44.964 + 131	65.22 -295	27.664 + 87	33.67 - 82
9 17.4	46.605 + 119	60.84 + 6	07.648 + 136	68.53 -176	45.151 + 187	62.20 -302	27.788 + 124	32.70 - 97
9 27.4	46.756 + 151	61.03 - 19	07.819 + 171	66.62 -191	45.389 + 238	59.16 -304	27.943 + 155	31.54 -116
10 7.4	46.943 + 187	61.52 - 49	08.027 + 208	64.57 -205	45.684 + 295	56.12 -304	28.134 + 191	30.17 -137
10 17.4	47.165 + 222	62.31 - 79	08.273 + 246	62.43 -214	46.034 + 350	53.19 -293	28.360 + 226	28.61 -156
10 27.3	47.419 + 254	63.40 -109	08.554 + 281	60.23 -220	46.432 + 398	50.40 -279	28.619 + 259	26.87 -174
11 6.3	47.704 + 285	64.79 -139	08.869 + 315	58.00 -223	46.880 + 448	47.83 -257	28.910 + 291	24.97 -190
11 16.3	48.014 + 310	66.46 -167	09.212 + 343	55.82 -218	47.366 + 496	45.57 -226	29.227 + 317	22.97 -200
11 26.3	48.342 + 328	68.35 -189	09.576 + 364	53.74 -208	47.881 + 515	43.65 -192	29.564 + 337	20.92 -205
12 6.2	48.682 + 340	70.43 -208	09.954 + 378	51.82 -192	48.416 + 535	42.15 -150	29.914 + 350	18.87 -205
12 16.2	49.020 + 338	72.61 -218	10.333 + 379	50.13 -169	48.951 + 535	41.14 -101	30.264 + 350	16.90 -197
12 26.2	49.348 + 328	74.84 -223	10.703 + 370	48.71 -142	49.475 + 524	40.61 - 53	30.606 + 342	15.06 -184
12 36.1	49.657 + 309	77.06 -222	11.053 + 350	47.63 -108	49.971 + 496	40.61 + 0	30.930 + 324	13.40 -166
	+ 277	-211	+ 317	- 73	+ 448	+ 53	+ 292	-140
Mean Place	47.559	71.04	08.410	62.25	46.127	60.52	28.602	24.40
sec δ, tan δ	+1.001	-0.047	+1.140	+0.546	+1.791	+1.485	+1.032	+0.253
dα(ψ), dδ(ψ)	+0.061	-0.37	+0.067	-0.37	+0.076	-0.37	+0.064	-0.37
dα(ε), dδ(ε)	-0.003	+0.39	+0.034	+0.39	+0.091	+0.38	+0.016	+0.38
Dble. Trans.	February 27		February 27		February 27		February 28	

AT UPPER TRANSIT AT GREENWICH

No.	397		396		1273		399	
Name	203 G. Carinae		ρ Leonis		219 G. Velorum		44 Hydrae	
Mag. Spect.	3.58	B5p	3.85	B0p	5.14	K0	5.32	K2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	10 31	-61 36	10 32	+ 9 22	10 32	-46 55	10 33	-23 40
1 -8.8	31 322 + 529	23.71 -228	04 375 + 340	47.68 -199	21.133 + 410	31.08 -242	20 610 + 345	07.58 -244
1 1.2	31 808 + 486	26.46 -275	04 699 + 324	45.82 -186	21 515 + 382	33.88 -280	20 934 + 324	10.21 -263
1 11.1	32 240 + 432	29.62 -316	05 000 + 301	44.13 -169	21 859 + 344	37.02 -314	21 232 + 298	12.98 -277
1 21.1	32 600 + 360	33.12 -350	05 264 + 264	42.67 -146	22 151 + 292	40.40 -338	21 490 + 258	15.80 -282
1 31.1	32 881 + 281	36.81 -369	05 486 + 222	41.48 -119	22 385 + 234	43.88 -348	21 703 + 213	18.58 -278
2 10.1	33 081 + 200	40.63 -382	05 662 + 176	40.56 -92	22 561 + 176	47.42 -354	21 869 + 166	21.28 -270
2 20.0	33 193 + 112	44.47 -384	05 788 + 126	39.92 -64	22 670 + 109	50.91 -349	21 983 + 114	23.81 -253
3 2.0	33 223 + 30	48.22 -375	05 867 + 79	39.56 -36	22 720 + 50	54.25 -334	22 049 + 66	26.13 -232
3 12.0	33 175 - 48	51.83 -361	05 900 + 33	39.43 -13	22 713 - 7	57.42 -317	22 069 + 20	28.22 -209
3 21.9	33 053 - 122	55.20 -337	05 891 - 9	39.52 + 9	22 653 - 60	60.31 -289	22 046 - 23	30.03 -181
3 31.9	32 871 - 182	58.27 -307	05 849 - 42	39.77 + 25	22 549 - 104	62.88 -257	21 991 - 55	31.54 -151
4 10.9	32 634 - 237	61.00 -273	05 779 - 70	40.16 + 39	22 408 - 141	65.12 -224	21 907 - 84	32.78 -124
4 20.9	32 352 - 282	63.31 -231	05 688 - 91	40.65 + 49	22 237 - 171	66.96 -184	21 801 - 106	33.68 -90
4 30.8	32 039 - 313	65.18 -187	05 586 - 102	41.20 + 55	22 046 - 191	68.38 -142	21 682 - 119	34.29 -61
5 10.8	31 699 - 340	66.58 -140	05 476 - 110	41.78 + 58	21 839 - 207	69.38 -100	21 554 - 128	34.60 -31
5 20.8	31 345 - 354	67.47 -89	05 366 - 110	42.37 + 59	21 626 - 213	69.91 -53	21 423 - 131	34.58 + 2
5 30.7	30 989 - 356	67.86 -39	05 262 - 104	42.93 + 56	21 413 - 213	70.01 -10	21 296 - 127	34.30 + 28
6 9.7	30 632 - 357	67.73 + 13	05 164 - 98	43.47 + 54	21 202 - 211	69.66 + 35	21 173 - 123	33.72 + 58
6 19.7	30 291 - 341	67.08 + 65	05 080 - 84	43.96 + 49	21 004 - 198	68.86 + 80	21 062 - 111	32.88 + 84
6 29.7	29 971 - 320	65.96 + 112	05 011 - 69	44.39 + 43	20 822 - 182	67.67 + 119	20 963 - 99	31.81 + 107
7 9.6	29 679 - 292	64.38 + 158	04 956 - 55	44.75 + 36	20 659 - 163	66.09 + 158	20 879 - 84	30.53 + 128
7 19.6	29 429 - 250	62.39 + 199	04 922 - 34	45.01 + 26	20 524 - 135	64.19 + 190	20 816 - 63	29.08 + 145
7 29.6	29 225 - 204	60.07 + 232	04 908 - 14	45.17 + 16	20 419 - 105	62.03 + 216	20 774 - 42	27.53 + 155
8 8.6	29 076 - 149	57.46 + 261	04 916 + 8	45.22 + 5	20 349 - 70	59.66 + 237	20 755 - 19	25.89 + 164
8 18.5	28 993 - 83	54.68 + 278	04 951 + 35	45.09 - 13	20 322 - 27	57.17 + 249	20 767 + 12	24.27 + 162
8 28.5	28 977 - 16	51.82 + 286	05 030 + 79	44.75 - 34	20 339 + 17	54.67 + 250	20 807 + 40	22.71 + 156
9 7.5	29 037 + 60	48.95 + 287	05 091 + 61	44.40 - 35	20 406 + 67	52.22 + 245	20 881 + 74	21.27 + 144
9 17.4	29 178 + 141	46.23 + 272	05 213 + 122	43.71 - 69	20 527 + 121	49.95 + 227	20 994 + 113	20.05 + 122
9 27.4	29 395 + 217	43.75 + 248	05 365 + 152	42.83 - 88	20 700 + 173	47.95 + 200	21 142 + 148	19.10 + 95
10 7.4	29 693 + 298	41.60 + 215	05 553 + 188	41.70 - 113	20 929 + 229	46.28 + 167	21 332 + 190	18.49 + 61
10 17.4	30 065 + 372	39.91 + 169	05 775 + 222	40.35 - 135	21 210 + 281	45.09 + 119	21 561 + 229	18.28 + 21
10 27.3	30 500 + 435	38.73 + 118	06 030 + 255	38.79 - 156	21 537 + 327	44.38 + 71	21 826 + 265	18.48 - 20
11 6.3	30 993 + 493	38.14 + 59	06 317 + 287	37.02 - 177	21 907 + 370	44.24 + 14	22 126 + 300	19.15 - 67
11 16.3	31 526 + 533	38.20 - 6	06 630 + 313	35.11 - 191	22 308 + 401	44.70 - 46	22 451 + 325	20.27 - 112
11 26.3	32 081 + 555	38.88 - 68	06 962 + 332	33.09 - 202	22 730 + 422	45.73 - 103	22 795 + 344	21.80 - 153
12 6.2	32 647 + 566	40.21 - 133	07 306 + 344	31.01 - 208	23 161 + 431	47.34 - 161	23 151 + 356	23.74 - 194
12 16.2	33 196 + 549	42.15 - 194	07 652 + 346	28.97 - 204	23 584 + 423	49.47 - 213	23 503 + 352	26.01 - 227
12 26.2	33 715 + 519	44.61 - 246	07 988 + 336	27.00 - 197	23 989 + 405	52.05 - 258	23 844 + 341	28.53 - 252
12 36.1	34 188 + 473	47.56 - 295	08 307 + 319	25.17 - 183	24 362 + 373	55.03 - 298	24 163 + 319	31.25 - 272
	+ 408	- 332	+ 287	- 162	+ 326	- 325	+ 284	- 282
Mean Place	32.534	56.62	06.059	34.86	22.654	61.13	22.297	31.27
sec δ, tan δ	+2.104	-1.851	+1.014	+0.165	+1.464	-1.070	+1.092	-0.438
dα(ψ), dδ(ψ)	+0.043	-0.37	+0.063	-0.37	+0.051	-0.37	+0.057	-0.37
dα(ε), dδ(ε)	-0.114	+0.38	+0.010	+0.37	-0.066	+0.37	-0.027	+0.37
Dble. Trans.	February 28		February 28		February 28		February 28	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	395		398		401		1274		
	9 H. Draconis		37 Ursae Majoris		γ Chamaeleontis		236 G. Hydrae		
Mag.Spect.	5.04	G5	5.16	F0	4.10	M0	5.85	F8	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	10 33	+75 46	10 34	+57 08	10 35	-78 31	10 35	-12 09	
1	-8.8	58.396 +1069	55.93 - 17	16.760 + 546	68.82 - 72	19.019 +1095	40.34 -193	50.264 + 336	06 64 -235
1	1.2	59.415 +1019	56.36 + 43	17.283 + 523	68.62 - 20	20.011 + 992	42.81 -247	50.582 + 318	09.09 -245
1	11.1	60.362 + 947	57.37 +101	17.770 + 487	68.95 + 33	20.882 + 871	45.76 -295	50.876 + 294	11.56 -247
1	21.1	61.192 + 830	58.96 +159	18.200 + 430	69.81 + 86	21.589 + 707	49.13 -337	51.133 + 257	13.99 -243
1	31.1	61.883 + 691	61.00 +204	18.562 + 362	71.13 +132	22.122 + 533	52.78 -365	51.347 + 214	16.30 -231
2	10.1	62.420 + 537	63.45 +245	18.849 + 287	72.85 +172	22.478 + 356	56.64 -386	51.517 + 170	18.46 -216
2	20.0	62.775 + 355	66.20 +275	19.049 + 200	74.92 +207	22.638 + 160	60.60 -396	51.637 + 120	20.40 -194
3	2.0	62.952 + 177	69.09 +289	19.165 + 116	77.19 +227	22.617 - 19	64.54 -394	51.710 + 73	22.10 -170
3	12.0	62.951 - 1	72.05 +296	19.198 + 33	79.60 +241	22.420 - 21	68.43 -389	51.740 + 30	23.56 -146
3	21.9	62.773 - 178	74.93 +288	19.150 - 48	82.02 +242	22.051 - 369	72.13 -370	51.729 - 11	24.75 -119
3	31.9	62.448 - 325	77.60 +267	19.037 - 113	84.33 +231	21.539 - 512	75.58 -345	51.685 - 44	25.68 - 93
4	10.9	61.987 - 461	80.00 +240	18.865 - 172	86.47 +214	20.890 - 649	78.73 -315	51.615 - 70	26.37 - 69
4	20.9	61.416 - 571	81.99 +199	18.647 - 218	88.34 +187	20.124 - 786	81.49 -276	51.523 - 92	26.80 - 43
4	30.8	60.774 - 642	83.52 +153	18.401 - 246	89.85 +151	19.271 - 853	83.81 -232	51.420 - 103	27.02 - 22
5	10.8	60.076 - 698	84.57 +105	18.134 - 267	91.00 +115	18.339 - 932	85.68 -187	51.308 - 112	27.01 + 1
5	20.8	59.356 - 720	85.05 + 48	17.862 - 272	91.70 + 70	17.356 - 983	87.01 -133	51.195 - 113	26.78 + 23
5	30.8	58.647 - 709	84.99 - 6	17.598 - 264	91.97 + 27	16.353 -1003	87.83 - 82	51.085 - 110	26.38 + 40
6	9.7	57.959 - 688	84.40 - 59	18.962 - 253	91.80 - 17	15.337 -1016	88.09 + 26	50.981 - 104	25.79 + 59
6	19.7	57.326 - 633	83.26 -114	17.345 - 227	91.16 - 64	14.347 - 990	87.78 + 31	50.887 - 94	25.04 + 75
6	29.7	56.762 - 564	81.65 -161	17.118 - 196	90.12 -104	13.404 - 943	86.96 + 82	50.807 - 80	24.17 + 87
7	9.6	56.277 - 485	79.58 -207	16.759 - 163	88.68 -144	12.526 - 878	85.60 +136	50.740 - 67	23.18 + 99
7	19.6	55.894 - 383	77.10 -248	16.640 - 119	86.87 -181	11.752 - 774	83.77 +183	50.693 - 47	22.11 +107
7	29.6	55.615 - 279	74.29 -281	16.562 - 78	84.75 -212	11.095 - 657	81.54 +223	50.664 - 29	21.01 +110
8	8.6	55.446 - 169	71.19 -310	16.530 - 32	82.33 -242	10.577 - 518	78.95 +259	50.657 - 7	19.91 +110
8	18.5	55.402 - 44	67.86 -333	16.551 + 21	79.67 -266	10.231 - 346	76.10 +285	50.677 + 20	18.87 +104
8	28.5	55.475 + 73	64.39 -347	16.621 + 70	76.84 -283	10.055 - 176	73.11 +299	50.723 + 46	17.93 + 94
9	7.5	55.675 + 200	60.81 -358	16.744 + 123	73.84 -300	10.072 + 17	70.03 +308	50.800 + 77	17.14 + 79
9	17.5	56.004 + 329	57.22 -359	16.926 + 182	70.77 -307	10.290 + 218	67.04 +299	50.910 + 110	16.58 + 56
9	27.4	56.451 + 447	53.69 -353	17.161 + 235	67.66 -311	10.697 + 407	64.22 +282	51.055 + 145	16.26 + 32
10	7.4	57.025 + 574	50.26 -343	17.455 + 294	64.56 -310	11.297 + 600	61.68 +254	51.238 + 183	16.26 + 0
10	17.4	57.716 + 691	47.06 -320	17.805 + 350	61.57 -299	12.072 + 775	59.56 +212	51.457 + 219	16.62 - 36
10	27.3	58.510 + 794	44.12 -294	18.206 + 401	58.73 -284	12.992 + 920	57.93 +163	51.710 + 253	17.32 - 70
11	6.3	59.408 + 898	41.52 -260	18.660 + 454	56.10 -263	14.041 +1049	56.86 +107	51.997 + 287	18.41 -109
11	16.3	60.383 + 975	39.36 -216	19.153 + 493	53.78 -232	15.171 +1130	56.45 + 41	52.308 + 311	19.81 -145
11	26.3	61.415 +1032	37.66 -170	19.678 + 525	51.82 -196	16.347 +1176	56.68 - 23	52.639 + 331	21.61 -175
12	6.2	62.490 +1075	36.51 -115	20.225 + 547	50.27 -155	17.535 +1188	57.58 - 90	52.982 + 343	23.67 -206
12	16.2	63.564 +1074	35.95 - 56	20.774 + 549	49.22 -105	18.678 +1143	59.14 -156	53.324 + 342	25.93 -226
12	26.2	64.614 +1050	35.97 + 2	21.313 + 539	48.66 - 56	19.748 +1070	61.27 -213	53.657 + 333	28.34 -241
12	36.2	65.609 + 995	36.61 + 64	21.825 + 512	48.65 - 1	20.711 + 963	63.97 -270	53.970 + 313	30.83 -249
		+ 897	+122	+ 464	+ 52	+ 814	-314	+ 281	-248
Mean Place	58.236	58.65	17.932	69.10	19.031	75.31	51.998	27.00	
sec δ, tan δ	+4.072	+3.947	+1.844	+1.549	+5.032	-4.932	+1.023	-0.215	
dα(ψ), dδ(ψ)	+0.100	-0.37	+0.076	-0.37	+0.014	-0.37	+0.059	-0.37	
dα(ε), dδ(ε)	+0.245	+0.37	+0.096	+0.37	-0.307	+0.36	-0.013	+0.36	
Dble.Trans.	March 1		March 1		March 1		March 1		

AT UPPER TRANSIT AT GREENWICH

No.	1275		402		404		1277	
Name	37 Leonis Minoris		225 G. Velorum*		33 Sextantis		78 G. Antliae	
Mag. Spect.	4.77	G0	4.37	G0	6.40	K0	5.73	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	10 37	+ 32 02	10 38	- 55 31	10 40	- 1 39	10 42	- 32 38
1 -8.8	<sup>s</sup> 56 190 + 386	53 35 -148	<sup>s</sup> 44 521 + 472	26 17 -228	<sup>s</sup> 41 233 + 336	56 67 -221	<sup>s</sup> 03 844 + 365	14 91 -240
1 1.2	56 560 + 370	52 21 -114	44 959 + 438	28 90 -273	41 553 + 320	58 86 -219	04 188 + 344	17 60 -269
1 11.1	56 906 + 346	51 44 -77	45 959 + 394	31 03 -313	41 850 + 297	60 99 -213	04 504 + 316	20 52 -292
1 21.1	57 213 + 307	51 08 -36	45 353 + 334	35 46 -343	42 112 + 262	62 98 -199	04 778 + 274	23 57 -305
1 31.1	57 474 + 261	51 11 + 3	45 687 + 268	39 06 -360	42 334 + 222	64 77 -179	05 006 + 228	26 66 -309
2 10.1	57 683 + 209	51 50 + 39	46 154 + 199	42 77 -371	42 511 + 177	66 35 -158	05 184 + 178	29 72 -306
2 20.0	57 835 + 152	52 24 + 74	46 277 + 123	46 49 -372	42 639 + 128	67 68 -133	05 307 + 123	32 68 -296
3 2.0	57 931 + 96	53 23 + 99	46 330 + 53	50 10 -361	42 722 + 83	68 74 -106	05 379 + 72	35 45 -277
3 12.0	57 973 + 42	54 44 +121	46 330 - 13	53 57 -347	42 760 + 38	69 57 -83	05 403 + 24	38 02 -267
3 21.9	57 965 - 8	55 80 +136	46 239 - 78	56 80 -323	42 760 - 3	70 13 -56	05 381 - 22	40 31 -229
3 31.9	57 916 - 49	57 19 +139	46 111 - 128	59 72 -292	42 722 - 35	70 48 -35	05 324 - 57	42 31 -200
4 10.9	57 831 - 85	58 59 +140	45 935 - 176	62 32 -260	42 659 - 63	70 64 -16	05 234 - 90	44 01 -170
4 20.9	57 720 - 111	59 91 +132	45 935 - 214	64 50 -218	42 575 - 84	70 60 + 4	05 120 - 114	45 34 -133
4 30.8	57 592 - 128	61 09 +118	45 721 - 240	66 27 -177	42 479 - 96	70 43 + 17	04 989 - 131	46 34 -100
5 10.8	57 454 - 138	62 10 +101	45 218 - 263	67 58 -131	42 374 - 105	70 12 + 31	04 847 - 142	46 98 -64
5 20.8	57 314 - 140	62 89 + 79	44 942 - 276	68 40 - 82	42 267 - 107	69 69 + 43	04 698 - 149	47 24 -26
5 30.8	57 180 - 134	63 45 + 56	44 665 - 277	68 75 - 35	42 165 - 102	69 19 + 50	04 551 - 147	47 16 + 8
6 9.7	57 053 - 127	63 76 + 31	44 386 - 279	68 60 + 15	42 066 - 99	68 60 + 59	04 406 - 145	46 72 + 44
6 19.7	56 942 - 111	63 80 + 4	44 119 - 267	67 96 + 64	41 979 - 87	67 95 + 65	04 270 - 136	45 94 + 78
6 29.7	56 848 - 94	63 59 - 21	43 869 - 250	66 88 +108	41 904 - 75	67 27 + 68	04 147 - 123	44 87 +107
7 9.6	56 773 - 75	63 12 - 47	43 640 - 229	65 35 +153	41 843 - 61	66 57 + 70	04 037 - 110	43 50 +137
7 19.6	56 723 - 50	62 40 - 72	43 445 - 195	63 44 +191	41 800 - 43	65 87 + 70	03 948 - 89	41 90 +160
7 29.6	56 696 - 27	61 45 - 95	43 285 - 160	61 23 +221	41 775 - 25	65 22 + 65	03 882 - 66	40 12 +178
8 8.6	56 696 + 0	60 27 -118	43 168 - 117	58 74 +249	41 771 - 4	64 62 + 60	03 841 - 41	38 20 +192
8 18.5	56 725 + 29	58 87 -140	43 105 - 63	56 09 +265	41 792 + 21	64 13 + 49	03 832 - 9	36 23 +197
8 28.5	56 784 + 59	57 27 -160	43 096 - 9	53 37 +272	41 837 + 45	63 79 + 34	03 855 + 23	34 28 +195
9 7.5	56 876 + 92	55 47 -180	43 148 + 52	50 66 +271	41 910 + 73	63 60 + 19	03 917 + 62	32 42 +186
9 17.5	57 005 + 129	53 50 -197	43 268 + 120	48 10 +256	42 017 + 107	63 61 - 1	04 021 + 104	30 76 +166
9 27.4	57 170 + 165	51 40 -210	43 451 + 183	45 77 +233	42 158 + 141	63 87 - 26	04 166 + 145	29 34 +142
10 7.4	57 374 + 204	49 16 -224	43 703 + 252	43 76 +201	42 334 + 176	64 42 - 55	04 356 + 190	28 26 +108
10 17.4	57 618 + 244	46 85 -231	44 019 + 316	42 21 +155	42 547 + 213	65 27 - 85	04 591 + 235	27 61 + 65
10 27.3	57 898 + 280	44 49 -236	44 391 + 372	41 16 +105	42 792 + 245	66 40 -113	04 865 + 274	27 40 + 21
11 6.3	58 216 + 318	42 14 -235	44 815 + 424	40 68 + 48	43 072 + 280	67 83 -143	05 177 + 312	27 68 - 28
11 16.3	58 563 + 347	39 87 -227	45 275 + 460	40 83 - 15	43 377 + 305	69 52 -169	05 519 + 342	28 48 - 80
11 26.3	58 933 + 370	37 72 -215	45 759 + 484	41 57 - 74	43 702 + 325	71 42 -190	05 882 + 363	29 77 -129
12 6.2	59 320 + 387	35 76 -196	46 256 + 497	42 95 -138	44 041 + 339	73 51 -209	06 257 + 375	31 53 -176
12 16.2	59 709 + 389	34 07 -169	46 742 + 486	44 91 -196	44 382 + 341	75 70 -219	06 630 + 373	33 72 -219
12 26.2	60 091 + 382	32 69 -138	47 207 + 465	47 37 -246	44 714 + 332	77 92 -222	06 991 + 361	36 24 -252
12 36.2	60 455 + 364	31 66 -103	47 635 + 428	50 29 -292	45 029 + 315	80 12 -220	07 329 + 338	39 06 -282
	60 455 + 332	31 66 -62	47 635 + 374	50 29 -326	45 029 + 285	80 12 -209	07 329 + 302	39 06 -299
Mean Place	57.780	47.74	46.009	58.18	42.979	73.20	05.578	41.39
sec δ, tan δ	+1.180	+0.626	+1.767	-1.457	+1.000	-0.029	+1.188	-0.641
da(ψ), dδ(ψ)	+0.067	-0.37	+0.048	-0.37	+0.061	-0.37	+0.055	-0.38
da(ε), dδ(ε)	+0.039	+0.35	-0.091	+0.35	-0.002	+0.34	-0.040	+0.33
Dble. Trans.	March 2		March 2		March 2		March 3	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	403		406		405		1276	
	35 H. Ursae Majoris		δ Carinae		41 Leonis Minoris		Piazzi 10 <sup>b</sup> 135 (Ursae Majoris)	
Mag. Spect.	5.23	K0	3.03	B0	5.05	A2	5.28	F0
U.T.	R.A. Dec.		R.A. Dec.		R.A. Dec.		R.A. Dec.	
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> ' "	<sup>h</sup> <sup>m</sup>	<sup>o</sup> ' "	<sup>h</sup> <sup>m</sup>	<sup>o</sup> ' "	<sup>h</sup> <sup>m</sup>	<sup>o</sup> ' "
	10 42	+ 69 08	10 42	- 64 18	10 42	+ 23 15	10 42	+ 46 16
	<sup>s</sup> + 775	" - 47	<sup>s</sup> + 579	" - 212	<sup>s</sup> + 364	" - 174	<sup>s</sup> + 452	" - 114
1 -8.8	06.243 + 745	47.44 + 10	27.008 + 536	51.10 - 261	39.342 + 349	41.75 - 147	44.116 + 434	32.08 - 69
1 1.2	06.988 + 696	47.54 + 68	27.544 + 480	53.71 - 306	39.691 + 326	40.28 - 118	44.550 + 408	31.39 - 21
1 11.1	07.684 + 618	48.22 + 125	28.024 + 405	56.77 - 342	40.017 + 291	39.10 - 82	44.958 + 363	31.18 + 28
1 21.1	08.302 + 523	49.47 + 174	28.429 + 322	60.19 - 365	40.308 + 247	38.28 - 48	45.321 + 309	31.46 + 73
1 31.1	08.825 + 415	51.21 + 216	28.751 + 236	63.84 - 382	40.555 + 201	37.80 - 14	45.630 + 249	32.19 + 114
2 10.1	09.240 + 289	53.37 + 250	28.987 + 141	67.66 - 387	40.756 + 146	37.66 + 20	45.879 + 180	33.33 + 151
2 20.0	09.529 + 164	55.87 + 270	29.128 + 53	71.53 - 381	40.902 + 96	37.86 + 47	46.059 + 114	34.84 + 175
3 2.0	09.693 + 41	58.57 + 280	29.181 - 31	75.34 - 371	40.998 + 47	38.33 + 70	46.173 + 48	36.59 + 194
3 12.0	09.734 - 83	61.37 + 278	29.150 - 114	79.05 - 349	41.045 + 0	39.03 + 89	46.221 - 16	38.53 + 203
3 21.9	09.651 - 187	64.15 + 263	29.036 - 181	82.54 - 321	41.045 - 38	39.92 + 99	46.205 - 67	40.56 + 200
3 31.9	09.464 - 280	66.78 + 240	28.855 - 243	85.75 - 291	41.007 - 70	40.91 + 105	46.138 - 113	42.56 + 191
4 10.9	09.184 - 357	69.18 + 205	28.612 - 296	88.66 - 248	40.937 - 94	41.96 + 105	46.025 - 149	44.47 + 173
4 20.9	08.827 - 407	71.23 + 164	28.316 - 333	91.14 - 207	40.843 - 109	43.01 + 90	45.876 - 171	46.20 + 147
4 30.8	08.420 - 447	72.87 + 120	27.983 - 367	93.21 - 161	40.734 - 120	43.99 + 98	45.705 - 188	47.67 + 120
5 10.8	07.973 - 464	74.07 + 67	27.616 - 388	94.82 - 108	40.614 - 121	44.89 + 77	45.517 - 192	48.87 + 84
5 20.8	07.509 - 458	74.74 + 17	27.228 - 395	95.90 - 60	40.493 - 117	45.66 + 61	45.325 - 187	49.71 + 48
5 30.8	07.051 - 446	74.91 - 34	26.833 - 399	96.50 - 6	40.376 - 111	46.27 + 44	45.138 - 180	50.19 + 12
6 9.7	06.605 - 412	74.57 - 87	26.434 - 388	96.56 + 47	40.265 - 98	46.71 + 26	44.958 - 161	50.31 - 27
6 19.7	06.193 - 367	73.70 - 133	26.046 - 367	96.09 + 95	40.167 - 83	46.97 + 7	44.797 - 140	50.04 - 63
6 29.7	05.826 - 318	72.37 - 178	25.679 - 342	95.14 + 143	40.084 - 67	47.04 - 12	44.657 - 116	49.41 - 98
7 9.6	05.508 - 251	70.59 - 220	25.337 - 298	93.71 + 188	40.017 - 46	46.92 - 33	44.541 - 85	48.43 - 132
7 19.6	05.257 - 185	68.39 - 254	25.039 - 251	91.83 + 222	39.971 - 25	46.59 - 51	44.456 - 55	47.11 - 161
7 29.6	05.072 - 113	65.85 - 285	24.788 - 192	89.61 + 255	39.946 - 2	46.08 - 70	44.401 - 22	45.50 - 189
8 8.6	04.959 - 30	63.00 - 311	24.596 - 121	87.06 + 276	39.944 + 25	45.38 - 91	44.379 + 17	43.61 - 215
8 18.5	04.929 + 47	59.89 - 327	24.475 - 48	84.30 + 287	39.969 + 51	44.47 - 108	44.396 + 53	41.46 - 234
8 28.5	04.976 + 132	56.62 - 342	24.427 + 35	81.43 + 291	40.020 + 81	43.39 - 131	44.449 + 95	39.12 - 254
9 7.5	05.108 + 220	53.20 - 348	24.462 + 125	78.52 + 279	40.101 + 116	42.08 - 151	44.544 + 140	36.58 - 268
9 17.5	05.328 + 303	49.72 - 346	24.587 + 210	75.73 + 260	40.217 + 150	40.57 - 168	44.684 + 182	33.90 - 276
9 27.4	05.631 + 393	46.26 - 340	24.797 + 300	73.13 + 229	40.367 + 188	38.89 - 185	44.866 + 231	31.14 - 282
10 7.4	06.024 + 476	42.86 - 324	25.097 + 384	70.84 + 185	40.555 + 225	37.04 - 199	45.097 + 277	28.32 - 281
10 17.4	06.500 + 553	39.62 - 302	25.481 + 456	68.99 + 136	40.780 + 260	35.05 - 210	45.374 + 321	25.51 - 274
10 27.3	07.053 + 630	36.60 - 274	25.937 + 522	67.63 + 80	41.040 + 296	32.95 - 218	45.695 + 364	22.77 - 263
11 6.3	07.683 + 689	33.86 - 234	26.459 + 569	66.83 + 14	41.336 + 324	30.77 - 220	46.059 + 401	20.14 - 241
11 16.3	08.372 + 736	31.52 - 192	27.028 + 598	66.69 - 48	41.660 + 347	28.57 - 216	46.460 + 428	17.73 - 216
11 26.3	09.108 + 770	29.60 - 142	27.626 + 612	67.17 - 114	42.007 + 363	26.41 - 206	46.888 + 449	15.57 - 183
12 6.2	09.878 + 776	28.18 - 85	28.238 + 599	68.31 - 176	42.370 + 366	24.35 - 189	47.337 + 453	13.74 - 143
12 16.2	10.654 + 764	27.33 - 30	28.837 + 570	70.07 - 230	42.736 + 361	22.46 - 167	47.790 + 447	12.31 - 100
12 26.2	11.418 + 730	27.03 + 31	29.407 + 523	72.37 - 283	43.097 + 343	20.79 - 139	48.237 + 427	11.31 - 53
12 36.2	12.148 + 663	27.34 + 89	29.930 + 455	75.20 - 322	43.440 + 314	19.40 - 105	48.664 + 390	10.78 - 3
Mean Place	06.868	49.78	28.371	84.69	41.009	33.60	45.539	30.29
sec δ, tan δ	+2.809	+2.625	+2.308	-2.080	+1.088	+0.430	+1.447	+1.046
dα(ψ), dδ(ψ)	+0.084	-0.38	+0.043	-0.38	+0.065	-0.38	+0.070	-0.38
dα(ε), dδ(ε)	+0.165	+0.33	-0.131	+0.33	+0.027	+0.33	+0.066	+0.33
Dble. Trans.	March 3		March 3		March 3		March 3	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	407		1278		411		1279	
Name	42 Leonis Minoris		Bradley 1493 (Leonis)		δ <sup>3</sup> Chamaeleontis		51 Leonis	
Mag. Spect.	5.37	B9	6.29	K0	4.62	B3	5.64	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	10 45	+ 30 44	10 45	+ 6 26	10 45	- 80 27	10 45	+ 18 57
1 -8.8	05.357 +383	78.98 -158	21.761 +341	54.09 -209	39.548 +1318	32.90 -176	39.262 +356	56.05 -186
1 1.2	05.726 +369	77.73 -125	22.088 +327	52.10 -199	40.752 +1204	35.21 -231	39.604 +342	54.42 -163
1 11.1	06.072 +346	76.85 -88	22.393 +305	50.25 -185	41.819 +1067	38.03 -282	39.925 +321	53.05 -137
1 21.1	06.381 +309	76.37 -48	22.664 +271	48.61 -164	42.701 +882	41.29 -326	40.211 +286	52.00 -105
1 31.1	06.645 +264	76.28 -9	22.894 +230	47.22 -139	43.382 +681	44.86 -357	40.455 +244	51.27 -73
2 10.1	06.860 +215	76.56 +28	23.081 +187	46.09 -113	43.857 +475	48.67 -381	40.654 +199	50.87 -40
2 20.0	07.018 +158	77.20 +64	23.219 +138	45.25 -84	44.100 +243	52.61 -394	40.800 +146	50.79 -8
3 2.0	07.121 +103	78.11 +91	23.309 +90	44.68 -57	44.130 +30	56.57 -396	40.897 +97	50.99 +20
3 12.0	07.172 +51	79.24 +113	23.356 +47	44.35 -33	43.951 -179	60.50 -393	40.947 +50	51.44 +45
3 22.0	07.172 +0	80.53 +129	23.359 +3	44.27 -8	43.562 -389	64.27 -377	40.951 +4	52.09 +65
3 31.9	07.131 -41	81.89 +136	23.330 -29	44.37 +10	42.999 -563	67.81 -354	40.919 -32	52.86 +77
4 10.9	07.055 -76	83.27 +138	23.271 -59	44.62 +25	42.267 -732	71.09 -328	40.856 -63	53.72 +86
4 20.9	06.952 -103	84.58 +131	23.191 -80	45.01 +39	41.385 -882	73.99 -290	40.768 -88	54.62 +90
4 30.8	06.832 -120	85.77 +119	23.097 -94	45.47 +46	40.392 -993	76.48 -249	40.667 -101	55.49 +87
5 10.8	06.699 -133	86.81 +104	22.994 -103	46.00 +53	39.294 -1098	78.52 -204	40.555 -112	56.31 +82
5 20.8	06.564 -135	87.64 +83	22.888 -106	46.57 +57	38.124 -1170	80.03 -151	40.441 -114	57.05 +74
5 30.8	06.433 -131	88.24 +60	22.786 -102	47.14 +57	36.917 -1207	81.04 -101	40.330 -111	57.67 +62
6 9.7	06.308 -125	88.62 +38	22.689 -97	47.71 +57	35.685 -1232	81.49 -45	40.225 -105	58.17 +50
6 19.7	06.197 -111	88.73 +11	22.602 -87	48.25 +54	34.473 -1212	81.37 +12	40.131 -94	58.52 +35
6 29.7	06.102 -95	88.59 -14	22.527 -75	48.75 +50	33.308 -1165	80.72 +65	40.051 -80	58.71 +19
7 9.6	06.024 -78	88.21 -38	22.466 -61	49.21 +46	32.210 -1098	79.54 +118	39.986 -65	58.75 +4
7 19.6	05.969 -55	87.56 -65	22.423 -43	49.59 +38	31.230 -980	77.85 +169	39.941 -45	58.61 -14
7 29.6	05.936 -33	86.70 -86	22.398 -25	49.88 +29	30.383 -847	75.75 +210	39.916 -25	58.31 -30
8 8.6	05.929 -7	85.60 -110	22.393 -5	50.06 +18	29.698 -685	73.25 +250	39.912 -4	57.84 -47
8 18.5	05.950 +21	84.27 -133	22.414 +21	50.09 +3	29.214 -484	70.48 +277	39.935 +23	57.18 -66
8 28.5	06.000 +50	82.75 -152	22.461 +47	49.94 -15	28.934 -280	67.52 +296	39.982 +7	56.35 -83
9 7.5	06.082 +82	81.01 -174	22.522 +61	49.69 -25	28.884 -50	64.45 +307	40.057 +45	55.29 -106
9 17.5	06.201 +119	79.09 -192	22.633 +111	49.17 -52	29.077 +193	61.43 +302	40.168 +111	54.01 -128
9 27.4	06.355 +154	77.02 -207	22.771 +138	48.43 -74	29.499 +422	58.55 +288	40.312 +144	52.56 -145
10 7.4	06.549 +194	74.81 -221	22.945 +174	47.44 -99	30.158 +659	55.91 +264	40.493 +181	50.91 -165
10 17.4	06.783 +234	72.51 -230	23.155 +210	46.20 -124	31.031 +873	53.68 +223	40.711 +218	49.09 -182
10 27.3	07.054 +271	70.15 -236	23.399 +244	44.73 -147	32.085 +1054	51.90 +178	40.963 +252	47.13 -196
11 6.3	07.363 +309	67.77 -238	23.677 +278	43.03 -170	33.302 +1217	50.67 +123	40.963 +288	45.05 -208
11 16.3	07.702 +339	65.46 -231	23.982 +305	41.15 -188	34.625 +1323	50.08 +59	41.251 +317	42.91 -214
11 26.3	08.065 +363	63.25 -221	24.309 +327	39.13 -202	36.012 +1387	50.12 -4	41.568 +339	40.76 -215
12 6.2	08.446 +381	61.22 -203	24.651 +342	37.01 -212	37.424 +1412	50.83 -71	42.262 +355	38.65 -211
12 16.2	08.832 +386	59.45 -177	24.995 +344	34.89 -212	38.793 +1369	52.21 -138	42.621 +359	36.68 -197
12 26.2	09.212 +380	57.96 -149	25.333 +338	32.81 -208	40.084 +1291	54.18 -197	42.974 +353	34.88 -180
12 36.2	09.575 +363	56.83 -113	25.655 +322	30.84 -197	41.257 +1173	56.72 -254	43.312 +338	33.32 -156
	+333	-74	+293	-178	+1004	-302	+308	-126
Mean Place	06.985	73.13	23.521	40.40	39.755	68.25	40.975	46.55
sec δ, tan δ	+1.164	+0.595	+1.006	+0.113	+6.039	-5.956	+1.057	+0.344
da(ψ), dδ(ψ)	+0.066	-0.38	+0.062	-0.38	+0.011	-0.38	+0.064	-0.38
da(ε), dδ(ε)	+0.038	+0.32	+0.007	+0.32	-0.376	+0.32	+0.022	+0.32
Dble. Trans.	March 3		March 3		March 3		March 3	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1280		409		410		1281	
	250 G. Hydrae		53 Leonis		v Hydrae		41 Sextantis	
Mag.Spect.	6.86	K0	5.27	A0	3.32	K0	5.78	A2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	10 46	-25 58	10 48	+10 36	10 48	-16 07	10 49	- 8 49
1 <sup>d</sup>	02.414	12.56	31.135	72.97	55.658	00.89	35.570	14.78
1 <sup>s</sup>	+353	-238	+346	-203	+343	-234	+339	-229
1	02.414	12.56	31.135	72.97	55.658	00.89	35.570	14.78
1	02.748	15.17	31.466	71.08	55.984	03.35	35.893	17.13
1	03.057	17.95	31.777	69.38	56.287	05.90	36.195	19.48
1	03.327	20.81	32.054	67.92	56.555	08.45	36.462	21.77
1	03.554	23.66	32.291	66.74	56.781	10.90	36.689	23.91
2	03.734	26.45	32.484	65.84	56.963	13.24	36.873	25.89
2	03.861	29.10	32.627	65.25	57.096	15.39	37.008	27.64
3	03.940	31.55	32.722	64.93	57.182	17.31	37.097	29.15
3	03.973	33.79	32.773	64.86	57.224	19.00	37.143	30.42
3	03.963	35.75	32.780	65.02	57.224	20.42	37.147	31.42
3	03.918	37.43	32.753	65.35	57.191	21.57	37.119	32.18
4	03.843	38.82	32.696	65.82	57.129	22.47	37.062	32.71
4	03.743	39.88	32.616	66.39	57.045	23.10	36.983	33.01
4	03.630	40.64	32.523	67.00	56.947	23.48	36.890	33.11
5	03.504	41.08	32.419	67.64	56.837	23.61	36.787	33.02
5	03.374	41.20	32.313	68.28	56.724	23.50	36.681	32.75
5	03.244	41.03	32.210	68.88	56.613	23.17	36.576	32.33
6	03.117	40.55	32.110	69.44	56.503	22.63	36.474	31.76
6	02.998	39.79	32.022	69.93	56.403	21.90	36.381	31.07
6	02.891	38.78	31.945	70.33	56.313	21.00	36.299	30.29
7	02.797	37.54	31.882	70.66	56.235	19.95	36.228	29.41
7	02.721	36.10	31.837	70.87	56.174	18.79	36.175	28.48
7	02.665	34.54	31.810	70.97	56.131	17.57	36.139	27.54
8	02.632	32.87	31.804	70.93	56.109	16.30	36.123	26.61
8	02.629	31.19	31.823	70.73	56.114	15.08	36.131	25.76
8	02.654	29.55	31.869	70.38	56.144	13.93	36.165	25.02
9	02.715	28.01	31.931	69.87	56.206	12.91	36.228	24.42
9	02.814	26.68	32.037	69.05	56.303	12.11	36.324	24.03
9	02.951	25.59	32.173	68.06	56.435	11.54	36.455	23.88
10	03.130	24.83	32.346	66.84	56.607	11.29	36.624	24.02
10	03.352	24.47	32.555	65.40	56.817	11.40	36.831	24.51
10	03.611	24.52	32.798	63.75	57.063	11.87	37.072	25.31
11	03.907	25.03	33.077	61.91	57.346	12.75	37.348	26.47
11	04.232	26.02	33.383	59.93	57.656	14.02	37.652	27.96
11	04.578	27.43	33.711	57.85	57.987	15.63	37.977	29.73
12	04.938	29.27	34.056	55.72	58.333	17.59	38.317	31.76
12	05.297	31.47	34.404	53.63	58.680	19.80	38.660	33.97
12	05.646	33.95	34.746	51.63	59.020	22.20	38.996	36.30
12	05.975	36.67	35.073	49.78	59.341	24.74	39.315	38.68
Mean Place	04.195	37.03	32.896	60.75	57.478	22.11	37.386	33.67
sec δ, tan δ	+1.112	-0.487	+1.017	+0.187	+1.041	-0.289	+1.012	-0.155
dα(w), dδ(v)	+0.057	-0.38	+0.063	-0.38	+0.059	-0.38	+0.060	-0.38
dα(ε), dδ(ε)	-0.031	+0.32	+0.012	+0.31	-0.018	+0.31	-0.010	+0.30
Dble.Trans.	March 4		March 4		March 4		March 4	

AT UPPER TRANSIT AT GREENWICH

No.	412		414		1282		413	
	46 Leonis Minoris		Antliae		47 Ursae Majoris		Bradley 1508 (Draconis)	
Mag.Spect.	3.92	K0	4.70	K0	5.14	G0	6.26	G5
U.T.	R.A.		R.A.		R.A.		R.A.	
	h	m	h	m	h	m	h	m
	10 52	+ 34 16	10 56	- 37 03	10 58	+ 40 29	10 58	+ 77 50
1 <sup>d</sup> -8.8	31.920 <sup>s</sup> + 396	81.12 <sup>o</sup> -156	03.349 <sup>s</sup> + 384	26.52 <sup>o</sup> -230	41.232 <sup>s</sup> + 421	71.93 <sup>o</sup> -146	54.146 <sup>s</sup> +1229	30.11 <sup>o</sup> - 48
1 1.2	32.303 + 383	79.92 -120	03.712 + 363	29.15 -263	41.641 + 409	70.89 -104	55.338 +1192	30.24 + 13
1 11.1	32.664 + 361	79.12 - 80	04.049 + 337	32.05 -290	42.027 + 386	70.30 - 59	56.467 +1129	30.98 + 74
1 21.1	32.988 + 324	78.75 - 37	04.344 + 295	35.15 -310	42.376 + 349	70.18 - 12	57.481 +1014	32.33 +135
1 31.1	33.268 + 280	78.79 + 4	04.592 + 248	38.33 -318	42.678 + 302	70.51 + 33	58.352 + 871	34.19 +186
2 10.1	33.496 + 228	79.23 + 44	04.791 + 199	41.53 -320	42.926 + 248	71.27 + 76	59.058 + 706	36.51 +232
2 20.0	33.667 + 171	80.04 + 81	04.933 + 142	44.66 -313	43.113 + 187	72.41 +114	59.563 + 505	39.18 +267
3 2.0	33.782 + 115	81.13 +109	05.022 + 89	47.64 -298	43.240 + 127	73.83 +142	59.866 + 303	42.06 +288
3 12.0	33.842 + 60	82.45 +132	05.062 + 40	50.45 -281	43.307 + 67	75.49 +166	59.964 + 98	45.07 +301
3 22.0	33.849 + 7	83.93 +148	05.053 - 9	53.01 -256	43.316 + 9	77.29 +180	59.853 - 111	48.06 +299
3 31.9	33.812 - 37	85.46 +153	05.005 - 48	55.27 -226	43.277 - 39	79.13 +184	59.560 - 293	50.89 +283
4 10.9	33.738 - 74	87.00 +154	04.923 - 82	57.24 -197	43.196 - 81	80.94 +114	59.098 - 462	53.49 +260
4 20.9	33.633 -105	88.46 +146	04.812 -111	58.85 -161	43.080 -116	82.62 +168	58.491 - 607	55.72 +223
4 30.8	33.510 -123	89.77 +131	04.683 -129	60.11 -126	42.942 -138	84.12 +150	57.782 - 709	57.51 +179
5 10.8	33.373 -137	90.90 +113	04.537 -146	61.00 - 89	42.786 -156	85.39 +127	56.988 - 794	58.84 +133
5 20.8	33.230 -143	91.80 + 90	04.382 -155	61.49 - 49	42.624 -162	86.37 + 98	56.147 - 841	59.61 + 77
5 30.8	33.091 -139	92.44 + 64	04.225 -157	61.62 - 13	42.463 -161	87.03 + 66	55.296 - 851	59.84 + 23
6 9.7	32.956 -135	92.81 + 37	04.068 -157	61.36 + 26	42.306 -157	87.38 + 35	54.449 - 847	59.51 - 33
6 19.7	32.834 -122	92.88 + 7	03.916 -152	60.72 + 64	42.162 -144	87.37 - 1	53.646 - 803	58.62 - 89
6 29.7	32.729 -105	92.67 - 21	03.774 -142	59.76 + 96	42.035 -127	87.03 - 34	52.907 - 739	57.23 -139
7 9.7	32.639 - 90	92.19 - 48	03.645 -129	58.47 +129	41.925 -110	86.36 - 67	52.242 - 665	55.35 -188
7 19.6	32.573 - 66	91.42 - 77	03.535 -110	56.89 +158	41.841 - 84	85.37 - 99	51.684 - 558	53.02 -233
7 29.6	32.530 - 43	90.39 -103	03.446 - 89	55.11 +178	41.781 - 60	84.09 -128	51.234 - 450	50.32 -270
8 8.6	32.512 -18	89.12 -127	03.383 - 63	53.13 +198	41.748 - 33	82.52 -157	50.905 - 329	47.27 -305
8 18.5	32.524 + 12	87.60 -152	03.353 - 30	51.07 +206	41.748 + 0	80.69 -183	50.716 - 189	43.96 -331
8 28.5	32.565 + 41	85.87 -173	03.356 + 3	48.99 +208	41.780 + 32	78.64 -205	50.660 - 56	40.46 -350
9 7.5	32.640 + 75	83.92 -195	03.400 + 44	46.95 +204	41.849 + 69	76.36 -228	50.749 + 89	36.81 -365
9 17.5	32.753 + 113	81.79 -213	03.489 + 89	45.08 +187	41.959 + 110	73.92 -244	50.991 + 242	33.10 -371
9 27.4	32.903 + 150	79.52 -227	03.622 + 133	43.44 +164	42.108 + 149	71.35 -257	51.374 + 383	29.41 -369
10 7.4	33.095 + 192	77.12 -240	03.805 + 183	42.11 +133	42.303 + 195	68.66 -269	51.909 + 535	25.79 -362
10 17.4	33.327 + 232	74.64 -248	04.035 + 230	41.20 + 91	42.542 + 239	65.94 -272	52.589 + 680	22.35 -344
10 27.4	33.599 + 272	72.12 -252	04.309 + 274	40.72 + 48	42.823 + 281	63.23 -271	53.399 + 810	19.15 -320
11 6.3	33.911 + 312	69.61 -251	04.626 + 317	40.75 - 3	43.148 + 325	60.56 -267	54.342 + 943	16.25 -290
11 16.3	34.255 + 344	67.20 -241	04.975 + 349	41.31 - 56	43.509 + 361	58.04 -252	55.390 +1048	13.79 -246
11 26.3	34.626 + 371	64.92 -228	05.349 + 374	42.38 -107	43.899 + 390	55.72 -232	56.521 +1131	11.77 -202
12 6.2	35.017 + 391	62.85 -207	05.739 + 390	43.96 -158	44.311 + 412	53.66 -206	57.721 +1200	10.29 -148
12 16.2	35.414 + 397	61.07 -178	06.129 + 390	46.01 -205	44.732 + 421	51.95 -171	58.941 +1220	09.41 - 88
12 26.2	35.807 + 393	59.62 -145	06.509 + 380	48.44 -243	45.149 + 417	50.62 -133	60.154 +1213	09.12 - 29
12 36.2	36.185 + 378	58.54 -108	06.867 + 358	51.21 -277	45.553 + 404	49.72 - 90	61.326 +1172	09.47 + 35
	36.185 + 347	58.54 - 65	06.867 + 323	51.21 -300	45.553 + 372	49.72 - 42	61.326 +1078	09.47 + 97
Mean Place	33.548	76.35	05.217	54.41	42.790	69.23	53.725	33.90
sec δ, tan δ	+1.210	+0.682	+1.253	-0.755	+1.315	+0.854	+4.748	+4.642
dα(ψ), dδ(ψ)	+0.066	-0.38	+0.056	-0.38	+0.067	-0.38	+0.094	-0.38
dα(ε), dδ(ε)	+0.044	+0.29	-0.048	+0.28	+0.055	+0.26	+0.299	+0.26
Dble.Trans.	March 5		March 6		March 7		March 7	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1283		415		1284		416	
	α Crateris		239 G. Velorum		58 Leonis		β Ursae Majoris	
Mag. Spect.	4.20	K0	4.56	A2	5.05	K0	2.44	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	10 59	- 18 13	10 59	- 42 08	10 59	+ 3 41	11 01	+ 56 26
1 -8.8	05.062 <sup>s</sup> +346	14.30 <sup>o</sup> -231	30.058 <sup>s</sup> +403	43.00 <sup>o</sup> -223	49.982 <sup>s</sup> +342	38.96 <sup>o</sup> -216	00.693 <sup>s</sup> +540	76.89 <sup>o</sup> -108
1 1.2	05.394 +332	16.77 -247	30.441 +383	45.60 -260	50.312 +330	36.86 -210	01.218 +525	76.34 -55
1 11.2	05.703 +309	19.35 -258	30.795 +354	48.52 -292	50.622 +310	34.88 -198	01.717 +499	76.33 -1
1 21.1	05.979 +276	21.95 -260	31.105 +310	51.68 -316	50.901 +279	33.09 -179	02.167 +450	76.89 +56
1 31.1	06.213 +234	24.49 -254	31.367 +262	54.96 -328	51.141 +240	31.52 -157	02.558 +391	77.94 +105
2 10.1	06.405 +192	26.93 -244	31.575 +208	58.31 -335	51.339 +198	30.20 -132	02.879 +321	79.45 +151
2 20.0	06.547 +142	29.19 -226	31.725 +150	61.62 -331	51.490 +151	29.17 -103	03.119 +240	81.36 +191
3 2.0	06.642 +95	31.24 -205	31.819 +94	64.81 -319	51.594 +104	28.40 -77	03.278 +159	83.54 +218
3 12.0	06.694 +52	33.07 -183	31.859 +40	67.84 -303	51.654 +60	27.89 -51	03.356 +78	85.93 +239
3 22.0	06.703 +9	34.63 -156	31.849 -10	70.63 -279	51.672 +18	27.63 -26	03.354 -2	88.39 +246
3 31.9	06.678 -25	35.93 -130	31.797 -52	73.14 -251	51.656 -16	27.58 -5	03.284 -70	90.80 +241
4 10.9	06.623 -55	36.96 -103	31.707 -90	75.36 -222	51.610 -46	27.70 +12	03.152 -132	93.10 +230
4 20.9	06.544 -79	37.72 -76	31.586 -121	77.20 -184	51.541 -69	27.97 +27	02.970 -182	95.17 +207
4 30.9	06.450 -94	38.22 -50	31.444 -142	78.68 -148	51.457 -84	28.35 +38	02.753 -217	96.93 +176
5 10.8	06.343 -107	38.46 -24	31.283 -161	79.77 -109	51.362 -95	28.82 +47	02.508 -245	98.35 +142
5 20.8	06.230 -113	38.44 +2	31.111 -172	80.44 -67	51.261 -101	29.35 +53	02.250 -258	99.35 +100
5 30.8	06.117 -113	38.20 +24	30.935 -176	80.71 -27	51.162 -99	29.35 +55	01.992 -258	99.91 +56
6 9.7	06.005 -112	37.73 +47	30.756 -179	80.56 +15	51.065 -97	30.49 +59	01.737 -255	100.04 +13
6 19.7	05.899 -106	37.04 +69	30.582 -174	80.00 +56	50.976 -89	31.07 +58	01.499 -238	99.69 -35
6 29.7	05.803 -96	36.17 +87	30.419 -163	79.08 +92	50.897 -79	31.63 +56	01.285 -214	98.92 -77
7 9.7	05.717 -86	35.13 +104	30.267 -152	77.78 +130	50.828 -69	32.16 +53	01.096 -189	97.72 -120
7 19.6	05.646 -71	33.96 +117	30.135 -132	76.17 +161	50.776 -52	32.63 +47	00.943 -153	96.11 -161
7 29.6	05.593 -53	32.71 +125	30.026 -109	74.31 +186	50.739 -37	33.03 +40	00.828 -115	94.17 -194
8 8.6	05.559 -34	31.40 +131	29.945 -81	72.22 +209	50.721 -18	33.34 +31	00.752 -76	91.88 -229
8 18.6	05.552 -7	30.11 +129	29.900 -45	70.00 +222	50.728 +7	33.50 +16	00.724 -28	89.31 -257
8 28.5	05.570 +18	28.88 +123	29.892 -8	67.75 +225	50.758 +30	33.52 +2	00.743 +19	86.52 -279
9 7.5	05.620 +50	27.76 +112	29.927 +35	65.50 +225	50.810 +52	33.22 -30	00.813 +70	83.52 -300
9 17.5	05.705 +85	26.85 +91	30.012 +85	63.41 +209	50.901 +91	33.02 -20	00.940 +127	80.39 -313
9 27.4	05.826 +121	26.17 +68	30.145 +133	61.53 +188	51.025 +124	32.43 -59	01.121 +181	77.19 -320
10 7.4	05.988 +162	25.78 +39	30.331 +186	59.95 +158	51.185 +160	31.58 -85	01.361 +240	73.94 -325
10 17.4	06.191 +203	25.76 +2	30.569 +238	58.79 +116	51.382 +197	30.46 -112	01.662 +301	70.76 -318
10 27.4	06.430 +239	26.12 -36	30.855 +286	58.07 +72	51.614 +232	29.09 -137	02.016 +354	67.69 -307
11 6.3	06.708 +278	26.87 -75	31.186 +331	57.87 +20	51.882 +268	27.47 -162	02.428 +412	64.79 -290
11 16.3	07.015 +307	28.04 -117	31.553 +367	58.22 -35	52.180 +298	25.64 -183	02.886 +458	62.17 -262
11 26.3	07.345 +330	29.57 -153	31.946 +393	59.11 -89	52.501 +321	23.64 -200	03.382 +496	59.87 -230
12 6.3	07.692 +347	31.46 -189	32.356 +410	60.56 -145	52.840 +339	21.51 -213	03.908 +526	57.98 -189
12 16.2	08.042 +350	33.63 -217	32.767 +411	62.50 -194	53.183 +343	19.34 -217	04.446 +538	56.57 -141
12 26.2	08.386 +344	36.02 -239	33.166 +399	64.87 -237	53.523 +340	17.18 -216	04.981 +535	55.65 -92
12 36.2	08.713 +327	38.57 -255	33.544 +378	67.64 -277	53.849 +326	15.10 -208	05.499 +518	55.29 -36
	+298	-260	+340	-303	+300	-192	+479	+20
Mean Place	06.939	36.24	31.954	72.21	51.829	24.51	01.974	77.92
sec δ, tan δ	+1.053	-0.329	+1.349	-0.905	+1.002	+0.064	+1.810	+1.508
dα(ψ), dδ(ψ)	+0.059	-0.38	+0.055	-0.38	+0.062	-0.38	+0.071	-0.38
dα(ε), dδ(ε)	-0.021	+0.26	-0.058	+0.26	+0.004	+0.26	+0.097	+0.25
Dble. Trans.	March 7		March 7		March 7		March 7	

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	1285		417		418		419	
	29 G. Leonis		$\alpha$ Ursae Majoris ( <i>Dubhe</i> )		$\chi$ Leonis		$\chi'$ Hydrae	
Mag. Spect.	7.13	G5	1.95	K0	4.66	F0	5.06	F5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 11 01	<sup>°</sup> <sup>'</sup> - 3 26	<sup>h</sup> <sup>m</sup> 11 02	<sup>°</sup> <sup>'</sup> + 61 49	<sup>h</sup> <sup>m</sup> 11 04	<sup>°</sup> <sup>'</sup> + 7 24	<sup>h</sup> <sup>m</sup> 11 04	<sup>°</sup> <sup>'</sup> - 27 12
1 -8.8	<sup>s</sup> 53.682 + 340	06 61 -224	<sup>s</sup> 53.075 + 612	24.48 - 97	<sup>s</sup> 17.434 + 344	46.12 -213	<sup>s</sup> 38.871 + 361	48.89 -228
1 1.2	54.010 + 328	08.85 -224	53.671 + 596	24.07 - 41	17.767 + 333	44.10 -202	39.217 + 346	51.43 -254
1 11.2	54.319 + 309	11.06 -221	54.237 + 566	24.23 + 16	18.082 + 315	42.23 -187	39.540 + 323	54.16 -273
1 21.1	54.596 + 277	13.14 -208	54.749 + 512	24.23 + 75	18.082 + 284	40.58 -165	39.540 + 288	57.00 -284
1 31.1	54.834 + 238	15.05 -191	55.193 + 444	26.23 +125	18.611 + 245	39.18 -140	40.073 + 245	59.86 -286
2 10.1	55.031 + 197	16.76 -171	55.559 + 366	27.96 +173	18.815 + 204	38.06 -112	40.273 + 200	62.68 -282
2 20.0	55.180 + 149	18.22 -146	55.831 + 272	30.08 +212	18.971 + 156	37.24 - 82	40.422 + 149	65.39 -271
3 2.0	55.284 + 104	19.42 -120	56.010 + 179	32.47 +239	19.080 + 109	36.70 - 54	40.523 + 101	67.91 -252
3 12.0	55.344 + 60	20.37 - 95	56.095 + 85	35.04 +257	19.145 + 65	36.41 - 29	40.578 + 55	70.24 -233
3 22.0	55.363 + 19	21.06 - 69	56.085 - 10	37.68 +264	19.167 + 22	36.38 - 3	40.588 + 10	72.31 -207
3 31.9	55.348 - 15	21.53 - 47	55.996 - 89	40.24 +256	19.155 - 12	36.54 + 16	40.563 - 25	74.11 -180
4 10.9	55.303 - 45	21.79 - 26	55.833 - 163	42.67 +243	19.111 - 44	36.85 + 31	40.505 - 58	75.64 -153
4 20.9	55.235 - 68	21.85 - 6	55.608 - 225	44.83 +216	19.044 - 67	37.30 + 45	40.421 - 84	76.84 -120
4 30.9	55.153 - 82	21.75 + 10	55.342 - 266	46.66 +183	18.961 - 83	37.83 + 53	40.320 - 101	77.74 - 90
5 10.8	55.058 - 95	21.51 + 24	55.041 - 301	48.10 +144	18.866 - 95	38.41 + 58	40.204 - 116	78.33 - 59
5 20.8	54.959 - 99	21.13 + 38	54.722 - 319	49.09 + 99	18.766 - 100	39.02 + 61	40.080 - 124	78.60 - 27
5 30.8	54.859 - 100	20.67 + 46	54.401 - 321	49.61 + 52	18.666 - 100	39.62 + 60	39.954 - 126	78.57 + 3
6 9.7	54.761 - 98	20.11 + 56	54.083 - 318	49.66 + 5	18.567 - 99	40.21 + 59	39.826 - 128	78.23 + 34
6 19.7	54.670 - 91	19.47 + 64	53.784 - 299	49.20 - 46	18.476 - 91	40.76 + 55	39.703 - 123	77.60 + 63
6 29.7	54.588 - 82	18.80 + 67	53.512 - 272	48.29 - 91	18.476 - 81	41.24 + 48	39.589 - 114	76.72 + 88
7 9.7	54.516 - 72	18.09 + 71	53.271 - 241	46.93 -136	18.324 - 71	41.67 + 43	39.484 - 105	75.58 +114
7 19.6	54.460 - 56	17.37 + 72	53.072 - 199	45.14 -179	18.269 - 55	42.01 + 34	39.395 - 89	74.24 +134
7 29.6	54.419 - 41	16.68 + 69	52.917 - 155	43.00 -214	18.229 - 40	42.24 + 23	39.324 - 71	72.75 +149
8 8.6	54.396 - 23	16.03 + 65	52.810 - 107	40.51 -249	18.208 - 21	42.36 + 12	39.274 - 50	71.12 +163
8 18.6	54.397 + 1	15.49 + 54	52.760 - 50	37.72 -279	18.211 + 3	42.32 - 4	39.251 - 23	69.46 +166
8 28.5	54.422 + 25	15.07 + 42	52.765 + 5	34.72 -300	18.238 + 27	42.12 - 20	39.257 + 6	67.82 +164
9 7.5	54.474 + 52	14.82 + 25	52.832 + 67	31.52 -320	18.294 + 56	42.08 - 4	39.297 + 40	66.25 +157
9 17.5	54.558 + 84	14.74 + 8	52.965 + 133	28.20 -332	18.373 + 79	41.17 - 91	39.377 + 80	64.86 +139
9 27.4	54.678 + 120	14.90 - 16	53.161 + 196	24.82 -338	18.492 + 119	40.34 - 83	39.495 + 118	63.69 +117
10 7.4	54.836 + 158	15.34 - 44	53.427 + 266	21.42 -340	18.649 + 157	39.27 -107	39.658 + 163	62.82 + 87
10 17.4	55.031 + 195	16.09 - 75	53.762 + 335	18.12 -330	18.842 + 193	37.96 -131	39.864 + 206	62.34 + 48
10 27.4	55.261 + 230	17.13 -104	54.159 + 397	14.96 -316	19.071 + 229	36.42 -154	40.111 + 247	62.25 + 9
11 6.3	55.528 + 267	18.48 -135	54.622 + 463	12.00 -296	19.337 + 266	34.66 -176	40.399 + 288	62.62 - 37
11 16.3	55.825 + 297	20.11 -163	55.138 + 516	09.36 -264	19.633 + 296	32.72 -194	40.719 + 320	63.46 - 84
11 26.3	56.145 + 320	21.97 -186	55.697 + 559	07.09 -227	19.953 + 320	30.65 -207	41.063 + 344	64.73 -127
12 6.3	56.482 + 337	24.04 -207	56.292 + 595	05.25 -184	20.292 + 339	28.48 -217	41.425 + 362	66.44 -171
12 16.2	56.825 + 343	26.24 -220	56.900 + 608	03.93 -132	20.638 + 346	26.32 -216	41.790 + 365	68.53 -209
12 26.2	57.163 + 338	28.49 -225	57.506 + 606	03.14 - 79	20.980 + 342	24.21 -211	42.149 + 359	70.92 -239
12 36.2	57.488 + 325	30.76 -227	58.094 + 588	02.93 - 21	21.310 + 330	22.21 -200	42.491 + 342	73.57 -265
	57.488 + 298	30.76 -217	58.094 + 544	02.93 + 37	21.310 + 304	22.21 -180	42.491 + 311	73.57 -279
Mean Place	55.564	23.53	54.168	26.48	19.277	33.04	40.814	73.79
sec $\delta$ , $\tan \delta$	+1.002	-0.060	+2.118	+1.867	+1.008	+0.130	+1.125	-0.514
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.061	-0.39	+0.073	-0.39	+0.062	-0.39	+0.058	-0.39
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.004	+0.25	+0.121	+0.25	+0.008	+0.24	-0.033	+0.24
Dble. Trans.	March 8		March 8		March 8		March 8	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1286		1287		1288		1289		
	11 G. Crateris		65 Leonis		259 G. Carinae		260 G. Carinae		
Mag.Spect.	6.14	A3	5.66	G5	5.80	B3	4.02	F8p	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° /	h m	° /	h m	° /	h m	° /	
	11 04	- 11 00	11 06	+ 2 01	11 06	- 70 47	11 07	- 58 53	
1	-8.8	51.379 +342	37.04 -228	11.031 +341	59.27 -219	18.639 +751	42.67 -170	58.615 +526	33.37 -192
1	1.2	51.710 +331	39.41 -237	11.361 +330	57.12 -215	19.344 +705	44.93 -226	59.113 +498	35.78 -241
1	11.2	52.020 +310	41.82 -241	11.673 +312	55.07 -205	19.989 +645	47.69 -276	59.572 +459	38.63 -285
1	21.1	52.298 +278	44.18 -236	11.954 +281	53.20 -187	20.546 +557	50.89 -320	59.974 +402	41.87 -324
1	31.1	52.538 +240	46.43 -225	12.197 +243	51.54 -166	21.004 +458	54.39 -350	60.310 +336	45.34 -347
2	10.1	52.736 +198	48.53 -210	12.399 +202	50.12 -142	21.358 +354	58.14 -375	60.576 +266	49.00 -366
2	20.0	52.886 +150	50.42 -189	12.554 +155	48.97 -115	21.594 +236	62.02 -388	60.764 +188	52.74 -374
2	20.0	52.991 +105	52.07 -165	12.663 +109	48.10 -87	21.719 +125	65.92 -390	60.878 +114	56.44 -370
3	12.0	53.052 +61	53.49 -142	12.728 +65	47.48 -62	21.737 +18	69.80 -388	60.920 +42	60.06 -362
3	22.0	53.072 +20	54.64 -115	12.751 +23	47.11 -37	21.645 -92	73.53 -373	60.890 -30	63.51 -345
3	31.9	53.057 -15	55.55 -91	12.739 -12	46.96 -15	21.461 -184	77.03 -350	60.802 -88	66.70 -319
4	10.9	53.013 -44	56.23 -68	12.698 -41	47.00 +4	21.191 -270	80.28 -325	60.658 -144	69.61 -291
4	20.9	52.945 -68	56.65 -42	12.633 -65	47.20 +20	20.841 -350	83.16 -288	60.466 -192	72.15 -254
4	30.9	52.862 -83	56.88 -23	12.553 -80	47.51 +31	20.433 -408	85.65 -249	60.239 -227	74.30 -215
5	10.8	52.766 -96	56.89 -1	12.460 -93	47.93 +42	19.968 -465	87.71 -206	59.979 -260	76.03 -173
5	20.8	52.664 -102	56.71 +18	12.362 -98	48.43 +50	19.463 -505	89.26 -155	59.696 -283	77.27 -124
5	30.8	52.562 -102	56.38 +33	12.263 -99	48.97 +54	18.934 -529	90.32 -106	59.400 -296	78.05 -78
6	9.7	52.459 -103	55.87 +51	12.166 -97	49.55 +58	18.386 -548	90.84 -52	59.095 -305	78.33 -28
6	19.7	52.363 -96	55.22 +65	12.075 -91	50.14 +59	17.839 -547	90.81 +3	58.792 -303	78.09 +24
6	29.7	52.275 -88	54.46 +76	11.993 -82	50.72 +58	17.307 -532	90.26 +55	58.498 -294	77.40 +69
7	9.7	52.196 -79	53.58 +88	11.921 -72	51.29 +57	16.799 -508	89.19 +107	58.219 -279	76.22 +118
7	19.6	52.132 -64	52.64 +94	11.864 -57	51.81 +52	16.337 -462	87.63 +156	57.967 -252	74.61 +161
7	29.6	52.083 -49	51.67 +97	11.822 -42	52.27 +46	15.931 -406	85.66 +197	57.748 -219	72.64 +197
8	8.6	52.053 -30	50.69 +98	11.798 -24	52.64 +37	15.594 -337	83.29 +237	57.571 -177	72.64 +230
8	18.6	52.047 -6	49.77 +92	11.798 +0	52.89 +25	15.349 -245	80.64 +265	57.447 -124	67.80 +254
8	28.5	52.065 +18	48.93 +84	11.821 +23	52.99 +10	15.197 -152	77.80 +284	57.380 -67	65.13 +267
9	7.5	52.113 +48	48.24 +69	11.871 +50	52.84 -15	15.154 -43	74.83 +297	57.379 -1	62.38 +275
9	17.5	52.194 +81	47.74 +50	11.949 +78	52.66 -18	15.54 +77	71.90 +293	57.451 +72	59.70 +268
9	27.4	52.309 +115	47.46 +28	11.949 +117	52.66 -49	15.231 +192	71.90 +281	57.451 +145	59.70 +251
10	7.4	52.464 +155	47.47 -1	12.220 +154	51.40 -77	15.423 +314	69.09 +258	57.596 +222	57.19 +227
10	17.4	52.659 +195	47.82 -35	12.411 +191	50.36 -104	16.168 +431	64.31 +220	58.116 +298	53.06 +186
10	27.4	52.890 +231	48.50 -68	12.637 +226	49.06 -130	16.701 +533	62.54 +177	58.481 +365	51.64 +142
11	6.3	53.158 +268	49.54 -104	12.901 +264	47.50 -156	17.329 +628	61.30 +124	58.911 +430	50.75 +89
11	16.3	53.457 +299	50.93 -139	13.194 +293	45.70 -180	18.027 +698	60.69 +61	59.390 +479	50.47 +28
11	26.3	53.780 +323	52.62 -169	13.512 +318	43.73 -197	18.773 +746	60.70 -1	59.903 +513	50.79 -32
12	6.3	54.120 +340	54.60 -198	13.849 +337	41.60 -213	19.549 +776	61.37 -67	60.440 +537	51.74 -95
12	16.2	54.465 +345	56.78 -218	14.191 +342	39.41 -219	20.318 +769	62.70 -133	60.976 +536	53.30 -156
12	26.2	54.806 +341	59.11 -233	14.531 +340	37.22 -219	21.061 +743	64.60 -190	61.497 +521	55.40 -210
12	36.2	55.133 +327	61.53 -242	14.858 +327	35.08 -214	21.755 +694	67.09 -249	61.989 +492	58.02 -262
		55.133 +300	61.53 -241	14.858 +301	35.08 -199	21.755 +616	67.09 -295	61.989 +440	58.02 -303
Mean Place	53.303	56.61	12.904	44.31	20.476	77.47	60.591	66.37	
sec δ, tan δ	+1.019	-0.195	+1.001	+0.035	+3.041	-2.872	+1.936	-1.658	
dα(w), dδ(w)	+0.060	-0.39	+0.061	-0.39	+0.043	-0.39	+0.051	-0.39	
dα(e), dδ(e)	-0.013	+0.24	+0.002	+0.23	-0.186	+0.23	-0.108	+0.22	
Dble.Trans.	March 8		March 9		March 9		March 9		

AT UPPER TRANSIT AT GREENWICH

No.	420		421		1290		1291	
Name	ψ Ursae Majoris		β Crateris		275 G. Hydrae		9 G. Centauri	
Mag.Spect.	3.15	K0	4.52	A2	6.46	M0	5.67	A2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	11 08	+44 33	11 10	-22 44	11 11	-32 21	11 11	-49 01
1 -8.8	52.907 +443	80.43 -148	57.584 +355	43.59 -227	33.663 +375	11.13 -221	53.965 +443	07.99 -202
1 1.2	53.340 +433	79.40 -103	57.926 +342	46.07 -248	34.024 +361	13.64 -251	54.389 +424	10.46 -247
1 11.2	53.753 +413	78.85 -56	58.248 +322	48.70 -263	34.361 +337	16.40 -276	54.782 +393	13.31 -285
1 21.1	54.129 +376	78.81 -4	58.536 +288	51.42 -272	34.662 +301	19.33 -293	55.130 +348	16.47 -316
1 31.1	54.457 +328	79.25 +44	58.784 +248	54.11 -269	34.921 +259	22.32 -299	55.426 +296	19.81 -334
2 10.1	54.731 +274	80.14 +89	58.990 +206	56.74 -263	35.133 +212	25.32 -300	55.665 +239	23.29 -348
2 20.0	54.941 +210	81.44 +130	59.145 +155	59.24 -250	35.293 +160	28.25 -293	55.840 +175	26.79 -350
3 2.0	55.087 +146	83.04 +160	59.254 +109	61.54 -230	35.403 +110	31.02 -277	55.954 +114	30.21 -342
3 12.0	55.171 +84	84.89 +185	59.318 +64	63.64 -210	35.466 +63	33.62 -260	55.910 +56	33.53 -332
3 22.0	55.192 +21	86.88 +199	59.339 +21	65.48 -184	35.482 +16	35.97 -235	56.009 -1	36.64 -311
3 31.9	55.161 -31	88.91 +203	59.324 -15	67.05 -157	35.460 -22	38.06 -209	55.960 -49	39.49 -285
4 10.9	55.083 +210	90.91 +130	59.278 -46	68.37 -132	35.404 -56	39.87 -181	55.868 -92	42.05 -256
4 20.9	54.965 -118	92.77 +186	59.206 -72	69.38 -101	35.320 -84	41.35 -148	55.738 -130	44.26 -221
4 30.9	54.822 -143	94.42 +165	59.117 -89	70.12 -74	35.216 -104	42.50 -115	55.581 -157	46.09 -183
5 10.8	54.657 -165	95.83 +141	59.013 -104	70.58 -46	35.095 -121	43.33 -83	55.399 -182	47.53 -144
5 20.8	54.481 -176	96.91 +108	58.900 -113	70.75 -17	34.963 -132	43.80 -47	55.201 -198	48.51 -98
5 30.8	54.305 -176	97.65 +74	58.785 -115	70.67 +8	34.828 -135	43.94 -14	54.994 -207	49.08 -57
6 9.7	54.130 -175	98.04 +39	58.668 -117	70.31 +36	34.688 -140	43.73 +21	54.780 -214	49.19 -11
6 19.7	53.966 -164	98.03 -1	58.555 -113	69.70 +61	34.553 -135	43.19 +54	54.567 -213	48.84 +35
6 29.7	53.818 -148	97.66 -37	58.450 -105	68.88 +82	34.424 -129	42.36 +83	54.363 -204	48.09 +75
7 9.7	53.686 -132	96.94 -72	58.352 -98	67.84 +104	34.304 -120	41.22 +114	54.168 -195	46.91 +118
7 19.6	53.580 -106	95.84 -110	58.269 -83	66.63 +121	34.199 -105	39.83 +139	53.994 -174	45.35 +156
7 29.6	53.499 -81	94.44 -140	58.203 -66	65.30 +133	34.112 -87	38.26 +157	53.844 -150	43.49 +186
8 8.6	53.446 -53	92.72 -172	58.155 -48	63.87 +143	34.046 -66	36.51 +175	53.723 -121	41.35 +214
8 18.6	53.428 -18	90.71 -201	58.133 -22	62.42 +145	34.009 -37	34.68 +183	53.643 -80	39.02 +233
8 28.5	53.444 +16	88.47 -224	58.137 +4	61.01 +141	34.002 -7	32.83 +185	53.604 -39	36.60 +242
9 7.5	53.498 +54	85.99 -248	58.174 +37	59.68 +133	34.032 +30	31.03 +180	53.615 +11	34.13 +247
9 17.5	53.498 +98	85.99 -265	58.174 +74	59.68 +115	34.032 +71	31.03 +165	53.615 +68	34.13 +236
9 17.5	53.596 +140	83.34 -278	58.248 +111	58.53 +93	34.103 +113	29.38 +143	53.683 +123	31.77 +218
9 27.4	53.736 +188	80.56 -289	58.359 +154	57.60 +64	34.216 +160	27.95 +116	53.806 +185	29.59 +192
10 7.4	53.924 +237	77.67 -291	58.513 +197	56.96 +27	34.376 +207	26.79 +77	53.991 +245	27.67 +152
10 17.4	54.161 +283	74.76 -290	58.710 +236	56.69 -10	34.583 +250	26.02 +36	54.236 +300	26.15 +109
10 27.4	54.444 +329	71.86 -282	58.946 +277	56.79 -53	34.833 +294	25.66 -11	54.536 +353	25.06 +57
11 6.3	54.773 +370	69.04 -265	59.223 +309	57.32 -96	35.127 +328	25.77 -61	54.889 +395	24.49 -1
11 16.3	55.143 +403	66.39 -243	59.532 +335	58.28 -137	35.455 +356	26.38 -107	55.284 +427	24.50 -57
11 26.3	55.546 +429	63.96 -214	59.867 +353	59.65 -176	35.811 +374	27.45 -155	55.711 +447	25.07 -115
12 6.3	55.975 +440	61.82 -175	60.220 +358	61.41 -210	36.185 +379	29.00 -199	56.158 +450	26.22 -171
12 16.2	56.415 +441	60.07 -134	60.578 +354	63.51 -236	36.564 +373	30.99 -233	56.608 +441	27.93 -220
12 26.2	56.856 +428	58.73 -86	60.932 +339	65.87 -257	36.937 +356	33.32 -264	57.049 +418	30.13 -264
12 36.2	57.284 +399	57.87 -37	61.271 +311	68.44 -269	37.293 +326	35.96 -285	57.467 +380	32.77 -289
Mean Place	54.463	79.02	59.580	67.05	35.689	37.58	56.011	38.91
sec δ, tan δ	+1.404	+0.985	+1.084	-0.419	+1.184	-0.634	+1.525	-1.151
dα(ψ), dδ(ψ)	+0.067	-0.39	+0.059	-0.39	+0.058	-0.39	+0.055	-0.39
dα(ε), dδ(ε)	+0.064	+0.22	-0.027	+0.21	-0.041	+0.21	-0.075	+0.21
Dble.Trans.	March 9		March 10		March 10		March 10	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	422		423		424		1292	
	δ Leonis		θ Leonis		Groombridge 1757 (Ursae Majoris)		φ Leonis	
Mag.Spect.	2.58	A3	3.41	A0	5.97	K0	4.58	A5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>
	11 13	+ 20 35	11 13	+ 15 29	11 15	+ 49 32	11 15	- 3 34
1 <sup>d</sup>	<sup>s</sup> + 362	" -199	<sup>s</sup> + 354	" -206	<sup>s</sup> + 475	" -145	<sup>s</sup> + 342	" -223
1 <sup>s</sup>	-8.8	21.672	30.101	82.66	54.949	60.32	56.537	22.97
1	1.2	22.025	30.446	80.79	55.415	59.37	56.869	25.22
1	11.2	22.361	30.774	79.15	55.862	58.93	57.184	27.44
1	21.1	22.667	31.073	77.80	56.271	59.03	57.470	29.54
1	31.1	22.935	31.334	76.78	56.630	59.64	57.719	31.47
2	10.1	23.161	31.553	76.07	56.932	60.72	57.928	33.20
2	20.1	23.336	31.723	75.71	57.166	62.23	58.091	34.69
3	2.0	23.462	31.847	75.65	57.331	64.05	58.209	35.91
3	12.0	23.541	31.924	75.86	57.428	66.12	58.283	36.89
3	22.0	23.573	31.956	76.31	57.456	68.34	58.316	37.60
3	31.9	23.567	31.952	76.93	57.425	70.58	58.314	38.08
4	10.9	23.527	31.914	77.68	57.342	72.77	58.282	38.36
4	20.9	23.460	31.851	78.50	57.213	74.81	58.225	38.43
4	30.9	23.374	31.770	79.35	57.053	76.60	58.152	38.35
5	10.8	23.273	31.675	80.19	56.868	78.12	58.065	38.12
5	20.8	23.165	31.572	80.98	56.668	79.28	57.971	37.76
5	30.8	23.056	31.469	81.68	56.465	80.06	57.875	37.31
6	9.8	22.948	31.366	82.29	56.261	80.46	57.778	36.77
6	19.7	22.847	31.270	82.77	56.068	80.41	57.686	36.15
6	29.7	22.755	31.183	83.12	55.891	79.98	57.600	35.51
7	9.7	22.675	31.106	83.33	55.731	79.14	57.523	34.81
7	19.6	22.610	31.043	83.37	55.598	77.90	57.458	34.13
7	29.6	22.562	30.997	83.26	55.493	76.33	57.408	33.46
8	8.6	22.533	30.969	82.97	55.418	74.42	57.374	32.83
8	18.6	22.528	30.964	82.49	55.381	72.20	57.363	32.31
8	28.5	22.547	30.983	81.84	55.380	69.74	57.375	31.90
9	7.5	22.594	31.029	80.99	55.423	67.03	57.415	31.66
9	17.5	22.675	31.106	79.88	55.513	64.15	57.483	31.61
9	27.5	22.790	31.218	78.56	55.650	61.15	57.589	31.75
10	7.4	22.944	31.369	77.03	55.839	58.05	57.733	32.19
10	17.4	23.137	31.558	75.29	56.081	54.95	57.916	32.93
10	27.4	23.368	31.784	73.38	56.374	51.89	58.136	33.95
11	6.3	23.638	32.048	71.31	56.718	48.93	58.394	35.29
11	16.3	23.941	32.345	69.14	57.107	46.18	58.683	36.90
11	26.3	24.271	32.669	66.91	57.533	43.68	58.999	38.75
12	6.3	24.623	33.013	64.67	57.990	41.52	59.334	40.81
12	16.2	24.984	33.367	62.52	58.460	39.78	59.676	43.00
12	26.2	25.345	33.719	60.51	58.933	38.49	60.018	45.26
12	36.2	25.695	34.061	58.70	59.395	37.71	60.347	47.53
Mean Place	23.500	52.06	31.957	72.54	56.442	60.34	58.502	39.75
sec δ, tan δ	+1.068	+0.376	+1.038	+0.277	+1.541	+1.173	+1.002	-0.063
dα(ψ), dδ(ψ)	+0.063	-0.39	+0.063	-0.39	+0.067	-0.39	+0.061	-0.39
dα(ε), dδ(ε)	+0.025	+0.20	+0.018	+0.20	+0.077	+0.19	-0.004	+0.19
Dble.Trans.	March 10		March 11		March 11		March 11	



AT UPPER TRANSIT AT GREENWICH

No.	425		1293		426		428									
	v Ursae Majoris		55 Ursae Majoris		δ Crateris		π Centauri*									
Mag. Spect.	3.71	K0	4.78	A2	3.82	K0	4.26	B5								
U.T.	R.A.		R.A.		R.A.		R.A.									
	h	m	h	m	h	m	h	m								
	+ 33 09		+ 38 15		- 14 41		- 54 24									
1 <sup>d</sup> -8.8	43.378 <sup>s</sup>	+ 393	69.31	-181	22.241 <sup>s</sup>	+ 411	37.81	-171	37.863 <sup>s</sup>	+ 347	58.95	-225	21.153 <sup>s</sup>	+ 487	28.79	-185
1 1.2	43.763	+ 385	67.87	-144	22.645	+ 404	36.50	-131	38.200	+ 337	61.33	-238	21.620	+ 467	31.12	-233
1 11.2	44.131	+ 368	66.82	-105	23.032	+ 387	35.62	-88	38.519	+ 319	63.79	-246	22.056	+ 436	33.88	-276
1 21.1	44.468	+ 337	66.21	-61	23.387	+ 355	35.23	-39	38.808	+ 289	66.25	-246	22.443	+ 387	37.01	-313
1 31.1	44.765	+ 297	66.04	-17	23.699	+ 312	35.29	+ 6	39.059	+ 251	68.63	-238	22.774	+ 331	40.37	-336
2 10.1	45.016	+ 251	66.28	+ 24	23.963	+ 264	35.80	+ 51	39.270	+ 211	70.89	-226	23.044	+ 270	43.91	-354
2 20.1	45.212	+ 196	66.93	+ 65	24.169	+ 206	36.72	+ 92	39.433	+ 163	72.97	-208	23.244	+ 200	47.52	-361
3 2.0	45.354	+ 142	67.90	+ 97	24.317	+ 148	37.97	+125	39.551	+ 118	74.84	-187	23.378	+ 134	51.09	-357
3 12.0	45.442	+ 88	69.15	+125	24.409	+ 92	39.48	+151	39.626	+ 75	76.48	-164	23.448	+ 70	54.60	-361
3 22.0	45.478	+ 36	70.60	+145	24.444	+ 35	41.19	+171	39.658	+ 32	77.86	-138	23.454	+ 6	57.92	-332
3 31.9	45.469	- 9	72.14	+154	24.432	- 12	42.97	+178	39.656	- 2	78.99	-113	23.406	- 48	61.01	-309
4 10.9	45.421	- 8	73.74	+160	24.377	- 55	44.78	+181	39.623	- 33	79.88	- 89	23.308	- 98	63.84	-283
4 20.9	45.340	- 81	75.30	+156	24.286	- 91	46.51	+173	39.565	- 58	80.50	- 62	23.165	-143	66.31	-247
4 30.9	45.237	-103	76.74	+144	24.171	-115	48.09	+158	39.489	- 76	80.91	- 41	22.991	-174	68.41	-210
5 10.8	45.116	-121	78.03	+129	24.035	-136	49.47	+138	39.399	- 90	81.09	- 18	22.785	-206	70.11	-170
5 20.8	44.984	-132	79.10	+107	23.889	-146	50.60	+113	39.300	- 99	81.04	+ 5	22.557	-228	71.34	-123
5 30.8	44.851	-133	79.93	+ 83	23.740	-149	51.43	+ 83	39.198	-102	80.81	+ 23	22.316	- 98	72.14	- 80
6 9.8	44.718	-133	80.50	+ 57	23.590	-150	51.97	+ 54	39.093	-105	80.38	+ 43	22.064	-252	72.47	- 33
6 19.7	44.592	-126	80.77	+ 27	23.449	-141	52.15	+ 18	38.992	-101	79.77	+ 61	22.811	-253	72.30	+ 17
6 29.7	44.477	-115	80.76	- 1	23.319	-130	52.02	- 13	38.897	- 95	79.02	+ 75	21.564	-247	71.70	+ 60
7 9.7	44.374	-103	80.46	- 30	23.203	-116	51.56	- 46	38.809	- 88	78.13	+ 89	21.325	-239	70.63	+107
7 19.6	44.289	- 85	79.86	- 60	23.107	- 96	50.76	- 80	38.734	- 75	77.13	+100	21.108	-217	69.15	+148
7 29.6	44.224	- 65	78.99	- 87	23.032	- 75	49.67	-109	38.673	- 61	76.08	+105	20.916	-192	67.33	+182
8 8.6	44.180	- 44	77.84	-115	22.980	- 52	48.28	-139	38.629	- 44	74.98	+110	20.757	-159	65.17	+216
8 18.6	44.163	- 17	76.43	-141	22.958	- 22	46.61	-167	38.608	- 21	73.91	+107	20.643	-114	62.79	+238
8 28.5	44.174	+ 11	74.79	-164	22.965	+ 7	44.69	-192	38.611	+ 3	72.90	+101	20.576	- 67	60.27	+252
9 7.5	44.216	+ 42	72.90	-189	23.006	+ 41	42.54	-215	38.644	+ 33	72.01	+ 89	20.565	- 11	57.67	+260
9 17.5	44.296	+ 80	70.80	-210	23.087	+ 81	40.17	-237	38.710	+ 66	71.31	+ 70	20.619	+ 54	55.13	+254
9 27.5	44.412	+116	68.53	-227	23.206	+119	37.65	-252	38.812	+102	70.82	+ 49	20.736	+117	52.74	+239
10 7.4	44.571	+159	66.10	-243	23.371	+165	34.98	-267	38.955	+143	70.60	+ 22	20.923	+187	50.58	+216
10 17.4	44.773	+202	63.56	-254	23.581	+210	32.24	-274	39.139	+184	70.72	- 12	21.179	+256	48.80	+178
10 27.4	45.017	+244	60.95	-261	23.834	+253	29.46	-278	39.361	+222	71.18	- 46	21.497	+318	47.44	+136
11 6.3	45.303	+286	58.32	-263	24.132	+298	26.70	-276	39.623	+262	72.02	- 84	21.877	+380	46.59	+ 85
11 16.3	45.626	+323	55.75	-257	24.469	+337	24.04	-286	39.918	+295	73.24	-122	22.305	+428	46.33	+ 26
11 26.3	45.979	+353	53.29	-246	24.839	+370	21.54	-250	40.239	+321	74.78	-154	22.768	+463	46.64	- 31
12 6.3	46.358	+379	51.01	-228	25.234	+395	19.27	-227	40.581	+342	76.65	-187	23.258	+490	47.57	- 93
12 16.2	46.748	+390	49.00	-201	25.643	+409	17.33	-194	40.929	+348	78.78	-213	23.752	+494	49.08	-151
12 26.2	47.140	+392	47.31	-169	26.053	+410	15.74	-159	41.275	+346	81.08	-230	24.236	+484	51.11	-203
12 36.2	47.522	+382	45.99	-132	26.453	+400	14.57	-117	41.610	+335	83.53	-245	24.699	+463	53.64	-253
		+357		- 89		+375		- 70		+309		-247		+420		-293
Mean Place	45.113		65.04		23.920		34.98		39.890		79.47		23.344		60.90	
sec δ, tan δ	+1.195		+0.654		+1.274		+0.789		+1.034		-0.262		+1.719		-1.398	
dα(ψ), dδ(ψ)	+0.064		-0.39		+0.065		-0.39		+0.060		-0.39		+0.055		-0.39	
dα(ε), dδ(ε)	+0.043		+0.18		+0.052		+0.18		-0.017		+0.18		-0.092		+0.17	
Dble. Trans.	March 12		March 12		March 12		March 12									

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	427		429		1294		431		
	$\sigma$ Leonis		Groombridge 1771 (Ursae Majoris)		28 G. Centauri		$\gamma$ Crateris*		
Mag.Spect.	4.13	A0	5.98	A0	6.42	B3	4.14	A5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	11 20	+ 6 06	11 22	+ 64 23	11 23	- 42 35	11 24	- 17 36	
<b>1</b>	-8.8	24.491 + 345	25.69 - 218	02 53.1 + 655	73.13 - 116	40.938 + 414	12.44 - 201	10.301 + 351	13.68 - 222
<b>1</b>	1.2	24.828 + 337	23.60 - 209	03.177 + 646	72.54 - 59	41.337 + 399	14.84 - 240	10.642 + 341	16.07 - 239
<b>1</b>	11.2	25.150 + 322	21.64 - 196	03.799 + 622	72.54 + 0	41.712 + 375	-275	10.966 + 324	18.58 - 251
<b>1</b>	21.1	25.443 + 293	19.89 - 175	04.371 + 572	73.16 + 62	42.049 + 337	-302	11.260 + 294	21.12 - 254
<b>1</b>	31.1	25.700 + 257	18.39 - 150	04.876 + 505	74.32 + 116	42.340 + 291	-317	11.517 + 257	23.60 - 248
<b>2</b>	10.1	25.917 + 217	17.16 - 123	05.302 + 426	75.99 + 167	42.581 + 241	-328	11.733 + 216	26.00 - 240
<b>2</b>	20.1	26.088 + 171	16.22 - 94	05.631 + 329	78.09 + 210	42.765 + 184	-327	11.902 + 169	28.23 - 223
<b>3</b>	2.0	26.214 + 126	15.58 - 64	05.861 + 230	80.50 + 241	42.895 + 130	-319	12.026 + 124	30.26 - 203
<b>3</b>	12.0	26.296 + 82	15.20 - 38	05.991 + 130	83.14 + 264	42.972 + 77	-308	12.107 + 81	32.08 - 182
<b>3</b>	22.0	26.334 + 38	15.08 - 12	06.017 + 26	85.88 + 274	42.997 + 25	-286	12.144 + 37	33.64 - 156
<b>3</b>	31.9	26.338 + 4	15.16 + 8	05.952 - 65	88.58 + 270	42.979 - 18	-262	12.147 + 3	34.95 - 131
<b>4</b>	10.9	26.310 - 28	15.42 + 26	05.804 - 148	91.18 + 260	42.920 - 59	-234	12.118 - 29	36.02 - 107
<b>4</b>	20.9	26.257 - 53	15.83 + 41	05.583 - 221	93.53 + 235	42.828 - 92	-201	12.063 - 55	36.81 - 79
<b>4</b>	30.9	26.186 - 71	16.32 + 49	05.309 - 274	95.55 + 202	42.710 - 118	-166	11.989 - 74	37.37 - 56
<b>5</b>	10.8	26.101 - 85	16.89 + 57	04.990 - 319	97.21 + 166	42.569 - 141	-130	11.900 - 89	37.68 - 31
<b>5</b>	20.8	26.007 - 94	17.49 + 60	04.644 - 346	98.40 + 119	42.413 - 156	-89	11.801 - 99	37.74 - 6
<b>5</b>	30.8	25.912 - 95	18.10 + 61	04.287 - 357	99.12 + 72	42.247 - 166	-50	11.698 - 103	37.60 + 14
<b>6</b>	9.8	25.816 - 96	18.70 + 60	03.926 - 361	99.35 + 23	42.074 - 173	-10	11.592 - 106	37.24 + 36
<b>6</b>	19.7	25.724 - 92	19.28 + 58	03.577 - 349	99.06 - 29	41.900 - 174	+ 32	11.487 - 105	36.67 + 57
<b>6</b>	29.7	25.639 - 85	19.80 + 52	03.251 - 326	98.30 - 76	41.731 - 169	+ 68	11.388 - 99	35.94 + 73
<b>7</b>	9.7	25.562 - 77	20.27 + 47	02.952 - 299	97.05 - 125	41.569 - 162	+ 107	11.294 - 94	35.04 + 90
<b>7</b>	19.6	25.498 - 64	20.65 + 38	02.693 - 259	95.35 - 170	41.422 - 147	+ 141	11.219 - 81	34.01 + 103
<b>7</b>	29.6	25.447 - 51	20.93 + 28	02.479 - 214	93.26 - 209	41.294 - 128	+ 167	11.143 - 68	32.89 + 112
<b>8</b>	8.6	25.414 - 33	21.11 + 18	02.313 - 166	90.78 - 248	41.189 - 105	+ 194	11.093 - 52	31.70 + 119
<b>8</b>	18.6	25.402 - 12	21.13 + 2	02.208 - 105	87.99 - 279	41.117 - 72	+ 209	11.065 - 28	30.53 + 117
<b>8</b>	28.5	25.413 + 11	20.99 - 14	02.160 - 48	84.94 - 305	41.081 - 36	+ 217	11.061 - 4	29.39 + 114
<b>9</b>	7.5	25.456 + 43	20.69 - 30	02.178 + 18	81.66 - 328	41.086 + 5	+ 221	11.087 + 26	28.36 + 103
<b>9</b>	17.5	25.514 + 58	20.20 - 49	02.268 + 90	78.24 - 342	41.140 + 54	+ 210	11.148 + 61	27.50 + 86
<b>9</b>	27.5	25.619 + 105	19.41 - 79	02.428 + 160	74.74 - 350	41.243 + 103	+ 193	11.244 + 96	26.85 + 65
<b>10</b>	7.4	25.759 + 140	18.40 - 101	02.665 + 237	71.19 - 355	41.402 + 159	+ 168	11.382 + 138	26.46 + 39
<b>10</b>	17.4	25.938 + 179	17.14 - 126	02.979 + 314	67.72 - 347	41.615 + 213	+ 130	11.563 + 181	26.43 + 3
<b>10</b>	27.4	26.154 + 216	15.65 - 149	03.365 + 386	64.37 - 335	41.880 + 265	+ 90	11.783 + 220	26.73 - 30
<b>11</b>	6.3	26.409 + 255	13.92 - 173	03.826 + 461	61.21 - 316	42.195 + 315	+ 41	12.044 + 261	27.43 - 70
<b>11</b>	16.3	26.696 + 287	11.99 - 193	04.351 + 525	58.37 - 284	42.551 + 356	- 14	12.340 + 296	28.52 - 109
<b>11</b>	26.3	27.010 + 314	09.93 - 206	04.928 + 577	55.88 - 249	42.939 + 388	- 65	12.662 + 322	29.97 - 145
<b>12</b>	6.3	27.345 + 335	07.75 - 218	05.551 + 623	53.83 - 205	43.349 + 410	- 120	13.006 + 344	31.76 - 179
<b>12</b>	16.2	27.690 + 345	05.54 - 221	06.196 + 645	52.31 - 152	43.767 + 418	- 172	13.358 + 352	33.85 - 209
<b>12</b>	26.2	28.034 + 344	03.38 - 216	06.847 + 651	51.33 - 98	44.179 + 412	- 215	13.708 + 350	36.14 - 229
<b>12</b>	36.2	28.369 + 335	01.31 - 207	07.487 + 640	50.95 - 38	44.575 + 396	- 257	14.047 + 339	38.61 - 247
		28.369 + 312	01.31 - 190	07.487 + 601	50.95 + 23	44.575 + 364	- 288	14.047 + 314	38.61 - 254
Mean Place	26.437	12.45	03.602	76.23	43.126	41.71	12.382	35.23	
sec $\delta$ , tan $\delta$	+1.006	+0.107	+2.315	+2.088	+1.358	-0.919	+1.049	-0.317	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.062	-0.39	+0.070	-0.39	+0.057	-0.39	+0.060	-0.39	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.007	+0.17	+0.137	+0.16	-0.061	+0.16	-0.021	+0.16	
Dble.Trans.	March 12		March 13		March 13		March 13		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1295		1296		1297		1298	
	Piazz 11 <sup>h</sup> 63 (Leonis)		83 Leonis*		τ Leonis		282 G. Hydrae	
Mag. Spect.	7.15	A2	6.54	K0	5.18	K0	6.79	K0
U.T.	R.A.		R.A.		R.A.		R.A.	
	Dec.		Dec.		Dec.		Dec.	
	h m	° ′	h m	° ′	h m	° ′	h m	° ′
	11 25	+ 26 48	11 26	+ 3 05	11 27	+ 2 55	11 28	- 27 56
1 <sup>d</sup> -8.8	01.086 <sup>s</sup> + 374	83 72 <sup>"</sup> -197	02.374 <sup>s</sup> + 343	26 50 <sup>"</sup> -220	12.592 <sup>s</sup> + 344	64 55 <sup>"</sup> -221	55.165 <sup>s</sup> + 368	57.30 <sup>"</sup> -213
1 <sup>s</sup> 1.2	01.455 + 369	82 06 -166	02.709 + 335	24.35 -215	12.929 + 337	62.39 -216	55.523 + 358	59.71 -241
1 11.2	01.808 + 353	80.72 -134	03.030 + 321	22.30 -205	13.251 + 322	60.33 -206	55.863 + 340	62.33 -262
1 21.1	02.133 + 325	79.79 -93	03.322 + 292	20.43 -187	13.546 + 295	58.45 -188	56.171 + 308	65.10 -277
1 31.1	02.421 + 288	79.26 -53	03.580 + 258	18.79 -164	13.806 + 260	56.79 -166	56.441 + 270	67.90 -280
2 10.1	02.666 + 245	79.13 -13	03.799 + 219	17.39 -140	14.028 + 222	55.38 -141	56.668 + 227	70.71 -281
2 20.1	02.860 + 194	79.39 + 26	03.972 + 173	16.29 -110	14.203 + 175	54.25 -113	56.846 + 178	73.42 -271
3 2.0	03.003 + 143	79.97 + 58	04.101 + 129	15.46 -83	14.334 + 131	53.41 -84	56.977 + 131	75.97 -255
3 12.0	03.097 + 94	80.85 + 88	04.186 + 85	15.46 -57	14.422 + 88	52.82 -59	57.062 + 85	78.36 -239
3 22.0	03.142 + 45	81.95 +110	04.228 + 42	14.59 -30	14.467 + 45	52.51 -31	57.102 + 40	80.51 -215
3 32.0	03.145 + 3	83.20 +125	04.235 + 7	14.51 -8	14.477 + 10	52.41 -10	57.105 + 3	82.41 -190
4 10.9	03.111 - 34	84.53 +133	04.212 - 23	14.61 + 10	14.456 - 21	52.49 + 8	57.074 - 31	84.05 -164
4 20.9	03.046 - 65	85.88 +136	04.162 - 50	14.88 + 27	14.409 - 47	52.75 + 26	57.014 - 60	85.38 -133
4 30.9	02.960 - 86	87.16 +128	04.094 - 68	15.26 + 38	14.344 - 65	53.12 + 37	56.934 - 80	86.43 -105
5 10.8	02.856 - 104	88.35 +119	04.012 - 82	15.74 + 48	14.263 - 81	53.58 + 46	56.835 - 99	87.18 - 75
5 20.8	02.742 - 114	89.39 +104	03.920 - 92	16.28 + 54	14.174 - 89	54.12 + 54	56.724 - 111	87.61 - 43
5 30.8	02.626 - 116	90.24 + 85	03.826 - 94	16.85 + 57	14.082 - 92	54.68 + 56	56.607 - 117	87.76 + 16
6 9.8	02.507 - 119	90.89 + 65	03.730 - 96	17.45 + 60	13.987 - 95	55.27 + 59	56.483 - 124	87.60 + 46
6 19.7	02.394 - 113	91.29 + 40	03.637 - 93	18.04 + 59	13.895 - 92	55.86 + 59	56.360 - 123	87.14 + 46
6 29.7	02.290 - 104	91.46 + 17	03.550 - 87	18.61 + 57	13.810 - 85	56.42 + 56	56.241 - 119	86.43 + 71
7 9.7	02.195 - 95	91.39 - 7	03.470 - 80	19.15 + 54	13.730 - 80	56.97 + 55	56.127 - 114	85.45 + 98
7 19.7	02.115 - 80	91.06 - 33	03.402 - 68	19.63 + 48	13.663 - 67	57.44 + 47	56.025 - 102	84.26 +119
7 29.6	02.052 - 63	90.49 - 57	03.347 - 55	20.03 + 40	13.608 - 55	57.85 + 41	55.937 - 88	82.89 +137
8 8.6	02.007 - 45	89.67 - 82	03.307 - 40	20.35 + 32	13.569 - 39	58.16 + 31	55.867 - 70	81.38 +151
8 18.6	01.988 - 19	88.60 -107	03.289 - 18	20.52 + 17	13.551 - 18	58.34 + 18	55.821 - 46	79.79 +159
8 28.5	01.992 + 4	87.31 -129	03.294 + 5	20.55 + 3	13.556 + 5	58.38 + 4	55.803 - 18	78.19 +160
9 7.5	02.026 + 34	85.79 -152	03.327 + 33	20.39 - 16	13.588 + 32	58.22 - 16	55.817 + 14	76.64 +155
9 17.5	02.094 + 68	84.03 -176	03.376 + 49	20.10 - 29	13.637 + 49	57.93 - 29	55.871 + 54	75.22 +142
9 27.5	02.198 + 104	82.07 -196	03.479 + 103	19.51 - 59	13.637 + 103	57.34 - 59	55.963 + 92	74.00 +122
10 7.4	02.342 + 144	79.93 -214	03.613 + 134	18.67 - 84	13.874 + 134	56.51 - 83	56.102 + 139	73.04 + 96
10 17.4	02.528 + 186	77.63 -230	03.786 + 173	17.57 -110	14.047 + 173	55.42 -109	56.286 + 184	72.43 + 61
10 27.4	02.754 + 226	75.23 -240	03.996 + 210	16.23 -134	14.258 + 211	54.07 -135	56.514 + 228	72.20 + 23
11 6.3	03.022 + 268	72.74 -249	04.245 + 249	14.62 -161	14.508 + 250	52.47 -160	56.787 + 273	72.40 - 20
11 16.3	03.326 + 304	70.25 -249	04.528 + 283	12.79 -183	14.791 + 283	50.64 -183	57.096 + 309	73.06 - 66
11 26.3	03.661 + 335	67.80 -245	04.838 + 310	10.79 -200	15.101 + 310	48.64 -200	57.434 + 338	74.16 -110
12 6.3	04.020 + 359	65.47 -233	05.170 + 332	08.64 -215	15.434 + 333	46.49 -215	57.795 + 361	75.69 -153
12 16.2	04.392 + 372	63.34 -213	05.511 + 341	06.44 -220	15.777 + 343	44.28 -221	58.165 + 370	77.61 -192
12 26.2	04.766 + 374	61.46 -188	05.854 + 343	04.24 -220	16.121 + 344	42.07 -221	58.533 + 368	79.86 -225
12 36.2	05.132 + 366	59.89 -157	06.187 + 335	02.10 -214	16.456 + 335	39.92 -215	58.889 + 356	82.38 -252
	05.132 + 343	59.89 -118	06.187 + 312	02.10 -199	16.456 + 313	39.92 -201	58.889 + 330	82.38 -269
Mean Place	02.914	77.67	04.342	12.42	14.595	50.33	57.339	82.22
sec δ, tan δ	+1.121	+0.506	+1.001	+0.054	+1.001	+0.051	+1.132	-0.531
da(ψ), dδ(ψ)	+0.063	-0.39	+0.061	-0.39	+0.061	-0.39	+0.059	-0.39
da(ε), dδ(ε)	+0.033	+0.15	+0.004	+0.15	+0.003	+0.14	-0.035	+0.14
Dble. Trans.	March 13		March 14		March 14		March 14	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	432		433		434		436	
	58 Ursae Majoris		$\lambda$ Draconis		$\xi$ Hydrae		$\lambda$ Centauri	
Mag.Spect.	5.88	F8	4.06	M0	3.72	G5	3.34	B9
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	11 29	+43 14	11 30	+69 23	11 32	-31 46	11 35	-62 56
1 <sup>d</sup>	45.810	51.81	35.989	76.55	17.960	32.11	06.675	08.52
1 <sup>s</sup>	+433	-173	+773	-116	+378	-207	+597	-151
1	-8.8	-128	+767	-56	+367	-238	+574	-205
1	1.2	-82	+744	+5	+349	-264	+541	-254
1	11.2	-28	+689	+69	+317	-282	+485	-299
1	21.1	+20	+611	+124	+277	-290	+419	-329
1	31.1	+68	+521	+178	+234	-292	+348	-355
2	10.1	+113	+406	+222	+184	-287	+264	-370
2	20.1	+146	+288	+253	+135	-273	+184	-373
3	2.0	+175	+167	+278	+89	-259	+105	-373
3	12.0	+195	+39	+287	+42	-235	+24	-362
3	22.0	+203	-73	+283	+4	-211	-45	-342
3	32.0	+204	-179	+272	-32	-184	-110	-319
4	10.9	+196	-272	+246	-62	-154	-171	-287
4	20.9	+177	-343	+212	-83	-124	-218	-252
4	30.9	+156	-402	+174	-104	-92	-263	-212
5	10.8	+127	-443	+125	-117	-58	-299	-165
5	20.8	+93	-460	+75	-125	-27	-322	-120
5	30.8	+60	-471	+25	-132	+6	-344	-71
6	9.8	+20	-460	-30	-133	+39	-352	-18
6	19.7	-15	-435	-80	-129	+67	-351	+30
6	29.7	-53	-406	-131	-126	+97	-344	+81
7	9.7	-90	-356	-179	-113	+123	-322	+129
7	19.7	-123	-304	-219	-99	+143	-292	+170
7	29.6	-157	-245	-259	-81	+160	-253	+209
8	8.6	-187	-171	-292	-55	+171	-197	+239
8	18.6	-214	-99	-319	-27	+174	-137	+260
8	28.5	-239	-19	-342	+7	+173	-64	+275
9	7.5	-261	+70	-357	+48	+160	-19	+276
9	17.5	-276	+156	-364	+90	+142	+101	+267
9	27.5	-291	+250	-368	+137	+117	+192	+250
10	7.4	-297	+345	-360	+185	+81	+283	+216
10	17.4	-298	+432	-346	+232	+43	+363	+178
10	27.4	-295	+525	-325	+277	+0	+444	+129
11	6.4	-281	+603	-291	+315	-50	+507	+70
11	16.3	-262	+670	-254	+346	-94	+556	+13
11	26.3	-235	+728	-208	+370	-142	+591	-51
12	6.3	-198	+758	-153	+379	-184	+602	-114
12	16.2	-159	+770	-97	+377	-219	+594	-170
12	26.2	-113	+762	-34	+366	-252	+571	-227
12	36.2	-62	+719	+29	+339	-272	+524	-274
Mean Place	47.468	50.74	36.804	80.60	20.176	58.18	09.224	42.09
sec $\delta$ , tan $\delta$	+1.373	+0.941	+2.843	+2.661	+1.176	-0.620	+2.199	-1.958
d $\alpha$ ( $\psi$ ), d $\delta$ ( $\psi$ )	+0.064	-0.39	+0.070	-0.39	+0.059	-0.39	+0.056	-0.40
d $\alpha$ ( $\epsilon$ ), d $\delta$ ( $\epsilon$ )	+0.062	+0.13	+0.176	+0.13	-0.041	+0.12	-0.130	+0.11
Dbie.Trans.	March 15		March 15		March 15		March 16	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	435		1299		437		438	
	C <sup>2</sup> Centauri		♃ Crateris		♃ Leonis		π Chamaeleontis	
Mag.Spect.	5.42	F0	4.81	B9	4.47	K0	5.74	F0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>
	11 35	-47 33	11 35	- 9 43	11 36	- 0 44	11 36	-75 48
1 -8.8	13.745 +444	29.92 -182	57.634 +346	20.56 -222	13.369 +343	41.70 -222	38.777 +1002	42.88 -118
1 1.2	14.174 +429	32.17 -225	57.973 +339	22.86 -230	13.707 +338	43.92 -222	39.737 +960	44.67 -179
1 11.2	14.581 +407	34.83 -266	58.298 +298	25.21 -235	14.032 +325	46.08 -216	40.638 +901	47.00 -233
1 21.1	14.949 +368	37.81 -298	58.596 +298	27.51 -230	14.330 +298	48.10 -202	41.442 +804	49.85 -265
1 31.1	15.269 +320	41.00 -319	58.860 +264	29.69 -218	14.595 +265	49.93 -183	42.130 +688	53.07 -322
2 10.1	15.538 +269	44.34 -334	59.086 +226	31.73 -204	14.823 +228	51.54 -161	42.696 +566	56.62 -355
2 20.1	15.748 +210	47.73 -339	59.267 +181	33.56 -183	15.006 +183	52.88 -134	43.116 +420	60.40 -378
3 2.0	15.899 +151	51.07 -334	59.404 +137	35.15 -159	15.144 +138	53.96 -108	43.395 +279	64.27 -387
3 12.0	15.995 +96	54.34 -327	59.499 +95	36.52 -137	15.241 +97	54.78 -82	43.535 +140	68.21 -394
3 22.0	16.034 +39	57.44 -310	59.551 +52	37.62 -110	15.295 +54	55.32 -54	43.529 -6	72.09 -388
3 32.0	16.026 -8	60.30 -286	59.569 +18	38.48 -86	15.314 +19	55.65 -33	43.395 -134	75.81 -372
4 10.9	15.974 -52	62.92 -262	59.555 -14	39.12 -64	15.301 -13	55.76 -11	43.138 -257	79.36 -355
4 20.9	15.883 -91	65.20 -228	59.515 -40	39.52 -40	15.262 -39	55.69 +7	42.762 -376	82.60 -324
4 30.9	15.762 -121	67.14 -194	59.455 -60	39.73 -21	15.204 -58	55.48 +21	42.293 -469	85.49 -289
5 10.8	15.613 -149	68.71 -157	59.380 -75	39.76 -3	15.130 -74	55.15 +33	41.732 -561	88.01 -252
5 20.8	15.444 -169	69.87 -116	59.293 -87	39.60 +16	15.046 -84	54.71 +44	41.097 -635	90.05 -204
5 30.8	15.262 -182	70.62 -75	59.201 -92	39.31 +29	14.957 -89	54.22 +49	40.410 -687	91.62 -157
6 9.8	15.067 -195	70.94 -32	59.105 -96	38.87 +44	14.864 -93	53.66 +56	39.675 -735	92.67 -106
6 19.7	14.869 -198	70.82 +12	59.009 -96	38.31 +56	14.772 -92	53.07 +59	38.920 -755	93.15 -48
6 29.7	14.673 -196	70.30 +52	58.917 -92	37.65 +66	14.684 -88	52.47 +60	38.165 -785	93.11 +4
7 9.7	14.482 -191	69.36 +94	58.829 -88	36.90 +75	14.601 -83	51.86 +61	37.421 -744	92.52 +59
7 19.7	14.304 -178	68.03 +133	58.751 -78	36.10 +80	14.528 -73	51.28 +58	36.721 -700	91.39 +113
7 29.6	14.145 -159	66.40 +163	58.684 -67	35.27 +83	14.467 -61	50.75 +53	36.081 -640	89.79 +160
8 8.6	14.010 -135	64.46 +194	58.632 -52	34.42 +85	14.420 -47	50.28 +47	35.520 -450	87.74 +205
8 18.6	13.910 -100	62.32 +214	58.601 -31	33.64 +78	14.393 -27	49.92 +36	35.070 -561	85.31 +243
8 28.5	13.848 -62	60.05 +227	58.591 -10	32.93 +71	14.388 -5	49.69 +23	34.739 -331	82.62 +269
9 7.5	13.831 -17	57.71 +234	58.609 +18	32.35 +58	14.410 +22	49.63 +6	34.548 -191	79.71 +291
9 17.5	13.868 +37	55.42 +229	58.659 +50	31.97 +38	14.458 +48	49.89 -26	34.517 -31	76.73 +298
9 27.5	13.959 +91	53.27 +215	58.743 +84	31.76 +21	14.543 +85	50.09 -20	34.641 +124	73.79 +294
10 7.4	14.110 +151	51.34 +193	58.867 +124	31.82 -6	14.668 +125	50.69 -60	34.935 +294	70.97 +282
10 17.4	14.323 +213	49.77 +157	59.034 +167	32.19 -37	14.833 +165	51.58 -89	35.393 +458	68.45 +252
10 27.4	14.593 +270	48.59 +118	59.239 +205	32.88 -69	15.036 +203	52.73 -115	35.998 +605	66.29 +216
11 6.4	14.919 +326	47.88 +71	59.486 +247	33.90 -102	15.279 +243	54.17 -144	36.744 +746	64.60 +169
11 16.3	15.292 +373	47.73 +15	59.767 +281	35.26 -136	15.557 +278	55.87 -170	37.602 +858	63.49 +111
11 26.3	15.701 +409	48.11 -38	60.077 +310	36.90 -164	15.863 +306	57.77 -190	38.541 +939	62.96 +53
12 6.3	16.137 +436	49.06 -95	60.411 +334	38.82 -192	16.194 +331	59.87 -210	39.540 +999	63.09 -13
12 16.2	16.583 +446	50.57 -151	60.756 +345	40.95 -213	16.535 +341	62.06 -219	40.552 +1012	63.89 -80
12 26.2	17.026 +443	52.55 -198	61.101 +345	43.21 -226	16.879 +344	64.30 -224	41.549 +997	65.29 -140
12 36.2	17.453 +427	54.99 -244	61.439 +338	45.56 -235	17.216 +337	66.53 -223	42.503 +954	67.31 -202
Mean Place	16.115	60.34	59.763	39.14	15.448	57.02	41.761	78.09
sec δ, tan δ	+1.482	-1.094	+1.015	-0.171	+1.000	-0.013	+4.083	-3.958
da(ψ), dδ(ψ)	+0.058	-0.40	+0.061	-0.40	+0.061	-0.40	+0.051	-0.40
da(ε), dδ(ε)	-0.073	+0.11	-0.011	+0.10	-0.001	+0.10	-0.263	+0.10
Dble.Trans.	March 16		March 16		March 16		March 16	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	439		1300		440		1301		
	o Hydrae		61 Ursae Majoris		3 Draconis		ζ Crateris		
Mag.Spect.	4.88	B8	5.46	G5	5.48	K0	4.90	G5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	11 39	- 34 39	11 40	+ 34 16	11 41	+ 66 48	11 44	- 18 16	
1	-8.8	30.108 +388	44.37 -198	18.679 +395	43.87 -198	42.628 +698	66.72 -138	02.410 +354	11.06 -214
1	1.2	30.486 +378	46.69 -232	19.070 +391	43.87 -161	43.326 +698	65.93 -79	02.758 +348	13.38 -232
1	11.2	30.847 +361	49.30 -261	19.450 +380	41.05 -121	44.008 +682	65.75 -18	03.092 +334	15.84 -246
1	21.2	31.176 +329	52.12 -282	19.802 +352	40.31 -74	44.644 +636	66.21 +46	03.400 +308	18.34 -250
1	31.1	31.465 +289	55.05 -293	20.118 +316	40.03 -28	45.216 +572	67.24 +103	03.673 +273	20.81 -247
2	10.1	31.712 +247	58.05 -300	20.390 +272	40.19 +16	45.710 +494	68.82 +158	03.908 +235	23.21 -240
2	20.1	31.907 +195	61.00 -295	20.610 +220	40.79 +60	46.103 +393	70.87 +205	04.098 +190	25.47 -226
3	2.0	32.054 +147	63.85 -285	20.777 +167	41.75 +96	46.392 +289	73.27 +240	04.244 +146	27.53 -206
3	12.0	32.153 +99	66.57 -272	20.892 +115	43.01 +126	46.574 +182	75.94 +267	04.346 +102	29.39 -186
3	22.0	32.204 +51	69.08 -251	20.952 +60	44.52 +151	46.642 +68	78.75 +281	04.406 +60	31.01 -162
3	32.0	32.215 +11	71.35 -227	20.967 +15	46.15 +163	46.609 -33	81.56 +281	04.431 +25	32.38 -137
4	10.9	32.190 -25	73.37 -202	20.940 -27	47.86 +171	46.481 -128	84.30 +274	04.422 -9	33.51 -113
4	20.9	32.133 -57	75.07 -170	20.877 -63	49.55 +169	46.267 -214	86.82 +252	04.386 -36	34.38 -87
4	30.9	32.052 -81	76.48 -141	20.788 -89	51.13 +158	45.988 -279	89.03 +221	04.329 -57	35.02 -64
5	10.9	31.949 -103	77.56 -108	20.677 -111	52.58 +145	45.652 -336	90.89 +186	04.254 -75	35.42 -40
5	20.8	31.830 -119	78.29 -73	20.552 -125	53.81 +123	45.276 -376	92.29 +140	04.166 -88	35.58 -16
5	30.8	31.702 -128	78.70 -41	20.420 -132	54.79 +98	44.881 -395	93.22 +93	04.071 -95	35.53 +5
6	9.8	31.565 -137	78.76 -6	20.285 -135	55.51 +72	44.471 -410	93.65 +43	03.968 -103	35.27 +26
6	19.7	31.425 -140	78.46 +30	20.152 -133	55.90 +39	44.067 -404	93.54 -11	03.865 -103	34.80 +47
6	29.7	31.287 -138	77.86 +60	20.026 -126	56.00 +10	43.681 -386	92.94 -60	03.763 -102	34.16 +64
7	9.7	31.151 -136	76.94 +92	19.909 -117	55.78 -22	43.316 -365	91.84 -110	03.664 -99	33.34 +82
7	19.7	31.027 -124	75.73 +121	19.807 -102	55.24 -54	42.990 -326	90.25 -159	03.573 -91	32.39 +95
7	29.6	30.916 -111	74.31 +142	19.721 -86	54.40 -84	42.707 -283	88.24 -201	03.493 -80	31.35 +104
8	8.6	30.823 -93	72.66 +165	19.653 -68	53.26 -114	42.472 -235	85.83 -241	03.427 -66	30.22 +113
8	18.6	30.756 -67	70.90 +176	19.612 -41	51.83 -143	42.300 -172	83.05 -278	03.382 -45	29.08 +114
8	28.6	30.717 -39	69.07 +183	19.596 -16	50.15 -168	42.188 -112	79.99 -306	03.360 -22	27.97 +111
9	7.5	30.714 -3	67.23 +184	19.611 +15	48.20 -195	42.147 -41	76.67 -332	03.366 +6	26.94 +103
9	17.5	30.753 +39	65.50 +173	19.663 +52	46.02 -218	42.184 +37	73.18 -349	03.407 +41	26.07 +87
9	27.5	30.835 +82	63.93 +157	19.752 +89	43.65 -237	42.298 +114	69.58 -360	03.484 +77	25.38 +69
10	7.4	30.967 +132	62.60 +133	19.885 +133	41.09 -256	42.496 +198	65.91 -367	03.602 +118	24.94 +44
10	17.4	31.149 +182	61.61 +99	20.063 +178	38.41 -268	42.782 +286	62.29 -362	03.765 +163	24.82 +12
10	27.4	31.379 +230	61.00 +61	20.284 +221	35.65 -276	43.149 +367	58.77 -352	03.970 +205	25.04 -22
11	6.4	31.657 +278	60.83 +17	20.551 +267	32.86 -279	43.601 +452	55.43 -334	04.217 +247	25.63 -59
11	16.3	31.976 +319	61.15 -32	20.859 +308	30.12 -274	44.129 +528	52.38 -305	04.503 +286	26.61 -98
11	26.3	32.328 +352	61.94 -79	21.202 +343	27.48 -264	44.720 +591	49.68 -270	04.818 +315	27.95 -134
12	6.3	32.705 +377	63.22 -128	21.574 +372	25.02 -246	45.369 +649	47.42 -226	05.159 +341	29.65 -170
12	16.3	33.093 +388	64.95 -173	21.962 +388	22.84 -218	46.050 +681	45.69 -173	05.511 +352	31.64 -199
12	26.2	33.481 +388	67.06 -211	22.357 +395	20.97 -187	46.748 +698	44.50 -119	05.866 +355	33.86 -222
12	36.2	33.858 +377	69.52 -246	22.747 +390	19.49 -148	47.442 +694	43.93 -57	06.213 +347	36.26 -240
		351	-271	+369	-104	+662	+6	+326	-249
Mean Place	32.424	71.18	20.490	40.38	43.666	70.82	04.653	32.47	
sec δ, tan δ	+1.216	-0.692	+1.210	+0.682	+2.540	+2.335	+1.053	-0.330	
da(ψ), dδ(ψ)	+0.060	-0.40	+0.063	-0.40	+0.066	-0.40	+0.061	-0.40	
dα(ε), dδ(ε)	-0.046	+0.09	+0.045	+0.09	+0.155	+0.08	-0.022	+0.07	
Dble.Trans.	March 17		March 17		March 18		March 18		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	442		1302		441		443	
	λ Muscae		ν Virginis		χ Ursae Majoris		65 G. Centauri	
Mag. Spect.	3.80	A5	4.20	M0	3.85	K0	4.22	G0
U.T.	R.A. Dec.		R.A. Dec.		R.A. Dec.		R.A. Dec.	
	h m	° '	h m	° '	h m	° '	h m	° '
	11 44	-66 38	11 45	+ 6 36	11 45	+47 50	11 45	-61 05
1 -8.8	55 015 + 671	39 94 -130	07 853 + 346	30 73 -223	18 818 + 458	74 96 -181	48 566 + 573	38 91 -141
1 1.2	55 665 + 650	41 80 -186	08 195 + 342	28 58 -215	19 274 + 456	73 62 -134	49 123 + 557	40 86 -195
1 11.2	56 280 + 615	44 18 -238	08 526 + 331	26 56 -202	19 720 + 446	72 80 -82	49 651 + 528	43 31 -245
1 21.2	56 837 + 557	47 04 -286	08 833 + 307	24 76 -180	20 136 + 416	72 54 -26	50 131 + 480	46 20 -289
1 31.1	57 322 + 485	50 25 -321	09 108 + 275	23 22 -154	20 511 + 375	72 80 + 26	50 551 + 420	49 40 -320
2 10.1	57 730 + 408	53 74 -349	09 345 + 237	21 95 -127	20 836 + 325	73 58 + 78	50 905 + 354	52 87 -347
2 20.1	58 045 + 315	57 44 -370	09 539 + 194	21 00 -95	21 100 + 264	74 83 +125	51 182 + 277	56 49 -362
3 2.0	58 271 + 226	61 20 -226	09 689 + 150	20 34 -66	21 300 + 200	76 46 +163	51 384 + 202	60 16 -367
3 12.0	58 409 + 138	64 99 -379	09 796 + 107	19 96 -38	21 436 + 136	78 40 +194	51 513 + 129	63 84 -368
3 22.0	58 454 + 45	68 71 -372	09 860 + 64	19 86 -10	21 506 + 70	80 56 +216	51 565 + 52	67 41 -357
3 32.0	58 421 - 33	72 25 -354	09 888 + 28	19 97 + 11	21 518 + 12	82 80 +224	51 551 - 14	70 80 -339
4 10.9	58 310 - 111	75 61 -336	09 884 - 4	20 27 + 30	21 475 - 43	85 06 +226	51 475 - 76	73 98 -318
4 20.9	58 128 - 182	78 65 -304	09 851 - 33	20 72 + 45	21 386 - 89	87 23 +217	51 341 - 134	76 85 -287
4 30.9	57 888 - 240	81 36 -271	09 798 - 53	21 27 + 55	21 261 - 125	89 22 +199	51 160 - 181	79 38 -253
5 10.9	57 593 - 295	83 69 -233	09 728 - 70	21 89 + 62	21 106 - 155	90 97 +175	50 936 - 224	81 54 -216
5 20.8	57 252 - 341	85 56 -187	09 646 - 82	22 54 + 65	20 931 - 175	92 40 +143	50 676 - 260	83 25 -171
5 30.8	56 880 - 372	86 98 -142	09 558 - 88	23 19 + 65	20 745 - 186	93 48 +108	50 391 - 285	84 51 -126
6 9.8	56 478 - 402	87 90 - 92	09 465 - 93	23 83 + 64	20 552 - 193	94 18 + 70	50 082 - 309	85 30 - 79
6 19.7	56 062 - 416	88 28 - 38	09 373 - 92	24 42 + 59	20 552 - 191	94 18 + 28	49 763 - 319	85 30 - 27
6 29.7	55 643 - 419	88 17 + 1	09 284 - 88	24 96 + 54	20 179 - 182	94 33 - 13	49 442 - 321	85 37 + 20
7 9.7	55 227 - 416	87 53 + 64	09 198 - 86	25 42 + 46	20 007 - 172	93 80 - 53	49 122 - 320	84 66 + 71
7 19.7	54 833 - 394	86 39 +114	09 122 - 76	25 79 + 37	19 854 - 153	92 85 - 95	48 820 - 302	83 49 +117
7 29.6	54 471 - 362	84 81 +158	09 057 - 65	26 05 + 26	19 722 - 132	91 54 -131	48 543 - 277	81 91 +158
8 8.6	54 152 - 319	82 81 +200	09 004 - 53	26 19 + 14	19 615 - 107	89 86 -168	48 299 - 244	79 93 +198
8 18.6	53 895 - 257	80 47 +234	08 972 - 32	26 17 - 2	19 540 - 75	87 83 -203	48 104 - 195	77 64 +229
8 28.6	53 707 - 188	77 88 +259	08 960 - 12	25 99 - 18	19 497 - 43	85 53 -230	47 964 - 140	75 13 +251
9 7.5	53 600 - 107	75 11 +277	08 975 + 15	25 63 - 36	19 493 - 4	82 94 -259	47 889 - 75	72 46 +267
9 17.5	53 589 - 11	72 28 +283	09 019 + 44	25 14 - 49	19 534 + 41	80 12 -282	47 891 + 2	69 76 +270
9 27.5	53 673 + 84	69 51 +277	09 092 + 73	24 27 - 87	19 620 + 86	77 14 -298	47 971 + 80	67 14 +262
10 7.4	53 862 + 189	66 87 +264	09 208 + 116	23 20 -107	19 759 + 139	74 01 -313	48 136 + 165	64 67 +247
10 17.4	54 155 + 293	64 54 +233	09 364 + 156	21 89 -131	19 951 + 192	70 82 -319	48 388 + 252	62 51 +216
10 27.4	54 543 + 388	62 57 +197	09 559 + 195	20 35 -154	20 194 + 243	67 63 -319	48 718 + 330	60 72 +179
11 6.4	55 024 + 481	61 06 +151	09 795 + 236	18 57 -178	20 493 + 299	64 48 -315	49 127 + 409	59 39 +133
11 16.3	55 582 + 558	60 12 + 94	10 067 + 272	16 61 -196	20 841 + 348	61 49 -299	49 601 + 474	58 63 + 76
11 26.3	56 197 + 615	59 76 + 36	10 370 + 303	14 49 -212	21 230 + 389	58 72 -277	50 123 + 522	58 44 + 19
12 6.3	56 856 + 659	60 03 - 27	10 699 + 329	12 26 -223	21 657 + 427	56 24 -248	50 685 + 562	58 87 - 43
12 16.3	57 530 + 674	60 95 - 92	11 041 + 342	10 01 -225	22 105 + 448	54 15 -209	51 260 + 575	59 92 -105
12 26.2	58 200 + 670	62 46 -151	11 387 + 346	07 79 -222	22 562 + 457	52 49 -166	51 833 + 573	61 53 -161
12 36.2	58 848 + 648	64 54 -208	11 729 + 342	05 67 -212	23 018 + 456	51 33 -116	52 388 + 555	63 70 -217
	58 848 + 598	64 54 -259	11 729 + 323	05 67 -194	23 018 + 434	51 33 - 61	52 388 + 514	63 70 -264
Mean Place	57.878	73.91	09.934	18.16	20.457	75.50	51.305	72.00
sec δ, tan δ	+2.523	-2.317	+1.007	+0.116	+1.490	+1.105	+2.069	-1.812
da(ψ), dδ(ψ)	+0.057	-0.40	+0.061	-0.40	+0.063	-0.40	+0.058	-0.40
da(ε), dδ(ε)	-0.154	+0.07	+0.008	+0.06	+0.074	+0.06	-0.121	+0.06
Dble. Trans.	March 18		March 19		March 19		March 19	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1303		1304		1305		444	
	Groombridge 1826 (Ursae Majoris)		93 Leonis		298 G. Hydrae		$\beta$ Leonis (Denebola)	
Mag. Spect.	6.64	F0	4.54	F8	5.45	M3	2.23	A2
U.T.	R.A.		R.A.		R.A.		R.A.	
	h	m	h	m	h	m	h	m
	11 46	+ 61 28	11 47	+ 20 17	11 48	- 26 40	11 48	+ 14 38
	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /
1 -8.8	23.147 + 594	33.99 -156	15.420 + 360	45.95 -218	01.740 + 369	04.85 -203	20.291 + 351	60.71 -222
1 1.2	23.743 + 596	32.99 -100	15.777 + 357	44.01 -194	02.101 + 361	07.15 -230	20.640 + 349	58.67 -204
1 11.2	24.326 + 583	32.58 -41	16.124 + 347	42.34 -167	02.449 + 348	09.66 -251	20.978 + 338	56.85 -182
1 21.2	24.872 + 546	32.80 + 22	16.447 + 323	41.02 -132	02.769 + 320	12.32 -266	21.293 + 315	55.32 -153
1 31.1	25.364 + 492	33.58 + 78	16.738 + 291	40.06 -96	03.053 + 284	15.02 -270	21.575 + 282	54.11 -121
2 10.1	25.792 + 428	34.92 +134	16.990 + 252	39.48 -58	03.298 + 245	17.72 -270	21.821 + 246	53.24 -87
2 20.1	26.137 + 345	36.74 +182	17.197 + 207	39.29 -19	03.496 + 198	20.35 -263	22.022 + 201	52.73 -51
3 2.0	26.395 + 258	38.93 +219	17.356 + 159	39.44 + 15	03.649 + 153	22.82 -247	22.177 + 155	52.55 -18
3 12.0	26.565 + 170	41.41 +248	17.470 + 114	39.90 + 46	03.757 + 108	25.14 -232	22.289 + 112	52.67 + 12
3 22.0	26.641 + 76	44.07 +266	17.538 + 68	40.63 + 73	03.820 + 63	27.23 -209	22.355 + 66	53.06 + 39
3 32.0	26.634 - 7	46.75 +268	17.566 + 28	41.54 + 91	03.846 + 26	29.09 -186	22.384 + 29	53.66 + 60
4 10.9	26.549 - 85	49.41 +266	17.558 - 8	42.60 +106	03.838 - 8	30.70 -161	22.379 - 5	54.41 + 75
4 20.9	26.393 -156	51.88 +247	17.519 - 39	43.74 +114	03.800 - 38	32.03 -133	22.344 - 35	55.28 + 87
4 30.9	26.184 -209	54.09 +221	17.457 - 62	44.88 +114	03.739 - 61	33.09 -106	22.287 - 57	56.19 + 91
5 10.9	25.929 -255	55.98 +189	17.377 - 80	45.99 +111	03.658 - 81	33.87 - 78	22.212 - 75	57.11 + 92
5 20.8	25.641 - 288	57.45 +147	17.283 - 94	47.01 +102	03.561 - 97	34.35 - 48	22.125 - 87	58.00 + 89
5 30.8	25.336 -305	58.48 +103	17.184 - 99	47.91 + 90	03.456 -105	34.57 - 22	22.032 - 93	58.81 + 81
6 9.8	25.019 -317	59.05 + 57	17.078 -106	48.67 + 76	03.342 -114	34.50 + 7	21.933 - 99	59.53 + 72
6 19.7	24.705 -314	59.10 + 5	16.974 -104	49.24 + 57	03.224 -118	34.15 + 35	21.834 - 99	60.13 + 60
6 29.7	24.403 -302	58.68 - 42	16.874 -100	49.63 + 39	03.108 -116	33.56 + 59	21.739 - 95	60.58 + 45
7 9.7	24.117 -286	57.78 - 90	16.778 - 96	49.82 + 19	02.992 -116	32.72 + 84	21.648 - 91	60.89 + 31
7 19.7	23.861 -256	56.40 -138	16.693 - 85	49.78 - 4	02.885 -107	31.66 +106	21.566 - 82	61.03 + 14
7 29.6	23.637 -224	54.61 -179	16.620 - 73	49.54 -24	02.885 -96	30.44 +122	21.496 - 70	60.99 - 4
8 8.6	23.450 -187	52.41 -220	16.562 - 58	49.08 -46	02.789 - 81	30.44 +137	21.496 - 56	60.78 - 21
8 18.6	23.313 -137	49.84 -257	16.524 - 38	48.38 -70	02.648 - 60	27.62 +145	21.403 - 37	60.36 - 42
8 28.6	23.223 - 90	46.99 -285	16.508 - 16	47.47 - 91	02.614 - 34	26.15 +147	21.388 - 15	59.75 - 61
9 7.5	23.190 - 33	43.85 -314	16.518 + 10	46.32 -115	02.610 - 4	24.70 +145	21.398 + 10	58.92 - 83
9 17.5	23.221 + 31	40.52 -333	16.561 + 43	44.93 -139	02.643 + 33	23.38 +132	21.438 + 40	57.87 -105
9 27.5	23.315 + 94	37.05 -347	16.636 + 75	43.32 -161	02.716 + 73	22.22 +116	21.512 + 74	56.57 -130
10 7.4	23.479 + 164	33.49 -356	16.752 + 116	41.48 -184	02.833 + 117	21.30 + 92	21.625 + 113	55.04 -153
10 17.4	23.717 + 238	29.94 -355	16.910 + 158	39.44 -204	02.998 + 165	20.71 + 59	21.779 + 154	53.29 -175
10 27.4	24.024 + 307	26.45 -349	17.107 + 197	37.25 -219	03.207 + 209	20.46 + 25	21.973 + 194	51.35 -194
11 6.4	24.404 + 380	23.10 -335	17.348 + 241	34.91 -234	03.463 + 256	20.63 -17	22.208 + 235	49.22 -213
11 16.3	24.849 + 445	20.01 -309	17.627 + 279	32.49 -242	03.758 + 295	21.24 - 61	22.481 + 273	46.97 -225
11 26.3	25.349 + 500	17.22 -279	17.938 + 311	30.05 -244	04.086 + 328	22.25 -101	22.786 + 305	44.65 -232
12 6.3	25.900 + 551	14.83 -239	18.277 + 339	27.63 -242	04.440 + 354	23.70 -145	23.117 + 331	42.30 -235
12 16.3	26.479 + 579	12.93 -190	18.631 + 354	25.34 -229	04.807 + 367	25.52 -182	23.464 + 347	40.01 -229
12 26.2	27.074 + 595	11.55 -138	18.992 + 361	23.23 -211	05.176 + 369	27.65 -213	23.816 + 352	37.84 -217
12 36.2	27.668 + 594	10.77 - 78	19.349 + 357	21.37 -186	05.537 + 361	30.06 -241	24.164 + 348	35.86 -198
	27.668 + 567	10.77 - 18	19.349 + 339	21.37 -154	05.537 + 339	30.06 -259	24.164 + 331	35.86 -172
Mean Place	24.448	37.36	17.400	38.36	04.076	28.98	22.308	51.16
sec $\delta$ , $\tan \delta$	+2.094	+1.840	+1.066	+0.370	+1.119	-0.502	+1.034	+0.261
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.064	-0.40	+0.062	-0.40	+0.060	-0.40	+0.062	-0.40
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.122	+0.06	+0.025	+0.06	-0.033	+0.05	+0.017	+0.05
Dble. Trans.	March 19		March 19		March 19		March 19	



AT UPPER TRANSIT AT GREENWICH

No.	445		1306		446		1307		
	β Virginis		12 G. Virginis		B Centauri		Groombridge 1830 (Ursae Majoris)		
Mag.Spect.	3.80	F8	5.81	K0	4.71	K0	6.46	G5	
U.T.	R.A.		R.A.		R.A.		R.A.		
	h	m	h	m	h	m	h	m	
	11 49	+ 1 50	11 50	- 5 15	11 50	- 45 05	11 52	+ 37 48	
	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	
1 <sup>d</sup>	-8.8	57 353 + 346	41 12 -224	18 603 + 344	13 23 -222	25 406 + 433	25 06 -170	10 232 + 414	61.31 -218
1	1.2	57 695 + 342	38 91 -221	18 944 + 341	15 48 -225	25 829 + 423	27 20 -214	10 646 + 414	59 52 -179
1	11.2	58 026 + 331	36 78 -213	19 273 + 329	17 74 -226	26 235 + 406	29 73 -253	11 051 + 405	58.17 -135
1	21.2	58 333 + 307	34 82 -196	19 579 + 306	19 90 -216	26 606 + 371	32 58 -285	11 431 + 380	57.32 -85
1	31.1	58 609 + 276	33 07 -175	19 853 + 274	21 92 -202	26 935 + 329	35 63 -305	11 775 + 344	56.95 -37
2	10.1	58 849 + 240	31 56 -151	20 091 + 238	23 75 -183	27 216 + 281	38 83 -320	12 077 + 302	57.06 + 11
2	20.1	59 046 + 197	30 34 -122	20 286 + 195	25 35 -160	27 443 + 227	42 10 -327	12 326 + 249	57.63 + 57
3	2.0	59 199 + 153	29 40 -94	20 438 + 152	26 70 -135	27 614 + 171	45 32 -322	12 520 + 194	58.58 + 95
3	12.0	59 311 + 112	28 73 -67	20 548 + 110	27 80 -110	27 733 + 119	48 48 -316	12 661 + 141	59.87 +129
3	22.0	59 380 + 69	28 34 -39	20 616 + 68	28 64 -84	27 797 + 64	51 48 -300	12 745 + 84	61.40 +153
3	32.0	59 413 + 33	28 17 -17	20 649 + 33	29 24 -60	27 816 + 19	54 26 -278	12 780 + 35	63.07 +167
4	10.9	59 414 + 1	28 20 + 3	20 651 + 2	29 62 -38	27 791 -25	56 82 -256	12 771 -9	64.81 +174
4	20.9	59 387 -27	28 41 + 21	20 624 -27	29 79 -17	27 728 -63	59 07 -225	12 723 -48	66.54 +173
4	30.9	59 340 -47	28 74 + 33	20 577 -47	29 80 -1	27 635 -93	60 99 -192	12 645 -78	68.15 +161
5	10.9	59 276 -64	29 18 + 44	20 513 -64	29 65 + 15	27 513 -122	62 58 -159	12 542 -103	69.60 +145
5	20.8	59 199 -77	29 70 + 52	20 436 -77	29 36 + 29	27 369 -144	63 77 -119	12 421 -121	70.82 +122
5	30.8	59 116 -83	30 25 + 55	20 351 -85	28 98 + 38	27 210 -159	64 58 -81	12 292 -129	71.76 + 94
6	9.8	59 026 -90	30 83 + 58	20 261 -90	28 50 + 48	27 037 -173	64 98 -40	12 292 -137	72.41 + 65
6	19.7	58 936 -90	31 42 + 59	20 168 -93	27 94 + 56	26 857 -180	64 97 + 1	12 155 -136	72.72 + 31
6	29.7	58 849 -87	31 99 + 57	20 078 -90	27 33 + 61	26 676 -181	64 57 + 40	11 889 -130	72.68 -4
7	9.7	58 764 -85	32 53 + 54	19 989 -89	26 68 + 65	26 495 -181	63 77 + 80	11 765 -124	72.31 -37
7	19.7	58 687 -77	33 02 + 49	19 909 -80	26 01 + 67	26 325 -170	62 60 +117	11 654 -111	71.57 -74
7	29.6	58 621 -66	33 44 + 42	19 837 -72	25 35 + 66	26 169 -156	61 12 +148	11 560 -94	70.51 -106
8	8.6	58 567 -54	33 77 + 33	19 778 -59	24 72 + 63	26 032 -137	59 35 +177	11 484 -76	69.12 -139
8	18.6	58 532 -35	33 98 + 21	19 738 -40	24 17 + 55	25 925 -107	57 36 +199	11 433 -51	67.41 -171
8	28.6	58 517 -15	34 04 + 6	19 719 -19	23 72 + 45	25 852 -73	55 24 +212	11 408 -25	65.43 -198
9	7.5	58 528 + 11	33 94 -10	19 725 + 6	23 41 + 31	25 821 -31	53 03 +221	11 415 + 7	63.17 -226
9	17.5	58 579 + 51	33 61 -33	19 763 + 38	23 32 + 9	25 840 + 19	50 87 +216	11 461 + 46	60.66 -251
9	27.5	58 638 + 59	33 15 -46	19 829 + 66	23 38 -6	25 910 + 70	48 81 +206	11 544 + 83	57.96 -270
10	7.4	58 753 + 115	32 35 -80	19 940 + 111	23 68 -30	26 038 + 128	46 96 +185	11 673 + 129	55.07 -289
10	17.4	58 906 + 153	31 30 -105	20 093 + 153	24 30 -62	26 226 + 188	45 43 +153	11 849 + 176	52.06 -301
10	27.4	59 099 + 193	30 00 -130	20 286 + 192	25 21 -91	26 471 + 245	44 26 +117	12 072 + 223	48.99 -307
11	6.4	59 333 + 234	28 43 -157	20 518 + 233	26 42 -121	26 772 + 301	43 55 + 71	12 343 + 271	45 88 -311
11	16.3	59 604 + 271	26 64 -179	20 789 + 271	27 93 -151	27 121 + 349	43 36 + 19	12 658 + 315	42.85 -303
11	26.3	59 906 + 302	24 65 -199	21 090 + 301	29 68 -175	27 509 + 388	43 68 -32	13 011 + 353	39 94 -291
12	6.3	60 233 + 327	22 50 -215	21 417 + 327	31 67 -199	27 927 + 418	44 55 -87	13 397 + 386	37.23 -271
12	16.3	60 575 + 342	20 27 -223	21 758 + 341	33 82 -215	28 359 + 432	45 95 -140	13 803 + 406	34.83 -240
12	26.2	60 921 + 346	18 03 -224	22 103 + 345	36 06 -224	28 793 + 434	47 81 -186	14 218 + 415	32.77 -206
12	36.2	61 263 + 342	15 82 -221	22 444 + 341	38 34 -228	29 216 + 423	50 13 -232	14 632 + 414	31.13 -164
		61 263 + 323	15 82 -207	22 444 + 322	38 34 -223	29 216 + 395	50 13 -267	14 632 + 395	31.13 -117
Mean Place	59 517	26 95	20 801	29 86	27 946	54 55	12 230	56 35	
sec δ, tan δ	+1.001	+0.032	+1.004	-0.092	+1.417	-1.003	+1.266	+0.776	
dα(ψ), dδ(ψ)	+0.061	-0.40	+0.061	-0.40	+0.060	-0.40	+0.062	-0.40	
dα(ε), dδ(ε)	+0.002	+0.04	-0.006	+0.04	-0.067	+0.04	+0.052	+0.03	
Dbble.Trans.	March 20		March 20		March 20		March 20		

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	447		1308		1309		1310	
	$\gamma$ Ursae Majoris		95 Leonis		$\eta$ Crateris		Piazzi 11 <sup>h</sup> 202 (Ursae Majoris)	
Mag. Spect.	2.54	A0	5.49	A2	5.16	A0	6.30	F0
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	11 53	+ 53 45	11 54	+ 15 43	11 55	- 17 04	11 57	+ 32 20
1 -8.8	05.917 <sup>s</sup> + 501	69.31 <sup>o</sup> - 179	56.852 <sup>s</sup> + 353	27.75 <sup>o</sup> - 223	17.257 <sup>s</sup> + 353	11.70 <sup>o</sup> - 211	23.763 <sup>s</sup> + 385	61.00 <sup>o</sup> - 215
1 1.2	06.420 + 503	68.03 - 128	57.204 + 352	25.69 - 206	17.606 + 349	13.98 - 228	24.148 + 385	59.20 - 180
1 11.2	06.914 + 494	67.30 - 73	57.546 + 342	23.86 - 183	17.943 + 337	16.38 - 240	24.526 + 378	57.79 - 141
1 21.2	07.379 + 465	67.17 - 13	57.867 + 321	22.34 - 152	18.256 + 313	18.83 - 245	24.881 + 355	56.84 - 95
1 31.1	07.800 + 421	67.60 + 43	58.156 + 289	21.15 - 119	18.537 + 281	21.24 - 241	25.203 + 322	56.34 - 50
2 10.1	08.168 + 368	68.57 + 97	58.409 + 253	20.31 - 84	18.781 + 244	23.57 - 233	25.486 + 283	56.30 - 4
2 20.1	08.469 + 301	70.03 + 146	58.618 + 209	19.83 - 48	18.981 + 200	25.75 - 218	25.720 + 234	56.71 + 41
3 2.1	08.700 + 231	71.88 + 185	58.783 + 165	19.70 - 13	19.138 + 157	27.74 - 199	25.903 + 183	57.50 + 79
3 12.0	08.859 + 159	74.06 + 218	58.903 + 120	19.87 + 17	19.253 + 115	29.53 - 179	26.037 + 134	58.62 + 112
3 22.0	08.943 + 84	76.45 + 239	58.979 + 76	20.32 + 45	19.325 + 72	31.08 - 155	26.118 + 81	60.02 + 140
3 32.0	08.960 + 17	78.92 + 247	59.016 + 37	20.98 + 66	19.362 + 37	32.39 - 131	26.153 + 35	61.58 + 156
4 10.9	08.914 - 46	81.40 + 248	59.018 + 2	21.80 + 82	19.365 + 3	33.46 - 107	26.148 - 5	63.26 + 168
4 20.9	08.813 - 101	83.76 + 236	58.990 - 28	22.74 + 94	19.340 - 25	34.29 - 83	26.105 - 43	64.95 + 169
4 30.9	08.669 - 144	85.92 + 216	58.939 - 51	23.71 + 97	19.294 - 46	34.89 - 60	26.035 - 70	66.57 + 162
5 10.9	08.487 - 182	87.81 + 189	58.870 - 69	24.70 + 99	19.228 - 66	35.26 - 37	25.942 - 93	68.09 + 152
5 20.8	08.279 - 208	89.34 + 153	58.786 - 84	25.64 + 94	19.148 - 80	35.41 - 15	25.831 - 111	69.42 + 133
5 30.8	08.057 - 222	90.49 + 115	58.695 - 91	26.49 + 85	19.059 - 89	35.36 + 5	25.711 - 120	70.52 + 110
6 9.8	07.824 - 233	91.22 + 73	58.597 - 98	27.25 + 76	18.961 - 98	35.12 + 24	25.583 - 128	71.38 + 86
6 19.8	07.591 - 233	91.48 + 26	58.499 - 98	27.88 + 63	18.861 - 100	34.68 + 44	25.454 - 129	71.94 + 56
6 29.7	07.367 - 224	91.31 - 17	58.403 - 96	28.34 + 46	18.760 - 101	34.09 + 59	25.329 - 125	72.21 + 27
7 9.7	07.152 - 215	90.69 - 62	58.309 - 94	28.66 + 32	18.660 - 100	33.33 + 76	25.209 - 120	72.17 - 4
7 19.7	06.958 - 194	89.61 - 108	58.225 - 84	28.79 + 13	18.567 - 93	32.45 + 88	25.099 - 110	71.81 - 36
7 29.6	06.788 - 170	88.14 - 147	58.150 - 75	28.74 - 5	18.567 - 84	31.49 + 96	25.099 - 97	71.81 - 65
8 8.6	06.645 - 143	86.27 - 187	58.089 - 61	28.50 - 24	18.483 - 72	31.49 + 105	25.002 - 81	71.16 - 96
8 18.6	06.538 - 107	84.04 - 223	58.046 - 43	28.04 - 46	18.411 - 53	30.44 + 105	24.921 - 58	70.20 - 127
8 28.6	06.468 - 70	81.51 - 253	58.025 - 21	27.38 - 66	18.327 - 31	28.37 + 102	24.828 - 35	67.41 - 152
9 7.5	06.442 + 26	78.68 - 283	58.028 + 3	26.50 - 88	18.323 - 4	27.42 + 95	24.821 - 7	65.61 - 180
9 17.5	06.468 + 26	75.63 - 305	58.062 + 34	25.39 - 111	18.354 + 31	26.63 + 79	24.850 + 29	63.55 - 206
9 27.5	06.543 + 75	72.42 - 321	58.128 + 66	24.04 - 135	18.418 + 64	26.02 + 61	24.915 + 65	61.28 - 227
10 7.5	06.677 + 134	69.06 - 336	58.234 + 106	22.45 - 159	18.525 + 107	25.64 + 38	25.023 + 108	58.80 - 248
10 17.4	06.872 + 195	65.67 - 339	58.382 + 148	20.64 - 181	18.676 + 151	25.56 + 8	25.177 + 154	56.17 - 263
10 27.4	07.125 + 253	62.29 - 338	58.570 + 188	18.65 - 199	18.870 + 194	25.81 - 25	25.374 + 197	53.44 - 273
11 6.4	07.441 + 316	58.98 - 331	58.801 + 231	16.47 - 218	19.108 + 238	26.43 - 62	25.619 + 245	50.63 - 281
11 16.3	07.811 + 370	55.87 - 311	59.071 + 270	14.18 - 229	19.385 + 277	27.42 - 99	25.907 + 288	47.84 - 279
11 26.3	08.230 + 419	53.01 - 286	59.373 + 302	11.81 - 237	19.694 + 309	28.75 - 133	26.231 + 324	45.12 - 272
12 6.3	08.692 + 462	50.48 - 253	59.703 + 330	09.42 - 239	20.029 + 335	30.43 - 168	26.588 + 357	42.55 - 257
12 16.3	09.180 + 488	48.39 - 209	60.050 + 347	07.11 - 231	20.379 + 350	32.39 - 196	26.964 + 376	40.22 - 233
12 26.2	09.683 + 503	46.76 - 163	60.404 + 354	04.92 - 219	20.733 + 354	34.57 - 218	27.351 + 387	38.18 - 204
12 36.2	10.185 + 502	45.67 - 109	60.756 + 352	02.93 - 199	21.082 + 349	36.93 - 236	27.737 + 386	36.50 - 188
	+ 482	- 50	+ 335	- 172	+ 330	- 243	+ 369	- 124
Mean Place	07.479	71.43	58.917	18.79	19.574	32.39	25.675	57.58
sec $\delta$ , tan $\delta$	+1.692	+1.365	+1.039	+0.281	+1.046	-0.307	+1.184	+0.633
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.062	-0.40	+0.061	-0.40	+0.061	-0.40	+0.061	-0.40
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.091	+0.03	+0.019	+0.02	-0.020	+0.02	+0.042	+0.01
Dble. Trans.	March 21		March 21		March 21		March 22	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1311		449		450		451	
Name	π Virginis		88 G. Centauri		ο Virginis		Groombridge 1852 (Camelopardi)	
Mag. Spect.	4.57	A3	5.28	F0	4.24	G5	5.96	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	12 00	+ 6 41	12 02	- 42 21	12 04	+ 8 48	12 04	+ 76 58
1 -8.8	08 717 + 345	34 48 -226	54 746 + 421	02 49 -165	29 130 + 345	39 65 -227	34 431 +1104	46 34 -146
1 1.2	09 061 + 344	32 31 -217	55 162 + 416	04 54 -205	29 475 + 345	37 49 -216	35 554 +1123	45 49 -85
1 11.2	09 396 + 335	30 27 204	55 563 + 401	06 97 -243	29 812 + 337	35 48 -201	36 671 +1117	45 29 -20
1 21.2	09 710 + 314	28 44 -183	55 935 + 372	09 71 -274	30 129 + 317	33 70 -178	37 735 +1064	45 76 + 47
1 31.1	09 994 + 284	26 86 -158	56 268 + 333	12 65 -294	30 416 + 287	32 20 -150	38 709 + 974	46 83 +107
2 10.1	10 243 + 249	25 57 -129	56 558 + 290	15 73 -308	30 669 + 253	31 00 -120	39 571 + 862	48 48 +165
2 20.1	10 450 + 207	24 59 -98	56 796 + 238	18 86 -313	30 881 + 212	30 13 -87	40 277 + 706	50 64 +216
3 2.1	10 614 + 164	23 92 -67	56 982 + 186	21 96 -310	31 049 + 168	29 58 -55	40 816 + 539	53 18 +254
3 12.0	10 736 + 122	23 54 -38	57 118 + 136	24 99 -303	31 176 + 127	29 33 -25	41 176 + 360	56 02 +284
3 22.0	10 816 + 80	23 44 -10	57 202 + 84	27 87 -288	31 176 + 83	29 33 + 3	41 342 + 166	59 02 +300
3 32.0	10 859 + 43	23 57 + 13	57 242 + 40	30 55 -268	31 306 + 47	29 62 + 26	41 328 - 14	62 03 +301
4 10.9	10 869 + 10	23 89 + 32	57 241 - 1	33 01 -246	31 319 + 13	30 07 + 45	41 139 - 189	64 98 +295
4 20.9	10 849 - 20	24 37 + 48	57 201 - 40	35 17 -216	31 302 - 17	30 67 + 60	40 786 - 353	67 72 +274
4 30.9	10 808 - 41	24 34 + 57	57 131 - 70	37 04 -187	31 263 - 39	31 35 + 68	40 301 - 485	70 14 +242
5 10.9	10 748 - 60	25 59 + 65	57 034 - 97	38 59 -155	31 204 - 59	32 10 + 75	39 698 - 603	72 19 +205
5 20.8	10 674 - 74	26 28 + 69	56 913 - 121	39 77 -118	31 131 - 73	32 87 + 77	39 004 - 694	73 76 +157
5 30.8	10 592 - 82	26 96 + 68	56 776 - 137	40 59 - 82	31 049 - 82	33 61 + 74	38 253 - 751	74 83 +107
6 9.8	10 503 - 89	27 64 + 68	56 624 - 152	41 03 - 44	30 959 - 90	34 32 + 71	37 459 - 794	75 38 + 55
6 19.8	10 411 - 92	28 26 + 62	56 462 - 162	41 08 - 5	30 866 - 93	34 96 + 64	36 655 - 804	75 35 - 3
6 29.7	10 320 - 91	28 81 + 55	56 297 - 165	40 76 + 32	30 774 - 92	35 51 + 55	35 866 - 789	74 79 - 56
7 9.7	10 231 - 89	29 29 + 48	56 130 - 167	40 07 + 69	30 682 - 92	35 97 + 46	35 101 - 765	73 68 -111
7 19.7	10 148 - 83	29 67 + 38	55 969 - 161	39 02 +105	30 597 - 85	36 30 + 33	34 394 - 707	72 05 -163
7 29.6	10 074 - 74	29 93 + 26	55 820 - 149	37 68 +134	30 520 - 77	36 50 + 20	33 754 - 640	69 97 -208
8 8.6	10 012 - 62	30 08 + 15	55 686 - 134	36 05 +163	30 454 - 66	36 56 + 6	33 194 - 560	67 44 -253
8 18.6	09 967 - 45	30 06 - 2	55 579 - 107	34 22 +183	30 405 - 49	36 44 - 12	32 739 - 455	64 52 -292
8 28.6	09 941 - 26	29 88 - 18	55 502 - 77	32 25 +197	30 376 - 29	36 15 - 29	32 389 - 350	61 29 -323
9 7.5	09 941 + 0	29 51 - 37	55 462 - 40	30 19 +206	30 371 - 5	35 67 - 48	32 158 - 231	57 79 -350
9 17.5	09 972 + 31	28 96 - 55	55 470 + 8	28 16 +203	30 396 + 25	34 98 - 69	32 065 - 93	54 09 -370
9 27.5	10 029 + 57	28 15 - 81	55 525 + 55	26 24 +192	30 450 + 54	34 05 - 93	32 103 + 38	50 28 -381
10 7.5	10 129 + 100	27 07 -108	55 636 + 111	24 49 +175	30 545 + 95	32 84 -121	32 289 + 186	46 40 -388
10 17.4	10 271 + 142	25 75 -132	55 805 + 169	23 05 +144	30 682 + 137	31 41 -143	32 625 + 336	42 57 -383
10 27.4	10 452 + 181	24 21 -154	56 030 + 225	21 95 +110	30 860 + 178	29 75 -166	33 103 + 478	38 85 -372
11 6.4	10 676 + 224	22 42 -179	56 311 + 281	21 28 + 67	31 080 + 220	27 87 -188	33 731 + 628	35 32 -353
11 16.3	10 938 + 262	20 45 -197	56 640 + 329	21 10 + 18	31 339 + 259	25 81 -206	34 495 + 764	32 11 -321
11 26.3	11 233 + 295	18 32 -213	57 010 + 370	21 42 - 32	31 632 + 293	23 61 -220	35 376 + 881	29 26 -285
12 6.3	11 556 + 323	16 08 -224	57 412 + 402	22 26 - 84	31 953 + 321	21 32 -229	36 366 + 990	26 86 -240
12 16.3	11 895 + 339	13 80 -228	57 830 + 418	23 61 -135	32 292 + 339	19 03 -229	37 428 +1062	25 03 -183
12 26.2	12 241 + 346	11 56 -224	58 253 + 423	25 40 -179	32 639 + 347	16 79 -224	38 535 +1107	23 77 -126
12 36.2	12 586 + 345	09 41 -215	58 670 + 417	27 63 -223	32 984 + 345	14 65 -214	39 659 +1124	23 15 - 62
Mean Place	10 881	22 46	57 422	30 96	31 291	28 56	34 701	52 22
sec δ, tan δ	+1.007	+0.117	+1.353	-0.912	+1.012	+0.155	+4.439	+4.325
dα(ψ), dδ(ψ)	+0.061	-0.40	+0.061	-0.40	+0.061	-0.40	+0.059	-0.40
dα(ε), dδ(ε)	+0.008	-0.00	-0.061	-0.01	+0.010	-0.02	+0.288	-0.02
Dble. Trans.	March 22		March 23		March 23		March 23	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1312		452		453		1313	
	311 G. Hydrae		δ Centauri		ε Corvi		3 Comae Berenices	
Mag. Spect.	6.26	B9	2.88	B3p	3.21	K0	6.34	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	12 05	-35 36	12 07	-50 38	12 09	-22 32	12 09	+16 52
1 <sup>d</sup>	-8.7	+393	+470	-140	+360	-197	+352	-230
1 <sup>s</sup>	12.300	-211	36.429	19.87	23.246	18.74	48.239	71.54
1	1.2	+390	+465	-188	+359	-219	+353	-210
1	11.2	+377	+449	-232	+350	-238	+347	-187
1	21.2	+350	+417	-271	+326	-250	+328	-156
1	31.1	+315	+373	-298	+296	-251	+300	-120
1	13.417	-267	37.760	26.78	24.281	25.81	49.267	66.01
1	13.732	-281	38.133	29.76	24.577	28.32	49.567	64.81
2	10.1	+276	+326	-319	+260	-250	+265	-85
2	14.008	-227	38.459	32.95	24.837	30.82	49.832	63.96
2	20.1	+180	+268	-332	+217	-240	+223	-46
2	20.1	+180	+268	-332	+217	-240	+223	-46
3	2.1	+134	+210	-333	+174	-224	+179	-10
3	12.0	+86	+154	-333	+132	-209	+136	+21
3	22.0	+86	+95	-322	+89	-186	+91	+52
3	14.635	-256	39.186	46.15	25.449	39.41	50.461	64.13
3	32.0	+44	+43	-304	+51	-163	+52	+73
4	11.0	+8	-5	-172	+18	-141	+16	+91
4	14.679	-28	39.224	52.04	25.518	42.45	50.529	65.77
4	20.9	-55	-87	-256	-13	-115	-15	+102
4	30.9	-80	-122	-226	-36	-90	-60	+107
5	10.9	-100	-151	-193	-59	-67	-40	+108
5	14.659	-128	38.965	58.79	25.410	45.17	50.414	68.94
5	20.8	-115	-172	-115	-75	-41	-77	+103
5	30.8	-128	-193	-72	-88	-18	-87	+93
6	9.8	-136	-206	-28	-105	+29	-99	+68
6	19.8	-140	-212	+13	-108	+50	-99	+51
6	29.7	-142	-217	+58	-110	+70	-99	+35
7	9.7	-136	-209	+99	-106	+88	-92	+14
7	19.7	-127	-197	+134	-99	+102	-84	-6
7	29.7	-114	-179	+170	-88	+115	-73	-26
8	8.6	-91	-147	+197	-70	+120	-55	-49
8	18.6	-85	-112	+217	-49	+122	-36	-70
8	28.6	-32	-67	+231	-21	+119	-12	-94
9	7.5	+10	-12	+233	+14	+108	+18	-118
9	17.5	+53	+46	+227	+50	+92	+50	-141
9	27.5	+102	+110	+213	+93	+71	+90	-166
10	7.5	+156	+179	+185	+140	+41	+132	-189
10	17.4	+207	+242	+151	+186	+10	+174	-207
10	27.4	+258	+308	+109	+232	-28	+218	-225
11	6.4	+305	+364	+57	+275	-68	+259	-237
11	16.4	+342	+410	+6	+309	-105	+293	-243
11	26.3	+373	+448	-51	+339	-144	+325	-246
12	6.3	+390	+467	-107	+356	-178	+344	-237
12	16.3	+396	+472	-157	+363	-206	+354	-225
12	26.2	+390	+466	-208	+360	-229	+354	-204
12	36.2	+370	+440	-248	+343	-244	+341	-175
12	15.004	-103	38.998	39.98	26.030	37.78	51.065	53.24
12	16.3	-150	39.465	41.05	26.386	39.56	51.409	50.87
12	26.2	-189	39.937	42.62	26.749	41.62	51.763	48.62
12	36.2	-254	40.403	44.70	27.109	43.91	52.117	46.58
Mean Place	14.894	67.51	39.304	50.23	25.725	40.87	50.367	63.44
sec δ, tan δ	+1.230	-0.716	+1.577	-1.219	+1.083	-0.415	+1.045	+0.304
dα(ψ), dδ(ψ)	+0.062	-0.40	+0.062	-0.40	+0.062	-0.40	+0.061	-0.40
dα(ε), dδ(ε)	-0.048	-0.02	-0.081	-0.03	-0.028	-0.04	+0.020	-0.04
Dble. Trans.	March 24		March 24		March 25		March 25	

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	454		1314		455		456	
	Bradley 1634 (Camelopardi)		Bradley 1636 (Ursae Majoris)		δ Crucis		δ Ursae Majoris	
Mag.Spect.	5.12	A5	6.26	K0	3.08	B3	3.44	A2
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	12 11	+77 40	12 14	+53 30	12 14	-58 39	12 14	+57 05
1 <sup>d</sup>	-8.7	34 44.2 <sup>s</sup> +1148	01 80.9 <sup>s</sup> +488	32 28 <sup>"</sup> -204	22 13.4 <sup>s</sup> +548	53.89 <sup>"</sup> -112	44 14.1 <sup>s</sup> +523	83.76 <sup>"</sup> -199
1	1.2	35 61.5 +1173	02 30.6 +497	30.74 -154	22 67.7 +525	55.55 -166	44 67.4 +533	82.31 -145
1	11.2	36 78.9 +1174	02 80.1 +495	29.75 -99	23 20.2 +525	57.70 -215	45 20.5 +531	81.42 -89
1	21.2	37 91.2 +1123	03 27.2 +471	29.37 -38	23 69.2 +490	60.31 -261	45 71.2 +507	81.15 -27
1	31.1	38 94.8 +1036	03 70.7 +435	29.57 +20	24 13.3 +441	63.25 -294	46 18.0 +468	81.48 +33
2	10.1	39 86.9 +921	04 09.5 +388	30.33 +76	24 51.9 +386	66.47 -322	46 59.7 +417	82.38 +90
2	20.1	40 63.2 +763	04 42.0 +325	31.62 +129	24 83.8 +319	69.89 -342	46 94.7 +350	83.82 +144
3	2.1	41 22.2 +590	04 67.9 +259	33.34 +172	25 09.0 +252	73.40 -351	47 22.5 +278	85.68 +186
3	12.0	41 62.6 +404	04 86.9 +190	35.43 +209	25 27.6 +186	76.94 -354	47 42.8 +203	87.91 +223
3	22.0	41 82.5 +199	04 98.5 +116	37.78 +235	25 39.1 +115	80.43 -349	47 54.9 +121	90.40 +249
3	32.0	41 83.4 +9	05 03.5 +50	40.26 +248	25 44.5 +54	83.77 -334	47 59.8 +49	93.00 +260
4	11.0	41 65.7 -177	05 02.1 -14	42.80 +254	25 43.9 -6	86.95 -318	47 57.7 -21	95.64 +264
4	20.9	41 30.3 -354	04 94.9 -72	45.27 +247	25 37.6 -63	89.87 -292	47 49.0 -87	98.20 +256
4	30.9	40 80.7 -496	04 83.1 -118	47.56 +229	25 26.6 -110	92.49 -262	47 35.3 -137	100.56 +236
5	10.9	40 18.1 -626	04 67.2 -159	49.63 +207	25 11.1 -155	94.79 -230	47 16.9 -184	102.67 +211
5	20.8	39 45.3 -728	04 48.0 -192	51.36 +173	24 91.6 -195	96.67 -188	46 95.0 -219	104.43 +176
5	30.8	38 66.1 -792	04 27.0 -210	52.72 +136	24 69.2 -224	98.15 -148	46 70.9 -241	105.78 +135
6	9.8	37 81.8 -843	04 04.3 -227	53.68 +96	24 43.9 -253	99.18 -103	46 45.0 -259	106.72 +94
6	19.8	36 95.7 -861	03 81.0 -233	54.18 +50	24 16.6 -273	99.72 -54	46 18.4 -266	107.17 +45
6	29.7	36 10.7 -860	03 58.0 -230	54.24 +6	23 88.4 -282	99.82 -10	45 92.0 -264	107.16 -1
7	9.7	35 27.9 -828	03 35.4 -226	53.84 -40	23 59.4 -290	99.42 +40	45 66.2 -258	106.68 -48
7	19.7	34 50.7 -772	03 14.3 -211	52.97 -87	23 31.1 -283	98.56 +86	45 42.1 -241	105.70 -98
7	29.7	33 80.2 -705	02 95.0 -203	51.69 -126	23 04.2 -269	97.28 +126	45 20.1 -220	104.31 -139
8	8.6	33 17.8 -624	02 78.0 -248	50.00 -169	22 79.6 -246	95.59 +169	45 00.7 -194	102.48 -183
8	18.6	32 66.1 -517	02 64.3 -137	47.90 -210	22 58.7 -209	93.57 +202	44 84.9 -158	100.25 -223
8	28.6	32 25.4 -407	02 53.9 -104	45.49 -241	22 42.2 -165	91.30 +227	44 72.9 -120	97.70 -255
9	7.5	31 97.1 -283	02 47.6 -63	42.74 -375	22 31.3 -109	88.81 +249	44 65.4 -75	94.82 -288
9	17.5	31 83.3 -138	02 46.3 -13	39.74 -369	22 27.2 -41	86.25 +256	44 63.3 -21	91.68 -314
9	27.5	31 83.2 -1	02 46.3 +36	36.54 -320	22 30.1 +29	83.71 +254	44 66.6 +33	88.35 -333
10	7.5	31 98.6 +154	02 59.2 +93	33.16 -338	22 41.0 +109	81.26 +245	44 76.2 +96	84.86 -349
10	17.4	32 30.1 +315	02 74.8 +156	29.71 -345	22 60.2 +192	79.07 +219	44 92.5 +163	81.31 -355
10	27.4	32 76.6 +465	02 96.3 +215	26.24 -347	22 87.2 +270	77.19 +188	45 15.2 +227	77.76 -365
11	6.4	33 39.2 +626	03 24.3 +280	22.80 -344	23 22.1 +349	75.71 +148	45 15.2 +298	74.26 -350
11	16.4	34 16.3 +771	03 58.2 +339	19.53 -327	23 63.8 +417	74.76 +95	45 45.0 +361	70.96 -330
11	26.3	35 06.2 +899	03 97.3 +391	16.48 -305	24 11.1 +473	74.33 +43	46 22.8 +417	67.89 -307
12	6.3	36 08.0 +1018	04 41.2 +439	13.73 -275	24 63.0 +519	74.48 -15	46 69.7 +469	65.16 -273
12	16.3	37 18.0 +1100	04 88.4 +472	11.40 -233	25 17.3 +543	75.25 -77	47 20.2 +505	62.87 -229
12	26.2	38 33.2 +1176	05 37.5 +491	09.52 -185	25 72.4 +551	76.56 -131	47 72.9 +527	61.05 -182
12	36.2	39 50.8 +1147	05 87.4 +485	08.17 -76	26 26.9 +516	78.42 -235	48 26.4 +535	59.80 -125
Mean Place	34.632	88.48	03.467	34.96	25.350	85.70	45.716	87.23
sec δ, tan δ	+4.691	+4.583	+1.682	+1.352	+1.923	-1.643	+1.841	+1.546
dα(ψ), dδ(ψ)	+0.055	-0.40	+0.059	-0.40	+0.064	-0.40	+0.059	-0.40
dα(ε), dδ(ε)	+0.305	-0.05	+0.090	-0.06	-0.109	-0.06	+0.103	-0.06
Dbble.Trans.	March 25		March 26		March 26		March 26	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	457		458		459		1315	
	γ Corvi		2 Canum Venat.*		β Chamaeleontis		14 Virginis	
Mag.Spect.	2.78	B8	5.92	K5	4.38	B5	7.03	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	12 15	- 17 27	12 15	+ 40 43	12 17	- 79 13	12 18	- 8 50
1 <sup>d</sup>	04.151 <sup>s</sup> + 352	41.18 - 201	25.201 <sup>s</sup> + 410	67.34 - 222	26.545 <sup>s</sup> + 1309	39.89 - 53	36.030 <sup>s</sup> + 344	05.87 - 213
1	04.503 + 352	43.38 - 220	25.616 + 415	65.54 - 180	27.841 + 1296	41.04 - 115	36.376 + 346	08.09 - 222
1	04.848 + 345	45.71 - 233	26.028 + 412	64.19 - 135	29.096 + 1255	42.78 - 174	36.714 + 338	10.36 - 227
1	05.172 + 324	48.11 - 240	26.421 + 393	63.37 - 82	30.263 + 1167	45.10 - 232	37.034 + 320	12.59 - 223
1	05.466 + 294	50.47 - 236	26.782 + 361	63.07 - 30	31.311 + 1048	47.86 - 276	37.326 + 292	14.71 - 212
2	05.727 + 261	52.78 - 231	27.105 + 323	63.28 + 21	32.226 + 915	51.04 - 318	37.586 + 260	16.69 - 198
2	05.946 + 219	54.95 - 217	27.377 + 272	64.00 + 72	32.976 + 750	54.54 - 350	37.806 + 220	18.46 - 177
3	06.123 + 177	56.94 - 199	27.595 + 218	65.14 + 114	33.557 + 581	58.24 - 370	37.985 + 179	20.01 - 155
3	06.260 + 324	58.74 - 180	27.759 + 164	66.65 + 151	33.967 + 410	62.09 - 385	38.124 + 139	21.32 - 131
3	06.355 + 96	60.31 - 157	27.866 + 107	68.45 + 180	34.190 + 223	65.99 - 390	38.222 + 98	22.38 - 106
3	06.413 + 58	61.65 - 134	27.921 + 55	70.42 + 197	34.243 + 53	69.83 - 384	38.284 + 62	23.20 - 82
4	06.438 + 25	62.76 - 111	27.928 + 7	72.51 + 209	34.127 - 116	73.59 - 376	38.314 + 30	23.80 - 60
4	06.433 - 5	63.63 - 87	27.891 - 37	74.59 + 208	33.841 - 286	77.14 - 355	38.314 + 0	24.18 - 38
4	06.405 - 28	64.29 - 66	27.820 - 71	76.58 + 199	33.413 - 428	80.42 - 328	38.291 - 23	24.38 - 20
5	06.355 - 50	64.72 - 43	27.718 - 102	78.42 + 184	32.840 - 573	83.39 - 297	38.248 - 43	24.41 - 3
5	06.288 - 67	64.94 - 22	27.593 - 125	80.03 + 161	32.141 - 699	85.95 - 256	38.187 - 61	24.27 + 14
5	06.209 - 79	64.97 - 3	27.454 - 139	81.35 + 132	31.342 - 799	88.08 - 213	38.115 - 72	24.02 + 25
6	06.119 - 90	64.80 + 17	27.302 - 152	82.36 + 101	30.449 - 893	89.73 - 165	38.033 - 82	23.65 + 37
6	06.021 - 98	64.45 + 35	27.145 - 157	83.00 + 64	29.491 - 958	90.84 - 111	37.943 - 90	23.17 + 48
6	05.921 - 100	63.94 + 51	26.989 - 156	83.29 + 29	28.499 - 992	91.42 - 58	37.851 - 92	22.62 + 56
7	05.817 - 104	63.27 + 67	26.835 - 154	83.20 - 9	27.485 - 1014	91.44 - 2	37.755 - 96	21.99 + 63
7	05.717 - 100	62.48 + 79	26.691 - 144	82.71 - 49	26.494 - 991	90.89 + 55	37.663 - 92	21.32 + 67
7	05.623 - 94	61.59 + 89	26.559 - 132	81.87 - 84	25.550 - 944	89.83 + 106	37.576 - 87	20.63 + 69
8	05.538 - 85	60.61 + 98	26.442 - 117	80.67 - 120	24.678 - 872	88.26 + 157	37.498 - 78	19.94 + 69
8	05.470 - 68	59.61 + 100	26.349 - 93	79.10 - 157	23.926 - 752	86.22 + 204	37.434 - 64	19.29 + 65
8	05.421 - 49	58.63 + 98	26.281 - 68	77.24 - 186	23.309 - 617	83.83 + 239	37.389 - 45	18.71 + 58
9	05.398 - 23	57.70 + 93	26.244 - 37	75.06 - 218	22.858 - 451	81.12 + 271	37.368 - 21	18.23 + 48
9	05.408 + 10	56.91 + 79	26.244 + 0	72.61 - 245	22.608 - 250	78.22 + 290	37.378 + 10	17.93 + 30
9	05.453 + 45	56.28 + 63	26.285 + 41	69.94 - 267	22.558 - 50	75.25 + 297	37.420 + 42	17.85 + 8
10	05.538 + 85	55.86 + 42	26.371 + 86	67.05 - 289	22.730 + 172	72.27 + 298	37.498 + 78	17.91 - 6
10	05.669 + 131	55.72 + 14	26.508 + 137	64.03 - 302	23.130 + 400	69.48 + 279	37.625 + 127	18.28 - 37
10	05.845 + 176	55.90 - 18	26.694 + 186	60.93 - 310	23.736 + 606	66.94 + 254	37.793 + 168	18.94 - 66
11	06.067 + 222	56.42 - 52	26.934 + 240	57.79 - 314	24.550 + 814	64.77 + 217	38.005 + 212	19.92 - 98
11	06.330 + 263	57.31 - 89	27.222 + 288	54.71 - 308	25.539 + 989	63.11 + 166	38.259 + 254	21.21 - 129
11	06.629 + 299	58.54 - 123	27.554 + 332	51.76 - 295	26.666 + 1127	61.97 + 114	38.547 + 288	22.78 - 157
12	06.958 + 329	60.12 - 158	27.924 + 370	49.00 - 276	27.907 + 1241	61.45 + 52	38.865 + 318	24.61 - 183
12	07.305 + 347	61.98 - 186	28.321 + 397	46.56 - 244	29.206 + 1299	61.58 - 13	39.203 + 338	26.64 - 203
12	07.660 + 355	64.07 - 209	28.734 + 413	44.47 - 209	30.524 + 1318	62.33 - 75	39.550 + 347	28.81 - 217
12	08.014 + 354	66.34 - 227	29.151 + 417	42.82 - 165	31.827 + 1303	63.72 - 139	39.897 + 347	31.08 - 227
	08.014 + 338	66.34 - 237	29.151 + 405	42.82 - 114	31.827 + 1232	63.72 - 198	39.897 + 333	31.08 - 226
Mean Place	06.621	61.39	27.092	66.92	32.036	74.26	38.444	22.92
sec δ, tan δ	+1.048	-0.315	+1.320	+0.861	+5.355	-5.261	+1.012	-0.156
dα(w), dδ(w)	+0.062	-0.40	+0.060	-0.40	+0.072	-0.40	+0.061	-0.40
dα(ε), dδ(ε)	-0.021	-0.07	+0.057	-0.07	-0.350	-0.08	-0.010	-0.08
Dbles. Trans.	March 26		March 26		March 27		March 27	

AT UPPER TRANSIT AT GREENWICH

No.	1316		460		1317		1318	
	3 Canum Venat.		η Virginis		16 Virginis		12 Comae Berenices	
Mag.Spect.	5.56	K2	4.00	A0	5.10	K0	4.78	F5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	12 19	+49 03	12 19	- 0 35	12 19	+ 3 23	12 21	+ 25 54
1 -8.7	07.230 +452	30.60 -216	10.552 +341	16.57 -222	37.543 +340	28.13 -226	47.571 +363	80.16 -235
1 1.2	07.691 +461	28.92 -168	10.895 +343	18.80 -223	37.886 +343	25.90 -223	47.939 +368	78.09 -207
1 11.2	08.150 +459	27.75 -117	11.232 +337	20.98 -218	38.223 +337	23.77 -213	48.304 +365	76.35 -174
1 21.2	08.590 +440	27.17 -58	11.551 +319	23.04 -206	38.543 +320	21.81 -196	48.651 +347	75.00 -135
1 31.2	08.996 +406	27.15 -2	11.842 +291	24.90 -186	38.835 +292	20.08 -173	48.972 +321	74.08 -92
2 10.1	09.360 +364	27.68 +53	12.102 +260	26.55 -165	39.096 +261	18.59 -149	49.259 +287	73.60 -48
2 20.1	09.667 +307	28.75 +107	12.323 +221	27.93 -138	39.318 +222	17.41 -118	49.503 +244	73.56 -4
3 2.1	09.915 +248	30.25 +150	12.502 +179	29.03 -110	39.499 +181	16.53 -88	49.702 +199	73.91 +35
3 12.0	10.100 +185	32.14 +189	12.642 +140	29.86 -83	39.639 +140	15.93 -60	49.856 +154	74.62 +71
3 22.0	10.218 +118	34.30 +216	12.741 +99	30.41 -55	39.737 +98	15.62 -31	49.962 +106	75.65 +103
3 32.0	10.277 +59	36.62 +232	12.803 +62	30.73 -32	39.800 +63	15.55 -7	50.025 +63	76.89 +124
4 11.0	10.278 +1	39.03 +241	12.833 +30	30.83 -10	39.829 +29	15.68 +13	50.050 +25	78.30 +141
4 20.9	10.226 -52	41.41 +238	12.832 -1	30.74 +9	39.828 -1	16.00 +32	50.039 -11	79.79 +149
4 30.9	10.133 -93	43.63 +222	12.810 -22	30.50 +24	39.804 -24	16.44 +44	50.000 -39	81.28 +149
5 10.9	10.003 -130	45.68 +205	12.766 -44	30.14 +36	39.759 -45	16.98 +54	49.937 -63	82.74 +146
5 20.9	09.844 -159	47.42 +174	12.706 -60	29.68 +46	39.698 -61	17.59 +61	49.854 -83	84.07 +133
5 30.8	09.666 -178	48.82 +140	12.635 -71	29.17 +51	39.626 -72	18.21 +62	49.759 -95	85.24 +117
6 9.8	09.473 -193	49.86 +104	12.553 -82	28.61 +56	39.543 -83	18.86 +65	49.653 -106	86.23 +99
6 19.8	09.273 -200	50.46 +60	12.466 -87	28.03 +58	39.454 -89	19.48 +62	49.540 -113	86.98 +75
6 29.7	09.073 -200	50.65 +19	12.376 -90	27.45 +58	39.363 -91	20.06 +58	49.427 -113	87.48 +50
7 9.7	08.876 -197	50.41 -24	12.283 -93	26.87 +58	39.270 -93	20.60 +54	49.312 -115	87.72 +24
7 19.7	08.690 -186	49.72 -69	12.194 -89	26.34 +53	39.181 -89	21.06 +46	49.203 -109	87.68 -4
7 29.7	08.520 -170	48.64 -108	12.110 -84	25.86 +48	39.097 -84	21.43 +37	49.102 -101	87.37 -31
8 8.6	08.368 -152	47.14 -150	12.035 -75	25.44 +42	39.021 -76	21.71 +28	49.011 -91	86.79 -58
8 18.6	08.243 -125	45.26 -188	11.975 -60	25.14 +30	38.961 -60	21.84 +13	48.938 -73	85.91 -88
8 28.6	08.149 -94	43.05 -221	11.932 -43	24.95 +19	38.918 -43	21.82 -2	48.884 -54	84.77 -114
9 7.6	08.089 -186	40.51 -254	11.912 -20	24.92 +3	38.898 -20	21.63 -19	48.855 -29	83.36 -141
9 17.5	08.075 -14	37.70 -281	11.924 +12	25.09 -17	38.909 +11	21.24 -39	48.858 +3	81.68 -168
9 27.5	08.105 +30	34.67 -303	11.978 +54	25.23 -14	38.948 +39	20.72 -52	48.894 +36	79.76 -192
10 7.5	08.187 +82	31.45 -322	12.041 +63	26.04 -81	39.025 +77	19.80 -92	48.971 +77	77.60 -216
10 17.4	08.327 +140	28.12 -333	12.165 +124	26.93 -89	39.146 +121	18.67 -113	49.092 +121	75.24 -236
10 27.4	08.523 +196	24.75 -337	12.330 +165	28.07 -114	39.309 +163	17.30 -137	49.257 +165	72.72 -252
11 6.4	08.778 +255	21.37 -338	12.538 +208	29.49 -142	39.516 +207	15.68 -162	49.470 +213	70.06 -266
11 16.4	09.089 +311	18.13 -324	12.787 +249	31.15 -166	39.763 +247	13.84 -184	49.725 +255	67.35 -271
11 26.3	09.449 +360	15.06 -307	13.070 +283	33.03 -188	40.045 +282	11.81 -203	50.020 +295	64.65 -270
12 6.3	09.855 +406	12.25 -281	13.385 +315	35.10 -207	40.359 +314	09.64 -217	50.349 +329	62.00 -265
12 16.3	10.291 +436	09.83 -242	13.718 +333	37.29 -219	40.691 +332	07.39 -225	50.702 +353	59.52 -248
12 26.3	10.747 +456	07.82 -201	14.062 +344	39.53 -224	41.035 +344	05.12 -227	51.068 +366	57.25 -227
12 36.2	11.210 +463	06.31 -151	14.406 +344	41.76 -223	41.379 +344	02.91 -221	51.438 +370	55.28 -197
	+451	-94	+332	-214	+332	-207	+359	-159
Mean Place	09.002	32.44	12.889	30.62	39.838	15.51	49.668	75.49
sec δ, tan δ	+1.526	+1.153	+1.000	-0.010	+1.002	+0.059	+1.112	+0.486
dα(ψ), dδ(ψ)	+0.059	-0.40	+0.061	-0.40	+0.061	-0.40	+0.060	-0.40
dα(ε), dδ(ε)	+0.077	-0.08	-0.001	-0.08	+0.004	-0.09	+0.032	-0.10
Dble.Trans.	March 27		March 27		March 27		March 28	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1319		461		462		463										
	322 G. Hydrae		6 Canum Venat.		α Crucis A*		323 G. Hydrae										
Mag. Spect.	6.34	K0	5.22	K0	1.58	B1	5.68	A0									
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.									
	h m	° ′	h m	° ′	h m	° ′	h m	° ′									
	12 24	- 27 40	12 25	+ 39 05	12 25	- 63 00	12 26	- 32 44									
1	-8.7	33 207	+ 370	04 61	-177	09 184	+ 398	36 85	-231	46 849	+ 611	55 45	-86	06 082	+ 384	54 41	-165
1	1.2	33 578	+ 371	06 67	-206	09 591	+ 407	34 93	-192	47 459	+ 610	56 86	-141	06 467	+ 385	56 39	-198
1	11.2	33 943	+ 365	08 97	-230	09 996	+ 405	33 45	-148	48 054	+ 595	58 81	-195	06 844	+ 377	58 67	-228
1	21.2	34 286	+ 343	11 45	-248	10 385	+ 389	32 49	-96	48 612	+ 558	61 25	-244	07 200	+ 356	61 17	-250
1	31.2	34 600	+ 314	14 01	-256	10 744	+ 369	32 04	-45	49 119	+ 507	64 07	-282	07 526	+ 326	63 81	-264
2	10.1	34 880	+ 280	16 61	-260	11 068	+ 324	32 11	+ 7	49 569	+ 450	67 22	-315	07 816	+ 290	66 53	-272
2	20.1	35 118	+ 238	19 16	-255	11 343	+ 275	32 69	+ 58	49 946	+ 377	70 61	-339	08 062	+ 246	69 26	-273
3	2.1	35 312	+ 194	21 61	-245	11 568	+ 225	33 71	+ 102	50 249	+ 303	74 13	-352	08 264	+ 202	71 92	-266
3	12.0	35 464	+ 152	23 93	-232	11 740	+ 172	35 11	+ 140	50 479	+ 230	77 73	-360	08 422	+ 158	74 48	-256
3	22.0	35 572	+ 108	26 07	-214	11 857	+ 117	36 82	+ 171	50 631	+ 152	81 32	-359	08 534	+ 112	76 87	-239
3	32.0	35 642	+ 70	27 99	-192	11 923	+ 66	38 72	+ 190	50 711	+ 80	84 80	-348	08 607	+ 73	79 07	-220
4	11.0	35 677	+ 35	29 71	-172	11 943	+ 20	40 75	+ 203	50 723	+ 12	88 16	-336	08 642	+ 35	81 07	-200
4	20.9	35 678	+ 1	31 16	-145	11 919	- 24	42 82	+ 207	50 667	- 56	91 28	-312	08 642	+ 0	82 81	-174
4	30.9	35 654	- 24	32 38	-122	11 861	- 58	44 80	+ 198	50 555	- 112	94 12	-284	08 615	- 27	84 29	-148
5	10.9	35 605	- 49	33 34	- 96	11 772	- 89	46 67	+ 187	50 388	- 167	96 65	-253	08 562	- 53	85 51	-122
5	20.9	35 535	- 70	34 02	- 68	11 659	- 113	48 32	+ 165	50 172	- 216	98 79	-214	08 486	- 76	86 42	- 91
5	30.8	35 451	- 84	34 45	- 43	11 530	- 129	49 70	+ 138	49 917	- 255	100 52	-173	08 393	- 93	87 05	- 63
6	9.8	35 351	- 100	34 61	- 16	11 387	- 143	50 79	+ 109	49 624	- 293	101 80	-128	08 284	- 109	87 38	- 33
6	19.8	35 241	- 110	34 50	+ 11	11 237	- 150	51 53	+ 74	49 305	- 319	102 59	- 79	08 163	- 121	87 40	- 2
6	29.7	35 126	- 115	34 16	+ 34	11 086	- 151	51 91	+ 38	48 970	- 335	102 91	- 32	08 036	- 127	87 13	+ 27
7	9.7	35 005	- 121	33 55	+ 61	10 934	- 152	51 94	+ 3	48 623	- 347	102 72	+ 19	07 902	- 134	86 57	+ 56
7	19.7	34 885	- 120	32 73	+ 82	10 790	- 144	51 57	- 37	48 279	- 344	102 04	+ 68	07 769	- 133	85 74	+ 83
7	29.7	34 771	- 114	31 71	+ 102	10 656	- 134	50 85	- 72	47 948	- 331	100 91	+ 113	07 642	- 127	84 68	+ 106
8	8.6	34 665	- 106	30 52	+ 119	10 536	- 120	49 77	- 108	47 640	- 308	99 34	+ 157	07 523	- 119	83 39	+ 129
8	18.6	34 576	- 89	29 22	+ 130	10 436	- 100	48 33	- 144	47 373	- 267	97 38	+ 196	07 423	- 100	81 95	+ 144
8	28.6	34 508	- 68	27 86	+ 136	10 360	- 76	46 58	- 175	47 155	- 218	95 13	+ 225	07 345	- 78	80 41	+ 154
9	7.6	34 467	- 41	26 47	+ 139	10 312	- 48	44 51	- 207	46 999	- 156	92 63	+ 250	07 296	- 49	78 81	+ 160
9	17.5	34 462	- 5	25 16	+ 131	10 302	- 10	42 15	- 236	46 920	- 79	90 01	+ 262	07 286	- 10	77 26	+ 155
9	27.5	34 496	+ 34	23 97	+ 119	10 329	+ 27	39 57	- 258	46 921	+ 1	87 35	+ 266	07 316	+ 30	75 81	+ 145
10	7.5	34 574	+ 78	22 96	+ 101	10 401	+ 72	36 75	- 282	47 014	+ 93	84 75	+ 260	07 393	+ 77	74 52	+ 129
10	17.4	34 702	+ 128	22 22	+ 74	10 524	+ 123	33 78	- 297	47 202	+ 188	82 36	+ 239	07 523	+ 130	73 50	+ 102
10	27.4	34 878	+ 176	21 79	+ 43	10 695	+ 171	30 71	- 307	47 481	+ 279	80 25	+ 211	07 704	+ 181	72 79	+ 71
11	6.4	35 104	+ 226	21 73	+ 6	10 919	+ 224	27 57	- 314	47 851	+ 370	78 52	+ 173	07 937	+ 233	72 45	+ 34
11	16.4	35 376	+ 272	22 09	- 36	11 193	+ 274	24 48	- 309	48 302	+ 451	77 29	+ 123	08 219	+ 282	72 55	- 10
11	26.3	35 686	+ 310	22 84	- 75	11 510	+ 317	21 49	- 299	48 819	+ 517	76 58	+ 71	08 540	+ 321	73 07	- 52
12	6.3	36 030	+ 344	24 00	- 116	11 868	+ 358	18 68	- 281	49 390	+ 571	76 45	+ 13	08 897	+ 357	74 04	- 97
12	16.3	36 394	+ 364	25 56	- 156	12 253	+ 385	16 15	- 253	49 994	+ 604	76 94	- 49	09 274	+ 377	75 44	- 140
12	26.3	36 768	+ 374	27 43	- 187	12 655	+ 402	13 96	- 219	50 610	+ 616	78 00	- 106	09 662	+ 388	77 21	- 177
12	36.2	37 142	+ 374	29 61	- 218	13 064	+ 409	12 19	- 177	51 224	+ 614	79 63	- 163	10 049	+ 387	79 33	- 212
		37 142	+ 359	29 61	- 238		+ 399		- 128		+ 586		- 216		+ 372		- 237
Mean Place	35.882	27.89		11.135	36.28	50.494	87.56	08.846	79.22								
sec δ, tan δ	+1.129	-0.524		+1.288	+0.812	+2.205	-1.965	+1.189	-0.643								
da(ψ), dδ(ψ)	+0.063	-0.40		+0.059	-0.40	+0.067	-0.40	+0.063	-0.40								
da(ε), dδ(ε)	-0.035	-0.11		+0.054	-0.11	-0.130	-0.11	-0.043	-0.11								
Dble. Trans.	March 29		March 29		March 29		March 29										



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	464		1320		466		465	
	σ Centauri		122 G. Centauri		20 Comae Berenices		δ Corvi	
Mag. Spect.	4.16	B3	5.60	B8	5.72	A2	3.11	A0
U.T.	R.A.		Dec.		R.A.		Dec.	
	h	m	h	m	h	m	h	m
	12	27	12	27	12	29	12	29
	-50 08		-38 57		+20 57		-16 26	
1 <sup>d</sup>	-8.7	15 199	52 48	36 293	33 44	00 401	07 287	06 03
1 <sup>s</sup>	1.2	15 666	54 15	36 700	35 31	00 759	07 639	08 18
1	11.2	16 124	56 27	37 098	37 54	01 116	07 986	10 46
1	21.2	16 555	58 79	37 475	40 06	01 456	08 315	12 80
1	31.2	16 947	61 59	37 818	42 77	01 771	08 617	15 10
2	10.1	17 296	64 63	38 124	45 62	02 055	08 887	17 34
2	20.1	17 591	67 82	38 385	48 53	02 298	09 119	19 44
3	2.1	17 832	71 05	38 598	51 42	02 498	09 309	21 37
3	12.0	18 018	74 30	38 764	54 25	02 656	09 460	23 10
3	22.0	18 147	77 47	38 883	56 94	02 768	09 570	24 61
3	32.0	18 225	80 49	38 958	59 46	02 839	09 644	25 89
4	11.0	18 254	83 35	38 994	61 79	02 874	09 684	26 95
4	20.9	18 237	85 96	38 991	63 85	02 874	09 693	27 77
4	30.9	18 182	88 29	38 958	65 66	02 848	09 678	28 39
5	10.9	18 090	90 31	38 896	67 18	02 797	09 641	28 80
5	20.9	17 965	91 97	38 809	68 36	02 727	09 584	29 00
5	30.8	17 815	93 26	38 702	69 24	02 644	09 514	29 04
6	9.8	17 640	94 16	38 577	69 78	02 548	09 431	28 89
6	19.8	17 448	94 62	38 438	69 95	02 446	09 338	28 57
6	29.7	17 246	94 68	38 291	69 80	02 341	09 240	28 11
7	9.7	17 033	94 31	38 137	69 31	02 233	09 137	27 51
7	19.7	16 823	93 52	37 984	68 48	02 129	09 035	26 78
7	29.7	16 620	92 37	37 836	67 38	02 031	08 937	25 97
8	8.6	16 430	90 86	37 698	66 00	01 941	08 845	25 09
8	18.6	16 267	89 06	37 580	64 41	01 867	08 768	24 18
8	28.6	16 136	87 03	37 487	62 68	01 810	08 709	23 29
9	7.6	16 045	84 83	37 426	60 85	01 777	08 674	22 45
9	17.5	16 008	82 58	37 407	59 02	01 774	08 671	21 74
9	27.5	16 026	80 35	37 432	57 27	01 803	08 702	21 18
10	7.5	16 107	78 22	37 510	55 66	01 872	08 772	20 83
10	17.4	16 258	76 33	37 644	54 31	01 984	08 889	20 74
10	27.4	16 473	74 74	37 833	53 26	02 139	09 051	20 94
11	6.4	16 756	73 54	38 078	52 60	02 340	09 260	21 48
11	16.4	17 100	72 82	38 375	52 38	02 585	09 512	22 37
11	26.3	17 492	72 59	38 715	52 62	02 869	09 801	23 59
12	6.3	17 928	72 90	39 092	53 35	03 187	10 123	25 14
12	16.3	18 388	73 77	39 491	54 55	03 529	10 465	26 97
12	26.3	18 860	75 13	39 900	56 18	03 885	10 818	29 01
12	36.2	19 331	77 00	40 310	58 21	04 245	11 173	31 24
Mean Place	18.344	81.95	39.180	60.01	02.587	74.63	09.848	25.42
sec δ, tan δ	+1.561	-1.198	+1.286	-0.809	+1.071	+0.383	+1.043	-0.295
da(ψ), dδ(ψ)	+0.065	-0.39	+0.064	-0.39	+0.060	-0.39	+0.062	-0.39
da(ε), dδ(ε)	-0.079	-0.12	-0.054	-0.12	+0.025	-0.13	-0.020	-0.13
Dbles. Trans.	March 29		March 29		March 30		March 30	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	467		468		469		1321	
	74 Ursae Majoris		γ Crucis		γ Muscae		35 G. Corvi	
Mag. Spect.	5.44	A5	1.61	M3	4.04	B5	5.76	G5
U.T.	R.A.		Dec.		R.A.		Dec.	
	h	m	h	m	h	m	h	m
	12 29		12 30		12 31		12 32	
	+ 58 28		- 57 01		- 72 02		- 12 45	
1 <sup>d</sup>	18.105	43.71	21.252	44.91	34.366	57.76	49.599	03.76
1 <sup>s</sup>	+ 528	" -214	+ 529	" -97	+ 843	" -53	+ 345	" -202
1	-8.7	-161	+ 530	-150	+ 843	-113	+ 349	-216
1	1.2	-105	+ 519	-200	+ 827	-170	+ 344	-226
1	11.2	41.05	22.301	48.41	36.036	60.59	50.292	08.18
1	19.195	-40	+ 490	-245	+ 778	-225	+ 328	-226
1	21.2	40.65	22.791	50.86	36.814	62.84	50.620	10.44
1	19.723	+ 20	+ 447	-279	+ 710	-269	+ 302	-220
1	31.2	40.85	23.238	53.65	37.524	65.53	50.922	12.64
2	10.1	+ 80	+ 398	-308	+ 631	-308	+ 272	-211
2	20.1	+ 136	+ 337	-329	+ 533	-340	+ 233	-193
2	20.1	43.01	23.973	60.02	38.688	72.01	51.427	16.68
3	2.1	+ 182	+ 275	-339	+ 429	-358	+ 193	-173
3	2.1	44.83	24.248	63.41	39.117	75.59	51.620	18.41
3	12.0	+ 221	+ 213	-345	+ 326	-377	+ 154	-153
3	12.0	47.04	24.461	66.86	39.443	79.32	51.774	19.94
3	22.0	+ 250	+ 146	-341	+ 213	-313	+ 114	-128
3	22.0	49.54	24.607	70.27	39.656	83.09	51.888	21.22
3	32.0	+ 265	+ 87	-329	+ 110	-371	+ 77	-105
4	11.0	+ 272	+ 31	-316	+ 7	-363	+ 45	-83
4	11.0	52.19	24.725	76.72	39.773	90.43	52.010	23.10
4	20.9	+ 265	-26	-291	-95	-342	+ 14	-61
4	20.9	57.56	24.699	79.63	39.678	93.85	52.024	23.71
4	30.9	+ 248	-72	-264	-182	-317	-10	-41
4	30.9	60.04	24.627	82.27	39.496	97.02	52.014	24.12
5	10.9	+ 226	-118	-234	-269	-288	+ 33	-23
5	10.9	62.30	24.509	84.61	39.227	99.90	51.981	24.35
5	20.9	+ 191	-158	-195	-348	-248	-52	-5
5	20.9	64.21	24.351	86.56	38.879	102.38	51.929	24.40
5	30.8	+ 151	-190	-158	-410	-207	-65	+ 10
5	30.8	65.72	24.161	88.14	38.469	104.45	51.864	24.30
6	9.8	+ 110	-221	-115	-472	-162	-78	+ 25
6	9.8	66.82	23.940	89.29	37.997	106.07	51.786	24.05
6	19.8	+ 61	-243	-68	-515	-110	-88	+ 39
6	19.8	67.43	23.697	89.97	37.482	107.17	51.698	23.66
6	29.7	+ 14	-258	-25	-544	-60	-94	+ 48
6	29.7	67.57	23.439	90.22	36.938	107.77	51.604	23.18
7	9.7	-34	-270	+ 23	-564	-6	-99	+ 60
7	9.7	67.23	23.169	89.99	36.374	107.83	51.505	22.58
7	19.7	-84	-268	+ 69	-561	+ 49	-99	+ 68
7	19.7	66.39	22.901	89.30	35.813	107.34	51.406	21.90
7	29.7	-129	-260	+ 110	-542	+ 98	-96	+ 74
7	29.7	65.10	22.641	88.20	35.271	106.36	51.310	21.16
8	8.6	-174	-243	+ 151	-508	+ 147	-89	+ 77
8	8.6	63.36	22.398	86.69	34.763	104.89	51.221	20.39
8	18.6	-216	-212	+ 186	-446	+ 192	-76	+ 77
8	18.6	61.20	22.186	84.83	34.317	102.97	51.145	19.62
8	28.6	-173	-125	+ 212	-372	+ 226	-59	+ 73
8	28.6	58.70	22.013	82.71	33.945	100.71	51.086	18.89
9	7.6	-111	-125	+ 235	-280	+ 259	-36	+ 66
9	7.6	55.84	21.888	80.36	33.665	98.12	51.050	18.23
9	17.5	-313	-61	+ 245	-164	+ 276	-5	+ 51
9	17.5	52.71	21.827	77.91	33.501	95.36	51.045	17.72
9	27.5	-335	+ 5	+ 246	-45	+ 285	+ 28	+ 34
9	27.5	49.36	21.832	75.45	33.456	92.51	51.073	17.38
10	7.5	-353	+ 80	+ 240	+ 89	+ 285	+ 66	+ 13
10	7.5	45.83	21.912	73.05	33.545	89.66	51.139	17.25
10	17.4	+ 134	+ 161	+ 217	+ 230	+ 268	+ 112	-10
10	17.4	42.21	22.073	70.88	33.775	86.98	51.251	17.35
10	27.4	-363	+ 237	+ 190	+ 360	+ 244	+ 157	-40
10	27.4	38.58	22.310	68.98	34.135	84.54	51.408	17.75
11	6.4	-360	+ 316	+ 152	+ 493	+ 208	+ 203	-73
11	6.4	34.98	22.626	67.46	34.628	82.46	51.611	18.48
11	16.4	-342	+ 385	+ 103	+ 610	+ 160	+ 245	-106
11	16.4	31.56	23.011	66.43	35.238	80.86	51.856	19.54
11	26.3	-320	+ 443	+ 53	+ 703	+ 109	+ 283	-136
11	26.3	28.36	23.454	65.90	35.941	79.77	52.139	20.90
12	6.3	-288	+ 493	-4	+ 785	+ 50	+ 316	-165
12	6.3	25.48	23.947	65.94	36.726	79.27	52.455	22.55
12	16.3	-194	+ 521	-62	+ 831	-14	+ 337	-190
12	16.3	23.04	24.468	66.56	37.557	79.41	52.792	24.45
12	26.3	-197	+ 535	-116	+ 852	-74	+ 349	-208
12	26.3	21.07	25.003	67.72	38.409	80.15	53.141	26.53
12	36.2	-141	+ 534	-171	+ 851	-136	+ 352	-222
12	36.2	19.66	25.537	69.43	39.260	81.51	53.493	28.75
	+ 538	-79	+ 513	-218	+ 815	-193	+ 340	-227
Mean Place	19.709	47.89	24.690	75.85	38.969	90.85	52.152	21.62
sec δ, tan δ	+1.913	+1.631	+1.838	-1.542	+3.246	-3.088	+1.025	-0.226
dα(ψ), dδ(ψ)	+0.056	-0.39	+0.067	-0.39	+0.072	-0.39	+0.062	-0.39
dα(ε), dδ(ε)	+0.108	-0.13	-0.102	-0.13	-0.204	-0.14	-0.015	-0.14
Dble. Trans.	March 30		March 30		March 30		March 31	

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	472		1322		470		471	
	α Draconis		Piazzi 12 <sup>b</sup> 122 (Canum Venaticorum)		β Canum Venat.		β Corvi	
Mag. Spect.	3.88	B5p	5.43	K0	4.32	G0	2.84	G5
U.T.	R.A.		Dec.		R.A.		Dec.	
	h	m	h	m	h	m	h	m
	12 32	+ 69 51	12 32	+ 33 18	12 33	+ 41 25	12 33	- 23 18
1 <sup>d</sup> -8.7	53 531 <sup>s</sup> + 732	39 25 -200	57 029 <sup>s</sup> + 377	81 33 <sup>s</sup> -240	04 270 <sup>s</sup> + 403	50 04 <sup>s</sup> -235	37 885 <sup>s</sup> + 360	58 41 <sup>s</sup> -181
1 1.2	54 290 + 759	37 84 -141	57 414 + 385	79 27 -206	04 684 + 414	48 10 -194	38 248 + 363	60 46 -205
1 11.2	55 059 + 769	37 04 -80	57 799 + 385	77 59 -168	05 098 + 414	46 62 -148	38 606 + 358	62 72 -226
1 21.2	55 807 + 748	36 93 -11	58 169 + 370	76 39 -120	05 497 + 399	45 68 -94	38 946 + 340	65 12 -240
1 31.2	56 507 + 700	37 44 + 51	58 513 + 344	75 67 -72	05 868 + 371	45 26 -42	39 259 + 313	67 55 -243
2 10.1	57 143 + 636	38 57 +113	58 824 + 311	75 43 -24	06 203 + 335	45 38 + 12	39 540 + 281	69 99 -244
2 20.1	57 687 + 544	40 27 +170	59 092 + 268	75 70 + 27	06 491 + 288	46 04 + 66	39 781 + 241	72 35 -236
3 2.1	58 126 + 439	42 42 +215	59 313 + 221	76 39 + 69	06 727 + 236	47 13 +109	39 981 + 200	74 58 -223
3 12.1	58 455 + 329	44 97 +255	59 485 + 172	77 47 +108	06 910 + 183	48 63 +150	39 981 + 160	76 67 -209
3 22.0	58 659 + 204	47 77 +280	59 607 + 122	78 87 +140	07 036 + 126	50 45 +182	40 258 + 117	78 56 -189
3 32.0	58 745 + 86	50 69 +292	59 683 + 76	80 50 +163	07 110 + 74	52 47 +202	40 338 + 80	80 23 -167
4 11.0	58 718 - 27	53 65 +296	59 716 + 33	82 29 +179	07 134 + 24	54 63 +216	40 383 + 45	81 70 -147
4 20.9	58 579 -139	56 50 +285	59 708 - 8	84 15 +186	07 113 - 21	56 82 +219	40 396 + 13	82 92 -122
4 30.9	58 350 -229	59 12 +262	59 669 - 39	85 97 +182	07 055 - 58	58 93 +211	40 383 - 13	83 91 - 99
5 10.9	58 037 -313	61 46 +234	59 601 - 68	87 72 +175	06 964 - 91	60 91 +198	40 347 - 36	84 68 - 77
5 20.9	57 655 -382	63 40 +194	59 510 - 91	89 30 +158	06 846 -118	62 66 +175	40 289 - 58	85 20 - 52
5 30.8	57 226 -429	64 90 +150	59 403 -107	90 67 +179	06 710 -136	64 14 +148	40 216 - 73	85 50 - 30
6 9.8	56 758 -468	65 92 +102	59 282 -121	91 79 +112	06 559 -151	65 31 +117	40 128 - 88	85 57 - 7
6 19.8	56 269 -489	66 40 + 48	59 153 -129	92 61 + 82	06 398 -161	66 10 + 79	40 029 - 99	85 41 + 16
6 29.8	55 777 -492	66 37 - 3	59 021 -132	93 13 + 52	06 235 -163	66 53 + 43	39 923 -106	85 05 + 36
7 9.7	55 286 -491	65 81 - 56	58 886 -135	93 32 + 19	06 070 -165	66 58 + 5	39 810 -113	84 49 + 56
7 19.7	54 818 -468	64 70 -111	58 756 -130	93 16 - 16	05 912 -158	66 22 - 36	39 698 -112	83 73 + 70
7 29.7	54 381 -437	63 12 -158	58 634 -122	92 67 - 49	05 763 -149	65 48 - 74	39 588 -110	82 83 + 96
8 8.6	53 981 -400	61 07 -205	58 522 -112	91 86 - 81	05 627 -136	64 36 -112	39 588 -103	82 83 +104
8 18.6	53 638 -343	58 58 -249	58 427 - 95	90 70 -116	05 512 -115	62 87 -149	39 398 - 87	80 67 +112
8 28.6	53 354 -284	55 74 -284	58 353 - 74	89 25 -145	05 421 - 91	61 05 -182	39 329 - 69	79 51 +116
9 7.6	53 140 -214	52 55 -319	58 305 - 48	87 48 -177	05 358 - 63	58 91 -214	39 284 - 45	78 35 +116
9 17.5	53 010 -130	49 10 -345	58 290 - 15	85 43 -205	05 358 - 25	56 46 -245	39 284 - 10	77 28 +107
9 27.5	52 964 - 46	45 46 -364	58 290 + 20	83 14 -229	05 333 + 15	56 46 -267	39 274 + 25	77 28 + 94
10 7.5	53 013 + 49	41 66 -380	58 310 + 63	80 59 -255	05 348 + 60	53 79 -292	39 299 + 68	76 34 + 76
10 17.5	53 166 + 153	37 82 -384	58 483 + 110	77 87 -272	05 520 + 112	47 81 -306	39 483 + 116	75 08 + 50
10 27.4	53 417 + 251	34 01 -381	58 639 + 156	75 01 -286	05 683 + 163	44 64 -317	39 646 + 163	74 87 + 21
11 6.4	53 776 + 359	30 29 -372	58 846 + 207	72 04 -297	05 900 + 217	41 42 -322	39 859 + 213	75 01 - 14
11 16.4	54 234 + 458	26 80 -349	59 101 + 255	69 06 -298	05 900 + 269	38 25 -317	39 859 + 258	75 01 - 53
11 26.3	54 782 + 548	23 59 -321	59 398 + 297	66 14 -292	06 484 + 315	35 18 -307	40 117 + 296	75 54 - 89
12 6.3	55 416 + 634	20 77 -282	59 734 + 336	63 33 -281	06 842 + 358	32 31 -287	40 744 + 331	77 70 -127
12 16.3	56 112 + 696	18 44 -233	60 098 + 364	60 75 -258	07 230 + 388	29 74 -257	41 097 + 353	79 32 -162
12 26.3	56 852 + 740	16 63 -181	60 478 + 390	58 45 -300	07 637 + 407	27 52 -222	41 461 + 364	81 22 -190
12 36.2	57 618 + 786	15 44 -119	60 866 + 388	56 51 -194	08 054 + 417	25 74 -178	41 827 + 366	83 38 -216
	57 757 + 757	- 53	+ 380	-149	+ 409	-128	+ 354	-232
Mean Place	54.691	45.27	59.094	79.33	06.189	50.55	40.575	79.90
sec δ, tan δ	+2.905	+2.727	+1.197	+0.657	+1.334	+0.883	+1.089	-0.431
dα(ψ), dδ(ψ)	+0.051	-0.39	+0.059	-0.39	+0.058	-0.39	+0.063	-0.39
dα(ε), dδ(ε)	+0.180	-0.14	+0.043	-0.14	+0.058	-0.14	-0.028	-0.15
Dbble. Trans.	March 31		March 31		March 31		March 31	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1323		473		1324		474		
	23 Comae Berenices		24 Comae* f.		25 Virginis		α Muscae		
Mag. Spect.	4.78	A0	5.18	K0	5.90	A0	2.94	B3	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	12 34	+ 22 41	12 34	+ 18 26	12 36	- 5 45	12 36	- 69 03	
1	-8.7	08 557 + 353	77 66 -242	24 921 + 347	71 20 -240	03 072 + 339	12 04 -214	17 735 + 744	08 10 -55
1	1.2	08 917 + 360	75 49 -217	25 275 + 354	69 00 -220	03 416 + 344	14 24 -220	18 481 + 746	09 23 -113
1	1.2	09 277 + 360	73 60 -189	25 628 + 353	67 04 -196	03 756 + 340	16 46 -222	19 214 + 733	10 93 -170
1	11.2	09 277 + 344	73 60 -150	25 628 + 338	67 04 -162	04 082 + 326	16 61 -215	19 908 + 694	13 17 -224
1	21.2	09 621 + 321	72 10 -112	25 966 + 313	65 42 -126	04 382 + 300	20 63 -202	20 543 + 635	15 83 -266
1	31.2	09 942	70 98	26 279	64 16	04 382	20 63	20 543	15 83
2	10.1	10 231 + 289	70 29 -69	26 563 + 284	63 28 -88	04 654 + 272	22 48 -185	21 112 + 569	18 88 -305
2	20.1	10 480 + 249	70 03 -26	26 807 + 244	62 81 -47	04 888 + 234	24 11 -163	21 595 + 483	22 23 -335
3	2.1	10 687 + 207	70 17 + 14	27 010 + 203	62 73 -8	05 083 + 195	25 48 -137	21 989 + 394	25 75 -352
3	12.1	10 850 + 163	70 67 + 50	27 171 + 161	62 99 + 26	05 239 + 156	26 62 -114	22 294 + 305	29 41 -366
3	22.0	10 968 + 118	71 50 + 83	27 288 + 117	63 58 + 59	05 355 + 116	27 48 -86	22 502 + 208	33 11 -370
3	32.0	11 045 + 77	72 57 +107	27 365 + 77	64 40 + 82	05 435 + 80	28 11 -63	22 620 + 118	36 75 -364
4	11.0	11 084 + 39	73 83 +126	27 406 + 41	65 43 +103	05 482 + 47	28 52 -41	22 650 + 30	40 31 -356
4	20.9	11 088 + 4	75 20 +137	27 413 + 7	66 59 +116	05 499 + 17	28 71 -19	22 593 - 57	43 66 -335
4	30.9	11 064 - 24	76 60 +140	27 393 - 20	67 79 +120	05 492 - 7	28 75 -4	22 460 - 133	46 76 -310
5	10.9	11 015 - 49	77 99 +139	27 350 - 43	69 02 +123	05 462 - 30	28 62 + 13	22 253 - 207	49 57 -281
5	20.9	10 945 - 70	79 30 +131	27 286 - 64	70 20 +118	05 414 - 48	28 37 + 25	21 977 - 276	51 99 -242
5	30.8	10 862 - 83	80 47 +117	27 209 - 77	71 28 +108	05 353 - 61	28 03 + 34	21 648 - 329	54 02 -203
6	9.8	10 765 - 97	81 50 +103	27 119 - 90	72 24 + 96	05 278 - 75	27 59 + 44	21 264 - 384	55 60 -158
6	19.8	10 661 - 104	82 31 + 81	27 022 - 97	73 03 + 79	05 194 - 84	27 08 + 51	20 841 - 423	56 67 -107
6	29.8	10 553 - 108	82 90 + 59	26 920 - 102	73 64 + 61	05 104 - 90	26 54 + 59	20 393 - 448	57 26 -59
7	9.7	10 441 - 112	83 27 + 37	26 815 - 105	74 06 + 42	05 009 - 95	25 95 + 54	19 924 - 469	57 32 -6
7	19.7	10 332 - 109	83 37 + 10	26 712 - 103	74 25 + 19	04 914 - 95	25 36 + 59	19 455 - 489	56 85 + 47
7	29.7	10 229 - 103	83 22 - 15	26 614 - 98	74 22 - 3	04 822 - 92	24 78 + 58	19 000 - 455	55 90 + 95
8	8.6	10 134 - 95	82 80 - 42	26 523 - 91	73 97 - 25	04 735 - 87	24 21 + 57	18 571 - 429	54 45 +145
8	18.6	10 054 - 80	82 11 - 69	26 447 - 76	73 46 - 51	04 662 - 73	23 72 + 49	18 192 - 379	52 58 +187
8	28.6	09 991 - 63	81 17 - 94	26 387 - 60	72 72 - 74	04 604 - 58	23 31 + 41	17 874 - 318	50 37 +221
9	7.6	09 951 - 40	79 96 -121	26 350 - 37	71 73 - 99	04 568 - 36	23 01 + 30	17 633 - 241	47 85 +252
9	17.5	09 942 - 9	78 47 -149	26 343 - 7	70 49 -124	04 563 - 5	22 90 + 11	17 490 - 143	45 16 +269
9	27.5	09 964 + 22	76 75 -172	26 366 + 23	69 00 -149	04 590 + 27	22 99 - 9	17 449 - 41	42 38 +278
10	7.5	10 026 + 62	74 76 -199	26 429 + 63	67 26 -174	04 642 + 52	23 24 - 25	17 522 + 73	39 60 +278
10	17.5	10 133 + 107	72 56 -220	26 534 + 105	65 28 -198	04 755 + 113	23 78 - 54	17 718 + 196	36 99 +261
10	27.4	10 282 + 149	70 18 -238	26 683 + 149	63 11 -217	04 906 + 151	24 60 - 82	18 028 + 310	34 62 +237
11	6.4	10 479 + 197	67 63 -255	26 878 + 195	60 75 -236	05 102 + 196	25 72 -112	18 454 + 426	32 59 +203
11	16.4	10 721 + 242	65 00 -263	27 117 + 239	58 28 -247	05 340 + 238	27 11 -139	18 984 + 530	31 04 +155
11	26.3	11 002 + 281	62 33 -267	27 394 + 277	55 74 -254	05 615 + 275	28 76 -165	19 599 + 615	30 00 +104
12	6.3	11 319 + 317	59 68 -265	27 706 + 312	53 17 -257	05 924 + 309	30 65 -189	20 286 + 687	29 54 + 46
12	16.3	11 660 + 341	57 16 -252	28 043 + 337	50 70 -247	06 255 + 331	32 71 -206	21 017 + 731	29 71 - 17
12	26.3	12 017 + 357	54 82 -234	28 394 + 351	48 35 -235	06 598 + 343	34 88 -217	21 769 + 752	30 46 - 75
12	36.2	12 380 + 363	52 73 -209	28 751 + 357	46 22 -213	06 944 + 346	37 11 -223	22 522 + 753	31 83 -137
		+ 355	-174	+ 348	-183	+ 337	-220	+ 725	-192
Mean Place	10.746	72.36	27.159	64.47	05.567	27.32	22.110	40.59	
sec δ, tan δ	+1.084	+0.418	+1.054	+0.334	+1.005	-0.101	+2.798	-2.613	
dα(ψ), dδ(ψ)	+0.060	-0.39	+0.060	-0.39	+0.062	-0.39	+0.072	-0.39	
dα(ε), dδ(ε)	+0.028	-0.15	+0.022	-0.15	-0.007	-0.16	-0.172	-0.16	
Dble. Trans.	March 31		March 31		March 31		April 1		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	475		1325		478		1326	
	$\chi$ Virginis		133 G. Centauri		76 Ursae Majoris		$\rho$ Virginis	
Mag.Spect.	4.78	K0	5.84	K0	5.92	A0	4.95	A0
U.T.	R.A.		R.A.		R.A.		R.A.	
	h	m	h	m	h	m	h	m
	12 38	- 7 55	12 40	-46 03	12 40	+62 46	12 41	+10 18
	<sup>s</sup>	<sup>o</sup>	<sup>s</sup>	<sup>o</sup>	<sup>s</sup>	<sup>o</sup>	<sup>s</sup>	<sup>o</sup>
1 -8.7	30.372	+ 339	35.009	+ 439	57.178	+ 575	09.716	+ 338
1 1.2	30.717	+ 345	50.96	-116	68.17	-222	44.92	-236
1 11.2	31.059	+ 342	52.57	-161	66.50	-167	42.67	-225
1 21.2	31.386	+ 327	54.59	-202	65.42	-108	40.57	-210
1 31.2	31.689	+ 303	56.99	-240	64.99	- 43	38.73	-184
			59.65	-266	65.19	+ 20	37.17	-156
2 10.1	31.962	+ 273	60.039	+ 509	66.00	+ 81	35.93	-124
2 20.1	32.198	+ 236	62.53	-288	67.41	+141	35.05	- 88
3 2.1	32.395	+ 197	65.54	-301	69.28	+187	34.51	- 54
3 12.1	32.554	+ 159	68.59	-305	71.58	+230	34.29	- 22
3 22.0	32.672	+ 118	71.64	-298	74.18	+260	34.39	+ 10
			74.62					
4 1.0	32.755	+ 83	88.24	-157	76.93	+275	34.74	+ 35
4 11.0	32.805	+ 50	89.47	-123	79.78	+285	35.30	+ 56
4 20.9	32.824	+ 19	90.34	- 87	82.56	+278	36.03	+ 73
4 30.9	32.819	- 5	90.81	- 47	85.17	+261	36.86	+ 83
5 10.9	32.791	- 28	90.92	-191	87.55	+238	37.75	+ 89
			90.92					
5 20.9	32.745	- 46	98.24	-157	89.58	+203	38.67	+ 92
5 30.8	32.684	- 61	99.47	-123	91.21	+163	39.54	+ 87
6 9.8	32.610	- 74	100.34	- 87	92.41	+120	40.38	+ 84
6 19.8	32.526	- 84	100.81	- 47	93.09	+ 68	41.12	+ 74
6 29.8	32.436	- 90	100.92	- 11	93.30	+ 21	41.75	+ 63
			100.92					
7 9.7	32.339	- 97	106.62	+ 30	92.99	- 31	42.26	+ 51
7 19.7	32.243	- 96	106.92	+ 68	92.16	- 83	42.62	+ 36
7 29.7	32.149	- 94	106.93	+101	90.87	-129	42.83	+ 21
8 8.6	32.060	- 89	106.93	+136	89.11	-176	42.88	+ 5
8 18.6	31.984	- 76	106.92	+163	86.90	-221	42.72	- 16
			106.92					
8 28.6	31.923	- 61	106.10	+184	84.33	-257	42.38	- 34
9 7.6	31.885	- 38	106.09	+201	81.40	-293	41.83	- 55
9 17.5	31.876	- 9	106.02	+207	78.17	-323	41.05	- 78
9 27.5	31.900	+ 24	106.02	+205	74.72	-345	40.05	-100
10 7.5	31.953	+ 53	106.02	+195	71.07	-365	38.78	-127
			106.02					
10 17.5	32.062	+ 109	106.74	+173	67.34	-373	37.26	-152
10 27.4	32.212	+ 150	106.72	+146	63.59	-375	35.51	-175
11 6.4	32.407	+ 195	106.73	+110	59.88	-371	33.54	-197
11 16.4	32.644	+ 237	106.09	+ 64	56.35	-353	31.39	-215
11 26.3	32.919	+ 275	106.09	+ 19	53.05	-330	29.11	-228
			106.09					
12 6.3	33.228	+ 309	106.23	- 33	50.07	-298	26.73	-238
12 16.3	33.559	+ 331	106.08	- 85	47.55	-252	24.35	-238
12 26.3	33.903	+ 344	106.08	-132	45.51	-204	22.02	-233
12 36.2	34.251	+ 348	106.19	-179	44.05	-146	19.81	-221
			106.19	-218		- 83		-200
Mean Place	32.906	17.32	38.211	78.76	58.713	73.38	12.076	35.55
sec $\delta$ , tan $\delta$	+1.010	-0.139	+1.441	-1.038	+2.187	+1.945	+1.016	+0.182
$d\alpha(v)$ , $d\delta(v)$	+0.062	-0.39	+0.066	-0.39	+0.052	-0.39	+0.060	-0.39
$d\alpha(e)$ , $d\delta(e)$	-0.009	-0.17	-0.068	-0.18	+0.128	-0.18	+0.012	-0.18
Dble.Trans.	April 1		April 2		April 2		April 2	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	479		1327		1328		481		
	330 G. Hydrae		Y Canum Venat.		32 Virginis		β Crucis		
Mag. Spect.	5.73	K2	4.8 to 6.0	N3	5.24	A5	1.50	B1	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	
	12 43	-28 14	12 44	+45 30	12 44	+ 7 44	12 46	-59 36	
1	-8.7	14.360 +369	37 31 -162	27.951 +417	48 55 -244	53.727 +335	59 25 -233	51.719 +558	23.91 -68
1	1.3	14.734 +374	39.23 -192	28.383 +432	46 54 -201	54.071 +344	57.00 -225	52.284 +565	25.14 -123
1	11.2	15.104 +370	41.41 -218	28.819 +436	45.01 -153	54.413 +342	54.87 -190	52.844 +560	26.88 -174
1	21.2	15.458 +354	43.78 -237	29.243 +424	44 05 -96	54.743 +330	52.97 -190	53.378 +534	29.11 -223
1	31.2	15.786 +328	46.25 -247	29.642 +399	43.65 -40	55.051 +308	51.33 -164	53.871 +493	31.72 -261
2	10.1	16.082 +296	48.77 -252	30.006 +364	43.81 +16	55.330 +279	49.98 -135	54.317 +446	34.65 -293
2	20.1	16.338 +256	51.27 -250	30.323 +317	44 53 +72	55.574 +244	48 97 -101	54.703 +386	37.84 -319
3	2.1	16.553 +215	53.69 -242	30.586 +263	45.73 +120	55.778 +204	48 30 -67	55.025 +322	41.16 -332
3	12.1	16.727 +174	56.00 -231	30.795 +209	47.34 +161	55.944 +166	47 93 -37	55.283 +258	44.59 -343
3	22.0	16.859 +132	58.13 -213	30.943 +148	49.31 +197	56.068 +124	47.88 -5	55.472 +189	48.02 -343
4	1.0	16.951 +92	60.08 -195	31.036 +93	51.48 +217	56.156 +88	48.08 +20	55.597 +125	51.37 -335
4	11.0	17.009 +58	61.83 -175	31.075 +39	53.81 +233	56.210 +54	48.49 +41	55.661 +64	54.62 -325
4	21.0	17.031 +22	63.34 -151	31.064 -11	56.17 +236	56.232 +22	49.09 +60	55.663 +2	57.67 -305
4	30.9	17.027 -4	64.62 -128	31.011 -53	58.44 +227	56.228 -4	49.80 +71	55.613 -50	60.47 -280
5	10.9	16.996 -31	65.66 -104	30.920 -91	60.59 +215	56.201 -27	50.59 +79	55.512 -101	63.00 -253
5	20.9	16.941 -55	66.44 -78	30.798 -122	62.50 +191	56.155 -46	51.41 +82	55.362 -150	65.16 -216
5	30.8	16.869 -72	66.97 -53	30.654 -144	64.11 +161	56.094 -61	52.22 +81	55.174 -188	66.96 -180
6	9.8	16.779 -90	67.25 -28	30.490 -164	65.40 +129	56.018 -76	53.01 +79	54.948 -226	68.35 -139
6	19.8	16.676 -103	67.26 -1	30.313 -177	66.29 +89	55.934 -84	53.73 +72	54.691 -257	69.27 -92
6	29.8	16.563 -113	67.03 +23	30.132 -181	66.78 +49	55.843 -91	54.36 +63	54.415 -276	69.75 -48
7	9.7	16.441 -122	66.56 +47	29.946 -186	66.87 +9	55.746 -97	54.91 +55	54.120 -295	69.76 -1
7	19.7	16.317 -124	65.85 +71	29.764 -182	66.51 -36	55.648 -98	53.32 +41	53.821 -299	69.28 +48
7	29.7	16.195 -122	64.95 +90	29.591 -173	65.75 -76	55.553 -95	55.60 +28	53.527 -294	68.37 +91
8	8.6	16.078 -117	63.86 +109	29.430 -161	64.59 -116	55.463 -90	55.73 +13	53.245 -282	67.02 +135
8	18.6	15.975 -103	62.64 +122	29.289 -141	63.01 -158	55.385 -78	55.69 -4	52.993 -252	65.29 +173
8	28.6	15.891 -84	61.34 +130	29.173 -116	61.10 -191	55.321 -64	55.48 -21	52.779 -214	63.26 +203
9	7.6	15.832 -59	60.00 +134	29.086 -87	58.82 -228	55.278 -43	55.06 -42	52.615 -164	60.95 +231
9	17.5	15.808 -24	58.70 +130	29.038 -48	56.24 -258	55.264 -14	54.43 -63	52.517 -98	58.50 +245
9	27.5	15.822 +14	57.50 +120	29.031 -7	53.41 -283	55.279 +15	53.59 -84	52.488 -29	55.99 +251
10	7.5	15.880 +58	56.46 +104	29.073 +92	50.33 -308	55.331 +52	52.49 -110	52.539 +51	53.50 +249
10	17.5	15.988 +108	55.66 +80	29.170 +97	47.09 -324	55.426 +95	51.11 -138	52.678 +139	51.17 +233
10	27.4	16.145 +157	55.14 +52	29.320 +150	43.76 -333	55.564 +138	49.51 -160	52.900 +222	49.09 +208
11	6.4	16.355 +210	54.97 +17	29.529 +209	40.37 -339	55.747 +183	47.67 -184	53.209 +309	47.34 +175
11	16.4	16.613 +258	55.19 -22	29.795 +266	37.04 -333	55.975 +228	45.64 -203	53.596 +387	46.05 +129
11	26.3	16.913 +300	55.80 -61	30.111 +316	33.83 -321	56.240 +265	43.46 -218	54.048 +452	45.25 +80
12	6.3	17.249 +336	56.82 -102	30.475 +364	30.83 -300	56.541 +301	41.15 -231	54.558 +510	44.99 +26
12	16.3	17.610 +361	58.22 -140	30.874 +399	28.15 -288	56.866 +325	38.81 -234	55.105 +547	45.32 -33
12	26.3	17.984 +374	59.96 -174	31.296 +422	25.85 -230	57.206 +340	36.50 -231	55.671 +566	46.20 -88
12	36.2	18.362 +378	62.00 -204	31.733 +437	24.00 -185	57.553 +347	34.27 -223	56.244 +573	47.63 -143
		+367	-226	+431	-131	+339	-204	+554	-195
Mean Place	17.207	59.95	29.901	50.28	56.127	49.18	55.573	54.35	
sec δ, tan δ	+1.135	-0.537	+1.427	+1.018	+1.009	+0.136	+1.977	-1.705	
da(ψ), dδ(ψ)	+0.064	-0.39	+0.056	-0.39	+0.060	-0.39	+0.070	-0.39	
da(ε), dδ(ε)	-0.035	-0.19	+0.067	-0.19	+0.009	-0.19	-0.111	-0.20	
Dble. Trans.	April 2		April 3		April 3		April 3		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	1330		1329		1331		1332	
Name	35 Virginis		332 G. Hydrae		143 G. Centauri		31 Comae Berenices	
Mag. Spect.	6.66	M0	6.29	B9	5.01	A0	5.07	G0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	12 47	+ 3 38	12 47	- 24 46	12 49	- 33 55	12 51	+ 27 36
1 -8.7	07 687 + 334	57 93 -228	07 647 + 360	20 18 -168	54 047 + 385	09 20 -142	00 303 + 355	53 53 -252
1 1.3	08 029 + 342	55 69 -224	08 014 + 367	22 13 -195	54 437 + 390	10 97 -177	00 669 + 366	51 29 -224
1 11.2	08 371 + 342	53 53 -216	08 377 + 363	24 30 -217	54 825 + 388	13 05 -208	01 039 + 370	49 37 -192
1 21.2	08 700 + 329	51 54 -199	08 726 + 349	26 63 -233	55 196 + 371	15 39 -234	01 397 + 358	47 88 -149
1 31.2	09 006 + 306	49 78 -176	09 049 + 323	29 02 -239	55 541 + 345	17 89 -250	01 734 + 337	46 83 -105
2 10.1	09 286 + 280	48 27 -151	09 343 + 294	31 44 -242	55 855 + 314	20 50 -261	02 043 + 309	46 24 -59
2 20.1	09 529 + 243	47 07 -120	09 598 + 255	33 80 -236	56 128 + 273	23 14 -264	02 313 + 270	46 14 -10
3 2.1	09 734 + 205	46 17 -90	09 813 + 215	36 06 -215	56 358 + 230	25 75 -261	02 541 + 228	46 46 + 32
3 12.1	09 901 + 167	45 58 -59	09 989 + 176	38 19 -213	56 546 + 188	28 29 -254	02 726 + 185	47 18 + 72
3 22.0	10 028 + 127	45 28 -30	10 122 + 133	40 13 -194	56 690 + 144	30 70 -241	02 864 + 138	48 25 +107
4 1.0	10 119 + 91	45 23 -5	10 218 + 96	41 87 -174	56 794 + 104	32 94 -224	02 959 + 95	49 58 +133
4 11.0	10 176 + 57	45 40 + 17	10 280 + 62	43 42 -155	56 860 + 66	35 00 -206	03 014 + 55	51 11 +153
4 21.0	10 202 + 26	45 76 + 36	10 308 + 28	44 73 -110	56 889 + 29	36 83 -183	03 032 + 18	52 76 +166
4 30.9	10 202 + 0	46 25 + 49	10 309 + 1	45 83 -131	56 888 - 1	38 43 -160	03 018 - 14	54 42 +166
5 10.9	10 180 - 22	46 85 + 60	10 284 - 25	46 69 -86	56 859 - 29	39 78 -135	02 976 - 42	56 07 +165
5 20.9	10 137 - 43	47 51 + 66	10 237 - 47	47 32 -63	56 803 - 56	40 84 -106	02 910 - 66	57 61 +154
5 30.8	10 080 - 57	48 19 + 68	10 172 - 65	47 72 -40	56 727 - 76	41 64 -80	02 827 - 83	58 99 +138
6 9.8	10 008 - 82	48 89 + 70	10 090 - 82	47 90 -18	56 630 - 97	42 15 -51	02 727 - 100	60 18 +119
6 19.8	09 926 - 72	49 55 + 66	09 993 - 97	47 90 + 6	56 517 - 113	42 35 -20	02 616 - 111	61 12 + 94
6 29.8	09 838 - 88	50 16 + 61	09 888 - 105	47 57 + 27	56 393 - 124	42 27 + 8	02 499 - 117	61 80 + 68
7 9.7	09 742 - 96	50 73 + 57	09 773 - 115	47 08 + 49	56 257 - 136	41 90 + 37	02 375 - 124	62 21 + 41
7 19.7	09 646 - 96	51 20 + 47	09 656 - 117	46 40 + 68	56 118 - 139	41 24 + 66	02 252 - 123	62 29 + 8
7 29.7	09 551 - 95	51 57 + 37	09 540 - 116	45 56 + 84	55 980 - 138	40 35 + 89	02 133 - 119	62 09 - 20
8 8.7	09 461 - 90	51 84 + 27	09 427 - 113	44 55 +101	55 846 - 134	39 21 +114	02 019 - 114	61 58 - 51
8 18.6	09 382 - 79	51 97 + 13	09 329 - 98	43 45 +110	55 727 - 119	37 89 +132	01 919 - 100	60 75 - 83
8 28.6	09 318 - 64	51 94 - 3	09 247 - 82	42 29 +116	55 627 - 100	36 44 +145	01 835 - 84	59 64 -111
9 7.6	09 273 - 45	51 74 -20	09 189 - 58	41 11 +118	55 554 - 73	34 89 +155	01 773 - 62	58 22 -142
9 17.5	09 258 - 15	51 34 -40	09 164 - 25	39 99 +112	55 517 - 37	33 35 +154	01 742 - 31	56 51 -171
9 27.5	09 273 + 15	50 75 -59	09 174 + 10	38 97 +102	55 520 + 3	31 87 +148	01 743 + 1	54 54 -197
10 7.5	09 321 + 48	49 91 -84	09 228 + 54	38 12 + 85	55 571 + 51	30 52 +135	01 785 + 42	52 31 -223
10 17.5	09 414 + 93	48 77 -114	09 330 + 102	37 52 + 60	55 676 + 105	29 40 +112	01 871 + 86	49 85 -246
10 27.4	09 551 + 137	47 40 -137	09 480 + 150	37 18 + 34	55 832 + 156	28 54 + 86	02 003 + 132	47 23 -262
11 6.4	09 733 + 182	45 78 -162	09 682 + 202	37 18 + 0	56 045 + 213	28 03 + 51	02 185 + 182	44 44 -279
11 16.4	09 959 + 226	43 94 -184	09 931 + 249	37 57 - 39	56 309 + 264	27 92 + 11	02 414 + 229	41 59 -285
11 26.4	10 224 + 265	41 92 -202	10 221 + 290	38 31 - 74	56 618 + 309	28 22 - 30	02 686 + 272	38 73 -286
12 6.3	10 523 + 289	39 74 -218	10 548 + 327	39 44 -113	56 966 + 348	28 96 - 74	02 997 + 311	35 91 -282
12 16.3	10 847 + 324	37 48 -226	10 899 + 351	40 93 -149	57 341 + 375	30 13 -117	03 338 + 341	33 26 -265
12 26.3	11 186 + 339	35 21 -227	11 265 + 366	42 71 -178	57 731 + 390	31 68 -155	03 699 + 361	30 83 -243
12 36.2	11 532 + 346	32 98 -223	11 635 + 370	44 77 -206	58 126 + 395	33 58 -190	04 069 + 370	28 69 -214
	+ 338	-210	+ 361	-223	+ 384	-219	+ 367	-175
Mean Place	10.148	46 48	10.471	41 48	57.060	33 23	02 520	50 37
sec δ, tan δ	+1.002	+0.064	+1.101	-0.462	+1.205	-0.673	+1.129	+0.523
dα(v), dδ(v)	+0.061	-0.39	+0.064	-0.39	+0.065	-0.39	+0.058	-0.39
dα(ε), dδ(ε)	+0.004	-0.20	-0.030	-0.20	-0.044	-0.22	+0.034	-0.22
Dble. Trans.	April 3		April 3		April 4		April 4	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1333		482		1334		483	
	32 Comae Berenices		150 G. Centauri		52 G. Corvi*		ε Ursae Majoris	
Mag. Spect.	6.53	K5	4.34	A5	6.84	A0	1.68	A0p
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	12 51	+ 17 08	12 52	- 40 05	12 53	- 17 57	12 53	+ 56 01
1 <sup>d</sup>	29.638 <sup>s</sup> +340	56.00 <sup>o</sup> -245	37.935 <sup>s</sup> +408	54.85 <sup>o</sup> -122	14.677 <sup>s</sup> +347	33.72 <sup>o</sup> -183	24.478 <sup>s</sup> +483	54.43 <sup>o</sup> -245
1	29.988 +350	53.72 -228	38.349 +414	56.47 -162	15.031 +354	35.74 -202	24.983 +505	52.49 -194
1	30.339 +361	51.67 -205	38.761 +412	58.46 -199	15.385 +364	37.91 -217	25.499 +516	51.09 -140
1	30.679 +340	49.94 -173	39.156 +395	60.77 -231	15.725 +340	40.17 -226	26.006 +507	50.32 -77
1	30.998 +319	48.56 -138	39.522 +366	63.30 -253	16.042 +317	42.42 -225	26.486 +480	50.16 -16
2	31.290 +292	47.55 -101	39.856 +334	66.00 -270	16.332 +290	44.63 -221	26.928 +442	50.61 +45
2	31.546 +256	46.96 -59	40.148 +292	68.79 -279	16.585 +253	46.73 -210	27.316 +388	51.66 +105
3	31.762 +216	46.75 -21	40.394 +246	71.60 -281	16.800 +215	48.67 -194	27.641 +325	53.21 +155
3	31.938 +176	46.91 +16	40.596 +202	74.38 -278	16.977 +177	50.44 -177	27.900 +259	55.21 +200
3	32.072 +134	47.40 +49	40.750 +154	77.07 -269	17.114 +137	52.01 -157	28.083 +183	57.55 +234
4	32.167 +95	48.15 +75	40.861 +111	79.61 -254	17.215 +101	53.35 -134	28.197 +114	60.10 +255
4	32.226 +59	49.12 +97	40.932 +71	82.00 -239	17.282 +67	54.50 -115	28.242 +45	62.79 +269
4	32.250 +24	50.24 +112	40.962 +30	84.16 -216	17.317 +35	55.41 -91	28.219 -23	65.48 +269
4	32.247 -3	51.43 +119	40.960 -2	86.08 -192	17.326 +9	56.13 -72	28.142 -77	68.05 +257
5	32.218 -29	52.66 +123	40.925 -35	87.75 -167	17.311 -15	56.64 -51	28.013 -129	70.45 +240
5	32.168 -50	53.86 +120	40.861 -64	89.11 -136	17.273 -38	56.96 -32	27.840 -173	72.56 +211
5	32.102 -66	54.98 +112	40.774 -87	90.17 -106	17.218 -55	57.10 -14	27.636 -204	74.32 +176
6	32.021 -81	55.99 +101	40.663 -111	90.92 -75	17.147 -71	57.06 +4	27.404 -232	75.70 +138
6	31.928 -93	56.85 +89	40.533 -130	91.31 -39	17.061 -86	56.85 +21	27.153 -251	76.61 +91
6	31.829 -99	57.54 +66	40.390 -143	91.39 -8	16.967 -94	56.50 +35	26.893 -260	77.07 +46
7	31.724 -105	58.04 +50	40.235 -155	91.11 +28	16.862 -105	55.99 +51	26.628 -265	77.05 -2
7	31.618 -106	58.32 +28	40.075 -160	90.50 +61	16.755 -107	55.35 +64	26.367 -261	76.53 -52
7	31.513 -105	58.39 +7	39.915 -160	89.60 +90	16.647 -108	54.62 +73	26.117 -250	75.56 -97
8	31.414 -99	58.24 -15	39.760 -155	88.41 +119	16.542 -105	53.79 +83	25.882 -235	74.13 -143
8	31.326 -88	57.83 -64	39.622 -138	86.97 +144	16.449 -93	52.91 +98	25.673 -209	72.26 -187
8	31.253 -73	57.19 -64	39.504 -118	85.37 +160	16.371 -78	52.03 +88	25.495 -178	70.01 -225
9	31.200 -53	56.30 -89	39.416 -88	83.61 +176	16.314 -57	51.17 +86	25.353 -142	67.37 -264
9	31.176 -24	55.15 -115	39.368 -48	81.82 +179	16.287 -27	50.41 +76	25.260 -93	64.42 -295
9	31.182 +6	53.76 -139	39.364 -4	80.06 +176	16.294 +7	49.78 +63	25.218 -42	61.22 -320
10	31.225 +43	52.10 -166	39.412 +48	78.39 +167	16.341 +47	49.34 +44	25.234 +16	57.78 -344
10	31.312 +87	50.20 -190	39.518 +106	76.94 +145	16.433 +92	49.12 +22	25.317 +83	54.20 -358
10	31.442 +130	48.09 -211	39.681 +163	75.75 +119	16.572 +139	49.16 -4	25.466 +149	50.56 -364
11	31.620 +178	45.78 -231	39.904 +223	74.89 +86	16.761 +189	49.54 -38	25.686 +220	46.89 -367
11	31.843 +223	43.33 -245	40.183 +279	74.46 +43	16.997 +236	50.25 -71	25.975 +289	43.34 -355
11	32.106 +263	40.80 -253	40.509 +326	74.45 +1	17.272 +275	51.29 -104	26.327 +352	39.97 -337
12	32.406 +300	38.22 -258	40.878 +369	74.92 -47	17.584 +312	52.67 -138	26.739 +412	36.86 -311
12	32.734 +328	35.70 -252	41.276 +398	75.85 -93	17.921 +337	54.33 -166	27.196 +457	34.14 -272
12	33.079 +345	33.30 -240	41.689 +413	77.22 -137	18.273 +352	56.23 -190	27.687 +491	31.86 -228
12	33.432 +353	31.09 -221	42.109 +420	78.99 -177	18.632 +359	58.33 -210	28.199 +512	30.10 -176
	33.432 +349	31.09 -193	42.109 +408	78.99 -213	18.632 +351	58.33 -221	28.199 +512	30.10 -115
Mean Place	31.975	49.43	41.119	80.48	17.444	52.47	26.278	58.76
sec δ, tan δ	+1.047	+0.309	+1.307	-0.842	+1.051	-0.324	+1.790	+1.484
dα(ψ), dδ(ψ)	+0.059	-0.39	+0.066	-0.39	+0.063	-0.39	+0.052	-0.39
dα(ε), dδ(ε)	+0.020	-0.22	-0.055	-0.23	-0.021	-0.23	+0.096	-0.23
Dble. Trans.	April 4		April 5		April 5		April 5	



# APPARENT PLACES OF STARS, 1986

199

## AT UPPER TRANSIT AT GREENWICH

No.	1335		484		486		485	
	ψ Virginis		δ Virginis		8 Draconis		α Canum Venat.* f.	
Mag.Spect.	4.91	M3	3.66	M0	5.27	F0	2.90	A0p
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	12 53	- 9 27	12 54	+ 3 28	12 54	+ 65 30	12 55	+ 38 23
1 -8.7	36.313 +338	41 13 -203	52.896 +331	25 43 -228	54.937 +604	35 64 -234	21.768 +381	27.83 -266
1 1.3	36.658 +345	43 26 -213	53.236 +340	23 19 -224	55.573 +636	33 86 -178	22.163 +395	25.64 -219
1 11.2	37.003 +345	45 45 -219	53.577 +341	21.02 -217	56.226 +653	32.66 -120	22.564 +401	23.87 -177
1 21.2	37.335 +332	47.63 -218	53.907 +330	19.02 -200	56.870 +644	32.13 -53	22.956 +392	22.62 -125
1 31.2	37.646 +311	49.71 -208	54.216 +309	17.24 -178	57.483 +613	32.24 +11	23.326 +370	21.89 -73
2 10.1	37.929 +283	51.67 -196	54.498 +282	15.72 -152	58.049 +566	32.98 +74	23.666 +340	21.69 -20
2 20.1	38.178 +249	53.44 -177	54.746 +248	14.50 -122	58.546 +497	34.34 +136	23.965 +299	22.03 +34
3 2.1	38.389 +211	54.99 -155	54.957 +211	13.59 -91	58.961 +415	36.19 +185	24.217 +252	22.84 +81
3 12.1	38.562 +173	56.31 -132	55.130 +173	12.98 -61	59.288 +327	38.49 +230	24.422 +205	24.09 +125
3 22.0	38.697 +135	57.39 -108	55.263 +133	12.67 -31	59.514 +226	41.11 +262	24.573 +151	25.70 +161
4 1.0	38.796 +99	58.23 -84	55.361 +98	12.61 -6	59.645 +131	43.92 +281	24.675 +102	27.56 +186
4 11.0	38.862 +66	58.85 -62	55.425 +64	12.77 +16	59.682 +37	46.83 +291	24.731 +56	29.61 +205
4 21.0	38.896 +34	59.26 -41	55.457 +32	13.14 +37	59.625 -57	49.71 +288	24.742 -11	31.74 +213
4 30.9	38.906 +10	59.49 -23	55.464 +7	13.63 +49	59.490 -135	52.43 +272	24.716 +26	33.85 +211
5 10.9	38.891 -15	59.55 -6	55.447 -17	14.23 +60	59.282 -208	54.94 +251	24.657 -59	35.88 +203
5 20.9	38.856 -35	59.47 +8	55.409 -38	14.90 +67	59.011 -271	57.10 +216	24.568 -89	37.73 +185
5 30.8	38.805 -51	59.27 +20	55.355 -54	15.58 +68	58.696 -315	58.87 +177	24.458 -110	39.34 +161
6 9.8	38.737 -68	58.95 +32	55.286 -69	16.28 +70	58.340 -356	60.20 +133	24.329 -129	40.69 +135
6 19.8	38.657 -80	58.54 +41	55.206 -80	16.96 +68	57.958 -382	61.02 +82	24.186 -143	41.69 +100
6 29.8	38.569 -88	58.06 +48	55.117 -89	17.58 +62	57.566 -392	61.34 +32	24.036 -150	42.35 +66
7 9.7	38.472 -97	57.50 +56	55.021 -96	18.15 +57	57.165 -401	61.15 -19	23.880 -156	42.65 +30
7 19.7	38.372 -100	56.91 +59	54.923 -98	18.62 +47	56.774 -391	60.42 -73	23.724 -156	42.55 -10
7 29.7	38.273 -99	56.29 +62	54.825 -98	19.01 +39	56.399 -375	59.21 -121	23.573 -151	42.09 -46
8 8.7	38.175 -98	55.66 +63	54.729 -96	19.28 +27	56.048 -351	57.51 -170	23.429 -144	41.24 -85
8 18.6	38.089 -96	55.06 +60	54.645 -84	19.41 +13	55.735 -313	55.34 -217	23.302 -127	40.01 -123
8 28.6	38.017 -72	54.52 +54	54.574 -71	19.39 -2	55.465 -270	52.80 -254	23.193 -109	38.45 -156
9 7.6	37.965 -52	54.06 +46	54.522 -52	19.20 -19	55.246 -219	49.87 -293	23.109 -84	36.54 -191
9 17.5	37.942 -23	53.75 +31	54.498 -24	18.81 -39	55.094 -152	46.63 -324	23.059 -50	34.32 -222
9 27.5	37.951 +9	53.61 +14	54.505 +7	18.22 -59	55.009 -85	43.15 -348	23.045 -14	31.83 -249
10 7.5	37.997 +46	53.76 -15	54.546 +41	17.41 -81	55.003 -6	39.46 -369	23.075 +30	29.07 -276
10 17.5	38.083 +86	53.96 -20	54.630 +84	16.28 -113	55.084 +81	35.67 -379	23.155 +80	26.12 -295
10 27.4	38.219 +136	54.53 -57	54.758 +128	14.92 -136	55.250 +166	31.85 -382	23.285 +130	23.02 -310
11 6.4	38.402 +183	55.40 -87	54.933 +175	13.32 -160	55.508 +258	28.05 -380	23.469 +184	19.82 -320
11 16.4	38.629 +227	56.57 -117	55.152 +219	11.49 -183	55.857 +349	24.42 -363	23.706 +237	16.62 -320
11 26.4	38.895 +266	58.01 -144	55.410 +258	09.48 -201	56.286 +429	21.01 -341	23.990 +284	13.48 -314
12 6.3	39.198 +303	59.72 -171	55.704 +294	07.31 -217	56.795 +509	17.92 -309	24.319 +329	10.47 -301
12 16.3	39.525 +327	61.63 -191	56.024 +320	05.06 -225	57.364 +569	15.28 -264	24.683 +364	07.72 -275
12 26.3	39.867 +342	63.70 -207	56.360 +336	02.78 -228	57.979 +615	13.12 -216	25.069 +386	05.27 -245
12 36.2	40.216 +349	65.88 -218	56.704 +344	00.54 -224	58.624 +645	11.55 -157	25.470 +401	03.23 -204
Mean Place	38.966	56.94	55.385	14.23	56.453	41.64	23.860	28.05
sec δ, tan δ	+1.014	-0.167	+1.002	+0.061	+2.412	+2.195	+1.276	+0.792
da(ψ), dδ(ψ)	+0.062	-0.39	+0.061	-0.39	+0.047	-0.39	+0.056	-0.39
da(ε), dδ(ε)	-0.011	-0.23	+0.004	-0.24	+0.142	-0.24	+0.051	-0.24
Dble.Trans.	April 5		April 5		April 5		April 5	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1336		487		488		1337		
	44 Virginis		δ Muscae		ε Virginis		14 Canum Venat.		
Mag Spect.	5.88	A0	3.63	K2	2.95	K0	5.11	B9	
U.T.	R.A.		R.A.		R.A.		R.A.		
	Dec.		Dec.		Dec.		Dec.		
	h m	° /	h m	° /	h m	° /	h m	° /	
	12 58	— 3 44	13 01	— 71 28	13 01	+ 11 01	13 05	+ 35 51	
1	-8.7	55 126 + 332	07 95 -213	14 345 + 817	03 87 -14	27 834 + 331	61 76 -241	04 459 + 367	75 65 -263
1	1.3	55 467 + 341	10 14 -219	15 180 + 835	04 60 -73	28 176 + 342	59 47 -229	04 843 + 384	73 35 -230
1	11.2	55 810 + 343	12 32 -218	16 015 + 835	05 91 -131	28 521 + 345	57 33 -214	05 234 + 391	71 46 -189
1	21.2	56 141 + 331	14 42 -210	16 821 + 806	07 78 -187	28 856 + 335	55 45 -188	05 618 + 384	70 06 -140
1	31.2	56 452 + 311	16 37 -195	17 573 + 752	10 12 -234	29 172 + 316	53 86 -159	05 982 + 364	69 16 -90
2	10.2	56 737 + 285	18 14 -177	18 262 + 689	12 88 -276	29 463 + 291	52 60 -126	06 320 + 338	68 79 -37
2	20.1	56 988 + 251	19 67 -153	18 866 + 604	16 00 -312	29 719 + 256	51 71 -89	06 619 + 299	68.95 + 16
3	2.1	57 203 + 215	20 94 -127	19 379 + 513	19 35 -335	29 938 + 219	51 17 -54	06 875 + 256	69 59 + 64
3	12.1	57 381 + 178	21 95 -101	19 798 + 419	22 90 -355	30 120 + 182	50 97 -20	07 086 + 211	70 67 +108
3	22.0	57 519 + 138	22 68 -73	20 111 + 313	26 55 -365	30 260 + 140	51 11 + 14	07 246 + 160	72 14 +147
4	1.0	57 623 + 104	23 18 -50	20 326 + 215	30 19 -364	30 364 + 104	51 50 + 39	07 359 + 113	73 86 +172
4	11.0	57 693 + 70	23 45 -27	20 442 + 116	33 80 -361	30 434 + 70	52 13 + 63	07 428 + 69	75 81 +195
4	21.0	57 732 + 39	23 50 -5	20 456 + 14	37 28 -348	30 470 + 36	52 94 + 81	07 453 + 25	77 86 +205
4	30.9	57 746 + 14	23 41 + 9	20 381 -75	40 54 -326	30 479 + 9	53 85 + 91	07 443 -10	79 91 +205
5	10.9	57 735 -11	23 17 + 24	20 215 -166	43 57 -303	30 463 -16	54 83 + 98	07 399 -44	81 91 +200
5	20.9	57 704 -31	22 81 + 36	19 964 -251	46 26 -269	30 425 -38	55 84 +101	07 325 -74	83 76 +185
5	30.9	57 656 -48	22 39 + 42	19 643 -321	48 58 -232	30 371 -54	56 80 + 96	07 231 -94	85 40 +164
6	9.8	57 592 -64	21 89 + 50	19 250 -393	50 49 -191	30 300 -71	57 72 + 92	07 115 -116	86 80 +140
6	19.8	57 515 -77	21 36 + 53	18 801 -449	51 91 -142	30 217 -83	58 53 + 81	06 985 -130	87 89 +109
6	29.8	57 429 -86	20 81 + 55	18 312 -489	52 86 -95	30 125 -92	59 23 + 70	06 845 -140	88 65 + 76
7	9.7	57 334 -96	20 24 + 57	17 786 -526	53 29 -43	30 025 -100	59 80 + 57	06 697 -148	89 06 + 41
7	19.7	57 236 -98	19 70 + 54	17 248 -538	53 17 + 12	29 922 -103	60 20 + 40	06 547 -150	89 10 + 4
7	29.7	57 137 -99	19 18 + 52	16 714 -534	52 55 + 62	29 819 -103	60 44 + 24	06 400 -147	88 78 -32
8	8.7	57 040 -97	18 70 + 48	16 196 -518	51 42 +113	29 718 -101	60 50 + 6	06 257 -143	88 08 -70
8	18.6	56 953 -87	18 31 + 39	15 725 -471	49 82 +160	29 627 -91	60 35 -15	06 128 -129	87 02 -106
8	28.6	56 880 -73	18 02 + 29	15 312 -413	47 83 +199	29 550 -77	60 01 -34	06 016 -112	85 62 -140
9	7.6	56 825 -55	17 84 + 18	14 978 -334	45 47 +236	29 491 -59	59 44 -57	05 927 -89	83 87 -175
9	17.6	56 798 -27	17 84 + 0	14 748 -230	42 86 +261	29 460 -31	58 64 -80	05 869 -58	81 80 -207
9	27.5	56 802 + 4	18 02 -18	14 627 -121	40 11 +275	29 458 -2	57 61 -103	05 845 -24	79 45 -235
10	7.5	56 849 + 47	18 30 -28	14 634 + 7	37 29 +282	29 492 + 34	56 33 -128	05 864 + 19	76 83 -262
10	17.5	56 921 + 72	19 04 -74	14 778 + 144	34 55 +274	29 569 + 77	54 78 -155	05 931 + 67	73 99 -284
10	27.4	57 049 + 128	19 97 -93	15 054 + 276	32 00 +255	29 689 + 120	53 00 -178	06 047 + 116	70 99 -300
11	6.4	57 224 + 175	21 16 -119	15 465 + 411	29 72 +228	29 856 + 167	50 99 -201	06 217 + 170	67 86 -313
11	16.4	57 443 + 219	22 62 -146	16 001 + 536	27 86 +186	30 069 + 213	48 81 -218	06 439 + 222	64 70 -316
11	26.4	57 701 + 258	24 31 -169	16 641 + 640	26 47 +139	30 322 + 253	46 49 -232	06 709 + 270	61 57 -313
12	6.3	57 996 + 295	26 22 -191	17 374 + 733	25 62 + 85	30 613 + 291	44 08 -241	07 024 + 315	58 54 -303
12	16.3	58 317 + 321	28 28 -206	18 169 + 795	25 39 + 23	30 932 + 319	41 65 -243	07 373 + 349	55 74 -280
12	26.3	58 655 + 338	30 44 -216	19 001 + 832	25 73 -34	31 268 + 336	39 28 -237	07 747 + 374	53 21 -253
12	36.3	59 000 + 345	32 64 -220	19 850 + 849	26 69 -96	31 615 + 347	37 03 -225	08 137 + 390	51 05 -216
		+ 340	-215	+ 831	-154	+ 343	-204	+ 389	-170
Mean Place	57.741	21.50	19.786	35.17	30.279	53.53	06.640	75.44	
sec δ, tan δ	+1.002	-0.065	+3.148	-2.985	+1.019	+0.195	+1.234	+0.723	
dα(y), dδ(y)	+0.062	-0.38	+0.082	-0.38	+0.060	-0.38	+0.056	-0.38	
dα(e), dδ(e)	-0.004	-0.25	-0.192	-0.26	+0.013	-0.27	+0.046	-0.28	
Dble.Trans.	April 6		April 7		April 7		April 8		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1338		1339		489		1340	
	Groombridge 1956 (Canum Venaticorum)		39 Comae Berenices		ξ <sup>1</sup> Centauri		177 G. Centauri	
Mag. Spect.	5.72	K0	6.04	F5	4.40	B3	5.96	B9
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	13 05	+45 19	13 05	+21 13	13 06	-49 49	13 06	-53 22
1 <sup>d</sup> -8.7	13 878 <sup>s</sup> +403	83 76 -264	39 399 <sup>s</sup> +338	37 25 -255	03 365 <sup>s</sup> +459	35 58 -76	45 962 <sup>s</sup> +487	48 43 -64
1 1.3	14 300 +422	81 55 -221	39 751 +352	34 92 -233	03 834 +469	36 83 -125	46 460 +498	49 57 -114
1 11.2	14 732 +432	79 81 -174	40 107 +356	40 107 -208	04 305 +471	38 52 -169	46 960 +500	51 19 -162
1 21.2	15 158 +426	78 63 -118	40 455 +348	31 12 -172	04 760 +455	40 62 -210	47 444 +484	53 25 -206
1 31.2	15 563 +405	78 02 -61	40 785 +330	29 79 -133	05 187 +427	43 04 -242	47 897 +453	55 65 -240
2 10.2	15 939 +376	77 98 -4	41 090 +305	28 87 -92	05 579 +392	45 74 -270	48 315 +418	58 36 -271
2 20.1	16 273 +334	78 53 +55	41 360 +270	28 41 -46	05 926 +347	48 63 -289	48 683 +368	61 30 -294
3 2.1	16 557 +284	79 57 +104	41 592 +232	28 36 -5	06 223 +297	51 62 -299	48 999 +316	64 36 -306
3 12.1	16 790 +233	81 08 +151	41 784 +192	28 70 +34	06 471 +248	54 67 -305	49 263 +264	67 52 -316
3 22.0	16 964 +174	82 97 +189	41 933 +149	29 40 +70	06 665 +194	57 71 -304	49 469 +206	70 67 -315
4 1.0	17 084 +120	85 12 +215	42 043 +110	30 37 +97	06 809 +144	60 65 -294	49 622 +153	73 76 -309
4 11.0	17 151 +67	87 46 +234	42 115 +72	31 57 +120	06 905 +96	63 50 -285	49 722 +100	76 75 -299
4 21.0	17 166 -15	89 87 +241	42 151 +36	32 94 +137	06 953 +48	66 15 -265	49 770 +48	79 56 -281
4 30.9	17 138 -26	92 24 +237	42 158 +7	34 36 +142	06 960 +7	68 58 -243	49 774 +4	82 16 -260
5 10.9	17 069 -69	94 51 +227	42 137 -21	35 82 +146	06 926 -34	70 76 -218	49 732 -42	84 51 -235
5 20.9	16 966 -103	96 57 +206	42 092 -45	37 22 +140	06 854 -72	72 63 -187	49 648 -84	86 54 -203
5 30.9	16 837 -129	98 36 +179	42 028 -64	38 52 +130	06 750 -104	74 19 -156	49 529 -119	88 25 -171
6 9.8	16 683 -154	99 84 +148	41 947 -81	39 68 +116	06 614 -136	75 39 -120	49 374 -155	89 59 -134
6 19.8	16 512 -171	100 94 +110	41 853 -94	40 66 +98	06 451 -163	76 20 -81	49 190 -184	90 52 -93
6 29.8	16 332 -180	101 64 +70	41 749 -104	41 42 +76	06 269 -182	76 63 -43	48 985 -205	91 05 -53
7 9.7	16 142 -190	101 94 +30	41 637 -112	41 97 +55	06 067 -202	76 66 -3	48 758 -227	91 15 -10
7 19.7	15 952 -190	101 79 -15	41 521 -116	42 25 +28	05 857 -210	76 27 +39	48 522 -236	90 82 +33
7 29.7	15 767 -185	101 23 -56	41 406 -115	42 28 +3	05 644 -213	75 51 +76	48 283 -239	90 09 +73
8 8.7	15 588 -179	100 24 -99	41 294 -112	42 05 -23	05 435 -209	74 37 +114	48 049 -234	88 95 +114
8 18.6	15 427 -161	98 83 -141	41 192 -102	41 53 -52	05 244 -191	72 91 +146	47 834 -215	87 46 +149
8 28.6	15 286 -141	97 06 -177	41 103 -89	40 75 -78	05 076 -168	71 19 +172	47 645 -189	85 68 +178
9 7.6	15 172 -114	94 91 -215	41 034 -69	39 69 -106	04 941 -135	69 23 +196	47 493 -152	83 65 +203
9 17.6	15 094 -78	92 42 -249	40 993 -41	38 35 -134	04 854 -87	67 15 +208	47 393 -100	81 46 +219
9 27.5	15 056 -38	89 66 -276	40 981 -12	36 75 -160	04 819 -35	65 02 +213	47 349 -44	79 21 +225
10 7.5	15 066 +10	86 62 -304	41 008 +27	34 88 -187	04 845 +26	62 91 +211	47 371 +22	76 96 +225
10 17.5	15 130 +64	83 39 -323	41 078 +70	32 77 -211	04 940 +95	60 96 +195	47 468 +97	74 85 +211
10 27.4	15 248 +118	80 04 -335	41 193 +115	30 45 -232	05 103 +163	59 23 +173	47 637 +169	72 96 +189
11 6.4	15 426 +178	76 59 -345	41 356 +163	27 93 -252	05 336 +233	57 81 +142	47 883 +246	71 37 +159
11 16.4	15 663 +237	73 18 -341	41 567 +211	25 30 -263	05 637 +301	56 81 +100	48 201 +318	70 19 +118
11 26.4	15 953 +290	69 86 -332	41 820 +253	22 60 -270	05 994 +357	56 23 +58	48 579 +378	69 45 +74
12 6.3	16 295 +342	66 70 -316	42 113 +293	19 88 -272	06 404 +410	56 16 +7	49 014 +435	69 22 +23
12 16.3	16 676 +381	63 86 -284	42 437 +324	17 25 -263	06 849 +445	56 60 -44	49 486 +472	69 53 -31
12 26.3	17 086 +410	61 36 -250	42 781 +344	14 76 -249	07 316 +467	57 53 -93	49 982 +496	70 34 -81
12 36.3	17 515 +429	59 30 -206	43 138 +357	12 51 -225	07 794 +478	58 96 -143	50 489 +507	71 68 -134
	17 515 +429	59 30 -152	43 138 +354	12 51 -194	07 794 +468	58 96 -186	50 489 +498	71 68 -179
Mean Place	15.927	86.07	41.758	32.56	07.028	62.83	49.797	76.41
sec δ, tan δ	+1.423	+1.012	+1.073	+0.388	+1.550	-1.185	+1.677	-1.346
da(ψ), dδ(ψ)	+0.054	-0.38	+0.058	-0.38	+0.070	-0.38	+0.071	-0.38
da(ε), dδ(ε)	+0.065	-0.28	+0.025	-0.28	-0.076	-0.28	-0.086	-0.29
Dbles. Trans.	April 8		April 8		April 8		April 8	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	490			491		1341		492	
	♁ Virginis*			17 Canum Venat.		342 G. Hydrae		β Comae Berenices	
Mag. Spect.	4.46	A0		6.05	F0	6.48	A3	4.32	G0
U.T.	R.A.	Dec.		R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	h m
	13 09	- 5 27	13 09	+ 38 33	13 10	- 26 28	13 11	+ 27 56	
1	-8.7	+ 330	-208	+ 372	-267	+ 359	-148	+ 345	-260
1	1.3	+ 340	-215	+ 391	-231	+ 368	-176	+ 360	-233
1	11.2	+ 344	-216	+ 400	-189	+ 371	-200	+ 366	-201
1	21.2	+ 334	-211	+ 395	-138	+ 361	-218	+ 361	-158
1	31.2	+ 315	-198	+ 375	- 85	+ 339	-228	+ 342	-114
2	10.2	+ 292	-182	+ 349	- 31	+ 313	-234	+ 318	- 66
2	20.1	+ 258	-159	+ 311	+ 24	+ 278	-232	+ 282	- 17
3	2.1	+ 223	-134	+ 266	+ 74	+ 240	-223	+ 243	+ 28
3	12.1	+ 187	-110	+ 220	+ 118	+ 203	-214	+ 202	+ 71
3	22.1	+ 149	- 83	+ 168	+ 158	+ 162	-198	+ 156	+ 108
4	1.0	+ 114	- 59	+ 120	+ 185	+ 125	-180	+ 114	+ 136
4	11.0	+ 81	- 36	+ 74	+ 207	+ 90	-163	+ 74	+ 160
4	21.0	+ 50	- 16	+ 27	+ 217	+ 55	-141	+ 35	+ 173
4	30.9	+ 23	+ 1	- 10	+ 216	+ 27	-121	+ 3	+ 178
5	10.9	- 1	+ 16	- 46	+ 211	- 1	-100	- 28	+ 177
5	20.9	- 23	+ 28	- 77	+ 195	- 28	- 76	- 54	+ 169
5	30.9	- 41	+ 36	- 100	+ 172	- 48	- 56	- 74	+ 152
6	9.8	- 59	+ 44	- 123	+ 147	- 69	- 33	- 94	+ 135
6	19.8	- 73	+ 49	- 139	+ 113	- 88	- 10	- 108	+ 110
6	29.8	- 84	+ 52	- 149	+ 79	- 101	+ 11	- 118	+ 82
7	9.7	- 94	+ 55	- 159	+ 42	- 115	+ 34	- 128	+ 56
7	19.7	- 100	+ 55	- 161	+ 2	- 122	+ 54	- 131	+ 22
7	29.7	- 102	+ 53	- 158	- 35	- 125	+ 72	- 130	- 8
8	8.7	- 102	+ 51	- 155	- 75	- 125	+ 90	- 128	- 39
8	18.6	- 93	+ 43	- 140	- 113	- 116	+ 102	- 117	- 73
8	28.6	- 82	+ 36	- 123	- 148	- 101	+ 111	- 103	- 103
9	7.6	- 63	+ 24	- 101	- 185	- 81	+ 117	- 82	- 135
9	17.6	- 36	+ 9	- 68	- 217	- 49	+ 113	- 55	- 165
9	27.5	- 6	- 8	- 32	- 246	- 14	+ 107	- 22	- 192
10	7.5	+ 36	- 29	+ 10	- 274	+ 29	+ 94	+ 16	- 221
10	17.5	+ 63	- 50	+ 60	- 295	+ 77	+ 73	+ 62	- 244
10	27.4	+ 120	- 82	+ 111	- 311	+ 127	+ 49	+ 108	- 263
11	6.4	+ 166	- 108	+ 166	- 324	+ 180	+ 18	+ 158	- 280
11	16.4	+ 211	- 135	+ 220	- 325	+ 232	- 17	+ 208	- 288
11	26.4	+ 253	- 158	+ 269	- 321	+ 276	- 53	+ 253	- 291
12	6.3	+ 290	- 183	+ 317	- 309	+ 317	- 91	+ 296	- 287
12	16.3	+ 317	- 199	+ 354	- 285	+ 346	- 127	+ 328	- 272
12	26.3	+ 336	- 210	+ 380	- 256	+ 365	- 158	+ 351	- 252
12	36.3	+ 346	- 218	+ 397	- 217	+ 375	- 187	+ 366	- 222
	+ 342	- 214	+ 398	- 169	+ 369	- 208	+ 365	- 184	
Mean Place	14.996	61.72	26.083	73.66	55.045	48.53	14.643	46.99	
sec δ, tan δ	+1.005	-0.096	+1.279	+0.797	+1.117	-0.498	+1.132	+0.531	
dα(ψ), dδ(ψ)	+0.062	-0.38	+0.055	-0.38	+0.065	-0.38	+0.057	-0.38	
dα(ε), dδ(ε)	-0.006	-0.30	+0.051	-0.30	-0.032	-0.30	+0.034	-0.31	
Dble. Trans.	April 9			April 9		April 9		April 9	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	493		1342		1343		1344	
	η Muscae		195 G. Centauri		196 G. Centauri		σ Virginis	
Mag. Spect.	4.95	B8	5.36	K0	5.87	A3p	5.01	M0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	13 14	-67 48	13 16	-31 25	13 16	-43 54	13 16	+ 5 32
1 -8.7	14.185 + 700	54.43 - 8	04.793 + 370	44.59 -128	23.102 + 419	05.04 - 85	52.756 + 324	36.27 -232
1 1.3	14.906 + 721	55.07 - 64	05.174 + 381	46.19 -160	23.534 + 432	06.33 -129	53.093 + 337	34.00 -227
1 11.2	15.633 + 727	56.28 -121	05.559 + 385	48.09 -190	23.970 + 436	08.01 -168	53.435 + 342	31.82 -218
1 21.2	16.340 + 707	58.03 -175	05.933 + 374	50.23 -214	24.393 + 423	10.07 -206	53.771 + 336	29.82 -200
1 31.2	17.007 + 667	60.24 -221	06.287 + 354	52.52 -229	24.793 + 400	12.39 -232	54.089 + 318	28.07 -175
2 10.2	17.626 + 619	62.87 -263	06.615 + 328	54.91 -239	25.164 + 371	14.94 -255	54.385 + 296	26.59 -148
2 20.1	18.175 + 549	65.85 -298	06.907 + 292	57.34 -243	25.494 + 330	17.64 -270	54.649 + 264	25.43 -116
3 2.1	18.649 + 474	69.05 -320	07.160 + 253	59.73 -239	25.781 + 287	20.41 -277	54.878 + 229	24.60 - 83
3 12.1	19.047 + 398	72.46 -341	07.376 + 216	62.06 -233	26.024 + 243	23.21 -280	55.072 + 194	24.09 - 51
3 22.1	19.357 + 310	75.96 -350	07.549 + 173	64.28 -222	26.219 + 195	25.98 -277	55.228 + 156	23.90 - 19
4 1.0	19.585 + 228	79.48 -352	07.685 + 136	66.33 -205	26.370 + 151	28.64 -266	55.348 + 120	23.97 + 7
4 11.0	19.731 + 146	82.97 -349	07.784 + 99	68.24 -191	26.478 + 108	31.19 -255	55.435 + 87	24.28 + 31
4 21.0	19.791 - 60	86.34 -337	07.846 + 62	69.93 -169	26.543 + 65	33.55 -236	55.489 + 54	24.79 + 51
4 30.9	19.775 - 16	89.52 -318	07.878 + 32	71.42 -149	26.571 + 28	35.71 -216	55.516 + 27	25.44 + 65
5 10.9	19.683 - 92	92.49 -297	07.880 + 2	72.70 -128	26.562 - 9	37.64 -193	55.517 + 1	26.18 + 74
5 20.9	19.518 - 165	95.14 -265	07.854 - 26	73.73 -103	26.519 - 43	39.28 -164	55.496 - 21	26.99 + 81
5 30.9	19.290 - 228	97.44 -230	07.805 - 49	74.53 - 80	26.446 - 73	40.64 -136	55.456 - 40	27.80 + 81
6 9.8	19.000 - 290	99.36 -192	07.733 - 72	75.08 - 55	26.344 - 102	41.69 -105	55.398 - 58	28.61 + 81
6 19.8	18.658 - 342	100.81 -145	07.640 - 93	75.36 - 28	26.217 - 127	42.39 - 70	55.324 - 74	29.37 + 76
6 29.8	18.277 - 381	101.82 -101	07.531 - 109	75.40 - 4	26.070 - 147	42.75 - 36	55.240 - 84	30.05 + 68
7 9.8	17.860 - 417	102.32 - 50	07.407 - 124	75.17 + 23	25.904 - 166	42.76 - 1	55.145 - 95	30.66 + 61
7 19.7	17.426 - 434	102.30 + 2	07.275 - 132	74.69 + 48	25.728 - 176	42.40 + 36	55.043 - 102	31.15 + 49
7 29.7	16.988 - 438	101.80 + 50	07.138 - 137	73.99 + 70	25.547 - 181	41.71 + 69	54.939 - 104	31.52 + 37
8 8.7	16.558 - 430	100.80 + 100	07.000 - 138	73.07 + 92	25.366 - 181	40.70 + 101	54.834 - 105	31.76 + 24
8 18.6	16.159 - 399	99.34 + 146	06.872 - 128	71.97 + 110	25.198 - 168	39.39 + 131	54.737 - 97	31.83 + 7
8 28.6	15.804 - 355	97.49 + 185	06.758 - 114	70.74 + 123	25.048 - 150	37.86 + 153	54.651 - 86	31.74 - 9
9 7.6	15.509 - 295	95.27 + 222	06.666 - 92	69.41 + 133	24.925 - 123	36.13 + 173	54.582 - 69	31.46 - 28
9 17.6	15.297 - 212	92.80 + 247	06.606 - 60	68.07 + 134	24.843 - 82	34.30 + 183	54.538 - 44	30.97 - 49
9 27.5	15.174 - 123	90.17 + 263	06.583 - 23	66.77 + 130	24.805 - 38	32.43 + 187	54.523 - 15	30.27 - 70
10 7.5	15.157 - 17	87.46 + 271	06.606 + 23	65.56 + 121	24.821 + 16	30.60 + 183	54.543 + 20	29.34 - 93
10 17.5	15.255 + 98	84.81 + 265	06.679 + 73	64.55 + 101	24.899 + 78	28.92 + 168	54.605 + 62	28.14 - 120
10 27.5	15.467 + 212	82.32 + 249	06.805 + 126	63.76 + 79	25.038 + 139	27.46 + 146	54.711 + 106	26.69 - 145
11 6.4	15.795 + 328	80.09 + 223	06.986 + 181	63.27 + 49	25.242 + 204	26.28 + 118	54.865 + 154	24.99 - 170
11 16.4	16.234 + 439	78.25 + 184	07.222 + 236	63.15 + 12	25.508 + 266	25.50 + 78	55.064 + 199	23.08 - 191
11 26.4	16.766 + 532	76.85 + 140	07.505 + 283	63.40 - 25	25.828 + 320	25.12 + 38	55.306 + 242	21.00 - 208
12 6.3	17.383 + 617	75.97 + 88	07.830 + 325	64.05 - 65	26.197 + 369	25.20 - 8	55.587 + 281	18.76 - 224
12 16.3	18.060 + 677	75.68 + 29	08.187 + 357	65.10 - 105	26.602 + 405	25.76 - 56	55.897 + 310	16.46 - 230
12 26.3	18.774 + 714	75.95 - 27	08.564 + 377	66.50 - 140	27.030 + 428	26.76 - 100	56.227 + 330	14.15 - 231
12 36.3	19.509 + 735	76.82 - 87	08.952 + 388	68.23 - 173	27.470 + 440	28.21 - 145	56.570 + 343	11.90 - 225
	+ 726	- 142	+ 384	- 199	+ 434	- 184	+ 341	- 211
Mean Place	19.362	84.35	07.995	66.36	26.663	30.18	55.359	26.80
sec δ, tan δ	+2.649	-2.453	+1.172	-0.611	+1.388	-0.963	+1.005	+0.097
da(ψ), dδ(ψ)	+0.082	-0.38	+0.066	-0.38	+0.070	-0.38	+0.060	-0.38
da(ε), dδ(ε)	-0.155	-0.32	-0.039	-0.33	-0.061	-0.33	+0.006	-0.33
Dble. Trans.	April 10		April 11		April 11		April 11	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	494		1345		495		1346		
	20 Canum Venat.		61 Virginis		$\gamma$ Hydrae		23 Canum Venat.		
Mag.Spect.	4.66	F0	4.80	G5	3.33	G5	5.69	K0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	
	13 16	+40 38	13 17	-18 13	13 18	-23 05	13 19	+40 12	
1	-8.7	54.137 +375	35 10 -273	38 910 +339	53 36 -173	08 100 +349	43 11 -154	40 530 +372	74 73 -275
1	1.3	54.532 +395	32.74 -236	39 260 +350	55.29 -193	08 461 +361	44 90 -179	40 922 +392	72.34 -239
1	11.2	54.938 +406	30 81 -193	39 614 +354	57.38 -209	08 826 +365	46 90 -200	41 326 +404	70 38 -196
1	21.2	55.341 +403	29 42 -139	39 960 +346	59 55 -217	09 181 +355	49 04 -214	41 728 +402	68 95 -143
1	31.2	55.727 +386	28 56 -86	40 286 +326	61.74 -219	09 518 +337	51 25 -221	42 112 +384	68.05 -90
2	10.2	56.088 +361	28 25 -31	40 589 +303	63 90 -216	09 830 +312	53 48 -223	42 473 +361	67.70 -35
2	20.1	56.410 +322	28 52 +27	40 858 +269	65 95 -205	10 109 +279	55 66 -218	42 796 +323	67.94 +24
3	2.1	56.689 +279	29 30 +78	41 092 +234	67 87 -192	10 351 +242	57 74 -208	43 077 +281	68 67 +73
3	12.1	56.922 +233	30 54 +124	41 291 +199	69 62 -175	10 558 +207	59 70 -196	43 311 +234	69 88 +121
3	22.1	57.101 +179	32 19 +165	41 451 +160	71 18 -156	10 725 +167	61 48 -178	43 494 +183	71 50 +162
4	1.0	57.231 +130	34 12 +193	41 575 +124	72 53 -135	10 856 +131	63 09 -161	43 627 +133	73 40 +190
4	11.0	57.313 +82	36 28 +216	41 666 +91	73 69 -116	10 953 +97	64 51 -142	43 713 +86	75 54 +214
4	21.0	57.347 +34	38 54 +226	41 724 +58	74 63 -94	11 016 +63	65 72 -121	43 751 +38	77 79 +225
4	30.9	57.342 -5	40 81 +227	41 756 +32	75 38 -75	11 051 +35	66 73 -101	43 749 -2	80 05 +226
5	10.9	57.298 -44	43 02 +221	41 760 +4	75 95 -57	11 058 +7	67 55 -82	43 710 -39	82 26 +221
5	20.9	57 221 -77	45 06 +204	41 740 -20	76 33 -38	11 040 -18	68 16 -61	43 637 -73	84 32 +206
5	30.9	57 119 -102	46 88 +182	41 700 -40	76 55 -22	11 001 -39	68 58 -42	43 539 -98	86 14 +182
6	9.8	56 992 -127	48 43 +155	41 640 -60	76 60 -5	10 940 -61	68 80 -2	43 415 -124	87 71 +157
6	19.8	56 847 -145	49 63 +120	41 563 -77	76 49 +11	10 861 -79	68 82 -2	43 273 -142	88 94 +123
6	29.8	56 690 -157	50 47 +84	41 473 -90	76 25 +24	10 768 -93	68 67 +15	43 119 -154	89 81 +87
7	9.8	56 522 -168	50 94 +47	41 369 -104	75 86 +39	10 660 -108	68 33 +34	42 953 -166	90 31 +50
7	19.7	56 351 -171	50 99 +5	41 258 -111	75 35 +51	10 544 -116	67 81 +52	42 782 -171	90 39 +8
7	29.7	56 180 -171	50 65 -34	41 143 -115	74 74 +61	10 424 -120	67 15 +66	42 612 -170	90 09 -30
8	8.7	56 013 -167	49 90 -75	41 026 -117	74 03 +71	10 303 -121	66 34 +81	42 445 -167	89 38 -71
8	18.6	55 859 -154	48 74 -116	40 918 -108	73 27 +76	10 190 -113	65 43 +91	42 291 -154	88 26 -112
8	28.6	55 722 -137	47 23 -151	40 822 -96	72 49 +78	10 089 -101	64 46 +97	42 152 -139	86 78 -148
9	7.6	55 608 -114	45 34 -189	40 744 -78	71 72 +77	10 007 -82	63 46 +100	42 036 -116	84 92 -186
9	17.6	55 526 -82	43 10 -224	40 694 -50	71 02 +70	09 955 -52	62 50 +96	42 036 -84	84 92 -220
9	27.5	55 480 -46	40 58 -252	40 676 -18	70 43 +59	09 936 -19	61 62 +88	41 952 -49	82 72 -249
10	7.5	55 478 -2	37 77 -281	40 698 +22	70 01 +42	09 958 +22	60 88 +74	41 897 -6	80 23 -279
10	17.5	55 527 +49	34 74 -303	40 764 +66	69 82 +19	10 027 +69	60 35 +53	41 942 +45	74 43 -301
10	27.5	55 627 +100	31 55 -319	40 878 +114	69 82 +0	10 143 +116	60 05 +30	42 038 +96	71 26 -317
11	6.4	55 784 +157	28 23 -332	41 043 +165	70 13 -31	10 314 +171	60 03 +2	42 191 +153	67 95 -331
11	16.4	55 997 +213	24 89 -334	41 257 +214	70 78 -65	10 535 +221	60 37 -34	42 400 +209	64 62 -333
11	26.4	56 262 +265	21 61 -328	41 514 +257	71 74 -96	10 800 +265	61 04 -67	42 661 +261	61 33 -329
12	6.3	56 577 +315	18 44 -317	41 812 +298	73 02 -128	11 106 +306	62 06 -102	42 972 +311	58 15 -318
12	16.3	56 930 +353	15 53 -291	42 138 +326	74 58 -156	11 442 +336	63 41 -135	43 322 +350	55 22 -293
12	26.3	57 313 +383	12 92 -261	42 483 +345	76 38 -180	11 798 +356	65 04 -163	43 701 +379	52 59 -263
12	36.3	57 715 +402	10 71 -221	42 840 +357	78 39 -201	12 165 +367	66 92 -188	44 101 +400	50 34 -225
		57 715 +406	10 71 -172	42 840 +353	78 39 -212	12 165 +364	66 92 -206	44 101 +403	50 34 -175
Mean Place	56.304	36.57	41.813	71.41	11.143	62.19	42.720	76.15	
sec $\delta$ , tan $\delta$	+1.318	+0.858	+1.053	-0.329	+1.087	-0.427	+1.310	+0.846	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.054	-0.38	+0.064	-0.38	+0.065	-0.37	+0.054	-0.37	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.054	-0.33	-0.021	-0.33	-0.027	-0.33	+0.053	-0.34	
Dbie.Trans.	April 11		April 11		April 11		April 12		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	496		1347		497		498	
	ι Centauri		ι Centauri*		ζ Ursae Majoris* ρ.		α Virginis (Spica)	
Mag. Spect.	2.91	A2	4.62	B5	2.40	A2p	1.21	B2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 13 19	<sup>o</sup> <sup>'</sup> -36 38	<sup>h</sup> <sup>m</sup> 13 21	<sup>o</sup> <sup>'</sup> -60 54	<sup>h</sup> <sup>m</sup> 13 23	<sup>o</sup> <sup>'</sup> +54 59	<sup>h</sup> <sup>m</sup> 13 24	<sup>o</sup> <sup>'</sup> -11 05
1 -8.7	46.749 +385	05 97 -108	40 532 +566	36 03 -20	21.050 +446	39.46 -276	25.956 +328	13.32 -188
1 1.3	47.147 +398	07 42 -145	41.117 +585	36.78 -75	21.527 +477	37.18 -228	26.298 +342	15.33 -201
1 11.2	47.549 +392	09 20 -178	41.710 +593	38.04 -126	22.022 +495	35.41 -177	26.646 +348	17.43 -210
1 21.2	47.941 +371	11 29 -209	42.289 +579	39.81 -177	22.519 +497	34.27 -114	26.986 +340	19.53 -210
1 31.2	48.312 +371	13 57 -228	42.837 +548	42.00 -219	22.998 +479	33.74 -53	27.310 +324	21.57 -204
2 10.2	48.655 +343	16 02 -245	43 348 +511	44.56 -256	23 451 +453	33.84 +10	27 612 +302	23.51 -194
2 20.1	48.963 +308	18 55 -253	43 806 +458	47 43 -287	23 858 +407	34.57 +73	27 883 +271	25.28 -177
3 2.1	49.231 +268	21 09 -254	44 204 +398	50.49 -306	24.211 +353	35.84 +127	28.120 +237	26.86 -158
3 12.1	49.459 +228	23 62 -253	44 543 +339	53.72 -323	24.505 +294	37.61 +177	28.323 +203	28.22 -136
3 22.1	49.643 +184	26 06 -244	44.815 +272	57.02 -330	24.730 +225	39.80 +219	28.489 +166	29.35 -113
4 1.0	49.787 +144	28 37 -231	45 022 +207	60.32 -330	24 889 +159	42.25 +245	28 620 +131	30.25 -90
4 11.0	49.892 +105	30 55 -218	45 166 +144	63.57 -325	24 982 +93	44.92 +267	28 719 +99	30.95 -70
4 21.0	49.959 +67	32 53 -198	45 244 +78	66.70 -313	25 008 +26	47.66 +274	28 785 +66	31.43 -48
4 30.9	49.993 +34	34 30 -177	45 265 +21	69.63 -293	24 977 -31	50.35 +269	28 825 +40	31.74 -31
5 10.9	49.995 +2	35.86 -156	45.227 -38	72.36 -273	24.893 -84	52.93 +258	28.839 +14	31.88 -14
5 20.9	49.966 -29	37.16 -130	45.133 -94	74.78 -242	24.760 -133	55.28 +235	28.828 -11	31.87 +1
5 30.9	49.911 -55	38.21 -105	44.991 -142	76.89 -211	24.590 -170	57.31 +203	28.798 -30	31.75 +12
6 9.8	49.831 -80	38.98 -77	44.800 -191	78.63 -174	24.385 -205	59.00 +169	28.748 -50	31.52 +23
6 19.8	49.727 -104	39.45 -47	44.567 -233	79.93 -130	24.153 -232	60.25 +125	28.680 -68	31.18 +34
6 29.8	49.607 -120	39.65 -20	44.303 -264	80.83 -90	23.906 -247	61.06 +81	28.599 -81	30.78 +40
7 9.8	49.468 -139	39.54 +11	44.008 -295	81.26 -43	23.644 -262	61.40 +34	28.505 -94	30.30 +48
7 19.7	49.320 -148	39.13 +41	43.697 -311	81.20 +6	23.378 -266	61.24 -16	28.401 -104	29.77 +53
7 29.7	49.167 -153	38.45 +68	43.379 -318	80.71 +49	23.115 -263	60.63 -61	28.294 -107	29.21 +56
8 8.7	49.013 -154	37.51 +94	43.063 -316	79.75 +96	22.858 -257	59.53 -110	28.183 -111	28.61 +60
8 18.6	48.868 -145	36.34 +117	42.767 -296	78.37 +138	22.621 -237	57.96 -157	28.079 -104	28.04 +57
8 28.6	48.739 -129	35.00 +134	42.501 -266	76.64 +173	22.407 -214	55.99 -197	27.986 -93	27.50 +54
9 7.6	48.633 -106	33.51 +149	42.277 -224	74.57 +207	22.223 -184	53.60 -239	27.909 -77	27.01 +49
9 17.6	48.561 -72	31.97 +154	42.116 -161	72.28 +229	22.083 -140	50.85 -275	27.858 -51	26.65 +36
9 27.5	48.529 -32	30.43 +154	42.021 -95	69.85 +243	21.988 -95	47.80 -305	27.837 -21	26.42 +23
10 7.5	48.545 +16	28.95 +148	42.008 -13	67.35 +250	21.949 -39	44.47 -333	27.854 +17	26.39 +3
10 17.5	48.616 +71	27.66 +129	42.085 +77	64.93 +242	21.975 +26	40.95 -352	27.905 +51	26.75 -36
10 27.5	48.742 +126	26.57 +109	42.250 +165	62.68 +225	22.065 +90	37.30 -365	28.014 +109	26.96 -21
11 6.4	48.928 +186	25.78 +79	42.510 +260	60.67 +201	22.227 +162	33.58 -372	28.169 +155	27.67 -71
11 16.4	49.170 +242	25.37 +41	42.858 +348	59.05 +162	22.460 +233	29.91 -367	28.372 +203	28.67 -100
11 26.4	49.462 +292	25.33 +4	43.283 +425	57.85 +120	22.759 +299	26.36 -355	28.617 +245	29.93 -126
12 6.3	49.801 +339	25.72 -39	43.778 +495	57.16 +69	23.123 +364	23.02 -334	28.902 +285	31.47 -154
12 16.3	50.172 +371	26.54 -82	44.324 +546	57.01 +15	23.539 +416	20.03 -299	29.217 +315	33.23 -176
12 26.3	50.565 +383	27.75 -121	44.902 +578	57.40 -39	23.996 +457	17.43 -260	29.553 +336	35.15 -192
12 36.3	50.970 +405	29.34 -159	45.500 +598	58.35 -95	24.482 +486	15.33 -210	29.901 +348	37.21 -206
	+402	-190	+592	-147	+495	-152	+347	-210
Mean Place	50.099	28.99	45.103	64.36	23.025	44.38	28.832	28.10
sec δ, tan δ	+1.246	-0.744	+2.057	-1.798	+1.743	+1.428	+1.019	-0.196
da(ψ), dδ(ψ)	+0.068	-0.37	+0.078	-0.37	+0.048	-0.37	+0.063	-0.37
da(ε), dδ(ε)	-0.047	-0.34	-0.112	-0.35	+0.089	-0.36	-0.012	-0.36
Dble. Trans.	April 12		April 12		April 12		April 13	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	499			1348		1350		1349									
	Groombridge 2001 (Ursae Minoris)			68 Virginis		B.D. +31° 2493 (Canum Venaticorum)		70 Virginis									
Mag.Spect.	6.07	K5		5.59	K2	7.12	K2		5.16	G0							
U.T.	R.A.	Dec.		R.A.	Dec.	R.A.	Dec.		R.A.	Dec.							
	h m	° ' "		h m	° ' "	h m	° ' "		h m	° ' "							
	13 25	+ 72 27		13 25	- 12 38	13 27	+ 31 12		13 27	+ 13 50							
1	-8.7	45.911	+ 725	33.69	-258	57.363	+ 329	00.66	-183	38.998	+ 342	68.84	-275	43.635	+ 321	68.56	-252
1	1.3	46.697	+ 786	31.64	-205	57.706	+ 343	02.63	-197	39.360	+ 362	66.37	-247	43.972	+ 337	66.17	-239
1	11.3	47.527	+ 830	30.19	-145	58.055	+ 349	04.71	-208	39.733	+ 373	64.25	-212	44.317	+ 345	63.96	-221
1	21.2	48.369	+ 842	29.41	-78	58.397	+ 342	06.81	-210	40.104	+ 371	62.58	-167	44.658	+ 341	62.02	-194
1	31.2	49.190	+ 821	29.30	-11	58.723	+ 326	08.87	-206	40.460	+ 356	61.38	-120	44.984	+ 326	60.41	-161
2	10.2	49.971	+ 781	29.85	+ 55	59.026	+ 303	10.84	-197	40.795	+ 395	60.67	-71	45.289	+ 305	59.14	-127
2	20.1	50.677	+ 706	31.05	+120	59.239	+ 273	12.66	-182	41.098	+ 303	60.50	-17	45.564	+ 275	58.28	-86
3	2.1	51.287	+ 610	32.80	+175	59.539	+ 240	14.29	-163	41.362	+ 284	60.81	+ 31	45.805	+ 241	57.80	-48
3	12.1	51.791	+ 504	35.04	+224	59.744	+ 205	15.73	-144	41.586	+ 224	61.57	+ 76	46.011	+ 206	57.69	-11
3	22.1	52.166	+ 375	37.66	+262	59.912	+ 168	16.94	-121	41.765	+ 179	62.74	+117	46.178	+ 167	57.95	+ 26
4	1.0	52.411	+ 245	40.53	+287	60.045	+ 133	17.94	-100	41.902	+ 137	64.22	+148	46.308	+ 130	58.49	+ 54
4	11.0	52.527	+ 116	43.56	+303	60.146	+ 101	18.72	-78	41.997	+ 95	65.94	+172	46.403	+ 95	59.28	+ 79
4	21.0	52.509	- 18	46.60	+304	60.215	+ 69	19.30	-58	42.050	+ 53	67.83	+189	46.464	+ 61	60.26	+ 98
4	31.0	52.374	- 135	49.52	+292	60.257	+ 42	19.69	-39	42.069	+ 19	69.77	+194	46.496	+ 32	61.36	+110
5	10.9	52.126	- 248	52.27	+275	60.272	+ 15	19.93	-24	42.055	- 14	71.71	+194	46.501	+ 5	62.54	+118
5	20.9	51.777	- 349	54.70	+243	60.263	- 9	20.00	- 7	42.011	- 44	73.57	+186	46.480	- 21	63.72	+118
5	30.9	51.350	- 427	56.75	+205	60.234	- 29	19.95	+ 5	41.944	- 67	75.25	+168	46.440	- 40	64.86	+114
6	9.8	50.851	- 499	58.38	+163	60.184	- 50	19.78	+ 17	41.854	- 90	76.75	+150	46.380	- 60	65.93	+107
6	19.8	50.299	- 552	59.50	+112	60.117	- 67	19.49	+ 29	41.745	- 109	77.98	+123	46.303	- 77	66.88	+ 95
6	29.8	49.716	- 583	60.10	+ 60	60.036	- 81	19.13	+ 36	41.624	- 121	78.92	+ 94	46.214	- 89	67.68	+ 80
7	9.8	49.108	- 608	60.19	+ 9	59.940	- 96	18.67	+ 46	41.489	- 135	79.56	+ 64	46.112	- 102	68.33	+ 65
7	19.7	48.496	- 612	59.70	- 49	59.836	- 104	18.14	+ 53	41.348	- 141	79.85	+ 29	46.002	- 110	68.77	+ 44
7	29.7	47.897	- 599	58.71	- 99	59.726	- 110	17.57	+ 57	41.205	- 143	79.80	- 5	45.890	- 112	69.02	+ 25
8	8.7	47.317	- 580	57.20	-151	59.614	- 112	16.96	+ 61	41.062	- 143	79.41	- 39	45.775	- 115	69.06	+ 4
8	18.7	46.780	- 537	55.20	-200	59.508	- 106	16.34	+ 62	40.928	- 134	78.65	- 76	45.667	- 108	68.86	- 20
8	28.6	46.294	- 486	52.77	-243	59.412	- 96	15.75	+ 59	40.806	- 122	77.56	-109	45.569	- 98	68.44	- 42
9	7.6	45.870	- 424	49.92	-285	59.333	- 79	15.20	+ 55	40.702	- 104	76.13	-143	45.486	- 83	67.77	- 67
9	17.6	45.531	- 339	46.73	-319	59.279	- 54	14.76	+ 44	40.626	- 76	74.37	-176	45.429	- 57	66.84	- 93
9	27.5	45.279	- 252	43.26	-347	59.256	- 23	14.45	+ 31	40.581	- 45	72.32	-205	45.400	- 29	65.68	-116
10	7.5	45.129	- 150	39.53	-373	59.272	+ 16	14.32	+ 13	40.575	- 6	69.98	-234	45.406	+ 6	64.24	-144
10	17.5	45.095	- 34	35.68	-385	59.327	+ 55	14.52	- 20	40.616	+ 41	67.38	-260	45.454	+ 48	62.55	-169
10	27.5	45.176	+ 81	31.75	-393	59.429	+ 102	14.71	- 19	40.703	+ 87	64.59	-279	45.546	+ 92	60.62	-193
11	6.4	45.384	+ 208	27.81	-394	59.584	+ 155	15.31	- 60	40.843	+ 140	61.62	-297	45.687	+ 141	58.46	-216
11	16.4	45.718	+ 334	24.01	-380	59.786	+ 202	16.21	- 90	41.035	+ 192	58.56	-306	45.875	+ 188	56.13	-233
11	26.4	46.170	+ 452	20.41	-360	60.031	+ 245	17.39	-118	41.275	+ 240	55.48	-308	46.107	+ 232	53.67	-246
12	6.4	46.739	+ 569	17.10	-331	60.316	+ 285	18.85	-146	41.561	+ 286	52.45	-303	46.380	+ 273	51.12	-255
12	16.3	47.405	+ 666	14.22	-288	60.632	+ 316	20.54	-169	41.884	+ 323	49.57	-288	46.685	+ 305	48.58	-254
12	26.3	48.148	+ 743	11.82	-240	60.969	+ 337	22.42	-188	42.234	+ 350	46.91	-266	47.013	+ 328	46.11	-247
12	36.3	48.953	+ 805	09.98	-184	61.318	+ 349	24.45	-203	42.603	+ 369	44.56	-235	47.357	+ 344	43.77	-234
			+ 831		-118		+ 349		-209		+ 373		-195		+ 345		-211
Mean Place	47.327	41.24		60.271	15.86	41.345	68.04	46.182	62.08								
sec δ, tan δ	+3.318	+3.164		+1.025	-0.224	+1.169	+0.606	+1.030	+0.247								
dα(ψ), dδ(ψ)	+0.030	-0.37		+0.063	-0.37	+0.055	-0.37	+0.059	-0.37								
dα(ε), dδ(ε)	+0.196	-0.37		-0.014	-0.37	+0.037	-0.37	+0.015	-0.37								
Dble.Trans.	April 13			April 13		April 14		April 14									



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	500		1351		501		502	
	69 H. Ursae Majoris		78 Virginis		ζ Virginis		17 H. Canum Venat.	
Mag.Spect.	5.41	A0	4.93	A2p	3.44	A2	4.96	F0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	13 27	+60 00	13 33	+ 3 43	13 33	- 0 31	13 34	+37 14
1 -8.7	55 550 + 486	49.41 -276	24.128 + 316	49.96 -227	57.496 + 317	27.54 -216	09.383 + 352	63.64 -284
1 1.3	56 072 + 522	47.14 -227	24.461 + 333	47.70 -226	57.829 + 333	29.72 -218	09.758 + 375	61.13 -251
1 11.3	56 620 + 548	45.41 -173	24.801 + 340	45.52 -218	58.169 + 340	31.88 -216	10.147 + 389	59.02 -211
1 21.2	57 171 + 551	44.33 -108	25.138 + 337	43.49 -203	58.505 + 336	33.93 -205	10.537 + 390	57.40 -162
1 31.2	57.707 + 536	43.87 -46	25.460 + 322	41.68 -181	58.826 + 321	35.80 -187	10.913 + 376	56.30 -110
2 10.2	58.215 + 508	44.07 + 20	25.763 + 303	40.13 -155	59.128 + 302	37.46 -166	11.269 + 356	55.74 -56
2 20.1	58.674 + 459	44.91 + 84	26.036 + 273	38.89 -124	59.401 + 273	38.85 -139	11.592 + 323	55.75 + 1
3 2.1	59.074 + 400	46.30 +139	26.278 + 242	37.96 -93	59.642 + 241	39.96 -111	11.876 + 284	56.27 + 52
3 12.1	59.407 + 333	48.20 +190	26.485 + 207	37.35 -61	59.850 + 208	40.79 -83	12.118 + 242	57.27 +100
3 22.1	59.663 + 256	50.52 +232	26.656 + 171	37.05 -30	60.020 + 170	41.31 -52	12.311 + 193	58.71 +144
4 1.0	59.842 + 179	53.12 +260	26.793 + 137	37.02 -3	60.157 + 137	41.59 -28	12.459 + 148	60.46 +175
4 11.0	59.945 + 103	55.92 +280	26.896 + 103	37.24 + 22	60.262 + 105	41.62 -3	12.562 + 103	62.46 +200
4 21.0	59.970 - 25	58.79 +287	26.967 + 71	37.66 + 42	60.334 + 72	41.45 + 17	12.619 + 57	64.62 +216
4 31.0	59.927 - 43	61.59 +280	27.011 + 44	38.23 + 57	60.379 + 45	41.12 + 33	12.638 + 19	66.82 +220
5 10.9	59.821 - 106	64.28 +269	27.028 + 17	38.91 + 68	60.398 + 19	40.66 + 46	12.621 - 17	69.01 +219
5 20.9	59.657 - 164	66.70 +242	27.021 - 7	39.67 + 76	60.392 - 6	40.11 + 55	12.569 - 52	71.07 +206
5 30.9	59.448 - 209	68.80 +210	26.993 - 28	40.45 + 78	60.367 - 25	39.51 + 60	12.491 - 78	72.95 +188
6 9.8	59.197 - 251	70.54 +174	26.946 - 47	41.23 + 78	60.321 - 46	38.88 + 63	12.491 - 104	72.95 +164
6 19.8	58.915 - 282	71.81 +127	26.880 - 66	41.98 + 75	60.257 - 64	38.24 + 64	12.262 - 125	74.59 +133
6 29.8	58.612 - 303	72.63 + 82	26.802 - 78	42.67 + 69	60.179 - 78	37.63 + 61	12.123 - 139	75.92 +101
7 9.8	58.292 - 320	72.96 + 33	26.709 - 93	43.30 + 63	60.087 - 92	37.03 + 60	11.969 - 154	77.58 + 65
7 19.7	57.967 - 325	72.76 - 20	26.607 - 102	43.82 + 52	59.986 - 101	36.51 + 52	11.808 - 161	77.84 + 26
7 29.7	57.646 - 321	72.08 - 68	26.500 - 107	44.23 + 41	59.879 - 107	36.04 + 47	11.644 - 164	77.72 - 12
8 8.7	57.331 - 315	70.91 -117	26.390 - 110	44.53 + 30	59.769 - 110	35.66 + 38	11.479 - 165	77.21 - 91
8 18.7	57.039 - 292	69.24 -167	26.285 - 105	44.68 + 15	59.664 - 105	35.39 + 27	11.324 - 155	76.30 - 51
8 28.6	56.773 - 266	67.17 -207	26.188 - 97	44.67 - 1	59.567 - 97	35.24 + 15	11.181 - 143	75.03 -127
9 7.6	56.543 - 230	64.66 -251	26.107 - 81	44.49 - 18	59.485 - 82	35.22 + 2	11.058 - 123	73.38 -165
9 17.6	56.362 - 181	61.78 -288	26.049 - 58	44.11 - 38	59.427 - 58	35.40 - 18	11.058 - 95	71.38 -200
9 27.5	56.232 - 130	58.61 -317	26.019 - 30	43.52 - 59	59.397 - 30	35.75 - 35	10.963 - 61	69.08 -230
10 7.5	56.166 - 66	55.15 -346	26.024 + 5	42.71 - 81	59.403 + 6	36.31 - 56	10.881 - 21	66.47 -261
10 17.5	56.172 + 6	51.51 -364	26.070 + 46	41.65 -106	59.448 + 45	37.09 - 78	10.909 + 28	63.61 -286
10 27.5	56.251 + 79	47.76 -375	26.159 + 89	40.32 -133	59.538 + 90	38.17 -108	10.986 + 77	60.56 -305
11 6.4	56.410 + 159	43.94 -382	26.297 + 138	38.74 -158	59.677 + 139	39.50 -133	11.119 + 133	57.34 -322
11 16.4	56.651 + 241	40.19 -375	26.483 + 186	36.95 -179	59.863 + 186	41.07 -157	11.119 + 188	54.07 -327
11 26.4	56.966 + 315	36.58 -361	26.711 + 228	34.96 -199	60.093 + 230	42.84 -177	11.547 + 240	50.80 -327
12 6.4	57.356 + 390	33.19 -339	26.981 + 270	32.81 -215	60.363 + 270	44.82 -198	11.837 + 290	47.61 -319
12 16.3	57.806 + 450	30.18 -301	27.282 + 301	30.57 -224	60.666 + 303	46.91 -209	12.167 + 330	44.62 -299
12 26.3	58.304 + 498	27.58 -260	27.606 + 324	28.30 -324	60.990 + 324	49.08 -217	12.528 + 361	41.89 -273
12 36.3	58.838 + 534	25.50 -208	27.946 + 340	26.05 -225	61.329 + 339	51.27 -219	12.912 + 384	39.51 -238
	58.838 + 548	25.50 -148	27.946 + 340	26.05 -212	61.329 + 341	51.27 -211	12.912 + 390	39.51 -191
Mean Place	57.428	55.37	26.846	40.65	60.263	38.20	11.685	64.73
sec δ, tan δ	+2.001	+1.733	+1.002	+0.065	+1.000	-0.009	+1.256	+0.760
dα(ψ), dδ(ψ)	+0.044	-0.37	+0.060	-0.37	+0.061	-0.36	+0.053	-0.36
dα(ε), dδ(ε)	+0.107	-0.37	+0.004	-0.40	-0.001	-0.40	+0.046	-0.40
Dbble.Trans.	April 14		April 15		April 15		April 15	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1353			1352			505		503			
	Groombridge 2017 (Canum Venaticorum)			80 Virginis			Groombridge 2029 (Ursae Minoris)		49 G. Chamaeleontis			
Mag. Spect.	6.63	A5		5.75	K0		5.67	K0	6.44	A0		
U.T.	R.A.		Dec.	R.A.		Dec.	R.A.		Dec.	R.A.		
	h	m	°	h	m	°	h	m	°	h	m	
	13 34		+ 44 15	13 34		- 5 19	13 36		+ 71 18	13 37		
			'			'			'			
			"			"			"			
1 <sup>d</sup>	-8.7	37.471	+ 374	46.230	+ 319	-201	49.850	+ 667	31.28	-273	53.568	+ 982
1 <sup>s</sup>	1.3	37.872	+ 401	46.565	+ 335	-209	50.579	+ 729	29.08	-220	54.598	+ 1030
1	11.3	38.290	+ 418	46.907	+ 342	-212	51.356	+ 777	27.45	-163	55.655	+ 1057
1	21.2	38.709	+ 419	47.246	+ 339	-206	52.150	+ 794	26.51	-94	56.704	+ 1049
1	31.2	39.115	+ 406	47.569	+ 323	-194	52.930	+ 780	26.22	-29	57.710	+ 1006
2	10.2	39.501	+ 386	47.873	+ 304	-178	53.678	+ 748	26.59	+ 37	58.662	+ 952
2	20.1	39.851	+ 350	48.148	+ 275	-156	54.361	+ 683	27.64	+ 105	59.527	+ 865
3	2.1	40.158	+ 307	48.391	+ 243	-131	54.960	+ 599	29.24	+ 160	60.294	+ 767
3	12.1	40.419	+ 261	48.601	+ 210	-106	55.462	+ 502	31.37	+ 213	60.957	+ 663
3	22.1	40.627	+ 208	48.774	+ 173	-80	55.846	+ 384	33.91	+ 254	61.496	+ 539
4	1.0	40.783	+ 156	48.914	+ 140	-55	56.110	+ 264	36.71	+ 280	61.914	+ 418
4	11.0	40.888	+ 105	49.022	+ 108	-33	56.254	+ 144	39.71	+ 300	62.209	+ 295
4	21.0	40.942	+ 54	49.098	+ 76	-11	56.272	+ 18	42.76	+ 305	62.370	+ 161
4	31.0	40.951	+ 9	49.146	+ 48	+ 4	56.179	-93	45.73	+ 297	62.410	+ 40
5	10.9	40.919	-32	49.169	+ 23	+ 20	55.978	-201	48.54	+ 281	62.326	-84
5	20.9	40.847	-72	49.166	-3	+ 31	55.679	-299	51.07	+ 253	62.118	-208
5	30.9	40.745	-102	49.144	-22	+ 38	55.303	-376	53.24	+ 217	61.804	-314
6	9.8	40.615	-130	49.100	-44	+ 46	54.855	-448	55.00	+ 176	61.381	-423
6	19.8	40.460	-155	49.038	-62	+ 50	54.352	-503	56.27	+ 127	60.863	-518
6	29.8	40.290	-170	48.962	-76	+ 52	53.814	-538	57.05	+ 78	60.273	-590
7	9.8	40.104	-186	48.871	-91	+ 54	53.247	-567	57.30	+ 25	59.613	-660
7	19.7	39.911	-193	48.771	-100	+ 53	52.671	-576	56.99	-31	58.913	-700
7	29.7	39.716	-195	48.664	-107	+ 50	52.100	-571	56.18	-81	58.195	-718
8	8.7	39.521	-195	48.553	-111	+ 48	51.542	-558	54.84	-134	57.475	-720
8	18.7	39.338	-183	48.447	-106	+ 40	51.019	-523	52.99	-185	56.792	-683
8	28.6	39.170	-168	48.349	-98	+ 33	50.540	-479	50.71	-228	56.166	-626
9	7.6	39.023	-147	48.266	-83	+ 23	50.115	-425	47.99	-272	55.621	-545
9	17.6	38.909	-114	48.208	-58	+ 7	49.767	-348	44.91	-308	55.195	-426
9	27.5	38.831	-78	48.178	-30	-9	49.497	-270	41.53	-338	54.898	-297
10	7.5	38.797	-34	48.185	+ 7	-28	49.322	-175	37.87	-366	54.755	-143
10	17.5	38.817	+ 20	48.233	+ 48	-42	49.256	-66	34.05	-382	54.786	+ 31
10	27.5	38.890	+ 73	48.320	+ 87	-83	49.298	+ 42	30.14	-391	54.985	+ 199
11	6.4	39.023	+ 133	48.461	+ 141	-104	49.461	+ 163	26.19	-395	55.364	+ 379
11	16.4	39.217	+ 194	48.650	+ 189	-130	49.745	+ 284	22.35	-384	55.912	+ 548
11	26.4	39.467	+ 250	48.883	+ 233	-153	50.143	+ 398	18.67	-388	56.609	+ 697
12	6.4	39.772	+ 305	49.156	+ 273	-175	50.655	+ 512	15.26	-341	57.443	+ 834
12	16.3	40.122	+ 350	49.461	+ 305	-193	51.263	+ 608	12.26	-300	58.380	+ 937
12	26.3	40.506	+ 384	49.788	+ 327	-205	51.948	+ 685	09.71	-255	59.389	+ 1009
12	36.3	40.916	+ 410	50.129	+ 341	-211	52.698	+ 750	07.72	-199	60.447	+ 1058
			+ 418		+ 343	-209		+ 780		-136		+ 1063
Mean Place	39.676	57.03		49.083	39.94		51.414	38.93	61.237	55.87		
sec δ, tan δ	+1.396	+0.975		+1.004	-0.093		+3.121	+2.956	+4.025	-3.899		
dα(ψ), dδ(ψ)	+0.051	-0.36		+0.062	-0.36		+0.029	-0.36	+0.104	-0.36		
dα(ε), dδ(ε)	+0.060	-0.40		-0.006	-0.40		+0.180	-0.41	-0.237	-0.41		
Dble.Trans.	April 15			April 15			April 16		April 16			

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	504		1354		1355		1356	
	ε Centauri		355 G. Hydrae*		82 Virginis		253 G. Centauri	
Mag.Spect.	2.56	B1	6.42	A0	5.16	M0	6.30	B2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	13 38	-53 23	13 40	-23 22	13 40	- 8 37	13 41	-56 41
1 -8.7	<sup>s</sup> 57 316 + 474	27 49 - 26	<sup>s</sup> 42 821 + 340	36 70 -139	<sup>s</sup> 51 221 + 319	53 77 -190	<sup>s</sup> 58 089 + 503	" - 11
1 1.3	57 811 + 495	28 24 - 75	43 178 + 357	38 33 -163	51 556 + 335	55 98 -201	58 617 + 528	34.89 - 61
1 11.3	58 317 + 506	29 46 -122	43 543 + 365	40 18 -185	51 900 + 344	58 04 -206	59 158 + 541	35.50 -109
1 21.2	58 817 + 500	31 14 -168	43 903 + 360	42 18 -200	52 241 + 341	60 10 -206	59 693 + 535	36 59 -158
1 31.2	59 296 + 479	33 18 -204	44 249 + 346	44 25 -207	52 568 + 327	62 06 -196	60 206 + 513	38 17 -198
2 10.2	59 747 + 451	35 54 -236	44 574 + 325	46 37 -212	52 875 + 307	63 91 -185	60 691 + 485	42 48 -233
2 20.2	60 156 + 409	38 17 -263	44 870 + 296	48 45 -208	53 155 + 280	65 56 -165	61 133 + 442	45 10 -262
3 2.1	60 520 + 364	40 96 -279	45 132 + 262	50 44 -199	53 404 + 249	67 00 -144	61 526 + 393	47 92 -282
3 12.1	60 836 + 316	43 89 -293	45 361 + 229	52 32 -188	53 620 + 216	68 22 -122	61 869 + 343	50 89 -297
3 22.1	61 098 + 262	46 87 -298	45 552 + 191	54 05 -173	53 800 + 180	69 18 -96	62 154 + 285	53 95 -306
4 1.0	61 309 + 211	49 83 -296	45 709 + 157	55 61 -156	53 947 + 147	69 92 -74	62 383 + 229	57 01 -306
4 11.0	61 469 + 160	52 75 -292	45 832 + 123	57 01 -140	54 062 + 115	70 44 -52	62 559 + 176	60 06 -305
4 21.0	61 576 + 107	55 55 -280	45 921 + 89	58 21 -120	54 144 + 82	70 74 -30	62 676 + 117	62 99 -293
4 31.0	61 637 + 61	58 18 -263	45 981 + 60	59 23 -102	54 200 + 56	70 89 -15	62 742 + 66	65 76 -277
5 10.9	61 650 + 13	60 62 -244	46 012 + 31	60 08 -85	54 229 + 29	70 88 + 1	62 755 + 13	68 36 -260
5 20.9	61 616 - 34	62 79 -217	46 015 + 3	60 73 -65	54 232 + 3	70 73 + 15	62 717 - 38	70 69 -233
5 30.9	61 542 - 74	64 68 -189	45 995 - 20	61 20 -47	54 214 - 18	70 50 + 23	62 634 - 83	72 74 -205
6 9.9	61 427 - 115	66 26 -158	45 950 - 45	61 50 -30	54 174 - 40	70 17 + 33	62 504 - 130	74 47 -173
6 19.8	61 274 - 153	67 46 -120	45 884 - 66	61 61 -11	54 115 - 59	69 77 + 40	62 334 - 170	75 82 -135
6 29.8	61 092 - 182	68 30 -84	45 799 - 85	61 55 + 6	54 041 - 74	69 33 + 44	62 130 - 204	76 78 -96
7 9.8	60 881 - 211	68 73 -43	45 697 - 102	61 31 + 24	53 950 - 91	68 84 + 49	61 894 - 236	77 33 -55
7 19.7	60 651 - 230	68 73 + 0	45 582 - 115	60 91 + 40	53 848 - 102	68 33 + 51	61 636 - 258	77 42 -9
7 29.7	60 411 - 240	68 35 + 38	45 459 - 123	60 36 + 55	53 740 - 108	67 81 + 52	61 366 - 270	77 11 + 31
8 8.7	60 165 - 246	67 55 + 80	45 330 - 129	59 66 + 70	53 626 - 114	67 29 + 52	61 091 - 275	76 36 + 75
8 18.7	59 929 - 236	66 37 +118	45 206 - 124	58 85 + 81	53 515 - 111	66 81 + 48	60 826 - 265	75 20 +116
8 28.6	59 713 - 216	64 87 +150	45 090 - 116	57 97 + 88	53 413 - 102	66 38 + 43	60 582 - 244	73 70 +150
9 7.6	59 525 - 188	63 08 +179	44 991 - 99	57 04 + 93	53 325 - 88	66 02 + 36	60 369 - 213	71 87 +183
9 17.6	59 384 - 141	61 08 +200	44 918 - 73	56 13 + 91	53 261 - 64	65 80 + 22	60 206 - 163	69 80 +207
9 27.6	59 294 - 90	58 95 +213	44 877 - 41	55 27 + 86	53 225 - 36	65 71 + 9	60 099 - 107	67 59 +221
10 7.5	59 268 - 26	56 76 +219	44 876 - 1	54 53 + 74	53 225 + 0	65 80 - 9	60 061 - 38	65 28 +231
10 17.5	59 315 + 47	54 64 +212	44 921 + 45	53 97 + 56	53 276 + 51	66 08 - 28	60 103 + 42	63 03 +225
10 27.5	59 436 + 121	52 67 +197	45 014 + 93	53 62 + 35	53 350 + 74	66 62 - 54	60 224 + 121	60 90 +213
11 6.4	59 636 + 200	50 92 +175	45 161 + 147	53 51 + 11	53 488 + 138	67 46 - 84	60 430 + 206	58 99 +191
11 16.4	59 912 + 276	49 52 +140	45 361 + 200	53 73 - 22	53 674 + 186	68 56 -109	60 719 + 289	57 41 +158
11 26.4	60 256 + 344	48 51 +101	45 608 + 247	54 27 - 54	53 904 + 230	69 89 -134	61 080 + 361	56 22 +119
12 6.4	60 662 + 406	47 95 + 56	45 899 + 291	55 14 - 87	54 175 + 271	71 48 -159	61 510 + 430	55 49 + 73
12 16.3	61 116 + 454	47 90 + 5	46 225 + 326	56 34 -120	54 479 + 304	73 27 -179	61 992 + 482	55 27 + 22
12 26.3	61 602 + 486	48 33 - 43	46 573 + 348	57 81 -147	54 806 + 327	75 20 -193	62 509 + 517	55 55 - 28
12 36.3	62 109 + 507	49 26 - 93	46 938 + 365	59 53 -172	55 149 + 343	77 25 -205	63 050 + 541	56 35 - 80
	62 109 + 508	49 26 -140	46 938 + 366	59 53 -191	55 149 + 345	77 25 -205	63 050 + 543	56 35 -129
Mean Place	61 599	53.04	46 037	54.37	54 157	66.94	62 643	60 81
sec δ, tan δ	+1.677	-1.346	+1.089	-0.432	+1.011	-0.152	+1.821	-1.522
da(ψ), dδ(ψ)	+0.076	-0.36	+0.066	-0.36	+0.063	-0.36	+0.079	-0.36
da(ε), dδ(ε)	-0.082	-0.42	-0.026	-0.43	-0.009	-0.43	-0.092	-0.43
Dble.Trans.	April 16		April 17		April 17		April 17	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1357		506		1358		507	
	83 Virginis		1 Centauri		3 Bootis		$\tau$ Bootis	
Mag.Spect.	5.71	G0	4.36	F5	5.91	F5	4.51	F5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	13 43	- 16 06	13 44	- 32 58	13 46	+ 25 45	13 46	+ 17 31
1 <sup>d</sup>	-8.7	"	"	"	"	"	"	"
1 <sup>s</sup>	42.915	+ 326	51.583	+ 363	03.224	+ 321	34.662	+ 312
1	1.3	-164	12.91	-100	72.33	-277	29.38	-261
1	11.3	-181	14.24	-133	03.567	+ 343	34.995	+ 333
1	21.2	-195	15.88	-164	69.78	-255	26.92	-246
1	31.2	-202	17.78	-190	03.923	+ 356	24.66	-226
2	10.2	-202	19.85	-207	04.281	+ 358	22.71	-195
2	20.2	-198	22.06	-221	04.628	+ 347	21.12	-159
3	2.1	-187	24.33	-227				
3	12.1	-172	26.61	-228	04.957	+ 329		
3	22.1	-156	28.86	-217	05.259	+ 302	36.332	+ 316
4	1.0	-136	31.03	-205	05.527	+ 288	36.621	+ 289
4	11.0	-97	33.08	-192	05.759	+ 232	19.14	-77
4	21.0	-76	35.00	-175	06.102	+ 191	18.78	-36
4	31.0	-58	36.75	-158	63.21	+ 85	18.83	+ 44
5	10.9	-43	38.33	-139	62.73	-99	19.27	-121
5	20.9	-25	39.72	-117	62.71	+ 43	19.14	-77
5	30.9	-13	40.89	-96	63.14	+ 223	18.78	-36
6	9.9	-13	41.85	-73	63.99	+ 85	18.83	+ 44
6	19.8	-60	42.58	-48	65.16	+ 117	19.27	-121
6	29.8	-76	43.31	-25	65.61	+ 145	19.14	-77
7	9.8	-94	43.29	+ 2	66.61	+ 165	18.78	-36
7	19.7	-106	43.29	+ 2	68.26	+ 175	18.83	+ 44
7	29.7	-114	43.02	+ 49	70.01	+ 179	19.27	-121
8	8.7	-120	42.53	+ 74	71.80	+ 176	20.02	+ 75
8	18.7	-116	41.79	+ 93	73.56	+ 163	21.05	+ 103
8	28.6	-109	40.86	+ 110	75.19	+ 150	22.28	+ 123
9	7.6	-94	39.76	+ 123	76.69	+ 128	23.62	+ 134
9	17.6	-70	38.53	+ 129	77.97	+ 104	25.05	+ 143
9	27.6	-40	37.24	+ 130	79.01	+ 78	26.48	+ 143
10	7.5	-3	35.94	+ 125	79.05	+ 78	27.84	+ 136
10	17.5	+ 43	34.69	+ 110	80.44	+ 18	27.84	+ 136
10	27.5	+ 81	33.59	+ 92	80.30	-14	29.12	+ 128
11	6.4	+ 141	33.59	+ 92	80.30	-14	30.24	+ 112
11	16.4	+ 190	32.67	+ 67	79.83	-47	30.24	+ 95
11	26.4	+ 234	32.00	+ 35	37.326	+ 78	31.19	+ 76
12	6.4	+ 278	31.65	+ 0	37.210	-116	31.95	+ 52
12	16.3	+ 312	31.65	+ 0	37.088	-122	32.47	+ 29
12	26.3	+ 351	32.03	-38	36.962	-126	32.76	+ 29
12	36.3	+ 353	32.79	-76	36.840	-122	32.80	+ 4
Mean Place	46.005	41.70	55.049	33.15	37.433	+ 148	20.02	+ 75
sec $\delta$ , tan $\delta$	+1.041	-0.289	+1.192	-0.649	37.547	+ 114	21.05	+ 103
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.065	-0.36	+0.069	-0.36	37.624	+ 77	22.28	+ 123
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.017	-0.44	-0.039	-0.44	37.672	+ 48	23.62	+ 134
Dble.Trans.	April 18		April 18		37.690	+ 18	25.05	+ 143
					37.681	-9	26.48	+ 143
					37.649	-32	27.84	+ 136
					37.594	-55	27.84	+ 136
					37.520	-74	29.12	+ 128
					37.431	-89	30.24	+ 112
					37.326	-105	31.19	+ 76
					37.210	-116	31.95	+ 52
					37.088	-122	32.47	+ 29
					36.962	-126	32.76	+ 29
					36.840	-122	32.80	+ 4
					36.725	-115	32.80	+ 4
					36.725	-101	32.57	-23
					36.624	-77	32.09	-48
					36.547	-51	32.09	-48
					36.496	-36	31.33	-105
					36.480	-16	30.28	-130
					36.506	+ 26	28.98	-159
					36.576	+ 70	27.39	-159
					36.696	+ 120	25.54	-185
					36.864	+ 168	25.54	-185
					37.079	+ 215	23.45	-209
					37.338	+ 259	23.45	-209
					37.632	+ 321	21.13	-248
					37.953	+ 340	18.65	-248
					38.293	+ 346	16.05	-260
							13.37	-268
							10.72	-265
							08.16	-240
							05.76	-214

AT UPPER TRANSIT AT GREENWICH

No.	509		508		1359		510	
Name	η Ursae Majoris		μ Centauri		B.D. +9° 2814 (Bootis)		89 Virginis	
Mag.Spect.	1.91	B3	3.32	B2p	6.54	A0	5.11	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	13 46	+ 49 22	13 48	- 42 24	13 49	+ 8 28	13 49	- 18 03
1 <sup>d</sup> 8.7	58.392 <sup>s</sup> + 386	45.29 <sup>o</sup> -298	44.110 <sup>s</sup> + 398	02.72 <sup>o</sup> - 59	01.196 <sup>s</sup> + 309	38.06 <sup>o</sup> -240	05.004 <sup>s</sup> + 328	46.81 <sup>o</sup> -154
1 1.3	58.809 + 417	42.72 -257	44.528 + 418	03.71 -137	01.523 + 327	35.72 -234	05.348 + 344	48.54 -173
1 11.3	59.250 + 441	40.61 -211	44.958 + 430	05.08 -173	01.861 + 338	33.50 -222	05.702 + 354	50.43 -189
1 21.2	59.697 + 447	39.08 -153	45.384 + 426	06.81 -173	02.200 + 339	31.48 -202	06.054 + 352	52.42 -199
1 31.2	60.134 + 437	38.15 - 93	45.794 + 410	08.82 -201	02.527 + 327	29.73 -175	06.393 + 339	54.43 -201
2 10.2	60.554 + 420	37.82 - 33	46.182 + 388	11.05 -223	02.837 + 310	28.28 -145	06.714 + 321	56.42 -199
2 20.2	60.938 + 384	38.13 + 31	46.537 + 355	13.46 -241	03.121 + 284	27.18 -110	07.007 + 293	58.32 -190
3 2.1	61.279 + 341	39.00 + 87	46.855 + 318	15.94 -248	03.374 + 253	26.44 - 74	07.269 + 262	60.09 -177
3 12.1	61.573 + 294	40.41 +141	47.134 + 279	18.49 -255	03.595 + 221	26.05 - 39	07.498 + 229	61.72 -163
3 22.1	61.809 + 236	42.27 +186	47.370 + 236	21.03 -254	03.781 + 186	26.00 - 5	07.692 + 194	63.16 -144
4 1.0	61.989 + 180	44.47 +220	47.564 + 194	23.50 -247	03.932 + 151	26.25 + 25	07.853 + 161	64.41 -125
4 11.0	62.114 + 125	46.94 +247	47.718 + 154	25.89 -239	04.050 + 118	26.76 + 51	07.981 + 128	65.47 -106
4 21.0	62.180 + 66	49.55 +261	47.830 + 112	28.14 -225	04.135 + 85	27.48 + 72	08.076 + 95	66.34 - 87
4 31.0	62.197 + 17	52.18 +263	47.905 + 75	30.23 -209	04.191 + 56	28.34 + 86	08.143 + 67	67.04 - 70
5 10.9	62.164 - 33	54.78 +260	47.942 + 37	32.13 -190	04.220 + 29	29.31 + 97	08.181 + 38	67.57 - 53
5 20.9	62.087 - 77	57.20 +242	47.942 + 0	33.80 -167	04.222 + 2	30.34 +103	08.193 + 12	67.93 - 36
5 30.9	61.973 - 114	59.38 +218	47.910 - 32	35.24 -144	04.203 - 19	31.35 +101	08.181 - 12	68.16 - 23
6 9.9	61.824 - 149	61.28 +190	47.844 - 66	36.40 -116	04.161 - 42	32.35 +100	08.145 - 36	68.23 - 7
6 19.8	61.647 - 177	62.79 +151	47.748 - 96	37.26 - 86	04.100 - 61	33.26 + 91	08.088 - 57	68.17 + 6
6 29.8	61.450 - 197	63.91 +112	47.627 - 121	37.83 - 57	04.023 - 77	34.08 + 82	08.012 - 76	67.99 + 18
7 9.8	61.233 - 217	64.60 + 69	47.481 - 146	38.07 - 24	03.929 - 94	34.78 + 70	07.918 - 94	67.68 + 31
7 19.7	61.005 - 228	64.82 + 22	47.317 - 164	37.98 + 9	03.825 - 104	35.33 + 55	07.810 - 108	67.25 + 43
7 29.7	60.774 - 231	64.59 - 23	47.141 - 176	37.58 + 40	03.713 - 112	35.73 + 40	07.693 - 117	66.74 + 51
8 8.7	60.542 - 232	63.90 - 69	46.958 - 183	36.85 + 73	03.595 - 118	35.97 + 24	07.570 - 123	66.13 + 61
8 18.7	60.320 - 222	62.74 -116	46.780 - 178	35.84 +101	03.480 - 115	36.00 + 3	07.449 - 121	65.47 + 66
8 28.6	60.113 - 207	61.16 -158	46.613 - 167	34.59 +125	03.372 - 108	35.85 - 15	07.336 - 113	64.77 + 70
9 7.6	59.928 - 185	59.16 -200	46.467 - 146	33.11 +148	03.277 - 95	35.49 - 36	07.236 - 100	64.06 + 71
9 17.6	59.778 - 150	56.77 -239	46.355 - 112	31.49 +162	03.204 - 73	34.89 - 60	07.161 - 75	63.41 + 65
9 27.6	59.665 - 113	54.05 -272	46.283 - 72	29.81 +168	03.158 - 46	34.07 - 82	07.116 - 45	62.84 + 57
10 7.5	59.600 - 65	51.00 -305	46.260 - 23	28.10 +171	03.145 - 13	33.00 -107	07.108 - 8	62.40 + 44
10 17.5	59.592 - 8	47.71 -329	46.297 + 37	26.50 +160	03.173 + 28	31.67 -133	07.145 + 37	62.17 + 23
10 27.5	59.641 + 49	44.24 -347	46.393 + 96	25.05 +145	03.244 + 71	30.10 -157	07.223 + 78	62.14 + 3
11 6.4	59.756 + 115	40.63 -361	46.554 + 161	23.83 +122	03.364 + 120	28.28 -182	07.359 + 136	62.31 - 17
11 16.4	59.937 + 181	37.00 -363	46.780 + 226	22.93 + 90	03.533 + 169	26.25 -203	07.546 + 187	62.82 - 51
11 26.4	60.180 + 243	33.43 -357	47.064 + 284	22.39 + 54	03.747 + 214	24.06 -219	07.779 + 233	63.61 - 79
12 6.4	60.485 + 305	29.98 -345	47.401 + 337	22.26 + 13	04.003 + 256	21.72 -234	08.056 + 277	64.71 -110
12 16.3	60.841 + 356	26.81 -317	47.781 + 380	22.58 - 32	04.295 + 292	19.34 -238	08.367 + 311	66.09 -138
12 26.3	61.238 + 397	23.96 -285	48.189 + 408	23.30 - 72	04.611 + 316	16.96 -238	08.703 + 336	67.69 -160
12 36.3	61.667 + 429	21.55 -241	48.618 + 429	24.44 -114	04.947 + 336	14.65 -231	09.056 + 353	69.50 -181
	61.667 + 443	21.55 -187	48.618 + 432	24.44 -151	04.947 + 340	14.65 -214	09.056 + 356	69.50 -193
Mean Place	60.574	49.63	47.954	25.03	03.929	31.11	08.160	62.29
sec δ, tan δ	+1.536	+1.166	+1.354	-0.913	+1.011	+0.149	+1.052	-0.326
dα(ψ), dδ(ψ)	+0.047	-0.36	+0.072	-0.35	+0.059	-0.35	+0.065	-0.35
dα(ε), dδ(ε)	+0.069	-0.45	-0.054	-0.46	+0.009	-0.46	-0.019	-0.46
Dble.Trans.	April 18		April 19		April 19		April 19	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	511		513		512		1360			
	10 Draconis		$\eta$ Bootis		$\zeta$ Centauri		B.D. +32° 2411 (Canum Venaticorum)			
Mag.Spect.	4.77	M0	2.80	G0	3.06	B2p	6.29	F2		
U.T.	R.A.		R.A.		R.A.		R.A.			
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "		
	13 51	+ 64 46	13 53	+ 18 27	13 54	- 47 12	13 55	+ 32 05		
	<sup>s</sup> + 511	<sup>o</sup> -295	<sup>s</sup> + 310	<sup>o</sup> -266	<sup>s</sup> + 420	<sup>o</sup> -33	<sup>s</sup> + 324	<sup>o</sup> -291		
1	-8.7	00.339	+ 564	75.98	-246	59.889	+ 331	57.84	-250	
1	1.3	00.903	+ 603	73.52	-193	60.220	+ 344	55.34	-229	
1	11.3	01.506	+ 620	71.59	-127	60.564	+ 346	53.05	-198	
1	21.2	02.126	+ 614	70.32	-63	60.910	+ 336	51.07	-162	
1	31.2	02.740		69.69		61.246		49.45		
2	10.2	03.333	+ 593	69.73	+ 4	61.566	+ 320	48.23	-122	
2	20.2	03.880	+ 547	70.45	+ 72	61.860	+ 294	47.46	-77	
3	2.1	04.367	+ 487	71.75	+130	62.122	+ 262	47.11	-35	
3	12.1	04.785	+ 418	73.59	+184	62.352	+ 230	47.18	+ 7	
3	22.1	05.116	+ 331	75.90	+263	62.545	+ 193	47.65	+ 47	
4	1.1	05.361	+ 245	78.53	+231	62.701	+ 156	48.43	+ 78	
4	11.0	05.518	+ 157	81.40	+287	62.822	+ 121	49.50	+107	
4	21.0	05.581	+ 63	84.38	+298	62.907	+ 85	50.78	+128	
4	31.0	05.562	- 19	87.33	+295	62.961	+ 54	52.18	+140	
5	10.9	05.463	- 99	90.19	+286	62.986	+ 25	53.67	+149	
5	20.9	05.288	- 175	92.82	+263	62.982	- 4	55.15	+148	
5	30.9	05.054	- 234	95.14	+232	62.955	- 27	56.57	+142	
6	9.9	04.763	- 291	97.11	+197	62.904	- 51	57.90	+133	
6	19.8	04.426	- 337	98.62	+151	62.833	- 71	59.07	+117	
6	29.8	04.058	- 368	99.66	+104	62.745	- 88	60.06	+ 99	
7	9.8	03.661	- 397	100.21	+ 55	62.640	- 105	60.84	+ 78	
7	19.8	03.251	- 410	100.22	+ 1	62.524	- 116	61.38	+ 54	
7	29.7	02.838	- 413	99.73	- 49	62.400	- 124	61.68	+ 30	
8	8.7	02.427	- 411	98.72	-101	62.271	- 129	61.73	+ 5	
8	18.7	02.036	- 391	97.19	-153	62.145	- 126	61.48	- 25	
8	28.6	01.671	- 365	95.22	-197	62.026	- 119	60.98	- 50	
9	7.6	01.342	- 329	92.80	-242	61.919	- 107	60.19	- 79	
9	17.6	01.067	- 275	89.98	-282	61.835	- 84	59.11	-108	
9	27.6	00.848	- 219	86.83	-315	61.778	- 57	57.77	-134	
10	7.5	00.699	- 149	83.37	-346	61.755	- 23	56.14	-163	
10	17.5	00.633	- 66	79.70	-367	61.774	+ 19	54.23	-191	
10	27.5	00.650	+ 17	75.88	-382	61.836	+ 62	52.10	-213	
11	6.5	00.760	+ 110	71.97	-391	61.949	+ 113	49.72	-238	
11	16.4	00.966	+ 206	68.11	-386	62.111	+ 162	47.19	-253	
11	26.4	01.262	+ 296	64.36	-375	62.320	+ 209	44.53	-266	
12	6.4	01.649	+ 387	60.82	-354	62.574	+ 254	41.80	-273	
12	16.3	02.113	+ 464	57.63	-319	62.864	+ 290	39.10	-270	
12	26.3	02.641	+ 528	54.85	-278	63.183	+ 319	36.50	-260	
12	36.3	03.222	+ 581	52.57	-228	63.522	+ 339	34.06	-244	
			+ 608		-166		+ 346		-217	
Mean Place	02.244	83.11		62.509	54.11		41.549	80.25	34.533	53.48
sec $\delta$ , tan $\delta$	+2.348	+2.124		+1.054	+0.334		+1.472	-1.081	+1.180	+0.627
da( $\psi$ ), d $\delta$ ( $\psi$ )	+0.035	-0.35		+0.057	-0.35		+0.075	-0.35	+0.053	-0.35
da( $\epsilon$ ), d $\delta$ ( $\epsilon$ )	+0.125	-0.47		+0.020	-0.48		-0.063	-0.48	+0.037	-0.48
Dble.Trans.	April 19		April 20		April 20		April 21			

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	514		515		1362		1361	
	294 G. Centauri		47 Hydrae		204 G. Virginis		48 Hydrae	
Mag. Spect.	4.68	K0	5.17	B8	6.30	F5	5.80	F0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	13 56	-63 36	13 57	-24 54	13 59	- 3 28	13 59	-24 56
1 -8.7	34.249 +586	49.73 +33	42.191 +336	07 16 -121	04.273 +307	53 74 -202	11.219 +335	24.95 -121
1 1.3	34.870 +621	49.94 -21	42.546 +355	08 64 -148	04.599 +326	55.82 -208	11.573 +354	26.41 -146
1 11.3	35.513 +643	50.66 -72	42.912 +366	10.34 -170	04.936 +337	57.91 -209	11.939 +366	28.10 -169
1 21.2	36.156 +643	51.92 -126	43.278 +366	12.22 -188	05.274 +338	59.94 -203	12.305 +366	29.97 -187
1 31.2	36.779 +623	53.62 -170	43.631 +353	14.19 -197	05.602 +328	61.83 -189	12.659 +354	31.94 -197
2 10.2	37.374 +595	55.74 -212	43.967 +336	16.22 -203	05.915 +313	63.54 -171	12.995 +336	33.96 -202
2 20.2	37.922 +548	58.22 -248	44.277 +310	18.24 -202	06.203 +288	65.01 -147	13.305 +310	35.98 -202
3 2.1	38.417 +495	60.97 -275	44.555 +278	20.19 -195	06.462 +259	66.23 -122	13.584 +279	37.93 -195
3 12.1	38.854 +437	63.95 -298	44.802 +247	22.07 -188	06.691 +229	67.19 -96	13.832 +248	39.80 -187
3 22.1	39.224 +370	67.07 -312	45.012 +210	23.81 -174	06.886 +195	67.86 -67	14.044 +212	41.53 -173
4 1.1	39.528 +304	70.26 -319	45.189 +177	25.40 -159	07.048 +162	68.28 -42	14.221 +177	43.12 -159
4 11.0	39.766 +238	73.49 -323	45.332 +143	26.84 -144	07.179 +131	68.46 -18	14.366 +145	44.56 -144
4 21.0	39.931 +165	76.66 -317	45.441 +109	28.10 -126	07.279 +100	68.43 +3	14.476 +110	45.82 -126
4 31.0	40.031 +100	79.71 -305	45.521 +80	29.19 -109	07.350 +71	68.25 +18	14.556 +80	46.92 -110
5 10.9	40.064 +33	82.63 -282	45.570 +49	30.12 -93	07.395 +45	67.92 +33	14.607 +51	47.85 -93
5 20.9	40.028 -36	85.30 -267	45.590 +20	30.87 -75	07.413 +18	67.48 +44	14.628 +21	48.59 -74
5 30.9	39.933 -95	87.71 -241	45.584 -6	31.45 -58	07.408 -5	66.99 +49	14.623 -5	49.18 -59
6 9.9	39.776 -157	89.80 -209	45.552 -32	31.85 -40	07.380 -28	66.44 +55	14.591 -32	49.59 -41
6 19.8	39.562 -214	91.51 -171	45.495 -57	32.07 -22	07.330 -50	65.86 +58	14.535 -56	49.81 -22
6 29.8	39.303 -259	92.83 -132	45.417 -78	32.12 -5	07.263 -67	65.30 +56	14.457 -78	49.87 -6
7 9.8	38.999 -304	93.71 -88	45.318 -99	31.99 +13	07.178 -85	64.74 +56	14.358 -99	49.75 +12
7 19.8	38.664 -335	94.10 -39	45.203 -115	31.69 +30	07.078 -100	64.21 +53	14.243 -115	49.45 +30
7 29.7	38.310 -354	94.05 +5	45.077 -126	31.23 +46	06.969 -109	63.73 +48	14.117 -126	49.00 +45
8 8.7	37.945 -365	93.52 +53	44.942 -135	30.61 +62	06.853 -116	63.30 +43	14.117 -135	48.39 +61
8 18.7	37.589 -356	92.52 +100	44.809 -133	29.86 +75	06.737 -116	62.97 +33	13.982 -135	47.66 +73
8 28.6	37.256 -333	91.12 +140	44.682 -127	29.02 +84	06.626 -111	62.72 +25	13.719 -128	46.83 +83
9 7.6	36.959 -297	89.33 +179	44.568 -114	28.11 +91	06.526 -100	62.59 +13	13.605 -114	45.92 +91
9 17.6	36.720 -239	87.23 +210	44.480 -88	27.19 +92	06.448 -78	62.61 -2	13.515 -90	45.00 +92
9 27.6	36.548 -172	84.91 +232	44.422 -58	26.30 +89	06.396 -52	62.80 -19	13.456 -59	44.11 +89
10 7.5	36.460 -88	82.43 +248	44.403 -19	25.48 +82	06.379 -17	63.18 -38	13.435 -21	43.30 +81
10 17.5	36.468 +8	79.94 +249	44.431 +28	24.83 +65	06.403 +24	63.76 -58	13.462 +27	42.66 +64
10 27.5	36.573 +105	77.51 +243	44.507 +76	24.38 +45	06.467 +64	64.58 -82	13.536 +74	42.20 +46
11 6.5	36.782 +209	75.25 +226	44.637 +130	24.13 +25	06.582 +115	65.70 -112	13.664 +128	41.95 +25
11 16.4	37.094 +312	73.28 +197	44.823 +186	24.19 -6	06.582 +165	65.70 -136	13.664 +184	41.95 -5
11 26.4	37.497 +403	71.67 +161	45.057 +234	24.56 -37	06.747 +210	67.06 -157	13.848 +234	42.00 -36
12 6.4	37.985 +488	70.50 +117	45.339 +282	25.26 -70	07.211 +254	70.41 -178	14.362 +280	43.06 -70
12 16.3	38.541 +556	69.84 +66	45.657 +318	26.28 -102	07.501 +290	72.35 -194	14.680 +318	44.07 -101
12 26.3	39.146 +605	69.70 +14	46.003 +346	27.58 -130	07.816 +315	74.39 -204	15.024 +344	45.37 -130
12 36.3	39.785 +639	70.09 -39	46.367 +364	29.15 -157	08.150 +334	76.49 -210	15.388 +364	46.93 -156
	39.719 +648	70.09 -94	46.367 +369	29.15 -177	08.150 +340	76.49 -206	15.388 +369	46.93 -176
Mean Place	39.719	75.47	45.562	24.08	07.233	64.01	14.594	41.79
sec δ, tan δ	+2.251	-2.016	+1.103	-0.464	+1.002	-0.061	+1.103	-0.465
dα(ψ), dδ(ψ)	+0.087	-0.35	+0.067	-0.35	+0.062	-0.35	+0.067	-0.35
dα(ε), dδ(ε)	-0.117	-0.49	-0.027	-0.49	-0.004	-0.50	-0.027	-0.50
Dbles. Trans.	April 21		April 21		April 22		April 22	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	517		516		1364		518	
	11 Bootis		$\tau$ Virginis		307 G. Centauri		$\beta$ Centauri*	
Mag. Spect.	6.12	A3	4.34	A2	6.44	A0p	0.86	B1
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "
	14 00	+ 27 26	14 00	+ 1 36	14 02	- 41 21	14 02	- 60 18
1 <sup>d</sup> -8.7	31.219 <sup>s</sup> + 313	65 88 <sup>"</sup> - 285	54 630 <sup>s</sup> + 303	42 65 <sup>"</sup> - 219	33 912 <sup>s</sup> + 385	10 69 <sup>"</sup> - 50	46 612 <sup>s</sup> + 532	05 57 <sup>"</sup> + 28
1 1.3	31.557 + 338	63 26 - 262	54 953 + 323	40 45 - 220	34.321 + 409	11 57 - 88	47.178 + 566	05 80 - 23
1 11.3	31.912 + 355	60 92 - 234	55 288 + 335	38 29 - 216	34.744 + 423	12 83 - 126	47.765 + 587	06 53 - 73
1 21.2	32.271 + 359	58 98 - 194	55 625 + 337	36 26 - 203	35.167 + 423	14 43 - 160	48.355 + 590	07 77 - 124
1 31.2	32.623 + 352	57 48 - 150	55 953 + 328	34 42 - 184	35.577 + 410	16 30 - 187	48.928 + 573	09 43 - 166
2 10.2	32.960 + 337	56 45 - 103	56 265 + 312	32 81 - 161	35.969 + 392	18 39 - 209	49 476 + 548	11 49 - 206
2 20.2	33.271 + 311	55 94 - 51	56 553 + 288	31 48 - 133	36.331 + 362	20 65 - 226	49.985 + 509	13 89 - 240
3 2.1	33.551 + 280	55 91 - 3	56 812 + 259	30 46 - 102	36.658 + 327	23 01 - 236	50.445 + 460	16 54 - 265
3 12.1	33.797 + 246	56 36 + 45	57.042 + 230	29 74 - 72	36.950 + 292	25 42 - 241	50.856 + 411	19 40 - 286
3 22.1	34.004 + 207	57 25 + 89	57.237 + 195	29 34 - 40	37.200 + 250	27 83 - 241	51.206 + 350	22 40 - 300
4 1.1	34.171 + 167	58 48 + 123	57.400 + 163	29 21 - 13	37.411 + 211	30 19 - 236	51.498 + 292	25 46 - 306
4 11.0	34.301 + 130	60 02 + 154	57 531 + 131	29 32 + 11	37 582 + 171	32 48 - 229	51.731 + 233	28 54 - 308
4 21.0	34.391 + 90	61 76 + 174	57 630 + 99	29 66 + 34	37 713 + 131	34 64 - 216	51 899 + 168	31 57 - 303
4 31.0	34.448 + 57	63 62 + 186	57 701 + 71	30 15 + 49	37 806 + 93	36 66 - 202	52 010 + 111	34 49 - 292
5 10.9	34.471 + 23	65 54 + 192	57 745 + 44	30 77 + 62	37 863 + 57	38 52 - 186	52.060 + 50	37 27 - 278
5 20.9	34.462 - 9	67 42 + 188	57 762 + 17	31 48 + 71	37 881 + 18	40 16 - 164	52.050 - 10	39 82 - 255
5 30.9	34.427 - 35	69 19 + 154	57 756 - 6	32 23 + 75	37 867 - 14	41 58 - 142	51 986 - 64	42 12 - 230
6 9.9	34.366 - 61	70 82 + 163	57 727 - 29	32 99 + 76	37 819 - 48	42 77 - 119	51 865 - 121	44 13 - 201
6 19.8	34.281 - 85	72 23 + 141	57 676 - 51	33 74 + 75	37 738 - 81	43 66 - 89	51 694 - 171	45 77 - 164
6 29.8	34.179 - 102	73 39 + 116	57 608 - 68	34 43 + 69	37 630 - 108	44 29 - 63	51 480 - 214	47 04 - 127
7 9.8	34.058 - 121	74 27 + 88	57 522 - 86	35 08 + 65	37 494 - 136	44 61 - 32	51 223 - 257	47 89 - 85
7 19.8	33.924 - 134	74 84 + 57	57 422 - 100	35 63 + 55	37 339 - 155	44 61 + 0	50 937 - 286	48 28 - 39
7 29.7	33.782 - 142	75 09 + 25	57 312 - 110	36 10 + 47	37 168 - 171	44 32 + 29	50 631 - 306	48 25 + 3
8 8.7	33.634 - 148	75 02 - 7	57 195 - 117	36 46 + 36	36 988 - 180	44 32 + 61	50 312 - 319	47 76 + 49
8 18.7	33.488 - 146	74 58 - 44	57 078 - 117	36 69 + 23	36 808 - 180	42 82 + 89	49 999 - 313	46 82 + 94
8 28.6	33.349 - 139	73 83 - 75	56 966 - 112	36 78 + 9	36 638 - 170	41 69 + 113	49 702 - 297	45 50 + 132
9 7.6	33.223 - 126	72 73 - 110	56 865 - 101	36 71 - 7	36 484 - 154	40 34 + 135	49 436 - 266	43 81 + 169
9 17.6	33.120 - 103	71 30 - 143	56 785 - 80	36 45 - 26	36 362 - 122	38 84 + 150	49 220 - 216	41 82 + 199
9 27.6	33.044 - 76	69 56 - 174	56 731 - 54	36 00 - 45	36 277 - 85	37 25 + 159	49 062 - 158	39 62 + 220
10 7.5	33.004 - 40	67 50 - 206	56 710 - 21	35 34 - 66	36 239 - 38	35 63 + 162	48 978 - 84	37 26 + 236
10 17.5	33.007 + 3	65 17 - 233	56 730 + 20	34 44 - 90	36 259 + 20	34 08 + 155	48 980 + 2	34 90 + 236
10 27.5	33.056 + 49	62 60 - 257	56 792 + 62	33 30 - 114	36 337 + 78	32 67 + 141	49 069 + 89	32 59 + 231
11 6.5	33.157 + 101	59 81 - 279	56 903 + 111	31 89 - 141	36 480 + 143	31 47 + 120	49 253 + 184	30 44 + 215
11 16.4	33.310 + 153	56 88 - 293	57 063 + 160	30 25 - 164	36 688 + 208	30 57 + 90	49 531 + 278	28 59 + 185
11 26.4	33.513 + 203	53 87 - 301	57 269 + 206	28 42 - 183	36 953 + 265	29 99 + 58	49 892 + 361	27 07 + 152
12 6.4	33.764 + 251	50 84 - 303	57 519 + 250	26 40 - 202	37 275 + 322	29 80 + 19	50 332 + 440	25 98 + 109
12 16.3	34.056 + 292	47 91 - 293	57 804 + 285	24 26 - 214	37 640 + 365	30 03 - 23	50 836 + 504	25 38 + 60
12 26.3	34.379 + 323	45 13 - 278	58 116 + 312	22 07 - 219	38 037 + 397	30 65 - 62	51 385 + 549	25 27 + 11
12 36.3	34.726 + 347	42 60 - 253	58 448 + 332	19 88 - 219	38 458 + 421	31 68 - 103	51 968 + 583	25 69 - 42
	34.726 + 357	42 60 - 218	58 448 + 338	19 88 - 211	38 458 + 426	31 68 - 139	51 968 + 594	25 69 - 92
Mean Place	33.761	65.18	57.522	34.13	37.846	31.57	51.797	30.20
sec $\delta$ , tan $\delta$	+1.127	+0.519	+1.000	+0.028	+1.332	-0.880	+2.019	-1.754
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.054	-0.34	+0.061	-0.34	+0.073	-0.34	+0.085	-0.34
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.030	-0.50	+0.002	-0.50	-0.050	-0.51	-0.101	-0.51
Dble. Trans.	April 22		April 22		April 22		April 22	



AT UPPER TRANSIT AT GREENWICH

No.	1365		1363		521		1366	
	210 G. Virginis		♁ Apodis		α Draconis		94 Virginis	
Mag. Spect.	6.36	K0	5.5 to 6.7	M3	3.64	A0p	6.56	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	14 03	-14 54	14 03	-76 43	14 03	+64 25	14 05	- 8 49
1 -8.7	39 819 + 315	12.63 -158	50 021 +1017	29.90 + 87	59 368 + 484	77 28 -307	31.708 + 307	27.88 -181
1 1.3	40 154 + 335	14 38 -175	51 109 +1088	29 58 + 32	59 909 + 541	74.67 -261	32 036 + 328	29.79 -191
1 11.3	40 502 + 348	16.25 -187	52 246 +1137	29 84 - 26	60 493 + 584	72.59 -208	32 376 + 340	31.78 -199
1 21.3	40 850 + 348	18.19 -194	53 395 +1149	30.70 - 86	61 100 + 607	71.14 -145	32 718 + 342	33.76 -198
1 31.2	41 188 + 338	20.12 -193	54 519 +1124	32.08 -138	61 706 + 606	70.34 - 80	33 050 + 332	35.66 -190
2 10.2	41 510 + 322	22.00 -188	55 602 +1083	33 96 -188	62 298 + 592	70.21 - 13	33 367 + 317	37.45 -179
2 20.2	41 809 + 299	23 77 -177	56 609 +1007	36.31 -235	62 850 + 552	70.76 + 55	33 661 + 294	39.05 -160
3 2.1	42 078 + 269	25 37 -160	57 523 + 914	39.02 -271	63 346 + 496	71.92 +116	33 926 + 265	40.45 -140
3 12.1	42 317 + 239	26 82 -145	58 338 + 815	42.04 -302	63 778 + 432	73.64 +172	34 163 + 237	41.63 -118
3 22.1	42 522 + 205	28.06 -124	59 029 + 691	45.32 -328	64 129 + 351	75.85 +221	34 366 + 203	42.56 - 93
4 1.1	42 696 + 174	29.09 -103	59 594 + 565	48.73 -341	64 397 + 268	78.41 +256	34 537 + 171	43.26 - 70
4 11.0	42 838 + 142	29.95 - 86	60 031 + 437	52.27 -354	64 579 + 182	81.25 +284	34 677 + 140	43.75 - 49
4 21.0	42 947 + 109	30.60 - 65	60 324 + 293	55.81 -354	64 669 + 90	84.22 +297	34 785 + 108	44.03 - 28
4 31.0	43 028 + 81	31.09 - 49	60 484 + 160	59.29 -348	64 678 + 9	87.21 +299	34 866 + 81	44.15 - 12
5 11.0	43 082 + 54	31.42 - 33	60 505 + 21	62.67 -338	64 606 - 72	90.13 +292	34 919 + 53	44.12 + 3
5 20.9	43 107 + 25	31.60 - 18	60 385 - 120	65.84 -317	64 457 - 149	92.85 +272	34 944 + 25	43.96 + 16
5 30.9	43 109 + 2	31.67 - 7	60 140 - 245	68.76 -292	64 246 - 211	95.28 +243	34 947 + 3	43.72 + 24
6 9.9	43 085 - 24	31 62 + 5	59 767 - 373	71.37 -261	63 975 - 271	97.38 +210	34 925 - 22	43 39 + 33
6 19.8	43 038 - 47	31 46 + 16	59 276 - 491	73 58 -221	63 655 - 320	99 04 +166	34 880 - 45	43 00 + 39
6 29.8	42 972 - 66	31 22 + 24	58 692 - 584	75 37 -179	63 300 - 355	100 25 +121	34 816 - 64	42 58 + 42
7 9.8	42 884 - 88	30 88 + 34	58 016 - 676	76 69 -132	62 911 - 389	100 98 + 73	34 732 - 84	42 12 + 46
7 19.8	42 782 - 102	30 47 + 41	57 278 - 738	77 47 - 78	62 504 - 407	101 16 + 18	34 633 - 99	41 64 + 48
7 29.7	42 668 - 114	30 00 + 47	56 504 - 774	77 74 - 27	62 090 - 414	100 85 - 31	34 522 - 111	41 16 + 48
8 8.7	42 545 - 123	29 47 + 53	55 708 - 796	77 46 + 28	61 674 - 416	100 02 - 83	34 403 - 119	40 68 + 48
8 18.7	42 422 - 123	28 91 + 56	54 933 - 775	76 64 + 82	61 272 - 402	98 66 -136	34 283 - 120	40 23 + 45
8 28.7	42 304 - 118	28 34 + 57	54 203 - 730	75 33 +131	60 893 - 379	96 85 -181	34 168 - 115	39 84 + 39
9 7.6	42 197 - 107	27 79 + 55	53 545 - 658	73 54 +179	60 545 - 348	94 58 -227	34 063 - 105	39 50 + 34
9 17.6	42 112 - 85	27 30 + 49	53 001 - 544	71 35 +219	60 246 - 299	91 88 -270	34 063 - 83	39 29 + 21
9 27.6	42 055 - 57	26 91 + 39	52 587 - 414	68 85 +250	60 002 - 244	88 84 -304	33 980 - 58	39 20 + 9
10 7.5	42 033 - 22	26 65 + 26	52 329 - 258	66 11 +274	59 824 - 178	85 47 -337	33 922 - 23	39 27 - 7
10 17.5	42 056 + 23	26 58 + 7	52 256 - 73	63 26 +285	59 726 - 98	81 85 -362	33 920 + 21	39 55 - 28
10 27.5	42 116 + 60	26 89 - 31	52 364 + 108	60 42 +284	59 710 - 16	78 07 -378	33 979 + 59	39 93 - 38
11 6.5	42 235 + 119	27 06 - 17	52 667 + 303	57 67 +275	59 787 + 77	74 17 -390	34 089 + 110	40 78 - 85
11 16.4	42 406 + 171	27 06 - 65	53 163 + 496	55 17 +250	59 960 + 173	70 29 -388	34 252 + 163	41 80 -102
11 26.4	42 622 + 216	28 63 - 92	53 828 + 665	53 01 +216	60 222 + 262	66 49 -380	34 461 + 209	43 06 -126
12 6.4	42 884 + 262	29 82 -119	54 656 + 828	51 26 +175	60 578 + 356	62 87 -362	34 715 + 264	44 55 -149
12 16.4	43 181 + 297	31 26 -144	55 613 + 957	50 04 +122	61 013 + 435	59 57 -330	35 005 + 290	46 25 -170
12 26.3	43 506 + 325	32 90 -164	56 665 +1052	49 35 + 69	61 516 + 503	56 66 -291	35 321 + 316	48 09 -184
12 36.3	43 850 + 344	34 70 -180	57 790 +1125	49 24 + 11	62 075 + 559	54 24 -242	35 657 + 336	50 05 -196
	43 850 + 350	34 70 -190	57 790 +1153	49 24 - 49	62 075 + 592	54 24 -183	35 657 + 343	50 05 -197
Mean Place	43.010	26.13	59.061	56.33	61.364	84.60	34.796	39.37
sec δ, tan δ	+1.035	-0.266	+4.357	-4.241	+2.318	+2.091	+1.012	-0.155
dα(ψ), dδ(ψ)	+0.065	-0.34	+0.119	-0.34	+0.033	-0.34	+0.063	-0.34
dα(ε), dδ(ε)	-0.015	-0.51	-0.242	-0.51	+0.119	-0.52	-0.009	-0.52
Dble. Trans.	April 23		April 23		April 23		April 23	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	519		1367		520		1368	
	π Hydrae		B.D. +39° 2720* (Canum Venaticorum)		γ Centauri		9 H. Bootis	
Mag.Spect.	3.48	K0	7.90	K0	2.26	K0	5.44	M3
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	14 05	-26 36	14 05	+38 28	14 05	-36 17	14 07	+43 54
1	-8.7	+336	50.408	+329	49.335	+363	21.036	+343
1	1.3	+357	50.767	+359	49.720	+385	21.413	+377
1	11.3	+370	51.147	+380	50.119	+399	21.814	+401
1	21.3	+370	51.536	+389	50.519	+400	22.225	+411
1	31.2	+360	51.919	+383	50.907	+388	22.631	+406
2	10.2	+343	52.290	+371	51.278	+371	23.025	+394
2	20.2	+318	52.634	+344	51.622	+344	23.392	+367
3	2.1	+287	52.944	+310	51.932	+310	23.723	+331
3	12.1	+257	53.217	+273	52.210	+278	24.014	+291
3	22.1	+221	53.446	+229	52.448	+238	24.257	+243
4	1.1	+186	53.630	+184	52.650	+202	24.452	+195
4	11.0	+154	53.770	+140	52.815	+165	24.598	+146
4	21.0	+119	53.865	+95	52.942	+127	24.694	+96
4	31.0	+89	53.919	+54	53.035	+93	24.744	+50
5	11.0	+58	53.933	+14	53.094	+59	24.750	+6
5	20.9	+28	53.909	-24	53.117	+23	24.713	-37
5	30.9	+1	53.854	-55	53.111	-6	24.642	-71
6	9.9	-27	53.767	-87	53.073	-38	24.536	-106
6	19.8	-54	53.654	-113	53.004	-69	24.401	-135
6	29.8	-75	53.520	-134	52.910	-94	24.243	-158
7	9.8	-99	53.364	-156	52.791	-119	24.063	-180
7	19.8	-116	53.195	-169	52.651	-140	23.867	-196
7	29.7	-129	53.017	-178	52.498	-153	23.664	-203
8	8.7	-138	52.833	-184	52.335	-163	23.453	-211
8	18.7	-139	52.652	-181	52.171	-164	23.247	-206
8	28.7	-133	52.479	-173	52.015	-156	23.051	-196
9	7.6	-121	52.320	-159	51.873	-142	22.870	-181
9	17.6	-96	52.187	-133	51.760	-113	22.717	-153
9	27.6	-66	52.084	-103	51.680	-80	22.597	-120
10	7.5	-27	52.019	-65	51.644	-36	22.517	-80
10	17.5	+21	52.002	-17	51.662	+18	22.489	-28
10	27.5	+69	52.035	+33	51.734	+72	22.513	+24
11	6.5	+123	52.124	+89	51.866	+132	22.598	+85
11	16.4	+181	52.272	+148	52.059	+193	22.745	+147
11	26.4	+231	52.474	+202	52.308	+249	22.950	+205
12	6.4	+279	52.731	+257	52.610	+302	23.215	+265
12	16.4	+318	53.035	+304	52.953	+343	23.530	+315
12	26.3	+346	53.375	+340	53.327	+374	23.885	+355
12	36.3	+367	53.745	+370	53.723	+396	24.274	+389
		+372		+385		+403		+405
Mean Place	36.016	64.00	52.839	53.71	53.078	74.62	23.401	66.24
sec δ, tan δ	+1.119	-0.501	+1.277	+0.795	+1.241	-0.735	+1.388	+0.963
da(ψ), dδ(ψ)	+0.068	-0.34	+0.050	-0.34	+0.071	-0.34	+0.048	-0.34
da(ε), dδ(ε)	-0.029	-0.52	+0.045	-0.52	-0.042	-0.52	+0.055	-0.53
Dble.Trans.	April 23		April 23		April 23		April 24	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	524		522		523		526	
	4 Ursae Minoris		12 Bootis		α Virginis		α Bootis (Arcturus)	
Mag Spect.	5.00	K0	4.82	F5	4.31	K0	0.24	K0
U.T.	R.A. Dec.		R.A. Dec.		R.A. Dec.		R.A. Dec.	
	h m	° '	h m	° '	h m	° '	h m	° '
	14 08	+77 36	14 09	+25 08	14 12	-10 12	14 15	+19 14
1 <sup>d</sup> -8.7	51 664 <sup>s</sup> +825	30.70 <sup>o</sup> -295	44.392 <sup>s</sup> +304	79.92 <sup>o</sup> -284	07.297 <sup>s</sup> +305	" -173	00.057 <sup>s</sup> +295	71.91 <sup>o</sup> -276
1 1.3	52.605 +941	28.24 -246	44.722 +330	77.28 -264	07.623 +326	29.35 -185	00.376 +319	69.29 -262
1 11.3	53.645 +1040	26.34 -190	45.069 +347	74.90 -238	07.963 +340	31.20 -193	00.712 +336	66.87 -242
1 21.3	54.743 +1098	25.10 -124	45.423 +354	72.89 -201	08.306 +343	33.13 -194	01.054 +342	64.77 -210
1 31.2	55.854 +1111	24.51 -59	45.770 +347	71.30 -159	08.640 +334	35.07 -188	01.390 +336	63.03 -174
2 10.2	56.950 +1096	24.60 +9	46.105 +335	70.17 -113	08.961 +321	36.95 -179	01.715 +325	61.70 -133
2 20.2	57.983 +1033	25.39 +79	46.416 +311	69.54 -63	09.259 +298	38.74 -162	02.017 +302	60.82 -88
3 2.1	58.915 +932	26.76 +137	46.698 +282	69.38 -16	09.529 +270	40.36 -142	02.291 +274	60.38 -44
3 12.1	59.728 +813	28.70 +194	46.947 +249	69.70 +32	09.772 +243	41.78 -122	02.536 +245	60.38 +0
3 22.1	60.382 +654	31.11 +241	47.159 +212	70.45 +75	09.981 +209	43.00 -98	02.745 +209	60.79 +41
4 1.1	60.868 +486	33.84 +273	47.334 +175	71.56 +111	10.159 +178	44.73 -75	02.919 +174	61.55 +76
4 11.0	61.179 +311	36.83 +299	47.472 +138	72.97 +141	10.306 +147	45.29 -56	03.059 +140	62.61 +106
4 21.0	61.298 +119	39.93 +310	47.573 +101	74.61 +164	10.422 +116	45.64 -35	03.163 +104	63.91 +130
4 31.0	61.242 -56	43.00 +307	47.640 +67	76.38 +177	10.509 +87	45.82 -18	03.236 +73	65.34 +143
5 11.0	61.014 -228	45.98 +298	47.674 +34	78.23 +185	10.569 +60	45.86 -4	03.278 +42	66.88 +154
5 20.9	60.621 -393	48.72 +274	47.677 +3	80.06 +183	10.601 +32	45.77 +9	03.290 +12	68.43 +155
5 30.9	60.093 -528	51.13 +241	47.653 -24	81.80 +174	10.609 +8	45.58 +19	03.277 -13	69.93 +150
6 9.9	59.436 -657	53.18 +205	47.602 -51	83.42 +162	10.592 -17	45.58 +27	03.237 -40	71.34 +141
6 19.8	58.674 -762	54.75 +157	47.527 -75	84.84 +142	10.551 -41	45.31 +34	03.173 -64	72.59 +125
6 29.8	57.839 -835	55.85 +110	47.433 -94	86.02 +118	10.490 -61	44.97 +38	03.090 -83	73.66 +107
7 9.8	56.937 -902	56.43 +58	47.319 -114	86.96 +94	10.408 -82	44.16 +43	02.986 -104	74.53 +87
7 19.8	56.001 -936	56.44 +1	47.191 -128	87.59 +63	10.309 -99	43.70 +46	02.868 -118	75.13 +60
7 29.7	55.055 -946	55.94 -50	47.053 -138	87.92 +33	10.199 -110	43.23 +47	02.739 -129	75.49 +36
8 8.7	54.110 -945	54.91 -103	46.907 -146	87.95 +3	10.078 -121	42.75 +48	02.600 -139	75.58 +9
8 18.7	53.200 -910	53.34 -157	46.762 -145	87.62 -33	09.955 -123	42.29 +46	02.462 -138	75.38 -20
8 28.7	52.342 -858	51.32 -202	46.622 -140	86.99 -63	09.836 -119	41.86 +43	02.327 -135	74.90 -48
9 7.6	51.549 -793	48.83 -249	46.494 -128	86.03 -96	09.727 -109	41.48 +38	02.202 -125	74.12 -78
9 17.6	50.858 -691	45.94 -289	46.387 -107	84.73 -130	09.638 -89	41.48 +27	02.202 -105	73.04 -108
9 27.6	50.274 -584	42.72 -322	46.306 -81	83.13 -160	09.575 -63	41.21 +16	02.097 -80	73.04 -135
10 7.5	49.819 -455	39.18 -354	46.259 -47	81.22 -191	09.546 -29	41.05 +0	01.969 -48	70.03 -166
10 17.5	49.520 -299	35.44 -374	46.254 -5	79.02 -220	09.560 +14	41.24 -19	01.963 -6	68.10 -193
10 27.5	49.374 -146	31.56 -388	46.295 +41	76.58 -244	09.620 +60	41.50 -26	02.000 +37	65.92 -218
11 6.5	49.404 +30	27.60 -396	46.386 +91	73.91 -267	09.718 +98	42.26 -76	02.087 +87	63.49 -243
11 16.4	49.617 +213	23.69 -391	46.530 +144	71.08 -283	09.877 +159	43.18 -92	02.225 +138	60.89 -260
11 26.4	50.002 +385	19.91 -378	46.722 +192	68.15 -293	10.082 +205	44.34 -116	02.411 +186	58.15 -274
12 6.4	50.566 +564	16.35 -356	46.964 +242	65.18 -297	10.332 +250	45.74 -140	02.644 +233	55.33 -282
12 16.4	51.291 +725	13.15 -320	47.247 +283	62.28 -290	10.619 +287	47.34 -160	02.918 +274	52.54 -279
12 26.3	52.150 +859	10.37 -278	47.561 +314	59.50 -278	10.933 +314	49.11 -177	03.222 +304	49.82 -272
12 36.3	53.132 +982	08.11 -226	47.901 +340	56.95 -255	11.269 +336	51.00 -189	03.551 +329	47.27 -255
	+1056	-163	+351	-223	+343	-193	+339	-229
Mean Place	53.182	39.41	47.004	78.91	10.447	40.76	02.726	68.45
sec δ, tan δ	+4.661	+4.552	+1.105	+0.470	+1.016	-0.180	+1.059	+0.349
dα(ψ), dδ(ψ)	-0.003	-0.34	+0.054	-0.34	+0.064	-0.33	+0.056	-0.33
dα(ε), dδ(ε)	+0.257	-0.53	+0.026	-0.54	-0.010	-0.55	+0.019	-0.56
Dble.Trans.	April 24		April 24		April 25		April 26	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	525		528		527		1370										
	ι Virginis		ι Bootis*		λ Bootis		A Bootis										
Mag. Spect.	4.16	F5	4.87	A5	4.26	A0	4.83	K0									
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.									
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "									
	14 15	- 5 56	14 15	+ 51 25	14 15	+ 46 08	14 17	+ 35 33									
1	-8.7	15.265	+ 299	01.14	-190	38.963	+ 364	39.74	-280	49.885	+ 342	55.54	-316	23.046	+ 313	75.17	-306
1	1.3	15.587	+ 322	03.13	-199	39.367	+ 404	36.94	-236	50.263	+ 378	52.73	-281	23.389	+ 343	72.39	-278
1	11.3	15.922	+ 335	05.15	-202	39.803	+ 436	34.58	-179	50.669	+ 406	50.33	-240	23.755	+ 366	69.94	-245
1	21.3	16.261	+ 339	07.13	-198	40.256	+ 463	32.79	-120	51.088	+ 419	48.47	-186	24.131	+ 376	67.95	-199
1	31.2	16.592	+ 331	09.01	-188	40.707	+ 451	31.59	-57	51.506	+ 418	47.18	-129	24.504	+ 373	66.46	-149
2	10.2	16.911	+ 319	10.75	-174	41.148	+ 441	31.02	+ 9	51.912	+ 406	46.49	-69	24.866	+ 362	65.50	-96
2	20.2	17.207	+ 296	12.27	-152	41.562	+ 414	31.11	+ 69	52.293	+ 381	46.44	-5	25.206	+ 340	65.13	-37
3	2.2	17.477	+ 270	13.56	-129	41.937	+ 375	31.80	+ 126	52.640	+ 347	46.97	+ 53	25.514	+ 308	65.30	+ 17
3	12.1	17.719	+ 242	14.60	-104	42.270	+ 333	33.06	+ 178	52.947	+ 307	48.06	+ 109	25.789	+ 275	65.98	+ 68
3	22.1	17.928	+ 209	15.38	-78	42.548	+ 278	34.84	+ 216	53.205	+ 258	49.65	+ 159	26.023	+ 234	67.16	+ 118
4	1.1	18.106	+ 178	15.92	-54	42.771	+ 223	37.00	+ 248	53.413	+ 208	51.64	+ 199	26.216	+ 193	68.72	+ 156
4	11.0	18.254	+ 148	16.23	-31	42.937	+ 166	39.48	+ 269	53.572	+ 159	53.95	+ 231	26.367	+ 151	70.61	+ 189
4	21.0	18.371	+ 117	16.33	-10	43.044	+ 107	42.17	+ 275	53.677	+ 105	56.47	+ 252	26.475	+ 108	72.73	+ 212
4	31.0	18.459	+ 88	16.27	+ 6	43.096	+ 52	44.92	+ 277	53.735	+ 58	59.08	+ 261	26.544	+ 69	74.96	+ 223
5	11.0	18.520	+ 61	16.06	+ 21	43.095	- 1	47.69	+ 264	53.746	+ 11	61.72	+ 284	26.575	+ 31	77.26	+ 230
5	20.9	18.553	+ 33	15.74	+ 32	43.042	- 53	50.33	+ 243	53.712	- 34	64.25	+ 253	26.569	- 6	79.50	+ 224
5	30.9	18.562	+ 9	15.35	+ 39	42.948	- 94	52.76	+ 217	53.640	- 72	66.60	+ 235	26.531	- 38	81.61	+ 211
6	9.9	18.546	- 16	14.90	+ 45	42.811	- 137	54.93	+ 180	53.531	- 109	68.71	+ 211	26.463	- 68	83.55	+ 194
6	19.9	18.506	- 40	14.41	+ 49	42.637	- 174	56.73	+ 142	53.389	- 142	70.49	+ 178	26.366	- 97	85.21	+ 166
6	29.8	18.446	- 60	13.91	+ 50	42.437	- 200	58.15	+ 99	53.223	- 166	71.91	+ 142	26.247	- 119	86.58	+ 137
7	9.8	18.366	- 80	13.40	+ 51	42.209	- 228	59.14	+ 52	53.031	- 192	72.93	+ 102	26.105	- 142	87.63	+ 105
7	19.8	18.269	- 97	12.91	+ 49	41.963	- 246	59.66	+ 6	52.822	- 209	73.51	+ 58	25.948	- 157	88.29	+ 66
7	29.7	18.159	- 110	12.45	+ 46	41.707	- 256	59.72	+ 6	52.603	- 219	73.65	+ 14	25.779	- 169	88.59	+ 30
8	8.7	18.039	- 120	12.02	+ 43	41.444	- 263	59.30	- 42	52.376	- 227	73.34	- 31	25.602	- 177	88.49	- 10
8	18.7	17.918	- 121	11.65	+ 37	41.185	- 259	58.38	- 92	52.153	- 223	72.55	- 79	25.425	- 177	87.98	- 51
8	28.7	17.799	- 119	11.36	+ 29	40.936	- 249	57.03	- 135	51.937	- 216	71.35	- 120	25.253	- 172	87.09	- 89
9	7.6	17.689	- 110	11.15	+ 21	40.705	- 231	55.22	- 181	51.737	- 200	69.71	- 164	25.094	- 159	85.81	- 128
9	17.6	17.599	- 90	11.08	+ 7	40.505	- 200	52.99	- 223	51.565	- 172	67.64	- 207	24.957	- 137	84.14	- 167
9	27.6	17.534	- 65	11.15	- 7	40.341	- 164	50.40	- 259	51.424	- 141	65.23	- 241	24.848	- 109	82.14	- 200
10	7.5	17.502	- 32	11.40	- 25	40.223	- 118	47.44	- 296	51.326	- 98	62.45	- 278	24.775	- 73	79.78	- 236
10	17.5	17.512	+ 10	11.85	- 45	40.162	- 61	44.20	- 324	51.280	- 46	59.38	- 307	24.748	- 27	77.13	- 265
10	27.5	17.563	+ 51	12.47	- 62	40.160	- 2	40.74	- 346	51.288	+ 8	56.09	- 329	24.769	+ 21	74.24	- 289
11	6.5	17.661	+ 98	13.43	- 96	40.226	+ 66	37.09	- 365	51.358	+ 70	52.59	- 350	24.844	+ 75	71.12	- 312
11	16.4	17.813	+ 152	14.62	- 119	40.362	+ 136	33.39	- 370	51.492	+ 134	49.02	- 357	24.977	+ 133	67.88	- 324
11	26.4	18.012	+ 199	16.02	- 140	40.564	+ 202	29.70	- 369	51.688	+ 196	45.44	- 358	25.163	+ 186	64.57	- 331
12	6.4	18.255	+ 243	17.65	- 163	40.834	+ 270	26.10	- 360	51.945	+ 257	41.91	- 353	25.404	+ 241	61.27	- 330
12	16.4	18.536	+ 281	19.45	- 180	41.164	+ 330	22.74	- 336	52.256	+ 311	38.60	- 331	25.691	+ 287	58.11	- 316
12	26.3	18.845	+ 309	21.38	- 193	41.542	+ 378	19.68	- 306	52.611	+ 355	35.56	- 304	26.015	+ 324	55.14	- 297
12	36.3	19.176	+ 331	23.39	- 201	41.961	+ 419	17.03	- 265	53.002	+ 391	32.89	- 267	26.370	+ 355	52.47	- 267
		19.176	+ 339	23.39	- 200	41.961	+ 442	17.03	- 213	53.002	+ 411	32.89	- 218	26.370	+ 370	52.47	- 226
Mean Place	18.353	11.34		41.254	45.24	52.249	60.02	25.565	77.19								
sec δ, tan δ	+1.005	-0.104		+1.604	+1.254	+1.443	+1.041	+1.229	+0.715								
dα(ψ), dδ(ψ)	+0.063	-0.33		+0.043	-0.33	+0.046	-0.33	+0.050	-0.33								
dα(ε), dδ(ε)	-0.006	-0.56		+0.069	-0.56	+0.058	-0.56	+0.039	-0.56								
Dble. Trans.	April 26		April 26		April 26		April 26										

# APPARENT PLACES OF STARS, 1986

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## AT UPPER TRANSIT AT GREENWICH

No.	1369		1371		1372		529	
	236 G. Virginis		λ Virginis		18 Bootis		ν Centauri	
Mag. Spect.	5.74	A0p	4.60	A2	5.31	F0	4.41	B5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>
	14 17	-18 39	14 18	-13 18	14 18	+13 03	14 19	-56 19
1 -8.7	<sup>s</sup> 49.976 +313	00.74 -135	<sup>s</sup> 19.409 +305	22.06 -158	<sup>s</sup> 34.249 +291	-255	<sup>s</sup> 17.459 +474	07.80 +31
1 1.3	50.311 +335	02.30 -156	19.736 +327	23.79 -173	34.565 +316	-245	17.968 +509	07.96 -16
1 11.3	50.661 +350	04.01 -171	20.078 +342	25.63 -184	34.897 +332	-232	18.501 +533	08.58 -62
1 21.3	51.014 +353	05.84 -183	20.424 +346	27.52 -189	35.235 +338	-206	19.042 +541	09.68 -110
1 31.2	51.360 +346	07.70 -186	20.762 +338	29.38 -186	35.568 +333	-177	19.572 +530	11.18 -150
2 10.2	51.693 +333	09.55 -185	21.087 +325	31.18 -180	35.889 +321	-142	20.084 +512	13.05 -187
2 20.2	52.003 +310	11.34 -179	21.391 +304	32.85 -167	36.189 +300	-103	20.565 +481	15.24 -219
3 2.2	52.286 +283	13.00 -166	21.668 +277	34.36 -151	36.463 +274	-62	21.005 +440	17.66 -242
3 12.1	52.540 +254	14.54 -154	21.918 +250	35.69 -133	36.708 +245	-23	21.403 +398	20.29 -263
3 22.1	52.762 +222	15.91 -137	22.135 +217	36.80 -111	36.920 +212	+16	21.750 +347	23.05 -276
4 1.1	52.952 +190	17.11 -120	22.320 +185	37.71 -91	37.098 +178	+49	22.046 +296	25.86 -281
4 11.0	53.112 +160	18.14 -103	22.476 +156	38.44 -73	37.245 +147	+77	22.292 +246	28.72 -286
4 21.0	53.239 +127	18.98 -84	22.600 +124	38.96 -52	37.358 +113	+102	22.481 +189	31.53 -281
4 31.0	53.337 +98	19.67 -69	22.696 +96	39.33 -37	37.441 +83	+117	22.619 +138	34.25 -272
5 11.0	53.406 +69	20.21 -54	22.764 +68	39.54 -21	37.494 +53	+128	22.704 +85	36.85 -260
5 20.9	53.446 +40	20.60 -39	22.803 +39	39.62 -8	37.519 +25	+133	22.733 +29	39.26 -241
5 30.9	53.460 +14	20.86 -26	22.817 +14	39.60 +2	37.518 -1	+131	22.714 -19	41.45 -219
6 9.9	53.447 -13	21.00 -14	22.805 -12	39.48 +12	37.492 -26	+126	22.714 -72	43.39 -194
6 19.9	53.408 -39	21.01 -1	22.767 -38	39.26 +22	37.442 -50	+116	22.642 -120	44.99 -160
6 29.8	53.347 -61	20.91 +10	22.709 -58	38.99 +27	37.372 -70	+102	22.522 -162	46.27 -128
7 9.8	53.262 -85	20.70 +21	22.628 -81	38.64 +35	37.281 -91	+86	22.156 -204	47.16 -89
7 19.8	53.160 -102	20.38 +32	22.529 -99	38.24 +40	37.174 -107	+67	22.120 -236	47.64 -48
7 29.7	53.043 -117	19.97 +41	22.417 -112	37.79 +45	37.056 -118	+47	21.920 -259	47.73 -9
8 8.7	52.914 -129	19.47 +50	22.293 -124	37.31 +48	36.927 -129	+25	21.385 -276	47.38 +35
8 18.7	52.783 -131	18.90 +57	22.167 -126	36.81 +50	36.797 -130	+1	21.108 -277	46.62 +76
8 28.7	52.655 -128	18.29 +61	22.044 -123	36.33 +48	36.670 -127	-21	20.841 -267	45.49 +113
9 7.6	52.537 -118	17.65 +64	21.929 -115	35.86 +47	36.551 -119	-47	20.595 -246	44.00 +149
9 17.6	52.439 -98	17.05 +60	21.834 -95	35.47 +39	36.452 -99	-74	20.389 -206	42.22 +178
9 27.6	52.368 -71	16.49 +56	21.765 -69	35.16 +31	36.376 -76	-99	20.232 -157	40.23 +199
10 7.6	52.332 -36	16.04 +45	21.730 -35	34.99 +17	36.332 -44	-126	20.137 -95	38.08 +215
10 17.5	52.340 +8	15.75 +29	21.738 +8	35.01 -2	36.328 -4	-153	20.118 -19	35.89 +219
10 27.5	52.394 +54	15.68 +7	21.798 +60	35.23 -22	36.367 +39	-178	20.177 +59	33.75 +214
11 6.5	52.494 +100	15.75 -7	21.885 +87	35.62 -39	36.454 +87	-203	20.321 +144	31.73 +202
11 16.4	52.655 +161	16.11 -36	22.041 +156	36.34 -72	36.592 +138	-223	20.552 +231	29.97 +176
11 26.4	52.863 +208	16.75 -64	22.243 +202	37.30 -96	36.777 +185	-239	20.860 +308	28.52 +145
12 6.4	53.118 +255	17.68 -93	22.491 +248	38.52 -122	37.008 +231	-251	21.244 +384	27.45 +107
12 16.4	53.412 +294	18.87 -119	22.778 +287	39.96 -144	37.279 +271	-254	21.689 +445	26.84 +61
12 26.3	53.736 +324	20.29 -142	23.093 +315	41.58 -162	37.580 +301	-252	22.180 +491	26.69 +15
12 36.3	54.081 +345	21.91 -162	23.430 +337	43.36 -178	37.905 +325	-241	22.707 +527	27.02 -33
	54.081 +354	21.91 -176	23.430 +346	43.36 -186	37.905 +336	-222	22.707 +540	27.02 -81
Mean Place	53.331	14.33	22.654	34.02	37.066	58.16	22.486	30.11
sec δ, tan δ	+1.055	-0.338	+1.028	-0.237	+1.027	+0.232	+1.803	-1.501
dα(ψ), dδ(ψ)	+0.066	-0.33	+0.065	-0.33	+0.058	-0.33	+0.084	-0.33
dα(ε), dδ(ε)	-0.019	-0.57	-0.013	-0.57	+0.013	-0.57	-0.082	-0.57
Dble. Trans.	April 26		April 26		April 26		April 27	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1373			1374			1375			530							
	$\psi$ Centauri			2 Librae			244 G. Virginis			10 G. Circini							
Mag. Spect.	4.17	A0		6.30	K0		5.08	A3		5.71	A2p						
U.T.	R.A.	Dec.		R.A.	Dec.		R.A.	Dec.		R.A.	Dec.						
	h m	° ′		h m	° ′		h m	° ′		h m	° ′						
	14 19	- 37 49		14 22	- 11 38		14 23	+ 5 52		14 23	- 68 07						
1	-8.7	39 977	+ 361	07 06	- 49	38 699	+ 300	59 20	-177	28 053	+ 288	57 17	-231	51 531	+ 648	41 72	+ 84
1	1.3	40 363	+ 386	07 91	- 85	39 022	+ 323	60 97	-177	28 365	+ 312	54 89	-228	52 232	+ 701	41 41	+ 31
1	11.3	40 767	+ 404	09 09	-118	39 361	+ 339	62 83	-186	28 693	+ 328	52 67	-222	52 972	+ 740	41 61	- 20
1	21.3	41 175	+ 408	10 58	-149	39 704	+ 343	64 73	-190	29 028	+ 335	50 63	-204	53 727	+ 755	42 37	- 76
1	31.2	41 574	+ 399	12 30	-172	40 041	+ 337	66 58	-185	29 357	+ 329	48 81	-182	54 472	+ 745	43 61	-124
2	10.2	41 958	+ 384	14 22	-192	40 366	+ 325	68 35	-177	29 675	+ 318	47 26	-155	55 198	+ 726	45 31	-170
2	20.2	42 318	+ 360	16 29	-207	40 670	+ 304	69 97	-162	29 973	+ 298	46 04	-122	55 882	+ 684	47 43	-212
3	2.2	42 647	+ 329	18 42	-213	40 948	+ 278	71 41	-144	30 246	+ 273	45 17	- 87	56 511	+ 629	49 87	-244
3	12.1	42 944	+ 297	20 60	-218	41 200	+ 252	72 66	-125	30 492	+ 246	44 63	- 54	57 084	+ 573	49 87	-275
3	22.1	43 204	+ 260	22 76	-216	41 419	+ 219	73 69	-103	30 705	+ 213	44 45	- 18	57 583	+ 499	52 62	-296
4	1.1	43 427	+ 223	24 87	-211	41 608	+ 189	74 51	- 82	30 887	+ 182	44 56	+ 11	58 008	+ 425	58 68	-310
4	11.0	43 615	+ 188	26 91	-204	41 767	+ 159	75 13	- 62	31 039	+ 152	44 95	+ 39	58 359	+ 351	61 89	-321
4	21.0	43 764	+ 149	28 84	-193	41 894	+ 127	75 54	- 41	31 158	+ 119	45 57	+ 62	58 623	+ 264	65 11	-322
4	31.0	43 878	+ 114	30 64	-180	41 993	+ 99	75 80	- 26	31 249	+ 91	46 35	+ 78	58 809	+ 186	68 29	-318
5	11.0	43 956	+ 78	32 29	-165	42 065	+ 72	75 92	- 12	31 311	+ 62	47 26	+ 91	58 911	+ 102	71 38	-309
5	20.9	43 998	+ 42	33 76	-147	42 107	+ 42	75 90	+ 2	31 345	+ 34	48 24	+ 98	58 927	+ 16	74 30	-292
5	30.9	44 008	+ 10	35 05	-129	42 125	+ 18	75 79	+ 11	31 354	+ 9	49 24	+100	58 865	- 62	77 00	-270
6	9.9	43 983	- 25	36 13	-108	42 116	- 9	75 59	+ 20	31 337	- 17	50 24	+100	58 722	-143	79 44	-244
6	19.9	43 925	- 58	36 96	- 83	42 081	- 35	75 31	+ 28	31 297	- 40	51 18	+ 94	58 503	- 219	81 52	-208
6	29.8	43 839	- 86	37 56	- 60	42 026	- 55	74 99	+ 32	31 235	- 62	52 04	+ 86	58 219	- 284	83 24	-172
7	9.8	43 724	- 115	37 90	- 34	41 947	- 79	74 60	+ 39	31 153	- 82	52 81	+ 77	57 872	- 347	84 53	-129
7	19.8	43 586	- 138	37 95	- 5	41 850	- 97	74 19	+ 41	31 053	-100	53 44	+ 63	57 476	- 396	85 35	- 82
7	29.7	43 431	- 155	37 76	+ 19	41 739	-111	73 74	+ 45	30 941	-112	53 94	+ 50	57 046	- 430	85 70	- 35
8	8.7	43 262	- 169	37 28	+ 48	41 616	-123	73 28	+ 46	30 817	-124	54 29	+ 35	56 592	- 454	85 56	+ 14
8	18.7	43 091	- 171	36 55	+ 73	41 490	-126	72 82	+ 46	30 691	-126	54 46	+ 17	56 139	- 453	84 91	+ 65
8	28.7	42 924	- 167	35 60	+ 95	41 365	-125	72 38	+ 44	30 566	-125	54 45	- 1	55 701	- 438	83 81	+110
9	7.6	42 770	- 154	34 44	+116	41 249	-116	71 98	+ 40	30 450	-116	54 25	- 20	55 296	- 405	82 25	+156
9	17.6	42 642	- 128	33 15	+129	41 152	- 97	71 67	+ 31	30 351	- 99	53 83	- 42	54 953	- 343	80 32	+193
9	27.6	42 546	- 96	31 78	+137	41 080	- 72	71 45	+ 22	30 276	- 75	53 20	- 63	54 682	- 271	78 10	+222
10	7.6	42 494	- 52	30 37	+141	41 041	- 39	71 37	+ 8	30 232	- 44	52 34	- 86	54 503	- 179	75 63	+247
10	17.5	42 495	+ 1	29 02	+135	41 045	+ 4	71 48	- 11	30 228	- 4	51 22	-112	54 435	- 68	73 05	+258
10	27.5	42 552	+ 57	27 79	+123	41 096	+ 51	71 75	- 27	30 265	+ 37	49 87	-135	54 480	+ 45	70 46	+259
11	6.5	42 670	+ 118	26 75	+104	41 182	+ 86	72 28	- 53	30 351	+ 86	48 26	-161	54 649	+ 169	67 94	+252
11	16.4	42 851	+ 181	25 97	+ 78	41 332	+ 150	73 10	- 82	30 487	+ 136	46 43	-183	54 943	+ 294	65 64	+230
11	26.4	43 089	+ 238	25 48	+ 49	41 529	+ 197	74 14	-104	30 670	+ 183	44 41	-202	55 349	+ 406	63 63	+201
12	6.4	43 383	+ 294	25 35	+ 13	41 772	+ 243	75 44	-130	30 899	+ 229	42 22	-219	55 865	+ 516	62 01	+162
12	16.4	43 722	+ 339	25 60	- 25	42 053	+ 281	76 94	-150	31 168	+ 269	39 96	-226	56 470	+ 605	60 86	+115
12	26.3	44 095	+ 373	26 20	- 60	42 364	+ 311	78 61	-167	31 466	+ 298	37 66	-230	57 143	+ 673	60 19	+ 67
12	36.3	44 494	+ 399	27 18	- 98	42 697	+ 333	80 42	-181	31 787	+ 321	35 39	-227	57 871	+ 728	60 06	+ 13
			+ 408		-129		+ 343		-187		+ 333		-214		+ 753		- 42
Mean Place	43 914	25 55		41 935	70 41		30 988	51 24		58 251	65 21						
sec $\delta$ , tan $\delta$	+1.266	-0.776		+1.021	-0.206		+1.005	+0.103		+2.685	-2.492						
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.073	-0.33		+0.064	-0.32		+0.060	-0.32		+0.100	-0.32						
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.042	-0.57		-0.011	-0.58		+0.006	-0.59		-0.134	-0.59						
Dble. Trans.	April 27			April 28			April 28			April 28							

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1376		531		1377		1378	
Name	3 G. Librae		♃ Bootis		τ <sup>1</sup> Lupi		22 Bootis	
Mag.Spect.	5.39	K0	4.06	F8	4.65	B3	5.36	A5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	14 23	-24 44	14 24	+51 54	14 25	-45 09	14 25	+19 16
1 -8.7	<sup>s</sup> 58 722 + 321	29 33 -105	<sup>s</sup> 41 894 + 355	40 84 -327	<sup>s</sup> 11 628 + 390	19.65 -11	<sup>s</sup> 46 911 + 288	75 61 -274
1 1.3	59 067 + 345	30 63 -130	42 292 + 398	37 95 -289	12 047 + 419	20.16 -51	47 225 + 314	73 02 -259
1 11.3	59 428 + 361	32 14 -151	42 725 + 433	37 95 -245	12 047 + 439	21.06 -90	47 559 + 334	70 62 -240
1 21.3	59 793 + 365	33 84 -170	43 726 + 451	35 50 -189	12 486 + 446	22.34 -128	47 900 + 341	68 52 -210
1 31.2	60 152 + 359	35 63 -179	43 630 + 454	33 61 -129	12 932 + 439	23.92 -158	48 239 + 339	66 79 -173
2 10.2	60 498 + 346	37 48 -185	44 075 + 445	31 65 -67	13 795 + 424	25.77 -185	48 567 + 328	65 45 -134
2 20.2	60 822 + 324	39 34 -186	44 496 + 421	31 65 + 0	14 193 + 398	27.84 -207	48 876 + 309	64 57 -88
3 2.2	61 118 + 296	41 14 -180	44 881 + 385	32 26 + 61	14 559 + 366	30.06 -222	49 158 + 282	64 14 -43
3 12.1	61 387 + 269	42 87 -173	45 225 + 344	33 44 +118	14 891 + 332	32.39 -233	49 413 + 255	64 15 + 1
3 22.1	61 623 + 236	44 48 -161	45 515 + 290	35 16 +172	15 183 + 292	34.77 -238	49 633 + 220	64 59 + 44
4 1.1	61 826 + 203	45 96 -148	45 751 + 236	37 28 +212	15 435 + 252	37.15 -238	49 820 + 187	65 38 + 79
4 11.0	61 999 + 173	47 30 -134	45 930 + 179	39 75 +247	15 648 + 213	39.51 -236	49 974 + 154	66 49 +111
4 21.0	62 137 + 138	48 49 -119	46 049 + 119	42 43 +268	15 817 + 169	41.79 -228	50 092 + 118	67 85 +136
4 31.0	62 246 + 109	49 53 -104	46 113 + 64	45 20 +277	15 947 + 130	43 96 -217	50 179 + 255	69 35 +150
5 11.0	62 324 + 78	50 42 -89	46 123 + 10	47 99 +279	16 037 + 90	46.01 -205	50 234 + 55	70 97 +162
5 20.9	62 371 + 47	51 15 -73	46 080 -43	50 68 +269	16 084 + 47	47.88 -187	50 259 + 25	72 62 +165
5 30.9	62 390 + 19	51 74 -59	45 992 -88	53 16 +248	16 094 + 10	49.55 -167	50 257 -2	74 21 +159
6 9.9	62 380 -10	52 18 -44	45 860 -132	55 40 +224	16 063 -31	51.00 -145	50 227 -30	75 74 +153
6 19.9	62 342 -38	52 46 -28	45 690 -170	57 28 +188	15 995 -68	52.18 -118	50 172 -55	77 11 +137
6 29.8	62 280 -62	52 60 -14	45 490 -200	58 78 +150	15 893 -102	53.08 -90	50 096 -76	78 29 +118
7 9.8	62 192 -88	52 57 + 3	45 260 -230	59 86 +108	15 757 -136	53 68 -60	49 998 -98	79 28 + 99
7 19.8	62 084 -108	52 38 + 19	45 011 -249	60 46 + 60	15 595 -162	53 95 -27	49 883 -115	80 01 + 73
7 29.7	61 960 -124	52 05 + 33	44 749 -262	60 60 + 14	15 412 -183	53 91 + 4	49 756 -127	80 49 + 48
8 8.7	61 822 -138	51 57 + 48	44 477 -272	60 26 -34	15 213 -199	53 52 + 39	49 617 -139	80 71 + 22
8 18.7	61 681 -141	50 96 + 61	44 207 -270	59 42 -84	15 011 -202	52.81 + 71	49 476 -141	80 62 - 9
8 28.7	61 543 -138	50 25 + 71	43 947 -260	58 14 -128	14 813 -198	51.82 + 99	49 337 -139	80 26 -36
9 7.6	61 413 -130	49 46 + 79	43 702 -245	56 39 -175	14 629 -184	50 56 +126	49 206 -131	79 59 -67
9 17.6	61 305 -108	48 63 + 83	43 487 -215	54 21 -218	14 474 -155	49 09 +147	49 094 -112	78 62 -97
9 27.6	61 225 -80	47 82 + 81	43 308 -179	51 65 -256	14 356 -118	47 47 +162	49 005 -89	77 37 -125
10 7.6	61 180 -45	47 05 + 77	43 173 -135	48 72 -293	14 286 -70	45 76 +171	48 948 -57	75 81 -156
10 17.5	61 182 + 2	46 42 + 63	43 095 -78	45 50 -322	14 275 -11	44 07 +169	48 931 -17	73 97 -184
10 27.5	61 231 + 49	45 95 + 47	43 077 -346	42 04 -346	14 325 + 50	42 45 +162	48 957 + 26	71 87 -210
11 6.5	61 332 + 101	45 68 + 27	43 126 + 49	38 39 -365	14 444 + 119	40 98 +147	49 033 + 76	69 52 -235
11 16.4	61 491 + 159	45 63 + 5	43 246 + 120	34 66 -373	14 633 + 189	39 77 +121	49 160 + 127	66 99 -253
11 26.4	61 702 + 211	45 88 -25	43 435 + 189	30 93 -373	14 885 + 252	38 85 + 92	49 336 + 176	64 32 -267
12 6.4	61 962 + 260	46 45 -57	43 692 + 257	27 28 -365	15 200 + 315	38 29 + 56	49 561 + 225	61 55 -277
12 16.4	62 263 + 301	47 31 -86	44 012 + 320	23 85 -343	15 565 + 365	38 14 + 15	49 827 + 266	58 79 -276
12 26.3	62 595 + 332	48 44 -113	44 382 + 370	20 71 -314	15 969 + 404	38 38 -24	50 125 + 298	56 11 -268
12 36.3	62 951 + 356	49 82 -138	44 795 + 413	17 98 -273	16 402 + 433	39 03 -65	50 450 + 325	53 57 -254
	62 951 + 365	49 82 -158	44 795 + 440	17 98 -222	16 402 + 446	39 03 -104	50 450 + 338	53 57 -227
Mean Place	62.266	44.10	44.218	46.37	15.951	39.26	49.670	73.66
sec δ, tan δ	+1.101	-0.461	+1.621	+1.276	+1.418	-1.006	+1.059	+0.350
da(ψ), dδ(ψ)	+0.068	-0.32	+0.041	-0.32	+0.077	-0.32	+0.056	-0.32
da(ε), dδ(ε)	-0.025	-0.59	+0.069	-0.59	-0.054	-0.59	+0.019	-0.59
Dble.Trans.	April 28		April 28		April 28		April 28	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	532		533		1379		534	
	52 Hydrae*		φ Virginis*		5 Ursae Minoris		ε Bootis	
Mag. Spect.	5.00	B8	4.99	K0	4.37	K2	3.78	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	14 27	- 29 25	14 27	- 2 09	14 27	+ 75 44	14 31	+ 30 25
1 <sup>d</sup> -8.7	19.114 +330	37.58 -81	27.266 +289	56.33 -201	30.667 +675	72.98 -314	12.246 +293	47.85 -302
1 <sup>s</sup> 1.3	19.469 +365	38.67 -109	27.579 +313	58.38 -205	31.455 +788	70.29 -269	12.569 +323	45.06 -279
1 11.3	19.841 +372	40.03 -136	27.908 +329	60.44 -206	32.340 +885	68.12 -217	12.916 +347	42.54 -252
1 21.3	20.219 +378	41.61 -158	28.243 +335	62.42 -198	33.290 +950	66.60 -152	13.275 +359	40.44 -210
1 31.2	20.590 +371	43.34 -173	28.573 +330	64.26 -184	34.262 +972	65.72 -88	13.632 +357	38.79 -165
2 10.2	20.949 +359	45.19 -185	28.893 +320	65.91 -165	35.235 +973	65.53 -19	13.981 +349	37.63 -116
2 20.2	21.286 +337	47.09 -190	29.193 +300	67.32 -141	36.165 +930	66.03 +50	14.311 +330	37.02 -61
3 2.2	21.595 +309	48.98 -189	29.467 +274	68.45 -113	37.020 +855	67.16 +113	14.615 +304	36.94 -8
3 12.1	21.877 +282	50.85 -187	29.716 +249	69.31 -86	37.781 +761	68.87 +171	14.888 +273	37.36 +42
3 22.1	22.124 +247	52.64 -179	29.934 +218	69.88 -57	38.413 +632	71.10 +223	15.125 +237	38.27 +91
4 1.1	22.339 +215	54.32 -168	30.121 +187	70.18 -30	38.905 +492	73.71 +261	15.324 +199	39.57 +130
4 11.0	22.521 +182	55.91 -159	30.278 +157	70.25 -7	39.250 +345	76.61 +290	15.487 +163	41.21 +164
4 21.0	22.669 +148	57.35 -144	30.404 +126	70.09 +16	39.431 +181	79.69 +308	15.609 +122	43.12 +191
4 31.0	22.785 +116	58.65 -130	30.503 +99	69.77 +32	39.459 +28	82.78 +309	15.696 +87	45.16 +204
5 11.0	22.870 +85	59.82 -117	30.573 +70	69.31 +46	39.336 -123	85.84 +306	15.747 +51	47.30 +214
5 20.9	22.921 +51	60.82 -100	30.615 +42	68.74 +57	39.064 -272	88.71 +287	15.762 +15	49.43 +213
5 30.9	22.943 +22	61.67 -85	30.632 +17	68.13 +61	38.669 -395	91.29 +258	15.748 -14	51.46 +203
6 9.9	22.934 -9	62.35 -68	30.624 -8	67.47 +66	38.154 -515	93.56 +227	15.702 -46	53.36 +190
6 19.9	22.895 -39	62.84 -49	30.590 -34	66.81 +66	37.538 -616	95.38 +182	15.628 -74	55.04 +168
6 29.8	22.829 -66	63.17 -33	30.535 -55	66.18 +63	36.846 -692	96.74 +136	15.530 -98	56.46 +142
7 9.8	22.737 -92	63.29 -12	30.458 -77	65.57 +61	36.086 -780	97.60 +86	15.409 -121	57.60 +114
7 19.8	22.622 -115	63.22 +7	30.363 -95	65.02 +55	35.282 -804	97.92 +32	15.269 -140	58.39 +79
7 29.7	22.490 -132	62.96 +26	30.253 -110	64.53 +49	34.458 -824	97.72 -20	15.269 -153	58.39 +46
8 8.7	22.344 -146	62.50 +46	30.132 -121	64.12 +41	33.622 -836	96.99 -73	15.116 -165	58.85 +10
8 18.7	22.193 -151	61.88 +62	30.007 -125	63.81 +31	32.805 -817	95.71 -128	14.951 -167	58.95 -28
8 28.7	22.045 -148	61.11 +77	29.883 -124	63.60 +21	32.022 -783	93.96 -175	14.619 -165	58.03 -64
9 7.6	21.906 -139	60.20 +91	29.766 -117	63.52 +8	31.286 -736	91.73 -223	14.463 -156	57.02 -101
9 17.6	21.789 -117	59.23 +97	29.667 -99	63.60 -8	30.629 -657	89.07 -266	14.327 -136	55.64 -138
9 27.6	21.700 -89	58.22 +101	29.592 -75	63.83 -23	30.059 -570	86.04 -303	14.215 -112	53.93 -171
10 7.6	21.649 -51	57.23 +99	29.548 -44	64.27 -44	29.596 -463	82.67 -337	14.137 -78	51.87 -206
10 17.5	21.646 -3	56.33 +90	29.544 -4	64.91 -64	29.264 -332	79.04 -363	14.101 -36	49.50 -237
10 27.5	21.692 +46	55.58 +75	29.582 +38	65.76 -85	29.066 -198	75.24 -380	14.111 +10	46.88 -262
11 6.5	21.794 +102	55.02 +56	29.667 +85	66.89 -113	29.022 -44	71.30 -394	14.173 +62	44.00 -288
11 16.4	21.954 +160	54.69 +33	29.804 +137	68.26 -137	29.139 +117	67.37 -393	14.290 +117	40.97 -303
11 26.4	22.168 +214	54.65 +4	29.988 +184	69.83 -157	29.411 +272	63.52 -385	14.459 +169	37.85 -312
12 6.4	22.434 +266	54.93 -28	30.218 +230	71.61 -178	29.846 +435	59.84 -368	14.681 +222	34.67 -318
12 16.4	22.744 +310	55.53 -60	30.488 +270	73.53 -192	30.429 +583	56.47 -337	14.948 +267	31.58 -309
12 26.3	23.085 +341	56.44 -91	30.787 +299	75.54 -201	31.139 +710	53.48 -299	15.253 +305	28.64 -294
12 36.3	23.452 +367	57.63 -119	31.110 +323	77.61 -207	31.966 +827	50.98 -250	15.588 +335	25.94 -270
	23.452 +377	57.63 -144	31.110 +333	77.61 -202	31.966 +905	50.98 -190	15.588 +352	25.94 -234
Mean Place	22.818	53.30	30.346	64.38	32.513	81.77	14.884	49.12
sec δ, tan δ	+1.148	-0.564	+1.001	-0.038	+4.064	+3.939	+1.160	+0.587
dα(ψ), dδ(ψ)	+0.070	-0.32	+0.062	-0.32	-0.002	-0.32	+0.052	-0.31
dα(ε), dδ(ε)	-0.030	-0.60	-0.002	-0.60	+0.210	-0.60	+0.031	-0.61
Dble. Trans.	April 29		April 29		April 29		April 30	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	536		535		1380		537		
	Groombridge 2125 (Draconis)		γ Bootis		σ Bootis		η Centauri		
Mag.Spect.	6.18	F0	3.00	F0	4.48	F0	2.65	B3p, A2p	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° /	h m	° /	h m	° /	h m	° /	
	14 31	+60 16	14 31	+38 21	14 34	+29 47	14 34	-42 05	
1	<sup>d</sup> -8.6	<sup>s</sup> 18.497 +396	<sup>s</sup> 58.33 -331	<sup>s</sup> 29.526 +305	<sup>s</sup> 57.81 -316	<sup>s</sup> 02.892 +291	<sup>s</sup> 70.94 -302	<sup>s</sup> 34.487 +368	<sup>s</sup> 38.73 -16
1	1.3	18.949 +452	55.42 -291	29.865 +339	54.92 -289	03.213 +321	68.15 -279	34.885 +398	39.26 -53
1	11.3	19.448 +499	52.98 -244	30.231 +366	52.38 -254	03.558 +345	65.63 -252	35.305 +420	40.16 -90
1	21.3	19.976 +528	51.14 -184	30.611 +380	50.31 -207	03.915 +357	63.51 -212	35.733 +428	41.40 -124
1	31.2	20.512 +536	49.92 -122	30.992 +381	48.75 -156	04.271 +356	61.84 -167	36.155 +422	42.92 -152
2	10.2	21.043 +531	49.35 -57	31.365 +373	47.74 -101	04.620 +349	60.66 -118	36.566 +411	44.68 -176
2	20.2	21.550 +507	49.48 +13	31.719 +354	47.34 -40	04.950 +330	60.02 -64	36.954 +388	46.64 -196
3	2.2	22.016 +466	50.24 +76	32.043 +324	47.50 +16	05.254 +304	59.90 -12	37.313 +359	48.71 -207
3	12.1	22.434 +418	51.60 +136	32.336 +293	48.20 +70	05.528 +274	60.29 +39	37.641 +328	50.88 -217
3	22.1	22.789 +355	53.50 +190	32.588 +252	49.42 +122	05.767 +239	61.17 +88	37.932 +291	53.09 -221
4	1.1	23.075 +286	55.81 +231	32.799 +211	51.05 +163	05.968 +201	62.44 +127	38.185 +253	55.29 -220
4	11.1	23.292 +217	58.48 +267	32.968 +169	53.03 +198	06.134 +166	64.05 +161	38.402 +217	57.46 -217
4	21.0	23.432 +140	61.36 +288	33.092 +124	55.27 +224	06.259 +125	65.93 +188	38.579 +177	59.55 -209
4	31.0	23.500 +68	64.32 +296	33.175 +83	57.63 +236	06.349 +90	67.95 +202	38.718 +139	61.54 -199
5	11.0	23.499 -1	67.30 +298	33.218 +43	60.07 +244	06.404 +55	70.08 +213	38.819 +101	63.41 -187
5	20.9	23.427 -72	70.15 +285	33.220 +2	62.48 +241	06.424 +20	72.19 +211	38.880 +61	65.12 -171
5	30.9	23.298 -129	72.78 +263	33.189 -31	64.75 +227	06.413 -11	74.22 +203	38.904 +24	66.65 -153
6	9.9	23.111 -187	75.14 +236	33.123 -66	66.85 +210	06.371 -42	76.12 +190	38.890 -14	67.98 -133
6	19.9	22.873 -238	77.12 +198	33.025 -98	68.67 +182	06.300 -71	77.80 +168	38.838 -52	69.07 -109
6	29.8	22.597 -276	78.69 +157	32.902 -123	70.19 +152	06.206 -94	79.23 +143	38.754 -84	69.92 -85
7	9.8	22.284 -313	79.81 +112	32.754 -148	71.38 +119	06.088 -118	80.38 +115	38.636 -118	70.48 -56
7	19.8	21.945 -339	80.42 +61	32.586 -168	72.16 +78	05.951 -137	81.19 +81	38.490 -146	70.75 -27
7	29.8	21.590 -355	80.54 +12	32.405 -181	72.56 +40	05.800 -151	81.68 +49	38.323 -167	70.74 +1
8	8.7	21.224 -366	80.16 -38	32.212 -193	72.55 -1	05.637 -163	81.81 +13	38.139 -184	70.41 +33
8	18.7	20.860 -364	79.24 -92	32.018 -194	72.11 -44	05.471 -166	81.55 -26	37.948 -191	69.79 +62
8	28.7	20.508 -352	77.86 -138	31.827 -191	71.26 -85	05.307 -164	80.95 -60	37.760 -188	68.91 +88
9	7.6	20.175 -333	75.99 -187	31.646 -181	70.00 -126	05.152 -155	79.98 -97	37.582 -178	67.77 +114
9	17.6	19.879 -296	73.66 -233	31.488 -158	68.34 -166	05.015 -137	78.63 -135	37.430 -152	66.45 +132
9	27.6	19.625 -254	70.96 -270	31.356 -132	66.32 -202	04.903 -112	76.96 -167	37.311 -119	64.99 +146
10	7.6	19.424 -201	67.87 -309	31.259 -97	63.93 -239	04.824 -79	74.93 -203	37.236 -75	63.44 +155
10	17.5	19.292 -132	64.49 -338	31.209 -50	61.23 -270	04.787 -37	72.61 -232	37.216 -20	61.91 +153
10	27.5	19.230 -62	60.88 -361	31.207 -52	58.27 -296	04.795 +8	70.02 -259	37.255 +39	60.45 +146
11	6.5	19.249 +19	57.07 -381	31.261 +4	55.07 -320	04.855 +60	67.18 -284	37.359 +104	59.14 +131
11	16.5	19.355 +106	53.22 -385	31.375 +114	51.74 -333	04.970 +115	64.18 -300	37.530 +171	58.06 +108
11	26.4	19.542 +187	49.37 -385	31.544 +169	48.34 -340	05.137 +167	61.07 -311	37.762 +232	57.26 +80
12	6.4	19.815 +273	45.63 -374	31.771 +227	44.94 -340	05.356 +219	57.92 -315	38.056 +294	56.79 +47
12	16.4	20.165 +350	42.14 -349	32.047 +276	41.68 -326	05.621 +265	54.84 -308	38.400 +344	56.70 +9
12	26.3	20.580 +415	38.96 -318	32.365 +318	38.61 -307	05.924 +303	51.91 -293	38.782 +382	56.98 -28
12	36.3	21.053 +473	36.22 -274	32.717 +352	35.84 -277	06.257 +333	49.20 -271	39.194 +412	57.65 -67
		+509	-220	+372	-235	+351	-235	+427	-102
Mean Place	20.748	65.51	32.067	60.98	05.560	72.19	38.735	56.76	
sec δ, tan δ	+2.017	+1.752	+1.275	+0.792	+1.152	+0.573	+1.348	-0.904	
dα(ψ), dδ(ψ)	+0.033	-0.31	+0.048	-0.31	+0.052	-0.31	+0.076	-0.31	
dα(ε), dδ(ε)	+0.092	-0.61	+0.042	-0.61	+0.030	-0.62	-0.047	-0.62	
Dble.Trans.	April 30		April 30		April 30		May 1		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1381		540		538		541		
	10 G. Librae		33 Bootis		α Centauri A*		α Lupi		
Mag.Spect.	6.24	F8	5.39	A0	0.33	G0	2.89	B2	
U.T.	R.A.		R.A.		R.A.		R.A.		
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	14 36	-12 14	14 38	+44 27	14 38	-60 46	14 40	-47 19	
	<sup>s</sup> +291	<sup>s</sup> -154	<sup>s</sup> +312	<sup>s</sup> -329	<sup>s</sup> +504	<sup>s</sup> +64	<sup>s</sup> +389	<sup>s</sup> +14	
1	-8.6	13.310	44.62	17.586	40.27	35.965	20.18	57.029	32.59
	+316	-167	+351	-297	+547	+17	+423	-25	
1	1.3	13.626	46.29	17.937	37.30	36.512	20.01	57.452	32.84
	+334	-178	+383	-260	+579	-31	+449	-65	
1	11.3	13.960	48.07	18.320	34.70	37.091	20.32	57.901	33.49
	+341	-182	+402	-210	+593	-81	+459	-104	
1	21.3	14.301	49.89	18.722	32.60	37.684	21.13	58.360	34.53
	+337	-178	+405	-154	+585	-124	+456	-137	
1	31.2	14.638	51.67	19.127	31.06	38.269	22.37	58.816	35.90
	+327	-171	+401	-96	+570	-165	+445	-166	
2	10.2	14.965	53.38	19.528	30.10	38.839	24.02	59.261	37.56
	+309	-157	+381	-32	+538	-201	+422	-191	
2	20.2	15.274	54.95	19.909	29.78	39.377	26.03	59.683	39.47
	+284	-141	+353	+27	+496	-229	+393	-208	
3	2.2	15.558	56.36	20.262	30.05	39.873	28.32	60.076	41.55
	+260	-121	+319	+85	+452	-253	+360	-223	
3	12.1	15.818	57.57	20.581	30.90	40.325	30.85	60.436	43.78
	+229	-100	+276	+139	+396	-271	+322	-232	
3	22.1	16.047	58.57	20.857	32.29	40.721	33.56	60.758	46.10
	+199	-80	+231	+182	+340	-281	+282	-235	
4	1.1	16.246	59.37	21.088	34.11	41.061	36.37	61.040	48.45
	+171	-60	+185	+218	+283	-289	+242	-236	
4	11.1	16.417	59.97	21.273	36.29	41.344	39.26	61.282	50.81
	+140	-41	+134	+245	+219	-288	+198	-232	
4	21.0	16.557	60.38	21.407	38.74	41.563	42.14	61.480	53.13
	+111	-25	+89	+257	+160	-282	+158	-223	
5	1.0	16.668	60.63	21.496	41.31	41.723	44.96	61.638	55.36
	+83	-11	+43	+266	+98	-274	+115	-215	
5	11.0	16.751	60.74	21.539	43.97	41.821	47.70	61.753	57.51
	+54	+1	-2	+260	+34	-257	+69	-198	
5	20.9	16.805	60.73	21.537	46.57	41.855	50.27	61.822	59.49
	+28	+11	-42	+245	-25	-237	+29	-181	
5	30.9	16.833	60.62	21.495	49.02	41.830	52.64	61.851	61.30
	+0	+19	-81	+226	-87	-213	-14	-161	
6	9.9	16.833	60.43	21.414	51.28	41.743	54.77	61.837	62.91
	-27	+27	-117	+197	-145	-181	-58	-134	
6	19.9	16.806	60.16	21.297	53.25	41.598	56.58	61.779	64.25
	-50	+30	-145	+162	-195	-148	-94	-109	
6	29.8	16.756	59.86	21.152	54.87	41.403	58.06	61.685	65.34
	-75	+37	-175	+127	-246	-110	-133	-79	
7	9.8	16.681	59.49	20.977	56.14	41.157	59.16	61.552	66.13
	-95	+40	-196	+83	-286	-68	-164	-45	
7	19.8	16.586	59.09	20.781	56.97	40.871	59.84	61.388	66.58
	-112	+42	-212	+41	-314	-26	-189	-13	
7	29.8	16.474	58.67	20.569	57.38	40.557	60.10	61.199	66.71
	-126	+45	-224	-4	-337	+18	-209	+22	
8	8.7	16.348	58.22	20.345	57.34	40.220	59.92	60.990	66.49
	-131	+45	-227	-51	-341	+63	-216	+56	
8	18.7	16.217	57.77	20.118	56.83	39.879	59.29	60.774	65.93
	-132	+43	-223	-93	-332	+102	-215	+86	
8	28.7	16.085	57.34	19.895	55.90	39.547	58.27	60.559	65.07
	-125	+41	-213	-138	-312	+144	-205	+117	
9	7.6	15.960	56.93	19.682	54.52	39.235	56.83	60.354	63.90
	-107	+33	-189	-182	-268	+176	-177	+141	
9	17.6	15.853	56.60	19.493	52.70	38.967	55.07	60.177	62.49
	-85	+24	-162	-219	-215	+202	-141	+160	
9	27.6	15.768	56.36	19.331	50.51	38.752	53.05	60.036	60.89
	-52	+12	-123	-257	-146	+224	-94	+173	
10	7.6	15.716	56.24	19.208	47.94	38.606	50.81	59.942	59.16
	-11	-6	-75	-290	-62	+232	-34	+175	
10	17.5	15.705	56.30	19.133	45.04	38.544	48.49	59.908	57.41
	+34	-23	-23	-316	+26	+232	+29	+172	
10	27.5	15.739	56.53	19.110	41.88	38.570	46.17	59.937	55.69
	+75	-38	+37	-340	+122	+224	+100	+161	
11	6.5	15.814	56.91	19.147	38.48	38.692	43.93	60.037	54.08
	+136	-79	+101	-352	+220	+203	+173	+139	
11	16.5	15.950	57.70	19.248	34.96	38.912	41.90	60.210	52.69
	+183	-96	+162	-357	+310	+175	+240	+112	
11	26.4	16.133	58.66	19.410	31.39	39.222	40.15	60.450	51.57
	+231	-119	+224	-357	+396	+138	+307	+80	
12	6.4	16.364	59.85	19.634	27.82	39.618	38.77	60.757	50.77
	+271	-141	+280	-340	+469	+94	+362	+40	
12	16.4	16.635	61.26	19.914	24.42	40.087	37.83	61.119	50.37
	+303	-158	+325	-318	+525	+49	+405	+1	
12	26.3	16.938	62.84	20.239	21.24	40.612	37.34	61.524	50.36
	+327	-172	+366	-284	+568	+0	+440	-39	
12	36.3	17.265	64.56	20.605	18.40	41.180	37.34	61.964	50.75
	+339	-178	+391	-239	+590	-50	+457	-80	
Mean Place	16.599	54.77	20.087	44.82	41.384	41.02	61.619	51.01	
sec δ, tan δ	+1.023	-0.217	+1.401	+0.981	+2.048	-1.788	+1.475	-1.085	
dα(ψ), dδ(ψ)	+0.065	-0.31	+0.045	-0.31	+0.091	-0.31	+0.080	-0.30	
dα(ε), dδ(ε)	-0.011	-0.63	+0.050	-0.64	-0.092	-0.64	-0.055	-0.65	
Dble.Trans.	May 1		May 1		May 2		May 2		

APPARENT PLACES OF STARS, 1986

225

AT UPPER TRANSIT AT GREENWICH

No.	1382		539		545		544	
	32 Bootis		$\alpha$ Circini*		$\mu$ Virginis		371 G. Centauri	
Mag. Spect.	5.63	G5	3.42	F0	3.95	F5	4.13	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	14 41	+ 11 42	14 41	- 64 54	14 42	- 5 35	14 42	- 35 06
1 -8.6	01 66.4 +274	69 36 -251	17 92.3 +562	40 60 +90	17 63.6 +282	51 95 -183	45 67.7 +335	42 64 -42
1 1.3	01 96.6 +302	66 91 -245	18 53.9 +616	40 18 +42	17 94.4 +308	53 86 -191	46 04.2 +365	43 39 -75
1 11.3	02 28.9 +323	64 59 -232	19 19.5 +656	40 25 -7	18 27.1 +327	55 81 -195	46 42.8 +386	44 44 -105
1 21.3	02 62.1 +332	62 48 -211	19 87.1 +676	40 85 -60	18 60.7 +336	57 72 -191	46 82.4 +396	45 76 -132
1 31.3	02 95.2 +331	60 65 -183	20 54.5 +674	41 91 -106	18 93.9 +332	59 53 -181	47 21.6 +392	47 29 -153
2 10.2	03 27.5 +323	59 15 -150	21 20.6 +661	43 40 -149	19 26.3 +324	61 20 -167	47 59.8 +382	49 00 -171
2 20.2	03 58.2 +307	58 04 -111	21 83.6 +630	45 31 -191	19 57.0 +307	62 66 -146	47 96.1 +363	50 84 -184
3 2.2	03 86.5 +283	57 32 -72	22 42.3 +587	47 53 -252	19 85.5 +285	63 88 -122	48 29.7 +336	52 72 -188
3 12.1	04 12.4 +269	56 99 -33	22 96.3 +540	50 05 -262	20 11.5 +260	64 86 -98	48 60.7 +310	54 65 -193
3 22.1	04 35.2 +228	57 06 +7	23 44.3 +480	52 79 -274	20 34.6 +231	65 56 -70	48 88.3 +276	56 56 -191
4 1.1	04 54.9 +197	57 46 +40	23 86.1 +418	55 67 -288	20 54.8 +202	66 03 -47	49 12.6 +243	58 42 -186
4 11.1	04 71.6 +167	58 17 +71	24 21.6 +355	58 67 -300	20 72.2 +174	66 26 -23	49 33.6 +210	60 22 -180
4 21.0	04 85.1 +135	59 13 +96	24 49.7 +261	61 71 -304	20 86.5 +143	66 28 -2	49 51.0 +174	61 92 -170
5 1.0	04 95.6 +105	60 26 +113	24 71.0 +213	64 72 -301	20 98.0 +115	66 15 +13	49 65.1 +141	63 51 -159
5 11.0	05 03.1 +75	61 53 +127	24 85.2 +142	67 68 -286	21 06.7 +87	65 86 +29	49 75.8 +107	64 98 -147
5 20.9	05 07.7 +46	62 86 +133	24 91.6 +64	70 49 -281	21 12.5 +58	65 47 +39	49 82.8 +70	66 31 -133
5 30.9	05 09.5 +18	64 18 +132	24 91.1 -5	73 11 -262	21 15.8 +33	65 02 +45	49 86.5 +37	67 48 -117
6 9.9	05 08.7 -8	65 48 +130	24 83.3 -78	75 51 -240	21 16.2 +4	64 51 +51	49 86.8 +3	68 48 -100
6 19.9	05 05.1 -36	66 68 +120	24 68.4 -149	77 60 -209	21 14.0 -22	63 97 +54	49 83.5 -33	69 28 -80
6 29.8	04 99.3 -58	67 75 +107	24 47.4 -210	79 35 -175	21 09.5 -45	63 45 +52	49 77.3 -62	69 90 -62
7 9.8	04 91.1 -82	68 69 +94	24 20.3 -271	80 71 -136	21 02.5 -70	62 92 +53	49 67.8 -95	70 28 -38
7 19.8	04 80.9 -102	69 44 +75	23 88.3 -320	81 64 -93	20 93.4 -91	62 42 +50	49 55.7 -121	70 43 -15
7 29.8	04 69.2 -117	70 00 +56	23 52.6 -357	82 13 -49	20 82.7 -107	61 96 +46	49 41.5 -142	70 36 +7
8 8.7	04 56.2 -130	70 35 +35	23 25.2 -385	82 14 -1	20 82.7 -122	61 96 +42	49 41.5 -160	70 05 +31
8 18.7	04 42.5 -137	70 47 +12	22 74.7 -394	81 68 +46	20 70.5 -129	61 54 +34	49 25.5 -167	70 05 +55
8 28.7	04 28.9 -136	70 36 -11	22 36.1 -386	80 78 +90	20 44.7 -129	60 92 +28	48 92.0 -168	68 76 +74
9 7.6	04 15.7 -132	70 01 -35	21 99.6 -365	79 43 +135	20 32.3 -124	60 74 +18	48 75.9 -161	67 82 +94
9 17.6	04 04.2 -115	69 39 -62	21 99.6 -318	77 70 +173	20 32.3 -108	60 74 +5	48 75.9 -139	67 82 +107
9 27.6	03 94.8 -94	68 54 -85	21 67.8 -259	75 68 +202	20 21.5 -87	60 69 -8	48 62.0 -111	66 75 +116
10 7.6	03 88.4 -64	67 40 -114	21 23.6 -183	73 39 +229	20 12.8 -56	60 77 -25	48 50.9 -72	65 59 +121
10 17.5	03 85.9 -25	66 00 -140	21 14.9 -87	70 97 +242	20 05.6 -16	61 47 -45	48 41.4 -23	63 21 +117
10 27.5	03 87.5 +16	64 36 -164	21 16.0 +11	68 51 +246	20 08.2 +26	62 10 -63	48 44.4 +30	62 13 +108
11 6.5	03 93.8 +63	62 45 -191	21 28.1 +121	66 09 +242	20 08.2 +72	62 10 -86	48 44.4 +89	62 13 +92
11 16.5	04 05.3 +115	60 33 -212	21 51.4 +233	63 86 +223	20 15.4 +125	62 96 -115	48 53.3 +150	61 21 +70
11 26.4	04 21.6 +163	58 03 -230	21 84.9 +335	61 88 +198	20 27.9 +173	64 11 -135	48 68.3 +208	60 51 +44
12 6.4	04 42.7 +211	55 60 -243	22 28.5 +436	60 25 +163	20 45.2 +221	65 46 -156	48 89.1 +265	59 93 +14
12 16.4	04 68.0 +253	53 11 -249	22 80.6 +521	59 05 +120	20 67.3 +262	67 02 -173	49 15.6 +312	59 93 -21
12 26.3	04 96.6 +286	50 62 -249	23 39.2 +596	58 30 +75	20 93.5 +293	68 75 -185	49 46.8 +349	60 14 -53
12 36.3	05 27.9 +313	48 21 -241	24 03.4 +642	58 06 +24	21 22.8 +319	70 60 -193	49 81.7 +379	60 67 -85
	05 27.9 +328	48 21 -223	24 03.4 +670	58 06 -27	21 54.7 +333	72 53 -192	50 19.6 +393	61 52 -115
Mean Place	04.592	65.97	24.304	61.87	20.860	60.16	49.683	58.40
sec $\delta$ , tan $\delta$	+1.021	+0.207	+2.359	-2.136	+1.005	-0.098	+1.223	-0.703
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.058	-0.30	+0.098	-0.30	+0.063	-0.30	+0.073	-0.30
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.011	-0.65	-0.109	-0.65	-0.005	-0.65	-0.036	-0.65
Dbble. Trans.	May 2		May 2		May 2		May 3	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1383		1384		547		546	
	34 Bootis		B.D. +33° 2489 (Bootis)		109 Virginis		30 G. Lupi	
Mag. Spect.	4.93 var.	M0	6.47	M0	3.76	A0	5.20	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	14 42	+26 34	14 44	+32 50	14 45	+1 56	14 45	-52 19
1 <sup>d</sup> -8.6	47.027 <sup>s</sup> +279	64.60 -297	37.144 <sup>s</sup> +284	40.08 -313	30.838 <sup>s</sup> +274	62.90 -213	59.284 <sup>s</sup> +417	18.93 +42
1 1.3	47.337 +310	61.81 -279	37.461 +317	37.19 -289	31.139 +301	60.75 -215	59.740 +456	18.93 +0
1 11.3	47.671 +334	59.27 -254	37.806 +345	34.58 -261	31.460 +321	58.63 -212	60.225 +485	19.36 -43
1 21.3	48.019 +348	57.09 -218	38.165 +359	32.39 -219	31.791 +331	56.63 -200	60.724 +499	20.21 -85
1 31.3	48.367 +348	55.33 -176	38.527 +362	30.66 -173	32.120 +329	54.80 -183	61.221 +497	21.43 -122
2 10.2	48.709 +342	54.03 -130	38.884 +357	29.44 -122	32.441 +321	53.20 -160	61.708 +487	22.99 -156
2 20.2	49.034 +325	53.25 -78	39.224 +340	28.79 -65	32.746 +305	51.90 -130	62.172 +464	24.85 -186
3 2.2	49.336 +302	52.97 -28	39.540 +316	28.69 -10	33.029 +283	50.89 -101	62.605 +433	26.93 -208
3 12.1	49.611 +275	53.19 +22	39.828 +288	29.11 +42	33.289 +260	50.20 -69	63.004 +399	29.21 -228
3 22.1	49.852 +241	53.89 +70	40.080 +252	30.05 +94	33.519 +230	49.84 -36	63.361 +357	31.62 -241
4 1.1	50.058 +206	54.98 +109	40.296 +216	31.40 +135	33.721 +202	49.77 -7	63.676 +315	34.10 -248
4 11.1	50.231 +173	56.43 +145	40.474 +178	33.11 +171	33.894 +173	49.96 +19	63.947 +271	36.63 -253
4 21.0	50.366 +135	58.15 +172	40.612 +138	35.11 +200	34.035 +141	50.39 +43	64.170 +223	39.15 -252
5 1.0	50.467 +101	60.03 +188	40.713 +101	37.26 +215	34.149 +114	50.98 +59	64.346 +176	41.61 -246
5 11.0	50.534 +67	62.03 +200	40.777 +64	39.53 +227	34.235 +86	51.72 +74	64.475 +129	44.00 -239
5 21.0	50.566 +32	64.05 +202	40.803 +26	41.80 +227	34.291 +56	52.55 +83	64.553 +78	46.24 -224
5 30.9	50.568 +2	66.00 +195	40.796 -7	43.97 +217	34.321 +30	53.41 +86	64.584 +31	48.30 -206
6 9.9	50.540 -28	67.85 +185	40.757 -39	46.02 +205	34.324 +3	54.30 +89	64.566 -18	50.16 -186
6 19.9	50.483 -57	69.51 +166	40.685 -72	47.84 +182	34.300 -24	55.15 +85	64.499 -67	51.76 -160
6 29.8	50.401 -82	70.95 +144	40.589 -96	49.39 +155	34.253 -47	55.95 +80	64.390 -109	53.07 -131
7 9.8	50.294 -107	72.13 +118	40.465 -124	50.66 +127	34.181 -72	56.69 +74	64.237 -153	54.07 -100
7 19.8	50.167 -127	73.01 +88	40.321 -144	51.56 +90	34.089 -92	57.32 +63	64.048 -189	54.70 -63
7 29.8	50.024 -143	73.57 +56	40.160 -161	52.12 +56	33.980 -109	57.85 +53	63.832 -216	54.97 -27
8 8.7	49.868 -156	73.73 +24	39.986 -174	52.30 +18	33.856 -124	58.27 +42	63.592 -240	54.87 +10
8 18.7	49.706 -162	73.69 -12	39.806 -180	52.07 -23	33.726 -130	58.53 +26	63.343 -249	54.37 +50
8 28.7	49.546 -160	73.23 -46	39.628 -178	51.48 -59	33.594 -132	58.66 +13	63.095 -248	53.53 +84
9 7.7	49.391 -155	72.42 -81	39.456 -172	50.49 -99	33.467 -127	58.62 -4	62.859 -236	52.34 +119
9 17.6	49.253 -138	71.25 -117	39.302 -154	49.11 -138	33.355 -112	58.39 -23	62.652 -207	50.86 +148
9 27.6	49.139 -114	69.76 -149	39.172 -130	47.38 -173	33.264 -91	57.98 -41	62.484 -168	49.16 +170
10 7.6	49.055 -84	67.93 -183	39.074 -98	45.29 -209	33.203 -61	57.36 -62	62.368 -116	47.28 +188
10 17.5	49.012 -43	65.79 -214	39.019 -55	42.87 -242	33.180 -23	56.50 -86	62.318 -50	45.33 +195
10 27.5	49.012 +0	63.38 -241	39.009 -10	40.19 -268	33.198 +18	55.43 -107	62.338 +20	43.38 +195
11 6.5	49.063 +51	60.71 -267	39.052 +43	37.24 -295	33.263 +65	54.10 -133	62.434 +96	41.51 +187
11 16.5	49.168 +105	57.86 -285	39.152 +100	34.13 -311	33.380 +117	52.54 -156	62.612 +178	39.85 +166
11 26.4	49.325 +157	54.88 -298	39.305 +153	30.91 -322	33.544 +164	50.78 -176	62.863 +251	38.43 +142
12 6.4	49.533 +208	51.83 -305	39.513 +208	27.64 -327	33.756 +212	48.83 -195	63.188 +325	37.35 +108
12 16.4	49.787 +254	48.82 -301	39.769 +256	24.45 -319	34.009 +253	46.77 -206	63.575 +387	36.66 +69
12 26.4	50.078 +291	45.92 -290	40.066 +297	21.41 -304	34.295 +286	44.64 -213	64.010 +435	36.38 +28
12 36.3	50.400 +322	43.21 -271	40.396 +330	18.61 -280	34.607 +312	42.49 -215	64.484 +474	36.53 +15
	50.400 +340	43.21 -239	40.396 +351	18.61 -244	34.607 +327	42.49 -207	64.484 +495	36.53 -58
Mean Place	49.768	65.24	39.817	42.26	33.936	57.14	64.271	37.75
sec δ, tan δ	+1.118	+0.500	+1.190	+0.646	+1.001	+0.034	+1.636	-1.295
dα(ψ), dδ(ψ)	+0.053	-0.30	+0.050	-0.30	+0.061	-0.30	+0.084	-0.30
dα(ε), dδ(ε)	+0.025	-0.65	+0.032	-0.66	+0.002	-0.66	-0.065	-0.66
Dbie. Trans.	May 3		May 3		May 3		May 3	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	542		1385		1386		1387		
Name	α Apodis		56 Hydrae		Groombridge 2152 (Bootis)		α' Librae		
Mag.Spect.	3.81	K5	5.39	G5	5.98	F0	5.33	F5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	14 45	- 78 58	14 46	- 26 01	14 48	+ 37 51	14 49	- 15 56	
1	<sup>d</sup> -8.6	<sup>s</sup> 56 378 +1101	<sup>s</sup> 57 18 +148	<sup>s</sup> 53 663 + 309	<sup>s</sup> 40 06 - 83	<sup>s</sup> 32 307 + 287	<sup>s</sup> 55 72 -323	<sup>s</sup> 52 817 + 288	<sup>s</sup> 19 92 -131
1	1.3	+1222	+ 96	+ 337	-109	+ 323	-297	+ 316	-149
1	11.3	+1318	+ 44	+ 357	-131	+ 353	-265	+ 336	-161
1	21.3	+1374	- 16	+ 367	-150	+ 372	-221	+ 345	-170
1	31.3	+1380	- 70	+ 363	-161	+ 375	-170	+ 343	-170
2	10.2	+1370	-121	+ 356	-169	+ 372	-116	+ 336	-167
2	20.2	+1316	-173	+ 337	-171	+ 356	- 56	+ 320	-158
3	2.2	+1234	-214	+ 314	-169	+ 332	+ 2	+ 297	-145
3	12.1	+1142	-252	+ 289	-163	+ 302	+ 57	+ 274	-131
3	22.1	+1016	-286	+ 259	-154	+ 266	+111	+ 245	-112
4	1.1	+ 881	-308	+ 228	-143	+ 226	+153	+ 217	- 94
4	11.1	+ 740	-328	+ 198	-131	+ 187	+192	+ 188	- 78
4	21.0	+ 573	-340	+ 166	-118	+ 143	+220	+ 158	- 69
5	1.0	+ 414	-342	+ 135	-106	+ 102	+236	+ 129	- 55
5	11.0	+ 244	-342	+ 105	- 93	+ 63	+247	+ 101	- 32
5	21.0	+ 64	-332	+ 72	- 78	+ 21	+246	+ 70	- 19
5	30.9	- 100	-314	+ 42	- 67	- 14	+235	+ 43	- 9
6	9.9	- 272	-293	+ 11	- 53	- 50	+220	+ 13	+ 0
6	19.9	- 436	-260	- 20	- 38	- 84	+195	- 15	+ 9
6	29.8	- 576	-224	- 49	- 25	- 112	+166	- 41	+ 14
7	9.8	- 714	-183	- 77	- 9	- 141	+134	- 69	+ 23
7	19.8	- 823	-133	- 102	+ 6	- 163	+ 95	- 91	+ 29
7	29.8	- 900	- 85	- 122	+ 21	- 180	+ 57	- 110	+ 34
8	8.7	- 960	- 29	- 139	+ 36	- 194	+ 16	- 127	+ 40
8	18.7	- 973	+ 26	- 147	+ 50	- 200	- 28	- 135	+ 43
8	28.7	- 953	+ 78	- 149	+ 61	- 199	- 67	- 137	+ 46
9	7.7	- 900	+132	- 143	+ 72	- 192	-110	- 133	+ 46
9	17.6	- 795	+180	- 125	+ 78	- 173	-152	- 117	+ 43
9	27.6	- 663	+218	- 100	+ 80	- 149	-188	- 95	+ 37
10	7.6	- 498	+254	- 66	+ 78	- 115	-227	- 63	+ 28
10	17.5	- 291	+276	- 22	+ 69	- 71	-259	- 23	+ 14
10	27.5	- 81	+287	+ 26	+ 57	- 23	-287	+ 23	- 2
11	6.5	+ 152	+290	+ 80	+ 37	+ 31	-314	+ 98	- 20
11	16.5	+ 391	+276	+ 134	+ 18	+ 91	-329	+ 93	- 46
11	26.4	+ 608	+255	+ 191	- 6	+ 147	-338	+ 177	- 69
12	6.4	+ 825	+223	+ 243	- 36	+ 205	-342	+ 225	- 95
12	16.4	+1008	+178	+ 287	- 66	+ 257	-331	+ 267	-117
12	26.4	+1155	+132	+ 321	- 91	+ 300	-314	+ 301	-136
12	36.3	+1279	+ 78	+ 350	-117	+ 338	-286	+ 327	-154
	+1352	+ 21	+ 363	+ 383	-138	+ 361	-247	+ 342	-164
Mean Place	68.405	79.00	57.390	53.17	34.923	59.25	56.288	30.23	
sec δ, tan δ	+5.235	-5.139	+1.113	-0.488	+1.267	+0.778	+1.040	-0.286	
dα(ψ), dδ(ψ)	+0.152	-0.30	+0.070	-0.30	+0.047	-0.29	+0.066	-0.29	
dα(ε), dδ(ε)	-0.256	-0.66	-0.024	-0.67	+0.038	-0.67	-0.014	-0.68	
Dble.Trans.	May 3		May 4		May 4		May 4		

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	548		550		549		1388	
	$\alpha^2$ Librae		$\beta$ Ursae Minoris		Groombridge 2164 (Draconis)		B.D. +6° 2957 (Virginis)	
Mag. Spect.	2.90	A3	2.24	K5	5.67	K2	6.69	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	14 50	- 15 59	14 50	+ 74 12	14 51	+ 59 20	14 52	+ 6 17
1 -8.6	04.324 + 289	00.17 -131	41.962 + 551	29.70 -335	03.383 + 356	47.58 -344	56.614 + 267	51.46 -229
1 1.3	04.639 + 315	01.65 -148	42.626 + 664	26.77 -293	03.799 + 416	44.50 -308	56.909 + 295	49.18 -228
1 11.3	04.975 + 336	03.26 -161	43.389 + 763	24.31 -246	04.266 + 467	41.86 -264	57.226 + 317	46.96 -222
1 21.3	05.321 + 346	04.95 -169	44.225 + 836	22.47 -184	04.767 + 501	39.78 -208	57.554 + 328	44.90 -206
1 31.3	05.664 + 343	06.65 -170	45.096 + 871	21.26 -121	05.283 + 516	38.32 -146	57.882 + 328	43.07 -183
2 10.2	06.000 + 336	08.33 -168	45.983 + 887	20.72 -54	05.802 + 519	37.50 -82	58.205 + 323	41.50 -157
2 20.2	06.319 + 319	09.91 -158	46.847 + 864	20.89 + 17	06.304 + 502	37.38 -12	58.513 + 308	40.27 -123
3 2.2	06.617 + 298	11.36 -145	47.656 + 809	21.70 + 81	06.773 + 469	37.90 + 52	58.799 + 286	39.38 -89
3 12.1	06.891 + 274	12.66 -130	48.394 + 738	23.14 +144	07.201 + 428	39.04 +114	59.064 + 265	38.84 -54
3 22.1	07.136 + 245	13.79 -113	49.027 + 633	25.14 +200	07.573 + 372	40.77 +173	59.299 + 235	38.67 -17
4 1.1	07.353 + 217	14.73 -94	49.542 + 515	27.56 +242	07.882 + 309	42.94 +217	59.506 + 207	38.81 + 14
4 11.1	07.542 + 189	15.50 -77	49.931 + 389	30.35 +279	08.128 + 246	45.50 +256	59.685 + 179	39.24 + 43
4 21.0	07.699 + 157	16.10 -60	50.176 + 245	33.36 +301	08.300 + 172	48.33 +283	59.833 + 148	39.93 + 69
5 1.0	07.829 + 130	16.55 -45	50.284 + 108	36.47 +311	08.403 + 103	51.29 +296	59.952 + 119	40.78 + 85
5 11.0	07.929 + 100	16.87 -32	50.255 -29	39.59 +312	08.438 + 35	54.31 +302	60.043 + 91	41.78 +100
5 21.0	08.000 + 71	17.06 -19	50.087 -168	42.59 +300	08.404 -34	57.25 +294	60.103 + 60	42.86 +108
5 30.9	08.043 + 43	17.16 -10	49.801 -286	45.36 +277	08.310 -94	60.01 +276	60.137 + 34	43.97 +111
6 9.9	08.056 + 13	17.16 + 0	49.400 -401	47.85 +249	08.156 -154	62.55 +254	60.143 + 6	45.07 +110
6 19.9	08.041 - 15	17.08 + 8	48.896 -504	49.95 +210	07.949 -207	64.73 +218	60.121 -22	46.13 +106
6 29.8	08.000 - 41	16.93 + 15	48.313 -583	51.62 +167	07.699 -250	66.52 +179	60.075 -46	47.09 +96
7 9.8	07.932 - 68	16.70 + 23	47.655 -658	52.82 +120	07.408 -291	67.90 +138	60.004 -71	47.95 + 86
7 19.8	07.840 - 92	16.42 + 28	46.945 -710	53.49 + 67	07.084 -324	68.77 + 87	59.911 -93	48.67 + 72
7 29.8	07.730 -110	16.08 + 34	46.203 -742	53.65 + 16	06.740 -344	69.17 + 40	59.800 -111	49.25 + 58
8 8.7	07.603 -127	15.68 + 40	45.436 -767	53.28 -37	06.379 -361	69.07 -10	59.674 -126	49.67 + 42
8 18.7	07.468 -135	15.25 + 43	44.673 -763	52.37 -91	06.014 -365	68.43 -64	59.540 -134	49.90 + 23
8 28.7	07.331 -137	14.79 + 46	43.928 -745	50.96 -141	05.655 -359	67.32 -111	59.404 -136	49.96 + 6
9 7.7	07.198 -133	14.33 + 46	43.214 -714	49.06 -190	05.309 -346	65.70 -162	59.271 -133	49.81 -15
9 17.6	07.081 -117	13.90 + 43	42.561 -653	46.69 -237	04.993 -316	63.62 -208	59.152 -119	49.43 -38
9 27.6	06.986 -95	13.53 + 37	41.979 -582	43.93 -276	04.715 -278	61.13 -249	59.053 -99	48.85 -58
10 7.6	06.922 -64	13.24 + 29	41.486 -493	40.77 -316	04.485 -230	58.23 -290	58.983 -70	48.02 -83
10 17.5	06.900 -22	13.10 + 14	41.107 -379	37.32 -345	04.320 -165	55.00 -323	58.950 -33	46.95 -107
10 27.5	06.922 + 22	13.12 -2	40.845 -262	33.64 -368	04.221 -99	51.51 -349	58.959 + 9	45.64 -131
11 6.5	07.019 + 97	13.34 -22	40.721 -124	29.78 -386	04.200 -21	47.79 -372	59.014 + 55	44.08 -156
11 16.5	07.113 + 94	13.77 -43	40.745 + 24	25.86 -392	04.264 + 64	43.97 -382	59.120 + 106	42.28 -180
11 26.4	07.290 + 177	14.46 -69	40.911 + 166	21.96 -390	04.409 + 145	40.11 -386	59.274 + 154	40.30 -198
12 6.4	07.515 + 225	15.41 -95	41.231 + 320	18.17 -379	04.640 + 231	36.31 -380	59.477 + 203	38.15 -215
12 16.4	07.782 + 267	16.57 -116	41.693 + 462	14.64 -353	04.949 + 309	32.72 -359	59.722 + 245	35.90 -225
12 26.4	08.083 + 301	17.93 -136	42.279 + 586	11.44 -320	05.325 + 376	29.41 -331	60.001 + 279	33.62 -228
12 36.3	08.410 + 327	19.47 -154	42.983 + 704	08.67 -277	05.763 + 438	26.49 -292	60.308 + 307	31.35 -227
	+ 342	-163	+ 788	-220	+ 479	-241	+ 323	-214
Mean Place	07.795	10.47	44.099	38.58	05.759	54.95	59.679	47.32
sec $\delta$ , tan $\delta$	+1.040	-0.286	+3.675	+3.536	+1.962	+1.687	+1.006	+0.110
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.066	-0.29	-0.002	-0.29	+0.031	-0.29	+0.059	-0.29
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.014	-0.68	+0.173	-0.68	+0.083	-0.68	+0.005	-0.69
Dble. Trans.	May 4		May 5		May 5		May 5	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1389		551		1390		1392		
Name	381 G. Centauri		Piazzi 14 <sup>h</sup> 221 (Bootis)		ξ <sup>a</sup> Librae		Piazzi 14 <sup>h</sup> 227 (Bootis)		
Mag.Spect.	5.34	A0	5.77	A0	5.63	K0	6.24	A0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° /	h m	° /	h m	° /	h m	° /	
	14 54	- 33 47	14 55	+ 14 29	14 55	- 11 21	14 56	+ 21 36	
1	<sup>d</sup> -8.6	<sup>s</sup> 50 777 + 323	51.65 - 39	<sup>s</sup> 32 018 + 264	63 13 - 261	<sup>s</sup> 58 651 + 279	12 28 - 151	<sup>s</sup> 24 247 + 265	34.03 - 285
1	1.3	51.131 + 354	52.34 - 69	32.311 + 293	60 61 - 252	58 957 + 306	13.91 - 163	24.543 + 296	31.31 - 272
1	11.3	51.508 + 377	53.32 - 98	32.628 + 317	58 21 - 240	59 284 + 327	15.64 - 173	24.864 + 321	28.78 - 253
1	21.3	51.897 + 389	54.55 - 123	32.958 + 330	56 06 - 215	59 621 + 337	17.39 - 175	25.199 + 335	26.57 - 221
1	31.3	52.284 + 387	55.99 - 144	33.289 + 331	54.20 - 186	59.958 + 337	19.11 - 172	25.537 + 338	24.72 - 185
2	10.2	52.665 + 381	57.58 - 159	33.615 + 326	52 70 - 150	60.289 + 331	20.74 - 163	25.871 + 334	23.28 - 144
2	20.2	53.029 + 364	59.29 - 171	33.928 + 313	51.61 - 109	60.605 + 316	22.24 - 150	26.192 + 321	22.32 - 96
3	2.2	53.369 + 340	61.05 - 176	34.220 + 292	50 94 - 67	60.900 + 295	23.56 - 132	26.491 + 299	21.84 - 2
3	12.2	53.684 + 315	62.84 - 179	34.488 + 288	50 69 - 25	61.174 + 274	24.69 - 113	26.767 + 276	21.82 - 48
3	22.1	53.968 + 284	64.61 - 177	34.728 + 240	50.86 + 17	61.419 + 245	25.60 - 91	27.013 + 246	22.28 + 46
4	1.1	54.221 + 253	66.33 - 172	34.938 + 210	51.38 + 52	61.637 + 218	26.30 - 70	27.227 + 214	23.12 + 84
4	11.1	54.442 + 221	68.00 - 167	35.119 + 181	52.23 + 85	61.827 + 190	26.81 - 51	27.410 + 183	24.31 + 119
4	21.0	54.629 + 187	69.57 - 157	35.267 + 148	53.36 + 113	61.988 + 161	27.12 - 31	27.559 + 149	25.79 + 148
5	1.0	54.783 + 154	71.04 - 147	35.385 + 118	54.66 + 130	62.121 + 133	27.29 - 17	27.675 + 116	27.46 + 167
5	11.0	54.903 + 120	72.41 - 137	35.473 + 88	56.11 + 145	62.225 + 104	27.31 - 2	27.759 + 84	29.26 + 180
5	21.0	54.988 + 85	73.64 - 123	35.530 + 57	57.62 + 151	62.299 + 74	27.22 + 9	27.810 + 51	31.11 + 185
5	30.9	55.039 + 51	74.74 - 110	35.559 + 29	59.13 + 151	62.347 + 48	27.05 + 17	27.832 + 22	32.93 + 182
6	9.9	55.056 + 17	75.68 - 94	35.559 + 0	60.60 + 147	62.365 + 18	26.80 + 25	27.823 - 9	34.68 + 175
6	19.9	55.036 - 20	76.45 - 77	35.530 - 29	61.96 + 136	62.355 - 10	26.50 + 30	27.784 - 39	36.28 + 160
6	29.9	54.986 - 50	77.05 - 60	35.476 - 54	63.18 + 122	62.318 - 37	26.17 + 33	27.720 - 64	37.69 + 141
7	9.8	54.902 - 84	77.45 - 40	35.397 - 79	64.24 + 106	62.255 - 63	25.80 + 37	27.629 - 91	38.90 + 121
7	19.8	54.790 - 112	77.63 - 18	35.295 - 102	65.09 + 85	62.168 - 87	25.42 + 38	27.516 - 113	39.83 + 93
7	29.8	54.655 - 135	77.61 + 2	35.177 - 118	65.73 + 64	62.062 - 106	25.03 + 39	27.385 - 131	40.49 + 66
8	8.7	54.500 - 155	77.36 + 25	35.042 - 135	66.13 + 40	61.938 - 124	24.62 + 41	27.239 - 146	40.87 + 38
8	18.7	54.335 - 165	76.90 + 46	34.899 - 143	66.27 + 14	61.805 - 133	24.23 + 39	27.085 - 154	40.91 + 4
8	28.7	54.167 - 168	76.25 + 65	34.754 - 145	66.16 - 11	61.670 - 135	23.86 + 37	26.928 - 157	40.66 - 25
9	7.7	54.004 - 163	75.41 + 84	34.612 - 142	65.79 - 37	61.537 - 133	23.52 + 34	26.775 - 153	40.08 - 58
9	17.6	53.860 - 144	74.44 + 97	34.485 - 127	65.12 - 67	61.419 - 118	23.26 + 26	26.637 - 138	39.17 - 91
9	27.6	53.742 - 118	73.37 + 107	34.377 - 108	64.19 - 93	61.321 - 98	23.09 + 17	26.519 - 118	37.95 - 122
10	7.6	53.660 - 82	72.26 + 111	34.298 - 79	62.98 - 121	61.253 - 68	23.03 + 6	26.430 - 89	36.41 - 154
10	17.5	53.625 - 35	71.18 + 108	34.256 - 42	61.48 - 150	61.225 - 28	23.14 - 11	26.380 - 50	34.56 - 185
10	27.5	53.642 + 17	70.17 + 101	34.255 - 1	59.73 - 175	61.240 + 15	23.41 - 27	26.371 - 9	32.44 - 212
11	6.5	53.717 + 75	69.31 + 86	34.303 + 48	57.71 - 202	61.303 + 63	23.83 - 42	26.411 + 40	30.05 - 239
11	16.5	53.852 + 135	68.65 + 66	34.401 + 98	55.47 - 224	61.414 + 111	24.60 - 77	26.504 + 93	27.46 - 259
11	26.4	54.044 + 192	68.21 + 44	34.548 + 147	53.06 - 241	61.579 + 165	25.56 - 96	26.647 + 143	24.71 - 275
12	6.4	54.295 + 251	68.08 + 13	34.745 + 197	50.52 - 254	61.793 + 214	26.75 - 119	26.841 + 194	21.85 - 286
12	16.4	54.593 + 298	68.26 - 18	34.986 + 241	47.93 - 259	62.050 + 257	28.12 - 137	27.081 + 240	18.99 - 286
12	26.4	54.930 + 337	68.74 - 48	35.261 + 275	45.35 - 258	62.340 + 290	29.66 - 154	27.358 + 277	16.19 - 280
12	36.3	55.298 + 368	69.54 - 80	35.567 + 306	42.86 - 249	62.658 + 318	31.34 - 168	27.666 + 308	13.54 - 265
		55.298 + 385	69.54 - 107	35.567 + 323	42.86 - 229	62.658 + 334	31.34 - 172	27.666 + 328	13.54 - 239
Mean Place	54.817	65.82	34.971	61.28	62.054	20.87	27.107	33.98	
sec δ, tan δ	+1.203	-0.669	+1.033	+0.259	+1.020	-0.201	+1.076	+0.396	
dα(ψ), dδ(ψ)	+0.073	-0.29	+0.056	-0.29	+0.065	-0.29	+0.054	-0.29	
dα(ε), dδ(ε)	-0.032	-0.69	+0.012	-0.69	-0.010	-0.69	+0.019	-0.70	
Dbble.Trans.	May 6		May 6		May 6		May 6		

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1391		1393		554		552	
	33 G. Librae*		Bradley 1908 (Virginis)		2 H. Ursae Minoris		β Lupi	
Mag. Spect.	6.00	K5	5.71	K0	4.86 var.	M3	2.81	B2p
U.T.	R.A.		R.A.		R.A.		R.A.	
	h	m	h	m	h	m	h	m
	14 56	- 21 21	14 56	- 0 06	14 57	+ 65 58	14 57	- 43 04
	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /
1	-8.6	+ 296	+ 268	-202	+ 398	-347	+ 354	+ 10
1	1.3	+ 325	+ 295	-206	+ 475	-309	+ 390	- 27
1	11.3	+ 345	+ 318	-205	+ 542	-264	+ 416	- 61
1	21.3	+ 357	+ 328	-196	+ 591	-205	+ 431	- 96
1	31.3	+ 355	+ 329	-180	+ 614	-144	+ 430	-125
2	10.2	+ 349	+ 323	-161	+ 624	- 78	+ 424	-150
2	20.2	+ 333	+ 309	-133	+ 608	- 7	+ 406	-171
3	2.2	+ 310	+ 289	-105	+ 572	+ 58	+ 380	-186
3	12.2	+ 288	+ 267	- 76	+ 525	+122	+ 354	-198
3	22.1	+ 260	+ 239	- 44	+ 457	+180	+ 320	-205
4	1.1	+ 230	+ 211	- 16	+ 380	+226	+ 285	-206
4	11.1	+ 202	+ 185	+ 10	+ 299	+265	+ 250	-207
4	21.0	+ 171	+ 153	+ 33	+ 206	+292	+ 210	-203
5	1.0	+ 142	+ 126	+ 50	+ 118	+305	+ 173	-196
5	11.0	+ 112	+ 98	+ 64	+ 30	+311	+ 135	-188
5	21.0	+ 80	+ 69	+ 75	- 61	+302	+ 92	-175
5	30.9	+ 52	+ 42	+ 78	-138	+283	+ 54	-161
6	9.9	+ 21	+ 13	+ 82	-215	+260	+ 12	-144
6	19.9	- 10	- 15	+ 80	-285	+223	- 29	-122
6	29.9	- 37	- 39	+ 75	-340	+183	- 65	-100
7	9.8	- 67	- 65	+ 70	- 394	+140	-105	- 75
7	19.8	- 91	- 88	+ 62	-434	+ 88	-136	- 46
7	29.8	-112	-106	+ 53	-459	+ 39	-163	- 19
8	8.7	-130	-123	+ 43	-482	- 13	-186	+ 12
8	18.7	-139	-131	+ 30	-486	- 68	-198	+ 42
8	28.7	-142	-135	+ 18	-478	-116	-200	+ 69
9	7.7	-139	-132	+ 4	-462	-168	-194	+ 97
9	17.6	-122	-117	-14	-424	-215	-173	+119
9	27.6	-100	-98	-31	-379	-256	-143	+136
10	7.6	- 68	- 70	- 50	-321	-297	-102	+149
10	17.6	- 26	- 32	- 72	-244	-331	- 47	+151
10	27.5	+ 20	+ 9	- 93	-163	-356	+ 10	+150
11	6.5	+ 72	+ 55	-118	- 68	-380	+ 75	+139
11	16.5	+120	+107	-141	+ 34	-388	+144	+121
11	26.4	+180	+155	-162	+134	-391	+208	+ 97
12	6.4	+230	+204	-181	+239	-384	+272	+ 68
12	16.4	+274	+246	-194	+338	-362	+327	+ 33
12	26.4	+309	+279	-203	+423	-334	+370	- 2
12	36.3	+337	+308	-206	+503	-293	+405	- 39
	+353	-150	+324	-200	+559	-240	+426	- 74
Mean Place	40.600	18.98	51.666	49.26	21.914	69.62	38.596	49.03
sec δ, tan δ	+1.074	-0.391	+1.000	-0.002	+2.457	+2.245	+1.369	-0.935
dα(ψ), dδ(ψ)	+0.068	-0.29	+0.061	-0.29	+0.020	-0.28	+0.079	-0.28
dα(ε), dδ(ε)	-0.019	-0.70	-0.000	-0.70	+0.107	-0.70	-0.045	-0.70
Dble. Trans.	May 6		May 6		May 6		May 6	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	553		1394		555		556	
	α Centauri		δ Librae		β Bootis		σ Librae	
Mag.Spect.	3.35	B3	4.8 to 5.9	A0	3.63	G5	3.41	M3
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	14 58	-42 02	15 00	- 8 27	15 01	+40 26	15 03	-25 13
1 -8.6	12.319 +349	47 08 + 5	11.627 +272	49.91 -163	23 574 +277	" -332	12.883 +296	" -78
1 1.3	12.704 +385	47 38 -30	11.927 +300	51.64 -173	23 892 +318	31 94 -307	12.883 +326	34.90 -101
1 11.3	13.114 +410	48 03 -65	12.249 +322	53.44 -180	24 244 +352	28 87 -276	13.209 +349	35.91 -122
1 21.3	13.539 +425	49 01 -98	12.582 +333	55.24 -180	24 618 +374	26 11 -229	13.558 +361	37.13 -139
1 31.3	13.964 +425	50 26 -125	12.916 +334	56.96 -172	25 000 +382	23 82 -179	13.919 +361	38.52 -150
2 10.2	14.382 +418	51.77 -151	13.244 +328	58.58 -162	25.382 +382	22.03 -124	14.280 +356	40.02 -157
2 20.2	14.783 +401	53.47 -170	13.559 +315	60.03 -145	25.751 +369	20.79 -61	14.636 +341	41.59 -159
3 2.2	15.159 +376	55.31 -184	13.853 +294	61.27 -124	26.097 +346	20.18 -3	14.977 +321	43.18 -156
3 12.2	15.508 +349	57.26 -195	14.126 +273	62.29 -102	26.417 +320	20.15 +56	15.298 +298	44.74 -150
3 22.1	15.825 +317	59.27 -201	14.371 +245	63.07 -78	26.700 +283	20.71 +111	15.596 +270	46.24 -141
4 1.1	16.106 +281	61.29 -202	14.590 +219	63.62 -55	26.945 +245	21.82 +156	15.866 +242	47.65 -131
4 11.1	16.354 +248	63.32 -203	14.782 +192	63.96 -34	27.149 +204	23.38 +197	16.108 +213	48.96 -120
4 21.0	16.562 +208	65.29 -197	14.944 +162	64.10 -14	27.309 +160	25.35 +228	16.321 +182	50.16 -107
5 1.0	16.734 +172	67.19 -190	15.078 +134	64.08 +2	27.449 +118	27.63 +245	16.503 +152	51.23 -95
5 11.0	16.868 +134	69.02 -183	15.185 +107	63.92 +16	27.502 +75	30.08 +258	16.655 +121	52.18 -84
5 21.0	16.960 +92	70.71 -169	15.261 +76	63.65 +27	27.534 +32	32.66 +259	16.776 +89	53.02 -72
5 30.9	17.015 +55	72.26 -155	15.311 +50	63.31 +34	27.527 -7	35.25 +248	16.865 +59	53.74 -61
6 9.9	17.030 +15	73.65 -139	15.331 +20	62.91 +40	27.482 -45	37.73 +234	16.924 +26	54.35 -49
6 19.9	17.003 -27	74.82 -117	15.323 -8	62.47 +44	27.399 -83	40.07 +210	16.950 -7	54.84 -37
6 29.9	16.941 -62	75.78 -96	15.288 -35	62.03 +44	27.286 -113	42.17 +179	16.943 -36	55.21 -25
7 9.8	16.840 -101	76.50 -72	15.227 -61	61.57 +46	27.141 -145	43.96 +148	16.907 -68	55.46 -12
7 19.8	16.707 -133	76.94 -44	15.141 -86	61.12 +45	26.970 -171	45.44 +107	16.839 -94	55.58 +2
7 29.8	16.549 -158	77.11 -17	15.141 -104	61.12 +43	26.970 -190	46.51 +68	16.745 -116	55.56 +14
8 8.7	16.367 -182	77.11 +13	15.037 -123	60.69 +41	26.880 -207	47.19 +26	16.629 -137	55.42 +29
8 18.7	16.174 -193	76.98 +42	14.914 -132	60.28 +37	26.573 -215	47.45 -20	16.492 -148	55.13 +41
8 28.7	15.978 -196	75.87 +69	14.646 -136	59.59 +32	26.358 -215	47.25 -61	16.344 -152	54.72 +53
9 7.7	15.788 -190	74.92 +95	14.464 -130	59.59 +25	26.141 -211	46.64 -105	16.192 -149	54.19 +62
9 17.6	15.618 -170	74.92 +116	14.513 -123	59.34 +16	25.930 -194	45.59 -149	16.043 -134	53.57 +68
9 27.6	15.478 -140	73.76 +132	14.393 -100	59.18 +5	25.736 -170	44.10 -188	15.909 -112	52.89 +72
10 7.6	15.378 -100	72.44 +144	14.293 -72	59.13 -9	25.566 -137	42.22 -227	15.797 -80	52.17 +70
10 17.6	15.331 -47	71.00 +147	14.221 -32	59.22 -26	25.429 -93	39.95 -262	15.717 -37	51.47 +63
10 27.5	15.341 +10	69.53 +144	14.189 +10	59.48 -44	25.336 -45	37.33 -291	15.680 +10	50.84 +52
11 6.5	15.415 +74	68.09 +134	14.199 +57	59.92 -63	25.291 +10	34.42 -318	15.690 +63	50.32 +34
11 16.5	15.556 +141	66.75 +115	14.256 +106	60.55 -90	25.301 +72	31.24 -336	15.753 +115	49.98 +15
11 26.4	15.761 +205	65.60 +92	14.362 +159	61.45 -113	25.373 +130	27.88 -346	15.868 +173	49.83 -3
12 6.4	16.029 +268	64.68 +63	14.521 +207	62.58 -133	25.503 +190	24.42 -351	16.041 +227	49.86 -33
12 16.4	16.352 +323	64.05 +28	14.728 +250	63.91 -152	25.693 +246	20.91 -340	16.268 +272	50.19 -59
12 26.4	16.717 +365	63.77 -6	14.978 +284	65.43 -165	25.939 +292	17.51 -324	16.540 +309	50.78 -85
12 36.3	17.117 +420	63.83 -43	15.262 +313	67.08 -176	26.231 +334	14.27 -296	16.849 +339	51.63 -109
		64.26 -76	15.575 +328	68.84 -179	26.565 +361	11.31 -256	17.188 +357	52.72 -127
Mean Place	16.750	62.63	14.986	57.44	26.225	36.26	16.672	46.33
sec δ, tan δ	+1.347	-0.902	+1.011	-0.149	+1.314	+0.852	+1.105	-0.471
dα(ψ), dδ(ψ)	+0.078	-0.28	+0.064	-0.28	+0.045	-0.28	+0.070	-0.28
dα(ε), dδ(ε)	-0.043	-0.70	-0.007	-0.71	+0.040	-0.71	-0.022	-0.72
Dble.Trans.	May 7		May 7		May 7		May 8	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	557		1395		1397		1396	
	$\psi$ Bootis		47 Bootis		B.D. +55° 1730 (Bootis)		45 Bootis	
Mag.Spect.	4.67	K0	5.59	A0	5.21	G5	5.03	F0
U.T.	R.A.		R.A.		R.A.		R.A.	
	h	m	h	m	h	m	h	m
	15 03	+ 26 59	15 04	+ 48 11	15 05	+ 54 36	15 06	+ 24 54
	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /
1	-8.6	+ 260	+ 290	-346	+ 309	-351	+ 258	-297
1	1.3	+ 295	+ 337	-316	+ 365	-319	+ 291	-282
1	11.3	+ 322	+ 378	-280	+ 413	-280	+ 319	-261
1	21.3	+ 340	+ 405	-230	+ 446	-227	+ 337	-228
1	31.3	+ 344	+ 417	-175	+ 462	-169	+ 341	-189
2	10.2	+ 343	+ 420	-116	+ 467	-107	+ 339	-145
2	20.2	+ 331	+ 408	-49	+ 456	-38	+ 328	-94
3	2.2	+ 310	+ 385	+ 13	+ 431	+ 25	+ 309	-45
3	12.2	+ 287	+ 355	+ 74	+ 398	+ 89	+ 286	+ 6
3	22.1	+ 257	+ 315	+ 132	+ 352	+ 149	+ 256	+ 54
4	1.1	+ 225	+ 271	+ 179	+ 300	+ 196	+ 225	+ 96
4	11.1	+ 192	+ 225	+ 221	+ 247	+ 238	+ 194	+ 133
4	21.0	+ 156	+ 172	+ 252	+ 185	+ 269	+ 159	+ 164
5	1.0	+ 122	+ 122	+ 270	+ 126	+ 285	+ 125	+ 183
5	11.0	+ 87	+ 73	+ 282	+ 67	+ 297	+ 92	+ 197
5	21.0	+ 53	+ 21	+ 280	+ 6	+ 293	+ 58	+ 203
5	30.9	+ 20	- 24	+ 269	- 47	+ 279	+ 26	+ 199
6	9.9	- 12	- 70	+ 252	- 101	+ 261	- 6	+ 192
6	19.9	- 44	- 113	+ 223	- 150	+ 230	- 38	+ 175
6	29.9	- 71	- 149	+ 191	- 192	+ 195	- 64	+ 155
7	9.8	- 100	- 184	+ 155	- 232	+ 156	- 93	+ 132
7	19.8	- 124	- 213	+ 111	- 265	+ 109	- 118	+ 81.75
7	29.8	- 142	- 235	+ 67	- 288	+ 63	- 136	+ 73
8	8.7	- 160	- 254	+ 22	- 308	+ 15	- 154	+ 42
8	18.7	- 168	- 261	- 28	- 316	- 37	- 163	+ 6
8	28.7	- 171	- 262	- 73	- 316	- 84	- 166	- 26
9	7.7	- 168	- 257	- 121	- 308	- 134	- 165	- 62
9	17.6	- 154	- 236	- 167	- 285	- 182	- 150	- 97
9	27.6	- 134	- 211	- 207	- 255	- 223	- 131	- 130
10	7.6	- 106	- 174	- 249	- 214	- 266	- 103	- 165
10	17.6	- 66	- 125	- 285	- 159	- 302	- 65	- 196
10	27.5	- 24	- 73	- 314	- 101	- 331	- 22	- 225
11	6.5	+ 27	- 11	- 342	- 31	- 357	+ 26	- 252
11	16.5	+ 80	+ 57	- 358	+ 45	- 372	+ 81	- 273
11	26.4	+ 132	+ 122	- 366	+ 118	- 379	+ 131	- 289
12	6.4	+ 186	+ 190	- 368	+ 195	- 378	+ 184	- 299
12	16.4	+ 233	+ 252	- 355	+ 266	- 363	+ 231	- 298
12	26.4	+ 274	+ 307	- 335	+ 329	- 339	+ 271	- 291
12	36.3	+ 308	+ 355	- 304	+ 385	- 306	+ 305	- 275
	+ 330	- 249	+ 388	- 259	+ 426	- 258	+ 327	- 247
Mean Place	52.024	59.33	58.983	70.11	53.515	28.78	42.482	76.42
sec $\delta$ , tan $\delta$	+1.122	+0.510	+1.500	+1.119	+1.727	+1.408	+1.103	+0.465
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.051	-0.28	+0.040	-0.28	+0.034	-0.27	+0.052	-0.27
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.024	-0.72	+0.052	-0.72	+0.065	-0.73	+0.021	-0.73
Dble. Trans.	May 8		May 8		May 8		May 9	

AT UPPER TRANSIT AT GREENWICH

No.	1398		558		559		1399	
Name	κ <sup>1</sup> Lupi*		ζ Lupi		ι Librae		1 Lupi	
Mag.Spect.	4.14	B9	3.50	K0	4.66	A0p	4.95	F0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	15 10	-48 40	15 11	-52 02	15 11	-19 44	15 13	-31 27
1 <sup>d</sup>	54 523 <sup>s</sup> + 369	58 66 + 49	13 410 <sup>s</sup> + 391	38 92 + 65	23 317 <sup>s</sup> + 279	19 20 -102	43 489 <sup>s</sup> + 301	58 29 - 37
1	54 935 + 412	58 54 + 12	13 845 + 435	38 65 + 27	23 627 + 310	20 39 -119	43 824 + 335	58 93 - 64
1	55 379 + 444	58 80 - 26	14 315 + 470	38 78 - 13	23 960 + 333	21 75 -136	44 185 + 361	59 83 - 90
1	55 842 + 463	59 44 - 64	14 806 + 491	39 32 - 54	24 307 + 347	23 23 -148	44 561 + 376	60 96 -113
1	56 309 + 467	60 41 - 97	15 301 + 495	40 22 - 90	24 655 + 348	24 76 -153	44 940 + 379	62 25 -129
2	56 773 + 464	61 69 -128	15 794 + 493	41 46 -124	25 000 + 345	26 30 -154	45 315 + 375	63 69 -144
2	57 222 + 449	63 25 -156	16 270 + 476	43 00 -154	25 332 + 332	27 80 -150	45 678 + 363	65 22 -153
3	57 646 + 424	65 00 -175	16 721 + 451	44 78 -178	25 646 + 314	29 21 -141	46 021 + 343	66 78 -156
3	58 045 + 399	66 94 -194	17 145 + 424	46 77 -199	25 939 + 293	30 52 -131	46 342 + 321	68 36 -158
3	58 408 + 363	69 02 -208	17 532 + 387	48 92 -215	26 206 + 267	31 69 -117	46 636 + 294	69 92 -156
4	58 735 + 327	71 16 -214	17 879 + 347	51 17 -225	26 445 + 239	32 71 -102	46 901 + 265	71 41 -149
4	59 026 + 291	73 36 -220	18 187 + 308	53 50 -233	26 659 + 214	33 60 - 89	47 138 + 237	72 86 -145
4	59 273 + 247	75 58 -222	18 449 + 262	55 85 -235	26 842 + 183	34 33 - 73	47 341 + 203	74 21 -135
5	59 479 + 206	77 75 -217	18 666 + 217	58 19 -234	26 998 + 156	34 94 - 61	47 514 + 173	75 48 -127
5	59 642 + 163	79 89 -214	18 836 + 170	60 49 -230	27 124 + 126	35 43 - 49	47 655 + 141	76 66 -118
5	59 758 + 116	81 92 -203	18 955 + 119	62 69 -220	27 218 + 94	35 80 - 37	47 760 + 105	77 73 -107
5	59 829 + 71	83 82 -190	19 026 + 71	64 76 -207	27 284 + 66	36 09 - 29	47 833 + 73	78 69 - 96
6	59 853 + 24	85 57 -175	19 046 + 20	66 67 -191	27 318 + 34	36 28 - 19	47 870 + 37	79 52 - 83
6	59 829 - 24	87 10 -153	19 013 - 33	68 36 -169	27 319 + 1	36 38 - 10	47 870 + 0	80 22 - 70
6	59 762 - 67	88 41 -131	18 935 - 78	69 81 -145	27 292 - 27	36 41 - 3	47 838 - 32	80 77 - 55
7	59 650 - 112	89 45 -104	18 808 - 127	70 98 -117	27 234 - 58	36 35 + 6	47 771 - 67	81 16 - 39
7	59 499 -151	90 18 - 73	18 640 -168	71 81 - 83	27 149 - 85	36 20 + 15	47 673 - 98	81 37 - 21
7	59 317 -182	90 61 - 43	18 438 -202	72 32 - 51	27 041 -108	35 98 + 22	47 550 -123	81 41 - 4
7	59 106 -211	90 69 - 8	18 206 -232	72 45 - 13	26 913 -128	35 68 + 30	47 403 -147	81 41 + 15
8	58 880 -226	90 42 + 27	17 958 -248	72 21 + 24	26 772 -141	35 30 + 38	47 243 -160	80 91 + 35
8	58 648 -232	89 83 + 59	17 705 -253	71 62 + 59	26 626 -146	34 87 + 43	47 077 -166	80 40 + 51
9	58 420 -228	88 91 + 92	17 456 -249	70 68 + 94	26 480 -146	34 39 + 48	46 911 -166	79 72 + 68
9	58 214 -206	87 71 +120	17 230 -226	69 42 +126	26 348 -132	33 90 + 49	46 761 -150	78 92 + 80
9	58 038 -176	86 28 +143	17 038 -192	67 91 +151	26 236 -112	33 42 + 48	46 632 -129	78 03 + 89
9	57 905 -133	84 66 +162	16 892 -146	66 17 +174	26 153 - 83	32 98 + 44	46 536 - 96	77 08 + 95
10	57 830 - 75	82 95 +171	16 808 - 84	64 33 +184	26 110 - 43	32 64 + 34	46 485 - 51	76 15 + 93
10	57 818 - 12	81 21 +174	16 791 - 17	62 43 +190	26 111 + 1	32 43 + 21	46 482 + 3	75 28 + 87
11	57 877 + 59	79 51 +170	16 850 + 59	60 57 +186	26 165 + 54	32 41 + 2	46 535 + 53	74 54 + 74
11	58 011 +134	77 96 +155	16 989 +139	58 85 +172	26 259 + 94	32 58 -17	46 646 +111	73 98 + 56
11	58 216 +205	76 62 +134	17 204 +215	57 32 +153	26 423 +164	32 91 -33	46 814 +168	73 61 + 37
12	58 492 +276	75 55 +107	17 495 +291	56 07 +125	26 634 +211	33 54 - 63	47 041 +227	73 50 + 11
12	58 830 +338	74 82 + 73	17 852 +357	55 18 + 89	26 890 +256	34 39 - 85	47 317 +276	73 68 - 18
12	59 218 +388	74 44 + 38	18 262 +410	54 65 + 53	27 182 +292	35 46 -107	47 633 +316	74 14 - 46
12	59 649 +431	74 45 - 1	18 717 +455	54 51 + 14	27 505 +323	36 71 -125	47 983 +350	74 87 - 73
12	59 649 +455	74 45 - 40	18 717 +482	54 51 - 29	27 505 +341	36 71 -140	47 983 +370	74 87 - 97
Mean Place	59 451	73 99	18 598	54 77	26 994	28 59	47 553	70 05
sec δ, tan δ	+1.515	-1.138	+1.626	-1.282	+1.062	-0.359	+1.172	-0.612
da(ψ), dδ(ψ)	+0.083	-0.27	+0.086	-0.27	+0.068	-0.27	+0.073	-0.26
da(ε), dδ(ε)	-0.051	-0.74	-0.057	-0.74	-0.016	-0.74	-0.027	-0.75
Dble.Trans.	May 10		May 10		May 10		May 10	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	565		562		563		564	
	1 H. Ursae Minoris		3 Serpentis		δ Bootis		β Librae	
Mag.Spect.	5.23	G0	5.44	K0	3.54	K0	2.74	B8
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	15 14	+ 67 23	15 14	+ 4 59	15 14	+ 33 21	15 16	- 9 19
1 -8.6	26 283 + 376	44 26 -356	27 879 + 251	23 26 -221	54 706 + 255	49 70 -322	13 302 + 260	54.89 -152
1 1.4	26.745 + 462	41.04 -322	28.161 + 282	21.05 -221	54.999 + 293	46.68 -302	13.594 + 292	56.52 -163
1 11.3	27.284 + 539	38.24 -280	28.468 + 307	18.88 -217	55.324 + 325	43.91 -277	13.909 + 315	58.23 -171
1 21.3	27.883 + 599	36.00 -224	28.789 + 321	16.85 -203	55.671 + 347	41.54 -237	14.238 + 329	59.95 -172
1 31.3	28.515 + 632	34.37 -163	29.114 + 325	15.03 -182	56.027 + 356	39.61 -193	14.571 + 333	61.61 -166
2 10.2	29.166 + 651	33.39 -98	29.437 + 323	13.44 -159	56.384 + 357	38.18 -143	14.901 + 330	63.17 -156
2 20.2	29.809 + 643	33.13 -26	29.749 + 312	12.18 -126	56.732 + 348	37.33 -85	15.219 + 318	64.57 -140
3 2.2	30.422 + 613	33.52 + 39	30.044 + 295	11.26 -92	57.060 + 328	37.03 -30	15.521 + 302	65.78 -121
3 12.2	30.993 + 571	34.57 +105	30.319 + 275	10.68 -58	57.367 + 307	37.29 + 26	15.803 + 282	66.78 -100
3 22.1	31.499 + 506	36.23 +166	30.569 + 250	10.45 -23	57.643 + 276	38.09 + 80	16.060 + 257	67.55 -77
4 1.1	31.928 + 429	38.36 +213	30.793 + 224	10.54 + 9	57.886 + 243	39.34 +125	16.292 + 232	68.09 -54
4 11.1	32.276 + 348	40.93 +257	30.991 + 198	10.93 + 39	58.095 + 209	41.00 +166	16.499 + 207	68.43 -34
4 21.1	32.528 + 252	43.80 +287	31.158 + 167	11.57 + 64	58.265 + 170	42.99 +199	16.677 + 178	68.57 -14
5 1.0	32.687 + 159	46.83 +303	31.298 + 140	12.39 + 82	58.398 + 133	45.18 +219	16.828 + 151	68.56 + 1
5 11.0	32.751 + 64	49.97 +314	31.410 + 112	13.36 + 97	58.494 + 96	47.53 +235	16.951 + 123	68.42 + 14
5 21.0	32.718 - 33	53.05 +308	31.491 + 81	14.44 +108	58.551 + 57	49.92 +239	17.043 + 92	68.16 + 26
5 30.9	32.600 -118	55.97 +292	31.545 + 54	15.54 +110	58.573 + 22	52.25 +233	17.108 + 65	67.84 + 32
6 9.9	32.396 -204	58.69 +272	31.569 + 24	16.65 +111	58.558 -15	54.49 +224	17.143 + 35	67.46 + 38
6 19.9	32.113 -283	61.07 +238	31.564 - 5	17.71 +106	58.508 -50	56.53 +204	17.147 + 4	67.04 + 42
6 29.9	31.767 -346	63.07 +200	31.532 -32	18.70 + 99	58.428 -80	58.32 +179	17.124 -23	66.62 + 42
7 9.8	31.358 -409	64.65 +158	31.471 -61	19.60 + 90	58.316 -112	59.84 +152	17.071 -53	66.19 + 43
7 19.8	30.901 -457	65.73 +108	31.386 -85	20.36 + 76	58.178 -138	61.01 +117	16.992 -79	65.76 + 40
7 29.8	30.411 -490	66.32 + 59	31.280 -106	20.98 + 62	58.019 -159	61.83 + 82	16.891 -101	65.36 + 40
8 8.8	29.891 -520	66.40 + 8	31.156 -124	21.46 + 48	57.840 -179	62.27 + 44	16.770 -121	64.97 + 39
8 18.7	29.361 -530	65.93 -47	31.019 -137	21.75 + 29	57.651 -189	62.30 + 3	16.636 -134	64.61 + 36
8 28.7	28.834 -527	64.96 -97	30.878 -141	21.88 + 13	57.458 -193	61.95 -35	16.496 -140	64.30 + 31
9 7.7	28.318 -516	63.48 -148	30.736 -142	21.81 -7	57.266 -192	61.19 -76	16.355 -141	64.04 + 26
9 17.6	27.837 -481	61.50 -198	30.606 -130	21.53 -28	57.088 -178	60.02 -117	16.226 -129	63.87 + 17
9 27.6	27.398 -439	59.09 -241	30.493 -113	21.05 -48	56.929 -159	58.49 -153	16.226 -111	63.87 + 8
10 7.6	27.017 -381	56.25 -284	30.406 -87	20.33 -72	56.799 -130	56.56 -193	16.115 -84	63.79 -5
10 17.6	26.714 -303	53.06 -319	30.355 -51	19.37 -96	56.709 -90	54.29 -227	15.984 -47	64.05 -21
10 27.5	26.494 -220	49.58 -348	30.344 -11	18.19 -118	56.663 -46	51.72 -257	15.979 -5	64.42 -37
11 6.5	26.370 -124	45.84 -374	30.379 + 35	16.76 -143	56.630 + 5	48.86 -286	16.021 + 42	64.98 -56
11 16.5	26.354 -16	41.98 -386	30.464 + 85	15.10 -166	56.730 + 62	45.79 -307	16.112 + 91	65.76 -78
11 26.5	26.444 + 90	38.06 -392	30.599 + 135	13.24 -186	56.847 + 117	42.58 -321	16.255 + 143	66.79 -103
12 6.4	26.646 + 202	34.17 -389	30.782 + 183	11.20 -204	57.020 + 173	39.28 -330	16.448 + 193	68.02 -123
12 16.4	26.955 + 309	30.47 -370	31.010 + 228	09.05 -215	57.245 + 225	36.02 -326	16.686 + 238	69.43 -141
12 26.4	27.358 + 403	27.03 -344	31.274 + 264	06.85 -220	57.514 + 269	32.88 -314	16.960 + 274	70.98 -155
12 36.3	27.852 + 494	23.96 -307	31.569 + 295	04.65 -220	57.822 + 308	29.94 -294	17.264 + 304	72.64 -166
	+ 561	-257	+ 314	-210	+ 335	-260	+ 323	-170
Mean Place	28.745	52.51	31.053	20.10	57.498	52.94	16.750	61.42
sec δ, tan δ	+2.602	+2.402	+1.004	+0.087	+1.197	+0.658	+1.013	-0.164
dα(v), dδ(w)	+0.013	-0.26	+0.059	-0.26	+0.048	-0.26	+0.064	-0.26
dα(ε), dδ(ε)	+0.106	-0.75	+0.004	-0.75	+0.029	-0.75	-0.007	-0.76
Dble.Trans.	May 11		May 11		May 11		May 11	

AT UPPER TRANSIT AT GREENWICH

No.	561		560		1400		1401	
	β Circini		γ Trianguli Australis		Piazzi 15 <sup>h</sup> 36 (Serpentis)		B.D. +10° 2823* (Serpentis)	
Mag.Spect.	4.16	A3	3.06	A0	5.66	G5	6.71	F8
U.T.	R.A.		R.A.		R.A.		R.A.	
	Dec.		Dec.		Dec.		Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	15 16	-58 44	15 17	-68 37	15 17	+20 36	15 17	+10 28
1 -8.6	21.066 +438	49 88 +102	30.472 +578	33.27 +146	45.221 +245	77.20 -283	59.947 +246	36.85 -244
1 1.4	21.559 +493	49 27 +61	31.127 +655	32.25 +102	45.501 +280	74.47 -273	60.225 +278	34.44 -241
1 11.3	22.094 +535	49 09 +18	31.845 +718	31.69 +56	45.808 +307	71.91 -256	60.529 +304	32.12 -232
1 21.3	22.657 +563	49 35 -26	32.605 +760	31.65 +4	46.134 +326	69.63 -228	60.849 +320	29.99 -213
1 31.3	23.227 +570	50.03 -68	33.379 +774	32.08 -43	46.466 +332	67.70 -193	61.174 +325	28.12 -187
2 10.2	23.798 +571	51 10 -107	34.157 +778	32.97 -89	46.798 +332	66.16 -154	61.498 +324	26.54 -158
2 20.2	24.353 +555	52 54 -144	34.917 +760	34.31 -134	47.121 +323	65.09 -107	61.812 +314	25.35 -119
3 2.2	24.881 +528	54.27 -173	35.642 +725	36.02 -171	47.427 +306	64.50 -59	62.108 +296	24.53 -82
3 12.2	25.379 +498	56.28 -201	36.328 +686	38.08 -206	47.712 +285	64.37 -13	62.387 +279	24.11 -42
3 22.1	25.835 +456	58.51 -223	36.956 +628	40.44 -236	47.971 +259	64.72 +35	62.640 +253	24.09 -2
4 1.1	26.246 +411	60.89 -238	37.521 +565	43.03 -259	48.202 +231	65.48 +76	62.866 +226	24.42 +33
4 11.1	26.612 +366	63.40 -251	38.021 +500	45.81 -278	48.404 +202	66.60 +112	63.066 +200	25.07 +65
4 21.1	26.922 +310	65.99 -259	38.440 +419	48.71 -290	48.572 +168	68.03 +143	63.235 +169	26.00 +93
5 1.0	27.179 +257	68.59 -260	38.781 +341	51.67 -296	48.710 +138	69.66 +163	63.376 +141	27.12 +112
5 11.0	27.379 +200	71.19 -260	39.039 +258	54.67 -300	48.816 +106	71.46 +180	63.488 +112	28.40 +128
5 21.0	27.517 +138	73.71 -252	39.204 +165	57.60 -293	48.889 +73	73.33 +187	63.569 +81	29.78 +138
5 30.9	27.597 +80	76.11 -240	39.284 +80	60.42 -282	48.931 +42	75.19 +186	63.621 +52	31.17 +139
6 9.9	27.615 +18	78.36 -225	39.273 -11	63.09 -267	48.941 +10	77.00 +181	63.644 +23	32.55 +138
6 19.9	27.569 -46	80.37 -201	39.170 -103	65.51 -242	48.920 -21	78.69 +169	63.635 -9	33.86 +131
6 29.9	27.467 -102	82.13 -176	38.985 -185	67.66 -215	48.870 -50	80.20 +151	63.600 -35	35.05 +119
7 9.8	27.307 -160	83.58 -145	38.718 -267	69.46 -180	48.791 -79	81.51 +131	63.536 -64	36.11 +106
7 19.8	27.096 -211	84.67 -109	38.379 -339	70.85 -139	48.687 -104	82.57 +106	63.447 -89	37.00 +89
7 29.8	26.845 -251	85.40 -73	37.994 -395	71.83 -98	48.561 -126	83.36 +79	63.337 -110	37.70 +70
8 8.8	26.557 -288	85.71 -31	37.540 -444	72.34 -51	48.417 -144	83.88 +52	63.207 -130	38.21 +51
8 18.7	26.250 -307	85.59 +12	37.070 -470	72.35 -1	48.260 -157	84.07 +19	63.066 -141	38.48 +27
8 28.7	25.936 -314	85.07 +52	36.593 -477	71.89 +46	48.099 -161	83.96 -11	62.919 -147	38.54 +6
9 7.7	25.626 -310	84.14 +93	36.126 -467	70.94 +95	47.937 -162	83.54 -42	62.771 -148	38.35 -19
9 17.6	25.344 -282	82.84 +130	35.698 -428	69.54 +140	47.787 -150	82.78 -76	62.634 -137	37.91 -44
9 27.6	25.100 -244	81.22 +162	35.325 -373	67.77 +177	47.655 -132	81.71 -107	62.514 -120	37.22 -69
10 7.6	24.910 -190	79.33 +189	35.029 -296	65.64 +213	47.548 -107	80.31 -140	62.420 -94	36.27 -95
10 17.6	24.792 -118	77.26 +207	34.834 -195	63.28 +236	47.478 -70	78.61 -170	62.361 -59	35.05 -122
10 27.5	24.752 -40	75.10 +216	34.748 -86	60.78 +250	47.448 -30	76.62 -199	62.342 -19	33.58 -147
11 6.5	24.800 +48	72.93 +217	34.785 +37	58.20 +258	47.466 +18	74.35 -227	62.369 +27	31.85 -173
11 16.5	24.943 +143	70.87 +206	34.952 +167	55.71 +249	47.537 +71	71.86 -249	62.447 +78	31.85 -196
11 26.5	25.174 +231	68.98 +189	35.241 +289	53.38 +233	47.657 +120	69.20 -266	62.574 +127	27.74 -215
12 6.4	25.493 +319	67.36 +162	35.654 +413	51.29 +209	47.830 +173	66.40 -280	62.750 +176	25.42 -232
12 16.4	25.892 +399	66.09 +127	36.176 +522	49.57 +172	48.049 +219	63.57 -283	62.972 +222	23.02 -240
12 26.4	26.353 +461	65.20 +89	36.788 +612	48.24 +133	48.308 +259	60.78 -279	63.231 +259	20.60 -242
12 36.3	26.870 +517	64.73 +47	37.478 +690	47.37 +87	48.601 +293	58.11 -267	63.522 +291	18.22 -238
	+551	+2	+740	+36	+316	-244	+312	-223
Mean Place	26.989	66.07	38.195	50.32	48.179	77.85	63.047	35.19
sec δ, tan δ	+1.928	-1.648	+2.744	-2.556	+1.068	+0.376	+1.017	+0.185
dα(ψ), dδ(ψ)	+0.094	-0.26	+0.113	-0.26	+0.054	-0.26	+0.057	-0.26
dα(ε), dδ(ε)	-0.072	-0.76	-0.111	-0.76	+0.016	-0.76	+0.008	-0.76
Dbble.Trans.	May 11		May 11		May 11		May 12	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1402		569		566		1404	
	δ Lupi		γ Ursae Minoris		φ' Lupi		73 G. Librae	
Mag. Spect.	3.43	B2	3.14	A2	3.59	K5	6.78	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' /	h m	° ' /	h m	° ' /	h m	° ' /
	15 20	- 40 35	15 20	+ 71 52	15 20	- 36 12	15 22	- 26 38
1 -8.6	24.431 <sup>s</sup> + 324	45.36 <sup>o</sup> + 16	42.063 <sup>s</sup> + 410	46.75 <sup>o</sup> - 356	52.487 <sup>s</sup> + 309	35.25 <sup>o</sup> - 7	04.642 <sup>s</sup> + 283	18.49 <sup>o</sup> - 57
1 1.4	24.794 + 363	45.52 - 16	42.583 + 520	43.53 - 322	52.832 + 345	35.61 - 36	04.959 + 317	19.30 - 81
1 11.3	25.186 + 392	45.99 - 47	43.203 + 620	40.73 - 280	53.205 + 373	36.26 - 65	05.302 + 343	20.32 - 102
1 21.3	25.598 + 412	46.77 - 78	43.902 + 699	38.49 - 224	53.597 + 392	37.18 - 92	05.662 + 360	21.52 - 120
1 31.3	26.013 + 415	47.81 - 104	44.648 + 746	36.86 - 163	53.992 + 395	38.31 - 113	06.025 + 363	22.84 - 132
2 10.3	26.428 + 415	49.08 - 127	45.423 + 775	35.87 - 99	54.386 + 394	39.63 - 132	06.386 + 361	24.25 - 141
2 20.2	26.830 + 402	50.55 - 147	46.197 + 774	35.60 - 27	54.768 + 382	41.10 - 147	06.737 + 351	25.70 - 145
3 2.2	27.212 + 382	52.14 - 159	46.939 + 742	35.99 + 39	55.131 + 363	42.65 - 155	07.069 + 332	27.14 - 144
3 12.2	27.573 + 361	53.84 - 170	47.634 + 695	37.04 + 105	55.473 + 342	44.27 - 162	07.383 + 314	28.55 - 141
3 22.1	27.904 + 331	55.61 - 177	48.252 + 618	38.70 + 166	55.787 + 314	45.91 - 164	07.671 + 288	29.88 - 133
4 1.1	28.204 + 300	57.40 - 179	48.779 + 527	40.85 + 215	56.072 + 285	47.54 - 163	07.933 + 262	31.13 - 125
4 11.1	28.473 + 269	59.20 - 180	49.206 + 427	43.43 + 258	56.328 + 256	49.15 - 161	08.168 + 235	32.30 - 117
4 21.1	28.706 + 233	60.98 - 178	49.514 + 308	46.32 + 289	56.550 + 222	50.71 - 156	08.372 + 204	33.36 - 106
5 1.0	28.905 + 199	62.71 - 173	49.705 + 191	49.38 + 306	56.739 + 189	52.21 - 150	08.547 + 175	34.33 - 97
5 11.0	29.066 + 161	64.38 - 167	49.778 + 73	52.55 + 317	56.894 + 155	53.64 - 143	08.692 + 145	35.19 - 86
5 21.0	29.187 + 121	65.95 - 157	49.727 - 51	55.67 + 312	57.012 + 118	54.97 - 133	08.803 + 111	35.96 - 77
5 30.9	29.271 + 84	67.42 - 147	49.568 - 159	58.64 + 297	57.094 + 82	56.19 - 122	08.883 + 80	36.63 - 67
6 9.9	29.313 + 42	68.76 - 134	49.301 - 267	61.40 + 276	57.138 + 44	57.29 - 110	08.928 + 45	37.20 - 57
6 19.9	29.313 + 0	69.93 - 117	48.933 - 368	63.83 + 243	57.142 + 4	58.24 - 95	08.939 + 11	37.65 - 45
6 29.9	29.275 - 38	70.92 - 99	48.484 - 449	65.88 + 205	57.111 - 31	59.04 - 80	08.917 - 22	38.01 - 36
7 9.8	29.197 - 78	71.70 - 78	47.956 - 528	67.51 + 163	57.042 - 69	59.64 - 60	08.862 - 55	38.23 - 22
7 19.8	29.083 - 114	72.24 - 54	47.367 - 589	68.63 + 112	56.939 - 103	60.04 - 40	08.776 - 86	38.33 - 10
7 29.8	28.939 - 144	72.54 - 30	46.735 - 632	69.27 + 64	56.808 - 131	60.24 - 20	08.776 - 112	38.33 + 3
8 8.8	28.768 - 171	72.57 - 3	46.066 - 669	69.39 + 12	56.651 - 157	60.20 + 4	08.528 - 136	38.12 + 18
8 18.7	28.581 - 187	72.32 + 25	45.384 - 682	68.96 - 43	56.478 - 173	59.93 + 27	08.378 - 150	37.80 + 32
8 28.7	28.386 - 195	71.83 + 49	44.704 - 680	68.04 - 92	56.298 - 180	59.45 + 48	08.220 - 158	37.37 + 43
9 7.7	28.191 - 195	71.07 + 76	44.036 - 668	66.59 - 145	56.117 - 181	58.75 + 70	08.061 - 159	36.81 + 56
9 17.6	28.013 - 178	70.10 + 97	43.409 - 627	64.64 - 195	55.951 - 166	57.88 + 87	07.915 - 146	36.17 + 64
9 27.6	27.859 - 154	68.96 + 114	42.833 - 576	62.27 - 237	55.808 - 143	56.88 + 100	07.788 - 127	35.47 + 70
10 7.6	27.740 - 119	67.68 + 128	42.325 - 508	59.46 - 281	55.698 - 110	55.77 + 111	07.691 - 97	34.76 + 71
10 17.6	27.671 - 69	66.35 + 133	41.910 - 415	56.29 - 317	55.634 - 64	54.64 + 113	07.635 - 56	34.08 + 68
10 27.5	27.655 - 16	65.02 + 133	41.593 - 317	52.84 - 345	55.621 - 13	53.53 + 111	07.625 - 10	33.49 + 59
11 6.5	27.701 + 46	63.75 + 127	41.392 - 201	49.12 - 372	55.667 + 46	52.51 + 102	07.668 + 43	33.03 + 46
11 16.5	27.814 + 113	62.63 + 112	41.322 - 70	45.27 - 385	55.774 + 107	51.65 + 86	07.766 + 98	32.77 + 26
11 26.5	27.989 + 175	61.70 + 93	41.379 + 57	41.37 - 390	55.941 + 167	50.98 + 67	07.919 + 153	32.64 + 13
12 6.4	28.228 + 239	61.02 + 68	41.574 + 195	37.50 - 387	56.170 + 229	50.55 + 43	08.129 + 210	32.78 - 14
12 16.4	28.524 + 296	60.65 + 37	41.901 + 327	33.80 - 370	56.451 + 281	50.42 + 13	08.388 + 259	33.18 - 40
12 26.4	28.865 + 341	60.59 + 6	42.347 + 446	30.36 - 344	56.776 + 325	50.58 - 16	08.686 + 298	33.82 - 64
12 36.3	29.244 + 379	60.85 - 26	42.907 + 560	27.29 - 307	57.137 + 361	51.04 - 46	09.017 + 331	34.70 - 88
	+ 403	- 58	+ 648	- 256	+ 384	- 74	+ 352	- 108
Mean Place	28.936	58.20	44.526	55.57	56.781	47.25	08.581	28.39
sec δ, tan δ	+1.317	-0.857	+3.216	+3.056	+1.239	-0.732	+1.119	-0.502
dα(ψ), dδ(ψ)	+0.079	-0.26	-0.001	-0.25	+0.076	-0.25	+0.071	-0.25
dα(ε), dδ(ε)	-0.037	-0.77	+0.130	-0.77	-0.031	-0.77	-0.021	-0.77
Dble. Trans.	May 12		May 12		May 12		May 13	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1405		1403		1406		568	
Name	30 Librae		φ <sup>2</sup> Lupi		8 Serpentis		μ Bootis* ρ.	
Mag.Spect.	6.74	K2	4.69	B3	6.10	F0	4.47	F0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	15 22	- 15 05	15 22	- 36 48	15 22	- 0 58	15 23	+ 37 25
1 -8.6	12 885 + 263	04 14 -120	13 074 + 310	26.95 - 2	58 579 + 249	25 31 -191	56 046 + 248	22.22 -333
1 1.4	13 180 + 295	05 49 -135	13 420 + 346	27.27 - 32	58 858 + 279	27 28 -197	56 336 + 290	19.09 -313
1 11.3	13 500 + 320	06 95 -146	13 795 + 375	27.88 - 61	59 163 + 305	29.25 -197	56 662 + 326	16.24 -285
1 21.3	13 835 + 335	08 49 -154	14 189 + 394	28.76 - 88	59 483 + 320	31.14 -189	57 013 + 351	13.79 -245
1 31.3	14 174 + 339	10 03 -154	14 587 + 398	29.87 -111	59 808 + 325	32.90 -176	57 376 + 363	11.82 -197
2 10.3	14 512 + 338	11 54 -151	14 983 + 396	31.17 -130	60 133 + 325	34.47 -157	57 744 + 368	10.37 -145
2 20.2	14 839 + 327	12 95 -141	15 369 + 386	32.62 -145	60 447 + 314	35.79 -132	58 104 + 360	09.52 - 85
3 2.2	15 149 + 310	14 22 -127	15 734 + 365	34.16 -154	60 746 + 299	36.83 -104	58 447 + 343	09.25 - 27
3 12.2	15 441 + 292	15 35 -113	16 080 + 346	35.77 -161	61 026 + 280	37.58 - 75	58 769 + 322	09.56 + 31
3 22.1	15 709 + 268	16 30 - 95	16 398 + 318	37.42 -165	61 283 + 257	38.02 - 44	59 061 + 292	10.44 + 88
4 1.1	15 951 + 242	17 08 - 78	16 686 + 288	39.06 -164	61 515 + 232	38.19 - 17	59 318 + 257	11.79 +135
4 11.1	16 169 + 218	17 68 - 60	16 945 + 259	40.69 -163	61 722 + 207	38.09 + 10	59 541 + 223	13.57 +178
4 21.1	16 358 + 189	18 12 - 44	17 170 + 225	42.27 -158	61 901 + 179	37.76 + 33	59 723 + 182	15.70 +213
5 1.0	16 520 + 162	18 42 - 30	17 363 + 193	43.79 -152	62 052 + 151	37.25 + 51	59 866 + 143	18.05 +235
5 11.0	16 654 + 134	18 60 - 18	17 521 + 158	45.25 -146	62 176 + 124	36.60 + 65	59 969 + 103	20.57 +252
5 21.0	16 756 + 102	18 67 - 7	17 640 + 119	46.60 -135	62 270 + 94	35.84 + 76	60 030 + 61	23.13 +256
5 31.0	16 830 + 74	18 67 + 0	17 725 + 85	47.86 -126	62 336 + 66	35.03 + 81	60 054 + 24	25.64 +251
6 9.9	16 873 + 43	18 59 + 8	17 770 + 45	48.99 -113	62 373 + 37	34.20 + 83	60 038 - 16	28.05 +241
6 19.9	16 884 + 11	18 45 + 14	17 776 + 6	49.97 - 98	62 378 + 5	33.38 + 82	59 984 - 54	30.25 +220
6 29.9	16 866 - 18	18 28 + 17	17 745 - 31	50.79 - 82	62 356 - 22	32.60 + 78	59 897 - 87	32.19 +194
7 9.8	16 816 - 50	18 05 + 23	17 676 - 69	51.43 - 64	62 305 - 51	31.87 + 73	59 775 - 122	33.85 +166
7 19.8	16 739 - 77	17 80 + 25	17 573 - 103	51.86 - 43	62 227 - 78	31.22 + 65	59 625 - 150	35.13 +128
7 29.8	16 638 - 101	17 51 + 29	17 441 - 132	52.07 - 21	62 127 - 100	30.67 + 55	59 452 - 173	36.04 + 91
8 8.8	16 515 - 123	17 18 + 33	17 283 - 158	52.05 + 2	62 006 - 121	30.21 + 46	59 257 - 195	36.56 + 62
8 18.7	16 378 - 137	16 83 + 35	17 108 - 175	51.80 + 25	61 873 - 133	29.87 + 34	59 050 - 207	36.63 + 7
8 28.7	16 234 - 144	16 48 + 35	16 926 - 182	51.32 + 48	61 732 - 141	29.66 + 21	58 837 - 213	36.30 - 33
9 7.7	16 089 - 145	16 11 + 37	16 744 - 182	50.63 + 69	61 590 - 142	29.57 + 9	58 625 - 122	35.54 - 76
9 17.7	15 955 - 134	15 78 + 33	16 575 - 169	49.75 + 88	61 458 - 132	29.66 - 9	58 426 - 199	34.34 -120
9 27.6	15 838 - 117	15 49 + 29	16 430 - 145	48.73 +102	61 342 - 116	29.90 - 24	58 246 - 180	32.75 -159
10 7.6	15 748 - 90	15 28 + 21	16 318 - 112	47.60 +113	61 251 - 91	30.32 - 42	58 095 - 151	30.76 -199
10 17.6	15 697 - 51	15 19 + 9	16 252 - 66	46.45 +115	61 197 - 54	30.96 - 64	57 984 - 111	28.40 -236
10 27.5	15 687 - 10	15 23 - 4	16 238 - 14	45.31 +114	61 181 - 16	31.79 - 83	57 917 - 67	25.73 -267
11 6.5	15 728 + 41	15 45 - 22	16 281 + 43	44.25 +106	61 212 + 31	32.85 -106	57 903 - 14	22.75 -298
11 16.5	15 814 + 86	15 45 - 31	16 281 + 107	43.35 + 90	61 212 + 81	32.85 -128	57 903 + 45	19.56 -319
11 26.5	15 957 + 143	15 76 - 73	16 388 + 167	42.64 + 71	61 293 + 130	34.13 -150	57 948 + 102	16.23 -333
12 6.4	16 151 + 194	17 35 - 86	16 783 + 228	42.17 + 47	61 603 + 180	37.32 -169	58 211 + 161	12.81 -342
12 16.4	16 391 + 240	18 42 -107	17 065 + 282	41.99 + 18	61 827 + 224	39.15 -183	58 428 + 217	09.44 -337
12 26.4	16 668 + 277	19 65 -123	17 391 + 326	42.11 - 12	62 089 + 262	41.07 -192	58 691 + 263	06.18 -326
12 36.4	16 977 + 309	21 05 -140	17 753 + 362	42.53 - 42	62 381 + 292	43.04 -197	58 997 + 306	03.15 -303
	16 977 + 328	21 05 -148	17 753 + 386	42.53 - 70	62 381 + 313	43.04 -192	58 997 + 337	03.15 -288
Mean Place	16.494	11.49	17.405	38.88	61.894	29.37	58.819	26.60
sec δ, tan δ	+1.036	-0.270	+1.249	-0.748	+1.000	-0.017	+1.259	+0.765
dα(ψ), dδ(ψ)	+0.067	-0.25	+0.076	-0.25	+0.062	-0.25	+0.045	-0.25
dα(ε), dδ(ε)	-0.011	-0.77	-0.032	-0.77	-0.001	-0.77	+0.032	-0.78
Dble.Trans.	May 13		May 13		May 13		May 13	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	571		570		572		1407	
	ι Draconis		τ' Serpentis		β Coronae Borealis		32 Librae	
Mag.Spect.	3.47	K0	5.46	M0	3.72	F0p	5.92	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>
	15 24	+ 59 00	15 25	+ 15 28	15 27	+ 29 08	15 27	- 16 40
1	-8.6							
1	1.4							
1	11.3							
1	21.3							
1	31.3							
2	10.3							
2	20.2							
3	2.2							
3	12.2							
3	22.1							
4	1.1							
4	11.1							
4	21.1							
5	1.0							
5	11.0							
5	21.0							
5	31.0							
6	9.9							
6	19.9							
6	29.9							
7	9.8							
7	19.8							
7	29.8							
8	8.8							
8	18.7							
8	28.7							
9	7.7							
9	17.7							
9	27.6							
10	7.6							
10	17.6							
10	27.5							
11	6.5							
11	16.5							
11	26.5							
12	6.4							
12	16.4							
12	26.4							
12	36.4							
Mean Place	37.636	47.07	09.801	29.74	16.334	66.36	29.621	12.29
sec δ, tan δ	+1.942	+1.665	+1.038	+0.277	+1.145	+0.558	+1.044	-0.299
dα(ψ), dδ(ψ)	+0.027	-0.25	+0.055	-0.25	+0.050	-0.25	+0.067	-0.25
dα(ε), dδ(ε)	+0.070	-0.78	+0.012	-0.78	+0.023	-0.79	-0.012	-0.79
Dble.Trans.	May 13		May 13		May 14		May 14	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	567		1408		573		576	
Name	α <sup>1</sup> Apodis		B.D. +9° 3055 (Serpentis)		ν <sup>1</sup> Bootis		9 Coronae Borealis	
Mag.Spect.	5.65	B5p	6.46	F2	5.15	K5	4.17	B5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 15 29	<sup>o</sup> / -73 20	<sup>h</sup> <sup>m</sup> 15 30	<sup>o</sup> / + 8 37	<sup>h</sup> <sup>m</sup> 15 30	<sup>o</sup> / +40 52	<sup>h</sup> <sup>m</sup> 15 32	<sup>o</sup> / +31 23
1	<sup>d</sup> -8.6	<sup>s</sup> 51.822 + 678	<sup>s</sup> 22 76 +178	<sup>s</sup> 12.900 + 236	<sup>s</sup> 30.44 -235	<sup>s</sup> 23.871 + 244	<sup>s</sup> 38.12 -343	<sup>s</sup> 20.221 + 235
1	1.4	+ 782	+134	+ 270	-233	+ 290	-321	+ 275
1	11.3	+ 867	+ 89	+ 297	-226	+ 329	-293	+ 308
1	21.3	+ 930	+ 36	+ 315	-210	+ 358	-250	+ 333
1	31.3	+ 956	- 13	+ 321	-187	+ 372	-202	+ 344
2	10.3	+ 972	- 61	+ 323	-159	+ 379	-148	+ 350
2	20.2	+ 958	-110	+ 315	-123	+ 373	- 86	+ 343
3	2.2	+ 922	-151	+ 300	- 87	+ 358	- 26	+ 328
3	12.2	+ 880	-190	+ 283	- 49	+ 338	+ 34	+ 311
3	22.1	+ 813	-225	+ 280	- 10	+ 306	+ 93	+ 283
4	1.1	+ 737	-251	+ 235	+ 25	+ 272	+143	+ 253
4	11.1	+ 657	-276	+ 210	+ 57	+ 236	+187	+ 223
4	21.1	+ 557	-294	+ 181	+ 84	+ 193	+223	+ 186
5	1.0	+ 457	-302	+ 153	+105	+ 152	+245	+ 152
5	11.0	+ 351	-311	+ 125	+121	+ 110	+264	+ 115
5	21.0	+ 232	-308	+ 94	+130	+ 65	+269	+ 77
5	31.0	+ 120	-300	+ 65	+134	+ 24	+263	+ 43
6	9.9	+ 1	-287	+ 35	+134	- 18	+253	+ 5
6	19.9	-120	-265	+ 2	+127	- 59	+232	- 31
6	29.9	-227	-238	- 3	+118	- 94	+205	- 63
7	9.8	-337	-206	- 55	+106	- 131	+175	- 96
7	19.8	-433	-165	- 83	+ 89	- 162	+137	- 125
7	29.8	-508	-123	-104	+ 73	- 187	+ 98	- 150
8	8.8	-576	- 74	-126	+ 54	- 210	+ 56	- 171
8	18.7	-614	- 22	-140	+ 33	- 224	+ 11	- 186
8	28.7	-628	+ 27	-148	+ 12	- 230	- 32	- 192
9	7.7	-622	+ 79	-150	- 10	- 231	- 77	- 194
9	17.7	-578	+129	-142	- 34	- 218	-123	- 184
9	27.6	-512	+171	-126	- 58	- 199	-163	- 167
10	7.6	-422	+211	-102	- 83	- 170	-205	- 141
10	17.6	-297	+240	- 67	-110	- 129	-244	- 104
10	27.5	-165	+259	- 29	-133	- 84	-275	- 62
11	6.5	- 13	+272	+ 17	-159	- 29	-307	- 13
11	16.5	+151	+269	+ 67	-183	+ 31	-329	+ 42
11	26.5	+306	+257	+116	-201	+ 90	-343	+ 97
12	6.4	+462	+236	+166	-220	+152	-352	+152
12	16.4	+604	+202	+212	-229	+211	-347	+206
12	26.4	+721	+165	+250	-233	+261	-334	+249
12	36.4	+827	+120	+283	-231	+307	-312	+291
12		+900	+ 69	+306	-218	+341	-274	+319
Mean Place	61.352	38.51	16.078	29.05	26.642	43.21	23.099	74.95
sec δ, tan δ	+3.489	-3.343	+1.011	+0.152	+1.323	+0.866	+1.172	+0.611
dα(ψ), dδ(ψ)	+0.131	-0.24	+0.058	-0.24	+0.043	-0.24	+0.048	-0.24
dα(ε), dδ(ε)	-0.136	-0.79	+0.006	-0.79	+0.035	-0.79	+0.024	-0.80
Dble.Trans.	May 15		May 15		May 15		May 15	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1409		578		577		1410		
	37 Librae		$\alpha$ Coronae Borealis		$\gamma$ Librae		115 G. Lupi		
Mag.Spect.	4.83	K0	2.31	A0	4.02	K0	5.47	K5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	$^{\circ}$ $'$ $''$	h m	$^{\circ}$ $'$ $''$	h m	$^{\circ}$ $'$ $''$	h m	$^{\circ}$ $'$ $''$	
	15 33	- 10 01	15 34	+ 26 45	15 34	- 14 44	15 35	- 44 20	
1	-8.6	22.788	02.88	04.024	32.18	42.513	36.63	11.575	56.38
1	1.4	23.070	04.41	04.294	29.26	42.800	37.93	11.943	56.23
1	11.3	23.378	06.03	04.596	26.52	43.113	39.35	12.345	56.39
1	21.3	23.703	07.66	04.921	24.11	43.443	40.83	12.772	56.89
1	31.3	24.033	09.25	05.257	22.09	43.779	42.31	13.206	57.67
2	10.3	24.364	10.74	05.597	20.50	44.116	43.75	13.643	58.71
2	20.2	24.687	12.09	05.930	19.44	44.445	45.10	14.071	59.99
3	2.2	24.995	13.25	06.250	18.89	44.759	46.31	14.481	61.44
3	12.2	25.287	14.22	06.552	18.86	45.056	47.37	14.871	63.05
3	22.2	25.557	14.95	06.828	19.36	45.332	48.25	15.233	64.77
4	1.1	25.803	15.48	07.076	20.30	45.583	48.95	15.565	66.55
4	11.1	26.025	15.80	07.296	21.65	45.811	49.49	15.866	68.38
4	21.1	26.219	15.93	07.481	23.34	46.011	49.86	16.129	70.24
5	1.0	26.388	15.91	07.634	25.26	46.184	50.10	16.357	72.07
5	11.0	26.528	15.76	07.754	27.37	46.330	50.22	16.546	73.89
5	21.0	26.639	15.51	07.837	29.55	46.445	50.23	16.691	75.63
5	31.0	26.721	15.19	07.887	31.72	46.530	50.18	16.796	77.29
6	9.9	26.772	14.82	07.902	33.84	46.584	50.07	16.856	78.84
6	19.9	26.790	14.42	07.882	35.82	46.605	49.90	16.869	80.23
6	29.9	26.780	14.02	07.832	37.59	46.596	49.71	16.840	81.44
7	9.8	26.738	13.61	07.748	39.14	46.554	49.48	16.766	82.45
7	19.8	26.667	13.21	07.637	40.39	46.483	49.22	16.651	83.20
7	29.8	26.572	12.84	07.501	41.34	46.387	48.95	16.502	83.71
8	8.8	26.454	12.47	07.344	41.97	46.266	48.64	16.321	83.92
8	18.7	26.320	12.15	07.172	42.22	46.130	48.32	16.120	83.84
8	28.7	26.178	11.85	06.993	42.13	45.985	48.00	15.908	83.47
9	7.7	26.032	11.61	06.812	41.67	45.836	47.67	15.693	82.80
9	17.7	25.896	11.44	06.640	40.83	45.696	47.38	15.491	81.88
9	27.6	25.775	11.36	06.484	39.65	45.573	47.13	15.314	80.74
10	7.6	25.679	11.39	06.353	38.10	45.474	46.95	15.171	79.41
10	17.6	25.618	11.56	06.258	36.21	45.412	46.88	15.079	77.97
10	27.5	25.598	11.88	06.203	34.01	45.392	46.94	15.042	76.49
11	6.5	25.625	12.39	06.197	31.51	45.420	47.16	15.069	75.02
11	16.5	25.702	13.07	06.244	28.78	45.500	47.49	15.166	73.67
11	26.5	25.828	14.01	06.342	25.88	45.625	48.17	15.330	72.48
12	6.4	26.008	15.16	06.496	22.84	45.808	49.01	15.561	71.51
12	16.4	26.233	16.47	06.699	19.79	46.037	50.04	15.855	70.82
12	26.4	26.495	17.92	06.946	16.79	46.304	51.24	16.198	70.44
12	36.4	26.790	19.48	07.231	13.93	46.605	52.58	16.584	70.39
Mean Place	26.335	08.30	06.968	34.76	46.167	42.83	16.382	68.14	
sec $\delta$ , tan $\delta$	+1.015	-0.177	+1.120	+0.504	+1.034	-0.263	+1.398	-0.978	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.065	-0.24	+0.050	-0.24	+0.067	-0.24	+0.082	-0.23	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.007	-0.80	+0.020	-0.80	-0.010	-0.81	-0.038	-0.81	
Dble.Trans.	May 15		May 16		May 16		May 16		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	574		579		580		1411	
	ε Trianguli Australis		ν Librae		φ Bootis		2 G. Normae	
Mag.Spect.	4.11	K0	3.78	K2	5.41	G5	5.48	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	15 35	-66 16	15 36	-28 05	15 37	+40 23	15 37	-52 19
1 -8.6	21 070 + 506	07 83 +154	08 111 + 276	19 09 - 41	17 684 + 236	43 94 -343	43 546 + 363	32 09 + 91
1 1.4	21 651 + 581	06 70 +113	08 422 + 311	19 73 - 64	17 966 + 282	40 72 -322	43 959 + 413	31 53 + 56
1 11.3	22 294 + 643	05 99 + 71	08 761 + 339	19 73 - 85	18 287 + 321	37 76 -296	44 413 + 454	31 34 + 19
1 21.3	22 982 + 688	05 76 + 23	09 119 + 358	20 58 -104	18 639 + 352	35 21 -255	44 896 + 483	31 53 - 19
1 31.3	23 690 + 708	05 99 - 23	09 484 + 365	21 62 -118	19 006 + 367	33 14 -207	45 391 + 495	32 07 - 54
2 10.3	24 407 + 717	06 65 - 66	09 850 + 366	24 07 -127	19 381 + 375	31 60 -154	45 890 + 499	32 94 - 87
2 20.2	25 114 + 707	07 74 -109	10 207 + 357	25 41 -134	19 753 + 372	30 68 - 92	46 380 + 490	34 13 -119
3 2.2	25 796 + 682	09 20 -146	10 549 + 342	26 75 -134	20 111 + 358	30 35 - 33	46 851 + 471	35 57 -144
3 12.2	26 447 + 651	11 01 -181	10 874 + 325	27 75 -133	20 450 + 339	30 63 + 28	47 301 + 450	37 24 -167
3 22.2	27 051 + 604	13 12 -211	11 175 + 301	29 36 -128	20 759 + 309	31 50 + 87	47 720 + 419	39 10 -186
4 1.1	27 602 + 551	15 45 -233	11 451 + 276	30 57 -121	21 036 + 277	32 87 +137	48 103 + 383	41 08 -198
4 11.1	28 098 + 496	17 99 -254	11 702 + 251	31 72 -115	21 278 + 242	34 69 +182	48 452 + 349	43 18 -210
4 21.1	28 525 + 427	20 68 -269	11 923 + 221	32 78 -106	21 478 + 200	36 89 +220	48 756 + 304	45 35 -217
5 1.0	28 884 + 359	23 45 -277	12 114 + 191	33 76 - 98	21 638 + 160	39 33 +244	49 017 + 261	47 55 -220
5 11.0	29 170 + 286	26 27 -282	12 276 + 162	34 67 - 91	21 756 + 118	41 95 +262	49 233 + 216	49 75 -220
5 21.0	29 372 + 202	29 07 -280	12 403 + 127	35 48 - 81	21 830 + 74	44 65 +270	49 397 + 164	51 91 -216
5 31.0	29 498 + 126	31 79 -272	12 499 + 96	36 21 - 73	21 863 + 33	47 30 +265	49 512 + 115	53 98 -207
6 9.9	29 539 + 41	34 39 -260	12 558 + 59	36 85 - 64	21 854 - 9	49 86 +256	49 573 + 61	55 94 -196
6 19.9	29 494 - 45	36 79 -240	12 581 + 23	37 39 - 54	21 803 - 51	52 22 +236	49 579 + 6	57 73 -179
6 29.9	29 373 - 121	38 95 -216	12 571 - 10	37 83 - 44	21 716 - 87	54 32 +210	49 535 - 44	59 32 -159
7 9.9	29 171 - 202	40 81 -186	12 523 - 48	38 15 - 32	21 592 - 124	56 13 +181	49 437 - 98	60 66 -134
7 19.8	28 899 - 272	42 29 -148	12 443 - 80	38 34 - 19	21 435 - 157	57 56 +143	49 291 - 146	61 71 -105
7 29.8	28 570 - 329	43 39 -110	12 335 - 108	38 41 - 7	21 253 - 182	58 61 +105	49 105 - 186	62 46 - 75
8 8.8	28 188 - 382	44 06 - 67	12 200 - 135	38 32 + 9	21 045 - 208	59 26 + 65	48 883 - 222	62 86 - 40
8 18.7	27 776 - 412	44 24 - 18	12 048 - 152	38 09 + 23	20 823 - 222	59 44 + 18	48 636 - 247	62 89 - 3
8 28.7	27 349 - 427	43 98 + 26	11 886 - 162	37 72 + 37	20 593 - 230	59 21 - 23	48 378 - 258	62 58 + 31
9 7.7	26 922 - 427	43 24 + 74	11 720 - 166	37 22 + 50	20 362 - 231	58 52 - 69	48 378 - 262	61 89 + 69
9 17.7	26 523 - 399	42 05 +119	11 564 - 156	36 61 + 61	20 362 - 221	58 52 -114	48 116 - 245	61 89 +102
9 27.6	26 168 - 355	40 48 +157	11 427 - 137	35 93 + 68	20 141 - 202	57 38 -155	47 871 - 219	60 87 +130
10 7.6	25 876 - 292	38 55 +193	11 317 - 110	35 20 + 73	19 763 - 176	53 85 -198	47 652 - 177	59 57 +157
10 17.6	25 672 - 204	36 36 +219	11 248 - 69	34 49 + 71	19 628 - 135	51 48 -237	47 356 - 119	56 27 +173
10 27.6	25 564 - 108	34 00 +236	11 224 - 24	33 82 + 67	19 538 - 90	48 79 -269	47 300 - 56	54 44 +183
11 6.5	25 564 + 0	31 53 +247	11 253 + 29	33 27 + 55	19 500 - 38	45 78 -301	47 319 + 19	52 58 +186
11 16.5	25 684 + 120	29 11 +242	11 339 + 86	32 89 + 38	19 523 + 23	45 78 -324	47 418 + 99	52 58 +178
11 26.5	25 916 + 232	26 81 +230	11 477 + 138	32 65 + 24	19 604 + 81	42 54 -340	47 418 + 177	50 80 +164
12 6.4	26 263 + 347	24 71 +210	11 676 + 199	32 62 + 3	19 748 + 144	35 63 -351	47 849 + 254	47 73 +143
12 16.4	26 714 + 451	22 93 +178	11 925 + 249	32 86 - 24	19 950 + 202	32 17 -346	48 175 + 326	46 60 +113
12 26.4	27 251 + 537	21 52 +141	12 215 + 290	33 34 - 48	20 202 + 252	28 82 -335	48 559 + 384	45 79 + 81
12 36.4	27 865 + 614	20 52 +100	12 542 + 327	34 05 - 71	20 501 + 299	25 69 -313	48 994 + 435	45 35 + 44
	27 865 + 667	20 52 + 53	12 542 + 349	34 05 - 91	20 501 + 334	25 69 -279	48 994 + 470	45 35 + 6
Mean Place	28.451	22.33	12.163	27.86	20.490	49.13	48.969	44.69
sec δ, tan δ	+2.485	-2.275	+1.134	-0.534	+1.313	+0.851	+1.636	-1.295
dα(ψ), dδ(ψ)	+0.110	-0.23	+0.073	-0.23	+0.043	-0.23	+0.089	-0.23
dα(ε), dδ(ε)	-0.089	-0.81	-0.021	-0.81	+0.033	-0.81	-0.050	-0.81
Dble.Trans.	May 16		May 16		May 16		May 17	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1412		1413		582		590	
	Piazzi 15 <sup>h</sup> 153 (Bootis)		♋ Librae		α Serpentis		ζ Ursae Minoris	
Mag.Spect.	5.78	F0	4.96	K5	2.75	K0	4.34	A2
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	Dec.	h m	Dec.	h m	Dec.	h m	Dec.
	15 37	+46 50	15 41	-19 38	15 43	+ 6 27	15 44	+77 49
1	<sup>d</sup> -8.6	<sup>s</sup> +243	<sup>s</sup> +255	<sup>s</sup> +227	<sup>s</sup> +435	<sup>s</sup> +243	<sup>s</sup> +361	<sup>s</sup> -361
1	47.488	+296	06.216	02.20	32.888	64.15	28.435	62.07
1	47.783	+339	06.506	03.23	33.149	61.92	29.044	58.77
1	48.122	+375	06.823	04.41	33.438	59.74	29.815	55.83
1	48.497	+393	07.160	05.70	33.748	57.70	30.725	53.43
1	48.890	+405	07.503	07.04	34.066	55.86	31.727	51.60
2	49.295	+403	08.185	08.39	34.387	54.28	32.798	50.40
2	49.698	+387	08.509	09.70	34.702	53.03	33.894	49.90
3	50.085	+368	08.817	10.93	35.005	52.12	34.967	50.06
3	50.453	+336	09.103	12.07	35.293	51.57	35.994	50.89
3	50.789	+298	09.366	13.07	35.560	51.41	36.928	52.35
4	51.087	+259	09.606	13.94	35.804	51.57	37.740	54.32
4	51.346	+212	09.818	14.68	36.024	52.05	38.416	56.76
4	51.558	+165	10.002	15.28	36.217	52.81	38.923	59.56
5	51.723	+118	10.159	15.77	36.383	53.77	39.258	62.56
5	51.841	+67	10.284	16.16	36.522	54.89	39.416	65.72
5	51.908	+20	10.379	16.46	36.629	56.12	39.386	68.87
5	51.928	-27	10.441	16.68	36.708	57.39	39.186	71.92
6	51.901	-74	10.469	16.84	36.756	58.67	38.818	74.80
6	51.827	-113	10.464	16.93	36.771	59.90	38.288	77.38
6	51.714	-155	10.426	16.97	36.757	61.03	37.627	79.62
7	51.559	-191	10.356	16.95	36.712	62.08	36.837	81.47
7	51.368	-218	10.259	16.86	36.638	62.97	35.944	82.83
7	51.150	-244	10.136	16.72	36.539	63.70	34.976	83.72
8	50.906	-260	09.996	16.51	36.417	64.28	33.941	84.11
8	50.646	-287	09.846	16.25	36.279	64.65	32.874	83.96
8	50.379	-289	09.691	15.92	36.131	64.83	31.799	83.31
9	50.110	-256	09.544	15.55	35.979	64.81	30.730	82.14
9	49.854	-236	09.414	15.16	35.834	64.56	29.707	80.46
9	49.618	-206	09.308	14.76	35.702	64.09	28.748	78.34
10	49.412	-163	09.239	14.39	35.593	63.39	27.875	75.76
10	49.249	-114	09.213	14.09	35.517	62.44	27.126	72.81
10	49.135	-57	09.235	13.89	35.479	61.25	26.510	69.54
11	49.078	+8	09.318	13.82	35.485	59.82	26.053	65.98
11	49.086	+73	09.432	13.95	35.541	58.16	25.780	62.25
11	49.159	+140	09.617	14.20	35.646	56.30	25.689	58.43
12	49.299	+205	09.847	14.71	35.801	54.25	25.799	54.58
12	49.504	+261	10.117	15.43	36.003	52.10	26.108	50.88
12	49.765	+314	10.421	16.33	36.244	49.89	26.598	47.38
12	50.079	+353		17.41	36.519	47.67	27.271	44.21
Mean Place	50.238	30.58	10.022	08.88	36.149	63.13	31.192	71.21
sec δ, tan δ	+1.462	+1.066	+1.062	-0.357	+1.006	+0.113	+4.746	+4.639
dα(ψ), dδ(ψ)	+0.038	-0.23	+0.069	-0.23	+0.059	-0.22	-0.041	-0.22
dα(ε), dδ(ε)	+0.041	-0.81	-0.014	-0.82	+0.004	-0.83	+0.172	-0.83
Dble.Trans.	May 17		May 17		May 18		May 18	

AT UPPER TRANSIT AT GREENWICH

No.	583		587		584		585	
	$\beta$ Serpentis		12 H. Draconis		$\kappa$ Serpentis		$\mu$ Serpentis	
Mag. Spect.	3.74	A2	5.13	A2	4.28	K5	3.63	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>
	15 45	+ 15 27	15 46	+ 62 38	15 48	+ 18 10	15 48	- 3 23
1 <sup>d</sup> -8.6	<sup>s</sup> 30.735 +221	47.73 -263	<sup>s</sup> 24.772 +270	19.78 -371	<sup>s</sup> 04.814 +218	56.21 -273	<sup>s</sup> 51.433 +228	19.74 -172
1 1.4	30.993 +258	45.16 -257	25.121 +349	16.33 -345	05.069 +255	-268	51.696 +263	21.52 -178
1 11.3	31.280 +287	42.69 -247	25.542 +421	13.23 -310	05.355 +286	-255	51.987 +291	23.33 -181
1 21.3	31.589 +309	40.44 -225	26.023 +481	10.63 -260	05.664 +309	-231	52.298 +311	25.10 -177
1 31.3	31.908 +319	38.47 -197	26.542 +519	08.58 -205	05.983 +319	-201	52.617 +319	26.75 -165
2 10.3	32.232 +324	36.84 -163	27.086 +544	07.14 -144	06.308 +325	-165	52.940 +323	28.26 -151
2 20.2	32.551 +319	35.63 -121	27.637 +551	06.41 -73	06.630 +322	-120	53.258 +318	29.53 -127
3 2.2	32.858 +307	34.85 -78	28.173 +536	06.34 -7	06.939 +309	-79	53.564 +306	30.56 -103
3 12.2	33.151 +293	34.50 -35	28.686 +513	06.95 +61	07.235 +296	-29	53.856 +292	31.33 -77
3 22.2	33.422 +271	34.61 +11	29.155 +469	08.20 +125	07.509 +274	+18	54.128 +272	31.80 -47
4 1.1	33.668 +246	35.11 +50	29.570 +415	10.00 +180	07.759 +250	+59	54.379 +251	32.02 -22
4 11.1	33.891 +223	35.98 +87	29.926 +356	12.28 +228	07.984 +225	+98	54.607 +228	31.98 +4
4 21.1	34.084 +193	37.17 +119	30.208 +282	14.96 +268	08.180 +196	+130	54.810 +203	31.71 +27
5 1.0	34.249 +165	38.57 +140	30.417 +209	17.88 +292	08.346 +166	+154	54.986 +176	31.27 +44
5 11.0	34.385 +136	40.17 +160	30.551 +134	20.99 +311	08.483 +137	+173	55.136 +150	30.69 +58
5 21.0	34.488 +103	41.87 +170	30.603 +52	24.14 +315	08.587 +104	+183	55.256 +120	30.00 +69
5 31.0	34.561 +73	43.59 +172	30.581 -22	27.21 +307	08.660 +73	+186	55.347 +91	29.26 +74
6 9.9	34.601 +40	45.30 +171	30.485 -96	30.15 +294	08.699 +39	+184	55.407 +60	28.49 +77
6 19.9	34.608 +7	46.92 +162	30.317 -168	32.84 +269	08.705 +6	+179	55.435 -3	27.72 +77
6 29.9	34.585 -23	48.41 +149	30.087 -230	35.20 +236	08.679 -26	-26	55.432 +28	26.99 +73
7 9.9	34.530 -55	49.74 +133	29.797 -290	37.21 +201	08.621 -58	+143	55.397 -35	26.29 +70
7 19.8	34.446 -84	50.86 +112	29.454 -343	38.75 +154	08.534 -87	+119	55.332 -65	25.67 +62
7 29.8	34.337 -109	51.75 +89	29.073 -381	39.85 +110	08.421 -113	+95	55.241 -91	25.13 +54
8 8.8	34.204 -133	52.41 +66	28.656 -417	40.45 +60	08.284 -137	+70	55.126 -115	24.67 +46
8 18.7	34.055 -149	52.79 +38	28.217 -439	40.52 +7	08.131 -153	+38	54.993 -133	24.32 +35
8 28.7	33.897 -158	52.90 +11	27.770 -447	40.10 -42	07.967 -164	+11	54.849 -144	24.06 +26
9 7.7	33.734 -163	52.73 -17	27.321 -449	39.15 -95	07.799 -168	-20	54.699 -150	23.92 +14
9 17.7	33.577 -157	52.26 -47	26.891 -430	37.69 -146	07.637 -162	-53	54.555 -144	23.92 +0
9 27.6	33.435 -142	51.51 -75	26.488 -403	35.77 -192	07.488 -149	-82	54.425 -130	24.05 -13
10 7.6	33.314 -121	50.45 -106	26.126 -362	33.37 -240	07.362 -126	-115	54.317 -108	24.34 -29
10 17.6	33.227 -87	49.10 -135	25.823 -303	30.56 -281	07.268 -94	-146	54.241 -76	24.82 -48
10 27.6	33.178 -49	47.47 -163	25.586 -237	27.41 -315	07.212 -56	-174	54.204 -37	25.47 -65
11 6.5	33.173 -5	45.57 -190	25.427 -159	23.93 -348	07.202 -10	-203	54.211 +7	26.33 -86
11 16.5	33.220 +47	43.42 -215	25.358 -69	20.25 -368	07.242 +40	-228	54.269 +58	27.40 -107
11 26.5	33.315 +95	41.08 -234	25.379 +21	16.43 -382	07.333 +91	-247	54.375 +106	28.67 -127
12 6.4	33.462 +147	38.57 -251	25.496 +117	12.54 -389	07.475 +142	-263	54.531 +156	30.15 -148
12 16.4	33.657 +195	35.99 -258	25.708 +212	08.76 -378	07.666 +191	-270	54.735 +204	31.76 -161
12 26.4	33.892 +235	33.39 -260	26.004 +296	05.14 -362	07.898 +232	-271	54.978 +243	33.49 -173
12 36.4	34.164 +272	30.85 -254	26.383 +379	01.81 -333	08.167 +269	-263	55.255 +277	35.28 -179
	+298	-237	+444	-289	+297	-245	+301	-178
Mean Place	33.864	48.59	27.461	27.87	07.910	57.68	54.883	22.46
sec $\delta$ , tan $\delta$	+1.038	+0.277	+2.176	+1.933	+1.053	+0.328	+1.002	-0.059
$da(\psi)$ , $d\delta(\psi)$	+0.055	-0.22	+0.018	-0.22	+0.054	-0.22	+0.062	-0.22
$da(\epsilon)$ , $d\delta(\epsilon)$	+0.010	-0.83	+0.071	-0.83	+0.012	-0.84	-0.002	-0.84
Dble. Trans.	May 19		May 19		May 19		May 19	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	586		588		1414		1416		
	$\chi$ Lupi		$\epsilon$ Serpentis		$\alpha$ Coronae Borealis		$\chi$ Herculis		
Mag.Spect.	4.11	B9	3.75	A2	4.77	K0	4.61	G0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	<sup>h</sup> <sup>m</sup> 15 50	<sup>o</sup> <sup>'</sup> - 33 35	<sup>h</sup> <sup>m</sup> 15 50	<sup>o</sup> <sup>'</sup> + 4 30	<sup>h</sup> <sup>m</sup> 15 50	<sup>o</sup> <sup>'</sup> + 35 41	<sup>h</sup> <sup>m</sup> 15 52	<sup>o</sup> <sup>'</sup> + 42 28	
	<sup>d</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	
1	-8.6	01 563 + 275	04 27 - 1	05 224 + 222	65 03 -212	40 486 + 217	50 99 -334	09 639 + 221	74 00 -349
1	1.4	01 878 + 315	04 52 - 25	05 481 + 257	62 90 -213	40 748 + 262	47 80 -319	09 909 + 270	70 71 -329
1	11.4	02 225 + 347	05 02 - 50	05 767 + 286	60 80 -210	41 047 + 299	44 84 -296	10 222 + 313	67 67 -304
1	21.3	02 595 + 370	05 74 - 72	06 074 + 307	58 81 -199	41 377 + 330	42 24 -260	10 570 + 348	65 03 -264
1	31.3	02 974 + 379	06 65 - 91	06 390 + 316	57 01 -180	41 723 + 346	40 07 -217	10 937 + 367	62 87 -216
2	10.3	03 358 + 384	07 71 -106	06 710 + 320	55 44 -157	42 079 + 356	38 40 -167	11 318 + 381	61 24 -163
2	20.2	03 735 + 377	08 89 -118	07 025 + 315	54 18 -126	42 434 + 355	37 31 -109	11 698 + 380	60 23 -101
3	2.2	04 100 + 365	10 14 -125	07 329 + 304	53 25 - 93	42 777 + 343	36 79 - 52	12 068 + 370	59 83 - 40
3	12.2	04 449 + 349	11 44 -130	07 620 + 291	52 66 - 59	43 106 + 329	36 86 + 7	12 422 + 354	60 05 + 22
3	22.2	04 776 + 327	12 76 -132	07 890 + 270	52 43 - 23	43 410 + 304	37 51 + 65	12 749 + 327	60 88 + 83
4	1.1	05 078 + 302	14 06 -130	08 138 + 248	52 52 + 9	43 685 + 275	38 66 +115	13 044 + 295	62 24 +136
4	11.1	05 356 + 278	15 35 -129	08 364 + 226	52 92 + 40	43 930 + 245	40 26 +160	13 306 + 262	64 07 +183
4	21.1	05 603 + 247	16 60 -125	08 563 + 199	53 59 + 67	44 138 + 208	42 26 +200	13 526 + 220	66 31 +224
5	1.1	05 821 + 218	17 80 -120	08 736 + 173	54 46 + 87	44 309 + 171	44 51 +225	13 705 + 179	68 81 +250
5	11.0	06 007 + 186	18 96 -116	08 882 + 146	55 49 +103	44 443 + 134	46 97 +246	13 841 + 136	71 52 +271
5	21.0	06 157 + 150	20 05 -109	08 997 + 115	56 63 +114	44 536 + 93	49 53 +256	13 930 + 89	74 32 +280
5	31.0	06 272 + 115	21 08 -103	09 084 + 87	57 81 +118	44 591 + 55	52 08 +255	13 977 + 47	77 10 +278
6	9.9	06 349 + 77	22 03 - 95	09 139 + 55	59 02 +121	44 606 + 15	54 57 +249	13 979 + 2	79 81 +271
6	19.9	06 386 + 37	22 87 - 84	09 161 + 22	60 18 +116	44 581 - 25	56 89 +232	13 936 - 43	82 33 +252
6	29.9	06 385 - 1	23 60 - 73	09 154 + 7	61 26 +108	44 520 - 61	58 99 +210	13 854 - 82	84 60 +227
7	9.9	06 344 - 41	24 21 - 61	09 114 - 40	62 26 +100	44 422 - 98	60 84 +185	13 732 - 122	86 58 +198
7	19.8	06 265 - 79	24 65 - 44	09 045 - 69	63 12 + 86	44 290 - 132	62 34 +150	13 574 - 158	88 19 +161
7	29.8	06 155 - 110	24 94 - 29	08 951 - 94	63 83 + 71	44 132 - 158	63 49 +115	13 386 - 188	89 41 +122
8	8.8	06 014 - 141	25 03 - 9	08 831 - 120	64 41 + 58	43 947 - 185	64 26 + 77	13 171 - 215	90 22 + 81
8	18.8	05 852 - 162	24 94 + 9	08 695 - 136	64 79 + 38	43 745 - 202	64 60 + 34	12 938 - 233	90 56 + 34
8	28.7	05 677 - 175	24 66 + 28	08 548 - 147	65 01 + 22	43 533 - 212	64 55 - 5	12 694 - 244	90 48 - 8
9	7.7	05 495 - 182	24 19 + 47	08 396 - 152	65 04 + 3	43 316 - 217	64 07 - 48	12 446 - 246	89 92 - 56
9	17.7	05 322 - 173	23 56 + 63	08 249 - 147	64 86 - 18	43 107 - 209	63 15 - 92	12 207 - 239	88 90 -102
9	27.6	05 166 - 156	22 79 + 77	08 115 - 134	64 47 - 39	42 913 - 194	61 83 -132	11 984 - 223	87 45 -145
10	7.6	05 037 - 129	21 91 + 88	08 003 - 112	63 87 - 60	42 743 - 170	60 10 -173	11 786 - 198	85 56 -189
10	17.6	04 949 - 88	20 99 + 92	07 923 - 80	63 02 - 85	42 609 - 134	57 98 -212	11 628 - 158	83 27 -229
10	27.6	04 907 - 42	20 06 + 93	07 880 - 43	61 96 -106	42 517 - 92	55 52 -246	11 514 - 114	80 63 -264
11	6.5	04 921 + 14	19 19 + 87	07 882 + 2	60 65 -131	42 474 - 43	52 73 -279	11 453 - 61	77 64 -299
11	16.5	04 994 + 73	18 45 + 74	07 933 + 51	59 12 -153	42 488 + 14	49 70 -303	11 452 - 1	74 42 -322
11	26.5	05 124 + 130	17 85 + 60	08 033 + 100	57 39 -173	42 558 + 70	46 49 -321	11 512 + 60	71 01 -341
12	6.5	05 315 + 191	17 43 + 42	08 183 + 150	55 47 -192	42 687 + 129	43 13 -336	11 635 + 123	67 48 -353
12	16.4	05 562 + 247	17 26 + 17	08 380 + 197	53 44 -203	42 871 + 184	39 78 -335	11 820 + 185	63 98 -350
12	26.4	05 853 + 291	17 34 - 8	08 616 + 236	51 33 -211	43 104 + 233	36 50 -328	12 059 + 239	60 57 -341
12	36.4	06 185 + 332	17 67 - 33	08 887 + 271	49 21 -212	43 383 + 279	33 39 -311	12 348 + 289	57 36 -321
		06 359 - 57	17 67 - 57	08 887 + 296	49 21 -205	43 383 + 312	33 39 -281	12 348 + 327	57 36 -286
Mean Place	05.893	12.55	08.539	64.03	43.385	55.53	12.500	80.14	
sec $\delta$ , tan $\delta$	+1.200	-0.664	+1.003	+0.079	+1.231	+0.719	+1.356	+0.916	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.076	-0.21	+0.059	-0.21	+0.045	-0.21	+0.041	-0.21	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.024	-0.84	+0.003	-0.84	+0.026	-0.85	+0.032	-0.85	
Dbble.Trans.	May 20		May 20		May 20		May 20		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	1415		589		591		593		
	λ Librae		β Trianguli Australis		γ Serpentis		ε Coronae Borealis		
Mag.Spect.	5.06	B3	3.04	F0	3.86	F5	4.22	K0	
U.T.	R.A.		R.A.		R.A.		R.A.		
	Dec.		Dec.		Dec.		Dec.		
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	15 52	- 20 07	15 53	- 63 23	15 55	+ 15 42	15 56	+ 26 54	
1	-8.6	29 072 +246	33 12 -77	49 737 +434	12.11 +157	46 570 +213	17.65 -266	58 688 +208	55.81 -307
1	1.4	29 354 +282	34.05 -93	50.244 +507	10.90 +121	46 819 +249	-261	58 937 +249	52.85 -296
1	11.4	29 665 +311	35 14 -109	50.813 +569	10.08 +82	47 100 +281	-252	59 221 +284	50.05 -280
1	21.3	29 997 +332	36 34 -120	51 428 +615	09 71 +37	47 405 +305	-230	59 532 +311	47.55 -250
1	31.3	30 338 +341	37.58 -124	52.066 +638	09.75 -4	47 721 +316	-202	59 857 +325	45.42 -213
2	10.3	30 683 +345	38 85 -127	52 718 +652	10 20 -45	48 043 +322	-168	60 191 +334	43.71 -171
2	20.2	31 022 +339	40 08 -123	53 368 +650	11 06 -86	48 363 +320	-127	60 525 +334	42.52 -119
3	2.2	31 350 +328	41 24 -116	53 998 +630	12 27 -121	48 672 +309	-84	60 848 +323	41.85 -67
3	12.2	31 664 +314	42 31 -107	54 608 +610	13 81 -154	48 968 +296	-39	61 158 +310	41.70 -15
3	22.2	31 958 +294	43 26 -95	55 179 +571	15 65 -184	49 245 +277	+6	61 447 +289	42.10 +40
4	1.1	32 230 +272	44 08 -82	55 708 +529	17 72 -207	49 498 +253	+46	61 710 +263	42.96 +86
4	11.1	32 480 +250	44 78 -70	56 191 +483	20 00 -228	49 729 +231	+84	61 949 +334	44 25 +129
4	21.1	32 703 +223	45 35 -57	56 616 +425	22 44 -244	49 931 +202	+116	62 155 +206	45 91 +166
5	1.1	32 900 +197	45 82 -47	56 982 +366	24 97 -253	49 931 +174	+140	62 330 +175	47 83 +192
5	11.0	33 070 +170	46 19 -37	57 285 +303	27 59 -262	50 105 +146	+159	62 330 +143	49 96 +213
5	21.0	33 207 +137	46 48 -29	57 515 +230	30 21 -262	50 363 +112	+170	62 579 +106	52 21 +225
5	31.0	33 314 +107	46 71 -23	57 675 +160	32 79 -258	50 446 +83	+173	62 651 +72	54 46 +225
6	9.9	33 388 +74	46 88 -17	57 760 +85	35 29 -250	50 495 +49	+173	62 688 +37	56 70 +224
6	19.9	33 426 +38	46 98 -10	57 765 +5	37 63 -234	50 510 +15	+164	62 687 -1	58 80 +210
6	29.9	33 432 +6	47 05 -7	57 699 -66	39 76 -213	50 495 -15	+151	62 652 -35	60 73 +193
7	9.9	33 401 -31	47 06 -1	57 557 -142	41 64 -188	50 446 -49	+136	62 583 -69	62 44 +171
7	19.8	33 338 -63	47 01 +5	57 346 -211	43 19 -155	50 366 -80	+115	62 481 -102	63 87 +143
7	29.8	33 246 -92	46 91 +10	57 346 -267	44 02 -121	50 366 -106	+91	62 353 -128	65 00 +113
8	8.8	33 126 -120	46 91 +17	57 079 -322	44 40 -80	50 260 -130	+68	62 198 -155	65 81 +81
8	18.8	33 287 -139	46 74 +23	56 757 -357	45 20 -36	50 130 -149	+40	62 025 -173	66 25 +44
8	28.7	32 836 -151	46 23 +28	56 023 -377	45 50 +6	49 822 -159	+13	61 841 -184	66 35 +10
9	7.7	32 678 -158	45 89 +34	55 639 -384	44 98 +52	49 656 -166	-16	61 651 -190	66 07 -28
9	17.7	32 526 -152	45 89 +37	55 639 -367	44 98 +96	49 656 -161	-46	61 651 -185	66 07 -67
9	27.6	32 388 -138	45 52 +38	55 272 -333	44 02 +134	49 495 -148	-75	61 466 -171	65 40 -102
10	7.6	32 274 -114	45 14 +37	54 939 -283	42 68 +171	49 347 -127	-105	61 295 -151	64 38 -140
10	17.6	32 196 -78	44 77 +31	54 656 -207	40 97 +198	49 220 -95	-136	61 144 -116	62 98 -175
10	27.6	32 158 -38	44 46 +23	54 449 -126	38 99 +218	49 125 -58	-163	61 028 -79	61 23 -207
11	6.5	32 170 +12	44 23 +11	54 323 -29	36 81 +230	49 067 -14	-191	60 949 -32	59 16 -240
11	16.5	32 237 +67	44 12 -6	54 294 +78	34 51 +230	49 053 +36	-216	60 917 +20	56 76 -264
11	26.5	32 340 +103	44 18 -18	54 372 +180	32 21 +223	49 089 +86	-235	60 937 +72	54 12 -285
12	6.5	32 517 +177	44 36 -45	54 552 +286	29 98 +205	49 175 +137	-254	61 009 +127	51 27 -300
12	16.4	32 738 +221	44 81 -63	54 838 +383	27 93 +178	49 312 +186	-261	61 136 +178	48 27 -305
12	26.4	32 999 +261	45 44 -82	55 221 +465	26 15 +146	49 498 +226	-263	61 314 +224	45 22 -302
12	36.4	33 296 +297	46 26 -98	55 686 +538	24 69 +109	49 724 +265	-258	61 538 +265	42 20 -291
12	36.4	33 296 +322	47 24 -111	56 224 +593	23 60 +66	49 989 +292	-241	61 803 +295	39 29 -266
Mean Place	32.937	38.77	56.691	24.01	49.736	18.43	61.703	59.23	
sec δ, tan δ	+1.065	-0.366	+2.233	-1.996	+1.039	+0.281	+1.121	+0.508	
dα(ψ), dδ(ψ)	+0.069	-0.21	+0.106	-0.21	+0.055	-0.21	+0.050	-0.20	
dα(ε), dδ(ε)	-0.013	-0.85	-0.070	-0.85	+0.010	-0.86	+0.017	-0.86	
Dble.Trans.	May 20		May 21		May 21		May 21		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1417		595		592		1418	
	48 Librae		Groombridge 2296 (Draconis)		π Scorpii		144 G. Lupi	
Mag.Spect.	4.68	B3p	4.96	A5	3.00	B2	5.07	G5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	15 57	-14 14	15 57	+54 46	15 57	-26 04	15 58	-41 42
1 <sup>d</sup>	22.195 <sup>s</sup> +234	23.99 <sup>°</sup> -109	25.347 <sup>s</sup> +226	68.00 <sup>°</sup> -370	57.935 <sup>s</sup> +252	27.25 <sup>°</sup> -39	30.151 <sup>s</sup> +290	14.70 <sup>°</sup> +51
1 <sup>s</sup>	22.464 +269	25.20 -121	25.638 +291	64.53 -347	58.224 +289	27.84 -59	30.487 +336	14.47 -23
1	22.762 +298	26.52 -132	25.987 +349	61.35 -318	58.545 +321	28.62 -78	30.860 +373	14.51 -4
1	23.081 +319	27.90 -138	26.384 +387	58.62 -273	58.888 +343	29.56 -94	31.260 +400	14.85 -34
1	23.410 +329	29.27 -137	26.812 +428	56.41 -221	59.241 +353	30.60 -104	31.673 +413	15.43 -58
2	23.744 +334	30.60 -133	27.262 +450	54.78 -163	59.599 +358	31.73 -113	32.093 +420	16.25 -82
2	24.073 +329	31.82 -122	27.717 +465	53.83 -95	59.953 +354	32.89 -116	32.510 +417	17.27 -102
3	24.392 +319	32.92 -110	28.163 +446	53.53 -30	60.296 +343	34.04 -115	32.913 +403	18.45 -118
3	24.698 +306	33.86 -94	28.592 +429	53.90 +37	60.625 +329	35.16 -112	33.303 +390	19.76 -131
3	24.985 +287	34.62 -76	28.990 +398	54.91 +101	60.935 +310	36.23 -107	33.669 +366	21.17 -141
4	25.251 +266	35.20 -58	29.347 +357	56.48 +157	61.223 +288	37.22 -99	34.010 +341	22.65 -148
4	25.497 +246	35.62 -42	29.660 +313	58.56 +208	61.489 +266	38.14 -92	34.325 +315	24.18 -153
4	25.716 +219	35.87 -25	29.919 +259	61.06 +250	61.727 +238	38.98 -84	34.606 +281	25.74 -156
5	25.911 +195	36.00 -13	30.122 +203	63.83 +277	61.939 +212	39.74 -76	34.855 +249	27.30 -156
5	26.078 +167	36.01 -1	30.268 +146	66.82 +299	62.121 +182	40.44 -70	35.069 +214	28.86 -156
5	26.215 +137	35.93 +8	30.351 +83	69.89 +307	62.271 +150	41.06 -62	35.241 +172	30.38 -152
5	26.323 +108	35.80 +13	30.377 +26	72.93 +304	62.389 +118	41.63 -57	35.375 +134	31.85 -147
6	26.398 +75	35.61 +19	30.343 -34	75.88 +295	62.471 +82	42.13 -50	35.465 +90	33.24 -139
6	26.438 +40	35.40 +21	30.251 -92	78.61 +273	62.515 +44	42.56 -43	35.508 +43	34.52 -128
6	26.447 +9	35.17 +23	30.108 -143	81.05 +244	62.525 +10	42.93 -37	35.509 +1	35.68 -116
7	26.421 -26	34.92 +25	29.913 -195	83.18 +213	62.497 -28	43.21 -28	35.464 -45	36.67 -99
7	26.362 -59	34.66 +26	29.674 -239	84.88 +170	62.432 -65	43.40 -19	35.375 -89	37.46 -79
7	26.275 -87	34.40 +26	29.399 -275	86.16 +128	62.338 -94	43.49 -9	35.250 -125	38.04 -58
8	26.161 -114	34.13 +27	29.090 -309	86.98 +82	62.213 -125	43.46 +3	35.090 -160	38.38 -34
8	26.027 -134	33.85 +28	28.760 -330	87.29 +31	62.067 -146	43.32 +14	34.904 -186	38.45 -7
8	25.880 -147	33.58 +27	28.418 -342	87.12 -17	61.908 -159	43.07 +25	34.703 -201	38.27 +18
9	25.726 -154	33.32 +26	28.070 -348	86.44 -68	61.741 -167	42.70 +37	34.494 -209	37.82 +45
9	25.578 -148	33.08 +24	27.734 -336	85.25 -119	61.579 -162	42.24 +46	34.292 -202	37.12 +70
9	25.442 -136	32.88 +20	27.418 -316	83.60 -165	61.432 -147	41.71 +53	34.109 -183	36.21 +91
10	25.327 -115	32.75 +13	27.131 -287	81.47 -213	61.308 -124	41.14 +57	33.954 -155	35.10 +111
10	25.247 -80	32.71 +4	26.892 -239	78.91 -256	61.222 -86	40.57 +57	33.844 -110	33.88 +122
10	25.205 -42	32.79 -8	26.705 -187	76.00 -291	61.177 -45	40.04 +53	33.784 -60	32.59 +129
11	25.210 +5	33.02 -23	26.582 -123	72.73 -327	61.183 +6	39.59 +45	33.784 +0	31.29 +130
11	25.268 +58	33.40 -38	26.533 -49	69.21 -352	61.246 +63	39.29 +30	33.850 +66	30.06 +123
11	25.371 +103	33.94 -54	26.556 +23	65.53 -368	61.357 +111	39.18 +11	33.981 +131	28.96 +110
12	25.530 +159	34.76 -82	26.658 +102	61.74 -379	61.529 +172	39.14 +4	34.177 +196	28.03 +93
12	25.738 +208	35.73 -97	26.838 +180	58.00 -374	61.754 +225	39.38 -24	34.435 +258	27.33 +70
12	25.985 +247	36.84 -111	27.086 +248	54.39 -361	62.021 +267	39.82 -44	34.745 +310	26.90 +43
12	26.269 +284	38.09 -125	27.401 +315	51.01 -338	62.327 +306	40.47 -65	35.100 +355	26.75 +15
	26.269 +309	38.09 -132	27.401 +388	51.01 -298	62.327 +332	40.47 -83	35.100 +387	26.75 -15
Mean Place	25.918	28.11	28.115	75.44	62.008	33.41	34.921	23.24
sec δ, tan δ	+1.032	-0.254	+1.734	+1.417	+1.113	-0.489	+1.339	-0.891
dα(ψ), dδ(ψ)	+0.067	-0.20	+0.029	-0.20	+0.072	-0.20	+0.082	-0.20
dα(ε), dδ(ε)	-0.009	-0.86	+0.048	-0.86	-0.017	-0.86	-0.030	-0.86
Dble.Trans.	May 22		May 22		May 22		May 22	



AT UPPER TRANSIT AT GREENWICH

No.	594		1419		1420		598	
	δ Scorpii		49 Librae		50 Librae		γ Draconis	
Mag.Spect.	2.54	B0	5.53	F8	5.55	A0	4.11	F8
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 15 59	<sup>o</sup> <sup>'</sup> -22 34	<sup>h</sup> <sup>m</sup> 15 59	<sup>o</sup> <sup>'</sup> -16 29	<sup>h</sup> <sup>m</sup> 16 00	<sup>o</sup> <sup>'</sup> - 8 22	<sup>h</sup> <sup>m</sup> 16 01	<sup>o</sup> <sup>'</sup> +58 35
1 -8.6	28.055 +244	56.97 -59	30.267 +234	35.02 -95	00.233 +224	23.29 -141	35.284 +226	55.96 -373
1 1.4	28.336 +281	57.74 -77	30.537 +270	36.12 -110	00.493 +260	24.79 -150	35.583 +299	52.45 -351
1 11.4	28.647 +311	58.66 -92	30.836 +299	37.34 -122	00.782 +289	26.35 -156	35.947 +364	49.25 -320
1 21.3	28.981 +334	59.72 -106	31.157 +321	38.63 -129	01.092 +310	27.92 -157	36.367 +420	46.50 -275
1 31.3	29.325 +344	60.85 -113	31.488 +331	39.94 -131	01.412 +320	29.42 -150	36.824 +457	44.29 -221
2 10.3	29.674 +349	62.03 -118	31.824 +336	41.23 -129	01.738 +326	30.83 -141	37.307 +483	42.66 -163
2 20.2	30.020 +346	63.20 -117	32.156 +332	42.45 -122	02.060 +322	32.07 -124	37.799 +492	41.71 -95
3 2.2	30.354 +334	64.32 -112	32.477 +321	43.55 -110	02.372 +312	33.11 -104	38.283 +484	41.42 -29
3 12.2	30.676 +322	65.39 -107	32.786 +309	44.53 -98	02.672 +300	33.93 -82	38.750 +467	41.81 +39
3 22.2	30.979 +303	66.35 -96	33.076 +290	45.35 -82	02.954 +282	34.52 -59	39.184 +434	42.86 +105
4 1.1	31.260 +281	67.22 -87	33.345 +289	46.01 -66	03.215 +281	34.88 -36	39.574 +390	44.47 +161
4 11.1	31.520 +260	67.98 -76	33.594 +249	46.52 -51	03.456 +241	35.04 -16	39.916 +342	46.60 +213
4 21.1	31.753 +233	68.64 -66	33.817 +223	46.89 -37	03.671 +215	34.99 +5	40.197 +281	49.15 +255
5 1.1	31.961 +208	69.21 -57	34.014 +197	47.14 -25	03.862 +191	34.79 +20	40.416 +219	51.98 +283
5 11.0	32.140 +179	69.70 -49	34.185 +171	47.29 -15	04.027 +165	34.45 +34	40.571 +155	55.03 +305
5 21.0	32.287 +147	70.11 -41	34.325 +140	47.34 -5	04.161 +134	34.02 +43	40.655 +84	58.17 +314
5 31.0	32.404 +117	70.46 -35	34.434 +109	47.35 -1	04.267 +106	33.53 +49	40.674 +19	61.28 +311
6 9.9	32.486 +82	70.76 -30	34.512 +78	47.30 +5	04.341 +74	33.01 +52	40.627 -117	64.30 +302
6 19.9	32.531 +45	71.00 -24	34.553 +41	47.21 +9	04.380 +39	32.47 +54	40.514 -43	67.09 +279
6 29.9	32.542 +11	71.19 -19	34.563 +10	47.10 +11	04.389 +9	31.95 +52	40.345 -169	69.60 +251
7 9.9	32.516 -26	71.31 -12	34.537 -26	46.96 +14	04.364 -25	31.45 +50	40.118 -227	71.78 +218
7 19.8	32.456 -60	71.37 -6	34.477 -60	46.80 +16	04.306 -58	30.98 +47	39.841 -277	73.54 +176
7 29.8	32.365 -91	71.36 +1	34.389 -88	46.62 +18	04.221 -85	30.56 +42	39.525 -316	74.86 +132
8 8.8	32.246 -119	71.26 +10	34.273 -116	46.40 +22	04.109 -112	30.17 +39	39.171 -354	75.71 +85
8 18.8	32.105 -141	71.09 +17	34.137 -136	46.17 +23	03.977 -132	29.85 +32	38.794 -377	76.04 +33
8 28.7	31.950 -155	70.83 +26	33.988 -149	45.91 +26	03.833 -144	29.58 +27	38.404 -390	75.89 -15
9 7.7	31.788 -162	70.50 +33	33.831 -157	45.64 +27	03.681 -152	29.38 +20	38.008 -396	75.22 -67
9 17.7	31.631 -157	70.11 +39	33.679 -152	45.38 +26	03.533 -148	29.27 +11	37.623 -385	74.02 -120
9 27.6	31.487 -144	69.68 +43	33.539 -140	45.13 +25	03.398 -135	29.24 +3	37.259 -364	72.36 -166
10 7.6	31.366 -121	69.24 +44	33.421 -118	44.92 +21	03.282 -116	29.34 -10	36.928 -331	70.22 -214
10 17.6	31.281 -85	68.83 +41	33.338 -83	44.80 +12	03.200 -82	29.57 -23	36.647 -281	67.64 -258
10 27.6	31.237 -44	68.47 +36	33.294 -44	44.77 +3	03.155 -45	29.95 -38	36.422 -225	64.70 -294
11 6.5	31.241 +4	68.22 +25	33.296 +2	44.88 -11	03.155 +0	30.51 -56	36.266 -156	61.40 -330
11 16.5	31.302 +61	68.13 +9	33.353 +57	45.13 -25	03.206 +51	31.24 -73	36.190 -76	57.85 -355
11 26.5	31.400 +98	68.28 -15	33.453 +100	45.51 -38	03.304 +98	32.17 -93	36.193 +3	54.13 -372
12 6.5	31.573 +173	68.40 -12	33.612 +159	46.22 -71	03.454 +150	33.31 -114	36.282 +89	50.31 -382
12 16.4	31.792 +219	68.85 -45	33.820 +208	47.05 -83	03.653 +199	34.61 -130	36.457 +175	46.54 -377
12 26.4	32.051 +259	69.48 -63	34.068 +248	48.04 -99	03.891 +238	36.04 -143	36.707 +250	42.90 -364
12 36.4	32.348 +297	70.30 -82	34.353 +285	49.18 -114	04.166 +275	37.56 -152	37.033 +326	39.49 -341
	32.348 +323	70.30 -97	34.353 +311	49.18 -123	04.166 +299	37.56 -155	37.033 +386	39.49 -300
Mean Place	32.019	62.38	34.032	39.55	03.826	26.10	38.044	63.95
sec δ, tan δ	+1.083	-0.416	+1.043	-0.296	+1.011	-0.147	+1.919	+1.638
dα(ψ), dδ(ψ)	+0.071	-0.20	+0.068	-0.20	+0.065	-0.20	+0.023	-0.20
dα(ε), dδ(ε)	-0.014	-0.87	-0.010	-0.87	-0.005	-0.87	+0.054	-0.87
Dble.Trans.	May 22		May 22		May 22		May 23	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	597		596		599		1421		
	$\beta$ Scorpii* <i>p.</i>		$\delta$ Normae		$\zeta$ Lupi		$\kappa$ Herculis* <i>p.</i>		
Mag. Spect.	2.90	B1	4.84	A3p	4.33	B3	5.34	G5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	16 04	- 19 46	16 05	- 45 08	16 05	- 36 45	16 07	+ 17 04	
1	-8.6	35 143 + 235	04.65 - 73	26.962 + 295	06.82 + 75	37.640 + 268	52 11 + 28	24.779 + 200	54.05 - 267
1	1.4	35 415 + 272	05.54 - 89	27.306 + 344	06.35 + 47	37.951 + 311	52 07 + 4	25 017 + 238	51 42 - 263
1	11.4	35 717 + 302	06.56 - 102	27.691 + 385	06.16 + 19	38 299 + 348	52 28 - 21	25 289 + 272	48 89 - 253
1	21.3	36 043 + 326	07.69 - 113	28 106 + 415	06.29 - 13	38.672 + 373	52 74 - 46	25 585 + 296	46.57 - 232
1	31.3	36 379 + 336	08.87 - 118	28 537 + 431	06.69 - 40	39.059 + 387	53 40 - 66	25 896 + 311	44.54 - 203
2	10.3	36.721 + 342	10.06 - 119	28.977 + 440	07.35 - 66	39.454 + 395	54 24 - 84	26 216 + 320	42 84 - 170
2	20.3	37.061 + 340	11.21 - 115	29 415 + 438	08.25 - 90	39.846 + 392	55 23 - 99	26 535 + 319	41 58 - 126
3	2.2	37.390 + 329	12.29 - 108	29 841 + 426	09.34 - 109	39.846 + 381	56 33 - 110	26 846 + 311	40.75 - 83
3	12.2	37.708 + 318	13.28 - 99	30.254 + 413	10.60 - 126	40 596 + 369	57 51 - 118	27 146 + 300	40 38 - 37
3	22.2	38.007 + 299	14.14 - 86	30.645 + 391	12.00 - 140	40.945 + 349	58 75 - 124	27.429 + 283	40 48 + 10
4	1.1	38.287 + 280	14.87 - 73	31.010 + 365	13.50 - 150	41.270 + 325	60.02 - 127	27 690 + 261	40 99 + 51
4	11.1	38 546 + 259	15.49 - 62	31.348 + 338	15.09 - 159	41.573 + 303	61 31 - 129	27 929 + 239	41 90 + 91
4	21.1	38.779 + 233	15.99 - 50	31.652 + 304	16.73 - 164	41.845 + 272	62 59 - 128	28 141 + 212	43 15 + 125
5	1.1	38.987 + 208	16.38 - 39	31.921 + 269	18.40 - 167	42.088 + 243	63 86 - 127	28 325 + 184	44 64 + 149
5	11.0	39.168 + 181	16.68 - 30	32.154 + 233	20.10 - 170	42.299 + 211	65.12 - 126	28.481 + 156	46.35 + 171
5	21.0	39.317 + 149	16.91 - 23	32.343 + 189	21.78 - 168	42.472 + 173	66 33 - 121	28 604 + 123	48 18 + 183
5	31.0	39.437 + 120	17.08 - 17	32.491 + 148	23.41 - 163	42.608 + 136	67 50 - 117	28 696 + 92	50.04 + 186
6	10.0	39.522 + 85	17.21 - 13	32.592 + 101	24.99 - 158	42.705 + 97	68 62 - 112	28 755 + 59	51 91 + 187
6	19.9	39.571 + 49	17.28 - 7	32.643 + 51	26.46 - 147	42.758 + 53	69 64 - 102	28 778 + 23	53 69 + 178
6	29.9	39.587 + 16	17.33 - 5	32.648 + 5	27.79 - 133	42.771 + 13	70.56 - 92	28.769 - 9	55.35 + 166
7	9.9	39.566 - 21	17.33 + 0	32.603 - 45	28.97 - 118	42.740 - 31	71.35 - 79	28 725 - 44	56 85 + 150
7	19.8	39.510 - 56	17.28 + 5	32.512 - 91	29.93 - 96	42.668 - 72	71.98 - 63	28 649 - 76	58 13 + 128
7	29.8	39.424 - 86	17.20 + 8	32.380 - 132	30.66 - 73	42.668 - 108	72 45 - 47	28 545 - 104	59 18 + 105
8	8.8	39.309 - 115	17.06 + 14	32.211 - 169	30.66 - 47	42.560 - 142	72 45 - 26	28 545 - 130	59 18 + 80
8	18.8	39.172 - 137	16.86 + 20	32.013 - 198	31.13 - 18	42.418 - 167	72.71 - 5	28 415 - 150	59.98 + 50
8	28.7	39.021 - 151	16.62 + 24	31.798 - 215	31.21 + 10	42.067 - 184	72.61 + 15	28 101 - 164	60.71 + 23
9	7.7	38.861 - 160	16.33 + 29	31.572 - 226	30.81 + 40	41.874 - 193	72.23 + 38	27 930 - 171	60 64 - 7
9	17.7	38.705 - 156	16.01 + 32	31.354 - 218	30.81 + 68	41.874 - 187	72.23 + 58	27 930 - 168	60 64 - 39
9	27.7	38.562 - 143	15.67 + 34	31.153 - 201	29.19 + 94	41.514 - 173	70.90 + 75	27 604 - 158	59.57 - 68
10	7.6	38.440 - 122	15.35 + 32	30.981 - 172	28.03 + 116	41.367 - 147	70.00 + 90	27 466 - 138	58.57 - 100
10	17.6	38.352 - 88	15.07 + 28	30.855 - 126	26.71 + 132	41.260 - 107	69 00 + 100	27 359 - 107	57.25 - 132
10	27.6	38.304 - 48	14.86 + 21	30.782 - 73	25.29 + 142	41.199 - 61	67 96 + 104	27 287 - 72	55 65 - 160
11	6.5	38.304 + 0	14.77 + 9	30.770 - 12	23.82 + 147	41.194 - 5	66 93 + 103	27 259 - 28	53 76 - 189
11	16.5	38.358 + 54	14.83 - 6	30.828 + 58	22.41 + 141	41.251 + 57	65 98 + 95	27 281 + 22	51 61 - 215
11	26.5	38.446 + 88	14.74 + 9	30.954 + 126	21.09 + 132	41.367 + 116	65.16 + 82	27 352 + 71	49 26 - 235
12	6.5	38.613 + 167	15.43 - 69	31.149 + 195	19.93 + 116	41.545 + 178	64.49 + 67	27 475 + 123	46 73 - 253
12	16.4	38.823 + 210	16.03 - 60	31.410 + 261	19.00 + 93	41.783 + 238	64 04 + 45	27 647 + 172	44 11 - 262
12	26.4	39.073 + 250	16.80 - 77	31.725 + 315	18.32 + 68	42.069 + 286	63 83 + 21	27 861 + 214	41 47 - 264
12	36.4	39.360 + 287	17.73 - 93	32.090 + 365	17.94 + 38	42.398 + 329	63 87 - 4	28 115 + 254	38 87 - 260
		+ 314	- 105	+ 401	+ 8	+ 361	- 29	+ 283	- 243
Mean Place	39.040	09.07	31.981	14.93	42.179	59 09	27 951	56 26	
sec $\delta$ , $\tan \delta$	+1.063	-0.359	+1.418	-1.005	+1.248	-0.747	+1.046	+0.307	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.070	-0.19	+0.085	-0.19	+0.079	-0.19	+0.054	-0.19	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.012	-0.88	-0.032	-0.88	-0.024	-0.88	+0.010	-0.88	
Dble. Trans.	May 23		May 24		May 24		May 24		

AT UPPER TRANSIT AT GREENWICH

No.	601		1423		1422		606	
	φ Herculis		τ Coronæ Borealis		B.D. +6° 3169 (Serpentis)		19 Ursæ Minoris	
Mag.Spect.	4.26	B9p	4.94	K0	6.02	G5	5.51	B8
U.T.	R.A.		R.A.		R.A.		R.A.	
	Dec.		Dec.		Dec.		Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	16 08	+44 57	16 08	+36 31	16 08	+ 6 24	16 11	+75 54
1 -8.6	17 735 +199	65 27 -357	25 693 +197	23 34 -336	27 916 +205	60 37 -218	08 796 +286	34 09 -372
1 1.4	17 988 +253	61 86 -341	25 936 +243	20 11 -323	28 157 +241	58 17 -220	09 240 +444	30 61 -348
1 11.4	18 288 +300	58 69 -317	26 220 +284	17 08 -303	28 430 +273	56 00 -217	09 836 +596	27 44 -317
1 21.3	18 629 +341	55 92 -277	26 538 +318	14 40 -268	28 726 +296	53 95 -205	10 566 +730	24 73 -271
1 31.3	18 994 +365	53 61 -231	26 876 +338	12 14 -226	29 035 +309	52 11 -184	11 392 +826	22 57 -216
2 10.3	19 377 +383	51 82 -179	27 228 +352	10 36 -178	29 351 +316	50 50 -161	12 295 +903	20 99 -158
2 20.3	19 765 +388	50 67 -115	27 583 +355	09 16 -120	29 666 +315	49 22 -128	13 239 +944	20 11 -88
3 2.2	20 146 +381	50 13 -54	27 930 +347	08 54 -62	29 973 +307	48 28 -94	14 182 +943	19 90 -21
3 12.2	20 516 +370	50 23 +10	28 267 +337	08 51 -3	30 269 +296	47 71 -57	15 106 +924	20 35 +45
3 22.2	20 862 +346	50 96 +73	28 582 +315	09 08 +57	30 548 +279	47 51 -20	15 966 +860	21 48 +113
4 1.1	21 177 +315	52 24 +128	28 871 +289	10 16 +108	30 807 +259	47 66 +15	16 738 +772	23 17 +169
4 11.1	21 461 +284	54 03 +179	29 133 +262	11 73 +157	31 046 +239	48 13 +47	17 407 +669	25 37 +220
4 21.1	21 702 +241	54 03 +222	29 133 +226	11 73 +199	31 046 +214	48 13 +76	17 407 +534	25 37 +263
4 21.1	21 702 +200	56 25 +251	29 359 +191	13 72 +227	31 260 +189	48 89 +97	17 941 +393	28 00 +290
5 1.1	21 902 +156	58 76 +276	29 550 +154	15 99 +251	31 449 +162	49 86 +116	18 334 +247	30 90 +312
5 11.0	22 058	61 52	29 704	18 50	31 611	51 02	18 581	34 02
5 21.0	22 165 +107	64 39 +287	29 816 +112	21 13 +263	31 742 +131	52 29 +127	18 666 +85	37 22 +320
5 31.0	22 227 +62	67 27 +288	29 889 +73	23 78 +265	31 844 +102	53 60 +131	18 602 -64	40 38 +316
6 10.0	22 241 +14	70 10 +283	29 921 +32	26 40 +262	31 914 +70	54 94 +134	18 387 -215	43 43 +305
6 19.9	22 206 -35	72 76 +266	29 910 -11	28 88 +248	31 950 +36	56 23 +129	18 387 -362	46 26 +283
6 29.9	22 128 -78	75 19 +243	29 862 -48	31 14 +226	31 955 +5	57 43 +120	18 025 -486	48 79 +253
7 9.9	22 006 -122	77 34 +215	29 774 -88	33 16 +202	31 926 -29	58 54 +111	16 929 -610	50 98 +219
7 19.8	21 844 -162	79 11 +177	29 649 -125	34 85 +169	31 865 -61	59 50 +96	16 214 -715	52 72 +174
7 29.8	21 649 -195	80 51 +140	29 494 -155	36 19 +134	31 865 -89	60 30 +80	16 214 -794	52 72 +131
8 8.8	21 423 -226	81 49 +98	29 434 -184	36 19 +98	31 776 -116	60 30 +64	15 420 -869	54 03 +82
8 18.8	21 174 -249	82 00 +51	29 310 -205	37 17 +53	31 660 -136	60 94 +43	14 551 -915	54 85 +28
8 28.7	20 912 -262	82 06 +6	28 887 -218	37 84 +14	31 375 -149	61 61 +24	12 698 -938	54 93 -20
9 7.7	20 642 -270	81 65 -41	28 661 -226	37 55 -29	31 217 -158	61 65 +4	11 748 -950	54 20 -73
9 17.7	20 378 -264	80 75 -90	28 439 -222	36 80 -75	31 062 -155	61 45 -20	10 823 -925	52 94 -126
9 27.7	20 127 -251	79 41 -134	28 230 -209	35 65 -115	30 918 -144	61 04 -41	09 940 -883	51 22 -172
10 7.6	19 901 -226	77 61 -180	28 042 -188	34 06 -159	30 792 -126	60 39 -65	09 117 -823	49 01 -221
10 17.6	19 712 -189	75 38 -223	27 889 -153	32 08 -198	30 697 -96	59 50 -89	08 391 -726	46 37 -264
10 27.6	19 566 -146	72 79 -259	27 775 -114	29 74 -234	30 637 -60	58 37 -113	07 771 -620	43 38 -299
11 6.5	19 474 -92	69 83 -296	27 709 -66	27 05 -269	30 620 -17	57 00 -137	07 282 -489	40 03 -335
11 16.5	19 443 -31	66 60 -323	27 699 -10	24 09 -296	30 652 +32	55 40 -160	06 948 -334	36 46 -357
11 26.5	19 473 +30	63 16 -344	27 745 +46	20 93 -316	30 733 +81	53 60 -180	06 770 -178	32 72 -374
12 6.5	19 570 +97	59 59 -357	27 851 +106	17 60 -333	30 863 +130	51 61 -199	06 767 -3	28 89 -383
12 16.4	19 731 +161	56 01 -358	28 013 +162	14 25 -335	31 042 +179	49 50 -211	06 940 +173	25 12 -377
12 26.4	19 949 +218	52 50 -351	28 227 +214	10 95 -330	31 261 +219	47 32 -218	07 277 +337	21 49 -363
12 36.4	20 222 +273	49 17 -333	28 488 +261	07 78 -317	31 518 +257	45 13 -219	07 781 +504	18 12 -337
	20 222 +317	49 17 -299	28 488 +298	07 78 -287	31 518 +284	45 13 -210	07 781 +645	18 12 -297
Mean Place	20 619	71 64	28 645	28 78	31 260	60 44	11 809	43 00
sec δ, tan δ	+1.413	+0.999	+1.244	+0.741	+1.006	+0.112	+4.108	+3.985
dα(ψ), dδ(ψ)	+0.038	-0.19	+0.044	-0.19	+0.059	-0.19	-0.033	-0.18
dα(ε), dδ(ε)	+0.031	-0.88	+0.023	-0.88	+0.004	-0.88	+0.121	-0.89
Dbble.Trans.	May 24		May 24		May 24		May 25	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	600		603		602		1425										
	α Normae		δ Ophiuchi		δ Trianguli Australis		17 Herculis										
	Mag.	Spect.	3.03	M0	4.03	G0	6.59	K0									
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.									
	h m	° ′	h m	° ′	h m	° ′	h m	° ′									
	16 12	-54 35	16 13	- 3 39	16 14	-63 38	16 15	+23 09									
1	-8.6	18.721	+332	39.47	+131	34.700	+207	35.87	-162	04.958	+401	59.53	+177	39.042	+190	17.15	-291
1	1.4	19.113	+392	38.47	+100	34.945	+245	37.56	-169	05.438	+480	58.09	+144	39.272	+230	14.30	-285
1	11.4	19.557	+444	37.79	+68	35.220	+275	39.29	-173	05.986	+548	57.00	+109	39.538	+266	11.57	-273
1	21.3	20.040	+483	37.47	+32	35.519	+299	40.97	-168	06.588	+602	56.33	+67	39.833	+295	09.09	-248
1	31.3	20.544	+504	37.49	- 2	35.829	+310	42.55	-158	07.220	+632	56.05	+28	40.144	+311	06.94	-215
2	10.3	21.063	+519	37.85	-36	36.148	+319	43.99	-144	07.874	+654	56.18	-13	40.467	+323	05.17	-177
2	20.3	21.584	+521	38.54	-69	36.465	+317	45.21	-122	08.533	+659	56.71	-53	40.792	+325	03.87	-130
3	2.2	22.093	+509	39.50	-96	36.775	+310	46.18	-97	09.181	+648	57.60	-89	41.110	+318	03.07	-80
3	12.2	22.589	+496	40.73	-123	37.075	+300	46.90	-72	09.813	+632	58.83	-123	41.420	+310	02.76	-31
3	22.2	23.061	+472	42.20	-147	37.359	+284	47.32	-42	10.415	+602	60.37	-154	41.712	+292	02.98	+22
4	1.1	23.502	+441	43.84	-164	37.624	+265	47.49	-17	10.978	+563	62.16	-179	41.983	+271	03.65	+67
4	11.1	23.913	+411	45.66	-182	37.870	+246	47.40	+9	11.501	+523	64.20	-204	42.232	+249	04.76	+111
4	21.1	24.282	+369	47.61	-195	38.092	+222	47.08	+32	11.969	+468	66.43	-223	42.452	+220	06.24	+148
5	1.1	24.609	+327	49.64	-203	38.291	+199	46.59	+49	12.381	+412	68.79	-236	42.644	+192	08.00	+176
5	11.0	24.891	+282	51.75	-211	38.464	+173	45.95	+64	12.732	+351	71.27	-248	42.806	+162	09.98	+198
5	21.0	25.119	+228	53.88	-213	38.606	+142	45.21	+74	13.010	+278	73.80	-253	42.934	+128	12.10	+212
5	31.0	25.295	+176	55.99	-176	38.721	+115	44.42	+79	13.219	+209	76.33	-253	43.029	+95	14.26	+216
6	10.0	25.413	+118	58.06	-207	38.803	+82	43.59	+83	13.350	+131	78.82	-249	43.088	+59	16.43	+217
6	19.9	25.469	+56	60.01	-195	38.851	+48	42.78	+81	13.399	+49	81.20	-238	43.110	+22	18.49	+206
6	29.9	25.467	- 2	61.82	-181	38.868	+17	42.00	+78	13.374	-25	83.41	-221	43.098	-12	20.41	+192
7	9.9	25.405	- 62	63.44	-162	38.849	-19	41.28	+72	13.267	-107	85.41	-200	43.050	-48	22.15	+174
7	19.8	25.284	-121	64.81	-137	38.798	-51	40.63	+65	13.086	-181	87.12	-171	42.967	-83	23.63	+148
7	29.8	25.115	-169	65.90	-109	38.717	-81	40.07	+56	12.842	-244	88.51	-139	42.856	-111	24.84	+121
8	8.8	24.898	-217	66.67	-77	38.609	-108	39.59	+48	12.537	-305	89.53	-102	42.715	-141	25.77	+93
8	18.8	24.646	-252	67.07	-40	38.479	-130	39.22	+37	12.188	-349	90.11	-58	42.554	-161	26.35	+58
8	28.7	24.372	-274	67.13	-6	38.334	-145	38.96	+26	11.812	-376	90.28	-17	42.378	-176	26.61	+26
9	7.7	24.085	-287	66.79	+34	38.180	-154	38.80	+16	11.420	-392	89.99	+29	42.193	-185	26.53	-8
9	17.7	23.806	-279	66.09	+70	38.028	-152	38.79	+1	11.038	-382	89.25	+74	42.010	-183	26.08	-45
9	27.7	23.547	-259	65.05	+104	37.886	-142	38.90	-11	10.682	-356	88.11	+114	41.837	-173	25.30	-78
10	7.6	23.321	-226	63.70	+135	37.762	-124	39.16	-26	10.370	-312	86.58	+153	41.682	-155	24.15	-115
10	17.6	23.150	-171	62.10	+160	37.669	-93	39.60	-44	10.128	-242	84.73	+185	41.558	-124	22.65	-150
10	27.6	23.040	-110	60.32	+178	37.612	-57	40.20	-60	09.964	-164	82.65	+208	41.469	-89	20.85	-180
11	6.5	23.003	-37	58.43	+189	37.597	-15	41.00	-80	09.893	-71	80.38	+227	41.424	-45	18.71	-214
11	16.5	23.050	+47	56.53	+190	37.632	+35	42.00	-100	09.929	+36	78.07	+231	41.429	+5	16.32	-239
11	26.5	23.178	+128	54.68	+185	37.714	+82	43.18	-118	10.067	+138	75.79	+228	41.485	+56	13.71	-261
12	6.5	23.389	+211	52.97	+171	37.847	+133	44.56	-138	10.313	+246	73.61	+218	41.594	+109	10.91	-280
12	16.4	23.678	+289	51.49	+148	38.029	+182	46.08	-152	10.660	+347	71.67	+194	41.754	+160	08.05	-286
12	26.4	24.035	+357	50.26	+123	38.251	+222	47.71	-163	11.094	+434	69.99	+168	41.959	+205	05.17	-282
12	36.4	24.453	+418	49.35	+91	38.511	+260	49.41	-170	11.607	+513	68.65	+134	42.206	+247	02.35	-288
		463	+55				+286		-169		+574		+94		+279		-261
Mean Place	24.578	47.79		38.232	36.86	12.129	68.38	42.161	20.66								
sec δ, tan δ	+1.726	-1.407		+1.002	-0.064	+2.253	-2.019	+1.088	+0.428								
dα(ψ), dδ(ψ)	+0.094	-0.18		+0.063	-0.18	+0.109	-0.18	+0.051	-0.17								
dα(ε), dδ(ε)	-0.042	-0.89		-0.002	-0.89	-0.060	-0.90	+0.013	-0.90								
Dble.Trans.	May 25		May 26		May 26		May 26										

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	605		612		1424		1426	
Name	ε Ophiuchi		η Ursae Minoris		δ' Apodis*		55 G. Scorpii* f.	
Mag. Spect.	3.34	K0	5.04	F0	4.78	M3	5.69	F2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>
	16 17	- 4 39	16 17	+ 75 46	16 18	- 78 39	16 18	- 30 52
1 -8.6	32.797 +206	36.24 -155	50.216 +258	63.22 -373	03.982 +757	40.09 +241	37.062 +242	24.85 +2
1 1.4	33.039 +242	37.86 -162	50.633 +417	59.72 -350	04.918 +936	38.01 +208	37.346 +284	25.04 -19
1 11.4	33.313 +274	39.52 -166	51.203 +570	56.51 -321	06.012 +1094	36.32 +169	37.665 +319	25.43 -39
1 21.3	33.610 +297	41.15 -163	51.909 +706	53.75 -276	07.237 +1225	35.11 +121	38.010 +345	26.00 -57
1 31.3	33.920 +310	42.69 -154	52.713 +804	51.52 -223	08.543 +1306	34.36 +75	38.370 +360	26.72 -72
2 10.3	34.239 +319	44.09 -140	53.599 +886	49.88 -164	09.914 +1371	34.10 +26	38.740 +370	27.57 -85
2 20.3	34.557 +318	45.28 -119	54.529 +930	48.92 -96	11.309 +1395	34.34 -24	39.109 +369	28.49 -92
3 2.2	34.868 +311	46.25 -97	55.463 +934	48.63 -29	12.692 +1383	35.05 -71	39.470 +361	29.47 -98
3 12.2	35.170 +302	46.96 -71	55.463 +920	49.01 +38	14.051 +1359	36.19 -114	39.821 +351	30.47 -100
3 22.2	35.456 +286	47.39 -43	57.245 +862	50.07 +106	15.347 +1296	37.77 -158	40.156 +335	31.47 -100
4 1.2	35.724 +268	47.57 -18	58.022 +777	51.69 +162	16.559 +1212	39.70 -193	40.470 +314	32.45 -98
4 11.1	35.974 +250	47.51 +6	58.701 +679	53.84 +215	17.680 +1121	41.97 -227	40.765 +295	33.41 -96
4 21.1	36.200 +226	47.22 +29	59.249 +548	56.43 +29	18.673 +993	44.53 -256	41.033 +268	34.33 -92
5 1.1	36.403 +203	46.77 +45	59.660 +411	59.31 +288	19.533 +860	47.29 -276	41.274 +241	35.22 -89
5 11.0	36.580 +177	46.17 +60	59.927 +267	62.43 +312	20.246 +713	50.25 -296	41.487 +213	36.09 -87
5 21.0	36.728 +148	45.46 +71	60.033 +106	65.64 +321	20.788 +542	53.30 -305	41.666 +179	36.91 -82
5 31.0	36.847 +119	44.71 +75	59.992 -41	68.82 +310	21.164 +376	56.38 -308	41.810 +144	37.70 -79
6 10.0	36.934 +87	43.92 +79	59.801 -191	71.92 +418	21.358 +194	59.46 -308	41.918 +108	38.44 -74
6 19.9	36.986 +52	43.15 +77	59.461 -340	74.80 +288	21.363 +5	62.43 -297	41.984 +66	39.13 -69
6 29.9	37.007 +21	42.41 +74	58.996 -465	77.39 +259	21.196 -167	65.22 -279	42.012 +28	39.75 -62
7 9.9	36.992 -15	41.71 +70	58.407 -589	79.66 +227	20.847 -349	67.77 -255	41.999 -13	40.29 -54
7 19.9	36.943 -49	41.09 +62	57.710 -697	81.50 +62	20.331 -516	69.99 -222	41.945 -54	40.73 -44
7 29.8	36.865 -78	40.54 +55	56.931 -779	82.90 +140	19.677 -654	71.84 -185	41.856 -89	41.05 -32
8 8.8	36.758 -107	40.08 +46	56.074 -857	83.82 +92	18.892 -785	73.25 -141	41.733 -123	41.05 -18
8 18.8	36.630 -128	39.71 +37	55.168 -906	84.21 +39	18.014 -878	74.15 -90	41.583 -150	41.26 -3
8 28.7	36.486 -144	39.44 +27	54.235 -933	84.11 -10	17.079 -935	74.54 -39	41.416 -167	41.15 +11
9 7.7	36.331 -155	39.28 +16	53.288 -947	83.49 -62	16.112 -967	74.39 +15	41.237 -179	40.87 +28
9 17.7	36.179 -152	39.24 +4	52.361 -927	82.34 -115	15.171 -941	73.67 +72	41.061 -176	40.45 +42
9 27.7	36.035 -144	39.31 -7	51.472 -889	80.71 -163	14.287 -884	72.46 +121	40.896 -165	39.90 +55
10 7.6	35.910 -125	39.54 -23	50.640 -832	78.60 -211	13.499 -788	70.75 +171	40.752 -144	39.25 +65
10 17.6	35.815 -95	39.92 -38	49.902 -738	76.05 -255	12.860 -639	68.62 +213	40.644 -108	38.54 +71
10 27.6	35.755 -60	40.47 -55	49.266 -636	73.13 -292	12.389 -471	66.16 +246	40.578 -66	37.81 +73
11 6.6	35.737 -18	41.20 -73	48.758 -508	69.85 -328	12.118 -271	63.43 +273	40.562 -16	37.11 +70
11 16.5	35.769 +32	42.12 -92	48.402 -356	66.33 -92	12.075 -43	60.59 +284	40.605 +43	36.50 +61
11 26.5	35.849 +80	43.22 -110	48.200 -202	62.63 -370	12.253 +178	57.71 +288	40.702 +97	36.02 +48
12 6.5	35.979 +130	44.53 -131	48.171 -29	58.82 -381	12.665 +412	54.91 +280	40.856 +154	35.66 +36
12 16.4	36.159 +180	45.98 -145	48.317 +146	55.05 -377	13.299 +634	52.32 +259	41.068 +212	35.49 +17
12 26.4	36.379 +220	47.53 -155	48.627 +310	51.42 -363	14.127 +828	50.00 +232	41.327 +259	35.52 -3
12 36.4	36.636 +257	49.17 -134	49.104 +477	48.01 -341	15.138 +1011	48.03 +197	41.629 +302	35.77 -25
	36.636 +285	49.17 -163	49.104 +620	48.01 -301	15.138 +1155	48.03 +152	41.629 +332	35.77 -45
Mean Place	36.364	36.99	53.282	72.23	17.883	49.18	41.388	29.49
sec δ, tan δ	+1.003	-0.082	+4.073	+3.948	+5.087	-4.988	+1.165	-0.598
dα(ψ), dδ(ψ)	+0.063	-0.17	-0.033	-0.17	+0.181	-0.17	+0.075	-0.17
dα(ε), dδ(ε)	-0.002	-0.90	+0.113	-0.90	-0.143	-0.90	-0.017	-0.90
Dble. Trans.	May 27		May 27		May 27		May 27	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	604		608		607		609	
	$\gamma^2$ Normae		$\tau$ Herculis		$\sigma$ Scorpii		$\gamma$ Herculis	
Mag.Spect.	4.14	K0	3.91	B5	3.10 var.	B1	3.79	F0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	16 18	-50 07	16 19	+46 20	16 20	-25 33	16 21	+19 10
	<sup>s</sup> +300	" +111	<sup>s</sup> +185	" -361	<sup>s</sup> +230	" -30	<sup>s</sup> +185	" -274
1 -8.6	44.132	17.31	17.135	35.79	17.854	36.60	16.277	60.09
1 1.4	44.487	16.47	17.376	32.33	18.124	37.08	16.503	57.39
1 11.4	44.890	15.92	17.668	29.10	18.428	37.72	16.763	54.78
1 21.3	45.330	15.71	18.002	26.24	18.758	38.50	17.052	52.39
1 31.3	45.790	15.79	18.365	23.85	19.101	39.39	17.357	50.30
	+473	-38	+384	-188	+352	-95	+317	-175
2 10.3	46.263	16.17	18.749	21.97	19.453	40.34	17.674	48.55
2 20.3	46.739	16.84	19.141	20.73	19.806	41.32	17.993	47.24
3 2.2	47.206	17.74	19.530	20.11	20.151	42.29	18.307	46.38
3 12.2	47.662	18.87	19.909	20.12	20.487	43.23	18.612	46.00
3 22.2	48.097	20.20	20.267	20.79	20.807	44.11	18.902	46.11
	+408	-147	+329	+123	+301	-81	+270	+55
4 1.2	48.505	21.67	20.596	22.02	21.108	44.92	19.172	46.66
4 11.1	48.887	23.28	20.894	23.77	21.390	45.67	19.422	47.62
4 21.1	49.233	25.01	21.151	25.97	21.647	46.35	19.645	48.95
5 1.1	49.542	26.80	21.366	28.49	21.879	46.96	19.841	50.54
5 11.0	49.811	28.66	21.536	31.27	22.084	47.52	20.009	52.35
	+221	-188	+170	+293	+173	-51	+135	+196
5 21.0	50.032	30.54	21.656	34.20	22.257	48.03	20.144	54.31
5 31.0	50.207	32.40	21.729	37.14	22.398	48.50	20.248	56.31
6 10.0	50.330	34.23	21.753	40.05	22.503	48.93	20.317	58.33
6 19.9	50.397	35.96	21.725	42.80	22.569	49.32	20.349	60.26
6 29.9	50.411	37.57	21.653	45.33	22.600	49.66	20.348	62.07
	+175	-186	+73	+294	+141	-47	+104	+200
7 9.9	50.370	39.02	21.534	47.60	22.590	49.95	20.310	63.71
7 19.9	50.275	40.25	21.371	49.50	22.542	50.16	20.239	65.13
7 29.8	50.134	41.24	21.174	51.02	22.460	50.31	20.137	66.30
8 8.8	49.949	41.95	20.942	52.12	22.345	50.36	20.007	67.22
8 18.8	49.730	42.33	20.686	52.75	22.205	50.31	19.855	67.82
	-241	-7	-273	+19	-158	+15	-168	+31
8 28.7	49.489	42.40	20.413	52.94	22.047	50.16	19.687	68.13
9 7.7	49.234	42.12	20.131	52.64	21.878	49.90	19.510	68.12
9 17.7	48.984	41.51	19.852	51.84	21.711	49.56	19.333	67.78
9 27.7	48.750	40.61	19.586	50.60	21.554	49.14	19.166	67.13
10 7.6	48.545	39.41	19.342	48.89	21.416	48.66	19.015	66.13
	-205	+120	-244	-171	-138	+48	-151	-100
10 17.6	48.388	38.00	19.134	46.73	21.313	48.18	18.894	64.81
10 27.6	48.285	36.43	18.969	44.20	21.249	47.70	18.807	63.20
11 6.6	48.249	34.76	18.857	41.28	21.233	47.29	18.763	61.27
11 16.5	48.289	33.08	18.807	38.08	21.272	46.99	18.768	59.09
11 26.5	48.401	31.47	18.818	34.66	21.365	46.86	18.823	56.68
	+112	+161	+11	-342	+93	+13	+55	-241
12 6.5	48.590	29.98	18.897	31.07	21.506	46.80	18.929	54.09
12 16.4	48.851	28.69	19.042	27.47	21.709	46.94	19.086	51.41
12 26.4	49.174	27.65	19.247	23.92	21.956	47.28	19.287	48.69
12 36.4	49.553	26.90	19.509	20.54	22.242	47.81	19.528	46.02
	+421	+44	+310	-306	+317	-68	+273	-250
Mean Place	49.578	24.33	20.052	42.47	21.983	40.34	19.460	63.28
sec $\delta$ , $\tan \delta$	+1.560	-1.197	+1.449	+1.048	+1.108	-0.478	+1.059	+0.348
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.090	-0.17	+0.036	-0.17	+0.073	-0.17	+0.053	-0.17
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.034	-0.90	+0.030	-0.91	-0.013	-0.91	+0.010	-0.91
Dble.Trans.	May 27		May 27		May 27		May 28	

APPARENT PLACES OF STARS, 1986

253

AT UPPER TRANSIT AT GREENWICH

No.	1427		1428		1429		614	
	$\sigma$ Serpentis		23 Herculis*		21 Herculis		Groombridge 2343 (Draconis)	
Mag.Spect.	4.80	F0	6.30	A2	5.72	A0	5.66	A2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 16 21	<sup>o</sup> <sup>'</sup> + 1 03	<sup>h</sup> <sup>m</sup> 16 22	<sup>o</sup> <sup>'</sup> + 32 21	<sup>h</sup> <sup>m</sup> 16 23	<sup>o</sup> <sup>'</sup> + 6 58	<sup>h</sup> <sup>m</sup> 16 24	<sup>o</sup> <sup>'</sup> + 55 13
1 -8.6	19 827 + 197	35.93 -185	22 325 + 180	45.38 -324	27 961 + 190	42.14 -216	04.635 + 181	60.29 -375
1 1.4	20 061 + 234	34.03 -190	22 551 + 226	42.20 -315	28 189 + 228	39.96 -218	04 885 + 250	56.71 -358
1 11.4	20 327 + 266	32.13 -190	22 817 + 266	39.21 -299	28 449 + 260	37.81 -215	05 198 + 313	53.37 -334
1 21.3	20 617 + 290	30.30 -183	23 116 + 299	36.52 -269	28 736 + 287	35.78 -203	05 567 + 369	50.44 -293
1 31.3	20 921 + 304	28.62 -168	23 436 + 320	34.21 -231	29 037 + 301	33.95 -183	05 974 + 407	47.99 -245
2 10.3	21 235 + 314	27.13 -149	23 772 + 336	32.34 -187	29 349 + 312	32.36 -159	06 411 + 437	46.08 -191
2 20.3	21 549 + 314	25.90 -123	24 113 + 341	31.02 -132	29 662 + 313	31.09 -127	06 863 + 452	44.84 -124
3 2.2	21 856 + 307	24.97 -93	24 449 + 336	30.24 -78	29 969 + 307	30.18 -91	07 313 + 450	44.25 -59
3 12.2	22 156 + 300	24.34 -63	24 777 + 328	30.04 -20	30 268 + 299	29.62 -56	07 755 + 442	44.32 + 7
3 22.2	22 440 + 284	24.05 -29	25 089 + 312	30.42 + 38	30 553 + 285	29.46 -16	08 174 + 419	45.08 + 76
4 1.2	22 707 + 267	24.05 + 0	25 377 + 288	31.31 + 89	30 820 + 267	29.64 + 18	08 558 + 384	46.41 +133
4 11.1	22 955 + 248	24.35 + 30	25 642 + 265	32.68 +137	31 068 + 248	30.16 + 52	08 905 + 347	48.30 +189
4 21.1	23 180 + 225	24.91 + 56	25 876 + 234	34.47 +179	31 293 + 225	30.98 + 82	09 201 + 296	50.65 +235
5 1.1	23 381 + 201	25.66 + 75	26 079 + 203	36.57 +210	31 494 + 201	32.02 +104	09 444 + 243	53.33 +268
5 11.0	23 557 + 176	26.58 + 92	26 247 + 168	38.92 +235	31 669 + 175	33.25 +123	09 632 + 188	56.29 +296
5 21.0	23 703 + 146	27.62 +104	26 377 + 130	41.41 +249	31 813 + 144	34.61 +136	09 757 + 125	59.38 +309
5 31.0	23 821 + 118	28.70 +108	26 470 + 93	43.95 +254	31 929 + 116	36.02 +141	09 823 + 66	62.50 +312
6 10.0	23 906 + 85	29.82 +112	26 524 + 54	46.49 +254	32 012 + 83	37.45 +143	09 828 + 5	65.58 +308
6 19.9	23 957 + 51	30.91 +109	26 537 + 13	48.91 +242	32 060 + 48	38.85 +140	09 769 - 59	68.50 +292
6 29.9	23 976 + 19	31.93 +102	26 512 - 25	51.15 +224	32 076 + 16	40.15 +130	09 656 -113	71.17 +267
7 9.9	23 960 - 16	32.89 + 96	26 447 - 65	53.18 +203	32 056 - 20	41.36 +121	09 486 - 170	73.57 +240
7 19.9	23 910 - 50	33.73 + 84	26 346 - 101	54.91 +173	32 003 - 53	42.41 +105	09 264 - 222	75.57 +200
7 29.8	23 830 - 80	34.45 + 72	26 212 - 134	56.33 +142	31 920 - 83	43.30 + 89	09 001 - 263	77.18 +161
8 8.8	23 722 - 108	35.04 + 59	26 048 - 164	57.40 +107	31 808 - 112	44.02 + 72	09 001 - 304	77.34 +116
8 18.8	23 591 - 131	35.48 + 44	25 861 - 187	58.07 + 67	31 674 - 134	44.53 + 51	08 697 - 332	79.00 + 66
8 28.7	23 445 - 146	35.77 + 29	25 659 - 202	58.36 + 29	31 524 - 150	44.85 + 32	08 014 - 351	79.19 + 19
9 7.7	23 288 - 157	35.90 + 13	25 446 - 213	58.24 - 12	31 363 - 161	44.95 + 10	07 651 - 363	78.86 - 33
9 17.7	23 132 - 156	35.85 - 5	25 235 - 211	57.69 - 55	31 203 - 160	44.81 - 14	07 293 - 358	78.02 - 84
9 27.7	22 985 - 147	35.64 - 21	25 033 - 202	56.76 - 93	31 051 - 152	44.46 - 35	06 949 - 344	76.70 -132
10 7.6	22 855 - 130	35.23 - 41	24 849 - 184	55.40 -136	30 915 - 136	43.86 - 60	06 629 - 320	74.88 -182
10 17.6	22 754 - 101	34.61 - 62	24 697 - 152	53.65 -175	30 808 - 107	43.02 - 84	06 351 - 278	72.60 -228
10 27.6	22 688 - 66	33.80 - 81	24 581 - 116	51.55 -210	30 735 - 73	41.94 -108	06 122 - 229	69.93 -267
11 6.6	22 663 - 25	32.77 -103	24 510 - 71	49.09 -246	30 703 - 32	40.61 -133	05 953 - 169	66.87 -306
11 16.5	22 687 + 24	31.53 -124	24 493 - 17	46.35 -274	30 720 + 17	39.05 -156	05 856 - 97	63.51 -336
11 26.5	22 758 + 71	30.10 -143	24 528 + 35	43.38 -297	30 784 + 64	37.29 -176	05 830 - 26	59.93 -358
12 6.5	22 880 + 122	28.47 -163	24 621 + 93	40.23 -315	30 899 + 115	35.33 -196	05 884 + 54	56.19 -374
12 16.4	23 050 + 170	26.71 -176	24 769 + 148	37.02 -321	31 062 + 163	33.25 -208	06 017 + 133	52.44 -375
12 26.4	23 261 + 211	24.86 -185	24 965 + 196	33.82 -310	31 267 + 205	31.11 -214	06 222 + 205	48.76 -368
12 36.4	23 510 + 249	22.96 -190	25 209 + 244	30.72 -320	31 511 + 244	28.94 -217	06 498 + 276	45.26 -350
	+ 278	-185	+ 280	-285	+ 272	-208	+ 336	-315
Mean Place	23.285	36.37	25.366	50.36	31.329	43.59	07.537	67.83
sec $\delta$ , $\tan \delta$	+1.000	+0.019	+1.184	+0.634	+1.007	+0.122	+1.754	+1.441
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.061	-0.17	+0.046	-0.16	+0.058	-0.16	+0.026	-0.16
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.001	-0.91	+0.017	-0.91	+0.003	-0.91	+0.039	-0.91
Dble.Trans.	May 28		May 28		May 28		May 28	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	613		610		619		616										
	ω Herculis		ζ Trianguli Australis		A Draconis		α Scorpii A* (Antares)										
Mag.Spect.	4.53	A0p	4.93	G0	4.98	B8p	1.22 var.	M0									
U.T.	R.A.		R.A.		R.A.		R.A.										
	h	m	h	m	h	m	h	m									
	16 24		16 26		16 27		16 28										
	+ 14 03		- 70 03		+ 68 47		- 26 24										
	°	'	°	'	°	'	°	'									
1 <sup>d</sup>	-8.6	44.287	+184	46.80	-250	51.507	+464	12.34	+215	57.309	+192	42.05	-379	30.539	+225	07.33	-20
1 <sup>s</sup>	1.4	44.512	+225	44.31	-249	52.077	+570	10.50	+184	57.609	+300	38.44	-361	30.803	+264	07.71	-38
1	11.4	44.770	+258	41.88	-243	52.740	+663	09.01	+149	58.014	+405	35.09	-335	31.103	+300	08.25	-54
1	21.3	45.055	+285	39.63	-225	53.479	+739	07.95	+106	58.512	+498	32.16	-293	31.430	+327	08.94	-69
1	31.3	45.356	+301	37.63	-200	54.266	+787	07.31	+64	59.079	+567	29.75	-241	31.772	+342	09.73	-79
2	10.3	45.669	+313	35.93	-170	55.089	+823	07.10	+21	59.701	+622	27.90	-185	32.125	+353	10.59	-86
2	20.3	45.984	+315	34.63	-130	55.927	+838	07.34	-24	60.355	+654	26.73	-117	32.479	+354	11.49	-90
3	2.2	46.294	+310	33.74	-89	56.757	+830	07.98	-64	61.014	+659	26.22	-51	32.827	+348	12.39	-90
3	12.2	46.596	+302	33.28	-46	57.574	+817	09.01	-103	61.666	+652	26.40	+18	33.167	+340	13.27	-88
3	22.2	46.883	+287	33.27	-1	58.358	+784	10.42	-141	62.284	+618	27.27	+87	33.493	+326	14.10	-83
4	1.2	47.152	+269	33.66	+39	59.096	+738	12.13	-171	62.848	+564	28.73	+146	33.801	+308	14.88	-78
4	11.1	47.402	+250	34.44	+78	59.784	+688	14.15	-202	63.352	+504	30.75	+202	34.091	+290	15.60	-72
4	21.1	47.626	+224	35.55	+111	60.404	+620	16.41	-226	63.772	+420	33.23	+248	34.357	+266	16.26	-66
5	1.1	47.826	+200	36.92	+137	60.951	+547	18.86	-245	64.104	+332	36.04	+281	34.598	+241	16.87	-61
5	11.0	47.999	+173	38.50	+158	61.419	+468	21.48	-262	64.343	+239	39.13	+309	34.812	+214	17.43	-56
5	21.0	48.140	+141	40.22	+172	61.792	+373	24.19	-271	64.477	+134	42.34	+321	34.994	+182	17.95	-52
5	31.0	48.251	+111	41.99	+177	62.072	+280	26.93	-274	64.513	+36	45.56	+322	35.144	+150	18.44	-49
6	10.0	48.328	+77	43.78	+179	62.251	+179	29.67	-274	64.448	-65	48.74	+318	35.259	+115	18.90	-46
6	19.9	48.370	+42	45.51	+173	62.320	+69	32.32	-265	64.282	-166	51.73	+299	35.334	+75	19.33	-43
6	29.9	48.378	+8	47.12	+161	62.290	-30	34.82	-250	64.029	-253	54.46	+273	35.371	+37	19.71	-38
7	9.9	48.351	-27	48.60	+148	62.153	-137	37.13	-231	63.687	-342	56.90	+244	35.368	-3	20.05	-34
7	19.9	48.289	-62	49.89	+129	61.916	-237	39.13	-200	63.267	-420	58.92	+202	35.325	-43	20.31	-26
7	29.8	48.198	-91	50.96	+107	61.594	-322	40.81	-168	62.785	-482	60.52	+160	35.248	-77	20.51	-20
8	8.8	48.078	-120	51.81	+85	61.190	-404	42.10	-129	62.244	-541	61.66	+114	35.136	-112	20.61	-10
8	18.8	47.935	-143	52.39	+58	60.727	-463	42.94	-84	61.662	-582	62.27	+61	34.997	-139	20.62	-1
8	28.7	47.777	-158	52.72	+33	60.223	-504	43.32	-38	61.056	-606	62.40	+13	34.839	-158	20.51	+11
9	7.7	47.607	-170	52.77	+5	59.695	-528	43.21	+11	60.433	-623	62.00	-40	34.668	-171	20.30	+21
9	17.7	47.439	-168	52.52	-25	59.175	-520	42.60	+61	59.819	-614	61.05	-95	34.497	-171	19.98	+32
9	27.7	47.278	-161	52.00	-52	58.684	-491	41.53	+107	59.226	-593	59.63	-142	34.335	-162	19.58	+40
10	7.6	47.134	-144	51.18	-82	58.244	-440	40.00	+153	58.669	-557	57.70	-193	34.192	-143	19.11	+47
10	17.6	47.019	-115	50.06	-112	57.889	-355	38.10	+190	58.174	-495	55.31	-239	34.082	-110	18.61	+50
10	27.6	46.937	-82	48.67	-139	57.630	-259	35.90	+220	57.749	-425	52.52	-279	34.011	-71	18.12	+49
11	6.6	46.897	-40	46.99	-168	57.487	-143	33.46	+244	57.411	-338	49.34	-318	33.987	-24	17.66	+46
11	16.5	46.905	+8	45.07	-192	57.479	-8	30.91	+255	57.178	-233	45.88	-346	34.018	+31	17.31	+35
11	26.5	46.962	+57	42.93	-214	57.601	+122	28.34	+257	57.052	-126	42.21	-367	34.104	+86	17.09	+22
12	6.5	47.070	+108	40.60	-233	57.861	+260	25.83	+251	57.045	-7	38.39	-382	34.237	+133	16.99	+10
12	16.4	47.227	+157	38.16	-244	58.254	+393	23.52	+231	57.160	+115	34.58	-381	34.433	+196	17.03	-4
12	26.4	47.427	+200	35.67	-249	58.760	+506	21.45	+207	57.387	+227	30.86	-372	34.674	+241	17.27	-24
12	36.4	47.667	+240	33.21	-246	59.375	+615	19.71	+174	57.730	+343	27.33	-353	34.956	+282	17.70	-43
			+270		-234		+699		+134		+440		-316		+313		-58
Mean Place	47.552	49.35		60.416	19.72	60.295	50.54	34.720	10.31								
sec δ, tan δ	+1.031	+0.251		+2.932	-2.756	+2.765	+2.578	+1.116	-0.496								
dα(ψ), dδ(ψ)	+0.055	-0.16		+0.128	-0.16	-0.002	-0.16	+0.073	-0.15								
dα(ε), dδ(ε)	+0.007	-0.91		-0.073	-0.92	+0.067	-0.92	-0.013	-0.92								
Dble.Trans.	May 28		May 29		May 29		May 29										



AT UPPER TRANSIT AT GREENWICH

No.	1430		618		1431		623	
Name	22 G. Ophiuchi		β Herculis		N Scorpii		Groombridge 2373 (Ursae Minoris)	
Mag. Spect.	5.75	G0	2.81	K0	4.33	B3	6.39	G5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	16 28	- 14 31	16 29	+ 21 30	16 30	- 34 40	16 31	+ 77 28
1	<sup>d</sup> -8.6	<sup>s</sup> +205	<sup>s</sup> +176	<sup>s</sup> -283	<sup>s</sup> +237	<sup>s</sup> +32	<sup>s</sup> +212	<sup>s</sup> -372
1	1.4	+245	+217	-279	+282	+10	+395	-354
1	11.4	+276	+254	-269	+321	-10	+574	-328
1	21.4	+303	+284	-246	+350	-31	+737	-285
1	31.3	+317	+302	-216	+368	-48	+858	-235
2	10.3	+327	+315	-181	+380	-63	+962	-179
2	20.3	+328	+321	-134	+382	-76	+1026	-111
3	2.2	+323	+309	-88	+376	-84	+1043	-46
3	12.2	+315	+316	-38	+369	-91	+1038	+22
3	22.2	+302	+295	+13	+354	-96	+985	+90
4	1.2	+285	+277	+58	+334	-97	+899	+148
4	11.1	+268	+256	+102	+316	-100	+795	+202
4	21.1	+246	+231	+140	+290	-100	+654	+249
5	1.1	+222	+204	+169	+263	-100	+503	+280
5	11.1	+198	+175	+192	+233	-100	+341	+307
5	21.0	+188	+142	+207	+199	-99	+161	+319
5	31.0	+138	+109	+213	+163	-97	-8	+320
6	10.0	+106	+74	+214	+124	-94	-180	+315
6	19.9	+69	+37	+207	+81	-89	-352	+295
6	29.9	+35	+2	+193	+39	-83	-499	+270
7	9.9	-2	-36	+177	-5	-75	-646	+240
7	19.9	-39	-71	+152	-48	-64	-874	+198
7	29.8	-71	-102	+128	-87	-51	-874	+156
8	8.8	-102	-132	+100	-125	-35	-969	+111
8	18.8	-128	-156	+67	-153	-17	-1032	+58
8	28.8	-145	-172	+37	-175	+0	-1069	+10
9	7.7	-158	-184	+3	-189	+20	-1095	-42
9	17.7	-158	-184	-33	-189	+39	-1079	-95
9	27.7	-150	-176	-65	-179	+55	-1045	-143
10	7.6	-133	-160	-101	-159	+70	-988	-192
10	17.6	-103	-131	-136	-123	+81	-891	-238
10	27.6	-68	-98	-166	-82	+86	-741	-276
11	6.6	-24	-56	-199	-30	+89	-645	-314
11	16.5	+27	-6	-225	+29	+83	-476	-341
11	26.5	+76	+43	-248	+87	+74	-308	-362
12	6.5	+125	+95	-268	+145	+62	-115	-375
12	16.5	+178	+147	-277	+206	+46	+84	-374
12	26.4	+221	+191	-280	+255	+26	+272	-365
12	36.4	+260	+234	-276	+301	+5	+465	-345
	+290	-114	+267	-258	+336	-17	+634	-309
Mean Place	61.061	18.78	38.359	66.31	29.882	32.79	12.706	26.22
sec δ, tan δ	+1.033	-0.259	+1.075	+0.394	+1.216	-0.692	+4.611	+4.501
da(ψ), dδ(ψ)	+0.067	-0.15	+0.052	-0.15	+0.078	-0.15	-0.049	-0.15
da(ε), dδ(ε)	-0.007	-0.92	+0.010	-0.92	-0.018	-0.92	+0.113	-0.93
Dble. Trans.	May 30		May 30		May 30		May 30	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	611		1432		621		620	
	$\gamma$ Apodis		Piazzi 16 <sup>h</sup> 140 (Draconis)		$\sigma$ Herculis		$\tau$ Scorpii	
Mag.Spect.	3.90	K0	5.85	A0	4.25	A0	2.91	B0
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	16 31	- 78 51	16 32	+ 60 50	16 33	+ 42 27	16 34	- 28 11
1 <sup>d</sup>	-8.6	+ 715	+ 169	- 379	+ 165	- 353	+ 221	- 5
1 <sup>s</sup>	06.951	+ 902	+ 252	- 364	+ 218	- 341	+ 262	- 24
1	07.853	+1072	+185	-340	+ 267	-323	+ 299	- 40
1	11.4	+1213	+140	-299	+ 308	-290	+ 327	- 56
1	21.4	+1308	+ 94	-251	+ 337	-247	+ 344	- 67
1	31.3							
2	10.3	+1381	+ 48	-197	+ 359	-199	+ 356	- 76
2	12.827	+1418	- 4	-129	+ 370	-139	+ 358	- 82
2	20.3	+1415	- 49	- 63	+ 369	- 79	+ 354	- 83
3	2.2	+1401	- 93	+ 7	+ 363	- 17	+ 347	- 84
3	12.2	+1346	-138	+ 73	+ 347	+ 48	+ 333	- 81
3	22.2							
4	1.2	+1269	-175	+134	+ 323	+104	+ 317	- 77
4	19.676	+1182	-210	+189	+ 297	+157	+ 299	- 73
4	11.1	+1060	-241	+238	+ 262	+203	+ 275	- 70
4	21.1	+ 928	-263	+272	+ 224	+238	+ 251	- 65
5	1.1	+ 784	-286	+301	+ 186	+266	+ 225	- 63
5	11.1							
5	21.0	+ 611	-298	+317	+ 139	+283	+ 191	- 59
5	24.241	+ 444	-304	+319	+ 96	+287	+ 160	- 58
5	31.0	+ 260	-307	+317	+ 49	+288	+ 123	- 55
6	10.0	+ 64	-298	+301	+ 1	+276	+ 82	- 51
6	19.9	- 114	-283	+278	- 42	+257	+ 45	- 49
6	29.9							
7	9.9	- 303	-263	+249	- 89	+233	+ 2	- 42
7	24.592	- 480	-232	+210	- 132	+199	- 39	- 36
7	19.9	- 627	-197	+170	- 167	+165	- 75	- 29
7	29.8	- 770	-155	+125	- 204	+125	- 111	- 18
8	8.8	- 875	-106	+ 74	- 229	+ 81	- 139	- 6
8	18.8							
8	28.8	- 942	- 56	+ 26	- 248	+ 38	- 160	+ 5
9	7.7	- 987	- 1	- 26	- 262	- 9	- 174	+ 18
9	19.911	- 972	+ 55	- 80	- 260	- 57	- 175	+ 30
9	17.7	- 924	+106	-128	- 252	-101	- 168	+ 40
9	27.7	- 838	+158	-179	- 234	-147	- 149	+ 50
10	7.6							
10	17.6	- 694	+202	-226	- 201	-192	- 117	+ 54
10	27.6	- 532	+237	-267	- 162	-231	- 78	+ 57
11	6.6	- 334	+267	-307	- 115	-270	- 32	+ 54
11	16.5	- 106	+283	-338	- 57	-300	+ 25	+ 46
11	26.5	+ 119	+288	- 69	+ 2	-325	+ 79	+ 35
12	6.5	+ 356	+286	-377	+ 64	-344	+ 130	+ 21
12	16.5	+ 586	+268	-380	+ 127	-350	+ 191	+ 11
12	26.4	+ 788	+244	-373	+ 183	-347	+ 237	- 10
12	36.4	+ 982	+211	-356	+ 239	-336	+ 280	- 28
12	18.342	+1137	+189	-321	+ 284	-308	+ 313	- 45
Mean Place	21.205	67.30	14.060	65.20	40.043	51.98	62.437	19.91
sec $\delta$ , $\tan \delta$	+5.180	-5.082	+2.053	+1.793	+1.356	+0.915	+1.135	-0.536
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.186	-0.15	+0.017	-0.15	+0.039	-0.15	+0.074	-0.14
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.128	-0.93	+0.045	-0.93	+0.022	-0.93	-0.013	-0.93
Dble.Trans.	May 30		May 30		May 31		May 31	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1433		622		1434		624	
	12 Ophiuchi		ζ Ophiuchi		42 Herculis		Bradley 2114 (Ophiuchi)	
Mag.Spect.	5.87	K0	2.70	B0	5.14	M0	5.04	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	16 35	- 2 17	16 36	- 10 32	16 38	+ 48 56	16 40	- 17 43
1 -8.6	35.273 +188	48.30 -163	21.132 +194	25.80 -115	19.850 +157	68.98 -366	43.528 +200	00.02 -70
1 1.4	35.499 +226	49.99 -169	21.364 +232	27.03 -123	20.068 +218	65.44 -354	43.767 +239	00.83 -81
1 11.4	35.758 +259	51.71 -172	21.630 +266	28.34 -131	20.341 +273	62.10 -334	44.040 +273	01.75 -92
1 21.4	36.044 +286	53.38 -167	21.923 +293	29.66 -132	20.665 +324	59.10 -300	44.341 +301	02.74 -99
1 31.3	36.345 +301	54.94 -156	22.230 +307	30.94 -128	21.022 +357	56.56 -254	44.658 +317	03.74 -100
2 10.3	36.657 +312	56.34 -140	22.549 +319	32.15 -121	21.407 +385	54.52 -204	44.986 +328	04.74 -100
2 20.3	36.972 +315	57.52 -118	22.871 +322	33.21 -106	21.807 +400	53.10 -142	45.319 +333	05.68 -94
3 2.2	37.283 +311	58.44 -92	23.188 +317	34.11 -90	22.209 +402	52.31 -79	45.647 +328	06.52 -84
3 12.2	37.587 +304	59.09 -65	23.499 +311	35.11 -71	22.606 +397	52.17 -14	45.970 +323	07.26 -74
3 22.2	37.879 +292	59.44 -35	23.798 +299	35.31 -49	22.987 +381	52.70 +53	46.281 +311	07.85 -59
4 1.2	38.155 +276	59.51 -7	24.081 +283	35.60 -29	23.341 +354	53.82 +112	46.576 +295	08.31 -46
4 11.1	38.415 +260	59.31 +20	24.349 +268	35.70 -10	23.667 +326	55.49 +167	46.856 +280	08.64 -33
4 21.1	38.653 +238	58.88 +43	24.595 +246	35.62 +8	23.952 +285	57.64 +215	47.115 +259	08.85 -21
5 1.1	38.869 +216	58.26 +62	24.819 +224	35.39 +23	24.194 +242	60.15 +251	47.351 +232	08.95 -10
5 11.1	39.061 +192	57.48 +78	25.019 +200	35.05 +34	24.392 +198	62.96 +281	47.563 +216	08.98 -3
5 21.0	39.223 +162	56.60 +88	25.189 +170	34.62 +43	24.537 +145	65.94 +298	47.745 +182	08.95 +3
5 31.0	39.357 +134	55.66 +94	25.331 +142	34.15 +47	24.632 +95	68.98 +304	47.898 +153	08.88 +7
6 10.0	39.459 +102	54.70 +96	25.441 +110	33.65 +50	24.674 +42	72.02 +304	48.017 +119	08.79 +9
6 19.9	39.525 +66	53.75 +95	25.514 +73	33.15 +50	24.660 -14	74.94 +292	48.099 +82	08.69 +10
6 29.9	39.559 +34	52.86 +89	25.554 +40	32.67 +48	24.597 -63	77.65 +271	48.145 +46	08.59 +10
7 9.9	39.556 -3	52.03 +83	25.556 +2	32.21 +46	24.483 -114	80.11 +246	48.153 +8	08.49 +10
7 19.9	39.517 -39	51.29 +74	25.521 -35	31.80 +41	24.320 -163	82.23 +212	48.121 -32	08.38 +11
7 29.8	39.448 -69	50.65 +64	25.455 -66	31.43 +37	24.117 -203	83.97 +174	48.057 -64	08.28 +10
8 8.8	39.348 -100	50.12 +53	25.356 -99	31.10 +33	23.875 -242	85.31 +134	47.957 -100	08.16 +12
8 18.8	39.223 -125	49.72 +40	25.232 -124	30.83 +27	23.604 -271	86.17 +86	47.831 -126	08.04 +12
8 28.8	39.080 -143	49.43 +29	25.089 -143	30.60 +23	23.313 -291	86.57 +40	47.686 -145	07.89 +15
9 7.7	38.925 -155	49.28 +15	24.932 -157	30.42 +18	23.007 -306	86.50 -7	47.525 -161	07.71 +18
9 17.7	38.768 -157	49.27 +1	24.775 -157	30.30 +12	22.701 -306	85.91 -59	47.362 -163	07.53 +18
9 27.7	38.618 -150	49.40 -13	24.624 -151	30.24 +6	22.404 -297	84.85 -106	47.206 -156	07.35 +18
10 7.6	38.483 -135	49.69 -29	24.488 -136	30.27 -3	22.126 -278	83.31 -154	47.065 -141	07.17 +18
10 17.6	38.376 -107	50.16 -47	24.380 -108	30.41 -14	21.883 -243	81.30 -201	46.954 -111	07.04 +13
10 27.6	38.302 -74	50.80 -64	24.307 -73	30.66 -25	21.681 -202	78.89 -241	46.877 -77	06.96 +8
11 6.6	38.269 -33	51.64 -84	24.275 -32	31.05 -39	21.531 -150	76.07 -282	46.843 -34	06.97 -1
11 16.5	38.284 +15	51.64 -102	24.275 +18	31.05 -54	21.531 -88	76.07 -314	46.843 +17	06.97 -13
11 26.5	38.346 +62	52.66 -120	24.293 +66	31.59 -68	21.443 -24	72.93 -338	46.860 +69	07.10 -24
12 6.5	38.458 +112	55.26 -140	24.474 +115	33.14 -87	21.464 +45	65.97 -358	47.042 +113	07.70 -36
12 16.5	38.619 +161	56.79 -153	24.641 +167	34.19 -105	21.579 +115	62.33 -364	47.214 +172	08.33 -63
12 26.4	38.823 +204	58.43 -164	24.850 +209	35.34 -115	21.757 +178	58.73 -360	47.429 +215	09.04 -71
12 36.4	39.065 +242	60.12 -169	25.099 +249	36.60 -126	21.998 +241	55.25 -348	47.684 +255	09.88 -84
	39.065 +271	60.12 -168	25.099 +278	36.60 -129	21.998 +294	55.25 -318	47.684 +287	09.88 -93
Mean Place	38.849	47.51	24.873	25.90	22.825	76.06	47.461	00.65
sec δ, tan δ	+1.001	-0.040	+1.017	-0.186	+1.523	+1.149	+1.050	-0.319
dα(ψ), dδ(ψ)	+0.062	-0.14	+0.066	-0.14	+0.033	-0.14	+0.069	-0.13
dα(ε), dδ(ε)	-0.001	-0.93	-0.004	-0.93	+0.027	-0.94	-0.007	-0.94
Dble.Trans.	May 31		May 31		June 1		June 2	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	626		627		1436		625	
	η Herculis		Groombridge 2377 (Draconis)		19 Ophiuchi*		α Trianguli Australis	
Mag.Spect.	3.61	K0	4.88	F0	6.04	A2	1.88	K2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	16 42	+38 56	16 44	+56 47	16 46	+ 2 05	16 47	-69 00
<b>1</b>	-8.6	+155	+146	-377	+173	-184	+397	+224
<b>1</b>	1.4	+206	+218	-363	+211	-187	+502	+198
<b>1</b>	11.4	+253	+281	-344	+246	-189	+596	+168
<b>1</b>	21.4	+293	+298	-308	+273	-181	+677	+130
<b>1</b>	31.3	+321	+396	-261	+292	-167	+729	+90
<b>2</b>	10.3	+342	+433	-210	+304	-147	+773	+50
<b>2</b>	20.3	+354	+456	-145	+309	-121	+795	+7
<b>3</b>	2.3	+355	+462	-80	+308	-91	+797	-33
<b>3</b>	12.2	+351	+460	-13	+303	-59	+793	-71
<b>3</b>	22.2	+336	+443	+56	+292	-25	+769	-108
<b>4</b>	1.2	+316	+413	+116	+278	+7	+733	-141
<b>4</b>	11.1	+293	+379	+174	+264	+37	+693	-172
<b>4</b>	21.1	+262	+330	+225	+243	+64	+634	-199
<b>5</b>	1.1	+227	+278	+261	+221	+86	+570	-220
<b>5</b>	11.1	+192	+255	+293	+198	+103	+500	-241
<b>5</b>	21.0	+149	+157	+312	+189	+116	+412	-254
<b>5</b>	31.0	+109	+96	+318	+140	+121	+326	-261
<b>6</b>	10.0	+65	+31	+318	+106	+125	+231	-266
<b>6</b>	20.0	+18	-37	+306	+73	+122	+126	-261
<b>6</b>	29.9	-23	-97	+284	+39	+115	+28	-252
<b>7</b>	9.9	-69	-159	+260	+2	+108	-77	-236
<b>7</b>	19.9	-110	-216	+223	-35	+95	-178	-211
<b>7</b>	29.8	-147	-264	+185	-66	+82	-265	-182
<b>8</b>	8.8	-182	-310	+143	-99	+68	-351	-148
<b>8</b>	18.8	-210	-345	+93	-125	+51	-417	-104
<b>8</b>	28.8	-229	-368	+46	-144	+35	-465	-62
<b>9</b>	7.7	-244	-387	-5	-158	+18	-498	-14
<b>9</b>	17.7	-244	-386	-58	-162	-1	-501	+35
<b>9</b>	27.7	-238	-377	-107	-156	-18	-483	+82
<b>10</b>	7.7	-222	-357	-157	-144	-39	-444	+128
<b>10</b>	17.6	-192	-318	-206	-117	-60	-372	+169
<b>10</b>	27.6	-156	-271	-248	-87	-79	-287	+202
<b>11</b>	6.6	-110	-213	-290	-47	-102	-181	+230
<b>11</b>	16.5	-56	-142	-322	+0	-122	-58	+245
<b>11</b>	26.5	-1	-69	-349	+47	-141	+66	+253
<b>12</b>	6.5	+60	+12	-368	+96	-160	+197	+252
<b>12</b>	16.5	+119	+95	-374	+145	-174	+326	+237
<b>12</b>	26.4	+173	+170	-371	+188	-183	+438	+218
<b>12</b>	36.4	+227	+247	-358	+227	-188	+546	+190
	+269	-305	+313	-327	+259	-183	+633	+155
Mean Place	25.972	51.14	62.344	80.72	28.853	17.61	13.738	15.52
sec δ, tan δ	+1.286	+0.808	+1.827	+1.528	+1.001	+0.036	+2.791	-2.606
dα(ψ), dδ(ψ)	+0.041	-0.13	+0.023	-0.13	+0.060	-0.13	+0.127	-0.12
dα(ε), dδ(ε)	+0.018	-0.94	+0.033	-0.95	+0.001	-0.95	-0.054	-0.95
Dble.Trans.	June 2		June 3		June 3		June 3	

AT UPPER TRANSIT AT GREENWICH

No.	1435		1437		1438		628	
	η Arae		B.D. -21° 4422 (Ophiuchi)		20 Ophiuchi		ε Scorpii	
Mag.Spect.	3.68	K5	7.60	M0	4.73	F5	2.36	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	16 48	-59 00	16 48	-21 49	16 49	-10 45	16 49	-34 16
1 -8.6	30.383 +303	62.99 +178	42.569 +199	45.83 -40	01.387 +182	36.64 -108	12.742 +215	09.04 +39
1 1.4	30.760 +377	61.45 +154	42.807 +238	46.36 -53	01.609 +222	37.82 -118	13.004 +262	08.84 +20
1 11.4	31.202 +442	60.19 +126	43.081 +274	47.01 -65	01.866 +257	39.06 -124	13.306 +302	08.82 +2
1 21.4	31.699 +497	59.26 +93	43.384 +303	47.76 -75	01.866 +285	40.32 -126	13.641 +335	08.99 -17
1 31.3	32.231 +532	58.66 +60	43.705 +321	48.56 -80	02.151 +301	41.53 -121	13.997 +356	09.32 -33
2 10.3	32.791 +560	58.40 +26	44.039 +334	49.39 -83	02.767 +315	42.68 -115	14.367 +370	09.78 -46
2 20.3	33.365 +574	58.49 -9	44.378 +339	50.21 -82	03.087 +320	43.68 -100	14.743 +376	10.36 -58
3 2.3	33.938 +573	58.90 -41	44.714 +336	50.97 -76	03.404 +317	44.53 -85	15.117 +374	11.02 -72
3 12.2	34.507 +569	59.61 -71	45.047 +333	51.66 -69	03.717 +313	45.18 -65	15.487 +370	11.74 -66
3 22.2	35.060 +553	60.62 -101	45.369 +322	52.27 -61	04.021 +304	45.63 -45	15.845 +358	12.51 -77
4 1.2	35.587 +527	61.88 -126	45.676 +307	52.78 -51	04.310 +289	45.87 -24	16.187 +342	13.31 -80
4 11.1	36.088 +501	63.37 -149	45.969 +293	53.20 -42	04.585 +275	45.92 -5	16.514 +327	14.13 -82
4 21.1	36.549 +461	65.08 -171	46.241 +272	53.53 -33	04.840 +255	45.80 +12	16.816 +302	14.97 -84
5 1.1	36.968 +419	66.94 -186	46.491 +250	54.01 -27	05.074 +234	45.53 +27	17.094 +278	15.81 -84
5 11.1	37.340 +372	68.96 -202	46.717 +226	54.01 -21	05.286 +212	45.16 +37	17.345 +251	16.68 -87
5 21.0	37.654 +314	71.08 -212	46.913 +196	54.17 -16	05.468 +182	44.70 +46	17.561 +216	17.55 -87
5 31.0	37.909 +255	73.25 -217	47.079 +166	54.32 -15	05.622 +154	44.20 +50	17.743 +182	18.42 -87
6 10.0	38.100 +191	75.46 -221	47.210 +131	54.45 -13	05.744 +122	43.67 +53	17.886 +143	19.30 -88
6 20.0	38.218 +118	77.63 -217	47.303 +93	54.57 -12	05.829 +85	43.15 +52	17.986 +100	20.15 -85
6 29.9	38.269 +51	79.71 -208	47.358 +55	54.69 -12	05.879 +50	42.66 +49	18.044 +58	20.96 -81
7 9.9	38.246 -23	81.67 -196	47.373 +15	54.80 -11	05.892 +13	42.20 +46	18.056 +12	21.72 -76
7 19.9	38.152 -94	83.41 -174	47.348 -25	54.89 -9	05.866 -26	41.79 +41	18.022 -34	22.39 -67
7 29.8	37.995 -157	84.92 -151	47.287 -61	54.95 -6	05.806 -59	41.43 +36	18.022 -74	22.39 -57
8 8.8	37.776 -219	86.12 -120	47.190 -97	54.98 -3	05.714 -93	41.11 +32	17.948 -114	23.40 -44
8 18.8	37.508 -288	86.97 -85	47.063 -127	54.96 +2	05.594 -120	40.85 +26	17.834 -147	23.40 -28
8 28.8	37.205 -303	87.46 -49	46.915 -148	54.89 +7	05.453 -141	40.64 +21	17.517 -170	23.80 -12
9 7.7	37.909 -329	87.54 -8	46.751 -164	54.75 +14	05.297 -156	40.47 +17	17.328 -189	23.73 +7
9 17.7	36.544 -332	87.20 +34	46.583 -168	54.57 +18	05.137 -160	40.37 +10	17.136 -192	23.48 +25
9 27.7	36.223 -321	86.48 +72	46.420 -163	54.33 +24	04.982 -155	40.33 +4	16.950 -186	23.06 +42
10 7.7	35.929 -294	85.37 +111	46.272 -148	54.07 +26	04.841 -141	40.36 -3	16.780 -170	22.48 +58
10 17.6	35.686 -243	83.92 +145	46.152 -120	53.80 +27	04.726 -115	40.50 -14	16.643 -137	21.78 +70
10 27.6	35.503 -183	82.21 +171	46.067 -85	53.55 +25	04.643 -83	40.74 -24	16.544 -99	21.01 +77
11 6.6	35.395 -108	80.27 +194	46.026 -41	53.35 +20	04.601 -42	41.11 -37	16.494 -50	20.19 +82
11 16.5	35.376 -19	78.22 +205	46.036 +10	53.24 +11	04.608 +7	41.62 -51	16.502 +8	19.39 +80
11 26.5	35.445 +69	76.14 +208	46.098 +62	53.23 +1	04.662 +54	42.27 -65	16.567 +65	18.66 +73
12 6.5	35.607 +162	74.09 +205	46.186 +88	52.90 +33	04.766 +104	43.08 -81	16.691 +124	18.03 +63
12 16.5	35.860 +253	72.17 +192	46.374 +188	53.63 -73	04.920 +154	44.06 -98	16.873 +182	17.52 +51
12 26.4	36.192 +332	70.45 +172	46.588 +214	54.05 -42	05.119 +199	45.16 -110	17.107 +234	17.18 +34
12 36.4	36.600 +408	68.98 +147	46.843 +255	54.61 -56	05.357 +238	46.35 -119	17.389 +282	17.02 +16
	36.600 +468	68.98 +115	46.843 +288	54.61 -67	05.357 +270	46.35 -123	17.389 +318	17.02 -4
Mean Place	36.937	66.60	46.642	46.16	05.162	35.76	17.261	10.70
sec δ, tan δ	+1.943	-1.665	+1.077	-0.401	+1.018	-0.190	+1.210	-0.681
dα(ψ), dδ(ψ)	+0.103	-0.12	+0.071	-0.12	+0.066	-0.12	+0.078	-0.12
dα(ε), dδ(ε)	-0.034	-0.95	-0.008	-0.95	-0.004	-0.95	-0.014	-0.95
Dbie.Trans.	June 4		June 4		June 4		June 4	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1439		1440		629		1441		
	$\mu^1$ Scorpii		51 Herculis		49 Herculis		53 Herculis		
Mag.Spect.	3.09	B3p	5.20	K0	6.41	A0p	5.35	F0	
U.T.	R.A.		R.A.		R.A.		R.A.		
	h	m	h	m	h	m	h	m	
	16 50	- 38 01	16 51	+ 24 40	16 51	+ 14 59	16 52	+ 31 43	
	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	<sup>s</sup>	<sup>o</sup> /	
1	-8.6	52.507 + 222	29.21 + 63	08.485 + 152	37.87 - 292	24.635 + 158	42.39 - 248	24.174 + 145	18.76 - 319
1	1.4	52.778 + 271	28.77 + 44	08.680 + 195	34.98 - 289	24.833 + 198	39.89 - 250	24.367 + 193	15.62 - 314
1	11.4	53.092 + 314	28.53 + 24	08.915 + 235	32.17 - 281	25.069 + 236	37.45 - 244	24.603 + 236	12.59 - 303
1	21.4	53.440 + 348	28.50 + 3	09.184 + 269	29.58 - 259	25.335 + 266	35.16 - 229	24.876 + 273	09.82 - 277
1	31.3	53.810 + 370	28.65 - 15	09.476 + 292	27.30 - 228	25.621 + 286	33.12 - 204	25.174 + 298	07.39 - 243
2	10.3	54.197 + 387	28.98 - 33	09.785 + 309	25.38 - 192	25.923 + 302	31.37 - 175	25.493 + 319	05.36 - 203
2	20.3	54.590 + 393	29.46 - 48	10.104 + 319	23.92 - 146	26.232 + 309	30.00 - 137	25.823 + 330	03.85 - 151
3	2.3	54.982 + 392	30.05 - 59	10.423 + 319	22.96 - 96	26.541 + 309	29.05 - 95	26.155 + 332	02.89 - 96
3	12.2	55.370 + 388	30.75 - 70	10.739 + 316	22.51 - 45	26.847 + 306	28.54 - 51	26.485 + 330	02.48 - 41
3	22.2	55.747 + 377	31.54 - 79	11.045 + 306	22.60 + 9	27.143 + 296	28.49 - 5	26.804 + 319	02.66 + 18
4	1.2	56.107 + 360	32.39 - 85	11.335 + 290	23.18 + 58	27.424 + 281	28.86 + 37	27.107 + 303	03.37 + 71
4	11.1	56.450 + 343	33.30 - 91	11.608 + 273	24.23 + 105	27.691 + 267	29.64 + 78	27.391 + 284	04.59 + 122
4	21.1	56.770 + 320	34.26 - 96	11.857 + 249	25.69 + 146	27.935 + 244	30.77 + 113	27.648 + 257	06.26 + 167
5	1.1	57.063 + 293	35.26 - 100	12.081 + 224	27.47 + 178	28.156 + 221	32.19 + 142	27.877 + 229	08.26 + 200
5	11.1	57.328 + 265	36.30 - 104	12.276 + 195	29.53 + 206	28.353 + 197	33.84 + 165	28.075 + 198	10.57 + 231
5	21.0	57.557 + 229	37.36 - 106	12.438 + 162	31.76 + 223	28.518 + 165	35.65 + 181	28.236 + 161	13.07 + 250
5	31.0	57.750 + 193	38.43 - 107	12.567 + 129	34.07 + 231	28.518 + 136	37.54 + 189	28.362 + 126	15.65 + 258
6	10.0	57.902 + 152	39.51 - 108	12.659 + 92	36.42 + 235	28.654 + 101	39.46 + 192	28.447 + 85	18.26 + 261
6	20.0	58.008 + 106	40.57 - 106	12.711 + 52	38.70 + 228	28.820 + 65	41.33 + 187	28.491 + 44	20.81 + 255
6	29.9	58.070 + 62	41.58 - 101	12.727 + 16	40.86 + 216	28.850 + 30	43.11 + 178	28.494 + 3	23.21 + 240
7	9.9	58.084 + 14	42.53 - 95	12.703 - 24	42.86 + 200	28.841 - 9	44.76 + 165	28.456 - 38	25.43 + 222
7	19.9	58.049 - 35	43.38 - 85	12.640 - 63	44.62 + 176	28.796 - 45	46.21 + 145	28.376 - 80	27.38 + 195
7	29.8	57.973 - 76	44.10 - 72	12.543 - 97	46.11 + 149	28.718 - 78	47.45 + 124	28.262 - 114	29.04 + 166
8	8.8	57.853 - 120	44.67 - 57	12.413 - 130	47.32 + 121	28.606 - 112	48.47 + 102	28.112 - 150	30.37 + 133
8	18.8	57.700 - 153	45.04 - 37	12.256 - 157	48.18 + 86	28.469 - 137	49.21 + 74	27.934 - 178	31.32 + 95
8	28.8	57.521 - 179	45.22 - 18	12.079 - 177	48.72 + 54	28.312 - 157	49.69 + 48	27.736 - 198	31.89 + 57
9	7.7	57.323 - 198	45.18 + 4	11.886 - 193	48.90 + 18	28.139 - 173	49.88 + 19	27.522 - 214	32.07 + 18
9	17.7	57.121 - 202	44.92 + 26	11.690 - 196	48.70 - 20	28.139 - 176	49.77 - 11	27.522 - 218	32.07 - 26
9	27.7	56.924 - 197	44.46 + 46	11.499 - 191	48.15 - 55	27.963 - 172	49.77 - 39	27.304 - 213	31.81 - 65
10	7.7	56.745 - 179	43.80 + 66	11.320 - 179	47.21 - 94	27.632 - 159	48.67 - 71	27.091 - 200	31.16 - 107
10	17.6	56.600 - 145	42.98 + 82	11.167 - 153	45.91 - 130	27.497 - 135	47.66 - 101	26.718 - 173	28.60 - 149
10	27.6	56.494 - 106	42.05 + 93	11.046 - 121	44.27 - 164	27.393 - 104	46.37 - 129	26.577 - 141	26.75 - 185
11	6.6	56.439 - 55	41.05 + 100	10.965 - 81	42.28 - 199	27.328 - 65	44.78 - 159	26.478 - 99	24.52 - 223
11	16.5	56.445 + 6	40.04 + 101	10.932 - 33	40.01 - 227	27.310 - 18	42.92 - 186	26.428 - 49	21.98 - 254
11	26.5	56.509 + 64	39.08 + 96	10.948 + 16	37.48 - 253	27.339 + 29	40.85 - 207	26.431 + 2	19.18 - 280
12	6.5	56.636 + 127	38.21 + 87	11.017 + 69	34.74 - 274	27.419 + 80	38.56 - 229	26.489 + 58	16.16 - 302
12	16.5	56.823 + 187	37.46 + 75	11.138 + 121	31.89 - 285	27.548 + 129	36.15 - 241	26.602 + 113	13.03 - 313
12	26.4	57.065 + 242	36.88 + 58	11.306 + 168	28.99 - 290	27.721 + 173	33.68 - 247	26.765 + 163	09.88 - 315
12	36.4	57.356 + 291	36.49 + 39	11.519 + 213	26.12 - 287	27.937 + 216	31.20 - 248	26.976 + 211	06.77 - 311
		57.356 + 331	36.49 + 18	11.519 + 249	26.12 - 269	27.937 + 249	31.20 - 236	26.976 + 252	06.77 - 291
Mean Place	57.241	30.89	11.682	42.86	27.949	46.37	27.301	24.46	
sec $\delta$ , $\tan \delta$	+1.269	-0.782	+1.101	+0.459	+1.035	+0.268	+1.176	+0.618	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.081	-0.12	+0.050	-0.12	+0.054	-0.12	+0.045	-0.12	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.015	-0.95	+0.009	-0.96	+0.005	-0.96	+0.012	-0.96	
Dbles.Trans.	June 4		June 4		June 4		June 4		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1442		633		1444		631	
	ι Ophiuchi		κ Ophiuchi		24 G. Arae		ζ Arae	
Mag. Spect.	4.29	B8	3.42	K0	5.70	B9	3.06	K5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 16 53	° ' " + 10 10	h m 16 56	° ' " + 9 23	h m 16 57	° ' " - 50 37	h m 16 57	° ' " - 55 58
1 <sup>d</sup> -8.5	18.743 +159	69 23 -225	58 335 +156	39 68 -219	09 644 +249	13 82 +138	23 835 +272	09 53 +167
1 1.4	18.943 +200	66 97 -226	58 532 +197	37 46 -222	09 955 +311	12 64 +118	24 176 +341	08 07 +146
1 11.4	19.178 +235	64 73 -224	58 764 +232	35 26 -220	10 320 +365	11 69 +95	24 579 +403	06 86 +121
1 21.4	19.443 +265	62 61 -212	59 027 +263	33 18 -208	10 730 +410	11 02 +67	25 033 +454	05 96 +90
1 31.3	19.728 +285	60 71 -190	59 309 +282	31 30 -188	11 169 +439	10 62 +40	25 522 +489	05 36 +60
2 10.3	20 028 +300	59 05 -166	59 607 +298	29 67 -163	11 632 +463	10 48 +14	26 037 +515	05 06 +30
2 20.3	20 335 +307	57 74 -131	59 912 +305	28 37 -130	12 106 +474	10 62 -14	26 567 +530	05 09 -3
3 2.3	20 641 +306	56 80 -94	60 217 +305	27 44 -93	12 581 +475	11 00 -38	27 099 +532	05 41 -32
3 12.2	20 945 +304	56 26 -54	60 521 +304	26 89 -55	13 054 +473	11 61 -61	27 629 +530	06 00 -59
3 22.2	21 239 +294	56 13 -13	60 815 +294	26 75 -14	13 515 +461	12 44 -83	28 145 +516	06 86 -86
4 1.2	21 519 +280	56 39 +26	61 096 +281	27 00 +25	13 957 +442	13 44 -100	28 640 +495	07 95 -109
4 11.2	21 785 +266	57 02 +63	61 363 +267	27 60 +60	14 380 +423	14 63 -119	29 113 +473	09 26 -131
4 21.1	22 030 +245	57 99 +97	61 610 +247	28 54 +94	14 773 +393	15 97 -134	29 552 +439	10 77 -151
5 1.1	22 253 +223	59 20 +121	61 835 +225	29 73 +119	15 134 +361	17 44 -147	29 953 +401	12 43 -166
5 11.1	22 453 +200	60 64 +144	62 037 +202	31 14 +141	15 459 +325	19 02 -158	30 314 +361	14 25 -182
5 21.0	22 622 +169	62 22 +158	62 210 +173	32 70 +156	15 739 +280	20 69 -167	30 622 +308	16 17 -192
5 31.0	22 763 +141	63 88 +166	62 354 +144	34 32 +162	15 973 +234	22 41 -172	30 877 +255	18 16 -199
6 10.0	22 870 +107	65 57 +169	62 465 +111	35 99 +167	16 156 +183	24 17 -176	31 074 +197	20 19 -203
6 20.0	22 941 +71	67 22 +165	62 539 +74	37 61 +162	16 281 +125	25 91 -174	31 204 +130	22 19 -200
6 29.9	22 978 +37	68 79 +157	62 579 +40	39 16 +155	16 350 +69	27 59 -168	31 272 +68	24 14 -195
7 9.9	22 977 -1	70 25 +146	62 581 +2	40 60 +144	16 359 +9	29 18 -159	31 271 -1	25 98 -184
7 19.9	22 939 -38	71 54 +129	62 546 -35	41 87 +127	16 308 -51	30 61 -143	31 202 -69	27 64 -166
7 29.9	22 869 -70	72 64 +110	62 478 -68	42 97 +110	16 205 -103	31 87 -126	31 075 -127	29 09 -145
8 8.8	22 765 -104	73 55 +91	62 376 -102	43 87 +90	16 205 -157	32 88 -101	30 888 -187	30 28 -119
8 18.8	22 635 -130	74 23 +68	62 247 -129	44 55 +68	16 048 -200	33 62 -74	30 653 -235	31 14 -86
8 28.8	22 484 -151	74 67 +44	62 098 -149	45 00 +45	15 617 -231	34 05 -43	30 383 -270	31 67 -53
9 7.7	22 319 -165	74 88 +21	61 933 -165	45 22 +22	15 361 -256	34 16 -11	30 086 -297	31 82 -15
9 17.7	22 149 -170	74 82 -6	61 763 -170	45 18 -4	15 099 -262	33 92 +24	29 783 -303	31 58 +24
9 27.7	21 983 -166	74 51 -31	61 597 -166	44 90 -28	14 844 -255	33 37 +55	29 488 -295	30 97 +61
10 7.7	21 829 -154	73 94 -57	61 442 -155	44 36 -54	14 609 -235	32 49 +88	29 215 -273	30 00 +97
10 17.6	21 700 -129	73 09 -86	61 311 -131	43 55 -81	14 413 -196	31 34 +115	28 986 -229	28 70 +130
10 27.6	21 601 -99	71 98 -111	61 210 -101	42 49 -106	14 265 -148	29 97 +137	28 812 -174	27 15 +155
11 6.6	21 540 -61	70 61 -137	61 147 -63	41 17 -132	14 177 -88	28 42 +155	28 705 -107	25 38 +177
11 16.6	21 526 -14	69 00 -161	61 131 -16	39 60 -157	14 162 -15	26 78 +164	28 679 -26	23 49 +189
11 26.5	21 558 +32	67 17 -183	61 160 +29	37 83 -177	14 219 +57	25 12 +166	28 734 +55	21 56 +193
12 6.5	21 640 +82	65 14 -203	61 239 +79	35 86 -197	14 352 +133	23 49 +163	28 875 +141	19 64 +192
12 16.5	21 772 +132	62 98 -216	61 368 +129	33 75 -211	14 560 +208	21 99 +150	29 101 +226	17 85 +179
12 26.4	21 946 +174	60 75 -223	61 539 +173	31 57 -218	14 834 +274	20 65 +134	29 400 +299	16 23 +162
12 36.4	22 162 +216	58 49 -226	61 752 +211	29 36 -221	15 170 +336	19 53 +112	29 770 +370	14 83 +140
	22 162 +249	58 49 -217	61 752 +246	29 36 -213	15 170 +386	19 53 +86	29 770 +427	14 83 +111
Mean Place	22.127	72.78	61.728	43.37	15.257	15.68	30.004	11.71
sec δ, tan δ	+1.016	+0.180	+1.014	+0.165	+1.576	-1.218	+1.787	-1.481
dα(ψ), dδ(ψ)	+0.057	-0.11	+0.057	-0.11	+0.092	-0.11	+0.099	-0.11
dα(ε), dδ(ε)	+0.003	-0.96	+0.003	-0.96	-0.022	-0.96	-0.027	-0.96
Dble. Trans.	June 5		June 6		June 6		June 6	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	632		1443		634		1445	
	e' Arae		51 G. Apodis		ε Herculis		30 Ophiuchi	
Mag.Spect.	4.15	K2	7.00	F8	3.92	A0	5.00	K0
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	16 58	-53 08	16 58	-76 11	16 59	+30 56	17 00	-4 12
	<sup>d</sup> -8.5	<sup>s</sup> 24.471 +257	<sup>s</sup> 50.245 +498	<sup>s</sup> 52.27 +260	<sup>s</sup> 43.218 +138	<sup>s</sup> 39.01 -314	<sup>s</sup> 17.178 +165	<sup>s</sup> 13.68 -143
1	1.4	24.793 +322	50.905 +660	49.90 +237	43.403 +185	35.90 -311	17.382 +204	15.18 -150
1	11.4	25.173 +380	51.712 +807	47.83 +207	43.631 +228	32.88 -302	17.622 +240	16.71 -153
1	21.4	25.601 +428	52.649 +937	46.14 +169	43.898 +267	30.11 -277	17.891 +269	18.22 -151
1	31.3	26.060 +459	53.677 +1028	44.86 +128	44.190 +292	27.67 -244	18.179 +288	19.63 -141
2	10.3	26.545 +485	54.780 +1103	44.01 +85	44.503 +313	25.62 -205	18.482 +303	20.91 -128
2	20.3	27.043 +498	55.929 +1149	43.62 +39	44.829 +326	24.09 -153	18.792 +310	21.99 -108
3	2.3	27.542 +499	57.092 +1163	43.67 -5	45.158 +329	23.08 -101	19.101 +309	22.83 -84
3	12.2	28.040 +498	58.260 +1168	44.16 -49	45.487 +329	22.62 -46	19.408 +307	23.42 -59
3	22.2	28.525 +485	59.400 +1140	45.08 -92	45.806 +319	22.75 +13	19.707 +299	23.74 -32
4	1.2	28.992 +467	60.493 +1093	46.37 -129	46.110 +304	23.41 +66	19.994 +287	23.79 -5
4	11.2	29.437 +445	61.532 +1039	48.04 -167	46.397 +287	24.58 +117	20.269 +275	23.59 +20
4	21.1	29.852 +415	62.485 +953	50.04 -200	46.658 +261	26.21 +163	20.525 +256	23.16 +43
5	1.1	30.232 +380	63.343 +858	52.30 -226	46.893 +235	28.18 +197	20.760 +235	22.55 +61
5	11.1	30.574 +342	64.096 +753	54.81 -251	47.098 +205	30.45 +227	20.974 +214	21.79 +76
5	21.0	30.868 +294	64.717 +621	57.52 -271	47.266 +168	32.92 +247	21.160 +186	20.93 +86
5	31.0	31.114 +246	65.207 +490	60.33 -281	47.399 +133	35.49 +257	21.318 +158	20.02 +91
6	10.0	31.305 +191	65.552 +345	63.23 -290	47.493 +94	38.10 +261	21.444 +126	19.08 +94
6	20.0	31.434 +129	65.738 +186	66.11 -288	47.545 +52	40.66 +256	21.534 +90	18.16 +92
6	29.9	31.505 +71	65.775 +37	68.91 -280	47.557 +12	43.07 +241	21.590 +56	17.29 +87
7	9.9	31.512 +7	65.653 -122	71.58 -267	47.527 -30	45.32 +225	21.607 +17	16.48 +81
7	19.9	31.455 -57	65.378 -275	74.01 -243	47.455 -72	47.30 +198	21.587 -20	15.76 +72
7	29.9	31.343 -112	64.969 -409	76.14 -213	47.347 -108	49.00 +170	21.532 -55	15.13 +63
8	8.8	31.175 -168	64.428 -541	77.92 -178	47.203 -144	50.39 +139	21.443 -89	14.61 +52
8	18.8	30.961 -214	63.784 -644	79.24 -132	47.030 -173	51.39 +100	21.326 -117	14.20 +41
8	28.8	30.714 -247	63.066 -718	80.11 -87	46.836 -194	52.03 +64	21.187 -139	13.90 +30
9	7.7	30.441 -273	62.290 -776	80.47 -36	46.625 -211	52.27 +24	21.032 -155	13.71 +19
9	17.7	30.161 -280	61.504 -786	80.28 +19	46.409 -216	52.09 -18	21.032 -161	13.66 +5
9	27.7	29.888 -273	60.737 -767	79.58 +70	46.196 -213	51.52 -57	20.871 -158	13.72 -6
10	7.7	29.636 -252	60.020 -717	78.35 +123	45.995 -201	50.52 -100	20.566 -147	13.93 -21
10	17.6	29.425 -211	59.401 -619	76.65 +170	45.820 -175	49.12 -140	20.444 -122	14.28 -35
10	27.6	29.264 -161	58.902 -499	74.57 +208	45.676 -144	47.35 -177	20.351 -93	14.79 -51
11	6.6	29.166 -98	58.550 -352	72.13 +244	45.572 -104	45.20 -215	20.297 -54	15.47 -68
11	16.6	29.145 -21	58.377 -173	69.48 +265	45.518 -54	42.73 -247	20.290 -7	16.32 -85
11	26.5	29.199 +54	58.382 +5	66.70 +278	45.514 -4	40.00 -273	20.329 +39	17.33 -101
12	6.5	29.333 +134	58.580 +198	63.88 +282	45.565 +51	37.04 -296	20.417 +88	18.51 -118
12	16.5	29.547 +214	58.970 +390	61.16 +272	45.670 +105	33.96 -308	20.554 +137	19.84 -133
12	26.4	29.830 +283	59.530 +560	58.61 +255	45.826 +156	30.85 -311	20.735 +181	21.28 -144
12	36.4	30.179 +349	60.257 +727	56.31 +230	46.030 +204	27.77 -308	20.956 +221	22.78 -150
		+402	+99	+866	+194	+244	+253	-150
Mean Place	30.330	27.04	62.353	55.13	46.371	44.85	20.823	11.18
sec δ, tan δ	+1.667	-1.334	+4.192	-4.071	+1.166	+0.600	+1.003	-0.073
dα(ψ), dδ(ψ)	+0.095	-0.11	+0.165	-0.10	+0.046	-0.10	+0.063	-0.10
dα(ε), dδ(ε)	-0.024	-0.96	-0.071	-0.96	+0.010	-0.97	-0.001	-0.97
Dble.Trans.	June 6		June 6		June 6		June 6	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1446		1448		635		1447		
	59 Herculis		Piazzi 16 <sup>h</sup> 307 (Herculis)		60 Herculis		80 G. Ophiuchi		
Mag. Spect.	5.27	A2	6.36	A0	4.91	A3	6.20	A0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	
	17 01	+ 33 34	17 04	+ 43 49	17 04	+ 12 45	17 05	- 26 29	
1	-8.5	03 288 +135	68 08 -323	37 160 +121	41 84 -353	41 737 +146	27 07 -235	58 743 +188	45 20 +5
1	1.4	03 471 +183	64 88 -320	37 339 +179	38 37 -347	41 925 +188	24 71 -236	58 973 +230	45 35 -15
1	11.4	03 699 +228	61 79 -309	37 570 +231	35 03 -334	42 150 +225	22 38 -233	59 242 +269	45 64 -29
1	21.4	03 967 +268	58 95 -280	37 849 +279	31 97 -306	42 406 +256	20 18 -220	59 543 +301	46 04 -40
1	31.3	04 262 +295	56 45 -250	38 163 +314	29 29 -268	42 684 +278	18 19 -199	59 865 +322	46 53 -49
2	10.3	04 579 +317	54 36 -209	38 506 +343	27 07 -222	42 979 +295	16 48 -171	60 203 +338	47 07 -54
2	20.3	04 911 +332	52 79 -157	38 869 +363	25 42 -165	43 284 +305	15 12 -136	60 550 +347	47 65 -58
3	2.3	05 246 +335	51 77 -102	39 238 +369	24 36 -106	43 589 +305	14 16 -96	60 897 +347	48 23 -56
3	12.2	05 581 +335	51 32 -45	39 609 +371	23 93 -43	43 895 +306	13 61 -55	61 243 +346	48 79 -56
3	22.2	05 907 +326	51 47 +15	39 971 +362	24 16 +23	44 192 +297	13 51 -10	61 582 +339	49 31 -52
4	1.2	06 217 +310	52 17 +70	40 315 +344	24 98 +82	44 477 +285	13 82 +31	61 908 +326	49 79 -48
4	11.2	06 510 +293	53 38 +121	40 640 +325	26 36 +138	44 750 +273	14 51 +69	62 222 +314	50 23 -44
4	21.1	06 777 +267	55 07 +169	40 933 +293	28 26 +190	45 002 +252	15 57 +106	62 516 +294	50 62 -39
5	1.1	07 015 +238	57 12 +205	41 192 +259	30 54 +228	45 234 +232	16 90 +133	62 790 +274	50 99 -37
5	11.1	07 223 +208	59 47 +235	41 414 +222	33 17 +263	45 442 +208	18 46 +156	63 040 +250	51 34 -35
5	21.0	07 393 +170	62 04 +257	41 590 +176	36 02 +285	45 620 +178	20 19 +173	63 260 +220	51 68 -34
5	31.0	07 526 +133	64 69 +265	41 723 +133	38 98 +296	45 769 +149	22 00 +181	63 449 +189	52 03 -35
5	10.0	07 619 +93	67 40 +271	41 808 +85	41 99 +301	45 885 +116	23 86 +186	63 603 +154	52 38 -35
6	20.0	07 668 +49	70 05 +265	41 842 +34	44 93 +294	45 964 +79	25 68 +182	63 717 +114	52 73 -35
6	29.9	07 676 +8	72 55 +250	41 828 -14	47 72 +279	46 008 +44	27 41 +173	63 792 +75	53 09 -36
7	9.9	07 640 -36	74 88 +233	41 764 -64	50 32 +260	46 013 +5	29 02 +161	63 823 +31	53 44 -35
7	19.9	07 562 -78	76 94 +206	41 652 -112	52 61 +229	45 980 -33	30 46 +144	63 811 -12	53 77 -33
7	29.9	07 447 -115	78 70 +176	41 652 -153	52 61 +197	45 980 -68	30 46 +124	63 811 -52	53 77 -29
8	8.8	07 296 -151	80 14 +144	41 499 -195	54 58 +160	45 912 -101	31 70 +103	63 759 -91	54 06 -23
8	18.8	07 114 -182	81 18 +104	41 304 -227	56 18 +116	45 811 -130	32 73 +77	63 668 -124	54 29 -15
8	28.8	06 911 -203	81 84 +66	40 825 -252	58 08 +74	45 530 -151	34 03 +53	63 394 -150	54 51 -7
9	7.7	06 690 -221	82 10 +26	40 554 -271	58 35 +27	45 361 -169	34 29 +26	63 225 -169	54 48 +3
9	17.7	06 464 -226	81 91 -19	40 277 -155	58 14 -21	45 187 -174	34 27 -2	63 049 -176	54 35 +13
9	27.7	06 242 -222	81 31 -60	40 004 -273	57 47 -67	45 015 -172	33 97 -30	62 875 -174	54 12 +23
10	7.7	06 031 -211	80 28 -103	39 742 -262	56 32 -115	44 853 -162	33 39 -58	62 713 -162	53 81 +31
10	17.6	05 846 -185	78 83 -145	39 509 -233	54 69 -163	44 714 -139	32 51 -88	62 578 -135	53 44 +37
10	27.6	05 693 -153	77 00 -183	39 309 -200	52 65 -204	44 604 -110	31 36 -115	62 477 -101	53 03 +41
11	6.6	05 581 -112	74 77 -223	39 154 -155	50 19 -246	44 532 -72	29 93 -143	62 419 -58	52 62 +41
11	16.6	05 519 -62	72 22 -255	39 055 -99	47 37 -282	44 505 -27	28 24 -169	62 412 -7	52 25 +37
11	26.5	05 508 -11	69 41 -281	39 011 -44	44 27 -310	44 524 +19	26 33 -191	62 458 +46	51 95 +30
12	6.5	05 553 +45	66 35 -306	39 030 +19	40 92 -335	44 593 +69	24 20 -213	62 561 +103	51 80 +15
12	16.5	05 654 +101	63 18 -317	39 114 +84	37 45 -347	44 711 +118	21 95 -225	62 707 +146	51 68 +12
12	26.4	05 806 +152	59 98 -310	39 255 +141	33 96 -349	44 873 +162	19 62 -233	62 912 +205	51 70 -2
12	36.4	06 009 +203	56 81 -327	39 456 +201	30 53 -343	45 077 +204	17 27 -235	63 161 +249	51 88 -18
		+245	-297	+251	-321	+239	-226	+284	-31
Mean Place	06.425	74.15	40.246	48.69	45.108	31.48	63.000	44.15	
sec $\delta$ , tan $\delta$	+1.200	+0.664	+1.386	+0.960	+1.025	+0.226	+1.117	-0.498	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.044	-0.10	+0.036	-0.10	+0.055	-0.09	+0.074	-0.09	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.011	-0.97	+0.015	-0.97	+0.004	-0.97	-0.008	-0.97	
Dble. Trans.	June 7		June 8		June 8		June 8		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	636		1449		639		1450		
	Groombridge 2415 (Herculis)		85 G. Ophiuchi		ζ Draconis		88 G. Ophiuchi		
Mag.Spect.	6.27	A2	6.14	K0	3.22	B5	5.58	F5	
U.T.	R.A.		Dec.		R.A.		Dec.		
	h	m	°	'	h	m	°	'	
	17 07	+ 40 31	17 07	- 17 35	17 08	+ 65 43	17 08	- 10 30	
1 <sup>d</sup>	-8.5	17.138 +121	53.07 -344	23.793 +173	32.91 -63	41.534 +85	44.54 -379	59.328 +162	25.83 -103
1 <sup>s</sup>	1.4	17.313 +175	49.68 -339	24.007 +214	33.61 -70	41.720 +196	40.83 -371	59.532 +204	26.94 -111
1	11.4	17.537 +224	46.40 -328	24.258 +251	34.39 -78	42.003 +283	37.27 -356	59.772 +240	28.11 -117
1	21.4	17.807 +270	43.39 -301	24.540 +282	35.22 -83	42.378 +375	34.04 -323	60.042 +270	29.29 -118
1	31.4	18.110 +303	40.74 -265	24.842 +302	36.07 -85	42.824 +446	31.24 -280	60.331 +289	30.42 -113
2	10.3	18.441 +331	38.53 -221	25.159 +317	36.90 -83	43.333 +509	28.93 -231	60.637 +306	31.48 -106
2	20.3	18.789 +348	36.87 -166	25.485 +326	37.67 -77	43.886 +553	27.26 -167	60.951 +314	32.39 -91
3	2.3	19.144 +355	35.80 -107	25.811 +326	38.35 -68	44.461 +575	26.22 -104	61.266 +315	33.15 -76
3	12.2	19.501 +357	35.33 -47	26.136 +325	38.91 -56	45.047 +586	25.87 -35	61.580 +314	33.71 -56
3	22.2	19.850 +349	35.50 +17	26.454 +318	39.34 -43	45.620 +573	26.22 +35	61.887 +307	34.06 -35
4	1.2	20.183 +333	36.25 +75	26.760 +306	39.64 -30	46.163 +543	27.20 +98	62.184 +297	34.21 -15
4	11.2	20.497 +314	37.56 +131	27.055 +295	39.81 -17	46.668 +505	28.80 +160	62.469 +285	34.17 +4
4	21.1	20.783 +286	39.38 +182	27.332 +277	39.86 -5	47.114 +446	30.93 +213	62.737 +268	33.95 +22
5	1.1	21.038 +255	41.58 +220	27.590 +258	39.82 +4	47.492 +378	33.48 +255	62.985 +248	33.59 +36
5	11.1	21.258 +220	44.11 +253	27.825 +235	39.71 +11	47.798 +306	36.40 +292	63.213 +228	33.12 +47
5	21.1	21.436 +178	46.88 +277	28.032 +207	39.55 +16	48.017 +219	39.54 +314	63.413 +200	32.57 +55
5	31.0	21.573 +137	49.75 +287	28.211 +179	39.38 +17	48.151 +134	42.80 +326	63.585 +172	31.98 +59
6	10.0	21.666 +93	52.68 +293	28.357 +146	39.19 +19	48.197 +46	46.11 +331	63.725 +140	31.38 +60
6	20.0	21.709 +43	55.56 +288	28.464 +107	39.02 +17	48.149 -48	49.33 +322	63.829 +104	30.79 +59
6	29.9	21.707 -2	58.28 +272	28.535 +71	38.87 +15	48.019 -130	52.38 +305	63.897 +68	30.24 +55
7	9.9	21.658 -49	60.83 +255	28.566 +31	38.74 +13	47.802 -217	55.21 +283	63.926 +29	29.73 +51
7	19.9	21.562 -96	63.09 +226	28.556 -10	38.63 +11	47.505 -297	57.70 +249	63.915 -11	29.28 +45
7	29.9	21.426 -136	65.03 +194	28.509 -47	38.63 +9	47.505 -363	59.83 +213	63.915 -46	29.28 +38
8	8.8	21.249 -177	66.62 +159	28.424 -85	38.54 +8	47.142 -428	59.83 +172	63.869 -83	28.90 +33
8	18.8	21.041 -208	67.79 +117	28.308 -116	38.46 +8	46.714 -480	61.55 +123	63.786 -113	28.57 +26
8	28.8	20.808 -233	68.55 +76	28.169 -139	38.30 +8	45.719 -515	63.55 +77	63.537 -136	28.11 +20
9	7.8	20.556 -252	68.86 +31	28.010 -159	38.30 +10	45.719 -545	63.55 +25	63.537 -154	28.11 +15
9	17.7	20.297 -259	68.69 -17	27.845 -165	38.20 +11	45.174 -552	63.80 -29	63.383 -162	27.96 +8
9	27.7	20.042 -255	68.09 -60	27.845 -164	38.09 +11	44.622 -546	63.51 -79	63.221 -160	27.88 +2
10	7.7	19.797 -245	67.01 -108	27.681 -152	37.98 +11	44.076 -529	62.72 -131	63.061 -150	27.86 -6
10	17.6	19.579 -218	65.48 -153	27.529 -128	37.87 +8	43.547 -485	61.41 -183	62.911 -126	27.92 -15
10	27.6	19.393 -186	63.54 -194	27.401 -97	37.79 +8	43.062 -434	59.58 -227	62.785 -97	28.07 -24
11	6.6	19.250 -143	61.17 -237	27.304 -57	37.75 +4	42.628 -367	57.31 -273	62.688 -58	28.31 -37
11	16.6	19.160 -90	61.17 -271	27.247 -8	37.77 -11	42.261 -281	54.58 -310	62.630 -12	28.68 -49
11	26.5	19.123 -37	55.46 -300	27.239 +42	37.88 -21	41.980 -191	51.48 -339	62.618 +36	29.17 -63
12	6.5	19.147 +24	52.21 -325	27.281 +42	38.09 -21	41.789 -191	48.09 -339	62.654 +36	29.80 -63
12	16.5	19.231 +84	48.84 -337	27.374 +93	38.39 -30	41.699 -90	44.45 -364	62.739 +85	30.56 -76
12	26.5	19.371 +140	45.44 -340	27.512 +138	38.89 -50	41.717 +18	40.71 -374	62.872 +133	31.48 -92
12	36.4	19.567 +196	42.08 -336	27.702 +231	39.51 -71	41.836 +224	36.96 -366	63.051 +179	32.52 -111
		19.567 +244	42.08 -315	27.933 +266	40.22 -78	42.060 +319	33.30 -340	63.272 +253	33.63 -115
Mean Place	20.244	59.71	27.769	31.01	44.729	52.48	63.126	23.24	
sec δ, tan δ	+1.316	+0.855	+1.049	-0.317	+2.433	+2.218	+1.017	-0.185	
da(ψ), dδ(ψ)	+0.039	-0.09	+0.069	-0.09	+0.004	-0.09	+0.066	-0.09	
da(ε), dδ(ε)	+0.013	-0.97	-0.005	-0.97	+0.033	-0.98	-0.003	-0.98	
Dble.Trans.	June 8		June 8		June 9		June 9		

AT UPPER TRANSIT AT GREENWICH

No.	1451		638		641		643	
	97 G. Ophiuchi		η Scorpii		δ Herculis*		π Herculis	
Mag. Spect.	6.39	K0	3.44	F2	3.16	A2	3.36	K5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	17 11	+ 7 54	17 11	- 43 13	17 14	+ 24 50	17 14	+ 36 49
1 <sup>d</sup> -8.5	02.701 +143	33.56 -207	06.016 +210	20.60 +102	25.379 +126	70.74 -288	31.451 +115	19.47 -331
1 1.4	02.886 +185	31.45 -211	06.281 +265	19.74 +86	25.551 +172	67.86 -288	31.618 +167	16.18 -329
1 11.4	03.107 +221	29.34 -211	06.595 +314	19.07 +67	25.764 +213	65.04 -282	31.832 +214	12.99 -319
1 21.4	03.360 +253	27.34 -200	06.949 +354	18.61 +46	26.013 +249	62.42 -262	32.090 +258	10.03 -296
1 31.4	03.635 +275	25.52 -182	07.331 +382	18.36 +25	26.289 +276	60.07 -235	32.379 +289	07.42 -261
2 10.3	03.926 +291	23.93 -159	07.735 +404	18.30 +6	26.585 +296	58.07 -200	32.695 +316	05.21 -221
2 20.3	04.227 +301	22.65 -128	08.151 +416	18.44 -14	26.896 +311	56.52 -155	33.028 +333	03.54 -167
3 2.3	04.531 +304	21.72 -93	08.569 +418	18.75 -31	27.210 +314	55.45 -107	33.369 +341	02.42 -112
3 12.2	04.835 +304	21.15 -57	08.988 +419	19.21 -46	27.527 +317	54.89 -56	33.713 +344	01.88 -54
3 22.2	05.132 +297	20.99 -16	09.399 +411	19.82 -61	27.838 +311	54.88 -1	34.050 +337	01.97 +9
4 1.2	05.418 +296	21.20 +21	09.796 +397	20.54 -72	28.136 +298	55.36 +48	34.374 +324	02.62 +65
4 11.2	05.693 +275	21.76 +56	10.178 +382	21.39 -85	28.422 +286	56.33 +97	34.682 +308	03.83 +121
4 21.1	05.950 +257	22.66 +90	10.538 +360	22.35 -96	28.687 +265	57.73 +140	34.964 +282	05.53 +170
5 1.1	06.187 +237	23.80 +114	10.871 +333	23.39 -104	28.928 +241	59.48 +175	35.219 +255	07.61 +208
5 11.1	06.401 +214	25.16 +136	11.176 +305	24.53 -114	29.144 +216	61.52 +204	35.442 +223	10.04 +243
5 21.1	06.588 +187	26.67 +151	11.443 +267	25.74 -121	29.327 +183	63.77 +225	35.627 +185	12.69 +265
5 31.0	06.746 +158	28.26 +159	11.672 +229	27.01 -127	29.478 +151	66.13 +236	35.773 +146	15.47 +278
6 10.0	06.872 +126	29.89 +163	11.857 +185	28.32 -131	29.593 +115	68.54 +241	35.877 +104	18.32 +285
6 20.0	06.962 +90	31.50 +161	11.991 +134	29.63 -131	29.667 +74	70.93 +239	35.935 +58	21.11 +279
6 29.9	07.016 +54	33.02 +152	12.078 +87	30.92 -129	29.704 +37	73.20 +227	35.950 +15	23.79 +268
7 9.9	07.032 +16	34.45 +143	12.111 +33	32.17 -125	29.698 -6	75.33 +213	35.919 -31	26.29 +250
7 19.9	07.010 -22	35.73 +128	12.090 -21	33.32 -115	29.652 -46	77.23 +190	35.842 -77	28.53 +224
7 29.9	06.953 -57	36.83 +110	12.021 -69	34.35 -103	29.569 -83	78.89 +166	35.725 -117	30.47 +194
8 8.8	06.860 -93	37.76 +93	11.902 -119	35.20 -85	29.450 -119	80.27 +138	35.569 -156	32.08 +161
8 18.8	06.739 -121	38.47 +71	11.744 -158	35.85 -65	29.300 -150	81.30 +103	35.380 -189	33.28 +120
8 28.8	06.595 -144	38.96 +49	11.555 -189	36.27 -42	29.127 -173	82.02 +72	35.167 -213	34.10 +82
9 7.8	06.433 -162	39.24 +28	11.340 -215	36.44 -115	28.935 -192	82.38 +36	34.933 -234	34.49 +39
9 17.7	06.264 -169	39.26 +2	11.117 -223	36.34 +10	28.736 -199	82.35 -3	34.693 -240	34.43 -6
9 27.7	06.097 -167	39.06 -20	10.897 -220	35.98 +36	28.538 -198	81.97 -38	34.453 -240	33.94 -49
10 7.7	05.938 -159	38.61 -45	10.690 -207	35.36 +62	28.348 -190	81.21 -76	34.223 -230	32.99 -95
10 17.6	05.802 -136	37.90 -71	10.515 -175	34.52 +84	28.181 -167	80.06 -115	34.017 -206	31.60 -139
10 27.6	05.694 -108	36.96 -94	10.381 -134	33.50 +102	28.043 -138	78.58 -148	33.841 -176	29.81 -179
11 6.6	05.622 -72	35.76 -120	10.297 -84	32.33 +117	27.942 -101	76.73 -185	33.705 -136	27.60 -221
11 16.6	05.595 -27	34.33 -143	10.276 -21	31.10 +123	27.887 -55	74.57 -216	33.620 -85	25.04 -256
11 26.5	05.613 +18	32.69 -164	10.317 +41	29.85 +125	27.879 -8	72.15 -242	33.586 -34	22.20 -284
12 6.5	05.681 +68	30.85 -184	10.424 +107	28.63 +122	27.923 +44	69.50 -265	33.609 +23	19.10 -310
12 16.5	05.797 +116	28.87 -198	10.598 +174	27.51 +112	28.019 +96	66.70 -280	33.690 +81	15.87 -323
12 26.5	05.956 +159	26.81 -206	10.830 +232	26.52 +99	28.162 +143	63.84 -286	33.824 +134	12.58 -329
12 36.4	06.158 +202	24.70 -211	11.117 +287	25.70 +82	28.352 +190	60.98 -286	34.011 +187	09.32 -326
	06.153 +235	37.89 -203	11.082 +333	20.28 +61	28.622 +229	76.43 -272	34.597 +233	26.01 -307
Mean Place	06.153	37.89	11.082	20.28	28.622	76.43	34.597	26.01
sec δ, tan δ	+1.010	+0.139	+1.372	-0.940	+1.102	+0.463	+1.249	+0.749
da(ψ), dδ(ψ)	+0.058	-0.08	+0.086	-0.08	+0.049	-0.08	+0.042	-0.08
da(ε), dδ(ε)	+0.002	-0.98	-0.013	-0.98	+0.006	-0.98	+0.010	-0.98
Dble. Trans.	June 9		June 9		June 10		June 10	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1453		1452		1454		1456	
	U Ophiuchi		139 G. Scorpii		Piazzi 17 <sup>h</sup> 68 (Herculis)		72 Herculis	
Mag.Spect.	5.7 to 6.4	B8	5.55	F5	5.17	M0	5.36	G0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	17 15	+ 1 13	17 16	- 32 38	17 19	+ 18 03	17 20	+ 32 28
1 <sup>d</sup>	47.020	25 59	06 389	56.25	39 825	67 79	06 024	58 54
1 <sup>s</sup>	47.205	23 84	06 620	55.97	39 994	65 21	06 187	55 36
1	47.427	22 08	06 894	55.84	40 203	62 67	06 395	52.26
1	47.680	20 38	07 203	55.86	40 447	60 27	06 644	49.38
1	47.955	18 81	07 536	55.99	40 715	58 11	06 923	46.81
2	48 246	17 42	07 888	56.24	41 003	56 25	07 227	44 62
2	48 547	16 27	08 252	56 58	41 305	54 78	07 548	42 93
3	48 851	15 41	08 617	56.98	41 610	53 74	07 875	41.77
3	49 155	14 85	08 984	57 42	41 919	53 16	08 207	41 17
3	49 454	14 63	09 345	57.90	42 222	53 07	08 534	41.16
4	49 743	14 72	09 694	58 39	42 515	53 44	08 848	41 71
4	50 022	15 11	10 032	58 91	42 797	54 23	09 149	42 78
4	50 283	15 78	10 351	59 45	43 060	55 44	09 428	44 33
5	50 526	16 66	10 649	60 01	43 303	56 95	09 680	46 26
5	50 748	17 73	10 923	60 60	43 523	58 74	09 905	48 53
5	50 943	18 92	11 165	61 22	43 712	60 73	10 094	51 02
5	51 111	20 18	11 376	61 86	43 872	62 31	10 248	53 64
6	51 247	21 47	11 549	62 54	43 998	64 95	10 362	56 33
6	51 346	22 74	11 678	63 23	44 085	67 07	10 432	58 99
6	51 411	23 94	11 766	63 93	44 136	69 09	10 460	61 53
7	51 437	25 07	11 808	64 61	44 147	71 00	10 445	63 92
7	51 425	26 08	11 802	65 25	44 117	72 71	10 385	66 06
7	51 377	26 95	11 753	65 83	44 051	74 20	10 287	67 92
8	51 293	27 69	11 661	66 32	43 949	75 45	10 149	69 47
8	51 179	28 25	11 533	66 70	43 816	76 41	09 980	70 64
8	51 042	28 66	11 376	66 94	43 660	77 09	09 785	71 45
9	50 886	28 90	11 196	67 02	43 484	77 46	09 570	71 85
9	50 723	28 96	11 007	66 95	43 300	77 50	09 347	71 82
9	50 559	28 85	10 819	66 71	43 116	77 24	09 124	71 39
10	50 404	28 55	10 641	66 33	42 939	76 63	08 910	70 53
10	50 271	28 05	10 491	65 81	42 784	75 69	08 717	69 24
10	50 166	27 37	10 374	65 20	42 656	74 45	08 554	67 57
11	50 097	26 48	10 301	64 53	42 564	72 88	08 429	65 49
11	50 072	25 39	10 283	63 84	42 516	71 03	08 352	63 08
11	50 093	24 12	10 318	63 18	42 514	68 94	08 323	60 38
12	50 161	22 67	10 412	62 59	42 561	66 61	08 349	57 43
12	50 279	21 08	10 560	62 10	42 659	64 15	08 431	54 33
12	50 439	19 39	10 762	61 69	42 802	61 60	08 563	51 17
12	50 641	17 65	11 013	61 44	42 989	59 03	08 745	48 02
Mean Place	50.586	29.68	10.894	54.52	43.151	73.24	09.218	64.41
sec δ, tan δ	+1.000	+0.021	+1.188	-0.641	+1.052	+0.326	+1.185	+0.637
dα(ψ), dδ(ψ)	+0.061	-0.08	+0.078	-0.08	+0.053	-0.07	+0.045	-0.07
dα(ε), dδ(ε)	+0.000	-0.98	-0.008	-0.98	+0.004	-0.98	+0.007	-0.98
Dble.Trans.	June 10		June 11		June 11		June 12	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	642		644		645		1458	
	ι Apodis		ζ Ophiuchi		β Arae		138 G. Ophiuchi	
Mag. Spect.	5.60	B8	3.37	B3	2.80	K2	6.31	F5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	17 20	-70 06	17 21	-24 59	17 24	-55 31	17 25	- 1 38
1 -8.5	26 196 +324	38 91 +247	06 576 +159	15 62' +15	04 435 +227	07 37 +178	12 176 +138	31 32 -148
1 1.4	26 637 +441	36 62 +229	06 789 +213	15 78 -16	04 733 +298	05 75 +162	12 355 +179	31 32 -155
1 11.4	27 186 +549	34 55 +207	07 041 +252	16 06 -28	05 095 +362	04 32 +143	12 572 +217	34 46 -159
1 21.4	27 832 +646	32 81 +174	07 327 +286	16 43 -37	05 514 +419	03 14 +118	12 820 +248	35 99 -153
1 31.4	28 546 +714	31 42 +139	07 635 +308	16 87 -44	05 972 +458	02 24 +90	13 090 +270	37 42 -143
2 10.3	29 320 +774	30 39 +103	07 961 +326	17 35 -48	06 464 +492	01 60 +64	13 378 +298	38 70 -128
2 20.3	30 133 +813	29 77 +62	08 299 +338	17 84 -49	06 977 +513	01 26 +34	13 678 +300	39 76 -106
3 2.3	30 963 +830	29 54 +23	08 640 +341	18 31 -47	07 498 +521	01 20 +6	13 981 +303	40 56 -80
3 12.3	31 803 +840	29 70 -16	08 982 +342	18 74 -43	08 025 +527	01 40 -20	14 287 +306	41 09 -53
3 22.2	32 634 +831	30 26 -56	09 319 +337	19 13 -39	08 545 +520	01 88 -48	14 588 +301	41 32 -23
4 1.2	33 439 +805	31 16 -90	09 646 +327	19 45 -32	09 051 +506	02 59 -71	14 881 +293	41 25 +7
4 11.2	34 215 +776	32 41 -125	09 964 +318	19 73 -28	09 541 +490	03 54 -95	15 166 +285	40 91 +34
4 21.1	34 941 +726	33 99 -158	10 264 +300	19 96 -23	10 004 +463	04 72 -118	15 434 +268	40 32 +59
5 1.1	35 608 +667	35 83 -184	10 546 +282	20 16 -20	10 434 +430	06 07 -135	15 686 +252	39 53 +79
5 11.1	36 210 +602	37 93 -210	10 806 +260	20 34 -18	10 828 +394	07 61 -154	15 917 +231	38 57 +96
5 21.1	36 726 +516	40 24 -231	11 038 +232	20 51 -17	11 174 +346	09 30 -169	16 122 +205	37 49 +108
5 31.0	37 155 +429	42 69 -245	11 240 +202	20 70 -19	11 470 +296	11 10 -180	16 301 +179	36 35 +114
6 10.0	37 486 +331	45 26 -257	11 407 +167	20 90 -20	11 710 +240	13 00 -190	16 448 +147	35 19 +116
6 20.0	37 707 +221	47 87 -261	11 535 +128	21 13 -23	11 884 +174	14 93 -193	16 558 +110	34 04 +115
6 30.0	37 823 +116	50 44 -257	11 624 +89	21 37 -24	11 996 +112	16 85 -192	16 634 +76	32 95 +109
7 9.9	37 824 +1	52 94 -250	11 669 +45	21 63 -26	12 037 +41	18 72 -187	16 671 +37	31 94 +101
7 19.9	37 712 -112	55 27 -233	11 670 +1	21 89 -26	12 009 -28	20 46 -174	16 667 -4	31 03 +91
7 29.9	37 499 -213	57 36 -209	11 631 -39	22 14 -25	11 918 -91	22 05 -159	16 628 -39	30 25 +78
8 8.8	37 185 -314	59 16 -180	11 551 -80	22 35 -21	11 763 -155	23 42 -137	16 552 -76	29 59 +66
8 18.8	36 787 -398	60 58 -142	11 436 -115	22 52 -17	11 554 -209	24 50 -108	16 444 -108	29 08 +51
8 28.8	36 325 -462	61 60 -102	11 294 -142	22 62 -10	11 304 -250	25 27 -77	16 311 -133	28 70 +38
9 7.8	35 811 -514	62 16 -56	11 129 -165	22 64 -2	11 019 -285	25 70 -43	16 158 -153	28 46 +24
9 17.7	35 278 -533	62 21 -5	10 955 -174	22 59 +5	10 719 -300	25 74 -4	15 996 -162	28 38 +8
9 27.7	34 746 -532	61 80 +41	10 781 -174	22 45 +14	10 420 -299	25 42 +32	15 832 -164	28 45 -7
10 7.7	34 239 -507	60 88 +92	10 616 -165	22 23 +22	10 134 -286	24 72 +70	15 676 -156	28 67 -22
10 17.7	33 792 -447	59 51 +137	10 474 -142	21 96 +27	09 885 -249	23 67 +105	15 540 -136	29 07 -40
10 27.6	33 422 -370	57 75 +176	10 364 -110	21 65 +31	09 683 -202	22 32 +135	15 431 -109	29 63 -56
11 6.6	33 149 -273	55 63 +212	10 293 -71	21 34 +31	09 542 -141	20 72 +160	15 357 -74	30 37 -74
11 16.6	32 999 -150	53 27 +236	10 273 -20	21 06 +28	09 542 -65	18 94 +178	15 327 -30	31 29 -92
11 26.5	32 973 -26	50 74 +253	10 303 +30	20 83 +23	09 489 +12	17 06 +188	15 342 +15	32 37 -108
12 6.5	33 082 +109	48 14 +260	10 389 +86	20 70 +13	09 585 +96	15 14 +192	15 404 +62	33 63 -126
12 16.5	33 328 +246	45 58 +256	10 514 +125	20 71 -1	09 764 +179	13 28 +186	15 515 +111	35 01 -138
12 26.5	33 696 +368	43 14 +244	10 704 +190	20 72 -1	10 019 +255	11 53 +175	15 669 +154	36 50 -149
12 36.4	34 186 +490	40 89 +225	10 936 +232	20 91 -19	10 346 +327	09 94 +159	15 865 +196	38 05 -155
	+592	+196	+267	-29	+388	+135	+231	-154
Mean Place	35.287	38.25	10.794	12.85	10.575	05.75	15.807	26.76
sec δ, tan δ	+2.939	-2.764	+1.103	-0.466	+1.766	-1.456	+1.000	-0.029
da(ψ), dδ(ψ)	+0.133	-0.07	+0.073	-0.07	+0.099	-0.06	+0.062	-0.06
da(ε), dδ(ε)	-0.032	-0.99	-0.005	-0.99	-0.015	-0.99	-0.000	-0.99
Dble. Trans.	June 12		June 12		June 13		June 13	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1457		1459		647		650		
	44 Ophiuchi		σ Ophiuchi		27 H. Ophiuchi		77 Herculis		
Mag.Spect.	4.28	F0	4.44	K0	4.61	F0	5.81	A2	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	17 25	-24 09	17 25	+ 4 08	17 25	- 5 04	17 26	+48 15	
1	-8.5	28 520 +143	52 62 + 3	47 136 +132	59 95 -182	51 169 +141	35 94 -129	19 596 + 85	68 50 -357
1	1.4	28 729 +209	52 82 -20	47 310 +174	58 08 -187	51 351 +182	37 29 -135	19 743 +147	64 94 -356
1	11.4	28 976 +247	53 12 -30	47 521 +211	56 20 -188	51 570 +219	38 69 -140	19 950 +207	61 48 -346
1	21.4	29 257 +281	53 51 -39	47 764 +243	54 39 -181	51 821 +251	40 06 -137	20 212 +262	58 27 -321
1	31.4	29 561 +304	53 96 -45	48 030 +266	52 73 -166	52 094 +273	41 34 -128	20 517 +305	55 42 -285
2	10.3	29 883 +322	54 44 -48	48 314 +284	51 26 -147	52 384 +290	42 51 -117	20 860 +343	53 00 -242
2	20.3	30 217 +334	54 92 -48	48 611 +297	50 07 -119	52 686 +302	43 48 -97	21 229 +369	51 15 -185
3	2.3	30 555 +338	55 37 -45	48 911 +300	49 18 -89	52 992 +306	44 24 -76	21 612 +383	49 90 -125
3	12.3	30 895 +340	55 77 -40	49 215 +304	48 63 -55	53 300 +308	44 75 -51	22 004 +392	49 28 -62
3	22.2	31 230 +335	56 12 -35	49 514 +299	48 44 -19	53 603 +303	44 99 -24	22 393 +389	49 34 + 6
4	1.2	31 556 +326	56 40 -28	49 804 +290	48 59 +15	53 899 +296	44 98 + 1	22 767 +374	50 01 + 67
4	11.2	31 874 +318	56 63 -23	50 086 +282	49 07 +48	54 185 +286	44 72 +26	23 125 +358	51 29 +128
4	21.1	32 175 +301	56 80 -17	50 352 +266	49 85 +78	54 457 +272	44 24 +48	23 452 +327	53 12 +183
5	1.1	32 457 +282	56 93 -13	50 600 +248	50 87 +102	54 711 +254	43 58 +66	23 746 +294	55 37 +225
5	11.1	32 719 +262	57 05 -12	50 828 +228	52 09 +122	54 945 +234	42 78 +80	24 001 +255	58 01 +264
5	21.1	32 952 +233	57 16 -11	51 030 +202	53 45 +136	55 153 +208	41 88 +90	24 208 +207	60 92 +291
5	31.0	33 157 +205	57 28 -12	51 204 +174	54 89 +144	55 335 +182	40 93 +95	24 367 +159	63 98 +306
6	10.0	33 327 +170	57 42 -14	51 346 +142	56 37 +148	55 485 +150	39 95 +98	24 475 +108	67 13 +315
6	20.0	33 458 +131	57 58 -16	51 452 +106	57 83 +146	55 599 +114	39 00 +95	24 526 + 51	70 25 +312
6	30.0	33 550 + 92	57 78 -20	51 523 + 71	59 22 +139	55 677 + 78	38 10 +90	24 525 - 1	73 25 +300
7	9.9	33 599 + 49	57 99 -21	51 555 + 32	60 53 +131	55 716 + 39	37 26 +84	24 467 - 58	76 08 +283
7	19.9	33 603 + 4	58 21 -22	51 547 - 8	61 70 +117	55 715 - 1	36 52 +74	24 356 -111	78 63 +255
7	29.9	33 568 - 35	58 42 -21	51 504 -43	62 72 +102	55 678 -37	35 89 +63	24 197 -159	80 87 +224
8	8.8	33 491 - 77	58 62 -20	51 423 - 81	63 58 + 86	55 603 - 75	35 35 +54	23 990 -207	82 75 +188
8	18.8	33 379 -112	58 77 -15	51 312 -111	64 25 + 67	55 496 -107	34 94 +41	23 745 -245	84 19 +144
8	28.8	33 239 -140	58 88 -11	51 176 -136	64 74 + 49	55 365 -131	34 63 +31	23 470 -278	85 20 +101
9	7.8	33 076 -163	58 91 - 3	51 019 -157	64 74 + 29	55 365 -153	34 63 +20	23 470 -295	85 20 +55
9	17.7	32 903 -173	58 87 + 4	50 853 -166	65 03 + 8	55 212 -161	34 43 +7	23 171 -310	85 75 + 3
9	27.7	32 730 -173	58 76 +11	50 686 -167	65 00 -11	54 888 -163	34 40 -4	22 861 -311	85 78 -43
10	7.7	32 564 -166	58 58 +18	50 526 -160	64 67 -33	54 732 -156	34 57 -17	22 550 -303	85 35 -94
10	17.7	32 422 -142	58 35 +23	50 386 -140	64 12 -55	54 597 -135	34 87 -30	21 969 -278	82 98 -143
10	27.6	32 309 -113	58 09 +26	50 273 -113	63 36 -76	54 489 -108	35 31 -44	21 724 -245	81 10 -188
11	6.6	32 237 -72	57 83 +26	50 194 -79	62 37 -99	54 416 -73	35 91 -60	21 522 -202	78 76 -234
11	16.6	32 213 -24	57 59 +24	50 159 -35	62 37 -120	54 416 -28	35 91 -75	21 522 -147	76 03 -273
11	26.5	32 239 + 26	57 41 +18	50 167 + 8	61 17 -139	54 404 +16	37 55 -89	21 285 -90	72 99 -304
12	6.5	32 320 + 81	57 32 + 9	50 224 + 57	58 20 -158	54 469 + 65	38 60 -105	21 261 -24	69 65 -334
12	16.5	32 435 +115	57 39 - 7	50 329 +105	56 48 -172	54 582 +113	39 78 -118	21 305 + 44	66 16 -349
12	26.5	32 626 +191	57 43 - 4	50 329 +148	56 48 -181	54 582 +157	39 78 -129	21 305 +107	66 16 -355
12	36.4	32 852 +226	57 64 -21	50 477 +191	54 67 -187	54 739 +199	41 07 -136	21 412 +172	62 61 -353
		32 852 +263	57 64 -32	50 668 +225	52 80 -183	54 938 +234	42 43 -136	21 584 +229	59 08 -334
Mean Place	32.714	49 40	50 665	64 88	54.861	31.57	22.736	75 65	
sec δ, tan δ	+1.096	-0.449	+1.003	+0.073	+1.004	-0.089	+1.502	+1.121	
dα(ψ), dδ(ψ)	+0.073	-0.06	+0.059	-0.06	+0.063	-0.06	+0.032	-0.06	
dα(ε), dδ(ε)	-0.004	-0.99	+0.001	-0.99	-0.001	-0.99	+0.011	-0.99	
Dbles.Trans.	June 13		June 13		June 13		June 13		

AT UPPER TRANSIT AT GREENWICH

No.	646		1455		649		648	
	45 Ophiuchi		59 G. Apodis		υ Scorpii		δ Arae	
Mag.Spect.	4.37	F5	5.93	M3	2.80	B3	3.79	B8
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	17 26	-29 51	17 28	-80 50	17 29	-37 17	17 29	-60 40
1 -8.5	25.111 <sup>s</sup> +164	23.68 <sup>"</sup> +30	37.600 <sup>s</sup> +522	58.80 <sup>"</sup> +293	45.975 <sup>s</sup> +174	12.81 <sup>"</sup> +75	45.878 <sup>s</sup> +236	27.74 <sup>"</sup> +208
1 1.4	25.327 +216	23.51 +17	38.376 +776	56.04 +276	46.201 +226	12.17 +64	46.198 +320	25.83 +191
1 11.4	25.585 +258	23.47 +4	39.389 +1013	53.51 +253	46.474 +273	11.68 +49	46.593 +395	24.10 +173
1 21.4	25.878 +293	23.55 -8	40.621 +1232	51.31 +220	46.786 +312	11.34 +34	47.055 +462	22.63 +147
1 31.4	26.195 +317	23.73 -18	42.015 +1394	49.49 +182	47.125 +339	11.15 +19	47.565 +510	21.46 +117
2 10.3	26.533 +338	23.99 -26	43.552 +1537	48.07 +142	47.488 +363	11.09 +6	48.117 +552	20.58 +88
2 20.3	26.883 +350	24.30 -31	45.192 +1640	47.12 +95	47.865 +377	11.17 -8	48.696 +579	20.04 +54
3 2.3	27.237 +354	24.65 -35	46.884 +1692	46.62 +50	48.247 +382	11.34 -17	49.287 +591	19.80 +24
3 12.3	27.594 +357	25.01 -36	48.612 +1728	46.56 +6	48.634 +387	11.61 -27	49.888 +601	19.89 -9
3 22.2	27.946 +352	25.38 -37	50.329 +1717	46.98 -42	49.016 +382	11.96 -35	50.483 +595	20.29 -40
4 1.2	28.289 +343	25.73 -35	51.999 +1670	47.82 -84	49.389 +373	12.38 -42	51.063 +580	20.97 -68
4 11.2	28.623 +334	26.09 -36	53.611 +1612	49.08 -126	49.753 +364	12.88 -50	51.627 +564	21.93 -96
4 21.1	28.940 +317	26.45 -36	55.115 +1504	50.74 -166	50.098 +345	13.44 -56	52.159 +532	23.16 -123
5 1.1	29.238 +298	26.81 -36	56.492 +1377	52.72 -198	50.423 +325	14.07 -63	52.655 +496	24.62 -146
5 11.1	29.514 +276	27.19 -38	57.725 +1233	55.03 -231	50.724 +301	14.77 -70	53.109 +454	26.30 -168
5 21.1	29.760 +246	27.60 -41	58.771 +1046	57.59 -256	50.993 +269	15.54 -77	53.507 +398	28.16 -186
5 31.0	29.975 +215	28.04 -44	59.626 +855	60.35 -276	51.229 +236	16.36 -82	53.848 +341	30.16 -200
6 10.0	30.155 +190	28.51 -47	60.268 +642	63.26 -291	51.425 +196	17.25 -89	54.123 +275	32.28 -212
6 20.0	30.293 +138	29.01 -50	60.672 +404	66.23 -297	51.576 +151	18.17 -92	54.322 +199	34.44 -216
6 30.0	30.391 +98	29.53 -52	60.850 +178	69.19 -296	51.682 +106	19.11 -94	54.449 +127	36.60 -216
7 9.9	30.442 +51	30.06 -53	60.784 -66	72.08 -289	51.739 +57	20.04 -93	54.495 +46	38.73 -213
7 19.9	30.447 +5	30.57 -51	60.476 -308	74.79 -271	51.744 +5	20.93 -89	54.460 -35	40.72 -199
7 29.9	30.410 -37	31.05 -48	59.956 -520	77.26 -247	51.703 -41	21.76 -83	54.352 -108	42.53 -181
8 8.8	30.329 -81	31.47 -42	59.222 -734	79.41 -215	51.614 -89	22.48 -72	54.169 -183	44.12 -159
8 18.8	30.210 -119	31.81 -34	58.310 -912	81.14 -173	51.484 -130	23.06 -58	53.924 -245	45.39 -127
8 28.8	30.063 -147	32.05 -24	57.262 -1048	82.43 -129	51.323 -161	23.49 -43	53.630 -294	46.33 -94
9 7.8	29.892 -171	32.16 -11	56.102 -1160	83.20 -77	51.134 -189	23.72 -23	53.295 -335	46.89 -56
9 17.7	29.709 -183	32.14 +2	54.894 -1208	83.41 -21	50.933 -201	23.75 -3	52.942 -353	47.02 -13
9 27.7	29.526 -183	32.14 +15	53.685 -1209	83.08 +33	50.731 -202	23.57 +18	52.587 -355	46.74 +28
10 7.7	29.351 -175	31.72 +27	52.516 -1169	82.18 +90	50.536 -195	23.19 +38	52.245 -342	46.04 +70
10 17.7	29.200 -151	31.34 +38	51.463 -1053	80.74 +144	50.368 -168	22.63 +56	51.943 -302	44.94 +110
10 27.6	29.080 -120	30.87 +47	50.560 -903	78.84 +190	50.233 -135	21.92 +71	51.693 -250	43.50 +144
11 6.6	29.002 -78	30.35 +52	49.849 -711	76.51 +233	50.141 -92	21.08 +84	51.511 -182	41.75 +175
11 16.6	28.975 -27	30.83 +52	49.386 -463	73.86 +265	50.105 -36	20.18 +90	51.415 -96	39.79 +196
11 26.5	29.001 +26	29.32 +51	49.175 -211	71.00 +286	50.125 +20	19.26 +92	51.406 -9	37.69 +210
12 6.5	29.082 +81	28.89 +43	49.242 +67	68.00 +300	50.206 +81	18.37 +89	51.491 +85	35.51 +218
12 16.5	29.216 +134	28.57 +32	49.597 +355	65.01 +299	50.346 +140	17.55 +82	51.673 +182	33.37 +214
12 26.5	29.401 +185	28.27 +30	50.213 +616	62.11 +290	50.540 +194	16.81 +74	51.942 +269	31.32 +205
12 36.4	29.637 +236	28.13 +14	51.092 +879	59.39 +272	50.788 +248	16.20 +61	52.295 +353	29.43 +189
	29.511 +274	28.13 +1	51.092 +1108	59.39 +243	50.788 +290	16.20 +46	52.295 +425	29.43 +164
Mean Place	29.511	20.65	54.796	57.07	50.707	09.68	52.723	25.49
sec δ, tan δ	+1.153	-0.574	+6.288	-6.208	+1.257	-0.761	+2.042	-1.780
dα(ψ), dδ(ψ)	+0.076	-0.06	+0.224	-0.05	+0.081	-0.05	+0.108	-0.05
dα(ε), dδ(ε)	-0.006	-0.99	-0.056	-0.99	-0.007	-0.99	-0.016	-0.99
Dble.Trans.	June 13		June 14		June 14		June 14	

## AT UPPER TRANSIT AT GREENWICH

No.	653		1460		651		655										
	$\beta$ Draconis		$\lambda$ Herculis		$\alpha$ Arae		$\nu^1$ Draconis										
Mag. Spect.	2.99	G0	4.48	K0	2.97	B3p	4.98	A5									
U.T.	R.A.		R.A.		R.A.		R.A.										
	h	Dec.	h	Dec.	h	Dec.	h	Dec.									
	17 30	+ 52 18	17 30	+ 26 06	17 30	- 49 51	17 31	+ 55 11									
1	-8.5	04.454	+ 72	32 55	-363	08 300	+ 109	66.76	-288	42 286	+ 199	62 44	+149	51 353	+ 63	28.21	-367
1	1.4	04.594	+ 140	28 93	-362	08 454	+ 154	63.86	-290	42 548	+ 262	61 08	+136	51 489	+ 136	24.55	-366
1	11.4	04.799	+ 205	25 39	-354	08 650	+ 196	61.01	-285	42 867	+ 319	59 88	+120	51 696	+ 207	20.99	-356
1	21.4	05.066	+ 267	22 12	-327	08 886	+ 236	58.33	-268	43 236	+ 369	58 91	+ 97	51 970	+ 274	17.68	-331
1	31.4	05.381	+ 315	19 21	-291	09 150	+ 264	55.92	-241	43 641	+ 405	58 15	+ 76	52 297	+ 327	14.74	-294
2	10.3	05.739	+ 358	16 73	-248	09 437	+ 287	53.84	-208	44 075	+ 434	57 63	+ 52	52 671	+ 374	12.23	-251
2	20.3	06.129	+ 390	14 83	-190	09 742	+ 305	52.21	-163	44 529	+ 454	57 34	+ 29	53 080	+ 409	10.31	-192
3	2.3	06.535	+ 406	13 54	-129	10 054	+ 312	51.06	-115	44 991	+ 462	57 28	+ 6	53 508	+ 428	09.00	-131
3	12.3	06.953	+ 418	12 88	- 6	10 371	+ 317	50.43	- 63	45 458	+ 467	57 44	- 16	53 950	+ 442	08.34	- 66
3	22.2	07.369	+ 416	12 92	+ 4	10 686	+ 315	50.35	- 8	45 922	+ 464	57 81	- 37	54 389	+ 439	08.38	+ 4
4	1.2	07.770	+ 401	13 59	+ 67	10 991	+ 305	50.79	+ 44	46 374	+ 452	58 37	- 56	54 814	+ 425	09.05	+ 67
4	11.2	08.153	+ 383	14 87	+128	11 286	+ 295	51.72	+ 93	46 815	+ 441	59 12	- 75	55 219	+ 405	10.34	+129
4	21.1	08.504	+ 351	16 72	+185	11 562	+ 276	53.11	+139	47 233	+ 418	60 05	- 93	55 589	+ 370	12.21	+187
5	1.1	08.817	+ 313	19 01	+229	11 816	+ 254	54.86	+175	47 624	+ 391	61 14	-109	55 919	+ 330	14.53	+232
5	11.1	09.088	+ 271	21 70	+269	12 046	+ 230	56.93	+207	47 985	+ 361	62 38	-124	56 203	+ 284	17.24	+271
5	21.1	09.306	+ 218	24 67	+297	12 244	+ 198	59.23	+230	48 306	+ 321	63 76	-138	56 431	+ 228	20.25	+301
5	31.0	09.472	+ 166	27 79	+312	12 410	+ 166	61.66	+243	48 584	+ 278	65 24	-148	56 601	+ 170	23 41	+316
6	10.0	09.582	+ 110	31 02	+323	12 540	+ 130	64.17	+251	48 814	+ 230	66 82	-158	56 710	+ 109	26 69	+328
6	20.0	09.628	+ 46	34 22	+320	12 629	+ 89	66.66	+249	48 986	+ 172	68 43	-161	56 752	+ 42	29 93	+324
6	30.0	09.618	- 10	37 31	+309	12 678	+ 49	69.06	+240	49 104	+ 118	70 06	-163	56 732	- 20	33 06	+313
7	9.9	09.547	- 71	40 23	+292	12 685	+ 7	71.32	+226	49 159	+ 55	71 66	-160	56 648	- 84	36.03	+297
7	19.9	09.416	-131	42 86	+263	12 649	- 36	73.37	+205	49 153	- 6	73 17	-151	56 500	- 148	38.71	+268
7	29.9	09.235	-181	45 18	+232	12 575	- 74	75.18	+181	49 089	- 64	74 56	-139	56 299	- 201	41 07	+236
8	8.8	09.002	-233	47 14	+196	12 462	-113	76.71	+153	48 968	-121	75 77	-121	56 042	- 257	43 06	+199
8	18.8	08.727	-275	48 65	+151	12 316	-146	77.90	+119	48 797	-171	76 74	- 97	55 742	- 300	44.61	+155
8	28.8	08.420	- 307	49 72	+107	12 145	-171	78.76	+ 86	48 588	- 209	77 46	- 72	55 407	- 335	45 71	+110
9	7.8	08.086	-334	50 32	+ 60	11 952	-193	79.26	+ 50	48 346	-242	77 88	- 42	55 043	- 364	46 33	+ 62
9	17.7	07.740	-346	50 40	+ 8	11 749	-203	79.37	+ 11	48 089	-257	77 97	- 9	54 667	- 376	46 43	+ 10
9	27.7	07.393	-347	50 00	- 40	11 544	-205	79.12	- 25	47 830	-259	77 74	+ 23	54 289	- 378	46 03	- 40
10	7.7	07.054	-339	49 08	- 92	11 346	-198	78.47	- 65	47 582	-248	77 18	+ 56	53 919	- 370	45 11	- 92
10	17.7	06.740	-314	47 65	-143	11 167	-179	77 42	-105	47 364	-218	76 32	+ 86	53 576	- 343	43 68	-143
10	27.6	06.460	-280	45 76	-189	11 016	-151	76.03	-139	47 186	-178	75 21	+111	53 268	- 308	41 78	-190
11	6.6	06.225	-235	43 40	-236	10 899	-117	74.26	-177	47 061	-125	73 86	+135	53 006	- 262	39 40	-238
11	16.6	06.048	-177	40 64	-276	10 827	- 72	72 16	-210	47 003	- 58	72 36	+150	52 806	- 200	36 62	-278
11	26.5	05.932	-116	37 55	-309	10 801	- 26	69.79	-237	47 013	+ 10	70 78	+158	52 671	- 135	33 51	-311
12	6.5	05 886	- 46	34 17	-338	10 826	+ 25	67 16	-263	47 096	+ 83	69 16	+162	52 608	- 63	30 09	-342
12	16.5	05 913	+ 27	30 62	-355	10 904	+ 78	64 38	-278	47 253	+ 157	67 59	+157	52 624	+ 16	26 52	-357
12	26.5	06 009	+ 96	27 01	-361	11 029	+ 125	61 51	-287	47 476	+ 223	66 12	+147	52 713	+ 89	22 87	-365
12	36.4	06 175	+ 166	23 41	-360	11 202	+ 173	58 63	-288	47 764	+ 288	64 78	+134	52 878	+ 165	19 24	-363
		06 175	+ 231	23 41	-340	11 202	+ 213	58 63	-276	47 764	+ 342	64 78	+113	52 878	+ 234	19 24	-344
Mean Place	07 611	39 84		11 560	73 05	47 853	59 70	54 539	35 62								
sec $\delta$ , tan $\delta$	+1.636	+1.294		+1.114	+0.490	+1.551	-1.186	+1.752	+1.438								
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.027	-0.05		+0.048	-0.05	+0.092	-0.05	+0.023	-0.05								
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.011	-0.99		+0.004	-0.99	-0.010	-0.99	+0.012	-0.99								
Dble. Trans.	June 14		June 14		June 14		June 15										



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	657		659		652		1462	
	v <sup>2</sup> Draconis		27 Draconis		λ Scorpii		Groombridge 2444 (Herculis)	
Mag.Spect.	4.95	A5	5.21	K0	1.71	B2	5.82	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	17 31	+55 10	17 31	+68 08	17 32	-37 05	17 32	+41 14
1 <sup>d</sup>	<sup>s</sup> 56 814 + 63	47 20 -367	<sup>s</sup> 57 596 + 16	29 61 -374	<sup>s</sup> 36 765 + 170	45 10 + 75	<sup>s</sup> 38 356 + 87	62 24 -340
1 1.5	56 951 + 137	43 54 -366	57 725 + 129	25 90 -371	36 987 + 222	44 46 + 64	38 498 + 142	58 85 -339
1 11.4	57 158 + 207	39 98 -366	57 964 + 239	22 28 -362	37 256 + 269	43 96 + 50	38 692 + 194	55 52 -333
1 21.4	57 431 + 273	36 67 -331	58 310 + 346	18 93 -335	37 565 + 309	43 61 + 35	38 936 + 244	52 42 -310
1 31.4	57 758 + 327	33 72 -295	58 744 + 434	15 97 -296	37 902 + 337	43 40 + 21	39 216 + 280	49 65 -277
2 10.3	58 132 + 374	31 22 -250	59 256 + 512	13 45 -252	38 261 + 359	43 32 + 8	39 528 + 312	47 27 -238
2 20.3	58 540 + 408	29 30 -192	59 828 + 572	11 53 -192	38 636 + 375	43 37 - 5	39 865 + 337	45 43 -184
3 2.3	58 968 + 428	27 99 -131	60 436 + 608	10 24 -129	39 017 + 381	43 51 -14	40 213 + 348	44 15 -128
3 12.3	59 410 + 442	27 32 - 67	61 068 + 632	09 61 - 63	39 402 + 385	43 75 -24	40 570 + 357	43 47 - 68
3 22.2	59 849 + 439	27 36 + 4	61 698 + 630	09 68 + 7	39 784 + 382	44 07 - 32	40 925 + 355	43 44 - 3
4 1.2	60 274 + 425	28 03 + 67	62 306 + 608	10 41 + 73	40 157 + 373	44 46 - 39	41 269 + 344	44 01 + 57
4 11.2	60 679 + 405	29 33 +130	62 881 + 575	11 76 +135	40 521 + 364	44 92 - 46	41 600 + 331	45 15 +114
4 21.2	61 050 + 371	31 19 +186	63 399 + 518	13 70 +194	40 868 + 347	45 45 - 53	41 907 + 307	46 83 +168
5 1.1	61 379 + 329	33 50 +231	63 849 + 450	16 09 +239	41 194 + 326	46 04 - 59	42 185 + 278	48 93 +210
5 11.1	61 664 + 285	36 22 +272	64 223 + 374	18 88 +279	41 497 + 303	46 71 - 67	42 432 + 247	51 41 +248
5 21.1	61 891 + 227	39 23 +301	64 505 + 282	21 97 +309	41 768 + 271	47 45 - 74	42 639 + 207	54 16 +275
5 31.0	62 061 + 170	42 39 +316	64 695 + 190	25 21 +324	42 007 + 239	48 25 - 80	42 805 + 166	57 06 +290
6 10.0	62 171 + 110	45 67 +328	64 787 + 92	28 56 +335	42 206 + 199	49 11 - 86	42 926 + 121	60 07 +301
6 20.0	62 213 + 42	48 91 +324	64 775 - 12	31 88 +332	42 360 + 154	50 01 - 90	42 998 + 72	63 05 +298
6 30.0	62 194 - 19	52 04 +313	64 668 - 107	35 07 +319	42 469 + 109	50 93 - 92	43 022 + 24	65 93 +288
7 9.9	62 109 - 85	55 01 +297	64 463 - 205	38 09 +302	42 529 + 60	51 85 - 92	42 996 - 26	68 66 +273
7 19.9	61 962 - 147	57 69 +268	64 165 - 298	40 81 +272	42 537 + 8	52 74 - 80	42 921 + 166	71 13 +247
7 29.9	61 760 - 202	60 05 +236	63 788 - 377	43 21 +240	42 499 - 38	53 56 - 82	42 802 - 119	73 31 +218
8 8.8	61 504 - 256	62 04 +199	63 333 - 455	45 23 +202	42 413 - 86	54 29 - 73	42 639 - 163	75 17 +186
8 18.8	61 204 - 300	63 59 +155	62 815 - 518	46 78 +155	42 285 - 128	54 88 - 59	42 439 - 200	76 61 +144
8 28.8	60 869 - 335	64 69 +110	62 251 - 564	47 88 +110	42 126 - 159	55 32 - 44	42 210 - 229	77 65 +104
9 7.8	60 506 - 363	65 32 + 63	61 646 - 605	48 49 + 61	41 939 - 187	55 57 - 25	41 957 - 253	78 25 + 60
9 17.7	60 130 - 376	65 41 + 9	61 025 - 621	48 55 - 201	41 738 - 201	55 61 - 4	41 694 - 263	78 38 + 13
9 27.7	59 752 - 378	65 02 - 39	60 401 - 624	48 12 - 43	41 536 - 202	55 46 + 15	41 428 - 266	78 06 - 32
10 7.7	59 382 - 370	64 10 - 92	59 789 - 612	47 15 - 97	41 341 - 195	55 10 + 36	41 168 - 260	77 26 - 80
10 17.7	59 039 - 343	62 67 -143	59 215 - 574	45 66 -149	41 172 - 169	54 56 + 54	40 931 - 237	75 98 -128
10 27.6	58 731 - 308	60 77 -190	58 689 - 526	43 69 -197	41 035 - 137	53 87 + 69	40 722 - 209	74 28 -170
11 6.6	58 469 - 262	58 40 -237	58 229 - 460	41 24 -245	40 942 - 93	53 06 + 81	40 552 - 170	72 13 -215
11 16.6	58 269 - 200	55 62 -278	57 857 - 372	38 38 -286	40 903 - 39	52 17 + 89	40 431 - 121	69 61 -252
11 26.5	58 133 - 136	52 50 -312	57 576 - 281	35 19 -319	40 920 + 17	51 26 + 91	40 363 - 68	66 77 -284
12 6.5	58 071 - 62	49 09 -341	57 403 - 173	31 70 -349	40 997 + 77	50 38 + 88	40 352 - 11	63 63 -314
12 16.5	58 086 + 15	45 51 -358	57 346 - 57	28 05 -365	41 133 + 136	49 57 + 81	40 403 + 51	60 34 -329
12 26.5	58 175 + 89	41 86 -365	57 400 + 54	24 34 -371	41 324 + 191	48 82 + 75	40 510 + 107	56 96 -338
12 36.4	58 340 + 165	38 23 -363	57 572 + 172	20 65 -369	41 568 + 244	48 21 + 61	40 674 + 164	53 58 -338
	58 340 + 234	38 23 -343	57 572 + 282	20 65 -349	41 568 + 287	48 21 + 47	40 674 + 214	53 58 -321
Mean Place	60.000	54.61	60.986	37.34	41.487	41.61	41.521	69.15
sec δ, tan δ	+1.751	+1.438	+2.686	+2.493	+1.254	-0.756	+1.330	+0.877
dα(ψ), dδ(ψ)	+0.023	-0.05	-0.004	-0.05	+0.081	-0.05	+0.038	-0.05
dα(ε), dδ(ε)	+0.012	-0.99	+0.020	-0.99	-0.006	-0.99	+0.007	-0.99
Dble.Trans.	June 15		June 15		June 15		June 15	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1461		656		654		658	
	B.D. -11° 4411 (Serpentis)		α Ophiuchi		♁ Scorpii		ξ Serpentis	
Mag. Spect.	5.68	B8	2.14	A5	2.04	F0	3.64	A5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ′	h m	° ′	h m	° ′	h m	° ′
	17 33	-11 14	17 34	+12 33	17 36	-42 59	17 36	-15 23
1 <sup>d</sup>	57.414	05.68	15.039	63.44	15.830	28.44	44.842	31.97
1 <sup>s</sup>	57.595	06.64	15.199	61.15	16.063	27.43	45.026	32.68
1	57.813	07.66	15.397	58.87	16.346	26.57	45.248	33.44
1	58.065	08.68	15.630	56.70	16.674	25.88	45.504	34.23
1	58.339	09.66	15.888	54.73	17.034	25.37	45.782	35.01
2	58.632	10.57	16.167	53.00	17.419	25.03	46.080	35.74
2	58.938	11.34	16.460	51.62	17.823	24.87	46.391	36.39
3	59.249	11.96	16.759	50.61	18.234	24.86	46.707	36.92
3	59.563	12.40	17.062	50.01	18.650	25.00	47.027	37.31
3	59.874	12.64	17.363	49.86	19.064	25.29	47.345	37.54
4	60.178	12.68	17.657	50.12	19.469	25.71	47.656	37.62
4	60.475	12.54	17.942	50.78	19.865	26.25	47.960	37.56
4	60.758	12.23	18.212	51.82	20.242	26.92	48.250	37.37
5	61.024	11.78	18.463	53.14	20.597	27.70	48.523	37.08
5	61.271	11.24	18.694	54.72	20.927	28.60	48.778	36.71
5	61.493	10.62	18.898	56.48	21.222	29.60	49.008	36.29
5	61.689	09.97	19.074	58.34	21.481	30.69	49.210	35.87
6	61.853	09.32	19.217	60.27	21.698	31.86	49.381	35.44
6	61.980	08.69	19.323	62.17	21.865	33.08	49.514	35.05
6	62.071	08.11	19.392	64.00	21.984	34.33	49.611	34.71
7	62.122	07.58	19.422	65.73	22.047	35.57	49.666	34.41
7	62.131	07.13	19.411	67.29	22.056	36.76	49.679	34.17
7	62.102	06.75	19.364	68.66	22.013	37.86	49.653	33.98
8	62.035	06.44	19.279	69.82	21.918	38.83	49.587	33.84
8	61.933	06.20	19.161	70.73	21.777	39.63	49.486	33.74
8	61.805	06.03	19.018	71.39	21.602	40.23	49.357	33.66
9	61.654	05.91	18.854	71.80	21.395	40.60	49.205	33.61
9	61.492	05.85	18.679	71.91	21.175	40.70	49.041	33.58
9	61.328	05.85	18.502	71.76	20.951	40.55	48.875	33.56
10	61.170	05.91	18.331	71.32	20.734	40.13	48.714	33.56
10	61.031	06.04	18.179	70.58	20.544	39.47	48.573	33.59
10	60.919	06.26	18.052	69.58	20.389	38.60	48.459	33.66
11	60.843	06.57	17.958	68.28	20.280	37.56	48.381	33.80
11	60.810	07.00	17.907	66.73	20.230	36.40	48.347	34.02
11	60.823	07.53	17.899	64.95	20.240	35.18	48.360	34.32
12	60.885	08.19	17.940	62.95	20.314	33.94	48.423	34.72
12	60.995	08.95	18.030	60.80	20.454	32.76	48.534	35.20
12	61.150	09.85	18.163	58.56	20.652	31.65	48.689	35.85
12	61.348	10.82	18.340	56.28	20.908	30.67	48.890	36.56
Mean Place	61.248	00.97	18.457	69.16	20.885	24.71	48.779	27.24
sec δ, tan δ	+1.020	-0.199	+1.025	+0.223	+1.367	-0.932	+1.037	-0.275
dα(ψ), dδ(ψ)	+0.066	-0.04	+0.055	-0.04	+0.086	-0.04	+0.068	-0.04
dα(ε), dδ(ε)	-0.001	-0.99	+0.002	-0.99	-0.006	-0.99	-0.002	-0.99
Dble. Trans.	June 15		June 15		June 16		June 16	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	664		663		660		670	
	ω Draconis		ι Herculis		κ Scorpis		ψ Draconis* p.	
Name								
Mag.Spect.	4.87	F5	3.79	B3	2.51	B2	4.90	F5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	17 36	+ 68 45	17 39	+ 46 00	17 41	- 39 01	17 42	+ 72 08
1 <sup>d</sup> -8.5 <sup>s</sup>	58 275 - 1	43 72 -372	01 822 + 71	40.11 -349	28 359 + 163	" + 90	06 974 - 42	" -370
1 1.5	58 390 + 115	40 01 -371	01 952 + 130	36 61 -350	28 575 + 216	" + 80	07 068 + 94	69 67 -370
1 11.4	58 620 + 230	36 39 -362	02 140 + 188	33 18 -343	28 839 + 264	" + 67	07 299 + 231	66 04 -363
1 21.4	58 961 + 341	33 03 -336	02 382 + 242	29 96 -322	29 146 + 307	" + 53	07 664 + 365	62 66 -338
1 31.4	59 393 + 432	30.04 -299	02 666 + 284	27.08 -288	29 483 + 337	" + 37	08 140 + 476	59 63 -303
2 10.3	59 907 + 514	27 49 -255	02 987 + 321	24 61 -247	29 845 + 362	" + 25	08 718 + 578	57 03 -260
2 20.3	60 487 + 580	25 53 -196	03 337 + 350	22 67 -194	30 225 + 380	" + 10	09 377 + 659	55 01 -202
3 2.3	61 104 + 617	24 19 -134	03 703 + 366	21 32 -135	30 612 + 387	" - 1	10 086 + 709	53 61 -140
3 12.3	61 750 + 646	23 50 - 69	04 080 + 377	20 58 - 74	31 006 + 394	" - 12	10 832 + 746	52 85 - 76
3 22.2	62 396 + 646	23 53 + 3	04 457 + 377	20 51 - 7	31 397 + 391	" - 22	11 582 + 750	52 81 - 4
4 1.2	63 021 + 625	24 20 + 67	04 823 + 366	21 05 + 54	31 782 + 385	" - 31	12 310 + 728	53 41 + 60
4 11.2	63 615 + 594	25 51 +131	05 177 + 354	22 19 +114	32 159 + 377	" - 41	13 004 + 694	54 64 +123
4 21.2	64 151 + 536	27 41 +190	05 505 + 328	23 90 +171	32 520 + 361	" - 49	13 631 + 627	56 47 +183
5 1.1	64 620 + 469	29 76 +235	05 802 + 297	26 05 +215	32 860 + 340	" - 59	14 177 + 546	58 76 +229
5 11.1	65 012 + 392	32 54 +392	06 066 + 264	28 59 +254	33 178 + 318	" - 67	14 634 + 457	61 48 +272
5 21.1	65 309 + 297	35 61 +307	06 286 + 220	31 43 +284	33 465 + 287	" - 77	14 978 + 344	64 51 +303
5 31.0	65 512 + 203	38 85 +324	06 461 + 175	34 44 +301	33 718 + 253	" - 85	15 209 + 231	67 72 +321
6 10.0	65 615 + 103	42 21 +336	06 587 + 126	37 57 +313	33 931 + 213	" - 93	15 322 + 113	71 05 +333
6 20.0	65 610 - 5	45 54 +333	06 659 + 72	40 69 +312	34 099 + 168	" - 97	15 307 - 15	74 37 +332
6 30.0	65 508 - 102	48 77 +323	06 680 + 21	43 70 +301	34 220 + 121	" -102	15 176 - 131	77 59 +322
7 9.9	65 304 - 204	51 83 +306	06 646 - 34	46 58 +288	34 290 + 70	" -102	14 925 - 251	80 66 +307
7 19.9	65 003 - 301	54 60 +277	06 559 - 87	49 20 +262	34 306 + 16	" -100	14 558 - 367	83 45 +279
7 29.9	64 621 - 382	57 05 +245	06 424 - 135	51 52 +232	34 306 - 31	" - 94	14 558 - 462	83 45 +247
8 8.9	64 157 - 464	59 13 +208	06 242 - 182	53 51 +199	34 275 - 83	" - 84	14 096 - 559	85 92 +212
8 18.8	63 628 - 529	60 76 +163	06 019 - 223	55 07 +156	34 192 - 125	" - 70	13 537 - 637	88 04 +166
8 28.8	63 049 - 579	61 93 +117	05 766 - 253	56 23 +116	33 907 - 160	" - 54	12 205 - 695	90 93 +123
9 7.8	62 427 - 622	62 62 + 69	05 486 - 280	56 93 + 70	33 716 - 191	" - 34	11 458 - 747	91 66 + 73
9 17.7	61 786 - 641	62 76 + 14	05 192 - 294	57 14 + 21	33 511 - 205	" - 12	10 687 - 771	91 87 + 21
9 27.7	61 142 - 644	62 41 - 35	04 896 - 296	56 88 - 26	33 302 - 209	" + 9	09 910 - 777	91 57 - 30
10 7.7	60 507 - 635	61 52 - 89	04 605 - 291	56 12 - 76	33 098 - 204	" + 32	09 142 - 768	90 74 - 83
10 17.7	59 909 - 598	60 10 -142	04 335 - 270	54 86 -126	32 918 - 180	" + 53	08 414 - 728	89 38 -136
10 27.6	59 359 - 550	58 21 -189	04 095 - 240	53 16 -170	32 771 - 147	" + 71	07 739 - 675	87 55 -183
11 6.6	58 875 - 484	55 82 -239	03 894 - 201	51 00 -216	32 666 - 105	" + 85	07 138 - 601	85 22 -233
11 16.6	58 479 - 396	53 02 -280	03 745 - 149	48 43 -257	32 666 - 50	" + 96	06 637 - 501	82 47 -275
11 26.6	58 176 - 303	49 88 -314	03 649 - 96	45 53 -290	32 616 + 6	" +100	06 243 - 394	79 37 -310
12 6.5	57 983 - 193	46 43 -345	03 616 - 33	42 32 -321	32 689 + 67	" +101	05 975 - 268	75 95 -342
12 16.5	57 907 - 76	42 81 -362	03 647 + 31	38 94 -338	32 817 + 128	" + 95	05 845 + 9	72 36 -359
12 26.5	57 946 + 39	39 11 -370	03 739 + 92	35 46 -348	33 000 + 183	" + 89	05 848 + 3	68 67 -369
12 36.4	58 106 + 160	35 43 -368	03 893 + 154	31 98 -348	33 239 + 239	" + 79	05 996 + 148	64 99 -368
	+ 273	-349	+ 210	-332	+ 284	+ 64	+ 263	-351
Mean Place	61.718	51.48	04.997	47.21	33.178	26.69	10.610	80.77
sec δ, tan δ	+2.761	+2.573	+1.440	+1.036	+1.287	-0.810	+3.263	+3.106
dα(ψ), dδ(ψ)	-0.007	-0.04	+0.034	-0.04	+0.083	-0.03	-0.021	-0.03
dα(ε), dδ(ε)	+0.017	-0.99	+0.006	-1.00	-0.004	-1.00	+0.016	-1.00
Dble.Trans.	June 16		June 16		June 17		June 17	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1463		665		662		661	
	58 Ophiuchi		$\beta$ Ophiuchi		$\mu$ Arae		$\eta$ Pavonis	
Mag. Spect.	4.89	F5	2.94	K0	5.26	G5	3.58	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "	h m	$^{\circ}$ ' "
	17 42	-21 40	17 42	+ 4 34	17 42	-51 49	17 44	-64 43
1 <sup>d</sup>	33.121 <sup>s</sup> +130	44.23 -18	44.789 <sup>s</sup> +116	13.91 -178	58.593 <sup>s</sup> +186	45.02 +165	16.876 <sup>s</sup> +227	11.58 +232
1	33.311 +190	44.53 -30	44.947 +158	12.08 -183	58.846 +253	43.49 +153	17.198 +322	11.58 +220
1	33.538 +227	44.89 -36	45.142 +195	10.23 -185	59.160 +314	42.10 +139	17.610 +412	09.38 +204
1	33.799 +261	45.31 -42	45.371 +229	08.45 -178	59.528 +368	40.92 +118	18.102 +492	07.34 +178
1	34.085 +286	45.75 -44	45.625 +254	06.81 -164	59.936 +408	39.96 +96	18.655 +563	05.56 +151
2	34.392 +307	46.20 -45	45.899 +274	05.35 -146	60.376 +440	39.22 +74	19.260 +605	02.85 +120
2	34.713 +321	46.61 -41	46.188 +289	04.17 -118	60.841 +465	38.74 +48	19.902 +642	02.00 +85
2	35.040 +327	46.98 -37	46.484 +296	03.30 -87	61.316 +475	38.48 +26	20.565 +663	02.00 +52
3	35.371 +331	47.27 -29	46.785 +301	02.76 -54	61.801 +485	38.46 +2	21.243 +678	01.48 +18
3	35.702 +331	47.47 -20	47.085 +300	02.59 -17	62.284 +483	38.67 -21	21.921 +678	01.48 -18
4	36.026 +324	47.59 -12	47.379 +294	02.77 +18	62.758 +474	39.09 -42	22.586 +665	01.97 -49
4	36.344 +318	47.63 -4	47.667 +288	03.28 +51	63.222 +464	39.73 -64	23.237 +651	02.79 -82
4	36.649 +305	47.59 +4	47.941 +274	04.10 +82	63.665 +443	40.57 -84	23.855 +618	03.92 -113
5	36.937 +288	47.51 +8	48.199 +258	05.16 +106	64.082 +417	41.59 -102	24.434 +579	05.31 -139
5	37.207 +270	47.40 +11	48.439 +240	06.44 +128	64.469 +387	42.80 -121	24.968 +534	06.97 -166
5	37.450 +243	47.28 +12	48.654 +215	07.87 +143	64.815 +346	44.17 -137	25.440 +472	08.85 -188
5	37.666 +216	47.17 +11	48.842 +188	09.38 +151	65.118 +303	45.67 -150	25.847 +407	10.91 -206
6	37.850 +184	47.09 +8	48.999 +157	10.94 +156	65.371 +253	47.28 -161	26.180 +333	13.13 -222
6	37.995 +145	47.05 +4	49.120 +121	12.48 +154	65.565 +194	48.96 -168	26.427 +247	15.43 -230
6	38.102 +107	47.05 +0	49.205 +85	13.95 +147	65.701 +136	50.67 -171	26.590 +163	17.75 -232
7	38.165 +63	47.10 -5	49.251 +46	15.34 +139	65.773 +72	52.38 -171	26.660 +70	20.06 -231
7	38.184 +19	47.18 -8	49.256 +5	16.60 +126	65.778 +5	54.01 -163	26.636 -24	22.26 -220
7	38.163 -21	47.18 -11	49.256 -33	16.60 +110	65.778 -55	54.01 -152	26.636 -109	22.26 -204
7	38.163 -64	47.29 -12	49.223 -71	17.70 +93	65.723 -116	55.53 -135	26.527 -197	24.30 -182
8	38.099 -101	47.41 -12	49.152 -104	18.63 +74	65.607 -170	56.88 -112	26.330 -272	26.12 -150
8	37.998 -131	47.53 -10	49.048 -130	19.37 +55	65.437 -213	58.00 -87	26.058 -332	27.62 -117
8	37.867 -155	47.63 -6	48.918 -154	19.92 +36	65.224 -249	58.87 -56	25.726 -383	28.79 -76
9	37.712 -169	47.69 -2	48.764 -166	20.28 +13	64.975 -268	59.43 -22	25.343 -409	29.55 -32
9	37.543 -173	47.71 +4	48.598 -169	20.41 -6	64.707 -274	59.65 +12	24.934 -417	29.87 +12
9	37.370 -167	47.67 +7	48.429 -164	20.35 -28	64.433 -265	59.53 +46	24.517 -408	29.75 +59
10	37.203 -148	47.60 +11	48.265 -148	20.07 -51	64.168 -237	59.07 +80	24.109 -368	29.16 +102
10	37.055 -121	47.49 +13	48.117 -123	19.56 -71	63.931 -198	58.27 +109	23.741 -314	28.14 +141
10	36.934 -84	47.36 +13	47.994 -91	18.85 -95	63.733 -145	57.18 +134	23.427 -242	26.73 +178
11	36.850 -39	47.23 +10	47.903 -49	17.90 -116	63.588 -79	55.84 +153	23.185 -149	24.95 +204
11	36.811 +10	47.13 +5	47.854 -6	16.74 -134	63.509 -9	54.31 +166	23.036 -52	22.91 +224
11	36.821 +61	47.08 -2	47.848 +41	15.40 -154	63.500 +66	52.65 +172	22.984 +54	20.67 +236
12	36.882 +120	47.10 +2	47.889 +88	13.86 -168	63.566 +143	50.93 +170	23.038 +163	18.31 +237
12	37.002 +145	47.08 -32	47.977 +132	12.18 -177	63.709 +213	49.23 +164	23.201 +263	15.94 +231
12	37.147 +206	47.40 -29	48.109 +174	10.41 -184	63.922 +280	47.59 +151	23.464 +362	13.63 +218
12	37.353 +243	47.69 -35	48.283 +211	08.57 -180	64.202 +338	46.08 +133	23.826 +447	11.45 +196
Mean Place	37.237	39.17	48.323	19.96	64.329	40.77	24.454	07.28
sec $\delta$ , tan $\delta$	+1.076	-0.397	+1.003	+0.080	+1.618	-1.272	+2.342	-2.117
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.072	-0.03	+0.059	-0.03	+0.095	-0.03	+0.117	-0.03
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.002	-1.00	+0.000	-1.00	-0.006	-1.00	-0.010	-1.00
Dble. Trans.	June 17		June 17		June 17		June 18	

AT UPPER TRANSIT AT GREENWICH

No.	667		666		1464		668	
	μ Herculis		ι' Scorpii		X Sagittarii		γ Ophiuchi	
Mag.Spect.	3.48	G5	3.14	F5p	4.4 to 5.0	F5 to G0	3.74	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>
	17 45	+ 27 43	17 46	- 40 07	17 46	- 27 49	17 47	+ 2 42
1 -8.5	<sup>s</sup> 52 583 + 90	34 57 -292	<sup>s</sup> 33 517 + 158	27 01 + 98	<sup>s</sup> 38 308 + 136	40 98 + 19	<sup>s</sup> 09 359 + 113	35 77 -167
1 1.5	52 719 + 136	31 63 -294	33 730 + 213	26 12 + 89	38 500 + 192	40 80 + 18	09 514 + 155	34 05 -172
1 11.4	52 900 + 181	28 71 -292	33 992 + 262	25 35 + 77	38 734 + 234	+ 5	09 707 + 193	32 30 -175
1 21.4	53 121 + 221	28 71 -276	33 992 + 306	25 35 + 63	38 734 + 270	40 75 - 5	09 707 + 227	32 30 -168
1 31.4	53 372 + 251	25 95 -250	34 298 + 337	24 72 + 47	39 004 + 297	40 80 - 12	09 934 + 252	30 62 -156
		23 45	34 635	24 25	39 301	40 92	10 186	29 06
2 10.4	53 651 + 279	21 27 -218	34 999 + 364	23 91 + 34	39 620 + 319	41 08 - 16	10 458 + 272	27 68 -138
2 20.3	53 949 + 298	19 54 -173	35 381 + 382	23 72 + 19	39 955 + 335	41 27 - 19	10 746 + 288	26 55 -113
3 2.3	54 255 + 309	18 30 -124	35 772 + 391	23 65 + 7	40 297 + 342	41 47 - 20	11 041 + 295	25 71 - 84
3 12.3	54 575 + 317	17 57 - 73	36 171 + 399	23 69 - 4	40 297 + 348	41 66 - 19	11 342 + 301	25 19 - 52
3 22.2	54 892 + 317	17 41 - 16	36 569 + 398	23 86 - 17	40 992 + 347	41 83 - 17	11 642 + 300	25 02 - 17
4 1.2	55 202 + 310	17 77 + 36	36 960 + 391	24 12 - 26	41 334 + 342	41 97 - 14	11 938 + 296	25 17 + 15
4 11.2	55 505 + 303	18 64 + 87	37 345 + 385	24 49 - 37	41 669 + 335	42 10 - 13	12 227 + 289	25 64 + 47
4 21.2	55 790 + 285	20 00 +136	37 713 + 368	24 96 - 47	41 991 + 322	42 22 - 12	12 504 + 277	26 41 + 77
5 1.1	56 056 + 266	21 74 +174	38 062 + 349	25 53 - 57	42 297 + 306	42 34 - 12	12 766 + 262	27 41 +100
5 11.1	56 298 + 242	23 82 +206	38 390 + 328	26 21 - 68	42 297 + 287	42 34 - 14	12 766 + 244	27 41 +121
		23 82	38 390	26 21	42 584	42 48	13 010	28 62
5 21.1	56 509 + 211	26 16 +234	38 685 + 295	27 00 - 79	42 844 + 280	42 65 - 17	13 229 + 219	29 97 +135
5 31.1	56 688 + 179	28 64 +248	38 946 + 261	27 87 - 87	43 075 + 231	42 86 - 21	13 422 + 193	31 39 +142
6 10.0	56 831 + 143	31 23 +259	39 168 + 222	28 83 - 96	43 272 + 197	43 11 - 25	13 585 + 163	32 86 +147
6 20.0	56 932 + 101	33 81 +258	39 343 + 175	29 85 -102	43 429 + 157	43 42 - 31	13 711 + 126	34 31 +145
6 30.0	56 992 + 60	36 31 +250	39 471 + 128	30 91 -106	43 546 + 117	43 78 - 36	13 802 + 91	35 70 +139
7 9.9	57 009 + 17	38 69 +238	39 547 + 76	32 00 -109	43 617 + 71	44 17 - 39	13 853 + 51	37 00 +130
7 19.9	56 982 - 27	40 86 +217	39 569 + 22	33 05 -105	43 641 + 24	44 57 - 40	13 863 + 10	38 18 +118
7 29.9	56 915 - 67	42 79 +193	39 541 - 28	34 05 -100	43 621 - 20	44 57 - 42	13 836 - 27	38 18 +102
8 8.9	56 806 - 109	44 45 +166	39 461 - 80	34 96 - 91	43 557 - 64	44 99 - 38	13 769 - 67	40 08 + 88
8 18.8	56 663 - 143	45 76 +131	39 336 - 125	35 72 - 76	43 454 - 103	45 37 - 34	13 669 - 100	40 77 + 69
8 28.8	56 492 - 171	46 75 + 99	39 176 - 160	36 32 - 60	43 319 - 135	45 98 - 27	13 541 - 128	41 28 + 51
9 7.8	56 296 - 196	47 36 + 61	38 984 - 192	36 72 - 40	43 156 - 163	46 17 - 19	13 390 - 151	41 62 + 34
9 17.8	56 089 - 207	47 58 + 22	38 775 - 209	36 89 - 17	42 979 - 177	46 24 - 7	13 227 - 163	41 75 + 13
9 27.7	55 877 - 212	47 42 - 16	38 562 - 213	36 83 + 6	42 798 - 181	46 21 + 3	13 059 - 168	41 70 - 5
10 7.7	55 669 - 208	46 85 - 57	38 353 - 209	36 53 + 30	42 621 - 177	46 07 + 14	12 895 - 164	41 44 - 26
10 17.7	55 480 - 189	45 88 - 97	38 167 - 186	36 01 + 52	42 464 - 157	45 83 + 24	12 747 - 148	40 98 - 46
10 27.6	55 314 - 166	44 55 -133	38 013 - 154	35 30 + 71	42 334 - 130	45 51 + 32	12 623 - 124	40 33 - 65
11 6.6	55 182 - 132	42 82 -173	37 902 - 111	34 42 + 88	42 242 - 92	45 13 + 38	12 532 - 91	39 46 - 87
11 16.6	55 093 - 89	40 75 -207	37 845 - 57	34 42 + 99	42 198 - 44	44 73 + 40	12 481 - 51	38 40 -106
11 26.6	55 049 - 44	38 39 -236	37 845 + 0	32 38 +105	42 203 + 5	44 34 + 39	12 473 - 8	37 15 -125
12 6.5	55 056 + 7	35 75 -264	37 906 + 61	31 30 +108	42 263 + 60	43 99 + 35	12 511 + 38	35 72 -143
12 16.5	55 115 + 59	32 95 -280	38 030 + 124	30 27 +103	42 377 + 114	43 77 + 22	12 598 + 87	34 16 -156
12 26.5	55 222 + 107	30 04 -291	38 209 + 179	29 29 + 98	42 532 + 155	43 51 + 26	12 727 + 129	32 50 -166
12 36.4	55 377 + 155	27 10 -294	38 444 + 235	28 42 + 87	42 743 + 211	43 37 + 14	12 899 + 172	30 77 -173
	55 377 + 198	27 10 -283	38 444 + 282	28 42 + 74	42 743 + 251	43 37 + 3	12 899 + 208	30 77 -169
Mean Place	55.840	40.99	38.393	21.91	42.630	35.55	12.926	41.91
sec δ, tan δ	+1.130	+0.526	+1.308	-0.843	+1.131	-0.528	+1.001	+0.047
da(ψ), dδ(ψ)	+0.047	-0.02	+0.083	-0.02	+0.075	-0.02	+0.060	-0.02
da(ε), dδ(ε)	+0.002	-1.00	-0.003	-1.00	-0.002	-1.00	+0.000	-1.00
Dble.Trans.	June 18		June 18		June 18		June 18	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1465		669		1466		675		
	B.D. +20° 3570 (Herculis)		G Scorii		B.D. +9° 3485 (Ophiuchi)		35 Draconis		
Mag.Spect.	5.77	K0	3.25	K2	6.79	K5	5.04	F5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	17 47	+20 33	17 48	-37 02	17 49	+9 50	17 49	+76 57	
1	-8.5	46.657 +95	62.93 -258	51.650 +151	29.13 +80	27.439 +104	59.65 -205	59.027 -141	47.46 -361
1	1.5	46.797 +140	60.30 -263	51.854 +204	28.41 +72	27.585 +146	57.55 -210	59.071 +44	43.82 -364
1	11.4	46.977 +180	57.69 -261	52.106 +252	27.80 +61	27.770 +185	55.44 -211	59.303 +232	40.23 -359
1	21.4	47.196 +219	55.21 -248	52.399 +293	27.32 +48	27.990 +220	53.42 -202	59.722 +419	36.87 -336
1	31.4	47.442 +246	52.95 -226	52.722 +323	26.97 +35	28.236 +246	51.56 -186	60.299 +577	33.84 -303
2	10.4	47.714 +272	50.97 -198	53.071 +349	26.73 +24	28.505 +269	49.93 -163	61.023 +724	31.21 -263
2	20.3	48.004 +290	49.39 -158	53.438 +367	26.61 +12	28.790 +285	48.61 -132	61.866 +843	29.15 -206
3	2.3	48.303 +299	48.24 -115	53.813 +375	26.58 +3	29.083 +293	47.63 -98	62.787 +921	27.68 -147
3	12.3	48.610 +307	47.56 -68	54.196 +383	26.64 -6	29.383 +300	47.04 -59	63.765 +978	26.85 -83
3	22.2	48.917 +307	47.39 -17	54.579 +383	26.78 -14	29.683 +300	46.86 -18	64.757 +992	26.72 -13
4	1.2	49.219 +302	47.70 +31	54.956 +377	26.99 -21	29.978 +295	47.08 +22	65.726 +969	27.23 +51
4	11.2	49.514 +295	48.47 +77	55.326 +370	27.27 -28	30.268 +290	47.68 +60	66.652 +926	28.38 +115
4	21.2	49.794 +280	49.68 +121	55.682 +356	27.64 -37	30.545 +277	48.63 +95	67.491 +839	30.12 +174
5	1.1	50.057 +263	51.24 +156	56.020 +338	28.07 -43	30.806 +261	49.87 +124	68.222 +731	32.34 +222
5	11.1	50.299 +242	53.10 +186	56.337 +317	28.60 -53	31.049 +243	51.36 +149	68.831 +609	34.99 +265
5	21.1	50.512 +213	55.20 +210	56.623 +286	29.21 -61	31.266 +217	53.03 +167	69.287 +456	37.96 +297
5	31.1	50.697 +185	57.43 +223	56.878 +255	29.90 -69	31.457 +191	54.80 +177	69.590 +303	41.13 +317
6	10.0	50.848 +151	59.76 +233	57.095 +217	30.68 -78	31.616 +159	56.63 +183	69.730 +140	44.44 +331
6	20.0	50.959 +111	62.08 +232	57.268 +173	31.52 -84	31.739 +123	58.46 +183	69.694 -36	47.75 +331
6	30.0	51.033 +74	64.32 +224	57.395 +127	32.40 -88	31.826 +87	60.22 +176	69.500 -194	50.99 +324
7	9.9	51.065 +32	66.46 +210	57.473 +78	33.31 -91	31.872 +46	61.89 +167	69.143 -357	54.08 +309
7	19.9	51.054 -11	68.42 +196	57.498 +25	34.20 -89	31.877 +5	63.41 +152	68.628 -515	56.92 +284
7	29.9	51.004 -50	70.16 +174	57.475 -23	35.06 -86	31.844 -33	64.74 +133	67.983 -645	59.47 +255
8	8.9	50.915 -89	71.66 +150	57.402 -73	35.85 -79	31.772 -72	65.90 +116	67.207 -776	61.67 +220
8	18.8	50.791 -124	72.85 +119	57.286 -116	36.51 -66	31.666 -106	66.81 +91	66.323 -884	63.43 +176
8	28.8	50.639 -152	73.76 +91	57.135 -151	37.04 -53	31.533 -133	67.50 +69	65.359 -964	64.76 +133
9	7.8	50.464 -175	74.35 +59	56.954 -181	37.40 -36	31.375 -158	67.96 +46	64.323 -1036	65.62 +86
9	17.8	50.276 -188	74.58 +23	56.756 -198	37.56 -16	31.205 -170	68.14 +18	63.252 -1071	65.96 +34
9	27.7	50.083 -193	74.49 -9	56.553 -203	37.52 +4	31.030 -175	68.14 -6	62.168 -1084	65.81 -15
10	7.7	49.894 -189	74.05 -44	56.354 -199	37.28 +24	30.859 -171	67.76 -32	61.089 -1079	65.12 -69
10	17.7	49.721 -173	73.24 -81	56.176 -178	36.84 +44	30.703 -156	67.16 -60	60.059 -1030	63.91 -121
10	27.6	49.572 -149	72.12 -112	56.029 -147	36.24 +60	30.571 -132	66.32 -84	59.094 -965	62.22 -169
11	6.6	49.455 -117	70.64 -148	55.922 -107	35.49 +75	30.470 -101	65.20 -112	58.220 -874	60.04 -218
11	16.6	49.380 -75	68.86 -178	55.868 -54	34.65 +84	30.410 -60	65.20 -136	57.475 -745	57.43 -261
11	26.6	49.348 -32	66.81 -205	55.868 +0	33.76 +89	30.392 -18	62.26 -158	56.867 -608	54.46 -297
12	6.5	49.364 +16	64.50 -231	55.926 +58	32.87 +89	30.421 +29	60.47 -179	56.424 -443	51.15 -331
12	16.5	49.430 +66	62.03 -247	56.045 +119	32.02 +85	30.497 +76	58.53 -194	56.164 -260	47.65 -350
12	26.5	49.542 +112	59.45 -258	56.216 +171	31.22 +80	30.618 +121	56.48 -205	56.085 -79	44.05 -360
12	36.5	49.699 +157	56.83 -262	56.441 +225	30.51 +71	30.781 +163	54.38 -210	56.202 +117	40.42 -363
		+197	-263	+271	+59	+201	-205	+305	-347
Mean Place	49.994	69.54	56.363	23.67	30.901	66.08	63.146	54.96	
sec δ, tan δ	+1.068	+0.375	+1.253	-0.755	+1.015	+0.174	+4.434	+4.320	
dα(ψ), dδ(ψ)	+0.051	-0.02	+0.081	-0.02	+0.057	-0.02	-0.053	-0.02	
dα(ε), dδ(ε)	+0.001	-1.00	-0.002	-1.00	+0.001	-1.00	+0.012	-1.00	
Dble.Trans.	June 19		June 19		June 19		June 19		

AT UPPER TRANSIT AT GREENWICH

No.	671		1467		1468		672	
Name	ξ Draconis		B.D. -7° 4523 (Ophiuchi)		89 Herculis		9 Herculis	
Mag. Spect.	3.90	K0	6.87	G5	5.48	F5p	3.99	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	17 53	+56 51	17 54	- 7 43	17 54	+26 02	17 55	+37 14
1 -8.5	14.404 <sup>s</sup> + 20	80 94 <sup>"</sup> -361	10.026 <sup>s</sup> + 115	61.46 <sup>"</sup> -102	49.201 <sup>s</sup> + 81	58.83 <sup>"</sup> -279	44.159 <sup>s</sup> + 64	59.50 <sup>"</sup> -319
1 1.5	14.501 + 97	77 29 -365	10.184 + 158	62.55 -109	49.328 + 127	55.99 -284	44.275 + 116	56.26 -324
1 11.4	14.673 + 172	73 68 -361	10.380 + 196	63.69 -114	49.499 + 171	53.16 -283	44.441 + 166	53.04 -322
1 21.4	14.918 + 245	70 28 -340	10.610 + 230	64.81 -112	49.710 + 211	50.47 -269	44.654 + 213	50.00 -304
1 31.4	15.222 + 304	67.21 -307	10.865 + 255	65.87 -106	49.953 + 243	48.02 -245	44.905 + 251	47.23 -277
2 10.4	15.581 + 359	64.54 -267	11.142 + 277	66.22 -95	50.223 + 270	45.87 -215	45.188 + 283	44.81 -242
2 20.3	15.983 + 402	62.42 -212	11.434 + 292	67.62 -80	50.514 + 291	44.15 -172	45.498 + 310	42.87 -194
3 2.3	16.411 + 428	60.89 -153	11.734 + 300	68.22 -60	50.816 + 302	42.89 -126	45.823 + 325	41.46 -141
3 12.3	16.861 + 450	60.00 -89	12.040 + 306	68.61 -39	51.129 + 313	42.14 -75	46.161 + 338	40.62 -84
3 22.2	17.316 + 455	59.81 -19	12.348 + 308	68.75 -14	51.443 + 314	41.94 -20	46.501 + 340	40.40 -22
4 1.2	17.763 + 447	60.26 + 45	12.651 + 303	68.67 + 8	51.753 + 310	42.25 + 31	46.837 + 336	40.76 + 36
4 11.2	18.195 + 432	61.35 +109	12.950 + 299	68.37 + 30	52.057 + 304	43.07 + 82	47.165 + 328	41.69 + 93
4 21.2	18.597 + 402	63.05 +170	13.238 + 288	67.87 + 50	52.346 + 289	44.37 +130	47.476 + 311	43.17 +148
5 1.1	18.960 + 363	65.22 +217	13.512 + 274	67.21 + 66	52.617 + 271	46.05 +168	47.764 + 288	45.08 +191
5 11.1	19.280 + 320	67.84 +262	13.770 + 258	66.42 + 79	52.867 + 250	48.08 +203	48.026 + 262	47.39 +231
5 21.1	19.543 + 263	70.79 +295	14.004 + 234	65.54 + 88	53.087 + 220	50.37 +229	48.254 + 228	50.00 +261
5 31.1	19.748 + 205	73.95 +316	14.213 + 209	64.63 + 91	53.277 + 190	52.81 +244	48.445 + 191	52.79 +279
6 10.0	19.891 + 143	77.25 +330	14.391 + 178	63.70 + 93	53.432 + 155	55.36 +255	48.596 + 151	55.71 +292
6 20.0	19.962 + 71	80.58 +333	14.534 + 143	62.81 + 89	53.545 + 113	57.92 +256	48.699 + 103	58.66 +295
6 30.0	19.969 + 7	83.83 +325	14.640 + 106	61.97 + 84	53.619 + 74	60.42 +250	48.758 + 59	61.53 +287
7 9.9	19.906 - 63	86.95 +312	14.707 + 67	61.20 + 77	53.649 + 30	62.81 +239	48.768 + 10	64.30 +277
7 19.9	19.775 -131	89.83 +288	14.731 + 24	60.53 + 67	53.635 - 14	65.00 +219	48.729 - 39	66.84 +254
7 29.9	19.584 -191	92.42 +259	14.716 - 15	59.96 + 57	53.580 - 55	66.97 +197	48.645 - 84	69.13 +229
8 8.9	19.333 -261	94.67 +225	14.660 - 56	59.49 + 47	53.484 - 96	68.67 +170	48.517 -128	71.12 +199
8 18.8	19.031 -302	96.48 +181	14.569 - 91	59.13 + 36	53.351 -133	70.05 +138	48.349 -168	72.74 +162
8 28.8	18.690 -341	97.88 +140	14.449 -120	58.87 + 26	53.190 -161	71.11 +106	48.150 -199	73.99 +125
9 7.8	18.314 -376	98.80 + 92	14.304 -145	58.70 + 17	53.003 -187	71.82 + 71	47.924 -226	74.83 + 84
9 17.8	17.919 -395	99.20 + 40	14.145 -159	58.64 - 6	52.802 -201	72.14 + 32	47.683 -241	75.21 + 38
9 27.7	17.517 -402	99.11 - 9	13.980 -165	58.66 - 2	52.596 -206	72.10 - 4	47.435 -248	75.17 - 4
10 7.7	17.117 -400	98.49 - 62	13.818 -162	58.78 -12	52.391 -205	71.66 -44	47.190 -245	74.67 -50
10 17.7	16.740 -377	97.33 -116	13.672 -146	59.01 -23	52.203 -188	70.82 -84	46.961 -229	73.70 -97
10 27.6	16.394 -346	95.70 -163	13.549 -123	59.33 -32	52.037 -166	69.63 -119	46.756 -205	72.31 -139
11 6.6	16.091 -303	93.57 -213	13.458 -91	59.78 -45	51.903 -134	68.04 -159	46.584 -172	70.47 -184
11 16.6	15.848 -243	90.99 -258	13.408 -50	60.35 -57	51.810 -93	66.12 -192	46.458 -126	68.25 -222
11 26.6	15.667 -181	88.05 -294	13.402 - 6	61.04 -69	51.761 -49	63.91 -221	46.378 -80	65.69 -256
12 6.5	15.559 -108	84.77 -328	13.442 + 40	61.86 -82	51.761 + 0	61.41 -250	46.351 -27	62.82 -287
12 16.5	15.531 -28	81.28 -349	13.531 + 89	62.78 -92	51.812 + 51	58.74 -267	46.381 + 30	59.75 -307
12 26.5	15.578 + 47	77.67 -361	13.662 +131	63.80 -102	51.911 + 99	55.95 -279	46.464 + 83	56.56 -319
12 36.5	15.705 +127	74.03 -364	13.836 +174	64.90 -110	52.057 +146	53.11 -284	46.602 +138	53.32 -324
	+202	-350	+212	-111	+188	-275	+186	-312
Mean Place	17.674	88.19	13.786	55.06	52.496	65.74	47.388	66.53
sec δ, tan δ	+1.830	+1.533	+1.009	-0.136	+1.113	+0.489	+1.256	+0.760
da(ψ), dδ(ψ)	+0.021	-0.01	+0.065	-0.01	+0.048	-0.01	+0.041	-0.01
da(ε), dδ(ε)	+0.003	-1.00	-0.000	-1.00	+0.001	-1.00	+0.001	-1.00
Dble. Trans.	June 20		June 20		June 20		June 21	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	676		674		673		1469		
	γ Draconis		ξ Herculis		ν Ophiuchi		93 Herculis		
Mag Spect.	2.42	K5	3.82	K0	3.50	K0	4.71	K0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	17 56	+51 28	17 57	+29 14	17 58	- 9 46	17 59	+16 44	
1	-8.5	14.303 + 32	77.56 -354	11.139 + 74	48.72 -291	13.182 + 113	28.76 -88	23.970 + 88	56.64 -236
1	1.5	14.403 + 100	73.99 -357	11.262 + 123	45.76 -296	13.338 + 156	29.72 -96	24.100 + 130	54.23 -241
1	11.4	14.567 + 164	70.45 -354	11.429 + 167	42.81 -295	13.533 + 195	30.73 -101	24.271 + 171	51.81 -242
1	21.4	14.795 + 228	67.10 -335	11.639 + 210	40.01 -280	13.762 + 229	31.72 -99	24.480 + 209	49.49 -232
1	31.4	15.074 + 279	64.07 -303	11.881 + 242	37.46 -255	14.017 + 255	32.66 -94	24.717 + 237	47.37 -212
2	10.4	15.399 + 325	61.42 -265	12.153 + 272	35.22 -224	14.294 + 277	33.51 -85	24.979 + 262	45.50 -187
2	20.3	15.762 + 363	59.30 -212	12.447 + 294	33.42 -180	14.586 + 292	34.22 -71	25.259 + 280	43.99 -151
3	2.3	16.148 + 386	57.77 -153	12.753 + 306	32.11 -131	14.887 + 301	34.76 -54	25.551 + 292	42.87 -112
3	12.3	16.552 + 404	56.85 -92	13.071 + 318	31.32 -79	15.195 + 308	35.11 -35	25.852 + 301	42.19 -68
3	22.2	16.961 + 409	56.62 -23	13.391 + 320	31.10 -22	15.505 + 310	35.23 -12	26.155 + 303	41.99 -20
4	1.2	17.364 + 403	57.03 + 41	13.708 + 317	31.42 + 32	15.811 + 306	35.15 + 8	26.455 + 300	42.24 + 25
4	11.2	17.756 + 392	58.06 +103	14.018 + 310	32.27 + 85	16.114 + 303	34.87 + 28	26.751 + 296	42.92 + 68
4	21.2	18.123 + 367	59.69 +163	14.313 + 295	33.62 +135	16.406 + 292	34.41 + 46	27.034 + 283	44.03 +111
5	1.1	18.458 + 335	61.79 +210	14.589 + 276	35.36 +174	16.685 + 279	33.80 + 61	27.302 + 268	45.46 +143
5	11.1	18.756 + 298	64.34 +255	14.843 + 254	37.48 +212	16.947 + 262	33.08 + 72	27.551 + 249	47.20 +174
5	21.1	19.007 + 251	67.21 +287	15.066 + 223	39.86 +238	17.187 + 240	32.29 + 79	27.775 + 224	49.16 +196
5	31.1	19.209 + 202	70.30 +309	15.258 + 192	42.41 +255	17.401 + 214	31.47 + 82	27.971 + 196	51.24 +208
6	10.0	19.356 + 147	73.53 +323	15.413 + 155	45.09 +268	17.585 + 184	30.64 + 83	28.135 + 164	53.43 +219
6	20.0	19.442 + 86	76.80 +327	15.526 + 113	47.77 +268	17.733 + 148	29.85 + 79	28.261 + 126	55.61 +218
6	30.0	19.471 + 29	79.99 +319	15.598 + 72	50.39 +262	17.845 + 112	29.12 + 73	28.349 + 88	57.73 +212
7	9.9	19.438 - 33	83.06 +307	15.626 + 28	52.91 +252	17.916 + 71	28.45 + 67	28.397 + 48	59.76 +203
7	19.9	19.344 - 94	85.90 +284	15.607 - 19	55.23 +232	17.945 + 29	27.88 + 57	28.402 + 5	61.62 +186
7	29.9	19.196 -148	88.46 +256	15.547 - 60	57.30 +207	17.934 - 11	27.41 + 47	28.367 - 35	63.28 +166
8	8.9	18.994 -202	90.69 +223	15.444 -103	59.12 +182	17.882 - 52	27.02 + 39	28.292 - 75	64.73 +145
8	18.8	18.745 -249	92.50 +181	15.305 -139	60.58 +146	17.793 - 89	26.73 + 29	28.182 -110	65.89 +116
8	28.8	18.460 -285	93.90 +140	15.135 -170	61.72 +114	17.675 -118	26.53 + 20	28.042 -140	66.79 + 90
9	7.8	18.142 -318	94.84 + 94	14.940 -195	62.48 + 76	17.531 -144	26.40 + 13	27.878 -164	67.40 + 61
9	17.8	17.806 -336	95.28 + 44	14.730 -210	62.84 + 36	17.372 -159	26.36 + 4	27.698 -180	67.69 + 29
9	27.7	17.464 -342	95.23 - 5	14.514 -216	62.81 - 3	17.207 -165	26.39 - 3	27.513 -185	67.68 - 1
10	7.7	17.123 -341	94.67 - 56	14.299 -215	62.37 - 44	17.044 -163	26.49 -10	27.329 -184	67.35 - 33
10	17.7	16.801 -322	93.58 -109	14.101 -198	61.50 - 87	16.897 -147	26.68 -19	27.160 -169	66.69 - 66
10	27.6	16.508 -293	92.03 -155	13.925 -176	60.26 -124	16.773 -124	26.95 -27	27.013 -147	65.72 - 97
11	6.6	16.253 -255	89.97 -206	13.781 -144	58.62 -164	16.680 - 93	27.32 -37	26.895 -118	64.44 -128
11	16.6	16.051 -202	87.49 -248	13.679 -102	56.61 -201	16.628 - 52	27.79 -47	26.818 - 77	62.86 -158
11	26.6	15.905 -146	84.64 -285	13.620 - 59	54.30 -231	16.619 - 9	28.37 -58	26.782 - 36	61.03 -183
12	6.5	15.824 - 81	81.45 -319	13.612 - 8	51.70 -260	16.658 + 39	29.06 - 69	26.793 + 11	58.95 -208
12	16.5	15.814 - 10	78.05 -340	13.656 + 44	48.91 -279	16.744 + 86	29.84 - 78	26.852 + 59	56.70 -225
12	26.5	15.870 + 56	74.52 -353	13.748 + 92	46.00 -291	16.874 + 130	30.73 - 89	26.956 + 104	54.35 -235
12	36.5	15.996 + 126	70.95 -357	13.890 + 142	43.04 -296	17.047 + 173	31.69 - 96	27.104 + 148	51.93 -242
		15.996 + 191	70.95 -344	13.890 + 186	43.04 -286	17.047 + 210	31.69 - 98	27.104 + 187	51.93 -235
Mean Place	17.535	84.69	14.417	55.71	16.986	22.10	27.356	63.61	
sec δ, tan δ	+1.606	+1.257	+1.146	+0.560	+1.015	-0.172	+1.044	+0.301	
dα(ψ), dδ(ψ)	+0.028	-0.01	+0.046	-0.00	+0.066	-0.00	+0.053	-0.00	
dα(ε), dδ(ε)	+0.001	-1.00	+0.000	-1.00	-0.000	-1.00	+0.000	-1.00	
Dbles.Trans.	June 21		June 21		June 21		June 21		



AT UPPER TRANSIT AT GREENWICH

No.	677		1470		679		1471	
	67 Ophiuchi		6 Sagittarii		γ Sagittarii		9 Arae	
Mag. Spect.	3.95	B5p	6.31	K2	3.07	K0	3.90	B1p
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	17 59	+ 2 55	18 00	- 17 09	18 04	- 30 25	18 05	- 50 05
1 -8.5	54.556 <sup>s</sup> +101	46 34 -163	32.061 <sup>s</sup> +115	32 80 -36	52.051 <sup>s</sup> +124	37 81 +39	29.249 <sup>s</sup> +147	44.34 <sup>"</sup> +162
1 1.5	54.698 +142	44 65 -169	32.221 +160	33.34 -54	52.223 +172	37.41 +40	29.462 +213	42.79 +155
1 11.4	54.879 +181	42.93 -172	32.424 +203	33.89 -55	52.442 +219	37.10 +31	29.735 +273	41.34 +145
1 21.4	55.094 +215	41.27 -166	32.661 +237	34.46 -57	52.701 +259	36.88 +22	30.063 +328	40.03 +131
1 31.4	55.336 +242	39.74 -153	32.925 +264	35.01 -55	52.989 +288	36.73 +15	30.432 +369	38.91 +112
2 10.4	55.600 +264	38.37 -137	33.211 +286	35.53 -52	53.303 +314	36.64 +9	30.837 +405	37.97 +94
2 20.3	55.881 +281	37.26 -111	33.513 +302	35.98 -45	53.635 +332	36.59 +5	31.270 +433	37.24 +73
3 2.3	56.171 +290	36.43 -83	33.824 +311	36.32 -34	53.978 +343	36.56 +3	31.719 +449	36.71 +53
3 12.3	56.469 +298	35.92 -51	34.144 +320	36.54 -22	54.331 +353	36.55 +1	32.181 +462	36.39 +32
3 22.3	56.769 +300	35.76 -16	34.464 +320	36.63 -9	54.686 +355	36.55 +0	32.647 +466	36.28 +11
4 1.2	57.066 +297	35.93 +17	34.782 +318	36.58 +5	55.038 +352	36.55 +0	33.110 +463	36.38 -10
4 11.2	57.359 +293	36.42 +49	35.097 +315	36.41 +17	55.388 +350	36.56 -1	33.569 +459	36.67 -29
4 21.2	57.642 +283	37.22 +80	35.401 +304	36.12 +29	55.727 +339	36.60 -4	34.012 +443	37.18 -51
5 1.1	57.911 +269	38.25 +103	35.692 +291	35.76 +36	56.051 +324	36.67 -7	34.435 +423	37.88 -70
5 11.1	58.164 +253	39.49 +124	35.967 +275	35.34 +42	56.359 +308	36.78 -11	34.833 +398	38.77 -89
5 21.1	58.393 +229	40.88 +139	36.218 +251	34.89 +45	56.640 +281	36.96 -18	35.196 +363	39.84 -107
5 31.1	58.597 +204	42.35 +147	36.444 +226	34.45 +44	56.894 +254	37.20 -24	35.520 +324	41.07 -123
6 10.0	58.771 +174	43.87 +152	36.639 +195	34.02 +43	57.114 +220	37.52 -32	35.798 +278	42.45 -138
6 20.0	58.909 +138	45.38 +151	36.797 +158	33.65 +37	57.293 +179	37.91 -39	36.021 +223	43.94 -149
6 30.0	59.012 +103	46.82 +144	36.918 +121	33.33 +32	57.431 +138	38.37 -46	36.188 +167	45.50 -156
7 10.0	59.074 +62	48.18 +136	36.997 +79	33.08 +25	57.522 +91	38.89 -52	36.293 +105	47.11 -161
7 19.9	59.095 +21	49.41 +123	37.032 +35	32.90 +18	57.564 +42	39.44 -55	36.333 +40	48.69 -158
7 29.9	59.077 -18	50.49 +108	37.025 -7	32.79 +11	57.561 -3	40.00 -56	36.312 -21	50.20 -151
8 8.9	59.019 -58	51.42 +93	36.976 -49	32.72 +7	57.509 -52	40.55 -55	36.228 -84	51.60 -140
8 18.8	58.926 -93	52.16 +74	36.888 -88	32.71 +1	57.415 -94	41.05 -50	36.088 -140	52.82 -122
8 28.8	58.804 -122	52.72 +56	36.770 -118	32.72 -1	57.286 -129	41.47 -42	35.902 -186	53.82 -100
9 7.8	58.656 -148	53.10 +38	36.624 -146	32.74 -2	57.126 -160	41.80 -33	35.675 -227	54.55 -73
9 17.8	58.494 -162	53.26 +16	36.462 -162	32.77 -3	56.947 -179	42.00 -20	35.424 -251	54.98 -43
9 27.7	58.326 -168	53.25 -1	36.293 -169	32.81 -4	56.760 -187	42.08 -8	35.163 -261	55.09 -11
10 7.7	58.160 -166	53.03 -22	36.127 -166	32.84 -3	56.575 -185	42.01 +7	34.902 -261	54.86 +23
10 17.7	58.008 -152	52.61 -42	35.976 -151	32.88 -4	56.406 -169	41.81 +20	34.662 -240	54.30 +56
10 27.7	57.878 -130	51.99 -62	35.848 -128	32.92 -4	56.262 -144	41.49 +32	34.455 -207	53.44 +86
11 6.6	57.777 -101	51.16 -83	35.753 -95	33.01 -9	56.109 -109	41.49 +41	34.294 -161	52.31 +113
11 16.6	57.717 -60	50.13 -103	35.700 -53	33.01 -12	56.153 -62	41.08 +48	34.294 -101	52.31 +135
11 26.6	57.698 -19	48.92 -121	35.692 -8	33.31 -18	56.091 -13	40.60 +51	34.193 -38	50.96 +151
12 6.5	57.724 +26	47.52 -140	35.733 +41	33.57 -26	56.118 +40	39.58 +51	34.188 +33	47.84 +161
12 16.5	57.798 +74	46.00 -152	35.824 +91	33.88 -31	56.214 +96	39.12 +46	34.294 +106	46.19 +165
12 26.5	57.914 +116	44.37 -163	35.954 +130	34.28 -40	56.354 +140	38.70 +42	34.466 +172	44.57 +162
12 36.5	58.073 +159	42.68 -169	36.135 +181	34.80 -52	56.549 +195	38.30 +40	34.705 +239	43.02 +155
	58.073 +197	42.68 -167	36.135 +218	34.80 -53	56.549 +237	38.30 +30	34.705 +298	43.02 +142
Mean Place	58.125	53.26	36.041	25.98	56.449	30.54	34.784	36.92
sec δ, tan δ	+1.001	+0.051	+1.047	-0.309	+1.160	-0.587	+1.559	-1.196
dα(ψ), dδ(ψ)	+0.060	-0.00	+0.069	+0.00	+0.077	+0.01	+0.093	+0.01
dα(ε), dδ(ε)	+0.000	-1.00	+0.000	-1.00	+0.001	-1.00	+0.002	-1.00
Dble. Trans.	June 22		June 22		June 23		June 23	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	680		681		1472		678	
	72 Ophiuchi		o Hercules		B.D. -13° 4863 (Serpentis)		66 G. Apodis	
Mag.Spect.	3.73	A3	3.83	A0	6.50	K0	5.69	K5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	18 06	+ 9 33	18 06	+28 45	18 08	-13 56	18 09	-75 53
1	-8.5 39.098 + 88	33.24 -196	57.655 + 64	29.12 -286	53.483 + 106	22.67 -57	10.832 + 222	45.03 +286
1	1.5 39.229 + 131	31.21 -203	57.767 + 112	26.21 -291	53.631 + 148	23.34 -67	11.225 + 393	42.23 +280
1	11.4 39.398 + 169	29.16 -205	57.923 + 156	23.29 -292	53.820 + 189	24.05 -71	11.780 + 555	39.55 +268
1	21.4 39.603 + 205	27.19 -197	58.122 + 199	20.51 -278	54.046 + 226	24.76 -71	12.490 + 710	37.09 +246
1	31.4 39.836 + 233	25.38 -181	58.355 + 233	17.95 -256	54.298 + 252	25.44 -68	13.322 + 832	34.92 +217
2	10.4 40.093 + 257	23.77 -161	58.617 + 262	15.70 -225	54.573 + 275	26.06 -62	14.262 + 940	33.06 +186
2	20.3 40.369 + 276	22.47 -130	58.904 + 287	13.88 -182	54.865 + 292	26.56 -50	15.290 +1028	31.58 +148
3	2.3 40.655 + 286	21.50 -97	59.205 + 301	12.52 -136	55.168 + 303	26.94 -38	16.371 +1081	30.50 +108
3	12.3 40.951 + 296	20.90 -60	59.519 + 314	11.68 -84	55.479 + 311	27.17 -23	17.499 +1128	29.81 +69
3	22.3 41.250 + 299	20.73 -17	59.837 + 318	11.41 -27	55.794 + 315	27.22 -5	18.643 +1144	29.56 +25
4	1.2 41.548 + 298	20.93 + 20	60.153 + 316	11.67 + 26	56.107 + 313	27.10 + 12	19.780 +1137	29.71 -15
4	11.2 41.842 + 294	21.53 + 60	60.465 + 312	12.46 + 79	56.418 + 311	26.83 + 27	20.902 +1122	30.27 -56
4	21.2 42.126 + 284	22.48 + 95	60.764 + 299	13.76 +130	56.721 + 303	26.42 + 41	21.978 +1076	31.24 -97
5	1.1 42.396 + 270	23.72 +124	61.045 + 281	15.46 +170	57.011 + 290	25.90 + 52	22.992 +1014	32.56 -132
5	11.1 42.651 + 255	25.22 +150	61.306 + 261	17.53 +207	57.286 + 275	25.30 + 60	23.934 + 942	34.24 -168
5	21.1 42.881 + 230	26.91 +169	61.538 + 232	19.89 +236	57.539 + 253	24.65 + 65	24.772 + 838	36.24 -200
5	31.1 43.086 + 205	28.70 +179	61.739 + 201	22.42 +253	57.767 + 228	23.99 + 66	25.500 + 728	38.49 -225
6	10.0 43.260 + 174	30.57 +187	61.905 + 166	25.09 +267	57.966 + 199	23.35 + 64	26.101 + 601	40.98 -249
6	20.0 43.398 + 138	32.44 +187	62.028 + 123	27.78 +269	58.128 + 162	22.76 + 59	26.553 + 452	43.62 -264
6	30.0 43.500 + 102	34.25 +181	62.111 + 83	30.42 +264	58.254 + 126	22.23 + 53	26.859 + 306	46.34 -272
7	10.0 43.562 + 62	35.98 +173	62.149 + 38	32.97 +255	58.338 + 84	21.77 + 46	27.005 + 146	49.10 -276
7	19.9 43.581 + 19	37.55 +157	62.140 - 9	35.33 +236	58.378 + 40	21.40 + 37	27.984 - 21	51.78 -268
7	29.9 43.561 - 20	38.95 +140	62.090 - 50	37.46 +213	58.378 + 0	21.12 + 28	26.812 -172	54.32 -254
8	8.9 43.501 - 60	40.17 +122	61.996 - 94	39.33 +187	58.335 - 43	20.90 + 22	26.483 -329	56.66 -234
8	18.8 43.405 - 96	41.15 + 98	61.864 -132	40.87 +154	58.253 - 82	20.77 + 13	26.015 -468	58.67 -201
8	28.8 43.279 -126	41.91 + 76	61.701 -163	42.08 +121	58.140 -113	20.69 + 8	25.436 -579	60.31 -164
9	7.8 43.127 -152	42.43 + 52	61.510 -191	42.92 + 84	57.999 -141	20.66 + 3	24.755 -681	61.52 -121
9	17.8 42.959 -168	42.69 + 26	61.303 -207	43.37 + 45	57.840 -159	20.67 - 1	24.013 -742	62.23 -71
9	27.7 42.785 -174	42.71 + 2	61.089 -214	43.43 + 6	57.674 -166	20.72 - 5	23.242 -771	62.43 -20
10	7.7 42.611 -174	42.47 -24	60.874 -215	43.09 -34	57.508 -166	20.79 - 7	22.467 -775	62.08 + 35
10	17.7 42.451 -160	41.95 -52	60.674 -200	42.32 -77	57.357 -151	20.91 -12	21.741 -726	61.19 + 89
10	27.7 42.311 -140	41.19 -76	60.494 -180	41.18 -114	57.227 -130	21.06 -15	21.089 -652	59.81 +138
11	6.6 42.200 -111	40.16 -103	60.345 -149	39.63 -155	57.127 -100	21.27 -21	20.542 -547	57.96 +185
11	16.6 42.128 -72	38.89 -127	60.236 -109	37.71 -192	57.068 -59	21.54 -27	20.140 -402	55.73 +223
11	26.6 42.097 -31	37.40 -149	60.170 -66	35.49 -222	57.052 -16	21.89 -35	19.891 -249	53.20 +253
12	6.5 42.110 + 13	35.70 -170	60.152 -18	32.97 -252	57.083 + 31	22.32 -43	19.816 -75	50.44 +276
12	16.5 42.171 + 61	33.84 -186	60.186 + 34	30.24 -273	57.163 + 80	22.81 -49	19.927 + 111	47.58 +266
12	26.5 42.275 + 104	31.88 -196	60.268 + 82	27.39 -285	57.285 + 122	23.38 -57	20.211 + 284	44.71 +287
12	36.5 42.423 + 148	29.85 -203	60.399 + 131	24.47 -292	57.451 + 166	24.06 -68	20.672 + 461	41.90 +281
		29.85 -199	60.399 + 175	24.47 -283	57.451 + 206	24.06 -68	20.672 + 621	41.90 +262
Mean Place	42.571	40.58	60.943	36.30	57.376	15.10	22.532	37.20
sec $\delta$ , tan $\delta$	+1.014	+0.168	+1.141	+0.549	+1.030	-0.248	+4.103	-3.979
da( $\psi$ ), d $\delta$ ( $\psi$ )	+0.057	+0.01	+0.047	+0.01	+0.068	+0.02	+0.167	+0.02
d $\alpha$ ( $\epsilon$ ), d $\delta$ ( $\epsilon$ )	-0.000	-1.00	-0.001	-1.00	+0.001	-1.00	+0.011	-1.00
Dble.Trans.	June 23		June 23		June 24		June 24	

AT UPPER TRANSIT AT GREENWICH

No.	1473		682		685		684	
	ε Telescopii		μ Sagittarii		36 Draconis		Groombridge 2533 (Lyrae)	
Name	ε Telescopii		μ Sagittarii		36 Draconis		Groombridge 2533 (Lyrae)	
Mag.Spect.	4.60	K0	4.01	B8p	5.03	F5	5.42	B5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	18 10	-45 57	18 12	-21 03	18 13	+64 23	18 15	+42 08
1 <sup>d</sup> -8.5 <sup>s</sup>	08.452 +136	35 63 +139	53 302 +114	55.53 - 4	45.602 - 58	26.49 -357	10.333 + 30	68.15 -324
1 1.5	08.648 +196	34 30 +133	53 445 +143	55.80 - 27	45.640 + 38	22.84 -365	10.418 + 85	64.82 -333
1 11.4	08.899 +251	33 04 +126	53 642 +197	56.06 - 26	45.774 +134	19.18 -366	10.558 +140	61.48 -334
1 21.4	09.202 +303	31 92 +112	53 875 +233	56.33 - 27	46.005 +231	15.68 -350	10.751 +193	58.29 -319
1 31.4	09.542 +340	30.94 + 98	54.135 +260	56.61 - 28	46.317 +312	12.46 -322	10.986 +235	55.35 -294
2 10.4	09.916 +374	30.12 + 82	54.419 +284	56.88 - 27	46.707 +390	09.61 -285	11.262 +276	52.74 -261
2 20.3	10.316 +400	29.47 + 65	54.723 +304	57.10 - 22	47.161 +454	07.28 -233	11.569 +307	50.61 -213
3 2.3	10.731 +415	28.99 + 48	55.037 +314	57.26 - 16	47.659 +498	05.52 -176	11.899 +330	49.00 -161
3 12.3	11.159 +428	28.67 + 32	55.361 +324	57.33 - 7	48.194 +535	04.38 -114	12.246 +347	47.97 -103
3 22.3	11.592 +433	28.52 + 15	55.689 +328	57.31 + 2	48.745 +551	03.95 - 43	12.602 +356	47.59 - 38
4 1.2	12.023 +431	28.54 - 2	56.016 +327	57.19 +12	49.293 +548	04.17 + 22	12.957 +355	47.80 + 21
4 11.2	12.451 +428	28.72 -18	56.341 +325	57.00 +19	49.830 +537	05.05 + 88	13.308 +351	48.63 + 83
4 21.2	12.866 +415	29.07 - 35	56.658 +317	56.73 +27	50.334 +504	06.57 +152	13.644 +336	50.03 +140
5 1.1	13.263 +397	29.59 - 52	56.963 +305	56.42 +31	50.794 +460	08.60 +203	13.958 +314	51.90 +187
5 11.1	13.639 +376	30.27 - 68	57.253 +290	56.08 +34	51.201 +407	11.11 +251	14.247 +289	54.22 +232
5 21.1	13.983 +344	31.12 - 85	57.521 +268	55.75 +33	51.539 +338	14.00 +289	14.500 +253	56.88 +266
5 31.1	14.292 +309	32.12 -100	57.763 +242	55.45 +30	51.803 +264	17.14 +314	14.715 +215	59.76 +288
6 10.0	14.559 +267	33.25 -113	57.975 +212	55.19 +26	51.989 +186	20.48 +334	14.887 +172	62.82 +306
6 20.0	14.776 +217	34.50 -125	58.149 +174	54.99 +20	52.085 + 96	23.88 +340	15.009 +122	65.93 +311
6 30.0	14.941 +165	35.83 -133	58.286 +137	54.87 +12	52.097 + 12	27.26 +338	15.083 + 74	69.00 +307
7 10.0	15.050 +109	37.20 -137	58.379 + 93	54.82 + 5	52.022 - 75	30.55 +329	15.104 + 21	72.00 +300
7 19.9	15.097 + 47	38.58 -138	58.426 + 97	54.84 - 2	51.858 -164	33.63 +308	15.071 - 33	74.79 +279
7 29.9	15.087 - 10	39.91 -133	58.431 + 5	54.91 - 7	51.619 -239	36.45 +282	14.989 - 82	77.35 +256
8 8.9	15.019 - 68	41.16 -125	58.390 - 41	55.03 -12	51.301 -318	38.96 +251	14.857 -132	79.62 +227
8 18.8	14.898 -121	42.26 -110	58.309 - 81	55.18 -15	50.917 -384	41.06 +210	14.682 -175	81.51 +189
8 28.8	14.734 -164	43.18 - 92	58.195 -114	55.34 -16	50.481 -436	42.75 +169	14.471 -211	83.03 +152
9 7.8	14.530 -204	43.87 - 69	58.051 -144	55.48 -14	49.996 -485	43.98 +123	14.229 -242	84.13 +110
9 17.8	14.303 -227	44.29 - 42	57.888 -163	55.60 -12	49.483 -513	44.69 + 71	13.966 -263	84.76 + 63
9 27.7	14.065 -238	44.43 -14	57.717 -171	55.67 - 7	48.955 -528	44.91 + 22	13.694 -272	84.95 + 19
10 7.7	13.827 -238	44.28 + 15	57.545 -172	55.71 - 4	48.424 -531	44.59 - 32	13.420 -274	84.66 - 29
10 17.7	13.607 -220	43.83 + 45	57.387 -158	55.71 + 0	47.912 -512	43.72 - 87	13.159 -261	83.87 - 79
10 27.7	13.417 -190	43.11 + 72	57.251 -136	55.68 + 3	47.430 -482	42.35 -137	12.920 -239	82.63 -124
11 6.6	13.268 -149	42.15 + 96	57.146 -106	55.63 + 5	46.994 -436	40.45 -190	12.711 -209	80.91 -172
11 16.6	13.175 - 93	41.00 +115	57.083 - 63	55.59 + 4	46.624 -370	38.08 -237	12.547 -164	78.77 -214
11 26.6	13.140 - 35	39.71 +129	57.065 - 18	55.56 + 3	46.325 -299	35.31 -277	12.429 -118	76.26 -251
12 6.5	13.170 + 30	38.32 +139	57.095 + 30	55.58 - 2	46.111 -214	32.15 -316	12.365 - 64	73.40 -286
12 16.5	13.267 + 97	36.91 +141	57.178 + 83	55.64 - 6	45.993 -118	28.74 -341	12.359 - 6	70.30 -310
12 26.5	13.426 +159	35.51 +140	57.294 +116	55.64 + 0	45.968 - 25	25.16 -358	12.409 + 50	67.04 -326
12 36.5	13.646 +220	34.17 +134	57.470 +176	55.96 -32	46.044 + 76	21.50 -366	12.517 +108	63.71 -333
	+274	+123	+213	-23	+173	-357	+162	-326
Mean Place	13.654	27.63	57.372	47.58	49.110	33.39	13.584	75.25
sec δ, tan δ	+1.438	-1.034	+1.072	-0.385	+2.314	+2.086	+1.349	+0.905
dα(ψ), dδ(ψ)	+0.089	+0.02	+0.071	+0.02	+0.006	+0.02	+0.037	+0.03
dα(ε), dδ(ε)	+0.003	-1.00	+0.001	-1.00	-0.008	-1.00	-0.004	-1.00
Dble.Trans.	June 24		June 25		June 25		June 25	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1474		1475		683		1477		
	6 G. Telescopii		Bradley 2292 (Serpentis)		η Sagittarii*		α Lyrae		
Mag.Spect.	5.54	B5	6.30	A5	3.16	M3	4.34	K0	
U.T.	R.A.		Dec.		R.A.		Dec.		
	h	m	h	m	h	m	h	m	
	18 15	— 56 01	18 16	— 9 45	18 16	— 36 46	18 19	+ 36 03	
	<sup>d</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	
1	-8.5	53.198 +139	52.39 +196	35.749 +95	58.77 -81	38.184 +118	08.83 +84	20.036 +38	21.48 -306
1	1.5	53.413 +215	50.47 +192	35.886 +137	59.66 -89	38.353 +169	08.02 +81	20.125 +89	18.35 -313
1	11.5	53.697 +284	48.63 +184	36.063 +177	60.59 -93	38.571 +218	07.27 +75	20.263 +138	15.20 -315
1	21.4	54.047 +350	46.94 +169	36.276 +213	61.51 -92	38.834 +263	06.61 +66	20.449 +186	12.17 -303
1	31.4	54.447 +400	45.45 +149	36.516 +240	62.37 -86	39.131 +297	06.04 +57	20.673 +224	09.38 -279
2	10.4	54.891 +444	44.16 +129	36.780 +264	63.14 -77	39.456 +325	05.56 +48	20.934 +261	06.89 -249
2	20.3	55.370 +479	43.11 +105	37.062 +282	63.76 -62	39.804 +348	05.17 +39	21.223 +289	04.85 -204
3	2.3	55.870 +500	42.31 +80	37.356 +294	64.22 -46	40.166 +362	04.86 +31	21.532 +309	03.31 -154
3	12.3	56.390 +520	41.75 +56	37.659 +303	64.48 -26	40.539 +373	04.62 +24	21.858 +326	02.32 -99
3	22.3	56.917 +527	41.47 +28	37.967 +308	64.52 -4	40.918 +379	04.46 +16	22.192 +334	01.93 -39
4	1.2	57.443 +526	41.44 +3	38.275 +307	64.36 +16	41.297 +379	04.37 +9	22.526 +334	02.12 +19
4	11.2	57.966 +523	41.67 -23	38.582 +306	63.99 +37	41.674 +377	04.35 +2	22.858 +332	02.89 +77
4	21.2	58.474 +508	42.17 -50	38.881 +299	63.45 +54	42.041 +367	04.42 -7	23.177 +319	04.21 +132
5	1.2	58.959 +485	42.91 -74	39.169 +288	62.76 +69	42.394 +353	04.59 -17	23.478 +301	05.98 +177
5	11.1	59.419 +460	43.89 -98	39.443 +274	61.96 +80	42.731 +337	04.86 -27	23.758 +280	08.17 +219
5	21.1	59.838 +419	45.11 -122	39.696 +253	61.08 +88	43.042 +311	05.24 -38	24.006 +248	10.69 +252
5	31.1	60.213 +375	46.52 -141	39.925 +229	60.18 +90	43.223 +281	05.73 -49	24.221 +215	13.43 +274
6	10.0	60.537 +324	48.12 -160	40.126 +201	59.28 +90	43.569 +246	06.33 -60	24.398 +177	16.33 +290
6	20.0	60.797 +260	49.86 -174	40.291 +165	58.41 +87	43.771 +202	07.04 -71	24.529 +131	19.29 +296
6	30.0	60.995 +198	51.70 -184	40.420 +129	57.62 +79	43.929 +158	07.83 -79	24.616 +87	22.22 +293
7	10.0	61.121 +126	53.59 -189	40.508 +88	56.90 +72	44.038 +109	08.69 -86	24.654 +38	25.06 +284
7	19.9	61.172 +51	55.46 -187	40.552 +44	56.29 +61	44.092 +54	09.58 -89	24.642 -12	27.72 +266
7	29.9	61.153 -19	57.27 -181	40.557 +5	55.78 +51	44.097 +5	10.48 -90	24.585 -57	30.15 +243
8	8.9	61.061 -92	58.96 -169	40.518 -39	55.37 +41	44.050 -47	11.34 -86	24.480 -105	32.32 +217
8	18.9	60.904 -157	60.45 -149	40.441 -77	55.07 +30	43.955 -95	12.13 -79	24.333 -147	34.13 +181
8	28.8	60.693 -211	61.69 -124	40.332 -109	54.86 +21	43.822 -133	12.81 -68	24.152 -181	35.59 +146
9	7.8	60.433 -260	62.63 -94	40.195 -137	54.74 +12	43.653 -169	13.34 -53	23.941 -211	36.66 +107
9	17.8	60.143 -290	63.22 -59	40.040 -155	54.71 +3	43.462 -191	13.70 -36	23.710 -231	37.29 +63
9	27.7	59.837 -306	63.45 -23	39.875 -165	54.75 -4	43.260 -202	13.87 -17	23.469 -241	37.51 +22
10	7.7	59.528 -309	63.29 +16	39.710 -165	54.86 -11	43.056 -204	13.83 +4	23.226 -243	37.27 -24
10	17.7	59.241 -287	62.74 +55	39.558 -152	55.06 -20	42.868 -188	13.59 +24	22.994 -232	36.56 -71
10	27.7	58.987 -254	61.83 +91	39.425 -133	55.32 -26	42.705 -163	13.16 +43	22.783 -211	35.44 -112
11	6.6	58.781 -206	60.58 +125	39.321 -104	55.69 -37	42.577 -128	12.56 +60	22.601 -182	33.86 -158
11	16.6	58.642 -139	59.05 +153	39.256 -65	56.14 -45	42.497 -80	11.84 +72	22.459 -142	31.87 -199
11	26.6	58.573 -69	57.32 +173	39.232 -24	56.69 -55	42.467 -30	11.02 +82	22.360 -99	29.54 -233
12	6.6	58.581 +8	55.42 +190	39.254 +22	57.34 -65	42.494 +27	10.15 +87	22.312 -48	26.86 -268
12	16.5	58.674 +93	53.45 +197	39.323 +69	58.07 -73	42.579 +85	09.27 +88	22.317 +5	23.96 -290
12	26.5	58.842 +168	51.47 +198	39.435 +112	58.88 -81	42.717 +138	08.42 +85	22.374 +57	20.90 -306
12	36.5	59.086 +244	49.54 +193	39.589 +154	59.78 -90	42.907 +190	07.60 +82	22.484 +110	17.75 -315
		+313	+180	+193	-90	+239	+75	+158	-307
Mean Place	59.292	43.54	39.543	50.66	42.832	00.21	23.302	28.74	
sec δ, tan δ	+1.790	-1.484	+1.015	-0.172	+1.248	-0.747	+1.237	+0.728	
dα(ψ), dδ(ψ)	+0.100	+0.03	+0.066	+0.03	+0.081	+0.03	+0.042	+0.03	
dα(ε), dδ(ε)	+0.007	-1.00	+0.001	-1.00	+0.004	-1.00	-0.004	-1.00	
Dble.Trans.	June 26		June 26		June 26		June 27		

AT UPPER TRANSIT AT GREENWICH

No.	687		1476		688		695	
	δ Sagittarii		74 Ophiuchi		η Serpentis		χ Draconis	
Mag.Spect.	2.84	K0	4.92	G5	3.42	K0	3.69	F8
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 18 20	<sup>o</sup> <sup>'</sup> -29 50	<sup>h</sup> <sup>m</sup> 18 20	<sup>o</sup> <sup>'</sup> + 3 21	<sup>h</sup> <sup>m</sup> 18 20	<sup>o</sup> <sup>'</sup> - 2 54	<sup>h</sup> <sup>m</sup> 18 21	<sup>o</sup> <sup>'</sup> + 72 43
1 -8.5	03 477 + 110	14.24 + 40	08 059 + 81	65 23' -158	33 024 + 85	18 89 -124	14 039 -170	31.72 -352
1 1.5	03 629 + 152	13.84 + 40	08 182 + 123	63 59 -164	33 151 + 127	20 19 -130	14 009 -30	28.10 -362
1 11.5	03 832 + 203	13.47 + 37	08 343 + 161	61 91 -168	33 317 + 166	21 53 -134	14 121 + 112	24.45 -365
1 21.4	04 075 + 243	13.19 + 28	08 540 + 197	60 28 -163	33 519 + 202	22 83 -130	14 378 + 257	20.94 -351
1 31.4	04 348 + 273	12.95 + 24	08 765 + 225	58 78 -150	33 748 + 229	24 04 -121	14 760 + 382	17.69 -325
2 10.4	04 648 + 300	12.76 + 19	09 015 + 250	57 44 -134	34 001 + 253	25 12 -108	15 261 + 501	14.78 -291
2 20.3	04 970 + 322	12.59 + 17	09 284 + 269	56 34 -110	34 273 + 272	26 00 -88	15 865 + 604	12.38 -240
3 2.3	05 304 + 334	12.44 + 15	09 566 + 282	55 54 -80	34 557 + 284	26 65 -65	16 541 + 676	10.53 -185
3 12.3	05 650 + 346	12.29 + 15	09 858 + 292	55 04 -50	34 852 + 295	27 05 -40	17 277 + 736	09.30 -123
3 22.3	06 002 + 352	12.14 + 15	10 156 + 298	54 90 -14	35 152 + 300	27 15 -10	18 042 + 765	08.76 -54
4 1.2	06 353 + 351	12.00 + 14	10 454 + 298	55 10 + 20	35 452 + 300	26 97 + 18	18 806 + 764	08.88 + 12
4 11.2	06 704 + 351	11.85 + 15	10 752 + 298	55 62 + 52	35 752 + 300	26 53 + 44	19 558 + 752	09.66 + 78
4 21.2	07 047 + 343	11.73 + 12	11 042 + 290	56 45 + 83	36 044 + 292	25 84 + 69	20 261 + 703	11.07 + 141
5 1.2	07 378 + 331	11.64 + 9	11 321 + 279	57 53 + 108	36 326 + 282	24 95 + 89	20 899 + 638	13.00 + 193
5 11.1	07 694 + 316	11.61 + 3	11 586 + 265	58 83 + 130	36 594 + 268	23 89 + 106	21 459 + 560	15.43 + 243
5 21.1	07 986 + 292	11.64 - 3	11 829 + 243	60 29 + 146	36 841 + 247	22 71 + 118	21 915 + 456	18.25 + 282
5 31.1	08 252 + 266	11.75 - 11	12 049 + 220	61 83 + 154	37 065 + 224	21 48 + 123	22 262 + 347	21.33 + 308
6 10.0	08 486 + 234	11.94 - 19	12 240 + 191	63 44 + 161	37 260 + 195	20 21 + 127	22 492 + 230	24.64 + 331
6 20.0	08 680 + 194	12.23 - 29	12 396 + 156	65 03 + 159	37 420 + 160	18 97 + 124	22 591 + 99	28.02 + 338
6 30.0	08 833 + 153	12.60 - 37	12 516 + 120	66 57 + 154	37 545 + 125	17 79 + 118	22 568 - 23	31.39 + 337
7 10.0	08 939 + 106	13 05 - 45	12 596 + 80	68 02 + 145	37 630 + 85	16 69 + 110	22 418 - 150	34.70 + 331
7 19.9	08 997 + 58	13 55 - 50	12 633 + 37	69 34 + 132	37 671 + 41	15 72 + 97	22 141 - 277	37.81 + 311
7 29.9	09 007 + 10	14 09 - 54	12 631 - 2	70 51 + 117	37 673 + 2	14 87 + 85	22 111 - 386	40 67 + 286
8 8.9	08 969 - 38	14 63 - 54	12 587 - 44	71 52 + 101	37 632 - 41	14 16 + 71	21 259 - 496	43 25 + 258
8 18.9	08 887 - 82	15 15 - 52	12 505 - 82	72 34 + 82	37 554 - 78	13 60 + 56	21 259 - 591	45 42 + 217
8 28.8	08 768 - 119	15 62 - 47	12 393 - 112	72 97 + 63	37 444 - 110	13 19 + 41	20 002 - 666	47 20 + 178
9 7.8	08 615 - 153	16 00 - 38	12 252 - 141	73 41 + 44	37 306 - 138	12 92 + 27	19 267 - 735	48 53 + 133
9 17.8	08 442 - 173	16 27 - 27	12 094 - 158	73 64 + 23	37 306 - 156	12 92 + 11	19 267 - 777	48 53 + 81
9 27.7	08 258 - 184	16 43 - 16	12 094 - 168	73 64 + 4	37 150 - 165	12 81 - 1	18 490 - 799	49 34 + 33
10 7.7	08 072 - 186	16 45 - 2	11 926 - 169	73 68 - 17	36 985 - 167	12 82 - 17	17 691 - 810	49 67 - 21
10 17.7	07 899 - 173	16 33 + 12	11 600 - 157	73 14 - 37	36 663 - 155	13 30 - 31	16 094 - 787	48 71 - 75
10 27.7	07 750 - 149	16 10 + 23	11 461 - 139	72 57 - 57	36 527 - 136	13 75 - 45	15 345 - 749	47 45 - 126
11 6.6	07 632 - 118	15 76 + 34	11 349 - 112	71 78 - 79	36 527 - 108	14 36 - 61	15 345 - 691	47 45 - 179
11 16.6	07 558 - 74	15 76 + 42	11 349 - 74	71 78 - 98	36 419 - 71	14 36 - 75	14 654 - 603	45 66 - 226
11 26.6	07 531 - 27	14 88 + 46	11 275 - 36	70 80 - 116	36 348 - 32	15 11 - 89	14 051 - 506	43 40 - 269
12 6.6	07 556 + 25	14 39 + 49	11 248 + 9	68 30 - 134	36 329 + 13	17 04 - 104	13 155 - 390	37 63 - 308
12 16.5	07 636 + 80	13 93 + 46	11 302 + 54	66 82 - 148	36 389 + 60	18 18 - 114	12 900 - 255	34 28 - 335
12 26.5	07 761 + 125	13 54 + 39	11 399 + 97	65 24 - 158	36 490 + 101	19 41 - 123	12 778 - 122	30 74 - 354
12 36.5	07 935 + 174	13 09 + 45	11 538 + 139	63 60 - 164	36 634 + 144	20 72 - 131	12 803 + 25	27 10 - 364
	07 935 + 221	13 09 + 36	11 538 + 177	63 60 - 163	36 634 + 182	20 72 - 129	12 803 + 169	27 10 - 357
Mean Place	07.830	05.28	11.620	73.32	36.666	10.97	18.031	38.24
sec δ, tan δ	+1.153	-0.574	+1.002	+0.059	+1.001	-0.051	+3.368	+3.216
da(ψ), dδ(ψ)	+0.076	+0.03	+0.060	+0.04	+0.063	+0.04	-0.024	+0.04
da(ε), dδ(ε)	+0.003	-1.00	-0.000	-1.00	+0.000	-1.00	-0.020	-1.00
Dble.Trans.	June 27		June 27		June 27		June 27	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	686		690		689		1478		
	ξ Pavonis*		109 Herculis		ε Sagittarii		B.D. +7° 3682 (Ophiuchi)		
Mag.Spect.	4.25	K2	3.92	K0	1.95	A0	5.69	G0, A3	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	18 21	- 61 30	18 23	+ 21 45	18 23	- 34 23	18 24	+ 8 01	
1	8.5	52.195 +136	14.52 +226	04.005 +58	39.17 -250	12.087 +108	40.55 +69	56.329 +71	17.24 -182
1	1.5	52.420 +225	12.30 +222	04.107 +102	36.59 -258	12.244 +157	39.86 +69	56.443 +114	15.36 -188
1	11.5	52.726 +306	10.15 +215	04.251 +144	33.99 -260	12.450 +206	39.21 +65	56.595 +152	13.44 -192
1	21.4	53.111 +385	08.16 +199	04.436 +185	31.48 -251	12.700 +250	38.64 +57	56.784 +189	11.58 -186
1	31.4	53.557 +446	06.37 +179	04.653 +217	29.16 -232	12.982 +282	38.14 +50	57.002 +218	09.86 -172
2	10.4	54.057 +500	04.80 +157	04.898 +245	27.09 -207	13.293 +311	37.71 +43	57.246 +244	08.33 -153
2	20.3	54.601 +544	03.51 +129	05.168 +270	25.39 -170	13.628 +335	37.35 +36	57.511 +265	07.08 -125
3	2.3	55.172 +571	02.50 +101	05.452 +284	24.12 -127	13.976 +348	37.03 +32	57.789 +278	06.15 -93
3	12.3	55.768 +596	01.77 +73	05.751 +299	23.29 -83	14.337 +361	36.77 +26	58.079 +290	05.57 -58
3	22.3	56.376 +608	01.37 +40	06.057 +306	22.98 -31	14.705 +368	36.55 +22	58.376 +297	05.39 -18
4	1.2	56.984 +608	01.27 +10	06.363 +306	23.16 +18	15.073 +368	36.38 +17	58.674 +298	05.58 +19
4	11.2	57.590 +606	01.47 -20	06.669 +306	23.82 +66	15.441 +368	36.26 +12	58.971 +297	06.14 +56
4	21.2	58.178 +588	01.99 -52	06.966 +297	24.95 +113	15.802 +361	36.22 +4	59.262 +291	07.06 +92
5	1.2	58.742 +564	02.79 -80	07.249 +283	26.45 +150	16.150 +348	36.24 -2	59.542 +280	08.26 +120
5	11.1	59.275 +533	03.88 -109	07.517 +268	28.31 +186	16.483 +333	36.35 -11	59.809 +267	09.72 +146
5	21.1	59.761 +486	05.25 -137	07.759 +242	30.43 +212	16.791 +308	36.57 -22	60.053 +244	11.37 +165
5	31.1	60.196 +435	06.84 -159	07.975 +216	32.72 +229	17.072 +281	36.89 -32	60.274 +221	13.13 +176
6	10.0	60.571 +372	08.64 -180	08.158 +183	35.14 +242	17.319 +247	37.32 -43	60.466 +192	14.97 +184
6	20.0	60.873 +305	10.61 -197	08.303 +145	37.60 +246	17.524 +205	37.86 -54	60.622 +156	16.81 +184
6	30.0	61.100 +227	12.68 -207	08.410 +107	40.01 +241	17.687 +163	38.49 -63	60.743 +121	18.60 +179
7	10.0	61.245 +145	14.83 -215	08.473 +63	42.35 +234	17.801 +114	39.20 -71	60.823 +80	20.32 +172
7	19.9	61.302 +57	16.96 -213	08.492 +19	44.52 +217	17.863 +62	39.95 -75	60.860 +37	21.89 +157
7	29.9	61.278 -24	19.01 -205	08.469 -23	46.49 +197	17.876 +13	40.73 -78	60.865 -3	23.29 +140
8	8.9	61.169 -109	20.94 -193	08.404 -65	48.24 +175	17.837 -39	41.50 -77	60.813 -44	24.52 +123
8	18.9	60.983 -186	22.64 -170	08.299 -105	49.69 +145	17.752 -85	42.22 -72	60.730 -83	25.53 +101
8	28.8	60.733 -250	24.08 -144	08.162 -137	50.85 +116	17.628 -124	42.85 -63	60.615 -115	26.32 +79
9	7.8	60.425 -308	25.19 -111	07.996 -166	51.70 +85	17.468 -160	43.37 -52	60.472 -143	26.89 +57
9	17.8	60.079 -346	25.90 -71	07.812 -184	52.19 +49	17.286 -182	43.73 -36	60.311 -161	27.20 +31
9	27.7	59.714 -365	26.22 -32	07.619 -193	52.36 +17	17.092 -194	43.93 -20	60.140 -171	27.29 +9
10	7.7	59.344 -370	26.09 +13	07.423 -196	52.16 -20	16.894 -198	43.95 -2	59.966 -174	27.13 -16
10	17.7	58.995 -349	25.52 +57	07.237 -186	51.58 -58	16.711 -183	43.79 +16	59.803 -163	26.71 -42
10	27.7	58.682 -313	24.55 +97	07.071 -166	50.68 -90	16.550 -161	43.47 +32	59.658 -145	26.07 -64
11	6.6	58.423 -259	23.19 +136	06.930 -141	49.40 -128	16.422 -128	42.99 +48	59.539 -119	25.16 -91
11	16.6	58.238 -185	21.50 +169	06.827 -103	47.80 -160	16.340 -82	42.38 +61	59.457 -82	24.03 -113
11	26.6	58.133 -105	19.56 +194	06.764 -63	45.91 -189	16.307 -33	41.70 +68	59.413 -44	22.69 -134
12	6.6	58.117 -16	17.42 +214	06.745 -19	43.74 -217	16.327 +20	40.96 +74	59.412 -1	21.13 -156
12	16.5	58.198 +81	15.18 +224	06.775 +30	41.37 -237	16.404 +77	40.22 +74	59.457 +45	19.43 -170
12	26.5	58.367 +169	12.91 +227	06.850 +75	38.87 -250	16.531 +127	39.51 +71	59.545 +88	17.61 -182
12	36.5	58.626 +259	10.67 +224	06.970 +120	36.28 -259	16.709 +178	38.80 +71	59.675 +130	15.72 -189
		58.341 +212		06.970 +162		16.709 +226		59.675 +169	
Mean Place	59.017	04.78	07.363	46.72	16.616	31.20	59.824	25.42	
sec δ, tan δ	+2.096	-1.842	+1.077	+0.399	+1.212	-0.685	+1.010	+0.141	
dα(ψ), dδ(ψ)	+0.110	+0.04	+0.051	+0.04	+0.079	+0.04	+0.057	+0.04	
dα(ε), dδ(ε)	+0.012	-1.00	-0.003	-0.99	+0.005	-0.99	-0.001	-0.99	
Dble. Trans.	June 27		June 27		June 28		June 28		

AT UPPER TRANSIT AT GREENWICH

No.	1479		691		692		696	
	B.D. +29° 3259 (Herculis)		α Telescopii		λ Sagittarii		γ Scuti	
Mag.Spect.	5.71	A2	3.76	B3	2.94	K0	4.73	A3
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	18 25	+29 48	18 25	-45 58	18 27	-25 25	18 28	-14 34
1 -8.5	24.240 + 43	66 78 -281	53 244 + 114	46 36 +141	04.092 + 101	57.51 + 15	21.800 + 89	40.23 - 47
1 1.5	24.330 + 90	63 89 -289	53 418 + 174	44 97 +139	04.225 + 133	57.40 + 11	21.928 + 128	40.76 - 53
1 11.5	24.465 + 135	60 96 -293	53 647 + 229	43 63 +134	04.416 + 191	57.27 + 13	22.099 + 171	41.37 - 61
1 21.4	24.645 + 180	58 14 -282	53 930 + 283	42 38 +125	04.644 + 228	57.21 + 6	22.308 + 209	41.95 - 58
1 31.4	24.860 + 215	55.53 -261	54.253 + 323	41.27 +111	04.900 + 256	57.17 + 4	22.545 + 237	42.50 - 55
2 10.4	25.108 + 248	53.20 -233	54.611 + 358	40.28 + 99	05.184 + 284	57.14 + 3	22.807 + 262	42.98 - 48
2 20.4	25.383 + 275	51.28 -192	54.999 + 388	39.45 + 83	05.488 + 304	57.09 + 5	23.088 + 281	43.36 - 38
3 2.3	25.676 + 293	49.82 -146	55.404 + 405	38.78 + 67	05.806 + 318	57.02 + 7	23.383 + 295	43.61 - 25
3 12.3	25.985 + 309	48.87 - 95	55.826 + 422	38.26 + 52	06.136 + 330	56.90 + 12	23.690 + 307	43.71 - 50
3 22.3	26.302 + 317	48.48 - 39	56.256 + 430	37.91 + 35	06.473 + 337	56.73 + 17	24.003 + 313	43.65 + 6
4 1.2	26.621 + 319	48.64 + 16	56.687 + 431	37.72 + 19	06.811 + 338	56.52 + 21	24.317 + 314	43.42 + 23
4 11.2	26.939 + 318	49.34 + 70	57.119 + 432	37.70 + 2	07.149 + 338	56.27 + 25	24.633 + 316	43.05 + 37
4 21.2	27.248 + 309	50.56 +122	57.541 + 422	37.86 - 16	07.481 + 332	56.00 + 27	24.942 + 309	42.54 + 51
5 1.2	27.541 + 293	52.21 +165	57.948 + 407	38.20 - 34	07.803 + 322	55.72 + 28	25.242 + 300	41.93 + 61
5 11.1	27.817 + 276	54.25 +204	58.337 + 389	38.71 - 51	08.111 + 308	55.46 + 26	25.530 + 288	41.25 + 68
5 21.1	28.065 + 248	56.60 +235	58.696 + 359	39.41 - 70	08.398 + 287	55.24 + 22	25.798 + 288	40.53 + 72
5 31.1	28.283 + 218	59.16 +256	59.022 + 326	40.28 - 87	08.659 + 261	55.08 + 16	26.042 + 244	39.82 + 71
6 10.1	28.467 + 184	61.88 +272	59.309 + 287	41.31 -103	08.891 + 232	55.00 + 8	26.258 + 216	39.12 + 70
6 20.0	28.609 + 142	64.65 +277	59.546 + 237	42.47 -116	09.084 + 193	55.00 + 0	26.439 + 181	38.49 + 63
6 30.0	28.709 + 100	67.38 +273	59.732 + 186	43.74 -127	09.239 + 155	55.09 - 9	26.583 + 144	37.93 + 56
7 10.0	28.765 + 56	70.05 +267	59.861 + 129	45.09 -135	09.349 + 110	55.27 - 18	26.686 + 103	37.46 + 47
7 19.9	28.772 + 7	72.54 +249	59.928 + 67	46.47 -138	09.411 + 62	55.52 - 25	26.744 + 58	37.08 - 38
7 29.9	28.736 - 36	74.82 +228	59.938 + 10	47.84 -137	09.428 + 17	55.83 - 31	26.760 + 16	36.81 + 27
8 8.9	28.654 - 82	76.86 +204	59.888 - 50	49.15 -131	09.398 - 30	56.17 - 34	26.731 - 29	36.61 + 20
8 18.9	28.532 - 122	78.56 +170	59.782 - 106	50.33 -118	09.324 - 74	56.53 - 36	26.663 - 68	36.51 + 10
8 28.8	28.376 - 156	79.95 +139	59.630 - 152	51.35 -102	09.214 - 110	56.87 - 34	26.560 - 103	36.47 + 4
9 7.8	28.190 - 186	80.98 +103	59.436 - 194	52.17 - 82	09.072 - 142	57.18 - 31	26.426 - 134	36.48 - 1
9 17.8	27.984 - 206	81.60 + 62	59.214 - 222	52.73 - 56	08.907 - 165	57.42 - 24	26.272 - 154	36.53 - 5
9 27.8	27.768 - 216	81.84 + 24	58.978 - 236	53.01 - 28	08.732 - 175	57.59 - 17	26.108 - 164	36.62 - 9
10 7.7	27.549 - 219	81.66 - 18	58.738 - 240	53.00 + 1	08.553 - 179	57.67 - 8	25.940 - 168	36.73 - 11
10 17.7	27.340 - 209	81.05 - 61	58.512 - 226	52.69 + 31	08.386 - 167	57.66 + 1	25.783 - 157	36.87 - 14
10 27.7	27.150 - 190	80.06 - 99	58.312 - 200	52.10 + 59	08.239 - 147	57.57 + 9	25.645 - 138	37.03 - 16
11 6.6	26.986 - 164	78.64 -142	58.150 - 162	51.25 + 85	08.123 - 116	57.41 + 16	25.535 - 110	37.23 - 20
11 16.6	26.861 - 125	76.85 -179	58.041 - 109	50.18 +107	08.047 - 76	57.21 + 20	25.462 - 73	37.48 - 25
11 26.6	26.776 - 85	74.73 -212	57.987 - 54	48.94 +124	08.016 - 31	56.97 + 24	25.431 - 31	37.78 - 30
12 6.6	26.738 - 38	72.29 -244	57.996 + 9	47.58 +136	08.034 + 18	56.74 + 23	25.445 + 14	38.14 - 36
12 16.5	26.751 + 13	69.62 -267	58.072 + 76	46.15 +143	08.104 + 70	56.53 + 21	25.507 + 62	38.56 - 42
12 26.5	26.811 + 60	66.81 -281	58.209 + 137	44.72 +143	08.226 + 122	56.47 + 6	25.611 + 104	39.01 - 45
12 36.5	26.921 + 110	63.90 -291	58.407 + 198	43.31 +141	08.377 + 151	56.21 + 26	25.757 + 146	39.57 - 56
	+ 154	-286	+ 253	+133	+ 207	+ 12	+ 189	- 57
Mean Place	27.539	74.24	58.400	36.38	08.274	48.06	25.687	31.02
sec δ, tan δ	+1.153	+0.573	+1.439	-1.035	+1.107	-0.475	+1.033	-0.260
dα(ψ), dδ(ψ)	+0.046	+0.04	+0.088	+0.04	+0.074	+0.05	+0.068	+0.05
dα(ε), dδ(ε)	-0.004	-0.99	+0.008	-0.99	+0.004	-0.99	+0.002	-0.99
Dble.Trans.	June 28		June 28		June 29		June 29	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1480			700		1481		697									
	60 Serpentis			Groombridge 2655 (Draconis)		B.D. +16° 3529 (Herculis)		9 Coronae Austrinae									
Mag.Spect.	5.44	K0		5.84	K0	5.67	A0		4.69	G5							
U.T.	R.A.	Dec.		R.A.	Dec.		R.A.	Dec.		R.A.	Dec.						
	h m	° /		h m	° /		h m	° /		h m	° /						
	18 28	- 1 59		18 30	+ 77 31		18 30	+ 16 54		18 32	- 42 19						
1	<sup>d</sup> -8.5	<sup>s</sup> 55.183	+ 77	49.97	-124	19.812	- 333	67.67	-341	25.004	+ 56	58.60	-224	27.464	+ 103	34.28	+121
1	1.5	55.302	+ 119	51.27	-130	19.668	- 144	64.14	-353	25.103	+ 99	56.28	-232	27.622	+ 158	33.08	+120
1	11.5	55.459	+ 157	52.62	-135	19.721	+ 53	60.54	-360	25.243	+ 140	53.92	-226	27.834	+ 212	31.92	+116
1	21.4	55.652	+ 193	53.93	-131	19.978	+ 257	57.05	-349	25.422	+ 179	51.65	-227	28.095	+ 261	30.83	+109
1	31.4	55.874	+ 222	55.14	-121	20.414	+ 436	53.79	-326	25.632	+ 210	49.53	-212	28.395	+ 300	29.84	+ 99
2	10.4	56.121	+ 247	56.22	-108	21.023	+ 609	50.84	-295	25.870	+ 238	47.64	-189	28.728	+ 333	28.96	+ 88
2	20.4	56.388	+ 267	57.10	- 88	21.782	+ 759	48.37	-247	26.131	+ 261	46.09	-155	29.090	+ 362	28.19	+ 77
3	2.3	56.668	+ 280	57.73	- 63	22.652	+ 870	46.43	-194	26.408	+ 277	44.91	-118	29.469	+ 379	27.55	+ 64
3	12.3	56.960	+ 292	58.11	- 38	23.614	+ 962	45.08	-135	26.700	+ 292	44.16	- 75	29.865	+ 396	27.02	+ 53
3	22.3	57.259	+ 299	58.18	- 7	24.627	+1013	44.42	- 66	26.999	+ 299	43.88	- 28	30.270	+ 405	26.62	+ 40
4	1.2	57.560	+ 301	57.97	+ 21	25.647	+1020	44.39	- 3	27.300	+ 301	44.04	+ 16	30.677	+ 407	26.34	+ 28
4	11.2	57.861	+ 301	57.49	+ 48	26.655	+1008	45.02	+ 63	27.602	+ 302	44.66	+ 62	31.086	+ 409	26.20	+ 14
4	21.2	58.157	+ 296	56.74	+ 75	27.604	+ 949	46.29	+127	27.897	+ 295	45.71	+105	31.488	+ 402	26.21	- 1
5	1.2	58.443	+ 284	55.78	+ 96	28.466	+ 862	48.10	+181	28.181	+ 284	47.10	+139	31.877	+ 389	26.37	- 16
5	11.1	58.717	+ 276	54.65	+113	29.224	+ 758	50.40	+230	28.450	+ 269	48.82	+172	32.250	+ 373	26.68	- 31
5	21.1	58.970	+ 253	53.39	+126	29.840	+ 616	53.12	+272	28.698	+ 248	50.79	+197	32.597	+ 347	27.16	- 48
5	31.1	59.201	+ 231	52.07	+132	30.307	+ 467	56.12	+300	28.919	+ 221	52.91	+212	32.914	+ 317	27.79	- 63
6	10.1	59.404	+ 203	50.71	+136	30.614	+ 307	59.36	+324	29.111	+ 192	55.16	+225	33.194	+ 280	28.59	- 80
6	20.0	59.573	+ 169	49.37	+134	30.741	+ 127	62.71	+335	29.266	+ 155	57.43	+227	33.428	+ 234	29.52	- 93
6	30.0	59.706	+ 133	48.10	+127	30.700	- 41	66.07	+336	29.384	+ 118	59.66	+223	33.615	+ 187	30.56	-104
7	10.0	59.799	+ 93	46.90	+120	30.484	- 216	69.39	+332	29.460	+ 76	61.82	+216	33.748	+ 133	31.69	-113
7	19.9	59.848	+ 49	45.84	+106	30.094	- 390	72.55	+316	29.492	+ 32	63.83	+201	33.823	+ 75	32.88	-119
7	29.9	59.858	+ 10	44.90	+ 94	29.554	- 540	75.48	+293	29.482	- 10	65.65	+182	33.844	+ 21	34.07	-119
8	8.9	59.825	- 33	44.11	+ 79	28.861	- 693	78.15	+267	29.430	- 52	67.26	+161	33.806	- 38	35.23	-116
8	18.9	59.753	- 72	43.48	+ 63	28.037	- 824	80.45	+230	29.339	- 91	68.61	+135	33.716	- 90	36.30	-107
8	28.8	59.649	- 104	43.00	+ 48	27.109	- 928	82.36	+191	29.215	- 124	69.70	+109	33.581	- 135	37.25	- 95
9	7.8	59.515	- 134	42.67	+ 33	26.082	-1027	83.85	+149	29.062	- 153	70.50	+ 80	33.405	- 176	38.02	- 77
9	17.8	59.362	- 153	42.51	+ 16	24.993	-1089	84.83	+ 98	28.890	- 172	70.98	+ 48	33.202	- 203	38.57	- 55
9	27.8	59.199	- 163	42.49	+ 2	23.866	-1127	85.35	+ 52	28.706	- 184	71.16	+ 18	32.983	- 219	38.89	- 32
10	7.7	59.032	- 167	42.63	- 14	22.718	-1148	85.33	- 2	28.520	- 186	71.02	- 14	32.759	- 224	38.95	- 6
10	17.7	58.876	- 156	42.92	- 29	21.593	-1125	84.78	- 55	28.343	- 177	70.55	- 47	32.548	- 211	38.74	+ 21
10	27.7	58.737	- 139	43.35	- 43	20.511	-1082	83.72	-106	28.183	- 160	69.78	- 77	32.360	- 188	38.29	+ 45
11	6.6	58.625	- 112	43.95	- 60	19.497	-1014	82.13	-159	28.048	- 135	68.67	-111	32.205	- 155	37.60	+ 69
11	16.6	58.549	- 76	44.70	- 75	18.594	- 903	80.05	-208	27.949	- 99	67.27	-140	32.100	- 105	36.71	+ 89
11	26.6	58.511	- 38	45.60	- 90	17.814	- 780	77.54	-251	27.888	- 61	65.61	-166	32.046	- 54	35.66	+105
12	6.6	58.516	+ 5	46.64	-104	17.186	- 628	74.61	-293	27.871	- 17	63.68	-193	32.051	+ 5	34.50	+116
12	16.5	58.568	+ 52	47.79	-115	16.737	- 449	71.39	-322	27.900	+ 29	61.57	-211	32.119	+ 68	33.29	+121
12	26.5	58.661	+ 93	49.02	-123	16.468	- 269	67.95	-344	27.972	+ 72	59.32	-225	32.242	+ 123	32.06	+123
12	36.5	58.796	+ 135	50.33	-131	16.401	- 67	64.39	-356	28.089	+ 117	56.99	-233	32.424	+ 182	30.83	+123
			+ 174		-130		+ 133		-353		+ 157		-230		+ 233		+116
Mean Place	58.823	41.22		24.362	73.96		28.398	66.65		32.369	23.59						
sec δ, tan δ	+1.001	-0.035		+4.634	+4.525		+1.045	+0.304		+1.353	-0.911						
dα(ψ), dδ(ψ)	+0.062	+0.05		-0.058	+0.05		+0.053	+0.05		+0.085	+0.06						
dα(ε), dδ(ε)	+0.000	-0.99		-0.040	-0.99		-0.003	-0.99		+0.009	-0.99						
Dble.Trans.	June 29			June 29			June 29			June 30							



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1483		1482		1484		701	
Name	Groombridge 2603 (Lyrae)		α Scuti		B.D. +9° 3783 (Ophiuchi)		Groombridge 2640 (Draconis)	
Mag. Spect.	6.66	A0	4.06	K0	5.40	F2	6.00	A3
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	18 33	+ 46 12	18 34	- 8 15	18 35	+ 9 06	18 36	+ 65 28
1 -8.5	21 495 <sup>s</sup> - 5	22 32 <sup>o</sup> -324	24 606 <sup>s</sup> + 77	24 61 <sup>o</sup> - 86	45 694 <sup>s</sup> + 61	" -184	07 136 <sup>s</sup> - 119	" -344
1 1 5	21 549 + 54	18 96 -336	24 725 + 119	25 53 - 92	45 796 + 102	29 81 -190	07 114 - 22	25 61 -357
1 11 5	21 660 + 111	15 55 -341	24 883 + 158	26 49 - 96	45 937 + 141	27 86 -195	07 192 + 78	21 97 -364
1 21 4	21 831 + 171	12 25 -330	25 078 + 195	27 43 - 94	46 116 + 179	25 97 -189	07 374 + 182	18 42 -355
1 31 4	22 050 + 219	09 17 -308	25 301 + 223	28 30 - 87	46 324 + 208	24 22 -175	07 644 + 270	15 11 -331
2 10 4	22 314 + 264	06 40 -277	25 550 + 249	29 07 - 77	46 559 + 235	22 65 -157	08 000 + 356	12 10 -301
2 20 4	22 618 + 304	04 09 -231	25 819 + 269	29 69 - 62	46 817 + 258	21 37 -128	08 431 + 431	09 57 -253
3 2 3	22 950 + 352	02 30 -179	26 102 + 283	30 12 - 43	47 090 + 273	20 41 - 96	08 916 + 485	07 57 -200
3 12 3	23 306 + 336	01 08 -122	26 398 + 296	30 34 - 22	47 376 + 286	19 80 - 61	09 448 + 532	06 18 -139
3 22 3	23 677 + 371	00 51 - 57	26 701 + 303	30 33 + 1	47 671 + 295	19 60 - 20	10 008 + 560	05 47 - 71
4 1 2	24 050 + 373	00 56 + 5	27 007 + 306	30 09 + 24	47 968 + 297	19 79 + 19	10 574 + 566	05 42 - 5
4 11 2	24 424 + 374	01 23 + 67	27 314 + 307	29 64 + 45	48 268 + 300	20 36 + 57	11 138 + 564	06 02 + 60
4 21 2	24 785 + 361	02 52 +129	27 617 + 303	29 00 + 64	48 562 + 294	21 29 + 93	11 678 + 540	07 29 +127
5 1 2	25 126 + 341	04 31 +179	27 911 + 294	28 19 + 81	48 846 + 284	22 52 +123	12 178 + 500	09 10 +181
5 11 1	25 442 + 316	06 58 +227	28 194 + 283	27 27 + 92	49 118 + 272	24 02 +150	12 631 + 453	11 42 +232
5 21 1	25 722 + 280	09 23 +265	28 457 + 263	26 25 +102	49 370 + 252	25 72 +170	13 017 + 386	14 17 +275
5 31 1	25 962 + 240	12 14 +291	28 698 + 241	25 21 +104	49 598 + 228	27 54 +182	13 330 + 313	17 22 +305
5 10 1	26 158 + 196	15 27 +313	28 911 + 213	24 16 +105	49 798 + 200	29 45 +191	13 565 + 235	20 52 +330
6 20 0	26 300 + 142	18 50 +323	29 090 + 179	23 15 +101	49 963 + 165	31 38 +193	13 708 + 143	23 94 +342
6 30 0	26 391 + 91	21 71 +321	29 234 + 144	22 22 + 93	50 093 + 130	33 25 +187	13 764 + 56	27 38 +344
7 10 0	26 425 + 34	24 88 +317	29 337 + 103	21 37 + 85	50 181 + 88	35 05 +180	13 727 - 37	30 78 +340
7 19 9	26 400 - 25	27 88 +300	29 396 + 59	20 64 + 73	50 226 + 45	36 71 +166	13 597 -130	34 03 +325
7 29 9	26 323 - 77	30 66 +278	29 414 + 18	20 02 + 62	50 231 + 5	38 21 +150	13 384 -213	37 05 +302
8 8 9	26 191 -132	33 17 +251	29 389 - 25	19 52 + 50	50 193 - 38	39 52 +131	13 087 -297	39 81 +276
8 18 9	26 011 -180	35 31 +214	29 323 - 66	19 15 + 37	50 116 - 77	40 61 +109	12 715 -372	42 19 +238
8 28 8	25 790 -221	37 09 +178	29 224 - 99	18 89 + 26	50 006 -110	41 47 + 86	12 284 -431	44 19 +200
9 7 8	25 533 -257	38 45 +136	29 094 -130	18 74 + 15	49 867 -139	42 11 + 64	11 795 -489	45 75 +156
9 17 8	25 252 -281	39 34 + 89	28 944 -150	18 70 + 4	49 707 -160	42 48 + 37	11 270 -525	46 81 +106
9 27 8	24 957 -295	39 77 + 43	28 782 -162	18 74 - 4	49 536 -171	42 61 + 13	10 723 -547	47 39 + 58
10 7 7	24 655 -302	39 71 - 6	28 616 -166	18 87 -13	49 361 -175	42 49 - 12	10 163 -560	47 43 + 4
10 17 7	24 364 -291	39 13 - 58	28 460 -156	19 10 - 23	49 195 -166	42 10 - 39	09 616 -547	46 92 - 51
10 27 7	24 091 -273	38 08 -105	28 321 -139	19 41 - 31	49 046 -149	41 48 - 62	09 092 -524	45 90 -102
11 6 6	23 847 -244	36 53 -155	28 208 -113	19 82 - 41	48 920 -126	40 59 - 89	08 607 -485	44 32 -158
11 16 6	23 645 -202	34 52 -201	28 131 - 77	20 33 - 51	48 830 - 90	39 46 -113	08 607 -423	44 32 -207
11 26 6	23 489 -156	32 11 -241	28 093 - 38	20 93 - 60	48 777 - 53	38 11 -135	08 184 -357	42 25 -251
12 6 6	23 387 -102	29 31 -280	28 098 + 5	21 64 - 71	48 766 - 11	36 55 -156	07 553 -274	36 80 -294
12 16 5	23 345 - 42	26 24 -307	28 150 + 52	22 42 - 78	48 801 + 35	34 83 -172	07 374 -179	33 56 -324
12 26 5	23 362 + 17	22 97 -327	28 243 + 93	23 27 - 85	48 877 + 76	32 99 -184	07 288 - 86	30 09 -347
12 36 5	23 439 + 137	19 59 -334	28 378 + 135	24 19 - 92	48 996 + 119	31 08 -191	07 306 + 18	26 48 -361
			28 378 + 175	24 19 - 93	48 996 + 158	31 08 -189	07 306 + 120	26 48 -357
Mean Place	24.782	29.27	28.351	15.36	49.171	40.29	10.738	35.56
sec δ, tan δ	+1.445	+1.043	+1.010	-0.145	+1.013	+0.160	+2.409	+2.192
dα(ψ), dδ(ψ)	+0.034	+0.06	+0.065	+0.06	+0.057	+0.06	+0.004	+0.06
dα(ε), dδ(ε)	-0.010	-0.99	+0.001	-0.99	-0.002	-0.99	-0.023	-0.99
Dble. Trans.	June 30		June 30		July 1		July 1	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	699		1485		698		1486	
	$\alpha$ Lyrae (Vega)		83 G. Sagittarii		$\zeta$ Pavonis		$\delta$ Scuti	
Mag. Spect.	0.14	A0	5.80	A5	4.10	K0	4.74 var.	F0
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	Dec.	h m	Dec.	h m	Dec.	h m	Dec.
	18 36	+ 38 45	18 37	- 21 24	18 41	- 71 26	18 41	- 9 03
1 -8.5	25 604 + 14	66 64 -304	01 910 + 87	45 33 - 5	18 826 + 97	41 50 +271	28 328 + 72	68 47 - 78
1 1.5	25 671 + 67	63 49 -315	02 026 + 116	45 33 + 0	19 056 + 230	38 76 +274	28 440 + 112	69 30 - 83
1 11.5	25 788 + 117	60 30 -319	02 204 + 178	45 54 - 21	19 411 + 355	36 06 +270	28 592 + 152	70 18 - 88
1 21.4	25 956 + 188	57 20 -310	02 414 + 210	45 67 - 13	19 890 + 479	33 49 +257	28 781 + 189	71 03 - 85
1 31.4	26 166 + 210	54 32 -288	02 654 + 240	45 79 - 12	20 468 + 578	31 13 +236	28 999 + 218	71 82 - 79
2 10.4	26 415 + 249	51 72 -260	02 920 + 266	45 89 - 10	21 137 + 669	29 00 +213	29 244 + 245	72 52 - 70
2 20.4	26 698 + 283	49 56 -216	03 209 + 289	45 93 - 4	21 884 + 747	27 17 +183	29 509 + 265	73 06 - 54
3 2.3	27 004 + 306	47 90 -166	03 511 + 302	45 91 + 2	22 683 + 799	25 68 +149	29 790 + 281	73 42 - 36
3 12.3	27 332 + 328	46 77 -113	03 828 + 317	45 80 + 11	23 529 + 846	24 53 +115	30 084 + 294	73 59 - 17
3 22.3	27 671 + 339	46 26 - 51	04 152 + 324	45 60 + 20	24 402 + 873	23 77 + 76	30 386 + 302	73 53 + 6
4 1.2	28 014 + 343	46 35 + 9	04 479 + 327	45 31 + 29	25 283 + 881	23 38 + 39	30 692 + 306	73 25 + 28
4 11.2	28 358 + 344	47 02 + 67	04 809 + 330	44 94 + 37	26 168 + 885	23 37 + 1	31 002 + 310	72 77 + 48
4 21.2	28 691 + 333	48 27 +125	05 134 + 325	44 50 + 44	27 034 + 866	23 77 - 40	31 307 + 305	72 10 + 67
5 1.2	29 009 + 318	50 00 +173	05 451 + 317	44 04 + 46	27 866 + 832	24 52 - 75	31 604 + 297	71 28 + 82
5 11.1	29 307 + 298	52 18 +218	05 756 + 305	43 55 + 49	28 657 + 791	25 65 -113	31 892 + 288	70 34 + 94
5 21.1	29 574 + 267	54 72 +254	06 042 + 286	43 08 + 47	29 382 + 725	27 13 -148	32 161 + 269	69 32 +102
5 31.1	29 807 + 233	57 51 +279	06 304 + 262	42 66 + 42	30 032 + 650	28 89 -176	32 408 + 247	68 28 +104
6 10.1	30 001 + 194	60 49 +298	06 538 + 234	42 30 + 36	30 595 + 563	30 95 -206	32 628 + 220	67 23 +105
6 20.0	30 149 + 148	63 56 +307	06 735 + 197	42 02 + 28	31 051 + 456	33 22 -227	32 814 + 186	66 23 +100
6 30.0	30 251 + 102	66 62 +306	06 895 + 160	41 83 + 19	31 398 + 347	35 64 -242	32 965 + 151	65 31 + 92
7 10.0	30 302 + 51	69 62 +300	07 012 + 117	41 74 + 9	31 624 + 226	38 17 -253	33 075 + 110	64 48 + 83
7 19.9	30 301 - 49	72 46 +284	07 083 + 71	41 74 + 0	31 720 + 96	40 72 -255	33 141 + 66	63 76 + 72
7 29.9	30 252 - 99	75 08 +262	07 109 + 26	41 82 - 8	31 694 - 26	43 21 -249	33 165 + 24	63 17 + 59
8 8.9	30 153 - 99	77 44 +236	07 088 - 21	41 97 - 15	31 541 - 153	45 58 -237	33 146 - 19	62 69 + 48
8 18.9	30 009 - 144	79 46 +202	07 025 - 63	42 16 - 19	31 270 - 271	47 72 -214	33 085 - 61	62 34 + 35
8 28.8	29 828 - 181	81 13 +167	06 924 - 101	42 38 - 22	30 900 - 370	49 56 -184	32 991 - 94	62 10 + 24
9 7.8	29 613 - 215	82 41 +128	06 791 - 133	42 60 - 22	30 438 - 462	51 05 -149	32 864 - 127	61 96 + 14
9 17.8	29 375 - 238	83 24 + 83	06 635 - 156	42 81 - 21	29 911 - 527	52 09 -104	32 716 - 148	61 92 + 4
9 27.8	29 125 - 250	83 65 + 41	06 466 - 169	42 98 - 17	29 346 - 565	52 68 - 59	32 556 - 160	61 97 - 5
10 7.7	28 869 - 256	83 59 - 6	06 293 - 173	43 11 - 13	28 761 - 585	52 75 - 7	32 390 - 166	62 10 - 13
10 17.7	28 623 - 246	83 05 - 54	06 129 - 164	43 19 - 8	28 196 - 565	52 30 + 45	32 232 - 158	62 31 - 21
10 27.7	28 394 - 229	82 07 - 98	05 983 - 146	43 22 - 3	27 672 - 524	51 36 + 94	32 091 - 141	62 60 - 29
11 6.6	28 191 - 203	80 62 -145	05 864 - 119	43 22 + 0	27 214 - 458	49 93 +143	31 975 - 116	62 98 - 38
11 16.6	28 027 - 164	78 74 -188	05 784 - 80	43 20 + 2	26 856 - 358	48 08 +185	31 894 - 81	63 44 - 46
11 26.6	27 905 - 122	76 49 -225	05 745 - 39	43 17 + 3	26 606 - 250	45 89 +219	31 851 - 43	63 99 - 55
12 6.6	27 833 - 72	73 87 -262	05 753 + 8	43 15 + 2	26 482 - 124	43 40 +249	31 851 + 0	64 63 - 64
12 16.5	27 814 + 19	71 00 -287	05 810 + 57	43 16 - 1	26 496 + 14	40 74 +266	31 897 + 46	65 34 - 71
12 26.5	27 848 + 34	67 94 -306	05 917 + 107	43 16 + 0	26 642 + 146	37 99 +275	31 984 + 87	66 11 - 77
12 36.5	27 935 + 87	64 77 -317	06 052 + 135	43 16 - 10	26 923 + 281	35 21 +278	32 114 + 130	66 94 - 83
	27 935 + 139	64 77 -313	06 052 + 191	43 26 - 10	26 923 + 407	35 21 +267	32 114 + 168	66 94 - 84
Mean Place	28.895	74.12	05.955	35.08	27.950	28.96	32.080	58.50
sec $\delta$ , tan $\delta$	+1.283	+0.803	+1.074	-0.392	+3.142	-2.979	+1.013	-0.160
$d\alpha(w)$ , $d\delta(w)$	+0.040	+0.06	+0.071	+0.06	+0.139	+0.07	+0.065	+0.07
$d\alpha(e)$ , $d\delta(e)$	-0.008	-0.99	+0.004	-0.99	+0.036	-0.98	+0.002	-0.98
Dble. Trans.	July 1		July 1		July 2		July 2	

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	702		1487		703		1488	
	ε Scuti		φ Sagittarii		110 Herculis		B.D. +26° 3349 (Lyrae)	
Mag.Spect.	5.09	G5	3.30	B8	4.26	F5	4.92	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	18 42	- 8 17	18 44	-27 00	18 45	+20 31	18 45	+26 38
1 -8.5	43.415 + 70	31 61 - 83	44 618 + 82	31.21 + 29	01.493 + 38	49.91 -234	28.512 + 27	41.52 -259
1 1.5	43.526 + 111	32 48 - 87	44 741 + 123	31 01 + 20	01.574 + 81	47.46 -245	28.585 + 73	38.83 -269
1 11.5	43.675 + 149	33 40 - 92	44 909 + 168	30 64 + 37	01.696 + 122	44.97 -249	28.701 + 116	36.08 -275
1 21.4	43.862 + 187	34 30 - 90	45 121 + 212	30 38 + 26	01.859 + 163	42.55 -242	28.861 + 160	33.40 -268
1 31.4	44.079 + 217	35 12 - 82	45.364 + 243	30.14 + 24	02.055 + 196	40.29 -226	29.056 + 195	30.90 -250
2 10.4	44.321 + 242	35 85 - 73	45.636 + 272	29.90 + 24	02.282 + 227	38.24 -205	29.283 + 227	28.64 -226
2 20.4	44.585 + 264	36 42 - 57	45.932 + 296	29.64 + 26	02.535 + 253	36.55 -169	29.540 + 257	26.75 -189
3 2.3	44.864 + 279	36 81 - 39	46.244 + 312	29.37 + 27	02.806 + 271	35.24 -131	29.816 + 276	26.29 -146
3 12.3	45.156 + 292	36 99 - 18	46.571 + 327	29.06 + 31	03.094 + 288	34.37 - 87	30.111 + 295	24.30 - 99
3 22.3	45.458 + 302	36 93 + 6	46.908 + 337	28.72 + 34	03.393 + 299	34.00 - 37	30.418 + 307	23.85 - 45
4 1.3	45.763 + 306	36 66 + 27	47 249 + 341	28.35 + 37	03.697 + 304	34.10 + 10	30.730 + 312	23.92 + 7
4 11.2	46.071 + 308	36 16 + 50	47.594 + 345	27.95 + 40	04.004 + 307	34.69 + 59	31.046 + 316	24.50 + 58
4 21.2	46.376 + 305	35 47 + 69	47.935 + 341	27.55 + 40	04.306 + 302	35.73 +104	31.355 + 309	25.61 +111
5 1.2	46.673 + 297	34 63 + 84	48 269 + 334	27.17 + 38	04.598 + 292	37.16 +143	31.654 + 299	27.13 +152
5 11.1	46.960 + 287	33 66 + 97	48.592 + 323	26.83 + 34	04.878 + 280	38.94 +178	31.939 + 285	29.04 +191
5 21.1	47.229 + 269	32 60 +106	48.895 + 303	26.55 + 28	05.135 + 257	41.01 +207	32.200 + 261	31.28 +224
5 31.1	47.476 + 247	31 52 +108	49.175 + 280	26.34 + 21	05.368 + 233	43.26 +225	32.435 + 235	33.73 +245
6 10.1	47.697 + 221	30 43 +109	49 426 + 251	26.24 + 10	05.571 + 203	45.65 +239	32.638 + 203	36.35 +262
6 20.0	47.883 + 186	29 38 +105	49 640 + 214	26.24 + 0	05.737 + 166	48.10 +245	32.801 + 163	39.04 +269
6 30.0	48.034 + 151	28 41 + 97	49.815 + 175	26.35 - 11	05.865 + 128	50.52 +242	32.925 + 124	41.71 +267
7 10.0	48.145 + 111	27 53 + 88	49 945 + 130	26.56 - 21	05.951 + 86	52.89 +237	33 005 + 80	44.34 +263
7 20.0	48.212 + 67	26 77 + 76	50 026 + 81	26.87 - 31	05.991 + 40	55.10 +221	33 037 + 32	46.82 +248
7 29.9	48.237 + 25	26 13 + 64	50 026 + 35	27.25 - 38	05.991 - 2	57.13 +203	33 037 - 11	49.10 +228
8 8.9	48.218 - 19	25 61 + 52	50.061 - 15	27.25 - 43	05.989 - 47	57.13 +183	33 026 - 57	51.16 +206
8 18.9	48.159 - 59	25 22 + 39	49.986 - 60	28.14 - 46	05.942 - 87	58.96 +154	32.969 - 100	52.93 +177
8 28.8	48.065 - 94	24 95 + 27	49.887 - 99	28.58 - 44	05.733 - 122	61.77 +127	32.735 - 134	54.39 +146
9 7.8	47.939 - 126	24 79 + 16	49.752 - 135	28.99 - 41	05.580 - 153	62.74 + 97	32.568 - 167	55.52 +113
9 17.8	47.791 - 148	24 73 + 6	49.752 - 160	28.99 - 35	05.580 - 175	62.74 + 62	32.568 - 190	56.26 + 74
9 27.8	47.631 - 160	24 73 - 4	49.592 - 175	29.34 - 26	05.405 - 187	63.36 + 30	32.378 - 202	56.65 + 39
10 7.7	47.465 - 166	24 77 - 13	49 417 - 181	29.60 - 16	05.218 - 194	63.66 - 4	32.176 - 209	56.65 + 0
10 17.7	47.308 - 157	25 12 - 22	49.063 - 173	29.81 - 5	05.024 - 186	63.62 - 41	31.967 - 202	56.65 - 41
10 27.7	47.167 - 141	25 42 - 30	48 908 - 155	29.75 + 6	04.838 - 171	63.21 - 74	31.765 - 187	56.24 - 79
11 6.7	47.049 - 118	25 42 - 40	48 908 - 129	29.75 + 14	04.667 - 149	62.47 -110	31.578 - 163	55.45 -118
11 16.6	46.968 - 81	25 82 - 49	48.779 - 89	29.61 + 23	04.518 - 114	61.37 -142	31.415 - 130	54.27 -156
11 26.6	46.923 - 45	26 31 - 58	48.690 - 48	29.38 + 29	04.404 - 78	59.95 -171	31.285 - 91	52.71 -188
12 6.6	46.922 - 1	27 57 - 68	48 643 + 1	28.77 + 32	04.291 - 35	56.24 -200	31.145 - 49	48.63 -220
12 16.5	46.966 + 44	28 32 - 75	48 695 + 52	28.44 + 33	04.302 + 11	54.03 -221	31.144 - 1	46.20 -243
12 26.5	47.052 + 86	29 14 - 82	48.795 + 100	28.14 + 30	04.356 + 54	51.67 -236	31.189 + 45	43.59 -261
12 36.5	47.179 + 127	30 01 - 87	48.932 + 137	27.85 + 29	04.454 + 98	49.21 -246	31.280 + 91	40.88 -271
	47.151 + 166	30 01 - 89	48.932 + 190	27.85 + 34	04.454 + 141	49.21 -243	31.280 + 135	40.88 -269
Mean Place	47.151	21.60	48.816	19.87	04.856	58.06	31.837	49.48
sec δ, tan δ	+1.011	-0.146	+1.122	-0.510	+1.068	+0.375	+1.119	+0.502
dα(ψ), dδ(ψ)	+0.065	+0.07	+0.074	+0.08	+0.051	+0.08	+0.048	+0.08
dα(ε), dδ(ε)	+0.002	-0.98	+0.007	-0.98	-0.005	-0.98	-0.007	-0.98
Dble.Trans.	July 2		July 3		July 3		July 3	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1492		1491		1489		1494	
	Groombridge 2671 (Draconis)		111 Herculis		β Scuti		50 Draconis	
Mag.Spect.	5.76	B5	4.37	A3	4.47	G0	5.37	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	18 46	+ 52 57	18 46	+ 18 09	18 46	- 4 45	18 46	+ 75 24
1	-8.5	21.627 - 50	22.116 + 40	48.34 - 223	23.833 + 64	57.08 - 102	44.316 - 326	60.99 - 331
1	1.5	21.643 + 16	22.198 + 82	46.03 - 231	23.937 + 104	58.16 - 108	44.150 - 166	57.50 - 349
1	11.5	21.727 + 84	22.321 + 123	43.66 - 237	24.080 + 143	59.27 - 111	44.149 - 1	53.91 - 359
1	21.4	21.879 + 152	22.485 + 164	41.36 - 230	24.260 + 180	60.36 - 109	44.324 + 175	50.38 - 363
1	31.4	22.090 + 211	22.680 + 195	39.21 - 215	24.469 + 209	61.37 - 101	44.655 + 331	47.04 - 334
2	10.4	22.358 + 268	22.905 + 225	37.28 - 193	24.705 + 236	62.26 - 89	45.136 + 481	43.98 - 306
2	20.4	22.675 + 317	23.157 + 252	35.67 - 161	24.963 + 258	62.97 - 71	45.754 + 618	41.35 - 263
3	2.3	23.029 + 354	23.426 + 269	34.45 - 122	25.236 + 273	63.46 - 49	46.474 + 720	39.24 - 211
3	12.3	23.415 + 396	23.712 + 286	33.63 - 82	25.523 + 287	63.72 - 26	47.283 + 809	37.69 - 155
3	22.3	23.823 + 408	24.008 + 296	33.30 - 33	25.821 + 298	63.71 + 1	48.146 + 863	36.82 - 87
4	1.3	24.237 + 414	24.310 + 302	33.43 + 13	26.122 + 301	63.44 + 27	49.028 + 882	36.59 - 23
4	11.2	24.655 + 418	24.615 + 305	34.02 + 59	26.427 + 305	62.92 + 52	49.911 + 883	37.02 + 43
4	21.0	25.061 + 406	24.915 + 300	35.05 + 103	26.729 + 302	62.16 + 76	50.757 + 846	38.11 + 109
5	1.2	25.445 + 384	25.206 + 291	36.45 + 140	27.024 + 295	61.22 + 94	51.538 + 781	39.75 + 164
5	11.1	25.803 + 358	25.485 + 279	38.19 + 174	27.309 + 285	60.12 + 110	52.241 + 703	41.93 + 218
5	21.1	26.120 + 317	25.744 + 259	40.20 + 201	27.576 + 267	58.91 + 121	52.832 + 591	44.55 + 262
5	31.1	26.391 + 271	25.978 + 234	42.38 + 218	27.822 + 246	57.65 + 126	53.302 + 470	47.49 + 294
6	10.1	26.611 + 220	26.183 + 205	44.70 + 232	28.042 + 220	56.37 + 128	53.640 + 338	50.70 + 321
6	20.0	26.770 + 159	26.351 + 168	47.06 + 236	28.228 + 186	55.12 + 125	53.826 + 186	54.07 + 337
6	30.0	26.870 + 100	26.483 + 132	49.40 + 234	28.379 + 151	53.94 + 118	53.870 + 44	57.48 + 341
7	10.0	26.905 + 35	26.573 + 90	51.67 + 227	28.490 + 111	52.85 + 109	53.762 - 108	60.90 + 342
7	20.0	26.874 - 31	26.617 + 44	53.80 + 213	28.557 + 67	51.88 + 97	53.503 - 259	64.18 + 328
7	29.9	26.782 - 92	26.620 + 3	55.76 + 196	28.583 + 26	51.04 + 84	53.109 - 394	67.28 + 310
8	8.9	26.627 - 155	26.579 - 41	57.51 + 175	28.565 - 18	50.34 + 70	52.580 - 529	70.13 + 285
8	18.9	26.416 - 211	26.496 - 83	58.99 + 148	28.507 - 58	49.79 + 55	51.931 - 649	72.64 + 251
8	28.8	26.159 - 257	26.380 - 116	60.20 + 121	28.414 - 93	49.38 + 41	51.184 - 747	74.79 + 215
9	7.8	25.859 - 300	26.232 - 148	61.13 + 93	28.289 - 125	49.11 + 27	50.345 - 839	76.53 + 174
9	17.8	25.529 - 330	26.063 - 169	61.73 + 60	28.143 - 146	48.99 + 12	49.442 - 903	77.77 + 124
9	27.8	25.181 - 348	25.881 - 182	62.03 + 30	27.983 - 160	48.98 + 1	48.499 - 943	78.56 + 79
10	7.7	24.822 - 359	25.692 - 189	61.99 - 4	27.817 - 166	49.10 - 12	47.529 - 970	78.81 + 25
10	17.7	24.471 - 351	25.511 - 181	61.61 - 38	27.659 - 158	49.35 - 25	46.569 - 960	78.52 - 29
10	27.7	24.136 - 335	25.345 - 166	60.92 - 69	27.516 - 143	49.71 + 27	45.638 - 931	77.72 - 80
11	6.7	23.829 - 307	25.201 - 144	59.89 - 103	27.397 - 119	50.21 - 50	44.758 - 880	76.36 - 136
11	16.6	23.566 - 263	25.090 - 111	58.56 - 133	27.312 - 85	50.82 - 61	43.965 - 793	74.49 - 187
11	26.6	23.351 - 215	25.016 - 74	56.94 - 162	27.263 - 49	51.55 - 73	43.271 - 694	72.17 - 232
12	6.6	23.194 - 157	24.984 - 32	55.05 - 189	27.256 - 7	52.40 - 85	42.700 - 571	69.40 - 277
12	16.5	23.103 - 91	24.997 + 13	52.97 - 208	27.295 + 39	53.35 - 95	42.279 - 421	66.30 - 310
12	26.5	23.077 - 26	25.053 + 56	50.73 - 224	27.374 + 79	54.36 - 101	42.007 - 272	62.94 - 336
12	36.5	23.121 + 44	25.153 + 100	48.40 - 233	27.495 + 121	55.44 - 108	41.905 - 102	59.41 - 353
		+ 112	+ 141	+ 231	+ 159	- 108	+ 70	- 354
Mean Place	24.984	82.27	25.501	56.91	27.500	47.07	48.670	66.85
sec δ, tan δ	+1.661	+1.326	+1.052	+0.328	+1.003	-0.083	+3.972	+3.844
da(ψ), dδ(ψ)	+0.027	+0.08	+0.053	+0.08	+0.063	+0.08	-0.039	+0.08
da(ε), dδ(ε)	-0.018	-0.98	-0.004	-0.98	+0.001	-0.98	-0.052	-0.98
Dble.Trans.	July 3		July 3		July 3		July 4	

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	1490		705		1493		704	
Name	η <sup>1</sup> Coronae Austrinae		β Lyrae		30 Sagittarii		λ Pavonis	
Mag.Spect.	5.59	A2	3.4 to 4.3	B8p, B2p	6.24	F0	4.42	B2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>
	18 47	-43 41	18 49	+33 20	18 49	-22 10	18 50	-62 12
1 -8.5	<sup>s</sup> 47.164 + 84	57.15 +130	<sup>s</sup> 31.584 + 10	39 82 -280	<sup>s</sup> 57.757 + 74	" + 2	<sup>s</sup> 51.446 + 78	" +230
1 1.5	47.304 + 140	55.83 +132	31.642 + 58	36.89 -293	57.891 + 134	53.73 + 32	51.613 + 167	29.68 +233
1 11.5	47.498 + 194	54.52 +131	31.747 + 105	33.89 -300	58.025 + 134	53.75 - 34	51.865 + 252	27.35 +234
1 21.4	47.744 + 246	53.25 +127	31.898 + 151	30.97 -292	58.224 + 199	53.77 - 2	52.200 + 335	25.01 +224
1 31.4	48.031 + 287	52.07 +118	32.090 + 192	28.22 -275	58.453 + 229	53.77 + 0	52.603 + 403	22.77 +209
2 10.4	48.355 + 324	50.98 +109	32.317 + 227	25.73 -249	58.710 + 257	53.75 + 2	53.067 + 464	18.75 +193
2 20.4	48.710 + 355	50.00 + 98	32.577 + 260	23.63 -210	58.991 + 281	53.67 + 8	53.583 + 516	17.07 +168
3 2.3	49.086 + 376	49.15 + 85	32.861 + 284	21.98 -165	59.288 + 297	53.53 + 14	54.136 + 553	15.65 +142
3 12.3	49.482 + 396	48.40 + 75	33.166 + 305	20.83 -115	59.600 + 312	53.31 + 22	54.722 + 586	14.49 +116
3 22.3	49.890 + 408	47.80 + 60	33.485 + 319	20.27 - 56	59.923 + 323	52.99 + 32	55.329 + 607	13.64 + 85
4 1.3	50.304 + 414	47.34 + 46	33.810 + 325	20.26 - 1	60.250 + 327	52.60 + 39	55.945 + 616	13.09 + 55
4 11.2	50.722 + 418	47.02 + 32	34.140 + 330	20.82 + 56	60.582 + 332	52.14 + 46	56.567 + 622	12.86 + 23
4 21.2	51.136 + 414	46.88 - 14	34.463 + 323	21.94 +112	60.912 + 330	51.62 + 52	57.181 + 614	12.96 - 10
5 1.2	51.540 + 404	46.89 - 1	34.775 + 312	23.51 +157	61.235 + 323	51.08 + 54	57.777 + 596	13.38 - 72
5 11.1	51.931 + 391	47.09 - 20	35.072 + 297	25.53 +202	61.549 + 314	50.53 + 55	58.351 + 574	14.11 - 43
5 21.1	52.297 + 366	47.48 - 39	35.343 + 271	27.90 +237	61.844 + 295	50.01 + 52	58.883 + 532	15.16 -105
5 31.1	52.634 + 337	48.04 - 56	35.584 + 241	30.52 +262	62.117 + 273	49.54 + 47	59.369 + 486	16.48 -132
6 10.1	52.936 + 302	48.79 - 75	35.792 + 208	33.34 +282	62.364 + 247	49.15 + 39	59.799 + 430	18.07 -159
6 20.0	53.192 + 256	49.70 - 91	35.958 + 166	36.25 +291	62.574 + 210	48.85 + 30	60.157 + 358	19.88 -181
6 30.0	53.400 + 208	50.75 -105	36.081 + 123	39.17 +292	62.747 + 173	48.65 + 20	60.443 + 286	21.86 -198
7 10.0	53.554 + 154	51.92 -117	36.156 + 75	42.05 +288	62.878 + 131	48.57 + 8	60.646 + 203	23.97 -211
7 20.0	53.649 + 95	53.16 -124	36.182 + 26	44.78 +273	62.961 + 83	48.58 - 1	60.758 + 112	26.13 -216
7 29.9	53.687 + 38	54.44 -128	36.161 - 21	47.32 +254	62.999 + 38	48.70 -12	60.785 + 27	28.28 -215
8 8.9	53.664 - 23	55.70 -126	36.092 - 69	49.64 +232	62.990 - 9	48.88 -18	60.722 - 63	30.36 -208
8 18.9	53.586 - 78	56.90 -120	35.979 - 113	51.63 +199	62.936 - 54	49.12 -24	60.575 - 147	32.26 -190
8 28.8	53.460 - 126	57.97 -107	35.828 - 151	53.30 +167	62.844 - 92	49.40 - 28	60.355 - 286	33.95 -169
9 7.8	53.290 - 170	58.88 - 91	35.643 - 185	54.62 +132	62.716 - 128	49.67 -27	60.069 - 220	35.35 -140
9 17.8	53.088 - 202	59.58 - 70	35.434 - 209	55.51 + 89	62.565 - 151	49.94 -27	59.734 - 335	36.38 -103
9 27.8	52.868 - 220	60.04 - 46	35.211 - 223	56.02 + 51	62.398 - 167	50.16 -22	59.370 - 364	37.03 - 65
10 7.7	52.638 - 230	60.23 - 19	34.979 - 232	56.09 + 7	62.223 - 175	50.34 -18	58.988 - 382	37.24 - 21
10 17.7	52.417 - 221	60.13 + 10	34.754 - 225	55.71 - 38	62.057 - 166	50.46 -12	58.618 - 370	36.99 + 25
10 27.7	52.217 - 200	59.77 + 36	34.544 - 210	54.91 - 80	61.906 - 151	50.52 - 6	58.274 - 344	36.32 + 67
11 6.7	52.047 - 170	59.14 + 63	34.356 - 188	53.67 -124	61.780 - 126	50.53 - 1	57.974 - 300	35.21 +111
11 16.6	51.924 - 123	58.28 + 86	34.204 - 152	52.02 -165	61.691 - 89	50.50 + 3	57.742 - 232	33.72 +149
11 26.6	51.852 - 72	57.23 +105	34.089 - 115	50.00 -202	61.641 - 50	50.45 + 5	57.583 - 159	31.92 +180
12 6.6	51.837 - 15	56.04 +119	34.020 - 69	47.63 -237	61.637 - 4	50.39 + 6	57.510 - 73	29.86 +206
12 16.5	51.885 + 48	54.75 +129	34.000 - 20	44.99 -264	61.682 + 45	50.33 + 6	57.532 + 22	27.61 +225
12 26.5	51.990 + 105	53.41 +134	34.027 + 27	42.17 -282	61.774 + 92	50.28 + 5	57.642 + 110	25.27 +234
12 36.5	52.153 + 163	52.06 +135	34.105 + 78	39.21 -296	61.893 + 119	50.25 + 3	57.844 + 202	22.89 +238
	+ 217	+133	+ 125	-294	+ 184	- 1	+ 288	+232
Mean Place	52.090	44.59	34.882	47.38	61.794	42.25	58.187	15.97
sec δ, tan δ	+1.383	-0.955	+1.197	+0.658	+1.080	-0.408	+2.144	-1.897
da(ψ), dδ(ψ)	+0.086	+0.08	+0.044	+0.09	+0.072	+0.09	+0.110	+0.09
da(ε), dδ(ε)	+0.013	-0.98	-0.009	-0.98	+0.006	-0.98	+0.028	-0.98
Dble.Trans.	July 4		July 4		July 4		July 5	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	707		706		714		1495		
	o Draconis*		σ Sagittarii		υ Draconis		114 G. Sagittarii		
Mag.Spect.	4.85	K0	2.14	B3	4.91	K0	5.58	F5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	18 50	+59 21	18 54	-26 18	18 54	+71 16	18 54	-16 23	
1	-8.5	56.663 - 95	71.77 -331	21.591 + 71	63.81 + 27	29.971 - 247	39.97 -330	40.486 + 65	49.45 - 32
1	1.5	56.646 - 17	68.29 -348	21.708 + 117	63.64 + 17	29.848 - 123	36.50 -347	40.592 + 106	49.75 - 30
1	11.5	56.708 + 62	64.71 -358	21.859 + 151	63.29 + 35	29.853 + 5	32.90 -360	40.734 + 142	50.16 - 41
1	21.5	56.854 + 146	61.19 -352	22.060 + 201	63.01 + 28	29.994 + 141	29.34 -356	40.920 + 186	50.53 - 37
1	31.4	57.071 + 217	57.87 -332	22.293 + 233	62.75 + 26	30.257 + 263	25.96 -338	41.136 + 216	50.85 - 32
2	10.4	57.358 + 287	54.82 -305	22.554 + 261	62.48 + 27	30.637 + 380	22.84 -312	41.379 + 243	51.11 - 26
2	20.4	57.707 + 349	52.21 -261	22.841 + 287	62.19 + 29	31.125 + 488	20.14 -270	41.645 + 266	51.27 - 16
3	2.3	58.103 + 396	50.12 -209	23.145 + 304	61.87 + 32	31.693 + 568	17.95 -219	41.928 + 283	51.31 - 4
3	12.3	58.540 + 437	48.61 -151	23.465 + 320	61.50 + 37	32.334 + 641	16.33 -162	42.227 + 299	51.22 + 9
3	22.3	59.004 + 464	47.76 - 85	23.797 + 332	61.09 + 41	33.021 + 687	15.37 - 96	42.536 + 309	50.98 + 24
4	1.3	59.478 + 474	47.56 - 20	24.135 + 338	60.64 + 45	33.726 + 705	15.07 - 30	42.851 + 315	50.60 + 38
4	11.2	59.957 + 479	48.03 + 47	24.478 + 343	60.16 + 48	34.438 + 712	15.42 + 35	43.172 + 321	50.09 + 51
4	21.2	60.422 + 465	49.15 +112	24.819 + 341	59.67 + 49	35.126 + 688	16.44 +102	43.490 + 318	49.46 + 63
5	1.2	60.861 + 439	50.82 +167	25.154 + 335	59.19 + 48	35.770 + 644	18.03 +159	43.803 + 313	48.75 + 71
5	11.2	61.267 + 406	53.03 +221	25.480 + 326	58.74 + 45	36.357 + 587	20.16 +213	44.108 + 305	47.98 + 77
5	21.1	61.625 + 358	55.68 +265	25.788 + 308	58.36 + 38	36.862 + 505	22.76 +260	44.395 + 287	47.20 + 78
5	31.1	61.927 + 302	58.65 +297	26.073 + 285	58.06 + 30	37.276 + 414	25.69 +293	44.662 + 267	46.44 + 76
6	10.1	62.169 + 242	61.89 +324	26.331 + 258	57.86 + 20	37.589 + 313	28.91 +322	44.902 + 240	45.72 + 72
6	20.0	62.338 + 169	65.29 +340	26.552 + 221	57.77 + 9	37.786 + 197	32.30 +339	45.109 + 207	45.08 + 64
6	30.0	62.437 + 99	68.72 +343	26.735 + 183	57.80 - 3	37.871 + 85	35.75 +345	45.279 + 170	44.53 + 55
7	10.0	62.461 + 24	72.15 +343	26.875 + 140	57.95 - 15	37.838 - 33	39.22 +347	45.409 + 130	44.09 + 44
7	20.0	62.406 - 55	75.45 +330	26.965 + 90	58.20 - 25	37.683 - 155	42.57 +335	45.492 + 83	43.77 + 32
7	29.9	62.280 - 126	78.55 +310	27.009 + 44	58.54 - 34	37.420 - 263	45.74 +317	45.532 + 40	43.55 + 22
8	8.9	62.083 - 197	81.41 +286	27.003 - 6	58.94 - 40	37.048 - 372	48.68 +294	45.526 - 6	43.44 + 11
8	18.9	61.820 - 263	83.92 +251	26.951 - 52	59.38 - 44	36.577 - 471	51.29 +261	45.477 - 49	43.42 + 2
8	28.8	61.503 - 317	86.06 +214	26.860 - 91	59.83 - 45	36.025 - 552	53.54 +225	45.390 - 87	43.47 - 5
9	7.8	61.135 - 368	87.79 +173	26.731 - 129	60.25 - 42	35.397 - 628	55.38 +184	45.269 - 121	43.58 - 11
9	17.8	60.733 - 402	89.02 +123	26.576 - 155	60.62 - 37	34.715 - 682	56.74 +136	45.124 - 145	43.72 - 14
9	27.8	60.308 - 425	89.79 + 77	26.404 - 172	60.92 - 30	33.997 - 718	57.63 + 89	44.963 - 161	43.89 - 17
10	7.7	59.870 - 438	90.03 + 24	26.225 - 179	61.13 - 21	33.256 - 741	57.99 + 36	44.795 - 168	44.06 - 17
10	17.7	59.438 - 432	89.72 - 31	26.052 - 173	61.24 - 11	32.520 - 736	57.80 - 19	44.633 - 162	44.24 - 18
10	27.7	59.023 - 415	88.90 - 82	25.894 - 158	61.24 + 0	31.804 - 716	57.09 - 71	44.486 - 147	44.42 - 18
11	6.7	58.637 - 386	87.53 -137	25.762 - 132	61.15 + 9	31.127 - 677	55.82 -127	44.362 - 124	44.61 - 19
11	16.6	58.300 - 337	85.65 -188	25.666 - 96	60.98 + 17	30.518 - 609	54.03 -179	44.272 - 90	44.81 - 20
11	26.6	58.015 - 285	83.31 -234	25.612 - 54	60.74 + 24	29.985 - 533	51.77 -226	44.221 - 51	45.02 - 21
12	6.6	57.796 - 219	80.54 -277	25.603 - 9	60.47 + 27	29.549 - 436	49.05 -272	44.212 - 9	45.27 - 25
12	16.5	57.653 - 143	77.43 -311	25.645 + 42	60.17 + 30	29.228 - 321	45.98 -307	44.250 + 38	45.54 - 27
12	26.5	57.585 - 68	74.08 -335	25.734 + 89	59.88 + 29	29.024 - 204	42.64 -334	44.331 + 81	45.83 - 29
12	36.5	57.600 + 15	70.55 -353	25.860 + 126	59.66 + 22	28.951 - 73	39.11 -353	44.451 + 120	46.13 - 30
		+ 97	-352	+ 178	+ 37	+ 60	-355	+ 163	- 38
Mean Place	60.138	77.97	25.739	51.64	33.964	45.69	44.366	38.09	
sec δ, tan δ	+1.963	+1.689	+1.116	-0.495	+3.116	+2.951	+1.042	-0.294	
dα(ψ), dδ(ψ)	+0.017	+0.09	+0.074	+0.09	-0.015	+0.09	+0.069	+0.09	
dα(ε), dδ(ε)	-0.025	-0.98	+0.008	-0.97	-0.046	-0.97	+0.005	-0.97	
Dble.Trans.	July 5		July 5		July 5		July 6		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	711		709		710		708		
	R Lyrae		♃ Serpentis* p.		♄ Sagittarii		λ Telescopii		
Mag.Spect.	4.0 to 4.5	M3	4.50	A5	3.61	K0	5.03	B9	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	18 54	+ 43 55	18 55	+ 4 10	18 56	- 21 07	18 57	- 52 57	
1	8.5	52 155 + 25	33 56 -306	29 395 + 47	57 31 +150	51 511 + 66	42 82 - 3	17 528 + 70	40 20 +182
1	1.5	52 185 + 30	30 34 -322	29 483 + 88	55 75 -156	51 625 + 114	42 77 + 5	17 666 + 138	38 33 +187
1	11.5	52 270 + 85	27 04 -330	29 609 + 126	54 15 -160	51 762 + 137	42 92 - 15	17 870 + 204	36 45 +188
1	21.5	52 412 + 142	23 80 -324	29 773 + 164	52 58 -157	51 953 + 191	42 97 - 5	18 137 + 267	34 63 +182
1	31.4	52 601 + 189	20 74 -306	29 966 + 193	51 13 -145	52 174 + 221	43 00 - 3	18 456 + 319	32 90 +173
2	10.4	52 836 + 235	17 94 -280	30 188 + 222	49 82 -131	52 423 + 249	42 99 + 1	18 821 + 365	31 30 +160
2	20.4	53 111 + 275	15 56 -238	30 433 + 245	48 76 -106	52 697 + 274	42 92 + 7	19 226 + 405	29 86 +144
3	2.3	53 417 + 306	13 66 -190	30 696 + 263	47 98 - 78	52 987 + 290	42 76 + 16	19 660 + 434	28 60 +126
3	12.3	53 751 + 334	12 30 -136	30 975 + 279	47 50 - 48	53 294 + 307	42 52 + 24	20 120 + 460	27 54 +106
3	22.3	54 103 + 352	11 56 - 74	31 265 + 290	47 39 - 11	53 612 + 318	42 18 + 34	20 597 + 477	26 70 + 84
4	1.3	54 463 + 360	11 44 - 12	31 560 + 295	47 61 + 22	53 936 + 324	41 74 + 44	21 083 + 486	26 08 + 62
4	11.2	54 829 + 366	11 93 + 49	31 861 + 301	48 17 + 56	54 266 + 330	41 22 + 52	21 576 + 493	25 69 + 39
4	21.2	55 188 + 359	13 03 +110	32 160 + 299	49 05 + 88	54 595 + 329	40 64 + 58	22 066 + 490	25 57 + 12
5	1.2	55 533 + 345	14 65 +162	32 453 + 293	50 20 +115	54 918 + 323	40 02 + 62	22 544 + 478	25 68 - 11
5	11.2	55 859 + 326	16 77 +212	32 737 + 284	51 58 +138	55 233 + 315	39 39 + 63	23 008 + 464	26 06 - 38
5	21.1	56 154 + 295	19 29 +252	33 003 + 266	53 15 +157	55 530 + 297	38 77 + 62	23 442 + 434	26 70 - 64
5	31.1	56 414 + 260	22 10 +281	33 248 + 245	54 81 +166	55 807 + 277	38 21 + 56	23 843 + 401	27 58 - 88
6	10.1	56 633 + 219	25 16 +306	33 468 + 220	56 55 +174	56 057 + 250	37 73 + 48	24 203 + 360	28 70 -112
6	20.0	56 803 + 170	28 35 +319	33 654 + 186	58 30 +175	56 272 + 215	37 33 + 40	24 508 + 305	30 03 -133
6	30.0	56 924 + 121	31 56 +320	33 805 + 151	59 99 +169	56 450 + 178	37 05 + 28	24 758 + 250	31 52 -149
7	10.0	56 990 + 66	34 76 +320	33 917 + 112	61 60 +161	56 586 + 136	36 87 + 18	24 943 + 185	33 16 -164
7	20.0	56 999 + 9	37 83 +307	33 984 + 67	63 09 +149	56 676 + 90	36 82 + 5	25 057 + 114	34 87 -171
7	29.9	56 956 - 43	40 70 +287	34 011 + 27	64 42 +133	56 720 + 44	36 86 - 4	25 104 + 47	36 61 -174
8	8.9	56 858 - 98	43 34 +264	33 994 - 17	65 58 +116	56 717 - 3	36 99 - 13	25 079 - 25	38 33 -172
8	18.9	56 710 - 148	45 65 +231	33 936 - 58	66 54 + 96	56 669 - 48	37 19 - 20	24 987 - 92	39 93 -160
8	28.9	56 521 - 189	47 61 +196	33 843 - 93	67 31 + 77	56 582 - 87	37 43 - 24	24 837 - 150	41 38 -145
9	7.8	56 292 - 229	49 18 +157	33 718 - 125	67 88 + 57	56 460 - 122	37 69 - 26	24 632 - 205	42 61 -123
9	17.8	56 036 - 256	50 30 +112	33 571 - 147	68 23 + 35	56 312 - 148	37 95 - 26	24 388 - 244	43 56 - 95
9	27.8	55 762 - 274	50 98 + 68	33 409 - 162	68 38 + 15	56 148 - 164	38 18 - 23	24 119 - 269	44 20 - 64
10	7.7	55 478 - 284	51 18 + 20	33 240 - 169	68 31 - 7	55 976 - 172	38 38 - 20	23 836 - 283	44 48 - 28
10	17.7	55 200 - 278	50 88 - 30	33 077 - 163	68 03 - 28	55 809 - 167	38 53 - 15	23 560 - 276	44 39 + 9
10	27.7	54 936 - 264	50 10 - 78	32 927 - 150	67 55 - 48	55 658 - 151	38 63 - 10	23 304 - 256	43 94 + 45
11	6.7	54 695 - 241	48 82 -128	32 799 - 128	66 86 - 69	55 530 - 128	38 70 - 7	23 082 - 222	43 13 + 81
11	16.6	54 491 - 204	47 08 -174	32 703 - 96	65 97 - 89	55 437 - 93	38 72 - 2	22 912 - 170	42 00 +113
11	26.6	54 328 - 163	44 92 -216	32 642 - 61	64 90 -107	55 383 - 54	38 72 + 0	22 800 - 112	40 61 +139
12	6.6	54 213 - 115	42 36 -256	32 620 - 22	63 65 -125	55 373 - 10	38 72 + 0	22 753 - 47	38 98 +163
12	16.6	54 155 - 58	39 49 -287	32 643 + 23	62 26 -139	55 411 + 38	38 71 + 1	22 780 + 27	37 21 +177
12	26.5	54 150 + 5	36 40 -309	32 706 + 63	60 77 -149	55 494 + 83	38 71 + 0	22 876 + 96	35 34 +187
12	36.5	54 203 + 109	33 15 -325	32 810 + 104	59 20 -157	55 606 + 112	38 59 + 12	23 041 + 165	33 42 +192
Mean Place	55 461	40 51	32 919	67 20	55 504	30 81	23 089	26 03	
sec δ, tan δ	+1.388	+0.963	+1.003	+0.073	+1.072	-0.386	+1.660	-1.325	
da(ψ), dδ(ψ)	+0.036	+0.09	+0.059	+0.10	+0.071	+0.10	+0.095	+0.10	
da(ε), dδ(ε)	-0.015	-0.97	-0.001	-0.97	+0.006	-0.97	+0.022	-0.97	
Dble.Trans.	July 6		July 6		July 6		July 6		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	713		712		716		717		
	γ Lyrae		ε Aquilae		ζ Aquilae		λ Aquilae		
Mag.Spect.	3.30	A0p	4.21	K0	3.02	A0	3.55	B9	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	18 58	+32 39	18 58	+15 02	19 04	+13 50	19 05	- 4 54	
1	-8.5	23.001 + 1	66.06 -273	57.197 + 32	48.41 -202	43.973 + 29	24.54 -194	28.319 + 47	23.75 -97
1	1.5	23.051 + 50	63.20 -286	57.270 + 73	46.28 -213	44.042 + 69	22.50 -204	28.405 + 86	24.75 -100
1	11.5	23.146 + 95	60.25 -295	57.383 + 113	44.11 -217	44.150 + 108	20.40 -210	28.529 + 124	25.79 -104
1	21.5	23.288 + 142	57.36 -289	57.535 + 152	41.98 -213	44.298 + 148	18.35 -205	28.691 + 162	26.80 -101
1	31.4	23.470 + 182	54.63 -273	57.719 + 184	39.98 -200	44.477 + 179	16.42 -193	28.883 + 192	27.74 -94
2	10.4	23.688 + 218	52.14 -249	57.933 + 214	38.18 -180	44.687 + 210	14.67 -175	29.103 + 220	28.56 -82
2	20.4	23.940 + 252	50.03 -211	58.174 + 241	36.67 -151	44.923 + 236	13.21 -146	29.347 + 244	29.19 -63
3	2.3	24.216 + 276	48.36 -167	58.434 + 260	35.52 -115	45.179 + 256	12.09 -112	29.609 + 262	29.62 -43
3	12.3	24.515 + 299	47.18 -118	58.712 + 278	34.75 -77	45.453 + 274	11.35 -74	29.888 + 279	29.81 -19
3	22.3	24.829 + 314	46.58 -60	59.002 + 290	34.43 -32	45.741 + 288	11.05 -30	30.180 + 292	29.74 + 7
4	1.3	25.152 + 323	46.52 -6	59.299 + 297	34.55 + 12	46.037 + 296	11.16 + 11	30.478 + 298	29.41 + 33
4	11.2	25.480 + 328	47.03 + 51	59.602 + 303	35.09 + 54	46.339 + 302	11.70 + 54	30.783 + 305	28.83 + 58
4	21.2	25.804 + 324	48.09 + 106	59.903 + 301	36.07 + 98	46.641 + 302	12.66 + 96	31.089 + 306	28.02 + 81
5	1.2	26.119 + 315	49.61 + 152	60.198 + 295	37.39 + 132	46.937 + 296	13.96 + 130	31.390 + 301	27.02 + 100
5	11.2	26.419 + 300	51.58 + 197	60.482 + 284	39.03 + 164	47.224 + 287	15.57 + 161	31.684 + 294	25.86 + 116
5	21.1	26.696 + 277	53.91 + 233	60.748 + 266	40.94 + 191	47.493 + 289	17.44 + 187	31.962 + 278	24.59 + 127
5	31.1	26.945 + 249	56.49 + 258	60.992 + 244	43.01 + 207	47.741 + 248	19.48 + 204	32.221 + 259	23.27 + 132
6	10.1	27.161 + 216	59.29 + 280	61.209 + 217	45.22 + 221	47.963 + 222	21.64 + 216	32.456 + 235	21.93 + 134
6	20.0	27.336 + 175	62.19 + 290	61.390 + 181	47.47 + 225	48.151 + 188	23.85 + 221	32.658 + 202	20.62 + 131
6	30.0	27.469 + 133	65.10 + 291	61.536 + 146	49.69 + 222	48.302 + 151	26.03 + 218	32.826 + 168	19.38 + 124
7	10.0	27.555 + 86	67.99 + 289	61.641 + 105	51.86 + 217	48.414 + 112	28.17 + 214	32.955 + 129	18.23 + 115
7	20.0	27.591 + 36	70.74 + 275	61.701 + 60	53.90 + 204	48.480 + 66	30.16 + 199	33.039 + 84	17.21 + 102
7	29.9	27.581 - 10	73.31 + 257	61.719 + 18	55.76 + 186	48.505 + 25	32.00 + 184	33.082 + 43	16.34 + 87
8	8.9	27.522 - 59	75.66 + 235	61.692 - 27	57.44 + 168	48.485 - 20	33.64 + 164	33.080 - 2	15.60 + 74
8	18.9	27.418 - 104	77.70 + 204	61.624 - 68	58.86 + 142	48.423 - 62	35.05 + 141	33.035 - 45	15.03 + 57
8	28.9	27.276 - 142	79.43 + 173	61.521 - 103	60.04 + 118	48.326 - 97	36.21 + 116	32.955 - 80	14.60 + 43
9	7.8	27.099 - 177	80.81 + 138	61.386 - 135	60.95 + 91	48.326 - 131	36.21 + 90	32.955 - 115	14.60 + 28
9	17.8	26.896 - 203	81.77 + 96	61.226 - 160	61.56 + 61	48.195 - 155	37.11 + 61	32.840 - 139	14.32 + 14
9	27.8	26.678 - 218	82.36 + 59	61.053 - 173	61.89 + 33	48.040 - 170	37.72 + 34	32.701 - 155	14.18 + 1
10	7.7	26.450 - 228	82.51 + 15	60.871 - 182	61.91 + 2	47.870 - 179	38.06 + 4	32.546 - 163	14.17 - 11
10	17.7	26.227 - 223	82.22 - 29	60.694 - 177	61.61 - 30	47.691 - 179	38.10 + 4	32.383 - 163	14.28 - 11
10	27.7	26.227 - 209	82.22 - 71	60.694 - 164	61.61 - 58	47.516 - 163	37.84 - 26	32.223 - 160	14.52 - 24
10	27.7	26.018 - 189	81.51 - 115	60.530 - 144	61.03 - 90	47.353 - 143	37.30 - 54	32.076 - 147	14.87 - 35
11	6.7	25.829 - 155	80.36 - 156	60.386 - 112	60.13 - 118	47.210 - 113	36.45 - 85	32.076 - 127	14.87 - 48
11	16.6	25.674 - 119	78.80 - 192	60.274 - 77	58.95 - 144	47.097 - 79	35.33 - 112	31.949 - 96	15.35 - 58
11	26.6	25.555 - 76	76.88 - 229	60.197 - 38	57.51 - 171	47.018 - 40	33.95 - 162	31.853 - 61	15.93 - 69
12	6.6	25.479 - 26	74.59 - 255	60.159 + 6	55.80 - 189	46.978 + 3	32.33 - 181	31.770 + 22	17.43 - 81
12	16.6	25.453 + 19	72.04 - 276	60.165 + 48	53.91 - 203	46.981 + 43	30.52 - 196	31.792 + 62	18.31 - 88
12	26.5	25.472 + 69	69.28 - 290	60.213 + 90	51.88 - 214	47.024 + 86	28.56 - 205	31.854 + 102	19.26 - 100
12	36.5	25.541 + 115	66.38 - 289	60.303 + 130	49.74 - 213	47.110 + 126	26.51 - 205	31.956 + 141	20.26 - 100
Mean Place	26.304	73.73	60.598	57.47	47.381	33.89	31.956	12.57	
sec δ, tan δ	+1.188	+0.641	+1.036	+0.269	+1.030	+0.246	+1.004	-0.086	
dα(ψ), dδ(ψ)	+0.045	+0.10	+0.054	+0.10	+0.055	+0.11	+0.063	+0.11	
dα(ε), dδ(ε)	-0.011	-0.97	-0.005	-0.97	-0.005	-0.96	+0.002	-0.96	
Dble.Trans.	July 6		July 7		July 8		July 8		



APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	1497		1498		1496		719	
	21 G. Aquilae*		Piazzi 18 <sup>h</sup> 318 (Lyrae)		τ Sagittarii		ι Lyrae	
Mag. Spect.	6.72	B8	5.46	A5	3.42	K0	5.13	B5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 19 05	<sup>o</sup> <sup>'</sup> - 1 22	<sup>h</sup> <sup>m</sup> 19 06	<sup>o</sup> <sup>'</sup> + 28 35	<sup>h</sup> <sup>m</sup> 19 06	<sup>o</sup> <sup>'</sup> - 27 41	<sup>h</sup> <sup>m</sup> 19 06	<sup>o</sup> <sup>'</sup> + 36 04
1	<sup>d</sup> -8.5	<sup>s</sup> 49 640 + 43	<sup>s</sup> 13.92 -116	<sup>s</sup> 02 272 + 3	<sup>s</sup> 76 50 -254	<sup>s</sup> 01.745 + 59	<sup>s</sup> 40.90 + 36	<sup>s</sup> 45 899 - 15
1	1.5	+ 83	-121	+ 48	-268	+ 106	+ 34	+ 33
1	11.5	49 723 + 121	15.13 -124	02 320 + 91	73 82 -277	01 851 + 141	40 56 + 40	45 932 + 81
1	21.5	49 844 + 158	16.37 -122	02 411 + 137	71.05 -272	01 992 + 191	40.16 + 43	46.013 + 131
1	31.4	50 002 + 188	17.59 -113	02 548 + 174	68.33 -257	02 183 + 224	39.73 + 40	46.144 + 172
1	31.4	50 190	18.72	02 722	65.76	02 407	39.33	46 316
2	10.4	50 406 + 216	19.72 -100	02 931 + 209	63.41 -235	02 661 + 254	38.92 + 41	46 528 + 212
2	20.4	50 647 + 241	20.52 - 80	03 172 + 241	61.41 -200	02 941 + 280	38.48 + 44	46 776 + 248
3	2.4	50 906 + 259	21.08 - 56	03 436 + 264	59.82 -159	03 241 + 300	38.02 + 46	47 052 + 272
3	12.3	51 182 + 276	21.38 - 30	03 436 + 288	58.70 -112	03 318	37.52 + 50	47 354 + 306
3	22.3	51 471 + 289	21.38 + 0	03 724 + 304	58.12 - 58	03 559 + 332	37.52 + 53	47 354 + 319
4	1.3	51 767 + 296	21.09 + 29	04 340 + 312	58.06 - 6	04 230 + 339	36.43 + 56	48 003 + 330
4	11.2	52 070 + 303	20.51 + 58	04 660 + 320	58.54 + 48	04 577 + 347	35.86 + 57	48 340 + 337
4	21.2	52 373 + 303	19.67 + 84	04 978 + 318	59.55 +101	04 924 + 347	35.29 + 57	48 675 + 335
5	1.2	52 671 + 298	18.60 +107	05 288 + 310	61.01 +146	05 266 + 342	34.75 + 54	49 001 + 326
5	11.2	52 963 + 292	17.35 +125	05 587 + 299	62.89 +188	05 600 + 334	34.26 + 49	49 313 + 312
5	21.1	53 239 + 276	15.95 +140	05 865 + 278	65.12 +223	05 918 + 318	33.85 + 41	49 602 + 289
5	31.1	53 495 + 256	14.48 +147	06 117 + 252	67.60 +248	06 215 + 297	33.54 + 31	49 861 + 259
6	10.1	53 727 + 232	12.97 +151	06 339 + 222	70.28 +268	06 485 + 270	33.34 + 20	50 087 + 226
6	20.1	53 926 + 199	11.48 +149	06 522 + 183	73.06 +278	06 719 + 234	33.27 + 7	50 271 + 184
6	30.0	54 092 + 166	10.04 +144	06 666 + 144	75.85 +279	06 915 + 196	33.34 - 7	50 411 + 140
7	10.0	54 218 + 126	08.69 +135	06 765 + 99	78.62 +277	07 067 + 152	33.53 - 19	50 503 + 92
7	20.0	54 300 + 82	07.48 +121	06 816 + 51	81.26 +264	07 169 + 102	33.84 - 31	50 542 + 39
7	29.9	54 341 + 41	06.40 +108	06 821 + 5	83.73 +247	07 225 + 56	34.25 - 41	50 534 - 8
8	8.9	54 337 - 4	05.48 + 92	06 779 - 42	85.99 +226	07 229 + 4	34.73 - 48	50 475 - 59
8	18.9	54 291 - 46	04.74 + 74	06 692 - 87	87.95 +196	07 186 - 43	35.26 - 53	50 368 - 107
8	28.9	54 209 - 82	04.16 + 58	06 567 - 125	89.63 +168	07 101 - 85	35.80 - 54	50 222 - 146
9	7.8	54 094 - 115	03.75 + 41	06 407 - 160	90.97 +134	06 978 - 123	36.32 - 52	50 038 - 184
9	17.8	53 954 - 140	03.52 + 23	06 222 - 185	91.93 + 96	06 826 - 152	36.78 - 46	49 827 - 211
9	27.8	53 798 - 156	03.44 + 8	06 020 - 202	92.52 + 59	06 655 - 171	37.16 - 38	49 598 - 229
10	7.8	53 634 - 164	03.52 - 8	05 807 - 213	92.71 + 19	06 474 - 181	37.44 - 28	49 358 - 240
10	17.7	53 473 - 161	03.77 - 25	05 599 - 208	92.49 - 22	06 298 - 176	37.60 - 16	49 122 - 236
10	27.7	53 325 - 148	04.15 - 38	05 402 - 197	91.87 - 62	06 135 - 163	37.64 - 4	48 896 - 226
11	6.7	53 196 - 129	04.70 - 55	05 224 - 178	90.84 -103	05 995 - 140	37.56 + 8	48 691 - 206
11	16.6	53 099 - 97	05.39 - 69	05 078 - 146	89.82 -142	05 891 - 104	37.38 + 18	48 518 - 173
11	26.6	53 035 - 64	06.21 - 82	04 967 - 111	87.65 -177	05 827 - 64	37.12 + 26	48 381 - 137
12	6.6	53 010 - 25	07.18 - 97	04 897 - 70	85.54 -211	05 807 - 20	36.79 + 33	48 287 - 94
12	16.6	53 029 + 19	08.25 -107	04 873 + 24	83.16 -238	05 838 + 31	36.41 + 38	48 243 + 4
12	26.5	53 087 + 58	09.40 -115	04 892 + 19	80.59 -257	05 915 + 77	36.02 + 39	48 245 + 2
12	36.5	53 186 + 99	10.61 -121	04 959 + 67	77.88 -271	06 035 + 120	36.68 + 34	48 299 + 54
		+ 137	-120	+ 111	-272	+ 163	+ 49	+ 102
Mean Place	53.224	03.03	05.589	84.62	05.898	27.64	49.198	42.77
sec δ, tan δ	+1.000	-0.024	+1.139	+0.545	+1.129	-0.525	+1.237	+0.729
dα(ψ), dδ(ψ)	+0.062	+0.11	+0.047	+0.11	+0.075	+0.11	+0.043	+0.11
dα(ε), dδ(ε)	+0.000	-0.96	-0.010	-0.96	+0.010	-0.96	-0.014	-0.96
Dble. Trans.	July 8		July 8		July 8		July 9	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	718		720		1500		723	
	$\alpha$ Coronae Austrinae		$\pi$ Sagittarii*		20 Aquilae		$\delta$ Draconis	
Mag.Spect.	4.12	A2	3.02	F2	5.37	B3	3.24	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	19 08	- 37 55	19 08	- 21 02	19 11	- 7 57	19 12	+ 67 37
1	d -8.5	s + 58	s + 53	" - 1	s + 43	" - 77	s - 225	" - 316
1	28 764	+ 109	53 748	+ 100	58 25	+ 1	53 114	+ 82
1	28 873	+ 157	53 848	+ 125	58 24	- 4	53 196	+ 120
1	29 030	+ 205	53 973	+ 181	58 28	- 1	53 316	+ 158
1	29 235	+ 244	54 154	+ 210	58 29	+ 3	53 474	+ 190
1	29 479	+ 280	54 364	+ 238	58 26	+ 7	53 664	+ 217
2	29 759	+ 310	54 602	+ 264	58 19	+ 15	53 881	+ 242
2	30 069	+ 332	54 866	+ 282	58 04	+ 23	54 123	+ 261
3	30 401	+ 354	55 148	+ 300	57 81	+ 32	54 384	+ 278
3	30 755	+ 369	55 448	+ 314	57 49	+ 43	54 662	+ 292
3	31 124	+ 377	55 762	+ 321	57 06	+ 52	54 954	+ 300
4	31 501	+ 386	56 083	+ 330	56 54	+ 61	55 254	+ 308
4	31 887	+ 387	56 413	+ 330	55 93	+ 67	55 562	+ 309
4	32 274	+ 380	56 743	+ 326	55 26	+ 71	55 871	+ 306
5	32 654	+ 373	57 069	+ 319	54 55	+ 71	56 177	+ 300
5	33 027	+ 354	57 388	+ 304	53 84	+ 70	56 477	+ 286
5	33 381	+ 330	57 692	+ 285	53 14	+ 64	56 763	+ 266
5	33 711	+ 301	57 977	+ 259	52 50	+ 56	57 029	+ 244
6	34 012	+ 280	58 236	+ 225	51 94	+ 45	57 273	+ 210
6	34 272	+ 218	58 461	+ 190	51 49	+ 35	57 483	+ 177
6	34 490	+ 169	58 651	+ 147	51 15	+ 22	57 660	+ 138
7	34 659	+ 115	58 798	+ 101	50 93	+ 9	57 798	+ 93
7	34 774	+ 61	58 899	+ 55	50 84	- 2	57 891	+ 51
7	34 835	+ 5	58 954	+ 8	50 86	- 12	57 942	+ 5
8	34 840	- 48	58 962	- 39	50 98	- 20	57 947	- 38
8	34 792	- 95	58 923	- 78	51 18	- 26	57 909	- 74
8	34 697	- 140	58 845	- 115	51 44	- 28	57 835	- 110
9	34 557	- 171	58 730	- 143	51 72	- 30	57 725	- 136
9	34 386	- 193	58 587	- 160	52 02	- 27	57 589	- 153
9	34 193	- 205	58 427	- 171	52 29	- 25	57 436	- 162
10	33 988	- 187	58 256	- 154	52 54	- 19	57 274	- 148
10	33 786	- 162	58 089	- 133	52 73	- 15	57 114	- 129
10	33 599	- 123	57 935	- 100	52 88	- 9	56 966	- 98
11	33 437	- 80	57 802	- 63	52 97	- 6	56 837	- 64
11	33 314	- 30	57 702	- 20	53 03	- 2	56 739	- 25
11	33 234	+ 26	57 639	+ 7	53 05	+ 0	56 675	+ 18
12	33 204	+ 77	57 619	+ 26	53 05	+ 1	56 650	+ 58
12	33 230	+ 129	57 645	+ 121	53 04	+ 1	56 668	+ 99
12	33 307	+ 178	57 716	+ 141	53 03	+ 18	56 726	+ 136
12	33 436	+ 205	57 837	+ 167	52 85	- 16	56 825	+ 190
Mean Place	33.300	35.26	57.705	45.24	56.789	46.27	33.242	76.15
sec $\delta$ , tan $\delta$	+1.268	-0.779	+1.071	-0.385	+1.010	-0.140	+2.628	+2.431
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.081	+0.12	+0.071	+0.12	+0.065	+0.12	-0.000	+0.12
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.015	-0.96	+0.008	-0.96	+0.003	-0.95	-0.050	-0.95
Dble.Trans.	July 9		July 9		July 10		July 10	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1499		729		724		726										
Name	42 G. Octantis		τ Draconis		♀ Lyrae		κ Cygni										
Mag.Spect.	6.78	A2	4.63	K0	4.46	K0	3.98	K0									
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.									
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "									
	19 14	- 75 49	19 15	+ 73 19	19 15	+ 38 06	19 16	+ 53 20									
1	-8.5	22.658	+36	44.82	+285	44.718	-357	45.50	-310	50.658	+31	25.86	-278	44.042	-96	29.62	-306
1	1.5	22.790	+132	41.86	+296	44.496	-222	42.16	-334	50.677	+19	22.91	-295	44.011	-31	26.34	-328
1	11.5	23.087	+297	38.84	+302	44.415	-81	38.64	-352	50.744	+67	19.84	-307	44.046	+35	22.92	-342
1	21.5	23.551	+464	35.88	+296	44.486	+71	35.11	-353	50.862	+118	16.79	-305	44.150	+104	19.50	-342
1	31.4	24.156	+605	33.07	+281	44.696	+210	31.68	-343	51.024	+162	13.88	-291	44.315	+165	16.22	-328
2	10.4	24.891	+735	30.43	+264	45.044	+348	28.46	-322	51.228	+204	11.19	-269	44.540	+225	13.16	-306
2	20.4	25.744	+853	28.07	+236	45.521	+477	25.61	-285	51.470	+242	08.86	-233	44.821	+281	10.48	-268
3	2.4	26.683	+939	26.02	+205	46.098	+577	23.23	-238	51.743	+273	06.97	-189	45.146	+325	08.28	-220
3	12.3	27.701	+1018	24.30	+172	46.768	+670	21.37	-186	52.043	+300	05.57	-140	45.511	+365	06.59	-169
3	22.3	28.775	+1074	22.97	+133	47.502	+734	20.15	-122	52.365	+322	04.76	-81	45.905	+394	05.55	-104
4	1.3	29.878	+1103	22.04	+93	48.270	+768	19.57	-58	52.698	+333	04.52	-24	46.315	+410	05.13	-42
4	11.2	31.005	+1127	21.51	+53	49.059	+769	19.64	+7	53.042	+344	04.87	+35	46.738	+423	05.36	+23
4	21.2	32.124	+1119	21.42	+9	49.832	+773	20.39	+75	53.384	+342	05.81	+94	47.157	+419	06.24	+88
5	1.2	33.216	+1092	21.75	-33	50.567	+735	21.73	+134	53.719	+335	07.26	+145	47.562	+405	07.69	+145
5	11.2	34.271	+1055	22.49	-74	51.248	+681	23.64	+191	54.042	+323	09.19	+193	47.948	+386	09.69	+200
5	21.1	35.254	+983	23.65	-116	51.846	+598	26.04	+240	54.340	+298	11.54	+235	48.299	+351	12.16	+247
5	31.1	36.154	+900	25.16	-151	52.348	+502	28.83	+279	54.611	+271	14.18	+264	48.609	+310	14.97	+281
6	10.1	36.954	+800	27.03	-187	52.744	+396	31.94	+311	54.848	+237	17.08	+290	48.872	+263	18.10	+313
6	20.1	37.623	+669	29.19	-216	53.013	+269	35.28	+334	55.041	+193	20.13	+305	49.076	+204	21.42	+332
6	30.0	38.160	+537	31.58	-239	53.159	+146	38.73	+345	55.190	+149	23.23	+310	49.221	+145	24.82	+340
7	10.0	38.544	+384	34.16	-258	53.174	+15	42.25	+352	55.291	+101	26.34	+311	49.303	+82	28.26	+344
7	20.0	38.762	+218	36.84	-268	53.052	-122	45.70	+345	55.337	+46	29.34	+300	49.316	+13	31.61	+335
7	29.9	38.823	+61	39.52	-268	52.808	-244	49.01	+331	55.334	-3	32.17	+263	49.266	-50	34.80	+319
8	8.9	38.714	-109	42.15	-263	52.439	-369	52.15	+314	55.279	-55	34.81	+264	49.151	-115	37.80	+300
8	18.9	38.444	-270	44.60	-245	51.954	-485	54.98	+283	55.175	-104	37.14	+233	48.974	-177	40.49	+269
8	28.9	38.035	-409	46.81	-221	51.374	-580	57.50	+252	55.029	-146	39.16	+202	48.747	-227	42.84	+235
9	7.8	37.490	-545	48.70	-189	50.701	-673	59.64	+214	54.844	-185	40.83	+167	48.471	-276	44.81	+197
9	17.8	36.843	-647	50.16	-146	49.960	-741	61.32	+168	54.630	-214	42.07	+124	48.159	-312	46.33	+152
9	27.8	36.124	-719	51.16	-100	49.171	-789	62.55	+123	54.396	-234	42.91	+84	48.822	-337	47.39	+106
10	7.8	35.355	-769	51.65	-49	48.344	-827	63.27	+72	54.149	-247	43.30	+39	47.467	-355	47.95	+56
10	17.7	34.585	-770	51.58	+7	47.512	-832	63.44	+17	53.903	-246	43.21	-9	47.113	-354	47.98	+3
10	27.7	33.845	-740	50.97	+61	46.692	-820	63.09	-35	53.668	-235	42.69	-52	46.768	-345	47.51	-47
11	6.7	33.163	-682	49.82	+115	45.903	-789	62.17	-92	53.450	-218	41.68	-101	46.443	-325	46.49	-102
11	16.6	32.587	-576	48.17	+165	45.177	-726	60.71	-146	53.263	-187	40.22	-146	46.155	-288	44.95	-154
11	26.6	32.133	-454	46.09	+208	44.526	-651	58.75	-196	53.112	-151	38.36	-186	45.909	-246	42.95	-200
12	6.6	31.823	-310	43.62	+247	43.971	-555	56.30	-245	53.003	-109	36.09	-227	45.714	-195	40.48	-247
12	16.6	31.683	-140	40.88	+274	43.538	-433	53.45	-285	52.943	-60	33.51	-258	45.580	-134	37.65	-283
12	26.5	31.706	+23	37.96	+292	43.228	-310	50.29	-316	52.931	-12	30.69	-282	45.508	-72	34.54	-311
12	36.5	31.903	+197	34.93	+303	43.060	-168	46.88	-341	52.969	+38	27.69	-300	45.504	-4	31.20	-334
		31.903	+366	34.93	+302	43.060	-20	46.88	-350	52.969	+89		-303	45.504	+63	31.20	-339
Mean Place	33.340	27.52		48.967	50.54	53.960	33.11	47.454	35.71								
sec δ, tan δ	+4.083	-3.959		+3.486	+3.340	+1.271	+0.784	+1.675	+1.344								
dα(ψ), dδ(ψ)	+0.161	+0.13		-0.023	+0.13	+0.041	+0.13	+0.028	+0.13								
dα(ε), dδ(ε)	+0.084	-0.95		-0.072	-0.95	-0.017	-0.95	-0.029	-0.94								
Dble.Trans.	July 11		July 11		July 11		July 11										

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	722		725		1501		727	
	43 Sagittarii		ω Aquilae		162 G. Sagittarii		υ Sagittarii	
Mag. Spect.	5.03	K0	5.14	A5	5.61	B5	4.58	B8p, F2p
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	19 16	-18 58	19 17	+11 33	19 18	-35 26	19 20	-15 58
1 <sup>d</sup>	46.855 <sup>s</sup>	53.56	07.563 <sup>s</sup>	63.66	42.005 <sup>s</sup>	64.18	53.467 <sup>s</sup>	65.51
1	-8.4	+45	+19	-178	+45	+83	+39	-30
1	1.5	+88	+60	-187	+95	+87	+82	-28
1	11.5	+117	+98	-193	+140	+92	+115	-25
1	21.5	+169	+136	-191	+187	+95	+158	-33
1	31.4	+199	+169	-179	+226	+94	+190	-23
2	10.4	+227	+198	-162	+260	+92	+219	-14
2	20.4	+254	+227	-136	+291	+91	+246	-3
3	2.4	+272	+247	-104	+314	+87	+284	+9
3	12.3	+292	+267	-69	+336	+86	+264	+23
3	22.3	+306	+283	-28	+353	+81	+299	+40
4	1.3	+315	+292	+13	+363	+76	+309	+53
4	11.3	+325	+301	+53	+373	+70	+318	+68
4	21.2	+326	+302	+93	+376	+61	+321	+80
5	1.2	+324	+299	+126	+373	+51	+319	+88
5	11.2	+318	+292	+156	+366	+38	+315	+94
5	21.1	+304	+277	+181	+350	+23	+301	+95
5	31.1	+286	+257	+197	+329	+8	+283	+93
6	10.1	+262	+233	+209	+302	-9	+261	+88
6	20.1	+229	+200	+214	+264	-27	+228	+79
6	30.0	+194	+165	+211	+223	-43	+193	+68
7	10.0	+153	+125	+206	+177	-59	+154	+56
7	20.0	+106	+81	+194	+123	-73	+108	+43
7	29.9	+63	+39	+177	+73	-82	+64	+29
8	8.9	+14	-6	+161	+17	-90	+17	+17
8	18.9	-32	-49	+136	-36	-91	-28	+5
8	28.9	-71	-85	+114	-83	-89	-68	-4
9	7.8	-109	-120	+90	-126	-84	-105	-12
9	17.8	-137	-146	+61	-159	-72	-133	-18
9	27.8	-156	-163	+37	-182	-57	-152	-21
10	7.8	-167	-173	+8	-197	-40	-164	-23
10	17.7	-165	-172	-20	-194	-21	-163	-24
10	27.7	-154	-161	-45	-183	+0	-152	-24
11	6.7	-135	-144	-74	-160	+20	-134	-24
11	16.6	-102	-116	-99	-125	+40	-103	-24
11	26.6	-68	-83	-124	-85	+56	-70	-23
12	6.6	-27	-47	-147	-37	+70	-30	-26
12	16.6	+19	-4	-165	+15	+80	+14	-26
12	26.5	+61	+34	-178	+64	+87	+56	-26
12	36.5	+106	+76	-189	+114	+92	+97	-24
	+135	-14	+115	-189	+160	+97	+131	-27
Mean Place	50.736	40.12	10.978	73.68	46.383	48.86	57.270	52.08
sec δ, tan δ	+1.057	-0.344	+1.021	+0.205	+1.228	-0.712	+1.040	-0.286
dα(ψ), dδ(ψ)	+0.070	+0.13	+0.056	+0.13	+0.079	+0.13	+0.068	+0.14
dα(ε), dδ(ε)	+0.008	-0.94	-0.005	-0.94	+0.016	-0.94	+0.007	-0.94
Dble. Trans.	July 11		July 11		July 12		July 12	

AT UPPER TRANSIT AT GREENWICH

No.	1502		734		728		1503	
	$\beta^1$ Sagittarii*		Groombridge 2900 (Draconis)		$\alpha$ Sagittarii		31 Aquilae	
Mag.Spect.	4.31	B8	6.00	A2	4.11	B8	5.23	G5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	19 21	-44 29	19 22	+79 34	19 22	-40 38	19 24	+11 54
1 -8.4	35 372 + 40	23 50 +134	25 143 - 672	30 88 -297	52 566 + 39	48 37 +112	16 157 + 15	42 85 -174
1 1.5	35 467 + 95	22 08 +142	24 681 - 462	27 65 -323	52 658 + 92	47 18 +119	16 211 + 54	41 00 -185
1 11.5	35 616 + 149	20 61 +147	24 441 - 240	24 22 -343	52 800 + 142	45 93 +125	16 304 + 93	39 10 -190
1 21.5	35 819 + 203	19 11 +150	24 448 + 7	20 74 -348	52 992 + 192	44 66 +127	16 435 + 131	37 22 -188
1 31.4	36 066 + 247	17 65 +146	24 681 + 233	17 34 -340	53 226 + 234	43 41 +125	16 598 + 163	35 44 -178
2 10.4	36 354 + 288	16 24 +141	25 141 + 460	14 11 -323	53 498 + 272	42 18 +123	16 792 + 194	33 83 -161
2 20.4	36 678 + 324	14 90 +134	25 814 + 673	11 23 -288	53 804 + 306	41 00 +118	17 015 + 223	32 48 -135
3 2.4	37 029 + 351	13 65 +125	26 658 + 844	08 78 -245	54 135 + 331	39 89 +111	17 259 + 244	31 45 -103
3 12.3	37 406 + 377	12 50 +115	27 656 + 998	06 83 -195	54 491 + 356	38 84 +105	17 523 + 264	30 77 - 68
3 22.3	37 803 + 397	11 49 +101	28 766 +1110	05 50 -133	54 865 + 374	37 89 + 95	17 805 + 282	30 50 - 27
4 1.3	38 211 + 408	10 60 + 89	29 935 +1169	04 79 - 71	55 251 + 386	37 03 + 86	18 097 + 292	30 64 + 14
4 11.3	38 632 + 421	09 87 + 73	31 140 +1205	04 72 - 7	55 649 + 398	36 28 + 75	18 398 + 301	31 18 + 54
4 21.2	39 055 + 423	09 32 + 55	32 325 +1185	05 32 + 60	56 049 + 400	35 68 + 60	18 703 + 305	32 12 + 94
5 1.2	39 475 + 420	08 95 + 37	33 450 +1125	06 51 +119	56 447 + 398	35 23 + 45	19 005 + 302	33 40 +129
5 11.2	39 887 + 412	08 79 + 16	34 491 +1041	08 27 +176	56 839 + 392	34 95 + 28	19 301 + 296	34 99 +158
5 21.1	40 281 + 394	08 85 - 6	35 399 + 908	10 54 +227	57 213 + 374	34 87 + 8	19 583 + 282	36 83 +184
5 31.1	40 650 + 369	09 13 - 28	36 155 + 756	13 19 +265	57 565 + 352	34 97 - 10	19 845 + 262	38 83 +200
6 10.1	40 989 + 339	09 64 - 51	36 742 + 587	16 19 +300	57 889 + 324	35 29 - 32	20 084 + 239	40 96 +213
6 20.1	41 285 + 296	10 36 - 72	37 129 + 387	19 44 +325	58 172 + 283	35 81 - 52	20 291 + 207	43 15 +219
6 30.0	41 535 + 250	11 27 - 91	37 322 + 193	22 81 +337	58 413 + 241	36 51 - 70	20 463 + 172	45 31 +216
7 10.0	41 733 + 198	12 36 -109	37 309 - 13	26 27 +346	58 604 + 191	37 38 - 87	20 595 + 132	47 43 +212
7 20.0	41 870 + 137	13 59 -123	37 082 - 227	29 70 +343	58 738 + 134	38 39 -101	20 683 + 88	49 42 +199
7 30.0	41 949 + 79	14 90 -131	36 665 - 417	33 01 +331	58 817 + 79	39 50 -111	20 729 + 46	51 25 +183
8 8.9	41 966 + 17	16 26 -136	36 052 - 613	36 17 +316	58 838 + 21	40 67 -117	20 729 + 0	52 91 +166
8 18.9	41 923 - 43	17 60 -134	35 259 - 793	39 05 +288	58 801 - 37	41 84 -117	20 687 - 42	54 34 +143
8 28.9	41 827 - 96	18 88 -128	34 317 - 942	41 64 +259	58 714 - 87	42 97 -113	20 607 - 80	55 54 +120
9 7.8	41 681 - 146	20 03 -115	33 229 -1088	43 87 +223	58 580 - 134	44 01 -104	20 492 - 115	56 49 + 95
9 17.8	41 496 - 185	21 00 - 97	32 031 -1198	45 66 +179	58 409 - 171	44 89 - 88	20 351 - 141	57 16 + 67
9 27.8	41 285 - 211	21 74 - 74	30 753 -1278	47 03 +137	58 214 - 195	45 58 - 69	20 191 - 160	57 57 + 41
10 7.8	41 057 - 228	22 23 - 49	29 410 -1343	47 89 + 86	58 001 - 213	46 06 - 48	20 020 - 171	57 71 + 14
10 17.7	40 829 - 228	22 43 - 20	28 051 -1359	48 22 + 33	57 790 - 211	46 28 - 22	19 850 - 170	57 56 - 15
10 27.7	40 614 - 215	22 33 + 10	26 701 -1350	48 04 - 18	57 590 - 200	46 25 + 3	19 689 - 161	57 15 - 41
11 6.7	40 422 - 192	21 94 + 39	25 387 -1314	47 30 - 74	57 412 - 178	45 96 + 29	19 544 - 145	56 46 - 69
11 16.7	40 269 - 153	21 27 + 67	24 162 -1225	46 01 -129	57 272 - 140	45 42 + 54	19 426 - 118	55 50 - 96
11 26.6	40 162 - 107	20 36 + 91	23 045 -1117	44 22 -179	57 173 - 99	44 68 + 74	19 340 - 86	54 31 -119
12 6.6	40 107 - 55	19 24 +112	22 069 - 976	41 93 -229	57 124 - 49	43 74 + 94	19 290 - 50	52 87 -144
12 16.6	40 111 + 4	17 95 +129	21 278 - 791	39 23 -791	57 131 + 7	42 67 +107	19 281 - 9	51 26 -161
12 26.5	40 171 + 60	16 56 +139	20 678 - 600	36 19 -304	57 190 + 59	41 49 +118	19 311 + 30	49 50 -176
12 36.5	40 289 + 118	15 08 +148	20 301 - 377	32 87 -332	57 303 + 113	40 25 +124	19 381 + 70	47 64 -186
	+ 172	+151	- 141	-342	+ 164	+129	+ 110	-187
Mean Place	40.166	07.07	30.542	35.43	57.152	32.20	19.586	53.42
sec $\delta$ , tan $\delta$	+1.402	-0.982	+5.527	+5.436	+1.318	-0.858	+1.022	+0.211
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.086	+0.14	-0.074	+0.14	+0.082	+0.14	+0.056	+0.14
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.023	-0.94	-0.128	-0.94	+0.020	-0.94	-0.005	-0.93
Dbble.Trans.	July 12		July 13		July 13		July 13	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	730			1506		1507		1505									
	Name	δ Aquilae		Groombridge 2844 (Cygni)		Piazzi 19 <sup>h</sup> 156 (Draconis)		Bradley 2462 (Vulpeculae)									
Mag.Spect.	3.44	F0		6.72	G5	6.46	B8	6.04	K5								
U.T.	R.A.	Dec.		R.A.	Dec.	R.A.	Dec.	R.A.	Dec.								
	h m	° ' "		h m	° ' "	h m	° ' "	h m	° ' "								
	19 24	+ 3 04	' "	19 25	+ 44 53	19 25	+ 57 59	19 25	+ 19 51								
1	-8.4	45.567	+ 23	62.52	-132	28.571	- 65	66.40	-287	28.593	- 70	54.25	-303	49.889	+ 0	41.40	-210
1	1.5	45.630	+ 63	61.12	-140	28.559	- 12	63.33	-307	28.523	- 70	50.98	-327	49.930	+ 41	39.17	-223
1	11.5	45.729	+ 99	61.12	-143	28.602	+ 43	60.11	-322	28.526	+ 3	47.53	-345	50.010	+ 80	36.86	-231
1	21.5	45.866	+ 137	59.69	-141	28.701	+ 99	56.88	-323	28.608	+ 82	44.05	-348	50.132	+ 122	34.56	-230
1	31.4	46.034	+ 168	58.28	-132	28.851	+ 150	53.77	-311	28.762	+ 154	40.69	-336	50.287	+ 155	32.38	-218
2	10.4	46.231	+ 197	55.79	-117	29.049	+ 198	50.86	-291	28.985	+ 223	37.52	-317	50.476	+ 189	30.37	-201
2	20.4	46.456	+ 225	54.83	- 96	29.294	+ 245	48.31	-255	29.273	+ 288	34.72	-280	50.695	+ 219	28.66	-171
3	2.4	46.700	+ 244	54.14	- 69	29.574	+ 280	46.20	-211	29.615	+ 342	32.37	-235	50.938	+ 243	27.30	-136
3	12.3	46.965	+ 285	53.74	- 40	29.889	+ 315	44.59	-161	30.005	+ 390	30.54	-183	51.204	+ 266	26.34	- 96
3	22.3	47.245	+ 280	53.67	- 7	30.230	+ 341	43.59	-100	30.431	+ 426	29.35	-119	51.487	+ 283	25.86	- 48
4	1.3	47.535	+ 290	53.94	+ 27	30.587	+ 357	43.18	- 41	30.879	+ 448	28.78	- 57	51.783	+ 296	25.83	- 3
4	11.3	47.836	+ 301	54.53	+ 59	30.957	+ 370	43.39	+ 21	31.343	+ 464	28.87	+ 9	52.088	+ 305	26.28	+ 45
4	21.2	48.139	+ 303	55.44	+ 91	31.327	+ 370	44.23	+ 84	31.805	+ 462	29.62	+ 75	52.397	+ 309	27.19	+ 91
5	1.2	48.440	+ 301	56.61	+117	31.690	+ 363	45.61	+138	32.254	+ 449	30.96	+134	52.702	+ 305	28.51	+132
5	11.2	48.737	+ 297	58.02	+141	32.039	+ 349	47.51	+190	32.681	+ 427	32.86	+190	53.002	+ 300	30.19	+168
5	21.1	49.020	+ 283	59.60	+158	32.363	+ 324	49.87	+236	33.070	+ 389	35.27	+241	53.285	+ 283	32.19	+200
5	31.1	49.285	+ 265	61.29	+169	32.656	+ 293	52.57	+270	33.414	+ 344	38.04	+277	53.549	+ 264	34.41	+222
6	10.1	49.528	+ 243	63.06	+177	32.911	+ 255	55.56	+299	33.705	+ 291	41.16	+312	53.786	+ 237	36.80	+239
6	20.1	49.739	+ 218	64.83	+177	33.119	+ 208	58.74	+318	33.931	+ 226	44.49	+333	53.990	+ 204	39.28	+248
6	30.0	49.917	+ 171	66.56	+173	33.278	+ 159	62.00	+326	34.091	+ 160	47.93	+344	54.158	+ 168	41.78	+250
7	10.0	50.056	+ 139	68.21	+165	33.383	+ 105	65.30	+330	34.180	+ 89	51.44	+351	54.285	+ 127	44.24	+246
7	20.0	50.152	+ 96	69.73	+152	33.429	+ 46	68.51	+321	34.192	+ 12	54.88	+344	54.366	+ 81	46.60	+236
7	30.0	50.205	+ 53	71.10	+137	33.421	- 8	71.58	+307	34.134	- 58	58.19	+331	54.404	+ 38	48.79	+219
8	8.9	50.214	+ 9	72.31	+121	33.355	- 66	74.46	+288	34.003	- 131	61.32	+313	54.395	- 9	50.81	+202
8	18.9	50.180	- 34	73.31	+100	33.236	- 119	77.05	+259	33.804	- 199	64.16	+284	54.343	- 52	52.57	+176
8	28.9	50.108	- 72	74.12	+ 81	33.070	- 166	79.32	+227	33.547	- 257	66.67	+251	54.252	- 91	54.07	+150
9	7.8	50.001	- 153	74.74	+ 62	32.861	- 209	81.23	+191	33.235	- 312	68.81	+214	54.125	- 127	55.29	+122
9	17.8	49.868	- 133	75.13	+ 39	32.618	- 243	82.71	+148	32.880	- 355	70.50	+169	53.970	- 155	56.18	+ 89
9	27.8	49.717	- 151	75.34	+ 21	32.353	- 265	83.76	+105	32.496	- 384	71.74	+124	53.798	- 172	56.76	+ 58
10	7.8	49.553	- 164	75.34	+ 0	32.071	- 282	84.34	+ 58	32.090	- 406	72.47	+ 73	53.612	- 186	57.01	+ 25
10	17.7	49.391	- 162	75.14	- 20	31.788	- 283	84.42	+ 8	31.681	- 409	72.66	+ 19	53.427	- 185	56.90	- 11
10	27.7	49.238	- 153	74.76	- 38	31.513	- 275	84.02	- 40	31.279	- 402	72.34	- 32	53.250	- 177	56.47	- 43
11	6.7	49.102	- 136	74.17	- 59	31.254	- 259	83.10	- 92	30.895	- 384	71.46	- 88	53.090	- 160	55.68	- 79
11	16.7	48.993	- 109	73.41	- 76	31.027	- 227	81.70	-140	30.549	- 346	70.04	-142	52.956	- 134	54.56	-112
11	26.6	48.916	- 77	72.48	- 93	30.835	- 192	79.85	-185	30.245	- 304	68.14	-190	52.854	- 102	53.15	-141
12	6.6	48.875	- 41	71.37	-111	30.686	- 149	77.56	-229	29.996	- 249	65.74	-240	52.787	- 67	51.44	-171
12	16.6	48.875	+ 0	70.15	-122	30.590	- 96	74.92	-264	29.814	- 182	62.96	-278	52.763	- 24	49.49	-195
12	26.5	48.913	+ 38	68.82	-133	30.544	- 46	72.00	-292	29.698	- 116	59.87	-309	52.778	+ 15	47.37	-212
12	36.5	48.991	+ 78	67.43	-139	30.555	+ 11	68.87	-313	29.657	- 41	56.52	-335	52.836	+ 58	45.11	-226
		+ 116		-140		+ 66		-320		+ 36		-343		+ 98		-228	
Mean Place	49.068	73.91		31.899	72.91	32.096	59.74	53.232	50.64								
sec δ, tan δ	+1.001	+0.054		+1.412	+0.997	+1.887	+1.600	+1.063	+0.361								
dα(ψ), dδ(ψ)	+0.060	+0.14		+0.037	+0.15	+0.022	+0.15	+0.052	+0.15								
dα(ε), dδ(ε)	-0.001	-0.93		-0.024	-0.93	-0.039	-0.93	-0.009	-0.93								
Dble.Trans.	July 13			July 13		July 13		July 13									

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	731		1504		1508		733	
	186 G. Sagittarii		59 G. Telescopii*		α Vulpeculae		ι Cygni	
Mag.Spect.	5.68	B9	5.58	K2	4.63	M0	3.94	A2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	19 26	- 29 46	19 26	- 54 21	19 28	+ 24 37	19 29	+ 51 41
1 -8.4	01.232 + 38	29.91 + 50	37.834 + 22	29.10 +186	05.315 - 11	" -228	18.551 - 103	" -294
1 1.5	01.316 + 84	29.37 + 54	37.925 + 91	27.13 +197	05.347 + 32	64.65 -242	18.509 - 42	56.46 -317
1 11.5	01.440 + 124	28.82 + 55	38.083 + 158	25.08 +205	05.419 + 72	62.23 -253	18.528 + 19	53.29 -334
1 21.5	01.609 + 169	28.16 + 66	38.308 + 225	23.02 +206	05.534 + 115	59.70 -251	18.528 + 86	49.95 -337
1 31.4	01.815 + 206	27.51 + 65	38.588 + 280	21.02 +200	05.685 + 151	57.19 -239	18.614 + 144	46.58 -326
2 10.4	02.053 + 238	26.85 + 66	38.920 + 332	19.08 +194	05.871 + 186	54.80 -222	18.758 + 203	43.32 -307
2 20.4	02.321 + 268	26.16 + 69	39.299 + 379	17.28 +180	06.089 + 218	50.68 -190	19.219 + 258	40.25 -271
3 2.4	02.611 + 290	25.46 + 70	39.713 + 414	15.64 +164	06.333 + 244	49.15 -153	19.521 + 302	37.54 -227
3 12.3	02.923 + 312	24.72 + 74	40.160 + 447	14.16 +148	06.602 + 269	48.04 -111	19.864 + 343	35.27 -176
3 22.3	03.252 + 329	23.96 + 76	40.633 + 473	12.91 +125	06.889 + 287	47.43 - 61	20.238 + 374	33.51 -114
4 1.3	03.592 + 340	23.20 + 76	41.121 + 488	11.87 +104	07.190 + 301	47.32 - 11	20.632 + 394	31.84 - 53
4 11.3	03.943 + 351	22.44 + 76	41.624 + 503	11.08 + 79	07.501 + 311	47.71 + 39	21.041 + 409	31.95 + 11
4 21.2	04.298 + 355	21.71 + 73	42.130 + 506	10.57 + 51	07.815 + 314	48.61 + 90	21.451 + 410	32.72 + 77
5 1.2	04.651 + 353	21.02 + 69	42.632 + 502	10.32 + 25	08.126 + 311	49.94 +133	21.851 + 400	34.05 +133
5 11.2	05.000 + 349	20.41 + 61	43.126 + 494	10.36 - 4	08.430 + 304	51.68 +174	22.236 + 385	35.94 +189
5 21.1	05.335 + 335	19.91 + 50	43.596 + 470	10.70 - 34	08.718 + 288	53.77 +209	22.591 + 355	38.31 +237
5 31.1	05.651 + 316	19.53 + 38	44.036 + 440	11.32 - 62	08.984 + 266	56.10 +233	22.909 + 318	41.05 +274
6 10.1	05.942 + 291	19.29 + 24	44.440 + 404	12.22 - 90	09.224 + 240	58.64 +254	23.184 + 275	44.11 +306
6 20.1	06.199 + 257	19.21 - 8	44.791 + 351	13.39 -117	09.429 + 205	61.30 +266	23.404 + 220	47.38 +327
6 30.0	06.418 + 219	19.29 - 8	45.088 + 297	14.78 -139	09.597 + 168	63.97 +267	23.569 + 165	50.76 +338
7 10.0	06.594 + 176	19.52 - 23	45.321 + 233	16.37 -159	09.722 + 125	66.64 +267	23.672 + 103	54.20 +344
7 20.0	06.720 + 126	19.89 - 37	45.481 + 160	18.09 -172	09.800 + 78	69.21 +257	23.709 + 37	57.58 +338
7 30.0	06.797 + 77	20.39 - 50	45.572 + 91	19.90 -181	09.833 + 33	71.62 +241	23.785 - 24	60.81 +323
8 8.9	06.822 + 25	20.98 - 59	45.588 + 16	21.74 -184	09.819 - 14	73.84 +222	23.597 - 88	63.88 +307
8 18.9	06.796 - 26	21.63 - 66	45.530 - 58	23.52 -178	09.759 - 60	75.80 +196	23.448 - 149	66.64 +276
8 28.9	06.726 - 70	22.30 - 67	45.408 - 122	25.19 -167	09.661 - 98	77.49 +169	23.248 - 200	69.10 +246
9 7.8	06.614 - 112	22.96 - 66	45.225 - 183	26.68 -149	09.526 - 135	78.87 +138	22.999 - 249	71.19 +209
9 17.8	06.470 - 144	23.56 - 60	44.994 - 231	27.91 -123	09.362 - 164	79.90 +103	22.712 - 287	72.83 +164
9 27.8	06.304 - 166	24.07 - 51	44.729 - 265	28.85 - 94	09.179 - 183	80.60 + 70	22.398 - 314	74.05 +122
10 7.8	06.123 - 181	24.47 - 40	44.441 - 288	29.44 - 59	08.983 - 196	80.93 + 33	22.065 - 333	74.76 + 71
10 17.7	05.942 - 181	24.73 - 26	44.152 - 289	29.64 - 20	08.787 - 196	80.87 - 6	21.729 - 336	74.96 + 20
10 27.7	05.772 - 170	24.85 - 12	43.874 - 278	29.47 + 17	08.599 - 188	80.45 - 42	21.400 - 329	74.65 - 31
11 6.7	05.620 - 152	24.82 + 3	43.622 - 252	28.90 + 57	08.426 - 173	79.64 - 81	21.087 - 313	73.80 - 85
11 16.7	05.502 - 118	24.64 + 18	43.416 - 206	27.96 + 94	08.281 - 145	78.46 -118	20.806 - 281	72.43 -137
11 26.6	05.420 - 82	24.34 + 30	43.263 - 153	26.71 +125	08.166 - 115	76.95 -151	20.564 - 242	70.59 -184
12 6.6	05.381 - 39	23.94 + 40	43.171 - 92	25.16 +155	08.088 - 78	75.10 -185	20.368 - 196	68.27 -232
12 16.6	05.391 + 10	23.45 + 49	43.150 - 21	23.39 +177	08.052 + 36	73.00 -210	20.230 - 138	65.58 -269
12 26.5	05.446 + 55	22.90 + 55	43.198 + 48	21.46 +193	08.058 + 6	70.70 -230	20.149 - 81	62.58 -300
12 36.5	05.548 + 102	22.34 + 56	43.316 + 118	19.41 +205	08.106 + 48	68.24 -246	20.132 - 17	59.34 -324
	+ 142	+ 63	+ 186	+ 208	+ 91	- 249	+ 47	- 332
Mean Place	05.374	14.50	43.307	11.29	08.629	73.33	21.949	62.42
sec δ, tan δ	+1.152	-0.572	+1.716	-1.394	+1.100	+0.459	+1.614	+1.266
dα(ψ), dδ(ψ)	+0.075	+0.15	+0.096	+0.15	+0.050	+0.15	+0.030	+0.15
dα(ε), dδ(ε)	+0.014	-0.93	+0.034	-0.93	-0.011	-0.93	-0.032	-0.92
Dble.Trans.	July 13		July 14		July 14		July 14	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1509		732		1510		1511		
	36 Aquilae		$\beta$ Cygni* p.		8 Cygni		$\mu$ Aquilae		
Mag.Spect.	5.22	M0	3.24	K0, A0	4.85	B3	4.65	K0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° /	h m	° /	h m	° /	h m	° /	
	19 29	- 2 49	19 30	+ 27 55	19 31	+ 34 24	19 33	+ 7 20	
1	-8.4	53.926 + 24	15.89 -101	07.328 + 24	42.30 -238	12.903 + 36	78.07 -257	22.367 + 11	47.57 -151
1	1.5	53.988 + 62	16.93 -104	07.352 + 24	39.76 -254	12.913 + 10	75.31 -276	22.417 + 50	45.98 -159
1	11.5	54.086 + 98	18.00 -107	07.418 + 66	37.11 -265	12.968 + 55	72.42 -289	22.504 + 87	44.32 -166
1	21.5	54.222 + 136	19.05 -105	07.528 + 110	34.47 -264	13.071 + 103	69.53 -289	22.628 + 124	42.70 -162
1	31.5	54.389 + 167	20.02 -97	07.676 + 148	31.94 -253	13.215 + 144	66.75 -278	22.785 + 157	41.16 -154
2	10.4	54.586 + 197	20.87 -85	07.860 + 184	29.59 -235	13.400 + 185	64.16 -259	22.971 + 186	39.77 -139
2	20.4	54.809 + 223	21.53 -66	08.079 + 219	27.56 -203	13.622 + 222	61.90 -226	23.186 + 215	38.62 -115
3	2.4	55.053 + 244	21.97 -44	08.324 + 245	25.91 -165	13.875 + 253	60.04 -186	23.423 + 237	37.75 -87
3	12.3	55.317 + 260	22.16 -19	08.595 + 271	24.70 -121	14.156 + 281	58.64 -140	23.681 + 258	37.20 -55
3	22.3	55.597 + 280	22.06 + 10	08.887 + 292	24.01 -69	14.460 + 304	57.80 -84	23.957 + 276	37.02 -18
4	1.3	55.888 + 281	21.69 + 37	09.192 + 305	23.84 -17	14.778 + 318	57.51 -29	24.244 + 287	37.21 + 19
4	11.3	56.190 + 302	21.05 + 64	09.508 + 316	24.18 + 34	15.109 + 331	57.79 + 28	24.543 + 299	37.76 + 55
4	21.2	56.496 + 306	20.15 + 90	09.828 + 320	25.07 + 89	15.444 + 335	58.63 + 84	24.846 + 303	38.67 + 91
5	1.2	56.801 + 305	19.05 +110	10.145 + 317	26.40 +133	15.774 + 330	59.98 +135	25.148 + 302	39.88 +121
5	11.2	57.103 + 302	17.76 +129	10.455 + 310	28.17 +177	16.095 + 321	61.80 +182	25.447 + 299	41.36 +148
5	21.1	57.392 + 289	16.34 +142	10.747 + 292	30.31 +214	16.398 + 303	64.02 +222	25.733 + 286	43.07 +171
5	31.1	57.665 + 273	14.85 +149	11.018 + 271	32.72 +241	16.676 + 278	66.55 +253	26.002 + 269	44.91 +184
6	10.1	57.915 + 250	13.32 +153	11.261 + 243	35.35 +263	16.924 + 248	69.34 +279	26.248 + 246	46.86 +195
6	20.1	58.135 + 220	11.82 +150	11.468 + 207	38.11 +276	17.133 + 209	72.29 +295	26.464 + 216	48.84 +198
6	30.0	58.322 + 187	10.38 +144	11.636 + 168	40.91 +280	17.301 + 168	75.29 +300	26.646 + 182	50.79 +195
7	10.0	58.471 + 149	09.04 +134	11.761 + 125	43.72 +281	17.422 + 121	78.32 +303	26.790 + 144	52.69 +190
7	20.0	58.576 + 105	07.83 +121	11.838 + 77	46.42 +270	17.492 + 70	81.26 +294	26.890 + 100	54.46 +177
7	30.0	58.639 + 63	06.76 +107	11.869 + 31	48.97 +255	17.514 + 22	84.06 +280	26.948 + 58	56.07 +161
8	8.9	58.657 + 18	05.85 + 91	11.852 - 17	51.34 +237	17.485 - 29	86.67 +261	26.960 + 12	57.52 +145
8	18.9	58.631 - 26	05.13 + 72	11.788 - 64	53.44 +210	17.407 - 78	89.00 +233	26.930 - 30	58.75 +123
8	28.9	58.567 - 64	04.57 + 56	11.685 - 103	55.26 +182	17.287 - 120	91.04 +204	26.861 - 69	59.77 +102
9	7.8	58.467 - 100	04.17 + 40	11.543 - 142	56.77 +151	17.128 - 159	92.75 +171	26.756 - 105	60.57 + 80
9	17.8	58.339 - 128	03.95 + 22	11.373 - 170	57.91 +114	16.938 - 190	94.06 +131	26.756 - 132	61.12 + 55
9	27.8	58.192 - 147	03.87 + 8	11.183 - 190	58.70 + 79	16.727 - 211	94.99 + 93	26.624 - 152	61.45 + 33
10	7.8	58.032 - 160	03.94 - 7	10.979 - 204	59.09 + 39	16.501 - 226	95.49 + 50	26.308 - 164	61.53 + 8
10	17.7	57.873 - 159	04.16 - 22	10.774 - 205	59.08 - 1	16.273 - 228	95.54 + 5	26.143 - 165	61.38 - 15
10	27.7	57.722 - 151	04.50 - 34	10.576 - 198	58.68 - 40	16.053 - 220	95.17 - 37	25.986 - 157	61.00 - 38
11	6.7	57.587 - 135	04.98 - 48	10.394 - 182	57.87 - 81	15.847 - 206	94.34 - 83	25.843 - 143	60.38 - 62
11	16.7	57.479 - 108	05.59 - 61	10.239 - 155	56.67 -120	15.669 - 178	93.08 -126	25.823 - 116	59.54 - 84
11	26.6	57.403 - 76	06.31 - 72	10.114 - 125	55.11 -156	15.523 - 146	91.42 -166	25.640 - 87	58.51 -103
12	6.6	57.362 - 41	07.15 - 84	10.027 - 87	53.19 -192	15.415 - 108	89.36 -206	25.588 - 52	57.26 -125
12	16.6	57.362 + 0	08.08 - 93	09.982 - 45	51.00 -219	15.353 - 62	87.00 -236	25.577 - 11	55.87 -139
12	26.5	57.400 + 38	09.07 - 99	09.979 - 3	48.59 -241	15.334 - 19	84.38 -262	25.603 + 26	54.35 -152
12	36.5	57.477 + 77	10.11 -104	10.021 + 42	46.01 -258	15.362 + 28	81.57 -281	25.668 + 65	52.74 -161
		57.481 + 115	03.54 -104	10.634 + 85	50.65 -261	16.201 + 76	85.66 -286	25.804 + 104	58.61 -161
Mean Place	57.481	03.54	10.634	50.65	16.201	85.66	25.804	58.61	
sec $\delta$ , tan $\delta$	+1.001	-0.049	+1.132	+0.530	+1.212	+0.685	+1.008	+0.129	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.062	+0.15	+0.048	+0.15	+0.044	+0.15	+0.058	+0.16	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.001	-0.92	-0.014	-0.92	-0.018	-0.92	-0.003	-0.92	
Dble.Trans.	July 14		July 14		July 15		July 15		



AT UPPER TRANSIT AT GREENWICH

No.	735		736		738		737	
	ι Telescopii		52 Sagittarii*		9 Cygni		α Aquilae	
Mag.Spect.	5.02	K0	4.66	B9	4.64	F5	5.04	B0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 19 34	° ' " / - 48 07	h m 19 35	° ' " / - 24 54	h m 19 36	° ' " / + 50 10	h m 19 36	° ' " / - 7 03
1 -8.4	08.097 <sup>s</sup> + 20	63 55 +152	49.261 <sup>s</sup> + 28	66 56 + 23	01.374 <sup>s</sup> - 102	75 68 -286	06.311 <sup>s</sup> + 21	42 95 - 76
1 1.5	08.176 + 79	61 91 +164	49.333 + 72	66 29 + 27	01.330 - 44	72 58 -310	06.370 + 59	43 73 - 78
1 11.5	08.311 + 135	60 20 +171	49.445 + 112	66 11 + 18	01.345 + 15	69 29 -329	06.466 + 96	44 53 - 80
1 21.5	08.505 + 194	58 44 +176	49.591 + 146	65 65 + 46	01.424 + 79	65 98 -331	06.598 + 132	45 30 - 77
1 31.5	08.747 + 242	56.71 +173	49.779 + 188	65.24 + 41	01.560 + 136	62.76 -322	06.763 + 165	46.01 - 71
2 10.4	09.034 + 287	55.02 +169	49.999 + 220	64.79 + 45	01.751 + 191	59.71 -305	06.958 + 195	46.60 - 59
2 20.4	09.362 + 328	53 40 +162	50.247 + 248	64.29 + 50	01.997 + 246	57.01 -270	07.180 + 222	47.02 - 42
3 2.4	09.721 + 359	51.89 +151	50.517 + 270	63.71 + 58	02.285 + 288	54.74 -227	07.422 + 242	47.25 - 23
3 12.3	10.110 + 389	50 50 +139	50.809 + 292	63.07 + 64	02.615 + 330	52.97 -177	07.686 + 264	47.27 - 2
3 22.3	10.523 + 413	49 26 +124	51.120 + 311	62.35 + 72	02.976 + 361	51.81 -116	07.966 + 280	47.04 + 23
4 1.3	10.951 + 428	48 19 +107	51.442 + 322	61 58 + 77	03.357 + 381	51 25 - 56	08.259 + 293	46 57 + 47
4 11.3	11.394 + 443	47 30 + 89	51 777 + 335	60 75 + 83	03.755 + 398	51 32 + 7	08.563 + 304	45 88 + 69
4 21.2	11.843 + 449	46 62 + 68	52 118 + 341	59 90 + 85	04.156 + 401	52 05 + 73	08.873 + 310	44 97 + 91
5 1.2	12.290 + 447	46 17 + 45	52.459 + 341	59 06 + 84	04.549 + 393	53.34 +129	09.182 + 309	43.90 +107
5 11.2	12.731 + 441	45 95 + 22	52.797 + 338	58.24 + 82	04.929 + 380	55.19 +185	09.490 + 308	42.68 +122
5 21.2	13.155 + 424	46 00 - 5	53.123 + 326	57 49 + 75	05.281 + 352	57.52 +233	09.786 + 296	41.36 +132
5 31.1	13.555 + 400	46 30 - 30	53.433 + 310	56 84 + 65	05.600 + 319	60.22 +270	10.066 + 280	40.01 +135
6 10.1	13.924 + 369	46 86 - 56	53.721 + 288	56 29 + 55	05.878 + 278	63.25 +303	10.325 + 259	38.64 +137
6 20.1	14.249 + 325	47 66 - 80	53.976 + 255	55 90 + 39	06.104 + 226	66.50 +325	10.555 + 230	37.33 +131
6 30.0	14.527 + 278	48 69 -103	54.196 + 220	55.65 + 25	06.277 + 173	69.86 +336	10.752 + 197	36.09 +124
7 10.0	14.750 + 223	49 92 -123	54.374 + 178	55 55 + 10	06.390 + 113	73.29 +343	10.910 + 158	34.96 +113
7 20.0	14.909 + 159	51.31 -139	54.505 + 131	55 61 - 6	06.439 + 49	76.66 +337	11.025 + 115	33.97 + 99
7 30.0	15.007 + 98	52 80 -149	54.589 + 84	55 81 - 20	06.429 - 10	79.91 +325	11.097 + 72	33.13 + 84
8 8.9	15.037 + 30	54 35 -155	54.623 + 34	56 12 - 31	06.429 - 73	82.98 +307	11.123 + 26	32.43 + 70
8 18.9	15.003 - 34	55 89 -154	54.608 - 15	56 53 - 41	06.223 - 133	85.78 +280	11.105 - 18	31.91 + 52
8 28.9	14.911 - 92	57 36 -147	54.550 - 58	57 00 - 47	06.040 - 183	88.26 +248	11.047 - 58	31 53 + 38
9 7.9	14.764 - 147	58 72 -136	54.450 - 100	57 50 - 50	05.808 - 232	90.39 +213	10.953 - 94	31 30 + 23
9 17.8	14.574 - 190	59 86 -114	54.318 - 132	57 99 - 49	05.538 - 270	92.08 +169	10.829 - 124	31 21 + 9
9 27.8	14.352 - 222	60 78 - 92	54.163 - 155	58 44 - 45	05.242 - 296	93.35 +127	10.685 - 144	31 23 - 2
10 7.8	14.109 - 243	61 40 - 62	53.993 - 170	58 84 - 40	04.925 - 317	94.13 + 78	10.528 - 157	31.36 - 13
10 17.7	13.863 - 246	61 70 - 30	53.822 - 171	59 14 - 30	04.604 - 321	94.39 + 26	10.370 - 158	31 60 - 24
10 27.7	13.626 - 237	61 68 + 2	53.659 - 163	59 35 - 21	04.289 - 315	94 16 - 23	10.219 - 151	31 91 - 31
11 6.7	13.410 - 216	61 32 + 36	53.512 - 147	59 46 - 11	03.988 - 301	93.39 - 77	10.083 - 136	32 33 - 42
11 16.7	13.234 - 176	60 63 + 69	53.395 - 117	59 47 - 1	03.718 - 270	92.10 -129	09.974 - 109	32 82 - 49
11 26.6	13.102 - 132	59 66 + 97	53.312 - 83	59 39 + 8	03.484 - 234	90.34 -176	09.895 - 79	33 38 - 56
12 6.6	13.023 - 79	58 42 +124	53.268 - 44	59 23 + 16	03.294 - 190	88.10 -224	09.852 - 43	34 03 - 65
12 16.6	13.006 - 17	56 98 +144	53.270 + 2	59 01 + 22	03.159 - 135	85.49 -261	09.849 - 3	34 73 - 70
12 26.6	13.047 + 41	55 39 +159	53.314 + 44	58 74 + 27	03.078 - 81	82.56 -293	09.885 + 36	35 48 - 75
12 36.5	13.149 + 102	53 69 +170	53.404 + 90	58 44 + 30	03.058 - 20	79.39 -317	09.960 + 75	36 25 - 77
	+ 161	+176	+ 122	+ 29	+ 42	-327	+ 112	- 75
Mean Place	13.028	45.43	53.221	50.89	04.757	81.77	09.909	29.70
sec δ, tan δ	+1.498	-1.116	+1.103	-0.464	+1.562	+1.200	+1.008	-0.124
dα(ψ), dδ(ψ)	+0.088	+0.16	+0.072	+0.16	+0.032	+0.16	+0.064	+0.16
dα(ε), dδ(ε)	+0.030	-0.92	+0.013	-0.91	-0.033	-0.91	+0.003	-0.91
Dbles.Trans.	July 16		July 16		July 16		July 16	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1512		1513		1514		1515		
	54 Sagittarii		β Sagittae		55 Sagittarii		10 Vulpeculae		
Mag.Spect.	5.45	K0	4.45	K0	5.10	F0	5.45	G5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° /	h m	° /	h m	° /	h m	° /	
	19 39	- 16 19	19 40	+ 17 26	19 41	- 16 09	19 43	+ 25 43	
1	-8.4	53.274 + 22	44.37 - 25	23.228 + 31	28.96 - 206	41.088 + 21	37.99 - 25	05.945 + 15	72.00 - 222
1	1.5	53.337 + 63	44.60 - 23	23.259 + 31	26.90 - 214	41.149 + 61	38.23 - 24	05.960 + 15	69.62 - 238
1	11.5	53.438 + 101	44.76 - 16	23.328 + 69	24.76 - 214	41.248 + 99	38.40 - 17	06.016 + 56	67.11 - 251
1	21.5	53.572 + 134	44.99 - 23	23.436 + 108	22.62 - 214	41.380 + 132	38.62 - 22	06.114 + 98	64.60 - 251
1	31.5	53.745 + 173	45.12 - 13	23.579 + 143	20.59 - 203	41.551 + 171	38.76 - 14	06.249 + 135	62.18 - 242
2	10.4	53.947 + 202	45.16 - 4	23.754 + 175	18.70 - 189	41.752 + 201	38.80 - 4	06.420 + 171	59.93 - 225
2	20.4	54.178 + 231	45.08 + 8	23.960 + 206	17.09 - 161	41.980 + 228	38.72 + 8	06.626 + 206	57.97 - 196
3	2.4	54.429 + 251	44.87 + 21	24.191 + 231	15.81 - 128	42.230 + 250	38.51 + 21	06.859 + 233	56.37 - 160
3	12.3	54.702 + 273	44.52 + 35	24.447 + 256	14.90 - 91	42.501 + 271	38.15 + 36	07.119 + 260	55.18 - 119
3	22.3	54.993 + 291	44.01 + 51	24.722 + 275	14.45 - 45	42.791 + 290	37.63 + 52	07.401 + 282	54.49 - 69
4	1.3	55.297 + 304	43.36 + 65	25.010 + 288	14.43 - 2	43.094 + 303	36.97 + 66	07.698 + 297	54.29 - 20
4	11.3	55.613 + 316	42.56 + 80	25.312 + 302	14.85 + 42	43.409 + 315	36.17 + 80	08.009 + 311	54.61 + 32
4	21.2	55.934 + 321	41.66 + 90	25.619 + 307	15.74 + 89	43.730 + 321	35.25 + 92	08.326 + 317	55.44 + 83
5	1.2	56.257 + 323	40.67 + 99	25.926 + 307	17.00 + 126	44.053 + 323	34.25 + 100	08.642 + 316	56.71 + 127
5	11.2	56.578 + 321	39.63 + 104	26.229 + 303	18.63 + 163	44.374 + 321	33.19 + 106	08.954 + 312	58.41 + 170
5	21.2	56.889 + 311	38.58 + 105	26.519 + 290	20.56 + 193	44.685 + 311	32.13 + 106	09.251 + 297	60.48 + 207
5	31.1	57.183 + 294	37.56 + 102	26.791 + 272	22.70 + 214	44.981 + 296	31.09 + 104	09.529 + 278	62.81 + 233
6	10.1	57.457 + 274	36.59 + 97	27.040 + 249	25.01 + 231	45.255 + 274	30.11 + 98	09.572 + 253	65.37 + 256
6	20.1	57.701 + 244	35.73 + 86	27.257 + 217	27.42 + 241	45.500 + 245	29.22 + 89	10.000 + 218	68.07 + 270
6	30.0	57.911 + 210	34.98 + 75	27.439 + 182	29.84 + 242	45.712 + 212	28.46 + 76	10.182 + 182	70.80 + 273
7	10.0	58.083 + 172	34.37 + 61	27.582 + 143	32.24 + 240	45.884 + 172	27.83 + 63	10.321 + 139	73.55 + 275
7	20.0	58.209 + 126	33.91 + 46	27.679 + 97	34.53 + 229	46.012 + 128	27.35 + 48	10.321 + 93	76.21 + 266
7	30.0	58.291 + 82	33.60 + 31	27.734 + 55	36.67 + 214	46.096 + 84	27.02 + 33	10.414 + 47	76.21 + 252
8	8.9	58.325 + 34	33.42 + 18	27.742 + 8	38.64 + 197	46.132 + 36	26.83 + 19	10.460 - 1	81.07 + 234
8	18.9	58.313 - 12	33.38 + 4	27.705 - 37	40.36 + 172	46.121 - 11	26.78 + 5	10.413 - 47	83.16 + 209
8	28.9	58.260 - 53	33.45 - 7	27.630 - 75	41.85 + 149	46.069 - 52	26.84 - 6	10.325 - 88	84.99 + 183
9	7.9	58.167 - 93	33.60 - 15	27.517 - 113	43.06 + 121	45.978 - 91	26.99 - 15	10.199 - 126	86.52 + 153
9	17.8	58.044 - 123	33.82 - 22	27.375 - 142	43.97 + 91	45.856 - 122	27.21 - 22	10.042 - 157	87.69 + 117
9	27.8	57.900 - 144	34.08 - 26	27.213 - 162	43.97 + 61	45.856 - 144	27.21 - 26	10.042 - 178	87.69 + 84
10	7.8	57.740 - 160	34.37 - 29	27.036 - 177	44.88 + 30	45.553 - 159	27.75 - 28	09.864 - 194	88.53 + 47
10	17.7	57.578 - 162	34.66 - 29	26.858 - 178	44.84 - 4	45.392 - 161	28.04 - 29	09.474 - 196	89.07 + 7
10	27.7	57.424 - 154	34.94 - 28	26.686 - 172	44.51 - 33	45.238 - 154	28.33 - 29	09.283 - 191	88.78 - 29
11	6.7	57.285 - 139	35.21 - 27	26.527 - 159	44.51 - 67	45.098 - 140	28.33 - 28	09.283 - 179	88.08 - 70
11	16.7	57.173 - 112	35.47 - 26	26.393 - 134	43.84 - 99	45.098 - 112	28.61 - 26	09.104 - 153	88.08 - 107
11	26.6	57.093 - 80	35.71 - 24	26.287 - 106	42.85 - 126	44.986 - 82	28.87 - 25	08.951 - 125	87.01 - 141
12	6.6	57.049 - 44	35.95 - 24	26.216 - 71	40.04 - 155	44.859 - 45	29.37 - 25	08.735 - 91	83.84 - 176
12	16.6	57.047 - 2	36.18 - 23	26.184 - 32	38.27 - 177	44.856 - 3	29.60 - 23	08.685 - 50	81.80 - 204
12	26.6	57.085 + 38	36.39 - 21	26.191 + 7	36.33 - 194	44.892 + 36	29.82 - 22	08.675 - 10	79.55 - 225
12	36.5	57.164 + 79	36.59 - 20	26.237 + 46	34.24 - 209	44.969 + 77	29.82 - 20	08.707 + 32	77.12 - 243
		+ 114	- 11	+ 87	- 211	+ 113	- 12	+ 75	- 248
Mean Place	57.024	29.57	26.568	38.82	44.828	23.08	09.246	80.77	
sec δ, tan δ	+1.042	-0.293	+1.048	+0.314	+1.041	-0.290	+1.110	+0.482	
dα(ψ), dδ(ψ)	+0.068	+0.17	+0.054	+0.17	+0.068	+0.17	+0.050	+0.17	
dα(ε), dδ(ε)	+0.008	-0.91	-0.009	-0.91	+0.008	-0.90	-0.014	-0.90	
Dble.Trans.	July 17		July 17		July 17		July 18		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	740		1516		1517		741	
	15 Cygni		228 G. Sagittarii		56 Sagittarii		γ Aquilae	
Mag. Spect.	5.02	K0	5.56	B8	5.06	K0	2.80	K2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	19 43	+ 37 18	19 45	- 31 56	19 45	- 19 47	19 45	+ 10 34
1 <sup>d</sup> -8.4	44 075 <sup>s</sup> - 56	69 20 <sup>o</sup> -255	05 516 <sup>s</sup> + 17	48 43 <sup>o</sup> + 62	30 750 <sup>s</sup> + 17	55 19 <sup>o</sup> - 6	33 709 <sup>s</sup> - 4	36 25 <sup>o</sup> -161
1 1.5	44 065 + 35	66 43 -277	05 580 + 64	47 74 + 69	30 810 + 60	55 20 - 1	33 743 + 34	36 55 -170
1 11.5	44 100 + 86	63 50 -293	05 686 + 106	46 99 + 75	30 911 + 101	55 14 + 6	33 814 + 71	32 77 -178
1 21.5	44 186 + 129	60 54 -296	05 834 + 148	46 15 + 84	31 036 + 125	55 14 + 0	33 923 + 109	31 01 -176
1 31.5	44 315 + 171	57 68 -286	06 022 + 188	45 27 + 88	31 208 + 172	55 03 + 11	34 065 + 142	29 33 -168
2 10.4	44 486 + 213	54 98 -270	06 245 + 223	44 37 + 90	31 410 + 202	54 83 + 20	34 238 + 173	27 80 -153
2 20.4	44 699 + 246	52 59 -239	06 500 + 255	43 44 + 93	31 639 + 229	54 54 + 29	34 440 + 202	26 51 -129
3 2.4	44 945 + 279	50 60 -199	06 780 + 280	42 49 + 95	31 892 + 253	54 14 + 40	34 667 + 227	25 51 -100
3 12.4	45 224 + 304	49 06 -154	07 084 + 304	41 51 + 98	32 166 + 274	53 62 + 52	34 917 + 250	24 85 -66
3 22.3	45 528 + 322	48 08 -98	07 409 + 325	40 53 + 98	32 460 + 294	52 98 + 64	35 186 + 269	24 57 -28
4 1.3	45 850 + 338	47 66 -42	07 749 + 340	39 56 + 97	32 767 + 307	52 23 + 75	35 469 + 283	24 69 + 12
4 11.3	46 188 + 344	47 81 + 15	08 103 + 354	38 61 + 95	33 088 + 321	51 37 + 86	35 766 + 297	25 20 + 51
4 21.2	46 532 + 341	48 56 + 75	08 464 + 361	37 71 + 90	33 416 + 328	50 44 + 93	36 070 + 304	26 09 + 89
5 1.2	46 873 + 334	49 82 +126	08 827 + 363	36 88 + 83	33 745 + 329	49 46 + 98	36 374 + 304	27 32 +123
5 11.2	47 207 + 317	51 58 +176	09 189 + 362	36 15 + 73	34 074 + 329	48 46 +100	36 676 + 302	28 85 +153
5 21.2	47 524 + 292	53 78 +220	09 539 + 350	35 55 + 60	34 393 + 319	47 48 + 98	36 967 + 291	30 64 +179
5 31.1	47 816 + 263	56 31 +253	09 873 + 334	35 10 + 45	34 696 + 303	46 56 + 92	37 243 + 276	32 59 +195
6 10.1	48 079 + 223	59 13 +282	10 185 + 312	34 82 + 28	34 980 + 284	45 72 + 84	37 497 + 254	34 68 +209
6 20.1	48 302 + 181	62 13 +300	10 463 + 278	34 73 + 9	35 233 + 253	45 00 + 72	37 720 + 223	36 83 +215
6 30.1	48 483 + 133	65 22 +309	10 705 + 242	34 82 - 9	35 452 + 219	44 42 + 58	37 911 + 191	38 96 +213
7 10.0	48 616 + 81	68 36 +314	10 903 + 198	35 09 - 27	35 633 + 181	43 99 + 43	38 063 + 152	41 05 +209
7 20.0	48 697 + 31	71 44 +308	11 051 + 148	35 54 - 45	35 767 + 134	43 72 + 27	38 172 + 109	43 03 +198
7 30.0	48 728 - 22	74 38 +294	11 149 + 98	36 12 - 58	35 857 + 90	43 60 + 12	38 238 + 66	44 86 +183
8 8.9	48 706 - 73	77 15 +277	11 194 + 45	36 82 - 70	35 898 + 41	43 61 - 1	38 259 + 21	46 52 +166
8 18.9	48 633 - 116	79 66 +251	11 186 - 8	37 60 - 78	35 891 - 7	43 75 - 14	38 235 - 24	47 95 +143
8 28.9	48 517 - 159	81 89 +223	11 132 - 54	38 41 - 81	35 842 - 49	43 99 - 24	38 173 - 62	49 17 +122
9 7.9	48 358 - 192	83 78 +189	11 031 - 101	39 22 - 81	35 752 - 90	44 30 - 31	38 073 - 100	50 15 + 98
9 17.8	48 166 - 216	85 28 +150	10 895 - 136	39 98 - 76	35 752 - 122	44 30 - 35	38 073 - 129	50 15 + 71
9 27.8	47 950 - 233	86 39 +111	10 734 - 161	40 64 - 66	35 630 - 145	44 65 - 36	37 944 - 149	50 86 + 46
10 7.8	47 717 - 237	87 07 + 68	10 553 - 181	41 18 - 54	35 485 - 162	45 01 - 36	37 795 - 165	51 32 + 20
10 17.8	47 480 - 233	87 28 + 21	10 369 - 184	41 55 - 37	35 323 - 164	45 37 - 33	37 630 - 167	51 52 - 7
10 27.7	47 247 - 220	87 05 - 23	10 192 - 177	41 76 - 21	35 159 - 158	45 70 - 28	37 463 - 162	51 45 - 32
11 6.7	47 027 - 194	86 35 - 70	10 030 - 162	41 79 - 3	35 001 - 144	45 98 - 23	37 301 - 149	51 13 - 59
11 16.7	46 833 - 165	85 19 -116	09 898 - 132	41 79 + 15	34 857 - 116	46 21 - 18	37 152 - 125	50 54 - 84
11 26.6	46 668 - 127	83 62 -157	09 800 - 98	41 64 + 31	34 741 - 86	46 39 - 13	37 027 - 97	49 70 -107
12 6.6	46 541 - 83	81 62 -200	09 742 - 58	40 88 + 45	34 655 - 49	46 52 - 9	36 930 - 85	48 63 -130
12 16.6	46 458 - 39	79 28 -234	09 732 - 10	40 29 + 59	34 606 - 7	46 61 - 5	36 865 - 25	47 33 -147
12 26.6	46 419 + 8	76 68 -284	09 767 + 82	39 62 + 74	34 599 + 33	46 66 - 1	36 840 + 11	45 86 -162
12 36.5	46 427 + 58	73 84 -291	09 849 + 124	38 88 + 81	34 632 + 76	46 67 + 2	36 851 + 49	44 24 -172
Mean Place	47.375	76.44	09.635	31.05	34.542	39.52	37.086	47.27
sec δ, tan δ	+1.257	+0.762	+1.178	-0.623	+1.063	-0.360	+1.017	+0.187
da(ψ), dδ(ψ)	+0.043	+0.17	+0.076	+0.18	+0.070	+0.18	+0.057	+0.18
da(ε), dδ(ε)	-0.022	-0.90	+0.018	-0.90	+0.011	-0.90	-0.006	-0.90
Dble. Trans.	July 18		July 18		July 18		July 18	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	743		739		744		745		
	δ Sagittae		ν Telescopii		51 Aquilae		α Aquilae (Altair)		
Mag. Spect.	3.78	M0, A0	5.52	A5	5.55	F0	0.89	A5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	<sup>h</sup> <sup>m</sup> 19 46	<sup>°</sup> <sup>'</sup> + 18 29	<sup>h</sup> <sup>m</sup> 19 46	<sup>°</sup> <sup>'</sup> - 56 23	<sup>h</sup> <sup>m</sup> 19 49	<sup>°</sup> <sup>'</sup> - 10 47	<sup>h</sup> <sup>m</sup> 19 50	<sup>°</sup> <sup>'</sup> + 8 49	
1	<sup>d</sup> -8.4	<sup>s</sup> 43 836 + 16	<sup>s</sup> 51 54 - 194	<sup>s</sup> 49 873 + 15	<sup>s</sup> 66 09 + 191	<sup>s</sup> 58 657 + 11	<sup>s</sup> 69 13 - 54	<sup>s</sup> 04 089 - 2	<sup>s</sup> 43.75 - 150
1	1.5	43 859 + 23	49 48 - 206	49 930 + 57	64 03 + 206	58 706 + 49	69 66 - 53	04 124 + 35	42.16 - 159
1	11.5	43 920 + 61	47 31 - 217	50 055 + 125	61 84 + 219	58 792 + 86	70 17 - 51	04 196 + 72	40.51 - 165
1	21.5	44 021 + 101	45 14 - 217	50 251 + 196	59 59 + 225	58 913 + 121	70 66 - 49	04 305 + 109	38.87 - 164
1	31.5	44 156 + 135	43 07 - 207	50 507 + 256	57 37 + 222	59 068 + 155	71 10 - 44	04 446 + 141	37.32 - 155
2	10.4	44 325 + 169	41 14 - 193	50 820 + 313	55 18 + 219	59 253 + 185	71 42 - 32	04 619 + 173	35.91 - 141
2	20.4	44 525 + 200	39 48 - 166	51 186 + 366	53 11 + 207	59 467 + 214	71 59 - 17	04 821 + 202	34.73 - 118
3	2.4	44 751 + 226	38 15 - 133	51 592 + 406	51 18 + 193	59 703 + 236	71 60 - 1	05 047 + 226	33.84 - 89
3	12.4	45 003 + 252	37 19 - 96	52 038 + 446	49 41 + 177	59 961 + 258	71 41 + 19	05 296 + 249	33 27 - 20
3	22.3	45 275 + 272	36 69 - 50	52 515 + 477	47 86 + 155	60 239 + 278	71 01 + 40	05 565 + 269	33.07 - 20
4	1.3	45 562 + 287	36 63 - 6	53 013 + 498	46 53 + 133	60 530 + 291	70 42 + 59	05 848 + 283	33.25 + 18
4	11.3	45 864 + 302	37 02 + 39	53 533 + 520	45 46 + 107	60 835 + 305	69 63 + 79	06 145 + 297	33.81 + 56
4	21.2	46 172 + 308	37 88 + 86	54 061 + 528	44 68 + 78	61 148 + 313	68 67 + 96	06 449 + 304	34.74 + 93
5	1.2	46 480 + 308	39 13 + 125	54 589 + 528	44 19 + 49	61 464 + 316	67 57 + 110	06 754 + 305	35.98 + 124
5	11.2	46 786 + 306	40 75 + 162	55 113 + 524	44 02 + 17	61 779 + 315	66 36 + 121	07 058 + 304	37.52 + 154
5	21.2	47 080 + 294	42 69 + 194	55 617 + 504	44 18 - 16	62 085 + 306	65 09 + 127	07 351 + 293	39 29 + 177
5	31.1	47 356 + 276	44 85 + 216	56 095 + 478	44 64 - 46	62 377 + 292	63 81 + 128	07 629 + 278	41 22 + 193
6	10.1	47 610 + 254	47 20 + 235	56 537 + 442	45 43 - 79	62 650 + 273	62 55 + 126	07 885 + 256	43 27 + 205
6	20.1	47 832 + 222	49 65 + 245	56 929 + 392	46 52 - 109	62 894 + 244	61 36 + 109	08 112 + 227	45 36 + 209
6	30.1	48 020 + 188	52 12 + 247	57 265 + 336	47 86 - 134	63 107 + 213	60 27 + 119	08 307 + 195	47 44 + 208
7	10.0	48 168 + 148	54 58 + 246	57 538 + 273	49 45 - 159	63 281 + 174	59 30 + 97	08 464 + 157	49 47 + 203
7	20.0	48 271 + 103	56 94 + 236	57 735 + 197	51 22 - 177	63 412 + 131	58 48 + 82	08 577 + 113	51 37 + 190
7	30.0	48 331 + 60	59 16 + 222	57 860 + 125	53 10 - 188	63 499 + 87	57 81 + 67	08 647 + 70	53 13 + 176
8	8.9	48 344 + 13	61 20 + 204	57 905 + 45	55 06 - 196	63 540 + 41	57 30 + 51	08 673 + 26	54 72 + 159
8	18.9	48 312 - 32	63 01 + 181	57 872 - 33	57 00 - 194	63 535 - 5	56 95 + 35	08 654 - 19	56 08 + 136
8	28.9	48 240 - 72	64 57 + 156	57 769 - 103	58 84 - 184	63 490 - 45	56 74 + 21	08 596 - 58	57 24 + 116
9	7.9	48 131 - 109	65 86 + 129	57 598 - 171	60 54 - 170	63 405 - 85	56 66 + 8	08 501 - 95	58 15 + 91
9	17.8	47 991 - 140	66 84 + 98	57 372 - 226	61 99 - 145	63 290 - 115	56 70 - 4	08 376 - 125	58 81 + 66
9	27.8	47 830 - 161	67 52 + 68	57 105 - 267	63 15 - 116	63 152 - 138	56 82 - 12	08 231 - 145	59 24 + 43
10	7.8	47 654 - 176	67 88 + 36	56 808 - 297	63 97 - 82	62 998 - 154	57 03 - 21	08 070 - 161	59 42 + 18
10	17.8	47 475 - 179	67 90 + 2	56 502 - 306	64 39 - 42	62 840 - 158	57 30 - 27	07 906 - 164	59 34 - 8
10	27.7	47 301 - 174	67 61 - 29	56 202 - 300	64 41 - 2	62 688 - 152	57 61 - 31	07 748 - 158	59 03 - 31
11	6.7	47 139 - 162	66 98 - 63	55 923 - 279	64 01 + 40	62 549 - 139	57 97 - 36	07 602 - 146	58 47 - 56
11	16.7	47 000 - 139	66 03 - 95	55 685 - 238	64 01 + 80	62 435 - 114	58 38 - 41	07 479 - 123	57 67 - 80
11	26.6	46 890 - 110	64 78 - 125	55 496 - 189	62 04 + 117	62 349 - 86	58 81 - 43	07 384 - 95	56 67 - 100
12	6.6	46 812 - 78	63 24 - 154	55 367 - 129	60 52 + 152	62 298 - 51	59 28 - 47	07 322 - 62	55 45 - 122
12	16.6	46 774 - 38	61 47 - 177	55 309 - 58	58 74 + 178	62 286 - 12	59 78 - 50	07 298 + 24	54 08 - 137
12	26.6	46 773 - 1	59 52 - 195	55 320 + 11	56 75 + 199	62 311 + 25	60 29 - 51	07 310 + 12	52 57 - 151
12	36.5	46 812 + 39	57 42 - 210	55 404 + 84	54 59 + 216	62 376 + 65	60 79 - 50	07 361 + 51	50 96 - 161
		46 812 + 78	57 42 - 214	55 404 + 155	54 59 + 224	62 376 + 101	60 79 - 47	07 361 + 88	50 96 - 161
Mean Place	47.159	61.38	55.355	45.90	62.269	54.50	07.494	55.48	
sec δ, tan δ	+1.054	+0.335	+1.807	-1.505	+1.018	-0.191	+1.012	+0.155	
dα(ψ), dδ(ψ)	+0.053	+0.18	+0.097	+0.18	+0.066	+0.18	+0.058	+0.18	
dα(ε), dδ(ε)	-0.010	-0.89	+0.045	-0.89	+0.006	-0.89	-0.005	-0.89	
Dble. Trans.	July 19		July 19		July 20		July 20		

AT UPPER TRANSIT AT GREENWICH

No.	746		1519		1518		1520	
	η Aquilae		90 G. Aquilae		75 G. Pavonis		ι Sagittarii	
Mag. Spect.	3.7 to 4.4	G0p	5.64	F0p, A	6.32	A3	4.21	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	19 51	+ 0 57	19 52	- 3 09	19 53	- 61 12	19 54	- 41 54
1 -8.4	43 674 + 2	60 46 -113	32 841 + 4	13 74 - 93	24 321 - 43	45.74 +212	15 493 + 1	36.41 +115
1 1.5	43 713 + 39	59 27 -119	32 883 + 42	14 70 - 96	24 358 + 37	43.44 +230	15 546 + 53	35.13 +128
1 11.5	43 787 + 74	58 05 -122	32 960 + 77	15 68 - 98	24 475 + 117	41.00 +244	15 648 + 102	33.74 +139
1 21.5	43 898 + 111	56 85 -120	33 073 + 113	16.63 - 95	24 674 + 199	38.49 +251	15 801 + 153	32.27 +147
1 31.5	44 040 + 142	55.73 -112	33.218 + 145	17.50 - 87	24.944 + 270	35.99 +250	15.998 + 197	30.77 +150
2 10.4	44 213 + 173	54 73 -100	33.394 + 176	18.27 - 77	25 281 + 337	33.55 +244	16.235 + 237	29.26 +151
2 20.4	44 415 + 202	53 93 - 80	33 598 + 204	18 84 - 57	25 680 + 399	31.22 +233	16 511 + 276	27.76 +150
3 2.4	44 639 + 224	53 37 - 56	33 825 + 227	19 20 - 36	26 128 + 448	29.06 +216	16 817 + 306	26.30 +146
3 12.4	44 887 + 248	53 09 - 28	34 074 + 249	19 32 - 12	26 622 + 494	27.08 +198	17 152 + 335	24.89 +141
3 22.3	45 155 + 268	53.11 + 2	34.343 + 269	19.16 + 16	27.155 + 533	25.35 +173	17.512 + 360	23.56 +133
4 1.3	45 436 + 281	53 45 + 34	34 627 + 284	18 73 + 43	27 715 + 560	23.89 +146	17 889 + 377	22.33 +123
4 11.3	45 732 + 296	54.09 + 64	34 925 + 298	18.03 + 70	28 299 + 584	22.71 +118	18 285 + 396	21.22 +111
4 21.2	46 036 + 304	55 02 + 39	35 230 + 305	17.07 + 96	28 894 + 595	21.87 + 84	18 690 + 405	20.26 + 96
5 1.2	46 342 + 306	56 21 +119	35 539 + 309	15.91 +116	29 491 + 597	21.36 + 51	19 097 + 407	19.46 + 80
5 11.2	46 647 + 305	57.61 +140	35 847 + 308	14.57 +134	30 084 + 593	21.19 + 17	19 505 + 408	18.86 + 60
5 21.2	46 944 + 297	59 19 +158	36 146 + 299	13.09 +148	30 655 + 571	21.40 - 21	19 901 + 396	18 48 + 38
5 31.1	47 226 + 282	60 86 +167	36 432 + 286	11.54 +155	31 197 + 542	21.95 - 55	20 279 + 378	18.33 + 15
6 10.1	47 488 + 262	62 61 +175	36 698 + 266	09.95 +159	31 699 + 502	22.85 - 90	20 633 + 354	18.42 - 9
6 20.1	47 722 + 234	64 36 +175	36 936 + 237	08 39 +156	32 145 + 446	24.08 -123	20 951 + 318	18.76 - 34
6 30.1	47 925 + 203	66 05 +169	37 143 + 208	06 89 +150	32 528 + 383	25.59 -151	21 228 + 277	19.32 - 56
7 10.0	48 090 + 165	67 68 +163	37 312 + 169	05 49 +140	32 839 + 311	27.37 -178	21 456 + 228	20 11 - 79
7 20.0	48 212 + 122	69 17 +149	37 439 + 127	04 22 +127	33 066 + 227	29.33 -196	21 629 + 173	21 09 - 98
7 30.0	48 292 + 80	70 51 +134	37 523 + 84	03 11 +111	33 210 + 144	31 42 -209	21 746 + 117	22 21 -112
8 8.9	48 327 + 35	71 68 +117	37 562 + 39	02 16 + 95	33 264 + 54	33 59 -217	21 803 + 57	23 45 -124
8 18.9	48 317 - 10	72 66 + 98	37 555 - 7	01 40 + 76	33 227 - 37	35 73 -214	21 799 - 4	24 74 -129
8 28.9	48 268 - 49	73 44 + 78	37 509 - 46	00 81 + 59	33 111 - 116	37 77 -204	21 742 - 57	26 03 -129
9 7.9	48 181 - 87	74 04 + 60	37 425 - 84	00 39 + 42	32 916 - 195	39 65 -188	21 632 - 110	27 26 -123
9 17.8	48 064 - 117	74 43 + 39	37 310 - 115	00 15 + 24	32 656 - 260	41 26 -161	21 480 - 152	28 37 -111
9 27.8	47 925 - 139	74 65 + 22	37 173 - 137	00 05 + 10	32 348 - 308	42 56 -130	21 297 - 183	29 32 - 95
10 7.8	47 771 - 154	74 67 + 2	37 021 - 152	00 10 - 5	32 002 - 346	43 48 - 92	21 090 - 207	30 05 - 73
10 17.8	47 613 - 158	74 52 - 15	36 864 - 157	00 30 - 20	31 643 - 359	43 96 - 48	20 876 - 214	30 53 - 48
10 27.7	47 460 - 153	74 20 - 32	36 713 - 151	00 62 - 32	31 288 - 355	44 00 - 4	20 667 - 209	30 73 - 20
11 6.7	47 318 - 142	73 71 - 49	36 573 - 140	01 07 - 45	30 952 - 336	43 58 + 42	20 473 - 194	30 65 + 8
11 16.7	47 201 - 117	73 07 - 64	36 457 - 116	01 63 - 56	30 661 - 291	42 71 + 87	20 309 - 164	30 65 + 36
11 26.6	47 110 - 91	72 28 - 79	36 369 - 88	02 30 - 67	30 423 - 238	41 43 +128	20 183 - 126	30 29 + 62
12 6.6	47 052 - 58	71 34 - 94	36 313 - 56	03 08 - 78	30 251 - 172	39 77 +166	20 101 - 82	28 81 + 86
12 16.6	47 032 - 20	70 30 -104	36 295 + 18	03 93 - 85	30 159 - 92	37 80 +197	20 071 - 30	27 74 +107
12 26.6	47 047 + 15	69 17 -113	36 313 + 57	04 84 - 91	30 144 + 69	35 59 +221	20 091 + 73	26 51 +123
12 36.5	47 101 + 54	67 99 -118	36 370 + 93	05 80 - 96	30 213 + 151	33 19 +240	20 164 + 73	25 15 +136
	+ 91	-119		- 93		+250	+ 124	+144
Mean Place	47.126	73.23	36.339	00.23	30.260	24.34	19.939	16.89
sec δ, tan δ	+1.000	+0.017	+1.002	-0.055	+2.076	-1.820	+1.344	-0.897
dα(ψ), dδ(ψ)	+0.061	+0.19	+0.062	+0.19	+0.104	+0.19	+0.082	+0.19
dα(ε), dδ(ε)	-0.001	-0.88	+0.002	-0.88	+0.058	-0.88	+0.029	-0.88
Dble. Trans.	July 20		July 20		July 20		July 21	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	749		1521		1522		752	
	β Aquilae		η Cygni		61 Sagittarii		γ Sagittae	
Mag. Spect.	3.90	K0	4.03	K0	5.05	A0	3.71	K5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>
	19 54	+ 6 21	19 55	+ 35 02	19 57	- 15 31	19 58	+ 19 26
1 <sup>d</sup>	<sup>s</sup> - 8.4	" - 6	<sup>s</sup> - 61	" - 241	<sup>s</sup> + 7	" - 28	<sup>s</sup> - 27	" - 190
1	35.620 + 32	68.96 - 139	44.698 - 17	41.98 - 263	07.468 + 46	56.55 - 24	06.106 + 12	67.91 - 205
1	35.652 + 67	67.49 - 153	44.681 + 26	39.35 - 279	07.514 + 84	56.79 - 21	06.118 + 49	65.86 - 217
1	35.719 + 105	65.96 - 152	44.707 + 73	36.56 - 285	07.598 + 115	57.00 - 14	06.167 + 88	63.69 - 218
1	35.824 + 136	64.44 - 143	44.780 + 116	33.71 - 277	07.713 + 154	57.14 - 16	06.255 + 123	61.51 - 209
1	35.960 + 168	63.01 - 130	44.896 + 157	30.94 - 263	07.867 + 185	57.30 - 1	06.378 + 157	59.42 - 196
2	36.128 + 197	61.71 - 107	45.053 + 197	28.31 - 234	08.052 + 214	57.31 + 12	06.535 + 191	57.46 - 170
2	36.325 + 221	60.64 - 82	45.250 + 231	25.97 - 196	08.266 + 236	57.19 + 26	06.726 + 217	55.76 - 138
3	36.546 + 244	59.82 - 50	45.481 + 264	24.01 - 154	08.502 + 260	56.93 + 41	06.943 + 244	54.38 - 101
3	36.790 + 265	59.32 - 15	45.745 + 291	22.47 - 100	08.762 + 281	56.52 + 58	07.187 + 267	53.37 - 56
3	37.055 + 280	59.17 + 19	46.036 + 310	21.47 - 46	09.043 + 295	55.94 + 73	07.454 + 284	52.81 - 11
4	37.335 + 294	59.36 + 56	46.346 + 328	21.01 + 10	09.338 + 310	55.21 + 88	07.738 + 300	52.70 + 34
4	37.629 + 303	59.92 + 91	46.674 + 337	21.11 + 67	09.648 + 319	54.33 + 101	08.038 + 309	53.04 + 82
4	37.932 + 305	60.83 + 120	47.011 + 337	21.78 + 119	09.967 + 323	53.32 + 109	08.347 + 311	53.86 + 121
5	38.237 + 304	62.03 + 147	47.348 + 333	22.97 + 168	10.290 + 324	52.23 + 115	08.658 + 310	55.07 + 161
5	38.541 + 296	63.50 + 169	47.681 + 319	24.65 + 211	10.614 + 315	51.08 + 118	08.968 + 299	56.68 + 193
5	38.837 + 280	65.19 + 183	48.000 + 297	26.76 + 244	10.929 + 303	49.90 + 114	09.267 + 284	58.61 + 217
5	39.117 + 261	67.02 + 194	48.297 + 271	29.20 + 274	11.232 + 283	48.76 + 109	09.551 + 262	60.78 + 237
6	39.378 + 232	68.96 + 198	48.568 + 233	31.94 + 293	11.515 + 255	47.67 + 99	09.813 + 244	63.15 + 249
6	39.610 + 201	70.94 + 195	48.801 + 194	34.87 + 303	11.770 + 224	46.68 + 87	10.045 + 192	65.64 + 253
6	39.811 + 163	72.89 + 189	48.995 + 149	37.90 + 309	11.994 + 185	45.81 + 72	10.242 + 159	68.17 + 252
7	39.974 + 119	74.78 + 178	49.144 + 97	40.99 + 303	12.179 + 142	45.09 + 56	10.401 + 113	70.69 + 243
7	40.093 + 78	76.56 + 162	49.241 + 49	44.02 + 291	12.321 + 97	44.53 + 41	10.514 + 70	73.12 + 230
7	40.171 + 32	78.18 + 146	49.290 - 4	46.93 + 276	12.418 + 50	44.12 + 25	10.584 + 23	75.42 + 214
8	40.203 - 12	79.64 + 124	49.286 - 54	49.69 + 251	12.468 + 2	43.87 + 9	10.607 - 23	77.56 + 190
8	40.191 - 52	80.88 + 104	49.232 - 97	52.20 + 224	12.470 - 39	43.78 - 3	10.584 - 63	79.46 + 166
8	40.139 - 89	81.92 + 82	49.135 - 141	54.44 + 192	12.431 - 80	43.81 - 13	10.521 - 103	81.12 + 139
9	40.050 - 120	82.74 + 57	48.994 - 174	56.36 + 155	12.351 - 112	43.94 - 22	10.418 - 133	82.51 + 107
9	39.930 - 141	83.31 + 36	48.820 - 200	57.91 + 117	12.239 - 136	44.16 - 28	10.285 - 157	83.58 + 78
9	39.789 - 157	83.67 + 13	48.620 - 218	59.08 + 76	12.103 - 154	44.44 - 31	10.128 - 173	84.36 + 45
10	39.632 - 161	83.80 - 10	48.402 - 224	59.84 + 31	11.949 - 159	44.75 - 33	09.955 - 179	84.81 + 10
10	39.471 - 157	83.70 - 32	48.178 - 222	60.15 - 11	11.790 - 154	45.08 - 33	09.776 - 175	84.91 - 21
10	39.314 - 146	83.38 - 54	47.956 - 212	60.04 - 58	11.636 - 142	45.41 - 32	09.601 - 165	84.70 - 56
11	39.168 - 122	82.84 - 75	47.744 - 189	59.46 - 102	11.494 - 118	45.73 - 31	09.436 - 143	84.14 - 89
11	39.046 - 96	82.09 - 93	47.555 - 161	58.44 - 143	11.376 - 90	46.04 - 29	09.293 - 118	83.25 - 119
11	38.950 - 65	81.16 - 114	47.394 - 127	57.01 - 185	11.286 - 56	46.33 - 28	09.175 - 86	82.06 - 149
12	38.885 - 26	80.02 - 128	47.267 - 86	55.16 - 219	11.230 - 16	46.61 - 26	09.089 - 48	80.57 - 174
12	38.859 + 9	78.74 - 139	47.181 - 45	52.97 - 246	11.214 + 22	46.87 - 24	09.041 - 12	78.83 - 193
12	38.868 + 46	77.35 - 149	47.136 + 1	50.51 - 269	11.236 + 62	47.11 - 21	09.029 + 27	76.90 - 209
12	38.914 + 84	75.86 - 149	47.137 + 46	47.82 - 279	11.298 + 100	47.32 - 12	09.056 + 66	74.81 - 214
Mean Place	39.015	80.71	47.980	49.41	11.136	40.78	09.409	77.79
sec δ, tan δ	+1.006	+0.112	+1.221	+0.701	+1.038	-0.278	+1.061	+0.353
dα(ψ), dδ(ψ)	+0.059	+0.19	+0.045	+0.19	+0.068	+0.19	+0.053	+0.20
dα(ε), dδ(ε)	-0.004	-0.88	-0.023	-0.88	+0.009	-0.87	-0.012	-0.87
Dbles. Trans.	July 21		July 21		July 21		July 22	

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	751		748		1523		753	
	3' Sagittarii		ε Pavonis		15 Vulpeculae		62 Sagittarii	
Mag.Spect.	4.39	B3	4.10	A0	4.74	A5	4.60	M3
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	19 58	-35 18	19 58	-72 56	20 00	+27 42	20 01	-27 44
1 -8.4	47 434 <sup>s</sup> + 1	68.03 + 79	54 557 <sup>s</sup> - 153	73.93 +258	29 413 <sup>s</sup> - 46	48.39 -218	45 887 <sup>s</sup> + 3	71.31 + 38
1 1.6	47 482 + 48	67.13 + 90	54 537 - 20	71.13 +280	29 408 - 5	46.04 -235	45 932 + 45	70.84 + 47
1 11.5	47 575 + 93	66.14 + 99	54 648 + 111	68.16 +297	29 443 + 35	43.53 -251	46 018 + 86	70.32 + 52
1 21.5	47 711 + 136	65.07 +107	54 899 + 251	65.12 +304	29 520 + 77	40.99 -254	46 141 + 123	69.73 + 59
1 31.5	47 888 + 177	63.93 +114	55 271 + 372	62.12 +300	29 636 + 116	38.52 -247	46 304 + 163	69.01 + 72
2 10.4	48 103 + 215	62.75 +118	55 758 + 487	59.18 +294	29 789 + 153	36.18 -234	46 500 + 196	68.25 + 76
2 20.4	48 352 + 249	61.55 +120	56 355 + 597	56.41 +277	29 978 + 189	34.12 -206	46 729 + 229	67.44 + 81
3 2.4	48 629 + 277	60.35 +120	57 038 + 683	53.87 +254	30 197 + 219	32.41 -171	46 983 + 254	66.56 + 88
3 12.4	48 933 + 304	59.13 +122	57 802 + 764	51.58 +229	30 447 + 250	31.10 -131	47 263 + 280	65.61 + 95
3 22.3	49 261 + 328	57.93 +120	58 633 + 831	49.61 +197	30 722 + 275	30.28 -82	47 565 + 302	64.61 +100
4 1.3	49 606 + 345	56.77 +116	59 508 + 875	47.99 +162	31 015 + 293	29.96 -32	47 884 + 319	63.58 +103
4 11.3	49 968 + 362	55.66 +111	60 424 + 916	46.74 +125	31 326 + 311	30.15 +19	48 219 + 335	62.51 +107
4 21.3	50 340 + 372	54.63 +103	61 357 + 933	45.91 +83	31 646 + 320	30.88 +73	48 565 + 346	61.45 +106
5 1.2	50 716 + 376	53.71 +92	62 291 + 934	45.48 +43	31 968 + 322	32.07 +119	48 915 + 350	60.43 +102
5 11.2	51 094 + 378	52.92 +79	63 216 + 925	45.49 -1	32 288 + 320	33.71 +164	49 267 + 352	59.46 +97
5 21.2	51 462 + 368	52.30 +62	64 105 + 889	45.94 -45	32 597 + 309	35.74 +203	49 611 + 344	58.59 +87
5 31.1	51 815 + 353	51.86 +44	64 943 + 838	46.79 -85	32 888 + 291	38.06 +232	49 942 + 331	57.85 +74
6 10.1	52 147 + 332	51.62 +24	65 717 + 774	48.05 -126	33 156 + 268	40.64 +258	50 253 + 311	57.25 +60
6 20.1	52 446 + 299	51.60 +2	66 398 + 681	49.69 -164	33 390 + 234	43.39 +275	50 534 + 281	56.83 +23
6 30.1	52 708 + 262	51.78 -18	66 980 + 582	51.63 -194	33 588 + 198	46.20 +281	50 782 + 248	56.60 +42
7 10.0	52 927 + 219	52.18 -40	67 446 + 466	53.86 -223	33 745 + 157	49.05 +285	50 989 + 207	56.55 +5
7 20.0	53 094 + 167	52.77 -59	67 777 + 331	56.29 -243	33 854 + 109	51.83 +278	51 148 + 159	56.69 -14
7 30.0	53 210 + 116	53.52 -75	67 977 + 200	58.85 -256	33 917 + 63	54.49 +266	51 260 + 112	56.99 -30
8 9.0	53 271 + 61	54.40 -88	68 034 + 57	61.46 -261	33 931 + 14	57.00 +251	51 321 + 61	57.44 -45
8 18.9	53 275 + 4	55.36 -96	67 946 -88	64.02 -256	33 897 -34	59.26 +226	51 330 + 9	58.00 -56
8 28.9	53 231 -44	56.36 -100	67 731 -215	66.45 -243	33 821 -76	61.26 +200	51 293 -37	58.64 -64
9 7.9	53 138 -93	57.36 -100	67 387 -344	68.66 -221	33 705 -116	62.98 +172	51 211 + 159	59.32 -68
9 17.8	53 005 -133	58.29 -93	66 936 -451	70.54 -188	33 555 -150	64.33 +135	51 092 -119	60.00 -68
9 27.8	52 844 -161	59.11 -82	66 404 -532	72.04 -150	33 382 -173	65.36 +103	50 947 -145	60.63 -63
10 7.8	52 660 -184	59.78 -67	65 806 -598	73.08 -104	33 190 -192	66.00 +64	50 781 -166	61.20 -57
10 17.8	52 469 -191	60.27 -49	65 179 -627	73.60 -52	32 993 -197	66.25 +25	50 608 -173	61.65 -45
10 27.7	52 283 -186	60.55 -28	64 552 -627	73.60 +0	32 797 -196	66.11 -14	50 439 -169	61.97 -32
11 6.7	52 109 -174	60.61 -6	63 948 -604	73.05 +55	32 612 -185	65.57 -54	50 282 -157	62.16 -19
11 16.7	51 963 -146	60.45 +16	63 407 -541	71.95 +110	32 447 -165	64.63 -94	50 150 -132	62.19 -3
11 26.7	51 850 -113	60.09 +36	62 946 -461	70.38 +157	32 309 -138	63.32 -131	50 048 -102	62.10 +9
12 6.6	51 776 -74	59.53 +56	62 587 -359	68.34 +204	32 202 -107	61.65 -167	49 982 -66	61.87 +23
12 16.6	51 750 -26	58.81 +72	62 354 -233	65.94 +240	32 135 -67	59.68 -197	49 959 -23	61.53 +34
12 26.6	51 769 +19	57.96 +85	62 246 -108	63.25 +269	32 105 -30	57.47 -221	49 978 +19	61.09 +44
12 36.5	51 835 +66	56.99 +97	62 276 +30	60.33 +292	32 116 +11	55.05 -242	50 040 +62	60.57 +52
	51 835 +112	56.99 +105	62 276 +168	60.33 +302	32 116 +54	55.05 -249	50 040 +104	60.57 +55
Mean Place	51.586	49.01	62.942	51.21	32.691	56.96	49.796	53.16
sec δ, tan δ	+1.225	-0.708	+3.410	-3.260	+1.130	+0.525	+1.130	-0.526
dα(ψ), dδ(ψ)	+0.077	+0.20	+0.136	+0.20	+0.049	+0.20	+0.073	+0.20
dα(ε), dδ(ε)	+0.023	-0.87	+0.108	-0.87	-0.018	-0.86	+0.018	-0.86
Dble. Trans.	July 22		July 22		July 22		July 23	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1524		755		754		1525	
	$\tau$ Aquilae		$\xi$ Telescopii		$\delta$ Pavonis		28 Cygni	
Mag.Spect.	5.65	K0	4.86	M0	3.64	G5	4.82	B2p
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 20 03	<sup>o</sup> <sup>'</sup> + 7 13	<sup>h</sup> <sup>m</sup> 20 06	<sup>o</sup> <sup>'</sup> - 52 55	<sup>h</sup> <sup>m</sup> 20 07	<sup>o</sup> <sup>'</sup> - 66 12	<sup>h</sup> <sup>m</sup> 20 08	<sup>o</sup> <sup>'</sup> + 36 47
1 -8.4	25 401 - 14	69.16 -138	16.430 - 35	35 32 +167	18.076 - 93	86 20 +225	52 246 - 79	50.82 -235
1 1.6	25 424 + 23	67.69 -147	16.458 + 28	33.45 +187	18.079 + 3	83.71 +249	52 211 - 35	48.24 -258
1 11.5	25 481 + 57	66.16 -153	16.547 + 89	31.43 +202	18.176 + 97	81.05 +266	52 219 + 8	45.45 -279
1 21.5	25 575 + 94	64.64 -152	16.700 + 153	29.31 +212	18.372 + 196	78.29 +276	52 274 + 55	42.60 -285
1 31.5	25 701 + 126	63.19 -145	16.908 + 208	27.16 +215	18.654 + 282	75.54 +275	52 373 + 99	39.79 -281
2 10.4	25.859 + 158	61.87 -132	17.168 + 260	25.00 +216	19.018 + 364	72.82 +272	52.514 + 141	37.10 -269
2 20.4	26.047 + 188	60.78 -109	17.479 + 311	22.89 +211	19.461 + 443	70.22 +260	52.699 + 185	34.67 -243
3 2.4	26.260 + 213	59.94 - 84	17.830 + 351	20.89 +200	19.965 + 504	67.80 +242	52.919 + 220	32.61 -206
3 12.4	26.497 + 237	59.41 - 53	18.219 + 389	18.99 +190	20.530 + 565	65.57 +223	53.175 + 256	30.96 -165
3 22.3	26.757 + 260	59.24 - 17	18.642 + 423	17.27 +172	21.144 + 614	63.63 +194	53.462 + 287	29.83 -113
4 1.3	27.033 + 276	59.43 + 19	19.089 + 447	15.73 +154	21.792 + 648	61.97 +166	53.771 + 309	29.25 - 58
4 11.3	27.325 + 188	59.97 + 54	19.559 + 470	14.40 +133	22.473 + 681	60.64 +133	54.100 + 329	29.22 - 3
4 21.3	27.626 + 301	60.88 + 91	20.043 + 484	13.33 +107	23.172 + 699	59.67 + 97	54.441 + 341	29.79 + 57
5 1.2	27.932 + 306	62.09 +121	20.532 + 489	12.52 + 81	23.874 + 702	59.08 + 59	54.785 + 344	30.88 +109
5 11.2	28.239 + 307	63.58 +149	21.022 + 490	12.00 + 52	24.574 + 700	58.87 + 21	55.127 + 342	32.47 +159
5 21.2	28.538 + 299	65.31 +173	21.500 + 478	11.81 + 19	25.253 + 679	59.07 - 20	55.457 + 330	34.52 +205
5 31.1	28.823 + 285	67.18 +187	21.958 + 458	11.92 - 11	25.898 + 645	59.65 - 58	55.767 + 310	36.93 +241
6 10.1	29.090 + 267	69.18 +200	22.388 + 430	12.35 - 43	26.500 + 602	60.62 - 97	56.051 + 284	39.65 +272
6 20.1	29.329 + 239	71.22 +204	22.775 + 387	13.10 - 75	27.037 + 537	61.97 -135	56.299 + 248	42.60 +295
6 30.1	29.536 + 207	73.24 +202	23.114 + 339	14.12 -102	27.503 + 466	63.61 -164	56.507 + 208	45.66 +306
7 10.0	29.707 + 171	75.22 +198	23.397 + 283	15.42 -130	27.885 + 382	65.56 -195	56.670 + 163	48.81 +315
7 20.0	29.835 + 128	77.08 +186	23.612 + 215	16.93 -151	28.169 + 284	67.72 -216	56.781 + 111	51.92 +311
7 30.0	29.921 + 86	78.79 +171	23.761 + 149	18.60 -167	28.357 + 188	70.03 -231	56.843 + 62	54.94 +302
8 9.0	29.962 + 41	80.34 +155	23.836 + 75	20.40 -180	28.438 + 81	72.43 -240	56.852 + 9	57.83 +289
8 18.9	29.957 - 5	81.67 +133	23.837 + 1	22.22 -182	28.412 - 26	74.82 -239	56.808 - 44	60.47 +264
8 28.9	29.913 - 44	82.80 +113	23.772 - 65	24.01 -179	28.291 - 121	77.11 -229	56.719 - 89	62.86 +239
9 7.9	29.829 - 84	83.70 + 90	23.642 - 130	25.71 -170	28.074 - 217	79.25 -214	56.586 - 133	64.95 +209
9 17.8	29.715 - 114	84.36 + 66	23.457 - 185	27.23 -152	27.776 - 298	81.09 -184	56.419 - 170	66.66 +171
9 27.8	29.578 - 137	84.79 + 43	23.230 - 227	28.50 -127	27.417 - 359	82.61 -152	56.219 - 197	68.00 +134
10 7.8	29.423 - 155	84.99 + 20	22.971 - 259	29.48 - 98	27.008 - 409	83.74 -113	56.001 - 218	68.92 + 92
10 17.8	29.263 - 160	84.94 - 5	22.698 - 273	30.10 - 62	26.577 - 431	84.38 - 64	55.774 - 227	69.40 + 48
10 27.7	29.106 - 157	84.68 - 26	22.427 - 271	30.35 - 25	26.144 - 433	84.56 - 18	55.547 - 227	69.44 + 4
11 6.7	28.959 - 147	84.19 - 49	22.168 - 259	30.21 + 14	25.727 - 417	84.22 + 34	55.327 - 220	69.01 - 43
11 16.7	28.833 - 126	83.47 - 72	21.942 - 226	29.67 + 54	25.356 - 371	83.39 + 83	55.128 - 199	68.12 - 89
11 26.7	28.731 - 102	82.57 - 90	21.757 - 185	28.77 + 90	25.043 - 313	82.10 +129	54.954 - 174	66.81 -131
12 6.6	28.660 - 71	81.45 -112	21.623 - 134	27.53 +124	24.802 - 241	80.37 +173	54.811 - 143	65.06 -175
12 16.6	28.626 - 34	80.19 -126	21.550 - 73	25.99 +154	24.653 - 149	78.29 +208	54.709 - 102	62.95 -211
12 26.6	28.626 + 0	78.81 -138	21.538 - 12	24.22 +177	24.594 - 59	75.92 +237	54.647 - 62	60.54 -241
12 36.5	28.663 + 37	77.32 -149	21.589 + 51	22.25 +197	24.632 + 38	73.32 +260	54.629 - 18	57.88 -286
	28.764 + 73	81.26 -150	21.589 + 116	22.25 +209	24.632 + 137	73.32 +273	54.629 + 29	57.88 -279
Mean Place	28.764	81.26	21.410	13.33	24.693	63.57	55.522	57.93
sec $\delta$ , tan $\delta$	+1.008	+0.127	+1.659	-1.323	+2.480	-2.269	+1.249	+0.748
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.058	+0.20	+0.091	+0.21	+0.112	+0.21	+0.044	+0.21
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.004	-0.86	+0.046	-0.85	+0.080	-0.85	-0.027	-0.85
Dble.Trans.	July 23		July 24		July 24		July 24	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	759		756		758		757		
Name	α Cephei*		η Aquilae		33 Cygni		ο² Cygni		
Mag.Spect.	4.43	B9	3.37	A0	4.32	A3	3.95 var.	K0, B8	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	20 09	+ 77 39	20 10	- 0 51	20 13	+ 56 31	20 13	+ 46 41	
1	-8.4	16.552 - 710	73.31 - 251	33.100 - 12	57.47 - 98	01.579 - 193	29.66 - 257	09.049 - 125	54.48 - 249
1	1.6	15.999 - 553	70.44 - 287	33.124 + 24	58.51 - 104	01.447 - 132	26.76 - 290	08.973 - 76	51.71 - 277
1	11.5	15.617 - 382	67.25 - 319	33.182 + 58	59.56 - 105	01.378 - 69	23.59 - 317	08.948 - 25	48.69 - 302
1	21.5	15.435 - 182	63.88 - 337	33.276 + 94	60.59 - 103	02.382 + 4	-331	08.979 + 31	45.56 - 313
1	31.5	15.442 + 7	60.46 - 342	33.401 + 125	61.54 - 95	01.453 + 71	-331	09.063 + 84	42.46 - 310
2	10.5	15.645 + 203	57.10 - 336	33.557 + 156	62.39 - 85	01.593 + 140	-323	09.199 + 136	39.45 - 301
2	20.4	16.043 + 398	53.95 - 315	33.743 + 186	63.04 - 65	01.801 + 208	-297	09.388 + 189	36.70 - 275
3	2.4	16.606 + 563	51.14 - 281	33.954 + 211	63.46 - 42	02.068 + 267	-262	09.622 + 234	34.32 - 238
3	12.4	17.326 + 720	48.73 - 241	34.190 + 236	63.64 - 18	02.391 + 323	-218	09.899 + 277	32.36 - 196
3	22.3	18.174 + 848	46.88 - 185	34.447 + 257	63.51 + 13	02.763 + 372	-161	10.214 + 315	30.95 - 141
4	1.3	19.108 + 934	45.61 - 127	34.722 + 275	63.10 + 41	03.169 + 406	-103	10.557 + 343	30.11 - 84
4	11.3	20.112 + 1004	44.96 - 65	35.013 + 291	62.41 + 69	03.605 + 436	-41	10.924 + 367	29.87 - 24
4	21.3	21.140 + 1028	44.98 + 2	35.316 + 303	61.42 + 99	04.055 + 450	+ 26	11.305 + 381	30.26 + 39
5	1.2	22.155 + 1015	45.61 + 63	35.623 + 307	60.21 + 121	04.506 + 451	+ 86	11.688 + 383	31.22 + 96
5	11.2	23.136 + 981	46.86 + 125	35.934 + 311	58.80 + 141	04.952 + 446	+ 146	12.069 + 381	32.75 + 153
5	21.2	24.039 + 903	48.68 + 182	36.238 + 304	57.22 + 158	05.375 + 423	+ 201	12.433 + 364	34.79 + 204
5	31.2	24.841 + 802	50.97 + 229	36.531 + 293	55.55 + 167	05.765 + 390	+ 245	12.774 + 341	37.23 + 244
6	10.1	25.527 + 686	53.70 + 273	36.807 + 276	53.82 + 173	06.115 + 350	+ 286	12.882 + 309	40.05 + 282
6	20.1	26.061 + 534	56.77 + 307	37.056 + 249	52.10 + 172	06.409 + 294	+ 317	13.083 + 267	43.13 + 308
6	30.1	26.443 + 382	60.07 + 330	37.275 + 219	50.43 + 167	06.646 + 237	+ 336	13.350 + 220	46.39 + 326
7	10.0	26.660 + 217	63.56 + 349	37.458 + 183	48.85 + 158	06.818 + 172	+ 351	13.739 + 169	49.76 + 337
7	20.0	26.696 + 36	67.13 + 357	37.599 + 141	47.40 + 145	06.918 + 100	+ 355	13.848 + 109	53.14 + 338
7	30.0	26.568 - 128	70.68 + 355	37.698 + 99	46.11 + 129	06.949 + 31	+ 350	13.900 + 52	56.45 + 331
8	9.0	26.268 - 300	74.18 + 350	37.752 + 54	44.98 + 113	06.908 - 41	+ 340	13.900 - 8	56.45 + 320
8	18.9	25.802 - 466	77.49 + 331	37.760 + 8	44.06 + 92	06.797 - 111	+ 319	13.892 - 66	59.65 + 297
8	28.9	25.193 - 609	80.59 + 310	37.727 - 33	43.32 + 74	06.624 - 173	+ 294	13.708 - 118	65.34 + 272
9	7.9	24.442 - 751	83.41 + 282	37.655 - 72	42.76 + 56	06.390 - 234	+ 263	13.539 - 169	67.75 + 241
9	17.8	23.573 - 869	85.85 + 244	37.551 - 104	42.41 + 35	06.107 - 283	+ 224	13.328 - 211	69.77 + 202
9	27.8	22.612 - 961	87.90 + 205	37.423 - 128	42.22 + 19	06.785 - 322	+ 183	13.087 - 241	71.40 + 163
10	7.8	21.567 - 1045	89.50 + 160	37.276 - 147	42.20 + 2	05.431 - 354	+ 137	12.819 - 268	72.58 + 118
10	17.8	20.479 - 1088	90.58 + 108	37.123 - 153	42.35 - 15	05.062 - 369	+ 84	12.539 - 280	73.27 + 69
10	27.7	19.368 - 1111	91.15 + 57	36.972 - 151	42.64 - 29	04.688 - 374	+ 35	12.258 - 281	73.49 + 22
11	6.7	18.256 - 1112	91.15 + 0	36.830 - 142	43.09 - 45	04.319 - 369	- 21	11.982 - 276	73.18 - 31
11	16.7	17.186 - 1070	90.58 - 57	36.708 - 122	43.66 - 57	03.972 - 347	- 77	11.782 - 256	73.18 - 82
11	26.7	16.177 - 1009	89.46 - 112	36.610 - 98	44.36 - 70	03.655 - 317	- 128	11.497 - 229	72.36 - 130
12	6.6	15.256 - 921	87.77 - 169	36.542 - 68	45.18 - 82	03.377 - 278	- 181	11.301 - 196	69.26 - 180
12	16.6	14.463 - 793	85.59 - 218	36.510 - 32	46.09 - 91	03.151 - 226	- 228	11.150 - 151	67.05 - 221
12	26.6	13.808 - 655	82.98 - 261	36.512 + 2	47.07 - 98	02.981 - 170	- 266	11.044 - 106	64.48 - 257
12	36.5	13.321 - 487	79.98 - 300	36.550 + 38	48.10 - 103	02.874 - 107	- 301	10.988 - 56	61.61 - 287
		- 300	- 323	+ 74	- 101	- 37	- 320	+ 0	- 303
Mean Place	21.699	76.23	36.516	43.62	05.090	34.12	12.391	60.09	
sec δ, tan δ	+4.683	+4.575	+1.000	-0.015	+1.813	+1.512	+1.458	+1.061	
dα(ψ), dδ(ψ)	-0.041	+0.21	+0.062	+0.21	+0.028	+0.22	+0.038	+0.22	
dα(ε), dδ(ε)	-0.163	-0.84	+0.001	-0.84	-0.055	-0.84	-0.039	-0.84	
Dble.Trans.	July 24		July 25		July 25		July 25		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1526		760		1527		1529		
	α Aquilae		24 Vulpeculae		α <sup>1</sup> Capricorni		4 Capricorni		
Mag. Spect.	4.96	A0	5.45	K0	4.55	G0p	5.96	K0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	<sup>h</sup> <sup>m</sup> 20 13	<sup>o</sup> <sup>'</sup> + 15 08	<sup>h</sup> <sup>m</sup> 20 16	<sup>o</sup> <sup>'</sup> + 24 37	<sup>h</sup> <sup>m</sup> 20 16	<sup>o</sup> <sup>'</sup> - 12 33	<sup>h</sup> <sup>m</sup> 20 17	<sup>o</sup> <sup>'</sup> - 21 51	
1	-8.4	35.869 - 32	70.10 - 166	09.177 - 51	35.31 - 197	50.482 - 11	18.56 - 41	10.196 - 10	26.92 + 6
1	1.6	35.874 + 5	68.31 - 179	09.163 - 14	33.15 - 216	50.508 + 26	18.94 - 38	10.225 + 29	26.78 + 14
1	11.5	35.913 + 39	66.42 - 189	09.187 + 24	30.84 - 231	50.569 + 61	19.29 - 35	10.292 + 67	26.58 + 20
1	21.5	35.990 + 77	64.51 - 191	09.251 + 64	28.49 - 235	50.666 + 97	19.55 - 26	10.400 + 108	26.49 + 9
1	31.5	36.101 + 111	62.67 - 184	09.351 + 100	26.19 - 230	50.792 + 126	19.81 - 26	10.530 + 130	25.94 + 55
2	10.5	36.244 + 143	60.95 - 172	09.488 + 137	24.01 - 218	50.954 + 162	19.93 - 12	10.702 + 172	25.47 + 47
2	20.4	36.421 + 177	59.46 - 149	09.660 + 172	22.07 - 194	51.145 + 191	19.90 + 3	10.905 + 203	24.90 + 57
3	2.4	36.624 + 203	58.27 - 119	09.863 + 203	20.45 - 162	51.360 + 215	19.71 + 19	11.134 + 229	24.22 + 68
3	12.4	36.855 + 231	57.41 - 86	10.097 + 234	19.20 - 125	51.601 + 241	19.33 + 38	11.389 + 256	23.42 + 80
3	22.3	37.110 + 255	56.96 - 45	10.358 + 261	18.41 - 79	51.865 + 264	18.76 + 57	11.667 + 278	22.51 + 91
4	1.3	37.384 + 274	56.92 - 4	10.639 + 281	18.10 - 31	52.146 + 281	18.01 + 75	11.964 + 297	21.50 + 101
4	11.3	37.676 + 292	57.30 + 38	10.940 + 301	18.27 + 17	52.446 + 300	17.07 + 94	12.279 + 315	20.40 + 110
4	21.3	37.980 + 304	58.12 + 82	11.253 + 313	18.96 + 69	52.758 + 312	15.97 + 110	12.606 + 327	19.24 + 116
5	1.2	38.289 + 309	59.31 + 119	11.572 + 319	20.09 + 113	53.076 + 318	14.76 + 121	12.941 + 335	18.06 + 118
5	11.2	38.599 + 310	60.86 + 155	11.892 + 320	21.64 + 155	53.398 + 322	13.45 + 131	13.280 + 339	16.87 + 119
5	21.2	38.903 + 304	62.70 + 184	12.204 + 312	23.59 + 195	53.716 + 318	12.10 + 135	13.614 + 334	15.73 + 114
5	31.2	39.193 + 290	64.77 + 207	12.501 + 297	25.81 + 222	54.023 + 307	10.75 + 135	13.937 + 323	14.68 + 105
6	10.1	39.466 + 273	67.01 + 224	12.778 + 277	28.29 + 248	54.315 + 292	09.43 + 132	14.244 + 307	13.73 + 95
6	20.1	39.709 + 243	69.36 + 235	13.024 + 246	30.93 + 264	54.580 + 265	08.20 + 123	14.524 + 280	12.93 + 80
6	30.1	39.922 + 213	71.74 + 238	13.238 + 214	33.64 + 271	54.816 + 236	07.09 + 111	14.773 + 249	12.29 + 64
7	10.0	40.097 + 175	74.10 + 236	13.411 + 173	36.39 + 275	55.015 + 199	06.11 + 98	14.985 + 212	11.84 + 45
7	20.0	40.228 + 131	76.38 + 228	13.539 + 128	39.09 + 270	55.172 + 157	05.31 + 80	15.152 + 167	11.57 + 27
7	30.0	40.317 + 89	78.53 + 215	13.622 + 83	41.67 + 258	55.287 + 115	04.67 + 64	15.274 + 122	11.49 + 8
8	9.0	40.360 + 43	80.51 + 198	13.657 + 35	44.11 + 244	55.354 + 67	04.20 + 47	15.347 + 73	11.57 - 8
8	18.9	40.357 - 3	82.28 + 177	13.645 - 12	46.32 + 221	55.374 + 20	03.91 + 29	15.370 + 23	11.81 - 24
8	28.9	40.313 - 44	83.82 + 154	13.590 - 55	48.29 + 197	55.351 - 23	03.77 + 14	15.349 - 21	12.16 - 35
9	7.9	40.229 - 84	85.11 + 129	13.493 - 97	49.99 + 170	55.288 - 63	03.77 + 0	15.283 - 66	12.60 - 44
9	17.9	40.113 - 116	86.10 + 99	13.363 - 130	51.35 + 136	55.189 - 99	03.89 - 12	15.181 - 102	13.10 - 50
9	27.8	39.972 - 141	86.83 + 73	13.207 - 156	52.40 + 105	55.065 - 124	04.09 - 20	15.051 - 130	13.62 - 52
10	7.8	39.812 - 160	87.27 + 44	13.031 - 176	53.09 + 69	54.921 - 144	04.37 - 28	14.900 - 151	14.12 - 50
10	17.8	39.646 - 166	87.40 + 13	12.846 - 185	53.41 + 32	54.769 - 152	04.70 - 33	14.740 - 160	14.59 - 47
10	27.7	39.480 - 166	87.24 - 16	12.662 - 184	53.38 - 3	54.617 - 152	05.06 - 36	14.580 - 160	14.98 - 39
11	6.7	39.322 - 158	86.78 - 46	12.484 - 178	52.96 - 42	54.674 - 143	05.44 - 38	14.430 - 150	15.30 - 32
11	16.7	39.183 - 139	86.03 - 75	12.484 - 159	52.96 - 80	54.474 - 123	05.44 - 40	14.430 - 130	15.30 - 23
11	26.7	39.067 - 116	85.01 - 102	12.189 - 136	51.03 - 113	54.253 - 98	06.23 - 39	14.197 - 103	15.67 - 14
12	6.6	38.980 - 87	83.72 - 129	12.081 - 108	49.54 - 149	54.185 - 68	06.63 - 40	14.126 - 71	15.72 - 5
12	16.6	38.928 - 52	82.22 - 150	12.009 - 72	47.77 - 177	54.153 - 32	07.02 - 39	14.093 - 33	15.68 + 4
12	26.6	38.910 - 18	80.54 - 168	11.972 - 37	45.76 - 201	54.156 + 3	07.40 - 38	14.098 + 5	15.57 + 11
12	36.6	38.929 + 19	78.72 - 182	11.974 + 2	43.55 - 221	54.197 + 41	07.75 - 35	14.142 + 44	15.38 + 19
		+ 57	- 187	+ 42	- 230	+ 77	- 29	+ 86	+ 25
Mean Place	39.160	81.01	12.431	44.43	54.018	02.15	13.890	08.73	
sec δ, tan δ	+1.036	+0.271	+1.100	+0.458	+1.024	-0.223	+1.077	-0.401	
dα(ψ), dδ(ψ)	+0.055	+0.22	+0.051	+0.22	+0.066	+0.22	+0.070	+0.22	
dα(ε), dδ(ε)	-0.010	-0.83	-0.017	-0.83	+0.008	-0.83	+0.015	-0.83	
Dble. Trans.	July 26		July 26		July 26		July 26		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	761		1528		1530		762	
	α <sup>2</sup> Capricorni		83 G. Telescopii		290 G. Sagittarii		β Capricorni	
Mag. Spect.	3.77	G5	6.28	M0	6.51	K2	3.25	G0, A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 20 17	<sup>o</sup> <sup>'</sup> - 12 35	<sup>h</sup> <sup>m</sup> 20 17	<sup>o</sup> <sup>'</sup> - 47 45	<sup>h</sup> <sup>m</sup> 20 19	<sup>o</sup> <sup>'</sup> - 35 43	<sup>h</sup> <sup>m</sup> 20 20	<sup>o</sup> <sup>'</sup> - 14 49
1 <sup>-8</sup>	14.833 <sup>s</sup> - 11	30.84 <sup>"</sup> - 40	53.523 <sup>s</sup> - 37	34.65 <sup>"</sup> +137	55.691 <sup>s</sup> - 21	21.87 <sup>"</sup> + 77	11.663 <sup>s</sup> - 13	45.87 <sup>"</sup> - 29
1 <sup>1.6</sup>	14.859 + 26	31.23 - 39	53.540 + 17	33.07 +158	55.715 + 24	20.96 + 91	11.687 + 24	46.13 - 26
1 <sup>11.5</sup>	14.920 + 61	31.57 - 34	53.610 + 70	31.34 +173	55.783 + 68	19.92 +104	11.746 + 59	46.34 - 21
1 <sup>21.5</sup>	15.017 + 97	31.82 - 25	53.737 + 127	29.47 +187	55.894 + 111	18.77 +115	11.842 + 96	46.42 - 8
1 <sup>31.5</sup>	15.143 + 126	32.07 - 25	53.913 + 176	27.55 +192	56.045 + 151	17.53 +124	11.965 + 123	46.55 - 13
2 <sup>10.5</sup>	15.305 + 162	32.20 - 13	54.135 + 222	25.58 +197	56.234 + 189	16.21 +132	12.126 + 161	46.52 + 3
2 <sup>20.4</sup>	15.496 + 191	32.16 + 4	54.403 + 268	23.63 +195	56.460 + 226	14.85 +136	12.317 + 191	46.34 + 18
3 <sup>2.4</sup>	15.712 + 216	31.96 + 20	54.707 + 304	21.72 +191	56.717 + 257	13.47 +138	12.532 + 215	46.01 + 33
3 <sup>12.4</sup>	15.953 + 241	31.58 + 38	55.047 + 340	19.88 +184	57.003 + 286	12.06 +141	12.773 + 241	45.52 + 49
3 <sup>22.3</sup>	16.217 + 264	31.00 + 58	55.420 + 373	18.14 +174	57.316 + 313	10.66 +140	13.038 + 265	44.85 + 67
4 <sup>1.3</sup>	16.498 + 281	30.25 + 75	55.816 + 396	16.55 +159	57.649 + 333	09.29 +137	13.321 + 283	44.01 + 84
4 <sup>11.3</sup>	16.798 + 300	29.31 + 94	56.236 + 420	15.11 +144	58.004 + 355	07.96 +133	13.622 + 301	43.02 + 99
4 <sup>21.3</sup>	17.109 + 311	28.21 +110	56.672 + 436	13.88 +123	58.373 + 369	06.71 +125	13.936 + 314	41.89 +113
5 <sup>1.2</sup>	17.428 + 319	26.99 +122	57.115 + 443	12.86 +102	58.750 + 377	05.58 +113	14.258 + 322	40.66 +123
5 <sup>11.2</sup>	17.750 + 322	25.68 +131	57.564 + 449	12.10 + 76	59.131 + 381	04.58 +100	14.584 + 326	39.36 +130
5 <sup>21.2</sup>	18.068 + 318	24.32 +136	58.004 + 440	11.62 + 48	59.508 + 377	03.76 + 82	14.906 + 322	38.04 +132
5 <sup>31.2</sup>	18.375 + 307	22.97 +135	58.428 + 424	11.42 + 20	59.872 + 364	03.14 + 62	15.218 + 312	36.75 +129
6 <sup>10.1</sup>	18.667 + 292	21.66 +131	58.831 + 403	11.52 - 10	60.219 + 347	02.73 + 41	15.514 + 296	35.50 +125
6 <sup>20.1</sup>	18.932 + 265	20.43 +123	59.197 + 366	11.92 - 40	60.536 + 317	02.56 + 17	15.785 + 271	34.36 +114
6 <sup>30.1</sup>	19.168 + 236	19.32 +111	59.522 + 325	12.61 - 69	60.818 + 282	02.63 - 7	16.026 + 241	33.34 +102
7 <sup>10.0</sup>	19.368 + 200	18.34 + 98	59.797 + 275	13.56 - 95	61.059 + 241	02.93 - 30	16.232 + 206	32.48 + 86
7 <sup>20.0</sup>	19.525 + 157	17.54 + 80	60.012 + 215	14.76 -120	61.249 + 190	03.45 - 52	16.394 + 162	31.79 + 69
7 <sup>30.0</sup>	19.639 + 114	16.90 + 64	60.167 + 155	16.14 -138	61.389 + 140	04.16 - 71	16.513 + 119	31.28 + 51
8 <sup>9.0</sup>	19.707 + 68	16.44 + 46	60.256 + 89	17.67 -153	61.473 + 84	05.04 - 88	16.585 + 72	30.94 + 34
8 <sup>18.9</sup>	19.727 + 20	16.15 + 29	60.278 + 22	19.27 -160	61.501 + 28	06.04 -100	16.609 + 24	30.77 + 17
8 <sup>28.9</sup>	19.705 - 22	16.01 + 14	60.239 - 39	20.88 -161	61.477 - 24	07.09 -105	16.590 - 19	30.75 + 2
9 <sup>7.9</sup>	19.641 - 64	16.01 + 0	60.140 - 99	22.46 -158	61.403 - 74	08.18 -109	16.529 - 61	30.86 - 11
9 <sup>17.9</sup>	19.543 - 98	16.13 - 12	59.989 - 151	23.90 -144	61.287 - 116	09.22 -104	16.433 - 96	31.07 - 21
9 <sup>27.8</sup>	19.419 - 124	16.34 - 21	59.800 - 189	25.15 -125	61.138 - 149	10.17 - 95	16.310 - 123	31.36 - 29
10 <sup>7.8</sup>	19.275 - 144	16.62 - 28	59.578 - 222	26.17 -102	60.962 - 176	10.99 - 82	16.166 - 144	31.70 - 34
10 <sup>17.8</sup>	19.122 - 153	16.96 - 34	59.343 - 235	26.88 - 71	60.776 - 186	11.63 - 64	16.013 - 153	32.07 - 37
10 <sup>27.7</sup>	18.971 - 151	17.31 - 35	59.105 - 238	27.28 - 40	60.589 - 187	12.06 - 43	15.861 - 152	32.45 - 38
11 <sup>6.7</sup>	18.828 - 143	17.70 - 39	58.877 - 228	27.32 - 4	60.410 - 179	12.26 - 20	15.717 - 144	32.83 - 38
11 <sup>16.7</sup>	18.705 - 123	18.09 - 39	58.677 - 200	27.01 + 31	60.255 - 155	12.23 + 3	15.592 - 125	33.19 - 36
11 <sup>26.7</sup>	18.607 - 98	18.48 - 39	58.510 - 167	26.37 + 64	60.128 - 127	11.97 + 26	15.492 - 100	33.52 - 33
12 <sup>6.6</sup>	18.539 - 68	18.89 - 41	58.387 - 123	25.41 + 96	60.037 - 91	11.49 + 48	15.421 - 71	33.85 - 33
12 <sup>16.6</sup>	18.508 - 31	19.27 - 38	58.317 - 70	24.16 +125	59.991 - 46	10.81 + 68	15.387 - 34	34.13 - 28
12 <sup>26.6</sup>	18.511 + 3	19.65 - 38	58.300 - 17	22.69 +147	59.987 - 4	09.96 + 85	15.388 + 1	34.39 - 26
12 <sup>36.6</sup>	18.551 + 40	20.00 - 35	58.338 + 38	21.01 +168	60.028 + 41	08.97 + 99	15.427 + 39	34.61 - 22
	18.551 + 78	20.00 - 28	58.338 + 94	21.01 +181	60.028 + 87	08.97 +111	15.427 + 76	34.61 - 14
Mean Place	18.370	14.40	58.063	12.18	59.716	01.02	15.219	28.84
sec δ, tan δ	+1.025	-0.223	+1.487	-1.101	+1.232	-0.719	+1.034	-0.265
da(ψ), dδ(ψ)	+0.066	+0.22	+0.085	+0.23	+0.077	+0.23	+0.067	+0.23
da(ε), dδ(ε)	+0.008	-0.83	+0.042	-0.82	+0.027	-0.82	+0.010	-0.82
Dble. Trans.	July 26		July 27		July 27,		July 27	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	763		765		1531		764										
	α <sup>1</sup> Sagittarii		γ Cygni		132 G. Aquilae		α Pavonis										
Mag.Spect.	5.64	A0	2.32	F8p	5.41	K0	2.12	B3									
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.									
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "									
	20 21	- 42 05	20 21	+ 40 12	20 22	+ 5 17	20 24	- 56 46									
1	-8.4	28.447	+19	56.69	+108	41.343	-59	40.60	-231	27.246	+8	44.33	-130	30.115	-77	69.38	+177
1	1.6	28.466	+66	55.42	+141	41.284	-15	38.02	-281	27.254	+42	43.03	-136	30.106	+56	67.37	+201
1	11.5	28.532	+116	54.01	+154	41.269	+34	35.21	-291	27.296	+77	41.67	-135	30.162	+126	65.15	+222
1	21.5	28.648	+160	52.47	+162	41.303	+80	32.30	-290	27.373	+109	40.32	-127	30.288	+188	62.79	+236
1	31.5	28.808	+202	50.85	+168	41.383	+125	29.40	-281	27.482	+140	39.05	-117	30.476	+248	60.38	+241
2	10.5	29.010	+242	49.17	+170	41.508	+172	26.59	-256	27.622	+171	37.88	-96	30.724	+305	57.93	+245
2	20.4	29.252	+276	47.47	+168	41.680	+212	24.03	-222	27.793	+197	36.92	-72	31.029	+351	55.52	+241
3	2.4	29.528	+309	45.79	+167	41.892	+251	21.81	-182	27.990	+224	36.20	-44	31.380	+398	53.20	+232
3	12.4	29.837	+338	44.12	+161	42.143	+286	19.99	-129	28.214	+248	35.76	-9	31.778	+439	51.00	+220
3	22.3	30.175	+361	42.51	+152	42.429	+312	18.70	-76	28.462	+267	35.67	+24	32.217	+469	48.97	+203
4	1.3	30.536	+383	40.99	+142	42.741	+336	17.94	-19	28.729	+286	35.91	+58	32.686	+498	47.15	+182
4	11.3	30.919	+399	39.57	+127	43.077	+351	17.75	+42	29.015	+299	36.49	+93	33.184	+519	45.56	+159
4	21.3	31.318	+407	38.30	+110	43.428	+356	18.17	+96	29.314	+306	37.42	+121	33.703	+527	44.25	+131
5	1.2	31.725	+412	37.20	+90	43.784	+357	19.13	+149	29.620	+310	38.63	+148	34.230	+534	43.25	+100
5	11.2	32.137	+406	36.30	+67	44.141	+345	20.62	+198	29.930	+305	40.11	+171	34.764	+525	42.56	+69
5	21.2	32.543	+393	35.63	+42	44.486	+326	22.60	+236	30.235	+295	41.82	+184	35.289	+506	42.23	+33
5	31.2	32.936	+374	35.21	+16	44.812	+302	24.96	+272	30.530	+279	43.66	+196	35.795	+481	42.25	-2
6	10.1	33.310	+341	35.05	-13	45.114	+264	27.68	+297	30.809	+253	45.62	+200	36.276	+388	42.62	-37
6	20.1	33.651	+304	35.18	-38	45.378	+224	30.65	+312	31.062	+224	47.62	+198	36.712	+329	44.62	-74
6	30.1	33.955	+259	35.56	-64	45.602	+178	33.77	+324	31.286	+189	49.60	+192	37.100	+257	43.36	-105
7	10.0	34.214	+204	36.20	-88	45.780	+125	37.01	+323	31.475	+147	51.52	+181	37.429	+186	44.41	-136
7	20.0	34.418	+150	37.08	-106	45.905	+73	40.24	+316	31.622	+105	53.33	+167	37.686	+106	45.77	-162
7	30.0	34.568	+90	38.14	-123	45.978	+18	43.40	+305	31.727	+60	55.00	+150	37.872	+25	47.39	-181
8	9.0	34.658	+28	39.37	-133	45.996	-36	46.45	+283	31.787	+14	56.50	+129	37.978	+106	49.20	-196
8	18.9	34.686	-28	40.70	-138	45.960	-85	49.28	+229	31.801	-26	57.79	+87	38.003	+49	51.16	-202
8	28.9	34.658	-83	42.08	-136	45.875	-132	51.87	+192	31.775	-67	58.87	+64	37.954	-124	53.18	-201
9	7.9	34.575	-130	43.44	-128	45.743	-171	54.16	+156	31.708	-100	59.74	+42	37.830	-187	55.19	-193
9	17.9	34.445	-165	44.72	-114	45.572	-201	56.08	+113	31.608	-124	60.38	+21	37.643	-236	57.12	-175
9	27.8	34.280	-195	45.86	-95	45.371	-225	57.64	+67	31.484	-145	60.80	-3	37.407	-278	58.87	-151
10	7.8	34.085	-208	46.81	-71	45.146	-238	58.77	+22	31.339	-153	61.01	-21	37.129	-305	60.38	-121
10	17.8	33.877	-209	47.52	-44	44.908	-240	59.44	-26	31.186	-153	60.98	-43	36.830	-296	61.59	-82
10	27.7	33.668	-177	47.96	-15	44.668	-235	59.66	-75	31.033	-147	60.77	-63	36.525	-268	62.41	-43
11	6.7	33.467	-145	48.11	+16	44.433	-218	59.40	-119	30.886	-129	60.34	-80	36.229	-228	62.84	+0
11	16.7	33.290	-107	47.95	+45	44.215	-195	58.65	-166	30.757	-96	59.71	-98	35.961	-179	62.84	+44
11	26.7	33.145	-59	47.50	+72	44.020	-164	57.46	-205	30.651	-106	58.91	-111	35.733	-116	62.40	+85
12	6.6	33.038	-117	46.78	+97	43.856	-125	55.80	-237	30.572	-46	57.93	-123	35.554	-85	60.29	+126
12	16.6	32.979	-117	45.81	+117	43.731	-86	53.75	-267	30.526	-13	56.82	-132	35.438	-52	58.69	+160
12	26.6	32.967	+37	44.64	+136	43.645	-42	51.38	-282	30.513	+22	55.59	-132	35.386	+15	56.81	+188
12	36.6	33.004	+88	43.28	+149	43.603	+7	48.71	-132	30.535	+58	54.27	-132	35.401	+85	54.67	+214
Mean Place	32.692	34.77		44.623	47.02	30.568	57.33	35.195	45.22								
sec δ, tan δ	+1.348	-0.903		+1.310	+0.845	+1.004	+0.093	+1.825	-1.527								
da(ψ), dδ(ψ)	+0.081	+0.23		+0.043	+0.23	+0.059	+0.23	+0.094	+0.23								
da(ε), dδ(ε)	+0.035	-0.82		-0.033	-0.81	-0.004	-0.81	+0.060	-0.81								
Dble.Trans.	July 28		July 28		July 28		July 28										

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1532		1535		1534		1533	
	296 G. Sagittarii		42 Cygni		41 Cygni		69 Aquilae	
Mag.Spect.	5.97	K0	5.94	A0	4.09	F5p	5.11	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	20 24	- 28 42	20 28	+ 36 24	20 28	+ 30 18	20 28	- 2 55
1 -8.4	33 562 <sup>s</sup> - 19	47 70 + 40	46 236 <sup>s</sup> - 94	26 34 <sup>o</sup> - 217	47 398 <sup>s</sup> - 74	74 77 <sup>o</sup> - 203	53 320 <sup>s</sup> - 24	66 45 <sup>o</sup> - 85
1 1.6	33 583 + 21	47 18 + 52	46 182 - 54	23 90 - 244	47 360 + 38	72 50 - 227	53 330 + 10	67 32 - 87
1 11.5	33 645 + 62	46 56 + 62	46 169 - 13	21 25 - 265	47 361 + 1	70 04 - 246	53 373 + 43	68 21 - 89
1 21.5	33 745 + 100	45 86 + 70	46 202 + 33	18 49 - 276	47 404 + 43	67 50 - 254	53 451 + 78	69 05 - 84
1 31.5	33 881 + 136	45 01 + 85	46 278 + 76	15 74 - 275	47 486 + 82	64 99 - 251	53 559 + 108	69 82 - 77
2 10.5	34 053 + 172	44 09 + 92	46 396 + 118	13 07 - 267	47 606 + 120	62 57 - 242	53 698 + 139	70 50 - 68
2 20.4	34 260 + 207	43 08 + 101	46 557 + 161	10 64 - 243	47 766 + 160	60 38 - 219	53 869 + 171	70 98 - 48
3 2.4	34 494 + 234	42 01 + 107	46 757 + 200	08 53 - 212	47 960 + 194	58 50 - 188	54 066 + 197	71 26 - 28
3 12.4	34 757 + 263	40 87 + 114	46 994 + 237	06 81 - 172	48 189 + 229	57 00 - 150	54 289 + 223	71 30 - 4
3 22.4	35 045 + 288	39 66 + 121	47 264 + 270	05 58 - 123	48 448 + 259	55 98 - 102	54 536 + 247	71 06 + 24
4 1.3	35 353 + 308	38 42 + 124	47 561 + 297	04 88 - 70	48 732 + 284	55 44 - 54	54 802 + 266	70 55 + 51
4 11.3	35 682 + 329	37 15 + 127	47 882 + 321	04 72 - 16	49 038 + 306	55 43 - 1	55 089 + 287	69 77 + 78
4 21.3	36 025 + 343	35 90 + 125	48 219 + 337	05 15 + 43	49 359 + 321	55 96 + 53	55 389 + 300	68 74 + 103
5 1.2	36 377 + 352	34 68 + 122	48 563 + 344	06 09 + 94	49 688 + 329	56 97 + 101	55 697 + 308	67 48 + 126
5 11.2	36 734 + 357	33 53 + 115	48 910 + 347	07 56 + 147	50 020 + 332	58 46 + 149	56 011 + 314	66 04 + 144
5 21.2	37 087 + 353	32 50 + 103	49 248 + 338	09 49 + 193	50 345 + 325	60 38 + 192	56 322 + 311	64 46 + 158
5 31.2	37 430 + 343	31 61 + 89	49 570 + 322	11 79 + 230	50 656 + 311	62 63 + 225	56 624 + 302	62 80 + 166
6 10.1	37 757 + 327	30 88 + 73	49 869 + 299	14 43 + 264	50 947 + 291	65 19 + 256	56 912 + 288	61 09 + 171
6 20.1	38 057 + 300	30 35 + 53	50 135 + 266	17 32 + 289	51 207 + 260	67 95 + 276	57 175 + 263	59 40 + 169
6 30.1	38 325 + 268	30 03 + 32	50 364 + 229	20 34 + 302	51 433 + 226	70 83 + 288	57 410 + 235	57 77 + 163
7 10.1	38 555 + 230	29 92 + 11	50 550 + 186	23 48 + 314	51 618 + 185	73 79 + 296	57 610 + 200	56 24 + 153
7 20.0	38 738 + 183	30 02 - 10	50 685 + 135	26 61 + 313	51 756 + 138	76 72 + 293	57 770 + 160	54 85 + 139
7 30.0	38 874 + 136	30 31 - 29	50 771 + 86	29 67 + 306	51 848 + 92	79 56 + 284	57 887 + 117	53 62 + 123
8 9.0	38 959 + 85	30 79 - 48	50 804 + 33	32 62 + 295	51 889 + 41	82 29 + 273	57 959 + 72	52 57 + 105
8 18.9	38 991 + 32	31 40 - 61	50 785 - 19	35 36 + 274	51 881 - 8	84 79 + 250	57 985 + 26	51 71 + 96
8 28.9	38 975 - 16	32 11 - 71	50 719 - 66	37 86 + 250	51 828 - 53	87 06 + 227	57 970 - 15	51 04 + 67
9 7.9	38 911 - 64	32 89 - 78	50 607 - 112	40 08 + 222	51 732 - 96	89 06 + 200	57 970 - 56	50 55 + 49
9 17.9	38 808 - 103	33 68 - 79	50 456 - 151	41 94 + 186	51 599 - 133	90 71 + 165	57 914 - 91	50 26 + 29
9 27.8	38 675 - 133	34 44 - 76	50 276 - 180	43 45 + 151	51 438 - 161	92 03 + 132	57 823 - 116	50 12 + 14
10 7.8	38 517 - 158	35 14 - 70	50 071 - 205	44 56 + 111	51 254 - 184	92 98 + 95	57 707 - 138	50 12 - 2
10 17.8	38 349 - 168	35 73 - 59	49 855 - 216	45 23 + 67	51 059 - 195	93 51 + 53	57 569 - 147	50 32 - 18
10 27.8	38 179 - 170	36 18 - 45	49 634 - 221	45 47 + 24	50 861 - 198	93 66 + 15	57 422 - 148	50 60 - 28
11 6.7	38 017 - 162	36 48 - 30	49 418 - 216	45 25 - 22	50 667 - 194	93 39 - 27	57 274 - 142	51 02 - 42
11 16.7	37 875 - 142	36 61 - 13	49 217 - 201	44 57 - 68	50 490 - 177	92 69 - 70	57 132 - 125	51 55 - 53
11 26.7	37 760 - 115	36 57 + 4	49 038 - 179	43 46 - 111	50 333 - 157	91 61 - 108	56 903 - 104	52 17 - 62
12 6.6	37 678 - 82	36 38 + 19	48 886 - 152	41 91 - 155	50 204 - 129	90 13 - 148	56 827 - 76	52 89 - 72
12 16.6	37 635 - 43	36 04 + 34	48 771 - 115	39 98 - 193	50 109 - 95	88 32 - 181	56 784 - 43	53 67 - 78
12 26.6	37 631 - 4	35 57 + 47	48 693 - 78	37 74 - 224	50 048 - 61	86 23 - 209	56 773 - 11	54 50 - 83
12 36.6	37 669 + 38	34 98 + 59	48 656 + 37	35 22 - 252	50 027 - 21	83 89 - 234	56 796 + 23	55 37 - 87
	37 669 + 79	34 98 + 68	48 656 + 7	35 22 - 267	50 027 + 19	83 89 - 246	56 796 + 59	55 37 - 84
Mean Place	37.362	27.74	49.487	33.31	50.630	82.84	56.693	51.50
sec δ, tan δ	+1.140	-0.548	+1.243	+0.738	+1.158	+0.585	+1.001	-0.051
da(ψ), dδ(ψ)	+0.073	+0.23	+0.046	+0.24	+0.049	+0.24	+0.062	+0.24
da(ε), dδ(ε)	+0.022	-0.81	-0.030	-0.80	-0.024	-0.80	+0.002	-0.80
Dbble.Trans.	July 28		July 29		July 29		July 29	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	767		1538		1536		770		
	♁ Cephei		Groombridge 3241 (Draconis)		29 G. Capricorni		73 Draconis		
Mag. Spect.	4.28	A5	6.42	K2	5.82	G5	5.18	A2p	
U.T.	R.A.		R.A.		R.A.		R.A.		
	h m	° /	h m	° /	h m	° /	h m	° /	
	20 29	+ 62 56	20 29	+ 72 28	20 31	- 9 54	20 31	+ 74 53	
1	-8.4	17.672 - 287	51 47 - 240	60.226 - 508	67.39 - 233	35.970 - 23	17.03 - 52	37.094 - 612	88.55 - 228
1	1.6	17.454 - 218	48.69 - 278	59.822 - 404	64.66 - 273	35.983 + 13	17.54 - 51	36.602 - 492	85.86 - 269
1	11.5	17.310 - 144	45.58 - 311	59.531 - 291	61.58 - 308	36.029 + 46	18.01 - 47	36.240 - 362	82.81 - 305
1	21.5	17.252 - 58	42.28 - 330	59.374 - 157	58.27 - 331	36.110 + 81	18.41 - 40	36.034 - 206	79.52 - 329
1	31.5	17.278 + 26	38.92 - 336	59.348 - 26	54.87 - 340	36.220 + 110	18.73 - 32	35.980 - 54	76.14 - 338
2	10.5	17.389 + 111	35.59 - 333	59.457 + 109	51.48 - 339	36.364 + 144	18.99 - 26	36.084 + 104	72.75 - 339
2	20.4	17.588 + 199	32.47 - 312	59.704 + 247	48.27 - 321	36.539 + 175	19.05 - 6	36.349 + 265	69.52 - 323
3	2.4	17.862 + 274	29.66 - 281	60.071 + 367	45.35 - 292	36.740 + 201	18.94 + 11	36.755 + 406	66.58 - 294
3	12.4	18.210 + 348	27.25 - 241	60.554 + 483	42.81 - 254	36.967 + 227	18.63 + 31	37.297 + 542	64.01 - 257
3	22.4	18.623 + 413	25.37 - 188	61.136 + 582	40.79 - 202	37.219 + 252	18.10 + 53	37.956 + 659	61.95 - 206
4	1.3	19.083 + 460	24.07 - 130	61.791 + 655	39.33 - 146	37.490 + 271	17.36 + 74	38.698 + 742	60.45 - 150
4	11.3	19.584 + 501	23.38 - 69	62.507 + 716	38.49 - 84	37.781 + 291	16.41 + 95	39.512 + 814	59.56 - 89
4	21.3	20.108 + 524	+ 2	63.255 + 748	38.31 - 18	38.087 + 306	15.27 + 114	40.363 + 851	59.33 - 23
5	1.2	20.637 + 529	23.96 + 60	64.007 + 752	38.76 + 45	38.401 + 314	13.99 + 128	41.219 + 856	59.72 + 39
5	11.2	21.164 + 527	25.18 + 122	64.750 + 743	39.83 + 107	38.722 + 321	12.58 + 141	42.064 + 845	60.73 + 101
5	21.2	21.665 + 501	26.98 + 180	65.452 + 702	41.50 + 167	39.041 + 319	11.10 + 148	42.860 + 796	62.35 + 162
5	31.2	22.130 + 485	29.25 + 227	66.094 + 642	43.66 + 216	39.351 + 310	09.61 + 149	43.587 + 727	64.46 + 211
6	10.1	22.550 + 420	31.98 + 273	66.664 + 570	46.29 + 263	39.647 + 296	08.12 + 149	44.230 + 643	67.04 + 258
6	20.1	22.905 + 355	35.06 + 308	67.135 + 471	49.30 + 301	39.919 + 272	06.71 + 141	44.760 + 530	70.01 + 297
6	30.1	23.192 + 283	38.39 + 333	67.503 + 368	52.57 + 327	40.163 + 244	05.40 + 131	45.171 + 411	73.26 + 325
7	10.1	23.404 + 212	41.92 + 353	67.758 + 255	56.08 + 351	40.372 + 209	04.22 + 118	45.452 + 281	76.74 + 348
7	20.1	23.530 + 126	45.53 + 361	67.887 + 129	59.69 + 361	40.540 + 168	03.21 + 101	45.588 + 136	80.33 + 359
7	30.1	23.575 + 45	49.14 + 361	67.897 + 10	63.32 + 363	40.666 + 126	02.37 + 84	45.588 + 0	83.96 + 363
8	9.0	23.535 - 40	52.69 + 355	67.783 - 114	66.93 + 361	40.746 + 80	01.71 + 66	45.445 - 143	87.57 + 361
8	18.9	23.410 - 125	56.08 + 339	67.545 - 238	70.39 + 346	40.778 + 32	01.25 + 46	45.161 - 284	91.05 + 348
8	28.9	23.211 - 199	59.25 + 317	67.200 - 345	73.65 + 326	40.768 - 10	00.95 + 30	44.755 - 406	94.33 + 328
9	7.9	22.938 - 273	62.15 + 290	66.748 - 452	76.67 + 302	40.716 - 52	00.81 + 14	44.225 - 530	97.38 + 305
9	17.9	22.603 - 335	64.67 + 252	66.204 - 544	79.32 + 265	40.629 - 87	00.81 + 0	43.590 - 635	100.08 + 270
9	27.8	22.220 - 383	66.81 + 214	65.588 - 616	81.61 + 229	40.515 - 114	00.93 - 12	42.871 - 719	102.41 + 233
10	7.8	21.792 - 428	68.50 + 169	64.904 - 684	83.45 + 184	40.379 - 136	01.16 - 23	42.073 - 798	104.31 + 190
10	17.8	21.340 - 452	69.67 + 117	64.181 - 723	84.79 + 134	40.232 - 147	01.46 - 30	41.228 - 845	105.70 + 139
10	27.8	20.876 - 464	70.34 + 67	63.436 - 745	85.62 + 83	40.085 - 147	01.82 - 36	40.355 - 873	106.59 + 89
11	6.7	20.410 - 466	70.44 + 10	62.681 - 755	85.88 + 26	39.943 - 142	02.23 - 41	39.465 - 886	106.91 + 32
11	16.7	19.962 - 448	69.97 - 47	61.948 - 733	85.55 - 33	39.818 - 125	02.68 - 45	38.609 - 864	106.65 - 26
11	26.7	19.542 - 420	68.96 - 101	61.251 - 687	84.68 - 87	39.715 - 103	03.14 - 46	37.780 - 825	105.83 - 82
12	6.6	19.162 - 380	67.38 - 158	60.608 - 643	83.21 - 147	39.640 - 75	03.63 - 49	37.015 - 765	104.43 - 140
12	16.6	18.839 - 323	65.30 - 208	60.047 - 561	81.22 - 199	39.598 - 42	04.12 - 49	36.344 - 671	102.49 - 194
12	26.6	18.577 - 262	62.78 - 252	59.576 - 471	78.78 - 244	39.589 - 9	04.62 - 50	35.774 - 570	100.09 - 240
12	36.6	18.388 - 189	59.87 - 291	59.216 - 360	75.91 - 287	39.615 + 26	05.09 - 47	35.332 - 442	97.26 - 283
		- 107	- 315	- 235	- 315	+ 63	- 42	- 297	- 312
Mean Place	21.393	54.73	64.600	69.79	39.417	00.40	41.784	90.74	
sec δ, tan δ	+2.199	+1.958	+3.323	+3.169	+1.015	-0.175	+3.841	+3.708	
dα(ψ), dδ(ψ)	+0.020	+0.24	-0.005	+0.24	+0.065	+0.24	-0.016	+0.24	
dα(ε), dδ(ε)	-0.079	-0.80	-0.129	-0.79	+0.007	-0.79	-0.152	-0.79	
Dble. Trans.	July 30		July 30		July 30		July 30		

AT UPPER TRANSIT AT GREENWICH

No.	768		1537		769		1539	
	ε Delphini		9 G. Delphini		α Indi		29 Vulpeculae	
Mag.Spect.	3.98	B5	6.68	K0	3.21	K0	4.78	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	20 32	+ 11 15	20 33	+ 4 50	20 36	- 47 20	20 37	+ 21 08
1 -8.4	30.832 <sup>s</sup> - 40	12.79 - 142	16.347 <sup>s</sup> - 33	53.81 - 116	32.988 <sup>s</sup> - 59	45.59 + 128	51.936 <sup>s</sup> - 60	62.11 - 172
1 1.6	30.825 - 7	11.26 - 153	16.347 + 0	52.57 - 124	32.982 - 6	44.08 + 151	51.910 - 26	60.21 - 190
1 11.5	30.852 + 27	09.63 - 163	16.379 + 32	51.27 - 130	33.026 + 44	42.37 + 171	51.919 + 9	58.15 - 206
1 21.5	30.914 + 62	07.99 - 164	16.446 + 67	49.98 - 129	33.124 + 98	40.50 + 187	51.965 + 46	56.04 - 211
1 31.5	31.009 + 95	06.41 - 158	16.544 + 98	48.77 - 121	33.271 + 147	38.53 + 197	52.045 + 80	53.97 - 207
2 10.5	31.135 + 126	04.94 - 147	16.674 + 130	47.65 - 112	33.464 + 193	36.49 + 204	52.161 + 116	51.98 - 199
2 20.4	31.294 + 159	03.67 - 127	16.835 + 161	46.73 - 92	33.704 + 240	34.43 + 206	52.312 + 151	50.21 - 177
3 2.4	31.481 + 187	02.66 - 101	17.023 + 188	46.06 - 67	33.982 + 278	32.39 + 204	52.494 + 182	48.73 - 148
3 12.4	31.697 + 216	01.96 - 70	17.239 + 216	45.65 - 41	34.299 + 317	30.38 + 201	52.707 + 213	47.58 - 115
3 22.4	31.939 + 242	01.63 - 33	17.480 + 241	45.59 - 6	34.650 + 351	28.47 + 191	52.950 + 243	46.85 - 73
4 1.3	32.201 + 262	01.68 + 5	17.742 + 262	45.85 + 26	35.028 + 378	26.67 + 180	53.216 + 266	46.57 - 28
4 11.3	32.485 + 284	02.12 + 44	18.024 + 282	46.44 + 59	35.433 + 405	25.02 + 165	53.504 + 288	46.74 + 17
4 21.3	32.782 + 297	02.96 + 84	18.320 + 296	47.38 + 94	35.858 + 425	23.56 + 146	53.809 + 305	47.38 + 64
5 1.2	33.089 + 307	04.13 + 117	18.625 + 305	48.59 + 121	36.294 + 436	22.31 + 125	54.122 + 313	48.45 + 107
5 11.2	33.401 + 312	05.63 + 150	18.937 + 312	50.08 + 149	36.739 + 445	21.31 + 100	54.442 + 320	49.93 + 148
5 21.2	33.709 + 308	07.41 + 178	19.246 + 309	51.78 + 170	37.181 + 442	20.60 + 71	54.758 + 316	51.78 + 185
5 31.2	34.008 + 299	09.39 + 198	19.545 + 299	53.63 + 185	37.610 + 429	20.18 + 42	55.063 + 305	53.90 + 212
6 10.1	34.291 + 283	11.52 + 213	19.830 + 285	55.59 + 196	38.022 + 412	20.06 + 12	55.352 + 289	56.26 + 236
6 20.1	34.549 + 258	13.75 + 223	20.091 + 261	57.60 + 201	38.401 + 379	20.28 - 22	55.615 + 263	58.79 + 253
6 30.1	34.778 + 229	15.99 + 224	20.324 + 233	59.58 + 198	38.742 + 341	20.78 - 50	55.847 + 232	61.38 + 269
7 10.1	34.972 + 194	18.22 + 223	20.522 + 198	61.51 + 193	39.036 + 294	21.59 - 81	56.042 + 195	64.03 + 265
7 20.0	35.124 + 152	20.35 + 213	20.679 + 157	63.33 + 182	39.272 + 236	22.67 - 108	56.194 + 152	66.62 + 259
7 30.0	35.234 + 110	22.35 + 200	20.795 + 116	65.00 + 167	39.450 + 178	23.96 - 129	56.302 + 108	69.11 + 249
8 9.0	35.299 + 65	24.20 + 185	20.865 + 70	66.50 + 150	39.563 + 113	25.44 - 148	56.364 + 62	71.46 + 235
8 18.9	35.317 + 18	25.83 + 163	20.890 + 25	67.80 + 130	39.609 + 46	27.04 - 160	56.378 + 14	73.60 + 214
8 28.9	35.294 - 23	27.25 + 142	20.873 - 17	68.90 + 110	39.594 - 15	28.68 - 164	56.349 - 29	75.52 + 192
9 7.9	35.231 - 63	28.44 + 119	20.816 - 57	69.78 + 88	39.516 - 78	30.31 - 163	56.279 - 70	77.19 + 167
9 17.9	35.133 - 98	29.36 + 92	20.725 - 91	70.42 + 64	39.386 - 130	31.84 - 153	56.172 - 107	77.55 + 136
9 27.8	35.009 - 124	30.03 + 67	20.725 - 118	70.42 + 44	39.386 - 172	31.84 - 138	56.172 - 134	78.55 + 107
10 7.8	34.864 - 145	30.44 + 41	20.607 - 139	71.08 + 22	39.214 - 208	33.22 - 117	56.038 - 156	79.62 + 74
10 17.8	34.709 - 155	30.58 + 14	20.468 - 149	71.08 + 0	39.006 - 227	34.39 - 87	55.882 - 168	80.36 + 40
10 27.8	34.552 - 157	30.47 - 11	20.319 - 151	71.08 - 19	38.779 - 232	35.26 - 57	55.714 - 172	80.76 + 7
11 6.7	34.399 - 153	30.09 - 38	20.168 - 146	70.89 - 40	38.547 - 228	35.83 - 23	55.542 - 168	80.83 - 28
11 16.7	34.263 - 136	29.46 - 63	20.022 - 130	70.49 - 59	38.319 - 206	36.06 + 14	55.374 - 153	80.55 - 63
11 26.7	34.147 - 116	28.60 - 86	19.892 - 109	69.90 - 75	38.113 - 177	35.92 + 49	55.221 - 135	79.92 - 93
12 6.6	34.056 - 91	27.51 - 109	19.783 - 84	68.21 - 94	37.936 - 138	35.43 + 82	55.086 - 110	78.99 - 127
12 16.6	33.998 - 58	26.23 - 128	19.699 - 52	67.15 - 106	37.798 - 88	34.61 + 113	54.976 - 78	77.72 - 153
12 26.6	33.971 - 27	24.79 - 144	19.647 - 21	67.15 - 117	37.710 - 40	33.48 + 139	54.898 - 46	76.19 - 176
12 36.6	33.978 + 7	23.23 - 156	19.626 + 13	65.98 - 125	37.670 + 12	32.09 + 163	54.852 - 12	74.43 - 196
	33.978 + 42	23.23 - 160	19.639 + 48	64.73 - 126	37.682 + 67	30.46 + 180	54.840 + 25	72.47 - 205
Mean Place	34.090	24.77	19.639	67.20	37.330	21.53	55.151	72.02
sec δ, tan δ	+1.020	+0.199	+1.004	+0.085	+1.476	-1.085	+1.072	+0.387
dα(ψ), dδ(ψ)	+0.057	+0.25	+0.059	+0.25	+0.083	+0.25	+0.053	+0.25
dα(ε), dδ(ε)	-0.008	-0.79	-0.004	-0.78	+0.046	-0.78	-0.016	-0.77
Dbble.Trans.	July 30		July 31		July 31		August 1	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	772		774		773		1540	
	α Delphini		α Delphini		υ Capricorni		13 G. Microscopii	
Mag. Spect.	5.23	G5	3.86	B8	5.33	M0	5.54	K2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	20 38	+ 10 01	20 38	+ 15 51	20 39	- 18 11	20 39	- 33 28
1 -8.4	25.183 - 42	64.68 -134	57.449 - 52	38.91 -155	13.420 - 28	31.20 - 13	25.425 - 37	70.60 + 61
1 1.6	25.174 + 9	63.22 -146	57.431 + 15	37.22 -169	13.428 + 8	31.26 + 6	25.429 + 4	69.83 + 77
1 11.6	25.197 + 23	61.68 -154	57.446 + 52	35.40 -182	13.470 + 42	31.24 + 2	25.473 + 44	68.92 + 91
1 21.5	25.255 + 58	60.13 -155	57.498 + 84	33.55 -185	13.552 + 82	31.12 + 12	25.560 + 87	67.88 +104
1 31.5	25.345 + 90	58.63 -150	57.582 + 210	31.74 -181	13.650 + 98	30.96 + 16	25.683 + 123	66.72 +116
2 10.5	25.467 + 122	57.24 -139	57.699 + 117	30.03 -171	13.799 + 149	30.62 + 34	25.844 + 161	65.45 +127
2 20.4	25.622 + 155	56.05 -119	57.850 + 151	28.53 -150	13.974 + 175	30.17 + 45	26.042 + 198	64.10 +135
3 2.4	25.804 + 182	55.11 -94	58.031 + 181	27.30 -123	14.177 + 203	29.57 + 60	26.271 + 229	62.69 +141
3 12.4	26.016 + 212	54.47 -64	58.241 + 210	26.38 -92	14.406 + 229	28.83 + 74	26.532 + 261	61.23 +146
3 22.4	26.254 + 238	54.19 -28	58.480 + 239	25.86 -52	14.662 + 256	27.93 + 90	26.821 + 289	59.74 +149
4 1.3	26.513 + 259	54.28 + 9	58.741 + 261	25.75 -11	14.939 + 277	26.90 +103	27.133 + 312	58.25 +149
4 11.3	26.795 + 282	54.74 + 46	59.024 + 283	26.05 + 74	15.237 + 298	25.73 +117	27.469 + 336	56.77 +148
4 21.3	27.091 + 296	55.59 + 85	59.324 + 300	26.79 + 30	15.551 + 314	24.46 +127	27.822 + 353	55.35 +142
5 1.3	27.397 + 306	56.77 +118	59.632 + 308	27.92 +113	15.876 + 325	23.13 +133	28.187 + 365	54.02 +133
5 11.2	27.710 + 313	58.27 +150	59.947 + 315	29.40 +148	16.209 + 333	21.76 +137	28.560 + 373	52.79 +123
5 21.2	28.020 + 310	60.03 +176	60.259 + 312	31.21 +181	16.541 + 332	20.39 +137	28.932 + 372	51.73 +106
5 31.2	28.322 + 302	61.98 +195	60.562 + 303	33.26 +205	16.865 + 324	19.08 +131	29.296 + 364	50.86 + 87
6 10.1	28.609 + 287	64.09 +211	60.849 + 287	35.51 +225	17.176 + 311	17.86 +122	29.645 + 349	50.19 + 67
6 20.1	28.872 + 263	66.28 +219	61.112 + 263	37.88 +237	17.464 + 288	16.76 +110	29.968 + 323	49.76 + 43
6 30.1	29.106 + 234	68.48 +220	61.345 + 233	40.30 +242	17.724 + 260	15.82 + 94	30.261 + 293	49.58 + 18
7 10.1	29.306 + 200	70.67 +219	61.543 + 198	42.73 +243	17.950 + 226	15.06 + 76	30.514 + 253	49.64 - 6
7 20.0	29.465 + 159	72.76 +209	61.698 + 155	45.10 +237	18.133 + 183	14.49 + 57	30.721 + 207	49.95 - 31
7 30.0	29.582 + 117	74.71 +195	61.812 + 114	47.34 +224	18.273 + 140	14.12 + 37	30.878 + 157	50.46 - 51
8 9.0	29.654 + 72	76.52 +181	61.879 + 67	49.45 +211	18.365 + 92	13.94 + 18	30.983 + 105	51.18 - 72
8 19.0	29.679 + 25	78.10 +158	61.900 + 21	51.34 +189	18.408 + 43	13.94 + 0	31.031 + 48	52.05 - 87
8 28.9	29.664 - 15	79.48 +138	61.878 - 22	53.01 +167	18.407 - 1	14.09 - 15	31.029 - 2	53.02 - 97
9 7.9	29.607 - 57	80.63 +115	61.816 - 62	54.44 +143	18.361 - 46	14.38 - 29	30.976 - 53	54.05 -103
9 17.9	29.515 - 92	81.52 + 89	61.718 - 98	55.58 +114	18.277 - 84	14.76 - 38	30.880 - 96	55.09 -104
9 27.8	29.397 - 118	82.17 + 65	61.593 - 125	56.46 + 88	18.164 - 113	15.20 - 44	30.749 - 131	56.07 - 98
10 7.8	29.257 - 140	82.57 + 40	61.446 - 147	57.04 + 58	18.027 - 137	15.68 - 48	30.590 - 159	56.96 - 89
10 17.8	29.106 - 151	82.70 + 13	61.287 - 159	57.32 + 28	17.878 - 149	16.17 - 49	30.416 - 174	57.70 - 74
10 27.8	28.953 - 153	82.60 - 10	61.126 - 161	57.31 - 1	17.726 - 152	16.62 - 45	30.238 - 178	58.26 - 56
11 6.7	28.803 - 150	82.24 - 36	60.967 - 159	56.99 - 32	17.578 - 148	17.04 - 42	30.064 - 174	58.62 - 36
11 16.7	28.668 - 135	81.64 - 60	60.824 - 143	56.38 - 61	17.447 - 131	17.40 - 36	29.908 - 156	58.76 - 14
11 26.7	28.552 - 116	80.82 - 82	60.699 - 125	55.50 - 88	17.338 - 109	17.69 - 29	29.777 - 131	58.67 + 9
12 6.7	28.461 - 91	79.78 -104	60.599 - 100	54.34 -116	17.255 - 83	17.92 - 23	29.677 - 100	58.37 + 30
12 16.6	28.401 - 60	78.57 -121	60.530 - 69	52.96 -138	17.207 - 48	18.07 - 15	29.616 - 61	57.86 + 51
12 26.6	28.372 - 29	77.21 -136	60.491 - 39	51.38 -158	17.193 - 14	18.15 - 8	29.595 - 21	57.17 + 69
12 36.6	28.376 + 4	75.73 -148	60.487 - 4	49.64 -174	17.214 + 21	18.16 - 1	29.615 + 20	56.32 + 85
	+ 39	-152	+ 31	-180	+ 60	+ 9	+ 63	+ 99
Mean Place	28.440	77.05	60.673	49.97	16.931	12.48	29.244	48.71
sec δ, tan δ	+1.016	+0.177	+1.040	+0.284	+1.053	-0.329	+1.199	-0.661
da(ψ), dδ(ψ)	+0.058	+0.25	+0.055	+0.25	+0.068	+0.25	+0.075	+0.26
da(ε), dδ(ε)	-0.008	-0.77	-0.012	-0.77	+0.014	-0.77	+0.028	-0.77
Dble. Trans.	August 1		August 1		August 1		August 1	



APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	777		778		776		775	
	$\alpha$ Cygni (Deneb)		$\delta$ Delphini		$\eta$ Indi		$\beta$ Pavonis	
Mag. Spect.	1.33	A2p	4.53	A5	4.70	F0	3.60	A5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	20 40	+45 13	20 42	+15 01	20 42	-51 58	20 43	-66 15
1 -8.4	54 996 <sup>s</sup> - 142	48 99 - 220	46 519 <sup>s</sup> - 52	20 92 - 150	58 671 <sup>s</sup> - 82	37 24 + 146	39 413 <sup>s</sup> - 178	" + 207
1 1.6	54 897 - 99	46 47 - 252	46 499 - 20	19 27 - 165	58 646 - 25	35 51 + 173	39 322 - 91	36 27 + 237
1 11.6	54 844 - 53	43 67 - 280	46 511 + 12	17 51 - 176	58 677 + 31	33 57 + 194	39 318 - 4	33 90 + 264
1 21.5	54 842 - 2	40 71 - 296	46 559 + 48	15 71 - 180	58 768 + 91	33 57 + 213	39 318 + 92	31 26 + 283
1 31.5	54 890 + 48	37 71 - 300	46 640 + 81	13 96 - 175	58 912 + 144	31 44 + 222	39 410 + 178	28 43 + 291
2 10.5	54 988 + 98	34 76 - 295	46 754 + 114	12 30 - 166	59 108 + 196	26 91 + 231	39 588 + 263	25 52 + 296
2 20.4	55 139 + 151	32 01 - 275	46 901 + 147	10 85 - 145	59 357 + 249	24 59 + 232	39 851 + 346	22 56 + 293
3 2.4	55 336 + 197	29 57 - 244	47 078 + 177	09 65 - 120	59 649 + 292	22 31 + 228	40 197 + 414	19 63 + 281
3 12.4	55 579 + 243	27 50 - 207	47 286 + 208	08 77 - 88	59 983 + 334	20 08 + 223	40 611 + 483	16 82 + 267
3 22.4	55 864 + 285	25 94 - 156	47 521 + 235	08 28 - 49	60 357 + 374	17 97 + 211	41 094 + 543	14 15 + 245
4 1.3	56 182 + 318	24 92 - 102	47 779 + 258	08 19 - 9	60 762 + 405	16 01 + 196	42 226 + 589	09 51 + 219
4 11.3	56 530 + 348	24 46 - 46	48 060 + 281	08 51 + 32	61 198 + 436	14 23 + 178	42 861 + 635	07 60 + 191
4 21.3	56 897 + 367	24 63 + 17	48 358 + 298	09 25 + 74	61 656 + 458	12 68 + 155	43 526 + 665	06 05 + 155
5 1.3	57 274 + 377	25 36 + 73	48 665 + 307	10 37 + 112	62 127 + 471	11 39 + 129	44 209 + 683	04 87 + 118
5 11.2	57 656 + 382	26 66 + 130	48 980 + 315	11 85 + 148	62 609 + 482	10 38 + 101	44 904 + 695	04 07 + 80
5 21.2	58 029 + 373	28 49 + 183	49 292 + 312	13 65 + 180	63 089 + 480	09 70 + 68	45 591 + 687	03 70 + 37
5 31.2	58 384 + 355	30 74 + 225	49 596 + 304	15 67 + 202	63 556 + 467	09 34 + 36	46 259 + 668	03 74 - 4
6 10.1	58 715 + 331	33 39 + 265	49 885 + 289	17 90 + 223	64 005 + 449	09 33 + 1	46 896 + 637	04 22 - 48
6 20.1	59 009 + 294	36 35 + 296	50 150 + 265	20 25 + 235	64 419 + 414	09 67 - 34	47 480 + 584	05 11 - 89
6 30.1	59 260 + 251	39 51 + 316	50 386 + 236	22 64 + 239	64 793 + 374	10 34 - 67	48 003 + 523	06 37 - 126
7 10.1	59 464 + 204	42 84 + 333	50 587 + 201	25 04 + 240	65 116 + 323	11 34 - 100	48 451 + 448	08 00 - 163
7 20.0	59 612 + 148	46 21 + 337	50 747 + 160	27 37 + 233	65 378 + 262	12 62 - 128	48 807 + 356	09 92 - 192
7 30.0	59 705 + 93	49 55 + 334	50 864 + 117	29 58 + 221	65 577 + 199	14 12 - 150	49 071 + 264	12 07 - 215
8 9.0	59 740 + 35	52 82 + 327	50 936 + 72	31 66 + 208	65 577 + 128	15 83 - 171	49 231 + 160	14 41 - 234
8 19.0	59 716 - 24	55 90 + 308	50 961 + 25	33 52 + 186	65 705 + 55	17 65 - 182	49 282 + 51	16 82 - 241
8 28.9	59 640 - 76	58 77 + 287	50 944 - 17	35 16 + 164	65 748 - 12	19 50 - 185	49 234 - 48	19 22 - 240
9 7.9	59 511 - 129	61 36 + 259	50 886 - 58	36 57 + 141	65 667 - 81	21 35 - 185	49 083 - 151	21 54 - 232
9 17.9	59 339 - 172	63 60 + 224	50 792 - 94	37 69 + 112	65 667 - 140	23 07 - 172	49 083 - 241	23 66 - 212
9 27.8	59 132 - 207	65 47 + 187	50 671 - 121	38 55 + 86	65 527 - 188	24 62 - 155	48 842 - 314	25 51 - 185
10 7.8	58 895 - 237	66 93 + 146	50 527 - 144	39 12 + 57	65 339 - 228	25 93 - 131	48 528 - 378	27 01 - 150
10 17.8	58 641 - 254	67 92 + 99	50 371 - 156	39 40 + 28	64 860 - 251	26 91 - 98	47 733 - 417	28 07 - 106
10 27.8	58 379 - 262	68 45 + 53	50 211 - 160	39 39 - 1	64 600 - 260	27 54 - 63	47 299 - 434	28 67 - 60
11 6.7	58 117 - 262	68 47 + 2	50 055 - 156	39 09 - 30	64 342 - 258	27 79 - 25	46 864 - 435	28 77 - 10
11 16.7	57 869 - 248	67 97 - 50	49 912 - 143	38 50 - 59	64 105 - 237	27 63 + 16	46 864 - 407	28 34 + 43
11 26.7	57 641 - 228	67 00 - 97	49 788 - 124	37 65 - 85	64 105 - 206	27 08 + 55	46 457 - 365	27 42 + 92
12 6.7	57 439 - 202	65 53 - 147	49 687 - 101	36 52 - 113	63 733 - 166	26 15 + 93	45 784 - 308	26 00 + 142
12 16.6	57 275 - 164	63 62 - 191	49 617 - 70	35 18 - 134	63 619 - 114	24 86 + 129	45 556 - 228	24 16 + 184
12 26.6	57 150 - 125	61 33 - 229	49 577 - 40	33 66 - 152	63 558 - 61	23 28 + 158	45 407 - 149	21 96 + 220
12 36.6	57 069 - 81	58 70 - 263	49 570 - 7	31 97 - 169	63 553 - 5	21 44 + 184	45 347 - 60	19 44 + 252
	- 31	- 284	+ 29	- 175	+ 56	+ 204	+ 35	+ 274
Mean Place	58 298	54 27	49 731	32 18	63 195	12 03	45 261	09 29
sec $\delta$ , tan $\delta$	+1.420	+1.008	+1.035	+0.268	+1.623	-1.279	+2.483	-2.273
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.041	+0.26	+0.056	+0.26	+0.087	+0.26	+0.107	+0.26
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.043	-0.76	-0.012	-0.76	+0.056	-0.76	+0.099	-0.76
Dble. Trans.	August 1		August 2		August 2		August 2	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	783		782		779		780		
	$\eta$ Cephei		6 H. Cephei		$\psi$ Capricorni		$\epsilon$ Cygni		
Mag. Spect.	3.59	K0	4.63	G0	4.26	F8	2.64	K0	
U.T.	R.A.		R.A.		R.A.		R.A.		
	h m	Dec.	h m	Dec.	h m	Dec.	h m	Dec.	
	20 44	+61 46	20 44	+57 31	20 45	-25 19	20 45	+33 54	
1	-8.4	57.332 -289	66.85 -221	57.517 -238	48.51 -224	14.300 +2	32.81 +19	36.658 -96	61.80 -198
1	1.6	57.106 -226	64.25 -260	57.334 -183	45.89 -262	14.302 +33	32.48 +33	36.598 -60	59.56 -224
1	11.6	56.947 -159	61.29 -296	57.210 -124	42.94 -296	14.341 +39	32.05 +43	36.575 -23	57.09 -247
1	21.5	56.868 -79	58.10 -319	57.156 -54	39.76 -318	14.419 +78	31.51 +54	36.595 +20	54.50 -259
1	31.5	56.868 +0	54.83 -327	57.170 +14	36.51 -325	14.527 +108	30.86 +65	36.655 +60	51.91 -259
2	10.5	56.949 +81	51.55 -328	57.254 +84	33.27 -324	14.671 +144	30.05 +81	36.755 +100	49.37 -254
2	20.4	57.114 +165	48.43 -312	57.411 +157	30.19 -308	14.850 +179	29.13 +92	36.899 +144	47.04 -233
3	2.4	57.354 +240	45.60 -283	57.632 +221	27.41 -278	15.057 +207	28.13 +100	37.079 +180	45.01 -203
3	12.4	57.668 +314	43.13 -247	57.918 +286	25.00 -241	15.294 +237	27.01 +112	37.298 +219	43.32 -169
3	22.4	58.048 +380	41.17 -196	58.260 +342	23.09 -191	15.558 +264	25.79 +122	37.551 +253	42.11 -121
4	1.3	58.478 +430	39.76 -141	58.647 +387	21.74 -135	15.845 +287	24.50 +129	37.833 +282	41.40 -71
4	11.3	58.952 +474	38.95 -81	59.074 +427	20.98 -76	16.155 +310	23.14 +136	38.141 +308	41.21 -19
4	21.3	59.455 +503	38.80 -15	59.527 +453	20.87 -11	16.482 +327	21.75 +139	38.467 +326	41.58 +37
5	1.3	59.968 +513	39.27 +47	59.990 +463	21.37 +50	16.820 +338	20.37 +138	38.805 +338	42.46 +88
5	11.2	60.485 +517	40.35 +108	60.457 +467	22.48 +111	17.168 +348	19.02 +135	39.149 +344	43.84 +138
5	21.2	60.984 +499	42.04 +169	60.910 +453	24.18 +170	17.516 +348	17.76 +126	39.488 +339	45.68 +184
5	31.2	61.452 +468	44.21 +217	61.337 +427	26.35 +217	17.856 +340	16.61 +115	39.814 +326	47.90 +222
6	10.1	61.881 +429	46.85 +264	61.731 +394	26.35 +263	18.185 +329	15.60 +101	40.122 +308	50.45 +255
6	20.1	62.253 +372	49.87 +302	62.074 +343	31.97 +299	18.489 +304	14.79 +81	40.400 +278	53.25 +280
6	30.1	62.562 +309	53.15 +328	62.363 +289	35.22 +325	18.766 +277	14.17 +62	40.644 +244	56.20 +295
7	10.1	62.801 +239	56.66 +351	62.590 +227	38.68 +346	19.006 +240	13.77 +40	40.847 +203	59.27 +307
7	20.0	62.959 +158	60.29 +363	62.745 +155	42.25 +357	19.203 +197	13.59 +18	41.003 +156	62.35 +308
7	30.0	63.039 -80	63.94 +365	62.832 +87	45.82 +357	19.356 +153	13.63 -4	41.111 +108	65.37 +302
8	9.0	63.037 -82	67.56 +362	62.844 +12	49.36 +354	19.458 +102	13.86 -23	41.168 +57	68.30 +293
8	19.0	62.953 -84	71.04 +348	62.783 -61	52.74 +338	19.509 +51	14.27 -41	41.173 +5	71.02 +272
8	28.9	62.795 -158	74.33 +329	62.656 -127	55.93 +319	19.513 +4	14.82 -55	41.132 -41	73.53 +251
9	7.9	62.565 -230	77.37 +230	62.464 -192	58.86 +293	19.470 -43	15.48 -66	41.045 -87	75.77 +224
9	17.9	62.272 -293	80.05 +268	62.215 -249	61.44 +258	19.386 -84	16.20 -72	40.918 -127	77.68 +191
9	27.8	61.929 -343	82.37 +232	61.922 -293	63.65 +221	19.270 -116	16.92 -72	40.761 -157	79.25 +157
10	7.8	61.540 -389	84.26 +189	61.589 -333	65.43 +178	19.128 -142	17.63 -71	40.577 -184	80.44 +119
10	17.8	61.124 -416	85.65 +139	61.232 -357	66.71 +128	18.972 -156	18.28 -65	40.379 -198	81.21 +77
10	27.8	60.691 -433	86.54 +89	60.862 -370	67.50 +79	18.812 -160	18.82 -54	40.176 -203	81.58 +37
11	6.7	60.252 -439	86.88 +34	60.486 -376	67.74 +24	18.655 -157	19.25 -43	39.972 -204	81.51 -7
11	16.7	59.827 -425	86.64 -24	60.124 -362	67.42 -32	18.515 -140	19.54 -29	39.782 -190	80.99 -52
11	26.7	59.423 -404	85.85 -79	59.783 -341	66.57 -85	18.396 -119	19.69 -15	39.610 -172	80.06 -93
12	6.7	59.052 -371	84.49 -136	59.472 -311	65.16 -141	18.305 -91	19.70 -1	39.462 -148	78.70 -136
12	16.6	58.732 -320	82.62 -187	59.206 -266	63.24 -192	18.249 -56	19.56 +14	39.346 -116	76.97 -173
12	26.6	58.466 -266	80.30 -232	58.989 -217	60.89 -235	18.229 -20	19.29 +27	39.263 -83	74.92 -205
12	36.6	58.266 -200	77.55 -275	58.829 -160	58.14 -275	18.246 +17	18.90 +39	39.219 -44	72.59 -233
		-124	-302	-93	-302	+56	+51	-4	-248
Mean Place	61.011	70.20	61.040	51.79	17.898	12.29	39.887	69.26	
sec $\delta$ , tan $\delta$	+2.115	+1.864	+1.863	+1.572	+1.106	-0.473	+1.205	+0.672	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.024	+0.26	+0.030	+0.26	+0.071	+0.26	+0.048	+0.26	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.082	-0.75	-0.069	-0.75	+0.021	-0.75	-0.030	-0.75	
Dble. Trans.	August 2		August 2		August 3		August 3		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1544		1541		781		1543	
	Groombridge 3285 (Cygni)		γ Delphini* f.		ε Aquarii		3 Aquarii	
Mag. Spect.	6.43	K0	4.49	G5	3.83	A0	4.60	M0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	20 45	+ 52 56	20 45	+ 16 04	20 46	- 9 32	20 46	- 5 04
1 -8.4	54 296 <sup>s</sup> - 197	40.98 -221	58 713 <sup>s</sup> - 56	19 47 <sup>"</sup> -152	53 398 <sup>s</sup> - 34	61 82 <sup>"</sup> - 52	58 218 <sup>s</sup> - 36	55 77 <sup>"</sup> - 72
1 1.6	54 147 - 149	38.41 -257	58 689 - 24	17.80 -167	53 397 - 1	62.32 - 50	58 214 - 4	55 61 - 72
1 11.6	54 051 - 96	35.51 -310	58 697 + 8	15.99 -181	53 428 + 31	62.79 - 47	58 242 + 28	57.23 - 72
1 21.5	54 017 - 34	32.41 -310	58 741 + 44	14.15 -184	53 494 + 66	63.18 - 39	58 304 + 62	57.90 - 67
1 31.5	54 041 + 24	29.25 -316	58 818 + 77	12.35 -180	53 588 + 94	63.47 - 29	58 396 + 92	58.47 - 57
2 10.5	54 126 + 85	26.10 -315	58 928 + 110	10.64 -171	53 714 + 126	63.71 - 24	58 518 + 122	58.97 - 50
2 20.4	54 276 + 150	23.13 -297	59 072 + 144	09.13 -151	53 873 + 159	63.76 - 5	58 673 + 155	59.28 - 31
3 2.4	54 481 + 205	20.45 -268	59 247 + 175	07.89 -124	54 059 + 186	63.62 + 14	58 855 + 182	59.39 - 11
3 12.4	54 743 + 262	18.13 -232	59 451 + 204	06.95 - 94	54 272 + 213	63.27 + 35	59 064 + 209	59.28 + 11
3 22.4	55 056 + 313	16.33 -180	59 685 + 234	06.41 - 54	54 512 + 240	62.71 + 56	59 300 + 236	58.91 + 37
4 1.3	55 408 + 352	15.07 -126	59 942 + 257	06.28 - 13	54 773 + 261	61.93 + 78	59 557 + 257	58.29 + 62
4 11.3	55 796 + 388	14.39 - 68	60 222 + 280	06.55 + 27	55 057 + 284	60.94 + 99	59 837 + 280	57.42 + 87
4 21.3	56 209 + 413	14.36 - 3	60 520 + 298	07.27 + 72	55 357 + 300	59.75 +119	59 837 + 296	57.42 +112
5 1.3	56 632 + 423	14.92 + 56	60 828 + 308	08.37 +110	55 669 + 312	58.41 +134	60 441 + 308	55.00 +130
5 11.2	57 060 + 428	16.08 +116	61 144 + 316	09.84 +147	55 989 + 320	56.95 +146	60 757 + 316	53.52 +148
5 21.2	57 477 + 417	17.81 +173	61 457 + 313	11.63 +179	56 310 + 321	55.40 +155	61 074 + 317	51.91 +161
5 31.2	57 873 + 396	20.00 +219	61 762 + 305	13.66 +203	56 624 + 314	53.84 +156	61 383 + 309	50.25 +166
6 10.1	58 240 + 367	22.63 +263	62 053 + 291	15.91 +225	56 926 + 302	52.28 +156	61 682 + 299	48.55 +170
6 20.1	58 564 + 324	25.61 +298	62 320 + 267	18.28 +237	57 207 + 281	50.79 +149	61 958 + 276	46.89 +166
6 30.1	58 839 + 275	28.83 +322	62 558 + 238	20.70 +242	57 461 + 254	49.41 +138	62 207 + 249	45.30 +159
7 10.1	59 059 + 220	32.25 +342	62 762 + 204	23.15 +245	57 682 + 221	48.15 +126	62 424 + 217	43.82 +148
7 20.0	59 214 + 155	35.76 +351	62 924 + 162	25.53 +238	57 863 + 181	47.07 +108	62 601 + 177	42.49 +133
7 30.0	59 307 + 93	39.27 +351	63 043 + 119	27.79 +226	58 002 + 139	46.17 + 90	62 737 + 136	41.33 +116
8 9.0	59 334 + 27	42.73 +346	63 117 + 74	29.92 +213	58 096 + 94	45.46 + 71	62 828 + 91	40.36 + 97
8 19.0	59 294 - 40	46.04 +331	63 144 + 27	31.84 +192	58 142 + 46	44.94 + 52	62 872 + 44	39.58 + 78
8 28.9	59 194 - 100	49.14 +310	63 129 - 15	33.54 +170	58 146 + 4	44.61 + 33	62 873 + 1	39.00 + 58
9 7.9	59 035 - 159	51.98 +284	63 072 - 57	35.00 +146	58 106 - 40	44.44 + 17	62 833 - 40	38.60 + 40
9 17.9	58 825 - 210	54.47 +249	62 979 - 93	36.18 +118	58 106 - 76	44.44 + 0	62 756 - 77	38.38 + 22
9 27.8	58 574 - 251	56 59 +212	62 859 - 120	37.09 + 91	58 030 - 105	44.44 - 11	62 756 - 104	38.31 + 7
10 7.8	58 287 - 287	58 29 +170	62 715 - 144	37.71 + 62	57 925 - 128	44.55 - 23	62 652 - 128	38.40 - 9
10 17.8	57 979 - 308	59 50 +121	62 559 - 156	38.02 + 31	57 656 - 141	45.10 - 32	62 383 - 141	38.61 - 21
10 27.8	57 660 - 319	60 23 + 73	62 399 - 160	38.04 + 2	57 511 - 145	45.47 - 37	62 239 - 144	38.92 - 31
11 6.7	57 337 - 323	60 42 + 19	62 241 - 158	37.76 - 28	57 369 - 142	45.91 - 44	62 098 - 141	39.34 - 42
11 16.7	57 027 - 310	60 42 - 35	62 241 - 145	37.76 - 58	57 369 - 127	45.91 - 46	62 098 - 127	39.34 - 49
11 26.7	56 736 - 291	59 20 - 87	62 096 - 127	36.33 - 85	57 242 - 108	46.37 - 48	61 971 - 109	39.83 - 57
12 6.7	56 473 - 263	57 79 -141	61 866 - 103	35.20 -113	57 050 - 84	47.36 - 51	61 778 - 84	41.03 - 63
12 16.6	56 252 - 171	55 89 -190	61 792 - 74	33.84 -136	56 998 - 52	47.86 - 50	61 724 - 54	41.70 - 67
12 26.6	56 073 - 229	53 58 -231	61 749 - 43	32.29 -155	56 976 - 22	48.35 - 49	61 701 + 9	42.40 - 70
12 36.6	55 945 - 128	50 88 -270	61 738 - 11	30.57 -172	56 988 + 12	48.83 - 48	61 710 + 9	43.11 - 71
	55 945 - 69	50 88 -295	61 738 + 25	30.57 -178	56 988 + 47	48.83 - 41	61 710 + 44	43.11 - 67
Mean Place	57.705	44.89	61.913	30.46	56.761	44.71	61.535	39.73
sec δ, tan δ	+1.660	+1.324	+1.041	+0.288	+1.014	-0.168	+1.004	-0.089
da(ψ), dδ(ψ)	+0.035	+0.26	+0.055	+0.26	+0.064	+0.26	+0.063	+0.26
da(ε), dδ(ε)	-0.058	-0.75	-0.013	-0.75	+0.007	-0.75	+0.004	-0.75
Dble. Trans.	August 3		August 3		August 3,		August 3	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1542		1545		1546		1547		
	ι Microscopii		B.D. -1° 4057 (Aquarii)		ω Capricorni		μ Aquarii		
Mag. Spect.	5.14	F0	6.53	M3	4.24	M0	4.80	A3	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ′	h m	° ′	h m	° ′	h m	° ′	
	20 47	- 44 02	20 48	- 0 36	20 50	- 26 58	20 51	- 9 02	
1	-8.4	30.373 - 63	42.59 +107	32.332 - 40	64.19 - 90	57.488 - 41	34.31 + 27	52.257 - 38	21.50 - 54
1	1.6	30.358 - 15	41.28 +131	32.325 - 7	65.12 - 93	57.484 - 4	33.91 + 40	52.252 - 5	22.02 - 52
1	11.6	30.390 + 32	39.77 +151	32.348 + 23	66.08 - 96	57.516 + 32	33.37 + 54	52.278 + 26	22.51 - 49
1	21.5	30.471 + 81	38.09 +168	32.405 + 57	67.00 - 92	57.587 + 71	32.72 + 65	52.338 + 60	22.92 - 41
1	31.5	30.597 + 126	36.29 +180	32.492 + 87	67.85 - 85	57.689 + 102	31.96 + 76	52.428 + 90	23.22 - 30
2	10.5	30.767 + 170	34.38 +191	32.610 + 118	68.60 - 75	57.827 + 138	31.03 + 93	52.547 + 119	23.48 - 26
2	20.4	30.981 + 214	32.42 +196	32.759 + 149	69.18 - 58	58.001 + 174	29.99 +104	52.701 + 154	23.54 - 6
3	2.4	31.231 + 250	30.46 +196	32.937 + 178	69.53 - 35	58.204 + 203	28.86 +113	52.882 + 181	23.42 + 12
3	12.4	31.519 + 288	28.49 +197	33.142 + 205	69.64 - 11	58.438 + 234	27.63 +123	53.090 + 208	23.08 + 34
3	22.4	31.841 + 322	26.58 +191	33.374 + 232	69.46 + 18	58.700 + 262	26.31 +132	53.326 + 236	22.52 + 56
4	1.3	32.191 + 350	24.74 +184	33.628 + 254	69.00 + 46	58.986 + 286	24.92 +139	53.583 + 257	21.74 + 78
4	11.3	32.568 + 377	23.02 +172	33.905 + 277	68.25 + 75	59.296 + 310	23.48 +144	53.864 + 281	20.75 + 99
4	21.3	32.967 + 399	21.45 +157	34.198 + 293	67.21 +104	59.625 + 329	22.02 +146	54.162 + 298	19.55 +120
5	1.3	33.379 + 412	20.06 +139	34.503 + 305	65.94 +127	59.966 + 341	20.59 +143	54.472 + 310	18.20 +135
5	11.2	33.802 + 423	18.89 +117	34.817 + 314	64.44 +150	60.318 + 352	19.20 +139	54.792 + 320	16.72 +148
5	21.2	34.224 + 422	17.98 + 91	35.130 + 313	62.78 +166	60.671 + 353	17.91 +129	55.113 + 321	15.15 +157
5	31.2	34.637 + 413	17.34 + 64	35.437 + 307	61.02 +176	61.018 + 347	16.76 +115	55.428 + 315	13.55 +160
6	10.1	35.036 + 399	16.99 + 35	35.733 + 296	59.19 +183	61.354 + 336	15.76 +100	55.732 + 304	11.95 +160
6	20.1	35.406 + 370	16.97 + 2	36.006 + 273	57.35 +184	61.667 + 313	14.97 + 79	56.015 + 283	10.42 +153
6	30.1	35.741 + 335	17.23 - 26	36.253 + 247	55.57 +178	61.951 + 284	14.39 + 58	56.272 + 257	09.00 +142
7	10.1	36.034 + 293	17.80 - 57	36.468 + 215	53.86 +171	62.201 + 250	14.03 + 36	56.497 + 225	07.70 +130
7	20.0	36.273 + 239	18.65 - 85	36.642 + 174	52.29 +157	62.407 + 206	13.92 + 11	56.681 + 184	06.57 +113
7	30.0	36.458 + 185	19.73 -108	36.776 + 134	50.87 +142	62.568 + 161	14.02 - 10	56.825 + 144	05.62 + 95
8	9.0	36.581 + 123	21.02 -129	36.865 + 89	49.63 +124	62.679 + 111	14.33 - 31	56.923 + 98	04.87 + 75
8	19.0	36.641 + 60	22.45 -143	36.908 + 43	48.60 +103	62.737 + 58	14.82 - 49	56.974 + 51	04.31 + 56
8	28.9	36.643 + 2	23.96 -151	36.909 + 1	47.76 + 84	62.748 + 11	15.45 - 63	56.982 + 8	03.94 + 37
9	7.9	36.585 - 58	25.50 -154	36.868 - 41	47.13 + 63	62.710 - 38	16.19 - 74	56.947 - 35	03.74 + 20
9	17.9	36.476 -109	26.98 -148	36.791 - 77	46.70 + 43	62.631 - 79	16.99 - 80	56.874 - 73	03.71 + 3
9	27.8	36.325 -151	28.34 -136	36.686 -105	46.45 + 25	62.518 -113	17.79 - 80	56.773 -101	03.81 - 10
10	7.8	36.140 -185	29.53 -119	36.558 -128	46.38 + 7	62.378 -140	18.57 - 78	56.647 -126	04.03 - 22
10	17.8	35.934 -206	30.47 - 94	36.417 -141	46.48 - 10	62.222 -156	19.27 - 70	56.509 -138	04.34 - 31
10	27.8	35.721 -213	31.14 - 67	36.273 -144	46.72 - 24	62.061 -161	19.85 - 58	56.365 -144	04.71 - 37
11	6.7	35.510 -211	31.50 - 36	36.131 -142	47.12 - 40	61.901 -160	20.31 - 46	56.224 -141	05.14 - 43
11	16.7	35.317 -193	31.52 - 2	36.003 -128	47.64 - 52	61.757 -144	20.60 - 29	56.096 -128	05.62 - 48
11	26.7	35.149 -168	31.22 + 30	35.893 -110	48.27 - 63	61.633 -124	20.74 - 14	55.987 -109	06.11 - 49
12	6.7	35.016 -133	30.60 + 62	35.806 - 87	49.02 - 75	61.537 - 96	20.71 + 3	55.901 - 86	06.63 - 52
12	16.6	34.927 - 89	29.67 + 93	35.749 - 57	49.84 - 82	61.475 - 62	20.52 + 19	55.846 - 55	07.15 - 51
12	26.6	34.881 + 3	28.49 +118	35.722 + 5	50.73 - 89	61.448 + 10	20.18 + 34	55.820 + 34	07.66 - 52
12	36.6	34.884 + 53	27.07 +142	35.727 + 38	51.66 - 93	61.458 + 49	19.70 + 48	55.828 + 8	08.15 - 49
Mean Place	34.470	18.29	35.605	49.13	61.078	13.04	55.591	04.32	
sec δ, tan δ	+1.391	-0.967	+1.000	-0.011	+1.122	-0.509	+1.013	-0.159	
dα(ψ), dδ(ψ)	+0.080	+0.27	+0.061	+0.27	+0.071	+0.27	+0.064	+0.27	
dα(ε), dδ(ε)	+0.043	-0.74	+0.000	-0.74	+0.023	-0.73	+0.007	-0.73	
Dble.Trans.	August 3		August 3		August 4		August 4		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	785		786		788		1548		
	β Indi		32 Vulpeculae		ν Cygni		64 G. Capricorni		
Mag. Spect.	3.72	K0	5.24	K5	4.04	A0	5.95	A3	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup> <sup>''</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup> <sup>''</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup> <sup>''</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup> <sup>''</sup>	
	20 53	- 58 30	20 53	+ 27 59	20 56	+ 41 06	20 56	- 16 05	
1 <sup>d</sup>	-8.4								
1	40.960 <sup>s</sup> -130	48.15 <sup>"</sup> +168	55.912 <sup>s</sup> - 86	72.64 <sup>"</sup> -179	36.943 <sup>s</sup> -134	47.77 <sup>"</sup> -199	51.980 <sup>s</sup> - 41	21.91 <sup>"</sup> - 24	
1	40.895 - 65	46.16 +199	55.859 - 53	70.61 -203	36.847 - 96	45.45 -232	51.973 - 7	22.07 - 16	
1	40.894 - 1	43.91 +225	55.841 - 18	68.38 -223	36.791 - 56	42.85 -260	51.997 + 24	22.16 - 9	
1	21.5	40.965 + 71	41.45 +246	55.861 + 20	66.05 -233	36.781 - 10	40.08 -277	52.058 + 61	22.13 + 3
1	31.5	41.100 +135	38.87 +258	55.917 + 56	63.71 -234	36.816 + 35	37.27 -281	52.153 + 95	21.70 + 43
2	10.5	41.297 +197	36.20 +267	56.011 + 94	61.43 -228	36.897 + 81	34.47 -280	52.264 + 111	21.79 - 9
2	20.5	41.558 +261	33.53 +267	56.144 +133	59.35 -208	37.026 +129	31.85 -262	52.420 +156	21.40 + 39
3	2.4	41.872 +314	30.90 +263	56.312 +168	57.53 -182	37.199 +173	31.85 -235	52.603 +183	20.85 + 55
3	12.4	42.239 +367	28.35 +255	56.515 +203	56.06 -147	37.416 +217	29.50 -200	52.603 +211	20.85 + 72
3	22.4	42.654 +415	25.96 +239	56.752 +237	55.02 -104	37.674 +258	27.50 -152	52.814 +239	20.13 + 89
4	1.3	43.108 +454	23.75 +221	57.016 +264	54.44 - 58	37.965 +291	24.96 -102	53.315 +262	18.19 +105
4	11.3	43.600 +492	21.77 +198	57.307 +291	54.35 - 9	38.288 +323	24.48 -262	53.601 +286	16.98 +121
4	21.3	44.120 +520	20.07 +170	57.617 +310	54.78 + 43	38.633 +345	24.60 + 12	53.906 +305	15.64 +134
5	1.3	44.658 +538	18.67 +140	57.940 +323	55.69 + 91	38.991 +358	25.27 + 67	54.224 +318	14.22 +142
5	11.2	45.210 +552	17.61 +106	58.271 +331	57.05 +136	39.358 +367	26.48 +121	54.553 +329	12.73 +149
5	21.2	45.761 +551	16.93 + 68	58.600 +329	58.85 +180	39.721 +363	28.21 +173	54.884 +331	11.23 +150
5	31.2	46.300 +539	16.62 + 31	58.919 +319	60.98 +213	40.071 +350	30.35 +214	55.210 +286	09.76 +147
6	10.2	46.820 +520	16.70 - 8	59.224 +305	63.41 +243	40.402 +331	32.89 +254	55.526 +316	08.36 +140
6	20.1	47.302 +482	17.19 - 49	59.502 +278	66.07 +266	40.701 +299	35.74 +285	55.821 +295	07.09 +127
6	30.1	47.739 +437	18.04 - 85	59.749 +247	68.85 +278	40.964 +263	38.79 +305	56.090 +269	05.96 +113
7	10.1	48.120 +381	19.24 -120	59.959 +210	71.73 +288	41.183 +219	42.01 +322	56.327 +237	05.00 + 96
7	20.0	48.430 +310	20.77 -153	60.124 +165	74.61 +288	41.351 +168	45.28 +327	56.524 +197	04.24 + 76
7	30.0	48.669 +239	22.54 -177	60.245 +121	77.41 +280	41.468 +117	48.53 +325	56.678 +154	03.69 + 55
8	9.0	48.826 +157	24.52 -198	60.318 + 73	80.12 +271	41.531 + 63	51.73 +320	56.786 +108	03.33 + 36
8	19.0	48.899 + 73	26.63 -211	60.340 + 22	82.63 +251	41.537 + 6	54.75 +302	56.846 + 60	03.18 + 15
8	28.9	48.892 - 7	28.78 -215	60.319 - 21	84.93 +230	41.493 - 44	57.57 +282	56.861 + 15	03.20 - 2
9	7.9	48.805 - 87	30.90 -192	60.252 - 67	86.97 +204	41.398 - 95	60.14 +257	56.831 - 30	03.38 - 18
9	17.9	48.805 -159	30.90 -219	60.252 -105	86.97 +173	41.398 -137	60.14 +224	56.831 - 69	03.38 - 31
9	27.9	48.646 -217	32.89 -179	60.147 -135	88.70 +142	41.261 -173	62.38 +189	56.762 - 99	03.69 - 39
9	27.9	48.429 -269	34.68 -151	60.012 -161	90.12 +107	41.088 -203	64.27 +150	56.663 -126	04.08 - 46
10	7.8	48.160 -300	36.19 -114	59.851 -176	91.19 + 68	40.885 -221	65.77 +106	56.537 -140	04.54 - 48
10	17.8	47.860 -316	37.33 - 74	59.675 -182	91.87 + 32	40.664 -230	66.83 + 62	56.397 -146	05.02 - 48
10	27.8	47.544 -318	38.07 - 31	59.493 -183	92.19 - 8	40.434 -234	67.45 + 14	56.251 -145	05.50 - 48
11	6.7	47.226 -299	38.38 + 17	59.310 -171	92.11 - 48	40.200 -223	67.59 - 35	56.106 -131	05.98 - 42
11	16.7	46.927 -268	38.21 + 61	59.139 -155	91.63 - 85	39.977 -207	67.24 - 80	55.975 -114	06.40 - 38
11	26.7	46.659 -225	37.60 +106	58.984 -134	90.78 -124	39.770 -185	66.44 -130	55.861 - 89	06.78 - 32
12	6.7	46.434 -166	36.54 +146	58.850 -103	89.54 -156	39.585 -152	65.14 -171	55.772 - 59	07.10 - 26
12	16.6	46.268 -108	35.08 +181	58.747 - 73	87.98 -185	39.433 -119	63.43 -208	55.713 - 28	07.36 - 18
12	26.6	46.160 - 42	33.27 +213	58.674 - 39	86.13 -210	39.314 - 80	61.35 -243	55.685 + 5	07.54 - 12
12	36.6	46.118 + 29	31.14 +236	58.635 - 1	84.03 -225	39.234 - 35	58.92 -264	55.690 + 40	07.66 - 1
Mean Place	45.781	21.15	59.089	81.05	40.182	53.46	55.367	02.82	
sec δ, tan δ	+1.914	-1.632	+1.133	+0.532	+1.327	+0.873	+1.041	-0.288	
da(ψ), dδ(ψ)	+0.093	+0.27	+0.051	+0.27	+0.045	+0.28	+0.067	+0.28	
da(ε), dδ(ε)	+0.075	-0.73	-0.024	-0.73	-0.041	-0.72	+0.013	-0.72	
Dble. Trans.	August 5		August 5		August 5		August 5		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1549		1551		789		1550		
	33 Vulpeculae		59 Cygni*		11 Aquarii		γ Microscopii		
Mag.Spect.	5.57	K5	4.88	B0p	6.26	G0	4.71	G5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	20 57	+22 15	20 59	+47 27	20 59	- 4 46	21 00	- 32 18	
1	-8.4	36.967 - 75	74.13 - 162	18.682 - 169	60.06 - 203	47.952 - 44	74.79 - 71	24.309 - 54	63.09 + 49
1	1.6	36.924 - 43	72.30 - 183	18.554 - 128	57.68 - 238	47.938 - 14	75.51 - 72	24.293 - 16	62.42 + 67
1	11.6	36.912 - 12	70.31 - 199	18.469 - 85	54.97 - 271	47.954 + 16	76.22 - 71	24.314 + 21	61.59 + 83
1	21.5	36.937 + 25	68.23 - 208	18.437 + 19	52.06 - 291	48.004 + 50	76.87 - 65	24.376 + 62	60.59 + 100
1	31.5	36.996 + 59	66.16 - 207	18.456 + 19	49.07 - 299	48.083 + 79	77.43 - 56	24.473 + 97	59.46 + 113
2	10.5	37.090 + 94	64.17 - 199	18.527 + 71	46.08 - 299	48.192 + 109	77.90 - 47	24.606 + 133	58.19 + 127
2	20.5	37.220 + 130	62.36 - 181	18.654 + 127	43.25 - 283	48.333 + 141	78.21 - 31	24.777 + 171	56.80 + 139
3	2.4	37.383 + 163	60.81 - 155	18.831 + 177	40.69 - 256	48.503 + 170	78.31 - 10	24.980 + 203	55.34 + 146
3	12.4	37.579 + 196	59.58 - 123	19.058 + 227	38.47 - 222	48.701 + 198	78.18 + 13	25.215 + 235	53.79 + 155
3	22.4	37.808 + 229	58.76 - 82	19.333 + 275	36.73 - 174	48.927 + 226	77.79 + 39	25.482 + 267	52.19 + 160
4	1.3	38.062 + 254	58.37 - 39	19.645 + 312	35.51 - 122	49.177 + 250	77.15 + 64	25.775 + 293	50.57 + 162
4	11.3	38.343 + 281	58.44 + 7	19.993 + 348	34.84 - 67	49.450 + 273	76.26 + 89	26.094 + 319	48.93 + 164
4	21.3	38.643 + 300	58.98 + 54	20.366 + 373	34.79 - 5	49.742 + 292	75.13 + 113	26.434 + 340	47.34 + 159
5	1.3	38.956 + 313	59.96 + 98	20.753 + 387	35.32 + 3	50.047 + 305	73.79 + 134	26.788 + 354	45.81 + 153
5	11.2	39.279 + 323	61.36 + 140	21.149 + 396	36.43 + 111	50.363 + 316	72.28 + 151	27.156 + 368	44.38 + 143
5	21.2	39.601 + 322	63.14 + 178	21.540 + 391	38.09 + 166	50.681 + 318	70.64 + 164	27.526 + 370	43.11 + 127
5	31.2	39.915 + 314	65.21 + 207	21.916 + 376	40.20 + 211	50.995 + 314	68.93 + 171	27.891 + 365	42.01 + 110
6	10.2	40.216 + 301	67.55 + 234	22.270 + 354	42.74 + 254	51.298 + 303	67.19 + 174	28.245 + 354	41.12 + 89
6	20.1	40.492 + 276	70.08 + 253	22.589 + 319	45.62 + 288	51.581 + 283	65.48 + 171	28.578 + 333	40.48 + 64
6	30.1	40.740 + 248	72.70 + 262	22.866 + 277	48.74 + 312	51.840 + 259	63.84 + 164	28.882 + 304	40.09 + 39
7	10.1	40.954 + 214	75.39 + 269	23.096 + 230	52.07 + 333	52.067 + 227	62.30 + 154	29.151 + 269	39.96 + 13
7	20.0	41.124 + 170	78.05 + 266	23.270 + 174	55.48 + 341	52.254 + 187	60.92 + 138	29.375 + 224	40.10 - 14
7	30.0	41.252 + 128	80.63 + 258	23.388 + 118	58.89 + 341	52.401 + 147	59.71 + 121	29.552 + 177	40.47 - 37
8	9.0	41.333 + 81	83.09 + 246	23.446 + 58	62.27 + 338	52.504 + 103	58.68 + 103	29.678 + 126	41.07 - 60
8	19.0	41.366 + 33	85.36 + 227	23.442 - 4	65.50 + 323	52.560 + 56	57.87 + 81	29.748 + 70	41.85 - 78
8	28.9	41.356 - 10	87.41 + 205	23.384 - 58	68.54 + 304	52.574 + 14	57.24 + 63	29.768 + 20	42.77 - 92
9	7.9	41.302 - 54	89.22 + 181	23.271 - 113	71.34 + 280	52.544 - 30	56.81 + 43	29.766 - 32	43.80 - 103
9	17.9	41.211 - 91	90.73 + 151	23.110 - 161	73.79 + 245	52.478 - 66	56.58 + 23	29.736 - 76	44.86 - 106
9	27.9	41.090 - 121	91.95 + 122	22.911 - 199	75.91 + 212	52.382 - 96	56.49 + 9	29.660 - 113	45.89 - 103
10	7.8	40.944 - 146	92.85 + 90	22.678 - 233	77.62 + 171	52.262 - 120	56.57 - 8	29.403 - 144	46.87 - 98
10	17.8	40.783 - 161	93.40 + 55	22.423 - 255	78.86 + 124	52.127 - 135	56.77 - 20	29.241 - 162	47.72 - 85
10	27.8	40.616 - 167	93.62 + 22	22.157 - 266	79.65 + 79	51.986 - 141	57.08 - 31	29.070 - 171	48.42 - 70
11	6.7	40.448 - 168	93.49 - 13	21.885 - 272	79.93 + 28	51.846 - 140	57.50 - 42	28.900 - 170	48.93 - 51
11	16.7	40.292 - 156	93.01 - 48	21.623 - 262	79.68 - 25	51.718 - 128	57.00 - 50	28.743 - 157	48.93 - 28
11	26.7	40.151 - 141	92.20 - 81	21.376 - 247	78.95 - 73	51.607 - 111	58.56 - 56	28.606 - 137	49.28 - 7
12	6.7	40.031 - 120	91.06 - 114	21.152 - 224	77.69 - 126	51.517 - 90	59.19 - 63	28.496 - 110	49.12 + 16
12	16.6	39.939 - 92	89.63 - 143	20.963 - 189	75.96 - 173	51.456 - 61	59.86 - 67	28.421 - 75	48.74 + 38
12	26.6	39.877 - 62	87.96 - 167	20.809 - 154	73.83 - 213	51.424 - 32	60.55 - 69	28.381 - 40	48.17 + 57
12	36.6	39.846 + 31	86.07 - 189	20.699 - 110	71.32 - 251	51.422 - 2	61.25 - 70	28.379 - 2	47.41 + 76
		+ 5	- 200	- 61	- 276	+ 32	- 66	+ 39	+ 93
Mean Place	40.128	83.83	21.988	64.55	51.210	58.46	27.941	40.12	
sec δ, tan δ	+1.081	+0.410	+1.479	+1.090	+1.003	-0.084	+1.183	-0.632	
dα(w), dδ(w)	+0.053	+0.28	+0.041	+0.28	+0.063	+0.28	+0.073	+0.28	
dα(ε), dδ(ε)	-0.019	-0.71	-0.051	-0.71	+0.004	-0.71	+0.030	-0.71	
Dble.Trans.	August 6		August 6		August 6		August 6		

AT UPPER TRANSIT AT GREENWICH

No.	790		787		792		1552	
	ζ Microscopii		α Octantis		ξ Cygni		γ Capricorni	
Mag. Spect.	5.35	F0	5.24	F2	3.92	K5	4.19	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 21 02	<sup>o</sup> <sup>'</sup> -38 41	<sup>h</sup> <sup>m</sup> 21 02	<sup>o</sup> <sup>'</sup> -77 04	<sup>h</sup> <sup>m</sup> 21 04	<sup>o</sup> <sup>'</sup> +43 51	<sup>h</sup> <sup>m</sup> 21 05	<sup>o</sup> <sup>'</sup> -17 17
1 -8.4	02.605 <sup>s</sup> - 66	29.98 <sup>"</sup> + 76	58.872 <sup>s</sup> - 478	64.21 <sup>"</sup> +230	23.114 <sup>s</sup> - 153	80.06 <sup>"</sup> -195	08.032 <sup>s</sup> - 46	32.87 <sup>"</sup> - 19
1 1.6	02.580 - 25	28.99 + 99	58.544 - 328	61.54 +267	23.000 - 114	77.77 -229	08.017 - 15	32.97 - 10
1 11.6	02.596 + 16	27.80 +119	58.369 - 175	58.54 +300	22.925 - 75	75.17 -260	08.034 + 17	32.98 - 10
1 21.5	02.656 + 60	26.42 +138	58.368 - 1	55.32 +322	22.899 - 26	72.37 -280	08.087 + 53	32.88 + 1
1 31.5	02.756 + 100	24.91 +151	58.528 + 160	51.97 +335	22.918 + 19	69.50 -287	08.181 + .94	32.67 + 21
2 10.5	02.895 + 139	23.26 +165	58.846 + 318	48.56 +341	22.986 + 68	66.63 -287	08.278 + 97	32.36 + 31
2 20.5	03.075 + 180	21.51 +175	59.323 + 477	45.19 +337	23.106 + 120	63.91 -272	08.426 + 148	31.85 + 51
3 2.4	03.290 + 215	19.71 +180	59.935 + 612	41.94 +325	23.272 + 166	61.46 -245	08.602 + 176	31.20 + 65
3 12.4	03.540 + 250	17.87 +184	60.679 + 744	38.85 +309	23.485 + 213	59.33 -213	08.807 + 205	30.39 + 81
3 22.4	03.824 + 284	16.01 +186	61.541 + 862	36.02 +283	23.743 + 258	57.68 -165	09.041 + 234	29.41 + 98
4 1.4	04.136 + 312	14.18 +183	62.494 + 953	33.49 +253	24.037 + 294	56.52 -116	09.299 + 258	28.27 +114
4 11.3	04.477 + 341	12.40 +178	63.536 +1042	31.29 +220	24.365 + 328	55.91 - 61	09.582 + 283	26.99 +128
4 21.3	04.840 + 363	10.72 +168	64.641 +1105	29.52 +177	24.719 + 354	55.90 - 1	09.886 + 304	25.59 +140
5 1.3	05.219 + 379	09.17 +155	65.783 +1142	28.16 +136	25.088 + 369	56.45 + 55	10.204 + 318	24.12 +147
5 11.2	05.611 + 392	07.78 +139	66.954 +1171	27.25 + 91	25.467 + 379	57.56 +111	10.534 + 330	22.59 +153
5 21.2	06.006 + 395	06.61 +117	68.119 +1165	26.84 + 41	25.843 + 376	59.21 +165	10.867 + 333	21.06 +153
5 31.2	06.396 + 390	05.66 + 95	69.256 +1137	26.90 - 6	26.207 + 364	61.30 +209	11.197 + 330	19.57 +149
6 10.2	06.775 + 379	04.98 + 68	70.347 +1091	27.44 - 54	26.552 + 345	63.80 +250	11.518 + 321	18.17 +140
6 20.1	07.130 + 355	04.59 + 39	71.354 +1007	28.47 -103	26.864 + 312	66.63 +283	11.820 + 302	16.89 +128
6 30.1	07.455 + 325	04.48 + 11	72.261 + 907	29.91 -144	27.140 + 276	69.69 +306	12.096 + 276	15.78 +111
7 10.1	07.743 + 288	04.67 - 19	73.047 + 786	31.77 -186	27.371 + 231	72.94 +325	12.342 + 246	14.84 + 94
7 20.1	07.983 + 240	05.15 - 48	73.680 - 633	33.97 -220	27.550 + 179	76.28 +334	12.546 + 204	14.12 + 72
7 30.0	08.173 + 190	05.87 - 72	74.156 + 476	36.43 -246	27.676 + 126	79.61 +333	12.710 + 164	13.61 + 51
8 9.0	08.308 + 135	06.83 - 96	74.455 + 299	39.10 -267	27.746 + 70	82.91 +330	12.827 + 117	13.31 + 30
8 19.0	08.383 + 75	07.97 -114	74.566 + 111	41.87 -277	27.757 + 11	86.05 +314	12.895 + 68	13.22 + 9
8 28.9	08.404 + 21	09.23 -126	74.501 - 65	44.64 -277	27.717 - 40	89.00 +295	12.918 + 23	13.30 - 8
9 7.9	08.369 - 35	10.57 -134	74.252 - 249	47.32 -268	27.624 - 93	91.72 +272	12.896 - 22	13.54 - 24
9 17.9	08.285 - 84	10.57 -133	74.252 - 417	47.32 -247	27.624 - 140	91.72 +238	12.896 - 62	13.54 - 37
9 27.9	08.162 - 123	11.90 -128	73.835 - 557	49.79 -218	27.484 - 175	94.10 +205	12.834 - 94	13.91 - 46
10 7.8	08.162 - 158	13.18 -117	73.278 - 686	51.97 -179	27.309 - 209	96.15 +166	12.740 - 121	14.37 - 52
10 17.8	08.004 - 179	14.35 - 98	72.592 - 773	53.76 -131	27.100 - 229	97.81 +120	12.619 - 137	14.89 - 54
10 27.8	07.825 - 189	15.33 - 76	71.819 - 825	55.07 - 79	26.871 - 241	99.01 + 77	12.482 - 145	15.43 - 53
11 6.7	07.636 - 189	16.09 - 52	70.994 - 851	55.86 - 22	26.630 - 246	99.78 + 28	12.337 - 145	15.96 - 50
11 16.7	07.447 - 176	16.61 - 22	70.143 - 824	56.08 + 38	26.384 - 238	100.06 - 23	12.192 - 133	16.46 - 44
11 26.7	07.271 - 155	16.83 + 6	69.319 - 770	55.70 + 95	26.146 - 224	99.83 - 70	12.059 - 116	16.90 - 38
12 6.7	06.990 - 126	16.77 + 34	68.549 - 686	54.75 +152	25.922 - 203	99.13 -121	11.943 - 94	17.28 - 31
12 16.6	06.990 - 89	16.43 + 63	67.863 - 562	53.23 +203	25.719 - 171	97.92 -165	11.849 - 64	17.59 - 22
12 26.6	06.901 - 51	15.80 + 86	67.301 - 428	51.20 +245	25.548 - 137	96.27 -204	11.785 - 35	17.81 - 14
12 36.6	06.850 - 9	14.94 +110	66.873 - 276	48.75 +285	25.411 - 99	94.23 -242	11.750 - 2	17.95 - 4
	06.841 + 35	13.84 +129	66.597 - 107	45.90 +311	25.312 - 53	91.81 -265	11.748 + 33	17.99 + 6
Mean Place	06.378	05.66	67.024	34.91	26.367	85.08	11.387	13.17
sec δ, tan δ	+1.281	-0.801	+4.471	-4.358	+1.387	+0.961	+1.047	-0.311
da(ψ), dδ(ψ)	+0.076	+0.28	+0.142	+0.29	+0.043	+0.29	+0.067	+0.29
da(ε), dδ(ε)	+0.038	-0.70	+0.208	-0.70	-0.046	-0.69	+0.015	-0.69
Dble. Trans.	August 7		August 7		August 7		August 8	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	795		1553		793		791		
	Bradley 2777 (Cephei)		B.D. -0° 4161 (Aquarii)		61 Cygni A*		A Capricorni		
Mag.Spect.	5.90	B9	7.10	K2	5.57	K5	4.60	M0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	
	21 05	+ 78 03	21 05	- 0 09	21 06	+ 38 40	21 06	- 25 03	
<sup>d</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	
1	-8.4	41.410 - 890	78.12 -179	48.690 - 51	49.80 - 87	14.164 - 117	49.23 -181	16.967 - 52	58.96 + 14
1	1.6	40.649 - 761	75.85 -227	48.669 - 21	50.71 - 91	14.082 - 82	47.11 -212	16.950 - 17	58.67 + 29
1	11.6	40.033 - 616	73.14 -433	48.677 + 8	51.65 - 94	14.038 - 44	44.72 -239	16.967 + 17	58.24 + 43
1	21.5	39.600 - 433	70.09 -305	48.718 + 41	52.55 - 90	14.037 - 1	42.15 -257	17.020 + 53	57.68 + 56
1	31.5	39.353 - 247	66.86 -323	48.788 + 70	53.37 - 82	14.078 + 41	39.55 -260	17.106 + 86	57.02 + 66
2	10.5	39.302 - 51	63.51 -335	48.887 + 99	54.10 - 73	14.163 + 85	36.95 -260	17.223 + 117	56.17 + 85
2	20.5	39.462 + 160	60.22 -329	49.020 + 133	54.66 - 56	14.294 + 131	34.53 -242	17.377 + 154	55.18 + 99
3	2.4	39.810 + 348	57.12 -310	49.180 + 160	55.01 - 35	14.467 + 173	32.37 -216	17.561 + 184	54.08 + 110
3	12.4	40.343 + 533	54.30 -282	49.371 + 191	55.11 - 10	14.683 + 216	30.54 -183	17.776 + 215	52.86 + 122
3	22.4	41.045 + 702	51.91 -239	49.590 + 219	54.92 + 19	14.939 + 256	29.18 -136	18.021 + 245	51.52 + 134
4	1.4	41.877 + 832	50.01 -190	49.833 + 243	54.45 + 47	15.228 + 289	28.30 - 88	18.291 + 270	50.10 + 142
4	11.3	42.822 + 945	48.67 -134	50.100 + 267	53.69 + 76	15.549 + 321	27.95 - 35	18.587 + 296	48.60 + 150
4	21.3	43.842 +1020	47.97 - 7	50.388 + 288	52.63 +106	15.893 + 344	28.18 + 23	18.905 + 318	47.06 + 154
5	1.3	44.894 +1052	47.88 - 9	50.690 + 302	51.34 +129	16.251 + 358	28.95 + 77	19.237 + 332	45.52 + 154
5	11.2	45.959 +1065	48.42 + 54	51.003 + 313	49.82 +152	16.620 + 369	30.25 +130	19.583 + 346	44.00 + 152
5	21.2	46.988 +1029	49.58 +116	51.319 + 316	48.13 +169	16.986 + 366	32.05 +180	19.932 + 349	42.57 + 143
5	31.2	47.953 + 965	51.28 +170	51.631 + 312	46.33 +180	17.342 + 356	34.26 +221	20.277 + 345	41.25 + 132
6	10.2	48.833 + 880	53.50 +222	51.934 + 303	44.44 +189	17.681 + 339	36.85 +259	20.614 + 337	40.07 + 118
6	20.1	49.590 + 757	56.17 +267	52.217 + 283	42.55 +189	17.990 + 309	39.74 +289	20.931 + 317	39.10 + 97
6	30.1	50.213 + 623	59.18 +301	52.475 + 258	40.70 +185	18.265 + 275	42.83 +309	21.222 + 291	38.33 + 77
7	10.1	50.686 + 473	62.51 +333	52.703 + 228	38.92 +178	18.500 + 235	46.08 +325	21.480 + 258	37.79 + 54
7	20.1	50.986 + 300	66.03 +352	52.892 + 189	37.28 +164	18.685 + 185	49.38 +330	21.697 + 217	37.49 + 30
7	30.0	51.122 + 136	69.66 +363	53.041 + 149	35.79 +149	18.821 + 136	52.66 +328	21.870 + 173	37.43 + 6
8	9.0	51.083 - 39	73.37 +371	53.146 + 105	34.48 +131	18.904 + 83	55.88 +322	21.994 + 124	37.58 - 15
8	19.0	50.866 - 217	77.02 +365	53.205 + 59	33.38 +110	18.932 + 28	58.93 +305	22.067 + 73	37.95 - 37
8	28.9	50.493 - 373	80.55 +353	53.222 + 17	32.48 + 90	18.912 - 20	61.79 +286	22.093 + 26	38.47 - 52
9	7.9	49.957 - 536	83.92 +337	53.196 - 26	31.78 + 70	18.842 - 70	64.39 +260	22.071 - 22	39.13 - 66
9	17.9	49.277 - 680	87.01 +309	53.133 - 63	31.30 + 48	18.729 - 113	66.67 +228	22.006 - 65	39.88 - 75
9	27.9	48.478 - 799	89.79 +278	53.040 - 93	31.01 + 29	18.583 - 146	68.61 +194	22.006 - 99	40.66 - 78
10	7.8	47.563 - 915	92.19 +240	52.922 - 118	30.90 + 11	18.406 - 177	70.18 +157	21.778 - 129	41.44 - 78
10	17.8	46.565 - 998	94.13 +194	52.790 - 132	30.97 - 7	18.210 - 196	71.31 +113	21.632 - 146	42.17 - 73
10	27.8	45.508 -1057	95.59 +146	52.650 - 140	31.19 - 22	18.005 - 205	72.02 + 71	21.478 - 154	42.82 - 65
11	6.8	44.407 -1101	96.52 + 93	52.511 - 139	31.56 - 37	17.796 - 209	72.27 + 25	21.323 - 155	43.36 - 54
11	16.7	43.306 -1101	96.85 + 33	52.381 - 130	32.06 - 50	17.596 - 200	72.05 - 22	21.180 - 143	43.75 - 39
11	26.7	42.223 -1083	96.62 - 23	52.268 - 113	32.67 - 61	17.411 - 185	71.39 - 66	21.055 - 125	43.99 - 24
12	6.7	41.186 -1037	95.78 - 84	52.174 - 94	33.39 - 72	17.246 - 165	70.26 -113	20.953 - 102	44.09 - 10
12	16.6	40.238 - 948	94.36 -142	52.108 - 66	34.19 - 80	17.111 - 135	68.72 -154	20.883 - 70	44.01 + 8
12	26.6	39.395 - 843	92.43 -193	52.068 - 40	35.06 - 87	17.008 - 103	66.83 -189	20.844 - 39	43.80 + 21
12	36.6	38.688 - 707	89.99 -244	52.059 - 9	35.97 - 91	16.942 - 66	64.61 -222	20.840 - 4	43.43 + 37
		- 538	-282	+ 23	- 89	- 25	-244	+ 33	+ 50
Mean Place	46.748	78.81	51.889	34.42	17.567	57.14	20.420	37.32	
sec $\delta$ , tan $\delta$	+4.838	+4.734	+1.000	-0.003	+1.281	+0.801	+1.104	-0.468	
$d\alpha(\psi)$ , $d\delta(\psi)$	-0.025	+0.29	+0.061	+0.29	+0.047	+0.29	+0.070	+0.29	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.229	-0.69	+0.000	-0.69	-0.039	-0.69	+0.023	-0.69	
Dble.Trans.	August 8		August 8		August 8		August 8		



AT UPPER TRANSIT AT GREENWICH

No.	794		1555		1554		797	
	v Aquarii		γ Equulei		ο Pavonis		ζ Cygni	
Mag. Spect.	4.52	K0	4.76	F0p	5.08	M0	3.40	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	21 08	- 11 25	21 09	+ 10 04	21 11	- 70 10	21 12	+ 30 09
1 <sup>d</sup> -8.4	48 309 <sup>s</sup> - 49	55.23 <sup>"</sup> - 43	38.013 <sup>s</sup> - 62	23.29 <sup>"</sup> - 121	59.700 <sup>s</sup> - 297	86.29 <sup>"</sup> + 200	18.540 <sup>s</sup> - 103	68.50 <sup>"</sup> - 170
1 1.6	48 292 - 17	55.62 - 39	37 980 - 33	21.96 - 133	59.497 - 203	83.92 + 237	18.468 - 72	66.55 - 195
1 11.6	48 304 + 12	55.95 - 33	37 975 - 5	20.54 - 142	59.391 - 106	81.22 + 270	18.428 - 40	64.36 - 219
1 21.5	48 349 + 45	56.19 - 24	38.004 + 29	19.09 - 145	59.396 + 5	78.25 + 297	18.426 - 2	62.03 - 233
1 31.5	48 426 + 77	56.28 - 9	38.063 + 59	17.69 - 140	59.503 + 107	75.14 + 311	18.460 + 34	59.67 - 236
2 10.5	48 525 + 99	56.34 - 6	38.152 + 89	16.37 - 132	59.710 + 207	71.93 + 321	18.532 + 72	57.34 - 233
2 20.5	48 665 + 140	56.22 + 12	38.275 + 123	15.22 - 115	60.021 + 311	68.71 + 322	18.644 + 112	55.16 - 218
3 2.4	48 832 + 167	55.90 + 32	38.428 + 153	15.22 - 92	60.419 + 398	65.56 + 315	18.644 + 150	55.16 - 192
3 12.4	49 028 + 196	55.38 + 52	38.612 + 184	14.30 - 64	60.904 + 485	62.51 + 305	18.794 + 187	53.24 - 161
3 22.4	49 252 + 224	54.65 + 73	38.827 + 215	13.37 - 29	61.469 + 565	59.68 + 283	18.981 + 224	51.63 - 118
4 1.4	49 501 + 249	53.73 + 92	39.067 + 240	13.42 + 5	62.098 + 629	57.09 + 259	19.460 + 255	49.71 - 74
4 11.3	49 775 + 274	52.60 + 113	39.333 + 266	13.85 + 43	62.790 + 692	54.78 + 231	19.745 + 285	49.46 - 25
4 21.3	50.069 + 294	51.30 + 130	39.619 + 296	14.65 + 80	63.530 + 740	52.83 + 195	20.053 + 308	49.74 + 28
5 1.3	50.378 + 309	49.86 + 144	39.920 + 301	15.79 + 114	64.300 + 770	51.26 + 157	20.377 + 324	50.50 + 76
5 11.2	50.699 + 321	48.31 + 155	40.233 + 313	17.25 + 146	65.097 + 797	50.10 + 116	20.713 + 336	51.74 + 124
5 21.2	51.025 + 326	46.70 + 161	40.549 + 316	18.98 + 173	65.896 + 799	49.41 + 69	21.050 + 337	53.43 + 169
5 31.2	51.347 + 322	45.08 + 162	40.860 + 311	20.92 + 194	66.683 + 787	49.15 + 26	21.380 + 330	55.48 + 205
6 10.2	51.661 + 314	43.48 + 160	41.162 + 302	23.03 + 211	67.445 + 762	49.36 - 21	21.698 + 318	57.87 + 239
6 20.1	51.956 + 295	41.97 + 151	41.443 + 281	25.23 + 220	68.156 + 711	50.04 - 68	21.992 + 294	60.51 + 264
6 30.1	52.227 + 271	40.58 + 139	41.700 + 257	27.47 + 224	68.805 + 649	51.14 - 110	22.255 + 263	63.31 + 280
7 10.1	52.467 + 240	39.33 + 125	41.925 + 225	29.69 + 222	69.376 + 571	52.66 - 152	22.484 + 229	66.24 + 293
7 20.1	52.668 + 201	38.27 + 106	42.111 + 186	31.84 + 215	69.846 + 470	54.54 - 188	22.668 + 184	69.19 + 295
7 30.0	52.829 + 161	37.41 + 86	42.258 + 147	33.87 + 203	70.213 + 367	56.70 - 216	22.808 + 140	72.10 + 291
8 9.0	52.945 + 116	36.75 + 66	42.359 + 101	35.75 + 188	70.463 + 250	59.11 - 241	22.899 + 91	74.94 + 284
8 19.0	53.014 + 69	36.30 + 45	42.415 + 56	37.42 + 167	70.585 + 122	61.65 - 254	22.939 + 40	77.60 + 266
8 28.9	53.038 + 24	36.04 + 26	42.428 + 13	38.89 + 147	70.589 + 4	64.23 - 258	22.934 - 5	80.06 + 246
9 7.9	53.019 - 19	35.96 + 8	42.399 - 29	40.14 + 125	70.469 - 120	66.79 - 256	22.883 - 51	82.29 + 223
9 17.9	52.961 - 58	36.05 - 9	42.333 - 66	41.12 + 98	70.235 - 234	69.18 - 239	22.792 - 91	84.21 + 192
9 27.9	52.871 - 90	36.25 - 20	42.237 - 96	41.88 + 76	69.906 - 329	71.33 - 215	22.668 - 124	85.83 + 162
10 7.8	52.755 - 116	36.57 - 32	42.115 - 122	42.37 + 49	69.489 - 417	73.17 - 184	22.515 - 153	87.10 + 127
10 17.8	52.623 - 132	36.96 - 39	41.978 - 137	42.61 + 24	69.013 - 476	74.57 - 140	22.344 - 171	87.98 + 88
10 27.8	52.484 - 139	37.40 - 44	41.834 - 144	42.62 + 1	68.499 - 514	75.50 - 93	22.164 - 180	88.49 + 51
11 6.8	52.344 - 140	37.87 - 47	41.688 - 146	42.38 - 24	67.967 - 532	75.92 - 42	21.980 - 184	88.60 + 11
11 16.7	52.214 - 130	37.87 - 48	41.688 - 137	41.91 - 47	67.451 - 516	75.76 + 16	21.803 - 177	88.60 - 31
11 26.7	52.101 - 113	38.82 - 47	41.429 - 122	41.22 - 69	66.968 - 483	75.08 + 68	21.640 - 163	87.60 - 69
12 6.7	52.008 - 93	39.29 - 47	41.326 - 103	40.31 - 91	66.538 - 430	73.85 + 123	21.494 - 146	86.50 - 110
12 16.6	51.943 - 65	39.72 - 43	41.249 - 77	39.23 - 108	66.188 - 350	72.12 + 173	21.376 - 118	85.04 - 146
12 26.6	51.906 - 37	40.11 - 39	41.198 - 51	38.00 - 123	65.922 - 266	69.97 + 215	21.285 - 91	83.28 - 176
12 36.6	51.900 - 6	40.46 - 35	41.177 - 21	36.64 - 136	65.753 - 169	67.43 + 254	21.226 - 59	81.24 - 204
	+ 28	- 27	+ 10	- 140	- 62	+ 283	- 23	- 222
Mean Place	51.583	36.85	41.155	35.99	65.574	56.56	21.679	76.27
sec δ, tan δ	+1.020	-0.202	+1.016	+0.178	+2.950	-2.775	+1.157	+0.581
dα(ψ), dδ(ψ)	+0.065	+0.29	+0.058	+0.29	+0.110	+0.30	+0.051	+0.30
dα(ε), dδ(ε)	+0.010	-0.68	-0.009	-0.68	+0.138	-0.67	-0.029	-0.67
Dble. Trans.	August 9		August 9		August 9		August 9	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1556		796		800		1558	
	58 G. Microscopii		23 G. Indi		α Equulei		σ Cygni	
Mag. Spect.	5.55	K5	5.84	A5	4.14	F8, A3	4.28	A0p
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	21 12	-27 40	21 14	-53 19	21 15	+ 5 11	21 16	+39 19
1 <sup>d</sup>	25.982 <sup>s</sup> - 59	52.62 <sup>"</sup> + 23	44.107 <sup>s</sup> - 128	38.48 <sup>"</sup> + 132	05.826 <sup>s</sup> - 61	15.59 <sup>"</sup> - 103	49.911 <sup>s</sup> - 139	70.14 <sup>"</sup> - 178
1	25.958 - 24	52.21 + 41	44.032 - 75	36.84 + 164	05.794 - 32	14.47 - 112	49.805 - 106	68.03 - 211
1	25.968 + 10	51.65 + 56	44.009 - 23	34.90 + 194	05.790 - 4	13.30 - 117	49.735 - 70	65.63 - 240
1	26.016 + 48	50.93 + 72	44.044 + 35	32.72 + 218	05.818 + 28	12.13 - 117	49.707 - 28	63.02 - 261
1	26.096 + 80	50.08 + 85	44.134 + 90	30.38 + 234	05.876 + 58	11.02 - 111	49.721 + 14	60.35 - 267
2	26.209 + 113	49.06 + 102	44.278 + 144	27.89 + 249	05.963 + 87	10.00 - 102	49.778 + 57	57.66 - 269
2	26.359 + 150	47.90 + 116	44.476 + 198	25.34 + 255	06.083 + 120	09.14 - 86	49.882 + 104	55.11 - 255
3	26.540 + 181	46.63 + 127	44.722 + 246	22.78 + 256	06.232 + 149	08.51 - 63	50.030 + 148	52.80 - 231
3	26.753 + 213	45.25 + 138	45.016 + 294	20.23 + 255	06.412 + 180	08.13 - 38	50.221 + 191	50.80 - 200
3	26.997 + 244	43.76 + 149	45.356 + 340	17.77 + 246	06.623 + 211	08.07 - 6	50.456 + 235	49.24 - 156
4	27.268 + 271	42.21 + 155	45.733 + 377	15.44 + 233	06.859 + 236	08.32 + 25	50.726 + 270	48.15 - 109
4	27.567 + 299	40.60 + 161	46.149 + 416	13.26 + 218	07.121 + 262	08.91 + 59	51.030 + 304	47.58 - 57
4	27.887 + 320	38.98 + 162	46.595 + 446	11.32 + 194	07.404 + 283	09.84 + 93	51.361 + 331	47.58 + 0
5	28.225 + 338	37.37 + 161	47.063 + 468	09.62 + 170	07.703 + 299	11.05 + 121	51.709 + 348	48.12 + 54
5	28.576 + 351	35.82 + 155	47.549 + 486	08.22 + 140	08.015 + 312	12.55 + 150	52.071 + 362	49.20 + 108
5	28.932 + 356	34.38 + 144	48.041 + 492	07.16 + 106	08.330 + 315	14.27 + 172	52.433 + 362	50.79 + 159
5	29.286 + 354	33.07 + 131	48.528 + 487	06.44 + 72	08.643 + 313	16.16 + 189	52.787 + 354	52.80 + 201
6	29.632 + 346	31.94 + 113	49.004 + 476	06.10 + 34	08.947 + 304	18.17 + 201	53.127 + 340	55.21 + 241
6	29.958 + 326	31.02 + 92	49.452 + 448	06.15 - 5	09.233 + 286	20.24 + 207	53.439 + 312	57.95 + 274
6	30.260 + 302	30.33 + 69	49.864 + 412	06.57 - 42	09.495 + 262	22.31 + 207	53.719 + 280	60.90 + 295
7	30.528 + 268	29.89 + 44	50.232 + 368	07.36 - 79	09.726 + 231	24.35 + 204	53.959 + 240	64.04 + 314
7	30.755 + 227	29.71 + 18	50.540 + 308	08.50 - 114	09.920 + 194	26.27 + 192	54.150 + 191	67.25 + 321
7	30.938 + 183	29.77 - 6	50.787 + 247	09.91 - 141	10.074 + 154	28.07 + 180	54.294 + 144	70.47 + 322
8	31.071 + 133	30.06 - 29	50.964 + 177	11.59 - 168	10.184 + 110	29.70 + 163	54.384 + 90	73.64 + 317
8	31.153 + 82	30.57 - 51	51.067 + 103	13.45 - 186	10.248 + 64	31.12 + 142	54.420 + 36	76.68 + 304
8	31.185 + 32	31.24 - 67	51.099 + 32	15.41 - 196	10.270 + 22	32.34 + 122	54.405 - 15	79.53 + 285
9	31.169 - 16	32.04 - 80	51.059 - 40	17.42 - 201	10.250 - 20	33.34 + 100	54.341 - 64	82.16 + 263
9	31.108 - 61	32.92 - 88	50.953 - 106	19.36 - 194	10.192 - 58	34.10 + 76	54.232 - 109	84.47 + 231
9	31.011 - 97	33.83 - 91	50.793 - 160	21.17 - 181	10.104 - 88	34.65 + 55	54.087 - 145	86.47 + 200
10	30.884 - 127	34.73 - 90	50.583 - 210	22.77 - 160	09.989 - 115	34.98 + 33	53.910 - 177	88.10 + 163
10	30.737 - 147	35.55 - 82	50.342 - 241	24.07 - 130	09.859 - 130	35.08 + 10	53.712 - 198	89.30 + 120
10	30.581 - 156	36.27 - 72	50.082 - 260	25.04 - 97	09.721 - 138	34.99 - 9	53.501 - 211	90.09 + 79
11	30.422 - 159	36.85 - 58	49.814 - 268	25.61 - 57	09.580 - 141	34.70 - 29	53.284 - 217	90.41 + 32
11	30.274 - 148	37.26 - 41	49.558 - 256	25.76 - 15	09.448 - 132	34.23 - 47	53.072 - 212	90.26 - 15
11	30.143 - 131	37.49 - 23	49.324 - 234	25.49 + 27	09.330 - 118	33.59 - 64	52.872 - 200	89.67 - 59
12	30.035 - 108	37.53 - 4	49.122 - 202	24.79 + 70	09.230 - 100	32.79 - 80	52.690 - 182	88.60 - 107
12	29.958 - 77	37.38 + 15	48.965 - 157	23.68 + 111	09.156 - 74	31.85 - 94	52.535 - 155	87.10 - 150
12	29.912 - 46	37.07 + 31	48.855 - 110	22.22 + 146	09.106 - 50	30.81 - 104	52.410 - 125	85.23 - 187
12	29.901 - 11	36.57 + 50	48.799 - 56	20.43 + 179	09.086 - 20	29.69 - 112	52.319 - 91	83.01 - 222
	29.901 + 27	36.57 + 65	48.799 + 1	20.43 + 205	09.086 + 10	29.69 - 115	52.319 - 51	83.01 - 246
Mean Place	29.437	30.11	48.294	10.63	08.963	29.68	53.094	75.81
sec δ, tan δ	+1.129	-0.524	+1.674	-1.343	+1.004	+0.091	+1.293	+0.820
da(ψ), dδ(ψ)	+0.070	+0.30	+0.085	+0.30	+0.060	+0.30	+0.047	+0.30
da(ε), dδ(ε)	+0.026	-0.67	+0.067	-0.66	-0.005	-0.66	-0.041	-0.65
Dble. Trans.	August 9		August 10		August 10		August 11	

APPARENT PLACES OF STARS, 1986

329

AT UPPER TRANSIT AT GREENWICH

No.	1557		801		1559		803	
Name	24 G. Indi		ε Microscopii		υ Cygni		α Cephei	
Mag. Spect.	6.70	K0	4.79	A0	4.42	B3p	2.60	A5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	21 16	-48 46	21 17	-32 13	21 17	+34 49	21 18	+62 31
1 -8.4	53 728 <sup>s</sup> - 110	56 69 +112	03 818 <sup>s</sup> - 68	70.19 + 42	18 576 <sup>s</sup> - 122	76.46 -172	11 804 <sup>s</sup> - 334	39.65 -182
1 1.6	53 665 - 63	55 27 +142	03 787 + 31	69.57 + 62	18 487 - 89	74.44 -202	11 523 - 281	37.38 -227
1 11.6	53 649 - 16	53 57 +170	03 790 + 3	68.75 + 82	18 430 - 57	72.15 -229	11 303 - 220	34.70 -268
1 21.6	53 685 + 36	51 64 +193	03 832 + 42	67.75 +100	18 413 - 17	69.69 -246	11 158 - 145	31.71 -299
1 31.5	53 769 + 84	49 53 +211	03 910 + 78	66.61 +114	18 435 + 22	67.17 -252	11 090 - 68	28.55 -316
2 10.5	53 901 + 132	47 28 +225	04 022 + 112	65.30 +131	18 497 + 62	64.65 -252	11 102 + 12	25.29 -326
2 20.5	54 082 + 181	44 94 +234	04 172 + 150	63.85 +145	18 602 + 105	62.28 -237	11 202 + 100	22.11 -318
3 2.4	54 306 + 224	42 57 +237	04 356 + 184	62.31 +154	18 747 + 145	60.16 -212	11 382 + 180	19.14 -297
3 12.4	54 574 + 268	40 18 +239	04 573 + 217	60.67 +164	18 933 + 186	58.34 -182	11 643 + 261	16.45 -269
3 22.4	54 883 + 309	37 85 +233	04 823 + 260	58.96 +171	19 159 + 226	56.94 -140	11 979 + 336	14.20 -225
4 1.4	55 227 + 344	35 61 +224	05 101 + 278	57.22 +174	19 419 + 260	56.02 - 92	12 377 + 398	12.46 -174
4 11.3	55 607 + 380	33 48 +213	05 408 + 307	55.45 +177	19 711 + 292	55.59 - 43	12 832 + 455	11.26 -120
4 21.3	56 016 + 409	31 55 +193	05 739 + 331	53.71 +174	20 028 + 317	55.71 + 12	13 327 + 495	10.71 - 55
5 1.3	56 445 + 429	29 83 +172	06 088 + 349	52.04 +167	20 362 + 334	56.34 + 63	13 846 + 519	10.76 + 5
5 11.3	56 892 + 447	28 35 +148	06 452 + 364	50.46 +158	20 710 + 348	57.49 +115	14 380 + 534	11.43 + 67
5 21.2	57 345 + 453	27 19 +116	06 822 + 370	49.04 +142	21 059 + 349	59.12 +163	14 908 + 528	12.72 +129
5 31.2	57 795 + 450	26 33 + 86	07 190 + 368	47.79 +125	21 401 + 342	61.14 +202	15 416 + 508	14.53 +181
6 10.2	58 235 + 440	25 82 + 51	07 550 + 360	46.76 +103	21 730 + 329	63.53 +239	15 894 + 478	16.86 +233
6 20.1	58 651 + 416	25 68 - 14	07 891 + 341	45 98 + 78	22 033 + 303	66.22 +269	16 322 + 428	19.61 +275
6 30.1	59 035 + 384	25 89 - 21	08 207 + 316	45 46 + 52	22 307 + 274	69.10 +288	16 693 + 371	22.69 +308
7 10.1	59 377 + 342	26 45 - 56	08 489 + 282	45 22 + 24	22 543 + 236	72.14 +304	17 000 + 307	26.07 +338
7 20.1	59 666 + 289	27 36 - 91	08 728 + 239	45 26 - 4	22 733 + 190	75.23 +309	17 227 + 227	29.62 +355
7 30.0	59 899 + 233	28 54 -118	08 922 + 194	45 56 - 30	22 877 + 144	78.31 +308	17 379 + 152	33.26 +364
8 9.0	60 069 + 170	29 99 -145	09 065 + 143	46 11 - 55	22 971 + 94	81.33 +302	17 448 + 69	36.94 +368
8 19.0	60 170 + 101	31 63 -164	09 154 + 89	46 86 - 75	23 013 + 42	84.20 +287	17 432 - 16	40.55 +361
8 29.0	60 207 + 37	33 39 -176	09 192 + 38	47 78 - 92	23 007 - 6	86 88 +268	17 340 - 92	44.03 +348
9 7.9	60 177 - 30	35 21 -182	09 178 - 14	48 82 -104	22 953 - 54	89 34 +246	17 171 - 169	47 32 +329
9 17.9	60 088 - 89	37 01 -180	09 117 - 61	49 93 -111	22 856 - 97	91 48 +214	16 932 - 239	50 31 +299
9 27.9	59 950 - 138	38 70 -169	09 018 - 99	51 03 -110	22 725 - 131	93 31 +183	16 636 - 296	52 98 +267
10 7.8	59 767 - 183	40 22 -152	08 886 - 132	52 09 -106	22 564 - 161	94 78 +147	16 286 - 350	55 27 +229
10 17.8	59 555 - 212	41 48 -126	08 732 - 154	53 04 - 95	22 383 - 181	95 85 +107	15 898 - 388	57 08 +181
10 27.8	59 326 - 229	42 44 - 96	08 568 - 164	53 85 - 81	22 190 - 193	96 53 + 68	15 485 - 413	58 43 +135
11 6.8	59 091 - 235	43 07 - 63	08 400 - 168	54 47 - 62	21 992 - 198	96 77 + 24	15 053 - 432	59 24 + 81
11 16.7	58 866 - 225	43 29 - 22	08 241 - 159	54 86 - 39	21 800 - 192	96 56 - 21	15 053 - 429	59 24 + 23
11 26.7	58 661 - 205	43 14 + 15	08 100 - 141	55 04 - 18	21 620 - 180	95 94 - 62	14 204 - 420	59 16 - 31
12 6.7	58 485 - 176	42 60 + 54	07 981 - 119	54 97 + 7	21 456 - 164	94 87 -107	13 806 - 398	58 25 - 91
12 16.7	58 349 - 136	41 68 + 92	07 894 - 87	54 67 + 30	21 320 - 136	93 41 -146	13 447 - 359	56 79 -146
12 26.6	58 256 - 93	40 43 +125	07 840 - 54	54 16 + 51	21 211 - 109	91 61 -180	13 134 - 313	54 84 -195
12 36.6	58 210 - 46	38 87 +156	07 822 - 18	53 43 + 73	21 135 - 76	89 49 -212	12 877 - 257	52 41 -243
	+ 6	+181	+ 20	+ 91	- 38	-233	- 187	-278
Mean Place	57.680	29.50	07.318	46.34	21.727	83.11	15.494	41.36
sec δ, tan δ	+1.517	-1.141	+1.182	-0.630	+1.218	+0.696	+2.168	+1.923
dα(ψ), dδ(ψ)	+0.081	+0.30	+0.072	+0.30	+0.049	+0.30	+0.028	+0.30
dα(ε), dδ(ε)	+0.058	-0.65	+0.032	-0.65	-0.035	-0.65	-0.098	-0.65
Dble. Trans.	August 11		August 11		August 11		August 11	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1560		802		804		1561			
	Groombridge 3434* (Cygni)		9 <sup>1</sup> Microscopii		1 Pegasi		1 Capricorni			
Mag. Spect.	6.81	K2	4.92	A2p	4.27	K0	4.30	K0		
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.		
	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>		
	21 19	+ 52 59	21 19	- 40 51	21 21	+ 19 44	21 21	- 16 53		
1 <sup>d</sup> 1 <sup>s</sup>	-8.4 11.325	-225 59.29	-183 57.05	-183 50.360	-87 88.01	+77 +103	-84 24.632	-141 36.46	-57 26.535	-23 53.59
1	1.6	-183	-224	-47	86.98	+103	-56	-160	-28	-12
1	11.6	-138	-261	-8	85.70	+128	-27	-177	+2	-2
1	21.6	-82	-289	+37	84.21	+149	+6	-185	+36	+10
1	31.5	-26	-302	+77	82.54	+167	+38	-186	+69	+22
2	10.5	+34	-308	+117	80.72	+182	+71	-181	+85	+29
2	20.5	+97	-299	+160	78.77	+195	+107	-165	+133	+58
3	2.4	+157	-276	+197	76.76	+201	+139	-141	+159	+69
3	12.4	+216	-247	+235	74.70	+206	+174	-114	+190	+85
3	22.4	+274	-203	+272	72.62	+208	+208	-75	+219	+104
4	1.4	+321	-152	+304	70.57	+205	+236	-35	+245	+120
4	11.3	+365	-99	+335	68.58	+199	+265	+7	+273	+135
4	21.3	+398	-36	+362	66.69	+189	+289	+52	+295	+148
5	1.3	+419	+23	+381	64.95	+174	+306	+93	+312	+156
5	11.3	+433	+82	+399	63.38	+157	+319	+134	+327	+162
5	21.2	+432	+141	+405	62.05	+133	+323	+170	+333	+162
5	31.2	+419	+190	+403	60.98	+107	+320	+199	+333	+159
6	10.2	+398	+238	+396	60.18	+80	+310	+225	+326	+151
6	20.1	+361	+277	+374	59.71	+47	+291	+243	+308	+138
6	30.1	+319	+307	+347	59.55	+16	+265	+254	+286	+122
7	10.1	+269	+332	+311	59.71	-16	+234	+260	+257	+103
7	20.1	+208	+347	+264	60.19	-48	+194	+258	+217	+81
7	30.0	+148	+352	+215	60.94	-75	+153	+250	+178	+60
8	9.0	+83	+355	+158	61.96	-102	+108	+240	+132	+37
8	19.0	+15	+343	+99	63.19	-123	+60	+221	+83	+14
8	29.0	-45	+329	+41	64.56	-137	+17	+202	+39	-4
9	7.9	-107	+309	-16	66.04	-148	-27	+178	-8	-22
9	17.9	-162	+277	-69	67.52	-148	-65	+150	-48	-36
9	27.9	-207	+245	-112	68.97	-145	-97	+124	-81	-47
10	7.8	-248	+207	-150	70.30	-133	-125	+93	-111	-54
10	17.8	-277	+161	-176	71.45	-115	-142	+61	-129	-57
10	27.8	-296	+115	-190	72.38	-93	-152	+32	-139	-57
11	6.8	-307	+64	-195	73.03	-65	-156	-2	-142	-55
11	16.7	-304	+9	-186	73.37	-34	-150	-35	-133	-50
11	26.7	-294	-43	-168	73.41	-4	-138	-64	-119	-42
12	6.7	-275	-98	-144	73.12	+29	-121	-95	-100	-36
12	16.7	-244	-150	-109	72.51	+61	-97	-122	-74	-25
12	26.6	-208	-195	-72	71.63	+88	-73	-145	-46	-17
12	36.6	-165	-238	-33	70.47	+116	-43	-167	-15	-6
	-113	-270	-270	+12		+139	-12	-177	+17	+5
Mean Place	14.700	62.31	54.028	62.12	27.725	46.79	29.786	33.33		
sec δ, tan δ	+1.662	+1.327	+1.322	-0.865	+1.062	+0.359	+1.045	-0.304		
dα(ψ), dδ(ψ)	+0.038	+0.30	+0.076	+0.30	+0.055	+0.31	+0.066	+0.31		
dα(ε), dδ(ε)	-0.068	-0.65	+0.044	-0.64	-0.018	-0.64	+0.016	-0.64		
Dble. Trans.	August 11		August 11		August 12		August 12			

APPARENT PLACES OF STARS, 1986

331

AT UPPER TRANSIT AT GREENWICH

No.	1562		1563		805		806	
	18 Aquarii		γ Indi		γ Pavonis		ζ Capricorni	
Mag. Spect.	5.54	A5	6.24	F0	4.30	F8	3.86	G5p
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 21 23	<sup>o</sup> <sup>'</sup> - 12 56	<sup>h</sup> <sup>m</sup> 21 25	<sup>o</sup> <sup>'</sup> - 54 43	<sup>h</sup> <sup>m</sup> 21 25	<sup>o</sup> <sup>'</sup> - 65 25	<sup>h</sup> <sup>m</sup> 21 25	<sup>o</sup> <sup>'</sup> - 22 28
1 <sup>-8.4</sup>	24.091 <sup>s</sup> - 57	30.91 <sup>o</sup> - 38	13.994 <sup>s</sup> - 148	38.48 <sup>o</sup> +130	15.550 <sup>s</sup> - 244	71.91 <sup>o</sup> +175	50.621 <sup>s</sup> - 64	34.92 <sup>o</sup> - 1
1 <sup>1.6</sup>	24.062 - 29	31.22 - 31	13.897 - 97	36.83 +165	15.380 - 170	69.78 +213	50.588 - 33	34.79 + 13
1 <sup>11.6</sup>	24.061 - 1	31.45 - 23	13.853 - 44	34.86 +197	15.284 - 96	67.30 +248	50.586 - 2	34.51 + 28
1 <sup>21.6</sup>	24.093 + 32	31.58 - 13	13.869 + 16	32.63 +223	15.275 - 9	64.53 +277	50.618 + 32	34.08 + 43
1 <sup>31.5</sup>	24.157 + 64	31.57 + 1	13.940 + 71	30.21 +242	15.347 + 72	61.58 +295	50.683 + 65	33.54 + 54
2 <sup>10.5</sup>	24.236 + 79	31.43 + 14	14.066 + 126	27.63 +258	15.499 + 152	58.50 +308	50.774 + 91	32.84 + 70
2 <sup>20.5</sup>	24.366 + 130	31.22 + 21	14.250 + 184	24.96 +267	15.733 + 234	55.36 +314	50.902 + 128	31.93 + 91
3 <sup>2.4</sup>	24.520 + 154	30.76 + 46	14.484 + 234	22.28 +268	16.039 + 306	52.25 +311	51.062 + 160	30.89 +104
3 <sup>12.4</sup>	24.703 + 183	30.12 + 64	14.769 + 285	19.60 +268	16.417 + 378	49.20 +305	51.253 + 191	29.71 +118
3 <sup>22.4</sup>	24.916 + 213	29.26 + 86	15.102 + 333	17.00 +260	16.862 + 445	46.31 +289	51.475 + 222	28.39 +132
4 <sup>1.4</sup>	25.155 + 239	28.22 +104	15.476 + 374	14.53 +247	17.363 + 501	43.62 +269	51.725 + 250	26.95 +144
4 <sup>11.3</sup>	25.422 + 267	27.00 +122	15.892 + 416	12.22 +231	17.918 + 555	41.16 +246	52.003 + 278	25.40 +155
4 <sup>21.3</sup>	25.711 + 289	25.60 +140	16.341 + 449	10.14 +208	18.518 + 600	39.02 +214	52.305 + 302	23.78 +162
5 <sup>1.3</sup>	26.017 + 306	24.08 +152	16.815 + 474	08.31 +183	19.148 + 630	37.23 +179	52.625 + 320	22.12 +166
5 <sup>11.3</sup>	26.339 + 322	22.46 +162	17.311 + 496	06.79 +152	19.805 + 657	35.80 +143	52.961 + 336	20.47 +165
5 <sup>21.2</sup>	26.666 + 327	20.80 +166	17.815 + 504	05.61 +118	20.470 + 665	34.81 + 99	53.304 + 343	18.86 +161
5 <sup>31.2</sup>	26.993 + 327	19.14 +166	18.317 + 502	04.80 + 81	21.131 + 661	34.25 + 56	53.648 + 344	17.35 +151
6 <sup>10.2</sup>	27.314 + 321	17.51 +163	18.810 + 493	04.37 + 43	21.776 + 645	34.13 + 12	53.985 + 337	15.96 +139
6 <sup>20.1</sup>	27.618 + 304	15.99 +152	19.276 + 466	04.35 + 2	22.385 + 609	34.48 - 35	54.306 + 321	14.75 +121
6 <sup>30.1</sup>	27.900 + 282	14.59 +140	19.709 + 433	04.72 - 37	22.946 + 561	35.25 - 77	54.604 + 298	13.74 +101
7 <sup>10.1</sup>	28.153 + 253	13.36 +123	20.097 + 388	05.48 - 76	23.447 + 501	36.44 -119	54.873 + 269	12.96 + 78
7 <sup>20.1</sup>	28.368 + 215	12.33 +103	20.426 + 329	06.60 -112	23.868 + 421	38.02 -158	55.102 + 229	12.42 + 54
7 <sup>30.0</sup>	28.544 + 176	11.50 + 83	20.693 + 267	08.02 -142	24.206 + 338	39.90 -188	55.290 + 188	12.13 + 29
8 <sup>9.0</sup>	28.675 + 131	10.89 + 61	20.890 + 197	09.73 -171	24.448 + 242	42.06 -216	55.432 + 142	12.07 + 6
8 <sup>19.0</sup>	28.758 + 83	10.50 + 39	21.010 + 120	11.63 -190	24.587 + 139	44.39 -233	55.523 + 91	12.24 - 17
8 <sup>29.0</sup>	28.797 + 39	10.30 + 20	21.058 + 48	13.66 -203	24.627 + 40	46.81 -242	55.568 + 45	12.60 - 36
9 <sup>7.9</sup>	28.792 - 5	10.30 + 0	21.030 - 28	15.75 -209	24.565 - 62	49.25 -244	55.565 - 3	13.13 - 53
9 <sup>17.9</sup>	28.746 - 46	10.46 - 16	20.933 - 97	17.78 -203	24.408 - 157	51.58 -233	55.519 - 46	13.78 - 65
9 <sup>27.9</sup>	28.668 - 78	10.75 - 29	20.778 - 155	19.69 -191	24.107 - 238	53.72 -214	55.438 - 81	14.50 - 72
10 <sup>7.8</sup>	28.561 - 107	11.14 - 39	20.571 - 207	21.41 -172	23.858 - 312	55.60 -188	55.326 - 112	15.26 - 76
10 <sup>17.8</sup>	28.436 - 125	11.60 - 46	20.327 - 244	22.83 -142	23.494 - 364	57.08 -148	55.194 - 132	16.01 - 75
10 <sup>27.8</sup>	28.301 - 135	12.09 - 49	20.061 - 266	23.90 -107	23.096 - 398	58.15 -107	55.051 - 143	16.70 - 69
11 <sup>6.8</sup>	28.163 - 138	12.61 - 52	19.783 - 278	24.59 - 69	22.680 - 416	58.74 - 59	54.903 - 148	17.32 - 62
11 <sup>16.7</sup>	28.032 - 131	13.11 - 50	19.514 - 269	24.82 - 23	22.272 - 408	58.79 - 5	54.764 - 139	17.81 - 49
11 <sup>26.7</sup>	27.915 - 117	13.59 - 48	19.264 - 250	24.63 + 19	21.889 - 383	58.34 + 45	54.637 - 127	18.18 - 37
12 <sup>6.7</sup>	27.817 - 98	14.03 - 44	19.043 - 221	23.99 + 64	21.544 - 345	57.36 + 98	54.530 - 107	18.42 - 24
12 <sup>16.7</sup>	27.744 - 73	14.42 - 39	18.866 - 177	22.92 +107	21.260 - 284	55.88 +148	54.451 - 79	18.50 - 8
12 <sup>26.6</sup>	27.697 - 47	14.75 - 33	18.736 - 130	21.47 +145	21.040 - 220	53.97 +191	54.399 - 52	18.43 + 7
12 <sup>36.6</sup>	27.680 + 14	15.02 - 27	18.658 - 78	19.66 +181	20.896 - 144	51.67 +230	54.378 - 21	18.22 + 21
		- 16	- 19	+209	- 61	+262	+ 13	+ 36
Mean Place	27.295	11.65	18.104	09.68	20.468	41.29	53.903	13.04
sec δ, tan δ	+1.026	-0.230	+1.731	-1.413	+2.405	-2.187	+1.082	-0.414
da(ψ), dδ(ψ)	+0.065	+0.31	+0.085	+0.31	+0.097	+0.31	+0.068	+0.31
da(ε), dδ(ε)	+0.012	-0.63	+0.074	-0.62	+0.114	-0.62	+0.022	-0.62
Dble.Trans.	August 12		August 13		August 13		August 13	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1564		809		807		1565		
	2 G. Pegasi		β Cephei*		71 Cygni		2 Pegasi		
Mag.Spect.	6.66	M0	3.33	B1	5.34	K0	4.76	K5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	°	h m	°	h m	°	h m	°	
	21 27	+ 8 07	21 28	+ 70 29	21 28	+ 46 28	21 29	+ 23 34	
1	-8.4	41.848 - 70	57.98 - 108	25.240 - 528	64.70 - 159	53.781 - 183	46.67 - 170	17.110 - 95	36.08 - 144
1	1.6	41.804 - 44	56.80 - 118	24.781 - 459	62.60 - 210	53.633 - 148	44.58 - 209	17.041 - 69	34.42 - 166
1	11.6	41.787 - 17	55.54 - 126	24.401 - 380	60.05 - 255	53.522 - 111	42.13 - 245	17.001 - 40	32.55 - 187
1	21.6	41.800 + 13	54.26 - 128	24.125 - 276	57.13 - 292	53.458 - 64	39.44 - 269	16.994 - 7	30.57 - 198
1	31.5	41.843 + 43	53.02 - 124	23.955 - 170	53.99 - 314	53.440 - 18	36.61 - 283	17.019 + 25	28.56 - 201
2	10.5	41.916 + 73	51.86 - 116	23.900 - 55	50.70 - 329	53.472 + 32	33.73 - 288	17.078 + 59	26.58 - 198
2	20.5	42.021 + 105	50.87 - 99	23.969 + 69	47.43 - 327	53.559 + 87	30.94 - 279	17.175 + 97	24.75 - 183
3	2.4	42.156 + 135	50.08 - 79	24.155 + 186	44.31 - 312	53.696 + 137	28.36 - 258	17.306 + 131	23.14 - 161
3	12.4	42.324 + 168	49.56 - 52	24.456 + 301	41.43 - 288	53.885 + 189	26.07 - 229	17.473 + 167	21.81 - 133
3	22.4	42.523 + 199	49.36 - 20	24.868 + 412	38.96 - 247	54.124 + 239	24.20 - 187	17.675 + 202	20.86 - 95
4	1.4	42.750 + 227	49.49 + 13	25.368 + 500	36.96 - 200	54.406 + 282	22.81 - 139	17.909 + 234	20.32 - 54
4	11.3	43.005 + 255	49.96 + 47	25.950 + 582	35.48 - 148	54.728 + 322	21.94 - 87	18.174 + 265	20.22 - 10
4	21.3	43.284 + 279	50.80 + 84	26.592 + 642	34.64 - 84	55.083 + 355	21.66 + 29	18.464 + 290	20.60 + 38
5	1.3	43.579 + 295	51.96 + 116	27.269 + 677	34.40 - 24	55.459 + 376	21.95 - 28	18.772 + 308	21.41 + 81
5	11.3	43.890 + 311	53.42 + 146	27.968 + 699	34.79 + 39	55.851 + 392	22.80 + 85	19.095 + 323	22.66 + 125
5	21.2	44.206 + 316	55.14 + 172	28.662 + 694	35.81 + 102	56.245 + 394	24.22 + 142	19.424 + 329	24.31 + 165
5	31.2	44.522 + 316	57.05 + 191	29.329 + 667	37.38 + 157	56.632 + 387	26.10 + 188	19.749 + 325	26.28 + 197
6	10.2	44.831 + 309	59.13 + 208	29.957 + 628	39.49 + 211	57.004 + 372	28.44 + 234	20.067 + 318	28.55 + 227
6	20.1	45.122 + 291	61.29 + 216	30.519 + 562	42.08 + 259	57.346 + 342	31.15 + 271	20.364 + 297	31.03 + 248
6	30.1	45.391 + 269	63.48 + 219	31.006 + 487	45.02 + 294	57.653 + 307	34.13 + 298	20.637 + 273	33.65 + 262
7	10.1	45.631 + 240	65.65 + 217	31.406 + 400	48.31 + 329	57.918 + 265	37.35 + 322	20.878 + 241	36.36 + 271
7	20.1	45.834 + 203	67.74 + 209	31.702 + 296	51.82 + 351	58.131 + 213	40.70 + 335	21.079 + 201	39.09 + 273
7	30.0	45.998 + 164	69.71 + 197	31.897 + 195	55.47 + 365	58.290 + 159	44.10 + 340	21.238 + 159	41.76 + 267
8	9.0	46.118 + 120	71.53 + 182	31.984 + 87	59.21 + 374	58.393 + 103	47.50 + 340	21.352 + 114	44.35 + 259
8	19.0	46.193 + 75	73.15 + 162	31.956 - 28	62.93 + 372	58.435 + 42	50.80 + 330	21.418 + 66	46.76 + 241
8	29.0	46.225 + 32	74.57 + 142	31.827 - 129	66.55 + 362	58.422 - 13	53.95 + 315	21.439 + 21	48.98 + 222
9	7.9	46.215 - 10	75.76 + 119	31.593 - 234	70.03 + 348	58.355 - 67	56.90 + 295	21.416 - 23	50.99 + 201
9	17.9	46.166 - 49	76.71 + 95	31.263 - 330	73.25 + 322	58.237 - 118	59.54 + 264	21.353 - 63	52.70 + 171
9	27.9	46.086 - 80	77.43 + 72	30.854 - 409	76.18 + 293	58.078 - 159	61.88 + 234	21.257 - 96	54.14 + 144
10	7.8	45.978 - 108	77.91 + 48	30.366 - 488	78.75 + 257	57.882 - 196	63.84 + 196	21.133 - 124	55.27 + 113
10	17.8	45.853 - 125	78.14 + 23	29.821 - 545	80.86 + 211	57.659 - 223	65.37 + 153	20.989 - 144	56.05 + 78
10	27.8	45.718 - 135	78.17 + 3	29.234 - 587	82.52 + 166	57.419 - 240	66.47 + 110	20.833 - 156	56.52 + 47
11	6.8	45.579 - 139	77.96 - 21	28.612 - 622	83.65 + 113	57.169 - 250	67.08 + 61	20.672 - 161	56.62 + 10
11	16.7	45.445 - 134	77.54 - 42	27.984 - 628	84.19 + 54	56.920 - 249	67.18 + 10	20.516 - 156	56.37 - 25
11	26.7	45.324 - 121	76.94 - 60	27.360 - 624	84.18 - 1	56.680 - 240	66.79 - 39	20.370 - 146	55.80 - 57
12	6.7	45.217 - 107	76.13 - 81	26.756 - 604	83.55 - 63	56.455 - 225	65.88 - 91	20.238 - 132	54.87 - 93
12	16.7	45.134 - 83	75.17 - 96	26.199 - 557	82.33 - 122	56.257 - 198	64.49 - 139	20.130 - 108	53.64 - 123
12	26.6	45.075 - 59	74.08 - 109	25.697 - 502	80.58 - 175	56.088 - 169	62.67 - 182	20.045 - 85	52.15 - 149
12	36.6	45.042 - 33	72.88 - 120	25.269 - 428	78.31 - 227	55.955 - 133	60.44 - 223	19.988 - 57	50.41 - 174
		- 3	- 124	- 335	- 267	- 89	- 252	- 25	- 189
Mean Place	44.921	71.43	29.408	65.07	57.025	50.68	20.180	45.34	
sec δ, tan δ	+1.010	+0.143	+2.996	+2.824	+1.452	+1.053	+1.091	+0.436	
dα(ψ), dδ(ψ)	+0.059	+0.31	+0.015	+0.31	+0.044	+0.31	+0.054	+0.31	
dα(ε), dδ(ε)	-0.008	-0.62	-0.149	-0.61	-0.056	-0.61	-0.023	-0.61	
Dble.Trans.	August 13		August 14		August 14		August 14		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	808		1566		1567		1568	
	β Aquarii		6 Piscis Austrini		3 G. Gruis		γ Cygni	
Mag.Spect.	3.07	G0	5.99	A2	5.73	K0	4.22	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 21 30	<sup>°</sup> <sup>'</sup> — 5 37	<sup>h</sup> <sup>m</sup> 21 31	<sup>°</sup> <sup>'</sup> — 34 00	<sup>h</sup> <sup>m</sup> 21 32	<sup>°</sup> <sup>'</sup> — 44 54	<sup>h</sup> <sup>m</sup> 21 33	<sup>°</sup> <sup>'</sup> + 45 31
1 -8.4	47 830 <sup>s</sup> - 63	69.10 - 64	22.381 <sup>s</sup> - 81	41.78 + 42	27.636 <sup>s</sup> - 110	59.62 + 86	25.122 <sup>s</sup> - 180	50.59 - 166
1 1.6	47.794 - 36	69.72 - 62	22.333 - 48	41.11 + 67	27.566 - 70	58.46 +116	24.975 - 147	48.56 -203
1 11.6	47.785 - 9	70.32 - 60	22.320 - 13	40.23 + 88	27.536 - 30	57.01 +145	24.864 - 111	46.16 -240
1 21.6	47.806 + 21	70.86 - 54	22.344 + 24	39.13 +110	27.553 + 17	55.30 +171	24.797 + 67	43.51 -265
1 31.5	47.856 + 50	71.29 - 43	22.405 + 61	37.86 +127	27.613 + 60	53.40 +190	24.776 - 21	40.73 -278
2 10.5	47.934 + 78	71.59 - 30	22.500 + 95	36.42 +144	27.716 + 103	51.33 +207	24.803 + 27	37.88 -285
2 20.5	48.043 + 109	71.78 - 19	22.634 + 134	34.83 +159	27.864 + 148	49.13 +220	24.883 + 80	35.13 -275
3 2.5	48.183 + 140	71.75 + 3	22.802 + 168	33.12 +171	28.053 + 189	46.85 +228	25.013 + 130	32.57 -256
3 12.4	48.353 + 170	71.50 + 25	23.006 + 204	31.32 +180	28.283 + 230	44.52 +233	25.194 + 181	30.29 -228
3 22.4	48.555 + 202	71.00 + 50	23.245 + 239	29.44 +188	28.555 + 272	42.20 +232	25.425 + 231	28.42 -187
4 1.4	48.783 + 228	70.25 + 75	23.515 + 270	27.53 +191	28.861 + 306	39.92 +228	25.698 + 273	27.02 -140
4 11.3	49.038 + 255	69.26 + 99	23.815 + 300	25.61 +192	29.203 + 342	37.72 +220	26.013 + 315	26.13 - 89
4 21.3	49.318 + 280	68.03 +123	24.143 + 328	23.72 +189	29.576 + 373	35.66 +206	26.360 + 347	25.84 - 29
5 1.3	49.615 + 297	66.60 +143	24.491 + 348	21.91 +181	29.971 + 395	33.77 +189	26.729 + 369	26.09 + 25
5 11.3	49.928 + 313	65.01 +159	24.857 + 366	20.21 +170	30.386 + 415	32.09 +168	27.116 + 387	26.91 + 82
5 21.2	50.248 + 320	63.28 +173	25.231 + 374	18.67 +154	30.812 + 426	30.68 +141	27.507 + 391	28.29 +138
5 31.2	50.568 + 320	61.49 +179	25.607 + 376	17.34 +133	31.237 + 425	29.55 +113	27.891 + 384	30.14 +185
6 10.2	50.884 + 316	59.67 +182	25.978 + 371	16.23 +111	31.658 + 421	28.75 + 80	28.261 + 370	32.43 +229
6 20.2	51.183 + 299	57.88 +179	26.331 + 353	15.39 + 84	32.058 + 400	28.30 + 45	28.605 + 344	35.10 +267
6 30.1	51.461 + 278	56.17 +171	26.661 + 330	14.84 + 55	32.432 + 374	28.19 + 11	28.914 + 309	38.05 +295
7 10.1	51.712 + 251	54.57 +160	26.959 + 298	14.58 + 26	32.770 + 338	28.44 - 25	29.182 + 268	41.23 +318
7 20.1	51.926 + 214	53.14 +143	27.215 + 256	14.63 - 5	33.060 + 290	29.05 - 61	29.400 + 218	44.55 +332
7 30.0	52.101 + 175	51.88 +126	27.427 + 212	14.95 - 32	33.299 + 239	29.95 - 90	29.565 + 165	47.91 +336
8 9.0	52.233 + 132	50.82 +106	27.588 + 161	15.55 - 60	33.480 + 181	31.13 -118	29.675 + 110	51.29 +338
8 19.0	52.319 + 86	49.98 + 84	27.693 + 105	16.38 - 83	33.597 + 117	32.55 -142	29.725 + 50	54.57 +328
8 29.0	52.362 + 43	49.35 + 63	27.747 + 54	17.38 -100	33.655 + 58	34.12 -157	29.722 - 3	57.70 +313
9 7.9	52.362 + 0	48.92 + 43	27.748 + 1	18.53 -115	33.650 - 5	35.81 -169	29.663 - 59	60.63 +293
9 17.9	52.322 - 40	48.70 + 22	27.699 - 49	19.75 -122	33.588 - 62	37.51 -170	29.555 - 108	63.27 +264
9 27.9	52.250 - 72	48.64 + 6	27.611 - 88	20.98 -123	33.478 - 110	39.15 -164	29.407 - 148	65.61 +234
10 7.9	52.149 - 101	48.74 - 10	27.486 - 125	22.18 -120	33.325 - 153	40.69 -154	29.220 - 187	67.58 +197
10 17.8	52.030 - 119	48.97 - 23	27.337 - 149	23.26 -108	33.142 - 183	42.01 -132	29.007 - 213	69.13 +155
10 27.8	51.901 - 129	49.31 - 34	27.174 - 163	24.18 - 92	32.940 - 202	43.08 -107	28.777 - 230	70.25 +112
11 6.8	51.767 - 134	49.74 - 43	27.003 - 171	24.91 - 73	32.729 - 211	43.85 - 77	28.535 - 242	70.89 + 64
11 16.7	51.640 - 127	50.23 - 49	26.840 - 163	25.39 - 48	32.525 - 204	44.27 - 42	28.294 - 241	71.02 + 13
11 26.7	51.524 - 116	50.78 - 55	26.690 - 150	25.63 - 24	32.335 - 190	44.34 - 7	28.060 - 234	70.67 - 35
12 6.7	51.424 - 100	51.37 - 59	26.561 - 129	25.60 + 3	32.168 - 167	44.04 + 30	27.840 - 220	69.81 - 86
12 16.7	51.348 - 76	51.98 - 61	26.461 - 100	25.31 + 29	32.036 - 132	43.37 + 67	27.646 - 194	68.46 -135
12 26.6	51.295 - 53	52.59 - 61	26.392 - 69	24.78 + 53	31.940 - 96	42.38 + 99	27.479 - 167	66.70 -176
12 36.6	51.270 + 5	53.19 - 60	26.357 + 3	24.00 + 78	31.884 - 56	41.07 +131	27.347 - 132	64.52 -218
						+157	- 91	-247
Mean Place	50.941	51.69	25.788	16.81	31.277	32.21	28.338	54.55
sec δ, tan δ	+1.005	-0.099	+1.206	-0.675	+1.412	-0.997	+1.428	+1.019
da(ψ), dδ(ψ)	+0.063	+0.32	+0.072	+0.32	+0.077	+0.32	+0.045	+0.32
da(ε), dδ(ε)	+0.005	-0.61	+0.036	-0.60	+0.053	-0.60	-0.055	-0.60
Dble.Trans.	August 14		August 14		August 15		August 15	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	811		1569		1570		813										
	74 Cygni		ξ Aquarii		5 Pegasi		13 H. Cephei*										
Mag. Spect.	5.09	A5	4.78	A5	5.29	F0	5.97	Oe5									
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.									
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "									
	21 36	+40 20	21 36	- 7 54	21 37	+19 15	21 38	+57 25									
1	-8.4	21.288	-154	64.17	-159	58.942	-66	72.94	-56	04.481	-91	16.31	-129	29.006	-282	38.17	-159
1	1.6	21.164	-124	62.22	-195	58.903	-39	73.46	-52	04.416	-65	14.81	-150	28.764	-242	36.13	-204
1	11.6	21.072	-92	59.95	-227	58.890	-13	73.94	-48	04.377	-39	13.14	-167	28.569	-195	33.67	-246
1	21.6	21.021	-51	57.44	-251	58.907	+17	74.34	-40	04.370	-7	11.38	-176	28.432	-137	30.87	-280
1	31.5	21.010	-11	54.83	-261	58.953	+46	74.62	-28	04.393	+23	09.61	-177	28.357	-75	27.88	-289
2	10.5	21.042	+32	52.16	-267	59.026	+73	74.74	-12	04.448	+55	07.86	-175	28.347	-10	24.77	-311
2	20.5	21.121	+79	49.59	-257	59.128	+102	74.80	-6	04.538	+90	06.27	-159	28.410	+63	21.70	-307
3	2.5	21.246	+125	47.23	-236	59.265	+137	74.62	+18	04.662	+124	04.88	-139	28.541	+131	18.79	-291
3	12.4	21.416	+170	45.14	-209	59.431	+166	74.23	+39	04.820	+158	03.76	-112	28.742	+201	16.13	-266
3	22.4	21.633	+217	43.45	-169	59.628	+197	73.59	+64	05.013	+193	03.01	-75	29.011	+269	13.87	-226
4	1.4	21.889	+256	42.22	-123	59.853	+225	72.73	+86	05.238	+225	02.63	-38	29.336	+325	12.07	-180
4	11.3	22.183	+294	41.49	-73	60.106	+253	71.63	+110	05.493	+255	02.67	+4	29.716	+380	10.80	-127
4	21.3	22.508	+325	41.32	-17	60.384	+278	70.33	+130	05.774	+281	03.15	+48	30.139	+423	10.14	-66
5	1.3	22.854	+346	41.68	+36	60.681	+297	68.84	+149	06.075	+301	04.03	+88	30.589	+450	10.06	-8
5	11.3	23.219	+365	42.59	+91	60.995	+314	67.21	+163	06.392	+317	05.31	+128	31.060	+471	10.60	+54
5	21.2	23.588	+369	44.02	+143	61.317	+322	65.47	+174	06.715	+323	06.96	+165	31.535	+475	11.74	+114
5	31.2	23.952	+364	45.89	+187	61.640	+323	63.69	+178	07.038	+323	08.90	+194	31.999	+464	13.40	+166
6	10.2	24.306	+354	48.18	+229	61.959	+319	61.90	+179	07.355	+317	11.11	+221	32.445	+446	15.57	+217
6	20.2	24.636	+330	50.82	+264	62.264	+305	60.16	+174	07.654	+299	13.50	+239	32.855	+410	18.19	+262
6	30.1	24.935	+299	53.70	+288	62.548	+284	58.51	+165	07.930	+276	16.00	+250	33.221	+366	21.14	+295
7	10.1	25.197	+262	56.80	+310	62.805	+257	56.99	+152	08.177	+247	18.58	+258	33.535	+314	24.40	+326
7	20.1	25.412	+215	60.01	+321	63.025	+220	55.65	+134	08.385	+208	21.14	+256	33.785	+250	27.86	+346
7	30.0	25.580	+168	63.25	+324	63.208	+183	54.50	+115	08.553	+168	23.64	+250	33.970	+185	31.42	+356
8	9.0	25.695	+115	66.48	+323	63.348	+140	53.56	+94	08.678	+125	26.04	+240	34.085	+115	35.05	+363
8	19.0	25.755	+60	69.60	+312	63.441	+93	52.84	+72	08.755	+77	28.27	+223	34.126	+41	38.63	+358
8	29.0	25.764	+9	72.57	+297	63.492	+51	52.34	+50	08.789	+34	30.30	+203	34.101	-25	42.10	+347
9	7.9	25.722	-42	75.33	+276	63.498	+6	52.03	+31	08.779	-10	32.11	+181	34.007	-94	45.41	+331
9	17.9	25.634	-88	77.80	+247	63.464	-34	51.93	+10	08.729	-50	33.65	+154	33.850	-157	48.45	+304
9	27.9	25.507	-127	79.97	+217	63.397	-67	51.98	-5	08.647	-82	34.93	+128	33.641	-209	51.19	+274
10	7.9	25.346	-161	81.80	+183	63.301	-96	52.18	-20	08.535	-112	35.92	+99	33.382	-259	53.58	+239
10	17.8	25.159	-187	83.20	+140	63.185	-116	52.49	-31	08.404	-131	36.59	+67	33.087	-295	55.51	+193
10	27.8	24.957	-202	84.21	+101	63.058	-127	52.89	-40	08.261	-143	36.97	+38	32.766	-321	57.01	+150
11	6.8	24.744	-213	84.76	+55	62.926	-132	53.36	-47	08.111	-150	37.03	+6	32.425	-341	57.99	+98
11	16.7	24.533	-211	84.83	+7	62.799	-127	53.88	-52	07.965	-146	36.78	-25	32.080	-345	58.42	+43
11	26.7	24.329	-204	84.45	-38	62.682	-117	54.41	-53	07.828	-137	36.24	-54	31.740	-340	58.32	-10
12	6.7	24.138	-191	83.59	-86	62.581	-101	54.97	-56	07.704	-124	35.38	-86	31.413	-327	57.63	-69
12	16.7	23.971	-167	82.29	-130	62.503	-78	55.51	-54	07.602	-102	34.27	-111	31.115	-298	56.41	-122
12	26.6	23.829	-142	80.59	-170	62.447	-56	56.03	-52	07.522	-80	32.92	-135	30.849	-266	54.69	-172
12	36.6	23.718	-111	78.52	-207	62.418	-29	56.53	-50	07.467	-55	31.36	-156	30.626	-223	52.48	-221
			-73		-234		+1		-42		-24		-167		-169		-257
Mean Place	24.437	69.23		62.036	54.77	07.520	26.68	32.461	39.86								
sec δ, tan δ	+1.312	+0.850		+1.010	-0.139	+1.059	+0.349	+1.857	+1.565								
dα(ψ), dδ(ψ)	+0.048	+0.32		+0.063	+0.32	+0.056	+0.32	+0.037	+0.32								
dα(ε), dδ(ε)	-0.046	-0.59		+0.008	-0.58	-0.019	-0.58	-0.085	-0.58								
Dble. Trans.	August 16		August 16		August 16		August 16										



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	812		810		817		815	
	$\gamma$ Capricorni		$\nu$ Octantis		11 Cephei		$\epsilon$ Pegasi	
Mag.Spect.	3.80	F0p	3.74	K0	4.85	K0	2.54	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>
	21 39	- 16 43	21 39	- 77 26	21 41	+ 71 14	21 43	+ 9 48
1 -8.4	17 518 <sup>s</sup> - 68	46 34 - 26	54 117 <sup>s</sup> - 616	95 32 - 197	39 426 <sup>s</sup> - 568	57 41 - 140	28 376 <sup>s</sup> - 80	32 78 - 106
1 1.6	17 477 - 41	46 48 - 14	53 633 - 484	92 89 + 243	38 925 - 501	55 49 - 192	28 321 - 55	31.61 - 117
1 11.6	17 464 - 13	46 51 - 3	53 289 - 344	90 07 + 282	38 500 - 425	53 09 - 240	28 290 - 31	30.34 - 127
1 21.6	17 482 + 18	46 41 + 10	53 289 - 178	90 07 + 315	38 500 - 322	53 09 - 280	28 290 - 2	30.34 - 131
1 31.5	17 532 + 50	46 17 + 24	53 111 - 18	86 92 + 335	38 178 - 215	50 29 - 306	28 288 + 27	29.03 - 128
			53 093	83 57	37 963	47 23	28 315	27.75
2 10.5	17 610 + 78	45 95 + 22	53 233 + 140	80 07 + 350	37 864 - 99	43 99 - 324	28 370 + 55	26 54 - 121
2 20.5	17 713 + 103	45 25 + 70	53 540 + 307	76 51 + 356	37 895 + 31	40 73 - 326	28 459 + 89	25 48 - 106
3 2.5	17 854 + 141	44 50 + 75	53 993 + 453	73 01 + 350	38 047 + 152	37 58 - 315	28 578 + 119	24 62 - 86
3 12.4	18 025 + 171	43 59 + 91	54 589 + 596	69 60 + 341	38 323 + 276	34 64 - 294	28 730 + 152	24 01 - 61
3 22.4	18 229 + 204	42 49 + 110	55 322 + 733	66 38 + 322	38 716 + 393	32 07 - 257	28 916 + 186	23.73 - 28
4 1.4	18 460 + 231	41 23 + 126	56 166 + 844	63 41 + 297	39 206 + 490	29 94 - 213	29 131 + 215	23.78 + 5
4 11.3	18 720 + 260	39 81 + 142	57 119 + 953	60 73 + 268	39 786 + 580	28 32 - 162	29 377 + 246	24 17 + 39
4 21.3	19 006 + 286	38 25 + 156	58 160 + 1041	58 43 + 230	40 436 + 650	27 32 - 100	29 377 + 271	24 95 + 78
5 1.3	19 311 + 305	36 60 + 165	59 261 + 1101	56 54 + 189	41 127 + 691	26 91 - 41	29 939 + 291	26 04 + 109
5 11.3	19 635 + 324	34 89 + 171	60 417 + 1156	55 08 + 146	41 849 + 722	27 12 + 21	30 248 + 309	27 46 + 142
5 21.2	19 967 + 332	33 17 + 172	61 592 + 1175	54 12 + 96	42 572 + 723	27 97 + 85	30 565 + 317	29 16 + 170
5 31.2	20 301 + 334	31 48 + 169	62 763 + 1171	53 64 + 48	43 274 + 702	29 38 + 141	30 884 + 319	31 07 + 191
6 10.2	20 632 + 331	29 87 + 161	63 913 + 1150	53 67 - 3	43 941 + 667	31 34 + 196	31 198 + 314	33 17 + 210
6 20.2	20 949 + 317	28 39 + 148	65 002 + 1089	54 22 - 55	44 546 + 605	33 79 + 245	31 497 + 299	35 37 + 220
6 30.1	21 245 + 296	27 08 + 131	66 010 + 1008	55 23 - 101	45 077 + 531	36 63 + 284	31 775 + 278	37 62 + 225
7 10.1	21 513 + 268	25 95 + 113	66 916 + 906	56 72 - 149	45 523 + 446	39 84 + 321	32 027 + 252	39 87 + 225
7 20.1	21 746 + 233	25 05 + 90	67 681 + 785	58 62 - 190	45 865 + 342	43 30 + 346	32 242 + 215	42 06 + 219
7 30.0	21 939 + 193	24 38 + 67	68 299 + 618	60 86 - 224	46 105 + 240	46 92 + 362	32 419 + 177	44 14 + 208
8 9.0	22 088 + 149	23 95 + 43	68 748 + 449	63 39 - 253	46 233 + 128	50 66 + 374	32 554 + 135	46 08 + 194
8 19.0	22 189 + 101	23 75 + 20	69 007 + 259	66 11 - 272	46 245 + 12	54 41 + 375	32 643 + 89	47 82 + 174
8 29.0	22 245 + 56	23 76 - 1	69 086 + 79	68 91 - 280	46 151 - 94	58 10 + 369	32 690 + 47	49 37 + 155
9 7.9	22 255 + 10	23 97 - 21	68 971 - 115	71 73 - 282	45 948 - 203	61 67 + 357	32 694 + 4	50 69 + 132
9 17.9	22 223 - 32	24 33 - 36	68 673 - 298	74 42 - 269	45 643 - 305	65 00 + 333	32 658 - 36	51 77 + 108
9 27.9	22 157 - 66	24 82 - 49	68 216 - 457	76 89 - 247	45 253 - 390	68 07 + 307	32 591 - 67	52 61 + 84
10 7.9	22 059 - 98	25 39 - 57	67 605 - 611	79 05 - 216	44 779 - 474	70 81 + 274	32 494 - 97	53 20 + 59
10 17.8	21 940 - 119	26 01 - 62	66 880 - 725	80 77 - 172	44 240 - 539	73 11 + 230	32 377 - 117	53 55 + 35
10 27.8	21 810 - 130	26 63 - 62	66 073 - 807	82 02 - 125	43 652 - 588	74 96 + 185	32 248 - 129	53 67 + 12
11 6.8	21 672 - 138	27 24 - 61	65 209 - 864	82 72 - 70	43 022 - 630	76 30 + 134	32 113 - 135	53 54 - 13
11 16.7	21 540 - 132	27 79 - 55	64 340 - 869	82 81 - 9	42 378 - 644	77 06 + 76	31 980 - 133	53 20 - 34
11 26.7	21 419 - 121	28 27 - 48	63 496 - 844	82 32 + 49	41 732 - 646	77 26 + 20	31 857 - 123	52 65 - 55
12 6.7	21 314 - 105	28 67 - 40	62 707 - 789	81 22 + 110	41 099 - 633	76 84 - 42	31 746 - 111	51 89 - 76
12 16.7	21 232 - 82	28 96 - 29	62 019 - 688	79 55 + 167	40 506 - 593	75 83 - 101	31 655 - 91	50 96 - 93
12 26.6	21 175 - 57	29 16 - 20	61 444 - 575	77 40 + 215	39 965 - 541	74 27 - 156	31 585 - 70	49 88 - 108
12 36.6	21 145 + 1	29 24 + 5	61 005 - 280	74 78 + 262	39 493 - 380	72 17 - 210	31 539 - 46	48 68 - 120
Mean Place	20 661	25 59	60 930	63 17	43 658	57 25	31 383	45 84
sec $\delta$ , tan $\delta$	+1.044	-0.300	+4.602	-4.492	+3.111	+2.946	+1.015	+0.173
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.066	+0.33	+0.129	+0.33	+0.017	+0.33	+0.059	+0.33
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.016	-0.58	+0.245	-0.57	-0.162	-0.57	-0.010	-0.56
Dble.Trans.	August 16		August 16		August 17		August 17	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	814		1572		1571		818	
	ι Piscis Austrini		ν Cephei		B.D. +35° 4626 (Cygni)		λ Capricorni	
Mag. Spect.	4.35	A0	4.46	A2p	6.60	K0	5.43	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>
	21 44	-33 05	21 44	+61 02	21 45	+35 47	21 45	-11 25
1	05 458 - 89	41.46 + 33	59 994 - 334	88 83 - 148	07 032 - 139	34 96 - 147	45 494 - 70	62 51 - 45
1	05 401 - 57	40.88 + 58	59 703 - 291	86 88 - 195	06 920 - 112	33 16 - 180	45 449 - 45	62 88 - 37
1	05 376 - 25	40.07 + 81	59 462 - 241	84 47 - 241	06 837 - 83	31.05 - 211	45 429 - 20	63 18 - 30
1	05 387 + 11	39.04 + 103	59 285 - 177	81.70 - 277	06 789 - 48	28.73 - 232	45 440 + 11	63 36 - 18
1	05 432 + 45	37.82 + 122	59 175 - 110	78.71 - 299	06 779 - 10	26.31 - 242	45 479 + 39	63 42 - 6
2	05 511 + 79	36.42 + 140	59 139 - 36	75.56 - 315	06 807 + 28	23.84 - 247	45 549 + 70	63 28 + 14
2	05 628 + 117	34.85 + 157	59 185 + 46	72.43 - 313	06 879 + 72	21.47 - 237	45 638 + 89	63 13 + 15
3	05 780 + 152	33.14 + 171	59 308 + 123	69.43 - 300	06 992 + 113	19.29 - 218	45 769 + 131	62 71 + 42
3	05 967 + 187	31.32 + 182	59 511 + 203	66.66 - 277	07 148 + 156	17.37 - 192	45 929 + 160	62 09 + 62
3	06 191 + 224	29.41 + 191	59 790 + 279	64.27 - 239	07 349 + 201	15.83 - 154	46 121 + 192	61 24 + 85
4	06 445 + 254	27.46 + 195	60 135 + 345	62.33 - 194	07 586 + 237	14.73 - 110	46 341 + 220	60 19 + 105
4	06 733 + 288	25.47 + 199	60 542 + 407	60.91 - 142	07 862 + 276	14.10 - 63	46 591 + 250	58 94 + 125
4	07 049 + 316	23.50 + 197	60 997 + 455	60.09 - 82	08 168 + 306	14.01 - 9	46 867 + 276	57 51 + 143
5	07 387 + 338	21.59 + 191	61 484 + 487	59.86 - 23	08 497 + 329	14.42 + 41	47 163 + 296	55 93 + 158
5	07 746 + 359	19.78 + 181	61 996 + 512	60.24 + 38	08 845 + 348	15.35 + 93	47 477 + 314	54 23 + 170
5	08 116 + 370	18.13 + 165	62 513 + 517	61.24 + 100	09 200 + 355	16.78 + 143	47 802 + 325	52 47 + 176
5	08 489 + 373	16.66 + 147	63 020 + 507	62.79 + 155	09 554 + 354	18.62 + 184	48 129 + 327	50 69 + 178
6	08 859 + 370	15.42 + 124	63 508 + 488	64.85 + 206	09 900 + 346	20.85 + 223	48 454 + 325	48 93 + 176
6	09 215 + 356	14.45 + 97	63 956 + 448	67.39 + 254	10 225 + 325	23.41 + 256	48 766 + 312	47 26 + 167
6	09 549 + 334	13.76 + 69	64 358 + 402	70.28 + 289	10 523 + 298	26.20 + 279	49 058 + 282	45 71 + 155
7	09 854 + 305	13.38 + 38	64 703 + 345	73.51 + 323	10 788 + 265	29.19 + 299	49 324 + 266	44 32 + 139
7	10 118 + 264	13.30 + 8	64 978 + 275	76.96 + 345	11 009 + 221	32.27 + 308	49 555 + 281	43 12 + 120
7	10 340 + 222	13.52 - 22	65 183 + 205	80.55 + 359	11 186 + 177	35.38 + 311	49 749 + 194	42 13 + 99
8	10 512 + 172	14.02 - 50	65 312 + 129	84.23 + 368	11 314 + 128	38.46 + 308	49 899 + 150	41 37 + 76
8	10 630 + 118	14.77 - 75	65 360 + 48	87.88 + 365	11 389 + 75	41.44 + 298	50 003 + 104	40 84 + 53
8	10 697 + 67	15.72 - 95	65 335 - 25	91.44 + 356	11 417 + 28	44.25 + 281	50 063 + 60	40 53 + 31
9	10 712 + 15	16.83 - 111	65 235 - 100	94.87 + 343	11 395 - 22	46.87 + 262	50 078 + 15	40 42 + 11
9	10 677 - 35	18.04 - 121	65 064 - 171	98.04 + 317	11 328 - 67	49.21 + 234	50 052 - 26	40 50 - 8
9	10 601 - 76	19.28 - 124	64 836 - 228	100.93 + 289	11 225 - 103	51.26 + 205	49 993 - 59	40 73 - 23
10	10 488 - 113	20.51 - 123	64 551 - 285	103.47 + 254	11 087 - 138	52.98 + 172	49 902 - 91	41 09 - 36
10	10 349 - 139	21.64 - 113	64 223 - 328	105.58 + 211	10 925 - 162	54.30 + 132	49 790 - 112	41 54 - 45
10	10 194 - 155	22.63 - 99	63 864 - 359	107.24 + 166	10 747 - 178	55.25 + 95	49 666 - 124	42 04 - 50
11	10 029 - 165	23.45 - 82	63 480 - 384	108.40 + 116	10 559 - 188	55.77 + 52	49 534 - 132	42 58 - 54
11	09 869 - 160	24.02 - 57	63 089 - 391	108.99 + 59	10 370 - 189	55.85 + 8	49 407 - 127	43 13 - 55
11	09 720 - 149	24.36 - 34	62 700 - 389	109.04 + 5	10 188 - 182	55.51 - 34	49 288 - 119	43 65 - 52
12	09 588 - 132	24.44 - 8	62 321 - 379	108.50 - 54	10 016 - 172	54.72 - 79	49 184 - 104	44 16 - 51
12	09 483 - 105	24.25 + 19	61 970 - 351	107.39 - 111	09 866 - 150	53.52 - 120	49 101 - 83	44 61 - 45
12	09 405 - 78	23.81 + 44	61 654 - 316	105.77 - 162	09 738 - 128	51.96 - 156	49 041 - 60	45 01 - 40
12	09 360 - 45	23.12 + 69	61 382 - 272	103.64 - 213	09 638 - 100	50.04 - 192	49 006 - 35	45 34 - 33
	09 360 - 10	23.12 + 92	61 382 - 212	103.64 - 253	09 638 - 67	50.04 - 217	49 006 - 6	45 34 - 23
Mean Place	08.741	16.22	63.563	89.74	10.120	40.89	48.553	43.12
sec δ, tan δ	+1.194	-0.652	+2.066	+1.808	+1.233	+0.721	+1.020	-0.202
da(ψ), dδ(ψ)	+0.071	+0.33	+0.035	+0.33	+0.051	+0.33	+0.064	+0.33
da(ε), dδ(ε)	+0.036	-0.56	-0.100	-0.56	-0.040	-0.55	+0.011	-0.55
Oble.Trans.	August 17		August 18		August 18		August 18	

APPARENT PLACES OF STARS, 1986

337

AT UPPER TRANSIT AT GREENWICH

No.	821		819		1574		1573	
	$\pi^3$ Cygni		$\delta$ Capricorni		11 Pegasi		13 G. Gruis	
Mag.Spect.	4.26	B3	2.98	A5	5.50	A0	5.75	G5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 21 46	<sup>°</sup> <sup>'</sup> + 49 14	<sup>h</sup> <sup>m</sup> 21 46	<sup>°</sup> <sup>'</sup> - 16 11	<sup>h</sup> <sup>m</sup> 21 46	<sup>°</sup> <sup>'</sup> + 2 37	<sup>h</sup> <sup>m</sup> 21 47	<sup>°</sup> <sup>'</sup> - 47 21
1 -8.3	14.380 - 211	45 70 -152	14.725 - 71	40 94 - 29	29 920 - 74	08 85 - 87	19 800 - 132	84 54 + 85
1 1.6	14.201 - 179	43 77 -193	14.680 - 45	41.11 - 17	29 869 - 51	07 94 - 91	19 707 - 93	83.35 +119
1 11.6	14.058 - 143	41 45 -232	14.662 + 18	41.18 + 7	29 842 - 27	06 98 - 96	19 655 - 52	81.84 +151
1 21.6	13.961 - 97	38 82 -263	14.674 + 12	41.11 - 7	29 844 + 2	06 04 - 94	19 649 - 6	80.04 +180
1 31.5	13.911 - 50	36 03 -279	14.716 + 42	40.89 + 22	29 874 + 30	05 17 - 87	19 687 + 38	78.01 +203
2 10.5	13.912 + 1	33 13 -290	14.791 + 75	40 62 + 27	29.931 + 57	04 39 - 78	19.770 + 83	75.79 +222
2 20.5	13.972 + 60	30 27 -286	14.883 + 92	40 03 + 59	30.020 + 89	03.76 - 63	19.901 + 131	73.42 +237
3 2.5	14.085 + 113	27 58 -249	15.017 + 134	39.30 + 73	30.139 + 119	03.32 - 44	20.075 + 174	70.97 +245
3 12.4	14.255 + 170	25 14 -264	15.181 + 164	38.40 + 90	30.290 + 151	03 12 - 20	20.293 + 218	68.46 +251
3 22.4	14.482 + 227	23 09 -205	15.378 + 197	37.31 +109	30.474 + 184	03.22 + 10	20.555 + 262	65.94 +252
4 1.4	14.755 + 273	21 49 -160	15.603 + 225	36.05 +126	30.687 + 213	03.60 + 38	20.856 + 301	63.48 +246
4 11.4	15.076 + 321	20 39 -110	15.858 + 255	34.62 +143	30.930 + 243	04.29 + 69	21.196 + 340	61.09 +239
4 21.3	15.434 + 358	19 88 - 51	16.140 + 282	33.05 +157	31.199 + 269	05.30 +101	21.570 + 374	58.86 +223
5 1.3	15.819 + 385	19 93 + 5	16.442 + 302	31.39 +166	31.488 + 289	06.57 +127	21.971 + 401	56.81 +205
5 11.3	16.225 + 406	20 55 + 62	16.762 + 320	29.66 +173	31.794 + 306	08.09 +152	22.396 + 425	54.99 +182
5 21.2	16.637 + 412	21.76 +121	17.093 + 331	27.90 +176	32.111 + 317	09.83 +174	22.833 + 437	53.46 +153
5 31.2	17.045 + 408	23 45 +169	17.427 + 334	26.19 +171	32.429 + 318	11.71 +188	23.275 + 442	52.23 +123
6 10.2	17.441 + 396	25 63 +218	17.759 + 332	24.53 +166	32.744 + 315	13.71 +200	23.713 + 438	51.34 + 89
6 20.2	17.810 + 369	28 21 +258	18.077 + 318	23.01 +152	33.046 + 302	15.76 +205	24.135 + 422	50.84 + 50
6 30.1	18.145 + 335	31.11 +290	18.376 + 299	21.64 +137	33.328 + 282	17.79 +203	24.531 + 396	50.70 + 14
7 10.1	18.438 + 293	34.28 +317	18.648 + 272	20.47 +117	33.583 + 255	19.78 +199	24.893 + 362	50.95 - 25
7 20.1	18.678 + 240	37 62 +334	18.885 + 237	19.52 + 95	33.804 + 221	21.65 +187	25.207 + 314	51.57 - 62
7 30.1	18.865 + 187	41.05 +343	19.083 + 198	18.81 + 71	33.987 + 183	23.38 +173	25.471 + 264	52.52 - 95
8 9.0	18.994 + 129	44 53 +348	19.238 + 155	18.33 + 48	34.129 + 142	24.95 +157	25.675 + 204	52.52 -126
8 19.0	19.059 + 65	47.94 +341	19.345 + 107	18.10 + 23	34.225 + 96	26.30 +135	25.814 + 139	53.78 -152
8 29.0	19.068 + 9	51 22 +328	19.408 + 63	18.07 + 3	34.279 + 54	27.44 +114	25.891 + 77	56.99 -169
9 7.9	19.019 - 49	54 35 +313	19.424 + 16	18.25 - 18	34.290 + 11	28.37 + 93	25.903 + 12	56.99 -183
9 17.9	18.915 - 104	57 19 +284	19.398 - 26	18.25 - 36	34.261 - 29	29.06 + 69	25.903 - 49	58.82 -186
9 27.9	18.768 - 147	59 75 +256	19.338 - 60	18.61 - 47	34.261 - 61	29.06 + 49	25.854 - 100	60.68 -181
10 7.9	18.578 - 190	61 97 +222	19.245 - 93	19.08 - 57	34.200 - 91	29.55 + 27	25.754 - 149	62.49 -171
10 17.8	18.357 - 221	63 75 +178	19.131 - 114	20.28 - 63	33.998 - 111	29.89 + 7	25.605 - 183	64.20 -149
10 27.8	18.115 - 242	65 11 +136	19.004 - 127	20.92 - 64	33.875 - 123	29.80 - 9	25.422 - 205	65.69 -123
11 6.8	17.856 - 259	65 99 + 88	18.870 - 134	21.55 - 83	33.745 - 130	29.80 - 28	25.217 - 219	66.92 - 92
11 16.8	17.595 - 261	66 35 + 36	18.739 - 131	22.13 - 58	33.745 - 127	29.52 - 42	24.998 - 217	67.84 - 55
11 26.7	17.337 - 258	66 21 - 14	18.618 - 121	22.64 - 51	33.618 - 118	29.10 - 55	24.781 - 206	68.39 - 16
12 6.7	17.090 - 247	65 54 - 67	18.511 - 107	23.07 - 43	33.394 - 106	27.86 - 69	24.389 - 186	68.32 + 23
12 16.7	16.866 - 224	64 35 -119	18.427 - 84	23 40 - 33	33.309 - 85	27.08 - 78	24.236 - 153	67.68 + 64
12 26.6	16.668 - 198	62 72 -163	18.366 - 35	23 63 - 23	33.244 - 65	26 22 - 86	24.236 - 119	66.69 + 99
12 36.6	16.504 - 164	60 63 -209	18.331 - 5	23 75 - 12	33.203 - 41	26 22 - 93	24.117 - 78	66.69 +134
	16.504 - 122	60 63 -242		23 75 + 2	33.203 - 14	25.29 - 92	24.039 - 33	65.35 +165
Mean Place	17.627	48.62	17.823	20.29	32.921	24.06	23.348	56.05
sec $\delta$ , tan $\delta$	+1.532	+1.160	+1.041	-0.290	+1.001	+0.046	+1.476	-1.086
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.044	+0.33	+0.065	+0.33	+0.060	+0.33	+0.077	+0.33
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.065	-0.55	+0.016	-0.55	-0.003	-0.55	+0.061	-0.55
Dbie.Trans.	August 18		August 18		August 18		August 18	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1575		820		1576		823	
	14 Pegasi		o Indi		127 G. Capricorni		16 Pegasi	
Mag.Spect.	5.00	A0	5.50	K2	6.85	F8	5.05	B3
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>
	21 49	+ 30 06	21 49	- 69 41	21 50	- 23 19	21 52	+ 25 51
1 <sup>d</sup> -8.3	11.779 <sup>s</sup> - 122	32.30 <sup>"</sup> - 138	34.911 <sup>s</sup> - 363	67.08 <sup>"</sup> + 163	35.521 <sup>s</sup> - 78	85.03 <sup>"</sup> - 5	23.866 <sup>s</sup> - 112	32.18 <sup>"</sup> - 131
1 <sup>s</sup> 1.6	11.682 - 97	30.63 - 167	34.626 - 285	65.00 + 208	35.469 - 52	84.90 + 13	23.778 - 88	30.63 - 155
1 11.6	11.612 - 70	28.70 - 193	34.425 - 201	62.51 + 249	35.445 - 24	84.61 + 29	23.715 - 63	28.83 - 180
1 21.6	11.574 - 38	26.58 - 212	34.321 - 104	59.68 + 283	35.453 + 8	84.13 + 48	23.683 - 32	26.88 - 195
1 31.5	11.570 - 4	24.39 - 219	34.313 - 8	56.62 + 306	35.492 + 39	83.49 + 64	23.683 + 0	24.88 - 200
2 10.5	11.601 + 31	22.17 - 222	34.399 + 86	53.37 + 325	35.559 + 67	82.71 + 78	23.715 + 32	22.86 - 202
2 20.5	11.672 + 71	20.05 - 212	34.586 + 187	50.02 + 335	35.659 + 100	81.69 + 102	23.785 + 70	20.95 - 191
3 2.5	11.780 + 108	18.12 - 193	34.862 + 276	46.67 + 335	35.793 + 134	80.52 + 117	23.891 + 106	19.24 - 171
3 12.4	11.929 + 149	16.46 - 166	35.228 + 366	43.35 + 332	35.959 + 166	79.20 + 132	24.035 + 144	17.77 - 147
3 22.4	12.118 + 189	15.16 - 130	35.681 + 453	40.16 + 319	36.160 + 201	77.72 + 148	24.218 + 183	16.67 - 110
4 1.4	12.343 + 225	14.27 - 89	36.207 + 526	37.17 + 299	36.390 + 230	76.12 + 160	24.435 + 217	15.96 - 71
4 11.4	12.604 + 261	13.84 - 43	36.805 + 598	34.40 + 277	36.652 + 262	74.41 + 171	24.687 + 252	15.68 - 28
4 21.3	12.895 + 291	13.90 + 6	37.464 + 659	31.96 + 244	36.941 + 289	72.63 + 178	24.969 + 282	15.87 + 19
5 1.3	13.208 + 313	14.44 + 54	38.168 + 704	29.87 + 209	37.253 + 312	70.81 + 182	25.273 + 304	16.52 + 65
5 11.3	13.541 + 333	15.46 + 102	38.913 + 745	28.16 + 171	37.585 + 332	68.99 + 182	25.596 + 323	17.61 + 109
5 21.2	13.882 + 341	16.94 + 148	39.679 + 766	26.91 + 125	37.928 + 343	67.23 + 176	25.929 + 333	19.12 + 151
5 31.2	14.223 + 341	18.79 + 185	40.447 + 768	26.11 + 80	38.275 + 347	65.57 + 166	26.263 + 334	20.98 + 186
6 10.2	14.558 + 335	21.00 + 221	41.210 + 763	25.79 + 32	38.621 + 346	64.04 + 153	26.592 + 329	23.17 + 219
6 20.2	14.875 + 317	23.50 + 250	41.938 + 728	25.97 - 18	38.954 + 333	62.70 + 134	26.905 + 313	25.62 + 245
6 30.1	15.167 + 292	26.19 + 269	42.621 + 683	26.61 - 64	39.267 + 313	61.58 + 112	27.196 + 291	28.22 + 260
7 10.1	15.429 + 262	29.04 + 285	43.241 + 620	27.72 - 111	39.555 + 288	60.70 + 88	27.457 + 261	30.97 + 275
7 20.1	15.651 + 222	31.96 + 292	43.775 + 534	29.26 - 154	39.806 + 251	60.09 + 61	27.680 + 223	33.76 + 279
7 30.1	15.831 + 180	34.88 + 292	44.218 + 443	31.15 - 189	40.017 + 211	59.74 + 35	27.862 + 182	36.52 + 276
8 9.0	15.965 + 134	37.76 + 288	44.553 + 335	33.38 - 223	40.184 + 167	59.65 + 9	28.000 + 138	39.23 + 271
8 19.0	16.048 + 83	40.51 + 275	44.768 + 215	35.82 - 244	40.301 + 117	59.82 - 17	28.090 + 90	41.80 + 257
8 29.0	16.086 + 38	43.09 + 258	44.867 + 99	38.40 - 258	40.372 + 71	60.21 - 39	28.135 + 45	44.20 + 240
9 7.9	16.078 - 8	45.48 + 239	44.844 - 23	41.05 - 265	40.394 + 22	60.79 - 58	28.135 + 0	46.39 + 219
9 17.9	16.026 - 52	47.58 + 210	44.703 - 141	43.62 - 257	40.371 - 23	61.52 - 73	28.093 - 42	48.31 + 192
9 27.9	15.939 - 87	49.41 + 183	44.460 - 243	46.04 - 242	40.312 - 59	62.34 - 82	28.016 - 77	49.96 + 165
10 7.9	15.819 - 120	50.92 + 151	44.120 - 340	48.22 - 218	40.218 - 94	63.21 - 87	27.907 - 109	51.31 + 135
10 17.8	15.676 - 143	52.07 + 115	43.705 - 415	50.01 - 179	40.100 - 118	64.09 - 88	27.776 - 131	52.32 + 101
10 27.8	15.517 - 159	52.87 + 80	43.237 - 468	51.40 - 139	39.967 - 133	64.91 - 82	27.630 - 146	53.00 + 68
11 6.8	15.349 - 168	53.28 + 41	42.733 - 504	52.29 - 89	39.825 - 142	65.65 - 74	27.473 - 157	53.32 + 32
11 16.8	15.181 - 168	53.28 + 0	42.223 - 510	52.62 - 33	39.687 - 138	66.27 - 62	27.317 - 156	53.27 - 5
11 26.7	15.018 - 163	52.91 - 37	41.727 - 496	52.41 + 21	39.557 - 130	66.74 - 47	27.167 - 150	52.88 - 39
12 6.7	14.867 - 151	52.14 - 77	41.263 - 464	51.63 + 78	39.442 - 115	67.06 - 32	27.027 - 140	52.12 - 76
12 16.7	14.734 - 133	51.00 - 114	40.859 - 404	50.30 + 133	39.349 - 93	67.20 - 14	26.905 - 122	51.04 - 108
12 26.6	14.623 - 111	49.54 - 146	40.521 - 338	48.49 + 181	39.281 - 68	67.16 + 4	26.803 - 102	49.67 - 137
12 36.6	14.537 - 86	47.77 - 177	40.263 - 258	46.22 + 227	39.240 - 41	66.95 + 21	26.726 - 77	48.02 - 165
	- 55	- 198	- 163	+ 265	- 10	+ 39	- 49	- 183
Mean Place	14.813	39.59	39.718	34.86	38.647	62.15	26.867	40.58
sec δ, tan δ	+1.156	+0.580	+2.881	-2.702	+1.089	-0.431	+1.111	+0.485
dα(ψ), dδ(ψ)	+0.053	+0.33	+0.100	+0.34	+0.067	+0.34	+0.054	+0.34
dα(ε), dδ(ε)	-0.033	-0.54	+0.152	-0.54	+0.024	-0.53	-0.027	-0.53
Dble.Trans.	August 19		August 19		August 19		August 20	

AT UPPER TRANSIT AT GREENWICH

No.	1577		1578		822		1579	
Name	μ Capricorni		Bradley 2880 (Cephei)		γ Gruis		Piazzi 21 <sup>h</sup> 339 (Pegasi)	
Mag.Spect.	5.18	F0	6.58	A0	3.16	B8	6.62	K5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	21 52	- 13 36	21 52	+ 73 37	21 53	- 37 25	21 55	+ 21 10
1	<sup>d</sup> 30.630 - 73	" - 37	<sup>s</sup> 33.300 - 677	79.17 +121	<sup>s</sup> 03.616 - 105	" + 44	<sup>s</sup> 43.105 - 103	" - 121
1	1.6 30.581 - 49	76.95 - 28	32.691 - 609	77.42 - 175	03.544 - 72	+ 73	43.025 - 80	21.67 - 143
1	11.6 30.557 - 24	77.23 - 19	32.165 - 526	75.16 - 226	03.504 - 40	+ 100	42.969 - 56	18.61 - 163
1	21.6 30.563 + 6	77.42 - 6	31.750 - 415	72.47 - 269	03.501 - 3	+ 126	42.942 - 27	16.86 - 175
1	31.5 30.597 + 34	77.48 + 8	31.457 - 293	69.49 - 298	03.535 + 34	+ 147	42.945 + 3	15.07 - 179
2	10.5 30.664 + 67	77.17 + 23	31.294 - 163	66.29 - 320	03.604 + 69	+ 167	42.979 + 34	13.29 - 178
2	20.5 30.746 + 82	76.83 + 34	31.280 - 14	63.03 - 326	03.713 + 109	+ 185	43.048 + 69	11.62 - 167
3	2.5 30.873 + 127	76.23 + 60	31.406 + 126	59.85 - 318	03.859 + 146	+ 197	43.152 + 104	10.15 - 147
3	12.4 31.029 + 156	75.45 + 78	31.675 + 269	56.84 - 301	04.043 + 184	+ 208	43.291 + 139	08.93 - 122
3	22.4 31.217 + 188	74.47 + 98	32.083 + 408	54.16 - 268	04.265 + 222	+ 216	43.469 + 178	08.05 - 88
4	1.4 31.434 + 217	73.30 + 117	32.605 + 522	51.91 - 225	04.522 + 257	+ 218	43.679 + 210	07.55 - 50
4	11.4 31.682 + 248	71.93 + 137	33.234 + 629	50.13 - 178	04.814 + 292	+ 219	43.923 + 244	07.45 - 10
4	21.3 31.957 + 275	70.41 + 152	33.948 + 714	48.95 - 118	05.137 + 323	+ 213	44.197 + 274	07.80 + 35
5	1.3 32.253 + 296	68.76 + 165	34.715 + 767	48.36 - 59	05.485 + 348	+ 203	44.493 + 296	08.56 + 76
5	11.3 32.568 + 315	67.01 + 175	35.522 + 807	48.39 + 3	05.856 + 371	+ 190	44.808 + 315	09.73 + 117
5	21.2 32.895 + 327	65.22 + 179	36.335 + 813	49.05 + 66	06.240 + 384	+ 171	45.134 + 326	11.29 + 156
5	31.2 33.226 + 331	63.44 + 178	37.130 + 795	50.29 + 124	06.629 + 389	+ 148	45.462 + 328	13.16 + 187
6	10.2 33.556 + 330	61.69 + 175	37.891 + 761	52.08 + 179	07.017 + 388	+ 122	45.787 + 325	15.32 + 216
6	20.2 33.873 + 317	60.05 + 164	38.585 + 694	54.39 + 231	07.392 + 375	+ 90	46.097 + 310	17.70 + 238
6	30.1 34.171 + 298	58.55 + 150	39.200 + 615	57.11 + 272	07.745 + 353	+ 80	46.385 + 288	20.21 + 251
7	10.1 34.445 + 274	57.23 + 132	39.723 + 523	60.21 + 310	08.070 + 325	+ 26	46.647 + 262	22.83 + 262
7	20.1 34.683 + 238	56.11 + 112	40.131 + 408	63.61 + 340	08.354 + 284	- 8	46.871 + 224	25.46 + 263
7	30.1 34.884 + 201	55.22 + 89	40.425 + 294	67.18 + 357	08.594 + 240	- 40	47.057 + 186	28.04 + 258
8	9.0 35.043 + 159	54.57 + 65	40.597 + 172	70.92 + 374	08.784 + 190	- 70	47.200 + 143	30.56 + 252
8	19.0 35.155 + 112	54.16 + 41	40.637 + 40	74.69 + 377	08.917 + 133	- 96	47.296 + 96	32.91 + 235
8	29.0 35.223 + 68	53.96 + 20	40.558 - 79	78.42 + 373	08.997 + 80	- 117	47.348 + 52	35.08 + 217
9	7.9 35.245 + 22	53.98 - 2	40.355 - 203	82.07 + 365	09.021 + 24	- 135	47.355 - 33	37.05 + 197
9	17.9 35.226 - 19	54.18 - 20	40.035 - 320	85.52 + 345	08.992 - 29	- 143	47.322 - 67	38.75 + 170
9	27.9 35.171 - 55	54.53 - 35	39.616 - 419	88.72 + 320	08.920 - 72	- 145	47.255 - 99	40.20 + 145
10	7.9 35.085 - 86	54.99 - 46	39.098 - 518	91.61 + 289	08.806 - 114	- 142	47.156 - 99	41.35 + 115
10	17.8 34.977 - 108	55.53 - 54	38.501 - 597	94.08 + 247	08.663 - 143	- 130	47.035 - 121	42.19 + 84
10	27.8 34.855 - 122	56.11 - 58	37.842 - 659	96.13 + 205	08.501 - 162	- 113	46.900 - 135	42.73 + 54
11	6.8 34.725 - 130	56.70 - 59	37.130 - 712	97.67 + 154	08.327 - 174	- 92	46.754 - 146	42.95 + 22
11	16.8 34.597 - 128	57.28 - 58	36.393 - 737	98.64 + 97	08.155 - 172	- 63	46.609 - 145	42.83 - 12
11	26.7 34.478 - 119	57.81 - 53	35.647 - 746	99.05 + 41	07.991 - 164	- 35	46.470 - 139	42.42 - 41
12	6.7 34.371 - 107	58.30 - 49	34.907 - 740	98.84 - 21	07.844 - 147	- 5	46.340 - 130	41.68 - 74
12	16.7 34.286 - 85	58.70 - 40	34.206 - 701	98.03 - 81	07.723 - 121	+ 28	46.228 - 112	40.66 - 102
12	26.6 34.222 - 64	59.02 - 32	33.555 - 651	96.65 - 138	07.630 - 93	+ 56	46.135 - 93	39.39 - 127
12	36.6 34.183 - 39	59.25 - 23	32.978 - 577	94.70 - 195	07.569 - 61	+ 86	46.065 - 70	37.89 - 150
	34.183 - 11	59.25 - 11	32.978 - 477	94.70 - 240	07.569 - 24	+ 113	46.065 - 43	37.89 - 165
Mean Place	33.672	56.76	37.774	78.32	06.882	43.63	46.077	31.36
sec δ, tan δ	+1.029	-0.242	+3.550	+3.406	+1.259	-0.765	+1.072	+0.387
da(ψ), dδ(ψ)	+0.065	+0.34	+0.014	+0.34	+0.072	+0.34	+0.056	+0.34
dα(ε), dδ(ε)	+0.014	-0.53	-0.193	-0.53	+0.043	-0.53	-0.022	-0.52
Dble.Trans.	August 20		August 20		August 20		August 20	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	824		1580		826		825		
	δ Indi		98 G. Aquarii		20 Pegasi		ε Indi		
Mag. Spect.	4.56	F0	6.42	K0	5.66	F2	4.74	K5	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° '	h m	° '	h m	° '	h m	° '	
	21 56	-55 03	21 58	-4 26	22 00	+13 02	22 02	-56 50	
1	<sup>d</sup> -8.3	<sup>s</sup> 56 753 - 185	<sup>s</sup> 56 89 +106	09 808 - 77	30 80 - 66	<sup>s</sup> 22 939 - 91	65 50 -105	16 187 - 189	61 14 +103
1	1.6	56 612 - 141	55.44 +145	09 755 - 53	31 44 - 64	22 871 - 68	64 30 -120	16 044 - 143	59 69 +145
1	11.6	56 518 - 94	53.61 +183	09 724 - 31	32 06 - 62	22 824 - 47	62 97 -133	15 949 - 95	57 85 +184
1	21.6	56 479 - 39	51.46 +215	09 720 - 4	32 62 - 56	22 805 - 19	61 58 -139	15 913 - 36	55 67 +218
1	31.6	56 493 + 14	49.05 +241	09 774 + 24	33 07 - 45	22 813 + 8	60 20 -138	15 931 + 18	53 24 +243
2	10.5	56 559 + 66	46 43 +262	09 795 + 51	33 40 - 33	22 850 + 37	58 85 -135	16 006 + 75	50 58 +266
2	20.5	56 684 + 125	43 65 +278	09 874 + 79	33 55 - 15	22 920 + 70	57 64 -121	16 141 + 135	47 78 +280
3	2.5	56 861 + 177	40 81 +289	09 985 + 111	33 58 - 3	23 021 + 101	56 62 -102	16 332 + 191	44 90 +288
3	12.4	57 091 + 230	37 92 +284	10 129 + 144	33 35 + 23	23 157 + 136	55 84 + 246	16 578 + 246	41 98 +292
3	22.4	57 375 + 284	35.06 +286	10 306 + 177	32 86 + 49	23 328 + 171	55 38 - 46	16 880 + 302	39 10 +288
4	1.4	57 705 + 330	32 29 +277	10 511 + 205	32 12 + 74	23 531 + 203	55 26 - 12	17 231 + 351	36 32 +278
4	11.4	58 082 + 377	29 64 +285	10 748 + 237	31 13 + 99	23 766 + 235	55 50 + 24	17 632 + 401	33 67 +265
4	21.3	58 500 + 418	27 20 +244	11 012 + 264	29 89 +124	24 031 + 265	56 13 + 63	18 076 + 444	31 25 +242
5	1.3	58 951 + 451	25 00 +220	11 298 + 286	28 44 +145	24 317 + 286	57 11 + 98	18 554 + 478	29 07 +218
5	11.3	59 431 + 480	23 08 +192	11 604 + 306	26 80 +164	24 624 + 307	58 44 +133	19 063 + 509	27 20 +187
5	21.3	59 928 + 497	21 52 +156	11 922 + 318	25 02 +178	24 942 + 318	60 08 +164	19 590 + 527	25 69 +151
5	31.2	60 432 + 504	20 31 +121	12 243 + 321	23 16 +196	25 264 + 322	61 97 +189	20 124 + 534	24 55 +114
6	10.2	60 935 + 503	19 50 + 81	12 565 + 322	21 25 +191	25 584 + 320	64 07 + 216	20 658 + 517	23 82 + 73
6	20.2	61 420 + 485	19 13 + 37	12 874 + 309	19 36 +189	25 891 + 307	66 33 +226	21 175 + 488	23 55 - 14
6	30.1	61 879 + 459	19 17 - 4	13 166 + 292	17 53 +183	26 179 + 288	68 65 +232	21 663 + 488	23 69 - 14
7	10.1	62 300 + 421	19 64 - 47	13 433 + 267	15 80 +173	26 441 + 262	71 02 +237	22 114 + 451	24 28 - 59
7	20.1	62 668 + 368	20 52 - 88	13 666 + 233	14 24 +156	26 669 + 228	73 35 +233	22 510 + 396	25 29 -101
7	30.1	62 979 + 311	21 76 -124	13 864 + 198	12 85 +139	26 860 + 191	75 60 +225	22 847 + 337	26 66 -137
8	9.0	63 223 + 244	23 34 -158	14 020 + 156	11 66 +119	27 010 + 150	77 72 +212	23 115 + 268	28 38 -172
8	19.0	63 391 + 168	25 18 -184	14 131 + 111	10 70 + 96	27 114 + 104	79 67 +195	23 305 + 190	30 37 -199
8	29.0	63 488 + 97	27 21 -203	14 200 + 69	09 96 + 74	27 176 + 62	81 43 +176	23 420 + 115	32 54 -217
9	8.0	63 509 + 21	29 36 -215	14 224 + 24	09 43 + 53	27 194 + 18	82 97 +154	23 456 + 36	34 85 -231
9	17.9	63 457 - 52	31 53 -217	14 208 - 16	09 13 + 30	27 172 - 22	84 25 +128	23 415 - 41	37 17 -232
9	27.9	63 342 - 115	33 64 -211	14 159 - 49	09 01 + 12	27 117 - 55	85 30 +105	23 308 - 107	39 42 -225
10	7.9	63 168 - 174	35 61 -197	14 078 - 81	09 06 - 5	27 031 - 86	86 09 + 79	23 140 - 168	41 52 -210
10	17.8	62 950 - 218	37 31 -170	13 976 - 102	09 27 - 21	26 923 - 108	86 61 + 52	22 923 - 217	43 35 -183
10	27.8	62 701 - 249	38 71 -140	13 860 - 116	09 58 - 31	26 801 - 122	86 88 + 27	22 674 - 249	44 87 -152
11	6.8	62 431 - 270	39 74 -103	13 735 - 125	10 01 - 43	26 669 - 132	86 89 + 1	22 401 - 273	45 99 -112
11	16.8	62 159 - 272	40 32 - 58	13 611 - 124	10 52 - 51	26 537 - 132	86 65 - 24	22 125 - 276	46 66 - 67
11	26.7	61 896 - 263	40 47 - 15	13 495 - 116	11 08 - 56	26 411 - 126	86 19 - 46	21 857 - 268	46 87 - 21
12	6.7	61 652 - 244	40 14 + 33	13 389 - 106	11 69 - 61	26 294 - 117	85 48 - 71	21 608 - 249	46 59 + 28
12	16.7	61 443 - 209	39 34 + 80	13 302 - 87	12 32 - 63	26 194 - 100	84 57 - 91	21 394 - 174	45 82 + 77
12	26.7	61 273 - 170	38 13 +121	13 235 - 67	12 95 - 63	26 113 - 81	83 48 -109	21 220 - 214	44 62 +120
12	36.6	61 148 - 125	36 50 +163	13 190 - 45	13 57 - 62	26 053 - 60	82 24 -124	21 094 - 126	43 00 +162
		- 72	+198	- 18	- 57	- 34	-133	- 72	+200
Mean Place	60.404	26.34	12.768	13.45	25.878	77.55	20.096	31.41	
sec δ, tan δ	+1.746	-1.431	+1.003	-0.078	+1.027	+0.232	+1.828	-1.531	
dα(ψ), dδ(ψ)	+0.081	+0.34	+0.062	+0.34	+0.058	+0.34	+0.081	+0.35	
dα(ε), dδ(ε)	+0.082	-0.51	+0.004	-0.51	-0.013	-0.50	+0.089	-0.49	
Dbles. Trans.	August 21		August 21		August 22		August 22		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	830		827		1581		828	
	20 Cephei		α Aquarii		λ Gruis		ι Aquarii	
Mag.Spect.	5.39	K5	3.19	G0	4.60	K2	4.35	B8
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	22 04	+ 62 42	22 05	- 0 23	22 05	- 39 36	22 05	- 13 56
1 -8.3	32 250 <sup>s</sup> - 371	70 64 - 120	02 540 <sup>s</sup> - 80	24 93 - 74	15 138 <sup>s</sup> - 119	59 34 + 44	39 599 <sup>s</sup> - 81	28 38 - 38
1 1.6	31 917 - 333	68 93 - 171	02 480 - 60	25 70 - 77	15 049 - 89	58 58 + 76	39 542 - 57	28 66 - 28
1 11.6	31 629 - 288	66 74 - 219	02 442 - 38	26 48 - 78	14 992 - 57	57 52 + 106	39 507 - 35	28 84 - 18
1 21.6	31 404 - 225	64 14 - 260	02 430 - 12	27 22 - 74	14 973 - 19	56 18 + 134	39 499 - 8	28 88 - 4
1 31.6	31 247 - 157	61 27 - 287	02 445 + 15	27 89 - 67	14 989 + 16	54 60 + 158	39 520 + 21	28 77 + 11
2 10.5	31 165 - 82	58 20 - 307	02 486 + 41	28 44 - 55	15 042 + 53	52 81 + 179	39 570 + 50	28 52 + 25
2 20.5	31 168 + 3	55 08 - 312	02 557 + 71	28 83 - 39	15 136 + 94	50 82 + 199	39 639 + 69	28 19 + 33
3 2.5	31 254 + 86	52 04 - 304	02 658 + 101	29 07 - 24	15 268 + 132	48 69 + 213	39 751 + 112	27 48 + 71
3 12.4	31 425 + 171	49 18 - 286	02 793 + 135	29 07 + 0	15 439 + 171	46 45 + 224	39 893 + 142	26 65 + 83
3 22.4	31 681 + 256	46 64 - 254	02 961 + 168	28 79 + 28	15 652 + 213	44 13 + 232	40 068 + 175	25 61 + 104
4 1.4	32 011 + 330	44 53 - 211	03 160 + 199	28 24 + 55	15 900 + 248	41 79 + 234	40 273 + 205	24 39 + 122
4 11.4	32 410 + 399	42 89 - 164	03 390 + 230	27 41 + 83	16 187 + 287	39 45 + 234	40 510 + 237	22 97 + 142
4 21.3	32 868 + 458	41 83 - 106	03 649 + 259	26 30 + 111	16 507 + 320	37 18 + 227	40 776 + 266	21 39 + 158
5 1.3	33 365 + 497	41 35 + 48	03 930 + 281	24 94 + 136	16 855 + 348	35 02 + 216	41 066 + 290	19 69 + 170
5 11.3	33 896 + 531	41 47 - 12	04 233 + 303	23 36 + 158	17 228 + 373	33 00 + 202	41 377 + 311	17 89 + 180
5 21.3	34 438 + 542	42 22 + 75	04 548 + 315	21 59 + 177	17 618 + 390	31 19 + 181	41 701 + 324	16 04 + 185
5 31.2	34 977 + 539	43 52 + 130	04 868 + 320	19 70 + 189	18 015 + 397	29 63 + 156	42 032 + 331	14 20 + 184
6 10.2	35 502 + 525	45 37 + 185	05 188 + 320	17 71 + 199	18 413 + 398	28 35 + 128	42 364 + 332	12 41 + 179
6 20.2	35 992 + 490	47 71 + 234	05 498 + 310	15 71 + 200	18 800 + 387	27 40 + 95	42 685 + 321	10 71 + 170
6 30.1	36 437 + 445	50 44 + 273	05 791 + 293	13 73 + 198	19 168 + 368	26 78 + 62	42 990 + 305	09 17 + 154
7 10.1	36 828 + 391	53 54 + 310	06 060 + 269	11 83 + 190	19 508 + 340	26 52 + 26	43 272 + 282	07 79 + 138
7 20.1	37 149 + 321	56 91 + 337	06 296 + 236	10 05 + 178	19 809 + 301	26 62 - 10	43 520 + 248	06 64 + 115
7 30.1	37 400 + 251	60 45 + 354	06 497 + 201	08 43 + 162	20 066 + 257	27 06 - 44	43 733 + 213	05 72 + 92
8 9.0	37 573 + 173	64 13 + 368	06 657 + 160	06 99 + 144	20 273 + 207	27 82 - 76	43 903 + 170	05 04 + 68
8 19.0	37 663 + 90	67 82 + 369	06 773 + 116	05 78 + 121	20 423 + 150	28 87 - 105	44 028 + 125	04 62 + 42
8 29.0	37 677 + 14	71 47 + 365	06 846 + 73	04 77 + 101	20 518 + 95	30 15 - 128	44 109 + 81	04 42 + 20
9 8.0	37 611 - 66	75 02 + 355	06 876 + 30	03 99 + 78	20 556 + 38	31 61 - 146	44 144 + 35	04 45 - 3
9 17.9	37 470 - 141	78 35 + 333	06 866 - 10	03 44 + 55	20 538 - 18	33 17 - 156	44 137 - 7	04 67 - 22
9 27.9	37 265 - 205	81 44 + 309	06 822 - 44	03 09 + 35	20 475 - 63	34 75 - 188	44 094 - 43	05 04 - 37
10 7.9	36 997 - 268	84 21 + 277	06 747 - 75	02 94 + 15	20 367 - 108	36 32 - 157	44 018 - 76	05 53 - 49
10 17.8	36 680 - 317	86 58 + 237	06 649 - 98	02 97 - 3	20 227 - 140	37 76 - 144	43 918 - 100	06 11 - 58
10 27.8	36 325 - 355	88 52 + 194	06 537 - 112	03 15 - 18	20 065 - 162	39 02 - 126	43 802 - 116	06 73 - 62
11 6.8	35 937 - 388	89 97 + 145	06 415 - 122	03 47 - 32	19 887 - 178	40 05 - 103	43 676 - 126	07 37 - 64
11 16.8	35 534 - 403	90 86 + 89	06 293 - 122	03 92 - 45	19 709 - 178	40 79 - 74	43 550 - 126	07 99 - 62
11 26.7	35 125 - 409	91 22 + 36	06 176 - 117	04 45 - 53	19 536 - 173	41 22 - 43	43 430 - 120	08 55 - 56
12 6.7	34 720 - 405	90 98 - 24	06 069 - 107	05 09 - 64	19 377 - 159	41 32 - 10	43 320 - 110	09 07 - 52
12 16.7	34 336 - 384	90 17 - 81	05 979 - 90	05 78 - 69	19 242 - 135	41 07 + 25	43 229 - 91	09 49 - 42
12 26.7	33 980 - 356	88 81 - 136	05 907 - 72	06 51 - 73	19 134 - 108	40 49 + 58	43 158 - 71	09 81 - 32
12 36.6	33 665 - 315	86 92 - 189	05 856 - 51	07 28 - 77	19 056 - 78	39 60 + 89	43 108 - 50	10 04 - 23
	33 665 - 259	86 92 - 233	05 856 - 26	07 28 - 74	19 056 - 41	39 60 + 120	43 108 - 22	10 04 - 10
Mean Place	35.847	70.65	05.453	08.68	18.306	31.75	42.546	07.92
sec δ, tan δ	+2.182	+1.939	+1.000	-0.007	+1.298	-0.828	+1.030	-0.248
dα(ψ), dδ(ψ)	+0.036	+0.35	+0.061	+0.35	+0.072	+0.35	+0.064	+0.35
dα(ε), dδ(ε)	-0.113	-0.48	+0.000	-0.48	+0.048	-0.48	+0.015	-0.48
Dble.Trans.	August 23		August 23		August 23		August 23	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	831		829		832		833		
	Pegasi		$\alpha$ Gruis		$\mu$ Piscis Austrini		27 Pegasi		
Mag. Spect.	3.96	F5	2.16	B5	4.62	A2	5.65	K0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	
	22 06	+ 25 16	22 07	- 47 01	22 07	- 33 03	22 08	+ 33 05	
	<sup>d</sup>	<sup>s</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	
1	-8.3	19.959 - 114	35.38 - 120	19.952 - 148	65.85 + 69	32.839 - 104	43.67 + 21	34.701 - 139	75.88 - 124
1	1.6	19.866 - 93	33.93 - 145	19.839 - 113	64.80 + 105	32.763 - 76	43.19 + 48	34.584 - 117	74.32 - 156
1	11.6	19.795 - 71	32.24 - 169	19.763 - 76	63.40 + 140	32.714 - 49	42.45 + 74	34.491 - 93	72.45 - 187
1	21.6	19.754 - 41	30.39 - 185	19.729 - 34	61.67 + 173	32.699 - 15	41.46 + 99	34.429 - 62	70.37 - 208
1	31.6	19.742 - 12	28.47 - 192	19.737 + 8	59.70 + 197	32.717 + 18	40.25 + 121	34.399 - 30	68.16 - 221
2	10.5	19.762 + 20	26.53 - 194	19.788 + 51	57.49 + 221	32.767 + 50	38.83 + 142	34.404 + 5	65.89 - 227
2	20.5	19.819 + 57	24.69 - 184	19.886 + 98	55.09 + 240	32.854 + 87	37.21 + 162	34.451 + 47	63.68 - 201
3	2.5	19.911 + 92	23.02 - 167	20.027 + 141	52.58 + 251	32.975 + 121	35.44 + 177	34.537 + 86	61.62 - 226
3	12.4	20.042 + 131	21.58 - 144	20.213 + 186	49.98 + 260	33.134 + 159	33.52 + 192	34.665 + 128	59.79 - 183
3	22.4	20.212 + 170	20.49 - 109	20.445 + 232	47.34 + 264	33.330 + 196	31.48 + 204	34.837 + 172	58.31 - 148
4	1.4	20.418 + 206	19.77 - 72	20.717 + 272	44.73 + 261	33.560 + 230	29.39 + 209	35.049 + 212	57.22 - 109
4	11.4	20.661 + 243	19.47 - 30	21.032 + 315	42.18 + 255	33.826 + 266	27.24 + 215	35.300 + 251	56.57 - 65
4	21.3	20.934 + 273	19.64 + 17	21.384 + 352	39.75 + 243	34.125 + 299	25.10 + 214	35.586 + 286	56.42 - 15
5	1.3	21.233 + 299	20.23 + 59	21.767 + 383	37.49 + 226	34.449 + 324	23.01 + 209	35.898 + 312	56.75 + 33
5	11.3	21.553 + 320	21.27 + 104	22.177 + 410	35.44 + 205	34.797 + 348	21.00 + 201	36.233 + 335	57.57 + 82
5	21.3	21.885 + 332	22.73 + 146	22.606 + 429	33.68 + 176	35.162 + 365	19.14 + 186	36.580 + 347	58.87 + 130
5	31.2	22.221 + 336	24.54 + 181	23.042 + 436	32.21 + 147	35.533 + 371	17.47 + 167	36.931 + 351	60.58 + 171
6	10.2	22.554 + 333	26.68 + 214	23.481 + 439	31.09 + 112	35.907 + 374	16.01 + 146	37.279 + 348	62.68 + 210
6	20.2	22.873 + 319	29.07 + 239	23.908 + 427	30.35 + 74	36.270 + 363	14.85 + 116	37.612 + 333	65.10 + 242
6	30.1	23.172 + 299	31.63 + 256	24.313 + 405	29.99 + 36	36.616 + 346	13.96 + 89	37.923 + 311	67.75 + 265
7	10.1	23.444 + 272	34.33 + 270	24.688 + 375	30.03 - 4	36.936 + 320	13.40 + 56	38.204 + 281	70.60 + 285
7	20.1	23.679 + 235	37.09 + 276	25.020 + 332	30.48 - 45	37.219 + 283	13.17 + 23	38.447 + 243	73.56 + 296
7	30.1	23.875 + 196	39.83 + 274	25.304 + 284	31.27 - 79	37.463 + 244	13.25 - 8	38.648 + 201	76.56 + 300
8	9.0	24.028 + 153	42.52 + 269	25.532 + 228	32.41 - 114	37.659 + 196	13.65 - 40	38.804 + 156	79.55 + 299
8	19.0	24.133 + 105	45.08 + 256	25.696 + 164	33.85 - 144	37.802 + 143	14.34 - 69	38.909 + 105	82.44 + 289
8	29.0	24.194 + 61	47.47 + 239	25.800 + 104	35.49 - 164	37.895 + 93	15.25 - 91	38.968 + 59	85.20 + 276
9	8.0	24.210 + 16	49.67 + 220	25.839 + 39	37.32 - 183	37.936 + 41	16.36 - 111	38.979 + 11	87.78 + 258
9	17.9	24.183 - 27	51.61 + 194	25.816 - 23	39.21 - 189	37.925 - 11	17.61 - 125	38.944 - 35	90.10 + 232
9	27.9	24.121 - 62	53.29 + 168	25.739 - 77	41.10 - 189	37.873 - 52	18.92 - 131	38.873 - 71	92.16 + 206
10	7.9	24.026 - 95	54.67 + 138	25.613 - 126	42.92 - 182	37.780 - 93	20.25 - 133	38.766 - 107	93.92 + 176
10	17.8	23.907 - 119	55.73 + 106	25.449 - 164	44.55 - 163	37.658 - 122	21.51 - 126	38.632 - 134	95.30 + 138
10	27.8	23.772 - 135	56.46 + 73	25.258 - 191	45.95 - 140	37.516 - 142	22.65 - 114	38.480 - 152	96.35 + 105
11	6.8	23.624 - 148	56.85 + 39	25.048 - 210	47.06 - 111	37.360 - 156	23.62 - 97	38.313 - 167	96.99 + 64
11	16.8	23.475 - 149	56.88 + 3	24.835 - 213	47.06 - 74	37.202 - 158	23.62 - 75	38.313 - 170	96.99 + 23
11	26.7	23.329 - 146	56.58 - 30	24.628 - 207	48.16 - 36	37.051 - 151	24.37 - 50	38.143 - 168	97.22 - 16
12	6.7	23.190 - 139	55.92 - 66	24.435 - 193	48.12 + 4	36.912 - 139	25.10 - 23	37.812 - 163	96.47 - 59
12	16.7	23.067 - 123	54.94 - 98	24.270 - 165	47.67 + 45	36.795 - 117	25.04 + 6	37.666 - 146	95.49 - 98
12	26.7	22.962 - 105	53.67 - 127	24.134 - 136	46.83 + 84	36.701 - 94	24.72 + 32	37.536 - 130	94.16 - 133
12	36.6	22.878 - 84	52.13 - 154	24.033 - 101	45.62 + 121	36.635 - 66	24.12 + 60	37.429 - 107	92.48 - 168
		- 56	- 173	- 59	+ 156	- 34	+ 86	- 78	- 193
Mean Place	22.924	43.80	23.238	36.52	35.908	17.63	37.689	81.99	
sec $\delta$ , tan $\delta$	+1.106	+0.472	+1.467	-1.073	+1.193	-0.651	+1.194	+0.652	
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.055	+0.35	+0.075	+0.35	+0.069	+0.35	+0.053	+0.35	
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	-0.028	-0.48	+0.063	-0.47	+0.038	-0.47	-0.038	-0.47	
Dble. Trans.	August 23		August 23		August 23		August 24		



APPARENT PLACES OF STARS, 1986

343

AT UPPER TRANSIT AT GREENWICH

No.	835		834		837		836	
	π Pegasi		9 Pegasi		24 Cephei		ζ Cephei	
Mag. Spect.	4.38	F5	3.70	A2	4.99	G5	3.62	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	22 09	+33 06	22 09	+ 6 07	22 09	+72 15	22 10	+58 07
1	<sup>d</sup> -83	<sup>s</sup> -139	<sup>s</sup> -86	<sup>"</sup> -88	<sup>s</sup> -629	<sup>"</sup> -99	<sup>s</sup> -307	<sup>"</sup> -118
1	16	-117	-65	-96	-575	-155	-275	-166
1	116	-94	-45	-103	-507	-207	-237	-214
1	21.6	-63	-208	-104	-413	-254	-185	-252
1	31.6	-30	-221	-100	-307	-285	-129	-279
2	10.5	+ 4	-227	+ 34	-191	-312	-66	-298
2	20.5	+ 46	-220	+ 65	-57	-321	+ 6	-302
3	2.5	+ 85	-205	+ 95	+ 72	-318	+ 76	-294
3	12.5	+ 128	-183	+ 128	+ 205	-304	+ 149	-277
3	22.4	+ 171	-149	+ 164	+ 336	-275	+ 224	-243
4	1.4	+ 211	-109	+ 194	+ 449	-236	+ 288	-203
4	11.4	+ 251	-66	+ 228	+ 554	-191	+ 350	-156
4	21.3	+ 285	-15	+ 257	+ 641	-133	+ 402	-99
5	1.3	+ 312	+ 33	+ 280	+ 701	-76	+ 441	-47
5	11.3	+ 335	+ 81	+ 301	+ 747	-16	+ 471	+ 12
5	21.3	+ 348	+130	+ 315	+ 764	+ 49	+ 486	+ 78
5	31.2	+ 351	+171	+ 320	+ 756	+105	+ 485	+132
6	10.2	+ 348	+209	+ 321	+ 734	+163	+ 476	+186
6	20.2	+ 334	+242	+ 310	+ 681	+216	+ 448	+234
6	30.2	+ 311	+265	+ 293	+ 616	+259	+ 410	+271
7	10.1	+ 282	+285	+ 269	+ 536	+299	+ 365	+307
7	20.1	+ 244	+296	+ 237	+ 436	+331	+ 305	+333
7	30.1	+ 202	+300	+ 201	+ 334	+352	+ 244	+348
8	9.0	+ 156	+299	+ 161	+ 223	+371	+ 176	+362
8	19.0	+ 107	+290	+ 117	+ 103	+377	+ 103	+362
8	29.0	+ 60	+276	+ 75	- 8	+377	+ 35	+357
9	8.0	+ 11	+258	+117	-123	+371	- 35	+347
9	17.9	- 33	+233	- 8	-233	+353	-101	+325
9	27.9	- 71	+206	- 43	-329	+332	-157	+301
10	7.9	-106	+176	- 73	-424	+303	-213	+269
10	17.9	-133	+140	- 96	-502	+264	-257	+229
10	27.8	-151	+104	-112	-565	+223	-289	+188
11	6.8	-166	+ 66	-122	-621	+174	-319	+139
11	16.8	-170	+ 23	-123	-651	+118	-331	+ 86
11	26.7	-168	- 15	-118	-668	+ 64	-337	+ 34
12	6.7	-162	- 58	-110	-672	+ 1	-335	- 25
12	16.7	-147	- 97	- 95	-645	- 59	-317	- 80
12	26.7	-130	-133	- 77	-607	-117	-293	-133
12	36.6	-107	-167	- 58	-549	-175	-260	-184
		- 79	-192	- 32	-465	-224	-213	-227
Mean Place	23.205	42.00	31.130	52.10	33.010	88.81	23.103	64.09
sec δ, tan δ	+1.194	+0.652	+1.006	+0.107	+3.285	+3.129	+1.894	+1.609
Δα(ψ), Δδ(ψ)	+0.053	+0.35	+0.060	+0.35	+0.023	+0.35	+0.042	+0.35
Δα(ε), Δδ(ε)	-0.039	-0.46	-0.006	-0.46	-0.185	-0.46	-0.095	-0.46
Dble. Trans.	August 24		August 24		August 24.		August 24	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1583		838		1582		840	
	1 H. Lacertae		λ Piscis Austrini		125 G. Aquarii		γ Aquarii	
Mag. Spect.	4.64	K2	5.40	B9	6.60	G5	4.32	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>o</sup> <sup>'</sup>
	22 13	+ 39 38	22 13	- 27 49	22 13	- 15 53	22 16	- 7 50
1 <sup>d</sup> -8.3	<sup>s</sup> 14.851 - 166	46.99 - 122	<sup>s</sup> 30.028 - 98	88.14 + 1	<sup>s</sup> 51.536 - 85	25.45 - 35	<sup>s</sup> 04.464 - 83	81.77 - 56
1 1.6	14.708 - 143	45.40 - 159	29.955 - 73	87.89 + 25	51.472 - 64	25.67 - 22	04.401 - 63	82.27 - 50
1 11.6	14.589 - 119	43.45 - 195	29.906 - 49	87.43 + 46	51.431 - 41	25.77 - 10	04.358 - 43	82.72 - 45
1 21.6	14.504 - 85	41.23 - 222	29.889 - 17	86.72 + 71	51.417 - 14	25.71 + 6	04.341 - 17	83.06 - 34
1 31.6	14.454 - 50	38.84 - 239	29.901 + 12	85.82 + 90	51.429 + 12	25.50 + 21	04.349 + 8	83.29 - 23
2 10.5	14.443 - 11	36.35 - 249	29.943 + 42	84.72 + 110	51.471 + 42	25.13 + 37	04.385 + 36	83.38 - 9
2 20.5	14.477 + 34	33.88 - 247	30.019 + 76	83.41 + 131	51.539 + 68	24.65 + 48	04.450 + 65	83.17 + 21
3 2.5	14.556 + 79	31.55 - 213	30.128 + 109	81.91 + 150	51.638 + 99	23.82 + 83	04.539 + 89	83.06 + 11
3 12.5	14.682 + 126	29.43 - 232	30.272 + 144	80.26 + 165	51.773 + 135	22.86 + 96	04.668 + 129	82.58 + 48
3 22.4	14.857 + 175	27.65 - 178	30.453 + 181	78.45 + 181	51.941 + 168	21.70 + 116	04.830 + 162	81.86 + 72
4 1.4	15.075 + 218	26.26 - 139	30.667 + 214	76.55 + 190	52.141 + 200	20.36 + 134	05.022 + 192	80.91 + 95
4 11.4	15.337 + 262	25.32 - 94	30.916 + 249	74.55 + 200	52.373 + 232	18.84 + 152	05.247 + 226	79.73 + 118
4 21.3	15.638 + 301	24.91 - 41	31.197 + 281	72.51 + 204	52.636 + 263	17.18 + 166	05.502 + 256	78.33 + 140
5 1.3	15.967 + 329	25.01 + 10	31.504 + 307	70.46 + 205	52.923 + 287	15.41 + 177	05.781 + 279	76.75 + 158
5 11.3	16.321 + 354	25.63 + 62	31.836 + 332	68.45 + 201	53.234 + 311	13.55 + 186	06.083 + 302	75.01 + 174
5 21.3	16.689 + 368	26.77 + 114	32.183 + 347	66.53 + 192	53.559 + 325	11.67 + 188	06.400 + 317	73.16 + 185
5 31.2	17.060 + 371	28.37 + 160	32.539 + 356	64.75 + 178	53.892 + 333	09.81 + 186	06.724 + 324	71.26 + 190
6 10.2	17.428 + 368	30.40 + 203	32.898 + 359	63.15 + 160	54.227 + 335	08.01 + 180	07.051 + 327	69.34 + 192
6 20.2	17.780 + 352	32.81 + 241	33.248 + 350	61.78 + 137	54.553 + 326	06.34 + 167	07.369 + 318	67.46 + 188
6 30.2	18.108 + 328	35.49 + 268	33.582 + 334	60.66 + 112	54.864 + 311	04.83 + 151	07.672 + 303	65.68 + 178
7 10.1	18.405 + 297	38.43 + 294	33.892 + 310	59.83 + 83	55.153 + 289	03.51 + 132	07.953 + 281	64.03 + 165
7 20.1	18.661 + 256	41.53 + 310	34.168 + 276	59.31 + 52	55.409 + 256	02.42 + 109	08.202 + 249	62.55 + 148
7 30.1	18.873 + 212	44.69 + 316	34.406 + 238	59.08 + 23	55.630 + 221	01.58 + 84	08.417 + 215	61.28 + 127
8 9.0	19.036 + 163	47.90 + 321	34.600 + 194	59.16 - 8	55.809 + 179	01.00 + 58	08.592 + 175	60.23 + 105
8 19.0	19.145 + 109	51.04 + 314	34.744 + 144	59.53 - 37	55.943 + 134	00.68 + 32	08.723 + 131	59.42 + 81
8 29.0	19.205 + 60	54.07 + 303	34.840 + 96	60.13 - 60	56.032 + 89	00.59 + 9	08.810 + 87	58.84 + 58
9 8.0	19.214 + 9	56.94 + 287	34.886 + 46	60.96 - 83	56.076 + 44	00.74 - 15	08.854 + 44	58.49 + 35
9 17.9	19.175 - 39	59.57 + 263	34.885 - 1	61.94 - 98	56.076 + 0	01.08 - 34	08.856 + 2	58.37 + 12
9 27.9	19.095 - 80	61.94 + 237	34.843 - 42	63.02 - 108	56.039 - 37	01.56 - 48	08.823 - 33	58.41 - 4
10 7.9	18.977 - 118	64.00 + 206	34.763 - 80	64.16 - 114	55.969 - 70	02.17 - 61	08.757 - 61	58.63 - 22
10 17.9	18.829 - 148	65.68 + 168	34.654 - 109	65.27 - 111	55.873 - 96	02.86 - 69	08.667 - 90	58.98 - 35
10 27.8	18.660 - 169	66.99 + 131	34.526 - 128	66.32 - 105	55.760 - 113	03.57 - 71	08.560 - 107	59.42 - 44
11 6.8	18.474 - 186	67.87 + 88	34.384 - 142	67.25 - 93	55.636 - 124	04.28 - 71	08.442 - 118	59.94 - 52
11 16.8	18.281 - 193	68.30 + 43	34.241 - 143	68.01 - 76	55.510 - 126	04.95 - 67	08.322 - 120	60.50 - 56
11 26.7	18.089 - 192	68.30 + 0	34.102 - 139	68.58 - 57	55.389 - 121	05.55 - 60	08.207 - 115	61.07 - 57
12 6.7	17.900 - 189	67.82 - 48	33.973 - 129	68.94 - 36	55.276 - 113	06.07 - 52	08.099 - 108	61.66 - 59
12 16.7	17.727 - 173	66.90 - 92	33.864 - 109	69.06 - 12	55.181 - 95	06.47 - 40	08.006 - 93	62.21 - 55
12 26.7	17.571 - 156	65.57 - 133	33.775 - 89	68.95 + 11	55.104 - 77	06.76 - 29	07.931 - 75	62.73 - 52
12 36.6	17.437 - 134	63.84 - 173	33.711 - 64	68.60 + 35	55.049 - 55	06.92 - 16	07.876 - 55	63.20 - 47
	- 102	- 203	- 35	+ 59	- 29	- 1	- 31	- 38
Mean Place	17.892	51.35	32.994	63.37	54.435	04.42	07.330	63.08
sec δ, tan δ	+1.299	+0.829	+1.131	-0.528	+1.040	-0.285	+1.009	-0.138
da(ψ), dδ(ψ)	+0.051	+0.36	+0.067	+0.36	+0.065	+0.36	+0.063	+0.36
da(ε), dδ(ε)	-0.049	-0.45	+0.031	-0.45	+0.017	-0.45	+0.008	-0.44
Dble. Trans.	August 25		August 25		August 25		August 26	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	841		839		1584		843	
	α Tucanae		ε Octantis		47 Aquarii		31 Pegasi	
Mag.Spect.	2.91	K2	5.11	M3	5.40	K0	4.93	B3p
U.T.	R.A.		R.A.		R.A.		R.A.	
	h	m	h	m	h	m	h	m
	22	17	22	18	22	20	22	20
	°		°		°		°	
	19	19	18	30	39	39	20	07
	'		'		'		'	
	"		"		"		"	
1 -8.3	31.741	-255	70.50	+104	28.113	-994	61.68	+165
1 1.6	31.533	-208	69.01	+149	27.260	-853	59.52	+216
1 11.6	31.373	-160	67.09	+192	26.563	-697	56.89	+263
1 21.6	31.274	-99	64.78	+231	26.061	-502	53.84	+306
1 31.6	31.235	-39	62.19	+259	25.758	-303	50.51	+333
2 10.5	31.256	+21	59.34	+285	25.655	-103	46.94	+357
2 20.5	31.344	+88	56.31	+303	25.772	+117	43.23	+371
3 2.5	31.494	+150	53.18	+192	26.086	+314	39.51	+372
3 12.5	31.706	+212	49.99	+319	26.598	+512	35.80	+371
3 22.4	31.984	+278	46.83	+316	27.306	+708	32.22	+358
4 1.4	32.317	+333	43.77	+306	28.179	+873	28.85	+337
4 11.4	32.708	+391	40.83	+294	29.216	+1037	25.72	+313
4 21.3	33.151	+443	38.12	+245	30.395	+1179	22.94	+278
5 1.3	33.634	+483	35.67	+281	31.682	+1287	20.54	+240
5 11.3	34.157	+523	33.53	+214	33.070	+1388	18.55	+199
5 21.3	34.705	+548	31.76	+177	34.519	+1449	17.07	+148
5 31.2	35.265	+560	30.39	+137	35.994	+1475	16.08	+99
6 10.2	35.831	+566	29.46	+93	37.479	+1485	15.61	+47
6 20.2	36.384	+553	29.00	+46	38.920	+1441	15.70	-9
6 30.2	36.911	+527	28.99	+1	40.290	+1370	16.29	-59
7 10.1	37.402	+491	29.45	-46	41.559	+1269	17.41	-112
7 20.1	37.838	+436	30.36	-91	42.676	+1117	19.01	-160
7 30.1	38.213	+375	31.67	-131	43.626	+950	21.01	-200
8 9.0	38.516	+303	33.36	-169	44.376	+750	23.39	-238
8 19.0	38.736	+220	35.36	-200	44.893	+517	26.04	-265
8 29.0	38.875	+139	37.57	-221	45.180	+287	28.86	-282
9 8.0	38.927	+52	39.94	-237	45.218	+38	31.79	-293
9 17.9	38.893	-34	42.35	-241	45.004	-214	34.67	-288
9 27.9	38.785	-108	44.71	-236	44.565	-439	37.41	-274
10 7.9	38.604	-181	46.94	-223	43.903	-662	39.92	-251
10 17.9	38.365	-239	48.91	-197	43.054	-849	42.04	-212
10 27.8	38.084	-281	50.56	-165	42.061	-993	43.73	-169
11 6.8	37.769	-315	51.82	-126	40.950	-1111	44.89	-116
11 16.8	37.444	-325	52.60	-78	39.784	-1166	45.45	-56
11 26.7	37.120	-324	52.90	-30	38.606	-1178	45.42	+3
12 6.7	36.810	-310	52.68	+22	37.453	-1153	44.75	+67
12 16.7	36.532	-278	51.93	+75	36.387	-1066	43.46	+129
12 26.7	36.292	-240	50.72	+121	35.434	-953	41.62	+184
12 36.6	36.099	-193	49.03	+169	34.626	-808	39.24	+238
		-135		+209		-624		+282
Mean Place	35.231	38.24	34.100	27.24	51.092	58.46	51.206	72.95
sec δ, tan δ	+2.020	-1.755	+6.064	-5.981	+1.076	-0.397	+1.023	+0.215
dα(w), dδ(w)	+0.081	+0.36	+0.129	+0.36	+0.066	+0.36	+0.059	+0.36
dα(ε), dδ(ε)	+0.106	-0.43	+0.360	-0.43	+0.024	-0.42	-0.013	-0.42
Dble.Trans.	August 26		August 26		August 27		August 27	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1587		845		1588		846	
	72 G. Indi		v Gruis		36 Pegasi		δ' Gruis	
Mag.Spect.	5.70	A3	5.48	K0	5.82	K2	4.02	G5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 22 27	<sup>o</sup> <sup>'</sup> -67 33	<sup>h</sup> <sup>m</sup> 22 27	<sup>o</sup> <sup>'</sup> -39 11	<sup>h</sup> <sup>m</sup> 22 28	<sup>o</sup> <sup>'</sup> + 9 03	<sup>h</sup> <sup>m</sup> 22 28	<sup>o</sup> <sup>'</sup> -43 33
1 -8.3	35 256 - 376	62 41 +115	48 997 - 132	89 95 + 27	24 770 - 95	22 15 - 87	25 050 - 149	82 95 + 40
1 1.7	34 937 - 319	60 76 +165	48 891 - 106	89 34 + 61	24 691 - 79	21 17 - 98	24 930 - 120	82 17 + 78
1 11.6	34 679 - 258	58 64 +212	48 812 - 79	88 41 + 93	24 631 - 60	20 10 -107	24 839 - 91	81.05 +112
1 21.6	34 498 - 181	56 10 +254	48 767 - 45	87 17 +124	24 593 - 38	18 99 -111	24 785 - 54	79 58 +147
1 31.6	34.395 - 103	53.25 +285	48.755 - 12	85.65 +152	24.580 - 13	17.90 -109	24.768 - 17	77.83 +175
2 10.5	34.372 - 23	50 12 +313	48.778 + 23	83 89 +176	24 593 + 13	16 85 -105	24.787 + 19	75 82 +201
2 20.5	34 438 + 66	46 80 +332	48 840 + 62	81.91 +198	24 636 + 43	15 93 - 92	24 850 + 63	73 59 +223
3 2.5	34 585 + 147	43 40 +340	48 940 + 100	79.75 +216	24 710 + 74	15 19 - 74	24 953 + 103	71.20 +239
3 12.5	34 815 + 230	39 94 +346	49 080 + 140	77 45 +230	24 818 + 108	14 65 - 54	25 098 + 145	68 67 +253
3 22.4	35 130 + 315	36.53 +341	49.262 + 182	75.04 +241	24.962 + 144	14.41 - 24	25.289 + 191	66.06 +261
4 1.4	35 519 + 389	33 24 +329	49 482 + 220	72 58 +246	25 140 + 178	14 46 + 5	25 520 + 231	63 44 +262
4 11.4	35 984 + 465	30 10 +314	49 742 + 260	70 10 +248	25 353 + 213	14 85 + 39	25 794 + 274	60 81 +263
4 21.4	36 517 + 533	27 23 +287	50 040 + 298	67 66 +244	25 598 + 245	15 59 + 74	26 107 + 313	58 26 +255
5 1.3	37 103 + 586	24 65 +258	50 369 + 329	65 32 +234	25 869 + 271	16 64 +105	26 453 + 346	55 84 +242
5 11.3	37.742 + 639	22.42 +223	50.728 + 359	63.10 +222	26.165 + 296	18.00 +136	26.830 + 377	53.58 +226
5 21.3	38 415 + 673	20 62 +180	51 107 + 379	61 08 +202	26 477 + 312	19 65 +165	27 229 + 399	51 56 +202
5 31.2	39 107 + 692	19 24 +138	51 497 + 390	59 29 +179	26 797 + 320	21 51 +186	27 640 + 411	49 81 +175
6 10.2	39 809 + 702	18 34 + 90	51 895 + 398	57 78 +151	27 121 + 324	23 56 +205	28 058 + 418	48 38 +143
6 20.2	40 497 + 688	17 95 + 39	52 285 + 330	56 60 +118	27 437 + 316	25 73 +217	28 469 + 411	47 31 +107
6 30.2	41 157 + 660	18 05 - 10	52 661 + 376	55 76 + 84	27 739 + 302	27 95 +222	28 865 + 396	46 61 + 70
7 10.1	41 776 + 619	18 65 - 60	53 013 + 352	55 29 + 47	28 019 + 280	30 19 +224	29 236 + 371	46 31 + 30
7 20.1	42 329 + 553	19 73 -108	53 330 + 317	55 21 + 8	28 269 + 250	32 38 +219	29 570 + 334	46 41 - 10
7 30.1	42 808 + 479	21 24 -151	53 607 + 277	55 48 - 27	28 485 + 216	34 48 +210	29 862 + 292	46 88 - 47
8 9.1	43 199 + 391	23 14 -190	53 836 + 229	56 11 - 63	28 662 + 177	36 44 +196	30 103 + 241	47 73 - 85
8 19.0	43 486 + 287	25 37 -223	54 011 + 175	57 06 - 95	28 796 + 134	38 22 +178	30 286 + 183	48 90 -117
8 29.0	43 671 + 185	27 82 -245	54 132 + 121	58 26 -120	28 888 + 92	39 80 +158	30 413 + 127	50 33 -143
9 8.0	43 746 + 75	30 43 -261	54 197 + 65	59 70 -144	28 938 + 50	41 18 +138	30 480 + 67	51 98 -165
9 17.9	43 710 - 36	33 08 -265	54 206 + 9	61 28 -158	28 946 + 8	42 30 +112	30 487 + 7	53 76 -178
9 27.9	43 575 - 135	35 66 -258	54 168 - 38	62 92 -164	28 920 - 26	43 20 + 90	30 443 - 44	55 58 -182
10 7.9	43 343 - 232	38 10 -244	54 084 - 84	64 58 -166	28 862 - 58	43 86 + 66	30 349 - 94	57 40 -182
10 17.9	43 031 - 312	40 25 -215	53 964 - 120	66 15 -157	28 778 - 84	44 28 + 42	30 217 - 132	59 09 -169
10 27.8	42 658 - 373	42 05 -180	53 818 - 146	67 56 -141	28 677 - 101	44 48 + 20	30 056 - 161	60 60 -151
11 6.8	42 235 - 423	43 42 -137	53 652 - 166	68 78 -122	28 563 - 114	44 46 - 2	29 874 - 182	61 87 -127
11 16.8	41 790 - 445	44 26 - 84	53 480 - 172	69 70 - 92	28 444 - 119	44 24 - 22	29 874 - 191	62 81 - 94
11 26.8	41 340 - 450	44 57 - 31	53 310 - 170	70 33 - 63	28 326 - 118	43 83 - 41	29 494 - 189	63 41 - 60
12 6.7	40 901 - 439	44 32 + 25	53 147 - 163	70 62 - 29	28 213 - 113	43 23 - 60	29 313 - 181	63 63 - 22
12 16.7	40 497 - 404	43 49 + 83	53 002 - 145	70 55 + 7	28 111 - 102	42 48 - 75	29 151 - 162	63 45 + 18
12 26.7	40 139 - 358	42 15 +134	52 880 - 122	70 15 + 40	28 024 - 87	41 59 - 89	29 013 - 138	62 90 + 55
12 36.6	39 837 - 302	40 29 +186	52 783 - 97	69 40 + 75	27 952 - 72	40 58 -101	28 902 - 111	61 97 + 93
	- 228	+231	- 65	+108	- 49	-106	- 75	+129
Mean Place	38.882	28.79	51.919	61.89	27.571	35.28	28.011	53.70
sec δ, tan δ	+2.620	-2.421	+1.290	-0.816	+1.013	+0.159	+1.380	-0.951
da(ψ), dδ(ψ)	+0.086	+0.37	+0.070	+0.37	+0.060	+0.37	+0.071	+0.37
da(ε), dδ(ε)	+0.148	-0.39	+0.050	-0.39	-0.010	-0.39	+0.058	-0.39
Dbles.Trans.	August 29		August 29		August 29		August 29	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1589		847		1590		1593		
	Piazz 22 <sup>h</sup> 120 (Pegasi)		δ Cephei*		38 Pegasi		ρ Cephei		
Mag. Spect.	5.96	K2	3.7 to 4.4	F5 to G0	5.51	A0	5.50	A2	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	22 28	+ 26 41	22 28	+ 58 20	22 29	+ 32 29	22 29	+ 78 44	
1	<sup>d</sup> -8.3	<sup>s</sup> 29.343 -125	<sup>s</sup> 30.54 -104	<sup>s</sup> 36.702 -316	<sup>s</sup> 45.22 -93	<sup>s</sup> 21.795 -143	<sup>s</sup> 65.91 -106	<sup>s</sup> 41.001 -1070	<sup>s</sup> 80.58 -57
1	1.7	29.235 -108	29.23 -131	36.413 -289	43.79 -143	21.671 -124	64.54 -137	39.999 -1002	79.42 -116
1	11.6	29.145 -90	27.66 -157	36.156 -257	41.86 -193	21.565 -106	62.85 -169	39.085 -914	77.68 -174
1	21.6	29.082 -63	25.89 -177	35.946 -210	39.51 -235	21.488 -77	60.93 -192	38.308 -777	75.43 -225
1	31.6	29.046 -36	24.03 -186	35.788 -158	36.86 -265	21.440 -48	58.86 -207	37.688 -620	72.78 -265
2	10.5	29.040 -6	22.11 -192	35.690 -96	33.98 -288	21.424 -16	56.70 -216	37.245 -443	69.81 -297
2	20.5	29.071 +31	20.25 -186	35.664 -26	31.01 -297	21.447 +23	54.58 -212	37.012 -23	66.65 -316
3	2.5	29.137 +66	18.53 -172	35.707 +43	28.09 -292	21.510 +63	52.58 -200	36.983 -299	63.45 -320
3	12.5	29.243 +106	17.02 -151	35.824 +117	25.28 -281	21.615 +105	50.77 -181	37.167 +184	60.31 -314
3	22.4	29.390 +147	15.81 -121	36.018 +194	22.77 -251	21.765 +150	49.27 -150	37.564 +397	57.38 -293
4	1.4	29.576 +186	14.96 -85	36.280 +262	20.62 -215	21.955 +190	48.14 -113	38.146 +582	54.78 -260
4	11.4	29.801 +225	14.50 -46	36.608 +328	18.91 -171	22.188 +233	47.41 -73	38.904 +758	52.57 -221
4	21.4	30.062 +261	14.50 +0	36.994 +386	17.75 -116	22.459 +271	47.17 -24	39.808 +904	50.89 -168
5	1.3	30.351 +289	14.93 +43	37.423 +429	17.13 -62	22.759 +300	47.39 +22	40.816 +1008	49.76 -113
5	11.3	30.666 +315	15.80 +87	37.890 +467	17.10 -3	23.086 +327	48.09 +70	41.909 +1093	49.21 -55
5	21.3	30.997 +331	17.11 +131	38.376 +486	17.67 +57	23.431 +345	49.27 +118	43.042 +1133	49.29 +8
5	31.2	31.336 +339	18.78 +167	38.868 +492	18.79 +112	23.782 +351	50.85 +158	44.175 +1133	49.96 +67
6	10.2	31.677 +341	20.80 +202	39.357 +489	20.44 +165	24.135 +353	52.82 +197	45.287 +1112	51.21 +125
6	20.2	32.008 +331	23.10 +230	39.822 +465	22.60 +216	24.476 +341	55.13 +231	46.333 +1046	53.02 +181
6	30.2	32.321 +313	25.60 +250	40.256 +434	25.16 +256	24.799 +323	57.67 +254	47.288 +955	55.30 +228
7	10.1	32.610 +289	28.27 +267	40.647 +391	28.09 +293	25.097 +298	60.44 +277	48.135 +847	58.03 +273
7	20.1	32.865 +255	31.02 +275	40.983 +336	31.32 +323	25.359 +262	63.33 +289	48.838 +703	61.14 +311
7	30.1	33.084 +219	33.78 +276	41.260 +277	34.73 +341	25.581 +222	66.27 +294	49.396 +568	64.51 +337
8	9.1	33.260 +176	36.53 +275	41.621 +212	38.30 +357	25.761 +180	69.23 +286	49.792 +396	68.13 +362
8	19.0	33.390 +130	39.16 +263	41.611 +139	41.92 +362	25.891 +130	72.10 +130	50.010 +218	71.88 +375
8	29.0	33.476 +86	41.66 +250	41.684 +73	45.52 +360	25.976 +85	74.86 +276	50.063 +53	75.69 +381
9	8.0	33.516 +40	43.99 +233	41.686 +2	49.05 +353	26.013 +37	77.47 +261	49.941 -122	79.51 +382
9	17.9	33.513 -3	46.07 +208	41.621 -65	52.39 +334	26.005 -8	79.84 +237	49.647 -294	83.22 +371
9	27.9	33.473 -40	47.91 +184	41.497 -124	55.52 +313	25.959 -46	81.96 +184	49.202 -445	86.76 +354
10	7.9	33.398 -75	49.46 +155	41.316 -181	58.36 +284	25.876 -83	83.80 +212	48.601 -601	90.08 +332
10	17.9	33.296 -102	50.70 +124	41.088 -228	60.83 +247	25.764 -112	85.29 +149	47.866 -735	93.06 +298
10	27.8	33.175 -121	51.62 +92	40.822 -266	62.91 +208	25.631 -133	86.45 +116	47.019 -847	95.66 +260
11	6.8	33.037 -138	52.20 +58	40.523 -299	64.53 +162	25.480 -151	87.24 +79	46.065 -954	97.82 +216
11	16.8	32.894 -143	52.42 +22	40.205 -318	65.62 +109	25.322 -158	87.62 +38	45.042 -1023	99.44 +162
11	26.8	32.749 -145	52.31 -11	39.876 -329	66.21 +59	25.162 -160	87.63 +1	43.971 -1071	100.52 +108
12	6.7	32.607 -142	51.83 -48	39.544 -332	66.22 +1	25.003 -159	87.22 -41	42.872 -1099	100.99 +47
12	16.7	32.477 -130	51.01 -82	39.222 -322	65.66 -56	24.856 -147	86.43 -79	41.790 -1082	100.82 -17
12	26.7	32.359 -118	49.90 -111	38.919 -303	64.57 -109	24.722 -134	85.28 -115	40.749 -1041	100.06 -76
12	36.6	32.259 -100	48.48 -142	38.642 -277	62.94 -163	24.605 -117	83.78 -150	39.779 -970	98.68 -138
		-76	-162	-234	-207	-91	-175	-851	-192
Mean Place	32.218	38.11	40.065	45.07	24.710	71.77	46.310	77.86	
sec δ, tan δ	+1.119	+0.503	+1.906	+1.622	+1.186	+0.637	+5.128	+5.030	
dα(ψ), dδ(ψ)	+0.056	+0.37	+0.044	+0.37	+0.055	+0.37	+0.010	+0.37	
dα(ε), dδ(ε)	-0.031	-0.39	-0.100	-0.39	-0.039	-0.39	-0.310	-0.38	
Dble. Trans.	August 29		August 29		August 29		August 29		

AT UPPER TRANSIT AT GREENWICH

No.	1591		848		1592		1594	
	σ Aquarii		α Lacertae		β Piscis Austrini*		Groombridge 3834 (Cephei)	
Mag.Spect.	4.89	A0	3.85	A0	4.40	A0	5.74	A0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	22 29	- 10 44	22 30	+ 50 12	22 30	- 32 24	22 31	+ 76 08
1 -8.3	53 227 <sup>s</sup> - 90	" - 50	40 849 <sup>s</sup> - 234	44 99 <sup>s</sup> - 99	41 622 <sup>s</sup> - 115	" + 6	57 470 <sup>s</sup> - 850	" - 69
1 1.7	53 157 - 70	70 16 - 41	40 849 - 212	44 99 - 144	41 530 - 92	81.88 + 35	56 674 - 796	87.12 - 118
1 11.6	53 104 - 53	70 57 - 32	40 637 - 187	43 55 - 189	41 530 - 69	81.88 + 62	56 674 - 726	85.94 - 174
1 21.6	53 076 - 28	70 89 - 19	40 450 - 149	41 66 - 227	41 461 - 38	81.26 + 90	55 948 - 617	84.20 - 226
1 31.6	53 076 - 3	71 08 - 6	40 301 - 108	39 39 - 251	41 423 - 9	80 36 + 114	55 331 - 492	81.94 - 265
1 31.6	53 073	71.14	40 193	36.88	41 414	79.22	54 839	79.29
2 10.5	53 095 + 22	71 04 + 10	40 131 - 62	34.17 - 271	41 436 + 22	77.84 + 138	54 488 - 351	76.32 - 297
2 20.5	53 153 + 58	70 76 + 28	40 125 - 6	31 40 - 277	41 493 + 57	76.24 + 160	54 305 - 183	73.17 - 315
3 2.5	53 222 + 69	70 34 + 42	40 175 + 50	28.71 - 269	41 584 + 91	74 45 + 179	54 287 - 18	69.99 - 318
3 12.5	53 338 + 116	69 63 + 71	40 284 + 109	26 16 - 255	41 712 + 128	72 49 + 196	54 441 + 154	66 86 - 313
3 22.4	53 487 + 149	68 71 + 92	40 454 + 170	23 91 - 225	41 879 + 167	70 39 + 210	54 770 + 329	63 95 - 291
4 1.4	53 668 + 181	67 58 + 113	40 680 + 226	22 03 - 188	42 083 + 204	68 21 + 218	55 249 + 479	61 38 - 257
4 11.4	53 883 + 215	66 24 + 134	40 961 + 281	20 58 - 145	42 324 + 241	65 94 + 227	55 872 + 623	59 19 - 219
4 21.4	54 130 + 247	64 70 + 154	41 291 + 330	19 67 - 91	42 600 + 276	63 66 + 228	56 618 + 746	57 54 - 165
5 1.3	54 404 + 274	63 01 + 184	41 658 + 367	19 29 - 38	42 907 + 307	61 42 + 224	57 452 + 834	56 44 - 110
5 11.3	54 702 + 298	61 17 + 184	42 058 + 400	19 46 + 17	43 241 + 334	59 23 + 219	58 358 + 906	55 91 - 63
5 21.3	55 018 + 316	59 26 + 191	42 476 + 418	20 22 + 76	43 595 + 354	57 18 + 205	59 299 + 941	56 03 + 12
5 31.2	55 343 + 325	57 32 + 194	42 901 + 425	21 48 + 126	43 961 + 366	55 31 + 187	60 244 + 945	56 72 + 69
6 10.2	55 673 + 330	55 38 + 194	43 325 + 424	23 25 + 177	44 333 + 372	53 65 + 166	61 175 + 931	58 00 + 128
6 20.2	55 997 + 324	53 51 + 187	43 732 + 407	25 48 + 223	44 699 + 366	52 26 + 139	62 054 + 879	59 84 + 184
6 30.2	56 308 + 311	51 77 + 174	44 114 + 382	28 06 + 258	45 052 + 353	51 17 + 109	62 860 + 806	62 14 + 230
7 10.1	56 600 + 292	50 17 + 160	44 461 + 347	30 99 + 293	45 383 + 331	50 40 + 77	63 580 + 720	64 89 + 275
7 20.1	56 861 + 261	48 78 + 139	44 762 + 301	34 15 + 316	45 682 + 299	49 99 + 41	64 182 + 602	68 01 + 312
7 30.1	57 089 + 228	47 61 + 117	45 015 + 253	37 47 + 332	45 943 + 261	49 90 + 9	64 665 + 483	71 40 + 339
8 9.1	57 278 + 189	46 68 + 93	45 212 + 197	40 91 + 344	46 161 + 218	50 15 - 25	65 016 + 351	75 03 + 363
8 19.0	57 422 + 144	46 01 + 67	45 349 + 137	44 36 + 345	46 328 + 167	50 72 - 57	65 220 + 204	78 78 + 375
8 29.0	57 525 + 103	45 58 + 43	45 428 + 79	47 76 + 340	46 446 + 118	51 55 - 83	65 289 + 69	82 59 + 381
9 8.0	57 583 + 58	45 39 + 19	45 449 + 21	51 06 + 330	46 511 + 65	52 62 - 107	65 214 - 75	86 40 + 381
9 17.9	57 598 + 15	45 42 - 3	45 413 - 36	54 16 + 310	46 526 + 15	53 86 - 124	64 997 - 217	86 40 + 369
9 27.9	57 578 - 20	45 63 - 21	45 328 - 85	57 03 + 287	46 498 - 28	55 20 - 134	64 657 - 340	90 09 + 353
10 7.9	57 523 - 55	46 00 - 37	45 196 - 132	59 61 + 258	46 428 - 70	56 59 - 139	64 189 - 468	93 62 + 330
10 17.9	57 442 - 81	46 49 - 49	45 025 - 171	61 82 + 221	46 325 - 103	57 95 - 136	63 612 - 577	99 87 + 295
10 27.8	57 342 - 100	47 05 - 56	44 825 - 200	63 65 + 183	46 199 - 126	59 21 - 126	62 944 - 668	102 45 + 258
11 6.8	57 229 - 113	47 67 - 62	44 598 - 227	65 04 + 139	46 055 - 144	60 33 - 112	62 189 - 755	104 58 + 213
11 16.8	57 112 - 117	48 30 - 63	44 357 - 241	65 93 + 89	45 905 - 150	61 24 - 91	61 379 - 810	106 17 + 159
11 26.8	56 996 - 116	48 92 - 62	44 110 - 247	66 34 + 41	45 757 - 148	61 91 - 67	60 530 - 849	107 23 + 106
12 6.7	56 885 - 111	49 51 - 59	43 860 - 250	66 21 - 13	45 615 - 142	62 31 - 40	59 658 - 872	107 67 + 44
12 16.7	56 789 - 96	50 03 - 52	43 621 - 239	65 57 - 64	45 489 - 126	62 42 - 11	58 800 - 858	107 48 - 19
12 26.7	56 707 - 82	50 48 - 45	43 397 - 224	64 44 - 113	45 383 - 106	62 24 + 18	57 973 - 827	106 71 - 77
12 36.6	56 643 - 64	50 84 - 36	43 196 - 201	62 82 - 162	45 299 - 84	61 77 + 47	57 203 - 770	106 71 - 140
	56 643 - 41	50 84 - 25	43 196 - 169	62 82 - 202	45 299 - 56	61 77 + 75	57 203 - 676	105 31 - 193
Mean Place	56.006	50.46	44.005	46.41	44.466	55.85	62.193	84.51
sec δ, tan δ	+1.018	-0.190	+1.563	+1.201	+1.185	-0.635	+4.179	+4.058
dα(ψ), dδ(ψ)	+0.063	+0.37	+0.049	+0.37	+0.068	+0.37	+0.021	+0.37
dα(ε), dδ(ε)	+0.012	-0.38	-0.074	-0.38	+0.039	-0.38	-0.251	-0.37
Dbie.Trans.	August 29		August 29		August 29		August 30	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	849		850		851		1595	
	υ Aquarii		η Aquarii		31 Cephei		κ Aquarii	
Mag. Spect.	5.29	F5	4.13	B8	5.22	F0	5.33	K0
U.T.	R.A.		R.A.		R.A.		R.A.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	22 33	- 20 46	22 34	- 0 11	22 35	+ 73 33	22 37	- 4 17
1 -8.3	54.651 - 97	62.39 - 27	37.021 - 90	30.48 - 71	21.793 - 699	85.45 - 60	00.731 - 90	69.97 - 64
1 1.7	54.573 - 78	62.48 - 9	36.947 - 74	31.20 - 72	21.138 - 655	84.28 - 117	00.656 - 75	70.58 - 61
1 11.6	54.515 - 58	62.38 + 10	36.899 - 58	31.93 - 73	20.539 - 599	82.54 - 174	00.599 - 57	71.15 - 57
1 21.6	54.483 - 32	62.08 + 30	36.854 - 35	32.62 - 69	20.029 - 510	80.30 - 224	00.563 - 36	71.65 - 50
1 31.6	54.476 - 7	61.58 + 50	36.843 - 11	33.24 - 62	19.622 - 407	77.67 - 263	00.551 - 12	72.05 - 40
2 10.6	54.496 + 20	60.90 + 68	36.856 + 13	33.75 - 51	19.332 - 290	74.72 - 295	00.564 + 13	72.33 - 28
2 20.5	54.547 + 51	60.02 + 88	36.899 + 43	34.09 - 34	19.181 - 151	71.59 - 313	00.607 + 43	72.41 - 8
3 2.5	54.628 + 81	58.91 + 111	36.968 + 69	34.26 - 17	19.169 - 12	68.43 - 316	00.671 + 64	72.31 + 10
3 12.5	54.743 + 115	57.60 + 131	37.072 + 104	34.26 + 0	19.300 + 131	65.32 - 311	00.777 + 106	72.08 + 23
3 22.4	54.895 + 152	56.11 + 149	37.213 + 141	33.96 + 30	19.579 + 279	62.44 - 288	00.916 + 139	71.53 + 55
4 1.4	55.080 + 185	54.46 + 165	37.386 + 173	33.40 + 56	19.987 + 408	59.89 - 255	01.088 + 172	70.74 + 79
4 11.4	55.301 + 221	52.65 + 181	37.593 + 207	32.56 + 84	20.519 + 532	57.73 - 216	01.294 + 206	69.70 + 104
4 21.4	55.555 + 254	50.73 + 192	37.833 + 240	31.44 + 112	21.156 + 637	56.10 - 163	01.532 + 238	68.41 + 129
5 1.3	55.837 + 282	48.75 + 198	38.100 + 267	30.07 + 137	21.871 + 715	55.01 - 109	01.798 + 266	66.90 + 151
5 11.3	56.145 + 308	46.71 + 204	38.392 + 292	28.47 + 160	22.650 + 779	54.51 - 50	02.090 + 292	65.20 + 170
5 21.3	56.472 + 327	44.70 + 201	38.701 + 309	26.68 + 179	23.463 + 813	54.64 + 13	02.399 + 309	63.35 + 185
5 31.3	56.811 + 339	42.75 + 195	39.020 + 319	24.77 + 191	24.282 + 819	55.35 + 71	02.719 + 320	61.41 + 194
6 10.2	57.155 + 344	40.90 + 185	39.345 + 325	22.75 + 202	25.092 + 810	56.64 + 129	03.045 + 326	59.41 + 200
6 20.2	57.494 + 339	39.23 + 167	39.663 + 318	20.69 + 206	25.861 + 769	58.49 + 185	03.365 + 320	57.42 + 199
6 30.2	57.821 + 327	37.76 + 147	39.968 + 305	18.67 + 202	26.571 + 710	60.80 + 231	03.673 + 308	55.48 + 194
7 10.1	58.128 + 307	36.52 + 124	40.254 + 286	16.70 + 197	27.208 + 637	63.56 + 276	03.962 + 289	53.64 + 184
7 20.1	58.405 + 277	35.56 + 96	40.511 + 257	14.86 + 184	27.747 + 539	66.68 + 312	04.223 + 261	51.96 + 168
7 30.1	58.648 + 243	34.88 + 68	40.735 + 224	13.17 + 169	28.184 + 437	70.07 + 339	04.451 + 228	50.46 + 150
8 9.1	58.850 + 202	34.49 + 39	40.921 + 186	11.66 + 151	28.510 + 326	73.70 + 363	04.641 + 190	49.17 + 129
8 19.0	59.007 + 157	34.39 + 10	41.064 + 143	10.38 + 128	28.712 + 202	77.45 + 375	04.788 + 147	48.11 + 106
8 29.0	59.120 + 113	34.55 - 16	41.166 + 102	09.32 + 106	28.797 + 85	81.24 + 379	04.894 + 106	47.29 + 82
9 8.0	59.185 + 65	34.96 - 41	41.226 + 60	08.49 + 83	28.760 - 37	85.04 + 380	04.957 + 63	46.70 + 59
9 17.9	59.205 + 20	35.57 - 61	41.244 + 18	07.89 + 60	28.602 - 158	88.72 + 368	04.978 + 21	46.35 + 35
9 27.9	59.187 - 18	36.33 - 76	41.227 - 17	07.51 + 38	28.338 - 264	92.24 + 352	04.964 - 14	46.20 + 15
10 7.9	59.131 - 56	37.21 - 88	41.177 - 50	07.33 + 18	27.966 - 372	95.52 + 328	04.916 - 48	46.24 - 4
10 17.9	59.047 - 84	38.14 - 93	41.101 - 76	07.34 - 1	27.501 - 465	98.45 + 293	04.842 - 74	46.45 - 21
10 27.8	58.942 - 105	39.07 - 93	41.007 - 94	07.50 - 16	26.959 - 542	101.01 + 256	04.749 - 93	46.78 - 33
11 6.8	58.821 - 121	39.97 - 90	40.899 - 108	07.82 - 32	26.344 - 615	103.12 + 211	04.641 - 108	47.22 - 44
11 16.8	58.696 - 125	40.77 - 80	40.786 - 113	08.25 - 43	25.682 - 662	104.70 + 158	04.529 - 112	47.74 - 52
11 26.8	58.571 - 125	41.45 - 68	40.674 - 112	08.76 - 51	24.987 - 695	105.74 + 104	04.417 - 112	48.31 - 57
12 6.7	58.452 - 119	42.00 - 55	40.565 - 109	09.38 - 62	24.271 - 716	106.18 + 44	04.308 - 109	48.93 - 62
12 16.7	58.346 - 106	42.36 - 36	40.468 - 97	10.04 - 66	23.566 - 705	105.99 - 19	04.211 - 97	49.54 - 61
12 26.7	58.257 - 89	42.55 - 19	40.385 - 83	10.73 - 69	22.886 - 680	105.21 - 78	04.127 - 84	50.15 - 61
12 36.6	58.186 - 71	42.55 + 0	40.317 - 68	11.45 - 72	22.252 - 634	103.82 - 139	04.059 - 68	50.74 - 59
Mean Place	57.427	39.50	39.776	14.31	26.140	82.97	03.462	52.46
sec δ, tan δ	+1.070	-0.379	+1.000	-0.003	+3.536	+3.392	+1.003	-0.075
α(ψ), dδ(ψ)	+0.065	+0.37	+0.061	+0.37	+0.029	+0.37	+0.062	+0.37
α(ε), dδ(ε)	+0.024	-0.37	+0.000	-0.36	-0.211	-0.36	+0.005	-0.35
Dble. Trans.	August 30		August 30		August 30		August 31	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	853		852		854		855	
	30 Cephei		10 Lacertae		ε Piscis Austrini		ζ Pegasi	
Name								
Mag.Spect.	5.21	A2	4.91	Oe5	4.22	B8	3.61	B8
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	22 38	+ 63 30	22 38	+ 38 58	22 39	- 27 06	22 40	+ 10 45
1 -8.3	06.643 -397	52.06 -73	36.296 -169	43.41 -96	51.942 -109	76.19 -14	44.569 -100	25.90 -85
1 1.7	06.273 -370	50.79 -127	36.144 -152	42.07 -134	51.853 -89	76.08 +11	44.484 -85	24.94 -96
1 11.6	05.937 -336	48.99 -180	36.010 -134	40.36 -171	51.784 -69	75.72 +36	44.414 -70	23.86 -108
1 21.6	05.655 -282	46.72 -227	35.905 -105	38.35 -201	51.742 -42	75.11 +61	44.366 -48	22.72 -114
1 31.6	05.433 -222	44.12 -260	35.831 -74	36.15 -220	51.726 -16	74.28 +83	44.341 -25	21.59 -113
2 10.6	05.281 -152	41.23 -289	35.792 -39	33.80 -235	51.739 +13	73.22 +106	44.341 +0	20.48 -111
2 20.5	05.213 -68	38.21 -302	35.797 +5	31.44 -236	51.783 +44	71.93 +129	44.371 +30	19.50 -98
3 2.5	05.229 +16	35.19 -302	35.844 +47	29.17 -227	51.860 +77	70.44 +149	44.432 +61	18.68 -82
3 12.5	05.333 +104	32.25 -294	35.938 +94	27.06 -211	51.971 +111	68.75 +169	44.526 +94	18.06 -62
3 22.4	05.530 +197	29.56 -269	36.083 +145	25.24 -182	52.121 +150	66.90 +185	44.658 +132	17.71 -35
4 1.4	05.808 +278	27.22 -234	36.273 +190	23.78 -146	52.306 +185	64.91 +199	44.825 +167	17.67 -4
4 11.4	06.166 +358	25.28 -194	36.510 +237	22.73 -105	52.529 +223	62.81 +210	45.029 +204	17.96 +29
4 21.4	06.595 +429	23.87 -141	36.789 +279	22.17 -56	52.787 +258	60.65 +216	45.266 +237	18.60 +64
5 1.3	07.075 +480	23.02 -85	37.102 +313	22.10 -7	53.074 +287	58.46 +219	45.532 +266	19.57 +97
5 11.3	07.602 +527	22.73 -29	37.444 +342	22.54 +44	53.390 +316	56.28 +218	45.824 +292	20.87 +130
5 21.3	08.154 +552	23.07 +34	37.807 +363	23.49 +95	53.727 +337	54.19 +209	46.134 +310	22.46 +159
5 31.3	08.714 +560	23.97 +90	38.178 +371	24.89 +140	54.076 +349	52.21 +198	46.454 +320	24.28 +182
6 10.2	09.273 +559	25.43 +146	38.551 +373	26.74 +185	54.433 +357	50.40 +181	46.780 +326	26.31 +203
6 20.2	09.807 +534	27.42 +199	38.914 +363	28.97 +223	54.786 +353	48.82 +158	47.100 +320	28.49 +218
6 30.2	10.306 +499	29.84 +242	39.258 +344	31.50 +253	55.128 +342	47.49 +133	47.407 +307	30.73 +224
7 10.1	10.759 +453	32.67 +283	39.575 +317	34.30 +280	55.450 +322	46.45 +104	47.695 +288	33.02 +229
7 20.1	11.149 +390	35.83 +316	39.855 +280	37.28 +298	55.742 +292	45.74 +71	47.953 +258	35.27 +225
7 30.1	11.473 +324	39.22 +339	40.095 +240	40.36 +308	56.000 +258	45.33 +41	48.179 +226	37.44 +217
8 9.1	11.724 +251	42.82 +360	40.289 +194	43.51 +315	56.217 +217	45.25 +8	48.367 +188	39.50 +206
8 19.0	11.892 +168	46.49 +367	40.432 +143	46.62 +311	56.386 +169	45.49 -24	48.512 +145	41.38 +188
8 29.0	11.984 +92	50.18 +369	40.527 +95	49.65 +303	56.509 +123	46.00 -51	48.616 +104	43.08 +170
9 8.0	11.996 +12	53.85 +367	40.572 +45	52.55 +290	56.583 +74	46.76 -76	48.678 +62	44.56 +148
9 18.0	11.928 -68	57.36 +351	40.568 -46	55.24 +269	56.609 +26	47.72 -96	48.698 +20	45.80 +124
9 27.9	11.792 -136	60.68 +332	40.522 -46	57.70 +246	56.593 -16	48.81 -109	48.683 -15	46.82 +102
10 7.9	11.587 -205	63.74 +306	40.436 -86	59.87 +217	56.538 -55	50.00 -119	48.635 -48	47.59 +77
10 17.9	11.324 -263	66.45 +271	40.318 -118	61.70 +183	56.452 -86	51.20 -120	48.561 -74	48.12 +53
10 27.8	11.014 -310	68.78 +233	40.176 -142	63.18 +148	56.342 -110	52.36 -116	48.468 -93	48.42 +30
11 6.8	10.661 -353	70.65 +187	40.012 -164	64.27 +109	56.214 -128	53.43 -107	48.359 -109	48.49 +7
11 16.8	10.280 -381	72.00 +135	39.837 -175	64.92 +65	56.080 -134	54.34 -91	48.244 -115	48.34 -15
11 26.8	09.881 -399	72.84 +84	39.657 -180	65.15 +23	55.945 -135	55.07 -73	48.128 -116	48.00 -34
12 6.7	09.472 -409	73.08 +24	39.475 -182	64.92 -23	55.814 -131	55.59 -52	48.014 -114	47.45 -55
12 16.7	09.072 -400	72.74 -34	39.303 -172	64.25 -67	55.697 -117	55.86 -27	47.909 -105	46.73 -72
12 26.7	08.687 -395	71.84 -90	39.141 -162	63.18 -107	55.595 -102	55.90 -4	47.816 -93	45.86 -87
12 36.7	08.331 -356	70.36 -148	38.997 -144	61.70 -148	55.513 -82	55.68 +22	47.737 -79	44.85 -101
	-311	-196	-119	-181	-57	+48	-59	-108
Mean Place	10.180	50.71	39.242	47.27	54.677	51.24	47.316	38.35
sec δ, tan δ	+2.242	+2.007	+1.286	+0.809	+1.123	-0.512	+1.018	+0.190
dα(ψ), dδ(ψ)	+0.043	+0.37	+0.054	+0.37	+0.066	+0.37	+0.059	+0.37
dα(ε), dδ(ε)	-0.125	-0.35	-0.051	-0.35	+0.032	-0.34	-0.012	-0.34
Dble.Trans.	August 31		August 31		September 1		September 1	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	856		857		858		1596		
	β Gruis		η Pegasi		13 Lacertae		45 Pegasi		
Mag. Spect.	2.24	M3	3.10	G0	5.24	K0	6.45	K0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° '	h m	° '	h m	° '	h m	° '	
	22 41	-46 57	22 42	+30 08	22 43	+41 44	22 44	+19 17	
1	-8.3	49.130 -172	50.24 +39	19.249 -137	55.33 -94	26.286 -183	50.44 -90	45.961 -113	33.01 -89
1	1.7	48.985 -145	49.44 +80	19.126 -123	54.09 -124	26.119 -167	49.14 -130	45.862 -99	31.92 -109
1	11.6	48.869 -116	48.25 +119	19.020 -106	52.54 -155	25.971 -148	47.45 -169	45.778 -84	30.62 -130
1	21.6	48.789 -80	46.69 +156	18.938 -82	50.77 -177	25.851 -120	45.43 -202	45.716 -62	29.20 -142
1	31.6	48.747 -42	44.81 +188	18.883 -55	48.86 -191	25.764 -87	43.19 -224	45.677 -39	27.71 -149
2	10.6	48.744 -3	42.65 +216	18.858 -25	46.86 -200	25.712 -52	40.78 -241	45.665 -12	26.19 -152
2	20.5	48.786 +42	40.25 +240	18.870 +12	44.88 -198	25.706 -6	38.34 -244	45.685 +20	24.75 -144
3	2.5	48.870 +84	37.67 +258	18.919 +9	43.01 -187	25.745 +39	35.96 -238	45.738 +53	23.46 -129
3	12.5	49.000 +130	34.94 +273	19.009 +40	41.32 -169	25.834 +89	33.73 -223	45.826 +88	22.35 -111
3	22.4	49.179 +179	32.13 +281	19.144 +135	39.92 -140	25.975 +141	31.78 -195	45.955 +129	21.52 -83
4	1.4	49.401 +222	29.30 +283	19.319 +175	38.86 -106	26.164 +189	30.19 -159	46.120 +165	21.02 -50
4	11.4	49.671 +270	26.48 +282	19.537 +218	38.19 -67	26.403 +239	28.99 -120	46.324 +204	20.87 -15
4	21.4	49.983 +312	23.75 +273	19.793 +256	37.97 -22	26.686 +283	28.29 -20	46.565 +241	21.12 +25
5	1.3	50.332 +349	21.17 +258	20.081 +288	38.20 +23	27.005 +319	28.09 -20	46.835 +270	21.76 +64
5	11.3	50.717 +385	18.76 +241	20.398 +317	38.89 +69	27.356 +351	28.40 +31	47.132 +297	22.78 +102
5	21.3	51.127 +410	16.61 +215	20.734 +336	40.04 +115	27.728 +372	29.24 +84	47.449 +317	24.18 +140
5	31.3	51.553 +426	14.76 +185	21.080 +346	41.57 +153	28.110 +382	30.55 +131	47.776 +327	25.88 +170
6	10.2	51.989 +436	13.25 +151	21.430 +350	43.48 +191	28.495 +385	32.32 +177	48.109 +333	27.87 +199
6	20.2	52.422 +433	12.13 +112	21.772 +342	45.72 +224	28.869 +374	34.50 +250	48.436 +327	30.08 +221
6	30.2	52.841 +419	11.40 +73	22.097 +325	48.18 +246	29.224 +355	37.00 +260	48.749 +313	32.44 +236
7	10.1	53.238 +397	11.10 +30	22.401 +304	50.86 +288	29.553 +329	39.79 +279	49.042 +293	34.92 +248
7	20.1	53.598 +360	11.23 -13	22.671 +270	53.65 +279	29.844 +291	42.79 +300	49.305 +263	37.44 +252
7	30.1	53.916 +318	11.76 -53	22.905 +234	56.50 +285	30.094 +250	45.91 +312	49.535 +230	39.93 +249
8	9.1	54.183 +267	12.69 -93	23.097 +192	59.36 +286	30.297 +203	49.13 +322	49.726 +191	42.37 +244
8	19.0	54.391 +208	13.97 -128	23.242 +145	62.14 +278	30.448 +151	52.32 +319	49.873 +147	44.68 +231
8	29.0	54.540 +149	15.52 -155	23.343 +101	64.80 +266	30.549 +101	55.46 +314	49.979 +106	46.83 +215
9	8.0	54.626 +86	17.32 -180	23.398 +55	67.32 +252	30.598 +49	58.48 +302	50.041 +62	48.80 +197
9	18.0	54.649 +23	19.27 -195	23.408 +10	69.61 +229	30.597 -1	61.30 +282	50.062 +21	50.53 +173
9	27.9	54.617 -32	21.27 -200	23.380 -28	71.66 +205	30.553 -44	63.90 +260	50.046 -16	52.03 +150
10	7.9	54.530 -87	23.27 -200	23.315 -65	73.45 +179	30.467 -86	66.22 +232	49.996 -50	53.27 +124
10	17.9	54.400 -130	25.14 -187	23.220 -95	74.90 +145	30.346 -121	68.19 +197	49.918 -78	54.22 +95
10	27.8	54.236 -164	26.82 -168	23.104 -116	76.05 +115	30.199 -147	69.82 +163	49.821 -97	54.91 +69
11	6.8	54.045 -191	28.25 -143	22.969 -135	76.84 +79	30.029 -170	71.04 +122	49.706 -115	55.31 +40
11	16.8	53.842 -203	29.33 -108	22.824 -145	77.25 +41	29.846 -183	71.82 +78	49.584 -122	55.42 +11
11	26.8	53.637 -205	30.04 -71	22.675 -149	77.31 +6	29.656 -190	72.17 +35	49.458 -126	55.26 -16
12	6.7	53.435 -202	30.34 -30	22.526 -149	76.98 -33	29.462 -194	72.04 -13	49.333 -125	54.80 -46
12	16.7	53.251 -184	30.19 +15	22.385 -141	76.28 -70	29.277 -185	71.45 -59	49.217 -116	54.09 -71
12	26.7	53.089 -162	29.65 +54	22.255 -130	75.25 -103	29.101 -176	70.43 -102	49.110 -107	53.15 -94
12	36.7	52.952 -137	28.68 +97	22.139 -116	73.89 -136	28.942 -159	68.97 -146	49.018 -92	51.98 -117
		-101	+136	-94	-161	-134	-180	-73	-133
Mean Place	51.961	19.94	22.095	61.57	29.250	53.46	48.723	42.62	
sec δ, tan δ	+1.465	-1.071	+1.156	+0.581	+1.340	+0.892	+1.060	+0.350	
dα(ψ), dδ(ψ)	+0.071	+0.37	+0.056	+0.38	+0.053	+0.38	+0.058	+0.38	
dα(ε), dδ(ε)	+0.067	-0.33	-0.037	-0.33	-0.056	-0.33	-0.022	-0.32	
Dble. Trans.	September 1		September 1		September 2		September 2		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	859		1598		1597		860	
	λ Pegasi		B.D. - 2° 5826 (Aquarii)		68 Aquarii		ε Gruis	
Mag.Spect.	4.14	K0	7.58	K2	5.43	G5	3.69	A2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	22 45	+23 29	22 46	- 1 51	22 46	- 19 40	22 47	-51 23
1 -8.3	50 024 <sup>s</sup> - 121	31.57 - 91	45.396 <sup>s</sup> - 94	53.04 - 67	47.049 <sup>s</sup> - 102	84.81 - 35	41.893 <sup>s</sup> - 202	48.29 - 47
1 1.7	49 917 - 107	30.42 - 115	45.317 - 79	53.71 - 67	46.965 - 84	84.97 - 16	41.720 - 173	47.38 + 91
1 11.6	49 826 - 91	29.04 - 138	45.253 - 64	54.36 - 65	46.898 - 67	84.95 + 2	41.577 - 103	46.06 + 132
1 21.6	49 756 - 70	27.48 - 156	45.210 - 43	54.95 - 59	46.855 - 43	84.72 + 23	41.474 - 143	44.32 + 174
1 31.6	49.711 - 45	25.83 - 165	45.188 - 22	55.46 - 51	46.835 - 20	84.30 + 42	41.413 - 61	42.25 + 207
2 10.6	49 693 - 18	24.12 - 171	45.191 + 3	55.86 - 40	46.841 + 6	83.68 + 62	41.394 - 19	39.88 + 237
2 20.5	49 709 + 16	22.47 - 165	45.222 + 31	56.08 - 22	46.878 + 37	82.85 + 83	41.424 + 30	37.26 + 262
3 2.5	49.759 + 87	20.95 - 152	45.279 + 57	56.08 + 0	46.942 + 64	81.82 + 103	41.501 + 77	34.47 + 279
3 12.5	49 846 + 50	19.61 - 134	45.370 + 91	56.00 + 8	47.041 + 99	80.55 + 127	41.629 + 128	31.53 + 294
3 22.4	49.975 + 129	18.55 - 106	45.500 + 130	55.59 + 41	47.177 + 136	79.08 + 147	41.810 + 181	28.52 + 301
4 1.4	50.142 + 167	17.83 - 72	45.662 + 162	54.93 + 66	47.348 + 171	77.45 + 163	42.039 + 229	25.51 + 301
4 11.4	50.349 + 207	17.47 - 36	45.859 + 197	54.00 + 93	47.554 + 206	75.65 + 180	42.318 + 279	22.53 + 298
4 21.4	50.594 + 245	17.54 + 7	46.090 + 231	52.80 + 120	47.796 + 242	73.73 + 192	42.646 + 328	19.66 + 287
5 1.3	50.869 + 275	18.01 + 47	46.349 + 269	51.37 + 143	48.067 + 271	71.71 + 202	43.014 + 368	16.97 + 269
5 11.3	51.172 + 303	18.89 + 88	46.636 + 287	49.72 + 165	48.366 + 299	69.64 + 207	43.421 + 407	14.49 + 248
5 21.3	51.495 + 323	20.19 + 130	46.942 + 306	47.89 + 183	48.687 + 321	67.57 + 207	43.856 + 435	12.30 + 219
5 31.3	51.828 + 333	21.82 + 163	47.260 + 318	45.95 + 194	49.020 + 333	65.55 + 202	44.310 + 454	10.44 + 186
6 10.2	52.166 + 338	23.77 + 195	47.585 + 325	43.92 + 203	49.361 + 341	63.62 + 193	44.776 + 466	08.94 + 150
6 20.2	52.498 + 332	25.99 + 222	47.906 + 321	41.87 + 205	49.700 + 339	61.86 + 176	45.240 + 464	07.88 + 106
6 30.2	52.816 + 318	28.39 + 240	48.216 + 310	39.86 + 201	50.028 + 328	60.28 + 158	45.690 + 450	07.23 + 65
7 10.1	53.113 + 297	30.95 + 256	48.509 + 293	37.92 + 194	50.339 + 311	58.93 + 135	46.118 + 428	07.04 + 19
7 20.1	53.380 + 267	33.58 + 263	48.774 + 265	36.12 + 180	50.622 + 283	57.86 + 107	46.508 + 390	07.30 - 26
7 30.1	53.612 + 232	36.21 + 263	49.008 + 234	34.48 + 164	50.872 + 250	57.07 + 79	46.854 + 346	07.99 - 69
8 9.1	53.805 + 193	38.82 + 261	49.205 + 197	33.04 + 144	51.084 + 212	56.57 + 50	47.146 + 292	09.09 - 110
8 19.0	53.953 + 148	41.32 + 250	49.361 + 156	31.83 + 121	51.251 + 167	56.37 + 20	47.374 + 228	10.55 - 146
8 29.0	54.059 + 106	43.67 + 235	49.475 + 114	30.84 + 99	51.375 + 124	56.44 - 7	47.539 + 165	12.30 - 175
9 8.0	54.120 + 61	45.86 + 219	49.547 + 72	30.09 + 75	51.453 + 78	56.77 - 33	47.636 + 97	14.30 - 200
9 18.0	54.139 + 19	47.82 + 196	49.578 + 31	29.58 + 51	51.485 + 32	57.32 - 55	47.664 + 28	16.44 - 214
9 27.9	54.121 - 18	49.54 + 172	49.572 - 6	29.28 + 30	51.479 - 6	58.03 - 71	47.631 - 33	18.63 - 219
10 7.9	54.068 - 53	51.00 + 146	49.533 - 39	29.19 + 9	51.435 - 44	58.88 - 85	47.537 - 94	20.80 - 217
10 17.9	53.986 - 82	52.15 + 115	49.467 - 66	29.28 - 9	51.361 - 74	59.81 - 93	47.394 - 143	22.82 - 202
10 27.8	53.884 - 102	53.02 + 87	49.382 - 85	29.50 - 22	51.266 - 95	60.75 - 94	47.213 - 181	24.64 - 182
11 6.8	53.764 - 120	53.58 + 56	49.280 - 102	29.87 - 37	51.266 - 113	61.67 - 92	47.000 - 213	26.16 - 152
11 16.8	53.636 - 128	53.81 + 23	49.180 - 108	29.87 - 47	51.153 - 120	62.52 - 85	47.000 - 228	26.16 - 114
11 26.8	53.504 - 132	53.74 - 7	49.062 - 110	30.88 - 54	51.033 - 122	63.25 - 73	46.772 - 234	27.30 - 74
12 6.7	53.371 - 133	53.34 - 40	48.955 - 107	31.48 - 60	50.792 - 119	63.86 - 61	46.306 - 232	28.33 - 29
12 16.7	53.247 - 124	52.64 - 70	48.856 - 99	32.12 - 64	50.684 - 108	64.30 - 44	46.092 - 214	28.14 + 19
12 26.7	53.133 - 111	51.67 - 97	48.769 - 87	32.77 - 65	50.590 - 94	64.56 - 26	45.900 - 192	27.51 + 63
12 36.7	53.032 - 80	50.42 - 125	48.695 - 74	33.42 - 65	50.512 - 78	64.64 - 8	45.735 - 165	26.42 + 109
		-143	-54	-61	-56	+12	-126	+151
Mean Place	52.812	39.80	48.075	36.36	49.712	62.24	44.687	16.95
sec δ, tan δ	+1.090	+0.435	+1.001	-0.032	+1.062	-0.358	+1.602	-1.252
da(ψ), dδ(ψ)	+0.058	+0.38	+0.061	+0.38	+0.064	+0.38	+0.071	+0.38
da(ε), dδ(ε)	-0.027	-0.32	+0.002	-0.31	+0.023	-0.31	+0.079	-0.31
Dble.Trans.	September 2		September 2		September 2		September 3	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	861		863		862		1599	
	τ Aquarii		ι Cephei		μ Pegasi		69 G. Gruis	
Mag. Spect.	4.21	K5	3.68	K0	3.67	K0	5.39	K2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	22 48	- 13 39	22 49	+ 66 07	22 49	+ 24 31	22 50	- 39 13
1 -8.3	50.028 - 96	71.32 - 47	08.202 - 452	47.00 - 54	18.266 - 123	40.65 - 89	13.615 - 144	71.55 + 10
1 1.7	49.947 - 81	71.67 - 35	07.775 - 427	46.50 - 110	18.156 - 110	39.52 - 113	13.493 - 122	71.08 + 47
1 11.6	49.881 - 66	71.89 - 22	07.381 - 394	44.85 - 165	18.060 - 96	38.13 - 139	13.393 - 100	70.27 + 81
1 21.6	49.838 - 43	71.94 - 5	07.041 - 340	42.70 - 215	17.986 - 74	36.56 - 157	13.323 - 70	69.11 +116
1 31.6	49.818 - 20	71.83 + 11	06.767 - 274	40.18 - 252	17.936 - 50	34.89 - 167	13.284 - 39	67.65 +146
2 10.6	49.821 + 3	71.56 + 27	06.567 - 200	37.35 - 283	17.914 - 22	33.15 - 174	13.277 - 7	65.92 +173
2 20.5	49.856 + 35	71.09 + 47	06.459 - 108	34.34 - 301	17.925 + 11	31.46 - 169	13.308 + 31	63.93 +199
3 2.5	49.914 + 58	70.47 + 62	06.444 - 15	31.29 - 305	17.971 + 46	29.89 - 157	13.376 + 68	61.75 +218
3 12.5	50.008 + 94	69.53 + 83	06.527 + 83	28.29 - 300	18.055 + 84	28.49 - 140	13.484 + 108	59.38 +237
3 22.5	50.139 + 131	68.40 +113	06.712 + 185	25.51 - 278	18.180 + 125	27.38 - 111	13.636 + 152	56.88 +250
4 1.4	50.303 + 164	67.08 +132	06.990 + 278	23.04 - 247	18.345 + 165	26.59 - 79	13.828 + 192	54.31 +257
4 11.4	50.503 + 200	65.55 +153	07.359 + 369	20.95 - 209	18.550 + 205	26.17 - 42	14.062 + 234	51.69 +262
4 21.4	50.738 + 235	63.85 +170	07.807 + 448	19.37 - 158	18.794 + 244	26.17 + 0	14.337 + 275	49.09 +260
5 1.3	51.001 + 263	62.01 +194	08.316 + 509	18.33 - 104	19.068 + 274	26.59 + 42	14.646 + 309	46.57 +252
5 11.3	51.293 + 292	60.06 +195	08.879 + 563	17.85 - 48	19.372 + 304	27.42 + 83	14.989 + 343	44.15 +242
5 21.3	51.605 + 312	58.05 +201	09.474 + 595	18.00 + 15	19.695 + 323	28.67 +125	15.356 + 367	41.92 +223
5 31.3	51.931 + 326	56.03 +202	10.081 + 607	18.71 + 71	20.030 + 335	30.26 +159	15.740 + 384	39.93 +199
6 10.2	52.264 + 333	54.04 +199	10.690 + 609	19.99 +128	20.371 + 341	32.19 +193	16.135 + 395	38.20 +173
6 20.2	52.595 + 331	52.15 +189	11.277 + 587	21.82 +183	20.705 + 334	34.40 +221	16.528 + 393	36.80 +140
6 30.2	52.915 + 320	50.41 +174	11.827 + 550	24.10 +228	21.026 + 321	36.79 +239	16.911 + 383	35.75 +105
7 10.2	53.218 + 303	48.84 +157	12.331 + 504	26.82 +272	21.327 + 301	39.36 +257	17.275 + 364	35.08 + 67
7 20.1	53.495 + 277	47.50 +134	12.769 + 438	29.89 +307	21.597 + 270	42.00 +264	17.607 + 332	34.82 + 26
7 30.1	53.739 + 244	46.40 +110	13.138 + 369	33.22 +333	21.833 + 236	44.66 +266	17.903 + 296	34.93 - 11
8 9.1	53.947 + 208	45.57 + 83	13.429 + 291	36.78 +356	22.030 + 197	47.30 +264	18.154 + 251	35.43 - 80
8 19.0	54.111 + 164	45.02 + 55	13.631 + 202	40.46 +368	22.182 + 152	49.84 +254	18.353 + 199	36.28 - 85
8 29.0	54.233 + 122	44.72 + 30	13.752 + 121	44.18 +372	22.292 + 110	52.25 +241	18.500 + 147	37.42 -114
9 8.0	54.311 + 78	44.68 + 4	13.785 + 33	47.90 +372	22.357 + 65	54.50 +225	18.591 + 91	38.83 -141
9 18.0	54.346 - 35	44.88 - 20	13.731 - 54	51.50 +360	22.379 + 22	56.51 +201	18.627 + 36	40.43 -160
9 27.9	54.343 - 3	45.26 - 38	13.602 - 129	54.94 +344	22.364 - 15	58.30 +179	18.614 - 13	42.12 -169
10 7.9	54.304 - 39	45.80 - 54	13.396 - 206	58.14 +320	22.314 - 50	59.82 +152	18.614 - 61	43.87 -175
10 17.9	54.236 - 68	46.45 - 65	13.123 - 273	61.01 +287	22.235 - 79	61.04 +122	18.454 - 99	45.56 -169
10 27.9	54.148 - 88	47.16 - 71	12.795 - 328	63.52 +251	22.134 - 101	61.97 + 93	18.325 - 129	47.13 -157
11 6.8	54.042 - 106	47.92 - 76	12.415 - 380	65.58 +206	22.015 - 119	62.58 + 61	18.172 - 153	48.51 -138
11 16.8	53.929 - 113	48.65 - 73	12.000 - 415	67.14 +156	21.887 - 128	62.87 + 29	18.007 - 165	49.62 -111
11 26.8	53.815 - 114	49.34 - 69	11.561 - 439	68.17 +103	21.754 - 133	62.84 - 3	17.839 - 168	50.44 - 82
12 6.7	53.703 - 112	49.97 - 63	11.104 - 457	68.62 + 45	21.621 - 133	62.47 - 37	17.673 - 166	50.92 - 48
12 16.7	53.600 - 103	50.49 - 52	10.652 - 452	68.47 - 15	21.494 - 127	61.80 - 67	17.520 - 153	51.02 - 10
12 26.7	53.510 - 90	50.90 - 41	10.211 - 441	67.75 - 72	21.377 - 117	60.85 - 95	17.384 - 136	50.77 + 25
12 36.7	53.435 - 75	51.18 - 28	09.797 - 414	66.44 - 131	21.273 - 104	59.61 - 124	17.269 - 115	50.16 + 61
	53.435 - 55	51.18 - 14	09.797 - 367	66.44 - 183	21.273 - 85	59.61 - 144	17.269 - 87	50.16 + 97
Mean Place	52.678	50.65	11.838	45.44	21.049	48.47	16.289	43.06
sec δ, tan δ	+1.029	-0.243	+2.471	+2.260	+1.099	+0.456	+1.291	-0.816
da(ψ), dδ(ψ)	+0.063	+0.38	+0.043	+0.38	+0.057	+0.38	+0.068	+0.38
da(ε), dδ(ε)	+0.015	-0.31	-0.144	-0.30	-0.029	-0.30	+0.052	-0.30
Dbble. Trans.	September 3		September 3		September 3		September 3	

AT UPPER TRANSIT AT GREENWICH

No.	864		865		866		1600	
	λ Aquarii		ϱ Indi		δ Aquarii		B.D. +36° 4956 (Lacertae)	
Mag.Spect.	3.84	M0	6.14	G0	3.51	A2	6.00	F2
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ′	h m	° ′	h m	° ′	h m	° ′
	22 51	- 7 38	22 53	- 70 08	22 53	- 15 53	22 54	+ 36 59
1 -8.3	51.991 <sup>s</sup> - 94	84.73 <sup>o</sup> - 58	41.063 <sup>s</sup> - 473	80.76 <sup>o</sup> + 93	53.478 <sup>s</sup> - 100	55.58 <sup>o</sup> - 44	21.996 <sup>s</sup> - 163	72.68 <sup>o</sup> - 81
1 1.7	51.910 - 81	85.24 - 51	40.642 - 421	79.30 +146	53.394 - 84	55.86 - 28	21.846 - 150	71.49 - 119
1 11.6	51.844 - 66	85.68 - 33	40.278 - 364	77.32 +198	53.324 - 70	56.00 - 14	21.712 - 134	69.95 - 154
1 21.6	51.799 - 45	86.01 - 44	39.993 - 285	74.87 +245	53.277 - 47	55.96 + 4	21.602 - 110	68.11 - 184
1 31.6	51.775 - 24	86.22 - 21	39.789 - 204	72.05 +282	53.252 - 25	55.73 + 23	21.519 - 83	66.07 - 204
2 10.6	51.775 + 0	86.28 - 6	39.670 - 119	68.91 +314	53.251 - 1	55.32 + 41	21.468 - 51	63.88 - 219
2 20.5	51.804 + 29	86.15 + 13	39.648 - 22	65.53 +338	53.280 + 29	54.72 + 60	21.458 - 10	61.65 - 223
3 2.5	51.847 + 43	86.86 - 71	39.717 + 69	62.01 +352	53.335 + 55	53.92 + 80	21.488 + 30	59.50 - 215
3 12.5	51.945 + 98	85.35 + 151	39.881 + 164	58.40 +361	53.424 + 89	52.86 + 106	21.564 + 76	57.48 - 202
3 22.5	52.071 + 126	84.57 + 78	40.144 + 263	54.79 +361	53.551 + 127	51.59 +127	21.688 + 124	55.73 - 175
4 1.4	52.230 + 159	83.57 +100	40.494 + 350	51.28 +351	53.712 + 161	50.13 +146	21.859 + 171	54.31 - 142
4 11.4	52.424 + 194	82.34 +123	40.933 + 439	47.89 +339	53.909 + 197	48.49 +164	22.076 + 217	53.27 - 104
4 21.4	52.653 + 229	80.88 +146	41.457 + 524	44.73 +316	54.141 + 232	46.68 +181	22.338 + 262	52.70 - 57
5 1.3	52.911 + 258	79.23 +165	42.048 + 591	41.87 +286	54.403 + 262	44.75 +193	22.635 + 297	52.59 - 31
5 11.3	53.197 + 286	77.42 +181	42.707 + 659	39.33 +254	54.694 + 291	42.73 +202	22.964 + 329	52.97 + 88
5 21.3	53.504 + 307	75.49 +193	43.415 + 708	37.21 +212	55.007 + 313	40.67 +206	23.316 + 352	53.85 + 132
5 31.3	53.823 + 319	73.49 +200	44.155 + 740	35.53 +168	55.334 + 327	38.62 +205	23.680 + 364	55.17 + 175
6 10.2	54.151 + 328	71.47 +202	44.918 + 763	34.32 +121	55.670 + 336	36.63 +199	24.050 + 370	56.92 + 213
6 20.2	54.477 + 326	69.48 +199	45.678 + 760	33.65 + 67	56.003 + 333	34.75 +188	24.414 + 364	59.05 + 243
6 30.2	54.792 + 315	67.58 +190	46.418 + 740	33.48 + 17	56.328 + 325	33.04 +171	24.761 + 347	61.47 + 212
7 10.2	55.091 + 299	65.80 +178	47.124 + 706	33.84 - 36	56.636 + 308	31.52 +152	25.086 + 325	64.17 + 270
7 20.1	55.363 + 272	64.21 +159	47.769 + 645	34.73 - 89	56.918 + 282	30.26 +126	25.377 + 291	67.04 + 287
7 30.1	55.604 + 241	62.82 +139	48.341 + 572	36.07 -134	57.168 + 250	29.25 +101	25.631 + 254	70.03 + 299
8 9.1	55.809 + 205	61.66 +116	48.823 + 482	37.86 -179	57.382 + 214	28.51 + 74	25.842 + 211	73.08 + 305
8 19.0	55.972 + 163	60.76 + 90	49.197 + 374	40.03 -217	57.552 + 170	28.08 + 43	26.004 + 162	76.11 + 303
8 29.0	56.094 + 122	60.11 + 65	49.461 + 264	42.46 -243	57.680 + 128	27.90 + 18	26.120 + 116	79.06 + 295
9 8.0	56.173 + 79	59.70 + 41	49.604 + 143	45.13 -267	57.763 + 83	27.99 - 9	26.187 + 67	81.90 + 284
9 18.0	56.209 + 36	59.53 + 17	49.623 + 19	47.88 -275	57.803 + 40	27.99 -33	26.207 + 20	84.54 + 264
9 27.9	56.210 + 1	59.56 - 3	49.528 - 95	50.62 -274	57.804 + 1	28.32 - 50	26.185 - 22	86.97 + 243
10 7.9	56.175 - 35	59.79 - 23	49.318 - 210	53.26 -264	57.769 - 35	29.49 - 67	26.123 - 62	89.13 + 216
10 17.9	56.112 - 63	60.16 - 37	49.009 - 309	55.64 -238	57.704 - 65	30.26 - 77	26.028 - 95	90.96 + 183
10 27.9	56.029 - 83	60.63 - 47	48.622 - 387	57.71 -207	57.617 - 87	31.07 - 81	25.908 - 120	92.47 + 151
11 6.8	55.929 - 100	61.20 - 57	48.165 - 457	59.37 -166	57.512 - 105	31.91 - 84	25.764 - 144	93.60 + 113
11 16.8	55.821 - 108	61.81 - 61	47.668 - 497	60.50 -113	57.399 - 113	32.70 - 79	25.608 - 156	94.32 + 72
11 26.8	55.711 - 110	62.43 - 62	47.151 - 517	61.12 - 62	57.284 - 115	33.43 - 73	25.443 - 165	94.65 + 33
12 6.7	55.603 - 108	63.06 - 63	46.630 - 521	61.14 - 2	57.169 - 115	34.07 - 64	25.274 - 169	94.54 - 11
12 16.7	55.503 - 100	63.64 - 58	46.134 - 496	60.57 + 57	57.064 - 105	34.58 - 51	25.110 - 164	94.01 - 93
12 26.7	55.414 - 89	64.18 - 54	45.676 - 458	59.44 +113	56.971 - 93	34.95 - 37	24.954 - 156	93.08 - 53
12 36.7	55.339 - 75	64.66 - 48	45.269 - 407	57.75 +169	56.892 - 79	35.17 - 22	24.811 - 143	91.76 - 132
	55.339 - 56	64.66 - 38	45.269 - 334	57.75 +218	56.892 - 59	35.17 - 5	24.811 - 122	91.76 - 164
Mean Place	54.628	66.07	44.072	46.15	56.091	34.16	24.866	76.66
sec δ, tan δ	+1.009	-0.134	+2.944	-2.769	+1.040	-0.285	+1.252	+0.754
dα(ψ), dδ(ψ)	+0.062	+0.38	+0.082	+0.38	+0.063	+0.38	+0.056	+0.38
dα(ε), dδ(ε)	+0.009	-0.29	+0.177	-0.29	+0.018	-0.28	-0.048	-0.28
Dble.Trans.	September 4		September 4		September 4		September 4	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	867		868		869		1601	
	$\alpha$ Piscis Austrini (Fomalhaut)		$\zeta$ Gruis		$\omicron$ Andromedae		$\pi$ Piscis Austrini	
Mag.Spect.	1.29	A3	4.18	G5	3.63 var.	B5, A2p	5.13	F0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	22 56	- 29 41	23 00	- 52 49	23 01	+ 42 14	23 02	- 34 49
1 <sup>d</sup> -8.3	51.841 -119	64.15 -16	02.728 -220	67.89 +38	14.960 -187	69.52 -70	42.590 -135	48.75 -8
1 1.7	51.740 -101	64.03 +12	02.534 -194	67.05 +84	14.785 -175	68.40 -112	42.473 -117	48.51 +24
1 11.6	51.656 -84	63.63 +40	02.368 -166	65.76 +129	14.625 -160	66.88 -152	42.374 -99	47.94 +57
1 21.6	51.598 -58	62.94 +69	02.241 -127	64.04 +172	14.489 -136	65.00 -188	42.301 -73	47.03 +91
1 31.6	51.565 -33	61.99 +95	02.155 -86	61.97 +207	14.383 -106	62.88 -212	42.254 -47	45.84 +119
2 10.6	51.559 -6	60.79 +120	02.111 -44	59.57 +240	14.310 -73	60.57 -231	42.236 -18	44.36 +148
2 20.5	51.586 +27	59.34 +145	02.118 +7	56.89 +268	14.282 -28	58.18 -239	42.253 +17	42.62 +174
3 2.5	51.645 +59	57.68 +166	02.173 +55	54.03 +286	14.298 +16	55.82 -236	42.304 +51	40.67 +195
3 12.5	51.740 +95	55.81 +187	02.279 +106	51.00 +303	14.363 +65	53.58 -224	42.392 +88	38.51 +216
3 22.5	51.874 +134	53.77 +204	02.441 +162	47.89 +311	14.483 +120	51.58 -200	42.522 +130	36.19 +232
4 1.4	52.045 +171	51.60 +217	02.654 +213	44.77 +312	14.653 +170	49.90 -168	42.691 +169	33.76 +243
4 11.4	52.256 +211	49.32 +228	02.920 +266	41.67 +310	14.874 +221	48.59 -131	42.902 +211	31.24 +252
4 21.4	52.504 +248	46.99 +233	03.238 +318	38.68 +299	15.144 +270	47.76 -83	43.153 +251	28.70 +254
5 1.3	52.785 +281	44.65 +234	03.599 +361	35.86 +282	15.452 +308	47.40 -36	43.439 +286	26.18 +252
5 11.3	53.097 +312	42.33 +232	04.002 +403	33.24 +262	15.796 +344	47.55 +15	43.758 +319	23.73 +245
5 21.3	53.434 +337	40.11 +222	04.439 +437	30.93 +231	16.166 +370	48.22 +67	44.104 +346	21.42 +231
5 31.3	53.785 +351	38.04 +207	04.897 +458	28.94 +199	16.549 +383	49.37 +115	44.468 +364	19.30 +212
6 10.2	54.148 +363	36.15 +189	05.371 +474	27.32 +162	16.939 +390	50.97 +160	44.844 +376	17.40 +190
6 20.2	54.509 +361	34.51 +164	05.845 +474	26.15 +117	17.323 +384	53.01 +204	45.221 +377	15.81 +159
6 30.2	54.862 +353	33.15 +136	06.309 +464	25.40 +75	17.691 +368	55.38 +237	45.589 +368	14.52 +129
7 10.2	55.198 +336	32.10 +105	06.754 +445	25.13 +27	18.036 +345	58.06 +268	45.943 +354	13.59 +93
7 20.1	55.505 +307	31.40 +70	07.163 +409	25.33 -20	18.345 +309	60.97 +291	46.268 +325	13.05 +54
7 30.1	55.780 +275	31.04 +36	07.529 +366	25.96 -63	18.616 +271	64.03 +306	46.559 +291	12.87 +18
8 9.1	56.015 +235	31.03 -3	07.842 +313	27.04 -108	18.842 +226	67.20 +317	46.811 +252	13.08 -21
8 19.0	56.203 +188	31.36 -31	08.091 +249	28.50 -146	19.017 +175	70.38 +318	47.013 +202	13.64 -56
8 29.0	56.345 +142	31.99 -63	08.277 +186	30.26 -176	19.143 +126	73.53 +315	47.168 +155	14.51 -87
9 8.0	56.437 +92	32.89 -90	08.393 +116	32.30 -204	19.218 +75	76.59 +306	47.270 +102	15.67 -116
9 18.0	56.480 +43	34.00 -111	08.438 +45	34.50 -220	19.242 +24	79.47 +288	47.320 +50	17.04 -137
9 27.9	56.480 +0	35.26 -126	08.419 -19	36.78 -228	19.223 -19	82.15 +268	47.324 +4	18.56 -152
10 7.9	56.438 -42	36.62 -136	08.337 -82	39.05 -227	19.160 -63	84.58 +243	47.283 -41	20.16 -160
10 17.9	56.361 -77	38.00 -138	08.202 -135	41.19 -214	19.060 -100	86.68 +210	47.204 -79	21.75 -159
10 27.9	56.259 -102	39.32 -132	08.024 -178	43.13 -194	18.931 -129	88.46 +178	47.096 -108	23.27 -152
11 6.8	56.136 -123	40.56 -124	07.810 -214	44.78 -165	18.776 -155	89.84 +138	46.964 -132	24.65 -138
11 16.8	56.002 -134	41.61 -105	07.577 -233	46.05 -127	18.604 -172	90.80 +96	46.819 -145	25.81 -116
11 26.8	55.864 -138	42.45 -84	07.333 -244	46.92 -87	18.422 -182	91.33 +53	46.669 -150	26.72 -91
12 6.7	55.728 -136	43.06 -61	07.089 -244	47.32 -40	18.232 -190	91.39 +6	46.518 -151	27.33 -61
12 16.7	55.602 -126	43.38 -32	06.858 -231	47.23 +9	18.045 -187	90.99 -40	46.377 -141	27.61 -28
12 26.7	55.490 -112	43.43 -5	06.646 -212	46.67 +56	17.864 -181	90.16 -83	46.249 -128	27.57 +4
12 36.7	55.394 -96	43.19 +24	06.460 -186	45.64 +103	17.695 -169	88.88 -128	46.137 -112	27.18 +39
Mean Place	54.450	38.39	05.333	36.08	17.868	71.89	45.126	21.37
sec $\delta$ , tan $\delta$	+1.151	-0.570	+1.655	-1.319	+1.351	+0.908	+1.218	-0.696
$d\alpha(\psi)$ , $d\delta(\psi)$	+0.065	+0.38	+0.070	+0.38	+0.055	+0.38	+0.066	+0.39
$d\alpha(\epsilon)$ , $d\delta(\epsilon)$	+0.037	-0.27	+0.085	-0.26	-0.059	-0.25	+0.045	-0.25
Dble.Trans.	September 5		September 6		September 6		September 6	

AT UPPER TRANSIT AT GREENWICH

No.	870		1602		871		1603	
	β Pegasi		β Piscium		α Pegasi		55 Pegasi	
Mag.Spect.	2.61 var.	M0	4.58	B5p	2.57	A0	4.69	M0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° '	h m	° '	h m	° '	h m	° '
	23 03	+ 28 00	23 03	+ 3 44	23 04	+ 15 07	23 06	+ 9 19
1 -8.3	04 362 <sup>s</sup> - 133	27 44 - 77	08 781 <sup>s</sup> - 99	35 47 - 71	02 616 <sup>s</sup> - 109	46 22 - 77	16 829 <sup>s</sup> - 103	58 42 - 75
1 1.7	04 239 - 123	26 37 - 107	08 694 - 87	34 71 - 76	02 518 - 98	45 28 - 94	16 737 - 92	57 58 - 84
1 11.7	04 128 - 111	25 03 - 134	08 618 - 76	33 91 - 80	02 431 - 87	44 18 - 110	16 655 - 82	56 63 - 95
1 21.6	04.037 - 91	23 46 - 157	08 560 - 58	33 12 - 79	02 362 - 69	42 99 - 119	16 591 - 64	55 64 - 99
1 31.6	03.970 - 67	21.74 - 172	08 523 - 37	32.37 - 75	02.314 - 48	41.75 - 124	16.547 - 44	54.66 - 98
2 10.6	03 929 - 41	19 93 - 181	08 507 - 16	31.70 - 67	02 289 - 25	40 50 - 125	16 525 - 22	53 70 - 96
2 20.5	03 922 - 7	18 12 - 181	08 520 + 13	31.16 - 54	02 294 + 5	39 33 - 117	16 531 + 6	52 85 - 85
3 2.5	03 950 + 28	16 41 - 171	08 561 + 41	30 81 - 35	02 329 + 35	38 30 - 103	16 567 + 36	52 16 - 69
3 12.5	04 018 + 68	14 84 - 157	08 632 + 71	30 63 - 18	02 399 + 70	37 45 - 85	16 635 + 68	51 66 - 50
3 22.5	04.130 + 112	13.54 - 130	08.743 + 111	30.69 + 6	02.508 + 109	36.85 - 60	16.741 + 106	51.40 - 26
4 1.4	04.283 + 153	12.55 - 99	08.889 + 146	31.04 + 35	02.654 + 146	36.55 - 30	16.885 + 144	51.42 + 2
4 11.4	04 480 + 197	11.91 - 64	09 072 + 183	31.68 + 64	02 840 + 186	36 57 + 2	17 066 + 181	51 75 + 33
4 21.4	04.717 + 237	11 70 - 21	09 290 + 218	32.63 + 95	03 063 + 223	36 97 + 40	17 284 + 218	52 43 + 68
5 1.4	04 989 + 272	11 91 + 21	09 540 + 250	33 84 + 121	03 317 + 254	37 71 + 74	17 533 + 249	53 41 + 98
5 11.3	05 292 + 303	12.55 + 64	09.818 + 278	35.32 + 148	03.602 + 285	38.81 + 110	17.812 + 279	54.70 + 129
5 21.3	05 618 + 326	13 63 + 108	10.119 + 301	37 03 + 171	03.909 + 307	40 23 + 142	18.114 + 302	56 27 + 157
5 31.3	05 958 + 340	15 09 + 146	10.434 + 315	38 91 + 188	04.230 + 321	41 93 + 170	18.430 + 316	58 06 + 179
6 10.2	06 306 + 348	16 91 + 182	10 758 + 324	40 94 + 203	04 560 + 330	43 89 + 196	18 756 + 326	60 05 + 199
6 20.2	06 651 + 345	19 04 + 213	11 081 + 323	43 05 + 211	04 887 + 327	46 03 + 214	19 080 + 324	62 19 + 214
6 30.2	06 983 + 332	21 40 + 236	11 395 + 314	45 18 + 213	05 204 + 317	48 30 + 227	19 396 + 316	64 39 + 220
7 10.2	07 297 + 314	23 96 + 256	11 693 + 298	47 29 + 211	05 506 + 302	50 66 + 236	19 696 + 300	66 62 + 223
7 20.1	07 581 + 284	26 64 + 268	11 966 + 273	49 31 + 202	05 780 + 274	53 02 + 236	19 970 + 274	68 83 + 221
7 30.1	07 832 + 251	29 38 + 274	12 210 + 244	51 21 + 190	06 024 + 244	55 35 + 233	20 215 + 245	70 94 + 211
8 9.1	08 044 + 212	32 13 + 275	12 418 + 208	52 96 + 175	06 232 + 208	57 60 + 225	20 425 + 210	72 95 + 201
8 19.1	08 212 + 168	34 82 + 269	12 586 + 168	54 50 + 154	06 399 + 167	59 71 + 211	20 594 + 169	74 77 + 182
8 29.0	08 338 + 126	37 39 + 257	12 714 + 128	55 83 + 133	06 525 + 126	61 66 + 195	20 724 + 130	76 41 + 164
9 8.0	08 418 + 80	39 83 + 244	12 801 + 87	56 93 + 110	06 609 + 84	63 42 + 176	20 812 + 88	77 85 + 144
9 18.0	08 455 + 37	42 06 + 223	12 846 + 45	57 79 + 86	06 652 + 43	64 94 + 152	20 859 + 47	79 04 + 119
9 27.9	08 453 - 2	44 06 + 200	12 856 + 10	58 43 + 64	06 659 + 7	66 24 + 130	20 870 + 11	80 01 + 97
10 7.9	08 415 - 38	45 81 + 175	12 831 - 25	58 84 + 41	06 631 - 28	67 29 + 105	20 847 - 23	80 74 + 73
10 17.9	08 345 - 70	47 26 + 145	12 779 - 52	59 04 + 20	06 574 - 57	68 08 + 79	20 795 - 52	81 23 + 49
10 27.9	08 252 - 93	48 42 + 116	12 705 - 74	59 07 + 3	06 496 - 78	68 64 + 56	20 722 - 73	81 52 + 29
11 6.8	08 137 - 115	49 25 + 83	12 613 - 92	58 91 - 16	06 399 - 97	68 93 + 29	20 631 - 91	81 59 + 7
11 16.8	08 011 - 126	49 74 + 49	12 512 - 101	58 60 - 31	06 291 - 108	68 98 + 5	20 529 - 102	81 46 - 13
11 26.8	07 877 - 134	49 89 + 15	12 406 - 106	58 17 - 43	06 179 - 112	68 81 - 17	20 422 - 107	81 15 - 31
12 6.8	07 738 - 139	49 69 - 20	12 299 - 107	57 61 - 56	06 063 - 116	68 38 - 43	20 312 - 110	80 66 - 49
12 16.7	07 604 - 134	49 14 - 55	12 198 - 101	56 97 - 64	05 952 - 111	67 76 - 62	20 207 - 105	80 03 - 63
12 26.7	07 476 - 128	48 28 - 86	12 104 - 94	56 25 - 72	05 849 - 103	66 94 - 82	20 110 - 97	79 27 - 76
12 36.7	07 358 - 118	47 11 - 117	12 022 - 82	55 48 - 77	05 755 - 94	65 94 - 100	20 022 - 88	78 38 - 89
	07.115	33.93	11.384	50.03	05.272	56.81	19.440	70.98
Mean Place	+1.133	+0.532	+1.002	+0.065	+1.036	+0.270	+1.013	+0.164
sec δ, tan δ								
da(ψ), dδ(ψ)	+0.058	+0.39	+0.061	+0.39	+0.059	+0.39	+0.060	+0.39
da(ε), dδ(ε)	-0.034	-0.25	-0.004	-0.25	-0.017	-0.24	-0.011	-0.23
Dble.Trans.	September 7		September 7		September 7		September 7	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1604		873		1605		1606		
	5 Andromedae		88 Aquarii		♄ Gruis		59 Pegasi		
Mag.Spect.	5.83	F0	3.80	K0	4.10	K0	5.15	A3	
U.T.	R.A.		R.A.		R.A.		R.A.		
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	23 07	+ 49 12	23 08	- 21 14	23 09	- 45 19	23 11	+ 8 38	
1	-8.3	05 42.0	79 07	41 20.0	68 03	33 47.7	41 83	00 69.4	35 31
1	1.7	05 20.2	78 04	41 10.4	68 21	33 31.9	41 31	00 60.1	34 50
1	11.7	04 99.9	76 55	41 02.2	68 19	33 18.2	40 39	00 51.8	33 58
1	21.6	04 82.3	74 65	40 96.0	67 93	33 07.5	39 06	00 45.2	32 63
1	31.6	04 68.0	72 46	40 91.9	67 44	33 00.0	37 38	00 40.5	31 69
2	10.6	04 57.6	70.00	40 90.2	66 74	32 95.9	35 38	00 37.9	30 78
2	20.5	04 52.3	67.43	40 91.5	65 80	32 95.9	33 09	00 38.2	29 99
3	2.5	04 52.1	64.85	40 95.6	64 65	32 99.9	30 59	00 41.3	29 35
3	12.5	04 57.7	62.34	41 03.0	63 27	33 08.3	27 89	00 47.6	28 89
3	22.5	04 69.4	60.05	41 14.3	61 66	33 21.6	25 05	00 57.8	28 67
4	1.4	04 87.0	58 06	41 29.1	59 89	33 39.3	22 16	00 71.6	28 73
4	11.4	05 10.5	56 44	41 47.8	57 95	33 61.9	19 22	00 89.3	29 10
4	21.4	05 39.5	55 29	41 70.2	55 88	33 89.1	16 34	01 10.8	29 80
5	1.4	05 72.9	54 63	41 95.9	53 72	34 20.2	13 55	01 35.3	30 80
5	11.3	06 10.4	54 49	42 24.7	51 51	34 55.4	10 91	01 63.0	32 11
5	21.3	06 50.7	54 92	42 56.0	49 31	34 93.6	08 50	01 93.0	33 69
5	31.3	06 92.6	55 84	42 89.0	47 17	35 34.0	06 35	02 24.4	35 49
6	10.2	07 35.4	57 27	43 23.2	45 12	35 76.0	04 52	02 57.0	37 48
6	20.2	07 77.4	59 18	43 57.5	43 25	36 18.2	03 07	02 89.4	39 60
6	30.2	08 17.7	61 47	43 91.2	41 58	36 59.8	02 01	03 21.1	41 79
7	10.2	08 55.6	64 12	44 23.5	40 16	36 99.8	01 38	03 51.3	44 01
7	20.1	08 89.6	67 06	44 53.2	39 03	37 36.8	01 20	03 79.0	46 19
7	30.1	09 19.3	70 19	44 80.0	38 20	37 70.2	01 43	04 03.8	48 28
8	9.1	09 44.2	73 49	45 03.3	37 68	37 99.2	02 10	04 25.2	50 26
8	19.1	09 63.5	76 85	45 22.2	37 49	38 22.6	03 16	04 42.5	52 05
8	29.0	09 77.4	80 21	45 36.9	37 58	38 40.7	04 54	04 56.0	53 66
9	8.0	09 85.7	83 53	45 47.0	37 96	38 52.7	06 22	04 65.3	55 06
9	18.0	09 88.3	86 70	45 52.6	38 59	38 58.6	08 11	04 70.4	56 21
9	27.9	09 86.1	89 68	45 54.1	39 40	38 59.1	10 11	04 72.0	57 14
10	7.9	09 78.9	92 44	45 51.8	40 36	38 54.2	12 17	04 70.2	57 84
10	17.9	09 67.5	94 87	45 46.2	41 41	38 44.6	14 16	04 65.5	58 31
10	27.9	09 52.6	96 96	45 38.2	42 48	38 31.3	16 01	04 58.6	58 57
11	6.8	09 34.6	98 66	45 28.0	43 54	38 15.0	17 65	04 49.8	58 61
11	16.8	09 14.4	99 91	45 16.7	44 50	37 96.8	18 98	04 39.8	58 47
11	26.8	08 92.7	100.70	45 04.9	45 35	37 77.7	19 97	04 29.3	58 16
12	6.8	08 69.9	100 98	44 92.9	46 06	37 58.3	20 56	04 18.5	57 67
12	16.7	08 47.1	100 76	44 81.6	46 56	37 39.8	20 72	04 08.1	57 04
12	26.7	08 24.8	100 05	44 71.2	46 87	37 22.6	20 47	03 98.3	56 30
12	36.7	08 03.6	98 85	44 62.1	46 97	37 07.4	19 78	03 89.4	55 45
Mean Place	08.432	79.62	43.692	44.89	35.938	11.70	03.277	48.03	
sec δ, tan δ	+1.531	+1.159	+1.073	-0.389	+1.422	-1.011	+1.011	+0.152	
dα(ψ), dδ(ψ)	+0.054	+0.39	+0.063	+0.39	+0.067	+0.39	+0.060	+0.39	
dα(ε), dδ(ε)	-0.075	-0.23	+0.025	-0.22	+0.066	-0.22	-0.010	-0.21	
Dble.Trans.	September 8		September 8		September 8		September 9		



APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	875		1607		1608		876	
	Bradley 3077 (Cassiopeiae)		φ Aquarii		ψ <sup>1</sup> Aquarii		25 G. Tucanae	
Mag. Spect.	5.65	K2	4.40	M0	4.48	K0	5.69	G0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /
	23 12	+ 57 05	23 13	- 6 07	23 15	- 9 09	23 16	- 62 04
1 -8.3	34.396 <sup>s</sup> - 296	38 59 - 39	34 920 <sup>s</sup> - 99	36 68 - 62	08 600 <sup>s</sup> - 99	60.05 - 59	07 090 <sup>s</sup> - 328	63.62 + 43
1 1.7	34 113 - 283	37 69 - 90	34 832 - 88	37 24 - 56	08 511 - 89	60.54 - 49	06 791 - 299	62.66 + 96
1 11.7	33 846 - 267	36 27 - 142	34 754 - 78	37.74 - 50	08 433 - 78	60.94 - 40	06 525 - 266	61.19 + 147
1 21.6	33 611 - 235	34 37 - 190	34 693 - 61	38 13 - 39	08 372 - 61	61.20 - 26	06 306 - 219	59.22 + 197
1 31.6	33 418 - 193	32 13 - 224	34.652 - 41	38 41 - 28	08.330 - 42	61.32 - 12	06 139 - 167	56.86 + 236
2 10.6	33 271 - 147	29 57 - 256	34 631 - 21	38 54 - 13	08 310 - 20	61.29 + 3	06 026 - 113	54.13 + 273
2 20.5	33 187 - 84	26 84 - 273	34.637 + 6	38 49 + 5	08 316 + 6	61.05 + 24	05 978 - 48	51.10 + 303
3 2.5	33 167 + 20	24 06 - 278	34 675 + 38	38 25 + 34	08 354 + 38	60.65 + 40	05 993 + 15	47.87 + 323
3 12.5	33 218 + 51	21 30 - 276	34 730 + 55	37 88 + 27	08 412 + 58	60.04 + 61	06 075 + 82	44.48 + 339
3 22.5	33.344 + 126	18 73 - 257	34.835 + 105	37.14 + 74	08.515 + 103	59.11 + 93	06 229 + 154	41.01 + 347
4 1.4	33 542 + 198	16 45 - 228	34.973 + 138	36 21 + 93	08 653 + 138	57 99 + 112	06 450 + 221	37.55 + 346
4 11.4	33 810 + 268	14 52 - 193	35 147 + 174	35 04 + 117	08 827 + 174	56 65 + 134	06 739 + 289	34.13 + 342
4 21.4	34 145 + 335	13 06 - 146	35 358 + 211	33 63 + 141	09 039 + 212	55 09 + 156	07 097 + 358	30.86 + 327
5 1.4	34 533 + 388	12 10 - 96	35 601 + 243	32 02 + 161	09 282 + 243	53 35 + 174	07 511 + 414	27.81 + 305
5 11.3	34 969 + 436	11 67 - 43	35 874 + 273	30 23 + 179	09 557 + 275	51 45 + 190	07 981 + 470	25.00 + 281
5 21.3	35 438 + 469	11 83 + 16	36 172 + 298	28 29 + 194	09 856 + 299	49 45 + 200	08 497 + 516	22.55 + 245
5 31.3	35 926 + 488	12 52 + 69	36 486 + 314	26 28 + 201	10 172 + 316	47 39 + 206	09 044 + 547	20.47 + 208
6 10.2	36 423 + 497	13 75 + 123	36 811 + 325	24 21 + 207	10 499 + 327	45 30 + 209	09 617 + 573	18 82 + 165
6 20.2	36 912 + 489	15 51 + 176	37 138 + 327	22 16 + 205	10 829 + 330	43 27 + 203	10 195 + 578	17 66 + 116
6 30.2	37 381 + 469	17 69 + 218	37 457 + 319	20 18 + 198	11 151 + 322	41 33 + 194	10 767 + 572	16 98 + 68
7 10.2	37 821 + 440	20 29 + 260	37 764 + 307	18 31 + 187	11 461 + 310	39 53 + 180	11 321 + 554	16 81 + 17
7 20.1	38 217 + 396	23 22 + 293	38 047 + 283	16 60 + 171	11 748 + 287	37 93 + 160	11 835 + 514	17 18 - 37
7 30.1	38 563 + 346	26 40 + 318	38 302 + 255	15 10 + 150	12 007 + 259	36 54 + 139	12 301 + 466	18 01 - 83
8 9.1	38 853 + 290	29 80 + 340	38 524 + 222	13 81 + 129	12 231 + 224	35 40 + 114	12 706 + 405	19 33 - 132
8 19.1	39 078 + 225	33 31 + 351	38 705 + 181	12 79 + 102	12 416 + 185	34 53 + 87	13 035 + 329	21 07 - 174
8 29.0	39 242 + 164	36 85 + 354	38 847 + 142	12 01 + 78	12 561 + 145	33 92 + 61	13 286 + 251	23 14 - 207
9 8.0	39 339 + 97	40 40 + 355	38 947 + 100	11 49 + 52	12 664 + 103	33 58 + 34	13 450 + 164	25 50 - 236
9 18.0	39 371 + 32	43 84 + 344	39 005 + 58	11 22 + 27	12 724 + 60	33 49 + 9	13 524 + 74	28 03 - 253
9 27.9	39 344 - 27	47 11 + 327	39 026 + 21	11 17 + 5	12 747 + 23	33 49 - 13	13 514 - 10	30 63 - 260
10 7.9	39 258 - 86	50 18 + 307	39 012 - 14	11 32 - 15	12 734 - 13	33 94 - 32	13 420 - 94	33 23 - 260
10 17.9	39 120 - 138	52 93 + 275	38 968 - 44	11 64 - 32	12 691 - 43	34 41 - 47	13 252 - 168	35 67 - 244
10 27.9	38 940 - 180	55 36 + 243	38 901 - 67	12 08 - 44	12 625 - 66	34 99 - 58	13 023 - 229	37 88 - 221
11 6.8	38 719 - 221	57 38 + 202	38 815 - 86	12 63 - 55	12 539 - 86	35 65 - 66	12 740 - 283	39 77 - 189
11 16.8	38 469 - 250	58 92 + 154	38 718 - 97	13 24 - 61	12 442 - 97	36 35 - 70	12 423 - 317	41 22 - 145
11 26.8	38 197 - 272	59 99 + 107	38 616 - 102	13 87 - 63	12 338 - 104	37 04 - 69	12 085 - 338	42 21 - 99
12 6.8	37 908 - 289	60 52 + 53	38 510 - 106	14 53 - 66	12 232 - 106	37 72 - 68	11 736 - 349	42 68 - 47
12 16.7	37 616 - 292	60 49 - 3	38 410 - 100	15 15 - 62	12 131 - 101	38 33 - 61	11 398 - 338	42 57 + 11
12 26.7	37 328 - 288	59 94 - 55	38 316 - 94	15 74 - 59	12 036 - 95	38 87 - 54	11 078 - 320	41 94 + 63
12 36.7	37 051 - 277	58 84 - 110	38 231 - 85	16 28 - 54	11 951 - 85	39 32 - 45	10 787 - 291	40 77 + 117
Mean Place	37.718	37.42	37.423	18.89	11.095	41.11	09.445	30.03
sec δ, tan δ	+1.841	+1.545	+1.006	-0.107	+1.013	-0.161	+2.135	-1.887
dα(ψ), dδ(ψ)	+0.053	+0.39	+0.062	+0.39	+0.062	+0.39	+0.071	+0.39
dα(ε), dδ(ε)	-0.101	-0.21	+0.007	-0.20	+0.011	-0.19	+0.123	-0.19
Dble. Trans.	September 9		September 9		September 10		September 10	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	878		877		879		1609		
	$\gamma$ Piscium		$\gamma$ Tucanae		$\gamma$ Sculptoris		$\psi^3$ Aquarii		
Mag Spect.	3.85	K0	4.10	F2	4.51	K0	5.16	A0	
U.T.	R.A.		R.A.		R.A.		R.A.		
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	23 16	+ 3 12	23 16	- 58 18	23 18	- 32 36	23 18	- 9 40	
1	-8.3	25.384 - 99	15.70 - 69	36.556 - 281	68.08 + 34	03.478 - 134	46.82 - 25	13.121 - 100	83.70 - 59
1	1.7	25.294 - 90	14.98 - 72	36.301 - 255	67.22 + 86	03.358 - 120	46.74 + 8	13.030 - 91	84.19 - 49
1	11.7	25.214 - 80	14.23 - 75	36.074 - 227	65.88 + 134	03.253 - 105	46.35 + 39	12.949 - 81	84.57 - 38
1	21.6	25.150 - 64	13.48 - 75	35.889 - 185	64.06 + 182	03.170 - 83	45.62 + 73	12.885 - 64	84.82 - 25
1	31.6	25.104 - 46	12.79 - 69	35.748 - 141	61.84 + 222	03.110 - 60	44.59 + 103	12.840 - 45	84.91 - 9
2	10.6	25.079 - 25	12.17 - 62	35.655 - 93	59.27 + 257	03.076 - 34	43.28 + 131	12.816 - 24	84.85 + 6
2	20.6	25.080 + 1	11.69 - 48	35.619 - 36	56.38 + 289	03.075 - 1	41.69 + 159	12.818 + 2	84.59 + 26
3	2.5	25.111 + 31	11.39 - 30	35.638 + 19	53.30 + 308	03.106 + 31	39.87 + 182	12.851 + 33	84.15 + 64
3	12.5	25.169 + 58	11.29 - 10	35.716 + 78	50.03 + 327	03.173 + 67	37.82 + 205	12.906 + 55	83.51 + 44
3	22.5	25.268 + 99	11.37 + 8	35.859 + 143	46.67 + 336	03.281 + 108	35.58 + 224	13.005 + 99	82.55 + 96
4	1.4	25.403 + 135	11.76 + 39	36.061 + 202	43.31 + 336	03.428 + 147	33.21 + 237	13.138 + 133	81.40 + 115
4	11.4	25.576 + 173	12.42 + 66	36.326 + 265	39.97 + 334	03.617 + 189	30.72 + 249	13.309 + 171	80.02 + 138
4	21.4	25.786 + 210	13.39 + 97	36.652 + 326	36.75 + 322	03.847 + 230	28.18 + 254	13.517 + 208	78.44 + 158
5	1.4	26.028 + 242	14.62 + 123	37.029 + 377	33.72 + 303	04.114 + 267	25.65 + 253	13.758 + 241	76.68 + 176
5	11.3	26.301 + 273	16.11 + 149	37.458 + 429	30.92 + 280	04.416 + 302	23.14 + 251	14.030 + 272	74.76 + 192
5	21.3	26.598 + 297	17.83 + 172	37.928 + 470	28.44 + 248	04.746 + 330	20.74 + 240	14.327 + 297	72.73 + 203
5	31.3	26.911 + 313	19.71 + 188	38.426 + 498	26.32 + 212	05.096 + 350	18.50 + 224	14.641 + 314	70.66 + 207
6	10.3	27.235 + 324	21.74 + 203	38.947 + 521	24.60 + 172	05.462 + 366	16.47 + 203	14.969 + 328	68.57 + 209
6	20.2	27.561 + 326	23.85 + 212	39.475 + 528	23.35 + 125	05.831 + 369	14.71 + 176	15.298 + 329	66.53 + 204
6	30.2	27.880 + 319	25.97 + 211	39.995 + 520	22.57 + 78	06.195 + 364	13.25 + 146	15.621 + 323	64.59 + 194
7	10.2	28.185 + 306	28.08 + 211	40.499 + 504	22.28 + 29	06.547 + 352	12.12 + 113	15.932 + 311	62.79 + 180
7	20.1	28.467 + 282	30.09 + 201	40.968 + 469	22.51 - 23	06.874 + 327	11.38 + 74	16.220 + 288	61.19 + 160
7	30.1	28.721 + 254	31.98 + 189	41.392 + 424	23.21 - 70	07.170 + 296	11.00 + 38	16.481 + 261	59.81 + 138
8	9.1	28.941 + 220	33.72 + 174	41.762 + 370	24.37 - 116	07.429 + 259	11.01 - 1	16.708 + 227	58.69 + 112
8	19.1	29.122 + 181	35.24 + 152	42.062 + 300	25.96 - 159	07.643 + 214	11.39 - 38	16.896 + 188	57.84 + 85
8	29.0	29.264 + 142	36.56 + 132	42.292 + 230	27.88 - 192	07.810 + 167	12.10 - 71	17.044 + 148	57.25 + 59
9	8.0	29.365 + 101	37.64 + 108	42.445 + 153	30.10 - 222	07.928 + 118	13.11 - 101	17.150 + 106	56.93 + 32
9	18.0	29.425 + 60	38.48 + 84	42.517 + 72	32.51 - 241	07.995 + 67	14.37 - 126	17.213 + 63	56.87 + 6
9	28.0	29.449 + 24	39.09 + 61	42.514 - 3	35.00 - 249	08.017 + 22	15.79 - 142	17.239 + 26	57.02 - 15
10	7.9	29.439 - 10	39.48 + 39	42.437 - 77	37.50 - 250	07.994 - 23	17.34 - 155	17.229 - 10	57.37 - 35
10	17.9	29.399 - 40	39.66 + 18	42.294 - 143	39.87 - 237	07.933 - 61	18.91 - 157	17.188 - 41	57.87 - 50
10	27.9	29.337 - 62	39.66 + 0	42.098 - 196	42.02 - 215	07.843 - 90	20.45 - 154	17.124 - 64	58.48 - 61
11	6.8	29.255 - 82	39.49 - 17	41.855 - 243	43.89 - 187	07.727 - 116	21.88 - 143	17.039 - 85	59.17 - 69
11	16.8	29.162 - 93	39.17 - 32	41.582 - 273	45.34 - 145	07.596 - 131	23.12 - 124	16.939 - 96	59.88 - 71
11	26.8	29.063 - 99	38.74 - 43	41.292 - 290	46.35 - 101	07.456 - 140	24.14 - 102	16.840 - 103	60.59 - 71
12	6.8	28.959 - 104	38.19 - 55	40.993 - 299	46.87 - 52	07.312 - 144	24.89 - 75	16.733 - 107	61.28 - 69
12	16.7	28.860 - 99	37.56 - 63	40.703 - 290	46.84 + 3	07.175 - 137	25.32 - 43	16.631 - 102	61.89 - 61
12	26.7	28.766 - 94	36.88 - 68	40.430 - 273	46.31 + 53	07.046 - 129	25.44 - 12	16.535 - 96	62.43 - 54
12	36.7	28.680 - 86	36.14 - 74	40.182 - 248	45.25 + 106	06.931 - 115	25.23 + 21	16.447 - 88	62.88 - 45
		- 72	- 73	- 211	+ 155	- 96	+ 54	- 72	- 31
Mean Place	27.937	30.25	38.895	35.08	05.860	20.22	15.579	64.63	
sec $\delta$ , tan $\delta$	+1.002	+0.056	+1.904	-1.620	+1.187	-0.640	+1.014	-0.171	
d $\alpha$ ( $\psi$ ), d $\delta$ ( $\psi$ )	+0.061	+0.39	+0.069	+0.39	+0.064	+0.39	+0.062	+0.39	
d $\alpha$ ( $\epsilon$ ), d $\delta$ ( $\epsilon$ )	-0.004	-0.19	+0.106	-0.19	+0.042	-0.18	+0.011	-0.18	
Dble. Trans.	September 10		September 10		September 10		September 10		

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	880		1610		1611		1612	
Name	τ Pegasi		12 Andromedae		11 G. Sculptoris		98 Aquarii	
Mag. Spect.	4.65	A5	5.75	F5	5.81	G5	4.20	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	23 19	+ 23 39	23 20	+ 38 06	23 20	- 27 03	23 22	- 20 10
1 -8.3	55 440 <sup>s</sup> - 124	51.53 - 68	11 251 <sup>s</sup> - 168	27 55 - 56	30 093 <sup>s</sup> - 122	63 91 - 36	13 370 <sup>s</sup> - 110	50.14 - 48
1 1.7	55 323 - 117	50 61 - 92	11 091 - 160	26 61 - 94	29 984 - 109	64 00 - 9	13 269 - 101	50.40 - 26
1 11.7	55 214 - 109	49 44 - 117	10 941 - 150	25 29 - 132	29 887 - 97	63 82 + 18	13 180 - 89	50.46 - 6
1 21.6	55 122 - 92	48 08 - 136	10 809 - 132	23 64 - 165	29 810 - 77	63 34 + 48	13 109 - 71	50.28 + 18
1 31.6	55 050 - 72	46 60 - 148	10 701 - 108	21.76 - 188	29.754 - 56	62 59 + 75	13 057 - 52	49.87 + 41
2 10.6	55 000 - 50	45 04 - 156	10 622 - 79	19 68 - 208	29 722 - 32	61 59 + 100	13 027 - 30	49.24 + 63
2 20.6	54 982 - 18	43 49 - 155	10 580 - 42	17 53 - 215	29 720 - 2	60 32 + 127	13 025 - 2	48.37 + 87
3 2.5	54 996 + 14	42 04 - 145	10 579 - 4	15 39 - 214	29 748 + 28	58 82 + 150	13 052 + 27	47.29 + 108
3 12.5	55 046 + 50	40 72 - 132	10 623 + 44	13 35 - 204	29 810 + 62	57 08 + 174	13 110 + 58	45.96 + 133
3 22.5	55 139 + 93	39.64 - 108	10 718 + 95	11.52 - 183	29 911 + 101	55 14 + 194	13 206 + 96	44.40 + 156
4 1.4	55 272 + 133	38 85 - 79	10 860 + 142	09 97 - 155	30 050 + 139	53 04 + 210	13 339 + 133	42.66 + 174
4 11.4	55 449 + 177	38 39 - 46	11 053 + 193	08 77 - 120	30 229 + 179	50 79 + 225	13 511 + 172	40.74 + 192
4 21.4	55 667 + 218	38 32 - 7	11 053 + 242	08 01 - 76	30 449 + 220	48 45 + 234	13 722 + 211	38 68 + 206
5 1.4	55 920 + 253	38 63 + 31	11 576 + 281	07 69 - 32	30 703 + 254	46 06 + 239	13 966 + 244	36 52 + 216
5 11.3	56 207 + 287	39 35 + 72	11 895 + 319	07 84 + 15	30 992 + 289	43 65 + 241	14 244 + 278	34 28 + 224
5 21.3	56 519 + 312	40 46 + 111	12 243 + 348	08 48 + 64	31 308 + 316	41 31 + 234	14 549 + 305	32 04 + 220
5 31.3	56 848 + 329	41 92 + 146	12 607 + 364	09 57 + 109	31 644 + 336	39 07 + 224	14 872 + 323	29 84 + 220
6 10.3	57 188 + 340	43 70 + 178	12 983 + 376	11 09 + 152	31 995 + 351	36 98 + 209	15 209 + 337	27 73 + 211
6 20.2	57 528 + 340	45 77 + 207	13 358 + 375	13 02 + 193	32 349 + 354	35 12 + 186	15 551 + 342	25 78 + 195
6 30.2	57 859 + 331	48 03 + 226	13 721 + 363	15 26 + 224	32 699 + 350	33 51 + 161	15 887 + 336	24 02 + 176
7 10.2	58 176 + 317	50 47 + 244	14 067 + 346	17 80 + 254	33 037 + 338	32 19 + 132	16 212 + 325	22 49 + 153
7 20.1	58 467 + 291	53 01 + 254	14 383 + 316	20 55 + 275	33 352 + 315	31 22 + 97	16 514 + 302	21 25 + 124
7 30.1	58 727 + 260	55 57 + 256	14 664 + 281	23 45 + 290	33 638 + 286	30 57 + 65	16 789 + 275	20 31 + 94
8 9.1	58 952 + 225	58 14 + 257	14 906 + 242	26 45 + 300	33 888 + 250	30 29 + 28	17 029 + 240	19 69 + 62
8 19.1	59 136 + 184	60 62 + 248	15 101 + 195	29 46 + 301	34 095 + 207	30 37 - 8	17 229 + 200	19 40 + 29
8 29.0	59 279 + 143	62 99 + 237	15 250 + 149	32 43 + 297	34 258 + 163	30 76 - 39	17 387 + 158	19 40 + 0
9 8.0	59 379 + 100	65 21 + 222	15 352 + 102	35 32 + 289	34 375 + 117	31 46 - 70	17 500 + 113	19 70 - 30
9 18.0	59 436 + 57	67 22 + 201	15 406 + 54	38 05 + 273	34 444 + 69	32 41 - 95	17 569 + 69	20 26 - 56
9 28.0	59 456 + 20	69 02 + 180	15 418 + 12	40 59 + 254	34 470 + 26	33 54 - 113	17 598 + 29	21 02 - 76
10 7.9	59 440 - 16	70 58 + 156	15 388 - 30	42 90 + 231	34 455 - 15	34 83 - 129	17 588 - 10	21 96 - 94
10 17.9	59 392 - 48	71 86 + 128	15 321 - 67	44 90 + 200	34 404 - 51	36 17 - 134	17 544 - 44	23 00 - 104
10 27.9	59 320 - 72	72 87 + 101	15 226 - 95	46 61 + 171	34 326 - 78	37 51 - 134	17 475 - 69	24 07 - 107
11 6.8	59 226 - 94	73 59 + 72	15 104 - 122	47 96 + 135	34 223 - 103	38 80 - 129	17 383 - 92	25 16 - 109
11 16.8	59 118 - 108	74 01 + 42	15 104 - 140	48 92 + 96	34 105 - 118	39 96 - 116	17 278 - 105	26 16 - 100
11 26.8	59 000 - 118	74 13 + 12	14 810 - 154	49 50 + 58	33 980 - 125	40 94 - 98	17 165 - 113	27 07 - 91
12 6.8	58 876 - 124	73 95 - 18	14 647 - 163	49 64 + 14	33 851 - 129	41 71 - 77	17 048 - 117	27 84 - 77
12 16.7	58 753 - 123	73 46 - 49	14 482 - 165	49 36 - 28	33 726 - 125	42 23 - 52	16 935 - 113	28 41 - 57
12 26.7	58 633 - 120	72 72 - 74	14 319 - 163	48 69 - 67	33 610 - 116	42 48 - 25	16 829 - 106	28 80 - 39
12 36.7	58 520 - 113	71 70 - 102	14 163 - 156	47 60 - 109	33 504 - 106	42 46 + 2	16 732 - 97	28 98 - 18
	58 520 - 100	71 70 - 123	14 163 - 140	47 60 - 143	33 504 - 88	42 46 + 32	16 732 - 81	28 98 + 5
Mean Place	58 079	58 93	14 036	30 46	32 467	39 03	15 752	27 55
sec δ, tan δ	+1.092	+0.438	+1.271	+0.784	+1.123	-0.511	+1.065	-0.367
dα(ψ), dδ(ψ)	+0.059	+0.39	+0.058	+0.39	+0.063	+0.39	+0.063	+0.39
dα(ε), dδ(ε)	-0.029	-0.17	-0.052	-0.17	+0.034	-0.17	+0.024	-0.16
Dble. Trans.	September 11		September 11		September 11		September 11	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1613		882		881		883		
	67 Pegasi		4 Cassiopeiae		υ Pegasi		ο Gruis		
Mag. Spect.	5.46	A0	5.20	K5	4.57	G0	5.54	F0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	
	23 24	+ 32 18	23 24	+ 62 12	23 24	+ 23 19	23 25	- 52 47	
1	-8.3	08 36.4 -146	33 50 -58	10 70.1 -371	33 77 -13	39 66.2 -123	39 67 -65	49 29.2 -232	78 91 +10
1	1.7	08 22.3 -141	32 58 -92	10 33.7 -364	33 09 -68	39 54.5 -117	38 78 -89	49 07.8 -214	78 32 +59
1	11.7	08 09.1 -132	31 35 -123	09 98.8 -349	31 86 -123	39 43.6 -109	37 65 -113	48 88.5 -193	77 26 +106
1	21.6	07 97.6 -115	29 83 -152	09 67.3 -315	30 12 -174	39 34.2 -94	36 33 -132	48 72.5 -160	75 73 +153
1	31.6	07 88.2 -94	28 12 -171	09 40.3 -270	27 96 -216	39 26.7 -75	34 89 -144	48 60.0 -125	73 81 +192
2	10.6	07 81.2 -70	26 26 -186	09 18.6 -217	25 44 -252	39 21.4 -53	33 36 -153	48 51.3 -87	71 52 +229
2	20.6	07 77.7 -35	24 35 -191	09 04.0 -146	22 68 -276	39 19.2 -22	31 85 -151	48 47.4 + 3	68 91 +261
3	2.5	07 77.8 + 1	22 48 -187	08 96.9 -71	19 83 -285	39 20.1 + 9	30 42 -143	48 48.2 + 57	66 07 +284
3	12.5	07 82.0 + 42	20 71 -177	08 98.1 + 12	16 94 -289	39 24.7 + 46	29 13 -129	48 53.9 + 57	63 03 +304
3	22.5	07 90.9 + 89	19 17 -154	09 08.3 + 102	14 19 -275	39 33.5 + 88	28 07 -106	48 65.4 + 115	59 85 +318
4	1.4	08 04.2 + 133	17 91 -126	09 26.8 + 185	11 69 -250	39 46.4 + 129	27 29 -78	48 82.1 + 167	56 62 +323
4	11.4	08 22.3 + 181	16 98 -93	09 53.9 + 271	09 49 -220	39 63.6 + 172	26 83 -46	49 04.4 + 223	53 37 +325
4	21.4	08 44.9 + 226	16 47 -51	09 88.9 + 350	07 75 -174	39 85.0 + 214	26 77 -6	49 32.2 + 278	50 19 +318
5	1.4	08 71.3 + 264	16 38 -9	10 30.2 + 413	06 49 -126	40 09.9 + 249	27 08 + 31	49 64.8 + 326	47 16 +303
5	11.3	09 01.4 + 301	16 73 + 35	10 30.2 + 473	06 49 -75	40 09.9 + 284	27 08 + 71	49 64.8 + 374	47 16 +286
5	21.3	09 34.2 + 328	17 54 + 81	11 29.0 + 515	05 59 -15	40 69.3 + 310	28 89 +110	50 43.4 + 412	41 71 +259
5	31.3	09 68.8 + 346	18 75 +121	11 82.0 + 538	05 98 + 39	41 02.1 + 328	30 33 +144	50 87.4 + 440	39 44 +227
6	10.3	10 04.6 + 358	20 35 +160	12 38.2 + 554	06 93 + 95	41 36.1 + 340	32 09 +176	51 33.7 + 463	37 52 +192
6	20.2	10 40.4 + 358	22 32 +197	12 93.1 + 549	08 44 +151	41 70.1 + 340	34 14 +205	51 80.8 + 471	36 05 +147
6	30.2	10 75.3 + 349	24 55 +223	13 45.9 + 528	10 40 +196	42 03.4 + 333	36 38 +224	52 27.6 + 468	35 00 +105
7	10.2	11 08.7 + 334	27 04 +249	13 95.9 + 500	12 81 +241	42 35.3 + 319	38 80 +242	52 73.0 + 454	34 43 + 57
7	20.1	11 39.3 + 306	29 71 +267	14 41.1 + 452	15 61 +280	42 64.6 + 293	41 31 +251	53 15.6 + 426	34 36 + 7
7	30.1	11 66.7 + 274	32 47 +276	14 81.0 + 399	18 70 +309	42 91.1 + 265	43 86 +255	53 54.4 + 388	34 75 -39
8	9.1	11 90.4 + 237	35 30 +283	15 14.7 + 337	22 05 +335	43 14.0 + 229	46 40 +254	53 88.6 + 342	35 61 -86
8	19.1	12 09.8 + 194	38 11 +281	15 41.3 + 266	25 57 +352	43 32.9 + 189	48 87 +247	54 16.8 + 282	36 91 -130
8	29.0	12 24.9 + 151	40 85 +274	15 61.0 + 197	29 17 +360	43 47.7 + 148	51 22 +235	54 39.0 + 222	38 55 -164
9	8.0	12 35.5 + 106	43 49 +264	15 73.3 + 123	32 82 +365	43 58.3 + 106	53 42 +220	54 54.5 + 155	40 52 -197
9	18.0	12 41.5 + 60	45 95 +246	15 78.0 + 47	36 40 +358	43 64.6 + 63	55 42 +200	54 62.9 + 84	42 71 -219
9	28.0	12 43.6 + 21	48 22 +227	15 76.0 - 20	39 86 +346	43 67.2 + 26	57 21 +179	54 65.0 + 21	45 03 -232
10	7.9	12 41.7 - 19	50 25 +203	15 67.1 - 89	43 16 +330	43 66.2 - 10	58 76 +155	54 60.5 - 45	47 40 -237
10	17.9	12 36.5 - 52	51 99 +174	15 51.9 - 152	46 16 +300	43 61.9 - 43	60 04 +128	54 50.3 - 102	49 69 -229
10	27.9	12 28.5 - 80	53 45 +146	15 31.4 - 205	48 86 +270	43 55.3 - 66	61 06 +102	54 35.4 - 149	51 82 -213
11	6.8	12 18.1 - 104	54 57 +112	15 05.6 - 258	51 18 +232	43 46.3 - 90	61 78 + 72	54 16.4 - 190	53 71 -189
11	16.8	12 05.9 - 122	55 34 + 77	14 76.0 - 296	53 02 +184	43 35.9 - 104	62 21 + 43	53 94.6 - 218	55 25 -154
11	26.8	11 92.6 - 133	55 77 + 43	14 43.2 - 328	54 40 +138	43 24.5 - 114	62 35 + 14	53 71.2 - 234	56 39 -114
12	6.8	11 78.3 - 143	55 80 + 3	14 07.8 - 354	55 22 + 82	43 12.3 - 122	62 18 - 17	53 46.8 - 244	57 08 - 69
12	16.7	11 63.9 - 144	55 47 - 33	13 71.5 - 363	55 47 + 25	43 00.1 - 122	61 73 - 45	53 23.0 - 238	57 28 - 20
12	26.7	11 49.7 - 142	54 79 - 68	13 35.0 - 365	55 17 - 30	42 88.2 - 119	61 01 - 72	53 00.3 - 227	56 99 + 29
12	36.7	11 36.0 - 137	53 75 -104	12 99.2 - 358	54 28 - 89	42 76.9 - 113	60 03 - 98	52 79.4 - 209	56 21 + 78
		- 122	-133	- 330	-142	- 101	-119	- 180	+126
Mean Place	11.061	38.03	14.005	31.06	42.283	47.08	51.495	47.04	
sec δ, tan δ	+1.183	+0.632	+2.145	+1.897	+1.089	+0.431	+1.654	-1.317	
dα(ψ), dδ(ψ)	+0.059	+0.39	+0.053	+0.39	+0.059	+0.39	+0.066	+0.39	
dα(ε), dδ(ε)	-0.042	-0.16	-0.125	-0.16	-0.028	-0.15	+0.087	-0.15	
Dble. Trans.	September 12		September 12		September 12		September 12		

AT UPPER TRANSIT AT GREENWICH

No.	884		1614		1615		885	
	α Piscium		♁ Piscium		B.D. +15° 4830 (Pegasi)		70 Pegasi	
Mag.Spect.	4.94	A2p	4.45	G5	6.98	A2	4.67	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	23 26	+ 1 10	23 27	+ 6 17	23 28	+ 15 55	23 28	+ 12 40
1 -8.3	11 957 <sup>s</sup> - 100	38 69 - 67	14 516 <sup>s</sup> - 102	63 71 - 68	18 888 <sup>s</sup> - 111	67 19 - 66	25 778 <sup>s</sup> - 108	58 89 - 67
1 1.7	11 865 - 92	38 01 - 68	14 420 - 96	62 97 - 74	18 782 - 106	66 36 - 83	25 677 - 101	58 09 - 80
1 11.7	11 780 - 70	37 32 - 66	14 332 - 88	62 16 - 81	18 684 - 98	65 36 - 100	25 583 - 94	57 15 - 94
1 21.6	11 710 - 70	36 66 - 66	14 257 - 75	61 33 - 83	18 599 - 85	64 25 - 111	25 582 - 81	56 14 - 101
1 31.6	11 657 - 53	36 08 - 58	14 200 - 57	60 53 - 80	18 532 - 67	63 08 - 117	25 438 - 64	55 09 - 105
2 10.6	11 623 - 34	35 57 - 51	14 162 - 38	59 78 - 75	18 485 - 47	61 89 - 119	25 394 - 44	54 04 - 105
2 20.6	11 615 - 8	35 22 - 35	14 150 - 12	59 14 - 64	18 465 - 20	60 74 - 115	25 378 - 16	53 07 - 97
3 2.5	11 636 + 21	35 05 - 17	14 166 + 16	58 67 - 47	18 476 + 11	59 72 - 102	25 390 + 12	52 22 - 85
3 12.5	11 684 + 48	35 13 + 8	14 213 + 47	58 39 - 28	18 520 + 44	58 84 - 88	25 435 + 45	51 55 - 67
3 22.5	11 770 + 86	35 29 + 16	14 297 + 84	58 30 - 9	18 603 + 83	58 21 - 63	25 518 + 83	51 10 - 45
4 1.5	11 895 + 125	35 79 + 50	14 420 + 123	58 49 + 19	18 725 + 122	57 84 - 37	25 639 + 121	50 91 - 19
4 11.4	12 058 + 163	36 57 + 78	14 581 + 161	58 97 + 48	18 888 + 163	57 77 - 7	25 802 + 163	51 03 + 12
4 21.4	12 258 + 200	37 63 + 106	14 782 + 201	59 77 + 80	19 092 + 204	58 07 + 30	26 004 + 202	51 50 + 47
5 1.4	12 492 + 234	38 94 + 131	15 015 + 233	60 85 + 108	19 331 + 239	58 70 + 63	26 240 + 236	52 29 + 79
5 11.3	12 758 + 266	40 49 + 155	15 281 + 266	62 21 + 136	19 603 + 272	59 69 + 99	26 509 + 269	53 40 + 111
5 21.3	13 049 + 291	42 26 + 177	15 573 + 292	63 83 + 162	19 901 + 298	61 01 + 132	26 805 + 296	54 82 + 142
5 31.3	13 358 + 309	44 17 + 191	15 882 + 309	65 64 + 181	20 218 + 317	62 60 + 159	27 118 + 313	56 50 + 168
6 10.3	13 681 + 323	46 21 + 204	16 205 + 323	67 63 + 199	20 547 + 329	64 47 + 187	27 445 + 327	58 41 + 191
6 20.2	14 006 + 325	48 31 + 210	16 530 + 325	69 73 + 210	20 878 + 331	66 54 + 207	27 773 + 328	60 49 + 208
6 30.2	14 325 + 319	50 41 + 210	16 850 + 320	71 88 + 215	21 203 + 325	68 75 + 221	28 096 + 323	62 69 + 220
7 10.2	14 633 + 308	52 48 + 207	17 158 + 308	74 05 + 217	21 516 + 313	71 06 + 231	28 407 + 311	64 96 + 227
7 20.1	14 919 + 286	54 44 + 196	17 444 + 286	76 16 + 211	21 806 + 290	73 41 + 235	28 695 + 288	67 23 + 227
7 30.1	15 179 + 260	56 26 + 182	17 703 + 259	78 17 + 201	22 068 + 262	75 73 + 232	28 956 + 261	69 45 + 222
8 9.1	15 406 + 227	57 91 + 165	17 930 + 227	80 04 + 187	22 297 + 229	78 00 + 227	29 185 + 229	71 60 + 215
8 19.1	15 595 + 189	59 33 + 142	18 118 + 188	81 73 + 169	22 486 + 189	80 14 + 214	29 374 + 189	73 59 + 199
8 29.0	15 745 + 150	60 54 + 121	18 268 + 150	83 22 + 149	22 637 + 151	82 14 + 200	29 525 + 151	75 42 + 183
9 8.0	15 855 + 110	61 51 + 97	18 378 + 110	84 49 + 127	22 747 + 110	83 95 + 181	29 636 + 111	77 06 + 164
9 18.0	15 924 + 69	62 23 + 72	18 446 + 68	85 52 + 103	22 816 + 69	85 55 + 160	29 705 + 69	78 46 + 140
9 28.0	15 957 + 33	62 73 + 50	18 480 + 34	86 33 + 81	22 848 + 32	86 92 + 137	29 739 + 34	79 65 + 119
10 7.9	15 954 - 3	63 00 + 27	18 478 - 2	86 90 + 57	22 845 - 3	88 06 + 114	29 737 - 2	80 61 + 96
10 17.9	15 922 - 32	63 06 + 6	18 446 - 32	87 25 + 35	22 812 - 33	88 95 + 89	29 705 - 32	81 31 + 70
10 27.9	15 867 - 55	62 96 - 10	18 391 - 55	87 42 + 17	22 754 - 58	89 60 + 65	29 649 - 56	81 80 + 49
11 6.8	15 791 - 76	62 70 - 26	18 315 - 76	87 38 - 4	22 675 - 79	90 01 + 41	29 572 - 77	82 06 + 26
11 16.8	15 702 - 89	62 31 - 39	18 225 - 90	87 17 - 21	22 581 - 94	90 16 + 15	29 481 - 91	82 09 + 3
11 26.8	15 605 - 97	61 83 - 48	18 128 - 97	86 83 - 34	22 478 - 103	90 10 - 6	29 381 - 100	81 93 - 16
12 6.8	15 503 - 102	61 26 - 57	18 025 - 103	86 34 - 49	22 368 - 110	89 79 - 31	29 275 - 106	81 56 - 37
12 16.7	15 403 - 100	60 63 - 63	17 923 - 102	85 74 - 60	22 258 - 110	89 28 - 51	29 168 - 107	81 02 - 54
12 26.7	15 307 - 96	59 97 - 66	17 824 - 99	85 05 - 69	22 150 - 108	88 57 - 71	29 064 - 104	80 32 - 70
12 36.7	15 218 - 89	59 29 - 68	17 731 - 93	84 28 - 77	22 048 - 102	87 68 - 89	28 966 - 98	79 46 - 86
	15 218 - 77	59 29 - 66	17 731 - 81	84 28 - 79	22 048 - 91	87 68 - 103	28 966 - 86	79 46 - 95
Mean Place	14.421	53.72	16.994	76.90	21.426	76.97	28.296	69.83
sec δ, tan δ	+1.000	+0.021	+1.006	+0.110	+1.040	+0.286	+1.025	+0.225
dα(ψ), dδ(ψ)	+0.061	+0.39	+0.061	+0.39	+0.060	+0.39	+0.060	+0.39
dα(ε), dδ(ε)	-0.001	-0.15	-0.007	-0.14	-0.019	-0.14	-0.015	-0.14
Dble.Trans.	September 12		September 13		September 13		September 13	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	886			1616			1617		888	
	$\beta$ Sculptoris			15 Andromedae			1 Phoenicis		248 G. Aquarii	
Mag.Spect.	4.46	B9		5.50	A0		4.80	A2p	6.51	K0
U.T.	R.A.	Dec.		R.A.	Dec.		R.A.	Dec.	R.A.	Dec.
	h m	° ' "		h m	° ' "		h m	° ' "	h m	° ' "
	23 32	- 37 53		23 33	+ 40 09		23 34	- 42 41	23 34	- 7 32
1	-8.3	12.771 -153	63.62 -27	55 018 -175	41.19 -40	19 012 -174	52.53 -19	47 941 -101	39.10 -63	
1	1.7	12.629 -142	63.50 +12	54 847 -171	40.40 -79	18 851 -161	52.31 +22	47 846 -95	39.64 -54	
1	11.7	12.501 -128	63.01 +49	54 682 -165	39.20 -120	18 704 -147	51.68 +63	47 758 -88	40.10 -46	
1	21.6	12.393 -108	62.14 +87	54 534 -148	37.65 -155	18 580 -124	50.62 +106	47 684 -74	40.44 -34	
1	31.6	12.310 -83	60.92 +122	54.408 -126	35.83 -182	18.483 -97	49.20 +142	47 626 -58	40.63 -19	
2	10.6	12.252 -58	59.38 +154	54 309 -99	33.78 -205	18 413 -70	47.43 +177	47 587 -39	40.68 -5	
2	20.6	12.228 -24	57.53 +185	54.248 -61	31.62 -216	18 380 -33	45.34 +209	47 573 -14	40.53 +15	
3	2.5	12.238 +10	55.43 +210	54 227 -21	29.46 -216	18 384 +4	42.99 +235	47 587 +14	40.19 +34	
3	12.5	12.287 +49	53.09 +234	54.253 +26	27.34 -212	18 429 +45	40.41 +258	47 630 +43	39.74 +45	
3	22.5	12.378 +91	50.57 +252	54.331 +78	25.41 -193	18 520 +91	37.65 +276	47 706 +76	38.86 +88	
4	1.5	12.512 +134	47.92 +265	54.459 +128	23.74 -167	18 656 +136	34.79 +286	47 822 +116	37.82 +104	
4	11.4	12.691 +179	45.16 +276	54.640 +181	22.40 -134	18 840 +184	31.84 +295	47 976 +154	36.54 +128	
4	21.4	12.915 +224	42.37 +279	54.873 +233	21.47 -93	19.071 +231	28.88 +296	48 169 +193	35.04 +150	
5	1.4	13.179 +264	39.60 +277	55.149 +276	20.97 -50	19.345 +274	25.99 +289	48 397 +228	33.35 +169	
5	11.3	13.482 +303	36.90 +270	55.466 +317	20.94 -3	19.661 +316	23.18 +281	48.657 +260	31.47 +188	
5	21.3	13.817 +335	34.34 +256	55.814 +348	21.41 +47	20.012 +351	20.57 +261	48 945 +288	29.47 +200	
5	31.3	14.176 +359	31.98 +236	56.183 +369	22.33 +92	20.388 +376	18.19 +238	49.253 +308	27.40 +207	
6	10.3	14.555 +379	29.86 +212	56.567 +384	23.70 +137	20.785 +397	16.08 +211	49.576 +323	25.28 +212	
6	20.2	14.941 +386	28.06 +180	56.951 +384	25.48 +178	21.190 +405	14.34 +174	49.903 +327	23.18 +210	
6	30.2	15.324 +383	26.60 +146	57.327 +376	27.61 +213	21.594 +404	12.96 +138	50.228 +325	21.17 +201	
7	10.2	15.697 +373	25.51 +109	57.687 +360	30.06 +245	21.988 +394	12.00 +96	50 542 +314	19.27 +190	
7	20.2	16.048 +351	24.85 +66	58.019 +332	32.75 +269	22.359 +371	11.49 +51	50 837 +295	17.55 +172	
7	30.1	16.369 +321	24.59 +26	58.318 +299	35.60 +285	22.699 +340	11.41 +8	51.105 +268	16.04 +151	
8	9.1	16.654 +285	24.75 -16	58.578 +260	38.60 +300	23.001 +302	11.77 -36	51.343 +238	14.77 +127	
8	19.1	16.892 +238	25.32 -57	58.792 +214	41.63 +303	23.254 +253	12.56 -79	51.543 +200	13.77 +100	
8	29.0	17.083 +191	26.24 -92	58.960 +168	44.65 +302	23.457 +203	13.70 -114	51.705 +162	13.03 +74	
9	8.0	17.222 +139	27.49 -125	59.081 +121	47.61 +296	23.605 +148	15.19 -149	51.826 +121	12.56 +47	
9	18.0	17.307 +85	29.01 -152	59.153 +72	50.44 +283	23.695 +90	16.94 -175	51.905 +79	12.36 +20	
9	28.0	17.344 +37	30.70 -169	59.182 +29	53.10 +266	23.733 +38	18.85 -191	51.947 +42	12.38 -2	
10	7.9	17.333 -11	32.52 -182	59.167 -15	55.55 +245	23.718 -15	20.89 -204	51.953 +6	12.61 -23	
10	17.9	17.278 -55	34.36 -184	59.114 -53	57.70 +215	23.656 -62	22.91 -202	51.928 -25	13.02 -41	
10	27.9	17.190 -88	36.14 -178	59.030 -84	59.58 +189	23.557 -99	24.85 -194	51.878 -50	13.55 -53	
11	6.9	17.071 -119	37.80 -166	58.917 -113	61.10 +152	23.424 -133	26.64 -179	51.806 -72	14.18 -63	
11	16.8	16.932 -139	39.23 -143	58.781 -136	62.24 +114	23.268 -156	28.16 -152	51.720 -86	14.87 -69	
11	26.8	16.781 -151	40.40 -117	58.630 -151	62.99 +75	23.098 -170	29.38 -122	51.624 -96	15.57 -70	
12	6.8	16.622 -159	41.26 -86	58.464 -166	63.31 +32	22.919 -179	30.24 -86	51 522 -102	16.27 -70	
12	16.7	16.466 -156	41.74 -156	58.294 -170	63.20 -11	22.743 -176	30.68 -44	51 421 -101	16.92 -65	
12	26.7	16.317 -149	41.86 -12	58.122 -172	62.68 -52	22.574 -169	30.72 -4	51 323 -98	17.50 -58	
12	36.7	16.178 -139	41.59 +27	57.954 -168	61.72 -96	22.416 -158	30.33 +39	51.231 -92	18.02 -52	
		16.178 -119	41.59 +66	57.954 -155	61.72 -132	22.416 -138	30.33 +82	51.231 -81	18.02 -39	
Mean Place	14.981	35.60		57.768	43.14	21.165	23.25	50.297	21.07	
sec $\delta$ , tan $\delta$	+1.267	-0.778		+1.309	+0.844	+1.360	-0.922	+1.009	-0.132	
da( $\psi$ ), d $\delta$ ( $\psi$ )	+0.064	+0.39		+0.059	+0.40	+0.064	+0.40	+0.062	+0.40	
da( $\epsilon$ ), d $\delta$ ( $\epsilon$ )	+0.052	-0.12		-0.056	-0.11	+0.061	-0.11	+0.009	-0.11	
Dble.Trans.	September 14			September 14			September 14		September 15	

AT UPPER TRANSIT AT GREENWICH

No.	890		889		891		893	
	λ Andromedae		11 G. Phoenicis		ι Andromedae		γ Cephei	
Mag. Spect.	4.00 var.	K0	4.86	A2	4.28	B8	3.42	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 23 36	<sup>o</sup> <sup>'</sup> +46 22	<sup>h</sup> <sup>m</sup> 23 37	<sup>o</sup> <sup>'</sup> -45 33	<sup>h</sup> <sup>m</sup> 23 37	<sup>o</sup> <sup>'</sup> +43 11	<sup>h</sup> <sup>m</sup> 23 38	<sup>o</sup> <sup>'</sup> +77 32
1 -8.3	<sup>s</sup> 51.174 -207	65.92 -28	<sup>s</sup> 05.480 -189	91.63' -17	<sup>s</sup> 25.528 -189	34.81 -32	<sup>s</sup> 42.531 -938	90.29 +42
1 1.7	50.971 -203	65.19 -73	05.304 -176	91.35 +28	25.342 -186	34.07 -74	41.597 -934	90.09 -20
1 11.7	50.773 -198	64.00 -119	05.143 -161	91.35 +70	25.161 -181	32.91 -116	40.685 -912	89.27 -82
1 21.6	50.594 -179	62.41 -159	05.005 -138	89.50 +115	24.998 -163	31.36 -155	39.841 -844	87.84 -143
1 31.6	50.440 -154	60.50 -191	04.896 -109	87.96 +154	24.857 -141	29.52 -184	39.093 -748	85.91 -193
2 10.6	50.316 -124	58.31 -219	04.815 -81	86.07 +189	24.744 -113	27.42 -210	38.464 -629	83.51 -240
2 20.6	50.234 -82	55.97 -234	04.773 -42	83.85 +222	24.671 -73	25.19 -223	37.993 -471	80.75 -276
3 2.5	50.199 +35	53.57 -240	04.770 -3	81.37 +248	24.641 -30	22.92 -227	37.692 -301	77.79 -296
3 12.5	50.215 +16	51.20 -237	04.810 +40	78.65 +272	24.659 +18	20.68 -224	37.575 -117	74.70 -309
3 22.5	50.291 +76	48.98 -222	04.899 +89	75.76 +289	24.732 +73	18.61 -207	37.657 +82	71.64 -306
4 1.5	50.423 +132	47.02 -196	05.034 +135	72.77 +299	24.859 +127	16.80 -181	37.925 +268	68.75 -289
4 11.4	50.614 +191	45.37 -165	05.220 +186	69.70 +307	25.042 +183	15.30 -150	38.377 +452	66.09 -266
4 21.4	50.861 +247	44.14 -123	05.455 +235	66.65 +305	25.279 +237	14.21 -109	39.002 +625	63.83 -226
5 1.4	51.157 +296	43.35 -79	05.735 +280	63.67 +298	25.561 +282	13.57 -64	39.764 +762	62.01 -182
5 11.3	51.497 +340	43.05 -30	06.059 +324	60.80 +287	25.887 +326	13.39 -18	40.652 +888	60.69 -132
5 21.3	51.872 +375	43.27 +22	06.419 +360	58.15 +265	26.246 +359	13.72 +33	41.631 +979	59.95 -74
5 31.3	52.269 +397	43.97 +70	06.807 +388	55.74 +241	26.626 +380	14.52 +80	42.664 +1033	59.77 -18
6 10.3	52.682 +413	45.16 +119	07.217 +410	53.63 +211	27.023 +397	15.78 +126	43.731 +1067	60.18 +41
6 20.2	53.096 +414	46.82 +166	07.637 +420	51.91 +172	27.421 +398	17.49 +171	44.793 +1062	61.18 +100
6 30.2	53.500 +404	48.85 +203	08.055 +418	50.57 +134	27.810 +389	19.56 +207	45.820 +1027	62.70 +152
7 10.2	53.887 +387	51.26 +241	08.465 +410	49.67 +90	28.184 +374	21.98 +242	46.795 +975	64.74 +204
7 20.2	54.244 +357	53.96 +270	08.850 +385	49.23 +44	28.528 +344	24.67 +269	47.681 +886	67.25 +251
7 30.1	54.565 +321	56.86 +290	09.205 +355	49.24 -1	28.839 +311	27.54 +287	48.466 +785	70.13 +288
8 9.1	54.845 +280	59.95 +309	09.521 +316	49.71 -47	29.111 +272	30.58 +304	49.137 +671	73.37 +324
8 19.1	55.074 +229	63.13 +318	09.786 +285	50.62 -91	29.335 +224	33.68 +310	49.667 +530	76.87 +350
8 29.0	55.255 +181	66.32 +319	09.999 +213	51.89 -127	29.512 +177	36.79 +311	50.062 +395	80.55 +368
9 8.0	55.384 +129	69.51 +319	10.155 +156	51.89 -161	29.512 +128	36.79 +309	50.062 +248	80.55 +382
9 18.0	55.460 +76	69.51 +307	10.155 +96	53.50 -188	29.640 +77	39.88 +295	50.310 +92	84.37 +384
9 28.0	55.489 +29	72.58 +292	10.251 +40	55.38 -204	29.717 +32	42.83 +280	50.402 -50	88.21 +381
10 7.9	55.470 -19	75.50 +273	10.291 -15	57.42 -216	29.749 -13	45.63 +260	50.352 -201	92.02 +372
10 17.9	55.409 -61	80.67 +244	10.211 -65	59.58 -213	29.736 -54	48.23 +232	50.151 -344	95.74 +350
10 27.9	55.312 -97	82.83 +216	10.106 -105	61.71 -204	29.682 -86	50.55 +203	49.807 -471	99.24 +324
11 6.9	55.181 -131	84.63 +180	10.106 -142	63.75 -187	29.596 -119	52.58 +169	49.336 -599	102.48 +291
11 16.8	55.024 -157	86.01 +138	09.964 -167	65.62 -158	29.477 -143	54.27 +128	48.737 -705	105.39 +245
11 26.8	54.848 -176	86.99 +98	09.797 -183	67.20 -126	29.334 -161	55.55 +89	48.032 -792	107.84 +199
12 6.8	54.655 -193	87.50 +51	09.614 -193	68.46 -87	29.173 -177	56.44 +4	47.240 -871	109.83 +142
12 16.7	54.454 -203	87.53 +3	09.421 -191	69.33 -43	28.996 -183	56.88 -41	46.369 -911	111.25 +82
12 26.7	54.251 -201	87.53 -42	09.230 -185	69.76 -1	28.813 -185	56.87 -45	45.458 -931	112.07 +22
12 36.7	54.050 -186	87.11 -91	09.045 -173	69.77 +45	28.628 -184	56.42 -90	44.527 -926	112.29 -43
		86.20 -133	08.872 -151	69.32 +90	28.444 -170	55.52 -130	43.601 -877	111.86 -104
Mean Place	54.020	65.95	07.576	61.65	28.308	35.85	47.113	85.25
sec δ, tan δ	+1.450	+1.050	+1.428	-1.020	+1.372	+0.939	+4.641	+4.532
dα(ψ), dδ(ψ)	+0.058	+0.40	+0.064	+0.40	+0.059	+0.40	+0.050	+0.40
dα(ε), dδ(ε)	-0.070	-0.10	+0.068	-0.10	-0.062	-0.10	-0.301	-0.09
Dbble. Trans.	September 15		September 15		September 15		September 16	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	892		1619		1618		1620	
	ι Piscium		α Andromedae		μ Sculptoris		λ Piscium	
Mag. Spect.	4.28	F8	4.33	A0	5.33	K0	4.61	A5
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>	<sup>h</sup> <sup>m</sup>	<sup>°</sup> <sup>'</sup>
	23 39	+ 5 32	23 39	+ 44 15	23 39	- 32 08	23 41	+ 1 42
1 <sup>d</sup> -8.3	<sup>s</sup> 12.916 - 101	" - 66	<sup>s</sup> 41 641 - 194	32.12 - 28	<sup>s</sup> 53 598 - 137	" - 41	<sup>s</sup> 19 096 - 101	" - 66
1 1.7	12.819 - 97	57 35 - 72	41 449 - 192	31 42 - 70	53 470 - 128	78 34 - 9	18 999 - 97	06 69 - 67
1 11.7	12.728 - 91	56 57 - 78	41 263 - 186	30 27 - 115	53 352 - 118	78 18 - 25	18 908 - 91	05 01 - 68
1 21.7	12.649 - 79	55 79 - 78	41 093 - 170	28 74 - 153	53 251 - 101	77 58 + 60	18 829 - 79	04 36 - 65
1 31.6	12.585 - 64	55.04 - 75	40.946 - 147	26.90 - 184	53.171 - 80	76.66 + 92	18.764 - 65	03.77 - 59
2 10.6	12.538 - 47	54 34 - 70	40 827 - 119	24 79 - 211	53 113 - 58	75 44 +122	18 717 - 47	03 26 - 51
2 20.6	12.517 - 21	53.76 - 58	40 748 - 79	22 54 - 225	53 085 - 28	73 91 +153	18 695 - 22	02 90 - 36
3 2.5	12.524 + 7	53.33 - 43	40 713 + 35	20 24 - 230	53 088 + 3	72 14 + 202	18 699 + 4	02 70 + 4
3 12.5	12.561 + 37	53.11 - 22	40 728 + 15	17 96 - 228	53 126 + 38	70 12 +202	18 736 + 37	02 74 + 4
3 22.5	12.632 + 71	53.08 - 3	40 799 + 71	15.85 - 211	53.206 + 80	67 88 +224	18 800 + 64	02 92 + 18
4 1.5	12.745 + 113	53 29 + 21	40 924 + 125	13 98 - 187	53 325 + 119	65 48 +240	18 911 + 111	03 38 + 46
4 11.4	12.897 + 152	53 80 + 51	41 106 + 182	12 42 - 156	53 487 + 162	62 95 +253	19 059 + 148	04 12 + 74
4 21.4	13 088 + 191	54 62 + 82	41 344 + 238	11 28 - 114	53 692 + 205	60 33 +262	19 247 + 188	05 15 +103
5 1.4	13 314 + 226	55 71 +109	41 628 + 284	10 57 - 71	53 936 + 244	57 70 +263	19 469 + 222	06 42 +127
5 11.3	13 574 + 260	57 08 +137	41 957 + 329	10 33 - 24	54 219 + 283	55 08 +262	19 725 + 256	07 94 +152
5 21.3	13 861 + 287	58 69 +161	42 319 + 362	10 61 + 28	54 533 + 314	52 55 +253	20 009 + 284	09 68 +174
5 31.3	14 168 + 307	60 50 +181	42 705 + 386	11 36 + 75	54 871 + 338	50 16 +239	20 313 + 304	11 57 +189
6 10.3	14 490 + 322	62 47 +197	43 106 + 401	12 58 +122	55 228 + 357	47 95 +221	20 632 + 319	13 60 +203
6 20.2	14 816 + 326	64 55 +203	43 509 + 403	14 25 +167	55 593 + 365	46 02 +193	20 957 + 325	15 70 +210
6 30.2	15 138 + 322	66 68 +213	43 905 + 396	16 29 +204	55 958 + 365	44 38 +164	21 278 + 321	17 81 +211
7 10.2	15 451 + 313	68 82 +214	44 284 + 379	18 69 +240	56 314 + 356	43 07 +131	21 591 + 313	19 89 +208
7 20.2	15 743 + 292	70 89 +207	44 635 + 351	21 36 +267	56 649 + 335	42 15 + 92	21 884 + 293	21 88 +199
7 30.1	16 011 + 268	72 86 +197	44 952 + 317	24 24 +288	56 957 + 308	41 60 + 55	22 152 + 268	23 73 +185
8 9.1	16 247 + 236	74 70 +184	45 228 + 276	27 28 +304	57 232 + 275	41 45 + 15	22 390 + 238	25 42 +169
8 19.1	16 446 + 199	76 35 +195	45 457 + 229	30 41 +313	57 464 + 232	41 70 - 25	22 591 + 201	26 89 +147
8 29.0	16 608 + 162	77 79 +144	45 639 + 182	33 54 +313	57 653 + 189	42 30 - 60	22 755 + 164	28 13 +124
9 8.0	16 730 + 122	79 01 +122	45 771 + 132	36 66 +312	57 794 + 141	43 23 - 93	22 879 + 124	29 15 +102
9 18.0	16 811 + 81	79 99 + 98	45 851 + 80	39 66 +300	57 885 + 91	44 44 - 121	22 963 + 84	29 90 + 75
9 28.0	16 857 + 46	80 74 + 75	45 886 + 35	42 51 +285	57 931 + 46	45 86 - 142	23 010 + 47	30 44 + 54
10 7.9	16 868 + 11	81 26 + 52	45 875 - 11	45 16 +265	57 932 + 1	47 43 - 157	23 023 + 13	30 74 + 30
10 17.9	16 848 - 20	81 56 - 30	45 823 - 52	47 53 +237	57 894 - 38	49 07 - 164	23 004 - 19	30 83 + 9
10 27.9	16 803 - 45	81 68 + 12	45 736 - 87	49 62 +209	57 823 - 71	50 69 - 162	22 961 - 43	30 76 - 7
11 6.9	16 737 - 66	81 60 - 8	45 617 - 119	51 37 +175	57 724 - 99	52 24 - 155	22 896 - 65	30 52 - 24
11 16.8	16 656 - 81	81 36 - 24	45 472 - 145	52 71 +134	57 606 - 118	53 63 - 139	22 816 - 80	30 15 - 37
11 26.8	16 565 - 91	81 00 - 36	45 308 - 164	53 65 + 94	57 475 - 131	54 80 - 117	22 726 - 90	29 68 - 47
12 6.8	16 466 - 99	80 50 - 50	45 128 - 180	54 14 + 49	57 336 - 139	55 72 - 92	22 628 - 98	29 11 - 57
12 16.7	16 367 - 99	79 90 - 60	44 940 - 188	54 17 + 3	57 198 - 138	56 32 - 60	22 528 - 100	28 50 - 61
12 26.7	16 268 - 99	79 23 - 67	44 749 - 191	53 76 - 41	57 064 - 134	56 60 - 28	22 430 - 98	27 85 - 65
12 36.7	16 174 - 94	78 49 - 74	44 560 - 189	52 88 - 88	57 064 - 126	56 60 + 5	22 336 - 94	27 17 - 68
	16 174 - 85	78 49 - 76	44 560 - 176	52 88 - 128	56 938 - 110	56 55 + 40	22 336 - 85	27 17 - 65
Mean Place	15.342	71.06	44.432	32.81	55.760	52.18	21.465	20.83
sec δ, tan δ	+1.005	+0.097	+1.396	+0.974	+1.181	-0.628	+1.000	+0.030
da(ψ), dδ(ψ)	+0.061	+0.40	+0.059	+0.40	+0.063	+0.40	+0.061	+0.40
da(ε), dδ(ε)	-0.006	-0.09	-0.065	-0.09	+0.042	-0.09	-0.002	-0.08
Dble. Trans.	September 16		September 16		September 16		September 16	



APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	894		1621		1622		1623	
	ω <sup>1</sup> Aquarii		106 Aquarii		ψ Andromedae		20 Piscium	
Mag. Spect.	4.62	A0	5.26	B8	5.09	K0, A5	5.60	K0
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	23 41	- 14 37	23 43	- 18 20	23 45	+ 46 20	23 47	- 2 50
1 -8.3	59.100 -106	30.94 -60	27.894 -111	88.33 -59	18.921 -206	43.17 -18	12.586 -101	28.02 -66
1 1.7	58.999 -101	31.39 -45	27.790 -104	88.71 -38	18.717 -204	42.55 -62	12.490 -96	28.63 -61
1 11.7	58.906 -80	31.67 -28	27.692 -98	88.89 -18	18.517 -200	41.47 -108	12.398 -92	29.21 -58
1 21.7	58.826 -83	31.75 -8	27.608 -84	88.84 +5	18.332 -185	39.98 -149	12.317 -81	29.70 -49
1 31.6	58.761 -65	31.64 +11	27.540 -68	88.56 +28	18.170 -162	38.16 -182	12.250 -67	30.10 -40
2 10.6	58.715 -46	31.32 +32	27.491 -49	82.06 +50	18.037 -133	36.05 -211	12.200 -50	30.37 -27
2 20.6	58.695 -20	30.78 +54	27.467 -24	87.31 +75	17.945 -92	33.77 -228	12.173 -27	30.48 -11
3 2.5	58.701 +36	30.02 +76	27.471 +4	86.33 +98	17.898 -47	31.42 -235	12.174 +1	30.41 +7
3 12.5	58.737 +36	29.05 +97	27.505 +34	85.12 +121	17.902 +4	29.08 -234	12.209 +35	30.13 +28
3 22.5	58.810 +73	27.80 +125	27.577 +72	83.65 +147	17.965 +63	26.88 -220	12.264 +55	29.67 +46
4 1.5	58.920 +110	26.34 +146	27.686 +109	81.98 +167	18.084 +119	24.91 -197	12.369 +105	28.88 +79
4 11.4	59.069 +149	24.67 +167	27.834 +148	80.11 +187	18.264 +180	23.23 -168	12.512 +143	27.87 +101
4 21.4	59.258 +189	22.81 +186	28.024 +190	78.07 +204	18.501 +237	21.97 -126	12.694 +182	26.60 +127
5 1.4	59.483 +225	20.81 +200	28.249 +225	75.92 +215	18.787 +286	21.13 -84	12.911 +217	25.12 +148
5 11.4	59.742 +259	18.69 +212	28.509 +260	73.67 +225	19.120 +333	20.76 -37	13.163 +252	23.41 +171
5 21.3	60.031 +269	16.49 +220	28.800 +291	71.38 +229	19.490 +370	20.92 +16	13.444 +281	21.54 +187
5 31.3	60.340 +309	14.29 +220	29.112 +312	69.11 +227	19.883 +393	21.55 +63	13.746 +302	19.54 +200
6 10.3	60.667 +327	12.10 +219	29.442 +330	66.90 +221	20.295 +412	22.66 +111	14.064 +318	17.45 +209
6 20.2	61.000 +333	10.02 +208	29.780 +338	64.82 +208	20.710 +415	24.24 +158	14.390 +326	15.33 +212
6 30.2	61.331 +331	08.07 +195	30.116 +336	62.92 +190	21.117 +407	26.21 +197	14.713 +323	13.25 +208
7 10.2	61.654 +323	06.31 +176	30.444 +328	61.24 +168	21.510 +393	28.54 +233	15.029 +316	11.24 +201
7 20.2	61.958 +304	04.80 +151	30.753 +309	59.83 +141	21.874 +364	31.18 +264	15.326 +297	09.36 +188
7 30.1	62.238 +290	03.54 +126	31.038 +285	58.71 +112	22.203 +329	34.04 +286	15.600 +274	07.65 +171
8 9.1	62.486 +248	02.58 +96	31.292 +254	57.90 +81	22.493 +290	37.09 +305	15.844 +244	06.15 +150
8 19.1	62.697 +211	01.93 +65	31.507 +215	57.43 +47	22.734 +241	40.24 +315	16.051 +207	04.89 +126
8 29.1	62.869 +172	01.57 +36	31.684 +177	57.27 +16	22.927 +193	43.42 +318	16.223 +172	03.87 +102
9 8.0	63.000 +131	01.51 +6	31.818 +134	57.43 -16	23.070 +143	46.60 +318	16.354 +131	03.11 +76
9 18.0	63.088 +88	01.73 -22	31.909 +91	57.86 -43	23.159 +89	49.68 +308	16.445 +91	02.62 +49
9 28.0	63.137 +49	02.18 -45	31.960 +51	58.52 -66	23.202 +43	52.62 +294	16.500 +55	02.35 +27
10 7.9	63.149 +12	02.83 -65	31.972 +12	59.38 -86	23.197 -5	55.39 +277	16.519 +19	02.31 +4
10 17.9	63.127 -22	03.63 -80	31.950 -22	60.37 -99	23.148 -49	57.88 +249	16.506 -13	02.47 -16
10 27.9	63.079 -48	04.51 -88	31.901 -49	61.43 -106	23.063 -85	60.09 +221	16.468 -38	02.78 -31
11 6.9	63.007 -72	05.46 -95	31.827 -74	62.52 -109	22.943 -120	61.96 +187	16.407 -61	03.23 -45
11 16.8	62.920 -87	06.39 -93	31.736 -91	63.57 -105	22.796 -147	63.43 +147	16.407 -77	03.23 -54
11 26.8	62.822 -98	07.28 -89	31.635 -101	64.54 -97	22.627 -169	64.50 +107	16.330 -87	03.77 -60
12 6.8	62.716 -106	08.09 -81	31.525 -110	65.39 -85	22.439 -188	65.11 +61	16.146 -97	05.01 -64
12 16.8	62.611 -105	08.76 -67	31.415 -110	66.08 -69	22.242 -197	65.25 +14	16.048 -98	05.65 -64
12 26.7	62.507 -104	09.30 -54	31.307 -108	66.58 -50	22.040 -202	64.93 -32	15.950 -98	06.28 -63
12 36.7	62.409 -98	09.68 -38	31.204 -103	66.88 -30	21.838 -202	64.13 -80	15.855 -95	06.89 -61
	62.409 -87	09.68 -19	31.204 -91	66.88 -8	21.838 -190	64.13 -123	15.855 -85	06.89 -52
Mean Place	61.368	10.60	30.123	66.70	21.720	43.15	14.895	11.98
sec δ, tan δ	+1.033	-0.261	+1.054	-0.332	+1.449	+1.048	+1.001	-0.050
da(ψ), dδ(ψ)	+0.062	+0.40	+0.062	+0.40	+0.059	+0.40	+0.061	+0.40
da(ε), dδ(ε)	+0.017	-0.08	+0.022	-0.07	-0.070	-0.06	+0.003	-0.06
Dbble. Trans.	September 16		September 17		September 17		September 18	

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	895		896		1624		897										
	41 H. Cephei		δ Sculptoris		Piazzi 23 <sup>b</sup> 194 (Aquarii)		268 G. Aquarii										
Mag.Spect.	5.02	A0	4.64	A0	7.14	K0	6.08	K0									
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.									
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "									
	23 47	+67 43	23 48	-28 12	23 48	-21 41	23 49	-10 02									
1	-8.3	12.121	-475	58.85	+31	11.359	-128	42.57	-52	41.978	-115	43.49	-58	30.698	-103	77.13	-65
1	1.7	11.645	-476	58.57	-28	11.237	-122	42.78	-21	41.867	-111	43.84	-11	30.599	-99	77.66	-53
1	11.7	11.175	-470	57.71	-86	11.123	-114	42.71	+7	41.764	-103	43.95	-11	30.505	-83	78.07	-41
1	21.7	10.737	-438	56.28	-143	11.024	-99	42.30	+41	41.673	-91	43.79	+16	30.422	-83	78.33	-26
1	31.6	10.347	-390	54.38	-190	10.943	-81	41.60	+70	41.598	-75	43.37	+42	30.354	-68	78.42	-9
2	10.6	10.016	-331	52.04	-234	10.882	-61	40.60	+100	41.542	-56	42.71	+66	30.302	-52	78.34	+8
2	20.6	09.768	-248	49.38	-266	10.849	-33	39.31	+129	41.512	-30	41.78	+93	30.274	-28	78.04	+30
3	2.5	09.610	-158	46.54	-284	10.844	-5	37.77	+154	41.509	-3	40.61	+117	30.273	+1	77.55	+49
3	12.5	09.552	-58	43.60	-294	10.873	+29	35.97	+180	41.537	+28	39.19	+142	30.302	+29	76.87	+68
3	22.5	09.607	+55	40.71	-289	10.942	+69	33.94	+203	41.603	+66	37.53	+166	30.363	+61	75.90	+97
4	1.5	09.766	+159	37.99	-272	11.049	+107	31.74	+220	41.707	+104	35.67	+186	30.464	+101	74.69	+121
4	11.4	10.034	+268	35.52	-247	11.198	+149	29.37	+237	41.852	+145	33.62	+205	30.605	+141	73.26	+143
4	21.4	10.403	+369	33.43	-209	11.391	+193	26.88	+249	42.038	+186	31.42	+220	30.785	+180	71.62	+164
5	1.4	10.857	+454	31.79	-164	11.621	+230	24.35	+253	42.261	+223	29.12	+230	31.002	+217	69.80	+182
5	11.4	11.390	+533	30.65	-114	11.890	+269	21.79	+256	42.520	+259	26.74	+238	31.253	+251	67.82	+198
5	21.3	11.982	+592	30.07	-58	12.191	+301	19.28	+251	42.811	+291	24.36	+238	31.535	+282	65.73	+209
5	31.3	12.611	+629	30.04	-3	12.517	+326	16.87	+241	43.125	+314	22.03	+233	31.838	+303	63.58	+215
6	10.3	13.267	+656	30.57	+53	12.862	+345	14.61	+226	43.458	+333	19.78	+225	32.159	+321	61.40	+218
6	20.2	13.926	+659	31.68	+111	13.216	+354	12.58	+203	43.800	+342	17.69	+209	32.487	+328	59.28	+212
6	30.2	14.570	+644	33.29	+161	13.571	+355	10.81	+177	44.141	+341	15.81	+188	32.815	+328	57.25	+203
7	10.2	15.187	+617	35.38	+209	13.918	+347	09.34	+147	44.475	+334	14.17	+164	33.136	+321	55.36	+189
7	20.2	15.755	+568	37.92	+254	14.247	+329	08.23	+111	44.792	+317	12.85	+132	33.438	+302	53.68	+168
7	30.1	16.267	+512	40.80	+288	14.551	+304	07.48	+75	45.084	+292	11.83	+102	33.717	+279	52.22	+146
8	9.1	16.712	+445	44.00	+320	14.824	+273	07.10	+38	45.346	+262	11.15	+68	33.967	+250	51.02	+120
8	19.1	17.076	+364	47.44	+344	15.056	+232	07.12	-2	45.570	+224	10.83	+32	34.181	+214	50.11	+91
8	29.1	17.361	+285	51.02	+358	15.248	+192	07.48	-36	45.754	+184	10.84	-1	34.357	+176	49.48	+63
9	8.0	17.561	+200	54.72	+370	15.394	+146	08.18	-70	45.895	+141	11.17	-33	34.493	+136	49.14	+34
9	18.0	17.670	+109	58.42	+370	15.492	+98	09.17	-99	45.992	+97	11.79	-62	34.588	+95	49.07	+7
9	28.0	17.697	+27	62.06	+364	15.548	+56	10.38	-121	46.049	+57	12.64	-85	34.646	+58	49.24	-17
10	7.9	17.638	-59	65.60	+354	15.561	+13	11.78	-140	46.065	+16	13.69	-105	34.666	+20	49.63	-39
10	17.9	17.498	-140	68.90	+330	15.535	-26	13.26	-148	46.046	-19	14.86	-117	34.654	-12	50.19	-66
10	27.9	17.287	-211	71.94	+304	15.479	-56	14.77	-151	45.998	-48	16.08	-122	34.615	-39	50.86	-67
11	6.9	17.005	-282	74.64	+270	15.395	-84	16.25	-148	45.924	-74	17.33	-125	34.553	-62	51.64	-78
11	16.8	16.665	-340	76.89	+225	15.291	-104	17.59	-134	45.832	-92	18.50	-117	34.474	-79	52.44	-80
11	26.8	16.276	-388	78.70	+181	15.174	-117	18.77	-118	45.727	-105	19.56	-106	34.384	-90	53.23	-79
12	6.8	15.843	-433	79.97	+127	15.047	-127	19.73	-96	45.614	-113	20.47	-91	34.285	-99	54.00	-77
12	16.8	15.386	-457	80.66	+69	14.920	-127	20.41	-68	45.499	-115	21.17	-70	34.184	-101	54.69	-69
12	26.7	14.914	-472	80.78	+12	14.794	-126	20.82	-41	45.386	-113	21.66	-49	34.083	-101	55.28	-59
12	36.7	14.441	-473	80.28	-50	14.675	-119	20.92	-10	45.277	-109	21.92	-26	33.986	-97	55.77	-49
			-451		-107		-107		+22		-98		+1		-88		-33
Mean Place	15.592	54.53		13.481	17.83			44.139	20.85			32.943	58.52				
sec δ, tan δ	+2.639	+2.442		+1.135	-0.536			+1.076	-0.398			+1.016	-0.177				
dα(ψ), dδ(ψ)	+0.058	+0.40		+0.062	+0.40			+0.062	+0.40			+0.061	+0.40				
dα(ε), dδ(ε)	-0.163	-0.06		+0.036	-0.05			+0.026	-0.05			+0.012	-0.05				
Dble.Trans.	September 18		September 18		September 18		September 18										

APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	898		1625		899		1626	
	φ Pegasi		82 Pegasi		g Cassiopeiae		27 G. Phoenicis	
Name	φ Pegasi		82 Pegasi		g Cassiopeiae		27 G. Phoenicis	
Mag.Spect.	5.23	M0	5.39	A3	4.4 to 5.1	F8p	6.01	F8
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	23 51	+19 02	23 51	+10 52	23 53	+57 25	23 53	-40 22
1 -8.3	45 564 <sup>s</sup> -114	35 07 <sup>o</sup> -53	53 386 <sup>s</sup> -106	09 36 <sup>o</sup> -60	39 272 <sup>s</sup> -295	30 35 <sup>o</sup> +15	54 327 <sup>s</sup> -166	59 54 <sup>o</sup> -41
1 1.7	45 451 -113	34 34 -73	53 283 -103	08 65 -71	38 975 -297	29 98 -37	54 167 -160	59 54 +0
1 11.7	45 340 -101	33 42 -92	53 183 -100	07 84 -81	38 680 -295	29 07 -91	54 017 -150	59 14 +40
1 21.7	45 239 -87	32 35 -107	53 092 -91	06 95 -89	38 403 -277	27 66 -141	53 885 -132	58 31 +83
1 31.6	45 152 -87	31 18 -117	53 015 -77	06 06 -89	38 155 -248	25 83 -183	53 774 -111	57.10 +121
2 10.6	45 083 -69	29 94 -124	52 954 -61	05 16 -90	37 944 -211	23 62 -221	53 687 -87	55 53 +157
2 20.6	45 039 -44	28 72 -122	52 917 -37	04 34 -82	37 787 -157	21 14 -248	53 632 -55	53 62 +191
3 2.5	45 025 -14	27 59 -113	52 908 -100	03 63 -71	37 690 -97	18 52 -262	53 612 -20	51.43 +219
3 12.5	45 043 +18	26 57 -102	52 930 +22	03 10 -53	37 660 -30	15 83 -269	53 629 +17	48 98 +245
3 22.5	45 102 +59	25 76 -81	52 988 +58	02 79 -31	37 707 +47	13 22 -261	53 692 +63	46.32 +266
4 1.5	45 201 +99	25 20 -56	53 086 +98	02 69 -10	37 828 +121	10 81 -241	53 799 +107	43 51 +281
4 11.4	45 343 +142	24 92 -28	53 225 +139	02 88 +19	38 026 +198	08 65 -216	53 952 +153	40 59 +292
4 21.4	45 529 +186	24 99 +7	53 406 +181	03 40 +52	38 299 +273	06 87 -178	54 155 +203	37 62 +297
5 1.4	45 753 +224	25 40 +41	53 624 +218	04 22 +82	38 634 +335	05 54 -133	54 401 +246	34 68 +294
5 11.4	46 014 +261	26 17 +77	53 877 +253	05 35 +113	39 028 +394	04 67 -87	54 690 +289	31.79 +289
5 21.3	46 306 +292	27 29 +112	54 160 +283	06 77 +142	39 469 +441	04 36 -31	55 017 +327	29 05 +274
5 31.3	46 619 +313	28 71 +142	54 465 +305	08 42 +165	39 941 +472	04 56 +20	55 372 +355	26 52 +253
6 10.3	46 949 +330	30 42 +171	54 786 +321	10 30 +188	40 436 +495	05 30 +74	55 751 +379	24 23 +229
6 20.2	47 284 +335	32 38 +196	55 114 +326	12 34 +204	40 937 +501	06 56 +126	56 142 +391	22 27 +196
6 30.2	47 618 +334	34 51 +213	55 440 +326	14 47 +213	41 428 +491	08 28 +172	56 535 +393	20.66 +161
7 10.2	47 942 +324	36 78 +227	55 758 +318	16 68 +221	41 904 +476	10 45 +217	56 923 +388	19 46 +120
7 20.2	48 246 +304	39 13 +235	56 057 +299	18 88 +220	42 345 +441	13 00 +255	57 293 +370	18 70 +76
7 30.1	48 526 +280	41 49 +236	56 332 +275	21 02 +214	42 746 +401	15 84 +284	57 636 +343	18 36 +34
8 9.1	48 775 +249	43 83 +234	56 578 +246	23 07 +205	43 100 +354	18 97 +313	57 945 +309	18 48 -12
8 19.1	48 987 +212	46 07 +224	56 787 +209	24 97 +190	43 395 +295	22 27 +330	58 210 +265	19 04 -56
8 29.1	49 162 +175	48 20 +213	56 960 +173	26 71 +174	43 633 +238	25 68 +341	58 429 +219	19 98 -94
9 8.0	49 297 +135	50 17 +197	57 094 +134	28 25 +154	43 809 +176	29 17 +349	58 597 +168	21 30 -132
9 18.0	49 390 +93	51 94 +177	57 188 +94	29 55 +130	43 920 +111	32 61 +344	58 710 +113	22 90 -160
9 28.0	49 448 +58	53 51 +157	57 246 +58	30 65 +110	43 972 +52	35 97 +336	58 773 +63	24 72 -182
10 7.9	49 469 +21	54 86 +135	57 269 +23	31 51 +86	43 963 -9	39 20 +323	58 785 +12	26 70 -198
10 17.9	49 457 -12	55 95 +109	57 260 -9	32 13 +62	43 898 -65	42 18 +298	58 750 -35	28 72 -202
10 27.9	49 420 -37	56 81 +86	57 226 -34	32 55 +42	43 784 -114	44 90 +272	58 678 -72	30 70 -198
11 6.9	49 358 -62	57 42 +61	57 168 -58	32 76 +21	43 621 -163	47 29 +239	58 570 -108	32 57 -187
11 16.8	49 278 -80	57 77 +35	57 093 -75	32 76 +0	43 419 -202	49 25 +196	58 437 -133	34 21 -164
11 26.8	49 185 -93	57 89 +12	57 006 -87	32 60 -16	43 184 -235	50 79 +154	58 286 -151	35 58 -137
12 6.8	49 080 -105	57 75 -14	56 909 -97	32 25 -35	42 919 -265	51 82 +103	58 123 -163	36 63 -105
12 16.8	48 970 -110	57 38 -37	56 808 -101	31 75 -50	42 637 -282	52 32 +50	57 957 -166	37 28 -65
12 26.7	48 858 -112	56 79 -59	56 705 -103	31 13 -62	42 344 -293	52 30 -2	57 793 -164	37 54 -26
12 36.7	48 746 -112	55 99 -80	56 603 -102	30 37 -76	42 048 -296	51 72 -58	57 635 -158	37 38 +16
	48 746 -104	55 99 -97	56 603 -94	30 37 -83	42 048 -283	51 72 -109	57 635 -143	37 38 +59
Mean Place	48.011	43.14	55.766	20.32	42.283	27.58	56.285	31.25
sec δ, tan δ	+1.058	+0.345	+1.018	+0.192	+1.857	+1.565	+1.313	-0.850
da(ψ), dδ(ψ)	+0.061	+0.40	+0.061	+0.40	+0.060	+0.40	+0.062	+0.40
da(ε), dδ(ε)	-0.023	-0.04	-0.013	-0.04	-0.104	-0.03	+0.057	-0.03
Dble.Trans.	September 19		September 19		September 19		September 19	

## APPARENT PLACES OF STARS, 1986

AT UPPER TRANSIT AT GREENWICH

No.	1627		1628		1629		900		
	Groombridge 4163 (Cephei)		Piazzi 23 <sup>h</sup> 235 (Pegasi)		ψ Pegasi		27 Piscium*		
Mag.Spect.	6.57	B9	6.30	M0	4.75	M0	5.07	K0	
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	
	h m	° ′	h m	° ′	h m	° ′	h m	° ′	
	23 54	+74 19	23 55	+22 34	23 57	+25 03	23 57	- 3 37	
1	-8.3	05.353 - 710	71.29 + 57	57.694 - 119	16.06 - 46	01.691 - 125	53.17 - 42	56.710 - 100	67.21 - 66
1	1.7	04.635 - 718	71.25 - 4	57.574 - 120	15.36 - 70	01.567 - 124	52.49 - 68	56.612 - 98	67.82 - 61
1	11.7	03.924 - 711	70.60 - 66	57.456 - 118	14.43 - 93	01.444 - 123	51.55 - 94	56.516 - 96	68.39 - 57
1	21.7	03.254 - 670	69.33 - 127	57.348 - 108	13.32 - 111	01.330 - 114	50.39 - 116	56.429 - 87	68.86 - 47
1	31.6	02.650 - 604	67.55 - 178	57.253 - 95	12.07 - 125	01.229 - 101	49.08 - 131	56.355 - 74	69.21 - 35
2	10.6	02.130 - 520	65.29 - 226	57.175 - 78	10.72 - 135	01.147 - 82	47.65 - 143	56.296 - 59	69.44 - 23
2	20.6	01.727 - 403	62.66 - 263	57.123 - 52	09.36 - 136	01.091 - 56	46.19 - 146	56.261 - 35	69.50 - 6
3	2.6	01.452 - 275	59.80 - 286	57.101 - 22	08.05 - 131	01.065 - 26	44.76 - 143	56.251 - 10	69.38 + 12
3	12.5	01.319 - 133	56.78 - 302	57.114 + 13	06.85 - 120	01.075 + 10	43.42 - 134	56.273 + 22	69.06 + 32
3	22.5	01.345 + 26	53.76 - 302	57.168 + 54	05.84 - 101	01.128 + 53	42.28 - 114	56.321 + 48	68.58 + 48
4	1.5	01.519 + 174	50.88 - 288	57.263 + 95	05.08 - 76	01.222 + 94	41.37 - 91	56.414 + 93	67.70 + 88
4	11.4	01.845 + 326	48.21 - 267	57.403 + 140	04.59 - 49	01.363 + 141	40.74 - 63	56.546 + 132	66.64 + 106
4	21.4	02.314 + 469	45.90 - 231	57.587 + 184	04.46 - 13	01.549 + 186	40.47 - 27	56.718 + 172	65.33 + 131
5	1.4	02.902 + 588	44.01 - 189	57.812 + 225	04.68 + 22	01.775 + 226	40.56 + 9	56.926 + 208	63.81 + 152
5	11.4	03.600 + 698	42.60 - 141	58.074 + 262	05.27 + 59	02.041 + 266	41.03 + 47	57.171 + 245	62.07 + 174
5	21.3	04.381 + 781	41.75 - 85	58.368 + 294	06.24 + 97	02.339 + 298	41.90 + 87	57.446 + 275	60.17 + 190
5	31.3	05.216 + 835	41.45 - 30	58.685 + 317	07.53 + 129	02.659 + 320	43.11 + 121	57.743 + 297	58.15 + 202
6	10.3	06.091 + 875	41.72 + 27	59.019 + 334	09.14 + 161	02.998 + 339	44.66 + 155	58.059 + 316	56.05 + 210
6	20.3	06.972 + 881	42.59 + 87	59.360 + 341	11.04 + 190	03.343 + 345	46.51 + 185	58.383 + 324	53.92 + 213
6	30.2	07.834 + 862	43.97 + 138	59.699 + 339	13.13 + 209	03.686 + 343	48.58 + 207	58.708 + 325	51.84 + 208
7	10.2	08.664 + 830	45.87 + 190	60.029 + 330	15.41 + 228	04.020 + 334	50.86 + 228	59.026 + 318	49.82 + 202
7	20.2	09.432 + 768	48.25 + 238	60.340 + 311	17.79 + 238	04.334 + 314	53.27 + 241	59.327 + 301	47.95 + 187
7	30.1	10.124 + 692	51.00 + 275	60.625 + 285	20.22 + 243	04.624 + 290	55.75 + 248	59.606 + 279	46.26 + 169
8	9.1	10.731 + 607	54.13 + 313	60.881 + 256	22.66 + 244	04.882 + 258	58.26 + 251	59.858 + 252	44.77 + 149
8	19.1	11.229 + 498	57.53 + 340	61.098 + 217	25.04 + 238	05.103 + 221	60.72 + 246	60.074 + 216	43.54 + 123
8	29.1	11.623 + 394	61.12 + 359	61.279 + 181	27.32 + 228	05.286 + 183	63.11 + 239	60.254 + 180	42.55 + 99
9	8.0	11.900 + 277	64.87 + 277	61.419 + 140	29.47 + 215	05.428 + 142	65.38 + 227	60.395 + 141	41.84 + 71
9	18.0	12.054 + 154	68.66 + 379	61.518 + 99	31.43 + 196	05.529 + 101	67.47 + 209	60.496 + 101	41.39 + 45
9	28.0	12.094 + 40	72.44 + 378	61.580 + 62	33.21 + 178	05.591 + 62	69.38 + 191	60.561 + 65	41.17 + 22
10	8.0	12.014 - 80	76.14 + 370	61.605 + 25	34.76 + 155	05.617 + 26	71.08 + 170	60.590 + 29	41.19 - 2
10	17.9	11.817 - 197	79.65 + 351	61.596 - 9	36.06 + 130	05.608 - 9	72.52 + 144	60.587 - 3	41.40 - 21
10	27.9	11.518 - 299	82.92 + 327	61.561 - 35	37.12 + 106	05.572 - 36	73.72 + 120	60.558 - 29	41.77 - 37
11	6.9	11.112 - 406	85.88 + 296	61.500 - 61	37.92 + 80	05.510 - 62	74.65 + 93	60.505 - 53	42.27 - 50
11	16.8	10.617 - 495	88.41 + 253	61.420 - 80	38.44 + 52	05.428 - 82	75.28 + 63	60.434 - 71	42.85 - 58
11	26.8	10.047 - 570	90.50 + 209	61.325 - 95	38.71 + 27	05.330 - 98	75.64 + 36	60.351 - 83	43.49 - 64
12	6.8	09.407 - 640	92.05 + 155	61.217 - 108	38.69 - 2	05.218 - 112	75.70 + 6	60.258 - 93	44.16 - 67
12	16.8	08.726 - 681	93.00 + 95	61.103 - 114	38.40 - 29	05.100 - 118	75.47 - 23	60.161 - 97	44.83 - 67
12	26.7	08.018 - 708	93.37 + 37	60.986 - 117	37.87 - 53	04.978 - 122	74.97 - 50	60.062 - 99	45.46 - 63
12	36.7	07.303 - 715	93.10 - 27	60.867 - 119	37.08 - 79	04.855 - 123	74.18 - 79	59.964 - 98	46.06 - 60
		- 687	- 88	- 111	- 99	- 117	- 101	- 90	- 51
Mean Place	09.327	65.95	60.151	22.82	04.167	59.05	58.942	51.21	
sec δ, tan δ	+3.704	+3.566	+1.083	+0.416	+1.104	+0.468	+1.002	-0.063	
dα(ψ), dδ(ψ)	+0.059	+0.40	+0.061	+0.40	+0.061	+0.40	+0.061	+0.40	
dα(ε), dδ(ε)	-0.238	-0.03	-0.028	-0.02	-0.031	-0.01	+0.004	-0.01	
Dble.Trans.	September 19		September 20		September 20		September 20		

APPARENT PLACES OF STARS, 1986

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AT UPPER TRANSIT AT GREENWICH

No.	901		902		903	
	π Phoenicis		ω Piscium		ε Tucanae	
Mag.Spect.	5.14	K0	4.03	F5	4.71	B9
U.T.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "
	23 58	- 52 49	23 58	+ 6 47	23 59	- 65 38
1 -8.3	12.321 -243	47.63 -26	34.752 -102	06.71 -62	12.085 -413	101.51 -3
1 1.7	12.088 -222	47.38 +25	34.652 -99	06.03 -68	11.687 -377	100.96 +55
1 11.7	11.866 -198	46.65 +125	34.553 -90	05.29 -76	11.310 -340	99.85 +167
1 21.7	11.668 -169	45.40 +168	34.463 -78	04.53 -74	10.970 -292	98.18 +214
1 31.6	11.499	43.72	34.385	03.79	10.678	96.04
2 10.6	11.362 -137	41.62 +210	34.322 -63	03.08 -71	10.437 -241	93.47 +257
2 20.6	11.268 -94	39.15 +247	34.282 -40	02.48 -60	10.262 -175	90.51 +296
3 2.6	11.217 -51	36.40 +275	34.269 -13	02.01 -47	10.155 -107	87.27 +324
3 12.5	11.215 -2	33.38 +302	34.286 +17	01.72 -29	10.120 +35	83.80 +347
3 22.5	11.269 +54	30.18 +320	34.338 +52	01.69 -3	10.167 +47	80.18 +362
4 1.5	11.377 +108	26.88 +330	34.428 +90	01.79 +10	10.293 +126	76.51 +367
4 11.4	11.543 +166	23.50 +338	34.561 +133	02.22 +43	10.501 +208	72.82 +369
4 21.4	11.769 +226	20.15 +335	34.735 +174	02.96 +74	10.792 +291	69.23 +359
5 1.4	12.047 +278	16.90 +325	34.945 +210	03.96 +100	11.156 +364	65.81 +342
5 11.4	12.378 +331	13.78 +312	35.192 +247	05.25 +129	11.594 +438	62.60 +321
5 21.3	12.756 +378	10.90 +288	35.469 +277	06.80 +155	12.096 +502	59.71 +289
5 31.3	13.168 +412	08.31 +259	35.769 +300	08.55 +175	12.647 +551	57.18 +253
6 10.3	13.612 +444	06.05 +226	36.087 +318	10.48 +193	13.242 +595	55.06 +212
6 20.3	14.072 +460	04.22 +183	36.413 +326	12.54 +206	13.861 +619	53.44 +162
6 30.2	14.537 +465	02.81 +141	36.737 +324	14.65 +211	14.489 +628	52.30 +114
7 10.2	14.998 +461	01.88 +93	37.056 +319	16.80 +215	15.114 +625	51.71 +59
7 20.2	15.439 +441	01.48 +40	37.357 +301	18.91 +211	15.713 +599	51.69 +2
7 30.1	15.851 +412	01.55 -7	37.635 +278	20.92 +201	16.273 +560	52.18 -49
8 9.1	16.223 +372	02.14 -59	37.885 +250	22.82 +190	16.780 +507	53.21 -103
8 19.1	16.542 +319	03.20 -106	38.100 +215	24.54 +172	17.214 +434	54.74 -153
8 29.1	16.806 +264	04.67 -147	38.280 +180	26.06 +152	17.570 +356	56.67 -193
9 8.0	17.007 +201	06.53 -186	38.421 +141	27.37 +131	17.836 +266	58.99 -232
9 18.0	17.140 +133	08.67 -214	38.522 +101	28.44 +107	18.004 +168	61.57 -258
9 28.0	17.209 +69	11.00 -233	38.588 +66	29.28 +84	18.077 +73	64.31 -274
10 8.0	17.212 +3	13.47 -247	38.618 +30	29.90 +62	18.052 -25	67.13 -282
10 17.9	17.154 -58	15.92 -245	38.616 -2	30.29 +39	17.935 -117	69.87 -274
10 27.9	17.045 -109	18.27 -235	38.589 -27	30.48 +19	17.737 -198	72.46 -259
11 6.9	16.888 -157	20.44 -217	38.538 -51	30.49 +1	17.465 -272	74.78 -232
11 16.8	16.695 -193	22.29 -185	38.470 -68	30.32 -17	17.135 -330	76.70 -192
11 26.8	16.477 -218	23.78 -149	38.389 -81	30.03 -29	16.763 -372	78.18 -148
12 6.8	16.240 -237	24.84 -106	38.296 -93	29.58 -45	16.360 -403	79.14 -96
12 16.8	15.997 -243	25.40 -56	38.199 -97	29.04 -54	15.947 -413	79.52 -38
12 26.7	15.757 -240	25.48 -8	38.099 -100	28.42 -62	15.537 -410	79.33 +19
12 36.7	15.524 -233	25.04 +44	37.999 -100	27.71 -71	15.140 -397	78.56 +77
	15.524 -212	25.04 +95	37.999 -93	27.71 -74	15.140 -364	78.56 +134
Mean Place	14.017	16.36	37.069	18.88	13.387	67.96
sec δ, tan δ	+1.655	-1.318	+1.007	+0.119	+2.426	-2.210
dα(ψ), dδ(ψ)	+0.061	+0.40	+0.061	+0.40	+0.061	+0.40
dα(ε), dδ(ε)	+0.088	-0.01	-0.008	-0.01	+0.147	-0.00
Dble.Trans.	September 20		September 21		September 21	

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

906 43 H. Cephei ~ Mag. 4.52 Spect. K0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 1 06	+ 86 11	h m 1 06	+ 86 11	h m 1 06	+ 86 11	h m 1 06	+ 86 10	h m 1 06	+ 86 10	h m 1 06	+ 86 10
	s "	"	s "	"	s "	"	s "	"	s "	"	s "	"
1	32.39	16.19	22.56	15.90	15.44	10.82	12.26	62.07	14.52	53.57	21.59	47.61
2	32.04	16.25	22.31	15.77	15.30	10.57	12.25	61.82	14.63	53.33	21.87	47.45
3	31.71	16.29	22.08	15.67	15.18	10.35	12.21	61.56	14.75	53.06	22.18	47.29
4	31.40	16.33	21.84	15.58	15.04	10.14	12.17	61.28	14.88	52.78	22.50	47.15
5	31.13	16.37	21.58	15.51	14.88	09.93	12.12	60.98	15.04	52.50	22.84	47.02
6	30.87	16.43	21.30	15.44	14.69	09.72	12.08	60.65	15.22	52.21	23.19	46.92
7	30.62	16.51	20.99	15.35	14.49	09.50	12.06	60.31	15.43	51.93	23.54	46.84
8	30.35	16.61	20.66	15.24	14.27	09.25	12.07	59.96	15.66	51.67	23.88	46.78
9	30.06	16.72	20.32	15.10	14.06	08.97	12.10	59.61	15.90	51.42	24.20	46.74
10	29.73	16.82	19.99	14.93	13.86	08.67	12.17	59.26	16.15	51.20	24.51	46.70
11	29.38	16.90	19.67	14.74	13.68	08.35	12.25	58.93	16.40	50.99	24.81	46.66
12	29.00	16.95	19.38	14.53	13.53	08.02	12.34	58.62	16.65	50.80	25.09	46.62
13	28.62	16.97	19.11	14.31	13.41	07.69	12.45	58.33	16.88	50.62	25.36	46.58
14	28.25	16.96	18.86	14.09	13.31	07.37	12.55	58.05	17.10	50.45	25.62	46.52
15	27.90	16.92	18.63	13.87	13.23	07.06	12.64	57.79	17.30	50.28	25.90	46.44
16	27.56	16.88	18.42	13.67	13.16	06.76	12.72	57.53	17.49	50.10	26.19	46.36
17	27.25	16.82	18.21	13.48	13.09	06.48	12.79	57.27	17.68	49.91	26.51	46.28
18	26.95	16.77	18.01	13.30	13.02	06.21	12.85	57.01	17.86	49.71	26.87	46.22
19	26.67	16.73	17.79	13.13	12.94	05.95	12.89	56.74	18.07	49.49	27.25	46.17
20	26.39	16.69	17.56	12.96	12.85	05.69	12.94	56.45	18.30	49.27	27.65	46.17
21	26.12	16.67	17.31	12.79	12.74	05.43	12.99	56.15	18.56	49.05	28.04	46.19
22	25.84	16.65	17.05	12.60	12.62	05.16	13.07	55.83	18.86	48.85	28.41	46.25
23	25.54	16.64	16.77	12.40	12.50	04.86	13.19	55.50	19.19	48.68	28.75	46.32
24	25.23	16.63	16.50	12.18	12.37	04.55	13.34	55.19	19.52	48.54	29.06	46.38
25	24.89	16.61	16.23	11.93	12.27	04.22	13.53	54.90	19.85	48.44	29.34	46.43
26	24.54	16.57	15.98	11.65	12.20	03.87	13.73	54.64	20.14	48.36	29.61	46.45
27	24.18	16.51	15.77	11.37	12.16	03.52	13.93	54.41	20.41	48.27	29.89	46.46
28	23.82	16.42	15.59	11.09	12.16	03.18	14.12	54.20	20.65	48.18	30.18	46.45
29	23.46	16.31	15.44	10.82	12.19	02.87	14.28	54.00	20.87	48.06	30.50	46.43
30	23.13	16.18			12.23	02.59	14.41	53.79	21.10	47.93	30.84	46.42
31	22.83	16.04			12.25	02.32	14.52	53.57	21.33	47.77	31.19	46.42
32	22.56	15.90			12.26	02.07			21.59	47.61		
	sec $\delta$ 15.04	tan $\delta$ 15.01	sec $\delta$ 15.04	tan $\delta$ 15.00	sec $\delta$ 15.03	tan $\delta$ 15.00	sec $\delta$ 15.02	tan $\delta$ 14.99	sec $\delta$ 15.01	tan $\delta$ 14.98	sec $\delta$ 15.01	tan $\delta$ 14.97

Mean R.A.  $1^{\text{h}} 06^{\text{m}} 42.80^{\text{s}}$

Double lower transit April 8

Mean Dec.  $+86^{\circ} 11' 06.78''$

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

373

906 43 H. Cephei Mag. 4.52 Spect. K0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /
	1 06	86 10	1 06	86 10	1 06	86 10	1 06	86 11	1 06	86 11	1 06	86 11
	s	"	s	"	s	"	s	"	s	"	s	"
1	31.19	46.42	41.42	50.42	49.52	58.94	53.84	09.78	53.86	21.87	49.52	31.66
2	31.57	46.45	41.75	50.66	49.69	59.30	53.87	10.15	53.83	22.22	49.35	31.99
3	31.95	46.49	42.06	50.91	49.85	59.64	53.90	10.49	53.82	22.60	49.15	32.32
4	32.32	46.55	42.35	51.16	50.00	59.96	53.96	10.83	53.79	23.00	48.91	32.64
5	32.70	46.64	42.62	51.41	50.15	60.27	54.04	11.18	53.73	23.42	48.63	32.94
6	33.06	46.74	42.87	51.66	50.31	60.56	54.15	11.53	53.64	23.84	48.34	33.21
7	33.40	46.85	43.11	51.89	50.50	60.86	54.26	11.91	53.50	24.25	48.04	33.44
8	33.72	46.97	43.35	52.11	50.71	61.16	<sup>54.38</sup> 54.47	<sup>12.32</sup> 12.76	53.34	24.64	47.75	33.65
9	34.02	47.08	43.60	52.32	50.94	61.49	54.54	13.20	53.17	24.99	47.47	33.84
10	34.31	47.19	43.86	52.52	51.18	61.84	54.57	13.65	53.00	25.32	47.22	34.02
11	34.59	47.28	44.15	52.72	51.41	62.22	54.56	14.08	52.83	25.63	46.98	34.20
12	34.87	47.36	44.46	52.94	51.62	62.62	54.53	14.49	52.68	25.93	46.76	34.39
13	35.17	47.43	44.79	53.18	51.80	63.04	54.49	14.88	52.55	26.22	46.55	34.58
14	35.49	47.50	45.12	53.45	51.95	63.45	54.46	15.24	52.44	26.51	46.33	34.79
15	35.84	47.58	45.45	53.76	52.06	63.85	54.43	15.59	52.33	26.82	46.10	35.01
16	36.21	47.68	45.75	54.08	52.15	64.23	54.43	15.92	52.23	27.14	45.86	35.23
17	36.60	47.80	46.02	54.42	52.24	64.58	54.44	16.26	52.12	27.47	45.59	35.46
18	36.99	47.96	46.25	54.75	52.34	64.91	54.47	16.61	52.00	27.82	45.30	35.68
19	37.37	48.15	46.46	55.06	52.45	65.24	54.50	16.97	51.86	28.17	45.00	35.88
20	37.72	48.36	46.65	55.36	52.58	65.55	54.53	17.35	51.69	28.52	44.67	36.07
21	38.03	48.58	46.84	55.62	52.73	65.88	54.56	17.75	51.51	28.86	44.34	36.24
22	38.32	48.78	47.05	55.88	52.89	66.22	54.56	18.16	51.30	29.20	44.00	36.38
23	38.58	48.97	47.28	56.12	53.06	66.58	54.55	18.57	51.07	29.51	43.67	36.51
24	38.84	49.13	47.53	56.37	53.22	66.96	54.51	18.99	50.83	29.81	43.36	36.61
25	39.10	49.27	47.80	56.64	53.37	67.36	54.45	19.40	50.60	30.09	43.07	36.71
26	39.39	49.40	48.07	56.92	53.51	67.76	54.36	19.79	50.37	30.34	42.80	36.81
27	39.70	49.53	48.35	57.22	53.62	68.18	54.27	20.18	50.16	30.59	42.56	36.93
28	40.03	49.67	48.62	57.54	53.70	68.59	54.16	20.54	49.97	30.83	42.32	37.06
29	40.37	49.83	48.88	57.88	53.76	69.00	54.05	20.88	49.81	31.08	42.08	37.23
30	40.73	50.00	49.11	58.23	53.81	69.40	53.96	21.21	49.66	31.36	41.82	37.40
31	41.08	50.20	49.33	58.59	53.84	69.78	53.90	21.54	49.52	31.66	41.52	37.58
32	41.42	50.42	49.52	58.94			53.86	21.87			41.18	37.74
	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ
	15.01	14.98	15.02	14.98	15.03	14.99	15.04	15.01	15.05	15.02	15.06	15.03

Mean R.A. 1<sup>h</sup> 06<sup>m</sup> 42.80<sup>s</sup>

Double lower transit April 8

Mean Dec. +86° 11' 06.78"

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1635 Bradley 256 (Cephei) Mag. 6.86 Spect. K0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 2 14	+ ° ' " / 83 30	h m 2 14	+ ° ' " / 83 30	h m 2 14	+ ° ' " / 83 30	h m 2 14	+ ° ' " / 83 29	h m 2 14	+ ° ' " / 83 29	h m 2 14	+ ° ' " / 83 29
1	s 29.86	" 08.25	s 24.46	" 10.71	s 19.71	" 07.89	s 16.52	" 60.54	s 16.40	" 51.95	s 19.44	" 44.49
2	29.67	08.40	24.31	10.66	19.60	07.70	16.47	60.31	16.43	51.69	19.57	44.26
3	29.50	08.53	24.17	10.63	19.49	07.52	16.41	60.08	16.45	51.41	19.72	44.03
4	29.34	08.65	24.02	10.61	19.38	07.37	16.34	59.83	16.47	51.11	19.88	43.81
5	29.20	08.76	23.88	10.62	19.26	07.22	16.26	59.55	16.51	50.80	20.05	43.60
6	29.07	08.89	23.71	10.63	19.13	07.08	16.18	59.26	16.57	50.48	20.23	43.42
7	28.95	09.04	23.53	10.64	18.98	06.92	16.11	58.94	16.64	50.16	20.42	43.25
8	28.83	09.21	23.33	10.63	18.82	06.75	16.06	58.60	16.72	49.85	20.60	43.11
9	28.69	09.40	23.12	10.59	18.65	06.54	16.02	58.26	16.82	49.55	20.79	42.98
10	28.54	09.59	22.91	10.52	18.49	06.31	15.99	57.92	16.92	49.27	20.96	42.87
11	28.36	09.76	22.70	10.42	18.33	06.05	15.98	57.59	17.03	49.02	21.12	42.76
12	28.16	09.92	22.50	10.30	18.19	05.78	15.99	57.27	17.14	48.78	21.28	42.65
13	27.96	10.04	22.31	10.17	18.07	05.50	16.00	56.96	17.25	48.55	21.42	42.54
14	27.75	10.13	22.14	10.03	17.96	05.23	16.01	56.68	17.35	48.33	21.56	42.41
15	27.55	10.19	21.98	09.89	17.86	04.96	16.02	56.40	17.43	48.12	21.71	42.27
16	27.36	10.24	21.83	09.76	17.78	04.70	16.03	56.14	17.51	47.91	21.86	42.12
17	27.17	10.28	21.68	09.63	17.70	04.45	16.03	55.89	17.59	47.68	22.03	41.96
18	27.00	10.31	21.54	09.52	17.62	04.22	16.02	55.63	17.66	47.44	22.22	41.80
19	26.84	10.35	21.40	09.42	17.53	04.00	16.00	55.36	17.74	47.18	22.43	41.66
20	26.69	10.39	21.24	09.33	17.44	03.78	15.97	55.08	17.83	46.90	22.66	41.55
21	26.54	10.44	21.08	09.24	17.34	03.57	15.95	54.77	17.94	46.62	22.89	41.48
22	26.38	10.51	20.91	09.14	17.22	03.35	15.94	54.45	18.08	46.35	23.12	41.44
23	26.22	10.58	20.72	09.03	17.11	03.11	15.95	54.11	18.24	46.11	23.32	41.42
24	26.05	10.66	20.53	08.89	16.98	02.84	15.98	53.77	18.41	45.90	23.51	41.40
25	25.87	10.74	20.33	08.73	16.87	02.55	16.04	53.45	18.58	45.72	23.68	41.38
26	25.67	10.80	20.15	08.53	16.77	02.24	16.12	53.15	18.74	45.57	23.84	41.33
27	25.46	10.84	19.98	08.32	16.69	01.92	16.20	52.88	18.88	45.42	24.00	41.26
28	25.25	10.86	19.84	08.11	16.63	01.60	16.27	52.64	19.00	45.27	24.17	41.17
29	25.03	10.85	19.71	07.89	16.60	01.30	16.33	52.42	19.11	45.11	24.34	41.07
30	24.83	10.82			16.57	01.03	16.37	52.19	19.22	44.92	24.53	40.97
31	24.64	10.76			16.55	00.78	16.40	51.95	19.32	44.71	24.74	40.88
32	24.46	10.71			16.52	00.54			19.44	44.49		
	sec δ 8.84	tan δ 8.78	sec δ 8.84	tan δ 8.78	sec δ 8.84	tan δ 8.78	sec δ 8.83	tan δ 8.78	sec δ 8.83	tan δ 8.77	sec δ 8.83	tan δ 8.77

Mean R.A. 2<sup>h</sup> 14<sup>m</sup> 34.95<sup>s</sup> Double lower transit April 25 Mean Dec. +83° 29' 56.96"



**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

375

1635 Bradley 256 (Cephei) Mag. 6.86 Spect. K0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<small>h m</small> 2 14	<small>° ' "</small> 83 29	<small>h m</small> 2 14	<small>° ' "</small> 83 29	<small>h m</small> 2 14	<small>° ' "</small> 83 29	<small>h m</small> 2 14	<small>° ' "</small> 83 29	<small>h m</small> 2 14	<small>° ' "</small> 83 30	<small>h m</small> 2 14	<small>° ' "</small> 83 30
	<small>s</small>	<small>"</small>	<small>s</small>	<small>"</small>	<small>s</small>	<small>"</small>	<small>s</small>	<small>"</small>	<small>s</small>	<small>"</small>	<small>s</small>	<small>"</small>
1	24.74	40.88	31.28	42.03	37.38	48.02	41.75	57.19	43.95	08.67	43.37	19.17
2	24.95	40.81	31.51	42.17	37.54	48.31	41.83	57.53	44.00	09.01	43.34	19.53
3	25.18	40.75	31.73	42.33	37.69	48.60	41.91	57.84	44.06	09.38	43.29	19.91
4	25.41	40.71	31.94	42.50	37.83	48.86	42.00	58.15	44.13	09.77	43.22	20.29
5	25.63	40.70	32.14	42.67	37.97	49.12	42.11	58.45	44.17	10.19	43.13	20.65
6	25.86	40.70	32.33	42.84	38.11	49.35	42.23	58.76	44.20	10.62	43.01	20.98
7	26.07	40.72	32.50	43.00	38.27	49.58	42.37	59.09	44.20	11.05	42.89	21.29
8	26.28	40.75	32.67	43.14	38.44	49.81	42.51	59.45	44.19	11.46	42.77	21.56
9	26.47	40.78	32.85	43.27	38.63	50.06	42.64	59.84	44.15	11.84	42.65	21.81
10	26.66	40.81	33.03	43.39	38.83	50.33	42.76	60.25	44.11	12.20	42.54	22.05
11	26.83	40.82	33.23	43.51	39.03	50.63	42.86	60.67	44.08	12.54	42.45	22.29
12	27.01	40.83	33.44	43.63	39.22	50.96	42.94	61.09	44.05	12.86	42.36	22.53
13	27.19	40.82	33.67	43.78	39.40	51.31	42.99	61.49	44.03	13.17	42.28	22.77
14	27.38	40.80	33.91	43.95	39.56	51.67	43.04	61.86	44.02	13.48	42.20	23.03
15	27.59	40.78	34.15	44.15	39.69	52.02	43.08	62.21	44.02	13.80	42.12	23.30
16	27.82	40.77	34.39	44.39	39.81	52.36	43.13	62.55	44.02	14.13	42.03	23.59
17	28.06	40.79	34.60	44.64	39.92	52.67	43.18	62.87	44.02	14.48	41.93	23.87
18	28.32	40.84	34.79	44.90	40.03	52.96	43.25	63.18	44.02	14.84	41.81	24.16
19	28.57	40.92	34.97	45.14	40.15	53.23	43.33	63.51	44.01	15.21	41.68	24.45
20	28.81	41.04	35.13	45.37	40.28	53.50	43.41	63.84	43.99	15.59	41.54	24.71
21	29.03	41.17	35.28	45.57	40.42	53.77	43.50	64.20	43.95	15.97	41.39	24.97
22	29.23	41.29	35.44	45.75	40.58	54.05	43.59	64.57	43.89	16.35	41.23	25.19
23	29.41	41.40	35.61	45.93	40.73	54.35	43.67	64.95	43.83	16.71	41.07	25.40
24	29.58	41.48	35.80	46.10	40.89	54.66	43.74	65.35	43.75	17.06	40.91	25.59
25	29.76	41.54	35.99	46.28	41.05	55.00	<small>43.79 43.83</small>	<small>65.76 66.17</small>	43.67	17.39	40.77	25.76
26	29.94	41.59	36.20	46.47	41.20	55.35	43.86	66.57	43.58	17.69	40.64	25.93
27	30.14	41.63	36.41	46.68	41.34	55.72	43.87	66.96	43.51	17.98	40.54	26.10
28	30.35	41.68	36.62	46.92	41.46	56.09	43.88	67.34	43.45	18.26	40.44	26.30
29	30.57	41.74	36.83	47.17	41.57	56.47	43.88	67.69	43.41	18.54	40.34	26.52
30	30.81	41.82	37.02	47.45	41.67	56.83	43.89	68.02	43.39	18.84	40.23	26.77
31	31.04	41.91	37.21	47.73	41.75	57.19	43.91	68.35	43.37	19.17	40.10	27.03
32	31.28	42.03	37.38	48.02			43.95	68.67			39.95	27.28
	sec $\delta$ 8.83	tan $\delta$ 8.77	sec $\delta$ 8.83	tan $\delta$ 8.77	sec $\delta$ 8.83	tan $\delta$ 8.77	sec $\delta$ 8.83	tan $\delta$ 8.78	sec $\delta$ 8.84	tan $\delta$ 8.78	sec $\delta$ 8.84	tan $\delta$ 8.79

Mean R.A.  $2^{\text{h}} 14^{\text{m}} 34^{\text{s}}.95$

Double lower transit April 25

Mean Dec.  $+83^{\circ} 29' 56''.96$

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

907  $\alpha$  Ursae Minoris (*Polaris*). Mag. 2.12 var. Spect. F8v

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> 2 <sup>m</sup> 16	<sup>+</sup> 89 <sup>°</sup> 12	<sup>h</sup> 2 <sup>m</sup> 15	<sup>+</sup> 89 <sup>°</sup> 12	<sup>h</sup> 2 <sup>m</sup> 15	<sup>+</sup> 89 <sup>°</sup> 12	<sup>h</sup> 2 <sup>m</sup> 15	<sup>+</sup> 89 <sup>°</sup> 12	<sup>h</sup> 2 <sup>m</sup> 15	<sup>+</sup> 89 <sup>°</sup> 12	<sup>h</sup> 2 <sup>m</sup> 15	<sup>+</sup> 89 <sup>°</sup> 11
	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"
1	82.46	24.04	96.26	27.00	55.63	24.45	27.73	17 11	24.89	08.28	47.26	60.39
2	80.93	24.21	94.93	26.97	54.64	24.26	27 25	16.88	25.00	08.02	48.28	60.15
3	79.48	24.36	93.66	26.95	53.68	24.09	26.66	16.64	25.14	07.72	49.42	59.90
4	78.15	24.49	92.39	26.95	52.68	23.94	26.01	16.39	25.33	07.41	50.67	59.67
5	76.93	24.62	91.05	26.97	51.59	23.80	25.33	16.11	25.62	07.09	51.99	59.45
6	75.81	24.77	89.60	26.99	50.39	23.66	24.68	15.80	26.03	06.75	53.37	59.24
7	74.72	24.94	88.00	27.01	49.09	23.51	24.10	15.48	26.56	06.42	54.78	59.06
8	73.59	25.13	86.29	27.01	47.71	23.33	23.64	15.14	27.20	06.10	56.17	58.90
9	72.34	25.33	84.51	26.99	46.32	23.13	23.30	14.79	27.92	05.79	57.52	58.76
10	70.93	25.54	82.73	26.93	44.97	22.90	23.08	14.44	28.70	05.50	58.81	58.63
11	69.37	25.73	80.99	26.84	43.71	22.65	22.97	14.10	29.50	05.23	60.02	58.50
12	67.69	25.90	79.34	26.73	42.56	22.38	22.94	13.78	30.28	04.97	61.17	58.38
13	65.96	26.04	77.79	26.61	41.52	22.11	22.95	13.47	31.02	04.73	62.28	58.25
14	64.23	26.15	76.34	26.48	40.61	21.83	22.97	13.17	31.70	04.51	63.37	58.11
15	62.55	26.23	74.99	26.35	39.78	21.56	22.97	12.89	32.32	04.28	64.49	57.95
16	60.95	26.30	73.69	26.22	39.01	21.30	22.92	12.62	32.89	04.05	65.69	57.78
17	59.43	26.35	72.44	26.11	38.27	21.05	22.82	12.36	33.42	03.81	67.01	57.60
18	57.99	26.40	71.18	26.01	37.52	20.82	22.65	12.09	33.96	03.55	68.49	57.43
19	56.62	26.45	69.90	25.91	36.73	20.60	22.44	11.82	34.56	03.28	70.12	57.27
20	55.28	26.51	68.55	25.83	35.89	20.39	22.21	11.52	35.28	02.99	71.85	57.14
21	53.95	26.58	67.13	25.75	34.98	20.17	22.01	11.21	36.16	02.70	73.59	57.05
22	52.59	26.66	65.62	25.66	34.01	19.94	21.91	10.88	37.21	02.41	75.27	57.00
23	51.17	26.75	64.04	25.55	32.99	19.70	21.97	10.53	38.40	02.15	76.81	56.96
24	49.66	26.84	62.42	25.42	31.97	19.44	22.20	10.18	39.67	01.92	78.21	56.93
25	48.06	26.93	60.83	25.26	31.02	19.15	22.61	09.84	40.90	01.73	79.48	56.89
26	46.35	27.01	59.32	25.08	30.19	18.84	23.12	09.54	42.04	01.56	80.70	56.82
27	44.58	27.07	57.94	24.87	29.54	18.51	23.65	09.26	43.03	01.40	81.94	56.73
28	42.77	27.10	56.71	24.66	29.05	18.19	24.12	09.01	43.91	01.24	83.23	56.63
29	40.99	27.11	55.63	24.45	28.70	17.89	24.48	08.77	44.72	01.06	84.62	56.52
30	39.29	27.09			28.41	17.61	24.73	08.53	45.51	00.86	86.12	56.40
31	37.71	27.05			28.11	17.35	24.89	08.28	46.34	00.63	87.72	56.29
32	36.26	27.00			27.73	17.11			47.26	00.39		
	sec $\delta$ 72.28	tan $\delta$ 72.28	sec $\delta$ 72.28	tan $\delta$ 72.27	sec $\delta$ 72.16	tan $\delta$ 72.15	sec $\delta$ 71.94	tan $\delta$ 71.93	sec $\delta$ 71.72	tan $\delta$ 71.72	sec $\delta$ 71.57	tan $\delta$ 71.56

Mean R.A. <sup>h</sup> 2 <sup>m</sup> 17 <sup>s</sup> 48.63

Double lower transit April 26

Mean Dec. <sup>+</sup> 89 <sup>°</sup> 12' 12.4"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

377

907     $\alpha$  Ursae Minoris (*Polaris*)    Mag. 2.12 var.    Spect. F8v

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /
	2 16	89 11	2 17	89 11	2 18	89 12	2 18	89 12	2 18	89 12	2 18	89 12
	s	"	s	"	s	"	s	"	s	"	s	"
1	27.72	56.29	18.39	56.95	06.33	02.58	41.12	11.64	58.57	23.30	52.56	34.24
2	29.40	56.20	20.17	57.07	07.58	02.87	41.79	11.97	58.97	23.65	52.21	34.61
3	31.13	56.12	21.87	57.21	08.75	03.14	42.48	12.29	59.43	24.03	51.70	35.01
4	32.89	56.07	23.50	57.37	09.88	03.40	43.25	12.60	59.84	24.43	51.01	35.40
5	34.63	56.04	25.02	57.53	11.01	03.65	44.14	12.90	60.14	24.86	50.14	35.78
6	36.33	56.02	26.47	57.68	12.20	03.88	45.13	13.22	60.27	25.30	49.16	36.14
7	37.96	56.03	27.86	57.83	13.49	04.10	46.21	13.55	60.22	25.74	48.12	36.46
8	39.52	56.04	29.23	57.96	14.90	04.33	47.29	13.91	60.03	26.17	47.10	36.75
9	40.99	56.06	30.63	58.08	16.40	04.57	48.31	14.30	59.74	26.57	46.13	37.03
10	42.39	56.07	32.11	58.19	17.97	04.83	49.21	14.72	59.43	26.94	45.24	37.28
11	43.77	56.07	33.70	58.29	19.53	05.13	49.94	15.14	59.13	27.29	44.42	37.54
12	45.15	56.05	35.41	58.40	21.02	05.45	50.51	15.56	58.90	27.62	43.66	37.79
13	46.58	56.03	37.23	58.53	22.37	05.79	50.96	15.96	58.74	27.95	42.94	38.06
14	48.11	55.99	39.09	58.69	23.58	06.15	51.34	16.34	58.65	28.27	42.21	38.33
15	49.77	55.96	40.94	58.88	24.63	06.50	51.71	16.70	58.62	28.60	41.45	38.63
16	51.56	55.93	42.71	59.10	25.59	06.83	52.12	17.04	58.60	28.95	40.61	38.93
17	53.46	55.93	44.34	59.35	26.49	07.14	52.60	17.37	58.57	29.31	39.68	39.23
18	55.40	55.97	45.81	59.59	27.42	07.43	53.17	17.69	58.48	29.69	38.65	39.54
19	57.31	56.04	47.15	59.83	28.40	07.70	53.80	18.02	58.32	30.08	37.50	39.84
20	59.11	56.13	48.42	60.04	29.48	07.96	54.48	18.36	58.04	30.47	36.26	40.13
21	60.76	56.25	49.67	60.24	30.64	08.23	55.17	18.72	57.65	30.87	34.95	40.41
22	62.27	56.35	50.97	60.41	31.87	08.50	55.83	19.10	57.16	31.26	33.61	40.65
23	63.67	56.45	52.37	60.57	33.14	08.80	56.43	19.49	56.57	31.64	32.28	40.88
24	65.03	56.52	53.86	60.73	34.41	09.11	56.94	19.90	55.91	32.00	31.00	41.09
25	66.43	56.56	55.43	60.90	35.64	09.45	57.34	20.31	55.23	32.35	29.81	41.28
26	67.91	56.60	57.07	61.09	36.80	09.80	57.63 57.81	20.73 21.14	54.56	32.67	28.73	41.47
27	69.48	56.63	58.73	61.29	37.86	10.16	57.90	21.54	53.97	32.98	27.76	41.66
28	71.16	56.66	60.38	61.51	38.82	10.54	57.95	21.92	53.48	33.27	26.85	41.88
29	72.92	56.70	62.00	61.76	39.68	10.91	57.99	22.29	53.11	33.57	25.93	42.12
30	74.73	56.76	63.54	62.02	40.43	11.28	58.08	22.63	52.83	33.89	24.90	42.38
31	76.56	56.84	64.99	62.30	41.12	11.64	58.26	22.97	52.56	34.24	23.71	42.66
32	78.39	56.95	66.33	62.58			58.57	23.30			22.33	42.93
	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$
	71.52	71.51	71.60	71.59	71.79	71.79	72.05	72.04	72.35	72.34	72.60	72.60

Mean R.A. 2<sup>h</sup> 17<sup>m</sup> 48<sup>s</sup>.63

Double lower transit April 26

Mean Dec. +89° 12' 12.42"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1636 Bradley 402 (Cephei)    Mag. 5.78    Spect. K0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 3 28	+ ° ' " 84 52	h m 3 28	+ ° ' " 84 52	h m 3 28	+ ° ' " 84 52	h m 3 28	+ ° ' " 84 52	h m 3 28	+ ° ' " 84 51	h m 3 28	+ ° ' " 84 51
	s 54.76	" 10.10	s 48.92	" 15.55	s 42.55	" 15.57	s 36.93	" 10.41	s 34.66	" 62.39	s 36.38	" 53.75
1	54.76	10.10	48.92	15.55	42.55	15.57	36.93	10.41	34.66	62.39	36.38	53.75
2	54.58	10.34	48.72	15.59	42.37	15.45	36.82	10.23	34.62	62.13	36.48	53.46
3	54.40	10.56	48.54	15.65	42.20	15.35	36.69	10.04	34.57	61.86	36.60	53.16
4	54.24	10.76	48.37	15.72	42.03	15.27	36.54	09.85	34.53	61.56	36.73	52.87
5	54.10	10.96	48.19	15.82	41.85	15.21	36.38	09.63	34.50	61.23	36.89	52.58
6	53.98	11.16	48.00	15.93	41.65	15.15	36.21	09.39	34.49	60.90	37.06	52.31
7	53.88	11.37	47.78	16.04	41.43	15.09	36.05	09.12	34.49	60.56	37.23	52.06
8	53.77	11.62	47.54	16.15	41.20	15.01	35.90	08.83	34.52	60.22	37.42	51.83
9	53.65	11.88	47.28	16.23	40.95	14.91	35.77	08.52	34.56	59.89	37.60	51.62
10	53.51	12.16	47.00	16.28	40.70	14.77	35.66	08.21	34.62	59.57	37.77	51.42
11	53.34	12.43	46.73	16.30	40.45	14.61	35.57	07.90	34.68	59.27	37.93	51.24
12	53.14	12.69	46.46	16.29	40.22	14.43	35.50	07.60	34.75	58.99	38.09	51.06
13	52.92	12.92	46.21	16.27	40.01	14.23	35.43	07.31	34.82	58.73	38.23	50.87
14	52.70	13.12	45.97	16.23	39.81	14.03	35.38	07.03	34.88	58.48	38.36	50.68
15	52.47	13.30	45.75	16.19	39.63	13.82	35.32	06.78	34.93	58.23	38.50	50.47
16	52.26	13.45	45.54	16.15	39.46	13.63	35.26	06.53	34.96	57.98	38.64	50.24
17	52.05	13.58	45.33	16.12	39.31	13.45	35.20	06.29	34.99	57.73	38.80	49.99
18	51.86	13.71	45.14	16.10	39.15	13.27	35.12	06.06	35.02	57.46	38.99	49.74
19	51.67	13.84	44.94	16.09	38.99	13.12	35.03	05.81	35.05	57.17	39.20	49.50
20	51.50	13.97	44.73	16.09	38.83	12.97	34.93	05.56	35.09	56.86	39.44	49.28
21	51.33	14.11	44.51	16.10	38.65	12.82	34.83	05.28	35.15	56.53	39.70	49.09
22	51.16	14.27	44.28	16.11	38.46	12.67	34.74	04.97	35.25	56.20	39.95	48.95
23	50.99	14.44	44.03	16.10	38.26	12.51	34.67	04.64	35.38	55.89	40.19	48.82
24	50.80	14.61	43.76	16.08	38.05	12.33	34.62	04.30	35.53	55.61	40.40	48.72
25	50.60	14.79	43.49	16.02	37.84	12.11	34.61	03.97	35.68	55.35	40.59	48.60
26	50.38	14.97	43.23	15.94	37.65	11.87	34.63	03.65	35.83	55.13	40.77	48.47
27	50.13	15.13	42.98	15.83	37.48	11.60	34.66	03.36	35.96	54.93	40.93	48.32
28	49.88	15.26	42.75	15.70	37.34	11.33	34.68	03.10	36.06	54.73	41.11	48.15
29	49.62	15.37	42.55	15.57	37.22	11.07	34.69	02.86	36.14	54.51	41.29	47.96
30	49.37	15.45			37.13	10.83	34.69	02.63	36.22	54.28	41.49	47.76
31	49.13	15.50			37.03	10.61	34.66	02.39	36.30	54.02	41.71	47.57
32	48.92	15.55			36.93	10.41			36.38	53.75		
	sec δ 11.18	tan δ 11.14	sec δ 11.19	tan δ 11.14	sec δ 11.18	tan δ 11.14	sec δ 11.18	tan δ 11.14	sec δ 11.18	tan δ 11.13	sec δ 11.17	tan δ 11.13

Mean R.A. 3<sup>h</sup> 28<sup>m</sup> 57.74<sup>s</sup>

Double lower transit May 14

Mean Dec. +84° 51' 57.6"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

379

1636 Bradley 402 (Cephei) Mag. 5.78 Spect. K0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 3 28	<sup>+</sup> <sup>o</sup> / 84 51	<sup>h</sup> <sup>m</sup> 3 28	<sup>+</sup> <sup>o</sup> / 84 51	<sup>h</sup> <sup>m</sup> 3 28	<sup>+</sup> <sup>o</sup> / 84 51	<sup>h</sup> <sup>m</sup> 3 29	<sup>+</sup> <sup>o</sup> / 84 51	<sup>h</sup> <sup>m</sup> 3 29	<sup>+</sup> <sup>o</sup> / 84 52	<sup>h</sup> <sup>m</sup> 3 29	<sup>+</sup> <sup>o</sup> / 84 52
	<sup>s</sup> 41.71	" 47.57	<sup>s</sup> 49.67	" 45.25	<sup>s</sup> 58.29	" 47.77	<sup>s</sup> 05.66	" 54.22	<sup>s</sup> 10.91	" 03.79	<sup>s</sup> 12.87	" 14.59
1	41.95	47.38	49.97	45.27	58.55	47.96	05.83	54.50	11.04	04.08	12.93	14.96
2	42.20	47.21	50.27	45.30	58.79	48.15	06.01	54.76	11.18	04.38	12.96	15.36
3	42.46	47.06	50.56	45.36	59.02	48.33	06.19	55.00	11.35	04.70	12.96	15.77
4	42.72	46.93	50.83	45.42	59.24	48.49	06.39	55.22	11.51	05.06	12.93	16.18
5	42.98	46.82	51.09	45.48	59.47	48.64	06.61	55.46	11.67	05.44	12.88	16.56
6	43.24	46.73	51.33	45.54	59.71	48.77	06.86	55.71	11.80	05.85	12.80	16.92
7	43.49	46.65	51.57	45.58	59.98	48.90	07.11	55.98	11.90	06.26	12.72	17.25
8	43.72	46.58	51.81	45.61	60.26	49.03	07.36	56.29	11.98	06.67	12.65	17.56
9	43.94	46.51	52.05	45.63	60.56	49.19	07.60	56.62	12.03	07.06	12.58	17.85
10	44.15	46.43	52.32	45.63	60.87	49.38	07.81	56.98	12.07	07.42	12.52	18.13
11	44.36	46.34	52.60	45.63	61.18	49.59	08.00	57.34	12.11	07.76	12.48	18.41
12	44.57	46.23	52.91	45.65	61.47	49.84	08.16	57.69	<sup>12 15</sup> 12.21	<sup>08 09</sup> 08.39	12.44	18.69
13	44.79	46.11	53.23	45.69	61.74	50.10	08.31	58.02	12.27	08.70	12.41	18.99
14	45.03	45.98	53.56	45.76	61.98	50.37	08.44	58.34	12.35	09.01	12.38	19.31
15	45.30	45.85	53.89	45.87	62.20	50.63	08.58	58.63	12.44	09.33	12.34	19.64
16	45.59	45.74	54.20	46.00	62.41	50.86	08.73	58.90	12.52	09.67	12.28	19.98
17	45.91	45.66	54.49	46.15	62.61	51.08	08.88	59.17	12.61	10.02	12.21	20.32
18	46.22	45.62	54.75	46.30	62.81	51.27	09.06	59.44	12.68	10.40	12.13	20.67
19	46.53	45.61	54.99	46.43	63.03	51.46	09.24	59.71	12.74	10.78	12.02	21.01
20	46.81	45.62	55.22	46.53	63.27	51.64	09.43	60.01	12.79	11.18	11.90	21.34
21	47.07	45.63	55.45	46.62	63.52	51.82	09.62	60.32	12.81	11.57	11.76	21.65
22	47.31	45.64	55.70	46.69	63.78	52.02	09.81	60.65	12.82	11.96	11.62	21.93
23	47.53	45.63	55.96	46.75	64.04	52.24	09.99	61.01	12.81	12.33	11.49	22.20
24	47.76	45.59	56.24	46.82	64.31	52.48	10.15	61.37	12.79	12.69	11.36	22.44
25	47.99	45.54	56.53	46.90	64.57	52.75	10.29	61.74	12.77	13.03	11.25	22.68
26	48.23	45.47	56.83	46.99	64.82	53.03	10.42	62.12	12.75	13.34	11.17	22.91
27	48.49	45.40	57.13	47.10	65.05	53.32	10.53	62.49	12.76	13.65	11.10	23.16
28	48.77	45.34	57.44	47.24	65.27	53.62	10.62	62.84	12.78	13.94	11.03	23.44
29	49.06	45.29	57.73	47.40	65.47	53.93	10.71	63.18	12.82	14.26	10.96	23.75
30	49.36	45.26	58.02	47.58	65.66	54.22	10.81	63.49	12.87	14.59	10.87	24.08
31	49.67	45.25	58.29	47.77			10.91	63.79			10.74	24.41
32												
	sec $\delta$ 11.17	tan $\delta$ 11.12	sec $\delta$ 11.17	tan $\delta$ 11.12	sec $\delta$ 11.17	tan $\delta$ 11.13	sec $\delta$ 11.18	tan $\delta$ 11.13	sec $\delta$ 11.18	tan $\delta$ 11.14	sec $\delta$ 11.19	tan $\delta$ 11.14

Mean R.A.  $3^{\text{h}} 28^{\text{m}} 57.74^{\text{s}}$

Double lower transit May 14

Mean Dec.  $+84^{\circ} 51' 57.61''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

908 Groombridge 750 (Cephei) Mag. 6.70 Spect. F8

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> 4 <sup>m</sup> 31	<sup>+</sup> <sup>o</sup> 85 <sup>'</sup> 30	<sup>h</sup> 4 <sup>m</sup> 30	<sup>+</sup> <sup>o</sup> 85 <sup>'</sup> 30	<sup>h</sup> 4 <sup>m</sup> 30	<sup>+</sup> <sup>o</sup> 85 <sup>'</sup> 30	<sup>h</sup> 4 <sup>m</sup> 30	<sup>+</sup> <sup>o</sup> 85 <sup>'</sup> 30	<sup>h</sup> 4 <sup>m</sup> 30	<sup>+</sup> <sup>o</sup> 85 <sup>'</sup> 30	<sup>h</sup> 4 <sup>m</sup> 30	<sup>+</sup> <sup>o</sup> 85 <sup>'</sup> 29
	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>
1	08.75	09.59	63.63	17.10	56.66	19.52	49.29	16.66	44.88	09.83	44.69	60.96
2	08.61	09.90	63.43	17.22	56.43	19.48	49.11	16.53	44.78	09.60	44.73	60.65
3	08.47	10.18	63.24	17.34	56.22	19.45	48.92	16.40	44.66	09.34	44.79	60.32
4	08.34	10.43	63.07	17.49	56.02	19.44	48.71	16.27	44.54	09.07	44.87	59.99
5	08.24	10.67	62.90	17.65	55.80	19.45	48.48	16.12	44.43	08.77	44.97	59.66
6	08.15	10.91	62.71	17.84	55.57	19.47	48.24	15.94	44.34	08.45	45.09	59.34
7	08.09	11.17	62.49	18.03	55.32	19.49	48.00	15.74	44.27	08.12	45.23	59.04
8	08.03	11.45	62.25	18.22	55.04	19.50	47.77	15.51	44.21	07.79	45.37	58.76
9	07.96	11.76	61.98	18.40	54.74	19.49	47.56	15.27	44.18	07.46	45.51	58.50
10	07.86	12.09	61.70	18.55	54.43	19.45	47.37	15.01	44.17	07.13	45.66	58.26
11	07.74	12.42	61.40	18.67	54.13	19.39	47.20	14.74	44.17	06.83	45.79	58.02
12	07.58	12.75	61.11	18.76	53.83	19.29	47.04	14.48	44.18	06.54	45.91	57.80
13	07.39	13.05	60.83	18.82	53.55	19.18	46.91	14.23	44.19	06.26	46.02	57.57
14	07.20	13.33	60.56	18.88	53.29	19.05	46.78	13.99	44.19	06.01	46.12	57.34
15	06.99	13.58	60.30	18.92	53.04	18.93	46.66	13.76	44.18	05.76	46.21	57.09
16	06.79	13.81	60.06	18.96	52.82	18.80	46.53	13.55	44.16	05.51	46.31	56.81
17	06.60	14.01	59.84	19.01	52.60	18.69	46.40	13.35	44.13	05.26	46.43	56.52
18	06.42	14.21	59.61	19.06	52.39	18.58	46.26	13.16	44.10	04.99	46.58	56.21
19	06.25	14.40	59.39	19.13	52.18	18.49	46.10	12.96	44.06	04.70	46.76	55.91
20	06.09	14.60	59.17	19.22	51.96	18.41	45.93	12.75	44.03	04.38	46.97	55.61
21	05.94	14.80	58.93	19.31	51.73	18.34	45.75	12.51	44.03	04.04	47.20	55.35
22	05.79	15.02	58.67	19.40	51.49	18.27	45.58	12.25	44.06	03.69	47.44	55.12
23	05.64	15.25	58.39	19.49	51.23	18.19	45.43	11.96	44.12	03.35	47.67	54.93
24	05.47	15.50	58.10	19.57	50.96	18.08	45.30	11.65	44.22	03.03	47.87	54.76
25	05.29	15.75	57.79	19.61	50.68	17.95	45.21	11.33	44.33	02.74	48.05	54.58
26	05.09	16.01	57.48	19.63	50.41	17.78	45.16	11.02	44.43	02.48	48.21	54.40
27	04.86	16.25	57.18	19.61	50.16	17.59	45.12	10.74	44.52	02.25	48.35	54.19
28	04.61	16.47	56.91	19.57	49.94	17.38	45.08	10.49	44.58	02.02	48.50	53.96
29	04.36	16.67	56.66	19.52	49.76	17.17	45.04	10.26	44.62	01.78	48.66	53.71
30	04.10	16.84			49.59	16.98	44.97	10.04	44.64	01.53	48.83	53.45
31	03.85	16.98			49.44	16.81	44.88	09.83	44.67	01.26	49.02	53.19
32	03.63	17.10			49.29	16.66			44.69	00.96		
	sec $\delta$ 12.76	tan $\delta$ 12.72	sec $\delta$ 12.76	tan $\delta$ 12.72	sec $\delta$ 12.76	tan $\delta$ 12.72	sec $\delta$ 12.76	tan $\delta$ 12.72	sec $\delta$ 12.75	tan $\delta$ 12.71	sec $\delta$ 12.74	tan $\delta$ 12.70

Mean R.A.  $4^{\text{h}} 31^{\text{m}} 08.93^{\text{s}}$

Double lower transit May 30

Mean Dec.  $+85^{\circ} 29' 57.2''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

381

908 Groombridge 750 (Cephei) Mag. 6.70 Spect. F8

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /
	4 30	85 29	4 30	85 29	4 31	85 29	4 31	85 29	4 31	85 29	4 31	85 30
	s	"	s	"	s	"	s	"	s	"	s	"
1	49.02	53.19	57.12	48.20	07.09	47.62	16.62	51.28	24.60	58.72	29.27	08.59
2	49.24	52.93	57.46	48.11	07.41	47.72	16.88	51.49	24.80	58.96	29.42	08.94
3	49.47	52.68	57.79	48.05	07.72	47.82	17.13	51.67	25.04	59.20	29.54	09.32
4	49.72	52.44	58.11	48.00	08.01	47.91	17.39	51.84	25.29	59.46	29.64	09.72
5	49.97	52.22	58.42	47.97	08.29	47.99	17.66	51.99	25.56	59.75	29.70	10.13
6	50.23	52.03	58.71	47.94	08.58	48.05	17.96	52.13	25.81	60.07	29.73	10.53
7	50.49	51.86	58.99	47.91	08.87	48.09	18.28	52.29	26.05	60.43	29.73	10.90
8	50.73	51.70	59.26	47.87	09.19	48.11	18.62	52.47	26.26	60.79	29.72	11.25
9	50.97	51.56	59.53	47.81	09.53	48.15	18.97	52.68	26.44	61.16	29.71	11.58
10	51.19	51.41	59.80	47.73	09.90	48.19	19.31	52.93	26.58	61.52	29.71	11.88
11	51.40	51.26	60.09	47.64	10.28	48.27	19.62	53.20	26.71	61.86	29.71	12.18
12	51.60	51.10	60.40	47.54	10.66	48.38	19.91	53.49	26.84	62.18	29.73	12.47
13	51.80	50.92	60.74	47.45	11.03	48.52	20.17	53.77	26.96	62.47	29.76	12.76
14	52.02	50.72	61.10	47.38	11.39	48.68	20.40	54.04	27.09	62.75	29.79	13.07
15	52.25	50.51	61.48	47.34	11.71	48.85	20.62	54.29	27.24	63.03	29.83	13.39
16	52.52	50.29	61.86	47.33	12.01	49.02	20.84	54.52	27.39	63.30	29.86	13.73
17	52.81	50.09	62.23	47.36	12.29	49.18	21.07	54.74	27.56	63.59	29.88	14.09
18	53.13	49.90	62.57	47.40	12.56	49.31	21.30	54.94	27.74	63.89	29.89	14.46
19	53.47	49.75	62.88	47.45	12.83	49.42	21.55	55.14	27.91	64.21	29.87	14.83
20	53.79	49.64	63.18	47.49	13.12	49.52	21.82	55.34	28.08	64.55	29.83	15.20
21	54.11	49.56	63.45	47.51	13.42	49.61	22.10	55.56	28.24	64.91	29.77	15.57
22	54.39	49.48	63.73	47.51	13.73	49.70	22.38	55.80	28.38	65.28	29.70	15.92
23	54.65	49.41	64.01	47.49	14.06	49.81	22.66	56.06	28.49	65.65	29.61	16.24
24	54.89	49.32	64.31	47.45	14.41	49.93	22.94	56.34	28.59	66.03	29.53	16.55
25	55.12	49.20	64.63	47.42	14.75	50.07	23.20	56.64	28.67	66.40	29.45	16.83
26	55.36	49.06	64.96	47.39	15.10	50.23	23.44	56.96	28.73	66.76	29.39	17.10
27	55.61	48.91	65.31	47.38	15.43	50.42	23.67	57.28	28.79	67.09	29.35	17.37
28	55.88	48.75	65.67	47.38	15.76	50.62	23.87	57.60	28.85	67.40	29.33	17.64
29	56.16	48.60	66.04	47.41	16.06	50.84	24.06	57.91	<sup>28.92</sup> <sub>29.02</sub>	<sup>67.69</sup> <sub>67.98</sub>	29.33	17.94
30	56.47	48.45	66.40	47.46	16.35	51.06	24.24	58.20	29.14	68.27	29.32	18.28
31	56.79	48.32	66.75	47.53	16.62	51.28	24.41	58.47	29.27	68.59	29.29	18.64
32	57.12	48.20	67.09	47.62			24.60	58.72			29.23	19.01
	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ
	12.74	12.70	12.74	12.70	12.74	12.70	12.74	12.70	12.75	12.71	12.76	12.72

Mean R.A. <sup>h</sup>4 <sup>m</sup>31 <sup>s</sup>08.93

Double lower transit May 30

Mean Dec. +85° 29' 57.28"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1637    B.D. +85° 74 (Cephei)    Mag. 6.54    Spect. A5

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> 5 <sup>m</sup> 26	<sup>+</sup> <sup>o</sup> 85 <sup>'</sup> 55	<sup>h</sup> 5 <sup>m</sup> 26	<sup>+</sup> <sup>o</sup> 85 <sup>'</sup> 56	<sup>h</sup> 5 <sup>m</sup> 26	<sup>+</sup> <sup>o</sup> 85 <sup>'</sup> 56	<sup>h</sup> 5 <sup>m</sup> 26	<sup>+</sup> <sup>o</sup> 85 <sup>'</sup> 56	<sup>h</sup> 5 <sup>m</sup> 26	<sup>+</sup> <sup>o</sup> 85 <sup>'</sup> 55	<sup>h</sup> 5 <sup>m</sup> 26	<sup>+</sup> <sup>o</sup> 85 <sup>'</sup> 55
	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>
1	57.74	54.73	54.00	03.56	47.09	07.94	38.52	07.30	32.19	61.96	29.89	53.45
2	57.66	55.07	53.81	03.74	46.84	07.97	38.30	07.23	32.02	61.76	29.86	53.13
3	57.58	55.38	53.64	03.91	46.61	08.00	38.06	07.16	31.84	61.55	29.85	52.80
4	57.50	55.66	53.49	04.11	46.38	08.05	37.80	07.09	31.64	61.32	29.86	52.46
5	57.45	55.93	53.34	04.32	46.16	08.13	37.52	07.01	31.46	61.05	29.89	52.11
6	57.42	56.19	53.18	04.56	45.91	08.22	37.22	06.91	31.28	60.77	29.94	51.77
7	57.41	56.46	53.00	04.82	45.64	08.32	36.92	06.78	31.13	60.47	30.02	51.45
8	57.41	56.76	52.78	05.07	45.34	08.41	36.62	06.62	30.99	60.16	30.10	51.14
9	57.40	57.09	52.53	05.32	45.02	08.48	36.34	06.44	30.88	59.85	30.20	50.84
10	57.37	57.44	52.26	05.55	44.68	08.53	36.07	06.24	30.80	59.55	30.29	50.57
11	57.31	57.81	51.97	05.75	44.34	08.55	35.83	06.03	30.72	59.25	30.37	50.31
12	57.22	58.17	51.68	05.92	44.00	08.54	35.60	05.82	30.66	58.97	30.45	50.06
13	57.09	58.52	51.39	06.06	43.67	08.51	35.40	05.62	30.61	58.71	30.51	49.81
14	56.94	58.85	51.12	06.19	43.37	08.46	35.21	05.43	30.55	58.46	30.56	49.56
15	56.78	59.15	50.86	06.30	43.08	08.41	35.02	05.25	30.48	58.22	30.60	49.29
16	56.62	59.42	50.61	06.41	42.80	08.36	34.84	05.08	30.40	57.99	30.65	48.99
17	56.46	59.68	50.38	06.53	42.55	08.31	34.65	04.93	30.31	57.75	30.71	48.67
18	56.32	59.93	50.15	06.65	42.30	08.27	34.45	04.78	30.20	57.50	30.79	48.33
19	56.18	60.16	49.93	06.78	42.05	08.24	34.23	04.63	30.10	57.23	30.91	47.99
20	56.06	60.40	49.71	06.93	41.80	08.23	34.00	04.48	29.99	56.93	31.07	47.65
21	55.94	60.65	49.47	07.09	41.53	08.23	33.75	04.30	29.91	56.60	31.26	47.33
22	55.84	60.91	49.22	07.26	41.25	08.23	33.51	04.09	29.86	56.25	31.46	47.05
23	55.72	61.18	48.94	07.43	40.95	08.23	33.28	03.85	29.85	55.90	31.65	46.81
24	55.60	61.47	48.64	07.58	40.63	08.20	33.07	03.58	29.88	55.57	31.83	46.58
25	55.47	61.77	48.32	07.71	40.31	08.15	32.90	03.30	29.93	55.26	31.97	46.37
26	55.30	62.08	47.99	07.81	39.98	08.06	32.77	03.02	29.98	54.99	32.10	46.14
27	55.12	62.38	47.67	07.88	39.67	07.94	32.66	02.76	30.01	54.74	32.20	45.90
28	54.90	62.67	47.37	07.92	39.39	07.80	32.56	02.53	30.02	54.51	32.31	45.64
29	54.67	62.94	47.09	07.94	39.14	07.65	32.46	02.33	30.01	54.27	32.42	45.35
30	54.44	63.17			38.92	07.52	32.34	02.14	29.98	54.02	32.54	45.05
31	54.21	63.38			38.72	07.40	32.19	01.96	29.93	53.75	32.69	44.74
32	54.00	63.56			38.52	07.30			29.89	53.45		
	sec $\delta$ 14.10	tan $\delta$ 14.06	sec $\delta$ 14.11	tan $\delta$ 14.07	sec $\delta$ 14.11	tan $\delta$ 14.07	sec $\delta$ 14.11	tan $\delta$ 14.07	sec $\delta$ 14.10	tan $\delta$ 14.06	sec $\delta$ 14.09	tan $\delta$ 14.05

Mean R.A.  $5^{\text{h}} 26^{\text{m}} 54.96^{\text{s}}$

Double lower transit June 13

Mean Dec.  $+85^{\circ} 55' 43.2''$



**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

383

1637 B.D. +85° 74 (Cephei) Mag. 6.54 Spect. A5

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> 5 <sup>m</sup> 26	<sup>+</sup> 85 55	<sup>h</sup> 5 <sup>m</sup> 26	<sup>+</sup> 85 55	<sup>h</sup> 5 <sup>m</sup> 26	<sup>+</sup> 85 55	<sup>h</sup> 5 <sup>m</sup> 27	<sup>+</sup> 85 55	<sup>h</sup> 5 <sup>m</sup> 27	<sup>+</sup> 85 55	<sup>h</sup> 5 <sup>m</sup> 27	<sup>+</sup> 85 55
	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"
1	32.69	44.74	40.16	37.68	50.66	34.35	01.69	35.26	11.94	40.28	19.01	48.37
2	32.85	44.43	40.50	37.50	51.03	34.36	02.01	35.39	12.22	40.46	19.24	48.64
3	33.04	44.12	40.83	37.34	51.38	34.37	02.32	35.49	12.52	40.63	19.47	48.95
4	33.25	43.82	41.17	37.21	51.71	34.38	02.63	35.58	12.86	40.81	19.69	49.29
5	33.48	43.55	41.49	37.09	52.02	34.37	02.96	35.65	13.21	41.03	19.88	49.66
6	33.71	43.29	41.79	36.98	52.34	34.35	03.32	35.71	13.56	41.28	20.04	50.05
7	33.94	43.05	42.08	36.88	52.67	34.30	03.70	35.77	13.89	41.56	20.16	50.43
8	34.17	42.84	42.36	36.76	53.01	34.24	04.11	35.85	14.20	41.86	20.25	50.80
9	34.38	42.63	42.63	36.63	53.39	34.17	04.53	35.97	14.47	42.17	20.32	51.14
10	34.58	42.43	42.90	36.48	53.79	34.12	04.94	36.12	14.71	42.48	20.39	51.46
11	34.77	42.23	43.19	36.31	54.22	34.09	05.34	36.30	14.93	42.78	20.45	51.76
12	34.94	42.01	43.50	36.12	54.65	34.09	05.71	36.49	15.13	43.05	20.53	52.04
13	35.12	41.78	43.84	35.94	55.08	34.12	06.05	36.70	15.33	43.30	<sup>20 62</sup> 20.72	<sup>52 32</sup> 52.61
14	35.30	41.52	44.21	35.77	55.49	34.19	06.37	36.90	15.54	43.54	20.83	52.90
15	35.51	41.25	44.61	35.63	55.88	34.27	06.66	37.08	15.76	43.76	20.94	53.21
16	35.74	40.97	45.01	35.52	56.24	34.35	06.95	37.24	16.00	43.99	21.05	53.54
17	36.01	40.69	45.41	35.45	56.57	34.42	07.24	37.38	16.24	44.22	21.16	53.88
18	36.31	40.42	45.78	35.40	56.89	34.47	07.54	37.51	16.50	44.47	21.25	54.24
19	36.63	40.19	46.13	35.36	57.21	34.50	07.86	37.64	16.76	44.74	21.32	54.61
20	36.95	39.99	46.45	35.31	57.53	34.51	08.19	37.76	17.02	45.02	21.36	54.99
21	37.26	39.83	46.75	35.26	57.87	34.52	08.54	37.90	17.27	45.33	21.38	55.36
22	37.54	39.68	47.04	35.17	58.24	34.52	08.90	38.06	17.50	45.66	21.38	55.73
23	37.80	39.54	47.34	35.07	58.61	34.53	09.26	38.23	17.72	45.99	21.37	56.07
24	38.03	39.38	47.65	34.96	59.01	34.55	09.62	38.43	17.91	46.34	21.35	56.39
25	38.25	39.20	47.98	34.83	59.41	34.59	09.97	38.65	18.07	46.67	21.33	56.69
26	38.47	39.00	48.34	34.71	59.82	34.66	10.30	38.89	18.22	47.00	21.33	56.97
27	38.71	38.78	48.71	34.60	60.22	34.75	10.61	39.14	18.36	47.31	21.35	57.24
28	38.96	38.55	49.09	34.51	60.61	34.86	10.90	39.40	18.50	47.60	21.40	57.52
29	39.23	38.32	49.49	34.44	60.99	34.99	11.17	39.65	18.64	47.86	21.46	57.82
30	39.52	38.09	49.89	34.39	61.35	35.12	11.43	39.88	18.82	48.11	21.53	58.16
31	39.83	37.88	50.28	34.36	61.69	35.26	11.68	40.09	19.01	48.37	21.58	58.52
32	40.16	37.68	50.66	34.35			11.94	40.28			21.60	58.91
	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$
	14.08	14.05	14.08	14.04	14.08	14.04	14.08	14.04	14.09	14.05	14.09	14.06

Mean R.A. <sup>h</sup> 5 <sup>m</sup> 26 <sup>s</sup> 54.96

Double lower transit June 13

Mean Dec. +85° 55' 43.22"

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1638 Groombridge 944 (Cephej) Mag. 6.41 Spect. K0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 5 57	+ ° ' " 85 11	<sup>h</sup> <sup>m</sup> 5 57	+ ° ' " 85 11	<sup>h</sup> <sup>m</sup> 5 56	+ ° ' " 85 11	<sup>h</sup> <sup>m</sup> 5 56	+ ° ' " 85 11	<sup>h</sup> <sup>m</sup> 5 56	+ ° ' " 85 11	<sup>h</sup> <sup>m</sup> 5 56	+ ° ' " 85 10
	<sup>s</sup> 07.78	" 05.66	<sup>s</sup> 05.64	" 14.92	<sup>s</sup> 60.36	" 20.23	<sup>s</sup> 53.15	" 20.82	<sup>s</sup> 47.31	" 16.47	<sup>s</sup> 44.52	" 68.45
1	07.75	06.00	05.50	15.12	60.16	20.28	52.97	20.78	47.15	16.30	44.46	68.15
2	07.71	06.32	05.39	15.32	59.97	20.35	52.76	20.75	46.98	16.12	44.42	67.82
3	07.68	06.61	05.28	15.53	59.79	20.44	52.54	20.72	46.79	15.91	44.39	67.48
4	07.66	06.88	05.19	15.77	59.61	20.55	52.29	20.68	46.61	15.68	44.38	67.14
5	07.67	07.14	05.08	16.03	59.42	20.67	52.03	20.62	46.43	15.43	44.39	66.80
6	07.69	07.42	04.95	16.31	59.20	20.81	51.76	20.53	46.27	15.16	44.42	66.47
7	07.73	07.72	04.80	16.59	58.96	20.94	51.50	20.42	46.13	14.87	44.46	66.16
8	07.76	08.04	04.62	16.87	58.70	21.06	51.24	20.28	46.00	14.58	44.51	65.86
9	07.78	08.40	04.41	17.13	58.42	21.15	51.00	20.12	45.90	14.29	44.56	65.58
10	07.77	08.77	04.19	17.37	58.14	21.22	50.77	19.95	45.81	14.01	44.61	65.32
11	07.73	09.14	03.97	17.58	57.85	21.26	50.56	19.77	45.73	13.75	44.65	65.06
12	07.66	09.50	03.74	17.76	57.58	21.27	50.37	19.60	45.66	13.50	44.67	64.81
13	07.57	09.85	03.53	17.92	57.31	21.27	50.19	19.44	45.58	13.27	44.69	64.56
14	07.47	10.16	03.32	18.07	57.07	21.26	50.02	19.29	45.50	13.04	44.69	64.28
15	07.37	10.46	03.13	18.22	56.83	21.24	49.85	19.15	45.41	12.83	44.70	63.99
16	07.26	10.74	02.95	18.36	56.61	21.23	49.67	19.03	45.31	12.61	44.71	63.67
17	07.17	11.00	02.78	18.51	56.40	21.23	49.49	18.92	45.20	12.38	44.75	63.32
18	07.08	11.25	02.61	18.68	56.20	21.24	49.29	18.80	45.08	12.13	44.82	62.96
19	07.01	11.50	02.44	18.86	55.99	21.27	49.08	18.68	44.96	11.84	44.92	62.61
20	06.94	11.76	02.26	19.05	55.77	21.30	48.86	18.54	44.85	11.53	45.04	62.28
21	06.88	12.04	02.07	19.26	55.53	21.34	48.63	18.37	44.78	11.20	45.19	61.98
22	06.82	12.32	01.85	19.46	55.28	21.38	48.41	18.16	44.74	10.86	45.33	61.71
23	06.75	12.63	01.62	19.66	55.01	21.40	48.21	17.93	44.73	10.53	45.45	61.47
24	06.67	12.95	01.36	19.83	54.73	21.40	48.04	17.67	44.74	10.22	45.55	61.24
25	06.57	13.28	01.10	19.97	54.45	21.36	47.90	17.42	44.75	09.95	45.63	61.01
26	06.45	13.60	00.84	20.08	54.18	21.28	47.79	17.19	44.76	09.71	45.69	60.75
27	06.30	13.92	00.59	20.16	53.93	21.18	47.69	16.98	44.74	09.48	45.75	60.48
28	06.14	14.21	00.36	20.23	53.71	21.07	47.58	16.79	44.71	09.25	45.81	60.18
29	05.97	14.47			53.51	20.97	47.46	16.63	44.65	09.00	45.89	59.87
30												
31	05.80	14.71			53.33	20.88	47.31	16.47	44.59	08.74	45.98	59.55
32	05.64	14.92			53.15	20.82			44.52	08.45		
	sec δ 11.92	tan δ 11.87	sec δ 11.92	tan δ 11.88	sec δ 11.92	tan δ 11.88	sec δ 11.92	tan δ 11.88	sec δ 11.92	tan δ 11.88	sec δ 11.91	tan δ 11.87

Mean R.A. <sup>h</sup> 5 <sup>m</sup> 57 <sup>s</sup> 04.57

Double lower transit June 21

Mean Dec. +85° 10' 54.98"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

385

1638 Groombridge 944 (Cephei) Mag. 6.41 Spect. K0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 5 56	<sup>+</sup> <sup>o</sup> / 85 10	<sup>h</sup> <sup>m</sup> 5 56	<sup>+</sup> <sup>o</sup> / 85 10	<sup>h</sup> <sup>m</sup> 5 57	<sup>+</sup> <sup>o</sup> / 85 10	<sup>h</sup> <sup>m</sup> 5 57	<sup>+</sup> <sup>o</sup> / 85 10	<sup>h</sup> <sup>m</sup> 5 57	<sup>+</sup> <sup>o</sup> / 85 10	<sup>h</sup> <sup>m</sup> 5 57	<sup>+</sup> <sup>o</sup> / 85 10
	<sup>s</sup> 45.98	<sup>s</sup> 59.55	<sup>s</sup> 51.53	<sup>s</sup> 51.62	<sup>s</sup> 00.01	<sup>s</sup> 46.95	<sup>s</sup> 09.37	<sup>s</sup> 46.35	<sup>s</sup> 18.53	<sup>s</sup> 49.91	<sup>s</sup> 25.38	<sup>s</sup> 56.94
1	46.09	59.22	51.80	51.40	00.32	46.90	09.65	46.43	18.79	50.05	25.59	57.18
2	46.21	58.89	52.06	51.20	00.61	46.87	09.93	46.49	19.06	50.17	25.83	57.46
3	46.36	58.57	52.33	51.03	00.89	46.83	10.20	46.54	19.37	50.31	26.05	57.77
4	46.52	58.27	52.59	50.87	01.16	46.78	10.48	46.56	19.69	50.48	26.26	58.11
5	46.69	57.99	52.83	50.72	01.42	46.71	10.79	46.56	20.01	50.68	26.43	58.47
6	46.86	57.73	53.06	50.58	01.69	46.62	11.12	46.57	20.32	50.91	26.57	58.83
7	47.03	57.48	53.28	50.43	01.97	46.51	11.47	46.60	20.61	51.17	26.69	59.18
8	47.19	57.25	53.49	50.26	02.28	46.40	11.84	46.66	20.88	51.44	26.79	59.51
9	47.34	57.03	53.71	50.07	02.61	46.29	12.20	46.75	21.11	51.71	26.88	59.81
10	47.47	56.81	53.93	49.87	02.97	46.20	12.56	46.88	21.32	51.97	26.96	60.10
11	47.60	56.57	54.17	49.64	03.34	46.14	12.89	47.02	21.52	52.21	27.06	60.37
12	47.72	56.32	54.44	49.42	03.70	46.12	13.20	47.18	21.72	52.44	27.17	60.64
13	47.84	56.04	54.74	49.20	04.06	46.13	13.49	47.33	21.92	52.64	27.28	60.90
14	47.99	55.75	55.06	49.01	04.39	46.16	13.75	47.47	22.13	52.83	27.41	61.18
15	48.15	55.44	55.39	48.85	04.70	46.19	14.01	47.59	22.35	53.02	27.54	61.47
16	48.35	55.13	55.71	48.72	04.98	46.21	14.27	47.69	22.59	53.22	27.67	61.78
17	48.58	54.83	56.02	48.63	05.26	46.22	14.53	47.78	22.83	53.43	27.80	62.10
18	48.82	54.56	56.31	48.54	05.52	46.21	14.81	47.85	23.08	53.66	27.91	62.45
19	49.07	54.32	56.57	48.46	05.80	46.17	15.11	47.93	23.33	53.91	28.01	62.81
20	49.32	54.12	56.82	48.36	06.09	46.13	15.42	48.02	23.58	54.18	<sup>28 09</sup> 28 15	<sup>63 18</sup> 63 54
21	49.54	53.94	57.05	48.24	06.39	46.08	15.74	48.13	23.81	54.47	28.19	63.90
22	49.74	53.77	57.29	48.10	06.71	46.04	16.06	48.25	24.02	54.77	28.22	64.24
23	49.92	53.58	57.54	47.94	07.05	46.01	16.38	48.40	24.22	55.09	28.23	64.56
24	50.09	53.38	57.81	47.77	07.39	46.00	16.70	48.58	24.40	55.40	28.25	64.86
25	50.25	53.15	58.09	47.61	07.74	46.01	17.01	48.77	24.56	55.70	28.28	65.14
26	50.42	52.90	58.39	47.45	08.09	46.05	17.30	48.97	24.71	55.99	28.33	65.40
27	50.61	52.64	58.71	47.31	08.43	46.10	17.57	49.18	24.85	56.25	28.41	65.67
28	50.81	52.37	59.03	47.18	08.76	46.18	17.82	49.39	25.01	56.49	28.50	65.96
29	51.04	52.11	59.36	47.08	09.07	46.26	18.06	49.59	25.18	56.72	28.59	66.29
30	51.28	51.86	59.69	47.00	09.37	46.35	18.30	49.76	25.38	56.94	28.68	66.64
31	51.53	51.62	60.01	46.95			18.53	49.91			28.74	67.03
32												
	sec $\delta$ 11.91	tan $\delta$ 11.86	sec $\delta$ 11.90	tan $\delta$ 11.86	sec $\delta$ 11.90	tan $\delta$ 11.86	sec $\delta$ 11.90	tan $\delta$ 11.86	sec $\delta$ 11.90	tan $\delta$ 11.86	sec $\delta$ 11.91	tan $\delta$ 11.87

Mean R.A. <sup>h</sup> <sup>m</sup> <sup>s</sup>  
5 57 04.57

Double lower transit June 21

Mean Dec. <sup>o</sup> <sup>'</sup> <sup>''</sup>  
+85 10 54.98

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

909 51 H. Cephei Mag. 5.26 Spect. M0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 7 34	<sup>+</sup> <sup>o</sup> / 87 03	<sup>h</sup> <sup>m</sup> 7 34	<sup>+</sup> <sup>o</sup> / 87 03	<sup>h</sup> <sup>m</sup> 7 34	<sup>+</sup> <sup>o</sup> / 87 03	<sup>h</sup> <sup>m</sup> 7 34	<sup>+</sup> <sup>o</sup> / 87 03	<sup>h</sup> <sup>m</sup> 7 34	<sup>+</sup> <sup>o</sup> / 87 03	<sup>h</sup> <sup>m</sup> 7 34	<sup>+</sup> <sup>o</sup> / 87 03
	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"
1	44.17	11.30	46.15	21.46	41.13	29.21	30.61	33.61	19.38	32.73	10.61	26.91
2	44.34	11.65	46.06	21.72	40.85	29.37	30.30	33.67	19.04	32.67	10.35	26.66
3	44.49	11.98	45.99	21.97	40.61	29.54	29.98	33.76	18.67	32.59	10.10	26.38
4	44.60	12.29	45.95	22.23	40.39	29.72	29.62	33.85	18.27	32.49	09.86	26.09
5	44.72	12.58	45.93	22.51	40.17	29.93	29.22	33.94	17.87	32.38	09.66	25.78
6	44.84	12.84	45.90	22.82	39.94	30.15	28.80	34.02	17.47	32.23	09.49	25.47
7	44.99	13.09	45.86	23.15	39.69	30.40	28.35	34.08	17.07	32.06	09.34	25.16
8	45.18	13.34	45.79	23.50	39.40	30.65	27.89	34.11	16.70	31.88	09.22	24.86
9	45.39	13.61	45.66	23.86	39.07	30.89	27.43	34.11	16.35	31.68	09.12	24.57
10	45.61	13.91	45.50	24.20	38.70	31.12	26.98	34.09	16.03	31.47	09.03	24.29
11	45.82	14.24	45.30	24.53	38.32	31.33	26.55	34.06	15.74	31.27	08.95	24.03
12	46.00	14.59	45.08	24.84	37.91	31.51	26.14	34.01	15.47	31.08	08.85	23.78
13	46.14	14.96	44.85	25.13	37.51	31.66	25.75	33.95	15.21	30.89	08.74	23.54
14	<sup>46.24</sup> <sup>46.29</sup>	<sup>15.34</sup> <sup>15.70</sup>	44.61	25.39	37.12	31.80	25.39	33.90	14.97	30.72	08.62	23.30
15	46.31	16.05	44.39	25.64	36.74	31.91	25.05	33.86	14.72	30.56	08.47	23.04
16	46.32	16.38	44.18	25.87	36.39	32.03	24.71	33.83	14.45	30.42	08.31	22.77
17	46.31	16.69	43.99	26.11	36.05	32.14	24.38	33.81	14.17	30.27	08.15	22.46
18	46.32	16.98	43.81	26.35	35.73	32.25	24.04	33.81	13.87	30.12	08.02	22.13
19	46.33	17.26	43.65	26.59	35.43	32.38	23.68	33.81	13.55	29.95	07.91	21.77
20	46.35	17.54	43.49	26.86	35.12	32.52	23.29	33.81	13.21	29.75	07.86	21.40
21	46.39	17.83	43.33	27.13	34.81	32.67	22.87	33.79	12.89	29.51	07.86	21.04
22	46.45	18.12	43.14	27.43	34.48	32.83	22.44	33.75	12.59	29.25	07.90	20.70
23	46.51	18.42	42.93	27.73	34.12	33.00	21.99	33.67	12.33	28.96	07.94	20.39
24	46.57	18.75	42.69	28.03	33.72	33.16	21.57	33.56	12.13	28.67	07.98	20.12
25	46.62	19.09	42.40	28.32	33.30	33.29	21.17	33.42	11.97	28.40	08.00	19.86
26	46.64	19.46	42.09	28.59	32.85	33.40	20.82	33.26	11.83	28.15	07.97	19.60
27	46.63	19.83	41.76	28.83	32.41	33.47	20.52	33.11	11.69	27.93	07.92	19.34
28	46.58	20.19	41.43	29.03	31.99	33.51	20.24	32.98	11.53	27.73	07.85	19.06
29	46.50	20.55	41.13	29.21	31.60	33.53	19.97	32.88	11.34	27.54	07.78	18.75
30	46.39	20.88			31.24	33.54	19.68	32.80	11.11	27.35	07.71	18.43
31	46.27	21.18			30.92	33.56	19.38	32.73	10.87	27.14	07.66	18.08
32	46.15	21.46			30.61	33.61			10.61	26.91		
	sec $\delta$ 19.46	tan $\delta$ 19.44	sec $\delta$ 19.48	tan $\delta$ 19.45	sec $\delta$ 19.49	tan $\delta$ 19.46	sec $\delta$ 19.49	tan $\delta$ 19.47	sec $\delta$ 19.49	tan $\delta$ 19.46	sec $\delta$ 19.47	tan $\delta$ 19.45

Mean R.A. <sup>h</sup> 7 <sup>m</sup> 34 <sup>s</sup> 32.75

Double lower transit July 15

Mean Dec. +87° 03' 04.57"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

387

909 51 H. Cephei Mag. 5.26 Spect. M0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	+ ° '	h m	+ ° '	h m	+ ° '	h m	+ ° '	h m	+ ° '	h m	+ ° '
	7 34	87 03	7 34	87 02	7 34	87 02	7 34	87 02	7 34	87 02	7 35	87 02
	s	"	s	"	s	"	s	"	s	"	s	"
1	07.66	18.08	11.36	68.03	21.24	59.45	34.72	54.15	50.22	52.79	04.16	55.90
2	07.64	17.72	11.63	67.70	21.67	59.26	35.18	54.07	50.67	52.79	04.62	56.02
3	07.64	17.36	11.91	67.39	22.08	59.08	35.62	53.99	51.15	52.76	05.10	56.16
4	07.68	17.00	12.20	67.10	22.46	58.90	36.05	53.88	51.68	52.74	05.60	56.35
5	07.75	16.65	12.49	66.83	22.83	58.71	36.48	53.75	52.24	52.74	06.09	56.57
6	07.83	16.31	12.76	66.57	23.18	58.51	36.94	53.61	52.82	52.77	06.54	56.82
7	07.93	15.99	13.02	66.32	23.53	58.28	37.44	53.45	53.41	52.83	06.94	57.08
8	08.04	15.68	13.26	66.06	23.89	58.04	37.98	53.30	53.97	52.93	07.30	57.35
9	08.14	15.40	13.48	65.80	24.29	57.77	38.55	53.17	54.51	53.05	07.62	57.60
10	08.23	15.12	13.69	65.52	24.72	57.51	39.14	53.08	55.00	53.19	07.92	57.84
11	08.30	14.84	13.90	65.21	25.20	57.25	39.73	53.02	55.46	53.32	08.21	58.06
12	08.35	14.56	14.14	64.88	25.71	57.02	40.30	52.99	55.89	53.44	08.50	58.26
13	08.39	14.27	14.42	64.53	26.23	56.82	40.83	52.98	56.30	53.54	08.80	58.46
14	08.42	13.95	14.73	64.19	26.75	56.65	41.33	52.97	56.71	53.62	09.12	58.65
15	08.47	13.60	15.09	63.85	27.26	56.51	41.80	52.96	57.12	53.70	09.45	58.85
16	08.54	13.23	15.49	63.55	27.72	56.38	42.25	52.94	57.56	53.76	09.81	59.06
17	08.66	12.85	15.89	63.27	28.16	56.25	42.69	52.89	58.02	53.83	10.17	59.28
18	08.82	12.46	16.29	63.03	28.57	56.12	43.14	52.83	58.49	53.90	10.53	59.53
19	09.03	12.10	16.66	62.81	28.96	55.96	43.59	52.76	58.99	53.99	10.88	59.80
20	09.27	11.76	17.00	62.60	29.35	55.79	44.08	52.69	59.49	54.10	11.22	60.09
21	09.51	11.46	17.30	62.38	29.75	55.60	44.58	52.62	60.00	54.24	11.54	60.39
22	09.73	11.19	17.59	62.14	30.18	55.40	45.11	52.56	60.49	54.39	11.82	60.71
23	09.92	10.92	17.86	61.88	30.63	55.20	45.66	52.51	60.98	54.57	12.07	61.02
24	10.07	10.66	18.15	61.61	31.11	55.00	46.22	52.49	61.43	54.76	12.30	61.32
25	10.20	10.39	18.45	61.32	31.61	54.82	46.78	52.49	61.87	54.96	12.50	61.61
26	10.32	10.09	18.78	61.02	32.13	54.66	47.33	52.52	62.27	55.16	12.69	61.88
27	10.44	09.77	19.14	60.72	32.66	54.51	47.87	52.56	62.65	55.35	12.89	62.12
28	10.57	09.44	19.52	60.43	33.20	54.40	48.39	52.62	63.01	55.51	13.11	62.34
29	10.72	09.09	19.93	60.16	33.73	54.30	48.88	52.68	63.37	55.66	13.36	62.57
30	10.91	08.73	20.36	59.90	34.24	54.22	49.34	52.74	63.75	55.78	13.65	62.80
31	11.12	08.38	20.80	59.67	34.72	54.15	49.78	52.78	64.16	55.90	13.96	63.06
32	11.36	08.03	21.24	59.45			50.22	52.79			14.28	63.36
	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ
	19.46	19.43	19.44	19.41	19.42	19.40	19.42	19.39	19.42	19.39	19.43	19.40

Mean R.A.  $7^{\text{h}} 34^{\text{m}} 32.75^{\text{s}}$

Double lower transit July 15

Mean Dec.  $+87^{\circ} 03' 04.57''$

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1639 Groombridge 1359 (Cameopardi) Mag. 6.39 Spect. A0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 8 13	+ o / 84 06	h m 8 13	+ o / 84 06	h m 8 13	+ o / 84 06	h m 8 13	+ o / 84 06	h m 8 13	+ o / 84 06	h m 8 13	+ o / 84 06
	s "	s "	s "	s "	s "	s "	s "	s "	s "	s "	s "	s "
1	53.14	03.32	55.42	12.85	53.93	21.02	49.35	26.72	43.83	27.45	39.00	23.10
2	53.27	03.62	55.41	13.11	53.82	21.22	49.22	26.83	43.66	27.44	38.84	22.89
3	53.38	03.93	55.41	13.37	53.72	21.42	49.07	26.96	43.47	27.42	38.69	22.66
4	53.48	04.21	55.43	13.62	53.64	21.62	48.90	27.10	43.27	27.38	38.55	22.41
5	53.57	04.47	55.46	13.90	53.56	21.85	48.72	27.24	43.06	27.32	38.42	22.15
6	53.66	04.70	55.49	14.20	53.48	22.10	48.52	27.38	42.84	27.24	38.30	21.87
7	53.77	04.92	55.52	14.53	53.39	22.37	48.31	27.49	42.63	27.13	38.20	21.59
8	53.90	05.14	55.52	14.88	53.28	22.66	48.08	27.59	42.43	27.00	38.12	21.32
9	54.05	05.37	55.50	15.24	53.14	22.94	47.86	27.65	42.24	26.86	38.04	21.06
10	54.20	05.63	55.46	15.60	52.99	23.21	47.63	27.69	42.07	26.70	37.98	20.81
11	54.35	05.92	55.40	15.94	52.82	23.46	47.42	27.72	41.91	26.55	37.91	20.57
12	54.49	06.24	55.33	16.27	52.64	23.69	47.22	27.73	41.76	26.40	37.84	20.35
13	54.60	06.58	55.25	16.57	52.46	23.89	47.03	27.73	41.62	26.26	37.77	20.14
14	54.69	06.93	55.16	16.86	52.29	24.07	46.85	27.73	41.49	26.13	37.68	19.92
15	54.76	07.27	55.08	17.13	52.12	24.24	46.68	27.74	41.35	26.02	37.58	19.70
16	54.82	07.61	55.01	17.38	51.96	24.39	46.52	27.76	41.21	25.92	37.47	19.46
17	54.86	07.92	54.95	17.64	51.81	24.55	46.36	27.79	41.06	25.82	37.36	19.18
18	54.89	08.22	54.90	17.89	51.67	24.70	46.19	27.83	40.89	25.71	37.26	18.88
19	54.93	08.50	54.85	18.15	51.54	24.87	46.02	27.89	40.71	25.59	37.18	18.55
20	54.97	08.77	54.81	18.43	51.41	25.05	45.83	27.94	40.53	25.45	37.12	18.20
21	55.02	09.04	54.76	18.72	51.28	25.24	45.62	27.98	40.34	25.27	37.09	17.86
22	55.08	09.30	54.71	19.03	51.14	25.44	45.40	28.00	40.17	25.05	37.08	17.53
23	55.15	09.58	54.64	19.36	50.98	25.66	45.18	27.99	40.02	24.81	37.08	17.24
24	55.22 55.30	09.87 10.18	54.56	19.68	50.80	25.86	44.96	27.93	39.90	24.56	37.07	16.97
25	55.37	10.50	54.45	20.00	50.61	26.05	44.75	27.85	39.80	24.32	37.06	16.72
26	55.43	10.85	54.32	20.30	50.40	26.22	44.57	27.75	39.71	24.11	37.02	16.48
27	55.47	11.21	54.19	20.57	50.19	26.34	44.41	27.65	39.63	23.92	36.97	16.24
28	55.48	11.57	54.05	20.81	49.99	26.43	44.27	27.57	39.53	23.76	36.90	15.98
29	55.48	11.93	53.93	21.02	49.81	26.50	44.13	27.51	39.42	23.61	36.83	15.69
30	55.47	12.26			49.64	26.57	43.99	27.47	39.29	23.45	36.77	15.39
31	55.44	12.57			49.49	26.63	43.83	27.45	39.15	23.29	36.71	15.07
32	55.42	12.85			49.35	26.72			39.00	23.10		
	sec $\delta$ 9.73	tan $\delta$ 9.68	sec $\delta$ 9.74	tan $\delta$ 9.68	sec $\delta$ 9.74	tan $\delta$ 9.69	sec $\delta$ 9.74	tan $\delta$ 9.69	sec $\delta$ 9.74	tan $\delta$ 9.69	sec $\delta$ 9.74	tan $\delta$ 9.69

Mean R.A. 8<sup>h</sup> 13<sup>m</sup> 47.82<sup>s</sup>

Double lower transit July 26

Mean Dec. +84° 05' 58.48"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

389

1639 Groombridge 1359 (Camelopardi) Mag. 6.39 Spect. A0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 8 13	<sup>+</sup> <sup>o</sup> / 84 06	<sup>h</sup> <sup>m</sup> 8 13	<sup>+</sup> <sup>o</sup> / 84 05	<sup>h</sup> <sup>m</sup> 8 13	<sup>+</sup> <sup>o</sup> / 84 05	<sup>h</sup> <sup>m</sup> 8 13	<sup>+</sup> <sup>o</sup> / 84 05	<sup>h</sup> <sup>m</sup> 8 13	<sup>+</sup> <sup>o</sup> / 84 05	<sup>h</sup> <sup>m</sup> 8 14	<sup>+</sup> <sup>o</sup> / 84 05
	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>
1	36.71	15.07	37.56	64.96	41.61	55.41	47.77	48.49	55.38	45.07	02.77	46.16
2	36.66	14.73	37.66	64.61	41.80	55.17	47.99	48.35	55.60	45.00	03.02	46.21
3	36.63	14.38	37.78	64.27	41.98	54.94	48.19	48.21	55.84	44.91	03.29	46.29
4	36.61	14.03	37.89	63.95	42.15	54.71	48.39	48.05	56.11	44.82	03.57	46.40
5	36.61	13.68	38.01	63.66	42.31	54.49	48.59	47.86	56.40	44.74	03.84	46.55
6	36.63	13.35	38.12	63.37	42.46	54.24	48.81	47.66	56.70	44.69	04.09	46.73
7	36.65	13.03	38.22	63.10	42.61	53.98	49.04	47.44	57.00	44.68	04.33	46.93
8	36.67	12.73	38.31	62.83	42.76	53.69	49.30	47.22	57.30	44.70	04.54	47.14
9	36.70	12.44	38.39	62.54	42.93	53.38	49.57	47.02	57.58	44.74	04.73	47.34
10	36.71	12.16	38.46	62.24	43.13	53.06	49.86	46.85	57.84	44.80	04.90	47.53
11	36.72	11.89	38.54	61.91	43.34	52.75	50.15	46.72	58.09	44.87	05.07	47.70
12	36.72	11.62	38.62	61.56	43.57	52.46	50.44	46.61	58.31	44.92	05.25	47.86
13	36.70	11.33	38.72	61.20	43.82	52.20	50.70	46.53	58.53	44.96	05.42	48.00
14	36.68	11.01	38.85	60.82	44.06	51.97	50.95	46.46	58.74	44.99	05.61	48.14
15	36.67	10.68	39.00	60.45	44.30	51.77	51.18	46.38	58.96	45.00	05.80	48.29
16	36.67	10.31	39.16	60.11	44.52	51.58	51.40	46.30	59.19	45.00	06.01	48.44
17	36.69	09.93	39.34	59.79	44.72	51.40	51.61	46.19	59.43	45.00	06.22	48.61
18	36.74	09.54	39.52	59.51	44.90	51.22	51.83	46.07	59.68	45.01	06.44	48.80
19	36.81	09.16	39.68	59.25	45.08	51.01	52.05	45.94	59.94	45.03	06.65	49.02
20	36.90	08.81	39.82	59.00	45.25	50.79	52.28	45.80	60.21	45.07	06.86	49.25
21	36.99	08.49	39.95	58.75	45.43	50.55	52.53	45.66	60.48	45.13	07.05	49.50
22	37.08	08.20	40.06	58.48	45.62	50.30	52.79	45.53	60.75	45.21	07.23	49.77
23	37.15	07.93	40.17	58.20	45.83	50.04	53.06	45.42	61.02	45.32	07.39	50.03
24	37.20	07.66	40.28	57.89	46.05	49.79	53.35	45.32	61.27	45.44	07.54	50.30
25	37.23	07.38	40.40	57.57	46.28	49.55	53.63	45.25	61.51	45.58	07.67	50.55
26	37.25	07.07	40.53	57.24	46.53	49.32	53.91	45.20	61.73	45.71	07.80	50.77
27	37.28	06.75	40.68	56.91	46.78	49.11	54.19	45.17	61.94	45.84	07.93	50.98
28	37.31	06.41	40.85	56.58	47.03	48.93	54.45	45.16	62.14	45.95	08.07	51.17
29	37.35	06.06	41.02	56.26	47.29	48.77	54.70	45.15	62.34	46.04	08.23	51.34
30	37.40	05.69	41.21	55.95	47.53	48.62	54.93	45.14	62.54	46.10	08.41	51.53
31	37.48	05.32	41.41	55.67	47.77	48.49	55.16	45.11	62.77	46.16	08.61	51.74
32	37.56	04.96	41.61	55.41			55.38	45.07			08.81	51.99
	sec $\delta$ 9.73	tan $\delta$ 9.68	sec $\delta$ 9.73	tan $\delta$ 9.68	sec $\delta$ 9.72	tan $\delta$ 9.67	sec $\delta$ 9.72	tan $\delta$ 9.67	sec $\delta$ 9.72	tan $\delta$ 9.67	sec $\delta$ 9.72	tan $\delta$ 9.67

Mean R.A.  $8^{\text{h}} 13^{\text{m}} 47.82^{\text{s}}$

Double lower transit July 26

Mean Dec.  $+84^{\circ} 05' 58.48''$

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1640 B.D. +84° 196 (Camelopardi) Mag. 6.26 Spect. F0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 9 12	+ ° / 84 14	h m 9 12	+ ° / 84 14	h m 9 12	+ ° / 84 14	h m 9 12	+ ° / 84 14	h m 9 12	+ ° / 84 14	h m 9 12	+ ° / 84 14
1	s 47.64	" 15.72	s 51.55	" 23.90	s 51.53	" 32.75	s 47.98	" 40.13	s 42.61	" 43.08	s 37.03	" 40.87
2	47.82	15.97	51.58	24.18	51.46	32.99	47.86	40.30	42.44	43.14	36.84	40.73
3	47.98	16.22	51.62	24.44	51.40	33.22	47.74	40.48	42.24	43.19	36.65	40.57
4	48.12	16.46	51.67	24.69	51.35	33.46	47.60	40.69	42.03	43.24	36.46	40.38
5	48.26	16.68	51.73	24.94	51.32	33.71	47.44	40.90	41.81	43.26	36.29	40.18
6	48.40	16.87	51.81	25.20	51.28	34.00	47.26	41.11	41.58	43.26	36.12	39.96
7	48.55	17.04	51.89	25.49	51.24	34.30	47.07	41.30	41.36	43.24	35.98	39.74
8	48.72	17.21	<sup>51 97</sup> 52 04	<sup>25 80</sup> 26 14	51.17	34.62	46.86	41.48	41.13	43.20	35.85	39.51
9	48.90	17.39	52.09	26.50	51.09	34.95	46.65	41.63	40.92	43.14	35.73	39.29
10	49.10	17.58	52.11	26.86	50.98	35.27	46.44	41.76	40.72	43.06	35.62	39.08
11	49.30	17.82	52.11	27.22	50.86	35.58	46.23	41.86	40.54	42.98	35.51	38.89
12	49.49	18.08	52.09	27.57	50.72	35.86	46.03	41.95	40.36	42.90	35.40	38.71
13	49.67	18.37	52.06	27.89	50.57	36.13	45.84	42.03	40.20	42.82	35.29	38.53
14	49.82	18.68	52.03	28.20	50.43	36.38	45.67	42.11	40.05	42.76	35.16	38.36
15	49.95	18.98	52.00	28.49	50.29	36.60	45.50	42.19	39.89	42.71	35.02	38.19
16	50.06	19.28	51.97	28.77	50.16	36.82	45.34	42.28	39.73	42.67	34.87	38.00
17	50.15	19.57	51.96	29.04	50.04	37.03	45.19	42.37	39.56	42.63	34.71	37.78
18	50.24	19.85	51.95	29.32	49.93	37.24	45.03	42.49	39.38	42.60	34.56	37.53
19	50.33	20.11	51.95	29.59	49.83	37.45	44.86	42.61	39.18	42.55	34.42	37.24
20	50.42	20.36	51.96	29.88	49.74	37.68	44.68	42.73	38.97	42.49	34.30	36.93
21	50.52	20.60	51.96	30.19	49.64	37.92	44.48	42.86	38.75	42.38	34.21	36.62
22	50.63	20.84	51.96	30.51	49.53	38.18	44.27	42.96	38.54	42.24	34.15	36.32
23	50.74	21.09	51.95	30.86	49.41	38.45	44.04	43.03	38.35	42.07	34.09	36.04
24	50.87	21.34	51.92	31.21	49.27	38.72	43.81	43.07	38.19	41.89	34.04	35.79
25	50.99	21.62	51.87	31.56	49.11	38.98	43.59	43.07	38.05	41.70	33.98	35.57
26	51.12	21.92	51.80	31.90	48.93	39.21	43.40	43.05	37.92	41.54	33.90	35.35
27	51.24	22.23	51.71	32.21	48.74	39.41	43.22	43.02	37.81	41.40	33.81	35.14
28	51.34	22.57	51.62	32.49	48.56	39.58	43.07	43.00	37.68	41.28	33.69	34.91
29	51.42	22.92	51.53	32.75	48.39	39.73	42.92	43.01	37.54	41.19	33.58	34.67
30	51.48	23.26			48.24	39.85	42.77	43.04	37.39	41.09	33.45	34.40
31	51.52	23.59			48.10	39.99	42.61	43.08	37.22	40.99	33.34	34.11
32	51.55	23.90			47.98	40.13			37.03	40.87		
	sec δ 9.96	tan δ 9.91	sec δ 9.97	tan δ 9.92	sec δ 9.97	tan δ 9.92	sec δ 9.97	tan δ 9.92	sec δ 9.97	tan δ 9.92	sec δ 9.97	tan δ 9.92

Mean R.A. 9<sup>h</sup> 12<sup>m</sup> 41.<sup>s</sup>57

Double lower transit August 9

Mean Dec. +84° 14' 13.93"



**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

391

1640 B.D. +84° 196 (Camelopardi) Mag. 6.26 Spect. F0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 9 12	+ ° / 84 14	h m 9 12	+ ° / 84 14	h m 9 12	+ ° / 84 14	h m 9 12	+ ° / 84 13	h m 9 12	+ ° / 84 13	h m 9 12	+ ° / 84 13
	s "	s "	s "	s "	s "	s "	s "	s "	s "	s "	s "	s "
1	33.34	34.11	32.42	24.13	34.77	13.43	39.69	64.41	46.69	58.22	54.26	56.51
2	33.23	33.81	32.46	23.76	34.92	13.12	39.89	64.19	46.90	58.06	54.52	56.47
3	33.14	33.49	32.51	23.40	35.06	12.83	40.07	63.98	47.13	57.89	54.80	56.45
4	33.07	33.16	32.57	23.05	35.19	12.55	40.24	63.74	47.38	57.70	55.10	56.46
5	33.01	32.83	32.63	22.72	35.31	12.26	40.41	63.48	47.65	57.52	55.40	56.50
6	32.96	32.51	32.69	22.41	35.41	11.97	40.59	63.20	47.94	57.36	55.68	56.59
7	32.93	32.20	32.74	22.11	35.51	11.66	40.78	62.90	48.25	57.24	55.95	56.70
8	32.90	31.90	32.78	21.81	35.62	11.32	41.00	62.60	48.55	57.15	56.20	56.82
9	32.87	31.62	32.81	21.50	35.73	10.95	41.24	62.30	48.83	57.09	56.42	56.94
10	32.84	31.35	32.83	21.18	35.87	10.58	41.50	62.03	49.10	57.05	56.63	57.05
11	32.79	31.09	32.85	20.84	36.03	10.20	41.77	61.80	49.36	57.01	56.83	57.15
12	32.74	30.83	32.87	20.47	36.21	09.83	42.03	61.59	49.59	56.98	57.03	57.24
13	32.67	30.55	32.91	20.08	36.41	09.49	42.28	61.41	49.81	56.94	57.23	57.32
14	32.60	30.26	32.97	19.67	36.61	09.18	42.51	61.24	50.03	56.88	57.44	57.39
15	32.53	29.94	33.05	19.26	36.81	08.90	42.73	61.08	50.25	56.81	57.66	57.45
16	32.47	29.59	33.16	18.87	37.00	08.63	42.93	60.91	50.48	56.72	57.89	57.53
17	32.42	29.21	33.28	18.50	37.16	08.38	43.13	60.73	50.72	56.63	58.14	57.62
18	32.40	28.82	33.41	18.17	37.32	08.13	43.32	60.53	50.97	56.55	58.38	57.73
19	32.41	28.44	33.52	17.86	37.45	07.86	43.52	60.32	51.24	56.47	58.63	57.86
20	32.44	28.07	33.62	17.56	37.59	07.58	43.73	60.09	51.51	56.41	58.88	58.01
21	32.47	27.74	33.70	17.27	37.73	07.28	43.95	59.87	51.80	56.37	59.12	58.18
22	32.50	27.43	33.77	16.97	37.87	06.96	44.19	59.64	52.08	56.35	59.34	58.37
23	32.52	27.14	33.82	16.65	38.03	06.64	44.44	59.43	52.36	56.36	59.55	58.57
24	32.52	26.87	33.88	16.31	38.21	06.31	44.71	59.23	52.64	56.38	59.74	58.77
25	32.51	26.58	33.94	15.96	38.40	05.99	44.98	59.06	52.90	56.42	59.92	58.96
26	32.48	26.28	34.02	15.59	38.60	05.68	45.25	58.91	53.14	56.47	60.09	59.13
27	32.44	25.96	34.11	15.21	38.82	05.39	45.52	58.77	53.37	56.51	60.25	59.28
28	32.41	25.62	34.21	14.83	39.04	05.11	45.78	58.66	53.59	56.54	60.43	59.41
29	32.39	25.26	34.34	14.46	39.27	04.86	46.02	58.56	53.80	56.55	60.62	59.53
30	32.38	24.89	34.47	14.10	39.48	04.63	46.26	58.46	54.02	56.54	60.83	59.65
31	32.39	24.51	34.62	13.75	39.69	04.41	46.48	58.35	54.26	56.51	61.07	59.79
32	32.42	24.13	34.77	13.43			46.69	58.22			61.31	59.96
	sec δ 9.97	tan δ 9.92	sec δ 9.96	tan δ 9.91	sec δ 9.96	tan δ 9.91	sec δ 9.95	tan δ 9.90	sec δ 9.95	tan δ 9.90	sec δ 9.95	tan δ 9.90

Mean R.A. 9<sup>h</sup> 12<sup>m</sup> 41.<sup>s</sup>57

Double lower transit August 9

Mean Dec. +84° 14' 13.<sup>''</sup>93

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

910 1 H. Draconis Mag. 4.58 Spect. K2

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 9 35	<sup>+</sup> <sup>o</sup> ' <sup>s</sup> 81 23	<sup>h</sup> <sup>m</sup> 9 35	<sup>+</sup> <sup>o</sup> ' <sup>s</sup> 81 23	<sup>h</sup> <sup>m</sup> 9 35	<sup>+</sup> <sup>o</sup> ' <sup>s</sup> 81 23	<sup>h</sup> <sup>m</sup> 9 35	<sup>+</sup> <sup>o</sup> ' <sup>s</sup> 81 23	<sup>h</sup> <sup>m</sup> 9 35	<sup>+</sup> <sup>o</sup> ' <sup>s</sup> 81 23	<sup>h</sup> <sup>m</sup> 9 35	<sup>+</sup> <sup>o</sup> ' <sup>s</sup> 81 23
1	<sup>s</sup> 17.58	" 15.00	<sup>s</sup> 20.66	" 22.35	<sup>s</sup> 21.12	" 31.02	<sup>s</sup> 19.14	" 38.84	<sup>s</sup> 15.76	" 42.66	<sup>s</sup> 12.02	" 41.48
2	17.71	15.22	20.70	22.62	21.08	31.27	19.08	39.03	15.65	42.74	11.89	41.38
3	17.83	15.43	20.74	22.87	21.06	31.50	19.00	39.24	15.52	42.83	11.75	41.25
4	17.94	15.64	20.78	23.11	21.04	31.75	18.92	39.46	15.38	42.91	11.62	41.10
5	18.04	15.83	20.84	23.34	21.03	32.00	18.83	39.69	15.24	42.97	11.50	40.93
6	18.15	15.99	20.91	23.58	21.03	32.29	18.72	39.93	15.08	43.01	11.39	40.75
7	18.26	16.14	20.99	23.85	21.01	32.59	18.60	40.15	14.93	43.03	11.28	40.56
8	18.39	16.27	21.06	24.15	20.99	32.92	18.46	40.36	14.78	43.02	11.19	40.36
9	18.53	16.41	21.12	24.47	20.94	33.25	18.33	40.54	14.64	43.00	11.11	40.17
10	18.68	16.58	21.17	24.82	20.89	33.59	18.19	40.70	14.51	42.96	11.03	39.99
11	18.83	16.77	21.20	25.17	20.82	33.91	18.06	40.84	14.39	42.91	10.95	39.82
12	18.97	17.00	21.22	25.52	20.74	34.21	17.93	40.96	14.27	42.86	10.87	39.66
13	19.11	17.26	21.22	25.86	20.65	34.49	17.82	41.07	14.17	42.82	10.79	39.52
14	19.22	17.53	<sup>21.22</sup> <sup>21.21</sup>	<sup>26.18</sup> <sup>26.49</sup>	20.57	34.76	17.71	41.17	14.06	42.79	10.70	39.37
15	19.32	17.81	21.21	26.78	20.49	35.00	17.60	41.28	13.96	42.76	10.60	39.23
16	19.41	18.09	21.21	27.05	20.42	35.23	17.51	41.39	13.85	42.75	10.49	39.07
17	19.49	18.35	21.21	27.32	20.35	35.46	17.41	41.52	13.74	42.75	10.38	38.88
18	19.56	18.61	21.22	27.59	20.29	35.68	17.31	41.65	13.62	42.75	10.27	38.66
19	19.63	18.85	21.24	27.86	20.23	35.91	17.21	41.80	13.48	42.74	10.17	38.41
20	19.71	19.07	21.26	28.15	20.18	36.15	17.09	41.96	13.34	42.71	10.08	38.13
21	19.79	19.29	21.28	28.45	20.13	36.41	16.97	42.11	13.19	42.64	10.01	37.84
22	19.88	19.51	21.30	28.77	20.07	36.68	16.83	42.25	13.05	42.54	09.96	37.56
23	19.97	19.73	21.31	29.10	20.00	36.96	16.68	42.36	12.92	42.41	09.92	37.30
24	20.07	19.96	21.31	29.45	19.92	37.25	16.53	42.43	12.81	42.26	09.88	37.07
25	20.17	20.21	21.29	29.81	19.83	37.53	16.39	42.47	12.71	42.10	09.83	36.87
26	20.28	20.49	21.25	30.15	19.72	37.79	16.26	42.48	12.63	41.97	09.77	36.68
27	20.37	20.78	21.21	30.47	19.60	38.02	16.15	42.48	12.55	41.85	09.70	36.49
28	20.46	21.09	21.16	30.76	19.49	38.21	16.05	42.50	12.47	41.77	09.62	36.29
29	20.53	21.42	21.12	31.02	19.38	38.38	15.96	42.53	12.37	41.70	09.53	36.07
30	20.59	21.74			19.29	38.53	15.86	42.58	12.27	41.63	09.44	35.83
31	20.63	22.06			19.21	38.68	15.76	42.66	12.15	41.56	09.35	35.57
32	20.66	22.35			19.14	38.84			12.02	41.48		
	sec δ 6.68	tan δ 6.60	sec δ 6.68	tan δ 6.61	sec δ 6.68	tan δ 6.61	sec δ 6.68	tan δ 6.61	sec δ 6.68	tan δ 6.61	sec δ 6.68	tan δ 6.61

Mean R.A. <sup>h</sup> 9 <sup>m</sup> 35 <sup>s</sup> 14.13

Double lower transit August 15

Mean Dec. +81° 23' 14.7"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

393

910 1 H. Draconis · Mag. 4.58 Spect. K2

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /
	9 35	81 23	9 35	81 23	9 35	81 23	9 35	81 22	9 35	81 22	9 35	81 22
	s	"	s	"	s	"	s	"	s	"	s	"
1	09.35	35.57	08.39	26.05	09.57	15.28	12.52	65.69	16.99	58.48	22.08	55.55
2	09.27	35.29	08.40	25.69	09.65	14.96	12.64	65.45	17.13	58.29	22.26	55.47
3	09.20	34.99	08.43	25.33	09.74	14.65	12.75	65.20	17.28	58.08	22.46	55.40
4	09.14	34.69	08.46	24.98	09.81	14.36	12.85	64.94	17.44	57.86	22.66	55.37
5	09.09	34.38	08.49	24.65	09.88	14.06	12.96	64.66	17.62	57.64	22.87	55.36
6	09.05	34.08	08.52	24.34	09.94	13.76	13.06	64.35	17.82	57.43	23.07	55.40
7	09.02	33.78	08.54	24.04	09.99	13.43	13.19	64.03	18.02	57.26	23.26	55.46
8	08.99	33.50	08.55	23.75	10.04	13.08	13.32	63.69	18.22	57.13	23.43	55.54
9	08.96	33.24	08.56	23.45	10.11	12.71	13.48	63.37	18.41	57.02	23.59	55.62
10	08.93	32.98	08.56	23.13	10.19	12.32	13.64	63.07	18.60	56.94	23.73	55.70
11	08.89	32.74	08.55	22.79	10.28	11.92	13.82	62.79	18.76	56.87	23.87	55.76
12	08.84	32.49	08.55	22.43	10.39	11.54	13.99	62.55	18.92	56.80	24.01	55.81
13	08.79	32.24	08.56	22.04	10.51	11.18	14.15	62.33	19.07	56.71	24.15	55.85
14	08.73	31.96	08.59	21.63	10.64	10.84	14.30	62.13	19.21	56.62	24.30	55.89
15	08.67	31.66	08.64	21.22	10.76	10.53	14.43	61.94	19.36	56.51	24.46	55.92
16	08.61	31.33	08.70	20.83	10.88	10.25	14.56	61.74	19.51	56.39	24.62	55.95
17	08.57	30.97	08.77	20.45	10.98	09.98	14.68	61.53	19.67	56.26	24.80	56.00
18	08.54	30.60	08.84	20.11	11.07	09.71	14.81	61.30	19.84	56.14	24.97	56.07
19	08.54	30.23	08.90	19.79	11.15	09.42	14.93	61.06	20.02	56.02	25.15	56.15
20	08.55	29.87	08.96	19.49	11.22	09.12	15.06	60.80	20.21	55.91	25.33	56.26
21	08.56	29.54	09.00	19.19	11.30	08.81	15.21	60.54	20.40	55.83	25.50	56.39
22	08.57	29.24	09.03	18.89	11.39	08.47	15.36	60.28	20.60	55.77	25.66	56.54
23	08.58	28.96	09.05	18.57	11.48	08.13	15.52	60.04	20.79	55.73	25.81	56.70
24	08.56	28.69	09.08	18.23	11.59	07.78	15.70	59.80	20.97	55.71	25.95	56.86
25	08.54	28.42	09.10	17.87	11.71	07.44	15.87	59.59	21.15	55.70	26.08	57.02
26	08.51	28.13	09.14	17.50	11.84	07.10	16.05	59.39	21.32	55.71	26.20	57.16
27	08.47	27.83	09.19	17.12	11.97	06.78	16.23	59.22	21.48	55.71	26.32	57.28
28	08.44	27.50	09.24	16.73	12.11	06.48	16.40	59.07	21.63	55.70	26.45	57.37
29	08.41	27.16	09.31	16.35	12.25	06.20	16.56	58.93	21.77	55.67	26.59	57.45
30	08.39	26.80	09.39	15.98	12.39	05.93	16.71	58.79	21.92	55.62	26.74	57.54
31	08.39	26.43	09.48	15.62	12.52	05.69	16.85	58.64	22.08	55.55	26.91	57.63
32	08.39	26.05	09.57	15.28			16.99	58.48			27.09	57.77

Mean R.A. 9<sup>h</sup> 35<sup>m</sup> 14.13<sup>s</sup>

Double lower transit August 15

Mean Dec. +81° 23' 14.37"

sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ
6.68	6.61	6.68	6.60	6.68	6.60	6.67	6.60	6.67	6.60	6.67	6.60	6.67	6.60

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

911 30 H. Camelopardis Mag. 5.34 Spect. F2

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 10 29	+ ° ' / 82 37	h m 10 29	+ ° ' / 82 37	h m 10 29	+ ° ' / 82 37	h m 10 29	+ ° ' / 82 38	h m 10 29	+ ° ' / 82 38	h m 10 29	+ ° ' / 82 38
	s "	s "	s "	s "	s "	s "	s "	s "	s "	s "	s "	s "
1	34.96	38.44	39.39	44.25	40.97	52.63	39.67	01.41	36.23	06.98	31.73	07.87
2	35.14	38.59	39.46	44.50	40.96	52.89	39.61	01.63	36.11	07.13	31.57	07.83
3	35.30	38.74	39.54	44.73	40.96	53.14	39.55	01.88	35.97	07.28	31.40	07.78
4	35.45	38.89	39.62	44.94	40.98	53.40	39.49	02.14	35.82	07.42	31.23	07.70
5	35.59	39.03	39.72	45.14	41.00	53.66	39.41	02.42	35.66	07.56	31.06	07.61
6	35.73	39.14	39.83	45.36	41.02	53.95	39.31	02.71	35.49	07.68	30.91	07.49
7	35.88	39.23	39.95	45.59	41.04	54.26	39.20	02.99	35.32	07.77	30.76	07.36
8	36.04	39.31	40.06	45.86	41.05	54.60	39.07	03.25	35.15	07.85	30.63	07.23
9	36.22	39.39	40.17	46.15	41.05	54.95	38.94	03.50	34.98	07.90	30.51	07.09
10	36.41	39.48	40.27	46.47	41.02	55.30	38.80	03.73	34.82	07.93	30.39	06.96
11	36.60	39.61	40.35	46.80	40.98	55.65	38.67	03.93	34.67	07.96	30.28	06.84
12	36.80	39.77	40.41	47.13	40.93	55.99	38.54	04.12	34.54	07.97	30.17	06.73
13	36.98	39.96	40.46	47.46	40.87	56.31	38.42	04.29	34.40	07.99	30.06	06.63
14	37.14	40.17	40.49	47.78	40.81	56.61	38.30	04.46	34.28	08.02	29.93	06.54
15	37.29	40.40	40.53	48.09	40.74	56.89	38.20	04.62	34.16	08.06	29.80	06.45
16	37.43	40.63	40.56	48.37	40.69	57.16	38.10	04.79	34.03	08.11	29.65	06.35
17	37.55	40.85	40.59	48.65	40.64	57.42	38.00	04.96	33.90	08.16	29.50	06.23
18	37.67	41.06	40.63	48.92	40.60	57.68	37.90	05.15	33.76	08.23	29.34	06.07
19	37.78	41.26	40.67	49.18	40.56	57.94	37.80	05.36	33.60	08.29	29.19	05.88
20	37.90	41.45	40.72	49.45	40.53	58.21	37.69	05.57	33.43	08.33	29.05	05.66
21	38.01	41.64	40.78	49.72	40.50	58.49	37.56	05.78	33.25	08.34	28.94	05.42
22	38.14	41.81	40.84	50.01	40.47	58.78	37.42	05.99	33.08	08.32	28.84	05.18
23	38.28	41.99	40.90	50.32	40.43	59.10	37.26	06.17	32.91	08.26	28.76	04.96
24	38.42	42.17	40.96	50.65	40.37	59.42	37.10	06.32	32.76	08.18	28.68	04.77
25	38.57	42.38	41.00	50.99	40.29	59.74	36.94	06.43	32.63	08.09	28.60	04.60
26	38.72	42.60	41.02	51.35	40.20	60.05	36.79	06.51	32.51	08.01	28.50	04.44
27	38.86	42.84	41.02 41.01	51.70 52.03	40.09	60.34	36.66	06.58	32.40	07.95	28.39	04.30
28	39.00	43.11	40.99	52.35	39.99	60.59	36.55	06.66	32.29	07.91	28.27	04.14
29	39.12	43.39	40.97	52.63	39.89	60.81	36.44	06.74	32.17	07.89	28.14	03.98
30	39.22	43.69			39.80	61.01	36.34	06.85	32.04	07.89	28.00	03.79
31	39.31	43.97			39.73	61.21	36.23	06.98	31.89	07.88	27.86	03.58
32	39.39	44.25			39.67	61.41			31.73	07.87		
	sec δ 7.79	tan δ 7.73	sec δ 7.80	tan δ 7.73	sec δ 7.80	tan δ 7.73	sec δ 7.80	tan δ 7.74	sec δ 7.80	tan δ 7.74	sec δ 7.80	tan δ 7.74

Mean R.A.  $10^{\text{h}} 29^{\text{m}} 30.66^{\text{s}}$

Double lower transit August 29

Mean Dec.  $+82^{\circ} 37' 40.74''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

395

911 30 H. Camelopardi Mag. 5.34 Spect. F2

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /	h m	+ o /
	10 29	82 37	10 29	82 37	10 29	82 37	10 29	82 37	10 29	82 37	10 29	82 37
	s	"	s	"	s	"	s	"	s	"	s	"
1	27.86	63.58	25.50	54.90	25.43	43.88	27.58	33.08	31.77	23.87	37.22	18.60
2	27.73	63.35	25.47	54.54	25.49	43.52	27.68	32.79	31.91	23.62	37.41	18.44
3	27.61	63.11	25.44	54.19	25.55	43.18	27.78	32.49	32.05	23.35	37.63	18.29
4	27.50	62.84	25.43	53.84	25.60	42.85	27.86	32.18	32.21	23.05	37.85	18.16
5	27.41	62.58	25.42	53.51	25.63	42.53	27.95	31.86	32.39	22.75	38.09	18.06
6	27.32	62.31	25.41	53.19	25.66	42.20	28.03	31.50	32.58	22.47	38.32	18.01
7	27.24	62.04	25.40	52.89	25.68	41.86	28.13	31.13	32.79	22.21	38.54	17.98
8	27.17	61.79	25.38	52.59	25.70	41.49	28.25	30.74	33.01	21.98	38.75	17.97
9	27.10	61.55	25.34	52.30	25.72	41.09	28.38	30.35	33.21	21.79	38.94	17.98
10	27.03	61.32	25.30	51.99	25.76	40.68	28.53	29.98	33.41	21.62	39.11	17.98
11	26.96	61.10	25.25	51.66	25.82	40.25	28.69	29.63	33.59	21.47	39.28	17.97
12	26.87	60.89	25.21	51.30	25.90	39.83	28.85	29.31	33.76	21.32	39.45	17.96
13	26.77	60.67	25.17	50.92	25.99	39.42	29.01	29.02	33.92	21.16	39.62	17.93
14	26.67	60.43	25.15	50.52	26.09	39.03	29.16	28.75	34.07	21.00	39.79	17.89
15	26.56	60.17	25.15	50.10	26.19	38.67	29.29	28.49	34.23	20.82	39.97	17.85
16	26.45	59.88	25.16	49.69	26.28	38.34	29.41	28.23	34.39	20.63	40.16	17.81
17	26.36	59.55	25.19	49.30	26.36	38.02	29.52	27.96	34.55	20.43	40.37	17.78
18	26.28	59.21	25.23	48.93	26.43	37.71	29.63	27.68	34.73	20.23	40.57	17.77
19	26.22	58.86	25.26	48.59	26.49	37.39	29.75	27.38	34.92	20.04	40.79	17.77
20	26.18	58.51	25.28	48.27	26.54	37.06	29.87	27.07	35.12	19.85	41.00	17.80
21	26.16	58.19	25.29	47.96	26.59	36.71	30.00	26.75	35.33	19.67	41.21	17.84
22	26.13	57.90	25.29	47.65	26.64	36.34	30.14	26.43	35.54	19.52	41.41	17.91
23	26.09	57.63	25.27	47.32	26.71	35.96	30.30	26.11	35.76	19.39	41.60	18.00
24	26.04	57.37	25.26	46.98	26.79	35.57	30.46	25.80	35.97	19.28	41.78	18.09
25	25.98	57.12	25.24	46.62	26.88	35.18	30.64	25.50	36.17	19.19	41.95	18.18
26	25.91	56.86	25.24	46.23	26.98	34.79	30.82	25.23	36.36	19.11	42.11	18.26
27	25.83	56.58	25.24	45.84	27.09	34.42	30.99	24.98	36.54	19.04	42.26	18.32
28	25.75	56.27	25.26	45.44	27.21	34.05	31.17	24.74	36.71	18.96	42.42	18.35
29	25.67	55.95	25.28	45.04	27.34	33.71	31.34	24.53	36.88	18.86	42.59	18.37
30	25.60	55.62	25.33	44.64	27.46	33.39	31.49	24.32	37.04	18.74	42.77	18.38
31	25.54	55.26	25.38	44.25	27.58	33.08	31.64	24.10	37.22	18.60	42.98	18.41
32	25.50	54.90	25.43	43.88			31.77	23.87			43.20	18.46
	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$
	7.80	7.73	7.80	7.73	7.79	7.73	7.79	7.73	7.79	7.72	7.79	7.72

Mean R.A. 10<sup>h</sup> 29<sup>m</sup> 30<sup>s</sup>.66

Double lower transit August 29

Mean Dec. +82° 37' 40".74

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1641 B.D. +86° 161 (Camelopardi) Mag. 7.17 Spect. A2

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 11 13	+ ° ' " / 85 42	h m 11 13	+ ° ' " / 85 42	h m 11 13	+ ° ' " / 85 42	h m 11 13	+ ° ' " / 85 43	h m 11 13	+ ° ' " / 85 43	h m 11 13	+ ° ' " / 85 43
1	09.38	44.66	17.72	49.10	21.71	56.70	20.90	06.24	15.86	12.99	08.16	15.45
2	09.70	44.75	17.88	49.32	21.73	56.99	20.83	06.48	15.67	13.18	07.87	15.47
3	10.01	44.85	18.04	49.53	21.75	57.26	20.77	06.75	15.47	13.37	07.57	15.47
4	10.29	44.95	18.22	49.72	21.79	57.52	20.69	07.04	15.24	13.57	07.26	15.46
5	10.55	45.04	18.41	49.90	21.84	57.77	20.60	07.34	14.98	13.76	06.96	15.42
6	10.80	45.11	18.62	50.08	21.92	58.03	20.49	07.66	14.71	13.93	06.66	15.36
7	11.05	45.16	18.85	50.28	22.00	58.32	20.34	07.97	14.43	14.09	06.38	15.28
8	11.33	45.19	19.09	50.51	22.09	58.62	20.18	08.28	14.15	14.22	06.12	15.20
9	11.63	45.22	19.32	50.77	22.16	58.96	19.99	08.57	13.87	14.33	05.88	15.11
10	11.96	45.27	19.53	51.05	<sup>22 20</sup> <sub>22 22</sub>	<sup>59 31</sup> <sub>59 67</sub>	19.80	08.84	13.60	14.42	05.65	15.02
11	12.30	45.33	19.72	51.36	22.21	60.03	19.60	09.09	13.34	14.50	05.43	14.94
12	12.64	45.43	19.88	51.67	22.18	60.38	19.41	09.32	13.10	14.57	05.21	14.87
13	12.98	45.57	20.02	51.99	22.14	60.72	19.23	09.54	12.87	14.63	04.99	14.81
14	13.29	45.73	20.14	52.29	22.08	61.04	19.05	09.75	12.65	14.71	04.76	14.77
15	13.58	45.90	20.24	52.59	22.02	61.34	18.89	09.95	12.44	14.79	04.51	14.72
16	13.85	46.09	20.34	52.87	21.97	61.63	18.74	10.15	12.23	14.88	04.24	14.67
17	14.10	46.27	20.44	53.13	21.92	61.91	18.60	10.36	12.01	14.98	03.95	14.60
18	14.33	46.45	20.54	53.39	21.89	62.18	18.47	10.58	11.77	15.09	03.65	14.50
19	14.55	46.61	20.66	53.64	21.87	62.46	18.32	10.82	11.52	15.20	03.35	14.36
20	14.77	46.77	20.79	53.89	21.86	62.74	18.17	11.07	11.23	15.30	03.07	14.19
21	15.00	46.91	20.93	54.15	21.85	63.03	17.98	11.32	10.93	15.37	02.82	14.00
22	15.24	47.05	21.07	54.42	21.84	63.34	17.77	11.58	10.61	15.41	02.60	13.80
23	15.49	47.19	21.22	54.71	21.82	63.67	17.54	11.81	10.31	15.42	02.41	13.62
24	15.75	47.34	21.36	55.02	21.77	64.01	17.28	12.01	10.03	15.39	02.23	13.45
25	16.03	47.49	21.49	55.36	21.70	64.35	17.02	12.18	09.78	15.35	02.05	13.31
26	16.31	47.67	21.59	55.70	21.60	64.69	16.78	12.32	09.55	15.31	01.85	13.20
27	16.59	47.87	21.65	56.05	21.47	65.01	16.56	12.44	09.35	15.30	01.63	13.09
28	16.87	48.09	21.69	56.39	21.33	65.29	16.37	12.55	09.14	15.30	01.39	12.97
29	17.12	48.33	21.71	56.70	21.19	65.55	16.20	12.68	08.93	15.33	01.13	12.85
30	17.34	48.59			21.07	65.78	16.03	12.83	08.69	15.37	00.87	12.71
31	17.54	48.85			20.98	66.01	15.86	12.99	08.44	15.41	00.60	12.55
32	17.72	49.10			20.90	66.24			08.16	15.45		
	sec δ 13.38	tan δ 13.34	sec δ 13.38	tan δ 13.35	sec δ 13.39	tan δ 13.35	sec δ 13.40	tan δ 13.36	sec δ 13.40	tan δ 13.36	sec δ 13.40	tan δ 13.36

Mean R.A. 11<sup>h</sup> 13<sup>m</sup> 01.<sup>s</sup>11

Double lower transit September 9

Mean Dec. +85° 42' 49".25

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

397

1641 B.D. +86° 161 (Camelopardi) Mag. 7.17 Spect. A2

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 11 12	<sup>+</sup> <sup>o</sup> / 85 43	<sup>h</sup> <sup>m</sup> 11 12	<sup>+</sup> <sup>o</sup> / 85 42	<sup>h</sup> <sup>m</sup> 11 12	<sup>+</sup> <sup>o</sup> / 85 42	<sup>h</sup> <sup>m</sup> 11 12	<sup>+</sup> <sup>o</sup> / 85 42	<sup>h</sup> <sup>m</sup> 11 12	<sup>+</sup> <sup>o</sup> / 85 42	<sup>h</sup> <sup>m</sup> 11 13	<sup>+</sup> <sup>o</sup> / 85 42
	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"
1	60.60	12.55	54.82	64.78	52.60	53.90	54.23	42.51	59.63	32.06	07.77	25.15
2	60.33	12.37	54.69	64.44	52.63	53.53	54.36	42.18	59.81	31.77	08.07	24.94
3	60.07	12.17	54.58	64.09	52.66	53.17	54.47	41.86	60.00	31.45	08.39	24.73
4	59.83	11.95	54.49	63.76	52.68	52.83	54.56	41.52	60.21	31.11	08.74	24.53
5	59.60	11.72	54.41	63.43	52.69	52.50	54.64	41.17	60.45	30.77	09.12	24.37
6	59.40	11.49	54.33	63.12	52.67	52.16	54.72	40.79	60.72	30.42	09.49	24.24
7	59.21	11.25	54.25	62.83	52.65	51.81	54.82	40.39	61.02	30.10	09.85	24.15
8	59.04	11.03	54.16	62.54	52.61	51.44	54.94	39.97	61.33	29.82	10.19	24.08
9	58.87	10.81	54.05	62.25	52.58	51.04	55.09	39.55	61.64	29.56	10.51	24.02
10	58.70	10.61	53.92	61.96	52.57	50.62	55.27	39.14	61.94	29.33	10.81	23.97
11	58.53	10.42	53.78	61.65	52.59	50.18	55.47	38.74	62.22	29.12	11.09	23.91
12	58.34	10.23	53.63	61.31	52.63	49.73	55.69	38.38	62.48	28.91	11.37	23.84
13	58.13	10.05	53.50	60.95	52.71	49.30	55.90	38.04	62.73	28.71	11.64	23.76
14	57.91	09.85	53.38	60.56	52.80	48.89	56.10	37.72	62.96	28.50	11.92	23.68
15	57.67	09.62	53.29	60.15	52.90	48.50	56.28	37.42	63.18	28.28	12.22	23.58
16	57.43	09.37	53.24	59.74	53.00	48.14	56.44	37.12	63.42	28.04	12.53	23.49
17	57.20	09.08	53.21	59.35	53.08	47.80	56.58	36.82	63.66	27.79	12.85	23.40
18	57.00	08.77	53.20	58.97	53.14	47.47	56.72	36.50	63.92	27.54	13.19	23.32
19	56.83	08.45	53.19	58.62	53.18	47.13	56.85	36.17	64.20	27.29	13.55	23.26
20	56.69	08.12	53.16	58.30	53.21	46.78	57.00	35.83	64.50	27.04	13.91	23.22
21	56.58	07.82	53.12	57.99	53.23	46.42	57.16	35.47	64.81	26.81	14.26	23.20
22	56.47	07.54	53.06	57.68	53.26	46.04	57.34	35.10	65.14	26.59	14.61	23.21
23	56.35	07.29	52.97	57.36	53.30	45.64	57.54	34.74	65.47	26.40	14.95	23.23
24	56.22	07.05	52.88	57.02	53.36	45.23	57.76	34.38	65.80	26.22	15.26	23.26
25	56.06	06.82	52.79	56.66	53.43	44.81	58.00	34.04	66.13	26.07	15.56	23.30
26	55.89	06.58	52.71	56.29	53.53	44.40	58.25	33.71	66.44	25.93	15.83	23.33
27	55.70	06.32	52.64	55.90	53.65	43.99	58.51	33.40	66.73	25.80	16.10	23.35
28	55.51	06.05	52.59	55.50	53.79	43.60	58.76	33.12	67.00	25.67	16.37	23.34
29	55.31	05.76	52.57	55.09	53.93	43.22	59.00	32.85	67.26	25.52	16.65	23.31
30	55.13	05.45	52.56	54.69	54.08	42.85	59.23	32.59	67.51	25.35	16.96	23.26
31	54.96	05.12	52.57	54.29	54.23	42.51	59.44	32.33	67.77	25.15	17.29	23.23
32	54.82	04.78	52.60	53.90			59.63	32.06			17.66	23.22
	sec δ 13.40	tan δ 13.36	sec δ 13.39	tan δ 13.35	sec δ 13.38	tan δ 13.34	sec δ 13.37	tan δ 13.33	sec δ 13.36	tan δ 13.32	sec δ 13.36	tan δ 13.32

Mean R.A. 11<sup>h</sup> 13<sup>m</sup> 01.11<sup>s</sup>

Double lower transit September 9

Mean Dec. +85° 42' 49.25"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1642 Groombridge 1850 (Camelopardi) Mag. 6.38 Spect. F5

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 12 03	<sup>+</sup> <sup>o</sup> <sup>'</sup> 85 39	<sup>h</sup> <sup>m</sup> 12 04	<sup>+</sup> <sup>o</sup> <sup>'</sup> 85 39	<sup>h</sup> <sup>m</sup> 12 04	<sup>+</sup> <sup>o</sup> <sup>'</sup> 85 39	<sup>h</sup> <sup>m</sup> 12 04	<sup>+</sup> <sup>o</sup> <sup>'</sup> 85 39	<sup>h</sup> <sup>m</sup> 12 04	<sup>+</sup> <sup>o</sup> <sup>'</sup> 85 40	<sup>h</sup> <sup>m</sup> 12 03	<sup>+</sup> <sup>o</sup> <sup>'</sup> 85 40
	<sup>s</sup> 58.61	<sup>"</sup> 35.96	<sup>s</sup> 07.58	<sup>"</sup> 38.31	<sup>s</sup> 12.95	<sup>"</sup> 44.81	<sup>s</sup> 14.03	<sup>"</sup> 54.38	<sup>s</sup> 10.47	<sup>"</sup> 02.27	<sup>s</sup> 63.48	<sup>"</sup> 06.64
1	58.95	35.97	07.78	38.50	13.02	45.09	14.01	54.63	10.32	02.50	63.20	06.74
2	59.26	36.00	07.98	38.66	13.09	45.35	14.00	54.91	10.16	02.74	62.91	06.82
3												
4	59.55	36.03	08.19	38.81	13.18	45.60	13.99	55.21	09.97	02.99	62.61	06.88
5	59.82	36.05	08.41	38.94	13.29	45.83	13.95	55.54	09.76	03.24	62.31	06.92
6	60.08	36.06	08.65	39.07	13.41	46.07	13.90	55.87	09.54	03.48	62.01	06.93
7	60.34	36.05	08.92	39.22	13.55	46.33	13.83	56.21	09.29	03.70	61.73	06.93
8	60.62	36.02	09.19	39.38	13.69	46.61	13.72	56.55	09.05	03.90	61.46	06.92
9	60.92	35.97	09.47	39.58	13.82	46.92	13.60	56.88	08.80	04.08	61.21	06.90
10	61.24	35.94	09.73	39.81	13.93	47.26	13.47	57.20	08.55	04.23	60.97	06.87
11	61.59	35.93	09.97	40.06	14.02	47.60	13.33	57.49	08.32	04.38	60.74	06.85
12	61.94	35.95	10.19	40.33	14.08	47.96	13.19	57.77	08.10	04.51	60.52	06.84
13	62.29	36.00	10.38	40.60	14.12	48.31	13.05	58.03	07.89	04.63	60.29	06.84
14	62.63	36.08	10.55	40.87	14.14	48.65	12.92	58.27	07.69	04.76	60.06	06.86
15	62.94	36.18	10.71	41.13	14.15	48.98	12.81	58.51	07.51	04.89	59.81	06.87
16	63.24	36.30	10.86	41.38	14.15	49.29	12.70	58.75	07.32	05.04	59.53	06.89
17	63.51	36.41	11.01	41.62	14.16	49.59	12.61	58.99	07.12	05.20	59.24	06.89
18	63.77	36.53	11.16	41.85	14.17	49.87	12.52	59.25	06.92	05.36	58.93	06.87
19	64.02	36.64	11.33	42.07	14.19	50.15	12.43	59.52	06.69	05.54	58.61	06.82
20	64.27	36.74	11.50	42.28	14.23	50.42	12.32	59.80	06.43	05.70	58.31	06.72
21	64.51	36.83	11.69	42.50	14.27	50.70	12.20	60.09	06.15	05.85	58.02	06.60
22	64.77	36.91	11.88	42.73	14.32	50.99	12.04	60.39	05.85	05.97	57.78	06.47
23	65.04	36.98	12.09	42.98	<sup>14.37</sup> 14.41	<sup>51.30</sup> 51.63	11.85	60.68	05.56	06.05	57.55	06.34
24	65.33	37.06	12.28	43.26	14.44	51.97	11.65	60.94	05.28	06.10	57.35	06.23
25	65.63	37.15	12.47	43.55	14.43	52.33	11.43	61.17	05.03	06.13	57.14	06.15
26	65.94	37.26	12.63	43.86	14.40	52.68	11.22	61.36	04.81	06.15	56.93	06.08
27	66.25	37.39	12.76	44.19	14.33	53.02	11.04	61.54	04.61	06.19	56.69	06.03
28	66.56	37.54	12.86	44.51	14.26	53.33	10.88	61.70	04.41	06.25	56.44	05.98
29	66.85	37.72	12.95	44.81	14.17	53.62	10.73	61.87	04.21	06.33	56.16	05.93
30	67.12	37.91			14.11	53.88	10.60	62.06	03.99	06.43	55.88	05.86
31	67.36	38.12			14.06	54.13	10.47	62.27	03.75	06.54	55.58	05.77
32	67.58	38.31			14.03	54.38			03.48	06.64		
	sec $\delta$ 13.21	tan $\delta$ 13.18	sec $\delta$ 13.22	tan $\delta$ 13.18	sec $\delta$ 13.23	tan $\delta$ 13.19	sec $\delta$ 13.23	tan $\delta$ 13.20	sec $\delta$ 13.24	tan $\delta$ 13.20	sec $\delta$ 13.24	tan $\delta$ 13.20

Mean R.A. <sup>h</sup> <sup>m</sup> <sup>s</sup>  
12 03 51.59

Double lower transit September 22

Mean Dec. <sup>o</sup> <sup>'</sup> <sup>"</sup>  
+85 39 43.03



**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

399

1642 Groombridge 1850 (Camelopardi) Mag. 6.38 Spect. F5

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 12 03	+ ° ' " / 85 39	h m 12 03	+ ° ' " / 85 39	h m 12 03	+ ° ' " / 85 39	h m 12 03	+ ° ' " / 85 39	h m 12 03	+ ° ' " / 85 39	h m 12 03	+ ° ' " / 85 39
	s 55.58	" 65.77	s 48.46	" 59.71	s 44.18	" 49.71	s 43.54	" 38.26	s 46.75	" 26.79	s 53.33	" 18.13
1	55.58	65.77	48.46	59.71	44.18	49.71	43.54	38.26	46.75	26.79	53.33	18.13
2	55.29	65.66	48.27	59.41	44.14	49.35	43.60	37.91	46.87	26.46	53.58	17.85
3	55.00	65.53	48.10	59.10	44.10	48.99	43.64	37.56	46.99	26.11	53.85	17.57
4	54.72	65.38	47.94	58.80	44.05	48.66	43.67	37.22	47.13	25.73	54.16	17.30
5	54.46	65.22	47.80	58.51	43.99	48.33	43.68	36.85	47.30	25.34	54.49	17.05
6	54.22	65.04	47.67	58.22	43.91	48.01	43.68	36.47	47.50	24.94	54.83	16.84
7	53.99	64.87	47.53	57.96	43.82	47.67	43.70	36.05	47.73	24.56	55.16	16.66
8	53.78	64.69	47.38	57.70	43.71	47.32	43.74	35.62	47.98	24.21	55.48	16.51
9	53.57	64.53	47.22	57.45	43.60	46.94	43.80	35.17	48.23	23.88	55.78	16.38
10	53.37	64.38	47.03	57.20	43.51	46.53	43.90	34.73	48.48	23.59	56.05	16.26
11	53.16	64.24	46.84	56.93	43.44	46.10	44.02	34.30	48.71	23.31	56.32	16.13
12	52.94	64.10	46.63	56.64	43.40	45.66	44.16	33.89	48.92	23.05	56.57	16.00
13	52.70	63.97	46.43	56.32	43.39	45.22	44.30	33.51	49.11	22.80	56.82	15.86
14	52.44	63.83	46.24	55.97	43.40	44.80	44.43	33.16	49.30	22.53	57.08	15.71
15	52.17	63.68	46.07	55.60	43.43	44.40	44.54	32.82	49.48	22.26	57.35	15.54
16	51.89	63.49	45.94	55.22	43.45	44.03	44.64	32.49	49.66	21.98	57.63	15.38
17	51.61	63.27	45.84	54.84	43.46	43.68	44.72	32.16	49.85	21.68	57.93	15.22
18	51.36	63.02	45.75	54.49	43.45	43.34	44.79	31.82	50.05	21.37	58.25	15.06
19	51.13	62.75	45.68	54.15	43.42	43.00	44.86	31.46	50.27	21.06	58.58	14.92
20	50.93	62.47	45.59	53.84	43.38	42.65	44.93	31.09	50.52	20.75	58.92	14.80
21	50.76	62.21	45.48	53.55	43.33	42.29	45.02	30.70	50.78	20.45	59.26	14.69
22	50.60	61.97	45.36	53.26	43.28	41.91	45.13	30.30	51.05	20.16	59.60	14.62
23	50.44	61.75	45.22	52.97	43.25	41.52	45.25	29.90	51.34	19.89	59.93	14.56
24	50.26	61.56	45.07	52.67	43.22	41.11	45.40	29.50	51.63	19.64	60.25	14.52
25	50.07	61.37	44.91	52.34	43.22	40.69	45.56	29.11	51.91	19.41	60.54	14.48
26	49.85	61.18	44.76	52.00	43.24	40.26	45.74	28.74	52.18	19.20	60.81	14.44
27	49.62	60.98	44.61	51.64	43.27	39.84	45.93	28.38	52.44	19.01	61.07	14.39
28	49.37	60.77	44.49	51.26	43.33	39.42	46.12	28.03	52.68	18.81	61.33	14.32
29	49.13	60.53	44.38	50.88	43.40	39.02	46.30	27.71	52.90	18.60	61.60	14.23
30	48.89	60.27	44.30	50.48	43.47	38.63	46.47	27.40	53.11	18.38	61.89	14.11
31	48.67	60.00	44.23	50.09	43.54	38.26	46.62	27.10	53.33	18.13	62.22	14.00
32	48.46	59.71	44.18	49.71			46.75	26.79			62.57	13.91
	sec δ 13.24	tan δ 13.20	sec δ 13.23	tan δ 13.19	sec δ 13.22	tan δ 13.18	sec δ 13.21	tan δ 13.17	sec δ 13.20	tan δ 13.16	sec δ 13.20	tan δ 13.16

Mean R.A. 12<sup>h</sup> 03<sup>m</sup> 51.<sup>s</sup>59

Double lower transit September 22

Mean Dec. +85° 39' 43".03

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1643 Groombridge 2063 (Camelopardi) Mag. 6.16 Spect. G5

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 13 42	<sup>+</sup> <sup>o</sup> / 82 48	<sup>h</sup> <sup>m</sup> 13 42	<sup>+</sup> <sup>o</sup> / 82 49	<sup>h</sup> <sup>m</sup> 13 42	<sup>+</sup> <sup>o</sup> / 82 49	<sup>h</sup> <sup>m</sup> 13 42	<sup>+</sup> <sup>o</sup> / 82 49	<sup>h</sup> <sup>m</sup> 13 42	<sup>+</sup> <sup>o</sup> / 82 49	<sup>h</sup> <sup>m</sup> 13 42	<sup>+</sup> <sup>o</sup> / 82 49
	<sup>s</sup> 44.30	<sup>s</sup> 62.35	<sup>s</sup> 49.97	<sup>s</sup> 00.18	<sup>s</sup> 54.51	<sup>s</sup> 03.50	<sup>s</sup> 57.31	<sup>s</sup> 11.47	<sup>s</sup> 57.24	<sup>s</sup> 20.73	<sup>s</sup> 54.46	<sup>s</sup> 28.27
1	44.30	62.35	49.97	00.18	54.51	03.50	57.31	11.47	57.24	20.73	54.46	28.27
2	44.49	62.20	50.13	00.24	54.62	03.72	57.36	11.72	57.22	21.01	54.33	28.50
3	44.67	62.07	50.28	00.30	54.72	03.92	57.41	11.97	57.18	21.32	54.18	28.72
4	44.84	61.95	50.44	00.33	54.83	04.10	57.47	12.23	57.13	21.64	54.03	28.92
5	45.00	61.84	50.60	00.35	54.95	04.27	57.53	12.52	57.07	21.96	53.88	29.11
6	45.16	61.72	50.77	00.35	55.09	04.43	57.59	12.83	57.00	22.29	53.73	29.28
7	45.31	61.59	50.96	00.36	55.23	04.61	57.64	13.16	56.92	22.61	53.58	29.42
8	45.46	61.43	51.16	00.38	55.37	04.80	57.67	13.51	56.82	22.92	53.43	29.55
9	45.63	61.25	51.36	00.43	55.51	05.02	57.69	13.86	56.73	23.20	53.29	29.66
10	45.82	61.07	51.56	00.51	55.65	05.27	57.69	14.22	56.64	23.47	53.16	29.76
11	46.01	60.89	51.75	00.63	55.78	05.54	57.69	14.57	56.54	23.72	53.04	29.87
12	46.22	60.74	51.93	00.76	55.89	05.83	57.68	14.91	56.46	23.95	52.91	29.98
13	46.43	60.62	52.10	00.91	55.99	06.13	57.67	15.23	56.38	24.18	52.79	30.10
14	46.64	60.54	52.25	01.07	56.08	06.43	57.65	15.53	56.30	24.40	52.67	30.23
15	46.84	60.48	52.40	01.23	56.16	06.72	57.64	15.82	56.23	24.62	52.53	30.37
16	47.03	60.44	52.55	01.38	56.23	07.00	57.64	16.10	56.17	24.85	52.38	30.52
17	47.21	60.41	52.69	01.53	56.31	07.27	<sup>57.64</sup> <sup>57.65</sup>	<sup>16.37</sup> <sup>16.65</sup>	56.10	25.09	52.22	30.68
18	47.39	60.39	52.83	01.66	56.38	07.52	57.66	16.92	56.02	25.35	52.05	30.81
19	47.55	60.37	52.97	01.79	56.46	07.77	57.67	17.22	55.93	25.62	51.87	30.92
20	47.72	60.34	53.12	01.90	56.55	08.00	57.68	17.53	55.82	25.90	51.68	30.99
21	47.88	60.30	53.28	02.01	56.64	08.24	57.67	17.86	55.70	26.17	51.51	31.03
22	48.05	60.25	53.45	02.13	56.74	08.48	57.65	18.21	55.57	26.43	51.35	31.05
23	48.23	60.19	53.62	02.26	56.84	08.74	57.61	18.56	55.43	26.65	51.21	31.05
24	48.41	60.12	53.80	02.42	56.93	09.02	57.55	18.90	55.30	26.84	51.08	31.06
25	48.61	60.06	53.97	02.60	57.02	09.32	57.49	19.21	55.17	26.99	50.95	31.10
26	48.81	60.01	54.12	02.80	57.10	09.65	57.43	19.50	55.07	27.14	50.82	31.15
27	49.02	59.98	54.27	03.03	57.15	09.98	57.37	19.75	54.97	27.28	50.68	31.23
28	49.23	59.97	54.40	03.27	57.20	10.32	57.33	19.99	54.88	27.44	50.53	31.31
29	49.43	59.99	54.51	03.50	57.22	10.64	57.29	20.22	54.79	27.62	50.36	31.40
30	49.62	60.04			57.25	10.94	57.27	20.47	54.69	27.83	50.19	31.48
31	49.80	60.10			57.27	11.22	57.24	20.73	54.58	28.04	50.01	31.55
32	49.97	60.18			57.31	11.47			54.46	28.27		
	sec δ 8.00	tan δ 7.93	sec δ 8.00	tan δ 7.93	sec δ 8.00	tan δ 7.94	sec δ 8.00	tan δ 7.94	sec δ 8.00	tan δ 7.94	sec δ 8.01	tan δ 7.94

Mean R.A. <sup>h</sup> 13 <sup>m</sup> 42 <sup>s</sup> 42.99

Double lower transit October 17

Mean Dec. +82° 49' 13.03"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1643 Groombridge 2063 (Camelopardi) Mag. 6.16 Spect. G5

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 13 42	+ o / 82 49	h m 13 42	+ o / 82 49	h m 13 42	+ o / 82 49	h m 13 42	+ o / 82 49	h m 13 42	+ o / 82 48	h m 13 42	+ o / 82 48
	s 50.01	" 31.55	s 44.84	" 29.76	s 40.34	" 22.97	s 37.51	" 13.02	s 36.84	" 61.13	s 38.74	" 50.13
1	49.83	31.60	44.67	29.58	40.24	22.67	37.47	12.67	36.84	60.77	38.83	49.76
2	49.64	31.63	44.51	29.40	40.14	22.37	37.41	12.34	36.84	60.39	38.93	49.38
3	49.46	31.64	44.37	29.21	40.04	22.09	37.35	12.01	36.84	59.98	39.05	48.99
4	49.29	31.62	44.23	29.02	39.93	21.83	37.27	11.68	36.86	59.55	39.19	48.61
5	49.12	31.60	44.09	28.84	39.81	21.58	37.19	11.32	36.89	59.10	39.34	48.26
6	48.96	31.56	43.96	28.67	39.68	21.32	37.12	10.94	36.94	58.65	39.49	47.94
7	48.81	31.51	43.82	28.52	39.54	21.05	37.05	10.54	37.01	58.21	39.63	47.65
8	48.67	31.47	43.67	28.38	39.40	20.76	36.99	10.10	37.08	57.80	39.77	47.39
9	48.52	31.44	43.51	28.24	39.27	20.44	36.96	09.66	37.15	57.42	39.90	47.14
10	48.38	31.42	43.34	28.10	39.14	20.09	36.93	09.22	37.22	57.06	40.02	46.90
11	48.23	31.42	43.17	27.94	39.03	19.72	36.92	08.79	37.28	56.72	40.14	46.66
12	48.07	31.42	42.99	27.75	38.93	19.34	36.92	08.38	37.34	56.39	40.25	46.40
13	47.89	31.42	42.81	27.53	38.85	18.96	36.91	08.00	37.38	56.06	40.37	46.14
14	47.71	31.42	42.64	27.28	38.78	18.59	36.90	07.64	37.42	55.72	40.49	45.87
15	47.51	31.39	42.49	27.01	38.71	18.25	36.88	07.29	37.47	55.38	40.62	45.58
16	47.32	31.33	42.36	26.73	38.63	17.93	36.85	06.95	37.51	55.02	40.76	45.29
17	47.13	31.24	42.24	26.46	38.55	17.63	36.82	06.61	37.57	54.64	40.91	45.00
18	46.95	31.12	42.13	26.20	38.46	17.33	36.78	06.25	37.63	54.25	41.08	44.72
19	46.79	30.97	42.01	25.97	38.36	17.04	36.74	05.88	37.70	53.86	41.24	44.44
20	46.64	30.83	41.88	25.76	38.25	16.74	36.71	05.49	37.79	53.46	41.42	44.19
21	46.51	30.70	41.75	25.57	38.15	16.42	36.69	05.08	37.89	53.07	41.60	43.95
22	46.37	30.59	41.61	25.37	38.04	16.08	36.68	04.66	37.99	52.69	41.77	43.74
23	46.23	30.51	41.45	25.17	37.94	15.72	36.67	04.23	38.10	52.33	41.94	43.55
24	46.08	30.44	41.30	24.96	37.85	15.35	36.69	03.80	38.21	51.99	42.09	43.38
25	45.92	30.38	41.14	24.73	37.77	14.96	36.71	03.37	38.32	51.66	42.24	43.21
26	45.74	30.32	40.98	24.47	37.70	14.56	36.73	02.96	38.42	51.36	42.38	43.03
27	45.56	30.24	40.83	24.20	37.65	14.16	36.77	02.56	38.51	51.06	42.51	42.84
28	45.38	30.15	40.69	23.91	37.60	13.77	36.80	02.18	38.59	50.77	42.65	42.63
29	45.19	30.04	40.57	23.60	37.55	13.39	36.82	01.82	38.66	50.46	42.80	42.39
30	45.01	29.91	40.45	23.29	37.51	13.02	36.84	01.47	38.74	50.13	42.97	42.14
31	44.84	29.76	40.34	22.97			36.84	01.13			43.16	41.89
32												
	sec δ 8.01	tan δ 7.94	sec δ 8.01	tan δ 7.94	sec δ 8.00	tan δ 7.94	sec δ 8.00	tan δ 7.94	sec δ 8.00	tan δ 7.93	sec δ 7.99	tan δ 7.93

Mean R.A. 13<sup>h</sup> 42<sup>m</sup> 42.99<sup>s</sup>

Double lower transit October 17

Mean Dec. +82° 49' 13.03"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1644 Groombridge 2196 (Ursae-Minoris) Mag. 5.73 Spect. G0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' +	h m	° ' +	h m	° ' +	h m	° ' +	h m	° ' +	h m	° ' +
	14 51	82 33	14 51	82 33	14 51	82 33	14 51	82 33	14 51	82 34	14 51	82 34
	s	"	s	"	s	"	s	"	s	"	s	"
1	10.45	52.75	15.47	47.72	20.24	48.52	24.07	54.71	25.39	03.48	23.95	12.66
2	10.61	52.51	15.63	47.70	20.37	48.67	24.15	54.93	25.41	03.74	23.86	12.95
3	10.76	52.29	15.78	47.67	20.50	48.81	24.24	55.15	25.43	04.04	23.76	13.24
4	10.90	52.09	15.93	47.62	20.63	48.93	24.34	55.37	25.44	04.35	23.65	13.53
5	11.04	51.90	16.09	47.56	20.77	49.03	24.44	55.61	<sup>25 44</sup> <sub>25 43</sub> 25.41	<sup>04 68</sup> <sub>05 03</sub> 04.35	23.53	13.80
6	11.16	51.71	16.25	47.48	20.92	49.12	24.54	55.88	25.41	05.39	23.42	14.05
7	11.28	51.50	16.43	47.39	21.08	49.22	24.63	56.18	25.38	05.74	23.30	14.27
8	11.41	51.27	16.62	47.31	21.25	49.33	24.71	56.49	25.34	06.09	23.18	14.48
9	11.54	51.02	16.82	47.25	21.41	49.46	24.78	56.82	25.30	06.42	23.07	14.68
10	11.69	50.75	17.02	47.22	21.58	49.62	24.84	57.16	25.25	06.73	22.97	14.86
11	11.85	50.48	17.21	47.23	21.74	49.82	24.89	57.50	25.20	07.03	22.87	15.03
12	12.03	50.23	17.40	47.26	21.88	50.03	24.93	57.83	25.16	07.31	22.77	15.21
13	12.21	50.01	17.58	47.31	22.02	50.26	24.97	58.15	25.12	07.57	22.67	15.39
14	12.39	49.81	17.75	47.38	22.15	50.50	25.00	58.45	25.08	07.83	22.58	15.59
15	12.57	49.65	17.92	47.45	22.27	50.74	25.04	58.74	25.05	08.09	22.47	15.81
16	12.74	49.51	18.07	47.52	22.38	50.97	25.08	59.02	25.02	08.35	22.36	16.04
17	12.91	49.39	18.23	47.59	22.49	51.19	25.12	59.28	25.00	08.62	22.23	16.28
18	13.07	49.27	18.38	47.64	22.60	51.40	25.17	59.55	24.96	08.92	22.08	16.51
19	13.22	49.16	18.54	47.69	22.71	51.59	25.22	59.81	24.92	09.23	21.93	16.72
20	13.37	49.05	18.70	47.72	22.83	51.78	25.27	60.09	24.86	09.56	21.77	16.90
21	13.52	48.93	18.87	47.75	22.95	51.96	25.33	60.39	24.79	09.89	21.62	17.04
22	13.67	48.79	19.04	47.77	23.08	52.14	25.37	60.71	24.70	10.21	21.48	17.15
23	13.83	48.65	19.22	47.81	23.21	52.34	25.40	61.06	24.61	10.51	21.35	17.24
24	14.00	48.49	19.41	47.87	23.34	52.55	25.42	61.41	24.51	10.77	21.23	17.34
25	14.17	48.33	19.59	47.95	23.47	52.79	25.42	61.77	24.42	10.99	21.11	17.45
26	14.36	48.18	19.77	48.06	23.59	53.06	25.40	62.11	24.35	11.20	21.00	17.58
27	14.55	48.04	19.94	48.20	23.69	53.35	25.39	62.43	24.28	11.40	20.88	17.73
28	14.74	47.92	20.10	48.35	23.78	53.66	25.38	62.71	24.22	11.61	20.75	17.90
29	14.94	47.84	20.24	48.52	23.86	53.95	25.37	62.97	24.16	11.85	20.61	18.08
30	15.12	47.77			23.93	54.23	25.38	63.22	24.10	12.10	20.46	18.25
31	15.30	47.74			23.99	54.48	25.39	63.48	24.03	12.37	20.30	18.42
32	15.47	47.72			24.07	54.71			23.95	12.66		
	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ
	7.73	7.66	7.73	7.66	7.73	7.66	7.73	7.66	7.73	7.67	7.73	7.67

Mean R.A.  $14^{\text{h}} 51^{\text{m}} 11.06^{\text{s}}$

Double lower transit November 3

Mean Dec.  $+82^{\circ} 34' 04''.83$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

403

1644 Groombridge 2196 (Ursae Minoris) Mag. 5.73 Spect. G0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> 14 51	<sup>+</sup> 82 34	<sup>h</sup> 14 51	<sup>+</sup> 82 34	<sup>h</sup> 14 51	<sup>+</sup> 82 34	<sup>h</sup> 14 51	<sup>+</sup> 82 33	<sup>h</sup> 14 51	<sup>+</sup> 82 33	<sup>h</sup> 14 51	<sup>+</sup> 82 33
	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"
1	20.30	18.42	15.21	19.73	10.01	15.86	05.90	67.99	03.52	57.07	03.70	45.65
2	20.13	18.58	15.03	19.67	09.87	15.63	05.80	67.68	03.47	56.74	03.73	45.27
3	19.97	18.71	14.86	19.58	09.73	15.40	05.70	67.39	03.41	56.38	03.77	44.86
4	19.80	18.83	14.69	19.49	09.59	15.19	05.59	67.11	03.35	55.99	03.83	44.43
5	19.64	18.92	14.53	19.39	09.45	15.00	05.47	66.83	03.31	55.58	03.91	44.00
6	19.48	18.99	14.38	19.30	09.30	14.82	05.34	66.54	03.27	55.14	04.00	43.59
7	19.33	19.05	14.23	19.22	09.14	14.65	05.22	66.23	03.26	54.69	04.09	43.21
8	19.18	19.10	14.08	19.15	08.98	14.47	05.09	65.88	03.26	54.24	04.19	42.86
9	19.04	19.15	13.92	19.10	08.80	14.27	04.98	65.50	03.26	53.81	04.28	42.53
10	18.90	19.20	13.75	19.05	08.63	14.04	04.88	65.11	03.28	53.41	04.36	42.22
11	18.76	19.27	13.57	19.01	08.46	13.79	04.80	64.70	03.29	53.03	04.44	41.93
12	18.62	19.35	13.38	18.96	08.30	13.50	04.73	64.30	03.30	52.67	04.51	41.64
13	18.47	19.44	13.18	18.88	08.16	13.19	04.66	63.92	03.30	52.33	04.58	41.34
14	18.31	19.54	12.99	18.78	08.02	12.88	04.60	63.56	03.29	51.99	04.66	41.03
15	18.13	19.64	12.80	18.64	07.90	12.58	04.53	63.22	03.28	51.65	04.73	40.71
16	17.95	19.73	12.62	18.47	07.79	12.29	04.46	62.90	03.27	51.30	04.81	40.37
17	17.76	19.79	12.45	18.28	07.67	12.03	04.39	62.59	03.26	50.94	04.90	40.02
18	17.57	19.81	12.30	18.10	07.55	11.78	04.30	62.28	03.26	50.55	05.00	39.67
19	17.38	19.80	12.15	17.92	07.42	11.55	04.21	61.96	03.26	50.16	05.11	39.32
20	17.22	19.76	12.01	17.77	07.28	11.33	04.12	61.63	03.27	49.74	05.23	38.97
21	17.06	19.72	11.86	17.64	07.13	11.10	04.04	61.28	03.30	49.33	05.36	38.63
22	16.91	19.68	11.71	17.52	06.99	10.85	03.96	60.91	03.33	48.91	05.49	38.32
23	16.77	19.66	11.54	17.42	06.84	10.59	03.89	60.52	03.37	48.49	05.62	38.02
24	16.62	19.66	11.37	17.31	06.69	10.31	03.82	60.11	03.42	48.09	05.75	37.75
25	16.47	19.68	11.19	17.20	06.55	10.00	03.77	59.70	03.48	47.70	05.87	37.50
26	16.31	19.71	11.01	17.06	06.42	09.68	03.73	59.29	03.53	47.34	05.99	37.26
27	16.14	19.75	10.83	16.91	06.30	09.34	03.69	58.88	03.58	46.99	06.09	37.02
28	15.96	19.78	10.65	16.74	06.19	09.00	03.66	58.48	03.62	46.66	06.19	36.77
29	15.77	19.80	10.48	16.54	06.09	08.65	03.64	58.11	03.65	46.34	06.29	36.50
30	15.58	19.80	10.31	16.32	05.99	08.31	03.61	57.75	03.68	46.01	06.40	36.20
31	15.40	19.78	10.15	16.09	05.90	07.99	03.57	57.41	03.70	45.65	06.52	35.88
32	15.21	19.73	10.01	15.86			03.52	57.07		45.31	06.66	35.55
	sec $\delta$ 7.74	tan $\delta$ 7.67	sec $\delta$ 7.73	tan $\delta$ 7.67	sec $\delta$ 7.73	tan $\delta$ 7.67	sec $\delta$ 7.73	tan $\delta$ 7.67	sec $\delta$ 7.73	tan $\delta$ 7.66	sec $\delta$ 7.72	tan $\delta$ 7.66

Mean R.A. 14<sup>h</sup> 51<sup>m</sup> 11.06<sup>s</sup>

Double lower transit November 3

Mean Dec. +82° 34' 04.83"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1645 Groombridge 2315 (Ursae Minoris) Mag. 7.32 Spect. A2

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	15 44	82 59	15 44	82 59	15 44	82 59	15 44	82 59	15 45	82 59	15 44	82 59
	s	"	s	"	s	"	s	"	s	"	s	"
1	44.63	08.92	49.21	01.96	54.25	00.74	58.98	05.20	01.43	13.26	61.04	23.00
2	44.76	08.61	49.37	01.88	54.41	00.84	59.10	05.38	01.48	13.52	60.99	23.33
3	44.89	08.34	49.52	01.79	54.56	00.92	59.22	05.55	01.53	13.80	60.92	23.66
4	45.01	08.08	49.68	01.68	54.71	00.99	59.35	05.73	01.58	14.10	60.84	23.99
5	45.13	07.84	49.83	01.56	54.87	01.03	59.48	05.93	01.63	14.43	60.75	24.31
6	45.23	07.61	49.99	01.41	55.04	01.06	59.61	06.15	01.66	14.78	60.66	24.61
7	45.33	07.36	50.17	01.25	55.21	01.09	59.74	06.40	01.68	15.13	60.56	24.89
8	45.43	07.09	50.35	01.10	55.40	01.13	59.87	06.67	01.69	15.49	60.47	25.16
9	45.54	06.79	50.55	00.96	55.59	01.19	59.98	06.96	01.70	15.85	60.38	25.40
10	45.66	06.48	50.75	00.85	55.78	01.27	60.08	07.27	01.69	16.20	60.29	25.63
11	45.80	06.15	50.96	00.77	55.97	01.39	60.18	07.58	01.68	16.53	60.20	25.85
12	45.95	05.84	51.16	00.72	56.15	01.54	60.26	07.88	01.67	16.85	60.12	26.07
13	46.11	05.55	51.35	00.69	56.32	01.70	60.34	08.18	01.65	17.14	60.05	26.30
14	46.27	05.28	51.54	00.68	56.48	01.88	60.41	08.47	01.64	17.43	59.97	26.54
15	46.44	05.05	51.71	00.69	56.63	02.06	60.48	08.74	01.64	17.70	59.89	26.80
16	46.60	04.84	51.89	00.69	56.78	02.24	60.56	08.99	01.64	17.97	59.79	27.08
17	46.76	04.65	52.05	00.69	56.92	02.41	60.64	09.24	01.64	18.24	59.69	27.37
18	46.91	04.47	52.22	00.68	57.06	02.57	60.72	09.48	<sup>01 64</sup> <sub>01 64</sub>	<sup>18 53</sup> <sub>18 83</sub>	59.57	27.67
19	47.05	04.30	52.39	00.66	57.20	02.71	60.80	09.72	01.64	19.16	59.43	27.95
20	47.20	04.13	52.56	00.62	57.34	02.85	60.89	09.97	01.62	19.50	59.29	28.20
21	47.34	03.95	52.73	00.58	57.49	02.97	60.98	10.24	01.58	19.86	59.15	28.42
22	47.48	03.75	52.92	00.54	57.65	03.10	61.07	10.53	01.53	20.22	59.01	28.60
23	47.62	03.55	53.11	00.50	57.81	03.23	61.14	10.86	01.47	20.56	58.89	28.76
24	47.78	03.33	53.31	00.47	57.97	03.39	61.20	11.20	01.40	20.86	58.77	28.91
25	47.94	03.11	53.51	00.47	58.13	03.57	61.25	11.55	01.33	21.13	58.67	29.07
26	48.11	02.89	53.71	00.50	58.29	03.78	61.28	11.89	01.28	21.38	58.56	29.26
27	48.29	02.67	53.90	00.56	58.43	04.02	61.30	12.21	01.23	21.61	58.46	29.46
28	48.48	02.47	54.09	00.65	58.56	04.27	61.32	12.50	01.20	21.85	58.34	29.69
29	48.67	02.31	54.25	00.74	58.67	04.53	61.35	12.77	01.17	22.11	58.22	29.93
30	48.86	02.17			58.78	04.77	61.38	13.01	01.13	22.38	58.08	30.17
31	49.04	02.05			58.88	05.00	61.43	13.26	01.09	22.68	57.94	30.41
32	49.21	01.96			58.98	05.20			01.04	23.00		
	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ
	8.19	8.13	8.19	8.13	8.19	8.13	8.19	8.13	8.19	8.13	8.19	8.13

Mean R.A.  $15^{\text{h}} 44^{\text{m}} 46.67^{\text{s}}$

Double lower transit November 17

Mean Dec.  $+82^{\circ} 59' 21.52''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1645 Groombridge 2315 (Ursae Minoris) Mag. 7.32 Spect. A2

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 15 44	<sup>+</sup> <sup>o</sup> / 82 59	<sup>h</sup> <sup>m</sup> 15 44	<sup>+</sup> <sup>o</sup> / 82 59	<sup>h</sup> <sup>m</sup> 15 44	<sup>+</sup> <sup>o</sup> / 82 59	<sup>h</sup> <sup>m</sup> 15 44	<sup>+</sup> <sup>o</sup> / 82 59	<sup>h</sup> <sup>m</sup> 15 44	<sup>+</sup> <sup>o</sup> / 82 59	<sup>h</sup> <sup>m</sup> 15 44	<sup>+</sup> <sup>o</sup> / 82 58
	<sup>s</sup> 57.94	" 30.11	<sup>s</sup> 52.79	" 34.12	<sup>s</sup> 46.88	" 32.81	<sup>s</sup> 41.62	" 27.09	<sup>s</sup> 37.80	" 17.65	<sup>s</sup> 36.56	" 66.63
1	57.94	30.11	52.79	34.12	46.88	32.81	41.62	27.09	37.80	17.65	36.56	66.63
2	57.79	30.64	52.59	34.14	46.70	32.65	41.48	26.84	37.70	17.35	36.55	66.25
3	57.63	30.85	52.40	34.14	46.53	32.49	41.34	26.60	37.59	17.04	36.54	65.84
4	57.47	31.04	52.22	34.13	46.36	32.35	41.19	26.38	37.48	16.70	36.55	65.41
5	57.31	31.21	52.04	34.11	46.19	32.23	41.03	26.16	37.38	16.32	36.57	64.97
6	57.15	31.36	51.87	34.10	46.01	32.12	40.86	25.94	37.30	15.91	36.61	64.54
7	57.00	31.49	51.70	34.09	45.83	32.03	40.69	25.70	37.22	15.49	36.66	64.13
8	56.85	31.61	51.53	34.09	45.63	31.93	40.52	25.42	37.17	15.07	36.72	63.75
9	56.71	31.73	51.36	34.11	45.42	31.82	40.36	25.11	37.12	14.65	36.77	63.40
10	56.57	31.84	51.18	34.15	45.21	31.68	40.20	24.78	37.08	14.26	36.82	63.07
11	56.44	31.97	50.98	34.19	45.01	31.51	40.07	24.43	37.05	13.89	36.87	62.75
12	56.30	32.12	50.78	34.23	44.81	31.31	39.94	24.08	37.01	13.54	36.91	62.44
13	56.15	32.28	50.56	34.25	44.62	31.09	39.83	23.74	36.97	13.21	36.95	62.12
14	55.99	32.46	50.35	34.24	44.44	30.85	39.72	23.42	36.92	12.89	36.98	61.79
15	55.82	32.64	50.13	34.19	44.28	30.61	39.61	23.12	36.87	12.56	37.02	61.45
16	55.64	32.81	49.92	34.12	44.12	30.39	39.49	22.84	36.82	12.23	37.06	61.10
17	55.45	32.96	49.73	34.02	43.96	30.18	39.38	22.58	36.76	11.89	37.11	60.73
18	55.26	33.07	49.55	33.91	43.81	30.00	39.25	22.31	36.71	11.52	37.17	60.35
19	55.06	33.15	49.37	33.81	43.64	29.84	39.12	22.05	36.66	11.14	37.25	59.96
20	54.88	33.20	49.20	33.73	43.47	29.68	38.98	21.76	36.63	10.74	37.33	59.58
21	54.71	33.23	49.03	33.67	43.29	29.52	38.85	21.47	36.60	10.33	37.42	59.20
22	54.56	33.26	48.86	33.63	43.11	29.35	38.72	21.15	36.58	09.91	37.51	58.84
23	54.40	33.31	48.67	33.60	42.92	29.17	38.60	20.81	36.58	09.50	37.61	58.50
24	54.25	33.38	48.48	33.58	42.73	28.96	38.48	20.45	36.58	09.09	37.71	58.19
25	54.10	33.47	48.28	33.55	42.55	28.73	38.38	20.08	36.59	08.70	37.81	57.89
26	53.93	33.58	48.07	33.50	42.38	28.48	38.28	19.70	36.60	08.32	37.90	57.61
27	53.76	33.70	47.86	33.44	42.21	28.21	38.19	19.32	36.60	07.97	37.98	57.34
28	53.57	33.81	47.66	33.35	42.05	27.93	38.12	18.95	36.61	07.63	38.05	57.06
29	53.38	33.91	47.45	33.24	41.90	27.65	38.04	18.60	36.60	07.31	38.12	56.76
30	53.18	34.00	47.25	33.11	41.75	27.36	37.97	18.27	36.58	06.98	38.19	56.43
31	52.98	34.07	47.06	32.97	41.62	27.09	37.88	17.95	36.56	06.63	38.28	56.07
32	52.79	34.12	46.88	32.81			37.80	17.65			38.39	55.70
	sec $\delta$ 8.20	tan $\delta$ 8.14	sec $\delta$ 8.20	tan $\delta$ 8.14	sec $\delta$ 8.20	tan $\delta$ 8.13	sec $\delta$ 8.19	tan $\delta$ 8.13	sec $\delta$ 8.19	tan $\delta$ 8.13	sec $\delta$ 8.19	tan $\delta$ 8.13

Mean R.A.  $15^{\text{h}} 44^{\text{m}} 46.6^{\text{s}}$

Double lower transit November 17

Mean Dec.  $+82^{\circ} 59' 21.52''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

912     $\epsilon$  Ursae Minoris     $\backslash$  Mag. 4.40    Spect. G5

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 16 47	+ ° ' / 82 03	h m 16 47	+ ° ' / 82 03	h m 16 47	+ ° ' / 82 03	h m 16 47	+ ° ' / 82 03	h m 16 47	+ ° ' / 82 03	h m 16 47	+ ° ' / 82 03
1	s 15.34	" 27.04	s 18.45	" 18.20	s 22.66	" 14.65	s 27.31	" 16.74	s 30.45	" 23.47	s 31.39	" 32.92
2	15.42	26.68	18.58	18.05	22.81	14.67	27.43	16.87	30.53	23.70	31.39	33.25
3	15.50	26.35	18.71	17.89	22.95	14.68	27.56	16.98	30.61	23.95	<sup>31 38</sup> 31 36	<sup>33 60</sup> 33 96
4	15.57	26.05	18.82	17.72	23.09	14.68	27.69	17.10	30.69	24.22	31.34	34.32
5	15.64	25.77	18.94	17.53	23.24	14.65	27.83	17.23	30.77	24.52	31.30	34.68
6	15.70	25.49	19.07	17.32	23.38	14.60	27.98	17.38	30.84	24.84	31.26	35.03
7	15.76	25.21	19.20	17.09	23.54	14.55	28.12	17.55	30.91	25.17	31.22	35.35
8	15.82	24.90	19.34	16.85	23.71	14.50	28.26	17.76	30.96	25.52	31.17	35.66
9	15.88	24.57	19.50	16.63	23.88	14.47	28.39	17.98	31.01	25.87	31.13	35.95
10	15.94	24.22	19.66	16.42	24.05	14.46	28.52	18.23	31.05	26.21	31.08	36.23
11	16.02	23.85	19.82	16.25	24.23	14.48	28.64	18.49	31.09	26.55	31.04	36.49
12	16.12	23.48	19.99	16.10	24.40	14.53	28.75	18.74	31.12	26.86	31.00	36.75
13	16.22	23.12	20.15	15.98	24.57	14.61	28.86	19.00	31.15	27.17	30.97	37.01
14	16.33	22.79	20.31	15.88	24.73	14.70	28.96	19.24	31.18	27.45	30.93	37.29
15	16.44	22.48	20.46	15.80	24.88	14.80	29.05	19.47	31.21	27.72	30.89	37.59
16	16.55	22.20	20.61	15.72	25.03	14.91	29.15	19.69	31.24	27.99	30.85	37.91
17	16.66	21.94	20.76	15.64	25.17	15.00	29.25	19.90	31.28	28.26	30.79	38.25
18	16.77	21.70	20.90	15.55	25.31	15.09	29.35	20.09	31.32	28.54	30.73	38.59
19	16.88	21.47	21.04	15.46	25.45	15.17	29.46	20.29	31.36	28.84	30.65	38.94
20	16.98	21.23	21.19	15.35	25.60	15.23	29.57	20.49	31.39	29.16	30.56	39.26
21	17.08	21.00	21.34	15.22	25.74	15.29	29.68	20.71	31.42	29.51	30.47	39.55
22	17.18	20.75	21.49	15.09	25.89	15.34	29.79	20.96	31.43	29.88	30.38	39.80
23	17.28	20.48	21.65	14.96	26.05	15.39	29.89	21.23	31.44	30.25	30.30	40.03
24	17.39	20.21	21.82	14.84	26.21	15.46	29.99	21.54	31.43	30.62	30.22	40.24
25	17.50	19.92	21.99	14.75	26.37	15.56	30.07	21.86	31.41	30.95	30.15	40.46
26	17.62	19.62	22.17	14.68	26.53	15.69	30.14	22.18	31.39	31.26	30.09	40.69
27	17.75	19.33	22.34	14.64	26.68	15.85	30.20	22.49	31.38	31.53	30.02	40.95
28	17.89	19.05	22.51	14.64	26.82	16.03	30.26	22.76	31.37	31.79	29.95	41.23
29	18.03	18.80	22.66	14.65	26.96	16.23	30.32	23.01	31.37	32.05	29.87	41.52
30	18.18	18.57			27.08	16.42	30.38	23.25	31.38	32.31	29.79	41.83
31	18.32	18.38			27.19	16.59	30.45	23.47	31.38	32.60	29.70	42.14
32	18.45	18.20			27.31	16.74			31.39	32.92		
	sec $\delta$ 7.24	tan $\delta$ 7.17	sec $\delta$ 7.23	tan $\delta$ 7.16	sec $\delta$ 7.23	tan $\delta$ 7.16	sec $\delta$ 7.24	tan $\delta$ 7.17	sec $\delta$ 7.24	tan $\delta$ 7.17	sec $\delta$ 7.24	tan $\delta$ 7.17

Mean R.A.  $16^{\text{h}} 47^{\text{m}} 19.04^{\text{s}}$

Double lower transit December 3

Mean Dec.  $+82^{\circ} 03' 39''.31$



**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

407

912  $\epsilon$  Ursae Minoris · Mag. 4.40 Spect. G5

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 16 47	+ o / 82 03	h m 16 47	+ o / 82 03	h m 16 47	+ o / 82 03	h m 16 47	+ o / 82 03	h m 16 47	+ o / 82 03	h m 16 47	+ o / 82 03
	s 29.70	" 42.14	s 25.79	" 48.46	s 20.60	" 50.26	s 15.40	" 47.43	s 10.97	" 40.29	s 08.59	" 30.39
1	29.60	42.44	25.63	48.58	20.43	50.19	15.25	47.25	10.85	40.05	08.53	30.04
2	29.49	42.73	25.47	48.69	20.26	50.13	15.10	47.09	10.72	39.81	08.48	29.66
3	29.38	43.00	25.31	48.77	20.10	50.08	14.94	46.95	10.59	39.53	08.43	29.24
4	29.27	43.25	25.16	48.85	19.94	50.05	14.78	46.83	10.46	39.23	08.40	28.81
5	29.15	43.48	25.01	48.92	19.77	50.03	14.61	46.70	10.34	38.89	08.39	28.38
6	29.04	43.69	24.86	49.00	19.60	50.03	14.43	46.55	10.23	38.52	08.38	27.97
7	28.93	43.89	24.72	49.09	19.42	50.04	14.25	46.37	10.13	38.15	08.38	27.58
8	28.83	44.08	24.57	49.20	19.23	50.04	14.08	46.16	10.04	37.77	08.38	27.21
9	28.73	44.26	24.42	49.32	19.03	50.01	13.91	45.92	09.96	37.42	08.39	26.87
10	28.63	44.46	24.26	49.46	18.84	49.96	13.75	45.66	09.88	37.08	08.39	26.54
11	28.52	44.68	24.09	49.60	18.64	49.87	13.60	45.39	09.81	36.76	08.38	26.22
12	28.42	44.91	23.91	49.73	18.45	49.75	13.46	45.12	09.73	36.46	08.38	25.90
13	28.31	45.16	23.73	49.84	18.27	49.61	13.32	44.86	09.65	36.18	08.37	25.58
14	28.18	45.42	23.54	49.91	18.10	49.47	13.19	44.63	09.57	35.89	08.36	25.24
15	28.05	45.68	23.36	49.95	17.94	49.33	13.06	44.42	09.48	35.60	08.36	24.88
16	27.91	45.93	23.18	49.96	17.78	49.22	12.92	44.22	09.39	35.30	08.36	24.50
17	27.76	46.14	23.01	49.95	17.63	49.12	12.78	44.03	09.30	34.98	08.37	24.11
18	27.61	46.32	22.85	49.94	17.46	49.04	12.64	43.84	09.22	34.64	08.38	23.71
19	27.46	46.47	22.70	49.95	17.30	48.98	12.49	43.64	09.14	34.28	08.41	23.31
20	27.32	46.60	22.54	49.98	17.12	48.91	12.34	43.42	09.07	33.90	08.44	22.90
21	27.19	46.71	22.39	50.03	16.95	48.84	12.19	43.18	09.00	33.52	08.48	22.51
22	27.07	46.84	22.22	50.10	16.76	48.76	12.05	42.92	08.95	33.12	08.52	22.14
23	26.95	46.99	22.06	50.17	16.58	48.66	11.90	42.63	08.90	32.73	08.57	21.79
24	26.83	47.15	21.88	50.24	16.40	48.53	11.77	42.33	08.86	32.35	08.61	21.46
25	26.70	47.34	21.70	50.31	16.22	48.38	11.64	42.02	08.82	31.98	08.66	21.15
26	26.56	47.54	21.51	50.35	16.04	48.21	11.52	41.70	08.78	31.64	08.69	20.85
27	26.42	47.75	21.33	50.38	15.87	48.02	11.41	41.38	08.74	31.32	08.72	20.55
28	26.27	47.95	21.14	50.38	15.71	47.82	11.30	41.08	08.70	31.01	08.75	20.23
29	26.11	48.14	20.95	50.36	15.55	47.62	11.19	40.80	08.65	30.71	08.77	19.88
30	25.95	48.31	20.77	50.32	15.40	47.43	11.09	40.54	08.59	30.39	08.81	19.50
31	25.79	48.46	20.60	50.26			10.97	40.29			08.85	19.10
32												
	sec $\delta$ 7.24	tan $\delta$ 7.17	sec $\delta$ 7.24	tan $\delta$ 7.17	sec $\delta$ 7.24	tan $\delta$ 7.17	sec $\delta$ 7.24	tan $\delta$ 7.17	sec $\delta$ 7.24	tan $\delta$ 7.17	sec $\delta$ 7.24	tan $\delta$ 7.17

Mean R.A. 16<sup>h</sup> 47<sup>m</sup> 19.04

Double lower transit December 3

Mean Dec. +82° 03' 39.31"

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

914  $\lambda$  Ursae Minoris  $\triangleright$  Mag. 6.55 Spect. M3

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 17 33	<sup>+</sup> <sup>o</sup> <sup>'</sup> 89 02	<sup>h</sup> <sup>m</sup> 17 33	<sup>+</sup> <sup>o</sup> <sup>'</sup> 89 02	<sup>h</sup> <sup>m</sup> 17 34	<sup>+</sup> <sup>o</sup> <sup>'</sup> 89 02	<sup>h</sup> <sup>m</sup> 17 35	<sup>+</sup> <sup>o</sup> <sup>'</sup> 89 02	<sup>h</sup> <sup>m</sup> 17 35	<sup>+</sup> <sup>o</sup> <sup>'</sup> 89 02	<sup>h</sup> <sup>m</sup> 17 35	<sup>+</sup> <sup>o</sup> <sup>'</sup> 89 02
	<sup>s</sup> 40.88	<sup>s</sup> 44.90	<sup>s</sup> 57.05	<sup>s</sup> 35.49	<sup>s</sup> 26.80	<sup>s</sup> 30.58	<sup>s</sup> 04.50	<sup>s</sup> 30.80	<sup>s</sup> 33.54	<sup>s</sup> 36.00	<sup>s</sup> 46.47	<sup>s</sup> 44.64
1	41.18	44.54	57.92	35.30	27.96	30.55	05.48	30.88	34.29	36.18	46.70	44.96
2	41.52	44.20	58.71	35.11	29.03	30.51	06.51	30.94	35.10	36.39	46.87	45.30
3	41.85	43.89	59.43	34.91	30.06	30.45	07.62	31.00	35.96	36.61	46.98	45.65
4	42.14	43.60	60.12	34.69	31.08	30.37	08.82	31.07	36.81	36.86	46.99	46.00
5	42.36	43.32	60.83	34.45	32.14	30.28	10.08	31.15	37.64	37.13	46.92	46.36
6	42.49	43.04	61.61	34.18	33.28	30.17	11.37	31.26	38.40	37.43	46.78	46.71
7	42.57	42.74	62.50	33.91	34.52	30.06	12.67	31.40	39.10	37.74	46.57	47.04
8	42.64	42.42	63.51	33.64	35.85	29.96	13.94	31.56	39.70	38.05	46.32	47.35
9	42.77	42.06	64.62	33.38	37.25	29.88	15.15	31.74	40.23	38.36	46.05	47.65
10	43.00	41.69	65.80	33.15	38.69	29.83	16.28	31.94	40.68	38.67	45.79	47.93
11	43.36	41.31	67.02	32.95	40.14	29.81	17.34	32.14	41.08	38.96	45.56	48.20
12	43.85	40.93	68.23	32.77	41.55	29.82	18.32	32.35	41.44	39.24	45.37	48.46
13	44.44	40.58	69.42	32.62	42.91	29.85	19.25	32.54	41.80	39.51	45.22	48.73
14	45.08	40.25	70.57	32.49	44.20	29.89	20.14	32.73	42.18	39.75	<sup>45 11</sup> 45 00	<sup>49 01</sup> 49 30
15	45.76	39.94	71.67	32.36	45.43	29.93	21.01	32.90	42.59	40.00	44.86	49.62
16	46.43	39.66	72.72	32.23	46.61	29.97	21.88	33.06	43.04	40.23	44.65	49.97
17	47.08	39.39	73.73	32.10	47.74	30.00	22.79	33.20	43.53	40.48	44.32	50.33
18	47.70	39.13	74.72	31.96	48.86	30.02	23.74	33.34	44.06	40.75	43.86	50.69
19	48.27	38.88	75.71	31.80	49.98	30.03	24.75	33.49	44.58	41.04	43.26	51.04
20	48.80	38.62	76.72	31.63	51.12	30.03	25.80	33.66	45.05	41.36	42.58	51.36
21	49.32	38.35	77.80	31.45	52.32	30.02	26.88	33.84	45.42	41.71	41.88	51.64
22	49.83	38.07	78.95	31.26	53.58	30.01	27.94	34.07	45.65	42.07	41.23	51.89
23	50.37	37.78	80.18	31.09	54.91	30.01	28.93	34.32	45.75	42.42	40.67	52.13
24	50.95	37.46	81.49	30.93	56.29	30.04	29.80	34.60	45.73	42.75	40.19	52.36
25	51.62	37.14	82.85	30.79	57.69	30.09	30.54	34.88	45.68	43.06	39.79	52.61
26	52.38	36.82	84.22	30.69	59.06	30.19	31.16	35.15	45.64	43.33	39.42	52.88
27	53.23	36.50	85.55	30.63	60.34	30.31	31.72	35.39	45.67	43.58	39.04	53.17
28	54.16	36.21	86.80	30.58	61.51	30.45	32.27	35.61	45.79	43.82	38.61	53.48
29	55.13	35.94			62.57	30.58	32.87	35.81	45.98	44.08	38.12	53.81
30	56.11	35.70			63.55	30.70	33.54	36.00	46.22	44.35	37.55	54.14
31	57.05	35.49			64.50	30.80			46.47	44.64		
	sec $\delta$ 59.96	tan $\delta$ 59.95	sec $\delta$ 59.83	tan $\delta$ 59.82	sec $\delta$ 59.79	tan $\delta$ 59.78	sec $\delta$ 59.84	tan $\delta$ 59.83	sec $\delta$ 59.96	tan $\delta$ 59.96	sec $\delta$ 60.13	tan $\delta$ 60.12

Mean R.A. <sup>h</sup> <sup>m</sup> <sup>s</sup>  
17 34 05.18

Double lower transit December 14

Mean Dec. <sup>o</sup> <sup>'</sup> <sup>''</sup>  
+89 02 56.18

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

409

914  $\lambda$  Ursae Minoris · Mag. 6.55 Spect. M3

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	+ ° /	h m	+ ° /	h m	+ ° /	h m	+ ° /	h m	+ ° /	h m	+ ° /
	17 35	89 02	17 34	89 03	17 33	89 03	17 32	89 03	17 32	89 02	17 32	89 02
	s	"	s	"	s	"	s	"	s	"	s	"
1	37.55	54.14	68.11	01.77	84.93	05.59	98.64	05.01	55.34	60.08	26.03	51.79
2	36.89	54.47	66.76	01.95	83.43	05.60	97.28	04.90	54.11	59.91	25.13	51.50
3	36.16	54.79	65.42	02.12	82.00	05.60	95.93	04.81	52.78	59.73	24.24	51.16
4	35.36	55.10	64.11	02.27	80.62	05.62	94.54	04.74	51.37	59.53	23.42	50.80
5	34.51	55.38	62.84	02.40	79.27	05.65	93.09	04.69	49.94	59.30	22.72	50.41
6	33.64	55.65	61.62	02.53	77.90	05.70	91.53	04.64	48.53	59.04	22.17	50.01
7	32.78	55.90	60.46	02.66	76.48	05.77	89.88	04.57	47.21	58.74	21.74	49.63
8	31.94	56.13	59.33	02.80	74.96	05.85	88.17	04.48	46.02	58.43	21.40	49.26
9	31.15	56.35	58.21	02.96	73.34	05.92	86.44	04.36	44.94	58.11	21.11	48.92
10	30.40	56.57	57.05	03.14	71.63	05.98	84.75	04.20	43.96	57.80	20.84	48.60
11	29.70	56.80	55.82	03.34	69.86	06.02	83.14	04.02	43.06	57.52	20.55	48.29
12	29.01	57.04	54.48	03.54	68.08	06.01	81.64	03.82	42.19	57.25	20.22	48.00
13	28.31	57.30	53.03	03.74	66.34	05.98	80.25	03.62	41.31	57.00	19.85	47.71
14	27.55	57.59	51.48	03.92	64.67	05.92	78.94	03.43	40.40	56.76	19.44	47.41
15	26.70	57.88	49.88	04.06	63.11	05.85	77.68	03.26	39.45	56.53	19.02	47.10
16	25.74	58.19	48.26	04.18	61.65	05.79	76.43	03.12	38.45	56.30	18.59	46.77
17	24.64	58.49	46.70	04.26	60.25	05.74	75.16	02.98	37.40	56.06	18.18	46.42
18	23.45	58.76	45.22	04.32	58.89	05.71	73.84	02.86	36.34	55.79	17.82	46.06
19	22.21	58.99	43.85	04.38	57.50	05.70	72.46	02.74	35.28	55.51	17.53	45.68
20	20.98	59.20	42.55	04.45	56.08	05.70	71.03	02.61	34.24	55.21	17.33	45.29
21	19.82	59.37	41.31	04.53	54.58	05.71	69.55	02.47	33.26	54.89	17.21	44.90
22	18.76	59.54	40.06	04.64	53.02	05.72	68.05	02.31	32.34	54.55	17.18	44.52
23	17.79	59.71	38.77	04.77	51.40	05.72	66.55	02.12	31.51	54.20	17.21	44.15
24	16.88	59.89	37.43	04.91	49.74	05.69	65.08	01.91	30.75	53.85	17.29	43.80
25	15.98	60.10	36.00	05.05	48.05	05.65	63.66	01.68	30.08	53.51	17.38	43.48
26	15.06	60.33	34.51	05.18	46.37	05.58	62.30	01.44	29.47	53.18	17.44	43.17
27	14.09	60.58	32.95	05.30	44.70	05.49	61.02	01.19	28.88	52.87	17.43	42.89
28	13.04	60.83	31.35	05.41	43.09	05.39	59.81	00.93	28.28	52.59	17.33	42.60
29	11.91	61.08	29.72	05.48	41.54	05.26	58.68	00.69	27.62	52.32	17.16	42.30
30	10.70	61.33	28.09	05.54	40.06	05.13	57.58	00.47	26.87	52.06	16.95	41.97
31	09.43	61.56	26.49	05.57	38.64	05.01	56.48	00.26	26.03	51.79	16.77	41.61
32	08.11	61.77	24.93	05.59			55.34	00.08			16.70	41.22
	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$
	60.28	60.27	60.39	60.38	60.42	60.41	60.37	60.36	60.25	60.24	60.08	60.07

Mean R.A.  $17^{\text{h}} 34^{\text{m}} 05^{\text{s}}.18$

Double lower transit December 14

Mean Dec.  $+89^{\circ} 02' 56''.18$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

913  $\delta$  Ursae Minoris  $\alpha$  Mag. 4.44 Spect. A0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 17 36	<sup>+</sup> <sup>o</sup> ' / 86 35	<sup>h</sup> <sup>m</sup> 17 36	<sup>+</sup> <sup>o</sup> ' / 86 35	<sup>h</sup> <sup>m</sup> 17 36	<sup>+</sup> <sup>o</sup> ' / 86 35	<sup>h</sup> <sup>m</sup> 17 36	<sup>+</sup> <sup>o</sup> ' / 86 35	<sup>h</sup> <sup>m</sup> 17 36	<sup>+</sup> <sup>o</sup> ' / 86 35	<sup>h</sup> <sup>m</sup> 17 36	<sup>+</sup> <sup>o</sup> ' / 86 35
	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"
1	23.71	29.47	28.36	19.86	36.82	14.79	47.59	14.93	55.96	20.14	59.86	28.91
2	23.79	29.10	28.60	19.66	37.16	14.75	47.87	15.00	56.18	20.33	59.93	29.23
3	23.88	28.75	28.83	19.46	37.47	14.71	48.17	15.06	56.41	20.54	59.98	29.57
4	23.98	28.44	29.04	19.26	37.76	14.65	48.49	15.12	56.65	20.76	60.02	29.93
5	24.06	28.14	29.25	19.03	38.06	14.57	48.83	15.19	56.90	21.02	60.03	30.29
6	24.13	27.86	29.46	18.79	38.37	14.47	49.19	15.27	57.13	21.29	60.02	30.65
7	24.17	27.57	29.69	18.52	38.70	14.35	49.55	15.38	57.35	21.59	60.00	31.00
8	24.20	27.27	29.94	18.24	39.05	14.24	49.92	15.51	57.55	21.90	59.95	31.34
9	24.24	26.93	30.23	17.96	39.43	14.14	50.28	15.68	57.73	22.22	59.89	31.66
10	24.28	26.57	30.54	17.70	39.82	14.06	50.62	15.86	57.89	22.54	59.83	31.97
11	24.36	26.19	30.87	17.46	40.23	14.00	50.94	16.06	58.03	22.85	59.77	32.25
12	24.46	25.80	31.21	17.25	40.63	13.98	51.25	16.26	58.15	23.14	59.72	32.53
13	24.60	25.42	31.55	17.07	41.03	13.98	51.53	16.47	58.26	23.43	59.68	32.80
14	24.77	25.06	31.89	16.91	41.41	14.01	51.80	16.66	58.38	23.69	59.64	33.07
15	24.95	24.72	32.21	16.77	41.78	14.04	52.06	16.85	58.49	23.95	59.62	33.35
16	25.14	24.41	32.52	16.64	42.13	14.08	52.31	17.02	58.62	24.19	<sup>59 59</sup> <sup>59 56</sup>	<sup>33 65</sup> <sup>33 98</sup>
17	25.32	24.12	32.82	16.50	42.47	14.12	52.57	17.18	58.75	24.43	59.51	34.33
18	25.51	23.85	33.11	16.37	42.80	14.15	52.83	17.32	58.90	24.69	59.43	34.70
19	25.68	23.58	33.40	16.22	43.12	14.17	53.11	17.47	59.05	24.96	59.31	35.06
20	25.85	23.32	33.69	16.06	43.44	14.18	53.40	17.62	59.20	25.25	59.16	35.42
21	26.00	23.06	33.98	15.88	43.77	14.17	53.70	17.78	59.34	25.58	58.98	35.74
22	26.16	22.79	34.29	15.70	44.11	14.16	54.00	17.97	59.45	25.93	58.81	36.03
23	26.31	22.50	34.61	15.51	44.47	14.14	54.30	18.19	59.52	26.29	58.64	36.29
24	26.47	22.20	34.96	15.32	44.85	14.14	54.58	18.45	59.56	26.65	58.50	36.53
25	26.64	21.88	35.33	15.16	45.24	14.17	54.83	18.73	59.58	26.99	58.37	36.77
26	26.83	21.55	35.71	15.02	45.63	14.22	55.05	19.01	59.58	27.29	58.27	37.03
27	27.05	21.22	36.10	14.91	46.01	14.31	55.24	19.28	59.58	27.57	58.17	37.30
28	27.29	20.90	36.47	14.84	46.38	14.43	55.41	19.53	59.61	27.83	58.07	37.60
29	27.55	20.60	36.82	14.79	46.71	14.57	55.58	19.75	59.65	28.08	57.96	37.92
30	27.82	20.32			47.02	14.71	55.76	19.95	59.71	28.33	57.83	38.25
31	28.09	20.08			47.31	14.83	55.96	20.14	59.78	28.61	57.67	38.59
32	28.36	19.86			47.59	14.93			59.86	28.91		
	sec $\delta$ 16.83	tan $\delta$ 16.80	sec $\delta$ 16.83	tan $\delta$ 16.80	sec $\delta$ 16.83	tan $\delta$ 16.80	sec $\delta$ 16.83	tan $\delta$ 16.80	sec $\delta$ 16.83	tan $\delta$ 16.80	sec $\delta$ 16.83	tan $\delta$ 16.80

Mean R.A.  $17^{\text{h}} 36^{\text{m}} 32.20^{\text{s}}$

Double lower transit December 15

Mean Dec.  $+86^{\circ} 35' 40.77''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

411

913  $\delta$  Ursae Minoris Mag. 4.44 Spect. A0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	+ ° /	h m	+ ° /	h m	+ ° /	h m	+ ° /	h m	+ ° /	h m	+ ° /
	17 36	86 35	17 36	86 35	17 36	86 35	17 36	86 35	17 36	86 35	17 36	86 35
	s	"	s	"	s	"	s	"	s	"	s	"
1	57.67	38.59	49.76	46.41	37.95	50.43	25.18	50.00	13.18	45.16	05.08	36.85
2	57.50	38.92	49.40	46.61	37.54	50.45	24.80	49.90	12.84	44.99	04.84	36.56
3	57.31	39.25	49.03	46.78	37.15	50.46	24.42	49.81	12.48	44.81	04.60	36.22
4	57.10	39.56	48.68	46.94	36.76	50.48	24.04	49.74	12.09	44.61	04.38	35.85
5	56.87	39.86	48.33	47.07	36.38	50.51	23.63	49.69	11.70	44.38	04.19	35.46
6	56.65	40.13	48.00	47.21	36.00	50.57	23.20	49.65	11.32	44.12	04.04	35.06
7	56.42	40.39	47.68	47.34	35.61	50.64	22.75	49.59	10.96	43.82	03.92	34.67
8	56.20	40.62	47.37	47.49	35.19	50.73	22.28	49.50	10.63	43.51	03.83	34.30
9	55.98	40.85	47.06	47.66	34.75	50.81	21.81	49.38	10.33	43.20	03.74	33.96
10	55.78	41.08	46.74	47.85	34.28	50.88	21.35	49.23	10.06	42.89	03.66	33.63
11	55.59	41.31	46.40	48.05	33.80	50.91	20.90	49.05	09.80	42.60	03.58	33.32
12	55.41	41.56	46.03	48.26	33.31	50.92	20.49	48.85	09.55	42.33	03.49	33.03
13	55.21	41.83	45.64	48.46	32.83	50.89	20.10	48.66	09.31	42.08	03.39	32.73
14	55.01	42.12	45.22	48.65	32.38	50.84	19.74	48.47	09.05	41.85	03.28	32.43
15	54.78	42.42	44.79	48.80	31.95	50.77	19.38	48.31	08.79	41.62	03.17	32.11
16	54.52	42.73	44.35	48.92	31.54	50.71	19.03	48.16	08.51	41.38	03.05	31.78
17	54.23	43.04	43.93	49.01	31.15	50.67	18.68	48.03	08.23	41.14	02.95	31.43
18	53.91	43.31	43.53	49.08	30.77	50.64	18.31	47.91	07.93	40.87	02.85	31.06
19	53.58	43.56	43.15	49.14	30.39	50.63	17.93	47.79	07.64	40.59	02.77	30.68
20	53.25	43.77	42.79	49.22	29.99	50.64	17.53	47.67	07.36	40.29	02.72	30.28
21	52.94	43.95	42.45	49.31	29.58	50.66	17.13	47.53	07.09	39.96	02.69	29.89
22	52.66	44.12	42.10	49.42	29.14	50.67	16.71	47.37	06.84	39.63	02.68	29.50
23	52.40	44.30	41.74	49.56	28.70	50.67	16.30	47.18	06.61	39.28	02.69	29.13
24	52.15	44.49	41.37	49.70	28.24	50.66	15.90	46.98	06.40	38.93	02.70	28.78
25	51.90	44.70	40.98	49.85	27.78	50.62	15.51	46.75	06.21	38.58	02.73	28.45
26	51.65	44.94	40.57	49.99	27.32	50.56	15.13	46.51	06.03	38.25	02.74	28.14
27	51.38	45.19	40.14	50.12	26.86	50.47	14.77	46.26	05.87	37.94	02.74	27.84
28	51.09	45.45	39.71	50.22	26.42	50.37	14.44	46.01	05.70	37.66	02.72	27.55
29	50.79	45.71	39.26	50.31	25.99	50.25	14.12	45.76	05.52	37.39	02.68	27.25
30	50.46	45.96	38.82	50.37	25.58	50.12	13.81	45.54	05.31	37.13	02.63	26.91
31	50.12	46.20	38.38	50.41	25.18	50.00	13.50	45.34	05.08	36.85	02.60	26.55
32	49.76	46.41	37.95	50.43			13.18	45.16			02.58	26.15
	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$
	16.84	16.81	16.85	16.82	16.85	16.82	16.85	16.82	16.84	16.81	16.82	16.79

Mean R.A.  $17^{\text{h}} 36^{\text{m}} 32.20^{\text{s}}$

Double lower transit December 15

Mean Dec.  $+86^{\circ} 35' 40.77''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1646 Bradley 2412 (Draconis) . . Mag. 6.15 Spect. A2

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 18 25	<sup>+</sup> <sup>o</sup> <sup>'</sup> 83 09	<sup>h</sup> <sup>m</sup> 18 25	<sup>+</sup> <sup>o</sup> <sup>'</sup> 83 09	<sup>h</sup> <sup>m</sup> 18 25	<sup>+</sup> <sup>o</sup> <sup>'</sup> 83 09	<sup>h</sup> <sup>m</sup> 18 25	<sup>+</sup> <sup>o</sup> <sup>'</sup> 83 09	<sup>h</sup> <sup>m</sup> 18 26	<sup>+</sup> <sup>o</sup> <sup>'</sup> 83 09	<sup>h</sup> <sup>m</sup> 18 26	<sup>+</sup> <sup>o</sup> <sup>'</sup> 83 09
	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>
1	50.66	51.86	51.97	41.45	55.64	34.83	01.03	32.95	05.86	36.60	08.94	44.65
2	50.66	51.47	52.08	41.21	55.80	34.73	01.19	32.97	05.99	36.75	09.02	44.96
3	50.67	51.11	52.17	40.97	55.96	34.63	01.35	32.98	06.14	36.91	09.09	45.29
4	50.68	50.78	52.26	40.73	56.10	34.51	01.52	32.98	06.28	37.09	09.15	45.64
5	50.69	50.47	52.34	40.47	56.25	34.38	01.70	32.98	06.43	37.30	09.20	46.00
6	50.69	50.18	52.42	40.18	56.39	34.22	01.88	33.00	06.58	37.53	09.24	46.36
7	50.69	49.88	52.51	39.87	56.55	34.05	02.07	33.04	06.72	37.78	09.28	46.72
8	50.68	49.58	52.61	39.55	56.71	33.87	02.27	33.10	06.86	38.05	09.30	47.07
9	50.67	49.24	52.72	39.22	56.88	33.70	02.46	33.20	06.99	38.34	09.32	47.40
10	50.66	48.88	52.85	38.90	57.07	33.54	02.65	33.31	07.11	38.62	09.34	47.72
11	50.66	48.49	52.99	38.60	57.26	33.41	02.83	33.45	07.22	38.91	09.35	48.02
12	50.68	48.09	53.13	38.33	57.45	33.31	03.01	33.60	07.32	39.18	09.36	48.31
13	50.70	47.68	53.27	38.09	57.65	33.24	03.18	33.75	07.42	39.44	09.38	48.58
14	50.75	47.29	53.42	37.87	57.84	33.19	03.34	33.89	07.51	39.69	09.40	48.86
15	50.80	46.92	53.56	37.66	58.03	33.16	03.49	34.03	07.60	39.92	09.42	49.15
16	50.85	46.58	53.71	37.47	58.21	33.13	03.64	34.15	07.70	40.15	09.45	49.46
17	50.92	46.25	53.84	37.28	58.38	33.11	03.79	34.26	07.80	40.37	09.47	49.79
18	50.98	45.95	53.97	37.09	58.55	33.07	03.94	34.36	07.90	40.59	09.49	50.15
19	51.03	45.65	54.10	36.89	58.72	33.03	04.10	34.46	08.01	40.83	09.50	50.54
20	51.09	45.36	54.23	36.68	58.88	32.98	04.26	34.55	08.12	41.10	09.49	50.93
21	51.14	45.07	54.36	36.45	59.05	32.91	04.43	34.66	08.22	41.40	09.47	51.31
22	51.19	44.77	54.49	36.21	59.22	32.84	04.60	34.79	08.32	41.73	09.43	51.67
23	51.24	44.46	54.64	35.96	59.39	32.76	04.77	34.96	08.41	42.08	09.39	52.00
24	51.29	44.13	54.79	35.71	59.58	32.69	04.94	35.16	08.48	42.43	09.35	52.29
25	51.35	43.78	54.95	35.48	59.77	32.64	05.10	35.39	08.53	42.77	09.32	52.56
26	51.41	43.42	55.12	35.27	59.97	32.62	05.24	35.63	08.58	43.08	09.29	52.83
27	51.48	43.05	55.30	35.09	60.17	32.64	05.37	35.87	08.63	43.35	09.27	53.11
28	51.57	42.69	55.47	34.95	60.36	32.69	05.50	36.08	08.68	43.61		
29	51.66	42.34	55.64	34.83	60.54	32.76	05.61	36.27	08.73	43.85	<sup>09 26</sup> <sup>09 25</sup>	<sup>53 40</sup> <sup>53 72</sup>
30	51.76	42.02			60.72	32.84	05.73	36.44	08.80	44.10	09.23	54.06
31	51.87	41.72			60.88	32.90	05.86	36.60	08.87	44.37	09.18	54.78
32	51.97	41.45			61.03	32.95			08.94	44.65		
	sec $\delta$ 8.40	tan $\delta$ 8.34	sec $\delta$ 8.40	tan $\delta$ 8.34	sec $\delta$ 8.40	tan $\delta$ 8.34	sec $\delta$ 8.40	tan $\delta$ 8.34	sec $\delta$ 8.40	tan $\delta$ 8.34	sec $\delta$ 8.40	tan $\delta$ 8.34

Mean R.A. <sup>h</sup> 18 <sup>m</sup> 25 <sup>s</sup> 57.26

Double lower transit December 28

Mean Dec. +83° 10' 01.75"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

413

1646 Bradley 2412 (Draconis) Mag. 6.15 Spect. A2

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 18 26	+ ° ' " / 83 09	h m 18 26	+ ° ' " / 83 10	h m 18 25	+ ° ' " / 83 10	h m 18 25	+ ° ' " / 83 10	h m 18 25	+ ° ' " / 83 10	h m 18 25	+ ° ' " / 83 09
	s	"	s	"	s	"	s	"	s	"	s	"
1	09.18	54.78	06.41	04.17	61.26	10.49	55.08	12.54	48.77	10.04	44.01	63.36
2	09.14	55.15	06.26	04.44	61.06	10.58	54.88	12.51	48.59	09.93	43.87	63.11
3	09.09	55.52	06.11	04.68	60.87	10.67	54.69	12.50	48.40	09.83	43.72	62.82
4	09.03	55.87	05.96	04.90	60.69	10.77	54.49	12.51	48.19	09.71	43.58	62.50
5	08.97	56.21	05.82	05.11	60.51	10.88	54.29	12.53	47.99	09.56	43.46	62.15
6	08.89	56.53	05.67	05.31	60.33	11.01	54.08	12.57	47.78	09.37	43.34	61.79
7	08.82	56.83	05.54	05.51	60.15	11.16	53.86	12.60	47.58	09.14	43.24	61.42
8	08.75	57.11	05.40	05.72	59.96	11.32	53.63	12.60	47.39	08.90	43.16	61.07
9	08.68	57.38	05.27	05.95	59.75	11.49	53.39	12.57	47.21	08.64	43.08	60.75
10	08.61	57.65	05.14	06.19	59.54	11.65	53.15	12.51	47.04	08.39	43.00	60.44
11	08.55	57.92	05.00	06.46	59.31	11.78	52.93	12.42	46.89	08.16	42.93	60.15
12	08.49	58.21	04.85	06.74	59.09	11.88	52.71	12.31	46.74	07.94	42.86	59.87
13	08.43	58.51	04.69	07.02	58.86	11.94	52.50	12.19	46.59	07.74	42.78	59.60
14	08.36	58.84	04.51	07.29	58.64	11.98	52.30	12.07	46.44	07.55	42.70	59.32
15	08.29	59.19	04.33	07.53	58.42	12.00	52.11	11.98	46.29	07.37	42.61	59.03
16	08.21	59.55	04.14	07.73	58.22	12.02	51.92	11.90	46.13	07.19	42.53	58.72
17	08.11	59.91	03.95	07.91	58.03	12.05	51.73	11.84	45.97	07.00	42.44	58.39
18	07.99	60.25	03.77	08.05	57.84	12.10	51.54	11.79	45.80	06.80	42.36	58.04
19	07.87	60.56	03.60	08.19	57.65	12.16	51.34	11.74	45.63	06.57	42.29	57.68
20	07.75	60.84	03.43	08.34	57.46	12.25	51.14	11.69	45.47	06.33	42.22	57.30
21	07.63	61.08	03.28	08.50	57.26	12.34	50.93	11.63	45.31	06.06	42.17	56.92
22	07.52	61.31	03.12	08.68	57.05	12.44	50.72	11.55	45.15	05.77	42.12	56.54
23	07.41	61.54	02.96	08.88	56.84	12.53	50.50	11.45	45.00	05.47	42.08	56.16
24	07.32	61.78	02.80	09.10	56.62	12.60	50.29	11.32	44.87	05.16	42.05	55.81
25	07.22	62.05	02.63	09.32	56.40	12.65	50.07	11.18	44.74	04.86	42.03	55.48
26	07.13	62.33	02.45	09.54	56.17	12.68	49.87	11.01	44.61	04.56	42.00	55.17
27	07.03	62.63	02.26	09.75	55.94	12.68	49.67	10.83	44.50	04.29	41.97	54.88
28	06.92	62.95	02.07	09.94	55.72	12.66	49.48	10.64	44.38	04.03	41.94	54.59
29	06.81	63.27	01.87	10.11	55.50	12.63	49.30	10.46	44.27	03.80	41.89	54.30
30	06.68	63.58	01.66	10.26	55.29	12.59	49.12	10.30	44.14	03.58	41.84	53.98
31	06.55	63.88	01.46	10.38	55.08	12.54	48.95	10.16	44.01	03.36	41.79	53.62
32	06.41	64.17	01.26	10.49			48.77	10.04			41.75	53.23
	sec δ 8.40	tan δ 8.34	sec δ 8.41	tan δ 8.35	sec δ 8.41	tan δ 8.35	sec δ 8.41	tan δ 8.35	sec δ 8.41	tan δ 8.35	sec δ 8.40	tan δ 8.34

Mean R.A. 18<sup>h</sup> 25<sup>m</sup> 57.<sup>s</sup>26

Double lower transit December 28

Mean Dec. +83° 10' 01".75

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1647 Groombridge 3212 (Draconis) Mag. 6.61 Spect. A2

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup>	<sup>s</sup>	<sup>h</sup> <sup>m</sup>	<sup>s</sup>	<sup>h</sup> <sup>m</sup>	<sup>s</sup>	<sup>h</sup> <sup>m</sup>	<sup>s</sup>	<sup>h</sup> <sup>m</sup>	<sup>s</sup>	<sup>h</sup> <sup>m</sup>	<sup>s</sup>
	20 01	84 37	20 01	84 37	20 01	84 37	20 01	84 37	20 01	84 37	20 01	84 37
1	15 05	46 04	13 66	35 86	16 05	27 36	21 74	21 94	28 30	21 98	34 05	27 33
2	14 94	45 70	13 70	35 57	16 20	27 16	21 93	21 86	28 50	22 02	34 22	27 56
3	14 85	45 37	13 75	35 29	16 35	26 97	22 11	21 76	28 71	22 07	34 39	27 82
4	14 77	45 06	13 78	35 02	16 48	26 77	22 31	21 64	28 93	22 14	34 55	28 10
5	14 70	44 78	13 80	34 74	16 61	26 55	22 51	21 52	29 16	22 22	34 71	28 39
6	14 62	44 52	13 81	34 43	16 74	26 31	22 73	21 41	29 39	22 33	34 86	28 70
7	14 53	44 27	13 83	34 09	16 86	26 05	22 97	21 30	29 63	22 46	35 00	29 01
8	14 43	44 01	13 85	33 73	17 00	25 77	23 21	21 23	29 86	22 62	35 12	29 33
9	14 32	43 78	13 89	33 36	17 16	25 49	23 46	21 17	30 09	22 79	35 23	29 63
10	14 21	43 41	13 95	32 98	17 33	25 22	23 71	21 15	30 30	22 97	35 33	29 92
11	14 10	43 07	14 02	32 62	17 52	24 97	23 96	21 14	30 51	23 16	35 42	30 19
12	14 00	42 70	14 11	32 27	17 72	24 74	24 20	21 16	30 70	23 35	35 52	30 45
13	13 92	42 32	14 22	31 94	17 92	24 54	24 44	21 18	30 88	23 53	35 61	30 70
14	13 86	41 94	14 32	31 64	18 13	24 36	24 66	21 21	31 05	23 69	35 71	30 95
15	13 82	41 57	14 43	31 36	18 33	24 19	24 88	21 23	31 22	23 85	35 81	31 20
16	13 79	41 22	14 54	31 09	18 54	24 05	25 08	21 24	31 39	23 99	35 93	31 47
17	13 77	40 88	14 65	30 83	18 73	23 91	25 29	21 24	31 57	24 13	36 05	31 76
18	13 76	40 57	14 74	30 56	18 91	23 76	25 49	21 23	31 75	24 26	36 17	32 08
19	13 74	40 26	14 84	30 30	19 09	23 62	25 69	21 21	31 94	24 41	36 28	32 43
20	13 73	39 97	14 92	30 02	19 27	23 46	25 90	21 18	32 14	24 58	36 37	32 81
21	13 71	39 67	15 01	29 73	19 44	23 28	26 13	21 16	32 34	24 78	36 45	33 19
22	13 68	39 38	15 10	29 42	19 61	23 10	26 36	21 16	32 55	25 02	36 50	33 55
23	13 65	39 07	15 19	29 09	19 80	22 90	26 61	21 19	32 74	25 28	36 54	33 89
24	13 61	38 74	15 30	28 76	19 99	22 70	26 86	21 26	32 91	25 57	36 57	34 20
25	13 57	38 39	15 42	28 43	20 20	22 52	27 11	21 36	33 07	25 85	36 60	34 48
26	13 54	38 03	15 56	28 12	20 43	22 36	27 34	21 49	33 20	26 11	36 65	34 75
27	13 53	37 65	15 72	27 84	20 66	22 24	27 55	21 62	33 33	26 34	36 70	35 03
28	13 52	37 26	15 88	27 58	20 90	22 15	27 75	21 74	33 45	26 55	36 77	35 31
29	13 53	36 88	16 05	27 36	21 13	22 09	27 94	21 84	33 58	26 74	36 84	35 61
30	13 56	36 51			21 35	22 05	28 12	21 92	33 73	26 92	36 91	35 94
31	13 61	36 17			21 55	22 00	28 30	21 98	33 88	27 12	36 98	36 28
32	13 66	35 86			21 74	21 94			34 05	27 33		
	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$
	10 68	10 63	10 68	10 63	10 67	10 63	10 67	10 62	10 67	10 63	10 68	10 63

Mean R.A. 20 01 25<sup>s</sup>.6

Double lower transit January 21

Mean Dec. +84° 37' 51".91



**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

415

1647 Groombridge 3212 (Draconis) Mag. 6.61 Spect. A2

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h m</sup> 20 01	<sup>+</sup> 84 37	<sup>h m</sup> 20 01	<sup>+</sup> 84 37	<sup>h m</sup> 20 01	<sup>+</sup> 84 37	<sup>h m</sup> 20 01	<sup>+</sup> 84 38	<sup>h m</sup> 20 01	<sup>+</sup> 84 38	<sup>h m</sup> 20 01	<sup>+</sup> 84 37
	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"
1	36.98	36.28	36.35	47.45	32.07	57.10	25.43	03.55	17.38	05.97	09.96	63.54
2	37.05	36.65	36.25	47.80	31.86	57.33	25.19	03.67	17.14	06.01	09.72	63.43
3	37.10	37.02	36.14	48.14	31.67	57.55	24.96	03.80	16.88	06.07	09.47	63.29
4	37.14	37.40	36.03	48.46	31.48	57.77	24.73	03.95	16.61	06.11	09.22	63.11
5	37.17	37.78	35.91	48.76	31.30	58.00	24.51	04.12	16.33	06.14	08.97	62.89
6	37.18	38.14	35.80	49.05	31.13	58.25	24.27	04.31	16.03	06.13	08.74	62.65
7	37.18	38.50	35.70	49.33	30.96	58.52	24.02	04.51	15.73	06.08	08.52	62.40
8	37.18	38.83	35.60	49.62	30.78	58.82	23.75	04.69	15.44	06.00	08.32	62.15
9	37.17	39.15	35.51	49.93	30.59	59.12	23.46	04.84	15.16	05.90	08.14	61.91
10	37.16	39.46	35.42	50.25	30.38	59.43	23.17	04.96	14.90	05.80	07.97	61.69
11	37.15	39.75	35.33	50.60	30.15	59.72	22.87	05.05	14.65	05.70	07.80	61.48
12	37.15	40.05	35.24	50.97	29.91	59.98	22.59	05.11	14.42	05.61	07.64	61.29
13	37.16	40.36	35.12	51.35	29.66	60.21	22.31	05.16	14.19	05.53	07.47	61.10
14	37.18	40.68	34.99	51.73	29.41	60.41	22.05	05.20	13.97	05.48	07.30	60.92
15	37.19	41.04	34.84	52.10	29.17	60.59	21.80	05.25	13.74	05.43	07.12	60.73
16	37.20	41.41	34.67	52.43	28.94	60.75	21.56	05.32	13.50	05.39	06.93	60.52
17	37.20	41.82	34.50	52.73	28.72	60.92	21.33	05.40	13.26	05.34	06.74	60.29
18	37.18	42.23	34.32	53.01	28.52	61.10	21.09	05.50	13.01	05.28	06.55	60.05
19	37.14	42.63	34.16	53.26	28.32	61.30	20.85	05.60	12.75	05.21	06.36	59.78
20	37.08	43.01	34.01	53.51	28.12	61.52	20.60	05.71	12.49	05.11	06.17	59.49
21	37.01	43.37	33.87	53.77	27.91	61.75	20.34	05.81	12.23	05.00	06.00	59.19
22	<sup>36 93</sup> 36.81	<sup>43 69</sup> 44.27	33.74	54.05	27.70	61.99	20.06	05.90	11.96	04.85	05.84	58.88
23	<sup>36 86</sup> 36.81	<sup>43 98</sup> 44.27	33.62	54.35	27.47	62.23	19.78	05.97	11.71	04.69	05.70	58.57
24	36.76	44.57	33.48	54.67	27.24	62.46	19.50	06.02	11.46	04.52	05.56	58.27
25	36.72	44.88	33.35	55.00	26.99	62.68	19.21	06.04	11.22	04.34	05.44	58.00
26	36.69	45.21	33.20	55.33	26.73	62.87	18.92	06.04	11.00	04.16	05.33	57.74
27	36.66	45.56	33.03	55.67	26.47	63.05	18.64	06.03	10.79	04.00	05.21	57.50
28	36.62	45.93	32.86	55.99	26.20	63.20	18.37	06.00	10.59	03.86	05.09	57.28
29	36.57	46.31	32.67	56.30	25.94	63.33	18.11	05.97	10.39	03.74	04.95	57.06
30	36.51	46.69	32.47	56.59	25.68	63.45	17.86	05.95	10.18	03.64	04.80	56.82
31	36.44	47.07	32.27	56.86	25.43	63.55	17.62	05.95	09.96	03.54	04.64	56.55
32	36.35	47.45	32.07	57.10			17.38	05.97		04.48	56.24	
	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ
	10.68	10.63	10.69	10.64	10.69	10.65	10.69	10.65	10.69	10.65	10.69	10.65

Mean R.A.  $20^{\text{h}} 01^{\text{m}} 25^{\text{s}}.16$

Double lower transit January 21

Mean Dec.  $+84^{\circ} 37' 51''.91$

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

915 76 Draconis Mag. 5.69 Spect. A0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 20 43	+ ° ' " / 82 28	h m 20 43	+ ° ' " / 82 28	h m 20 43	+ ° ' " / 82 28	h m 20 43	+ ° ' " / 82 28	h m 20 43	+ ° ' " / 82 28	h m 20 43	+ ° ' " / 82 28
1	s 29.10	" 51.51	s 27.30	" 41.83	s 28.28	" 32.89	s 31.86	" 26.19	s 36.53	" 24.70	s 41.13	" 28.71
2	28.99	51.19	27.31	41.53	28.38	32.65	31.98	26.07	36.68	24.70	41.28	28.90
3	28.90	50.89	27.32	41.26	28.46	32.43	32.11	25.93	36.83	24.71	41.42	29.12
4	28.82	50.61	27.32	40.98	28.54	32.20	32.23	25.77	36.99	24.72	41.57	29.35
5	28.75	50.35	27.32	40.70	28.62	31.96	32.37	25.60	37.16	24.74	41.71	29.61
6	28.67	50.11	27.30	40.39	28.69	31.69	32.51	25.43	37.34	24.79	41.84	29.89
7	28.59	49.89	27.29	40.06	28.76	31.41	32.67	25.27	37.51	24.87	41.97	30.17
8	28.51	49.66	27.28	39.70	28.83	31.10	32.83	25.14	37.69	24.97	42.09	30.45
9	28.41	49.41	27.27	39.32	28.92	30.79	33.00	25.03	37.87	25.09	42.20	30.73
10	28.31	49.13	27.28	38.94	29.01	30.48	33.18	24.94	38.04	25.22	42.30	31.00
11	28.20	48.82	27.30	38.56	29.12	30.18	33.35	24.88	38.20	25.36	42.39	31.25
12	28.11	48.48	27.33	38.19	29.24	29.91	33.53	24.83	38.36	25.51	42.48	31.49
13	28.02	48.13	27.38	37.85	29.37	29.65	33.70	24.80	38.51	25.64	42.58	31.72
14	27.95	47.77	27.43	37.52	29.50	29.43	33.86	24.77	38.65	25.77	42.67	31.94
15	27.89	47.41	27.48	37.21	29.63	29.22	34.02	24.75	38.79	25.89	42.77	32.17
16	27.83	47.07	27.53	36.92	29.76	29.02	34.17	24.71	38.92	25.99	42.87	32.41
17	27.79	46.75	27.59	36.64	29.88	28.84	34.31	24.67	39.06	26.08	42.99	32.67
18	27.75	46.44	27.63	36.36	30.00	28.66	34.45	24.61	39.20	26.18	43.10	32.96
19	27.72	46.14	27.68	36.07	30.12	28.47	34.60	24.54	39.35	26.28	43.21	33.29
20	27.69	45.86	27.72	35.78	30.23	28.27	34.75	24.47	39.50	26.40	43.32	33.64
21	27.65	45.57	27.76	35.47	30.34	28.06	34.90	24.40	39.67	26.55	43.41	34.01
22	27.61	45.29	27.79	35.15	30.45	27.83	35.07	24.34	39.83	26.74	43.49	34.36
23	27.56	44.99	27.83	34.81	30.56	27.60	35.24	24.31	40.00	26.96	43.55	34.70
24	27.51	44.68	27.88	34.45	30.68	27.36	35.43	24.32	40.15	27.20	43.61	35.00
25	27.46	44.35	27.94	34.10	30.81	27.13	35.61	24.36	40.29	27.45	43.66	35.28
26	27.41	44.00	28.01	33.76	30.96	26.91	35.79	24.43	40.41	27.68	43.72	35.54
27	27.36	43.63	28.09	33.44	31.11	26.73	35.96	24.51	40.53	27.88	43.78	35.80
28	27.33	43.25	28.18	33.15	31.27	26.59	36.11	24.59	40.64	28.06	43.86	36.07
29	27.30	42.87	28.28	32.89	31.43	26.48	36.25	24.65	40.75	28.22	43.94	36.35
30	27.29	42.50			31.58	26.38	36.39	24.69	40.87	28.38	44.02	36.66
31	27.29	42.15			31.72	26.29	36.53	24.70	41.00	28.54	44.10	36.99
32	27.30	41.83			31.86	26.19			41.13	28.71		
	sec δ 7.64	tan δ 7.58	sec δ 7.64	tan δ 7.57	sec δ 7.64	tan δ 7.57	sec δ 7.63	tan δ 7.57	sec δ 7.63	tan δ 7.57	sec δ 7.64	tan δ 7.57

Mean R.A. 20<sup>h</sup> 43<sup>m</sup> 37.38<sup>s</sup>

Double lower transit January 31

Mean Dec. +82° 28' 55".99

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

417

915 76 Draconis Mag. 5.69 Spect. A0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 20 43	<sup>+</sup> <sup>o</sup> ' " 82 28	<sup>h</sup> <sup>m</sup> 20 43	<sup>+</sup> <sup>o</sup> ' " 82 28	<sup>h</sup> <sup>m</sup> 20 43	<sup>+</sup> <sup>o</sup> ' " 82 28	<sup>h</sup> <sup>m</sup> 20 43	<sup>+</sup> <sup>o</sup> ' " 82 29	<sup>h</sup> <sup>m</sup> 20 43	<sup>+</sup> <sup>o</sup> ' " 82 29	<sup>h</sup> <sup>m</sup> 20 43	<sup>+</sup> <sup>o</sup> ' " 82 29
	<sup>s</sup> 44.10	" 36.99	<sup>s</sup> 44.80	" 47.94	<sup>s</sup> 42.73	" 59.05	<sup>s</sup> 38.72	" 07.14	<sup>s</sup> 33.37	" 11.55	<sup>s</sup> 28.06	" 11.01
1	44.10	36.99	44.80	47.94	42.73	59.05	38.72	07.14	33.37	11.55	28.06	11.01
2	44.18	37.34	<sup>44 77</sup> <sup>44 74</sup>	<sup>48 34</sup> <sup>48 72</sup>	42.61	59.33	38.57	07.31	33.21	11.65	27.89	10.97
3	44.26	37.70	44.70	49.09	42.49	59.60	38.42	07.49	33.04	11.77	27.70	10.89
4	44.33	38.07	44.65	49.44	42.38	59.87	38.27	07.70	32.86	11.88	27.52	10.78
5	44.38	38.44	44.60	49.77	42.28	60.14	38.13	07.93	32.67	11.98	27.33	10.63
6	44.43	38.81	44.55	50.08	42.18	60.43	37.98	08.17	32.46	12.05	27.15	10.45
7	44.47	39.16	44.51	50.39	42.08	60.74	37.83	08.43	32.25	12.07	26.97	10.26
8	44.50	39.50	44.46	50.70	41.99	61.08	37.66	08.68	32.05	12.07	26.82	10.06
9	44.53	39.82	44.43	51.03	41.88	61.43	37.48	08.90	31.85	12.04	26.67	09.87
10	44.55	40.13	44.40	51.38	41.77	61.79	37.29	09.10	31.66	12.00	26.53	09.69
11	44.57	40.43	44.37	51.75	41.64	62.13	37.10	09.26	31.48	11.97	26.40	09.53
12	44.60	40.73	44.34	52.14	41.50	62.46	36.90	09.40	31.30	11.94	26.27	09.38
13	44.64	41.04	44.30	52.55	41.35	62.75	36.72	09.51	31.14	11.92	26.14	09.24
14	44.68	41.36	44.24	52.96	41.20	63.01	36.54	09.62	30.98	11.92	26.00	09.10
15	44.72	41.71	44.17	53.36	41.05	63.25	36.37	09.73	30.82	11.93	25.86	08.96
16	44.77	42.08	44.09	53.74	40.90	63.47	36.21	09.85	30.65	11.94	25.72	08.80
17	44.81	42.48	44.00	54.09	40.77	63.70	36.05	09.99	30.48	11.96	25.57	08.63
18	44.84	42.90	43.91	54.40	40.64	63.93	35.90	10.14	30.31	11.97	25.42	08.44
19	44.85	43.32	43.82	54.70	40.52	64.17	35.74	10.31	30.12	11.96	25.26	08.22
20	44.85	43.72	43.74	54.99	40.40	64.44	35.57	10.48	29.94	11.93	25.11	07.98
21	44.83	44.09	43.67	55.28	40.28	64.72	35.40	10.65	29.74	11.88	24.97	07.73
22	44.81	44.43	43.60	55.59	40.15	65.01	35.22	10.81	29.55	11.81	24.83	07.46
23	44.80	44.75	43.54	55.92	40.02	65.30	35.04	10.95	29.36	11.72	24.70	07.20
24	44.78	45.05	43.48	56.27	39.87	65.59	34.85	11.07	29.17	11.61	24.59	06.93
25	44.78	45.36	43.41	56.63	39.72	65.87	34.65	11.16	29.00	11.49	24.48	06.69
26	44.78	45.68	43.34	57.00	39.56	66.13	34.45	11.24	28.83	11.37	24.38	06.46
27	44.79	46.01	43.26	57.38	39.40	66.37	34.25	11.29	28.67	11.26	24.28	06.26
28	44.80	46.37	43.17	57.74	39.23	66.59	34.06	11.33	28.51	11.17	24.18	06.08
29	44.81	46.75	43.07	58.10	39.06	66.78	33.88	11.37	28.36	11.10	24.07	05.90
30	44.82	47.14	42.96	58.44	38.89	66.96	33.70	11.41	28.21	11.05	23.94	05.70
31	44.81	47.54	42.85	58.76	38.72	67.14	33.54	11.47	28.06	11.01	23.81	05.47
32	44.80	47.94	42.73	59.05			33.37	11.55			23.68	05.21
	sec $\delta$ 7.64	tan $\delta$ 7.57	sec $\delta$ 7.64	tan $\delta$ 7.58	sec $\delta$ 7.65	tan $\delta$ 7.58	sec $\delta$ 7.65	tan $\delta$ 7.58	sec $\delta$ 7.65	tan $\delta$ 7.58	sec $\delta$ 7.65	tan $\delta$ 7.58

Mean R.A. <sup>h</sup> 20 <sup>m</sup> 43 <sup>s</sup> 37.38

Double lower transit January 31

Mean Dec. <sup>o</sup> +82 <sup>'</sup> 28 <sup>"</sup> 55.39

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1648 32 H. Cephei Mag. 5.38 Spect. A0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 22 14	<sup>+</sup> <sup>o</sup> <sup>'</sup> 86 02	<sup>h</sup> <sup>m</sup> 22 14	<sup>+</sup> <sup>o</sup> <sup>'</sup> 86 02	<sup>h</sup> <sup>m</sup> 22 14	<sup>+</sup> <sup>o</sup> <sup>'</sup> 86 02	<sup>h</sup> <sup>m</sup> 22 14	<sup>+</sup> <sup>o</sup> <sup>'</sup> 86 01	<sup>h</sup> <sup>m</sup> 22 14	<sup>+</sup> <sup>o</sup> <sup>'</sup> 86 01	<sup>h</sup> <sup>m</sup> 22 14	<sup>+</sup> <sup>o</sup> <sup>'</sup> 86 01
	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>	<sup>s</sup>	<sup>"</sup>
1	11.83	27.22	05.01	20.04	03.31	11.29	06.90	62.57	14.24	57.75	23.37	58.05
2	11.53	27.02	04.92	19.77	03.38	11.01	07.06	62.37	14.48	57.64	23.69	58.12
3	11.26	26.82	04.82	19.52	03.45	10.74	07.21	62.15	14.74	57.53	24.01	58.21
4	11.02	26.63	04.72	19.28	03.49	10.49	07.37	61.91	15.02	57.42	24.34	58.32
5	10.79	26.46	04.59	19.04	03.52	10.22	07.53	61.65	15.32	57.31	24.67	58.45
6	10.57	26.31	04.44	18.78	03.53	09.93	07.72	61.39	15.64	57.22	24.99	58.61
7	10.34	26.18	04.28	18.50	03.54	09.62	07.93	61.12	15.97	57.16	25.30	58.78
8	10.09	26.06	04.12	18.19	03.55	09.29	08.17	60.87	16.31	57.11	25.59	58.95
9	09.82	25.92	03.97	17.85	03.58	08.94	08.42	60.64	16.65	57.09	25.87	59.14
10	09.53	25.77	03.84	17.50	03.64	08.58	08.69	60.43	16.99	57.09	26.12	59.31
11	09.22	25.57	03.74	17.14	03.72	08.23	08.97	60.24	17.31	57.10	26.37	59.48
12	08.92	25.35	03.67	16.78	03.83	07.88	09.25	60.07	17.62	57.12	26.60	59.64
13	08.64	25.10	03.62	16.43	03.95	07.55	09.52	59.91	17.91	57.15	26.83	59.78
14	08.38	24.83	03.58	16.10	04.10	07.25	09.79	59.77	18.19	57.16	27.06	59.92
15	08.14	24.56	03.56	15.78	04.24	06.96	10.03	59.64	18.45	57.17	27.31	60.05
16	07.93	24.29	03.55	15.48	04.39	06.69	10.27	59.50	18.71	57.16	27.58	60.19
17	07.74	24.03	03.53	15.19	04.54	06.43	10.49	59.35	18.98	57.15	27.86	60.35
18	07.56	23.78	03.50	14.91	04.67	06.18	10.71	59.19	19.25	57.13	28.16	60.53
19	07.39	23.55	03.46	14.62	04.79	05.93	10.93	59.02	19.54	57.11	28.47	60.75
20	07.22	23.32	03.42	14.33	04.90	05.67	11.15	58.84	19.85	57.10	28.76	61.00
21	07.04	23.11	03.36	14.03	05.00	05.40	11.39	58.66	20.19	57.11	29.04	61.28
22	06.85	22.89	03.29	13.71	05.10	05.11	11.66	58.48	20.54	57.16	29.28	61.56
23	06.65	22.67	03.23	13.38	05.20	04.81	11.95	58.31	20.89	57.25	29.49	61.83
24	06.44	22.44	03.18	13.02	05.32	04.50	12.27	58.18	21.22	57.37	29.68	62.08
25	06.22	22.18	03.16	12.65	05.47	04.19	12.60	58.09	21.53	57.50	29.86	62.30
26	06.00	21.91	03.16	12.28	05.64	03.88	12.92	58.03	21.81	57.63	30.04	62.50
27	05.78	21.61	03.19	11.93	05.84	03.60	13.23	57.99	22.07	57.74	30.24	62.69
28	05.58	21.30	03.24	11.59	06.07	03.35	13.51	57.95	22.31	57.83	30.46	62.88
29	05.40	20.97	03.31	11.29	06.29	03.13	13.76	57.90	22.55	57.89	30.70	63.09
30	05.24	20.65			06.51	02.94	14.00	57.84	22.81	57.95	30.95	63.31
31	05.12	20.33			06.72	02.75	14.24	57.75	23.08	57.99	31.20	63.55
32	05.01	20.04			06.90	02.57			23.37	58.05		
	sec $\delta$ 14.48	tan $\delta$ 14.45	sec $\delta$ 14.47	tan $\delta$ 14.44	sec $\delta$ 14.46	tan $\delta$ 14.43	sec $\delta$ 14.46	tan $\delta$ 14.42	sec $\delta$ 14.45	tan $\delta$ 14.42	sec $\delta$ 14.46	tan $\delta$ 14.42

Mean R.A.  $22^{\text{h}} 14^{\text{m}} 26.05^{\text{s}}$

Double lower transit February 23

Mean Dec.  $+86^{\circ} 02' 26.04''$

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

419

1648 32 H. Cephei · Mag. 5.38 Spect. A0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 22 14	<sup>+</sup> <sup>o</sup> ' " 86 02	<sup>h</sup> <sup>m</sup> 22 14	<sup>+</sup> <sup>o</sup> ' " 86 02	<sup>h</sup> <sup>m</sup> 22 14	<sup>+</sup> <sup>o</sup> ' " 86 02	<sup>h</sup> <sup>m</sup> 22 14	<sup>+</sup> <sup>o</sup> ' " 86 02	<sup>h</sup> <sup>m</sup> 22 14	<sup>+</sup> <sup>o</sup> ' " 86 02	<sup>h</sup> <sup>m</sup> 22 14	<sup>+</sup> <sup>o</sup> ' " 86 02
	<sup>s</sup> 31.20	" 03.55	<sup>s</sup> 36.07	" 13.26	<sup>s</sup> 36.26	" 25.23	<sup>s</sup> 32.12	" 35.88	<sup>s</sup> 24.35	" 44.26	<sup>s</sup> 14.76	" 48.19
1	31.20	03.55	36.07	13.26	36.26	25.23	32.12	35.88	24.35	44.26	14.76	48.19
2	31.46	03.81	36.16	13.65	36.15	25.58	31.92	36.16	24.10	44.49	14.44	48.29
3	31.71	04.09	36.22	14.03	36.04	25.92	31.73	36.44	23.84	44.74	14.08	48.38
4	31.95	04.39	36.27	14.41	35.95	26.24	31.56	36.74	23.56	45.00	13.70	48.44
5	32.17	04.69	36.30	14.77	35.87	26.57	31.39	37.07	23.24	45.26	13.30	48.47
6	32.37	05.00	36.33	15.12	35.81	26.91	31.22	37.42	22.90	45.49	12.91	48.45
7	32.55	05.31	36.35	15.45	35.76	27.28	31.04	37.79	22.54	45.69	12.54	48.41
8	32.71	05.61	36.38	15.77	35.71	27.67	30.83	38.16	22.17	45.86	12.19	48.36
9	32.86	05.89	36.42	16.09	35.65	28.08	30.58	38.52	21.81	45.99	11.87	48.31
10	33.00	06.16	36.47	16.42	35.57	28.50	30.31	38.85	21.46	46.11	11.57	48.26
11	33.14	06.42	36.54	16.76	35.46	28.93	30.03	39.16	21.14	46.22	11.28	48.22
12	33.30	06.67	36.63	17.13	35.32	29.35	29.74	39.44	20.83	46.33	10.99	48.20
13	33.47	06.92	36.70	17.52	35.16	29.74	29.45	39.69	20.54	46.44	10.71	48.18
14	33.65	07.19	36.77	17.94	34.98	30.11	29.18	39.93	20.26	46.58	10.42	48.17
15	33.85	07.48	36.81	18.37	34.80	30.45	28.93	40.16	19.98	46.72	10.11	48.16
16	34.05	07.79	36.82	18.80	34.63	30.76	28.70	40.40	19.70	46.87	09.79	48.15
17	34.26	08.14	36.80	19.22	34.47	31.07	28.48	40.65	19.40	47.03	09.46	48.12
18	34.44	08.51	36.76	19.62	34.34	31.38	28.27	40.92	19.09	47.19	09.11	48.07
19	34.60	08.90	36.70	19.99	34.22	31.70	28.05	41.20	18.76	47.34	08.76	48.00
20	34.72	09.28	36.65	20.33	34.11	32.04	27.82	41.49	18.41	47.47	08.40	47.91
21	34.82	09.65	36.61	20.66	34.00	32.40	27.58	41.79	18.05	47.58	08.05	47.80
22	34.89	09.98	36.59	20.98	33.88	32.77	27.32	42.08	17.68	47.68	07.72	47.67
23	34.96	10.29	36.59	21.32	33.75	33.15	27.04	42.37	17.31	47.75	07.40	47.53
24	35.04	10.58	36.60	21.67	33.60	33.53	26.74	42.64	16.94	47.80	07.10	47.39
25	35.14	10.87	<sup>36 62</sup> 36.64	<sup>22 04</sup> 22.43	33.43	33.91	26.43	42.89	16.59	47.83	06.82	47.25
26	35.26	11.16	36.64	22.83	33.24	34.28	26.10	43.11	16.25	47.86	06.56	47.14
27	35.40	11.46	36.63	23.24	33.03	34.64	25.78	43.32	15.93	47.89	06.31	47.04
28	35.54	11.79	36.59	23.65	32.81	34.98	25.46	43.51	15.63	47.93	06.06	46.97
29	35.69	12.13	36.54	24.07	32.58	35.29	25.15	43.69	15.35	47.99	05.78	46.90
30	35.83	12.49	36.46	24.47	32.34	35.59	24.87	43.87	15.06	48.08	05.48	46.84
31	35.96	12.87	36.37	24.86	32.12	35.88	24.60	44.05	14.76	48.19	05.16	46.75
32	36.07	13.26	36.26	25.23			24.35	44.26			04.81	46.62
	sec δ 14.46	tan δ 14.43	sec δ 14.47	tan δ 14.44	sec δ 14.49	tan δ 14.45	sec δ 14.50	tan δ 14.46	sec δ 14.50	tan δ 14.47	sec δ 14.50	tan δ 14.47

Mean R.A. <sup>h</sup> 22 <sup>m</sup> 14 <sup>s</sup> 26.05

Double lower transit February 23

Mean Dec. +86° 02' 26.04"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1649 36 H. Cephei  $\searrow$  Mag. 4.96 Spect. K5

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 22 54	<sup>+</sup> <sup>o</sup> / 84 16	<sup>h</sup> <sup>m</sup> 22 54	<sup>+</sup> <sup>o</sup> / 84 16	<sup>h</sup> <sup>m</sup> 22 54	<sup>+</sup> <sup>o</sup> / 84 16	<sup>h</sup> <sup>m</sup> 22 54	<sup>+</sup> <sup>o</sup> / 84 16	<sup>h</sup> <sup>m</sup> 22 54	<sup>+</sup> <sup>o</sup> / 84 15	<sup>h</sup> <sup>m</sup> 22 54	<sup>+</sup> <sup>o</sup> / 84 15
	<sup>s</sup> 23.26	" 29.99	<sup>s</sup> 17.92	" 24.09	<sup>s</sup> 15.84	" 15.78	<sup>s</sup> 17.34	" 06.61	<sup>s</sup> 21.85	" 60.66	<sup>s</sup> 28.19	" 59.48
1	23.04	29.84	17.83	23.84	15.86	15.49	17.43	06.38	22.01	60.52	28.41	59.50
2	22.84	29.68	17.74	23.61	15.87	15.22	17.51	06.14	22.17	60.36	28.64	59.54
3												
4	22.66	29.54	17.64	23.40	15.88	14.96	17.59	05.88	22.35	60.20	28.88	59.59
5	22.49	29.41	17.54	23.19	15.87	14.70	17.68	05.60	22.54	60.05	29.12	59.67
6	22.32	29.31	17.41	22.96	15.85	14.41	17.78	05.31	22.75	59.91	29.36	59.77
7												
8	22.16	29.22	17.28	22.71	15.82	14.11	17.89	05.01	22.97	59.79	29.59	59.89
9	21.98	29.14	17.13	22.43	15.79	13.78	18.02	04.73	23.20	59.69	29.82	60.02
10	21.79	29.06	17.00	22.13	15.78	13.43	18.17	04.45	23.43	59.62	30.03	60.16
11												
12	21.58	28.95	16.87	21.80	15.77	13.07	18.33	04.20	23.66	59.56	30.23	60.29
13	21.35	28.82	16.76	21.46	15.79	12.70	18.50	03.96	23.89	59.52	30.42	60.42
14	21.13	28.65	16.67	21.12	15.82	12.34	18.67	03.75	24.10	59.49	30.60	60.54
15												
16	20.91	28.45	16.60	20.78	15.87	12.00	18.84	03.56	24.31	59.47	30.78	60.65
17	20.70	28.23	16.54	20.46	15.93	11.67	19.01	03.38	24.50	59.44	30.95	60.74
18	20.51	28.00	16.49	20.15	16.00	11.37	19.16	03.20	24.69	59.40	31.14	60.84
19												
20	20.34	27.77	16.45	19.86	16.08	11.08	19.31	03.03	24.87	59.36	31.34	60.93
21	20.18	27.55	16.40	19.58	16.15	10.80	19.45	02.85	25.04	59.30	31.55	61.04
22	20.03	27.34	16.36	19.30	16.21	10.53	19.58	02.66	25.23	59.24	31.78	61.17
23												
24	19.89	27.14	16.30	19.03	16.27	10.26	19.71	02.45	25.42	59.17	32.01	61.34
25	19.76	26.94	16.24	18.76	16.31	09.99	19.85	02.24	25.64	59.11	32.25	61.54
26	19.61	26.76	16.17	18.47	16.36	09.71	19.99	02.02	25.87	59.07	32.47	61.78
27												
28	19.47	26.58	16.09	18.17	16.39	09.41	20.15	01.79	26.12	59.06	32.68	62.02
29	19.31	26.40	16.02	17.85	16.43	09.10	20.33	01.58	26.37	59.09	32.86	62.26
30	19.15	26.21	15.94	17.51	16.48	08.77	20.54	01.40	26.62	59.15	33.02	62.47
31												
32	18.97	26.00	15.88	17.15	16.54	08.43	20.75	01.25	26.85	59.23	33.17	62.66
33	18.79	25.77	15.84	16.79	16.62	08.10	20.97	01.14	27.06	59.32	33.32	62.83
34	18.61	25.51	15.82	16.43	16.73	07.79	21.17	01.05	27.25	59.39	33.48	62.99
35												
36	18.44	25.24	15.82	16.09	16.85	07.51	21.36	00.97	27.43	59.44	33.65	63.14
37	18.28	24.95	15.84	15.78	16.98	07.25	21.54	00.89	27.60	59.47	33.84	63.30
38	18.14	24.65			17.11	07.03	21.70	00.79	27.79	59.48	34.04	63.48
39												
40	18.02	24.36			17.23	06.82	21.85	00.66	27.98	59.48	34.24	63.68
41	17.92	24.09			17.34	06.61			28.19	59.48		
42												
	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$
	10.02	9.97	10.02	9.97	10.02	9.97	10.01	9.96	10.01	9.96	10.01	9.96

Mean R.A.  $22^{\text{h}} 54^{\text{m}} 33.48^{\text{s}}$

Double lower transit March 6

Mean Dec.  $+84^{\circ} 16' 26.74''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1649 36 H. Cephei · Mag. 4.96 Spect. K5

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 22 54	<sup>+</sup> <sup>o</sup> ' " 84 16	<sup>h</sup> <sup>m</sup> 22 54	<sup>+</sup> <sup>o</sup> ' " 84 16	<sup>h</sup> <sup>m</sup> 22 54	<sup>+</sup> <sup>o</sup> ' " 84 16	<sup>h</sup> <sup>m</sup> 22 54	<sup>+</sup> <sup>o</sup> ' " 84 16	<sup>h</sup> <sup>m</sup> 22 54	<sup>+</sup> <sup>o</sup> ' " 84 16	<sup>h</sup> <sup>m</sup> 22 54	<sup>+</sup> <sup>o</sup> ' " 84 16
	<sup>s</sup> 34.24	" 03.68	<sup>s</sup> 38.76	" 12.53	<sup>s</sup> 40.39	" 24.01	<sup>s</sup> 38.84	" 35.65	<sup>s</sup> 34.60	" 45.26	<sup>s</sup> 28.66	" 50.79
1	34.45	03.90	38.87	12.91	40.36	24.29	38.73	35.96	34.46	45.53	28.45	50.95
2	34.65	04.13	38.97	13.28	40.33	24.76	38.63	36.27	34.32	45.82	28.23	51.10
4	34.85	04.39	39.05	13.65	<sup>40 29</sup> <sup>40 27</sup>	<sup>25 11</sup> <sup>25 46</sup>	38.55	36.60	34.16	46.13	27.98	51.23
5	35.04	04.66	39.11	14.01	40.25	25.79	38.48	36.95	33.98	46.44	27.72	51.32
6	35.22	04.94	39.17	14.35	40.25	26.14	38.41	37.32	33.78	46.73	27.46	51.37
7	35.38	05.21	39.23	14.67	40.26	26.51	38.33	37.72	33.57	46.99	27.21	51.40
8	35.53	05.48	39.28	14.99	40.27	26.90	38.23	38.12	33.34	47.21	26.97	51.41
9	35.67	05.74	39.35	15.30	40.28	27.32	38.12	38.52	33.11	47.41	26.75	51.41
10	35.80	05.99	39.43	15.61	40.28	27.76	37.98	38.90	32.89	47.59	26.54	51.41
11	35.93	06.22	39.51	15.94	40.26	28.20	37.82	39.25	32.69	47.75	26.34	51.42
12	36.06	06.44	39.61	16.29	40.22	28.64	37.66	39.58	32.49	47.91	26.15	51.45
13	36.21	06.67	39.72	16.66	40.16	29.06	37.50	39.88	32.31	48.07	25.96	51.48
14	36.36	06.90	39.81	17.07	40.08	29.45	37.34	40.16	32.14	48.25	25.76	51.52
15	36.53	07.15	39.89	17.49	40.00	29.82	37.20	40.43	31.97	48.44	25.56	51.57
16	36.71	07.43	39.96	17.92	39.92	30.16	37.07	40.70	31.80	48.64	25.35	51.61
17	36.89	07.75	40.00	18.34	39.85	30.49	36.95	40.99	31.62	48.85	25.12	51.64
18	37.07	08.09	40.02	18.75	39.79	30.82	36.84	41.29	31.43	49.06	24.89	51.65
19	37.22	08.44	40.02	19.12	39.75	31.16	36.73	41.61	31.23	49.26	24.64	51.65
20	37.36	08.81	40.03	19.47	39.71	31.51	36.61	41.93	31.01	49.45	24.40	51.62
21	37.47	09.15	40.04	19.80	39.68	31.88	36.48	42.27	30.79	49.63	24.15	51.57
22	37.56	09.48	40.07	20.13	39.65	32.27	36.34	42.60	30.55	49.78	23.91	51.50
23	37.65	09.77	40.11	20.46	39.61	32.67	36.19	42.93	30.31	49.92	23.68	51.41
24	37.74	10.05	40.16	20.80	39.55	33.07	36.02	43.25	30.07	50.03	23.46	51.33
25	37.85	10.32	40.21	21.17	39.48	33.48	35.84	43.55	29.83	50.12	23.26	51.24
26	37.96	10.58	40.27	21.55	39.40	33.88	35.65	43.83	29.61	50.21	23.07	51.17
27	38.09	10.86	40.32	21.95	39.30	34.27	35.46	44.09	29.40	50.29	22.89	51.12
28	38.23	11.16	40.36	22.36	39.19	34.64	35.26	44.33	29.21	50.38	22.72	51.09
29	38.37	11.48	40.39	22.78	39.08	34.99	35.08	44.56	29.02	50.49	22.53	51.08
30	38.51	11.81	40.40	23.20	38.95	35.33	34.90	44.78	28.84	50.63	22.33	51.06
31	38.64	12.17	40.40	23.61	38.84	35.65	34.75	45.01	28.66	50.79	22.10	51.03
32	38.76	12.53	40.39	24.01			34.60	45.26			21.86	50.97
	sec δ 10.01	tan δ 9.96	sec δ 10.02	tan δ 9.97	sec δ 10.02	tan δ 9.97	sec δ 10.03	tan δ 9.98	sec δ 10.03	tan δ 9.98	sec δ 10.04	tan δ 9.99

Mean R.A. <sup>h</sup> 22 <sup>m</sup> 54 <sup>s</sup> 33.48

Double lower transit March 6

Mean Dec. +84° 16' 26.74"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1650 V Cephei Mag. 6.42 Spect. A0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 23 55	+ ° ' 83 07	h m 23 55	+ ° ' 83 06	h m 23 55	+ ° ' 83 06	h m 23 55	+ ° ' 83 06	h m 23 55	+ ° ' 83 06	h m 23 55	+ ° ' 83 06
	s 40.31	" 04.13	s 35.27	" 04.13	s 32.45	" 05.44	s 32.35	" 04.12	s 35.12	" 06.77	s 40.04	" 03.36
1	40.12	04.07	35.17	04.07	32.42	05.16	32.39	04.87	35.22	06.58	40.22	03.29
2	39.94	04.00	35.06	04.00	32.40	05.90	32.43	04.62	35.33	06.37	40.41	03.24
3												
4	39.77	03.93	34.96	04.04	32.37	05.66	32.45	04.33	35.45	06.15	40.61	03.21
5	39.62	03.87	34.84	05.88	32.33	05.41	32.48	04.03	35.58	05.93	40.81	03.20
6	39.48	03.84	34.72	05.72	32.27	05.15	32.52	04.71	35.73	05.71	41.02	03.21
7	39.34	03.83	34.57	05.53	32.21	05.17	32.56	04.39	35.88	05.51	41.23	03.24
8	39.19	03.83	34.42	05.32	32.14	05.56	32.63	04.06	36.05	05.34	41.43	03.29
9	39.02	03.83	34.27	05.08	32.07	05.23	32.71	04.74	36.23	05.18	41.62	03.35
10	38.84	03.81	34.12	05.82	32.02	05.89	32.80	04.43	36.41	05.04	41.80	03.41
11	38.65	03.77	33.99	05.53	31.98	05.53	32.90	04.15	36.58	04.93	41.97	03.47
12	38.45	03.70	33.87	05.24	31.95	05.17	33.01	04.88	36.75	04.82	42.13	03.52
13	38.25	03.59	33.76	05.94	31.94	04.82	33.11	04.63	36.91	04.73	42.29	03.56
14	38.05	03.46	33.67	05.65	31.95	04.48	33.22	04.40	37.06	04.63	42.44	03.59
15	37.87	03.31	33.59	05.38	31.96	04.16	33.32	04.18	37.21	04.53	42.61	03.61
16	37.70	03.16	33.51	05.11	31.97	04.86	33.42	03.96	37.35	04.43	42.78	03.63
17	37.54	03.01	33.44	05.86	31.99	04.57	33.50	03.74	37.48	04.31	42.96	03.66
18	37.40	02.86	33.36	05.62	32.00	04.29	33.58	03.51	37.62	04.18	43.17	03.71
19	37.26	02.72	33.28	05.38	32.01	04.01	33.66	03.27	37.77	04.04	43.38	03.78
20	37.12	02.60	33.19	05.15	32.01	04.74	33.73	03.01	37.93	03.90	43.60	03.90
21	36.99	02.48	33.10	05.90	32.01	04.45	33.81	02.74	38.11	03.78	43.82	04.04
22	36.85	02.37	33.00	05.65	31.99	04.16	33.91	02.46	38.30	03.68	44.02	04.21
23	36.70	02.26	32.89	05.37	31.98	04.84	34.03	02.19	38.51	03.62	44.20	04.38
24	36.54	02.14	32.78	05.07	31.97	04.51	34.16	01.94	38.72	03.59	44.36	04.54
25	36.38	02.01	32.68	05.74	31.97	04.16	34.31	01.72	38.92	03.59	44.51	04.67
26	36.20	01.86	32.60	05.41	31.99	04.81	34.47	01.54	39.10	03.60	44.66	04.78
27	36.02	01.69	32.53	05.07	32.03	04.47	34.62	01.38	39.27	03.61	44.81	04.87
28	35.85	01.49	32.48	05.75	32.08	04.15	34.77	01.24	39.42	03.59	44.97	04.96
29	35.68	01.27	32.45	05.44	32.15	04.86	34.90	01.10	39.57	03.55	45.14	05.05
30	35.53	01.04			32.23	04.60	35.01	00.94	39.71	03.50	45.33	05.14
31	35.39	00.80			32.29	04.35	35.12	00.77	39.87	03.43	45.52	05.26
32	35.27	00.58			32.35	04.12			40.04	03.36		
	sec δ 8.34	tan δ 8.28	sec δ 8.34	tan δ 8.28	sec δ 8.34	tan δ 8.28	sec δ 8.34	tan δ 8.28	sec δ 8.34	tan δ 8.28	sec δ 8.34	tan δ 8.27

Mean R.A.  $23^{\text{h}} 55^{\text{m}} 48.39^{\text{s}}$

Double lower transit March 21

Mean Dec.  $+83^{\circ} 06' 57.88''$



**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

423

1650 V Cephei Mag. 6.42 Spect. A0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	+ ° '	h m	+ ° '	h m	+ ° '	h m	+ ° '	h m	+ ° '	h m	+ ° '
	23 55	83 06	23 55	83 06	23 55	83 06	23 55	83 07	23 55	83 07	23 55	83 07
	s	"	s	"	s	"	s	"	s	"	s	"
1	45.52	35.26	50.46	42.25	53.46	52.84	53.96	04.74	52.04	15.69	48.20	23.39
2	45.72	35.40	50.60	42.58	53.50	53.22	53.92	05.08	51.97	16.01	48.06	23.63
3	45.92	35.55	50.73	42.91	53.53	53.59	53.89	05.42	51.91	16.35	47.91	23.87
4	46.12	35.73	50.85	43.24	53.55	53.94	53.88	05.76	51.83	16.71	47.73	24.09
5	46.31	35.93	50.96	43.56	53.58	54.28	53.87	06.13	51.74	17.08	47.54	24.28
6	46.49	36.13	51.06	43.87	53.62	54.62	53.87	06.52	51.62	17.45	47.35	24.44
7	46.66	36.35	51.15	44.17	53.67	54.96	53.87	06.94	51.49	17.79	47.15	24.56
8	46.82	36.56	51.24	44.45	53.73	55.31	53.86	07.37	51.35	18.09	46.96	24.66
9	46.97	36.76	51.34	44.73	53.80	55.69	53.82	07.81	51.20	18.37	46.79	24.75
10	47.11	36.95	51.44	45.00	53.87	56.09	53.77	08.23	51.05	18.63	46.62	24.83
11	47.25	37.13	51.56	45.29	53.93	56.52	53.70	08.64	50.91	18.86	46.47	24.92
12	47.39	37.30	51.69	45.59	53.99	56.96	53.62	09.01	50.78	19.09	46.32	25.02
13	47.54	37.47	51.83	45.92	54.02	57.40	53.53	09.36	50.66	19.32	46.18	25.13
14	47.70	37.63	51.97	46.28	54.03	57.84	53.45	09.69	50.55	19.56	46.03	25.25
15	47.87	37.82	52.10	46.66	54.03	58.25	53.38	10.01	50.45	19.80	45.88	25.37
16	48.06	38.02	52.22	47.06	54.02	58.64	53.32	10.32	50.34	20.07	45.72	25.50
17	48.25	38.26	52.31	47.46	54.01	59.00	53.26	10.64	50.23	20.34	45.55	25.62
18	48.44	38.53	52.39	47.85	54.00	59.34	53.22	10.98	50.12	20.62	45.37	25.73
19	48.62	38.83	52.45	48.21	54.00	59.68	53.18	11.33	49.99	20.90	45.18	25.82
20	48.78	39.13	52.51	48.55	<sup>54 02</sup> 54.04	<sup>60 03</sup> 60.38	53.14	11.69	49.85	21.17	44.98	25.89
21	48.92	39.44	52.56	48.87	54.07	60.75	53.09	12.07	49.70	21.43	44.78	25.94
22	49.05	39.72	52.63	49.17	54.10	61.14	53.03	12.45	49.53	21.67	44.58	25.97
23	49.16	39.98	52.71	49.48	54.13	61.55	52.95	12.83	49.36	21.90	44.38	25.98
24	49.28	40.21	52.80	49.79	54.15	61.96	52.87	13.20	49.19	22.10	44.20	25.97
25	49.40	40.43	52.90	50.13	54.16	62.38	52.77	13.57	49.02	22.28	44.03	25.97
26	49.53	40.65	53.00	50.48	54.15	62.81	52.66	13.91	48.85	22.45	43.87	25.97
27	49.67	40.87	53.10	50.85	54.13	63.22	52.55	14.24	48.70	22.61	43.73	26.00
28	49.82	41.11	53.20	51.23	54.10	63.63	52.43	14.55	48.56	22.77	43.59	26.04
29	49.98	41.36	53.28	51.63	54.06	64.02	52.32	14.84	48.44	22.95	43.44	26.11
30	50.15	41.64	53.36	52.03	54.01	64.39	52.21	15.12	48.32	23.16	43.28	26.18
31	50.31	41.94	53.42	52.44	53.96	64.74	52.12	15.40	48.20	23.39	43.10	26.25
32	50.46	42.25	53.46	52.84			52.04	15.69			42.90	26.29
	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ
	8.34	8.28	8.34	8.28	8.34	8.28	8.35	8.29	8.35	8.29	8.35	8.29

Mean R.A. 23<sup>h</sup> 55<sup>m</sup> 48.<sup>s</sup>39

Double lower transit March 21

Mean Dec. +83° 06' 57".88

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1655 o Octantis Mag. 7.22 Spect. A0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 0 12	<sup>o</sup> <sup>'</sup> 88 26	<sup>h</sup> <sup>m</sup> 0 12	<sup>o</sup> <sup>'</sup> 88 26	<sup>h</sup> <sup>m</sup> 0 12	<sup>o</sup> <sup>'</sup> 88 26	<sup>h</sup> <sup>m</sup> 0 12	<sup>o</sup> <sup>'</sup> 88 26	<sup>h</sup> <sup>m</sup> 0 12	<sup>o</sup> <sup>'</sup> 88 26	<sup>h</sup> <sup>m</sup> 0 12	<sup>o</sup> <sup>'</sup> 88 25
	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"
1	38.15	50.78	16.60	44.29	04.61	34.78	01.74	22.50	10.25	11.37	28.32	62.98
2	37.42	50.69	15.89	44.01	04.20	34.39	01.91	22.06	10.83	11.04	28.99	62.82
3	36.64	50.60	15.19	43.69	03.83	33.97	02.13	21.63	11.38	10.73	29.62	62.66
4	35.79	50.51	14.54	43.35	03.53	33.54	02.40	21.23	11.91	10.45	30.22	62.49
5	34.90	50.38	13.96	42.99	03.31	33.10	02.67	20.85	12.39	10.17	30.82	62.32
6	33.98	50.23	13.47	42.62	03.17	32.67	02.92	20.49	12.83	09.90	31.43	62.13
7	33.09	50.04	13.04	42.26	03.08	32.25	03.14	20.14	13.24	09.62	32.07	61.94
8	32.25	49.82	12.66	41.92	03.02	31.86	03.31	19.80	13.64	09.33	32.75	61.74
9	31.49	49.59	12.30	41.60	02.96	31.48	03.45	19.46	14.04	09.03	33.47	61.53
10	30.81	49.35	11.92	41.30	02.88	31.13	03.57	19.11	14.46	08.72	34.25	61.34
11	30.19	49.13	11.51	41.01	02.75	30.78	03.68	18.75	14.92	08.40	35.06	61.16
12	29.59	48.93	11.05	40.72	02.59	30.43	03.80	18.37	15.42	08.08	35.91	61.00
13	28.99	48.75	10.55	40.43	02.39	30.08	03.94	17.98	15.98	07.75	36.78	60.86
14	28.36	48.58	10.02	40.12	02.17	29.71	04.13	17.58	16.58	07.43	37.63	60.74
15	27.68	48.41	09.48	39.80	01.95	29.33	04.38	17.17	17.24	07.13	38.46	60.64
16	26.96	48.25	08.95	39.46	01.76	28.93	04.68	16.76	17.93	06.84	39.24	60.56
17	26.20	48.07	08.44	39.10	01.59	28.52	05.03	16.37	18.63	06.58	39.95	60.48
18	25.42	47.88	07.98	38.73	01.48	28.09	05.44	15.98	19.32	06.33	40.60	60.40
19	24.63	47.66	07.56	38.34	01.42	27.66	05.87	15.61	19.97	06.11	41.22	60.30
20	23.84	47.43	07.20	37.95	01.42	27.23	06.31	15.27	20.57	05.90	41.83	60.17
21	23.09	47.17	06.91	37.55	01.48	26.80	06.73	14.94	21.10	05.68	42.48	60.02
22	22.37	46.90	06.66	37.17	01.58	26.40	07.10	14.63	21.58	05.45	43.21	59.86
23	21.71	46.62	06.45	36.80	01.71	26.01	07.41	14.33	22.05	05.20	44.02	59.70
24	21.10	46.33	06.24	36.45	01.82	25.64	07.65	14.01	22.54	04.92	44.91	59.56
25	20.55	46.04	06.01	36.12	01.90	25.28	07.87	13.67	23.09	04.61	45.83	59.46
26	20.04	45.77	05.74	35.80	01.93	24.94	08.10	13.30	23.74	04.31	46.74	59.38
27	19.55	45.50	05.41	35.48	01.89	24.59	08.37	12.91	24.47	04.02	47.62	59.34
28	19.05	45.26	05.02	35.14	01.80	24.22	08.73	12.50	25.25	03.76	48.45	59.32
29	18.52	45.02	04.61	34.78	01.71	23.82	09.18	12.10	26.06	03.52	49.23	59.31
30	17.93	44.79			01.65	23.39	09.70	11.72	26.85	03.32	49.96	59.30
31	17.29	44.55			01.66	22.95	10.25	11.37	27.61	03.14	50.65	59.28
32	16.60	44.29			01.74	22.50			28.32	02.98		
	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ
	36.89	36.88	36.83	36.82	36.76	36.75	36.69	36.67	36.62	36.61	36.58	36.57

Mean R.A. 0<sup>h</sup> 12<sup>m</sup> 27<sup>s</sup>.51      Double lower transit March 25      Mean Dec. -88° 26' 16".84

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

425

1655     $\circ$  Octantis    Mag. 7.22    Spect. A0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 0 12	° ' / 88 25	h m 0 13	° ' / 88 26	h m 0 13	° ' / 88 26	h m 0 13	° ' / 88 26	h m 0 13	° ' / 88 26	h m 0 12	° ' / 88 26
	s	"	s	"	s	"	s	"	s	"	s	"
1	50.65	59 28	13 50	00 67	30 36	06.86	35 59	16 02	26.26	24.86	66.26	29.62
2	51.32	59.26	14 15	00.78	30 83	07.11	35 55	16.37	25.60	25.10	65.42	29.63
3	52.00	59.23	14.83	00.88	31.31	07.38	35.44	16.73	24.92	25.30	64.65	29.63
4	52.69	59.18	15 55	00.99	31.76	07.68	35.24	17.07	24.28	25.48	63.96	29.63
5	53.41	59.13	16.30	01.12	32.16	07.99	34.98	17.40	23.70	25.63	63.32	29.64
6	54.18	59.08	17.06	01.27	32.49	08.32	34.69	17.70	23.19	25.79	62.68	29.68
7	54.99	59.04	17.82	01.44	32.74	08.64	34.41	17.97	22.72	25.95	62.01	29.74
8	55.84	59.01	18.55	01.64	32.92	08.96	34.16	18.22	22.28	26.14	61.28	29.81
9	56.71	58.99	19.23	01.85	33.05	09.26	33.97	18.46	21.82	26.34	60.50	29.88
10	57.61	59.00	19.84	02.07	33.17	09.53	33.84	18.70	21.33	26.56	59.66	29.95
11	58.49	59.03	20.38	02.30	33.30	09.78	33.74	18.96	20.77	26.80	58.78	29.99
12	59.35	59.08	20.86	02.51	33.47	10.02	33.65	19.24	20.14	27.03	57.87	30.02
13	60.16	59.15	21.30	02.71	33.71	10.25	33.53	19.55	19.46	27.25	56.95	30.03
14	60.90	59.23	21.74	02.88	33.99	10.50	33.37	19.87	18.72	27.46	56.05	30.01
15	61.58	59.31	22.21	03.03	34.31	10.76	33.13	20.20	17.96	27.64	55.18	29.97
16	62.21	59.37	22.73	03.17	34.62	11.05	32.82	20.54	17.19	27.81	54.34	29.92
17	62.82	59.41	23.32	03.32	34.90	11.37	32.45	20.86	16.43	27.95	53.55	29.86
18	63.44	59.43	23.96	03.48	35.12	11.71	32.03	21.17	15.70	28.08	52.80	29.80
19	64.11	59.43	24.63	03.67	35.26	12.05	31.59	21.46	15.01	28.20	52.09	29.75
20	64.86	59.43	25.29	03.89	35.33	12.40	31.14	21.73	14.35	28.31	51.39	29.70
21	65.68	59.44	25.90	04.14	35.34	12.74	30.70	21.98	13.72	28.42	50.70	29.66
22	66.54	59.47	26.44	04.41	35.32	13.06	30.29	22.22	13.11	28.54	49.98	29.64
23	67.42	59.54	26.91	04.69	35.28	13.37	29.92	22.45	12.52	28.67	49.23	29.61
24	68.28	59.64	27.32	04.96	<sup>35 23</sup> 35.21	<sup>13 66</sup> 13.94	29.57	22.69	11.91	28.80	48.43	29.59
25	69.08	59.77	27.69	05.23	35.21	14.21	29.24	22.93	11.26	28.95	47.57	29.56
26	69.82	59.91	28.02	05.48	35.25	14.49	28.93	23.18	10.57	29.11	46.65	29.51
27	70.49	60.05	28.35	05.72	35.31	14.76	28.62	23.44	09.80	29.26	45.70	29.43
28	71.12	60.20	28.70	05.95	35.40	15.05	28.28	23.72	08.97	29.40	44.76	29.31
29	71.72	60.33	29.06	06.17	35.48	15.36	27.89	24.01	08.08	29.51	43.85	29.16
30	72.30	60.45	29.46	06.40	35.56	15.68	27.42	24.30	07.16	29.59	43.02	28.98
31	72.89	60.57	29.89	06.62	35.59	16.02	26.88	24.59	06.26	29.62	42.28	28.79
32	73.50	60.67	30.36	06.86			26.26	24.86			41.61	28.62
	sec $\delta$ 36.57	tan $\delta$ 36.56	sec $\delta$ 36.60	tan $\delta$ 36.58	sec $\delta$ 36.65	tan $\delta$ 36.63	sec $\delta$ 36.71	tan $\delta$ 36.70	sec $\delta$ 36.76	tan $\delta$ 36.74	sec $\delta$ 36.77	tan $\delta$ 36.76

Mean R.A.  $0^{\text{h}} 12^{\text{m}} 27.51^{\text{s}}$

Double lower transit March 25

Mean Dec.  $-88^{\circ} 26' 16.84''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

916 4 G. Octantis    Mag. 5.63    Spect. K0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 1 38	° ' " / 84 50	h m 1 38	° ' " / 84 50	h m 1 38	° ' " / 84 50	h m 1 38	° ' " / 84 50	h m 1 38	° ' " / 84 50	h m 1 38	° ' " / 84 49
	s 19.04	" 47.09	s 11.43	" 44.55	s 05.62	" 37.67	s 01.65	" 26.75	s 01.23	" 15.08	s 04.31	" 64.43
1	18.81	47.13	11.15	44.40	05.41	37.37	01.59	26.32	01.31	14.68	04.45	64.17
2	18.57	47.17	10.88	44.22	05.20	37.05	01.54	25.89	01.38	14.31	04.59	63.92
3												
4	18.31	47.22	10.62	44.00	05.01	36.69	01.52	25.47	01.46	13.97	04.73	63.67
5	18.03	47.24	10.37	43.76	04.84	36.32	01.49	25.08	01.52	13.63	04.86	63.41
6	17.74	47.24	10.14	43.50	04.69	35.95	01.47	24.71	01.57	13.31	04.99	63.14
7	17.45	47.21	09.94	43.24	04.56	35.58	01.43	24.36	01.62	12.98	05.13	62.86
8	17.17	47.14	09.75	42.98	04.45	35.22	01.39	24.01	01.66	12.65	05.28	62.56
9	16.91	47.05	09.56	42.75	04.33	34.89	01.34	23.67	01.70	12.31	05.44	62.26
10	16.67	46.94	09.38	42.53	04.21	34.58	01.28	23.33	01.74	11.95	05.62	61.96
11	16.44	46.84	09.18	42.33	04.08	34.27	01.21	22.97	01.79	11.58	05.82	61.66
12	16.23	46.75	08.97	42.14	03.94	33.98	01.15	22.60	01.86	11.20	06.03	61.38
13	16.02	46.68	08.75	41.95	03.78	33.68	01.09	22.21	01.94	10.81	06.24	61.11
14	15.80	46.63	08.52	41.75	03.62	33.37	01.05	21.81	02.04	10.41	06.46	60.87
15	15.56	46.58	08.29	41.54	03.46	33.05	01.02	21.39	02.15	10.03	06.67	60.65
16	15.32	46.55	08.05	41.31	03.30	32.71	01.00	20.97	02.28	09.66	06.87	60.45
17	15.06	46.50	07.82	41.05	03.15	32.35	01.00	20.54	02.41	09.30	07.06	60.27
18	14.79	46.45	07.59	40.78	03.01	31.98	01.02	20.12	02.54	08.97	07.22	60.09
19	14.51	46.38	07.38	40.49	02.89	31.59	01.05	19.72	02.67	08.66	07.38	59.89
20	14.24	46.28	07.18	40.18	02.78	31.19	01.09	19.33	02.78	08.36	07.53	59.67
21	13.96	46.17	07.00	39.87	02.69	30.79	01.12	18.96	02.88	08.08	07.69	59.43
22	13.70	46.03	06.84	39.55	02.62	30.39	01.14	18.62	02.96	07.79	07.87	59.16
23	13.45	45.87	06.68	39.25	02.55	30.02	01.14	18.28	03.03	07.47	08.07	58.89
24	13.21	45.70	06.53	38.96	02.48	29.66	01.13	17.95	03.11	07.13	08.30	58.62
25	12.99	45.53	06.38	38.69	02.41	29.32	01.10	17.59	03.20	06.76	08.55	58.38
26	12.78	45.36	06.21	38.44	02.32	28.99	01.08	17.21	03.32	06.38	08.79	58.18
27	12.58	45.20	06.03	38.19	02.21	28.67	01.06	16.80	03.46	06.00	09.04	58.00
28	12.37	45.05	05.83	37.94	02.09	28.34	01.07	16.37	03.63	05.63	09.27	57.85
29	12.16	44.92	05.62	37.67	01.96	27.98	01.10	15.93	03.80	05.29	09.49	57.72
30	11.93	44.80			01.84	27.60	01.16	15.49	03.98	04.98	09.70	57.59
31	11.69	44.68			01.73	27.19	01.23	15.08	04.15	04.69	09.89	57.47
32	11.43	44.55			01.65	26.75			04.31	04.43		
	sec δ 11.13	tan δ 11.09	sec δ 11.13	tan δ 11.08	sec δ 11.12	tan δ 11.08	sec δ 11.12	tan δ 11.07	sec δ 11.11	tan δ 11.07	sec δ 11.10	tan δ 11.06

Mean R.A. 1<sup>h</sup> 38<sup>m</sup> 08.43<sup>s</sup>

Double lower transit April 16

Mean Dec. -84° 50' 17.36"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

427

916 4 G. Octantis · Mag. 5.63 Spect. K0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 1 38	° ' / 84 49	h m 1 38	° ' / 84 49	h m 1 38	° ' / 84 49	h m 1 38	° ' / 84 50	h m 1 38	° ' / 84 50	h m 1 38	° ' / 84 50
	s	"	s	"	s	"	s	"	s	"	s	"
1	09.89	57.47	17.01	55.17	23.65	58.30	27.63	05.72	27.60	15.76	23.44	23.39
2	10.09	57.34	17.23	55.16	23.86	58.46	27.73	06.04	27.48	16.09	23.22	23.53
3	10.28	57.20	17.46	55.15	24.07	58.64	27.81	06.37	27.35	16.38	23.02	23.65
4	10.47	57.05	17.71	55.15	24.28	58.85	27.87	06.72	27.23	16.65	22.84	23.76
5	10.68	56.89	17.96	55.15	24.48	59.08	27.91	07.07	27.13	16.88	22.68	23.88
6	10.90	56.72	18.23	55.17	24.66	59.33	27.92	07.42	27.04	17.11	22.52	24.03
7	11.13	56.55	18.49	55.21	24.82	59.60	27.93	07.74	26.96	17.34	22.35	24.19
8	11.37	56.39	18.76	55.28	24.95	59.86	27.93	08.03	26.89	17.59	22.17	24.37
9	11.63	56.24	19.01	55.38	25.07	60.12	27.94	08.30	26.83	17.85	21.97	24.57
10	11.89	56.11	19.24	55.49	25.18	60.35	27.96	08.56	26.75	18.14	21.75	24.76
11	12.15	56.00	19.45	55.61	25.30	60.56	28.00	08.81	26.65	18.45	21.52	24.94
12	12.42	55.91	19.65	55.73	25.42	60.76	28.05	09.07	26.54	18.76	21.27	25.11
13	12.67	55.85	19.83	55.84	25.56	60.94	28.11	09.35	26.41	19.08	21.02	25.26
14	12.90	55.81	20.01	55.93	25.72	61.12	28.16	09.66	26.26	19.39	20.77	25.39
15	13.12	55.77	20.20	56.00	25.89	61.32	28.20	09.99	26.10	19.68	20.53	25.49
16	13.32	55.73	20.40	56.05	26.06	61.55	<sup>28 22</sup> 28.22	<sup>10 33</sup> 10.89	25.93	19.95	20.29	25.58
17	13.51	55.67	20.62	56.09	26.23	61.80	28.20	11.05	25.77	20.21	20.07	25.65
18	13.71	55.59	20.86	56.15	26.38	62.09	28.17	11.40	25.60	20.44	19.85	25.72
19	13.91	55.48	21.11	56.22	26.51	62.39	28.12	11.74	25.45	20.66	19.64	25.79
20	14.14	55.36	21.36	56.33	26.62	62.70	28.08	12.06	25.31	20.87	19.44	25.86
21	14.39	55.24	21.60	56.47	26.72	63.01	28.03	12.36	25.17	21.08	19.24	25.94
22	14.66	55.14	21.83	56.63	26.80	63.31	27.99	12.65	25.04	21.28	19.04	26.03
23	14.93	55.07	22.03	56.82	26.87	63.60	27.95	12.93	24.91	21.50	18.82	26.13
24	15.21	55.03	22.22	57.01	26.95	63.88	27.93	13.21	24.78	21.73	18.59	26.24
25	15.47	55.03	22.40	57.20	27.02	64.15	27.91	13.48	24.64	21.97	18.35	26.35
26	15.72	55.04	22.57	57.38	27.11	64.40	27.89	13.77	24.49	22.23	18.08	26.44
27	15.95	55.07	22.73	57.55	27.20	64.65	27.88	14.07	24.32	22.49	17.79	26.52
28	16.17	55.10	22.90	57.71	27.30	64.90	27.86	14.38	24.12	22.75	17.51	26.56
29	16.38	55.13	23.07	57.86	27.41	65.16	27.83	14.71	23.90	23.00	17.22	26.56
30	16.59	55.15	23.25	58.01	27.52	65.43	27.78	15.06	23.67	23.21	16.96	26.53
31	16.80	55.17	23.45	58.15	27.63	65.72	27.70	15.41	23.44	23.39	16.72	26.48
32	17.01	55.17	23.65	58.30			27.60	15.76			16.50	26.43
	sec δ 11.11	tan δ 11.07	sec δ 11.11	tan δ 11.07	sec δ 11.11	tan δ 11.07	sec δ 11.11	tan δ 11.07	sec δ 11.11	tan δ 11.07	sec δ 11.11	tan δ 11.07

Mean R.A. 1<sup>h</sup> 38<sup>m</sup> 08.43<sup>s</sup>

Double lower transit April 16

Mean Dec. -84° 50' 17.36"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1657 Lacaille 1848 (Octantis) - Mag. 8.35 Spect. G5

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 2 23	<sup>o</sup> <sup>'</sup> 88 12	<sup>h</sup> <sup>m</sup> 2 23	<sup>o</sup> <sup>'</sup> 88 12	<sup>h</sup> <sup>m</sup> 2 23	<sup>o</sup> <sup>'</sup> 88 12	<sup>h</sup> <sup>m</sup> 2 23	<sup>o</sup> <sup>'</sup> 88 12	<sup>h</sup> <sup>m</sup> 2 23	<sup>o</sup> <sup>'</sup> 88 12	<sup>h</sup> <sup>m</sup> 2 23	<sup>o</sup> <sup>'</sup> 88 12
	<sup>s</sup> 65.90	<sup>s</sup> 51.39	<sup>s</sup> 42.57	<sup>s</sup> 50.79	<sup>s</sup> 22.75	<sup>s</sup> 45.50	<sup>s</sup> 06.52	<sup>s</sup> 35.85	<sup>s</sup> 00.08	<sup>s</sup> 24.65	<sup>s</sup> 03.90	<sup>s</sup> 13.65
1	65.27	51.48	41.72	50.71	22.00	45.26	06.14	35.45	00.13	24.25	04.21	13.37
2	64.59	51.59	40.84	50.60	21.26	45.00	05.82	35.04	00.19	23.87	04.50	13.09
3	63.85	51.69	39.97	50.46	20.54	44.70	05.56	34.65	00.25	23.52	04.75	12.82
4	63.04	51.79	39.13	50.28	19.88	44.38	05.32	34.27	00.28	23.18	05.00	12.54
5	62.19	51.86	38.35	50.09	19.28	44.05	05.09	33.91	00.30	22.85	05.24	12.25
6	61.32	51.90	37.62	49.88	18.74	43.73	04.85	33.58	00.28	22.53	05.49	11.94
7	60.45	51.91	36.95	49.68	18.24	43.41	04.59	33.25	00.25	22.20	05.77	11.63
8	59.63	51.88	36.32	49.50	17.77	43.11	04.29	32.94	00.20	21.86	06.08	11.30
9	58.87	51.84	35.69	49.33	17.29	42.83	03.97	32.62	00.16	21.50	06.44	10.97
10	58.16	51.79	35.04	49.18	16.80	42.57	03.64	32.29	00.13	21.13	06.85	10.64
11	57.50	51.76	34.37	49.04	16.27	42.32	03.29	31.94	00.13	20.75	07.29	10.31
12	56.84	51.75	33.66	48.91	15.71	42.06	02.95	31.58	00.18	20.35	07.78	10.01
13	56.18	51.75	32.92	48.77	15.12	41.80	02.64	31.20	00.27	19.95	08.28	09.72
14	55.49	51.76	32.15	48.62	14.52	41.53	02.35	30.81	00.41	19.55	08.78	09.46
15	54.76	51.78	31.36	48.45	13.92	41.24	02.12	30.40	00.60	19.16	09.26	09.22
16	54.00	51.80	30.57	48.26	13.32	40.93	01.93	29.99	00.81	18.79	09.69	09.00
17	53.19	51.82	29.80	48.05	12.75	40.59	01.79	29.58	01.05	18.44	10.08	08.79
18	52.36	51.81	29.05	47.82	12.21	40.25	01.69	29.18	01.27	18.11	10.42	08.57
19	51.52	51.79	28.34	47.57	11.73	39.88	01.62	28.79	01.47	17.80	10.73	08.32
20	50.67	51.75	27.67	47.31	11.29	39.52	01.55	28.43	01.61	17.50	11.05	08.05
21	49.83	51.68	27.05	47.05	10.89	39.15	01.47	28.09	01.70	17.20	11.41	07.76
22	49.02	51.59	26.47	46.79	10.54	38.80	01.34	27.76	01.75	16.88	11.84	07.45
23	48.25	51.48	25.92	46.54	10.19	38.47	01.15	27.44	01.80	16.53	12.35	07.14
24	47.52	51.37	25.36	46.32	09.84	38.16	00.92	27.10	01.88	16.16	12.91	06.85
25	46.82	51.25	24.78	46.11	09.46	37.86	00.66	26.74	02.02	15.76	13.51	06.59
26	46.16	51.14	24.16	45.91	09.02	37.58	00.43	26.35	02.23	15.36	14.11	06.37
27	45.51	51.05	23.48	45.71	08.53	37.28	00.24	25.93	02.52	14.97	14.70	06.17
28	44.84	50.97	22.75	45.50	08.00	36.97	00.12	25.50	02.85	14.60	15.26	05.99
29	44.13	50.91			07.47	36.62	00.07	25.07	03.21	14.26	15.78	05.82
30	43.38	50.85			06.97	36.25	00.08	24.65	03.56	13.94	16.28	05.65
31	42.57	50.79			06.52	35.85			03.90	13.65		
32												
	sec $\delta$ 32.09	tan $\delta$ 32.08	sec $\delta$ 32.08	tan $\delta$ 32.06	sec $\delta$ 32.04	tan $\delta$ 32.02	sec $\delta$ 31.99	tan $\delta$ 31.97	sec $\delta$ 31.93	tan $\delta$ 31.91	sec $\delta$ 31.88	tan $\delta$ 31.87

Mean R.A. <sup>h</sup> 2 <sup>m</sup> 23 <sup>s</sup> 19.52

Double lower transit April 28

Mean Dec.  $-88^{\circ} 12' 25.6''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

429

1657 Lacaille 1848 (Octantis) Mag. 8.35 Spect. G5

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 2 23	<sup>°</sup> <sup>'</sup> 88 12	<sup>h</sup> <sup>m</sup> 2 23	<sup>°</sup> <sup>'</sup> 88 12	<sup>h</sup> <sup>m</sup> 2 23	<sup>°</sup> <sup>'</sup> 88 12	<sup>h</sup> <sup>m</sup> 2 24	<sup>°</sup> <sup>'</sup> 88 12	<sup>h</sup> <sup>m</sup> 2 24	<sup>°</sup> <sup>'</sup> 88 12	<sup>h</sup> <sup>m</sup> 2 23	<sup>°</sup> <sup>'</sup> 88 12
	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"
1	16.28	05.65	34.86	01.83	54.44	03.38	08.40	09.72	12.08	19.57	62.87	28.07
2	16.75	05.49	35.45	01.78	55.08	03.49	08.81	10.00	11.87	19.92	62.27	28.27
3	17.22	05.31	36.09	01.72	55.75	03.62	09.18	10.31	11.61	20.24	61.71	28.44
4	17.69	05.12	36.75	01.66	56.42	03.77	09.50	10.63	11.34	20.53	61.21	28.60
5	18.17	04.92	37.46	01.60	57.07	03.95	09.75	10.97	11.10	20.79	60.76	28.76
6	18.69	04.71	38.20	01.56	57.68	04.15	09.93	11.30	10.91	21.04	60.34	28.94
7	19.24	04.50	38.96	01.54	58.23	04.37	10.05	11.62	10.76	21.28	59.91	29.14
8	19.84	04.29	39.72	01.55	58.73	04.60	10.15	11.91	10.65	21.54	59.46	29.36
9	20.48	04.08	40.46	01.58	59.16	04.82	10.26	12.17	10.55	21.82	58.96	29.60
10	21.15	03.89	41.16	01.64	59.56	05.03	10.41	12.42	10.44	22.12	58.41	29.84
11	21.84	03.73	41.81	01.71	59.94	05.21	10.60	12.66	10.29	22.44	57.82	30.08
12	22.54	03.58	42.40	01.78	60.35	05.37	10.83	12.90	10.10	22.78	57.18	30.30
13	23.21	03.47	42.95	01.85	60.80	05.52	11.09	13.17	09.84	23.12	56.51	30.51
14	23.85	03.37	43.47	01.90	61.29	05.67	11.35	13.45	09.54	23.46	55.83	30.70
15	24.43	03.29	44.00	01.92	61.83	05.82	11.60	13.76	09.19	23.78	55.14	30.86
16	24.97	03.20	44.56	01.93	62.40	06.00	11.80	14.10	08.81	24.09	54.48	31.01
17	25.47	03.10	45.17	01.92	62.97	06.21	11.95	14.45	08.42	24.38	53.84	31.14
18	25.95	02.98	45.84	01.92	63.51	06.45	12.04	14.80	08.04	24.65	53.22	31.26
19	26.46	02.83	46.55	01.94	64.01	06.71	12.09	15.16	07.66	24.91	52.64	31.37
20	27.02	02.67	47.29	01.98	64.45	06.99	12.09	15.50	07.31	25.15	52.07	31.49
21	27.64	02.50	48.03	02.06	64.84	07.27	12.07	15.82	06.98	25.39	51.52	31.62
22	28.33	02.34	48.73	02.17	65.19	07.55	12.04	16.13	06.68	25.62	50.96	31.75
23	29.06	02.21	49.39	02.30	65.51	07.82	12.02	16.43	06.39	25.87	50.38	31.90
24	29.81	02.11	50.01	02.44	65.82	08.07	12.02	16.71	06.10	26.12	49.76	32.07
25	30.55	02.04	50.57	02.59	66.13	08.31	12.03	16.99	05.80	26.39	49.09	32.23
26	31.25	02.00	51.11	02.72	66.45	08.55	12.08	17.27	05.46	26.68	48.35	32.39
27	31.91	01.97	51.64	02.86	66.79	08.77	12.14	17.55	05.07	26.98	47.55	32.54
28	32.54	01.95	52.15	02.97	67.16	08.99	<sup>12.21</sup> <sub>12.28</sub>	<sup>17.84</sup> <sub>18.16</sub>	04.61	27.28	46.72	32.65
29	33.13	01.94	52.69	03.08	67.56	09.22	12.32	18.49	04.07	27.57	45.88	32.72
30	33.71	01.91	53.24	03.18	67.97	09.46	12.31	18.84	03.49	27.84	45.07	32.76
31	34.28	01.88	53.82	03.28	68.40	09.72	12.23	19.20	02.87	28.07	44.33	32.77
32	34.86	01.83	54.44	03.38			12.08	19.57			43.64	32.78
	sec $\delta$ 31.85	tan $\delta$ 31.84	sec $\delta$ 31.85	tan $\delta$ 31.83	sec $\delta$ 31.87	tan $\delta$ 31.85	sec $\delta$ 31.91	tan $\delta$ 31.89	sec $\delta$ 31.95	tan $\delta$ 31.94	sec $\delta$ 31.99	tan $\delta$ 31.97

Mean R.A. <sup>h</sup> 2 <sup>m</sup> 23 <sup>s</sup> 19.52

Double lower transit April 28

Mean Dec. <sup>°</sup> -88 <sup>'</sup> 12 <sup>"</sup> 25.68

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1656 Lacaille 1029 (Octantis) Mag. 7.76 Spect. F0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 2 23	<sup>o</sup> <sup>'</sup> 85 47	<sup>h</sup> <sup>m</sup> 2 23	<sup>o</sup> <sup>'</sup> 85 47	<sup>h</sup> <sup>m</sup> 2 23	<sup>o</sup> <sup>'</sup> 85 46	<sup>h</sup> <sup>m</sup> 2 23	<sup>o</sup> <sup>'</sup> 85 46	<sup>h</sup> <sup>m</sup> 2 23	<sup>o</sup> <sup>'</sup> 85 46	<sup>h</sup> <sup>m</sup> 2 23	<sup>o</sup> <sup>'</sup> 85 46
	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>
1	39.04	10.45	29.33	10.00	21.06	64.81	14.30	55.20	11.70	43.94	13.49	32.81
2	38.77	10.55	28.97	09.93	20.75	64.58	14.15	54.79	11.73	43.53	13.63	32.52
3	38.49	10.66	28.61	09.82	20.44	64.31	14.02	54.38	11.75	43.16	13.75	32.25
4	38.17	10.77	28.25	09.68	20.14	64.02	13.91	53.99	11.78	42.80	13.87	31.97
5	37.84	10.87	27.90	09.51	19.87	63.70	13.81	53.61	11.80	42.46	13.98	31.68
6	37.49	10.95	27.58	09.32	19.63	63.37	13.72	53.25	11.80	42.13	14.09	31.39
7	37.12	11.00	27.28	09.12	19.40	63.05	13.61	52.91	11.80	41.80	14.20	31.08
8	36.77	11.01	27.01	08.92	19.20	62.73	13.50	52.59	11.79	41.46	14.33	30.75
9	36.43	10.99	26.74	08.74	19.00	62.44	13.38	52.27	11.77	41.12	14.47	30.42
10	36.12	10.95	26.48	08.58	18.79	62.16	13.24	51.95	11.76	40.76	14.63	30.08
11	35.83	10.91	26.21	08.43	18.58	61.90	13.10	51.62	11.76	40.39	14.81	29.75
12	35.56	10.88	25.92	08.30	18.36	61.65	12.96	51.27	11.77	40.00	15.01	29.42
13	35.29	10.87	25.62	08.17	18.12	61.40	12.82	50.91	11.79	39.60	15.22	29.11
14	35.01	10.88	25.31	08.03	17.88	61.14	12.69	50.53	11.84	39.20	15.44	28.82
15	34.72	10.90	24.98	07.89	17.62	60.86	12.58	50.13	11.91	38.79	15.66	28.55
16	34.41	10.92	24.66	07.72	17.37	60.57	12.49	49.73	11.99	38.40	15.86	28.31
17	34.09	10.95	24.33	07.54	17.12	60.26	12.41	49.31	12.09	38.02	16.05	28.08
18	33.75	10.97	24.01	07.33	16.89	59.93	12.36	48.90	12.19	37.66	16.22	27.86
19	33.41	10.97	23.70	07.10	16.67	59.58	12.32	48.49	12.29	37.33	16.37	27.64
20	33.05	10.95	23.40	06.86	16.47	59.22	12.30	48.11	12.38	37.01	16.51	27.39
21	32.70	10.91	23.13	06.60	16.29	58.86	12.27	47.74	12.44	36.71	16.66	27.11
22	32.36	10.85	22.87	06.34	16.12	58.49	12.23	47.40	12.48	36.41	16.83	26.81
23	32.02	10.76	22.63	06.08	15.97	58.14	12.18	47.07	12.51	36.08	17.02	26.49
24	31.70	10.66	22.40	05.84	15.83	57.81	12.10	46.75	12.54	35.73	17.25	26.18
25	31.40	10.55	22.16	05.61	15.68	57.50	12.01	46.41	12.58	35.35	17.50	25.89
26	31.12	10.44	21.91	05.41	15.52	57.20	11.91	46.05	12.66	34.95	17.76	25.63
27	30.84	10.33	21.65	05.21	15.33	56.92	11.81	45.65	12.76	34.55	18.02	25.39
28	30.57	10.25	21.36	05.02	15.12	56.62	11.74	45.23	12.89	34.15	18.27	25.19
29	30.28	10.17	21.06	04.81	14.91	56.31	11.70	44.80	13.04	33.78	18.51	25.00
30	29.99	10.12			14.69	55.96	11.69	44.36	13.19	33.43	18.74	24.83
31	29.67	10.06			14.48	55.59	11.70	43.94	13.35	33.11	18.96	24.66
32	29.33	10.00			14.30	55.20			13.49	32.81		
	sec $\delta$ 13.61	tan $\delta$ 13.57	sec $\delta$ 13.61	tan $\delta$ 13.57	sec $\delta$ 13.60	tan $\delta$ 13.56	sec $\delta$ 13.59	tan $\delta$ 13.55	sec $\delta$ 13.58	tan $\delta$ 13.54	sec $\delta$ 13.57	tan $\delta$ 13.54

Mean R.A.  $2^{\text{h}} 23^{\text{m}} 20.6^{\text{s}}$

Double lower transit April 28

Mean Dec.  $-85^{\circ} 46' 44.6''$



**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1656 Lacaille 1029 (Octantis) Mag. 7.76 Spect. F0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 2 23	° ' / 85 46	h m 2 23	° ' / 85 46	h m 2 23	° ' / 85 46	h m 2 23	° ' / 85 46	h m 2 23	° ' / 85 46	h m 2 23	° ' / 85 46
	s	"	s	"	s	"	s	"	s	"	s	"
1	18.96	24.66	27.07	20.68	35.57	22.13	41.62	28.44	43.29	38.34	39.55	46.96
2	19.16	24.48	27.33	20.62	35.85	22.23	41.79	28.72	43.21	38.69	39.31	47.16
3	19.37	24.30	27.61	20.56	36.13	22.36	41.95	29.03	43.10	39.02	39.08	47.34
4	19.57	24.11	27.90	20.49	36.42	22.51	42.08	29.35	43.00	39.31	38.88	47.50
5	19.79	23.90	28.21	20.44	36.70	22.69	42.19	29.69	42.91	39.58	38.70	47.67
6	20.02	23.69	28.53	20.39	36.96	22.89	42.27	30.02	42.84	39.83	38.53	47.85
7	20.26	23.47	28.85	20.37	37.19	23.11	42.33	30.34	42.78	40.08	38.35	48.06
8	20.53	23.25	29.18	20.37	37.40	23.33	42.38	30.63	42.74	40.34	38.16	48.29
9	20.81	23.04	29.50	20.40	37.59	23.55	42.43	30.90	42.71	40.62	37.95	48.53
10	21.10	22.85	29.80	20.45	37.77	23.76	42.50	31.15	42.66	40.92	37.72	48.77
11	21.40	22.68	30.07	20.52	37.94	23.94	42.59	31.39	42.60	41.25	37.47	49.02
12	21.70	22.53	30.33	20.59	38.12	24.10	42.70	31.63	42.51	41.59	37.20	49.25
13	21.99	22.41	30.57	20.65	38.32	24.25	42.81	31.89	42.41	41.93	36.93	49.46
14	22.26	22.31	30.80	20.69	38.54	24.39	42.93	32.18	42.28	42.27	36.64	49.65
15	22.52	22.22	31.03	20.72	38.77	24.55	43.03	32.50	42.14	42.60	36.36	49.82
16	22.75	22.12	31.28	20.72	39.02	24.72	43.12	32.83	41.98	42.92	36.09	49.97
17	22.97	22.02	31.55	20.71	39.26	24.93	43.18	33.18	41.83	43.21	35.83	50.11
18	23.18	21.90	31.85	20.70	39.49	25.17	43.22	33.54	41.67	43.49	35.58	50.23
19	23.41	21.74	32.16	20.72	39.70	25.43	43.24	33.89	41.52	43.74	35.34	50.35
20	23.66	21.57	32.48	20.76	39.89	25.71	43.24	34.24	41.38	43.99	35.10	50.47
21	23.94	21.40	32.79	20.84	40.06	25.99	43.24	34.57	41.25	44.23	34.87	50.61
22	24.24	21.24	33.09	20.94	40.21	26.27	43.24	34.88	41.12	44.47	34.64	50.75
23	24.56	21.10	33.37	21.07	40.35	26.53	43.23	35.18	41.01	44.72	34.40	50.91
24	24.88	20.99	33.63	21.21	40.49	26.79	43.24	35.46	40.89	44.98	34.14	51.07
25	25.20	20.92	33.88	21.35	40.62	27.03	43.25	35.74	40.76	45.26	33.85	51.24
26	25.50	20.88	34.11	21.49	40.77	27.26	43.28	36.02	40.62	45.55	33.55	51.41
27	25.78	20.84	34.34	21.61	40.92	27.49	43.31 43.34	36.31 36.60	40.46	45.85	33.21	51.56
28	26.05	20.82	34.57	21.73	41.08	27.71	43.37	36.92	40.26	46.16	32.87	51.68
29	26.31	20.80	34.80	21.84	41.26	27.94	43.39	37.25	40.04	46.45	32.53	51.75
30	26.56	20.77	35.04	21.93	41.44	28.18	43.39	37.61	39.80	46.73	32.20	51.80
31	26.81	20.73	35.30	22.03	41.62	28.44	43.36	37.97	39.55	46.96	31.89	51.81
32	27.07	20.68	35.57	22.13			43.29	38.34			31.61	51.83
	sec δ 13.57	tan δ 13.53	sec δ 13.57	tan δ 13.53	sec δ 13.57	tan δ 13.53	sec δ 13.58	tan δ 13.54	sec δ 13.58	tan δ 13.55	sec δ 13.59	tan δ 13.55

Mean R.A.  $2^{\text{h}} 23^{\text{m}} 20.61^{\text{s}}$

Double lower transit April 28

Mean Dec.  $-85^{\circ} 46' 44.69''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1658 12 G. Mensae  $\approx$  Mag. 6.76 Spect. A2

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 4 24	° ' " s 82 55	h m 4 24	° ' " s 82 56	h m 4 24	° ' " s 82 55	h m 4 24	° ' " s 82 55	h m 4 24	° ' " s 82 55	h m 4 24	° ' " s 82 55
1	37.53	58.22	32.47	03.58	26.85	63.92	20.84	59.50	16.57	51.28	14.68	40.68
2	37.41	58.46	32.26	03.72	26.62	63.89	20.65	59.24	16.48	50.92	14.68	40.36
3	37.30	58.73	32.05	03.84	26.40	63.84	20.48	58.97	16.40	50.57	14.67	40.05
4	37.16	59.01	31.83	03.93	26.17	63.76	20.32	58.69	16.32	50.25	14.66	39.74
5	37.02	59.29	31.61	03.99	25.95	63.65	20.17	58.42	16.24	49.95	14.65	39.43
6	36.86	59.57	31.40	04.02	25.74	63.51	20.03	58.17	16.15	49.65	14.63	39.12
7	36.69	59.82	31.20	04.02	25.54	63.36	19.88	57.93	16.06	49.37	14.62	38.78
8	36.52	60.04	31.01	04.02	25.36	63.21	19.74	57.71	15.97	49.09	14.60	38.44
9	36.35	60.23	30.83	04.02	25.17	63.07	19.59	57.51	15.87	48.80	14.60	38.07
10	36.19	60.38	30.65	04.03	24.99	62.95	19.43	57.30	15.78	48.50	14.60	37.69
11	36.03	60.52	30.46	04.06	24.81	62.84	19.27	57.10	15.68	48.18	14.61	37.30
12	35.89	60.67	30.28	04.11	24.62	62.75	19.11	56.88	15.59	47.84	14.64	36.91
13	35.74	60.82	30.09	04.17	24.43	62.67	18.94	56.64	15.51	47.48	14.67	36.52
14	35.60	60.99	29.89	04.24	24.24	62.58	18.78	56.39	15.43	47.11	14.71	36.15
15	35.46	61.18	29.68	04.29	24.03	62.49	18.62	56.11	15.37	46.72	14.75	35.80
16	35.31	61.38	29.47	04.34	23.83	62.38	18.47	55.81	15.31	46.34	14.80	35.47
17	35.15	61.59	29.25	04.37	23.62	62.26	18.32	55.50	15.26	45.95	14.84	35.17
18	34.98	61.80	29.03	04.38	23.41	62.11	18.19	55.18	15.22	45.59	14.87	34.89
19	34.80	62.01	28.82	04.36	23.21	61.93	18.07	54.85	15.19	45.24	14.90	34.61
20	34.62	62.20	28.60	04.32	23.01	61.74	17.95	54.53	15.15	44.92	14.91	34.31
21	34.43	62.37	28.40	04.26	22.82	61.53	17.84	54.23	15.10	44.62	14.92	34.00
22	34.24	62.52	28.20	04.19	22.65	61.31	17.73	53.95	15.05	44.34	14.94	33.65
23	34.05	62.65	28.01	04.11	22.48	61.09	17.61	53.70	14.98	44.04	14.97	33.27
24	33.86	62.75	27.82	04.04	22.31	60.89	17.49	53.46	14.91	43.73	15.02	32.88
25	33.68	62.83	27.64	03.98	22.15	60.70	17.35	53.22	14.84	43.38	15.08	32.49
26	33.51	62.91	27.45	03.94	21.98	60.54	17.21	52.97	14.78	42.99	15.15	32.11
27	33.34	62.98	27.26	03.93	21.81	60.40	17.06	52.68	14.74	42.59	15.23	31.77
28	33.17	63.07	27.06	03.92	21.62	60.26	16.92	52.36	14.71	42.18	15.31	31.45
29	33.01	63.17	26.85	03.92	21.43	60.11	16.79	52.01	14.69	41.77	15.38	31.15
30	32.84	63.30			21.23	59.94	16.68	51.65	14.69	41.39	15.46	30.87
31	32.66	63.43			21.03	59.74	16.57	51.28	14.68	41.02	15.53	30.61
32	32.47	63.58			20.84	59.50			14.68	40.68		
	sec $\delta$ 8.13	tan $\delta$ 8.07	sec $\delta$ 8.13	tan $\delta$ 8.07	sec $\delta$ 8.13	tan $\delta$ 8.07	sec $\delta$ 8.13	tan $\delta$ 8.07	sec $\delta$ 8.12	tan $\delta$ 8.06	sec $\delta$ 8.12	tan $\delta$ 8.06

Mean R.A. 4<sup>h</sup> 24<sup>m</sup> 22.06<sup>s</sup>

Double lower transit May 28

Mean Dec.  $-82^{\circ} 55' 47.31''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

433

1658 12 G. Mensae · Mag. 6.76 Spect. A2

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 4 24	° ' s 82 55	h m 4 24	° ' s 82 55	h m 4 24	° ' s 82 55	h m 4 24	° ' s 82 55	h m 4 24	° ' s 82 55	h m 4 24	° ' s 82 55
1	15.53	30.61	18.89	22.67	23.87	19.22	28.83	21.40	32.39	28.88	32.96	39.10
2	15.60	30.34	19.02	22.47	24.05	19.46	29.00	21.55	32.46	29.24	32.90	39.42
3	15.66	30.07	19.15	22.26	24.24	19.11	29.16	21.74	32.51	29.60	32.84	39.71
4	15.72	29.79	19.30	22.05	24.43	19.09	29.32	21.95	32.55	29.95	32.79	39.98
5	15.79	29.49	19.45	21.83	24.62	19.08	29.46	22.18	32.59	30.27	32.74	40.24
6	15.86	29.18	19.61	21.61	24.81	19.11	29.60	22.43	32.62	30.56	32.71	40.51
7	15.94	28.85	19.78	21.41	24.99	19.17	29.71	22.68	32.66	30.83	32.68	40.80
8	16.03	28.52	19.95	21.23	25.16	19.25	29.83	22.91	32.70	31.09	32.64	41.11
9	16.13	28.19	20.13	21.08	25.32	19.34	29.93	23.11	32.76	31.35	32.60	41.45
10	16.23	27.86	20.30	20.95	25.47	19.42	30.05	23.30	32.82	31.62	32.54	41.80
11	16.35	27.54	20.46	20.85	25.62	19.49	30.16	23.46	32.88	31.92	32.48	42.16
12	16.47	27.25	20.62	20.77	25.77	19.53	30.29	23.63	32.93	32.25	32.41	42.52
13	16.59	26.98	20.76	20.69	25.92	19.55	30.43	23.80	32.98	32.59	32.32	42.87
14	16.71	26.73	20.90	20.60	26.08	19.56	30.56	23.99	33.02	32.96	32.24	43.20
15	16.82	26.51	21.04	20.50	26.25	19.57	30.70	24.21	33.05	33.33	32.14	43.52
16	16.92	26.30	21.18	20.36	26.43	19.59	30.84	24.45	33.06	33.71	32.05	43.82
17	17.01	26.09	21.33	20.21	26.61	19.64	30.97	24.73	33.07	34.07	31.95	44.09
18	17.10	25.87	21.49	20.05	26.80	19.72	31.08	25.02	33.08	34.43	31.86	44.36
19	17.19	25.61	21.66	19.89	26.98	19.83	31.19	25.32	33.07	34.76	31.78	44.61
20	17.29	25.33	21.84	19.75	27.15	19.96	31.29	25.62	33.07	35.08	31.69	44.86
21	17.40	25.03	22.03	19.64	27.31	20.11	31.38	25.91	33.07	35.39	31.61	45.11
22	17.52	24.72	22.21	19.56	27.47	20.27	31.46	26.19	33.08	35.68	31.53	45.38
23	17.66	24.43	22.40	19.52	27.62	20.43	31.55	26.46	33.08	35.97	31.45	45.66
24	17.80	24.16	22.57	19.49	27.76	20.57	31.64	26.71	33.09	36.26	31.36	45.96
25	17.95	23.92	22.74	19.48	27.90	20.71	31.72	26.95	33.10	36.56	31.26	46.28
26	18.09	23.71	22.90	19.46	28.05	20.84	31.82	27.19	33.11	36.88	31.15	46.60
27	18.24	23.52	23.06	19.45	28.19	20.95	31.91	27.43	33.12	37.22	31.02	46.93
28	18.37	23.35	23.21	19.43	28.34	21.06	32.02	27.67	33.10	37.97	30.88	47.23
29	18.51	23.19	23.37	19.39	28.50	21.17	32.12	27.94	33.07	38.36	30.73	47.51
30	18.63	23.02	23.53	19.34	28.66	21.28	32.22	28.22	33.02	38.74	30.58	47.74
31	18.76	22.85	23.70	19.29	28.83	21.40	32.31	28.54	32.96	39.10	30.44	47.95
32	18.89	22.67	23.87	19.22			32.39	28.88			30.30	48.13
	sec δ 8.12	tan δ 8.06	sec δ 8.12	tan δ 8.05	sec δ 8.12	tan δ 8.05	sec δ 8.12	tan δ 8.06	sec δ 8.12	tan δ 8.06	sec δ 8.12	tan δ 8.06

Mean R.A. 4<sup>h</sup> 24<sup>m</sup> 22.<sup>s</sup>06

Double lower transit May 28

Mean Dec. -82° 55' 47".31

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

917     $\xi$  Mensae    Mag. 5.85    Spect. K0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 5 00	° ' " / 82 29	h m 5 00	° ' " / 82 29	h m 5 00	° ' " / 82 29	h m 5 00	° ' " / 82 29	h m 5 00	° ' " / 82 29	h m 5 00	° ' " / 82 29
	s 36.41	" 29.85	s 32.12	" 36.71	s 26.91	" 38.73	s 20.98	" 36.16	s 16.40	" 29.32	s 13.84	" 19.46
1	36.32	30.12	31.94	36.91	26.70	38.78	20.79	35.96	16.28	28.99	13.82	19.15
2	36.23	30.42	31.75	37.10	26.49	38.80	20.62	35.74	16.18	28.68	13.79	18.84
3	36.13	30.74	31.55	37.26	26.28	38.79	20.45	35.52	16.08	28.38	13.75	18.55
4	36.02	31.07	31.36	37.38	26.06	38.74	20.29	35.30	15.98	28.11	13.72	18.25
5	35.89	31.39	31.16	37.47	25.86	38.67	20.13	35.09	15.88	27.84	13.68	17.94
6	35.76	31.69	30.98	37.54	25.66	38.58	19.98	34.90	15.78	27.59	13.64	17.62
7	35.61	31.97	30.80	37.59	25.47	38.49	19.82	34.72	15.67	27.34	13.60	17.28
8	35.47	32.20	30.63	37.65	25.29	38.40	19.67	34.56	15.56	27.08	13.57	16.93
9	35.33	32.41	30.46	37.72	25.12	38.34	19.51	34.41	15.44	26.81	13.55	16.56
10	35.20	32.60	30.29	37.80	24.94	38.28	19.34	34.25	15.33	26.53	13.53	16.17
11	35.08	32.79	30.12	37.91	24.76	38.25	19.17	34.08	15.22	26.22	13.52	15.78
12	34.96	32.98	29.95	38.02	24.57	38.22	19.00	33.90	15.12	25.90	13.53	15.39
13	34.84	33.20	29.77	38.14	24.38	38.19	18.83	33.70	15.02	25.55	13.54	15.01
14	34.72	33.43	29.58	38.26	24.19	38.16	18.66	33.47	14.93	25.19	13.55	14.65
15	34.59	33.67	29.39	38.37	23.98	38.12	18.50	33.23	14.85	24.83	13.57	14.32
16	34.46	33.93	29.19	38.47	23.78	38.06	18.34	32.96	14.78	24.47	13.58	14.01
17	34.32	34.19	28.99	38.54	23.58	37.97	18.19	32.68	14.71	24.12	13.59	13.72
18	34.17	34.44	28.78	38.59	23.38	37.86	18.05	32.40	14.65	23.79	13.59	13.44
19	34.01	34.69	28.58	38.62	23.18	37.73	17.92	32.12	14.59	23.49	13.59	13.15
20	33.85	34.92	28.39	38.62	22.99	37.58	17.80	31.85	14.53	23.21	13.57	12.84
21	33.68	35.13	28.19	38.61	22.81	37.41	17.67	31.61	14.45	22.94	13.57	12.49
22	33.52	35.31	28.01	38.58	22.63	37.25	17.54	31.39	14.37	22.67	13.57	12.11
23	33.35	35.47	27.83	38.57	22.46	37.09	17.41	31.20	14.28	22.38	13.58	11.72
24	33.19	35.61	27.66	38.56	22.30	36.96	17.26	31.00	14.19	22.06	13.61	11.32
25	33.04	35.74	27.48	38.58	22.13	36.85	17.11	30.79	14.11	21.70	13.65	10.94
26	32.89	35.86	27.30	38.62	21.96	36.76	16.95	30.55	14.04	21.32	13.69	10.57
27	32.74	36.00	27.11	38.68	21.77	36.68	16.80	30.28	13.98	20.93	13.74	10.24
28	32.59	36.15	26.91	38.73	21.58	36.59	16.65	29.98	13.94	20.54	13.80	09.92
29	32.44	36.32			21.38	36.48	16.52	29.65	13.90	20.16	13.84	09.63
30	32.28	36.51			21.18	36.34	16.40	29.32	13.87	19.80	13.89	09.34
31	32.12	36.71			20.98	36.16			13.84	19.46		
32												
	sec $\delta$ 7.65	tan $\delta$ 7.59	sec $\delta$ 7.66	tan $\delta$ 7.59	sec $\delta$ 7.66	tan $\delta$ 7.59	sec $\delta$ 7.65	tan $\delta$ 7.59	sec $\delta$ 7.65	tan $\delta$ 7.59	sec $\delta$ 7.65	tan $\delta$ 7.58

Mean R.A.  $5^{\text{h}} 00^{\text{m}} 21^{\text{s}}.32$

Double lower transit June 6

Mean Dec.  $-82^{\circ} 29' 24''.12$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

435

917     $\xi$  Mensae    Mag. 5.85    Spect. K0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 5 00	° ' / 82 29	h m 5 00	° ' / 82 28	h m 5 00	° ' / 82 28	h m 5 00	° ' / 82 28	h m 5 00	° ' / 82 29	h m 5 00	° ' / 82 29
	s "	"	s "	"	s "	"	s "	"	s "	"	s "	"
1	13.89	09.34	16.44	60.62	20.85	55.85	25.66	56.64	29.57	03.08	30.93	12.76
2	13.93	09.06	16.55	60.39	21.01	55.74	25.82	56.74	29.66	03.42	30.90	13.13
3	13.97	08.78	16.66	60.15	21.18	55.64	25.99	56.87	29.74	03.76	30.87	13.48
4	14.01	08.48	16.78	59.89	21.36	55.56	26.15	57.04	29.80	04.10	30.84	13.79
5	14.05	08.18	16.91	59.64	21.54	55.50	26.31	57.23	29.86	04.42	30.81	14.07
6	14.10	07.85	17.04	59.38	21.72	55.48	26.45	57.44	29.91	04.70	30.79 30.78	14.35 14.63
7	14.15	07.51	17.18	59.13	21.89	55.48	26.58	57.65	29.97	04.96	30.77	14.93
8	14.20	07.16	17.33	58.91	22.06	55.51	26.70	57.85	30.04	05.21	30.76	15.25
9	14.27	06.81	17.48	58.71	22.21	55.56	26.82	58.03	30.11	05.45	30.75	15.60
10	14.35	06.45	17.63	58.53	22.36	55.60	26.94	58.18	30.18	05.71	30.73	15.96
11	14.43	06.11	17.78	58.39	22.50	55.62	27.07	58.32	30.26	05.99	30.70	16.34
12	14.52	05.78	17.92	58.27	22.65	55.63	27.20	58.45	30.34	06.30	30.66	16.72
13	14.61	05.48	18.05	58.15	22.79	55.61	27.34	58.58	30.41	06.63	30.61	17.09
14	14.70	05.21	18.17	58.02	22.94	55.57	27.48	58.73	30.48	06.98	30.55	17.46
15	14.79	04.96	18.29	57.88	23.10	55.53	27.63	58.91	30.53	07.34	30.49	17.80
16	14.87	04.73	18.41	57.72	23.27	55.51	27.77	59.11	30.58	07.71	30.43	18.12
17	14.94	04.50	18.54	57.53	23.45	55.50	27.91	59.35	30.61	08.07	30.36	18.43
18	15.01	04.25	18.68	57.32	23.63	55.53	28.04	59.60	30.64	08.43	30.30	18.72
19	15.07	03.98	18.83	57.12	23.80	55.59	28.17	59.87	30.67	08.76	30.24	19.00
20	15.14	03.68	18.99	56.93	23.97	55.67	28.28	60.14	30.69	09.08	30.18	19.27
21	15.22	03.35	19.16	56.77	24.14	55.77	28.39	60.41	30.72	09.39	30.13	19.55
22	15.32	03.02	19.32	56.64	24.29	55.89	28.49	60.66	30.74	09.68	30.07	19.84
23	15.42	02.69	19.49	56.54	24.45	56.00	28.59	60.91	30.77	09.97	30.02	20.15
24	15.54	02.39	19.65	56.47	24.59	56.11	28.69	61.14	30.80	10.26	29.95	20.47
25	15.66	02.11	19.81	56.41	24.74	56.21	28.80	61.35	30.84	10.56	29.89	20.82
26	15.78	01.86	19.96	56.35	24.88	56.29	28.90	61.56	30.87	10.87	29.80	21.18
27	15.90	01.64	20.10	56.29	25.03	56.37	29.01	61.77	30.90	11.21	29.71	21.54
28	16.01	01.43	20.25	56.23	25.18	56.43	29.12	61.99	30.93	11.57	29.60	21.89
29	16.12	01.23	20.39	56.15	25.33	56.50	29.24	62.22	30.94	11.96	29.49	22.21
30	16.23	01.03	20.54	56.06	25.49	56.56	29.35	62.48	30.94	12.36	29.37	22.49
31	16.34	00.83	20.69	55.96	25.66	56.64	29.47	62.77	30.93	12.76	29.25	22.74
32	16.44	00.62	20.85	55.85			29.57	63.08			29.14	22.96
	sec $\delta$ 7.65	tan $\delta$ 7.58	sec $\delta$ 7.64	tan $\delta$ 7.58	sec $\delta$ 7.64	tan $\delta$ 7.58	sec $\delta$ 7.64	tan $\delta$ 7.58	sec $\delta$ 7.65	tan $\delta$ 7.58	sec $\delta$ 7.65	tan $\delta$ 7.58

Mean R.A.  $5^{\text{h}} 00^{\text{m}} 21^{\text{s}}.32$

Double lower transit June 6

Mean Dec.  $-82^{\circ} 29' 24''.12$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1659 31 G. Mensae  $\gamma$  Mag. 6.24 Spect. A0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> 5 <sup>m</sup> 33	<sup>o</sup> 84 <sup>'</sup> 47	<sup>h</sup> 5 <sup>m</sup> 32	<sup>o</sup> 84 <sup>'</sup> 47	<sup>h</sup> 5 <sup>m</sup> 32	<sup>o</sup> 84 <sup>'</sup> 47	<sup>h</sup> 5 <sup>m</sup> 32	<sup>o</sup> 84 <sup>'</sup> 47	<sup>h</sup> 5 <sup>m</sup> 32	<sup>o</sup> 84 <sup>'</sup> 47	<sup>h</sup> 5 <sup>m</sup> 32	<sup>o</sup> 84 <sup>'</sup> 47
	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"
1	11.99	41.39	66.40	49.34	59.06	52.77	50.23	51.90	42.89	46.49	38.13	37.61
2	11.90	41.69	66.16	49.59	58.76	52.87	49.93	51.75	42.69	46.20	38.06	37.31
3	11.80	42.01	65.90	49.83	58.45	52.95	49.65	51.59	42.51	45.93	37.98	37.02
4	11.68	42.35	65.63	50.04	58.13	53.00	49.38	51.41	42.33	45.66	37.90	36.74
5	11.55	42.70	65.35	50.21	57.82	53.02	49.13	51.24	42.16	45.42	37.82	36.46
6	11.39	43.05	65.08	50.36	57.51	53.00	48.88	51.08	41.99	45.19	37.73	36.18
7	11.22	43.39	64.81	50.48	57.22	52.97	48.65	50.94	41.82	44.97	37.64	35.88
8	11.03	43.70	64.56	50.58	56.94	52.93	48.41	50.81	41.64	44.76	37.55	35.56
9	10.84	43.98	64.31	50.68	56.67	52.90	48.17	50.69	41.45	44.54	37.46	35.23
10	10.66	44.22	64.08	50.80	56.41	52.88	47.92	50.58	41.26	44.31	37.38	34.87
11	10.48	44.45	63.85	50.92	56.15	52.88	47.67	50.48	41.06	44.06	37.31	34.51
12	10.32	44.67	63.62	51.07	55.89	52.89	47.41	50.36	40.87	43.80	37.25	34.13
13	10.16	44.89	63.38	51.23	55.62	52.91	47.14	50.23	40.68	43.51	37.21	33.75
14	10.01	45.13	63.13	51.40	55.35	52.94	46.87	50.08	40.50	43.20	37.19	33.38
15	09.86	45.39	62.87	51.57	55.06	52.96	46.60	49.91	40.33	42.88	37.17	33.02
16	09.70	45.67	62.60	51.73	54.76	52.98	46.34	49.71	40.17	42.55	37.16	32.69
17	09.53	45.96	62.32	51.88	54.46	52.97	46.08	49.50	40.03	42.22	37.15	32.39
18	09.35	46.25	62.03	52.01	54.16	52.95	45.84	49.27	39.90	41.89	37.13	32.11
19	09.16	46.54	61.74	52.12	53.86	52.89	45.61	49.03	39.78	41.59	37.10	31.84
20	08.96	46.83	61.45	52.20	53.56	52.82	45.39	48.79	39.66	41.31	37.05	31.56
21	08.74	47.10	61.17	52.26	53.26	52.72	45.18	48.56	39.54	41.05	37.00	31.26
22	08.52	47.35	60.89	52.30	52.98	52.62	44.98	48.36	39.41	40.81	36.94	30.93
23	08.29	47.58	60.62	52.33	52.72	52.50	44.77	48.19	39.26	40.58	36.90	30.57
24	08.07	47.78	60.36	52.36	52.46	52.39	44.56	48.03	39.09	40.32	36.87	30.18
25	07.84	47.96	60.11	52.40	52.21	52.31	44.33	47.88	38.93	40.04	36.86	29.78
26	07.63	48.13	59.86	52.47	51.96	52.24	44.08	47.72	38.76	39.72	36.88	29.40
27	07.42	48.30	59.61	52.55	51.70	52.20	43.83	47.54	38.62	39.37	36.90	29.03
28	07.22	48.47	59.34	52.66	51.43	52.17	43.57	47.32	38.49	39.00	36.94	28.69
29	07.03	48.66	59.06	52.77	51.14	52.14	43.33	47.06	38.38	38.63	36.98	28.37
30	06.83	48.87			50.84	52.09	43.10	46.78	38.29	38.27	37.02	28.07
31	06.62	49.10			50.53	52.01	42.89	46.49	38.21	37.93	37.05	27.78
32	06.40	49.34			50.23	51.90			38.13	37.61		
	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$
	11.03	10.98	11.03	10.98	11.03	10.98	11.03	10.98	11.02	10.98	11.02	10.97

Mean R.A.  $5^{\text{h}} 32^{\text{m}} 48.96^{\text{s}}$

Double lower transit June 15

Mean Dec.  $-84^{\circ} 47' 40.5''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1659 31 G. Mensae · Mag. 6.24 Spect. A0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 5 32	° ' / 84 47	h m 5 32	° ' / 84 47	h m 5 32	° ' / 84 47	h m 5 32	° ' / 84 47	h m 5 32	° ' / 84 47	h m 5 32	° ' / 84 47
	s 37.05	" 27.78	s 39.69	" 18.65	s 45.38	" 12.88	s 52.24	" 12.42	s 58.38	" 17.74	s 61.14	" 26.94
1	37.05	27.78	39.69	18.65	45.38	12.88	52.24	12.42	58.38	17.74	61.14	26.94
2	37.08	27.50	39.81	18.40	45.60	12.73	52.49	12.47	58.54	18.05	61.13	27.32
3	37.11	27.22	39.94	18.14	45.84	12.59	52.75	12.56	58.68	18.37	61.11	27.67
4	37.13	26.92	40.08	17.86	46.08	12.46	52.99	12.68	58.80	18.69	61.09	27.99
5	37.15	26.61	40.23	17.58	46.33	12.36	53.23	12.82	58.90	18.99	61.07	28.28
6	37.17	26.29	40.39	17.29	46.58	12.29	53.45	12.99	59.00	19.25	61.06	28.56
7	37.20	25.95	40.57	17.02	46.83	12.25	53.66	13.17	59.10	19.50	61.07	28.84
8	37.24	25.59	40.75	16.76	47.07	12.23	53.84	13.34	59.21	19.72	61.08	29.14
9	37.30	25.23	40.95	16.52	47.30	12.23	54.02	13.48	59.33	19.95	61.10	29.46
10	37.36	24.86	41.15	16.31	47.51	12.24	54.20	13.61	59.46	20.18	61.11	29.80
11	37.45	24.51	41.34	16.14	47.71	12.23	54.39	13.71	59.60	20.44	61.11	30.17
12	37.54	24.17	41.52	15.98	47.90	12.20	54.58	13.80	59.74	20.72	61.10	30.55
13	37.64	23.85	41.69	15.83	48.10	12.14	54.79	13.89	59.88	21.02	61.08	30.93
14	37.74	23.56	41.85	15.68	48.31	12.07	55.01	14.00	60.00	21.35	61.04 60.99	31.31 31.69
15	37.84	23.30	42.00	15.51	48.53	11.99	55.24	14.14	60.11	21.70	60.93	32.05
16	37.93	23.05	42.15	15.32	48.77	11.92	55.47	14.30	60.21	22.05	60.86	32.39
17	38.00	22.81	42.31	15.11	49.02	11.87	55.69	14.50	60.29	22.40	60.79	32.71
18	38.06	22.55	42.48	14.87	49.27	11.85	55.90	14.71	60.36	22.74	60.72	33.01
19	38.12	22.28	42.67	14.63	49.53	11.86	56.10	14.94	60.43	23.07	60.66	33.30
20	38.18	21.97	42.88	14.41	49.78	11.90	56.29	15.18	60.49	23.38	60.60	33.59
21	38.26	21.63	43.10	14.21	50.03	11.95	56.46	15.41	60.55	23.67	60.54	33.88
22	38.35	21.28	43.32	14.04	50.26	12.02	56.63	15.64	60.61	23.96	60.49	34.18
23	38.46	20.94	43.55	13.90	50.48	12.10	56.79	15.86	60.67	24.23	60.44	34.49
24	38.59	20.61	43.77	13.78	50.70	12.17	56.95	16.06	60.74	24.51	60.38	34.83
25	38.73	20.31	43.98	13.68	50.91	12.23	57.12	16.25	60.82	24.80	60.31	35.19
26	38.88	20.03	44.19	13.59	51.12	12.28	57.28	16.43	60.89	25.10	60.23	35.57
27	39.03	19.78	44.39	13.50	51.33	12.32	57.46	16.60	60.97	25.42	60.13	35.95
28	39.17	19.55	44.59	13.40	51.54	12.34	57.64	16.79	61.04	25.77	60.00	36.32
29	39.31	19.33	44.78	13.28	51.77	12.36	57.82	16.99	61.09	26.15	59.86	36.67
30	39.44	19.11	44.98	13.16	52.00	12.39	58.01	17.21	61.13	26.54	59.70	36.99
31	39.56	18.88	45.18	13.02	52.24	12.42	58.20	17.46	61.14	26.94	59.55	37.27
32	39.69	18.65	45.38	12.88			58.38	17.74			59.41	37.52
	sec δ 11.01	tan δ 10.97	sec δ 11.01	tan δ 10.96	sec δ 11.01	tan δ 10.96	sec δ 11.01	tan δ 10.96	sec δ 11.01	tan δ 10.97	sec δ 11.02	tan δ 10.97

Mean R.A.  $5^{\text{h}} 32^{\text{m}} 48.96^{\text{s}}$

Double lower transit June 15

Mean Dec.  $-84^{\circ} 47' 40.50''$

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1660 6 G. Octantis  $\searrow$  Mag. 6.74 Spect. K0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 5 43	° ' " / 85 55	h m 5 43	° ' " / 85 55	h m 5 43	° ' " / 85 55	h m 5 43	° ' " / 85 55	h m 5 43	° ' " / 85 55	h m 5 43	° ' " / 85 55
1	<sup>s</sup> 60.25	"12.50	<sup>s</sup> 53.37	"20.76	<sup>s</sup> 44.09	"24.63	<sup>s</sup> 32.73	"24.33	<sup>s</sup> 23.08	"19.44	<sup>s</sup> 16.57	"10.95
2	60.14	12.80	53.07	21.02	43.71	24.75	32.34	24.21	22.82	19.17	16.46	10.65
3	60.02	13.12	52.75	21.27	43.32	24.85	31.97	24.06	22.57	18.90	16.35	10.37
4	59.89	13.47	52.41	21.50	42.91	24.92	31.62	23.91	22.34	18.65	16.24	10.10
5	59.73	13.83	52.05	21.69	42.51	24.96	31.29	23.75	22.11	18.42	16.11	09.83
6	59.54	14.19	51.71	21.85	42.11	24.96	30.98	23.61	21.88	18.21	15.98	09.55
7	59.33	14.54	51.37	21.99	41.74	24.95	30.67	23.48	21.65	18.00	15.85	09.26
8	59.10	14.86	51.04	22.11	41.37	24.93	30.36	23.36	21.41	17.80	15.71	08.96
9	58.86	15.14	50.74	22.22	41.03	24.91	30.05	23.26	21.16	17.60	15.58	08.63
10	58.63	15.40	50.44	22.35	40.70	24.91	29.73	23.17	20.90	17.38	15.46	08.29
11	58.41	15.63	50.15	22.49	40.37	24.92	29.40	23.08	20.64	17.15	15.36	07.92
12	58.21	15.86	49.86	22.65	40.03	24.95	29.06	22.98	20.38	16.90	15.27	07.55
13	58.02	16.10	49.56	22.83	39.69	24.99	28.71	22.87	20.12	16.63	15.20	07.18
14	57.83	16.35	49.25	23.01	39.34	25.04	28.36	22.74	19.87	16.33	15.15	06.81
15	57.65	16.61	48.93	23.20	38.98	25.08	28.01	22.59	19.64	16.02	15.11	06.46
16	57.46	16.90	48.59	23.37	38.60	25.11	27.66	22.41	19.42	15.71	15.08	06.14
17	57.26	17.19	48.24	23.54	38.21	25.13	27.32	22.22	19.23	15.38	15.05	05.84
18	57.04	17.50	47.87	23.69	37.82	25.12	27.00	22.00	19.05	15.07	15.01	05.56
19	56.81	17.80	47.50	23.81	37.43	25.09	26.69	21.78	18.88	14.78	14.96	05.29
20	56.55	18.10	47.13	23.91	37.04	25.03	26.40	21.55	18.72	14.51	14.88	05.02
21	56.29	18.38	46.76	23.99	36.66	24.96	26.13	21.34	18.55	14.26	14.79	04.73
22	56.01	18.65	46.41	24.04	36.30	24.87	25.86	21.16	18.36	14.04	14.70	04.41
23	55.73	18.89	46.06	24.09	35.95	24.77	25.59	21.00	18.16	13.81	14.62	04.05
24	55.44	19.10	45.74	24.14	35.62	24.68	25.31	20.86	17.94	13.57	14.57	03.67
25	55.16	19.30	45.42	24.20	35.29	24.61	25.00	20.72	17.70	13.30	14.54	03.28
26	54.89	19.48	45.10	24.28	34.97	24.56	24.68	20.58	17.48	12.99	14.54	02.90
27	54.63	19.66	44.78	24.38	34.64	24.54	24.35	20.42	17.27	12.65	14.56	02.53
28	54.39	19.84	44.45	24.50	34.29	24.53	24.01	20.21	17.09	12.30	14.59	02.19
29	54.14	20.04	44.09	24.63	33.92	24.52	23.68	19.98	16.93	11.94	14.62	01.87
30	53.90	20.26			33.53	24.49	23.37	19.72	16.80	11.59	14.66	01.57
31	53.64	20.50			33.13	24.43	23.08	19.44	16.68	11.26	14.69	01.29
32	53.37	20.76			32.73	24.33			16.57	10.95		
	sec $\delta$ 14.06	tan $\delta$ 14.02	sec $\delta$ 14.07	tan $\delta$ 14.03	sec $\delta$ 14.07	tan $\delta$ 14.03	sec $\delta$ 14.06	tan $\delta$ 14.03	sec $\delta$ 14.06	tan $\delta$ 14.02	sec $\delta$ 14.05	tan $\delta$ 14.01

Mean R.A.  $5^{\text{h}} 43^{\text{m}} 30^{\text{s}}.28$

Double lower transit June 17

Mean Dec.  $-85^{\circ} 55' 13''.25$



**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

439

1660 6 G. Octantis Mag. 6.74 Spect. K0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 5 43	° ' / 85 54	h m 5 43	° ' / 85 54	h m 5 43	° ' / 85 54	h m 5 43	° ' / 85 54	h m 5 43	° ' / 85 54	h m 5 43	° ' / 85 54
	s	"	s	"	s	"	s	"	s	"	s	"
1	14.69	61.29	17.56	52.08	24.50	46.02	33.16	45.16	41.13	50.08	44.96	59.06
2	14.71	61.00	17.71	51.83	24.77	45.86	33.48	45.19	41.35	50.37	44.96	59.44
3	14.72	60.72	17.86	51.56	25.06	45.70	33.80	45.26	41.54	50.69	44.94	59.79
4	14.73	60.43	18.02	51.28	25.36	45.56	34.13	45.37	41.70	50.99	44.92	60.11
5	14.74	60.12	18.19	50.99	25.68	45.45	34.43	45.50	41.84	51.28	44.90	60.40
6	14.76	59.80	18.38	50.70	26.00	45.36	34.72	45.65	41.97	51.55	44.90	60.68
7	14.78	59.46	18.59	50.41	26.31	45.30	34.99	45.82	42.11	51.78	44.92	60.96
8	14.81	59.11	18.82	50.14	26.62	45.28	35.23	45.97	42.25	52.00	44.95	61.25
9	14.86	58.74	19.06	49.89	26.90	45.26	35.46	46.11	42.41	52.22	44.98	61.57
10	14.93	58.38	19.30	49.68	27.17	45.26	35.69	46.22	42.59	52.44	45.01	61.91
11	15.01	58.02	19.54	49.49	27.41	45.23	35.92	46.31	42.78	52.68	45.02	62.27
12	15.12	57.67	19.76	49.32	27.66	45.19	36.17	46.39	42.96	52.95	45.02	62.65
13	15.23	57.36	19.97	49.17	27.90	45.13	36.44	46.47	43.15	53.25	45.01	63.04
14	15.35	57.06	20.17	49.01	28.16	45.05	36.72	46.57	43.32	53.57	44.97	63.42
15	15.46	56.80	20.35	48.84	28.44	44.96	37.02	46.69	43.47	53.91	44.92	63.80
16	15.56	56.55	20.52	48.64	28.73	44.87	37.31	46.83	43.61	54.25	44.85	64.16
17	15.64	56.30	20.71	48.41	29.05	44.81	37.60	47.01	43.73	54.59	44.77 44.69	64.50 64.82
18	15.70	56.05	20.91	48.17	29.38	44.77	37.88	47.21	43.83	54.93	44.61	65.13
19	15.76	55.77	21.14	47.92	29.70	44.76	38.15	47.43	43.92	55.25	44.54	65.42
20	15.82	55.46	21.39	47.69	30.03	44.78	38.39	47.66	44.00	55.56	44.47	65.71
21	15.89	55.12	21.66	47.48	30.34	44.83	38.62	47.88	44.09	55.85	44.41	66.00
22	15.99	54.77	21.95	47.29	30.64	44.88	38.84	48.09	44.17	56.13	44.35	66.30
23	16.12	54.42	22.23	47.14	30.92	44.94	39.06	48.30	44.26	56.40	44.30	66.62
24	16.27	54.09	22.50	47.01	31.20	45.00	39.27	48.49	44.36	56.67	44.24	66.96
25	16.44	53.78	22.77	46.90	31.47	45.05	39.48	48.67	44.47	56.95	44.17	67.32
26	16.61	53.50	23.03	46.79	31.73	45.08	39.69	48.84	44.58	57.24	44.07	67.70
27	16.78	53.24	23.28	46.69	32.00	45.11	39.92	49.00	44.69	57.56	43.95	68.09
28	16.95	53.00	23.52	46.58	32.27	45.12	40.16	49.17	44.79	57.90	43.80	68.47
29	17.12	52.78	23.76	46.46	32.55	45.13	40.40	49.36	44.87	58.27	43.63	68.83
30	17.27	52.55	24.00	46.32	32.85	45.14	40.65	49.57	44.93	58.66	43.44	69.15
31	17.42	52.32	24.24	46.18	33.16	45.16	40.90	49.81	44.96	59.06	43.25	69.44
32	17.56	52.08	24.50	46.02			41.13	50.08			43.08	69.70
	sec δ 14.04	tan δ 14.00	sec δ 14.03	tan δ 14.00	sec δ 14.03	tan δ 13.99	sec δ 14.03	tan δ 14.00	sec δ 14.04	tan δ 14.00	sec δ 14.05	tan δ 14.01

Mean R.A.  $5^{\text{h}} 43^{\text{m}} 30.28^{\text{s}}$

Double lower transit June 17

Mean Dec.  $-85^{\circ} 55' 13.25''$

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1662 A Octantis Mag. 7.75 Spect. A0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 6 40	° ' " / 88 43	h m 6 40	° ' " / 88 43	h m 6 39	° ' " / 88 44	h m 6 39	° ' " / 88 44	h m 6 38	° ' " / 88 43	h m 6 38	° ' " / 88 43
1	s 74.64	" 49.31	s 58.46	" 59.04	s 91.78	" 05.19	s 55.57	" 07.90	s 81.41	" 65.78	s 54.43	" 59.43
2	74.50	49.62	57.69	59.37	90.66	05.41	54.24	07.88	80.38	65.59	53.88	59.18
3	74.35	49.96	56.83	59.70	89.47	05.61	52.96	07.84	79.42	65.40	53.32	58.94
4	74.17	50.33	55.90	60.01	88.22	05.78	51.73	07.78	78.51	65.22	52.75	58.71
5	73.92	50.72	54.90	60.29	86.95	05.92	50.58	07.72	77.63	65.06	52.15	58.49
6	73.57	51.11	53.89	60.53	85.69	06.03	49.49	07.66	76.75	64.92	51.52	58.26
7	73.12	51.51	52.89	60.75	84.48	06.12	48.43	07.62	75.87	64.78	50.87	58.03
8	72.59	51.88	51.95	60.95	83.33	06.19	47.39	07.59	74.95	64.66	50.20	57.77
9	72.01	52.21	51.06	61.14	82.23	06.27	46.35	07.58	74.01	64.53	49.52	57.50
10	71.43	52.52	50.23	61.34	81.19	06.35	45.28	07.58	73.02	64.39	48.87	57.20
11	70.88	52.80	49.43	61.55	80.17	06.45	44.17	07.58	72.01	64.24	48.25	56.89
12	70.39	53.08	48.63	61.78	79.15	06.56	43.02	07.57	70.98	64.08	47.69	56.56
13	69.94	53.35	47.82	62.02	78.11	06.69	41.83	07.56	69.95	63.88	47.19	56.22
14	69.54	53.64	46.98	62.28	77.04	06.83	40.61	07.53	68.94	63.67	46.75	55.89
15	69.15	53.94	46.08	62.54	75.91	06.96	39.37	07.48	67.97	63.44	46.38	55.57
16	68.76	54.26	45.13	62.80	74.74	07.09	38.13	07.40	67.05	63.19	46.05	55.26
17	68.33	54.60	44.12	63.06	73.52	07.21	36.91	07.30	66.19	62.94	45.74	54.99
18	67.85	54.95	43.07	63.30	72.26	07.31	35.72	07.18	65.40	62.69	45.41	54.74
19	67.32	55.30	41.97	63.51	70.99	07.38	34.59	07.05	64.66	62.45	45.02	54.50
20	66.73	55.65	40.86	63.71	69.71	07.43	33.51	06.91	63.96	62.24	44.56	54.27
21	66.07	55.99	39.74	63.88	68.45	07.46	32.50	06.78	63.25	62.05	44.04	54.02
22	65.36	56.32	38.64	64.02	67.23	07.47	31.53	06.67	62.49	61.89	43.48	53.74
23	64.61	56.63	37.59	64.16	66.06	07.46	30.58	06.59	61.66	61.73	42.93	53.42
24	63.85	56.91	36.59	64.29	64.96	07.47	29.58	06.53	60.75	61.56	42.45	53.07
25	63.09	57.17	35.64	64.43	63.90	07.48	28.52	06.49	59.79	61.37	42.07	52.71
26	62.35	57.42	34.71	64.59	62.86	07.52	27.38	06.44	58.83	61.13	41.77	52.35
27	61.65	57.65	33.79	64.77	61.81	07.58	26.17	06.37	57.90	60.87	41.56	52.00
28	61.00	57.89	32.82	64.97	60.70	07.67	24.93	06.27	57.05	60.58	41.41	51.67
29	60.38	58.15	31.78	65.19	59.51	07.76	23.70	06.13	56.29	60.28	41.29	51.35
30	59.77	58.42			58.24	07.83	22.52	05.97	55.61	59.98	41.17	51.06
31	59.14	58.72			56.92	07.88	21.41	05.78	55.00	59.69	41.05	50.78
32	58.46	59.04			55.57	07.90			54.43	59.43		
	sec δ 45.18	tan δ 45.17	sec δ 45.26	tan δ 45.25	sec δ 45.31	tan δ 45.30	sec δ 45.31	tan δ 45.30	sec δ 45.27	tan δ 45.26	sec δ 45.19	tan δ 45.18

Mean R.A. <sup>h m s</sup> 6 39 37.36

Double lower transit July 1

Mean Dec. <sup>° ' "</sup> -88 43 58.46

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

441

1662 A Octantis Mag. 7.75 Spect. A0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	6 38	88 43	6 38	88 43	6 38	88 43	6 39	88 43	6 39	88 43	6 40	88 43
	s	"	s	"	s	"	s	"	s	"	s	"
1	41.05	50.78	42.85	41.36	59.64	33.87	25.57	30.89	53.41	33.59	11.03	41.25
2	40.90	50.51	43.10	41.09	60.36	33.65	26.59	30.84	54.28	33.82	11.25	41.62
3	40.72	50.24	43.34	40.80	61.14	33.43	27.65	30.82	55.07	34.08	11.40	41.97
4	40.52	49.97	43.62	40.49	61.98	33.22	28.73	30.84	55.75	34.33	11.50	42.28
5	40.30	49.68	43.93	40.17	62.88	33.03	29.78	30.89	56.36	34.58	11.62	42.57
6	40.07	49.37	44.31	39.84	63.81	32.86	30.77	30.97	56.91	34.80	11.78	42.83
7	39.86	49.04	44.75	39.51	64.76	32.73	31.68	31.06	57.45	34.99	12.01	43.10
8	39.69	48.70	45.27	39.20	65.67	32.63	32.52	31.15	58.03	35.16	12.30	43.37
9	39.56	48.34	45.83	38.91	66.53	32.55	33.29	31.22	58.66	35.33	12.61	43.67
10	39.50	47.98	46.43	38.64	67.33	32.48	34.05	31.27	59.36	35.50	12.93	43.99
11	39.51	47.61	47.04	38.40	68.06	32.40	34.81	31.30	60.10	35.69	13.23	44.33
12	39.58	47.26	47.61	38.19	68.75	32.30	35.63	31.31	60.87	35.90	13.49	44.69
13	39.70	46.93	48.13	37.99	69.44	32.18	36.50	31.32	61.65	36.13	13.68	45.07
14	39.85	46.62	48.59	37.79	70.15	32.04	37.45	31.34	62.39	36.40	13.81	45.45
15	40.00	46.34	48.99	37.59	70.93	31.88	38.44	31.38	63.10	36.68	13.88	45.82
16	40.11	46.08	49.36	37.35	71.79	31.72	39.47	31.45	63.75	36.97	13.89	46.19
17	40.16	45.83	49.75	37.10	72.72	31.58	40.49	31.55	64.33	37.28	13.86	46.54
18	40.14	45.58	50.19	36.81	73.71	31.46	41.50	31.67	64.86	37.57	13.81	46.87
19	40.07	45.30	50.71	36.52	74.72	31.37	42.46	31.81	65.34	37.86	13.74	47.19
20	40.00	45.00	51.32	36.23	75.74	31.31	43.37	31.96	65.79	38.13	13.69	47.49
21	39.95	44.66	52.01	35.96	76.74	31.27	44.23	32.12	66.22	38.39	13.66	47.79
22	39.99	44.30	52.76	35.72	77.70	31.25	45.04	32.27	66.65	38.64	13.66	48.08
23	40.12	43.94	53.53	35.50	78.62	31.24	45.82	32.42	67.10	38.88	13.68	48.38
24	40.35	43.58	54.29	35.31	79.49	31.23	46.57	32.55	67.58	39.11	13.73	48.70
25	40.65	43.25	55.04	35.14	80.34	31.21	47.33	32.66	68.09	39.35	13.77	49.04
26	40.99	42.94	55.75	34.97	81.16	31.18	48.10	32.77	68.63	39.60	13.79	49.40
27	41.35	42.65	56.43	34.81	81.98	31.13	48.90	32.87	69.19	39.88	13.75	49.79
28	41.70	42.38	57.08	34.65	82.82	31.08	49.75	32.98	69.74	40.18	13.62	50.20
29	42.03	42.12	57.71	34.48	83.69	31.01	50.63	33.09	70.25	40.52	13.38	50.61
30	42.33	41.87	58.34	34.29	84.60	30.95	51.55	33.23	70.69	40.88	13.05	51.00
31	42.60	41.62	58.98	34.09	85.57	30.89	52.49	33.39	71.03	41.25	12 <sup>64</sup> 12 <sup>21</sup>	51 <sup>36</sup> 51 <sup>68</sup>
32	42.85	41.36	59.64	33.87			53.41	33.59			11.81	51.98
	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ
	45.10	45.09	45.01	45.00	44.96	44.95	44.96	44.94	45.01	45.00	45.10	45.09

Mean R.A. 6<sup>h</sup> 39<sup>m</sup> 37.<sup>s</sup>36

Double lower transit July 1

Mean Dec. -88° 43' 58.<sup>46</sup>"

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1661 7 G. Octantis  $\approx$  Mag. 6.41 Spect. F2

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 6 52	° ' / 87 00	h m 6 52	° ' / 87 00	h m 6 52	° ' / 87 00	h m 6 51	° ' / 87 00	h m 6 51	° ' / 87 00	h m 6 51	° ' / 87 00
1	s 35.09	" 20.89	s 28.99	" 31.29	s 18.24	" 37.95	s 63.24	" 41.28	s 48.80	" 39.72	s 37.13	" 33.78
2	35.04	21.19	28.69	31.64	17.78	38.18	62.69	41.29	48.36	39.55	36.88	33.54
3	<sup>35.00</sup> 34.97	<sup>21.51</sup> 21.86	28.36	31.98	17.30	38.41	62.15	41.27	47.94	39.38	36.63	33.31
4	34.92	22.23	27.99	32.31	16.79	38.60	61.63	41.23	47.55	39.21	36.38	33.09
5	34.84	22.63	27.60	32.61	16.27	38.77	61.14	41.19	47.16	39.07	36.12	32.87
6	34.72	23.03	27.20	32.88	15.76	38.90	60.68	41.15	46.79	38.93	35.84	32.66
7	34.57	23.44	26.80	33.11	15.26	39.01	60.23	41.12	46.41	38.81	35.56	32.43
8	34.38	23.82	26.42	33.33	14.78	39.10	59.79	41.11	46.01	38.70	35.26	32.18
9	34.17	24.17	26.06	33.54	14.32	39.19	59.35	41.12	45.61	38.59	34.97	31.92
10	33.95	24.49	25.72	33.75	13.89	39.29	58.90	41.13	45.19	38.47	34.68	31.63
11	33.75	24.79	25.40	33.98	13.46	39.41	58.43	41.15	44.76	38.34	34.41	31.33
12	33.56	25.07	25.08	34.22	13.04	39.54	57.95	41.17	44.32	38.18	34.15	31.00
13	33.40	25.35	24.75	34.48	12.61	39.69	57.45	41.17	43.88	38.01	33.92	30.67
14	33.25	25.65	24.41	34.76	12.16	39.84	56.94	41.16	43.45	37.81	33.72	30.35
15	33.10	25.96	24.05	35.04	11.70	40.00	56.42	41.13	43.03	37.59	33.54	30.03
16	32.96	26.30	23.67	35.32	11.22	40.15	55.90	41.08	42.63	37.36	33.38	29.73
17	32.80	26.64	23.27	35.59	10.72	40.29	55.38	41.00	42.25	37.12	33.24	29.45
18	32.63	27.00	22.84	35.84	10.20	40.41	54.88	40.90	41.91	36.88	33.08	29.21
19	32.43	27.37	22.40	36.08	09.67	40.50	54.39	40.78	41.58	36.65	32.91	28.97
20	32.21	27.73	21.95	36.30	09.14	40.58	53.93	40.66	41.27	36.45	32.71	28.75
21	31.96	28.09	21.50	36.49	08.62	40.62	53.50	40.55	40.96	36.27	32.48	28.50
22	31.69	28.43	21.05	36.65	08.11	40.65	53.08	40.46	40.63	36.12	32.23	28.23
23	31.40	28.75	20.62	36.81	07.62	40.67	52.67	40.39	40.28	35.98	32.00	27.92
24	31.10	29.05	20.20	36.96	07.15	40.69	52.25	40.35	39.89	35.82	31.78	27.58
25	30.81	29.33	19.81	37.11	06.70	40.72	51.81	40.32	39.48	35.64	31.60	27.22
26	30.52	29.59	19.43	37.29	06.27	40.78	51.33	40.29	39.07	35.42	31.45	26.86
27	30.24	29.84	19.05	37.49	05.83	40.86	50.82	40.24	38.67	35.17	31.34	26.51
28	29.98	30.09	18.66	37.71	05.36	40.97	50.30	40.16	38.30	34.89	31.26	26.18
29	29.74	30.36	18.24	37.95	04.87	41.07	49.78	40.04	37.96	34.61	31.19	25.87
30	29.50	30.65			04.35	41.17	49.28	39.89	37.66	34.32	31.12	25.57
31	29.26	30.96			03.80	41.24	48.80	39.72	37.38	34.04	31.05	25.30
32	28.99	31.29			03.24	41.28			37.13	33.78		
	sec $\delta$ 19.15	tan $\delta$ 19.13	sec $\delta$ 19.17	tan $\delta$ 19.14	sec $\delta$ 19.18	tan $\delta$ 19.15	sec $\delta$ 19.18	tan $\delta$ 19.15	sec $\delta$ 19.17	tan $\delta$ 19.15	sec $\delta$ 19.16	tan $\delta$ 19.13

Mean R.A.  $6^{\text{h}} 51^{\text{m}} 55.69^{\text{s}}$

Double lower transit July 5

Mean Dec.  $-87^{\circ} 00' 31.99''$

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

443

1661 7 G. Octantis · Mag. 6.41 Spect. F2

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 6 51	° ' / 87 00	h m 6 51	° ' / 87 00	h m 6 51	° ' / 87 00	h m 6 51	° ' / 87 00	h m 6 52	° ' / 87 00	h m 6 52	° ' / 87 00
	s 31.05	" 25.30	s 31.35	" 15.76	s 38.11	" 07.91	s 49.03	" 04.45	s 01.16	" 06.71	s 09.31	" 14.16
1	30.98	25.02	31.44	15.48	38.41	07.68	49.46	04.39	01.54	06.93	09.45	14.53
2	30.89	24.75	31.54	15.18	38.72	07.44	49.91	04.35	01.90	07.17	09.54	14.87
3	30.79	24.48	31.64	14.86	39.07	07.21	50.37	04.35	02.22	07.42	09.62	15.19
4	30.69	24.19	31.76	14.54	39.44	07.00	50.82	04.38	02.50	07.66	09.70	15.47
5	30.58	23.88	31.90	14.20	39.82	06.82	51.25	04.44	02.76	07.87	09.80	15.74
6	30.48	23.56	32.07	13.86	40.21	06.67	51.65	04.52	03.01	08.06	09.92	16.01
7	30.39	23.21	32.27	13.54	40.60	06.55	52.02	04.60	03.28	08.22	10.06	16.28
8	30.32	22.86	32.49	13.23	40.96	06.46	52.36	04.66	03.56	08.38	10.22	16.57
9	30.27	22.49	32.73	12.95	41.30	06.37	52.69	04.70	03.87	08.54	10.38	16.89
10	30.25	22.12	32.97	12.70	41.61	06.28	53.03	04.71	04.21	08.72	10.53	17.24
11	30.26	21.77	33.20	12.47	41.91	06.17	53.38	04.71	04.55	08.92	10.67	17.60
12	30.29	21.43	33.41	12.26	42.20	06.03	53.76	04.71	04.89	09.14	10.78	17.97
13	30.34	21.12	33.60	12.06	42.50	05.88	54.16	04.71	05.23	09.40	10.87	18.35
14	30.38	20.83	33.76	11.84	42.83	05.70	54.59	04.73	05.55	09.67	10.93	18.73
15	30.42	20.57	33.92	11.60	43.18	05.53	55.03	04.79	05.85	09.96	10.97	19.10
16	30.43	20.32	34.07	11.33	43.57	05.37	55.47	04.87	06.13	10.25	10.99	19.45
17	30.41	20.06	34.25	11.04	43.98	05.24	55.91	04.97	06.38	10.54	11.00	19.79
18	30.37	19.78	34.45	10.74	44.41	05.13	56.33	05.10	06.61	10.82	11.00	20.11
19	30.33	19.48	34.70	10.44	44.84	05.05	56.73	05.24	06.83	11.09	11.01	20.42
20	30.30	19.14	34.97	10.15	45.26	04.99	57.11	05.38	07.03	11.35	11.02	20.72
21	30.30	18.78	35.27	09.89	45.67	04.96	57.47	05.52	07.24	11.59	11.04	21.02
22	30.34	18.41	35.58	09.66	46.06	04.93	57.82	05.65	07.46	11.82	11.08	21.32
23	30.41	18.04	35.90	09.45	46.44	04.90	58.15	05.77	07.68	12.05	11.12	21.64
24	30.52	17.70	36.20	09.27	46.80	04.86	58.49	05.88	07.92	12.29	11.16	21.99
25	30.64	17.38	36.50	09.09	47.15	04.82	58.83	05.97	08.17	12.53	11.20	22.35
26	30.78	17.08	36.78	08.92	47.51	04.76	59.18	06.06	08.42	12.80	11.21	22.75
27	30.91	16.81	37.05	08.74	47.86	04.69	59.55	06.15	08.68	13.10	11.19	23.16
28	31.03	16.54	37.31	08.55	48.23	04.61	59.94	06.25	08.92	13.43	11.13	23.58
29	31.15	16.28	37.57	08.35	48.62	04.53	60.34	06.38	09.14	13.79	11.02	23.98
30	31.26	16.02	37.84	08.14	49.03	04.45	60.75	06.53	09.31	14.16	10.89	24.35
31	31.35	15.76	38.11	07.91			61.16	06.71			10.74	24.69
32												
	sec δ 19.14	tan δ 19.12	sec δ 19.13	tan δ 19.10	sec δ 19.12	tan δ 19.09	sec δ 19.12	tan δ 19.09	sec δ 19.12	tan δ 19.10	sec δ 19.14	tan δ 19.12

Mean R.A. 6<sup>h</sup> 51<sup>m</sup> 55.<sup>s</sup>69

Double lower transit July 5

Mean Dec. -87° 00' 31.99"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

918    ζ Octantis    Mag. 5.38    Spect. F0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 8 59	° ' / 85 36	h m 8 59	° ' / 85 36	h m 8 58	° ' / 85 36	h m 8 58	° ' / 85 36	h m 8 58	° ' / 85 36	h m 8 58	° ' / 85 36
	s 07.32	" 11.55	s 08.57	" 22.77	s 65.40	" 33.39	s 58.31	" 42.46	s 49.36	" 47.09	s 40.07	" 46.83
1	07.32	11.55	08.57	22.77	65.40	33.39	58.31	42.46	49.36	47.09	40.07	46.83
2	07.43	11.83	08.56	23.17	65.25	33.78	58.00	42.70	49.03	47.12	39.82	46.73
3	07.56	12.13	08.55	23.59	65.07	34.18	57.68	42.90	48.71	47.14	39.58	46.63
4	07.69	12.45	08.51 08.45	24.03 24.47	64.87	34.56	57.37	43.08	48.41	47.16	39.33	46.55
5	07.83	12.79	08.37	24.90	64.65	34.92	57.07	43.25	48.13	47.19	39.09	46.48
6	07.97	13.17	08.26	25.29	64.42	35.24	56.79	43.40	47.85	47.24	38.84	46.41
7	08.09	13.58	08.14	25.67	64.18	35.54	56.52	43.57	47.58	47.29	38.57	46.33
8	08.18	14.00	08.02	26.01	63.95	35.82	56.26	43.74	47.31	47.35	38.30	46.24
9	08.25	14.41	07.91	26.34	63.73	36.09	56.00	43.92	47.03	47.43	38.02	46.14
10	08.29	14.81	07.81	26.67	63.52	36.35	55.75	44.12	46.73	47.50	37.73	46.02
11	08.32	15.18	07.73	27.00	63.33	36.63	55.49	44.33	46.43	47.56	37.44	45.87
12	08.34	15.52	07.65	27.34	63.14	36.92	55.23	44.54	46.11	47.61	37.15	45.70
13	08.36	15.85	07.58	27.70	62.96	37.22	54.94	44.75	45.79	47.65	36.88	45.51
14	08.40	16.16	07.51	28.07	62.77	37.54	54.65	44.95	45.45	47.66	36.61	45.32
15	08.45	16.48	07.43	28.46	62.58	37.86	54.34	45.14	45.12	47.64	36.37	45.12
16	08.51	16.82	07.33	28.86	62.37	38.19	54.01	45.31	44.79	47.61	36.15	44.93
17	08.57	17.17	07.23	29.27	62.14	38.52	53.68	45.46	44.46	47.56	35.94	44.75
18	08.64	17.53	07.10	29.67	61.90	38.84	53.35	45.58	44.16	47.50	35.75	44.61
19	08.70	17.92	06.95	30.06	61.64	39.14	53.02	45.68	43.87	47.44	35.55	44.49
20	08.75	18.32	06.79	30.43	61.37	39.42	52.71	45.76	43.60	47.39	35.34	44.38
21	08.79	18.73	06.62	30.78	61.10	39.68	52.41	45.85	43.35	47.37	35.10	44.27
22	08.81	19.15	06.44	31.11	60.82	39.91	52.13	45.94	43.09	47.38	34.84	44.14
23	08.81	19.56	06.26	31.42	60.54	40.13	51.86	46.05	42.83	47.40	34.57	43.98
24	08.79	19.96	06.09	31.72	60.28	40.34	51.60	46.19	42.54	47.43	34.30	43.78
25	08.76	20.34	05.94	32.02	60.04	40.55	51.33	46.35	42.23	47.45	34.04	43.55
26	08.72	20.71	05.80	32.33	59.82	40.78	51.05	46.52	41.90	47.44	33.80	43.30
27	08.67	21.05	05.67	32.65	59.60	41.03	50.74	46.69	41.57	47.39	33.59	43.04
28	08.63	21.39	05.54	33.01	59.38	41.31	50.41	46.84	41.23	47.30	33.39	42.80
29	08.59	21.71	05.40	33.39	59.15	41.61	50.06	46.95	40.91	47.19	33.21	42.56
30	08.58	22.05			58.89	41.91	49.71	47.03	40.61	47.07	33.05	42.34
31	08.57	22.39			58.61	42.20	49.36	47.09	40.33	46.95	32.89	42.13
32	08.57	22.77			58.31	42.46			40.07	46.83		
	sec δ 13.05	tan δ 13.01	sec δ 13.06	tan δ 13.02	sec δ 13.07	tan δ 13.03	sec δ 13.07	tan δ 13.03	sec δ 13.07	tan δ 13.04	sec δ 13.07	tan δ 13.03

Mean R.A. 8<sup>h</sup> 58<sup>m</sup> 50.40<sup>s</sup>

Double lower transit August 6

Mean Dec. -85° 36' 37.9"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

918    ζ Octantis    Mag. 5.38    Spect. F0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° /	h m	° /	h m	° /	h m	° /	h m	° /	h m	° /
	8 58	85 36	8 58	85 36	8 58	85 36	8 58	85 36	8 58	85 36	8 58	85 36
	s	"	s	"	s	"	s	"	s	"	s	"
1	32.89	42.13	28.92	33.92	29.43	24.51	34.28	17.16	42.41	14.26	50.58	17.50
2	32.72	41.93	28.85	33.65	29.50	24.19	34.51	16.93	42.73	14.29	50.83	17.77
3	32.56	41.74	28.77	33.36	29.58	23.86	34.75	16.71	43.05	14.36	51.05	18.03
4	32.38	41.54	28.70	33.05	29.68	23.52	35.02	16.53	43.35	14.45	51.24	18.28
5	32.20	41.34	28.62	32.72	29.80	23.19	35.30	16.38	43.62	14.55	51.42	18.50
6	32.00	41.13	28.56	32.38	29.94	22.88	35.57	16.26	43.88	14.63	51.61	18.70
7	31.80	40.90	28.51	32.02	30.10	22.59	35.84	16.16	44.11	14.69	51.80	18.88
8	31.60	40.64	28.48	31.66	30.27	22.34	36.09	16.08	44.35	14.73	52.01	19.06
9	31.41	40.37	28.47	31.31	30.44	22.11	36.32	16.00	44.59	14.76	52.23	19.26
10	31.22	40.07	28.49	30.97	30.60	21.90	36.54	15.90	44.84	14.77	52.47	19.47
11	31.05	39.77	28.52	30.66	30.75	21.70	36.75	15.78	45.12	14.79	52.72	19.71
12	30.90	39.46	28.55	30.37	30.87	21.49	36.96	15.64	45.41	14.83	52.96	19.97
13	30.77	39.16	28.58	30.11	30.99	21.26	37.18	15.49	45.71	14.88	53.20	20.25
14	30.66	38.88	28.60	29.86	31.10	21.00	37.41	15.33	46.02	14.97	53.42	20.55
15	30.56	38.62	28.61	29.62	31.21	20.73	37.67	15.18	46.33	15.08	53.63	20.86
16	30.46	38.38	28.60	29.35	31.34	20.44	37.95	15.04	46.64	15.21	53.83	21.17
17	30.36	38.16	28.57	29.06	31.50	20.14	38.25	14.93	46.93	15.35	54.00	21.47
18	30.24	37.96	28.55	28.75	31.68	19.86	38.55	14.85	47.21	15.51	54.16	21.77
19	30.10	37.74	28.54	28.40	31.88	19.59	38.85	14.79	47.48	15.66	54.31	22.05
20	29.95	37.50	28.55	28.05	32.09	19.35	39.15	14.75	47.73	15.81	54.46	22.32
21	29.78	37.22	28.58	27.69	32.31	19.13	39.43	14.72	47.97	15.95	54.61	22.57
22	29.63	36.92	28.64	27.35	32.53	18.94	39.71	14.70	48.20	16.08	54.76	22.82
23	29.49	36.59	28.72	27.02	32.75	18.75	39.97	14.68	48.44	16.20	54.92	23.08
24	29.37	36.25	28.81	26.72	32.96	18.58	40.23	14.65	48.67	16.31	55.09	23.34
25	29.28	35.91	28.90	26.43	33.16	18.40	40.47	14.60	48.92	16.42	55.27	23.62
26	29.21	35.59	29.00	26.16	33.35	18.22	40.72	14.55	49.18	16.53	55.46	23.93
27	29.16	35.28	29.09	25.90	33.53	18.03	40.97	14.49	49.45	16.67	55.65	24.27
28	29.12	34.99	29.17	25.64	33.71	17.83	41.22	14.42	49.73	16.82	55.82	24.64
29	29.07	34.71	29.24	25.38	33.89	17.61	41.49	14.35	50.03	17.01	55.98	25.03
30	29.03	34.45	29.30	25.10	34.08	17.39	41.78	14.29	50.31	17.24	56.10	25.43
31	28.98	34.19	29.37	24.82	34.28	17.16	42.09	14.26	50.58	17.50	56.20	25.82
32	28.92	33.92	29.43	24.51			42.41	14.26			56.27	26.17
	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ
	13.07	13.03	13.06	13.02	13.05	13.01	13.05	13.01	13.05	13.01	13.05	13.01

Mean R.A. 8<sup>h</sup> 58<sup>m</sup> 50<sup>s</sup>.40

Double lower transit August 6

Mean Dec. -85° 36' 37".95

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1663 10 G. Octantis  $\approx$  Mag. 6.74 Spect. A0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 10 31	<sup>o</sup> <sup>'</sup> 86 00	<sup>h</sup> <sup>m</sup> 10 31	<sup>o</sup> <sup>'</sup> 86 00	<sup>h</sup> <sup>m</sup> 10 31	<sup>o</sup> <sup>'</sup> 86 01	<sup>h</sup> <sup>m</sup> 10 31	<sup>o</sup> <sup>'</sup> 86 01	<sup>h</sup> <sup>m</sup> 10 31	<sup>o</sup> <sup>'</sup> 86 01	<sup>h</sup> <sup>m</sup> 10 31	<sup>o</sup> <sup>'</sup> 86 01
	<sup>s</sup> 53.79	<sup>s</sup> 42.44	<sup>s</sup> 59.19	<sup>s</sup> 52.35	<sup>s</sup> 59.94	<sup>s</sup> 03.66	<sup>s</sup> 56.18	<sup>s</sup> 15.31	<sup>s</sup> 48.92	<sup>s</sup> 23.70	<sup>s</sup> 39.51	<sup>s</sup> 27.79
1	54.01	42.66	59.33	52.73	59.93	04.09	55.96	15.67	48.60	23.88	39.22	27.81
2	54.24	42.87	59.48	53.13	59.90	04.54	55.71	16.00	48.30	24.04	38.95	27.83
3												
4	54.50	43.11	59.60	53.56	59.84	04.99	55.47	16.31	48.00	24.20	38.68	27.87
5	54.77	43.37	59.70	54.00	59.74	05.43	55.23	16.60	47.73	24.36	38.40	27.92
6	55.05	43.67	59.77	54.43	59.63	05.84	55.00	16.87	47.47	24.52	38.12	27.98
7	55.32	43.99	59.81	54.86	59.50	06.22	54.79	17.14	47.22	24.70	37.83	28.03
8	55.57	44.34	59.82	55.25	59.37	06.58	54.60	17.41	46.97	24.89	37.52	28.08
9	55.78	44.70	59.83	55.63	59.25	06.93	54.42	17.70	46.71	25.08	37.20	28.12
10	55.97	45.06	59.84	55.98	59.15	07.27	54.24	18.00	46.45	25.29	36.86	28.15
11	56.13	45.40	59.86	56.33	59.05	07.61	54.05	18.31	46.17	25.49	36.52	28.15
12	56.28	45.71	59.90	56.67	58.98	07.96	53.86	18.63	45.87	25.69	36.16	28.13
13	56.42	46.00	59.95	57.02	58.91	08.32	53.66	18.96	45.55	25.87	35.82	28.08
14	56.57	46.28	60.02	57.39	58.84	08.70	53.44	19.28	45.22	26.04	35.48	28.02
15	56.74	46.55	60.08	57.77	58.76	09.09	53.19	19.60	44.88	26.18	35.17	27.95
16	56.93	46.83	60.15	58.17	58.67	09.49	52.93	19.91	44.53	26.30	34.87	27.87
17	57.12	47.13	60.20	58.58	58.57	09.90	52.65	20.19	44.19	26.40	34.61	27.81
18	57.33	47.44	60.24	59.01	58.44	10.30	52.36	20.46	43.86	26.48	34.36	27.77
19	57.53	47.77	60.26	59.44	58.29	10.70	52.07	20.70	43.55	26.56	34.11	27.76
20	57.73	48.12	60.26	59.87	58.13	11.09	51.79	20.92	43.27	26.64	33.86	27.76
21	57.92	48.49	60.23	60.29	57.94	11.45	51.52	21.13	43.00	26.74	33.58	27.78
22	58.09	48.87	60.19	60.69	57.75	11.80	51.27	21.34	42.75	26.87	33.27	27.79
23	58.25	49.25	60.13	61.08	57.55	12.12	51.05	21.57	42.50	27.02	32.94	27.77
24	58.37	49.64	60.07	61.45	57.37	12.43	50.84	21.82	42.22	27.19	32.59	27.71
25	58.48	50.01	60.01	61.80	57.21	12.73	50.63	22.09	41.91	27.35	32.24	27.62
26	58.57	50.37	59.96	62.15	57.07	13.04	50.41	22.39	41.58	27.49	31.91	27.50
27	58.65	50.72	59.94	62.49	56.95	13.38	50.16	22.69	41.22	27.61	31.60	27.37
28	58.73	51.04	<sup>59.93</sup> <sup>59.94</sup>	<sup>62.86</sup> <sup>63.24</sup>	56.83	13.74	49.88	22.99	40.85	27.69	31.31	27.23
29	58.82	51.36	59.94	63.66	56.71	14.12	49.58	23.25	40.49	27.73	31.05	27.10
30	58.92	51.68			56.56	14.52	49.25	23.49	40.15	27.76	30.80	26.97
31	59.05	52.00			56.39	14.92	48.92	23.70	39.82	27.78	30.56	26.86
32	59.19	52.35			56.18	15.31			39.51	27.79		
	sec $\delta$ 14.38	tan $\delta$ 14.35	sec $\delta$ 14.39	tan $\delta$ 14.36	sec $\delta$ 14.40	tan $\delta$ 14.37	sec $\delta$ 14.42	tan $\delta$ 14.38	sec $\delta$ 14.42	tan $\delta$ 14.39	sec $\delta$ 14.42	tan $\delta$ 14.39

Mean R.A. <sup>h</sup> 10 <sup>m</sup> 31 <sup>s</sup> 46.69

Double lower transit August 29

Mean Dec.  $-86^{\circ} 01' 15.30''$



**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

447

1663 10 G. Octantis Mag. 6.74 Spect. A0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 10 31	<sup>o</sup> <sup>'</sup> 86 01	<sup>h</sup> <sup>m</sup> 10 31	<sup>o</sup> <sup>'</sup> 86 01	<sup>h</sup> <sup>m</sup> 10 31	<sup>o</sup> <sup>'</sup> 86 01	<sup>h</sup> <sup>m</sup> 10 31	<sup>o</sup> <sup>'</sup> 86 00	<sup>h</sup> <sup>m</sup> 10 31	<sup>o</sup> <sup>'</sup> 86 00	<sup>h</sup> <sup>m</sup> 10 31	<sup>o</sup> <sup>'</sup> 86 00
	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"
1	30.56	26.86	23.53	21.26	20.56	12.50	22.72	63.63	29.83	57.40	39.25	56.83
2	30.33	26.75	23.36	21.04	20.51	12.17	22.86	63.32	30.17	57.29	39.60	56.98
3	30.09	26.66	23.18	20.81	20.46	11.83	23.03	63.01	30.52	57.22	39.91	57.14
4	29.84	26.57	22.98	20.57	20.44	11.48	23.23	62.72	30.85	57.17	40.20	57.29
5	29.58	26.47	22.79	20.31	20.44	11.12	23.46	62.46	31.16	57.14	40.46	57.42
6	29.30	26.37	22.60	20.02	20.47	10.77	23.69	62.23	31.44	57.12	40.71	57.52
7	29.01	26.25	22.41	19.72	20.53	10.44	23.93	62.03	31.70	57.07	40.98	57.60
8	28.72	26.12	22.25	19.40	20.61	10.13	24.15	61.85	31.95	57.01	41.25	57.68
9	28.42	25.96	22.12	19.08	20.69	09.85	24.35	61.68	32.20	56.92	41.55	57.76
10	28.12	25.77	22.01	18.77	20.78	09.59	24.53	61.50	32.46	56.82	41.87	57.85
11	27.84	25.57	21.92	18.47	20.85	09.34	24.69	61.30	32.75	56.72	42.21	57.96
12	27.57	25.36	21.85	18.20	20.89	09.10	24.85	61.08	33.05	56.62	42.55	58.10
13	27.33	25.14	21.79	17.95	20.92	08.84	25.01	60.84	33.38	56.54	42.89	58.26
14	27.12	24.94	21.72	17.72	20.94	08.56	25.20	60.58	33.73	56.48	43.23	58.44
15	26.92	24.75	21.63	17.50	20.95	08.26	25.40	60.33	34.08	56.45	43.55	58.63
16	26.74	24.58	21.51	17.27	20.98	07.93	25.63	60.08	34.44	56.43	43.86	58.84
17	26.56	24.43	21.38	17.02	21.02	07.59	25.89	59.85	34.78	56.44	44.15	59.04
18	26.36	24.30	21.24	16.74	21.10	07.25	26.16	59.64	35.12	56.46	44.42	59.25
19	26.14	24.18	21.10	16.44	21.20	06.92	26.44	59.45	35.45	56.49	44.67	59.45
20	25.89	24.03	20.98	16.11	21.33	06.60	26.73	59.28	35.75	56.52	44.92	59.63
21	25.62	23.86	20.88	15.76	21.47	06.30	27.01	59.13	36.05	56.55	45.16	59.81
22	25.35	23.65	20.81	15.42	21.62	06.02	27.28	58.99	36.33	56.57	45.41	59.97
23	25.09	23.42	20.77	15.09	21.77	05.76	27.53	58.86	36.60	56.58	45.66	60.14
24	24.85	23.16	20.75	14.77	21.92	05.51	27.77	58.72	36.88	56.58	45.93	60.30
25	24.63	22.89	20.74	14.47	22.05	05.27	28.01	58.57	37.17	56.57	46.22	60.48
26	24.45	22.63	20.74	14.18	22.18	05.02	28.23	58.42	37.47	56.56	46.53	60.69
27	24.28	22.37	20.73	13.90	22.29	04.77	28.46	58.25	37.80	56.56	46.84	60.92
28	24.13	22.13	20.72	13.63	22.39	04.51	28.69	58.08	38.14	56.58	47.16	61.19
29	23.98	21.90	20.69	13.37	22.49	04.23	28.94	57.89	38.51	56.63	47.46	61.49
30	23.84	21.68	20.65	13.09	22.60	03.93	29.21	57.71	38.88	56.71	47.73	61.81
31	23.69	21.47	20.61	12.80	22.72	03.63	29.51	57.54	39.25	56.83	47.96	62.13
32	23.53	21.26	20.56	12.50			29.83	57.40			48.17	62.44
	sec $\delta$ 14.42	tan $\delta$ 14.39	sec $\delta$ 14.41	tan $\delta$ 14.38	sec $\delta$ 14.40	tan $\delta$ 14.37	sec $\delta$ 14.40	tan $\delta$ 14.36	sec $\delta$ 14.39	tan $\delta$ 14.36	sec $\delta$ 14.39	tan $\delta$ 14.36

Mean R.A. 10<sup>h</sup> 31<sup>m</sup> 46.69<sup>s</sup>

Double lower transit August 29

Mean Dec. -86° 01' 15.30"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1664  $\eta$  Octantis Mag. 6.26 Spect. A0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 10 59	<sup>o</sup> <sup>'</sup> 84 30	<sup>h</sup> <sup>m</sup> 10 59	<sup>o</sup> <sup>'</sup> 84 30	<sup>h</sup> <sup>m</sup> 10 59	<sup>o</sup> <sup>'</sup> 84 31	<sup>h</sup> <sup>m</sup> 10 59	<sup>o</sup> <sup>'</sup> 84 31	<sup>h</sup> <sup>m</sup> 10 59	<sup>o</sup> <sup>'</sup> 84 31	<sup>h</sup> <sup>m</sup> 10 59	<sup>o</sup> <sup>'</sup> 84 31
	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"
1	24.47	42.75	29.25	52.05	30.75	02.84	29.11	15.30	24.65	24.50	18.31	29.67
2	24.64	42.94	29.39	52.41	30.79	03.25	28.98	15.69	24.44	24.71	18.10	29.72
3	24.83	43.13	29.53	52.79	30.82	03.69	28.84	16.05	24.23	24.91	17.91	29.78
4	25.03	43.34	29.66	53.21	30.84	04.14	28.69	16.38	24.04	25.10	17.72	29.85
5	25.25	43.57	29.77	53.63	30.84	04.60	28.54	16.69	23.85	25.29	17.53	29.93
6	25.48	43.83	29.86	54.06	30.81	05.04	28.40	16.99	23.68	25.48	17.33	30.01
7	25.70	44.13	29.93	54.48	<sup>30 76</sup> 30 71	<sup>05 46</sup> 05 86	28.27	17.28	23.52	25.69	17.13	30.10
8	25.92	44.45	29.97	54.88	30.65	06.24	28.16	17.58	23.35	25.90	16.92	30.19
9	26.11	44.79	30.01	55.25	30.59	06.60	28.05	17.88	23.19	26.13	16.70	30.27
10	26.28	45.12	30.05	55.61	30.54	06.95	27.95	18.20	23.02	26.36	16.46	30.33
11	26.43	45.44	30.10	55.95	30.50	07.29	27.84	18.53	22.84	26.60	16.21	30.38
12	26.56	45.74	30.15	56.29	30.48	07.65	27.74	18.87	22.64	26.83	15.96	30.39
13	26.69	46.02	30.22	56.63	30.46	08.02	27.62	19.22	22.43	27.05	15.71	30.39
14	26.83	46.28	30.30	56.99	30.44	08.40	27.49	19.57	22.21	27.25	15.47	30.37
15	26.97	46.53	30.38	57.36	30.42	08.80	27.34	19.92	21.98	27.44	15.24	30.33
16	27.13	46.79	30.46	57.75	30.39	09.21	27.18	20.25	21.74	27.60	15.02	30.30
17	27.30	47.06	30.54	58.16	30.35	09.63	27.01	20.57	21.51	27.74	14.82	30.27
18	27.47	47.35	30.60	58.58	30.30	10.05	26.83	20.87	21.28	27.86	14.64	30.26
19	27.65	47.66	30.65	59.00	30.23	10.47	26.64	21.15	21.07	27.97	14.47	30.27
20	27.82	47.99	30.69	59.43	30.14	10.87	26.45	21.40	20.87	28.08	14.29	30.31
21	27.99	48.33	30.71	59.86	30.04	11.26	26.28	21.64	20.69	28.21	14.10	30.36
22	28.15	48.69	30.72	60.27	29.93	11.62	26.12	21.88	20.52	28.37	13.88	30.40
23	28.30	49.06	30.71	60.66	29.82	11.97	25.98	22.13	20.36	28.55	13.65	30.42
24	28.43	49.43	30.69	61.04	29.71	12.29	25.85	22.40	20.18	28.75	13.40	30.41
25	28.54	49.79	30.68	61.40	29.62	12.61	25.73	22.70	19.97	28.95	13.15	30.36
26	28.64	50.14	30.68	61.74	29.55	12.94	25.60	23.02	19.75	29.13	12.90	30.28
27	28.73	50.48	30.69	62.09	29.49	13.29	25.45	23.35	19.51	29.29	12.67	30.19
28	28.81	50.80	30.71	62.45	29.44	13.66	25.27	23.67	19.25	29.41	12.45	30.08
29	28.90	51.10	30.75	62.84	29.38	14.06	25.08	23.98	19.00	29.50	12.25	29.98
30	29.01	51.41			29.31	14.47	24.87	24.25	18.76	29.57	12.06	29.88
31	29.12	51.72			29.22	14.89	24.65	24.50	18.52	29.62	11.88	29.80
32	29.25	52.05			29.11	15.30			18.31	29.67		
	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$
	10.46	10.41	10.46	10.42	10.47	10.42	10.48	10.43	10.48	10.43	10.48	10.43

Mean R.A.  $10^{\text{h}} 59^{\text{m}} 22.65^{\text{s}}$

Double lower transit September 5

Mean Dec.  $-84^{\circ} 31' 16.44''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

449

1664  $\eta$  Octantis Mag. 6.26 Spect. A0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> 10 59	<sup>m</sup> 84 31	<sup>h</sup> 10 59	<sup>m</sup> 84 31	<sup>h</sup> 10 59	<sup>m</sup> 84 31	<sup>h</sup> 10 59	<sup>m</sup> 84 31	<sup>h</sup> 10 59	<sup>m</sup> 84 30	<sup>h</sup> 10 59	<sup>m</sup> 84 30
	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"
1	11.88	29.80	06.45	25.07	03.66	16.74	04.53	07.70	09.18	60.72	15.99	59.12
2	11.71	29.72	06.32	24.88	03.60	16.42	04.60	07.37	09.42	60.57	16.26	59.23
3	11.53	29.66	06.17	24.68	03.54	16.09	04.70	07.05	09.66	60.46	16.51	59.36
4	11.35	29.59	06.01	24.46	03.49	15.74	04.82	06.74	09.90	60.38	16.73	59.47
5	11.16	29.53	05.85	24.22	03.46	15.39	04.96	06.45	10.13	60.32	16.93	59.57
6	10.96	29.46	05.69	23.96	03.46	15.03	05.11	06.20	10.33	60.26	17.13	59.65
7	10.74	29.38	05.54	23.68	03.47	14.70	05.27	05.97	10.52	60.19	17.33	59.71
8	10.52	29.28	05.40	23.38	03.50	14.38	05.42	05.77	10.70	60.10	17.54	59.75
9	10.30	29.16	05.27	23.08	03.54	14.09	05.55	05.58	10.88	59.99	17.76	59.80
10	10.07	29.01	05.17	22.78	03.58	13.83	05.67	05.38	11.06	59.86	18.00	59.85
11	09.85	28.84	05.08	22.50	03.62	13.58	05.77	05.16	11.26	59.73	18.25	59.93
12	09.64	28.66	05.01	22.24	03.63	13.33	05.87	04.93	11.47	59.60	18.51	60.02
13	09.46	28.48	04.95	22.00	03.64	13.07	05.97	04.67	11.70	59.48	18.77	60.14
14	09.28	28.30	04.88	21.78	03.63	12.80	06.08	04.40	11.94	59.38	19.03	60.29
15	09.13	28.13	04.80	21.57	03.61	12.49	06.21	04.12	12.20	59.30	19.29	60.44
16	08.99	27.99	04.71	21.36	03.61	12.17	06.35	03.85	12.45	59.25	19.53	60.62
17	08.85	27.86	04.60	21.13	03.61	11.82	06.52	03.59	12.71	59.22	19.76	60.79
18	08.70	27.76	04.47	20.87	03.64	11.47	06.70	03.35	12.96	59.20	19.97	60.97
19	08.54	27.66	04.35	20.58	03.69	11.13	06.89	03.13	13.20	59.20	20.18	61.14
20	08.35	27.55	04.24	20.27	03.75	10.80	07.08	02.93	13.42	59.20	20.37	61.30
21	08.15	27.41	04.14	19.94	03.83	10.49	07.27	02.75	13.64	59.19	20.57	61.44
22	07.94	27.24	04.06	19.60	03.92	10.20	07.46	02.58	13.85	59.18	20.76	61.58
23	07.73	27.03	04.01	19.28	04.01	09.92	07.63	02.42	14.05	59.16	20.96	61.72
24	07.54	26.81	03.97	18.96	04.09	09.65	07.80	02.26	14.25	59.13	21.17	61.86
25	07.37	26.56	03.94	18.67	04.17	09.40	07.96	02.09	14.46	59.09	21.39	62.00
26	07.21	26.32	03.91	18.38	04.24	09.14	08.11	01.91	14.68	59.04	21.63	62.17
27	07.07	26.09	03.88	18.11	04.30	08.88	08.26	01.72	14.91	59.01	21.88	62.37
28	06.94	25.87	03.85	17.84	04.36	08.61	08.41	01.52	15.17	58.99	22.13	62.60
29	06.82	25.65	03.82	17.58	04.41	08.32	08.58	01.31	15.44	59.00	22.38	62.87
30	06.70	25.45	03.77	17.31	04.47	08.02	08.76	01.10	15.71	59.04	22.60	63.16
31	06.58	25.26	03.72	17.03	04.53	07.70	08.96	00.90	15.99	59.12	22.80	63.46
32	06.45	25.07	03.66	16.74			09.18	00.72			22.98	63.74
	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$
	10.48	10.43	10.48	10.43	10.47	10.42	10.47	10.42	10.46	10.42	10.47	10.42

Mean R.A.  $10^{\text{h}} 59^{\text{m}} 22.65^{\text{s}}$

Double lower transit September 5

Mean Dec.  $-84^{\circ} 31' 16.44''$

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

919 † Octantis Mag. 5.38 Spect. K0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 12 53	<sup>o</sup> / 85 02	<sup>h</sup> <sup>m</sup> 12 53	<sup>o</sup> / 85 02	<sup>h</sup> <sup>m</sup> 12 53	<sup>o</sup> / 85 02	<sup>h</sup> <sup>m</sup> 12 53	<sup>o</sup> / 85 02	<sup>h</sup> <sup>m</sup> 12 53	<sup>o</sup> / 85 03	<sup>h</sup> <sup>m</sup> 12 53	<sup>o</sup> / 85 03
	<sup>s</sup> 16.74	" 28.97	<sup>s</sup> 24.71	" 34.13	<sup>s</sup> 30.08	" 42.77	<sup>s</sup> 33.05	" 54.56	<sup>s</sup> 32.22	" 06.28	<sup>s</sup> 28.10	" 15.33
1	16.74	28.97	24.71	34.13	30.08	42.77	33.05	54.56	32.22	06.28	28.10	15.33
2	16.98	29.02	24.97	34.36	30.27	43.11	33.09	55.01	32.10	06.62	27.93	15.51
3	17.23	29.07	25.25	34.61	30.46	43.48	33.10	55.45	31.98	06.94	27.76	15.70
4	17.51	29.11	25.52	34.90	30.65	43.88	33.10	55.87	31.86	07.24	27.61	15.90
5	17.80	29.17	25.78	35.21	30.81	44.29	<sup>33 08</sup> 33.06	<sup>56 27</sup> 56.64	31.76	07.53	27.46	16.11
6	18.11	29.26	26.03	35.54	30.94	44.71	33.03	57.00	31.67	07.82	27.31	16.32
7	18.44	29.38	26.24	35.88	31.05	45.13	33.01	57.34	31.59	08.11	27.15	16.55
8	18.76	29.53	26.43	36.21	31.14	45.52	33.01	57.68	31.51	08.42	26.98	16.78
9	19.07	29.72	26.60	36.51	31.22	45.90	33.02	58.03	31.44	08.74	26.80	17.02
10	19.35	29.91	26.77	36.80	31.30	46.25	33.04	58.38	31.36	09.07	26.59	17.24
11	19.60	30.10	26.93	37.07	31.38	46.59	33.07	58.74	31.28	09.41	26.38	17.46
12	19.84	30.28	27.11	37.33	31.47	46.92	33.09	59.12	31.18	09.75	26.14	17.65
13	20.06	30.44	27.30	37.59	31.58	47.25	33.11	59.52	31.06	10.10	25.90	17.82
14	20.29	30.59	27.51	37.85	31.69	47.59	33.11	59.92	30.92	10.44	25.66	17.97
15	20.52	30.71	27.72	38.13	31.82	47.95	33.10	60.33	30.77	10.76	25.43	18.10
16	20.76	30.84	27.94	38.42	31.95	48.32	33.07	60.75	30.60	11.07	25.21	18.21
17	21.02	30.97	28.16	38.74	32.07	48.70	33.02	61.15	30.43	11.36	25.02	18.32
18	21.30	31.11	28.38	39.07	32.19	49.10	32.95	61.54	30.26	11.62	24.85	18.44
19	21.58	31.26	28.59	39.42	32.29	49.52	32.88	61.92	30.09	11.86	24.69	18.59
20	21.87	31.44	28.78	39.78	32.37	49.94	32.79	62.27	29.95	12.10	24.53	18.75
21	22.15	31.64	28.95	40.15	32.44	50.36	32.71	62.60	29.83	12.34	24.37	18.94
22	22.44	31.86	29.10	40.52	32.48	50.78	32.65	62.91	29.73	12.60	24.18	19.14
23	22.71	32.10	29.24	40.88	32.51	51.17	32.61	63.23	29.64	12.88	23.96	19.33
24	22.97	32.34	29.36	41.22	32.53	51.55	32.59	63.56	29.54	13.19	23.72	19.50
25	23.20	32.60	29.48	41.54	32.55	51.91	32.59	63.91	29.43	13.52	23.46	19.64
26	23.42	32.85	29.60	41.85	32.58	52.26	32.58	64.30	29.28	13.85	23.19	19.74
27	23.63	33.09	29.74	42.15	32.63	52.59	32.56	64.70	29.10	14.16	22.94	19.82
28	23.83	33.32	29.90	42.45	32.71	52.94	32.52	65.12	28.90	14.45	22.69	19.87
29	24.03	33.53	30.08	42.77	32.79	53.31	32.44	65.53	28.70	14.70	22.47	19.92
30	24.24	33.73			32.89	53.70	32.34	65.92	28.49	14.93	22.26	19.97
31	24.46	33.92			32.98	54.12	32.22	66.28	28.29	15.14	22.06	20.02
32	24.71	34.13			33.05	54.56			28.10	15.33		
	sec δ 11.57	tan δ 11.53	sec δ 11.58	tan δ 11.53	sec δ 11.58	tan δ 11.54	sec δ 11.59	tan δ 11.55	sec δ 11.60	tan δ 11.55	sec δ 11.60	tan δ 11.56

Mean R.A. <sup>h</sup> 12 <sup>m</sup> 53 <sup>s</sup> 27.54

Double lower transit October 4

Mean Dec. -85° 03' 01.1"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

451

919     $\iota$  Octantis    Mag. 5.38    Spect. K0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	12 53	85 03	12 53	85 03	12 53	85 03	12 53	85 02	12 53	85 02	12 53	85 02
	s	"	s	"	s	"	s	"	s	"	s	"
1	22.06	20.02	15.17	19.78	09.45	14.52	06.98	66.10	08.89	56.93	14.83	51.11
2	21.86	20.08	14.96	19.71	09.28	14.29	06.94	65.76	09.07	56.64	15.12	51.04
3	21.67	20.15	14.75	19.64	09.10	14.04	06.91	65.41	09.26	56.39	15.40	51.00
4	21.48	20.23	14.52	19.56	08.93	13.76	06.92	65.05	09.46	56.17	15.66	50.97
5	21.27	20.32	14.28	19.47	08.77	13.47	06.95	64.71	09.65	55.98	15.88	50.93
6	21.05	20.41	14.03	19.35	08.64	13.16	07.00	64.39	09.83	55.80	16.10	50.87
7	20.82	20.49	13.78	19.21	08.53	12.86	07.07	64.09	09.98	55.62	16.31	50.79
8	20.57	20.56	13.54	19.05	08.45	12.56	07.14	63.82	10.12	55.43	16.52	50.69
9	20.31	20.61	13.31	18.87	08.38	12.28	07.19	63.57	10.24	55.22	16.76	50.59
10	20.04	20.64	13.10	18.68	08.33	12.03	07.23	63.33	10.37	54.98	17.01	50.48
11	19.77	20.65	12.92	18.49	08.26	11.80	07.25	63.08	10.51	54.73	17.27	50.37
12	19.51	20.63	12.76	18.31	08.19	11.58	07.26	62.81	10.67	54.47	17.56	50.29
13	19.26	20.60	12.61	18.15	08.10	11.37	07.26	62.52	10.84	54.22	17.86	50.22
14	19.03	20.56	12.47	18.02	07.99	11.14	07.26	62.21	11.04	53.97	18.16	50.18
15	18.83	20.52	12.31	17.90	07.86	10.88	07.28	61.88	11.26	53.73	18.46	50.16
16	18.64	20.50	12.14	17.79	07.73	10.60	07.33	61.53	11.49	53.52	18.75	50.16
17	18.47	20.50	11.95	17.67	07.61	10.29	07.39	61.19	11.72	53.33	19.03	50.17
18	18.29	20.52	11.74	17.54	07.51	09.97	07.48	60.86	11.95	53.16	19.30	50.19
19	18.09	20.56	11.52	17.37	07.43	09.63	07.58	60.54	12.18	53.00	19.56	50.21
20	17.88	20.60	11.29	17.17	07.38	09.30	07.69	60.25	12.39	52.85	19.80	50.23
21	17.63	20.63	11.08	16.95	07.34	08.97	07.81	59.97	12.60	52.71	20.04	50.23
22	17.37	20.62	10.89	16.71	07.32	08.66	07.92	59.70	12.79	52.57	20.27	50.23
23	17.10	20.59	10.71	16.46	07.30	08.36	08.03	59.45	12.98	52.42	20.51	50.22
24	16.83	20.52	10.56	16.21	07.29	08.08	08.13	59.20	13.16	52.26	20.76	50.20
25	16.57	20.43	10.42	15.98	07.27	07.81	08.22	58.95	13.34	52.09	21.03	50.18
26	16.34	20.32	10.30	15.75	07.24	07.54	08.30	58.70	13.54	51.90	21.32	50.17
27	16.12	20.21	10.17	15.53	07.20	07.28	08.37	58.43	13.75	51.71	21.63	50.19
28	15.92	20.11	10.05	15.33	07.16	07.00	08.44	58.15	13.98	51.53	21.96	50.23
29	15.73	20.01	09.92	15.13	07.10	06.72	08.52	57.86	14.24	51.36	22.30	50.31
30	15.54	19.92	09.77	14.94	07.04	06.42	08.62	57.55	14.53	51.22	22.62	50.43
31	15.36	19.85	09.62	14.73	06.98	06.10	08.74	57.24	14.83	51.11	22.92	50.57
32	15.17	19.78	09.45	14.52			08.89	56.93			23.19	50.72
	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$
	11.60	11.56	11.60	11.56	11.60	11.55	11.59	11.55	11.59	11.54	11.58	11.54

Mean R.A.  $12^{\text{h}} 53^{\text{m}} 27.54^{\text{s}}$

Double lower transit October 4

Mean Dec.  $-85^{\circ} 03' 01''.21$

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1665  $\times$  Octantis Mag. 5.65 Spect. A2

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 13 38	<sup>o</sup> <sup>'</sup> 85 42	<sup>h</sup> <sup>m</sup> 13 38	<sup>o</sup> <sup>'</sup> 85 42	<sup>h</sup> <sup>m</sup> 13 38	<sup>o</sup> <sup>'</sup> 85 42	<sup>h</sup> <sup>m</sup> 13 38	<sup>o</sup> <sup>'</sup> 85 42	<sup>h</sup> <sup>m</sup> 13 38	<sup>o</sup> <sup>'</sup> 85 43	<sup>h</sup> <sup>m</sup> 13 38	<sup>o</sup> <sup>'</sup> 85 43
	<sup>s</sup> 15.60	<sup>s</sup> 34.56	<sup>s</sup> 25.41	<sup>s</sup> 37.66	<sup>s</sup> 32.93	<sup>s</sup> 44.83	<sup>s</sup> 38.30	<sup>s</sup> 55.72	<sup>s</sup> 39.40	<sup>s</sup> 07.52	<sup>s</sup> 36.31	<sup>s</sup> 17.54
1	15.60	34.56	25.41	37.66	32.93	44.83	38.30	55.72	39.40	07.52	36.31	17.54
2	15.88	34.55	25.75	37.82	33.21	45.12	38.43	56.15	39.32	07.89	36.15	17.77
3	16.17	34.53	26.10	38.00	33.49	45.44	38.52	56.58	39.24	08.23	36.00	18.00
4	16.48	34.51	26.46	38.22	33.76	45.79	38.58	57.00	39.16	08.55	35.86	18.24
5	16.82	34.49	26.81	38.47	34.01	46.16	38.63	57.40	39.09	08.87	35.73	18.48
6	17.19	34.50	27.13	38.74	34.23	46.54	38.66	57.78	39.04	09.18	35.60	18.74
7	17.58	34.54	27.43	39.01	34.43	46.92	38.70	58.13	39.00	09.49	35.46	19.01
8	17.96	34.61	27.70	39.29	34.59	47.29	38.75	58.47	38.97	09.81	35.30	19.29
9	18.33	34.72	27.94	39.55	34.75	47.64	38.80	58.81	38.95	10.14	35.13	19.57
10	18.68	34.85	28.18	39.79	34.89	47.97	38.88	59.14	38.92	10.49	34.94	19.84
11	19.00	34.97	28.41	40.01	35.04	48.28	38.96	59.48	38.88	10.85	34.73	20.11
12	19.29	35.09	28.66	40.22	35.21	48.58	39.05	59.84	38.83	11.22	34.50	20.37
13	19.57	35.19	28.92	40.42	35.38	48.88	39.15	60.21	38.75	11.59	34.26	20.60
14	19.84	35.28	29.19	40.63	35.58	49.18	39.23	60.60	38.65	11.97	34.01	20.81
15	20.13	35.34	29.48	40.85	35.78	49.50	39.31	61.00	38.54	12.33	33.77	21.00
16	20.42	35.41	29.78	41.09	35.99	49.83	<sup>39 36</sup> 39.40	<sup>61 41</sup> 61.82	38.40	12.68	33.55	21.16
17	20.74	35.47	30.08	41.34	36.19	50.18	39.41	62.24	38.25	13.00	33.35	21.33
18	21.07	35.54	30.38	41.61	36.39	50.55	39.40	62.64	38.11	13.31	33.18	21.49
19	21.41	35.62	30.68	41.91	36.58	50.94	39.38	63.03	37.97	13.59	33.02	21.67
20	21.77	35.72	30.95	42.22	36.74	51.33	39.35	63.39	37.85	13.86	32.88	21.88
21	22.12	35.85	31.21	42.54	36.89	51.73	39.32	63.74	37.76	14.12	32.72	22.12
22	22.48	35.99	31.44	42.87	37.01	52.13	39.30	64.07	37.69	14.41	32.54	22.37
23	22.82	36.16	31.65	43.19	37.11	52.52	39.32	64.39	37.64	14.72	32.32	22.62
24	23.15	36.34	31.85	43.49	37.20	52.88	39.35	64.72	37.58	15.05	32.07	22.85
25	23.46	36.54	32.04	43.78	37.28	53.23	39.41	65.07	37.50	15.41	31.80	23.06
26	23.75	36.73	32.23	44.05	37.38	53.56	39.47	65.46	37.39	15.78	31.52	23.23
27	24.02	36.92	32.44	44.31	37.50	53.88	39.52	65.87	37.24	16.13	31.25	23.37
28	24.28	37.09	32.67	44.56	37.64	54.20	39.53	66.29	37.07	16.47	30.98	23.49
29	24.54	37.24	32.93	44.83	37.80	54.54	39.52	66.72	36.87	16.77	30.74	23.59
30	24.81	37.39			37.98	54.91	39.47	67.13	36.68	17.05	30.50	23.70
31	25.10	37.52			38.15	55.30	39.40	67.52	36.49	17.31	30.29	23.80
32	25.41	37.66			38.30	55.72			36.31	17.54		
	sec $\delta$ 13.39	tan $\delta$ 13.35	sec $\delta$ 13.39	tan $\delta$ 13.35	sec $\delta$ 13.39	tan $\delta$ 13.35	sec $\delta$ 13.39	tan $\delta$ 13.35	sec $\delta$ 13.39	tan $\delta$ 13.35	sec $\delta$ 13.39	tan $\delta$ 13.35

Mean R.A. <sup>h</sup>13 <sup>m</sup>38 <sup>s</sup>33.14

Double lower transit October 16

Mean Dec.  $-85^{\circ} 43' 04''.03$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

453

1665     $\alpha$  Octantis    Mag. 5.65    Spect. A2

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 13 38	° ' / — 85 43	h m 13 38	° ' / — 85 43	h m 13 38	° ' / — 85 43	h m 13 38	° ' / — 85 43	h m 13 38	° ' / — 85 42	h m 13 38	° ' / — 85 42
	s 30.29	" 23.80	s 22.43	" 25.42	s 15.02	" 21.80	s 10.72	" 14.20	s 11.22	" 64.76	s 16.83	" 57.60
1	30.08	23.91	22.19	25.41	14.78	21.62	10.61	13.88	11.36	64.44	17.15	57.47
2	29.88	24.04	21.93	25.40	14.54	21.41	10.52	13.54	11.54	64.14	17.45	57.36
3	29.67	24.17	21.66	25.39	14.29	21.19	10.46	13.19	11.72	63.88	17.73	57.27
4	29.45	24.31	21.37	25.36	14.07	20.94	10.43	12.85	11.90	63.64	17.97	57.18
5	29.22	24.46	21.06	25.31	13.86	20.67	10.44	12.52	12.06	63.43	18.20	57.07
6	28.97	24.60	20.76	25.24	13.69	20.40	10.46	12.22	12.20	63.22	18.42	56.94
7	28.70	24.74	20.45	25.14	13.54	20.13	10.49	11.94	12.32	63.00	18.64	56.78
8	28.41	24.86	20.16	25.02	13.42	19.88	10.50	11.68	12.42	62.76	18.89	56.62
9	28.11	24.96	19.90	24.89	13.31	19.65	10.50	11.44	12.52	62.50	19.15	56.45
10	27.80	25.04	19.66	24.75	13.20	19.44	10.48	11.19	12.63	62.22	19.43	56.28
11	27.50	25.09	19.45	24.62	13.07	19.25	10.43	10.93	12.76	61.92	19.74	56.13
12	27.22	25.12	19.25	24.51	12.93	19.07	10.38	10.64	12.92	61.62	20.06	55.99
13	26.96	25.14	19.06	24.41	12.76	18.87	10.33	10.33	13.10	61.33	20.39	55.87
14	26.72	25.16	18.87	24.34	12.57	18.66	10.30	10.00	13.30	61.05	20.72	55.78
15	26.50	25.19	18.66	24.28	12.37	18.41	10.28	09.66	13.52	60.78	21.05	55.71
16	26.31	25.24	18.41	24.22	12.18	18.14	10.30	09.30	13.74	60.54	21.36	55.65
17	26.11	25.31	18.15	24.15	12.01	17.85	10.33	08.96	13.97	60.31	21.67	55.61
18	25.89	25.41	17.86	24.04	11.86	17.54	10.39	08.62	14.20	60.11	21.95	55.57
19	25.65	25.51	17.57	23.91	11.74	17.22	10.47	08.30	14.41	59.91	22.23	55.52
20	25.37	25.60	17.30	23.74	11.64	16.91	10.55	08.00	14.62	59.73	22.49	55.47
21	25.07	25.67	17.04	23.55	11.56	16.62	10.63	07.72	14.81	59.54	22.75	55.41
22	24.76	25.70	16.80	23.35	11.49	16.33	10.70	07.44	14.98	59.35	23.02	55.34
23	24.44	25.71	16.58	23.15	11.42	16.06	10.77	07.18	15.16	59.14	23.30	55.25
24	24.14	25.68	16.39	22.95	11.35	15.80	10.82	06.91	15.33	58.93	23.60	55.17
25	23.86	25.64	16.20	22.77	11.27	15.55	10.87	06.65	15.52	58.70	23.92	55.09
26	23.59	25.59	16.02	22.59	11.18	15.30	10.90	06.37	15.72	58.46	24.28	55.02
27	23.35	25.54	15.85	22.43	11.08	15.05	10.93	06.07	15.96	58.22	24.65	54.99
28	23.11	25.50	15.66	22.27	10.96	14.78	10.97	05.76	16.22	57.99	25.04	54.99
29	22.89	25.46	15.46	22.12	10.84	14.50	11.02	05.44	16.52	57.78	25.42	55.03
30	22.66	25.44	15.25	21.96	10.72	14.20	11.10	05.10	16.83	57.60	25.78	55.10
31	22.43	25.42	15.02	21.80	10.60	13.92	11.22	04.76	17.14	57.42	26.10	55.17
32	sec $\delta$ 13.41	tan $\delta$ 13.37	sec $\delta$ 13.41	tan $\delta$ 13.37	sec $\delta$ 13.40	tan $\delta$ 13.37	sec $\delta$ 13.40	tan $\delta$ 13.36	sec $\delta$ 13.39	tan $\delta$ 13.35	sec $\delta$ 13.39	tan $\delta$ 13.35

Mean R.A. 13<sup>h</sup> 38<sup>m</sup> 33.14<sup>s</sup>

Double lower transit    October 16

Mean Dec. —85° 43' 04.03"

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

920 20 G. Octantis Mag. 6.52 Spect. A2

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 15 19	<sup>o</sup> <sup>'</sup> 88 04	<sup>h</sup> <sup>m</sup> 15 19	<sup>o</sup> <sup>'</sup> 88 04	<sup>h</sup> <sup>m</sup> 15 20	<sup>o</sup> <sup>'</sup> 88 04	<sup>h</sup> <sup>m</sup> 15 20	<sup>o</sup> <sup>'</sup> 88 04	<sup>h</sup> <sup>m</sup> 15 20	<sup>o</sup> <sup>'</sup> 88 05	<sup>h</sup> <sup>m</sup> 15 20	<sup>o</sup> <sup>'</sup> 88 05
	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>	<sup>s</sup>
1	36.54	48.61	58.42	46.73	19.33	49.65	39.25	57.02	51.26	06.96	53.78	18.16
2	37.07	48.47	59.22	46.71	20.13	49.78	39.85	57.36	51.45	07.35	53.66	18.45
3	37.63	48.31	60.08	46.71	20.95	49.94	40.39	57.72	51.60	07.73	53.56	18.74
4	38.23	48.13	60.96	46.74	21.78	50.14	40.86	58.07	51.73	08.08	53.48	19.03
5	38.90	47.95	61.85	46.81	22.58	50.36	41.29	58.41	51.86	08.42	53.43	19.32
6	39.63	47.79	62.70	46.90	23.34	50.60	41.68	58.73	52.00	08.73	53.37	19.63
7	40.42	47.64	63.51	47.02	24.03	50.86	42.06	59.04	52.17	09.04	53.32	19.95
8	41.24	47.53	64.26	47.14	24.67	51.11	42.45	59.33	52.36	09.35	53.24	20.29
9	42.05	47.46	64.96	47.26	25.27	51.35	42.86	59.60	52.58	09.66	53.12	20.64
10	42.82	47.41	65.62	47.36	25.84	51.58	43.30	59.87	52.82	09.98	52.97	21.00
11	43.54	47.38	66.28	47.45	26.41	51.79	43.77	60.14	53.05	10.32	52.76	21.35
12	44.20	47.35	66.94	47.51	27.00	51.98	44.26	60.43	<sup>53 28</sup> <sup>53 47</sup>	<sup>10 68</sup> <sup>11 06</sup>	52.51	21.70
13	44.83	47.30	67.64	47.57	27.61	52.16	44.76	60.72	53.63	11.44	52.22	22.04
14	45.44	47.25	68.37	47.63	28.26	52.34	45.26	61.04	53.75	11.83	51.91	22.35
15	46.05	47.17	69.13	47.68	28.94	52.54	45.74	61.37	53.82	12.22	51.59	22.64
16	46.69	47.08	69.92	47.75	29.64	52.74	46.20	61.73	53.84	12.61	51.29	22.91
17	47.37	46.98	70.74	47.84	30.35	52.96	46.62	62.10	53.82	12.98	51.04	23.15
18	48.08	46.88	71.57	47.95	31.05	53.21	46.99	62.47	53.79	13.33	50.83	23.40
19	48.83	46.79	72.39	48.08	31.74	53.47	47.31	62.85	53.76	13.66	50.68	23.65
20	49.62	46.72	73.19	48.23	32.40	53.76	47.59	63.21	53.76	13.96	50.56	23.92
21	50.43	46.66	73.96	48.41	33.02	54.06	47.84	63.56	53.81	14.26	50.43	24.23
22	51.25	46.63	74.69	48.59	33.59	54.36	48.08	63.89	53.92	14.55	50.26	24.56
23	52.06	46.62	75.38	48.78	34.12	54.67	48.34	64.19	54.08	14.87	50.02	24.91
24	52.85	46.63	76.02	48.97	34.60	54.96	48.65	64.48	54.24	15.22	49.71	25.25
25	53.62	46.66	76.64	49.13	35.07	55.23	49.02	64.77	54.37	15.60	49.33	25.57
26	54.34	46.70	77.26	49.28	35.55	55.48	49.43	65.07	54.44	16.00	48.91	25.86
27	55.02	46.74	77.90	49.41	36.07	55.71	49.88	65.40	54.44	16.40	48.48	26.13
28	55.68	46.77	78.59	49.53	36.64	55.93	50.31	65.76	54.37	16.80	48.05	26.37
29	56.32	46.78	79.33	49.65	37.26	56.17	50.69	66.15	54.24	17.18	47.65	26.59
30	56.98	46.78			37.92	56.42	51.01	66.55	54.09	17.53	47.28	26.80
31	57.67	46.76			38.60	56.71	51.26	66.96	53.93	17.85	46.94	27.01
32	58.42	46.73			39.25	57.02			53.78	18.16		
	sec $\delta$ 29.84	tan $\delta$ 29.83	sec $\delta$ 29.85	tan $\delta$ 29.83	sec $\delta$ 29.87	tan $\delta$ 29.85	sec $\delta$ 29.91	tan $\delta$ 29.89	sec $\delta$ 29.95	tan $\delta$ 29.94	sec $\delta$ 30.00	tan $\delta$ 29.98

Mean R.A. <sup>h</sup> 15 <sup>m</sup> 20 <sup>s</sup> 35.13

Double lower transit November 11

Mean Dec.  $-88^{\circ} 05' 07''.1$



**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

455

920 20 G. Octantis Mag. 6.52 Spect. A2

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 15 20	° ' " 88 05	h m 15 20	° ' " 88 05	h m 15 19	° ' " 88 05	h m 15 19	° ' " 88 05	h m 15 19	° ' " 88 05	h m 15 19	° ' " 88 05
	s 46.94	" 27.01	s 32.35	" 32.55	s 74.08	" 33.04	s 58.66	" 28.34	s 51.24	" 19.58	s 55.93	" 10.44
1	46.61	27.22	31.84	32.67	73.44	33.00	58.16	28.10	51.25	19.22	56.43	10.17
2	46.30	27.44	31.30	32.79	72.76	32.94	57.68	27.83	51.34	18.87	56.91	09.93
3	45.99	27.68	30.72	32.92	72.08	32.85	57.27	27.54	51.47	18.55	57.36	09.73
4	45.66	27.92	30.10	33.05	71.40	32.73	56.92	27.24	51.60	18.26	57.75	09.53
5	45.31	28.18	29.44	33.15	70.77	32.59	56.64	26.94	51.72	17.99	58.08	09.32
6	44.92	28.45	28.76	33.24	70.18	32.43	56.42	26.66	51.78	17.74	58.39	09.09
7	44.48	28.71	28.06	33.30	69.66	32.26	56.22	26.41	51.80	17.49	58.70	08.85
8	44.00	28.97	27.38	33.34	69.19	32.09	56.01	26.18	51.78	17.22	59.03	08.58
9	43.47	29.21	26.73	33.35	68.76	31.95	55.77	25.96	51.75	16.94	59.41	08.29
10	42.92	29.43	26.14	33.34	68.35	31.82	55.49	25.75	51.73	16.63	59.83	08.00
11	42.37	29.63	25.59	33.33	67.91	31.72	55.16	25.54	51.73	16.29	60.29	07.72
12	41.82	29.80	25.10	33.33	67.44	31.63	54.79	25.31	51.78	15.94	60.81	07.44
13	41.32	29.95	24.63	33.35	66.91	31.54	54.42	25.05	51.88	15.59	61.36	07.18
14	40.86	30.09	24.16	33.39	66.33	31.44	54.06	24.76	52.04	15.24	61.92	06.94
15	40.45	30.23	23.66	33.45	65.72	31.32	53.73	24.45	52.24	14.89	62.49	06.72
16	40.09	30.38	23.11	33.52	65.11	31.16	53.46	24.12	52.47	14.57	63.06	06.52
17	39.74	30.56	22.49	33.59	64.51	30.97	53.23	23.79	52.72	14.26	63.60	06.34
18	39.37	30.76	21.81	33.64	63.95	30.76	53.06	23.46	52.97	13.97	64.12	06.17
19	38.95	30.99	21.11	33.66	63.43	30.54	52.92	23.14	53.21	13.69	64.61	06.00
20	38.46	31.22	20.41	33.64	62.96	30.31	52.81	22.83	53.43	13.43	65.08	05.82
21	37.90	31.43	19.72	33.60	62.54	30.08	52.72	22.54	53.63	13.17	65.53	05.64
22	37.29	31.62	19.08	33.54	62.14	29.86	52.61	22.26	53.81	12.91	65.99	05.44
23	36.65	31.78	18.47	33.46	61.76	29.65	52.50	21.99	53.97	12.64	66.47	05.23
24	36.03	31.91	17.91	33.38	61.38	29.46	52.36	21.73	54.12	12.36	66.99	05.01
25	35.42	32.01	17.37	33.30	60.99	29.28	52.20	21.47	54.29	12.06	67.57	04.77
26	34.85	32.10	16.85	33.24	60.58	29.10	52.01	21.20	54.49	11.74	68.21	04.55
27	34.31	32.18	16.34	33.18	60.14	28.93	51.81	20.92	54.74	11.41	68.92	04.34
28	33.80	32.26	15.82	33.14	59.66	28.75	51.61	20.62	55.07	11.07	69.68	04.16
29	33.32	32.34	15.27	33.11	59.17	28.55	51.43	20.29	55.47	10.74	70.45	04.02
30	32.83	32.44	14.70	33.08	58.66	28.34	51.30	19.94	55.93	10.44	71.19	03.92
31	32.35	32.55	14.08	33.04			51.24	19.58			71.87	03.84
32												
	sec δ 30.03	tan δ 30.01	sec δ 30.04	tan δ 30.03	sec δ 30.04	tan δ 30.02	sec δ 30.01	tan δ 29.99	sec δ 29.96	tan δ 29.95	sec δ 29.93	tan δ 29.91

Mean R.A. 15<sup>h</sup> 20<sup>m</sup> 35<sup>s</sup>.13

Double lower transit November 11

Mean Dec. -88° 05' 07".91

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1666  $\rho$  Octantis Mag. 5.66 Spect. A2

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 15 39	<sup>°</sup> <sup>'</sup> 84 25	<sup>h</sup> <sup>m</sup> 15 39	<sup>°</sup> <sup>'</sup> 84 25	<sup>h</sup> <sup>m</sup> 15 39	<sup>°</sup> <sup>'</sup> 84 25	<sup>h</sup> <sup>m</sup> 15 40	<sup>°</sup> <sup>'</sup> 84 25	<sup>h</sup> <sup>m</sup> 15 40	<sup>°</sup> <sup>'</sup> 84 25	<sup>h</sup> <sup>m</sup> 15 40	<sup>°</sup> <sup>'</sup> 84 25
	<sup>s</sup> 38.97	<sup>"</sup> 06.03	<sup>s</sup> 46.58	<sup>"</sup> 03.48	<sup>s</sup> 54.08	<sup>"</sup> 05.62	<sup>s</sup> 01.50	<sup>"</sup> 12.11	<sup>s</sup> 06.36	<sup>"</sup> 21.35	<sup>s</sup> 08.08	<sup>"</sup> 32.13
1	38.97	06.03	46.58	03.48	54.08	05.62	01.50	12.11	06.36	21.35	08.08	32.13
2	39.15	05.87	46.86	03.43	54.37	05.72	01.73	12.42	06.45	21.73	08.06	32.42
3	39.33	05.70	47.16	03.40	54.67	05.85	01.95	12.75	06.53	22.09	08.05	32.70
4	39.53	05.51	47.47	03.40	54.97	06.01	02.14	13.08	06.60	22.43	08.04	32.98
5	39.76	05.31	47.79	03.43	55.27	06.20	02.31	13.40	06.66	22.75	08.05	33.27
6	40.01	05.12	48.10	03.50	55.55	06.41	02.46	13.70	06.73	23.05	08.06	33.57
7	40.28	04.95	48.40	03.58	55.82	06.64	02.61	13.98	06.81	23.34	08.07	33.88
8	40.56	04.82	48.67	03.68	56.05	06.86	02.76	14.25	06.90	23.63	08.07	34.21
9	40.85	04.72	48.92	03.77	56.28	07.08	02.92	14.50	07.00	23.92	08.06	34.55
10	41.13	04.65	49.16	03.85	56.49	07.28	03.09	14.74	07.10	24.23	08.04	34.91
11	41.38	04.60	49.39	03.91	56.70	07.46	03.27	14.99	07.21	24.55	08.00	35.26
12	41.62	04.54	49.63	03.96	56.91	07.63	03.45	15.25	07.32	24.89	07.94	35.61
13	41.84	04.48	49.87	03.99	57.13	07.79	03.65	15.52	07.42	25.24	07.87	35.94
14	42.05	04.41	50.13	04.02	57.37	07.94	03.85	15.81	07.50	25.61	07.79	36.26
15	42.26	04.31	50.40	04.05	57.61	08.10	04.04	16.12	07.58	25.99	07.70	36.55
16	42.47	04.20	50.68	04.09	57.87	08.28	04.23	16.44	07.63	26.37	07.61	36.82
17	42.70	04.08	50.97	04.14	58.13	08.47	04.40	16.79	<sup>07 67</sup> 07.69	<sup>26 75</sup> 27.11	07.54	37.07
18	42.95	03.96	51.27	04.22	58.40	08.68	04.56	17.14	07.70	27.45	07.50	37.31
19	43.21	03.85	51.56	04.32	58.66	08.92	04.69	17.50	07.71	27.77	07.47	37.55
20	43.48	03.75	51.86	04.44	58.91	09.17	04.82	17.84	07.73	28.06	07.45	37.82
21	43.76	03.67	52.14	04.59	59.14	09.44	04.92	18.18	07.77	28.34	07.44	38.13
22	44.05	03.61	52.41	04.75	59.36	09.72	05.03	18.48	07.83	28.62	07.42	38.45
23	44.34	03.57	52.66	04.91	59.56	10.00	05.13	18.77	07.91	28.93	07.37	38.80
24	44.62	03.56	52.90	05.07	59.75	10.27	05.26	19.04	08.00	29.26	07.29	39.14
25	44.89	03.56	53.12	05.21	59.93	10.52	05.40	19.30	08.08	29.62	07.19	39.47
26	45.15	03.58	53.34	05.33	60.11	10.74	05.57	19.58	08.14	30.01	07.07	39.77
27	45.40	03.59	53.57	05.44	60.30	10.95	05.75	19.88	08.18	30.40	06.94	40.04
28	45.63	03.60	53.82	05.53	60.51	11.15	05.93	20.22	08.18	30.79	06.81	40.29
29	45.85	03.60	54.08	05.62	60.74	11.35	06.10	20.58	08.17	31.16	06.69	40.52
30	46.08	03.57			60.99	11.57	06.24	20.97	08.14	31.51	06.58	40.74
31	46.32	03.53			61.25	11.83	06.36	21.35	08.11	31.83	06.48	40.95
32	46.58	03.48			61.50	12.11			08.08	32.13		
	sec $\delta$ 10.28	tan $\delta$ 10.23	sec $\delta$ 10.28	tan $\delta$ 10.23	sec $\delta$ 10.28	tan $\delta$ 10.23	sec $\delta$ 10.29	tan $\delta$ 10.24	sec $\delta$ 10.29	tan $\delta$ 10.24	sec $\delta$ 10.30	tan $\delta$ 10.25

Mean R.A. <sup>h</sup> <sup>m</sup> <sup>s</sup> 15 40 01.61

Double lower transit November 16

Mean Dec.  $-84^{\circ} 25' 22.5''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

457

1666  $\rho$  Octantis Mag. 5.66 Spect. A2

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 15 40	° / 84 25	h m 15 39	° / 84 25	h m 15 39	° / 84 25	h m 15 39	° / 84 25	h m 15 39	° / 84 25	h m 15 39	° / 84 25
	s 06.48	" 40.95	s 62.06	" 46.82	s 56.04	" 47.93	s 50.63	" 43.89	s 47.72	" 35.62	s 48.99	" 26.57
1	06.39	41.16	61.90	46.95	55.82	47.91	50.45	43.67	47.71	35.27	49.15	26.29
2	06.31	41.39	61.74	47.09	55.59	47.87	50.27	43.43	47.72	34.92	49.32	26.05
3												
4	06.23	41.62	61.55	47.24	55.35	47.81	50.11	43.16	47.76	34.61	49.47	25.83
5	06.14	41.87	61.36	47.38	55.12	47.72	49.98	42.88	47.80	34.32	49.60	25.63
6	06.05	42.14	61.14	47.51	54.89	47.60	49.87	42.59	47.83	34.06	49.72	25.42
7	05.94	42.41	60.92	47.62	54.68	47.46	49.78	42.33	47.85	33.82	49.82	25.19
8	05.81	42.68	60.69	47.70	54.50	47.32	49.71	42.09	47.85	33.57	49.91	24.94
9	05.67	42.95	60.46	47.76	54.34	47.17	49.63	41.87	47.84	33.31	50.01	24.67
10	05.51	43.21	60.24	47.79	54.19	47.04	49.55	41.67	47.81	33.04	50.13	24.38
11	05.34	43.44	60.04	47.80	54.05	46.94	49.45	41.48	47.79	32.74	50.26	24.08
12	05.17	43.65	59.86	47.81	53.91	46.85	49.33	41.28	47.77	32.41	50.41	23.78
13	04.99	43.83	59.70	47.82	53.75	46.78	49.20	41.07	47.77	32.07	50.57	23.50
14	04.83	43.99	59.55	47.86	53.57	46.72	49.05	40.83	47.79	31.72	50.75	23.22
15	04.69	44.14	59.40	47.91	53.37	46.64	48.91	40.57	47.82	31.37	50.94	22.97
16	04.57	44.29	59.25	47.99	53.16	46.54	48.79	40.28	47.88	31.03	51.14	22.74
17	04.46	44.45	59.07	48.08	52.94	46.41	48.67	39.97	47.95	30.70	51.33	22.53
18	04.37	44.63	58.87	48.17	52.73	46.25	48.58	39.65	48.02	30.39	51.52	22.33
19	04.26	44.85	58.65	48.24	52.52	46.06	48.50	39.33	48.10	30.10	51.69	22.15
20	04.15	45.08	58.42	48.29	52.33	45.86	48.44	39.02	48.18	29.83	51.86	21.97
21	04.00	45.32	58.18	48.30	52.16	45.65	48.39	38.72	48.25	29.56	52.02	21.79
22	03.83	45.55	57.94	48.28	52.01	45.44	48.35	38.44	48.31	29.31	52.17	21.59
23	03.64	45.76	57.72	48.24	51.86	45.24	48.31	38.18	48.36	29.05	52.32	21.39
24	03.44	45.93	57.51	48.18	51.73	45.05	48.26	37.92	48.41	28.79	52.47	21.17
25	03.24	46.08	57.32	48.12	51.60	44.88	48.21	37.67	48.45	28.51	52.64	20.93
26	03.04	46.20	57.13	48.07	51.46	44.71	48.14	37.43	48.49	28.21	52.83	20.68
27	02.85	46.30	56.96	48.02	51.31	44.56	48.07	37.17	48.54	27.89	53.04	20.44
28	02.68	46.39	56.79	47.98	51.16	44.40	47.99	36.91	48.61	27.56	53.28	20.21
29	02.51	46.49	56.62	47.96	50.99	44.25	47.90	36.62	48.71	27.22	53.55	20.01
30	02.36	46.59	56.44	47.95	50.82	44.08	47.82	36.31	48.83	26.88	53.81	19.85
31	02.21	46.70	56.25	47.94	50.63	43.89	47.76	35.98	48.99	26.57	54.08	19.73
32	02.06	46.82	56.04	47.93			47.72	35.62			54.32	19.63
	sec $\delta$ 10.30	tan $\delta$ 10.25	sec $\delta$ 10.30	tan $\delta$ 10.25	sec $\delta$ 10.30	tan $\delta$ 10.25	sec $\delta$ 10.30	tan $\delta$ 10.25	sec $\delta$ 10.29	tan $\delta$ 10.25	sec $\delta$ 10.29	tan $\delta$ 10.24

Mean R.A. 15<sup>h</sup> 40<sup>m</sup> 01.61<sup>s</sup>

Double lower transit November 16

Mean Dec. -84° 25' 22.57"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

921    26 G. Octantis    Mag. 6.13    Spect. A0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 16 55	<sup>o</sup> <sup>'</sup> 86 20	<sup>h</sup> <sup>m</sup> 16 55	<sup>o</sup> <sup>'</sup> 86 20	<sup>h</sup> <sup>m</sup> 16 55	<sup>o</sup> <sup>'</sup> 86 20	<sup>h</sup> <sup>m</sup> 16 55	<sup>o</sup> <sup>'</sup> 86 20	<sup>h</sup> <sup>m</sup> 16 55	<sup>o</sup> <sup>'</sup> 86 20	<sup>h</sup> <sup>m</sup> 16 55	<sup>o</sup> <sup>'</sup> 86 20
	<sup>s</sup> 06.65	" 33.41	<sup>s</sup> 16.48	" 27.45	<sup>s</sup> 27.85	" 26.00	<sup>s</sup> 40.63	" 28.78	<sup>s</sup> 50.72	" 35.43	<sup>s</sup> 56.79	" 44.79
1	06.65	33.41	16.48	27.45	27.85	26.00	40.63	28.78	50.72	35.43	56.79	44.79
2	06.84	33.18	16.86	27.28	28.29	25.97	41.07	28.98	50.98	35.75	56.85	45.09
3	07.04	32.92	17.28	27.11	28.76	25.95	41.48	29.19	51.22	36.06	56.92	45.38
4	07.26	32.64	17.73	26.97	29.25	25.97	41.86	29.42	51.43	36.35	57.00	45.66
5	07.51	32.35	18.19	26.85	29.74	26.01	42.22	29.64	51.64	36.63	<sup>57.09</sup> 57.20	<sup>45.93</sup> 46.21
6	07.80	32.06	18.64	26.77	30.21	26.09	42.54	29.86	51.84	36.89	57.31	46.50
7	08.12	31.77	19.09	26.72	30.65	26.19	42.85	30.06	52.06	37.13	57.43	46.81
8	08.48	31.52	19.50	26.69	31.07	26.29	43.16	30.24	52.28	37.37	57.54	47.13
9	08.84	31.29	19.89	26.66	31.46	26.40	43.48	30.40	52.53	37.61	57.65	47.47
10	09.20	31.11	20.25	26.63	31.83	26.49	43.80	30.56	52.78	37.85	57.73	47.83
11	09.54	30.94	20.60	26.57	32.19	26.56	44.14	30.71	53.05	38.12	57.79	48.20
12	09.85	30.78	20.95	26.50	32.55	26.62	44.50	30.87	53.31	38.40	57.82	48.56
13	10.13	30.62	21.31	26.42	32.92	26.66	44.88	31.04	53.57	38.70	57.83	48.92
14	10.40	30.45	21.68	26.32	33.31	26.70	45.26	31.23	53.82	39.02	57.82	49.27
15	10.67	30.26	22.08	26.22	33.72	26.74	45.64	31.44	54.05	39.36	57.79	49.59
16	10.94	30.05	22.49	26.13	34.15	26.78	46.01	31.68	54.25	39.70	57.77	49.89
17	11.22	29.83	22.93	26.05	34.59	26.85	46.37	31.93	54.43	40.05	57.75	50.16
18	11.53	29.60	23.37	25.99	35.04	26.93	46.71	32.20	54.58	40.39	57.77	50.42
19	11.85	29.37	23.83	25.95	35.49	27.04	47.03	32.48	54.72	40.71	57.81	50.68
20	12.20	29.15	24.29	25.93	35.93	27.17	47.32	32.75	54.84	41.01	57.88	50.96
21	12.57	28.94	24.74	25.94	36.36	27.32	47.59	33.02	54.98	41.28	57.96	51.26
22	12.96	28.75	25.17	25.97	36.76	27.49	47.84	33.27	55.13	41.53	58.04	51.60
23	13.35	28.59	25.58	26.00	37.14	27.66	48.10	33.49	55.32	41.78	58.08	51.97
24	13.75	28.45	25.97	26.04	37.50	27.83	48.37	33.69	55.54	42.04	58.08	52.34
25	14.13	28.33	26.33	26.07	37.84	27.98	48.68	33.87	55.78	42.33	58.04	52.71
26	14.50	28.22	26.69	26.08	38.18	28.11	49.01	34.06	56.01	42.65	57.96	53.06
27	14.85	28.13	27.06	26.07	38.52	28.21	49.37	34.28	56.22	43.00	57.87	53.38
28	15.17	28.03	27.44	26.04	38.89	28.30	49.74	34.52	56.40	43.37	57.78	53.68
29	15.49	27.91	27.85	26.00	39.30	28.39	50.10	34.80	56.54	43.75	57.68	53.96
30	15.80	27.78			39.73	28.49	50.43	35.11	56.64	44.11	57.60	54.22
31	16.13	27.62			40.18	28.62	50.72	35.43	56.72	44.46	57.53	54.48
32	16.48	27.45			40.63	28.78			56.79	44.79		
	sec $\delta$ 15.67	tan $\delta$ 15.64	sec $\delta$ 15.67	tan $\delta$ 15.64	sec $\delta$ 15.67	tan $\delta$ 15.64	sec $\delta$ 15.67	tan $\delta$ 15.64	sec $\delta$ 15.68	tan $\delta$ 15.65	sec $\delta$ 15.70	tan $\delta$ 15.66

Mean R.A.  $16^{\text{h}} 55^{\text{m}} 44.02^{\text{s}}$

Double lower transit    December 5

Mean Dec.  $-86^{\circ} 20' 39''.0$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

459

921    26 G. Octantis    Mag. 6.13    Spect. A0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 16 55	° ' " / 86 20	h m 16 55	° ' " / 86 21	h m 16 55	° ' " / 86 21	h m 16 55	° ' " / 86 20	h m 16 55	° ' " / 86 20	h m 16 55	° ' " / 86 20
1	s 57.53	" 54.48	s 53.12	" 02.40	s 44.76	" 06.50	s 35.49	" 65.32	s 28.32	" 58.90	s 26.83	" 49.77
2	57.48	54.73	52.93	02.62	44.44	06.59	35.15	65.20	28.18	58.57	26.96	49.43
3	57.43	55.00	52.74	02.84	44.09	06.66	34.81	65.05	28.08	58.24	27.10	49.13
4	57.39	55.27	52.52	03.07	43.73	06.72	34.49	64.87	28.01	57.93	27.24	48.86
5	57.35	55.56	52.28	03.31	43.36	06.74	34.20	64.66	27.97	57.64	27.34	48.61
6	57.30	55.87	52.02	03.54	42.99	06.74	33.95	64.45	27.92	57.39	27.42	48.36
7	57.23	56.19	51.73	03.75	42.64	06.70	33.73	64.24	27.85	57.15	27.48	48.09
8	57.14	56.52	51.43	03.94	42.33	06.65	33.53	64.05	27.75	56.92	27.52	47.81
9	57.02	56.85	51.12	04.11	42.04	06.60	33.34	63.89	27.63	56.69	27.57	47.50
10	56.88	57.17	50.82	04.24	41.78	06.55	33.14	63.75	27.50	56.44	27.63	47.17
11	56.72	57.48	50.53	04.35	41.54	06.53	32.92	63.62	27.35	56.16	27.71	46.83
12	56.54	57.77	50.28	04.45	41.30	06.53	32.68	63.50	27.21	55.86	27.81	46.47
13	56.35	58.03	50.05	04.55	41.04	06.54	32.41	63.36	27.09	55.53	27.95	46.12
14	56.18	58.26	49.84	04.66	40.75	06.57	32.12	63.20	26.99	55.19	28.11	45.78
15	56.02	58.48	49.64	04.80	40.44	06.59	31.82	63.01	26.92	54.84	28.28	45.46
16	55.90	58.68	49.44	04.96	40.09	06.60	31.54	62.79	26.88	54.49	28.47	45.15
17	55.80	58.90	49.21	05.14	39.73	06.58	31.27	62.55	26.85	54.15	28.67	44.87
18	55.72	59.13	48.95	05.32	39.37	06.53	31.02	62.29	26.85	53.83	28.86	44.60
19	55.64	59.39	48.65	05.50	39.01	06.45	30.80	62.03	26.85	53.52	29.04	44.34
20	55.54	59.68	48.33	05.65	38.67	06.35	30.60	61.76	26.86	53.23	29.20	44.10
21	55.41	59.99	47.99	05.78	38.35	06.23	30.42	61.51	26.86	52.95	29.36	43.85
22	55.24	60.30	47.64	05.87	38.05	06.11	30.26	61.27	26.85	52.68	29.50	43.60
23	55.04	60.59	47.31	05.94	37.78	05.99	30.10	61.04	26.83	52.41	29.64	43.33
24	54.80	60.86	46.99	05.99	37.51	05.88	29.93	60.82	26.79	52.14	29.78	43.04
25	54.56	61.10	46.69	06.03	37.25	05.78	29.76	60.62	26.75	51.86	29.93	42.74
26	54.32	61.31	46.41	06.07	37.00	05.70	29.58	60.42	26.70	51.55	30.12	42.41
27	54.09	61.50	46.14	06.11	36.73	05.62	29.38	60.21	26.66	51.23	30.34	42.08
28	53.87	61.67	45.88	06.17	36.45	05.55	29.16	60.00	26.65	50.87	30.60	41.75
29	53.67	61.85	45.62	06.23	36.15	05.49	28.94	59.77	26.66	50.50	30.89	41.45
30	53.48	62.02	45.35	06.31	35.83	05.41	28.71	59.51	26.72	50.13	31.21	41.18
31	53.30	62.21	45.07	06.40	35.49	05.32	28.51	59.21	26.83	49.77	31.53	40.95
32	53.12	62.40	44.76	06.50			28.32	58.90			31.84	40.75
	sec δ 15.71	tan δ 15.67	sec δ 15.71	tan δ 15.68	sec δ 15.72	tan δ 15.68	sec δ 15.71	tan δ 15.68	sec δ 15.70	tan δ 15.67	sec δ 15.69	tan δ 15.66

Mean R.A.  $16^{\text{h}} 55^{\text{m}} 44.02^{\text{s}}$

Double lower transit    December 5

Mean Dec.  $-86^{\circ} 20' 39.50''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

922  $\chi$  Octantis Mag. 5.22 Spect. K0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 18 46	° ' " / 87 37	h m 18 46	° ' " / 87 37	h m 18 46	° ' " / 87 37	h m 18 46	° ' " / 87 37	h m 18 47	° ' " / 87 37	h m 18 47	° ' " / 87 37
1	s 09.68	" 29.15	s 18.31	" 19.58	s 32.51	" 13.31	s 51.89	" 10.20	s 10.57	" 11.74	s 25.87	" 17.52
2	09.76	28.86	18.69	19.25	33.09	13.09	52.63	10.18	11.17	11.92	26.19	17.76
3	09.83	28.54	19.13	18.92	33.71	12.87	53.34	10.20	11.71	12.09	26.50	17.99
4	09.91	28.19	19.62	18.60	34.38	12.67	54.02	10.23	12.22	12.26	26.82	18.20
5	10.03	27.82	20.15	18.31	35.07	12.51	54.67	10.28	12.71	12.41	27.16	18.41
6	10.19	27.43	20.71	18.04	35.76	12.38	55.27	10.33	13.19	12.55	27.52	18.62
7	10.41	27.04	21.26	17.81	36.43	12.27	55.84	10.36	13.66	12.67	27.90	18.83
8	10.69	26.67	21.79	17.60	37.07	12.18	56.40	10.39	14.16	12.78	28.29	19.06
9	11.01	26.32	22.28	17.41	37.67	12.10	56.95	10.39	14.67	12.89	28.69	19.31
10	11.35	26.00	22.74	17.21	38.23	12.02	57.51	10.39	15.21	13.00	29.09	19.58
11	11.67	25.71	23.17	17.01	38.77	11.92	58.10	10.37	15.76	13.13	29.47	19.87
12	11.96	25.44	23.59	16.79	39.31	11.81	58.70	10.36	16.34	13.27	29.83	20.17
13	12.21	25.18	24.01	16.55	39.85	11.68	59.34	10.35	16.92	13.43	30.15	20.49
14	12.44	24.90	24.44	16.30	40.41	11.54	60.00	10.36	17.50	13.61	30.43	20.81
15	12.64	24.61	24.90	16.04	40.99	11.39	60.68	10.38	18.06	13.81	30.67	21.13
16	12.84	24.31	25.39	15.77	41.61	11.25	61.36	10.43	18.59	14.04	30.88	21.43
17	13.06	23.98	25.92	15.51	42.25	11.11	62.04	10.50	19.09	14.27	31.07	21.70
18	13.30	23.64	26.47	15.26	42.92	10.99	62.70	10.59	19.55	14.51	31.27	21.95
19	13.56	23.30	27.06	15.03	43.61	10.90	63.34	10.70	19.98	14.74	31.49	22.18
20	13.87	22.95	27.66	14.82	44.30	10.82	63.94	10.82	20.38	14.95	31.75	22.40
21	14.21	22.60	28.27	14.64	44.99	10.77	64.50	10.94	20.77	15.13	32.06	22.62
22	14.58	22.27	28.87	14.47	45.67	10.74	65.03	11.05	21.18	15.29	32.40	22.87
23	14.99	21.96	29.45	14.33	46.31	10.73	65.55	11.13	21.62	15.43	32.75	23.16
24	15.41	21.67	30.00	14.19	46.92	10.72	66.07	11.18	22.12	15.57	33.07	23.48
25	15.83	21.40	30.51	14.06	47.49	10.70	66.62	11.21	22.66	15.73	33.35	23.82
26	16.24	21.15	31.00	13.90	48.04	10.67	67.23	11.24	23.22	15.92	33.57	24.17
27	16.63	20.91	31.49	13.73	48.59	10.60	67.88	11.28	23.77	16.16	33.74	24.51
28	16.99	20.67	31.98	13.53	49.17	10.52	68.57	11.35	24.29	16.42	33.86	24.84
29	17.32	20.43	32.51	13.31	49.78	10.42	69.26	11.45	24.75	16.70	33.96	25.16
30	17.64	20.17			50.45	10.32	69.93	11.58	25.17	16.98	34.05	25.45
31	17.96	19.89			51.16	10.24	70.57	11.74	25.54	17.25	34.14	25.72
32	18.31	19.58			51.89	10.20			25.87	17.52		
	sec $\delta$ 24.12	tan $\delta$ 24.09	sec $\delta$ 24.09	tan $\delta$ 24.07	sec $\delta$ 24.08	tan $\delta$ 24.06	sec $\delta$ 24.08	tan $\delta$ 24.06	sec $\delta$ 24.09	tan $\delta$ 24.07	sec $\delta$ 24.11	tan $\delta$ 24.09

Mean R.A.  $18^{\text{h}} 47^{\text{m}} 04.41^{\text{s}}$

Double lower transit January 2

Mean Dec.  $-87^{\circ} 37' 18.92''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

461

922  $\chi$  Octantis Mag. 5.22 Spect. K0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h m</sup> 18 47	<sup>o ' "</sup> 87 37	<sup>h m</sup> 18 47	<sup>o ' "</sup> 87 37	<sup>h m</sup> 18 47	<sup>o ' "</sup> 87 37	<sup>h m</sup> 18 46	<sup>o ' "</sup> 87 37	<sup>h m</sup> 18 46	<sup>o ' "</sup> 87 37	<sup>h m</sup> 18 46	<sup>o ' "</sup> 87 37
	<sup>s</sup> 34.14	<sup>s</sup> 25.72	<sup>s</sup> 34.27	<sup>s</sup> 35.18	<sup>s</sup> 26.00	<sup>s</sup> 42.70	<sup>s</sup> 72.45	<sup>s</sup> 45.88	<sup>s</sup> 57.69	<sup>s</sup> 43.46	<sup>s</sup> 48.52	<sup>s</sup> 36.13
1	34.14	25.72	34.27	35.18	26.00	42.70	72.45	45.88	57.69	43.46	48.52	36.13
2	34.24	25.98	34.18	35.46	25.63	42.93	71.89	45.93	57.24	43.23	48.44	35.78
3	34.36	26.24	34.08	35.76	25.21	43.15	71.31	45.94	56.86	42.99	48.39	35.46
4	<sup>34 50</sup> <sup>34 66</sup>	<sup>26 50</sup> <sup>26 78</sup>	33.96	36.07	24.75	43.37	70.74	45.93	56.52	42.75	48.35	35.17
5	34.82	27.06	33.81	36.39	24.27	43.55	70.19	45.87	56.23	42.53	48.29	34.91
6	34.98	27.37	33.63	36.72	23.77	43.71	69.68	45.80	55.96	42.33	48.20	34.66
7	35.13	27.69	33.40	37.04	23.28	43.83	69.23	45.72	55.68	42.16	48.06	34.40
8	35.25	28.03	33.13	37.35	22.81	43.93	68.81	45.65	55.37	42.01	47.89	34.13
9	35.34	28.38	32.83	37.63	22.39	44.01	68.42	45.60	55.01	41.86	47.71	33.83
10	35.40	28.74	32.53	37.88	22.00	44.10	68.04	45.57	54.63	41.69	47.54	33.51
11	35.40	29.09	32.23	38.11	21.65	44.19	67.64	45.56	54.21	41.51	47.38	33.17
12	35.38	29.43	31.96	38.32	21.31	44.31	67.20	45.56	53.79	41.30	47.26	32.81
13	35.33	29.74	31.73	38.51	20.97	44.45	66.71	45.56	53.37	41.07	47.17	32.45
14	35.27	30.03	31.53	38.71	20.59	44.60	66.19	45.55	52.98	40.81	47.12	32.08
15	35.23	30.29	31.37	38.93	20.18	44.77	65.65	45.51	52.61	40.53	47.11	31.72
16	35.22	30.54	31.21	39.17	19.71	44.93	65.09	45.44	52.28	40.25	47.12	31.37
17	35.25	30.78	31.03	39.44	19.20	45.07	64.54	45.35	51.99	39.96	47.16	31.04
18	35.32	31.03	30.81	39.73	18.66	45.19	64.01	45.23	51.73	39.68	47.20	30.72
19	35.41	31.31	30.54	40.03	18.12	45.28	63.50	45.10	51.49	39.41	47.24	30.42
20	35.50	31.63	30.21	40.31	17.58	45.34	63.03	44.95	51.27	39.16	47.27	30.13
21	35.55	31.97	29.84	40.58	17.06	45.38	62.59	44.81	51.05	38.92	47.28	29.85
22	35.54	32.33	29.44	40.81	16.56	45.40	62.18	44.68	50.82	38.69	47.27	29.56
23	35.48	32.68	29.04	41.02	16.09	45.43	61.78	44.55	50.58	38.47	47.25	29.26
24	35.37	33.02	28.65	41.21	15.65	45.45	61.39	44.44	50.31	38.24	47.22	28.95
25	35.22	33.34	28.28	41.38	15.22	45.49	60.99	44.34	50.03	38.01	47.19	28.60
26	35.05	33.64	27.93	41.54	14.80	45.53	60.58	44.25	49.73	37.76	47.19	28.24
27	34.89	33.91	27.60	41.71	14.38	45.59	60.14	44.16	49.42	37.49	47.23	27.85
28	34.73	34.17	27.28	41.88	13.94	45.66	59.68	44.07	49.12	37.18	47.33	27.44
29	34.59	34.42	26.97	42.07	13.47	45.74	59.19	43.96	48.86	36.85	47.50	27.05
30	34.47	34.67	26.67	42.26	12.98	45.82	58.69	43.83	48.66	36.49	47.72	26.68
31	34.36	34.92	26.35	42.48	12.45	45.88	58.18	43.66	48.52	36.13	47.96	26.34
32	34.27	35.18	26.00	42.70			57.69	43.46			48.21	26.04
	sec $\delta$ 24.13	tan $\delta$ 24.11	sec $\delta$ 24.16	tan $\delta$ 24.14	sec $\delta$ 24.17	tan $\delta$ 24.15	sec $\delta$ 24.18	tan $\delta$ 24.15	sec $\delta$ 24.16	tan $\delta$ 24.14	sec $\delta$ 24.14	tan $\delta$ 24.11

Mean R.A. <sup>h m s</sup>18 47 04.41

Double lower transit January 2

Mean Dec. <sup>o ' "</sup>-87 37 18.92

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1667 44 G. Octantis Mag. 6.32 Spect. K0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> 19 <sup>m</sup> 53	<sup>o</sup> 81 <sup>'</sup> 23	<sup>h</sup> 19 <sup>m</sup> 53	<sup>o</sup> 81 <sup>'</sup> 23	<sup>h</sup> 19 <sup>m</sup> 53	<sup>o</sup> 81 <sup>'</sup> 23	<sup>h</sup> 19 <sup>m</sup> 53	<sup>o</sup> 81 <sup>'</sup> 23	<sup>h</sup> 19 <sup>m</sup> 53	<sup>o</sup> 81 <sup>'</sup> 23	<sup>h</sup> 19 <sup>m</sup> 53	<sup>o</sup> 81 <sup>'</sup> 23
1	<sup>s</sup> 21.05	" 28.55	<sup>s</sup> 22.31	" 18.42	<sup>s</sup> 25.43	" 10.24	<sup>s</sup> 30.34	" 03.92	<sup>s</sup> 35.68	" 01.92	<sup>s</sup> 40.71	" 04.36
2	21.03	28.27	22.38	18.06	25.56	09.93	30.54	03.77	35.87	01.97	40.82	04.52
3	21.01	27.97	22.46	17.68	25.71	09.62	30.74	03.66	36.04	02.03	40.94	04.67
4	20.99	27.65	22.56	17.30	25.87	09.32	30.94	03.57	36.20	02.09	41.06	04.80
5	20.98	27.29	22.67	16.94	26.04	09.05	31.11	03.50	36.35	02.14	41.18	04.92
6	20.98	26.91	22.80	16.61	26.22	08.81	31.28	03.44	36.49	02.17	41.31	05.04
7	21.00	26.52	22.93	16.30	26.39	08.59	31.44	03.37	36.64	02.19	41.45	05.17
8	21.04	26.13	23.05	16.03	26.55	08.41	31.59	03.28	36.79	02.20	41.60	05.30
9	21.10	25.76	23.16	15.77	26.70	08.23	31.74	03.19	36.95	02.20	41.75	05.46
10	21.16	25.42	23.26	15.51	26.84	08.05	31.89	03.07	37.11	02.20	41.90	05.63
11	21.22	25.11	23.35	15.25	26.97	07.86	32.05	02.95	37.28	02.21	42.05	05.82
12	21.27	24.82	23.43	14.98	27.10	07.66	32.21	02.82	37.47	02.23	42.19	06.04
13	21.31	24.54	23.51	14.69	27.23	07.45	32.39	02.70	37.65	02.27	42.33	06.27
14	21.34	24.25	23.60	14.38	27.36	07.21	32.57	02.58	37.84	02.34	42.45	06.51
15	21.36	23.96	23.69	14.06	27.50	06.97	32.76	02.48	38.02	02.42	42.56	06.76
16	21.37	23.65	23.79	13.73	27.65	06.73	32.96	02.40	38.20	02.53	42.65	06.99
17	21.39	23.31	23.90	13.40	27.81	06.49	33.16	02.35	38.37	02.65	42.74	07.20
18	21.41	22.96	24.03	13.07	27.98	06.26	33.35	02.31	38.53	02.79	42.83	07.39
19	21.45	22.60	24.16	12.76	28.16	06.05	33.54	02.30	38.67	02.92	42.93	07.55
20	21.49	22.23	24.30	12.46	28.35	05.86	33.72	02.30	38.81	03.03	43.04	07.70
21	21.54	21.86	24.45	12.19	28.53	05.69	33.89	02.31	38.94	03.12	43.16	07.85
22	21.61	21.49	24.60	11.94	28.71	05.55	34.04	02.31	39.07	03.19	43.30	08.01
23	21.69	21.14	24.74	11.71	28.88	05.43	34.19	02.28	39.22	03.23	43.45	08.21
24	21.77	20.81	24.87	11.49	29.05	05.31	34.34	02.23	39.38	03.26	43.59	08.44
25	21.86	20.49	24.99	11.28	29.20	05.19	34.50	02.16	39.56	03.31	43.71	08.71
26	21.94	20.20	25.10	11.05	29.34	05.05	34.67	02.07	39.75	03.39	43.83	08.99
27	22.02	19.92	25.20	10.80	29.47	04.89	34.86	01.98	39.94	03.50	43.92	09.27
28	22.09	19.65	25.31	10.53	29.62	04.71	35.06	01.92	40.12	03.65	44.00	09.55
29	22.15	19.37	25.43	10.24	29.77	04.50	35.27	01.88	40.29	03.82	44.07	09.81
30	22.20	19.08			29.95	04.29	35.48	01.89	40.44	04.00	44.13	10.06
31	22.25	18.76			30.14	04.09	35.68	01.92	40.58	04.19	44.19	10.29
32	22.31	18.42			30.34	03.92			40.71	04.36		
	sec $\delta$ 6.68	tan $\delta$ 6.60	sec $\delta$ 6.68	tan $\delta$ 6.60	sec $\delta$ 6.68	tan $\delta$ 6.60	sec $\delta$ 6.68	tan $\delta$ 6.60	sec $\delta$ 6.68	tan $\delta$ 6.60	sec $\delta$ 6.68	tan $\delta$ 6.60

Mean R.A.  $19^{\text{h}} 53^{\text{m}} 35.77^{\text{s}}$

Double lower transit January 19

Mean Dec.  $-81^{\circ} 23' 09''.18$



**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

463

1667 44 G. Octantis Mag. 6.32 Spect. K0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	19 53	81 23	19 53	81 23	19 53	81 23	19 53	81 23	19 53	81 23	19 53	81 23
	s	"	s	"	s	"	s	"	s	"	s	"
1	44.19	10.29	45.70	18.85	44.66	27.19	41.61	32.55	37.54	33.04	34.38	28.10
2	44.26	10.50	45.72	19.12	44.60	27.47	41.47	32.69	37.39	32.91	34.32	27.80
3	44.34	10.71	45.74	19.41	44.52	27.75	41.32	32.81	37.27	32.75	34.29	27.53
4	44.42	10.93	45.76	19.72	44.42	28.03	41.16	32.89	37.16	32.60	34.26	27.28
5	44.50	11.14	45.77	20.04	44.32	28.28	41.01	32.94	37.07	32.45	34.22	27.06
6	44.60	11.38	45.76	20.38	44.21	28.51	40.88	32.96	36.99	32.33	34.17	26.86
7	44.69	11.62	45.75	20.71	44.09	28.71	40.75	32.97	36.90	32.23	34.10	26.65
8	44.78	11.89	45.72	21.04	43.99	28.88	40.65	32.98	36.81	32.16	34.03	26.44
9	44.87	12.18	45.68	21.35	43.89	29.03	40.55	33.01	36.70	32.09	33.94	26.21
10	44.95	12.49	45.63	21.63	43.81	29.17	40.45	33.05	36.58	32.01	33.86	25.95
11	45.01	12.81	45.58	21.89	43.74	29.32	40.36	33.13	36.45	31.92	33.78	25.67
12	45.06	13.13	45.54	22.12	43.67	29.49	40.24	33.21	36.31	31.81	33.70	25.36
13	45.10	13.43	45.52	22.33	43.61	29.69	40.12	33.30	36.17	31.67	33.64	25.05
14	45.13	13.73	45.50	22.55	43.54	29.90	39.98	33.39	36.04	31.51	33.59	24.72
15	45.16	13.99	45.50	22.78	43.46	30.13	39.83	33.45	35.91	31.32	33.55	24.40
16	45.18	14.23	45.50	23.03	43.35	30.37	39.67	33.49	35.79	31.12	33.52	24.09
17	45.22	14.46	45.50	23.32	43.24	30.59	39.52	33.50	35.69	30.92	33.50	23.78
18	45.27	14.67	45.49	23.63	43.11	30.79	39.36	33.49	35.59	30.71	33.49	23.50
19	45.34	14.89	45.46	23.95	42.98	30.96	39.22	33.45	35.51	30.51	33.47	23.22
20	45.41 45.49	15.13 15.40	45.41	24.27	42.84	31.11	39.08	33.41	35.42	30.33	33.45	22.96
21	45.56	15.71	45.34	24.57	42.71	31.24	38.95	33.36	35.35	30.15	33.42	22.71
22	45.61	16.04	45.27	24.85	42.59	31.35	38.84	33.31	35.26	29.99	33.38	22.46
23	45.65	16.37	45.19	25.11	42.47	31.45	38.72	33.27	35.18	29.84	33.34	22.19
24	45.66	16.71	45.11	25.35	42.37	31.56	38.62	33.24	35.08	29.69	33.30	21.91
25	45.67	17.02	45.04	25.57	42.27	31.67	38.50	33.23	34.98	29.54	33.25	21.61
26	45.66	17.32	44.97	25.78	42.17	31.79	38.39	33.23	34.87	29.37	33.21	21.27
27	45.66	17.60	44.92	25.99	42.07	31.92	38.27	33.23	34.76	29.17	33.17	20.91
28	45.65	17.86	44.86	26.21	41.97	32.07	38.14	33.23	34.64	28.95	33.16	20.53
29	45.65	18.10	44.81	26.43	41.86	32.23	37.99	33.22	34.54	28.69	33.17	20.15
30	45.66	18.35	44.77	26.67	41.74	32.39	37.84	33.19	34.45	28.40	33.20	19.78
31	45.68	18.60	44.72	26.92	41.61	32.55	37.69	33.13	34.38	28.10	33.23	19.43
32	45.70	18.85	44.66	27.19			37.54	33.04			33.27	19.12
	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ
	6.68	6.60	6.68	6.60	6.68	6.61	6.68	6.61	6.68	6.61	6.68	6.60

Mean R.A. 19<sup>h</sup> 53<sup>m</sup> 35.77<sup>s</sup>

Double lower transit January 19

Mean Dec. -81° 23' 09.18"

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1668 48 G. Octantis Mag. 7.08 Spect. A0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 20 39	<sup>o</sup> / 84 27	<sup>h</sup> <sup>m</sup> 20 39	<sup>o</sup> / 84 27	<sup>h</sup> <sup>m</sup> 20 39	<sup>o</sup> / 84 27	<sup>h</sup> <sup>m</sup> 20 39	<sup>o</sup> / 84 27	<sup>h</sup> <sup>m</sup> 20 39	<sup>o</sup> / 84 27	<sup>h</sup> <sup>m</sup> 20 39	<sup>o</sup> / 84 27
	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"
1	12.07	44.66	12.35	34.04	15.80	24.57	22.28	16.24	30.04	12.11	37.93	12.60
2	12.00	44.39	12.39	33.65	15.95	24.21	22.56	16.02	30.32	12.08	38.14	12.71
3	11.93	44.09	12.46	33.24	16.13	23.84	22.84	15.83	30.59	12.07	38.33	12.81
4	11.84	43.77	12.55	32.82	16.33	23.48	23.12	15.66	30.84	12.07	38.53	12.90
5	11.77	43.42	12.67	32.42	16.54	23.14	23.38	15.52	31.08	12.05	38.74	12.98
6	11.71	43.04	12.80	32.04	16.77	22.83	23.63	15.38	31.30	12.03	38.95	13.05
7	11.68	42.65	12.94	31.68	17.00	22.55	23.85	15.24	31.53	11.99	39.17	13.13
8	11.67	42.25	13.08	31.36	17.21	22.29	24.07	15.10	31.76	11.94	39.41	13.21
9	11.69	41.86	13.21	31.05	17.42	22.05	24.28	14.94	31.99	11.88	39.65	13.31
10	11.73	41.50	13.32	30.75	17.60	21.81	24.50	14.76	32.24	11.82	39.90	13.42
11	11.76	41.17	13.41	30.45	17.77	21.56	24.72	14.58	32.50	11.76	40.15	13.56
12	11.79	40.86	13.50	30.14	17.94	21.31	24.95	14.38	32.78	11.71	40.40	13.73
13	11.80	40.57	13.58	29.82	18.10	21.04	25.20	14.19	33.06	11.68	40.63	13.91
14	11.80	40.27	13.66	29.47	18.27	20.75	25.46	14.00	33.35	11.68	40.84	14.10
15	11.78	39.96	13.75	29.11	18.45	20.45	25.73	13.83	33.64	11.69	41.04	14.30
16	11.76	39.64	13.86	28.74	18.64	20.15	26.01	13.67	33.92	11.73	41.22	14.50
17	11.73	39.30	13.98	28.37	18.84	19.84	26.30	13.53	34.19	11.79	41.39	14.68
18	11.72	38.94	14.12	27.99	19.07	19.55	26.59	13.42	34.45	11.85	41.55	14.83
19	11.71	38.57	14.27	27.62	19.30	19.26	26.87	13.33	34.69	11.92	41.72	14.96
20	11.72	38.18	14.44	27.27	19.55	19.00	27.14	13.26	34.91	11.99	41.90	15.07
21	11.74	37.79	14.61	26.94	19.80	18.76	27.40	13.20	35.12	12.02	42.10	15.18
22	11.78	37.40	14.79	26.63	20.05	18.54	27.63	13.13	35.33	12.04	42.33	15.29
23	11.84	37.02	14.97	26.34	20.30	18.35	27.86	13.05	35.56	12.02	42.57	15.44
24	11.91	36.65	15.14	26.07	20.52	18.16	28.07	12.93	35.80	12.00	42.81	15.63
25	11.99	36.31	15.29	25.80	20.73	17.98	28.30	12.79	36.08	11.98	43.04	15.85
26	12.07	35.98	15.42	25.52	20.93	17.78	28.55	12.64	36.37	11.99	43.24	16.09
27	12.14	35.67	15.55	25.23	21.12	17.56	28.82	12.48	36.67	12.03	43.42	16.34
28	12.21	35.36	15.67	24.91	21.31	17.31	29.12	12.34	36.96	12.11	43.58	16.58
29	12.25	35.06	15.80	24.57	21.52	17.04	29.43	12.23	37.23	12.22	43.72	16.82
30	12.29	34.74			21.75	16.77	29.74	12.15	37.49	12.34	43.85	17.04
31	12.32	34.40			22.00	16.49	30.04	12.11	37.72	12.47	43.98	17.25
32	12.35	34.04			22.28	16.24			37.93	12.60		
	sec δ 10.36	tan δ 10.31	sec δ 10.35	tan δ 10.31	sec δ 10.35	tan δ 10.30	sec δ 10.35	tan δ 10.30	sec δ 10.35	tan δ 10.30	sec δ 10.35	tan δ 10.30

Mean R.A.  $20^{\text{h}} 39^{\text{m}} 30.78^{\text{s}}$  Double lower transit January 30 Mean Dec.  $-84^{\circ} 27' 20.09''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1668 48 G. Octantis Mag. 7.08 Spect. A0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	20 39	84 27	20 39	84 27	20 39	84 27	20 39	84 27	20 39	84 27	20 39	84 27
	s	"	s	"	s	"	s	"	s	"	s	"
1	43.98	17.25	<sup>47 30</sup> <sub>47 37</sub>	<sup>25 13</sup> <sub>25 38</sub>	46.87	34.32	42.90	41.07	36.63	43.37	30.93	39.87
2	44.11	17.44	47.43	25.66	46.81	34.63	42.70	41.27	36.40	43.30	30.80	39.60
3	44.25	17.63	47.50	25.94	46.73	34.95	42.49	41.45	36.18	43.21	30.69	39.35
4	44.40	17.81	47.57	26.25	46.62	35.26	42.26	41.60	35.99	43.10	30.59	39.12
5	44.56	18.00	47.62	26.57	46.50	35.56	42.04	41.71	35.82	43.01	30.49	38.93
6	44.73	18.21	47.66	26.91	46.36	35.84	41.83	41.80	35.66	42.93	30.38	38.75
7	44.90	18.43	47.68	27.26	46.22	36.09	41.64	41.87	35.51	42.87	30.24	38.57
8	45.07	18.66	47.68	27.60	46.08	36.31	41.47	41.93	35.34	42.84	30.09	38.39
9	45.24	18.93	47.66	27.93	45.95	36.50	41.32	42.00	35.16	42.82	29.93	38.19
10	45.40	19.21	47.63	28.23	45.84	36.69	41.17	42.10	34.96	42.80	29.76	37.97
11	45.54	19.50	47.60	28.51	45.75	36.87	41.03	42.22	34.75	42.76	29.59	37.72
12	45.66	19.80	47.57	28.76	45.67	37.08	40.86	42.36	34.52	42.71	29.43	37.45
13	45.76	20.09	47.55	29.00	45.59	37.31	40.68	42.50	34.28	42.63	29.28	37.16
14	45.84	20.38	47.56	29.23	45.51	37.56	40.48	42.64	34.05	42.52	29.15	36.87
15	45.92	20.64	47.58	29.47	45.41	37.83	40.26	42.77	33.83	42.39	29.04	36.57
16	46.00	20.87	47.61	29.73	45.29	38.10	40.03	42.87	33.62	42.24	28.94	36.27
17	46.08	21.08	47.64	30.03	45.14	38.38	39.79	42.95	33.42	42.09	28.86	35.98
18	46.18	21.28	47.66	30.35	44.97	38.63	39.55	43.00	33.24	41.93	28.78	35.71
19	46.31	21.48	47.65	30.68	44.79	38.86	39.32	43.04	33.07	41.77	28.70	35.44
20	46.45	21.71	47.62	31.02	44.61	39.07	39.10	43.05	32.91	41.63	28.63	35.20
21	46.60	21.96	47.57	31.36	44.43	39.25	38.89	43.06	32.76	41.49	28.54	34.95
22	46.74	22.24	47.50	31.67	44.25	39.42	38.70	43.07	32.60	41.37	28.45	34.71
23	46.86	22.56	47.41	31.97	44.09	39.58	38.52	43.09	32.44	41.26	28.34	34.47
24	46.96	22.88	47.33	32.24	43.94	39.73	38.34	43.11	32.27	41.15	28.22	34.21
25	47.03	23.21	47.25	32.50	43.80	39.89	38.16	43.15	32.09	41.04	28.10	33.92
26	47.08	23.53	47.18	32.74	43.66	40.06	37.98	43.20	31.89	40.91	27.99	33.61
27	47.11	23.83	47.11	32.98	43.52	40.24	37.79	43.25	31.69	40.77	27.88	33.26
28	47.14	24.11	47.06	33.22	43.39	40.44	37.59	43.31	31.48	40.59	27.80	32.89
29	47.17	24.38	47.01	33.47	43.24	40.64	37.37	43.36	31.27	40.38	27.74	32.51
30	47.21	24.63	46.97	33.74	43.08	40.86	37.13	43.40	31.09	40.13	27.72	32.13
31	47.25	24.88	46.92	34.02	42.90	41.07	36.88	43.40	30.93	39.87	27.72	31.78
32	<sup>47 30</sup> <sub>47 37</sub>	<sup>25 13</sup> <sub>25 39</sub>	46.87	34.32			36.63	43.37			27.72	31.46
	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ	sec δ	tan δ
	10.35	10.30	10.36	10.31	10.36	10.31	10.36	10.31	10.36	10.31	10.36	10.31

Mean R.A. 20<sup>h</sup> 39<sup>m</sup> 30.78<sup>s</sup>

Double lower transit January 30

Mean Dec. -84° 27' 20.09"

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

923  $\sigma$  Octantis Mag. 5.48 Spect. F0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 20 54	° ' / 89 00	h m 20 54	° ' / 89 00	h m 20 54	° ' / 89 00	h m 20 55	° ' / 89 00	h m 20 56	° ' / 89 00	h m 20 56	° ' / 89 00
1	s 43.83	" 63.27	s 41.07	" 52.32	s 56.80	" 42.33	s 29.66	" 33.34	s 10.70	" 28.57	s 53.55	" 28.52
2	43.36	62.99	41.18	51.91	57.51	41.95	31.12	33.09	12.25	28.52	54.70	28.63
3	42.82	62.70	41.39	51.49	58.33	41.56	32.60	32.87	13.72	28.49	55.81	28.72
4	42.26	62.37	41.72	51.06	59.28	41.18	34.05	32.68	15.09	28.47	56.91	28.79
5	41.71	62.02	42.18	50.64	60.33	40.82	35.44	32.52	16.39	28.44	58.03	28.86
6	41.22	61.64	42.75	50.23	61.45	40.48	36.76	32.36	17.64	28.39	59.18	28.92
7	40.86	61.23	43.38	49.86	62.58	40.18	37.99	32.20	18.87	28.34	60.40	28.99
8	40.63	60.82	44.00	49.51	63.69	39.90	39.17	32.03	20.10	28.27	61.66	29.06
9	40.54	60.43	44.59	49.19	64.73	39.63	40.30	31.85	21.37	28.20	62.98	29.14
10	40.54	60.05	45.11	48.87	65.70	39.37	41.44	31.66	22.70	28.12	64.33	29.24
11	40.57	59.71	45.55	48.55	66.60	39.11	42.60	31.46	24.08	28.04	65.70	29.37
12	40.57	59.39	45.93	48.23	67.45	38.83	43.81	31.24	25.53	27.98	67.04	29.52
13	40.52	59.08	46.29	47.89	68.28	38.54	45.09	31.03	27.04	27.93	68.35	29.69
14	40.38	58.77	46.64	47.53	69.13	38.24	46.44	30.82	28.58	27.90	69.58	29.87
15	40.19	58.46	47.04	47.15	70.02	37.92	47.86	30.62	30.13	27.90	70.72	30.06
16	39.95	58.13	47.49	46.76	70.97	37.60	49.34	30.44	31.67	27.91	71.76	30.25
17	39.70	57.78	48.01	46.37	72.01	37.27	50.86	30.29	33.16	27.95	72.72	30.42
18	39.48	57.41	48.63	45.98	73.12	36.95	52.39	30.15	34.59	28.00	73.64	30.57
19	39.29	57.03	49.33	45.59	74.31	36.65	53.90	30.04	35.92	28.06	74.56	30.69
20	39.18	56.63	50.11	45.22	75.57	36.36	55.37	29.95	37.16	28.10	75.54	30.79
21	39.15	56.23	50.96	44.86	76.86	36.09	56.75	29.86	38.33	28.13	76.63	30.89
22	39.21	55.83	51.83	44.53	78.16	35.85	58.04	29.77	39.48	28.13	77.84	30.99
23	39.37	55.43	52.70	44.22	79.44	35.63	59.25	29.67	40.68	28.10	79.12	31.13
24	39.60	55.05	53.53	43.92	80.64	35.42	60.43	29.54	41.98	28.06	80.43	31.30
25	39.88	54.68	54.28	43.64	81.77	35.22	61.63	29.39	43.41	28.03	81.69	31.51
26	40.19	54.34	54.96	43.34	82.81	35.00	62.91	29.21	44.94	28.02	82.86	31.74
27	40.47	54.01	55.58	43.03	83.80	34.76	64.32	29.03	46.53	28.04	83.90	31.98
28	40.70	53.69	56.17	42.70	84.79	34.50	65.84	28.87	48.10	28.10	84.83	32.22
29	40.86	53.38	56.80	42.33	85.84	34.21	67.45	28.74	49.61	28.19	85.67	32.45
30	40.96	53.05			87.00	33.91	69.09	28.64	51.02	28.30	86.45	32.67
31	41.02	52.70			88.28	33.62	70.70	28.57	52.33	28.41	87.21	32.87
32	41.07	52.32			89.66	33.34			53.55	28.52		
	sec $\delta$ 58.24	tan $\delta$ 58.23	sec $\delta$ 58.05	tan $\delta$ 58.04	sec $\delta$ 57.90	tan $\delta$ 57.89	sec $\delta$ 57.79	tan $\delta$ 57.78	sec $\delta$ 57.75	tan $\delta$ 57.74	sec $\delta$ 57.78	tan $\delta$ 57.78

Mean R.A. 20<sup>h</sup> 56<sup>m</sup> 12.27<sup>s</sup>

Double lower transit February 3

Mean Dec. -89° 00' 37.15"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

923  $\sigma$  Octantis Mag. 5.48 Spect. F0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 20 57	<sup>o</sup> <sup>'</sup> 89 00	<sup>h</sup> <sup>m</sup> 20 57	<sup>o</sup> <sup>'</sup> 89 00	<sup>h</sup> <sup>m</sup> 20 57	<sup>o</sup> <sup>'</sup> 89 00	<sup>h</sup> <sup>m</sup> 20 56	<sup>o</sup> <sup>'</sup> 89 00	<sup>h</sup> <sup>m</sup> 20 56	<sup>o</sup> <sup>'</sup> 89 00	<sup>h</sup> <sup>m</sup> 20 55	<sup>o</sup> <sup>'</sup> 89 00
	<sup>s</sup> 27.21	<sup>s</sup> 32.87	<sup>s</sup> 46.71	<sup>s</sup> 40.74	<sup>s</sup> 45.87	<sup>s</sup> 50.22	<sup>s</sup> 84.80	<sup>s</sup> 57.49	<sup>s</sup> 49.34	<sup>s</sup> 60.37	<sup>s</sup> 74.82	<sup>s</sup> 57.24
1	27.21	32.87	46.71	40.74	45.87	50.22	84.80	57.49	49.34	60.37	74.82	57.24
2	27.96	33.07	47.07	41.00	45.57	50.55	83.75	57.71	47.95	60.32	73.91	56.97
3	28.75	33.25	47.46	41.27	45.19	50.88	82.60	57.91	46.64	60.25	73.13	56.73
4	29.57	33.43	47.87	41.56	44.70	51.21	81.39	58.09	45.45	60.16	72.43	56.50
5	30.45	33.62	48.28	41.87	44.11	51.53	80.16	58.22	44.38	60.07	71.73	56.30
6	31.37	33.81	<sup>48 64</sup> 48.93	<sup>42 20</sup> 42.54	43.42	51.82	78.97	58.33	43.40	60.00	70.97	56.13
7	32.33	34.03	49.13	42.89	42.68	52.09	77.87	58.42	42.44	59.96	70.13	55.96
8	33.30	34.26	49.22	43.24	41.94	52.33	76.88	58.50	41.46	59.94	69.20	55.78
9	34.25	34.51	49.21	43.58	41.25	52.54	75.97	58.59	40.40	59.93	68.20	55.58
10	35.16	34.79	49.12	43.90	40.63	52.74	75.11	58.70	39.25	59.92	67.16	55.37
11	36.00	35.08	48.99	44.19	40.11	52.95	74.25	58.83	38.01	59.90	66.11	55.13
12	36.74	35.37	48.88	44.45	39.66	53.16	73.35	58.99	36.69	59.86	65.10	54.87
13	37.38	35.67	48.82	44.70	39.24	53.40	72.35	59.15	35.34	59.80	64.14	54.58
14	37.93	35.95	48.84	44.94	38.80	53.67	71.25	59.31	33.98	59.71	63.25	54.29
15	38.41	36.21	48.96	45.18	38.29	53.95	70.04	59.45	32.64	59.59	62.46	53.99
16	38.87	36.45	49.14	45.45	37.67	54.25	68.76	59.58	31.36	59.46	61.74	53.69
17	39.36	36.67	49.33	45.75	36.92	54.54	67.43	59.68	30.15	59.32	61.10	53.41
18	39.93	36.87	49.48	46.07	36.07	54.81	66.09	59.76	29.02	59.17	60.51	53.13
19	40.60	37.07	49.52	46.42	35.13	55.06	64.78	59.81	27.96	59.03	59.95	52.87
20	41.37	37.28	49.44	46.77	34.16	55.29	63.52	59.84	26.95	58.89	59.38	52.61
21	42.19	37.53	49.24	47.12	33.19	55.50	62.32	59.87	25.98	58.76	58.79	52.37
22	42.99	37.81	48.93	47.45	32.24	55.68	61.18	59.90	25.02	58.65	58.15	52.13
23	43.71	38.12	48.55	47.76	31.33	55.86	60.10	59.93	24.03	58.54	57.46	51.88
24	44.32	38.45	48.15	48.04	30.48	56.04	59.05	59.97	23.01	58.44	56.71	51.62
25	44.79	38.78	47.75	48.32	29.67	56.21	58.02	60.02	21.93	58.34	55.93	51.34
26	45.15	39.10	47.38	48.57	28.91	56.40	56.97	60.09	20.77	58.23	55.14	51.02
27	45.43	39.41	47.06	48.83	28.16	56.59	55.88	60.16	19.55	58.09	54.40	50.68
28	45.67	39.70	46.78	49.08	27.40	56.80	54.73	60.23	18.30	57.93	53.76	50.30
29	45.89	39.97	46.54	49.35	26.61	57.03	53.49	60.30	17.05	57.73	53.26	49.92
30	46.12	40.23	46.32	49.62	25.75	57.26	52.17	60.36	15.87	57.49	52.92	49.54
31	46.39	40.48	46.11	49.92	24.80	57.49	50.77	60.38	14.82	57.24	52.70	49.18
32	46.71	40.74	45.87	50.22			49.34	60.37			52.53	48.85
	sec $\delta$ 57.88	tan $\delta$ 57.88	sec $\delta$ 58.03	tan $\delta$ 58.02	sec $\delta$ 58.18	tan $\delta$ 58.17	sec $\delta$ 58.26	tan $\delta$ 58.25	sec $\delta$ 58.26	tan $\delta$ 58.25	sec $\delta$ 58.17	tan $\delta$ 58.16

Mean R.A.  $20^{\text{h}} 56^{\text{m}} 12.27^{\text{s}}$

Double lower transit February 3

Mean Dec.  $-89^{\circ} 00' 37.15''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1670  $\nu$  Octantis  $\searrow$  Mag. 5.74 Spect. K0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "	h m	° ' "
	22 29	86 02	22 29	86 02	22 29	86 02	22 29	86 02	22 29	86 02	22 29	86 02
	s	"	s	"	s	"	s	"	s	"	s	"
1	06.54	46.28	01.89	36.77	01.79	26.15	06.06	14.57	13.87	05.93	23.95	01.36
2	06.32	46.08	01.76	36.40	01.82	25.73	06.31	14.20	14.21	05.73	24.26	01.33
3	06.09	45.87	01.65	35.99	01.87	25.30	06.57	13.85	14.54	05.54	24.55	01.30
4	05.84	45.64	01.58	35.57	01.95	24.85	06.84	13.53	14.85	05.37	24.84	01.25
5	05.58	45.38	01.53	35.14	02.07	24.42	07.10	13.23	15.14	05.21	25.13	01.19
6	05.33	45.09	01.52	34.73	02.20	24.00	07.34	12.95	15.41	05.04	25.43	01.12
7	05.10	44.76	01.53	34.33	02.36	23.61	07.56	12.67	15.67	04.86	25.75	01.05
8	04.91	44.42	01.55	33.95	02.51	23.24	07.77	12.40	15.94	04.66	26.08	00.98
9	04.75	44.08	01.57	33.60	02.64	22.89	07.96	12.11	16.21	04.46	26.43	00.92
10	04.62	43.75	01.56	33.27	02.77	22.56	08.15	11.82	16.49	04.25	26.80	00.87
11	04.51	43.44	01.54	32.94	02.87	22.23	08.34	11.51	16.80	04.03	27.17	00.84
12	04.40	43.15	01.50	32.60	02.95	21.89	08.55	11.19	17.12	03.82	27.55	00.84
13	04.27	42.89	01.45	32.25	03.03	21.53	08.77	10.86	17.46	03.62	27.92	00.86
14	04.12	42.63	01.40	31.89	03.11	21.17	09.01	10.53	17.82	03.43	28.28	00.90
15	03.96	42.37	01.34	31.51	03.20	20.79	09.27	10.20	18.18	03.26	28.62	00.95
16	03.78	42.10	01.30	31.11	03.30	20.39	09.55	09.88	18.55	03.12	28.93	01.01
17	03.59	41.81	01.28	30.70	03.42	19.99	09.85	09.58	18.92	03.00	29.22	01.06
18	03.40	41.50	01.28	30.29	03.56	19.58	10.16	09.30	19.27	02.89	29.49	01.09
19	03.21	41.18	01.30	29.87	03.73	19.18	10.47	09.04	19.60	02.80	29.76	01.10
20	03.04	40.83	01.35	29.45	03.92	18.79	10.78	08.80	19.90	02.71	30.03	01.09
21	02.89	40.47	01.41	29.04	04.12	18.42	11.06	08.58	20.18	02.61	30.34	01.06
22	02.76	40.10	01.49	28.65	04.33	18.06	11.33	08.36	20.45	02.48	30.68	01.03
23	02.66	39.73	01.58	28.29	04.54	17.73	11.57	08.14	20.73	02.33	31.04	01.02
24	02.57	39.37	01.66	27.94	04.74	17.42	11.79	07.89	21.03	02.15	31.43	01.05
25	02.51	39.02	01.72	27.60	04.92	17.12	12.01	07.62	21.36	01.97	31.80	01.10
26	02.45	38.68	01.76	27.26	05.07	16.81	12.25	07.33	21.73	01.80	32.17	01.19
27	02.40	38.36	01.78	26.92	05.21	16.49	12.52	07.02	22.12	01.66	32.50	01.30
28	02.33	38.05	01.79	26.55	05.34	16.14	12.83	06.71	22.52	01.55	32.81	01.42
29	02.24	37.75	01.79	26.15	05.47	15.77	13.16	06.42	22.91	01.48	33.09	01.54
30	02.14	37.44			05.64	15.37	13.51	06.16	23.28	01.43	33.36	01.66
31	02.02	37.12			05.83	14.97	13.87	05.93	23.63	01.39	33.62	01.76
32	01.89	36.77			06.06	14.57			23.95	01.36		
	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$	sec $\delta$	tan $\delta$
	14.50	14.46	14.49	14.45	14.48	14.44	14.47	14.43	14.46	14.42	14.46	14.42

Mean R.A.  $22^{\text{h}} 29^{\text{m}} 18.35^{\text{s}}$

Double lower transit February 27

Mean Dec.  $-86^{\circ} 02' 13.39''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

1670  $\nu$  Octantis Mag. 5.74 Spect. K0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 22 29	— ° ′ 86 02	<sup>h</sup> <sup>m</sup> 22 29	— ° ′ 86 02	<sup>h</sup> <sup>m</sup> 22 29	— ° ′ 86 02	<sup>h</sup> <sup>m</sup> 22 29	— ° ′ 86 02	<sup>h</sup> <sup>m</sup> 22 29	— ° ′ 86 02	<sup>h</sup> <sup>m</sup> 22 29	— ° ′ 86 02
	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"	<sup>s</sup>	"
1	33.62	01.76	41.33	06.84	44.94	15.53	42.99	24.32	36.11	30.63	27.24	31.45
2	33.87	01.85	41.53	07.04	45.00	15.86	42.83	24.63	35.78	30.73	26.95	31.31
3	34.13	01.94	41.73	07.25	45.03	16.20	42.64	24.93	35.46	30.80	26.69	31.17
4	34.40	02.01	41.95	07.47	45.05	16.55	42.43	25.21	35.17	30.84	26.46	31.05
5	34.69	02.09	42.17	07.71	45.03	16.90	42.20	25.46	34.91	30.88	26.24	30.95
6	34.99	02.17	42.38	07.97	44.98	17.24	41.98	25.67	34.67	30.92	26.01	30.87
7	35.30	02.26	42.58	08.25	44.91	17.56	41.77	25.86	34.45	30.99	25.75	30.81
8	35.62	02.38	42.76	08.55	44.84	17.84	41.58	26.04	34.22	31.08	25.48	30.75
9	35.95	02.51	42.92	08.86	44.77	18.11	41.42	26.22	33.98	31.18	25.17	30.68
10	36.27	02.66	43.04	09.17	44.71	18.35	41.28	26.42	33.72	31.29	24.85	30.59
11	36.58	02.84	43.14	09.46	44.68	18.59	41.15	26.63	33.43	31.41	24.53	30.49
12	36.86	03.03	43.22	09.73	44.67	18.84	41.00	26.86	33.11	31.51	24.20	30.36
13	37.12	03.23	43.30	09.98	44.68	19.10	40.84	27.12	32.78	31.59	23.88	30.20
14	37.36	03.43	43.39	10.21	44.69	19.39	40.64	27.38	32.43	31.65	23.58	30.03
15	37.57	03.61	43.50	10.42	44.68	19.70	40.42	27.64	32.09	31.69	23.29	29.85
16	37.77	03.78	43.64	10.64	44.65	20.04	40.17	27.88	31.76	31.71	23.03	29.66
17	37.98	03.92	43.80	10.86	44.59	20.38	39.91	28.11	31.44	31.70	22.79	29.47
18	38.20	04.04	43.96	11.12	44.49	20.71	39.63	28.32	31.13	31.69	22.56	29.28
19	38.45	04.15	44.13	11.40	44.37	21.04	39.36	28.50	30.85	31.67	22.34	29.11
20	38.72	04.27	44.27	11.71	44.24	21.34	39.09	28.66	30.58	31.66	22.12	28.95
21	39.02	04.41	44.39	12.04	44.09	21.63	38.84	28.81	30.32	31.65	21.90	28.79
22	39.32	04.59	44.47	12.37	43.95	21.90	38.60	28.96	30.06	31.65	21.67	28.65
23	39.61	04.79	44.52	12.70	43.82	22.15	38.37	29.10	29.80	31.66	21.41	28.50
24	39.88	05.03	44.55	13.02	43.70	22.40	38.16	29.25	29.54	31.68	21.15	28.34
25	40.12	05.28	44.57	13.32	43.59	22.64	37.95	29.41	29.25	31.70	20.86	28.17
26	40.32	05.53	44.59	13.60	43.49	22.89	37.74	29.58	28.95	31.72	20.56	27.97
27	40.50	05.78	44.61	13.88	43.41	23.15	37.52	29.76	28.62	31.73	20.27	27.73
28	40.67	06.01	44.64	14.14	43.32	23.42	37.29	29.95	28.27	31.71	19.99	27.46
29	40.83	06.23	<sup>44.68</sup> 44.73	<sup>14.40</sup> 14.66	43.23	23.70	37.03	30.14	27.91	31.66	19.75	27.17
30	40.99	06.44	44.80	14.94	43.12	24.00	36.75	30.33	27.56	31.57	19.54	26.86
31	41.15	06.65	44.87	15.23	42.99	24.32	36.44	30.49	27.24	31.45	19.37	26.57
32	41.33	06.84	44.94	15.53			36.11	30.63			19.22	26.29
	sec $\delta$ 14.46	tan $\delta$ 14.43	sec $\delta$ 14.47	tan $\delta$ 14.43	sec $\delta$ 14.48	tan $\delta$ 14.44	sec $\delta$ 14.48	tan $\delta$ 14.45	sec $\delta$ 14.49	tan $\delta$ 14.45	sec $\delta$ 14.49	tan $\delta$ 14.45

Mean R.A.  $22^{\text{h}} 29^{\text{m}} 18.35^{\text{s}}$

Double lower transit February 27

Mean Dec.  $-86^{\circ} 02' 13.39''$

APPARENT PLACES OF STARS, 1986  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

1669 B Octantis Mag. 6.54 Spect. A5

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 22 38	° ' / 88 53	h m 22 38	° ' / 88 53	h m 22 38	° ' / 88 53	h m 22 39	° ' / 88 53	h m 22 39	° ' / 88 53	h m 22 40	° ' / 88 53
	s 75.85	" 54.30	s 56.92	" 44.82	s 54.41	" 34.10	s 07.32	" 22.32	s 33.22	" 13.42	s 07.65	" 08.57
1	75.85	54.30	56.92	44.82	54.41	34.10	07.32	22.32	33.22	13.42	07.65	08.57
2	75.03	54.10	56.39	44.44	54.41	33.67	08.12	21.93	34.39	13.20	08.73	08.53
3	74.14	53.90	55.91	44.04	54.49	33.23	08.99	21.57	35.52	13.01	09.75	08.49
4	73.19	53.67	55.53	43.61	54.69	32.78	09.87	21.24	36.58	12.83	10.75	08.43
5	72.20	53.41	55.27	43.18	54.99	32.34	10.73	20.93	37.58	12.66	11.75	08.36
6	71.23	53.12	55.13	42.76	55.39	31.92	11.55	20.64	38.52	12.48	12.78	08.29
7	70.33	52.80	55.07	42.36	55.84	31.52	12.30	20.36	39.42	12.29	13.86	08.21
8	69.54	52.46	55.05	41.98	56.31	31.14	12.99	20.08	40.32	12.09	14.99	08.13
9	68.87	52.12	55.02	41.62	56.74	30.79	13.63	19.79	41.23	11.88	16.18	08.06
10	68.30	51.79	54.95	41.28	57.12	30.45	14.26	19.49	42.18	11.66	17.43	08.00
11	67.80	51.48	54.81	40.95	57.44	30.11	14.88	19.17	43.19	11.44	18.72	07.97
12	67.31	51.20	54.62	40.61	57.70	29.76	15.54	18.84	44.27	11.21	20.03	07.95
13	66.79	50.93	54.38	40.26	57.93	29.41	16.25	18.51	45.41	11.00	21.33	07.96
14	66.21	50.67	54.12	39.90	58.15	29.03	17.03	18.17	46.62	10.80	22.59	07.99
15	65.57	50.41	53.86	39.52	58.38	28.65	17.89	17.83	47.86	10.63	23.78	08.03
16	64.87	50.14	53.64	39.12	58.67	28.25	18.81	17.50	49.13	10.47	24.89	08.08
17	64.14	49.86	53.47	38.71	59.01	27.84	19.80	17.19	50.39	10.34	25.92	08.12
18	63.39	49.55	53.37	38.28	59.44	27.43	20.84	16.90	51.60	10.23	26.88	08.15
19	62.66	49.23	53.36	37.86	59.94	27.02	21.89	16.63	52.75	10.12	27.80	08.16
20	61.97	48.89	53.43	37.44	60.52	26.62	22.92	16.38	53.81	10.03	28.75	08.14
21	61.33	48.53	53.57	37.03	61.17	26.24	23.90	16.15	54.78	09.92	29.78	08.10
22	60.78	48.16	53.78	36.63	61.85	25.88	24.80	15.92	55.71	09.78	30.92	08.07
23	60.31	47.79	54.00	36.26	62.54	25.54	25.61	15.69	56.64	09.62	32.17	08.05
24	59.92	47.42	54.22	35.90	63.19	25.22	26.36	15.44	57.64	09.44	33.48	08.06
25	59.59	47.07	54.38	35.56	63.78	24.90	27.10	15.17	58.75	09.25	34.81	08.10
26	59.31	46.73	54.47	35.22	64.28	24.59	27.88	14.86	59.98	09.07	36.08	08.18
27	59.04	46.40	54.49	34.87	64.71	24.26	28.75	14.54	61.29	08.92	37.28	08.28
28	58.73	46.10	54.46	34.50	65.11	23.91	29.75	14.23	62.65	08.80	38.38	08.40
29	58.37	45.79	54.41	34.10	65.53	23.53	30.85	13.93	64.00	08.71	39.40	08.51
30	57.94	45.49			66.01	23.13	32.02	13.66	65.29	08.65	40.35	08.62
31	57.45	45.16			66.61	22.72	33.22	13.42	66.51	08.60	41.26	08.72
32	56.92	44.82			67.32	22.32			67.65	08.57		
	sec δ 51.96	tan δ 51.95	sec δ 51.82	tan δ 51.81	sec δ 51.68	tan δ 51.67	sec δ 51.54	tan δ 51.53	sec δ 51.45	tan δ 51.44	sec δ 51.42	tan δ 51.41

Mean R.A. 22<sup>h</sup> 39<sup>m</sup> 47<sup>s</sup>.63

Double lower transit March 2

Mean Dec. -88° 53' 21".08



**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

471

1669 B Octantis Mag. 6.54 Spect. A5

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 22 40	° ' " 88 53	h m 22 41	° ' " 88 53	h m 22 41	° ' " 88 53	h m 22 40	° ' " 88 53	h m 22 40	° ' " 88 53	h m 22 39	° ' " 88 53
1	<sup>s</sup> 41.26	" 08.72	<sup>s</sup> 08.76	" 13.63	<sup>s</sup> 22.14 22.41	<sup>s</sup> 21.99 22.28	<sup>s</sup> 76.53	" 31.23	<sup>s</sup> 52.51	" 37.84	<sup>s</sup> 80.14	" 38.96
2	42.16	08.80	09.45	13.82	22.66	22.62	76.02	31.55	51.32	37.95	79.03	38.83
3	43.07	08.88	10.18	14.03	22.85	22.96	75.40	31.86	50.16	38.03	78.04	38.69
4	44.01	08.95	10.95	14.24	22.95	23.31	74.68	32.15	49.09	38.09	77.14	38.58
5	45.00	09.02	11.74	14.48	22.95	23.67	73.90	32.41	48.11	38.13	76.28	38.48
6	46.04	09.10	12.53	14.74	22.84	24.01	73.12	32.63	47.23	38.19	75.40	38.41
7	47.13	09.18	13.27	15.01	22.65	24.33	72.38	32.84	46.41	38.26	74.46	38.36
8	48.26	09.28	13.96	15.31	22.41	24.63	71.71	33.02	45.58	38.35	73.44	38.30
9	49.41	09.41	14.55	15.61	22.19	24.90	71.13	33.21	44.72	38.47	72.34	38.24
10	50.55	09.56	15.04	15.92	22.01	25.15	70.62	33.41	43.78	38.59	71.17	38.17
11	51.66	09.72	15.44	16.21	21.91	25.39	70.14	33.63	42.75	38.71	69.97	38.07
12	52.69	09.91	15.77	16.49	21.88	25.64	69.65	33.87	41.63	38.83	68.75	37.95
13	53.64	10.10	16.08	16.74	21.92	25.91	69.09	34.13	40.44	38.92	67.56	37.80
14	54.50	10.30	16.41	16.96	21.97	26.20	68.44	34.40	39.21	38.99	66.41	37.64
15	55.28	10.48	16.80	17.18	21.98	26.51	67.69	34.67	37.98	39.04	65.33	37.46
16	56.01	10.64	17.27	17.39	21.92	26.85	66.85	34.93	36.75	39.07	64.31	37.28
17	56.73	10.77	17.83	17.61	21.75	27.19	65.93	35.17	35.58	39.08	63.37	37.09
18	57.49	10.89	18.44	17.86	21.48	27.54	64.98	35.38	34.45	39.07	62.48	36.91
19	58.34	10.99	19.05	18.14	21.11	27.87	64.01	35.58	33.39	39.07	61.63	36.74
20	59.29	11.11	19.60	18.45	20.67	28.18	63.06	35.75	32.38	39.06	60.79	36.59
21	60.33	11.24	20.06	18.78	20.20	28.48	62.15	35.91	31.41	39.06	59.94	36.44
22	61.40	11.41	20.40	19.11	19.73	28.75	61.29	36.07	30.47	39.07	59.06	36.29
23	62.44	11.61	20.65	19.44	19.28	29.01	60.47	36.22	29.52	39.09	58.13	36.15
24	63.41	11.84	20.81	19.76	18.86	29.27	59.70	36.38	28.54	39.11	57.13	36.00
25	64.28	12.08	20.92	20.07	18.49	29.52	58.95	36.54	27.51	39.15	56.06	35.84
26	65.05	12.33	21.01	20.35	18.16	29.77	58.21	36.72	26.41	39.18	54.96	35.64
27	65.73	12.57	21.11	20.63	17.86	30.04	57.45	36.91	25.23	39.19	53.84	35.41
28	66.35	12.81	21.24	20.89	17.58	30.31	56.64	37.11	23.96	39.19	52.77	35.15
29	66.93	13.03	21.40	21.16	17.28	30.60	55.75	37.31	22.66	39.15	51.79	34.86
30	67.52	13.23	21.61	21.42	16.94	30.91	54.76	37.51	21.37	39.07	50.95	34.56
31	68.12	13.43	21.86	21.70	16.53	31.23	53.67	37.69	20.14	38.96	50.24	34.27
32	68.76	13.63	22.14 22.41	21.99 22.28			52.51	37.84			49.61	33.99
	sec δ 51.45	tan δ 51.44	sec δ 51.54	tan δ 51.53	sec δ 51.66	tan δ 51.65	sec δ 51.76	tan δ 51.75	sec δ 51.82	tan δ 51.81	sec δ 51.79	tan δ 51.78

Mean R.A. 22<sup>h</sup> 39<sup>m</sup> 47.<sup>s</sup>63

Double lower transit March 2

Mean Dec. -88° 53' 21."08

**APPARENT PLACES OF STARS, 1986**  
CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH

924  $\beta$  Octantis Mag. 4.34 Spect. F0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	h m 22 44	° ' s 81 27	h m 22 44	° ' s 81 27	h m 22 44	° ' s 81 27	h m 22 44	° ' s 81 27	h m 22 44	° ' s 81 26	h m 22 44	° ' s 81 26
1	38.45	43.44	36.16	34.69	35.91	24.38	37.65	12.66	41.15	63.43	45.86	57.96
2	38.35	43.27	36.10	34.33	35.91	23.96	37.77	12.27	41.31	63.20	46.00	57.90
3	38.23	43.09	36.04	33.95	35.93	23.53	37.89	11.91	41.46	62.99	46.14	57.83
4	38.11	42.89	36.00	33.55	35.96	23.09	38.01	11.57	41.60	62.80	46.28	57.75
5	37.99	42.66	35.98	33.14	36.01	22.66	38.12	11.25	41.73	62.61	46.41	57.66
6	37.87	42.40	35.97	32.73	36.07	22.24	38.22	10.95	41.85	62.41	46.56	57.56
7	37.77	42.11	35.97	32.35	36.13	21.84	38.32	10.66	41.97	62.20	46.71	57.46
8	37.68	41.79	35.97	31.98	36.20	21.47	38.40	10.37	42.09	61.99	46.87	57.36
9	37.61	41.48	35.97	31.64	36.25	21.12	38.49	10.08	42.21	61.76	47.04	57.26
10	37.55	41.17	35.96	31.32	36.30	20.78	38.57	09.77	42.35	61.52	47.22	57.18
11	37.49	40.89	35.94	31.00	36.33	20.45	38.65	09.44	42.49	61.28	47.40	57.12
12	37.44	40.62	35.92	30.68	36.36	20.11	38.74	09.11	42.64	61.04	47.58	57.08
13	37.37	40.38	35.88	30.35	36.39	19.76	38.83	08.76	42.80	60.81	47.76	57.06
14	37.30	40.15	35.85	30.00	36.42	19.39	38.94	08.41	42.97	60.59	47.93	57.06
15	37.22	39.91	35.81	29.63	36.45	19.01	39.06	08.06	43.14	60.39	48.09	57.08
16	37.13	39.66	35.79	29.25	36.49	18.61	39.19	07.73	43.31	60.21	48.24	57.11
17	37.03	39.40	35.77	28.85	36.54	18.21	39.33	07.40	43.48	60.06	48.38	57.13
18	36.94	39.12	35.76	28.44	36.60	17.80	39.47	07.10	43.64	59.92	48.51	57.13
19	36.85	38.82	35.77	28.03	36.67	17.39	39.61	06.82	43.80	59.80	48.64	57.11
20	36.76	38.51	35.78	27.62	36.75	16.99	39.74	06.55	43.94	59.68	48.78	57.07
21	36.69	38.17	35.81	27.22	36.84	16.61	39.87	06.31	44.07	59.55	48.93	57.01
22	36.63	37.83	35.84	26.84	36.93	16.24	39.99	06.07	44.19	59.40	49.10	56.95
23	36.57	37.48	35.87	26.47	37.02	15.90	40.09	05.83	44.32	59.22	49.28	56.90
24	36.53	37.13	35.90	26.13	37.10	15.58	40.19	05.56	44.47	59.02	49.47	56.89
25	36.50	36.80	35.92	25.79	37.18	15.26	40.29	05.27	44.63	58.80	49.66	56.91
26	36.47	36.48	35.92	25.46	37.24	14.95	40.40	04.96	44.80	58.60	49.83	56.96
27	36.44	36.17	35.92	25.12	37.29	14.62	40.52	04.63	44.99	58.42	49.99	57.04
28	36.40	35.89	35.92	24.76	37.34	14.27	40.67	04.29	45.18	58.28	50.14	57.13
29	36.35	35.60	35.91	24.38	37.40	13.89	40.82	03.98	45.37	58.17	50.28	57.22
30	36.30	35.32			37.47	13.48	40.99	03.69	45.54	58.08	50.41	57.30
31	36.23	35.02			37.55	13.07	41.15	03.43	45.71	58.02	50.54	57.38
32	36.16	34.69			37.65	12.66			45.86	57.96		
	sec $\delta$ 6.73	tan $\delta$ 6.66	sec $\delta$ 6.73	tan $\delta$ 6.66	sec $\delta$ 6.73	tan $\delta$ 6.66	sec $\delta$ 6.73	tan $\delta$ 6.65	sec $\delta$ 6.73	tan $\delta$ 6.65	sec $\delta$ 6.73	tan $\delta$ 6.65

Mean R.A. 22<sup>h</sup> 44<sup>m</sup> 44.07<sup>s</sup>

Double lower transit March 3

Mean Dec. -81° 27' 10.01"

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

473

924  $\beta$  Octantis Mag. 4.34 Spect. F0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 22 44	<sup>o</sup> / 81 26	<sup>h</sup> <sup>m</sup> 22 44	<sup>o</sup> / 81 27	<sup>h</sup> <sup>m</sup> 22 44	<sup>o</sup> / 81 27	<sup>h</sup> <sup>m</sup> 22 44	<sup>o</sup> / 81 27	<sup>h</sup> <sup>m</sup> 22 44	<sup>o</sup> / 81 27	<sup>h</sup> <sup>m</sup> 22 44	<sup>o</sup> / 81 27
	<sup>s</sup> 50.54	" 57.38	<sup>s</sup> 54.45	" 01.58	<sup>s</sup> 56.49	" 09.44	<sup>s</sup> 56.00	" 18.53	<sup>s</sup> 53.10	" 25.39	<sup>s</sup> 49.17	" 27.08
1	50.66	57.44	54.56	01.76	<sup>56 54</sup> <sup>56 58</sup>	<sup>09 74</sup> <sup>10 05</sup>	55.93	18.85	52.95	25.52	49.05	26.98
2	50.79	57.49	54.67	01.94	56.61	10.39	55.85	19.16	52.82	25.61	48.94	26.87
3	50.93	57.54	54.78	02.14	56.62	10.73	55.76	19.46	52.69	25.68	48.84	26.78
4	51.07	57.58	54.90	02.35	56.62	11.07	55.67	19.72	52.58	25.75	48.74	26.70
5	51.22	57.63	55.01	02.59	56.61	11.41	55.57	19.95	52.48	25.82	48.63	26.66
6	51.38	57.70	55.12	02.85	56.59	11.72	55.49	20.16	52.39	25.90	48.52	26.62
7	51.54	57.77	55.21	03.12	56.57	12.01	55.42	20.35	52.29	26.01	48.39	26.59
8	51.70	57.87	55.29	03.41	56.55	12.27	55.36	20.54	52.19	26.14	48.25	26.56
9	51.86	58.00	55.36	03.70	56.54	12.52	55.30	20.75	52.07	26.28	48.10	26.51
10	52.02	58.14	55.41	03.97	56.54	12.75	55.25	20.97	51.94	26.42	47.95	26.44
11	52.16	58.30	55.46	04.23	56.55	13.00	55.20	21.22	51.80	26.55	47.80	26.34
12	52.29	58.47	55.51	04.46	56.57	13.26	55.13	21.48	51.65	26.67	47.65	26.22
13	52.40	58.64	55.57	04.68	56.59	13.54	55.05	21.76	51.50	26.76	47.51	26.08
14	52.51	58.80	55.63	04.87	56.60	13.85	54.95	22.03	51.34	26.83	47.39	25.93
15	52.61	58.94	55.71	05.07	56.59	14.18	54.85	22.30	51.19	26.88	47.27	25.77
16	52.72	59.05	55.80	05.28	56.57	14.52	54.73	22.55	51.05	26.90	47.16	25.62
17	52.83	59.14	55.90	05.51	56.54	14.86	54.61	22.77	50.92	26.92	47.05	25.46
18	52.96	59.23	55.99	05.77	56.49	15.19	54.49	22.98	50.79	26.93	46.95	25.32
19	53.11	59.32	56.07	06.06	56.44	15.50	54.38	23.16	50.67	26.95	46.85	25.18
20	53.26	59.43	56.13	06.38	56.38	15.79	54.27	23.33	50.56	26.97	46.75	25.06
21	53.41	59.57	56.18	06.70	56.33	16.06	54.17	23.50	50.45	26.99	46.64	24.94
22	53.56	59.75	56.21	07.01	56.28	16.32	54.08	23.66	50.34	27.03	46.52	24.82
23	53.70	59.96	56.24	07.32	56.24	16.57	53.99	23.83	50.22	27.08	46.40	24.70
24	53.81	60.18	56.26	07.61	56.20	16.82	53.90	24.01	50.09	27.14	46.26	24.56
25	53.92	60.41	56.28	07.88	56.17	17.08	53.82	24.19	49.95	27.19	46.12	24.39
26	54.01	60.63	56.30	08.15	56.14	17.34	53.72	24.39	49.80	27.23	45.98	24.19
27	54.10	60.84	56.33	08.40	56.12	17.61	53.62	24.60	49.64	27.24	45.86	23.95
28	54.18	61.04	56.36	08.65	56.09	17.91	53.51	24.82	49.48	27.23	45.74	23.69
29	54.27	61.23	56.40	08.90	56.05	18.21	53.38	25.03	49.32	27.17	45.65	23.42
30	54.36	61.41	56.45	09.17	56.00	18.53	53.25	25.22	49.17	27.08	45.58	23.15
31	54.45	61.58	56.49	09.44			53.10	25.39			45.51	22.90
32												
	sec $\delta$ 6.73	tan $\delta$ 6.65	sec $\delta$ 6.73	tan $\delta$ 6.65	sec $\delta$ 6.73	tan $\delta$ 6.65	sec $\delta$ 6.73	tan $\delta$ 6.66	sec $\delta$ 6.73	tan $\delta$ 6.66	sec $\delta$ 6.73	tan $\delta$ 6.66

Mean R.A.  $22^{\text{h}} 44^{\text{m}} 44.07^{\text{s}}$

Double lower transit March 3

Mean Dec.  $-81^{\circ} 27' 10.01''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

925  $\tau$  Octantis Mag. 5.56 Spect. K0

Day	January		February		March		April		May		June	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 23 26	<sup>o</sup> / 87 33	<sup>h</sup> <sup>m</sup> 23 26	<sup>o</sup> / 87 33	<sup>h</sup> <sup>m</sup> 23 26	<sup>o</sup> / 87 33	<sup>h</sup> <sup>m</sup> 23 26	<sup>o</sup> / 87 33	<sup>h</sup> <sup>m</sup> 23 26	<sup>o</sup> / 87 33	<sup>h</sup> <sup>m</sup> 23 26	<sup>o</sup> / 87 33
	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"	<sup>s</sup> "	"
1	18.11	58.56	06.83	50.50	02.40	40.22	04.52	27.95	13.39	17.68	27.41	10.85
2	17.69	58.42	06.48	50.16	02.27	39.81	04.77	27.53	13.85	17.40	27.88	10.75
3	17.23	58.27	06.15	49.80	02.18	39.37	05.05	27.12	14.30	17.15	28.33	10.64
4	16.73	58.11	05.85	49.41	02.13	38.92	05.34	26.75	14.72	16.91	28.76	10.53
5	16.22	57.92	05.61	49.01	02.13	38.47	05.63	26.40	15.11	16.68	29.19	10.40
6	15.70	57.70	05.42	48.61	02.18	38.04	05.90	26.06	15.47	16.44	29.64	10.27
7	15.21	57.44	05.27	48.22	02.26	37.62	06.14	25.74	15.82	16.20	30.10	10.12
8	14.76	57.16	05.15	47.86	02.35	37.23	06.36	25.42	16.16	15.95	30.59	09.98
9	14.37	56.87	05.03	47.51	02.43	36.86	06.55	25.10	16.50	15.69	31.11	09.84
10	14.02	56.58	04.89	47.19	02.49	36.50	06.74	24.77	16.86	15.42	31.66	09.70
11	13.71	56.31	04.72	46.87	02.52	36.15	06.92	24.42	17.25	15.14	32.24	09.59
12	13.41	56.07	04.52	46.55	02.53	35.80	07.11	24.06	17.67	14.86	32.82	09.50
13	13.10	55.84	04.31	46.23	02.52	35.44	07.33	23.68	18.13	14.58	33.41	09.43
14	12.76	55.63	04.08	45.89	02.50	35.06	07.58	23.30	18.61	14.31	33.99	09.38
15	12.39	55.41	03.84	45.53	02.48	34.67	07.86	22.92	19.12	14.06	34.54	09.35
16	11.99	55.19	03.62	45.16	02.49	34.26	08.18	22.55	19.64	13.84	35.05	09.33
17	11.58	54.96	03.42	44.76	02.52	33.84	08.53	22.18	20.17	13.63	35.52	09.31
18	11.15	54.71	03.25	44.36	02.58	33.41	08.90	21.84	20.67	13.45	35.96	09.28
19	10.73	54.44	03.11	43.95	02.68	32.99	09.29	21.51	21.16	13.28	36.38	09.23
20	10.32	54.15	03.02	43.53	02.82	32.56	09.67	21.21	21.60	13.12	36.81	09.15
21	09.93	53.84	02.96	43.12	02.99	32.15	10.04	20.92	22.00	12.95	37.27	09.05
22	09.57	53.51	02.93	42.73	03.19	31.76	10.37	20.65	22.38	12.76	37.79	08.95
23	09.25	53.18	02.91	42.35	03.39	31.38	10.66	20.37	22.75	12.55	38.35	08.85
24	08.97	52.85	02.89	41.99	03.58	31.03	10.91	20.08	23.15	12.31	38.95	08.79
25	08.72	52.53	02.86	41.65	03.74	30.69	11.16	19.76	23.60	12.05	39.57	08.75
26	08.50	52.21	02.79	41.31	03.86	30.36	11.42	19.42	24.10	11.81	40.17	08.76
27	08.28	51.92	02.68	40.97	03.95	30.01	11.72	19.05	24.66	11.58	40.74	08.78
28	08.04	51.64	02.55	40.61	04.01	29.64	12.07	18.68	25.23	11.38	41.26	08.83
29	07.79	51.36	02.40	40.22	04.08	29.24	12.48	18.32	25.81	11.21	41.76	08.87
30	07.50	51.09			04.18	28.82	12.93	17.99	26.38	11.07	42.22	08.92
31	07.17	50.81			04.32	28.39	13.39	17.68	26.91	10.96	42.66	08.96
32	06.83	50.50			04.52	27.95			27.41	10.85		
	sec $\delta$ 23.54	tan $\delta$ 23.52	sec $\delta$ 23.51	tan $\delta$ 23.49	sec $\delta$ 23.48	tan $\delta$ 23.46	sec $\delta$ 23.45	tan $\delta$ 23.43	sec $\delta$ 23.43	tan $\delta$ 23.41	sec $\delta$ 23.42	tan $\delta$ 23.40

Mean R.A.  $23^{\text{h}} 26^{\text{m}} 22.86^{\text{s}}$

Double lower transit March 14

Mean Dec.  $-87^{\circ} 33' 24.25''$

**APPARENT PLACES OF STARS, 1986**  
**CIRCUMPOLAR STARS AT UPPER TRANSIT AT GREENWICH**

475

925     $\tau$  Octantis    Mag. 5.56    Spect. K0

Day	July		August		September		October		November		December	
	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.	R.A.	Dec.
	<sup>h</sup> <sup>m</sup> 23 26	<sup>o</sup> / 87 33	<sup>h</sup> <sup>m</sup> 23 26	<sup>o</sup> / 87 33	<sup>h</sup> <sup>m</sup> 23 27	<sup>o</sup> / 87 33	<sup>h</sup> <sup>m</sup> 23 26	<sup>o</sup> / 87 33	<sup>h</sup> <sup>m</sup> 23 26	<sup>o</sup> / 87 33	<sup>h</sup> <sup>m</sup> 23 26	<sup>o</sup> / 87 33
	<sup>s</sup> "	<sup>s</sup> "	<sup>s</sup> "	<sup>s</sup> "	<sup>s</sup> "	<sup>s</sup> "	<sup>s</sup> "	<sup>s</sup> "	<sup>s</sup> "	<sup>s</sup> "	<sup>s</sup> "	<sup>s</sup> "
1	42.66	08.96	56.66	12.10	05.37	19.48	65.85	28.85	57.32	36.75	43.44	39.81
2	43.09	08.99	57.03	12.26	05.60	19.76	65.72	29.19	56.83	36.93	42.92	39.75
3	43.53	09.01	57.43	12.41	05.81	20.07	65.53	29.53	56.35	37.08	42.45	39.68
4	43.98	09.02	57.85	12.58	06.00	20.39	65.31	29.85	55.90	37.20	42.03	39.62
5	44.45	09.03	58.29	12.76	06.16	20.73	65.04	30.15	55.50	37.30	41.63	39.59
6	44.95	09.04	58.72	12.97	06.26	21.07	64.77	30.42	55.13	37.41	41.22	39.57
7	45.48	09.06	59.15	13.19	06.32	21.41	64.51	30.66	54.80	37.53	40.79	39.57
8	46.02	09.09	59.54	13.44	06.33	21.74	64.28	30.89	54.47	37.67	40.32	39.59
9	46.58	09.15	59.90	13.70	06.32	22.04	64.09	31.10	54.12	37.84	39.81	39.59
10	47.15	09.22	60.22	13.97	06.31	22.32	63.94	31.33	53.74	38.02	39.27	39.59
11	47.69	09.32	60.49	14.23	06.32	22.57	63.80	31.58	53.32	38.20	38.70	39.57
12	48.22	09.44	60.72	14.48	06.36	22.82	63.66	31.84	52.86	38.38	38.13	39.52
13	48.70	09.57	60.94	14.71	<sup>06 43</sup> <sup>06 54</sup>	<sup>23 06</sup> <sup>23 32</sup>	63.49	32.13	52.36	38.54	37.56	39.45
14	49.15	09.71	61.17	14.91	06.66	23.60	63.29	32.44	51.84	38.69	37.01	39.36
15	49.55	09.84	61.42	15.09	06.77	23.91	63.03	32.74	51.31	38.81	36.48	39.26
16	49.93	09.95	61.70	15.27	06.84	24.25	62.74	33.04	50.78	38.91	35.98	39.14
17	50.30	10.04	62.03	15.46	06.88	24.59	62.41	33.33	50.27	38.99	35.51	39.02
18	50.69	10.10	62.39	15.67	06.86	24.94	62.05	33.60	49.78	39.05	35.07	38.90
19	51.12	10.16	62.75	15.91	06.79	25.29	61.68	33.85	49.31	39.11	34.64	38.79
20	51.59	10.21	63.10	16.17	06.70	25.62	61.32	34.07	48.87	39.16	34.23	38.69
21	52.11	10.28	63.41	16.47	06.58	25.94	60.97	34.29	48.45	39.22	33.81	38.59
22	52.64	10.38	63.66	16.77	06.46	26.23	60.64	34.49	48.03	39.29	33.37	38.51
23	53.18	10.52	63.87	17.08	06.35	26.51	60.34	34.69	47.62	39.37	32.92	38.43
24	53.69	10.68	64.04	17.38	06.25	26.79	60.05	34.89	47.20	39.45	32.42	38.35
25	54.15	10.87	64.19	17.67	06.17	27.05	59.78	35.10	46.76	39.55	31.90	38.25
26	54.57	11.07	64.32	17.95	06.11	27.32	59.51	35.32	46.28	39.64	31.35	38.12
27	54.95	11.26	64.46	18.21	06.06	27.60	59.23	35.55	45.76	39.73	30.78	37.97
28	55.30	11.45	64.60	18.46	06.03	27.89	58.93	35.79	45.19	39.80	30.23	37.78
29	55.64	11.63	64.77	18.71	05.99	28.19	58.60	36.04	44.61	39.84	29.72	37.56
30	55.97	11.80	64.95	18.96	05.93	28.51	58.22	36.29	44.01	39.84	29.27	37.31
31	56.30	11.95	65.15	19.21	05.85	28.85	57.79	36.53	43.44	39.81	28.87	37.07
32	56.66	12.10	65.37	19.48			57.32	36.75			28.51	36.85
	sec $\delta$ 23.42	tan $\delta$ 23.40	sec $\delta$ 23.43	tan $\delta$ 23.41	sec $\delta$ 23.46	tan $\delta$ 23.44	sec $\delta$ 23.48	tan $\delta$ 23.46	sec $\delta$ 23.50	tan $\delta$ 23.48	sec $\delta$ 23.50	tan $\delta$ 23.48

Mean R.A.  $23^{\text{h}} 26^{\text{m}} 22.86^{\text{s}}$

Double lower transit March 14

Mean Dec.  $-87^{\circ} 33' 24.25''$

BESSELIAN DAY NUMBERS, 1986  
FOR 12<sup>h</sup> SIDEREAL TIME AND EQUINOX 1986.5

Date	$\tau$	$A$	Hourly variation	$B$	Hourly variation
1986			(0''0001)		(0''0001)
Jan. — 8.8	—0.2527	—14''532	+33	—6''811	— 2
1.2	0.499	—13.741	+33	—6.899	— 5
11.2	0.472	—12.974	+31	—7.054	— 8
21.2	0.445	—12.250	+29	—7.261	— 9
31.1	0.417	—11.585	+26	—7.500	—10
Feb. 10.1	—0.390	—10.986	+24	—7.748	—10
20.1	0.363	—10.450	+21	—7.978	— 9
Mar. 2.1	0.336	— 9.969	+19	—8.169	— 7
12.0	0.308	— 9.527	+18	—8.303	— 4
22.0	0.281	— 9.103	+18	—8.370	— 1
Apr. 1.0	—0.254	— 8.677	+18	—8.370	+ 1
10.9	0.226	— 8.227	+20	—8.308	+ 4
20.9	0.199	— 7.738	+21	—8.198	+ 5
30.9	0.172	— 7.197	+24	—8.058	+ 6
May 10.9	0.144	— 6.599	+26	—7.908	+ 6
20.8	—0.117	— 5.945	+28	—7.770	+ 5
30.8	0.090	— 5.242	+30	—7.663	+ 4
June 9.8	0.063	— 4.503	+31	—7.603	+ 1
19.8	0.035	— 3.744	+32	—7.599	— 1
29.7	—0.008	— 2.982	+32	—7.655	— 4
July 9.7	+0.019	— 2.234	+31	—7.770	— 6
19.7	0.047	— 1.519	+29	—7.934	— 8
29.6	0.074	— 0.848	+27	—8.134	— 9
Aug. 8.6	0.101	— 0.229	+25	—8.352	— 9
18.6	0.129	+0.333	+22	—8.569	— 9
Sept. 28.6	+0.156	+0.843	+20	—8.763	— 7
7.5	0.183	+1.310	+19	—8.918	— 5
17.5	0.211	+1.747	+18	—9.017	— 3
27.5	0.238	+2.173	+18	—9.053	0
Oct. 7.5	0.265	+2.608	+19	—9.024	+ 3
17.4	+0.292	+3.072	+20	—8.934	+ 5
27.4	0.320	+3.583	+23	—8.797	+ 6
Nov. 6.4	0.347	+4.153	+25	—8.633	+ 7
16.3	0.374	+4.788	+28	—8.463	+ 7
26.3	0.402	+5.487	+30	—8.312	+ 6
Dec. 6.3	+0.429	+6.239	+32	—8.202	+ 3
16.3	0.456	+7.027	+33	—8.152	+ 1
26.2	0.484	+7.831	+34	—8.170	— 2
36.2	0.511	+8.625	+33	—8.259	— 5

FOR 12<sup>h</sup> SIDEREAL TIME AND EQUINOX 1986.5

Date	C	Hourly variation	D	Hourly variation	E	Greenwich Sidereal Date
1986		(0 <sup>''</sup> .0001)		(0 <sup>''</sup> .0001)	(0 <sup>''</sup> .0001)	245
Jan. - 8.8	- 0 <sup>''</sup> .195	-139	+20 <sup>''</sup> .831	- 2	-14	3120.5
1.2	- 3.497	-137	+20.490	- 27	-13	3130.5
11.2	- 6.717	-131	+19.525	- 54	-13	3140.5
21.2	- 9.714	-119	+17.933	- 78	-12	3150.5
31.1	-12.396	-105	+15.819	- 98	-12	3160.5
Feb. 10.1	-14.711	- 87	+13.222	-118	-11	3170.5
20.1	-16.544	- 66	+10.222	-132	-11	3180.5
Mar. 2.1	-17.870	- 45	+ 6.960	-141	-12	3190.5
12.0	-18.664	- 21	+ 3.490	-148	-12	3200.5
22.0	-18.871	+ 3	- 0.055	-147	-12	3210.5
Apr. 1.0	-18.537	+ 25	- 3.547	-144	-13	3220.5
10.9	-17.663	+ 48	- 6.934	-137	-13	3230.5
20.9	-16.265	+ 68	-10.075	-124	-13	3240.5
30.9	-14.434	+ 85	-12.893	-111	-13	3250.5
May 10.9	-12.191	+102	-15.345	- 93	-13	3260.5
20.8	- 9.609	+113	-17.319	- 72	-13	3270.5
30.8	- 6.794	+122	-18.803	- 52	-12	3280.5
June 9.8	- 3.779	+129	-19.763	- 28	-12	3290.5
19.8	- 0.674	+130	-20.138	- 4	-11	3300.5
29.7	+ 2.429	+129	-19.975	+ 18	-10	3310.5
July 9.7	+ 5.485	+125	-19.247	+ 43	- 9	3320.5
19.7	+ 8.371	+116	-17.963	+ 64	- 9	3330.5
29.6	+11.030	+106	-16.202	+ 84	- 8	3340.5
Aug. 8.6	+13.404	+ 92	-13.960	+103	- 8	3350.5
18.6	+15.386	+ 74	-11.310	+117	- 8	3360.5
28.6	+16.958	+ 57	- 8.346	+130	- 8	3370.5
Sept. 7.5	+18.060	+ 35	- 5.097	+140	- 8	3380.5
17.5	+18.627	+ 13	- 1.690	+144	- 9	3390.5
27.5	+18.682	- 9	+ 1.785	+146	- 9	3400.5
Oct. 7.5	+18.181	- 33	+ 5.263	+143	-10	3410.5
17.4	+17.127	- 54	+ 8.590	+135	-10	3420.5
27.4	+15.577	- 75	+11.696	+124	-10	3430.5
Nov. 6.4	+13.527	- 95	+14.493	+108	-10	3440.5
16.3	+11.056	-111	+16.844	+ 88	-10	3450.5
26.3	+ 8.247	-124	+18.718	+ 68	- 9	3460.5
Dec. 6.3	+ 5.145	-134	+20.030	+ 41	- 8	3470.5
16.3	+ 1.890	-138	+20.711	+ 16	- 8	3480.5
26.2	- 1.431	-139	+20.783	- 10	- 7	3490.5
36.2	- 4.733	-135	+20.197	- 38	- 6	3500.5

TABLE I, 1986  
SHORT-PERIOD TERMS OF NUTATION

Date	$d\psi$	$d\epsilon$	Date	$d\psi$	$d\epsilon$	Date	$d\psi$	$d\epsilon$	Date	$d\psi$	$d\epsilon$
	(0''001)			(0''001)			(0''001)			(0''001)	
Jan. 0	+177	+ 15	Feb. 15	-195	+ 46	Apr. 1	+ 31	-121	May 17	+145	+ 31
1	+131	+ 63	16	-227	0	2	+172	-110	18	+ 85	+ 77
2	+ 42	+ 99	17	-218	- 44	3	+281	- 75	19	- 14	+109
3	- 73	+115	18	-172	- 82	4	+335	- 24	20	-134	+118
4	-190	+104	19	- 97	-105	5	+330	+ 30	21	-247	+ 98
5	-279	+ 68	20	- 5	-110	6	+270	+ 77	22	-319	+ 50
6	-313	+ 13	21	+ 87	- 95	7	+170	+106	23	-320	- 13
7	-277	- 48	22	+159	- 61	8	+ 52	+115	24	-242	- 75
8	-172	- 97	23	+195	- 14	9	- 64	+103	25	- 98	-117
9	- 23	-123	24	+182	+ 39	10	-158	+ 72	26	+ 73	-127
10	+135	-117	25	+117	+ 86	11	-217	+ 30	27	+227	-104
11	+264	- 82	26	+ 13	+115	12	-235	- 16	28	+331	- 57
12	+334	- 29	27	-108	+117	13	-212	- 59	29	+367	+ 1
13	+336	+ 28	28	-214	+ 91	14	-156	- 91	30	+336	+ 55
14	+279	+ 76	Mar. 1	-275	+ 43	15	- 77	-109	31	+254	+ 95
15	+180	+106	2	-274	- 16	16	+ 10	-107	June 1	+142	+114
16	+ 63	+114	3	-208	- 71	17	+ 90	- 87	2	+ 22	+112
17	- 50	+102	4	- 91	-109	18	+147	- 50	3	- 85	+ 90
18	-143	+ 72	5	+ 51	-121	19	+167	- 2	4	-163	+ 53
19	-202	+ 31	6	+185	-104	20	+140	+ 50	5	-203	+ 8
20	-222	- 15	7	+283	- 64	21	+ 67	+ 94	6	-203	- 36
21	-201	- 57	8	+326	- 11	22	- 43	+119	7	-164	- 74
22	-144	- 91	9	+308	+ 43	23	-165	+115	8	- 98	-100
23	- 61	-108	10	+237	+ 87	24	-264	+ 82	9	- 16	-108
24	+ 33	-107	11	+130	+111	25	-306	+ 25	10	+ 66	- 98
25	+119	- 85	12	+ 11	+114	26	-273	- 39	11	+132	- 70
26	+179	- 46	13	- 99	+ 95	27	-167	- 93	12	+166	- 29
27	+196	+ 3	14	-182	+ 60	28	- 16	-122	13	+160	+ 18
28	+163	+ 54	15	-228	+ 16	29	+142	-119	14	+109	+ 64
29	+ 84	+ 94	16	-233	- 30	30	+270	- 88	15	+ 19	+ 99
30	- 28	+115	17	-198	- 71	May 1	+344	- 38	16	- 97	+115
31	-147	+110	18	-132	- 99	2	+354	+ 18	17	-215	+105
Feb. 1	-244	+ 79	19	- 46	-111	3	+306	+ 67	18	-307	+ 69
2	-294	+ 28	20	+ 44	-103	4	+213	+101	19	-342	+ 12
3	-280	- 31	21	+123	- 76	5	+ 97	+115	20	-302	- 51
4	-200	- 83	22	+173	- 33	6	- 21	+108	21	-187	-103
5	- 72	-116	23	+179	+ 19	7	-122	+ 81	22	- 23	-129
6	+ 77	-120	24	+135	+ 70	8	-192	+ 42	23	+149	-120
7	+211	- 96	25	+ 44	+108	9	-223	- 3	24	+285	- 80
8	+301	- 50	26	- 74	+121	10	-212	- 47	25	+355	- 22
9	+329	+ 6	27	-190	+105	11	-165	- 83	26	+351	+ 38
10	+294	+ 59	28	-269	+ 61	12	- 93	-104	27	+286	+ 86
11	+209	+ 97	29	-284	+ 2	13	- 9	-109	28	+180	+112
12	+ 95	+114	30	-228	- 58	14	+ 72	- 94	29	+ 61	+116
13	- 22	+109	31	-114	-103	15	+133	- 62	30	- 51	+ 98
14	-124	+ 84	Apr. 1	+ 31	-121	16	+160	- 18	July 1	-136	+ 64
15	-195	+ 46	2	+172	-110	17	+145	+ 31	2	-186	+ 20

Corrections to apparent places of 10-day stars are given by:

$$\Delta\alpha = d\alpha(\psi) \cdot d\psi + d\alpha(\epsilon) \cdot d\epsilon \quad \Delta\delta = d\delta(\psi) \cdot d\psi + d\delta(\epsilon) \cdot d\epsilon$$

where  $d\psi$  and  $d\epsilon$  are to be taken from the table above, and their coefficients are tabulated under each star.



SHORT-PERIOD TERMS OF NUTATION

Date	$d\psi$	$d\epsilon$	Date	$d\psi$	$d\epsilon$	Date	$d\psi$	$d\epsilon$	Date	$d\psi$	$d\epsilon$
	(0''001)			(0''001)			(0''001)			(0''001)	
July 1	-136	+ 64	Aug. 16	+ 1	-127	Oct. 1	+146	+ 63	Nov. 16	-204	0
2	-186	+ 20	17	+154	-111	2	+ 60	+101	17	-192	- 46
3	-194	- 26	18	+271	- 68	3	- 56	+119	18	-142	- 82
4	-164	- 66	19	+327	- 9	4	-176	+110	19	- 68	-104
5	-102	- 95	20	+312	+ 50	5	-270	+ 75	20	+ 16	-108
6	- 22	-107	21	+237	+ 95	6	-311	+ 20	21	+ 93	- 93
7	+ 63	-101	22	+125	+118	7	-283	- 41	22	+150	- 62
8	+134	- 77	23	+ 5	+115	8	-189	- 93	23	+174	- 20
9	+177	- 39	24	- 99	+ 90	9	- 51	-122	24	+157	+ 28
10	+181	+ 8	25	-170	+ 49	10	+101	-121	25	+ 99	+ 72
11	+139	+ 55	26	-199	+ 2	11	+231	- 92	26	+ 4	+104
12	+ 56	+ 93	27	-187	- 44	12	+312	- 42	27	-114	+117
13	- 56	+113	28	-139	- 81	13	+330	+ 16	28	-231	+104
14	-176	+109	29	- 65	-104	14	+286	+ 69	29	-319	+ 65
15	-278	+ 81	30	+ 22	-109	15	+194	+105	30	-349	+ 6
16	-335	+ 31	Sept. 31	+106	- 94	16	+ 77	+119	Dec. 1	-302	- 58
17	-327	- 29	1	+170	- 62	17	- 42	+109	2	-180	-108
18	-246	- 85	2	+200	- 18	18	-138	+ 78	3	- 12	-131
19	-105	-121	3	+187	+ 32	19	-198	+ 34	4	+160	-118
20	+ 62	-127	4	+127	+ 78	20	-213	- 14	5	+292	- 76
21	+215	-100	5	+ 28	+109	21	-187	- 58	6	+357	- 16
22	+317	- 47	6	- 92	+118	22	-128	- 91	7	+347	+ 44
23	+346	+ 15	7	-207	+100	23	- 48	-108	8	+277	+ 90
24	+305	+ 70	8	-287	+ 59	24	+ 37	-106	9	+168	+115
25	+212	+107	9	-312	+ 3	25	+113	- 86	10	+ 48	+116
26	+ 94	+119	10	-271	- 56	26	+164	- 50	11	- 62	+ 95
27	- 22	+107	11	-169	-102	27	+179	- 4	12	-142	+ 57
28	-116	+ 76	12	- 29	-124	28	+152	+ 45	13	-183	+ 11
29	-175	+ 34	13	+119	-116	29	+ 81	+ 87	14	-182	- 35
30	-193	- 13	14	+242	- 82	30	- 24	+114	15	-142	- 74
Aug. 31	-171	- 56	15	+312	- 28	Nov. 31	-146	+117	16	- 74	- 99
1	-115	- 89	16	+317	+ 31	1	-255	+ 92	17	+ 8	-107
2	- 37	-106	17	+259	+ 82	2	-319	+ 42	18	+ 87	- 97
3	+ 50	-105	18	+158	+113	3	-315	- 20	19	+149	- 70
4	+128	- 85	19	+ 37	+119	4	-236	- 79	20	+181	- 31
5	+182	- 49	20	- 76	+101	5	- 98	-118	21	+173	+ 15
6	+198	- 3	21	-160	+ 65	6	+ 66	-127	22	+123	+ 59
7	+168	+ 45	22	-205	+ 18	7	+214	-104	23	+ 36	+ 94
8	+ 95	+ 87	23	-205	- 29	8	+314	- 56	24	- 77	+113
9	- 12	+112	24	-167	- 71	9	+349	+ 2	25	-197	+109
10	-133	+114	25	- 99	- 99	10	+319	+ 57	26	-300	+ 80
11	-242	+ 90	26	- 15	-110	11	+236	+ 98	27	-358	+ 30
12	-312	+ 45	27	+ 71	-102	12	+122	+117	28	-350	- 31
13	-323	- 12	28	+143	- 75	13	+ 2	+113	29	-264	- 89
14	-267	- 69	29	+186	- 34	14	-103	+ 87	30	-115	-126
15	-151	-111	Oct. 30	+188	+ 15	15	-174	+ 47	31	+ 64	-130
16	+ 1	-127	1	+146	+ 63	16	-204	0	32	+225	- 99

Corrections to apparent places of 10-day stars are given by:

$$\Delta\alpha = d\alpha(\psi) \cdot d\psi + d\alpha(\epsilon) \cdot d\epsilon \quad \Delta\delta = d\delta(\psi) \cdot d\psi + d\delta(\epsilon) \cdot d\epsilon$$

where  $d\psi$  and  $d\epsilon$  are to be taken from the table above, and their coefficients are tabulated under each star.

TABLE II, 1986  
SIDEREAL TIME AT 0<sup>h</sup> U.T.

Date	Sidereal Time		Equation of Equinoxes		Date	Sidereal Time		Equation of Equinoxes	
	Apparent	Mean	Long-Period	Short-Period		Apparent	Mean	Long-Period	Short-Period
			(0 <sup>o</sup> 001)					(0 <sup>o</sup> 001)	
Jan. 0	6 <sup>h</sup> 37 <sup>m</sup> 27 <sup>s</sup> .554	28 <sup>s</sup> .121	-578	+11	Feb. 15	9 <sup>h</sup> 38 <sup>m</sup> 49 <sup>s</sup> .170	49 <sup>s</sup> .668	-486	-12
1	6 41 24.110	24.676	-574	+8	16	9 42 45.723	46.223	-487	-14
2	6 45 20.664	21.232	-571	+3	17	9 46 42.278	42.779	-487	-13
3	6 49 17.215	17.787	-567	-4	18	9 50 38.836	39.334	-487	-11
4	6 53 13.767	14.343	-564	-12	19	9 54 35.396	35.889	-488	-6
5	6 57 10.321	10.898	-560	-17	20	9 58 31.956	32.445	-488	0
6	7 01 06.877	07.453	-557	-19	21	10 02 28.516	29.000	-489	+5
7	7 05 09.438	04.009	-553	-17	22	10 06 25.075	25.556	-490	+10
8	7 09 00.003	00.564	-550	-11	23	10 10 21.632	22.111	-491	+12
9	7 12 56.571	57.119	-547	-1	24	10 14 18.186	18.666	-492	+11
10	7 16 53.139	53.675	-544	+8	25	10 18 14.736	15.222	-493	+7
11	7 20 49.706	50.230	-540	+16	26	10 22 11.284	11.777	-494	+1
12	7 24 46.269	46.785	-537	+20	27	10 26 07.831	08.332	-495	-7
13	7 28 42.827	43.341	-534	+21	28	10 30 04.379	04.888	-496	-13
14	7 32 39.382	39.896	-531	+17	Mar. 1	10 34 00.929	01.443	-497	-17
15	7 36 35.934	36.452	-529	+11	2	10 37 57.483	57.998	-499	-17
16	7 40 32.485	33.007	-526	+4	3	10 41 54.041	54.554	-500	-13
17	7 44 29.036	29.562	-523	-3	4	10 45 50.602	51.109	-501	-6
18	7 48 25.589	26.118	-520	-9	5	10 49 47.165	47.665	-503	+3
19	7 52 22.143	22.673	-518	-12	6	10 53 43.727	44.220	-504	+11
20	7 56 18.699	19.228	-515	-14	7	10 57 40.287	40.775	-506	+17
21	8 00 15.258	15.784	-513	-12	8	11 01 36.843	37.331	-508	+20
22	8 04 11.820	12.339	-511	-9	9	11 05 33.395	33.886	-509	+19
23	8 08 08.382	08.895	-509	-4	10	11 09 29.945	30.441	-511	+14
24	8 12 04.945	05.450	-507	+2	11	11 13 26.492	26.997	-513	+8
25	8 16 01.508	02.005	-505	+7	12	11 17 23.038	23.552	-515	+1
26	8 19 58.069	58.561	-503	+11	13	11 21 19.585	20.108	-517	-6
27	8 23 54.627	55.116	-501	+12	14	11 25 16.133	16.663	-518	-11
28	8 27 51.182	51.671	-499	+10	15	11 29 12.684	13.218	-520	-14
29	8 31 47.734	48.227	-498	+5	16	11 33 09.237	09.774	-522	-14
30	8 35 44.284	44.782	-496	-2	17	11 37 05.793	06.329	-524	-12
Feb. 31	8 39 40.834	41.337	-495	-9	18	11 41 02.350	02.884	-526	-8
1	8 43 37.384	37.893	-494	-16	19	11 44 58.909	59.440	-528	-3
2	8 47 33.938	34.448	-492	-18	20	11 48 55.468	55.995	-530	+3
3	8 51 30.495	31.004	-491	-17	21	11 52 52.026	52.550	-532	+8
4	8 55 27.056	27.559	-490	-12	22	11 56 48.583	49.106	-534	+11
5	8 59 23.620	24.114	-489	-4	23	12 00 45.136	45.661	-536	+11
6	9 03 20.186	20.670	-489	+5	24	12 04 41.687	42.217	-538	+8
7	9 07 16.750	17.225	-488	+13	25	12 08 38.235	38.772	-540	+3
8	9 11 13.311	13.780	-487	+18	26	12 12 34.781	35.327	-541	-5
9	9 15 09.869	10.336	-487	+20	27	12 16 31.328	31.883	-543	-12
10	9 19 06.422	06.891	-487	+18	28	12 20 27.876	28.438	-545	-16
11	9 23 02.973	03.446	-486	+13	29	12 24 24.429	24.993	-547	-17
12	9 26 59.521	60.002	-486	+6	30	12 28 20.986	21.549	-549	-14
13	9 30 56.070	56.557	-486	-1	31	12 32 17.547	18.104	-551	-7
14	9 34 52.619	53.113	-486	-8	Apr. 1	12 36 14.109	14.659	-552	+2
15	9 38 49.170	49.668	-486	-12	2	12 40 10.671	11.215	-554	+11

TABLE II, 1986  
SIDEREAL TIME AT 0<sup>h</sup> U.T.

Date	Sidereal Time		Equation of Equinoxes		Date	Sidereal Time		Equation of Equinoxes	
	Apparent	Mean	Long-Period	Short-Period		Apparent	Mean	Long-Period	Short-Period
			(0 <sup>s</sup> 001)					(0 <sup>s</sup> 001)	
Apr. 1	12 <sup>h</sup> 36 <sup>m</sup> 14 <sup>s</sup> .109	14 <sup>s</sup> .659	-552	+ 2	May 17	15 <sup>h</sup> 37 <sup>m</sup> 35 <sup>s</sup> .655	36 <sup>s</sup> .206	-560	+ 9
2	12 40 10.671	11.215	-554	+11	18	15 41 32.208	32.762	-558	+ 5
3	12 44 07.232	07.770	-556	+17	19	15 45 28.760	29.317	-557	- 1
4	12 48 03.789	04.326	-557	+21	20	15 49 25.310	25.872	-555	- 8
5	12 52 00.342	00.881	-559	+20	21	15 53 21.860	22.428	-553	-15
6	12 55 56.892	57.436	-561	+16	22	15 57 18.413	18.983	-551	-19
7	12 59 53.440	53.992	-562	+10	23	16 01 14.971	15.539	-548	-20
8	13 03 49.987	50.547	-563	+ 3	24	16 05 11.533	12.094	-546	-15
9	13 07 46.534	47.102	-565	- 4	25	16 09 08.099	08.649	-544	- 6
10	13 11 43.082	43.658	-566	-10	26	16 13 04.668	05.205	-541	+ 4
11	13 15 39.632	40.213	-567	-13	27	16 17 01.235	01.760	-539	+14
12	13 19 36.186	36.769	-569	-14	28	16 20 57.799	58.315	-537	+20
13	13 23 32.741	33.324	-570	-13	29	16 24 54.359	54.871	-534	+22
14	13 27 29.299	29.879	-571	-10	30	16 28 50.915	51.426	-531	+21
15	13 31 25.858	26.435	-572	- 5	31	16 32 47.468	47.982	-529	+16
16	13 35 22.418	22.990	-573	+ 1	June 1	16 36 44.020	44.537	-526	+ 9
17	13 39 18.977	19.545	-574	+ 6	2	16 40 40.571	41.092	-523	+ 1
18	13 43 15.535	16.101	-574	+ 9	3	16 44 37.122	37.648	-520	- 5
19	13 47 12.091	12.656	-575	+10	4	16 48 33.676	34.203	-517	-10
20	13 51 08.644	09.211	-576	+ 9	5	16 52 30.232	30.758	-514	-12
21	13 55 05.195	05.767	-576	+ 4	6	16 56 26.790	27.314	-511	-12
22	13 59 01.743	02.322	-577	- 3	7	17 00 23.351	23.869	-508	-10
23	14 02 58.290	58.878	-577	-10	8	17 04 19.913	20.424	-505	- 6
24	14 06 54.839	55.433	-577	-16	9	17 08 16.477	16.980	-502	- 1
25	14 10 51.392	51.988	-578	-19	10	17 12 13.040	13.535	-499	+ 4
26	14 14 47.949	48.544	-578	-17	11	17 16 09.603	10.091	-496	+ 8
27	14 18 44.511	45.099	-578	-10	12	17 20 06.163	06.646	-493	+10
28	14 22 41.076	41.654	-578	- 1	13	17 24 02.722	03.201	-489	+10
29	14 26 37.641	38.210	-578	+ 9	14	17 27 59.277	59.757	-486	+ 7
30	14 30 34.204	34.765	-577	+17	15	17 31 55.830	56.312	-483	+ 1
May 1	14 34 30.764	31.320	-577	+21	16	17 35 52.382	52.867	-480	- 6
2	14 38 27.321	27.876	-577	+22	17	17 39 48.933	49.423	-476	-13
3	14 42 23.874	24.431	-576	+19	18	17 43 45.486	45.978	-473	-19
4	14 46 20.424	20.987	-576	+13	19	17 47 42.043	42.533	-470	-21
5	14 50 16.973	17.542	-575	+ 6	20	17 51 38.604	39.089	-466	-18
6	14 54 13.522	14.097	-574	- 1	21	17 55 35.170	35.644	-463	-11
7	14 58 10.072	10.653	-573	- 7	22	17 59 31.739	32.200	-460	- 1
8	15 02 06.624	07.208	-573	-12	23	18 03 28.308	28.755	-456	+ 9
9	15 06 03.178	03.763	-572	-14	24	18 07 24.875	25.310	-453	+17
10	15 09 59.735	60.319	-570	-13	25	18 11 21.438	21.866	-450	+22
11	15 13 56.295	56.874	-569	-10	26	18 15 17.996	18.421	-446	+21
12	15 17 52.856	53.430	-568	- 6	27	18 19 14.551	14.976	-443	+17
13	15 21 49.418	49.985	-567	- 1	28	18 23 11.103	11.532	-440	+11
14	15 25 45.980	46.540	-565	+ 4	29	18 27 07.655	08.087	-436	+ 4
15	15 29 42.540	43.096	-564	+ 8	30	18 31 04.206	04.643	-433	- 3
16	15 33 39.099	39.651	-562	+10	July 1	18 35 00.760	01.198	-430	- 8
17	15 37 35.655	36.206	-560	+ 9	2	18 38 57.315	57.753	-427	-11

TABLE II, 1986  
SIDEREAL TIME AT 0<sup>h</sup> U.T.

Date	Sidereal Time		Equation of Equinoxes		Date	Sidereal Time		Equation of Equinoxes	
	Apparent	Mean	Long-Period	Short-Period		Apparent	Mean	Long-Period	Short-Period
			(0 <sup>o</sup> 001)					(0 <sup>o</sup> 001)	
July 1	18 <sup>h</sup> 35 <sup>m</sup> 00 <sup>s</sup> .760	01 <sup>s</sup> .198	-430	- 8	Aug. 16	21 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> .400	22 <sup>s</sup> .745	-345	0
2	18 38 57.315	57.753	-427	-11	17	21 40 18.965	19.300	-345	+ 9
3	18 42 53.873	54.309	-424	-12	18	21 44 15.527	15.856	-345	+17
4	18 46 50.434	50.864	-420	-10	19	21 48 12.086	12.411	-345	+20
5	18 50 46.996	47.419	-417	- 6	20	21 52 08.640	08.966	-345	+19
6	18 54 43.559	43.975	-414	- 1	21	21 56 05.190	05.522	-346	+14
7	18 58 40.123	40.530	-411	+ 4	22	22 00 01.738	02.077	-346	+ 8
8	19 02 36.685	37.085	-408	+ 8	23	22 03 58.286	58.632	-347	0
9	19 06 33.246	33.641	-405	+11	24	22 07 54.834	55.188	-347	- 6
10	19 10 29.805	30.196	-402	+11	25	22 11 51.385	51.743	-348	-10
11	19 14 26.361	26.752	-400	+ 9	26	22 15 47.938	48.298	-349	-12
12	19 18 22.914	23.307	-397	+ 3	27	22 19 44.493	44.854	-349	-11
13	19 22 19.465	19.862	-394	- 3	28	22 23 41.050	41.409	-350	- 8
14	19 26 16.016	16.418	-391	-11	29	22 27 37.609	37.965	-351	- 4
15	19 30 12.567	12.973	-389	-17	30	22 31 34.169	34.520	-352	+ 1
16	19 34 09.122	09.528	-386	-20	31	22 35 30.728	31.075	-353	+ 6
17	19 38 05.680	06.084	-384	-20	Sept. 1	22 39 27.287	27.631	-354	+10
18	19 42 02.243	02.639	-381	-15	2	22 43 23.843	24.186	-356	+12
19	19 45 58.809	59.195	-379	- 6	3	22 47 20.396	20.741	-357	+11
20	19 49 55.377	55.750	-377	+ 4	4	22 51 16.946	17.297	-358	+ 8
21	19 53 51.944	52.305	-374	+13	5	22 55 13.494	13.852	-360	+ 2
22	19 57 48.508	48.861	-372	+19	6	22 59 10.041	10.408	-361	- 6
23	20 01 45.067	45.416	-370	+21	7	23 03 06.588	06.963	-362	-13
24	20 05 41.622	41.971	-368	+19	8	23 07 03.137	03.518	-364	-18
25	20 09 38.173	38.527	-366	+13	9	23 10 59.689	60.074	-366	-19
26	20 13 34.723	35.082	-364	+ 6	10	23 14 56.245	56.629	-367	-17
27	20 17 31.273	31.637	-363	- 1	11	23 18 52.805	53.184	-369	-10
28	20 21 27.825	28.193	-361	- 7	12	23 22 49.368	49.740	-370	- 2
29	20 25 24.378	24.748	-359	-11	13	23 26 45.930	46.295	-372	+ 7
30	20 29 20.934	21.304	-358	-12	14	23 30 42.491	42.850	-374	+15
31	20 33 17.492	17.859	-356	-10	15	23 34 39.049	39.406	-376	+19
Aug. 1	20 37 14.052	14.414	-355	- 7	16	23 38 35.603	35.961	-377	+19
2	20 41 10.614	10.970	-354	- 2	17	23 42 32.153	32.517	-379	+16
3	20 45 07.176	07.525	-353	+ 3	18	23 46 28.700	29.072	-381	+10
4	20 49 03.737	04.080	-351	+ 8	19	23 50 25.247	25.627	-383	+ 2
5	20 53 00.296	00.636	-350	+11	20	23 54 21.793	22.183	-385	- 5
6	20 56 56.854	57.191	-349	+12	21	23 58 18.342	18.738	-387	-10
7	21 00 53.408	53.746	-349	+10	22	0 02 14.892	15.293	-389	-13
8	21 04 49.960	50.302	-348	+ 6	23	0 06 11.446	11.849	-390	-13
9	21 08 46.509	46.857	-347	- 1	24	0 10 08.002	08.404	-392	-10
10	21 12 43.058	43.413	-347	- 8	25	0 14 04.559	04.959	-394	- 6
11	21 16 39.607	39.968	-346	-15	26	0 18 01.118	01.515	-396	- 1
12	21 20 36.159	36.523	-346	-19	27	0 21 57.677	58.070	-398	+ 4
13	21 24 32.714	33.079	-345	-20	28	0 25 54.235	54.626	-400	+ 9
14	21 28 29.273	29.634	-345	-16	29	0 29 50.791	51.181	-402	+11
15	21 32 25.835	26.189	-345	- 9	30	0 33 47.344	47.736	-403	+12
16	21 36 22.400	22.745	-345	0	Oct. 1	0 37 43.895	44.292	-405	+ 9

TABLE II, 1986  
SIDEREAL TIME AT 0<sup>h</sup> U.T.

Date	Sidereal Time		Equation of Equinoxes		Date	Sidereal Time		Equation of Equinoxes	
	Apparent	Mean	Long-Period	Short-Period		Apparent	Mean	Long-Period	Short-Period
			(0 <sup>o</sup> 001)					(0 <sup>o</sup> 001)	
Oct. 1	0 <sup>h</sup> 37 <sup>m</sup> 43 <sup>s</sup> .895	44 <sup>s</sup> .292	-405	+ 9	Nov.16	3 <sup>h</sup> 39 <sup>m</sup> 05 <sup>s</sup> .408	05 <sup>s</sup> .839	-418	-13
2	0 41 40.444	40.847	-407	+ 4	17	3 43 01.966	02.394	-416	-12
3	0 45 36.990	37.402	-409	- 3	18	3 46 58.526	58.949	-414	- 9
4	0 49 33.537	33.958	-410	-11	19	3 50 55.088	55.505	-412	- 4
5	0 53 30.084	30.513	-412	-17	20	3 54 51.651	52.060	-410	+ 1
6	0 57 26.636	27.069	-414	-19	21	3 58 48.213	48.615	-408	+ 6
7	1 01 23.191	23.624	-415	-17	22	4 02 44.775	45.171	-405	+ 9
8	1 05 19.751	20.179	-417	-12	23	4 06 41.334	41.726	-403	+11
9	1 09 16.313	16.735	-418	- 3	24	4 10 37.891	38.282	-400	+10
10	1 13 12.876	13.290	-420	+ 6	25	4 14 34.445	34.837	-398	+ 6
11	1 17 09.438	09.845	-421	+14	26	4 18 30.997	31.392	-395	0
12	1 21 05.997	06.401	-423	+19	27	4 22 27.548	27.948	-392	- 7
13	1 25 02.552	02.956	-424	+20	28	4 26 24.099	24.503	-389	-14
14	1 28 59.104	59.511	-425	+17	29	4 30 20.652	21.058	-386	-20
15	1 32 55.652	56.067	-426	+12	30	4 34 17.209	17.614	-383	-21
16	1 36 52.199	52.622	-427	+ 5	Dec. 1	4 38 13.770	14.169	-380	-18
17	1 40 48.747	49.178	-428	- 3	2	4 42 10.336	10.724	-377	-11
18	1 44 45.295	45.733	-429	- 8	3	4 46 06.905	07.280	-374	- 1
19	1 48 41.846	42.288	-430	-12	4	4 50 03.474	03.835	-371	+10
20	1 52 38.400	38.844	-431	-13	5	4 54 00.041	00.391	-367	+18
21	1 56 34.956	35.399	-432	-11	6	4 57 56.604	56.946	-364	+22
22	2 00 31.514	31.954	-432	- 8	7	5 01 53.162	53.501	-360	+21
23	2 04 28.074	28.510	-433	- 3	8	5 05 49.717	50.057	-357	+17
24	2 08 24.634	25.065	-433	+ 2	9	5 09 46.269	46.612	-353	+10
25	2 12 21.194	21.620	-434	+ 7	10	5 13 42.821	43.167	-349	+ 3
26	2 16 17.752	18.176	-434	+10	11	5 17 39.373	39.723	-346	- 4
27	2 20 14.308	14.731	-434	+11	12	5 21 35.927	36.278	-342	- 9
28	2 24 10.861	11.287	-435	+ 9	13	5 25 32.484	32.833	-338	-11
29	2 28 07.412	07.842	-435	+ 5	14	5 29 29.043	29.389	-334	-11
30	2 32 03.961	04.397	-434	- 1	15	5 33 25.605	25.944	-330	- 9
31	2 36 00.509	00.953	-434	- 9	16	5 37 22.168	22.500	-327	- 5
Nov. 1	2 39 57.058	57.508	-434	-16	17	5 41 18.733	19.055	-323	0
2	2 43 53.610	54.063	-434	-20	18	5 45 15.297	15.610	-319	+ 5
3	2 47 50.166	50.619	-433	-19	19	5 49 11.860	12.166	-315	+ 9
4	2 51 46.727	47.174	-433	-14	20	5 53 08.421	08.721	-311	+11
5	2 55 43.292	43.730	-432	- 6	21	5 57 04.980	05.276	-307	+11
6	2 59 39.858	40.285	-431	+ 4	22	6 01 01.536	01.832	-303	+ 8
7	3 03 36.423	36.840	-430	+13	23	6 04 58.090	58.387	-299	+ 2
8	3 07 32.985	33.396	-429	+19	24	6 08 54.643	54.943	-295	- 5
9	3 11 29.544	29.951	-428	+21	25	6 12 51.195	51.498	-291	-12
10	3 15 26.099	26.506	-427	+19	26	6 16 47.748	48.053	-287	-18
11	3 19 22.650	23.062	-426	+14	27	6 20 44.303	44.609	-283	-22
12	3 23 19.200	19.617	-425	+ 7	28	6 24 40.863	41.164	-279	-21
13	3 27 15.750	16.172	-423	0	29	6 28 37.428	37.719	-275	-16
14	3 31 12.300	12.728	-421	- 6	30	6 32 33.996	34.275	-272	- 7
15	3 35 08.853	09.283	-420	-11	31	6 36 30.566	30.830	-268	+ 4
16	3 39 05.408	05.839	-418	-13	32	6 40 27.135	27.385	-264	+14

**TABLE III**  
**CONVERSION OF MEAN SOLAR TO SIDEREAL TIME**  
**CORRECTION TO BE ADDED TO A MEAN TIME INTERVAL**

	0 <sup>h</sup>	1 <sup>h</sup>	2 <sup>h</sup>	3 <sup>h</sup>	4 <sup>h</sup>	5 <sup>h</sup>	6 <sup>h</sup>	7 <sup>h</sup>		For Seconds
0 <sup>m</sup>	0 <sup>m</sup> 00 <sup>s</sup> 000	0 <sup>m</sup> 09 <sup>s</sup> 856	0 <sup>m</sup> 19 <sup>s</sup> 713	0 <sup>m</sup> 29 <sup>s</sup> 569	0 <sup>m</sup> 39 <sup>s</sup> 426	0 <sup>m</sup> 49 <sup>s</sup> 282	0 <sup>m</sup> 59 <sup>s</sup> 139	1 <sup>m</sup> 08 <sup>s</sup> 995	0 <sup>s</sup>	0 <sup>s</sup> 000
1	00.164	10.021	19.877	29.734	39.590	49.447	59.303	09.160	1	.003
2	00.329	10.185	20.041	29.898	39.754	49.611	59.467	09.324	2	.005
3	00.493	10.349	20.206	30.062	39.919	49.775	59.632	09.488	3	.008
4	00.657	10.514	20.370	30.227	40.083	49.939	59.796	09.652	4	.011
5	00.821	10.678	20.534	30.391	40.247	50.104	59.960	09.817	5	.014
6	00.986	10.842	20.699	30.555	40.412	50.268	1 00.124	09.981	6	.016
7	01.150	11.006	20.863	30.719	40.576	50.432	00.289	10.145	7	.019
8	01.314	11.171	21.027	30.884	40.740	50.597	00.453	10.310	8	.022
9	01.478	11.335	21.191	31.048	40.904	50.761	00.617	10.474	9	.025
10	01.643	11.499	21.356	31.212	41.069	50.925	1 00.782	1 10.638	10	.027
11	01.807	11.663	21.520	31.376	41.233	51.089	00.946	10.802	11	.030
12	01.971	11.828	21.684	31.541	41.397	51.254	01.110	10.967	12	.033
13	02.136	11.992	21.849	31.705	41.561	51.418	01.274	11.131	13	.036
14	02.300	12.156	22.013	31.869	41.726	51.582	01.439	11.295	14	.038
15	02.464	12.321	22.177	32.034	41.890	51.746	1 01.603	1 11.459	15	.041
16	02.628	12.485	22.341	32.198	42.054	51.911	01.767	11.624	16	.044
17	02.793	12.649	22.506	32.362	42.219	52.075	01.932	11.788	17	.047
18	02.957	12.813	22.670	32.526	42.383	52.239	02.096	11.952	18	.049
19	03.121	12.978	22.834	32.691	42.547	52.404	02.260	12.117	19	.052
20	03.285	13.142	22.998	32.855	42.711	52.568	1 02.424	1 12.281	20	.055
21	03.450	13.306	23.163	33.019	42.876	52.732	02.589	12.445	21	.057
22	03.614	13.471	23.327	33.183	43.040	52.896	02.753	12.609	22	.060
23	03.778	13.635	23.491	33.348	43.204	53.061	02.917	12.774	23	.063
24	03.943	13.799	23.656	33.512	43.368	53.225	03.081	12.938	24	.066
25	04.107	13.963	23.820	33.676	43.533	53.389	1 03.246	1 13.102	25	.068
26	04.271	14.128	23.984	33.841	43.697	53.554	03.410	13.266	26	.071
27	04.435	14.292	24.148	34.005	43.861	53.718	03.574	13.431	27	.074
28	04.600	14.456	24.313	34.169	44.026	53.882	03.739	13.595	28	.077
29	04.764	14.620	24.477	34.333	44.190	54.046	03.903	13.759	29	.079
30	04.928	14.785	24.641	34.498	44.354	54.211	1 04.067	1 13.924	30	.082
31	05.093	14.949	24.805	34.662	44.518	54.375	04.231	14.088	31	.085
32	05.257	15.113	24.970	34.826	44.683	54.539	04.396	14.252	32	.088
33	05.421	15.278	25.134	34.990	44.847	54.703	04.560	14.416	33	.090
34	05.585	15.442	25.298	35.155	45.011	54.868	04.724	14.581	34	.093
35	05.750	15.606	25.463	35.319	45.176	55.032	1 04.888	1 14.745	35	.096
36	05.914	15.770	25.627	35.483	45.340	55.196	05.053	14.909	36	.099
37	06.078	15.935	25.791	35.648	45.504	55.361	05.217	15.073	37	.101
38	06.242	16.099	25.955	35.812	45.668	55.525	05.381	15.238	38	.104
39	06.407	16.263	26.120	35.976	45.833	55.689	05.546	15.402	39	.107
40	06.571	16.427	26.284	36.140	45.997	55.853	1 05.710	1 15.566	40	.110
41	06.735	16.592	26.448	36.305	46.161	56.018	05.874	15.731	41	.112
42	06.900	16.756	26.612	36.469	46.325	56.182	06.038	15.895	42	.115
43	07.064	16.920	26.777	36.633	46.490	56.346	06.203	16.059	43	.118
44	07.228	17.085	26.941	36.798	46.654	56.510	06.367	16.223	44	.120
45	07.392	17.249	27.105	36.962	46.818	56.675	1 06.531	1 16.388	45	.123
46	07.557	17.413	27.270	37.126	46.983	56.839	06.695	16.552	46	.126
47	07.721	17.577	27.434	37.290	47.147	57.003	06.860	16.716	47	.129
48	07.885	17.742	27.598	37.455	47.311	57.168	07.024	16.880	48	.131
49	08.049	17.906	27.762	37.619	47.475	57.332	07.188	17.045	49	.134
50	08.214	18.070	27.927	37.783	47.640	57.496	1 07.353	1 17.209	50	.137
51	08.378	18.234	28.091	37.947	47.804	57.660	07.517	17.373	51	.140
52	08.542	18.399	28.255	38.112	47.968	57.825	07.681	17.538	52	.142
53	08.707	18.563	28.419	38.276	48.132	57.989	07.845	17.702	53	.145
54	08.871	18.727	28.584	38.440	48.297	58.153	08.010	17.866	54	.148
55	09.035	18.892	28.748	38.605	48.461	58.317	1 08.174	1 18.030	55	.151
56	09.199	19.056	28.912	38.769	48.625	58.482	08.338	18.195	56	.153
57	09.364	19.220	29.077	38.933	48.790	58.646	08.502	18.359	57	.156
58	09.528	19.384	29.241	39.097	48.954	58.810	08.667	18.523	58	.159
59	09.692	19.549	29.405	39.262	49.118	58.975	1 08.831	1 18.688	59	.162

(The argument is Mean Solar Time)

CONVERSION OF MEAN SOLAR TO SIDEREAL TIME  
CORRECTION TO BE ADDED TO A MEAN TIME INTERVAL

	8 <sup>h</sup>	9 <sup>h</sup>	10 <sup>h</sup>	11 <sup>h</sup>	12 <sup>h</sup>	13 <sup>h</sup>	14 <sup>h</sup>	15 <sup>h</sup>	For Seconds
0 <sup>m</sup>	1 <sup>m</sup> 18.852	1 <sup>m</sup> 28.708	1 <sup>m</sup> 38.565	1 <sup>m</sup> 48.421	1 <sup>m</sup> 58.278	2 <sup>m</sup> 08.134	2 <sup>m</sup> 17.991	2 <sup>m</sup> 27.847	0 <sup>s</sup> 0.000
1	19.016	28.873	38.729	48.585	58.442	08.298	18.155	28.011	1 .003
2	19.180	29.037	38.893	48.750	58.606	08.463	18.319	28.176	2 .005
3	19.345	29.201	39.058	48.914	58.771	08.627	18.483	28.340	3 .008
4	19.509	29.365	39.222	49.078	58.935	08.791	18.648	28.504	4 .011
5	1 19.673	1 29.530	1 39.386	1 49.243	1 59.099	2 08.956	2 18.812	2 28.668	5 0.014
6	19.837	29.694	39.550	49.407	59.263	09.120	18.976	28.833	6 .016
7	20.002	29.858	39.715	49.571	59.428	09.284	19.141	28.997	7 .019
8	20.166	30.022	39.879	49.735	59.592	09.448	19.305	29.161	8 .022
9	20.330	30.187	40.043	49.900	59.756	09.613	19.469	29.326	9 .025
10	1 20.495	1 30.351	1 40.207	1 50.064	1 59.920	2 09.777	2 19.633	2 29.490	10 0.027
11	20.659	30.515	40.372	50.228	2 00.085	09.941	19.798	29.654	11 .030
12	20.823	30.680	40.536	50.393	00.249	10.105	19.962	29.818	12 .033
13	20.987	30.844	40.700	50.557	00.413	10.270	20.126	29.983	13 .036
14	21.152	31.008	40.865	50.721	00.578	10.434	20.290	30.147	14 .038
15	1 21.316	1 31.172	1 41.029	1 50.885	2 00.742	2 10.598	2 20.455	2 30.311	15 0.041
16	21.480	31.337	41.193	51.050	00.906	10.763	20.619	30.475	16 .044
17	21.644	31.501	41.357	51.214	01.070	10.927	20.783	30.640	17 .047
18	21.809	31.665	41.522	51.378	01.235	11.091	20.948	30.804	18 .049
19	21.973	31.829	41.686	51.542	01.399	11.255	21.112	30.968	19 .052
20	1 22.137	1 31.994	1 41.850	1 51.707	2 01.563	2 11.420	2 21.276	2 31.133	20 0.055
21	22.302	32.158	42.014	51.871	01.727	11.584	21.440	31.297	21 .057
22	22.466	32.322	42.179	52.035	01.892	11.748	21.605	31.461	22 .060
23	22.630	32.487	42.343	52.200	02.056	11.912	21.769	31.625	23 .063
24	22.794	32.651	42.507	52.364	02.220	12.077	21.933	31.790	24 .066
25	1 22.959	1 32.815	1 42.672	1 52.528	2 02.385	2 12.241	2 22.097	2 31.954	25 0.068
26	23.123	32.979	42.836	52.692	02.549	12.405	22.262	32.118	26 .071
27	23.287	33.144	43.000	52.857	02.713	12.570	22.426	32.283	27 .074
28	23.451	33.308	43.164	53.021	02.877	12.734	22.590	32.447	28 .077
29	23.616	33.472	43.329	53.185	03.042	12.898	22.755	32.611	29 .079
30	1 23.780	1 33.636	1 43.493	1 53.349	2 03.206	2 13.062	2 22.919	2 32.775	30 0.082
31	23.944	33.801	43.657	53.514	03.370	13.227	23.083	32.940	31 .085
32	24.109	33.965	43.822	53.678	03.534	13.391	23.247	33.104	32 .088
33	24.273	34.129	43.986	53.842	03.699	13.555	23.412	33.268	33 .090
34	24.437	34.294	44.150	54.007	03.863	13.719	23.576	33.432	34 .093
35	1 24.601	1 34.458	1 44.314	1 54.171	2 04.027	2 13.884	2 23.740	2 33.597	35 0.096
36	24.766	34.622	44.479	54.335	04.192	14.048	23.905	33.761	36 .099
37	24.930	34.786	44.643	54.499	04.356	14.212	24.069	33.925	37 .101
38	25.094	34.951	44.807	54.664	04.520	14.377	24.233	34.090	38 .104
39	25.258	35.115	44.971	54.828	04.684	14.541	24.397	34.254	39 .107
40	1 25.423	1 35.279	1 45.136	1 54.992	2 04.849	2 14.705	2 24.562	2 34.418	40 0.110
41	25.587	35.444	45.300	55.156	05.013	14.869	24.726	34.582	41 .112
42	25.751	35.608	45.464	55.321	05.177	15.034	24.890	34.747	42 .115
43	25.916	35.772	45.629	55.485	05.341	15.198	25.054	34.911	43 .118
44	26.080	35.936	45.793	55.649	05.506	15.362	25.219	35.075	44 .120
45	1 26.244	1 36.101	1 45.957	1 55.814	2 05.670	2 15.527	2 25.383	2 35.239	45 0.123
46	26.408	36.265	46.121	55.978	05.834	15.691	25.547	35.404	46 .126
47	26.573	36.429	46.286	56.142	05.999	15.855	25.712	35.568	47 .129
48	26.737	36.593	46.450	56.306	06.163	16.019	25.876	35.732	48 .131
49	26.901	36.758	46.614	56.471	06.327	16.184	26.040	35.897	49 .134
50	1 27.066	1 36.922	1 46.778	1 56.635	2 06.491	2 16.348	2 26.204	2 36.061	50 0.137
51	27.230	37.086	46.943	56.799	06.656	16.512	26.369	36.225	51 .140
52	27.394	37.251	47.107	56.963	06.820	16.676	26.533	36.389	52 .142
53	27.558	37.415	47.271	57.128	06.984	16.841	26.697	36.554	53 .145
54	27.723	37.579	47.436	57.292	07.149	17.005	26.861	36.718	54 .148
55	1 27.887	1 37.743	1 47.600	1 57.456	2 07.313	2 17.169	2 27.026	2 36.882	55 0.151
56	28.051	37.908	47.764	57.621	07.477	17.334	27.190	37.046	56 .153
57	28.215	38.072	47.928	57.785	07.641	17.498	27.354	37.211	57 .156
58	28.380	38.236	48.093	57.949	07.806	17.662	27.519	37.375	58 .159
59	1 28.544	1 38.400	1 48.257	1 58.113	2 07.970	2 17.826	2 27.683	2 37.539	59 0.162

(The argument is Mean Solar Time)

CONVERSION OF MEAN SOLAR TO SIDEREAL TIME  
CORRECTION TO BE ADDED TO A MEAN TIME INTERVAL

	16 <sup>h</sup>	17 <sup>h</sup>	18 <sup>h</sup>	19 <sup>h</sup>	20 <sup>h</sup>	21 <sup>h</sup>	22 <sup>h</sup>	23 <sup>h</sup>	For Seconds
0 <sup>m</sup>	2 <sup>m</sup> 37.704	2 <sup>m</sup> 47.560	2 <sup>m</sup> 57.417	3 <sup>m</sup> 07.273	3 <sup>m</sup> 17.129	3 <sup>m</sup> 26.986	3 <sup>m</sup> 36.842	3 <sup>m</sup> 46.699	0 <sup>s</sup> 0.000
1	37.868	47.724	57.581	07.437	17.294	27.150	37.007	46.863	1 .003
2	38.032	47.889	57.745	07.602	17.458	27.314	37.171	47.027	2 .005
3	38.196	48.053	57.909	07.766	17.622	27.479	37.335	47.192	3 .008
4	38.361	48.217	58.074	07.930	17.787	27.643	37.500	47.356	4 .011
5	2 38.525	2 48.381	2 58.238	3 08.094	3 17.951	3 27.807	3 37.664	3 47.520	5 0.014
6	38.689	48.546	58.402	08.259	18.115	27.972	37.828	47.685	6 .016
7	38.853	48.710	58.566	08.423	18.279	28.136	37.992	47.849	7 .019
8	39.018	48.874	58.731	08.587	18.444	28.300	38.157	48.013	8 .022
9	39.182	49.039	58.895	08.751	18.608	28.464	38.321	48.177	9 .025
10	2 39.346	2 49.203	2 59.059	3 08.916	3 18.772	3 28.629	3 38.485	3 48.342	10 0.027
11	39.511	49.367	59.224	09.080	18.936	28.793	38.649	48.506	11 .030
12	39.675	49.531	59.388	09.244	19.101	28.957	38.814	48.670	12 .033
13	39.839	49.696	59.552	09.409	19.265	29.122	38.978	48.834	13 .036
14	40.003	49.860	59.716	09.573	19.429	29.286	39.142	48.999	14 .038
15	2 40.168	2 50.024	2 59.881	3 09.737	3 19.594	3 29.450	3 39.307	3 49.163	15 0.041
16	40.332	50.188	3 00.045	09.901	19.758	29.614	39.471	49.327	16 .044
17	40.496	50.353	00.209	10.066	19.922	29.779	39.635	49.492	17 .047
18	40.661	50.517	00.373	10.230	20.086	29.943	39.799	49.656	18 .049
19	40.825	50.681	00.538	10.394	20.251	30.107	39.964	49.820	19 .052
20	2 40.989	2 50.846	3 00.702	3 10.558	3 20.415	3 30.271	3 40.128	3 49.984	20 0.055
21	41.153	51.010	00.866	10.723	20.579	30.436	40.292	50.149	21 .057
22	41.318	51.174	01.031	10.887	20.744	30.600	40.456	50.313	22 .060
23	41.482	51.338	01.195	11.051	20.908	30.764	40.621	50.477	23 .063
24	41.646	51.503	01.359	11.216	21.072	30.929	40.785	50.641	24 .066
25	2 41.810	2 51.667	3 01.523	3 11.380	3 21.236	3 31.093	3 40.949	3 50.806	25 0.068
26	41.975	51.831	01.688	11.544	21.401	31.257	41.114	50.970	26 .071
27	42.139	51.995	01.852	11.708	21.565	31.421	41.278	51.134	27 .074
28	42.303	52.160	02.016	11.873	21.729	31.586	41.442	51.299	28 .077
29	42.468	52.324	02.180	12.037	21.893	31.750	41.606	51.463	29 .079
30	2 42.632	2 52.488	3 02.345	3 12.201	3 22.058	3 31.914	3 41.771	3 51.627	30 0.082
31	42.796	52.653	02.509	12.366	22.222	32.078	41.935	51.791	31 .085
32	42.960	52.817	02.673	12.530	22.386	32.243	42.099	51.956	32 .088
33	43.125	52.981	02.838	12.694	22.551	32.407	42.263	52.120	33 .090
34	43.289	53.145	03.002	12.858	22.715	32.571	42.428	52.284	34 .093
35	2 43.453	2 53.310	3 03.166	3 13.023	3 22.879	3 32.736	3 42.592	3 52.448	35 0.096
36	43.617	53.474	03.330	13.187	23.043	32.900	42.756	52.613	36 .099
37	43.782	53.638	03.495	13.351	23.208	33.064	42.921	52.777	37 .101
38	43.946	53.802	03.659	13.515	23.372	33.228	43.085	52.941	38 .104
39	44.110	53.967	03.823	13.680	23.536	33.393	43.249	53.106	39 .107
40	2 44.275	2 54.131	3 03.988	3 13.844	3 23.700	3 33.557	3 43.413	3 53.270	40 0.110
41	44.439	54.295	04.152	14.008	23.865	33.721	43.578	53.434	41 .112
42	44.603	54.460	04.316	14.173	24.029	33.885	43.742	53.598	42 .115
43	44.767	54.624	04.480	14.337	24.193	34.050	43.906	53.763	43 .118
44	44.932	54.788	04.645	14.501	24.358	34.214	44.070	53.927	44 .120
45	2 45.096	2 54.952	3 04.809	3 14.665	3 24.522	3 34.378	3 44.235	3 54.091	45 0.123
46	45.260	55.117	04.973	14.830	24.686	34.543	44.399	54.256	46 .126
47	45.424	55.281	05.137	14.994	24.850	34.707	44.563	54.420	47 .129
48	45.589	55.445	05.302	15.158	25.015	34.871	44.728	54.584	48 .131
49	45.753	55.610	05.466	15.322	25.179	35.035	44.892	54.748	49 .134
50	2 45.917	2 55.774	3 05.630	3 15.487	3 25.343	3 35.200	3 45.056	3 54.913	50 0.137
51	46.082	55.938	05.795	15.651	25.507	35.364	45.220	55.077	51 .140
52	46.246	56.102	05.959	15.815	25.672	35.528	45.385	55.241	52 .142
53	46.410	56.267	06.123	15.980	25.836	35.692	45.549	55.405	53 .145
54	46.574	56.431	06.287	16.144	26.000	35.857	45.713	55.570	54 .148
55	2 46.739	2 56.595	3 06.452	3 16.308	3 26.165	3 36.021	3 45.878	3 55.734	55 0.151
56	46.903	56.759	06.616	16.472	26.329	36.185	46.042	55.898	56 .153
57	47.067	56.924	06.780	16.637	26.493	36.350	46.206	56.063	57 .156
58	47.231	57.088	06.944	16.801	26.657	36.514	46.370	56.227	58 .159
59	2 47.396	2 57.252	3 07.109	3 16.965	3 26.822	3 36.678	3 46.535	3 56.391	59 0.162

(The argument is Mean Solar Time)



CONVERSION OF SIDEREAL TO MEAN SOLAR TIME  
CORRECTION TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL

	0 <sup>h</sup>	1 <sup>h</sup>	2 <sup>h</sup>	3 <sup>h</sup>	4 <sup>h</sup>	5 <sup>h</sup>	6 <sup>h</sup>	7 <sup>h</sup>	For Seconds
0 <sup>m</sup>	0 <sup>m</sup> 00:000	0 <sup>m</sup> 09:830	0 <sup>m</sup> 19:659	0 <sup>m</sup> 29:489	0 <sup>m</sup> 39:318	0 <sup>m</sup> 49:148	0 <sup>m</sup> 58:977	1 <sup>m</sup> 08:807	0 <sup>s</sup> 0:000
1	00.164	09.993	19.823	29.653	39.482	49.312	59.141	08.971	1 .003
2	00.328	10.157	19.987	29.816	39.646	49.475	59.305	09.135	2 .005
3	00.491	10.321	20.151	29.980	39.810	49.639	59.469	09.298	3 .008
4	00.655	10.485	20.314	30.144	39.974	49.803	59.633	09.462	4 .011
5	0 00.819	0 10.649	0 20.478	0 30.308	0 40.137	0 49.967	0 59.796	1 09.626	5 0.014
6	00.983	10.813	20.642	30.472	40.301	50.131	0 59.960	09.790	6 .016
7	01.147	10.976	20.806	30.635	40.465	50.295	1 00.124	09.954	7 .019
8	01.311	11.140	20.970	30.799	40.629	50.458	00.288	10.118	8 .022
9	01.474	11.304	21.134	30.963	40.793	50.622	00.452	10.281	9 025
10	0 01.638	0 11.468	0 21.297	0 31.127	0 40.957	0 50.786	1 00.616	1 10.445	10 0.027
11	01.802	11.632	21.461	31.291	41.120	50.950	00.779	10.609	11 .030
12	01.966	11.795	21.625	31.455	41.284	51.114	00.943	10.773	12 .033
13	02.130	11.959	21.789	31.618	41.448	51.278	01.107	10.937	13 .035
14	02.294	12.123	21.953	31.782	41.612	51.441	01.271	11.100	14 .038
15	0 02.457	0 12.287	0 22.117	0 31.946	0 41.776	0 51.605	1 01.435	1 11.264	15 0.041
16	02.621	12.451	22.280	32.110	41.939	51.769	01.599	11.428	16 .044
17	02.785	12.615	22.444	32.274	42.103	51.933	01.762	11.592	17 .046
18	02.949	12.778	22.608	32.438	42.267	52.097	01.926	11.756	18 .049
19	03.113	12.942	22.772	32.601	42.431	52.260	02.090	11.920	19 .052
20	0 03.277	0 13.106	0 22.936	0 32.765	0 42.595	0 52.424	1 02.254	1 12.083	20 0.055
21	03.440	13.270	23.099	32.929	42.759	52.588	02.418	12.247	21 .057
22	03.604	13.434	23.263	33.093	42.922	52.752	02.582	12.411	22 .060
23	03.768	13.598	23.427	33.257	43.086	52.916	02.745	12.575	23 .063
24	03.932	13.761	23.591	33.421	43.250	53.080	02.909	12.739	24 .066
25	0 04.096	0 13.925	0 23.755	0 33.584	0 43.414	0 53.243	1 03.073	1 12.903	25 0.068
26	04.259	14.089	23.919	33.748	43.578	53.407	03.237	13.066	26 .071
27	04.423	14.253	24.082	33.912	43.742	53.571	03.401	13.230	27 .074
28	04.587	14.417	24.246	34.076	43.905	53.735	03.564	13.394	28 .076
29	04.751	14.581	24.410	34.240	44.069	53.899	03.728	13.558	29 .079
30	0 04.915	0 14.744	0 24.574	0 34.403	0 44.233	0 54.063	1 03.892	1 13.722	30 0.082
31	05.079	14.908	24.738	34.567	44.397	54.226	04.056	13.886	31 .085
32	05.242	15.072	24.902	34.731	44.561	54.390	04.220	14.049	32 .087
33	05.406	15.236	25.065	34.895	44.725	54.554	04.384	14.213	33 .090
34	05.570	15.400	25.229	35.059	44.888	54.718	04.547	14.377	34 .093
35	0 05.734	0 15.563	0 25.393	0 35.223	0 45.052	0 54.882	1 04.711	1 14.541	35 0.096
36	05.898	15.727	25.557	35.386	45.216	55.046	04.875	14.705	36 .098
37	06.062	15.891	25.721	35.550	45.380	55.209	05.039	14.868	37 .101
38	06.225	16.055	25.885	35.714	45.544	55.373	05.203	15.032	38 .104
39	06.389	16.219	26.048	35.878	45.707	55.537	05.367	15.196	39 .106
40	0 06.553	0 16.383	0 26.212	0 36.042	0 45.871	0 55.701	1 05.530	1 15.360	40 0.109
41	06.717	16.546	26.376	36.206	46.035	55.865	05.694	15.524	41 .112
42	06.881	16.710	26.540	36.369	46.199	56.028	05.858	15.688	42 .115
43	07.045	16.874	26.704	36.533	46.363	56.192	06.022	15.851	43 .117
44	07.208	17.038	26.867	36.697	46.527	56.356	06.186	16.015	44 .120
45	0 07.372	0 17.202	0 27.031	0 36.861	0 46.690	0 56.520	1 06.350	1 16.179	45 0.123
46	07.536	17.366	27.195	37.025	46.854	56.684	06.513	16.343	46 .126
47	07.700	17.529	27.359	37.189	47.018	56.848	06.677	16.507	47 .128
48	07.864	17.693	27.523	37.352	47.182	57.011	06.841	16.671	48 .131
49	08.027	17.857	27.687	37.516	47.346	57.175	07.005	16.834	49 .134
50	0 08.191	0 18.021	0 27.850	0 37.680	0 47.510	0 57.339	1 07.169	1 16.998	50 0.137
51	08.355	18.185	28.014	37.844	47.673	57.503	07.332	17.162	51 .139
52	08.519	18.349	28.178	38.008	47.837	57.667	07.496	17.326	52 .142
53	08.683	18.512	28.342	38.171	48.001	57.831	07.660	17.490	53 .145
54	08.847	18.676	28.506	38.335	48.165	57.994	07.824	17.654	54 .147
55	0 09.010	0 18.840	0 28.670	0 38.499	0 48.329	0 58.158	1 07.988	1 17.817	55 0.150
56	09.174	19.004	28.833	38.663	48.493	58.322	08.152	17.981	56 .153
57	09.338	19.168	28.997	38.827	48.656	58.486	08.315	18.145	57 .156
58	09.502	19.331	29.161	38.991	48.820	58.650	08.479	18.309	58 .158
59	0 09.666	0 19.495	0 29.325	0 39.154	0 48.984	0 58.814	1 08.643	1 18.473	59 0.161

(The argument is the Sidereal Time Interval)

**TABLE IV**  
**CONVERSION OF SIDEREAL TO MEAN SOLAR TIME**  
**CORRECTION TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL**

	8 <sup>h</sup>	9 <sup>h</sup>	10 <sup>h</sup>	11 <sup>h</sup>	12 <sup>h</sup>	13 <sup>h</sup>	14 <sup>h</sup>	15 <sup>h</sup>	For Seconds	
0 <sup>m</sup>	1 <sup>m</sup> 18 <sup>s</sup> 636	1 <sup>m</sup> 28 <sup>s</sup> 466	1 <sup>m</sup> 38 <sup>s</sup> 296	1 <sup>m</sup> 48 <sup>s</sup> 125	1 <sup>m</sup> 57 <sup>s</sup> 955	2 <sup>m</sup> 07 <sup>s</sup> 784	2 <sup>m</sup> 17 <sup>s</sup> 614	2 <sup>m</sup> 27 <sup>s</sup> 443	0 <sup>s</sup>	0 <sup>s</sup> 000
1	18.800	28.630	38.459	48.289	58.119	07.948	17.778	27.607	1	.003
2	18.964	28.794	38.623	48.453	58.282	08.112	17.942	27.771	2	.005
3	19.128	28.958	38.787	48.617	58.446	08.276	18.105	27.935	3	.008
4	19.292	29.121	38.951	48.780	58.610	08.440	18.269	28.099	4	.011
5	19.456	29.285	39.115	48.944	58.774	08.603	18.433	28.263	5	.014
6	19.619	29.449	39.279	49.108	58.938	08.767	18.597	28.426	6	.016
7	19.783	29.613	39.442	49.272	59.102	08.931	18.761	28.590	7	.019
8	19.947	29.777	39.606	49.436	59.265	09.095	18.924	28.754	8	.022
9	20.111	29.940	39.770	49.600	59.429	09.259	19.088	28.918	9	.025
10	20.275	30.104	39.934	49.763	59.593	09.423	19.252	29.082	10	.027
11	20.439	30.268	40.098	49.927	59.757	09.586	19.416	<b>29.245</b>	11	.030
12	20.602	30.432	40.262	50.091	59.921	09.750	19.580	29.409	12	.033
13	20.766	30.596	40.425	50.255	2 00.084	09.914	19.744	29.573	13	.035
14	20.930	30.760	40.589	50.419	00.248	10.078	19.907	29.737	14	.038
15	21.094	30.923	40.753	50.583	2 00.412	2 10.242	2 20.071	2 29.901	15	.041
16	21.258	31.087	40.917	50.746	00.576	10.406	20.235	30.065	16	.044
17	21.422	31.251	41.081	50.910	00.740	10.569	20.399	30.228	17	.046
18	21.585	31.415	41.244	51.074	00.904	10.733	20.563	30.392	18	.049
19	21.749	31.579	41.408	51.238	01.067	10.897	20.727	30.556	19	.052
20	21.913	31.743	41.572	51.402	2 01.231	2 11.061	2 20.890	2 30.720	20	.055
21	22.077	31.906	41.736	51.566	01.395	11.225	21.054	30.884	21	.057
22	22.241	32.070	41.900	51.729	01.559	11.388	21.218	31.048	22	.060
23	22.404	32.234	42.064	51.893	01.723	11.552	21.382	31.211	23	.063
24	22.568	32.398	42.227	52.057	01.887	11.716	21.546	31.375	24	.066
25	22.732	32.562	42.391	52.221	2 02.050	2 11.880	2 21.710	2 31.539	25	.068
26	22.896	32.726	42.555	52.385	02.214	12.044	21.873	31.703	26	.071
27	23.060	32.889	42.719	52.548	02.378	12.208	22.037	31.867	27	.074
28	23.224	33.053	42.883	52.712	02.542	12.371	22.201	32.031	28	.076
29	23.387	33.217	43.047	52.876	02.706	12.535	22.365	32.194	29	.079
30	23.551	33.381	43.210	53.040	2 02.870	2 12.699	2 22.529	2 32.358	30	.082
31	23.715	33.545	43.374	53.204	03.033	12.863	22.692	32.522	31	.085
32	23.879	33.708	43.538	53.368	03.197	13.027	22.856	32.686	32	.087
33	24.043	33.872	43.702	53.531	03.361	13.191	23.020	32.850	33	.090
34	24.207	34.036	43.866	53.695	03.525	13.354	23.184	<b>33.013</b>	34	.093
35	24.370	34.200	44.030	53.859	2 03.689	2 13.518	2 23.348	2 33.177	35	.096
36	24.534	34.364	44.193	54.023	03.852	13.682	23.512	33.341	36	.098
37	24.698	34.528	44.357	54.187	04.016	13.846	23.675	33.505	37	.101
38	24.862	34.691	44.521	54.351	04.180	14.010	23.839	33.669	38	.104
39	25.026	34.855	44.685	54.514	04.344	14.174	24.003	33.833	39	.106
40	25.190	35.019	44.849	54.678	2 04.508	2 14.337	2 24.167	2 33.996	40	.109
41	25.353	35.183	45.012	54.842	04.672	14.501	24.331	34.160	41	.112
42	25.517	35.347	45.176	55.006	04.835	14.665	24.495	34.324	42	.115
43	25.681	35.511	45.340	55.170	04.999	14.829	24.658	34.488	43	.117
44	25.845	35.674	45.504	55.334	05.163	14.993	24.822	34.652	44	.120
45	26.009	35.838	45.668	55.497	2 05.327	2 15.156	2 24.986	2 34.816	45	.123
46	26.172	36.002	45.832	55.661	05.491	15.320	25.150	34.979	46	.126
47	26.336	36.166	45.995	55.825	05.655	15.484	25.314	35.143	47	.128
48	26.500	36.330	46.159	55.989	05.818	15.648	25.478	35.307	48	.131
49	26.664	36.494	46.323	56.153	05.982	15.812	25.641	35.471	49	.134
50	26.828	36.657	46.487	56.316	2 06.146	2 15.976	2 25.805	2 35.635	50	.137
51	26.992	36.821	46.651	56.480	06.310	16.139	25.969	35.799	51	.139
52	27.155	36.985	46.815	56.644	06.474	16.303	26.133	35.962	52	.142
53	27.319	37.149	46.978	56.808	06.638	16.467	26.297	36.126	53	.145
54	27.483	37.313	47.142	56.972	06.801	16.631	26.460	36.290	54	.147
55	27.647	37.476	47.306	57.136	2 06.965	2 16.795	2 26.624	2 36.454	55	.150
56	27.811	37.640	47.470	57.299	07.129	16.959	26.788	36.618	56	.153
57	27.975	37.804	47.634	57.463	07.293	17.122	26.952	36.781	57	.156
58	28.138	37.968	47.798	57.627	07.457	17.286	27.116	36.945	58	.158
59	28.302	38.132	47.961	57.791	2 07.620	2 17.450	2 27.280	2 37.109	59	.161

(The argument is the Sidereal Time Interval)

CONVERSION OF SIDEREAL TO MEAN SOLAR TIME  
CORRECTION TO BE SUBTRACTED FROM A SIDEREAL TIME INTERVAL

	16 <sup>h</sup>	17 <sup>h</sup>	18 <sup>h</sup>	19 <sup>h</sup>	20 <sup>h</sup>	21 <sup>h</sup>	22 <sup>h</sup>	23 <sup>h</sup>	For Seconds
0 <sup>m</sup>	2 <sup>m</sup> 37 <sup>s</sup> 27.3	2 <sup>m</sup> 47 <sup>s</sup> 10.3	2 <sup>m</sup> 56 <sup>s</sup> 9.32	3 <sup>m</sup> 06 <sup>s</sup> 7.62	3 <sup>m</sup> 16 <sup>s</sup> 5.91	3 <sup>m</sup> 26 <sup>s</sup> 4.21	3 <sup>m</sup> 36 <sup>s</sup> 2.50	3 <sup>m</sup> 46 <sup>s</sup> 0.80	0 <sup>s</sup> 0 <sup>s</sup> .000
1	37.437	47.266	57.096	06.925	16.755	26.585	36.414	46.244	1 .003
2	37.601	47.430	57.260	07.089	16.919	26.748	36.578	46.408	2 .005
3	37.764	47.594	57.424	07.253	17.083	26.912	36.742	46.571	3 .008
4	37.928	47.758	57.587	07.417	17.247	27.076	36.906	46.735	4 .011
5	2 38.092	2 47.922	2 57.751	3 07.581	3 17.410	3 27.240	3 37.069	3 46.899	5 0.014
6	38.256	48.085	57.915	07.745	17.574	27.404	37.233	47.063	6 .016
7	38.420	48.249	58.079	07.908	17.738	27.568	37.397	47.227	7 .019
8	38.584	48.413	58.243	08.072	17.902	27.731	37.561	47.391	8 .022
9	38.747	48.577	58.407	08.236	18.066	27.895	37.725	47.554	9 .025
10	2 38.911	2 48.741	2 58.570	3 08.400	3 18.229	3 28.059	3 37.889	3 47.718	10 0.027
11	39.075	48.905	58.734	08.564	18.393	28.223	38.052	47.882	11 .030
12	39.239	49.068	58.898	08.728	18.557	28.387	38.216	48.046	12 .033
13	39.403	49.232	59.062	08.891	18.721	28.551	38.380	48.210	13 .035
14	39.567	49.396	59.226	09.055	18.885	28.714	38.544	48.373	14 .038
15	2 39.730	2 49.560	2 59.389	3 09.219	3 19.049	3 28.878	3 38.708	3 48.537	15 0.041
16	39.894	49.724	59.553	09.383	19.212	29.042	38.872	48.701	16 .044
17	40.058	49.888	59.717	09.547	19.376	29.206	39.035	48.865	17 .046
18	40.222	50.051	2 59.881	09.711	19.540	29.370	39.199	49.029	18 .049
19	40.386	50.215	3 00.045	09.874	19.704	29.533	39.363	49.193	19 .052
20	2 40.549	2 50.379	3 00.209	3 10.038	3 19.868	3 29.697	3 39.527	3 49.356	20 0.055
21	40.713	50.543	00.372	10.202	20.032	29.861	39.691	49.520	21 .057
22	40.877	50.707	00.536	10.366	20.195	30.025	39.855	49.684	22 .060
23	41.041	50.871	00.700	10.530	20.359	30.189	40.018	49.848	23 .063
24	41.205	51.034	00.864	10.693	20.523	30.353	40.182	50.012	24 .066
25	2 41.369	2 51.198	3 01.028	3 10.857	3 20.687	3 30.516	3 40.346	3 50.176	25 0.068
26	41.532	51.362	01.192	11.021	20.851	30.680	40.510	50.339	26 .071
27	41.696	51.526	01.355	11.185	21.015	30.844	40.674	50.503	27 .074
28	41.860	51.690	01.519	11.349	21.178	31.008	40.837	50.667	28 .076
29	42.024	51.853	01.683	11.513	21.342	31.172	41.001	50.831	29 .079
30	2 42.188	2 52.017	3 01.847	3 11.676	3 21.506	3 31.336	3 41.165	3 50.995	30 0.082
31	42.352	52.181	02.011	11.840	21.670	31.499	41.329	51.159	31 .085
32	42.515	52.345	02.175	12.004	21.834	31.663	41.493	51.322	32 .087
33	42.679	52.509	02.338	12.168	21.997	31.827	41.657	51.486	33 .090
34	42.843	52.673	02.502	12.332	22.161	31.991	41.820	51.650	34 .093
35	2 43.007	2 52.836	3 02.666	3 12.496	3 22.325	3 32.155	3 41.984	3 51.814	35 0.096
36	43.171	53.000	02.830	12.659	22.489	32.319	42.148	51.978	36 .098
37	43.335	53.164	02.994	12.823	22.653	32.482	42.312	52.141	37 .101
38	43.498	53.328	03.157	12.987	22.817	32.646	42.476	52.305	38 .104
39	43.662	53.492	03.321	13.151	22.980	32.810	42.640	52.469	39 .106
40	2 43.826	2 53.656	3 03.485	3 13.315	3 23.144	3 32.974	3 42.803	3 52.633	40 0.109
41	43.990	53.819	03.649	13.479	23.308	33.138	42.967	52.797	41 .112
42	44.154	53.983	03.813	13.642	23.472	33.301	43.131	52.961	42 .115
43	44.317	54.147	03.977	13.806	23.636	33.465	43.295	53.124	43 .117
44	44.481	54.311	04.140	13.970	23.800	33.629	43.459	53.288	44 .120
45	2 44.645	2 54.475	3 04.304	3 14.134	3 23.963	3 33.793	3 43.623	3 53.452	45 0.123
46	44.809	54.639	04.468	14.298	24.127	33.957	43.786	53.616	46 .126
47	44.973	54.802	04.632	14.461	24.291	34.121	43.950	53.780	47 .128
48	45.137	54.966	04.796	14.625	24.455	34.284	44.114	53.944	48 .131
49	45.300	55.130	04.960	14.789	24.619	34.448	44.278	54.107	49 .134
50	2 45.464	2 55.294	3 05.123	3 14.953	3 24.783	3 34.612	3 44.442	3 54.271	50 0.137
51	45.628	55.458	05.287	15.117	24.946	34.776	44.605	54.435	51 .139
52	45.792	55.621	05.451	15.281	25.110	34.940	44.769	54.599	52 .142
53	45.956	55.785	05.615	15.444	25.274	35.104	44.933	54.763	53 .145
54	46.120	55.949	05.779	15.608	25.438	35.267	45.097	54.927	54 .147
55	2 46.283	2 56.113	3 05.943	3 15.772	3 25.602	3 35.431	3 45.261	3 55.090	55 0.150
56	46.447	56.277	06.106	15.936	25.765	35.595	45.425	55.254	56 .153
57	46.611	56.441	06.270	16.100	25.929	35.759	45.588	55.418	57 .156
58	46.775	56.604	06.434	16.264	26.093	35.923	45.752	55.582	58 .158
59	2 46.939	2 56.768	3 06.598	3 16.427	3 26.257	3 36.087	3 45.916	3 55.746	59 0.161

(The argument is the Sidereal Time Interval)

**TABLE V**  
**CONVERSION OF HOURS, MINUTES AND SECONDS**  
**TO DECIMALS OF A DAY**

	0 <sup>h</sup>	1 <sup>h</sup>	2 <sup>h</sup>	3 <sup>h</sup>	4 <sup>h</sup>	5 <sup>h</sup>	SECONDS
0 <sup>m</sup>	0.00000	0.04167	0.08333	0.12500	0.16667	0.20833	0 <sup>s</sup> 0.00000
1	.00069	.04236	.08403	.12569	.16736	.20903	1 .00001
2	.00139	.04306	.08472	.12639	.16806	.20972	2 .00002
3	.00208	.04375	.08542	.12708	.16875	.21042	3 .00003
4	.00278	.04444	.08611	.12778	.16944	.21111	4 .00005
5	0.00347	0.04514	0.08681	0.12847	0.17014	0.21181	5 0.00006
6	.00417	.04583	.08750	.12917	.17083	.21250	6 .00007
7	.00486	.04653	.08819	.12986	.17153	.21319	7 .00008
8	.00556	.04722	.08889	.13056	.17222	.21389	8 .00009
9	.00625	.04792	.08958	.13125	.17292	.21458	9 .00010
10	0.00694	0.04861	0.09028	0.13194	0.17361	0.21528	10 0.00012
11	.00764	.04931	.09097	.13264	.17431	.21597	11 .00013
12	.00833	.05000	.09167	.13333	.17500	.21667	12 .00014
13	.00903	.05069	.09236	.13403	.17569	.21736	13 .00015
14	.00972	.05139	.09306	.13472	.17639	.21806	14 .00016
15	0.01042	0.05208	0.09375	0.13542	0.17708	0.21875	15 0.00017
16	.01111	.05278	.09444	.13611	.17778	.21944	16 .00019
17	.01181	.05347	.09514	.13681	.17847	.22014	17 .00020
18	.01250	.05417	.09583	.13750	.17917	.22083	18 .00021
19	.01319	.05486	.09653	.13819	.17986	.22153	19 .00022
20	0.01389	0.05556	0.09722	0.13889	0.18056	0.22222	20 0.00023
21	.01458	.05625	.09792	.13958	.18125	.22292	21 .00024
22	.01528	.05694	.09861	.14028	.18194	.22361	22 .00025
23	.01597	.05764	.09931	.14097	.18264	.22431	23 .00027
24	.01667	.05833	.10000	.14167	.18333	.22500	24 .00028
25	0.01736	0.05903	0.10069	0.14236	0.18403	0.22569	25 0.00029
26	.01806	.05972	.10139	.14306	.18472	.22639	26 .00030
27	.01875	.06042	.10208	.14375	.18542	.22708	27 .00031
28	.01944	.06111	.10278	.14444	.18611	.22778	28 .00032
29	.02014	.06181	.10347	.14514	.18681	.22847	29 .00034
30	0.02083	0.06250	0.10417	0.14583	0.18750	0.22917	30 0.00035
31	.02153	.06319	.10486	.14653	.18819	.22986	31 .00036
32	.02222	.06389	.10556	.14722	.18889	.23056	32 .00037
33	.02292	.06458	.10625	.14792	.18958	.23125	33 .00038
34	.02361	.06528	.10694	.14861	.19028	.23194	34 .00039
35	0.02431	0.06597	0.10764	0.14931	0.19097	0.23264	35 0.00041
36	.02500	.06667	.10833	.15000	.19167	.23333	36 .00042
37	.02569	.06736	.10903	.15069	.19236	.23403	37 .00043
38	.02639	.06806	.10972	.15139	.19306	.23472	38 .00044
39	.02708	.06875	.11042	.15208	.19375	.23542	39 .00045
40	0.02778	0.06944	0.11111	0.15278	0.19444	0.23611	40 0.00046
41	.02847	.07014	.11181	.15347	.19514	.23681	41 .00047
42	.02917	.07083	.11250	.15417	.19583	.23750	42 .00049
43	.02986	.07153	.11319	.15486	.19653	.23819	43 .00050
44	.03056	.07222	.11389	.15556	.19722	.23889	44 .00051
45	0.03125	0.07292	0.11458	0.15625	0.19792	0.23958	45 0.00052
46	.03194	.07361	.11528	.15694	.19861	.24028	46 .00053
47	.03264	.07431	.11597	.15764	.19931	.24097	47 .00054
48	.03333	.07500	.11667	.15833	.20000	.24167	48 .00056
49	.03403	.07569	.11736	.15903	.20069	.24236	49 .00057
50	0.03472	0.07639	0.11806	0.15972	0.20139	0.24306	50 0.00058
51	.03542	.07708	.11875	.16042	.20208	.24375	51 .00059
52	.03611	.07778	.11944	.16111	.20278	.24444	52 .00060
53	.03681	.07847	.12014	.16181	.20347	.24514	53 .00061
54	.03750	.07917	.12083	.16250	.20417	.24583	54 .00062
55	0.03819	0.07986	0.12153	0.16319	0.20486	0.24653	55 0.00064
56	.03889	.08056	.12222	.16389	.20556	.24722	56 .00065
57	.03958	.08125	.12292	.16458	.20625	.24792	57 .00066
58	.04028	.08194	.12361	.16528	.20694	.24861	58 .00067
59	0.04097	0.08264	0.12431	0.16597	0.20764	0.24931	59 0.00068

TABLE V  
CONVERSION OF HOURS, MINUTES AND SECONDS  
TO DECIMALS OF A DAY

	6 <sup>h</sup>	7 <sup>h</sup>	8 <sup>h</sup>	9 <sup>h</sup>	10 <sup>h</sup>	11 <sup>h</sup>	SECONDS
0 <sup>m</sup>	0. <sup>d</sup> 25000	0. <sup>d</sup> 29167	0. <sup>d</sup> 33333	0. <sup>d</sup> 37500	0. <sup>d</sup> 41667	0. <sup>d</sup> 45833	0 <sup>s</sup> 0. <sup>d</sup> 00000
1	.25069	.29236	.33403	.37569	.41736	.45903	1 .00001
2	.25139	.29306	.33472	.37639	.41806	.45972	2 .00002
3	.25208	.29375	.33542	.37708	.41875	.46042	3 .00003
4	.25278	.29444	.33611	.37778	.41944	.46111	4 .00005
5	0.25347	0.29514	0.33681	0.37847	0.42014	0.46181	5 0.00006
6	.25417	.29583	.33750	.37917	.42083	.46250	6 .00007
7	.25486	.29653	.33819	.37986	.42153	.46319	7 .00008
8	.25556	.29722	.33889	.38056	.42222	.46389	8 .00009
9	.25625	.29792	.33958	.38125	.42292	.46458	9 .00010
10	0.25694	0.29861	0.34028	0.38194	0.42361	0.46528	10 0.00012
11	.25764	.29931	.34097	.38264	.42431	.46597	11 .00013
12	.25833	.30000	.34167	.38333	.42500	.46667	12 .00014
13	.25903	.30069	.34236	.38403	.42569	.46736	13 .00015
14	.25972	.30139	.34306	.38472	.42639	.46806	14 .00016
15	0.26042	0.30208	0.34375	0.38542	0.42708	0.46875	15 0.00017
16	.26111	.30278	.34444	.38611	.42778	.46944	16 .00019
17	.26181	.30347	.34514	.38681	.42847	.47014	17 .00020
18	.26250	.30417	.34583	.38750	.42917	.47083	18 .00021
19	.26319	.30486	.34653	.38819	.42986	.47153	19 .00022
20	0.26389	0.30556	0.34722	0.38889	0.43056	0.47222	20 0.00023
21	.26458	.30625	.34792	.38958	.43125	.47292	21 .00024
22	.26528	.30694	.34861	.39028	.43194	.47361	22 .00025
23	.26597	.30764	.34931	.39097	.43264	.47431	23 .00027
24	.26667	.30833	.35000	.39167	.43333	.47500	24 .00028
25	0.26736	0.30903	0.35069	0.39236	0.43403	0.47569	25 0.00029
26	.26806	.30972	.35139	.39306	.43472	.47639	26 .00030
27	.26875	.31042	.35208	.39375	.43542	.47708	27 .00031
28	.26944	.31111	.35278	.39444	.43611	.47778	28 .00032
29	.27014	.31181	.35347	.39514	.43681	.47847	29 .00034
30	0.27083	0.31250	0.35417	0.39583	0.43750	0.47917	30 0.00035
31	.27153	.31319	.35486	.39653	.43819	.47986	31 .00036
32	.27222	.31389	.35556	.39722	.43889	.48056	32 .00037
33	.27292	.31458	.35625	.39792	.43958	.48125	33 .00038
34	.27361	.31528	.35694	.39861	.44028	.48194	34 .00039
35	0.27431	0.31597	0.35764	0.39931	0.44097	0.48264	35 0.00041
36	.27500	.31667	.35833	.40000	.44167	.48333	36 .00042
37	.27569	.31736	.35903	.40069	.44236	.48403	37 .00043
38	.27639	.31806	.35972	.40139	.44306	.48472	38 .00044
39	.27708	.31875	.36042	.40208	.44375	.48542	39 .00045
40	0.27778	0.31944	0.36111	0.40278	0.44444	0.48611	40 0.00046
41	.27847	.32014	.36181	.40347	.44514	.48681	41 .00047
42	.27917	.32083	.36250	.40417	.44583	.48750	42 .00049
43	.27986	.32153	.36319	.40486	.44653	.48819	43 .00050
44	.28056	.32222	.36389	.40556	.44722	.48889	44 .00051
45	0.28125	0.32292	0.36458	0.40625	0.44792	0.48958	45 0.00052
46	.28194	.32361	.36528	.40694	.44861	.49028	46 .00053
47	.28264	.32431	.36597	.40764	.44931	.49097	47 .00054
48	.28333	.32500	.36667	.40833	.45000	.49167	48 .00056
49	.28403	.32569	.36736	.40903	.45069	.49236	49 .00057
50	0.28472	0.32639	0.36806	0.40972	0.45139	0.49306	50 0.00058
51	.28542	.32708	.36875	.41042	.45208	.49375	51 .00059
52	.28611	.32778	.36944	.41111	.45278	.49444	52 .00060
53	.28681	.32847	.37014	.41181	.45347	.49514	53 .00061
54	.28750	.32917	.37083	.41250	.45417	.49583	54 .00062
55	0.28819	0.32986	0.37153	0.41319	0.45486	0.49653	55 0.00064
56	.28889	.33056	.37222	.41389	.45556	.49722	56 .00065
57	.28958	.33125	.37292	.41458	.45625	.49792	57 .00066
58	.29028	.33194	.37361	.41528	.45694	.49861	58 .00067
59	0.29097	0.33264	0.37431	0.41597	0.45764	0.49931	59 0.00068

SECOND DIFFERENCE CORRECTION  $B'' (\Delta'_0 + \Delta'_1)$

$n$	10 15 20	25 30 35	40 45 50	55 60 65	70 75 80	85 90 95	100 105 110	$n$
0.01	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0.99
.02	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 1 1	.98
.03	0 0 0	0 0 0	0 0 0	0 0 0	1 1 1	1 1 1	1 1 1	.97
.04	0 0 0	0 0 0	0 0 0	1 1 1	1 1 1	1 1 1	1 1 1	.96
.05	0 0 0	0 0 0	0 1 1	1 1 1	1 1 1	1 1 1	1 1 1	0.95
0.06	0 0 0	0 0 0	1 1 1	1 1 1	1 1 1	1 1 1	1 1 2	.94
.07	0 0 0	0 0 1	1 1 1	1 1 1	1 1 1	1 1 2	2 2 2	.93
.08	0 0 0	0 1 1	1 1 1	1 1 1	1 1 1	2 2 2	2 2 2	.92
.09	0 0 0	1 1 1	1 1 1	1 1 1	1 2 2	2 2 2	2 2 2	.91
.10	0 0 0	1 1 1	1 1 1	1 1 1	2 2 2	2 2 2	2 2 2	0.90
0.11	0 0 0	1 1 1	1 1 1	1 1 2	2 2 2	2 2 2	2 3 3	.89
.12	0 0 1	1 1 1	1 1 1	1 2 2	2 2 2	2 2 3	3 3 3	.88
.13	0 0 1	1 1 1	1 1 1	2 2 2	2 2 2	2 3 3	3 3 3	.87
.14	0 0 1	1 1 1	1 1 2	2 2 2	2 2 2	3 3 3	3 3 3	.86
.15	0 0 1	1 1 1	1 1 2	2 2 2	2 2 3	3 3 3	3 3 4	0.85
0.16	0 1 1	1 1 1	1 2 2	2 2 2	2 3 3	3 3 3	3 4 4	.84
.17	0 1 1	1 1 1	1 2 2	2 2 2	2 3 3	3 3 3	4 4 4	.83
.18	0 1 1	1 1 1	1 2 2	2 2 2	3 3 3	3 3 4	4 4 4	.82
.19	0 1 1	1 1 1	2 2 2	2 2 3	3 3 3	3 3 4	4 4 4	.81
.20	0 1 1	1 1 1	2 2 2	2 2 3	3 3 3	3 4 4	4 4 4	0.80
0.21	0 1 1	1 1 1	2 2 2	2 2 3	3 3 3	4 4 4	4 4 5	.79
.22	0 1 1	1 1 2	2 2 2	2 3 3	3 3 3	4 4 4	4 5 5	.78
.23	0 1 1	1 1 2	2 2 2	2 3 3	3 3 4	4 4 4	4 5 5	.77
.24	0 1 1	1 1 2	2 2 2	3 3 3	3 3 4	4 4 4	4 5 5	.76
.25	0 1 1	1 1 2	2 2 2	3 3 3	3 4 4	4 4 4	4 5 5	0.75
0.26	0 1 1	1 1 2	2 2 2	3 3 3	3 4 4	4 4 5	5 5 5	.74
.27	0 1 1	1 1 2	2 2 2	3 3 3	3 4 4	4 4 5	5 5 5	.73
.28	1 1 1	1 2 2	2 2 3	3 3 3	4 4 4	4 5 5	5 5 6	.72
.29	1 1 1	1 2 2	2 2 3	3 3 3	4 4 4	4 5 5	5 5 6	.71
.30	1 1 1	1 2 2	2 2 3	3 3 3	4 4 4	4 5 5	5 6 6	0.70
0.31	1 1 1	1 2 2	2 2 3	3 3 3	4 4 4	5 5 5	5 6 6	.69
.32	1 1 1	1 2 2	2 2 3	3 3 4	4 4 4	5 5 5	5 6 6	.68
.33	1 1 1	1 2 2	2 2 3	3 3 4	4 4 4	5 5 5	6 6 6	.67
.34	1 1 1	1 2 2	2 3 3	3 3 4	4 4 4	5 5 5	6 6 6	.66
.35	1 1 1	1 2 2	2 3 3	3 3 4	4 4 5	5 5 5	6 6 6	0.65
0.36	1 1 1	1 2 2	2 3 3	3 3 4	4 4 5	5 5 5	6 6 6	.64
.37	1 1 1	1 2 2	2 3 3	3 3 4	4 4 5	5 5 6	6 6 6	.63
.38	1 1 1	1 2 2	2 3 3	3 4 4	4 4 5	5 5 6	6 6 6	.62
.39	1 1 1	1 2 2	2 3 3	3 4 4	4 4 5	5 5 6	6 6 7	.61
.40	1 1 1	2 2 2	2 3 3	3 4 4	4 4 5	5 5 6	6 6 7	0.60
0.41	1 1 1	2 2 2	2 3 3	3 4 4	4 5 5	5 5 6	6 6 7	.59
.42	1 1 1	2 2 2	2 3 3	3 4 4	4 5 5	5 5 6	6 6 7	.58
.43	1 1 1	2 2 2	2 3 3	3 4 4	4 5 5	5 6 6	6 6 7	.57
.44	1 1 1	2 2 2	2 3 3	3 4 4	4 5 5	5 6 6	6 6 7	.56
.45	1 1 1	2 2 2	2 3 3	3 4 4	4 5 5	5 6 6	6 6 7	0.55
0.46	1 1 1	2 2 2	2 3 3	3 4 4	4 5 5	5 6 6	6 7 7	.54
.47	1 1 1	2 2 2	2 3 3	3 4 4	4 5 5	5 6 6	6 7 7	.53
.48	1 1 1	2 2 2	2 3 3	3 4 4	4 5 5	5 6 6	6 7 7	.52
.49	1 1 1	2 2 2	2 3 3	3 4 4	4 5 5	5 6 6	6 7 7	.51
0.50	1 1 1	2 2 2	2 3 3	3 4 4	4 5 5	5 6 6	6 7 7	0.50

The correction  $B'' (\Delta'_0 + \Delta'_1)$  is always of the opposite sign to  $\Delta'_0 + \Delta'_1$

SECOND DIFFERENCE CORRECTION  $B'' (\Delta_0'' + \Delta_1'')$

$n$	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	$n$
0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.99
.02	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.98
.03	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.97
.04	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	.96
.05	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0.95
0.06	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	.94
.07	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	.93
.08	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	4	4	.92
.09	2	2	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	.91
.10	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	0.90
0.11	3	3	3	3	3	3	4	4	4	4	4	4	4	4	5	5	5	5	.89
.12	3	3	3	3	4	4	4	4	4	4	4	4	5	5	5	5	5	5	.88
.13	3	3	4	4	4	4	4	4	4	5	5	5	5	5	5	5	6	6	.87
.14	3	4	4	4	4	4	4	5	5	5	5	5	5	5	6	6	6	6	.86
.15	4	4	4	4	4	4	5	5	5	5	5	5	6	6	6	6	6	6	0.85
0.16	4	4	4	4	5	5	5	5	5	5	6	6	6	6	6	6	7	7	.84
.17	4	4	4	5	5	5	5	5	5	6	6	6	6	6	7	7	7	7	.83
.18	4	4	5	5	5	5	5	6	6	6	6	6	6	7	7	7	7	7	.82
.19	4	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	.81
.20	5	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	0.80
0.21	5	5	5	5	6	6	6	6	6	7	7	7	7	7	8	8	8	8	.79
.22	5	5	5	6	6	6	6	6	7	7	7	7	8	8	8	8	8	9	.78
.23	5	5	6	6	6	6	6	7	7	7	8	8	8	8	8	8	9	9	.77
.24	5	5	6	6	6	6	7	7	7	7	8	8	8	8	8	9	9	9	.76
.25	5	6	6	6	6	7	7	7	7	8	8	8	8	8	9	9	9	9	0.75
0.26	6	6	6	6	6	7	7	7	7	8	8	8	8	9	9	9	9	10	.74
.27	6	6	6	6	7	7	7	7	8	8	8	8	9	9	9	9	10	10	.73
.28	6	6	6	7	7	7	7	8	8	8	8	9	9	9	9	10	10	10	.72
.29	6	6	6	7	7	7	7	8	8	8	8	9	9	9	10	10	10	10	.71
.30	6	6	7	7	7	7	8	8	8	8	9	9	9	9	10	10	10	10	0.70
0.31	6	6	7	7	7	7	8	8	8	9	9	9	9	10	10	10	10	11	.69
.32	6	7	7	7	7	8	8	8	8	9	9	9	10	10	10	10	11	11	.68
.33	6	7	7	7	7	8	8	8	9	9	9	9	10	10	10	11	11	11	.67
.34	6	7	7	7	8	8	8	8	9	9	9	10	10	10	10	11	11	11	.66
.35	7	7	7	7	8	8	8	9	9	9	9	10	10	10	11	11	11	11	0.65
0.36	7	7	7	7	8	8	8	9	9	9	10	10	10	10	11	11	11	12	.64
.37	7	7	7	8	8	8	8	9	9	9	10	10	10	10	11	11	11	12	.63
.38	7	7	7	8	8	8	9	9	9	9	10	10	10	10	11	11	11	12	.62
.39	7	7	7	8	8	8	9	9	9	10	10	10	10	11	11	11	12	12	.61
.40	7	7	8	8	8	8	9	9	9	10	10	10	10	11	11	11	12	12	0.60
0.41	7	7	8	8	8	8	9	9	9	10	10	10	11	11	11	11	12	12	.59
.42	7	7	8	8	8	9	9	9	9	10	10	10	11	11	11	11	12	12	.58
.43	7	7	8	8	8	9	9	9	9	10	10	10	11	11	11	11	12	12	.57
.44	7	7	8	8	8	9	9	9	10	10	10	10	11	11	11	11	12	12	.56
.45	7	7	8	8	8	9	9	9	10	10	10	11	11	11	11	11	12	12	0.55
0.46	7	7	8	8	8	9	9	9	10	10	10	11	11	11	11	12	12	12	.54
.47	7	7	8	8	8	9	9	9	10	10	10	11	11	11	12	12	12	12	.53
.48	7	7	8	8	8	9	9	9	10	10	10	11	11	11	12	12	12	12	.52
.49	7	7	8	8	8	9	9	9	10	10	10	11	11	11	12	12	12	12	.51
0.50	7	8	8	8	8	9	9	9	10	10	10	11	11	11	12	12	12	12	0.50

The correction  $B'' (\Delta_0'' + \Delta_1'')$  is always of the opposite sign to  $\Delta_0'' + \Delta_1''$

SECOND DIFFERENCE CORRECTION  $B'' (\Delta_0'' + \Delta_1'')$

$n$	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280	285	$n$
0.01	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.99
.02	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	.98
.03	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	.97
.04	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	.96
.05	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0.95
0.06	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	.94
.07	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	5	5	.93
.08	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5	5	5	5	.92
.09	4	4	4	4	5	5	5	5	5	5	5	5	5	5	6	6	6	6	.91
.10	4	5	5	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	0.90
0.11	5	5	5	5	5	6	6	6	6	6	6	6	6	6	7	7	7	7	.89
.12	5	5	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	8	.88
.13	6	6	6	6	6	6	7	7	7	7	7	7	7	7	8	8	8	8	.87
.14	6	6	6	6	7	7	7	7	7	7	8	8	8	8	8	8	8	9	.86
.15	6	7	7	7	7	7	7	7	8	8	8	8	8	8	9	9	9	9	0.85
0.16	7	7	7	7	7	8	8	8	8	8	8	9	9	9	9	9	10	10	.84
.17	7	7	7	7	8	8	8	8	8	9	9	9	9	9	10	10	10	10	.83
.18	7	8	8	8	8	8	8	8	9	9	9	9	10	10	10	10	10	11	.82
.19	8	8	8	8	8	8	9	9	9	9	10	10	10	10	10	10	11	11	.81
.20	8	8	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	0.80
0.21	8	9	9	9	9	9	10	10	10	10	10	11	11	11	11	11	12	12	.79
.22	9	9	9	9	9	10	10	10	10	10	11	11	11	11	12	12	12	12	.78
.23	9	9	9	10	10	10	10	10	11	11	11	11	12	12	12	12	12	13	.77
.24	9	9	10	10	10	10	10	11	11	11	11	12	12	12	12	13	13	13	.76
.25	9	10	10	10	10	11	11	11	11	11	12	12	12	12	13	13	13	13	0.75
0.26	10	10	10	10	11	11	11	11	12	12	12	12	13	13	13	13	13	14	.74
.27	10	10	10	11	11	11	11	12	12	12	12	13	13	13	13	14	14	14	.73
.28	10	10	11	11	11	11	12	12	12	12	13	13	13	13	14	14	14	14	.72
.29	10	11	11	11	11	12	12	12	12	13	13	13	13	14	14	14	14	15	.71
.30	10	11	11	11	12	12	12	12	13	13	13	13	14	14	14	14	15	15	0.70
0.31	11	11	11	11	12	12	12	13	13	13	13	14	14	14	14	15	15	15	.69
.32	11	11	11	12	12	12	13	13	13	13	14	14	14	14	15	15	15	16	.68
.33	11	11	12	12	12	12	13	13	13	14	14	14	14	15	15	15	15	16	.67
.34	11	12	12	12	12	13	13	13	13	14	14	14	15	15	15	15	16	16	.66
.35	11	12	12	12	13	13	13	13	14	14	14	15	15	15	15	16	16	16	0.65
0.36	12	12	12	12	13	13	13	13	14	14	14	15	15	15	16	16	16	16	.64
.37	12	12	12	13	13	13	13	14	14	14	15	15	15	15	16	16	16	17	.63
.38	12	12	12	13	13	13	14	14	14	14	15	15	15	16	16	16	16	17	.62
.39	12	12	12	13	13	13	14	14	14	14	15	15	15	16	16	16	17	17	.61
.40	12	12	13	13	13	14	14	14	14	15	15	15	16	16	16	16	17	17	0.60
0.41	12	12	13	13	13	14	14	14	15	15	15	15	16	16	16	17	17	17	.59
.42	12	12	13	13	13	14	14	14	15	15	15	16	16	16	16	17	17	17	.58
.43	12	13	13	13	13	14	14	14	15	15	15	16	16	16	17	17	17	17	.57
.44	12	13	13	13	14	14	14	14	15	15	15	16	16	16	17	17	17	18	.56
.45	12	13	13	13	14	14	14	14	15	15	15	16	16	16	17	17	17	18	0.55
0.46	12	13	13	13	14	14	14	15	15	15	16	16	16	16	17	17	17	18	.54
.47	12	13	13	13	14	14	14	15	15	15	16	16	16	17	17	17	17	18	.53
.48	12	13	13	13	14	14	14	15	15	15	16	16	16	17	17	17	17	18	.52
.49	12	13	13	13	14	14	14	15	15	15	16	16	16	17	17	17	17	18	.51
.50	12	13	13	13	14	14	14	15	15	15	16	16	16	17	17	17	18	18	0.50

The correction  $B' (\Delta_0' + \Delta_1')$  is always of the opposite sign to  $\Delta_0' + \Delta_1'$



SECOND DIFFERENCE CORRECTION  $B'' (\Delta''_0 + \Delta''_1)$

$n$	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355	360	365	370	$n$
0.01	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.99
.02	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	.98
.03	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	.97
.04	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	4	.96
.05	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0.95
0.06	4	4	4	4	4	4	4	5	5	5	5	5	5	5	5	5	5	5	.94
.07	5	5	5	5	5	5	5	5	5	5	6	6	6	6	6	6	6	6	.93
.08	5	5	5	6	6	6	6	6	6	6	6	6	6	6	7	7	7	7	.92
.09	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	8	.91
.10	6	7	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	0.90
0.11	7	7	7	7	7	8	8	8	8	8	8	8	8	9	9	9	9	9	.89
.12	8	8	8	8	8	8	8	9	9	9	9	9	9	9	9	10	10	10	.88
.13	8	8	8	8	9	9	9	9	9	9	10	10	10	10	10	10	10	10	.87
.14	9	9	9	9	9	9	9	10	10	10	10	10	10	11	11	11	11	11	.86
.15	9	9	9	10	10	10	10	10	10	11	11	11	11	11	11	11	12	12	0.85
0.16	10	10	10	10	10	10	11	11	11	11	11	11	12	12	12	12	12	12	.84
.17	10	10	10	11	11	11	11	11	11	12	12	12	12	12	13	13	13	13	.83
.18	11	11	11	11	11	11	12	12	12	12	12	13	13	13	13	13	13	14	.82
.19	11	11	11	12	12	12	12	12	13	13	13	13	13	13	14	14	14	14	.81
.20	11	12	12	12	12	12	13	13	13	13	13	14	14	14	14	14	15	15	0.80
0.21	12	12	12	12	13	13	13	13	13	14	14	14	14	15	15	15	15	15	.79
.22	12	12	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	.78
.23	13	13	13	13	14	14	14	14	14	15	15	15	15	15	16	16	16	16	.77
.24	13	13	13	14	14	14	14	15	15	15	15	16	16	16	16	16	17	17	.76
.25	13	14	14	14	14	15	15	15	15	15	16	16	16	16	17	17	17	17	0.75
0.26	14	14	14	14	15	15	15	15	16	16	16	16	17	17	17	17	18	18	.74
.27	14	14	15	15	15	15	16	16	16	16	17	17	17	17	17	18	18	18	.73
.28	14	15	15	15	15	16	16	16	16	17	17	17	17	18	18	18	18	19	.72
.29	15	15	15	15	16	16	16	16	17	17	17	18	18	18	18	19	19	19	.71
.30	15	15	15	16	16	16	17	17	17	17	18	18	18	18	19	19	19	19	0.70
0.31	15	16	16	16	16	17	17	17	17	18	18	18	18	19	19	19	20	20	.69
.32	16	16	16	16	17	17	17	17	18	18	18	18	19	19	19	20	20	20	.68
.33	16	16	16	17	17	17	17	18	18	18	19	19	19	19	20	20	20	20	.67
.34	16	16	17	17	17	17	18	18	18	19	19	19	19	20	20	20	20	21	.66
.35	16	16	17	17	17	18	18	18	18	19	19	19	20	20	20	20	21	21	0.65
0.36	16	17	17	17	18	18	18	18	19	19	19	20	20	20	20	21	21	21	.64
.37	17	17	17	17	18	18	18	19	19	19	20	20	20	20	21	21	21	22	.63
.38	17	17	17	18	18	18	19	19	19	19	20	20	20	21	21	21	21	22	.62
.39	17	17	18	18	18	18	19	19	19	20	20	20	21	21	21	21	22	22	.61
.40	17	17	18	18	18	19	19	19	20	20	20	20	21	21	21	22	22	22	0.60
0.41	17	18	18	18	18	19	19	19	20	20	20	21	21	21	21	22	22	22	.59
.42	17	18	18	18	19	19	19	19	20	20	20	21	21	21	22	22	22	23	.58
.43	17	18	18	18	19	19	19	20	20	20	21	21	21	21	22	22	22	23	.57
.44	18	18	18	18	19	19	19	20	20	20	21	21	21	21	22	22	22	23	.56
.45	18	18	18	19	19	19	19	20	20	20	21	21	21	21	22	22	23	23	0.55
0.46	18	18	18	19	19	19	20	20	20	20	21	21	21	21	22	22	23	23	.54
.47	18	18	18	19	19	19	20	20	20	21	21	21	21	22	22	22	23	23	.53
.48	18	18	18	19	19	19	20	20	20	21	21	21	22	22	22	22	23	23	.52
.49	18	18	18	19	19	19	20	20	20	21	21	21	22	22	22	22	23	23	.51
0.50	18	18	18	19	19	19	20	20	20	21	21	21	22	22	22	22	23	23	0.50

The correction  $B'' (\Delta''_0 + \Delta''_1)$  is always of the opposite sign to  $\Delta''_0 + \Delta''_1$

SECOND DIFFERENCE CORRECTION  $B'' (\Delta'_0 + \Delta'_1)$

$n$	370	375	380	385	390	395	400	405	410	415	420	425	430	435	440	445	450	455	$n$
0.01	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.99
0.02	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0.98
0.03	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0.97
0.04	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0.96
0.05	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	0.95
0.06	5	5	5	5	5	6	6	6	6	6	6	6	6	6	6	6	6	6	0.94
0.07	6	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	0.93
0.08	7	7	7	7	7	7	7	7	8	8	8	8	8	8	8	8	8	8	0.92
0.09	8	8	8	8	8	8	8	8	8	8	9	9	9	9	9	9	9	9	0.91
0.10	8	8	9	9	9	9	9	9	9	9	9	10	10	10	10	10	10	10	0.90
0.11	9	9	9	9	10	10	10	10	10	10	10	10	11	11	11	11	11	11	0.89
0.12	10	10	10	10	10	10	11	11	11	11	11	11	11	11	12	12	12	12	0.88
0.13	10	11	11	11	11	11	11	11	12	12	12	12	12	12	12	13	13	13	0.87
0.14	11	11	11	12	12	12	12	12	12	12	13	13	13	13	13	13	14	14	0.86
0.15	12	12	12	12	12	13	13	13	13	13	13	14	14	14	14	14	14	15	0.85
0.16	12	13	13	13	13	13	13	14	14	14	14	14	14	15	15	15	15	15	0.84
0.17	13	13	13	14	14	14	14	14	14	15	15	15	15	15	16	16	16	16	0.83
0.18	14	14	14	14	14	15	15	15	15	15	15	16	16	16	16	16	17	17	0.82
0.19	14	14	15	15	15	15	15	16	16	16	16	16	17	17	17	17	17	18	0.81
0.20	15	15	15	15	16	16	16	16	16	16	17	17	17	17	17	18	18	18	0.80
0.21	15	16	16	16	16	16	17	17	17	17	17	18	18	18	18	18	19	19	0.79
0.22	16	16	16	17	17	17	17	17	18	18	18	18	18	19	19	19	19	20	0.78
0.23	16	17	17	17	17	17	18	18	18	18	19	19	19	19	19	20	20	20	0.77
0.24	17	17	17	18	18	18	18	18	19	19	19	19	20	20	20	20	21	21	0.76
0.25	17	18	18	18	18	19	19	19	19	19	20	20	20	20	21	21	21	21	0.75
0.26	18	18	18	19	19	19	19	19	20	20	20	20	21	21	21	21	22	22	0.74
0.27	18	18	19	19	19	19	20	20	20	20	21	21	21	21	22	22	22	22	0.73
0.28	19	19	19	19	20	20	20	20	21	21	21	21	22	22	22	22	23	23	0.72
0.29	19	19	20	20	20	20	21	21	21	21	22	22	22	22	23	23	23	23	0.71
0.30	19	20	20	20	20	21	21	21	22	22	22	22	23	23	23	23	24	24	0.70
0.31	20	20	20	21	21	21	21	22	22	22	22	23	23	23	24	24	24	24	0.69
0.32	20	20	21	21	21	21	22	22	22	22	23	23	23	23	24	24	24	25	0.68
0.33	20	21	21	21	22	22	22	22	23	23	23	23	24	24	24	25	25	25	0.67
0.34	21	21	21	22	22	22	22	23	23	23	23	24	24	24	25	25	25	26	0.66
0.35	21	21	22	22	22	22	23	23	23	24	24	24	24	25	25	25	26	26	0.65
0.36	21	22	22	22	22	23	23	23	24	24	24	24	25	25	25	26	26	26	0.64
0.37	22	22	22	22	23	23	23	24	24	24	24	25	25	25	26	26	26	27	0.63
0.38	22	22	22	23	23	23	24	24	24	24	25	25	25	26	26	26	27	27	0.62
0.39	22	22	23	23	23	23	24	24	24	25	25	25	26	26	26	26	27	27	0.61
0.40	22	22	23	23	23	24	24	24	25	25	25	26	26	26	26	27	27	27	0.60
0.41	22	23	23	23	24	24	24	24	25	25	25	26	26	26	27	27	27	28	0.59
0.42	23	23	23	23	24	24	24	25	25	25	26	26	26	26	27	27	27	28	0.58
0.43	23	23	23	24	24	24	25	25	25	25	26	26	26	27	27	27	28	28	0.57
0.44	23	23	23	24	24	24	25	25	25	26	26	26	26	27	27	27	28	28	0.56
0.45	23	23	24	24	24	24	25	25	25	26	26	26	27	27	27	28	28	28	0.55
0.46	23	23	24	24	24	25	25	25	25	26	26	26	27	27	27	28	28	28	0.54
0.47	23	23	24	24	24	25	25	25	26	26	26	26	27	27	27	28	28	28	0.53
0.48	23	23	24	24	24	25	25	25	26	26	26	27	27	27	27	28	28	28	0.52
0.49	23	23	24	24	24	25	25	25	26	26	26	27	27	27	27	28	28	28	0.51
0.50	23	23	24	24	24	25	25	25	26	26	26	27	27	27	28	28	28	28	0.50

The correction  $B' (\Delta'_0 + \Delta'_1)$  is always of the opposite sign to  $\Delta'_0 + \Delta'_1$

SECOND DIFFERENCE CORRECTION  $B'' (\Delta_0'' + \Delta_1'')$

"	455	460	465	470	475	480	485	490	495	500	505	510	515	520	525	530	535	540	"
0.01	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0.99
.02	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	.98
.03	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	.97
.04	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	.96
.05	5	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	0.95
0.06	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	8	8	.94
.07	7	7	8	8	8	8	8	8	8	8	8	8	8	8	9	9	9	9	.93
.08	8	8	9	9	9	9	9	9	9	9	9	9	9	10	10	10	10	10	.92
.09	9	9	10	10	10	10	10	10	10	10	10	10	11	11	11	11	11	11	.91
.10	10	10	10	11	11	11	11	11	11	11	11	11	12	12	12	12	12	12	0.90
0.11	11	11	11	12	12	12	12	12	12	12	12	12	13	13	13	13	13	13	.89
.12	12	12	12	12	13	13	13	13	13	13	13	13	14	14	14	14	14	14	.88
.13	13	13	13	13	13	14	14	14	14	14	14	14	15	15	15	15	15	15	.87
.14	14	14	14	14	14	14	15	15	15	15	15	15	16	16	16	16	16	16	.86
.15	15	15	15	15	15	15	15	16	16	16	16	16	16	17	17	17	17	17	0.85
0.16	15	15	16	16	16	16	16	16	17	17	17	17	17	17	18	18	18	18	.84
.17	16	16	16	17	17	17	17	17	17	18	18	18	18	18	19	19	19	19	.83
.18	17	17	17	17	18	18	18	18	18	18	19	19	19	19	19	20	20	20	.82
.19	18	18	18	18	18	18	19	19	19	19	19	20	20	20	20	20	21	21	.81
.20	18	18	19	19	19	19	19	20	20	20	20	20	21	21	21	21	21	22	0.80
0.21	19	19	19	19	20	20	20	20	21	21	21	21	21	22	22	22	22	22	.79
.22	20	20	20	20	20	21	21	21	21	21	22	22	22	22	23	23	23	23	.78
.23	20	20	21	21	21	21	21	22	22	22	22	23	23	23	23	24	24	24	.77
.24	21	21	21	21	22	22	22	22	23	23	23	23	23	24	24	24	24	25	.76
.25	21	22	22	22	22	22	23	23	23	23	24	24	24	24	25	25	25	25	0.75
0.26	22	22	22	23	23	23	23	24	24	24	24	25	25	25	25	25	26	26	.74
.27	22	23	23	23	23	24	24	24	24	25	25	25	25	26	26	26	26	27	.73
.28	23	23	23	24	24	24	24	25	25	25	25	26	26	26	26	27	27	27	.72
.29	23	24	24	24	24	25	25	25	25	26	26	26	27	27	27	27	28	28	.71
.30	24	24	24	25	25	25	25	26	26	26	27	27	27	28	28	28	28	28	0.70
0.31	24	25	25	25	25	26	26	26	26	27	27	27	28	28	28	28	29	29	.69
.32	25	25	25	26	26	26	26	27	27	27	27	28	28	28	29	29	29	29	.68
.33	25	25	26	26	26	27	27	27	27	28	28	28	28	29	29	29	30	30	.67
.34	26	26	26	26	27	27	27	27	28	28	28	29	29	29	29	30	30	30	.66
.35	26	26	26	27	27	27	28	28	28	28	29	29	29	30	30	30	30	31	0.65
0.36	26	26	27	27	27	28	28	28	29	29	29	29	30	30	30	31	31	31	.64
.37	27	27	27	27	28	28	28	29	29	29	29	30	30	30	31	31	31	31	.63
.38	27	27	27	28	28	28	29	29	29	29	30	30	30	31	31	31	31	32	.62
.39	27	27	28	28	28	29	29	29	29	30	30	30	31	31	31	32	32	32	.61
.40	27	28	28	28	28	29	29	29	30	30	30	31	31	31	32	32	32	32	0.60
0.41	28	28	28	28	29	29	29	30	30	30	31	31	31	31	32	32	32	33	.59
.42	28	28	28	29	29	29	30	30	30	30	31	31	31	31	32	32	33	33	.58
.43	28	28	28	29	29	29	30	30	30	31	31	31	32	32	32	32	33	33	.57
.44	28	28	29	29	29	30	30	30	30	31	31	31	32	32	32	33	33	33	.56
.45	28	28	29	29	29	30	30	30	31	31	31	32	32	32	32	33	33	33	0.55
0.46	28	29	29	29	29	30	30	30	31	31	31	32	32	32	33	33	33	34	.54
.47	28	29	29	29	30	30	30	31	31	31	31	32	32	32	33	33	33	34	.53
.48	28	29	29	29	30	30	30	31	31	31	32	32	32	32	33	33	33	34	.52
.49	28	29	29	29	30	30	30	31	31	31	32	32	32	32	33	33	33	34	.51
0.50	28	29	29	29	30	30	30	31	31	31	32	32	32	32	33	33	33	34	0.50

The correction  $B'' (\Delta_0'' + \Delta_1'')$  is always of the opposite sign to  $\Delta_0'' + \Delta_1''$

SECOND DIFFERENCE CORRECTION  $B'' (\Delta_0'' + \Delta_1'')$

$n$	540	545	550	555	560	565	570	575	580	585	590	595	600	605	610	615	620	625	$n$
0.01	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	0.99
0.02	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0.98
0.03	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	5	0.97
0.04	5	5	5	5	5	5	5	6	6	6	6	6	6	6	6	6	6	6	0.96
0.05	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	0.95
0.06	8	8	8	8	8	8	8	8	8	8	8	8	8	9	9	9	9	9	0.94
0.07	9	9	9	9	9	9	9	9	9	10	10	10	10	10	10	10	10	10	0.93
0.08	10	10	10	10	10	10	10	11	11	11	11	11	11	11	11	11	11	12	0.92
0.09	11	11	11	11	11	12	12	12	12	12	12	12	12	12	12	13	13	13	0.91
0.10	12	12	12	12	13	13	13	13	13	13	13	13	14	14	14	14	14	14	0.90
0.11	13	13	13	14	14	14	14	14	14	14	14	15	15	15	15	15	15	15	0.89
0.12	14	14	15	15	15	15	15	15	15	15	16	16	16	16	16	16	16	16	0.88
0.13	15	15	16	16	16	16	16	16	16	17	17	17	17	17	17	17	18	18	0.87
0.14	16	16	17	17	17	17	17	17	17	18	18	18	18	18	18	19	19	19	0.86
0.15	17	17	18	18	18	18	18	18	18	19	19	19	19	19	19	20	20	20	0.85
0.16	18	18	18	19	19	19	19	19	19	20	20	20	20	20	20	21	21	21	0.84
0.17	19	19	19	20	20	20	20	20	20	21	21	21	21	21	22	22	22	22	0.83
0.18	20	20	20	20	21	21	21	21	21	22	22	22	22	22	23	23	23	23	0.82
0.19	21	21	21	21	22	22	22	22	22	23	23	23	23	23	23	24	24	24	0.81
0.20	22	22	22	22	22	23	23	23	23	23	24	24	24	24	24	25	25	25	0.80
0.21	22	23	23	23	23	23	24	24	24	24	24	25	25	25	25	26	26	26	0.79
0.22	23	23	24	24	24	24	24	25	25	25	25	26	26	26	26	27	27	27	0.78
0.23	24	24	24	25	25	25	25	25	26	26	26	26	27	27	27	27	28	28	0.77
0.24	25	25	25	25	26	26	26	26	26	27	27	27	27	28	28	28	28	28	0.76
0.25	25	26	26	26	26	26	27	27	27	27	28	28	28	28	29	29	29	29	0.75
0.26	26	26	26	27	27	27	27	28	28	28	28	29	29	29	29	30	30	30	0.74
0.27	27	27	27	27	28	28	28	28	29	29	29	29	30	30	30	30	31	31	0.73
0.28	27	27	28	28	28	28	29	29	29	29	30	30	30	30	31	31	31	32	0.72
0.29	28	28	28	29	29	29	29	30	30	30	31	31	31	31	31	32	32	32	0.71
0.30	28	29	29	29	29	30	30	30	30	31	31	31	32	32	32	32	33	33	0.70
0.31	29	29	29	30	30	30	30	31	31	31	32	32	32	32	33	33	33	33	0.69
0.32	29	30	30	30	30	31	31	31	32	32	32	32	33	33	33	33	34	34	0.68
0.33	30	30	30	31	31	31	32	32	32	32	33	33	33	33	34	34	34	35	0.67
0.34	30	31	31	31	31	32	32	32	33	33	33	33	34	34	34	35	35	35	0.66
0.35	31	31	31	32	32	32	32	33	33	33	34	34	34	34	35	35	35	36	0.65
0.36	31	31	32	32	32	33	33	33	33	34	34	34	35	35	35	35	36	36	0.64
0.37	31	32	32	32	33	33	33	34	34	34	34	35	35	35	36	36	36	36	0.63
0.38	32	32	32	33	33	33	34	34	34	34	35	35	35	36	36	36	37	37	0.62
0.39	32	32	33	33	33	34	34	34	34	35	35	35	36	36	36	37	37	37	0.61
0.40	32	33	33	33	34	34	34	34	35	35	35	36	36	36	37	37	37	38	0.60
0.41	33	33	33	34	34	34	34	35	35	35	36	36	36	37	37	37	37	38	0.59
0.42	33	33	33	34	34	34	35	35	35	36	36	36	37	37	37	37	38	38	0.58
0.43	33	33	34	34	34	35	35	35	36	36	36	36	37	37	37	38	38	38	0.57
0.44	33	34	34	34	34	35	35	35	36	36	36	37	37	37	38	38	38	38	0.56
0.45	33	34	34	34	35	35	35	36	36	36	37	37	37	37	38	38	38	39	0.55
0.46	34	34	34	34	35	35	35	36	36	36	37	37	37	38	38	38	39	39	0.54
0.47	34	34	34	35	35	35	35	36	36	36	37	37	37	38	38	38	39	39	0.53
0.48	34	34	34	35	35	35	36	36	36	37	37	37	37	38	38	38	39	39	0.52
0.49	34	34	34	35	35	35	36	36	36	37	37	37	37	38	38	38	39	39	0.51
0.50	34	34	34	35	35	35	36	36	36	37	37	37	38	38	38	38	39	39	0.50

The correction  $B'' (\Delta_0'' + \Delta_1'')$  is always of the opposite sign to  $\Delta_0'' + \Delta_1''$

TABLE VII  
DIURNAL ABERRATION

Unit 0.001

Lat. Dec.	0°	10°	20°	30°	35°	40°	45°	50°	52°	54°	56°	58°	60°
0°	21	21	20	18	17	16	15	14	13	13	12	11	11
5	21	21	20	19	18	16	15	14	13	13	12	11	11
10	22	21	20	19	18	17	15	14	13	13	12	11	11
15	22	22	21	19	18	17	16	14	14	13	12	12	11
20	23	22	21	20	19	17	16	15	14	13	13	12	11
25	24	23	22	20	19	18	17	15	14	14	13	12	12
30	25	24	23	21	20	19	17	16	15	14	14	13	12
35	26	26	24	23	21	20	18	17	16	15	15	14	13
40	28	27	26	24	23	21	20	18	17	16	16	15	14
45	30	30	28	26	25	23	21	19	19	18	17	16	15
50	33	33	31	29	27	25	23	21	20	20	19	18	17
52	35	34	33	30	28	27	25	22	21	20	19	18	17
54	36	36	34	31	30	28	26	23	22	21	20	19	18
56	38	38	36	33	31	29	27	24	23	22	21	20	19
58	40	40	38	35	33	31	28	26	25	24	23	21	20
60	43	42	40	37	35	33	30	27	26	25	24	23	21
62	45	45	43	39	37	35	32	29	28	27	25	24	23
64	49	48	46	42	40	37	34	31	30	29	27	26	24
66	52	52	49	45	43	40	37	34	32	31	29	28	26
68	57	56	54	49	47	44	40	37	35	33	32	30	28
70	62	61	59	54	51	48	44	40	38	37	35	33	31
71	66	65	62	57	54	50	46	42	40	39	37	35	33
72	69	68	65	60	57	53	49	44	43	41	39	37	35
73	73	72	69	63	60	56	52	47	45	43	41	39	36
74	77	76	73	67	63	59	55	50	48	45	43	41	39
75	82	81	77	71	68	63	58	53	51	48	46	44	41
76	88	87	83	76	72	68	62	57	54	52	49	47	44
77	95	93	89	82	78	73	67	61	58	56	53	50	47
78	103	101	96	89	84	79	73	66	63	60	57	54	51
79	112	110	105	97	92	86	79	72	69	66	63	59	56

Unit 0.01

80° 00'	12	12	12	11	10	9	9	8	8	7	7	7	6
81 00	14	13	13	12	11	10	10	9	8	8	8	7	7
82 00	15	15	14	13	13	12	11	10	9	9	9	8	8
83 00	18	17	16	15	14	13	12	11	11	10	10	9	9
84 00	20	20	19	18	17	16	14	13	13	12	11	11	10
85 00	24	24	23	21	20	19	17	16	15	14	14	13	12
85 30	27	27	26	24	22	21	19	17	17	16	15	14	14
86 00	31	30	29	26	25	23	22	20	19	18	17	16	15
86 30	35	34	33	30	29	27	25	22	22	21	20	19	17
87 00	41	40	38	35	33	31	29	26	25	24	23	22	20
87 30	49	48	46	42	40	37	35	31	30	29	27	26	24
88 00	61	60	57	53	50	47	43	39	38	36	34	32	31
88 10	67	66	63	58	55	51	47	43	41	39	37	35	33
88 20	73	72	69	64	60	56	52	47	45	43	41	39	37
88 30	82	80	77	71	67	62	58	52	50	48	46	43	41
88 40	92	90	86	79	75	70	65	59	56	54	51	49	46
88 50	105	103	98	91	86	80	74	67	65	62	59	56	52
89 00	122	120	115	106	100	94	86	79	75	72	68	65	61

The unit is 0.001 for declinations less than 80°, and 0.01 for declinations of 80° and over.

This correction is to be *subtracted* from the observed time of transit for transits above pole, and *added* to the time of transit for transits below pole.











## INDEX TO APPARENT PLACES OF STARS, 1986

In this list the letters "B. D." have, for reasons of space, been omitted; no confusion can, however, be caused

Name	Cat. No.	Page	Name	Cat. No.	Page	Name	Cat. No.	Page	Name	Cat. No.	Page
Cephei			Ceti			Columbae			Cygni		
δ	847	348	σ	1071	40	18 G.	1149	87	α	777	319
ζ	836	343	τ	59	28	35 G.	1153	91	β	732	302
η	783	320	υ	71	32	74 G.	1164	97	γ	765	314
θ	767	316	φ <sup>x</sup>	30	14	Comae Berenices			ε	780	320
ι	863	354	χ	1051	29	β	492	202	ζ	797	327
κ	759	311	2	905	1	3	1313	186	η	1521	308
ν	1572	336	12	13	7	12	1318	189	θ	738	303
ρ	1593	348	19	*30	14	20	466	191	ι	733	301
V	1650	422	20	1022	14	23	1323	194	κ	726	297
11	817	335	26	37	17	24	473	194	ν	788	323
20	830	341	47	1041	23	24	1332	197	ξ	792	325
24	837	343	48	1043	23	31	1333	198	ο <sup>1</sup>	757	311
30	853	351	67	80	36	32	1339	201	π <sup>1</sup>	821	337
31	851	350	80	1074	41	39	*492	202	ρ	1568	333
6 H.	782	320	94	116	51	43			σ	1558	328
13 H.	813	334	9 G.	1003	2				υ	1559	329
32 H.	1648	418	49 G.	14	7	Coronae Austrinae			ε	*807	332
36 H.	1649	420	79 G.	1018	12	α	718	296	8	1510	302
41 H.	895	368	98 G.	1024	16	η <sup>1</sup>	1490	291	15	740	305
43 H.	906	372	101 G.	1025	16	θ	697	286	28	1525	310
44 H.	41	19	106 G.	1029	17	Coronae Borealis			31	*757	311
47 H.	105	49	138 G.	1037	21	α	578	240	33	758	311
48 H.	115	53	175 G.	1049	27	β	572	238	41	1534	315
51 H.	909	386	232 G.	1061	36	ε	593	245	42	1535	315
Br. 256	1635	374	239 G.	1064	37	θ	576	239	59	1551	324
Br. 402	1636	378	268 G.	1073	41	κ	1414	244	61	793	326
Br. 2777	795	326	Pi. ο <sup>h</sup> 78	1011	7	τ	1423	249	71	807	332
Br. 2880	1578	339	-18° 41	1007	5	Corvi			74	811	334
Grb. 750	908	380	Chamaeleontis			β	471	193	Grb. 2844	1506	300
Grb. 944	1638	384	β	459	188	γ	457	188	Grb. 3285	1544	321
Grb. 3834	1594	349	γ	401	164	δ	465	191	Grb. 3434	1560	330
Grb. 4163	1627	370	δ <sup>1</sup>	411	167	ε	453	186	+35° 4626	1571	336
+85° 74	1637	382	η	331	136	35 G	1321	192	Delphin		
			θ	318	131	52 G	1334	198	α	774	318
			π	438	179	Crateris			γ	1541	321
			49 G.	503	208	α	1283	170	δ	778	319
			Circini			β	421	173	ε	768	317
			α	539	225	γ	431	176	κ	772	318
			β	561	235	δ	426	175	9 G.	1537	317
			10 G.	530	220	ζ	1301	180	Doradus		
			Columbae			η	1309	184	α	171	73
			α	215	91	θ	1299	179	β	212	89
			β	223	93	11 G	1286	172	γ	157	68
			γ	1160	95	Crucis			δ	1154	91
			η	229	96	α	462	190	ζ	189	81
			κ	238	100	β	481	196	θ	196	83
			ο	197	84	γ	468	192	υ	1166	98
			12 G.	198	85	δ	455	187			

\* These names are alternative names, given only in the list on page XLVI

INDEX TO APPARENT PLACES OF STARS, 1986

505

In this list the letters "B. D." have, for reasons of space, been omitted; no confusion can, however, be caused

Name	Cat. No.	Page	Name	Cat. No.	Page	Name	Cat. No.	Page	Name	Cat. No.	Page
<b>Draconis</b>			<b>Equulei</b>			<b>Fornacis</b>			<b>Groombridge</b>		
α	521	215	α	800	328	β	101	45	1450	320	133
β	653	270	γ	1555	327	δ	133	59	1460	323	135
γ	676	278				κ	83	38	1501	340	141
δ	723	296				λ <sup>1</sup>	88	40	1564	363	150
ε	639	264				μ	78	34	1586	372	154
θ	598	247				ν	1055	33	1757	424	174
ι	571	238	<b>Eridani</b>			τ	1102	58	1771	429	176
κ	472	193	α	54	25	21 G.	1062	36	1826	1303	182
λ	433	178	β	188	82	43 G.	1078	44	1830	1307	183
ν <sup>1</sup>	655	270	γ	149	64	79 G.	1090	52	1850	1642	398
ν <sup>2</sup>	657	271	δ	135	59	Lac. 1044	1092	53	1852	451	185
ξ	671	277	ε	127	57				1956	1338	201
ο	707	292	ζ	1091	52				2001	499	206
τ	729	297	η	104	46				2017	1353	208
υ	714	292	θ	106	47	<b>Geminorum</b>			2029	505	208
χ	695	283	ι	1075	42	α	287	118	2063	1643	400
ψ	670	273	κ	86	39	β	295	121	2125	536	223
ω	664	273	λ	190	82	γ	251	104	2152	1386	227
A	619	254	μ	176	76	δ	279	115	2164	549	228
f	*659	271	ν	169	73	ε	254	105	2196	1644	402
i	*511	212	ξ	1120	70	ζ	269	111	2296	595	246
3	440	180	ο <sup>1</sup>	154	67	θ	261	109	2315	1645	404
8	486	199	τ <sup>2</sup>	102	45	ι	282	117	2343	614	253
10	511	212	τ <sup>3</sup>	1085	48	κ	294	121	2373	623	255
27	659	271	τ <sup>5</sup>	1099	57	λ	277	115	2377	627	258
35	675	276	τ <sup>6</sup>	140	61	μ	241	101	2415	636	264
36	685	281	υ <sup>2</sup>	170	73	ν	1173	103	2444	1462	271
50	1494	290	φ	82	35	ξ	256	106	2533	684	281
73	770	316	χ	68	31	π	296	123	2603	1483	287
76	915	416	ε	*119	53	ρ	286	117	2640	701	287
1 H	910	392	g	*143	62	υ	1196	119	2655	700	286
4 H.	*454	187	y	*130	58	φ	1207	124	2671	1492	290
9 H.	395	164	17	1097	56	χ	305	127	2844	1506	300
12 H.	587	243	20	1100	57	ω	1182	111	2900	734	299
Br. 1508	413	169	24	137	59	ι	1163	97	3212	1647	414
Br. 2412	1646	412	35	1111	65	51	1188	114	3241	1538	316
Grb. 2125	536	223	43	1121	71	81	1200	122	3285	1544	321
Grb. 2164	549	228	53	172	74	<b>Groombridge</b>			3434	1560	330
Grb. 2296	595	246	56	1131	76	716	129	58	3834	1594	349
Grb. 2343	614	253	40 G.	1080	46	750	908	380	4163	1627	370
Grb. 2377	627	258	58 G.	1086	49	848	173	77			
Grb. 2640	701	287	63 G.	1087	50	866	1128	75	<b>Gruis</b>		
Grb. 2655	700	286	82 G.	119	53	944	1638	384	α	829	342
Grb. 2671	1492	290	110 G.	130	58	966	205	91	β	856	352
Grb. 2900	734	299	138 G.	143	62	1156	1172	103	γ	822	339
Grb. 3212	1647	414	145 G.	1107	62	1281	1190	114	δ <sup>1</sup>	846	347
Grb. 3241	1538	316	174 G.	153	66	1308	284	118	ε	860	353
Pi. 16 <sup>b</sup> 140	1432	256	208 G.	1119	69	1359	1639	388	ζ	868	356
Pi. 19 <sup>b</sup> 156	1507	300	212 G.	161	70	1374	300	126	ι	1605	358
			258 G.	1127	74	1384	1209	125	λ	1581	341
			268 G.	1132	76	1446	322	134			
			-18° 516	1084	48						

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Name	Cat. No.	Page	Name	Cat. No.	Page	Name	Cat. No.	Page	Name	Cat. No.	Page	
Orionis			Pegasi			Persei			Pictoris			
$\alpha$	224	95	$\chi$	1004	4	57	1124	72	$\alpha$	262	108	
$\beta$	194	84	$\psi$	1629	370	Br. 658	1133	77	$\gamma$	1156	93	
$\gamma$	201	86	1	804	330	Grb. 866	1128	75	$\delta$	235	98	
$\delta$	206	88	2	1565	332	+34° 674	1098	56	$\zeta$	199	85	
$\epsilon$	210	90	5	1570	334				$\eta^2$	187	81	
$\iota$	209	90	11	1574	337				13 G.	1143	82	
$\kappa$	220	92	14	1575	338				20 G.	1152	88	
$\nu$	232	98	16	823	338				37 G.	1159	94	
$\sigma^1$	1136	78	20	826	340	Phoenicis						
$\pi^2$	1134	77	27	833	342	$\alpha$	12	6				
$\pi^4$	179	77	31	843	345	$\gamma$	49	23				
$\pi^5$	180	78	36	1588	347	$\delta$	1044	24	Piscium			
$\tau$	195	84	38	1590	348	$\epsilon$	3	3	$\beta$	1602	357	
$\varphi^1$	208	89	45	1596	352	$\eta$	23	10	$\gamma$	878	360	
11	1140	80	55	1603	357	$\iota$	1617	364	$\delta$	28	13	
16	1142	82	59	1606	358	$\lambda^1$	15	8	$\epsilon$	36	17	
22	1147	86	67	1613	362	$\mu$	1015	10	$\zeta$	1033	20	
60	1161	95	70	885	363	$\pi$	901	371	$\eta$	50	24	
66	230	97	82	1625	369	$\nu$	1031	18	$\theta$	1614	363	
74	1169	100	2 G.	1564	332	$\varphi$	1053	30	$\iota$	892	366	
142 G.	1155	93	Pi. 21 <sup>h</sup>	339	1579	339	11 G.	889	365	$\kappa$	884	363
			Pi. 22 <sup>h</sup>	97	1586	346	27 G.	1626	369	$\lambda$	1620	366
			Pi. 22 <sup>h</sup>	120	1589	348	58 G.	1014	8	$\nu$	56	26
			Pi. 23 <sup>h</sup>	235	1628	370	70 G.	1017	11	$\xi$	65	30
			+15° 483 <sup>o</sup>	1615	363	80 G.	1027	16	$\omicron$	60	28	
						135 G.	1060	35	$\pi$	1046	25	
Pavonis			Persei			Piazzii			$\tau$	43	19	
$\alpha$	764	314	$\alpha$	120	54	$\sigma^b$	38	1006	4	$\upsilon$	45	20
$\beta$	775	319	$\beta$	111	50	$\sigma$	78	1011	7	$\chi$	1032	19
$\gamma$	805	331	$\gamma$	108	49	3	27	1096	54	$\omega$	902	371
$\delta$	754	310	$\delta$	131	59	3	187	1106	62	20	1623	367
$\epsilon$	748	309	$\epsilon$	147	63	4	148	1126	74	27	900	370
$\zeta$	698	288	$\zeta$	144	63	7	308	1214	128	30	1630	1
$\eta$	661	274	$\eta$	99	45	8	245	1237	142	33	1002	2
$\lambda$	704	291	$\theta$	93	43	9	229	1259	155	41	1008	5
$\xi$	686	284	$\iota$	112	50	10	135	1276	166	44	1010	6
$\omicron$	1554	327	$\lambda$	1113	66	11	63	1295	177	48	1012	7
75 G.	1518	307	$\mu$	1117	68	11	202	1310	184	64	1020	13
			$\nu$	134	60	12	122	1322	193	68	1023	15
			$\xi$	148	64	14	221	551	229	72	1028	17
			$\theta$	109	50	14	227	1392	229	89	1034	20
			$\sigma$	124	55	15	36	1400	235	94	1039	22
			$\tau$	103	46	15	153	1412	242	96 G.	1019	12
			$\upsilon$	*52	25	16	140	1432	256			
			$\varphi$	57	27	16	307	1448	263	Piscis Austrini		
			$c$	*152	66	17	68	1454	266	$\alpha$	867	356
			2	1052	29	18	318	1498	295	$\beta$	1592	349
			4	1054	32	19	156	1507	300	$\epsilon$	854	351
			6	*77	34	21	339	1579	339	$\iota$	814	336
			14	1077	43	22	97	1586	346	$\lambda$	838	344
			24	1082	47	22	120	1589	348	$\mu$	832	342
			48	152	66	23	194	1624	368	$\pi$	1601	356
			54	158	69	23	235	1628	370	4	*801	329
										6	1566	333

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Name	Cat. No.	Page	Name	Cat. No.	Page	Name	Cat. No.	Page	Name	Cat. No.	Page
Puppis			Sagittarii			Scorpii			Serpentis		
ζ	306	127	δ	687	283	τ	620	256	8	1406	237
ν	252	105	ε	689	284	υ	649	269	60	1480	286
ξ	1204	123	η	683	282	G	669	276	Br. 2292	1475	282
π	278	114	θ <sup>1</sup>	751	309	N	1431	255	Pi. 15 <sup>b</sup> 36	1400	235
ρ	308	128	ι	1520	307	24	*624	257	+10° 2823	1401	235
σ	1194	117	κ <sup>1</sup>	763	314	55 G.	1426	251	+ 9° 3055	1408	239
τ	263	108	λ	692	285	139 G.	1452	266	+ 6° 3169	1422	249
C	1184	112	μ	682	281	3 H.	*579	241	-11° 4411	1461	272
I	275	114	ξ	*710	293				-13° 4863	1472	280
a	*301	124	ξ <sup>2</sup>	710	293	Sculptoris			Sextantis		
f	*290	120	π	720	296	α	35	15	δ	1270	162
q	*313	130	σ	706	292	β	886	364	ε	1263	158
4	1202	122	τ	1496	295	γ	879	360	6	370	152
20	311	129	υ	727	298	δ	896	368	12	376	154
1 G.	231	97	φ	1487	289	ε	61	28	23	1266	159
31 G.	1178	107	X	1464	275	θ	6	3	25	388	160
108 G.	288	118	c	*753	309	κ <sup>2</sup>	5	3	33	404	165
125 G.	1197	119	d	*722	298	λ <sup>2</sup>	26	11	41	1281	168
127 G.	290	120	h	*736	303	μ	1618	366	18 G.	1257	153
187 G.	1203	123	6	1470	279	π	1048	27			
213 G.	301	124	30	1493	291	σ	1026	16			
225 G.	1210	125	43	722	298	11 G.	1611	361			
232 G.	1212	126	52	736	303	77 G	1013	8			
289 G.	313	130	54	1512	304	102 G.	44	20			
294 G.	1219	131	55	1514	304	109 G.	1036	21			
302 G.	1221	132	56	1517	305	129 G.	58	27			
			61	1522	308	Lac. 181	1016	10			
			62	753	309						
Pyxidis			83 G	1485	288	Scuti			Tauri		
α	327	136	114 G.	1495	292	α	1482	287	α	168	73
γ	332	138	162 G.	1501	298	β	1489	290	β	202	86
ε	1241	143	186 G	731	301	γ	696	285	γ	159	69
θ	1243	145	228 G	1516	305	δ	1486	288	δ	162	70
25 G	1229	137	290 G.	1530	313	ε	702	289	ε	164	71
			296 G.	1532	315	2 H.	*696	285	ζ	211	90
						5 H.	*702	289	η	139	61
Reticuli			Scorpii			Serpentis			Serpentis		
α	156	68	α	616	254	α	582	242	5	125	56
β	141	60	β	597	248	β	583	243	10	1101	57
δ	1110	64	γ	*556	231	γ	591	245	11	1103	58
η	163	70	δ	594	247	ε	588	244	17	136	60
κ	126	55	ε	628	259	η	688	283	27	142	61
17 G.	1109	64	η	638	265	θ	709	293	29	1104	60
			θ	654	272	ι <sup>1</sup>	666	275	37	1112	66
			ι <sup>1</sup>	666	275	κ	660	273	43	1115	67
			κ	652	271	λ	652	271	44	1116	67
			λ	1439	260	μ <sup>1</sup>	1439	260	97	1135	78
			π	592	246	π	592	246	115	1148	87
			σ	607	252	σ	607	252	130	218	92
						τ <sup>1</sup>	570	238			
						3	562	234			

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