Planetary Position Effect on Short-Wave Signal Quality

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A new approach to an as yet unsolved problem is the observance of planetary effects on transatlantic short-wave radio signals. Correlation over seven years shows that certain planetary arrangements agree well with the behavior of short-wave signals.

AT THE Central Radio Office of RCA Communications, Inc., in lower Manhattan, an observatory housing a 6-inch refracting telescope is maintained for the observation of sunspots. The purpose of erecting this observatory in 1946 was to develop a method of forecasting radio storms from the study of sunspots. After about one year of experimenting, a forecasting system of short-wave conditions was inaugurated based upon the age, position, classification, and activity of sunspots. Satisfactory results were obtained, but failure of this system from time to time, indicated that phenomena other than sunspots needed to be studied. The first article[1] by the author on this subject appeared in March 1951; the current article is in part a review of that article, and in part will submit additional evidence supporting deductions made at that time.

STUDY OF PLANET POSITIONS

CYCLIC variations in sunspot activity have been studied by many solar investigators in the past and attempts were made by some, notably Huntington,[2] Clayton,[3] and Sanford,[4] to connect these variations to planetary influences. The books of these three investigators were studied and their results found sufficiently encouraging to warrant correlating similar planetary interrelationships with radio signal behavior. However, it was decided to investigate the effects of all the planets from Mercury to Saturn* instead of only the major planets as they had done. The same heliocentric angular relationships of 0, 90, 180, and 270 degrees were used and dates when any two or more planets were separated by one of these angles were recorded.

Investigation quickly showed there was positive correlation between these planetary angles and transatlantic short-wave signal variations. Radio signals showed a tendency to become degraded within a day or two of planetary configurations of the type being studied. However, all configurations did not correspond to signal degradation. Certain configurations showed better correlation than others.

Considerable study was devoted to the most severe degradations and led to the discovery that when three planets held a "multiple of 90 degrees" arrangement among themselves, the correlation was more pronounced. These arrangements were called "multiple configurations" and exist when two planets are at 0 degree with each other and a third planet is 90 degrees or 180 degrees away from them. Also, a multiple exists when two planets are separated by 180 degrees with a third planet 90 degrees from each. These multiples are quite common. A more uncommon type of multiple is the case where all three planets are at 0 degree with each other. From the few cases recorded, this type of multiple shows the least correlation.

Many of the multiples are completed in the space of a few hours, being accompanied by sharp severe signal degradation. At other times, the multiple may take several days to pass, being accompanied by generally erratic conditions during the period. The time needed to complete the multiple depends on the relative speeds between the three or more planets involved. These multiples show correlation for plus and minus about 5 degrees from the exact arrangements previously mentioned.

Configurations of this type actually can be considered as cycles and when several cycles peak at the same time there should be maximum effects. The records for 1948, 1949, and 1950 indicate that such has been the result. Specific instances are demonstrated in Cases 1 to 9 in Table I. Since consistency of data is of paramount importance in an article of this type, the same cycles between the same three planets have been selected. We may refer to these arrangements as multicycles.

All the close multicycles made between Mercury-Venus-Jupiter were extracted from the records of 1948, 1949, 1950

Table I. Multicycles Among Planets Affecting Radio Signal

Cases	Dates	Time Consumed	Results in Signal Degradation
1	Feb 23/48	1 day	Severe 23d and 24th
2	Apr 18–22/48	5 days	Severe 19th to 22d
3	June 19–23/48	5 days	Slight 19th to 22d
4	Aug 18–21/48	4 days	Slight 19th to 21st
5	Oct 15/48	1 day	Very severe 14th and 15th
6	Apr 12/49	1 day	Very severe 11th to 13th
7	Oct 6–8/49	3 days	Very severe 7th and 8th
8	Apr 2–5/50	4 days	Very severe 1st to 6th
9	Sept 28–Oct 1/50	4 days	Very severe 30th to 4th*
10	Sept 21–23/51	3 days	Extremely severe 20th to 26th**

* A multicycle between Mercury-Earth-Mars came on 5th and 6th. The degradation continued through to October 7.

** Three complete multicycles took place during this period involving Mercury, Venus, Jupiter, Saturn, and Uranus.

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* J. H. Clark of Press Wireless Inc., New York, N. Y., has found that Uranus, Neptune, and Pluto also show correlation. Mr. Clark has been correlating planetary positions and short-wave signal behavior using the methods given in the author's original article.

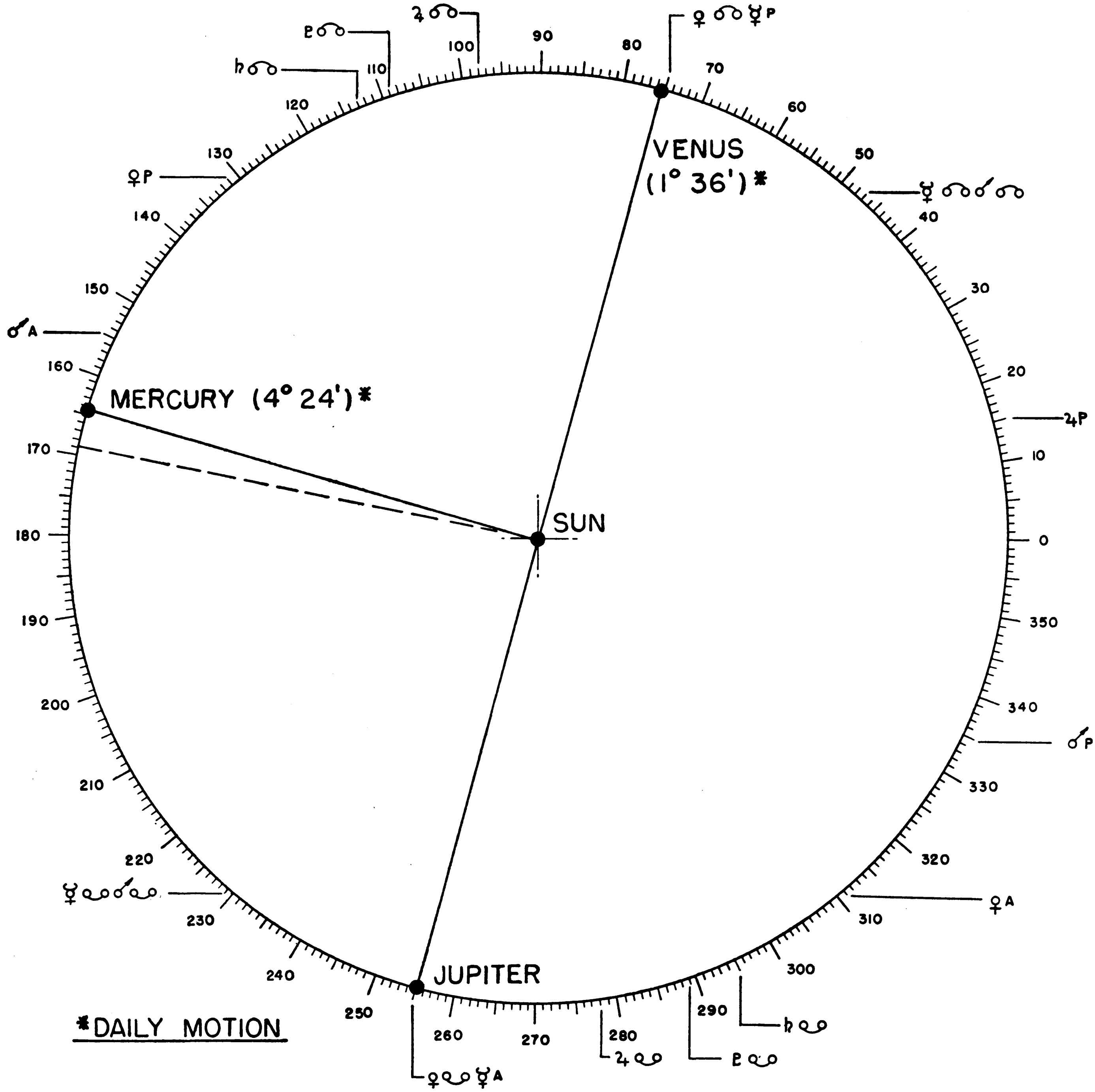

Figure 1. The heliocentric arrangement of Venus, Mercury, and Jupiter on February 23, 1948, which resulted in severe signal degradation on that day and the one following

and correlated with existing radio conditions. Multicycles for these three planets were found in nine cases which are listed in Table I. Case 10 is a triple multicycle that coincided with an extremely severe signal degradation in 1951. The heliocentric arrangements of the planets involved are shown in Figures 1 and 2 for Cases 1 and 10.

Single configurations (one cycle) between only two isolated planets show the least correlation, but often when several single cycles between several isolated planets coincide in time the correlation is quite pronounced. Most of the single cycles, however, do correlate with at least slight signal degradation. Some correlate with severe degradation.

At times, two, and sometimes three, complete multicycles occur in the space of a few days. At other times a multicycle will occur mingled with one or more single cycles between other planets.

Theoretically, if these planetary arrangements do have the effect that correlation indicates, the cycles between the slow planets should have gradual long-term effects establishing an over-all standard. The most degraded periods should come as the faster planets come into cycle with them or among themselves.

Jupiter and Saturn, the largest planets in the solar system, are the most important. Due to their great size and slow motion, they can exercise the predominating

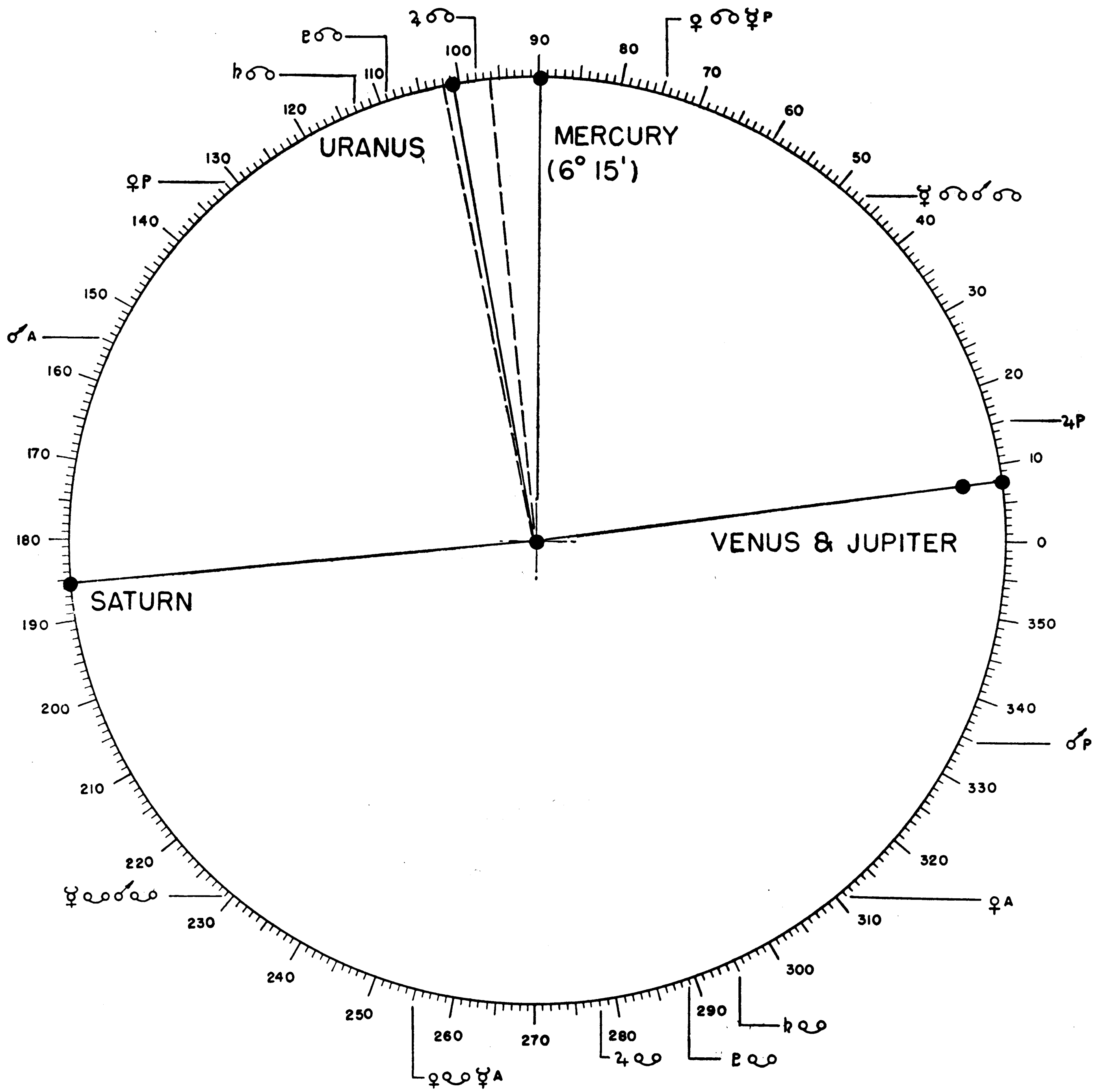

Figure 2. The heliocentric arrangement of the five planets shown which resulted in extremely severe signal degradation from September 20 to 26, 1951

influence on the sun for prolonged periods of time and therefore establish an over-all standard of disturbed or quiet conditions. However, the arrangements of the other slow planets can add to or take away from their effectiveness to some extent. Therefore, when Jupiter and Saturn are spaced near any multiple of 90 degrees, we should find the most degraded years with a high percentage of the radio disturbances severe.

The year 1951, which was a very degraded year, is an example of this. A slow planet multiple existed between Jupiter, Saturn, and Uranus with Jupiter and Saturn at nearly 180 degrees and Uranus almost 90 degrees from each. This arrangement set a low standard for 1951 and even normally weak cycles between isolated planets showed an effect. The radio disturbances were prolonged and severe. This multiple between these three slow planets permitted a great increase in fast planet multiples and semimultiples. A semimultiple took place each time a fast planet cycled with Jupiter, Saturn, and Uranus successively within a few days. This happened frequently in 1951.

The records indicate that when Jupiter and Saturn were spaced by a multiple of 60 degrees, radio signals were of better quality than when spaced by multiples of 90 degrees. Under such an arrangement there are fewer multicycles. During such years a high percentage of the single cycles show no important correlation except on the normally weaker circuits. Only the stronger groups of cycles are then accompanied by significant degradation.

It is worthy of note that in 1948 when Jupiter and Saturn were spaced by 120 degrees, and solar activity was at a maximum, radio signals averaged of far higher quality for the year than in 1951 with Jupiter and Saturn at 180 degrees and a considerable decline in solar activity. In other words, the average quality curve of radio signals followed the cycle curve between Jupiter and Saturn rather than the sunspot curve.

When all nine planets of the solar system are considered, we find a great many multicycles and individual cycles which would make correlation very difficult if these cycles were evenly spaced in time. However, the cycles are not evenly spaced, there being a general tendency for the cycles to occur in groups. There are, however, exceptions to this at times.

CONCLUSION

THE AUTHOR chooses to look upon this hypothesis of a planetary-positions effect upon the quality of shortwave signals as a new approach to the problem and it should be considered as one more tool with which a researcher might work. A tremendous amount of work needs yet to be done.

The correlation found between signal degradations and these planetary arrangements in the past has been sufficiently consistent to indicate that under these arrangements, particularly in the case of multicycles, the planets possibly influence the sun in such a manner as to cause a temporary change in its radiation characteristics. The ionosphere of the earth is apparently particularly sensitive to these changes and reacts accordingly.

By combining planetary indications with solar observations and a day-to-day signal analysis, a 24-hour forecasting system has been developed which averaged close to 85 per cent accuracy throughout 1950 and 1951 as reported by RCA Communications at Riverhead, L. I., N. Y.

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Application of Motors to Household Refrigeration Compressors

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Modern refrigeration demands a motor-compressor unit of long life, which will operate over long periods with little or no attention with high efficiency. To achieve this end, the designer of the hermetically sealed motors used today must take into consideration a number of factors peculiar to this application.

THE FIRST mechanical compressor for household refrigeration consisted of a pump which was belt-driven by an electric motor. There were shaft seals in the pump to prevent the refrigerant and oil from escaping. The belt and shaft seals were troublesome. Manufacturers did their best to make as good a box, and the mechanism as quiet, efficient, and free of vibration, as was possible at that time. However, with all its shortcomings, the housewife welcomed this type of refrigeration in preference to the old ice box.

One major step in solving these problems was the development of the hermetically sealed unit into which was assembled the pump, motor, refrigerant, and oil. This design made it possible to eliminate belt, shaft, and seal, and thus provide more space in the box for food per unit area of floor space. Less maintenance is required because of elimination of the belt and shaft seal and by sealing all working parts. The complete unit is also quieter, has less vibration, and can be manufactured at a lower cost than the belt-driven unit.

The hermetically sealed unit is a mechanical, electrical, and chemical unit which poses many problems, and which has taxed the ingenuity of mechanical, electrical, chemical, metallurgical, welding, manufacturing, and tool engineers. Today, as a result of their co-operation, the industry can point with pride to the great progress made in the art of making hermetically sealed refrigerators for the household,

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