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# SOLAR-TERRESTRIAL RELATIONSHIPS RELATED TO THUNDERSTORMS AND BUV DARK CURRENT AND OZONE DATA

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## ABSTRACT

Solar-terrestrial interactions as they affect Nimbus-4 BUV dark current and possibly affect thunderstorm occurrence are investigated. A solar wind index is calculated for 1970-1971. Dark current enhancements appear to be associated in some way with solar proton events and the solar wind index, but additional investigations by GSFC are required before conclusions can be drawn. Superposed epoch analysis of an index of North American thunderstorm occurrence reveals a discernible (statistically significant) increase in the index magnitude on days 1 and 2 following solar proton events. There appears to be little or no 27-day recurrence tendency in thunderstorm occurrence frequency, and no association with vorticity area index on a day-to-day basis.

## ACKNOWLEDGEMENTS

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# APPENDIX B

## CONSIDERATION OF X-RAY DETECTOR GEOMETRY FOR AURORОZONE II

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## 1. INTRODUCTION

Investigations by Goddard Space Flight Center (GSFC) of dark current variations in the backscattered ultraviolet (BUV) instrumentation and its possible effects on the BUV ozone data base are continuing (Stassinopoulos et al, 1978; 1979). Radio Sciences Company has provided support for these efforts under contract NAS5-25663. Under the contract the company also conducted a very limited investigation of solar-terrestrial effects on thunderstorms, and participated in Aurorozone II analysis. The tentative nature of the results precludes extensive technical discussion in this final report. The bulk of the report is therefore given over to the tabulation of a daily solar wind index which may be useful for correlations with both dark current and BUV ozone data.

Highlights of the thunderstorm analysis are briefly summarized in Section 2, and a comparison of selected solar proton events with dark current enhancements referred to as "blue streaks" by Stassinopoulos is discussed in Section 3. The development of the solar wind index using solar wind data, and a quantitative "blue streak" index as suggested by Schatten is discussed in Section 4; the tabulated values are given in Appendix A. Recommendations for future work are listed in Section 5, and Section 6 lists references cited in the text.

## 2. THUNDERSTORM ANALYSIS

Based on various ideas and speculations treated earlier (Herman and Goldberg, 1978; Goldberg and Herman, 1979; Herman, 1979), we have performed a superposed epoch analysis of thunderstorm occurrence using PCA (Polar Cap Absorption) dates as key days, investigated 27-day recurrence tendencies in thunderstorm occurrence in the northern part of the United States, and correlated thunderstorms against the Roberts and Olson (1973) vorticity area index (VAI) and the solar wind index discussed in section 4. In all cases, the thunderstorm parameter used is the Lethbridge (1979) daily index (LTI) for the 40-45 $^{o}$N latitude band covering the northern United States.

The LTI was derived by Lethbridge from thunderstorm observations at 102 U.S. stations in an area extending from the Atlantic Coast to 102 $^{o}$W longitude and from 30 $^{o}$N to 45 $^{o}$N latitude. The data were compiled for the entire area and for the three latitude bands 30-35 $^{o}$N; 35-40 $^{o}$N; and 40-45 $^{o}$N. The compilation was grouped into three periods: 1947-1956; 1957-1965; and 1966-1976. In each group, the variable is the cube root of the thunderstorm frequency for each day minus the 10-yr means of the daily cube roots. With seasonal effects thus removed, the index ranges from about -3 to +3 in magnitude.

## 2.1 Thunderstorms and PCA's

Arguments by Herman and Goldberg (1978, pp 248ff) suggest that the solar protons associated with polar cap absorption (PCA) events may help in the formation of thunderstorms in nontropical latitudes. The LTI was therefore subjected to a superposed epoch analysis using as key days the list of 76 major PCA events (30-MHz riometer absorption $\geq$ 2.5 dB) given by Pomerantz and Duggal (1974) covering the period 2/23/56 to 5/16/73. For later comparison, a table of random key dates within the same period was generated by microcomputer. Before proceeding to the thunderstorm analysis itself, it is instructive to examine the relative properties of the PCA and randomly selected key dates.

The distributions by month and year of the Pomerantz and Duggal dates are given in Fig. 1, along with those of the random dates. For the winter months only (Nov - Mar), the computer selected 36 key dates, while the actual PCA occurrence was only 23. This would imply a bias in favor of the random data, but it will be seen later that no statistically significant peaks appear in the superposed epoch distributions of thunderstorm occurrence following random key dates. In the yearly distribution, no PCA's occurred in sunspot minimum years (1964-1965), but the computer selected nine events in those two years.

It is interesting to note the tendency for more PCA's to occur in sunspot maximum than in minimum years (Fig. 1, bottom panel), which is in the same direction as the solar cycle variation of thunderstorm occurrence in mid to high latitudes (e.g., Herman and Goldberg, 1978). Additionally, the number of PCA's occurring in the sunspot maximum period of 1957-1960 surpassed that in the 1968-1970 maximum in rough proportion to the ratio of annual sunspot number in the two maxima. Finally, more PCA's seem to occur in the northern hemisphere summer half of the year, which is reminiscent of the seasonal variation in U.S. thunderstorm occurrence frequency. Thus emboldened, we may proceed to the superposed epoch analysis.

The day of PCA maximum was assigned day 0, and the average daily LTI from 2 days before to 7 days after day 0 was computed, using all 76 key dates. The result is shown as a solid line in the upper panel of Fig. 2. The LTI surrounding the 76 computer-generated random key dates between 1956 and 1973 were subjected to the same analysis, with the result shown as a dashed line in Fig. 2. Both the PCA and random key date data have a zero offset for easier comparison. The average of the 10 daily means is -.0367 for the PCA data and .011 for the random data. The standard deviation ($\sigma$) plotted in Fig. 2 refers to that for the average of the 10 daily PCA means.

The LTI values for all 10 days relative to the random key dates fall within one standard deviation of the average, while days 1 and 2 of the PCA events show a thunderstorm enhancement slightly greater than one sigma.

The procedure was repeated using only those key dates falling in the months Nov-Mar inclusive, with the results shown in the bottom panel of Fig. 2. Again, the LTI for days 1 and 2 of the PCA events are greater than 1 $\sigma$, while all randomly selected days and the days prior to the PCA are less than this level.

To determine whether or not the PCA-associated enhancement of days 1 and 2 are statistically significant, the statistics of small populations may be used (e.g., Meyer, 1975). The question to be answered is, what is the probability (P) that the LTI value will exceed 1 $\sigma$ on any one day in the 10 days surrounding the key date?

To find out, we assume that the 10 daily means are independent of each other, and randomly selected from an infinite, normally distributed index set. Without a priori knowledge of the fluctuations in the infinite set, we may use the standard deviation of the 10-day sample, and construct a test statistic t (Meyer, 1975, p 280):

$$t = \frac{m - u}{\sigma/(n)^{\frac{1}{2}}} \qquad (1)$$

where n (= 10) is the sample size, m is the sample mean, and u is the level at which we wish to test the null hypotheses. In the present case, since any desired significance level may be selected, we set $u = m + \sigma$, and have $n = 10$.

That is, we are testing at the 1 $\sigma$ level (solid horizontal lines in Fig. 2.). Thus, $t = (n)^{\frac{1}{2}} = 3.16$ for both the top and bottom panels in Fig. 2. Using standard tables of the cumulative student t distribution for $n - 1 = 9$ degrees of freedom, we find that

$$P(t < 3.1;\ 9) = 0.994$$

In other words, the probability for the mean daily LTI to exceed 1$\sigma$ on any one day in the 10 plotted in Fig. 2 is only 0.6%. It might therefore be concluded that the peak on days 1 and 2 following the PCA key date is physically meaningful. The fact that all the other daily means fail to exceed the 1$\sigma$ level tends to support the validity of this statistical approach.

However, it may be argued that we do have a priori knowledge of the fluctuations in the infinite set, and the foregoing approach is too simplistic. While calculating the daily means for each of the 10 days, the variance (v) and standard deviation were also recorded. Fig. 3 shows the variances across the 10-day samples. For the 76 PCA events (top panel) the average variance of the ten daily means is 0.4735, and the standard deviation is 0.688. The latter is much greater than that used before, and it is obvious that the peak fails to exceed the new 1 $\sigma$ level. We therefore select a significance level just below the peak level, at say, $m - u = 0.15$ (broken horizontal lines in Fig. 2, top panel). Again using the null hypothesis (eq. 1), we now have $m - u = 0.15$, $\sigma = 0.688$ and $n = 76$. Then $t = 1.05$, and from the tables (Meyer, 1975), $P(t < 1.0;\ 75) = 0.840$. Thus, the probability that the peak on day 2 (Fig.2, top panel) arose by chance is 16%.

Similarly, the 10-day average standard deviation associated with the variances of the Nov-Mar PCA days is 0.629, and n = 23. Setting m - u = 0.36 (dashed horizontal lines in Fig. 2, bottom panel), we find t = 2.74, and $P(t < 2.7; 22) = 0.993$. Thus, there is only a 0.7% probability that the peak on day 2 could have arisen by chance. The exceedance probability for both days 1 and 2 is 1.6% for the Nov-Mar data. If, for these winter events, the random sample is used ($\sigma = 0.651$; n = 36), then the probability that the PCA peaks were due to chance is 0.4% rather than 1.6%.

We are thus led to the inescapable conclusion that PCA events occurring in the winter half of the year produced a measurable influence on thunderstorm occurrence in the northern U.S. in the latitude band 40-45 $^{o}$N, in the years 1956-1973. This conclusion supports the theoretical predictions of Herman and Goldberg (1978). A conclusion that PCA effects are discernible in the year-round thunderstorm data is on shakier grounds since ther is a 16% probability that the enhancements occurred by chance. Better statistics, using a more complete PCA data base, would serve to strengthen (or destroy) this conclusion.

## 2.2 27-Day Recurrence Tendency

Spectral analysis of the 30-yr daily index (LTI) conducted at Pennsylvania State University revealed no strong peak at 27 days (Lethbridge, private communication). On the other hand, Lethbridge (1979) has shown that winter thunderstorms in the northern U.S. tend to occur about one day after solar magnetic sector boundary crossings. Others have shown that active regions on the solar surface tend to cluster near sector boundaries, and Heath and Wilcox (1975) found that certain active regions marked by enhanced UV emission may persist for a few years. On this basis, it was decided to test for a 27-day recurrence in portions of the Lethbridge index by ordering the daily index values in Bartels' rotation plots.

LTI data for Bartels rotations 1866 through 1903 (12/21/69 to 10/12/72) are plotted in Fig. 4. Days with greater than average thunderstorm occurrence are colored black. A coarse indication of the index level is made in the plot according to the scheme set forth in the figure caption. Cursory inspection of Fig. 4 reveals no obvious pattern of recurrence, except perhaps for day 7 of rotations 1884 to 1891 and a few others. Though there are many exceptions, there is a tendency for the index to remain high for several consecutive days.

This line of inquiry was abandoned after two additional simple tests were applied to the plot of Fig. 4. In the first, an overlay of the Svalgaard (1976) solar sector structure was prepared in the same format (not illustrated). Superposition of the overlay onto Fig. 4 gave the visual impression of a correspondence, but again there were many exceptions. Of a total of 326 thunderstorms (i.e., LTI $\geq$ 0.500) in the period 12/8/68 to 10/22/72, 133 of them occurred on days when the interplanetary magnetic field was directed away from the Sun (+ sector), and the remainder (193 days) occurred in negative sectors. Neither the statistical significance nor the possible physical inferences of these findings were investigated. Finally, the Carrington longitudes of the long-lived regions studied by Heath and Wilcox (1975) were converted to Bartels rotation days. No discernible (i.e. visual) correlation with thunderstorm occurrence (Fig. 4) was found. It appears that further work along this line would be fruitless.

## 2.3 Additional Correlations

Three tentative and brief correlation analyses were made using the Lethbridge index against: the Roberts/Olson VAI; the solar wind index discussed in section 4; and the daily solar flare index list in NOAA Solar-Geophysical Data booklets.

The rationale for the LTI/VAI correlation was that an increase in VAI is an indication of increased cyclogenesis in the northern hemisphere, which in turn implies increased stormy weather. In view of this rationale the results were somewhat surprizing. At first, a very simple, quick test was made, using data already ordered in relation to sector boundary key days. For the LTI, we used Fig. 2 of Lethbridge (1979, p 256), and for the VAI, we used curve c of Fig. 4.13 in Herman and Goldberg (1978, p 201). Those curves, for winter, northern hemisphere conditions, are plotted in Fig. 5 using arbitrary amplitudes. They are obviously negatively correlated, and indeed the correlation coefficient is -0.89. If we shift LTI to the right so that the VAI lags the LTI by 3 days, the correlation becomes positive, with a coefficient of 0.91.

Based on the standard Z test (e.g., Mendenhall and Scheaffer, 1973, p 421), the confidence level of this correlation lies between 95% and 98%. In other words, because of the small sample size (n = 7), the probability that the apparently high correlation was due to chance is about 4%. To further test this relationship, the LTI was correlated with daily VAI as reported by Olson et al (1977). Daily January and July values for the years 1947 to 1956 were utilized, and the VAI was smoothed (VS) according to the Lethbridge criterion:

$$VS = (VAI)^{1/3} - (vai)^{1/3}$$

where VAI is the index for a particular day and vai is the 10-yr average for that day. The correlation coefficients for all months computed were = $\pm$ 0.17, for both 0 and 3-day lags, indicating that the day-to-day variations in LTI and VAI are essentially independent of each other. It appears that the LTI and VAI are correlated only when acted on jointly by a solar influence related in some way to magnetic sector boundaries.

On the basis of extremely limited investigation, a lack of correlation was found between the daily LTI and solar wind index of section 4 (in one test month), and between LTI and the NOAA solar flare index (3 test months).

## 3. PROTON FLUXES AND BUV DARK CURRENT

In studying dark-current count-rate variations, Stassinopoulos has discovered unexpected enhancements that persist over several days. With the rate levels plotted in B-L space, it could be seen that the enhancements seem to be confined to approximately $2.8 \leq L \leq 4.3$, and when color-coded in the plot, they take on the appearance of "blue streaks". Initially, three such enhancements were found in the dark current data, covering the periods April 24 - May 14, 1970; July 28 - August 9, 1970; and August 23-30, 1970.

For an initial test of solar effects on blue streak events, the daily average solar proton flux at 1 A.U. as measured by ATS-1 was utilized as a solar activity indicator. Hourly average ATS-1 data reported in Solar-Geophysical Data reports issued monthly by NOAA Environmental Research Laboratories were used to generate daily averages. The results for the 21-70 MeV proton channel covering the aforementioned events are given in Figs. 6 and 7. Here it can be seen that each of the three events was preceded by a PCA event (Shea and Smart, 1979). However, the long-lasting blue streak of April/May 1970 (Fig. 6) followed a minor PCA with an accompanying low daily average proton flux level, while the shorter lived blue streak of Aug. 23-30, 1970 (Fig. 7) was preceded by a strong PCA with a high daily average proton flux.

The blue streak of July 28 - Aug. 7, 1970 (Fig. 7) was intermediate between the other two. In short, for these three events, the time span of the blue streak event varied inversely with the intensity of the PCA as measured in terms of the daily average proton flux level. To pursue this line of inquiry further, one might test additional blue streak occurrences against the PCA list given in Table 1. In passing, it might be mentioned that the high daily average ATS-1 proton flux on May 6, 1970 (Fig. 6) was not accompanied by any reported PCA event, and the Explorer 41 proton monitoring experiment detected no enhancement until it entered the trapped proton belt late on May 6. A more promising approach to studying other possible solar effects on dark current lies in solar wind data, so further comparisons with PCA's have been made only in a preliminary way, as discussed later in section 4.

Table 1. Solar Proton Events, April 1970 - April 1971.

| Date | Riometer Absorption (dB) | Flare Imp. | Duration (Hours) | Max. E=10MeV Proton Flux ($cm^{-2}s^{-1}$) | Time of Proton Max. | Reference* |
|---|---|---|---|---|---|---|
| 4/15/70 | 0.6 | - | 12 | 93 | 4/1800 | 1,5 |
| 5/30/70 | 1.9 | - | 48 | | | 5 |
| 6/14/70 | SAT | 2B | - | 3628 | 16/0700 | 1 |
| 6/26/70 | 0.8 | 2N | 20 | 9 | | 5 |
| 7/7/70 | SAT | 1B | 29 | 6 | 7/2200 | 2 |
| 7/23/70 | 4.7 | 2B | C | 12 | 23/2300 | 1 |
| 7/24/70 | 4.5 | | 55 | 206 | 25/0100 | 1,3,5 |
| 8/14/70 | 3.0 | 1B | 55 | | 15/0600 | 3,5 |
| 11/5/70 | 3.5 | 3B | | | | 1,3,5 |
| 12/12/70 | 0.8 | 1B | | | 13/1600 | 1,5 |
| 12/24/70 | 0.6 | | | | | 5 |
| 1/24/71 | 14.5 | 3B | 120 | 1170 | 25/1800 | 1,3,5 |
| 4/1/71 | 0.4 | | | | | 5 |
| 4/6/71 | 3.8 | 1B | 60 | | 6/1800 | 1,3,5 |
| 4/21/71 | 0.9 | | 10 | 3 | 21/0800 | 2,5 |

* 1 - Castelli and Barron (1977)

2 - Solar-Geophysical Data (NOAA)

3 - Pomerantz and Duggal (1974)

5 - Shea and Smart (1979)

## 4. SOLAR WIND INDEX

It has been known for some time that variations in the bulk velocity of the solar wind ($V_{sw}$) are correlated with geomagnetic activity (Kp) fluctuations on a day-to-day basis (Snyder et al, 1963). More recent findings by Akasofu and others suggest that the interplanetary magnetic field (IMF) strength (F) and direction angle ($\theta_{GSM}$) are more important parameters than the bulk velocity alone (Schatten, private communication).

Accordingly, a solar wind index (SWI) incorporating all three parameters was devised by Schatten (following Akasofu), for use in studying the blue streak phenomenon. The index has been calculated with and without a zero offset for the period April 1, 1970 to December 31, 1971, as follows:

$$\text{AK-I} = (V_{sw} - \bar{V})\,(F)^2 \sin^4(\theta') \qquad (2)$$

where $\bar{V}$ is the mean daily velocity averaged over the period of interest. For April 1 - December 31, 1970, $\bar{V}$ = 423 km/s; and for Jan 1 - Dec 31, 1971, $\bar{V}$ = 433 km/s.

Noting that the index is negative when $V_{sw} < \bar{V}$, it was decided to leave out the offset (i.e., letting $\bar{V} = 0$ in eq. 2), and recompute AK-II. The daily values of AK-II are plotted in Fig. 8, for visual comparison with the blue streak index to be discussed below. Tabular values of AK-I and AK-II are given in Appendix A.

In accordance with Schatten's suggestion, the direction angle $\theta' = \frac{1}{2}\theta_{GSM}$, was computed for each hour from:

$$\theta_{GSM} = \tan^{-1} B_y/B_z \qquad \text{for } B_z > 0 \qquad (3)$$

$$\theta_{GSM} = 180 - \tan^{-1} B_y/B_z \qquad \text{for } B_z < 0 \qquad (4)$$

where $B_y$ and $B_z$, the IMF components in magnetospheric coordinates, are tabulated in the Interplanetary Medium Data Book, NSSDC/WDC-a-R&S 77-04 and 77-04a. The hourly $\theta'$ were averaged for each day for use in eq. 2 and tabulation in Appendix A. The daily averages for $V_{sw}$ and F were likewise derived from the Data Book hourly values. Unfortunately, solar wind data for October through December 1971 are missing.

To gain a quantitative index of "blue streak" dark current data, Schatten suggested the use of an index M(t):

$$M(t) = (\%1)2500 + (\%2)7500 + (\%3)15000 + (\%4)30000 \quad (5)$$

where %N (N = 1,2,3,4) is the normalized total counts per day of the dark current in each channel N at times when the BUV satellite was within the blue streak region of space. Based on tabulated values of %N supplied by GSFC, we have calculated the daily M(t) for the period April 10, 1970 through December 31, 1971. These are plotted in Fig. 8 for comparison with the AK-II index, and all M(t) are tabulated in Appendix A.

Other solar-terrestrial indicators are noted in Fig. 8 to provide a visual comparison with M(t) and AK-II. These are keyed as follows:

K = King et al, Solar Rotation Key Dates (SCOSTEP WD-II)

R = Roberts and Olson, List of Geomagnetic Disturbances (WD-I)

A = Allen and Dunham, Major Magnetic Disturbances (WD-I)

P = Shea and Smart, List of PCA Events (SCOSTEP WD-III)

In thumbing through the pages of Fig. 8, it quickly becomes obvious that the most dramatic blue streak event as measured by M(t) occurred beginning April 21, 1970, shortly after the Nimbus 4 BUV experiment went into orbit.

The second largest M(t) event commenced near August 17, 1970, which provides a strong indication that the earlier event was not due to equipment malfunction. There seems to be a general tendency for the M(t) enhancements to follow the occurrence of a PCA by about a week, though this is not invariably true.

In passing, it is interesting to note that nearly all of King's solar rotation key dates (K) in Fig. 8 fall on peaks in the AK-II index. (The physical ramifications of this note with regard to the King et al (1977) 27-day recurrence pattern in planetary atmospheric pressure waves could not be followed up in the present work.) There is thus a rather pronounced 27-day recurrence tendency in the AK-II daily index. The same tendency can be seen in the solar wind bulk velocity alone, plotted in Fig. 9. This result reconfirms the Snyder et al (1963) findings based on earlier data.

In conclusion, it appears that additional work will be worthwhile in following up solar wind effects on the BUV dark current in certain regions of space.

## 5. CONCLUSIONS AND RECOMMENDATIONS

The nature of the work reported here precludes the drawing of any final conclusions, but the tentative results do suggest areas where further research may be fruitful.

With regard to the thunderstorm/solar activity question, it appears that there may be discernible solar proton effects on thunderstorm occurrence in mid- to high-latitudes. The possible relationship between thunderstorm coourrence and atmospheric vorticity is unclear, but there does seem to be a weak statistical link between the two near times of solar magnetic sector crossings. It appears that the NOAA solar flare index is too coarse an indicator to be useful in thunderstorm analysis. Further, for 27-day recurrence effects, the meteorological noise level is apparently too high to permit a straightforward analysis. These tentative results suggest the following additional analyses:

1) Superposed epoch analysis of the Lethbridge index using a more extensive PCA data base for key dates;

2) More detailed statistical analysis of the possible relationship between thunderstorms and atmospheric vorticity;

3) To test the D'Angelo (1978) hypothesis that the solar wind electric field modulates the earth-ionosphere total potential with subsequent thunderstorm triggering, it is recommended to investigate the relationship between Schatten's solar wind index and the Lethbridge index.

With regard to the solar wind index itself, we recommend that:

4) The index be extended to additional years for use in various solar-terrestrial relationship studies, and particularly in analyses of BUV ozone over the 6-year life of the Nimbus 4 experiment;

5) The incorporation of solar wind bulk density into the index should be considered; and

6) Consideration should be given to varying the exponents on the elements of the index (i.e., $V_{sw}^{a}\ F^{b}\ \sin^{c}\theta'$) to determine their relative importance in solar-terrestrial processes related to the solar wind.

Finally, specifically for the continued analysis of dark current enhancements, we suggest the following:

7) Using the M(t) index enhancements, consider a superposed epoch analysis with PCA, solar flare or other solar-tagged key dates;

8) Consider running averages of the solar wind index (e.g., AK-II) for correlation with M(t);

9) Use integrated AK-II over N days prior to an M(t) event.

10) Use values of the magnetic indexes Kp or C9 to establish approximate solar wind velocities for days where the solar data are missing, in order to provide a more complete AK data base.

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## FIGURE CAPTIONS

Fig. 1. Distribution of major PCA occurrence by month (top panel) and by year (bottom panel) for period 1956-1973, compared with computer-generated random dates.

Fig. 2. Superposed epoch analysis of Lethbridge Index (LTI) using random key dates and Pomerantz and Duggal (1974) major PCA dates.

Fig. 3. Variance in daily mean LTI surrounding PCA key dates (solid curves) and random key dates (dashed curves) for years 1956-1973, latitude band 40-45 $^{\circ}$N.

Fig. 4. Lethbridge Index plotted in 27-day Bartels' rotation format. Full squares are LTI $\geq$ 2.000; 3/4 square, LTI $\geq$ 1.500; 1/2 square, LTI $\geq$ 1.000; 1/4 square, LTI $\geq$ 0.500.

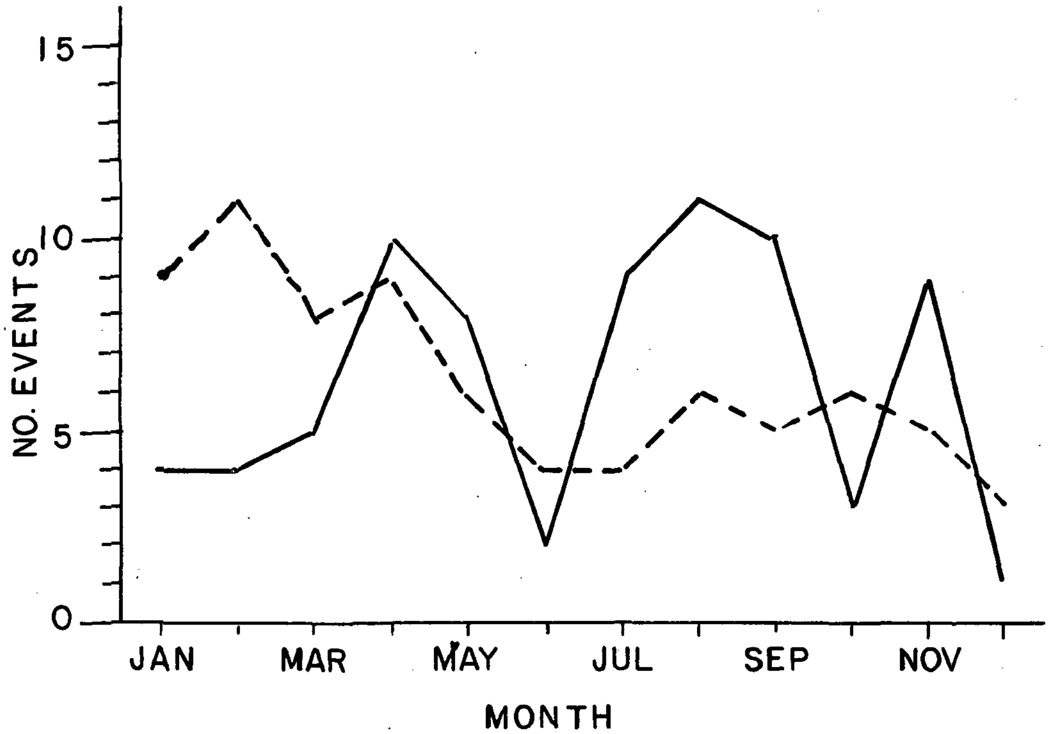
Fig. 5. Comparative response of Lethbridge (1979) thunderstorm index (LTI) and Roberts and Olson (1973) vorticity area index (VAI) to solar magnetic sector boundary crossings.

Fig. 6. Daily average ATS-1 solar proton flux for energies 21-70 MeV, compared to dark current blue streak event and PCA event, April-May, 1970.

Fig. 7. Same as Fig. 6 but for July-August, 1970.

Fig. 8. Daily values of solar wind index (AK-II) and blue streak index M(t) for April 1970 - July 1971. Legend: K- solar rotation key dates used by King et al (1977); R and A - geomagnetic storm dates; P - polar cap absorption events.

Fig. 9. Daily average solar wind bulk velocity, April 1970 - March 1971.



15
10
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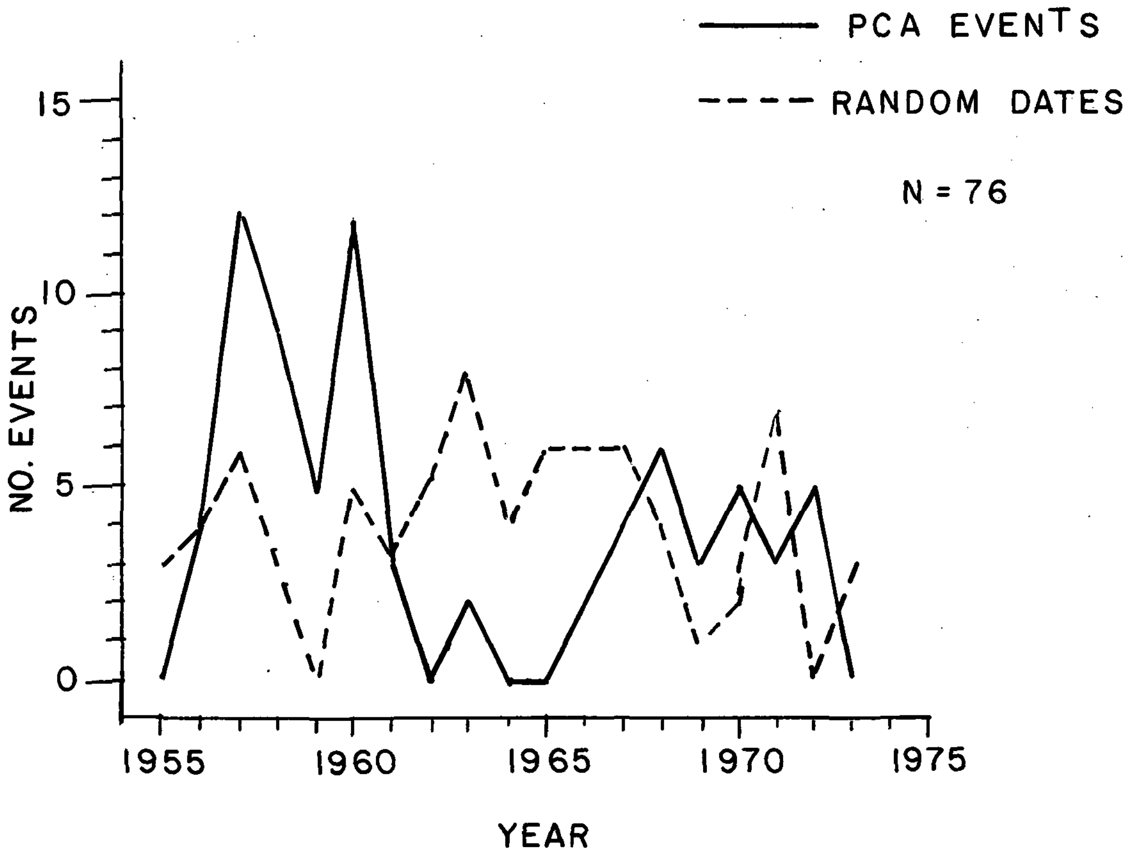
0
NO. EVENTS
JAN
MAR
MAY
JUL
SEP
NOV
MONTH

PCA EVENTS
RANDOM DATES
N = 76
15
10
5
0
NO. EVENTS
1955
1960
1965
1970
1975
YEAR


FIGURE 1.

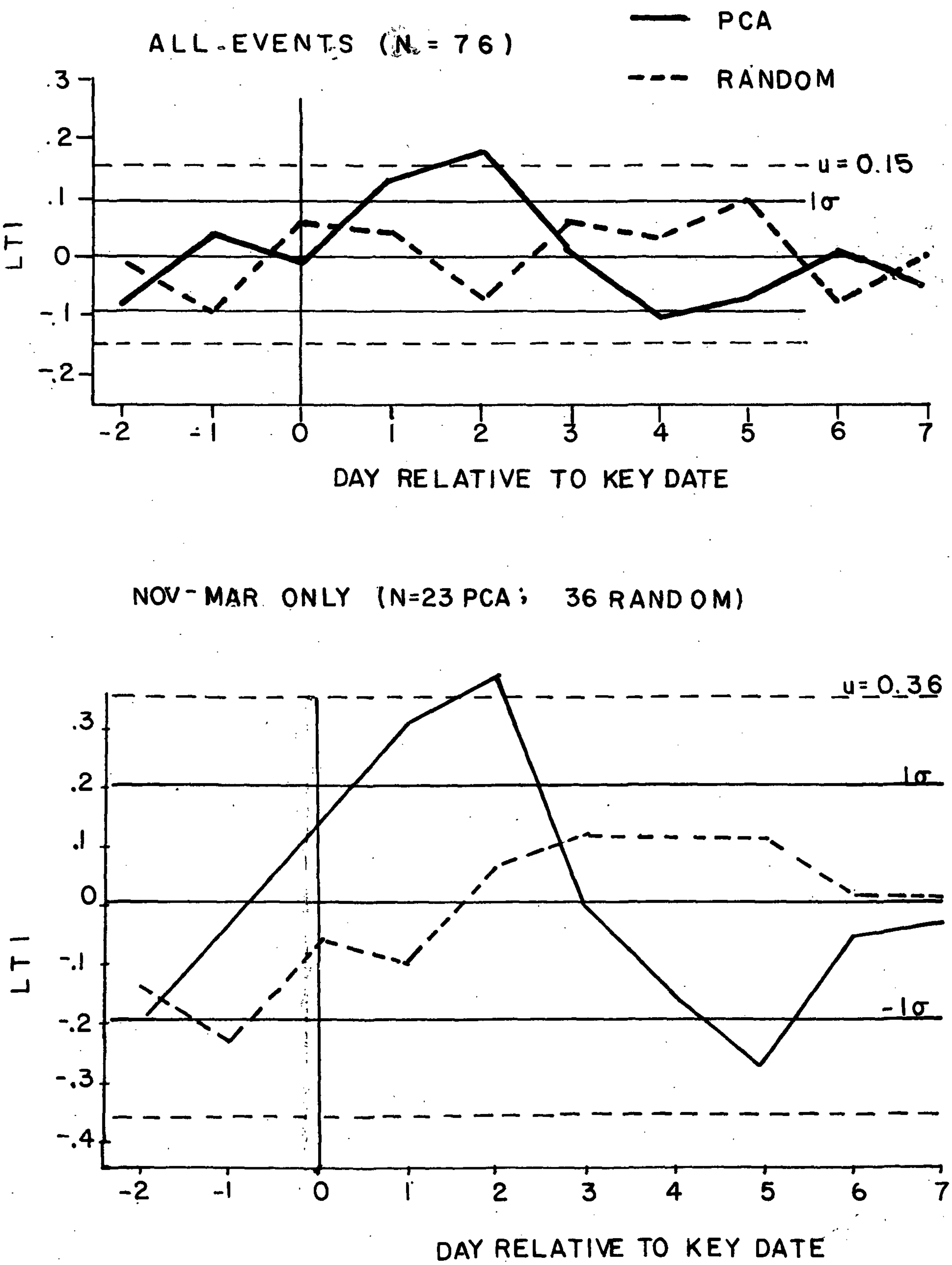
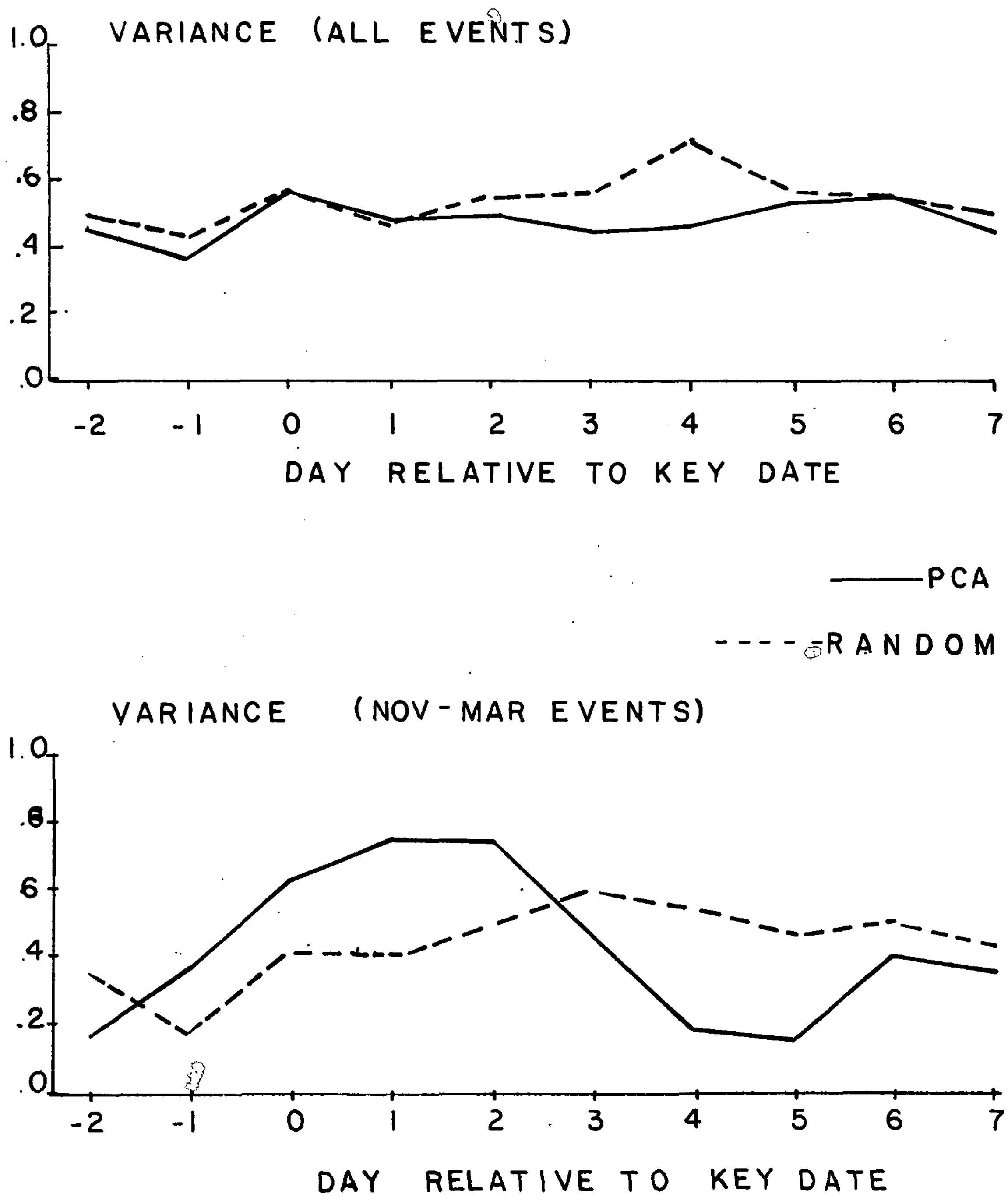

ALL EVENTS (N = 76)
PCA
RANDOM
u = 0.15
1σ
LTI
.3
.2
.1
0
-.1
-.2
-2
-1
0
1
2
3
4
5
6
7
DAY RELATIVE TO KEY DATE
NOV-MAR ONLY (N=23 PCA; 36 RANDOM)
u = 0.36
1σ
-1σ
LTI
.3
.2
.1
0
-.1
-.2
-.3
-.4
-2
-1
0
1
2
3
4
5
6
7
DAY RELATIVE TO KEY DATE

FIGURE 2.



VARIANCE (ALL EVENTS)
1.0
.8
.6
.4
.2
.0
-2
-1
0
1
2
3
4
5
6
7
DAY RELATIVE TO KEY DATE
PCA
RANDOM
VARIANCE (NOV-MAR EVENTS)
1.0
.8
.6
.4
.2
.0
-2
-1
0
1
2
3
4
5
6
7
DAY RELATIVE TO KEY DATE


FIGURE 3.

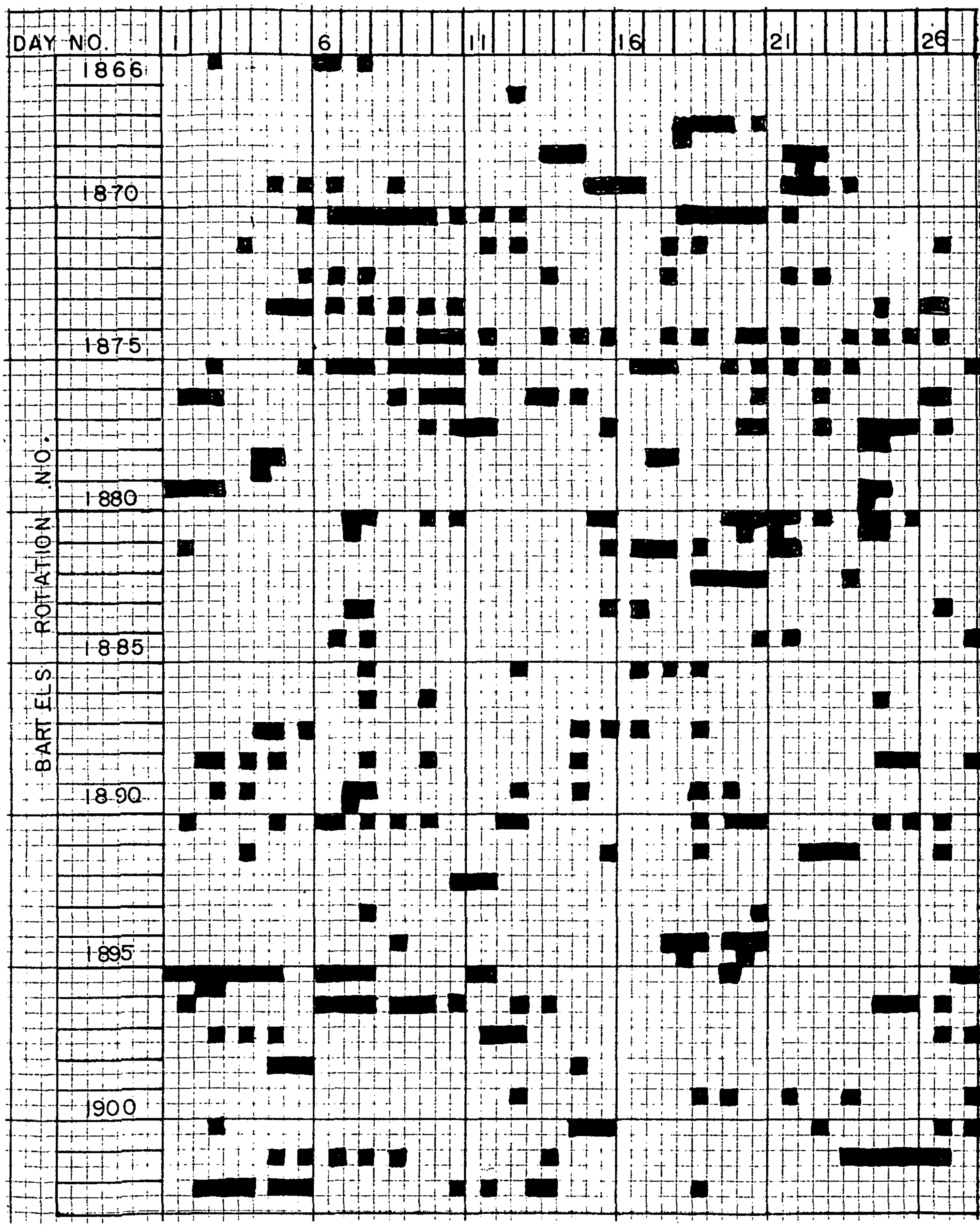

DAY NO.
1
6
11
16
21
26
1866
1870
1875
1880
1885
1890
1895
1900
BARTELS ROTATION NO.

FIGURE 4.

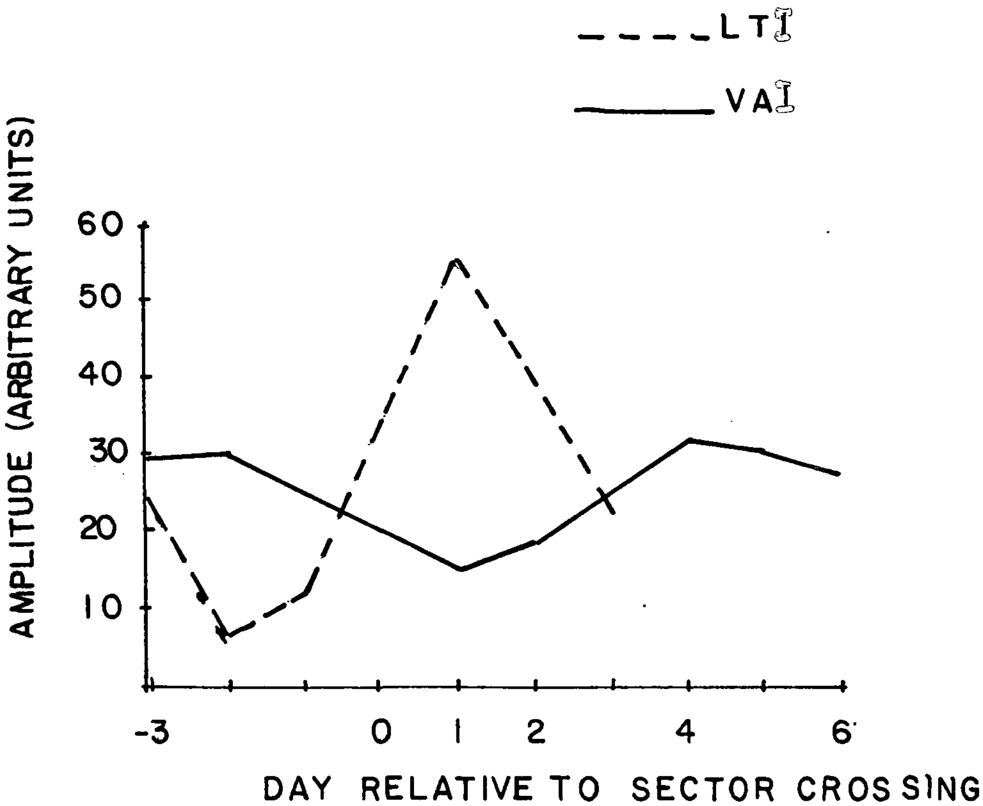

LTI
VAI
AMPLITUDE (ARBITRARY UNITS)
60
50
40
30
20
10
-3
0
1
2
4
6
DAY RELATIVE TO SECTOR CROSSING

FIGURE 5.

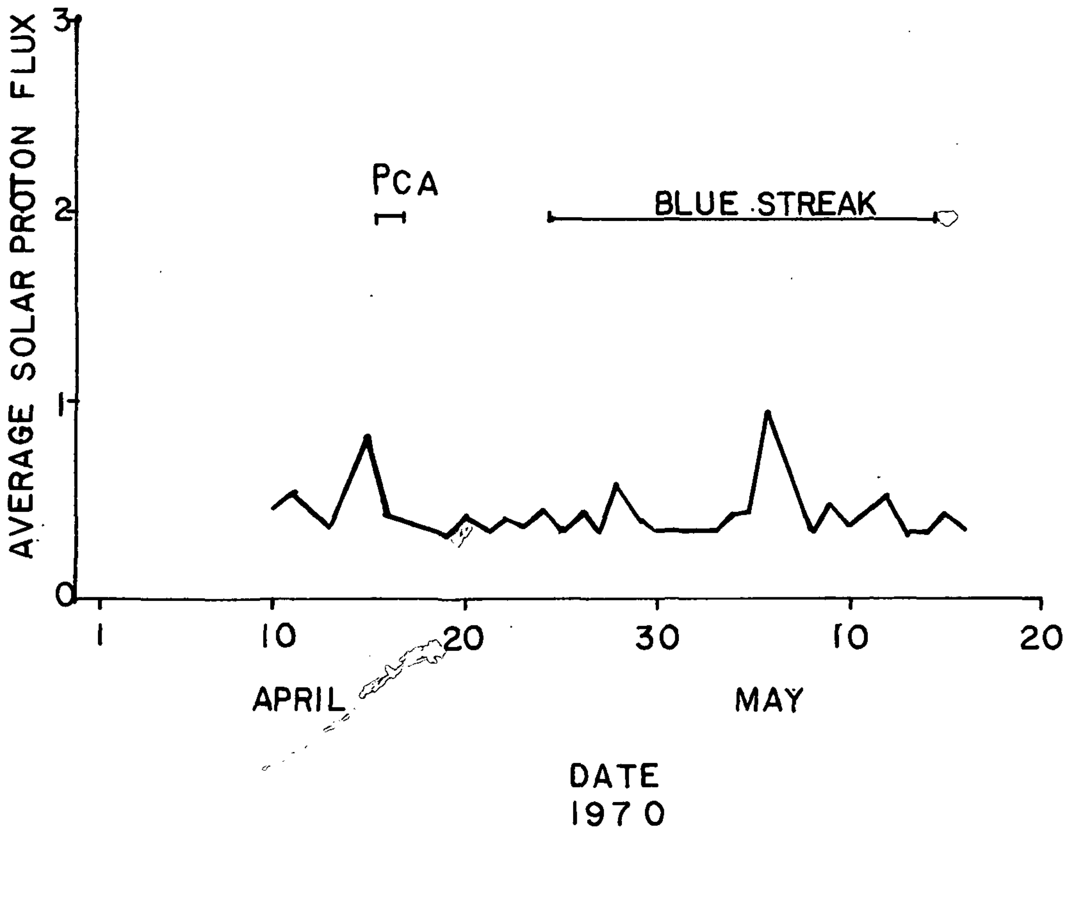
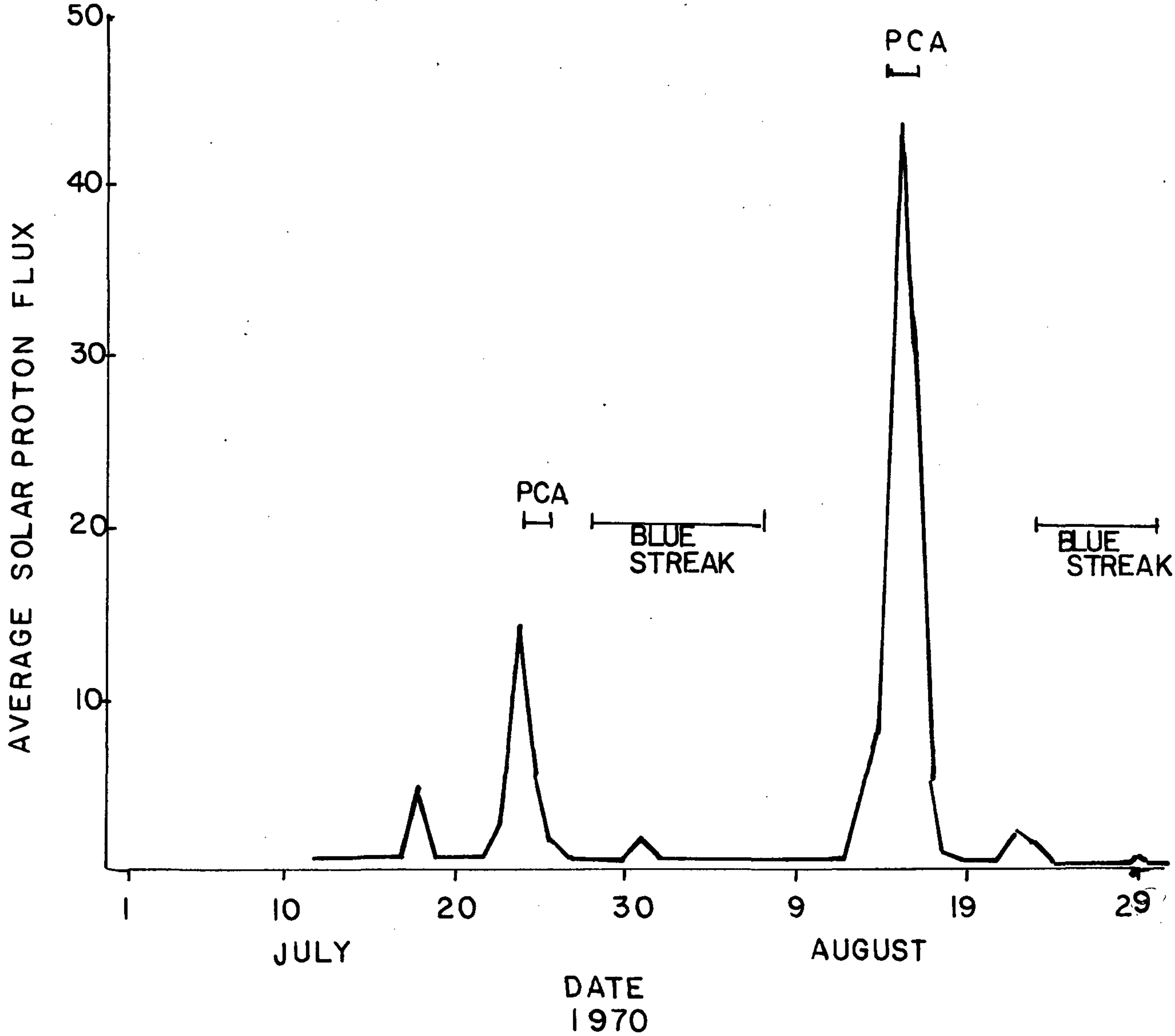

AVERAGE SOLAR PROTON FLUX
3
2
1
0
PCA
BLUE STREAK
1
10
20
30
10
20
APRIL
MAY
DATE
1970

FIGURE 6.



AVERAGE SOLAR PROTON FLUX
50
40
30
20
10
PCA
PCA
BLUE STREAK
BLUE STREAK
1
10
20
30
9
19
29
JULY
AUGUST
DATE
1970


FIGURE 7.

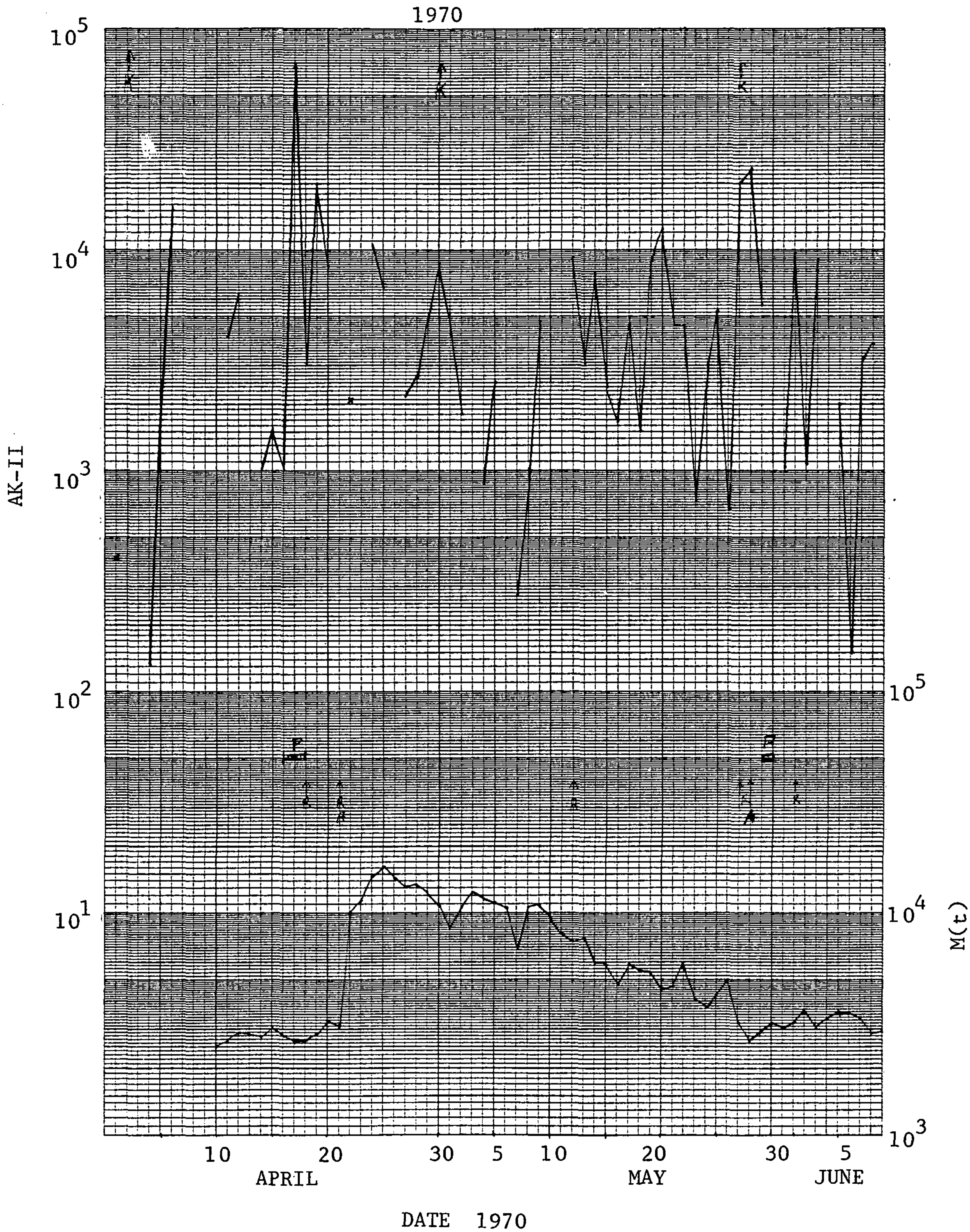

1970
$10^5$
$10^4$
$10^3$
$10^2$
$10^1$
AK-II
$10^5$
$10^4$
$10^3$
M(t)
10
20
30
5
10
20
30
5
APRIL
MAY
JUNE
DATE 1970

FIGURE 8

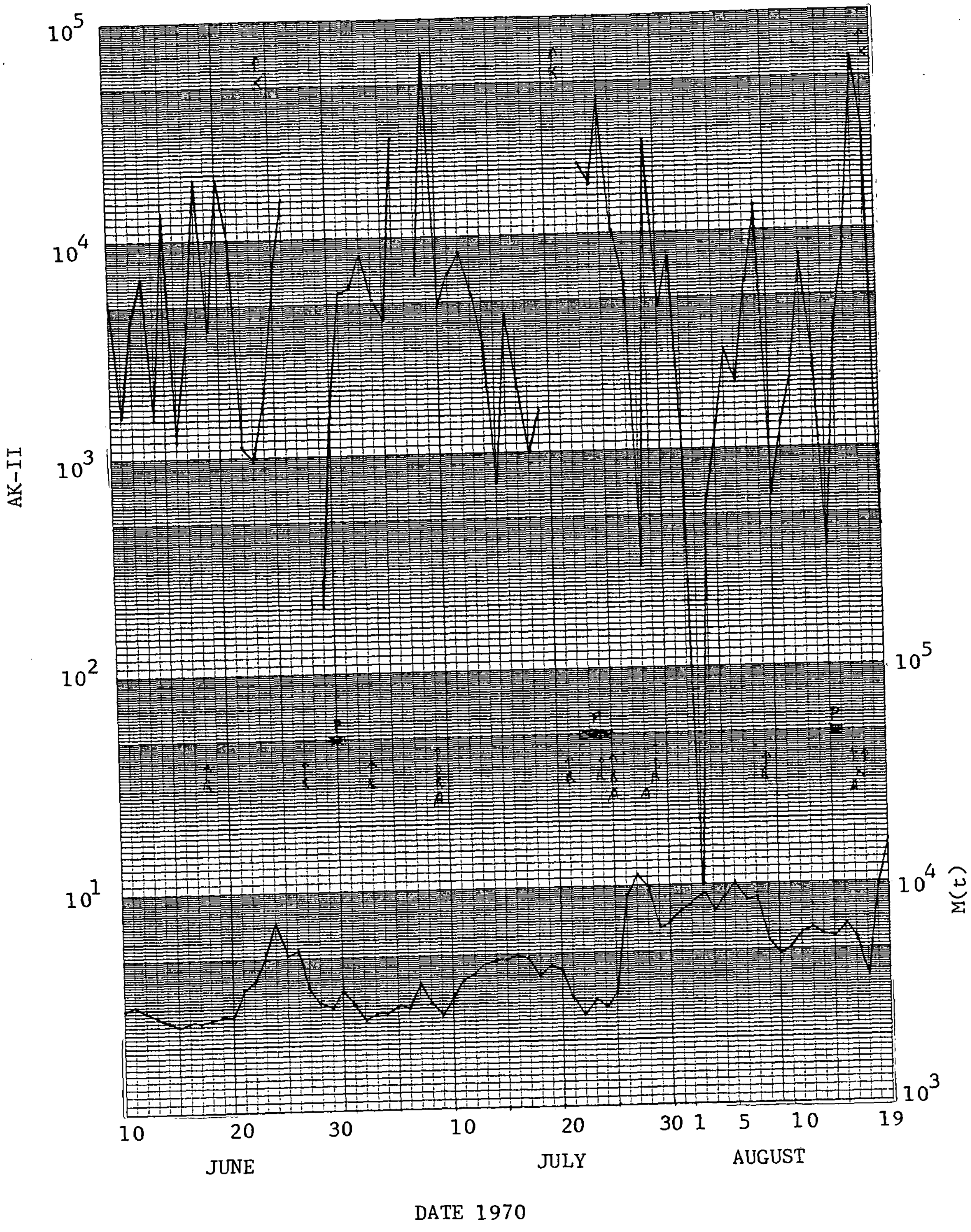



FIGURE 8, CONT'D.

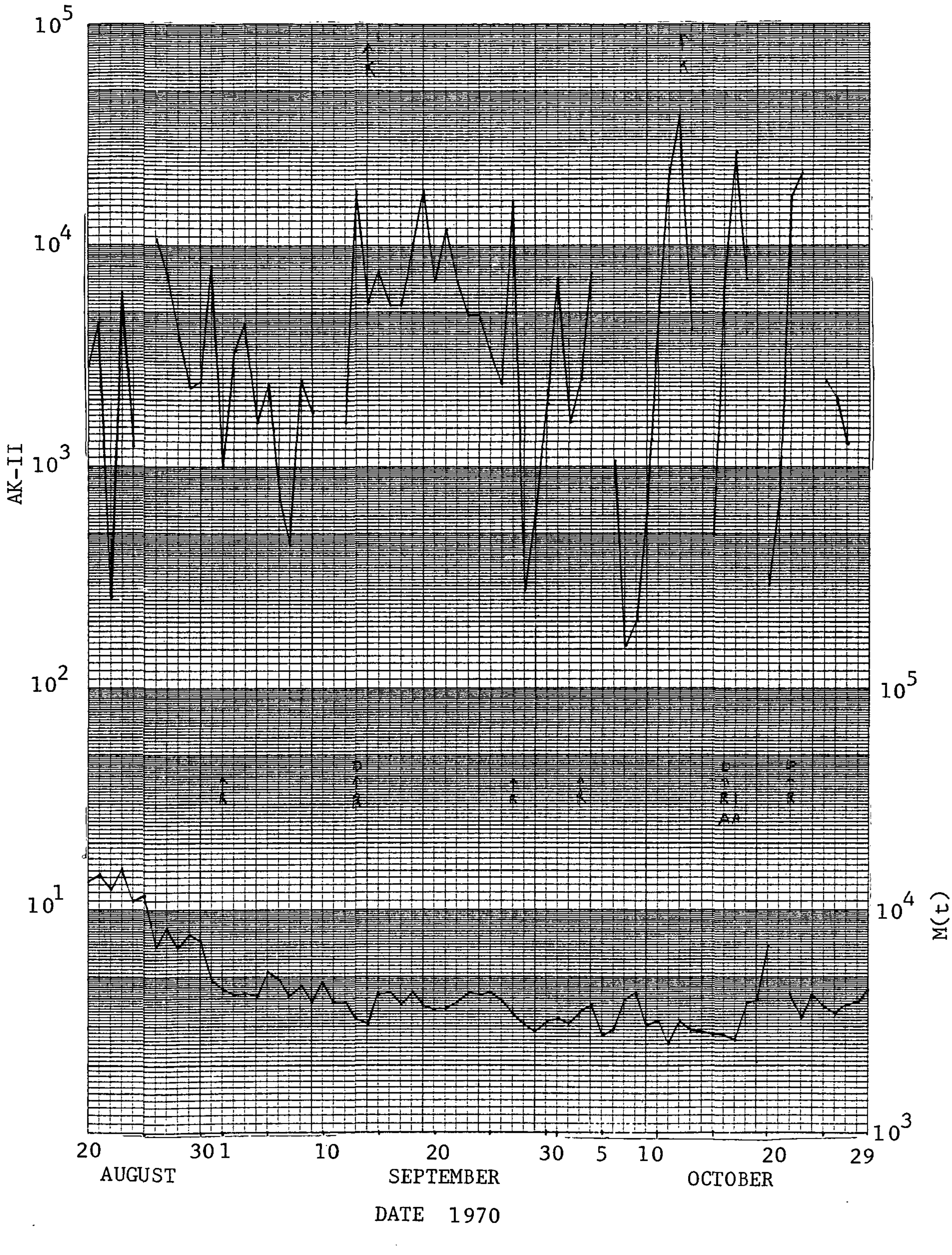



FIGURE 8, CONT'D.

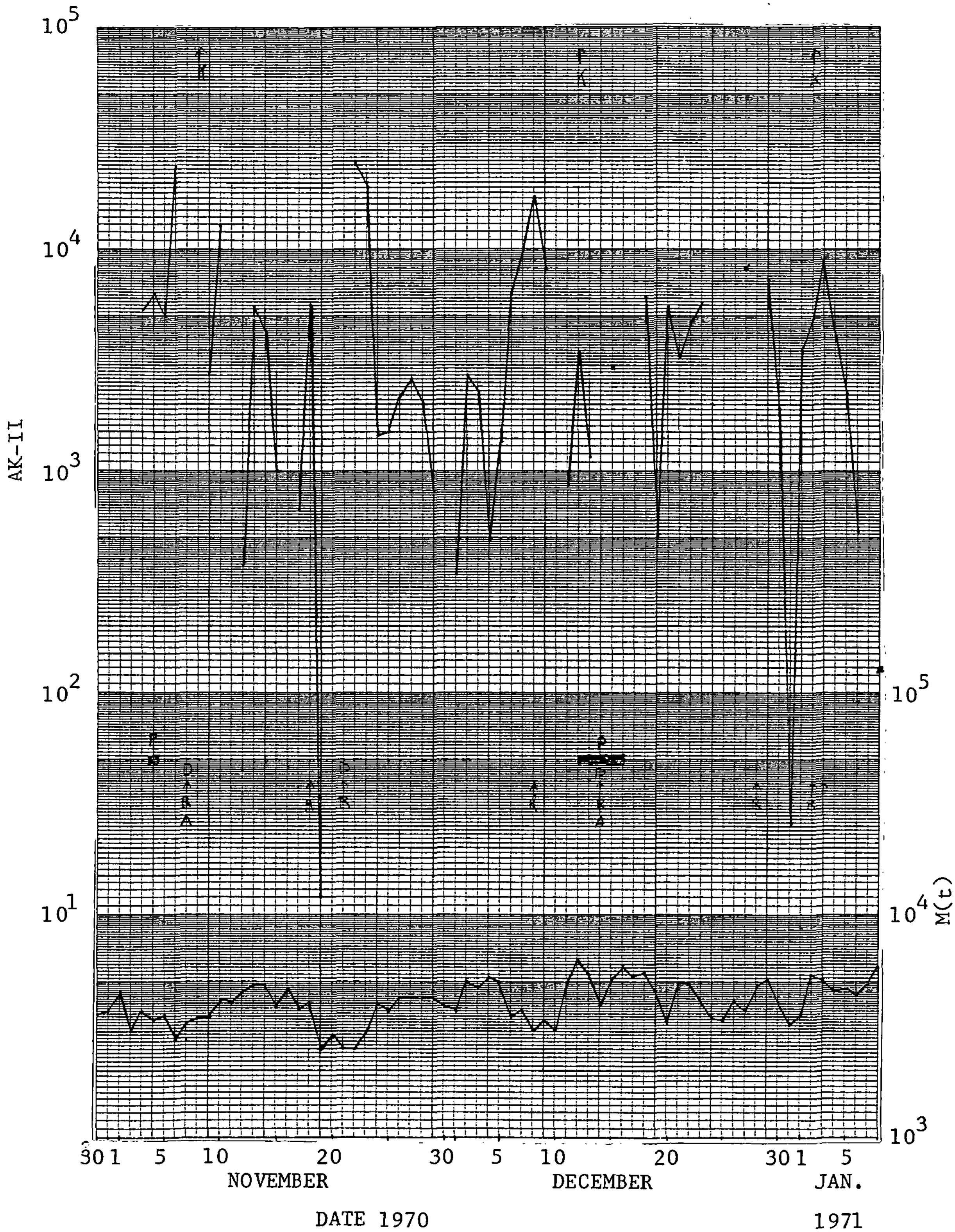



FIGURE 8, CONT'D.

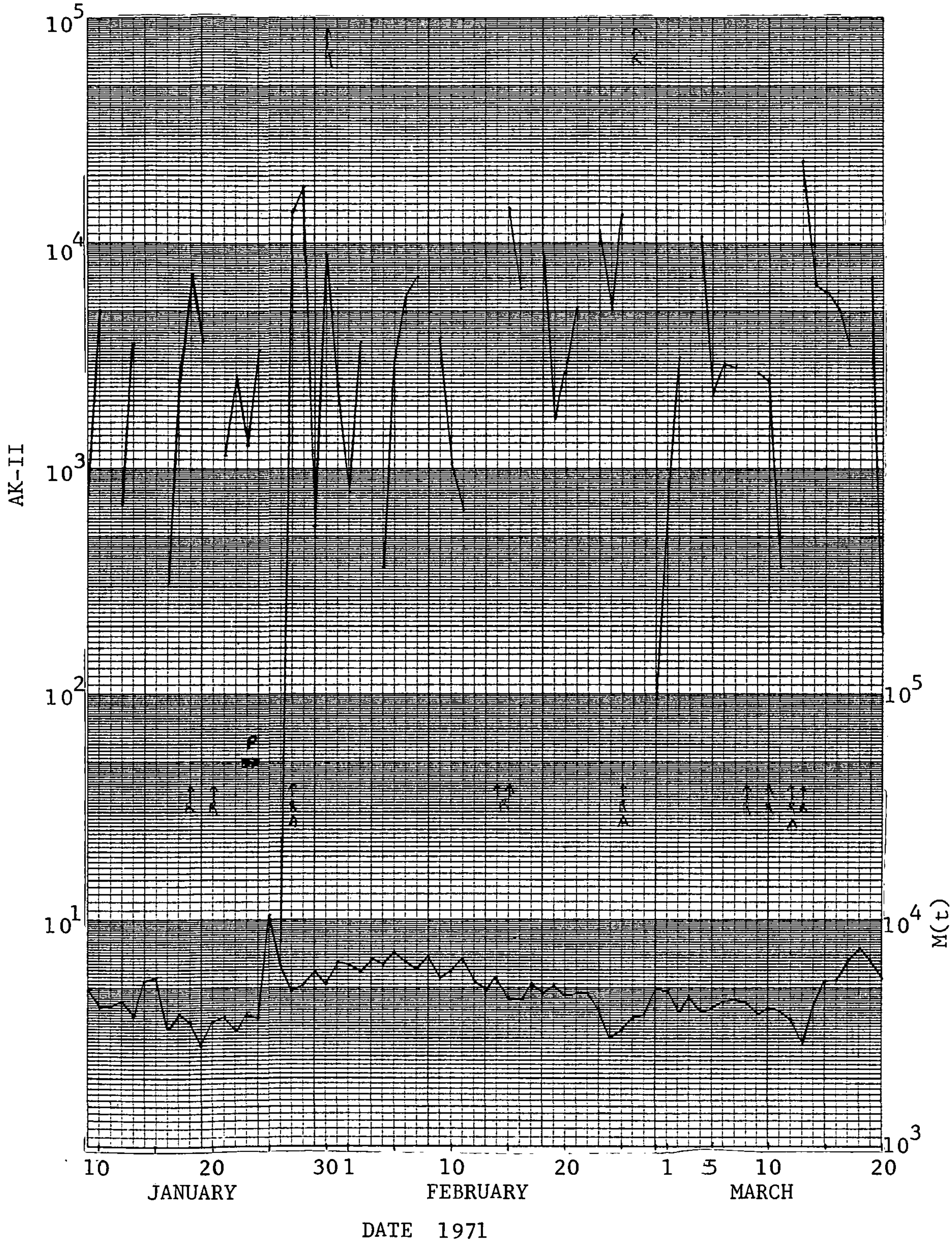



FIGURE 8, CONT'D.

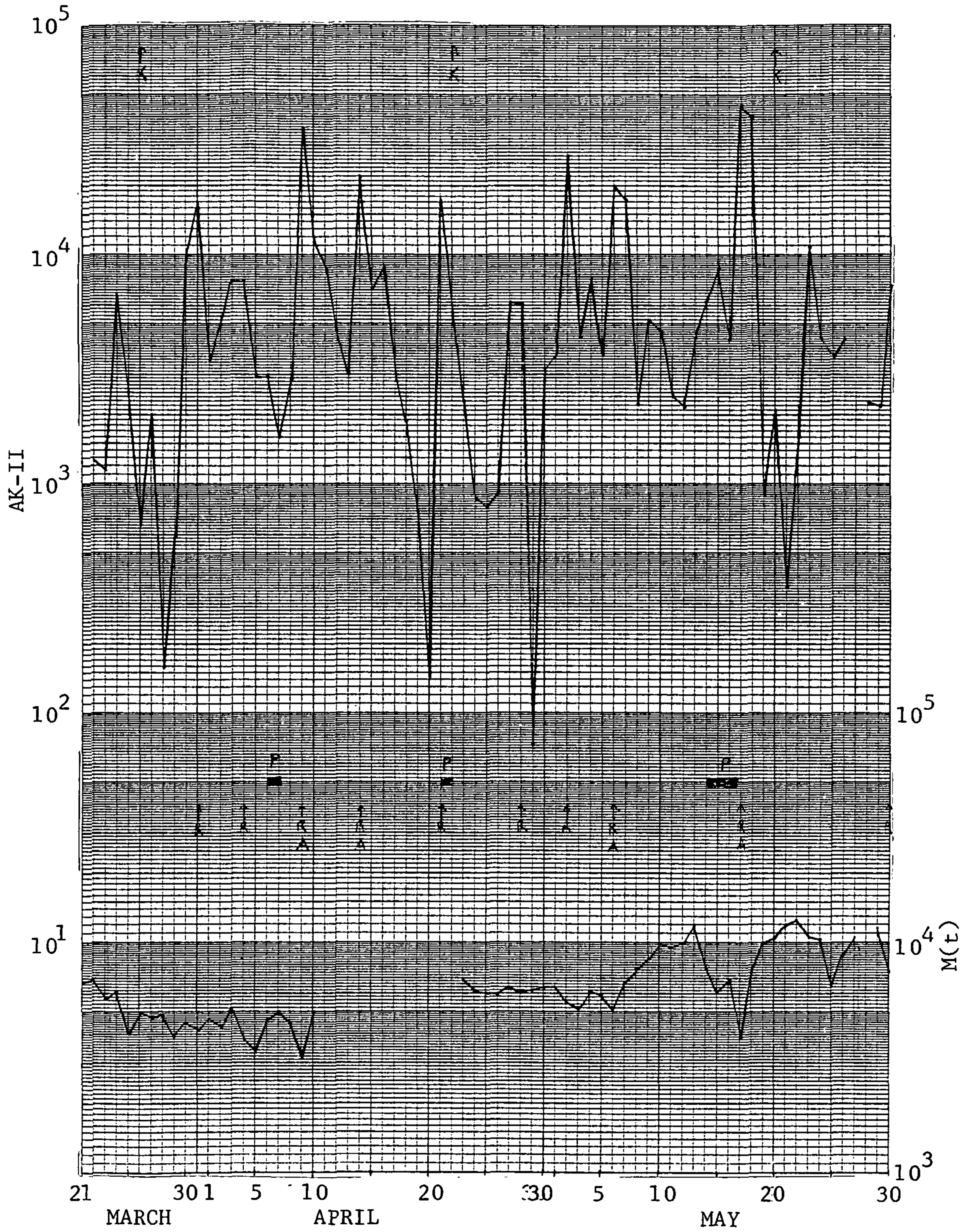



FIGURE 8, CONT'D.

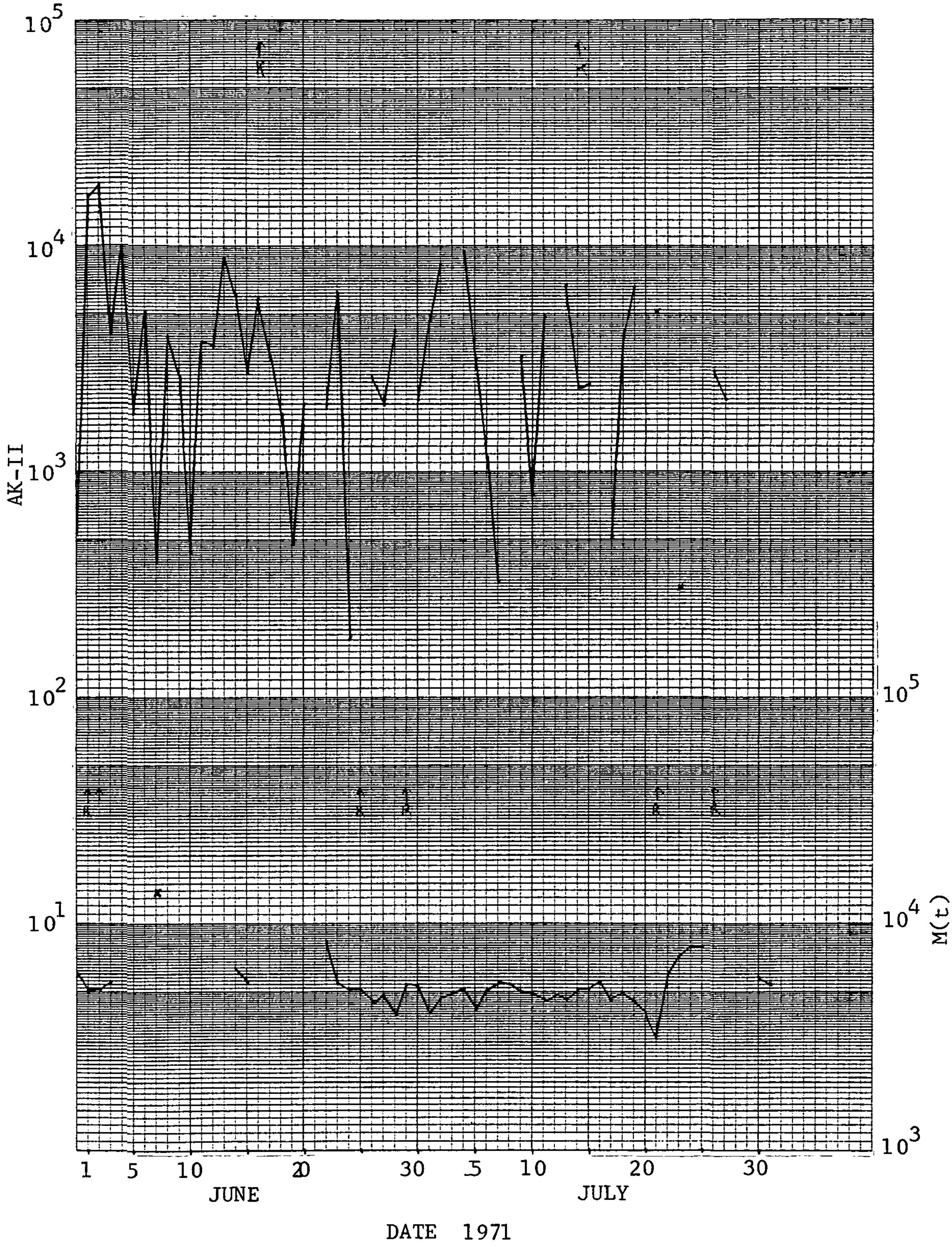



FIGURE 8, CONCL'D.

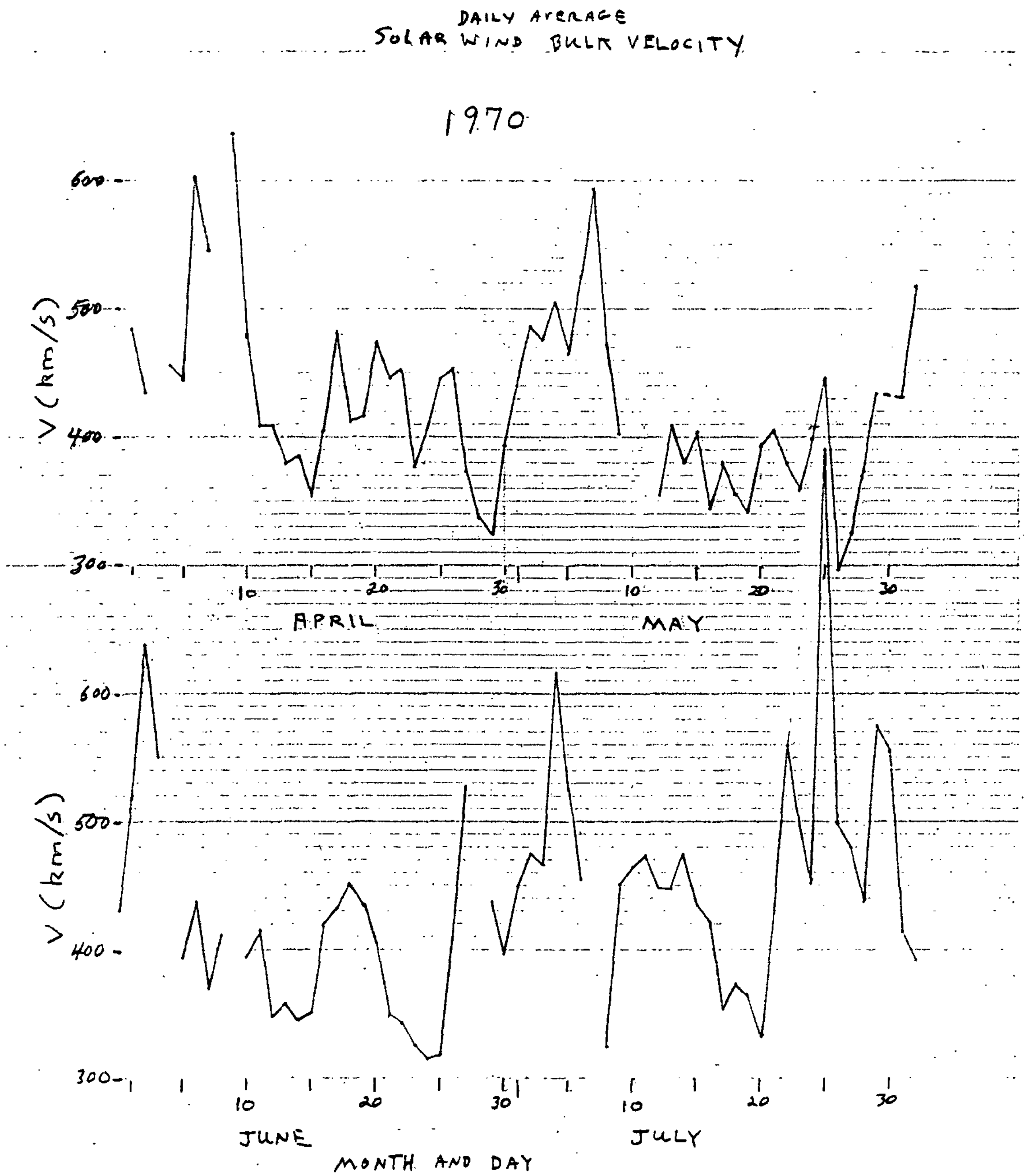



FIG 9. Daily Average Solar Wind Bulk Velocity.

DAILY AVERAGE
SOLAR WIND BULK VELOCITY

1970

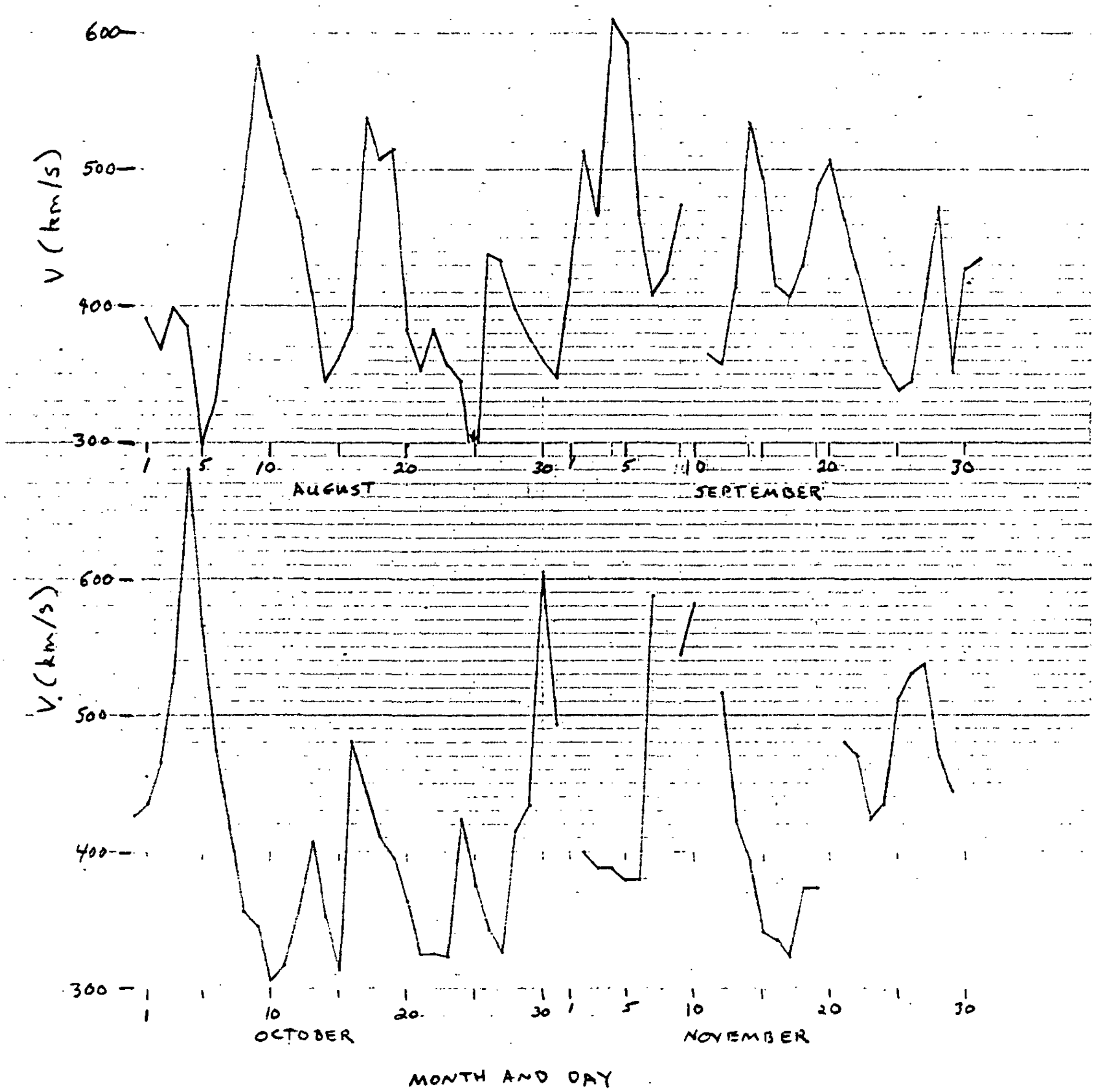



Fig. 9. cont'd.

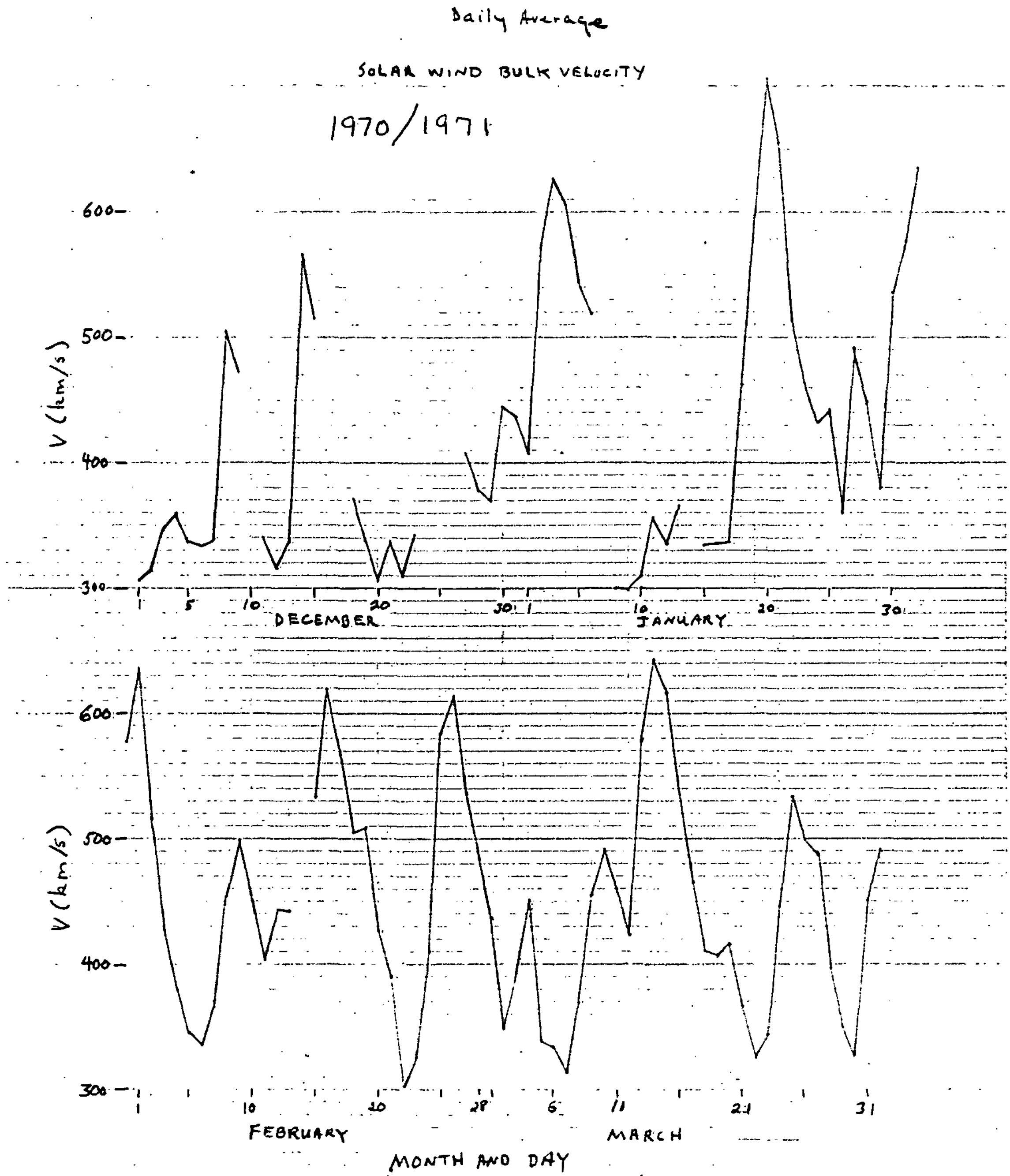

Daily Average
SOLAR WIND BULK VELOCITY
1970/1971
600
500
400
300
V (km/s)
1
5
10
20
30
1
10
20
30
DECEMBER
JANUARY
600
500
400
300
V (km/s)
1
10
20
28
6
11
21
31
FEBRUARY
MARCH
MONTH AND DAY

Fig. 9 concl'd.

# APPENDIX A

## TABLE OF DAILY AVERAGE SOLAR WIND PARAMETERS, SOLAR WIND INDEX AND BLUE STREAK INDEX

$V_{sw}$ = solar wind bulk velocity (km/s)

F = IMF field strength (gammas)

$\theta'$ = IMF angle in magnetospheric coordinates (degrees)

AK-I = solar wind index with zero offset

AK-II = solar wind index without zero offset

M(t) = dark current blue streak index

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|

April 1970

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 91 | 1 | 483 | 9.2 | 18.4 | 51 | 406 | - |
| 92 | 2 | 435 | - | - | - | - | - |
| 93 | 3 | - | - | - | - | - | - |
| 94 | 4 | 457 | 6.3 | 17.0 | 10 | 133 | - |
| 95 | 5 | 447 | 8.1 | 29.4 | 92 | 1703 | - |
| 96 | 6 | 603 | 8.5 | 50.7 | 4666 | 15623 | - |
| 97 | 7 | 546 | - | - | - | - | - |
| 98 | 8 | - | - | - | - | - | - |
| 99 | 9 | 638 | - | - | - | - | - |
| 100 | 10 | 479 | - | 59.6 | 60 | - | 2500 |
| 101 | 11 | 409 | 5.4 | 50.0 | -140 | 4107 | 2670 |
| 102 | 12 | 409 | 5.3 | 59.6 | -216 | 6358 | 2891 |
| 103 | 13 | 380 | - | - | - | - | 2857 |
| 104 | 14 | 386 | 4.6 | 36.5 | 37 | 1022 | 2790 |
| 105 | 15 | 353 | 4.1 | 45.5 | 45 | 1536 | 3047 |
| 106 | 16 | 406 | 19.3 | 16.6 | 17 | 1007 | 2803 |
| 107 | 17 | 481 | 17.8 | 54.6 | 55 | 67280 | 2569 |
| 108 | 18 | 412 | 6.5 | 40.5 | 41 | 3097 | 2704 |
| 109 | 19 | 416 | 8.4 | 65.8 | 66 | 20317 | 2929 |
| 110 | 20 | 473 | 12.9 | 35.0 | 35 | 8519 | 3334 |
| 111 | 21 | 446 | - | - | - | - | 3134 |
| 112 | 22 | 452 | 5.3 | 39.6 | 40 | 2096 | 9999 |
| 113 | 23 | 377 | - | - | - | - | 11387 |
| 114 | 24 | 406 | 6.8 | 60.1 | 60 | 10603 | 14730 |
| 115 | 25 | 447 | 6.6 | 50.3 | 50 | 6823 | 16268 |
| 116 | 26 | 453 | - | - | - | - | 14250 |
| 117 | 27 | 373 | 3.6 | 55.0 | 55 | 2177 | 13204 |
| 118 | 28 | 338 | 4.1 | 56.0 | 56 | 2684 | 13427 |
| 119 | 29 | 326 | 4.0 | 79.7 | 80 | 4888 | 12296 |
| 120 | 30 | 393 | 8.2 | 49.3 | 49 | 8730 | 10900 |

May 1970

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 121 | 1 | 440 | 8.2 | 38.7 | 176 | 4521 | 8705 |
| 122 | 2 | 487 | 6.9 | 32.0 | 241 | 1828 | 10692 |
| 123 | 3 | 478 | - | - | - | - | 12312 |
| 124 | 4 | 505 | 5.6 | 29.0 | 142 | 875 | 11644 |
| 125 | 5 | 466 | 6.1 | 38.2 | 235 | 2536 | 11143 |
| 126 | 6 | 527 | - | - | - | - | 10624 |
| 127 | 7 | 594 | 2.6 | 30.8 | 80 | 276 | 6939 |
| 128 | 8 | 471 | 3.2 | 39.8 | 83 | 810 | 10704 |
| 129 | 9 | 402 | 4.0 | 68.4 | -250 | 4807 | 10977 |
| 130 | 10 | - | - | - | - | - | 9564 |
| 131 | 11 | - | 3.0 | 47.4 | - | - | 8098 |
| 132 | 12 | 354 | 8.6 | 50.5 | -1807 | 9282 | 7469 |
| 133 | 13 | 410 | 6.9 | 39.1 | -97 | 3088 | 7749 |
| 134 | 14 | 380 | 7.3 | 52.1 | -886 | 7851 | 5968 |

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 135 | 15 | 402 | 5.3 | 42.8 | -125 | 2407 | 5833 |
| 136 | 16 | 344 | 4.6 | 44.0 | -389 | 1695 | 4769 |
| 137 | 17 | 380 | 8.2 | 41.4 | -552 | 4887 | 5884 |
| 138 | 18 | 356 | 7.2 | 32.4 | -286 | 1521 | 5527 |
| 139 | 19 | 341 | 7.6 | 55.3 | -2161 | 8999 | 5293 |
| 140 | 20 | 394 | 6.2 | 71.8 | -905 | 12335 | 4470 |
| 141 | 21 | 407 | 5.6 | 50.5 | -177 | 4525 | 4668 |
| 142 | 22 | 380 | 5.1 | 55.3 | -510 | 4516 | 5739 |
| 143 | 23 | 359 | 4.5 | 34.4 | -132 | 741 | 4136 |
| 144 | 24 | 399 | 6.2 | 41.9 | -183 | 3051 | 3820 |
| 145 | 25 | 446 | 4.7 | 59.1 | 277 | 5341 | 4331 |
| 146 | 26 | 297 | 3.9 | 38.4 | -285 | 672 | 4965 |
| 147 | 27 | 326 | 8.2 | 78.4 | -5999 | 20184 | 3228 |
| 148 | 28 | 373 | 13.8 | 49.3 | -3139 | 23467 | 2662 |
| 149 | 29 | 434 | 8.6 | 40.4 | 145 | 5664 | 2943 |
| 150 | 30 | - | - | - | - | - | 3215 |
| 151 | 31 | 431 | 6.5 | 29.3 | 20 | 1044 | 3013 |

June 1970

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 152 | 1 | 518 | 9.4 | 42.8 | 1791 | 9754 | 3261 |
| 153 | 2 | 639 | 9.3 | 22.0 | 368 | 1088 | 3620 |
| 154 | 3 | 550 | 5.3 | 61.3 | 2113 | 9145 | 3041 |
| 155 | 4 | - | 4.4 | 55.5 | - | - | 3373 |
| 156 | 5 | 393 | 5.0 | 42.3 | -153 | 2016 | 3596 |
| 157 | 6 | 438 | 2.9 | 26.7 | 5 | 150 | 3572 |
| 158 | 7 | 370 | 5.3 | 48.0 | -453 | 3170 | 3360 |
| 159 | 8 | 412 | 7.7 | 38.8 | -100 | 3766 | 2885 |
| 160 | 9 | - | 7.3 | 42.7 | - | - | 2967 |
| 161 | 10 | 395 | 5.6 | 54.4 | -382 | 5414 | 2972 |
| 162 | 11 | 415 | 5.3 | 37.3 | -30 | 1572 | 3125 |
| 163 | 12 | 348 | 4.6 | 61.2 | -935 | 4342 | 2911 |
| 164 | 13 | 358 | 6.7 | 53.7 | -1229 | 6780 | 2763 |
| 165 | 14 | 345 | 5.9 | 36.5 | -339 | 1503 | 2572 |
| 166 | 15 | 351 | 7.9 | 62.1 | -2737 | 13363 | 2500 |
| 167 | 16 | 418 | 6.0 | 32.1 | -14 | 1200 | 2628 |
| 168 | 17 | 432 | 9.6 | 32.5 | 70 | 3318 | 2571 |
| 169 | 18 | 452 | 8.3 | 62.0 | 1218 | 18925 | 2647 |
| 170 | 19 | 434 | 4.8 | 52.0 | 99 | 3856 | 2744 |
| 171 | 20 | 405 | 7.2 | 76.5 | -830 | 18769 | 2712 |
| 172 | 21 | 348 | 6.7 | 63.4 | -2149 | 9986 | 3648 |
| 173 | 22 | 341 | 5.5 | 35.1 | -271 | 1128 | 3988 |
| 174 | 23 | 326 | 6.1 | 32.1 | -288 | 967 | 4971 |
| 175 | 24 | 314 | 7.0 | 35.7 | -619 | 1784 | 7235 |
| 176 | 25 | 319 | 6.7 | 55.9 | -2193 | 6733 | 5192 |
| 177 | 26 | 408 | 7.5 | 64.5 | -556 | 15231 | 5487 |
| 178 | 27 | 529 | - | - | - | - | 3654 |
| 179 | 28 | - | 3.3 | 46.6 | - | - | 3118 |
| 180 | 29 | 438 | 3.5 | 26.2 | 7 | 204 | 3015 |
| 181 | 30 | 397 | 5.6 | 36.3 | -100 | 1529 | 3553 |

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| | | | | July 1970 | | | |
| 182 | 1 | 448 | 9.2 | 38.4 | 316 | 5645 | 3070 |
| 183 | 2 | 475 | 8.9 | 39.0 | 647 | 5901 | 2581 |
| 184 | 3 | 466 | 7.3 | 49.6 | 772 | 8352 | 2741 |
| 185 | 4 | 617 | 6.7 | 41.2 | 1640 | 5214 | 2760 |
| 186 | 5 | 525 | 6.2 | 42.7 | 830 | 4268 | 3000 |
| 187 | 6 | 456 | 8.0 | 84.9 | 2085 | 28725 | 2929 |
| 188 | 7 | - | 3.4 | 34.2 | - | - | 3728 |
| 189 | 8 | 325 | 5.4 | 66.8 | -2037 | 6764 | 3041 |
| 190 | 9 | 451 | 18.6 | 54.7 | 4313 | 69224 | 2715 |
| 191 | 10 | 466 | 9.6 | 35.4 | 447 | 4836 | 3334 |
| 192 | 11 | 473 | 6.7 | 48.7 | 716 | 6764 | 3907 |
| 193 | 12 | 449 | 7.1 | 51.6 | 496 | 8538 | 4118 |
| 194 | 13 | 447 | 5.8 | 50.2 | 282 | 5239 | 4554 |
| 195 | 14 | 473 | 5.1 | 45.7 | 342 | 3228 | 4779 |
| 196 | 15 | 435 | 4.2 | 33.8 | 20 | 735 | 4744 |
| 197 | 16 | 421 | 4.3 | 59.3 | -19 | 4255 | 4933 |
| 198 | 17 | 353 | 6.7 | 37.6 | -435 | 2196 | 4853 |
| 199 | 18 | 373 | 4.4 | 37.6 | -134 | 1001 | 3952 |
| 200 | 19 | 364 | 3.3 | 52.5 | -254 | 1570 | 4414 |
| 201 | 20 | 332 | - | - | - | - | 4208 |
| 202 | 21 | 429 | - | - | - | - | 3070 |
| 203 | 22 | 559 | - | - | - | - | 2639 |
| 204 | 23 | 497 | 10.9 | 50.6 | 3139 | 21054 | 3047 |
| 205 | 24 | 451 | 9.1 | 55.0 | 1048 | 16816 | 2862 |
| 206 | 25 | 791 | 11.8 | 52.1 | 19871 | 42701 | 3293 |
| 207 | 26 | 499 | 4.7 | 78.8 | 1557 | 10207 | 9081 |
| 208 | 27 | 480 | 4.9 | 58.2 | 715 | 6013 | 11200 |
| 209 | 28 | 438 | 6.2 | 21.3 | 10 | 293 | 9883 |
| 210 | 29 | 575 | 9.6 | 57.3 | 7029 | 26574 | 6518 |
| 211 | 30 | 555 | 5.4 | 47.2 | 1116 | 4691 | 6948 |
| 212 | 31 | 414 | 4.9 | 69.9 | -166 | 7731 | 7673 |
| | | | | August 1970 | | | |
| 213 | 1 | 391 | 3.1 | 44.5 | -74 | 907 | 8298 |
| 214 | 2 | 369 | 6.1 | 9.3 | -1 | 9 | 9222 |
| 215 | 3 | 398 | 6.5 | 25.2 | -35 | 553 | 7672 |
| 216 | 4 | 385 | 4.5 | 39.4 | -125 | 1265 | 8914 |
| 217 | 5 | 299 | 4.1 | 60.4 | -1190 | 2873 | 10202 |
| 218 | 6 | 333 | 8.0 | 33.9 | -557 | 2062 | 8507 |
| 219 | 7 | 409 | 11.2 | 35.4 | -196 | 5777 | 8688 |
| 220 | 8 | 487 | 11.0 | 43.3 | 1716 | 13036 | 5441 |
| 221 | 9 | 582 | 4.2 | 29.7 | 169 | 619 | 4825 |
| 222 | 10 | 539 | 4.6 | 35.2 | 271 | 1259 | 5141 |
| 223 | 11 | 497 | 4.5 | 42.5 | 313 | 2097 | 6023 |
| 224 | 12 | 464 | 4.9 | 66.1 | 689 | 7784 | 6270 |
| 225 | 13 | 410 | 4.3 | 49.2 | -78 | 2489 | 5808 |

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 226 | 14 | 346 | 4.9 | 27.1 | -80 | 358 | 5694 |
| 227 | 15 | 361 | 6.4 | 47.9 | -768 | 4482 | 6525 |
| 228 | 16 | 385 | 7.7 | 51.3 | -834 | 8468 | 5626 |
| 229 | 17 | 539 | 14.5 | 59.2 | 13288 | 61690 | 3820 |
| 230 | 18 | 508 | 7.7 | 78.9 | 4679 | 27928 | 9775 |
| 231 | 19 | 514 | 5.4 | 24.4 | 77 | 437 | 15413 |
| 232 | 20 | 383 | 6.7 | 39.7 | -298 | 2862 | 13266 |
| 233 | 21 | 353 | 5.5 | 53.6 | -887 | 4482 | 14338 |
| 234 | 22 | 383 | 5.7 | 22.2 | -26 | 254 | 12257 |
| 235 | 23 | 357 | 5.0 | 65.5 | -1130 | 6119 | 15215 |
| 236 | 24 | 346 | 5.7 | 35.1 | -273 | 1229 | 11099 |
| 237 | 25 | 193 | - | - | - | - | 11885 |
| 238 | 26 | 439 | 6.0 | 65.5 | 397 | 10836 | 6932 |
| 239 | 27 | 434 | 6.1 | 55.5 | 191 | 7449 | 8268 |
| 240 | 28 | 399 | 7.0 | 41.7 | -229 | 3829 | 6841 |
| 241 | 29 | 376 | 5.0 | 44.7 | -273 | 2301 | 7817 |
| 242 | 30 | 360 | 4.8 | 47.4 | -425 | 2435 | 7299 |
| 243 | 31 | 348 | 7.6 | 52.9 | -1751 | 8134 | 4820 |

September 1970

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 244 | 1 | 417 | 7.7 | 26.7 | -14 | 1008 | 4384 |
| 245 | 2 | 514 | 7.1 | 36.9 | 597 | 3367 | 4190 |
| 246 | 3 | 467 | 6.3 | 44.4 | 419 | 4442 | 4181 |
| 247 | 4 | 610 | 8.3 | 26.2 | 490 | 1597 | 4108 |
| 248 | 5 | 593 | 4.1 | 44.2 | 675 | 2355 | 5227 |
| 249 | 6 | 468 | 3.9 | 34.7 | 72 | 748 | 4875 |
| 250 | 7 | 409 | 4.8 | 27.9 | -15 | 452 | 4222 |
| 251 | 8 | 424 | 7.7 | 34.0 | 6 | 2458 | 4584 |
| 252 | 9 | 475 | 6.7 | 32.5 | 195 | 1777 | 3916 |
| 253 | 10 | - | 5.5 | 38.3 | - | - | 4759 |
| 254 | 11 | 364 | - | - | - | - | 3871 |
| 255 | 12 | 359 | 5.4 | 38.7 | -285 | 1600 | 3880 |
| 256 | 13 | 413 | 9.2 | 57.3 | -420 | 17529 | 3263 |
| 257 | 14 | 534 | 6.8 | 43.5 | 1153 | 5544 | 3125 |
| 258 | 15 | 494 | 5.5 | 57.6 | 1093 | 7594 | 4228 |
| 259 | 16 | 414 | 4.6 | 62.3 | -116 | 5383 | 4274 |
| 260 | 17 | 408 | 5.4 | 55.1 | -197 | 5383 | 3773 |
| 261 | 18 | 430 | 5.9 | 63.2 | 157 | 9501 | 4318 |
| 262 | 19 | 485 | 7.5 | 63.7 | 2256 | 17621 | 3730 |
| 263 | 20 | 508 | 5.8 | 53.0 | 1165 | 6952 | 3572 |
| 264 | 21 | 462 | 6.2 | 64.5 | 998 | 11786 | 3561 |
| 265 | 22 | 426 | 4.8 | 66.4 | 50 | 6921 | 3854 |
| 266 | 23 | 388 | 4.7 | 60.2 | -437 | 4860 | 4281 |
| 267 | 24 | 355 | 5.3 | 56.6 | -927 | 4844 | 4144 |
| 268 | 25 | 338 | 5.0 | 51.8 | -810 | 3223 | 4250 |
| 269 | 26 | 346 | 3.8 | 56.2 | -530 | 2382 | 3897 |
| 270 | 27 | 406 | 8.1 | 61.6 | -664 | 15949 | 3391 |
| 271 | 28 | 471 | 7.9 | 18.2 | 29 | 280 | 3097 |
| 272 | 29 | 351 | 8.4 | 23.4 | -126 | 616 | 2834 |
| 273 | 30 | 429 | 9.7 | 37.9 | 28 | 1935 | 3155 |

| Day | Date | $V_{sw}$ | F | θ' | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| | | | | October 1970 | | | |
| 274 | 1 | 436 | 6.7 | 50.8 | 212 | 7059 | 3234 |
| 275 | 2 | 466 | 7.9 | 28.9 | 147 | 1587 | 3106 |
| 276 | 3 | 531 | 7.1 | 33.5 | 506 | 2484 | 3500 |
| 277 | 4 | 680 | 6.7 | 44.9 | 2865 | 7578 | 3750 |
| 278 | 5 | 564 | - | - | - | - | 2757 |
| 279 | 6 | 473 | 4.2 | 36.7 | 113 | 1064 | 2939 |
| 280 | 7 | 417 | 3.8 | 23.6 | -2 | 155 | 3963 |
| 281 | 8 | 356 | 3.8 | 26.5 | -38 | 204 | 4242 |
| 282 | 9 | 344 | 4.1 | 34.7 | -139 | 607 | 3020 |
| 283 | 10 | 305 | 6.3 | 49.8 | -1593 | 4120 | 3150 |
| 284 | 11 | 318 | 8.4 | 78.0 | -6776 | 20540 | 2500 |
| 285 | 12 | 353 | 11.6 | 72.1 | -7713 | 38949 | 3145 |
| 286 | 13 | 407 | 7.9 | 39.5 | -162 | 4158 | 2875 |
| 287 | 14 | 351 | - | - | - | - | 2817 |
| 288 | 15 | 312 | 4.5 | 31.9 | -175 | 493 | 2744 |
| 289 | 16 | 480 | 11.2 | 36.0 | 855 | 7187 | 2760 |
| 290 | 17 | 442 | 19.3 | 39.4 | 1155 | 26724 | 2619 |
| 291 | 18 | 411 | 7.6 | 47.5 | -203 | 7014 | 3827 |
| 292 | 19 | 396 | - | - | - | - | 3935 |
| 293 | 20 | 364 | 2.6 | 36.3 | -49 | 302 | 6896 |
| 294 | 21 | 326 | 3.4 | 41.5 | -216 | 726 | - |
| 295 | 22 | 326 | 7.7 | 73.7 | -4876 | 16403 | 4205 |
| 296 | 23 | 322 | 13.7 | 50.2 | -6598 | 21056 | 3275 |
| 297 | 24 | 422 | - | - | - | - | 4211 |
| 298 | 25 | 375 | 3.2 | 63.3 | -312 | 2446 | 3667 |
| 299 | 26 | 342 | 3.2 | 61.1 | -487 | 2057 | 3423 |
| 300 | 27 | 327 | 5.8 | 35.7 | -374 | 1276 | 3770 |
| 301 | 28 | 413 | - | - | - | - | 3877 |
| 302 | 29 | 433 | - | - | - | - | 4365 |
| 303 | 30 | 605 | - | - | - | - | 3561 |
| 304 | 31 | 492 | - | - | - | - | 3731 |
| | | | | November 1970 | | | |
| 305 | 1 | - | 3.8 | 50.3 | - | - | 4500 |
| 306 | 2 | 400 | - | - | - | - | 3056 |
| 307 | 3 | 388 | 5.3 | 56.9 | -483 | 5368 | 3710 |
| 308 | 4 | 388 | 6.7 | 51.0 | -571 | 6353 | 3409 |
| 309 | 5 | 379 | 6.1 | 50.3 | -572 | 4942 | 3500 |
| 310 | 6 | 380 | 8.1 | 79.5 | -2631 | 23303 | 2754 |
| 311 | 7 | 588 | - | - | - | - | 3250 |
| 312 | 8 | - | 4.8 | 41.8 | - | - | 3453 |
| 313 | 9 | 545 | 4.9 | 42.7 | 620 | 2768 | 3500 |
| 314 | 10 | 581 | 6.4 | 58.9 | 3481 | 12793 | 4141 |
| 315 | 11 | - | - | - | - | - | 3982 |
| 316 | 12 | 517 | 4.1 | 27.2 | 69 | 379 | 4461 |
| 317 | 13 | 422 | 4.8 | 60.1 | -12 | 5491 | 4859 |

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 318 | 14 | 394 | 4.9 | 55.2 | -315 | 3401 | 4870 |
| 319 | 15 | 341 | 4.6 | 37.6 | -240 | 1000 | 3915 |
| 320 | 16 | 336 | - | - | - | - | 4637 |
| 321 | 17 | 322 | 4.0 | 37.0 | -212 | 676 | 3773 |
| 322 | 18 | 373 | 10.9 | 36.7 | -756 | 5653 | 3991 |
| 323 | 19 | 372 | 12.5 | 6.9 | -2 | 12 | 2500 |
| 324 | 20 | - | 11.1 | 14.0 | - | - | 2917 |
| 325 | 21 | 480 | - | - | - | - | 2500 |
| 326 | 22 | 470 | 8.2 | 70.1 | 2476 | 24704 | 2500 |
| 327 | 23 | 423 | 9.3 | 58.1 | 5 | 19006 | 2947 |
| 328 | 24 | 434 | 9.5 | 26.1 | 38 | 1467 | 4010 |
| 329 | 25 | 512 | 10.0 | 24.5 | 264 | 1514 | 3661 |
| 330 | 26 | 531 | 4.6 | 41.4 | 437 | 2149 | 4210 |
| 331 | 27 | 538 | 3.8 | 49.6 | 559 | 2613 | 4222 |
| 332 | 28 | 474 | 3.4 | 46.9 | 168 | 1557 | 4205 |
| 333 | 29 | 445 | 4.2 | 34.5 | 40 | 808 | 4274 |
| 334 | 30 | - | - | - | - | - | 3889 |

December 1970

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 335 | 1 | 308 | 4.2 | 30.3 | -131 | 352 | 3821 |
| 336 | 2 | 313 | 7.0 | 40.5 | -958 | 2728 | 5043 |
| 337 | 3 | 347 | 4.9 | 46.3 | -498 | 2276 | 4676 |
| 338 | 4 | 360 | 4.2 | 31.8 | -86 | 490 | 5224 |
| 339 | 5 | 337 | 4.6 | 41.3 | -345 | 1353 | 5000 |
| 340 | 6 | 333 | 6.0 | 59.2 | -1762 | 6526 | 3500 |
| 341 | 7 | 338 | 8.4 | 52.7 | -2399 | 9549 | 3797 |
| 342 | 8 | 503 | 9.4 | 62.1 | 4318 | 27113 | 3065 |
| 343 | 9 | 471 | 5.4 | 61.3 | 830 | 8130 | 3387 |
| 344 | 10 | - | 4.2 | 48.8 | - | - | 3114 |
| 345 | 11 | 340 | 4.4 | 36.9 | -209 | 855 | 4914 |
| 346 | 12 | 315 | 5.1 | 53.5 | -1172 | 3421 | 6276 |
| 347 | 13 | 337 | 5.5 | 34.6 | -270 | 1060 | 5441 |
| 348 | 14 | 566 | - | - | - | - | 3864 |
| 349 | 15 | 515 | 4.3 | 48.3 | 529 | 2959 | 5176 |
| 350 | 16 | - | 4.4 | 58.2 | - | - | 5913 |
| 351 | 17 | - | 4.7 | 55.7 | - | - | 5278 |
| 352 | 18 | 371 | 5.7 | 57.7 | -861 | 6153 | 5459 |
| 353 | 19 | 339 | 8.4 | 22.5 | -127 | 513 | 4597 |
| 354 | 20 | 306 | 7.4 | 49.2 | -2102 | 5502 | 3334 |
| 355 | 21 | 337 | 5.4 | 49.4 | -832 | 3266 | 4914 |
| 356 | 22 | 310 | 4.2 | 73.4 | -1680 | 4612 | 4869 |
| 357 | 23 | 342 | 4.5 | 72.5 | -1355 | 5730 | 4026 |
| 358 | 24 | - | 7.2 | 36.4 | - | - | 3446 |
| 359 | 25 | - | 6.1 | 32.1 | - | - | 3362 |
| 360 | 26 | - | 6.2 | 48.6 | - | - | 4138 |
| 361 | 27 | 409 | 7.1 | 52.6 | -279 | 8212 | 3770 |
| 362 | 28 | 379 | - | - | - | - | 4792 |
| 363 | 29 | 370 | 7.6 | 49.9 | -1046 | 7316 | 5162 |
| 364 | 30 | 446 | 8.1 | 30.4 | 99 | 1919 | 4058 |
| 365 | 31 | 438 | 6.5 | 11.2 | 1 | 26 | 3247 |

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| | | | | January 1971 | | | |
| 1 | 1 | 408 | 6.4 | 42.8 | -192 | 3562 | 3600 |
| 2 | 2 | 572 | 7.6 | 38.2 | 1200 | 4832 | 5411 |
| 3 | 3 | 628 | 6.8 | 48.1 | 2810 | 8912 | 5123 |
| 4 | 4 | 606 | 5.7 | 42.3 | 1173 | 4040 | 4569 |
| 5 | 5 | 543 | 4.3 | 43.4 | 466 | 2238 | 4654 |
| 6 | 6 | 519 | 5.1 | 26.5 | 92 | 535 | 4365 |
| 7 | 7 | - | 2.0 | 52.2 | - | - | 4933 |
| 8 | 8 | 300 | 2.1 | 33.9 | -56 | 128 | 5861 |
| 9 | 9 | 299 | 3.0 | 47.0 | -337 | 770 | 5000 |
| 10 | 10 | 310 | 5.7 | 57.1 | -1940 | 5005 | 4167 |
| 11 | 11 | 357 | - | - | - | - | 4197 |
| 12 | 12 | 335 | 3.2 | 42.2 | -198 | 698 | 4405 |
| 13 | 13 | 366 | 12.2 | 30.5 | -632 | 3615 | 3777 |
| 14 | 14 | - | 11.0 | 72.1 | - | - | 5395 |
| 15 | 15 | 333 | - | - | - | - | 5585 |
| 16 | 16 | 335 | 5.8 | 24.1 | -89 | 313 | 3370 |
| 17 | 17 | 337 | 6.4 | 40.6 | -683 | 2476 | 3873 |
| 18 | 18 | 462 | 11.9 | 35.3 | 505 | 7295 | 3611 |
| 19 | 19 | 597 | 6.9 | 37.0 | 1043 | 3728 | 2778 |
| 20 | 20 | 706 | - | - | - | - | 3535 |
| 21 | 21 | 656 | 3.3 | 39.3 | 396 | 1150 | 3750 |
| 22 | 22 | 513 | 3.9 | 49.6 | 425 | 2624 | 3261 |
| 23 | 23 | 463 | 4.6 | 37.7 | 92 | 1285 | 3791 |
| 24 | 24 | 434 | 5.2 | 47.0 | 31 | 3357 | 3727 |
| 25 | 25 | 442 | - | - | - | - | 10375 |
| 26 | 26 | 360 | 4.6 | 10.4 | -2 | 8 | 6286 |
| 27 | 27 | 491 | 10.4 | 45.5 | 1708 | 13744 | 4916 |
| 28 | 28 | 449 | 6.6 | 78.3 | 761 | 17983 | 5242 |
| 29 | 29 | 380 | 6.6 | 25.4 | -74 | 560 | 5905 |
| 30 | 30 | 537 | 7.3 | 48.5 | 1794 | 9004 | 5250 |
| 31 | 31 | 578 | 6.8 | 32.9 | 596 | 2327 | 6452 |
| | | | | February 1971 | | | |
| 32 | 1 | 637 | 5.3 | 28.2 | 290 | 892 | 6349 |
| 33 | 2 | 517 | 3.4 | 62.1 | 614 | 3646 | 5818 |
| 34 | 3 | 429 | - | - | - | - | 6716 |
| 35 | 4 | 380 | 3.4 | 32.6 | -49 | 370 | 6411 |
| 36 | 5 | 344 | 6.7 | 42.1 | -780 | 3120 | 7222 |
| 37 | 6 | 335 | 6.2 | 54.8 | -1628 | 5742 | 6510 |
| 38 | 7 | 366 | 4.8 | 73.3 | -1241 | 7097 | 6078 |
| 39 | 8 | 453 | - | - | - | - | 6903 |
| 40 | 9 | 499 | 7.1 | 38.5 | 522 | 3778 | 5570 |
| 41 | 10 | 455 | 6.0 | 30.1 | 57 | 1036 | 5982 |
| 42 | 11 | 402 | 6.4 | 26.6 | -46 | 662 | 6756 |
| 43 | 12 | 442 | - | - | - | - | 5380 |
| 44 | 13 | 441 | - | - | - | - | 4892 |
| 45 | 14 | - | 8.1 | 51.6 | - | - | 5544 |

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 46 | 15 | 532 | 8.3 | 52.3 | 2754 | 14364 | 4527 |
| 47 | 16 | 620 | 5.7 | 48.3 | 1918 | 6260 | 4500 |
| 48 | 17 | 568 | - | - | - | - | 5209 |
| 49 | 18 | 503 | 4.8 | 68.8 | 1271 | 8756 | 4799 |
| 50 | 19 | 509 | 5.2 | 36.1 | 257 | 1659 | 5095 |
| 51 | 20 | 427 | 4.7 | 46.8 | -19 | 2664 | 4648 |
| 52 | 21 | 390 | 4.5 | 64.3 | -534 | 5206 | 4742 |
| 53 | 22 | 301 | - | - | - | - | 4750 |
| 54 | 23 | 326 | 9.1 | 53.6 | -3615 | 11331 | 4033 |
| 55 | 24 | 411 | 9.3 | 37.9 | -234 | 5062 | 3044 |
| 56 | 25 | 583 | 11.7 | 39.9 | 3546 | 13511 | 3261 |
| 57 | 26 | 614 | - | - | - | - | 3687 |
| 58 | 27 | 537 | - | - | - | - | 3820 |
| 59 | 28 | 483 | 4.0 | 19.5 | 11 | 96 | 5000 |

March 1971

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 60 | 1 | 438 | 4.4 | 33.0 | 14 | 746 | 4853 |
| 61 | 2 | 349 | 6.1 | 44.5 | -727 | 3134 | 3959 |
| 62 | 3 | 392 | - | - | - | - | 4621 |
| 63 | 4 | 451 | 4.9 | 84.1 | 494 | 10601 | 3985 |
| 64 | 5 | 339 | 4.7 | 47.0 | -575 | 2142 | 4039 |
| 65 | 6 | 333 | 3.9 | 60.6 | -850 | 2918 | 4334 |
| 66 | 7 | 312 | 4.0 | 59.9 | -1058 | 2797 | 4397 |
| 67 | 8 | 369 | - | - | - | - | 4346 |
| 68 | 9 | 455 | 7.8 | 33.9 | 147 | 2679 | 3918 |
| 69 | 10 | 491 | 6.7 | 35.2 | 302 | 2433 | 4046 |
| 70 | 11 | 460 | 6.1 | 22.5 | 24 | 367 | 3985 |
| 71 | 12 | 422 | - | - | - | - | 3722 |
| 72 | 13 | 578 | 8.1 | 62.0 | 5902 | 23048 | 2875 |
| 73 | 14 | 642 | 6.4 | 45.2 | 2201 | 6666 | 4167 |
| 74 | 15 | 617 | 4.3 | 56.0 | 1633 | 5989 | 5330 |
| 75 | 16 | 535 | 3.9 | 62.5 | 1011 | 5154 | 5382 |
| 76 | 17 | 466 | 3.7 | 59.7 | 274 | 3545 | 6651 |
| 77 | 18 | 411 | - | - | - | - | 7390 |
| 78 | 19 | 407 | 5.0 | 66.1 | -402 | 7109 | 6604 |
| 79 | 20 | 416 | 5.0 | 21.5 | -6 | 188 | 5511 |
| 80 | 21 | 367 | - | - | - | - | 6744 |
| 81 | 22 | 326 | 4.3 | 42.5 | -401 | 1256 | 6886 |
| 82 | 23 | 343 | 5.7 | 34.5 | -291 | 1147 | 5743 |
| 83 | 24 | 446 | 8.4 | 42.7 | 239 | 6656 | 6072 |
| 84 | 25 | 533 | 5.7 | 38.2 | 489 | 2533 | 4063 |
| 85 | 26 | 500 | 6.2 | 25.5 | 92 | 660 | 5000 |
| 86 | 27 | 488 | 3.6 | 48.7 | 239 | 2015 | 4745 |
| 87 | 28 | 398 | 3.3 | 25.9 | -13 | 158 | 4807 |
| 88 | 29 | 350 | 3.0 | 41.1 | -134 | 588 | 3873 |
| 89 | 30 | 328 | 6.3 | 69.2 | -3092 | 9942 | 4484 |
| 90 | 31 | 451 | 9.2 | 54.0 | 761 | 16353 | 4217 |

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| | | | | April 1971 | | | |
| 91 | 1 | 491 | 4.5 | 50.2 | 430 | 3464 | 4643 |
| 92 | 2 | 387 | 5.1 | 56.8 | -548 | 4935 | 4269 |
| 93 | 3 | 375 | 5.4 | 66.8 | -1145 | 7804 | 5167 |
| 94 | 4 | 458 | 11.8 | 36.1 | 470 | 7685 | 3770 |
| 95 | 5 | 485 | 5.4 | 42.5 | 334 | 2946 | 3426 |
| 96 | 6 | 468 | 4.9 | 45.6 | 238 | 2928 | 4643 |
| 97 | 7 | 447 | 4.0 | 43.5 | 61 | 1606 | 4961 |
| 98 | 8 | 361 | 4.2 | 55.1 | -551 | 2881 | 4397 |
| 99 | 9 | 455 | 13.7 | 53.5 | 1959 | 35659 | 3179 |
| 100 | 10 | 583 | 6.1 | 58.0 | 2945 | 11221 | 4929 |
| 101 | 11 | 565 | 5.7 | 56.2 | 2091 | 8753 | - |
| 102 | 12 | 533 | 3.9 | 61.0 | 917 | 4744 | - |
| 103 | 13 | 446 | 4.3 | 51.0 | 108 | 3008 | - |
| 104 | 14 | 435 | 9.3 | 60.9 | 252 | 21931 | - |
| 105 | 15 | 466 | 7.7 | 45.5 | 552 | 7151 | - |
| 106 | 16 | 532 | 4.9 | 66.2 | 1716 | 8952 | - |
| 107 | 17 | 471 | 4.0 | 52.5 | 260 | 2985 | - |
| 108 | 18 | 409 | 4.5 | 43.6 | -96 | 1873 | - |
| 109 | 19 | 412 | 2.6 | 46.5 | -34 | 771 | - |
| 110 | 20 | 358 | 6.3 | 18.6 | -30 | 147 | - |
| 111 | 21 | 353 | 9.8 | 57.4 | -3725 | 17077 | - |
| 112 | 22 | 365 | 7.9 | 44.8 | -1000 | 5616 | - |
| 113 | 23 | 436 | 7.9 | 32.7 | 32 | 2318 | 6876 |
| 114 | 24 | 385 | 4.2 | 36.8 | -102 | 874 | 6122 |
| 115 | 25 | 356 | 3.7 | 39.6 | -167 | 8805 | 6006 |
| 116 | 26 | 356 | 4.6 | 36.4 | -194 | 934 | 5893 |
| 117 | 27 | 398 | 5.5 | 57.9 | -498 | 6200 | 6389 |
| 118 | 28 | 398 | 10.8 | 37.0 | -490 | 6090 | 6038 |
| 119 | 29 | 404 | 9.7 | 12.1 | -5 | 73 | 6078 |
| 120 | 30 | 439 | 6.6 | 39.7 | 65 | 3184 | 6302 |
| | | | | May 1971 | | | |
| 121 | 1 | 406 | 9.1 | 35.3 | -222 | 3749 | 6428 |
| 122 | 2 | 401 | 9.1 | 71.7 | -1951 | 26982 | 5463 |
| 123 | 3 | 403 | 5.5 | 50.6 | -291 | 4347 | 5190 |
| 124 | 4 | 395 | 5.6 | 63.2 | -697 | 7863 | 6065 |
| 125 | 5 | 399 | 4.8 | 52.8 | -288 | 3701 | 5938 |
| 126 | 6 | 528 | 7.9 | 61.6 | 3662 | 19730 | 5210 |
| 127 | 7 | 651 | 6.2 | 65.7 | 5862 | 17267 | 6683 |
| 128 | 8 | 618 | 4.0 | 43.5 | 675 | 2220 | 7726 |
| 129 | 9 | 539 | 3.5 | 70.0 | 1041 | 5148 | 8694 |
| 130 | 10 | 476 | 4.0 | 61.7 | 442 | 4577 | 9807 |
| 131 | 11 | 379 | 3.7 | 55.6 | -324 | 2405 | 9606 |
| 132 | 12 | 357 | 5.0 | 44.9 | -453 | 2216 | 9904 |
| 133 | 13 | 335 | 6.0 | 51.0 | -1247 | 4399 | 11905 |
| 134 | 14 | 350 | 7.8 | 47.5 | -1438 | 6292 | 7806 |
| 135 | 15 | 379 | 9.5 | 45.3 | -1175 | 8731 | 6139 |

| Day | Date | $V_{SW}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 136 | 16 | 344 | 10.5 | 35.4 | -1068 | 4271 | 6938 |
| 137 | 17 | 447 | 13.3 | 60.0 | 1692 | 44477 | 3856 |
| 138 | 18 | 462 | 10.6 | 69.8 | 2789 | 40270 | 7389 |
| 139 | 19 | 457 | 4.6 | 33.5 | 33.53 | 8977 | 9883 |
| 140 | 20 | 422 | 5.2 | 41.6 | -42 | 2217 | 10509 |
| 141 | 21 | 391 | 6.0 | 23.6 | -36 | 362 | 11700 |
| 142 | 22 | 383 | 4.5 | 42.6 | -200 | 1628 | 12041 |
| 143 | 23 | 407 | 7.6 | 55.6 | -616 | 10896 | 10700 |
| 144 | 24 | 449 | 6.2 | 44.9 | 181 | 4285 | 10337 |
| 145 | 25 | 437 | 5.0 | 49.2 | 57 | 3588 | 6590 |
| 146 | 26 | 413 | 5.0 | 53.2 | -175 | 4245 | 8823 |
| 147 | 27 | - | 4.4 | 44.4 | - | - | 10500 |
| 148 | 28 | 330 | 3.9 | 54.9 | -681 | 2249 | - |
| 149 | 29 | 310 | 5.2 | 45.7 | -851 | 2199 | 11479 |
| 150 | 30 | 438 | 10.9 | 37.7 | 133 | 7278 | 7543 |
| 151 | 31 | 458 | 5.5 | 26.3 | 33 | 534 | 5922 |

June 1971

| Day | Date | $V_{SW}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 152 | 1 | 475 | 8.3 | 56.7 | 1546 | 16183 | 5127 |
| 153 | 2 | 623 | 7.7 | 57.2 | 5700 | 18378 | 5160 |
| 154 | 13 | 646 | 4.4 | 48.8 | 1362 | 4072 | 5577 |
| 155 | 4 | 589 | 5.4 | 60.6 | 2683 | 9932 | - |
| 156 | 5 | 487 | 3.4 | 48.7 | 214 | 1815 | - |
| 157 | 6 | 461 | 4.4 | 60.2 | 347 | 5109 | - |
| 158 | 7 | 431 | 3.5 | 31.5 | 1.11 | 397 | 13848 |
| 159 | 8 | 451 | 4.3 | 55.8 | 185 | 3983 | - |
| 160 | 9 | 375 | 4.2 | 52.1 | -386 | 2617 | - |
| 161 | 10 | 393 | 5.5 | 26.1 | -41 | 440 | - |
| 162 | 11 | 416 | 4.2 | 57.7 | -128 | 3782 | - |
| 163 | 12 | 342 | 4.2 | 62.7 | -947 | 3690 | - |
| 164 | 13 | 339 | 5.7 | 71.5 | -2402 | 8906 | - |
| 165 | 14 | 312 | 5.2 | 67.5 | -2328 | 6169 | 6413 |
| 166 | 15 | 306 | 4.8 | 52.5 | -1124 | 2759 | 5643 |
| 167 | 16 | 309 | 7.6 | 49.5 | -2324 | 5918 | - |
| 168 | 17 | 419 | 8.2 | 35.7 | -82 | 3236 | - |
| 169 | 18 | 414 | 4.7 | 42.0 | -71 | 1819 | - |
| 170 | 19 | 372 | 4.5 | 30.2 | -75 | 482 | - |
| 171 | 20 | 354 | 4.8 | 44.7 | -434 | 2019 | - |
| 172 | 21 | - | 2.8 | 62.3 | - | - | - |
| 173 | 22 | 345 | 3.6 | 54.3 | -482 | 1948 | 8183 |
| 174 | 23 | 349 | 8.9 | 43.7 | -1456 | 6249 | 5441 |
| 175 | 24 | 336 | 7.3 | 18.5 | -51 | 182 | 5157 |
| 176 | 25 | - | 13.7 | 63.4 | - | - | 5093 |
| 177 | 26 | 566 | 4.7 | 42.7 | 630 | 2623 | 4569 |
| 178 | 27 | 430 | 3.3 | 54.2 | -1.6 | 2018 | 4841 |
| 179 | 28 | 370 | 5.3 | 53.4 | -696 | 4266 | 4091 |
| 180 | 29 | - | 8.6 | 51.5 | - | - | 5395 |
| 181 | 30 | 565 | 4.5 | 40.7 | 496 | 2080 | 5357 |

| Day | Date | $V_{sw}$ | F | $\theta$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| | | | | July 1971 | | | |
| 182 | 1 | 530 | 4.4 | 55.0 | 891 | 4707 | 4079 |
| 183 | 2 | 539 | 5.7 | 56.8 | 1712 | 8438 | 4750 |
| 184 | 3 | - | 4.7 | 40.3 | - | - | 5000 |
| 185 | 4 | 461 | 4.9 | 73.6 | 637 | 9375 | 5193 |
| 186 | 5 | 461 | 4.8 | 47.7 | 215 | 3169 | 4342 |
| 187 | 6 | 424 | 5.9 | 32.0 | -16 | 1164 | 5076 |
| 188 | 7 | 395 | 5.4 | 24.1 | -29 | 323 | 5500 |
| 189 | 8 | - | 6.1 | 52.3 | - | - | 5417 |
| 190 | 9 | 443 | 6.8 | 39.1 | 98 | 3255 | 4892 |
| 191 | 10 | 335 | 4.8 | 34.4 | -225 | 796 | 4924 |
| 192 | 11 | 317 | 6.1 | 53.3 | -1732 | 4866 | 4643 |
| 193 | 12 | - | 8.4 | 29.5 | - | - | 4900 |
| 194 | 13 | 427 | 7.0 | 48.6 | -50 | 6687 | 4621 |
| 195 | 14 | 496 | 6.2 | 37.0 | 326 | 2467 | 5119 |
| 196 | 15 | 477 | 5.2 | 41.7 | 243 | 2484 | 5093 |
| 197 | 16 | - | 3.4 | 49.1 | - | - | 5625 |
| 198 | 17 | 369 | 4.0 | 33.0 | -86 | 512 | 4643 |
| 199 | 18 | 385 | 5.9 | 47.5 | -464 | 3945 | 4881 |
| 200 | 19 | 427 | 8.3 | 43.4 | -51 | 6555 | 4537 |
| 201 | 20 | - | 5.7 | 33.3 | - | - | 4100 |
| 202 | 21 | 425 | 5.8 | 50.7 | -60 | 5104 | 3182 |
| 203 | 22 | - | 10.7 | 19.1 | - | - | 5938 |
| 204 | 23 | 368 | 7.4 | 20.6 | -52 | 311 | 7175 |
| 205 | 24 | - | 6.2 | 30.5 | - | - | 7941 |
| 206 | 25 | - | 4.0 | 53.9 | - | - | 8000 |
| 207 | 26 | 404 | 6.7 | 39.0 | -182 | 2833 | - |
| 208 | 27 | 492 | 7.4 | 31.8 | 262 | 2071 | - |
| 209 | 28 | - | 4.4 | 27.1 | - | - | - |
| 210 | 29 | - | 5.6 | 56.7 | - | - | - |
| 211 | 30 | - | 8.1 | 50.9 | - | - | 5769 |
| 212 | 31 | - | 8.6 | 42.2 | - | - | 5370 |
| | | | | August 1971 | | | |
| 213 | 1 | | 5.0 | 40.5 | | | 5132 |
| 214 | 2 | | 5.7 | 51.7 | | | 5385 |
| 215 | 3 | | 3.1 | 39.4 | | | 4436 |
| 216 | 4 | | 7.1 | 37.5 | | | 5357 |
| 217 | 5 | | 7.9 | 48.0 | | | 5834 |
| 218 | 6 | | 4.9 | 28.6 | | | - |
| 219 | 7 | | 8.3 | 58.6 | | | - |
| 220 | 8 | | 8.1 | 64.6 | | | 5648 |
| 221 | 9 | | 7.4 | 53.0 | | | 4000 |
| 222 | 10 | | 8.0 | 40.9 | | | 4342 |
| 223 | 11 | | 5.5 | 36.5 | | | 5132 |
| 224 | 12 | | 4.8 | 54.5 | | | 5100 |

| Day | Date | $V_{sw}$ | F | θ' | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 225 | 13 | | 3.8 | 55.8 | | | 4423 |
| 226 | 14 | | 2.7 | 49.6 | | | 4537 |
| 227 | 15 | | 4.3 | 46.4 | | | 4834 |
| 228 | 16 | | 5.3 | 41.9 | | | 3611 |
| 229 | 17 | | 9.2 | 42.4 | | | 5682 |
| 230 | 18 | | 10.7 | 27.0 | | | - |
| 231 | 19 | | 5.0 | 52.8 | | | - |
| 232 | 20 | | 5.3 | 29.2 | | | 5000 |
| 233 | 21 | | 6.2 | 72.3 | | | 5385 |
| 234 | 22 | | 6.2 | 68.9 | | | 4039 |
| 235 | 23 | | 7.1 | 44.4 | | | 4792 |
| 236 | 24 | | 6.0 | 59.6 | | | 5500 |
| 237 | 25 | | 5.3 | 44.8 | | | 5000 |
| 238 | 26 | | 4.7 | 69.7 | | | 4643 |
| 239 | 27 | | 4.4 | 31.2 | | | 4537 |
| 240 | 28 | | 6.7 | 24.2 | | | 2955 |
| 241 | 29 | | 8.3 | 26.3 | | | 4584 |
| 242 | 30 | | 7.7 | 43.7 | | | 4700 |
| 243 | 31 | | 5.4 | 31.6 | | | 4722 |

September 1971

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 244 | 1 | | 3.2 | 50.3 | | | 3929 |
| 245 | 2 | | 3.0 | 32.7 | | | 13335 |
| 246 | 3 | | 3.3 | 73.0 | | | 7000 |
| 247 | 4 | | 4.9 | 46.8 | | | 6250 |
| 248 | 5 | | 7.4 | 55.6 | | | 5769 |
| 249 | 6 | | 7.9 | 43.5 | | | 4674 |
| 250 | 7 | | 6.3 | 56.0 | | | 5938 |
| 251 | 8 | | 3.3 | 58.8 | | | 4947 |
| 252 | 9 | | 3.6 | 44.5 | | | 4211 |
| 253 | 10 | | 3.7 | 56.7 | | | 4519 |
| 254 | 11 | | 5.9 | 57.2 | | | 4885 |
| 255 | 12 | | 4.8 | 49.0 | | | 5000 |
| 256 | 13 | | 5.7 | 58.1 | | | 4079 |
| 257 | 14 | | 4.3 | 47.4 | | | - |
| 258 | 15 | | 5.3 | 40.6 | | | 4167 |
| 259 | 16 | | 4.7 | 56.4 | | | 4436 |
| 260 | 17 | | 4.5 | 59.6 | | | - |
| 261 | 18 | | 8.4 | 56.3 | | | - |
| 262 | 19 | | 6.2 | 27.0 | | | - |
| 263 | 20 | | 4.9 | 56.9 | | | - |
| 264 | 21 | | 4.6 | 30.9 | | | - |
| 265 | 22 | | 4.4 | 56.9 | | | - |
| 266 | 23 | | - | - | | | - |
| 267 | 24 | | 5.3 | 37.3 | | | 4688 |
| 268 | 25 | | 10.1 | 55.5 | | | 5599 |
| 269 | 26 | | 9.5 | 40.3 | | | 4677 |
| 270 | 27 | | 5.6 | 40.2 | | | 5185 |

| Day | Date | $V_{sw}$ | F | θ' | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 271 | 28 | | 3.6 | 33.2 | | | 5300 |
| 272 | 29 | | 3.1 | 38.6 | | | 5068 |
| 273 | 30 | | 6.7 | 52.8 | | | 5000 |

October 1971

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 274 | 1 | | | | | | 5423 |
| 275 | 2 | | | | | | 5656 |
| 276 | 3 | | | | | | 5625 |
| 277 | 4 | | | | | | 6134 |
| 278 | 5 | | | | | | 4902 |
| 279 | 6 | | | | | | 5602 |
| 280 | 7 | | | | | | 5556 |
| 281 | 8 | | | | | | 4590 |
| 282 | 9 | | | | | | 5294 |
| 283 | 10 | | | | | | 5483 |
| 284 | 11 | | | | | | 6200 |
| 285 | 12 | | | | | | 6155 |
| 286 | 13 | | | | | | 5137 |
| 287 | 14 | | | | | | 5750 |
| 288 | 15 | | | | | | 5738 |
| 289 | 16 | | | | | | 5379 |
| 290 | 17 | | | | | | 5293 |
| 291 | 18 | | | | | | 5416 |
| 292 | 19 | | | | | | 6125 |
| 293 | 20 | | | | | | 5626 |
| 294 | 21 | | | | | | 7318 |
| 295 | 22 | | | | | | 6091 |
| 296 | 23 | | | | | | 6230 |
| 297 | 24 | | | | | | 6611 |
| 298 | 25 | | | | | | 6037 |
| 299 | 26 | | | | | | 6210 |
| 300 | 27 | | | | | | 6746 |
| 301 | 28 | | | | | | 5648 |
| 302 | 29 | | | | | | 5500 |
| 303 | 30 | | | | | | 5900 |
| 304 | 31 | | | | | | 5648 |

November 1971

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 305 | 1 | | | | | | 5056 |
| 306 | 2 | | | | | | 6305 |
| 307 | 3 | | | | | | 6364 |
| 308 | 4 | | | | | | 6030 |
| 309 | 5 | | | | | | 5658 |
| 310 | 6 | | | | | | 5798 |
| 311 | 7 | | | | | | 5970 |
| 312 | 8 | | | | | | 5556 |
| 313 | 9 | | | | | | 5782 |

| Day | Date | $V_{sw}$ | F | $\theta'$ | AK-I | AK-II | M(t) |
|---|---|---|---|---|---|---|---|
| 314 | 10 | | | | | | 5766 |
| 315 | 11 | | | | | | 4798 |
| 316 | 12 | | | | | | 6346 |
| 317 | 13 | | | | | | 5798 |
| 318 | 14 | | | | | | 6011 |
| 319 | 15 | | | | | | 5695 |
| 320 | 16 | | | | | | 5900 |
| 321 | 17 | | | | | | 5427 |
| 322 | 18 | | | | | | 5761 |
| 323 | 19 | | | | | | 5479 |
| 324 | 20 | | | | | | 6448 |
| 325 | 21 | | | | | | 5521 |
| 326 | 22 | | | | | | 5500 |
| 327 | 23 | | | | | | 5870 |
| 328 | 24 | | | | | | 6137 |
| 329 | 25 | | | | | | 6137 |
| 330 | 26 | | | | | | 7267 |
| 331 | 27 | | | | | | 7206 |
| 332 | 28 | | | | | | 7631 |
| 333 | 29 | | | | | | 8126 |
| 334 | 30 | | | | | | 7381 |

December 1971

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 335 | 1 | | | | | | 9999 |
| 336 | 2 | | | | | | 8965 |
| 337 | 3 | | | | | | 8587 |
| 338 | 4 | | | | | | 7568 |
| 339 | 5 | | | | | | 7639 |
| 340 | 6 | | | | | | 7985 |
| 341 | 7 | | | | | | 8270 |
| 342 | 8 | | | | | | 6923 |
| 343 | 9 | | | | | | 7046 |
| 344 | 10 | | | | | | 7682 |
| 345 | 11 | | | | | | 6343 |
| 346 | 12 | | | | | | 7232 |
| 347 | 13 | | | | | | 7094 |
| 348 | 14 | | | | | | 6000 |
| 349 | 15 | | | | | | 6207 |
| 350 | 16 | | | | | | 6475 |

end