

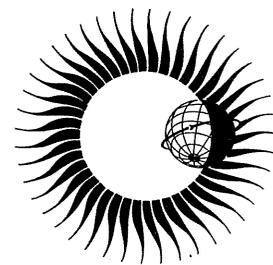
WORLD DATA CENTER A
Upper Atmosphere Geophysics



REPORT UAG - 2

A REEVALUATION OF SOLAR FLARES
1964-1966

August 1968



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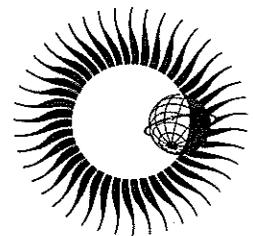
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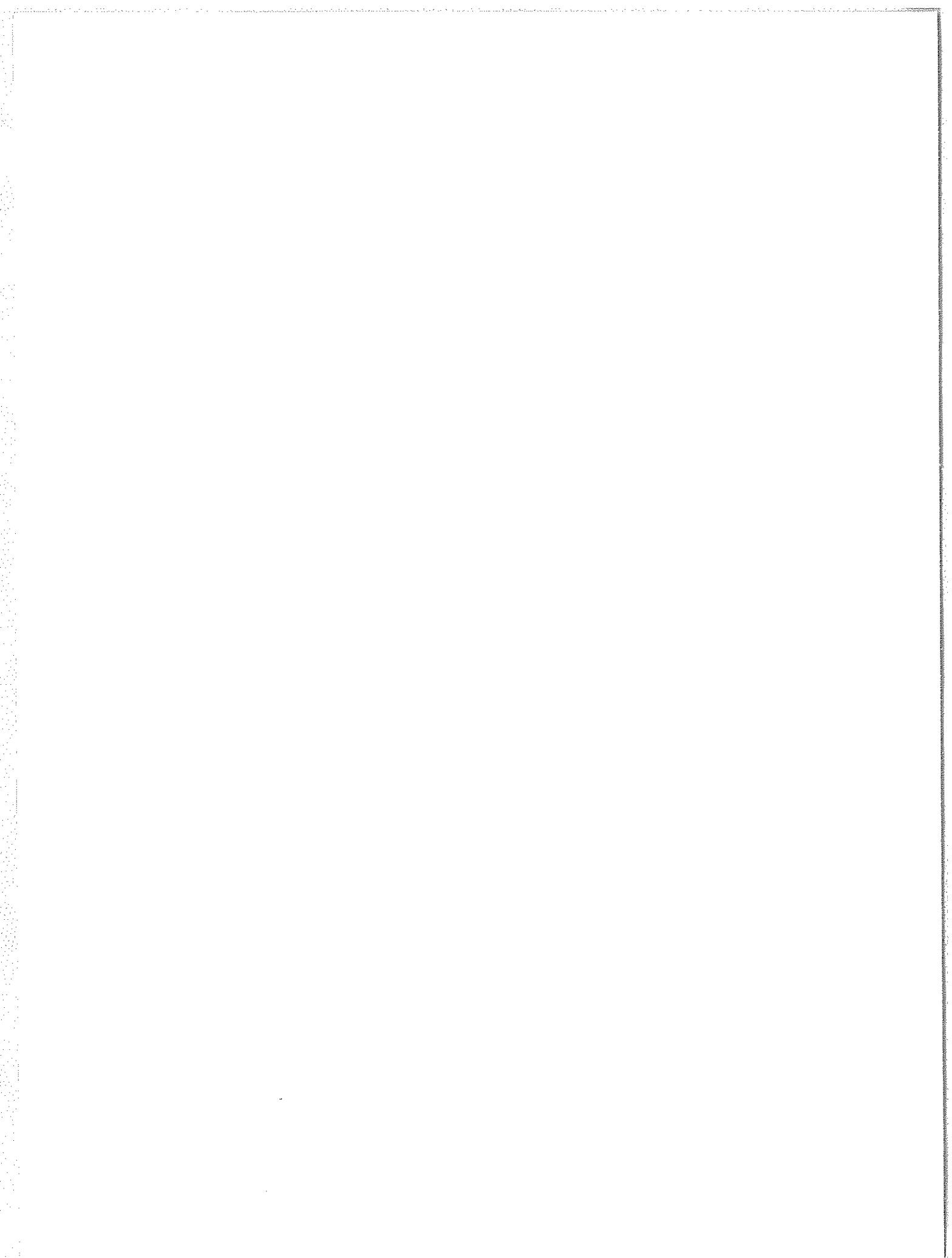
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A REEVALUATION OF SOLAR FLARES, 1964-1966

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INTRODUCTION

In efforts to understand the cosmic environment of the earth, geophysicists often turn to tabulations of solar flares prepared by solar astronomers and Solar World Data Centers. The tabulations vary in time of issue and in degrees of completeness and reliability. All too often the user of flare data is confronted with conflicting reports or with disconcerting words of caution from solar astronomers who are especially aware of the many difficulties in the primary measurements and evaluations of the solar events.

Through international cooperation, reports of solar flares from 45 or more different solar observatories are assembled in three Solar World Data Centers, and at one of them, the Meudon Observatory, final summaries are prepared with the utmost care. The Quarterly Bulletin on Solar Activity contains the published tabulation of the flare summaries. Through 1967, the Quarterly Bulletin tables have included entries for all solar events for which any one observer reported the importance of the flare to be at least as great as one. Since 1963 many of the entries have been evaluated as subflares (flares of importance 1-) on the basis of the data from all of the reporting stations. Events reported unambiguously as subflares do not appear in the Quarterly Bulletin lists.

EFFORTS TO IMPROVE FLARE DATA

It has been known for a long time that worldwide flare lists, even in the Quarterly Bulletin, contain serious systematic errors, (Dodson and Hedeman, 1960) and genuine efforts have been made to reduce the faults. During the years 1961 to 1964 a working group from the Commission on Solar Activity of the International Astronomical Union developed recommendations for improvement in the assignment of H α flare importance (Report, IAU, Comm. 10, published, Meudon Obs. 1964). In 1964, at the 12th General Assembly of the International Astronomical Union, solar astronomers agreed to take steps to improve the measurement of the area of flares so that the assigned importance for an event would be a more meaningful quantity. In subsequent years there has been real improvement in the reports from a number of observatories. Efforts also have been made to correct the faults of the published flare lists. Systematic station peculiarities were determined statistically by C. Warwick (1962, 1966) at CRPL-ESSA and were used to derive standard or normalized lists of flares for the IGY (1957-58) and for the years 1959-61. Statistical studies at Air Force Cambridge Research Laboratories by D. C. Jensen and H. J. E. Fischer (1966, 1967_a, 1967_b) have assembled a great many facts about the worldwide flare patrol, 1954-64, and the characteristics of each station reporting flares.

In spite of these efforts, systematic errors or inhomogeneities continue to exist in the worldwide flare data. (Dodson and Hedeman, 1968). The principal fault is a vast preponderance of apparently important flares (importance ≥ 1) between approximately 7^h and 10^h UT. (See Figure 1A). In an attempt to provide improved flare data for the International Years of the Quiet Sun (1964-65) the flares listed in the Quarterly Bulletins were reevaluated against the information represented by the times of H α patrol for each of the 45 observing stations (Michard, Dodson, and Hedeman 1968). The results of the reevaluation were so drastic, and so informative, that the reevaluation was continued through 1966, and the results for the three years are here described.

FLARES OF "IMPORTANCE ZERO"

According to the agreements of the international flare patrol, a station is said to be conducting a "patrol" if it either sees or photographs the sun at least once in every five-minute interval.

Stations participating in the international flare patrol report to world data centers all flare-like brightenings for which the importance is judged to be ≥ 1 , (i.e., area ≥ 100 millionths of the solar hemisphere). There is no general agreement or practice in reporting the thousands of smaller brightenings called subflares. Therefore, in principle, there should be as many reports of flares of importance ≥ 1 as there are stations conducting valid patrols at the time the flare breaks out and reaches maximum development. If a station indicates that it was patrolling at the time of a supposed flare of importance ≥ 1 , but fails to report either flare or subflare for the time in question, the event can be said to be a flare of "importance 0" for the station in question. For stations not reporting subflares, the evaluation "importance 0" may be the equivalent of "subflare". In all cases, if the patrol is valid, the assigned evaluation "importance 0" indicates that in the judgment of the station in question, there was an absence of a transient increase in $H\alpha$ brightness covering an area ≥ 100 millionths of the solar hemisphere, the minimum requirement for a flare of importance 1.

The present survey of flares versus total flare patrol data was undertaken because many of the flares, even flares of importance 2, occur in the Quarterly Bulletins through the report of only a single station. Of the 1110 flares of importance ≥ 1 in the Quarterly Bulletin, 1964-66, 512 were reported by only one station. In the past, it has been tacitly assumed that other stations were not conducting patrols for the times in question. This proves to be an incorrect assumption. Of the 85 flares of importance ≥ 2 in the Quarterly Bulletins for 1964-66, 34 were reported by only one station. However there was not one instance in which the reporting observatory was the only one observing. (See Table 1.) For more than 85% of the cases, 2 to 9 additional observatories were patrolling and reported neither flare nor subflare. For the same three years 480 flares of importance 1 are included in the Quarterly Bulletin through the report of a single station. Of these, only 27 occurred at times when only one station was patrolling.

THE FINDING LIST OF FLARES, 1964-66

Preparation of the Finding List

In order to obtain the needed information about individual flare patrols at the time of each flare, graphical representations were prepared of the reported times of patrol hours for each station for each day of the three-year period, with ten minutes as

the smallest time interval considered. From such graphs, the number of patrolling stations has been determined for the time of each flare, importance ≥ 1 , in the Quarterly Bulletins. Due regard has been given to the problem of stations that had only intermittent patrols or began observing late in a flare. In an effort to separate the bona fide flares of importance ≥ 1 from the subflares, we have required that at least half of the stations conducting patrols near the time of supposed start and maximum of the event, report a flare of importance ≥ 1 . On the basis of these principles and reevaluations, a "Finding List of Flares, Importance ≥ 1 , 1964-66" has been prepared (see Table 2).

The list is in two parts. The first is a tabulation of the 306 flare events in 1964-1966 for which the evaluation "importance ≥ 1 " was assigned by at least two observatories with concurrence from more than half of all the actually patrolling stations, or from the principal cinematographic stations. These events can be considered as confirmed flares of importance ≥ 1 . The second part of the list includes (a) the 27 flares reported when only one station was patrolling, and (b) the 58 flares for which the evaluation on the basis of all reports still remains ambiguous. The latter are cases for which the evaluations subflare or "zero" equal in number the reports of "importance ≥ 1 ".

Reduction in Number of Flares, Importance ≥ 1 .

The reevaluation of flares 1964-66 on the basis of total patrol hours has modified significantly the flare-data as given in the Quarterly Bulletins, (see Table 3). The number of flares of importance ≥ 1 is sharply lowered. The Finding List contains only 391 flares of importance ≥ 1 for the three-year interval whereas the Quarterly Bulletins originally listed 1087 such flares. Approximately two-thirds of the 1002 flares called importance 1, and one-third of the 85 flares listed as of importance 2 in the Quarterly Bulletins did not hold up under the scrutiny of patrol hours. (See Table 3.)

Flares of Importance 2.

Since flares of importance ≥ 2 are of especial interest for investigators, we have included in Table 4 evaluations from all of the individual stations for the 85 such flares in the Quarterly Bulletins, 1964-66. For about one-half of the events there was general agreement that a major flare had taken place. For the other half of the

cases, the events are of two types, a small number of marginal cases for which the observers divide their evaluations between importance 0, 1, and 2, and a large number of cases (34) in which the flare was denied by all observers other than the single reporting station.

The flares of importance ≥ 2 in the Finding List differ from such flares in the Quarterly Bulletins primarily by the omission of those flares of importance ≥ 2 that were reported by one station and denied by all other observing stations. Unless one is familiar with the details of the flare reports it is hard to understand how major discrepancies of this kind can occur for flares of importance ≥ 2 . The present survey has made it clear that many of the apparently "false flares" of importance ≥ 2 occurred at the very beginning of a station's observing period. It seems that the observer, frequently a visual observer, mistakes a bright plage for a large flare in progress. Users of flare data should develop an attitude of caution with respect to reports by single stations of major flares "in progress".

Of the 51 flares of importance ≥ 2 in the Quarterly Bulletins with observations from more than one station, only three failed to qualify for a similar evaluation in the Finding List. This result gives gratifying assurance that an abnormally large and real flare on the sun is generally recognized as such by the majority of observing stations. In the present reevaluation of flares, it has seemed appropriate to assign importance ≥ 2 to ten flares evaluated as of importance 1 in the Quarterly Bulletins. These flares are identified by asterisks in the Finding List. The increased importance evaluation stemmed from new flare reports, a reexamination of our own films, and simple differences in judgment. Unfortunately, marginal situations frequently prevail in the evaluation of flare data.

Number of Patrolling Stations

Figure 2 has been prepared to show the number of stations actually conducting H α patrols in the winter and summer months, January and June, in the three years 1964-66. The diagram can serve as a guide in estimating the probable number of flare-patrols in progress at a specific time. During these intervals, the sun was unobserved less than 2 per cent of the time, and the patrol was limited to one station for only an additional 8 per cent of the six months. In June it was not unusual to have 6-12 stations simultaneously observing the sun during the middle half of the Universal Day. A number of these stations were making visual observations only. The user of flare data, when trying to evaluate the certainty of a specific flare report should remember that in recent years the number of patrolling stations has been a function of both the season of the year and Universal Time.

Distribution of Flares versus Universal Time

The flares in the Finding List show a gratifyingly uniform distribution with respect to Universal Time (see Figure 1B). The large maximum from 07^h to 10^h UT. has been practically eliminated. Although 09^h UT. continues to be a somewhat "favorite" time for important flares, the distribution versus Universal Time of flares in the Finding List seems reasonably uniform.

The cause of the inhomogeneities in primary flare data is apparent if the numbers of flares per hour of patrol are derived for individual stations. Figure 3 presents this information graphically for the 23 stations that conducted the principal flare patrols during the months July-September 1966. For each station, the number of flares (Importance ≥ 1) per hour of patrol is given for (a) the original reports from the observatory, (b) the summaries in the Quarterly Bulletins and (c) the Finding List. For some stations the intercomparison of reports and the study of patrol times resulted in very little change; for others the reduction was great. Data for each station are entered at the approximate U.T. of local noon. Cinematographic stations are indicated by the letter C. The clustering of non-cinematographic stations (visual and/or photographic) with a high rate of flares per hour of patrol contributed significantly to the high maximum in flare counts in the middle hours of the Universal Day.

Distribution of Flares versus Central Meridian Distance

Flare lists for earlier years usually have shown a diminution in numbers of flares with increasing central meridian distance. (C. S. Warwick, 1962) For 1964-66 the flares of importance ≥ 1 in the Quarterly Bulletin exhibit a marked increase in numbers from center to limb. (See Figure 4A). This change may reflect over-correction in application of recommendations in the 1964 IAU report on flare importance (Report IAU, Com. 10, published Meudon 1964). The flares in the Finding List for 1964-66 show reduced numbers at 80°-89°, but addition of flares at 90° to this group makes the distribution reasonably uniform (see Figure 4B). Continued center-to-limb effects in original flare data indicate that the very difficult task of evaluating phenomena near the edge of the sun remains one of the major problems in the reporting of solar flares.

Number of Flares per Month: 1964-1966

The number of flares per month in the Finding List shows clearly the course of flare development in the early years of solar cycle 20 (see Figure 5). The paucity of flares ≥ 1 in 1964

is evident. The formation of the first significant centers of activity in May and October 1965 is accompanied by major enhancements in the number of flares ≥ 1 , and the 1966 March-April and July-August flare-rich regions likewise yield new levels of flare production.

The difference between the development of the cycle as shown by monthly sunspot numbers and 2800 MHz flux, and by flares is striking (see Figure 5). A relatively small number of flare-rich regions developed on the sun in 1965 and 1966, and the times of their transits can be identified by the isolated high ordinates in the plot of number of flares (Finding List) versus month. The occurrence of flare-rich regions apparently was followed by the outbreak of numerous lesser centers of activity that contributed to the spot number and 2800 MHz flux but failed to add significantly to the number of flares of importance ≥ 1 . In 1965 and 1966 the lesser centers of activity comprised the first manifestations of the encircling "zones royales" so characteristic of the active sun.

CONCLUSION

Consideration of total patrol information adds enormously to the burden of preparing worldwide H α flare summaries, but the need for increased reliability in flare-data suggests that it should be attempted. As of January 1968 the flare lists prepared at Meudon Observatory for the Quarterly Bulletin will be screened against patrol times when fewer than two stations report an event. This should provide a big step toward the elimination of spurious reports of important flares. The problem of stations that report long hours of uninterrupted patrol but fail to "see" or report flares well observed at other stations also must be explored.

The Finding Lists here tabulated represent a conservative reevaluation of flares in 1964-66 on the basis of patrol times. Although certain faults and uncertainties still remain, it is hoped that the Finding List will provide useful guidance to the major H α flares in the three-year interval. Many of the residual uncertainties could be resolved by requesting cinematographic stations to reexamine their records for specific events. This has been done for the events for which cinematographic records existed at the McMath-Hulbert Observatory. If a list of important flares that can be defended on the basis of the totality of known facts is a goal for the future, it may be necessary to develop a worldwide cooperative system of checking ambiguous flares against cinematographic records before publication of definitive flare data.

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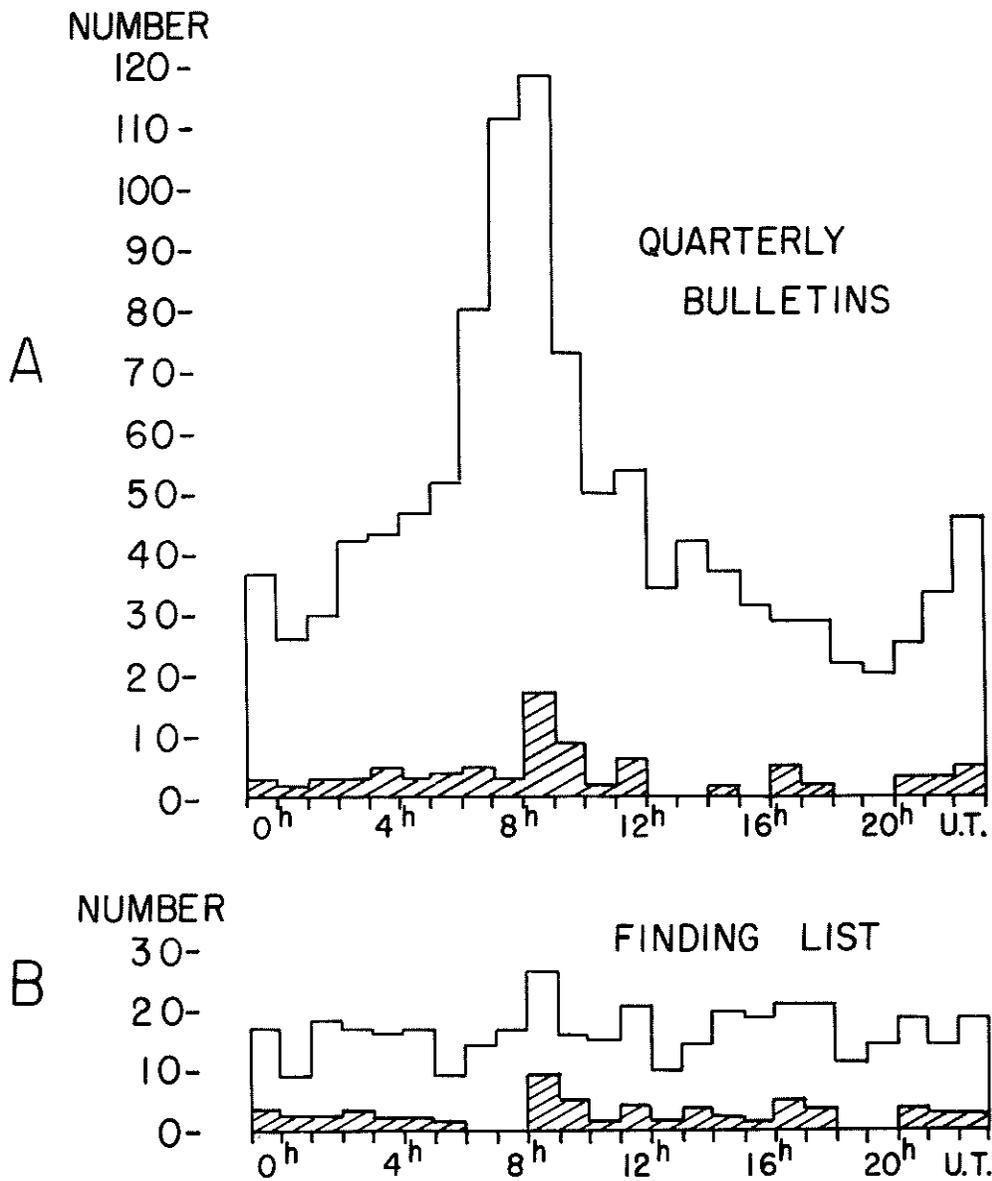


FIGURE 1. Number of flares, importance ≥ 1 , 1964-1966, according to Universal Time, of time of start or of first observation.
 A. Quarterly Bulletins on Solar Activity.
 B. Finding List of Flares.

The shaded areas indicate flares of importance ≥ 2 .

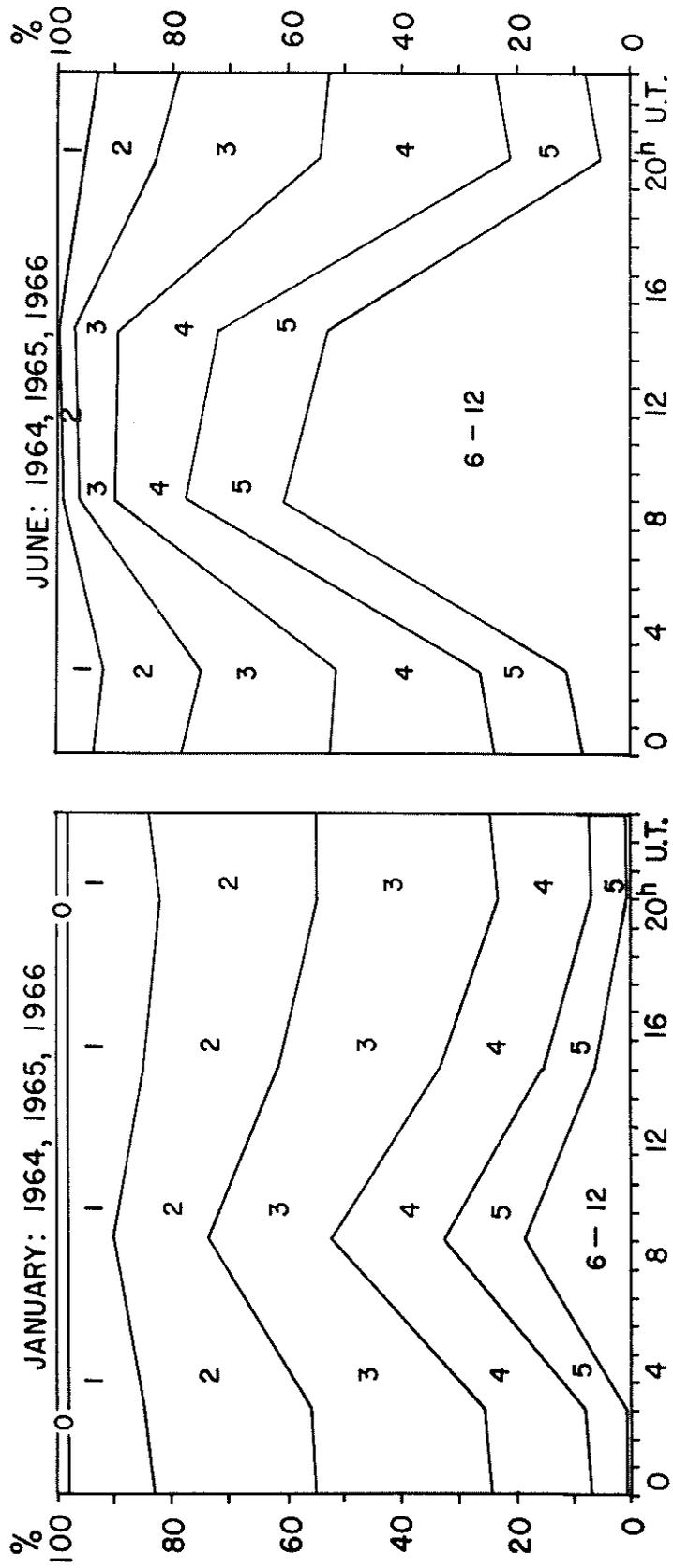


FIGURE 2. Average number of observatories actually conducting H α flare-patrols during a typical winter month (January) and a typical summer month (June), 1964-1966.

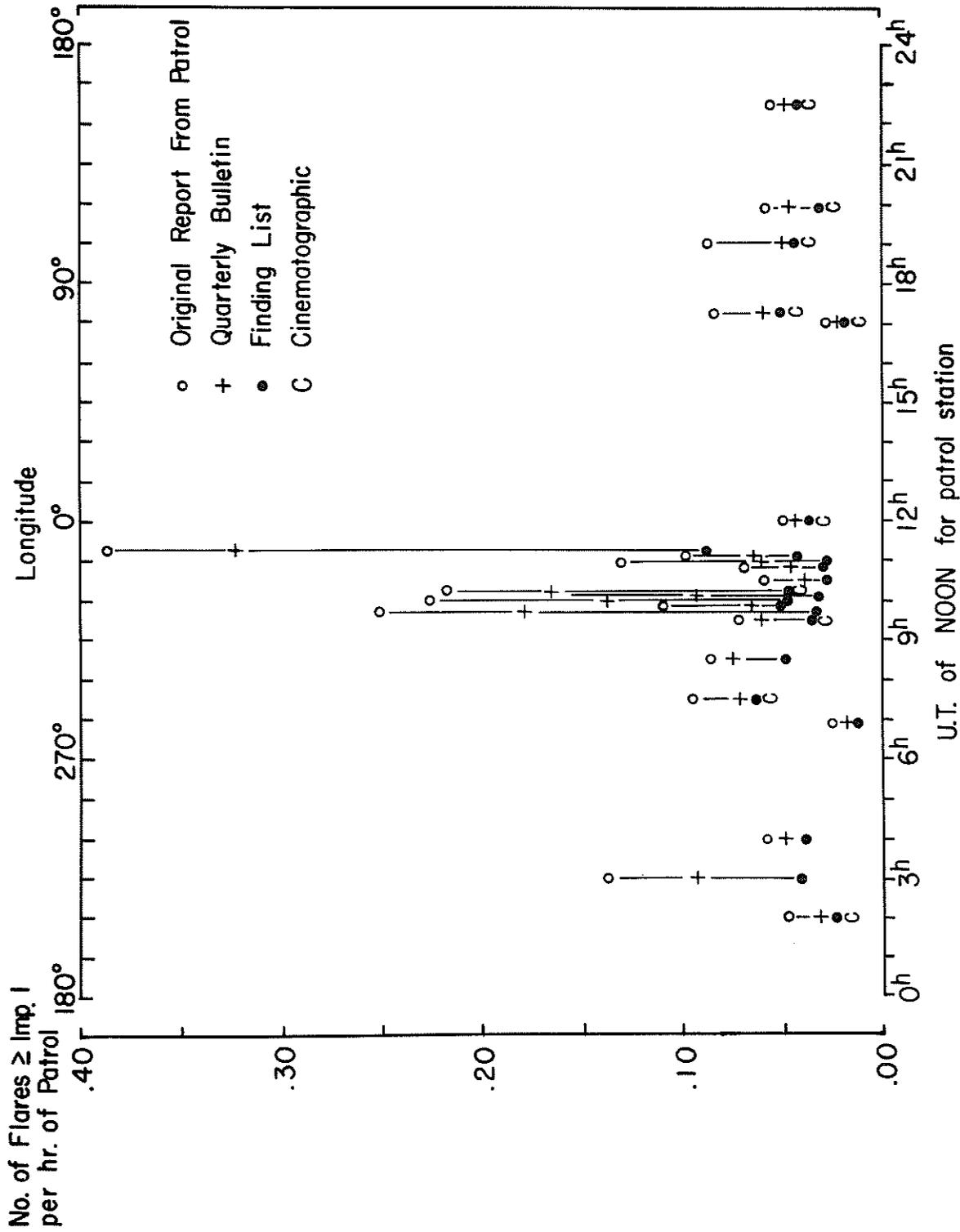


FIGURE 3. Number of flares, importance ≥ 1 , per hour of patrol for 23 observing stations, July - September, 1966.
 Data are given for flares listed in (1) the original reports of the stations and for flares as evaluated in (2) the Quarterly Bulletins and (3) in the Finding List.

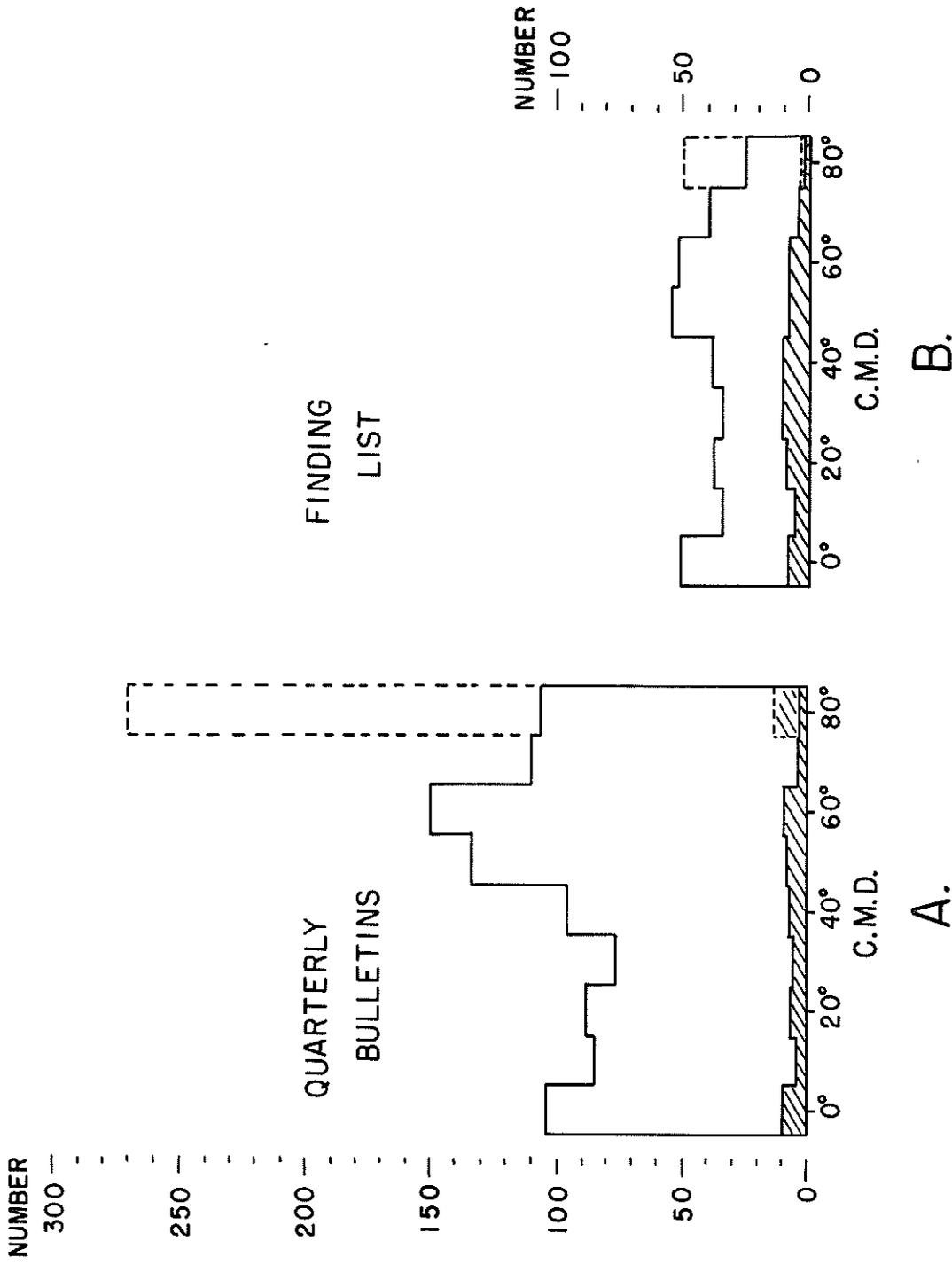


FIGURE 4. Number of flares, importance ≥ 1 , according to distance from the central meridian.
 A. Quarterly Bulletin of Solar Activity.
 B. Finding List of Flares.
 The shaded areas indicate flares of importance ≥ 1 . The dotted lines provide data for flares reported as 90° from the central meridian.

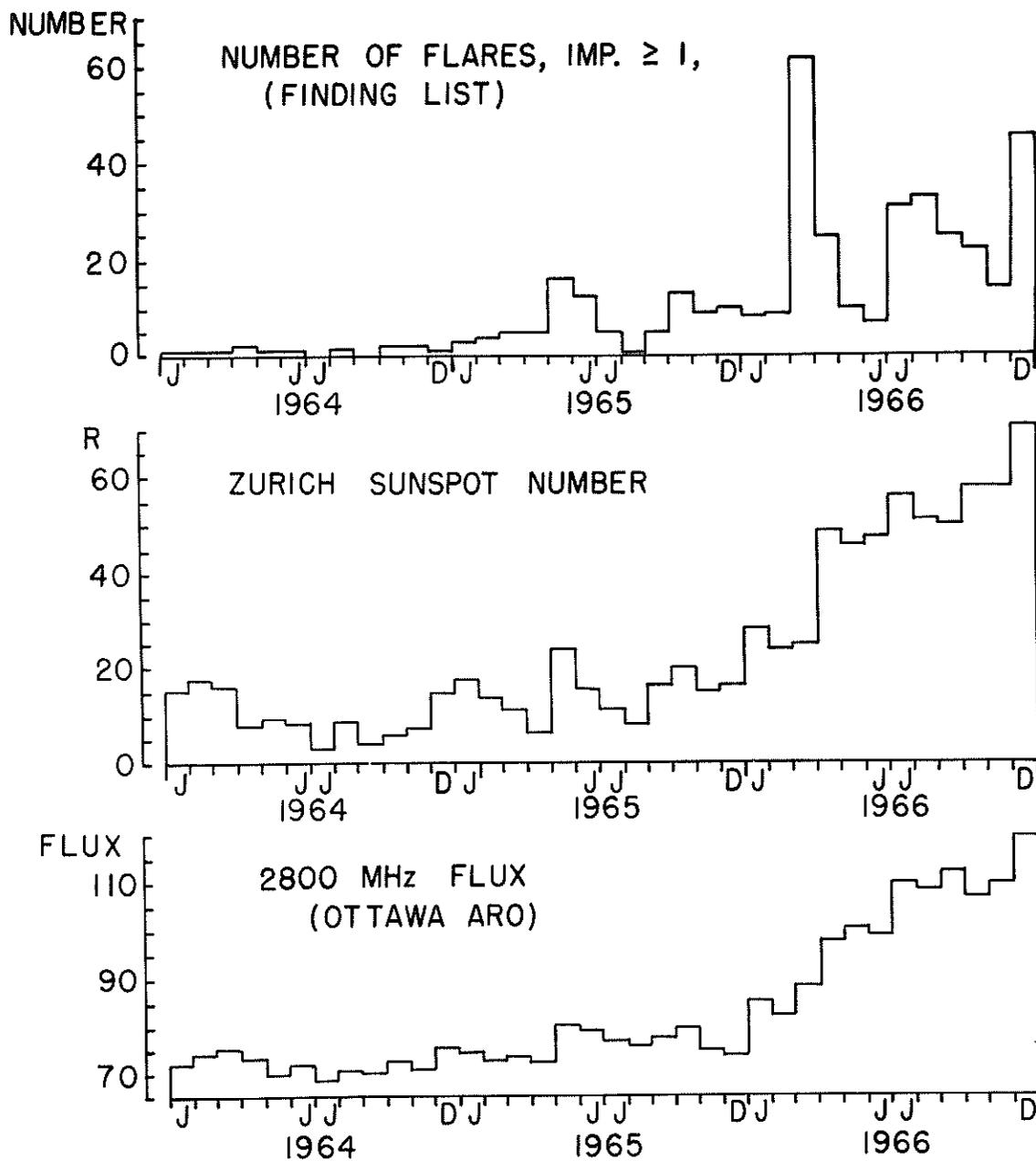


FIGURE 5. Development of the ascending branch of Solar Cycle 20 according to the number of flares, importance ≥ 1 in the Finding List, Zurich Sunspot Number, and 2800 MHz Flux (Ottawa, ARO).

TABLE 1

Summary of Importance Evaluations on Basis of Total
Patrol Data, for Flares of Importance ≥ 1 Reported
by only One Station in Quarterly Bulletin, 1964-1966

| <u>Importance Evaluation</u> | <u>Number of Cases</u> | <u>Importance Evaluation</u> | <u>Number of Cases</u> |
|------------------------------|------------------------|------------------------------|------------------------|
| 1 | 27 | 2 | 0 |
| 1 0 | 36 | 2 0 | 4 |
| 1 0 0 | 64 | 2 0 0 | 6 |
| 1 0 0 0 | 106 | 2 0 0 0 | 4 |
| 1 0 0 0 0 | 70 | 2 0 0 0 0 | 8 |
| 1 0 0 0 0 0 | 56 | 2 0 0 0 0 0 | 3 |
| 1 0 0 0 0 0 0 | 40 | 2 0 0 0 0 0 0 | 6 |
| 1 0 0 0 0 0 0 0 | 41 | 2 0 0 0 0 0 0 0 | 2 |
| 1 0 0 0 0 0 0 0 0 | 17 | 2 0 0 0 0 0 0 0 0 | 0 |
| 1 0 0 0 0 0 0 0 0 0 | 14 | 2 0 0 0 0 0 0 0 0 0 | 1 |
| 1 0 0 0 0 0 0 0 0 0 0 | 6 | | |
| 1 0 0 0 0 0 0 0 0 0 0 0 | 2 | | |
| 1 0 0 0 0 0 0 0 0 0 0 0 0 | 1 | | |
| | <hr/> | | <hr/> |
| TOTAL | <u>480</u> | TOTAL | <u>34</u> |

TABLE 2

McMath-Hulbert Observatory Finding List of Flares of Importance ≥ 1 , 1964-1966

| Date | Beg. UT | End UT | Max. UT | Imp. | Position | Individual Station Importance Ratings |
|-------------|-------------|-------------|------------------|------|----------|---------------------------------------|
| <u>1964</u> | | | | | | |
| Jan. 26 | <u>1238</u> | <u>1550</u> | <u>1310</u> | 2 | N10 W08 | 2 2 2 2 2 1+ 1+ 1 |
| Feb. 21 | <u>1011</u> | <u>1040</u> | <u>1024</u> | 1 | N07 E44 | 1+ 1 1 1 1 0 0 0 0 |
| Mar. 16 | <u>1553</u> | <u>1700</u> | <u>1608</u> | 1+ | N05 W73 | 2 1+ 1+ 1 1 1 |
| Apr. 7 | <u>0125</u> | <u>0300</u> | <u>0147</u> | 2 | N18 E67 | 3 2 1+ 1 |
| Apr. 14 | <u>0750</u> | <u>0814</u> | <u>0753</u> | 1 | N10 E55 | 1 1 1 1 1- 0 0 0 0 |
| May 21 | <u>0807</u> | <u>0916</u> | (0823) (0840) | 1 | N07 W22 | 2 1+ 1+ 1 1 1 1 1- 1- 0 0 0 |
| June 21 | <u>2330</u> | <u>2430</u> | <u>2340</u> | 1 | N27 W39 | 1 1 1 1 0 |
| Aug. 25 | <u>1013</u> | <u>1049</u> | <u>1019</u> | 1 | N01 E62 | 1 1 1 1- 0 |
| Oct. 8 | <u>1231</u> | <u>1310</u> | <u>1234</u> | 1 | N25 W67 | 1+ 0 |
| Nov. 22 | <u>2333</u> | <u>2430</u> | | 1 | N37 W86 | 1 1 1- |
| <u>1965</u> | | | | | | |
| Jan. 3 | <u>1427</u> | <u>1520</u> | <u>1440</u> | 1 | N23 E70 | 1+ 1 1 1 0 |
| Feb. 5 | <u>1750</u> | <u>2024</u> | <u>1810</u> | 2 | N08 W25 | 2+ 2 2 |
| Feb. 7 | <u>1819</u> | <u>1848</u> | <u>1826</u> | 1 | N09 W51 | 1 1 |
| Feb. 27 | <u>0932</u> | <u>1020</u> | <u>0936</u> | 1 | N20 E45 | 1 1 1 1 1- 0 0 0 0 0 |
| Mar. 26 | <u>0505</u> | <u>0612</u> | <u>0513</u> | 1 | N09 E54 | 1 1 1 0 |
| Apr. 14 | <u>0542</u> | <u>0607</u> | <u>0550</u> | 1 | N05 E52 | 1 1 |
| Apr. 15 | <u>2352</u> | <u>2420</u> | <u>2357</u> | 1 | N04 E29 | 2 1 1 1 1 1- 1- |
| Apr. 16 | <u>0942</u> | <u>1105</u> | <u>1006</u> | 1 | N04 E20 | 2 2 1 0 0 |
| May 2 | <u>1207</u> | <u>1244</u> | <u>1214</u> | 1 | N28 E68 | 1+ 1 1- |
| May 8 | <u>1412</u> | <u>1510</u> | <u>1438</u> | 1 | N36 W64 | 1 1 1 1- 1- |
| May 16 | <u>0755</u> | <u>0942</u> | | 1+ | N25 E90 | 2 2 2 1+ 1+ 0 0 0 0 0 |
| May 16 | <u>1127</u> | <u>1156</u> | | 1 | N25 E90 | 2 2 1+ 1 |
| May 16 | <u>1217</u> | <u>1538</u> | | 1 | N24 E90 | 2+ 1+ 1+ 1 1 1- |
| May 16 | <u>2214</u> | <u>2338</u> | (2226) (2312) | 1 | N24 E90 | 2 1 1 1- 0 |
| May 17 | <u>0030</u> | <u>0119</u> | (0037) (0103) | 1 | N24 E89 | 1+ 1 1 1 0 0 |
| May 17 | <u>0240</u> | <u>0502</u> | <u>0257</u> | 1 | N25 E83 | 1 1 1 1 0 0 0 |
| May 20 | <u>0556</u> | <u>0639</u> | | 1 | N20 W46 | 1 1 1 1- 0 |
| May 20 | <u>2320</u> | <u>2440</u> | (2323) (2430) | 1 | N20 W59 | 1 1 1 1- 0 |
| May 22 | <u>1940</u> | <u>2009</u> | <u>1944</u> | 1 | N26 W20 | 1 1 1 1- |
| May 25 | <u>2239</u> | <u>2253</u> | <u>2243</u> | 1 | N19 W73 | 1+ 1 1 |

Table 2 - cont.

| Date | Beg. UT | End UT | Max. UT | Imp. | Position | Individual Station Importance Ratings | | | | | | | | | | | | | | | |
|-------------|-------------|-------------|------------------|------|----------|---------------------------------------|---|----|----|----|----|----|----|----|----|---|---|---|---|----|---|
| <u>1965</u> | | | | | | | | | | | | | | | | | | | | | |
| Dec. 17 | <u>2146</u> | <u>2151</u> | | 1 | N25 W90 | 1+ | 1 | 1- | | | | | | | | | | | | | |
| Dec. 29 | <u>1123</u> | <u>1235</u> | 1150 | 1+ | N11 W60 | 2 | 2 | 1+ | 1+ | 1 | 1 | | | | | | | | | | |
| Dec. 29 | <u>2132</u> | <u>2146</u> | 2138 | 1 | N08 W75 | 1+ | 1 | | | | | | | | | | | | | | |
| <u>1966</u> | | | | | | | | | | | | | | | | | | | | | |
| Jan. 17 | <u>1029</u> | <u>1250</u> | 1123 | 2b | N19 E27 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | | | | | | | | |
| Jan. 18 | <u>2253</u> | <u>2515</u> | 2328 | 2b | N20 E07 | 2 | 2 | 2 | 2 | 1 | 1 | | | | | | | | | | |
| Jan. 20 | <u>0023</u> | <u>0050</u> | 0025 | 1n | N28 W08 | 1 | 1 | 1- | 1- | | | | | | | | | | | | |
| Jan. 20 | <u>0303</u> | <u>0320</u> | 0308 | 1n | N28 W10 | 1 | 1 | 1 | 1 | 1- | | | | | | | | | | | |
| Jan. 29 | <u>1800</u> | <u>1837</u> | 1811 | 1n | S23 W56 | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | | |
| Feb. 2 | <u>1510</u> | <u>1607</u> | 1525 | 1n | N26 E27 | 2 | 1 | 1 | 1 | 1 | | | | | | | | | | | |
| Feb. 11 | <u>1641</u> | <u>1725</u> | 1653 | 1n | N32 W58 | 1 | 1 | 1 | 1 | 1- | | | | | | | | | | | |
| Feb. 11 | <u>2335</u> | <u>2407</u> | 2343 | 1b | N33 W60 | 1 | 1 | 1 | | | | | | | | | | | | | |
| Feb. 28 | <u>0351</u> | <u>0425</u> | 0403 | 1n | N21 E70 | 2 | 1 | 1 | 0 | | | | | | | | | | | | |
| Mar. 2 | <u>0334</u> | <u>0358</u> | 0342 | 1n | N20 W90 | 2 | 1 | 0 | | | | | | | | | | | | | |
| Mar. 15 | <u>1636</u> | <u>1722</u> | 1638 | 1n | N23 E75 | 2 | 1 | 1 | 1- | 1- | 1- | | | | | | | | | | |
| Mar. 16 | <u>0912</u> | <u>1007</u> | 0914 | 2b | N22 E65 | 4 | 3 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | | | | | | |
| Mar. 16 | 1918 | 1950 | (1923) (1937) | 1b | N18 E58 | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | | |
| Mar. 16 | <u>2147</u> | <u>2206</u> | 2153 | 1b | N20 E55 | 1 | 1 | 1 | | | | | | | | | | | | | |
| Mar. 17 | <u>0425</u> | <u>0458</u> | 0431 | 1n | N23 E53 | 2 | 1 | 1 | 1 | | | | | | | | | | | | |
| Mar. 17 | <u>1359</u> | <u>1440</u> | 1410 | 1n | N20 E48 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1- | 0 | | | | | | |
| Mar. 17 | <u>1746</u> | <u>1830</u> | 1802 | 1n | N21 E48 | 1 | 1 | 1 | 1 | | | | | | | | | | | | |
| Mar. 18 | <u>0420</u> | <u>0510</u> | 0427 | 1n | N16 E40 | 1 | 1 | 1- | | | | | | | | | | | | | |
| Mar. 18 | <u>1257</u> | <u>1430</u> | | 1n | N20 E35 | 2 | 1 | 1 | 1 | 1 | 1- | 1- | 1- | | | | | | | | |
| Mar. 18 | <u>2345</u> | <u>2410</u> | 2355 | 1n | N15 E27 | 1 | 1 | 1 | 1 | 1- | | | | | | | | | | | |
| Mar. 19 | <u>0338</u> | <u>0527</u> | 0348 | 3n | N21 E33 | 4 | 3 | 3 | 2 | | | | | | | | | | | | |
| Mar. 19 | <u>1422</u> | <u>1444</u> | 1431 | 1n | N14 E20 | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | | |
| Mar. 19 | <u>2131</u> | <u>2240</u> | (2157) (2209) | 1b | N15 E15 | 2 | 1 | 1 | 1- | | | | | | | | | | | | |
| Mar. 20 | <u>0226</u> | <u>0320</u> | | 1n | N21 E20 | 2 | 1 | 1- | 0 | | | | | | | | | | | | |
| * Mar. 20 | <u>0928</u> | 1255 | 0957 | 2b | N21 E25 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1- | 0 | | | | | |
| * Mar. 20 | <u>1011</u> | <u>1130</u> | (1015) (1037) | 2b | N15 E08 | 2 | 2 | 2 | 2 | 1 | 1 | 0 | 0 | | | | | | | | |
| Mar. 20 | <u>1848</u> | <u>2026</u> | (1857) (2008) | 1n | N19 E07 | 1 | 1 | | | | | | | | | | | | | | |
| Mar. 21 | <u>0925</u> | <u>1125</u> | (0944) (1100) | 2b | N21 W02 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1- | 0 |
| Mar. 21 | <u>1504</u> | <u>1535</u> | 1510 | 1n | N20 E01 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1- | 1- | 1- | | | | | | |
| Mar. 21 | <u>1544</u> | <u>1624</u> | (1550) (1618) | 1n | N21 W04 | 2 | 1 | 1 | 1 | 1 | 1 | 1- | 1- | 1- | | | | | | | |
| Mar. 21 | <u>1820</u> | <u>1930</u> | (1826) (1855) | 1b | N21 W08 | 1 | 1 | 1 | 1- | 0 | | | | | | | | | | | |

* A "double" event.

Table 2 - cont.

| Date | Beg. UT | End UT | Max. UT | Imp. | Position | Individual Station Importance Ratings | | | | | | | | | | | | | | | |
|-------------|-------------|-------------|------------------------------------|------|----------|---------------------------------------|---|----|----|----|----|----|----|----|---|---|---|----|---|--|--|
| <u>1966</u> | | | | | | | | | | | | | | | | | | | | | |
| Aug. 21 | <u>1553</u> | <u>1640</u> | (<u>1601</u>) (<u>1618</u>) | 1n | N35 W88 | 1 | 1 | | | | | | | | | | | | | | |
| Aug. 22 | <u>2125</u> | <u>2220</u> | 2145 | 1n | N29 E59 | 2 | 1 | 1 | 1- | 1- | | | | | | | | | | | |
| Aug. 23 | <u>0950</u> | <u>1150</u> | 1004 | 1n | N23 E67 | 2 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | | | | | | | | |
| Aug. 25 | <u>0620</u> | <u>0645</u> | 0622 | 1b | NO6 W20 | 1 | 1 | 1 | 1- | 1- | | | | | | | | | | | |
| Aug. 26 | <u>1805</u> | <u>1900</u> | 1820 | 2n | N23 E22 | 2 | 2 | 2 | 1 | 1 | | | | | | | | | | | |
| Aug. 26 | <u>2153</u> | <u>2240</u> | 2212 | 2n | N24 E30 | 2 | 2 | 1- | | | | | | | | | | | | | |
| Aug. 27 | <u>1855</u> | <u>1927</u> | | 1n | NO7 W52 | 1 | 1 | 1- | 0 | | | | | | | | | | | | |
| Aug. 28 | <u>0512</u> | <u>0532</u> | 0516 | 1n | NO7 W55 | 1 | 1 | 1 | 1 | | | | | | | | | | | | |
| Aug. 28 | <u>0946</u> | <u>1025</u> | (<u>0957</u>) (<u>1008</u>) | 1n | NO6 W64 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1- | 0 | | |
| Aug. 28 | <u>1153</u> | <u>1209</u> | 1157 | 1n | NO5 W59 | 1 | 1 | 1 | 1 | 1- | 0 | | | | | | | | | | |
| Aug. 28 | <u>1523</u> | <u>1700</u> | 1529 | 3b | N22 E05 | 4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | | | | | |
| Aug. 28 | <u>1638</u> | <u>1657</u> | 1643 | 1n | NO8 W62 | 1 | 1 | 1 | 1 | 1- | 1- | | | | | | | | | | |
| Aug. 29 | <u>0533</u> | <u>0625</u> | 0539 | 1n | N22 W07 | 2 | 1 | 1 | 1 | 1 | 1 | 1- | 1- | 1- | | | | | | | |
| Aug. 29 | <u>1324</u> | <u>1430</u> | 1335 | 1n | N21 W11 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1- | 0 | 0 | | | | | |
| Aug. 29 | <u>2022</u> | <u>2201</u> | 2037 | 1b | N24 W18 | 2 | 1 | 1 | 0 | | | | | | | | | | | | |
| Aug. 29 | <u>2223</u> | <u>2250</u> | 2235 | 1n | NO6 W83 | 2 | 1 | 1- | | | | | | | | | | | | | |
| Aug. 30 | <u>0231</u> | <u>0250</u> | 0236 | 1n | N24 W23 | 2 | 1 | 1 | 1- | 0 | | | | | | | | | | | |
| Aug. 30 | <u>1450</u> | <u>1600</u> | (<u>1458</u>) (<u>1548</u>) | 2n | N23 W26 | 2 | 2 | 2 | 2 | 1 | 1 | | | | | | | | | | |
| Aug. 31 | <u>0037</u> | <u>0123</u> | 0111 | 2b | N21 W30 | 2 | 2 | 2 | 2 | 1 | | | | | | | | | | | |
| Aug. 31 | <u>0154</u> | <u>0235</u> | 0210 | 1n | N22 W30 | 2 | 1 | 1- | 0 | | | | | | | | | | | | |
| Aug. 31 | <u>0250</u> | <u>0421</u> | (<u>0256</u>) (<u>0353</u>) | 1n | N22 W30 | 2 | 2 | 1 | 1 | 1- | | | | | | | | | | | |
| Aug. 31 | <u>1104</u> | <u>1213</u> | (<u>1132</u>) (<u>1145</u>) | 1n | N23 W36 | 2 | 1 | 1 | 1 | 1 | 0 | | | | | | | | | | |
| Aug. 31 | <u>1831</u> | <u>1922</u> | (<u>1832</u>) (<u>1908</u>) | 1n | N24 W36 | 2 | 2 | 1 | 1 | 1- | | | | | | | | | | | |
| Sep. 1 | <u>1522</u> | <u>1542</u> | 1528 | 1n | N22 W54 | 2 | 1 | 1 | 1- | 1- | 0 | | | | | | | | | | |
| Sep. 2 | <u>0542</u> | <u>0800</u> | 0600 | 3b | N24 W56 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 0 | 0 | | | | |
| Sep. 4 | <u>0407</u> | <u>0519</u> | | 3n | N21 W87 | 3 | 3 | 3 | 2 | 1 | 1 | 0 | 0 | | | | | | | | |
| Sep. 7 | <u>2105</u> | <u>2153</u> | 2120 | 1n | N23 E62 | 1 | 1 | 1 | 1- | 1- | | | | | | | | | | | |
| Sep. 8 | <u>1615</u> | <u>1628</u> | 1620 | 1n | N22 E51 | 1 | 1 | 1- | 0 | | | | | | | | | | | | |
| Sep. 10 | <u>1813</u> | <u>1935</u> | 1834 | 1n | N22 E25 | 2 | 1 | 1 | 1 | | | | | | | | | | | | |
| Sep. 14 | <u>0310</u> | <u>0345</u> | 0314 | 1b | NO7 E78 | 1 | 1 | 1- | 0 | | | | | | | | | | | | |
| Sep. 16 | <u>0120</u> | <u>0210</u> | (<u>0125</u>) (<u>0136</u>) | 1n | NO6 E49 | 2 | 2 | 1 | 1- | 0 | | | | | | | | | | | |
| Sep. 16 | <u>1637</u> | <u>2120</u> | (<u>1702</u>) (<u>1815</u>) | 2n | NO5 E36 | 2 | 2 | 2 | 1 | 1- | | | | | | | | | | | |
| Sep. 16 | <u>1740</u> | <u>1840</u> | (<u>1744</u>) (<u>1828</u>) | 1n | N22 E67 | 2 | 1 | 1 | 1 | 1- | | | | | | | | | | | |
| Sep. 17 | <u>0940</u> | <u>1045</u> | 1005 | 2n | N24 W63 | 4 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | | |
| Sep. 18 | <u>1452</u> | <u>1522</u> | 1500 | 2b | N22 E42 | 2 | 2 | 2 | 1 | 1 | 1- | 1- | | | | | | | | | |
| Sep. 19 | <u>1157</u> | <u>1244</u> | (<u>1157</u>) (<u>1210</u>) | 2b | N22 E30 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 0 | 0 | | | | | | |

Table 2 - cont.

| Date | Beg. UT | End UT | Max. UT | Imp. | Position | Individual Station Importance Ratings |
|-------------|-------------|-------------|------------------|------|----------|---------------------------------------|
| <u>1966</u> | | | | | | |
| Dec. 9 | <u>0258</u> | <u>0320</u> | 0307 | 1n | N23 E59 | 1 1 1- 0 |
| Dec. 9 | <u>0922</u> | <u>1000</u> | 0925 | 1n | N21 E58 | 2 1 1 1 1- 0 0 0 |
| Dec. 9 | <u>1755</u> | <u>1907</u> | 1805 | 2b | N22 E50 | 2 2 |
| Dec. 10 | <u>1208</u> | <u>1330</u> | | 1n | N23 E43 | 2 1 1 0 |
| Dec. 10 | <u>1419</u> | <u>1553</u> | (1425) (1440) | 2n | N23 E40 | 2 2 2 1 |
| Dec. 10 | <u>1736</u> | <u>1817</u> | 1747 | 1f | S24 E08 | 1 1 1- |
| Dec. 11 | <u>1911</u> | <u>1941</u> | 1921 | 1n | S22 W09 | 1 1 1- |
| Dec. 11 | <u>2345</u> | <u>2359</u> | 2354 | 1n | S20 W09 | 1 1 1- 0 |
| Dec. 13 | <u>2300</u> | <u>2350</u> | 2310 | 2b | N24 E56 | 2 2 |
| Dec. 15 | <u>0522</u> | <u>0649</u> | 0539 | 1n | N20 E25 | 1 1 1 1 1 |
| Dec. 15 | <u>1945</u> | <u>2155</u> | 2052 | 1n | N20 E26 | 1 1 |
| Dec. 17 | <u>0808</u> | <u>0853</u> | 0816 | 1b | N18 W02 | 2 1 1 1 0 |
| Dec. 17 | <u>0948</u> | <u>1110</u> | (0957) (1010) | 2b | N20 W03 | 3 3 2 2 1 0 |
| Dec. 17 | <u>1226</u> | <u>1318</u> | 1237 | 1n | N20 E03 | 2 1 1 0 |
| Dec. 17 | <u>1634</u> | <u>1745</u> | | 1f | N22 W05 | 1 1- |
| Dec. 18 | <u>1820</u> | <u>1920</u> | 1854 | 1n | N25 W09 | 2 1 1- |
| Dec. 23 | <u>0800</u> | <u>0912</u> | | 1n | N29 E25 | 1 1 1 1 1 1- 0 |
| Dec. 23 | <u>1639</u> | <u>1732</u> | | 1n | N22 E76 | 1 1 1 1 1- |
| Dec. 23 | <u>1925</u> | <u>1945</u> | 1928 | 1n | N22 E69 | 1 1 1- |
| Dec. 24 | <u>0346</u> | <u>0417</u> | 0354 | 1n | N21 E65 | 1 1 1- |
| Dec. 24 | <u>0444</u> | <u>0600</u> | 0503 | 1n | N22 E65 | 2 1 1 |
| Dec. 25 | <u>0205</u> | <u>0318</u> | 0224 | 1b | N22 E54 | 1 1 0 |
| Dec. 28 | <u>1758</u> | <u>1830</u> | 1802 | 2b | N25 W63 | 2 2 1 |
| Dec. 31 | <u>0842</u> | <u>0900</u> | 0845 | 1b | S20 E27 | 1 1 1 1 1- 0 0 |
| Dec. 31 | <u>1610</u> | <u>1700</u> | 1625 | 1n | N24 W29 | 1 1 1- |

? Flares for McMath-Hulbert Observatory Finding List, 1964-1966.

| Date | Beg. UT | End UT | Max. UT | Imp. | Position | Individual Station Importance Ratings |
|-------------|-------------|-------------|---------|------|----------|---------------------------------------|
| <u>1964</u> | | | | | | |
| Oct. 8 | <u>0424</u> | <u>0443</u> | 0429 | 1? | N25 W64 | 1 0 |
| Nov. 21 | <u>0334</u> | <u>0347</u> | 0339 | 1? | N21 W75 | 1 0 |
| Dec. 4 | <u>0827</u> | <u>1015</u> | 0831 | 1? | N32 E81 | 2 2 2 1+ 1- 0 0 0 0 0 |
| <u>1965</u> | | | | | | |
| Jan. 1 | <u>1827</u> | <u>1848</u> | 1834 | 1? | N22 E90 | 1 |
| Jan. 1 | <u>2210</u> | <u>2232</u> | 2215 | 1? | N10 E90 | 1 |

Table 2 - cont.

| Date | Beg. UT | End UT | Max. UT | Imp. | Position | Individual Station Importance Ratings | | | |
|-------------|-------------|-------------|------------|------|----------|---------------------------------------|----|----|----------|
| <u>1965</u> | | | | | | | | | |
| Feb. 9 | <u>2255</u> | <u>2327</u> | 2305 | 1? | N25 E38 | 2 | 0 | | |
| Mar. 7 | <u>0307</u> | <u>0324</u> | 0311 | 1? | N25 W55 | 1 | 0 | | |
| Mar. 18 | <u>1225</u> | <u>1240</u> | 1228 | 1? | N29 W26 | 1 | 1 | 0 | 0 |
| Mar. 21 | <u>2119</u> | <u>2133</u> | 2127 | 1? | N28 W70 | 1 | 0 | | |
| Mar. 26 | <u>0323</u> | <u>0359</u> | 0337 | 1? | N10 E52 | 1 | 1 | 0 | 0 |
| Apr. 12 | <u>2232</u> | 2302 | 2243 | 1? | N06 E70 | 1 | 0 | | |
| Apr. 15 | <u>2109</u> | <u>2147</u> | 2116 | 1? | N04 E30 | 2 | 1 | 1 | 1- 1- 1- |
| May 3 | <u>0248</u> | <u>0305</u> | 0254 | 1? | N28 E62 | 1 | 0 | | |
| May 3 | <u>0412</u> | <u>0416</u> | 0413 | 1? | N28 E63 | 1 | 0 | | |
| May 23 | <u>0542</u> | <u>0552</u> | 0545 | 1? | N24 W07 | 1 | 0 | | |
| May 26 | <u>0500</u> | <u>0510</u> | | 1? | N21 W78 | 1 | 1- | | |
| June 18 | <u>1035</u> | <u>1100</u> | 1041 | 1? | N25 W68 | 1+ | 1 | 1- | 0 |
| Oct. 22 | <u>1558</u> | <u>1612</u> | 1602 | 1? | S17 E76 | 1 | 0 | | |
| Oct. 22 | <u>1706</u> | <u>1730</u> | 1715 | 1? | S17 E77 | 1 | 1 | 1- | 0 |
| Oct. 22 | <u>2352</u> | <u>2406</u> | | 1? | S17 E76 | 1 | 1 | 1- | 0 |
| Nov. 6 | <u>1756</u> | <u>1839</u> | 1818 | 1? | N27 E04 | 1 | 1- | | |
| Nov. 28 | <u>2139</u> | <u>2213</u> | 2142 | 1? | N28 E82 | 1 | 1- | | |
| Nov. 29 | <u>0011</u> | <u>0022</u> | 0015 | 1? | N28 E80 | 1 | | | |
| Nov. 29 | <u>0103</u> | <u>0128</u> | 0116 | 1? | N28 E83 | 1 | 0 | | |
| Dec. 17 | <u>1635</u> | <u>1642</u> | | 1? | N25 W90 | 1 | 1- | | |
| Dec. 17 | <u>2349</u> | <u>2354</u> | | 1? | N25 W90 | 1 | 1 | 1- | 0 |
| Dec. 28 | 1358 | 1406 | | 1? | N09 W48 | 1 | 0 | | |
| Dec. 29 | <u>1205</u> | <u>1230</u> | 1210 | 1? | S29 E26 | 1+ | 1 | 0 | 0 |
| Dec. 30 | <u>0006</u> | <u>0130</u> | 0040 | 1? | N09 W70 | 1+ | 1- | | |
| Dec. 31 | <u>1740</u> | <u>1753</u> | 1744 | 1? | N13 W90 | 1 | | | |
| Dec. 31 | 1850 | 1928 | 1900 | 1? | N10 W90 | 1 | 0 | | |
| <u>1966</u> | | | | | | | | | |
| Jan. 10 | 1126 | 1140 | | 1n? | N24 W02 | 1 | | | |
| Jan. 15 | 1040 | <u>1058</u> | | 1n? | N17 E58 | 1 | 0 | | |
| Jan. 19 | <u>1110</u> | 1145 | 1125 | 1f? | N30 E34 | 1 | 1 | 0 | 0 |
| Feb. 12 | <u>1331</u> | <u>1347</u> | 1333 | 1b? | N32 E90 | 1 | | | |
| Feb. 27 | <u>0015</u> | <u>0154</u> | 0043 | 1b? | N20 W50 | 1 | 1- | | |
| Feb. 27 | <u>2140</u> | <u>2213</u> | 2152 | 1n? | N19 W68 | 1 | 1- | | |
| Feb. 28 | <u>2026</u> | <u>2043</u> | 2032 | 1n? | N21 W86 | 1 | 1 | 1- | 0 |
| Feb. 28 | <u>2102</u> | <u>2117</u> | 2110 | 1n? | N20 W86 | 1 | 1 | 1- | 0 |

Table 2 - cont.

| Date | Beg. UT | End UT | Max. UT | Imp. | Position | Individual Station Importance Ratings | | | | |
|-------------|-------------|-------------|--------------------------------|------|----------|---------------------------------------|----|---|---|--|
| <u>1966</u> | | | | | | | | | | |
| Dec. 14 | <u>1742</u> | <u>1754</u> | 1750 | 1n? | S20 W53 | 1 | 0 | | | |
| Dec. 19 | <u>1419</u> | <u>1444</u> | 1424 | 1n? | N13 W67 | 1 | | | | |
| Dec. 21 | <u>0534</u> | <u>0600</u> | | 1n? | N29 E56 | 1 | | | | |
| Dec. 23 | <u>1112</u> | <u>1130</u> | | 1f? | S27 E70 | 1 | 0 | | | |
| Dec. 23 | <u>1506</u> | <u>1550</u> | 1509 | 1n? | N21 E71 | 1 | | | | |
| Dec. 25 | <u>0944</u> | <u>1042</u> | (<u>0947</u> <u>1003</u>) | 1n? | N24 E51 | 1 | 1 | 0 | 0 | |
| Dec. 30 | <u>2135</u> | <u>2220</u> | 2152 | 1n? | N25 W22 | 1 | | | | |
| Dec. 30 | <u>2231</u> | <u>2254</u> | 2235 | 1b? | S23 E32 | 1 | | | | |
| Dec. 30 | <u>2305</u> | <u>2332</u> | 2313 | 1f? | N11 E90 | 1 | | | | |
| Dec. 31 | <u>1836</u> | <u>1917</u> | 1842 | 1b? | S23 E22 | 1 | 1- | | | |

TABLE 3.

Importance of Flares in Quarterly Bulletin before and after
Reevaluation on Basis of all Observing Stations, 1964-66.

| Month | Total Number | Importance in Q.B. | | | | | | Importance after Reevaluation | | | | | |
|-----------|-----------------|--------------------|-----|----|----|---|-----|-------------------------------|-----|----|----|----|---|
| | | S, 1- | 1 | 1+ | 2 | 3 | ? | S, 1- | 1 | 1? | 1+ | 2 | 3 |
| 1964 Jan. | 15 | 3 | 8 | 2 | 2 | | | 14 | | | | | 1 |
| Feb. | 6 | 2 | 4 | | | | | 5 | 1 | | | | |
| Mar. | 27 | 5 | 20 | 1 | | | 1 | 26 | | | 1 | | |
| Apr. | 23 | 6 | 14 | 1 | 1 | | 1 | 21 | 1 | | | 1 | |
| May | 19 | 8 | 8 | 2 | | | 1 | 18 | 1 | | | | |
| June | 17 | 5 | 9 | 1 | | | 2 | 16 | 1 | | | | |
| July | 3 | 2 | 1 | | | | | 3 | | | | | |
| Aug. | 15 | 6 | 7 | | | | 2 | 14 | 1 | | | | |
| Sept. | 8 | 1 | 5 | | 1 | | 1 | 8 | | | | | |
| Oct. | 12 | 1 | 9 | 1 | 1 | | | 10 | 1 | 1 | | | |
| Nov. | 9 | 2 | 5 | | 1 | | 1 | 7 | 1 | 1 | | | |
| Dec. | 21 | 4 | 14 | 1 | 1 | | 1 | 20 | | 1 | | | |
| 1965 Jan. | 26 | 5 | 17 | 1 | | | 3 | 23 | 1 | 2 | | | |
| Feb. | 12 | 1 | 8 | | 3 | | | 8 | 2 | 1 | | 1 | |
| Mar. | 28 | 6 | 19 | | | | 3 | 23 | 1 | 4 | | | |
| Apr. | 19 | 3 | 13 | 1 | 2 | | | 14 | 3 | 2 | | | |
| May | 64* | 16 | 38 | 3 | 3 | | 4* | 50 | 11 | 4 | 1 | | |
| June | 53 | 9 | 39 | 2 | 2 | | 1 | 41 | 9 | 1 | | 2 | |
| July | 16 | 6 | 8 | 2 | | | | 11 | 5 | | | | |
| Aug. | 21 | 9 | 9 | 2 | 1 | | | 20 | 1 | | | | |
| Sept. | 31 | 12 | 18 | | | | 1 | 26 | 3 | | 1 | 1 | |
| Oct. | 40 | 10 | 27 | 1 | 2 | | | 27 | 7 | 3 | 1 | 2 | |
| Nov. | 34 | 12 | 22 | | | | | 25 | 5 | 4 | | | |
| Dec. | 39 | 4 | 34 | 1 | | | | 29 | 2 | 7 | 1 | | |
| 1966 Jan. | 30 | 5 | 22 | † | 2 | | 1 | 22 | 3 | 3 | † | 2 | |
| Feb. | 53 | 13 | 39 | | 1 | | | 44 | 4 | 5 | | | |
| Mar. | 167 | 50 | 102 | | 14 | 1 | | 106 | 39 | 8 | | 13 | 1 |
| Apr. | 107 | 50 | 52 | | 5 | | | 82 | 21 | 1 | | 3 | |
| May | 87 | 36 | 48 | | 3 | | | 77 | 7 | 1 | | 2 | |
| June | 60 | 30 | 28 | | 2 | | | 53 | 5 | 1 | | 1 | |
| July | 135 | 51 | 77 | | 6 | 1 | | 104 | 22 | 4 | | 3 | 2 |
| Aug. | 122 | 42 | 73 | | 7 | | | 89 | 26 | 1 | | 5 | 1 |
| Sept. | 124 | 71 | 48 | | 4 | 1 | | 99 | 15 | 2 | | 6 | 2 |
| Oct. | 91 | 40 | 46 | | 5 | | | 69 | 12 | 7 | | 2 | 1 |
| Nov. | 49 | 23 | 23 | | 3 | | | 35 | 10 | 3 | | 1 | |
| Dec. | 108 | 32 | 66 | | 10 | | | 63 | 22 | 18 | | 5 | |
| Totals: | | | | | | | | | | | | | |
| 1964 | 175 | 45 | 104 | 9 | 7 | - | 10 | 162 | 7 | 3 | 1 | 2 | |
| 1965 | 383* | 93 | 252 | 13 | 13 | - | 12* | 297 | 50 | 28 | 4 | 6 | |
| 1966 | 1133 | 443 | 624 | | 62 | 3 | 1 | 843 | 186 | 54 | | 43 | 7 |
| 1964-1966 | 1691 | 581 | 980 | 22 | 82 | 3 | 23 | 1302 | 243 | 85 | 5 | 51 | 7 |

*One event in the Quarterly Bulletin lasting 6 hours has been reevaluated as 3 events of importance 1+, 1, and 1- respectively.

†Importance 1+ was discontinued in 1966.

TABLE 4

Importance Evaluations by all Patrolling Stations for the 85 Flares of Importance ≥ 2 in Quarterly Bulletins, 1964-1966

| Importance Evaluation | Number of Cases | Importance Evaluation | Number of Cases |
|-------------------------------------|-----------------|-------------------------|-----------------|
| 2 0 | 4 | 3 2 1+ 1 | 1 |
| 2 0 0 | 6 | 3 2 2 1 | 1 |
| 2 0 0 0 | 4 | 3 2 2 1- | 1 |
| 2 0 0 0 0 | 8 | 3 2 2 2 | 1 |
| 2 0 0 0 0 0 | 3 | 3 2 2 2 1 1 1 1 | 1 |
| 2 0 0 0 0 0 0 | 6 | 3 2 2 2 1 0 0 | 1 |
| 2 0 0 0 0 0 0 0 | 2 | 3 2 2 2 2 1 1 | 1 |
| 2 0 0 0 0 0 0 0 0 0 | 1 | 3 2 2 2 2 2 1 1 | 1 |
| | | 3 2 2 2 2 2 2 | 1 |
| | | 3 2 2 2 2 2 2 1 1 0 | 1 |
| 2 1 1 0 0 | 1 | | |
| 2 2 | 2 | 3 3 2 2 1 | 2 |
| 2 2 0 | 1 | 3 3 2 2 1- | 1 |
| 2 2 1 | 1 | 3 3 2 2 2 2 1 | 1 |
| 2 2 1 0 | 1 | 3 3 2+ 2+ 2 2 2 1 1 0 | 1 |
| 2 2 1 1- 0 | 1 | 3 3 3 2 1 1 0 | 1 |
| 2 2 1 0 0 | 1 | 3 3 3 2 2 2 2 | 1 |
| 2 2 2 | 1 | 3 3 3 3 2 2 2 2 2 1- 0 | 1 |
| 2 2 2 1 | 1 | 3 3 3 3 3 3 2 2 2 2 0 0 | 1 |
| 2 2 2 1 1 | 1 | | |
| 2 2 2 1- | 2 | 4 3 2 1 | 1 |
| 2 2 2 1 1 0 | 1 | | |
| 2 2 2 2 | 1 | 4 3 2 2 1 1 1 0 0 0 | 1 |
| 2 2 2 2 1 | 1 | 4 3 2 2 2 2 2 1 1 1 1 | 1 |
| 2 2 2 2 1 1 | 2 | 4 3 3 2 | 1 |
| 2+ 2 2 2 1+ 1 1 1 1 1- 1- | 1 | 4 3 3 2 2 2 2 2 1 | 1 |
| 2 2 2 2 2 1+ 1+ 1 | 1 | 4 3 3 3 3 3 2 2 2 1 | 1 |
| 2 2 2 2 2 1 1 1 1- 0 0 | 1 | 4 4 3 2 0 0 0 0 0 0 | 1 |
| 2 2 2 2 2 1 1 1 1 1- 0 | 1 | | |
| 2 2 2 2 2 1 1 1 1 1 1- 0 | 1 | | |
| 2 2 2 2 2 2 2 1- | 1 | | |
| 2+ 2+ 2 2 2 2 2 2 2 2 2 1+ 1+ 1 0 0 | 1 | | |
| | | TOTAL | <u>85</u> |