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SOLAR ACTIVITY CATALOGUE
VOLUME 5
CATALOGUE OF SOLAR ACTIVITY DURING 1960-1963
BY

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INTRODUCTION

CATALOGUE OF SOLAR ACTIVITY FOR THE YEAR 1960-1963

INTRODUCTION

The data compiled in this volume of the catalogue covers the Greenwich years 1960-1963. This covers synodic rotations of the sun 1422 through 1475.

The solar activity data have been arranged in eight tables, or catalogues:

I. Catalogue of Major Solar Flares and Related Terrestrial Effects
II. Catalogue of Important Sunspot Groups
III. Catalogue of Important Plage Regions
IV. Catalogue of Outstanding Solar Radio Emissions
V. Catalogue of Geomagnetic Storms
VI. Catalogue of Important Solar-Terrestrial Effects
VII. Catalogue of Balloon Flights
VIII. Chronological Catalogue of Major Solar Events

The year 1960 was notable in that five sea level solar cosmic ray events were recorded (May 3, September 3, and November 12, 15, and 20), compared with only seven previously reported since February 1942. Two of the 1960 events were unusual: the event of September 3 was produced by a flare on the sun's east limb and the event on November 20 came from a flare about 30 degrees behind the west limb of the sun in Mt. Wilson sunspot No. 15114 which crossed the solar disk between the 8th and 18th of November. This sunspot produced six major flares and a total 98 flares of importance equal to or greater than one during disk passage.

Each of these catalogues is described in detail in the subsequent sections and in the description of the tables. The data have been obtained from many sources. These are listed in Table 5.3 of references, page 5.7 and 5.8.

This work has been carried out at LTV Astronautics Division under NASA Contract NAS 9-2469. Dr. Helen Dodson-Prince and Miss E. Ruth Hedeman prepared the data for the Chronological Catalogue (Table VIII). In addition, they have made valuable contributions to the other tables through discussions and data contributions. Their work was supported by the Office of Naval Research.

We wish to express our appreciation to Dr. Howard for use of the Mt. Wilson daily work sheets of sunspot magnetic classifications. Miss Virginia Lincoln at the National Bureau of Standards, Central Radio Propagation Laboratory, has made valuable suggestions and data at the World Data Center A (airglow and ionospheric) available. Dr. H. Carmichael has generously supplied unpublished data on Forbush Decreases determined

by the Chalk River Nuclear Laboratory, Atomic Energy of Canada, Limited. Maximum area of large sunspots for the period 1960-1963 were obtained through the courtesy of the Astronomer Royal, Greenwich Observatory. Many of the authors listed in the reference table have generously supplied reprints of their papers and in some cases have made unpublished data available. Other scientists throughout the world have made valuable contributions through discussions and helpful suggestions during the period when many of the data were being obtained and the idea of a solar activity catalogue was generated.

1. Major Solar Flares 1960-1963

For the purpose of this catalogue a major flare is defined as a flare which has been reported with an importance of 3 or 3+ by at least one solar observatory, or with an importance 2+ by at least two observatories, and published in the IAU Quarterly Bulletin (reference 15) for the years 1960 through 1962. Beginning with January 1963, IAU Quarterly Bulletin stopped publishing individual observatory flare reports. Each flare was evaluated on the basis of the individual reports. The resulting flare data is published in a form similar to the McMath-Hulbert working lists for the previous years. Consequently, our flare catalogue for 1963 includes flares of importance 2+ or greater.

Table 5.1 summarizes the flare activity data for the four year period.

Year	Major Flares This Catalogue	Catalogue Major Flares Imp. 2+ In McMath List	All Flares Importance ≥ 1
1960	50	32	2169
1961	20	14	1129
1962	6	4	667
1963	3	3*	470**

* Includes one importance 2+ and two with importance 3.

** This total includes 109 flares with importance 1- and 13 flares where an importance could not be assigned.

TABLE 5.1
Summary of Flare Activity 1960-1963

2. Sunspots 1960-1963

The Mt. Wilson Solar Observatory assigned numbers to approximately 1156 sunspot groups during the four year period. This catalogue contains 99 spot groups. This includes:

All spots irrespective of size or magnetic classification associated with a major solar flare indicated by the flare serial number or numbers.

All magnetically complex spot groups (γ and $\beta\gamma$ classification) reported in references 29 and 30 (indicated by M).

All spots with a maximum corrected area greater than 500 millionths of the visible solar hemisphere in the Greenwich data.

The maximum area of small spot groups, mean areas, or areas on flare days have not been calculated by the Greenwich Observatory.

Similarly, magnetic classification and sunspot field strengths were not measured by Mt. Wilson Observatory on a large percentage of the days during this four year period, although a magnetic classification was estimated for most of the days.

The number of spots in each category for each of the four years is given in Table 5.2.

	All Spots			Spots with Major Flares								
	L	LM	M	L Spots Number Spot	L Spots Number Flares	LM Spots Spot	LM Spots Flares	M Spots Spot	M Spots Flares	Small Spots Spot	Small Spots Flares	Total Spots
1960	19	14	7	5	5	7	17	5	11	12	16	543
1961	11	5	0	1	3	3	10	0	0	7	7	297
1962	8	4	3	2	3	1	1	1	1	1	1	189
1963	6	2	0	0	0	1	3	0	0	0	0	127
Total	44	25	10	8	11	12	31	6	12	20	24	1156

TABLE 5.2
Distribution of Sunspots by Categories
for the Years 1960-1963

3. Important Plage Regions During 1960-1963

Our catalogue contains 94 plage regions. This includes:

All plages associated with major flares. Indicated by the major flare serial number or numbers.

All plages with an average maximum area equal to or greater than 10,000 millionths of the solar hemisphere (denoted by L in Table III).

All plages with an average brightness greater than 3.5 during disk passage (B in Table III).

All plages that produced 30 or more flares of importance 1 or greater during disk passage (N in Table III).

The 79 major flares during the four year period were produced in 47 different plage regions. Twenty-three plage regions produced 30 or more flares. These 23 regions were the source of 1084 flares with importance 1 or greater, or slightly more than 25% of all flares reported during the four year period. These flare productive regions were associated with slightly more than 44% of the major flares: One region which crossed the solar disk between November 5 and 20 was the source of 6 major flares and a total of 98 flares of importance 1 or greater. This is the region that produced the high energy particles on November 12, 15, and 20, 1960.

4. Important Radio Emissions from the Sun During 1960-1963

We have limited this portion of the catalogue to spectral observations Type II (slow drift) and Type IV (Broad band continuum) and radio emissions at discrete frequencies between 167 Mc/s and 9400 Mc/s.

5. Geomagnetic Storms During 1960-1963

Data for this catalogue was obtained from the preliminary reports of ssc and SFE published in the Journal of Geophysical Research (reference 22), the Principal Magnetic Storms, also published in the Journal of Geophysical Research (reference 23), and a summary of ssc prior to publication of the IAGA Bulletin (reference 44).

6. Solar-Terrestrial Effects During 1960-1963

This portion of the catalogue is limited to short wave radio fadeouts (SWF) selected geomagnetic storms, solar flare effects (SFE), polar-cap absorptions, and Forbush decreases.

6.1 Short Wave Radio Fadeouts

In the case of the SWF we have included those of importance 3 or greater that lasted for 30 minutes or more, and those that occurred at the time of a major flare, irrespective of their importance or duration.

6.2 Geomagnetic Storms

In general, the geomagnetic storms listed in this portion of the catalogue are limited to those that have been classified as moderately severe (K_p = 6 or 7) and severe (K_p = 8 or 9). A few moderate storms (K_p = 5) have been included if in the literature they have been associated with a flare (irrespective of the flare importance) or a polar-cap absorption.

6.3 Solar Flare Effects

Solar flare effects (SFE) (magnetic crochets) have been taken from reference 22. These must be considered as preliminary.

6.4 Polar-Cap Absorptions

A number of papers in the scientific literature have discussed polar-cap absorption and their correlation with solar flares, solar radio emissions, geomagnetic storm and other terrestrial effects. There is, in general, good agreement between the different investigators, although the choice of the flare responsible for the PCA is, in some cases, not unique. There are cases when two or more flares of importance 2 or greater take place within the acceptable time limit.

6.5 Forbush Decreases

The data in this catalogue has been based on a list of Forbush decreases prepared by the Chalk River Nuclear Laboratory, Atomic Energy of Canada, Limited (reference 34). These data were kindly supplied by Dr. Carmichael. These data have been supplemented by discussions of Forbush decreases in reference to other solar-terrestrial effects published in the scientific literature.

7. Catalogue of Balloon Flights

This catalogue is based on lists supplied by Professor Winckler and those discussed in the scientific literature. In many cases the flights discussed in the literature did not give sufficient data to be included in the catalogue. These are included in a supplementary bibliography, pages 5.VII-v.

8. <u>Chronological Catalogue of Major Solar Events During 1960-1962</u>

This table summarized many of the data contained in Tables I through VI of the catalogue. However, Tables I through VI give many events and more detailed data than was possible in Table VIII. The criteria used for inclusion of events in this catalogue are given on page 5.VIII-i.

TABLE 5.3 SOURCES AND REFERENCES SOLAR ACTIVITY CATALOGUE 1960-1963

						SOLAR PHENOMENA			RADIO EMISSIONS			SOLAR-TERRESTRIAL EFFECTS					
Ref. No.	Author	Publication	Vol.	Year	Pages	Plage	Sun Spot	Flares	II	IV	Single Freq.	SWF	PCA	Forbush Decrease	Geomag. Storm	Kp	SFE
1	Bailey	Planet Space Sci.	12	1964	495-541								X				
2	Bailey	J. Phys. Soc. Japan	17-AI	1962	106-112								X				
3	Bailey	J. Geophys. Res.	67	1962	391-396								X				
4	Bartels	IAGA Bulletin	18	1962												X	
5	Boorman, et. al	M.N. Royal Astron. Soc.	123	1961	87-96				X								
6	Caroubalos	Ann. Astrophys.	27	1964													
7	CRPL	Solar Geophys. Data	186-233			X		X	x	x	x	X				x	
8	CSIRO	Monthly Reports							X	X							
9	Dodson & Hedeman	IGY Solar Activity Report	18, 21, 25.					X									
10	Dodson & Hedeman	Plage Catalogue	To be published			X	x										
11	Dodson & Hedeman	Planet. Space Sci.	12	1964	393-418			x	x	x		X			x		
12	Crosling	J. Geophys. Res.	69	1964	1233-1238			x					X	X			
13	Haurwitz	J. Geophys. Res.	67	1962	2979-2982										X		
14	Haurwitz	Astrophys. J	140	1964	1236-1246			x			x						
15	IAU	Quarterly Bulletins	129-144					X	X	X	X						
16	Jelley & Collins	Can. J. Phys.	40	1962	706-718								X				
17	Jenkins & Paghis	Can. J. Phys.	41	1963	1056-1073												
18	Kahle	U. Alaska Geophys. Rep.	R-129	1962				x	x	x		x	X		x		
19	Kamiya	J. Geomag. Geoel.	13	1961	33-41			x		X				x	x		
20	Laurie & Finch	Observatory 1960	81	1961	110-112										x		
		1961	82	1962	85-87										x		
		1962	83	1963	87-88										x		
		1963	84	1964	78-80										x		
21	Leinbach	U. Alaska Geophys Rep.	R-127	1962									X				
22	Lincoln Ed. Preliminary Rep. SSC and GFE	J. Geophys. Res.	66	1961	660, 979, 1561, 3045, 3947.										X		X
			67	1962	381, 2035, 2975, 4071.												
			68	1963	581, 2335, 3724, 5879.												
			69	1964	525, 1903, 3283.												
23	Lincoln Ed. Principal Magnetic Storms.	J. Geophys. Res.	65	1960	2467, 4195										X X		X
			66	1961	311, 980, 1279, 1562, 2255, 2573, 3571, 4301.												

TABLE 5.3 1960-1963 (CONTINUED)

Ref. No.	Author	Publication	Vol.	Year	Pages	SOLAR PHENOMENA: Plage	Sun Spot	Flares	RADIO EMISSIONS: II	IV	Single Freq.	SOLAR-TERRESTRIAL EFFECTS: SWF	PCA	Forbush Decrease	Geomag. Storm	Kp	SFE
23	Lincoln, Ed. Principal Magnetic Storms.	J. Geophys. Res.	67	1962	383, 1665, 2036, 2255, 2976, 3614, 4497, 4875, 5341,												
			68	1963	582, 1155, 1768, 2336, 3723, 4359, 5310, 5880, 6199,												
			69	1964	525, 1001, 1907, 5087.												
24	Lockwood & Razdan	J. Geophys. Res.	68	1963	1581-1591									X			
25	Malitson	NASA-TR	R-169	1963	109-117			X		X			X		X		
26	Malville & Smith	J. Geophys. Res.	68	1963	3181-3185												
27	Martres & Pick	Ann. Geophys.	25	1962	293-300			X									
28	Maxwell, Hughes, & Thompson	J. Geophys. Res.	68	1963	1347-1354				X	X							
29	Mt. Wilson Obs.	Microfilm					X										
30	Mt. Wilson Obs.	Daily Work Sheets					X										
31	Ney & Stein	J. Geophys. Res.	67	1962	2087-2105									X			
32	Ortner, et. al	J. Geophys. Res.	67	1962	4169-4186			X					X		X		
33	Pick-Gutman	Ann. Astrophys.	24	1961	183-210					X	X			X			
34	Robertson & Kodama	Atomic Energy Canada,	Chalk River unpublished											X			
		See also Ref. 7, No's 195, 196, & 197															
35	Roederer, et. al	J. Geophys. Res.	66	1961	1603-1610												
36	Royal Greenwich Obs.		Unpublished				X										
37	Sinno	J. Geomag & Geoel.	13	1961	1-10			X		X					X		
38	Smith, H. J.	AFCRL Res. Note	62-827	1962	38pp.			X									
39	Steljes, Carmichael & McCracken	J. Geophys. Res.	66	1961	1363-1377			X					X	X			
40	Tokyo Astron. Obs.	Quarterly Bull. Solar. Phenom.	12-15				X	X			X	X					
41	Waldmeier	Pub. Eidgenoss. Sternwarte	Sunspot Activity		1910-1960		X										
42	Waldmeier	Heliogr. Karten Photosphere	11(5) 12(1,2)	1961 1962-63	117-145 1-55	•	X										
43	Warwick & Haurwitz	J. Geophys. Res.	67	1962	1317-1332			X	X	X	X		X				
44	Romana	Data to be published in IAGA Bulletin	120, p.q.												X		X
45	Warwick J																

•Meudon Region

I. CATALOGUE OF MAJOR SOLAR FLARES DURING 1960 – 1963

TABLE I. CATALOGUE OF MAJOR SOLAR FLARES DURING 1960-1963

The meaning of the various columns and a description of the data contained in Table I - Catalogue of Major Solar Flares, are given below.

A major flare is defined as a flare which has been reported with importance 3 or 3+ by at least one solar observatory, or with importance 2+ by at least two observatories and published in the Quarterly Bulletin of the IAU (reference 15).

Column 1 — Major Flare Serial Number.

Column 2 — Solar Event Serial Number. Data were not available in time for inclusion in this catalogue.

Column 3 — Greenwich Date of the Flare.

Column 4 — Beginning of the Flare U.T. This is the earliest time reported in the IAU Bulletin. If the observatory reported the start of the flare was observed, the fact is indicated by underlining the start time.

Column 5 — End Time U.T. This is the latest reported end time in the IAU Bulletin. If the end of the flare was observed, the end time is underlined.

Column 6 — Time of Maximum. Since different observatories often report different maximum times for the same flare, the time (or in a few cases, times) entered in this column has been taken from the McMath-Hulbert working list of flares. In general, the tabulated time is the arithmetic mean of the reported times of maximum for all observations that covered the principal maximum of the flare. If a second time is given, there is an indication that a secondary maximum may have occurred as indicated by two well developed phases or that several observers reported them as two separate flares.

Column 7 — Position. The heliographic position given in the catalogue are arithmetic means of the values reported in the IAU Bulletin. A reported value is excluded in deriving the mean if the value deviates by a large amount from the other reported positions.

Column 8 Plage Number. This is the serial number of the McMath plage in which the flare occurred.

Column 9 Solar Rotation Number.

Column 10 Active Region. This is the serial number assigned to active regions by the Meudon Observatory in the IAU Quarterly Bulletin. The numbering starts with one at the beginning of each quarter. It will be noted that there is not always a one to one correspondence between the plage and the active region, a plage may cover two or more regions.

Column 11 Mt. Wilson Serial Number of Sunspot Group Where the Flare Occurred. Occasionally a flare occurs between two groups and two spot numbers are recorded.

Column 12 Greenwich Serial Number of the Spot Group. Not available at this time.

Column 13 Flare Importance. This is the maximum importance reported for the flare in the IAU Quarterly Bulletin.

Column 14 No. Rep./No. Max. This column gives the number of observatories reporting the flare in the IAU Bulletin and the number that reported it with the maximum importance. Occasionally an observer reports the same flare two or more times. These separate reports are all considered in the selection of the start, end, and maximum times use in Columns 4, 5, and 6. But only once for the number of reports. The number of observers reporting the flare with the importance shown in Column 12 is indicated by the second number in this column.

Column 15 This column gives the importance assigned to the flare in the McMath-Hulbert Observatory working list of flares (reference 9).

FLARE AREA SQUARE DEGREES

Reported areas of flares, in square degrees, frequently vary over a wide range. These differences are due to the methods used by the observer, different times at which the estimate, or measurement was made, and other factors. In order to give the tabulation of this parameter as much value as possible, we have given:

Column 16 The range of areas reported in the IAU Quarterly Bulletin:

Column 17 Number of Observatories Reporting an Area.

Column 18 The Arithmetic Mean of the Reported Values.

RELATED FLARE ACTIVITY

Column 19 Other Flares. This column lists the number of minor and major flares associated with the active region during disk passage (plage, sunspot, or IAU active region) before and after the major flare.

Column 20 This column gives the heliographic longitude (or central meridian distance) of the first flare associated with the region and the importance of the first flare. For example: E90/2 indicates that the first flare occurred at E90, and at least one observatory reported it with an importance 2.

Column 21 Short Wave Radio Fadeouts (S.W.F.). Short wave radio fadeouts associated with major flares are listed with the following notation: Beginning/Duration in minutes/importance. Complete data for S.W.F.'s of importance ≥ 3 that lasted 30 minutes or more are given in Table VI, Catalogue of Solar-Terrestrial Effects.

Column 22 Solar Radio Emissions at 10 cm. Peak flux reported at approximately 10 cm. wave length. (The frequencies may be 2800, 2980, or 3000 Mc/s.) Detailed data for important solar radio emissions are given in Table IV, Catalogue of Solar Radio Emissions.

Column 23 Peak flux reported at 1.5 m. wave length (200 Mc/s).

Column 24 Emissions at Other Wave Lengths. The notation cm. in this column indicates that emissions are reported (and given in Table IV at one or more frequencies greater than 600 Mc/s (except approximately 3000 Mc/s). Similarly, the notation m. indicates that emissions are reported at frequencies less than 600 Mc/s (except 200 Mc/s) and detailed data are given in Table IV.

Column 25 Dynamic Spectral Emissions. The notation II or IV in this column indicates that emissions of Type II (slow drift), or broad band continuum, Type IV, are reported by either the Sweep Frequency Observatory at Sydney, Australia, or the Harvard College Radio Observatory at Fort Davis, Texas.

SOLAR TERRESTRIAL EFFECTS

Column 25 Polar-Cap Absorption. Polar-cap absorptions reported within a reasonable time after a major flare (generally between one and seven hours) are listed. The data in this column are limited to: month/Greenwich day/beginning time UT/absorption in db. Additional data, including references, are given in Table VI, Catalogue of Solar-Terrestrial Effects.

Column 26 Geomagnetic Storms. Geomagnetic Storms with a maximum $K_p \geq 5$ reported by three or more observatories within a reasonable time after the major flare (generally between twelve and seventy two hours). The data in this column are limited to: Month/Greenwich day/onset time, UT/type/degree of activity/maximum reported K_p. Additional data, including: references, duration, number of reports, etc. are given in the Catalogue of Geomagnetic Storms, Table V, and the Catalogue of Solar Terrestrial Effects, Table VI.

TABLE I CATALOGUE OF MAJOR SOLAR FLARES DURING 1960-

		MAJOR FLARE						SOLAR REGION				FLARE IMPORTANCE			F
Serial No.	Event No.	Gr. Day	Beg. UT	End UT	Max UT	Position		Plage No	Rotation	Region No	Sunspot No. Mt.Wilson Greenwich	IAU	No. Rept./No. Max.	McM	Ra
1		1960 Jan. 07	1504	1555	1528	N08	W78	5512	1422	24	14641	3	3/1	2	[illegible]
2		11	2040	2355	2126	N22	E03	5527	1422	47	14660	3	2/2	3	22
3		15	1336	1455	-	S20	W68	5525	1422	45	14657	3	4/1	2	7-
4		Feb. 03	0815	0903	0820	S14	W36	5551	1423	32-33	14701	2-	6/2	2	5
5		22	1352	1520	1400	N08	E41	5581	1424	14	14732	3	4/1	3	9
6		26	0700	0955	0713	S21	W16	5580	1424	12	14731	3	8/2	2+	5
7		29	1522	1635	1546	N22	E04	5586	1424	21	14738	2	4/1	1	4
8		Mar. 02	1015	1156	1107	N22	W20	5586	1424	21	14738	3	4/1	2	2-
9		27	0634	0923	0740	N20	W51	5607	1425	14	14764	3	8/1	2	3-
10		29	0604	1220	0710	N13	E30	5615	1425	29	14778	3	10/1	2+	4-
11		30	1455	2030	1540	N12	E13	5615	1425	29	14778	3+	8/1	2	2-
12		Apr. 01	0843	1355	0859	N12	W11	5615	1425	29	14778	3	10/4	3	5-
13		05	0215	0530	0245	N12	W62	5615	1425	29	14778	3	4/1	2	13-
14		12	0131	0142	0140	N15	E22	5628	1426	11	14796	3	1/1	*	-
15		28	0130	0145	0137	S05	E34	5645	1426	44	14815	3	1/1	3	-
16		29	0107	0908	0210 0359 0554	N14	W21	5642	1426	38-40	14814	3	14/2	2+	3-
17		May 04	1000	1105	-	N13	W90	5642	1426	38-40	14814	3	3/1	3	-
18		06	1404	2020	1448	S09	E07	5653	1426	55	14823	3+	10/1	3+	5-
19		09	0704	1021	0734	S11	E52	5657	1427	11	14831	3+	7/1	3	11-
20		13	0519	0735	0532	N29	W67	5654	1427	01	14825	3+	6/1	3	5-
21		26	0818	1107	0928	N14	W15	5669	1427	39-40	14849	2+	13/4	2+	3-
22		June 01	0824	1600	0900	N29	E46	5680	1428	02	14867	3+	18/10	3+	7-
23		08	0732	0855	0746	N32	W37	5693	1428	02	14867	2+	9/4	2+	6-
24		25	1131	1520	1215	N21	E06	5713	1428	39	14908	3	8/4	3	8-
25		25	2039	2140	2046	N19	W04	5713	1428	39	14908	3	4/1	2+	7-
26		26	0428	0525	0436	N20	W08	5713	1428	39	14908	3	2/2	3	29
27		26	1326	1525	1403	N19	W13	5713	1428	39	14908	2+	5/2	2+	3-
28		26	2358	2457	2415	S08	E34	5719	1428	42-44	14915	3	2/2	3	16
29		27	2140	2345	2156	M21	W27	5713	1428	39	14908	3	4/2	3	7-
30		Aug. 11	1916	2055	1929	N22	E26	5794	1430	13	14981	3+	3/1	2+	8-
31		14	0511	0655	0525	N22	W06	5794	1430	13	14981	3	8/2	2+	16-
32		26	0847	0926	0852	N17	W89	5802	1430	23	14989	3	5/1	1	-
33		26	1132	1400	-	N15	W90	-	1430	23	14989 ?	3	1/1	*	-
34		30	0918	1100	0934	N18	E16	5822	1431	14	15008	3	7/1	2	2-
35		Sept. 02	0525	0906	0725	N18	W23	5822	1431	14	15008	3	8/2	2+	6-
36		02	2223	2506	2307	N02	W31	5822	1431	14	15008	3	3/1	2	3
37		03	0037	0154	0108	N18	E88	5838	1431	22	14014	3	2/1	2+	
38		25	0759	0832	0804	N27	E10	5866	1432	10	15050	3	2/1	1	3
39		Oct. 14	2033	2245	2058	S24	E56	5896	1433	02	14087	3	3/1	2+	5
40		29	1026	1331	1030	N22	E26	5909	1433	19	15099	3	4/2	3	3

5.1-1 ①

1963 WITH ASSOCIATED PHENOMENA AND SELECTED EFFECTS

ARE AREA SQ.-DEG.			RELATED FLARE ACTIVITY			S.W.F.	RADIO EMISSION				POLAR CAP ABS.	GEOMAGNETIC STORMS
ge	No. Rept.	Mean	Minor, Before	Major After	1st Flare Pos/Imp	Beg., Dur., Imp	Peak Flux 10 Cm.	1.5m	Other Wave Lengths	Dynamic II & IV	Gr. Beg. Abs. Day/ UT /db	Gr. Beg. Type Int. Max. Day UT Kp
	1	6	17, 0	3/0	W37 1	1505/30, 1						1960
	1	22	2/0	3/0	E 21/1	2100/24, 2-	220		m	II IV		Jan. 13, 1859, sc, ms, 6+
20	3	13	7, 0	0/0	E 45/1	1340, 45, 1+		450	cm,m	(IV)		18, 0645, sc,g, ms, 6-
-12	5	8	21/0	11/0	E 43/1	0825/17/2		>450	cm			
-17	3	12	2/0	6/0	E 56/1	1358, 42, 3-	340	280	cm,m	II IV		
-25	6	16	8, 0	2, 0	E 63, 2				cm			
-12	3	7	2/0	7/1	E 08/1					II		
12	3	8	5/1	4, 0	E 08, 1							
26	6	9	2/0	7/0	W46/1+	0638/19/1-					1960	
24	9	10	5/0	69/3	E 45/1	0652, 121, 3+		38000	cm,m	(IV)	Mar. 29, 0800 2.6	Mar. 31, 1036, sc,g, s, 9-
15	7	6	16, 1	58/2	E 45, 1	1520 160/3	1750	6000	cm,m	II IV		
20	7	12	30/2	44, 1	E 45, 1	0850, 57, 3	>1000	4500	cm	(IV)	Apr. 01, 1000, 3.6	Apr. 02, 2313, sc ms, 7+
25	3	16	57, 3	17/0	E 45, 1			300	m	IV	05, 0700, 3.1	07, 1511 sc, m 5+
	-	-	13/0	13/0	E 68/2+							
	-	-	2, 0	1/0	E 79/1	0120 100/3+			cm,m	II IV	28, 0230, 2.5	27, 2020/sc, ms/7o
59	11	15	11/0	15/1	E 90, 1+	0205/110/2+		220	cm,m	II IV	29, 0500/11.2	30, 0132/sc/s/9o 30/1213/sc/s/9o
	-	-	26/1	0/0	E 57/2	1015/35/3	2650		cm,m	(IV)	May 04, 1032 3.4	May 06, 1650, sc,g, ms/7+
2	5	9	12/0	1 0	E 90, 1	1427/151, 3			cm,m	II IV	06 1800 8.7	08, 0421 sc s, 8+
9	6	18	3/0	3/0	E 90, 1	0700, 98 2			cm,m			11, 0435 sc ms, 7-
3	5	22	27/0	6/0	E 65/1	0512/221/3+		480	cm,m	II IV	13/0730 3.6	16/1350, sc,g/ms/6+
20	11	10	19, 0	10/0	E 48, 1	0914 46 2	>1350	1100	cm	(IV)		28 2029 sc s, 8-
60	13	34	4/0	33/1	E 90/1	0837/75/3	3100	3100	cm,m	(IV)		June 04/0248/sc.g/ms/6+
5	5	12	14, 0	23/0	E 90, 1	0740, 52, 2-			cm			
4	6	16	10, 0	31, 4	E 90/1	1203, 67, 2	425	3000	cm,m	IV		27, 0145, sc, ms, 7-
	2	8	12, 1	29, 3	E 90/1	2040, 30, 2-	700	>1250	m	II IV		27, 0145, sc, ms, 7-
	1	29	12, 2	29, 2	E 90 1	0432, 56, 1-		>250	cm,m			
1	4	7	15, 3	26, 1	E 90, 1	1402/67, 2-	200		cm,m			
	1	16	1, 0	1. 0	E 60 1+	2403 67 2-	13	>240	cm	II IV		
9	2	8	19, 4	22, 0	E 90, 1	2140 138, 2+	140	>250	cm,m	IV		
10	3	9	15, 0	21 1	E 90, 1+	1925, 65, 2	1100	>950	m	II IV		
52	6	31	21 1	16 0	E 90, 1+	0515, 45 3		>2000	cm			Aug. 16, 1409 sc, s, 8-
	-	-	14 0	1, 1	E 80/1		16	>40	cm,m			
	-	-	14 1	1 0	E 80, 1							
15	7	5	7 0	27 2	E 62, 1	0843, 65, 2			cm,m			
6	7	11	16 1	18 1	E 62, 1	0540, 66 2 0707 83 1-			cm	II		
0	2	7	19 2	15 0	E 62, 1	2300, 50, 2-		>350	cm			
	-	-	0 0	19 0	E 88, 3	0045 126 3+			cm	IV	Sept. 03 0500 2.7	Sept. 04, 0230, sc s, 8o
9	2	11	9 0	2 0	E 87 1							
	1	5	0, 0	1 0	E 56, 3							
26	4	14	17 0	3 0	E 90 2	1029 80 3	1000	2100	cm,m			

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MAJOR FLARE							SOLAR REGION				FLARE IMPORTANCE			FLARE A
Serial No.	Event No.	Gr. Day	Beg. UT	End UT	Max. UT	Position	Plage No.	Rotation	Region No.	Sunspot No. Mt.Wilson Greenwich	IAU	No. Rept./No. Max.	McM	Range
41		Nov. 05	1157	1327	1217	N13 E24	5921	1433	31	15110	3	2/1	2	9-15
42		06	1752	2030	1841	N13 E07	5921	1433	31	15110	3	1/1	3	13
43		10	1009	1400	1023	N28 E29	5925	1433	39	15114	3+	9/1	3	11-23
44		12	1315	1922	1330	N27 W04	5925	1433	39	15114	3+	8/5	3+	12-33
45		15	0207	0427	0221	N26 W08	5925	1433	39	15114	3+	2/1	3	8-15
46		17	2126	2228	2151	N23 W80	5925	1433	36	15114	3	2/1	1	-
47		20	1955	2032	2020	N25 W90	5925	1433	39	15114	3	2/1	1	-
48		20	2114	2258	2135	N28 W90	5925	1433	39	15114	3	4/1	2	-
49		Dec. 05	1825	2350	1838	N26 E74	5959	1434	38	15151	3+	4/3	3+	2-18
50		30	0344	0415	0348	N15 E22	5983	1435	23	15179	3	2/1	1	1
51		1961 Mar. 26	1009	1150	1035	S15 E74	6069	1439	02	15269	3	16/6	3	3-22
52		Apr. 13	0556	0620	-	N20 W90	6077	-	-	15268 ?	3	2/1	2	25
53		26	1646	1945	1710	S11 E54	6098	1440	05	15280	3	2/1	3	9-11
54		May 04	2145	2340	2213	S11 W56	6098	1440	05-06	15280	3	4/2	3	8-12
55		09	1438	1805	1551	N09 E12	6104	1440	10	No spot	3	6/1	2	4-10
56		June 11	1502	1620	1521	N02 W49	6135	1441	18	15314	2+	5/2	2+	4-10
57		July 11	1615	2040	1659 1710	S07 E31	6171	1442	32	15353	3	4/2	3	9-16
58		12	0950	1300	1025	S07 E22	6171	1442	32	15353	3+	19/4	3	4-50
59		15	1433	1929	1558	N13 E15	6172	1442	36	15355	3+	8/1	3	8-25
60		17	0710	0926	0736	S07 W45	6171	1442	32	15353	3	7/2	2	7-29
61		18	0920	1250	1005	S07 W59	6171	1442	32	15353	3+	19/8	3+	7-80
62		20	1633	1735	1653	S05 W90	6171	1442	32	15353	3+	3/1	3	-
63		20	1828	1942	1847	S07 W90	6171	1442	32	15353	3+	5/1	3	-
64		21	1714	1800	1718	S03 W90	6171	1442	32	15353	3	3/1	2	-
65		24	0403	0620	0504	N12 E16	6178	1443	12	15363	3+	8/1	2+	2-29
66		24	1722	2220	1822	N08 E09	6178	1443	12	15363	3	6/1	2+	4-14
67		28	1512	1938	1730	N09 W44	6178	1443	12	15363	3	3/1	2	4-12
68		Sept. 16	1057	1258	1110	N18 E77	6227	1445	11	15425	3+	8/1	2+	-
69		28	2202	2530	2223	N13 E29	6235	1445	16	15435	3	3/2	3	10-22
70		Dec. 23	1856	2350	2002	S07 E43	6301	1448	14-15	15488	3	2/1	1	4-13
71		1962 Mar. 13	1444	1640	1446	N10 E66	6366	1451	16	15528	2+	5/3	2+	5-16
72		22	2220	2310	2241	N07 E36	6373	1452	06	15532	3	1/1	3	16
73		Apr. 18	1734	2129	1806	N09 E05	6393	1453	05-06	15542 15543	3	5/2	3	2-22
74		22	1430	1710	1450	N08 W48	6393	1453	05-06	15542 15543	3	8/1	2+	3-20
75		27	1346	1440	1413	N08 E58	6403	1453	15	15548 15549	3	5/1	2	3-13

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63 (CONTINUED)

EA SQ-DEG.		RELATED FLARE ACTIVITY			S.W.F.	RADIO EMISSIONS				POLAR CAP ABS.	GEOMAGNETIC STORMS
o. ept.	Mean	Minor/Major Before	Minor/Major After	1st Flare Pos/Imp.	Beg./Dur./Imp.	Peak Flux 10 Cm.	Peak Flux 1.5m	Other Wave Lengths	Dynamic II & IV	Gr. Day/Beg. UT/Abs. db	Gr. Day/Beg. UT/Type/Int./Max. Kp
2	12	2/0	3/1	E 42/1							
1	13	2/1	3/0	E 42/1	1708/67/1				II		
7	17	16/0	64/4	E 80/1+	1022/90/2	> 600	27000	cm,m			Nov. 12/1325/sc/s/9o
7	21	30/1	50/3	E 80/1+	1320/154/3+	5500	> 2000	cm,m	IV	Nov. 12/1400/21.2	
2	12	50/2	30/2	E 80/1+	0217/253/3+		> 2700	cm,m	II IV	15/0430/20	15/1304/sc/s/8+
-	-	19/0	2/0	E 90/1							
-	-	80/3	0/1	E 80/1+	2023/82/3-	400	220	m	II IV		21/0631/sc,g/ms/6o
-	-	80/4	0/0	E 80/1+							
3	11	1/0	5/0	E 80/1+	1830/100/3	330	> 1000	m	II IV		Dec. 07/1804/sc/ms/6-
1	1	14/0	31/0	E 90/1				cm			
8	13	7/0	18/0	E 90/1	1019/41/3	460	400	cm,m			
1	25	1/0	0/0	E 35/1							
2	10	14/0	13/1	E 90/1	1650/113/3	18.3		m			
3	10	25/1	2/0	E 90/1	2205/40/1+	95.		cm,m			
4	6	2/0	0/0	E 53/1		9		cm			
5	8	16/0	5/0	E 38/1	1503/57/2+	365	> 900	cm,m	II IV		
3	12	13/0	58/6	E 56/1	1648/245/3+	1500	> 900	cm,m	II IV		1961 July 13/1113/sc/s/8+
5	15	18/1	53/5	E 56/1	1023/97/3	4100	22000	cm,m	(IV)	1961 July 12/1300/17.0	14/0809/sc,g/s/8+
6	18	1/0	3/0	E 85/1	1512/113/3	111	280	cm,m	IV	15/1545/3	17/1825/sc/s/8-
4	16	46/2	25/4	E 56/1	0731/29/1	103		cm			
6	30	56/3	15/3	E 56/1	1000/113/3 1158/137/3-	2400	1000	cm,m	(IV)	18/1130/18.7	20/0248/sc/ms/6-
	-	71/4	0/2	E 56/1		1800	4000	cm,m	II IV		
-	-	71/5	0/1	E 56/1							
-	-	7/16	0/0	E 56/1	1702/73/2+						
7	16	4/0	20/2	E 82/1	0455/85/2+		> 800				
5	9	5/1	19/1	E 82/1	1755/95/2+	16	350	cm			
2	8	14/2	10/0	E 82/1							
	-	1/0	3/0	E 90/1	1102/50/2	146	5000	cm,m			
	18	13/0	4/0	E 90/1	2218/62/2		> 900	cm,m	II IV	Sept. 28/2335/1.8	30/2109/sc/s/9-
	9	5/0	5/0	E 90/1		13					
	11	1/0	5/0	E 67/1	1448/94/3	470	320	cm,m			
	16	5/0	23/0	E 74/1		35		cm			
	10	12/0	30/1	E 90/1	1752/108/3	25		m	II IV		
	11	34/1	8/0	E 90/1	1446/134/3	42		cm,m	II		
	7	7/0	6/0	E 90/1	1413/20/1+	180	2100	cm,m	II		

5.1-2 2

TABLE I 19

		MAJOR FLARE					SOLAR REGION					FLARE IMPORTANCE			FLA
Serial No.	Event No.	Gr. Day	Beg. UT	End UT	Max. UT	Position	Plage No.	Rotation	Region No.	Sunspot No. Mt.Wilson	Sunspot No. Greenwich	IAU	No. Rept. / No. Max.	McM	Range
76		June 21	0620	0756	0640	N18 E25	6459	1455	12	15587		3	11/1	2	3-
77		1963 Sept. 15	2008	2210	2030 2113	N10 E60	6964	1472	02	15768		2+	3		7.3
78		16	0325	0617	0422	N11 E57	6964	1472	02	15768		3	3		9-
79		26	0638	0944	0717	N13 W78	6964	1472	02	15768		3	16		5.1

*These flares were not included in the McMath working list
see appropritate serial number Table I A.

TABLE IA IAU MAJOR FLARES (TABLE I) 1960-1962, REDUCED TO IMPORTANCE ≤2 IN THE MCMATH WORKING LIST TABLE IB

Serial No.	McM Serial	Date	Beg. UT	Position	Imp. IAU	McM	Observatory Reporting Max. Imp.	Other Imp Reported
1	40	1960 Jan. 07	1504	N08 W78	3	2	Capri S.	2,2
3	73	15	1336	S20 W68	3	2	Uccle	2,2,2
4	190	Feb. 03	0815	S14 W36	2+	2	Kanzelhohe & Istanbul	2,2,2,2
7	333	29	1522	N22 E04	3	1	Capri F.	1,1,1
8	340	Mar. 02	1015	N22 W20	3	2	Capri F.	2,2,1+
9	459-1	27	0634	N20 W51	3	2	Bakou	2,2,1+,1+,1+,1,1
11	490-1	30	1455	N12 E13	3+	2	Capri F.	2+,2,2,1+,1+,1,1
13	541	Apr. 05	0215	N12 W62	3	2	Nizamiah	2,1+,1+
14	*	12	0130	N15 E22	3	*	Honolulu	*Not included in McMath working list
32	1500	Aug. 26	0847	N17 W89	3	1	Bakou	2,1,1,1
33	*	26	1132	N15 W90	3	*	Capri F.	*Not included in McMath working list
34	1525	30	0918	N18 E16	3	2	Capri F.	2,2,2,1,1,1
36	1557	Sept. 02	2223	N20 W31	3	2	Honolulu	2,1
38	1712	25	0759	N27 E10	3	1	Wendelstein	1
41	1907	Nov. 05	1157	N13 E24	3	2	Lacarno	2
46	2017	17	2126	N23 W80	3	1	Climax	2
47	2049	20	1955	N25 W90	3	1	Climax	1
48	2052	20	2114	N28 W90	3	2	Climax	2,1,1
50	2160	Dec. 30	0344	N15 E22	3	1	Kodaikanal	1
52	248	1961 Apr. 13	0556	N20 W90	3	2	Nizamiah	1+
55	321	May 09	1438	N09 E12	3	2	Sac Peak	2,2,2,2-,1
60	603	July 17	0710	S07 W45	3	2	Capri S. & Kharkov	2+,2,2,2,1+
64	639	21	1714	S03 W90	3	2	Lockheed	2,2
67	6701	28	1512	N09 W44	3	2	Sac Peak	2,1
70	1110	Dec. 23	1856	S07 E43	3,	1	Sac Peak	1
75	275	1962 Apr. 27	1346	N08 E58	3	2	Capri F.	2,2,1+,1
76	391	June 21	0620	N18 E25	3	2	Bucarest	2,2,2,2,1+,1+,1,1,1,1

TAI
OB

McM Serial
323
575
1040
1119
1295
1909
1957
62

T

Date
1960 Feb 25
July 08
Nov. 14

5.1-3 1

60-1963 (CONTINUED)

...RE AREA SQ-DEG.	No. Rept.	Mean	Related Flare Activity: Minor/Major Before	Minor/Major After	1st Flare Pos./Imp.	S.W.F. Beg. Dur. Imp.	Radio Emissions: Peak Flux 10 Cm.	1.5m	Other Wave Lengths	Dynamic II & IV	Polar Cap Abs.: Gr. Day Beg. UT Abs. db	Geomagnetic Storms: Gr. Day Beg. UT Type Int. Max. Kp
·24	10	10	5/0	9/0	E 90/1				cm			
-11.5	-	-	25/0	59/1	E 90/1	2015/55/2+						
15.4	-	-	28/1	56/1	E 90/1							
-xx	-	-	83/2	1/0	E 90/1	0709/102/3+					Sept. 26/0730/4.6	

...BLE IB FLARES REPORTED BY ONLY ONE ...SERVATORY - IAU IMPORTANCE 2+

Date	Beg. UT	End UT	Max UT	Position	Plage No.	Observatory
1960 Feb. 26	2130	2202	-	N11 E14	5584	Honolulu
Apr. 09	0123	0134	0123	N15 E68	5627	Mitaka
June 20	0945	1007	0955	S15 W65	5695	Bakou
July 01	0332	0514	0404	N08 E37	5726	Alma Ata
Aug. 02	0033	0050	0041	N11 W30	5775	Mitaka
Nov. 05	2004	2032	2016	N13 E80	5925	Honolulu
11	0305	0428	0340	N29 E12	5925	Vorochilov
1961 None						
1962 Feb. 04	0158	0235	0222	N11 W80	6326	Kodaikanal

...ABLE 1C IMPORTANCE 2+ FLARES NOT LISTED AS MAJOR FLARES

Beg. UT	End UT	Max UT	Position	IAU Max.	Imp Reported by Other Sta.	McM	Total Sta. Rpt.	Plage No.	Area Range	Area No. Report	Area Mean
0704	0807	0714	S18 W06	2+	1+	2+	2	5580	10	1	10
2328	2410	2334	N07 W33	2+	2	2+	2	5732	6	1	6
0246	0520	0304	N27 W20	2+	2	2+	2	5925	7-8	2	8

II. CATALOGUE OF IMPORTANT SUNSPOTS DURING 1960 – 1963

II

TABLE II. CATALOGUE OF IMPORTANT SUNSPOT GROUPS DURING 1960-1963

This catalogue will list all sunspot groups that, during disk passage, meet one or more of the following requirements:

(a) All sunspot groups with a maximum area, during disk passage, equal to or greater than 500 millionth of the solar hemisphere, based on unpublished Royal Greenwich data.

(b) All sunspot groups that have a γ or $\beta\gamma$ magnetic classification as reported by Mt. Wilson Observatory in References 29 and 30.

(c) All sunspot groups associated with the major solar flares catalogued in Table I.

The column headings together with any necessary explanations follow:

Column 1 Catalogue Serial Number.

Column 2 Mt. Wilson Sunspot Number.

Column 3 Catalogue Classification from a, b, or c Above. A sunspot with a maximum area greater than 500 millionth is designated in this column by a letter L. If the entry is due to the magnetic classification, the letter M is used. If the sunspot groups are associated with a major flare, the flare serial number or numbers are used. There will be cases where all three symbols may appear in the column, as well as more than one major flare.

Column 4 McMath Plage Number.

Column 5 Sunspot Mean Latitude During Disk Passage.

Column 6 Sunspot Mean Longitude During Disk Passage.

Column 7 Time of Central Meridian Passage. These data are given to the nearest tenth of a day.

Column 8 Spots in the Plage. We have given the Mt. Wilson numbers for all sunspots in the plage during disk passage, these are from McMath-Hulbert unpublished data.

Column 9 — Plage Catalogue Serial Numbers. If the plage is included in the Table III catalogue, detailed data for the sunspots listed in Column 8 are given in that table.

Column 10 — Maximum Area. The sunspot maximum area data are available for sunspots with a maximum area during disk passage equal to or greater than 500 millionths of the solar hemisphere. These data have been made available through the courtesy of the Astronomer Royal.

Column 11 — Greenwich Day of Maximum Area.

Column 12 — Mean Magnetic Class. The value given in reference 30.

Column 13 — Mean Magnetic Strength. The values in units of 100 gauss have been taken from reference 30.

Column 18 — Disk Passage Data. The five lines in this column give the following data:

Top Line - The left hand number gives the date on which the sunspot was first seen; the right hand number gives the date on which the sunspot was last seen. These data have been taken from the two references 30 and/or 42.

Second Line - The left hand number gives the longitude from the central meridian where the spot was first seen; the right hand number gives the longitude distance from the central meridian where the spot was last seen.

Third Line - This line gives the Zurich classification of the spot for each day (on which a classification was made) during disk passage as recorded in reference 42.

Fourth Line - The Mt. Wilson magnetic classification of the sunspot on each day that a classification was made during disk passage. If the classification is an estimate, the symbol is enclosed in brackets. The data for this line are taken from a microfilm of Mt. Wilson daily work sheets. (Reference 29).

Last Line - This gives the magnetic field strength in units of 100 gauss for each day on which the field strength was measured and shown on the Mt. Wilson daily sunspot maps. The values given on this line are the maximum values shown on the map.

Column 19 Recurrent Spots. If the sunspot group is the return of a previous group determined by Mt. Wilson, the serial number, or numbers, of the groups during the previous rotation or rotations are given.

TABLE II CATALOGUE OF IMPORTA

	POSITION DATA								MAX. ARE
Serial No.	Sunspot Mt. Wilson	Category	McM Plage	Lat.	Long.	CMP	All Spots in Plage	Plage Serial No. in Table III	Whole Spot
1	14641	1	5512	N07		Jan. 02.2	14638 14653 14641	1	
2	14657	3,L	5525	S17	121	10.2	14667 14657	2	1150
3	14660	2,L	5527	N19	101	11.7	14660 14671	3	575
4	14694	M	5549	N09		27.4	14694		
5	14698	L,M	5550	N07 N08	235 227	28.8 29.5	14698 14696 14697 14704 14705 14700	4	1050 750
6	14701	4,M	5551	S15		31.8	14701 14702 14714	5	
7	14720	L	5566	N22	53	Feb. 11.7	14719 14720		1050
8	14725	L	5570	N10	12	14.8	14725		1300
9	14731	6	5580	S 21		24.9	14731	6	
10	14732	5,M	5581	N08		25.8	14732	7	
11	14738	7, 8	5586	N25		Mar. 01.2	14737 14743 14738	8	
12	14763	L	5604	N17	257	21.9	14763 14766 14761 14768		525

5.II-1 (1)

NT SUNSPOTS DURING 1960-1963

A	SPOT MEAN DATA		DISK PASSAGE DATA	
Gr. Day	Mt. Wilson Mag. Cl.	H	Days Seen, Zurich Class Magnetic Class, Magnetic Strength	Return Sequence
Jan.	$d\beta f\ell$	(15)	Dec. 29 … Jan. 10 βf (β) (0) (0) (β) (β) βf (βf) βf (βf) (α) - - - - - - - - - - - - - - -	
5	$\ell\beta\ell$	(25)	Jan. 04 … Jan. 16 E … W E E E E E E E E E E C J - βf (βf) (β) (β) (βf) - (β) (βp) (βp) (βp) - - (α) - - - - - - - - - - - - -	
5	$\ell\alpha p\ell$	(25)	Jan. 05 … Jan. 17 - H H H H H H H H H H H H (αp) αp (αp) (βp) - - (βp) (αp) (αp) (αp) - - (αp) (αp)	14600
	$\ell\gamma d$	12	Jan. 21 … Jan. 29 (α) - (βp) γ - - γ γ (α) - - - 13 - - 8 6 -	
26	$\ell\beta\gamma\ell$	22	Jan. 22 … Feb. 04 - F F F F F F F E E E E E - - $(\beta\gamma)$ $\beta\gamma$ - - $\beta\gamma$ $\beta\gamma$ $(\beta\gamma)$ βf (βf) - $(\beta\gamma)$ - (αf) - - 23 - - 22 23 - - - - - - -	14641
	$\ell\gamma\ell$	19	Jan. 24 … Feb. 06 αp - - γ γ (γ) γ (γ) - (γ) - (γ) β (βf) - - - 20 17 - - - - - - - - -	14664
Feb. 7	$\ell\beta\ell$	(20)	Feb. 05 … Feb. 18 - G G G G G G G G G G G G - (α) (βp) (βp) (βf) (βp) (βf) β (β) (β) (β) (βf) (βf) (βf) (αf) - - - - - - - - - - - - - -	
16	$\ell\beta\ell$	(25)	Feb. 08 … Feb. 21 - H G G G G E F F E E E G - (α) (αp) (βp) βp (βp) (βp) (β) (β) (β) (β) (βf) βf (βf) (αf) - - - - - - - - - - - 15 - -	
	$\ell\beta pd$	21	Feb. 18 … Feb. 25 - - - (βp) βf βf βp αp αp (αp) (αp) (βp) - 21 14 22 20 17 - - - - - - -	
	$\ell\gamma\ell$	11	Feb. 19 … Feb. 25 (αp) βf γ γ γ (γ) (γd) - (β) - - - 10 13 14 11 - - - - - - -	14698, 14641
	$\ell\beta d$	(15)	Feb. 25 … Mar. 05 (αp) - (βf) - - (βp) (βp) (βp) βf αf - - - - - - - 8 -	
Mar. 24	$\ell\beta pd$	(20)	Mar. 18 … Mar. 28 A A B B D D E E E G - (α) β β (βp) (βp) (βp) (βp) (βp) (βp) (β) - - 2 4 - - - - - - - -	

5.II-1 (2)

	POSITION DATA								MAX. AR
Serial No.	Sunspot Mt. Wilson	Category	McM Plage	Lat.		CMP	All Spots in Plage	Plage Serial No. in Table III	Whole Spot
13	14764	9, L	5607	N23	231	23.9	14764 14776	10	550
14	14769	L	5609	S13	195	26.6	14769		575
15	14778	10,L,M 11 12 13	5615	N12	130	31.5	14778	11	1650
16	14787	M	5619	N18		Apr. 05.1	14787 14785		
17	14796	14,L	5627	N11	316	13.7	14796 14804	13	750
18	14798	L	5630	S12	280	16.4	14798 14797		900
19	14814	16, L, M, 17	5642	N10	133	27.5	14818 14814 14819	14	850
20	14815	15	5645	S06		30.4	14815	15	
21	14823	18	5653	S08		May 06.9	14823	16	
22	14825	20,L,M	5654	N28	353	08.2	14832 14825	17	1800
23	14831	19	5657	S09		13.6	14830 14831	18	
24	14840	L	5663	S12	200	19.7	14840 14848	19	1575

5.II-2 0

Gr. Day	Mt. Wilson Mag. Class	H	Days Seen, Zurich Class, Magnetic Class, Magnetic Strength	Return Sequence
	SPOT MEAN DATA		DISK PASSAGE DATA	
4	dβl	17	Mar. 18 … Mar. 29 A D D E E E E E G G G G (α) βp βp (βp) (βf) (βf) (β) (βf) (β) βγ (βp) (γ) - 16 18 - - - - - - 6 - -	
8	lβpl	12	Mar. 22 … Apr. 02 A C C D E E E E C C - - (βp) (βp) (βp) (βf) (β) βf (β) (βp) βp (βp) (αp) - - - - - - 13 - - 12 - - -	
0	dγl	29	Mar. 26 … Apr. 07 A J H E E F F F F F F E - (β) βf (βf) (β) βγ (βγ) (βγ) γ (γ) γ (γ) γ - - 14 - - 29 - - - - - - - -	
	dβγl	(17)	Apr. 01 … Apr. 10 (βp) βp (βp) βγ (βγ) (βγ) (β) (αp) αp (αp) - - - - - - - - - -	
pr. 6	lβpl	(20)	Apr. 08 … Apr. 19 A C C D E E E E E E E D (αp) βp (βp) βp (βp) βγ βγ (βγ) β (β) (βp) (βp) - - - - - - - - - - - -	
0	lβfl	(20)	Apr. 10 … Apr. 22 C E E E E E E E E E D C C (β) β (βf) βf βf (βf) βf (βf) (βf) βf (βf) βf - - - - - - - - - - - - 12 -	
2	lγl	22	Apr. 21 … May 03 - H H H H H H H H H H H J (γ) - (γ) (γ) γ (γ) - (γ) (γ) (α) α (α) - 19 - - - 23 - - - - - - - -	14778 (No. 15)
pr. 8	lβpl	16	Apr. 24 … May 05 (α) βp (βp) - (βp) (βp) (βp) βp (αp) - - αp - 17 - - - - - - - - - -	
ay 6	lαpl	21	Apr. 30 … May 12 (α) αp (αp) - - βp (βp) αp (αp) βp βp (αp) (αp) - - - - - 22 - - - - - - -	
2	lγl	(25)	May 02 … May 14 J J H H H D D E E F F F - (γ) - - γ (γ) βγ (βγ) βγ βγ (γ) (γ) γ (γ) - - - 14 - - - - - - - - -	
	lαl	(15)	May 07 … May 19 α (α) α α (α) (α) α (α) (α) α (α) α (α) - - - - - - - - - - - - -	14798
2	lβγl	32	May 13 … May 25 - G G G G G G F F F F F F αp (α) (βp) βγ (βγ) βp βγ (βp) (βp) (βp) (βp) (βp) (βp) - - - - - - - - - - - - -	

5.II-2 (2)

	POSITION DATA								MAX. AREA	
Serial No.	Sunspot Mt. Wilson	Category	McM Plage	Lat.	Long.	CMP	All Spots in Plage	Plage Serial No. in Table III	Whole Spot	Gr. Day
25	14848	L	5663		188	20.6	Same as 24		700	22
26	14849	21, L, M	5669	N13	126	25.3	14849 14855 14856	20	750	25
27	14864	L	5679	S10	12	June 02.9	14863 14864	21	825	28
28	14867	22 23	5680	N29			14867 14866	22		
29	14869	L	5687	N08	359	03.9	14869		650	June 05
30	14901	L	5706	N13	128	21.4	14901 14897		650	26
31	14908	24, M 25 26 27 29	5713	N20		25.8	14908	24		
32	14915	28	5719	S08		29.9	14911 14914 14915	25		
33	14916	L	5724	N28	353	July 01.7	14916		875	[illegible]
34	14921	L, M	5726	N08	326	03.6	14921	26	1960	03
35	14939	L, M	5749	N21	149	17.0	14943 14939		1400	17
36	14967	L, M	5775	N08	330	30.5	14967		1150	25

5.II-3 (1)

SPOT MEAN DATA		DISK PASSAGE DATA	
Mt. Wilson Mag. Cl.	H	Days Seen, Zurich Class Magnetic Class, Magnetic Strength	Return Sequence
dβℓ	(15)	May 18 May 26 G G F F F F F F - - β (β) (βp)(βp)(β) (β) (β) (α - - - - - - - - -	
ℓγℓ	19	May 19 May 31 J J J J J H H H H H H - - (αp)(β) (α) (α) (α) (γ) (γ) (γ) γ γ (γ) γ (α) - - - - - - - - 20 20 - 18 -	14811
ℓαpℓ	21	May 27 May 08 - H H H H H H H H H H H H (αp) αp (αp) αp (α) αp (αp) αp (αp)(αp) αp (αp) (αp) - 15 - 22 - - - - - - - - -	14823
ℓβℓ	(15)	May 29 June 11 (βp) βp (β) β (βp) β (β) (βp) βf (βf)(βf) βf (βf)(βf) - 12 - - - - - - - - - - - -	14825
[illegible]	(15)	June 01 June 10 B B C E E E E E D - [illegible]	
[illegible]	15	June 15 June 27 J J J J J J J C J J H H - [illegible] - - - - - 12 12 - - 16 - -	14849, 14811
[illegible]	23	June 19 July 01 [illegible] - 14 20 - - - 24 - 23 18 - -	
[illegible]	27	June 23 July 05 [illegible] - - 14 - 19 19 - - 27 - - -	14864
[illegible]	30	June 25 July 08 E E E E E E E G G H G H - [illegible] - - 18 21 - - - 30 - - - - - -	
[illegible]	26	June 27 July 09 - D E E F F F F F F F F F [illegible] 12 - - - 26 - - - - - - -	
[illegible]	(20)	July 10 July 23 - H H H H C D D D D D D D - [illegible] - 16 - - - - - - - - - - -	
[illegible]	16	July 24 Aug. 05 - H H H H C C C H H H H - (γ) [illegible] (γ) (γ) (γ) (γ) γ (γ) (αp)(αp) - - - - 17 - - - - - - - -	14921

5.II-3 (2)

TABLE II 1960-1

	POSITION DATA								MAX. ARE
Serial No.	Sunspot Mt. Wilson	Category	McM Plage	Lat.	Long.	CMP	All Spots in Plage	Plage Serial No. in Table III	Whole Spot
37	14981	30,L,M 31	5794	N22	147	Aug. 13.3	14980 14981	28	1100
38	14983	L	5797	S14	130	14.7	14983	29	900
39	14984	L,M	5800	S08	105	16.5	14988 14984		550
40	14985	L	5799	N16	102	16.7	14985	31	1225
41	14989	32 33	5802	N15		19.3	14997 14998 14991	33	
42	15008	34,M 35 36	5822	N19		31.4	15008	35	
43	15015	37,L,M	5838	N19	152	Sept. 09.3	15015 15025 15028 15026 15029	36	800
44	15043	L,M	5858	S19	353	21.3	15053 15043	38	925
45	15050	38	5866	N26		26.0	15050	40	
46	15087	39	5896				15087 15085	42	
47	15090	L,M	5901	N20	320	Oct. 21.1	15090 15092	44	1225
48	15099	40,L	5909	N21	185	31.2	15108 15099	45	700

A SPOT MEAN DATA			DISK PASSAGE DATA	
Gr. Day	Mt. Wilson Mag. Cl.	H	Days Seen, Zurich Class Magnetic Class, Magnetic Strength	Return Sequence
Aug. 07	ℓβγℓ	(20)	Aug. 07 — Aug. 19 - J J J C C C C C B B - - - E E E E E E C E E D D C (α) βγ βγ (βγ) βγ (βγ) βγ (βγ) βp (βp) βγ (βγ) (βγ) - - - - - - - - - - - - -	
14	ℓβpℓ	(20)	Aug. 09 — Aug. 20 C C D E E E E E E E D D βp (βp) β (βp) β (βp) βp (βp) βp (βp) βp (βp) - - - - - - - - - - - -	
12	ℓβγℓ	(15)	Aug. 10 — Aug. 22 H H D C C D D D D C C B - (βp) βγ (βγ) βγ (βγ) βγ (βγ) (βγ) (βγ) βγ (βγ) (αp) - - - - - - - - - - - - - -	
15	ℓβpℓ	(20)	Aug. 10 — Aug. 22 - D C D D D D D D D C C B - D D D E E E E C C C C A (βp) βp (βp) βp (βp) βp (βp) βγ (βγ) βγ (βγ) (βγ) (β) - - - - - - - - - - - - -	
	ℓβpℓ	(25)	Aug. 12 — Aug. 25 (α) βp βp βp (βp) (βp) (βp) βp (βp) (βp) βp (αp) (βp) (βp) - - - - - - - - - - - - - -	
	dβγℓ	19	Aug. 27 — Sept. 06 (α) β (βγ) (βγ) βγ βγ βγ (βγ) (βγ) βp (β) - - - - - 13 18 20 - - - -	
Sept. 04	ℓγℓ	(15)	Sept. 03 — Sept. 15 H H H H H H H H H H H H - (α) (α) γ γ γ (γ) (γ) (γ) γ (γ) γ (γ) (γ) - - - - - - - - - - - - -	14980 14981
19	ℓβγℓ	(20)	Sept. 15 — Sept. 27 - H E E E E E E E E E E - (α) γ (γ) βp (βγ) βγ (βγ) (βγ) βγ βγ (βγ) (βγ) - - - - - - - - - - - - - -	
	ℓβℓ	(15)	Sept. 19 — Oct. 02 (βp) βp βγ (γ) βp (βp) βp (βp) (βp) βp (βp) (αp) (αp) (αp) - - - - - - - - - 6 - - - -	
	dαd	(2)	Oct. 13 - Oct. 14 (α) (α) - -	
Oct. 21	ℓγℓ	25	Oct. 14 — Oct. 27 - H H H H H H H H H H H - (βp) (βp) γ γ (γ) γ (γ) γ (γ) (γ) (γ) (γ) (γ) (γ) - - - 22 - 25 - 25 - - - - - -	
25	ℓβpℓ	(20)	Oct. 24 — Nov. 06 - D D D D D D D D D D A - (β) (β) (β) βp (βp) (βp) βp (βp) βp (βp) - (βp) - - - - - - - - - - - - - - - -	

5.II-4 (2)

TABLE II 1960-196

Serial No.	POSITION DATA: Sunspot Mt. Wilson	Category	McM Plage	Lat.	Long.	CMP	All Spots in Plage	Plage Serial No. in Table III	MAX. A: Whole Spot
49	15110	41 42	5921	N12		Nov. 08.0	15107 15109 15110	46	
50	15114	43,L,M 44 45 46 47 48	5925	N27	28	12.2	15114	47	1775
51	15121	L	5932	N20	315	17.7	15127 15120 15128 15121	48	1050
52	15151	49,M	5959	N26		Dec. 10.6	15152 15160 15151	50	
1961 53	15179	50,L,M	5983	N17	88	Jan. 01.2	15178 15179	51	1475
54	15191	L	5991	N22	22	06.3	15191		850
55	15253	L	6065	N08	64	Mar. 26.1	15253 15258 15256		525
56	15259	51	6069	S14		31.8	15261 15259	53	
57	15268	52	6077	N15		Apr. 06.1	15268	54	
58	15284	L,M	6097	N03	318	30.4	15284		750
59	15280	53,L,M 54	6098	S08	317	30.5	15282 15281 15289 15280	55	750
60	15314	56	6135	N02		June 08.1	15314 15318	58	

5.II-50

3 (Continued)

EA: Gr. Day	SPOT MEAN DATA: Mt. Wilson Mag. Cl.	H	DISK PASSAGE DATA: Days Seen, Zurich Class, Magnetic Class, Magnetic Strength	Return Sequence
	lαp	(15)	Nov. 01 … Nov. 13 (α) (αp) - (αp) - (αp) (αp) α (αp) αp (αp) - (αp) - - - - - - - - - - - - -	
Nov. 14	lβγl	31	Nov. 06 … Nov. 18 F F F F F F F F F F F F - (βp) (βp) βγ (βγ) βγ βγ - βγ - βγ βγ (βγ) (βγ) - - - - - - - - - 25 17 - -	
13	lβpl	20	Nov. 11 … Nov. 24 E E F F F F F F F F E E E - (α) - βp - βp βp (βp) (βp) (βp) βp (βp) (βp) αp (α) - - - - 19 21 - - - 17 - - - -	
	lβγl	(15)	Dec. 04 … Dec. 16 (βγ) (βγ) (βγ) βγ (βγ) β (β) (β) α (α) α (α) α - - - - - - - - - - - - -	15114
Jan. 01	lγl	31	Dec. 25 … Jan. 07 - D E E F F F F E E E E E - (α) (γ) γ γ (γ) (γ) γ (γ) γ (γ) (γ) (γ) (γ) (α) - - - - - - 31 - - - - - - -	
05	lβpl	(25)	Jan. 02 … Jan. 12 D D D E E E D H H H - βp (βp) (βp) βp (βp) βp (βp) (βp) βp (αp) - - - - - - - - - - - -	
Mar. 22	lαpl	27	Mar. 20 … Apr. 01 H H H H H H H H H H H H - (αp) αp (αp) (αp) - (αp) αp (αp) (αp) αp (αp) αp - - 27 - - - - - - - - - - -	15229, 15206
	lαp	(15)	Mar. 25 … Apr. 06 (βp) (βp) (βp) (βp) α (α) α (α) αp αp (αp) (αp) - - - - - - - - - - - - - -	
	βl	(15)	Apr. 04 … Apr. 11 (β) (β) - βp (β) (β) βp (βp) - - - - - - - -	
May 03	αβl	(20)	Apr. 27 … May 06 A B D E E E E E E - β (βp) βp (β) βγ (β) (βγ) (βp) (βp) (α) - - - - - - - - - -	
Apr. 26	αβl	(20)	Apr. 24 … May 05 - H H H H H H H J J J A (α) αp αp αp (αp) αp (αp) αp (αp) αp (α) (α) - 17 14 - - - - - - - - -	
	βl	(15)	June 02 … June 12 (αp) α [illegible] βp [illegible] - - - - - - - - - - -	

5.II-5 (2)

TABLE II 1960-19

	POSITION DATA								MAX.
Serial No.	Sunspot Mt. Wilson	Category	McM Plage	Lat.	Long.	CMP	All Spots in Plage	Plage Serial No. in Table III	Whole Spot
61	15319	L	6140	N02	68	June 15.5	15320 15332 15319		825
62	15322	L	6144	S07	32	18.2	15321 15322		850
63	15333	L	6151	N12	12	19.7	15338 15333		1050
64	15341	L	6155	N07	257	28.4	15341		1250
65	15343	L	6164	N12	150	July 06.5	15343		500
66	15353	57,L,M 58 60 61 62 63 64	6171	S06	48	14.2	15353 15357 15356	62	1400
67	15355	59	6172	N12		16.5	15355 15366	63	
68	15363	65,L 66 67	6178	N07	262	25.2	15363	64	725
69	15405	L	6206	N18	206	Aug. 25.7	15408 15400 15405 15406	67	550
70	15411	L	6212	N14	76	Sept. 04.4	15411	68	1350
71	15418	L,M	6223	S10	300	14.9	15423 15418		950
72	15420	L	6224	N15	286	15.9	15420 15427		825

5.II-6 (1)

63 (Continued)

AREA	SPOT MEAN DATA		DISK PASSAGE DATA	
Gr. Day	Mt. Wilson Mag. Class	H	Days Seen, Zurich Class Magnetic Class, Magnetic Strength	Return Sequence
June 12	lβpl	28	June 09 — June 21 - E E E E E E E H H H H - (βr) βp (βp) βp (βp) βr (βr) βr (βr) (αp) βr (αp) (αp) - - - - - 28 - - - - - - -	15303
16	lβpl	(25)	June 11 — June 25 - E E E E E E E H H J J - - (α) β (βp) βp (βp) βp (βp) (βp) βp (βp) (αp) γ (αp) - - - - - - - - - - - - - 15 - - -	
23	dβpl	20	June 19 — June 26 A C D E E E E - β (βp) (β) β (βp) (βp) (α) - - - 20 - - - -	
July 03	lβpl	24	June 27 — July 04 A C C D E E E - (βf) βp βp (βp) βp (βp) (βp) (βp) - 14 24 - 23 - - -	
07	lαpl	27	June 30 — July 12 - H H H H H H H H H H H H (αp) αp (αp) βp (βp) (βp) αp (αp) αp βp αp (αp) (αp) - 26 - 27 - - 24 - 25 27 24 - -	
11	dβrl	28	July 08 — July 20 - H H E E E E E E E E E - α βr βr βr (βr) βr (βr) βr (βr) (βr) (βr) βr (α) 2 27 26 26 - 28 - 25 - - - - -	
	lαpl	26	July 09 — July 22 (α) αp (αp) (α) β (αp) βp (αp) (αp) (αp) (αp) (αp) αp (αp) - 20 - - 26 - 22 - - - - - - -	15333
20	lβpl	29	July 19 — July 31 H H H H H H H H H H H H - β (βp) βp (βp) βp (βp) βr (βp) (βp) (βp) (βp) (αp) (αp) - - - - 29 - - - - - - - -	15341
Aug. 30	dβpl	(15)	Aug. 24 — Sept. 01 B D D D D D D D - βf (β) β (βp) β βp (βp) βp - - - - - - - - - -	
31	lβpl	29	Aug. 29 — Sept. 10 - D D E F F F F F F E E - β (βp) βp (βp) βp (βp) (βp) (β) (β) βp (βp) (βp) - - - - - 29 - - - - - - - -	
Sept. 10	lαrl	(25)	Sept. 08 — Sept. 20 - E E E E E E E G G G G J (α) (α) β (β) (β) (βp) βr (βr) (βr) βp (αp) (αp) - - - - - - - - - - - 16 - -	
10	lαpl	27	Sept. 09 — Sept. 22 - G G G G H H G G G G G G - (α) βp (βp) (βp) (βp) βp (βp) (βp) βp (αp) (αp) - - - - - - - - - - - 27 - - - -	

5.II-6

2

TABLE II 1

	POSITION DATA								
Serial No.	Sunspot Mt. Wilson	Category	McM Plage	Lat.	Long.	CMP	All Spots in Plage	Plage Serial No. in Table III	W S
73	15425	68	6227	N18		Sept. 21.9	15425		
74	15435	69	6235	N12		30.7	15435	70	
75	15488	70	6301	S04		Dec. 26.9	15488	73	
1962 76	15505	L	6324	N06	7	Jan. 24.3	15505		1
77	15507	L,M	6326	N10	298	29.6	15507	75	
78	15520	L,M	6351	S10	298	Feb. 25.9	15520		1
79	15521	L	6352	N10	293	26.2	15521		
80	15528	71,M	6366	N11		Mar. 18.5	15528	77	
81	15532	72,L	6373	N10	295	25.5	15532 15536	78	1
82	15540	L,M	6386	N11	32	Apr. 14.3	15540		
83	15542 15543	73L 74	6393	N08	333	18.8	15542 15543 15546	79	
84	15548 15549	75,L,M	6403	N08	173	May 01.0	15548 15549		

5.II-7 1

1960-1963 (Continued)

MAX. AREA		SPOT MEAN DATA		DISK PASSAGE DATA	
Whole Spot	Gr. Day	Mt. Wilson Mag. Cl.	H	Days Seen, Zurich Class Magnetic Class, Magnetic Strength	Return Sequence
		ℓαpℓ	19	Sept. 15 … Sept. 28 (α) (αp) - αp (αp)(αp) - - (αp) αp αp (αp) (αp)(αp) - - - - 20 - - - - - - - - - - -	15405
		ℓβfℓ	(19)	Sept. 26 … Oct. 01 (α) (α) βf (αf) (βf) (αp) - - - - - -	
		ℓβpℓ	21	Dec. 20 … Jan. 01 (α) - βp βp βp - (βp) βp - (βp) αp - (αp)	
50	Jan. 22	ℓβpℓ	(25)	Jan. 18 … Jan. 30 D D E E E E E E E E E E - (βp) βr - - - - - (βp)(βp) βp (βp)(βp) βp (α)	
25	29	ℓβrℓ	21	Jan. 23 … Feb. 05 - D D D D E E E E E E H H - - (βf)(βr) βf (βf)(βr) βr (βr) βr βr βr βr (βr) -	
75	Feb. 25	βrℓ	(25)	Feb. 20 … Mar. 04 E E E E E E E E E E - H - - - (βr) - - (βr) - (βr)(βr)(βr)(βr)(βr) -	
50	22	αℓ	(25)	Feb. 20 … Mar. 04 H H H H H H H H H H J H - - - (α) - - (α) - (α)(α)(α)(α) α (α)	15507
		ℓβrℓ	11	Mar. 12 … Mar. 21 (α) α γ βr - - - - - (α)	
50	Mar. 20	βfℓ	(25)	Mar. 19 … Apr. 01 E E E E E E E E E E E E - - - - (βf) - (βf)(βf)(βf) βf (βf)(βf) βf βf βf -	
50	Apr. 14	ℓβrℓ	16	Apr. 08 … Apr. 20 - - A - C - C D E E D D D - - - βr βr βr βr β βf βf βf βf	
75	14	ℓαpℓ ℓβℓ	30 16	Apr. 13 … Apr. 25 J J J J J J J J J J J - - βp βp βp βp βp (αp) (αp)(αp)(αp)(αp)(αp) (αp) - D D D D D D D D C C C C - βp β β βp βr (βr)(βr)(β)(β) β (β)(β) -	
50		ℓβpℓ ℓβrℓ	25 14	Apr. 24 … May 07 - H G G G G G G G G H H J - (αp)(αp) αp αp αp αp αp αp αp αp αp αp (αp) - - (β) β β β β β βr βr β βr (β) -	

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TABLE II 1960-1963

	POSITION DATA								MAX. AREA	
Serial No.	Sunspot Mt. Wilson	Category	McM Plage	Lat.	Long.	CMP	All Spots in Plage	Plage Serial No. in Table III	Whole Spot	Gr. Day
85	15565	L	6427	S 08	178	May 27.8	15565		975	23
86	15587	76	6459	N16		June 23.0	15587 15589			
87	15590	L	6463	0	94	30.3	15590		625	
88	15613	M	6514	N06		Aug. 13.3	15613			
89	15622	L	6542	N10	323	Sept. 02.7	15622		850	
90	15629	L	6553	N22	132	17.1	15629		650	
91	15644	M	6579	S13		Oct. 14.7	15644			
92	15686 15688	L		N10 N08	337	1963 1/16.1			625	1/15
93	15692	L		N10	202	1/26.4			625	1/31
94	15714	L	6766	S 12	246	4/15.0			600	4/16
95	15728 15726	L	6805	N09	148	5/19.7			800	5/15
96	15733	L		N12	198	5/12.1			550	6/10
97	15766	L		S 09	5	9/16.4			550	9/16
98	15768	77 L,M 78 79	6964	N13	309	9/20.6			1400	9/15
99	15779 15780	L,M	7003	N12	202	10/26.0			950	10/21

Continued)

SPOT MEAN DATA		DISK PASSAGE DATA	
Mt. Wilson Mag. Class	H	Days Seen, Zurich Class Magnetic Class, Magnetic Strength	Return Sequence
lβpl	(25)	May 21 June 03 - D D D D D D D C H H H H - (α) βp (βp - (βp) - - (βp)(βp)(βp)(αp)(αp)(αp) -	
lβpd	(15)	June 17 June 25 βp βp (βp) βp (βp) (βp) (βp) βp β	
lβpl	30	June 24 July 06 D D D D D D D C C G G G - βp βp βp βp βp βp (βp) βp βp (αp) (αp) βp (αp)	
dβγl	(15)	Aug. 11 Aug. 19 (α) βp β βγ (βγ) (βγ) (βf) (βf) (αf)	
dβl	25	Aug. 30 Sept. 09 A B D D D E E E E G - β β β β β (β) β β β (β) -	
dβpl	15	Sept. 11 Sept. 23 B C D D E E E E E C H J - β βp (β) β βp βp βp (βp)(βp)(βp)(αp)(αp) -	
lβγd	17	Oct. 08 Oct. 19 (αp) βp βp βp βγ γ - (βγ) βγ (αp) (αp) (αp)	
dβpl dβd	23 26	Jan. 10 - Jan. 22	
αβfl	(12)	Jan. 28 - Feb. 01	
-βf -	(10)	Apr. 09 - Apr. 22	
dβl dβpl	(4) (20)	May 13 - May 25	
dβpl	-	June 08 - June 18	
lαp -	7	Sept. 10 - Sept. 22	
lβγl	(35)	Sept. 13 - Sept. 26	
lβγl lαpl	29 13	Oct. 20 - Oct. 31	

III

III. CATALOGUE OF PLAGE

DATA FOR 1960 – 1963

TABLE III. CATALOGUE OF PLAGE DATA FOR THE YEARS 1960-1963

The data in this catalogue includes:

(a) Plage regions associated with major solar flares.

(b) Plages with an average maximum area during disk passage equal to or greater than 10,000 millionths of the visible solar hemisphere.

(c) Plages with an average brightness equal to or greater than 3.5 during disk passage.

(d) Plages in which 30 or more flares of all importance equal to or greater than 1 were reported.

The categories are indicated in Column 4 by the symbols: L = large, B = bright, N = 30 or more flares. These data were obtained from the McMath-Hulbert unpublished plage catalogue (reference 10). Plages that were the source of major flares are indicated by the major flare serial number.

Column 1 Catalogue Serial Number.

Column 2 McMath Plage Number.

Column 3 The Major Flare or Flares Serial Numbers and/or Category.

Column 4 Mean Latitude During Disk Passage.

Column 5 Greenwich Date of Central Meridian Passage.

Column 6 Life in Rotations.

Column 7 Date First Seen.

Column 8 Number of Days Seen.

Column 9 Average Maximum Area.

Column 10 Intensity. Three regions are used, E/C/W, where:
E = E90° to E45°
C = E45° to W45°
W = W45° to W90°
The intensity is estimated on a scale of 1 = faint to 5 = very bright.

Column 11 Number of Flares During Disk Passage E/C/W.
E = E90° to E45°
C = E45° to W45°
W = W45° to W90°

Column 12 Total Number of Flares During Disk Passage.

Column 13 Return Sequence. If the plage region is the return of a plage or plages from the previous rotation or rotations, the McMath plage numbers are given in the return sequence.

ASSOCIATED SUNSPOTS - COLUMNS 14-17

Column 14 Mt. Wilson Sunspot Numbers of All Spots Covered by the Plage.

Column 15 Mt. Wilson Magnetic Classification of the Spots.

Column 16 Field Strength in Units of 100 gauss. A bracket indicates an estimated value.

Column 17 Days Seen.

TABLE III CATALOGUE OF IMPO

	IDENTIFICATION			PLAGE POSITION				DISK PASSAGE		
Serial No.	McM Plage	Major Flare Serial No.	Category	Mean Lat.	Date CMP	Life Rotation	First Seen	Days Seen	Average Max. Area	Intensity E/C/W
1	5512	1		N08	1960 Jan. 1.5	2	Dec. <28	≥12	2500	X/2.5/
2	5525	3		S16	10	1	Jan. 03	14	6000	3.5/3/
3	5527	2		N19	11.5	2	05	13	3500	3/2.5/
4	5550		L,N	N12	29.5	3	22	15	10000	3/3/3
5	5551	4	N	S10	Feb. 01	4	24	15	5000	X/3/3
6	5580	6	B	S21	25	1	Feb. 18	13	1300	3.5/3.
7	5581	5		N08	26	4	19	14	5500	3/3/3
8	5586	7, 8		N25	May 1.5	2, 5	24	14	2500	2/3/2
9	5600		B	S08	19.5	1	Mar. 02	15	4500	3.5/3.
10	5607	9		N21	24	1	18	13	3000	3.5/3/
11	5615	10,11,12,13	N,B	N11	31.5	2	25	13	3000	3.5/3.
12	5625		B	S10	Apr. 10.5	1	Apr. 04	13	2000	3.5/3.
13	5627	14	N	N08	13.5	1	07	14	5000	3/3/3
14	5642	16,17		N27	27.5	3	21	14	4500	2.5/3/
15	5645	15		S08	30.5	2	23	14	4500	3/3/2.
16	5653	18		S07	May 07	2	30	13	4000	3/3/3
17	5654	20	N	N29	07	1	May 02	13	2000	3/3/3
18	5657	19		S13	13	3	06	14	4000	2.5/3/
19	5663		B	S16	20	3	13	14	7500	3.5/3.
20	5669	21		N12	24.5	4	18	14	3600	3/3/2
21	5679		B	S11	June 03	3	27	14	4000	3.5/3.
22	5680	22,23	N	N28	04.5	2	28	15	7000	3/3/3
23	5695		N	S13	15.5	4	June 08	15	2500	3.5/3/
24	5713	24,25,26,27, 29	N	N20	25.5	1	19	14	2500	3/3.5/

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TANT PLAGES DURING 1960-1963

	PLAGE DATA			ALL SPOTS IN THE PLAGE			
	No. Flares E/C/W	Total Flares	Return Sequence	Mt. Wilson Number	Mag. Class	Intensity 100 Gauss	Days Seen
	0/3/18	21	Part of 5478	14638	dγd	(2)	24 - 28
				14653	dγd	(1)	03 - 03
				14641	dβfl	(15)	29 - 08
	4/9/2	15	New	14667	dβd	(3)	11 - 11
				14657	lβl	(25)	03 - 16
	0/6/0	6	5491	14671	dγd	(10)	12 - 12
				14660	lαpl	(25)	05 - 17
	8/26/5	39	5511, 5512, 5513, 5519 } Parts of 5478	14696	lαpd	19	23 - 31
				14697	αpd	(2)	23 - 24
				14698	lβγl	22	22 - 04
				14704	dγd	(2)	28 - 28
				14705	dβpd	(15)	28 - 02
				14700	lαpl	21	24 - 05
	2/31/7	40	5514, Part of 5482, 5452	14701	lγl	19	24 - 06
				14702	αd	3	27 - 28
				14714	dβpd	(7)	02 - 02
'3	3/7/1	11	New	14731	lβpd	21	Feb. 18 - 25
	3/6/0	9	5550 (See No. 4)	14732	lγd	11	19 - 25
	0/11/0	11	5555	14737	dβd	(10)	25 - 25
			5556, 5520, 5487, 5459	14743	dαpd	(2)	04 - 04
				14738	dβd	(15)	25 - 05
/3	9/0/6	15	New	14771	dαpd	(3)	23 - 24
				14756	lβl	15	12 - 25
	3/15/7	25	New	14764	dβl	17	18 -29
				14776	lβd	(5)	25 - 27
/3	0/48/22	70	5594	14778	dγd	29	25 - 06
/3	3/7/6	16	New	14795	lβpl	(20)	04 - 16
	8/20/3	31	New	14796	lβpl	(20)	07 - 19
				14804	dαd	(2)	14 - 15
.5	3/15/7	25	5615 (See No. 11)	14818	dβpd	(7)	26 - 29
				14814	lγl	22	21 - 02
				14819	dβpl	15	28 - 02
	2/3/0	5	5618	14815	lβpl	16	24 - 05
	7/7/0	14	5625 (See No. 12)	14823	lαpl	21	30 - 12
5	1/14/23	38	New	14832	lβγl	(10)	08 - 12
				14825	lγl	(25)	02 - 14
3	4/3/0	7	5630, 5600 (See No. 9)	14830	dβpd	(10)	07 - 15
				14831	lαl	(15)	07 - 19
/3.5	1/2/2	5	5635, 5609	14840	lβpl	32	13 - 25
				14848	dβl	(15)	19 - 26
5	0/22/5	27	5642 (See No. 14)	14855	dβd	(5)	23 - 25
				14856	dβpl	13	25 - 30
				14849	lγl	19	19 - 31
/3	1/2/2	5	5653 (See No. 16)	14863	lβpd	15	27 - 06
				14864	lαpd	21	27 - 08
	3/11/20	34	5654 (See No. 17)	14866	lβpd	(10)	29 - 07
				14867	lβl	(20)	29 - 11
3	10/16/7	33	5663 (See No. 19)	14880	lαpd	(15)	08 - 16
				14894	dβfd	(7)	12 - 15
				14888	dβpl	(15)	10 - 21
				14898	dαd	(2)	15 - 15
				14885	lαpl	(20)	09 - 21
				14889	lαpd	(15)	10 - 18
				14899	dγd	(2)	15 - 16
3	3/23/20	46	New	14908	lγl	(23)	19 - 01

Table III

	IDENTIFICATION			PLAGE POSITION				DISK PASSAGE P		
Serial No.	McM Plage	Major Flare Serial No.	Category	Mean Lat.	Date CMP.	Life Rotation	First Seen	Days Seen	Average Max. Area	Intensi E/C/V
25	5719	28		S 08	29.5	4	22	14	5400	3/3/2.
26	5726		B	N08	July 03.5	2	27	14	5500	4/3.5/
27	5775		B,N	N10	30.5	3	July 23	15	7500	3.5/3.
28	5794	30,31	L,B,N	N20	Aug. 13	2	Aug. 05	15	12000	3.5/3.
29	5797		B	S 14	14.5	1	08	13	4500	3.5/3.
30	5798		B	S 09	16	1	09	13	3500	3.5/3.
31	5799		B	N17	17	1	09	15	6500	3.5/3.
32	5801		B	S10	18.5	2	12	14	5000	3.5/3.
33	5802	32,33		N18	19.5	3	12	15	6000	3.5/3/
34	5811		B	S 18	24	?	17	13	2500	3.5/3.
35	5822	34,35,36	N	N17	31.5	6	25	14	4000	2.5/3/
36	5837 5838	 37	L	N24	Sept. 10	3	Sept. 02	15	10000	3.5/3
37	5847		B	S 04	15.5	1	09	13	2000	3.5/3
38	5858		B	S 18	21.5	2	14	14	5600	3.5/3
39	5863		N	S 15	25.5	2	18	15	8000	3/3/3
40	5866	38		N25	26	1	19	14	3000	3/3/3
41	5881		B	S 17	Oct. 10	2	Oct. 03	14	3200	3/3.5
42	5896	39		S 22	19	3	12	13	3500	3/2.5
43	5900		B	S 14	21	3	14	13	5500	3.5/3
44	5901		B	N21	21.5	?	14	15	6500	3.5/3
45	5909	40		N24	31	1	12	13	3500	3/2.5
46	5921	41,42		N14	Nov. 7.5	2	31	15	6500	3/3/
47	5925	43,44,45, 46,47,48	B,N	N24	12	3	Nov. 05	15	9000	3.5/3
48	5932		L,B,N	N18	17.5	?	10	14	10000	3.5/3
49	5948		B	N12	29.5	1	23	13	3000	3.5/3
50	5959	49		N30	Dec. 10.5	4	Dec. 03	15	6500	3/3/
	1961									
51	5983	50	N	N17	Jan. 01	1	26	14	7000	3.5/

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…AGE DATA				ALL SPOTS IN THE PLAGE			
y	No. Flares E/C/W	Total Flares	Return Sequence	Mt. Wilson Number	Mag. Class	Intensity 100 Gauss	Days Seen
	1/2/0	3	5679 (See No. 21)	14911 14914 14915	ℓβpd ℓαfd ℓαpℓ	5 8 27	22 - 29 23 - 03 23 - 05
	4/17/3	24	5688	14921	ℓβγℓ	26	27 - 09
/3.5	5/26/1	32	5726 (See No. 26)	14967	ℓγℓ	16	July 24 - 05
/3	34/13/13	60	5749	14980 14981	ℓαpℓ ℓβγℓ	(20) (20)	Aug. 05 - 18 06 - 19
/3	1/4/2	7	New	14983	ℓβpℓ	(20)	08 - 20
/3	7/5/1	13	New	14987	dαpd	(10)	11 - 16
/3	11/13/4	28	New	14985	ℓβpℓ	(20)	09 - 22
/3	4/14/2	20	5764	14990	dβpℓ	(20)	13 - 24
	3/7/10	20	5763, 5713 5765, 5713	14997 14998 14991	dβd ℓβpℓ ℓαpd	(2) (25) (7)	20 - 21 12 - 25 13 - 17
/3	4/6/0	10		14996	ℓβpℓ	(20)	17 - 29
	1/28/7	36	5782, 5737, 5693, 5660, 5633	15008	dβγℓ	19	27 - 06
.5	2/12/7	21	5794 (See No. 28) (5838 Merged with 5837)	15015 15025 15028 15026 15029	ℓγℓ dβfd dγd dβd dβd	(15) (5) (4) (2) (4)	Sept. 02 - 15 09 - 10 10 - 11 09 - 10 10 - 11
/3	3/3/0	6	New	15030	dβpd	(15)	10 - 19
/3	6/13/10	29	5828	15053 15043	dγd ℓβγℓ	(2) (20)	21 - 21 15 - 27
	6/25/2	33	5825 5830	15047 15051 15052 15060	ℓβpℓ ℓβd ℓαfd dβpℓ	(20) (10) (6) 16	18 - 29 19 - 25 20 - 25 26 - 02
	7/5/0	12	New	15050	ℓβℓ	(15)	19 - 02
.5	3/1/0	4	5854	15071	dβfd	(10)	Oct. 04 - 12
	2/0/0	2	Part of 5858 (See No. 38)	15085 15087	dαpd dαd	(2) (2)	12 - 13 13 - 14
/3	3/1/0	4	5861, 5829 5863 (See No. 39)	15096	dαd	(2)	20 - 20
/3.5	2/24/3	29		15090 15092	ℓγℓ dαfd	25 4	14 - 27 16 - 24
	2/0/0	2	New	15108 15099	dβpd ℓβpℓ	(2) (20)	12 - 13 13 - 14
	0/10/0	10	5884	15109 15107 15110	dβfℓ ℓβpd ℓαp	(10) (12) (15)	01 - 11 31 - 09 01 - 13
/3.5	16/45/37	98	5894, 5864	15114	ℓβγℓ	31	08 - 18
/3.5	7/14/14	35	5901	15127 15120 15128 15121	dβℓ ℓαpd dβfℓ ℓβpℓ	16 21 10 20	17 - 23 11 - 22 17 - 23 11 - 24
/3	1/12/8	21	New	15136 15132 15139	dβℓ dαd dβpℓ	(15) (2) (17)	24 - 05 25 - 25 27 - 06
	7/2/4	13	5925 (See No. 47)	15152 15160 15151	dγd dβpd ℓβγℓ	(2) (5) (15)	04 - 05 09 - 12 04 - 16
							1961
	11/26/8	45	New	15178 15179	ℓαpℓ ℓγℓ	30 31	26 - 06 26 - 07

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Table

Serial No.	McM Plage	IDENTIFICATION Major Flare Serial No.	Category	PLAGE POSITION Mean Lat.	Date Cmp.	Life Rotation	First Seen	DISK PASSA Days Seen	Average Max. Area	Inte E/C
52	6022		B	N05	Feb. 10	1	Feb. 03	14	4800	3.5/
53	6069	51		S13	Mar. 31.5	1	Mar. 25	13	3500	3.5/
54	6077	52		N15	Apr. 06	1	Apr. 04	8	2000	-/3/
55	6098	53,54	N	S13	30.5	3	24	14	8000	3/3/
56	6104	55		N10	May 10.6	3				
57	6134		B	S04	June 06.5	1	May 31	13	2500	3.5/
58	6135	56	B	N05	08	2	June 01	14	3500	3/3.
59	5140		B,N	N08	15.5	1	09	13	5400	3.5/
60	6144		B	S13	17.5	2	10	15	4600	3.5/
61	6151		N	N12	20	1	19	8	4200	-/3/
62	6171	57,58,60 61,62,63,64	B,N	S10	July 14.5	3	July 08	14	5600	3.5/
63	6172	59		N13	17	1,2,3	09	16	5000	3/3/
64	6178	65,66,67	B	N08	25.5	2	18	14	4000	3.5/
65	6197		B	N17	Aug. 09	1	Aug. 09	7	1200	-/3.
66	6199		N	N12	17	5	09	14	6000	2.5/
67	6206		B	N20	26	3	19	13	3000	3/3.
68	6212		B,N	N15	Sept. 04.5	2	28	14	6000	3.5/
69	6227	68		N16	22.0	3				
70	6235	69		N15	Oct. 01	3	Sept. 24	14	3600	3/3/
71	6237		B	N13	02.5	1	26	13	2400	3.5/
72	6285		B	N15	Dec. 05	1	Nov. 29	>10	2500	3.5/
73	6301	70		S04	27	1	Dec. 22	>10	2000	3.5/
74	6303		B	N21	28.5	1	22	>12	1800	3.5/
1962 75	6326		N	N11	1962 Jan. 29.5	1	Jan. 23	14	4800	3/3/
76	6357		N	S12	Feb. 26		Feb. 19	14	7000	3/3/
77	6366	71		N12	Mar. 18.5	1	Mar. 12	12	1800	3/3/
78	6373	72	B	N12	25.5	3	19	14	5600	3.5/

5.III-3 0

E PLAGE DATA				ALL SPOTS IN THE PLAGE			
sity /W	No. Flares E/C/W	Total Flares	Return Sequence	Mt. Wilson Number	Mag. Class	Intensity 100 Gauss	Days Seen
3/3.5	3/1/7	11	New	15216	lβpl	(25)	03 - 16
3/3	10/16/1	27	New	15261	dβpd	(15)	27 - 03
				15259	lαp	(15)	25 - 05
3	-/25/2	27	New	15268	dβl	(15)	04 - 11
3	16/11/3	30	6074, 6048	15282	dβpd	12	25 - 29
				15281	lβpd	(20)	24 - 04
				15289	lβpd	(5)	29 - 05
				15280	lβ d	(20)	24 - 05
			6082, 6062	No Spots			
.5/3	3/1/0	4	New	15313	dβpl	(15)	02 - 11
/3.5	1/17/5	23	6106	15314	βd	(15)	02 - 12
				15318	dγd	(10)	08 - 09
.5/3	10/18/2	30	New	15319	lβpl	28	09 - 21
				15320	dβd	(3)	10 - 11
				15332	dβd	(3)	19 - 19
.5/3	1/8/0	9	6121a	15321	lαpd	(10)	10 - 11
				15322	lβpd	(25)	11 - 18
	-/22/8	30	New in position 6119	15333	dβpl	20	19 - 25
				15338	dγl	(5)	25 - 25
.5/3.5	4/53/22	79	6144 (See No. 60)	15353	dβγl	28	08 - 20
				15357	dβpd	(2)	13 - 13
				15356	dαpd	(2)	11 - 11
.5	1/2/2	5	6151 (See No. 61), 6147, 6122 Part New	15355	[illegible]αpl	26	09 - 23
				15366	d[illegible]pl	(2)	21 - 23
.5/3.5	3/14/10	27	6155	15363	lβpl	29	18 - 31
/3.5	-/7/5	12	New	15384	dβfl	(15)	09 - 14
/2.5	26/14/1	41	6175, 6149, 6125, 6097	15385	lαpl	21	09 - 21
				15397	dαd	(3)	18 - 19
				15395	dαd	2	16 - 18
				15391	lβd	(12)	12 - 20
/3.5	0/6/11	17	6180, 6167	15408	dβfd	(5)	27 - 30
				15400	dαpd	(2)	20 - 20
				15405	dβpl	(15)	24 - 31
				15406	dαd	(2)	24 - 24
.5/3.5	16/42/11	69	6197 (See No. 65)	15411	lβpl	29	29 - 09
			6206 (See No. 67)	15425			
	7/7/1	15	6212 (See No. 68)	15433	lβpd	(15)	24 - 04
.5/3	12/15/0	27	New	15436	lβpl	17	26 - 08
				15435	dβfd	(10)	26 - 01
.5/X	0/3/0	3	New	15480	dβpl	22	30 09
				15483	dβpl	10	06 - 09
/X	6/5/0	11	New	No Spots			
.5/3.5	3/1/0	4	New	15492	dβpl	15	23 - 03
	2/28/18	48	New	15507	lβγl	21	24 - 05
	21/22/7	50	New in position 6337	15520	βγl	(25)	22 - 03
	2/5/0	7	New	15528	lβγd	11	12 - 21
5/3	3/13/13	29	Part of 6352, 6326 (See No. 75)	15532	βγl	(25)	21 - 31
				15536	dαpl	2	30 - 31

	IDENTIFICATION			PLAGE POSITION				DISK PASSAGE PL[cut off]		
Serial No.	McM Plage	Major Flare Serial No.	Category	Mean Lat.	Date CMP.	Life Rotation	First Seen	Days Seen	Average Max. Area	Intensity E/C/W
79	6393	73,74	N	N10	Apr. 19	4	Apr. 12	13	5400	3/3/3
80	6403	75		N10	May 01.5	2	Apr. 24	14	5500	3/3/3
81	6459	76		N14	June 23.5	3,4	June 17	13	3500	3/3.5/3
82	6463		B	N00	30	1	23	14	3000	3.5/3.5/3.
83	6538		B	S06	Sept. 02.5	1	Aug. 27	13	2000	3.5/3.5/3.
84	6542		B	N09	02.5	1	30	10	2400	-/3.5/3.5
85	6553		B	N22	17	1	Sept. 10	14	3200	3.5/3.5/3
86	6626		B	N02	Dec. 01.5	2	Nov. 25	>10	2600	3.5/3.5/X
87	1963 6689		B	S15	1963 Feb. 06.5	1	Jan. 31	13	3600	3/3.5/3.5
88	6730		B	N12	Mar. 21.5	3	Mar. 14	15	3600	3/3.5/3.5
89	6766		B	S11	Apr. 15	1	Apr. 08	14	2500	3.5/3.5/3
90	6805		B	N09	May 19.5	1	May 13	13	4200	3.5/3.5/3
91	6892		B	N10	July 25	3	July 18	13	2800	3.5/3.5/
92	6964	77, 78, 79	B	N14	Sept. 20.5	3	Sept. 13	15	4800	4/3.5/3.
93	6997		B	N04	Oct. 15	1	Oct. 13	8	1200	-/3.5/3.
94	7003		B	N12	26.5	2	20	14	5000	3.5/3.5/

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GE DATA			ALL SPOTS IN THE PLAGE			
No. Flares E/C/W	Total Flares	Return Sequence	Mt. Wilson Number	Mag. Class	Intensity 100 Gauss	Days Seen
7/31/12	50	6370, Part of 6352 (See No. 78)	15542	lαpl	20	12 - 24
			15543	lβl	16	13 - 24
			15546	dβpd	(10)	21 - 23
8/5/2	15	6385	15549	dβγd	14	26-05
			15548	dαpl	25	44-06
3/12/0	15	6426, 6406b	15587	lβpd	(15)	17 - 25
		6428, 6403 (See No. 80)	15589	dαd	(2)	23 - 23
1/5/2	8	New	15590	lβpl	30	23 - 06
2/18/0	20	New	15621	dβpd	11	28 - 06
0/10/1	11	New	15622	dβl	25	30 - 08
11/14/1	26	New	15629	dβpl	15	11 - 22
0/0/0	0	6612	15663	lαpl	18	24 - 07
						1963
-	-	New	15694	βpd	18	02 - 18
-	-	6703, 6680	15707	lαpl	24	15 - 27
		New	15714	dβpd	(10)	10 - 16
		New				
		6854, 6830	15738	dαpl	4	28 - 30
			15742	lβpd	(6)	18 - 27
			15746	dβpl	16	29 - 02
		6931, Part of 6905	15768	lβγl	(35)	13 - 26
		New	15777	dβpd	20	13 - 15
5		6980	15779	lβγl	29	20 - 31
			15780	lαpd	13	20 - 29

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(2)

IV. CATALOGUE OF IMPORTANT RADIO EMISSIONS FROM THE SUN DURING 1960 – 1963

IV

TABLE IV. CATALOGUE OF IMPORTANT RADIO EMISSIONS FROM THE SUN DURING 1960-1963

This table will include all important radio emissions from the sun that occur within an acceptable time of:

(a) The major flares reported in Table I, or at the time of a spectral radio emission Type II or Type IV.

(b) All reported spectral emissions of the Type II (slow drift bursts) and Type IV (broad band continuum).

It should be noted that no spectral observations are made between approximately 0600 UT and 1300 UT. The previous volumes (data for 1954 through 1959) have included probable Type IV emissions derived by Pick-Gutmann (reference 33) from single frequency observations. Her study includes only the first quarter of 1960.

The spectral observations in the previous volumes were limited to the frequency ranges 25 to 210 Mc/s (Radiophysics Laboratory, Sydney, Australia) and 25 to 580 Mc/s (Harvard Radio Astronomy Station, Fort Davis, Texas). The Harvard Radio Astronomy Station added the frequency range 2100 to 3900 during the first quarter of 1960. These data are published in reference 7 (starting with CRPL-F, Part B, No. 197). In addition, the High Altitude Observatory at Boulder started spectral observation in the frequency range 7.6-41 Mc/s during 1960. These data starting with March 1961 are published in reference 7 (starting with CRPL-F, Part B, No. 207). Some unpublished data obtained before March 1961 have been included in this catalogue. Data for both the Type II and Type IV spectral data have been taken from the CRPL Bulletins (reference 7) and the IAU Quarterly Bulletin (reference 15).

Radio Emissions at Single Frequency

Starting with the IAU Quarterly Bulletin (reference 15), No. 129 (first quarter 1960), new symbols were introduced to describe the single frequency records of distinctive events. These new symbols are:

s = Simple rise and fall of intensity

c = Complex variation of intensity

C+ = Prolonged broad band enhancement of radiation

f = Group of bursts

RF = More or less irregular rise and fall of intensity

e = Sudden beginning of bursts and/or steep rise of intensity

In the case of a major event a capital letter is used.

All fluxes at single frequencies are reported in units of 10^{-22} W $M^{-2}(c/s)^{-1}$.

Table IV is arranged in three general columns:

(a) FLARE, if any, associated with the radio emission.

(b) RADIO EMISSIONS OF THE SPECTRAL TYPE.

(c) RADIO EMISSIONS AT SINGLE FREQUENCIES.

The column headings together with any necessary explanations follows:

FLARE DATA - (Columns 1 through 7)

Column 1 Date.

Column 2 Beginning Time UT. If the start of the flare was observed, the time is underlined.

Column 3 End Time UT. When the end of the flare was observed the time is underlined.

Column 4 Maximum Time UT. This has been taken from reference 9.

Column 5 Heliographic Position. The position of the flare is taken as the arithmetic mean of the values reported in the IAU Bulletin.

Column 6 Importance. The method used for major flares has already been described in connection with Table I. The minor flares are reported as 2+, 2, 1+, 1 as the highest importance given reference 15, subflares are denoted with importance 1-.

Column 7 Flare Serial Number. This is the serial number of the major flare in Table 5.I.

SPECTRAL EMISSIONS

Outstanding spectral emissions of Types I, II, III, and IV are given in Table VIII. The entries in this table will be limited to emissions of Type II and Type IV reported by CSIRO Sydney (Syd), the Harvard Radio Astronomy Observatory (Har) at Fort Davis, Texas, and the High Altitude Observatory at Boulder (7).

TYPE II SLOW DRIFT BURSTS (Columns 8 through 12)

Column 8 Beginning Time UT.

Column 9 End Time UT.

Column 10 Intensity.

Column 11 Frequency Range.

Column 12 Observatory or reference.

TYPE IV BROAD BAND CONTINUUM (Columns 13 through 17)

Column 13 Beginning Time.

Column 14 End Time.

Column 15 Intensity.

Column 16 Frequency Range.

Column 17 Observatory or reference.

RADIO EMISSIONS AT SINGLE OR DISCRETE FREQUENCIES (Columns 18 through 25)

Selected frequencies between 9500 Mc/s and 167 Mc/s associated in time with the major solar flares, solar-terrestrial events, or spectral emissions are tabulated in a descending order of frequency with the following data.

Column 18 Frequency.

Column 19 Type.

Column 20 Beginning Time.

Column 21 End Time.

Column 22 Time of Peak Flux.

Column 23 Peak Flux. In units of 10^{-22} Wm^{-2} $(c/s)^{-1}$

Column 24 Mean Smoothed Flux.

Column 25 Observatory.

TABLE IV CATALOGUE OF IMPORTANT

FLARE DATA							SPECTRAL OBSERVATIONS TYPE II					S.
Gr. Day	Beg. UT	End UT	Max. UT	Position	Imp.	Flare Serial No.	Beg. UT	End UT	Max. Int.	Freq. Range	Obs.	Beg. UT
1960 Jan. 11	2040	2355	2126	N22 E03	3	2	2103.3	2118	3	150->25	Har,15	2105 2040 2056 2105
12	1646	1710	1650	S10 W37	1		1651	1654	2	150- 60	Har,15	1653 1653
15	1336	1455	-	S20 W68	3	3						1336 1347
16	2239	2335	2250	N12 E76	2		2244	2254	3	450-100	Har.15	
Feb. 03	0815	0930	0820	S14 W36	2+	4						
03	2015	2043	2035	N10 W32	1+		2022	2027	3	300- 70	Har.	2027
04	No Flare Reported						2046	2059	3	175- 30	Har.	
04	No Flare Reported											2149
05	1943	2007	1949	N10 W57	1		1950	1954	2	250-120	Har.	
07	No Flare Reported						1612	1619	2	175- 90	Har.	
13	2002	2050	2010	N11 E45	1		2002	2009	1	22-33	46	
18	No Flare Reported						0107	0118	1		Syd	0056
21							2020	2029	1		46	
22	1352	1520	1400	N08 E41	3	5	1358	1411	3	240-<25	Har	<1356 1356
26	0700	0955	0713	S21 W16	3	6						
29	0140	0200	-	S32 W56	2		0153.5	0156	1		Syd	
Mar. 01	1915	2050	-	N22 W15	2+		1923	1933	3	450- 60	Har.	
10	1716	1810	1720	N25 E08	1		1720	1726	3	400- 60	Har.	
28	2042	2150	2056	N15 E37	2		2057 2112	2112 2126	3 1	150-<25 33-20	Har. 46	2050 2047 2051
29	No Flare Reported											0000
29	0640	1220	0710	N13 E30	3	10						0656 0700
30	No Flare Reported						0325	0337	Possible		Syd	0325

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ECTRAL OBSERVATIONS TYPE IV				SINGLE-FREQUENCY RADIO EMISSIONS							
End UT	Max. Int.	Freq. Range	Obs.	Freq.	Type	Beg. UT	End UT	Max. UT	Peak Flux	Mean Flux	Obs.
2355	3	450- <50	Har.15	2800	S	2056	>2131	2108	220		Ott
			33	545	RF	2058	2138	-	50	30	Hol
			37	167	C+	2056	>2343	-	>1000		NBS
2355	1-3		19	18	C	2055	2104	-			NBS
1704	2	320- 200	Har.15	2800	c	1647.3	1656.3	1649	80		Ott
1704	1-2		19	545	f	1648	1655	-	20	10	Ned
				200	c	1648	1649.5	-	>400	180	Ned
				167	C	1648.9	1700.9	1651.2	>1000		NBS
			33	9400	C+	1335	1502.2	1356.8	206		HHI
			37	3000	C+	1334	1501	1357.6	750		HHI
				1500	C+	1335	1500	1410	440		HHI
				808	C+	1334	1515	1347.5	-	120	Pra
				600	EC+	1334.8	1507.8	-	220	90	Ucc
				234	C+	1346	-	-	550	110	AOP
				200	C+	1347	1412	-	450	180	Ned
				200	C	2246	2251	-	>30000		Hol
				167	C	2247	2253	2250	>1000		NBS
				9100	c	0817.5	0820.5	0818	110	60	Ned
				1500	f	0817.4	0840	0818.8	135		HHI
				600	ec	0818	0821.6	-	80	9	Ucc
				200	C	0815.5	0819	-	>450	400	Ned
2032	2	450- 180	Har.15	2800	c	2024	2037	2026	25		Ott
				545	c	2025	2029	-	90	20	Par
			•	200	C	2022	2024	-	>500	>500	Par
				167	C	2023.8	2026	2024.1	>1000		NBS
				2800	s	2037	2046	2040	125		Ott
				545	c	2038	2040.5	-	25	13	Par
				200	c	2037	2040	-	>450	200	Par
				167	C	2037.6	2041.5	2038.1	>1000		NBS
2200	3		Har.	545	c	2144	2159	-	65	15	Hol
				200	s	2142	2142.2	-	>500		Hol
				167	s	1943.5	1943.7	1943.5	>1000		NBS
				167	s	1945.0	1947	1946	>1000		NBS
			33	9400	S	0056	0109	0101.2	2100	-	Nag
				3750	C	0053	0110	0101.3	765	-	Nag
				1000	c	0053	0108	0059.6	35	-	Nag
				545	c	0055	0103	-	25	14	Hol
				200	c	0055	0111	-	110	30	Hol
1416	2	>580-<100	Har.	9400	C	1353.8	1453.6	1358.6	455		HHI
1416			19	2800	C	1353.5	1421.5	1359	340		Ott
				1500	C	1351.4	1441.4	1355.4	219		HHI
				545	C	1354.5	1413.5	-	350	80	Ned
				200	C	1358.5	1413.5	-	280	80	Ned
				3750	c	0703	0716	0707.4	16		Nag
				2000	s	0703	0714	0707.8	19		Nag
				1000	c	0703.5	0707	0704.1	340		Nag
				-							
				2800	S	1919	1926	1921	>140		Ott
				545	c	1920	1926	-	>180	30	Par
				200	F	1922	1927	-	>600		Par
				167	c	1921	1821.5	1921.2	>1000		NBS
				2800	S	1717	1724	1718.5	335		Ott
				545	s	1718	1723	-	60	30	Par
				200	C	1718	1723	-	>600		Par
				167	C	1717.5	1726.5	1718.2	>1000		NBS
>2447	3	>3000- <50	Har.	2800	C+	2047.7	2157.7	-	>885		Ott
			33	545	C+	2052	2552	-	≫400	300	Par
2401			19	200	Rise	2054	2114	-	>400		Par
				167	C+	2051	2501	2130	>1000		NBS
0047			19	-							
	13		33	9500	C+	0656.5	0758	0733.5		7074	Tok
			37	3750	C+	0655	0747	0733.5	8250		Nag
				2000	C+	0655	0855	0733.4	49000		Nag
				1000	C+	0656	0856	0812.8	247000		Nag
				545	C+	0700	1130		100000		Hol
				200	C+	0700	0920		38000	15000	Hol
0740	3		Syd	2000	Storm	0351.5	0356.5	0355.5	14		Nag
				1000	Storm	0336	0426	0351.9	57		Nag

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FLARE DATA							SPECTRAL OBSERVATIONS TYPE II					
Gr. Day	Beg. UT	End UT	Max. UT	Position	Imp.	Flare Serial No.	Beg. UT	End UT	Max. Int.	Freq. Range	Obs.	Beg. UT
Mar. 30	1455	2030	1540	N12 E13	3+	11	1529	1540	3	160-<25	Har.	1526 1519 1519 1526 1529
Apr. 01	0843	1355	0859	N12 W11	3	12						0848
05	0215	0530	0245	N12 W62	3	13	0152	0207	Possible		Syd.	0207
10	2312	2416	2323	S08 W03	2							2323
28	0130	0145	0137	S05 E34	3	15	0122 0120	0130 0146	3	180- 35	Har. Syd	0145 0145 0116
29	0107	0908	0210 0359 0554	N14 W21	3	16	0214	0225	2		Syd	0200 0200 0208 0350
29							0417	0425	2(Possible)		Syd	0440 0606
May 04	1000	1105	-	N13 W90	3	17						1015
06	No Flare Reported						0312	0316	1		Syd	
06	1404	2020	1446	S09 E07	3+	18	1438	1445	3	90-<25	Har.	1414 1414
12	1342	1546	1400	N30 W59	2							1403
13	0519	0735	0532	N29 W67	3+	20	0523	0538	3		Syd	0530 0530 0518
17	No Flare Reported						1743 1744 1800	1810 1746 1809	3 1- 1	150- 25 31-16	Har. 46	1755 1800
26	0818	1107	0928	N14 W15	2+	21						0909

3 (CONTINUED)

SPECTRAL OBSERVATIONS TYPE IV				SINGLE-FREQUENCY RADIO EMISSIONS							
End UT	Max. Int.	Freq. Range	Obs.	Freq.	Type	Beg. UT	End UT	Max. UT	Peak Flux	Mean Flux	Obs.
>2300	3	>3900- <25	Har.	9100	S	1521	1533	1527	1900	700	Ned
			33	9100	S	1553	1623	1556	7300	3700	Ned
				2800	C+	1518	1858	1556	1750		Ott
			25	545	C+	1547	1817	-	>>200	>200	Ned
2300			19	200	Rise	1525	1553	-	900	500	Ned
				200	C+	1553	1753	-	6000	2000	Ned
				167	C+	1529	1929	1550	>1000		NBS
			37	9100	C+	0846.5	1006.5	0858	8000	2400	Ned
				3000	C+	0848	>1258	-	>1000		HHI
				1500	C+	0816	1200	0928	>950		HHI
				808	C+	0845	1105		>150	>140	Pra
				600	C+	0846	1155		860	171	Ucc
				200	C+	0848	1048		4500	1000	Ned
0300	3		Syd	545	C	0235	0345	-	1000	250	Hol
				200	c	0247	0249	-	300		Hol
2328	2	>580- 160	Har.	3750	c	2317	2331	2324.6	32		Nag
				1000	F	2319.5	2330.5	2326.4	205		Nag
				545	c	2323	2327.5	-	50	25	Hol
				167	c	2323	2332	2326.5	>100		NBS
0230			Syd	9500	C	0124.5	0139.5	0130	573	208	Tok
			25	3750	C	0116	0156	0129.5	260		Nag
			37	2000	C	0115	0145	0129.7	285		Nag
				1000	C	0117	0142	0139.2	265		Nag
				545	c	0135	0140	-	170	50	Hol
0305			Syd	9400	s	0140	0144	0140.8	55		Nag
			25	3750	c	0139	0148	0140.0	115		Nag
0304	1+		19	1000	Storm	0139	0301	0207.3		30300	Nag
0645			Syd , 25	545	C	0140	0256	-	32000	11000	Hol
			37	200	C+	0346	0606	-	220		Hir
			25	9400	C+	0357	0450	0414.7	195		Nag
				3750	C+	0356	0451	0359.7	365		Nag
				2000	C+	0356	0446	0427.4	370		Nag
				1000	C+	0348	0503	0442.2	340		Nag
				545	C+	0358	0503	-	250	70	Hol
				200	C+	0346	0606	-		220	Hir
				9400	s	0527	0551	0532	43		Nag
				3750	S	0526	0550	0532	115		Nag
				2000	C	0525	0548	0538.1	990		Nag
				1000	C	0525	0548	0536	3350		Nag
				545	C	0525	0531	-	>450	>400	Hol
			37	9400	C+	1013.4	1232.6	1033	380		HHI
				2980	C+	1015	1117	-	2650	1400	Ned
				1500	C+	1011.4	1159	1042.4	37		HHI
				808	C+	1010	1140	1127	94	55	Pra
				536	C+	1010	1101	1046	127	105	Pra
				23	F	1018.6	1035	1019.8	600		AOP
				-							
>1610	3	580- <50	Har.	9400	c	1438.8	1530.4	1509.4	22		HHI
			25,37,	2980	C	1428	1456	-	>620		Ned
			19	2800	C+	1406.5	1536.5	1434.5	695		Ott
				1500	C+	1408	1741	1435.4	520		HHI
				808	C+	1408.5	1540.5	1431	166	150	Pra
				600	EC+	1407.9	1422.4	-	242	125	Ucc
				545	C	1414	1834	-	250		Ned
				200	Storm	1414					Ned
				23	F	1431.2	1447.9	1444.6	500		AOP
1552	1	33-16	46	9100	C+	1340	1440		334	167	Ned
				2800	C+	1340	1500	1426	250		Ott
				1500	C+	1345	1439	1410	118		HHI
				808	C+	1351	1606	1410.5	150	100	Pra
				536	C+	1342.5	1626	1357.5	94	60	Pra
				200	RF	1345	1430		140	70	Ned
>0609	1		Syd	9400	C+	0517	0702	0531.8	18300		Nag
			25	3750	C+	0517	0702	0532	3750		Nag
			37	2000	C+	0517	0719	0557.8	1440		Nag
				1000	C+	0517	0719.5	0556.8	2200		Nag
				600	EC+	0518.2	0719.2	-	1080		Ucc
				200	C+	0517	0730	0553	480	100	Osl
1829	2	60-25	Har, 19	600	ec	1742.3	1745.2	-	40	14	Ucc
1852	1	31-16	46	200	c	1743	1743.7	-	80	40	Pra
			37	9100	C+	0909	0934	-	>1150	700	Ned
				2980	C+	0909	0936	-	>1350	475	Ned
				808	C+	0906	0954	0917	109	90	Pra
				600	EC+	0906.5	0950.5	-	447	180	Ucc
				200	C+	0909	0949	-	1100	450	Ned

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FLARE DATA							SPECTRAL OBSERVATIONS TYPE II					SP
Gr. Day	Beg. UT	End UT	Max. UT	Position	Imp.	Flare Serial No.	Beg. UT	End UT	Max. Int.	Freq. Range	Obs.	Beg. UT
June 01	0824	1600	0900	N29 E46	3+	22						0837
01	No Flare Reported						2007	2016	2	150- 60	Har.	2012
05	2217	2346	2224	N26 W24	2		2258	2301	1	75- 25	Har.	
08	0732	0855	0746	N32 W37	2+	23						
15	0248 0251	0349 0339	0301 0254	N18 W13 N22 W53	1 -		0300	0316	2		Syd	
20	0126	0205	-	S13 W59	2		0132 0130	0138 0146	3	240-<100	Har. Syd	
23	0329	0344	0332	N12 W23	1		0335	0339	1		Syd	
25	1131	1530	1215	N21 E06	3	24						1215 1200
25	1659	1740	1707	N19 W01	1+							1717
25	2039	2140	2046	N19 W04	3	25	2048	2105	3	150-<25	Har.	2045
26	0428	0525	0436	N20 W08	3	26						
26	1326	1525	1403	N19 W13	2+	27						
26	2358	2457	2415	S08 E34	3	28	2404	2408.5	3		Syd	2413 2413
27	0418	0615	0431	N20 W19	1+		0422 0453 0503	0443 0454 0505	3 1 2		Syd	0425
27	2140	2345	2156	N21 W27	3	29	2157	2212	3	33-15	46	2150 2146
29	0125	0247	0148	N21 W50	1+		0149.5	0158	2		Syd	0140 0143
July 08	2328	2410	2334	N08 W33	2+		2337	2348	2	140- 40	Har.	

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CTRAL OBSERVATIONS TYPE IV				SINGLE-FREQUENCY RADIO EMISSIONS							
End UT	Max. Int.	Freq. Range	Obs.	Freq.	Type	Beg. UT	End UT	Max. UT	Peak Flux	Mean Flux	Obs.
			37	9100	C+	0834	0937	-	>3400		Ned
				2980	C+	0831	0931	0848	3100	1300	Ned
				1500	C+	0822.4	1322.4	0846.5	700		HHI
				600	C+	0834.3	0926.3	-	876	250	Ucc
				545	C+	0835	0920	-	1200	500	Ned
				200	C+	0838.5	0952.5	-	3100	600	Ned
				23	C+	0841	0904.8	0852.3	700		AOP
2038	2	>580- 180	Har,19	2800	c	2003	2019	2005.5	9		Ott
				200	c	2005	2007		350	160	Par
				2800	c	2241	2257	2245	25		Ott
				9400	C	0733	0823	0740.5	62		Nag
				3750	C	0732	0807	0741.2	55		Nag
				1500	RF	0736	0804	0742	9		HHI
				9400	c	0251	0255	0252.4	400		Nag
				3750	c	0251	0256	0252.5	300		Nag
				2000	s	0251	0255	0252.5	120		Nag
				1000	c	0251	0254	0252.5	125		Nag
				200	c	0251	0255	-	110	25	Hol
				9400	F	0127.5	0133.5	0128.4	1150		Nag
				3750	f	0127.5	0135.5	0128.4	210		Nag
				200	c	0128	0129	-	>220		Hol
				200	f	0332	0335	-	> 300		Hol
500	3	>580-<100	Har, 19 37	9100	C+	1159	1229	-	303	165	Ned
				2800	C+	1148	1316	-	425		Ott
				1500	C+	1148.5	1749.5	1207.0	610		HHI
				808	C+	1152	1500	1213.5		170	Pra
				600	C+	1152.8	1539.8	-	830	195	Ucc
				200	C+	1200	1410	-	3000	350	Ned
923	3	>580- 320	Har,19	2800	S	1701	1716	1705	160		Ott
				1500	S	1700	1718	1705	163		HHI
				545	C+	1703	1843		550	140	Ned
				200	RF	1700	1840		80	16	Ned
153	3	>580- 100	Har.	2800	C+	2037	2117	2046	700		Ott
				545	C+	2040	2125	-	>>300		Par
				208	C	2045	2049	2047	>1250	460	Uss
				167	C+	2056	2157	2110.8	-	-	NBS
				9400	C	0432	0442	0032.1	525	-	Nag
				3750	C	0428	0438	0432.2	225	-	Nag
				2000	c	0428	0438	0432.2	92	-	Nag
				1000	C	0428	0438	0436.5	360	-	Nag
				545	C	0432	0439	-	>1200	500	Hol
				200	C	0432	0437		>250	200	Hol
				9100	C	1359	1412	-	1140	300	Ned
				2800	s	1350	1500	1417	8		Ott
				2800	C	1358.8	1412.8	1408	200		Ott
				536	C	1359	1412.5	1402.5	282	140	Pra
				234	F	1358.8	1411	1359	1800	50	AOP
				23	F	1358.9	1405.7	1359	800		AOP
449	3	280-<100	Har.	9400	f	2256	2308	2257	50		Nag
450			Syd	3750	f	2259	2309	2304.1	17		Nag
				9400	c	2405	2445	2412.4	50		Nag
				3750	c	2405	2455	2412.5	50		Nag
				2800	s	2402	2430	-	13		Ott
				1000	f	2405	2452	2446.5	44		Nag
				200	C	2402	2452	-	>240	70	Hol
539	1		Syd	3750	C	-	-	0421.5	400		Nag
				2000	C	-	-	0422	105		Nag
				1000	S	-	-	0421.2	1450		Nag
				545	C+	0423	0523	-	1200	60	Hol
				200	C+	0421.5	0616.5	0502	200	50	Osl
234	3	>580- 100	Har 37	9400	S	-	-	2153.9	105		Nag
				2800	S	2140	2218	2154	140		Ott
				1000	F	-	-	2209.6	2000		Nag
				545	C+	2144	2307	-	600	150	Hol
				200	C+	2144	2259	-	250	80	Hol
149	3	>580- 175	Har.	9400	F	0136.5	0157.5	0147.4	1450		Nag
230			Syd	3750	F	0135	0156	0147.7	840		Nag
				2000	F	0137	0154	0142.3	240		Nag
				1000	F	0136.5	0151.5	0141.8	130		Nag
				545	C+	0138	0155	-	140	50	Hol
				200	C+	0138	0155	-	>250	90	Hol
				545	s	2336	2336.2	-	220	110	Hol

5.IV-3 (2)

FLARE DATA							SPECTRAL OBSERVATIONS TYPE II					SPE
Gr. Day	Beg. UT	End UT	Max. UT	Position	Imp.	Flare Serial No.	Beg. UT	End UT	Max. Int.	Freq. Range	Obs.	Beg. UT
July 19	1816	1835	1820	N18 W42	1+		1821	1828	3	290- 40	Har.	1818
26	0320	0502	0333	N09 W31	1		0332.5 0351	0340 0404	3 1		Syd	
Aug. 03	No Flare Reported						1624	1633	2	90- 30	Har.	
06	1528	1650	1625	N21 E76	2+		1627	1636	2	90- 30	Har.	1619
11	0223	0400	0257	N21 E35	2+		0257.5	0314	3		Syd	0307
11	1916	2055	1929	N22 E26	3+	3o	1929 1951	1938 2010	3+ 1-	425-<25 39-22	Har. 46	1926 1929
11	No Flare Reported											2248
14	0511	0655	0525	N22 W06	3	31						
26	0847	0926	0852	N17 W89	3	32						
26	1358	1442	-	N08 E16	1+		1404	1412	2	125- 50	Har.	
30	0918	1100	0934	N18 E16	3	34						
Sept. 01	2038	2100	2042	S18 W49	1		2042	2046	3	420- 40	Har	
02	0231 0243	0348 0321	0247 0248	N18 W25 S16 W57	1 2		0244	0249	2		Syd	
02	0525	0906	0725	N20 W31	3	35	0545	0559	3		Syd	
02	2223	2506	2307	N20 W31	3	36						
03	0037	0154	0108	N18 E88	3	37	0102	0124	1		46	0038 0102
04	No Flare Reported						0021	0029	1	125-<50	Har	0006
05	1924	2100	1936	N04 E66	1		1942	1953	3	100-<25	Har	
08	No Flare Reported						1820	1826	3	140- 35	Har	

5. IV-4 ①

(CONTINUED)

CTRAL OBSERVATIONS TYPE IV				SINGLE-FREQUENCY RADIO EMISSIONS							
nd T	Max. Int.	Freq. Range	Obs.	Freq.	Type	Beg. UT	End UT	Max. UT	Peak Flux	Mean Flux	Obs.
825	2	>3900-<2100	Har.	2800	C	1817.5	1832.5	1819	150		Ott
				600	ec	1817.3	1840	-	160	20	Ucc
				200	f	1818	1822	1821.5	>200	20	Osl
				3750	f	0328	0342	0329	17		Nag
				2000	f	0322	0342	0333	24		Nag
				1000	f	0323	0341	0332.8	28		Nag
				200	c	0330	0342		60	25	Hol
				200	c	1617	1618		160	80	Ned
				18	f	1615	1640	-	-	-	NBS
650	1	39-18	46	9100	S	1620	1624	-	270	135	Ned
				2800	f	1619	1635.5	-	42		Ott
				1500	c	1618.8	1625.8	1622.3	17		HHI
				200	F	1619	1624	-	>850	150	Ned
615	1		Syd	9500	C	0249	0255	0253.1	231		Tok
				545	s	0250	0257	-	25	12	Hol
				200	C	0249.5	0254	0251.2	>1600	100	Hir
019	2	>580- 150	Har.	2800	s	1916	2140	-	9		Ott
938	1-2		19	2800	S	1923.5	2000.5	1928	1100		Ott
				545	C	1926	1943	-	150	50	Par
				200	C	1926	1938	-	>950		Par
				18	F	1925	2020	-	-	-	NBS
308	2	250- 150	Har.	-							
				9400	C	0515	0535	0518.2	1540		Nag
				3750	C	0514	0533	0518.4	1410		Nag
				2000	C	0515	0535	0518.2	775		Nag
				1000	C	0515	0539	0518.2	630		Nag
				545	C	0516	0531		200	40	Hol
				200	C	0517	0532		>2000	400	Hir
				9400	s	0849.6	0851	0850.2	27		HHI
				3000	s	0849.4	0851.8	0850.6	16		HHI
				1500	s	0849.6	0852.8	0850.6	38		HHI
				600	ec	0849	0850.5		19	9	Ucc
				200	s	0850	0851.5	0851	>40	11	Osl
				23	c	0850	0851.1	0850.1	400		AOP
				1500	f	0920	1005	0928.8	10		HHI
				23	F	0925.3	0833.4	0929.1	700		AOP
				1420	c	2044.5	2047	2046	65	8	Syd
				545	s	2042	2044	-	60	15	Par
				200	C	2039.5	2041.9	-	>1400	420	Hir
				9400	c	0240	0249	0243.2	115		Nag
				3750	c	0240	0249	0242.3	60		Nag
				2000	c	0241	0245	0242.3	35		Nag
				1420	c	0240	0247.5	0244	129	30	Syd
				200	ec	0244	0245.5	0244.8	1100	620	Tok
				3750	s	0535	0645	0612.5	20		Nag
				1420	c	0536	0542	0538	68	8	Syd
				1000	f	0536	0540	0538	17		Nag
				9400	c	2301	2316	2303.3	73		Nag
				3750	s	2302	2304	2303.4	80		Nag
				1000	s	2314	2316	2314.8	30		Nag
				200	C	2309	2313.5	-	>350		Hol
054	2	>580- 320	Har,19 37	9400	C	0039	0154	0108.1	14700		Nag
				3750	C	0039	0204	0104.6	12000		Nag
				5000	C+	0059	0149	-	5600	-	Tok
				2000	C	0035	0205	0105.2	7100		Nag
				1000	C	0035	0205	0105.6	3770		Nag
				9500	eC+	0103.7	1036.7	0108	7000	-	Tok
				545	C+	0103.5	0120.5	-	>180	>180	Hol
				200	C+	0103	0136	-	>1000	>1000	Hol
028	2	>580- 180	Har, 19	9400	C+	0010	0035	0028	220		Nag
				3750	C+	0010	0035	0028	280		Nag
				2000	C+	0010	0033	0028.5	110		Nag
				545	C+	0006.5	0020	-	60	25	Hol
				200	-	0007.7	0008.7	0008.3	1670	360	Hir
				200	C+	0012	0030	-	>300	50	Hol
				-							
				2800	s	1815.5	1817.5	1816.5	13		Ott
				200	c	1816	1817.5	-	200	100	Par

5.IV.4(2)

FLARE DATA							SPECTRAL OBSERVATIONS TYPE II					SPEC	
Gr. Day	Beg. UT	End UT	Max. UT	Position	Imp.	Flare Serial No.	Beg. UT	End UT	Max. Int.	Freq. Range	Obs.	Beg. UT	E U
Sept. 16	1710	1855	1721	S22 E68	1		1714	1728	3	175-<25	Har	1717	1
26	0525	0616	0539	S22 W64	2+		0543	0604	2		Syd	<0554	>0
Oct. 11	0517	0647	0600	S17 W36	2		0530	0547	3		Syd	0532	>0
12	1742	1859	1750	N11 W24	1		1750	1802	3	280- 40	Har	1753	1
13	1901	2030	1921	S17 E81	2+		1905	1907	2	180- 50	Har		
14	0152	0205	-	N08 W42	1		0154	0200	1		Syd		
29	1026	1331	1030	N22 E26	3	40							
Nov. 06	1752	2030	1841	N13 E07	3	42	1840 1843	1841 1850	2 2	50- 40 70- 35	Har Har		
10	1009	1400	1023	N28 E29	3+	43							
11	0305 0341	0428 0356	0340	N29 E12 N11 W27	2+ 1+		0349	0357	2		Syd	0330 0321	>0
12	1315	1922	1330	N27 W04	3+	44						<1345 1327 1328	>1
14	0000	0100	0016	N29 W17	2		0009	0011	1		Syd		
14	0246	0520	0304	N27 W21	2+							0305 0319	0
15	0207	0427	0221	N26 W35	3+	45	0221	0248	3		Syd	0221	>0

5.IV-5 (1)

(CONTINUED)

TRAL OBSERVATIONS TYPE IV				SINGLE-FREQUENCY RADIO EMISSIONS							
nd T	Max. Int.	Freq. Range	Obs.	Freq.	Type	Beg. UT	End UT	Max. UT	Peak Flux	Mean Flux	Obs.
911	3	>3500- < 25	Har, 19	9100	C+	1709.5	1721.5	-	740	320	Ned
				2800	C+	1702	1839	1756	2000		Ott
				545	C+	1710	1824	-	>250	>250	Par
				200	C+	1710	1838	-	>900		Par
611	1		Syd,25	9400	C	0530	0600	0538.6	2000		Nag
				3000	C	0532	0600	0545	1120	210	Tok
				1420	C	0529	0607	-	>139		Syd
				545	c	0531.5	0541.5	-	20	8	Hol
				200	c	0535.3	0536.1	0535.7	600	250	Tok
613	2		Syd	9400	C+	0524	0559	0529	2600		Nag
				3750	C+	0520	0600	0532.8	1580		Nag
				2000	C+	0523	0559	0527.6	630		Nag
				1000	C+	0519.5	0559.5	0524.7	310		Nag
				545	C+	0521	0559	-	180	40	Hol
				200	C+	0527.2	0548.9	0527.8	560	480	Tok
759	3	400- 150	Har,19	2800	c	1745.5	1752.5	1748	83		Ott
				545	c	1746	1749	-	40	18	Par
				200	c	1748	1752	-	>600		Par
				108	s	1751.5	1753.5	1753	>300		NBS
				108	s	1905.1	1907.1	1906.2	>30		NBS
				3750	c	0147	0150	0149.1	18		Nag
				200	c	0147.2	0148.4	0147.8	660	500	Tok
				9400	C+	1025	1325	1041	820		HHI
				9100	S	1037	1046	1042.5	1600	900	Ned
				3000	C+	1026	1421	1045	>800		HHI
				2980	S	1036	1126	1049	1000	350	Ned
				1500	C+	1026.5	1500	1055.2	583		HHI
				808	C+	1026	1130	1041	>170		Pra
				600	eC+	1028	1132	-	830	144	Ucc
				234	C	1039.7	1120.7	1107	2000	150	AOP
				200	C+	1029	1125	-	2100	170	Ned
				178	eC	1038	1117	1105	290	94	Kis
				23	f	1028.5	1029.7	1029.1	200		AOP
				23	F	1041	1054.2	1041.8	800		AOP
				2800	s	1835	1900	1838	28		Ott
				9100	C	1012	1026	1019	600	320	Ned
				9100	C+	1119	1152	-	>1500	500	Ned
				2980	C	1015	1027	1021.7	360	200	Ned
				2980	C+	1119	1152	-	>600	400	Ned
				1500	C+	1016.4	1336.4	1120.6	600		HHI
				808	C+	1018	1249	1224	>320		Pra
				545	Rise	1020	1116	-	100	50	Ned
				545	C+	1116	1144	-	1000	150	Ned
				200	Rise	1020	1116	-	480	250	Ned
				200	C+	1116	1200	-	27000	12000	Ned
				178	C+	1021	1130	1108	102	48	Kis
				127	eC+	1035	>1500	1130	>1300		Tor
709	3		Syd 37	9500	C+	0315	0500	0333	5800	5320	Tok
				3750	CS+	0315	0500	0345	3450		Nag
				2000	C+	0316	0506	0450.4	1800	1600	Nag
				1000	C+	0317	0517	0422.8	47500		Nag
				545	C+	0318	0558	-	7500	2000	Hol
				200	C+	0321	0731	-	10000	3000	Hol
800	3	>580- <50	Har,Ka 25 37	9100	C+	1322	1502	1332	>7500	3750	Ned
				2800	C+	1320	1900	1345.5	5500		Ott
				1500	C+	1323	1453	1328.7	770		HHI
				808	eC+	1325	1445	1341	>240		Pra
				545	C+	1326.5	1506.5	-	>5000	1000	Ned
				200	C+	1327.5	1757.5	-	>2000	300	Ned
				9400	C	0001.5	0036.5	0004.3	265		Nag
				3750	c	2355	0040	0003.3	45		Nag
				2000	c	0010	0035	0023.7	20		Nag
				1000	F	0017	0034	0029.4	980		Nag
500	3		Syd 37	9500	C+	0335	0510	0350.5	4220		Tok
				9400	FCS	0258	0518	0350.5	8050		Nag
				3750	FCS	0258	0518	0354.6	4300		Nag
				2000	FCS	0258	0518	0443.7	1800		Nag
				1000	FCS	0259	0519	0336.1	1400		Nag
				545	Storm	0300	0335	-	75	20	Hol
				545	C+	0335	0535	-	>220	100	Hol
				200	C+	0319	0539	-	>700	120	Hol
608			Syd, 25,37	9400	CS+	0218	0343	0228.4	24000		Nag
				3750	CS+	0219	0339	0222	11600		Nag
				2000	C+	0220	0335	0222.6	4950		Nag
				1000	C+	0220	0615	0227.1	8600		Nag
				545	C+	0221.5	0501.5	-	800	60	Hol
				200	C+	0221	0619	-	>2700	160	Hol

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FLARE DATA							SPECTRAL OBSERVATIONS TYPE II					SPE
Gr. Day	Beg. UT	End UT	Max. UT	Position	Imp.	Flare Serial No.	Beg. UT	End UT	Max. Int.	Freq. Range	Obs.	Beg. UT
19	1543	1649	1557	N28 W90	2							1636
	1657	1735	1707	N28 W90	1							1708
20	1955	2032	2020	N25 W90	3	47			3	125- 30	Har	2027
27	No Flare Patrol						1523	1526	3	75- 50	Har	1509
Dec. 05	1825	2350	1838	N26 E74	3+	49	1834	1850	3	125-<25	Har	1834
08	No Flare Reported						1604	1610	2	170- 35	Har	
16	1517	1630	1531	N17 W35	2		1532	1548	3	130- 35	Har	
30	0344	0415	0348	N15 E22	3	50						
1961 Jan. 03	No Flare Patrol						0211.5	0229	2		Syd	
30	1418	1440	1425	N11 E06	2-		1426	1430	2	400-100	Har	
30	2000	2013	2004	N12 E03	1		2006	2013	2	350- 80	Har	
31	1500	1535	1512	N10 W11	1+		1517	1519	2	260- 80	Har	
Feb. 21	2259	2342	2310	S14 E78	1+		2317	2318	1		Syd	2310
							2327.5	2331.5	1			
Mar. 18	1738	1810	1742	N06 E07	1+		1749	1754	1	115- 70	Har	
							1757	1800	2	80-<25	Har	
							1757	- 1800	1	41-28	46,7	
26	1009	1150	1035	S15 E74	3	51						
Apr. 04	1414	1438	-	N14 E23	1							1421
04	2233	2306	2240	N14 E17	1		2209	2237.3	1	41-20	7	2235 2249
05	1555	1658	1526	N13 E12	1+							1625
05	2051	2149	2059	N12 E03	1							2057
06	No Flare Reported						0015	0021	3	200-<40	Har	0013
							0015.5	0021.5			Syd	

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CTRAL OBSERVATIONS TYPE IV				SINGLE-FREQUENCY RADIO EMISSIONS							
End UT	Max. Int.	Freq. Range	Obs.	Freq.	Type	Beg. UT	End UT	Max. UT	Peak Flux	Mean Flux	Obs.
1653	2		19	-							
1723	1-2		19	-							
2046	2	>580- 60	Har,19	2800	C	2023	2110	2026.5	400		Ott
				545	RF	2025	2115	-	90	40	Par
				200	C	2028	2033	-	220	100	Par
				108	C	2027.5	2034.5	2033	>300		NBS
1513	3	>580- 150	Har	-							
1858	3	580- 25	Har,19	2800	C	1828	1855	1837.5	330		Ott
				545	C	1832	1843	-	>180	45	Par
				200	C	1835	1843	-	>1000	280	Par
				108	C	1832	1850	1837.1	>300		NBS
				-							
				108	C	1531	1535.5	1532.6	>300		NBS
				9400	s	0350	0500	0424	24		Nag
				3750	c	0345	0445	0424	20		Nag
				9500	c	0215	0222	0217.5	101		Tok
				9500	c	0230	0233	0230.3	87		Tok
				9100	S	1424	1426	-	800	370	Ned
				2980	c	1424	1425.5	-	160	77	Ned
				2800	s	1423.8	1430.8	1424.7	160		Ott
				1500	s	1424	1430.5	1424.7	77		HHI
				536	ec	1424	1427	1424.5	470		Pra
				200	c	1424.5	1425	-	>700		Ned
				200	C	1426	1429	-	2650	1300	Ned
				108	C	1424	1426	1425.5	>300		NBS
				108	C	1426	1429.5	1428	>300		NBS
				2800	s	2003	2006	2004.3	70		Ott
				545	c	2003	2004.5	-	>120		Par
				200	c	2003.5	2004.5	-	700	400	Par
				200	C	2007	2009	-	>800	700	Par
				9100	c	1514	1515	-	158	72	Ned
				2980	s	1513	1515	-	210	74	Ned
				2800	s	1511.5	1516.5	1514.3	350		Ott
				600	ec	1512	1512.3	-	80	45	Ucc
				600	s	1513	1516	-	95	10	Ucc
				200	c	1512	1513.5	-	>220		Ned
				108	c	1517	1517.6	1518.3	>300		NBS
2343	1-	41-29	46	-							
				2800	c	1738.5	1747	1741.5	15	5	Ott
				200	c	1738.5	1741	-	550	200	Par
				9100	C	1026	1038	-	1150	550	Ned
				2980	C	1026	1040	-	460	205	Ned
				1500	C+	1020	1210	1028.7	200		HHI
				808	C+	1026	1200	1109	>220		Pra
				536	C+	1024	1200	-	>450		Pra
				200	RF	1027.5	1059.5	-	400	120	Ned
				111	C+	1030	1143	1034	3000	150	AOP
				30	C+	1033.8	1053.8	1035	2000		AOP
1424			Har	2800	s	1421	1429	1422.8	12	5	Ott
				600	ec	1422	1426		66	35	Ucc
2320	2	>580-<100	Har	3750	c	2235	2243	2238	31		Nag
2401	1-	41-26	7	2800	c	2232.5	2343.5	2237.7	25	8	Ott
				2000	f	2235	2243	2238	40		Nag
				1000	f	2234	2246	2241.8	115		Nag
				545	c	2235	2246	2241	85	35	Hol
				200	RF	2236	2300	2241.5	800	300	Hol
1628			Har	2800	c	1623.5	1627.5	1625.5	14	7	Ott
				1500	c	1623.5	1635	1626.3	17		HHI
				545	s	1625	1627		65	30	Ned
2105	3	>3000- 125	Har	2800	s	2056	2141	-	3	1.5	Ott
				545	C	2057	2105.5	-	>350		Par
				200	C	2057.5	2102.5	2100.2	380	150	Hir
				108	c	2059	2108	2059.9	>30		NBS
0019	3	>580- 150	Har	9400	s	0014	0024	0016.2	28		Nag
				3750	c	0012	0019	0616.3	55		Nag
				2000	c	0012	0019	0015.4	65		Nag
				1000	c	0012	0019	0016.6	73		Nag
				545	c	0013.5	0019	-	>170		Hol
				200	c	0013.1	0017	0013.7	200	80	Hir
				108	C	0016.6	0022.6	0020	>300		NBS

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FLARE DATA							SPECTRAL OBSERVATIONS TYPE II					SPECTR	
Gr. Day	Beg. UT	End UT	Max. UT	Position	Imp.	Flare Serial No.	Beg. UT	End UT	Max. Int.	Freq. Range	Obs.	Beg. UT	End UT
26	1646	1945	1710	S11 E54	3	53							
May 04	2145	2340	2213	S11 W56	3	54	2209	2239.3	1	41-20	7	2249	>2401
09	1438	1805	1551	N09 E12	3	55							
June 11	1502	1620	1521	N02 W49	2+	56	1508 1508 1516	1515 1512 1523	2 2 3	150- 50 41-12 41-11	Har 7	1505 1520	1526 1578
13	0439	0456	0442	N02 E28	1		0445	0446			Syd		
14	1610	1700	1635	N02 E07	2		1634	1638	1	140- 45	Har		
15	1622	1736	1645	N05 W07	2+		1646 1649	1701 1708	2 1+	150-<25 41-20	Har 7		
15	1716	1730	1718	N03 W06	1+		1723	1727	2	200- 50	Har	1717	1732
July 11	1615	2040	1659 1710	S07 E31	3	57	1702	1718	3+	140-<25	Har	1655 1702	1845 2300
12	0950	1300	1025	S07 E22	3+	58							
15	1433	1929	1558	N13 E15	3+	59						1533 1435 1522	1623 1803
17	0710	0926	0736	S07 W45	3	60							
18	0920	1250	1005	S07 W59	3+	61							

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(CONTINUED)

...AL OBSERVATIONS TYPE IV			SINGLE - FREQUENCY RADIO EMISSIONS							
Max. Int.	Freq. Range	Obs.	Freq.	Type	Beg. UT	End UT	Max. UT	Peak Flux	Mean Flux	Obs.
			2800	s	1640	1857		32	11.3	Ott
			2800	c	1656.8	1704.8	1702	18.3	9.6	Ott
			108	s	1647.5	1648.1	1648	>30		NBS
1-	41-26	7	9400	s	2207	2216	2209.2	25		Nag
			3750	c	2207	2213	2209	80		Nag
			2800	s	2205	2214	2208.8	95	31	Ott
			2000	c	2205	2213	2208	110		Nag
			1000	f	2205	2213	2208	30		Nag
			108	s	2207.5	2210.5	2208.6	>30		NBS
			2800	s	1540	1830	-	6	3.7	Ott
			2800	s	1543	1546.3	1544.8	9	4.6	Ott
			1500	s	1542.5	1549	1544.5	14		HHI
3	3000-<100	Har	9400	c	1505	1515	1508	100		Pra
2	41-28	7	2800	C+	1500	1527	1507	365	77	Ott
			808	C+	1503	1520	1507	187		Pra
			600	eC+	1503	1527	-	500	105	Ucc
			200	C+	1504	1531	-	>900	200	Ned
			108	C	1505	1509.5	1506	>300		NBS
			108	C+	1509.5	1529.5	1531	>300		NBS
			200	c	0442.3	0443.6	0442.9	>830	40	Hir
			2800	s	1627	1635	1629.5	30	15	Ott
			1500	c	1627.3	1635.3	1629.8	14		HHI
			545	c	1628	1632	-	16	8	Ned
			200	c	1627.5	1631.5	-	150	50	Ned
			108	c	1633	1637.5	1634.2	>30		NBS
			9100	S	1640	1645	-	265	133	Ned
			2800	S	1638	1647	1642	185	48	Ott
			1500	s	1637.6	1657.2	1642.2	52		HHI
			545	c	1635	1647	-	18	8	Ned
			200	C	1635	1643	-	480	80	Ned
			108	C	1643	1646.5	1645	>300		NBS
1-	41-25	7	9100	s	1718	1720	-	292	119	Ned
			2800	s	1717.5	1723.5	1718.5	95	11	Ott
			1500	s	1718	1725	1719	66		HHI
			545	S	1718	1720	-	>750		Ned
			200	C	1718	1720.5	-	>1000		Ned
3	>3900- <25	Har	9100	C+	1652	1730	1704.5	1380		Ned
2+	41-18	7	2800	C+	1650	1845	1745	1500	360	Ott
			600	eC+	1652.5	1826.5	-	840	260	Ucc
			200	C+	1657	1847	-	>900	500	Ned
			108	C+	1654	2608	1750	>300		NBS
			9100	C+	1018	1145	1029	6000	1500	Ned
			2980	C+	1018	1145	-	4100	1100	Ned
			2800	Pi	1145	1530	-	45	13	Ott
			1500	C+	1010	1410.5	1042.5	1700		HHI
			600	eC+	1019	1159	-	950	250	Ucc
			200	C+	1022	1142	-	22000	2000	Ned
			111	C+	1024.2	1200.2	1030	4000	350	AOP
			23	C+	1023.8	1052.3	1031.4	3000	300	AOP
3	3000- 100	25	9100	f	1430	1445	-	14		Ned
			2980	c	1433	1441	1436.5	61	27	Ned
3+	41-9	7	2800	s	1432	2210	1623	54	23	Ott
			2800	c	1432	1446	1436.3	54	16	Ott
			1500	c	<1435	>1635	1600.7	296		HHI
			600	ec	1431	1451	-	47	13	Ucc
			200	c	1435.5	1439.5	-	280	100	Ned
			111	c	1435.8	1438.6	1436.9	1500	150	AOP
			2800	c	1536	1623	1610	111	25	Ott
			808	C	1535	1630	1620	>270		Pra
			545	C	1525	1635	-	400	70	Ned
			200	RF	1530	1730	-	100		Ned
			3750	C	0718	0843	0758.6	125		Nag
			2980	C	0718	0908	-	103	41	Ned
			2000	C	0718	0843	0758.2	105		Nag
			1000	C	0720	0810	0758.5	85		Nag
			600	ec	0729	0734	-	55	13	Ucc
			9100	C+	0939	1049	-	>2400		Ned
			2980	C+	0938	1043	-	2400	800	Ned
			1500	C+	0938.5	1330	0858	1180		HHI
			808	C+	0743	1100	-	300		Pra
			545	C+	0944	1034	-	650	200	Ned
			200	C+	0944	1044	-	1000	200	Ned
			111	C+	0944	1330	0956.7	4000	150	AOP
			23	C+	0946.2	1030.2	0951.5	3000	300	AOP

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TABLE IV 1960-

FLARE DATA							SPECTRAL OBSERVATIONS TYPE II					
Gr. Day	Beg. UT	End UT	Max. UT	Position	Imp.	Flare Serial No.	Beg. UT	End UT	Max. Int.	Freq. Range	Obs.	Beg. UT
July 20	1633	1735	1653	S05 W90	3+	62	1554	1556	3	420-150	Har	1552
							1557	1619	3	250-<25	Har	1607
							1600	1625	3	41- 20	7	1620
23	2343	2430	2348	S06 W49	1		2347	2359	3	>580-<100	Har	
24	0403	0620	0504	N12 E16	3+	65						
24	1722	2220	1822	N08 E09	3	66						
28	No Flare Patrol						0233	0258			Syd	0303
30	No Flare Reported						1927	1930	2	180- 50	Har	1946
							1926	1932	1-	41- 33	7	
							1942	1946	1+	41- 30		
Aug. 10	2309	2353	2320	N08 E68	1		2325	2342			Syd	
							2330	2343	1	41- 21	7	
11	No Flare Reported						0412	0420			Syd	
12	1614	1635	1618	N17 W49	1		1618	1631	2	220-<25	Har	
							1624	1638	1+	41- 7.6	7	
18	2038	2152	2049	N09 W37	2		2046	2110	3	180-<25	Har	2135
							2051	2146	3	41-22	7	
Sept. 03	2040	2125	2049	N11 E01	2		2049	2055	1	200- 35	Har	
10	No Flare Reported						1947	2014	3	150-<25	Har	1937
							1935.2	1938	2	41- 7.6	7	1935
												2013
15	0031	0139	0042	S15 W11	2		0043	0050			Syd	
16	1057	1258	1110	N18 E77	3+	68						
27	1950	2016	1956	N13 E71	1+		1956	2013	3	180-<25	Har	
							2001.3	2015	1+	41-25	7	
28	2202	2530	2223	N13 E29	3	69	2217	2231	3+	150-<25	Har	2212
							2217	2249	3+	41-15	7	2214.3
Nov. 10	1434	1450	1444	N19 W90	1+		1433	1437	3	150-<50	Har	1440
							1439	1502	3	150-<25	Har	1440
							1433.4	1509	3	41-21	7	
Dec. 23	1856	2350	2002	S07 E43	3	70						
23	2100	2140	2120	507 E90	1							2022
	2209	2225	2214	512 E90	1							

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SPECTRAL OBSERVATIONS TYPE IV				SINGLE-FREQUENCY RADIO EMISSIONS							
End UT	Max. Int.	Freq. Range	Obs.	Freq.	Type	Beg. UT	End UT	Max. UT	Peak Flux	Mean Flux	Obs.
1804	3	>3900- 50	Har	9100	EC+	1552	1637	1553.6	4000	1000	Ned
			25	2800	C+	1552	1634	1621.3	1800	500	Ott
1730	2	48-10	7	2800	C	1634	2016	1725.5	250	55	Ott
				1500	C+	1552	>1842	1621.5	412		HHI
				545	C+	1552.5	1629.5	-	700	75	Ned
				200	C+	1554	1613	-	4000	1000	Ned
				108	C+	1557	1604.2	1559	>300		NBS
				545	C	2345	2357	-	130	60	Hol
				200	RF	2347	2407	-	250	120	Hol
				200	c	0428.7	0429.6	-	>800	200	Hir
				2800	S	1730	>2330	1802	16		Ott
				600	s	1742	1813	-	11	7	Ucc
				200	Rise	1735	-	-	350		Ned
0344			Syd	9400	C	0230	0300	0235.6	220		Nag
				3750	C	0226	0321	0235.2	400		Nag
				3000	eC	0230	0240	0236	380		Tok
				2000	C	0226	0301	0235.6	260		Nag
				1000	C	0227	0252	0235.3	45		Nag
				545	s	0230	0233	-	50	30	Hol
				200	Storm	0231	0327	-	>350	30	Hol
2042	2	41-24	7								
				9400	s	2316	2319	2317.1	25		Nag
				3750	s	2316	2318	2316.8	40		Nag
				2800	s	2315.5	2318	2316.8	22	10	Ott
				2000	c	2316	2319	2316.8	10		Nag
				200	c	2317	2319	-	450	120	Hol
				-							
				2800	s	1613.5	1618	1616	7	3	Ott
				1500	s	1614	1620	1615	7		HHI
				600	es	1614.5	1617.5	-	33	9	Ucc
				200	f	1613	1623	-	300		Ned
2158	1-	41-26	7	2800	s	2039	2050	2044	43	16	Ott
				2800	c	2054.2	2058.	2056.3	28	10	Ott
				180	C	2047.5	2054.5	2049.3	>300		NBS
				2800	S	2042	2052	2045.5	270	35	Ott
2017	3	>3900-<2100	Har	2800	C	1930	2031	2001	880	300	Ott
			25	108	Onset	1934	2014	1939.3	>30		NBS
2154	1+	41-21	7		Storm						
				9400	S	0034	0104	0040	105		Nag
				3750	S	0030	0110	0040	280		Nag
				2000	C	0030	0100	0040	145		Nag
				1000	c	0033	0103	0040	43		Nag
				9100	C	1102	1127	1104	635	221	Ned
				2980	C	1101	1135	1104.6	532	106	Ned
				1500	C	1055	1205	1111.6	146		HHI
				600	s	1101	1108	-	47	20	Ucc
				200	C	1103	1111	-	5000	300	Ned
				111	c	1103.2	1118.1	1103.9	10000	100	AOP
				23	f	1104.7	1118.1	1115	1000	50	AOP
				2800	c	1952.5	1954.5	1952.7	13	5	Ott
				200	c	1952	1953.7	-	>1200		Par
				108	c	1952.5	2004.5	1953.4	>30		NBS
2249	3	>3900- 50	Har ,25	9400	C+	2213	2253	2217.3	1600		Nag
2358	2+	41-14	7	3750	C+	2212	2252	2217.3	1690		Nag
				2000	C+	2211	2251	2220.2	1000		Nag
				1000	C	2208	2253	-	>75		Nag
				545	C+	2214	2250	-	1600	300	Hol
				200	C+	2213	2343	-	>900	150	Hol
				108	C	2213	2222	2217	>300		NBS
				108	C+	2222	2404	2347	>300		NBS
			25	9100	c	1432	1452	1439.8	142	52	Ned
1543	3	41-21	7	2800	C	1428	1506	1444	124	46	Ott
				1500	c	1430	1440	1435.3	47		HHI
				108	C	1432	1437	1435	>300		NBS
				108	C	1438	1501	1441	>300		NBS
				2800		1900	>2015	-	13		Ott
2025	2	41-20	7								

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FLARE DATA							SPECTRAL OBSERVATIONS TYPE II					
Gr. Day	Beg. UT	End UT	Max. UT	Position	Imp.	Flare Serial No.	Beg. UT	End UT	Max. Int.	Freq. Range	Obs.	Be UT
1962 Jan. 23	No Flare Patrol						1500.2 1459.4	1506 1508	2 1+	75- 50 41-26	Har 7	
Feb. 06	No Flare Reported						2203	2223	3	41-16	7	211 222
23	No Flare Reported											220
Mar. 01	1634	1725	1644	S13 W56	2+		1641.1 1637.2	1659 1705	3	320- 25	Har 7	170 175
13	1444	1640	1446	N10 E66	2+	71						
22	No Flare Patrol						0231.5	0235			Syd	
22	2220	2310	2241	N07 E36	3	72						
Apr. 12	No Flare Reported						1648 1658	1651 1107	3 2	41-26 41-22	7	16 17
12	2149	2244	2213	N11 E19	1		2154	2207	3	41-21	7	22 22
18	1734	2129	1806	N09 E05	3	73	1844.4	1853	2	75-25	Har	18
20	1958	2040	2003	N09 W26	2+		2004.6 2016	2019 2020.3	3 1+	300-25 41-29	Har 7	
21	2007	2040	2013	N14 W44	1		2021.8	2032	2	120-30	Har	
22	1430	1710	1450	N08 W48	3	74	1554.3	1603	3	90-25	Har	
27	1346	1440	1413	N08 E58	3	75	1414.5	1427	3	240-25	Har	
May 01	1916	1940	1927	N19 E60	1		1919.7 1921	1940 1940	3+ 3	150-25 41-12	Har 7	1 1
18	1532	1609	1535	S07 W53	1+		1533.3	1538	3	240-50	Har	
23	No Flare Reported						0245	0253			Syd	
28	1629	1720	1640	S15 E78	1		1640.3	1645	2	240-50	Har	
June 21	0620	0756	0640	N18 E25	3	76						
Aug. 13	2040	2112	2046	N06 W05	1		2042	2045	3	75-45	Har	
14	0226	0302	0235	N02 E76	1		0248	0255			Syd	

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	SPECTRAL OBSERVATIONS TYPE IV				SINGLE-FREQUENCY RADIO EMISSIONS							
	End UT	Max. Int.	Freq. Range	Obs.	Freq.	Type	Beg. UT	End UT	Max. UT	Peak Flux	Mean Flux	Obs.
					-							
	2200	1-3	450-150	Har	108	c	2156	2204	2157	>30		NBS
	2326	1+	41-24	7	108	c	2204	2330	2229	>30		NBS
	2417	2	580-320	Har	-							
	2005	1+	41-15.5	7	2800	C	1635	1657	1642.5	425	81	Ott
	1828	2-3	250-125	HAR	545	c	1637	1645	1639	120	30	Ned
					200	C	1640.7	1645	-	>900	>900	Ned
					108	C	1636.5	1648.5	1645	>300		NBS
					108	C	1648.5	1740.5	-	>30		NBS
					9100	C	1448.2	1503.2	1450.5	861	271	Ned
					2800	C	1447.5	1507	1450.5	470	85	Ott
					1500	C	1448.7	1558.7	1451.6	>880		HHI
					545	s	1450	1500	1454	40	18	Ned
					200	C	1450.5	1501.5	1452.7	320	55	Ned
					108	f	1450	1512	1452.3	30		NBS
						c	-	-	2231.2	29		Nag
					3750	-	2214	2250	2230	35		Ott
					2800	c	-	-	2231.4	16		Nag
					2000							
5	1707	2	41-22	7								
0	1425	2	41-22									
	2213	2-3	580-100	Har	9400	s	2211.5	2215.5	2212.1	76		Nag
	2335	2+	41-21	7	3750	s	2204	2215	2212.2	135		Nag
					2800	c	2148	2218	2212	150	21	Ott
					2000	c	2203	2214	2212.2	92		Nag
					1000	c	2203	2213	2212	74		Nag
					208	eC+	2148	2214	2207	360	210	Uss
					200	c	2149.1	2157.1	2150.4	120	30	Hir
					200	C+	2200.5	2213	2210.4	460	120	Hir
					108	C+	2147.8	2158.9	2150.9	>300		NBS
					108	C+	2158.9	2213.5	2212.3	>300		NBS
	1942	2-3	580-170	Har	2800	s	1734	2228	1845	25	12	Ott
					2800	s	1800	1818	1803.5	20	5	Ott
					222	f	1800	1940	1817.3	310	50	Sea
					2800	s	1957.3	2009	1959	72	13	Ott
					200	c	2002.7	2006.2	2004.2	170	60	Hir
					108	C	2001.5	2008.2	2006	>300		NBS
					2800	s	2002	2127	2035	4	2.7	Ott
					222	c	2008	2010	2009	50	10	Sed
					9100	s	1438	1515	1502	52	26	Ned
					2800	c	1437	1450	1443.5	42	17	Ott
					2800	s	1532	1541	1535.5	7	4	Ott
					215	c	1535	1645	1625	115	25	Osl
					9100	S	1412.2	1415.2	1413.1	614	256	Ned
					2980	s	1411.5	1415.5	1413.1	180	100	Ned
					1500	s	1412	>1421	1412.5	72		HHI
					545	s	1412.8	1416	1413.8	25	12	Ned
					545	s	1416.2	1416.5	-	60	30	Ned
					200	C	1412.3	1420.3	1413.6	2100	350	Ned
					111	C	1412.3	-	1412.5	8000		AOP
					23	F	1412.4	1438.6	1412.6	>10000	1000	AOP
3	2012	1-2	3000-180	Har	2800	c	1915	2105	1920.5	60	6	Ott
5	2130	1	41-23	7	222	c	1918	1928	1918.5	270	50	Sea
					108	C	1918.5	1936.5	1922.5	>300		NBS
					9100	s	1531.9	1533.1	1532.2	62	35	Ned
					2800	s	1531.7	1536.7	1532.4	56	11	Ott
					1500	s	1531.5	1535.7	1532.4	5		HHI
					200	c	1531.9	1534.9	1533.7	800	250	Ned
					108	C	1531.5	1541.5	1535	>300		NBS
					-							
					200	c	1640	1642	-	160	45	Ned
					108	s	1641.8	1645.3	1643	>300		NBS
					9400	f	0625	0805	0646	-	-	HHI
					1500	s	0625	0800	0637	5	-	HHI
					2800	s	2039.5	2042.1	2041	23	7	Ott
					108	s	2039.5	2041	2040.3	>30		NBS
					9400	s	0245	0248	-	>175		Nag
					3750	c	0244.5	0248.5	0246.8	70		Nag
					2000	c	0245	0250	0246.8	33		Nag
					1000	s	0245	0250	0247	22		Nag
					545	c	0246	0247.6	-	30	12	Hol
					200	c	0247.1	0253.1	0249.7	>1000	120	Hir

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TABLE IV 1960-196

FLARE DATA							SPECTRAL OBSERVATIONS TYPE II					SPEC
Gr. Day	Beg. UT	End UT	Max. UT	Position	Imp.	Flare Serial No.	Beg. UT	End UT	Max. Int.	Freq. Range	Obs.	Beg. UT
19	No Flare Reported						1653.3	1655	3	150-60	Har	
Sept. 07	1507	1730	1534	S14 E24	2							1517
Oct. 23	1642	1745	1704	N03 W70	2		1648.7	1650	2	125-60	Har	
Nov. 30	No Flare Patrol						0322	0329			Syd	
1963 Mar. 03	No Flare Reported						2350	2353	1	140-<50	Har	
Apr. 26	No Flare Reported						0352	0415			Syd	
May 01	0525	0835	0608	N15 E46	2		0536	0558			Syd	
24	1515	1525	1519	N10 W70	1-		1519.7 1524.3	1527 1540	2 1	175-<50 41- 22	Har 7	
25	0129	0135	0129	N08 W78	1		0133	0135			Syd	
25	1622	1638	1624	N05 W85	1		1623.5 1631.4	1637 1654	2 3	150-<50 41- 19	Har	1652
June 14	0225 0247	0245 0330	0228	N09 W34 N09 W35	1 1		0234.5	0252.5			Syd	
26	0300	0346	0306	N07 W68	?		0306	0316			Syd	
Aug. 12	No Flare Reported						0000	0008			Syd	
17	1540	1640	-	S12 E09	1+		1611.5 1613.3	1616 1618	2 2	240- 50 41- 29	Har 7	
Sept. 14	2112	2205	2123	N12 E72	1							
15	2008	2210	2113	N10 E60	2+	17						

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3(CONTINUED)

...TRAL OBSERVATIONS TYPE IV				SINGLE-FREQUENCY RADIO EMISSIONS							
End UT	Max. Int.	Freq. Range	Obs.	Freq.	Type	Beg. UT	End UT	Max. UT	Peak Flux	Mean Flux	Obs.
				600	ec	1651	1653	-	14	9	Ucc
				221.5	f	1651	1652	1651.3	120	25	Sea
				108	s	1653.3	1654.8	1654	>300		NBS
1702	1-3	580- 180	Har	9100	s	1510	1605	1527	26	13	Ned
				2800	C+	1503	1550.2	1529	140	44	Ott
				2000	C+	1505	1705	1529.5	-	-	HHI
				1500	C+	1505.5	1705.5	1531	282		HHI
				808	C+	1507	1617	-	>300		Pra
				550	C+	1512	1712	1545	1000	200	Ned
				260	C+	1505	1615	1518	20		Pra
				200	S	1510	1543	1520	85	45	Ned
				108	C+	1507	1555	1529	>30		NBS
				2800	s	1642	2112	1658	16		Ott
				221.5	RF	1645	1833	1656	62	6	Sea
				9400	s	0317	0329	0320	56		Nag
				3750	s	0317	0327	0319.6	87		Nag
				2000	s	0312	0324	0318.4	57		Nag
				1000	c	0312	0330	0317	62		Nag
				-							
				2000	c	0358	0438	0418	59	25	Nag
				1000	c	0346	0401	0348	24	10	Nag
				200	c	0351.5	0352	0351.7	720	200	Hir
				200	c	0351	0411	-	20	10	Hir
				9400	C+	0532	0600	0537.6	1500	600	Nag
				3750	C+	0526	0600	0544	1500	640	Nag
				2000	C+	0526	0606	0545	600	200	Nag
				1000	C+	0526	0606	0545	135	50	Nag
				600	eC+	0520	0617	-	550	100	Ucc
				200	c	0533.8	0535.8	0534.9	1000	250	Hir
				200	c	0536	0611	-	180	40	Hir
				9400	s	1515.5	1518.5	1516	109		HHI
				2800	s	1515.3	1520.5	1515.9	32	6	Ott
				550	-	1515	1516	-	20		Ned
				200	-	1515	1516.2	-	>180		Ned
				108	s	1515	1516.3	1515.5	>300		NBS
				18	-	1514	2130	-	-		NBS
				2000	c	0129	0137	0130.1	15	3	Nag
				1000	f	0126	0136	0130.1	37	10	Nag
				208	c	0130	0132	0131	62	40	Uss
				108	f	0126	0134	0130.8	>300		NBS
1712	1-	41-23	7	9400	s	1621.5	1625.5	1622.4	21		HHI
				2800	s	1621.8	1628	1622.5	16	4	Ott
				2000	s	1621.5	1625.5	1622.3	-		HHI
				550	s	1621.8	1623.8		15	8	Ned
				200	c	1621.8	1625.8		420	130	Ned
				200	Rise/ Storm	1622	-			-	Ned
				108	Precur- sor	1621.4	1626.6	1623.5	>300		NBS
					Storm	1621.6	2731.6	2010	>30		NBS
				9400	c	0221	0231	0336.6	50	25	Nag
				3750	c	0220	0230	0226.7	70	35	Nag
				2000	c	0219	0231	0227.6	34	19	Nag
				1000	c	0219	0231	0227.6	25	11	Nag
				9400	s	0303	0313	0304.4	20	10	Nag
				3750	c	0302.5	0317.5	0304.4	50	15	Nag
				2000	c	0301	0321	0304.4	36	14	Nag
				-							
				9400	C	1609	1629	1610.2	344		HHI
				2800	s	1609	1617	1610.5	145	27	Ott
				2800	s	1620	1623	1621	6	3	Ott
				1500	c	1609	1639	1610.2	80		HHI
				600	es	1609.5	1614.5	-	80	35	Ucc
				600	c	1615	1628	-	27	10	Ucc
				200	C	1609.5	1615	1610	>650	85	Ned
				200	RF	1617	1637	1621	14	7	Ned
				18	-	1610	1613	-	-		NBS
				2800	Pre- cursor	2134	2143		24	14	Ott
				2800	S	2143	2150	2144.5	550	130	Ott
				2800	s	2017	2130	2031	9	4.5	Ott
				2800	s	2017	2018	2017.5	6	3	Ott

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FLARE DATA							SPECTRAL OBSERVATIONS TYPE II					SP
Gr. Day	Beg. UT	End UT	Max. UT	Position	Imp.	Flare Serial No.	Beg. UT	End UT	Max. Int.	Freq. Range	Obs.	Beg. UT
Sept. 20	No Flare Reported						2400 2403	2426 2415	3	41-15	Syd 7	2410 >2
26	0638	0944	0717	N13 W78	3	79						

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3 (CONTINUED)

CTRAL OBSERVATIONS TYPE IV				SINGLE-FREQUENCY RADIO EMISSIONS							
End UT	Max. Int.	Freq. Range	Obs.	Freq.	Type	Beg. UT	End UT	Max. UT	Peak Flux	Mean Flux	Obs.
55	3	41-23	7	9400	C+	2347	2404	2358.8	3850	470	Nag
				9400	C	2429	2435	2432.8	275	165	Nag
				3750	C+	2350	2413	2400.3	1400	300	Nag
				2000	F	2405	2500	2430.4	880	100	Nag
				1000	F	2404	2500	2432.4	1350	120	Nag
				200	C+	2350	2640	—	>10000	1000	Hir
				9500	S	0710	0732	0714	2901	2479	Tok
				9400	C+	0705	1000	0714	>992		HHI
				9400	C+	0705	0735	0714.2	4350	1030	Nag
				3750	C+	0705	0740	0716.2	1850	605	Nag
				3750	C	0740	0755	0749.3	200	105	Nag
				2980	C+	0705	0805	0716	1008	168	Ned
				2000	C+	0705	0732	0723	495	255	Nag
				2000	C+	0732	0755	0749.4	115	115	Nag
				1500	C	0637	1137	0723.5	287		HHI
				1000	C+	0700	0732	0714	185	75	Nag
				1000	c	0732	0755	0749.2	47	30	Nag
				600	es	0701.5	0712.5	-	340		Ucc
				600	C+	0713.5	0923.5	-	415		Ucc
				550	C+	0705	0900	0713	260	20	Ned
				200	C+	0705	0745	0710	260	90	Ned
				111	c	-	-	(0722)	(220)		AOP
				23	C	-	-	(0716.1)	(10000)		AOP

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V. CATALOGUE OF GEOMAGNETIC STORMS DURING 1960 – 1963

V

TABLE V. CATALOGUE OF GEOMAGNETIC STORMS DURING 1960-1963

This catalogue has been prepared from geomagnetic storm data from many sources. Data derived from papers published in the scientific literature are referenced in the last column of the table.

The table has been set up in three sections that will be described in some detail under the column headings; these sections are as follows:

1. General storm classification.

2. Planetary three hour Greenwich interval indices during the storm.

3. Values for D, H., and Z and other storm data from six selected magnetic observatories (reference 23).

		Geographic		Geomagnetic	
		Lat.	Long.	Lat.	Long.
Co	College, Alaska	N64°52'	212°10'	N64.5	255.4
Fr	Fredericksburg	N38°12'	282°38'	N49.6	349.9
GR*	Greenwich	N51°00'	355°31'	N54.6	79.0
Ho	Honolulu	N21°18'	201°54'	N21.1	266.5
Si	Sitka	N57°04'	224°40'	N60.0	275.4
Tu	Tucson	N32°15'	249°10'	N40.4	312.2

* Data published by the Royal Greenwich Observatory in reference 20.

The column heading, together with any necessary descriptions or definitions, follows:

Column 1 Storm Catalogue Serial Number.

Column 2 Greenwich Day.

GENERAL STORM CLASSIFICATION (Columns 3 through 8)

Column 3 Onset Time UT.

Column 4 End, Greenwich Day/UT.

Column 5 Type, g - gradual, sc - sudden commencement.

Column 6 Maximum Intensity, m - moderate (K - index as great as 5) ms - moderately severe (K = 6 or 7), s - severe (K = 8 or 9).

Column 7 Maximum three hour K_p

Column 8 Average storm K_p. This has been calculated as the average K_p for the period shown in Columns 3 and 4.

Column 9 Number of Observatories Reporting the Geomagnetic Storm. We have given the number of observatories reporting the storm as a sudden commencement in references 22 and 23. The first numbers from reference 44 give number of observatories reporting an sc. The second number gives the total number of observatories reporting.

PLANETARY THREE-HOUR INDICES AND OTHER DATA DURING THE STORM PERIOD

Column 10 Planetary three-hour indices.

Column 11 Sum of the K_p for the Greenwich day.

Column 12 A_p for the Greenwich Day.

Column 13 The Greenwich Day and three hour interval with the first $K_p \geq 4-$.

GEOMAGNETIC DATA FROM SIX SELECTED OBSERVATORIES

The data for five of the stations were taken from reference 23. The Greenwich data were obtained from reference 20.

Column 14 D-Magnetic Declination - This is the azimuth of the horizontal component or the magnetic intensity measured from the geographic north towards the east from 0 to 360. Unit in minutes of Arc.

Column 15 H-Horizontal Intensity. The magnitude of the horizontal component, always considered as positive. In units of gammas (10^{-5} gauss).

Column 16 Z-Vertical Intensity. The magnitude of the vertical component. Positives if downward, negatives if upward, in units of gammas (10^{-5} gauss).

Column 17 Onset Time. This is the time reported by the observatory.

Column 18 End Time. Reported by the observatory (Greenwich Day/UT).

Column 19 Maximum K_p. This is the maximum three-hour K_p reported by the observatory.

Column 20 Name of the Observatory. The code is given on page 5.V-i.

Column 21 Range of Starting Time.

Column 22 Sources. These are the published sources for the data given in this table. In many cases these references give relations of the storms to other phenomena, such as a solar flare, polar cap absorption, etc.

TABLE V-A. MAJOR GEOMAGNETIC STORMS DURING 1960-1963

A list of all storms during 1960-1963 with at least one K_p equal to or greater than 7+ is given on Table V-A, page 5.V-4. The data for 1960 were published in IAGA Bulletin 12-01. The data for 1961 through 1963 were prepared from the planetary three-hour-range indices Kp published in references 4 and 7.

TABLE V CATALOGUE OF GEOM

Serial No	Date	BASIC STORM DATA Onset	End	Type	Max. Int.	Max. Kp	Average Storm Kp	SSC REPORTS Reference 22	44	23	Three Hour Gr. Interval Kp 1	2	3	4	5	6	7	8	Σ Kp
	1960																		
	Jan.																		
1	05	0201	06/04xx	Sc	m	5-	4-	41	50/63	4	3o	5-	4o	3+	4+	3+	3-	4o	29+
	06										4-	3+	2-	1+	2-	2-	2o	1+	17-
2	10	0718	11/18xx	Sc	ms	6-	5-	44	52/65	14	1+	2+	5o	5+	5-	6-	6-	5+	35+
	11										4o	3+	5-	4+	5o	4o	3o	3-	31o
3	13	1859	15/17xx	Sc	ms	6+	4+	62	76/78	17	2o	3-	2o	2-	1+	1+	4-	3+	18o
	14										5+	4+	5o	5-	4o	3o	5+	6-	37+
	15										6+	5+	4-	3+	3+	3+	2o	1+	29-
4	18	0645	18/15xx	Sc,g	ms	6·	5o	6		3	2o	2+	6-	5-	4+	2+	3-	3-	27-
5	19	2208	22/14xx	Sc,g	m	6o	4o	22	26/46	3	3+	2o	1o	2o	2+	2o	2-	2-	16o
6	20	0357	22/14xx	Sc,g	ms	6o	4o	2		2	2-	3+	3o	4+	3+	4o	3-	2+	25-
	21										6o	4+	4o	5o	5o	5o	6-	5o	40o
	22										4o	3+	4-	5o	3o	3o	2o	3-	27-
	Feb.																		
7	05	06xx	06/17xx	g	m	5o	4o	-		4	1+	1-	3-	5o	4+	4-	3-	3+	24-
	06										5-	5-	4o	2+	2+	3o	1+	2o	24+
8	13	1930	14/23xx	g	m	5+	4o	2		2	0o	0+	2o	2+	2-	1-	3o	5o	15o
	14										5+	4+	4-	4-	4-	4-	5-	3o	32o
9	16	0847	21/21xx	Sc,g	ms	6-	4-	4		9	3+	2+	2+	4-	6-	5+	3o	4-	29+
	17										4-	3+	4+	3+	4-	3o	3+	5-	29+
	18										5+	5-	5-	3+	3o	3+	4o	3-	31o
10	19	1600	20/07xx	g	m	5o	4+	-		1	2o	2o	3+	4-	3o	4o	5-	4+	27o
	20										5o	4o	3o	3-	3o	3o	2-	3-	25o
	21										3+	4-	4+	5-	3o	4o	3o	2+	28+
11	26	1043	27/23xx	Sc	m	5-	3o	36	44/58	1	0+	0o	1o	2+	2-	3o	2-	1+	11+
	27										4-	5-	4-	4o	3+	3+	3o	3-	28+
	Mar.																		
12	14	1502	18/14xx	Sc,g	ms	7-	3+	6	8/15	1	1+	2+	2-	3-	2-	3o	1-	1+	15-
13	15	1225	17/22xx	Sc,g	ms	7-	4+	5		5	2+	0o	1+	1+	3o	4o	5-	6-	22+
	16										6+	7-	6-	4-	3o	4o	5o	4+	39-
	17										3+	4-	4+	4o	3-	3+	4o	3-	28o
	18										3-	4-	4o	3-	2+	1o	0+	3-	19+
	30										4-	2+	2o	3o	3-	4+	4o	4+	26+
14	31	0955	02/14xx	g	s	9-	8-	8	0/14	10	4+	5-	5o	8-	7-	8o	8-	8+	52+
	Apr.																		
15	01	0307	-	Sc	s	9-	-	2		-	9-	9-	7o	8o	8+	9-	9-	7+	65+
16	02	2313	05/09xx	Sc	ms	7+	4+	53	67/69	15	7o	6o	6o	6+	5+	2o	3-	4+	40-
	03										7-	7+	7o	6-	4-	3+	4+	3-	41-
	04										3-	4+	3-	3-	4-	4o	4-	6-	29+
17	05	1300	05/21xx	Sc	ms	6o	5-	37	45/60	1	4+	6-	4+	2-	5-	6o	3o	1+	31o
	06										1o	2+	3-	2o	3-	5-	4o	4o	23+
18	07	1511	08/14xx	Sc	m	5+	4o	30	37/54	2	3+	4-	2o	1-	2+	5-	5+	3+	25+
	08										4o	4-	3+	3+	3-	3+	2o	2o	24+
19	10	0126	13/09xx	Sc,g	ms	7-	4o	40	49/54	7	3-	4o	4-	3+	4-	3o	5-	7-	32-
	11										4+	5-	3o	3+	3+	3+	3-	5o	30-
	12										6-	6-	5+	4-	3o	3o	3-	4o	33o
	13										4+	5+	6-	3-	2+	3-	3+	3+	30-
20	16	1200	18/12xx	g	ms	6-	4o	-		3	4o	3+	2+	3-	5o	5+	4+	4+	31+
	17										6-	5-	4-	4o	2+	3+	4o	4o	32-
	18										5+	3+	4+	4+	2+	3-	1+	2o	26-
21	23	2100	26/11xx	g	ms	7-	5o	-		8	2-	3-	2o	2o	1+	2-	2o	6-	19o
	24										7-	7-	5o	4-	5o	3+	6o	6+	43-
	25										7-	5+	5+	5o	5+	5-	5o	5-	42o
	26										4+	3+	4-	3-	3-	3-	2+	4o	26-

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AGNETIC STORMS DURING 1960-1963

Ap	Kp Interval 1st Kp ≥ 4- Date/Interval	Time where 3 Consecutive Kp<4- Date/Interval	D	H	Z	Onset	End	Max. Kp	Obs.	Range of Starting Time	Sources
24	05/2	06/2	60	610	360	0201	5/16	7	Si		
9											
43	10/3	11/7	173	1180	685	0718	11/04xx	7	Lo	0647 - 0720	32
27			16	140	58	0719	12/03xx	5	Fr		
			2	115	25	0718	10/24xx	5	Ho		
			70	700	480	0720	11/17xx	7	Si		
			10	152	28	0647	11/18xx	5	Tu		
10	13/7	15/4	100	1530	540	2000	15/09xx	7	Co	1859 - 2000	13,32,37
42			26	160	97	1900	15/17xx	5	Fr		
30			1	100	20	1900	15/18xx	5	Ho		
			50	970	660	1900	15/17xx	7	Si		
			13	157	59	1859	15/17xx	6	Tu		
23	18/3	18/6	17	128	40	07xx	19/02xx	5	Fr	0645 - 0800	37
			80	720	510	0800	18/13xx	7	Si		
			13	73	37	0645	18/21xx	6	Tu		
8	-	-	22	187	46	2200	22/12xx	5	Am	2200 - 2208	
			11	132	41	2203	26/06xx	5	Ap		
			15	132	23	2208	22/14xx	5	Tu		
17	20/4	22/5	22	129	56	20/03xx	24/22xx	5	Fr	20/03xx - 21/01xx	
50			28	136	121	20/03xx	22/00xx	5	He		
20			42	115	130	21/01xx	-	-	Gr		
19	05/4	06/4	26	90	46	06xx	6/17xx	5	Fr	06xx - 1100	
19			90	580	450	1000	5/20xx	7	Si		
11	13	14	21	78	50	19xx	14/23xx	5	Fr	19xx - 1930	
29											
27	16/4	18/4	22	90	55	16/09xx	21/21xx	5	Fr	0836 - 1400	
23			25	590	450	16/1400	16/18xx	7	Si		
28			15	105	39	16/0920	19/00xx	5	Tu		
21	19/4	20/3	25	115	50	19/1600	20/07xx	5	Wi	Only by one station	
19											
22											
6	27/1	27/5						6	Hu	26/1043 - 27/1100	
22			9	264	44	27/1100	27/23xx				
8	-	-	6	271	41	14/1500	18/14xx	6	Ap	Only by one station	
21	15/6	18/4	33	147	171	15/12xx	17/22xx	6	Fr	15/1200 - 16/0200	
52			45	125	130	15/12xx	16/xxxx	-	Gr		
21			4	225	15	15/12xx	16/24xx	8	Ho		
12			130	990	630	16/0200	16/11xx	8	Si		
20			516	3030	1940	31/0430	02/14xx	9	Co	30/21xx - 31/1053	25,37
129	30/6	05/7	105	1082	661	30/21xx	02/13xx	9	Fr		18,13
			94	795	985	31/10xx	03/xxxx	-	Gr		
			10	300	85	31/09xx	01/24xx	8	Ho		
			350	3420	2450	31/0500	02/13xx	9	Si		
			47	398	114	31/0813	02/13xx	8	Tu		
			-	-							18
241	30/6	05/7	266	1960	770	02/2312	03/11xx	8	Co		18,13,25,37,32
62	30/6	05/7	36	223	271	02/2314	05/09xx	6	Fr		
68			5	185	35	02/2313	03/15xx	6	Ho		
26			90	950	600	02/2313	03/11xx	7	Si		
			18	135	43	02/2314	05/18xx	6	Tu		
34			30	145	85	05/1259	05/21xx	6	Wi	Only one station	18,25,32
17											18,25,32
22	07/6	08/3	17	93	114	07/1511	08/14xx	5	He	-	
16			5	366	19	07/1511	08/03xx	6	Hu		
33	10/2	11/3	105	1030	2980	0127	10/18xx	6	Co	-	32
25			33	119	133	0127	13/12xx	5	Fr		
35			21	133	54	0127	13/09xx	6	Tu		
28											
29	16/5	18/5	32	107	68	12xx	18/12xx	5	Fr	1200 - 12xx	
30			90	650	690	1200	17/11xx	7	Si		
21											
15	23/8	26/4	162	1260	910	23/21xx	25/22xx	6	Co	23/2100 - 24/0100	
66			40	209	216	23/21xx	26/11xx	6	Fr		
57			45	210	135	23/21xx	25/xxxx	-	Gr		
18			105	950	530	24/0100	25/17xx	7	Si		
			21	218	67	23/21xx	25/18xx	7	Tu		

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TABLE V 1960-

Serial No.	Date	BASIC STORM DATA Onset	End	Type	Max. Int.	Max. Kp	Average Kp	SSC REPORTS Reference 22	44	23	Three Hour Gr. Interval Kp 1	2	3	4	5	6	7	8	Σ K
	1960 Apr.																		
22	27	2020	29/20xx	Sc	ms	7o	6-	54	67/68	16	3-	2-	2+	2-	2+	2o	6-	7o	2
	28										7o	7-	7o	6o	6-	5+	6o	3+	4
	29										6+	6o	6o	5o	5-	4o	5-	4+	4
23	30	0132	01/14xx	Sc	s	9o	7-	48	54/64	10	7-	7-	6-	6-	9-	9o	8o	7o	5
		1213	02/13xx	Sc	s	9o	5o	36	45/52	7									
	May 01										7-	6+	6-	4+	4o	3+	3o	4o	3
	02										3-	4+	3o	3o	3-	3o	3o	2o	2
24	05	2000	07/24xx	Sc,g	ms	7+	5-	-		7	2-	2o	3-	2o	2-	1+	3+	4-	1
25	06	1650	08/01xx	Sc,g	ms	7+	5+	14	16/17	2	3+	4-	4-	5o	4o	5+	7o	7+	3
	07										6-	6o	4o	5o	6o	5o	4+	5+	4
26	08	0421	09/12xx	Sc	s	8+	6-	52	68/69	15	3+	6+	7-	7+	8o	8+	6+	7-	5
	09										3o	4-	3o	4o	3+	3o	2o	2-	2
	10										2+	2o	2+	2+	3-	2+	3o	4-	2
27	11	0435	12/15xx	Sc	ms	7-	4o	42	57/63	9	4-	7-	6+	4o	3+	3o	4-	4o	3
	12										2o	4-	4+	4o	4+	4-	2-	2+	2
	13										3-	2+	2-	2o	2+	3-	3+	3+	2
28	16	1350	17/14xx	Sc	ms	6+	4+	-	54/60	6	1+	2-	2o	2o	5+	6+	6+	6-	3
	17										3o	2o	4-	4-	4-	3-	1+	1+	2
29	23	1400	25/05xx	Sc,g	ms	6-	4+	-	7/10	5	1o	1o	1+	2o	6-	5-	5+	4o	2
	24										4-	5-	6-	4-	4-	3+	4+	4o	3
	25										4o	3+	3-	3-	3+	4-	4-	3+	2
30	28	2029	30/17xx	Sc	s	8-	4+	56	-/72	13	2+	2-	2o	1+	1o	1+	6o	4+	2
	29										8-	4+	4o	3+	5o	5-	5+	4+	3
	30										3-	2+	4-	4o	4+	4o	2-	2o	2
	31										2o	2+	2+	2+	3o	3o	3o		3
	June 01										4-	6o	4-	5-	4o	2o	2+	1+	2
	03										0+	0+	1o	1+	1+	3-	3-	4-	1
31	04	0248	06/14xx	Sc	ms	6+	5o	44	57/61	14	5-	6+	6+	5-	5-	4o	4o	5+	4
	05										5o	5+	5-	5o	4o	3+	4-	3+	3
											5-	4+	4-	5o	4o	3o	2o	2+	2
											3+	3o	3o	4-	3o	2-	3+	2+	2
32	25	1230	26/11xx	g	m	5+	5-	-		5	4-	2o	2+	3o	3+	5-	5-	5+	2
33	26	2015	27/11xx	Sc,g	ms	7-	5-	2		1	5-	5-	4+	2+	2+	3o	3-	3+	2
	27	0145	28/21xx	Sc	ms	7-	5-	55	68/72	15	7-	7-	6-	4+	2o	5+	6o	5+	4
	28										4o	4o	5-	6o	4+	4o	4+	4o	3
34	29	1939	30/06xx	Sc	ms	7o	6o	52	67/73	10	4-	4+	5-	2+	2o	3o	5+	7-	3
35	30	1720	30/22xx	Sc	ms	6o	5o	22	27/40	1	7o	6+	3+	3+	3-	5+	6o	4o	3
	July																		
36	14	0447	17/10xx	Sc	s	8+	5o	30	43/58	4									
	14	1702	17/06xx	Sc	s	8+	6-	51	69/75	13	1+	4-	3+	4o	4-	6o	5o	6+	3
	15										3o	4-	4-	5o	6+	7+	8-	8o	4
	16										8+	7-	6-	5o	4+	5+	5-	4o	4
	17										5+	5-	4+	3-	2o	3+	3-	3+	2
37	19	0400	20/02xx	g	ms	6o	4+	-		6	1-	3-	5o	6o	4o	4o	5o	4+	3
38	20	21xx	21/06xx	g	m	5+	4o	-		1	4o	2o	2+	4-	5o	4o	4+	5+	3
	21										2+	4-	2+	1+	3o	2o	2-	2o	1
39	29	0000	31/24xx	Sc,g	ms	6-	4o	-		7	5-	4+	4o	3-	3o	5o	5-	4-	3
	30										5-	4+	3-	5o	5+	3o	3o	3-	3
	31										6-	4+	5+	5o	4-	4+	3o	4-	3
	Aug.																		
40	08	0339	09/12xx	Sc,g	m	5o	4-	2		2	1-	2-	4-	3-	3+	4-	3+	4o	2
	09										4-	5o	5-	4o	3-	2+	2+	2o	2
41	16	1409	18/12xx	Sc	s	8-	6-	57	73/80	18	2-	1-	1-	2-	6+	7o	6+	6o	3
	17										8-	8-	7o	5+	4+	7-	6+	6-	5
	18										4-	3o	4-	5-	3-	2-	2-	1+	2

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p	Ap	Kp Interval 1st Kp≥4- Date/Interval	Time where 3 Consecutive Kp<4- Date/Interval	D	H	Z	Onset	End	Max. Kp	Obs.	Range of Starting Time	Sources
5+	31	27/7	02/3	399	1700	1180	27/2000	29/20xx	7	Co	2000 - 20xx	25
7o	84			97	791	536	27/2000	02/12xx	9	Fr		
1o	55			116	845	650	27/20xx	01/xxxx	-	Gr		
				4	115	35	27/2001	29/15xx	6	Ho		
				130	1440	730	27/2000	29/14xx	8	Si		
				26	169	62	27/2000	29/17xx	6	Tu		
7+	174	27/7	02/3								0132 - 1213	13,18,25,32,37
				563	3540	3540	30/0132	01/15xx	9	Co		
				15	300	105	30/1213	01/09xx	8	Ho		
7+	49			460	3650	1800	30/0132	01/14xx	9	Si		
4-	15			51	629	154	30/0132	01/10xx	9	Tu		
				177	1750	620	05/1854	07/08xx	7	Co		
3+	10	05/8	09/5	33	216	170	05/20xx	08/01xx	7	Fr	05/1854 - 06/1918	13,25
9+	60			40	305	235	06/12xx	08/xxxx	-	Gr		18
1+	55			175	2050	920	06/0600	09/13xx	9	Si		
3o	128	05/8	09/5	45	313	241	08/0422	09/12xx	7	Fr		13,18,25,32,37
4-	16			4	110	40	08/0422	09/15xx	6	Ho		
				16	150	70	08/0422	09/17xx	6	Tu		
1-	12											
5-	42	10/8	12/7	22	149	135	0434	12/22xx	6	Fr	-	13,18,32
6o	20			5	70	30	0435	12/18xx	5	Ho		
0+	11			70	720	490	0434	12/15xx	7	Si		
				21	112	16	0434	11/13xx	6	Tu		
1-	42	16/5	17/6	32	107	68	1451	17/14xx	6	Fr	1230 - 1451	13,25,32,37
1+	14			32	185	80	1351	16/xxxx	-	Gr		
				21	153	35	1327	17/14xx	6	Tu		
5o	26	23/5	25/2	25	190	105	12xx	25/05xx	6	Fr	12xx - 14xx	
3o	31			20	240	40	1400	24/08xx	6	Wi		
7-	19											
0o	18	28/7	30/7	38	212	110	2019	30/17xx	7	Fr	2019 - 2029	13,32
9-	54			42	160	100	2020	29/xxxx	-	Gr		
5-	18			4	95	45	2019	30/15xx	6	Ho		
2-	13			95	800	560	2019	30/16xx	7	Si		
				20	152	58	2019	30/17xx	6	Tu		
3+	28											
3+	8											
0o	52	03/8	06/6	-	-	-	0250	06/18xx	-	Fr	0206 - 2115	13,37
4+	34			4	170	25	0250	05/12xx	6	Ho		
9o	25			16	1480	670	0230	06/14xx	8	Si		
3+	15			21	151	42	0250	05/13xx	6	Tu		
9o	26	25/6	26/4	24	97	66	25/12xx	26/11xx	5	Fr	25/1100 - 25/12xx	
				32	210	145	25/12xx	01/xxxx	-	Gr		
				136	1880	765	25/1230	28/13xx	9	Si		
7+	22	27/1	29/4	20	101	91	26/19xx	27/11xx	5	Ho	26/19xx - 26/2015	
2o	65			178	1440	940	27/0147	27/13xx	6	Co	27/0144 - 27/1637	13,32,37
5+	36			37	172	147	27/0144	29/09xx	6	Fr		
				5	160	25	27/0146	28/21xx	6	Ho		
				19	158	43	27/0145	28/13xx	7	Tu		
2o	36	29/7	30/3	189	825	920	29/1938	30/06xx	6	Co	-	13,32,37
				25	235	130	29/1938	02/17xx	6	Fr		
				5	180	30	29/1939	01/18xx	6	Ho		
				100	920	520	29/1939	30/06xx	8	Si		
				19	185	60	29/1939	02/16xx	6	Tu		
3o	55	30/6	01/1	7	199	42	30/1200	30/22xx	5	Hu	30/1200 - 30/1720	32
3+	40	14/2	17/4	408	1980	1330	2131	16/20xx	7	Co	0446 - 2131	32
5-	93			97	280	366	1702	17/10xx	9	Fr		
4o	77			44	290	295	1702	16/xxxx	-	Gr		
3+	24			7	170	20	1702	17/15xx	6	Ho		
				195	2150	1150	0447	17/10xx	9	Si		
				23	256	109	1702	17/10xx	7	Tu		
2-	35	19/3	21/3	28	110	107	19/04xx	20/04xx	6	Fr	19/0400 - 20/21xx	
0o	26			95	1370	550	19/0630	19/13xx	9	Si		
3+	10			25	45	57	20/21xx	21/06xx	5	He		
2o	29	29/1	01/1	18	81	31	0052	29/09xx	5	Fr	0000 - 1230	
1-	29			41	106	102	12xx	01/14xx	6	Fr		
5o	37			3	30	15	0053	31/15xx	5	Ho		
				125	1140	700	0000	31/18xx	8	Si		
				15	123	40	00xx	31/24xx	6	Tu		
3o	16	08/3	09/5	23	99	75	13xx	09/12xx	5	Fr	0339 - 23xx	
7-	22			17	60	58	23xx	09/14xx	5	He		
0+	52	16/5	18/5	309	1990	1410	1408	17/22xx	7	Co		32,37
1-	106			50	174	173	1409	18/12xx	6	Fr		
2+	16			40	255	320	1410	17/xxxx	-	Gr		
				6	230	36	1409	18/11xx	6	Ho		
				235	1770	830	1409	18/14xx	9	Si		
				26	198	66	1409	18/11xx	6	Tu		

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Serial No.	Date	BASIC STORM DATA: Onset	End	Type	Max. Int.	Max. Kp	Average Storm Kp	SSC REPORTS: Reference 22	44	23	Three Hour Gr. Interval Kp: 1	2	3	4	5	6	7	8	ΣKp	A
	Aug.																			
42	19	1616	22/06xx	Sc	ms	6o	4o	52	73/75	10	2o	1o	2o	3+	3-	4+	4+	5+	25o	
	20										2+	5-	6o	3o	3o	3-	3+	3+	28+	
	21										4o	4o	5-	5o	3o	4-	4o	4-	32o	
	22										5-	3-	2-	2+	2-	2+	3+	2+	21o	
43	29	0022	30/20xx	Sc	ms	7o	5o	55	-/75	16	5o	7-	5o	3+	4+	4+	4-	5o	37+	
											6-	7o	7o	5o	4o	4+	3o	2o	38o	
	Sept.																			
44	02	1158	03/09xx	Sc,g	ms	7-	5-	38	62/65	8	1-	2o	2o	2o	3+	3o	4+	6-	23-	
	03										5o	5+	7-	3o	3+	3-	3-	2o	31-	
45	04	0230	06/09xx	Sc	s	8o	6o	41	63/70	17	4-	5-	7-	6o	7-	6o	7-	8o	48+	
	05										7+	8-	8-	8-	5o	6-	6o	5+	52+	1
	06										5+	5o	5-	2+	2-	2-	3o	5o	29-	
46	07	1100	08/20xx	g	ms	6-	4-	-		1	3+	3o	3o	4-	6-	3+	4+	4o	30+	
	08										4-	3+	5-	3+	3o	4o	3-	1o	25+	
47	24	0000	24/20xx	g	m	5o	5-	-		2	5o	5-	5-	5-	2+	4-	3o	1+	29+	
48	26	1930	27/11xx	Sc	m	5-	4o	2		1	3-	1+	3-	2-	1-	1+	3-	4-	17-	
	27										5-	4+	4o	3-	1+	1o	2+	1+	22-	
49	29	0836	02/23xx	Sc,g	ms	6o	4+	7	14/19	8	1o	0+	3-	2o	5-	3o	2+	4o	20o	
	30										5-	4o	4-	3o	4+	4-	4+	5-	32+	
	Oct.																			
	01										4+	6o	5+	5+	5o	4o	4+	5+	40-	
	02										5-	5-	6-	5o	6o	6-	5-	3o	39+	
50	04	1427	09/24xx	Sc,g	s	9o	5+	8		10	2-	1-	2o	3-	3+	6-	7-	6-	28+	
	05										4+	5o	4o	3o	3+	4-	3o	6+	33-	
51	06	0237	10/05xx	Sc	s	9o	6o	18	23/28	8	6o	8o	7+	8o	8o	8+	8+	9-	63-	[illegible]
	07										9o	9-	8-	8-	7+	7o	6-	6o	59o	1
	08										5+	4o	5o	5o	3+	3o	4o	4o	34-	
	09										4o	6-	5-	4o	5-	4o	4o	5o	36o	
	10										4o	4-	2-	1-	0+	1o	1+	3o	16-	
52	24	1452	31/22xx	Sc	s	8-	5-	54	76/77	15	0+	1-	1-	2-	4+	6o	4+	2o	20o	
	25										2+	3-	6-	6-	6-	8-	7+	5+	42+	
	26										7-	6o	6o	6-	6-	5-	4+	4o	43o	
	27										5-	5-	3o	5+	4+	5-	4+	5+	36+	
	28										5-	6-	5o	5+	5o	5+	4+	3o	38+	
	29										5o	4-	4o	6-	5o	5o	4o	4+	27-	
	30										4o	4-	5-	5+	5-	4o	4-	5-	35-	
	31										5-	3+	4o	4o	4-	5-	5-	3+	32+	
	Nov.																			
53	03	2228	05/09xx	Sc,g	ms	6-	5-	2		4	4+	3-	3-	3+	3o	2o	3-	5-	25+	
	04										6-	6-	6-	5-	5+	5+	4-	5-	41-	
	05										4-	4o	2+	2o	3-	1o	0+	0+	16+	
54	10	0718	-	Sc	m	5-	-	21	30/46	-	0o	0o	2+	2+	3o	2+	1o	1-	12-	
55	11	0034	11/22xx	Sc	m	5-	3o	21	29/31	4	2+	3+	4-	5-	3+	2o	3o	3-	25o	
56	12	1325	-	Sc	s	9o	-	8	66/71	-	2o	1o	2o	2-	5o	6o	8-	8o	33+	
	13																			
	14																			
57	15	1304	16/17xx	Sc	s	8+	7-	42	57/61	8	9-	9-	9o	9o	9-	8+	8o	6+	67-	[illegible]
											7+	5-	5o	4o	3-	4+	5+	4o	37+	
											5+	4o	4+	3o	6o	6o	6o	8-	42+	
	16										8+	8+	6o	5+	6-	5-	3+	3+	45o	
	17										4-	3o	3+	3o	3-	4-	4o	3-	26o	
58	21	0631	22/13xx	Sc	ms	6o	5o	32	46/48	11	1o	4+	6-	5-	5o	5o	6o	5-	36+	
	22										6-	5+	5-	4-	3+	3-	2o	4-	31o	
59	24	1232	26/15xx	Sc,g	m	5+	4o	7		4	4-	2+	3+	1o	2o	2o	3o	5o	22+	
	25										4o	5-	5+	5+	5-	4+	4+	4+	37o	
	26										3-	4+	4-	3+	4-	1+	3o	3-	25-	
60	30	1909	02/24xx	Sc	s	8o	5o	49	69/70	16	2o	3o	2-	1o	2-	2-	4o	6-	21-	
	Dec.																			
	01										6+	8o	7-	5o	5+	6o	6-	6o	49o	
	02										4-	4o	4-	4o	5o	3+	3+	4-	31-	
	03										2+	4o	2o	3-	1+	2-	0+	1o	15+	

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	Kp Interval 1st Kp ≥4- Date/Interval	Time where 3 Consecutive Kp<4- Date/Interval	D	H	Z	Onset	End	Max. Kp	Obs.	Range of Starting Time	Sources
'1	19/6	20/4	26	124	133	1615	22/06xx	5	Fr		32
'6			4	140	16	1616	20/09xx	5	Ho		
'8			130	645	590	1616	21/11xx	7	Si		
4			18	96	46	1615	22/06xx	6	Tu		
5	29/1	30/7	361	1860	1760	0022	30/20xx	7	Co		32
8			48	212	162	0022	30/15xx	7	Fr		
			28	200	155	0022	30/xxxx	-	Gr		
			5	210	25	0023	30/16xx	7	Ho		
			220	1910	910	0022	30/16xx	9	Si		
			28	176	44	0022	30/21xx	6	Tu		
0	02/7	03/4	36	103	134	02/17xx	03/09xx	6	Fr	02/0500 - 02/17xx	25,32
5			47	385	210	02/1158	05/xxxx	-	Gr		
5	04/1	06/4	5	100	14	02/1100	03/15xx	5	Ho		
8			360	2520	1210	02/0500	08/20xx	9	Si		
8			12	123	39	02/1158	03/09xx	6	Tu		25,32,37
			297	2110	1640	04/0229	05/20xx	8	Co	04/0029 - 05/0307	
			54	381	555	04/0230	06/13xx	7	Fr		
			6	360	30	04/0230	06/11xx	6	Ho		
			35	195	66	04/0230	06/09xx	7	Tu		
			29	212	105	05/0303	06/09xx	7	Am	One Station	
7	07/4	08/7	4	214	45	1100	08/20xx	5	Hu	Only one station	
9											
7	24/1	24/7	2	105	10	23/2000	24/16xx	5	Ho	23/2000 - 24/0000	
			6	299	18	24/0000	24/20xx	5	Hu		
10	26/8	27/4	15	67	46	1927	27/11xx	5	Fr	1927 - 1930	
17											
14	29/5	02/8	133	912	800	30/08xx	01/19xx	7	Co	29/0836 - 30/13xx	
28			29	135	102	30/13xx	02/19xx	5	Fr		
48			160	1400	780	30/0700	02/19xx	8	Si		
49			17	118	31	29/21xx	03/15xx	6	Tu		
36	04/6	10/3	24	110	64	04/14xx	05/10xx	5	Fr	04/1132 - 05/22xx	
34			89	500	980	04/14xx	08/xxxx	-	Gr		
03			10	300	40	04/1500	08/12xx	7	Ho		
6			14	110	36	04/16xx	05/11xx	5	Tu		
3			560	2710	1950	05/22xx	07/21xx	8	Co		
8			108	640	651	06/0239	10/05xx	9	Fr		
0			460	2220	1340	06/0300	09/16xx	9	Si		
1	24/5	24/8	480	2270	1340	25/0700	25/21xx	8	Co	24/1452 - 25/0700	32
6	25/3	31/8	41	237	159	24/1452	01/09xx	6	Fr		
3			49	340	300	24/1452	26/xxxx	-	Gr		
8			5	135	20	24/1452	30/14xx	6	Ho		
5			210	1600	950	24/1452	31/22xx	9	Si		
0			23	204	52	24/1452	31/23xx	7	Tu		
4											
9											
18	03/8	05/3	31	113	82	2227	05/09xx	6	Fr	1620 - 2227	
52											
11											
6	11/3	11/5									
18			8	223	56	11/0033	11/22xx	5	Hu		
57	12/5	17/2	1000	4260	2160	12/1349	14/04xx	9	Co	1325 - 1845	25
			219	1343	858	12/1349	-	9	Fr		18,32,37
			170	945	705	12/1349	14/xxxx	-	Gr		
30			43	410	130	12/1349	17/12xx	8	Ho		
49			450	2870	2400	12/1349	16/16xx	9	Si		
59	12/5	17/2	87	465	111	12/1350	14/12xx	9	Tu		18,25,32,37
			63	660	428	12/1846	14/11xx	8	To	Only one Station	37
94			456	3500	1500	15/0738	16/17xx	8	Co	0220 - 22xx	
18			49	285	226	15/1304	17/21xx	7	Fr		
			47	370	555	15/1304	16/xxxx	-	Gr		
			24	201	68	15/1304	17/11xx	7	Tu		
45	21/2	22/5	265	2160	1160	21/05xx	21/20xx	7	Co	03xx - 0632	18,25,32
30			26	124	64	21/03xx	22/13xx	5	Fr		
			90	900	600	21/0500	21/19xx	8	Si		
			18	102	24	21/04xx	22/18xx	6	Tu		
16	24/8	26/6	31	99	68	24/1233	26/15xx	5	Fr	24/1232 - 15/1707	
39			4	120	20	25/1707	26/15xx	5	Ho		
17			100	600	670	25/0800	26/13xx	7	Si		
			18	99	26	24/2052	26/15xx	6	Tu		
17	30/7	03/3	330	1660	1380	30/1908	02/04xx	8	Co	1840 - 2358	32
			52	182	126	30/1908	02/24xx	7	Fr		
			39	190	195	30/1910	01/xxxx	-	Gr		
93			5	215	48	30/1910	02/24xx	6	Ho		
26			145	1460	900	30/1909	02/19xx	8	Si		
9			28	210	45	30/1909	02/23xx	7	Tu		

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TABLE V 196

		BASIC STORM DATA						SSC REPORTS										
									Reference		Three Hour Gr. Interval Kp							
Serial No.		Onset	End	Type	Max. Int.	Max. Kp	Average Storm Kp	22	44	23	1	2	3	4	5	6	7	8
61	Dec. 07	1804	08/11xx	Sc	ms	6-	5o	42	62/66	10	2o	4-	2+	3-	4o	2-	5o	6-
											5-	5+	4-	4o	3-	2-	1o	2-
62	14	0913	16/12xx	Sc,g	ms	6o	4-	3	9/11	1	0o	1-	2o	3o	2+	2o	1-	1o
63	15	1413	16/14xx	Sc,g	ms	6o	5+	5		3	3-	3o	3+	4o	6o	5+	5+	6o
	16										6-	6-	5o	5-	4-	2o	1+	2+
64	18	0514	18/21xx	Sc,g	m	5o	4o	7	10/16	2	3-	4o	5o	5-	3+	4o	4o	3-
65	25	2002	28/16xx	Sc	ms	6+	4-	27	40/59	3	4-	2o	2-	2o	2-	1-	3-	2-
	26										4o	4o	4o	3-	3+	2o	2-	2-
66	27	0510	28/20xx	Sc,g	ms	6+	5-	3		8	2o	4o	5o	5o	5o	6o	6+	5o
	28										4o	3-	3+	5+	4o	4-	3+	2-
	1961 Jan.																	
67	07	2049	09/24xx	Sc,	m	5o	4-	7	11/14	2	3-	3o	1+	1+	2+	1+	1o	3-
68	08	1617	09/24xx	Sc	m	5o	4o	26	30/54	7	4o	4o	4-	3+	3o	4o	4+	3-
	09										2+	4o	5-	5-	4o	4-	4+	5o
	10										2+	0+	1+	2-	2-	1+	1-	1o
69	18	0200	20/21xx	Sc,g	ms	6o	4-	2		7	3-	2-	3-	3+	5-	3-	4-	3o
70	19	1250	20/22xx	Sc,g	ms	6o	5-	2		8	4-	2+	2-	1+	3o	4+	6-	5+
	20										6o	6-	5o	4o	4+	5-	4o	2-
	21										2-	4-	4o	4-	4o	4+	1+	1+
71	Feb. 03	0908	05/18xx	Sc	ms	7o	4-	40	60/62	8	1o	0+	1o	4-	5-	3o	2+	2+
72	04	1331	05/12xx	Sc	ms	7o	6-	39	54/58	12	1+	2o	2o	1+	5o	4+	7-	7o
	05	1829	05/12xx	Sc	ms	7o	6-	21	31/46	8	6-	6-	5+	4-	2o	2o	1-	1o
73	06	0106	06/17xx	Sc	m	5o	4-	33	45/59	10	2+	2+	5o	4o	4-	5-	3-	3o
	07										3o	3+	2o	2+	2+	1+	2-	4-
74	13	0253	13/18xx	Sc	m	5o	4o	39	52/58	12	1+	1+	4o	5o	4+	5-	3+	2+
	14										2o	1+	1+	1+	1-	1+	3o	3o
75	16	0043	16/19xx	Sc	m	5+	4o	44	62/64	9	4-	4-	5-	5+	5-	3+	2+	3-
		0536	16/23xx	Sc	m	5+	4-	13	19/22	3								
76	17	0600	18/22xx	g	ms	7-	4o	-		16	2-	1-	2o	4+	5o	4-	4+	6o
	18										7-	5+	5o	5o	5o	5+	4+	2-
	19										3o	2+	3+	3+	5-	4-	3o	2+
77	Mar. 05	1800	06/15xx	g	ms	7-	5o	-		8	1o	2o	1o	1+	1-	1+	3+	6-
	06										7-	6o	4o	4+	4+	2-	1o	0+
78	09	1327	10/15xx	Sc	ms	7o	4+	53	77/79	14	2o	3-	3-	1o	3+	3o	3o	4-
											4o	5-	6+	7o	5o	3o	2-	1-
79	13	2316	16/14xx	Sc,g	m	5+	4-	-		6	3o	2o	3o	2-	2o	3o	2-	2-
	14										4+	5-	4+	4o	3+	4-	4o	2-
	15										2o	4o	3-	4+	5o	3-	3o	5-
	16										5-	3+	5+	3o	3+	3-	1-	1-
80	19	1026	20/02xx	Sc,g	ms	6o	4+	2		3	2-	5o	6o	4-	5-	5+	4+	4
	20										4-	3o	3-	4o	4-	3-	4-	2
81	27	1503	28/10xx	Sc	ms	6o	4o	49	70/71	12	2o	2o	2+	3-	3-	6o	5-	2
	28										4o	4+	4-	3o	3o	3-	2+	1

Σ Kp	Ap	Kp Interval 1st Kp≥4- Date/Interval	Time where 3 Consecutive Kp<4- Date/Interval	D	H	Z	Onset	End	Max. Kp	Obs.	Range of Starting Time	Sources
27o	25	07/2	08/5	22	65	54	1804	08/16xx	5	Fr	-	32
25-	22			2	42	10	1805	08/16xx	5	Ho		
				15	69	33	1804	08/15xx	5	Tu		
12-	6	15/4	16/6	3	34	6	14/0900	16/12xx	6	Ho	14/0900 - 14/0913	
36-	43			472	2010	2038	15/05xx	16/13xx	8	Co	15/02xx - 15/1413	
30+	33			39	180	215	15/14xx	16/xxxx	-	Gr		
				125	1260	960	15/0700	16/13xx	8	Si		
				24	201	68	15/1304	17/11xx	7	Tu		
30+	26	18/2	18/8	65	450	460	0400	18/21xx	6	Si	0313 - 0514	
16o	9	26/1	26/4	3	40	15	25/2003	28/16xx	5	Ho	-	32
23+	16			312	1575	885	27/06xx	27/22xx	7	Co	27/03xx - 27/0712	
38+	50	27/2	28/7	26	141	77	27/03xx	28/21xx	5	Fr		
28o	23			35	145	130	27/12xx	27/xxxx	-	Gr		
				70	700	590	27/0645	27/20xx	8	Si		
				17	124	37	27/03xx	28/23xx	5	Tu		
16-	8	08/1	10/1	19	122	84	07/2048	10/00xx	5	He	07/2047 - 08/1618	
29o	22			10	314	30	07/2047	09/24xx	6	Hu		
33-	30			3	90	8	08/1617	09/24xx	5	Ho		
10+	5			12	84	29	08/1618	10/03xx	5	Tu		
24+	17	18/5	19/2	6	60	20	18/0600	20/22xx	5	Ho	18/0158 - 19/15xx	
27+	26	19/6	21/7	287	1960	970	19/1441	20/20xx	7	Co		
35+	41			25	110	63	19/12xx	20/19xx	5	Fr		
24o	18			34	105	95	19/14xx	20/xxxx	-	Gr		
				70	770	680	19/1430	20/22xx	7	Si		
				14	100	36	19/15xx	20/20xx	5	Tu		
18+	13	03/3	03/6	7	200	39	03/0908	05/18xx	6	Ho	-	
				9	54	23	03/0908	04/06xx	4	Tu		
30-	43	04/5	05/5	164	1530	620	04/0600	05/02xx	7	Co	04/0600 - 04/1829	
				37	154	238	04/1331	05/12xx	6	Fr		
26o	29			43	185	215	04/1332	05/xxxx	-	Gr		
				50	460	480	04/1200	05/13xx	6	Si		
				19	213	57	04/1332	05/14xx	6	Tu		
28-	23	06/3	06/7	5	50	14	0106	06/22xx	5	Ho	-	
20-	11			60	640	530	0106	06/17xx	7	Si		
				5	47	10	0106	07/11xx	4	Tu		
26+	23	13/3	13/7	200	990	690	0252	13/21xx	6	Co	0252 - 0739	
14o	8			17	102	59	0253	14/03xx	5	Fr		
				5	93	24	0253	14/02xx	5	Ho		
				60	490	400	0253	13/18xx	6	Si		
30-	27	16/1	16/6	305	1110	780	0043	16/19xx	6	Co	0026 - 0536	
				19	99	56	0044	16/22xx	5	Fr		
				9	198	35	0042	16/22xx	5	Ho		
				60	650	660	0044	16/16xx	8	Si		
				13	67	11	0044	17/11xx	5	Tu		
28-	29	17/4	18/8	271	2000	1450	2027	18/22xx	7	Co	0500 - 2027	
38+	51			44	165	94	05xx	18/22xx	6	Fr		
26-	18			34	110	170	10xx	18/xxxx	-	Gr		
				7	190	25	0600	19/18xx	6	Ho		
				90	1040	800	0900	18/22xx	8	Si		
				23	190	45	05xx	18/23xx	6	Tu		
16+	14	05/8	06/6	34	135	120	18xx	06/14xx	6	Fr	0932 - 19xx	
28+	37			33	125	70	19xx	06/xxxx	-	Gr		
				7	170	37	0932	06/18xx	5	Ho		
				105	1550	720	0933	06/15xx	8	Si		
				19	143	50	19xx	06/15xx	6	Tu		
21+	13	09/8	10/6	237	1340	1040	10/0757	10/22xx	7	Co	09/1327 - 10/0800	
33o	46			47	188	164	09/1327	10/18xx	7	Fr		
				21	173	60	09/1327	10/xxxx	-	Gr		
				17	190	30	09/1327	10/20xx	6	Ho		
				135	1280	1250	10/0800	10/14xx	9	Si		
				12	117	33	09/1327	10/15xx	6	Tu		
18o	10	14/1	16/4	150	1370	860	13/2316	15/00xx	7	Co	13/2300 - 14/0021	
31-	26			24	94	48	13/2316	16/14xx	5	Fr		
28+	24			5	80	28	13/2300	16/14xx	5	Ho		
24-	20			15	97	36	13/23xx	16/15xx	5	Tu		
34+	38	19/2	20/8	163	1180	847	19/03xx	20/04xx	7	Co	03xx - 1026	
25+	17			26	119	56	19/04xx	20/02xx	5	Fr		
				60	510	350	19/0500	19/20xx	7	Si		
24o	22	27/7	28/4	421	1840	1010	1503	27/22xx	8	Co	1503 - 1506	
24-	17			27	150	39	1503	28/16xx	5	Fr		
				7	65	30	1503	28/16xx	4	Ho		
				13	82	40	1506	28/10xx	5	Tu		

Serial No.	Date	BASIC STORM DAT. Onset	End	Type	Max. Int.	Max. Kp	Average Storm Kp	SSC REPORTS Reference 22	44	23	Three Hour Gr. Interval Kp 1	2	3	4	5	6	7	8	Σ Kp
82	Mar. 31	1512	01/15xx	Sc	m	5-	3o	39	53/68	2	0+	1-	1-	1o	2-	3+	2o	2o	12-
83	Apr. 01										5-	4-	4o	3-	2o	2-	2+	3-	24-
	02	20xx	03/12xx	g	ms	6o	4o	-		2	2-	3+	4o	2+	3o	2o	3+	3o	23-
	03										4o	6o	5-	4o	2+	3-	2+	3-	29-
84	09	0900	09/21xx	g	ms	6+	4+	-		5	2-	2+	3-	6+	5-	3o	3-	2+	26-
	10	1948	12/00xx	g	m	5+	3o	-		1	4-	4-	3+	4-	3+	3o	3+	3-	27-
	11										4o	5o	3o	3+	3+	5+	3+	2-	29o
	12										2o	2-	3+	2o	3+	3-	2+	2-	19o
85	13	1450	15/21xx	Sc	s	8-	4+	44	65/75	16	2-	2+	2-	1+	4-	5+	3-	2o	21-
	14										3-	3o	3-	4-	4+	5+	7o	7+	36o
	15										8-	7o	6o	3+	3+	4+	3+	3-	38-
86	May 01	23xx	02/08xx	g	ms	6-	5-	-		1	3+	4-	1+	3+	3+	3o	1-	3+	22o
	02										6-	5-	3-	3o	1o	2-	1-	1-	20o
87	04	1648	07/16xx	g	m	5+	4-	3		3	0o	0+	1o	1o	1-	2-	3o	4+	12o
	05										2+	3-	4-	2+	2+	5+	4-	4-	26o
	06										3-	5o	5o	5-	5-	2o	4-	4-	31+
	07										4-	3o	5-	4-	3o	4-	2+	3+	27+
88	25	0211	26/03xx	Sc,g	ms	6-	4o	-		9	4-	6-	6-	4-	4+	4-	4+	2o	33o
	26										4-	1o	2o	1+	2+	1o	1-	1+	13+
89	June 01	0800	01/20xx	g	ms	6-	4o	-		3	3o	3o	3o	5-	6-	5+	3+	3o	31-
	02	0700	02/20xx	g	m	5-	5-	-		2	4-	2+	4-	5-	5-	5-	5o	1o	30-
90	20	1617	23/03xx	Sc	ms	7o	5o	19	33/36	18	2-	2+	2+	2-	0+	2o	3+	4o	18-
	21										5o	5-	4+	6-	6-	4+	5o	7o	42-
	22										7o	6-	5-	5o	4o	5o	5+	5o	42-
	23										4-	2-	1o	1-	2-	3-	2o	2+	16-
91	29	0010	29/22xx	Sc,g	ms	6+	4-	3		5	3+	6+	5-	3+	3-	2o	2o	2-	26o
92	July 04	1400	06/05xx	Sc,g	ms	6+	4o	2		2	2+	1+	2-	2+	3o	3-	3o	5+	22-
	05										6o	6+	4o	4o	5o	5-	3-	4o	37o
	06										3o	4o	3-	2+	2o	5-	3-	2+	24-
93	13	1113	16/07xx	Sc	s	8+	5+	52	68/71	18	0+	1o	1-	6+	8o	8+	8-	6+	39-
	14										5-	3o	7-	8+	7+	7-	6+	4o	47o
	15										3o	5-	3o	3o	4+	2+	5-	5-	30-
	16										6-	4o	3-	2+	3+	3+	4-	3-	28-
94	17	1825	19/05xx	Sc	s	8-	6o	54	68/70	17	3o	3-	2+	4-	4+	2+	6+	6+	31o
	18										5o	6+	6o	5o	8-	7o	6-	6+	49o
	19										6o	5-	1+	0+	2-	1o	1o	1+	17+
95	20	0248	21/09xx	Sc	ms	6-	4o	46	58/66	9	2o	3o	3+	2o	2-	3o	4o	5+	24+
	21										5o	6-	6-	3-	3+	4o	4o	3-	33o
96	26	1950	28/05xx	Sc	s	8+	6-	58	-/76	19	4o	4-	2-	2o	2-	1o	5+	5+	25-
	27										4o	4+	8+	8+	6o	5+	6+	7+	50o
	28										4o	3o	3+	3+	2o	4-	4o	2+	26-
97	Aug. 01	2300	04/21xx	g	ms	6+	4-	-		9	3o	3+	1+	1o	1o	1o	2-	3-	15o
	02										5+	6+	6-	4+	4o	4o	3+	3o	36o
	03										3-	4-	4-	3+	3+	3-	3+	4-	26+
	04										5-	4-	4-	3+	3o	3-	3-	2-	25+

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Ap	Kp Interval 1st Kp$\geq$4- Date/Interval	Time where 3 Consecutive Kp<4- Date/Interval	D	H	Z	Onset	End	Max. Kp	Obs.	Range of Starting Time	Sources
6	01/1	01/4	8	155	39	1511	02/18xx	4	Ho	1511 - 2324	
			12	83	32	1511	01/15xx	5	Tu		
17			34	83	59	20xx	03/12xx	6	Fr		
14	02/3	02/4	13	112	28	20xx	03/14xx	6	Tu		
27	03/1	03/5									
24	09/4	09/6	105	450	530	09/0900	09/13xx	7	Si	0530 - 0900	
18			9	44	16	09/06xx	09/21xx	6	Tu		
26			178	1520	550	10/1948	12/00xx	6	Co	One Station	
10											
15	13/5	13/7	51	135	226	13/1450	16/06xx	6	Fr	13/1450 - 14/09xx	
54	14/4	15/7	13	185	48	13/1450	15/24xx	5	Ho		
61			95	830	540	13/1451	15/21xx	7	Si		
			22	202	70	13/1450	16/03xx	6	Tu		
			334	1710	1230	14/09xx	15/23xx	7	Co		
			50	240	240	14/12xx	15/xxxx	-	Gr		
15	02/1	02/3	14	99	25	23xx	02/08xx	6	Tu		
19											
8	04/8	07/7	18	120	104	17xx	09/13xx	5	Fr	1648 - 2242	
20			8	90	44	1700	07/16xx	5	Ho		
30			22	82	21	2242	06/19xx	6	Tu		
20											
34	25/1	26/2	210	1520	980	25/0211	25/21xx	7	Co	24/23xx - 25/0211	
7			20	100	84	24/23xx	26/04xx	5	Fr		
			4	86	24	25/0200	25/16xx	5	Ho		
			65	620	440	25/0200	25/16xx	7	Si		
			11	108	36	25/02xx	26/03xx	6	Tu		
30	01/4	02/8	120	1060	410	0800	01/23xx	6	Co		
28	02/1	02/8	208	1090	680	0700	02/20xx	6	Co		
10	20/8	23/2	207	1412	980	20/2020	23/04xx	6	Co	20/1617 - 21/1149	
58			37	157	146	20/18xx	23/03xx	7	Fr		
58			28	170	150	20/16xx	23/xxxx	-	Gr		
9			12	160	50	20/10xx	23/03xx	5	Ho		
			16	178	63	20/18xx	23/03xx	6	Tu		
			80	960	800	21/0000	23/03xx	7	Si		
25	29/1	29/6	30	105	68	0010	29/12xx	5	Fr	0010 - 0300	
			65	640	450	0200	29/12xx	7	Si		
16	04/8	06/3	30	130	94	13xx	06/05xx	6	Fr		
45											
16											
102	13/3	16/3	194	1370	1250	13/1113	14/07xx	7	Co	13/0950 - 14/0940	25
98			64	305	243	12/1113	15/12xx	7	Fr		
25			43	500	225	13/1114	14/xxxx	-	Gr		
23			13	260	34	13/1112	16/07xx	7	Ho		
			165	1840	1080	13/0950	15/07xx	9	Si		
			-	-	-	13/1114	15/00xx	-	Tu		
			287	1630	940	14/08xx	16/20xx	7	Co		
36	17/3	19/3	348	2380	1250	17/18xx	19/07xx	8	Co	17/1816 - 18/1125	25
93			35	242	192	17/1826	19/06xx	6	Fr		
18			32	295	175	17/1816	19/xxxx	-	Gr		
			15	130	42	17/1826	19/05xx	6	Ho		
			200	1320	990	17/1830	19/05xx	8	Si		
			19	152	73	17/1825	19/06xx	6	Tu		
			10	312	40	18/1123	19/01xx	7	Hu		
19	20/7	21/7	240	1500	880	17xx	22/00xx	7	Co	0248 - 1934	25
35			37	148	101	0249	21/10xx	6	Fr		
			13	115	53	0247	22/11xx	5	Ho		
			125	750	550	1700	21/20xx	8	Si		
			19	133	77	0248	21/09xx	6	Tu		
23	26/7	28/2	321	2085	1310	1951	28/10xx	8	Co		
114			73	346	498	1950	28/12xx	8	Fr		
18			32	460	120	1951	27/xxxx	-	Gr		
			8	225	37	1951	28/05xx	7	Ho		
			225	1680	870	1951	28/05xx	9	Si		
			25	148	47	1951	28/10xx	7	Tu		
8	02/1	02/7	175	1250	720	01/2300	04/21xx	6	Co	01/2300 - 02/0400	
42			32	187	89	01/23xx	04/09xx	6	Fr		
18			10	122	40	01/2200	03/17xx	6	Ho		
18			14	107	14	01/23xx	02/12xx	6	Tu		
			19	175	70	02/00xx	03/xxxx	-	Gr		
			80	810	530	02/0400	03/14xx	8	Si		

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Serial No.	Date	Onset	End	Type	Max. Int.	Max. Kp	Average Storm Kp	SSC Reports Reference 22	44	23	Three Hour Gr. Interval Kp 1	2	3	4	5	6	7	8	Σ Kp
98	Aug. 29	1709	01/13xx	Sc	m	5+	4o	31	44/47	14	2-	1-	0+	1+	1+	4-	5o	5-	19
	30										5-	4-	2+	4+	6o	5+	4-	5-	35
	31										5-	5+	5o	3-	3+	4o	3+	4-	32
	Sept. 01										4+	5-	4+	4+	2+	3+	4+	4+	32
99	12	04xx	12/09xx	g	m	5o	5-	-		1	2+	4+	5o	3o	2+	1o	1o	3o	22
100	13	1554	15/01xx	Sc	ms	6o	4-	22	33/37	3	2-	2o	1o	1-	0+	3-	3-	3o	14
	14										3o	4o	4-	4-	6o	2+	3+	4+	30
	15										3-	1+	2+	2-	2o	1-	0+	1+	12
101	24	0545	25/16xx	Sc,g	ms	6o	5o	2		2	1+	1+	3-	5+	6o	6o	5o	5o	33
	25										5o	5+	6o	4o	4-	3+	3-	3o	33
	26										3+	3o	2+	2+	3+	4+	3+	4-	26
102	27	0342	27/19xx	Sc,g	m	5-	4+	-		2	4-	5-	4-	5-	4+	4o	2o	2o	30
103	30	1847	01/23xx	Sc	s	9-	5+	34	48/52	1	2o	3o	2-	2-	2o	0+	5-	8o	23
		2100	01/15xx	Sc	s	9-		45		19									
	Oct. 01										9-	8+	7o	8-	5-	2o	2o	2+	43
104	19	23xx	20/10xx	g	m	5+	4o	-		1	2o	2+	1+	1o	1-	0+	1+	2+	1
	20										5+	5-	4+	2-	0+	1o	1-	0+	1
105	26	1941	27/24xx	Sc	m	5+	4+	46	61/65	8	3-	4-	5o	3+	3o	3+	5+	5+	3
	27										4+	5+	4-	4+	3o	3o	4o	5-	3
106	28	0810	29/13xx	Sc	s	9-	7-	50	-/68	18	2+	2+	5o	6+	8o	8o	9-	7+	4
	29										6-	5+	6o	4o	2o	1+	1-	2+	2
107	Nov. 06	2318	08/08xx	Sc	ms	6+	4+	15	20/24	9	3-	4o	5-	4o	2-	1-	1-	2o	2
	07										3-	3o	4+	5o	4+	5+	6+	5o	3
	08										6-	4+	4o	2o	3+	1-	3+	3o	2
108	17	1406	18/20xx	Sc,g	ms	6+	5-	11	15/23	14	2+	2-	1o	1-	4o	4+	2+	5-	2
	18										5o	4o	6+	6-	5o	5-	5o	3+	3
	19										4+	3+	3+	2-	2+	0+	0+	0+	1
109	Dec. 01	0313	03/24xx	g	s	8-	5o	4		8	0+	2-	4+	5o	8-	6o	5-	5o	3
	02										5+	5-	4o	6-	5+	6+	6+	6+	4
	03										7-	6-	6+	5o	5o	3o	4-	4+	4
110	1962 Jan. 10	0213	11/09xx	Sc	ms	6+	5-	40		16	4-	6+	4+	6o	5+	5+	5o	4+	
	11										4-	4-	3o	2o	2o	2+	2+	2-	
111	Feb. 04	0930	04/24xx	Sc,g	m	5o	4o	30		14	1+	2-	2-	3+	5o	4+	4-	4-	
	05										3-	3o	0+	1-	2-	2-	1+	1+	
112	11	0958	12/10xx	Sc,g	m	5+	3+	10		2	2o	1+	0+	3-	3-	2-	4o	4+	
											5+	3-	3o	3-	2o	3-	4o	4-	
113	15	1619	17/12xx	Sc,g	ms	6-	4o	3		9	2o	3+	2-	2o	1o	4-	4o	2o	
	16										2+	3o	3o	6-	5o	5+	5o	5o	
	17										4o	3+	4+	3o	1+	1+	2+	1+	
114	26	0834	27/21xx	Sc,g	m	5-	3+	6		6	3o	1+	1+	2+	3+	5-	4o	3+	
	27										3o	3-	3-	4-	4o	3+	3o	1-	
115	Mar. 05	0645	06/21xx	Sc,g	ms	6-	4o	-		9	1+	1-	3-	3+	5+	3+	3o	2+	
	06										3-	5-	4+	4+	6-	4o	4o	2+	

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Ap	Kp Interval 1st Kp ≥4- Date/Interval	Time where 3 Consecutive Kp<4- Date/Interval	D	H	Z	Onset	End	Max. Kp	Obs.	Range of Starting Time	Sources
16	29/6	02/1	29	123	88	29/17xx	01/23xx	5	Fr	24/1700 - 30/09xx	
37			11	118	45	29/1700	01/13xx	5	Ho		
30			15	102	48	29/16xx	02/12xx	5	Tu		
			250	1620	1030	30/0900	02/18xx	7	Co		
28			100	1100	770	30/0900	01/12xx	8	Si		
17	12/2	12/4	-	-	-	12/04xx	12/09xx	-	He	One station	
8	14/2	15/1	20	135	48	1556	15/01xx	5	Fr		
28											
6											
42	24/4	25/6	288	1880	1060	24/0830	25/19xx	7	Co	24/02xx - 24/10xx	
35			30	139	82	24/09xx	27/14xx	6	Fr		
18			32	180	110	24/09xx	27/xxxx	-	Gr		
			9	110	45	24/1000	23/16xx	5	Ho		
			130	1270	730	24/0900	27/14xx	9	Si		
26	26/6	27/7	20	132	31	24/10xx	25/16xx	6	Tu		
			227	1620	950	27/0646	27/19xx	7	Co	27/0342 - 27/0646	
36	30/7	01/6	278	2080	1600	2108	01/15xx	7	Co	1847 - 2109	
			101	334	464	2109	01/23xx	8	Fr		
			44	480	365	1850	01/xxxx	-	Gr		25
			10	290	66	2109	01/14xx	7	Ho		
114			195	2860	910	2109	01/14xx	9	Si		
			31	238	68	2109	01/17xx	8	Tu		
6	20/1	20/4	17	71	34	23xx	20/10xx	5	Fr	One Station	
18											
31	26/7	29/5	139	900	340	26/1940	28/05xx	6	Co	26/1241 - 26/1941	
30			32	92	68	26/1940	27/24xx	5	Fr		
			8	102	30	26/1940	28/01xx	4	Ho		
			19	87	28	26/1241	28/00xx	6	Tu		
128	26/7	29/5	726	2540	1920	28/0810	29/13xx	9	Co	-	
32			56	399	670	28/0810	29/13xx	9	Fr		
			85	330	490	28/0810	29/xxxx	-	Gr		
			14	213	36	28/0810	29/13xx	7	Ho		
			510	2450	1590	28/0810	29/07xx	9	Si		
			30	365	88	28/0809	29/15xx	7	Tu		
16	07/3	08/4	359	1820	1000	06/2321	08/17xx	7	Co	06/2318 - 07/0500	
42			26	118	102	06/2318	08/08xx	5	Fr		
23			13	116	31	06/23xx	08/08xx	5	Tu		
			36	130	100	07/xxxx	08/xxxx	-	Gr		
			90	660	580	07/0500	08/08xx	7	Si		
16	17/5	19/2	31	103	68	14xx	19/10xx	6	Fr	1300 - 14xx	
49			6	90	28	1407	19/14xx	5	Ho		
11			150	660	540	1300	19/14xx	7	Si		
			14	100	32	14xx	19/08xx	6	Tu		
54	01/3	04/1	428	2280	1200	0630	02/08xx	8	Co	0300 - 1305	
66			50	209	144	07xx	03/23xx	7	Fr		
55			56	205	200	06xx	03/xxxx	-	Gr		
			10	196	27	0300	03/15xx	6	Ho		
			290	2100	070	970	03/14xx	9	Si		
			26	214	57	06xx	04/03xx	7	Tu		
52	10/1	11/3	492	3160	1310	0212	11/22xx	9	Co	0212 - 0350	
12			30	136	82	0213	11/09xx	6	Fr		
			27	165	105	0213	10/xxxx	-	Gr		
			8	96	24	0213	11/11xx	5	Ho		
			160	1910	950	0350	11/04xx	8	Si		
			17	136	32	0213	11/09xx	6	Tu		
20	04/5	05/1	180	1130	650	11xx	05/04xx	6	Co	0930 - 11xx	
7			4	88	22	0900	05/04xx	4	Ho		
			10	122	22	0931	05/04xx	5	Tu		
13	11/7	12/2	129	68	36	19xx	12/05xx	5	Fr	0958 - 19xx	
20			7	78	21	1000	12/10xx	5	Ho		
			11	104	36	0958	12/11xx	4	Tu		
12	15/6	17/4	130	109	74	15/16xx	17/11xx	5	Fr	15/1600 - 17/0803	
38			7	107	20	15/1600	17/12xx	5	Ho		
14			14	105	26	15/16xx	17/xxxx	5	Tu		
			366	1960	1350	16/0803	17/21xx	7	Co		
			135	1100	670	16/0900	16/21xx	8	Si		
17	26/6	28/8	5	94	23	0800	27/23xx	5	Ho	0834 - 1234	
17			10	103	31	1234	27/18xx	5	Tu		
17	05/5	05/6	233	1490	960	05/0715	07/01xx	7	Co	05/0645 - 06/0600	
31	06/2	06/8	6	68	30	05/1200	06/21xx	4	Ho		
			65	690	470	05/0826	05/15xx	8	Si		
			16	79	27	05/08xx	06/17xx	5	Tu		
			16	63	29	06/03xx	06/23xx	5	Fr		
			35	780	530	06/0400	06/22xx	8	Si		

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Serial No.	Date	BASIC STORM DATA: Onset	End	Type	Max. Int.	Max. Kp	Average Storm Kp	SSC REPORTS: Reference 22	44	23	Three Hour Gr. Interval Kp 1	2	3	4	5	6	7	8	Σ Kp
116	Apr. 06	0400	09/02xx	g	ms	6+	4+	-		8	2-	4o	4-	5-	3o	3-	5-	5+	30-
	07										5+	6-	5o	6-	6-	5+	5+	5o	43o
	08										5-	4o	3o	3-	4-	6+	4o	4-	32o
	09										4o	1+	3o	2-	3o	3-	2-	20	19+
117	10	02xx	11/18xx	g	m	5o	4o	-		11	2+	4-	2o	4+	5o	5-	5o	5-	32-
	11										5-	4+	3+	4-	4-	4-	2o	3-	28o
118	20	2356	23/12xx	Sc	m	5o	4-	51		10	3-	3-	1+	1-	1-	3o	2-	4o	17-
	21										3+	2o	3-	3-	1o	5o	4o	4+	25o
	22										4+	5o	4+	4o	4-	5-	3+	4-	33o
	23										3+	4-	3o	3o	3-	2+	1o	1o	20o
119	May 05	1837	07/02xx	Sc,g	m	5o	3+	3		7	0o	0o	1-	0+	0+	1-	1+	3o	6+
	06										2-	2o	1+	3+	4+	5o	5-	4+	27-
	07										3+	2+	1+	1+	2-	1-	1+	2o	14o
120	31	0552	21/24xx	g	m	5o	4o	2		8	0+	2o	3+	5-	5o	4-	3-	4o	26-
121	June 09	00xx	10/15xx	g	m	5-	4-	-		5	3-	4o	3+	4-	4-	3-	4o	5-	29-
	10										5-	4-	3+	4o	3o	2-	2o	1o	23+
122	July 26	0222	28/18xx	Sc,g	ms	6+	4o	14		11	3-	6+	6-	6-	5o	3+	4+	4+	37+
	27										50	4-	3+	3-	4o	5+	3-	4o	31-
	28										4-	4-	4o	3-	3o	4-	2+	3-	26-
123	31	1531	-	Sc	ms	6o	-				1-	1-	1+	1+	1-	2o	4+	4+	15+
	Aug. 01							7		10	5o	5+	5-	6o	4-	3o	3o	4o	35-
	02										3o	3o	1o	2+	2+	2+	2+	2o	19-
124	07	1157	09/13xx	Sc,g	m	5o	4o	2		5	4o	3o	2+	2+	3o	4-	5-	4+	27+
	08										5o	4o	5o	4+	4o	4o	3o	4+	33+
	09										5-	3+	4o	3+	3o	2+	3-	3o	26+
125	15	04xx	19/12xx	g	m	5o	3+	3		6	3-	5-	5o	3+	2o	3-	3-	4o	27o
	16										5o	3+	4o	1o	1+	2-	4-	5-	25-
	17										4+	3+	3o	3o	3+	4-	4-	5o	29+
	18										3+	4+	5-	3-	3+	4-	2+	3+	28-
	19										4+	4+	3+	3+	3-	2+	2o	2+	25-
126	30	2340	31/14xx	Sc	m	5+	4+	6		5	2+	3o	3-	2-	4-	3-	4-	2o	22-
	31										5-	5-	5+	4-	3+	1+	3-	2o	28-
127	Sept. 02	05xx	04/23xx	g	ms	6+	4+	-		7	3+	2+	5-	4o	4o	5o	5-	4o	32o
	03										3o	5-	5-	5-	6-	4o	4+	3+	34+
	04										4o	5+	4-	5+	4o	4o	6-	6+	38+
											5-	6-	4+	5-	4o	5o	4-	3o	35o
128	11	1949	13/21xx	g	ms	7+	4o	5		15	2+	1+	2+	4-	1-	1-	2-	3-	15+
	12										3-	3o	7+	5o	4-	5-	7-	6-	39-
	13										4o	3+	4-	3-	3o	4+	5o	2o	28o
129	18	2047	20/15xx	Sc,g	ms	6o	4o	8		12	2-	1-	1o	1o	1o	1o	1+	3-	10+
	19										3o	4+	6-	4o	3+	4+	6o	5-	35+
	20										5-	3+	2+	4-	2+	1-	1o	1-	19-
130	25	18xx	26/21xx	g	ms	6-	4-	-		8	0+	1-	1-	2-	2-	2+	2+	3o	13-
	26										5+	6-	3+	2o	3+	5+	4o	2+	31+
131	28	1256	-	Sc	m	5+	-	8		-	3-	1+	1-	1o	2+	3-	2-	3+	16-
	29										2o	3+	3o	3+	2+	2+	3+	5+	25o
	30										4o	4+	3o	3-	3-	2o	2-	1+	22-

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3 (CONTINUED)

Ap	Kp Interval 1st Kp ≥4- Date/Interval	Time where 3 Consecutive Kp<4- Date/Interval	D	H	Z	Onset	End	Max. Kp	Obs.	Range of Starting Time	Sources
27	06/2	09/2	28	141	76	06/04xx	09/03xx	5	Fr	06/04xx - 04/0500	
58			33	165	120	06/04xx	10/xxxx	-	Gr		
32			11	94	38	06/0400	09/03xx	5	Ho		
12			125	800	570	06/0500	08/20xx	8	Si		
			16	112	41	06/04xx	09/02xx	6	Tu		
30	10/2	11/7	130	1090	620	02xx	12/05xx	6	Co	02xx - 1100	
22			21	111	68	08xx	12/04xx	5	Fr		
			6	56	26	0800	12/04xx	4	Ho		
			60	320	340	0850	11/18xx	6	Si		
			13	86	32	08xx	12/03xx	5	Tu		
10	20/8	21/1	188	1140	710	20/2356	23/21xx	6	Co	20/2355 - 21/1615	
20	21/6	23/3	9	114	38	20/2355	22/18xx	4	Ho		
30			15	118	44	20/2356	23/21xx	5	Tu		
12			28	101	49	21/15xx	23/17xx	5	Fr		
4	05/5	07/1	9	114	27	05/1800	07/04xx	4	Ho	05/1800 - 06/18xx	
23			359	1420	880	06/10xx	07/06xx	7	Co		
7			57	480	490	06/1000	07/04xx	6	Si		
			7	119	34	06/18xx	07/06xx	4	Tu		
22	31/4	01/1	125	950	680	04xx	01/17xx	6	Co	04xx - 0630	
			11	57	32	0500	01/12xx	4	Ho		
			67	580	570	0630	31/18xx	7	Si		
			11	97	32	04xx	01/15xx	4	Tu		
22	09/2	10/5	66	700	410	01xx	10/22xx	5	Co	00xx - 01xx	
17			8	69	24	0055	10/16xx	5	Ho		
			11	97	32	00xx	10/16xx	4	Tu		
46	26/2	29/2	30	142	64	25/22xx	25/09xx	6	Fr	25/20xx - 26/0535	
28			7	175	30	25/20xx	27/18xx	7	Ho		
18			15	127	34	25/20xx	28/08xx	6	Tu		
			213	1280	870	26/0100	29/06xx	7	Co		
			85	790	660	26/03xx	29/14xx	7	Si		
17	31/7	02/1	233	2150	950	1547	02/06xx	7	Co	15xx - 20xx	
			30	105	71	15xx	02/06xx	6	Fr		
			8	115	39	15xx	01/18xx	5	Ho		
38			130	1125	890	20xx	01/16xx	8	Si		
10			23	88	35	19xx	01/15xx	6	Tu		
2-	07/6	09/4	180	1050	850	00xx	10/20xx	6	Co	00xx - 16xx	
32			30	98	64	14xx	10/11xx	5	Fr		
19			6	67	19	16xx	08/20xx	5	Ho		
			30	98	64	14xx	10/11xx	5	Tu		
22	15/2	15/4	107	1130	420	15/04xx	15/12xx	6	Co	15/04xx - 16/19xx	
21	16/7	17/2	3	63	15	15/04xx	15/12xx	5	Ho		
24			65	230	380	15/04xx	19/19xx	6	Si		
21											
17											
13	30/7	31/5	230	1440	590	30/2348	31/18xx	7	Co	30/2335 - 31/00xx	
25			23	77	39	30/2338	31/14xx	5	Fr		
			5	93	16	30/2336	31/13xx	5	Ho		
			80	485	540	31/00xx	31/15xx	7	Si		
			6	111	44	30/2335	04/18xx	6	Tu		
29	01/3	04/8	236	2290	1030	01/01xx	05/02xx	8	Co	01/01xx - 02/03xx	
34			28	110	84	01/06xx	04/24xx	6	Fr		
47			80	810	755	02/03xx	04/19xx	8	Si		
36											
16	12/3	13/8	43	140	163	11/20xx	14/09xx	7	Fr	11/19xx - 12/06xx	
58			11	118	59	11/19xx	13/12xx	6	Ho		
23			192	1360	990	12/0121	14/01xx	7	Co		
			29	165	70	12/06xx	-	-	Gr		
			185	690	620	12/06xx	14/10xx	7	Si		
			19	140	35	12/05xx	14/09xx	6	Tu		
5	19/2	20/5	27	94	56	18/21xx	20/04xx	5	Fr	18/20xx - 19/05xx	
39			6	113	43	18/20xx	20/06xx	5	Ho		
13			125	1210	1110	19/0031	20/22xx	7	Co		
			31	115	100	19/05xx	-	-	Gr		
			70	510	460	19/05xx	20/13xx	7	Si		
			12	99	41	19/00xx	20/15xx	5	Tu		
7	26/1	26/8	14	123	27	25/18xx	26/09xx	5	Fr	25/18xx - 26/02xx	
32			5	127	31	25/18xx	26/24xx	6	Ho		
			11	137	27	25/18xx	26/18xx	6	Tu		
			38	510	315	26/00xx	26/20xx	7	Si		
9	29/8	30/3									
19											
14											

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TABLE V 1960-19

Serial No.	Date	BASIC STORM DATA Onset	End	Type	Max. Int.	Max. Kp	Average Storm Kp	SSC REPORTS Reference 22	44	23	Three Hour Gr. Interval Kp 1	2	3	4	5	6	7	8	Σ
132	Oct. 01	0000	02/20xx	g	ms	6-	4o	-		9	3+	4+	5o	5o	5+	5-	6-	5-	
	02										4+	4-	5-	4-	4-	4+	3-	1+	
133	07	2026	11/24xx	Sc	ms	6+	4o	51		17	2+	3+	1+	2o	1-	1+	3+	4+	
	08										6+	4-	3+	4+	3+	5-	4o	4o	
	09										6-	4+	5-	4-	4+	4o	3o	4-	
	10										4-	3+	3-	3+	5-	4-	4+	3-	
	11										4-	5o	4+	3+	4-	3o	4-	3+	
134	14	0000	14/24xx	g	m	5-	4o	-		2	4o	4+	5-	5-	4o	3o	5-	4-	
135	16	10xx	16/16xx	g	ms	6-	4o	-		2	3-	2o	2o	6-	4o	2o	4-	3o	
136	19	0713	19/23xx	g	m	5o	4+	3		5	0+	0o	5o	5o	5-	5o	4-	4-	
	20										2o	2o	2-	1o	3-	3-	3o	4-	
137	22	1217	28/12xx	Sc	m	5+	4o	9		5	2+	4-	3o	4-	4+	3+	3+	5-	
	23										5o	4o	3o	4-	3+	4-	3o	3+	
138	24	0907	27/18xx	g	m	5+	4+	-		3	3o	4-	3-	3o	4o	5o	5-	5-	
	25										4-	4+	4+	4o	4+	5-	5-	5o	
	26										4-	4-	5-	4+	4+	4+	5+	4o	
	27										4-	4o	5o	3o	5o	5-	3-	3+	
	28										3+	4+	3+	3o	3o	3-	3+	3o	
139	Nov. 06	02xx	07/15xx	g	m	5o	3+	-		4	3o	4+	3o	2o	3-	4-	5-	5o	
	07										4+	4-	1-	4-	3+	1-	1+	3-	
140	15	0530	16/17xx	g	ms	6-	4-	-		12	1o	3o	4-	4o	6-	3-	4+	4+	
	16										6-	4o	4-	4-	4-	4o	3+	3-	
141	21	1354	23/17xx	Sc,g	m	5o	4o	8		9	2+	2+	5-	3o	3+	4-	3+	4-	
	22										4+	5-	5o	5-	4o	4+	4o	5o	
	23										4+	3+	3+	4o	3+	3o	3-	3+	
142	30	0100	30/16xx	g	m	5+	5-	-		2	5o	5+	5-	5-	4o	2o	2o	4-	
143	Dec. 17	1649	21/21xx	Sc,g	ms	7-	4+	11		10	3-	2-	3-	3-	2+	6o	5o	7-	
	18										6+	5o	3o	3+	5-	5-	5o	5o	
	19										5+	5-	5+	5-	4o	5-	5o	4+	
	20										4-	5o	4o	4o	4o	5-	5-	5o	
	21										4o	4-	4-	3o	4-	4-	4+	3+	
144	26	0809	27/02xx	g	m	5-	3+	2		3	2-	1+	2+	3+	5-	4-	3-	4-	
											2o	1o	1+	1o	2-	1+	2-	3-	
145	1963 Jan. 12	2220	20/01xx	Sc,g	m	5+	3+	8 •		11	0+	2-	1-	1-	0+	1-	2-	3o	
	13										5-	5+	4o	5-	3+	4-	3-	4-	
	14										3+	4-	4o	5o	4o	5-	5o	3+	
	15										4-	5o	5+	4o	3+	2+	3o	2+	
	16										4o	2o	4-	3o	4+	4+	4+	4o	
	17										3o	4o	5-	2+	2+	4o	3o	3-	
	18										3-	3-	2+	3-	2+	3-	3-	5-	
	19										3+	3-	4-	4-	4o	4o	2+	3+	
	20										2+	1-	3-	2+	2o	1-	1o	1o	
146	30	0023	31/21xx	Sc,g	ms	6-	5-	2		4	3+	4o	4o	4+	4+	3+	4+	5o	
	31										5+	6-	5+	5-	5+	5-	4o	2-	
147	Feb. 09	1944	14/10xx	Sc,g	ms	6-	4o	27		12	0o	0o	0o	0+	1-	1o	2+	5o	
	10										6-	5o	6-	4+	5o	3+	4+	5o	
	11										3+	4o	3+	3o	3+	4-	4o	4-	
	12										4+	4+	5-	3o	2o	2+	3o	3+	
	13										4-	4-	4+	3+	4-	5-	5o	3o	
	14										3+	3+	5+	3o	3-	3-	3-	2o	
148	Mar. 07	2152	11/21xx	g	ms	6+	4o			11	1-	2o	0+	0o	0o	0+	2+	5o	
	08										4o	3+	5-	5+	4+	4o	4+	3+	
	09										3o	4+	3+	3o	3o	3-	2+	4+	
	10										3o	4o	4+	4o	5o	6+	6o	5-	
	11										5-	4-	2+	3-	3-	3+	4+	3o	
149	31	2115	01/15xx	Sc	m	5-	3o	21		1	0o	1-	1o	1o	1o	0+	1-	2-	
	Apr. 01										3+	5-	4-	2o	2o	1+	0+	0	

p	Ap	Kp Interval 1st Kp ≥4- Date/Interval	Time where 3 Consecutive Kp < 4- Date/Interval	D	H	Z	Onset	End	Max. Kp	Obs.	Range of Starting Time	Sources
8o	43	01/2	02/7	211	1410	1050	0541	02/22xx	7	Co	0000 - 0541	
8+	23			23	117	98	0100	02/18xx	5	Fr		
				85	580	595	04xx	02/20xx	7	Si		
				12	132	21	00xx	02/21xx	5	Tu		
9-	12	07/8	10/2	130	1320	650	2026	10/05xx	6	Co	-	
4-	35			29	100	70	2027	11/15xx	5	Fr		
3+	32			6	100	27	2026	09/20xx	5	Ho		
8+	22			65	365	460	2026	12/13xx	6	Si		
0o	25			11	145	32	2026	12/03xx	6	Tu		
3o	30	14/1	15/1	9	87	21	00xx	15/12xx	5	Tu	-	
				25	145	45	0000	14/24xx	5	Wi		
5o	20	16/4	16/8	80	615	435	10xx	16/16xx	7	Si	-	
				5	40	27	06xx	19/23xx	4	Ho	06xx - 0800	
				40	480	255	07xx	19/23xx	7	Si		
7+	29	19/3	20/1									
9-	11											
29-	22	22/2	23/7	40	215	90	22/1219	27/16xx	6	Wi	22/1217 - 24/10xx	
29o	23											
31-	27	24/2	27/7	197	1320	620	24/0907	26/05xx	7	Co		
35o	34			60	440	430	24/10xx	27/18xx	6	Si		
34+	33			11	90	32	24/15xx	28/15xx	5	Tu		
31+	29											
26o	18											
28+	24	06/2	06/3	9	63	20	02xx	07/15xx	4	Tu	02xx - 1700	
20+	15	06/6	07/5									
29-	26	15/3	16/7	252	1630	1040	0530	17/06xx	7	Co	0033 - 1102	
31-	27			7	71	26	05xx	16/17xx	5	Ho		
				80	540	590	11xx	16/18xx	7	Si		
				14	118	33	05xx	17/06xx	6	Tu		
6+	19	21/3	23/5	198	1470	890	06xx	23/18xx	7	Co	00xx - 1354	
6o	35			4	105	11	00xx	22/17xx	5	Ho		
7+	20			70	485	390	06xx	23/17xx	7	Si		
				12	82	22	00xx	25/15xx	5	Tu		
1+	32	30/1	01/1	22	110	45	0100	30/15xx	5	Fr	-	
30-	36	17/6	21/8	289	1400	800	0825	18/04xx	7	Co	08xx - 1649	
37o	44			36	140	90	09xx	21/23xx	5	Fr		
38o	42			42	135	130	16xx	21/xxxx	-	Gr		
35o	35			7	156	17	16xx	18/06xx	5	Ho		
29+	22			90	540	495	08xx	22/01xx	6	Si		
				21	154	29	15xx	22/15xx	6	Tu		
23+	17	26/5	27/1	106	1055	600	07xx	27/02xx	6	Co	07xx - 0810	
13-	6											
9o	5	13/1	15/5	165	1945	750	22xx	17/00xx	7	Co	21xx - 23xx	
32o	29	16/1	17/7	26	100	40	23xx	17/20xx	5	Fr		
33o	31			65	515	610	23xx	20/01xx	7	Si		
29o	26			17	123	22	21xx	18/00xx	6	Tu		
30-	24											
26o	19											
23-	15											
27o	19											
13-	6											
33-	29	30/2	31/8	445	2775	1350	00xx	31/24xx	7	Co	00xx - 04xx	
37-	43			8	132	30	00xx	31/18xx	5	Ho		
				100	630	650	04xx	31/21xx	6	Si		
9+	8	09/8	12/4	185	1270	900	2100	14/02xx	6	Co	18xx - 2102	
38+	45			5	145	31	18xx	10/15xx	5	Ho		
28+	21			75	730	555	2102	14/21xx	7	Si		
27o	21			13	149	20	18xx	14/15xx	6	Tu		
31+	27											
25o	19											
11-	9	07/8	09/3	220	1500	800	19xx	12/18xx	7	Co	17xx - 2152	
33+	31			25	115	40	21xx	11/05xx	5	Fr		
26o	18			6	91	30	18xx	08/16xx	5	Ho		
38-	48	09/8	11/3	60	330	450	17xx	12/20xx	6	Si		
27-	20			14	110	35	18xx	12/15xx	5	Tu		
7o	4	01/2	01/4	8	65	18	2116	01/15xx	4	Tu	One Station	
17+	12											

Serial No.	Date	BASIC STORM DATA Onset	End	Type	Max. Int.	Max. Kp	Average Storm Kp	SSC REPORTS Reference 22	44	23	Three Hour Gr. Interval Kp 1	2	3	4	5	6	7	8	Σ Kp
149	Apr. 01										3+	5-	4-	2o	2o	1+	0+	0o	17+
150	04	0546	07/19xx	Sc,g	ms	6-	4-	30		12	1-	2-	2+	3+	4-	4o	4+	4+	24+
	05										5+	6-	4o	3+	4-	4o	4o	3o	33o
	06										3-	3o	5-	4-	3+	3-	3o	3+	26+
	07										3-	3-	4-	4-	3o	3o	1o	3o	23-
151	30	1522	04/12xx	Sc	ms	6+	4-	39		13	1o	1-	1-	2-	2-	5-	6+	4+	21o
	May 01										6o	5o	5-	5-	3+	4o	2o	4-	33+
	02										4o	4-	4-	4+	3+	4+	3-	4o	30o
	03										4-	2+	3-	2+	3-	3+	3-	4-	23+
	04										4-	3+	4o	4+	3-	3+	2+	3o	27-
152	27	2028	29/10xx	Sc	ms	6-	3+	11		2	1+	1o	1-	1o	2o	2+	3-	3-	14-
	28										4-	4o	4o	4-	2o	2o	2-	2o	23o
	29										5-	6-	4-	2-	2+	1o	3o	1o	23o
153	June 06	1511	07/14xx	Sc,g	ms	7o	5o	5		9	0o	1-	0+	1o	1+	2+	5-	6-	16o
	07										7o	6-	5-	3+	4-	4-	3+	4o	35+
	0																		
154	25	0109	26/10xx	sc,g	ms	6-	4o	2		1	3o	4o	4+	3-	2+	2+	4o	5+	28o
	26										6-	5-	5o	3+	2+	2o	2+	3-	28o
155	July 05	22xx	05/15xx	g	ms	6-	4+	-		1	3+	4+	4o	2o	2o	2-	4-	4-	25-
	06										3o	6-	5-	3-	2o	2+	2+	1+	24o
156	21	0600	21/21xx	g	m	5+	4o	-		8	1+	2+	3+	4+	5+	5+	4-	2o	28-
	23	1[illegible]00	24/19xx	g	m	5+	4+	-		1	2+	3-	3+	3-	4+	3+	4-	5+	28-
	24										5o	5+	4-	4o	4o	4-	3+	3+	32+
158	30	03xx	02/12xx	g	m	5o	3+	-		2	3o	4+	5o	3-	5o	3-	4+	4-	31-
	31										4o	3+	3-	2+	4-	3-	2+	5-	26-
	Aug. 01										4-	4o	2+	3-	3o	3+	3+	3o	25+
	02										2o	4+	4o	3-	2-	2-	3o	3-	22o
159	18	0816	18/17xx	sc,g	ms	6+	5-	4		7	2o	3o	4o	4-	6+	3+	2+	3+	28o
160	19	1449	21/12xx	sc,g	ms	7o	5o	5		7	3-	2o	2-	1-	2o	4-	5+	6o	24o
	20										7o	7-	6o	4o	5o	4o	3o	4-	39+
	21										5-	4-	5o	5o	3o	3+	3o		30+
161	Sept. 13	1846	18/04xx	sc,g	ms	7o	5-	8		7	2-	1-	1o	0+	1-	1o	3-	4+	12+
	14										4o	5+	7o	7-	6+	7-	6-	5+	47o
	15										4-	4+	4o	4+	5-	5o	4+	5+	36-
	16										3+	5-	4o	5-	5-	4o	5-	5-	35-
	17										5-	4+	6-	6+	4o	4o	5o	3-	37-
	18										3+	2o	2o	3o	3+	4+	2-	3o	23-
162	19	0534	19/18xx	sc	m	5-	4o	10		3	4-	4o	4+	5-	5-	4-	3+	2o	30+
163	21	1413	23/14xx	sc	s	9-	6o	43		19	3-	4-	2-	2o	5+	7o	6+	4o	33-
	23										4+	8+	8-	5-	4o	5-	7+	9-	50-
											9-	8o	4+	4+	3+	3+	3o	2-	37-
164	24	1812	30/03xx	sc,g	ms	7+	4+	-		6	0o	2o	2o	2o	2o	3o	4-	6o	21-
	25										7+	6+	5-	5o	4o	6o	4o	3-	40o
	26										2+	5+	4o	3+	4-	5-	3+	4o	31-
165	27	1942	30/14xx	sc	ms	6+	4o	33		14	4o	3+	2+	3o	3o	3o	6+	6o	31o
	28										6o	6-	5-	3o	5o	5o	5+	4+	39o
	29										3+	3o	3o	4-	3+	3-	4o	4-	27-
	30										4o	3-	3o	3o	3-	1+	1o	2-	19+
166	Oct. 11	05xx	14/22xx	g	ms	6-	4o	4		2	1+	2+	4-	5-	4+	4-	3-	4+	27o
	12										4+	4o	4o	4-	5+	5+	6-	4o	36+
	13										3-	4+	4-	3-	3+	4-	4o	5o	29+
	14										5-	4+	5-	4+	4+	4+	4o	3-	33+
	15										3+	4-	3o	3o	3o	2-	3o	4-	24+
	16										4o	3+	3+	3-	3-	4-	3+	1+	24+
167	24	0019	25/03xx	sc,g	ms	7+	5o	5		9	5+	6+	6+	7+	4o	4o	4-	4+	41+
	25										5+	3+	3-	2-	2-	1+	2+	3-	21o
168	29	1359	30/12xx	sc	s	8o	5o	46		16	3+	3-	2+	2-	4o	7o	8-	8o	37-
	30										8-	5-	4o	3o	1+	1+	2o	1o	25o

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3 (CONTINUED)

Ap	Kp Interval 1st Kp ≥ 4- Date/Interval	Time where 3 Consecutive Kp<4- Date/Interval	D	H	Z	Onset	End	Max. Kp	Obs.	Range of Starting Time	Sources
12											
19	04/5	05/7	113	1070	440	13xx	07/19xx	6	Co	0545 - 13xx	
32	04/5	05/7	23	100	45	06xx	09/10xx	5	Fr		
19			8	86	31	0545	05/09xx	5	Ho		
15			77	190	387	0545	07/19xx	6	Si		
			15	113	31	0545	07/15xx	5	Tu		
23	30/6	03/2	166	1120	690	13xx	04/17xx	6	Co	13xx - 1523	
			24	150	45	1523	04/09xx	5	Fr		
35			10	130	41	1522	01/18xx	6	Ho		
24			11	152	42	1523	06/15xx	6	Tu		
14											
19											
7	28/1	28/5	24	60	30	2027	29/10xx	5	Fr	-	
16	29/1	29/4	15	69	38	2027	30/12xx	5	Tu		
21											
16	06/7	08/1	215	1195	845	18xx	09/14xx	6	Co	1414 - 2133	
43			40	165	85	17xx	07/23xx	6	Fr		
			12	185	37	15xx	07/14xx	6	Ho		
			115	870	685	17xx	07/10xx	7	Si		
			21	183	74	1414	08/12xx	6	Tu		
23	25/2	25/4	59	295	405	01xx	26/10xx	5	Si	-	
26	25/7	26/4									
18	05/7	06/4	4	96	30	22xx	06/15xx	5	Pm	-	
20											
26	21/4	21/8	130	1190	880	04xx	24/23xx	7	Co	04xx - 0600	
			58	1075	780	05xx	25/10xx	8	Si		
22	23/5	24/7	20	145	75	1200	24/19xx	5	Wi	-	
30											
28	30/2	31/2	74	260	460	03xx	02/12xx	7	Si		
18	31/5	01/2									
17											
15											
26	18/3	18/6	367	1920	1060	18/04xx	23/21xx	7	Co	18/04xx - 18/0816	
24	19/6	21/5	42	320	520	18/04xx	18/23xx	7	Si	19/14xx - 19/15xx	
58			35	110	165	19/15xx	21/10xx	6	Fr		
27			11	132	38	19/15xx	21/12xx	5	Ho		
			156	980	760	19/15xx	23/17xx	8	Si		
			19	132	56	19/14xx	21/12xx	6	Tu		
8	13/8	17/8	352	1930	1350	19xx	19/23xx	8	Co	18xx - 19xx	
82			35	160	150	1930	18/03xx	6	Fr		
38			12	173	48	19xx	17/20xx	7	Ho		
33			17	136	46	18xx	18/04xx	5	Tu		
43											
15											
26	19/1	19/7	4	42	10	0543	19/18xx	5	Ho	0534 - 0543	
44	21/5	23/5	389	2050	2060	1413	23/22xx	7	Co	21/1413 - 22/1601	
126			110	368	490	1414	23/22xx	9	Fr		
78			16	378	73	1413	23/22xx	8	Ho		
			305	1390	1030	1414	23/22xx	9	Si		
			39	377	110	1414	23/23xx	8	Tu		
18	24/7	7/2	303	1740	1080	18xx	30/03xx	7	Co	1812 - 21xx	
60			35	138	100	21xx	25/24xx	6	Fr		
27			7	138	29	21xx	27/01xx	6	Ho		
34	27/7	29/1	82	925	625	18xx	29/24xx	7	Si	-	
48			15	137	37	18xx	25/24xx	6	Tu		
19			20	150	70	1942	29/05xx	5	Fr		
12			8	92	33	1942	30/14xx	5	Ho		
			14	102	28	1942	29/14xx	6	Tu		
22	11/3	15/3	263	1560	990	07xx	16/22xx	7	Co	05xx - 07xx	
39			85	410	520	05xx	14/22xx	6	Si		
24											
31											
16											
16											
63	24/1	25/2	33	160	170	0030	25/08xx	6	Fr	00xx - 0150	
16			210	1450	835	00xx	25/08xx	8	Si		
74	29/5	30/4	30	170	230	1359	30/04xx	6	Fr	13xx - 1400	
35			8	201	33	13xx	30/12xx	6	Ho		
			130	1170	600	13xx	30/12xx	8	Si		
			11	225	53	1400	30/12xx	7	Tu		

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TABLE V 1960-19

Serial No.	Date	BASIC STORM DATA: Onset	End	Type	Max. Int.	Max. Kp	Average Storm Kp	SSC REPORTS: Reference 22	44	23	Three Hour Gr. Interval Kp: 1	2	3	4	5	6	7	8	Σ Kp
	Nov.																		
169	06	0924	11/12xx	sc,g	ms	6o	4o	2		5	2-	1+	2+	2o	3+	3-	3o	4o	20+
	07										3+	5-	4-	5o	4o	5-	6o	5-	36o
	08										5+	6-	6o	4+	4+	5-	4+	4o	39-
	09										4+	4-	4+	3+	4+	4+	5o	5o	34-
	10										5o	4+	3+	4o	3+	5-	4-	4o	32-
	11										4-	4-	3+	3o	2-	2+	4-	3-	24o
170	17	0903	17/21xx	sc	m	5-	4o	38		12	0+	0+	1o	3+	4+	5-	4o	2-	20-
171	24	0320	25/16xx	g	m	5o	3o	-		4	1o	3o	2+	3o	3+	4-	4o	5o	25-
	25										5-	4o	3+	3-	3-	2+	1o	0+	21-
	Dec.																		
172	01	2226	06/15xx	sc	ms	6-	4-	17		1	1+	1-	1o	1-	1-	2+	1o	2+	10o
173	02	2116	07/19xx	sc	ms	6-	4o	17		9	2o	3-	2+	1+	3+	3+	3-	3o	21
	03										4-	4+	6-	4+	5-	4o	4+	5-	36
	04										3+	4+	4o	3-	4-	4-	4-	5o	30
	05										5-	4o	3o	3+	4+	4o	5-	4o	32
	06										4-	4o	4-	3-	4+	4o	4-	4-	30
	07										3+	3o	3o	3o	4-	3o	3-	2o	24

TABLE V-A MAJOR GE

Mo.	Day	Onset sc	1st 3 hr Kp ≥ 5-	No 3 hrs Intervals	No 3 hrs with Kp = 7-	7o	7+	8-	8o	8+	9-	9o	8	Consecutive 3 hr-Kp's, No Kp < 5- At I 1	2	3	4	5	6
1960 Mar.	31		2	20	1	2	1	2	2	2	4				5-	5o	8-	7-	8o
Apr.	03	02/2313	1	4	1	1	1							7-	7+	7o	6-		
	30	30/0132	1	11	3	1	-		1	-	1	1		7-	7-	6-	6-	9-	9o
May	06		6	5	-	1	1												5+
	08	08/0421	2	7	2	-	1	0	1	1					6+	7-	7+	8o	8+
	29	28/2029	1	1	-	-	-	1						8-					
July	15	14/1702	4	9	1	-	1	1	1	1							5o	6+	7+
Aug.	16	16/1409	5	8	-	2	-	2										6+	7o
Sept.	04	04/0230	2	18	3	-	1	3	1						5-	7-	6o	7-	6o
Oct.	05		8	18	-	1	2	2	3	3	2	1	6+	6o	8o	7+	8o	8o	8+
	25	24/1452	3	12	1	-	1	1								6-	6-	6-	8-
Nov.	12	12/1349	5	15	-	-	1	1	2	1	3	2						5o	6o
	15	15/1304	5	10	-	-	-	1	2									6o	6o
	30	30/1909	8	9	1	-	-	-	1				61	6+	8o	7-	5o	5+	6o
1961 Apr.	14	13/1450	6	6		2	1	1											5+
July	13	13/1115	4	6				1	1	1							6+	8o	8+
	14		3	5	2		1			1						7-	8+	7+	7-
	17	17/1825	7	12		1		1											
	27	26/1950	7	6			1			2						8+	8+	6o	5+
Sept.	30	30/1847	7	7		1		1	1		1								
Oct.	28	28/0810	3	9			1		2		1								
Dec.	01		4	7				1											
1962 Sept.	12		3	2	-	-	1									7+	5o		
1963 Sept.	22		2	3	-	-	-	1	-	1					8+	8-	5-		
			6	5	-	-	1	-	1	-	2								5-
	24		8	5	-	-	1						6o	7+	6+	5-	5o		
Oct.	25	24/0019	2	4	-	-	1							5+	6+	6+	7+		
	29		6	5	-	1	-	2	1									7o	8-

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3 (CONTINUED)

Ap	Kp Interval 1st Kp 4- Date/Interval	Time where 3 Consecutive Kp < 4- Date/Interval	D	H	Z	Onset	End	Max. Kp	Obs.	Range of Starting Time	Sources
12	06/8	11/3	193	1820	820	06/08xx	11/13xx	7	Co	06/08xx - 07/04xx	
39			80	310	420	06/08xx	11/12xx	6	Si		
48			28	120	80	07/04xx	11/11xx	6	Fr		
33			7	65	26	07/04xx	11/12xx	5	Ho		
29			13	144	34	07/04xx	11/12xx	6	Tu		
16											
16	17/5	17/8	94	660	340	09xx	18/00xx	6	Co	-	
20	24/6	25/3	104	1140	530	06xx	25/18xx	6	Co	0120 - 06xx	
16											
5	03/1	07/1	10	95	36	01/2225	06/15xx	5	Tu	01/2225 - 02/21xx	
12			25	80	50	02/2117	07/17xx	5	Fr		
36			60	300	405	02/21xx	06/19xx	5	Si		
25											
28											
23											
15											

MAGNETIC STORMS 1960-1963

ast One Kp ≥ 7+	8	1	2	3	4	5	6	7	8	1	2	3	4	5	Ap				Storm No. Table V
-	8+	9-	9-	7o	8o	8+	9-	9-	7+	7o	6o	6o	6+	5+	-	129	241	62	14
															-	68	-	-	16
o	7o	7-	6+	6-											-	174	49	-	23
o	7+	6-	6o												-	60	55	-	25
+	7-														-	128	-	-	26
															-	54	-	-	30
-	8o	8+	7-	6-	5o										-	93	77	-	36
+	6o	8-	8-	7o	5+										-	52	106	-	41
-	8o	7+	8-	8-	8-	5o	6-	6o	5+	5+	5o	5-			-	95	118	28	45
+	9-	9o	9-	8-	8-	7+	7o	6-	6o	5+					34	203	186	33	51
+	5+	7-	6o	6o	6-	6-	5-								-	76	63	-	52
-	8o	9-	9-	9o	9o	9-	8+	8o	6+	7+	5-	3o			-	67	280	49	56
o	8-	8+	8+	6o	5+	6-	5-								-	69	94	-	57
-	6o														17	93	-	-	60
o	7+	8-	7o	6o											-	54	61	-	85
-	6+	5-													-	102	98	-	93
+															-	98	-	-	93
+	6+	5o	6+	6o	5o	8-	7o	6-	6+	6o	5-				-	36	93	18	94
+	7+														-	114	-	-	96
-	8o	9-	8+	7o	8-	5-									-	36	114	-	103
				5o	6+	8o	8o	9-	7+	6-	5+	6o			-	-	128	32	106
					5o	8-	6o	5-	5o	5+	5-				-	-	54	66	109
															-	58	-	-	128
															-	126	-	-	163
7+	9-	9-	8o												-	126	78	-	163
															18	60	-	-	164
															-	63	-	-	167
8o		8-	5-												-	74	35	-	168

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VI. CATALOGUE OF SOLAR-TERRESTRIAL EFFECTS DURING 1960 – 1963

VI

TABLE VI. CATALOGUE OF SOLAR-TERRESTRIAL EFFECTS DURING 1960-1963

This table will include short wave radio fadeouts of importance 3 or greater that lasted for 30 minutes or more, as well as S.W.F.'s that occur at the times of the major flares catalogued in Table I. All polar cap absorptions reported in the literature; geomagnetic storms with a maximum $K_p \geq 5$; Forbush decreases, and solar flare effects reported in reference 22.

The column headings together with any necessary description or definitions follow:

Column 1 Date.

Column 2 Major Flare Serial Number from Table 5.I.

Column 3 Event Serial Number from Table 5.VIII. Data for this column were not available in time for inclusion.

FLARE DATA (Columns 4 through 8)

A few minor or sub flares are given when a clear association with an SWF or other terrestrial effect has been made in the literature.

Column 4 Flare Beginning Time.

Column 5 Flare End.

Column 6 Time of Maximum Intensity.

Column 7 Heliographic Position of the Flare.

Column 8 Flare Importance.

SHORT WAVE FADE (Columns 9 through 13)

Column 9 Onset.

Column 10 Importance. SWF's are given an importance rating on a scale from 1- to 3+, based on the amplitude of the fade, duration of the event, and confidence in the reality of the event.

Column 11 Type (S, SL, or G) the following classifications are used:
S - SWF (S) - sudden drop out and gradual recovery
Slow S - SWF (SL) - drop out takes 5 to 15 minutes and gradual recovery
G - SWF (G) - Gradual disturbance fade irregular in either the drop out or recovery stage

Column 12 Duration in Minutes.

Column 13 Wide Spread Index. The degree of confidence in identifying the event by individual stations is combined into an index of certainty that the event is geographically wide spread, ranging from 1 (possible - single station reporting) to 5 (definite - many stations reporting).

SOLAR FLARE EFFECT

Preliminary reports of solar flare effects, sometimes referred to as magnetic crotchets, have been published in the Journal of Geophysical Research, reference 22. Final data normally published in the IAGA bulletins, series No. 12, were not available in time for inclusion in the catalogue.

Column 14 Beginning Time.

Column 15 Number of Observatories Reporting the Effect.

POLAR-CAP ABSORPTION (Columns 16 through 21)

Column 16 Onset Time.

Column 17 Rise Time in Hours from Reference 1.

Column 18 Duration in Hours.

Column 19 Absorption in db on the 30 Mc/s Riometer.

Column 20 Probable Flare - day/beg, if a polar-cap absorption-flare, association is given in the literature.

Column 21 The Sources Checked during the preparation of this cat have been listed.

GEOMAGNETIC STORMS (Columns 22 through 32)

The geomagnetic storms listed in this portion of the catalogue are limited to those with a maximum Kp $\geq$ 5, and a few minor storms if one or more investigators associated it with a major flare, or it was preceded by a PCA and/or followed by a Forbush decrease.

Column 22 Onset Time.

Column 23 End Time.

Column 24 Type.

Column 25 Maximum Intensity - The symbols m (moderate K_p as great as 5) ms (moderately severe K_p = 6 or 7) and s (severe K_p = 8 or 9) have been used.

Column 26 Maximum K_p.

Column 27 Number of Magnetic Observatories Reporting the Storm as an sc in reference 22.

Column 28 ΣK_p. This is the sum of the 8 three-hour Greenwich day K_p's.

Column 29 Ap from reference 4.

Column 30 Probable Flare (day/beginning) - An entry in this column is based on one or more flare-storm correlations in one or more of the references listed in column 31.

Column 31 Sources of flare associations or other data.

FORBUSH DECREASE (Columns 32 through 35)

The data for the Forbush decreases were obtained from unpublished data kindly supplied by Dr. H. Carmichael, Chalk River Nuclear Laboratory, Atomic Energy of Canada Limited (reference 34). The cosmic ray indices pressure corrected hourly totals are published in reference 7. Three outstanding Forbush decreases (4-2-60, 11-12-60 and 7-13-61) are discussed, along with several others that occurred during 1957-1959, in reference 24.

Column 32 Onset Time. The start of the Forbush decrease to the nearest tenth day is from reference 24.

Column 33 Magnitude of the Decrease in Percent. This information is taken from reference 24.

Column 34 Probable Flare (day/hour).

Column 35 Sources.

			FLARE					
Date	Flare Serial No.	Event	Beg. UT	End UT	Max. UT	Position	Imp.	Onset UT
1960								
Jan.								
05								
07	1		1504	1555	1528	N08 W78	3	1505
08			1800	2050	1841	N27 W13	2	
10								
11	2		2040	2355	2126	N22 E03	3	2100
13								
15	3		1336	1455	-	S20 W68	3	1340
18								
19								
20								
Feb.								
01			No Flare Reported					
03	4		0815	0930	0820	S14 W36	2+	0825
04			1306	1423	1316	S15 W49	2	1309
05								
06			0306	0325	-	S17 W73	1	0303
13								
16								
18			No Flare Reported					0103
19								
20			No Flare Reported					0218
22	5		1352	1520	1400	N08 E41	3	1358
26								
Mar.								
14								
15								
27	9		0634	0923	0740	N20 W51	3	0638
29	10		0640	1220	0710	N13 E30	3	0652
30	11		1455	2030	1540	N12 E13	3+	1520
31								
Apr.								
01	12		0843	1355	0859	N12 W11	3	0850
02			0834	0920	0846	N12 W25	2+	0842
03			No Flare Reported					0520
04			0846	1124	0904	N12 W52	2	0854
05	13		0215	0530	0245	N12 W62	3	0140
06			1130	1157	1133	N11 W08	2	1134
07								
09			1044	1106	1054	N10 E59	2	1050
10								
16								
23								
27								
28	15		0130	0145	0137	S05 E34	3	0120
29	16		0107	0908	0210 0359 0554	N14 W21	3	0205
30								
May								
04	17		1000	1105	-	N13 W90	3	1015
05								
06	18		1404 2034	2020 2126	1448 2057	S09 E07 N14 W23	3+ 2-	1427
08								
09	19		0704	1021	0734	S11 E52	3+	0700
11			1914	1942	-	N23 W55	1	
12			1342	1611	-	N30 W58	2	1348
13	20		0519	0735	0532	N29 W67	3+	0512
15			No Flare Reported 1350	1530	1429	N16 E19	2+	0312
16								
22								
23								
26	21		0818	1107	0928	N14 W15	2+	0914
27			1414	1540	1429	N15 W26	1+	
28								
29								
June								
01	22		0824	1600	0900	N29 E46	3+	0837
03								
04								
08	23		0732	0855	0746	N32 W37	2+	0740
12			No Flare Reported					0453
19			1330	1354	1336	S13 W51	1+	1335
20			0126	0205	-	S13 W59	2	0128
25	24		1131	1530	1215	N21 E06	3	1203

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TABLE VI 1960-1963 (CONTINUED)

POLAR CAP ABSORPTION					GEOMAGNETIC STORM							
Rise Time	Duration Hrs.	Abs. db 30 Mc/S Riom	Probable Flare	Reference	Onset	End	Type	Max. Int.	Max. Kp	Obs. Report	Σ Kp	Ap
					1960							
					June							
					26/2015	27/11xx	sc,g	ms	7-	2	27+	22
					27/0145	28/21xx	sc	ms	7-	55	42o	65
					29/1939	30/06xx	sc,g	ms	7o	52	32o	36
					30/1720	30/22xx	sc,g	ms	6o	22	38o	55
					July							
					14/0447	17/10xx	sc	s	8+	30	33+	40
					19/0400	20/02xx	g	ms	6o	-	32-	35
					20/21xx	21/06xx	g	m	5+	-	30o	26
					29/0000	31/24xx	sc,g	ms	6-	-	32o	29
					Aug.							
					08/0339	09/12xx	sc,g	m	5o	2	23o	16
					16/1409	18/12xx	sc	s	8-	57	30+	52
					19/1616	22/06xx	sc	ms	6o	52	25o	21
					29/0022	30/02xx	sc	ms	7o	55	37+	45
					Sept.							
					02/1158	03/09xx	sc,g	ms	7-	38	23o	20
31	89	2.7		B								
	72	2.5	03/0037	M								
				JC								
		2.0	03/0037	K								
					04/0230	06/09xx	sc	s	8o	41	48+	91
					05/0307	06/09xx	sc	s	8o	1	52+	118
					07/1100	08/20xx	g	ms	6-	-	30o	27
					24/0000	24/20xx	g	m	5o	-	29+	27
					26/1930	27/11xx	sc	m	5-	2	17-	10
				JC								
	48		26/0525	M								
		2.0	26/0525	K								
					29/0836	02/23xx	sc,g	ms	6o	7	20o	14
					Oct.							
					04/1427	09/24xx	sc,g	s	9o	8	28+	36
					06/0237	10/05xx	sc,g	s	9o	18	63-	203
					24/1452	31/22xx	sc	s	8-	54	20o	21
					Nov.							
					03/2228	05/09xx	sc,g	ms	6-	2	25+	18
					10/0718	-	sc	m	5-	21	12-	6
					11/0034	11/22xx	sc,g	m	5-	21	25o	18
16	73	21.2	12/1315	B,K,M	12/1325	-	sc	s	9o	8	33+	67
15	79	20		B	15/1304	16/17xx	sc	s	8+	42	42+	69
	84	>20	15/0207	M								
	72	>22	15/0207	K								
15	51	3		B	21/0631	22/13xx	sc,g	ms	6o	32	36+	45
	24	5	20/1955	M								

TABLE VI CATALOGUE OF SOLAR-TERRESTRIAL EFFECTS DURIN

SHORT-WAVE RADIO FADEOUT				SOLAR FLARE EFFECT		POLAR CAP ABSORPTION					
Imp.	Type	Duration Min.	W.S. Index	Beg UT	No.Obs. Reported	Onset	Rise Time	Duration Hrs.	Abs. db 30 Mc/s Riom	Probable Flare	Reference
1	SL	30	5								
						1960					
2-	SL	24	5			Jan.					
						13/2000					16
1+	SL	45	4	1431	1						
				1259	8						
2	S	17	5								
1	SL	31	5	1312	3						
3	SL	97	1								
3+	S	111	5								
3+	SL	110	5								
3-	S	42	5	1354	2						
1-	SL	19	1			Mar.					
3+	S	121	5	0917	2	29/0800	50	73	2.6		1
3	SL	160	5	1507	1						
						31/0300		24	7.0	30/1455	25, 43
						31/0730		14	7.0		18
						Apr.					
3	S	57	5			01/0935		86	3.0	01/0843	..., 25, 4
						01/1000	6	73	3.6		1
2	S	20	4	0836	3						
3	S	60	5								
2+	S	30	5	0851	1						
3+	SL	157	5			05/0700	16	55	3.1		1
						05/0800		40	3.0	05/0215	18, 25, 4
2	S	20	5	1132	11						
1+	S	20	5	1050	4						
						Apr.					
3+	SL	100	5			28/0200		24	3.0	28/0130	25, 43
						28/0230	12	30	2.5		1
						28/0320		26	3.0	28/0130	18
2+	SL	110	5			29/0500	27	36	11.2		1
						29/0600		114	14.0	29/0107	18, 25, 4
						30/xxxx			14	29/0107	
						May					
3	S	35	5	1013	2	04/1030	2	8	3.4	04/1000	1, 43
						04/1040		49	5.0	04/1000	18, 25
3	SL	151	5	1513	1	06/1620		103	15.0	06/1404	18
						06/1800	34	48	8.7		1
						06/1830		96	15.0	06/1404	25, 43
2	SL	98	1								
				1930	3						
3	SL	224	5								
3+	S	221	5	0518	6	13/0620		65	4.5	13/0519	18, 25, 4
						13/0730	8	36	3.6		1
3	S	208	5								
2	S	46	5	0840	1						
3	SL	75	5	0830	1	June					
						03/2000					16
2-	SL	52	5								
3+	S	169	1								
2	S	15	5	1332	5						
1+	S	28	5	0128	5						
2	SL	67	1								

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GEOMAGNETIC STORM										FORBUSH DECREASE			
Onset	End	Type	Max. Int.	Max. Kp	Obs. Report	Σ Kp	Ap	Probable Flare	Reference	Onset	Mag. Dec. %	Probable Flare	Reference
1960 Jan. 05/0201	06/04xx	sc	m	5-	41	29+	24						
10/0718	11/18xx	sc,g	ms	6-	44	35+	43	08/1800	32				
13/1859	15/17xx	sc	ms	6+	62	18o	10	11/2040	13, 37, 32	1960 Jan. 13.9	5.1		34,7
18/0645	18/15xx	sc,g	ms	6-	6	27-	23	15/1336	37				
19/2208	22/14xx	sc,g	ms	6o	22	16o	8						
20/0357	22/14xx	sc,g	ms	6o	2	25-	17						
Feb. 05/06xx	06/17xx	g	m	5o	-	24-	19						
13/1930	14/23xx	sc,g	m	5+	2	15o	11						
16/0847	21/21xx	sc,g	ms	6-	4	29+	27						
19/1600	20/07xx	g	m	5o	-	27o	21						
26/1043	27/23xx	sc,g	m	5-	36	11+	6						
Mar. 14/1502	18/14xx	sc,g	ms	7-	6	15-	8						
15/1225	17/22xx	sc,g	ms	7-	5	22+	21						
31/0955	02/14xx	sc,g	s	9-	8	52+	129	29/0640 30/1455	37, 13 25	Mar. 31.5	10	30/1455	34,7
Apr. 01/0307	-	sc	s	9-	2	65+	241						
02/2313	05/09xx	sc	ms	7+	53	40-	62	01/0843	13, 25, 37, 32	Apr. 02/2030	5.5	01/0843	24
05/1300	05/21xx	sc	ms	6o	37	31o	34	04/0846	25, 32				
07/1511	08/14xx	sc	m	5+	30	25+	22	05/0215 06/1130	25 32				
10/0126	13/09xx	sc,g	ms	7-	40	32-	33	09/1044	32				
16/1200	18/12xx	g	ms	6-	-	31+	29						
23/2100	26/11xx	g	ms	7-	-	19o	15						
27/2020	29/20xx	sc	ms	7o	54	25+	31		25, 32	28.2	4.1		34,7
30/0132	01/14xx	sc	s	9o	42	57+	174	28/0130 29/0107	37 13, 25, 32	30.6	6.5	29/0107	34,7
May 05/2000	07/24xx	sc,g	ms	7+	-	18+	10						
06/1650	08/01xx	sc,g	ms	7+	14	38+	60	04/1000	13, 25				
08/0421	09/12xx	sc	s	8+	52	53o	128	06/1404 06/2034	13, 25, 37 32	May 08.2	11.3		34,7
11/0435	12/15xx	sc	ms	7-	42	35-	42	09/0704	13, 32				
16/1350	17/14xx	sc,g	ms	6+	-	31-	42	13/0519 15/1350	25, 37 32	16/xxxx	3		
23/1400	25/05xx	g	ms	6-	-	25-	26			23.0	3.6		34,7
28/2029	30/17xx	sc	s	8-	56	20o	18	26/0818 27/1414	13 32	29.0	4.8		34,7
June 04/0248	06/14xx	sc,g	ms	6+	44	40o	52	01/0824	13, 37	June 03.9	4.5		34,7
25/1230	26/11xx	g	m	5+		29o	26						

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			FLARE					SHORT-WAVE RADIO FADEOUT					SOLAR FLARE EFFECT		
Date	Flare Serial No.	Event	Beg. UT	End UT	Max. UT	Position	Imp.	Onset UT	Imp	Type	Duration Min.	W.S. Index	Beg. UT	No.Obs. Reported	Onset
1960 June															
25	25		2039	2140	2046	N19 W04	3	2040	2-	S	30	5			
26	26		0428	0525	0436	N20 W08	3	0432	1+	S	56	5	0430	3	
	27		1326	1525	1403	N19 W13	2+	1402	2-	S	38	5	1358	2	
	28		2358	2457	2415	S08 E34	3	2403	2-	S	67	1			
27	29		2140	2345	2156	N21 W27	3	2141	2+	SL	138	5			
28			1815	1952	1848	N09 E67	2+	1823	1-	SL	22	4	1838	1	
								1855	2-	SL	40	5			
29															
30															
July															
11			No Flare Reported										0939	6	
12			2028	2115	2039	N15 W30	2+	2033	1+	S	37	5	2033	1	
			2328	2410	2354	N13 W31	1	2345	1	S	21	5			
14															
19															
20															
29															
Aug.															
05			No Flare Reported					1043	3+	S	21	1			
08															
11	30		1916	2055	1929	N22 E26	3+	1925	2	S	65	5	1926	1	
14	31		0511	0655	0525	N22 W06	3	0515	3	S	45	5	0517	7	
			1242	1414	1310	N19 E34	2+	1307	3-	S	53	5	1308	13	
16			1127	1250	1144	S11 E29	2	1143	1	SL	23	5	1144	3	
18			0653	0730	0657	S10 E06	2								
19															
21			1546	1630	1558	N27 W04	2	1538	3+	SL	172	5	1547	2	
27			0844	0936	0854	S04 W52	1+								
29															
30	34		0918	1100	0934	N18 W16	3	0843	2	S	65	1	0944	1	
Sept.															
02			0231	0348	0247	N18 W25	1	0240	2-	S	43	5	0239	4	
	35		0525	0906	0725	N18 W23	3	0540	2	SL	66	1			
								0707	1+	S	83	5			1960
	36		2223	2506	2307	N20 W31	3	2300	2+	S	50	5			Sept.
03	37		0037	0154	0108	N18 E88	3	0045	3+	SL	126	5			03/0500
															03/0800
															03/1100
															03/1430
04			No Flare Reported					0003	3	SL	97	5			
05															
07															
14			No Flare Reported					1620	3	SL	130	5			
16			1710	1855	1721	S22 E68	1	1709	3	S	101	5			
18			1815	1910	1829	S22 E43	1+	1824	1+	S	26	5	1826	4	
21			0830	0850	0834	N22 E57	2	0835	2	S	9	3	0831	5	
24															
26			0525	0616	0539	S22 W64	2+	0520	3+	SL	121	1	0521	3	26/1200
															26/1328
															26/2300
29															
Oct.															
04															
06															
11			0517	0756	0559	S16 W36	2	0525	3	S	63	5			
			1035	1154	1047	S18 W40	1+						1112	7	
15			1109	1138	1117	N15 W66	2+	1100	3	G	145	5	1114	1	
			No Flare Reported					1715	3	G	205	5			
17			No Flare Reported					1428	3	G	126	5			
22			1236	1343	-	N19 W17	2+	1307	1	S	17	3			
23			1531	1545	-	N18 W32	2								
24															
29	40		1026	1331	1030	N22 E26	3	1029	3	G	80	5	1024	1	
Nov.															
03															
06	42		1752	2030	1841	N13 E07	3	1708	1	G	67	1			
10	43		1009	1400	1023	N28 E29	3+	1022	2	S	90	4	1017	2	
11			0305	0428	0304	N29 E12	2+	0311	3+	S	185	5			
			1011	1058	1014	N29 E17	1+								Nov.
12	44		1315	1922	1330	N27 W04	3+	1326	3+	S	154	5	1325	8	12/1400
13															
14			0246	0520	0304	N27 W21	2+	0300	3	SL	120	5			
15	45		0207	0427	0221	N26 W35	3+	0217	3+	S	253	5	0221	7	15/0430
															15/0505
															15/0700
19			1741	1838	1747	N18 W33	2								
20	47		1955	2032	2020	N25 W90	3	2023	3-	SL	82	5			21/0200
21															21/0500

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		FORBUSH DECREASE			
Probable Flare	Reference	Onset	Mag. Dec. %	Probable Flare	Reference
25/1131 25/2039	H,S O	1960 June 27.2	8.0		34,7
27/2140 28/1815	H,S,O O				
12/2028 12/2328	O O	July 14.9	7.0		34,7
14/0511 14/1242	S O	Aug. 14.7	3.2		34,7
18/0653	O	29.1	4		34,7
27/0844	O				
	M,O				
02/2223 03/0037	13,32 25,37				
		Oct. 06.2	7.1		34,7
22/1236 23/1531	32				
10/1009 11/0305 11/1011	13 25,37 32	Nov. 12/1930		10/1009	24,18
		Nov. 13/1035	14	12/1315	32,34,39
14/0246 15/0207	13,32,37 25,37	15/1330	12.0	14/0246	31,34
19/1741 20/1955	32 25	24.2	4.5		34,7

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Date	Flare Serial No.	Event	FLARE Beg. UT	End UT	Max. UT
1960 Nov.					
24					
29			0206	0227	0209
30					
Dec.					
05	49		1825	2350	1838
07					
14					
15					
18					
24			0902	0957	-
25					
26					
27					
1961 Jan.					
05			0206	0220	0208
07					
08					
18					
19					
Feb.					
03					
04					
06					
13					
16					
17					
27			No Flare Reported		
Mar.					
05					
09					
13					
19					
26	51		1009	1150	1035
27					
Apr.					
02					
09					
10					
13					
14					
26	53		1646	1945	1710
29			No Flare Reported		
May					
01			1619	1724	1626
04	54		2145	2340	2213
25					
June					
01					
02					
11	56		1502	1620	1521
20					
21					
26			No Flare Reported		
29					
July					
04					
11	57		1615	2040	1659 1710
12	58		0950	1300	1025
13					
14					
15	59		1433	1929	1558
17	60		0710	0926	0736
18	61		0920	1250	1005
20			1524	1726	1545
21	64		1714	1800	1718
24	65		0403	0620	0504
	66		1722	2220	1822
26					

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FORBUSH DECREASE			
Onset	Mag. Dec. %	Probable Flare	Reference
1961 Sept. 30.9	6.3	28/2202	12,34,7
Oct. 28.7	2.5		34,7
Dec. 1.8	5		34,7
1962 Jan. 10.3	3		34,7
Feb. 04.3	4		34,7
23.1	2.6		34,7
26.9	2		34,7
Apr. 21.2	3.2		34,7
25.9	1.6		34,7
1963			
Apr. 30.9	2.2		34,7

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		SHORT-WAVE RADIO FADEOUT					SOLAR FLARE EFFECT		POLAR CAP ABSORPTION					
Position	Imp.	Onset UT	Imp	Type	Duration Min.	W.S. Index	Beg. UT	No.Obs. Reported	Onset	Rise Time	Duration Hrs.	Abs. db 30 Mc/S Riom.	Probable Flare	Reference
N10 E08	1													
N26 E74	3+	1830	3	S	100	5								
N17 E40	1+													
N19 W42	2	0207	1	S	23	5	0207	4						
							1506	5						
15 E74	3						1022	3						
							1040	1						
11 E54	3	1650	3	SL	113	5	1642	1						
							1756	1						
							1036	4						
04 W18	1	1623	2	S	47	5	1646	3						
11 W56	3	2205	1+	SL	40	5								
02 W49	2+	1503	2+	S	57	5	1501	2						
							1436	5						
07 E31	3	1648	3+	S	245	5								
07 E22	3+	1023	3	S	97	5	1021	14	July 12/000		24	1.5	11/1615	25
									12/1300	23	72	17		1
									13/0700		60	20	12/0950	25
13 E15	3+	1512	3	S	113	5			15/1545		72	3	15/1433	28
07 W45	3	0731	1	SL	29	5	0715	1						
07 W59	3+	1000	3	S	113	5	0945	1	18/1130	8	55	8.7	18/0920	1,25
		1158	3-	SL	137	5								
07 W90	2	1550	3+	S	370	5	1552	7						
03 W90	3	1702	2+	SL	73	5			21/0300		24	5	20/1524	25
12 E16	3+	0455	2+	SL	85	1								
08 E09	3	1755	2+	SL	95	5								

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TABLE VI 1960-1963 (CONTINUED)

POLAR CAP ABSORPTION					GEOMAGNETIC STORM									
Rise Time	Duration Hrs.	Abs db 30 Mc/S Riom	Probable Flare	Reference	Onset	End	Type	Max.	Max. Kp	Obs. Report	Σ Kp	Ap	Probable Flare	Reference
					1961									
					Aug.									
					01/2300	04/21xx	g	ms	6+	-	15o	8		
					29/1709	01/13xx	sc,g	m	5+	31	19-	16		
17	79	2.9		1										
		8		25	Sept.									
					12/04xx	12/09xx	g	m	5o	-	22o	17		
					13/1554	15/01xx	sc,g	ms	6o	22	14o	8		
					24/0545	25/16xx	sc,g	ms	6o	2	33-	42		
					27/0342	27/19xx	sc,g	m	5-	-	30-	26		
		1.8	28/2202	25	30/1847	01/23xx	sc	s	91	34	23+	36	28/2202	24
					Oct.									
					19/23xx	20/10xx	g	m	5+	-	11+	6		
					26/1941	27/24xx	sc	m	5+	46	32-	31		
					28/0810	29/13xx	sc	s	9-	5o	48o	128		
					Nov.									
					06/2318	08/08xx	sc,g	ms	6+	15	21o	16		
					17/1406	18/20xx	sc,g	ms	6+	11	21o	16		
					Dec.									
					01/0313	03/24xx	sc,g	s	8-	4	35-	54		
					1962									
					Jan.									
					01/0213	11/09xx	sc	ms	6+	40	40+	52		
					Feb.									
					04/0930	04/24xx	sc	m	5o	30	25-	20		
					11/0958	12/10xx	sc,g	m	5+	10	19-	13		
					15/1619	17/12xx	sc,g	ms	6-	3	20-	12		
					26/0634	27/21xx	sc,g	m	5-	6	23+	17		
					Mar.									
					05/0645	06/21xx	sc,g	ms	6-	-	22o	17		
					Apr.									
					06/0400	09/02xx	g	ms	6+	-	30-	27		
					10/02xx	11/18xx	g	m	5o	-	32-	30		
					20/2356	23/12xx	sc	m	5o	51	17-	10		
					May									
					05/1837	07/02xx	sc,g	m	5o	3	6+	4		
					31/0552	31/24xx	g	m	5o	2	26-	22		
					1963									
					Jan.									
					12/2220	20/01xx	sc,g	m	5+	8	9o	5		
					30/0023	31/21xx	sc,g	ms	6-	2	33-	29		
					Feb.									
					09/1944	14/01xx	sc,g	ms	6-	6	9+	8		
					Mar.									
					07/2152	11/21xx	g	ms	6+	-	11-	9		
					31/2115	01/15xx	sc	m	5-	21	7o	4		
					Apr.									
					04/0546	07/19xx	sc,g	ms	6-	28	24+	19		
					30/1522	04/12xx	sc	ms	6+	39	21o	23		

2

GEOMAGNETIC STORM										FORBUSH DECREASE			
nset	End	Type	Max. Int.	Max. Kp	Obs. Report	ΣKp	Ap	Probable Flare	Reference	Onset	Mag. Dec. %	Probable Flare	Reference
960													
ov.													
4/1232	26/15xx	sc,g	m	5+	7	22+	16						
0/1909	02/24xx	sc	s	8o	49	21-	17	29/0206	32				
ec.													
7/1804	08/11xx	sc	ms	6-	42	27o	25	05/1825	13,32				
4/0913	16/12xx	sc,g	ms	6o	3	12-	6						
5/1413	16/14xx	sc,g	ms	6o	5	36-	43						
8/0514	18/21xx	sc,g	m	5o	7	30+	26						
5/2002	28/16xx	sc,g	ms	6+	27	16o	9	24/0920	32	1960 Dec. 25.9	6		34.7
7/0510	28/20xx	sc,g	ms	6+	3	38+	5o						
961													
an.													
7/2049	09/24xx	sc	m	5o	7	16-	8						
8/1617	09/24xx	sc	m	5o	26	29o	22						
8/0200	20/21xx	sc,g	ms	6o	2	24+	17						
9/1250	20/22xx	sc,g	ms	6o	2	27+	26						
eb.										1961 Feb.			
3/0908	05/18xx	sc	ms	7o	40	18+	13			03.4	4		34,7
4/1331	05/12xx	sc	ms	7o	39	30-	43						
6/0106	13/18xx	sc	m	5o	33	28-	23						
3/0253	13/18xx	sc	m	5o	39	26+	23						
6/0026	-	sc	m	5+	2	30-	27			16.6	2.9		34.7
6/0043	16/19xx	sc	m	5+	44	30-	27						
7/0600	18/22xx	g	ms	7-	-	28-	29						
ar.													
5/1800	06/15xx	g	ms	7-	-	16+	14						
9/1327	10/15xx	sc	ms	7o	53	21+	13						
3/2316	16/14xx	sc,g	m	5+	-	18+	38						
9/1026	20/02xx	sc,g	ms	6o	2	34+	38						
7/1503	28/10xx	sc	ms	6o	49	24o	22						
pr.													
2/20xx	03/12xx	g	ms	6o	-	23-	14						
9/0900	09/21xx	g	ms	6+	-	26-	24						
0/1948	12/00xx	g	m	5+	-	27-	18						
3/1450	15/21xx	sc	s	8-	44	21-	15			Apr. 14.4	5.6		34,7
ay													
/23xx	02/08xx	g	ms	6-	-	22o	15						
4/1648	07/16xx	g	m	5+	3	12o	8						
5/0211	26/03xx	sc,g	ms	6-	-	33o	34						
une													
1/0800	01/20xx	g	ms	6-	-	31o	30						
/0700	02/20xx	g	m	5-	-	30-	28						
/1617	23/03xx	sc,g	ms	7o	19	18-	10						
/0010	29/22xx	sc,g	ms	6+	3	26o	25						
uly													
4/1400	06/05xx	sc,g	ms	6+	2	22-	16						
/1113	16/07xx	sc	s	8+	52	39-	102	11/1615 12/0950	13,25 13,25	July 13.5	12	11/1615	34,24
/1825	19/05xx	sc	s	8-	54	31o	36	15/1433	13,25				
/0248	21/09xx	sc	ms	6-	46	24+	19	18/0920	25				
/1950	28/05xx	sc	s	8+	58	25-	23			26.9	6		34,7

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3

			FLARE					SHORT-WAVE RADIO FADEOUT					SOLAR FLARE EFFECT		
Date	Flare Serial No.	Event	Beg. UT	End UT	Max. UT	Position	Imp.	Onset UT	Imp.	Type	Duration Min.	W.S. Index	Beg UT	No. Obs. Reported	Onset
1961 Aug. 01															
13			0329	0410	0344	N07 E41	1+	0346	1	S	13	4	0343	3	
29															
Sept. 02			0321	0352	0327	N10 E27	2						0320	3	1961 Sept.
10			No Flare Reported					1942	3	SL	101	5			10/210 10/230
12															
13															
16	68		1057	1258	1110	N18 E77	3+	1102	2	S	50	4	1101	3	
24															
27															
28	69		2202	2530	2223	N13 E29	3	2218	2	S	62	5			28/233
30															
Oct. 19															
26															
28															
29															
Nov. 03			No Flare Reported										0802	10	
05			1311	1350	1318	N09 W25	1	1339	3+	S	109	5			
06															
11			No Flare Reported					0327	3-	SL	81	1			
17															
Dec. 01			No Flare Reported					1327	3	S	71	3			
27															
1962 Jan. 10															
Feb. 04															
11															
15															
23															
26															
Mar. 05															
06															
13	71		1444	1640	1446	N10 E66	2+	1448	3	S	94	5	1448	3	
Apr. 06															
10															
18	73		1734	2129	1806	N09 E05	3	1752	3	G	108	5			
20															
21															
22	74		1430	1710	1450	N08 W48	3	1446	3	S	134	5			
25															
27	75		1346	1440	1413	N08 E58	3	1413	1+	S	20				
May 05															
31															
1963 Jan. 12															
30															
Feb. 09															
Mar. 07															
10															
15			No Flare Reported					1615	3	S	50	5			
31															
Apr. 04															
15			1034	1230	1125	S11 W06	2	1124	2	S	16	5	1127	11	
			1613	1713	1619	S10 W09	2	1615	3	S	50	5	1613	1	
30															

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(1)

					FL
Date	Flare Serial No.	Event	Beg. UT	End UT	Ma UT
1963					
May					
03					
23			1229	1305	123
27					
June					
06					
25					
July					
05					
21					
23					
30					
Aug.					
18					
19					
Sept.					
13			No Flare Reported		
15			0015	0219	004
	77		2008	2210	203
					211
Sept.					
16			1300	1410	130
			No Flare Reported		
19					
20			2314	2601	240
21					
22					
24					
26			0638	0944	071
27					
28					
Oct.					
11					
22					
24					
28					
29					
30					
Nov.					
06					
17					
24					
Dec.					
01					
02					

5, VI-5

1

ARE		SHORT-WAVE RADIO FADEOUT					SOLAR FLARE EFFECT		POLAR CAP ABSORPTION					
Position	IMP.	Onset UT	Imp.	Type	Duration Min.	W.S. Index	Beg. UT	No.Obs. Reported	Onset	Rise Time	Duration Hrs.	Abs. db 30 Mc/s Riom	Probable Flare	Refere
N05 W65	1	1235	2	S	24	5	1234	7						
		0409	3	SL	71	5								
N15 E75	2	0015	3+	S	180	5								
N10 E60	2+	2015	2+	S	55	5								
N10 E50	2	1303	2	S	22	5	1304	6						
		1440	3	G	125	4								
N10 W09	2	2351	3	S	34	5	2359	2	1963 Sept. 21/0000	15	54	3.1		1
N14 W78	3	0709	3+	SL	102	5			26/0730	8	89	4.6		1
		1338	3	SL	118	5	1335	4						
		0140	3	SL	140	5								

2

ice	GEOMAGNETIC STORM										FORBUSH DECREASE			
	Onset	End	Type	Max.	Max. Kp	Obs. Report	Σ Kp	Ap	Probable Flare	Reference	Onset	Mag. Dec. %	Probable Flare	Reference
											1963 May 03.0	3.5		34*,7
	1963 May 27/2028	29/10xx	sc	ms	6-	11	14-	7						
	June 06/1511	07/14xx	sc,g	ms	7o	3	16o	16						
	25/0109	26/10xx	sc,g	ms	6-	2	28o	23						
	July 05/22xx	06/15xx	g	ms	6-	-	25-	18						
	21/0600	21/21xx	g	m	5+	-	28-	26						
	23/1200	24/19xx	g	m	5+	-	28-	22						
	30/03xx	02/12xx	g	m	5o	-	31-	28						
	Aug. 18/0814	18/17xx	sc,g	ms	6+	4	28o	26						
	19/1449	21/12xx	sc,g	ms	7o	5	24o	24						
	Sept. 13/1846	18/04xx	sc,g	ms	7o	3	12+	8						
											Sept. 17.0	3.0		34*,7
	19/0534	19/18xx	sc	m	5-	10	30+	26						
	21/1413	23/14xx	sc	s	9-	41	33-	44						
											22.0	3.2		34,7
	24/1812	30/03xx	sc,g	ms	7+	-	21-	18			22.8	7		34*,7
	27/1942	30/14xx	sc	ms	6+	33	31o	34						
											28.2	2		34**,7
	Oct. 11/05xx	14/22xx	g	ms	6-	-	27o	22						
	24/0019	30/12xx	sc,g	ms	7+	3	41+	63						
	29/1359	30/12xx	sc	s	8o	46	37-	74			Oct. 29.8	5.6		34,7
	Nov. 06/0924	11/12xx	sc,g	ms	6o	2	20+	12						
	17/0903	17/21xx	sc	m	5-	38	20-	16			Nov. 17.3	2.5		34**,7
	24/0320	25/16xx	g	m	5o	-	25+	20						
	Dec. 01/2226	06/15xx	sc	ms	6-	17	10o	5						
	02/2116	07/19xx	sc	ms	6-	17	21-	12						

*Considerably doubtful event
**Slightly doubtful event

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3

VII. CATALOGUE OF BALLOON FLIGHTS ASSOCIATED WITH MAJOR SOLAR FLARES DURING 1960 – 1963

VII

TABLE VII. CATALOGUE OF BALLOON FLIGHTS ASSOCIATED WITH MAJOR SOLAR FLARES DURING 1960-1963

Our Catalogue of Balloon Flights during the period 1960-1963 is based almost entirely on the balloon status reports issued by the University of Michigan (references 17, 18, and 19). A few additional flights reported in the scientific literature by other groups have been included when sufficient flight data were given. The flights are limited to those that were made within four days after a major solar flare. No balloon flights were found during the literature search for 11 of the major flares (3, 7, 14, 21, 40, 50, 70, 71, 75, 77 and 78). Sources for data obtained for the 210 flights listed in the table are given in the Bibliography of Balloon Flights (pages 5.VII-iii through 5.VII-iv). A supplementary Balloon Flight Bibliography (pages 5.VII-v through 5.VII-ix) has been included for flights discussed in the scientific literature, but in most cases without sufficient flight data to be included in the table.

Column 1 Greenwich Date.

Column 2 Flare Serial Number. This refers to the major flare serial number in Table I.

Column 3 Beginning Time of the Flare.

Column 4 Flare Importance.

Column 5 Spectral Observations Type II Beginning Time.

Column 6 Spectral Observations Type IV Beginning Time.

Column 7 Polar-cap Absorption, Greenwich day/beginning UT.

BALLOON DATA (Columns 8 through 17)

Column 8 Balloon Flight Serial Number.

Column 9 Launch Date.

Column 10 Launch Time UT.

Column 11 Time at Altitude, Hours, Minutes.

Column 12 Maximum Altitude. This is given in either kilometers or millibars. These data were not found for most of the flights.

Column 13 Name of the Place Where Balloon was launched.

Column 14 Geographical Latitude and Longitude.

Column 15 Instrument Carried. Where:

IC - Ion Chamber
SCI - Scintillation Counter
GT - Geiger Telescope
SCA - Single Geiger Counter (aluminum)
SC - Single Geiger Counter (brass)
NE - Nuclear Emulsion
SC-S - Single Geiger Counter (steel)

Column 16 Group. These have been designated as follows:

Minn. - School of Physics, University of Minnesota
Dr. J. R. Winckler

CIT - Norman Bridge Laboratory of Physics
California Institute of Technology
Dr. H. V. Neher

UC - Department of Physics, University of California, Berkeley, Dr. Kinsey A. Anderson

Chicago - Ennco Fermi Institute, University of Chicago, Dr. Peter Meyer, Dr. Gordon Lentz

Column 17 Published Balloon Flight Data. References that discuss the data obtained during some of the flights refer to the balloon flight bibliography, page 5.VII-iii. In many cases several of the flights are discussed in the reference. In general, only large or outstanding changes in the radiation count are discussed. In addition to the references given on page 5.VII-iii, we have prepared a supplementary Bibliography of Balloon Flights giving the date of the flights and/or a brief abstract.

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BALLOON FLIGHTS 1960-1963

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1. 6-27-60	6. 7-22-60	11. 6-17-61
2. 6-28-60	7. 7-30-60	12. 6-18-61
3. 7-7 & 8- 60	8. 7-31-60	13. 6-22-61
4. 7-15-60	9. 8-1-60	14. 6-24 & 25-61
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Six balloon flights were made at Thule, Greenland, during the summer of 1962 and the summer of 1963. The dates and times (UT) when the balloon reached maximum altitude is shown.

1962

7/29/0907, 8/02/0844, 8/04/0828, 8/06/0805, 8/08/0827, and 8/10/0707

1963

7/28/0758, 7/30/0824, 8/02/0900, 8/05/0753, 8/07/0817, and 8/09/0746

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This paper discusses thirteen x-ray events between 23 August 1959 and 1 August 1960. (The dates of the 1960 flights are 1/11, 4/1. 4/2, 4/3, 4/29, 4/30, 5/7, 5/11, and 6/5.)

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TABLE VII BALLOON FLIGHTS ASSOCIATED

	FLARE			SPECTRAL		PCA	BALLOON FLIGHT DATA					
Gr. Day	Maj. Flare Serial No.	Beg. UT	Imp.	Type II Beg. UT	Type IV Beg UT	Gr. Day Beg. UT	Serial No.	Gr. Day	Launch UT	Time at Altitude Hr.	Min	Altit Km
1960								1960				
Jan.								Jan.				
07	1	1504	3				1	07	2317	6	00	
							2	11	0521	4	00	
11	2	2040	3	2103.3	2105		3	13	0458	4	30	
Feb.								Feb.				
03	4	0815	2+				4	04	1508	Negligible		
							5	05	1505	3	15	
							6	06	1402	3	45	
22	5	1352	3	1358	1356		7	23	0620	5	00	
26	6	0700	3				8	28	1444	5	00	
Mar.								Mar.				
02	8	1015	3				9	05	1453	4	00	
27	9	0634	3			Mar.						
29	10	0640	3		0656	29/0800	10	30	0525	Neglibible		
30	11	1455	3+	1529	1526		11	31	0328	4		
							12		1925	4	15	
								Apr.				
							13	01	0140	4	00	
Apr.						Apr.	14		0837	4	00	
01	12	0843	3		0848	01/1000	15		1458	Negligible		
							16		0845	3	30	
							17	02	0131	4	45	
							18		0825	5	00	
							19	03	0339	5	15	
05	13	0215	3		0207	05/0700	20	06	0327	4	00	
28	15	0130	3	0122	0145	28/0230	21	28	0059	10	00	
							22		1122	9	00	
29	16	0107	3	0214	0200	29/0500	23	29	0058	7	30	
							24		2048	6	00	
							25	30	0337	8	30	
							26		1522	8	00	
								May				
							27	01	0230	8	30	
May						May						
04	17	1000	3		1915	04/1032	28	04	1458	11	15	
							29		1928	1	30	
							30	05	0045	1	45	
							31		0109	24		
							32	06	0131	Negligible		
06	18	1404	3+	1438	1414	06/1800	33	07	0310	22	00	
							34	08	1009	Negligible		
09	19	0704	3+				35	09	0445	20	30	
							36	10	0336	11	00	
							37	11	0321	9	00	
							38	12	1140	14	30	
13	20	0519	3+	0523	0530	13/0730	39	14	0115	11	00	
							40	15	0145	9	45	
June								June				
01	22	0824	3+		0837		41	03	1100	Negligible		
							42	04	1120	8	30	
							43	05	0122	9	30	
08	23	0732	2+				44	09	0301	10	45	
25	24	1131	3		1215		45	25	0230	13	30	
	25	2039	3	2048	2045							
26	26	0428	3				46	26	0150	9	30	
	27	1326	2+				47		1615	17	45	
	28	2358	3	2404	2413		48	27	0620	9	30	
27	29	2140	3		2150		49		0624	9	30	
							50		1901	19	00	
							51	28	0154	6	45	
							52		0730	9	15	
							53		1843	16	00	
							54	29	0138		15	
							55		1620	14	00	
							56	30	0223	8	15	
							57		1252	13	00	
								July				
							58	01	0200	6	15	
							59		1500	12	00	
Aug.								Aug				
11	30	1916	3+	1929	1926		60	10	1646	36	45	
							61	11	0154	20	00	
							62	12	0715*			
14	31	0511	3				63	16	0329	27	00	
							64	17	9115	19	30	
							65	18	0106	19	30	
							66		0244	30	00	
26	32	0847	3									
	33	1132	3				67	30	0159	12	15	
30	34	0918	3				68	31	0119	20	15	

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le mb	LOCATION Location Place	Geographic Lat.	Long.	Instrument Carried	Group	Notes
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	15, 17, 20
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17, 20
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	1, 17, 20
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	1, 17, 20
	Ft. Churchill, Canada	N58.7	W93.3	NE	Minn.	17, 20
9.4	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	1, 17, 20
9.3	Minneapolis, Minn.	N44.9	W93.3	SCI, NE	Minn.	1, 17, 20
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17, 20
3.9	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	1, 7
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17, 20
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17, 20
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17, 20
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17, 20
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17, 20
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC-S, NE	Minn	17
9.2	Worthington, Minn.			SCI	Chicago	22
	Minneapolis, Minn.	N44.9	W93.3	SCI, SC, NE	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT, IC	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Ft. Churchill, Canada	N58.7	W93.8	NE	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC-S, NE	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT, IC	Minn.	17
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT, IC	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
4.6	Richland Center, Wisc.			SCI	Chicago	22
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18
	Iowa City, Iowa			IC, SC, SC-A, NE, GT	Minn.	18
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18
	Iowa City, Iowa			IC, SC, SC-A, NE, GT	Minn.	18
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	15, 18
	NBS, Washington, D.C.			Barium Fluoride Film	NBS	10
	Minneapolis, Minn.	N44.9	W93.3	SCI, GT	Minn.	18
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	15, 18
12	College, Alaska			GT	Uc	11
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18

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WITH MAJOR SOLAR FLARES DURING 60-63

...ide mb	LOCATION Location Place	Geographic Lat.	Long.	Instrument Carried	Group	Notes
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	15, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	15, 17
	Minneapolis, Minn.	N44.9	W93.3	SCI, NE	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	SCI, NE	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	12, 15, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC-A, NE, GT	Minn.	12, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	12, 15, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	12, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	NE	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	12, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	12, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	12, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	12, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	12, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	12, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	12, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	12, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	12, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	12, 15, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	12, 15, 17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17, 21
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
5.9	Sioux Falls, S.D.			SCI	Chicago	22
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17, 21
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	SCI, NE	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
20	Happy, Alaska			SC, SC-A	Uc	2
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	15, 17
12	Happy, Alaska			SC, SC-A	Uc	2, 3, 6
	Minneapolis, Minn.	N44.9	W93.3	SCI, NG	Minn.	17
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
15	Happy, Alaska			SC, SC-A	Uc	2
	Ft. Churchill, Canada	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
12.5	Happy, Alaska			SC, SC-A	Uc	2
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
19.1	Thule, Greenland	N76.5	W68.9	IC	CIT	14
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Ft. Churchill, Canada	N58.7	W93.8	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17
	Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	17

TABLE VII 1960 T

FLARE				SPECTRAL		PCA	BALLOON FLIGHT DATA					
Gr. Day	Maj. Flare Serial No.	Beg. UT	Imp.	Type II Beg. UT	Type IV Beg. UT	Gr. Day Beg. UT	Serial No.	Gr. Day	Launch UT	Time at Altitude Hr.	Min.	Altit Km
							69	Sept. 01	0132	23	15	
							70		0343	26	15	
Sept. 02	35	0525	3	0545			71	02	0335	22	00	
	36	2223	3			Sept.	72		2012	32	30	
03	37	0037	3		0038	03/0500	73	03	0122	25	00	
							74		0725	9	30	
							75		1500	5	00	
							76	04	0105	25	00	
							77		0617	18	00	
							78		1200	4	15	
							79		-	6	30	
							80		2101	13	45	
							81	05	0140	27	30	
							82		1300	12	15	
							83	06	0115	27	30	
							84		0217	25	00	
25	38	0759	3				85	26	0946	6	15	
							86	27	1222	6	45	
Oct. 14	39	2033	3				87	Oct. 15	1305	6	30	
Nov. 05	41	1157	3				88	Nov. 05	0103	24	30	
							89		1100	13	15	
06	42	1752	3	1840			90	07	0015	6	30	
							91	08	0515	Negligible		
							92		1858	3	00	
							93	09	0600	13	45	
10	43	1009	3+				94	11	0232	20	00	
							95		0307	9	00	
							96	12	-	Negligible		
						Nov.	97		0014	12	45	
12	44	1315	3+		1345	12/1400	98		1835	6	00	
							99	13	0017	5	00	
							100		0545	13	45	
							101		0555	6	15	
							102		1015	9	00	
							103		1107	5	00	
							104		2037	9	30	
							105	14	0310	2	45	
							106		1120	11	15	
							107		1715	3	30	
							108	15	0058	Negligible		
15	45	0207	3+	0221	0221	15/0430	109		0258	9	00	
							110		1222	6	00	
							111		1934	4	15	
							112	16	0224	10	00	
							113		0726	10	00	
							114		2215	24	00	
							115	17	0251	8	30	
17	46	2126	3				116		1900	3	00	
							117	18	0057	8	00	
							118	19	1418	8	00	
							119	20	0645	3	00	
20	47	1955	3	2028	2027		120	22	0302	7	15	
	48	2114	3				121	24	0321	6	00	
Dec. 05	49	1825	3+	1834	1834		122	Dec. 05	0440	16	15	
							123	07	0248	12	15	
							124		1721	8	15	
							125	08	0036	11	15	
							126	09	1026	13	00	
1961 Mar. 26	51	1009	3				127	1961 Mar. 27	-	Negligible		
							128	28	0406	7	01	
							129	29	0004	15	16	
							130		0112	14	53	
							131	30	0048	16	52	
							132		0209	25	51	
Apr. 13	52	0556	3				133	Apr. 13	0231	18	18	4.
								14	1808			4.
							134	15	0133	17	51	
26	53	1646	3				135	28	0207	21	58	
							136	29	0120	14	46	
May							137	May 05	1230	-	-	
04	54	2145	3				138	07	0100	20	37	
09	55	1438	3				139	10	0139	29	11	
							140	12	0144	21	21	
							141	13	0133	20	22	

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TABLE VII 1960

	FLARE			SPECTRAL		PCA	BALLOON FLIGHT DATA				
Gr. Day	Maj. Flare Serial No.	Beg. UT	Imp	Type II Beg. UT	Type IV Beg. UT	Gr. Day Beg. UT	Serial No.	Gr. Day	Launch UT	Time at Altitude Hr.	Min.
June								June			
11	56	1502	2+	1508	1505		142	13	0900	3	00
							143	14	1000	14	00
							144	15	0553	15	37
July						1961		July			
11	57	1615	3	1702	1655	July	145	11	2037	19	23
12	58	0950	3+		1400	12/1300	146	12	0136	11	48
							147		1645	9	15
							148		1733	18	57
							149		2205	19	20
							150	13	0232	Negligible	
							151		0540	12	00
							152		0614	12	05
							153		1859	12	00
							154		2052	16	38
							155		2103	13	22
							156	14	0935	11	55
							157	14	1558	17	02
							158	15	0130	10	48
15	59	1433	3+		1533	15/1545	159		2104	11	52
							160		2122	16	08
							161	16	1721	19	39
17	60	0710	3						0132	12	28
18	61	0920	3+		0940	18/1130	162	18	1305	19	18
							163		1522	23	38
							164		1556	9	31
							165		2204	19	41
							166		0118	2	14
							167	19	0507	1	47
							168		0224	12	00
							169	20	1107	14	53
20	62	1633	3+	1554	1552		170		2211	Negligible	
	63	1828	3+	1557			171		2348	10	02
							172		0206	1	51
							173	21	0258	16	02
21	64	1714	3				174		2246	17	44
							175		1100	2	00
							176	22			
24	65	0403	3+								
	66	1722	3				177	26	0914	11	16
							178	27	0133	11	57
28	67	1512	3				179	29	0236	12	35
							180		0832*		
							181		1000	10	00
								Aug.			
							182	01	0807*		
							183		1200	10	00
Sept.								Sept.			
							184	18	0028	17	05
16	68	1057	3+				185		0043	15	57
							186		2345	15	43
28	69	2202	3	2217	2212		187	28	0035	11	15
							188		0035	9	08
							189		0100	13	43
							190		1200	12	35
							191		1205	09	12
							192		1640	11	48
							193	29	0001	13	29
							194		0036	Negligible	
							195		0130	11	30
							196		0320	14	21
							197	30	0050	1	48
								Oct.			
							198	01	0130	11	57
							199		0155	13	05
							200		0210	11	20
							201		0323	3	14
							202		0907	11	03
1962								1962			
Mar.								Mar.			
22	72	2220	3	0231.5			203	24	0302	5	04
Apr.								Apr.			
18	73	1734	3	1844.4	1839		204	18	0355	15	50
22	74	1430	3	1554.3			205	20	0137	19	23
							206	22	0134	22	41
							207	23	0100	18	45
June								June			
21	76	0620	3				208	23	0207	9	53
							209	24	0700	9	30
									0630	10	00

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Altitude Km	mb	LOCATION Location Place	Geographic Lat.	Long.	Instrument Carried	Group	Notes
	12	College, Alaska			SC, SC-A	Uc	3
	12.5	College, Alaska	N		SC, SC-A	Uc	3
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	15, 18
		Ft. Churchill, Canada	N58.7	W93.8	IC, SC, GT	Minn.	9
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	9, 15, 18
		Minneapolis, Minn.	N44.9	W93.3	SCI, GT	Minn.	9, 18
		Ft. Churchill, Canada	N58.7	W93.8	SCI	Minn.	9
		Ft. Churchill, Canada	N58.7	W93.8	IC, SC, GT	Minn.	9
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	9, 15, 18
	4	Ft. Churchill, Canada	N44.9	W93.3	NE	Goddard	8
	5	Minneapolis, Minn.	N44.9	W93.3	SCI, SC	Minn.	16, 18
		Ft. Churchill, Canada	N58.7	W93.8	SCI	Minn.	9
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	9, 18
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	9, 18
		Ft. Churchill, Canada	N58.7	W93.8	IC, SC, GT	Minn.	9
		Minneapolis, Minn.	N44.9	W93.3	SCI, GT	Minn.	9, 18
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	9, 18
		Ft. Churchill, Canada	N58.7	W93.8	IC, SC, GT	Minn.	9
		Ft. Churchill, Canada	N58.7	W93.8	IC, SC, GT	Minn.	9
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	9, 15, 18
	2	Ft. Churchill, Canada	N58.7	W93.8	NE	Goddard	8
		Ft. Churchill, Canada	N58.7	W93.8	IC, SC, GT	Minn.	9
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	9, 18
		Ft. Churchill, Canada	N58.7	W93.8	IC, SC, GT	Minn.	9
		Bemidji, Minn.			IC, SC, NE, GT	Minn.	9
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	9, 18
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	9, 18
		Ft. Churchill, Canada	N58.7	W93.8	Flare Unit	Minn.	9
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18
		Bemidji, Minn.			IC, SC, NE, GT	Minn.	9
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	9, 18
		Ft. Churchill, Canada	N58.7	W93.8	Flare Unit	Minn.	9
		Ft. Churchill, Canada	N58.7	W93.8	IC, SC, GT	Minn.	9
	4.5-5	Ft. Churchill, Canada	N58.7	W93.8	Counter Telescope	Chicago	13
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	15, 18
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18
	10	Thule, Greenland	N76.5	W68.9	IC	CIT	14
	4.5-5	Ft. Churchill, Canada	N58.7	W93.8	Counter Telescope	Chicago	13
	9.4	Thule, Greenland	N76.5	W68.9	IC	CIT	14
	4.5-5	Ft. Churchill, Canada	N58.7	W93.3	Counter Telescope	Chicago	13
		Waterloo, Iowa			SCI, GT	Minn.	18
		Minneapolis, Minn.	N44.9	W93.3	SCI, GT	Minn.	18
		International Falls, Minn.			SCI, GT	Minn.	18
		Minneapolis, Minn.	N44.9	W93.3	SCI, GT	Minn.	18
		Waterloo, Iowa			SCI, GT	Minn.	18
		International Falls, Minn.			SCI, GT	Minn.	18
		Minneapolis, Minn.	N44.9	W93.3	SCI, GT	Minn.	18
		Waterloo, Iowa			SCI, GT	Minn.	18
		International Falls, Minn.			SCI, GT	Minn.	18
		Waterloo, Iowa			IC, SC, SC-A, NE, GT	Minn.	18
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18
		International Falls, Minn.			IC, SC, SC-A, NE, GT	Minn.	18
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	18
		International Falls, Minn.			IC, SC, SC-A, NE, GT	Minn.	18
		International Falls, Minn.			IC, SC, SC-A, NE, GT	Minn.	18
		Minneapolis, Minn.	N44.9	W93.3	SCI, GT	Minn.	18
		Flin Flon, Manitoba			SCI, GT	Minn.	18
		Waterloo, Iowa			SCI, GT	Minn.	18
		Waterloo, Iowa			IC, SC, SC-A, NE, GT	Minn.	18
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	19
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	19
		Minneapolis, Minn.	N44.9	W93.3	SCI	Minn.	19
		Minneapolis, Minn.	N44.9	W93.3	SCI	Minn.	19
		Minneapolis, Minn.	N44.9	W93.3	SCI	Minn.	19
		Minneapolis, Minn.	N44.9	W93.3	IC, SC, SC-A, NE, GT	Minn.	19
	10-12	Ft. Yukon, Alaska			SCI	Uc	5
	10-12	College, Alaska			SCI	Uc	5

VIII. CHRONOLOGICAL CATALOGUE OF MAJOR SOLAR EVENTS DURING 1960 – 1963

VIII

TABLE VIII. CHRONOLOGICAL CATALOGUE OF MAJOR SOLAR EVENTS DURING 1960 - 1962

The entries in this table include the following:

1. All major flares that are listed in the McMath-Hulbert working list of solar flares with importance 3 and 3+.

2. All great short wave radio fades of importance 3 or 3+ that last for 30 minutes or more.

3. All great 10 cm bursts with a peak flux equal to or greater than 500 units (10^{-22} Wm^{-2} $(c/s)^{-1}$).

4. The most active plages. (Produced 30 or more flares during disk passage).

5. The greatest sunspots (maximum area $\geq$ 1000 millionth in the Greenwich data) and all spots with a γ or $\beta\gamma$ magnetic classification in the Mt. Wilson data.

6. All spectral radio emission of Type II and Type IV. In addition, outstanding bursts of Type I and Type III have been included. Spectral type II and Type IV includes data from the High Altitude Observatory in the frequency range 7.6 to 41 Mc/s,the expanded Ft. Davis frequency range 2100 to 3900 Mc/s,and data from the University of Michigan Radio Astronomy Observatory. These are in addition to the CSIRO and Harvard data given in previous volumes of this catalogue. The HAO, expanded Ft. Davis and University of Michigan frequency ranges started operation in the early part of 1960.

7. Radio emissions at 200 Mc/s at the time of major events.

8. Radio emissions at other frequencies.

9. Polar-cap absorptions

10. Geomagnetic storms

The entries in this section of the catalogue will bring together in chronological order many of the entries already given in Tables I through VI. The exceptions are defined below:

(a) The major solar flare requirement for Table I is based on the list of flares reported in the IAU Quarterly Bulleting and includes some of importance 2+ and all flares of importance 3 and 3+. In Table VIII only flares of importance 3 and 3+ listed in the McMath-Hulbert Observatory working list of flare are included.

(b) The Table VIII requirement for "the greatest" sunspots is based on unpublished Greenwich data and only those with an area greater than a 1000 millionth qualify. On the other hand, Table II includes all sunspot groups from the Royal Greenwich Observatory list with a maximum area, during disk passage, equal to or greater than 500 millionth.

As in the previous tables, minor flares, small sunspot groups, plages, and the other solar and solar-terrestrial effects associated with any of the major entries are included if an observation is available.

A major entry, i.e., one qualifying under 1 through 6 above is indicated by an asterisk in the appropriate column. The column headings and explanations, where necessary, are given below:

Column 1 Event number, starting with one at the beginning of each year.

Column 2 Greenwich date of the event.

FLARE DATA (Columns 3 through 8)

These will include all 3 and 3+ flares (reference 9) as well as minor flares, and in some cases - sub-flares that may be associated with a solar or terrestrial event given in subsequent columns of the table:

Column 3 Beginning of the flare UT. If the start of the flare was observed, the beginning time is underlined.

Column 4 End Time UT. If the end of the flare was observed, the time is underlined.

Column 5 Time of Maximum, UT.

Column 6 Importance. This is the value assigned to the flare in the McMath-Hulbert working list of flares (reference 9).

Column 7 The heliographic position is the arithmetic mean of positions reported in the IAU Bulletin and given in reference 9.

Column 8 Number of Observations.

SHORT WAVE RADIO FADEOUTS (Columns 9 through 14)

Sudden ionosphere disturbances may be detected in a number of ways: short wave fadeouts (SWF), enhancement of low frequency atmospherics (SEA), increase in cosmic absorption (SCNA), sudden phase anomalies at VLF (SPA), and sudden signal enhancements at VLF (SES).

The data included in this catalogue are limited to SWF's and includes all outstanding short wave radio fadeouts of importance 3 or 3+ that lasted for 30 minutes or more. In addition, minor SWF's that occurred at the time of the flares catalogued in Columns 3 through 8 are included. The following data are given.

Column 9 — Type (S, SL, or G). The following classifications are used:
S-SWF (S): sudden dropout and gradual recovery
Slow S - SWF (SL): dropout takes 5 to 15 minutes and gradual recovery
G-SWF (G): Gradual disturbance: fade irregular in either the dropout or recovery stage

Column 10 — Importance. SWF's are given an importance rating on a scale from 1- to 3+ based on amplitude of the fade, duration of the event, and confidence in the reality of the event.

Column 11 — Beginning Time UT.

Column 12 — Duration in Minutes.

Column 13 — Widespread Index. The degree of confidence in identifying the event by the individual stations is combined into an index of certainty that the event is geographically widespread, ranging from 1 (possible - single station) to 5 (definite - many stations).

Column 14 — Number of Observations. The column gives the number of observatories reporting the event.

SOLAR RADIO EMISSIONS AT 10 cm (Columns 15 through 19)

Column 15 — Type. Two different classifications are used: (1) numerical, on a scale from 1 to 9, used in reference 52 and defined in "Descriptions Test and Index for CRPL-F, Part B. Solar-Geophysical Data," issued November 1962. (2) Alphabetical symbols used in reference 15. These are defined in the introduction of Table IV.

Column 16 — Beginning Time UT.

Column 17 — Duration in Minutes.

Column 18 — Time of Maximum Flux, UT.

Column 19 — Peak Flux.

PLAGE DATA (Columns 20 through 28)

The data in this section of Table VIII are taken from the McMath-Hulbert Plage Catalogues. The entries in this table are limited to: plage regions that were the source of 30 or more flares during disk passage, indication in Column 20 with an asterisk, and/or plage regions associated with flares tabulated in Columns 3 through 8. The column headings, in general, self-explanatory, follow:

Column 20 McMath-Hulbert Plage Number.

Column 21 Greenwich Day of Central Meridian Passage.

Column 22 Mean Longitude.

Column 23 Mean Latitude.

Column 24 Average Intensity - The intensity of calcium plages are estimated on a scale from 1 (faint) to 5 (very bright). The values given in this column are the average intensity during dark passage.

Column 25 Maximum Area. In units of millio' of the area of the solar hemisphere.

Column 26 Number of Flares. This is the total of all flares associated with the plage during disk passage.

Column 27 Age in Rotations. The number 1 indicates that the plage is new.

Column 28 Identification. This is the number of the plage region during the previous rotation. If two or more numbers are given in this column, those plages or parts are then combined to form the tabulated plage.

SUNSPOT DATA (Columns 29 through 34)

This portion of the catalogue is limited to the sunspots in the plage region given in Column 20.

Column 29 Mt. Wilson Magnetic Classification from reference 30.

Column 30 Greenwich Day of Central Meridian Passage.

Column 31 Mean Latitude During Disk Passage.

Column 32 Mean Magnetic Field Strength H, in units of 100 gauss from reference 30.

Column 33 When seen: The first number gives the data the sunspot was first seen, the second number is the last date on which the spot was seen.

Column 34 Area. From unpublished Greenwich data.

Column 35 Mt. Wilson Sunspot Numbers of all spots located in the plage of Column 20.

DYNAMIC SPECTRUM DATA (Columns 36 through 40)

Column 36 Type I Bursts. The following information is given: amount of activity indicated by the Symbols I_s, b, G, g, or s; duration of the burst - beginning time, end time; and the intensity on a scale from 1 (weak) to 3 (strong). The activity symbols are defined as follows:

At 100 Mc/s intensity 1 corresponds to 5 to 40 x 10^{-22} Wm^{-2} $(c/s)^{-1}$, 2 = 40 - 200 x 10^{-22} Wm^{-2} $(c/s)^{-1}$ and 3, 200 x 10^{-22} $Wm^{-2}(c/s)^{-1}$

I_s - A noise storm
C - A noise storm with a slowly varying enhancement over a broad spectrum
b - Single bursts
g - Small group (≤ 10) of bursts
G - Large group (> 10) of bursts
s - Storm intermittent but apparently connected activity.

Column 37 Type III Bursts, activity, duration and intensity.

Column 38 Type II (slow drift) bursts, duration, and intensity.

Column 39 Type IV (broad band continuum) duration and intensity.

Column 40 Frequency Range.

200 Mc/s DATA (Columns 41 through 45)

Column 41 Type.

Column 42 Beginning Time UT.

Column 43 Duration in Minutes.

Column 44 Time of Maximum Flux.

Column 45 Peak Flux.

OTHER RADIO DATA (Columns 46 through 52)

Column 46 Frequency Mc/s

Column 47 Type.

Column 48 Beginning Time UT.

Column 49 Duration in Minutes.

Column 50 Time of Peak Flux.

Column 51 Peak Flux.

Column 52 Observatory.

POLAR-CAP ABSORPTION DATA (Columns 53 through 58)

Column 53 Greenwich Day.

Column 54 Onset Time.

Column 55 Time to Rise to Peak.

Column 56 Duration in Hours.

Column 57 Intensity.

Column 58 Observer.
B - Bailey
H - Hakura and Goh
K - Kiruna
L - Leinbach

GEOMAGNETIC STORMS (Columns 59 through 65)

Column 59 Greenwich Day.

Column 60 Beginning of the Storm.

Column 61 Duration of the storm (h) indicates hours, (d) indicates days.

Column 62 Type.
g - gradual
sc- sudden commencement

Column 63 Intensity.
m - moderate
ms- moderately severe
s - severe

The magnetic storms listed in this section of the table comprise a summary of the magnetic storm data reported by individual magnetic observatories in the Journal of Geophysical Research. The data given in Columns 60, 61, 62, and 63 are based on an evaluation of the individual reports, and represent a description of the storm which best fits the observations of a majority of the stations. It should be noted that the "consensus" for the intensity of the storm is not always reflected by the maximum 3 hour K_p value reached during the storm, as listed in Column 65.

Column 64 Number of stations reporting the storm.

Column 65 Maximum K_p during the storm.

Note: Remarks and comments about many of the events listed in this catalogue are given on pages 5.VIII-vii through 5.VIII-xlix for 1960. The notes for 1961 start on page 5.VIII-1. The notes were prepared by Miss Hedeman.

TABLE VIII. NOTES AND COMMENTS ABOUT SOME SOLAR-TERRESTRIAL EVENTS

This section contains selected information and pertinent data concerning some of the events listed in the Chronological Catalogue of Solar Events for 1960. The numbers refer to the number of the event in the catalogue. Not every event will necessarily be accompanied by remarks in this section.

No. 1 This brief magnetic disturbance on January 5^d 0201 UT was classified as a storm by only 4 stations -- situated either at high magnetic latitudes, or near the equator. The stormy period was preceded by 3 days of very quiet geomagnetic conditions. There is no known major solar event associated with the Sc, although flares of Imp. 1 and 1+ occurred on January 3 and 4. The storm is not a member of any sequence.

No. 2 This storm on January 10^d 0719 UT was preceded by two days of very quiet geomagnetic conditions. The disturbance was world-wide, and five stations indicate that the sudden commencement was preceded by an earlier preliminary change in the character of the record -- which may have occurred at about 0600 UT, when several stations begin the storm gradually. There is no known major solar event associated with this sc storm, although flares of Imp. 1 and 2 occurred on January 8 and 9. It may be of some significance that the storm occurred 27.5 days after the gradual storm of December 13, 1959.

No. 3 The major flare (with solar protons) at January 11^d 2040 UT was accompanied by strong Type II and Type IV radio emission. The flare occurred near the center of the solar disk in plage region 5527, which is in its second rotation and contains an α_p spot, No. 14660, that is a return of the large β_p spot No. 14600 in region 5491. The Type II burst, which Ft. Davis ends at 2118 UT, was also recorded by Warwick on his very low frequency sweep. In the dekameter range of the dynamic spectrum the Type II burst continues in progress until 2216 UT. However, Warwick does not report any Type IV emission at the very low frequencies. When observations begin at Sydney, at 2321 UT, a weak Type III noise storm is in progress, which continues to the end of their observing period at 0541 UT on January 12. At meter and decimeter wavelengths the single radio frequency events are large bursts, representing mostly a rise in base level. The major 10 cm. burst that registered during the sunset oscillations at Ottawa indicates that microwave Type IV emission also probably occurred at centimeter wavelengths.

No. 4 This small proton event appears in Bailey's secondary list of lesser phenomena. The event was also detected by Dr. Gregory, on data from high-latitude stations, using vertical-incidence backscatter soundings of the lower ionosphere at a frequency of 2.3 Mc. Between January 11-14, a small but significant increase in cosmic ray counts was recorded on instruments carried aboard the satellite Explorer VII (reported by Dr. Van Allen). It should be noted that, with the onset of the PCA, there is an increase in the intensity of the Type III noise storm which is in progress.

No. 5 The Type II and Type IV bursts at January 12^d 1651 UT are associated with a flare of importance 1 in region 5525. This large bright plage is a new region, and β spot No. 14657 is one of the largest spots of the year -- its area equals 1150 millionths of the solar hemisphere (Greenwich data). The Type IV, which is of short duration, is confined to a small range of frequencies at meter wavelengths. The SWF does not appear in the CRPL F-Series list of ionospheric disturbances, but is taken from the checklist of such events, and represents an SWF reported by only one station, and therefore unconfirmed.

No. 6 The Sc storm at January 13^d 1859 UT is worldwide. Although the maximum value of the 3-hr. K_p's was 6, nine stations classified the storm as of moderate intensity, while 8 stations classified it as moderately severe. The latter stations were confined to the high geomagnetic latitudes and the equatorial regions.

No. 7 The large 10 cm. burst at January 15^d 1334 UT is associated with major flare activity in plage region 5525, which is now nearing the southwest limb of the sun. Plage and spot data for this region were given in event No. 5. No dynamic spectrum observations exist at the time of the 10 cm. burst. The earliest observation is at 1350 UT, when Michigan began observing, and no events are reported after this time. The 10 cm. event consists of a great burst, which is followed by a long post-burst increase in flux. Major bursts are reported at all of the single radio frequencies. Because of the large bursts at centimeter wavelengths, Mme. Pick-Gutmann classifies this as a "probable Type IV."

No. 7a This small solar proton event, at January 16^d 0300 UT, which was reported by Dr. Gregory, was deduced from partial ionospheric reflections at 2.3 Mc, and was present in data from high latitude stations. The small event does not appear to have been reported elsewhere.

No. 8 The strong Type II burst at January 16^d 2244 UT is associated with a flare which occurred very near the limb of the sun. Major radio bursts of short duration occurred at the lower radio frequencies, but there was little or no radiation at centimeter wavelengths. No 10 cm. events are reported in association with the Type II burst.

No. 9 The initial phase of this geomagnetic storm of January 17^d 12^h UT is weak ($K_p = 4$). There is a second start at January 18^d 0700 UT, after which the maximum K_p value of 6 is attained.

No. 10 This storm may be a member of a possible sequence of storms, having a recurrence pattern of about 27-28 days, which has existed since early October 1959.

No. 11 The γ spot No. 14694, (CMP January 27.4^d) which came around the east limb of the sun on January 21, expires on the disk on January 29. This complex spot is not associated with any solar activity of sufficient magnitude to warrant inclusion in this catalogue as a major solar event.

No. 12 This very large, bright and active region, with its large and complex $\beta\gamma$ spot, does not produce any solar events of sufficient magnitude to warrant their inclusion in this catalogue of major solar events. The $\beta\gamma$ spot, No. 14698, is a return of the βf spot No. 14641 in region 5512.

No. 13 This weak interval of magnetic disturbance was classified as a storm by only two stations -- Hermanus and Huancayo.

No. 14 The Type II burst at February 3^d 2022 UT is associated with a flare in the active plage region 5552, which is in its si[illegible] solar rotation. The α_p spot No. 14703 is probably a return of the α_p spot No. 14644, in region 5517. This is a persistent spot, for it existed previously as α_p spot No. 14596 in region 5484, and as α_p spot No. 14544 in region 5453. The Type IV event at 2027 UT is of very short duration, and seems to be confined to the meter and decimeter wavelengths.

No. 15 The weak Type IV event at February 4^d 1310 UT was recorded at Michigan on their B and C bands, at the higher frequencies. Ft. Davis was not observing at this time. The Type IV emission is associated with flare activity that occurred in region 5551. This large, bright and very active plage contains a complex γ spot, No. 14701, which is a return of β_p spot No. 14664 in region 5514.

No. 16 The strong Type II burst at February 4^d 2046 UT is apparently associated with a sub-flare in region 5551. Although Michigan was observing at the time, they do not report the Type II, which evidently was confined to the lower frequencies. The weak noise storm is reported only by Michigan.

No. 17 The strong Type IV burst at February 4^d 2149 UT is also associated with a sub-flare in region 5551 and perhaps events Nos. 16 and 17 should actually be regarded as a single solar event. Michigan continues the Type IV emission until 2216 UT. No SWF and no 10 cm. events are reported at the time of the Type IV burst. However, there was an SEA of importance 2, 2147-2217 UT.

No. 19 The strong Type II burst at February 5^d 1351 UT is associated with flare activity in region 5552. Plage and spot data for this region are given in event No. 14. The Type II burst was observed by Michigan on their A and B bands, and evidently was confined to the lower frequencies.

No. 20 Like No. 19 above, the Type II burst at February 5^d 1950 UT is also associated with flare activity in region 5552, which is now situated in the northwest quadrant of the sun, near the west limb. No radio events are reported at any of the single radio frequencies, in association with the Type II burst, except for bursts of very short duration at 167 Mc. These are probably related to the group of Type III bursts at 1943 UT. The SWF was reported by only one station, and appears only in the CRPL check-list of unconfirmed ionospheric events.

No. 20a This small proton event of February 7^d appears in Dr. Gregory's list of minor proton events, and is not known to have been reported elsewhere. No flare or other major solar event is known to have caused this slight proton increase. However, it should be pointed out that this event occurs 27 days after the small proton increase of January 11-12 (event No. 4, above).

No. 21 Like No. 19 and No. 20, the Type II burst at February 7^d 1612 UT is associated with flare activity in region 5552, which is now going over the west limb of the sun. No radio events are reported at any of the single radio frequencies at the time of the Type II burst.

No. 22 The β spot No. 14720, in plage region 5566, is one of the largest spots of the year, with an area equal to 1050 millionths of the solar hemisphere (Greenwich data). This plage, with its very large spot, does not produce any major solar events such as those included in this catalogue.

No. 24 The Type II burst at February 13^d 2002 UT was reported by Warwick on his very low frequency dynamic spectrum sweep, in the dekameter range. Ft. Davis reports a group of Type III bursts, at 2002-2012 UT -- at the time of Warwick's Type II. No known radio events are reported at any of the single radio frequencies, with the exception of the small 10 cm. burst at 2003 UT.

No. 25 The β spot No. 14725, in plage region 5570, is one of the largest spots of the year, with an area equal to 1300 millionths of the solar hemisphere (Greenwich data). This plage, with its very large spot, does not produce any solar events of sufficient magnitude to warrant inclusion in this catalogue as major solar events.

No. 26 It is difficult to find any good solar event preceding this magnetic storm at February 16^d 09^h UT, with the exception of the weak Type II event described above in No. 24. It should be pointed out that this gradual storm may also be regarded as a member of the sequence mentioned in connection with event No. 10 -- it follows the storm of January 20 by an interval of 27 days.

No. 27 The major SWF at February 18^d 0103 UT, with its concomitant large 10 cm. burst and Type II burst, is associated with minor flare activity in a bright plage (region 5580) which is coming around the east limb of the sun. Because of the strong radio bursts at centimeter wavelengths, Mme. Pick-Gutmann classifies this event as a "probable" Type IV.

No. 29 The major SWF at February 20^d 0218 UT (like event No. 27) is associated with flare activity in region 5580, which is now on the disk and near the southeast limb of the sun. Plage and spot data for this region were given in event No. 27.

Dynamic spectrum observations were not in progress at the time of the large SWF. At the single radio frequencies, no known radio events are reported at meter or decimeter wavelengths, but the centimeter radiation is strong.

No. 30 No known flare event was reported at the time of the weak Type II burst at February 21^{d} 2020 UT, therefore plage and spot data for this event are not available. The only known solar activity of any form which we can find recorded at this time is an active dark flocculus at N20 W41, which was reported by Lockheed from 2000 to 2200 UT. No SWF, and no radio events at any of the single radio frequencies are reported in association with the Type II burst, which was recorded on Warwick's dynamic spectrum sweep in the dekameter range (33-24 Mc) and which apparently is confined to the very low frequencies.

No. 31 The major flare at February 22^{d} 1352 UT occurred in plage region 5581, which contains a complex γ spot, No. 14732. This γ spot is a return of the large $\beta\gamma$ spot No. 14698 in region 5550 (described in event No. 12). The flare was accompanied by a strong Type II burst, and Type IV emission, in the dynamic spectrum. The strong radio bursts which occurred at centimeter wavelengths indicate that some form of microwave Type IV emission also probably was present. This almost "classical" major solar event evidently was not accompanied by the ejection of protons, or of a plasma stream, since no proton event (PCA) and no geomagnetic disturbance were reported after the occurrence of the flare.

No. 32 The Type II burst at February 29^{d} 0153 UT is associated with flare activity in plage region 5580, which is now located in the southwest quadrant, near the west limb of the sun. Plage and spot data for this region were given in event No. 27. No known SWF is reported at the time of the Type II burst, and no known radio bursts occurred at any of the single radio frequencies.

No. 32a The event at February 29^{d} 16^{h} UT is one of Dr. Gregory's small proton events, of very long duration, which was detected on records at Scott Base, Antarctica.

No. 34a The event at March 10^d 18^h UT is also one of Dr. Gregory's small proton events, which was found to be present in data from high-latitude stations, and evidently is an event which does not appear to have been reported elsewhere.

No. 35 The gradual geomagnetic storm of March 11^d has various starting times, ranging from 0400 UT to 1000 UT. The start may also be as early as 10^d 0700 UT, when the K_p's show an initial brief increase to a storm-value of 5.

No. 36 It is difficult to find a major solar event to serve as the origin of this gradual geomagnetic storm at March 15^d 12^h UT, which perhaps may be a member of the sequence referred to in events No. 26 and No. 10.

No. 37 This proton event at March 17^d 18^h UT is not one of the "usual" PCA events, but represents an observation of solar cosmic rays recorded on instruments carried aboard the satellite Explorer VII. Between March 18-20, the counting rate increased by 10 to 20% above the normal cosmic ray value -- an increase which is regarded as "significant," by Dr. Van Allen. No obvious solar event or activity appears to be related to the cosmic ray increase. It should be noted that the event occurs at the end of the sequential magnetic storm described in event No. 36. Dr. Gregory finds evidence for the existence of a small proton event at this same time, in the data from high-latitude stations.

No. 38 This weak geomagnetic disturbance at March 28^d 0600 UT was classified as a storm by only two stations. The moderately disturbed interval was preceded by three days of very quiet geomagnetic conditions.

No. 39 This event at March 28^d 2050 UT serves as an introduction to one of the great regions of the year, and indeed, of the entire solar cycle No. 19. The large 10 cm. burst at 2048 UT, which was followed by strong Type II and Type IV events in the dynamic spectrum, is associated with flare activity in region 5615 -- a large, very bright and very active plage in which 70 flares of importance ≥ 1 occurred during its transit across the solar disk. The region contains a complex γ spot, No. 14778, which is one of the largest spots of the year, with an area equal to 1650 millionths of the solar hemisphere (Greenwich data). The spot group has reversed polarity, and also contains some nuclei of opposite polarity -- which is said to be a situation correlated with strong flare activity. Activity in this remarkable plage region is responsible for perhaps a total of 14 major events in this catalogue -- Nos. 39, 40, 41, 43, 44, 45, 46, 47, 48, 49, 50, 51, 53 and 54 -- which include 4 PCA events and 4 geomagnetic storms, by association. The Type II burst at 2057 UT apparently was confined to the very low frequencies in the dynamic spectrum, and was observed by Warwick in the dekameter range down to a frequency of 20 Mc. At Ft. Davis, the microwave receiver was also in operation, and the strong Type IV emission was observed over a very wide range of frequencies, from 3000 - 50 Mc. At even lower frequencies, Warwick observes the Type IV emission as still being in progress at 2505 UT. The second and weaker Type II at 2112 UT is observed only by Warwick at the very low frequency range of 33-20 Mc. When Sydney began observing at 2251 UT, continuum radiation and a noise storm was in progress on their records. These continue until the end of the Sydney observing period at 0612 on the 29th. The strength and duration of the single frequency radio bursts mostly parallel the strong Type IV event in the dynamic spectrum. The 10 cm. event consists of a very large burst (the maximum is indeterminate because the burst is off-scale), which is followed by a long post-burst increase in flux. At meter wavelengths the radio event consists of a rise in base level, and at dekameter wavelengths the 18 Mc record registers strong cosmic noise absorption beginning at 2048 UT, and strong bursts at 2100 UT (related to the Type II burst), and very strong continuum beginning at 2200 UT. It is a curious fact that the major solar event described here was not followed, after the usual number of hours, by any known solar proton event on or in the vicinity of the earth. However, within a few hours it was followed by another major solar event (No. 40) which was accompanied by polar cap absorption. This time relationship strongly reminds us of a similar situation with respect to the great PCA region of July 1959, when a major flare event late on July 9 was closely followed by a great flare event on July 10, after which PCA occurred.

No. 40 The major SWF at March 29^d 0652 UT is associated with an important flare in region 5615. Plage and spot data for this region are given in event No. 39. No dynamic spectrum observations exist at the time of the large SWF, but the single radio frequency events indicate that radio bursts of long duration and extremely great intensity occurred at all wavelengths. It seems obvious that some form of Type IV continuum emission exists over the entire frequency range of the radio spectrum, starting first at centimeter wavelengths at $\backsim$ 0655 UT and reaching the decimeter and meter wavelengths at $\backsim$ 0700 UT. Mme. Pick-Gutmann classifies this event as a "probable" Type IV, because of the strong centimeter radiation.

No. 41 This PCA event at March 29^d 0800 UT is referred to by Bailey as a "rather curious" event, because of its late peak and its abrupt recovery before the beginning of the next proton event on April 1. The late peak may perhaps be due to additional solar protons which arrive as a consequence of solar activity on March 30.

No. 42 No known flare event is reported at the time of the major SWF at March 30^d 0215 UT and the accompanying Type II and Type IV bursts, therefore plage and spot data for this event are not available. The SWF is taken from the CRPL check-list of unconfirmed ionospheric disturbances. The Type II burst at 0325 UT is described by Sydney as a "possible" Type II. The strong emission must obviously be confined to the very low frequencies, since no radio bursts are reported at any of the single radio frequencies at meter or decimeter wavelengths, and the bursts at centimeter wavelengths are not great.

No. 43 This event at March 30^d 1520 UT follows the "classical" pattern of an important flare, associated with a major SWF, great 10 cm. burst, strong Type II and Type IV emission in the dynamic spectrum, and subsequent PCA and a geomagnetic disturbance. The solar flare occurred near the center of the solar disk, in region 5615. Plage and spot data for this region are given in event No. 39. At Ft. Davis, the microwave receiver was in operation, and the strong Type IV continuum emission was recorded over a very wide range of frequencies, from 3900 - 25 Mc. After 2300 UT, the Type IV "changes gradually into noise storm activity." At the very low frequencies, Warwick observes the Type IV emission in the dekameter range, at 33-16 Mc, and still in progress at 0112 UT on March 31. At centimeter wavelengths the radio event consists of a very great burst, followed by a long period of increased flux. At decimeter and meter wavelengths the radio event consists of a very large burst, preceded by an earlier rise in base level which is coincident with the start of the flare. Major 18 Mc cosmic noise absorption occurs at 1522 UT and is followed later by the onset of an 18 Mc noise storm, with strong continuum, at 1653 -> 0045 UT.

No. 44 This PCA event at March 31^d 0300 UT was reported as a separate event by Leinbach, but Bailey includes it as a part of the event reported by him on March 29 (event No. 41, above). Regarded as an independent event, it may help to explain the curious nature of Bailey's observation.

No. 45 This storm at March 31^d 09^h UT is one of the relatively few great storms for which the 3-hr. K_p's reach a maximum value of 9. Dr. Bartels has listed only such great storms in 37 instances in an interval of 30 years (1932-1961).

No. 46 Like event No. 43, this event at April 1^d 0843 UT also follows the "classical" pattern of major flare, major SWF, great centimeter radiation, with possible Type IV emission in the dynamic spectrum, and subseq ent PCA and geomagnetic storm. Also like event No. 43, the great flare occurred near the center of the solar disk, in the same plage, region 5615. Great radio bursts of high intensity and long duration are reported throughout the entire range of the radio spectrum at the single radio frequencies. Although dynamic spectrum observations do not exist at the time of the major flare at 0843 UT, it seems highly probable that some form of Type IV continuum emission occurred, because of the strong radiation at all wavelengths -- especially at centimeter and meter wavelengths.

No. 47 Using his back-scatter technique, Bailey reports the start of this PCA event at April 01^d 1000 UT. Leinbach reports the onset of PCA on riometers at Thule at 0945 UT. From data recorded on the satellite Explorer VII, Dr. Van Allen reports that substantial increase of the intensity of solar protons of $E > 30$ Mev, in the vicinity of the earth, occurred during the period 0933 - 1019 UT (but not before 0933 UT), with maximum at about 1020 UT. Dr. Van Allen comments that this solar proton event of April 1 "was the most intense of the some ten events observed by Explorer VII since October 13, 1959," but was of intermediate intensity when compared with all such events. A 24% Forbush decrease occurred just prior to the cosmic ray event, during the early morning hours of April 1.

No. 49 The major SWF at April 3^d 0520 UT is associated with an important flare that occurred in region 5615. Plage and spot data for this region are given in event No. 39. No dynamic spectrum observations exist at the time of the SWF. At the single radio frequencies, no known radio events are reported at meter and decimeter wavelengths. At centimeter wavelengths, rather strong bursts of short duration ($\leq$ 10 minutes) occur almost simultaneously and very soon after the start of the SWF, and it is rather unlikely that any significant Type IV emission is present.

No. 50 This is another major event in the "classical" pattern, like events Nos. 43 and 46. The major SWF at April 5^d 0140 UT is accompanied by a very great 10 cm. burst, followed by strong Type II and Type IV bursts in the dynamic spectrum, and is associated with an important flare in plage 5615, which is now situated in the northwest quadrant of the solar disk, near the west limb. Very great events are reported at all of the single radio frequencies where a major burst of great power seems to sweep rather slowly through the radio spectrum, appearing first at meter wavelengths at 0124 UT and reaching the centimeter wavelengths about 28 minutes later, at 0152 UT. At this time, the Type II burst appears in the dynamic spectrum (described as a "possible" Type II by the Sydney observers). After 0300 UT, the Type IV continuum emission degenerates into weak noise storm activity. This major event on the sun, like events Nos. 43 and 46, is also followed by PCA and a subsequent geomagnetic storm.

No. 51 Bailey reports the onset of this PCA event at 0700 UT on April 5. Dr. Gregory starts the PCA at 0400 UT (and continues the event for an interval of 4 days). Dr. Van Allen reports that Explorer VII measured the onset of a "distinct solar proton event" in the vicinity of the earth at about 0615 UT on April 5th, which lasted about 1-1/2 days. The peak intensity was not observed by the satellite, due to lack of observations.

No. 53 This gradual magnetic storm at April 5^d 00^h UT is given an independent start by only two stations. The other five stations include this interval of storminess as a part of the storm described in event No. 48. However, the 3-hrly. K_p's clearly show an increase in their values late on April 4, reaching a maximum value of 6 on the 5th.

No. 54 The brief sudden commencement storm at April 7^d 1511 UT was classified as a storm by only two stations (Hermanus and Huancayo). However, there is a real, though minor, change in the 3-hrly. K_p's during this interval.

No. 55 There is no known major solar event related to this sudden commencement storm at April 10^d

0127 UT. It may, however, be a member of the sequence of storms referred to in events Nos. 36, 26 and 10.

No. 56 No SWF is reported in association with the Type IV event at April 10^d 2323 UT. This Type IV emission is of very short duration (5 minutes) and is related only to minor bursts, also of short duration, at decimeter and meter wavelengths. The single radio frequency events seem to indicate that a modest radio event began first at the high frequencies (2317 UT at centimeter wavelengths) and progressed toward the lower frequencies (reaching the decimeter and meter wavelengths at 2323 UT).

No. 57 Only two stations give this gradual magnetic storm an independent start on April 11^d 21^h UT. The other stations include this interval of storminess as part of the storm that began on April 10 (event No. 55). However, it seems logical to actually end the earlier storm on the 11th, since the 3-hrly. K_p's decline, and then increase to a maximum on the 12th, and again on the 13th.

No. 58 This large, bright and active plage, region 5627, although it produces 31 flares of importance ≥ 1 during its transit across the solar disk, does not produce any solar events of sufficient magnitude to warrant their inclusion in this catalogue of major solar events.

No. 58a This proton event at April 15^d 10^h UT is one of Dr. Gregory's small proton events which is present in data from high-latitude stations, and does not appear to have been reported elsewhere. It has no major event in this catalogue as its antecedent, although solar events of lesser degree occurred on April 15, prior to the onset of the PCA.

No. 61 The Type II and Type IV bursts at April 24^d 2343 UT are reported only by Warwick in the very low frequency dekameter range of the dynamic spectrum. At the higher frequencies, Ft. Davis reports only an increase in Type I noise storm activity, with continuum, on an already noisy record. The bursts are associated with flare activity in region 5642. This plage is a return of the active region 5615 (event No. 39), which was responsible for the solar protons detected on March 29, 31, April 1 and 5. It has already been pointed out that the unusual parent region 5615 was responsible for at least 14 major events in this catalogue. The present region -- its offspring, region 5642 -- is also responsible for an unusually large number of events. There are 8 major events attributed to activity in plage 5642 -- Nos. 61, 62, 65, 66, 67, 68, 69 and 70 -- two of which are PCA events, followed by subsequent geomagnetic storms. The complex γ spot No. 14814 in region 5642 is a return of the large γ spot No. 14778 in region 5615. Except for a group of small bursts reported at 1000 Mc, no other radio bursts are reported at any of the single radio frequencies at the time of the Type II and Type IV bursts. The radio event therefore appears to be confined mainly to the very low frequency range of the radio spectrum. The SWF appears in the CRPL checklist as an unconfirmed event, reported by only one station.

No. 62 This sudden commencement geomagnetic storm at April 27^d 2001 UT has two maxima, the first of which is reached quickly, late on the 27th. During the second half of the 28th, the K_p's decline and then increase again on the 29th, when a second maximum is reached. This latter maximum may be the effect of the major flare event on April 28th, described next in event No. 63.

No. 63 The major SWF at April 28^d 0120 UT is associated with a large 10 cm. event, and Type II and Type IV bursts in the dynamic spectrum. It is also related to a major flare which occurred in a plage region which is not very flare-productive (only 5 flares of Imp. $\geq$ 1 occurred in region 5645 as it transited the solar disk). This is not the usual circumstance for regions connected with solar events of the "classical" pattern and followed by PCA.

No. 64 The duration of this PCA event of April 28, as given by Bailey, is based on an extrapolation

into the next event, which sta...
29th, before the end of the earlier event. The satellite Explorer VII also detected the arrival of solar protons in the vicinity of the earth. According to Dr. Van Allen the satellite data show a slight increase at 0323 UT, and this starting time "almost coincided with the onset of PCA of int.>1 db recorded at Thule, Greenland."

No. 65 The Type II and Type IV double events at April $29^d \sim 0200$ UT and ~ 0400 UT are associated with an important flare in region 5642. Plage and spot data for this region are given in event No. 61. The flare obviously is a "double" event of long duration, with two principal maxima of about the same intensity occurring in about the same position in the plage. The SWF and the radio bursts at centimeter wavelengths show this same "double" aspect. However, the radio bursts at decimeter and meter wavelengths are associated only with the second phase of the flare.

No. 66 This PCA event at April 29^d 0500 UT was also reported by Dr. Gregory, who starts the event at 02^h, with a duration >5 days. Solar cosmic ray particles were also measured by the satellite Explorer VII. According to Dr. Van Allen, there was "a marked increase in intensity during late April 29 and early April 30." Scientists from the USSR also recorded the event, with balloon equipment. Bailey comments that the event is a curious one, with a late peak which is followed by an abrupt recovery. Obayashi suggests the following explanation: "Solar protons ejected from the flare of April 29 were stopped and trapped by the magnetic plasma cloud --- which had been produced by the flare of April 28. However, some particles, presumably of higher energy, leaked out through the magnetic plasma cloud, and this leaking may account for a slow rise in flux until the arrival of the cloud, which is observed at the time of the Sc storm of early April 30."

No. 67 This sudden commencement storm at April 30^d 0132 UT is one of the relatively rare great storms for which the 3-hr. K_p's reach a maximum value of 9. Seven stations indicate that a second sudden commencement occurred at April 30^d 1214 UT -- which is when the K_p's reach their maximum value. A Forbush-type decrease in galactic cosmic ray intensity of about 13% was observed by Explorer VII at around 2100 UT on April 30. The neutron monitors at Deep River showed a Forbush decrease of about 8%, observed around 2200 UT on the 30th.

No. 68 The major flare at May 4^d 1000 UT is a great limb event, and has been thoroughly described and discussed by Ellison. The event is a spectacular one, not especially for its intensity as for the unusual loop activity that began at 1035 UT. The flare occurred in region 5642, which was at the west limb of the sun at the time. Plage and spot data for this region are given in event No. 61. The flare was accompanied by a major SWF, and a great 10 cm. outburst. Dynamic spectrum observations do not exist at the time of the flare at 1000 UT, but the radio events at the single radio frequencies indicate that major bursts occurred at all wavelengths. The very strong bursts at centimeter wavelengths indicate that Type IV emission most probably occurred.

No. 69 This proton event at May 4^d 1030 UT is one of the rare events which are accompanied by a cosmic-ray increase at ground level. The first arrival of solar cosmic rays was observed at 1029 UT by the ground neutron monitors. Solar cosmic rays were also measured by many other observers with equipment aboard balloons and satellites. Data from Explorer VII does not exist prior to 1516 UT, after which time the cosmic-ray intensity increased by a factor of 8 times the normal cosmic-ray intensity.

No. 70 Five of the 14 stations begin this gradual storm of May 5^d 20^h UT about 20 hours later, on the 6th. This may be due to the fact that the 3-hr. K_p's show an initial decline, after which they increase again on the 6th and reach their maximum value of 7 late on that day. (Also, all of this may be mixed up with the arrival of solar protons at 1800 UT on the 6th.) (cf. event 73, below)

No. 71 No known flare is reported at the time of the Type II burst at 0312 UT (this may be due to a lack of observations), therefore plage and spot data for this event are not available. No radio events are reported at any of the single radio frequencies in association with the Type II event. The SWF appears in the CRPL check-list, and is an unconfirmed ionospheric event.

No. 72 The major flare at May 6^d 1404 UT follows the "classical" pattern, and is accompanied by a major SWF, Type II and Type IV emission in the dynamic spectrum, and large radio bursts of long duration at all wavelengths, followed subsequently by PCA and a geomagnetic disturbance. The flare occurred near the center of the solar disk, in region 5653, which is a large and bright, but relatively inactive plage (only 14 flares of importance ≥ 1 occurred in the region as it transited the solar disk) and contains only an α spot. One wonders why such a major solar flare as the above, followed by PCA, should have occurred in such a region. The strong type II burst is confined to the low frequencies, and is preceded by the onset, shortly after the start of the flare, of strong Type IV emission which covers the full range of the dynamic spectrum sweep. The Michigan observers report only the strong Type I noise storm, and Ft. Davis comments that the Type IV "changes gradually into noise storm activity." In the dekameter range at the very low frequencies, Warwick reports the onset of continuum emission of very long duration. The single radio frequency events indicate that a similar situation prevails throughout the entire range of the radio spectrum. At centimeter wavelengths, the radio event consists of a great burst, followed by a very long-enduring interval of increased flux. At decimeter wavelengths the event consists of a major burst, followed by the onset of a noise storm, and at meter wavelengths the event is a rise in base level with the onset of a noise storm. The major burst appears to progress rather slowly through the radio spectrum, beginning first at centimeter wavelengths at 1406 UT, and reaching the meter wavelengths 8 minutes later, at 1414 UT.

No. 73 A burst of solar cosmic rays detected by Explorer VII on May 6 was in close coincidence with the onset of PCA at May 6^d 1800 UT. The satellite data also show a second increase, late on May 7, which apparently is not associated with any major solar event.

No. 75 No dynamic spectrum observations exist at the time of the flare of importance 3, in progress at May 9^d 0704 UT. The radio events at the single radio frequencies indicate that a relatively minor burst occurred at about 0645 UT and was followed by a long interval of increased flux or noise, of relatively modest intensity. It does not seem likely that any significant Type IV emission occurred with the major flare. No 200 Mc radio events are reported in association with the flare, but this may be due to a lack of observations.

No. 75a This minor proton event at May 9^d 08 UT is one of Dr. Gregory's small proton events, which is present in data from high-latitude stations.

No. 77 The major SWF at May 12^d 1348 UT and the subsequent Type IV burst at 1403 UT are associated with flare activity in plage region 5654, which is located at a high solar latitude (N30°), near the west limb of the sun on the 12th. Region 5654 is a new plage -- active, with 38 flares of imp.$\geq$ 1 during its transit across the disk -- and containing a complex γ spot, No. 14825, which is one of the largest spots of the year, with an area equal to 1800 millionths of the solar hemisphere (Greenwich data). The Type IV emission must have been confined to the very low frequencies, since it is reported only by Warwick, in the dekameter range of the dynamic spectrum, at 33-16 Mc. The weak Type I noise storm is reported only by Michigan, on their lowest frequency band. At centimeter wavelengths, the radio event consists of a rather large and complex burst which is followed by a post-burst enhancement of flux lasting all day. At decimeter wavelengths, the radio event consists of major bursts superposed on a noise storm, and at meter wavelengths the event is described as a rise and fall in flux.

No. 78 The major event at May 13^d @ 0520 UT follows the "classical" pattern of a major flare which is associated with a major SWF, great 10 cm. burst, Type II and Type IV emission in the dynamic spectrum, and great bursts of long duration at all of the single radio frequencies -- followed within a few hours by polar cap absorption. The major flare occurred near the west limb of the sun, at high latitude, in region 5654. Plage and spot data for this region are given in event No. 77.

No. 79 The PCA event of May 13^d has an onset at 0730 UT, according to Bailey. Using the data from high-latitude stations, Dr. Gregory starts the proton event at 0700 UT, and using the riometer recordings at College, Alaska, Leinbach begins the event at 0620 UT. Explorer VII data show an increase in intensity above the normal cosmic-ray background of 15 counts/sec to 58 counts/sec at 1330 UT on May 13. The counting rate was back to normal by 1600 UT on May 13th.

No. 80 The flare data associated with the major SWF at May 15^d 0312 UT are rather poor. Flare observations were not in progress at the beginning of the SWF, and there is only a doubtful association with flares of importance 1 and 1+ in progress during the later stages of the SWF (which was of very long duration). These flares were in progress in plage regions 5660 and 5663, near the center of the disk, and near the southeast limb. Region 5663 contains a large β_p spot, No. 14840, which is one of the largest spots of the year, with an area equal to 1575 millionths of the solar hemisphere (Greenwich data). No dynamic spectrum observations exist at the time of the major SWF, and no known radio events are reported at any of the single radio frequencies, except for a minor burst at 9400 Mc.

No. 82 No known flare event is reported at the time of the Type II and Type IV events at May 17^d 1743 UT and later. However, it should be noted that both Climax and Sac. Peak report surge activity on the disk, in region 5663, from 1726 - 1743 UT. Plage and spot data for this region are given in event No. 81. No SWF is reported in association with the dynamic spectrum events. At the single radio frequencies, no radio events are reported at centimeter wavelengths, and at decimeter wavelengths the radio event consists of a minor burst of short duration. At meter wavelengths the radio event is a minor burst which is followed by a rise and fall in flux. This solar event apparently is confined to the lower radio frequencies -- the Type II burst at $\leq$ 150 Mc. and the Type IV event at $\leq$ 60 Mc. In the dekameter range, Warwick observes the Type IV emission until 1852 UT, at 31-16 Mc. The 18 Mc cosmic noise recorder registers a major burst (at the time of the Type II), followed by the onset of an 18 Mc noise storm (at the time of the Type IV) which continues until 1900 UT.

No. 83 The small proton event of May 18 was observed by Explorer VII. Dr. Van Allen says, "On May 18 after 1200 UT an increase of about 40% above the normal cosmic-ray intensity was observed." Dr. Gregory reports a small proton event, present in data from high latitude stations, beginning on the 17^d at 15^h UT, and lasting for about 2 days.

No. 84 There is no known major solar event readily available as the antecedent of this gradual geomagnetic storm at May 23^d 14^h UT. However, it may be related to region 5663, which is a very radio-noisy region and which has been the source of Type IV emission and solar protons. The storm occurs 3 days after the central meridian passage of region 5663.

No. 85 The great 10 cm. burst at May 26^d 0909 UT is associated with flare activity in region 5669, which is a return of the unusually active solar-proton regions 5642 and 5615 of April and March. Region 5669 contains a γ spot, No. 14849, which is a return of the β_p spot No. 14819 in region 5642. No dynamic spectrum observations exist at the time of the large 10 cm. event, but the great bursts which are reported at all of the single radio frequencies, and especially at centimeter wavelengths, indicate that some form of Type IV emission probably occurred.

No. 86 The small proton event at May 26^d 1000 UT was reported by Dr. Gregory, and appears in data from high-latitude stations. Dr. Van Allen reports that a small proton event was recorded by instruments aboard the satellite, Explorer VII, at 1200 UT, when an increase of about 40% above the normal cosmic-ray intensity was observed.

No. 87 It is difficult to find any good and exact flare association for the Type II burst at May 27^d 1502 UT and the Type IV at 1517 UT. These events are reported only by Warwick, in the dekameter range, at 33-20 Mc, and are evidently confined to the very low frequency range of the radio spectrum. It is difficult to decide which of two flare events (a or b) may be associated -- if at all -- with the dynamic spectrum events. Flare a is described as a bright point with an active dark flocculus, in region 5678 near the east limb of the sun. Flare b is described as several bright points with an active dark flocculus, in region 5669 near the center of the solar disk. Plage and spot data for this region are given in event No. 85. No SWF is reported at the time of the Type II and IV events, or at the time of flare a. However an SWF is reported in association with flare b.

No. 89 The major flare at June 1^d 0823 UT, one of the great flares of the current solar cycle, was accompanied by a major SWF and a great 10 cm. outburst. The flare occurred near the east limb of the sun, at high solar latitude, in a very large, bright and active plage, region 5680, which produced 34 flares of importance ≥ 1 during its transit across the solar disk. Region 5680 is a return of the plage which was responsible for events Nos. 77, 78 and 79 in this catalogue (region 3654), and contains a δ spot No. 14867, which is a return of the large γ spot No. 14825 in region 5654. Although dynamic spectrum observations do not exist at the time of the great flare at 0823 UT, great outbursts occur at all of the single radio frequencies, and indicate that Type IV emission probably was present throughout the entire frequency range of the radio spectrum.

No. 90 This small proton event of June 1 was also reported by Dr. Gregory, starting at June 1^d 14^h, duration 6 days. No significant polar cap absorption was reported by ground-based riometers. Explorer VII data showed a slight increase in intensity, above the normal value, at 1021 UT, and Dr. Van Allen comments that "solar protons therefore began arriving in the vicinity of the earth sometime between 0839 UT (the time of the previous pass of the satellite) and 1021 UT." The peak intensity occurred about 3.5 hours after the flare.

No. 91 The Type II burst at June 1^d 2007 UT and Type IV event at 2012 UT are associated with activity in region 5669 at the west limb of the sun. The event is described as a "bright surge at the limb." Plage and spot data for region 5669 are given in event No. 85. The event was accompanied by a major SCNA at 18 Mc, from 2007 - 2125 UT, with numerous bursts superposed on the absorption record.

No. 93 The small proton event of June 4 is reported by Dr. Van Allen, who states that "an enhanced solar proton intensity was observed on June 4 by Explorer VII." The event is small, and is very similar to the events of May 18 and May 26. Dr. Van Allen offers the suggestion that the flare-associated solar plasma ejected from the sun during the great flare of June 1 (which reached the earth on June 4 and caused the Sc storm of event No. 92, and a Forbush decrease recorded by neutron monitors) also may provide a mechanism for the increase in solar protons observed by the satellite on June 4, after the start of the geomagnetic disturbance.

No. 94 The Type II burst at June 5^d 2258 UT is associated with flare activity in region 5680. Plage and spot data for this region are given in event No. 89. The SWF appears in the CRPL check-list and is an unconfirmed event, reported by only 1 station. With the exception of the relatively minor 10 cm. radio bursts, no radio events are reported at any of the single radio frequencies in association with the Type II burst. In the dekameter range, the Type II was a stronger event, and was observed by Warwick at 33-18 Mc.

No. 95 The large 10 cm. burst at June 10^d 0508 UT is associated with flare activity in region 5680, near the northwest limb. Plage and spot data for this region are given in event No. 89. In the dynamic spectrum, the group of bursts at 0435 UT is described by the Sydney observers as a "possible Type II," and is the only event reported during their several hours of observation. It may have no association with the later events at 0508 UT. No single radio frequency events are reported at decimeter and meter wavelengths at the time of the strong 10 cm. burst.

No. 96 The major SWF at June 12^d 0453 UT is associated with an important flare that occurred near the southeast limb of the sun, in region 5695. This region is a very large, bright and active plage which contains an unusually large number of spot groups. In addition to the four spot groups listed in the catalogue, three other spots of an ephemeral nature also were present in the plage. The α_p spot No. 14885 is a return of the large β_p spot No. 14840, and α_p spot No. 14889 is a return of β spot No. 14848, both in region 5663. No dynamic spectrum observations exist at the time of the large SWF, and no known radio events are reported at any of the single radio frequencies (this may be due partly to a lack of observations).

No. 97 The weak Type II burst at June 14^d 0018 UT was evidently observed only in the very low frequency range, at 33-22 Mc. The event was not reported by Sydney or Ft. Davis, at any higher frequencies.

No. 98a This minor proton event of June 15 is one of Dr. Gregory's small proton events, present in data from high-latitude stations, which does not appear to have been reported elsewhere.

No. 99 The Type II burst at June 20^d 0132 UT is associated with flare activity in region 5695, now situated near the southwest limb of the sun. Plage and spot data for this region are given in event No. 95. The Sydney observers continue the Type II event until 0146 UT. Strong bursts of short duration occur almost simultaneously at all of the single radio frequencies, with the start of the flare, and with the first group of strong Type III bursts at 0127 UT.

No. 100 The Type II burst at June 23^d 0335 UT is associated with minor flare activity in region 5706, which is another "descendent" of the active "proton" regions of March and April. Region 5706, in its fifth rotation, is a return of region 5669 (cf event No. 85), and contains an α_p spot, No. 14901, that is a return of γ spot No. 14849 in region 5669. The latter spot was a return of the β_p spot No. 14819 in region 5642. No SWF and no 10 cm. events are reported at the time of the Type II event. With the exception of a minor burst at 200 Mc, no other radio events are reported at any of the other single radio frequencies.

No. 101 The large 10 cm. burst at June 25^d 1026 UT, and the Type II and Type IV events which follow, are related to flare activity in an unusual plage. Region 5713 is a new plage, which is active (46 flares of importance ≥ 1) and contains a complex γ spot, No. 14908, and which may be responsible for 14 events in this catalogue -- the solar activity described in events Nos. 101, 102, 105, 106, 107, 108, 111, 112 and 113, and the possibly related proton events and magnetic storms of events Nos. 103, 104, 110, 112a, and 115. A most unusual group of rather remarkable flares occurs in plage region 5713 on June 25, 26 and 27. The large 10 cm. burst at 1026 UT on June 25 is of short duration and is coincident with the start of the flare and the SWF, and also with similar bursts at other single radio frequencies, and may be related to the weak Type IV emission, of short duration, which occurs in the dynamic spectrum. The strong Type II burst is confined to the lower frequencies.

No. 102 The major flare at June 25^d 1136 UT occurred near the center of the solar disk, in region 5713. Plage and spot data for the region are given in event No. 101. Observations began at Ft. Davis at 1215 UT, and Type IV emission was in progress at that time. The start of the Type IV event was recorded at Michigan. Large radio bursts are reported at all of the sing[l]
radio frequencies, and these are followed

very long-enduring post-burst increases in flux or noise.

No. 103 This minor proton event on June 25 was reported by Dr. Gregory and is based on data from high-latitude stations. Dvoryashin also reports the existence of weak absorption in the polar cap, following the major flare at 1136 UT.

No. 105 The Type IV event at June 25^d 1717 UT is associated with flare activity in region 5713 (like event No. 102, but a lesser flare). The Type IV emission appears to be confined to the decimeter and meter wavelength regions of the radio spectrum. The 10 cm. event is a relatively minor burst, compared to the strong bursts of long duration which are reported at the lower frequencies. In the dekameter range of the dynamic spectrum, Warwick reports weak continuum from 1600-1809 UT at 33-22 Mc, and the 18 Mc SCNA recorder registers the onset of a noise storm at 1659 UT (which continues for > 8 hours).

No. 106 The large 10 cm. burst at June 25^d 2037 UT, followed by strong Type II and Type IV events, is associated with an important flare in region 5713 (like events Nos. 102 and 105). The 10 cm. event is a great burst, described as a "period of irregular activity," which begins at 2037 UT, near the time of the start of the flare and the SWF. At decimeter wavelengths the major radio burst starts a few minutes later, at 2040 UT, and at meter wavelengths strong bursts of long duration begin at 2045 UT, coincident with the onset of the strong type IV emission in the dynamic spectrum. Although Ft. Davis ends the Type IV burst at 2153 UT, Michigan continues the event until 2216 UT. In the dekameter range, Warwick observes the Type II burst over a frequency sweep of 33-20 Mc, and continues the burst until 2110 UT. At these very low frequencies, no Type IV emission is observed -- instead, there is weak continuum at 33-21 Mc, from 2048 - 2120 UT.

No. 107 This is another major flare in the active region 5713. Plage and spot data for this region are given in event No. 101. No dynamic spectrum observations exist at the time of the major flare at June 26^d 0428 UT. The radio events at the single radio frequencies indicate that strong bursts occur at all wavelengths in the radio spectrum. Since these are of relatively short duration and begin near the time of start of the flare and SWF, it is not likely that any significant Type IV bursts occurred.

No. 108 The weak Type IV burst at June 26^d 1401 UT was reported only by Michigan, and was observed on their C band; in the decimeter range of their frequency sweep. This unusual Type IV event, of only 4 minutes duration, is associated with an important flare in region 5713, and the entire event is very similar to the preceding event No. 107. Very strong radio bursts of relatively short duration occur almost simultaneously at all of the single radio frequencies at about 1359 UT, and have their counterpart in the dynamic spectrum as groups of strong Type III bursts.

No. 109 The major flare at June 26^d 2358 UT, occurred in a large, bright plage which was rather inactive as it transited the solar disk (only 3 flares of importance ≥ 1). This plage, region 5719, was in its 4th rotation, and contained an α_p spot, No. 14915, which was the return of α_p spot No. 14864 in region 5679 -- in turn a return of α_p spot No. 14823 in region 5653. The flare was accompanied by strong Type II and Type IV bursts in the dynamic spectrum. Both Ft. Davis and Sydney comment on the fact that the Type IV emission has "unusual structure, resembling Type III." The strong emission seems to be confined to the lower frequencies, for the radio bursts at centimeter wavelengths are relatively minor, but very strong bursts are reported at meter wavelengths.

No. 111 The large 10 cm. bursts at June 27^d 0419 UT and 0501 UT, and the Type II and Type IV bursts, are associated with flare activity in region 5713. Plage and spot data for this region are given in event No. 101. The flare has several maxima, and a nearby filament suddenly becomes active. In the dynamic spectrum, the stronger Type III bursts occur in the midst of a Type III noise storm of intensity 1, already in progress. The

Type IV emission gradually changes into Type I noise storm activity after 0529 UT.

No. 112 The major flare at June 27^d 2140 UT, which occurred in region 5713, was accompanied by strong Type II and Type IV bursts in the dynamic spectrum. The Type II burst at 2157 UT, observed by Warwick at the very low frequencies, was called an unclassified burst by Ft. Davis and by Michigan, "resembling Type II." Although Ft. Davis ends the Type IV emission at 2255 UT, both Michigan and Warwick continue the Type IV event until 2345 UT.

No. 112a These minor proton events of June 27 and 28 are small events which are reported by Dr. Gregory, and are present in data from high-latitude stations. They do not appear to have been reported elsewhere. The second event, on June 28, begins before the first event has ended.

No. 113 The large 10 cm. burst at June 29^d 0141 UT, and the Type II and Type IV bursts, are associated with flare activity in the active plage 5713, which is now in the northwest quadrant, near the west limb of the sun. Plage and spot data for this region are given in event No. 101.

No. 114 The weak Type II burst at June 29^d 1047 UT is associated with flare activity in a large, bright and active plage, region 5724, which is the return of the active region 5680 -- described in event No. 89. No SWF is reported at the time of the Type II burst. At the single radio frequencies, relatively minor bursts occur simultaneously with the start of the flare at centimeter wavelengths, but no radio events are reported at decimeter or at meter wavelengths.

No. 116 This minor geomagnetic disturbance at July 3^d 15^h UT was classified as a separate storm by only two stations -- Fredericksburg and Tucson. The Kp's reach a maximum only of 4, which is below real storm level. Perhaps this interval of storminess should more properly be regarded as a continuation of the more severe disturbance that began on June 29th.

No. 117 The $\beta\gamma$ spot No. 14921, in region 5726, is one of the largest spots of the year, with an area equal to 1900 millionths of the solar hemisphere (Greenwich data). This large, bright and active region (24 flares of importance ≥ 1 during its transit across the solar disk), with its huge and complex $\beta\gamma$ spot, does not contribute any major solar events for inclusion in this catalogue.

No. 118 No SWF and no 10 cm. bursts are reported in association with the Type II burst at July 8^d 2337 UT. Except for a minor burst at 545 Mc, no radio events are reported at any of the single radio frequencies at the time of the Type II burst, which apparently is confined to the very low frequencies.

No. 119 It is difficult to find any major solar event to be the antecedent of the strong sudden commencement storm at July 14^d 1702 UT.

No. 121 The strong Type II burst at July 19^d 1821 UT is associated with modest flare activity in region 5749. This large, bright and active region, in its first rotation, contains a large and complex $\beta\gamma$ spot, No. 14939, which is one of the largest spots of the year, with an area equal to 1400 millionths of the solar hemisphere (Greenwich data). At the single radio frequencies, moderately strong bursts of short duration occur simultaneously with the start of the flare, at all wavelengths. The microwave receiver was in operation at Ft. Davis, and Type IV emission was briefly recorded at centimeter wavelengths.

No. 124 The Type II burst at August 3^d 1624 UT is associated with minor flare activity in region 5775, near the northwest limb of the sun. This very large, very bright and active plage is a return of the region described in event No. 117, and contains a complex γ spot, No. 14967, which is a return of the huge $\beta\gamma$ spot No. 14921 in region 5726. No 10 cm. events are reported at the time of the Type II burst, and the only radio events which are reported at other radio frequencies are minor bursts at meter wavelengths, coincident with the start of the flare and with the group of Type III bursts in the dynamic spectrum. The

SWF appears in the CRPL check-list, and is an unconfirmed ionospheric event which is reported by only one station.

No. 125 No known flare is reported at the time of the Type II burst at August 4^d 1623 UT, therefore plage and spot data for this event are not available. However, the sun was not without some form of activity at this time. An active dark flocculus was reported from 1631 - 1710 UT, at N27 W70 (near region 5775). Also, frequent bright surges at the east limb (N22 E90), where region 5794 is coming around, were reported at 1545 - 1600 UT and 1720 - $>$2400 UT. The event appears to be confined to the lower radio frequencies, for no radio events are reported at any of the single radio frequencies except for very minor bursts at meter wavelengths, which are coincident with the group of Type III bursts in the dynamic spectrum. The weak Type II event is recorded in the dekameter range only, at 39 - 22 Mc. The SWF appears in the CRPL check-list, and is an unconfirmed event which is reported by only one station.

No. 126 The only flare activity which is reported at any time reasonably close to the time of the major SWF at August 5^d 1043 UT, is a flare in progress in region 5794 at the east limb of the sun. This very great plage -- very large, very bright, very active (70 flares of importance $\geq$ 1) -- is a return of the active region 5749 (which was described in event No. 121), and contains a complex $\beta\gamma$ spot, No. 14981, which is one of the largest spots of the year, with an area equal to 1100 millionths of the solar hemisphere (Greenwich data). Nine events in this catalogue may be attributed, either directly or indirectly, to activity in region 5794 -- events Nos. 125, 126, 127, 130, 131 and 140 and the proton event No. 133 and subsequent storms Nos. 128 and 136. No dynamic spectrum observations exist at the time of the SWF at 1043 UT, and no 10 cm. bursts are reported at this time, although minor bursts are reported at other centimeter wavelengths. No known radio events are reported at any other single radio frequencies.

No. 127 The Type II burst at August 6^d 1627 UT is associated with flare activity in region 5794, near the east limb of the sun. Plage and spot data for this region are given in event No. 126. Moderate bursts of short duration occur almost simultaneously at all of the single radio frequencies, coincident with the start of the flare at 1618 UT, and with the onset of the Type IV burst reported by Warwick in the very low frequency dekameter range of the dynamic spectrum. The Type II burst is also confined to the lower frequencies, and continues until 1649 UT on the dekameter spectrum sweep.

Nos. 130, 131 The large 10 cm. burst at August 11^d 0235 UT, which is followed by Type II and Type IV bursts, is associated with flare activity in the active plage region 5794. Similarly, the large 10 cm. burst later in the day, at August 11^d 1923 UT, which is also accompanied by Type II and Type IV bursts in the dynamic spectrum, is also associated with major flare activity in the same plage region.

No. 132 No SWF is reported at the time of the Type IV burst at August 11^d 2248 UT, which appears to be associated with a minor flare in region 5788, near the southwest limb of the sun. However, there is also an active prominence region at the southeast limb at 2241 UT (where plage region 5800 is coming around the limb), and the association is therefore not definite. No SWF is reported at the time of the Type IV burst, and no radio events are reported at any of the single radio frequencies with the exception of an 18 Mc burst which is coincident with the start of the flare, and with the group of Type III bursts in the dynamic spectrum. Instead of classifying the event as Type IV, Sydney reports continuum emission of int. 2, < 2241 - 2315 UT.

No. 133 This minor proton event of August 12 was reported by Dr. Gregory, based on data from high-latitude stations. Dr. Van Allen reports that at 1240 UT on August 12, Explorer VII measured solar protons in the neighborhood of the earth, with a "significant increase in the counting rate above the normal value."

No. 134 The major SWF and great 10 cm. burst at August 14^d 0515 UT is associated with an important flare that occurred near the center of the solar disk, in the active plage region 5794. Plage and spot data for this region are given in event No. 126. No dynamic spectrum observations exist at the time of the major SWF. The single radio frequency events indicate that strong bursts occur at all wavelengths within a minute or two of the start of the SWF at 0515 UT. All of the large bursts at centimeter wavelengths (9400 to 1000 Mc) are followed by a long interval of decreased flux, or absorption, which is a rather rare happening. At decimeter wavelengths the radio event consists of a major burst, followed by the onset of a long-enduring noise storm.

No. 135 The large 10 cm. burst at August 14^d 1307 UT is associated with flare activity in plage region 5799, which is a very large, very bright and active plage in its first rotation. The β_p spot No. 14985 is one of the largest spots of the year,with an area of 1225 millionths of the solar hemisphere (Greenwich data). At centimeter wavelengths, the strong radio bursts occur simultaneously with the start of the flare and SWF, but only minor bursts of very short duration are reported at decimeter wavelengths, and no radio events are reported at meter wavelengths.

No. 136 This minor geomagnetic disturbance at August 14^d 1510 UT was classified as a storm by only two stations -- Binza and Wilkes. The sudden commencement is "almost coincident with the onset of a Forbush decrease at Deep River," according to Dr. Van Allen.

No. 137 Dr. Van Allen states that on August 15 at about 1130 UT, the solar proton intensity as measured by Explorer VII was slightly higher than it was on August 14, and continued to increase slightly for a number of hours. He suggests that this may be an event similar to that of June 4, 1960 -- and that the magnetic storm and Forbush decrease on August 14 may provide the mechanism for the temporary small increase in the solar proton intensity on the 15th, when the counting rate was about 20% above normal.

No. 139 The large bright plage, region 5800, with its complex $\beta\gamma$ spot No. 14984, is not a very active region (only 2 flares of importance ≥ 1 as it transits the solar disk) and does not contribute any major solar events for this catalogue.

No. 140 The Type II burst at August 19^d 1239 UT is associated with flare activity in the active plage region 5794, which is now going over the west limb of the sun. Plage and spot data for this region are given in event No. 126.

No. 142 The major SWF at August 21^d 1538 UT is associated with flare activity near the center of the solar disk, in region 5806, which is a new and not very active plage. The 10 cm. event consists of a modest rise and fall in flux. The only other events reported at the single radio frequencies are onsets of noise storms at meter and dekameter wavelengths. In the dynamic spectrum, the Type II was observed only on the very low frequencies, in the dekameter range.

No. 142a This minor proton event of August 26 is one of Dr. Gregory's small proton events, present in data from high-latitude stations.

No. 143 The Type II burst at August 26^d 1404 UT is associated with minor flare activity near the center of the solar disk, in region 5814. This rather uninteresting and inactive plage is in its 4th rotation and is the return of part of active region 5775, described in event No. 124. This event is evidently confined to the very low frequency range of the radio spectrum, since no radio bursts are reported at centimeter, decimeter or meter wavelengths.

No. 145 Although region 5822 is a large, bright and active plage, containing a complex $\beta\gamma$ spot, it does not produce any solar events of sufficient magnitude to warrant inclusion in this catalogue.

No. 146 No 10 cm. events are reported at the time of the Type II burst at September 1^d 2042 UT. Only relatively minor bursts of short duration occur at other wavelengths, with the onset of a noise storm at the very low frequencies.

No. 147 The Type II burst at September 2^d 0244 UT is associated with flare activity in region 5825, situated in the southwest quadrant near the west limb. Plage and spot data for this region are given in event No. 146.

No. 148 The Type II burst at September 2^d 0545 UT is associated with flare activity near the northwest limb of the sun, in plage region 5816. This region is partly a new plage, and partly a return of a portion of the large and active plage 5775, described in event No. 124. The α_p spot No. 15001 in region 5816 is a return of the γ spot No. 14967 in region 5775 -- which was a return of β_p spot No. 14916 in region 5724.

No. 150 This major event at September 3^d 0037 UT follows the "classical" pattern of an important flare, with major SWF, large 10 cm. burst, and Type II and Type IV bursts in the dynamic spectrum, followed within a few hours by PCA. The flare occurred near the east limb of the sun, in region 5837. This very large, bright and active plage is a return of the active "proton" region 5794, described in event No. 126, and contains a complex γ spot, No. 15015, which is a return of the large $\beta\gamma$ spot No. 14981 in region 5794. The radio event consists of a great outburst, since very great bursts of long duration occur at all wavelengths. In the dynamic spectrum, the Type II burst is confined to the very low frequencies, and is reported only by Warwick in the dekameter range of the spectrum, at 39-22 Mc.

No. 151 This proton event at September 3^d 0500 UT is most unusual, especially because of the rather long delay in the arrival of the particles. In addition to the polar cap absorption, there was also a small ground level effect, and solar cosmic rays were detected during a rocket flight. A large increase in the solar proton intensity was also detected by Explorer VII, which measured solar protons in the vicinity of the earth for more than 5 days.

No. 152 The major SWF at September 4^d 0003 UT, and the Type II and Type IV bursts which follow, are associated with minor flare activity in region 5816, at the west limb of the sun. Plage and spot data for this region are given in event No. 148.

No. 153 This major sudden commencement storm at September 4^d 0230 UT occurs while the PCA event (No. 151) is still in progress. Dr. Van Allen suggests that the plasma cloud which is responsible for this storm (and which may have left the sun on September 2, due to flare activity on that day), would have been between the sun and the earth at the time of the September 3 proton flare, and might therefore be responsible for the observed long delay time in the arrival of the solar protons from the latter flare.

No. 154 The Type II burst at September 5^d 1942 UT is associated with flare activity near the northeast limb of the sun. No SWF is reported with this event.

No. 156 The Type II burst at September 8^d 1820 UT is associated with sub-flare activity at the northeast limb, where region 5848 is coming around the limb. This large bright plage is in its 4th rotation, and its β_p spot No. 15024 is a return of the β_p spot No. 14989 in region 5802. No SWF is reported with this event.

No. 157 The major SWF at September 14^d 1620 UT is associated with sub-flare activity in region 5858, at the southeast limb of the sun. Although the flare as such is only a minor event, and is late with respect to the start of the SWF, the complete limb event includes the appearance of bright loops and the development of loop activity at the limb. Region 5858 is a large, very bright and active plage that contains a complex $\beta\gamma$ spot, No. 15043. Except for a minor burst at centimeter wavelengths at 1703-1704 UT, and a minor group of bursts in the dynamic spectrum at 1758 UT, there are no radio events reported at the radio frequencies at the time of the SWF.

No. 158 The major SWF at September 16^d 1709 UT, and the great 10 cm. burst at 1702 UT, followed by Type II and Type IV bursts, are associated with a flare of importance 1 that occurred in region 5858 in the southeast quadrant of the sun, near the east limb. Plage and spot data for this region are given in event No. 157. Strong bursts of long duration are reported at all radio wavelengths. With their microwave receiver in operation, Ft. Davis detected strong Type IV emission over the entire spectrum range, from 3500 to 25 Mc.

No. 160 Although region 5863 is a very large, bright and active plage, with 33 flares of importance ≥ 1 during its transit across the disk, it did not produce any solar events of sufficient magnitude to warrant inclusion in this catalogue.

No. 161 The major SWF at September 26^d 0520 UT, with the accompanying great 10 cm. event and Type II and Type IV bursts, is associated with flare activity in region 5858, which is now in the southwest quadrant of the sun, near the west limb. Plage and spot data for this region are given in event No. 157.

No. 162 The small proton event of September 26 appears in the NASA Proton Manual, and was also reported by Dr. Gregory. Fichtel has described the detection of solar cosmic rays during a rocket flight on the 26th, and Dr. Gregory's report is based on data from high-latitude stations.

No. 165 It is difficult to find any isolated solar event as the antecedent of this brief storm at October 4^d 1400 UT. It should be pointed out that the storm occurs 27 days after the storm of September 7 (event No. 155). Also, it should be noted that Dr. Gregory reports a small proton event on October 3 at 1600 UT (and lasting for 10 days). No major solar event can be found to precede this proton event of the 3rd.

No. 166 This great geomagnetic storm of October 5-6 is one of the rare storms for which the 3-hr. K_p's reach a maximum value of 9. There is no known major solar event that will serve adequately as the antecedent of the storm, which has a gradual beginning on the 5th, followed by a sudden commencement about 7 hours later, on the 6th.

No. 167 The large 10 cm. burst at October 10^d 0708 UT is associated with flare activity in region 5880. The α_p spot No. 15068 is a return of α_p spot No. 15018 in region 5839. No dynamic spectrum observations exist at the time of the large burst. Because of the strong bursts at centimeter wavelengths, it is possible that some form of Type IV emission may have occurred. No SWF is reported with this event.

No. 168 The major SWF at 0525 UT, with the accompanying great 10 cm. event and Type II and Type IV bursts, is associated with flare activity in region 5880. Plage and spot data for this region are given in event No. 167.

No. 169 This small proton event of October 11 is reported by Dr. Gregory. The previous event, which started on October 3, had not entirely ceased when a small new effect was noted at October 11^d 0000 UT. Between 0500 - 0600 UT a larger effect was detected. Perhaps the latter effect is related to emission from the flare described above, in event No. 168.

No. 171 The Type II burst at October 13^d 1905 UT is associated with flare activity in the southeast quadrant, near the east limb. In addition to this Type II burst, which was observed by Ft. Davis at their lower frequencies, Warwick reports three more Type II bursts, between 1920 and 1954 UT, at the very low frequencies in the dekameter range. No 200 Mc radio events are reported in association with the Type II bursts at 0905 UT and later.

No. 172 The Type II burst at October 14^d 0154 UT is associated with minor flare activity in region 5884. Plage and spot data for this region are given in event No. 170. No SWF is reported with the event.

No. 174 The major SWF at October 15^d 1100 UT is associated with flare activity in region 5884, which is now approaching the west limb of the sun. Plage and spot data for this region are given in event No. 170. No dynamic spectrum observations exist at the time of the large SWF.

Nos. 175, 176 No known flares are reported exactly at the times of the two large SWF's, at October 15^d 1715 UT and October 17^d 1428 UT. The CRPL F-Series Bulletin states that "these events are strange, and may be due to MUF failure or changes of mode, and not solar flare effects." However, on October 15 region 5884, which is near the west limb, has many small flares of imp. 1- between 1635 - > 2300 UT, and on October 17, when the region is exactly at the west limb, there are frequent 1- flares reported between 1450 - 1645 UT, and "frequent small bright surges at the limb" ∠ 1625 UT. No 10 cm. events are reported with either of these two SWF's. Radio bursts occur in the dynamic spectrum at times that suggest a suitable association with the SWF's.

No. 177 Although region 5901 is a very large, very bright and active plage, with a large and complex γ spot, No. 15090, which is one of the largest spots of the year (area equal to 1225 millionths of the solar hemisphere), it does not produce any solar events of sufficient magnitude to warrant their inclusion in this catalogue.

No. 178 The Type II and Type IV bursts at October 23^d 2116 UT and 2120 UT are associated with flare activity at the northeast limb of the sun (region 5909). These events were reported only by Warwick in the very low frequency range of the dynamic spectrum.

No. 180 The major flare at October 29^d 1026 UT, and the major SWF and great 10 cm. burst, are associated with region 5909. Plage and spot data for this region are given in event No. 178. Although dynamic spectrum observations do not exist at the time of these events, it seems likely that Type IV radio emission probably occurred throughout the entire frequency range, because of the great bursts which occurred at all of the single radio frequencies.

No. 181 The minor proton event of October 29 is one of Dr. Gregory's small events, present in data from high-latitude stations.

No. 182 It is difficult to find any special solar event to serve as the antecedent of this storm. However, the storm occurs about 28 days after the great storm of October 6.

No. 183 The major flare at November 6^d 1752 UT occurs near the center of the solar disk, in region 5921, which is a return of the active plage region 5884 (event No. 170). Two Type II bursts occur in the dynamic spectrum, near the time of flare maximum, at the very low frequency range of the spectrum.

No. 184 This major solar flare at November 10^d 1009 UT is the first in an unusual series of similar great proton-flares which are associated with one of the greatest regions of solar cycle No. 19. The very large and very bright plage, region 5925, is the most active region of the year. A total of 98 flares of importance $\gtrsim 1$ occurred in the region as it transited the solar disk, many of these being major flares and at least three being major proton-flares. There are some 20 events in this catalogue which may be attributed, either directly or indirectly, to activity in this remarkable region -- Nos. 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202 and 203. The region contains a complex $\beta\gamma$ spot, No. 15114, which is one of the largest spots of the year, with an area equal to 1775 millionths of the solar hemisphere (Greenwich data). Although dynamic spectrum observations do not exist at the time of the great flare at 1009 UT, it seems most likely that Type IV emission occurred throughout the entire spectrum range, because of the very great radio bursts that occurred at all wavelengths.

No. 185 The proton event at November 10^d 18^h UT is one of Dr. Gregory's small proton events which he describes as "probable," and which does not seem to have been reported elsewhere. The event does not have an ending, since it is still in progress when the next proton event begins.

No. 187 The major SWF at November 11^d 0311 UT, and the great 10 cm. burst at 0315 UT, with Type II and Type IV events in the dynamic spectrum, are associated with an important flare which occurred near the center of the solar disk in region 5925. Plage and spot data for this region are given in event No. 184. The strong radio bursts of long duration, that occurred at all of the single radio frequencies indicate that the Type IV emission was not confined to the dynamic spectrum, but was present throughout the entire range of the radio spectrum. In addition to the Type II burst at 0349 UT, the Sydney observers report a possible Type II of intensity 1, 0330 - 0345 UT.

No. 188 A minor proton event at November 11^d 04^h UT, reported by Dr. Gregory, and present in data from high-latitude stations.

No. 189 This major event at November 12^d 1315 UT follows the truly "classical" pattern of a great flare with great SWF, very great 10 cm. burst, and strong Type IV emission in the dynamic spectrum, followed within a relatively few hours by the onset of polar cap absorption. The great flare occurred near the center of the solar disk, in the active plage 5925. Very great radio bursts, with durations of the order of hours, occurred at all of the single radio frequencies. Since observations did not begin at Ft. Davis until 1345 UT, we do not know whether or not a Type II burst occurred prior to this time. Strong Type IV emission was in progress and continued for more than 4 hours. The Type IV continuum has Type III structure, and degenerates into noise storm activity at 1700 UT.

No. 190 The great sudden commencement magnetic storm at November 12^d 1348 UT is one of the relatively rare storms for which the 3-hr. K_p values reach a maximum of 9. This "saturated" maximum is maintained for 5 consecutive 3-hrly. intervals, which is most unusual. This severe storm began just about 30 minutes after the start of the great flare described above in event No. 189, and for which there was a magnetic crochet at 1324 UT.

No. 191 This major solar proton event of November 12 was recorded by instruments aboard rockets and on Explorer VII, as well as by ground-based riometers. Neutron monitors also recorded an increase in cosmic ray counts at ground level. The peak intensity observed by Explorer VII occurred around 2330 UT. At Deep River, the ground neutron monitors show an increase, starting slowly, between 1335 and 1345 UT. Shortly after, and while the intensity of the solar cosmic rays was still high, a strong Forbush decrease occurred (at 1930 UT) -- due to the arrival at the earth of the plasma cloud that was ejected from the flare of November 11, according to the interpretation of Dr. Carmichael and his co-workers.

No. 193 This is another "classical" event, consisting of major flare, major SWF, great 10 cm. burst, and strong Type IV emission, at about 0300 UT on November 14. The major flare occurs in the active plage 5925. The Type IV burst which lasts for about two hours, degenerates into weak noise storm activity after 0500 UT. Great radio bursts are reported at all of the single radio frequencies.

No. 194 The small proton event at November 14^d 22^h UT is reported by Dr. Gregory, and is attributed by him to a flare that occurred in region 5925 at 2114 UT.

No. 195 Again we have a great flare, at November 15^d 0207 UT, with a major SWF and very great 10 cm. burst, followed by Type II and Type IV bursts in the dynamic spectrum, in the "classical" pattern, associated with the active plage 5925. Very great bursts of long duration occur at all of the single radio frequencies.

No. 196 This is a great PCA event at November 15^d 0430 UT, also recorded on riometers and by instruments carried aboard balloons and rockets. A major increase in solar proton intensity was also measured by Explorer VII, and cosmic rays were recorded at ground-level on neutron monitors which recorded a rapid increase in the cosmic-ray counts at 0236 UT. This ground level increase reached maximum amplitude within 5 minutes (in contrast to the November 12th ground level event, which took over an hour.)

No. 198 The minor proton event of November 19 is one of Dr. Gregory's small events, which he attributes to a flare in our active region 5925, at the west limb.

Nos. 199, 200 These events are very similar and consist primarily of Type II and Type IV bursts in the dynamic spectrum, which are associated with major limb activity in region 5925 as it goes over the west limb on November 19 and 20.

No. 201 The proton event of November 21 has an onset time of 0200 UT, according to Bailey. Dr. Gregory starts the event at 00^h on the 21st, using data from high-latitude stations. Explorer VII registered an enhancement in solar proton intensity late on November 20th, at about 2200 UT. Ground level neutron monitors registered a small but sudden increase in cosmic rays at ground level at 2055 UT. The neutron monitors aboard the satellite do not fully recover, in their counting rate, from the series of events starting with November 12th, until November 28th.

No. 204 No known flares are reported at the time of the Type II and Type IV bursts at 1509 and 1523 UT, but this may be due to a lack of observations. There were bright surges at the southeast limb. No radio events are reported at any of the single radio frequencies at the time of the Type II and Type IV events. The SWF appears in the CRPL check-list and is an unconfirmed event.

No. 206 The major flare at December 5^d 1825 UT was accompanied by a major SWF and Type II and Type IV bursts, and occurred in plage region 5959, which is a return of the unusually active PCA region of November. The $\beta\gamma$ spot No. 15151 is a return of the large $\beta\gamma$ spot No. 15114 in region 5925.

No. 207 The minor proton event of December 6 is one of Dr. Gregory's small proton events, present in data from high-latitude stations, and does not appear to have been reported elsewhere.

No. 210 No SWF, and no 10 cm. events or 200 Mc. events are reported at the time of the Type II burst at December 8^d 1604 UT.

TABLE VIII. NOTES AND COMMENTS ABOUT SOME SOLAR-TERRESTRIAL EVENTS - 1961

This section contains selected information and pertinent data concerning some of the events listed in the Chronological Catalogue of Solar Events for 1961. The numbers refer to the number of the event in the catalogue. Not every event will necessarily be accompanied by remarks in this section.

No. 1 Region 5983 is a new plage, very large and bright, and contains a γ spot, No. 15179, which is one of the largest spots of the year, with an area equal to 1475 millionths of the hemisphere (Greenwich data). Although 45 flares occurred in this active region, with its complex spot, during its passage across the solar disk, there were no solar events of sufficient magnitude to warrant inclusion in this catalogue of major solar events.

No. 2 No SWF and no 10 cm. bursts are reported at the time of the Type II burst January 3^d 0211 UT. Radio bursts at other centimeter wavelengths indicate that the radio event at these frequencies is a moderate burst of short duration. The flare data is fragmentary, and the flare association may be questionable.

No. 3 Although nine of the 10 stations agree that the geomagnetic storm of January 7-8 is a sudden commencement storm, 2 of these stations start the Sc at 7^d 2047 UT, and 7 start the Sc at 8^d 1618 UT. This interval of disturbance is preceded by about 5 days of extremely quiet geomagnetic conditions. It is difficult to find a solar event as the antecedent of this storm other than flares of importance 1 and 1+ on January 4, 5 and 6.

No. 5 The Type II burst at January 30^d 1426 UT. apparently was observed only in the decimeter and meter ranges of the dynamic spectrum, since no such event was reported by Warwick in the dekameter range. However, Warwick observes the Type III bursts at these very low frequencies, and is the observer of the continuum emission that begins at 1505 UT.

Nos. 6 & 7 The Type II bursts at January 30^d 2006 UT and January 31^d 1517 UT are associated with relatively minor flare activity in region 6013, which is located near the center of the solar disk on these days. Plage and spot data for this region are given in event No. 5. The SWF appears in the CRPL checklist, and is an unconfirmed report.

Nos. 8-14 The remarkable series of geomagnetic storms between February 3 and February 22, 1961 has no major solar activity as an antecedent (with the possible exception of the storm of February 3). Extremely quiet geomagnetic conditions prevail during the intervals between the storms, when the 3-hrly. K_p's, for the most part, = 0, 1 or 2. The storm of February 3 occurs 27 days after the storm of January 7 (event No. 3).

No. 15 The several Type II bursts on February 21 are apparently associated with flare activity in plage 6042, which is located in the southeast quadrant of the solar disk, near the east limb. The SWF appears in the CRPL checklist of ionospheric disturbances, and is an unconfirmed observation which was reported by only one station. No radio events are reported at any of the single radio frequencies in association with the Type II bursts at 2317 UT and 2327 UT, which apparently are confined to the lower frequency ranges. Warwick observes the Type II bursts at 41-28 Mc, and also reports weak Type IV emission at these low frequencies.

Nos. 16, 17, 18, and 20. The series of geomagnetic storms between March 5 and March 20 has no major solar event for an antecedent. The storm of March 5, however, occurs 27 days after the storm of February 6 (event No. 10).

No. 19 There are no known flares reported at the time of the Type II burst at March 14^d 2145 UT, and the Type IV burst at 2220 UT. These dynamic spectrum events were reported by Warwick at the very low frequencies in the dekameter range. A bright surge at the limb is reported by Lockheed, 2200-2245 UT, at N06 E90 where region 6059 is coming around the east limb. The SWF appears in the CRPL checklist, and is an unconfirmed event. No radio events are reported at any of the single radio frequencies at the time of the dynamic spectrum events.

No. 21 No SWF is reported at the time of the Type II burst at March 18^d 1627 UT, which is associated with minor flare activity in region 6057, near the center of the solar disk. No radio events are reported at any of the single radio frequencies in association with the Type II event, which was reported by Warwick at the very low frequencies in the dekameter range of the dynamic spectrum.

No. 22 The Type II bursts at March 18^d 1749 UT and 1757 UT are associated with minor flare activity in region 6059, near the center of the solar disk. Plage and spot data for this region are given in event No. 19. The first Type II burst at 1749 UT covers a frequency range of 115 - 70 Mc, and does not extend into the dekameter range which is covered by Warwick's frequency sweep. The second Type II at 1757 is observed at lower frequencies, and appears in Warwick's records down to a frequency of 25 Mc. Except for the minor bursts at 2800 Mc and 200 Mc, no known radio events are reported at any other single radio frequencies at the time of the Type II bursts. The SWF appears in the CRPL checklist and is an unconfirmed event.

No. 23 There are no known flares or any other form of solar activity at the time of the Type II and Type IV bursts at March 21^d 2222 UT and 2237 UT, therefore plage and spot data for these events are not available. No SWF, and no radio bursts at any of the single radio frequencies, are reported in association with the dynamic spectrum events, which were reported by Warwick at the very low frequency range of 41 - 28 Mc.

No. 24 No dynamic spectrum observations exist at the time of the major flare and SWF at March 26^d 1012 UT. However, the strong bursts which occurred at all of the single radio frequencies indicate that Type IV emission probably occurred at all wavelengths.

Nos. 26 & 27 This interval of magnetic disturbance between March 31 and April 3 was classified as "storm" by only three stations -- Tucson, Honolulu, and Fredericksburg.

No. 28 The Type IV burst at April 4^d 2235 UT is associated with flare activity in region 6077, near the center of the solar disk. Warwick observes the Type IV emission in the dekameter range of the dynamic spectrum, at 41 - 27 Mc, and Owens Valley reports bursts of continuum emission, at 975 - 540 Mc, from 2234 - 2241 UT. In addition to the Type IV, Ft. Davis also reports an unclassified burst, 2239.8 - 2245 UT. The SWF appears in the CRPL checklist, and is an unconfirmed observation, reported by only one station.

No. 29 The brief but strong burst of Type IV emission at April 5^d 2057 UT, like event No. 28, is associated with flare activity in region 6077. Plage and spot data for this region are given in event No. 28. At Ft. Davis, the microwave receiver was in operation, and the Type IV burst was observed over a wide range of frequencies covering centimeter, decimeter and meter wavelengths. In the dekameter range at 41-22 Mc, Warwick reports a series of Type III bursts between 2056 - 2100 UT followed by continuum emission from 2102 - 2110 UT. Ft. Davis also reports an unclassified burst, 2059.7 - 2108 UT, at 150 - 25 Mc.

No. 30 The Type II and Type IV bursts at April 6^d 0013 UT and 0015 UT are associated with a subflare in region 6077 (like events No. 28 and No. 29). The SWF is an unconfirmed observation taken from the CRPL checklist.

No. 31a There are no major solar events, such as those included in this catalogue, that appear to be related to this worldwide sudden commencement storm of April 13^d 1450 UT. However, it should be pointed out that flares of Imp. 1+ and 2 occurred on April 10 and 13 in the active region 6077 as it approached the west limb of the sun.

No. 32 The major flare at April 26^d 1646 UT occurred in a very large, bright and active plage, region 6098, located in the southeast quadrant of the solar disk, near the east limb. The region contains a complex $\beta\gamma$ spot, No. 15280. No dynamic spectrum events are reported on any of the frequency sweeps made by the various observers -- Ft. Davis, Michigan, Boulder and Owens Valley all report "no event" at the time of the major flare and major SWF.

No. 33 Although region 6097 is a bright and active region, containing a complex $\beta\gamma$ spot, it does not produce any solar events of sufficient magnitude to be included in this catalogue.

No. 36 The major flare at May 4^d 2145 UT occurred in region 6098, which is now in the southwest quadrant of the sun, near the west limb. Plage and spot data for this region are given in event No. 32. The Type II burst at 2209 UT and the weak Type IV emission that begins at 2249 UT are reported only by Warwick in the dekameter range at the very low frequencies. Ft. Davis reports only a brief burst of Type IV emission, from 2207-2210 UT, on their microwave receiver.

No. 37 There are no known flares or subflares or other solar activity reported at the time of the weak Type II burst that is reported by Warwick at May 7^d 1452 UT at the very low frequencies of 40-31 Mc. Plage and spot data for this event therefore are not available. However, it should be noted that regions 6097 and 6098 are going over the west limb of the sun at this time. No SWF, and no radio events at any of the single radio frequencies, are reported at the time of the Type II burst.

No. 39 Although this long interval of geomagnetic disturbance, beginning at May 10^d 21^h UT, is classified as a storm by only one station (Fredericksburg), it represents a period during which the K_p's reach a value of 5, i.e. storm level. It should be noted that this period of storminess occurs 27 days after the storm of April 13 (event No. 31a).

Nos.40-46 The several geomagnetic storms that occur between May 16 and June 7 are not preceded by any major solar events such as those listed in this catalogue. The storms of June 1 and 2 (events Nos. 44 and 45) may be sequentially related to the storm of May 4 (event No. 35), and the storm of June 6 (event No. 46) follows the storm of May 10 (event No. 39) by an interval of 27 days.

No. 47 The Type II and Type IV bursts at June 9^d 2138 UT and 2153 UT are associated with minor flare activity in a region located in the southwest quadrant of the sun, near the west limb. No SWF and no 10 cm. bursts are reported at the time of the dynamic spectrum events, which are reported by Warwick in the dekameter range at very low frequencies. Ft. Davis reports an unclassified burst from 2136-2144 UT at 240-25 Mc, and states that it "resembles a Type II."

No. 48 The Type II burst at June 11^d 1508 UT and the Type IV burst at 1505 UT are related to an important flare and SWF, and to rather strong radio bursts of relatively short duration at all of the single radio frequencies. With their microwave receiver in operation, Ft. Davis recorded the Type IV burst at 1505 UT up to the centimeter wavelengths (3000 Mc), and Warwick observed this emission down to 28 Mc. Warwick recorded the Type II burst at 1508 UT down to frequencies as low as 12 Mc, and also reported a second and even stronger Type II event at 1516 UT at these very low frequencies.

No. 49 The Type II burst at June 13^{d} 0445 UT is associated with a flare of importance 1 that occurred in a large, very bright and active region in the northeast quadrant of the solar disk. No SWF is reported at the time of the Type II burst. The single radio events indicate that a relatively small burst occurred almost simultaneously at all frequencies at 0439 UT, concurrently with the start of the flare and the strong groups of Type III bursts in the dynamic spectrum.

No. 50 The weak Type II burst at June 14^{d} 1634 UT is associated with flare activity in region 6140, now located at the center of the solar disk. Plage and spot data for this region are given in event No. 49. Ft. Davis is the only observer to report the Type II event. Warwick reports the continuum emission at 1628-1635 UT, over a range of 41-7 Mc. Bursts of short duration, reported at the various single radio frequencies, are related to the groups of Type III bursts in the dynamic spectrum.

No. 51 The weak sudden commencement storm at June 14^{d} 2332 UT is preceded by about 5 days of extremely quiet geomagnetic conditions.

No. 52 The two Type II bursts at June 15^{d} 1646 UT and 1723 UT are related to the two phases of an important flare that occurred in region 6140. Plage and spot data for this region are given in event No. 49. This double aspect, which represents a spreading or a second outbreak about 45 minutes after the first outbreak of the flare, is seen also in the SWF and in the various single radio frequency events, as well as in the dynamic spectrum. The weak Type IV emission at 1717 UT was reported only by Warwick at low frequencies in the dekameter range, at 41-25 Mc.

No. 53 Region 6151 is a large, bright and active plage, containing a large β_p spot, No. 15333, which is one of the largest spots of the year with an area equal to 1050 millionths of the solar hemisphere (Greenwich data). This region does not produce any solar events of sufficient magnitude to warrant inclusion in this catalogue of major solar events.

No. 54 It is difficult to find any major solar event or activity to adequately serve as the antecedent of this storm. Flares of importance 1 and 1- occurred on June 17, 18, 19 and 20th. Four of the 17 stations start the storm with a sudden commencement at 1618 UT, instead of gradually. It should be noted that the storm occurs about 27-1/2 days after the storm of May 25th (event No. 42).

No. 55 This storm of June 29 follows the storm of June 2 by an interval of 27 days.

No. 56 The Type II burst at June 29^d 1956 UT is associated with a subflare in region 6155. This large, bright and active region contains a large β_p spot which is one of the largest spots of the year, with an area equal to 1250 millionths of the solar hemisphere (Greenwich data). No SWF is reported at the time of the Type II event, which was not observed at Ft. Davis and evidently was confined to the very low frequency range. No radio events are reported at any of the single radio frequencies, except for a temporary noise storm at 18 Mc which is concurrent with the Type II.

No. 58 This major solar event of July 11 follows the "classical" pattern of a great solar flare, major SWF, and great 10 cm. burst, and strong Type II and Type IV bursts in the dynamic spectrum followed within a few hours by PCA. These events are associated with region 6171, which is one of the great plage regions of solar cycle No. 19, and the most active region of the year. This very large and very bright plage produced 78 flares of importance ≥ 1 during its transit across the solar disk, and contains a large and complex $\beta\gamma$ spot, No. 15353, which is one of the largest spots of the year, with an area equal to 1400 millionths of the solar hemisphere (Greenwich data). This unusual plage may possibly be associated with 13 of the major events appearing in this catalogue -- events Nos. 58, 59, 60, 61, 62, 64, 65, 66, 67, 68, 69, 70 and 71 -- five of which are proton events. The complex $\beta\gamma$ spot formed on the disk near the east limb on July 8th and developed very rapidly. On July 11, at 1615 UT there occurred the first in a remarkable series of great flares of importance 3 which were accompanied by polar cap absorption. The single frequency radio events were great bursts of long duration at all wavelengths. The st Type IV emission was observed by Ft. Davis c a broad spectrum band from 3900 - 25 Mc, since their microwave receiver was in operation. Warwick extended the range of the Type IV down to 9 Mc, and at these very low frequencies of 41 - 9 Mc the Type IV emission continued until 2300 UT.

No. 59 The start of this PCA event at July 12^d 0000 UT is based on a report of Leinbach's, from riometer observations. The event appears in the NASA Solar Proton Manual. Bailey begins the event later on the 12th (event No. 61, below).

No. 60 Another great flare in region 6171, on July 12, is accompanied by a major SWF, a very great 10 cm. burst and Type IV radio emission, followed by strong PCA and a subsequent geomagnetic storm. No dynamic spectrum observations exist at the time of the great flare and burst at July 12^d 1000 UT. However, the very great bursts which occur at all of the single radio frequencies indicate that Type IV emission must have occurred, probably at all wavelengths. Warwick reports weak Type IV in progress at 1400 UT at the very low frequencies.

No. 61 Bailey reports the onset of PCA on July 12 at 1300 UT, three hours after the flare. From riometer data, Leinbach reports the event as in progress at < 0700 UT on July 13 and continuing for 2.5 days. Solar cosmic rays were also measured by instruments aboard a balloon which was flown on July 13th.

No. 62 This great magnetic storm of July 13 has several maxima. The 3-hr. K_p's reach a maximum value of 8 very soon after the Sc at July 13^d 1113 UT, and again late on the 14th a circumstance which may perhaps reflect the influence of the two great flares (with PCA) in region 6171 on July 11 and 12.

Nos. 63 & 64 These two major flares on July 15, although they occurred in two different regions on the sun, seem to be intimately related to each other. The first flare, which started at 1433 UT and increased very slowly in brightness, was of very long duration and occurred in a large and bright plage, region 6172, which has been relatively inactive, and which is the return of region 6151 of the previous rotation (event No. 53). The α_p spot No. 15355 is a return of the large β_p spot No. 15333 of region 6151. No SWF is reported as starting at or near the beginning of this major flare, but there is an SEA of imp. 1, 1435-1448 UT, an SPA, 1434-1517 UT, and the start of an 18 Mc noise storm at 1435 UT. An outstanding feature of this flare is the activity which is generated in a nearby filament. In the dynamic spectrum all observers report a strong group of Type III bursts which occurs with the start of the flare, at 1433 UT. The continuum emission is reported only at the very low frequencies in the dekameter range, at 41-7 Mc. At the single radio frequencies, the radio event consists of relatively weak bursts, which begin at centimeter wavelengths near the start of the flare, at about 1430 UT, and appear to move rather rapidly through the radio spectrum, reaching the very low frequencies in the dekameter range 5 minutes later, at 1435 UT. At centimeter wavelengths the start of the flare is also marked by the start of a modest but very long-enduring rise and fall in flux (duration > 7 hours), which has as its counterpart in the dekameter range the onset of an 18 Mc noise storm (duration > 6 hours). About 30 minutes later, and while this unusual flare is still in progress, another major flare begins, at 1508 UT, in plage region 6171 (the region in which the proton flares of July 11 and 12 have previously occurred, as described in events Nos. 58 and 60). A major SWF accompanies this aspect of the flare phenomenon, with strong Type IV emission in the dynamic spectrum. Ft. Davis begins the Type IV event at 1533 UT, over a broad spectrum band covering all frequencies from 3000 - 100 Mc and states that the Type IV "changes gradually into noise storm activity." In the dekameter range, Warwick observes the Type IV at 41 - 9 Mc, begins the emission at 1522 UT, and has a more long-enduring event, which deteriorates into weak continuum. It is difficult to say, in all honesty, whether the Type IV emission is the result of the flare activity in the earlier flare (in region 6172) or of the flare activity in the subsequent flare (in region 6171). We are inclined toward the view that these two flares, taken together, constitute the "whole event" which took place on the sun during the hours in question.

No. 65 The PCA event that begins at July 15^d 1545 UT does not appear in Bailey's list of principal PCA events, but appears in the NASA Solar Proton Manual. It is an observation made by Leinbach, and is based on riometer records.

No. 67 Still active, the remarkable plage, region 6171, produces another great flare at July 18^d 0920 UT which is accompanied by a major SWF, a great 10 cm. burst, and great bursts at all of the single radio frequencies. Although no dynamic spectrum observations exist at the time of the major flare, the great radio bursts at all of the single frequencies indicate that Type IV emission must have occurred, probably at all wavelengths. With this flare, solar cosmic rays were measured by instruments carried aboard a balloon, and were also recorded at ground level at ~ 0950 UT by neutron monitors.

No. 70 As it departs over the west limb of the sun, region 6171 climaxes its transit across the solar disk with a final flare of importance 3 on July 20. As with many such great limb flares, the event has two phases, the most spectacular aspect being the major loop activity which occurs during the later stages of the flare. The flare is accompanied by a major SWF, great 10 cm. bursts, and strong Type II and Type IV bursts, all of which occur near the start of the flare at 1553 UT. A small groun level cosmic ray effect was recorded by neutron monitors at 1620 UT on the 20th.

No. 71 The PCA event of July 21 appears in the NASA Proton Manual and is an observation made by Leinbach, based on riometer records.

No. 72 No known flare or any other form of solar activity is reported at the time of the weak Type IV event at July 22^d 2315 UT, observed by Warwick in the dekameter range of the dynamic spectrum, at 41-20 Mc. No SWF and no 10 cm. events are reported in association with the Type IV event, which appears to be confined to the very low frequencies. Except for a minor 200 Mc burst, no radio events are reported at any of the single radio frequencies, and at 300-100 Mc Ft. Davis reports a noise storm in progress, < 2400-2545 UT, which may be related to Warwick's Type IV emission at lower frequencies.

No. 73 No SWF and no 10 cm. events are reported at the time of the Type IV burst at July 23^d 2347 UT.

No. 74 The Type II burst at July 24^d 0454 UT and the Type IV at 0507 UT are associated with major flare activity in region 6178, near the center of the solar disk. This plage, in its second rotation, is the return of region 6155 (described in event No. 56) and the β_p spot No. 15363 is a return of the large β_p spot No. 15341 in region 6155. The flare, which begins at 0410 UT, is one of those rather uncommon flare events that spreads, or has a second outbreak, in another part of the plage. The dynamic spectrum events occur during the second phase of the flare. The two aspects of the flare event have their counter part in the SWF's and in the 10 cm. bursts. The two SWF's appear in the CRPL checklist, and are unconfirmed events which are reported by only one station.

No. 76 The large 10 cm. burst at July 28^d 0230 UT, and the Type II and Type IV bursts at 0233 UT and 0303 UT, are associated with an important flare in region 6178. Plage and spot data for this region are given in event No. 74.

No. 77 No known flares are reported at the time of the Type II and Type IV bursts at July 30^d 1926 UT and later, therefore plage and spot data for this event are not available. No SWF and no radio events at any of the single radio frequencies are reported in association with the dynamic spectrum events, which appear to be confined to the lower frequencies.

No. 79 The Type II burst at August 10^d 2325 UT is associated with flare activity in region 6199, which is located in the northeast quadrant of the solar disk, very close to the east limb. No SWF is reported, but there is an SEA at 2321 - 2346 UT. The radio events at the single radio frequencies consist of bursts of very short duration at about 2316 UT, apparently related to the strong group of Type III bursts in the dynamic spectrum near that time.

No. 80 The Type II burst at August 11^d 0412 UT is associated with a subflare in region 6199. No SWF and no 10 cm. bursts are reported at the time of the Type II event.

No. 81 The Type II burst at August 12^d 1618 UT is associated with flare activity in region 6197. No SWF is reported, but there is an SEA of importance 1+ at 1615-1645 UT. Although Ft. Davis ends the Type II event at 1631 UT, at the very low frequencies Warwick continues the burst until 1638 UT and observes it over the frequency range of 41-7 Mc.

No. 82 The Type IV event at August 17^d 2130 UT is associated with flare activity in region 6199. Plage and spot data for this region are given in event No. 79. The Type IV is reported only by Warwick, at the very low frequencies, and the emission soon degenerates into weak continuum which lasts for several hours. Ft. Davis reports no events at this time, other than a weak noise storm in progress.

No. 83 The Type II burst and Type IV burst at August 18^d 2046 UT and 2135 UT are related to flare activity in region 6199. Ft. Davis starts the Type II burst at 2046 UT. At the lower frequencies, Warwick begins the burst at 2051 UT, and continues it until 2146 UT. The weak Type IV emission appears only in the dekameter range, at 41-22 Mc.

No. 84 It is difficult to find any major solar events that would serve adequately as the antecedent of this storm of August 29. It should be noted that it follows the storm of August 1-2 (event No. 78) by an interval of about 27.5 days.

No. 85 The Type II burst at September 3^d 2049 UT is associated with flare activity in region 6212, near the center of the solar disk. This very large, very bright, and very active plage is a return of region 6197 (described in event No. 81). The β_p spot No. 15411 is one of the largest spots of the year, with an area equal to 1350 millionths of the solar hemisphere (Greenwich data). Warwick continues the Type II burst until 2113 UT, at 41-30 Mc.

No. 86 This strong continuum emission at September 6^d 1738 UT (duration > 5 hours) was recorded by Warwick at the low frequencies in the dekameter range of the dynamic spectrum. Warwick says that "during the early phase of the event, structures that are perhaps faint Type II bursts were superposed on the continuum." Because the event was not triggered by a major outburst, but rather had a gradual onset, the continuum was not described as Type IV emission. From interferometer measures, Warwick assigns the origin of the emission to plage 6212 (described in event No. 85).

No. 87 The small proton event, in progress at 1200 UT on September 7, was recorded by instruments aboard the satellite Explorer XII. No major solar flare immediately precedes the event. The NASA observers report "an anomalously slow intensity decay," and suggest that the flare responsible for the solar proton event "occurred on the remote side of the sun." On the other hand, Warwick (and others) attribute the small proton increase to the strong continuum emission reported above, in event No. 86.

No. 89 The large 10 cm. burst at September 10^d 1930 UT, and the major SWF and Type II and Type IV events, are associated with flare activity in region 6212, which is now situated at the northwest limb. Plage and spot data for this region are to be found in event No. 85. This limb-flare is bright, and is followed by the development of loop-type prominence activity during later stages of the flare, but the entire event is not equivalent to the spectacular nature of such great limb events as May 4, 1960, for example, or July 20, 1961 (event No. 70). The Type IV emission at 1937 UT, recorded at Ft. Davis on their microwave receiver, is concurrent with the large 10 cm. event. At the very low frequencies, Warwick reports Type IV emission in the dekameter range, from 41-21 Mc, starting at 2013 UT. The Type II burst is observed by Warwick over the entire range of his frequency sweep, 41-7.6 Mc, from 1935-2038 UT. The 18 Mc cosmic noise recorders show a major absorption event from 1943-2115 UT, with the onset of a temporary 18 Mc noise storm at 1951 UT.

No. 90 The intensity of the PCA event at September 10^d 2100 UT, as reported by Bailey, is based on riometer data. The proton event was also recorded by Explorer XII, and the NASA observers comment that "the event was dominated by intensity changes occurring simultaneously at all energies." The lower energy components reach their maximum increase early on September 12, "probably due to the arrival of enhanced solar plasma that produced a small cosmic-ray decrease at about that time," and probably associated with the geomagnetic storm which began on the following day.

No. 92 The Type II burst at September 15^d 0043 UT is associated with flare activity in region 6223, near the center of the solar disk. Plage and spot data for this region are given in event No. 88.

No. 93 The large 10 cm. burst at September 16^d 1101 UT is associated with major flare activity in region 6227, near the northeast limb of the sun. No dynamic spectrum observations exist at the time of the event. The single radio frequency events indicate that strong radio bursts occurred at all frequencies, near the start of the flare and the SWF. These bursts are most intense, but are of short duration, at meter and decimeter wavelengths. Strong bursts of relatively long duration occur at centimeter wavelengths, and indicate that Type IV emission probably may have occurred in the microwave region of the spectrum.

No. 94 A small increase in the proton intensity of >3 Mev solar protons, recorded by Explorer XII on September 18, was apparently not associated with any major flare or other solar activity immediately prior to the event. The NASA observers regard it as possible evidence for the existence of a long-lived solar stream in interplanetary space.

No. 97 The weak Type II burst at September 27^d 1617 UT is associated with a subflare in region 6237, in the northeast quadrant of the sun, near the east limb. No 10 cm. event is reported at the time of the Type II burst, which apparently is confined to the low frequencies, since it is reported only by Warwick, in the dekameter range of the dynamic spectrum, at 41-26 Mc. At higher frequencies, Ft. Davis observes only the group of Type III bursts. The SWF appears in the CRPL checklist and is an unconfirmed event, reported by only 1 station.

No. 98 The strong Type II burst at September 27^d 1956 UT is associated with flare activity in region 6237. Plage and spot data for this region are given in event No. 97.

No. 99 The major flare at September 28^d 2202 UT occurred in region 6235, which is a return of the active region 6212 of the previous rotation (associated with protons on September 6 and 10), described in event No. 85 and responsible for events Nos. 85, 86, 87, 88 and 90. The β_p spot No. 15433 is a return of β_p spot No. 15411 in region 6212. The flare was accompanied by a great 10 cm. burst and strong Type II and Type IV bursts in the dynamic spectrum. Ft. Davis reports that the Type IV emission is present over a broad spectrum band, from 3900 - 25 Mc, has Type III structure, and continues at reduced intensity until about 2340 UT. Warwick observes the Type IV emission in the dekameter range, at 41-14 Mc, and continues the event until 2358 UT. Strong bursts of long duration are reported at all of the single radio frequencies, and an 18 Mc noise storm of importance 3 begins at 2214 UT. A brief X-ray burst was observed by Winckler and Anderson from 2216 - 2217 UT, and is attributed by them to Bremstrahlung of non-relativistic electrons.

No. 100 The PCA event at September 28^d 2330 UT is one of Bailey's lesser events, observed on riometer records by Leinbach, and also recorded by Explorer XII. The NASA observers comment that "the time taken to reach maximum intensity increases with decreasing energy. There is a departure from smooth decay at about 48 hours after the start, when an increase took place in the intensity of low-energy particles, associated with the arrival of a solar plasma stream that produced an Sc geomagnetic storm and a Forbush decrease. The increase starts at about 1930 UT, just before the Sc at 2108 UT (on September 30th)."

No. 102 No SWF, and no radio events at any of the single radio frequencies, are reported at the time of the Type II burst at October 9^d 1415 UT. The Type II event, which was reported only at the very low frequencies in the dekameter range, is associated with minor flare activity at the center of the solar disk, in region 6249. There is an active filament in this plage region.

Nos. 103 & 104 These minor geomagnetic disturbances of October 11 and October 19 were each classified as a storm by only one station. In each case the disturbed interval was preceded by 2-3 days of extremely quiet geomagnetic conditions, during which the 3-hr. K_p's equal 0 or 1.

No. 105 Between October 26-27, Explorer XII recorded an increase in solar protons of low energy ($>$ 3 Mev). The NASA observers say that it "is unlike the usual solar proton event. It is not immediately preceded by a solar disturbance, and the time constants of rise and decay are only a few hours. --- We suggest that the active region of the sun responsible for the 28 September flare was the origin of a long-lived plasma stream encountered on October 27, a full rotation of the sun after September 30, and when the plage region responsible for the flare of September 28 was again close to the central meridian." The burst of low energy solar protons was a much smaller increase than that of September 30. This recurrent proton event apparently also was associated with a recurrent geomagnetic storm and a recurrent Forbush decrease, and is used by the NASA observers as "new evidence for the existence of long-lived solar streams."

No. 106 It is difficult to find any major solar activity to serve satisfactorily as the antecedent of the sudden commencement storm of October 26^d 1940 UT. No flares of importance ≥ 1 are reported between October 20 and October 27.

No. 107 The sudden commencement storm at October 28^d 0810 UT is one of the rare storms for which the maximum 3-hr. K_p attains a value of 9. There is no known major flare associated with the origin of the storm. However, the severe storm follows the great storm of September 30 by an interval of about 27.5 days.

No. 108 The major SWF at November 5^d 1339 UT is apparently associated with flare activity in region 6264a. This plage is a new region which appeared on the disk near the central meridian on November 4, when a β_p spot also developed. Since it formed very close to the position of an old plage, region 6264, the newly formed plage originally was regarded as a part of the older region. In retrospect, however, it seems better to classify the newly developed region as a separate plage, to which we have assigned the plage number 6264a. No dynamic spectrum events, and no radio events at any of the single radio frequencies, are reported at the time of the large SWF.

No. 110 The Type II bursts at November 10^d 1433 UT and 1439 UT, and the Type IV at 1440 UT are related to a limb-flare which occurred in region 6264a at the west limb of the sun. The flare was accompanied by the later development of loop-type prominence activity within several hours of the original flare-brightening. Plage and spot data for region 6264a are given in event No. 108. The Type IV emission is reported only by Warwick, at the very low frequencies in the dekameter range, at 41-21 Mc. A temporary 18 Mc noise storm, with onset at 1445 UT, is concurrent with the Type IV emission.

No. 111 The PCA event of November 10^d 1600 UT is one of Bailey's lesser proton events, and was also observed by Explorer XII. The NASA observers report that a change in proton intensity first occurred at 1536 UT, and that the unusual record consisted of marked fluctuations in intensity.

No. 112 No SWF and no 10 cm. events are reported at the time of the Type II burst at November 11^d 1349 UT, which was reported by Warwick at low frequencies in the dekameter range of the radio spectrum.

No. 113 The gradual geomagnetic storm at November 17^d 14^h UT occurs after 3 days of extremely quiet geomagnetic conditions. No major solar activity occurred prior to the storm, that might serve as a suitable antecedent. The storm follows that of September 24 (event No. 95) after an interval of about 54 days.

No. 114 The small proton event of December 1 was detected by Explorer XII. The increase in low-energy (>3 Mev) solar protons was not due to any known solar flare activity, but occurred at the beginning of a magnetic storm (and Forbush decrease). The NASA observers point out that these events occurred near the time of central meridian passage of region 6280, which is the return of region 6624a of the previous rotation (events No. 108, 109, 110, 111). The latter region was responsible for the flare and proton event of November 10 when the region was at the west limb. It is suggested that the small event of December 1 indicates the arrival at the earth of a solar plasma stream emanating from an active region, and which came into existence during the previous rotation of the region. The NASA observers believe this to be new evidence for the existence of long-lived solar streams.

No. 116 No known flare is reported at the time of the major SWF at December 1^d 1324 UT, therefore plage and spot data for this event are not available. Strong cosmic noise absorption, continuing for about two hours, starts at 1325 UT. Dynamic spectrum observations do not exist at the time of the SWF, and no radio events were reported at any of the single radio frequencies.

No. 117 The Type II bursts at December 3^d 1441 UT and 1507 UT are associated with flare activity in region 6280. This plage is the return of region 6264a, which was the active plage associated with the proton-flare of November 10. The two Type II events evidently are confined to the very low frequencies, for they are not observed by Ft. Davis at higher frequencies in the meter and decimeter range of the dynamic spectrum. Ft. Davis reports only the group of Type III bursts at 1448 UT, and the weak noise storm in progress. The SWF appears in the CRPL checklist, and is an unconfirmed event reported by only one station.

No. 119 The Type IV event at December 23^d 2022 UT appears to be associated with activity related to the east-limb appearance of region 6304. In addition to the flares listed, Hawaii reports continuous bright surges at the east limb between 1950 - 2230 UT. No SWF and no radio events at centimeter wavelengths are reported at the time of the Type IV emission, which is observed only at the very low frequencies. At higher frequencies, Ft. Davis reports a Type I noise storm, and a strong group of Type III bursts. Region 6304 does not contain any sunspots.

No. 120 This minor geomagnetic disturbance at December 28^d 09^h UT follows the storm of December 1 by an interval of 27 days. Two stations start the storm one day earlier, at December 27^d 00^h UT, when the K_p's first begin to increase after two days of extremely quiet geomagnetic conditions during which the 3-hr. K_p values never exceed 0 or 1.

TABLE VIII. NOTES AND COMMENTS ABOUT SOME SOLAR-TERRESTRIAL EVENTS - 1962

This section contains selected information and pertinent data concerning some of the events listed in the Chronological Catalogue of Solar Events for 1962. The numbers refer to the number of the event in the catalogue. Not every event will necessarily be accompanied by remarks in this section.

No. 1 There is no known flare or solar event which can satisfactorily serve as the antecedent of this sudden commencement geomagnetic storm at 1962 January 10^d 0213 UT. The storm occurs 54 days after the storm of November 17, 1961 -- which in turn occurred 54 days after the storm of September 24, 1961.

No. 2 The weak sudden commencement storm of January 19^d 0113 UT has no known major solar flare as its antecedent. However, flares of importance 1 occurred on January 17 and 18.

No. 3 No known flare is reported at the time of the Type II burst at January 23^d 1500 UT (but this may be due to a lack of observations), therefore plage and spot data for this event are not available. No 10 cm. events are reported in association with the Type II burst, which is confined to the lower frequencies. The SWF appears in the CRPL checklist of ionospheric disturbances, and is an unconfirmed report from only 1 station.

No. 4 Although region 6324 contains a very large spot, it does not produce any major solar events for this catalogue. The β_p spot No. 15505 is one of the largest spots of the year, with an area equal to 1250 millionths of the solar hemisphere (Greenwich data).

No. 5 This large, bright and active plage, region 6326, contains a complex $\beta\gamma$ spot, No. 15507. Although 48 flares of importance ≥ 1 occurred in the region during its transit across the disk, none was of sufficient magnitude to warrant inclusion in this catalogue as a major solar event.

No. 6 Alth[illegible]gh this Sc geomagnetic storm at February 4^d 0930 UT does not have any major solar event as its antecedent, flares of importance 1, 1+ and 2 occurred in region 6326 on February 1, 2 and 3.

No. 7 This minor geomagnetic disturbance at February 6^d 1800 UT may have its origin in a flare of importance 2+, which occurred on February 4 when region 6326 was near the west limb of the sun. The storm also follows the storm of January 10^d (event No. 1) by an interval of 27^d.

No. 8 There is no known flare or solar event associated with the Type II and Type IV bursts at February 6^d 2203 UT and 2113 UT. However, it should be noted that active region 6326 (of Note No. 5, above) is going over the west limb on February 6. No radio events are reported at centimeter wavelengths at the time of the dynamic spectrum events. Ft. Davis reports that the Type IV emission has "pulsating structure." The Type II burst at 2203 UT is reported only by Warwick at the very low frequencies in the dekameter range.

No. 10 There are no solar flares which can satisfactorily serve as the antecedent of this geomagnetic storm at February 15^d 16^h UT -- no flares of importance ≥ 1 were reported on February 12, 13, 14 or 15th. However, the storm occurs 27 days after the storm of January 19 (event No. 2).

No. 12 The Type IV emission at February 23^d 2201 UT is associated with a sub-flare in region 6352, which is a return of the active plage region 6326 of the previous rotation (event No. 5). The α spot No. 15521 is a return of the $\beta\gamma$ spot No. 15507 in region 6326. No radio events are reported at any of the single radio frequencies at the time of the Type IV burst. Ft. Davis comments that the Type IV emission is "possibly the high frequency component of the noise storm," which occured at 200-25 Mc. At the very low frequencies, Warwick reports only continuum emission in the dekameter range, at 41-22 Mc. The SWF's are unconfirmed ionospheric observations which appear in the CRPL checklist.

No. 14 The strong Type II and Type IV bursts at March 1^d 1641 UT and 1753 UT are associated with an important flare which occurred in region 6351, in the southwest quadrant of the sun near the west limb.

Region 6351 is a very large, bright and very active plage in its second rotation, and contains a complex $\beta\gamma$ spot, No. 15520, which is one of the largest spots of the year with an area equal to 1475 millionths of the solar hemisphere (Greenwich data). Although Ft. Davis observes the Type IV emission in the meter wavelength range of the dynamic spectrum, beginning at 1753 UT, in the dekameter range Warwick starts the Type IV event at 1700 UT, and continues it for more than an hour longer.

No. 15 The geomagnetic storm at March 5^d 08^h UT occurs almost 4 days after the solar event on March 1, which is described in event No. 14. There is no other solar activity, except for flares of importance 1 and 1- on March 3 and 4 in region 6351 as it goes over the west limb. It should also be noted that this storm follows the weak storm of February 6 (event No. 7) by an interval of 27 days.

No. 16 The major SWF at March 13^d 1448 UT is associated with a major flare of importance 2+ which occurred in region 6366, in the northeast quadrant of the sun, near the east limb. Region 6366 is a new plage, containing a complex $\beta\gamma$ spot, No. 15528, which expires on the disk on March 21. Relatively large bursts of long duration occur at centimeter wavelengths, with the start of the SWF and indicate that Type IV microwave emission probably may have occurred. The radio bursts at decimeter and meter wavelengths are concurrent with the group of strong Type III bursts at 1450 UT, which is the only event reported in the dynamic spectrum, except for an unclassified burst from 1456-1500 UT at 150-50 Mc. At the very low frequencies, Warwick reports weak continuum emission from 1519-1522 UT at 41-22 Mc.

No. 17 No SWF, and no radio events, at any of the single radio frequencies, are reported in association with the Type II burst at March 22^d 0231 UT, which is related to flare activity in region 6370 near the center of the solar disk. Region 6370 is a return of part of region 6352 (described in event No. 12).

No. 18 This major flare on March 22 was observed by Sacramento Peak Observatory in progress at

2220 UT in region 6373, which is a large, very bright and active plage in its third solar rotation. Region 6373 is a return of a part of region 6352 (described in event No. 12), and had its origin in region 6326 (described in event No. 5). The β_f spot No. 15532 is one of the largest spots of the year, with an area equal to 1550 millionths of the solar hemisphere (Greenwich data), and may possibly be a return of α spot No. 15521 in region 6352. Only relatively minor bursts are reported at the single radio frequencies and in the dynamic spectrum in association with the flare. The SWF appears in the CRPL checklist and is an unconfirmed observation.

Nos. 19 & 20 It is very difficult to find a solar event prior to these geomagnetic storms of April 6 and April 10. Between April 1-6, no flares of importance ≥ 1 were observed. The storm of April 10 follows the storm of February 15 (event No. 10) by an interval of 54 days.

No. 21 No SWF is reported in association with the Type II bursts at April 12^d 1648 UT and 1658 UT, and the Type IV burst at 1710 UT. Flare observations are meager and any flare association is an ambiguous one. A flare of Imp. 1- (a small bright point) is in progress on the disk in region 6386 at 1740 UT. On the other hand, there are bright surges at the limb between 1440 -1800 UT, where region 6393 is coming around the east limb. The dynamic spectrum events occur at the very low frequencies, in the dekameter range of the radio spectrum. Ft. Davis reports an unclassified burst from 1647-1651 UT at 80-50 Mc, "resembling Type II."

No. 22 The Type II and Type IV bursts at April 12^d 2154 UT and 2202 UT are associated with minor flare activity in region 6386, near the center of the solar disk. Region 6386 is the return of plage region 6366 (described in event No. 16) and contains a complex $\beta\gamma$ spot that formed on the disk on April 11. The Type II burst is not reported by the Ft. Davis observers, who report only the groups of strong Type III bursts at 500-25 Mc, and a short burst of Type IV emission from 2201-2213 UT, at 580-100 Mc.

No. 23 The major flare at April 18^d 1734 UT, with major SWF, and Type II and Type IV bursts at 1844 UT and 1839 UT, are associated with the large, bright and active plage, region 6393, which is a return of region 6370 (event No. 17). The 10 cm. event consists of a small burst, superposed on a gradual but small rise in flux which starts with the flare at 1734 UT and continues for many hours. Except for the onset of noise (or continuum) at meter wavelengths, no radio events are reported at any other single radio frequencies at the time of the flare.

No. 24 The Type II burst at April 20^d 2004 UT is associated with flare activity in region 6393. Plage and spot data for this region are given in event No. 23.

No. 25 Four stations start this geomagnetic storm gradually on April 21, about 16 hours after the Sc on the 20th. The storm actually does have a "second start" at this time, and a second maximum.

No. 26 The Type II burst at April 21^d 2022 UT is associated with minor flare activity in region 6393. Plage and spot data for this region are given in event No. 23. No SWF is reported at the time of the Type II burst, but there is an SEA of importance 1+, 1920-2045 UT. The 10 cm. radio event consists of a small but gradual rise and fall in flux.

No. 27 The major SWF at April 22^d 1446 UT and the Type II and Type IV bursts at 1554 UT and 1612 UT are associated with major flare activity in region 6393. Plage and spot data for this region are given in event No. 23. The Type IV emission occurs only at the very low frequencies in the dekameter range.

No. 28 The Type II and Type IV bursts at April 27^d 1414 UT and 1420 UT are related to flare activity in region 6403, in the northeast quadrant of the solar disk, near the limb. Region 6403 contains a complex $\beta\gamma$ spot, No. 15549, that developed on the disk on April 26, and an α_p spot, No. 15548 that is the return of β_p spot No. 15539 in region 6385. The Type IV event is reported only by Warwick at the very low frequencies in the dekameter range -- although at higher frequencies Ft. Davis reports the onset of a weak noise storm at this time. A strong radio burst occurs almost simultaneously at all of the single radio frequencies at

1412 UT, coincident with the SWF and the strong group of Type III bursts which were observed in the dynamic spectrum.

No. 29 The Type II and Type IV bursts at May 1^d 1920 UT are associated with flare activity in region 6411, near the northeast limb of the sun. The 10 cm. event is described as a "period of irregular activity," that begins with the flare and runs concurrently with the Type IV event. At Ft. Davis, the microwave receiver was in operation, and the Type IV emission was observed over a wide spectrum band, from 3000-180 Mc. At the very low frequencies, Warwick continues the Type IV burst until 2130 UT.

No. 31 The Type II burst at May 18^d 1533 UT is associated with flare activity in region 6416, in the southwest quadrant near the west limb of the sun. The SWF appears in the CRPL checklist and is an unconfirmed observation, reported by only one station.

No. 32 There was no flare patrol in operation on May 23 at the time of the Type II burst at 0245 UT, therefore plage and spot data related to this event are not available. The SWF is an unconfirmed report from the CRPL checklist of ionospheric observations. No radio events are reported at any of the single radio frequencies at the time of the Type II burst.

No. 33 This weak Sc geomagnetic storm of May 27 was classified as a storm by only two stations -- Honolulu and Tucson. The disturbance occurred after an unusually long period of extremely quiet geomagnetic conditions -- an interval of 6 days during which the 3-hour K_p's remained = 0 for 60% of the time.

No. 34 No SWF is reported with the weak Type IV emission at May 27^d 1530 UT, associated with minor flare activity in region 6432 at the center of the solar disk. The Type IV event is observed only at the very low frequencies, in the dekameter range. At the higher frequencies, Ft. Davis reports the weak Type I noise storm in progress, and the group of Type III bursts.

No. 37 The Type II burst at June 1^d 2005 UT is associated with an important flare in region 6426, near the southwest limb of the sun. The SWF appears in the

CRPL checklist, and is an unconfirmed report. The 10 cm. event consists of a small rise and fall in flux. No other radio events are reported at any other single radio frequencies, except for the group of bursts at 18 Mc.

No. 39 This very weak geomagnetic disturbance of June 27 follows the storm of May 31 (event No. 36) by an interval of 27 days.

Nos. 39-44 It is difficult to find any solar events to serve adequately as the origin of these geomagnetic storms between June 27 and August 6. The very weak disturbance of June 27 (event No. 39) follows the storm of May 31 (event No. 36) by an interval of 27 days, and there is a similar time interval between the storms of June 27 and July 24 (events Nos. 39 and 41) and July 4 and July 31 (events Nos. 40 and 43). The storm of August 6 (event No. 44) may very likely be the first member of the long series of disturbances that comprises the great sequence of magnetic storms which dominates the declining phase of solar cycle 19.

Nos. 45 & 46 The Type II bursts at August 13^d 2042 UT and August 14^d 0248 UT are associated with minor flare activity on these two days in region 6514 near the center of the solar disk. Region 6514 is a new plage, in which a complex $\beta\gamma$ spot No. 15613 developed on the disk on August 11.

No. 47 This long interval of storminess, beginning at August 14^d 17^h UT, has its ups and downs. Three stations start the geomagnetic storm on the next day, at August 15^d 04 UT, and 4 stations start it even later, at 16^d 18^h UT. There are several maxima, on successive days.

No. 48 No 10 cm. event is reported at the time of the Type II burst at August 19^d 1653 UT.

No. 49 The gradual geomagnetic storm of August 21^d 22^h UT follows the storm of July 25 (event No. 42) by an interval of 27 days.

No. 50 No known flare is reported at the time of the Type II burst at August 28^d 1519 UT, therefore plage and spot data are not available for this event. (But a bright surge at the west limb was reported by one observer, between 1523 - 1548 UT.)

No SWF, and no radio events at any of the single radio frequencies, were reported at the time of the Type II burst, which was observed only at the very low frequencies in the dekameter range of the dynamic spectrum.

No. 52 The gradual geomagnetic storm of September 1^d 06^h UT has two maxima -- on September 2 and again on September 3. The second phase of the storm occurs 27 days after the storm of August 6 (event No. 44).

No. 54 The Type II burst at September 7^d 1514 UT and the Type IV burst at 1517 UT are associated with an important flare that occurred in region 6548, in the southeast quadrant of the solar disk. Ft. Davis does not report the Type II burst, but reports an unclassified burst from 1514 - 1520 UT at 75 - 25 Mc "resembling a Type II." The Type IV emission registers strongly at decimeter and meter wavelengths on the Ft. Davis spectrum sweep, and is also observed by Warwick at the very low frequencies. In the dekameter range, at 41 - 20 Mc, the Type IV emission continues until 1740 UT. Large bursts of long duration are reported at all of the single radio frequencies. One surmises that weak Type IV emission perhaps may also have occurred at centimeter wavelengths.

No. 55 The geomagnetic storm at September 11^d 19^h UT occurred 4 days after the solar event described in event No. 54. Six of the 16 stations begin the storm on the following day, at August 12^d 05^h UT, and two stations start it with a sudden commencement at 12^d 0121 UT (Wilkes and College, Alaska). It should be noted that the storm follows the disturbance of August 14-15 (event No. 47) by an interval of about 27 days.

Nos. 56-61, 63, 64 There are no good solar events to serve as antecedents for any of the geomagnetic storms that occurred between September 18 and October 19. Many of these storms, however, fit into a sequential pattern, apparently related to an interval of 26 to 28 days. The storm of September 18 (event No. 56) follows the storm of August 21 (event No. 49) by an interval of 28 days. The storms of September 29 and October 1 (events Nos. 58 and 59) may perhaps be regarded as covering a single prolonged interval of storminess that occurs about 27 days after the storm of September 1-2 (event No. 52). The Sc storm of October 7 (event No. 60) occurs 26 days after the storm of September 11-12 (event No. 55). The brief storm of October 16 (event No. 63) follows the storm of September 18 (event No. 56) by an interval of about 27.5 days.

No. 62 The bright and active plage, region 6579, containing a complex $\beta\gamma$ spot, does not produce any solar events of sufficient magnitude to warrant their inclusion in this catalogue as major events.

No. 65 The Type IV burst at October 19^d 2033 UT and the Type II burst at 2100 UT are associated with flare activity in region 6591 at the northeast limb of the sun. No dynamic spectrum events were reported at this time by Ft. Davis on their spectrum sweep of 580-25 Mc. The 10 cm. event consists of a small rise and fall in flux which occurs concurrently with the weak type IV emission at the very low frequencies. The SWF appears in the CRPL checklist and is an unconfirmed observation, reported by only one station.

No. 66 The geomagnetic storm of October 22^d 02^h UT occurs about 2 days after the solar event described in No. 65, above. However, this period of storminess also occurs 27 days after the storm of September 25 (No. 57).

No. 67 The Type II bursts and Type IV burst at October 23^d 1648 UT and 1656 UT are associated with an important flare that occurred in region 6581, very near the northwest limb of the sun. No SWF is reported at the time of the event. Although the Type II and Type IV bursts are reported only at the very low frequencies in the dekameter range, Ft. Davis says that an event of importance 2 at 1656-1706 UT "has similarities to Types II and IV" in their frequency sweep, at higher frequencies. At centimeter and meter wavelengths, the single radio events consist of a gradual rise and fall in flux, of modest proportions but of considerable duration, beginning with the start of the flare.

No. 68 The small proton event of October 23 was recorded on instruments carried aboard the satellite Explorer XIV. The NASA observers comment that it is "probably the lowest-intensity primary solar-proton event studied to date." The event was also detected by cosmic-ray equipment on Mariner II (the Venus probe). Like the September 28, 1961 event, the higher energy particles arrive earlier.

No. 69 This rather lengthy geomagnetic storm of October 24 has three maxima, on the 24th, 25th, and 26th. Although the maximum 3-hour K_p only reaches a value of 5, seven of the nine stations agree that the storm is "moderately severe." The onset of the storm occurs about 18 hours after the major solar event on the 23rd. The storminess on October 26 and 27 follows the storm of September 29 (event No. 58) by an interval of about 27 days, so that a sequential effect may be contributing to the duration of the storm.

Nos.70-73 There are no major solar events to serve as antecedents for any of the geomagnetic storms between November 6 and November 30. The storm of November 15(event No. 71) occurs 27 days after the storm of October 19 (event No. 64), and the storm of November 21 (event No. 71) follows the storm of October 24-25 (event No. 69) by an interval of 27-28 days.

No. 74 No known flare is reported in association with the Type II burst at November 30^{d} 0322 UT, therefore plage and spot data for this event are not available. No SWF, and no radio events at decimeter or at meter wavelengths, are reported at the time of the Type II.

No. 75 This sudden commencement geomagnetic storm at December 4^{d} 0334 UT occurred 4 days after the solar event described in event No. 74.

Nos.76-78 No major solar events occurred prior to these geomagnetic storms of December 11, 17 and 26. The storm of December 17 (event No. 77) occurs about 26.5 days after the storm of November 21 (event No. 72), and the storm of December 26 follows the storm of November 30 by a similar interval of time.

TABLE VIII. NOTES AND COMMENTS ABOUT SOME SOLAR-TERRESTRIAL EVENTS - 1963

This section contains selected information and pertinent data concerning some of the events listed in the Chronological Catalogue of Solar Events for 1963. The numbers refer to the number of the event in the catalogue. Not every event will necessarily be accompanied by remarks in this section.

Nos. 1-3 These geomagnetic storms of January 12, January 29 and February 9, 1963 are not preceded by any major solar events that might serve satisfactorily as their origin. The storm of January 12 (event No. 1) occurs approximately 27 days after the storm of December 17, 1962 and is a member of the sequence of storms that has been in progress apparently since August, 1962. The storm of February 9 (event No. 3) follows the storm of January 12 by an interval of about 27.8 days, and also is probably a member of the sequence. A flare of importance 2 on February 6 at 2219 UT, in region 6689 at the center of the solar disk, may be contributing factor to the intensity and duration of the storm.

No. 4 This small proton event of February 10 describes the detection of solar protons in the 3 to 20 - Mev range, made by instruments carried aboard the satellite Explorer XIV. These very low-energy protons are not associated with any isolated solar events, according to the NASA observers, but are contained in streams which sweep past the earth in a recurrent pattern associated with consecutive rotations of the sun. During the lifetime of Explorer XIV (2 October 1962 to 6 August 1963) at least six (and perhaps as many as 8) such recurrences of the same proton stream are reported by the NASA observers. "Each recurrence event is immediately preceded by a period of complex magnetic activity .... in each case the counting rate increases rapidy after the sudden commencement, and displays a strong assymetry with the initial increase and partial decay followed by a long plateau." The continued presence of these low-energy protons is taken as evidence that they are being continually accelerated by the sun. In fact, this particular solar stream is believed to be the same as that detected in deep space by equipment on Mariner II from September - December, 1962, when a marked enhancement of the plasma velocity was measured in association with the passage of the stream.

No. 5 The Type II bursts at February 15^d 2019 UT and 2048 UT are associated with minor flare activity near the northeast limb of the sun. No SWF and no radio events at any of the single radio frequencies, are reported at the time of the Type II bursts, which apparently are observed only at the very low frequencies.

No. 6 The very small increase of proton intensity in the 3 to 20 - Mev range on February 16, as measured by Explorer XIV, may be associated with the solar event on February 15 (event No. 5). It is apparently not related to any geomagnetic activity.

No. 7 No known flare or other form of solar activity is reported at the time of the Type II burst at March 3^d 2350 UT, therefore plage and spot data for this event are not available. No SWF, and no radio events at any of the single radio frequencies, are reported at the time of the Type II burst.

No. 8 The geomagnetic storm at March 7^d 18^h UT is probably a member of the great sequence of storms referred to in the notes accompanying events Nos. 1 and 3.

No. 9 Like event No. 4, this event of March 9 is another of the low-energy proton events reported by the NASA observers, based on data from Explorer XIV, and associated with the recurrence of a solar plasma stream sweeping past the earth at approximately 27-day intervals.

No. 11 This sudden commencement geomagnetic disturbance at April 4^d 0545 UT is not preceded by any major solar activity, but is another member of the great sequence of storms to which events Nos. 1, 3 and 8 also belong.

No. 12 Like events Nos. 4 and 9, this event on April 5 is another in the series of recurrent proton events detected by Explorer XIV.

No. 14 This low-energy solar proton event of April 15 occurred while a weak geomagnetic disturbance was in progress. However, the event may be flare-associated, since a flare of importance 2 occurred at 1034 UT on April 15, in region 6766 (S11 W06) and was accompanied by a rather strong 10 cm. burst (indicating the possibility of Type IV microwave emission).

No. 15 The major SWF at April 15^d 1615 UT is associated with an important flare in region 6766, at the center of the solar disk. No dynamic spectrum events are reported at the time of the SWF. Ft. Davis reports a weak Type I noise storm in progress all day, and Warwick reports weak continuum emission in progress. Except for a weak rise and fall in flux at 2800 Mc, no radio events are reported at any of the other single radio frequencies.

No. 16 The Type IV burst at April 16^d 1703 UT is associated with minor flare activity in region 6766. No SWF is reported at the time of the Type IV burst.

No. 17 No known flare is reported at the time of the Type II and Type IV bursts at April 24^d 2005 UT and 2030 UT, therefore plage and spot data for this event are not available. No SWF, and no radio events at any of the single radio frequencies, are reported at the time of the dynamic spectrum events, which evidently are confined to the very low-frequencies. Ft. Davis reports nothing at their higher frequency sweep.

No. 18 The very small solar proton event of April 25, detected by Explorer XIV, is probably associated with the solar activity described in event No. 17, according to the NASA observers.

No. 19 No known flare is reported at the time of the Type II burst at April 26^d 0352 UT, therefore plage and spot data for this event are not available. The SWF appears in the CRPL checklist, and is an unconfirmed event, reported by only one station.

No. 20 The geomagnetic storm of April 30 is probably another member of the sequence of storms which includes events Nos. 1, 3, 8 and 11.

No. 21 The small proton event of May 1 is another in the series of recurrent proton events detected by Explorer XIV.

No. 22 The large 10 cm. burst at May 1^d 0526 UT and the Type II burst at 0536 UT are associated with an important flare in the northeast quadrant of the sun, near the east limb. Major bursts of long duration occur at all of the single radio frequencies, and the especially strong bursts at centimeter wavelengths, with long post-burst increases in flux, seem to indicate that Type IV microwave emission probably occurred.

No. 24 The Type IV emission at May 20^d 2313 UT is associated with a minor flare in region 6805, at the center of the solar disk. No SWF is reported at the time of the Type IV burst, which is apparently confined to the very low frequencies in the dekameter range. At their higher frequency sweep, Ft. Davis reports only a weak noise storm in progress, and the groups of Type III bursts. The single radio events indicate only a very weak increase in flux at centimeter wavelengths and the onset of a noise storm at meter wavelengths.

Nos.25&26 The Type II and Type IV dynamic spectrum events of May 23 are associated with minor flare activity in region 6814, in the northwest quadrant of the sun, near the west limb. Minor flares occurred almost continuously in this plage region between 1230 - 1600 UT. The SWF at 1516 UT appears in the CRPL checklist, and is an unconfirmed observation.

Nos.27-29 The Type II dynamic spectrum events of May 24 and 25 are associated with minor flare activity in region 6805, near the northwest limb of the sun. Plage and spot data for this region are given in event No. 24. No SWF and no 10 cm. events are reported at the time of the Type II burst early on May 25, at 0133 UT. The event later on May 25, at 1623 UT, is accompanied by strong radio bursts at meter wavelengths, followed by a rise in base level and the onset of a noise storm -- events which may suggest the weak Type IV emission reported by Warwick in his dynamic spectrum sweep at the very low frequencies.

No. 30 This event of May 27 is a miniscule solar proton event and, according to the NASA observers, is one of the recurrent events -- like Nos. 4, 9, 12 and 21 -- all of which belong to the same plasma stream (from Explorer XIV data).

No. 31 The geomagnetic storm of May 27 is a member of the great sequence of storms which includes events Nos. 1, 3, 8, 11 and 20. It may also be influenced by the solar events of May 23, 24, and 25.

No. 32 There are no solar events which rightly fit this geomagnetic storm of June 6 as an antecedent. On June 2, 3 and 4, only flares of importance 1- were reported (in addition to bright surges at the east limb). It should be noted, however, that the storm appears to be in sequence with storms which occur later in July and August.

No. 33 No SWF is reported at the time of the II burst at June 7^d 2400 UT.

No. 35 The small proton event of June 14, detected by Explorer XIV, is not a recurrent event but is flare-associated, probably related to solar event No. 34 (a Type II burst).

No. 36 The geomagnetic storm of June 18 occurs 4 days after the solar event No. 34 with small proton increase, on June 14. There were flares of importance 1+ and 2 which also could be the antecedent of this storm.

No. 37 The geomagnetic storm of June 25 is another member of the great sequence of storms (events Nos. 1, 3, 8, 11, 20 and 31).

No. 38 The small proton event of June 25, detected by Explorer XIV, is another in the series of recurrent solar proton events (events Nos. 4, 9, 12, 21 and 30) reported by the NASA observers.

No. 39 The Type II burst at June 26^d 0306 UT is associated with flare activity in region 6847, in the northwest quadrant of the solar disk, near the west limb. Although Mt. Wilson does not report a sunspot in this new plage, a β-type spot was seen to develop in the re[illegible] on June 23rd, and appears on the McMath-[illegible] [illegible]rt

Observatory sunspot maps from June 23-26. The SWF appears in the CRPL checklist of ionospheric disturbances, and is an unconfirmed event.

No. 40 The geomagnetic storm of July 4 is not preceded by any major solar activity, and may be related sequentially to the storm of June 6-7 (event No. 32) which it follows by an interval of 28 days.

No. 41 No known flare was reported at the time of the Type II burst at July 9^d 0222 UT, therefore plage and spot data for this event are not available. No SWF and no radio events at any of the single radio frequencies were reported in association with the Type II.

Nos. 42 & 43 These geomagnetic storms of July 21 and July 30 were not preceded by any major solar activity and apparently are members of sequences. The storm of July 21 occurs 27 days after the storm of June 25 (event No. 37), and belongs to the great sequence which now includes events Nos. 1, 3, 8, 11, 20, 21 and 37. The storm of July 30 has two maxima, and a second start at July 31^d 23^h UT. The latter interval of storminess occurs 27 days after the storm of July 4 (event No. 40) and therefore could be related to a sequence which may include events Nos. 32 and 40.

No. 44 The Type IV burst at August 9^d 2237 UT is related to flare activity in region 6908 at the northwest limb of the sun. Rather large bursts occur at the centimeter wavelengths, near the start of the flare and the Type IV event, which is reported only by Warwick in the dekameter range of the dynamic spectrum. At higher frequencies, Ft. Davis reports only a weak Type I noise storm in progress throughout the period of their observing hours.

No. 45 The Type II and Type IV bursts at August 11^d 1905 UT were reported only at the very low frequencies (41-18 Mc) and are associated with solar activity at the northwest limb, where region 6909 is going over the limb. During the first phase of the activity, an eruptive prominence was observed out to a distance of .3 of a solar radius beyond the limb and with high negative radial velocity.

During the second phase, the prominence shows a resurgence of activity. The radio events at the single radio frequencies consist only of minor bursts which occur during the second phase of the activity at the limb. The SWF appears in the CRPL checklist, and is an unconfirmed event.

Nos. 46 & 47 The Type II burst at August 12^d 0000 UT is associated with minor flare activity in region 6909 at the west limb of the sun, and the Types II and IV bursts at August 12^d 2057 UT and 2102 UT are associated with bright surge activity at the west limb ($<$ 2020-2048 UT), where region 6909 is going over the limb. Plage and spot data for this region are given in event No. 45. No SWF, and no radio events at any of the single radio frequencies, are reported at the time of any of the dynamic spectrum events on August 12.

No. 48 The Type II burst at August 17^d 1611 UT is associated with flare activity in region 6924, at the center of the solar disk. Rather strong radio bursts occur at centimeter and meter wavelengths, starting at the time of the SWF and the group of strong Type III bursts in the dynamic spectrum.

Nos. 49 & 50 The two geomagnetic storms of August 18 and August 19 form a disturbance which may be a part of the great sequence of storms (Nos. 1, 3, 8, 11, 20, 31, 37 and 42). The solar event of August 17 (event No. 48) may, however, also be a contributing factor to the occurrence of the storms.

No. 51 The geomagnetic storm of August 27 occurs 27 days after the storm of July 30-31, and may be a member of a sequence of storms which includes events Nos. 32, 40 and 43.

No. 52 The Type IV burst at September 8^d 1938 UT is associated with minor flare activity in region 6961, at the east limb of the sun. The weak Type IV emission is reported only at the very low frequencies in the dekameter range.

No. 53 The major SWF at September 13^d 0409 UT is associated with flare activity in region 6961, in the southeast quadrant of the sun. Plage and spot data for this region are given in event No. 52. No dynamic spectrum events are reported at the time of the SWF.

No. 54 The geomagnetic storm of September 13 is apparently a member of the great sequence of storms (Nos. 1, 3, 8, 11, 20, 31, 37, 42 and 49-50).

No. 55 No SWF is reported at the time of the large 10 cm. burst at September 14^d 2143 UT, associated with a flare of importance 1 in region 6924, near the northeast limb of the sun. This large and very bright plage is very active (with 87 flares of importance ≥ 1 during its transit across the solar disk), and contains a large and complex $\beta\gamma$ spot, No. 15768, which is the only spot during 1963 with an area >1000 millionths of the solar hemisphere (the area of the spot equals 1400 millionths, based on Greenwich data). Region 6924 is responsible for 12 events in this catalogue -- Nos. 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65 and 66 -- two of which are PCA events. The complete 10 cm. event consists of unusual burst activity between 2106 and 2240 UT, superposed on a gradual rise and fall in flux which began earlier and lasts for many hours. The only other known single radio event is a rise and fall in flux that is reported at meter wavelengths at 108 Mc. In the dynamic spectrum, the event consists of the onset of a noise storm at the higher frequencies in the meter range, and the onset of continuum emission at the lower frequencies in the dekameter range.

No. 56 The major SWF and great 10 cm. burst at September 15^d 0015 UT, and the Type II burst at 0027 UT, are related to an important flare that occurred in region 6924 near the northeast limb of the sun. Plage and spot data for this region are given in event No. 55. The radio event at all of the single frequencies consists of a very great burst which is followed by a long period of increased flux. The radio burst apparently moves rather slowly through the radio spectrum, starting at centimeter wavelengths at 0015 UT at the start of the flare, and reaching the meter wavelengths 10 minutes later, at 0025 UT. The Type II burst at 0027 UT is confined to the dekameter wavelengths, at 41-12 Mc.

No. 57 Although observations were in progress at Sydney, no dynamic spectrum events were reported at the time of the large flare at September 16^d 0325 UT, in region 6924, in the northeast quadrant, near the east limb of the sun. Except for minor bursts at centimeter wavelengths, no radio events are reported at the single radio frequencies at the time of the flare. The SWF appears in the CRPL checklist and is an unconfirmed event.

No. 58 The large 10 cm. burst at September 16^d 1436 UT, and major SWF, are associated with an important flare in region 6924. Plage and spot data for this region are given in event No. 55. The radio event at the single radio frequencies consists of a strong burst, followed by a long period of increased flux. The radio event occurs first at meter wavelengths at about 1434 UT, reaches the 3 centimeter region at about 1440 UT, and therefore apparently moves rather rapidly from lower to higher frequencies at this time, shortly after the start of the flare. No Type II or Type IV events are reported in the dynamic spectrum, except for the onset of a noise storm at 1400 UT, and a group of strong Type III bursts.

No. 60 The strong Type II and Type IV bursts at September 21^d 0000 UT and 0010 UT, with major SWF and large 10 cm. bursts, are associated with an important flare that occurred late on September 20, in region 6924 at the center of the solar disk. The 10 cm. event consists of a remarkable group of great bursts that occurred between September 20^d 2350 UT and September 21^d 0100 UT, accompanied by a long period of increased flux. A very great burst of long duration also occurred at meter wavelengths. In the dynamic spectrum, the Type IV emission is reported only at the very low frequencies, in the dekameter range. This major solar event was accompanied by solar protons that began arriving at September 21^d 0000 UT.

No. 62 The severe Sc geomagnetic storm at September 21^d 1413 UT began about 15 hours after the proton-flare of September 20-21.

No. 63 The geomagnetic storm of September 24 occurs 28 days after the storm of August 27 (event No. 51), and may be a member of a sequence. Since the proton-flare of September 20-21, no flares of importance > 1 have occurred, although numerous flares of Imp. $\lesssim$ 1 have occurred in region 6924. The storm of the 24th, on the other hand, may be a consequence of the proton-flare of September 20-21.

No. 64 The solar event at about September 26^d 0705 UT is a major event in all categories -- great flare, great SWF, great 10 cm. event, and strong radio bursts at all of the single radio frequencies. The major flare occurred in region 6924, near the northwest limb of the sun. Plage and spot data for this region are given in event No. 55. No dynamic spectrum observations exist at the time of the great flare, but the strong bursts at the single radio frequencies, especially at centimeter wavelengths, indicate that Type IV emission probably occurred. This major solar event was accompanied by solar protons that began arriving at September 26^d 0730 UT.

No. 67 The geomagnetic storm of October 11 apparently is a member of the great sequence (events Nos. 1, 3, 8, 11, 20, 31, 37, 42, 49 - 50 and 54).

No. 68 The Type II and Type IV bursts at October 18^d 1600 UT and 1613 UT are associated with a flare at the northeast limb of the sun, in region 7003. The Type IV emission is reported only by Warwick at the very low frequencies in the dekameter range, while the Type II burst is reported only by Ft. Davis, at meter wavelengths. Region 7003 is a large, very bright and active plage, which contains a complex $\beta\gamma$ spot and is responsible for 7 events in this catalogue - Nos. 68, 69, 70, 71, 72, 73 and 74.

Nos. 69 & 70 The dynamic spectrum events at October 18^d 2046 UT and October 19^d 1702 UT are associated with important limb-flares that occurred in region 7003 at the northeast limb of the sun. Plage and spot data for this region are given in event No. 68. The Type IV emission at October 19^d 1702 UT is reported only by Warwick at the very low frequencies.

No. 71 The major SWF at October 22^d 1338 UT, and the Type II burst at 1356 UT and Type IV burst at 1418 UT are associated with a major flare that occurred in region 7003 in the northeast quadrant of the sun. Plage and spot data for this region are given in event No. 68. The Type IV emission is reported only by Warwick at the very low frequencies.

No. 73 No dynamic spectrum observations exist at the time of the major flare and SWF on October 28. The flare at 0135 UT occurred in region 7003. Strong bursts of long duration occur at all wavelengths, and suggest the possibility that Type IV emission may have occurred.

No. 75 The geomagnetic storm of November 7 occurs 27 days after the storm of October 11, and is a member of the great sequence, which now includes events Nos. 1, 3, 8, 11, 20, 31, 37, 42, 49-50, 54 and 67.

No. 76 No major solar event occurred prior to the geomagnetic storm of November 17. It should be noted that the storm follows the storm of September 24 by an interval of 54 days, and therefore may be related to the sequence that includes events Nos. 32, 40, 43, 51 and 63.

Nos.77-81 There are no major solar events prior to these geomagnetic storms that occurred between November 24 and December 29. The storm of December 2 (event No. 79) is of long duration, and may, in part, be associated with the return of the great sequence (event No. 75). The weak disturbance of December 29 occurs 27 days after the Sc storm of December 2.

Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	SHORT-WAVE RADIO FADEOUTS Type	Imp	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.
	1960 Jan.												
1	05												
2	10												
3	11	* 2040	2355	2126	3	N22 E02	2/2	SL	2-	2100	24	5	6
4	12												
5	12	1646	1710	1650	1	S10 W37	1/1	G	1-	1640	1706	-	2
6	13												
7	15	1334	1455		2	S20 W68	5/1	SL	1+	1340	45	4	1+
7a	16												
8	16	2239	2335	2250	1+	N12 E76	2/2	SL	2-	2245	34	5	7
9	17												
10	20												
11	27												
12	29												
13	Feb. 02												
14	03	2015	2155	2025	2	N14 W30	2/2	SL	2-	2020	40	5	8
15	04	1306	1423	1316	2	S15 W49	2/2	SL	1	1309	31	5	3
16	04	2032	2100	2040	1-	S14 W56	2/2	S	1+	2038	15	5	6
17	04	2136	2220	2142	1-	S14 W54	1/1						
18	05												
19	05	1350	1400		1	N11 W50	1/1	SL	2-	1349	23	5	8
20	05	1943	2007	1949	1	N10 W56	2/2	SL	1-	1924	31	-	1
20a	07												
21	07	1604	1636	1610	1-	N12 W87	1/1	S	1-	1607	16	4	4
22	11												
23	13												
24	13	2002	2050	2010	1	N11 E45	3/3	SL	1	2000	35	5	7

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10 CM EVENTS						PLAGE DATA								
Type	Beg. (UT)	Dur. (Min)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification
2	2056	>35	2108	220	Ot	5527	Jan. 11.5	104°	N19	2.5	3500	6	2	5491
6	1647.3	9	1649	80	Ot	5525	10	124°	S16	3	6000	15	1	New
*6	1334	106	1357	700	Ot	5525								
4	1520	150		25										
						5541	22.5	319°	N13	3	3000	7	2	Part of 5505a
						5549	27.5	253°	N09	3	2000	4	1	New
						*5550	29.5	227°	N12	3	10000	39	3	5511, 5512, 5513, 5519
3	2019	50		7	Ot	5552	Feb. 01.5	187°	N09	2.5	2000	29	6	5517
6	2024	13	2026	25										
2	1312.5	2.5	1313	65	Ot	*5551	01	194°	S18	3	5000	40	4	5514
2	1316	5	1317.3	18										
2	2037	9	2040	125	Ot	5551								
4	2046	30		5										
						5551								
2	1348.2	4.8	1349	-	HHI	5552								
						5552								
						5552								
						5566	11.5	56°	N24	3	3200	5	1	New
2	2003	6	2004.5	13	Ot	5574	17.5	337°	N11	2.5	3000	5	3	5540

TABLE VIII CHRONOLOGICAL CATALOGUE

SPOT DATA						
Mt. Wilson Type	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
	Jan.					
ℓαpℓ	11.8	N19	(25)	5-17		14660
*ℓβℓ	10.3	S17	(25)	3-16	1150	14657
See Spot Data Event 5						
dαd	22.3	N11	(7)	21-21		14691
dβpd	22.8	N07	(3)	20-21		689
*ℓγd	27.4	N09	12	21-29		14694
ℓαpd	28.1	N09	19	23-31		14696
*ℓβγℓ	29.3	N07	22	23- 4	1800	698
dβpd	30.3	N13	(15)	28- 2		705
ℓαpℓ	30.7	N09	21	24- 5		700
ℓαpℓ	Feb. 01.7	N09	16	27- 7		14703
*ℓγℓ	Jan. 31.8	S15	19	24- 6		14701
See Spot Data Event 15						
See Spot Data Event 15						
See Spot Data Event 14						
See Spot Data Event 14						
See Spot Data Event 14						
*ℓβℓ	Feb. 11.9	N23	(20)	5-18	1050	14720
dαd	17.5	N09	(3)	12-17		14729

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MAJOR SOLAR EVENTS 1960-1962

	DYNAMIC SPECTRUM DATA				
Event No.	Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs.
1					
2					
3	I_s (weak) in progress all day I_s 2105-2400/2		*2103-2118/3	 * 2105->2355/3	H,W H
4					
5	I_s (weak) in progress all day	G 1647-1649/3 III_s 1653-2045 (weak)	*1651-1654/2	 *1653-1704/2	H,M
6					
7	I_s (weak) in progress all day				
7a					
8	I_s (weak) in progress all day	IIIG2244-2251/2	*2244-2254/3		H
9					
10					
11					
12					
13					
14	I_s (weak) in progress all day		*2022-2027/3	 * 2027-2032/2	H,M H,M
15		g1312.5-1318/m		* 1310-1400/w	M
16	I_s 2046-2245/w	G2036/3 2042/3	*2046-2059/3		H,M
17		G2144-2147/2		* 2149-2200/3	H,M
18					
19	C 1347-1350/s	g1347-1450/s g1351-1353/w	*1351-1355/s		M
20	I_s in progress all day	G1943-1950/3	*1950-1954/2		H
20a					
21	I_s in progress all day		*1612-1619/2		H
22					
23					
24	I_s (weak) in progress all day		*2002-2009/1		W

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TABLE VIII

Mt. Wilson Type	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
•ℓβℓ	15.1	N12	(25)	8-21	1300	14725
ℓβpd	24.9	S21	21	18-25		14731
See Spot Data Event 27						
•ℓγd	25.8	N08	11	19-25		14732
See Spot Data Event 27						
dβd	29.3	N18	(10)	25-25		14737
dβd	Mar. 01.2	N25	(15)	25- 5		738
dβpℓ	10.0	N22	(15)	5-16		14751
•dγℓ	31.6	N12	29	25- 6	1650	14778
See Spot Data Event 39						
See Spot Data Event 39						
See Spot Data Event 39						

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Freq. Range (mc)	200 MC DATA Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	OTHER RADIO DATA Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
150-	RBL	2100				N(H)	545	RF	2058	40		50	N(H)
25							167	C+	2056	>167		>1000	NBS
450-							18	c	2055	9			NBS
50													
150-	C	1648	1.5		400	N	545	C	1648	7		20	N
60							167	C	1648.9	12	1651.2	>1000	NBS
320-													
200													
	C+	1347	25		450	N	9000	C+	1335	87.2	1356.8	206	HHI
							1500	C+	1335	85	1410	440	HHI
							808	C+	1334	101	1347.5	(120)	Pra
							600	C+	1334.8	93		220	Uc
							545	C+	1344	85		250	N
							234	C+	1346			550	Aop
450-	C	2246	5		>30000	N	167	C	2247	6	2250	>1000	NBS
100													
300-	C	2022	2		>500	N(P)	545	C	2025	4		90	N(P)
70							167	C	2023.8	2.2	2024.1	>1000	NBS
450-													
180													
	C	1312.5	5		> 450	N	9100	S	1312.5	1.5	1312.9	95	N
								C	1316	5	1316.8	130	
							808	C	1312.5	11	1312.5	(25)	Pra
							600	S	1312.8	2.8		42	Uc
								c	1316.8	3		91	
							545	S	1312.5	1		15	N
								c	1316	3		150	
175-	C	2037	3		> 450	N(P)	545	c	2038	2.5		25	N(P)
30							167	C	2037.6	3.9	2038.1	>1000	NBS
450-	S	2142	0.2		> 500	N(P)	545	c	2144	15		65	N(P)
200							167	c	2141.6	0.3			NBS
								c	2146.3	0.3			
							167	E	2232	>100			NBS
250-							167	s	1943.5	0.2		> 1000	NBS
120								s	1945	2		> 1000	
175-													
90													
22-													
33													

10 CM EVENTS						PLAGE DATA								
Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Longitude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification
						5570	15	10°	N15	3	3800	16	2	5538
*C	0058	15	0102.8	819	Tk	5580	25	238°	S 21	3.5	1300	11	1	New
S	0220	19	0227.6	342	Tk	5580								
3 6	1335 1353.5	115 28	1430 1359	20 340	Ot	5581	26	225°	N08	3	5500	9	4	5550
						5580								
2	1919	7	1921	140	Ot	5586	Mar. 01.5	166°	N25	2.5	2500	11	2 and 5	5555, 5556
2	1717	7	1718.5	335	Ot	5592	11	40°	N24	3	4000	11	2	5566
*6 4	2047.7 2157.7	70 60		885 30	Ot	*5615	31.5	130°	N11	3.5	3000	70	2	5594
*C+	0655	52	0733.5	8250	Nag	5615								
S	0301	14	0310.7	296	Tk									
*6 4	1518 1858	220 190	1556	1760 20	Ot	5615								
*C+	0848	250		1000	HHI	5615								

POLAR CAP ABSORPTION							GEOMAGNETIC STORMS							
Onset Date	Time Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	t	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
							Jan. 05	0201	1.1d	sc	m	4	5	1
							10	0719	1.5d	sc	ms	16	6	2
Jan. 12	0300		36	16	B,G,VA									
							13	1859	2 d	sc	m	17	6	7
16	0300		24		G									
							17	12--	1.2d	g	ms	8	6	10
							20	03--	2.4d	g	ms	10	6	11
							Feb. 02	08--	0.6d	g	m	2	4	13
							05	06--	1.5d	g	m	4	5	18
Feb 07	07--		~96		G									
							13	19--	1.2d	g	m	2	5	23

5.VIII-1R (3)

Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	SHORT-WAVE RADIO FADEOUTS Type	Imp.	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.
	1960 Feb.												
25	15												
26	16												
27	18	0122	0327	0125	1-	S21 E90	1/1	*S	3+	0103	111	5	3
28	19												
29	20	0235	0331	0238	2	S20 E63	2/1	*S	3+	0218	110	5	3
30	21												
31	22	* 1352	1520	1400	3	N08 E41	4/3	S	3-	1358	42	5	11
32	29	0140	0200		2	S32 W56	1/1						
32a	29												
33	Mar. 01	1915	2050		1+	N22 W14	2/2	S	2	1918	26	5	9
34	10	1716	1810	1720	1	N24 E07	2/2	S	2-	1719	21	5	9
34a	10												
35	11												
26	15												
37	18												
38	28												
39	28	2042	2150	2056	2	N14 E37	2/2	S	2+	2050	50	5	9
40	29	0650	1220	0710	2+	N12 E30	8/3	*S	3+	0652	121	5	9
41	29												
42	30							*SL	3+	0215	255	-	1
43	30	{1455 / 1520	---- / 2034	1540	2	N12 E11	9/5	*SL	3	1520	160	5	11
44	31												
45	31												
46	Apr. 01	* 0843	1320	0859	3	N12 W11	10/3	*S	3	0850	57	5	5

5-VIII-21

1960-1962 (CONTINUED)

	DYNAMIC SPECTRUM DATA				
Event No.	Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs.
25					
26					
27	C0059- 0107/3	G0059- 0107/3	*0107- 0118/1		s
28					
29					
30			*2020- 2029/1-		W
31	C1354.5/m	g1354.5/m g1358/w	*1358- 1411/3	*<1356- 1416/2	H,M
32			*0153.5- 0156/1		S
32a					
33	C1921	g1921- 1921.5/s g1924/w	*1923- 1933/3		H,M
34		G1717- 1719/3	*1720- 1726/3		H,M
34a					
35					
36					
37					
38					
39		g2048/w g2052- 2104/w	*2057- 2112/3 *2112- 2126/1	* 2050- 2447/3	H,M W W
40					
41					
42		III_s in progress all day	*0325- 0337/2	* 0325- >0740/3	S
43	I_s in progress all day	g1553- 1557/3	*1529- 1540/3	* 1526- 2300/3	H,M,W
44					
45					
46					

5VIII-2R
(7)

TABLE VIII

SPOT DATA						
Mt. Wilson Type	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
See Spot Data Event 39						
See Spot Data Event 39						
	Apr.					
•dβrl	05.1	N18	(17)	1-10		14787
lβpd	06.3	N10	(15)	31-10		785
lβpl	10.9	S09	(20)	4-16		14795
lβpl	14.2	N04	(20)	7-19		14796
•lrl	27.6	N10	22	21- 2		14814
lβpl	30.4	S06	16	24- 5		14815
See Spot Data Event 61						

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B

Freq. Range (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
	200 MC DATA						**OTHER RADIO DATA**						
	C	0055	16	0101	110	N(H)							
							9500	C	0058	16	0101.5	2712	Tk
							3750	C	0053	17	0101.3	765	Nag
							1000	c	0053	15	0059.6	35	Nag
							545	c	0055	8		25	N(H)
							9500	S	0224.6	13	0229.5	651	Tk
							3750	s	0214	23	0227.4	190	Nag
							2000	c	0214	50	0227.5	88	Nag
							1000	E	0215	63	0201.6	195	Nag
240-	C	1358.5	15		280	N	9400	C	1353.8	60	1355.8	568	HHI
25											1358.6	683	
580-							1500	C	1351.4	50	1355.4	465	HHI
100											1358.0	306	
							545	C	1354.5	19		350	N
450-	C	1922	5		> 600	N(P)	545	c	1920	6		> 180	N(P)
60							167		1921	0.5	1921.2	>1000	NBS
									1925	1.0		>1000	
400-	C	1718	5		> 600	N(P)	545	s	1718	5		60	N(P)
60							167	C	1717.5	9	1718.2	>1000	NBS
150-	RBL	2054	> 25		> 400	N(P)	545	C+	2052	300		>> 400	N(P)
<25							167	C+	2051	>250	2130	>1000	NBS
>3000-							18	s	2046	2			Bo
<50								S	2100	10			Bo
33-								C+	2200	105			Ha
20													
	C+	0700	140		38000	N	9500	C+	0656.5	61.5	0733.5	7480	Tk
							2000	C+	0655	120	0733.4	49000	Nag
							1000	C+	0656	120	0812.8	250000	Nag
							600	C+	0657	13		>1300	Uc
									0710	115		>1300	
							545	C+	0700	270		100000	N
							2000	s	0302	15	0310.5	23	Nag
							1000	f	0301	20	0312	20	Nag
									0336	32	0351.9	57	
> 3900-	RBL	1525	28		900	N	9100	S	1521	12	1527	1900	N
<25	C+	1553	120		6000			S	1553	30	1556	7300	
160-								+	1623	60			
25							1500	C	1520	> 90	1555	> 810	HHI
							545	RBL	1523	24		55	
								C+	1547	>150		> 200	
							167	C+	1529	240	1550	>1000	NBS
							18		1653	> 470			NBS
	C+	0848	120		4500	N	9100	C+	0846.5	80	0858	8000	N
											0919		
							1500	C+	0816	224	0828	> 950	HHI
							808	C+	0845	140		> 150	Pra
							600	C+	0846	189		860	Uc

10 CM EVENTS					PLAGE DATA								
Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	Cmp. Day	Mean Longitude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification
0522	10	0524	395	Nag	5615								
0152	64	0202.7	2400	Tk	5615								
					5619	Apr. 05.5	64	N14	3	3200	10	1	New
2317	14	2324.6	32	Nag	5625	10.5	357	S10	3.5	2000	16	1	New
					*5627	13.5	319	N08	3	5000	31	1	New
					5642	27.5	134	N12	2.5	4500	25	3	5615
0124.5	15	0130	512	Tk	5645	30.5	94	S08	3	4500	5	2	5618
0139	9	0140	115	Nag	5642								
0201	70	0207.3	37	Nag									
0356	55	0359.7	365	Nag									
0526	24	0532	115	Nag									

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Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	SHORT-WAVE RADIO FADEOUTS Type	Imp.	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.	Type
	1960 April													
47	01													
48	02													
49	03	0542	0700	0546	2	N11 W36	4/2	*S	3	0520	60	5	4	C
50	05	0215	0530	0245	2	N12 W63	4/2	*SL	3+	0140	187	5	7	*C
51	05													
52	05													
53	05													
54	07													
55	10													
56	10	2312	2416	2321	1	S08 W03	4/4							C
57	11													
58	13													
58a	15													
59	16													
60	23													
61	24	2332	2430	2345	1	N15 E35	1/1	G	1+	2328	43	-	1	
62	27													
63	28	* 0130	0145	0137	3	S05 E34	1/1	*SL	3+	0120	100	5	6	*C
64	28													
65	29	0107	0908	0210 0400	2+	N14 W21	14/8	SL	2+	0205 0355	175	5	5	c C C+ S
66	29													
67	30													

5.VIII 1 3L

POLAR CAP ABSORPTION							GEOMAGNETIC STORMS							
Onset Time Date	Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	t	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
							Feb. 16	09--	2.1d	g	m	9	6	26
							19	1600	0.6d	g	m	4	5	28
29	16--		190		G									
Mar. 10	18--		60		G									
							Mar. 11	04--	0.8d	g	m	7	6	35
							15	12--	1.5d	g	ms	8	7	36
17	18--		72		G,VA									
							28	0600	1.2d	g	m	2	4	38
29	0800	50h	73	21	B,G									
31	0300		24	7	L,K									
							31	09--	2.5d	g	s	19	9	45

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1960-1962 (CONTINUED)

Event No.	Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs.
	DYNAMIC SPECTRUM DATA				
47					
48					
49					
50	I$_s$ 0243-0416/1	III$_s$ 0137-0221/3 g0246/1 g0247.5/1 III$_s$ 0404-0527/2	*0152-0207/3	* 0207-0300/3	S
51					
52					
53					
54					
55					
56		G2321.5-2329/2 b2336.5/1 g2338/1 G2359.5-2400/2		* 2323-2328/2	H,S
57					
58					
58a					
59					
60					
61			*2343-2400/1	* 2343-2545/1+	W
	I$_s$ 2400-2530/2 (with cont.)				H,M
62					
63		G0117-0119/1	*0120-0146/3	* 0145-0230/1	H,S
64					
65		G0140-0148/2 III$_s$ 0357-0423/3	*0214-0225/2 *0417-0425/2	* 0200-0305/2 * 0350->0645/3	S
66					
67					

5·VIII – 3R

TABLE VIII

SPOT DATA						
. Wilson pe	CMP Gr. Day	Lat	H	When Seen	Area	Mt. Wilson No.
ee Spot Data Event 61						
lαpl	May 06.9	S 08	21	30-12		14823
lβpd	12.1	S 08	(10)	7-15		14830
lαl	13.6	S 09	(15)	7-19		831
dβfl	06.9	N30	(10)	8-12		14832
lγl	08.1	N29	(25)	2-14	1800	825
ee Spot Data Event 77						
dβpl	16.3	N15	(10)	15-22		14841
lβfd	17.1	N16	(15)	10-20		836
lβpl	19.9	S 12	32	13-25	1575	14840
dβl	20.6	S 13	(15)	19-26		848

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(3)

Freq. Range (mc)	200 MC DATA Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	OTHER RADIO DATA Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
							9500	C	0523.2	7	0527	679	Tk
							2000	C	0523	10	0524	95	Nag
							1000	s	0523	3	0524.1	38	Nag
	C+	0124	60		(140)	HIR	9500	C	0151.5	25	0200.8	9210	Tk
							2000	C+	0140	125	0206.1	1230	Nag
							1000	C+	0136	135	0302.8	18000	Nag
580-160							1000	F	2319.5	11	2326.4	205	Nag
							545	c	2323	4.5		50	N(H)
							167	c	2323	9	2326.5	>100	NBS
33-21							1000	f	2348	12	2351.7	17	Nag
150-35							9500	C	0124.5	15	0130	573	Tk
							3750	C	0116	40	0129.5	260	Nag
							2000	C	0115	30	0129.7	285	Nag
							1000	C	0117	25	0139.2	265	Nag
							545	c	0135	5		170	N(H)
	C+	0346	140		220	HIR	9400	s	0140	4	0140.8	55	Nag
								C	0203	65	0247	23	
								C+	0357	53	0414.7	195	
								s	0527	24	0532	43	
							2000	c	0139	9	0140		Nag
								C	0200	20	0207.1	75	
								E	0232	30	0248	185	
								C+	0356	50	0427.4	370	
								C	0525	23	0538.1	990	
							1000	E	0139	82	0207.3	30000	Nag
								C+	0348	75	0442.2	340	
								C	0525	23	0536	3350	
							545	C+	0358	65		250	N(H)
								C	0525	6		>450	

10 CM EVENTS					PLAGE DATA									
Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.	Avg. Int.	Avg Max. Area	No. of Flares	Age in Rotation	Identification
1015	62	1039	2650	N	5642								
1118	30	1124	140										
1339	27.5		7	Ot	5653	May 07	8°	S07	3	4000	14	2	5625
1406.5	90	1434.5	695										
1536.5	360		70										
0710	60		>40	Nag	5657	13	289°	S10	3	4000	7	3	5630
1250	50		87	Ot	*5654	07	8°	N29	3	2000	38	1	New
1340	80	1426	250										
1500	375		38										
0519	101	0531.6	2065	Tk	5654								
					a5660	16.5	242°	N09	3	5400	13	2	5633
					b5663	20	196°	S16	3.5	7500	16	3	5635

POLAR CAP ABSORPTION						GEOMAGNETIC STORMS							
Onset Date	Time Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	Start Date	Hr (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
Apr. 01	1000	6	73	29	B,L,K,G,VA	Apr. 02	2313	3d	sc	ms	15	7	48
05	0700	16h	55	25	B,L,K,G,VA								
						05	00--	1d	g	m	7	6	53
						07	1511	0.7d	sc	m	2	5	54
						10	0127	1.1d	sc	ms	6	7	55
						11	21--	1.5d	g	m	7	6	57
15	10--		96		G								
						16	12--	2d	g	m	5	6	59
						23	21--	2.2d	g	ms	10	7	60
						27	2001	2.1d	sc	ms	16	7	62
28	0230	12h	30	20	B,L,K,G,VA								
29	0500	27h	36	90	B,L,G,VA								
						30	0132	1.6d	sc	s	14	9	67

5. VIII - 3R (3)

Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	SHORT-WAVE RADIO FADEOUTS Type	Imp.	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.	Ty
68	1960 May 04	* 1000	1200	1016	3	N13 W90	3/1	*S	3	1015	35	5	4	*C+ S
69	04													
70	05													
71	06							G	1+	0305	38	-	1	
72	06	* 1404	2020	1440	3+	S08 E07	10/6	*SL	3	1427	151	5	8	9 *6 4
73	06													
74	08													
75	09	* 0704	1021	0734	3	S11 E52	7/1	SL	2	0700	98	1	1	S
75a	09													
76	11													
77	12	1342	1546	1400	1+	N30 W59	12/3	*SL	3	1348	154	5	9	
78	13	* 0519	0733	0532	3	N30 W67	6/2	*S	3+	0512	221	5	9	*
79	13													
80	15	a 0529	0605		1	N15 E27	2/1	*S	3	0312	208	5	3	
		b 0532	0719		1+	S12 E66	1							
81	16													
82	17													

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Event No.	DYNAMIC SPECTRUM DATA Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs.
68					
69					
70					
71		g0259/1 b0303/1	*0312- 0315/1		S
72	I_s1430- 1942/s		*1438- 1445/3		H,M
				* 1414- >1610/3	
	C1429- 2112/1+	g1444- 1445/2			W
73					
74					
75					
75a					
76					
77	I_s1458- 1556/vw	g1348- 1348.5/1 g1403- 1405/1- b1407/1- g1408- 1409/1		* 1403- 1552/1	W,M
78		G0517- 0525/3	*0523- 0528/3	* 0530- >0609/1	S
79					
80					
81					
82	I_s 1737- 1743/w	g1749.5/m g1752- 1753.5/m g1754.5/m g1804- 1808/w	*1743- 1810/3		H,M
				* 1755- 1829/2	H
			*1744- 1746/1- *1800- 1809/1	* 1800- 1852/1	W

5-VIII 4R

TABLE VIII

SPOT DATA						
ilson	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
pl	25.1	N18	13	25-30		14856
l	25.3	N13	19	19-31		849
	June					
βd	01.8	N12	12	26- 3		14860
βl	02.4	N06	(15)	2- 9		870
pot Data Event 85						
pd	04.7	N28	(10)	29- 7		14866
βl	05.2	N29	(20)	29-11		867
Spot Data Event 85						
Spot Data Event 89						
Spot Data Event 89						
αpd	14.7	S12	(15)	8-16		14880
βpl	15.8	S12	(15)	10-21		888
αpl	16.0	S12	(20)	9-21		885
αpd	16.3	S15	(15)	10-18		889
αd	11.7	N11	(10)	9-16		14883
βd	12.3	N12	(10)	6-15		876
βpd	13.0	N15	(10)	5-15		877
βpd	13.9	N16	(15)	9-18		14884
αpl	14.3	N21	(20)	8-20		879
βd	14.5	N18	(15)	4-19		896
Spot Data Event 96						
βd	20.7	N22	(12)	14-21		14897
αpl	21.4	N12	15	15-27		901

5.VIII-5 3

Freq. Range (mc)	200 MC DATA Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	OTHER RADIO DATA Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	Ons Date
							9400	C+	1013.4	139.2	1033	603	HHI	
							9100	C	1015	63			N	
								s	1118	20		78		
							1500	C+	1011.4	107.6	1042.4	504	HHI	
											1125.4	292		
							600	EC	1012.5	47.5		225	Uc	
								C	1116	118		23		
							536	C+	1010	51	1046	127	Pra	
								c	1115	20	1127	42		
							23	F	1018.6	16.4	1019.8	600	Aop	
							18	c	1029	5			Re	
														May 04
90-	R-E	1414				N	9400	C+	1438.8	51.6	1509.4	273	HHI	
<25							9100	S	1428	20			N	
580-							1500	C	1341	6	1344	143	HHI	
50								C+	1408	213	1435.4	652		
33-							808	C+	1408.5	82	1431	166	Pra	
19							600	EC+	1407.9	14.5		338	Uc	
									1422	128		405		
							545	C-E	1414	260		250	N	
							167	C+	1420	130	1553	>1000	NBS	
							23	F	1431.2	16.7	1444.6	500	Aop	
							18	C	1431	9			Bo	
														06
							2000	S	0700	70		> 20	Nag	
							1000	c	0647	80	0759.8	15	Nag	
							600	c+	0644	6		140	Ucl	
									0650	20		380		
							536	C	0644	34	0657.5	106	Pra	
														09
33-	RF	1345	45		140	N	9400	C+	1302.8	162	1352.6	365	HHI	
16											1408.8	405		
											1425	450		
							9100	C+	1340	60		334	N	
							1500	C+	1345	114	1357	244	HHI	
											1403	249		
											1410	272		
											1426	244		
							808	C+	1351	255	1410.5	150	Pra	
							600	C+	1343.4	17		180	Uc	
									1400	74		218		
							545	C	1349	25		70	N	
							167	C+	1330	135	1407.9	-	NBS	
	C+	0518	>110	1310	1310	TK	9500	C+	0518.5	72	0531.6	10450	TK	
							3750	C+	0517	105	0532	3750	NAG	
							2000	C+	0517	122	0557.8	1440	NAG	
							1000	C+	0517.5	122	0556.8	2200	NAG	
							600	C+	0518	18		360	UC	
									0536	103		1080		
							545	C+	0521	105		600	N	
														13
							9400	C	0303	20	0314	50	NAG	
150-	C	1743	0.7		80	N(P)	600	C	1742	3		102	UC	
25	RF	1745	15		40		545	C	1743	2		20	N(P)	
60-							167	C+	1739	31	1751		NBS	
25							18	C+	1743	8			MC M	
									1757	63				
31-														
16														

10 CM EVENTS						PLAGE DATA								
Type	Beg. (UT)	Dur. (Min)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Longitude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification
*C+	0909	27	0925	>1350	N	5669	24.5	136°	N12	3	3600	27	4	5642
6	1416.2	54	1426.8	32	HHI	a5678	June 02	24°	N12	2.5	2500	23	2	5649, 5652
						b5669								
*C+	0831	60	0848	3100	N	*5680	04.5	351°	N28	3	7000	34	2	3654
6	2003	16	2005.5	9	Ot	5669								
1 6 4	2218 2241 2257	7 16 55	2221.5 2245	7 25 5	Ot	5680								
*C	0508.2	6	0508.9	605	Tk	5680								
						*5695	15.5	205°	S13	3	7500	33	4	5663
*	-	-	0050	539	Tk	5693	12	252°	N13	2.5	5000	16	3	5660
c s	0251 0302	5 3	0252.5 0304	300 11	Nag	5694	14	225°	N20	3	3500	8	1	New
C	0128.2	1.5	0128.8	449	Tk	5695								
						5706	21	133°	N17	3	4000	14	5	5669

POLAR CAP ABSORPTION						GEOMAGNECTIC STORMS							
t Time Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	t	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
1030	2h	8	27	B,L,K,G,VA									
						May 05	20--	2.2d	g	ms	14	7	70
1800	34h	48	70	B,L,K, G,VA									
						08	0422	1.5d	sc	ms	14	8	74
08--		72		G									
						11	0434	1.2d	sc	ms	9	7	76
0730	8h	36	29	B,K,L,G,VA									
						16	1120	1.1d	g	ms	9	6	81

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		FLARE DATA						SHORT-WAVE RADIO FADEOUTS					
Event No.	Date	Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	Type	Imp.	Beg. (UT)	Dur. (Min)	Wide Spread Index	No. of Obs.
83	1960 May 18												
84	23												
85	26	0850	1050	0928	2+	N14 W15	13/4	S	2	0914	46	5	6
86	26												
87	27	a 1500	1555	1519	1	N13 E69	7/4	SL	1+	1415	30	5	6
		b 1414	1517	1430	1	N16 W26	9/4						
88	28												
89	June 01	* 0823	1340	0900	3+	N29 E46	19/8	*SL	3	0837	80	5	9
90	01												
91	01	2020	2150		1	N18 W90	4/4	S	2	2007	63	5	9
92	04												
93	04												
94	05	2217	2346	2224	1-	N26 W24	2/2	G	1	2324	-	-	1
95	10	0506	0737	0518	2	N31 W62	7/3	SL	1+	0510	23	1	1
96	12	0436	0720		2	S14 E53	4/2	*G	3+	0453	169	1	2
97	14	0001	0045	0012	1	N17 W36	4/4	S	1+	0007	36	5	5
98	15	0248	0349	0301	1	N18 W13	1/1	S	1	0250	35	4	3
98a	15												
99	20	0126	0205		2	S13 W59	1/1	S	1+	0128	28	5	6
100	23	0329	0344	0332	1-	N12 W23	1/1						

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1960-1962 (CONTINUED)

	DYNAMIC SPECTRUM DATA				
Event No.	Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs.
83					
84					
85					
86					
87	a. Continuum in progress all day	III$_s$1620-2100/2	*1502-1506/1	* 1517-1601/1	H,W
	b.	G1420-1427/3			H
88					
89					
90					
91		G2003-2006/2	*2007-2016/2	* 2012-2038/2	H,M
92					
93					
94		g2236.5/w	*2258-2301/1		H,W,
95			*0435-0438/1		S
96					
97		G0005-0011/2	*0018-0037/1-		W,H,
98	C0248-0254/3	G0248-0254/3	*0300-0316/2		S
98a					
99		G0127-0129/3 G0130-0134/2 G0135-0138/2	*0132-0138/3		H,S
100		b0326/1 G0331-0333/3	*0335-0339/1		S

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TABLE VIII

...on	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
SPOT DATA						
	25.8	N20	23	19- 1		14908
...t Data Event 101						
...ot Data Event 101						
...ot Data Event 101						
...t Data Event 101						
...ot Data Event 101						
...l	29.8	S08	27	23- 5		14915
...ot Data Event 101						
...pot Data Event 101						
...l	July 02.0	N27	30	25- 8		14916

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③

	Freq. Range (mc)	200 MC DATA Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	OTHER RADIO DATA Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
		C+	0909	40		1100	N	9100	C+	0909	25		>1150	N
								1500	C+	0847.5	117.5	0926	507	HHI
								808	C+	0906	48	0917	109	PEA
								600	C+	0906	44		526	UC
	33-20							600	f	1507.5	14.8		80	UC
								9400	C	1414	50.2	1421	47	HHI
								1500	RF	1413	40	1422.6	13	HHI
								600	f	1415.9	16.5		43	UC
								536	C	1419	8.5	1419	60	PEA
								23	f	1418.7	15.7	1421.3	1000	AOP
								18	C	1418	10			McM
		C+	0838.5	75		3100	N	9400	C+	0830.4	194	0847.4	>850	HHI
												0912	575	
												0942.8	338	
								9100	C+	0834	63		>3400	N
								1500	C+	0822.4	300	0846.5	837	HHI
												0852	766	
												0912	582	
												0945.6	288	
								600	C+	0834.2	52		935	UC
										0938	15.5		95	UC
								545	C+	0835	45		1200	N
								23	C+	0841	23.8	0852.3	700	AOP
	150-60 580-180	C	2005	2		350	N(P)	545	S	2036	5		100	N(P)
		RF	2014	30		130		167	C+	2003.4	4.2	2004.3		NBS
										2014	36	2019.4		
								18	C+	2004	3			McM
										2008	2			
										2017	1			
										2027	13			
M	75-25													
								9400	S	0507	5	0508.8	135	NAG
								3750	C	0500	15	0509.7	300	NAG
								2000	C	0508	9	0509.0	165	NAG
								1000	S	0508	12	0511.3	40	NAG
S	33-22							9400	C	0005	8	0009.9	320	NAG
								3750	C	0004.5	10	0009.9	365	NAG
								1000	c	0005	7	0010	25	NAG
								167	c	0006.5	5	0009.9	>1000	NBS
								18	C+	0004	8			HA
										0016	12			
		C	0251	4		110	N(H)	9400	c	0251	4	0252.4	400	NAG
								2000	s	0251	4	0252.5	120	NAG
								1000	c	0251	3	0252.5	125	NAG
								18		0252	2			HA
	240-<100	C	0128	1		>220	N(H)	9400	F	0127.5	6	0128.4	1150	NAG
								3750	f	0127.5	8	0128.4	210	NAG
								167	c	0128	2	0128.5		NBS
									c	0134.5	2	0135.9		NBS
								18		0127	4			HA
		f	0332	3		>300	N(H)							

10 CM EVENTS						PLAGE DATA									
Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification	Mt. Wi Type
*2	1026	5	1026.9	[illegible]50	Ot	*5713	25.5	73°	N20	3	2500	46	1	New	*[illegible]
6	1148	88	1208.5	425	Ot	5713									See S
4	1316	224		20											
2	1701	15	1705	160	Ot	5713									See
4	1716	60		8											
*	2037	40	2046	700	Ot	5713									See
C	0430.8	8	0432.7	422	Tk	5713									See
6	1358.8	14	1408	200	Ot	5713									See
3	0002	> 28	-	13	Ot	5719	29.5	20°	S 08	3	5400	3	4	5679	[illegible]
2	0012	4	0012.8	30											
*C	0419.3	11	0420	780	Tk	5713									
C	0501	10	0511	539											
2	2140	38	2154	140	Ot	5713									Se
4	2218	> 120		30											
*C	0141	15	0149	1214	Tk	5713									Se
s	1043.5	3.5	1044.8	61	HHI	5724	July 02.5	340°	N28	3	6500	23	3	5680	

POLAR CAP ABSORPTION							GEOMAGNETIC STORMS								
set Time ate	Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	t	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
.8	>1200		~ 24		G,VA									
							May 23	14--	1d	g	m	4	6	84
26	1000		72		G,VA									
							28	2019	1.3d	sc	ms	13	8	88
une 01	≤ 1021		~ 48		G,VA									
							June 04	0250	2.5d	sc	ms	14	6	92
4	<1200		~ 20		VA									
5	10--		48		G									

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		FLARE DATA						SHORT-WAVE RADIO FADEOUTS					
Event No.	Date	Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	no. of Obs.	Type	Imp.	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.
101	1960 June 25	1026	1046	1029	1+	N19 E03	5/1	S	2	1027	33	1	1
102	25	* 1136	1530	1215	3	N21 E06	8/3	SL	2	1203	67	1	2
103	25												
104	25												
105	25	1659	1740	1707	1	N19 W01	3/3	S	1+	1705	25	5	7
106	25	2039	2140	2046	2+	N18 W04	4/4	S	2-	2040	30	5	10
107	26	* 0428	0525	0436	3	N20 W08	2/2	S	1+	0432	56	5	5
108	26	1349	1445	1402	2+	N19 W13	5/3	S	2-	1402	38	5	9
109	26 27	* 2358	2600	2415	3	S08 E34	2/2	S	2-	0003	67	1	1
110	27												
111	27	0418	0615	0430	1+	N20 W19	3/3	SL	1+	0417	36	5	5
112	27	* 2140	2345	2156	3	N22 W27	6/6	SL	2+	2140	138	4	5
112a	27												
113	29	0125	0247	0148	1	N20 W50	2/2	S	2	0138	8	5	3
114	29	1042	1102	1045	1	N29 E39	5/3						

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0

1960-1962 (CONTINUED)

Event No.	DYNAMIC SPECTRUM DATA Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs.
101		g1029.6/m	*1030-1036/s	* 1026-1040/w	M
102	g1202-1205/w I_s 1254-1452/w	g1135.7-1136/m g1153/m g1157-1201/w		* 1153-1500/s	H,M
103					
104					
105	I_s 1724-1840/2	G1700-1713/3		* 1717-1923/2	H,M
106	I_s 2048-2240/m	G2030-2033/3 G2035-2046/2	*2048-2105/3	* 2045-2153/3	H,M,W
107					
108	I_s in progress all day	g1356-1356.3/w g1358.9-1359.7/s g1359.7-1401.8/5 III_s 1401-1408/w		* 1401-1405/w	M,H
109		III_s in progress all day g2345/3 g2352 2353/3	*0004-0009/3	* 0013-0049/3	H,M,S
110					
111	I_s 0529-0608/1	g0420-0421/2 g0443-0443.5/2 G0450-0452/3 G0500-0503/3 g0508-0509/2	*0422-0443/3 *0453-0454.5/1 *0503-0505/2	* 0425-0539/1	S
112	I_s 2149-2440/vw	g2144-2145/m g2153/w	*2157-2212/3	* 2150-2255/3	H,M,W W
112a					
113	I_s (weak) in progress all day	g0122.5/3 g0135-0137/1 G0138-0139.5/2 g0142-0143/1	*0149.5-0158/2	* 0140-0230/3	H,S
114		g1045/w	*1047.9-1048.5/w		M

5-VIII-6R (1)

TABLE VIII

SPOT DATA						
Wilson e	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
βrl	03.7	N08	26	27- 9	1900	14921
pl	06.2	N02	(2)	30- 2		14925
βrl	16.7	N21	(20)	10-23	1400	14939
pd	23.8	N08	(15)	18-26		14953
l	30.4	N07	16	24- 5		14967
	Aug.					
pl	12.4	N20	(20)			14980
rl	13.6	N20	(20)		1100	981
pot Data Event 126						
pot Data Event 126						
pot Data Event 126						
βd	08.1	S 23	(5)	7-11		14982
pot Data Event 126						

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3

	200 MC DATA						OTHER RADIO DATA						
Freq. Range (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
	f	1028.3	4.4	1030.3	490	AOP	9400	s	1025.5	13.4	1027.4	433	HHI
							9100	s	1026	5		344	N
							1500	s	1025.8	10.5	1027.1	322	HHI
							808	c	1025.5	8.5	1027	92	PRA
							600	c	1026.3	5.8		91	UC
580- <100							9400	C+	1149	204	1208	435	HHI
							9100	C+	1159	30		303	N
							1500	c	1137	2.5	1138.2	29	HHI
								C+	1148.5	241	1207	745	
							800	C+	1152	188	1213.5	170	PRA
							600	c	1136	3.5		190	
								C-	1152.5	58		900	UC
									1251	169		450	
							545	C+	1153	115		>200	N
							167	c	1135.9	0.9			NBS
								C+	1156	209	1237.6	>1000	
							23	c	1216	2.6	1217.4	800	AOP
							18		1219	4			McM
	C+	1200	130		3000	N							
> 580- 320	RF	1700	100		80	N	1500	S	1700	18	1705	300	HHI
							600	C+	1700.3	88		703	UC
							545	C+	1703	100		550	N
							167	C+	1700	37	1709.3	>1000	NBS
							18		1659	>400			McM
150- < 25 580- 100	C+	2045.5	75		>850	N(P)	545	C+	2040	45		>300	N(P)
							167	C+	2045	11	2047	>1000	
									2056	51	2110.8	>1000	NBS
									2146	29	2150	>100	
	C	0432	5		> 250	N(H)	9400	C	0430	12	0432.1	525	NAG
							3750	C	0428	10	0432.2	225	NAG
							2000	c	0428	10	0432.2	92	NAG
							1000	C	0428	10	0436.5	360	NAG
							600	C	0428	13		1021	UC
							545	C	0432	7		>1200	N(H)
	C	1359	13		800	N	9100	C	1359	13		1140	N
							600	C	1358.4	12.8		730	UC
							545	C	1359	12		400	N
							234	F	1358.8	12.2	1359	1800	Aop
							167	C+	1350	16	1400	>1000	NBS
									1406	5	1407	> 100	
							23	F	1358.9	6.8	1359	800	Aop
							18	C	1358	3			Bo
280- <100	C	0002	50		> 240	N(H)	9400	c	0005	40	0012.4	50	NAG
	C	< 0008	46	0013	1130	TK	3750	c	0005	50	0012.5	50	NAG
							1000	f	0005	44	0008	44	NAG
							167	C+	0005	10	0013.8	>1000	NBS
									0015	40	0019.5	>1000	
	C+	0421.5	115	0502	200	OSL	9500	C	0419.4	6	0420.5	1432	TK
								C	0500.3	2	0501	1542	
							1000	c	0408.5	1	0408.8	50	
								S		> 3	0421.2	1450	NAG
								F	0437	40	0437.5	90	
							600	C	0445.4	32.7		206	UC
							545	C+	0423	60		1200	N(H)
> 580- 18 33- 15	C+	2144	75		250	N(H)	9400	S		> 45	2153.9	105	NAG
							1000	F		> 50	2209.6	2000	NAG
							545	C+	2144	83		600	N(H)
							167	C+	2146	74	2155.5		NBS
							18		2142	218	2147		HA
	C+	1038	2	0138.9	1500	TK	9500	C	0141.5	12	0157.9	1730	TK
		0140	17	0153.6	820		9400	F	0136.5	21	0147.4	1450	NAG
							3750	F	0135	21	0147.7	840	NAG
							2000	F	0137	17	0142.3	240	NAG
							1000	F	0136.5	15	0141.8	130	NAG
							545	C+	0138	17		> 250	N(H)
							9400	s	1043.6	8.8	1044.9	265	HHI
							1500	s	1043.8	3.2	1044.9	176	HHI

10 CM EVENTS						PLAGE DATA								
Type	Beg. (UT)	Dur. (Min)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification
						5726	03.5	327°	N08	3.5	5500	24	2	5688
						5732	06	294°	N04	2	1400	1	1	New
6	1817.5	15	1819	150	Ot	5749	17	149°	N20	3	5500	21	1	New
f	0328	14	0329	17	Nag	5765	24.5	49°	N10	2.5	2800	18	2	5733
						*5775	30.5	330°	N10	3.5	7500	32	3	5726
						*5794	Aug. 13	152°	N20	3.5	12000	60	2	5749
6	1619	6	1622.5	42		5794								
1	1626.4	1	1626.8	6	Ot									
1	1633.5	2	1634.5	6										
*C	0235.6	19	0252	562	Tk	5794								
3	1916	144	-	9	Ot	5794								
*2	1923.5	37	1928	1100										
						5788	08	218°	S18	2.5	3000	2	6	5741
*C	0514	19	0518.4	1410	Nag	5794								
-	0533	85		-22										

5.VIII-7L

2

POLAR CAP ABSORPTION							GEOMAGNECTIC STORMS							
set Time te	Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	t	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
ne	17--		>48		G,D									
							June 25	12--	1d	g	m	4	5	104
							27	1046	2.4d	sc	ms	14	7	110
	23--		>24		G									
	19--		36		G									

5-VIII-68

Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	SHORT-WAV ADIO FADEOUTS Type	Imp.	Beg. (UT)	r. (Min.)	Wide Spread Index	No. of Obs.
115	29												
116	July 03												
117	03												
118	08	2328	2410	2334	2+	N07 W33	2/2						
119	14												
120	19												
121	19	1817	1833	1821	1	N18 W42	5/4	S	1+	1815	25	5	7
122	26	0320	0502	0333	1	N09 W31	1/1	SL	1+	0325	27	5	2
123	29												
124	Aug. 03	1616	1629	1622	1-	N06 W55	2/1	SL	1-	1632	38	-	1
125	04							G	1+	1600	52	-	1
126	05	1123	1131		1	N18 E88	1	*S	3+	1043	21	1	1
127	06	1618	1650	1625	1+	N20 E78	5/3	S	2	1620	20	5	9
128	08												
129	11												
130	11	0233	0356	0255	2	N21 E35	4/3	SL	2	0225	90	5	4
131	11	1916	2055	1929	2+	N22 E26	3/3	S	2	1925	65	5	10
132	11	2254	2309	2259	1-	S24 W58	3/3						
133	12												
134	14	0511	0655	0525	2+	N22 W06	8/5	*S	3	0515	45	5	6

5-U116-72

1960-1962 (CONTINUED)

Event No.	DYNAMIC SPECTRUM DATA Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	IV Time/Int.	C
115					
116					
117					
118		g2335/m g2339- 2340/w	*2337- 2348/2		H
119					
120					
121		g1818/m	*1821- 1828/3	* 1818- 1825	H
122		III_s 0300- 0429/1 g0317- 0319/2 g0321/3 g0345/3 g0348/3	*0332.5- 0340/3 *0351- 0404/1		S
123					
124		G1616- 1618/3	*1624- 1633/2		[illegible]
125		G1606- 1612/3	*1623- 1632/1-		V
126					
127		III_s 1613- 1636/m G1619- 1625/3 G1637- 1638/2	*1627- 1636/2	* 1619- 1650/1	[illegible]
128					
129					
130	C0248- 0257/3	G0248- 0257/3	*0257.5- 0314/3	* 0307- 0615/1	S
131	I_s (weak) in progress all day	G1926- 1930/3	*1929- 1938/3+ *1951 2010/1-	* 1926- 2019/2	[illegible]
132		G2255.5- 2259/2		* 2248- 2308/2	
133					
134					

5. VIII - 72
(1)

TABLE VIII

	SPOT DATA					
ilson	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
βpℓ	17.0	N16	(20)	9-22	1225	14985
βγℓ	16.3	S08	(15)	9-21		14984
pℓ	17.0	S06	(20)	11-22		988
pot Data Event 126						
pℓ	22.0	N27	(15)	20-27		14998
ℓ	26.2	N09	(5)	25-28		15005
γℓ	31.4	N19	19	27- 6		15008
pℓ	29.3	S17	19	28- 3		15010
pot Data Event 146						
ℓ	26.6	N05	(12)	20-28		14999
pℓ	26.6	N06	(12)	20- 1		15001
pℓ	27.9	N17	11	28- 2		009
ℓ	Sept. 09.3	N18	(15)	2-15		15015
pot Data Event 148						
βℓ	10.8	N05	(10)	4-13		15017
pℓ	15.2	N15	(15)	8-20		15024

5-VIII-8L

3

		200 MC DATA						OTHER RADIO DATA						
bs.	Freq. Range (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
W.M	140- 25							545	s	2336	0.2		220	N(H)
.M	290- 40 3900- 2100	f	1818	4	1821.5	>200	OSL	600	C	1817.2	12.7		230	UC
								545	C	1817	2.5		>200	N(P)
		C	0330.3	10	0333	230	TK	2000	f	0322	20	0333	24	NAG
								1000	f	0323	18	0332.8	28	NAG
,W	90- 22	c	1617	1		160	N	167	c	1616.3	2.2	1617		NBS
								18		1615	25			McM
,H	39- 22	s	1607	0.4		220	N							
		C	1609	2		360								
								9400	s	1033.8	25.4	1053	13	HHI
								1500	c	1030	15.5	1032.8	12	HHI
.M,W	90- 28 39- 18	F	1619	5		>850	N	9100	S	1620	4		270	N
								1500	c	1618.8	7	1622.3	17	HHI
								167	C	1618.9	7	1622.6		NBS
								18	C	1619	10			Bo
		C	0249.5	4.5	0251.2	>1600	HIR	9500	C	0249	6	0253	681	TK
								9400	F	0222	40	0253.2	255	NAG
								3750	F	0222	35	0252.9	610	NAG
								2000	F	0223	35	0253	375	NAG
								1000	F	0223	35	0253.3	175	NAG
								545	s	0250	7		25	N(H)
	425- 18 580- 150	C	1926	12		>950	N(P)	545	C	1926	17		150	N(P)
								167	c	1926	1	1926		NBS
									C+	1929	16	1932.9		
								18	C+	1925	55			McM
e S	39- 22													
	250- 150							18	C	2255	7			HA
		C	0517	15		>2000	Hir	9400	C	0515	20	0518.3	1540	NAG
										0535	85		-30	
								2000	C	0515	20	0518.2	775	NAG
										0535	135		-35	
								1000	C	0515	24	0518.2	630	NAG
										0539	125		-23	
								600	C+	0516	24		300	UC
										0540	335			
								545	C	0516	15		200	N

10 CM EVENTS						PLAGE DATA									Mt. W
Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.	Avg Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification	Type
*2 4	1307 1323	16 90	1310.7	680 22	Ot	5799	Aug 17	99°	N17	3.5	6500	28	1	New	* ℓβ
						5800	17	99°	S05	3.5	4200	2	1	New	* ℓβ ℓα,
2 6	1235 1246	8 8	1238 1248	74 38	Ot	5794									See S
3 3 2	<1544 1556 1604.5	>85 8 16	- 1558.5 1607	10 6 19	Ot	5806	22	33°	N26	3	1200	3	1	New	dβ,
						5814	26	340°	N11	2	2200	1	4	Part of 5775	dα
						*5822	31.5	267°	N17	3	4000	36	6	5782	*dβ
						5825	29	300°	S18	3	2000	19	1	New	dβ,
C	0242	2	0242.4	240	Tk	5825									See S
s	0535	70	0612.5	20	Nag	5816	27	326°	N08	3	3500	10	4 and 1	Part of 5775 and partly new	dβ ℓα dβ
*C+	0059	50	0105	5800	Tk	5837	Sept. 10	142°	N24	3	10000	21	3	5794	*ℓ
C+	0010	25	0028	280	Nag	5816									Se
1	1924	2.5	1926	7	Ot	5840	10.5	135°	N07	3	3500	3	1	New	
2	1815.5	2	1816.5	13	Ot	5848	15.5	69°	N16	3	7500	7	4	5802	

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POLAR CAP ABSORPTION							GEOMAGNETIC STORMS							
Onset Time Date	Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	t	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
							29	1939	1.6d	sc	ms	11	7	115
							July 03	15--	1.3d	g	m	2	4	116
							14	1702	2.7d	sc	ms	17	8	119
							19	04--	0.9d	g	m	6	6	120
							29	0052	3d	g	m	8	6	123
							Aug. 08	23--	0.6d	g	m	2	5	128
							11	01--	1.5d	g	m	3	5	129
Aug. 12	00--		120		G,VA									

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(3)

Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	SHORT-WAVE F[illegible]O FADEOUTS Type	Imp.	Beg. (UTO	[illegible] (min.)	Wide Spread Index	No. of Obs.
135	1960 Aug. 14	1306	1414	1310	2	N20 E36	6/2	S	3-	1307	53	5	10
136	14												
137	15												
138	16												
139	17												
140	19	1233	1320	1248	1+	N16 W85	5/2	S	2+	1237	38	5	10
141	19												
142	21	1546	1630	1558	1+	N27 W02	5/2	*S	3+	1538	172	5	7
142a	26												
143	26	1354	1442	1359	1-	N07 E17	6/2	S	2	1427	35	5	8
144	29												
145	31												
146	Sept. 01	2038	2100	2042	1	S18 W49	4/3	S	1-	2042	15	5	4
147	02	0243	0321	0248	1-	S17 W57	3/2	S	2-	0240	43	5	5
148	02	0538	0655	0550	1	N18 W80	5/4	SL	2	0540	66	1	1
149	02												
150	03	0037	0154	0108	2+	N18 E88	2/2	*SL	3+	0045	126	5	6
151	03												
152	03-04	2348	0048	2356 0017	1-	N17 W90	4/3	*SL	3	0003	97	5	5
153	04												
154	05	1924	2100	1940	1	N04 E66	3/3						
155	07												
156	08	1816	1824	1819	1-	N18 E90	1/1						

5-VIII-82 (1)

Event No.	DYNAMIC SPECTRUM DATA Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs.
135	I_s (weak) in progress all day	b1333.4/m			H,M
136					
137					
138					
139					
140		g1235-1236.8/w g1248-1248.9/m	*1239-1247/m		M
141					
142	I_s 1550-1615/vw				M,H
			*1555-1625/1		W
142a					
143	I_s (weak) in progress all day	b1356.3/w	*1404-1412/2		H,M
144					
145					
146	I_s 2204-2340/1	IIIG2100-2102/3 IIIs 2120-2240	*2042-2046/3		H,M
	C2140-2440/1-				W
147	I_s and cont. in progress all day (weak)	III_s 0033-0333/1	*0244-0249/2		S
148	I_s and cont. in progress		0545-0559/3		S
149					
150		G0103-0105/3		0038->0054	H
		G0047-0048/1	0102-0124/1		W
151					
152			0021-0029/1		H
				0006-0028/2	
153					
154		g1950-1951/1- g1952-1953/1	*1942-1953/3		H,W
155					
156		G1815.5-1817/3	*1820-1826/3		H,M

5:VIII/(1)-8R

TABLE VIII

SPOT DATA						
. Wilson pe	CMP Gr.Day	Lat.	H	When Seen	Area	Mt. Wilson No.
	1960 Sept.					
ℓβγℓ	21.4	S 21	(20)	15-27		15043
e Spot Data Event 157						
βpℓ	24.6	S 19	(20)	18-29		15047
βd	25.8	S 12	(10)	19-25		051
βpℓ	26.7	S 11	16	26- 2		060
e Spot Data Event 157						
	Oct.					
βℓ	08.4	S 17	(12)	2-13		15067
αpℓ	08.4	S 16	18	2-14		068
e Spot Data Event 167						
βd	10.3	N10	(10)	4-12		15072
βfℓ	11.2	N12	19	4-17		074
ℓαd	21.8	S 21	(2)	20-20		15096
e Spot Data Event 170						
e Spot Data Event 170						
e Spot Data Event 170						
e Spot Data Event 170						
ℓγℓ	21.1	N20	25	14-27	1225	15090
ℓβpℓ	31.3	N22	(20)	24-4		15099

5·UTTI -92

3

	200 MC DATA						OTHER RADIO DATA						
Freq. Range (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
							9100	S	1307.5	8		1500	N
							808	s	1308	2	1309	69	PRA
							600	c	1309	1.5		215	UC
							545	c	1309	1		100	N
	f	1235.5	13.5	1240	> 300	Osl.	9100	c	1235	5		310	N
							1500	E	1234.8	17	1238.4	59	HHI
							808	c	1235	5	1238	41	PRA
							600	c	1236	3		35	UCL
							545	c	1238	1		40	N
							23	c	1236.3	1.3	1237.3	150	Aop
	E	1529				N(P)	167	E	1529	156	1634		NBS
39-18							18		1557	553			Bo
125-50							167	s	1356.4	0.9	1356.4	> 100	NBS
							23	f	1359.4	5.5	1400.5	350	Aop
420-40	C	2039.5	2.4		>1400	Hir	1420	c	2044.5	2.5	2046	65	SYD
							545	s	2042	2		60	N(P)
							167	E	2041				NBS
							18	E	2030	227			HA
39-22													
	C	0244	1.5	0244.8	1100	Tk	9500	C	0242.7	2	0244.4	502	TK
							3750	c	0240	9	0242.3	60	NAG
							2000	c	0241	4	0242.3	35	NAG
							1420	c	0240	7.5	0244	129	SYD
							3750	s	0535	70	0612.5	20	NAG
							1420	c	0536	6	0538	68	SYD
							1000	f	0536	4	0538	17	NAG
580-320 39-22	C	0103.3	22	0107.5	5300	Tk	9500	C	0103.7	33	0108	7400	TK
							9400	C	0039	75	0108	14700	NAG
							3750	C	0039	85	0104.6	12000	NAG
							2000	C	0035	90	0105.2	7100	NAG
							1000	C	0035	90	0105.6	3770	NAG
							545	C+	0103.5	17		>180	N(H)
							200	C+	0103	33		>1000	HIR
							167	C+	0102	13	0103	>1000	NBS
125-50	c	0009	1.5		>350	N(H)	9400	C+	0010	25	0028	220	NAG
580-180	C	0012	18		300		2000	C+	0010	23	0028.5	110	NAG
							545	C+	0006.5	13.5		60	N(H)
							167	C+	0009	6	0009	> 1000	NBS
									0015	15	0020	> 100	
100-22							167	C	1932	10	1939.5		NBS
							18		1952	5			McM
140-35	c	1816	1.5		200	N(P)	167	C	1815.5	1.7	1816.1		NBS

10 CM EVENTS						PLAGE DATA								
Type	Beg. (UT)	Dur. (Min)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification
6	1703	6	1705	19	Ot	5858	1960 Sept. 21.5	350°	S18	3.5	5600	29	2	5828
*GB	1702	97	1756	2000	Ot	5858								
4	1839	160		18										
						*5863	25.5	297°	S15	3	8000	33	2	5825, 5830
*C	0532	28	0545	1120	Tk	5858								
*C	0708	20	0719.2	510	Nag	5880	Oct. 07.5	139°	S12	3	5000	26	5839	
S	0716.5	21	0719	410	N									
*C	0524.6	10	0528.2	960	Tk	5880								
3	1722	85	-	8	Ot	5884	10.5	99°	N15	3	4500	19	1	New
6	1745.5	7	1748	83										
3	1910	80	-	5	Ot	5900	21	321°	S14	3.5	5500	4	3	Parts of 5861, 5863
c	0147	3	0149.1	18	Nag	5884								
s	1108.6	9.4	1113	50	HHI	5884								
						5884								
						5884								
						5901	21.5	314°	N21	3.5	6500	29	3	5862
9	2056	4.7		9	Ot	5909	31	189°	N24	3	3000	18	1	New
6	2100.7	37	2122.5	325										
4	2137.7	20		15										

5.VHI-9L

2

POLAR CAP ABSORPTION							GEOMAGNECTIC STORMS							
Onset Date	Time Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	t	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
Aug 15	< 1130		∼ 24		G,VA		Aug. 14	1510	0.6d	sc	m	2	4	136
							16	1409	2d	sc	ms	18	8	138
							19	1616	2.5d	sc	m	10	6	141
Aug														
26	10--		120		G									
							29	0022	1.9d	sc	ms	16	7	144
							Sept. 02	1159	0.9d	g	ms	8	7	149
Sept 03	0500	31	89	22	B,L,G,VA									
							04	0230	2.4d	sc	ms	16	8	153
							07	1100	1.4d	g	m	2	6	155

5·VIII·8R
3

		FLARE DATA						SHORT-WAVE RADI FADEOUTS					
Event No.	Date	Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	Type	Imp.	Beg. (UT)	.r. Min.)	Wide Spread Index	No. of Obs.
	1960 Sept.												
157	14	1721	1814	1732	1-	S17 E90	3/3	*SL	3	1620	130	5	7
158	16	1706	1855	1724	1	S22 E67	3/2	*S	3	1709	101	5	9
159	23												
160	25												
161	26	0525	0616	0537	1+	S22 W64	4/3	*SL	3+	0520	121	1	1
162	26												
163	26												
164	29												
165	Oct. 04												
166	05-06												
167	10	0713	0836	0722	1+	S17 W23	5/3						
168	11	0517	0755	0535	2	S17 W36	8/5	*S	3	0525	63	5	4
169	11												
170	12	1742	1859	1750	1	N11 W24	3/3	S	2-	1744	26	5	6
171	13	1901	2030	1923	2	S16 E83	5/4	S	1-	1911	21	5	4
172	14	0148	0207	0156	1-	N09 W42	2/2						
173	15												
174	15	1109	1138	1117	2	N15 W66	2/2	*S	3	1100	145	5	4
175	15							*G	3	1715	205	5	4
176	17							*G	3	1428	126	5	4
177	21												
178	23	2114	2215	2130	1+	N22 E90	3/3	SL	2	2100	60	5	2

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Freq. Range (mc)	200 MC DATA Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	OTHER RADIO DATA Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
200-<25							9100	s	1704.5	2		165	N
175-25	C+	1710	88		>900	N(P)	9100	C+	1709.5	13		740	N
							545	C+	1710	74		>250	N(P)
<3500-<25							167	C+	1709	89	1809	>1000	NBS
								C+	1838	47		>100	
							18		1718	8			McM
									1744	51			
	C	0535.3	2.8	0535.7	600	Tk	9500	C	0536.5	27	0539	3000	TK
							1420	C	0529	38		>139	SYD
							545	c	0531.5	10		20	N(H)
								c	0605	25		40	
	c	0705	1.5		800	N	9500	C	0718	6	0718.8	937	TK
	R	0717					2000	C	0708	20	0719.3	270	NAG
							1420	c	0704	21	0718	(30)	SYD
	C	0527.2	21.7	0527.8	560	Tk	9500	C+	0525	18		>1215	TK
							9400	C+	0524	35	0529	2600	NAG
							2000	C+	0523	26	0527.6	630	NAG
							1000	C+	0519.5	40	0524.7	310	NAG
							545	C+	0521	38		180	N(H)
280-40	C	1748	4		>600	N(P)	545	c	1746	3		40	N(P)
400-150	R	1757					108	c	1751.5	2	1753	>1000	NBS
								C	1756.8	4.2	1758.9	>1000	
180-50							108	c	1905.1	2	1906.2	>100	NBS
41-25													
	C	0147.2	1.2	0147.8	660	Tk							
	C	1114.5	0.8		>60	N	9400	s	1110.2	10	1113	285	HHI
							1500	s	1112.2	7	1113.6	155	HHI
							127	c	1116	6	1116	>78	TOR
							108	s	1452.6	2	1454.4	>30	NBS
								s	1456.8	0.8	1457		
41-25													
41-25							1420	c	2100	30	2122	(34)	SYD
33-25							108	c	2107.0	16	2110	<30	NBS
41-30													

10 CM EVENTS						PLAGE DATA									
Type	Beg. (UT)	Dur. (Min)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification	Mt. Wil Type
						1960 Oct.									
*C+	1026	>235	1045	>800	HHI	5909									See Sp
3	1628	> 280	1900	28	Ot	5921	Nov. 07.5	90°	N14	3	6500	10	2	5884	dβ
2	1835	25	1838	28											ℓβ
															ℓα
*C+	1009.6	>100	1022 1121 1136		HHI	*5925	12	30°	N24	3.5	9000	98	3	5894	ℓβγ
C	1015	12	1021.7	360	N										
C-	1119	33		600											
*C+	0315	115	0345	3450	Nag										
						5925									See Sp
*GB	1320	340	1345.5	5500	Ot	5925									See Sp
c	2355	45	0003.3	45	Nag	5925									See Sp
*CF	0258	140	0354.6	4300	Nag	5925									See S

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POLAR CAP ABSORPTION						GEOMAGNECTIC STORMS							
)nset Time													
)ate	Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Obs	t	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
						1960 Sept. 23	20--	1d	g	m	3	5	159
;	1328		2d	F,G									
						26	1927	0.7d	sc	m	1	5	163
						29	21--	3d	g	ms	11	6	164
						Oct 04	1400	0.7d	g	ms	10	7	165
						05 06	19-- 0239	4.4d	g sc	s	12	9	166
ct 1	{0000 05--}	~12	48	G									
						15	10--	0.6d	g	m	2	4	173

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3

Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	SHORT-WAVE : DIO FADEOUTS Type	Imp.	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.
179	1960 Oct. 24												
180	29	* 1026	1252	1030	3	N22 E27	4/2	*G	3	1029	80	5	2
181	29												
182	Nov. 03												
183	06	* 1752	2030	1841	3	N13 E07	1/1	G	1	1708	67	5	4
184	10	* 1009	1635	1023	3	N28 E28	13/3	S	2	1022	90	4	3
185	10												
186	11							*S	3+	0311	185	5	5
187	11	0305	0428	0340	2	N28 E12	2/1						
188													
189	12	* 1315	1922	1330	3-	N27 W04	8/4	*S	3+	1326	154	5	9
190	12												
191	12												
192	14	0000	0100	0016	2	N28 W18	3/2	SL	2-	0010	53	5	4
193	14	0246	0520	0304	2+	N27 W20	2/1	*SL	3	0300	120	5	5
194	14												

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1960-1962 (CONTINUED)

	DYNAMIC SPECTRUM DATA				
Event No.	Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs.
157		G1758- 1802/2			H
158	I_s 1717- 1722/m	g1716.7- 1718/w	*1714- 1728/3	* 1717- 1911/3	H,M,
159					
160					
161		g0526/1 G0537- 0541/3	*0543- 0604/2	*<0554- >0611/1	S
162					
163					
164					
165					
166					
167					
168	I_s (weak) in progress all day I_s 0532- 0613/2	b0516/1 g0519- 0523/1 G0524 0530/3 G0555- 0601/1	*0530- 0547/3	* 0532- > 0613/2	S
169					
170	I_s 1750- 2130/w	G1745- 1749/2	*1750- 1802/3	* 1753- 1759/3	H,M
171	I_s 1904- 1916/w	III_s 1905- 1914/1-	*1905- 1907/2 *1920- 1932/1 *1936- 1946/1- *1952- 1954/1-		H,M W
172		G0147.5- 0149.5/1 b0152/1 b0153/1	*0154- 0200/1		S
173					
174					
175		g1720- 1721.9/m			M
176		g1453.8- 1454.6/m g1456.2- 1456.9/w III_s 1419- 1600/1+			M W
177					
178	I_s (weak) in progress all day	G2053- 2056/2 g2101/1- G2104- 2106/1 g2110/1+ G2115- 2116/1+	*2116- 2122/1+ 2147- 2149/1	* 2120- 2200/1-	W,H

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TABLE VIII

	SPOT DATA					
son	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
	1960 Oct.					
ot Data Event 178						
	Nov.					
ℓ	06.1	N08	(10)	1-11		15109
pα	06.6	N11	(12)	31- 9		107
p	08.0	N16	(15)	1-13		110
ℓ	12.0	N25	31	8-18	1775	15114
ot Data Event 184						
ot Data Event 184						
ot Data Event 184						
ot Data Event 184						

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Event No.	DYNAMIC SPECTRUM DATA Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs.
179					
180					
181					
182					
183			*1840-1841/2 1843-1850/2		H
184					
185					
186					
187	I_s 0305-0330/2	III_s 0318-0339/1 g0357-0358/3	*0349-0357/2	* 0330->0709/3	S
188					
189	I_s 1700-2335/3			*<1345->1800/3	H,M
190					
191					
192	g0025-5/1 g0038/1 I_s 0112-0305/1	III_s 0018->0614/1 G0055.5-0104/2	*0009-0011/1		S
193	I_s 0500->0614/1	III_s in progress g0240-0241/3 g0302/3 G0335-0344/3 g0440.5-0441/2		* 0305-0500/3	S
194					

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TABLE VIII

SPOT DATA						
ilson	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
pot Data Event 184						
pot Data Event 184						
pot Data Event 184						
rl	Dec. 10.6	N26	(15)	4-16		15151
pl	03.5	S08	(25)	27- 9		15140
pl	05.1	S10	(10)	7-10		155
pd	13.6	N05	(15)	7-14		15157
pd	13.8	N13	(12)	9-18		162
pd	14.6	N17	(15)	13-18		166
pl	Dec 31.4	N15	30	26-6		15178
l	Jan. 1.1	N16	31	26-7	1475	179
pd	5.6	S15	10	30-7		15190
pl	31.0	N08	(25)	24-5		15206
pd	31.8	N09	(10)	28-30		211
pot Data Event 5						

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	200 MC DATA						OTHER RADIO DATA							
Freq. Range (mc)	Type	Beg. (UT)	Dur. (Min.)	Max (UT)	Peak Flux	Obs.	Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	On Da
	C+	1029	56		2100	N	9400	C+	1025	> 180	1028	440	HHI	
											1041	860		
							1500	C+	1026.5	273.5	1042	620	HHI	
											1055	694		
							808	C+	1026	64	1041	>170	PRA	
							600	C+	1028	64		900	UC	
							545	C+	1029	62		> 500	N	
							234	C+	1029				Aop	
									1039.7	41	1107	2000		
							178	C	1038	39	1105	290	KIS	
							23	f	1028.5	1.2	1029.1	200	Aop	19
								F	1041	13.2	1041.8	800		Oc
														29
50- 40 70- 35														
	RBL	1020	56		480	N	9400	C+	1009.2	214	1018.8	680		
	C+	1116	44		27000						1122	1090	HHI	
											1135.6	858		
							9100	C	1012	14	1019	600	N	
								C+	1119	33		>1500		
							1500	C+	1016.4	200	1020	365		
											1120.6	760	HHI	
											1135.8	400		
							808	C+	1018	151	1224	>320	PRA	
							600	RF	1018.3	56		160	UC	
								C	1115	31		>290		
							545	R	1020	56		100	N	
								C+	1116	28		1000		
							178	C+	1021	69	1108	102	KIS	
							127	EC+	1035	>265	1130	>1300	Tok	
														N 1
	C+	0321	250	0435	10000	N	9500	C+	0315	105	0333	5800	TK	
							2000	C+	0316	110	0350.4	1800	NAG	
							1000	C+	0317	120	0422.8	47500	NAG	
							545	C+	0318	160		7500	N	
580- 50	C+	1327.5	270		> 2000	N	9400	GB	1255	>155	1330	>1060	HHI	
											1410	950		
							1500	GB	1323	>90	1328.7	930		
											1354.8	830	HHI	
											1414	900		
							808	C+	1325	80	1341	> 240	PRA	
							600	C+	1326	120		1360	UC	
							545	C+	1326.5	100		>5000	N	
							108	E	1347	> 500			NBS	
							9500	C	0011	6	0013.4	903	TK	
							2000	c	0010	25	0023.7	20	NAG	
							1420	c	0017	21	0021	(>38)	SYD	
							1000	C	0017	17	0029.4	980	NAG	
	C+	0319	140	0344	> 700	N	9400	FCS	0258	140	0350.5	8050	NAG	
							2000	FCS	0258	140	0443.7	1800	NAG	
							1000	FCS	0259	140	0336.1	1400	NAG	
							545	E	0300	35		75	N(H)	
								C+	0335	120		>220		
														1

10 CM EVENTS						PLAGE DATA									
Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification	Mt. Typ
*C+	0219	80	0222	11600	Nag	5925									See
1	1554	2	1555	4	Ot	5925									See
9 6	1939 2023	44 >47	 2026.5	14 400	Ot	5925									See
9 6 4	1728 1828 1855	60 27 >120	 1837.5	10 330 45	Ot	5959	Dec. 10.5	15	N30	3	6500	13	4	5925	
						5953	04	100	S10	3	3300	3	1	New	
3 1	1520 1523	70 8	1550 1527	9 6	Ot	5961	14	329	N12	2.5	5000	6	5	Part [illegible]32	
						5983	1961 Jan. 01	92	N17	3	7000	45	1	New	
						5990	5.5	32	S14	2	1500	2	8	Part of 5958	
2	1423.8	7	1424.7	160	OT	6013	31.5	50	N09	3	2800	25	2	5986a	
	2003	3	2004.3	70	OT	6013									Se

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	POLAR CAP ABSORPTION						GEOMAGNECTIC STORMS							
e	et Time Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	t	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
							1960 Oct. 24	1452	7.4d	sc	ms	16	8	179
0	12--		~192		G									
							Nov. 03	20--	1.3d	g	ms	6	6	182
ov	18--		> 24		G									
							11	0033	0.6d	sc	m	4	5	186
l	04--		>24		G									
							12	1348	2.6d	sc	s	17	9	190
2	1400	16	>73	170	B,L,G,VA									
	22--		>24		G									

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(3)

Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	SHORT-WAVE RADIO FADEOUTS Type	Imp.	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.
195	1960 Nov. 15	* 0207	0427	0221	3	N25 W35	2/1	*S	3+	0217	253	5	5
196	15												
197	15												
198	19												
199	19	1543 1657	1649 1735	1556 1706	2 1	N28 W90	2/2	S	1+	1542	30	-	2
200	20	2017 2126	2032 2258	2020 2135	1 2	N28 W90	4/4	SL	3-	2023	82	5	11
201	21												
202	21												
203	24												
204	27							G	1+	1525	53	-	1
205	30												
206	Dec. 05	* 1825	2350	1838	3+	N26 E74	4/3	*S	3	1830	100	5	10
207	06												
208	06												
209	07												
210	08	1555	1736	1609	1-	S09 W49	1/1						
211	15												
212	16	1517	1630	1531	2	N17 W35	3/2	SL	1+	1530	35	3	3
213	17												
214	27												
1	1961 Jan. 01												
2	03	0224	0240	0225	1	S15E36	1/1						
3	07												
4	18												
5	30	1418	1440	1425	1	N11E06	4/2	S	1	1423	17	4	3
6	30	1958	2014	2005	1-	N11E03	4/3	G	1	2000	20	-	1

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1960-1962 (CONTINUED)

Ser. No.	DYNAMIC SPECTRUM DATA Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	
195			*0221- 0248/3	* 0221- >0618/3	
196					
197					
198					
199	I_s 1625- 1700/w g1700- 1702/s	G1559- 1602/2 G1659- 1701/3 G1742- 1754/2	*1636- 1723/3		
200	I_s (weak) in progress all day		*2028- 2035/3	* 2027- 2046/2	
201					
202					
203					
204			*1523- 1526/3	* 1509- 1513/3	H
205					
206	I_s (weak) in progress all day		*1834- 1850/3	* 1834- 1858/3	H
207					
208					
209					
210	I_s (weak) in progress all day		*1604- 1610/2		H
211					
212			*1532- 1548/3 *1548- 1557/2		H W
213					
214					
1					
2		G0157- 0200.5/1	*0211.5- 0229/2		S
3					
4					
5	I_s Progress all day c1505- 2255/1-	G1424- 1425/3 G1426.4- 1429/3	*1426- 1430		H.
6	I_s in progress	G2003- 2005/3 G2009- 2012/3	*2006- 2013/2		H.

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TABLE VIII

SPOT DATA						
Wilson e	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
e Spot Data Event 5						
α d	Feb. 27.7	S14	(5)	26-26		15235
α pd	28.0	S15	(1)	21-22		231
α pd	Mar. 19.4	N04	18	13-23		15247
β pd	17.7	N20	(10)	13-16		15246
e Spot Data Event 19						
[illegible]	31.6	S13	(15)	27-3		15261
[illegible]	31.8	S14	(15)	25-5		259
[illegible]	Apr. 6.1	N15	(15)	4-11		15268
ee Spot Data Event 28						
ee Spot Data Event 28						
[illegible]	Apr 30.2	S05	12	25-29		15282
[illegible]	30.4	S06	(20)	24-4		281
[illegible]	30.7	S10	(20)	24-5		280
[illegible]	30.5	N04	(20)	27-6		15284

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Obs.	Freq. Range (mc)	200 MC DATA Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	OTHER RADIO DATA Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
S		C+	0221	> 300	0223	5300	Tk	9400	C+	0218	85	0228.4	24000	NAG
								2000	C+	0220	75	0222.6	4950	NAG
								1000	C+	0220	235	0227.1	8600	NAG
								545	C+	0221.5	160		800	N(H)
								108	S	1557.5	1		> 30	NBS
									C	1658.2	4.8	1650.3	> 300	
[,M	450-200													
[,M	125-30 580-60	C	2028	5		220	N(P)	545	RF	2025	50		90	N(P)
								108	C+	2027.5	7	2033	> 300	NBS
										2038	15	2039.9	> 300	
								18	s	2042	2			HA
,M	75-50 580-150													
,M	125-25 580-25	C	1835	8		> 1000	N(P)	545	C	1832	11		> 180	N(P)
								108	C+	1832	18	1837.1	> 300	NBS
										1850.5	9	1853.8		
,M	170-35							108	C	1604.3	6	1609.6		NBS
,W	130-29 41-30							108	C	1531	4.5	1532.6	> 300	NBS
								9500	c	0215	7	0217.5	504	TK
									c	0230	3	0230.3	493	
								1000	c	0157	6	0200.7	55	Nag
								208	s	0156	3	0158	370	uss
M	400-100	c	1424.5	0.5		> 700	N	9100	S	1424	2		800	N
		C	1426	3		2650		1500	s	1424	6.5	1424.7	77	HHI
								536	c	1424	3	1424.5	470	Pra
								108	C	1424	2	1425.5	> 300	NBS
									C+	1426	3.5	1428	> 300	
M	350-80	c	2003.5	1		700	N(P)	545	c	2003	1.5		120	N(P)
		C	2007	2		800		18	s	2004	2			Bo
									s	2010	1			

10 CM EVENTS						PLAGE DATA								
Type	Beg. (UT)	Dur. (Min)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.		Avg. Max. Area	No. of Flares	Age in Rotation	Identification
2	1511.5	5	1514.3	350	OT	6013								
4	1516.5	10		2										
						6042	Feb. 27.5	54°	S13	2.5	1200	3	1	New
						Mar. 6059	19.5	151°	N05	2.5	3200	7	1	New
						6057	18	171°	N19	2	1400	3	5	Part of 6030
-	1738.5	8.5	1741.5	15	OT	6059								
4	1747	25		2										
C	1026	14		460	N	6069	31.5	353°	S13	3	3500	27	1	New
6	2232.5	11	2237.7	25	OT	Apr. 6077	6	280°	N15	3	2000	27	1	New
3	2056	45		3	OT	6077								
2	2101.8	8	2104	105										
c	0012	7	0016.3	55	NAG	6077								
3	1640	237		32	OT	•6098	30.5	316°	S13	3	8000	30	3	6074
6	1656.8	8	1702	18.3										
						6097	Apr. 30.5	316	N04	3	3500	21	1	New

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POLAR CAP ABSORPTION						GEOMAGNECTIC STORMS							
Onset Time Date	Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
15	0430	15	79	160	B,L,G.VA								
						15	1304	1.3	sc	ms	13	8	197
19	12--		48		G								
21	0200	15h	51	24	B,L,G,VA								
						21	0632	1.5d	sc	ms	12	6	202
						24	2052	1.7d	sc	m	5	5	203
						30	1908	1.9d	sc	ms	15	8	205
Dec 06	05--		140		G								
						Dec. 06	08--	0.6d	g	m	3	4	208
						07	1804	0.8d	sc	m	10	6	209
						15	08--	1.2d	g	ms	12	6	211
						18	03--	0.7d	g	m	3	5	213
						27	03--	1.6d	g	ms	12	6	214
						1961 Jan. 07 08	2047 1618	2.1d	sc	m	10	5	3
						18 19	06-- 12--	1.4d	g	m	12	6	4

5.VIII-11R (3)

Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	SHORT-WAVE RADIO FADEOUTS Type	Imp.	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.
7	1961 Jan. 31	1500	1535	1514	1	N10W10	5 4	S	1	1512	14	5	4
8	Feb												
9													
10													
11													
12													
13													
14													
15	21	2259	2342	2310	1	S13E78	2 2	G	1-	2227	36	-	1
16													
17													
18													
19								G	1	2000	114	-	2
20													
21	Mar 16	1604	1715	1615	1-	N20W13	4 3						
22	18	1738	1812	1742	1-	N05E07	3, 3	S	2-	1720 1747	87	-	1
23													
24	26	*1012	1140	1033	3	S15E74	15 3	*S	3	1019	41	5	6
25													
26													
27													
28	Apr. 04	2232	2306	2240	1	N13E18	2 2	G	1-	2227	21	-	1
29	05	2051	2149	2059	1	N12E03	1 1						
30	06	0010	0038	0018	1-	N13E01	1 1	G	1-	0004	43	-	1
31													
32	26	*1646	1945	1710	3	S11E53	3 2	*SL	3	0650	113	5	6
33													

5-VIII-12L
①

1960-1962 (CONTINUED)

Event No.	DYNAMIC SPECTRUM DATA Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs.
7	I_s (weak) in progress all day c1513-1515/1	G1512-1515/3	*1517-1519/2		H,M
8					
9					
10					
11					
12					
13					
14					
15		b2239/1 g2310-2410.5/2	*2317-2318/1 *2327.5-2331.5/1		S,W
				* 2310-2343/1-	W
16					
17					
18					
19		g2138.5-2139/1-	*2145-2151/1-		B
				* 2220-2245/-1	
20					
21		g1612/1-	*1627.5-1640/1		W
22		G1739-1743/3	*1749-1754/1 *1757-1800/2		H,W
23			*2222-2237/1	* 2237->2330/1-	W
24					
25					
26					
27					
28		g2235/w g2242-2243/1		* 2235-2320/2	H,M,W
29				* 2057-2105/3	H,M
30		b0040/1 b0042/1 b0049/1	*0015-0021/3		H,S
				* 0013-0019/3	H
31					
32					
33					
34					

5.VIII-12R (1)

TABLE VIII

SPOT DATA						
Wilson	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
Spot Data Event 32						
pl	June 6.6	S05	(15)	2-11		15313
l	8.1	N02	(15)	2-12		15314
d	8.5	N10	(10)	8-9		318
pl	15.4	N03	28	9-21		15319
Spot Data Event 49						
Spot Data Event 49						
pl	19.7	N12	20	19-25	1050	15333
βpl	28.5	N06	24	27-4	1250	15341

Freq. Range (mc)	200 MC DATA						OTHER RADIO DATA						
	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
260-	C	1512	1.5		220	N	9100	c	1514	1		158	N
80							600	c	1512	0.3		80	Dc
								s	1513	3		95	
							108	c	1512	2.6	1513.2	> 30	NBS
								c	1517		1518.3	>300	
41- 29													
38- 27 36- 26													
41- 23													
115- 70 80- 25	c	1738.5	2.5		550	N(P)							
41- 28													
	RF	1027.5	32		400	N	9500	GB	1019.5	35.5	1030.6	750	HHI
											1032.9	670	
							9100	C	1026	12		1150	N
							1500	GB	1020	110	1028.7	300	HHI
											1029.6	300	
							808	C+	1026	94	1109	> 220	Pra
							545	C+	1027	94		250	N
							536	C+	1024	96		>450	Pra
							111	C+	1030	73	1034	3000	Aop
							30	C+	1033.8	20	1035	2000	Aop
							3750	c	2235	8	2238	31	Nag
580-	RF	2236	24		800	N(H)	2000	f	2235	8	2238	40	Nag
<100							1000	f	2234	12	2241.8	115	Nag
							545	c	2235	11		85	N(H)
							108	c	2236.5	0.7	2237.1		NBS
3000-	C	2057.5	5	2100.2	380	Hir	545	C	2057	8.5		> 350	N(H)
125							108	-	2059	9	2059.9		NBS
200-	c	0013.1	3.5	0013.7	200	Hir	9400	s	0014	10	0016.2	28	Nag
40							2000	c	0012	7	0015.4	65	Nag
580-							1000	c	0012	7	0016.6	73	Nag
150							545	c	0013.5	5.5		>170	N(H)
							108	C	0016.6	6	0020	>300	NBS
							18	c	0015	5			Ha
							108	c	1647.5	0.6	1648	30	NBS

10 CM EVENTS						PLAGE DATA									
Type	Beg. (UT)	Dur. (Min)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification	Mt. Typ
3	2145	36		10	OT	6098									See
2	2205	9	2208.8	95											
						6134	June 6.5	187	S04	3.5	2500	4	1	New	
6	1500	27	1507	365	OT	6135	8	167	N05	3.5	3500	23	2	6106	
4	1527	81		10											
f	0438.5	7	0442.7	26	NAG	*6140	15.5	68	N08	3.5	5400	30	1	New	
3	1611	40	-	2	OT	6140									Se
1	1612	6	1614.5	6											
2	1627	8	1629.5	30											
3	1630	55	-	5	OT	6140									S
2	1638	9	1642	185											
2	1717.5	6	1718.5	95											
						*6151	20	8	N12	3	4200	30	1	New	
						6155	28.5	256	N08	3	3600	26	1	New	

POLAR CAP ABSORPTION							GEOMAGNETIC STORMS							
Onset Date	Time Hr. (UT)	Rise Time to Peak	Dur. (Hrs.)	Int. (db)	Obs.	t	tart Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
							Feb 03	0907	0.4d	sc	m	8	5	8
							04	1331	1d	sc	ms	16	7	9
							06	0106	0.6d	sc	m	11	5	10
							13	0253	0.6d	sc	ms	12	5	11
							16	0042	0.7d	sc	m	11	5	12
							17	06--	1.5d	g	ms	14	7	13
							19	06--	2.7d	g	m	5	5	14
							Mar. 05	1800	0.9d	g	ms	8	7	16
							09	1327	1.2d	sc	ms	15	7	17
							13	2317	2.5d	g	m	6	5	18
							19	04--	1d	g	m	8	6	20
							27	1503	1d	sc	ms	12	6	25
							31	1511	0.8d	sc	m	2	5	26
							Apr. 02	20--	0.7d	g	ms	3	6	27
							09	06--	2.5d	g	ms	10	6	31
							13	1450	2.2d	sc	ms	17	8	32
							May 01	23--	0.4d	g	ms	1	6	34

5.VIII-12R
(3)

Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	SHORT-WAVE RADIO FADEOUTS Type	Imp.	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.
35	1961 May 04												
36	04	*2145 2202	2200 2340	- 2213	3	S10W56	4/4	SL	1+	2205	40	5	8
37	07												
38	09												
39	10												
40	16												
41	22												
42	25												
43	30												
44	June 01												
45	02												
46	06												
47	09	2129 2205	2150 2213	2134 2209	1-	S03W52	1/1						
48	11	1502	1620	1518	2+	N02W49	5/1	S	2+	1503	57	5	7
49	13	0439	0456	0442	1	N02E28	1/1						
50	14	1605	1700	1632	1	N02E08	9/5	SL	1+	1625	25	5	4
51	14												
52	15	1622 1716	1730 1730	1642 1718	2	N05W07 N02W06	7/4	S S	1+ 1-	1640 1720	35 15	5 5	7 4
53	20												
54	20												
55	29												
56	29	1947	2002	1953	1-	N06W21	2/2						
57	July 04												

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1960-1962 (CONTINUED)

Event No.	DYNAMIC SPECTRUM DATA				
	Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs
35					
36		g2203- 2205/2 g2208- 2212/2	*2209- 2237/1	* 2249- >2401/1-	W
37			*1452- 1513/-1		W
38					
39					
40					
41					
42					
43					
44					
45					
46					
47		G2138- 2143/3	*2130- 2159/3	* 2153- 2243/1-	W
48		G1503- 1507/3	*1508 1515/2		H,M
				* 1505- 1526/3	H,V
			*1516- 1523/3		W
49	c0439- 0440/3	g0439- 0440/3 G0441.5- 0443.5/3	*0445- 0446/1		S
50	c1628- 1635/2	G1613- 1615/2 G1627- 1631/3	*1634- 1638/1		H,M
51					
52	I_s (weak) in Progress all day	G1635- 1646/3+ G1702- 1712/3- G1718- 1720/3+ G1721- 1722/1	*1646- 1701/2 *1723- 1727/2		H,M H
				* 1717- 1732/1-	W
53					
54					
55					
56			*1956- 2055/1+		W
57					

5 VIII -1

TABLE VIII

SPOT DATA						
lson	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
l	July 13.9	S07	28	8-20	1400	15353
pot Data Event No. 58						
pl	16.5	N12	26	9-23		15355
pot Data Event No. 58						
pot Data Event No. 58						
pot Data Event No. 58						
d	19.8	S07	11	14-22		15359
pd	20.7	S05	(10)	18-23		362

5.VIII -14c
3

	Freq. Range (mc)	200 MC DATA Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	OTHER RADIO DATA Freq. (mc)	Type	Bet. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
	41-							9400	s	2207	9	2209.2	25	Nag
	20							3750	c	2207	6	2209	80	Nag
								2000	c	2205	8	2208	110	Nag
								1000	f	2205	8	2209	30	Nag
								108	s	2207.5	3	2208.6	> 30	NBS
								18	c	2202	3			Ha
									c	2209	3			
	40-													
	31													
	41-	f	2135	7	2142	96	Uss	18		2138	5	2142		McM
	24													
I,W	150-	C+	1504	27		> 900	N	9400	c	1505	10	1508	100	Pra
	12							808	C+	1503	17	1507	187	Pra
	3000-							600	C+	1503	24		500	UC
	28							545	C+	1503	23		250	N
	41-							108	C+	1505	4.5	1506	> 300	NBS
	11									1509.5	20	1531	> 300	
								18	C	1505	6			McM
									C	1515	4			
		c	0442.3	1.3	0442.9	> 830	Hir	2000	f	0438.5	6	0440	34	Nag
								1000	f	0438.5	6	0439.5	82	Nag
								600	c	0438.5	2.5		87	UC
								545	c	0439	1.2		25	N
I.W	140-	c	1612	5		160	N	1500	c	1627.3	8	1629.8	111	HHI
	45	c	1627.5	4		150						1630.5	110	
								600	c	1613	2		32	UC
									c	1628	4		16	
								545	c	1612	2		12	N
									c	1628	4		16	
								108	c	1618.8	2	1620	> 300	NBS
									c	1633	4.5	1634	> 30	
									c	1640.8	3.5	1643	> 30	
.W	150-	C	1635	8		480	N	9400	C	1639	25	1641.8	427	HHI
	20	C	1704.5	3		>1000			C	1718	10	1718.4	466	
	200-	C	1718	2.5		>1000		9100	S	1640	5		265	N
	50								s	1718	2		292	
	41-							1500	s	1630	4	1632	101	HHI
	25								s	1637.6	17.6	1642.2	151	
									s	1718	7	1719	165	
								545	c	1635	12		18	N
									S	1718	2		> 750	
								108	c	1638.7	2.8	1640.5	> 30	NBS
									C+	1651.7	4.3	1653.5	> 300	
										1700	109	1708	> 30	
								18		1635	3			Bo
										1638	5			
										1644	9			
										1700	10			
										1717	5			
	35-							18	f	1955	35			McM
	20													

10 CM EVENTS						PLAGE DATA									
Type	Beg. (UT)	Dur. (Min)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification	Mt. Wi Type
9	1604	46		8	OT	*6171	1961 July 14.5	44°	S10	3.5	5600	78	3	6144	αβγ
6	1650	115	1745	1500											
4	1845	285		65											
GB	1018	87	1042	4100	N	6171									See S
4	1145	225		45	OT										
3	1432	458	1623	54	OT	6172	17	11°	N13	3	5000	5	2 & 3	6147 and 6151	[illegible]
6	1432	14	1436.3	54											
						6171									
6	1510.5	6.5	1512	76	OT										See S
6	1536	47	1610	111											
						6171									See S
*6	1552	42	1553.5	1200		6171									See S
			1621.3	1800											
4	1634	450		80											
IA	1634	222	1725.5	250											
						6174	July 20	331	S08	3	3500	4	1	New	αβ αβ

POLAR CAP ABSORPTION							GEOMAGNECTIC STORMS							
Onset Date	Time Hr. (UT)	Rise Time to Peak	Dur. (Hrs.)	Int. (db)	Obs.	t	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
							04	17--	3d	g	ms	10	5	35
							09	04--	0.4d	g	m	2	5	38
							10	21--	2.7d	g	m	1	5	39
							16	00--	0.7d	g	m	2	5	40
							22	0136	1.9d	sc	m	4	4	41
							25	02--	0.9d	g	m	11	6	42
							30	0415	1d	g	m	5	4	43
							Jun. 01	0800	0.4d	g	ms	3	6	44
							02	0700	0.6d	g	ms	3	5	45
							06	17--	0.3d	g	m	1	5	46
							14	2332	1.2d	sc	m	3	4	51
							20	1618	2.3d	g	ms	17	7	54
							29	00--	0.5d	g	ms	7	6	55
							July 04	13--	0.7d	g	m	9	6	57

5.VIII - 13R

		FLARE DATA						SHORT-WAVE RADIO FADEOUTS					
Even No.	Date	Beg. (UT)	End (UT)		Imp.	Position	No. of Obs.	Type	Imp.	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.
58	1961 July 11	*1615	2040	1700	3	S07E32	4/3	*S	3+	1648	245	5	10
59	12												
60	12	*1000	1300	1025	3	S07E23	18/6	*S	3	1023	97	5	8
61	12												
62	13												
63	15	*1433	1929	1558	3	N13E15	8/4	*S	3	1512	113	5	7
64	15	1508	1549	1512	2	S07W20	5/2	*S	3	1512	113	5	7
65	15												
66	17												
67	18	*0920	1250	1005	3-	S07W59	19/7	*S	3	1000	113	5	4
68	18												
69	20												
70	20	*1553 1828	1735 1942	1847	3	S06W90	5/4	*S	3+	1550	370	5	11
71	21												
72	22												
73	23	2343	2430	2348	1	S06W49	2/2						

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1960- 1962 (CONTINUED)

Event No.	DYNAMIC SPECTRUM DATA Type I and Cont Time/Int.	Type III Time/Int.	II Time/Int.	IV Time/Int.	Obs.
58	I_s (weak) in progress all day	g1656/1 g1659-1700/1	*1702-1718/3	* 1655-1845/3	H,W
59					
60				*<1400-1925/1-	W
61					
62					
63	c1435-1443/1-	G1433-1441/3			H,M.
64	I_s 1540-1710/1 c1803->2453/1-	G1540-1542/2		* 1533->1623/3 * 1522-1803/3	H W
65					
66					
67					
68					
69					
70		G1554-1600/3	*1554-1556/3 *1557-1619/3	* 1552-1804/3	H,M
71					
72		g2330-2331/1		* 2315->2548/1-	W
73				* 2347-2359/3	H

5-VIII-14R
(1)

TABLE VIII

SPOT DATA						
Wilson e	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
pl	25.2	N08	29	18-31		15363
e Spot Data Event 74						
pl	Aug. 16.1	N07	21	9-21		15385
d	17.5	N01	(12)	12-20		391
e Spot Data Event 79						
fl	09.0	N17	(15)	9-14		15384
e Spot Data Event 79						
e Spot Data Event 79						
lβpl	Sept. 04.1	N13	29	29-9	1350	15411
l	15.0	S11	(25)	8-20		15418
d	14.2	S11	(15)	13-18		423
e Spot Data Event 85						
e Spot Data Event 88						
pl	21.9	N18	19	15-28		15425

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3

		200 MC DATA						OTHER RADIO DATA						
	Freq. Range (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
	140-	C+	1657	110		>900	N	9400	GB	1633	>120	1705.3	1225	HHI
	25											1744.7	1100	
	3900-											1805	740	
	9							9100	C+	1652	>38		1380	N
								1500	GB	1638.5	>150	1659	>620	HHI
												1745.5	910	
								600	C+	1652.5	94		840	Uc
								545	C-	1654	87		>400	N
								108	C+	1654	554	1750	>300	NBS
								18		1704	191			McM
	41-	C+	1022	80		22000	N	9400	GB	1000	190	1027	>1300	HHI
	18											1115	>680	
								9100	C+	1018	87	1029	6000	N
								1500	GB	1010	240	1023.5	1140	HHI
												1042.5	1820	
												1113	1250	
								600	C+	1019	100		950	Uc
								545	C-	1019.5	100		550	N
								111	C+	1024.2	96	1030	4000	Aop
								23	C+	1023.8	28.5	1038.4	3000	Aop
								18		1030	4			CE
										1120	65			
W	350-	c	1435.5	4		280	N	9100	f	1430	15		14	N
	7							1500	s	1428.4	1.6	1428.7	117	Ot
									C-	<1435	>240	1437	222	
												1600.7	410	
												1619	300	
								600	C	1431	20		47	Uc
								111	c	1435.8	2.8	1436.9	1500	AoP
								19		1435	315			McM
	3000-	RF	1530	120		100	N	9400	C	1510	17	1512.4	465	HHI
	100							808	c	1510	4	1512	100	Pra
	41-								C	1535		1620	55	
	9							545	C+	1525	70		400	N
								108	C+	1505	220	1615	>300	NBS
		C+	0944	60		1000	N	9400	GB	0938	217	0951	540	HHI
												~1000	>1200	
								9100	C+	0939	70		>2400	N
								1500	GB	0938.5	232	0951.2	>590	HHI
												0958	~1300	
								808	C+	0943	77		300	Pra
								545	C+	0944	50		650	N
								111	c	0921	1.9	0922.5	700	AoP
									C+	0944	226	0956.7	4000	
								23	C+	0946.2	44	0951.5	3000	AoP
W	420-	C+	1554	19		4000	N	9400	C+	1551.6	>180	1553.5	>1000	HHI
	150											~1620	>1000	
	250-							9100	EC+	1552	45	1553.6	~4000	N
	20							1500	C+	1552	>170	1554	>490	HHI
	3900-											1621.5	>520	
	10							545	C+	1552.5	37		700	N
								108	C+	1557	7.2	1559	>300	NBS
										1605.2	12.5	1608	>300	
								18		1557	256			McM
	41-	s	2318	1		125	Uss							
	20													
	580-	RF	2347	20		250	N(H)	545	C	2345	12		130	N(H)
	100													

10 CM EVENTS						PLAGE DATA									
Type	Beg. (UT)	Dur. (Min)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification	M Ty
C	0400	120	0509.5	32	NAG	6178	July 25.5	258	N08	3.5	4000	27	2	6155	ℓ
RF	0450	70	0510	41	N										
*C	0230	10	0236	574	TK	6178									S
s	2316	2	2316.8	40	NAG	*6199	Aug. 17	321	N12	2.5	6000	41	5	6175	ℓ ℓ
						6199									S
3	1611	45	-	2		6197	9	67	N17	3.5	1200	12	1	New	d
1	1613.5	4.5	1616	7	OT										
2	1629	4	1630.3	12											
3	2104	45	2113	5.5	OT	6199									S
1	2108	4	2109.5	4											
3	2036	99	2052	12		6199									S
2	2039	11	2044	43	OT										
6	2054.2	3.8	2056.3	38											
2	2042	10	2045.5	270	OT	*6212	Sept. 04.5	77	N15	3.5	6000	69	2	6197	*
4	2052	118		8											
3	1535	410	2005	9	OT										
3	1430	405	-	9		6223	14.5	305	S10	3	6800	22	1	New	$\ell\beta$
6	1546	31	1602	78	OT										$d\beta$
2	1621.8	5.2	1623.2	10											
9	1545	225		6		6212									S
*6	1930	61	2001	880	OT										
4	2031	>120		44											
S	0030	40	0040	280	NAG	6223									S
*C	1101	34	1104.6	532	N	6227	22	206	N19	3	2000	6	4	6206	$\ell\alpha$

5.VIII-15L

2

POLAR CAP ABSORPTION							GEOMAGNECTIC STORMS							
Onset Time Date	Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	t	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
July 12	0000		24	(1.5)	L									
12	1300	23h	72	136	B,L									
							13	1113	3d	sc	ms	17	8	62
15	1545		72	(3)	L									
							17	1826	1.5d	sc	ms	178		66
18	1130	8h	55	70	B,L									
							20	0248	1.3d	sc	m	11	6	69
21	0300		24	(5)	L									

5-VIII-14R
3

		FLARE DATA						SHORT-WAVE RADIO FADEOUTS					
Event No.	Date	Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	Type	Imp.	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.
74	1961 July 24	{0410 0449	0449 0612	0504}	2+	{N12E15 N15E19}	7/3	S G	1+ 2+	0418 0455	32 65	- -	1 1
75	26												
76	28	0240	0431	0248	2	N12W38	2/2	SL	2-	0227	90	5	6
77	30												
78	Aug 01												
79	10	2307	2353	2320	1	N08E71	3, 3						
80	11	0350	0412	0355	1-	N09E69	3 3						
81	12	1612	1640	1618	1	N17W49	4 3						
82	17	2102	2226	2114	1	N08W23	3, 3						
83	18	2038	2203	2048	2	N08W37	4, 4	S	1+	2040	40	5	8
84	29												
85	Sept. 03	2040	2125	2049	1	N10E01	3 3	S	1+	2043	32	5	6
86	06												
87	07												
88	08	1545	1650	1603	1	S10E89	2/2	SL	2+	1552	73	5	9
89	10	{1958 2018	2018 2054	2010} 2030}	1	{N08W80 N15W90}	3 3	*SL	3	1942	101	5	9
90	10												
91	13												
92	15	0031	0139	0041	1+	S15W11	2 2	SL	2-	0025	63	5	3
93	16	1057	1158	1110	2-	N18E77	8 3	S	2	1102	50	4	2

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	200 MC DATA						OTHER RADIO DATA						
Freq. Range (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
	c	0428.7	0.9		> 800	Hir	9400	S	0430	100	0510	30	Nag
	c	0429.6	0.6		550		2000	c	0452	15	0453.9	78	Nag
	RF	0437	250		> 450	N	1000	C	0440	60	0454.3	30	Nag
							545	c	0433	0.7		70	N
								RF	0445	50		40	
	E	0231	30		> 350	N(H)	9400	C	0230	30	0235.6	220	Nag
							3750	C	0226	55	0235.2	400	Nag
							2000	C	0226	35	0235.6	260	Nag
							1000	C	0227	25	0235.3	45	Nag
							545	s	0230	3		50	N(H)
180-33 41-42													
200-7	c	2317	2		450	N(H)	9400	s	2316	3	2317.1	25	Nag
							2000	c	2316	3	2316.8	10	Nag
	f	0349	9		350	N(H)	545	c	0352	1		8	N(H)
220-7	s	1614	6	1615.9	120	HHI	600	s	1614.5	3		33	Uc
							545	c	1613.5	3		15	N
							108	C	1620.5	4.5	1622.5	> 300	NBS
							18		1614	21			McM
41-26							108	E	2120	250	2150		NBS
							18		2103	9			McM
180-<25 41-22							108	C	2047.5	7	2049.3	> 300	NBS
							18		2036	14			
									2105	4			Bo
									2152	11			
200-30							108	c	2050	2	2050.7		NBS
41-20							108	E	1625	185			NBS
							18	E	1820	270			Bo
41-11 41-20	C	1553	20		180	N	9400	RF	1535	> 60	1557	214	HHI
							1500	C+	1510	> 120	1556.8	125	HHI
											1602.4	130	
							600	s	1552	20		(7)	Uc
							108	c	1556	28	1603.1	> 30	NBS
150--7 3900-2100 41-21							108	E	1934	40	1939.3	> 30	NBS
							18		1951	94			Bo
							9400	S	0034	30	0040	105	Nag
							2000	C	0030	30	0040	145	Nag
							1000	c	0033	30	0040	43	Nag
							18		0044	2			HA
	C	1103	8		5000	N	9400	C	1101	> 60	1104	> 570	HHI
							9100	C	1102	25	1104	635	N
							1500	C	1055	70	1104	238	HHI
											1111.6	255	
							600	s	1101	7		47	Uc
							111	c	1103.2	14.9	1103.9	10000	AoP
							23	f	1104.7	13.4	1115	1000	AoP

10 CM EVENTS						PLAGE DATA									
Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification	Mt Ty
						6237	Oct. 02.5	67°	N13	3.5	2400	27	1	New	lβ
6	1952.5	2	1952.7	13	OT	6237									See
*2	2211	>30	2218	800	OT	6235	01	87°	N15	3	3600	15	3	6212	dβ lβ
						6249	09	341°	N05	3	1500	4	1	New	
						6264a	Nov. 03.5	5	N09	3	2200	9	1	New	dβ
6 4	1428	38 170	1444	124 8	OT	6264a									
						6270	Nov. 10	279°	N17	3	1800	10	1	New	dβ
2 4	1443.7 1448	4.3 65	1446	8 4	OT	6280	30.5	9°	N11	3	2400	8	2	6264a	d
						6304	Dec. 30.5	334	S10	2	1200	4	2	6282	

POLAR CAP ABSORPTION							GEOMAGNECTIC STORMS								
mset ate	Time Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	t	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp		Event No.
							July 26	1951	1.4d	sc	ms	17	8		75
							Aug 01	23--	2.5d	g	ms	9	6		78
							29	1708	3.4d	g	m	15	6		84
ept. 7	<1200				N										
0	2100	17h	79	(2.9)	B.L,N										
							Sept 13	1550	1.4d	g	ms	4	6		91

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		FLARE DATA						SHORT-WAVE RADIO FADEOUTS					
Event No.	Date	Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	Type	Imp.	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.
94	1961 Sept. 18												
95	24												
96	27												
97	27	1615	1644	1620	1-	N14E63	1/1	SL	1+	1605	40	-	1
98	27	1950	2015	1956	1	N13E72	5/4	S	1	1955	20	5	4
99	28	*2202	2530	2223	3	N13E29	3/3	S	2	2218	62	5	8
100	28												
101	30												
102	Oct 09	1405	1417	1410	1-	N05W05	1/1						
103	11												
104	19												
105	20												
106	26												
107	28												
108	Nov. 05	1308	1410	1318	1	N09W24	3/3	*S	3+	1339	109	5	4
109	06												
110	10	1434	1450	1444	1+	N19W90	1/1	SL	2+	1436	58	5	7
111	10												
112	11	1346	1357	1351	1-	N16W13	3/1						
113	17												
114	Dec. 01												
115	01												
116	01							*S	3	1324	71	3	3
117	03	1447	1514		1	N11W42	1/1	S	1	1446	34	-	1
118	05												
119	23	2100 2209	2140 2225	2120 2214	1 1	S07E90 S12E90	1/1 1/1						
120	28												

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(5)

1960-1962 (CONTINUED)

Event No.	DYNAMIC SPECTRUM DATA Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs
74	I_s 0443-0638/2	G0429.5-0433.5/2 g0448/1 G0509-0511/2 g0524.5-0525.5/2 g0538-0539/2	*0454.5-0514.5/2	* 0507-0632/2	S
75					
76		b0230.5/1	*0233-0258/2	* 0303-0355/1	S
77			*1926-1932/2		H,W
		g1930.5-1931/1-	*1942-1946/1+	* 1946-2042/2	W
78					
79		g2311/1 C2317 2319/2 G2338-2342/1	*2325-2342/1		S,W
80	g0401.5/1	b0349/2 G0350-0355/1 b0357/1	*0412-0420/1		S
81		G1613-1617/3 G1628-1631/2	*1618-1631/2		H,W
82	c2158-2501/1-	G2104-2108/2+ g2109-2110/2		* 2130-2155/1	W
	I_s (weak) in progress all day	G2039-2048/3	*2046-2110/3		H
			*2051-2146/3	* 2135-2158/1-	W
84					
85	I_s in progress	g2042/1-	*2049-2055/1		H,W
86	Cont. 1738-2254/3				W
87					
88		G1601-1605/1+ G1608-1609/2 G1610-1612/1+	*1601.5-1630/3	* 1606-1730/2	W
89	I_s (weak) in progress all day		*1947-2014/3		H,B
				* 1937-2017/3	H
				* 2013-2154/1+	W
90					
91					
92			*0043-0050/1		S
93					

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TABLE VIII

SPOT DATA						
Wilson	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
ℓ	Oct. 02.5	N13	17	26-8		15436
pot Data Event 97						
d	30.7	N12	(10)	26-1		15435
ℓ	01.0	N12	(15)	24-4		433
βd	09.1	N04	(8)	7-12		15441
ℓ	Nov. 03.6	N09	15	4-9		15461
ℓ	10.1	N18	26	8-15		15465
d	30.7	N11	(10)	30-5		15477

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1960-1962 (CONTINUED)

Event No.	DYNAMIC SPECTRUM DATA Type I and Cont. Time/Int	Type III Time Int.	Type II Time Int.	Type IV Time/Int.	Obs.
94					
95					
96					
97		G1604-1608/2		* 1617-1640/1-	W,H
98		G1952-1955/3	*1956-2013/3		H,W
99		g2212/2+	*2217-2231/3+		H,B
				* 2212-2249/3	H,B
100					
101					
102	c1338-1415/1-		*1415-1419/1-		W
103					
104					
105					
106					
107					
108					
109					
110			*1433-1437/3 *1439-1502/3		H,W
				* 1440-1543/3	W
111					
112		g1347-1347.5/1-	*1349-1351/1		W
		G1350-1352/3			H
113					
114					
115					
116					
117	I_s (weak) in progress all day	G1448-1449/1+	*1441-1457/2 *1507-1511/1-		W,H
118					
119		G2003-2023/1		* 2022-2225/2	W
	I_s 2016-2200/2	G2033-2110/3			H
120					

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TABLE VIII

SPOT DATA					
P Day	Lat.	H	When Seen	Area	Mt. Wilson No.
n.					
.1	N06	(25)	18-30	1250	15505
.5	N10	21	24- 5		15507
b.					
.2	N11	(25)	22- 4		15521
.6	S10	(25)	22-3	1475	15520
ar.					
.5	N11	11	12-21		15528
.0	N10	(10)	21-27		15530
.4	N10	(25)	21-31	1550	15532
3	N10	16	11-20		15540

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3

Freq. Range (ms)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	Ons… Dat…
	200 MC DATA						OTHER RADIO DATA							
														196… Sep 18
41-26	c	1607	1.2		800	N	108	c	1604.2	4	1607.5	>300	NBS	
180-25	c	1952	1.7		>1200	N(P)	108	c	1952.5	12	1953.4	>30	NBS	
150-15 3900-14	C+	2213	90		>900	N(H)	9500	C	2215	8	2216.5	1580	Tk	
							9400	C+	2213	40	2217.3	1600	Nag	
							3750	C+	2212	40	2217.3	1690	Nag	
							2000	C+	2211	40	2220.2	1000	Nag	
							1000	C	2208	45		>75	Nag	
							545	C+	2214	36		1600	N(H)	
							108	C+	{2213	9	2217	>300}	NBS	
									2222	102	2347	>300		
							18		2214	54			HA	
														28
41-24														
														Oc… 26
150-21 41-21							9400	C	1432	>20	1440	244	HHI	
							9100	c	1432	20	1439.8	142	N	
							1500	c	1430	>10	1435.3	128	HHI	
							108	C+	{1432	5	1435	>300}	NBS	
									1438	23	1441	>300		
							18	f	1445	31			RE	
														No… 10
41-22 580-25	C	1347	5		300	N	1500	s	1349.8	1	1350.2	82	HHI	
							600	f	1349	3		54	Uc	
							111	f	1347.3	4.2	1349.8	10000	AoP	
							108	s	1348	3.2	1349.2	>300	NBS	
							23	s	1350.4	0.6	1350.7	600	AoP	
														De… 01
41-24 41-33							108	E	<1409	>490			NBS	
41-20 580-25							108	E	2013	185	2040		NBS	

10 CM EVENTS					PLAGE DATA										
.	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification	Mt. Wilson Type	C G
					6324	24	11°	N08	3	4500	10	4	6302	*ℓβpℓ	J 2
					* 6326	29.5	299°	N11	3	4800	48	1	New	*ℓβγℓ	29
					6352	Feb. 25.5	303°	N10	2.5	5400	7	2	6326	αℓ	Fe 26
5 7	22 28	1642.5	425 8	Ot	* 6351	26	297°	S12	3	7000	50	2	6327	*βγℓ	25
7.5 7	19.5 383	1450.5	470 12	Ot	6366	Mar. 18.5	26°	N12	3	1800	7	1	New	*ℓβγd	M 18
					6370	23.5	321°	N08	3	2800	4	3	Part of 6352	βpd	23
	>36	2230	35	Ot	6373	25.5	294°	N12	3.5	5600	29	3	Part of 6352	*βfℓ	25
	46 1.5	- 1720.8	1.3 1.5	Ot											
	33 39	2212	150 2	Ot	6386	Apr. 14.5	30°	N13	2.5	2400	15	2	6366	*ℓβγℓ	14

e	et Time Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr Kp	Event No.
	POLAR CAP ABSORPTION					GEOMAGNETIC STORMS							
1 t.	--				N								
						24	09--	1.3d	g	ms	15	6	95
						27	00--	0.9d	g	m	4	5	96
	2330	~6	~30	17	B,L,N								
						Sept 30	2109	0.9d	sc	ms	17	8	101
						Oct 11	07--	1.1d	g	m	1	5	103
						19	23--	0.5d	g	m	1	5	104
27			<24		N								
						26	1940	1.3d	sc	m	10	5	106
						28	0810	1.2d	sc	m	18	9	107
						Nov. 06	2318	1.4d	g	m	10	6	109
7.	1600			16	B,L,N								
						17	14--	1.6d	g	ms	15	6	113
c.	< 0300				N								
						Dec. 01	03--	2.4d	g	ms	18	8	115
						05	1358	1.2d	sc	m	2	4	118
						28	09--	0.7d	g	m	4	4	120

5. VIII-16 R (3)

Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	SHORT-WAVE RADIO FADEOUTS Type	Imp.	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.	Type	Be (U
1	1962 Jan. 10														
2	19														
3	23							G	1+	1422	30	-	1		
4	24														
5	29														
6	Feb. 04														
7	06														
8	06							SL G	1+ 2	2107 2205	43 60	- -	1 1		
9	11														
10	15														
11	22														
12	23	2202	2209	2205	1-	N11 E28	1/1	G G	1 1	2150 2410	27 28	- -	1 1		
13	26														
14	Mar. 01	1634	1730	1644	2	S13 W57	4/4	S	2+	1634	56	5	9	6 4	1 1
15	05														
16	13	1444	1640	1446	2+	N10 E66	5/2	*S	3	1448	94	5	9	6 4	14 1
17	22	0233	0236		1	N12 E12	1								
18	22	* 2220	2310	2241	3	N07 E36	1/1	G	1-	2241	26	-	1		2
19	Apr. 06														
20	10														
21	12													3 1	1 1
22	12	2149	2248	2216	1-	N11 E19	3/3	G	1+	2212	108	3	2	6 4	2 2

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1960-1962 (CONTINUED)

	DYNAMIC SPECTRUM DATA				
Event No.	Type I and Cont Time/Int.	Type III Time/Int	Type II Time/Int.	Type IV Time/Int.	Obs.
1					
2					
2	I_s (weak) in progress all day C1440-1455/1-	III_s 1600-1956/1 G1503-1505.5/1	*1500-1506/2		H,W W
4					
5					
6					
7					
8	I_s 2156-2247/2		*2203-2223/3	* 2113-2200/2 * 2223-2326/1-	H W
9					
10					
11					
12	I_s 2000->2420/2 C2015-2105/1- C2105->2435/2			* 2201-2417/2	H W
13					
14		G1636-1642/3+	*1641-1659/3	 * 1753-1828/3 * 1700-2005/2	H,W H W
15					
16		G1450-1458/3			H
17		g0225.5-0228.5/1 g0231.5-0234/2 g0239-0240.5/2	*0231.5-0235/2		S
18		G2301-2304/2			H
19					
20					
21		g1640-1643/1 g1654-1655/2 G1718-1722/2+	*1648-1651/3 *1658-1707/2	* 1710-1925/2	W,H
22	c2148-2156/2+	G2148-2156/3 G2210-2213/3	*2154-2207/3	* 2202-2335/2+	W,H

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(1)

TABLE VIII

ilson	SPOT DATA					
	CMP Gr. Day	Lat.	H	When Seen	Area	Mt. Wilson No.
	Apr. 18.5	N07	20	12-24		15542
	19.2	N09	16	13-24		543
	19.5	N15	(10)	21-23		546
pot Data Event 23						
pot Data Event 23						
pot Data Event 23						
	May 01.0	N09	25	24- 6		15548
	01.4	N10	14	26- 5		549
	06 0	N18	15	30- 8		15555
	14.7	S09	18	8-19		15560
	27.8	S08	(25)	21- 2		15565
	June 03.4	S17	2	31- 2		15568
	26.1	N15	(15)	21-31		15564

S.VIII-18L

3

Freq. Range (mc)	200 MC DATA Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	OTHER RADIO DATA Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
75- 26 41- 19							108	E	1430	120			NBS
450- 150 41- 16							108	C+	2156	8	2157	> 30	NBS
									2204	86	2229	> 30	
							18	c	2211	2			HA
580- 320 41- 23 41- 22													
320- 12 250- 125 41- 22	C	1640.5	4.5		>900	N	545	c	1637	8	1639	120	N
	C	1752	43	1756	500		108	C+	1636.5	12	1645	>300	NBS
									1648.5	52		> 30	
							18		1639	1			McM
									1645	2			
									1654	2			
580- 25	C	1450.5	11	1452.7	320	N	9400	C+	1448	>70	1450.7		HHI
							9100	C	1448.2	15	1450.5	861	N
							1500	C+	1448	>70	1451.7	>880	HHI
							545	s	1450	10	1454	40	N
							108	C	1450	22	1452.3	>30	NBS
280- 50							3750	c	2231	> 15		29	Nag
							2000	c	-	> 15	2231.4	16	Nag
							108	s	2302.4	2.2		>300	NBS
41- 26 41- 22 41- 22	c	1720	1		300	Osl	600	s	1709.5	1.5		17	Uc
							545	c	1720	1		22	N
							108	s	1719.2	2.2	1720.9	> 30	NBS
41- 21	C+	2148	24	2206	> 400	N	9400	s	2211.5	4	2212.1	76	Nag
							3750	s	2204	11	2212.2	135	Nag
							2000	c	2150	2	2150.9	60	Nag
								c	2203	11	2212.2	92	
							1000	c	2203	10	2212	74	Nag
							208	C+	2148	26	2207	360	Uss
							108	C+	2147.8	11.1	2150.9	> 300	NBS
									2158.9	14.6	2212.3	> 300	
							18		2134	42			Bo

10 CM EVENTS						PLAGE DATA									
Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Lo.	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification	Mt. Typ
3 2	1734 1800	294 11	1845 1803.5	25 20	Ot	* 6393	Apr. 19	331	N10	3	5400	50	4	6370	ℓα ℓβ dβ
3 2	1832 1957.3	268 11.7	2017 1959	12 72	Ot	6393									See
3	2002	85	2035	4	Ot	6393									See
3 6 1 6	1342 1437 1532 1613.5	366 13 9 29.5	1624 1443.5 1535.5 1624.2	37 42 7 45	Ot	6393									See
3 2	1344 1405	67 24	1356 1413	4 175	Ot	6403	May 01.5	166	N10	3	5500	15	2	6385	ℓ *d
IA	1915	110	1910.5	60	Ot	6411	06	106	N18	3	1600	10	1	New	ℓβ
						6416	15	347	S11	3	2000	8	2	6391	
3 2	1413 1531.7	95 5	1430 1532.4	3 56	Ot										ℓ
2	1517	2	1517.2	11	Ot	6427	28	175	S08	3	3500	10	1	New	ℓ
3	1634	22	1638	3	Ot	6432	June 03.5	89	S18	3	1600	2	2	6414	d
3	1950	80	2013	6	Ot	6426	May 26.5	195	N15	3	4200	16	2	6406b	d

Event No.	Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int	Type IV Time/Int.	Obs.
	DYNAMIC SPECTRUM DATA				
23	I_s in progress all day	III_s 1520-2000	*1844-1853/2		H
				* 1839-1942/3	
24	I_s (weak) in progress all day	G2000-2002/2	*2004.6-2019/3		H,W
25					
26	I_s (weak) in progress all day	G2007-2011/3	*2022-2032/2		H,W
27		G1511-1514/3 g1615/1+ G1620-1622/1+	*1554-1603/3	* 1612-1930/1+	H,W
28		G1353-1357/1 G1412-1416/3+	*1414-1427/3		H,W
				* 1420-1635/2	W
29		G1918-1921/3	*1920-1940/3		H,W
				* 1918-2012/2	H
				* 1925-2130/1	W
30					
31		G1532-1533/2	*1533-1538/3		H
32	I_s in progress all day		*0245-0253/1		S
33					
34	I_s (weak) in progress all day	G1516-1520/2		* 1530-1725/1-	W,H
35			*1640-1645/2		H
36					
37		g1952-1953/1- G1956-1957/1 G2008-2010/2	*2005-2015/2		W
38					
39					
40					
41					
42					
43					
44					

5·VIII -18R
(1)

TABLE VIII

SPOT DATA					
MP r. Day	Lat	H	When Seen	Area	Mt. Wilson No.
Aug. 13.3	N06	(15)	11-19		15613
See Spot Data Event 45					
20.3	N02	(10)	17-25		15616
Sept. 09.5	S14	21	3-15		15624
Oct. 14.7	S13	17	8-19		15644
26.0	N15	(2)	24-24		15653
26.2	N10	20	19-31		650
18.4	N03	12	12-19		15646
18.6	S01	(1)	13-13		647

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Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs.	SHORT-WAVE RADIO FADEOUTS Type	Imp.	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.
23	1962 Apr. 18	* 1734	2129	1806	3	N09 E05	4 4	*G	3	1752	108	5	5
24	20	1958	2040	2002	2	N09 W27	5 5	S	2	2000	30	5	8
25	20												
26	21	2005	2107	2013	1-	N13 W44	3, 3						
27	22	1430	1710	1450	2+	N08 W48	8, 5	*S	3	1446	134	5	9
28	27	1346	1440	1413	2	N08 E49	6, 3	S	1+	1413	20	5	11
29	May 01	1915	1940	1924	1	N19 E61	3, 3	S	1+	1916	26	5	7
30	06												
31	18	1530	1609	1534	1	S10 W55	4 3	SL	1-	1530	30	-	1
32	23							G	3-	0127	105	-	1
33	27												
34	27	1511 1527	1524 1539	1519 1533	1- 1-	S11 E00 S05 E01	4 2						
35	28	1629	1725	1640	2	S16 E78	2, 2	SL	1	1640	20	5	6
36	31												
37	June 01	2006	2043	2019	2	S08 W66	1 1	G	1	1955	55	-	2
38	09												
39	26												
40	July 04												
41	24												
42	25												
43	31												
44	Aug. 06												

5-VIII-18L
(1)

POLAR CAP ABSORPTION						GEOMAGNETIC STORMS							
nset ate	Time Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr Kp	Event No.
						Jan. 10	0213	1.4d	sc	ms	15	6	1
						19	0113	0.8d	sc	m	6	4	2
						Feb. 04	0930	0.7d	sc	m	12	5	6
						06	1800	1 d	g	m	2	4	7
						11	10--	1 d	g	m	3	5	9
						15	16--	1.8d	g	m	14	6	10
						22	0220	0.7d	sc	m	4	4	11
						26	1234	1.3d	sc	m	9	5	13
						Mar. 05	08--	1.6d	g	ms	14	6	15
						Apr. 06	0400	3 d	g	ms	12	6	19
						10	08--	1.4d	g	m	12	5	20

5. VIII -17R (3)

Freq. Range (mc)	200 MC DATA Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	OTHER RADIO DATA Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
75-25	f	1800	100	1817.3	310	Sea							
580-170													
300-25	c	2002.7	3.5	2004.2	170	Hir	108	C	2001.5	6.7	2006	> 300	NBS
							18		2000	3			Bo
120-24	c	2008	3	2009	50	Sea	18		2008	5			Bo
90-20	c	1535	70	1625	115	Osl	9100	s	1438	37	1502	52	N
	c	1551	2	1552.5	130	Sea		s	1613	15		15	
41-19	C	1603	32	1624	140	N	600	s	1545	15		21	Uc
								s	1602	35		25	
							545	c	1552	40		18	N
240-16	C	1412.3	8	1413.6	2100	N	9400	c+	1412	23	1413.2	614	HHI
							1500	c	1412	>9	1412.5	150	HHI
							545	s	1412.8	3.2	1413.8	25	N
								s	1416.2	0.3		60	
41-22							111	C	1412.3		1412.5	8000	AOP
							108	C+	1412.3	50.7		> 300	NBS
							23	F	1412.4	26.2	1412.6	>10000	AOP
150-12	c	1918	10	1918.5	270	Sea	108	C+	1918.5	18	1922.5	> 300	NBS
3000-180							18		1919	36			Bo
41-23													
240-50	c	1531.9	3	1533.7	800	N	9400	c	1531.7	2.6	1532.5		HHI
							9100	s	1531.9	1.2	1532.3	62	N
							1500	s	1531.5	4.2	1532.4	84	HHI
							108	C	1531.5	10	1535	>300	NBS
							18	c	1531	4			McM
41-22	S	1517	1		> 1000	N	808	c	1517	3	1518	50	Pra
							536	c	1516.5	3.5	1517.5	19	Pra
							108	s	1516	3.5	1516.5	>300	NBS
							18	c	1517	3			McM
240-50	c	1640	2		160	N	108	s	1641.8	3.5	1643	>300	NBS
41-19							18		2009	6			McM

10 CM EVENTS					PLAGE DATA									
g. T)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	McM Plage No.	CMP Gr. Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification	Mt. Wilson Type
039.5	2.6 30	2041	23 2	Ot	6514	Aug. 13.5	230	N06	3	2000	14	1	New	* [illegible]
244.5	4	0246.8	70	Nag	6514									
					6522	20.5	137	N02	3	1500	10	1	New	d βd
503 550.2	47.2 200	1529	140 13	Ot	6548	Sept. 09.5	233	S12	3.5	1800	7	1	New	l βpl
644.5 712	27.5 38	1646 7	105 9	Ot										
					6579	Oct. 14.5	131	S13	3	2800	20	1	New	* l βγd
033	> 60	2100	6	Ot	6591	26.5	333	N14	3	3800	11	3	6562	d βpd l βpd
42	> 270	1658	16	Ot	6581	18.5	78	N04	3.5	3800	14	1	New	l βpd d γ'd
17	10	0319.6	87	Nag										

POLAR CAP ABSORPTION							GEOMAGNETIC STORMS							
Onset Date	Time Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	t	Start Date	Hr. (UT)	Dur.	Type	Int.	No. of Stations Reporting	Max. 3-Hr Kp	Event No.
							Apr. 20	2356	2.5d	sc	m	12	5	25
							May 06	09--	0.6d	g	m	9	5	30
							27	0414	0.8d	sc	m	2	4	33
							31	04--	1.2d	g	ms	8	5	36
							June 09	01--	1.6d	g	m	5	5	38
							27	00--	1.6d	g	m	2	4	39
							July 04	18--	1.7d	g	m	2	5	40
							24		0.7d	sc	m	-	5	41
							25	20--	2.5d	g	ms	16	6	42
							31	15--	1.6d	g	ms	11	6	43
							Aug. 06	00--	3.5d	g	m	8	5	44

5. VIII-18R
(3)

		FLARE DATA						SHORT-WAVE RADIO FADEOUTS						
Event No.	Date	Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Obs	Type	Imp.	Beg. (UT)	Dur. (Min.)	Wide Spread Index	No. of Obs.	Type
45	1962 Aug. 13	2033	2118	2045	1-	N07 W05	4 3	SL	1	2040	60	5	4	2 4
46	14	0244	0322	0247	1	N06 W09	3 3	S	1-	0245	15	4	2	c
47	14													
48	19	1648	1715	1655	1-	N01 E08	4 3	S	1	1652	18	5	4	
49	21													
50	26													
51	30													
52	Sept. 01													
53	06													
54	07	1507	1730	1531	2	S14 E25	8 3	SL	1+	1515	43	5	5	6 4 2 4
55	11													
56	18													
57	25													
58	29													
59	Oct. 01													
60	07													
61	14													
62	14													
63	16													
64	19													
65	19	2021	2114	2040	1	N05 E80	2 2	SL	1-	2042	18	-	1	3
66	22													
67	23	1642	1745	1704	2	N03 W70	2 2							3
68	23													
69	24													
70	Nov. 06													
71	15													
72	21													
73	30													
74	30													s
75	Dec. 04													
76	11													
77	17													
78	26													

5-VIII-1960

1960-1962 (CONTINUED)

	DYNAMIC SPECTRUM DATA				
Event No.	Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs
45		G2035-2038/2 G2040-2042/3 G2048-2050/2	*2042-2045/3		H
46		g0236.5-0237/1 G0239-0240/1 G0246-0247.5/2	*0248-0255/3		S
47					
48		G1651-1655/3	*1653-1655/3		H
49					
50		g1520-1521/1	*1519-1523/1-		W
51					
52					
53					
54	I_s (weak) in progress all day		*1514-1535/3		W,H
				* 1517-1702/3	H,W
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					
65		G2033-2038/2	*2100-2115/1	* 2033-2128/1-	W
66					
67		G1649-1653	*1648.7-1650/2		H
			*1656-1706/3	* 1656-1813/1-	W
68					
69					
70					
71					
72					
73					
74			*0322-0329/1		S
75					
76					
77					
78					

5.VIII-1962
(1)

Freq. Range (mc)	200 MC DATA Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	OTHER RADIO DATA Freq. (mc)	Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.
75-45							108	s	2039.5	1.5	2040.3	>30	NBS
							18	c	2047	3			McM
	c	0240	0.8		890	Hir	9400	s	0245	3		>175	Nag
	c	0247.1	6	0249.7	>1000		2000	c	0245	5	0246.8	33	Nag
							1000	s	0245	5	0247	22	Nag
							545	c	0246	1.6		30	N(H)
							18		0246	6			HA
150-60	f	1651	1	1651.3	120	sea	600	c	1651	2		14	Ucl
							108	s	1653.3	1.5	1654	>300	NBS
							18	c	1649	6			McM
41-28													
41-18 580-180	S	1510	33	1520	85	N	9400	RF	1509.3	65	1527	183	HHI
							9100	s	1510	55	1527	26	N
							2000	C+	1505	120	1529.5		HHI
							1500	C+	1505.3	120	1527	240	HHI
											1531	360	
							808	C+	1507	70		>300	Pra
							550	C+	1512	120	1545	1000	N
							260	C+	1505	70	1518	20	Pra
							108	C+	1507	48	1529	>30	NBS
41-22							18		2035	4			Bo
125-60 41-13	RF	1645	108	1656	62	Sea							
							9400	s	0317	12	0320	56	Nag
							2000	s	0312	12	0318.4	57	Nag
							1000	c	0312	18	0317	62	Nag

POLAR CAP ABSORPTION						GEOMAGNETIC STORMS							
et Time Hr. (UT)	Rise Time To Peak	Dur. (Hrs.)	Int. (db)	Obs.	t	Start Date	Hr. (UT)	Dur	Type	Int.	No. of Stations Reporting	Max. 3-Hr. Kp	Event No.
						Aug. 14	17--	4.8d	g	m	10	5	47
						21	22--	3.3d	g	m	4	5	49
						30	2336	0.6d	sc	ms	5	5	51
						Sept. 01	06--	3.6d	g	ms	10	6	52
						06	04--	0.5d	g	m	2	5	53
						11	19--	2.5d	g	ms	16	7	55
						18	21--	1.6d	g	m	12	6	56
						25	18--	1 d	g	ms	8	6	57
						29	20--	0.7d	g	m	1	5	58
						Oct. 01	01--	1.8d	g	m	12	6	59
						07	2026	4.5d	sc	ms	14	6	60
						14	00--	1.5d	g	m	4	5	61
						16	10--	0.5d	g	m	2	6	63
						19	08--	0.7d	g	m	4	5	64
						22	02--	1.5d	g	m	5	5	66
~1730		~12		N									
						24	10--	3.2d	g	ms	9	5	69
						Nov. 06	02--	1.5d	g	m	4	5	70
						15	05--	2 d	g	ms	11	6	71
						21	00--	2.5d	g	m	11	5	72
						30	01--	1 d	g	m	8	5	73
						Dec. 04	0334	1 d	sc	m	13	4	75
						11	00--	1.2d	g	m	5	5	76
						17	16--	4.5d	g	ms	15	7	77
						26	08--	0.6d	g	m	3	5	78

5-VIII-15R
(3)

Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Observations	SHORTWAVE RADIO RADEOUTS Type	Imp.	Beg. (UT)	Dur. (Min)	Wide Spread Index
	1963 Jan.											
1	12											
2	29											
	Feb.											
3	09											
4	10											
5	15	2020	2035	2022	1-	N08 E72	1/1					
6	16											
	Mar.											
7	03											
8	07											
9	09											
10	31											
	Apr.											
11	04											
12	05											
13	14											
14	15											
15	15	1613	1713	1619	2	S10 W09	8/4	*S	3	1615	50	5
16	16	1640	1710	1651	1-	S15 W22	2/2					
17	24											
18	25											
19	26							G	1+	0312	39	-
20	30											
	May											
21	01											
22	01	0525	0835	0608	2	N15 E46	8/2	SL	2+	0530	39	5
23	13											
24	20	2303	2315		1-	N05 W19	1/1					

5.VIII.28

No. of Obs.	10 CM EVENTS Type	Beg. (UT)	Dur. (Min)	Max. (UT)	Peak Flux	Obs.	PLAGE DATA McM Plage No.	CMP Gr.Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area
								Feb.				
							6701	21	225°	N07	3	1200
								Apr.				
10	3	1615	95	1617	7	Ot	6766	15	246°	S11	3.5	2500
	3	1637	33		2		6766					
	2	1642.5	3	1644	11	Ot						
	2	1649	3	1649.3	22							
1	s	0346	4	0346.6	44	Nag						
	c	0405	45	0418.2	43							
								May				
6	*C+	0526	34	0544	1500	Nag	6790	4.5	348°	N17	3	5200
		0600	40	55								
	3	2254	29	2258	2	Ot	6805	19.5	150°	N09	3.5	4200

TABLE VIII CHRONOLOGICAL CATALOGUE

No. of Flares	Age in Rotation	Identification	SPOT DATA Mt. W. Type	CMP Gr.Day	Lat.	H	When Seen	Area	Mt. W. No.
				Feb.					
2	2	6678	* dβrd	21.1	N07	(3)	19 - 23		15699
				Apr.					
28	1	New	dβfd	14.9	S13	(10)	10 - 16		15714
			See Spot Data for Event 15						
				May					
5	2	6759	lβpl	3.5	N07	(15)	28 - 8		15716
			dαpd	3.6	N21	(4)	3 - 3		718
18	1	New	lβpl	20.2	N08	(20)	13 - 25		15726

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MAJOR SOLAR EVENTS 1963

Event No.	DYNAMIC SPECTRUM DATA: Type I and Cont. Time, Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs.	Frequency Range (mc)	200 MC DATA: Type	Beg. (UT)	Dur. (Min)	Max. (UT)	Peak Flux	Obs.	Freq.	Type	Be (U
1															
2															
3															
4															
5			*2019- 2034/2 *2048- 2056/2		W	41- 22 38- 25									
6															
7			*2350- 2353/1		H,W	140- 27									
8															
9															
10															
11															
12															
13															
14															
15															
16	c in progress all day	G 1641- 1645/2+ G 1648- 1653/2+		* 1703- 1755/1	W	41- 18	c C	1643.7 1649	1 3	1643.9 1649.2	190 1860	N Sea	9400 1500 600 108 18	s f s C+ s s c s C E C C	16 16 16 16 16 16 16 16 16 16 16 16
17			*2005- 2029/1+	* 2030- 2118	W	41- 21									
18															
19		g 0346- 0348/1 g 0350- 0350.5/1 g 0403.5- 0409/1	*0352- 0415/2		S		c c	0351.5 0351	0.5 20	0351.7	720 20	Hir	2000 1000	c c c f	03 03 03 04
20															
21															
22		G 0535- 0537/2 G 0548- 0600/1	*0536- 0558/1		S		c c	0533.8 0536	2 35	0534.9	1000 180	Hir	9400 2000 1500 1000 600	C+ C+ C+ C+ C+	05 06 05 < 05 05 05
23															
24		g 2241- 2242/1 G 2247- 2249/1 G 2303- 2304/2		* 2313- 2422/2	W	41- 22							108	E	23

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TABLE VIII

eak lux	Obs.	McM Plage No.	CMP Gr.Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification	Mt. W. Type	CMP Gr.Day	Lat.	H	When Seen	Area	Mt. W. No.
		PLAGE DATA									SPOT DATA						
2 27	Ot	6814	18.5	163°	N03	3.5	1200	15	1	New	dβl	18.7	N03	(4)	21 - 24		15728
15	N	6814									See Spot Data for Event 25						
32	Ot	6805									See Spot Data for Event 24						
		6805									See Spot Data for Event 24						
16	Ot	6805									See Spot Data for Event 24						
14 27	Ot	6827	June 09	239°	S13	3	1200	4	1	New	dβd	June 9.0	S12	(7)	7 - 9		15732
70 10	Nag	6832	12	199°	N15	3.5	4200	27	2	6803	dβpl	12.0	N13	(25)	8 - 16		15733
50	Nag	6847	20.5	87	N08	3	700	2	1	New	dβl	21.2	N08	-	23 - 26		-
300 25	Ot	6908	Aug. 4	218°	N11	3.5	1800	7	1	New	lβpl	Aug. 4.0	N11	28	28 - 9		15745
3.4 2	Ot	6909	5	205	N12	3.5	2400	13	4	6870	lβpl lβpl	5.2 5.6	N11 N12	26 6	30 - 10 31 - 6		15747 748
		6909									See Spot Data for Event 45						
		6909									See Spot Data for Event 45						
45 2	Ot	6924	18	33	S12	3	2500	14	1	New	lβpl	18.1	S13	22	12 - 23		15750

1L [redacted]

5-IIII - [redacted] 2/2 2

OTHER RADIO DATA					POLAR CAP ABSORPTION						GEOMAGNETIC STORMS							
	Dur. (Min)	Max (UT)	Peak Flux	Obs.	Onset Date	Time Hr.(UT)	Rise Time to Peak	Dur. (Hrs.)	Peak Abs (db)	Obs.	Start Date	Hr(UT)	Dur.	Type	Int.	No. of Sta. Rept.	Max. 3-Hr Kp	Event No.
											Jan.							
											12	2220	7d	g	m	13	5	1
											29	18--	2d	g	m	15	6	2
											Feb.							
											09	18--	5d	g	m	13	6	3
					Feb.													
					10		~30h	~72		N								
					16	<1200		~80		N								
											Mar.							
											07	18--	4.8d	g	m	11	6	8
					Mar.													
					09	00--	~8h	~90		N								
											31	2116	0.6d	sc	m	1	5	10
											Apr.							
					Apr.						04	0545	3.5d	sc	m	12	6	11
					05	<1200		~24		N								
											14	09--	1.2d	?	m	2	5	13
					15	<1200	30h	~100		N								
3	2	1643.8	160	HHI														
9	3.3	1649.3	163															
2.5	2.5	1644	>88	HHI														
8.5	12	1649.4	88															
3.5	1		23															
9	1		20	Uc														
0	1.5		12															
3	1.8	1643.8	>300	NBS														
8	11	1650	>300															
0	210																	
1	5			McM														
8	6																	
					25	~00--	~8h	~30		N								
5.8	12	0346.6	61	Nag														
8	48	0418	59															
6	15	0348	24	Nag														
7	21	0410	24															
					May						30	1523	4d	sc	m	12	6	20
					01	~00--	~36h	~168		N								
2	28	0537.6	1500	Nag														
0	40		80															
6	40	0545	600	Nag														
0	>60	0546	>290	HHI														
6	40	0545	135	Nag														
0	57		555	Uc							May							
											13	04--	0.5d	g	m	2	5	23
5	>157	2346	>30	NBS														

		FLARE DATA						SHORTWAVE RADIO FADEOUTS						10 CM EVENTS			
Event No.	Date	Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Observations	Type	Imp.	Beg. (UT)	Dur. (Min)	Wide Spread Index	No. of Obs.	Type	Beg. (UT)	Dur. (Min)	Max. (UT)
25	23	1229	1305	1232	1	N05 W65	6/3	S	2	1235	24	5	10	3 2	1210 1236	35 6	 1236.5
26	23	1510 1547	1530 1555	1521 1550	1 1-	N04 W70 N05 W70	5/4 3/3	SL S	1- 1+	1516 1544	26 23	- 5	1 10	s	1549.5	2	
27	24	1515	1525	1519	1-	N10 W70	5/3	SL	1+	1517	13	5	5	2	1515.3	5	1515.9
28	25	0129	0135		1	N08 W78	1										
29	25	1622	1638	1624	1	N05 W85	3/2	S	2	1620	25	5	11	2	1621.8	6.2	1622.5
30	27																
31	27																
	June																
32	06																
33	07	2337	0102	0012	1	S12 E14	2/2							3 2	2235 2335	>80 15	 2342
34	.14	0220 0247	0247 0330	0229	1 1	N10 W32 N09 W35	2 1	S	1+	0223	25	4	3	C+	0220 0230	10 30	0226.7
35	14																
36	18																
37	25																
38	25																
39	26	0252	0346	0305	1	N07 W68	3/1	G	1	0250	17	-	1	C	0302.5	15	0304.4
	July																
40	04																
41	09																
42	21																
43	30-31																
	Aug.																
44	09	2234	2340	2245	1	N07 W80	1/1	SL	1+	2234	66	4	2	2 4	2234	30 26	2246.3
45	11	1827 1935	1900 2005	1841 1948	- -	N19 W90 N14 W90	2/2 2/2	S	1+	1900	40	-	1	1 1	1944 1957.5	4.5 1.5	1946.3 1958
46	11-12	2357	2406	2401	1	N18 W90	1/1										
47	12																
48	17	1540	1640		1+	S12 E09	2/1	S	2	1609	31	5	6	2 4	1609 1617	8 30	1610.5
49	18																
50	19																
51	27																

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CONTINUED

Event No.	DYNAMIC SPECTRUM DATA: Type I and Cont. Time, Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs.	Frequency Range (mc)	200 MC DATA: Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	C…: Freq.	Type	Beg. (UT)
25			*1254.5- 1304/2	* 1343- 1425/1-	W	41- 22							600 108 18	c E c	1238 1230 1251
26		G 1521.5- 1524/2 g 1550- 1551.5/1+		* 1600- 2015/1	W	41- 22							600 108 18	c c+ C C	1549.5 1549 1600 1522 1549
27		 G 1515- 1518/1+	*1519- 1527/2 *1524- 1540/1		H W	175- 50 41- 22	c	1515	1.2		180	N	9400 550 108 18	s s s E	1515.5 1515 1515 1514
28	c 0127- 0128.5	G 0111- 0117/1 g 0127- 0128.5/2 g 0129- 0130/1	*0133- 0135/1		S		c	0130	2		62	Uss	2000 1000 108	c f C	0129 0126 0126
29		G 1621- 1626/3	*1623.5- 1637/2 *1631- 1654/3	 * 1652- 1712/1-	H W	150- 50 41- 19	c R	1621.8 1622	4		420	N	9400 1500 550 108	s c s C+	1621.5 1613.5 1621.8 1621.4 1626.6
30															
31															
32															
33	c 2344- 2354/3	G 2340- 2341.5/1	*2400- 2415/3		W	41- 12	c	2340	20	2347	73	Uss	2000 1000 108	c c c	2340 2340 2344
34	I_s (weak) in progress Cont. 0254- 0607/1	G 0216.5- 0224/1 G 0245- 0301/1	*0234.5- 0252.5/1		S								9400 2000 1000	C+ C+ C+	0221 0231 0219 0231 0219 0231
35															
36															
37															
38															
39			*0306 0316/2		S								9400 2000	s c	0303 0301
40															
41			*0222/1		S										
42															
43															
44	c < 1844- 2240			* 2237- 2335/2	W	41- 14	c	2233	1.5	2243	51	Uss	9400 3750 2000 1000 18	C C S s 	2239 2235 2235 2235 2236
45		G 1905- 1906/2 G 1957- 2002/2+	*1905- 1914/2	* 1905- 2032	W	41- 18							18		1958
46			*0000- 0008/1		S										
47		g 1944- 1945/1-	*2057- 2102/2	* 2102- 2300/2	W	41- 19									
48	c 1610	G 1609- 1611/3	*1611.5- 1616/2		H,W	240- 29	C RF	1609.5 1617	5.5 20	1610 1621	>650 14	N	9400 1500 600 18	C c s 	1609 1609 1609.5 1610
49															
50															
51															

5·VIII-21 R

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k x	Obs.	PLAGE DATA McM Plage No.	CMP Gr.Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No of Flares	Age in Rotation	Identification	SPOT DATA Mt. W. Type	CMP Gr.Day	Lat.	H	When Seen	Area	Mt. W. No.
			Sept.									Sept.					
2	Ot	6961	16	10°	S07	3	3600	20	2	6930	lαpd	15.2	S06	7	9 - 15		15766
1	Nag	6961									See Spot Data for Event 52						
9 3 4 0 5 0	Ot	*6964	20.5	310°	N14	3.5	4800	87	3	6931	• lβγl	20.1	N14	(35)	13 - 26	1400	15768
0 5	Nag	6964									See Spot Data for Event 55						
5	Nag	6964									See Spot Data for Event 55						
4 0 8	Ot	6964									See Spot Data for Event 55						
0 0 0 0 0	Nag	6964									See Spot Data for Event 55						
50 00 65	Nag	6964									See Spot Data for Event 55						
			Oct.									Oct.					
71 3	Ot	7003	26.5	195	N12	3.5	5000	23	2	6980	• lβγl lαpd	26.1 26.7	N12 N12	29 13	20 - 31 20 - 29		15779 780
05	Ot	7003									See Spot Data for Event 68						

)THER RADIO DATA				POLAR CAP ABSORPTION						GEOMAGNETIC STORMS							
Dur. (Min)	Max. (UT)	Peak Flux	Obs.	Onset Time Date	Hr.(UT)	Rise Time to Peak	Dur. (Hrs.)	Peak Abs (db)	Obs.	Start Date	Hr.(UT)	Dur.	Type	Int.	No. of Sta. Rept.	Max. 3-Hr Kp	Event No.
1.5		17	Uc														
90	1308		NBS														
4			McM														
3.5		23	Uc														
2.5	1550	>30	NBS														
75	1610	<30															
3			McM														
4																	
3	1516	264	HHI														
1		20	N														
1.8	1515.5	>300	NBS														
376			McM														
8	0130.1	3	Nag														
10	0130.1	10	Nag														
8	0130.8	>300	NBS														
4	1622.4	175	HHI														
18	1622.5	76	HHI														
2		15	N														
5.2	1623.5	>300	NBS														
665	2010	>30															
				27	~00--		<24		N								
										27	2027	1.6d	sc	m	3	5	31
										June							
										06	17--	1.5d	g	ms	16	7	32
15	2345.1	72	Nag														
20	2345.2	350	Nag														
5	2344.3	30	NBS														
10	0226.6	50	Nag														
20		18															
12	0227.6	34	Nag														
35		6															
12	0227.6	25	Nag														
20		4		June													
				14	~12--	~24h	96		N								
										18	11--	0.5d	g	m	3	5	36
										25	02--	1.5d	g	m	11	6	37
				25	<12--		~24		N								
10	0304.4	20	Nag							July							
20	0304.4	36	Nag														
										04	18--	1.6d	g	m	6	6	40
										21	05--	4d	g	m	13	5	42
										30	03--	3.5d	g	m	8	5	43
30	2246.2	140	Nag														
35	2246.2	290	Nag														
30	2246.3	210	Nag														
25	2246.5	21	Nag														
24			Ha														
7			Bo														
20	1610.2	500	HHI														
30	1610.2	137	HHI														
5		80	Uc														
3			Bo							Aug.							
										18	08--	0.6d	g	m	10	6	49
										19	15--	2d	g	ms	13	7	50
										27	15--	1.5d	g	m	5	5	51

Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Observations	SHORTWAVE RADIO FADEOUTS Type	Imp.	Beg. (UT)	Dur. (Min)	Wide Spread Index	No. of Obs.	10 CM EVENTS Type	Beg. (UT(	Dur. (Min)	Max. (UT)	Pe[ak] Flu[x]
	Sept.																	
52	08	1951	2006	1956	1-	S09 E90	1/1	G	1+	1905	65	4	3	1	1915	10	1918.5	
53	13	0535	0840		1	S10 E42	4/-	*SL	3	0409	71	5	5	c	0411	7	0414	1
54	13																	
														3	1855	>225		
55	14	2112	2205	2123	1	N12 E72	1/1							1A	2106.5	27.5	2134	
		2202	2221	2206	1	N11 E71	2/2							9	2134	9		2
														*2	2143	7	2144.5	55
														4	2150	8		
														6	2229.5	10.5	2235	18
56	15	0015	0219	0042	2	N15 E75	4/2	*S	3+	0015	180	0	7	*C+	0015	90	0049.4	808
															0145	90		17
57	16	*0325	0617	0422	3	N11 E57	4/1	S	2	0325	60	-	1	s	0419.5	1	0419.6	
														9	1428	8.5		
58	16	1430	1532	1505	2	N12 E48	6/2	*G	3	1440	125	4	3	*6	1436.5	133.5	1543	7
														4	1650	220		
59	19																	
60	20-	2314	-	-	2	N10 W09	4/4	*S	3	2351	214	5	10	*C+	2350	23	2400.3	14
	21	2351	2601	2403										C+	2429	6	2432.7	3
															2435	47		1
														*C+	2500	45	2515.2	53
															2545	90		
61	21																	
62	21																	
63	24																	
64	26	*0638	0944	0717	3	N13 W78	16/4	*SL	3+	0709	102	5	9	*C+	0705	35	0716.2	
															0740	15	0749.3	
															0755	10		
65	26																	
66	27																	
	Oct.																	
67	11																	
68	18	1625	1710	1631	1	N12 E90	2/2	S	2	1558	28	5	9	2	1557	4.5	1559.2	
														4		7.5		
69	18	2006	2058	2010	1+	N16 E90	1/1	S	2	2045	15	5	9	2	2043.3	5.8	2044.5	

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Event No.	DYNAMIC SPECTRUM DATA						200 MC DATA						OTHER		
	Type I and Cont. Time Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs.	Frequency Range (mc)	Type	Beg. (UT)	Dur. (Min)	Max. (UT)	Peak Flux	Obs.	Freq.	Type	Beg. (UT)
52	c 1922- 1938/2	g 1922/1		*1938- 2025/1-	W	41- 17									
53							c	0423	1.2	0423.4	190	Hir	18		1930
54															
55	I_s 2100- 2140/2				H	200- 50							108	RF	2110
	c 2007- 2353/3				W	41- 22									
56	I_s (weak) all day	g 0024- 0025/1+	*0027- 0049/2		W	41- 12	c	0025	80		(20)	Hir	9400	C+	0015 0145
							c	0025.7	4	0025.9	440		2000	C+	0017 0207
							c	0033.5	7	0035	800		1000	C+	0022
													108	C+	0027 0031
57													9400	s	0419
													2000	s	0419.5
58	I_s (weak) all day	G 1510- 1512/3			H	200- 16							9400	C+	1441
	I_s 1400- 1540/2												9100	C+	1438
	c 1510													RB	1510.1
													1500	C+	1440
													600	C	1423
													550	C+	1435
													108	C+	1434
													23	c	1510
													18		1511
59															
60		G 2321- 2323/3	*2400- 2426/2		S,H		C+	2350	170		10000	Hir	9500	C+	2356.5 2506.5
	Cont. in progress all day		*2403- 2415/3	* 2410- >2455/3	W	41- 15							2000	C+	2350 2405 2500 2555
													1000	C+	2351 2404 2500 2556
													18		2348
61															
62															
63															
64							C+	0705	40	0710	260	N	9500	C+	0710
													9400	C+	0705 0735
													2000	C+	0705 0732
													1000	C+	0700 0732
													600	s	0701.5
														C+	0713.5
													550	C+	0705
													111	c	
													23	C	
65															
66															
67															
68		G 1558- 1600/3	*1600- 1613/3		H	250- 50	c	1557.4	2		1100	N	550	s	1558.4
				* 1613- 1733/1	W	41- 15							108	C	1557
													18		1558
69		G 2043- 2047/3	*2046- 2100/3		H,W	200- 18	C	2045	16		>250	N(P)	550	s	2045
			*2120- 2128/1-		W	41- 19							108	C	2043
													18		2044

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TABLE VIII

bs.	PLAGE DATA: McM Plage No.	CMP Gr.Day	Mean Long-itude	Lat.	Avg. Int.	Avg. Max. Area	No. of Flares	Age in Rotation	Identification	SPOT DATA: Mt.W. Type	CMP Gr.Day	Lat.	H	When Seen	Area	Mt.W. No.
Dt	7003									See Spot Data for Event 68						
	7003									See Spot Data for Event 68						
Dt																
Nag	7003									See Spot Data for Event 68						

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IO DATA: Dur. (Min)	Max. (UT)	Peak Flux	Obs	POLAR CAP ABSORPTION	GEOMAGNETIC STORMS: Start Date	Hr.(UT)	Dur.	Type	Int.	No of Sta. Rpt.	Max. 3-Hr. Kp	Event No.
8		140	N									
>80	1348.8	420	HHI									
>80	1348.5		HHI									
>80	1349	128	HHI									
36		54	Uc									
>30	1416	(70)	AoP									
2.9	1357.8	25000										
2.3	1352.9	2000	AoP									
14.1	1403.3	6000										
					24	00--	1.3d	g	ms	17	7	72
70	0156.5	456	Tk									
40	0156.5	145	Nag									
100		50										
>40	0156.5	580	Nag									
>40	0155.5	355										
18	0223.7	125										
92.5		>2000	HIR									
					29	1359	1d	sc	ms	18	8	74
					Nov.							
					07	04--	4.4d	g	m	15	6	75
					17	0902	0.5d	sc	m	12	5	76
					24	04--	1.5d	g	m	5	5	77
					30	10--	0.4d	g	m	2	6	78
					Dec.							
					02	2116	4.8d	sc	m	14	6	79
					19	1429	1.2d	sc	m	1	5	80
					29	1035	0.5d	g	m	2	4	81

Event No.	Date	FLARE DATA Beg. (UT)	End (UT)	Max. (UT)	Imp.	Position	No. of Observations	SHORTWAVE RADIO FADEOUTS Type	Imp.	Beg. (UT)	Dur. (Min)	Wide Spread Index	No. of Obs.	10 CM EVENTS Type	Beg. (UT)	Dur. (Min)	Max. (UT)	Peak Flux
70	19	1650	1725	1657	2	N11 E 90	1/1	S	2+	1651	39	5	9	2	1649.3	11.8	1653	48
71	22	1321	1610	1350	2	N11 E 50	13/5	*SL	3	1338	118	5	9	3	1333	165	1436	16
														6	1333	45		>95
														1	1431.5	2.5	1432.5	2
														6	1455	2	1456.5	2.5
72	24																	
73	28	*0135	0335	0158	3	N12 W24	3	*SL	3	0140	140	5	7	C	0139	50	0156.3	465
74	29																	
	Nov.																	
75	07																	
76	17																	
77	24																	
78	30																	
	Dec.																	
79	02																	
80	19																	
81	29																	

Event No.	DYNAMIC SPECTRUM Type I and Cont. Time/Int.	Type III Time/Int.	Type II Time/Int.	Type IV Time/Int.	Obs.	Frequency Range (mc)	200 MC DATA Type	Beg. (UT)	Dur. (Min.)	Max. (UT)	Peak Flux	Obs.	OTHER RA Freq.	Type	Beg. (UT)
70		g 1652-1653/2		* 1702-1837/1	W	41-15							550	c	1653
		g 1656-1657/2													
		g 1701-1703/1													
71	I_s (weak) in progress all day		*1356-1404/3		H	175-50	RF	1348	50		40	N	9400	C	1333
		g 1351-1354/1	*1356-1418/3	* 1418-1600/2	W	41-20							2000	C	1333
													1500	C	1333
													600	c	1344
													111	RF	1350
														C	1356.4
													23	c+	1352.5
															1400.6
72															
73							C	0142.2	100			Hir	9500	C	0143
													9400	C+	0140
															0220
													2000	C+	
													1000	C+	0222
													500	C	0141
74															
75															
76															
77															
78															
79															
80															
81															

RADIO DATA				POLAR CAP ABSORPTION						GEOMAGNETIC STORMS							
Dur. (Min)	Max. (UT)	Peak Flux	Obs.	Onset Time Date	Hr.(UT)	Rise Time To Peak	Dur. (Hrs.)	Peak Abs. (db)	Obs.	Start Date	Hr.(UT)	Dur.	Type	Int.	No. of Sta. Rept.	Max. 3-Hr Kp	Event No.
4			McM							Sept.							
										13	19--	4.2d	g	ms	19	7	54
192		>30	NBS														
90	0047.5	17000	Nag														
100		135															
110	0054.4	2500	Nag														
80		40															
120	0154.3	13800	Nag														
3	0027	> 300	NBS														
25	0035	> 300															
4	0419.6	110	Nag														
1	0419.6	55	Nag														
>140	1510.4	520	HHI														
	1542.4	460															
110	1510.1	770	N														
120	1456	>1000	HHI														
	1508	>1000															
120		550	Uc														
90	1507	320	N														
70	1450	>30	NBS														
2.3	1510.3	10000	AoP														
3			McM														
										19	0543	0.9d	sc	m	5	5	59
14.5		> 900	Tk														
39	2516	2800															
15	2358.4	1200	Nag														
55	2430.4	880															
55	2517.4	2100															
70		50															
13	2358.4	485	Nag														
56	2432.4	1350															
56	2510.9	3250															
20		15															
15			HA	Sept.													
				21	0000	15	54	(3.1)	B								
										21	1413	2.4d	sc	s	19	9	62
										24	18--	2.5d	g	ms	14	7	63
22	0714	2901	Tk														
30	0714.2	4350	Nag														
>15		80															
27	0723	495	Nag														
23	0749.4	115															
32	0714	185	Nag														
23	0749.2	47															
11		340	Uc														
130		415															
115	0713	260	N														
	0722	(220)	AoP														
	0716	10000	AoP														
				26	0730	8	89	(4.6)	B								
										27	1942	2.5d	sc	ms	15	6	66
										Oct.							
										11	06--	5.5d	g	ms	9	6	67
2		105	N														
21	1605	>300	NBS														
3			McM														
3		140	N(P)														
17	2045	>300	NBS														
2			McM														