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Spectrum Observations

Data on solar radio emission in the spectral range 25-580 Mc/s recorded at the Radio Astronomy Station of Harvard College Observatory, Fort Davis, Texas, are presented. The research program is supported by financial assistance from the Air Force Cambridge Research Center, through the offices of Sacramento Peak Observatory.

The receiving equipment consists of five separate sweep frequency receivers covering the bands 25-50, 50-100, 100-180, 170-320, 300-580 Mc/s. The 25-50 and 50-100 Mc/s receivers are each connected to broad band dipoles which are cross polarised and mounted over a reflecting screen. The other three receivers are attached to separate broad band feeds mounted coaxially at the primary focus of an 8.55 meter diameter paraboloid, the 170-320 Mc/s feed being cross polarised with the other two feeds. The effective collecting area of the antenna is 40 sq. meters at 100 Mc/s and 45 sq. meters at 500 Mc/s.

The four types of recognized spectral activity are idealized below:

The large scale examples of continuum, sometimes called Type IV, are listed as "Cont. IV" in the tables. Photographic examples of the bursts have been published by Maxwell, Swarup, and Thompson (Proc. IRE 46, 142, 1958), and Maxwell (Sky and Telescope 17, 308, 1958; 18, 544, and 556, 1959). A few remaining solar radio bursts are tabulated as unclassified.
The symbols used in the tables are:

- \( b = \) single burst
- \( g = \) small group (<10) of bursts
- \( G = \) large group (>10) of bursts
- \( \rightarrow = \) Arrows indicate continuity of solar activity between two Greenwich days.

The minimum detectable level of solar activity is a function of frequency: approximately \( 5 \times 10^{-22} \text{ watts meter}^{-2} \text{ (c/s)}^{-1} \) at 500 Mc/s. The equipment records signals over an intensity range of approximately 10,000:1. There are three classes of intensity given in the tables. For 100 Mc/s they are:

- \( 1 = \) Faint, \( 5 \text{ to } 40 \times 10^{-22} \text{ watts meter}^{-2} \text{ (c/s)}^{-1} \).
- \( 2 = \) Moderate, \( 30 \text{ to } 200 \times 10^{-22} \).
- \( 3 = \) Strong, \( >200 \times 10^{-22} \).

The times are Universal Time (U. T.). The accuracy is to the nearest half minute, except in the case of major outbursts which are specified to the nearest 0.1 minute.

Details of the frequency ranges of activity may be obtained on request to the Radio Astronomy Station, Ft. Davis, Texas.
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PREDICTED AND OBSERVED SUNSPOT NUMBERS

SOLAR CYCLE 13
(BEGINNING APRIL 1954)

OBSERVED
(INCLUDES 1958
FINAL NUMBERS)

CYCLE 18
(BEGINNING FEB. 1944
PLACED ON APR. 1954)

MEAN OF CYCLES 8-18

COMMERCIAL STANDARDS BOULDER
CALCIUM PLAGE AND SUNSPOT REGIONS

SEPTEMBER 1959

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04.6 N25 5352 5315 800 2.5 1
04.7 N03 5351 New 900 1
05.3 S14 5353 *** 5000 3
05.5 N18 5354 5315 1000 1.5
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08.3 N15 5356 5315 3200 3
08.7 N27 5374 New (800) 3
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09.9 S19 5367 New (700) 3
10.8 N18 5359 5323 1200 2.5
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11.5 S17 5361 New 2000 3
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15.9 N06 5366 **** 2500 2.5
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19.7 N15 5373 New 1500 3
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24.8 S12 5381 5340 7000 3
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* 5310 and new.
** Merged with 5344.
*** 5313, 5317.
**** 5328, 5329.
+ 5339 and part of 5341.
Coronal indices for September 1959 will appear in a later issue of this report. Reductions have not yet been made due to scaling equipment failure.
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*Lockheed observations: Starting September 10, 1959 all values in the maximum intensity column are arbitrary units on a scale of 1 to 4 - not percent of the continuous spectrum.

Errata:
The latitude reported for the Sydney flare observed April 9, 1959 at 2343 UT., which was published in CRPL-F 180 Part B, August 1959 should be corrected to read South 11 instead of North 19.
SUBFLARES
Noted as follows: Date - Universal Time - Coordinates

AUGUST 1959

Noted as follows: Date - Universal Time - Coordinates
SUBFLARES
Noted as follows: Date-Universal Time-Coordinates
AUGUST 1959

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* MCMATH 26 1025 H05 130
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*Noted as Class of Importance *1 by other observatories (see CRPL 181 Part B).
### SOLAR FLARES

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#### Summary

- The table above lists solar flares observed during June 1959 at various observatories.
- Each entry includes the date, time, location, and maximum flaring activity.
- Observatories include SMITH, KAZAHK, and MOSCOW-G.
- Ecliptic coordinates are used to locate the flares.
- The duration and peak emission are recorded for each event.
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**Note:** The table contains information related to solar flares observed on June 1959, including time, observed conditions, and corresponding values.
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These flare reports are addenda to the June 1959 flares published in CRPL F 179 Part B, July 1959.

**Capri**  ANACAPI - GERMAN  MOSCOW-G  MOSCOW - GAISH  SAC PEAK: ALL VALUES IN MAX. INT. COLUMN ARE ARBITRARY UNITS (0-40), NOT PERCENT OF CONTINUOUS SPECTRUM.
**Capri S**  ANACAPI - SWEDISH  R O EDIN  ROYAL OBSERVATORY, EDINBURGH  E - LESS THAN 6 - PLUS
**Good Hope**  ROYAL OBSERVATORY, CAPE OF GOOD HOPE  R O HERST  GREENWICH ROYAL OBSERVATORY, HERSTMONCEUX  D - GREATER THAN - MINDS
**Kiev**  KIEV UNIVERSITY  SAC PEAK  SACRAMENTO PEAK  U - APPROXIMATE - NOT REPORTED
**KODA KNAI**  KODA KNAI  SCHAUIN  SCHAUINSLAND  U - APPROXIMATE - NOT REPORTED
**Krasnaya**  KRASNYA, PAHRRA  URSNRL  UNITED STATES NAVAL RESEARCH LABORATORY
INTERVALS OF NO FLARE PATROL OBSERVATIONS
JUNE 1959

HOUR-UT

DAY

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Abastumani  Alma Ata  Alacapri (Swedish)  Arcetri  Climax  Dunslain  Hawaii  Huancayo  Kharkov

Stations Include:

Abastumani  Alma Ata  Alacapri (Swedish)  Arcetri  Climax  Dunslain  Hawaii  Huancayo  Kharkov

Sacramento Peak  Simeiz  Sydney  Tashkent  Utrecht  Voroshilov  Zurich

Stations Include:

Abastumani  Alma Ata  Alacapri (Swedish)  Arcetri  Climax  Dunslain  Hawaii  Huancayo  Kharkov

Sacramento Peak  Simeiz  Sydney  Tashkent  Utrecht  Voroshilov  Zurich
IONOSPHERIC EFFECTS OF SOLAR FLARES

Sudden Cosmic Noise Absorption
Sudden Enhancements Of Atmospherics

Solar Noise Bursts At 18 Mc.

MARCH 1959

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OBSERVATION STATIONS

BOULDER

COMMERCIAL - STANDARDS - BOULDER
IONOSPHERIC EFFECTS OF SOLAR FLARES

Sudden Cosmic Noise Absorption
Sudden Enhancements Of Atmospherics
Solar Noise Bursts At 18 Mc.

MARCH 1959

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COMMENCE - STANDARDS - BOULDER
## IONOSPHERIC EFFECTS OF SOLAR FLARES

### (SHORT-WAVE RADIO FADEOUTS)

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## Ionospheric Effects of Solar Flares

(Short-Wave Radio Fadeouts)

**August 1959**

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*No known flare patrol*

BR = Breisach, G.F.R.  
CA = Canberra, Australia  
DA = Darmstadt, G.F.R.  
JU = Jubileruh, G.D.R.  
KO = Kodaikanal, India  
KU = Kuhlungsborn, G.D.R.  
LA = Los Angeles, Calif.  
LI = Lindau, G.F.R.  
NE = Nederhorst den Berg, Netherlands  
PA = Paramaribo, Dutch Guiana  
PU = Prague, Czechoslovakia  
SW = Enkoping, Sweden  
TO = Hiraiso Radio Wave Observatory, Japan  
CW* = Cable and Wireless, Barbados  
CW** = Cable and Wireless, Somerton, England  
CW*** = Cable and Wireless, Brentwood, England  
CW+ = Cable and Wireless, Hong Kong  
CW++ = Cable and Wireless, Singapore  
### SOLAR RADIO EMISSION
#### OUTSTANDING OCCURRENCES
#### SEPTEMBER 1959

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**HOURS OF OBSERVATION: JULY, AUGUST, SEPTEMBER 1959**

**OBSERVING PERIOD:**

- **July:** 0730 UT - 2400 UT (approx.)
- **August:** 1130 UT - 2330 UT (approx.)
- **September:** 1205 UT - 2240 UT (approx.)

with the following exceptions:

1. **Observations commenced:**
   - July 4 at 1615
   - August 4 at 1605

2. **Observations ended:**
   - July 29 at 2230
   - September 10 at 1930
   - September 12 at 1900

3. **Daily interruption of observations for calibration purposes of approximately 20 minutes, usually in the period 1630 UT to 1800 UT.**

4. **Periods of interference obscuring the records on:**
   - July 2, 7, 9-10, 13-15, 20-22, 28-29, 31
   - August 4, 6-9, 12, 14, 18-22, 25-28
   - September 3-4, 9, 11, 13-14, 18-19, 23-24
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# Solar Radio Emission Spectrum Observations

**Fort Davis**

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### SPECTRUM OBSERVATIONS

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**Remarks**

- Some features of a Type II burst.
- Unclass. burst has some features of a Type II burst.
- Unclassified Type II (Fast Drift Bursts)
- Type III (Fast Drift Bursts)
- Unclassified Type III (Fast Drift Bursts)
- Type II (Slow Drift Bursts)
### SOLAR RADIO EMISSION
### SPECTRUM OBSERVATIONS

**Fort Davis**

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**COMMENTS - STANDARDS - NEEDED**
## SOLAR RADIO EMISSION
### SPECTRUM OBSERVATIONS

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- **Type II**: 'Slow Drift Bursts' Unclassified
- **Type III**: Fast Drift Bursts

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- B: Indicates Commerce - Standards - Boulder
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## GEOMAGNETIC ACTIVITY INDICES
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COMMERCE - STANDARDS - BOULDER
PLANETARY MAGNETIC
THREE-HOUR-RANGE INDICES
KP till 1959 Aug. 31
(Ks from Wingst and Göttingen till 1959 Sept. 17)

△ = sudden commencement

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Score: Quiet Periods P 19 13 22 19 12 12
S 9 11 7 10 16 16
U 1 1 1 0 0 0
F 0 0 0 0 0 0

Disturbed Periods P 2 3 1 2 1 0
S 0 1 0 0 0 0
U 0 0 0 0 0 0
F 0 2 0 0 2 3

( ) represent disturbed values.
QUALITY QUALITY QUALITY

CRPL RADIO PROPAGATION QUALITY FIGURES AND FORECASTS
NORTH ATLANTIC

— Short-term forecast

AUGUST 1959

Range of reports

OUTCOME OF ADVANCED FORECASTS

FINAL ESTIMATE

DISTURBED

ACTUAL

COMPARISON
(SEE TEXT)

0 10 20 31

COMMERCIAL STANDARDS BOULDER
Adapted from Observations by Deutsches Bundespost
<table>
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<tr>
<th>Aug. 1959</th>
<th>North Pacific 12-hourly quality figures</th>
<th>Short-term forecasts issued at 0600 1800</th>
<th>Whole day index</th>
<th>Advance forecasts (Jp reports) for whole day; issued in advance by: 1-7 1-7 1-7 days 1-7 days Final Jps SDW Jp</th>
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</table>

Score: Quiet Periods | P | 15 | 17 | 15 |
| | S | 12 | 11 | 10 |
| | U | 2 | 0 | 2 |
| | F | 0 | 0 | 2 |

Disturbed Periods | P | 1 | 0 | 0 |
| | S | 0 | 3 | 0 |
| | U | 1 | 0 | 0 |
| | F | 0 | 0 | 2 |

( ) represent disturbed values.
OUTCOME OF ADVANCED FORECASTS       FINAL ESTIMATE

DISTURBED

ACTUAL

COMPARISON (SEE TEXT)

QUIET

0  10  20  31

P  S  U  F

COMMERCED  STANDARDS  BOLDER
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<td>Sacramento Peak Solar Flare 01/1652Z</td>
<td>25 Aurora Inferred Magnetic Storm 03/2159Z</td>
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