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Solar-Geophysical Data

explanation of data reports

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE / NATIONAL GEOPHYSICAL DATA CENTER / BOULDER, COLORADO

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Solar - Geophysical Data

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Michael A. Chinnery, Director
NATIONAL GEOPHYSICAL DATA CENTER
BOULDER, COLORADO

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For obtaining bulletins on a data exchange basis, send request to: World Data Center A for Solar-Terrestrial Physics, NOAA/NESDIS/NGDC, E/GC2, 325 Broadway, Boulder, Colorado 80303 U.S.A.

BACK ISSUES OF "SOLAR-GEOPHYSICAL DATA"

Reel #	Coverage	Medium	Reel #	Coverage	Medium	Reel #	Coverage	Medium
1	Jan 56 - Dec 56	Microfilm	9	Jan 64 - Dec 64	Microfilm	17	Jul 69 - Dec 69	Microfilm
2	Jan 57 - Dec 57	Microfilm	10	Jan 65 - Dec 65	Microfilm	18	Jan 70 - Jun 70	Microfilm
3	Jan 58 - Dec 58	Microfilm	11	Jan 66 - Sep 66	Microfilm	19	Jul 70 - Dec 70	Microfilm
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8	Jan 63 - Dec 63	Microfilm	16	Jan 69 - Jun 69	Microfilm		1973 - 1986	Microfiche

Microfilm are available at $30.00 per reel; microfiche at $48.00 per year; $1,200.00 for the above set. Back issues in booklet form are available, as long as the stocks exist, at $4.00 for either Part plus a $3.00 handling charge per order. Any entire year of back issues in booklet form is available at the current annual subscription rate, as long as the stocks exist. Please add a ten dollar ($10.00) handling fee for non-U.S.A. orders. Prices are subject to change.

SOLAR-GEOPHYSICAL DATA
EXPLANATION OF DATA REPORTS

INTRODUCTION

This supplement contains the description and explanation of the data in the monthly publication **Solar-Geophysical Data**, compiled by the National Geophysical Data Center (NGDC) in Boulder, CO USA. NGDC is one of the several components of the National Environmental Satellite, Data and Information Service (NESDIS) in the National Oceanic and Atmospheric Administration (NOAA). Dr. M.A. Chinnery is Director of NGDC. Mr. J.H. Allen is Chief of the Solar-Terrestrial Physics Division and Director of the World Data Center A for Solar-Terrestrial Physics.

These data reports continue a series that was issued by the Central Radio Propagation Laboratory of the National Bureau of Standards, beginning November 1955 and known for many years as the CRPL-F Series Part B. The title **Solar-Geophysical Data** was first used in 1955. The name of the organization compiling the data reports has changed many times, but the personnel involved are generally the same. The monthly bulletins are available on a data exchange basis or at a nominal cost.*

Solar-Geophysical Data is intended to keep research workers informed on a timely schedule of the major events of solar activity and the associated interplanetary, ionospheric, radio propagation and other geophysical effects. This report series is made possible through the cooperation of many observatories, laboratories, and agencies as recorded in the detailed descriptions that follow.

For some data types, the material published in **Solar-Geophysical Data** is only a small part of what is available from the NGDC archives. The published data are considered to be in greatest demand, and thus the dissemination in this form is efficient and economical for both the user and the data center. Many of the published data bases are available in digital form. Users are invited to avail themselves of the data services of NGDC and the collocated World Data Center A for Solar-Terrestrial Physics.

Beginning with the July 1969 issue the publication was divided into two Parts (I and II). Part I (Prompt Reports) contains data for 1 and 2 months prior to the month of publication, plus late data. Part II (Comprehensive Reports) contains data for 6 months prior to the month of publication, plus late and miscellaneous data. These reports may be referenced in the open literature.** Errata or revisions are included from time to time. Additions to this descriptive text will appear with the data when new material is added or revision is made.

The first two pages of each issue of Part I and II give the general contents and a running index to locate data for recent months. A complete index for data since July 1957 is given in the blue section of this supplement.

In various places in this text, data types are identified both by name and an alphanumeric designation (A.2, C.3, etc.). The latter come from the data categories given in **Guide to International Data Exchange**, issued by the ICSU Panel on World Data Centres, Washington, DC 1979.

A useful reference containing descriptions of many solar and geophysical phenomena as well as directing the reader to more detailed discussions is the **Handbook of Correlative Data**, issued by the National Space Science Data Center, NASA, Goddard Space Flight Center, Greenbelt, MD 20771, Feb. 1971. (The Handbook is also available through World Data Center A for Solar-Terrestrial Physics.)

For addresses of individual stations, please refer to the **MONSEE Directory of Solar-Terrestrial Monitoring Stations**, Edition 2, AFGL-TR-84-0237, August 1984 (available from NGDC).

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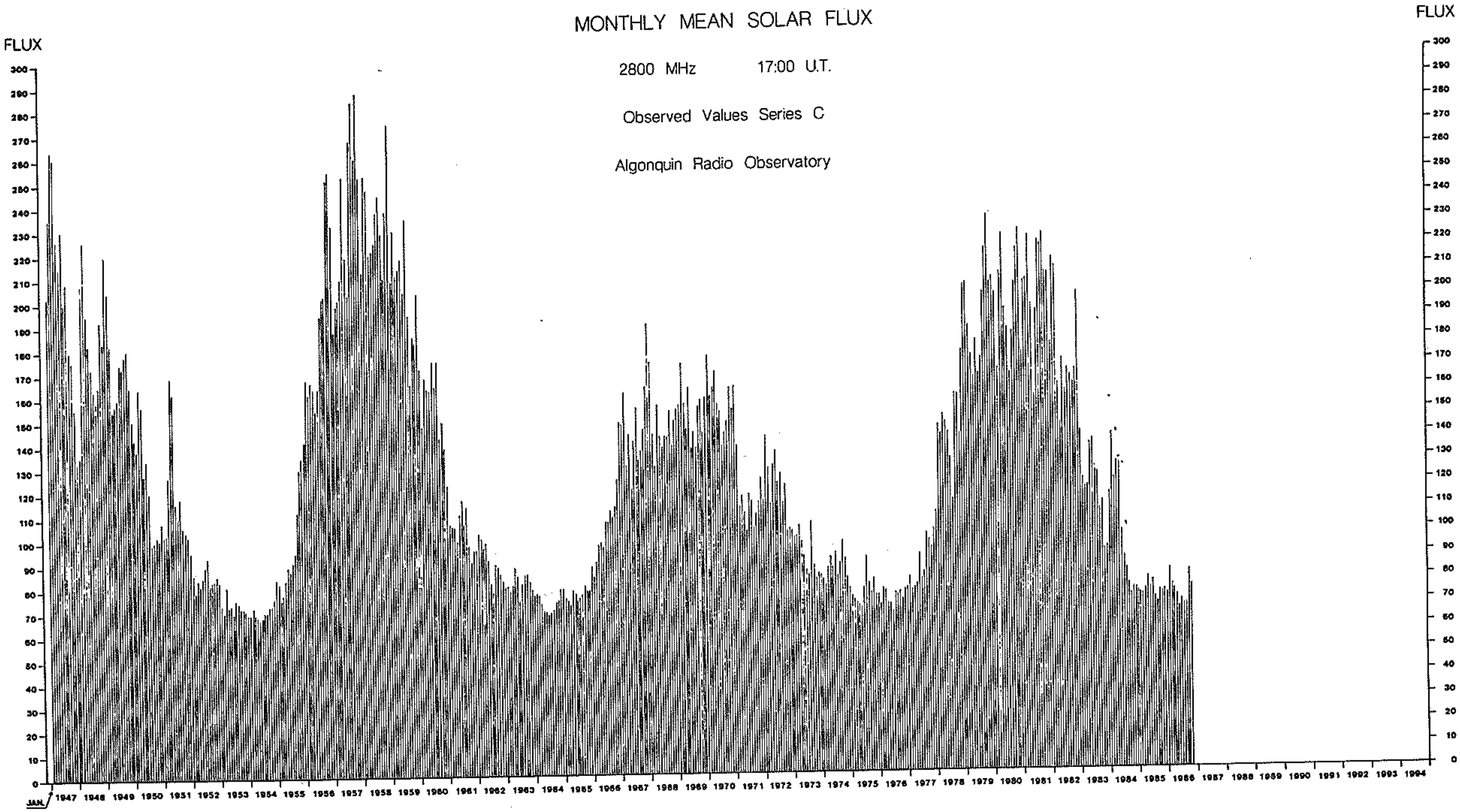
*For sale from the National Geophysical Data Center, NOAA, E/GC2, 325 Broadway, Boulder, CO 80303 USA. 1987 and 1988 Subscription Price for U.S.: $70.00 annually for both Part I (Prompt Reports) and Part II (Comprehensive Reports) or $35.00 annually for either Part. This supplement is included. For foreign countries, the Subscription Price is $106.00 for both Parts or $53.00 for either Part. Single issue price $4.00 for either Part and $3.00 for this extra issue. $3.00 handling charge per order except for subscription orders. Make checks and money orders payable to: Department of Commerce, NOAA/NGDC.

**To standardize referencing these reports in the open literature, the following format is recommended (with this issue as an example):

Solar-Geophysical Data, 515 Part I (or Part II), pages, July 1987, U.S. Department of Commerce (Boulder, CO, USA 80303).


MONTHLY MEAN SOLAR FLUX
2800 MHz 17:00 U.T.
Observed Values Series C
Algonquin Radio Observatory
FLUX
JAN.
1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994

SUMMARY TABLE OF CONTENTS

DETAILED TABLE OF CONTENTS
DATA FOR 1 MONTH AGO

DETAILED TABLE OF CONTENTS
DATA FOR 2 MONTHS AGO

DETAILED TABLE OF CONTENTS
DATA FOR 6 MONTHS AGO

MISCELLANEOUS DATA

DATA FOR ONE MONTH AGO

ALERT PERIODS (H.60)

The table gives the Advance Geophysical Alerts (PRESTO) as initiated by (or received by) the Western Hemisphere Regional Warning Center of the International Ursigram and World Days Service (IUWDS) at Boulder, Colorado, and also by the Worldwide Geophysical Alerts (GEOALERTS) as designated by the IUWDS World Warning Agency, Boulder, Colorado.

These alerts are of the types recommended by the International Ursigram and World Days Service. A description of the IUWDS program can be found in Synoptic Codes for Solar and Geophysical Data, revised by RWC Circular Letters, Third Revised Edition 1973. This code book and its revision are available from the IUWDS Secretary for Ursigrams, G.R. Heckman, NOAA, 325 Broadway, R/E/SE2, Boulder, CO 80303 USA.

The PRESTO messages are originated by the reporting observatory or at the Regional Warning Centers. They are for advance reporting of major events. The format of these messages follows (extracted from Synoptic Codes for Solar and Geophysical Data):

PRESTO

1. **Content.**

   Report of major events to the other RWCs and to the local or regional customers

2. **General form.**

PRESTO   observatory   JJHHmm   report

3. **Definition of symbols.**

PRESTO - key word for RAPID reporting of major events

observatory - name of reporting observatory in clear text

JJHHmm - Greenwich date and time of issue of message in hours and minutes UT

report = one or more of statements as below

For **GEOMAGNETIC ACTIVITY**

MAGSTORM BEGINS	JJHHmm
STRONG MAGSTORM IN PROGRESS	JJHHmm ($A \geq 50$)
WEAK MAGSTORM IN PROGRESS	JJHHmm ($30 \leq A < 50$)

Note: One may add plain language comments related to auroral reports or Forbush effect expected

For **MAJOR FLARES**

SOFLARE - importance class - coordinates (i.e. N20 E78) - JJHHmm (date and time) - "duration in minutes given" or statement "in progress"

Note: One may add plain language comments like "Y-shaped" or "covering spots" or "suspected proton flare"

For **TENFLARE** (solar radio emission outburst at 10 cm>100% over background)

TENFLARE - XX units - JJHHmm for onset - duration in minutes, or statement "in progress" at the time of PRESTO, or statement "observed until hours and minutes UT"

Note: Units give the increase of the flux density over the pre-burst level in conventional units ($10^{-22}Wm^{-2}Hz^{-1}$) by significant digits and words such as "1700 units over background"

For **PROTON EVENT**

COSMIC RAY INCREASE - JJHHmm - percent increase above normal based on neutron monitor

POLCAP ABSORPTION - JJHHmm - dB of absorption by riometer or ionospheric forward scatter technique

PROTON EVENT - JJHHmm - specify energy range from a spacecraft report

Notes:
1. PRESTO should be circulated as soon as the event has been recognized.
2. The PRESTO will only report events and no forecasts. Any change of a forecast would be sent to the interested customers as a GEOSOL, GEOALERT or in plain language.
3. If the observatories follow this scheme, it is not necessary to report the kind of experiment

   SOFLARE signifies a chromospheric report
   TENFLARE signifies a centimetric outburst
   COSMIC RAY INCREASE signifies a neutron monitor count increase
   POLCAP ABSORPTION signifies a ground based polar cap report
   PROTON EVENT signifies spacecraft reports only

The GEOSOL or GEOALERT messages are originated by the Regional Warning Center (RWC) or by the World Warning Agency (WWA) in Boulder, Colorado. They report the current level of solar activity and forecast solar geophysical events. The format of these messages follows:

GEOSOL
or
GEOALERT

1. **Content.**

- For sending combined data and forecasts to other RWCs and for general data users
- For sending ADVICE information to other RWCs

2. **General form.**

GEOALERT or GEOSOL   IIINN   DDHHmm

DDHHmm: date time group of message in UT

IIINN: warning center of origin, serial number of message

GEOALERT or GEOSOL: key word - (use GEOALERT when ADVICE included in message)

9HHJJ   1aaab   2cccd   3eeef   4gggh

4gggh: cosmic ray intensity and events

3eeef: geomagnetic A index and events

2cccd: 10 cm flux and number of bursts

1aaab: relative sunspot number, and number of new spot groups

9HHJJ: signifies indices for preceding 24 hours follow

[repeat for each region QXXYY nnijk] ...FLARE   JJHHmm   QXXYY

QXXYY: heliograpic coordinates of flare

JJHHmm: date and UT of Outstanding flare

FLARE: key word

nnijk: total number of flares, number > imp I, number of M and X flares in active region

QXXYY: heliographic coordinates of active region

MAGSTORM JJHHmm 8HHJJ 7777C

- 7777C: key numbers and observations used for forecast
- 8HHJJ: key numbers signify solar forecast to follow for day
- JJHHmm: date and UT of beginning of magnetic storm
- MAGSTORM: key word

[may be repeated or omitted] QXXYY ZZZZZZ...ZZZZ ---ALERT FIN

- FIN: end of message
- ---ALERT: type of alert
- ZZZZZZ...ZZZZ: active region description
- QXXYY: heliographic coordinates of active region

3. **Definition of symbols.**

GEOSOL = key word for sending combined data and forecasts
GEOALERT = key word for sending combined data and forecasts including ADVICE information

III = warning center of origin

MEU - Meudon	TOK - Tokyo
WWA - Boulder	SYD - Sydney
MOS - Moscow	DAR - Darmstadt

NN = originating center's serial number
DDHHmm = date (DD) hour (HH) and minutes (mm) in UT of issue of message

9 = key number to indicate indices follow
HHJJ = the middle of the 24-hour period for which the indices apply in UT; HH - hour; JJ - date
1 = key number to indicate sunspot data follows
aaa = relative sunspot number (Wolf number)
b = number of new sunspot groups that have appeared (by rotation or birth) during this period
2 = key number to indicate 10 cm solar flux data follow
ccc = value of 10 cm solar flux in $10^{-22}Wm^{-2}Hz^{-1}$ units
d = number of known IMPORTANT 10 cm bursts during this period
3 = key number to indicate magnetic activity follows
eee = A_k index for Greenwich date
f = important event, if any, where:
- 0 = no event
- 1 = end of magnetic storm
- 2 = storm in progress
- 6 = gradual storm commencement
- 7 = sudden storm commencement (sc)
- 8 = very pronounced sudden storm commencement

4 = key number to indicate cosmic radiation data observed by neutron monitor follows
ggg = median level in thousandths of an arbitrary normal level

h = important event, if any, where:
- 0 = no event
- 1 = pre-decrease
- 2 = beginning of a Forbush decrease
- 3 = Forbush decrease in progress
- 4 = end of Forbush decrease
- 5 = arrival of solar particles (GLE)

Q = quadrant (heliographic coordinates) of the active region where:

1 = NE (north-east)	3 = SW (south-west)
2 = SE (south-east)	4 = NW (north-west)

XX = distance to central meridian in degrees (longitude)
YY = heliographic latitude in degrees
[heliographic location of active region]

nn = total number of flares
i = number of flares greater than importance 1
j = number of M flares
k = number of class X flares
[in this region during this period]

Note: Definitions of class C, M or X flares follow:

CLASS C: A solar flare which is not associated with significant X-ray production.

CLASS M: Solar flares which are accompanied by significant X-ray production, greater than 10^{-2}ergs $cm^{-2}sec^{-1}$ in 0-8A band, or 10^{-3}ergs $cm^{-2}sec^{-1}$ in 0.5-5A band, comparable SID (SWF or SPA).

CLASS X: Solar flares which are accompanied by great X-ray production, greater than 10^{-1}ergs $cm^{-2}sec^{-1}$ in 0-8A band, or 10^{-2}ergs $cm^{-2}sec^{-1}$ in 0.5-5A band, comparably great SID, or by a 10 cm radio noise outburst of more than 1000 flux units over background and duration greater than 10 minutes.

This classification is designed to give an indication of the geophysical effect which is likely to be associated with a solar event. Class C events will usually be accompanied by only minor sudden ionospheric disturbances (SID), class M by significant SID, and class X by major SID.

OUTSTANDING EVENTS

...FLARE = key word to indicate OUTSTANDING event data follows, where:
- PROTONFLARE - protons from this flare have been observed in the Earth's vicinity
- MAGFLARE - a geomagnetic and/or cosmic storm has been associated with this flare
- MAJORFLARE - this flare is the basis for the forecast of geomagnetic storm, cosmic storm and/or protons in the Earth's vicinity

JJHHmm = UT of beginning of OUTSTANDING flare

Q = quadrant of the OUTSTANDING flare location, where:

1 = NE (north-east)	3 = SW (south-west)
2 = SE (south-east)	4 = NW (north-west)

XX = distance to central meridian in degrees
YY = heliographic latitude in degrees
[heliographic location of OUTSTANDING FLARE]

MAGSTORM = key to indicate magnetic storm data follows
JJHHmm = UT of beginning of magnetic storm

Notes: Omit these groups if no events to be reported.
Use clear text if event does not correspond to conventional classification.
Include data from earlier PRESTO messages for this period.

DETAILED FORECASTS

8 = key number to indicate 24-hour forecast information follows
HHJJ = the UT hour (HH) and date (JJ) of the beginning of the 24-hour forecast period
7777 = key numbers to indicate available local observatories follow
C = definitions of available local observatories, where
- 0 = none
- 1 = solar radio observations
- 2 = partial solar optical observations
- 3 = all (optical and radio)
- 4 = all including solar magnetic field measurements

Q = quadrant of PREDICTED ACTIVE REGION, where

1 = NE (north-east)	3 = SW (south-west)
2 = SE (south-east)	4 = NW (north-west)

XX = distance to central meridian in degrees
YY = heliographic latitude in degrees
[heliographic location of ACTIVE REGION at HHJJ]

ZZZ•••ZZZ = key word to describe the PREDICTED ACTIVE REGION, where:
- SPOTNIL - indicates spotless disk
- PLAGENIL - indicates spotless disk free of calcium plage

[when these are used, QXXYY omitted]

QUIET = less than one chromospheric event per day
ERUPTIVE = at least one radio event (10cm) and several chromospheric events per day (Class C Flare)
ACTIVE = at least one geophysical event or several larger radio events (10cm) per day (Class M Flare)
PROTON = at least one high energy event (Class X Flare)

Notes: 1. Events are classified as below:

a) **Chromospheric Events**: some flares are just Chromospheric Events without Centimetric Bursts or Ionospheric Effects. (SID) (Class C flare)
b) **Radio Event**: flares with Centimetric Bursts and/or definite Ionospheric Event. (SID).
c) **Geophysical Event**: flare (Importance two or larger) with Centimetric Outbursts (maximum of the flux higher than the Quiet Sun flux, duration longer than 10 minutes) and/or strong SID. Sometimes these flares are followed by Geomagnetic Storms or small PCA. (Class M flare)
d) **High Energy Event**: flare (class two or more) with outstanding Centimetric Bursts and SID. High Energy Protons are reported at the Earth in the case where most of these events occur on the western part of the solar disk. (Class X flare) flare)

2. Some quiet groups being of very little importance, these can be reported only by their number.

3. If the word CAUTION is inserted between QXXYY group and the description word, it signifies one cannot forecast real evolution of the group at the time of the message.

4. If the word DOUBTFUL is inserted between QXXYY group and description word, it signifies it is impossible to determine definitely the true class of activity expected.

ADVICES AND ALERTS

---ALERT--- key word(s) to describe one or more of the following situations during the next 24 hours or longer:

SOLNIL		End of active period
MAGNIL	-	or
PROTONNIL		Beginning of period of very low activity

SOLQUIET - No active regions on the solar disk
MAGQUIET - Only sporadic weak geomagnetic activity activity

SOLALERT JJ/KK - increased solar activity expected between days JJ and KK
MAGALERT JJ/KK - increased geomagnetic activity expected between days JJ and KK

MAJOR FLARE ALERT JJ/KK QXXYY - large bright flare (Class X) expected between days JJ and KK in region QXXYY
PROTON FLARE ALERT JJ/KK QXXYY - protons expected in Earth's vicinity as a result of proton flare predicted to occur between days JJ and KK in region QXXYY

PRESTO PROTON ARRIVAL ALERT KK/JJHHmm - forecast of arrival of protons in Earth's vicinity on day KK from flare which occurred on day JJ at HHmm (UT)

STRATWARM STARTS____	includes day of week and
STRATWARM EXISTS____	geographical area
STRATWARM ENDS	

Notes: 1) The Alert section is always included in the GEOALERT code format as it is used as ADVICE by RWCs and WWA.

2) More than one type of Alert may be included in a message

3) Previous transmission of ALERT (SOL, MAG, MAJOR FLARE, PROTON FLARE, PRESTO PROTON ARRIVAL) requires the eventual transmission of appropriate NIL (SOL, MAG, PROTON)

4) Transmission of STRATWARM STARTS or EXISTS requires the eventual transmission of STRATWARM ENDS

5) GEOALERTS are converted by WWA to plain language and broadcast on WWV and WWVH as described in Circular letter RWC-123.

DAILY SOLAR INDICES (A.2, A.8)

Description of Tables:

Relative Sunspot Numbers and Adjusted 2800 MHz Solar Flux -- The first table presents International relative sunspot numbers, Ri, for the month. The corresponding data for 11 earlier months are reprinted to permit the trend of solar activity to be followed. On the same page is presented a similar table of 12 months of daily solar flux values at 2800 MHz adjusted to one Astronomical Unit, S_a, as reported by the Algonquin Radio Observatory (ARO) of the National Research Council near Ottawa.

Combined Sunspot Numbers and Solar Flux Values -- The next table gives several available daily indices for the month preceding that of publication. In addition to the calendar date the table gives the day-number of the year and the day-number of the standard 27-day (solar rotation) cycles. The data presented are International relative sunspot numbers, (Ri), American relative sunspot numbers (Ra), daily solar flux values at 2800 MHz, (S and S_a), from Ottawa, and daily solar flux values, (S_a), from Sagamore Hill, adjusted to 1 AU for 15400, 8800, 4995, 2695, 1415, 609, 410 and 242 MHz. The Ra and R_I numbers in this table are provisional.

Historical Table of Observed and Predicted Sunspot Numbers and Solar Flux -- This table presents the monthly mean and smoothed Rz or Ri, Ra, Rs and S_a for the past four years. Rz is the Zurich relative sunspot number, Ri the International sunspot number; Ra is the final American relative sunspot number available two months after observation; and S_a is the Ottawa daily solar flux value at 2800 MHz, adjusted to 1 AU. Rs is a relative sunspot number computed directly from S_a using the equation $Rs = -62 + 1.08\ S_a$. This equation was derived from a linear regression between Rz data and S_a data for the years 1947-79. The current Rs definition gives values on the average to within 4% of the Rz value.

Also included in this table are predictions for one year ahead for Ri, Ra and Rs. These are computed using the McNish-Lincoln method (see below).

Table and Graph of Observed and Predicted Relative Sunspot Number -- All data in the table and the succeeding graph are smoothed relative sunspot numbers, which are defined as:

$$R_{12} = 1/12 \left\{ \sum_{n-5}^{n+5} (R_k) + 1/2\ (R_{n+6} + R_{n-6}) \right\}$$

in which Rk is the mean value of R for a single month k and R_{12} is the smoothed index for the month represented by k = n.

The predicted sunspot numbers in the table (and for the 12th month after the latest observation point in the graph) are computed using the method of A.G. McNish and J.V. Lincoln [**Trans. Am. Geophy. Union, 30**, 673-685, 1949] and modified using regression coefficients and mean cycle values computed for Cycles 8 through 20. The 90% confidence interval is shown by parentheses for each month of predictions in the table and by a bar on the graph. This indicates the uncertainty above and below the predicted number. The predictions are always based on the latest observed data available and will change each month as a new observation is included in the calculations. Final Zurich or International sunspot numbers, as they become available, are used in deriving the smoothed data.

The graph shows the mean cycle, the observations to date of Cycle 21, and the 12th month ahead prediction for Cycle 21. All are shown on the same time base, which is that for Cycle 21, beginning with the sunspot minimum at June 1976.

Graph and Table of Monthly Mean Sunspot Numbers -- The values of the final monthly mean sunspot numbers from 1944 to the present are given both in tabular and graphical form. These data are not smoothed. Provisional data in the table are indicated by an asterisk.

Description of Data:

Relative Sunspot Numbers -- The relative sunspot number is an index of the activity of the entire visible disk of the Sun. It is determined each day without reference to preceding days. Each isolated cluster of sunspots is termed a sunspot group, and it may consist of one or a large number of distinct spots whose size can range from 10 or more square degrees of the solar surface down to the limit of resolution (e.g., 1/25 square degree). The relative sunspot number is defined as R = K (10g + s), where g is the number of sunspot groups and s is the total number of distinct spots. The scale factor K (usually less than unity) depends on the observer and is intended to effect the conversion to the scale originated by Wolf.

The provisional daily Zurich relative sunspot numbers, Rz, were based upon observations made at Zurich and its two branch stations in Arosa and Locarno and communicated by M. Waldmeier of the Swiss Federal Observatory. Beginning January 1, 1981, the Zurich relative sunspot number program is replaced by the "Sunspot Index Data Center" (c/o Dr. A. Koeckelenbergh, 3 av. Circulaire, B-1180 Bruxelles, Belgium). The determination of the **provisional International Sunspot Numbers** Ri results from a statistical treatment of the data originating from more than twenty-five observing stations. These stations constitute an international network, with the Locarno (Switzerland) station as the reference station, to guarantee continuity with the past Zurich series of Rz. **The definitive International Sunspot Numbers** Ri are evaluated by a similar method based on a network of observing stations selected for their high number of observations, their continuity during the whole year and an existing series of observations during the last years. Also taken into account is the stability of the K monthly factors with reference to the Locarno station. These relative sunspot numbers are now designated Ri (International) instead of Rz (Zurich).

The daily American relative sunspot numbers, Ra, are compiled by Peter Taylor for the Solar Division of the American Association of Variable Star Observers (AAVSO). The Ra observations for sunspot numbers are made by a rather small group of extraordinarily faithful observers, many of them amateurs, and each with many years of experience. About 30 observers contribute to the preliminary Ra. About 50 observers contribute to the final Ra values. The counts are made visually with small, suitably protected telescopes.

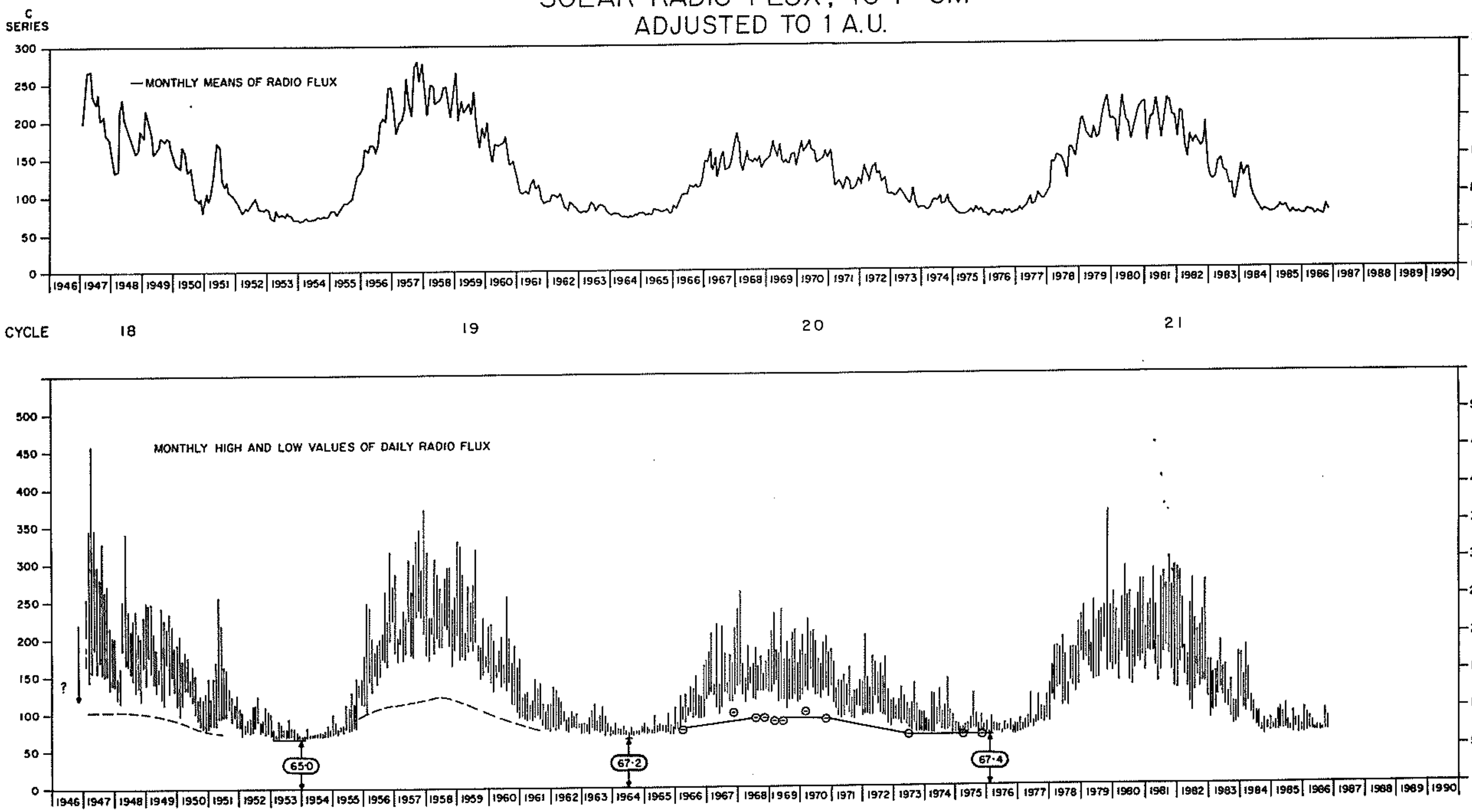
Final values of Ri appear in these reports, in the **IAU Quarterly Bulletin on Solar Activity**, and elsewhere. They usually differ slightly from the provisional values. The American numbers, Ra, are provisional in the month after observation. Final Ra are prepared two months after observation upon collection of reports from overseas standard observers.

Daily Solar Flux Values - Ottawa-ARO -- Daily observations of the 2800 MHz radio emissions that originated from the solar disk and from any active regions are made at the Algonquin Radio Observatory (ARO) of the National Research Council of Canada with a reflector of 1.8 m diameter. These are a continuation of observations that commenced in Ottawa in 1947. Numerical values of flux in the tables are in units of $10^{-22}Wm^{-2}Hz^{-1}$ and refer to a single calibration made near local noon at 1700 UT. When the flux changes rapidly, or when there is a burst in progress at that time, the reported value, the best estimate of the undisturbed level, provides the reference level for measuring the burst intensity. The various types of outstanding events are listed separately in another table.

The observed flux values have variations resulting from the eccentric orbit of the Earth in its annual path around the Sun. Although these radio values are suitable to use with observed ionospheric and other data, an adjustment must be introduced when the observations are used in studies of the absolute or intrinsic variation of the solar radio flux. Thus the tables show both the observed flux, S, and the flux adjusted to 1 AU S_a. The observations are made for a single North-South polarization but are reduced under the assumption of two equal orthogonal polarizations.

Graphs showing the monthly mean adjusted flux and the monthly high and low values since 1947 are shown on page 11. Relative errors over long periods of time are believed to be $\pm 2\%$, over a few days may be $\pm 5\%$. The characteristics of the observations are surveyed in "Solar Radio Emission at 10.7 cm" by A.E. Covington [**J. Royal Astron. Soc., Canada, 63**, 125, 1969]. Values of the quiet Sun for the minima of January 1954 and July 1964 have been derived as 65.0 and 67.2 s.f.u. using the solar flux adjusted to 1 AU [Covington, **J. Royal Astron.** Soc., Canada, 68, 31, 1974]. When the same method is applied to the daily values for 1975-76, it would appear that the basic quiet Sun was observed on a number of days from March 1975 to March 1976, and that the average of the 8 quietest days is 67.3 solar flux units (s.f.u.). A minimum value of 2.7 s.f.u. for the slowly varying component (s.v.c.) was observed in February 1976 and defines radio sunspot minimum as the slow increase in both the monthly quiet Sun values and the s.v.c. combined.

SOLAR RADIO FLUX, 10·7 CM
ADJUSTED TO 1 A.U.



Vertical bars indicate high and low daily values within each month and define the slowly varying component of flux

Dashed curve approximately separates the flux associated with centers of activity from a quiet sun derived as the flux intercept for zero sunspot number in annual plots of daily flux versus sunspot number.

Quiet solar flux derived from some radio cool regions on high resolution solar strip scans. Such regions are associated with x-ray coronal holes.

First and last appearance of this basic emission given by horizontal line. Radio minimum is determined by selecting a month with minimum values of the slowly varying component as well as the basic flux.

Magnitude of the basic quiet sun obtained as the lowest daily flux value observed during minimum sunspot activity and indicated in cartouche at time indicated.

Though experiments have indicated that a multiplying factor of 0.90 should be applied to the reported flux values in order to derive the absolute flux values, the published flux values are not corrected by this factor because of the number of computerized data series listing these values. Maintaining homogeneity of the published series is considered more important than having the absolute flux values published. A review of the history of the absolute calibration of the Ottawa series, as well as a number of other series of observations made within the microwave region, was prepared by H. Tanaka of the Research Institute of Atmospherics, Nagoya University, as convener of a Working Group of then Comm. 5 of URSI [H. Tanaka et al., "Absolute calibration of solar radio flux density in the microwave region," Solar Physics, 29, 243, 1973].

The numerical data for the graph shown above and a selected bibliography are given in **Algonquin Radio Observatory Report No. 5**, "A Working Collection of Daily 2800 MHz Solar Flux Values 1946-1976" by A.E. Covington, Herzberg Institute of Astrophysics N.R.C. of Canada, Ottawa, Canada.

These solar radio noise indices are published in accordance with a CCIR Recommendation originally from the Xth Plenary Assembly, Geneva, 1963 (maintained at XIth through XIVth Plenaries), which states "that the monthly-mean value of solar radio-noise flux at wavelengths near 10 cm should be adopted as the index to be used for predicting monthly median values of foE and foF1, for dates certainly up to 6, and perhaps up to 12 months ahead of the date of the last observed values of solar radio-noise flux."

Daily Solar Flux Values - Sagamore Hill -- The Sagamore Hill Solar Radio Observatory (located at 42°37'54.36"N, 70°49'15.15"W) began operating solar patrols at 8800, 4995, 2695, 1415, and 609 MHz in 1966. The patrol was extended to 15400 MHz in 1967, to 242 MHz in early 1969, and to 410 MHz in early 1971. Flux calibrations in units of $10^{-22}Wm^{-2}Hz^{-1}$ are made at about meridian transit each day. All flux data are corrected to Sun-Earth distance of 1 AU.

The Air Force Geophysics Laboratory (AFGL) transferred operation of the observatory to Detachment 2, 3rd Weather Wing of the Air Weather Service in October 1978. However, AFGL continues to work in an advisory capacity to the observatory. Det 2, 4WW and AFGL completed an absolute calibration of several frequencies using Cassiopeia A and the moon as a reference source. The results are presented in the table below (apply correction factor to all data before indicated date).

Frequency	Data to Date	Correction Factor
242 MHz	1 Aug 79	1.55
410	3 Aug 79	1.33
609	21 Nov 79	1.33
609	21 Nov 79 - 27 Sep 80	1.17
1415	15 Nov 79	1.11
8800	23 Oct 81	0.85
8800	23 Oct - 21 Nov 81	1.07

SOLAR FLARES (C.1)

The H-alpha solar flare data in Part I (Prompt Reports) are a preliminary record of those flares received on a rapid schedule. Definitive data are published later in Part II (Comprehensive Reports). After 6 months the flares are grouped and an attempt made to eliminate errors. The explanation of these definitive flare data begins on page 35 of this text. It includes an explanation of the column headings together with the definition of the letters used in the Remarks column. A table of solar flare patrol observatories is on page 37.

The solar flare reports are received from throughout the world at World Data Center A for Solar-Terrestrial Physics, NOAA, Boulder, CO USA. Observations are made in the light of the center of the H-alpha line unless noted otherwise. NOAA provides support and jointly operates with the IPS Radio and and Space Services of Australia the flare patrol at Culgoora. The USAF operates Ramey, Holloman, and Palehua. The observatory at Learmonth is jointly operated by the USAF and the IPS Radio and Space Services of Australia. NOAA also supports the Learmonth operation.

The no-flare patrol observations matching the solar flare table are given in graphical form. The observatories reporting the patrols are indicated. The dark areas at the bottom half of each day are times of no cinematographic patrol. The dark areas at the top half of the day are times of neither visual nor cinematographic patrol.

SOLAR RADIO WAVES (A.10, C.3)

Interferometric Observations -- The chart presents solar interferometric observations at 169 MHz recorded around local noon at Nancay, France (47°23'N, 8°47'E), the field station of the Meudon Observatory.

The main lobes are parallel to the meridian plane. The half-power width is 3.8 minutes of arc in the east-west direction. The main lobes are about 1° apart [Ann. Astrophys., 20, 155, 1957]. The records give the strip intensity distribution from the center of the disk to 30' to the west and east.

These daily distributions are plotted on the same chart, giving diagrams of evolution. Points of equal intensity in relative units are joined day after day in the form of isophotes. Four equal intensity levels were chosen to draw the isophotes. The first level corresponds to the Sun without any radio storm center.

In each solar radio noise region the smoothed intensity around noon is given in $10^{-22}Wm^{-2}Hz^{-1}$.

East-West Solar Scans - Toyokawa 3 cm -- East-west drift curves of the Sun at 3 cm are observed at Toyokawa Observatory (N34.83 E137.37), The Research Institute of Atmospherics, Nagoya University, Toyokawa, Japan.

The array, consisting of 32 2-m paraboloids, gives an angular resolution of 1.1 arc min on the meridian. The main lobe separation is 40 arc min at local noon. The observed drift curves are normalized by the total flux measured simultaneously with the 3-cm radiometer. The quiet Sun curve in the first frame is obtained by connecting the most probable lowest values in each bin of 27-day data.

East-West Solar Scans - Algonquin 10.7 cm -- East-west solar scans at 10.7 cm are taken daily at the Algonquin Radio Observatory of the National Research Council of Canada (N 45°56'43", W 78°3'33").

The antenna consists of an array of 32 3-m paraboloids having interference fringes separated by approximately 1°. The zero order fringe on the meridian (where most of the published curves are taken) has an east-west width of 1.5', but the width increases to 1.7' for fringes 30° from the meridian. The antennas are kept fixed during each drift curve to avoid changes in sensitivity owing to scanning, and an effort is made to maintain a constant sensitivity from one day to another. When necessary, however, the receiver gain is adjusted to accommodate large fluxes. (Antenna specification can be found in **Solar Phys.**, 1, 465-473, 1967 and details of the antennas' performance appear in **Astron. J.**, 73, 749-755, 1968.)

The position of the limbs of the photosphere are indicated on each curve by the vertical bars at the ends of the horizontal line, which itself represents the cold-sky level. The estimated level of the quiet Sun, shown at the center of the photosphere, is based on an assumed quiet Sun of 60 solar flux units (one solar flux unit = $10^{-22}Wm^{-2}Hz^{-1}$). This level is determined for each curve by comparing the area under the curve with the total solar flux at 10.7 cm. (Prior to December 1968 the quiet-Sun level was estimated each day from a calibrating noise signal inserted between the antenna and receiver. The present method was begun in December 1968 when it was discovered that the quiet-Sun levels shown for September and October 1968 were approximately 8% too low.)

East-West Solar Scans - Fleurs 21 cm and 43 cm -- East-west strip scans of the Sun at 21 cm and 43 cm are made available by the "Fleurs" Radio Astronomy Station of the University of Sydney, Sydney, Australia.

For the east-west solar scans from the 21 cm solar radio array the fan-beam has 2' of arc resolution. The two short horizontal lines drawn crossing the center line indicate the cold-sky level and the estimated quiet-Sun level. The gain may differ from day-to-day. The curves have not been normalized to account for these gain variations other than by the indication of the estimated quiet-Sun level.

For the east-west solar scans from the 43 cm solar radio array the fan beam has a resolution of 4' of arc. The estimated quiet Sun is indicated on the published profiles in the same manner as for the 21 cm scans. The curves have not been normalized for variations in gain.

The east-west scans may be used to infer the positions of solar coronal holes (see B.F. Ferguson, **Solar Physics**, 69, 185, 1981).

Outstanding Occurrences (SELECTED) -- A list of SELECTED centimeter and millimeter wavelength events at fixed frequencies is published one month following observations. Selections are made to provide 24-hour coverage as nearly as possible. See page 37, Outstanding Occurrences, for descriptions of the types of events and observatory characteristics. From time-to-time selected solar bursts are illustrated.

SOLAR WIND MEASUREMENTS (A.13)

Pioneer Venus (Pioneer 12) Measurements -- Interplanetary solar wind data from the NASA Ames Research Center Plasma Probe on board the Pioneer Venus Orbiter (Pioneer 12) are supplied by John Mihalov. These data include the date, the observation time in UT, the solar wind proton bulk velocity U_{H+} in kilometers per second, the density N_{H+} in protons per cubic centimeter, the temperature T_{H+} in degrees Kelvin, and the Earth-Sun-Venus (ESV) angle in degrees.

Solar Wind Speed from Interplanetary Scintillation (IPS) Measurements at UC San Diego -- The solar wind speed is measured regularly with the three-station scintillation observatory at UCSD [Armstrong and Coles, **J. Geophys. Res.**, 77, 4602, 1972]. The IPS stations are Borrego Springs (33°20'N 116°17'W), La Posta (32°41'N 116°26'W) and Carlsbad (33°09'N 117°15'W). The data are supplied by W.A. Coles and B.J. Rickett. The interplanetary scintillation (IPS) technique, pioneered by Dennison and Hewish [**Nature**, 213, 343, 1967] yields an average velocity transverse to the line-of-sight to a distant radio source. Eighteen radio sources are observed each day but useful speed estimates are typically obtained from only six.

Each velocity can be considered as a weighted average from along the line-of-sight to the radio source, where the weighting factor decreases rapidly with distance from the Sun. Details of the spatial weighting function can be computed and examples are shown in Figure 1 on the assumption of a power law shape for the electron density spectrum. The results are not very sensitive to the assumed density spectrum as can be seen by comparison with Readhead's [MNRAS, 155, 185, 1971] calculations for a Gaussian spectrum, but they assume spherical symmetry.

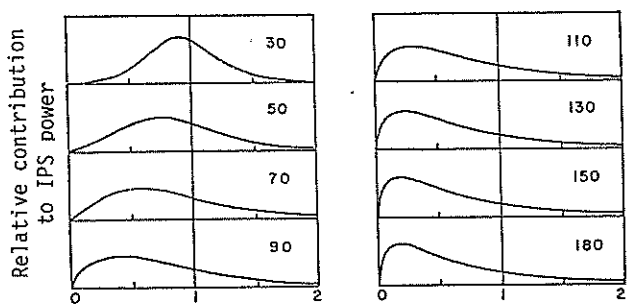


Fig. 1. Computed interplanetary scintillation (IPS) weighting functions along the line-of-sight, at the solar elongation angles indicated. The density spectrum was assumed to be a power law proportional to $q^{-3.3}r^{-4}$ where q is the wave number and r is the solar distance; a source diameter of 0.25 seconds of arc was also assumed.

The spatial average is centered on an effective position (P), which is nominally at the point of closest approach of the line-of-sight to the Sun. At large solar elongations where this point would be closer to the earth than 0.3 AU, P is taken to be at the point 0.3 AU from the Earth along the line-of-sight. The heliographic coordinates of P vary slowly over the year as shown in Figure 2.

The IPS 'midpoint' speed is interpreted as an estimate of the solar wind speed at the point P. Close agreement is found between ecliptic IPS observations and IMP spacecraft observations which are mapped to the point P (see Figure 3 of Coles, Harmon, Sullivan and Lazarus, **J. Geophys. Res.**, 83, 337, 1978). This ecliptic calibration allows confidence to be placed on IPS wind speed determinations out of the ecliptic.

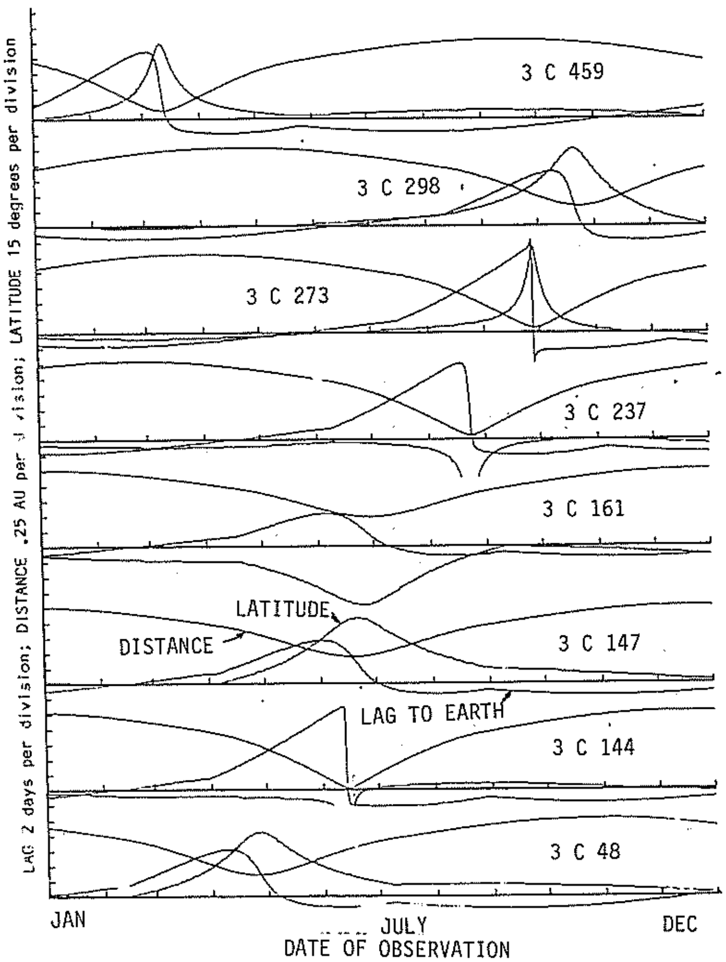


Fig. 2. The yearly variation of the heliographic coordinates of the effective position (P) of eight distant radio sources is shown.

Coles and Kaufman [Radio Science, 13, 591, 1978] carefully analyzed the flow angle, as well as the speed, and found it to be very close to radial. Thus the speed is estimated under the assumption that the flow is radial; however the angle is also estimated. An algorithm is used that avoids any bias due to anisotropy in the scintillation pattern and allows a least-square estimate of the radial component of velocity and also an associated error estimate. When the solar elongation is greater than about 73° (where the distance to P becomes equal to 0.3 AU), the pattern velocity is less than the radial velocity at P; the tabulated velocities have been corrected for this projection effect.

We assign a rating of (0-4) daily for each source on the basis of the strength of the IPS and the freedom from contaminating interference. Listed each month are all speed estimates with a rating of 2 or better. Scintillations at 74 MHz maximize at an elongation of 35° [Armstrong and Coles, Ap. J., 220, 346, 1978]. Our rating values vary systematically throughout the year and generally reflect this change in IPS strength. The tabulated data do not include daily values from a source if the apparent flow angle is greater than 30° from the radial or if the speed error is greater than 33 percent of the speed estimate itself. Further analysis may yield speeds from data rejected by these criteria; those interested in particular periods should contact the authors directly.

Since January 1980 the printed data format has been revised. Observations of each radio source are averaged (from 10-120 minutes) and are entered as a single line in the list as follows: The UT date, day of the year, and UT in hours at the middle of the integration time; the 'midpoint' velocity and its error (see below for explanation); the 'peak' velocity and its error; the source rating from 2 to 4; the number of the radio source in the 3CR catalog [Bennet, A.S. Mem. R.A.S., 68, 163, 1962]; the elongation angle between Sun and source. The next five parameters give the coordinates of point P; its heliographic latitude and solar distance; the longitude of the Earth minus that of P; the time lag for a spiral (defined by the midpoint speed) to rotate from the Earth to P; and lastly the Carrington rotation (integer and fraction) of the photospheric footpoint of the spiral through P. For the latter two of these parameters we assume a constant radial velocity for the solar wind.

The 'midpoint' speed should be used as an estimate of the average speed in a region along the line-of-sight. For a spherically symmetrical speed and density distribution, the 'peak' speed should be only a few percent greater than the 'midpoint'. If the peak speed is significantly different from the midpoint, a wide range of velocities is distributed along the line-of-sight; normally this causes the peak to exceed the midpoint and indicates that some speeds as high as the peak are present. Occasionally the midpoint exceeds the peak, indicating large variations are present and the Earth is in relatively slow wind. The speed errors listed are the formal statistical errors in deriving the IPS pattern speeds; systematic differences of up to 50 km/s can also exist between the IPS speed and the true solar wind speed at point P.

Support for the IPS observations at UCSD is provided by the Atmospheric Services Division of NSF (ATM-78 06770) and the Air Force Geophysical Laboratories (F19628-77-C-0161).

INFERRED INTERPLANETARY MAGNETIC FIELD (A.17c)

The table shows daily inferences of the polarity of the interplanetary magnetic field. The first half of the day is based principally on magnetograms produced by the magnetometer at the Vostok Antarctic Station of the USSR. The magnetometer of the U.S. Air Weather Service operated at Thule by the Danish Meteorological Institute is used for the second half of the day when available. The inference relies on the studies of Mansurov [Geomag. Aeron., 9, 622-623, 1969] and Svalgaard [Geophys. Pap. R-6, 11 pp. Dan. Meteorol. Inst., Copenhagen, 1968] relating the variation of the polar cap magnetic field to the polarity of the interplanetary magnetic field. During 1972, the inferred polarity agreed with spacecraft observations on 83% of the days for which a definitive polarity was inferred. The rate of successful inferences for "toward" (interplanetary field directed toward the Sun) days was somewhat greater than "away" days, 85% and 80%, respectively [Russell et al., J. Geophys. Res., 80, 4747, 1975]. Forming a combined index from the two individual station inferences yields an overall success rate of 87% [Wilcox et al., J. Geophys. Res., 80, 3685, 1975]. The data on the vertical component of geomagnetic field from the Resolute Bay station of Canada have been used since July 1976 to increase the reliability of daily inferences.

It appears that the sign of the east-west component of the interplanetary field is actually being inferred [Friis-Christensen et al., J. Geophys. Res., 77, 3371, 1972], rather than the polarity toward or away from the Sun. Russell and Rosenberg [Solar Phys., 37, 251, 1974] show that the east-west component is an accurate predictor of the magnetic polarity approximately 90% of the time. On "toward" days incorrectly inferred to have "away" polarity in 1972, the average Ap index was 20% less than the average Ap index on "toward" days. "Away" days incorrectly inferred to be "toward" days had no significant geomagnetic bias [Russell et al., 1975]. This effect when combined with the success rate results in a slight (2.5%) bias of the average Ap index for all inferred "toward" days over inferred "away" days. The subject of inferring the polarity of the interplanetary magnetic field has been reviewed by Svalgaard [Correlated Interplanetary and Magnetospheric Observations, D. Reidel, 1974].

The effect is visible at Vostok in the first half of the Greenwich Universal Day and at Thule in the second half of the day. The inferences from Vostok and sometimes from Thule are made at the Institute for Terrestrial Magnetism, Ionosphere and Radiowave Propagation (IZMIRAN), Moscow, and are shown in the table. The inferences from Thule were made at the NOAA Space Environment Services Center, Boulder, CO. However, budget problems preclude this service for the foreseeable future.

The notation adopted for the table is that T represents days of negative Y-solar magnetospheric interplanetary magnetic field which would be characteristic of a "toward" sector and A represents days of positive Y-solar magnetospheric field, i.e., "away" polarity. T, definitely "towards" the Sun, is shown by a shaded box. A, definitely "away" from the Sun is indicated by a blank box. The half-filled boxes represent AT or TA, depending on whether the first half of the box is filled (TA) or the second half (AT). Stanford Solar Observatory has kindly plotted these data for SGD publication.

MEAN SOLAR MAGNETIC FIELD (A.3d)

Sun-as-a-star integrated light measurements of the solar magnetic field are made daily at the Stanford Solar Observatory. The instrument is a Babcock-type magnetograph attached to a 23 m vertical Littrow spectrograph. The mean field measurement represents a weighted average of the net magnetic field on the visible disk of the Sun. The weighting arises from a variety of sources including limb darkening, solar rotation, and weakening of the line in magnetic regions. The difference in weighting between integrated light observations and averages of regular magnetograms is primarily due to limb darkening.

An individual mean field observation consists of a measurement of the mean magnetic field seen in the line Fe I 5250A and a measurement of the instrumental zero offset in the magnetically insensitive line Fe I 5124A. A complete observation, including several checks for instrumental errors, takes about 20 minutes. Several observations are made each day. The reported value is a weighted average of all observations for the particular local day. The daily observations are usually centered about local noon (2000 UT). The uncertainty in each day's mean field is about 2 microTeslas (0.02 gauss). The observations started on May 16, 1975. A more complete explanation of the observation program may be found in the report "The Mean Magnetic Field of the Sun: Observations at Stanford" [P.H. Scherrer et al., Solar Physics, 54, 353-361, (1977)]. The data are provided in two forms: a simple tabulation by date and a Bartels rotation type polarity diagram. In the Bartels diagram the data are shifted 5 calendar days to allow for Sun-Earth transit time for easier comparison with at-Earth observations. For further information contact P.H. Scherrer, Center for Space Science and Astrophysics, Stanford University, ERL, Stanford, CA 94305 USA.

DATA FOR TWO MONTHS AGO

DAILY SOLAR ACTIVITY CENTERS
(A.1,A.3a,A.3c,A.3e,A.4,A.5,A.5a,A.5b,A.6,A.6c,A.6d,A.7g,A.7h)

H-alpha Synoptic Charts -- These charts of the entire solar surface display solar activity in context with large-scale patterns of magnetic fields outlined by neutral lines (polarity inversion lines) inferred from H-alpha solar images. The H-alpha structures and their corresponding symbols are as follows: filaments (cross-hatched), major sunspots (large dots), bright H-alpha plage (closely spaced lines), faint H-alpha plage (stipple), distinct neutral lines (solid lines), estimated neutral lines (dashed lines) and boundaries of coronal holes observed in lambda 10830 (lines bordered with ticks directed toward center of coronal hole). Neutral lines which disappear, or move at least three heliographic degrees during the disk transit of its location, are marked by ticks crossing through the line ("railroad track"). Bright plage is defined as those active centers which produce at least two Class-M1 X-ray flares or any event exceeding Class M1 [M1 = 10^{-2} ergs/cm^2/s/ster at 1-8 Angstroms peak intensity].

Longitude is in terms of the mean rotation rate for sunspots as determined by Carrington. This is the heliographic longitude tabulated in The Astronomical Almanac. The dates at the top of the synoptic chart correspond to these values, showing the time of central meridian passage for the heliographic longitudes directly below the date.

The charts are labeled with the serial number of the solar rotation as counted by Carrington, with the first rotation commencing November 9, 1853.

The positions of magnetic polarity reversal are assumed to agree with the locations of filaments, filament channels, plage corridors, "iron-filing" patterns of fibrils adjacent to active centers, and arch-filament systems, in accordance with polarity-inference techniques described by McIntosh [**Rev. Geophys. and Space Phys.**, 11, 837-846, 1972; in **Solar Activity Observations and Predictions**, McIntosh and Dryer, ed., MIT Press, 1972; and **UAG Report 70**, World Data Center A for Solar-Terrestrial Physics, NOAA, Boulder, Colorado, USA]. The patterns are mapped by accumulating the positions of features on H-alpha filtergrams from several consecutive days. Seldom does a single photograph show the patterns in their complete form, owing to the transient nature of the filaments and the variable observing conditions. Polarities and the positions of estimated neutral lines are carefully confirmed with daily full-disk magnetograms and synoptic charts of magnetic fields provided by the National Solar Observatory at Kitt Peak and by the John Wilcox Solar Observatory at Stanford University.

In the absence of magnetic-field measurements, magnetic polarities are inferred from Hale's law: leader sunspots in opposite solar hemispheres have opposite polarities. Northern leaders possess positive polarity during odd numbered solar cycles, while southern leaders are negative. The present solar cycle is #21. The polarities of all areas on the Sun are inferred by beginning with a leader sunspot, or the leading portion of a bipolar plage, and alternating polarities with each successive neutral line.

The H-alpha neutral-line patterns are mapped as they appeared during the latter half of their disk transits, but include active regions and filaments that may have formed even during the last day before west limb passage. Radical changes (movement or re-arrangement) in neutral lines are signified by crosses through the older position of the line ("railroad track" symbol).

Outlines of coronal holes, as inferred from bright areas on lambda 10830 spectroheliograms, have been added to the H-alpha synoptic charts since December 1981 (Rotation 1716). These outlines are traced with a digitizing cursor directly from daily images transmitted to NOAA/SESC from the National Solar Observatory at Kitt Peak, and represent an interpretation of those images independent of that produced by Kitt Peak. Examination of consecutive daily images eliminates transient features and confirms positions of indistinct features. Comparison between lambda 10830 and H-alpha images eliminates confusion between coronal holes and filament channels.

The charts published here are revisions of the preliminary versions constructed as part of the real-time solar monitoring at NOAA/SESC in Boulder and published in their "Preliminary Report and Forecast of Solar-Geophysical Data". Even these edited versions may be incomplete, or even inaccurate in limited areas, due to variations in the amount and quality of the solar data available within 30 days of the observations. More definitive versions may be published at a later date in atlas form, using complete data from several observatories for a careful and comprehensive mapping. The date in the lower right corner of the charts is the date of last revision.

The mapping techniques include comparisons with previous synoptic charts for maintenance of consistency and continuity. Daily use of inferred solar magnetic field data has demonstrated a near-perfect reliability within active regions and only slightly less reliability in regions of weak field strength. The reliability is degraded most in regions where estimated neutral lines (dashed lines) are used extensively. Large portions of the charts for the period near solar minimum are so delineated. Charts beginning with Carrington Rotation 1648 (November 1976) are constructed with a computerized reader-plotter and have improved coordinate accuracy over previously constructed H-alpha synoptic charts.

Small-scale, shaded versions of the H-alpha synoptic charts are printed three to a page to facilitate perception of gradual evolution of large-scale patterns. The negative polarity areas are shaded solid black (no indication of variation in magnetic fieldstrength), positive polarity areas are white, and the grey dot pattern indicates coronal holes observed in the infrared line of HeI 10830. Filaments are small, cross-hatched features on the boundaries between polarities.

Cross-hatching overlaid on the polarity patterns are strong active regions defined as those which produced X-ray activity of at least 0.2 on the active region index scale derived from summing all of the X-ray flares that occurred during the disk transit of the region. The X-ray flares are detected by the GOES space environment monitor, equipped with a full-Sun detector in the 1-8 Angstrom wavelength range. The active region index is the sum of the multipliers of Class M and Class X events, divided by ten. The minimum index used in mapping strong flaring regions is 0.2, produced when two flares of class M1 occur or a single event ranked as M2 occurs. Class X events are ten times the Class M events, so that an X3 event would add 30 to the sum for the active region, whereas an M3 event would add 3. Class C events are not included in the summation. In the recent series of Carrington Rotations 1780-1789 there were only three strong active regions on the maps.

Further information can be obtained from P.S. McIntosh, NOAA Space Environment Lab., Mail Code R/S/SE, 325 Broadway, Boulder, CO 80303 USA.

Stanford Solar Magnetic Field Synoptic Charts -- These charts are derived from the Stanford Solar Observatory daily magnetograms (see page 20). They are made by projecting each magnetogram onto a grid with points spaced each 5 degrees of heliographic latitude and longitude. For each 5 degrees of Carrington longitude, the available magnetograms are averaged together weighted with distance from central meridian and sky conditions. The resulting synoptic charts are plotted in the same format and scale as the H-alpha charts. While this format provides more visual weight to higher latitudes where the observations are less accurate, it is a useful form for comparison to the H-alpha charts. The symbols "v" at the top of the charts mark the times of magnetograms used. The isoTesla lines are shown at 0, ± 100, ± 500, ± 1000, ± 2000, etc., microTesla. Note that the published labels are incorrect from Carrington rotation 1676 to 1741, since the ± 200 microTesla contour levels are not plotted. The field strength shown will tend to be somewhat lower than the corresponding central meridian magnetogram due to the interpolation and averaging procedures used. Although the absolute calibration of solar magnetogram data (particularly when made with low spatial resolution) is somewhat uncertain, the position of the zero line is reasonably well determined. A direct comparison with the H-alpha inferred magnetic patterns is reported by T.L. Duvall, Jr. et al. [Solar Physics, 55, 63-68 (1977)].

Above each synoptic chart is plotted the mean magnetic field (see page 14) during the same rotation. Dotted lines indicate that no measurements were available for that time period and are a linear interpolation of the data from preceding and following measurements.

Inquiries may be directed to P.H. Scherrer, Center for Space Science and Astrophysics, Stanford University, ERL, Stanford, CA 94305 USA.

Sacramento Peak Coronal Synoptic Charts -- These charts are derived from the daily National Solar Observatory Coronal Scans (see description below). For each Carrington Rotation, maps are presented of Fe XIV 5303A intensities at $0.15R_0$ above the limb for both the East- and West-limb scans. The data have been shifted in time by ± 6.75 days to display the intensity at Central Meridian Passage (CMP); thus, the two maps are directly comparable, and differences between them are indicative of coronal evolution between observations of a given longitude at the East limb followed two weeks later by the same longitude at the West limb. Numbers at the top of the chart are the day of the year (DOY) of CMP, with 0000 UT at the tick mark under the right side of the DOY (i.e., the DOY number is approximately centered between the two ticks that represent 0000 UT and 2400 UT for that day). Heliographic longitude in ten-degree intervals is displayed at the bottom of the chart. Latitude in ten-degree intervals is displayed on the left. No correction is required for the B_0 angle.

The intensities are both contoured and shaded. Contour levels at this writing (1 February 1987) are 0.5, 1, 2, 4, 8, 12, 16, 24 and 32 millionths (μ) of the intensity of the center of the solar disk at 5303A. Contour levels of 8 μ and above are labelled with the intensity. Current shading is as follows: white (surrounded by black), 0.0 to 0.5 μ ; black, 0.5 to 1.0 μ ; dark hatch, 1.0 to 2.0 μ; light hatch, 2.0 to 4.0 μ ; white (surrounded by light hatch), >4.0 μ . The current definition of Coronal Holes is $I < 0.5\mu$ (white areas [surrounded by black]). This definition, as well as contour levels and shading definitions may undergo small changes during the coming year as activity levels change.

Missing days of data are indicated by the word "INTERPOLATED" written vertically near the equator. A linear interpolation routine has been used. No limit has been placed on the number of days that may be included in this routine, and intensities plotted for longitudes having more than two consecutive interpolated days are probably of little value. Evolution of intensities at the limb is sufficiently slow that interpolation over one or two consecutive days is acceptable.

For further information, contact Dr. Richard C. Altrock, Air Force Geophysics Laboratory, National Solar Observatory/Sacramento Peak, Sunspot, NM 88349.

Solar Magnetic Field Synoptic Chart, National Solar Observatory -- Daily full disk magnetograms (described under National Solar Observatory Solar Magnetograms) are transformed to a Carrington coordinate system with a resolution of 1 degree in longitude and 1/90 in the sine of the latitude. Shortly after the end of each solar rotation, these transformed observations are merged into a single, equal-area cylindrical projection with a weighting system that strongly emphasizes observations nearest to the central meridian on a given date. The final synoptic chart is produced by photographing a cathode-ray-tube display of the data. Marginal ticks indicate 10 degree increments of Carrington longitude and selected north and south latitudes. The positions of the central meridians corresponding to the times of the observations are indicated by longer marginal ticks with dates appended.

The gray-scale display labeled "flux" represents the average longitudinal field strength in each latitude and longitude resolution element weighted heavily by the observations made closest to central meridian. The gray-scale display labeled "polarity" represents the ratio of the weighted average of the field measurements in each resolution element to the weighted average absolute value of the field measurements. Thus, if all the measurements in a resolution element have the same polarity, the element is displayed as full white or black, and if the measurements are equally distributed between positive and negative polarity, the resolution element is displayed as middle gray. In both displays white represents positive (toward the observer) magnetic polarity, and black represents negative polarity. If no observations are available, the corresponding latitude and longitude elements are shown as full black.

Further information can be obtained from J. Harvey or W. Livingston, National Solar Observatory, P.O. Box 26732, Tucson, AZ 85726 USA. The magnetic field observations are supported in part by assistance from NOAA and NASA which is gratefully acknowledged.

Photographs or Charts -- On one page per day are presented several photographs or charts of active solar centers recorded at optical wavelengths. For each day the ephemeris heliographic longitude, Lo, at 0000 UT, position angle, P, and center of Sun, Bo, are given. Transparent Stonyhurst disks (regular or modified) are provided at the end of this publication to fit the size of the charts. Regular Stonyhurst disks have the longitude lines spaced in intervals of

Stonyhurst disks have the longitude lines spaced at days east and west of central meridian. Though a magnifying glass is needed to read detail, it is felt that the significant regions stand out on the scale used. For those interested, larger sizes of these photographs or charts can be made available at cost through the World Data Center A for Solar-Terrestrial Physics. Also, many of these long term data sets are available on microfilm.

These solar maps for each day include solar magnetograms, coronal intensities, calcium plage and sunspot tracings, and H-alpha filtergrams. The sunspot drawings also show prominences.

Details of these individual observations follow:

National Solar Observatory Coronal Scans -- Photoelectric scans of the solar corona are made daily at Sacramento Peak with the three-line coronal photometer in Fe XIV 5303A, Fe X 6374A and Ca XV 5694A. The intensity of the corona is recorded at 120 points around the limb with an aperture of 1.1 arcmin by chopping between the corona and the sky at a rate of 100 kHz. The scan height is 0.15 R_0 (radius of the sun) above the limb for FE XIV and Fe X, and 0.13 R_0 above the limb for Ca XV.

The display is in the form of a polar plot of the intensity around a circle representing the sun with a radius of 5 millionths of the intensity of the center of the solar disk at the given wavelength. The intensity at the edge of the circle is zero. Tick marks are separated by 5 millionths. Effective 1 Jan 1983 the calibration method was changed. For 1982 and prior plots, the distance between tick marks should be assumed to be 3.2 millionths. Observation times are shown in UT. Horizontal and vertical scales on the printed page may vary from day to day and relative to each other as a result of the reproduction process.

Fe XIV is plotted as a solid line at the scale given on the graph. Fe X is plotted as a dotted line, and its intensities have been multiplied by a factor of 2. The noise level for Fe XIV and Fe X is normally on the order of 0.1 millionths. Ca XV is plotted as X's after having been multiplied by a factor of 6. Ca XV points are only plotted if they fall above a variable threshold, the value of which is determined by the noise level present on that day. It is usually $\leq$1 millionth. Points plotted represent a determination by the reduction analyst that Ca XV was present at the indicated latitudes. If Ca XV observations were made, and the reducion analyst determined that no activity was present above the threshold, a legend will be displayed, "No 5694A activity."

Fe XIV, formed near a temperature of 1.5 MK, is useful for determining the presence of coronal holes and large-scale active regions. Coronal holes appear in these plots as a rapid decrease in the intensity below 1 or 2 millionths. Fe X, formed near 1.0 MK, shows the coolest regions in the solar corona. Emission is often present in coronal holes. Ca XV is formed only at temperatures above 3 MK, and shows those active regions having a high probability of energetic flare activity.

These observations are a joint production of the Air Force Geophysics Laboratory and National Solar Observatory at Sacramento Peak. For further information contact Dr. Richard C. Altrock, Air Force Geophysics Laboratory, National Solar Observatory, Sunspot, NM 88349, USA.

Mount Wilson Observatory Solar Magnetograms -- The Mount Wilson Observatory solar magnetograms are computer-plotted isogauss drawings made with the magnetograph at the 150-foot tower telescope on Mount Wilson. The program is supported in part by the Office of Naval Research, the National Aeronautics and Space Administration, and the National Science Foundation. The polarities are indicated with "Plus" signifying the magnetic vector pointed toward the observer. The gauss levels are also indicated. This instrument measures the longitudinal component of the magnetic field using the line 5250.216 Fe I. A solar magnetograph is basically a flux measuring instrument. It measures the total flux over the aperture which is being used. The magnetograph apertures are square (image slicer is used) and the raster scan lines are separated by the dimension of the aperture. This separation of the scan lines is given by the Y (DELTAY) printed on the magnetogram. The units of Y are arc seconds. The DELTAX represents in the same units the distance along the scan line between points at which the data were digitized.

The scan is a boustrophedonic raster scan which extends for all scan lines beyond the disk. The data within about 12 arc seconds of the solar limb are not plotted. The scanning system is always oriented so that the scan lines are perpendicular to the central meridian of the Sun. The cardinal points on the magnetogram refer to heliocentric coordinates so that the "N" and "S" define the rotation axis of the Sun.

Because the magnetic field strength measured by the magnetograph is the product of the true field strength and the brightness of the image, the fields used to make the contours have been corrected for the brightness at each point. So effects of limb darkening and variable sky transparency have been corrected.

Effects due to weakening of the line profile in magnetic field regions have not been included. In general the magnetic field strengths on the map are low by about a factor of two because of these effects, but this varies somewhat with distances from the disk's center. For more details c.f. Solar Physics, 22, 402-417, 1972.

The errors in the magnetic data which go into these magnetograms are difficult to estimate because they are somewhat variable. In general, the zero level for any day's observation is accurate to about 0.1 gauss. The gauss scale is generally accurate to 10% or better. The point-to-point noise across the solar disk is about 1 gauss rms.

Sometimes, because of the small scale of the reproductions, it is difficult to make out the details of the field distribution in some regions.

Large scale copies of the particular magnetograms or microfilmed data may be obtained by writing to:

World Data Center A for
Solar-Terrestrial Physics
NOAA E/GC2, 325 Broadway
Boulder, CO, 80303 USA

National Solar Observatory Solar Magnetograms -- Full disk magnetograms are now made daily, weather permitting, at the vacuum telescope on Kitt Peak in Arizona. At the exit focus of the spectrograph is a Babcock-type magnetograph which utilizes as detectors a pair of 512-element silicon-diode arrays. The diode spacing, referred to the entrance slit, is one arc second. Resolution achieved depends in practice mainly on "seeing", but in any case falls to zero at this one arc second limit. At present the magnetograms are taken in the wings of Fe I 8688.6A, a line selected to faithfully record network, plage and penumbral magnetic flux but which underestimates umbral flux by a factor of about two. A full disk recording is made up of four swaths and requires 37 minutes of scan time.

The display of magnetograph data is by a CRT generated picture where bright represents positive flux and dark negative flux. The display intensity is non-linear in an effort to compress the dynamic range so that weak fields can be seen along with the strong sunspot fields. The noise is about 10^{17} maxwells (i.e., 15 gauss over one arc second). Black areas indicate interfering clouds. These high resolution maps complement the Mt. Wilson isogauss charts. Mt. Wilson dot plots when available fill in for days with missing data. Detailed numeric listings exist and can be retrieved from the observatory archives. Assistance supplied by NOAA and NASA in acquiring these observations is gratefully acknowledged. For further information contact: J. Harvey or W. Livingston, National Solar Observatory, P.O. Box 26732, Tucson, AZ 85727 USA.

Stanford Solar Observatory Magnetograms -- The Stanford Solar Observatory magnetograms are presented as computer-drawn plots of the Sun's large scale magnetic fields. The observations are made daily, weather permitting, with the same instrument as the mean solar magnetic field observations except that instead of observing in integrated light, a 6 cm image is formed at the spectrograph entrance aperture.

In this mode of observation the instrument and procedures are very similar to those for the Mt. Wilson Observatory magnetograms. The aperture corresponds to 180 arc seconds square and is scanned boustrophedonically. The scan lines are oriented E-W on the disk with the aperture stepped 90 arc seconds between measurements. The scan lines are spaced 180 arc seconds in the N-S direction. At each point the field data are averaged for 15 seconds with the resulting noise level less than 10 microTesla. The zero level is believed to be better than 5 microTesla. The field is measured in the line Fe I 5250A with the line Fe I 5124A used as a magnetic zero reference. A complete scan procedure with calibrations takes about 2 hours.

With a 3-minute aperture the magnetogram only crudely shows regions of strong or complex fields (The Mt. Wilson and Kitt Peak magnetograms better represent these fields). The large scale organization of magnetic flux can usually be clearly seen in the Stanford observations.

The contour lines are plotted at intervals of $\pm$ 20, 50, 100, 200, 500, etc. microTesla. The isoTesla lines corresponding to fields directed out of the Sun are shown as solid lines. The zero line is shown as a thick solid line. The data and time given are for the middle of the observation. The equator line shown is calculated from the velocitygrams made at the same time as the magnetograms. Magnetic synoptic charts derived from these observations are also published in **Solar-Geophysical Data**. More details about the observations are available on request from P.H. Scherrer, Center for Space Science and Astrophysics, Stanford University, ERL, Stanford, CA 94305 USA.

Daily H-alpha Filtergrams -- The H-alpha filtergrams are furnished by the Sacramento Peak Observatory, Air Force Geophysics Laboratory, Sunspot, NM. The telescope is a 10 cm (4 inch) refractor equipped with a half-Angstrom bandpass Halle birefringent filter. These photographs are supplemented by photographs provided by the NOAA Space Environment Services Center Observatory at Boulder, CO, using an 11 cm (4.5 inch) refractor.

Daily Sunspot Drawings -- These drawings are simplified copies of originals made at the Boulder Solar Observatory operated by the NOAA Space Environment Services Center. Sunspot groups are boxed according to a judgment of bipolar pairs based on sunspot group evolution and structure of associated H-alpha plage, following guidelines developed by P.S. McIntosh of the NOAA Space Environment Laboratory. Magnetic measurements of sunspot polarities, provided by the Mt. Wilson Observatory, and Big Bear Observatory real-time video magnetograms are used as an additional aid to ascertain individual sunspot groups. Serial numbers appearing adjacent to the sunspot groups are generated by the joint NOAA/USAF Space Environment Services Center (SESC). It is not uncommon for more than one sunspot group to occur within the same large active region. Sunspot drawings provided by the SOON telescope at Ramey Solar Observatory may be used when NOAA-Boulder data are missing.

Active-Region Serial Numbers -- The NOAA/USAF active-region serial numbers differ from those assigned by McMath-Hulbert and Big Bear Observatories by emphasis on those regions which produce sunspots or solar flares. Large, extended areas of plage are not numbered if no flares or sunspots appear within their borders. Plages without spots or flares are numbered only if their intensity, area and growth suggest spots and flares are likely to occur. Large activity complexes often contain two or more numbered sunspot groups if the birth, evolution and separation among the spots permit definition of multiple bipolar regions and it is unlikely that further evolution will blend the regions.

H-alpha Prominences -- Drawings of prominences are added to the limb of the sunspot drawings by tracing detail from photographic prints made from the NOAA Boulder H-alpha patrol films.

Big Bear Solar Observatory Calcium Plage Records and Active Region Maps -- Daily full disk calcium K_{232} images from Big Bear Solar Observatory are reduced to provide the data in the table of calcium plages and the active region, iso-intensity contour maps. The single contour on the maps shows the spatial distribution of the plage area given in the tables. The region numbers on the maps are identical with the plage numbers in the tables. Kitt Peak full disk and Big Bear large scale magnetograms are used for the unambiguous identity of the active regions as bipolar units. Contiguous regions are those adjacent plages which would appear to be a single entity in the absence of magnetic field information. They are indicated in the table following the list of individual calcium plage regions. For days when calcium K_{232} images are not obtained at Big Bear, CaII negatives are sometimes supplied by Sacramento Peak or Haleakala Observatories and reduced at Big Bear Solar Observatory. Since 1 October 1981, the daily calcium images have been photographically taken at Big Bear Solar Observatory through a 1 Angstrom Daystar filter. Digitization of the calcium images was also routinely begun on 1 October 1982 with a 480 x 640 video grid.

Historically the reported calcium plage intensity has been a visually estimated relative number, from 0 to 4 in steps of 0.5, produced by an experienced observer interpreting CaK spectroheliograms or filtergrams. More recently, the values have been produced by computer from the digital images. The intensity measures from the computer are calibrated against the visual scale used by experienced observers. The reported intensities of each active region are now an excess intensity which is the difference between the mean intensity of the plage elements and the local threshold, measured as a percentage of the background intensity of the quiet sun at disk center. The threshhold is 6% above the local background. To maintain uniformity with previous visual intensity estimates, the measured intensity excess is multiplied by a factor 2. Therefore the excess intensities given are referred to half the intensity of disk center. Some intensities are still estimated visually when the original data are of poor quality.

The areas of the calcium plages (active regions) are given in millionths of the hemisphere and millionths of the visible disk. The threshhold for the areas is the same as for the measures of excess intensity.

The Big Bear Active Region Data replace the Calcium Plage Data and reports that were supplied to **Solar-Geophysical Data** by the McMath-Hulbert Observatory until 30 Septebmer 1979, and the Mount Wilson Observatory from 1 October 1979 to 30 September 1981. There is no discontinuity in numbering between the former McMath-Hulbert McMath plage numbers, the Mount Wilson Hale plage numbers and the new Big Bear Active Region numbers assigned by the Big Bear Solar Observatory. Active Region numbers are assigned in order of their appearance on the disk but are listed in the order of their dates of central meridian passage.

Sunspot Groups -- This table presents the sunspot groups' evolution as they cross the Sun's disk. The groups are sorted by date of passage through Central Meridian. Daily reports from a number of stations are listed. The first column contains the NOAA/USAF region number assigned by the NOAA Space Environment Services Center (SESC) and USAF. When no number was assigned, the number of a group which passes through CMP at about the same time is used with a letter appended. Letters are added sequentially depending on the number of unassigned different groups. The Mt. Wilson sunspot region number is also included when the Mt. Wilson reports are available.

The four letter station code follows, then the month and day of the observation, the Universal Time of the measurement, and the sunspot position (Latitude and Central Meridian Distance (CMD)). Next is the Central Meridian Passage (CMP) month and decimal day.

The largest magnetic field strength measured in each group is given. The number which appears under the column headed "Max H" is a coded representation of the largest magnetic field strength measured in the group. The field strength is only given to the nearest 500 gauss because it is felt that the uncertainties of the measurement do not permit greater accuracy. These measurements are made with the line 5250.216A(Fe I). No correction is made for blending the Zeeman components. The code is as follows:

Code	Maximum Field Strength in Gauss
1	100- 500
2	600-1000
3	1100-1500
4	1600-2000
5	2100-2500
6	2600-3000
7	3100-3500
8	3600-4000
9	4100-4500
10	>4500

The magnetic classifications are defined as follows:

A = α All the magnetic measures in the group are of the same polarity.

AP = αp All the magnetic measures in the group are of the same polarity which is that corresponding to the preceding spots in that hemisphere for that cycle.

AF = αf All the magnetic measures in the group are of the same polarity which is that corresponding to the following spots in that hemisphere for that cycle.

BP = βp A bipolar group in which the magnetic measures indicate that the preceding spots are dominant.

B = β A bipolar group in which the magnetic measures indicate a balance between the preceding and following spots.

BF = βf A bipolar group in which the magnetic measures indicate that the following spots are dominant.

BG = $\beta\gamma$ or BY A group which has general characteristics but in which one or more spots are out of place as far as the polarities are concerned.

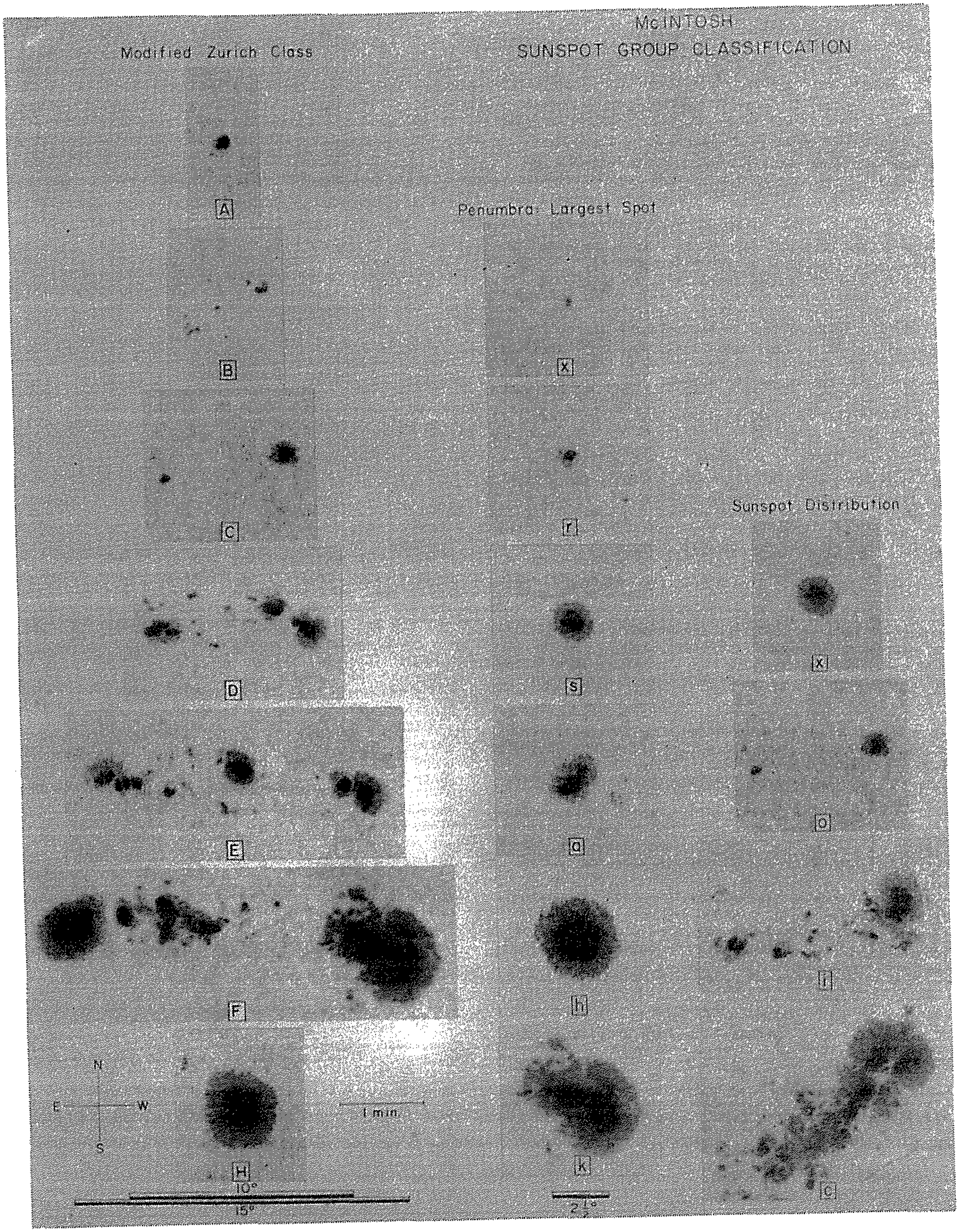
G = γ or Y A group in which the polarities are completely mixed.

Statements will be added to the above classification if the group is also of the "D = δ-configuration": spots of opposite polarity within 2° of one another and in the same penumbra.

The Mt. Wilson magnetic sunspot classifications are given for spot groups observed at Mt. Wilson. If a magnetic classification is based on magnetic measurements, that classification is enclosed in parentheses. When only half of the sunspot group is measured, a half parenthesis indicates which half was measured -- either the leader or the follower. A magnetic classification not enclosed in parentheses is determined from the appearance of the spot groups and plage. A blank in the classification column indicates sufficient information was not available to make an intelligent determination of the magnetic classification. Prior to July 1966 the only magnetic classifications included in the lists were those for which there were magnetic measurements.

The sunspot classification, the corrected area in millionths of a solar hemisphere, the number of spots in a group, its longitudinal extent in degrees, and the observation quality (range 1 = poor to 6 = excellent) as observed at the USAF SOON sites complete the sunspot information.

The sunspot classification in the column marked "Spot Class" is represented by three consecutive uppercase letters. It is the revised classification devised by P.S. McIntosh of NOAA. It consists of a modified Zurich Brunner class, the type of largest spot within the group, and the relative spot distribution or compactness of the group. This classification is included in the USSPS code, IUWDS, **Synoptic Codes for Solar and Geophysical Data**, Third Revised Edition, p. 108, 1973. A discussion of the rationale and interpretation of this classification is included in the McIntosh review paper on sunspot observations in **The Physics of Sunspots**, Sacramento Peak National Observatory, 1981. The definitions of the classification and an illustration of the types of sunspots follow.


McINTOSH
SUNSPOT GROUP CLASSIFICATION
Modified Zurich Class
Penumbra: Largest Spot
Sunspot Distribution
A
B
X
C
r
D
s
x
E
a
o
F
h
i
N
E
W
S
1 min
H
k
c
10°
15°
2½°

When possible, separate bipolar sets of spots are identified by measured magnetic polarities, by the positions of spots relative to lines of polarity reversal inferred from structures on H-alpha filtergrams, and by the record of birth and evolution of spots. If these observations are not available, the following definitions identify most unipolar and bipolar spot groups: (see Figure and definitions to follow)

Unipolar Group: A single spot or a single compact cluster of spots with the greatest distance between two spots of the cluster not exceeding three heliographic degrees. In modified Zurich H-class groups, this distance is measured from the outer penumbral border of the largest spot to the center of the most distant spot in the group. Strong new spots which are clearly younger than the nearby h-type spot (see Penumbra: Largest Spot) are usually members of a new emerging bipolar group and should be called a separate group.

Bipolar (Elongated) Group: Two spots or a cluster of many spots extending roughly east-west with the major axis exceeding a length of three heliographic degrees. An h-type major spot can have a diameter of three degrees, so a bipolar group with an h-type spot must exceed five degrees in length.

Modified Zurich Class (first upper case letter in Table)

- A — A unipolar group with no penumbra. There is no upper limit to the length of Class B groups.
- B — A bipolar group with no penumbra.
- C — A bipolar group with penumbra on spots of one polarity, usually on spots at only one end of an elongated group. Class C groups become compact class D when the penumbra exceeds five degrees in longitudinal extent. There is no upper limit to the length of Class C groups.
- D — A bipolar group with penumbra on spots of both polarities, usually on spots at both ends of an elongated group. The length does not exceed 10 degrees of heliographic longitude.
- E — A bipolar group with penumbra on spots of both polarities and with a length between 10 and 15 heliographic degrees.
- F — A bipolar group with penumbra on spots of both polarities and with a length exceeding 15 heliographic degrees.
- H — A unipolar group with penumbra. Attendent spots are less than three heliographic degrees from the penumbra of the main spot. The principal spots are nearly always the leader spots remaining from an old bipolar group. Class H groups become compact Class D when the penumbra exceeds five degrees in longitudinal extent.

Note that Zurich classes G and J are missing in this revision. Class G groups are included in the definition of classes E and F, and class J groups are included in class H.

Penumbra: Largest Spot (second upper case letter in Table)

- "x" — No penumbra. The width of the gray area bordering spots must exceed three arc seconds in order to classify as penumbra.
- "r" — The penumbra is rudimentary. It is usually incomplete, irregular in outline, as narrow as three arc seconds, brighter intensity than normal penumbra and has a mottled, or granular, fine structure. Rudimentary penumbra represents the transition between photospheric granulation and filamentary penumbra. Recognition of rudimentary penumbra will ordinarily require photographs or direct observation at the telescope.
- "s" — Symmetric, nearly circular penumbra with filamentary fine structure and a spot diameter not exceeding 2 1/2 heliographic degrees. The umbrae form a compact cluster near the center of the penumbra. Also, elliptical penumbrae are symmetric about a single umbra. Spots with symmetric penumbra change very slowly.
- "a" — Asymmetric, or complex penumbra with filamentary fine structure and a spot diameter along a solar meridian not exceeding 2½ heliographic degrees. Asymmetric penumbra is irregular in outline or clearly elongated (not circular) with two or more umbrae scattered within it. The example in the figure is transitional between "s" and "a". Asymmetric spots typically change form from day-to-day.
- "h" — A large symmetric penumbra with diameter greater than 2½ heliographic degrees. Other than size, it has characteristics the same as "s" penumbra.
- "k" — A large asymmetric penumbra with diameter greater than 2½ heliographic degrees. Other than size, its characteristics are the same as "a" penumbra. When the longitudinal extent of the penumbra exceeds five heliographic degrees, it is almost certain that both magnetic polarities are present within the penumbra and the classification of the group becomes Dkc or Ekc or Fkc.

Sunspot Distribution (third upper case letter)

- "x" — Single spot.
- "o" — An open spot distribution. The area between leading and following ends of the group is free of spots so that the group appears to divide clearly into two areas of opposite magnetic polarity. An open distribution implies a relatively low magnetic field gradient across the line of polarity reversal.
- "i" — An intermediate spot distribution. Some spots lie between the leading and following ends of the group, but none of them possesses penumbra.
- "c" — A compact spot distribution. The area between the leading and following ends of the spot group is populated with many strong spots, with at least one interior spot possessing penumbra. The extreme case of compact distribution has the entire spot group enveloped in one continuous penumbral area. A compact spot distribution implies a relatively steep magnetic field gradient across the line of polarity reversal.

The first letter of the McIntosh classification is essentially the Brunner classification with the following exceptions:

McIntosh types:			
	Ero and Fro		
	Eso	Fso	Brunner class G
	Eao	Fao	
	Eho	Fho	
	Eko	Fko	
	Hrx		Brunner class J
	Hsx		
	Hax		

Calcium Plage Regions -- The tabulated data provide a history of each active center visible on the Sun using full disk images from Big Bear Solar Observatory with fill-ins from Mt. Wilson Solar Observatory. The regions are ordered by Central Meridian Passage date (CMP). A one-line entry is made for each plage on each observing day. The first entry is the Big Bear Calcium Plage Region number, followed by the observing station (four letter code). Next the observation time (month, day and Universal Time) is given. The plage position (latitude and Central Meridian Distance (CMD)) is then followed by its CMP month and decimal day. The next column gives the intensity of the region at the time of observation on a scale of 1 = faint to 5 = very bright, referring to the brightest part of the plage. The corrected area in millionths of the solar hemisphere appears next, followed by the NOAA/USAF sunspot groups that fall within the plage area. This last entry is limited to three sunspot group numbers.

A Daily Plage Summaries table presents the daily plage index, the number of plage regions visible on the disk on a given day, the smallest and largest plage areas, the total area for that day, and the smallest and largest intensities on that day. A graph of the daily plage areas for the month completes this listing.

This is followed by an Active Region Summary table which lists whether each plage is new or a return from the previous rotation, its age (how many rotations old it is), the date it was first seen in its current rotation, and its duration (how many days it was seen during the current rotation).

Daily Calcium Plage Index -- This table provides the daily calcium plage index based on the formula by Wesley R. Swartz, Ionosphere Research Laboratory, Pennsylvania State University as published in February 1971 text. The formula is re-expressed below:

$$\text{Ca II}_{\text{index}} = \left[\sum_i I_i A_i \cos\theta_i \cos\phi_i\right] / 1000$$

where the summation includes all the plages visible on the day.

I_i = intensity of plage i

A_i = corrected area of plage i in millionths of a solar hemisphere (Big Bear Solar Observatory data)

θ_i = central meridian distance of plage i in degrees

ϕ_i = latitude of plage i.

Values of this index for the period January 1, 1958, through January 31, 1971, appear in the Pennsylvania State University Ionosphere Research Laboratory Report 373(E), **The Solar Ca II Plage Index**, Wesley E. Swartz and Regan Overbeck, October 8, 1971.

SUDDEN IONOSPHERIC DISTURBANCES (C.6)

The **Sudden Ionospheric Disturbances** (SID) table lists one line per SID event. This table gives the date, beginning, maximum, and ending time in UT of each event; an importance rating; a widespread index; the number of station reports by type; and the H-alpha and/or X-ray flare time, X-ray classification, and NOAA/USAF region number, if known. The selected times of beginning, maximum, and ending are usually those of a sudden phase anomaly (SPA). The time chosen is selected considering the amplitude of the event and the time of the associated flare, if known. If SPA events are not available, shortwave fadeout (SWF) events are used to determine the times. In the table D = greater than, E = less than, U = approximate time. The importance rating is obtained by the subjective averaging of the importances reported by all stations for all the different types of SID. The importance rating is based on a scale of 1- the least to 3+ the most important.

The degree of confidence of identifying the event is reported by the stations as a subjective estimate (definiteness rating). This helps to decide whether the reported event is an SID or not. From the reports believed to be SIDs, a widespread index is prepared based on their geographic positions. The index ranges from 1 (possible -- single station) to 5 (definite -- event noted over whole sunlit hemisphere). An index of 3 indicates that the event reports came from roughly the same 30 degree rectangular area. Some phenomena are listed if noted at only one location if a flare or other type of flare-associated effect was reported for that time. In the flare column an * represents no flare patrol as yet available for the time of the event, and "No Flare" means that no flare was observed even though there was a flare patrol at that time. We consider also whether other reports are available from that longitude on that date.

Another table lists the number of SID events by NOAA/USAF region number for each day. A station list follows, giving the type of SID monitored by each station.

The table here gives the two-letter station code, the types of SID reports submitted, and their monitoring frequencies. The SID data originated through the auspices of the International Ursigram and World Days Service (IUWDS), and private interested individual observers (AAVSO). Greater detail concerning the SID reports is in "The Listing of Sudden Ionospheric Disturbances," by J. Virginia Lincoln [**Planet. Space Sci., 12, 419-434, 1964**] and in earlier versions of this text.

STATIONS REPORTING SUDDEN IONOSPHERIC DISTURBANCES

CODE NAME	STATION	SID TYPES	GEOGRAPHIC LAT LONG	FREQUENCIES MONITORED
DA	Darmstadt, German Federal Republic	SWF	54N 7E	3.3 to 28.2 MHz
HI	Hiraiso, Japan	SWF	36N 140E	12.095, 15.0, 15.07, 15.16, 15.485 MHz
HU	Huancayo, Peru	SWF	12S 285E	10.0, 15.0 MHz
IN	Inubo, Japan	SPA	36N 141E	13.6, 16.0, 22.3 kHz
JU	Juliusruh, German Democratic Republic	SWF	55N 13E	2.0 MHz
KA	Kandilli, Turkey	SEA	41N 29E	27 kHz
KU	Kuhlungsborn, German Democratic Rep.	SEA	54N 12E	27 kHz
		SPA		164 KHz
LT	Lintong, People's Republic of China	SPA	34N 109E	100 kHz
MI	Maui, Hawaii, USA	SWF	21N 204E	5 MHz
PU	Panska Ves, Czechoslovakia	SWF	50N 15E	1.5, 6.9 MHz
		SEA		27.0 kHz
		SES		153.0, 162.0 kHz
RS	Rimavska Sobota, Czechoslovakia	SEA	48N 20E	10, 23 kHz
SF	Sofia, Bulgaria	SES	43N 24E	164.0 kHz
UI	Upice, Czechoslovakia	SEA	50N 16E	27 kHz
UM	Sao Paulo, Brazil	SES	24S 313E	10.2, 13.6 kHz
		SPA		10.2, 13.6, 16.0, 17.8 kHz
VS	Vsetin, Czechoslovakia	SEA	49N 18E	35.0 kHz
ZI	Zilina, Czechoslovakia	SEA	49N 18E	10 kHz

AMERICAN ASSOCIATION OF VARIABLE STAR OBSERVERS (AAVSO)

AY	Ayrshire, Scotland	SES	56N 356E	16.0, 19.0, 60.0 kHz
A52	Edenvale, Republic of South Africa	SES	15S 25E	22.3 kHz
FS	Farsta, Sweden	SES	59N 18E	60.0 kHz
A50	Houston, Texas, USA	SES	30N 265E	37.2 kHz
A32	Lake Hiawatha, New Jersey, USA	SES	41N 286E	24.0, 51.6 kHz
A19	Latrobe, Pennsylvania, USA	SES	41N 281E	21.4 kHz
A26	Louisville, Kentucky, USA	SES	38N 284E	21.4 kHz
A03	Paterson, New Jersey, USA	SES	41N 286E	21.4 kHz
A46	Paterson, New Jersey, USA	SES	41N 286E	23.4 kHz
SO	Somersworth, New Hampshire, USA	SES	43N 289E	24.0 kHz
A49	Tavares, Florida, USA	SES	29N 279E	28.5 kHz
A09	Tucson, Arizona, USA	SES	32N 249E	26.5 kHz
A01	Valley Cottage, New York, USA	SES	41N 281E	51.6, 73.6 kHz

SIDs and GIDs (gradual ionospheric disturbances) are detected in a number of ways: shortwave fadeouts (SWF), increases in cosmic noise absorption (SCNA), enhancement or decrease of low frequency atmospherics (SEA or SDA), sudden phase anomalies at VLF (SPA), sudden enhancements at VLF (SES), sudden phase anomalies at LF (SPA and SFA (Sudden Field Anomalies)), and sudden frequency deviations (SFD).

SWF -- Short Wave Fadeouts (SWF) events are recognized on fieldstrength recordings of distant high-frequency radio transmissions (1-30 MHz).

The abnormal fades of fieldstrength not obviously ascribable to other causes are described as shortwave fadeouts with the following further classifications:

S-SWF (S)	:	sudden dropout and gradual recovery
Slow S-SWF (SL)	:	dropout taking 5 to 15 minutes and gradual recovery
G-SWF (G)	:	gradual disturbance: fade irregular in either dropout or recovery or both.

The importance rating depends on: a) the degree to which the normal fieldstrength is reduced (at mid-day a relatively smaller decrease may be as significant as a very deep fade earlier or later in the day; b) the duration of the fade, especially at the minimum phase (the longer the duration, the greater the importance); and c) the definiteness of the event. For importance rating 1- to 3+, roughly use: 1- if duration is 14 minutes or less; 1 if 15-29 min; 1+ if 30-44 min; 2- if 45-59 min; 2 if 60-74 min; 2+ if 75-89 min; 3- if 90-104 min; 3 if 105-119 min; and 3+ if greater than 120 min. Raise the importance one step if the depth of the fade is equal to or greater than twice the normal variations from the median or diurnal trend line. Lower one step if the depth of fade is less than twice the normal variations.

For definiteness rating: 5 = definite; 4 = reasonably definite; 3 = reasonable; 2 = fair; 1 = possible; and 0 = questionable. Definiteness depends on the frequency recorded, the time of day, the presence of minor interference, the presence of a calibration signal, or the occurence of an event during intermittent transmission from the station being monitored, etc. Depending on the depth and width of an event, use 4 or 5 if the event is obvious and well-defined before drawing the diurnal trend line; use 2 or 3 if the event then stands out clearly after drawing the diurnal trend line; and use 0 or 1 if the separation of the event from the background fading pattern is questionable after drawing the diurnal trend line. Use a higher rating if the depth of fade is greater than twice the normal variations from the diurnal trend line during middle daylight hours or three times the normal variations during early or late daylight hours, and the width is more than half an hour. Reduce the rating two units if it is likely that the fade was influenced by propagation mode changes, magnetic storms, wide fading pattern, equipment failure, etc. See J.V. Lincoln, Planet. Space Sci., 12, 419-434, 1964.

SCNA-SEA -- Sudden Cosmic Noise Absorption (SCNA) at 18-25 MHz are sudden decreases in the fieldstrength of the recorded cosmic noise signal, followed by gradual recovery. Sudden Enhancement of Atmospherics (SEA) are sudden increases in the fieldstrength of low frequency recordings near 27 kHz.

Similar rules as for SWF may be used to report SCNA and SEA. Importance guidelines are: 1 = small intensity change usually of relatively short duration; 2 = moderate intensity change and relatively long duration; 3 = great intensity change and relatively long duration. SCNA importance can be the % absorption $((I_n - I_f)/I_n)$x100 where I_n is the noise diode current required to give a recorder reflection equal to that which would occur in the absence of a flare, and I_f is the noise diode current required to give a deflection equal to the level at the time of maximum absorption.

SPA and SES -- Sudden phase anomalies (SPA) are observed as a phase shift of the downcoming skywave on VLF recordings or on pulse measurements on LF recordings. An estimate of the intensity can be obtained in terms of the degree of phase shift [see Chilton, C.J., et al., J. Geophys. Res., 68, 5421-5435, 1963]. The length of path and amount of sunlight on the path must, of course, be considered.

Sudden enhancements of signal strength (SES) are observed on field-strength recordings of extremely stable VLF transmissions (5 to 50 kHz). They are similar to SEA except that the receivers are narrow band and pick up manmade VLF transmissions. Use rules for reporting similar to those for SEAs.

SPA recorded by LF pulse observations over a one-hop propagation path yield information more indicative of the ionospheric changes occurring at the midpoint of the path, rather than over the entire path. LF phase observations, reported in degrees, represent an increase in sensitivity over VLF observations. The phase sensitivity is directly proportional to the ratio of the frequencies for identical paths. However since the height of energy deposition is related to the type of flare x-rays emitted, the LF measurements in conjunction with the VLF measurements will tend to indicate the x-ray intensity range. Since the LF signal can apparently be reflected from either of two layers within the D-region [Doherty, R.H., Radio Science, 2, 645-651, 1967], phase retardations as well as phase advances may occur during an SID at LF.

The amplitude of the low frequency pulse observations made at Loran stations normally changes during an SID. This change is usually, but not always in the direction of a signal enhancement (SES). The height of signal absorption is below the height of signal reflection. LF amplitude observations along with the LF and VLF phase observations for any one event tend to indicate the x-ray intensities associated with that event. Amplitude changes are reported in dB to the nearest dB of voltage change. Since 6 dB represents doubling of the received signal and 20 dB represents a ten fold change in amplitude, it is obvious that many SIDs produce large effects in LF propagation.

Guidelines for SPA importance: 1- = less that 45 degrees phase advance; 2 = more than 70 to 80 degrees phase advance; 2+ = more than 100 degrees phase advance; and 3 = more than 150 degrees phase advance. For LF SPA importance: 1- = less than 100 degrees phase advance; 2 = more than 200 degrees phase advance; and 3 = more than 300 degrees phase advance.

SFA -- On LF amplitude recordings on paths about 1000 km long, sudden field anomalies (SFA) can be detected. These are events recognized by indirect phase measurements made evident by the one-hop sky wave interfering with the ground wave.

SFD -- A sudden frequency deviation (SFD) is an event where the received frequency of an HF radio wave reflected from the ionosphere increases suddenly, peaks, and then decays back to the transmitted frequency. Sometimes several peaks occur and usually the frequency deviation takes on negative values during the decaying portion of an SFD. The peak frequency deviation for most SFDs is less than 0.5 Hz. The start-to-maximum time is typically about 1 minute. SFDs are caused by sudden enhancements of ionization at E and F1 region heights produced by impulsive flare radiation at wavelengths from 10 - 1030A. A more complete discussion of SFDs can be found in Report UAG-36, An Atlas of Extreme Ultraviolet Flashes of Solar Flares Observed During the ATM-SKYLAB Missions, 1974, available from World Data Center A for Solar-Terrestrial Physics.

SOLAR RADIO WAVES SPECTRAL OBSERVATIONS (C.4)

Solar spectral events from Bleien (Switzerland), Culgoora (Australia), Learmonth (Australia), Palehua (Hawaii), Sagamore Hill (Massachusetts), San Vito (Italy), Weissenau (GFR) are presented in a combined table. The table contains:

Universal (Greenwich) date;

Observing periods during the day (UT) (not available for USAF RSTN stations);

Station Codes --BLEN = Bleien (47N 9E);
CULG = Culgoora (30S 150E);
LEAR = Learmonth (22S 114E);
PALE = Palehua (21N 204E);
SGMR = Sagamore Hill (43N 289E);
SVTO = San Vito (41N 18E);
WEIS = Weissenau (47N 9E).

Burst indicated in wavelength band by beginning and ending times in UT together with an indication of intensity on a 1 to 3 scale, 3 the most important. Symbol "E" is used for an event in progress before the time given and "D" for one that ends after the given time;

Spectral type --

I = storm bursts
II = slow drift bursts
III = fast drift bursts
IV = prolonged continuum
V = brief continuum (normally following Type III burst)

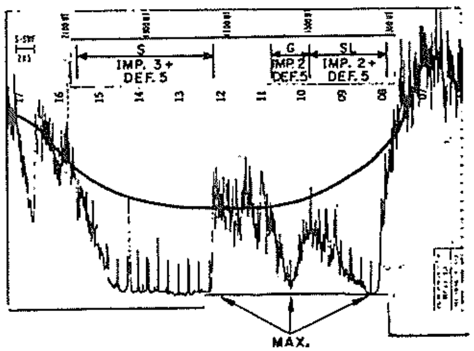


Fig. 1 Short-wave fade-out (SWF); 18 September 1957. Mason, Ohio (KQ2XAU, 6.080 Mc/sec), recorded at Fort Belvoir, Virginia.

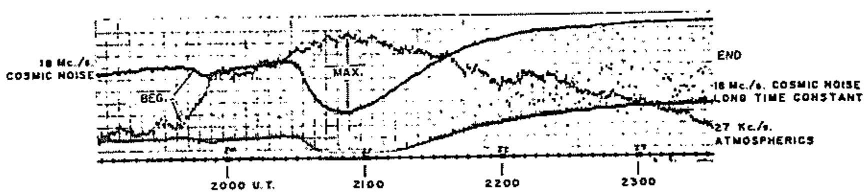


Fig. 2 Sudden cosmic-noise absorption (SCNA) and sudden enhancement of atmospherics (SEA); 20 November 1960. Recorded at Boulder, Colorado.

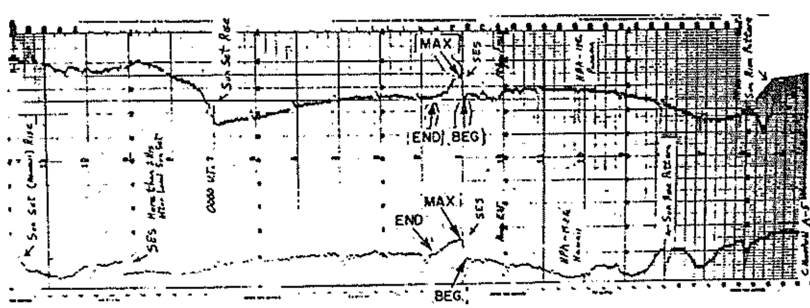


Fig. 4 Sudden enhancement of signals (SES); 19 April 1963.
Top trace: Panama (NBA, 18 kc/sec);
Bottom trace: Hawaii (NPM, 19.8 kc/sec), both recorded at Ramsey, New Jersey.

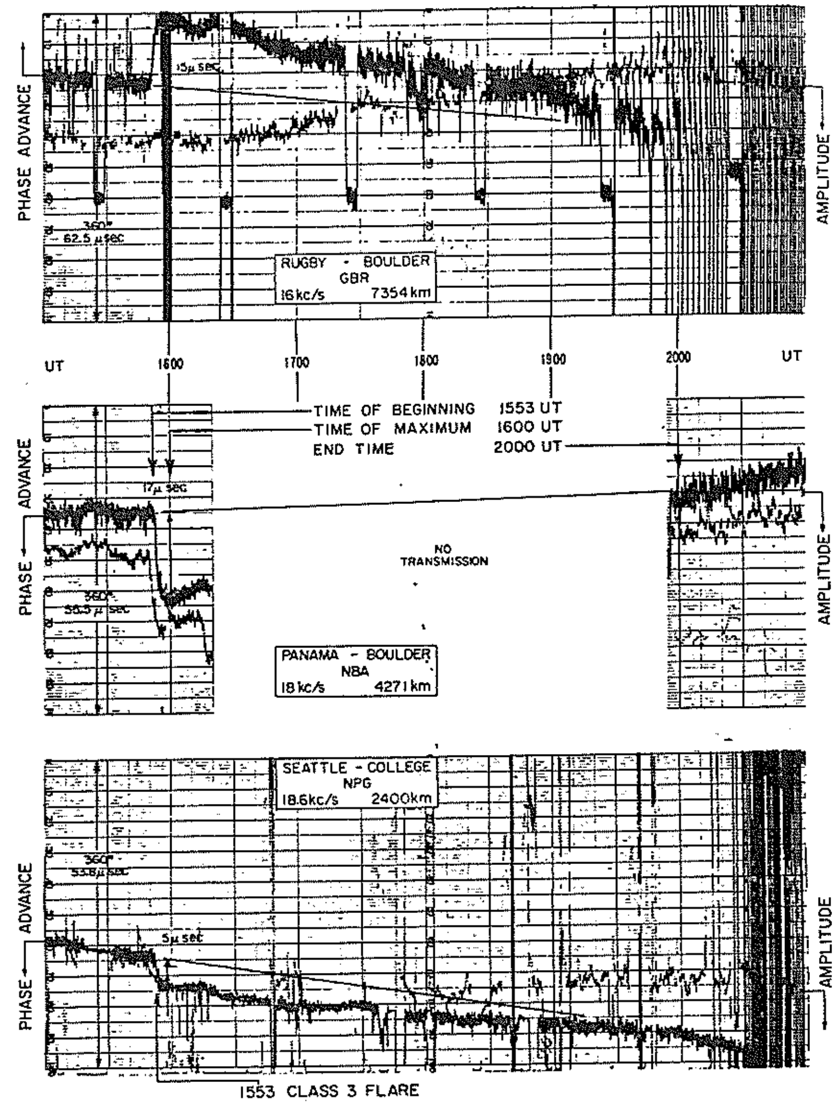
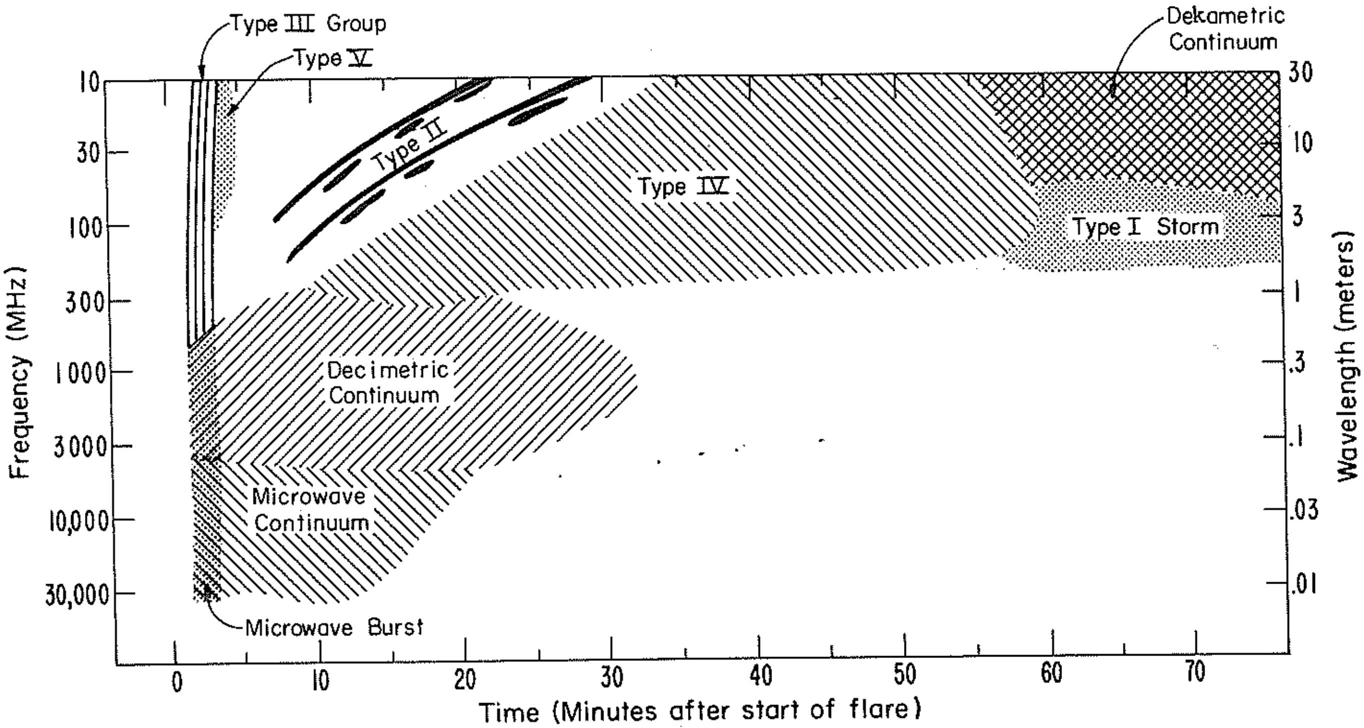


Fig. 3 Sudden phase anomaly (SPA); 20 July 1961.
Top: Rugby (GBR, 16 kc/sec) recorded at Boulder, Colorado; distance 7354 km.
Center: Panama (NBA, 18 kc/sec) recorded at Boulder, Colorado; distance 4271 km.
Bottom: Seattle (NPG, 18.6 kc/sec) recorded at College, Alaska; distance 2400 km.

Sample SIDs taken from Annals of the IQSY, "Reporting of Sudden Ionospheric Disturbances" by J. Virginia Lincoln.



CONTINUUM = continuum in close association with Type III burst storms, often with reverse drift bursts and often, but not always, associated with noise storms on metric wavelengths (used by SMGR);
DCIM = decimetric burst defined by very fast drift spike or group of spikes with very high degree of polarization extending usually less than one octave in or close to decimeter range;
UNCLF = unclassified activity.

See J.P. Wild, S.F. Smerd and A.A. Weiss, **Annual Review of Astronomy and Astrophysics**, 1, 291, 1963 for description of Types I through V.

Symbols appended to spectral type:

B = Single burst;
G = Small group ($\leq$10) of bursts;
GG = Large group ($\geq$10) of bursts;
C = Underlying continuum (particularly with Type I);
S = Storm in the sense of intermittent but apparently connected activity;
N = Intermittent activity in this period;
U = U-shaped burst of Type III;
RS = Reverse slope burst;
DP = Drifting pairs;
DC = Drifting chains;
H = Herringbone;
W = Weak activity;
P = Pulsations;
MOV = Moving (Type IV);
STA = Stationary (Type IV);
Z = Zebra patterns (parallel drifting bands);
F = Fiber bursts (intermediate drift bursts);
MWB = Meter wave burst.
HARM = Harmonic

The bursts are divided into dekameter, meter, and decimeter wavelength ranges. These ranges cover approximately the frequency bands 10-30, 30-300 and 300-3000 MHz. There is little uniformity among observatories in interpreting the intensity levels. The equipment and antenna systems at different stations are different, having different gains, different dynamic ranges and saturate at different levels.

The Instruction Manual for reporting solar radio emission prepared by World Data Center-C2, Toyokawa Observatory 1975, recommends that spectral observations be given a uniform intensity classification by all observatories. These are:

Intensity Classes	Flux Density in $10^{-22}Wm^{-2}Hz^{-1}$
1	<50
2	50-500
3	>500

Because of equipment and antenna differences this recommendation has not generally been followed.

Sagamore Hill and other U.S. Air Weather Service RSTN observatory report event types using only the following eight morphological classifications:

1 - Type 1 storm burst;
2 - Type 2 burst (slow drift);
3 - Type 3 burst (fast drift) - one or more bursts over a period of less than 10 minutes;
4 - Type 4 burst (smooth broad band continuum);
5 - Type 5 burst (continuum tail on a Type 3 burst);
6 - Series of Type 3 bursts over a period of 10-60 minutes with no period exceeding 10 minutes without activity;
7 - Series of Type 3 and Type 5 bursts over a period of 10-60 minutes with no period exceeding 10 minutes without activity;
8 - Continuum (broad band continuum with Type 3 and 5 - like bursts superimposed.

Weissenau Radio Astronomy Observatory, Astronomical Institute of Tubingen University -- This research work is supported by the University of Tubingen, Baden-Wurttemberg, GFR. Instrumental descriptions are given by:

[1] H.W. Urbarz, **Mittlg. Astron. Ges. No. 40**, Hamburg, 220-221, 1976.
[2] H.W. Urbarz, **Kleinheubacher Berichte, 21**, FTZ Darmstadt, 421-429, 1978.
[3] H.W. Urbarz and Th. Wachter, **Kleinheubacher Berichte, 21**, FTZ Darmstadt, 413-420, 1978.
[4] W. Brunner, H.W. Urbarz and L.v.Zech-Burckersroda, **Kleinheubacher Berichte, 22**, FTZ Darmstadt, 501-514, 1979.
[5] H.W. Urbarz and L.v.Zech-Burckersroda, **Kleinheubacher Berichte, 23**, FTZ Darmstadt, 207-218, 1980.
[6] H.W. Urbarz and L.v.Zech-Burckersroda, **Kleinheubacher Berichte, 25**, FTZ Darmstadt. 389-407, 1982.
[7] R. Kral, **Kleinheubacher Berichte,28**, FTZ Darmstadt, 527-530, 1985.
[8] R. Kral, **Diploma Piece**, High School of Technology, Ravensburg, German Fed. Rep.
[9] H. Ch. Buck, **Diploma Piece**, High School of Technology, Ravensburg, German Fed. Rep.
[10] H.v. Bohlen, R. Kral, P. Riese, K. Steger, H.W. Urbarz, **Kleinheubacher Berichte, 30**, FTZ Darmstadt, 1987, in print.

A 35-mm film is used with a 0.2-mm/s feed; the sweep rate is 4-cycles/s. The number of resolution elements of recorded events is about 100 per octave on film. The frequency range is 30-1000 MHz, the frequency scale is stepped in 6 octave-wide channels: 30-46-86-160-290-540-1000 MHz, each of which is linear. The approximate flux densities including minimum fluxes and saturation fluxes corresponding to antenna temperatures are given in [5]. The new flux calibration is a result of new antennas used in channels 1, 2 and 3 since Nov. 1976 (groups of log-periodic dipoles) and a result of a new IC-Video device matching the radiometer outputs to the scope since Aug. 1978 and of the automatic calibration unit in operation since October 1979.

Culgoora Solar Observatory, Australia -- The radiospectrograph at the Culgoora Solar Observatory is operated by the IPS Radio and Space Services, a branch of the Department of Science. Summaries are presented of solar radio bursts in the frequency range 8-8000 MHz. For a description of the equipment see K.V. Sheridan [**Proc. Astron. Soc. Australia, 1**, 58, 1967]. The intensity scale is qualitative.

Because of limited staff, we no longer report weak activity (Flux $< 10 \times 10^{-22}$ $Wm^2H_z^{-1}$) unless it occurs as a Type III or Type I storm.

Sagamore Hill Solar Radio Observatory -- Prior to 12 July 1970, the monitored frequency range was 19-41 MHz and prior to 12 August 1975, the monitored frequency range was 24-48 MHz. Currently, a special purpose radiometer sweeps over 30-80 MHz frequency range once per second. The interferometer array consists of two semi-bicone stationary antennas spaced 270 m apart on an E-W line. The spectrogram fringe patterns are recorded on a Versatec Electrostatic Recorder (Model 1100) for a real-time readout. Sagamore Hill reports dekameter spectral type bursts and uses the recommended intensity classification listed above.

Bleien Radio Spectrograph, Switzerland -- The Bleien spectrograph (formerly located in Durnten) was constructed with support of the Swiss National Science Foundation. It is located in Bleien near Zurich, Switzerland. This analog spectrograph is a routinely operated subsystem of the digital spectrometer "PHOENIX", the data of which are not routinely published. The analog spectrograph registers on 35-mm film the frequency range from 100-1000 MHz in one continuous sweep. Maximum flux densities are estimated from the film according to the following criteria and corresponding to the following levels:

1:	< 100 sfu	(weak)
2:	100-300 sfu	(not saturated)
3:	> 300 sfu	(clearly saturated)

For a description of the whole system see: Perrenoud, M.R., **Solar Phys., 81**, 197 (1982), and for detailed information on the spectrograph see: Tarnstrom, G.L., **Astr. Mitt. Eidgen. Sternwarte Zurich, No. 317**, 1973.

Learmonth and Palehua Observatories -- These two observatories (Learmonth, Australia, and Palehua, Hawaii) observe in the spectral range 25-75 MHz, and also coordinate their observations with the observers at Sagamore Hill.

INTERPLANETARY MAGNETIC FIELD

Pioneer 12 -- The interplanetary magnetic field data from the UCLA magnetometer on the Pioneer Venus Orbiter (Pioneer 12) are being supplied by C.T. Russell of UCLA. The data supplied are one-hour averages of the vector field and its magnitude in spacecraft coordinates which are very close to solar eliptic coordinates. The field magnitude given is the average of the instantaneous magnitudes. The averages are centered on apoapsis and the time given is the center of the average. Periods when apoapsis is close to or in the Venus wake (magnetosheath or tail) are flagged with a "W". The instrument is a triaxial fluxgate magnetometer mounted on a 5m boom. The magnetometer has a ± 128 nT range and $\pm .0625$ nT resolution. These data are being obtained as part of the routine processing of the telemetered data.

COSMIC RAYS (F.1)

Tabulated Observations -- The table presents the daily (UT) average counting rates per hour (scaled) for eight high counting rate neutron monitors: Thule, Alert, Deep River, Kiel, Climax, Predigstuhl, Tokyo, and Huancayo. The characteristics of the stations are given below; the data are corrected applying the barometric coefficients to the listed mean station pressure.

The **Climax, CO, USA**, and **Huancayo, Peru**, Neutron Monitor data are communicated by J.A. Simpson and G. Lentz of the Enrico Fermi Institute for Nuclear Studies, University of Chicago. The instruments are standard Chicago type neutron monitors, utilizing 12 BF_3, counter tubes, divided into two identical and independent sections. For a more detailed description of the neutron intensity monitors see J.A. Simpson, **Annals of the IGY, Vol. IV**, Part VII, 351-373, 1957. The publication of these data in this monthly series began September 1960 for Climax and in January 1979 for Huancayo. Hourly averages, both corrected and uncorrected and local pressure data are available in both tabular and magnetic tape form for these stations from the WDC-A for Solar-Terrestrial Physics, Boulder, CO, USA.

COSMIC RAY NEUTRON MONITORS

Station	Geographic Lat. North	Geographic Long. East	Cutoff* GV	Alt. m	Type	Scaling Factor	Baro. coeff. %/mm Hg	Mean press. mm Hg
Thule	76.50	291.30	0.00	44	NM 64	100	0.99	754
Alert	82.50	297.67	0.00	57	NM 64	100	0.987	752
Deep River	46.10	282.50	1.07	145	NM 64	300	0.987	747
Kiel	54.34	10.12	2.32	54	NM 64	100	0.961	755
Climax	39.37	253.82	2.97	3400	IGY	100**	0.943	504
Predigtstuhl	47.70	12.88	4.29	1614	NM 64	100	0.75%/mb	624.8
Tokyo	35.75	139.72	11.50	20	NM 64	256	0.888	760.5
Huancayo	-12.03	248.67	13.01	3400	NM 64	100	0.96	518

*Calculated by DGRF75 (COSMIC RAY TABLE No. 1, ed. WDC-C2 Japan, March 1983).
**From January 1, 1966.

The Deep River, Ontario, Canada, neutron monitor, follows the IQSY design [IQSY Instruction Manual No. 7 which is published in the Annals of the IQSY, Vol 1, Chapter 13]. Publication of the daily rates in this series began in January 1966 but a chart of hourly values from Deep River, described below, has been published herein since January 1959. Until December 31, 1972, the station was operated and maintained by Atomic Energy of Canada Ltd., but on January 1, 1973, the National Research Council of Canada took over the responsibility for maintenance of the station.

The 18-NM-64 neutron monitor located at Alert, Northwest Territories, Canada, is unique because its asymptotic cone of acceptance in space is less than 10° wide and is aligned within 7° of the spin axis of the Earth. Hence, unlike the stations whose cones of acceptance rotate with the Earth approximately in the plane of the ecliptic, Alert always "looks" into a fixed cone directed northward. It experiences negligible periodic diurnal intensity variation. The monitor at Alert was provided by Atomic Energy of Canada, Ltd., and housed in a building provided by National Research Council of Canada. It is the responsibility of the National Research Council; the day-to-day operation is by courtesy of the Canadian Meteorological Service.

The data for Deep River and Alert are now provided by Margaret D. Wilson and M. Bercovitch of the National Research Council of Canada. The original data can be obtained from National Research Council of Canada, Ontario, Canada K1A OR6, or from any of the World Data Centers.

The Thule nucleonic intensity detector, of standard IQSY design, was originally located at the Geopole Station Greenland: latitude 76°36'N, longitude 68°48'W, altitude 260m, geomagnetic threshold rigidity essentially zero. At the end of 1976, it was moved to a new site on Thule Air Base. The coordinates are essentially unchanged except that the altitude is now close to sea level. The data are communicated by Martin A. Pomerantz, Bartol Research Foundation, Newark, DE 19711 USA. Any changes in either the atmospheric attenuation length or in the sensitivity arising from long term drifts are applied retrospectively before the final hourly mean data are routinely distributed to the World Data Centers and to the scientific community.

Two other monitors, at Kiel (18-NM-64) and Tokyo (36-NM-64), have asymptotic cones of acceptance much different from those given above. Therefore, they can be used to distinguish between UT-dependent and LT-dependent time variations. Higher cutoff rigidities also aid further estimation of rigidity dependence.

The publication of the Kiel and Tokyo data began with the December 1973 data. The data from both neutron monitors are routinely submitted to the World Data Centers A, B, and C2 for Cosmic Rays as well as to listed researchers. Kiel data have been available since September 1964 and Tokyo (or Tokyo-Itabashi) data since January 1970. Since there were changes in the number of counters, a revision of pressure reduction, and so on, the level of Tokyo data has changed several times. The data are communicated to Solar-Geophysical Data by K. Takahashi after receiving the Kiel data from K. Rohrs.

Predigtstuhl is located on a mountain top in the northern Bavarian Alps. The following data are stored on computer: pressure, uncorrected and corrected counts per hour of neutrons; error/counts by NaJ Scintillator. Specifications: 3-NM-64 Super Neutron Monitor -- all three detectors active. Computer tables, magnetic tapes and original data are available since January 1981 on request. Data are regularly mailed to World Data Center A for Solar-Terrestrial Physics, Boulder, Colorado, U.S.A. For requests contact Dr. R. Reiter, Fritz Muellerstrasse 54, D-8100 Garmisch, German Federal Republic. Prints on scientific use of the data are available (solar-terrestrial and meteorological relations).

Charts -- Variations of cosmic ray intensity are depicted in chart form for the above stations. The vertical scale lines mark the days of the month in Universal Time. The horizontal scale lines are in intervals of 5% deviation from the arbitrarily chosen 100% reference level for each station. The 100% reference levels are based upon (after barometric correction) 0.6740×10^6 counts per hour for Deep River, and 0.7132×10^6 for Alert. For Thule, Kiel, Climax, and Tokyo, the plots represent percentage deviation from the mean intensity of the corresponding 27 days which is taken to be the 100% level.

GEOMAGNETIC ACTIVITY (D.1)

Table of Indices, Kp, Kn, Ks, Km, Cp, Ap, aa, and Selected Quiet and Disturbed Days -- The data in the table are: ten quietest days (Q), and five most disturbed days of the month (D); three-hourly indices Kp, Kn, Ks, Km; character figure, Cp; daily "equivalent amplitude", Ap; and aa indices with quiet day figures K and C.

The data are made available by the International Service of Geomagnetic Indices under the auspices of the International Association of Geomagnetism and Aeronomy through Division V: Observatories, Instruments, Indices and Data. The Institut fur Geophysik der Gottingen Universitat, FRG, computes the planetary and equivalent amplitude indices Kp and Ap and determines the "international quiet and disturbed days," Q and D. The aa indices and the hemispherical indices Kn, Ks, and the planetary index Km are provided by the Institut de Physique du Globe de Paris, France. Many of the activity indices are described by J. Bartels in **Annals of the IGY, 4**, 227-236, London, Pergamon Press, 1957, and by P.N. Mayaud in "Derivation, Meaning, and Use of Geomagnetic Indices" **Geophysical Monograph, 22**, American Geophysical Union, Washington, DC, 1980.

Kp is the mean standardized K-index from 13 observatories between geomagnetic latitudes 47 and 63 degrees. The scale is 0 (very quiet) to 9 (extremely disturbed), expressed in thirds of a unit, e.g., 5- is 4 and 2/3, 5o is 5 and 0/3, and 5+ is 5 and 1/3. This planetary index is designed to measure solar particle radiation by its magnetic effects, specifically to meet the needs of research workers in the other geophysical fields.

A full description of the indices Kn, Ks, Km is given in a monograph, **Indices Kn, Ks et Km, 1964-1967**, edited in 1968 by the Centre National de la Recherche Scientifique, 15 quai Anatole, France, 75007 Paris, which contains these indices for 1964-67 while **IAGA Bulletin No. 39** contains those for 1959-63. Yearly computations of these data are published in the series of **IAGA Bulletin No. 32.** All of them are available on magnetic tape at the appropriate World Data Center.

Briefly, the three-hourly indices Kn and Ks for the Northern and Southern Hemispheres respectively are derived from the K indices of observatories approximately well distributed in latitude and in longitude. The indices are standardized according to the distances of the stations to the auroral zones. The stations are arranged in groups representing a longitude sector in one of the hemispheres (5 in the Northern Hemisphere, 4 in the Southern). The observatories currently in use are:

MGD	Magadan	EYR	Eyrewell
PET	Petropavlovsk	LAU	Lauder
MMB	Memambetsu		
		CAN	Canberra
POD	Podkammenaya Tunguska	GNA	Gnangara
SVE	Sverdlovsk		
		KGL	Kerguelen
NGK	Niemegk	CZT	Crozet
WIT	Witteveen	HER	Hermanus
HAD	Hartland		
		AIA	Argentine Island
OTT	Ottawa	SGG	South Georgia
FRD	Fredericksburg	TWA	Trelew
NEW	Newport		
VIC	Victoria		
TUC	Tucson		

The mean standardized K of each sector is converted into an equivalent amplitude and the weighted (in longitude) averages an and as of these amplitudes are converted back into Kn and Ks. Km is derived in the same way from am, the average of an and as. Indices an, as, and am are expressed in gammas (one gamma equals one nanoTesla) and correspond to the magnetic activity level (as it can be inferred from K indices) at an invariant magnetic latitude of 50°. Indices Kn, Ks, and Km are expressed in the same units as Kp. Values published in these reports are only provisional because in some months all observatories used in each longitude sector have not sent K indices at the right time and because K indices of Antarctic stations have to be rescaled at the end of each wintering.

The **Cp-figure** is a standardized version of the Ci-figure formerly published and is derived from the indices Kp by converting the daily sum of ap into the range 0.0 to 2.5.

Ap is a daily index of magnetic activity on a linear scale rather than on the quasi-logarithmic scale of the K indices. It is the average of the eight values of an intermediate 3-hourly index ap, defined as approximately one-half the average gamma range of the most disturbed of the three force components, in the three-hour interval at standard stations; in practice, ap is computed from the Kp for the 3-hour interval. The extreme range of the scale of Ap is 0 to 400. Values of Ap (like Kp and Cp) have been published for 1932 to 1961 in **IAGA Bulletin No. 18** by J. Bartels. Yearly compilations of these data, as well as the selected days, are published in the series of **IAGA Bulletin No. 32** (the continuation of **IAGA Bulletin No. 12**). These Bulletins are available from the IUGG Publications Office 39, Rue Gay Lussac, Paris (V). These indices are also available at the appropriate World Data Centers.

The **aa indices** are the continuation of the series beginning in the year 1868. A full description of these indices is given in the **IAGA Bulletin 33**, which contains them for the years 1868-1967. Descriptions are also given (especially comparisons with am, ap, or Ci indices) in two short papers [**Ann. Geoph., 27**, 62-70, 1971 and **J. Geophys. Res., 77**, 6870-6874, 1972]. The aa values for 1968-75 are contained in **IAGA Bulletin 39.** From 1976 onward they are included in **IAGA Bulletin 32.** Revised aa values for the years 1969-76 have been distributed in 1979 to the recipients of **IAGA Bulletin 32** in the form of loose sheets to be inserted in the **Bulletins 39** (1968-75) and **32f** (1976). A graph of these values 1868 - 1979 is published in the 426 Part I issue of **Solar-Geophysical Data (page 137).** Revised aa values for 1968-77 appear in the 411 Part II February 1977 SGD. Briefly, such three-hourly indices as these, computed from K indices of two antipodal observatories (invariant magnetic latitude 50°), provide a quantitative characterization of the magnetic activity, which is homogeneous through the whole series. Half-daily and daily values give an estimation of the activity level very close to that obtained with am indices. Values are in gammas and correspond to the activity level at an invariant magnetic latitude of 50°. The aa indices are computed for:

N = daily values for the Northern Hemisphere,

S = daily values for the Southern Hemisphere,

M = half-daily values of aa indices for the Greenwich day.

Letters **C** and **K** refer to a classification of the quiet days of the month (C = really quiet, K = quiet but with slightly disturbed three-hourly intervals). The letters on the left refer to the 24-hour Greenwich day, on the right to a period of 48 hours centered on the Greenwich noon. The three-hourly indices aa are available from the appropriate World Data Centers on magnetic tape using the format described in **IAGA Bulletin 33.**

The magnetically quiet and disturbed days (Q and D) are selected in accordance with the general outline in Terr. Mag. (Predecessor to J. Geophys. Res.) 48, 219-227, 1943. The method in current use calls for ranking the days of a month by their geomagnetic activity as determined from the following three criteria with equal weight: (1) the sum of the eight Kp's; (2) the sum of the squares of the eight Kp's and (3) the greatest Kp.

Beginning with the data for December 1976 numbers appear with the Qs and Ds to rank them in order from the most quiet or most disturbed, respectively. A selected "quiet day" considered "not really quiet" is marked by the letter A if Ap > 6 for that day, or marked by the letter K if Ap $\leq$ 6 but with one Kp $\geq$ 3o or two Kp values are $\geq$ 3-. A selected "disturbed day" considered "not really disturbed" is marked by an asterisk (*) if Ap < 20. This ranking method has been used since the responsibility for issuing these selected days was transferred from De Bilt to Gottingen in July 1976. The rankings may be obtained for the months of July-November 1976 by request to WDC-A for Solar-Terrestrial Physics.

A table of Ap indices for the last 12 months is presented so that trends in magnetic activity can be easily followed.

Chart of Kp by Solar Rotations -- Monthly a graph of Kp is given for several solar rotations, furnished through the courtesy of the Geophysikalisches Institut of the University of Gottingen. Annually a graph of the whole year by solar rotations is included. From time-to-time another 27-day rotation chart depicting the daily geomagnetic character figure, C9, is presented. C9 is obtained from Cp by reducing the Cp-values to integers between 0 and 9 according to the key given in the charts.

Table and Graph of Provisional Hourly Equatorial Dst Index -- The equatorial Dst index at a given UT represents magnetic field variations at the dipole equator on the Earth's surface, averaged over local time, that are caused mainly by the magnetospheric equatorial currents including the cross-tail current. The reference level of Dst is such that Dst is statistically zero on the days internationally designated as quiet days.

Provisional hourly Dst data are based on hourly values of the horizontal component from four magnetic observatories: San Juan, Honolulu, Kakioka, and Hermanus. These provisional hourly values are replaced by a more definitive annual set of the Dst index at the end of each year. The provisional hourly values are calculated and forwarded for publication by M. Sugiura, World Data Center C2 for Geomagnetism, Faculty of Science, Kyoto University, Kyoto, 606, Japan.

Principal Magnetic Storms -- This table presents the principal magnetic storms for the month as reported by several observatories through cooperation with the International Association of Geomagnetism and Aeronomy. These are the data formerly published in the Journal of Geophysical Research. They are now, however, grouped by the storm rather than by station. The geomagnetic latitude of the station is indicated. The beginning time is given to the hour and minute in UT.

The type of sudden commencement, if any, together with its magnitude in each element D, H or Z is next in the table: sc = sudden commencement; sc* = small initial impulse followed by main impulse (in this case the amplitude is that of the main pulse only, neglecting the initial brief pulse); dots in these columns represent a storm with gradual commencement; blanks indicate no data entries. Signs of amplitudes of D and Z are taken algebraically; D reckoned positive if toward the east and Z reckoned positive if vertically downward. In the next columns the day and the three-hour periods on that day when the K index reached its maximum are given followed by the K index value. In the next three columns the maximum ranges in D, H and Z during the storm are given. The ending time is given only to the nearest hour. This is the time of cessation of reasonably marked disturbance movements in the trace. More specifically, it is the time when the K index measure has diminished to 2 or less for a reasonable period. For each date the data are listed in north-to-south geomagnetic latitude order. The observatories reporting are listed below the table each month. The abbreviations used for the observatory names are as follows:

GEOMAGNETIC OBSERVATORIES

Code	Station	Geomag. Latitude
ABG	Alibag	9.5N
ANN	Annamalainagar	1.5N
API	Apia	16.0S
BJI	Beijing	28.5N
CNB	Canberra	43.9S
COL	College	64.6N
ETT	Etaiyapuram	00.6S
EYR	Eyrewell	47.9S
FRD	Fredericksburg	49.6N
GNA	Gnangara	43.2S
GUA	Guam	4.0N
GUL	Gulmarg	24.5N
HER	Hermanus	33.7S
HON	Honolulu	21.1N
HUA	Huancayo	0.6S
HYB	Hyderabad	7.6N
IRK	Irkutsk	41.0N
JAI	Jaipur	17.3N
KRC	Karachi	16.4N
KGL	Kerguelen	56.5S
NEW	Newport	55.1N
PMG	Port Moresby	18.6S
SHL	Shillong	14.7N
SIT	Sitka	60.0N
SJG	San Juan	29.9N
TOO	Toolangi	46.7S
TRD	Trivandrum	1.1S
TUC	Tucson	40.4N
UJJ	Ujjain	13.5N
WIT	Witteveen	54.2N

Sudden Commencements and Solar Flare Effects -- These reports are provided by Observatorio del Ebro, Roquetas, Spain. The sudden commencements (ssc) and solar flare effects (sfe) are from magnetograms of the worldwide network of magnetic observatories. The stations, together with their abbreviations, are given in the series IAGA Bulletin No. 32 which contains the yearly compilations of these data. Before January 1966 these reports were published periodically in **Journal of Geophysical Research**. From then until December 1970 they were published quarterly in **Solar-Geophysical Data**.

Beginning with December 1970 these data are published monthly and, thus, are based on fewer reports and differ slightly in detail from the similar data published previously. The decision to publish this less complete report was made in order to make the data available more rapidly. The table gives date and UT time of event with stations by three-letter abbreviations grouped by quality A, B or C, where A means very remarkable; B means fair, ordinary, but unmistakable; and C means very poor, doubtful.

RADIO PROPAGATION QUALITY INDICES (B.52, B.53)

Transmission Frequency Ranges -- The North Atlantic path (Norddeich (53.6°N, 7.1°E) - New York) is represented by four frequencies, 6.376, 8.630, 13.033, and 16.972 MHz, recorded continuously. They are shown in a series of diagrams, one for each day. The heavy solid lines represent fieldstrength $\geq$ -12 dB above 1 μV/m (transmitter power reduced to 1 kW). Observed fieldstrengths between -12 dB and -40 dB above 1 μV/m are shown by the fine line. These diagrams are based on data reported by the German Post Office through the Fernmeldetechnisches Zentralamt, Darmstadt, Federal Republic of Germany.

Radio Propagation Quality Indices are calculated from the records on six circuits received at Norddeich, Federal Republic of Germany, with a short vertical antenna. The quality figures are calculated for a twenty-four hour period (0600-0600 UTC) using transmissions from Tokyo, Japan; New York, USA; Teheran, Iran; Canberra, Australia; Bracknell, England; and Johannesburg, Republic of South Africa. The following frequencies are currently in use:

Tokyo	New York	Teheran
22.770 MHz	16.972 MHz	15.084 MHz
18.220	13.033	9.022
13.597	8.630	
9.970	6.376	
	4.331	

Canberra	Bracknell	Johannesburg
19.690 MHz	18.261 MHz	21.535 MHz
13.920	14.436	17.780
11.030	11.086	17.367
5.100	8.040	
	4.782	
	3.289	

For the exact calculation, see the footnote on each data table "Radio Propagation Quality Indices."

LATE DATA

This section contains data received too late for publication in the normal Pronpt Reports issue. Sometimes unusual or unique data sets appear here, e.g., a list of the Forbush decreases monitored at Mt. Washington for the years 1955-1984.

CARTE SYNOPTIQUE (A.6b)

These documents are a preliminary version of the maps of filaments and active regions published biennially by the Paris Observatory. They are prepared from the daily spectroheliograms of the Meudon Observatory (H-alpha, K_{1v} and K_3) and from filtergrams of the Haute Provence Observatory (H-alpha). When there are gaps in these observations, they are filled by the complementary H-alpha and K_{2-3} images from the Kodaikanal (India), Athens (Greece) and Madrid (Spain) Observatories.

I. Map -- On the map solar meridian and parallels appear as a rectangular grid so that a phenomenon appearing at latitude ϕ has its longitudinal size enlarged proportional to sec ϕ. Choice of the 0° meridian and numbering follows Carrington. A rotation begins at the moment when the 0° meridian coincides with the central meridian.

The longitude of the central meridian of the visible hemisphere at 0000 UT is shown for every day of the rotation by short heavy bars. Some dates are shown for convenience. The longer bars show the longitude of the central meridian at the time of the observations used.

The map presents a synopsis of chromospheric filaments and of active regions with or without sunspots. The schematic line which locates the filaments is obtained by superposition of daily observations. The solid areas inside the double lines correspond to the part of the filament which was observed on more than eight days whether successive days or not. The hatched parts were observed between 4 and 8 days and the parts left blank correspond to a visibility of less than four days. Small size filaments visible only by a single observation are not shown.

Sunspots are shown by small circles with diameters proportional to their size. The adopted diameter corresponds approximately to a maximum diameter observed while the sunspot crosses the visible hemisphere of the Sun, measured on the Meudon plates K_{1v} and reduced to the scale of the maps. Facular plages are shown at the moment of the maximum development of the sunspots that they contain, or on the day when the brightness was maximum. This brightness is indicated by four kinds of hatching, the darkest corresponds to the most intense plages, the clearest to highly scattered faculae.

II. Table of Active Regions -- The columns of the table are explained as follows:

1) Region no. 1. Identification numbers by rotation. This identification has been used in IAU Quarterly Bulletin since 1959 with the lists of published flares to indicate the responsible active regions.

2) Mean coordinates for each active region.

3) Importance on a scale of 1 to 10. The value given takes into account the persistence, the number and the size of sunspots and the size of the facular plage. Ephemeral plages or the very scattered ones are outlined on the maps but are not mentioned in the table.

4) Age, given in days in relation to central meridian passage. Example: A center is >6 days old when it was born before appearing at east limb. The number of days is preceded by + if it was born before passage at central meridian, by - if it was born between the central meridian and the west limb.

5) Indication (x) that no visible sunspots on K_{1v} spectroheliograms have been observed in this center during the passage.

6) Identification of the center in the preceding rotation if the active region is a return one.

7) State of activity in the center during the passage at the west limb.

Hα SOLAR FLARES (C.1ba, C.1e, C.1d)

We prepare comprehensive solar flare listings in cooperation with the Department d'Astronomie Solaire et Planetaire, Observatoire de Paris, 92190 Meudon, France. For each distinct flare event, the table gives a group report line, which closely resembles the one-line summaries published later in the IAU Quarterly Bulletin on Solar Activity. Group-lines condense and average all individual flare reports of the same event; they give the best estimate of time, size and position. We assign station reports to a group by matching heliographic latitudes; central meridian distances; central meridian passage dates; and start times, maximum times, and end times. In Solar-Geophysical Data, the individual flare reports follow each group-line; in the Quarterly Bulletin, only this summary line appears.

Please note that beginning with the February 1982 data, we published our grouped tables before consulting with Meudon. This helped us bring our listings up-to-date, even though they are "preliminary." We will maintain at WDC-A the final listings after Meudon makes their valuable editorial changes.

The statements below describe the measurements each GROUP-LINE contains in the flare table.

Grp #	Group serial number. This sequential number ultimately counts the number of flares for the month.
Sta	Station name abbreviation. Blank unless only one flare report is assigned to the group. Station name abbreviations appear in the individual station reports.
Day	Earliest day of reported flare event.
Start (UT)	Earliest Universal Time of flare onset reported within a group (earliest time without a letter qualifier). If all start times have a letter qualifier, then the letter used here is from the earliest time. When a group contains two or more flares, a single digit immediately following the onset time gives the spread among start times. For example, "13245" means that the start times ranged between 1324 and 1329; an asterisk instead of a number in the last column implies a spread exceeding 9 minutes.

The letter E after a start time indicates that the flare began earlier than the tabulated time; the letter U means uncertain.

Max (UT) Earliest Universal Time within group that flare reached maximum brightness (earliest time without a letter qualifier). If all maximum times have a letter qualifier, then the letter used here is from the earliest time. The letter U following a maximum time stands for uncertain.

End (UT) Average of flare end times that have no letter qualifier. If all end times are qualified, then the latest end time and its letter qualifier are used. The letter D following an end time means that the flare ended after the tabulated time; the letter U indicates uncertainty.

Lat CMD Average heliographic latitude and average heliographic central meridian distance. These two coordinates mark the mean center of mass of the flaring region at its time of maximum brightness.

NOAA/ USAF Region Serial number of active region in which the flare occurred. The National Oceanic and Atmospheric Administration (NOAA) assigns a number to each region, in cooperation with the network of observatories operated by the U.S. Air Force (USAF). Flare reports are matched to these numbered regions.

CMP Mo Day Central meridian passage date--the month, the day, and the fraction of day that the flare's position either crossed or would have crossed the sun's central meridian of longitude.

Dur (Min) Duration of the flare in minutes. The letter D following a duration means that the flare lasted longer than the number of minutes shown.

Imp Opt Average optical importance of flare--a measurement of flare size and brilliance. The first character in the importance ranks the area of the brightened plage on a 5-level scale; the second character grades the plage brilliance on a 3-level scale. See the table below. Under this classification scheme, an Sf event is the smallest and faintest kind of flare, and a 4b event is the largest and brightest.

Imp	Flare Area Actual*	Flare Area Apparent*	Flare Brilliance
S	$A \le 2.0$	$A < 200$	f,n,b**
1	$2.1 \le A \le 5.1$	$200 \le A < 500$	f,n,b
2	$5.2 \le A \le 12.4$	$500 \le A < 1200$	f,n,b
3	$12.5 \le A \le 24.7$	$1200 \le A < 2400$	f,n,b
4	$A \ge 24.7$	$A > 2400$	f,n,b

*Actual area in units of square degrees. Apparent area in millionths of solar disk.

**f=faint, n=normal, b=bright

We compute the average optical importance of a flare by substituting numeric values for the area and the brilliance rankings of each report and calculating the arithmetic mean of each part. The mean of the area classes and the mean of the brightness classes are then converted to their respective 5- and 3-level scales.

Imp X-ray Importance of flare at X-ray wavelengths--the peak flux measured at Earth in the 1-to-8 Angstrom range in units of Watts/sq meter. The letters C, M and X stand for powers of 10: C denotes the power 10 to the -5, M the power 10 to the -4, and X any power greater than 10 to the -4.

Digits from 1.0 to 9.9 following C, M, and X act as multipliers. For example, C3.2 stands for an X-ray burst with a maximum flux of 3.2 x 10E-5 Watts/sq meter.

See Seeing conditions--a measurement of the stability of the atmosphere above the observing site. One means poor, 2 fair, and 3 good. Observatories at Athens, Learmonth, Holloman, Palehua and Ramey use a 1-to-5 scale. The seeing conditions appear in the group-line only when the group contains a single report.

Obs Type Type and completeness of observations--included only when a group contains a single report. The letter under this heading describes the form of the measurements and their continuity according to the following code:

C for either a complete or nearly complete CINEMATOGRAPHIC sequence;
P for a PHOTOGRAPHIC sequence with either a few photos or only one;
V for either a complete or nearly complete VISUAL record; and
S for only a fragmentary visual record.

AREA MEASUREMENT

Time (UT) The Universal Time of measurement of the tabulated flare area--given if group contains only one flare.

Appar (Disk) Average apparent (projected) area at time of maximum brightness--expressed in millionths of the area of the solar disk. Maximum plage brightness and maximum plage area do not necessarily occur simultaneously. If the reported areas scatter by more than a factor of two, no area appears under this column heading.

Corr (Sq Deg) Average apparent area corrected for foreshortening and expressed in units of square degrees.

Remarks Each letter of the alphabet stands for one of the noteworthy conditions listed below. The group-line contains an alphabetically sorted collection of all remarks listed with the individual flare reports.

A = Eruptive prominence < 90° from the central meridian.
B = Probably the end of a more important flar
C = Invisible 10 min earlier.
D = Brilliant point.
E = Two or more brilliant points.
F = Several eruptive centers.
G = No visible spots nearby.
H = Flare accompanied by high-speed dark filament.

I = Active region very extended.
J = Distinct variations in plage intensity before or after flare.
K = Several intensity maxima.
L = Existing filaments suddenly active.
M = White-light flare.
N = Continuous spectrum shows polarization effects.
O = Observations made in H and K lines of calcium II.
P = Flare shows helium D3 in emission.
Q = Flare shows Balmer continuum in emission.
R = Asymmetry in H-alpha line suggests high-speed mass ejection.
S = Brightness followed filament disappearance in same position.
T = Region active all day.
U = Two bright branches, parallel or converging.
V = An explosive phase: important expansion in about 1 min that often includes a significant intensity increase.
W = Great area increase after time of maximum brightness.
X = Unusually wide H-alpha line.
Y = System of loop prominences.
Z = Major sunspot umbra covered by flare.

The table below lists the solar flare observatories presently cooperating in the international data exchange through the World Data Centers as originally established during the International Geophysical Year. For each observatory are given the four letter station code, the geographic latitude and longitude, the observation type as defined above, and the station name and country.

CONTRIBUTING SOLAR FLARE OBSERVATORIES

Sta Code	Geographic Lat	Long	Obs Type	Name
ABST	42N	43E	C	Abastumani, USSR
ATHN	38N	24E	V	Athens, Greece
BUCA	44N	26E	P	Bucharest, Rumania
CATA	38N	15E	C	Catania, Sicily, Italy
CULG	30S	150E	C	Culgoora, N. S. W., Australia
HTPR	44N	6E	C	Haute Provence, France
HOLL	32N	254E	C	Holloman AFB, New Mexico, USA
ISTA	41N	32E	P	Istanbul, Turkey
KANZ	47N	14E	C	Kanzelhoehe, Austria
KHAR	49N	37E	P	Kharkov, Ukraine, USSR
LEAR	22S	114E	C	Learmonth, Australia
LVOV	50N	24E	CV	Lvov, Ukraine, USSR
MANI	15N	121E	V	Manila, Rep. of the Philippines
MITK	34N	140E	C	Mitaka, Tokyo, Japan
PALE	21N	202E	C	Palehua, Hawaii, USA
PEKG	40N	116E	P	Peking, People's Rep. of China
PURP	32N	119E	C	Purple Mt, People's Rep.of China
RAMY	18N	293E	C	Ramey Air Base, Puerto Rico
TACH	41N	69E	CP	Tashkent, Uzbek, USSR
URUM	44N	87E	C	Urumqi, People's Rep. of China
VORO	43N	132E	CPV	Voroshilov (Ussurisk), USSR
WEND	48N	12E	C	Wendelstein, German Federal Rep.
YUNN	25N	103E	C	Yunnan, People's Rep. of China

Patrols -- Following the table, a graph of the intervals of no flare patrol for all the observatories included in the total patrol is given. The graph is divided into cinematographic and visual patrols. The dark areas at the bottom half of each day are time of no cinematographic patrol. The dark areas at the top half of the day are times of neither visual nor cinematographic patrol.

SOLAR RADIO WAVES (C.3)

Outstanding Occurrences -- Solar radio emission bursts at fixed frequencies are reported by the worldwide network of observing stations. By the sixth month following observation, all reports have been received and the data are then published in table form in Solar-Geophysical Data.

The code name used in this publication to identify the station, its alternate station names, if appropriate, the geographic coordinates, and frequencies in MHz on which the station reports are given in the table on page 39.

In the data presentation, bursts reported from different observing stations are joined by brackets when they occur near the same time. Each set of brackets may not always include all of the solar event. The frequency in the MHz precedes the abbreviated station name. Following the name is given the type of event. The Type consists of two columns. The first column is the morphological SGD numerical code which has been used in Solar-Geophysical Data, and the second column is the letter symbol for easier recognition of type. The use of the letter symbol began with the January 1975 data. In the case of OTTA and PENT observations, letters are sometimes appended to the SGD numerical code. See page 40 for explanations. For each event start and maximum phase in UT, duration in minutes, and peak and mean flux densities in $10^{-22} Wm^{-2} Hz^{-1}$ are listed. The letter "E" after the starting time indicates that the event began before the time listed. A "U" after any time denotes an uncertainty in the measurement. A "D" denotes the burst lasted longer than indicated. Information on polarization, positions and other remarks are included in the final column.

Both the tables and illustrations prepared by H. Tanaka, as a part of the Instruction Manual for Monthly Report, and a table of definitions with a page of illustrations prepared by A. Covington are included here. It is felt that though the meanings are essentially the same, the two viewpoints may aid experimenters in interpreting how the symbols are assigned to bursts by various observatories. Two possibly confusing items seem to remain. Covington feels those GRF bursts with obvious flat tops are a new type of burst best listed under 27(RF) rather than with the GRF symbol since it is also defined as more or less regular rise and fall of continuum with long duration. The illustration of the 10-cm wavelength "Group" with the letter code "SER" may also prove confusing as Covington feels it should rightfully be listed with the SGD number code 41 rather than 42(SER).

The modifications appended to the SGD numerical code for Ottawa and Penticton observations are given here as explained by A.E. Covington, National Research Council, Canada. The letter A added to a Simple event recognizes the longest duration event superimposed upon a long duration event. The use of A enables a marginal line to be placed against the entry for the start and extended to include the superimposed events. The presence of unlisted fluctuations or variations which slightly modify the basic form are denoted by the letter F added to the SGD numerical code for the event so modified. Records observed simultaneously at widely separated stations have led to the recognition of unique variations of small intensity such as the

Rise Only event (which can sometimes be regarded as a discontinuity in the daily level), the absorption only event, the GRF of great duration, isolated events or short duration or spikes, and a single cycle of a sinusoid. Clarification of some of the profiles follows. To identify Rise Only encode as 240, and to identify the Post Rise enhanced level following the rise encode as either 24P or 25P. Typical profiles based upon the new IAU letter symbols and the modifications suggested are shown in idealized form in the Figure on page identified by the SGD numerical code and underlined letters. The various systems are related as indicated by the key to the figures.

In the Descriptive Texts published before 1975 details were given concerning equipment used at Western Hemisphere observatories. Although these are no longer included in the text, information concerning equipment and data reduction may be obtained from the World Data Center A for Solar-Terrestrial Physics or from the observatories.

Explanation of letter symbols:
Basically, microwave bursts can be classified into the following types:

- S = Simple: Mostly nonthermal 'microwave impulsive burst' or 'decimetric burst' (see p.).
- C = Complex: Combination of a few or many simple bursts.
- F = Fluctuation: Minor C sometimes superposed in the main burst.
- GB = Great Burst: Major C of special importance.
- PRE = Precursor: Preburst activity connected to the main burst.
- PBI = Post Burst Increase: Tail of the main burst which may be regarded as enhancement of S-component.
- GRF = Gradual Rise and Fall: Temporal enhancement of S-component or similar activation in the flaring region. It may sometimes start with relatively sharp rise like a simple burst. If this sharp rise can be clearly recognized as simple burst, GRF becomes PBI. Note that both have similar characteristics.
- ABS = Absorption: Absorption due to surge-like material mainly appears after the burst and is sometimes called post-burst decrease. This phenomenon may occur frequently, but it can only be recognized when the flux comes down to preburst level. Temporal fall of flux which is sometimes called negative burst may be listed as ABS, but it may simply be the temporal fall of emission.

The following three symbols are simply morphological, which may be necessary due to limited observation time, or for the simplicity of tabulation:

- R = Rise: This may also occur as the onset of long-enduring enhancement of S-component associated with other solar events.
- FAL = Fall
- SER = Series of Bursts

On dm-m-Dm wavelength range, most of the events may be C with F, GB, and PRE as more specific descriptions. The following two symbols were prepared for this range:

- NS = Noise Storm
- RF = Rise and Fall: Defined as more or less irregular rise and fall of continuum with duration of the order of minutes to an hour.

S, FAL and SER may also be used.

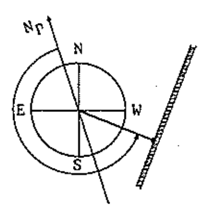
These types are illustrated in these tables in which samples from different sources are compared.

Polarization information is denoted by the letters R (right-handed) or L (left-handed). The degree of polarization in percent is shown in two digits. When precise values are not available, the degree of polarization is expressed in symbols W = weak, M = moderate or S = strong. For example, 83R means 83% right-hand polarization, and SL means strong left-hand polarization.

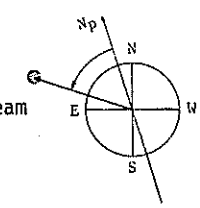
Positional information is indicated by the letters F (fan-beam) or P (pencil-beam). Position angle is shown in the first three digits, and radial distance is shown by the following three digits. For example, 135120F means -- position angle = 135°, radial distance = 120% of solar radius observed by fan beam.

A **Selected Bibliography with Comments Related to Evolution of Burst Profiles at 2700-2800 MHz** has been compiled by A.E. Covington. A copy can be made available, on request, from the World Data Center A for Solar-Terrestrial Physics.

Fan Beam



Pencil Beam



SOLAR RADIO OBSERVATORIES
(FIXED FREQUENCY OBSERVATIONS)

CODE NAME	STATION	ALTERNATE NAME	GEOGRAPHIC LAT	LONG	FREQUENCIES REPORTED (MHZ)
ATHN	Athens, Greece		38N	24E	8800, 4995, 2695, 1415
BERN	Berne, Switzerland	Bumishus	47N	07E	92500, 50000, 35000, 19600, 11800, 8400, 5200, 3100
BORD	Bordeaux, France		44N	03E	930
CRIM	Simferopol, USSR	Crimea	44N	34E	3100
GORK	Gorky, USSR	Zimenki	56N	44E	9100, 2950, 950, 650, 200, 100
HIRA	Hiraiso, Japan		36N	140E	500, 200, 100
HUAN	Huancayo, Peru		12S	75W	9400
IZMI	Moscow IZMIRAN, USSR	Krasnaja Pakhra	55N	37E	204
KISV	Kislovodsk, USSR		43N	42E	15000, 6100
KRAK	Krakow, Poland		50N	19E	810, 430
LEAR	Learmonth, Australia		22S	114E	15400, 8800, 4995, 2695, 1415, 606, 410, 245
NOBE	Nobeyama, Japan		36N	138E	80000, 35000, 17000
ONDR	Ondrejov, Czechoslovakia		49N	14E	808, 536, 260
OTTA	Ottawa, Canada	Algonquin	45N	78W	2800
PALE	Palehua, Hawaii, USA		21N	158W	15400, 8800, 4995, 2685, 1415, 610, 410, 245
PEKG	Peking, People's Republic of China	Beijing	40N	116E	9395, 2840
PENT	Penticton, Canada		49N	119W	2695
POTS	Potsdam, German Democratic Republic	Tremsdorf	52N	13E	9500, 3000, 1470, 234, 113, 68, 30
SAOP	Sao Paulo, Brazil	Itapetinga	23S	46W	7000
SGMR	Sagamore Hill, Massachusetts, USA		42N	71W	15400, 8800, 4995, 2695, 1415, 609, 410, 245
SVTO	San Vito, Italy		41N	18E	15400, 8800, 4995, 2695, 1415, 610, 410, 245
TORN	Torun, Poland		53N	19E	127
TRST	Trieste, Italy		46N	14E	408, 327, 237
TYKW	Toyokawa, Japan		34N	137E	9400, 3750, 2000, 1000
UPIC	Upice, Czechoslovakia		50N	16E	33, 29
VORO	Voroshilov, Maritime Territory, USSR	Ussurisk	43N	132E	2930
YUNN	Yunnan, People's Republic of China		25N	103E	3653, 2902

Event Types According to the Instruction Manual for Monthly Report
(prepared by H. Tanaka for ICSU-STP-IAU)
The key for identifying types of event by numerical SGD code and letter symbol.

SGD Code	New Letter Symbol	Morphological Classification	URANO Code	Remarks
1	S	Simple 1	1	
2	S/F	Simple 1	1	S + F
3	S	Simple 2	1	
4	S/F	Simple 2F	1	S + F
5	S	Simple	1	
6	S	Minor	0	Defined as simple rise and fall of minor burst with duration 1 or 2 minutes.
7	C	Minor+	0	Defined as minor burst with second part.
8	S	Spike	1	Self-evident by duration.
20	GRF	Simple 3	1	
21	GRF	Simple 3A	1	"A" means underlying. Clearly superposed burst is to be listed separately, but separation is sometimes difficult and arbitrary. In such cases list as C.
22	GRF	Simple 3F		Fluctuations of short periods should be listed separately.
23	GRF	Simple 3AF	1	
24	R	Rise	8	
25	R	Rise A	8	
26	FAL	Fall		
27	RF			
28	PRE	Precursor		
29	PBI	Post Burst Increase	2	
30	PBI	Post Burst Increase A	2	
31	ABS	Post Burst Decrease		
32	ABS	Absorption		
40	F	Fluctuations	4	
41	F	Group of Bursts	4	A group of minor bursts close to each other.
42	SER	Series of Bursts	4	A series of bursts occur intermittently from base level with considerable time intervals between bursts.
43	NS	Onset of Noise Storm	7	To be listed with starting time, and duration with symbol D.
44	NS	Noise Storm in Progress	7	Starting time with symbol E, and duration with symbol D.
45	C	Complex	3	
46	C	Complex F	3	
47	GB	Great Burst	3	
48	C	Major	5	Defined as complex variation of intensity with large amplitude.
49	GB	Major+	6	Major increase of flux with duration greater than 10 min.

Covington Additions to Tanaka's Proposed IAU Key

SGD Code	New Letter Symbol	Morphological Classification	Remarks
1A	S	Simple 1A	Single simple burst any duration and intensity. Event separable from other superimposed bursts.
3A	S	Simple 2A	
21A	GRF	Simple 3A GRF	
2A	S/F	Simple 1AF	Single simple burst any duration and intensity. Event separable from other superimposed bursts. Unlisted minor departures and fluctuations.
4A	S/F	Simple 2AF	
240	R	Rise only	Discontinuity in daily level without observed restoration, any cause.
240F	R	Rise only F	With unlisted fluctuations.
24P	R	Post Rise	Post Rise enhanced level.
24PF	R	Post Rise F	Post Rise enhanced level with unlisted fluctuations.
26A	FAL	Fall A	Fall with listed superimposed event.
260	FAL	Fall Only	Fall only as discontinuity in daily level.
26F	FAL	Fall F	Fall with unlisted minor fluctuations.
27F	RF	Rise and Fall F	Rise and Fall with unlisted minor variations and fluctuations.
27AF	RF	Rise and Fall AF	Rise and Fall with listed superimposed events and unlisted minor variations and fluctuations.
31A	ABS	P.B. Decrease A	Post Burst Decrease with listed superimposed event.
32A	ABS	Absorption A	Absorption with listed superimposed emissive event.
46F	C	Complex F	Complex event with fluctuations.

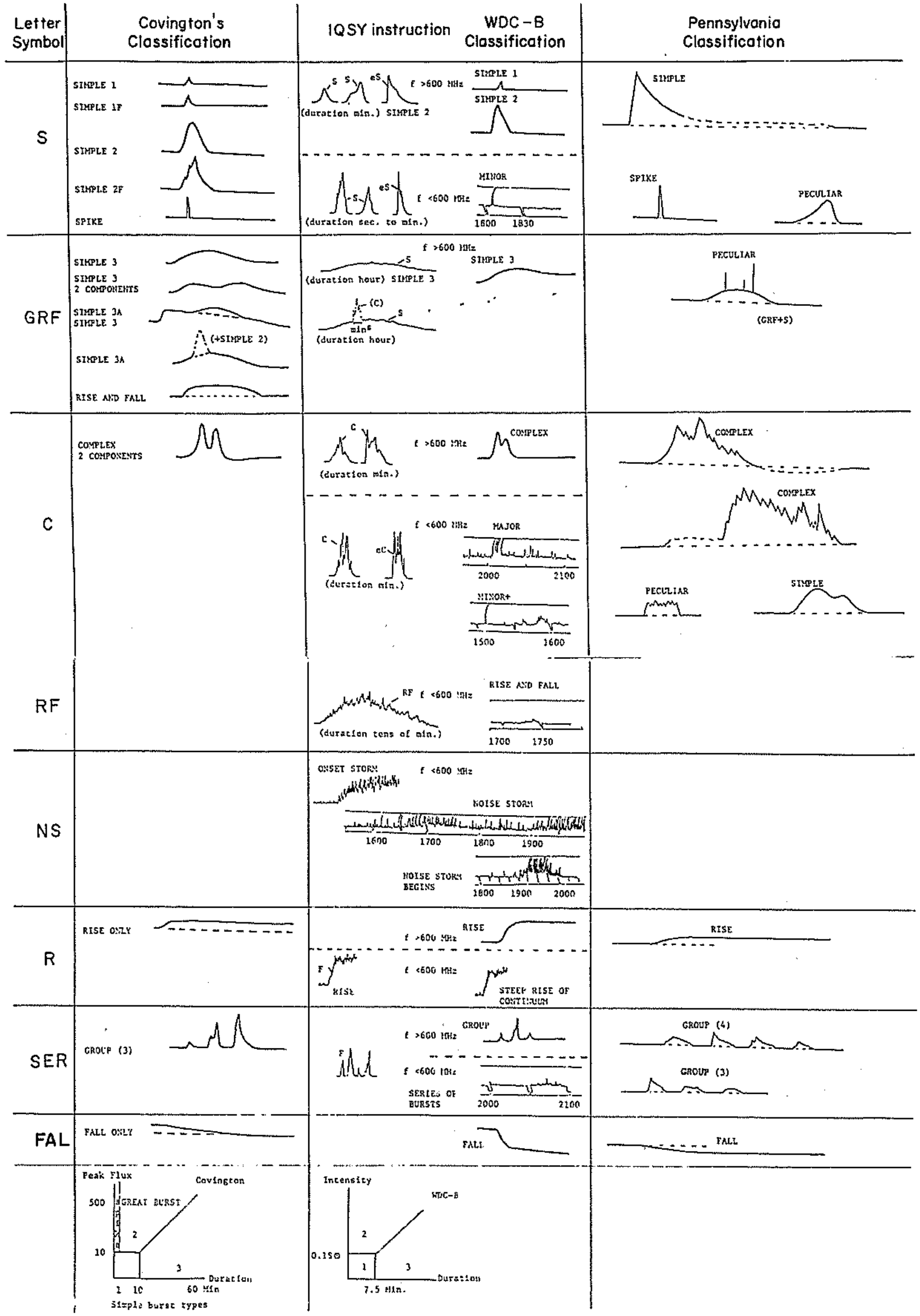
The U.S. Air Weather Service RSTN observatories (Sagamore Hill, Learmonth, Palehua, and San Vito) report event types using only the following nine morphological classifications:

RSTN Burst Type		SGD Translation		
01	Noise storm or fluctuations	43	NS	if start time exact or uncertain;
		44	NS	if start time is "in progress".
02	Rise and Fall (non-impulsive)	20	GRF	(impossible to distinguish between the four types of Simple 3 bursts).
03	Simple impulsive (<50 sfu)	8	S	if duration $\leq$ 2 min;
		4	S/F	otherwise.
04	Impulsive ($\geq$50 sfu but <500 sfu)	8	S	if duration $\leq$ 2 min;
		46	C	if more than one peak flux reported;
		4	S/F	otherwise.
05	Great burst ($\geq$500 sfu)	48	C	if duration $\leq$ 10 min + more than one peak reported;
		49	GB	if duration $\geq$ 10 min + more than one peak reported;
		47	GB	otherwise.
06	Castelli U	49	GB	
13	Complex (<50 sfu)	45	C	
14	Complex ($\geq$50 but <500 sfu)	46	C	
15	Complex great ($\geq$500 sfu)	48	C	

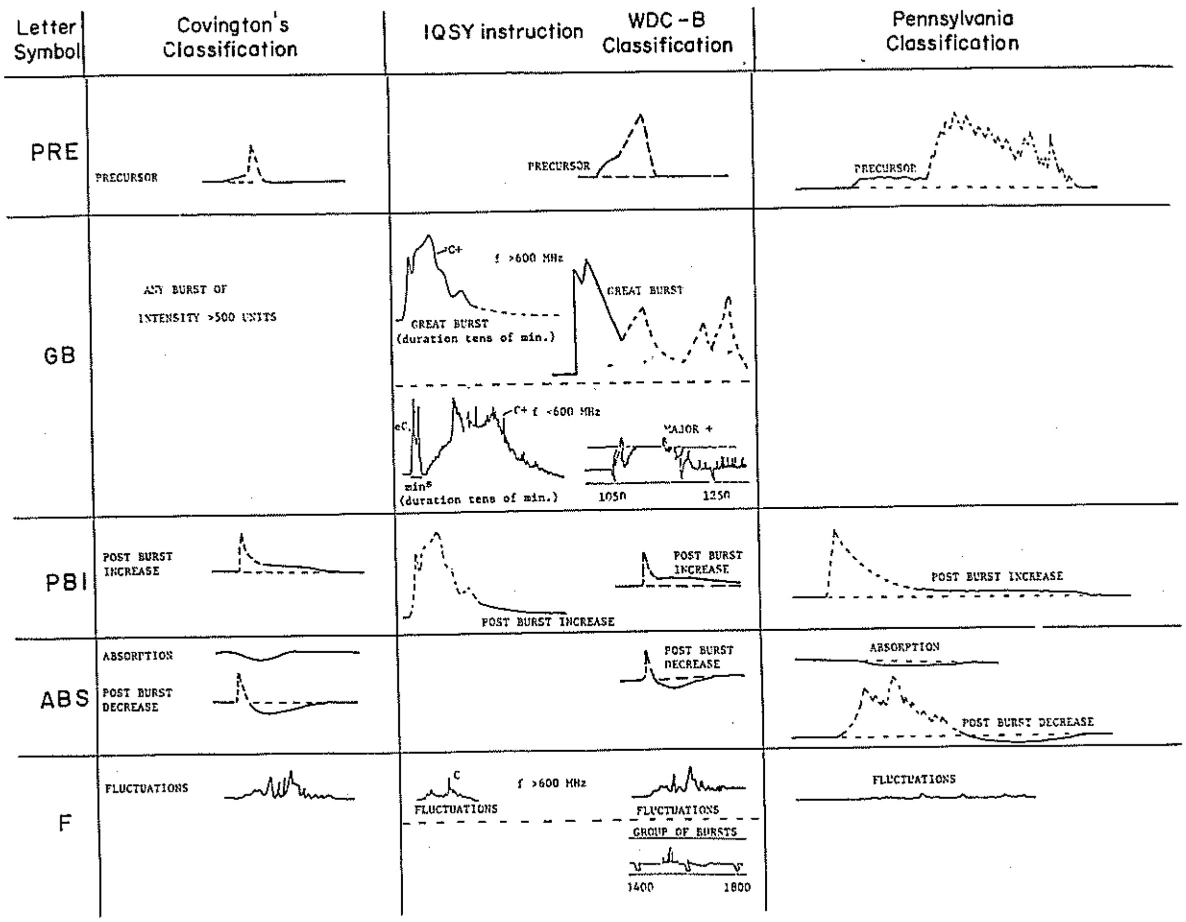
Bursts are reported on any given frequency only when they exceed 15 sfu. RSTN station reports include quality (QL), Status (ST) and Type (TYP) in the remarks column. Quality ranges from 1 to 6 where 1 is poor and 6 is excellent.

Status:
- 1 = Real time
- 2 = Final
- 3 = Correction
- 4 = Deletion

Type :
- 1 = Noise storm
- 2 = Rise in base level
- 3 = Minor
- 4 = Group
- 5 = Major
- 6 = Major plus
- 7 = Castelli U-type burst

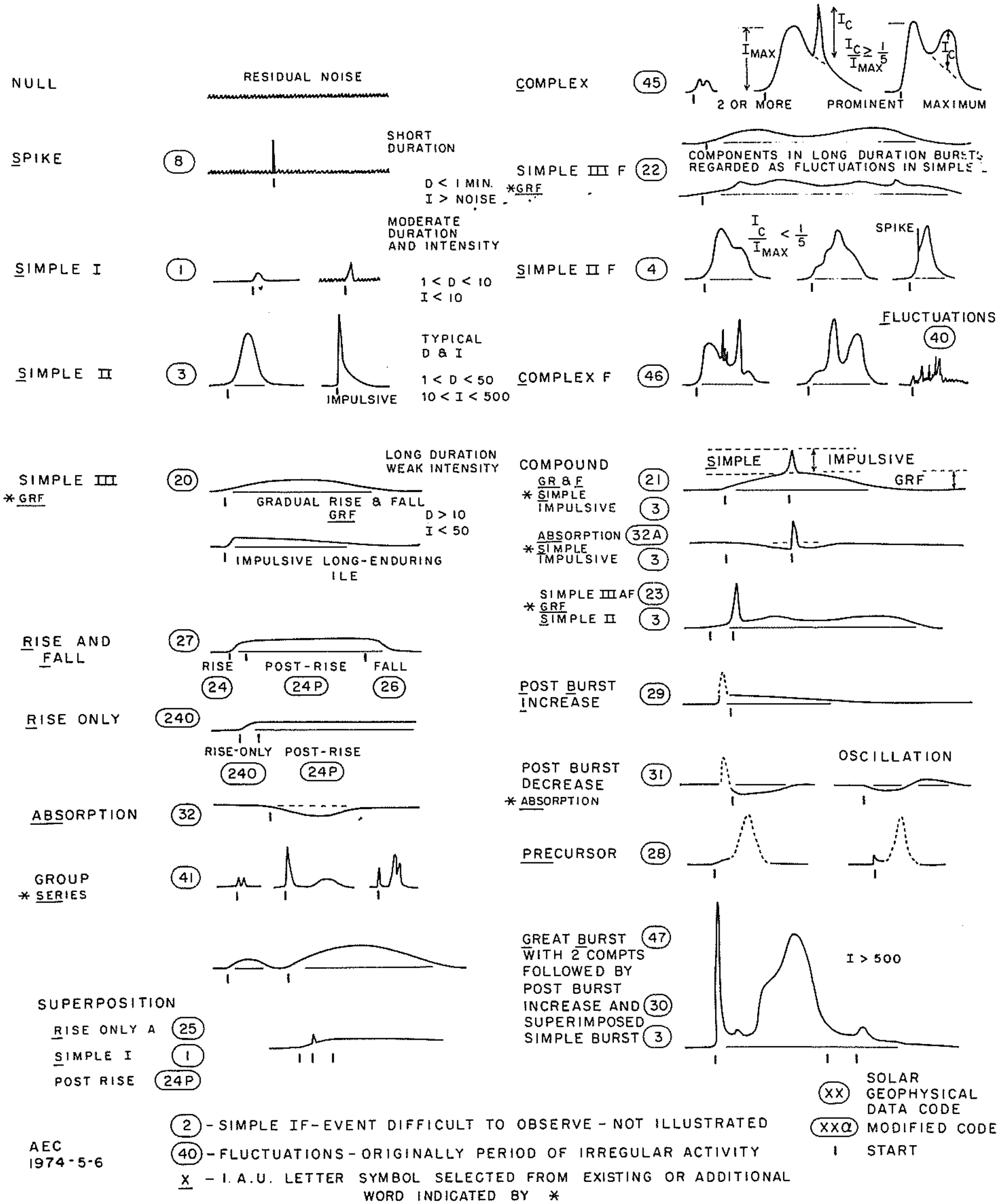


Letter Symbol
Covington's Classification
IQSY instruction
WDC-B Classification
Pennsylvania Classification
S
SIMPLE 1
SIMPLE 1F
SIMPLE 2
SIMPLE 2F
SPIKE
f >600 MHz
(duration min.) SIMPLE 2
f <600 MHz
(duration sec. to min.)
MINOR
1800
1830
SIMPLE
SPIKE
PECULIAR
GRF
SIMPLE 3
SIMPLE 3 2 COMPONENTS
SIMPLE 3A SIMPLE 3
(+SIMPLE 2)
SIMPLE 3A
RISE AND FALL
(duration hour) SIMPLE 3
(C)
(duration hour)
(GRF+S)
C
COMPLEX 2 COMPONENTS
(duration min.)
COMPLEX
MAJOR
2000
2100
MINOR+
1500
1600
RF
RISE AND FALL
(duration tens of min.)
1700
1750
NS
ONSET STORM
NOISE STORM
1600
1700
1800
1900
NOISE STORM BEGINS
2000
R
RISE ONLY
RISE
STEEP RISE OF CONTINUUM
SER
GROUP (3)
GROUP
SERIES OF BURSTS
GROUP (4)
FAL
FALL ONLY
FALL
Peak Flux
Covington
500
GREAT BURST
10
Duration
1
60 Min
Simple burst types
Intensity
WDC-B
0.15⊙
7.5 Min.



Letter Symbol
Covington's Classification
IQSY instruction
WDC-B Classification
Pennsylvania Classification
PRE
PRECURSOR
PRECURSOR
PRECURSOR
GB
ANY BURST OF
INTENSITY >500 UNITS
C+
f >600 MHz
GREAT BURST
(duration tens of min.)
GREAT BURST
C+ f <600 MHz
MAJOR +
min
(duration tens of min.)
1050
1250
PBI
POST BURST INCREASE
POST BURST INCREASE
POST BURST INCREASE
POST BURST INCREASE
ABS
ABSORPTION
POST BURST DECREASE
POST BURST DECREASE
ABSORPTION
POST BURST DECREASE
F
FLUCTUATIONS
C
f >600 MHz
FLUCTUATIONS
FLUCTUATIONS
GROUP OF BURSTS
1400
1800
FLUCTUATIONS

2800-2700 MHz
SOLAR BURST PROFILES



ENERGETIC SOLAR PARTICLES AND PLASMA (A.12e, A.13e)

A series of data plots are presented using data obtained on the NASA spacecraft IMP 8 and through September 1978 on IMP 7. The purpose of the plots is to convey on as near continuous a basis as possible the state of the interplanetary particle environment. The plots consist of hourly averaged solar wind plasma parameters and representative fluxes of energetic electrons, protons, and alpha particles.

Plasma plots are generated at MIT. Energetic particle flux plots are generated at the National Space Science Data Center (Code 601, Goddard Space Flight Center, Greenbelt, MD 20772 USA) from machine sensible hourly averaged fluxes given in $(cm^2\ sr\ s\ MeV/n)^{-1}$ provided by several experimental groups. Updated composite magnetic tapes are available at NSSDC, as are 35-mm microfilm flux plots with standard International Magnetosphere Study scalings.

IMP 7 (Explorer 47, IMP H) was launched into a near-circular geocentric, ~12 day, orbit at 30-40 R_E on September 23, 1972. IMP 8 (Explorer 50, IMP J) was launched on October 26, 1973, into a similar orbit. The two spacecraft were instrumented to measure the plasmas, fields, and energetic particle fluxes found in the interplanetary medium and in the distant magnetosheath and magnetotail. The relative orbital phase of the two spacecraft evolved such that the percent of each 12-day period during which at least one spacecraft was in the interplanetary medium was 100% until mid-1975, decreased to a minimum of about 65% near January 1976, and returned to 100% in late 1976. IMP 7 was deactivated in October 1978.

Due to the relatively large number of flux plots, multiple traces are graphed on individual frames. Accordingly, the statistical error bar associated with each data point is omitted in order to maximize cleanliness of plot. To compensate for this, only data points with statistical uncertainties of about 20% or less are plotted. As this corresponds to 25 counts ($1/\sqrt{25} = 20\%$), averages of hourly fluxes are taken over a sufficient number of hours to assure that the longer term averaged flux corresponds to at least 25 incident particles. In this process it is assumed that during each hour for which a flux is given, the instrument was counting for a full 60 minutes. This assumption is rarely significantly in error, and, after the first two months of data submission, only data for hours during which at least 30 minutes of counting occurred were provided to NSSDC. Such >1-hour - averaged fluxes are plotted as a series of apparent hourly fluxes of the common value. The reader is cautioned against interpreting such a series of apparently constant flux values as representing a physically real time independence in the flux level.

In order to preserve particle event onset-time information low flux averages are terminated whenever the flux for a single hour exceeds that associated with 50 counts.

Data gaps in the data are distinguished by the lack of connecting lines between data points.

The purpose of the IMP data plots is to convey on as near continuous a basis as possible the state of the interplanetary particle environment. As such, IMP 7 and IMP 8 data have been interspersed for the Caltech and JHU/APL modes. Such an interspersal is not feasible for the U. of Maryland mode due to a disparity in energy windows, and is not required for the U. of Chicago and GSFC modes due to the negligible magnetotail modulation of the high rigidity particles involved in these modes.

Plasma plots contain data only for hours during which the appropriate spacecraft was beyond the Earth's bow shock. These interplanetary identifications are made by a visual inspection of preliminary data plots at MIT. On the two lowest energy proton plots, fluxes obtained in the magnetotail during hours when no interplanetary values are available are distinguishable. For only the 0.16 - 0.22 MeV protons is there a significant probability that the fluxes so plotted will be significantly different than the interplanetary fluxes. Predicted times of model bow shock crossings are used for these energetic proton plots.

Plasma Data -- Hourly averaged plasma parameters (bulk speed, proton number density, most probable thermal speed), determined from the MIT plasma experiments on IMP 8, are provided by the Space Plasma Group, Massachusetts Institute of Technology, Center for Space Research. The instrument is a split-collector, modulated-grid Faraday cup designed to measure the positive ion component of the solar wind. Particle fluxes in eight contiguous energy channels chosen automatically to contain the peak of the solar wind are measured every 30 seconds (IMP 8). Full azimuthal coverage is obtained by rotation of the spacecraft. The hourly averages are based on plasma parameters computed by fitting the observations to a convected, isotropic Maxwellian proton velocity distribution function. The error bars on each plotted data point indicate the standard deviation of the data contributing to the hourly average. Note that the thermal speed plot has scales for thermal speed (left side) and temperature (right side). The two are related by $V_{thermal} = \sqrt{2kT/m_p}$ since the most probable speed is calculated.

Energetic Particle Data -- The sources and some characteristics of the energetic particle data are summarized in Table 1. The geometric factors are in some cases average values over the indicated energy ranges. Neglect of energy dependence in geometric factors leads to an error whose magnitude depends on sensor geometry and ambient particle spectrum. Thus for the highest energy proton mode which uses a noncurved, relatively thick sensor, a flux 5% too high is found for an E^{-4} spectrum. Typically, smaller errors are made for other modes.

TABLE 1

SPECIES	ENERGY (Mev/n)	GEOMETRIC FACTOR (cm^2 ster)	MULTI-PARAMETER ANALYSIS?	SOURCE
Electrons	1-5	0.07 to 1.6 (see text)	yes	Caltech.
Protons	0.16-0.22	0.03	no	U. of Md.
Protons	0.97-1.85	1.51	no	JHU/APL
Protons	4.0-12.5	0.07 or 0.23 (see text)	yes	Caltech.
Protons	13.7-25.2	0.32	yes	JHU/APL
Protons	19.8-40.1	3.13	yes	GSFC
Protons	40.1-81.8	2.68	yes	GSFC
Alphas	11-20	2.05	yes	U. Chicago
Alphas	20-25	2.05	yes	U. Chicago
Alphas	25-90	2.05	yes	U. Chicago

The "Multi-Parameter Analysis?" column indicates whether multi-parameter analysis (typically dE/dx vs. E) is used in flux determination. Such analysis permits unambiguous identification of particle species [see, for example, discussion in Garcia-Munoz et al., Astrophys. J., 184, 967, 1973] but is generally not feasible for particles which have insufficient energy to penetrate one sensor and reach a second sensor. As discussed below, however, an attempt has been made to remove the nonproton component from the 0.97 - 1.85 MeV proton fluxes.

Fluxes in units of $(cm^2\ sr\ s)^{-1}$ have been obtained by folding together count rates, geometric factors, and, where appropriate, pulse height analysis data. These fluxes are then divided by the width of the energy window to yield the differential fluxes plotted. The ratio of these average differential fluxes to the "true" differential flux at the midpoint of the energy range E_1 to E_2, is indicated in Table 2 for E^{-n} spectra and for $R = E_2/E_1$. Alternatively, one can ask at what energy within the E_1 to E_2 interval is the true differential flux equal to the average differential flux. The ratio of this energy $[(n-1)\ (E_2-E_1)/\ (E_1^{1-n}-E_2^{1-n})]$ to the midpoint energy $[1/2(E_1 + E_2)]$ is given in Table 3. It is clear from these tables that great care must be used when obtaining spectral parameters from fluxes resulting from wide energy windows at times of steep spectra.

TABLE 2

RATIO OF AVERAGE TO TRUE DIFFERENTIAL

FLUX AT MIDPOINT OF ENERGY INTERVAL

n \ R	1.3	1.6	2	3
0.5	1.0021	1.0068	1.0146	1.0353
2	1.0173	1.0563	1.1250	1.3333
5	1.0893	1.3110	1.7798	3.9506

TABLE 3

RATIO OF ENERGY AT WHICH TRUE FLUX =

AVERAGE FLUX TO MIDPOINT ENERGY

n \ R	1.3	1.6	2	3
0.5	.9957	.9865	.9714	.9330
2	.9914	.9730	.9428	.8660
5	.9830	.9473	.8912	.7598

The 1-5 MeV electron data and 4.0-12.5 MeV proton data are obtained from telescopes consisting of eleven fully depleted silicon detectors surrounded by a plastic scintillator anticoincidence cup. These data are provided by E.C. Stone, R.E. Vogt, R.A. Mewaldt, and co-workers at the California Institute of Technology. During most times, the electron fluxes result from a "wide geometry" mode (effective geometric factor = 1.5 cm^2 sr for IMP 8), although for times of large solar particle fluxes, a "narrow geometry" mode is used (effective geometric factor = 0.23 cm^2 sr for IMP 8). Electron fluxes have been corrected for secondary electrons produced by the interaction of gamma rays in the detector stack. (This background flux is separately monitored by the instrument.) Periods during which magnetospheric electrons seriously contaminate the observed 1-5 MeV electron fluxes have been identified and eliminated by analysis of 0.2-1.0 MeV electron fluxes. Plotted proton fluxes result from a mode having geometric factors of 0.23 cm^2 sr on IMP 8. Illustrations and further descriptions of the instruments can be found in Hurford et al. [Ap. J., 192, 541, 1974], and in Mewaldt et al. [Ap. J., 205, 931, 1976].

The 0.16-0.22 MeV proton fluxes are provided from a University of Maryland experiment flown on IMP 8. They are obtained from an electrostatic analyzer in which incident particles are deflected by an applied electric field by an amount dependent on their energy/charge ratio. The deflected particles are then counted by a series of surface-barrier detectors positioned to measure particles having experienced various amounts of deflection. The flux as plotted results from the counting rate of one of these sensors and consists of:

(1) 0.16-0.22 MeV ambient protons,
(2) ambient Helium and heavier ions which generally do not exceed 10% of the proton component,
(3) a background flux level of 90 particles per cm^2 sr s MeV caused by interactions of galactic cosmic rays in the spacecraft, and
(4) during times of intense fluxes of high energy particles, a complicated time-variable background.

This last component may be particularly important in the onset phase of solar flare particle events. For further details on the instrument, see Tums et al. [IEEE Trans. Nuc. Sci., NS-21, 1, 210, 1974].

The University of Maryland data are provided by G. Gloeckler, C.Y. Fan (University of Arizona), D. Hovestadt (Max-Planck Institute), F. Ipavich and co-workers.

The 0.97-1.85 MeV and 13.7-25.2 MeV proton fluxes are provided from an experiment of the Johns Hopkins University/Applied Physics Laboratory. They are obtained from a telescope consisting of three colinear sensors (two surface-barrier totally depleted detectors followed by a lithium-drifted detector) surrounded by a plastic scintillator anticoincidence cup. The 0.97-1.85 MeV proton fluxes correspond to particles stopping in the first sensor; hence standard dE/dx - E analysis is not possible. However, ratios of proton to alpha particle fluxes and alpha particle to medium nuclei fluxes measured at slightly higher energies have been used to estimate the magnitude of, and to eliminate, the nonproton component of this 0.97-1.85 MeV proton mode. In the 13.7-25.2 MeV channels, background effects are significant for ambient fluxes below 10^{-3} $(cm^2\ sr\ s\ MeV)^{-1}$. As such, only fluxes above this amplitude are plotted. These data are provided by S.M. Krimigis and T.P. Armstrong (University of Kansas). Further details on the instrument and on data analysis techniques may be found in Sarris et al. ["Observations of Magnetospheric Bursts of High Energy Protons and Electrons at $\sim$35 R_E with IMP 7", J. Geophys. Res., 81, 2341, 1976].

The 19.8-40.1 MeV and 40.1-81.8 MeV proton fluxes are obtained from a telescope consisting of two CsI (Na) scintillators viewed by phototubes and surrounded by an active anticoincidence detector. These fluxes are obtained on IMP 8 and are provided by F.B. McDonald and T.T. von Rosenvinge of NASA, Goddard

Space Flight Center. The dE/dx element is 1 mm x 5 cm diameter whereas the E element is 2.01 cm x 5 cm diameter. The finite thickness of the E element yields a geometric factor which decreases nearly linearly with increasing energy, being 3.25 cm^2 sr at 19.8 MeV and 2.35 cm^2 sr at 81.8 MeV. In computing fluxes, the average geometric factors in each of the two energy intervals is used. No correction is made for the resultant error which ranges from zero for a flat spectrum to 5% (computed flux too high) for an E^{-4} spectrum. Corrections for slow gain shifts in the scintillator/phototube output are made.

The three alpha particle fluxes are provided by J.A. Simpson and G.M. Mason of the University of Chicago. They are obtained from a telescope consisting of three lithium-drifted silicon detectors, a CsI (T) scintillator viewed by four photodiodes and a sapphire scintillator/Cerenkov radiator, all surrounded by a plastic anticoincidence scintillator.. The three fluxes correspond to alpha particles stopping in the second, third, and fourth sensors of the telescope. Background contamination of these fluxes is less than 10%. Care should be taken when proton and electron fluxes above 0.5 MeV are $\geq 3x10^3$ particles/cm^2 sr s, since these high rates may interfere with the proper operation of the instrument logic and analysis. The quoted fluxes include He^3 and He^4. During quiet periods, He^3 may contribute up to 10% of the total 25-90 MeV/n flux, and considerably less for the two lower energy fluxes. The instrument is further described in Garcia-Munoz **et al.** [Astrophys. J. Lett., 201, 145, 1975].

SOLAR X-RAY RADIATION (A.11, C.5)

The Space Environment Monitor (SEM) aboard the Synchronous Meteorological Satellites (SMS) and the Geostationary Operational Environmental Satellites (GOES) include 0.5-4A and 1-8A X-ray ion chambers. SMS-1 was launched in May 1974; SMS-2 in February 1975; GOES-1 in October 1975; GOES-2 in June 1977; GOES-3 in June 1978; GOES-4 in September 1980; GOES-5 in May 1981; and GOES-6 in April 1983. The X-ray data from GOES-2 was the main source of data for SGD. In the fall of 1981, the GOES-2 measurements suffered occasionally from inadequate adjustment of the pointing angle of the X-ray telescope, which causes the 1-8A measurements to underestimate the 1-8A solar flux. In the spring of 1983, the main source of data for SGD was GOES-4. Currently, GOES-6 is our primary source of X-ray data.

The GOES satellites presently operating are located over the Western Hemisphere and provide nearly continuous solar X-ray data. The SEM's data from two satellites are recorded, processed, and disseminated in real time by the NOAA Space Environment Laboratory in Boulder, Colorado. Further details of these X-ray data are given in "Solar X-Ray Measurements from SMS-1, SMS-2, and GOES-1: Information for Data Users," by Donnelly, R.F., R.N. Grubb, and F.C. Cowley, NOAA Technical Memorandum ERL SEL-48, NOAA Space Environment Lab., Boulder, Colorado, June 1977. Six-day graphs for the period July 1, 1974 through July 31, 1978, and two-hour graphs of X-class solar flares for the period July 1, 1974 through December 31, 1980, are given in "SMS-GOES Solar Soft X-Ray Measurements Part I, SMS-1, SMS-2, and GOES-1 Measurements from July 1, 1974, through December 31, 1976", by R.F. Donnelly and "Part II. SMS-2, GOES-1, GOES-2 and GOES-3 Measurements from January 1, 1977, through December 31, 1980", by R.F. Donnelly and S.D. Bouwer, NOAA Technical Memoranda ERL SEL-56 and -57, respectively, NOAA Space Environment Lab., Boulder, Colorado, May 1981.

No flux values below 10^{-7} Wm^{-2} for the 1-8A detector or 10^{-8} Wm^{-2} for the 0.5-4A detector are reported. The data are presented graphically, 6 days to a page. The values are plotted every 3 seconds. The ordinate values are the exponent of ten for the Wm^{-2}: i.e., -8 signifies 10^{-8} Wm^{-2}. These are plotted on a logarithmic scale. These GOES X-ray daily plots are produced from the WDC-A for Solar-Terrestrial Physics archive magnetic tapes which are received from NOAA SEL. These daily graphs are followed by the preliminary listing of the X-ray events derived from data taken from the NOAA SEL weekly report "Preliminary Report and Forecast of Solar Geophysical Data". As in the solar flare table, the importance of a flare at X-ray wavelengths is the peak flux measured at Earth in the 1 to 8 Angstrom range in units of Watts/square meter. The letters A, B, C, M and X stand for powers of 10: A denotes the power 10^{-7}, B denotes the power 10^{-6}, C the power 10^{-5}, M the power 10^{-4}, and X any power greater than 10^{-4}. Digits from 1.0 to 9.9 following the A, B, C, M and X act as multipliers. For example, C3.2 stands for an X-ray burst with a maximum flux of 3.2 x 10E-5 Watts/sq meter.

A table of preliminary daily average X-ray background fluxes follows. These data are derived from the NOAA SEL weekly report "Preliminary Report and Forecast of Solar-Geophysical Data."

MASS EJECTIONS FROM THE SUN (A.6)

In response to the request of the Working Group of Commission 10 on Solar Activity of the International Astronomical Union (IAU), World Data Center A (WDC-A) publishes in the monthly **Solar-Geophysical Data Comprehensive Report**, a table of solar transients listing monthly reports of Mass Ejections. This summary table is compiled from data reports sent to us within four months after the observation month. The table includes H-alpha, EUV, X-ray, white light, coronal line and radio observations with comments as to the type of associated activity (i.e., surge, spray, eruptive prominence, expanding loop, white light, coronal transients, moving Type IV, etc.).

The following is the suggested classification mainly of the optical events:

Surge: S - (Flare-surge if there is a known flare association)
Spray: SP - (Flare-spray if there is a known flare association)
Eruptive Prominence: A - Eruptive (Active region prominence)
Q - Eruptive (Quiescent prominence)
Coronal Transient - Enhancement: E
Depletion: D
Cloud Bubble: CB
Expanding Loop: EL
Ray or Streamer: R
Radio Burst: Moving Type IV - IVm

In the table the RA in degrees is the position angle of the radius vector of the measurement. RA is measured on the solar disk from the North pole, moving East around the solar disk to the South pole and then West back up to the North pole (0 to 360°), e.g., RA = 306 refers to the NW quadrant; RA = 066 refers to the NE quadrant.

The term DP (disparition brusque) is not included because although it is a most descriptive term, it is perhaps limited to the disk manifestation of the eruptive quiescent prominence. In the literature one of the confusing issues is whether a prominence activation is related to the quiescent or active region prominence, a distinction that should be made in this regard. Another term omitted is the high-speed (or fast) ejection. Examples of its use in the literature are not common, and most of those would correspond to sprays or the A-Eruptive prominence.

For further definitions of the terms proposed, see Bruzek and Durant (Eds.) **Illustrated Glossary for Solar and Solar-Terrestrial Physics.**

Stations currently reporting include: Abastumani, Kharkov and Voroshilov and Wroclaw, as well as the solar radio spectral stations Bleien, Culgoora, Learmonth, Palehua, Sagamore Hill and Weissenau.

ACTIVE PROMINENCES AND FILAMENTS (A.6f)

This table lists the type of event, the date, the observed start and end time (UT), the position (latitude and central meridian distance), the Importance, the observation type, the four letter station code, and any Remarks relevant to the event. The listing is not complete because many relatively small events are simply not reported. For a detailed discussion, please refer to the **Annals of the IGY, Vol V, Part IV, Solar Activity**, pp 273-280. A brief summary follows:

SURGES:
- ASR = Active surge region;
- BSD = Bright surge on disk;
- BSL = Bright surge at limb (spray);
- DSD = Dark surge on disk;
- SPY = Spray.

Importance	Single Surge (Apparent Length)
1	.05 - .10 R
2	.10 - .20 R
3	.20 - .40 R
3+	greater than .40 R

PROMINENCES:
- APR = Active prominence region;
- EPL = Eruptive prominence at limb.

Importance	General activity of prominence region
1	Clear indication of activity;
2	High activity;
3	Very high activity.

Direction of Outflow: For objects on the disk the approximate direction should be given in the table as N, NE, E, SE, S, SW, W, or NW. At the limb an outgoing motion should be indicated in the table as r (radial) when the deviations are less than 5 degrees from this direction, otherwise rn (north) or rs (south).

Remarks: **For all phenomena --**
- A = Phenomenon not associated with flare.
- B = Phenomenon associated with subflares or 1F, 1N, or 1B flare.
- C = Phenomenon associated with 2F, 2N, or 2B flare.
- D = Phenomenon associated with 3F flares or larger.
- E = Outgoing sightline velocities greater than 50 km/s.
- F = Tangential velocities greater than 50 km/s.
- G = Associated with large sunspots.
- H = Associated with yellow coronal emission.

For APR only --
- J = Loop prominences of small activity.
- K = Loop prominences of medium activity.
- L = Loop prominences of high activity.
- M = Down-flowing streamers (coronal rain) without clear focus of material.
- N = Down-flowing streamers with focus of material. Indicate position of focus in the position column.
- P = Sprays at the limb of small magnitude.
- Q = Sprays at the limb of medium magnitude.
- R = Sprays at the limb of high magnitude. (Note that in some cases an R is the radius of the Sun.)

Photographic material available --
- W = Good individual photographs of the phenomenon. Indicate instruments used as Wl = Lyot filter or Wlc = Lyot filter and coronagraph or Ws = spectroheliograph.
- X = Good cinematograms of the phenomenon. Indicate instruments used as in W.

FILAMENTS:
- ADF = Active dark filament;
- AFS = Active filament system;
- SDF = Sudden disappearance of filament (Disparitions Brusques).

For disk phenomena --

Importance	Greatest extension of filament before activation	Disintegration by rapid outflow of matter
1	10 - 20 degrees	Not observed;
1+	10 - 20 degrees	Observed;
2	20 - 40 degrees	Not observed;
2+	20 - 40 degrees	Observed;
3	greater than 40 degrees	Not observed;
3+	greater than 40 degrees	Observed.

For limb phenomena --

For such phenomena the importance should be judged according to the observer's experience, using the same symbols as above. In case the phenomenon is not a clear activation of an already existing object, the importance figure should be put in brackets.

Remarks:
- 1 = Photographic recordings of the phenomenon are available.
- 2 = A flare was observed in the neighborhood before disintegration started.
- 3 = A flare was observed shortly after the filament (prominence) had disappeared and with about the same position as the filament.
- 4 = Surges penetrated the object before disintegration started.
- 5 = Another filament (prominence) approached the object before disintegration started.

For filaments that disappear overnight, Culgoora classifies these as ADF importance 3. To highlight this, they mark them with an asterisk (i.e., ADF*) and accompany the report by the remark "*Overnight".

Stations currently reporting Prominences and Filaments include: Abastumani, Athens, Bucharest, Culgoora, Holloman, Kharkov, Learmonth, Palehua, Ramey, San Vito, and Voroshilov.

SOLAR IRRADIANCE (A.16a,b)

The first Active Cavity Radiometer Irradiance Monitor (ACRIM I) experiment was launched on the NASA Solar Maximum Mission (SMM) spacecraft in February 1980 to make regular observations of the total solar irradiance. The principal goals of the experiment were to begin a climatological data base on solar irradiance variability to be extended by follow-on experiments over at least one solar magnetic cycle (about 22 years) with at least ± 0.1% long term precision, and to provide a shorter term data base (minutes-to-months) with maximum precision and accuracy for studying aspects of solar variability significant to solar physics investigations.

The ACRIM I instrument employs three Active Cavity Radiometer (ACR) type IV sensors, each capable of defining the radiation scale at the solar total irradiance level with state-of-the-art precision and accuracy. The sensors view the Sun in a five degree field of view and have a tolerance for off-sun pointing of ±0.75 degree. Wavelength sensitivity is uniform from the far ultraviolet through the far infrared with an effective cavity absorptance of 0.9995.

The time series of ACRIM I daily mean results is shown as Figure 1. During normal satellite operation with precise solar pointing up to 20,000 samples of primary sensor data per day were acquired from each of the three ACRIM I detectors. During the "spin mode" of satellite operation, between failure of the 3-axis stabilization in November 1980 and its repair by the NASA space shuttle in April 1984, an average of only 100 samples per day were acquired. Reduced sampling and less reproducible observation opportunities are responsible for the increased scatter between adjacent daily means during this interval in Figure 1. The data sampling returned to 20,000 per day in April 1984 following repair of the SMM satellite by the shuttle. The data quality and quantity at the beginning and end of the database is sufficient that the measurement errors are essentially negligible. The scatter seen in these points is due almost entirely to intrinsic solar variations.

The SMM/ACRIM I "spin mode" have a different sampling pattern as well as frequency. In the spin mode shutters over active sensors were opened at orbit sunrise and closed at sunset. The satellite, not designed for spin-stabilization, rotated and precessed slowly about the solar line of sight, occasionally allowing the Sun to pass through ACRIM I's field of view. Sufficient time for acquisition of data occurred when the Sun crossed near ACRIM I's optical axis. Differences in duration of solar exposure and sensor thermal response to off-axis irradiance produced a systematic offset in the solar irradiance results derived from the spin mode, relative to the solar pointed mode, of the +0.12 (±0.02)%. This offset has been removed from the results shown in Figure 1.

Independent shutters on each sensor facilitate their operation with different frequencies in all possible combinations for either automatic (shutter opens or closes every 65.536 seconds) or manual modes. The three sensors are used in various combinations to provide periodic cross references on the optical degradation of the continuously monitoring sensor (channel A). During most of the mission, channel B has been compared with channel A once per month to calibrate channel A's degradation. Channel C is used less frequently to calibrate the A/B comparisons. Over the 1980-86 period a total of about 300 parts per million degradation of channel A was detected using this procedure. The tabulated results have been corrected for degradation with an uncertainty of less than 30 ppm over this period. The results for intercomparison experiments is included as Figure 2. Inflight comparisons with other sensors on rocket and space shuttle payloads have been carried out and are planned for the future that assists in sustaining the long-term precision of the database.

The irradiance measured by ACRIM I is corrected for the following effects listed in order of significance: a) Normalization to one AU distance; b) Correction for the slow decrease in channel A's sensitivity; c) Temperature dependent corrections for radiation lost through the arperture and for the cavity heaters' temperature coefficients of resistance (1); d) Correction for relativistic effects due to Sun-satellite relative velocity; e) Correction for the cosine of the angle between ACRIM I's line-of-sight and the Sun's center. These corrections are small. Only the first two exceed 0.01%. The standard error of the relative measurements is frequently as small as 0.001% for orbit averages.

Data are received from R.C. Willson, Principal Investigator for SMM/ACRIM I Experiment, Jet Propulsion Laboratory, California Institute of Technology, M/S 171-400, 4800 Oak Grove Drive, Pasadena, CA 91103, USA.

More detailed descriptions of the active Cavity Radiometer instrumentation, measurements, and the long-term solar irradiance monitoring program conducted by the Jet Propulsion Laboratory for the National Aeronautics and Space Administration are given in the following references:

Willson, R.C., S. Gulkis, M. Janssen, H.S. Hudson, and G.A. Chapman, Science 211, 700 (1981).

Willson, R.C., Solar total irradiance observations by active cavity radiometers, Solar Physics, V. 74, p. 218, (1981).

Willson, R.C., Hudson, H.S., Astroph. J. Lett., v. 24, p. 185, (1981).

Hudson, H.S., Silva, S., Woodard M., Willson, R.C., Effects of sunspots on solar irradiance, Solar Physics, v. 76, p. 211, (1982).

Willson, R.C., Solar irradiance variations and solar activity, J. Geophys. Res., v. 86, p. 4319 (1982).

Woodard, M., Hudson, H., Frequencies, amplitudes and line widths of solar oscillations from total irradiance observations, Nature, v. 305, p. 589, (1983).

Willson, R.C., Measurements of Solar Total Irradiance and Its Variability, Space Science Reviews, v. 38, pp. 203-242, (1984).

Willson, R.C., Hudson, H.S., Frohlich, C., Brusa, R.W.; Long Term Downward Trend in Total Solar Irradiance, Science, v. 234, pp. 1114, (1986).

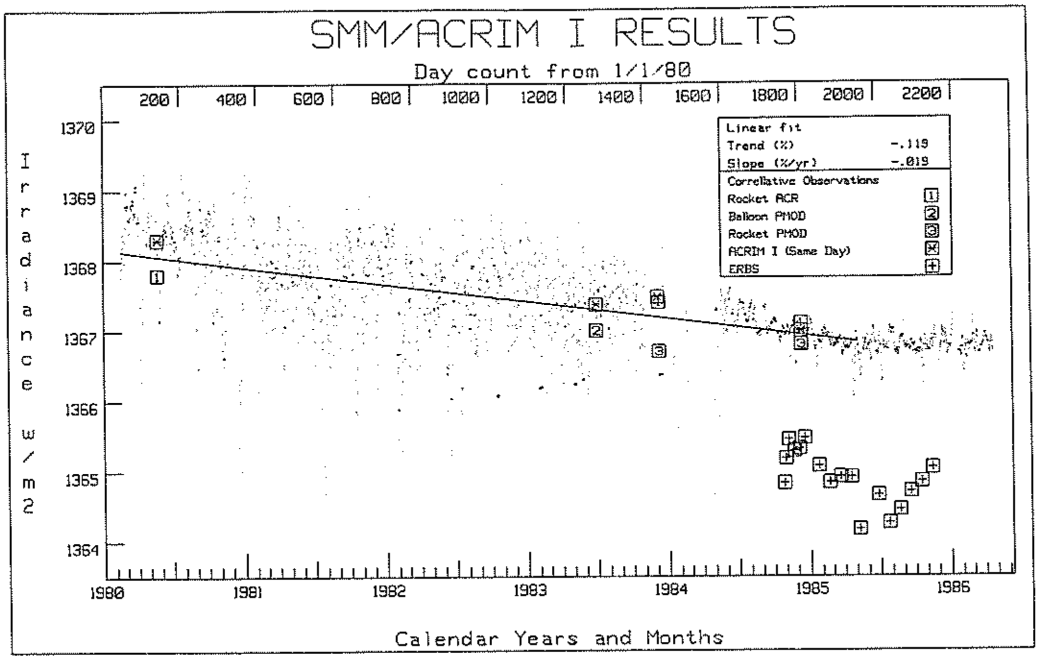


Fig. 1. Time series of the SMM ACRIM I daily mean results for the 1980-1985 period. Standard errors of the daily means increased from 10^{-4} to $5x10^{-4}$ % during 1981-83 due to a much lower rate of data acquisition during this period of "wobbly" spin stabilization of the SMM spacecraft. The linear least mean square fit shown has a slope of -0.019 %/year. Independent total solar irradiance observations by sounding rocket and balloon experiments show generally good agreement with the ACRIM I results (with a linear least mean square fit slope of -0.014 %/year).

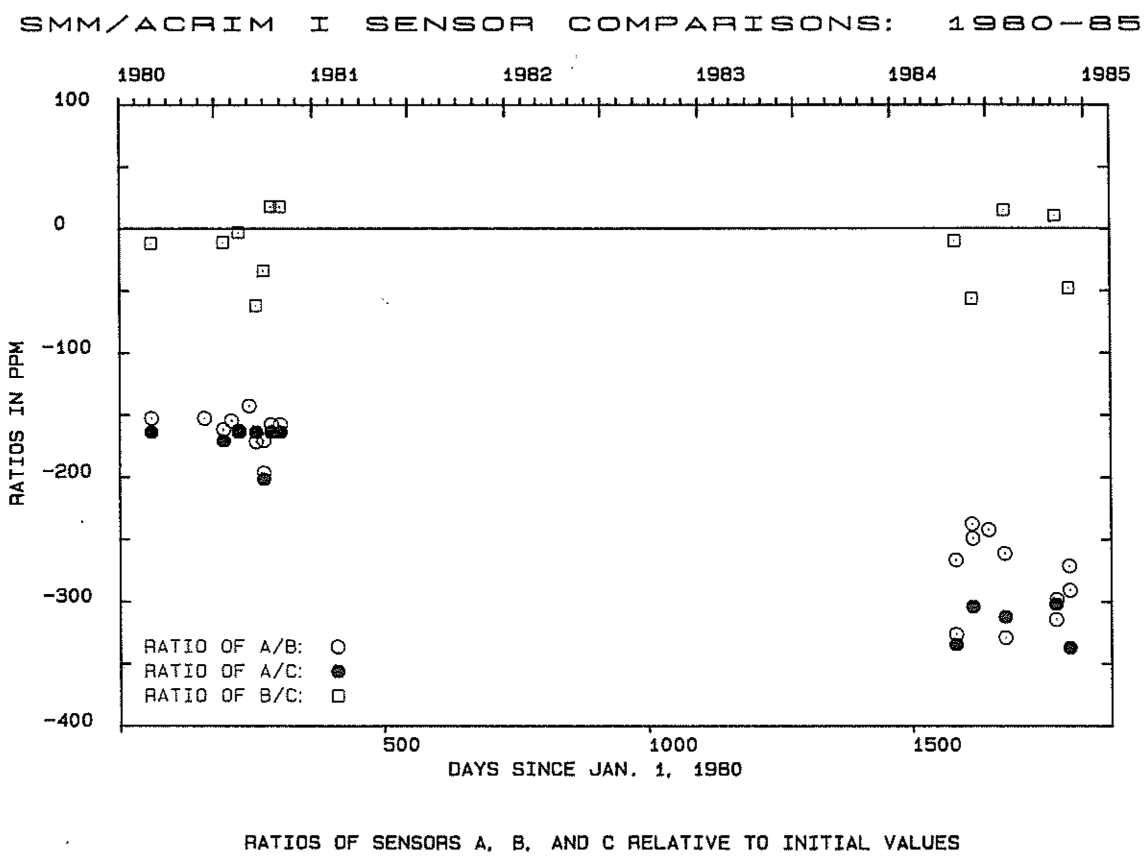


Fig. 2. Results of ACRIM I self-calibration by periodic comparisons of solar irradiance data acquired by its three independent ACR sensors. Ratios are shown relative to initial comparisons conducted shortly after launch. Sensor A has operated almost continuously throughout the interval. Sensor B is compared with A about once per month. Sensor C is used less frequently to minimize its exposure to solar UV. Sensor A exhibits degradation of about 300 ppm over the 5 year period, while sensors B and C show no significant degradation. The results shown in Figure 1 have been corrected for sensor A's degradation.

The Earth Radiation Budget (ERB) NIMBUS 7 Cavity Pyrheliometer data from Channel 10C are also available for the period November 1978 to the present. These daily mean data in Watts/m2 are made available by John Hickey, The Eppley Laboratory, Inc., 12 Sheffield Ave., P.O. Box 419, Newport, RI 02840 USA.

The Nimbus-7 ERB Channel 10c is a Hickey-Freidan (HF) electrically self-calibrating total solar irradiance cavity radiometer. Further details concerning Channel 10c and the Nimbus-7 ERB experiment and resultant data sets are given by Hickey et al., Science, 208 (1980); Hickey and Alton, 5th Conference on Atmospheric Radiations, AMS (1983); Jacbowitz et al., J. Geophys. Res., 89 (1984); and Kyle et al., Bull. Amer. Meteor. Soc. (1985). The Nimbus-7 is a polar orbiting satellite with the ERB solar sensors facing forward along the velocity vector. The sampling frequency is one measurement period of about three minutes out of every 104 minute orbit. This takes place as the satellite traverses the terminator near the southern extent of its orbit. The sensor acquires signals every second. The central 48 seconds are averaged to obtain a mean orbital measurement. In addition, the sensor establishes a radiometric reference by viewing deep space both before and after the solar measurement time. During the periodic electrical calibration sequences, the cavity also views deep space to assure that the radiometric transfer correction terms can be properly applied. There is also a six step voltage calibration of the electronics which is independent of the sensor itself. Neither the electrical calibration of the sensor nor the voltage calibration of the electronics have shown deviations beyond the resolution limits of the respective measurement parameters. Because of the limitation of the overall data system, resolution is limited by the analog to digital conversion of one part in 2047 referred to full scale. The noise level of the sensor is well below the threshold so that the $\pm.5$ count (roughly 0.384 W/m^2) constitutes the maximum error for a single independent reading... The Nimbus operating schedule generally restricts ERB to three days of measurement out of every four. At turn-on, a thermal transient situation prevails which raises the uncertainty (by tenths of a percent) above that for the remainder of the three day period.

The Nimbus-7 available power goes through an annual cycle with maximum power in the winter and minimum power in the summer. By 1984 two of the original Nimbus-7 experiments were terminated. This allowed the ERB experiment to operate continuously during the winter months, but on 17 April it went back to the three days on/one day off cycle for the next six months.

The Nimbus-7 ERB began taking useful data on 16 November 1978 and seven years of data have been received to date. At present, six years of data are processed and in the public archive, while the seventh year is still being processed. The ERB data year is defined to start on 1 November and end on 31 October. [Editor's Note: The above text was excerpted from Report UAG-96 paper "Total Solar Irradiance Variations in February and April 1984" by Kyle, Hickey and Major, (issued July 1987).]

MISCELLANEOUS DATA

Information available either annually or on a nonroutine publication basis will be given. The descriptive material necessary to understand the data will be included in the issue presenting the data. Data received too late for publication in the normal section may also appear here.

Special data sets include:

- o Mt. Washington Forbush Decreases 1955 - Apr 1984 (SGD 485A 91);
- o GOES Solar Proton Events 1976 - May 1986 (SGD 502B 26);
- o RSTN solar radio burst events Aug 1979 - Oct 1980 (SGD 461B103);
- o aa indices corrected data 1968 - 1977 (SGD 411B 78);
- o aa indices graph 1868 - 1979 (SGD 426A137);
- o AE(11) Mar-Apr 1986 (SGD 503B 41)
  May-Jun 1986 (SGD 505B 97);

- o Descriptive Text and inventory of data:
  - --IAU Quarterly Bulletin on Solar Activity 1917 to present (SGD 501B 23);
  - --Cartes Synoptiques 1919 to present (SGD 501B 34);
  - --Chinese Solar-Geophysical Data (SGD 514B 25).

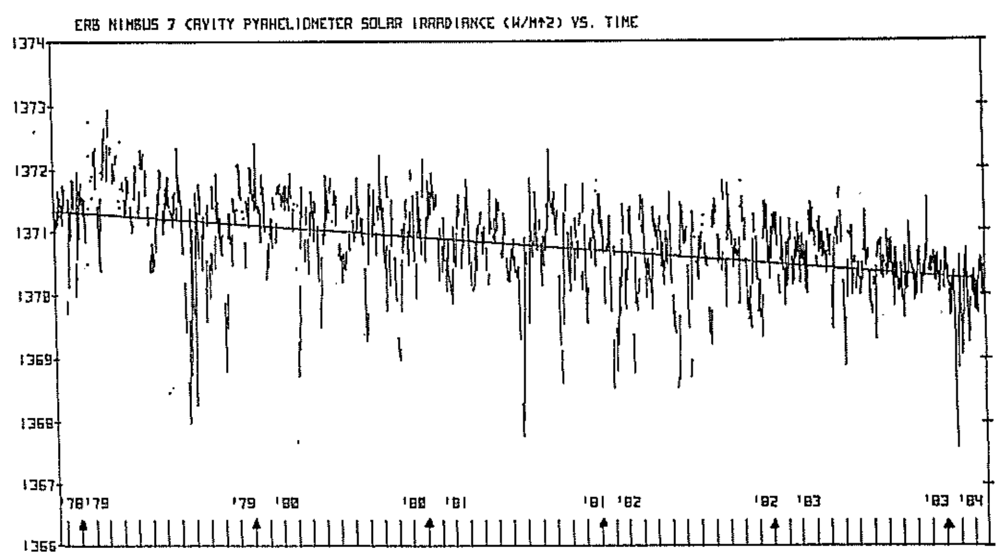


Fig. 1. Solar irradiance data are plotted for the SMM (ACRIM) for the period 1980 through 1984 and the NIMBUS 7 Channel 10C for the period November 1978 through March 1984.

SOME OTHER SOURCES OF DATA

Data Available: Some data available in publication form are cited here. A list is given, along with addresses of the responsible institutions. The WDC-A for Solar-Terrestrial Physics publishes the Toyokawa, Ottawa and Penticton radio data in its monthly publication, **Solar-Geophysical Data.** The WDC-A for Solar-Terrestrial Physics also receives most of the periodicals when they become available.

Belgium: **Bulletin d'Observations: Activite Solaire - Observations Radio-Electriques Solaires - 600 MHz (Humain, Belgium)** Observatoire Royal de Belgique, Ave. Circulaire 3, Brussels, Belgium (monthly since 1962).

Canada: **Solar Noise Observations at 2800 Mc/s (Ottawa - ARO) and 2700 Mc/s (Penticton - DRAO)** Series C Monthly Report, National Research Council, Radio Astronomy Section Ottawa 7, Ontario, Canada (since 1947).

China: **Report of Magnetic Storms,** Institute of Geophysics, State Seismological Bureau, Beijing, **Peoples Republic of China (quarterly); Monthly Solar Activity** Yunnan Observatory, Academia Sinica (monthly); **Chinese Solar-Geophysical Data** Beijing, Academia Sinica (monthly).

Czechoslovakia: **Contributions of the Astronomical Observatory Skalnate Pleso,** Astronomical Institut of the Slovak Academy of Sciences, 059 60 Tatranska Lomnica, Czechoslovakia (Vol XII).

France: **Carte Synoptiques de la Chromosphere Solaire** Observatoire de Paris, 92 Meudon, France (monthly since 1919).

Germany: **Daily Mean Value of Solar** Flux Density, Heinrich -Hertz Institut, 1199 Berlin Adlershof, Rudower Chaussee 5, GDR (monthly since July 1957).

Italy: **Solar Phenomena - Monthly Bulletin and Photographic Supplement,** Osservatorio Astronomica di Roma, Monte Mario, Rome, Italy (monthly since 1958); **Osservazion Solari, Solar Flux and Distinctive Events** Osservatorio Astronomico Di Trieste (quarterly since 1965); **Solar Observations made at Catania Astrophysical Observatory,** Osservatorio Astrofisico, Catania, Italy (annually since 1967).

Japan: **Monthly Report of Solar Radio Emission,** Radio Astronomy Section, Research Institute of Atmospherics, Nagoya University, Toyokawa, Japan (since 1956); **Solar Activity Chart,** WDC-C2 Toyokawa Observatory, Nagoya University, Toyokawa, Japan (annually since 1968); **IAU Quarterly Bulletin on Solar Activity,** Tokyo Astronomical Observatory, Mitaka, Tokyo, Japan (since 1978); Radio Research Labs, Tokyo, Japan, nonroutine data publications.

Netherlands: **Geomagnetic Data** IAGA Bulletin No. 12 (1932 - 1969), No. 32 (since 1970) IUGG Publications Office, 39 ter, Rue Gay-Lussac, Paris V, France (annually).

Philippines: Manila Observatory "**Solar Maps and Activity**" Manila Observatory, P.O. Box 1231, Manila, Philippines (monthly).

Switzerland: Bulletin of "**Berne Solar Observations**", Institute of Applied Physics, Div. of Solar Observations, Sidlerstrasse 5, 3012 Berne, Switzerland (since 1968).

Taiwan: **Report on Sunspot Observations** Taiwan Provincial Weather Bureau Observatory, Taipei, Taiwan (quarterly since 1957).

USSR: СОЛНЕЧНЫЕ ДАННЫЕ **Solar Data)** USSR Academy of Science (monthly since 1958)· КОСМИЧЕСКИЕ ДАННЫЕ **(Cosmic Data)** (monthly since 1962); **Magnetic Fields of Sunspots** WDC-B2 for Solar-Terrestrial Physics, Ulitza Molodezhnaya 3, Moscow 117-296, USSR (bimonthly since 1964); **Catalog of Indices of Solar and Geomagnetic Data,** Obninsk, 1979.

USA: **Preliminary Report and Forecast of Solar-Geophysical Data,** NOAA Space Environment Services Center, Boulder, Colorado 80303 USA (weekly); **Solar-Geophysical Data,** NOAA, Boulder, Colorado 80303 USA (monthly since November 1955); NCAR Technical Note (NCAR/TN-188+STR Jan 1982, NCAR/TN-193+STR May 1982, NCAR/TN-205+STR Feb 1983) **The White Light Corona, An Atlas of K-Coronameter Synoptic Charts,** data for Aug 1980 - Jan 1983; also NCAR/TN-194+STR May 1982 **An Atlas of Variations in the Solar Constant Caused by Sunspot Blocking and Facular Emissions from 1874 to 1981,** NCAR, P.O. Box 3000, Boulder, CO 80307 USA.

SOME OTHER SOURCES OF DATA THAT HAVE CEASED OR APPARENTLY CEASED PUBLICATION

Data Available: Some data available in publication form are cited here. A list is given, along with the addresses of the responsible institutions. The WDC-A for Solar-Terrestrial Physics holds most of these publications.

Argentina: **Solar Radio Emission 408 MHz Data,** Observatorio de Fisica Cosmica, 3226 Mitre, San Miguel (FCGSM) Buenos Aires, Argentina (monthly 1967 - Apr 1972).

Belgium: **Observations Photospheriques Solaires -** Nombre de Wolfe (Uccle, Belgium) (1957-June 1974); **Observations Chromospheriques Solaires - Eruptions, Protuberances (Uccle)** (1947-71) Observatoire Royal de Belgique, Ave. Circulaire 3, Brussels, Belgium (monthly).

England: **Photoheliographic Results,** Greenwich Royal Observatory Bulletins, Royal Greenwich Observatory, Herstmonceux Castle, Hailsham, Sussex, England (annually 1874-1976).

Germany: **Daily Maps of the Sun,** Fraunhofer Institut, Freiburg i/Breisgau, GFR (twice monthly 1957-73).

Italy: **Photographic Journal of the Sun,** Osservatorio Astronomica di Roma, Monte Mario, Rome, Italy (monthly) (27 day rotation) (1966-78).

Japan: **Bulletin of Solar Phenomena,** Tokyo Astromonical Observatory, Tokyo, Japan (quarterly 1949-70): **Solar Radio Emission,** Tokyo Astronomical Observatory, University of Tokyo, Mitaka, Japan (monthly 1959-73).

Lebanon: **Solar Photospheric Observations,** Monthly Bulletin, Astronomical Section, Lee Observatory, American University of Beirut, Lebanon (monthly April 1956-April 1975).

Netherlands: **Solar Radio Noise Observations - Stations Nera and Paramaribo,** Sonnenborgh Observatory, Servaas Bolwerk 15, Utrecht, Netherlands (monthly 1959 - June 1970).

Switzerland: **IAU Quarterly Bulletin on Solar Activity,** Eidgen. Sternwarte, Zurich, Switzerland (1917-77). (Now published in Japan)

United States of America:
AFCRL Geophysics and Space Data Bulletin, AFCRL, L.G. Hanscom Field, Bedford, Massachusetts, USA (quarterly 1964-74); **Solar Radio Flux Observed at University Park,** Pennsylvania Radio Astronomy Observatory, Pennsylvania State University, University Park, Pennsylvania, USA (quarterly 1964 - May 1975).

PARTIAL LIST OF CONTRIBUTORS

These monthly reports would not be possible without the continuing support and cooperation of scientists throughout the world. Much of the data included have been obtained through either the International Ursigram and World Days Service program or the international exchange of geophysical observation between World Data Centers in accordance with the principles set forth in recommendations of relevant organizations of the International Council of Scientific Unions. (See **Guide to International Data Exchange,** issued in 1979 by the ICSU Panel on World Data Centres.) For individual station addresses, please refer to the MONSEE Directory of Solar-Terrestrial Monitoring Stations, Edition 2, August 1984, AFGL-TR-84-0237, available from the WDC-A for Solar-Terrestrial Physics.

Special thanks are due to many individuals, including the following:

Name	Organization	Data Type
J. Mattei	American Association of Variable Star Observers, Solar Division (AAVSO) 25 Birch Street Cambridge, MA 02138	Sunspots (American number)
B. Wingate	American Association of Variable Star Observers, Solar Division (AAVSO) 121 Chesapeake Ave. Lake Hiawatha, NJ 07034	SES (AAVSO stations)
P.S. McIntosh	Space Environment Laboratory NOAA, R/E/SE, 325 Broadway Boulder, CO 80303 USA	Sunspots, H-alpha photographs, H-alpha synoptic charts (Boulder)
A. Koeckelenbergh	Sunspot Index Data Center (SIDC) 3 Av. Circulaire B-1180 Bruxelles, Belgium	Sunspots (International number)
G. Chapman A. Herzog	CSUN/San Fernando Observatory Dept. of Physics and Astronomy Calif. State Univ., Northridge Northridge, CA 91330 USA	H-alpha photographs (San Fernando)
	Osservatorio Astrofisico Citta Universitaria Viale A. Doria 95123 Catania, Italy	Flares (Catania) Prominences and Filaments
R. Ulrich P. Gilman	Mount Wilson Solar Observatory UCLA Department of Astronomy 405 Hilgard Avenue Los Angeles, CA 90024 USA	Magnetic classifications of sunspots, solar magnetograms (Mt. Wilson)
J.W. Harvey W. Livingstone F. Receley	National Solar Observatory P.O. Box 26732 Tucson, AZ 85726 USA	Solar magnetograms Helium 10830A synoptic chart (Kitt Peak)
R.C. Altrock	Sacramento Peak Observatory Sunspot, NM 88349 USA	Corona (Sacramento Peak)
A.A. Giesecke M. Ishitsuka	Observatorio de Huancayo Instituto Geofisico del Peru Apartado 46 Huancayo, Peru	SWF, solar radio emission, flares (Huancayo)
V. Badillo F.J. Heyden	Manila Observatory UP P.O. Box 122 UP Post Office, Diliman Quezon City, Philippines	Flares, sunspots (Manila) Prominences and Filaments

M.J. Martres M. Bernot P. Lantos	DASOP Observatoire de Paris 92195 Meudon Principal Cedex France	Flares, active regions, synoptic charts (Meudon, Haute Provence)
A. Magun	Institute of Applied Physics Division of Solar Observations Sidlerstrasse 5 CH-3012 Berne, Switzerland	Digital Solar radio emission data, photographs and digital H-alpha flare data (Berne)
S. Enome	Toyokawa Observatory The Research Institute of Atmospherics Nagoya University Toyokawa, 442 Japan	Solar radio emission (Toyokawa)
G. Wortham	Det 2, 4WW (MAC) Sagamore Hill Solar Radio Observatory Box 2517 South Hamilton, MA 01982 USA	Solar radio emission (Sagamore Hill)
R. Thompson	IPS Radio and Space Services Department of Science 162-166 Goulburn Street Darlinghurst, NSW 2010, Australia	Solar radio emission (Fleurs)
C. Donaldson V. Gaizauskas K.F. Tapping	Herzberg Institute of Astrophysics National Research Council Ottawa, Ontario, Canada K1A 0R6	Solar radio emission (Ottawa, Penticton)
H. Urbarz	Aussenstelle Astronomie Institut der Universitaet Tubingen 7981 Weissenau Federal Republic of Germany	Solar radio emission (Weissenau)
A.O. Benz R.W. Stehling	Radio Astronomy Group (Bleien) Institute of Astronomy ETH-Zentrum CH-8092 Zurich, Switzerland	Solar radio emission (Bleien)
M. Pick	Observatoire de Meudon 92195 Meudon, France	Solar radio emission (Nancay)
	Department of Science IPS Radio and Space Services P.O. Box 372 Narrabri N.S.W. 2390 Australia	Solar radio emission (Culgoora) Prominences and Filaments
H. Zirin S. Martin W. Marquette	Big Bear Solar Observatory California Institute of Technology North Shore Drive Big Bear City, CA 92314 USA	Calcium plages (Big Bear)
B.J. Rickett	University of California, San Diego Department of Electrical Engineering and Computer Sciences C-014 La Jolla, CA 92093 USA	Solar wind (Interplanetary Scintillations (IPS))
J. Mihalov	NASA Ames Research Center Mail Code 245-11 Electrodynamics Branch Moffett Field, CA 94035 USA	Solar wind (Pioneer 12)
A. Lazarus R.E. McNair	Massachusetts Institute of Technology Center for Space Research Cambridge, MA 02139 USA	Solar wind (IMP 8)
C. Russell	UCLA Science Center Institute of Geophysics and Planetary Physics Los Angeles, CA 90024 USA	Interplanetary Magnetic Field (Pioneer 12)
R. Post	NSSDC NASA/GSFC Code 601 Greenbelt, MD 20771 USA	Solar particles, plasma (IMP 8)
G. Heckman	Space Environment Services Center NOAA, R/E/SE2, 325 Broadway Boulder, CO 80303 USA	Alerts, SELDADS data, GOES X-rays

A. Zaitsev	IZMIRAN P.O. Akademgorodok Moscow Region 142092 USSR	Inferred IP Magnetic Fields (Vostok)
P.H. Scherrer	Center for Space Science and Astrophysics Stanford University, ERL Stanford, CA 94305 USA	Solar Mean Magnetic Fields (Stanford)
S. Barnes	Ionospheric Sounding Station P.O. Box 578 Puunene, Maui, HI 96784 USA	SWF (Maui)
	Space Environment Laboratory NOAA, R/E/SE2, 325 Broadway Boulder, CO 80303 USA	Solar x-rays (GOES)
M. Bercovitch Margaret D. Wilson	National Research Council of Canada Herzberg Institute of Astrophysics Ottawa, Ontario, Canada K1A 0R6	Cosmic rays (Alert/Deep River)
J.A. Simpson G. Lentz	LASR Enrico Fermi Institute University of Chicago 933 E. 56th Street Chicago, IL 60637 USA	Cosmic rays (Climax/Huancayo) Solar cosmic ray protons
M.A. Pomerantz	Bartol Research Foundation The Franklin Institute University of Delaware Newark, DE 19711 USA	Cosmic rays (Thule)
K. Takahashi	Institute of Physical and Chemical Research, WDC-C2 for Cosmic Rays Hirosawa 2-1 Wako, Saiktama 351-01, Japan	Cosmic rays (Tokyo)
K. Rohrs	Institut fur Reine und Angewandte Kernphysik Olshausenstr. 40/60, Gebaude N20a 23 Kiel, German Federal Republic	Cosmic rays (Kiel)
R. Reiter	Consulting Bureau Reiter Fritz-Muller-Strasse 54 D-8100 Garmisch-Partenkirchen German Federal Republic	Cosmic rays (Predigtstuhl)
M. Siebert	Institut fur Geophysik Herzberger Landstrasse 180 34 Gottingen, German Federal Republic	Magnetic indices (Kp, Ap, Cp)
J.A. As	Kon. Nederlands Meteorologisch Instituut 3730 AE DeBilt, The Netherlands	Magnetic indices (IAGA Bulletin of indices)
M. Sugiura	World Data Center C2 for Geomagnetism Faculty of Science Kyoto University Kyoto 606, Japan	Magnetic indices (Dst)
M. Menvielle	Institut de Physique du Globe 4, Place Jussieu - Tour 24-25 75230 Paris, France	Magnetic indices (aa, Kn,Km,Ks)
	Observatorio del Ebro Roqueta (Tarragona) Spain	SSC, SFE sudden commencements
T. Damboldt	Forschungsinstitut der Deutschen Bundespost 6100 Darmstadt, Postfach 5000 German Federal Republic	Radio quality figures (Darmstadt)
R.C. Willson	Jet Propulsion Laboratory California Institute of Technology M/S 171-400 4800 Oak Grove Drive Pasadena, CA 91103 USA	Solar irradiance (SMM)
J. Hickey	The Eppley Laboratory, Inc. 12 Sheffield Ave. P.O. Box 419 Newport, RI 02840 USA	Solar irradiance (NIMBUS 7)

DETAILED DATA COVERAGE FOR SOLAR-GEOPHYSICAL DATA

An index to **Solar-Geophysical Data** beginning with the year 1957 can be found on pages 56-83. The serial number of the report in which data for a given year and month were published is listed in the index according to type of data. The types are keyed according to ICSU recommendations; and this key, expanded for the data published in **Solar-Geophysical Data**, precedes the index. Listed with the kinds of data received are the periods during which they were available for publication.

Beginning with 1969, when **Solar-Geophysical Data** was divided into Part I and Part II, the index gives pages on which the data appear in addition to the serial number. A "B" appears between the serial number and the page number when the data were published in Part II.

STONYHURST DISKS

At the end of this report, two transparencies provide Stonyhurst disks in days from CMP in the size of the maps or drawings presented in the second section of these monthly reports. A second set of transparencies with meridian calibrated in degrees from CMP are included.

KEY TO DETAILED DATA COVERAGE FOR SOLAR-GEOPHYSICAL DATA

A.	Solar and Interplanetary Phenomena	Mo/Yr Mo/Yr
A.1	Sunspot Drawings	1/67 - present
A.1a	Sunspot Data (see A.5a)	7/57 - present
A.1b	Sunspot Groups	8/82 - present
A.2a	Zurich Provisional Relative Sunspot numbers, R_Z	7/57 - 12/80
A.2aa	International Provisional Relative Sunspot numbers, R_I	1/81 - present
A.2b	Zurich Final Sunspot numbers, R_Z	7/57 - 12/80
A.2c	American Relative Sunspot numbers, R_A'	7/57 - present
A.2d	27-day Plot of Relative Sunspot numbers (see D.1c)	7/57 - present
A.2e	Sunspot Cycle (Smoothed numbers) Graphs - in each issue	7/57 - present
A.2f	Table of Observed and Predicted Smoothed Sunspot numbers	10/64 - present
A.3a	Mt. Wilson Magnetograms	9/66 - present
A.3b	Mt. Wilson Sunspot Magnetic Field Classifications	1/62 - present
A.3c	Kitt Peak Magnetograms	7/74 - present
A.3d	Mean Solar Magnetic Field (Stanford)	1/77 - present
A.3e	Stanford Magnetograms	1/79 - present
A.4	H-alpha Filtergrams	1/67 - present
A.5	Calcium Plage Drawings - Big Bear (previously Mt Wilson/McMath/Catania)	1/67 - present
A.5a	Calcium Plage (McMath - Mt. Wilson) and Sunspot Regions	7/57 - 8/82
A.5b	Daily Calcium Plage Index	12/70 - present
A.5c	Calcium Plage Reports (Big Bear)	9/82 - present
A.6	H-alpha Synoptic Charts	6/73 - present
A.6b	Synoptic Chart and Active Regions	4/76 - present
A.6c	Stanford Solar Magnetic Field Synoptic Charts	1/79 - present
A.6d	Kitt Peak Solar Magnetic Field Synoptic Charts	4/79 - present
A.6e	Mass Ejections from the Sun	3/80 - present
A.6f	Active Prominences and Filaments	2/84 - present
A.6g	Sacramento Peak Coronal Green Line Synoptic Maps	1/86 to present
A.7a	Coronal Line Emission Indices (Provisional)	7/57 - 5/66
A.7b	Coronal Line Emission Indices (Final)	1/60 - 5/66
A.7c	White Light Corona (NRL OSO-7, 1971-083A)	2/72 - 6/74
A.7e	Solar XUV Coronagrams (NRL OSO-7, 1971-083A)	10/72 - 12/73
A.7f	Helium D3 Coronal Holes (Big Bear)	1/76 - 11/81
A.7g	Helium Synoptic Maps (KPNO)	1/77 - present
A.7h	5303A Coronal Intensities (Sac Peak or Wendelstein)	1/77 - present
A.8aa	2800 MHz (ARO-Ottawa) Daily Observed Values of Solar Flux	7/57 - present
A.8ab	2800 MHz (Ottawa) Final - Daily Observed Values of Solar Flux	1/62 - 12/66
A.8ac	2800 MHz (ARO-Ottawa) Daily Values Solar Flux Adjusted to 1 AU	1/64 - present
A.8ad	2800 MHz (Ottawa) Final - Daily Values of Solar Flux Adjusted to AU	1/64 - 12/66
A.8b	470 MHz (Boulder) Daily 3-hourly Averages	7/57 - 3/58
A.8c	167 MHz (Boulder) Daily 3-hourly Averages	7/57 - 12/58
A.8d	200 MHz (Cornell) Daily 3-hourly Averages	7/57 - 12/58
A.8e	9530 MHz (USNRL) Daily Averages	2/58 - 4/59
A.8f	3200 MHz (USNRL) Daily Averages	2/58 - 4/59
A.8g	15400, 8800, 4995, 2695, 1415, 606, 410, 245 MHz (AFGL) Solar Flux Adjusted to 1 AU (15400 MHz began 6/69, 245 MHz began 10/69, 410 MHz began 9/71)	1/67 - present
A.9a	9.1 cm (Stanford) Radio Maps of the Sun	4/60 - 8/73
A.9aa	9.1 cm Spectroheliogram tabulated Data (Stanford)	1/69 - 8/73
A.9b	21 cm (Fleurs) Radio Maps of the Sun	12/64 - 12/73
A.9c	8.6 mm (Prospect Hill) Radio Maps of the Sun	4/70 - 2/74
A.9cb	8.6 mm (NOSC) Radio Maps of the Sun	11/74 - 12/80
A.9d	2 cm (NOSC) Radio Maps of the Sun	6/74 - 12/80
A.10a	169 MHz (Nancay) Interferometric Observations	7/57 - present
A.10b	408 MHz (Nancay) Interferometric Observations	11/65 - 8/71
A.10c	21 cm (Fleurs) East-West Solar Scans	10/65 - present
A.10d	43 cm (Fleurs) East-West Solar Scans	4/66 - present
A.10e	10.7 cm (Ottawa-ARO) East-West Solar Scans	6/68 - present
A.10f	3 cm (Toyokawa) East-West Solar Scans	12/77 - present
A.11aa	Solar X-ray Background Levels (NRL) satellites, see below	1/64 - 10/79
A.11ab	Solar X-ray Background Levels (NRL Graphs) " " "	3/65 - 10/79
A.11ac	Solar X-ray Background Levels (Boulder) " " "	12/65 - 11/68
A.11ad	Solar X-ray Background Levels (France) " " "	4/66 - 5/66
A.11ae	Solar X-ray Background Levels (Aberdeen, S.D.) " "	1/66 - 11/68
A.11b	Solar X-ray Background Levels, 0-20A Injun 1/SOLRAD-3, 1962-02	6/61 - 12/61
A.11c	Solar X-ray Background Levels (Vela 1,2; 1963-39A,C)	(10/63)
A.11d	Solar X-ray Background Levels (McMath) (OSO-3; 1967-20A), 8-12A	3/67 - 8/67
A.11e	Solar X-ray (OSO-5; 1969-6A) Spectroheliograms (University College London, Leicester Univ.)	7/69 - 11/72 7/74 - 6/75

A.11f	Solar X-ray (GSFC OSO-7, 1971-083A) Spectroheliograms		12/72 - 7/74
A.11g	Solar X-ray Background Levels (SMS-1/GOES, 1974-033A; SMS-2/GOES, 1975-011A; GOES 2, 1977-048A)	Tables	1/74 - 10/78
	Graphs: GOES 2 11/78-5/83; GOES 5 (81-049A) 10/83-7/84; GOES 6 (83-041A) 6/83-9/83 and 8/84 to present	Graphs	11/78 - present
A.11h	Solar X-ray (OSO-8, 1975-057 A) 2-14 keV (Lockheed)		8/75 - 9/78
A.11i	Solar X-ray (OSO-8, 1975-057A) (Columbia University)		
	Popular Name — Satellite Designation		
	SOLRAD 7A — 1964-1D		1/64 - 10/64
	SOLRAD 7B — 1965-16D		3/65 - 12/65
	SOLRAD 8 — 1965-93A (Explorer 30)		1/66 - 12/67
	OGO-4 — 1967-73A		1/68 - 3/68
	OSO-4 — 1967-100A		
	SOLRAD 9 — 1968-17A		3/68 - 7/72
	(Explorer 37)		6/73 - 4/74
	(Beginning 12/68 daily/hourly averages presented)		
	SOLRAD-10 — 1971-58A (Explorer 44)		8/72 - 6/73
	SOLRAD-11 — 1976-023D		1/78 - 10/79
A.11ja	Solar EUV Spectroheliograms FeXV 284A (GSFC OSO-7, 1971-083A)		5/72 - 3/74
A.11jb	FeXV - 284A Spectroheliograms		2/76 - 12/76
A.12aa	Solar Protons, Daily-hourly Values, JPL/GSFC (satellites, see below)		5/67 - 5/73
A.12ab	Solar Protons, Graphs, JPL/GSFC " " "		5/67 - 5/73
	Popular Name — Satellite Designation		
	Explorer 34 — 1967-51A, EP >10, >30, >60 Mev		5/67 - 5/69
	Explorer 41 — 1969-53A, EP >10, >30, >60 Mev		6/69 - 12/72
	Explorer 43 — 1971-19A, Ep >10, >30, >60 Mev		11/71 - 5/73
A.12ba	Cosmic Ray Protons, Ep 0.6-13, 13-175, >175 Mev, Univ. of Chicago (Pioneer 6; 1965-105A and Pioneer 7; 1966-75A)		3/69 -
A.12bb	Cosmic Ray Protons, Ep 13.9, >64 or >40 Mev, Univ. of New Hampshire (Pioneer 8; 1967-123A and Pioneer 9; 1968-100A)		12/69 -
A.12c	Cosmic Ray Protons, Ep 5-21, 21-70 Mev, Aerospace (ATS-1; 1966-110A)		1/70 - 8/72
A.12d	Low Energy Protons (NOAA satellites 1972-082A, 1973-086A, 1974-089A)		7/74 - 11/74
A.12e	Energetic Solar Particles (IMP H, 1972-073A and IMP J, 1973-078A)		8/75 - present
A.12f	Energetic Solar Particles (GMS/SEM, 1977-065A)		9/77 - 7/78
A.13a	Solar Wind (Pioneer 6, 1965-105A; and Pioneer 7, 1966-75A) NASA Ames		12/65 -
A.13ab	Solar Wind (Pioneer 8, 1967-123A; Pioneer 9, 1968-100A) NASA Ames		4/72 -
A.13b	Solar Wind, M.I.T.		
	Pioneer 6, 1965-105A		3/69 - 2/70
			12/73 -
	Pioneer 7, 1966-75A		6/69 - 12/69
A.13c	Solar Wind (Vela 3, 1964-40A; Vela 5, 1965-58A)		1/69 - 6/72
A.13d	Solar Wind from IPS Measurements (UCSD)		1/75 - present
A.13e	Solar Plasma Data (IMP H, 1972-073A and IMP J, 1973-078A)		8/75 - present
A.13f	Solar Wind (Pioneer 12 (Venus) 1978-051A)		1/79 - present
A.16a	Solar Irradiance SMM (ACRIM) (JPL)		2/80 - present
a.16b	Solar Irradiance NIMBUS 7 Channel 10C (The Eppley Labs)		11/78 - present
A.17	Interplanetary Magnetic Field		
	Pioneer 8, 1967-123A		10/72 -
	Pioneer 9, 1968-100A		4/72 -
	Pioneer 12, 1978-051A		9/79 - present
A.17c	Inferred Interplanetary Magnetic Field		12/71 - present
A.18	Interplanetary Electric Field		
	Pioneer 8, 1967-123A		5/72 - 10/77
	Pioneer 9, 1968-100A		1/73 - 4/80

B. Ionospheric (and Radio Wave Propagation) Phenomena

B.10	Radar Meteor Indices, perpetual, based upon 1958-1962 data for N45 latitude -- see issues 246, 251	
B.51aa	NARWS Quality Figures and Forecasts (NBS/ESSA)	7/57 - 12/65
B.51ab	NARWS Comparison Graphs (NBS/ESSA)	7/57 - 12/65
B.51ba	NPRWS Quality Figures and Forecasts (NBS)	7/57 - 12/65
B.51bb	NPRWS Comparison Graphs (NBS)	7/57 - 10/64
B.51ca	High Latitude Quality Figures and Forecasts (ESSA/OT)	11/64 - 9/76
B.51cb	High Latitude Comparison Graphs (ESSA/OT)	11/64 - 11/73
B.52	North Atlantic Graphs of Useful Frequency Ranges (German PTT)	7/57 - present
B.53	Quality Figures Based Upon Frequency Ranges (German PTT)	1/70 - present

C. Flare-Associated Events

C.1a	H-alpha Solar Flares (Preliminary)	7/57 - present
C.1ba	H-alpha Solar Flares (including Standardization Data) (Divided into Confirmed and Unconfirmed Flares from 1/68-12/74)	9/66 - present
C.1c	H-alpha Subflares (included in C.1a and C.1b after 1/62)	7/57 - present
C.1d	H-alpha Flare Patrol (The most recent issue listed for a month contains the comprehensive flare patrol.)	7/57 - present
C.1e	H-alpha Flare Index (Daily)	9/69 - 1/82
C.1f	H-alpha Flare Index (by Region)	9/70 - 12/79
C.1g	Frequency of Occurrence of Confirmed Solar Flares	1/68 - 6/68
C.3a	2800 MHz (Ottawa) Outstanding Occurrences	7/57 - present
C.3aa	2800 MHz (Ottawa) Hours of Observation	7/57 - 12/65
C.3b	470 MHz (Boulder) Outstanding Occurrences	7/57 - 3/58
C.3c	167 MHz (Boulder) Outstanding Occurrences	7/57 - 10/60
C.3ca	167 MHz (Boulder) Hours of Observation	1/59 - 12/59
C.3d	200 MHz (Cornell) Outstanding Occurrences	7/57 - 12/58
C.3e	9530 MHz (USNRL) Outstanding Occurrences	2/58 - 4/59
C.3f	3200 MHz (USNRL) Outstanding Occurrences	2/58 - 4/59
C.3g	200 MHz (Hawaii) Outstanding Occurrences	6/59 - 8/59
C.3h	108 MHz (Boulder) Outstanding Occurrences	1/60 - 6/66
C.3ha	108 MHz (Boulder) Hours of Observation	1/60 - 12/65
C.3i	221 MHz (Boeing-Seattle) Outstanding Occurrences (Interferometric) - Changed to 223 MHz in May 1963	4/62 - 7/63 5/65 - 11/65
C.3j	107 MHz (Haleakala) Outstanding Occurrences	6/65 - 3/66
C.3k	10700, 2700, 960 MHz (Pennsylvania State Univ.) Outstanding Occurrences	7/64 - 5/75
C.3l	486 MHz (Washington State Univ.) Outstanding Occurrences	7/66 - 4/69
C.3m	18 MHz Bursts (Boulder) (reported with C.6 1/63 - 11/66, C.6ab prior to 1/63)	11/67 - 12/77
C.3n	35000, 15400, 8800, 4995, 2695, 1415, 606, 410, 245 MHz (AFCRL - Sagamore Hill) Outstanding Occurrences (15400 MHz began 11/67, 35000 MHz began early 1969 and was turned off in 1983, 245 MHz began early 1969, and 410 MHz began 1971)	1/66 - present
C.3p	184 MHz (Boulder) Outstanding Occurrences	3/67 - 7/72
C.3q	7000 MHz (Sao Paulo) Outstanding Occurrences	11/67 - present
C.3r	408 MHz (San Miguel) Outstanding Occurrences	10/67 - 4/72
C.3s	18 MHz (McMath-Hulbert) Bursts	1/68 - 9/79
C.3t	43.25, 80 and 160 MHz (Culgoora) Selected Bursts	12/72 - 1/79

Note: Beginning with the data for April 1966, in CRPL-FB-261, the C.3 entries on Solar Radio Outstanding Occurrences for the Western Hemisphere observatories and frequencies were combined into a single table "Solar Radio Emission Outstanding Occurrences, C.3." Beginning with June 1969 data, the table was expanded to worldwide coverage, and the various observatories are no longer indexed separately.

C.4aa	Solar Radio Spectrograms of Events (Fort Davis)	
	100 - 580 MHz	7/57 - 12/58
	25 - 580 MHz	1/59 - 12/62
	50 - 320 MHz	1/63 - 3/65
	25 - 320 MHz	4/65 - 12/66
	10 - 580 MHz	1/67 - 2/70
	10 - 1000 MHz	3/70 - 4/70
	10 - 2000 MHz	5/70 - 5/73
	10 - 4000 MHz	5/73 - 3/74
	25 - 320 MHz	4/74 - 12/77
	25 - 580 MHz	1/78 - 12/82
C.4ab	2100-3900 MHz Solar Radio Spectrograms of Events (Fort Davis)	1/60 - 12/61
C.4b	Solar Radio Spectrograms of Events (Boulder)	
	7.6 - 41 MHz	3/61 - 8/68
	7.6 - 80 MHz	9/68 - 6/76
C.4c	450-1000 MHz Solar Radio Spectrograms of Events (Owens Valley)	11/60 - 10/61
C.4d	Solar Radio Spectrograms of Events (Culgoora)	
	10 - 210 MHz	1/67 - 7/69
	8 - 2000 MHz	8/69 - 2/70
	8 - 4000 MHz	3/70 - 10/70
	8 - 8000 MHz	11/70 - present
C.4e	30-1000 MHz Solar Radio Spectrograms of Events (Weissenau, GFR)	3/68 - present
C.4f	Solar Radio Spectrograms of Events (AFCRL - Sagamore Hill)	
	19 - 41 MHz	1/68 - 7/70
	24 - 48 MHz	7/70 - 7/75
	25 - 75 MHz	8/75 - 12/83
	30 - 80 MHz	1/84 - present

C.4g	20-60 MHz Solar Radio Spectrograms of Events (Clark Lake)	4/70 - 9/70
C.4h	160-320 MHz Solar Radio Spectrograms of Events (Dwingeloo)	1/74 - 5/81
C.4i	100-1000 MHz Solar Radio Spectrograms of Events (Durnten/Bleien)	1/74 - present
C.4j	24-48 MHz Solar Radio Spectrogram of Events (Manila)	4/74 -
C.4k	25-75 MHz Solar Radio Spectrograms of Events (Learmonth)	8/79 - present
C.4l	25-75 MHz Solar Radio Spectrograms of Events (Palehua)	8/79 - present
C.5a	Solar X-ray Events (Vela 1,2; 1963-39A,C)	(10/63)
C.5b	Solar X-ray Events (Univ. of Iowa)	
	Explorer 33; 1966-58A (2-12A)	7/66 - 10/71
	Explorer 35; 1967-70A (2-12A)	12/67 - 7/72
C.5c	Solar X-ray Events (NRL Tabulation)	1/64 - 10/64
	(See A.11ab for NRL Graphs and list of satellites) and	3/65 - 10/79
C.5d	Solar X-ray Events (McMath-Hulbert) OSO-3; 1967-20A (8-12A)	3/67 - 8/67
C.5e	Solar X-ray Events (SMS-1/GOES, 1974-033A; SMS-2/GOES, 1975-011A; GOES 2 1977-048A) See A.11g	11/74 - present
C.5f	Solar X-ray Events (OSO-8, 1975-057A) (Columbia University)	7/76 - 9/77
C.6	Sudden Ionospheric Disturbances (SID)	1/63 - present
C.6aa	Sudden Ionospheric Disturbances (SWF) (included with C.6 after 12/62)	7/57 - present
C.6ab	Sudden Ionospheric Disturbances (SCNA, SEA bursts) "	1/58 - present
C.6ac	Sudden Ionospheric Disturbances (SPA) "	6/61 - present
C.7	Solar Proton Events--Direct Measurement--same as A.12	5/67 - present
C.8	Solar Proton Events--Riometer	1/67 - 6/67
C.8ba	Solar Protons, 26 MHz Riometer Events (South Pole) Provisional	9/63 - 11/67
C.8bc	Solar Protons, 30 MHz Riometer Events (Frobisher Bay)	1/65 - 5/65
C.8be	Solar Protons, 30 MHz Riometer Events (Great Whale River)	6/65 - 2/67

D. Geomagnetic and Magnetospheric Phenomena

D.1a	Geomagnetic Indices Ci, Ks, Kn, Km, Cp, Kp, Ap, aa, Selected Days (aa first published 1/74; Ks, Kn, Km first published 12/75; Ci discontinued 8/75)	7/57 - present
D.1b	27-day Chart of Kp for Year	7/57 - present
D.1ba	27-day Chart of Kp Indices	7/57 - present
D.1c	27-day Chart of C9 for Year	7/57 - present
D.1ca	aa graph 1868 - 1979 in SGD 426A137	
D.1d	Principal Magnetic Storms	7/66 - present
D.1e	Reduced Magnetograms	1/67 - 12/80
D.1f	Sudden Commencements and Solar Flare Effects	1/66 - present
D.1g	Equatorial Indices Dst	5/73 - present
D.1h	Geomagnetic Substorm Log (Boulder)	3/78 - present

F. Cosmic Rays

F.1a	Cosmic Ray Daily Averages Neutron Monitors (Deep River--graph of hourly values, daily averages begin 11/65)	1/59 - present
F.1b	Cosmic Ray Daily Averages Neutron Monitors (Climax)	9/60 - 3/72
	Daily Averages and Graph of hourly values	12/74 - present
F.1c	Cosmic Ray Daily Averages Neutron Monitors (Dallas)	1/64 - 3/74
F.1d	Cosmic Ray Daily Averages Neutron Monitors (Churchill)	5/64 - 6/72
F.1e	Cosmic Ray Daily Averages Neutron Monitors (Alert)	3/74 - present
	Graph of hourly values (Alert)	7/66 - present
F.1f	Cosmic Ray Daily Averages Neutron Monitors (Calgary--also graph of hourly values) (closed in 1978)	1/71 - 10/77
F.1g	Cosmic Ray Daily Averages Neutron Monitors (Sulphur Mountain--also graph of hourly values) (closed in 8/78)	1/71 - 10/77
F.1h	Cosmic Ray Daily Averages Neutron Monitors (Thule--also graph of hourly values) (closed 6/76 - 6/78)	4/73 - present
F.1i	Cosmic Ray Daily Averages Neutron Monitors (Tokyo--also graph of hourly values)	12/73 - present
F.1j	Cosmic Ray Daily Averages Neutron Monitors (Kiel--also graph of hourly values)	12/73 - present
F.1k	Cosmic Ray Daily Averages Neutron Monitors (Kula--also graph of hourly values)	5/77 - 2/80
F.1l	Cosmic Ray Daily Averages Neutron Monitors (Huancayo--also graph of hourly values)	1/79 - present
F.1m	Cosmic Ray Daily Averages Neutron Monitors (Predigtstuhl)	11/83 - present

H. Miscellaneous

H.60	Alert and Special World Interval Decisions (IUWDS Geophysical Alerts)	7/57 - present
H.61	International Geophysical Calendar	1/62 - 12/62
H.62	Abbreviated Calendar Record (temporarily suspended)	12/68 - 3/79
H.63	Retrospective World Intervals	1/66 - 12/67

Key	1957 Jul	Aug	Sep	Oct	Nov	Dec	1958 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.2a	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173
A.2b	166	166	166	166	166	166	175	175	175	175	175	175	175	175	175	175	175	175
A.2c	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174
A.5a	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173
A.7	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173
			165	165	165	165	165	171	171	171	171	171	171					
							171											
A.8aa	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173
A.8b	156	157	158	159	161	162	163	164	165									
A.8c	156	157	158	159	162	162	163	164	165	167	168	169	170	172	173	174	175	176
A.8d	156	157	158	159	160	161	163	163	164	165	167	167	168	169	170	171	172	173
A.8e								176	175	174	172	170	170	170	170	171	172	173
A.8f								176	175	174	172	170	170	170	170	171	172	173
A.10a	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	171	172	173
B.51aa	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174
B.51ab	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174
B.51bb	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174
B.52	157	159	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174
C.1a	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173
	166	167	168	168	169	169	170	170	171	171	172	172	173	173	174	174	175	175
	169	174	174	174	161	174	174		174	174	174					176		
	174		175		174													
C.1c	156	157	158	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174
C.1d	158	158	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173
	166	167	168	168	169	169	170	170	171	171	172	172	173	173	174	174	175	175
	176	176	176	176	176	176	176	176	176	176								
C.3a	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173
C.3aa	158	158	158	161	161	161	164	164	164	167	167	167	170	170	170	173	173	173
C.3b	156	157	159	159	161	162	163	164	165									
C.3c	156	157	159	159	162	162	163	164	165	168	169	169	170	172	173	174	175	176
C.3d	156	157	158	159	160	161	163	163	164	165	167	167	168	169	170	171	172	173
C.3e								176	175	174	172	170	170	170	170	171	172	173
C.3f								176	175	174	172	170	170	170	170	171	172	173
C.4aa												174	168	169	170	171	172	174
C.6aa	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174
C.6ab									171	172	173	174	175	176	177	178	178	179
D.1a	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174
D.1b	174	174	174	174	174	174	174	174	174	174	174	174	174	174	174	174	174	174
D.1c	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190
H.60	158	158	158	159	160	161	162	163	164	165	165	167	168	168	170	171	172	173
										166	166			169				

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Key	1959 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1960 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.2a	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197
A.2b	187	187	187	187	187	187	187	187	187	187	187	187	199	199	199	199	199	199	199	199	199	199	199	199
A.2c	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
A.5a	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197
A.7a	174	175	176	177	178	179	180	181	183	183 185	184 185	185	186	187	188	189	190	191	192	193	194	195	196	197
A.7b													189	189	189	193	193	193	196	196	196	199	199	199
A.8aa	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197
A.8e	174	175	176	177																				
A.8f	174	175	176	177																				
A.9a																196	197	199	210	211	212	212	212	
A.10a	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197
B.51aa	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
B.51ab	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
B.51ba	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
B.51bb	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
B.52	175	176	177	178	179	180	181	182	183	184	185	186	187	188	190	190	191	192	193	194	195	196	197	198
C.1a	174 176 178 185	175 178 185	176 179 185	177 180 185	178 181 185	179 182 185	180 183 185	181 184 185	182 185	183 186	184 187 191	185 188 189 191	186 189 191 194	187 190 191 194 196	188 191 194	189 192 194	190 193 201	191 194 195 201	192 195 201	193 196 201	194 197 201	195 198 199 201	196 199 201	197 200 201
C.1c	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
C.1d	174 176 178 185	175 178 185	176 179 185	177 180 185	178 181 185	179 182 185 200	180 183 185	181 184 185	182 185	183 186	184 187 191	185 188 191	186 189 191	187 190 191	188 191	189 192	190 193 202	191 194 202	192 195 202	193 196 202	194 197 202	195 198 202	196 199 202	197 200 202
C.3a	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197
C.3aa	176	176	176	179	179	179	182	182	182	185	185	185	188	188	188	191	191	191	194	194	194	197	197	197
C.3c	176	177	178	178	179	180	180	181	182	183	184	185	195	195	195	195	195	195	195	195	195	195		
C.3ca	182	182	182	182	182	182	182	182	182	183	184	185												
C.3e	174	175	176	177																				
C.3f	174	175	176	177																				
C.3g						180	182	185																
C.3h													186	187	188	189	190	191	192	193	194	195	196	197
C.4aa	182	182	182	184	184	184	188	188	188	192	192	192	197	197	197	198	198	198	199	199	199	200	200	200
C.4ab													197	197	197	198	198	198	199	199	199	200	200	200
C.4c																							197	197
C.6aa	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
C.6ab	180	181	182	183	184	184	184	185	186	187	187	188	188	189	189	190	191	192	193	194	195	196	197	198
D.1a	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198
D.1b	186	186	186	186	186	186	186	186	186	186	186	186	198	198	198	198	198	198	198	198	198	198	198	198
D.1c	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	190	226	226	226	226	226	226	226	226
F.1a	195	195	195	195	195	195	195	195	195	195	195	195	195	195	195	195	195 205	195	195	195	195	196	197	198
F.1b																					195	196	197	198
H.60	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197

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Key	1961 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1962 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.2a	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221
A.2b	211	211	211	211	211	211	211	211	211	211	211	211	223	223	223	223	223	223	223	223	223	223	223	223
A.2c	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222
A.3b													210	211	212	213	214	215	216	217	218	219	220	221
A.5a	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221
A.7a	199	200	200	201	202	203	205	206	207	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221
A.7b	204	204	204	205	205	205	208	208	208	212	212	212	213	213	213	216	216	216	220	220	220	226	226	226
A.8aa	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221
A.8ab													223	223	223	223	223	223	223	223	223	223	223	223
A.9a		213	213													213	214	215	216	217	218	219	220	221
A.10a	198	200	201	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	219	219	220	221
A.11b						249	249	249	249	249	249	249												
B.51aa	199	200	201	202	203	204	205	206	207	208	209	210	222	212	213	214	215	216	217	218	219	220	221	222
B.51ab	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222
B.51ba	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222
B.51bb	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222
B.52	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222
C.1a	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221
C.1a	201	202	203	204	205	206	207	208	210	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224
C.1a	208	208	208	208	208		208																	
C.1c	199	200	201	202	203	204	205	206	207	208	209	210	211	included in C.1a after Jan. 1962										
C.1d	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221
C.1d	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224
C.1d	208	208	208	208	208		208																	
C.1d	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221
C.3a							206		209		209													
C.3aa	200	200	200	203	203	203	206	206	206	209	209	209	212	212	212	215	215	215	218	218	218	221	221	221
C.3h	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221
C.3ha													210	211	212	213	214	215	216	217	218	219	220	221
C.3I													-	-	-	221	221	221	221	221	221	221	221	221
C.4aa	203	203	203	204	204	204	208	208	208	209	209	209	213	213	213	216	216	216	219	219	219	222	222	222
C.4ab	203	203	203	204	204	204	208	208	208	209	209	209												
C.4b			207	207	207	207	207	207	207	207	208	209	210	211	·212	213	214	215	216	217	218	219	220	221
C.4c	198	201	202	202	202	203	207	207	207	207	207													
C.6aa	199	200	201	202	203	204	207	206	207	208	209	210	211	212	213	214	215	216	219	219	219	220	221	222
C.6ab	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	219	219	219	220	221	222
C.6ac						204	205	206	207	208	209	210	211	212	213	214	215	216	219	219	219	220	221	222
D.1a	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222
D.1b	208	208	208	208	208	208	208	208	208	208	208	208	221	221	221	221	221	221	221	221	221	221	221	221
D.1c	226	226	226	226	226	226	226	226	226	226	226	226	226	233	233	233	233	233	233	233	233	233	233	233
F.1a	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	223	223	223	223	223	223	233	222
F.1a						205																		
F.1b	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222
H.60	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221
H.61													207	207	207	207	207	207	207	207	207	207	207	207

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Key	1963 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1964 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.2a	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245
A.2b	235	235	235	235	235	235	235	235	235	235	235	235	247	247	247	247	247	247	247	247	247	247	247	247
A.2c	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246
A.3b	222	223	224	225	none	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245
A.5a	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245
A.7a	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245
A.7b	226	226	226	228	228	228	231	231	231	234	234	234	237	237	237	240	240	240	243	243	243	248	248	248
A.8aa	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245
A.8ab	233	233	233	233	233	233	233	233	233	233	233	233	245	245	245	245	245	245	245	245	245	245	245	245
A.8ac													240	240	240	240	240	240	240	241	242	243	244	245
A.8ad													245	245	245	245	245	245	245	245	245	245	245	245
A.9a	222	–	–	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245
A.9b																								250
A.10a	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245
A.11aa													243 -	247	247	241 249	241 255	241 264	244 266	244 266	245	245		
A.11c										249														
B.51aa	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246
B.51ab	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246
B.51ba	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244		
B.51bb	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244		
B.51ca																							245	246
B.51cb																							245	246
B.52	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246
C.1a	222 225	223 226	224 227	225 228	226 229	227 230	228 231	229 232	230 233	231 234	232 235	233 236	234 237 240	235 238 240	236 239 240	237 240	238 241	239 242	240 243	241 244	242 245	243 246	244 248	245 248
C.1d	222 225	223 226	224 227	225 228	226 229	227 230	228 231	229 232	230 233	231 234	232 235	233 236	234 237	235 238	236 239	237 240	238 241	239 242	240 243	241 244	242 245	243 246	244 248	245 248
C.3a	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245
C.3aa	224	224	224	227	227	227	230	230	230	233	233	233	236	236	236	239	239	239	242	242	242	245	245	245
C.3h	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245
C.3ha	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245
C.3l	222	223	224	225	229	229	229																	
C.3k																			252	252	252	252	252	252
C.4aa	225	225	225	228	228	228	230	230	230	234	234	234	237	237	237	240	240	240	243	243	243	246	246	246
C.4b	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245
C.5a										249														
C.6	223	224	225	226	227	228	229 230	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246
	231	231	231	231	231	231	231	231																
C.8ba									231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246
D.1a	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246
D.1b	233	233	233	233	233	233	233	233	233	233	233	233	245	245	245	245	245	245	245	245	245	245	245	245
D.1c	233	233	233	233	233	233	233	233	233	233	233	233	245	245	245	245	245	245	245	245	245	245	245	245
F.1a	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246
F.1b	223	224	225	226	227	228	229	230	231 234	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246
F.1c													243	243	243	243	243	243	243	243	243	244	245	246
F.1d																	243	243	243	243	243	244	245	246
H.60	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245

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Key	1965 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1966 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.2a	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269
A.2b	258	258	258	258	258	258	258	258	258	258	258	258	271	271	271	271	271	271	271	271	271	271	271	271
A.2c	247	248	249	250	251	252	253	254	255	256	257	257	258	259	260	261	262	263	264	265	266	267	268	269
A.3a																					269	269	269	270
A.3b	246	247	248	259	---	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269
A.5a	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269
A.7a	247	248	248	249	250	251	253	253	---	256	257	257	258	259	260	261	262							
A.7b	249	249	249	252	252	252	256	256	256	258	258	258	261	261	261	264	264	264	267	267	267	270	270	270
A.8aa	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269
A.8ab	257	257	257	257	257	257	257	257	257	257	257	257	269	269	269	269	269	269	269	269	269	269	269	269
A.8ac	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269
A.8ad	257	257	257	257	257	257	257	257	257	257	257	257	269	269	269	269	269	269	269	269	269	269	269	269
A.9a	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269
A.9b	250	250	254	254	257	257	257	259	260	263	263	263	263	263	263	266	266	266	267	267	267	268	---	269
A.10a	246	---	---	---	---	---	---	253	254	255	257	257	258	259	260	261	262	263	264	265	266	267	268	269
A.10b											257	257	258	259	260	261	262	263	264	265	266	267	268	269
A.10c										255	256	257	258	259	260	261	262	263	264	265	266	267	268	269
A.10d																261	262	263	264	265	266	267	268	269
A.11aa			279	279	279	279	279	279	279	279	276	276	276	276	264	276	276	264	265	267	267	269	269	269
A.11ab			286	286	286	286	286	286	286	286										279		272	273	274
A.11ac												270	270	270	270	270	271	271	271	271	271	271	271	271
A.11ad																267	267							
A.11ae													261	261	261	261	262	263	264	265	266	---	272	---
A.13a												306	306	306	306	306	306	306	306	306	306	306	306	306
B.51aa	247	248	249	250	251	252	253	254	255	256	257	258												
B.51ab	247	248	249	250	251	252	253	254	255	256	257	258												
B.51ba	247	248	249	250	251	252	253	254	255	256	257	258												
B.51ca	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
B.51cb	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
B.52	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
C.1a	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269
	249	250	251	252	253	255	255	256	257	258	259	260	261	262	263	264	265	266	267	268				
														266		266	266			270				
																268								
C.1ba																					269	272	273	274
																					271			
C.1d	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269
	249	250	251	252	253	255	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	272	273	274
																				270	271			
C.3a	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269
C.3aa	248	248	248	251	251	251	254	254	254	257	257	257												
C.3h	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	---	---	---	---	---	---
C.3ha	246	247	248	249	250	251	252	253	254	255	256	257												
C.3i					251	252	253	253	254	255	256													
C.3j						252	253	253	254	255	256	257	258	---	261	---	---	---	---	---	---	---	---	---
C.3k	252	252	252	256	256	256	263	263	263	263	263	263	258	259	260	261	262	263	264	265	266	267	268	269
C.3l																			264	265	266	267	268	269
C.3n													260	260	260	261	262	263	264	265	266	267	268	269
C.4aa	249	249	249	252	252	252	255	255	255	258	258	258	261	261	261	264	264	264	267	267	267	270	270	270
C.4b	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269
C.5b																			275	275	275	275	275	277
C.5c			279	279	279	279	279	279	279	279	276	276	276	276	264	276	276	264	265	267	267	269	269	269
C.6	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
C.8bc	247	248	249	250	251																			
C.8be						252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
D.1a	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
D.1b	258	258	258	258	258	258	258	258	258	258	258	258	270	270	270	270	270	270	270	270	270	270	270	270
D.1c	258	258	258	258	258	258	258	258	258	258	258	258	270	270	270	270	270	270	270	270	270	270	270	270
D.1d																			270	270	270	270	270	270
D.1f													270	270	270	270	270	270	270	270	270	273	273	273
F.1a	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
F.1b	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270
F.1c	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	275	275	275	275	275	275			
F.1d	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	274	274	274	274	274	274	274	274	274
F.1e																			265	266	267	268	269	270
H.60	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269
H.63													282	282	282	282	282	282	282	282	282	282	282	282

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Key	1967 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1968 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.1	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
A.2a	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293
A.2b	282	282	282	282	282	282	282	282	282	282	282	282	295	295	295	295	295	295	295	295	295	295	295	295
A.2c	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293
A.3a	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
A.3b	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293
A.4	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
A.5	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
A.5a	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293
A.7b	271	272	273	275	275	276	277	278	279	280	282	282	283	284	285	286	287	288	289	290	291	292	293	294
A.8aa	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293
A.8ac	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293
A.8g	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293
A.9a	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
A.9b	271	272	273	274	275	276	277	278	---	280	281	282	283	284	285	286	---	288	281	290	291	292	293	294
A.10a	270	271	272	273	---	---	277	277	279	279	280	---	---	---	284	285	287	287	288	289	290	291	292	293
A.10b	270	271	272	273	275	275	276	277	279	279	280	281	282	283	284	285	287	287	288	289	290	291	292	293
A.10c	270	271	272	273	274	275	276	277	278	280	280	281	282	283	284	285	286	287	288	289	290	291	292	293
A.10d	270	271	272	273	274	275	276	277	278	280	280	281	282	283	284	285	286	287	288	289	290	291	292	293
A.10e													---	---	---	---	---	287	288	289	290	291	292	293
A.11aa	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
A.11ab	275	276	277	278	279	280	281	---	---	---	---	---												
A.11ac	271	272	273	274	275	---	---	278	279	280	281	---	---	---	---	---	---	288	289	290	291	292	293	---
A.11ae	---	272	273	274	---	276	277	---	279	280	---	---	---	---	---	---	---	288	289	290	291	292	293	---
A.11d	---	---	278	279	279	280	281	282	---	---	---	---												
A.12aa					282	282	282	282	283	284	285	286	287	288	289	290	291	292	293	298	298	298	300	301
A.12ab					282	282	282	282	283	284	285	286	287	288	289	290	291	292	293	298	298	298	300	301
A.13a	305	305	305	305	305	305	305	305	305	305	281	281	282	283	284	285	286	287	288	289	290	291	292	293
B.51ca	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
B.51cb	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
B.52	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
C.1a	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293
C.1ba	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298
			278																					
C.1d	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293
	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298
C.1g													295	295	295	295	295	295						
C.3a	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293
C.3k	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293
C.3l	270	271	272	273	274	275	276	277	278	279	280	281	---	283	284	---	---	---	---	---	290	291	---	293
C.3m											280	281	282	283	284	285	286	287	288	289	290	291	292	293
C.3n	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293
C.3p	---	---	272	273	274	275	276	277	278	279	280	281	282	---	---	---	---	---	288	289	290	291	292	293
C.3q											280	281	282	283	284	285	286	287	288	289	290	291	292	293
C.3r										279	280	281	282	283	284	285	286	287	288	289	290	291	292	293
C.3s													282	---	284	285	286	287	288	289	290	291	292	293
C.4aa	277	277	277	277	277	277	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
C.4b	270	271	272	273	274	275	276	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
C.4d	277	277	277	277	277	277	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
C.4e													---	---	285	286	287	288	289	290	291	292	293	294
C.4f													283	284	285	286	287	288	289	290	291	292	293	294
C.5b	278	278	278	280	280	281	281	283	283	284	285	287	287	288	289	290	291	292	293	294	295	296	297	299
C.5c	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
C.5d	---	---	278	279	279	280	281	282	---	---	---	---												
C.6	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	287	288	289	290	291	292	293
													287	288	289	290	291	292	293	294	295	296	297	298
C.8	284	284	284	284	284	284	---	---	---	---	---	---												
C.8ba	---	---	273	274	275	276	277	278	279	280	281	---												
C.8be	271	272	---	---	---	---	---	---	---	---	---	---												
D.1a	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
D.1b	282	282	282	282	282	282	282	282	282	282	282	282	294	294	294	294	294	294	294	294	294	294	294	294
D.1c	282	282	282	282	282	282	282	282	282	282	282	282	294	294	294	294	294	294	294	294	294	294	294	294
D.1d	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
D.1e	297																					298	298	
D.1f	277	277	277	280	280	280	283	283	283	285	285	285	290	290	290	291	291	291	295	295	295	296	296	296
F.1a	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
F.1b	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
F.1c	288	288	288	288	288	288	288	288	288	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294
F.1d	288	288	288	288	288	288	288	288	288	288	288	282	288	284	285	286	287	288	289	290	291	292	293	294
F.1e	271	272	273	274	275	276	277	278	279	280	281	282	---	284	285	286	287	288	289	290	291	292	293	294
H.60	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293
H.62	---	---	---	---	---	---	---	---	---	---	---	---												
H.63	282	282	282	282	282	282	282	282	282	282	282	282	---	---	---	---	---	---	---	---	---	---	---	299

*See "Key" on pages 56-59.

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Key*	1969 Jan Serial		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
	#	page	#	page	#	page	#	page	#	page	#	page	#	page	#	page	#	page	#	page	#	page	#	page
A.1	295		296		297		298		299	41	300	31	301	32	302	34	303	34	304	36	305	28	306	28
A.2a	294		295		296		297		298		299	7	300	7	301	7	302	7	303	7	304	7	305	7
A.2b	307	6	307	6	307	6	307	6	307	6	307	6	307	6	307	6	307	6	307	6	307	6	307	6
A.2c	294		295		296		297		298		299	7	300	7	301	7	302	7	303	7	304	7	305	7
A.3a	295		296		297		298		299	41	300	31	301	32	302	34	303	34	304	36	305	28	306	28
A.3b	295		296		297		298		299	72	300	61	301	69	302	71	303	69	304	73	305	63	306	65
A.4	295		296		297		298		299	41	300	31	301	32	302	65	303	64	304	67	305	58	306	59
A.5	295		296		297		298		299	41	300	31	301	32	302	34	303	34	304	36	305	28	306	28
A.5a	295		296		297		298		299	72	300	61	301	69	302	71	303	69	304	73	305	63	306	65
A.7b	295		296		297		298		299	41	300	31	301	32	302	34	303	34	304	36	305	28	306	28
A.8aa	294		295		296		297		298		299	7	300	7	301	7	302	7	303	7	304	7	305	7
A.8ac	294		295		296		297		298		299	7	300	7	301	7	302	7	303	7	304	7	305	7
A.8g	294		295		296		297		298		299	7	300	7	301	7	302	7	303	7	304	7	305	7
A.9a	295		296		297		298		299	41	300	31	301	32	302	34	303	34	304	36	305	28	306	28
A.9b	295		296		297		298		299	41	300	31	301	32	302	34	303	34	304	36	305	28	306	28
A.10a	294		295		296		297		298		299	29	300	20	301	22	302	21	303	23	304	25	305	19
A.10b	294		295		296		297		298		299	28	300	19	301	21	302	20	303	22	304	24	305	18
A.10c	294		295		296		297		298		299	31	300	22	301	24	302	23	303	25	304	27	305	21
A.10d	294		295		296		297		298		299	32	300	23	301	25	302	24	303	26	304	28	305	22
A.10e	294		295		296		297		298		299	30	300	21	301	23	302	22	303	24	304	26	305	20
A.11aa	295		296		297		298		299	84	300	71	301	78	302	81	303	79	304	83	305	73	306	74
A.11ab	299B	58	300B	60	301B	86	302B	64	303B	80	304B	77	305B	46	306B	52	307B	55	308B	65	309B	63	310B	36
A.11e	---		---		---		---		---		---		301	64	302	34	303	34	304	36	305	28	306	28
A.12aa	301B	120	301B	126	303B	112	303B	118	303B	96	304B	92	305B	62	306B	68	307B	70	308B	81	309B	78	310B	52
A.12ab	301B	121	301B	127	303B	113	303B	119	303B	97	304B	93	305B	63	306B	69	307B	70	308B	82	309B	79	310B	53
A.12ba	---		---		296		297		298		299	37	300	27	301	29	302	29	303	31	304	31	305	25
A.12bb	---		---		---		---		---		---		---		---		---		---		---		305	26
A.13a	294		295		296		297		298		299	33	300	24	301	26	302	25	303	27	304	29	305	23
A.13b	---		---		296		297		298		299	34	300	25	301	27	302	26	303	28	306B	99	306B	100
A.13c	294		295		296		297		298		299	36	300	26	301	28	302	28	303	30	304	30	305	24
B.51ca	295		296		297		298		299	104	300	88	301	94	302	95	303	95	304	100	305	92	306	92
B.51cb	295		296		297		298		299	105	300	89	301	95	302	96	303	96	304	101	305	93	306	93
B.52	295		296		297		298		299	106	300	90	301	96	302	97	303	97	304	102	305	94	306	94
B.53	---		---		---		--		---		---		---		---		---		---		---		306	96
C.1a	294		295		296		297		298		299	10	300	10	301	10	302	10	303	10	304	10	305	10
C.1ba	299B	10	300B	4	301B	4	302B	4	303B	4	304B	5	305B	4	306B	4	307B	4	308B	4	309B	4	310B	4
C.1d	294		295		296		297		298		280	18	399	15	301	14	302	14	303	15	304	13	305	12
	299B	35	300B	29	301B	35	302B	37	303B	48	304B	43	305B	30	306B	34	307B	34	308B	38	309B	33	310B	23
C.1e	---		---		---		---		---		---		---		---		307B	24	308B	27	309B	23	310B	17
C.3	299B	41	300B	38	301B	51	302B	45	303B	57	304B	51	305B	34	306B	35	307B	35	308B	39	309B	34	310B	24
C.3a	294		295		296		297		298		(-- See C.3 --)													
C.3k	294		295		296		297		298		(-- See C.3 --)													
C.3l	---		---		---		297		---		---		---		---		---		---		---		---	
C.3m	294		295		296		297		298		(-- See C.3 --)													
C.3n	294		295		296		297		298		(-- See C.3 --)													
C.3p	294		295		296		297		298		(-- See C.3 --)													
C.3q	294		300B	38	296		297		298		(-- See C.3 --)													
C.3r	294		295		296		297		298		(-- See C.3 --)													
C.3s	294		295		296		297		298		(-- See C.3 --)													
C.4aa	295		296		297		298		299	87	300	74	301	81	302	84	303	82	304	86	305	77	306	79
C.4b	295		296		297		298		299	87	300	74	301	81	302	84	303	82	304	86	305	77	306	79
C.4d	295		296		297		298		299	87	300	74	301	81	302	84	303	82	304	86	305	77	306	79
C.4e	295		296		297		298		299	87	300	74	301	81	302	84	303	82	304	86	305	77	306	79
C.4f	295		296		297		298		299	87	300	74	301	81	302	84	303	82	304	86	305	77	306	79
C.5b	299B	57	300B	58	302B	89	303B	108	304B	104	304B	76	305B	45	306B	51	311B	53	311B	71	312B	86	312B	88
C.5c	295		296		297		298		299	86	300	73	301	80	302	83	303	81	304	85	305	75	306	76
C.6	294		295		296		297		298		299	19	300	16	301	15	302	15	303	16	304	14	305	13
	299B	36	300B	30	301B	36	302B	38	303B	49	304B	44	305B	31	306B	74	---		---		---		306	77
D.1a	295		296		297		298		299	100	300	84	301	90	302	92	303	92	304	97	305	89	306	87
D.1b	306	89	306	89	306	89	306	89	306	89	306	89	306	89	306	89	306	89	306	89	306	89	306	89
D.1c	306	90	306	90	306	90	306	90	306	90	306	90	306	90	306	90	306	90	306	90	306	90	306	90
D.1d	295		296		297		298		299	102	300	86	301	92	302	94	303	94	304	99	305	91	306	91
D.1e	---		300B	74	301B	102	302B	79	303B	98	304B	94	305B	68	306B	74	307B	76	---		309B	84	310B	58
D.1f	300B	84	300B	84	300B	84	303B	110	303B	110	303B	110	304B	107	304B	107	304B	107	307B	88	307B	88	307B	88
F.1a	295		296		297		298		299	98	300	82	301	88	302	90	303	90	304	95	305	87	306	85
F.1b	295		296		297		298		299	98	300	82	301	88	302	90	303	90	304	95	305	87	306	85
F.1c	295		296		297		298		299	98	300	82	301	88	302	90	---		---		---		---	
F.1d	295		296		297		298		299	98	300	82	301	88	302	90	---		---		---		---	
F.1e	295		296		297		298		299	99	300	83	301	89	302	91	303	91	304	96	305	88	306	86
H.60	294		295		296		297		298		299	5	300	5	301	5	302	5	303	5	304	4	305	5
H.62	300B	76	301B	107	302B	82	303B	101	304B	97	305B	70	306B	78	307B	80	308B	88	309B	88	310B	60	311B	62

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Key	1970 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.												
A.1	307 30	308 30	309 31	310 63	311 63	312 62	313 62	314 63	315 60	316 63	317 58	318 59
A.2a	306 7	307 7	308 7	309 7	310 7	311 7	312 7	313 7	314 7	315 7	316 7	317 7
A.2b	319 6	319 6	319 6	319 6	319 6	319 6	319 6	319 6	319 6	319 6	319 6	319 6
A.2c	306 7	307 7	308 7	309 7	310 7	311 7	312 7	313 7	314 7	315 7	316 7	317 7
A.3a	307 30	308 30	309 31	310 31	311 32	312 32	313 31	314 31	315 30	316 32	317 28	318 28
A.3b	307 67	308 63	309 68	310 73	311 74	312 72	313 73	314 74	315 70	316 74	317 68	318 70
A.4	307 61	308 58	309 62	310 63	311 63	312 62	313 62	314 63	315 60	316 63	317 58	318 59
A.5	307 30	308 30	309 31	310 33	311 32	312 32	313 31	314 31	315 30	316 32	317 28	318 28
A.5a	307 67	308 63	309 68	310 73	311 74	312 72	313 73	314 74	315 70	316 74	317 68	318 70
A.5b	---	---	---	---	---	---	---	---	---	---	---	318 77
A.7b	307 30	308 30	309 31	310 63	311 63	312 62	313 62	314 63	315 60	316 63	317 58	318 59
A.8aa	306 7	307 7	308 7	309 7	310 7	311 7	312 7	313 7	314 7	315 7	316 7	317 7
A.8ac	306 7	307 7	308 7	309 7	310 7	311 7	312 7	313 7	314 7	315 7	316 7	317 7
A.8g	306 7	307 7	308 7	309 7	310 7	311 7	312 7	313 7	314 7	315 7	316 7	317 7
A.9a	307 30	308 30	309 31	310 33	311 32	312 32	313 31	314 31	315 30	316 32	317 28	318 28
A.9b	307 30	308 30	309 31	310 33	311 32	312 32	313 31	314 31	315 30	316 32	317 28	318 28
A.9c	---	---	---	310 33	311 32	312 32	313 31	314 31	315 30	316 32	317 28	318 28
A.10a	306 14	307 17	308 17	309 18	310 18	311 21	---	---	314 18	315 17	316 17	318 97
A.10b	306 13	307 16	308 16	309 17	310 17	311 20	312 19	313 15	314 17	315 16	316 16	318 96
A.10c	306 16	307 19	308 19	309 20	310 20	311 23	312 21	313 17	314 20	315 19	316 19	317 18
A.10d	306 17	307 20	308 20	309 21	310 21	311 24	312 22	313 18	314 21	316 20	316 20	317 19
A.10e	306 15	307 18	308 18	309 19	310 19	311 22	312 20	313 16	314 19	315 18	316 18	317 17
A.11aa	307 77	308 73	309 78	310 84	311 84	312 83	313 83	314 85	315 81	316 82	317 77	318 78
A.11ab	311B 38	312B 56	313B 72	314B 61	315B 72	316B 99	317B 90	318B 68	319B 61	320B 65	321B 65	322B 66
A.11e	307 30	308 30	309 31	310 33	311 32	312 32	313 31	314 31	316B130	316 32	317 28	318 28
A.12aa	311B 54	312B 70	313B 88	314B 76	315B 88	316B114	317B106	323B 86	323B 92	323B 98	326B 74	326B 80
A.12ab	311B 55	312B 70	313B 89	314B 77	315B 89	316B115	317B107	323B 87	323B 93	323B 99	326B 75	326B 81
A.12ba	306 21	307 24	308 23	309 24	310 25	311 27	312 25	313 21	314 25	315 23	316 23	317 23
A.12bb	306 22	307 25	308 24	309 25	310 26	311 28	312 26	313 22	314 26	315 24	316 24	317 24
A.12c	306 24	307 27	308 26	309 27	310 28	311 30	312 28	313 24	314 28	315 26	316 26	317 25
A.13a	306 18	307 21	308 21	309 22	310 22	311 25	312 23	313 19	314 22	315 21	317 21	318 20
A.13b	306 19	307 22	---	---	---	---	---	---	---	---	---	---
A.13c	306 20	307 23	308 22	309 23	310 23	311 26	312 24	313 20	314 23	315 22	316 22	317 21
B.												
B.51ca	307 96	308 98	309 106	310 107	311 106	312 106	313 112	314 112	315 104	316 104	317 100	318 106
B.51cb	307 97	308 99	309 107	310 108	311 107	312 107	313 113	314 113	315 105	316 105	317 101	318 107
B.52	307 98	308 100	309 108	310 109	311 108	312 108	313 114	314 114	315 106	316 106	317 102	318 108
B.53	307 100	308 102	309 110	310 111	311 110	312 110	313 116	314 115	315 108	316 108	317 104	318 110
C.												
C.1a	306 10	307 10	308 10	309 10	310 10	311 10	312 10	313 10	314 10	315 10	316 10	317 10
C.1ba	311B 5	312B 4	313B 5	314B 5	315B 4	316B 5	317B 5	318B 4	319B 4	320B 4	321B 4	322B 4
C.1d	306 12	307 15	308 15	309 16	310 16	311 19	312 18	313 14	314 16	315 15	316 15	317 14
	311B 26	312B 34	313B 34	314B 38	315B 41	316B 52	317B 56	318B 44	319B 45	320B 47	321B 40	322B 38
C.1e	311B 19	312B 24	313B 25	314B 26	315B 29	316B 38	317B 40	318B 30	319B 32	320B 36	321B 32	322B 30
C.1f	---	---	---	---	---	---	---	319B 85	320B 91	321B 89	322B 91	323B 79
C.3	311B 27	312B 35	313B 35	314B 39	315B 42	316B 53	317B 57	318B 45	319B 46	320B 48	321B 41	322B 39
C.4aa	307 84	308 82	309 87	310 93	311 92	312 92	313 91	314 93	315 87	316 89	317 86	318 84
C.4b	307 84	308 82	309 87	310 93	311 92	312 92	---	---	---	---	317 86	318 84
C.4d	307 84	308 82	309 87	310 93	311 92	313B108	313 91	314 93	315 87	316 89	317 86	318 84
C.4e	307 84	308 82	309 87	311B 72	311 92	312 92	313 91	314 93	315 87	316 89	318B 96	318 84
C.4f	307 84	308 82	309 87	310 93	311 92	312 92	313 91	314 93	315 87	316 89	317 86	318 84
C.4g	---	308 82	309 87	310 93	312B 89	312 92	313 91	314 93	315 87	323B 83	---	---
C.5b	313B106	313B107	313B 70	314B 60	315B 71	316B 97	317B 88	318B 66	319B 60	320B 64	321B 64	323B 85
C.5c	307 79	308 76	309 80	310 86	311 86	312 85	313 85	314 87	315 83	316 84	317 79	318 80
C.6	307 80	308 77	309 82	310 88	311 87	312 87	313 87	314 89	315 84	316 85	317 81	318 81
D.												
D.1a	307 93	308 94	309 102	310 104	311 103	312 103	313 108	314 109	315 100	316 100	317 96	318 100
D.1b	318 102	318 102	318 102	318 102	318 102	318 102	318 102	318 102	318 102	318 102	318 102	318 102
D.1c	318 103	318 103	318 103	318 103	318 103	318 103	318 103	318 103	318 103	318 103	318 103	318 103
D.1d	307 95	308 96	309 104	310 106	311 105	312 105	313 110	314 111	315 102	316 102	317 98	318 104
D.1e	311B 60	---	313B 94	314B 82	315B 94	316B120	317B112	318B 84	---	320B 81	321B 80	322B 82
D.1f	310B 68	310B 68	310B 68	313B104	313B104	313B104	317B122	317B122	317B122	318B 94	318B 94	318B 94
F.												
F.1a	307 91	308 92	309 100	310 102	311 101	312 101	313 106	314 107	315 98	316 98	317 94	318 98
F.1b	307 91	308 92	309 100	310 102	311 101	312 101	313 106	314 107	315 98	316 98	317 94	318 98
F.1c	---	---	---	---	311 101	312 101	313 106	314 107	315 98	316 98	317 94	318 98
F.1d	---	---	---	---	311 101	312 101	313 106	314 107	315 98	316 98	317 94	318 98
F.1e	307 92	308 93	309 101	310 103	311 102	312 102	313 107	314 108	315 99	316 99	317 95	318 99
H.												
H.60	306 5	307 5	308 4	309 5	310 5	311 5	312 4	313 5	314 5	315 5	316 4	317 5
H.62	312B 78	313B 97	314B 85	315B 97	316B122	317B114	318B 86	319B 78	320B 84	321B 82	322B 84	323B 72

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Key	1971 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.												
A.1	319 62	320 59	321 64	322 61	323 60	324 62	325 63	326 61	327 58	328 60	329 58	330 58
A.2a	318 7	319 7	320 7	321 7	322 7	323 7	324 7	325 7	326 7	327 7	328 7	329 7
A.2b	331 6	331 6	331 6	331 6	331 6	331 6	331 6	331 6	331 6	331 6	331 6	331 6
A.2c	318 7	319 7	320 7	321 7	322 7	323 7	324 7	325 7	326 7	327 7	328 7	329 7
A.3a	319 31	320 31	321 33	322 31	323 29	324 32	325 32	326 30	327 28	328 29	329 28	330 27
A.3b	319 73	320 69	321 75	322 71	323 71	324 72	325 74	326 72	327 68	328 71	329 68	330 69
A.4	319 62	320 59	321 64	322 61	323 60	324 62	325 63	326 61	327 58	328 60	329 58	330 58
A.5	319 31	320 31	321 33	322 31	323 29	324 32	325 32	326 30	327 28	328 29	329 28	330 27
A.5a	319 73	320 69	321 75	322 71	323 71	324 72	325 74	326 72	327 68	328 71	329 68	330 69
A.5b	319 80	320 75	321 83	322 79	323 80	324 80	325 82	326 79	327 76	328 78	329 76	330 76
A.7b	319 62	320 59	321 64	322 61	323 60	324 62	325 63	326 61	327 58	328 60	329 58	330 58
A.8aa	318 7	319 7	320 7	321 7	322 7	323 7	324 7	325 7	326 7	327 7	328 7	329 7
A.8ac	318 7	319 7	320 7	321 7	322 7	323 7	324 7	325 7	326 7	327 7	328 7	329 7
A.8g	318 7	319 7	320 7	321 7	322 7	323 7	324 7	325 7	326 7	327 7	328 7	329 7
A.9a	319 31	320 31	321 33	322 31	323 29	324 32	325 32	326 30	327 28	328 29	329 28	330 27
A.9b	319 31	320 31	321 33	322 31	323 29	324 32	325 32	326 30	327 28	328 29	329 28	330 27
A.9c	319 31	320 31	321 33	322 31	325B 61	324 32	325 32	326 30	327 28	329 29	329 29	330 27
A.10a	318 15	319 15	320 16	321 16	322 15	323 15	324 18	325 18	---	---	333B 66	333B 67
A.10b	318 14	319 14	320 15	321 15	322 14	323 14	324 17	325 17	---	---	---	---
A.10c	318 17	319 17	320 18	321 18	322 17	323 17	324 20	325 20	326 15	327 16	328 15	329 16
A.10d	318 18	319 18	320 19	321 19	322 18	323 18	324 21	325 21	326 16	327 17	328 16	329 17
A.10e	318 16	319 16	320 17	321 17	322 16	323 16	324 19	325 19	326 14	327 15	328 14	329 15
A.11aa	319 81	320 76	321 84	322 80	323 81	324 81	325 83	326 80	327 77	328 79	329 77	330 77
A.11ab	323B 53	324B 44	325B 33	326B 47	327B 44	328B 36	329B 60	330B 64	331B 42	332B 34	333B 39	334B 38
A.11e	319 31	322B 94	321 33	322 31	323 29	324 32	325 32	326 30	327 28	328 29	329 28	330 27
A.12aa	328B 68	328B 74	328B 80	328B 86	328B 92	330B 92	330B 98	336B 98	336B104	336B110	338B 64	338B 70
A.12ab	328B 69	328B 75	328B 81	328B 87	328B 93	330B 93	330B 99	336B 99	336B105	336B111	338B 65	338B 71
A.12ba	318 21	319 24	320 25	321 24	322 24	323 22	324 27	325 27	326 22	327 23	328 23	329 23
A.12bb	318 22	319 25	320 26	321 25	322 25	323 23	324 28	325 28	326 23	329B 89	329B 89	---
A.12c	318 23	319 26	320 27	321 26	322 26	323 24	324 29	325 29	326 24	327 24	328 24	329 24
A.13a	318 19	319 22	320 23	321 22	322 22	323 20	324 25	325 25	326 20	327 21	328 21	329 21
A.13c	318 20	319 23	320 24	321 23	322 23	323 21	324 26	325 26	326 21	327 22	328 22	329 22
B.												
B.51ca	319 104	320 96	321 104	322 100	323 102	324 100	325 104	326 100	327 96	328 98	329 96	330 98
B.51cb	319 105	320 97	321 105	322 101	323 103	324 101	325 105	326 101	327 97	328 99	329 97	330 99
B.52	319 106	320 98	321 106	322 102	323 104	324 102	325 106	326 102	327 98	328 100	329 98	330 100
B.53	319 108	320 100	321 108	324B 70	324B 70	324 104	325 108	326 104	327 100	328 102	330B104	330 102
C.												
C.1a	318 10	319 10	320 10	321 10	322 10	323 10	324 10	325 10	326 10	327 10	328 10	329 10
C.1ba	323B 4	324B 5	325B 5	326B 4	327B 4	328B 4	329B 4	330B 4	331B 4	332B 4	333B 4	334B 5
C.1d	323B 33	324B 29	325B 23	326B 32	327B 28	328B 26	329B 44	330B 45	331B 30	332B 23	333B 25	334B 24
C.1e	323B 25	324B 21	325B 16	326B 22	327B 19	328B 17	329B 30	330B 33	331B 29	332B 15	333B 19	334B 18
C.1f	324B 67	325B 58	326B 71	327B 69	328B 62	329B 89	330B 89	331B 65	332B 59	333B 63	334B 65	335B 63
C.3	323B 34	324B 30	325B 24	326B 33	327B 29	328B 27	329B 45	330B 46	331B 31	332B 24	333B 26	334B 25
	---	319 19	320 20	321 20	322 19	323 19	324 22	325 22	326 17	327 18	328 17	329 18
C.4aa	319 88	320 81	321 89	322 86	323 87	324 87	325 89	326 86	327 82	328 84	329 82	330 82
C.4b	319 88	320 81	321 89	322 86	323 87	324 87	324 89	326 86	327 82	328 84	329 82	330 82
C.4d	319 88	320 81	321 89	322 86	323 87	324 87	324 89	326 86	327 82	328 84	329 82	330 82
C.4e	319 88	320 81	321 89	322 86	323 87	327B 73	325 89	327B 71	327 82	328 84	329 82	330 82
C.4f	319 88	320 81	321 89	322 86	323 87	324 87	325 89	326 86	327 82	328 84	329 82	330 82
C.4g	---	---	321 89	322 86	323 87	324 87	328B 64	328B 65	---	---	333B 70	333B 71
C.5b	323B 52	324B 43	325B 32	326B 46	327B 43	328B 35	329B 59	330B 63	331B 41	332B 33	333B 38	334B 37
C.5c	319 83	320 78	321 86	322 82	323 83	324 83	325 85	326 82	327 79	328 81	329 79	330 79
C.6	319 84	320 79	321 87	322 83	323 84	324 84	325 86	326 83	327 80	328 82	329 80	330 80
D.												
D.1a	319 100	320 92	321 100	322 96	323 98	324 96	325 100	326 96	327 92	328 94	329 92	330 92
D.1b	330 94	330 94	330 94	330 94	330 94	330 94	330 94	330 94	330 94	330 94	330 94	330 94
D.1c	330 95	330 95	330 95	330 95	330 95	330 95	330 95	330 95	330 95	330 95	330 95	330 95
D.1d	319 102	320 94	321 102	322 98	323 100	324 98	325 102	326 98	327 94	328 96	329 94	330 96
D.1e	323B 69	324B 58	325B 49	326B 62	327B 60	328B 51	329B 76	----	----	----	---	334B 54
D.1f	319 103	320 95	321 103	322 99	323 101	324 99	325 103	326 99	327 95	328 97	329 95	330 97
F.												
F.1a	319 96	320 90	321 98	322 94	323 96	324 94	325 98	326 94	327 90	328 92	329 90	330 90
F.1b	319 96	320 90	321 98	322 94	323 96	324 94	328B 67	328B 67	328B 67	328 92	329 90	330 90
F.1c	319 96	320 90	321 98	322 94	323 96	324 94	325 98	326 94	327 90	328 92	333B 76	333B 76
F.1d	319 96	320 90	321 98	322 94	323 96	324 94	325 98	326 94	327 90	328 92	333B 76	333B 76
F.1e	319 98	320 91	321 99	322 95	323 97	324 95	325 99	326 95	327 91	328 93	329 91	330 91
F.1f	319 96	320 90	321 98	322 94	323 96	324 94	325 98	326 94	327 90	328 92	329 90	330 90
F.1g	319 96	320 90	321 98	322 94	323 96	324 94	325 98	326 94	327 90	328 92	329 90	330 90
H.												
H.60	318 4	319 5	320 5	321 5	322 5	323 5	324 5	325 5	326 5	327 5	328 5	329 5
H.62	324B 60	325B 52	326B 64	327B 62	328B 55	329B 78	330B 82	331B 58	332B 52	333B 56	334B 58	335B 56

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Key	1972 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.												
A.1	331 64	332 59	333 56	334 66	335 34	336 30	337 40	338 24	339 28	340 26	341 22	342 22
A.2a	330 7	331 7	332 7	333 7	334 7	335 7	336 7	337 7	338 7	339 6	340 7	341 7
A.2b	343 6	343 6	343 6	343 6	343 6	343 6	343 6	343 6	343 6	343 6	343 6	343 6
A.2c	330 7	331 7	332 7	333 7	334 7	335 7	336 7	337 7	338 6	339 7	340 7	341 7
A.3a	331 33	332 30	333 25	334 36	335 34	336 30	337 40	338 24	339 28	340 26	341 22	342 22
A.3b	331 75	332 74	333 72	334 81	335 96	336 90	337 102	338 86	339 88	340 89	341 82	342 84
A.4	331 64	332 59	333 56	334 66	335 34	336 30	337 40	338 24	339 28	340 26	341 22	342 22
A.5	331 33	332 30	333 25	334 36	335 34	336 30	337 40	338 24	339 28	340 26	341 22	342 22
A.5a	331 75	332 74	333 72	334 81	335 96	336 90	337 102	338 86	339 88	340 89	341 82	342 84
A.5b	331 82	332 81	333 79	334 88	335 104	336 97	337 109	338 93	339 95	340 98	341 87	342 89
A.7b	331 64	332 59	333 56	334 66	335 34	336 30	337 40	338 24	339 28	340 26	341 22	342 22
A.7c	---	332 59	333 56	334 66	335 34	336 30	337 40	338 24	339 28	340 26	341 22	342 22
A.11ja	---	---	---	---	335 34	336 30	337 40	338 24	339 28	340 26	341 22	342 22
A.8aa	330 7	331 7	332 7	333 7	334 7	335 7	336 7	337 7	338 7	339 7	340 7	341 7
A.8ac	330 7	331 7	332 7	333 7	334 7	335 7	336 7	337 7	338 7	339 7	340 7	341 7
A.8g	330 7	331 7	332 7	333 7	334 7	335 7	336 7	337 7	338 7	339 7	340 7	341 7
A.9a	331 33	332 30	333 25	334 36	335 34	336 30	337 40	338 24	339 28	340 26	341 22	342 22
A.9b	331 33	332 30	333 25	334 36	335 34	336 30	337 40	338 24	339 28	340 26	341 22	342 22
A.9c	331 33	332 30	333 25	334 36	335 34	336 30	338B 83	339B 96	339 28	340 26	341 22	342 22
A.10a	333B 68	333B 69	334B 69	334B 70	334 17	335 15	336 15	337 15	338 15	340 117	340 13	341 13
A.10c	330 14	331 18	332 16	333 14	334 19	335 17	336 17	337 18	338 17	339 15	340 15	341 15
A.10d	330 15	331 19	332 17	333 15	334 20	335 18	336 18	337 19	338 18	339 16	340 16	341 16
A.10e	330 13	331 16	332 15	333 13	334 18	335 16	336 16	337 16	338 16	339 13	340 14	341 14
A.11aa	331 83	332 82	333 80	334 89	335 105	336 98	337 110	338 94	339 96	340 99	341 88	342 90
A.11ab	335B 39	336B 68	337B 66	338B 32	339B 62	340B 59	341B 44	342B 70	343B 34	344B 54	345B 23	346B 24
A.11e	331 33	332 30	333 25	334 36	335 34	336 30	337 40	338 24	339 28	340 26	342B109	---
A.12aa	338B 78	337B 98	337B 82	338B 47	339B 78	340B 74	341B 60	342B 86	343B 49	345B 56	345B 38	346B 40& 353B 58
A.12ab	338B 79	337B 99	337B 83	338B 48	339B 79	340B 75	341B 61	342B 87	343B 50	345B 57	345B 39	346B 41& 353B 59
A.12ba	330 22	331 28	332 26	333 19	334 28	335 26	336 24	337 28	---	339 22	340 20	---
A.12bb	---	---	---	333 20	334 29	335 27	336 26	337 29	338 21	339 23	340 22	341 19
A.12c	330 23	331 29	332 27	333 21	334 31	335 28	336 27	337 31	---	---	---	---
A.13a	330 20	331 26	332 24	333 19	334 28	335 26	336 24	337 28	---	339 22	340 20	341 19
A.13b	---	---	---	333 20	334 30	335 27	336 26	337 29	338 21	339 24	340 23	341 19
A.13c	330 20	331 27	332 25	333 18	334 27	335 25	---	---	---	---	---	---
A.17	---	---	---	333 20	334 30	335 27	336 26	337 29	338 21	339 24	340 23	341 19
A.18	---	---	---	333 20	334 29	335 27	336 26	337 29	338 21	339 23	340 22	341 19
B.												
B.51ca	331 106	332 106	333 104	334 108	335 130	336 122	337 132	338 122	339 116	340 124	341 104	342 110
B.51cb	331 107	332 107	333 105	334 109	335 131	336 123	337 133	338 123	339 117	340 125	341 105	342 111
B.52	331 108	332 108	333 106	334 110	335 132	336 124	337 134	338 124	339 118	340 126	341 106	342 112
B.53	331 110	332 110	333 108	334 112	335 134	336 126	337 136	338 126	339 120	340 128	341 108	342 114
C.												
C.1a	330 10	331 10	332 10	333 10	334 10	335 10	336 10	337 10	338 10	339 9	340 10	341 10
C.1ba	335B 5	336B 5	337B 5	338B 5	339B 5	340B 5	341B 5	342B 4	343B 4	344B 4	345B 4	346B 4
C.1d	335B 23	336B 38	337B 37	338B 22	339B 38	340B 35	341B 28	342B 34	343B 22	344B 25	345B 14	346B 14
C.1e	335B 18	336B 30	337B 28	338B 15	339B 28	340B 24	341B 21	342B 25	343B 16	344B 19	345B 11	346B 11
C.1f	336B 92	337B 96	338B 62	339B 94	340B 90	341B 76	342B105	343B 65	344B 79	345B 55	346B 55	347B 51
C.3	335B 24	336B 39	337B 38	338B 23	339B 39	340B 36	341B 29	342B 35	343B 23	344B 26	345B 15	346B 15
	330 16	331 20	332 18	333 16	334 21	335 19	336 19	337 20	338 19	339 18	340 17	341 17
C.3t	---	---	---	---	---	---	---	---	---	---	---	342 101
C.4aa	331 88	332 88	333 86	334 94	335 111	336 104	337 115	338 100	339 101	340 105	341 93	342 95
C.4b	331 88	332 88	333 86	334 94	335 111	336 104	337 115	338 100	339 101	340 105	341 93	342 95
C.4d	331 88	332 88	333 86	334 94	335 111	336 104	337 115	338 100	339 101	340 105	341 93	342 95
C.4e	331 88	332 88	336B 95	334 94	335 111	336 104	337 115	338 100	339 101	340 105	341 93	342 95
C.4f	331 88	332 88	333 86	334 94	335 111	336 104	337 115	338 100	339 101	340 105	341 93	342 95
C.4g	---	333B 72	---	334 94	335 111	---	---	---	---	---	---	---
C.5b	335B 38	337B104	338B 82	338B 31	341B 78	341B 79	341B 43	---	---	---	---	---
C.5c	331 85	332 84	333 82	334 91	335 107	336 100	337 112	338 96	339 98	340 101	341 90	342 92
C.6	331 86	332 85	333 83	334 92	335 108	336 101	337 113	338 97	339 99	340 102	341 91	342 93
D.												
D.1a	331 102	332 102	333 100	334 104	335 126	336 118	337 128	338 118	339 112	340 120	341 100	342 104
D.1b	342 106	342 106	342 106	342 106	342 106	342 106	342 106	342 106	342 106	342 106	342 106	342 106
D.1c	342 107	342 107	342 107	342 107	342 107	342 107	342 107	342 107	342 107	342 107	342 107	342 107
D.1d	331 104	332 104	333 102	334 106	335 128	336 120	337 130	338 120	339 114	340 122	341 102	342 108
D.1e	---	---	---	---	339B 84	340B 80	---	342B 92	343B 55	---	345B 44	---
D.1f	331 105	332 105	333 103	334 107	335 129	336 121	337 131	338 121	339 115	340 123	341 103	342 109
F.												
F.1a	331 100	332 100	333B 71	334 102	335 124	336 116	337 126	350B 98	350B 98	350B 98	350B 98	350B 98
F.1b	331 100	332 100	333 98									
F.1c	331 100	342B111	333 98	334 102	335 124	336 116	337 126	338 116	339 110	340 118	341 98	342 102
F.1d	331 100	342B111	342B111	342B111	342B111	336 116	348B 49	348B 49	348B 49	348B 49	348B 49	348B 49
F.1e	331 101	332 101	334B 71	334 103	335 125	336 117	337 127	350B 99	350B100	350B100	350B101	350B101
F.1f	331 100	332 100	333 98	334 102	335 124	336 116	337 126	338 116	339 110	340 118	341 98	342 102
F.1g	331 100	332 100	333 98	334 102	335 124	336 116	337 126	338 116	339 110	340 118	341 98	342 102
H.												
H.60	330 5	331 5	332 5	333 5	334 5	335 5	336 5	337 4	338 5	339 4	340 5	341 5
H.62	336B 85	337B 90	338B 55	339B 87	340B 83	341B 69	342B 98	343B 98	344B 72	345B 48	346B 48	347B 44

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Key	1973 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.												
A.1	343 22	344 26	345 30	346 30	347 24	348 24	349 26	350 28	351 26	352 24	353 26	354 24
A.2a	342 7	343 7	344 7	345 7	346 7	347 7	348 7	349 7	350 7	351 7	352 7	353 7
A.2b	355 6	355 6	355 6	355 6	355 6	355 6	355 6	355 6	355 6	355 6	355 6	355 6
A.2c	342 7	343 7	344 7	345 7	346 7	347 7	348 7	349 7	350 7	351 7	352 7	353 7
A.3a	343 22	344 26	345 30	346 30	347 24	348 24	349 26	350 28	351 26	352 24	353 26	354 24
A.3b	343 84	344 82	345 92	346 90	347 86	348 84	349 88	350 90	351 86	352 86	353 86	354 86
A.4	343 22	344 26	345 30	346 30	347 24	348 24	349 26	350 28	351 26	352 24	353 26	354 24
A.5	343 22	344 26	345 30	346 30	347 24	348 24	349 26	350 28	351 26	352 24	353 26	354 24
A.5a	343 84	344 82	345 92	346 90	347 86	348 84	349 88	350 90	351 86	352 86	353 86	354 86
A.5b	343 91	344 88	345 99	346 96	347 92	348 90	349 95	350 95	351 91	352 93	353 92	354 91
A.6	---	---	---	---	---	348 22	349 25	350 27	351 25	352 23	353 25	354 23
A.7b	343 22	344 26	345 30	346 30	347 24	348 24	349 26	350 28	351 26	352 24	353 26	354 24
A.7c	343 22	344 26	345 30	346 30	347 24	348 24	349 26	350 28	351 26	352 24	353 26	354 24
A.11ja	343 22	344 26	345 30	346 30	347 24	348 24	349 26	350 28	351 26	352 24	353 26	354 24
A.7e	343 22	344 26	345 30	346 30	347 24	348 24	349 26	350 28	351 26	352 24	353 26	354 24
A.8aa	342 7	343 7	344 7	345 7	346 7	347 7	348 7	349 7	350 7	351 7	352 7	353 7
A.8ac	342 7	343 7	344 7	345 7	346 7	347 7	348 7	349 7	350 7	351 7	352 7	353 7
A.8g	342 7	343 7	344 7	345 7	346 7	347 7	348 7	349 7	350 7	351 7	352 7	353 7
A.9a	343 22	344 26	345 30	346 30	347 24	348 24	349 26	350 28	---	---	---	---
A.9b	343 22	344 26	345 30	346 30	347 24	348 24	349 26	350 28	351 26	352 24	353 26	354 24
A.9c	---	---	---	---	---	---	---	350 28	351 26	353B 54	353 6	354 24
A.10a	341 13	343 13	344 15	345 15	346 15	347 13	348 13	349 13	350 14	351 13	352 13	353 13
A.10c	342 15	343 15	344 17	345 17	346 17	347 15	348 15	349 15	351 107	351 15	353 104	353 15
A.10d	342 16	343 16	344 18	345 18	346 18	347 16	348 16	349 16	351 108	351 16	353 105	353 16
A.10e	342 14	343 14	344 16	345 16	346 16	347 14	348 14	349 14	350 15	351 14	352 14	353 14
A.11aa	343 92	344 89	345 100	346 97	347 93	348 91	349 96	350 96	351 92	352 94	353 93	354 92
A.11ab	347B 26	348B 21	349B 50	350B 67	351B 61	352B 30	353B 26	354B 21	355B 37	356B 24	357B 21	358B 20
A.11f	343 22	344 26	345 30	346 30	347 24	348 24	349 26	350 28	351 26	352 24	353 26	354 24
A.12aa	350B102	353B 64	353B 70	353B 76	353B 82	---	---	---	---	---	---	---
A.12ab	350B102	353B 64	353B 70	353B 76	353B 82	---	---	---	---	---	---	---
A.12ba	342 19	---	---	---	346 26	347 20	---	349 20	350 20	---	352 17	353 20
A.13a	342 20	343 19	344 24	345 27	346 27	347 21	348 19	349 21	350 21	351 20	352 18	353 21
A.13ab	342 20	343 19	344 24	345 27	346 27	347 21	348 19	349 21	350 21	351 20	352 18	353 21
A.17	342 19	---	---	---	346 17	347 21	---	349 21	350 21	---	---	353 21
	342 20	343 19	344 24	345 27	346 27	347 21	348 19	349 21	350 21	351 20	352 18	353 21
A.17c	348 20	348 20	348 20	348 20	348 20	348 20	348 20	349 22	350 22	351 21	352 19	353 22
A.18	342 19	---	---	---	346 27	347 21	---	349 21	350 21	---	---	353 21
	342 20	343 19	344 24	345 27	346 27	347 21	348 19	349 21	350 21	351 20	352 18	353 21
B.												
B.51ca	343 110	344 108	345 126	346 128	347 120	348 114	349 118	350 114	351 116	352 114	353 114	354 111
B.51cb	343 111	344 109	345 127	346 129	347 121	348 115	349 119	350 115	351 117	352 115	353 115	---
B.52	343 112	344 110	345 128	346 130	347 122	348 116	349 120	350 116	351 118	352 116	353 116	354 112
B.53	343 114	344 112	345 130	346 132	347 124	348 118	349 122	350 118	351 120	352 118	353 118	354 114
C.												
C.1a	342 10	343 6	344 10	345 10	346 10	347 10	348 10	349 10	350 10	351 10	352 10	353 10
C.1ba	347B 4	348B 4	349B 4	350B 4	351B 4	352B 4	353B 4	354B 4	355B 4	356B 4	357B 4	358B 4
C.1d	347B 15	348B 14	349B 26	350B 29	351B 27	352B 19	353B 16	354B 14	355B 22	356B 15	357B 12	358B 13
C.1e	347B 14	348B 12	349B 20	350B 28	351B 21	352B 14	353B 11	354B 10	355B 16	356B 12	357B 9	358B 10
C.1f	348B 45	349B 78	350B 95	351B 82	352B 63	353B 51	354B 45	355B 61	356B 51	357B 45	358B 45	459B 45
C.3	347B 16	348B 15	349B 27	350B 30	351B 28	352B 20	353B 17	354B 15	355B 23	356B 16	357B 13	358B 14
	342 17	343 17	344 19	345 19	346 19	347 17	348 17	349 17	350 16	351 17	352 15	353 17
C.3t	344B 83	344 101	345 117	346 119	347 111	348 105	349 109	350 106	351 106	352 105	353 102	354 101
C.4aa	343 97	344 95	345 106	346 104	347 100	348 97	349 101	350 100	351 97	352 99	353 97	354 96
C.4b	343 97	344 95	345 106	346 104	347 100	348 97	349 101	350 100	351 97	352 99	353 97	354 96
C.4d	343 97	344 95	345 106	346 104	347 100	348 97	349 101	350 100	351 97	352 99	353 97	354 96
C.4e	343 97	344 95	345 106	346 104	347 100	348 97	349 101	350 100	351 97	352 99	353 97	354 96
C.4f	343 97	344 95	345 106	346 104	347 100	348 97	349 101	350 100	351 97	352 99	353 97	354 96
C.5c	343 94	344 91	345 102	346 99	347 95	348 93	349 98	350 98	351 94	352 96	353 95	354 94
C.6	343 95	344 93	345 103	346 100	347 97	348 94	349 99	350 99	351 95	352 97	353 96	354 95
D.												
D.1a	343 106	344 104	345 120	346 123	347 114	348 108	349 112	350 109	351 111	352 108	353 108	354 104
D.1b	354 106	354 106	354 106	354 106	354 106	354 106	354 106	354 106	354 106	354 106	354 106	354 106
D.1c	354 107	354 107	354 107	354 107	354 107	354 107	354 107	354 107	354 107	354 107	354 107	354 107
D.1d	343 108	344 106	345 122	346 125	347 118	348 111	349 115	350 112	351 114	352 111	353 111	354 109
D.1e	---	348B 35	349B 66	350B 82	351B 77	352B 51	---	---	---	356B 40	---	---
D.1f	343 109	344 107	345 124	346 127	347 119	348 113	349 116	350 113	351 115	352 113	353 112	354 110
D.1g	---	---	---	---	347 116	348 110	349 114	350 111	351 113	352 110	353 110	354 108
F.												
F.1a	346B 58	346B 58	346B 58	347B 55	348B 48	349B 81	349 110	350 107	351 109	352 106	353 106	355B 64
F.1c	343 104	344 102	345 118	346 121	347 112	348 106	349 110	350 107	352B 66	352 106	353 106	354 102
F.1e	346B 59	346B 60	346B 61	347B 55	348B 48	349B 81	349 111	350 108	351 110	352 107	353 107	355B 64
F.1f	343 104	344 102	345 118	346 121	347 112	348 106	349 110	350 107	351 109	352 106	353 106	354 102
F.1g	343 104	344 102	345 118	346 121	347 112	348 106	349 110	350 107	351 109	352 106	353 106	354 102
F.1h	---	---	---	346 121	347 112	348 106	349 110	350 107	351 109	352 106	353 106	354 102
F.1i	---	---	---	---	---	---	---	---	---	---	---	354 102
F.1j	---	---	---	---	---	---	---	---	---	---	---	354 102
H.												
H.60	342 5	343 5	344 5	345 5	346 5	347 5	348 5	349 5	350 5	351 5	352 5	353 5
H.62	348B 38	349B 72	350B 88	351B 82	352B 56	353B 44	354B 38	355B 54	356B 44	357B 38	358B 38	359B 38

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Key	1974 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.												
A.1	355 24	356 24	357 26	358 30	359 22	360 42	361 30	362 32	363 28	364 32	365 26	366 24
A.2a	354 7	355 7	356 7	357 7	358 7	359 7	360 7	361 7	362 7	363 7	364 7	365 7
A.2b	367A 6	367A 6	367A 6	367A 6	367A 6	367A 6	367A 6	367A 6	367A 6	367A 6	367A 6	367A 6
A.2c	354 7	355 7	356 7	357 7	358 7	359 7	360 7	361 7	362 7	363 7	364 7	365 7
A.3a	355 24	356 24	357 26	358 30	359 22	360 42	361 30	362 32	363 28	364 32	365 26	366 24
A.3b	355 86	356 80	357 88	358 90	359 84	360 102	361 92	362 94	363 88	364 94	365 86	366 86
A.3c	---	---	---	---	---	---	361 27	362 32	363 28	364 32	365 26	366 24
A.4	355 24	356 24	357 26	358 30	359 22	360 42	361 30	362 32	363 28	364 32	365 26	366 24
A.5	355 24	356 24	357 26	358 30	359 22	360 42	361 30	362 32	363 28	364 32	365 26	366 24
A.5a	355 86	356 80	357 88	358 90	359 84	360 102	361 92	362 94	363 88	364 94	365 86	366 86
A.5b	355 92	356 86	357 96	358 97	359 94	360 110	361 102	362 102	363 97	364 101	365 92	366 92
A.6	355 23	356 23	357 25	358 29	359 21	360 40	361 26	362 31	363 27	364 31	365 24	366 23
A.7b	355 24	356 24	357 26	358 30	359 22	360 42	361 30	362 32	363 28	364 32	365 26	366 24
A.7c	355 24	356 24	357 26	358 30	359 22	360 42	---	---	---	---	---	---
A.11ja	355 24	356 24	357 26	---	---	---	---	---	---	---	---	---
A.8aa	354 7	355 7	356 7	357 7	358 7	359 7	360 7	361 7	362 7	363 7	364 7	365 7
A.8ac	354 7	355 7	356 7	357 7	358 7	359 7	360 7	361 7	362 7	363 7	364 7	365 7
A.8g	354 7	355 7	356 7	357 7	358 7	359 7	360 7	361 7	362 7	363 7	364 7	365 7
A.9c	356B 56	356 24	---	---	---	---	---	---	---	---	---	---
A.9cb	---	---	---	---	---	---	---	---	---	---	365 26	366 24
A.9d	---	---	---	---	---	360 42	361 30	362 32	363 28	364 32	365 26	366 24
A.10a	354 13	355 13	356 12	357 14	358 14	359 13	360 16	361 13	362 14	364 110	364 13	365 12
A.10c	354 15	355 15	356 14	357 16	358 16	360B 32	360 18	361 15	362 16	363 15	364 15	365 14
A.10d	354 16	355 16	356 15	357 17	358 17	360B 33	360 19	361 16	362 17	363 16	364 16	365 15
A.10e	354 14	355 14	356 13	357 15	358 15	359 14	360 17	361 14	362 15	363 14	364 14	365 13
A.11aa	355 93	356 87	364B 57	364B 59	---	---	---	---	---	---	---	---
A.11ab	359B 18	364 44	365 84	365 92	---	---	---	---	---	---	---	---
A.11e	---	---	---	---	---	---	365B 98	362 32	363 28	364 32	365 26	366 24
A.11f	355 24	356 24	357 26	358 30	359 22	360 42	361 30	---	---	---	---	---
A.11g	---	---	---	---	---	---	---	---	---	---	364 21	365 18
A.12ba	---	---	---	356 17	---	---	---	---	361 18	---	---	365 17
A.12bb	354 19	355 19	356 18	---	358 23	---	360 31	361 19	362 22	---	364 19	---
A.12d	---	---	---	---	---	---	360 33	361 20	362 23	363 22	364 24	---
A.13a	---	---	356 17	---	---	---	---	361 18	---	---	---	365 17
A.13ab	354 19	355 19	356 18	---	358 23	---	360 31	361 19	---	363 21	364 19	---
A.17	354 19	---	---	---	---	---	360 31	361 19	362 22	---	---	---
	354 19	355 19	356 18	---	358 23	---	360 31	361 19	---	363 21	364 19	---
A.17c	354 20	355 20	356 19	357 22	358 25	359 18	360 32	361 23	362 26	363 24	364 27	365 21
A.18	354 19	---	---	---	---	---	360 31	361 19	362 22	---	---	---
	354 19	355 19	356 18	---	358 23	---	360 31	361 19	---	363 21	364 19	---
B.												
B.51ca	355 111	356 107	357 111	358 117	359 119	360 131	361 131	362 119	363 123	364 119	365 109	366 111
B.52	355 112	356 108	357 112	358 118	359 120	360 132	361 132	362 120	363 124	364 120	365 110	366 112
B.53	355 114	356 110	357 114	358 120	359 122	360 134	361 134	362 122	363 126	364 122	365 112	366 114
C.												
C.1a	354 10	355 10	356 10	357 10	358 10	359 10	360 10	361 10	362 10	363 10	364 10	365 10
C.1ba	359B 4	360B 4	361B 4	362B 4	363B 4	364B 4	365B 4	366B 4	367B 4	368B 4	369B 4	370B 4
C.1d	359B 12	360B 12	361B 10	362B 23	363B 18	364B 17	365B 26	366B 14	367B 20	368B 24	369B 14	370B 11
C.1e	359B 9	360B 10	361B 8	362B 18	363B 14	364B 13	365B 20	366B 13	367B 16	368B 20	369B 11	370B 8
C.1f	360B 29	361B 22	362B 47	363B 41	364B 39	365B 81	366B 29	367B 52	368B 56	369B 34	370B 26	371B 22
C.3	359B 13	360B 13	361B 11	362B 24	363B 19	364B 18	365B 27	366B 15	367B 21	368B 25	369B 15	370B 12
	354 17	355 17	356 16	357 18	358 18	359 15	360 20	361 17	362 18	363 17	364 17	365 16
C.3t	355 103	356 98	357 103	359B 51	359 110	360 122	361 122	362 111	363 115	365B106	365 101	366 100
C.4aa	355 98	356 91	357 99	358 102	359 98	361B 24	361 106	362 104	363 101	364 104	365 94	366 94
C.4b	355 98	356 91	357 99	358 102	359 98	360 113	361 106	362 104	363 101	364 104	365 94	366 94
C.4d	355 98	356 91	357 99	359B 48	359 98	360 113	361 106	362 104	363 101	365B103	365 94	366 94
C.4e	355 98	356 91	357 99	358 102	359 98	360 113	361 106	362 104	363 101	364 104	365 94	366 94
C.4f	355 98	356 91	357 99	358 102	359 98	360 113	361 106	362 104	363 101	364 104	365 94	366 94
C.4h	---	356 91	357 99	358 102	---	360 113	361 106	362 104	---	---	365 94	366 94
C.4i	---	---	357 99	---	359 98	360 113	361 106	362 104	363 101	364 104	365 94	366 94
C.4j	---	---	---	358 102	359 98	360 113	361 106	362 104	363 101	364 104	365 94	366 94
C.5c	355 95	356 89	---	364B 61	---	---	---	---	---	---	---	---
C.5e	---	---	---	---	---	---	---	---	---	---	364 23	365 18
C.6	355 96	356 90	357 97	358 98	359 95	360 111	361 103	362 103	363 99	364 102	365 93	366 93
D.												
D.1a	355 106	356 102	357 106	358 112	359 114	360 126	361 126	362 114	363 118	364 113	365 104	366 103
D.1ba	355 107	356 103	357 107	358 113	359 115	360 127	361 127	362 115	363 119	364 114	365 104	366 105
D.1c	366 107	366 107	366 107	366 107	366 107	366 107	366 107	366 107	366 107	366 107	366 107	366 107
D.1d	355 109	356 105	357 109	358 115	359 117	360 129	361 129	362 117	363 121	364 116	365 107	366 109
D.1e	359B 34	---	362B 48	363B 42	---	---	365B 70	---	367B 40	367B 44	---	---
D.1f	355 110	356 106	357 110	358 116	359 118	360 130	361 130	362 118	363 122	364 118	365 108	366 110
D.1g	355 108	356 104	357 108	358 114	359 116	360 128	361 128	362 116	363 120	364 115	365 106	366 108
F.												
F.1a	356B 54	357B 48	357 104	358 110	359 112	360 124	361 124	362 112	364B 42	364 111	365 102	366 101
F.1b	---	---	---	---	---	---	---	---	---	---	---	366 101
F.1c	355 104	356 100	357 104	---	---	---	---	---	---	---	---	---
F.1e	356B 54	357B 48	357 104	358 110	359 112	360 124	361 124	364 112	364B 42	364 111	365 102	366 101
F.1f	355 104	356 100	357 104	358 110	359 112	360 124	361 124	362 112	363 116	364 111	366 32	366 101
F.1g	355 104	356 100	357 104	358 110	359 112	360 124	361 124	362 112	363 116	364 111	366 32	366 101
F.1h	355 104	356 100	357 104	358 110	359 112	360 124	361 124	363B 47	363 116	364 111	366 32	366 101
F.1i	355 104	356 100	357 104	358 110	359 112	360 124	361 124	362 112	363 116	364 111	366 32	366 101
F.1j	355 104	356 100	357 104	358 110	359 112	360 124	361 124	361 112	363 116	364 111	366 32	366 191
H.												
H.60	354 4	355 4	356 4	357 4	358 4	359 4	360 4	361 4	362 4	363 4	364 4	365 4
H.62	360B 22	361B 16	362B 40	363B 34	364B 32	365B 74	366B 22	367B 44	368B 48	369B 25	370B 17	371B 13

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Key	1975 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.												
A.1	367A 24	368A 26	369A 26	370A 24	371A 24	372A 28	373A 34	374A 28	375A 24	376A 28	377A 26	378A 28
A.2a	366A 7	367A 7	368A 7	369A 7	370A 7	371A 7	372A 7	373A 7	374A 7	375A 7	376A 7	377A 7
A.2b	378A 6	378A 6	378A 6	378A 6	378A 6	378A 6	378A 6	378A 6	378A 6	378A 6	378A 6	378A 6
A.2c	366A 7	367A 7	368A 7	369A 7	370A 7	371A 7	372A 7	373A 7	374A 7	375A 7	376A 7	377A 7
A.3a	367A 24	368A 26	369A 26	370A 24	371A 24	372A 28	373A 34	374A 28	375A 24	376A 28	377A 26	378A 28
A.3b	367A 86	368A 82	369A 88	370A 84	371A 86	372A 88	373A 96	374A 90	375A 84	376A 90	377A 86	378A 90
A.3c	367A 24	368A 26	369A 26	370A 24	371A 24	372A 28	373A 34	374A 28	375A 24	376A 28	377A 26	378A 28
A.4	367A 24	368A 26	369A 26	370A 24	371A 24	372A 28	373A 34	374A 28	375A 24	376A 28	377A 26	378A 28
A.5	367A 24	368A 26	369A 26	370A 24	371A 24	372A 28	373A 34	374A 28	375A 24	376A 28	377A 26	378A 28
A.5a	367A 86	368A 82	369A 88	370A 84	371A 86	372A 88	373A 96	374A 90	375A 84	376A 90	377A 86	378A 90
A.5b	367A 93	368A 89	369A 93	370A 91	371A 92	372A 93	373A101	374A 95	375A 90	376A 96	377A 92	378A 94
A.6	367A 23	368A 25	369A 25	370A 23	371A 23	372A 27	373A 33	374A 26	375A 23	376A 27	377A 25	378A 27
A.7b	367A 24	368A 26	369A 26	370A 24	371A 24	372A 28	373A 34	374A 28	375A 24	376A 28	377A 26	378A 28
A.8aa	366A 7	367A 7	368A 7	369A 7	370A 7	371A 7	372A 7	373A 7	374A 7	375A 7	376A 7	377A 7
A.8ac	366A 7	367A 7	368A 7	369A 7	370A 7	371A 7	372A 7	373A 7	374A 7	375A 7	376A 7	377A 7
A.8g	366A 7	367A 7	368A 7	369A 7	370A 7	371A 7	372A 7	373A 7	374A 7	375A 7	376A 7	377A 7
A.9cb	367A 24	368A 26	369A 26	370A 24	371A 24	372A 28	373A 34	374A 28	375A 24	376A 28	377A 26	378A 28
A.9d	367A 24	368A 26	369A 26	370A 24	371A 24	372A 28	373A 34	374A 28	375A 24	376A 28	377A 26	378A 28
A.10a	366A 12	367A 12	369A101	369A 12	370A 12	371A 12	372A 15	373A 15	374A 12	375A 12	376A 14	377A 12
A.10c	366A 14	367A 14	368A 14	369A 14	371A100	371A 14	372A 17	373A 17	374A 14	375A 14	376A 16	378A 57
A.10d	366A 15	367A 15	368A 15	369A 15	371A101	371A 15	372A 18	373A 18	374A 15	375A 15	376A 17	378A 58
A.10e	366A 13	367A 13	368A 13	369A 13	370A 13	371A 13	372A 16	373A 16	374A 13	375A 13	376A 15	377A 13
A.11e	368B 58	369B 36	369A 26	371B 24	371A 24	373A 34	---	---	---	---	---	---
A.11g	366A 18	367A 18	368A 18	369A 20	370A 18	---	---	373A 25	374A 20	375A 18	376A 21	377A 19
A.11h	---	---	---	---	---	---	---	374A 28	375A 24	376A 28	377A 26	378A 28
A.12a	---	---	---	369A 18	370A 16	371A 18	---	---	374A 18	---	---	377A 18
A.12bb	---	---	---	369A 19	370A 17	371A 19	---	---	374A 19	---	---	---
A.13a	---	---	---	369A 18	370A 16	371A 18	---	---	374A 18	---	---	377A 18
A.13ab	---	---	---	369A 19	370A 17	371A 19	372A 22	---	374A 19	---	---	---
A.13d	366A 17	367A 17	368A 17	369A 17	370A 15	371A 17	372A 21	373A 24	374A 17	375A 17	376A 20	377A 17
A.17	---	---	---	369A 19	370A 17	371A 19	---	---	374A 19	---	---	---
	---	---	---	369A 19	---	371A 19	372A 22	---	374A 19	---	---	---
A.17c	366A 20	367A 20	368A 21	369A 22	370A 20	371A 20	372A 24	373A 29	374A 23	375A 20	376A 24	377A 21
A.18	---	---	---	369A 19	370A 17	371A 19	---	---	374A 19	---	---	---
	---	---	---	369A 19	---	371A 19	372A 24	---	374A 19	---	---	---
B.												
B.51ca	367A111	368A103	369A109	370A105	371A108	372A109	373A119	374A115	375A103	376A113	377A111	378A114
B.52	367A112	368A104	369A110	370A106	371A109	372A110	373A120	374A116	375A104	376A114	377A112	378A115
B.53	367A114	368A106	369A112	370A108	371A111	372A112	373A122	374A118	375A106	376A116	377A114	378A117
C.												
C.1a	366A 10	367A 10	368A 10	369A 10	370A 10	371A 10	372A 10	373A 10	374A 10	375A 10	376A 10	377A 10
C.1ba	375B 26	375B 30	375B 35	375B 39	375B 6	376B 4	377B 4	378B 4	379B 4	380B 4	381B 4	382B 4
C.1d	366A 11	367A 11	368A 11	369A 11	370A 11	371A 11	372A 14	373A 14	374A 11	375A 11	376A 13	377A 11
	371B 6	372B 6	373B 6	374B 5	375B 10	376B 9	377B 15	378B 25	379B 8	380B 7	381B 13	382B 8
C.1e	371B 5	372B 5	375B 41	375B 41	375B 9	376B 8	377B 14	378B 24	379B 7	380B 6	381B 12	382B 7
C.1f	372B 20	375B 41	375B 41	375B 24	376B 22	377B 32	378B 52	379B 22	380B 20	381B 36	382B 26	383B 32
C.3	371B 7	372B 7	373B 7	374B 6	375B 11	376B 10	377B 16	378B 26	379B 9	380B 8	381B 14	382B 9
	366A 16	367A 16	368A 16	369A 16	370A 14	371A 16	372A 19	373A 19	374A 16	375A 16	376A 18	377A 16
C.3t	367A103	368A 95	369A100	370A 97	371A 99	372A101	373A111	374A107	376B 26	376A105	377A102	378A101
C.4a	367A 96	368A 91	369A 95	370A 93	371A 94	372A 95	373A103	374A 99	375A 92	376A 98	377A 94	378A 96
C.4b	367A 96	368A 91	369A 95	370A 93	371A 94	372A 95	373A103	374A 99	375A 92	376A 98	377A 94	378A 96
C.4d	367A 96	368A 91	369A 95	370A 93	371A 94	372A 95	374B 19	378B 54	376B 24	376A 98	377A 94	378A 96
C.4e	367A 96	368A 91	369A 95	370A 93	371A 94	372A 95	373A103	374A 99	375A 92	376A 98	377A 94	378A 96
C.4f	367A 96	368A 91	369A 95	370A 93	371A 94	372A 95	373A103	374A 99	375A 92	376A 98	377A 94	378A 96
C.4h	367A 96	368A 91	369A 95	---	---	372A 95	373A103	---	---	376A 98	---	---
C.4i	367A 96	368A 91	369A 95	370A 93	371A 94	372A 95	373A103	374A 99	375A 92	376A 98	377A 94	378A 96
C.4j	367A 96	368A 91	369A 95	370A 93	371A 94	372A 95	373A103	374A 99	375A 92	376A 98	377A 94	378A 96
C.5e	366A 18	367A 18	368A 18	369A 20	370A 18	---	372A 23	373A 27	374A 22	375A 18	376A 23	377A 23
C.6	367A 95	368A 90	369A 94	370A 92	371A 93	372A 94	373A102	374A 96	375A 91	376A 97	377A 93	378A 95
D.												
D.1a	367A106	368A 98	369A104	370A100	371A104	372A104	373A114	374A110	375A 98	376A108	377A105	378A105
D.1ba	367A107	368A 99	369A105	370A101	371A115	372A105	373A115	374A111	375A 99	376A109	377A106	378A107
D.1c	378A108	378A108	378A108	378A108	378A108	378A108	378A108	378A108	378A108	378A108	378A108	378A108
D.1d	367A109	368A101	369A107	370A103	371A106	372A107	373A117	374A113	375A101	376A111	377A108	378A112
D.1e	---	---	373B 10	---	---	---	---	---	---	381B 47	382B 40	---
D.1f	367A110	368A102	369A108	370A104	371A107	372A108	373A118	374A114	375A102	376A112	377A110	378A113
D.1g	367A108	368A100	369A106	370A102	372B 24	372A106	373A106	374A112	375A100	376A110	377A107	378A111
F.												
F.1a	367A104	368A 96	369A102	370A 98	371A102	372A102	373A112	374A108	375A 96	377B 34	377A103	378A104
F.1b	367A104	368A 96	369A102	370A 98	371A102	372A102	373A112	374A108	375A 96	376A106	377A103	378A104
F.1e	367A104	368A 96	369A102	370A 98	371A102	372A102	373A112	374A108	375A 96	377B 34	377A103	378A104
F.1f	367A104	368A 96	369A102	370A 98	371A102	372A102	374B 22	374A108	375A 96	376A106	377A103	378A104
F.1g	367A104	368A 96	369A102	370A 98	371A102	372A102	374B 22	374A108	375A 96	376A106	377A103	378A104
F.1h	367A104	368A 96	369A102	370A 98	371A102	372A102	373A112	374A108	375A 96	376A106	377A103	378A104
F.1i	367A104	368A 96	369A102	370A 98	371A102	372A102	373A112	374A108	375A 96	376A106	377A103	378A104
F.1j	367A104	368A 96	369A102	370A 98	371A102	372A102	373A112	374A108	375A 96	376A106	377A103	378A104
H.												
H.60	366A 4	367A 5	368A 4	369A 5	370A 5	371A 5	372A 4	373A 4	374A 4	375A 5	376A 5	377A 5
H.62	372B 11	373B 15	374B 8	375B 16	376B 14	377B 24	378B 44	379B 15	380B 13	381B 29	382B 19	383B 25

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A.1	379A 26	380A 36	381A 30	382A 26	383A 26	384A 24	385A 26	386A 22	387A 26	388A 26	389A 26	390A 28
A.2a	378A 7	379A 7	380A 7	381A 7	382A 7	383A 7	384A 7	385A 7	386A 7	387A 7	388A 7	389A 7
A.2b	391A 6	391A 6	391A 6	391A 6	391A 6	391A 6	391A 6	391A 6	391A 6	391A 6	391A 6	391A 6
A.2c	378A 7	379A 7	380A 7	381A 7	382A 7	383A 7	384A 7	385A 7	386A 7	387A 7	388A 7	389A 7
A.3a	379A 26	380A 36	381A 30	382A 26	383A 26	384A 24	385A 26	386A 22	387A 26	388A 26	389A 26	390A 28
A.3b	379A 88	380A 94	381A 92	382A 86	383A 88	384A 84	385A 88	386A 84	387A 86	388A 88	389A 86	390A 90
A.3c	379A 26	380A 36	381A 30	---	---	---	---	386A 22	387A 26	388A 26	389A 26	390A 28
A.3d	390A 21	390A 21	390A 21	390A 21	390A 21	390A 21	390A 21	390A 21	390A 21	390A 21	390A 21	390A 21
A.4	379A 26	380A 36	381A 30	382A 26	383A 26	384A 24	385A 26	386A 22	387A 26	388A 26	389A 26	390A 28
A.5	379A 26	380A 36	381A 30	382A 26	383A 26	384A 24	385A 26	386A 22	387A 26	388A 26	389A 26	390A 28
A.5a	379A 88	380A 94	381A 92	382A 86	383A 88	384A 84	385A 88	386A 84	387A 86	388A 88	389A 86	390A 90
A.5b	379A 93	380A100	381A 97	382A 91	383A 94	384A 90	385A 93	386A 89	387A 93	388A 94	389A 90	390A 95
A.6	379A 25	380A 33	381A 29	382A 25	383A 25	384A 23	385A 24	386A 20	387A 26	388A 26	389A 26	390A 26
A.6b	---	---	---	386B 4	387B 4	388B 4	389B 4	390B 4	391B 4	392B 4	393B 4	394B 4
A.7b	379A 26	380A 36	381A 30	382A 26	383A 26	384A 24.	385A-26	386A 22	387A 26	388A 26	389A 26	390A 28
A.7f	378A 23	379A 21	380A 30	381A 24	382A 21	383A 21	384A 19	385A 21	---	387A 20	388A 21	389A 21
A.8aa	378A 7	379A 7	380A 7	381A 7	382A 7	383A 7	384A 7	385A 7	386A 7	387A 7	388A 7	389A 7
A.8ac	378A 7	379A 7	380A 7	381A 7	382A 7	383A 7	384A 7	385A 7	386A 7	387A 7	388A 7	389A 7
A.8g	378A 7	379A 7	380A 7	381A 7	382A 7	383A 7	384A 7	385A 7	386A 7	387A 7	388A 7	389A 7
A.9cb	379A 26	380A 36	381A 30	382A 26	383A 26	384A 24	385A 26	386A 22	387A 26	388A 26	389A 26	390A 28
A.9d	379A 26	380A 36	381A 30	382A 26	383A 26	384A 24	385A 26	386A 22	387A 26	388A 26	389A 26	390A 28
A.10a	378A 13	379A 12	380A 15	381A 13	382A 12	383A 13	384A 12	---	386A 12	387A 12	388A 12	389A 12
A.10c	378A 15	379A 14	380A 17	381A 15	382A 14	383A 15	384A 14	385A 14	387A101	388A101	388A 14	389A 14
A.10d	378A 16	379A 15	380A 18	381A 16	382A 15	383A 16	384A 15	385A 15	387A102	388A102	388A 15	389A 15
A.10e	378A 14	379A 13	380A 16	381A 14	382A 13	383A 14	384A 13	385A 13	386A 13	387A 13	388A 13	389A 13
A.11g	378A 20	379A 19	380A 26	381A 21	382A 18	383A 19	384A 17	385A 18	386A 16	387A 18	388A 19	389A 18
A.11h	379A 26	380A 36	381A 30	382A 26	383A 26	384A 24	385A 26	386A 22	387A 26	388A 26	389A 26	390A 28
A.11i	---	---	---	---	---	---	---	---	391B 25	---	---	402B 48
A.11jb	---	380A 36	381A 30	382A 26	383A 26	384A 24	385A 26	386A 22	387A 26	388A 26	389A 26	390A 28
A.12ba	---	---	---	---	---	---	---	---	386A 15	387A 16	388A 18	---
A.12bb	---	---	---	---	---	---	---	---	---	387A 17	---	---
A.12e	383B 17	384B 10	385B 16	386B 20	387B 16	388B 15	389B 12	390B 23	391B 20	392B 18	393B 15	394B 17
A.13a	378A 19	379A 18	---	---	---	---	---	---	386A 15	387A 16	388A 18	---
A.13ab	---	---	---	---	---	---	---	---	---	387A 17	---	---
A.13d	378A 18	380A123	380A 25	381A 20	382A 17	383A 18	---	---	---	387A 15	388A 17	389A 17
A.13e	383B 16	384B 9	385B 15	387B 36	387B 15	388B 14	389B 11	390B 22	391B 19	392B 19	393B 15	394B 17
A.17	---	---	---	---	---	---	---	---	---	387A 17	---	---
A.17c	378A 24	379A 22	380A 31	381A 25	382A 22	383A 22	384A 20	385A 22	386A 18	387A 21	388A 22	389A 22
A.18	---	---	---	---	---	---	---	---	---	387A 17	---	---
B.												
B.51ca	379A115	380A119	381A126	382A113	383A118	384A108	385A113	386A111	387A115	---	---	---
B.52	379A116	380A120	381A127	382A114	383A120	384A110	385A114	386A112	387A116	388A116	389A110	390A116
B.53	379A118	380A122	381A129	382A116	383A119	384A109	385A116	386A114	387A118	388A118	389A109	390A118
C.												
C.1a	378A 10	379A 10	380A 10	381A 10	382A 10	383A 10	384A 10	385A 10	386A 10	387A 10	388A 10	389A 10
C.1ba	383B 4	384B 4	385B 4	386B 7	387B 6	388B 6	389B 6	390B 6	391B 8	392B 8	393B 8	394B 8
C.1d	378A 12	379A 11	380A 14	381A 12	382A 11	383A 12	384A 11	385A 11	386A 11	387A 11	388A 11	389A 11
	383B 10	384B 7	385B 14	386B 12	387B 10	388B 11	389B 9	390B 11	391B 13	392B 13	393B 12	394B 13
C.1e	383B 9	384B 6	385B 13	386B 11	387B 9	388B 10	389B 8	390B 10	391B 12	392B 12	393B 11	394B 12
C.1f	384B 24	385B 56	386B 34	387B 30	388B 30	389B 26	390B 39	391B 39	392B 35	393B 31	394B 33	395B 33
C.3	383B 11	384B 8	385B 15	386B 13	387B 11	388B 12	389B 10	390B 12	391B 14	392B 14	393B 13	394B 14
	378A 17	379A 16	380A 19	381A 17	382A 16	383A 17	384A 16	385A 16	386A 14	387A 14	388A 16	389A 16
C.3t	379A102	380A106	381A114	383B 37	383A103	385B 60	385A100	390B 42	390B 43	390B 44	391B 45	391B 46
C.4a	379A 95	380A102	381A100	382A 93	383A 96	384A 92	385A 95	386A 91	387A 95	388A 96	389A 92	390A 97
C.4b	379A 95	380A102	381A100	382A 93	383A 96	394A 92	---	---	---	---	---	---
C.4d	379A 95	380A 94	381A100	382A 93	383A 96	385B 58	385A 95	387B 32	389B 29	389B 32	389A 92	391B 47
C.4e	379A 95	380A102	381A100	382A 93	383A 96	384A 92	385A 95	386A 91	387A 95	388A 96	389A 92	390A 97
C.4f	379A 95	381B 45	381A100	382A 93	383A 96	384A 92	385A 95	386A 91	387A 95	388A 96	389A 92	390A 97
C.4h	379A 95	---	381A100	382A 93	383A 96	384A 92	---	386A 91	387A 95	388A 96	389A 92	390A 97
C.4i	379A 95	380A102	381A100	382A 93	383A 96	384A 92	385A 95	386A 91	387A 95	388A 96	389A 92	390A 97
C.4j	379A 95	381B 45	381A100	382A 93	383A 96	384A 92	385A 95	386A 91	387A 95	388A 96	389A 92	390A 97
C.5e	378A 22	---	380A 28	381A 23	382A 20	---	---	385A 20	---	---	---	389A 20
C.5f	---	---	---	---	---	---	---	---	391B 25	---	---	402B 48
C.6	379A 94	380A101	381A 98	382A 92	383A 95	384A 91	385A 94	386A 90	387A 94	388A 95	389A 91	390A 96
D.												
D.1a	379A108	380A112	381A119	382A106	383A111	385B 61	385A106	386A104	387A108	388A108	389A102	390A107
D.1ba	379A109	380A114	381A121	382A108	383A113	384A103	385A108	386A106	387A110	388A110	389A104	390A109
D.1c	390A110	390A110	390A110	390A110	390A110	390A110	390A110	390A110	390A110	390A110	390A110	390A110
D.1d	379A113	380A117	381A124	382A111	383A116	384A106	385A111	386A109	387A113	388A113	389A107	390A114
D.1e	391B 50	---	391B 52	393B 46	393B 48	---	---	---			---	---
D.1f	379A114	380A118	381A125	382A112	383A117	384A107	385A112	386A110	387A114	388A114	389A108	390A115
D.1g	379A112	380A116	381A123	382A110	383A115	384A105	385A110	386A108	387A112	388A112	389A106	390A113
F.												
F.1a	379A103	380A107	381A118	382A101	383A104	384A 96	385A101	386A 99	387A103	388A103	389A 97	390A106
F.1b	379A103	380A107	381A118	382A101	383A104	384A 96	385A101	386A 99	387A103	388A103	389A 97	390A106
F.1e	379A103	380A107	381A118	382A101	383A104	384A 96	385A101	386A 99	387A103	388A103	389A 97	390A106
F.1f	380B 28	381B 44	381A118	382A101	383A104	384A 96	385A101	386A 99	387A103	388A103	389A 97	390A106
F.1g	380B 28	381B 44	381A118	382A101	383A104	384A 96	385A101	386A 99	387A103	388A103	389A 97	390A106
F.1h	379A103	380A107	381A118	383B 38	383A104	---	---	---	---	---	---	---
F.1i	379A103	380A107	381A118	382A101	383A104	384A 96	385A101	386A 99	387A103	388A103	389A 97	390A106
F.1j	379A103	380A107	381A118	382A101	383A104	384A 96	385A101	386A 99	387A103	388A103	389A 97	390A106
H.												
H.60	378A 5	379A 5	380A 4	381A 4	382A 4	383A 5	384A 5	385A 5	386A 5	387A 4	388A 5	389A 4
H.62	384B 17	385B 49	386B 27	387B 23	388B 23	389B 19	390B 32	391B 32	392B 28	393B 24	394B 26	395B 26

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A.2a	390A 7	391A 7	392A 7	393A 7	394A 7	395A 7	396A 7	397A 7	398A 7	399A 7	400A 7	401A 7
A.2b	404A 8	404A 8	404A 8	404A 8	404A 8	404A 8	404A 8	404A 8	404A 8	404A 8	404A 8	404A 8
A.2c	390A 7	391A 7	392A 7	393A 7	394A 7	395A 7	396A 7	397A 7	398A 7	399A 7	400A 7	401A 7
A.3a	391A 34	392A 28	393A 34	394A 32	395A 36	396A 34	397A 32	398A 36	399A 34	400A 30	401A 36	402A 38
A.3b	391A 96	392A 84	393A 96	394A 92	395A 98	396A 94	397A 94	398A 98	399A 94	400A 92	401A 96	402A100
A.3c	391A 34	392A 28	393A 34	394A 32	395A 36	396A 34	397A 32	398A 36	399A 34	400A 30	401A 36	402A 38
A.3d	390A 21	391A 29	392A 21	393A 29	394A 27	395A 29	396A 29	397A 25	398A 29	399A 29	400A 24	401A 31
A.4	391A 34	392A 28	393A 34	394A 32	395A 36	396A 35	397A 32	398A 36	399A 34	400A 30	401A 36	402A 38
A.5	391A 34	392A 28	393A 34	394A 32	395A 36	396A 35	397A 32	398A 36	399A 34	400A 30	401A 36	402A 38
A.5a	391A 96	392A 84	393A 96	394A 92	395A 98	396A 94	397A 94	398A 98	399A 94	400A 92	401A 96	402A100
A.5b	391A101	392A 88	393A100	394A 96	395A104	396A 99	397A101	398A105	399A 99	400A 99	401A100	402A105
A.6	391A 32	392A 26	393A 32	394A 30	395A 34	396A 32	397A 30	398A 34	399A 32	400A 28	401A 35	402A 36
A.6b	395B 4	396B 4	397B 4	398B 4	399B 4	400B 4	401B 4	402B 4	403B 4	404B 4	405B 4	406B 6
A.7f	390A 18	391A 22	392A 18	---	394A 21	---	396A 20	397A 19	398A 24	399A 24	400A 21	401A 28
A.7g	390A 19	391 23	392A 19	393A 23	394A 22	395A 24	396A 22	397A 20	398A 22	399A 23	400A 20	401A 27
A.7h	391A 34	392A 28	393A 34	395B 36	395A 36	396A 34	397A 32	398A 36	399A 34	400A 30	401A 36	402A 38
A.8aa	390A 7	391A 7	392A 7	393A 7	394A 7	395A 7	396A 7	397A 7	398A 7	399A 7	400A 7	401A 7
A.8ac	390A 7	391A 7	392A 7	393A 7	394A 7	395A 7	396A 7	397A 7	398A 7	399A 7	400A 7	401A 7
A.8g	390A 7	391A 7	392A 7	393A 7	394A 7	395A 7	396A 7	397A 7	398A 7	399A 7	400A 7	401A 7
A.9cb	391A 34	392A 28	393A 34	394A 32	395A 36	396A 35	397A 32	398A 36	400B 57	400A 30	401A 36	402A 38
A.9d	391A 34	392A 28	393A 34	394A 32	395A 36	396A 35	397A 32	398A 36	400B 57	400A 30	401A 36	402A 38
A.10a	390A 12	391A 13	392A 12	393A 13	394A 12	395A 14	396A 12	397A 13	398A 14	399A 14	400A 12	401A 15
A.10c	391B 43	391A 15	393B 35	393A 15	394A 14	395A 16	396A 14	397A 15	398A 16	399A 16	400A 14	401A 17
A.10d	391B 44	391A 16	393B 36	393A 16	394A 15	395A 17	396A 15	397A 16	398A 17	399A 17	400A 15	401A 18
A.10e	390A 13	391A 14	392A 13	393A 14	394A 13	395A 15	396A 13	397A 14	398A 15	399A 15	400A 13	401A 16
A.10f	---	---	---	---	---	---	---	---	---	---	---	403B 68
A.10g	390A 15	391A 19	392A 15	393A 20	394A 18	395A 21	396A 17	---	398A 25	399A 20	400A 17	401A 22
A.11h	391A 34	392A 28	393A 34	394A 32	395A 36	396A 34	397A 32	398A 36	399A 34	400A 30	401A 36	402A 38
A.111	402B 51	402B 54	402B 57	402B 60	402B 63	404B 58	404B 62	404B 64	404B 68			
A.12ba	---	391A 25	---	393A 24	394A 23	395A 26	396A 24	397A 23	---	399A 26	---	---
A.12bb	---	391A 27	---	393A 26	394A 24	395A 27	396A 25	---	---	399A 27	---	---
A.12e	395B 17	396B 20	397B 15	398B 22	399B 18	400B 34	401B 20	402B 24	403B 37	404B 35	405B 22	406B 43
A.13a	---	391A 25	---	393A 24	394A 23	395A 26	396A 24	397A 23	---	399A 26	---	---
A.13ab	---	391A 27	---	393A 26	394A 24	395A 27	396A 25	---	---	399A 27	---	---
A.13d	390A 24	391A 24	392A 23	393A 27	394A 25	395A 31	396A 27	397A 27	398A 27	399A 25	400A 25	401A 29
A.13e	395B 17	396B 19	397B 15	398B 21	399B 17	400B 33	401B 19	402B 23	403B 22	404B 34	408B 81	408B 82
A.17	---	---	---	---	---	395A 27	396A 25	---	---	---	---	---
	---	---	---	---	---	395A 27	396A 25	---	---	---	---	---
A.17c	390A 20	391A 28	392A 20	393A 28	394A 26	---	396A 28	397A 24	398A 28	400A 22	400A 22	401A 30
A.18	---	---	---	---	---	395A 27	396A 25	---	---	399A 27	---	---
	---	391A 27	---	393A 28	394A 24	---	396A 26	---	---	---	---	---
B.												
B.52	391A118	392A104	393A122	394A118	395A122	396A118	397A120	398A124	399A128	400A120	401A116	402A132
B.53	391A120	392A103	393A121	394A120	395A124	396A120	397A122	398A126	399A127	400A122	401A118	402A131
C.												
C.1a	390A 10	391A 11	392A 101	393A 10	394A109	395A 10	396A 10	397A 10	398A 10	399A 10	400A 10	401A 10
C.1ba	395B 8	396B 8	397B 8	398B 8	399B 8	400B 8	401B 8	402B 8	403B 8	404B 8	405B 8	406B 8
C.1d	390A 1	391A 12	392A 11	393A 12	394A 11	395A 13	396A 11	397A 12	398A 13	399A 13	400A 11	401A 14
	395B 1	396B 13	397B 11	398B 14	399B 13	400B 19	401B 15	402B 17	403B 21	404B 22	405B 16	406B 25
C.1e	395B 12	396B 12	397B 10	398B 13	399B 12	400B 18	401B 14	402B 16	403B 20	404B 21	405B 15	406B 24
C.1f	396B 35	397B 31	398B 41	399B 33	400B 49	401B 35	402B 39	403B 53	404B 53	405B 38	406B 59	407B 49
C.3	395B 14	396B 14	397B 12	398B 15	399B 14	400B 20	401B 16	402B 18	403B 22	404B 23	405B 17	406B 26
	390A 14	391A 17	392A 14	393A 17	394A 16	395A 18	396A 16	397A 17	398A 18	399A 18	400A 16	401A 19
C.3t	393B 40	393B 41	393A108	394A105	396B 41	398B 44	398B 46	399B 36	399A113	401B 44	403B 64	403B 65
C.4a	391A103	392A 90	393A102	394A 98	395A106	396A102	397A103	398A107	399A102	400A101	401A102	402A108
C.4d	391A103	393B 37	393A102	394A 98	396B 38	397B 34	397A103	400B 62	399A102	401B 38	403B 56	403B 59
C.4e	391A103	392A 90	393A102	394A 98	395A106	397B 34	397A103	398A107	399A102	400A101	402B 42	402A108
C.4f	391A103	392A 90	393A102	394A 98	395A106	396A102	397A103	398A107	399A102	400A101	401A102	402A108
C.4h	391A103	392A 90	393A102	394A 98	395A106	396A102	397A103	398A107	399A102	400A101	401A102	402A108
C.4i	391A103	392A 90	393A102	394A 98	395A106	396A102	397A103	398A107	399A102	400A101	401A102	402A108
C.4j	391A103	392A 90	393A102	394A 98	395A106	396A103	397A103		399A102	400A101	401A102	402A108
C.5e	390A 17	391A 21	392A 17	393A 22	394A 20	395A 21	396A 17	397A 22	399B 37	399A 22	400A 19	401A 24
C.5f	402B 51	402B 54	402B 57	402B 60	402B 63	404B 58	404B 62	404B 64	404B 68			
C.6	391A102	392A 89	393A101	394A 97	395A105	396A100	397A102	398A106	399A100	400A100	401A101	402A106
D.												
D.1a	391A114	392A 97	393A114	394A111	395A115	397B 39	397A114	398A117	399A120	400A113	401A109	402A125
D.1ba	391A116	392A 99	393A116	394A113	395A117	396A113	397A116	398A119	399A122	400A115	401A111	402A127
D.1c												
D.1d	391A117	392A101	393A119	394A116	395A120	396A116	397A119	398A122	399A125	400A118	401A114	402A130
D.1e	412B 69	---	412B 70	412B 71	412B 72	---	412B 73	---	412B 74	412B 76	---	412B 77
D.1f	392B 38	392A102	393A120	394A117	395A121	396A117	398B 47	398A123	399A126	400A119	401A115	403B 69
D.1g	488A 82	392A100	393A118	394A115	395A119	396A115	397A118	398A121	399A124	400A117	401A113	402A129
F.												
F.1a	391A109	393B 44	393A109	394A110	395A114	396A110	397A109	398A116	399A115	400A112	402B 47	402A124
F.1b	391A109	392A 96	393A109	394A110	395A114	396A110	397A109	398A116	399A115	400A112	401A108	406B 73
F.1e	391A109	393B 44	393A109	394A110	395A114	396A110	397A109	398A116	399A115	400A112	402B 47	402A124
F.1f	393B 44	394B 36	394B 36	394A110	395A114	396A110	397A109	400B 70	400B 70	402B 47		
F.1g	393B 44	394B 36	394B 36	394A110	395A114	396A110	397A109	400B 70	---	402B 47		
F.1i	391A109	392A 96	393A109	394A110	395A114	396A110	397A109	398A116	399A115	400A112	401A108	402A124
F.1j	391A109	392A 96	393A109	394A110	395A114	396A110	397A109	398A116	399A115	400A112	401A108	402A124
F.1k					395A114	396A110	397A109	398A116				
H.												
H.60	390A 4	391A 5	392A 5	393A 5	394A 5	395A 4	396A 5	397A 4	398A 4	399A 4	400A 4	401A 4
H.62	396B 28	397B 24	398B 34	399B 26	400B 42	401B 28	402B 32	403B 46	404B 16	405B 30	406B 52	407B 42

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A.2a	402A 9	403A 9	404A 9	405A 9	406A 9	407A 9	408A 9	409A 9	410A 11	411A 11	412A 9	413A 11
A.2b	415A 10	415A 10	415A 10	415A 10	415A 10	415A 10	415A 10	415A 10	415A 10	415A 10	415A 10	415A 10
A.2c	402A 9	403A 9	404A 9	405A 9	406A 9	407A 9	408A 9	409A 9	410A 11	411A 11	412A 9	413A 11
A.3a	403A 46	404A 40	405A 48	406A 54	407A 46	408A 50	409A 38	419A 48	411A 46	412A 40	413A 48	414A 48
A.3b	403A108	404A 96	405A110	406A114	407A108	408A110	409A100	410A110	411A106	412A102	413A108	414A110
A.3c	403A 46	404A 40	405A 48	406A 54	407A 46	408A 50	409A 38	410A 48	411A 46	412A 40	413A 48	414A 48
A.3d	402A 33	404A 33	404A 33	405A 36	406A 40	407A 40	408A 41	409A 31	410A 41	411A 40	412A 34	413A 42
A.4	403A 47	404A 40	405A 48	406A 54	407A 46	408A 50	409A 38	410A 48	411A 46	412A 40	413A 48	414A 48
A.5	403A 47	404A 40	405A 48	406A 54	407A 46	408A 50	409A 38	410A 48	411A 46	412A 40	413A 48	414A 48
A.5a	403A108	404A 96	405A110	406A114	407A108	448A110	409A100	410A110	411A106	412A102	413A108	414A110
A.5b	403A114	404A104	405A119	406A124	407A118	408A119	409A110	410A120	411A116	412A114	413A116	414A121
A.6	403A 44	404A 38	405A 46	406A 52	407A 44	408A 48	409A 38	410A 46	411A 44	412A 38	413A 46	414A 46
A.6b	407B 4	408B 4	409B 4	410B 4	411B 4	412B 4	413B 4	414B 4	415B 4	416B 4	417B 4	418B 4
A.7f	402A 29	403A 36	404A 29	405A 31	406A 35	407A 34	408A 37	409A 28	410A 37	411A 36	---	418A 38
A.7g	402A 28	403A 35	404A 27	405A 32	406A 36	407A 36	408A 38	409A 29	410A 38	411A 35	412A 30	413A 36
A.7h	403A 46	404A 40	405A 48	406A 54	407A 46	408A 50	409A 38	410A 48	411A 46	412A 40	413A 48	414A 48
A.8aa	402A 9	403A 9	404A 9	405A 9	406A 9	407A 9	408A 9	409A 9	410A 11	411A 11	412A 9	413A 11
A.8ac	402A 9	403A 9	404A 9	405A 9	406A 9	407A 9	408A 9	409A 9	410A 11	411A 11	412A 9	413A 11
A.8g	402A 9	403A 9	404A 9	405A 9	406A 9	407A 9	408A 9	409A 9	410A 11	411A 11	412A 9	413A 11
A.9cb	403A 47	404A 40	405A 48	406A 54	407A 46	408A 50	409A 38	410A 48	411A 46	---	---	---
A.9d	403A 47	404A 40	405A 48	406A 54	407A 46	408A 50	409A 38	410A 48	411A 46	---	---	---
A.10a	402A 16	403A 20	404A 17	405A 17	406A 19	407A 20	408A 19	409A 17	410A 23	411A 20	412A 18	413A 21
A.10c	402A 19	403A 23	404A 20	405A 20	406A 22	407A 23	408A 20	409A 20	412B 58	411A 23	412A 21	413A 24
A.10d	402A 20	302A 24	404A 21	405A 21	406A 23	407A 24	408A 23	409A 21	412B 59	411A 24	412A 22	413A 25
A.10e	401A 18	403A 22	404A 19	405A 19	406A 21	407A 22	408A 21	409A 19	410A 25	411A 22	412A 20	413A 23
A.10f	402A 17	403A 21	404A 18	405A 18	406A 20	407A 21	408A 20	409A 18	410A 24	411A 21	412A 19	413A 22
A.11k	403A116	404A108	405A122	406A129	407A123	408A123	410B 82	410A123	411A120	412A118	413A119	414A126
A.11g	402A 24	403A 29	404A 24	405A 29	406A 30	407A 29	408A 31	409A 25	416B 96	416B 52	417B 41	418B 31
A.11h	403A 46	404 40	405A 48	406A 54	407A 46	408A 50	409A 38	410A 48	411A 46	---	---	---
A.12ba	402A 30	---	---	---	---	---	---	---	---	---	---	---
A.12bb	402A 31	---	---	---	---	---	408A 43	---	---	---	412A 29	---
A.12e	407B 33	408B 62	410B100	411B 83	413B 83	413B 88	413B 63	414B 32	416B 91	416B 46	417B 36	418B 26
A.12f	---	---	---	---	406A 44	---	408A 45	---	---	---	---	---
A.13a	402A 30	---	---	---	---	---	---	---	---	---	---	---
A.13ab	402A 31	---	---	---	---	---	408A 43	---	---	---	412A 29	---
A.13d	402A 34	403A 37	404A 31	405A 37	406A 41	407A 35	408A 39	409A 33	410A 39	414B 50	414B 51	414B 52
A.13e	408B 83	408B 61	409B 35	410B 67	411B 53	412B 44	413B 62	414B 31	415B 53	416B 45	417B 35	418B 25
A.16b	---	---	---	---	---	---	---	---	---	---	499B 26	499B 26
A.17	402A 31	---	---	---	---	---	408A 43	---	---	---	412A 29	---
A.17c	402A 32	403A 38	404A 32	406A 38	406A 38	407A 38	408A 40	409A 30	410A 40	411A 38	412A 32	413A 40
A.18	402A 31	---	---	---	---	---	---	---	---	---	412A 29	---
B.												
B.52	403A148	404A144	405A158	406A171	407A168	408A168	409A142	410A160	411A158	412A162	413A160	414A172
B.53	403A150	404A146	405A157	406A170	407A167	408A170	409A144	410A162	411A160	412A161	413A159	414A174
C.												
C.1a	402A 12	403A 12	404A 12	405A 12	406A 12	407A 12	408A 12	409A 12	410A 14	411A 14	412A 12	413A 14
C.1ba	407B 8	408B 8	409A 8	410B 8	411B 8	412B 8	413B 8	414B 8	415B 6	416B 8	417B 6	419B 64
C.1d	402A 15	403A 19	404A 16	405A 16	406A 18	407A 19	408A 18	409A 16	410A 22	411A 19	412A 17	413A 20
C.1e	407A 21	408B 34	409B 23	410B 28	411B 24	412B 28	413B 34	414B 23	415B 31	416B 29	417B 24	419B 92
C.1f	408B 77	409B 47	410B 80	411B 66	412B 55	413B 80	414B 48	415B 66	416B 70	417B 58	419B 94	420B121
C.3	407B 23	408B 36	409B 25	410B 30	411B 26	412B 30	413B 36	414B 25	415B 33	416B 31	417B 26	418B 6
C.3t	405B 45	405B 48	406B 62	407B 67	407A151	408A152	409A129	410A147	411A144	412A148	413A147	414A159
C.4a	403A132	404A122	405A138	406A144	407B 52	408A138	411B 72	411B 75	411A135	414B 53	414B 55	414A142
C.4d	404B 56	405B 40	406B 64	407B 59	407B139	408B138	409A115	410A139	412B 60	412A134	413A134	414A142
C.4e	403A132	404A122	405A138	406A144	407A139	408A138	409A115	410A139	411A135	412A134	413A134	414A142
C.4f	403A132	404A122	405A138	406A144	407B 52	408A138	409A115	410A139	411A135	412A134	413A134	414A142
C.4h	403A132	404A122	405A138	---	---	---	---	---	411A135	---	413A134	414A142
C.4i	403A132	404A122	405A138	406A144	407A139	408A138	409A115	410A139	411A135	412A134	413A134	415B 70
C.4j	406B 70	404A122	405A138	406A144	407B 52	408A138	409A115	410A139	411A135	412A134	413A134	---
C.5e	402A 26	403A 29	404A 26	---	406A 32	407A 29	408A 33	409A 27	416B 96	416B 52	417B 41	418B 31
C.6	403A115	404A105	405A120	406A125	407A119	408A120	409A111	410A121	411A117	412A115	413A117	413A122
D.												
D.1a	403A142	404 139	405A151	406A162	407A160	408A160	409A135	410A153	411A151	413B 82	413A152	414A164
D.1ba	403A144	404A141	405A153	406A164	407A162	408A162	409A137	410A155	411A153	412A157	413A154	414A166
D.1c	414A167	414A167	414A167	414A167	414A167	414A167	414A167	414A167	414A167	414A167	414A167	414A167
D.1d	403A145	404A143	405A156	406A167	407A165	408A165	409A140	410A158	411A156	412A160	413A157	414A170
D.1e	---	---	405A 39	---	---	---	---	---	---	---	---	---
D.1f	403A147	405B 55	406B 72	406A169	407A166	408A167	409A141	410A159	411A157	412A161	413A158	414A171
D.1g	405B 53	405B 54	405A155	406A166	408B 80	408A164	409A139	410A157	411A155	412A159	413A156	414A169
D.1h	---	---	404A 35	405A 38	406A 42	407A 41	408A 44	409A 34	410A 43	411A 41	412A 36	413A 43
F.												
F.1a	403A138	404A138	405A150	407B 70	408A155	408A155	410B 98	410A152	411A150	412A154	414B 57	414A161
F.1b	406B 73	406B 73	406B 73	406A161	411A 69	411A 69	411A 69	487A	487A	415B 72	415B 72	415B 72
F.1e	403A138	404A138	405A150	407B 70	407A155	408A155	410B 98	410A152	411A150	412A154	414B 57	414A161
F.1h	---	---	---	---	---	---	---	419B 62	419B 62	419B 62	419B 62	419B 62
F.1i	403A138	404A138	405A150	405A161	407A155	408A155	409A134	410A152	411A150	412A154	413A149	418B 74
F.1j	403A138	404A138	405A150	405A161	407A155	408A155	409A134	410A152	411A150	412A154	413A149	418B 74
H.												
H.60	402A 5	403A 5	404A 4	405A 4	406A 4	407A 4	408A 5	409A 5	410A 5	411A 4	412A 4	413A 5
H.62	408B 70	409B 40	410B 72	411A 58	412B 48	413B 72	414B 40	415B 58	416B 62	417B 50	418B 40	419B 42

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A.2a	414A 11	415A 11	416A 11	417A 9	418A 11	419A 11	420A 11	421A 11	422A 11	423A 11	424A 11	425A 11
A.2b	418A 9	428A 9	428A 9	428A 9	428A 9	428A 9	428A 9	428A 9	428A 9	428A 9	428A 9	428A 9
A.2c	414A 11	415A 11	416A 11	417A 9	418A 11	419A 11	420A 11	421A 11	422A 11	423A 11	424A 11	425A 11
A.3a	415A 52	416A 50	417A 44	418A 48	419A 48	420A 50	421A 50	422A 52	423A 50	424A 50	425A 48	426A 50
A.3b	418B 50	418B 60	417A106	418A108	419A110	420A110	421A112	422A 11	423A110	424A112	425A108	428A150
A.3c	415A 52	416A 50	417A 44	418A 48	419A 48	420A 50	421A 50	422A 52	423A 50	424A 50	425A 48	426A 50
A.3d	414A 42	415A 44	416A 42	417A 36	418A 38	419A 38	420A 40	421A 40	422A 42	423A 40	424A 40	425A 36
A.3e	415A 52	416A 50	417A 44	418A 48	419A 48	420A 50	421A 50	422A 52	423A 50	424A 50	425A 48	426A 50
A.4	415A 52	416A 50	417A 44	418A 48	419A 48	420A 50	421A 50	422A 52	423A 50	424A 50	425A 48	426A 50
A.5	415A 52	416A 50	417A 44	418A 48	419A 48	420A 50	421A 50	422A 52	423A 50	424A 50	425A 48	426A 50
A.5a	418B 50	418B 60	417A106	418A108	419A110	420A110	421A112	422A114	423A112	424A112	425A108	428A150
A.5b	415A125	416A116	417A118	418A118	419A124	420A121	421A125	422A129	423A124	424A125	425A121	426A112
A.6	415A 48	416A 46	417A 40	418A 42	419A 43	420A 44	421A 44	422A 46	423A 44	424A 44	425A 40	426A 42
A.6b	419B 4	420B 4	421B 4	426B 38	426B 39	426B 40	426B 41	427B 48	429B 38	430B 30	432B 42	432B 43
A.6c	415A 49	416A 47	417A 41	418A 43	419A 44	420A 46	421A 46	422A 48	423A 45	424A 46	425A 42	426A 44
A.6d	---	---	---	418A 45	419A 45	420A 48	421A 48	422A 50	423A 48	424A 48	425A 44	426A 46
A.7f	---	---	416A 38	417A 33	418A 34	419A 34	420A 35	421A 37	422A 38	423A 41	425A 28	425A 37
A.7g	414A 34	415A 40	416A 36	417A 32	418A 33	419A 33	420A 34	421A 36	423B/424B	425A 46	425A 47	425A 48
A.7h	415A 52	416A 50	417A 44	418A 48	419A 48	420A 50	421A 50	422A 52	423A 50	424A 50	425A 48	426A 50
A.8aa	414A 11	415A 11	416A 11	417A 11	418A 11	419A 11	420A 11	421A 11	422A 11	423A 11	424A 11	425A 11
A.8ac	414A 11	415A 11	416A 11	417A 11	418A 11	419A 11	420A 11	421A 11	422A 11	423A 11	424A 11	425A 11
A.8g	414A 11	415A 11	416A 11	417A 11	418A 11	419A 11	420A 11	421A 11	422A 11	423A 11	424A 11	425A 11
A.9cb	---	---	---	---	419A 48	420A 50	421A 50	422A 52	423A 50	424A 50	425A 48	426A 50
A.9d	---	---	---	---	419A 48	420A 50	421A 50	422A 52	423A 50	424A 50	425A 48	426A 50
A.10a	414A 24	415A 25	416A 25	417A 21	419B 52	420B 69	420A 24	422B 85	422A 25	423A 27	424A 25	426A148
A.10c	414A 27	415A 28	426A 28	417A 24	418A 25	420B 70	420A 27	421A 28	422A 28	423A 30	424A 28	425A 27
A.10d	414A 28	415A 29	416A 29	417A 25	418A 26	420B 71	420A 28	421A 29	422A 29	423A 31	424A 29	415A 28
A.10e	414A 26	415A 27	416A 27	417A 23	418A 24	419A 26	420A 26	421A 27	422A 27	423A 29	424A 27	425A 26
A.10f	414A 25	415A 26	416A 26	417A 22	418A 23	418A 25	420A 25	421A 26	422A 26	423A 28	424A 26	425A 25
A.11k	415A129	416A120	417A119	418A122	419A126	420A124	421A129	422A133	423A128	426A158	---	---
A.11g	419B 33	420B 53	421B 35	422B 31	423B 17	424B 29	425B 20	426B 24	427B 28	428B 24	429B 26	430B 16
A.12ba	414A 36	---	---	---	---	---	---	---	---	---	---	---
A.12bb	414A 37	---	---	---	---	---	---	---	424B 39	---	---	---
A.12e	421B 43	420B 48	421B 30	422B 26	424B 40	427B 37	426B 33	427B 42	430B 24	429B 32	429B 37	434B 50
A.13a	414A 36	---	---	---	---	---	---	---	---	---	---	---
A.13ab	414A 37	---	---	---	---	---	---	---	424B 39	---	---	---
A.13d	414A 39	415A 45	416A 39	417A 37	418A 35	419A 35	420A 37	422B 89	422A 39	424B 36	424A 37	426A146
A.13e	419B 32	419B 47	421B 29	422B 25	423B 17	424B 28	425B 19	426B 23	427B 27	428B 23	429B 25	430B 15
A.13f	414A 38	428A 39	416A 35	417A 31	418A 32	419A 32	420A 36	421A 35	422A 37	423A 37	424A 36	425A 32
A.16b	499B 27	499B 27	499B 27	499B 27	499B 27	499B 27	499B 27	499B 27	499B 27	499B 27	499B 27	499B 27
A.17	414A 37	---	---	---	---	---	---	---	424B 39	---	---	---
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A.17c	415A 42	415A 42	417A 34	417A 34	418A 36	419A 36	420A 38	421A 38	422A 40	423A 38	424A 38	425A 34
A.18	414A 37	---	---	---	---	---	---	---	424B 39	---	---	---
B.												
B.52	415A162	416A166	417A166	418A166	419A168	420A166	421A166	422A178	423A174	424A154	425A152	426A142
B.53	415A161	416A165	417A165	418A165	419A167	420168	421A165	422A180	423A173	424A153	425A151	416A141
C.												
C.1a	414A 14	414A 15	416A 14	417A 12	418A 14	419A 14	420A 14	421A 14	422A 14	423A 15	424A 15	425A 15
C.1ba	420B 82	422B 38	423B 25	430B 32	430B 68	431B 34	434B 15	436B 50	439B 30	439B 73	442B 44	443B 28
C.1d	420B120	422B 72	424B 45	430B 66	430B108	431B 67	434B 49	436B 89	439B 71	439B116	442B 82	443B 59
C.1e	420B119	422B 72	423B 58	430B 64	430B107	431B 66	434B 48	436B 88	439B 70	439B115	442B 81	443B 58
C.1f	422B 91	423B 83	430B 31	430B 67	431B 70	434B 55	436B 92	439B122	439B 72	442B 86	443B 68	445B 92
C.3	419B 8	420B 8	421B 10	422B 4	423B 4	424B 4	425B 5	426B 5	427B 5	428B 5	429B 5	420B 5
C.3t	415A147	---	---	---	---	---	---	---	---	---	---	---
C.4a	417B 60	417B 62	417A138	420B 72	420B 75	420A139	423B 76	423B 78	423B143	426A149	426A153	426A117
C.4d	415A129	416A134	417A137	418A137	419A142	420A139	421A145	422A149	423A143	424A130	425A125	426A117
C.4e	415A129	416A134	417A137	419A137	419A142	420A139	422B 86	422A149	423A143	424A130	425A125	426A117
C.4f	415A129	416A134	417A137	419A137	419A142	420A139	421A145	---	---	---	---	---
C.4h	415A129	416A134	417A137	419A137	419A142	---	421A145	422A149	423A143	424A130	425A125	426A117
C.4i	415A129	416A134	417A137	419A137	419A142	---	---	422A149	423A143	424A130	425A125	426A117
C.4j	415A129	416A134	417A137	419A137	419A142	420A139	421A145	422A149	---	424A130	425A125	426A117
C.4k	---	---	---	---	---	---	---	422A149	423A143	---	425A125	---
C.4l	---	---	---	---	---	---	---	422A149	423A143	---	425A125	---
C.5e	419B 33	420B 53	421B 35	422B 31	423B 17	424B 29	425B 20	426B 24	427B 28	428B 24	429B 26	430B 16
C.6	415A126	416A117	417A119	418A119	419A124	420A122	421A126	422A130	423A125	424A126	425A122	426A113
D.												
D.1a	415A155	416A158	417A158	418A158	419A160	420A160	421A159	422A170	423A166	424A144	425A144	426A133
D.1ba	415A157	416A160	417A160	418A160	419A162	420A162	421A161	422A172	423A168	424A149	425A146	426A135
D.1c	426A136	426A136	426A136	426A136	426A135	426A136	426A136	426A136	426A136	426A136	426A136	426A136
D.1ca	426A137	426A137	426A137	426A137	426A137	426A137	426A137	426A137	426A137	426A137	426A137	426A137
D.1d	415A158	416A163	417A163	418A163	419A165	420A165	421A164	422A175	423A171	424A152	425A149	426A140
D.1e	---	437B 47	---	437B 48	---	---	---	437B 51	---	---	---	---
D.1f	415A160	416A164	418B 76	419B 63	419A166	421B 42	422B 90	422A177	423A172	425B 33	425A150	427A164
D.1g	416B 90	416A162	417A162	418A162	419A164	420A164	421A163	422A174	423A170	424A151	425A148	426A139
D.1h	414B 43	415A 46	416A 43	417A 38	418A 39	419A 39	420A 41	421A 41	422A 43	423A 42	424A 41	425A 38
F.												
F.1a	415A154	416A161	417A151	418A151	419A153	420A155	421A158	422A165	423A161	425B 32	427A159	427A159
F.1b	416B 88	417A151	417A151	418A151	419A153	420A155	421A158	422A165	423A161	425B 32	427A159	427A159
F.1e	415A154	416A151	417A151	418A151	420A 78	420A155	421A158	422A165	423A161	425B 32	427A159	427A159
F.1h	419B 62	419B 62	419B 62	419B 62	419A153	420A155	421A158	422A165	423A161	424A146	425A143	426A132
F.1i	415A154	416A151	417A151	418A151	419A153	420A155	421A158	422A165	423A161	427A159	425A143	426A132
F.1j	415A154	416A151	417A151	418A151	419A153	420A155	421A158	422A165	423A161	427A159	425A143	426A132
F.1l	416B 88	417B 67	418B 72	419B 58	420B 79	420A155	421A158	423B 81	425B 32	425B 32	426A177	427A159
H.												
H.60	414A 4	415A 5	416A 4	417A 4	418A 5	419A 5	420A 5	421A 5	422A 4	423A 4	424A 4	425A 4
H.62	420B 58	422B 76	423B 62	---	---	---	---	---	---	---	---	---

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A.2a	426A 10	427A 9	428A 10	429A 9	430A 11	431A 11	432A 11	433A 11	434A 11	435A 11	436A 11	437A 11
A.2b	440A 10	440A 10	440A 10	440A 10	440A 10	440A 10	440A 10	440A 10	440A 10	440A 10	440A 10	440A 10
A.2c	426A 10	427A 9	428A 10	429A 9	430A 11	431A 11	432A 11	433A 11	434A 11	435A 11	436A 11	437A 11
A.3a	427A 50	427A 44	429A 42	430A 52	431A 48	432A 50	433A 48	434A 46	435A 50	436A 50	437A 60	438A 44
A.3b	427A112	428A102	429A104	430A112	431A110	432A110	433A110	434A108	435A110	436A112	437A120	438A106
A.3c	427A 50	428A 44	429A 42	430A 52	431A 48	432A 50	433A 48	434A 46	435A 50	436A 50	437A 60	438A 44
A.3d	426A 38	427A 38	428A 34	429A 35	430A 44	431A 41	432A 42	433A 40	434A 38	435A 42	436A 42	437A 48
A.3e	427A 50	428A 44	429A 42	430A 52	431A 48	432A 50	433A 48	434A 46	435A 50	436A 50	437A 60	438A 44
A.4	427A 50	428A 44	429A 42	430A 52	431A 48	432A 50	433A 48	434A 46	435A 50	436A 50	437A 60	438A 44
A.5	427A 50	428A 44	429A 42	430A 52	431A 48	432A 50	433A 48	434A 46	435A 50	436A 50	437A 60	438A 44
A.5a	427A112	428A102	429A104	430A112	431A110	432A110	433A110	434A108	435A110	436A112	437A120	438A106
A.5b	427A122	428A112	429A115	430A123	431A121	432A128	433A127	434A125	435A127	436A127	437A134	438A121
A.6	427A 42	428A 38	429A 39	430A 48	431A 44	432A 46	433A 44	---	435A 46	436A 46	437A 52	438A 40
A.6b	434B 14	435B 88	436B 96	436B 97	437B 40	438B 33	439B120	439B121	440B 48	442B 84	444B 52	444B 54
A.6c	427A 44	438A 40	429A 40	430A 49	431A 45	432A 47	433A 45	434A 43	435A 47	436A 47	437A 54	444B 54
A.6d	427A 46	428A 42	429A 41	430A 50		432A 48	433A 46	434A 44	435A 48	436A 48	437A 56	438A 42
A.6e	436B 93	436B 94	434B 56	435B 85	435B 47	436B 46	436B 36	438B 29	439B 28	440B 38	441B 51	443B 62
A.7f	426A 39	427A 39	428A 35	429A 36	430A 41	432A167	432A 37	433A 35	436A177	436A177	436A 39	437A 44
A.7g	427A 48		431A162	430A 51	431A 46	432A 49	433A 47	434A 45	435A 49	436A 49	437A 58	438A 43
A.7h	427A 50	428A 44	429A 42	430A 52	431A 48	432A 50	433A 48	434A 46	435A 50	436A 50	437A 60	438A 44
A.8aa	426A 10	427A 9	428A 10	429A 9	430A 11	431A 11	432A 11	433A 11	434A 11	435A 11	436A 11	437A 11
A.8ac	426A 10	427A 9	428A 10	429A 9	430A 11	431A 11	432A 11	433A 11	434A 11	435A 11	436A 11	437A 11
A.8g	426A 10	427A 9	428A 10	429A 9	430A 11	431A 11	432A 11	433A 11	434A 11	435A 11	436A 11	437A 11
A.9cb	427A 50	428A 44	429A 42	430A 52	431A 48	---	433A 48	434A 46	435A 50	436A 50	437A 60	438A 44
A.9d	427A 50	428A 44	429A 42	430A 52	431A 48	---	433A 48	434A 46	435A 50	436A 50	437A 60	438A 44
A.10a	426A 23	427A 23	428A 20	429A 22	430A 26	432A166	432A 24	433A 22	434A 25	436A176	438A160	438A161
A.10c	426A 26	427A 26	429A150	429A 25	430A 29	431A 28	432A 27	433A 25	434A 28	435A 30	436A 29	437A 34
A.10d	426A 27	427A 27	429A151	429A 26	430A 30	431A 29	432A 28	433A 26	434A 29	435A 31	436A 30	437A 35
A.10e	426A 25	427A 25	428A 22	430A175	430A 28	431A 27	432A 26	433A 24	434A 27	435A 29	436A 28	437A 33
A.10f	426A 24	427A 24	428A 21	429A 23	430A 27	431A 26	432A 25	433A 23	434A 26	435A 28	436A 27	437A 32
A.11g	431B 27	432B 30	433B 26	434B 6	435B 41	436B 41	437B 30	438B 23	439B 23	440B 32	441B 46	442B 36
A.12bb	426A 32	427A 33	428A 28	429A 32	431A160	431A 38	432A 38	---	---	---	---	---
A.12e	437B 42	438B 34	---	440B 42	450B 68	449B 98	452B 60	452B 65	452B 70	454B 40	467B 82	467B 88
A.13a	---	427A 32	428A 27	429A 32	---	431A 38	432A 39	433A 36	---	---	---	---
A.13ab	426A 32	427A 33	428A 28	429A 32	431A160	431A 38	432A 38	433A 37	---	---	---	---
A.13d	426A 34	427A 35	428A 30	430A164	430A 37	431A 36	432A 34	433A 31	434A 34	435A 37	436A 37	437A 41
A.13e	432B 36	432B 29	435B 50	434B 5	436B100	436B 40	437B 29	443B 64	443B 65	443B 66	443B 67	449B103
A.13f	426A 33	427A 34	428A 29	429A 33	431A161	431A 39	432A 39	433A 37	435A160	435A 43	436A 43	437A 45
A.16a	---	515B 26	515B 26	515B 26	515B 26	515B 26	515B 26	515B 26	515B 26	515B 26	515B 26	515B 26
A.16b	499B 28	499B 28	499B 28	499B 28	499B 28	499B 28	499B 28	499B 28	499B 28	499B 28	499B 28	499B 28
A.17	426A 32	427A 33	428A 28	429A 32	431A160	431A 38	432A 38	433A 37	---	---	---	---
A.17	---	---	429A119	430A127	431A125	432A132	433A131	---	---	436A132	438A162	438A125
A.17c	426A 36	427A 36	428A 32	430A 42	430A 42	432A 40	432A 40	433A 38	436A 40	436A 40	436A 40	437A 46
A.18	426A 32	427A 33	428A 28	429A 32	---	---	---	---	---	---	---	---
B.												
B.52	427A154	428A140	429A146	430A160	431A156 7	432A162	433A154	434A154	434A156	436A172	437A170	438A156
B.53	427A153	428A139	429A148	430A159	431A155	432A164	433A156	434A153	435A158	436A174	437A169	438A155
C.												
C.1a	426A 15	427A 14	428A 15	429A 14	430A 16	431A 16	432A 16	433A 16	434A 16	435A 16	436A 16	437A 16
C.1ba	445B 60	454B 45	454B 47	451B 48	457B 76	459B 39	460B116	462B 56	463B 46	465B 68	467B 24	470B 36
C.1d	445B 90	448B 42	449B 95	451B 92	457B115	469B 87	460B151	462B 89	463B 91	465B116	467B 75	470B 76
C.1e	445B 89	447B 73	451B 94	451B 41	457B114	459B 86	460B150	462B 88	463B 90	465B115	467B 74	470B 75
C.3	431B 5	432B 5	433B 5	435B 51	435B 5	436B 5	437B 5	438B 5	439B 5	440B 5	441B 5	442B 5
C.4a	427A126	428A116	429A120	430A128	431A126	432A133	433A132	434A129	435A131	436A133	437A139	439A155
C.4d	427A126	428A116	429A120	430A128	431A126	432A133	433A132	434A129	435A131	436A133	437A139	438A125
C.4e	427A126	428A116	429A120	430A128	431A126	432A133	433A132	434A177	435A131	436A133	437A139	439A128
C.4f	---	---	429A120	430A128	431A126	433A158	433A132	434A132	435A131	436A133	437A139	438A126
C.4h	427A125	429A116	439A120	430A128	431A126	432A133	433A132	434A129	435A131	436A133	437A139	438A126
C.4i	427A125	428A116	429A120	430A128	431A126	432A133	433A132	434A177	435A131	436A133	437A139	438A126
C.4j	427A126	---										
C.4k	427A126	428A116	429A120	430A128	431A126	433A158	433A132	433A129	435A131	436A133	437A139	438A126
C.4l	427A126	428A116	429A120	430A128	431A126	433A158	433A132	433A129	435A131	436A133	437A139	438A126
C.5e	431B 27	432B 30	433B 26	434B 6	435B 41	436B 41	437B 30	438B 23	439B 23	440B 32	441B 46	442B 36
C.6	427A123	428A113	429A116	430A124	431A122	432A129	433A128	433A126	435A128	436A128	437A135	438A122
D.												
D.1a	427A148	429A154	429A142	430A155	431A151	432A158	433A150	434A147	435A152	436A166	437A163	438A149
D.1ba	427A150	428A137	429A144	430A157	431A153	432A160	433A152	434A149	435A154	436A168	437A165	438A141
D.1c	441A165	441A165	441A165	441A165	441A165	441A165	441A165	441A165	441A165	441A165	441A165	441A165
D.1d	427A151	428A138	429A145	430A158	431A154	432A161	433A153	434A152	435A155	436A171	437A168	438A154
D.1f	427A152	431A168	431A168	431A169	433A168	433A168	434A188	435A164	436A179	437A176	437A169	439A163
D.1g	428A147	429A155	431A166	431A167	433A167	434A186	434A187	434A151	436A178	436A168	437A176	438A153
D.1h	426A 40	427A 40	428A 36	429A 37	430A 45	431A 42	432A 43	433A 41	434A 40	435A 44	436A 44	437A 49
F.												
F.1a	428A146	429A153	429A137	430A154	432A170	433A165	434A183	434A146	435A151	436A165	438A163	439A162
F.1b	428A146	428A134	430A167	430A154	431A150	433A165	433A147	435A161	437A175	436A165	438A163	438A148
F.1e	428A146	429A153	429A137	430A154	432A170	433A165	434A183	434A146	435A151	436A165	438A163	439A162
F.1h	427A147	428A134	429A137	430A154	431A150	432A155	433A147	434A146	435A151	436A165	437A162	438A148
F.1i	427A147	428A134	429A137	430A154	431A150	432A155	433A147	434A146	435A151	436A165	437A162	438A148
F.1j	427A147	428A134	429A137	430A154	431A150	432A155	433A147	434A146	435A151	436A165	437A162	438A148
F.1k	---	---	---	---	---	---	---	---	---	---		
F.1l	428A146	430A167	430A167	431A163	433A165	435A161	437A175	437A175	437A175	438A163	439A162	439A162
H.												
H.60	426A 4	427A 4	428A 4	429A 4	430A 5	431A 5	432A 5	433A 5	434A 5	435A 5	436A 5	437A 5

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Key*	1981 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.												
A.1	439A 46	440A 52	441A 58	442A 52	443A 44	444A 52	445A 54	446A 40	447A 54	448A 52	449A 50	450A 42
A.2aa	438A 11	439A 9	440A 11	441A 13	442A 11	443A 11	444A 11	445A 11	446A 11	447A 11	448A 11	449A 11
A.2c	438A 11	439A 9	440A 11	441A 13	442A 11	443A 11	444A 11	445A 11	446A 11	447A 11	448A 11	449A 11
A.3a	439A 46	440A 52	441A 58	442A 52	443A 44	444A 52	445A 54	446A 40	447A 54	448A 52	449A 50	450A 42
A.3b	439A108	440A108	441A120	442A112	443A106	444A112	445A116	447A163	447A114	448A114	449A110	450A104
A.3c	439A 46	440A 52	441A 58	442A 52	443A 44	444A 52	445A 54	446A 40	447A 54	448A 52	449A 50	450A 42
A.3d	438A 36	439A 38	440A 46	441A 50	442A 44	443A 38	444A 46	445A 47	446A 34	447A 46	448A 44	449A 38
A.3e	439A 46	439A 52	441A 58	442A 52	443A 44	444A 52	445A 54	446A 40	447A 52	448A 52	449A 50	450A 42
A.4	439A 46	440A 52	441A 58	442A 52	443A 44	444A 52	445A 54	446A 40	447A 54	448A 52	449A 50	450A 42
A.5	439A 46	440A 52	441A 58	442A 52	443A 44	444A 52	445A 54	446A 40	447A 54	447A 52	449A 50	450A 42
A.5a	439A108	440A108	441A120	442A112	443A106	444A112	445A116	447A163	447A114	448A114	449A110	450A104
A.5b	439A123	440A121	441A135	442A127	443A119	444A122	445A129	447A145	447A128	449A172	449A127	450A118
A.6	439A 42	440A 48	441A 54	442A 48	443A 42	444A 50	445A 52	446A 38	447A 50	448A 48	449A 42	450A 38
A.6b	444B 56	444B 58	446B 79	447B 76	448B 40	450B 66	451B 67	451B 95	452B 56	454B 38	455B 36	455B 37
A.6c	439A 43	440A 49	441A 55	442A 49	443A 43	444A 51	445A 53	446A 39	447A 51	448A 50	449A 44	450A 39
A.6d	439A 44	440A 50	441A 56	442A 50	449A190	449A192	449A194	449A196	449A198	449A 46	449A 47	450A 40
A.6e	443B 26	444B 48	445B 57	446B 74	447B 40	448B 36	449B 64	450B 60	451B 45	452B 53	453B 64	454B 35
A.7f	438A 33	439A 39	441A170	---	---	443A 35	444A 43	---	446A 30	---	448A 40	---
A.7g	439A 45	440A 51	441A 57	449A188	449A189	449A191	449A193	449A197	449A199	449A 48	449A 49	---
A.7h	439A 46	440A 52	441A 58	442A 52	443A 44	444A 52	445A 54	446A 40	447A 54	448A 52	449A 50	450A 42
A.8aa	438A 11	439A 9	440A 11	441A 13	442A 11	443A 9	444A 11	445A 11	446A 11	447A 11	448A 11	449A 11
A.8ac	438A 11	439A 9	440A 11	441A 13	442A 11	443A 9	444A 11	445A 11	446A 11	447A 11	448A 11	449A 11
A.8g	438A 11	439A 9	440A 11	441A 13	442A 11	443A 9	444A 11	445A 11	---	447A 11	448A 11	449A 11
A.10a	439A154	439A 24	440A 29	442A160	442A 27	443A 23	444A 27	445A 27	446A 20	447A 28	448A 25	449A 25
A.10c	438A 24	439A 27	440A 32	441A 33	442A 30	443A 26	444A 30	445A 30	446A 23	447A 32	448A 28	449A 28
A.10d	438A 25	439A 28	440A 33	441A 34	442A 31	443A 27	444A 31	445A 31	446A 24	447A 33	448A 29	449A 29
A.10e	438A 23	439A 26	440A 31	441A 32	442A 29	443A 25	444A 29	445A 29	446A 22	447A 31	448A 27	449A 27
A.10f	438A 22	439A 25	440A 30	441A 31	442A 28	443A 24	444A 28	445A 30	---	447A 29	448A 26	449A 26
A.10g	---	---	---	---	---	---	---	---	446A 21	447A 30	---	---
A.11g	443B 20	444B 43	445B 51	446B 69	447B 34	448B 31	449B 58	450B 54	451B 40	452B 47	453B 59	454B 29
A.12e	475B 62	475B 62	475B 62	475B 62	475B 62	475B 62	475B 62	475B 62	475B 62	475B 62	475B 62	475B 62
A.13d	442A161	442A161	442A161	442A161	442A 39	442A 32	445A170	445A 42	447A160	447A 41	448A 38	451A166
A.13e	449B104	449B105	449B106	449B107	449B108	457B118	457B119	457B120	457B121	457B122	457B123	457B124
A.13f	438A 37	442A170	442A170	442A171	442A 45	443A 39	444A 47	445A 45	446A 31	447A 43	448A 41	449A 35
A.16a	515B 27	515B 27	515B 27	515B 27	515B 27	515B 27	515B 27	515B 27	515B 27	515B 27	515B 27	515B 27
A.16b	499B 29	499B 29	499B 29	499B 29	499B 29	499B 29	499B 29	499B 29	499B 29	499B 29	499B 29	499B 29
A.17	439A127	440A153	---	---	---	444A126	445A135	446A107	447A129	450A148	---	---
A.17c	438A 34	439A 36	440A 44	441A 48	442A 42	443A 36	444A 44	445A 46	446A 32	447A 44	448A 42	449A 36
B.												
B.52	439A150	440A154	441A167	442A156	443A150	444A148	445A166	446A140	447A156	448A154	449A164	450A144
B.53	439A152	440A156	443A166	442A158	443A149	444A150	445A165	446A139	447A158	448A156	449A166	450A143
C.												
C.1a	438A 16	439A 14	440A 14	441A 18	442A 16	443A 15	444A 16	445A 16	446A 16	447A 16	448A 16	449A 16
C.1ba	470B 77	472B 46	473B 30	474B 40	475B 19	476B 29	477B 14	477B 36	480B 61	481B 38	482B 62	483B 68
C.1d	470B105	472B 83	473B 74	474B 86	475B 53	476B 60	477B 59	479B 84	480B 94	481B 79	382B100	483B 98
C.1e	470B104	472B 82	473B 73	474B 85	475B 52	476B 59	477B 60	479B 83	480B 93	481B 78	482B 99	483B 97
C.3	443B 5	444B 5	445B 5	446B 5	447B 4	448B 4	449B 4	450B 4	451B 4	452B 4	453B 4	454B 4
C.4a	439A128	440A126	441A136	442A134	443A123	444A127	445A136	446A108	447A130	448A134	449A132	450A122
C.4d	439A128	440A126	441A136	443A154	443A123	444A127	445A136	446A108	447A130	448A173	449A132	450A122
C.4e	440A126	441A136	442A134	443A123	445A174	445A136	446A108	447A130	447A130	448A173	449A132	450A122
C.4f	439A128	440A126	441A136	442A134	443A123	444A127	445A136	446A108	447A130	448A134	449A132	450A122
C.4h	439A128	440A126	441A136	442A134	443A123	---	---	---	---	---	---	---
C.4i	439A128	440A126	441A136	442A134	443A123	444A127	445A136	---	---	---	---	---
C.4k	439A128	440A126	441A136	442A134	443A123	444A127	445A136	446A108	447A130	448A134	449A132	450A122
C.4l	439A128	440A126	441A136	442A134	443A123	444A117	445A136	446A108	447A130	448A134	449A132	450A122
C.5e	443B 20	444B 43	445B 51	446B 69	447B 34	448B 31	449B 58	450B 54	451B 40	452B 47	453B 59	454B 29
C.6	439A124	440A122	442A172	442A128	443A120	444A123	445A130	446A102	448A159	449A168	449A128	450A119
D.												
D.1a	439A145	440A149	441A162	443A164	443A144	444A144	445A160	446A135	447A152	448A150	449A159	450A138
D.1ba	439A147	440A151	441A164	442A153	443A146	444A146	445A162	446A137	447A154	448A152	449A161	450A140
D.1c	451A158	451A158	451A158	451A158	451A158	451A158	451A158	451A158	451A158	451A158	451A158	451A158
D.1d	439A148	440A152	441A166	442A155	443A147	444A147	445A163	447A180	448A164	449A186	449A162	450A141
D.1f	439A149	441A170	442A180	443A165	443A148	445A180	445A164	446A138	447A155	448A153	449A163	450A142
D.1g	440A160	441A172	442A182	444A155	445A182	445A183	446A144	447A179	448A163	449A145	450A153	451A175
D.1h	438A 38	439A 40	440A 43	441A 51	442A 46	443A 40	444A 48	445A 4	446A 35	447A 47	448A 45	449A 39
F.												
F.1a	440A159	440A145	442A177	442A151	444A152	447A176	447A176	447A177	447A151	449A180	450A149	450A134
F.1b	440A159	440A159	442A177	442A151	443A141	445A178	447A176	447A177	447A151	449A180	450A149	451A172
F.1e	440A159	440A145	442A177	442A151	444A152	447A176	447A176	447A177	447A151	449A180	459A149	450A134
F.1h	439A144	440A145	441A159	442A151	443A141	444A141	445A157	446A134	447A151	448A149	449A159	450A134
F.1i	439A144	440A145	441A159	442A151	443A141	444A141	445A157	446A177	447A151	448A149	449A149	450A134
F.1j	439A144	440A145	441A159	442A151	443A141	444A141	445A157	446A177	447A151	448A149	449A149	450A134
F.1l	442A177	442A177	442A177	443A163	443A141	445A178	447A176	447A177	447A151	449A180	450A149	451A172
H.												
H.60	438A 5	439A 4	440A 5	441A 5	442A 5	443A 5	444A 5	445A 5	446A 4	447A 4	448A 4	449A 5

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Key*	1982 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.												
A.1	451A 58	452A 50	453A 40	454A 44	455A 64	456A 58	457A 50	458A 48	459A 44	460A 52	461A 58	462A 44
A.2aa	450A 11	451A 11	452A 11	453A 11	454A 9	455A 11	456A 9	457A 9	458A 9	459A 9	460A 11	461A 11
A.2c	450A 11	451A 11	452A 11	453A 11	454A 9	455A 11	456A 9	457A 9	458A 9	459A 9	460A 11	461A 11
A.3a	451A 58	452A 50	453A 40	454A 44	455A 64	456A 58	457A 50	458A 48	459A 44	460A 52	461A 58	462A 44
A.3b	451A120	452A106	453A102	454A104	455A126	457A166	457A112	458A110	459A105	460A 83	461A 88	462A 75
A.3c	451A 58	452A 50	453A 40	454A 44	455A 64	456A 58	457A 50	458A 48	459A 44	460A 52	461A 58	462A 44
A.3d	450A 34	451A 50	452A 42	453A 32	454A 32	455A 56	456A 48	457A 42	458A 38	459A 36	460A 44	461A 52
A.3e	451A 58	452A 50	453A 40	454A 44	455A 64	456A 58	457A 50	458A 48	459A 44	460A 52	461A 58	462A 44
A.4	451A 58	452A 50	453A 40	454A 44	455A 64	456A 58	457A 50	458A 48	459A 44	460A 52	461A 58	462A 44
A.5	450A 42	451A 58	452A 50	453A 40	454A 44	455A 64	456A 58	457A 50	479A105	479A109	479A113	479A116
A.5a	451A120	452A106	453A102	454A104	455A126	457A166	457A112	487A 91	487A 98	489A 94	490A101	491A 88
A.5b	477A122	477A122	477A122	477A122	477A122	477A122	477A122	477A122	477A122	477A122	477A122	477A122
A.6	451A 54	452A 46	453A 36	454A 36	456A 52	456A 53	457A 46	458A 42	459A 40	460A 47	461A 54	462A 36
A.6b	458B 43	459B 91	460B154	460B155	462B 92	463B 94	465B118	466B 86	467B 78	467B 79	469B 32	470B108
A.6c	451A 55	452A 47	453A 37	454A 38	455A 61	456A 55	458A 43	458A 44	460A 48	460A 49	461A 55	462A 38
A.6d	451A 56	452A 48	453A 38	454A 40	455A 62	456A 56	457A 48	458A 45	459A 42	460A 50	461A 56	462A 40
A.6e	455B 32	456B 83	457B 73	458B 40	459B 37	460B113	461B 94	462B 52	463B 43	464B 36	465B 65	466B 82
A.7g	451A 57	452A 49	453A 44	454A 42	455A 63	456A 56	457A 49	458A 47	459A 43	460A 51	461A 57	462A 42
A.7h	451A 58	452A 50	453A 40	454A 44	455A 64	456A 58	457A 50	458A 48	459A 44	460A 52	461A 58	462A 44
A.8aa	450A 11	451A 11	452A 11	453A 11	454A 9	455A 11	456A 9	457A 9	458A 9	459A 9	460A 11	461A 11
A.8ac	450A 11	451A 11	452A 11	453A 11	454A 9	455A 11	456A 9	457A 9	458A 9	459A 9	460A 11	461A 11
A.8g	450A 11	451A 11	452A 11	453A 11	454A 9	455A 11	456A 9	457A 9	458A 9	459A 9	460A 11	461A 11
A.10a	450A 23	452A162	452A 28	455A162	454A 21	455A 30		---	458A 25	459A 26	460A 28	461A 32
A.10c	450A 26	451A 33	452A 31	---	---	455A 33	456A 30	457A 29	458A 28	459A 28	460A 31	461A 35
A.10d	450A 27	451A 34	452A 32	---	---	---	456A 30	457A 30	458A 29	459A 29	460A 32	461A 36
A.10e	450A 25	451A 32	452A 30	453A 25	454A 23	455A 32	456A 29	457A 28	458A 27	459A 27	460A 30	461A 34
A.10f	450A 24	451A 31	452A 29	453A 24	454A 22	455A 31	456A 28	457A 27	458A 26		460A 29	461A 33
A.11g	455B 26	456B 78	457B 67	458B 35	459B 31	461B 98	461B 88	462B 46	463B 38	464B 31	465B 60	466B 76
A.12e	476B 67	476B 72	476B 77	476B 82	476B 86	476B 90	476B 94	476B 98	476B102	476B106	476B110	476B146
A.13d	451A169	451A 45	---	---	---	---	---	---	---	---	---	---
A.13e	476B 66	476B 71	476B 66	476B 81	477B 62	477B 63	477B 64	477B 65	477B 66	477B 67	477B 68	477B 69
A.13f	450A 31	451A 51	452A 43	453A 33	454A 33	455A 57	456A 45	457A 39	458A 39	459A 37	---	469A110
A.16a	515B 28	515B 28	515B 28	515B 28	515B 28	515B 28	515B 28	515B 28	515B 28	515B 28	515B 28	515B 28
A.16b	499B 30	499B 30	499B 30	499B 30	499B 30	499B 30	499B 30	499B 30	499B 30	499B 30	499B 30	499B 30
A.17	452A163	452A123	455A175	455A175	455A142	---	457A129	458A124	459A130	461A136	462A132	
A.17c	485A 99	485A 99	485A 99	485A 99	485A 99	485A 99	485A 99	485A 99	485A 99	485A 99	485A 99	485A 99
B.												
B.52	451A162	452A158	453A144	454A140	455A158	456A156	457A162	458A148	459A156	460A128	461A132	462A128
B.53	451A161	452A160	453A143	454A142	455A157	456A158	457A161	458A150	459A158	460A130	461A131	462A130
C.												
C.1a	450A 16	451A 16	452A 16	453A 16	454A 14	455A 16	456A 14	457A 14	458A 14	459A 14	460A 16	461A 16
C.1ba	484B 29	485B 26	486B 22	486B 60	486B 84	486B112	487B 20	487B 57	487B 95	487B125	487B151	488B 18
C.1d	484B 58	485B 66	486B 59	486B 83	486B111	486B153	487B178	487B179	487B180	487B181	487B182	488B 52
C.1e	484B 58	---	---	---	---	---	---	---	---	---	---	---
C.3	455B 4	456B 4	457B 4	458B 4	459B 4	460B 4	461B 4	462B 4	463B 4	464B 4	465B 4	466B 4
C.4a	451A140	452A124	453A118	454A121	455A143	456A124	457A130	458A125	459A131	460A106	461A109	468A122
C.4d	451A140	452A124	453A163	454A170	455A143	456A124	457A130	458A125	459A131	460A106	461A109	462A 98
C.4e	451A140	452A124	453A118	454A121	455A143	456A124	457A130	458A125	459A131	460A106	461A109	462A 98
C.4f	451A140	452A124	453A118	454A121	455A143	456A124	457A130	458A125	459A131	460A106	461A109	462A 98
C.4i	451A140	452A124	454A145	---	---	---	---	---	---	---	461A109	462A 98
C.4k	451A140	452A124	453A118	454A121	455A143	456A124	457A130	458A125	459A131	460A106	461A109	462A 98
C.4l	451A140	452A124	453A118	454A121	455A143	456A124	457A130	458A125	459A131	460A106	461A109	462A 98
C.5e	455B 26	456B 78	457B 67	458B 35	459B 31	461B 98	461B 88	462B 46	463B 38	464B 31	465B 60	466B 76
C.6	451A136	452A119	453A114	454A118	455A139	456A118	457A123	458A120	459A126	460A102	461A103	462A 92
D.												
D.1a	451A151	452A152	453A136	454A134	455A153	456A149	457A154	459A162	459A150	461A136	461A126	462A121
D.1ba	451A153	452A154	453A138	454A136	455A155	456A151	457A156	458A144	459A152	460A125	461A128	462A123
D.1c	462A124	462A124	462A124	462A124	462A124	462A124	462A124	462A124	462A124	462A124	462A124	462A124
D.1d	451A159	452A155	453A141	454A139	455A156	456A154	457A159	458A147	459A153	460A126	461A129	462A125
D.1f	451A160	452A157	453A142	456A160	---	456A155	457A160	459A164	459A155	460A127	461A130	462A127
D.1g	452A165	453A148	453A140	454A138	456A160	456A153	457A158	458A146	460A135	462A139	462A140	463A111
D.1h	450A 35	451A 52	452A 44	453A 34	454A 34	455A 58	456A 49	457A 43	458A 40	459A 38	460A 41	461A 49
F.												
F.1a	451A151	452A151	453A135	455A177	455A152	456A148	457A153	459A160	459A149	460A119	462A134	462A116
F.1b	454A150	454A150	454A150	454A131	457A176	457A178	467A128	462A133	462A133	462A133	462A134	462A116
F.1e	451A151	452A151	453A135	455A177	455A152	456A148	457A153	459A160	459A149	460A119	462A134	462A116
F.1h	451A151	452A151	453A135	454A131	455A152	456A148	457A153	458A143	459A149	460A119	461A123	462A116
F.1i	451A151	452A151	453A135	454A131	457A178	457A178	457A153	458A143	459A149	460A119	461A123	462A116
F.1j	451A151	452A151	453A135	454A131	457A178	457A178	457A153	458A143	459A149	460A119	461A123	462A116
F.1l	451A150	454A150	454A150	457A176	457A178	462A133	462A133	462A133	462A133	462A134	462A134	462A116
H.												
H.60	450A 5	451A 5	452A 5	453A 5	454A 4	455A 5	456A 4	457A 4	458A 4	459A 4	460A 5	461A 4

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A.1	463A 40	464A 38	465A 42	466A 54	467A 48	468A 44	469A 44	470A 36	471A 40	472A 34	473A 38	474A 42
A.2aa	462A 11	463A 9	464A 9	465A 9	466A 11	467A 11	468A 9	469A 11	470A 9	471A 9	472A 9	473A 9
A.2c	462A 11	463A 9	464A 9	465A 9	466A 11	467A 11	468A 9	469A 11	470A 9	471A 9	472A 9	473A 9
A.3a	463A 40	464A 38	465A 42	466A 54	467A 48	468A 44	469A 44	470A 36	471A 40	472A 34	473A 38	474A 42
A.3b	463A 71	464A 66	465A 73	466A 84	467A 79	468A 74	469A 75	470A 67	471A 70	472A 65	473A 68	474A 69
A.3c	463A 40	464A 38	465A 42	466A 54	467A 48	468A 44	469A 44	470A 36	471A 40	472A 34	473A 38	474A 42
A.3d	462A 34	463A 30	464A 32	465A 34	466A 48	467A 40	468A 38	469A 36	470A 28	471A 34	472A 26	473A 26
A.3e	463A 40	464A 38	465A 42	466A 54	467A 48	468A 44	469A 44	470A 36	471A 40	472A 34	473A 38	474A 42
A.4	463A 40	464A 38	465A 42	466A 54	467A 48	468A 44	469A 44	470A 36	471A 40	472A 34	473A 38	474A 42
A.5	479A120	479A124	479A127	483A 88	483A 90	485A101	485A104	485A109	489A 84	489A 88	489A 92	490A 91
A.5a	492A 96	494A 81	495A 73	496A 90	496A 94	497A 77	497A 84	498A 77	499A124	500A 85	500A 92	501A 79
A.5b	485A113	485A113	485A113	485A113	485A113	485A113	485A113	485A113	499A129	500A 90	500A 94	501A 82
A.6	463A 45	464A 34	465A 38	466A 50	467A 44	468A 40	469A 40	470A 32	471A 36	472A 30	473A 30	474A 38
A.6b	472B 86	472B 87	473B 76	474B 88	475B 56	475B 57	475B 58	476B 62	475B 63	478B 20	478B 21	478B 22
A.6c	463A 37	464A 35	465A 39	466A 51	467A 45	468A 41	469A 41	470A 33	471A 37	472A 31	473A 32	474A 39
A.6d	463A 38	464A 36	465A 40	466A 52	467A 46	468A 42	469A 42	470A 34	471A 38	472A 32	473A 34	474A 40
A.6e	467B 22	468B 29	469B 30	470B 34	471B 55	472B 44	473B 27	474B 37	475B 17	476B 27	477B 11	478B 18
A.7g	463A 39	464A 37	465A 41	466A 53	467A 47	468A 43	469A 43	470A 35	471A 39	472A 33	473A 36	474A 41
A.7h	463A 40	464A 38	465A 42	466A 54	467A 48	468A 44	469A 44	470A 36	471A 40	472A 34	473A 38	474A 42
A.8aa	462A 11	463A 9	464A 9	465A 9	466A 11	467A 11	468A 9	469A 11	470A 9	471A 9	472A 9	473A 9
A.8ac	462A 11	463A 9	464A 9	465A 9	466A 11	467A 11	468A 9	469A 11	470A 9	471A 9	472A 9	473A 9
A.8g	462A 11	463A 9	464A 9	465A 9	466A 11	467A 11	468A 11	469A 11	470A 9	471A 9	472A 9	473A 9
A.10a	462A 24	463A 20	464A 20	465A 22	466A 31	467A 26	468A 25	469A 23	470A 19	471A 22	472A 18	473A 19
A.10c	462A 27	463A 23	464A 23	465A 25	466A 34	467A 29	468A 28	469A 26	470A 22	471A 25	472A 21	473A 22
A.10d	462A 28	463A 24	464A 24	465A 26	466A 35	467A 30	468A 29	469A 27	470A 23	471A 26	472A 22	473A 22
A.10e	462A 26	463A 22	464A 22	465A 24	466A 33	467A 28	468A 27	469A 25	470A 21	471A 24	472A 20	473A 21
A.10f	462A 25	463A 21	464A 21	465A 23	466A 32	467A 27	468A 26	469A 24	470A 20	471A 23	472A 19	473A 20
A.11g	467B 16	468B 24	469B 24	470B 29	471B 51	488B 58	488B 63	488B 69	488B 75	479B 90	477B 79	478B 12
A.12e	478B 28	478B 32	478B 36	491B 80	491B 84	491B 88	491B 92	491B 96	491B100	491B104	491B108	491B112
A.13d	---	---	---	---	---	---	---	---	---	---	---	---
A.13e	477B 70	477B 71	477B 72	477B 73	477B 74	477B 75	477B 76	477B 77	477B 78	483B102	483B103	483B104
A.13f	469A111	469A112	474A101	474A102	474A103	474A104	474A105	487A 82	487A 83	487A 84	487A 85	487A 86
A.16a	515B 29	515B 29	515B 29	515B 29	515B 29	515B 29	515B 29	515B 29	515B 29	515B 29	515B 29	515B 29
A.16b	499B 31	499B 31	499B 31	499B 31	499B 31	499B 31	499B 31	499B 31	499B 31	499B 31	499B 31	499B 31
A.17	477A124	477A125	477A126	477A127	477A128	477A129	477A130	477A131	477A132	477A133	477A134	477A135
A.17c	485A100	485A100	485A100	485A100	485A100	485A100	485A100	485A100	485A100	485A100	485A100	485A100
B.												
B.52	463A106	464A 92	465A106	466A120	467A124	468A118	469A118	470A106	471A100	472A 94	473A 86	474A 88
B.53	463A106	464A 91	465A108	466A119	467A123	468A120	469A117	470A108	471A 99	472A 96	473A 88	474A 87
C.												
C.1a	462A 16	463A 14	464A 14	465A 14	466A 16	467A 14	468A 14	469A 16	470A 14	471A 14	472A 14	473A 14
C.1ba	489B 26	489B 44	490B 20	490B 39	490B 57	491B 26	491B 56	492B 18	492B 41	493B 22	493B 39	493B 45
C.1d	489B 43	489B 56	490B 38	490B 56	490B 87	491B 55	491B 77	492B 40	492B 55	493B 38	493B 44	493B 54
C.3	467B 4	468B 4	469B 4	470B 4	471B 4	472B 4	473B 4	474B 4	475B 4	476B 4	477B 4	478B 4
C.4d	463A 92	464A 78	465A 89	466A103	467A102	468A 96	469A 98	470A 86	471A 85	472A 80	473A 76	475A119
C.4e	463A 92	464A 78	465A 89	466A103	467A102	468A 96	469A 98	470A 86	471A 85	472A 80	473A 76	474A 79
C.4f	463A 92	464A 78	465A 89	466A103	467A102	468A 96	469A 98	470A 86	471A 85	472A 80	473A 76	474A 79
C.4i	463A 92	464A 78	465A 89	466A103	467A102	468A 96	469A 98	470A 86	---	---	---	---
C.4k	463A 92	464A 78	465A 89	466A103	467A102	468A 96	469A 98	470A 86	471A 85	472A 80	473A 76	474A 79
C.41	463A 92	464A 78	465A 89	466A103	467A102	468A 96	469A 98	470A 86	471A 85	472A 80	473A 76	474A 79
C.6	463A 89	464A 75	465A 86	466A 99	467A 97	468A 91	469A 94	470A 83	471A 82	472A 77	473A 74	474A 77
D.												
D.1a	463A102	464A 87	465A101	466A114	467A118	468A111	471A104	471A105	472A100	472A 90	473A 81	474A 82
D.1ba	463A104	464A 89	465A103	466A116	467A120	468A113	469A114	470A104	471A 97	472A 92	473A 83	474A 84
D.1c	475A105	475A105	475A105	475A105	475A105	475A105	475A105	475A105	475A105	475A105	475A105	475A105
D.1d	463A105	464A 90	465A104	466A117	467A122	468A116	469A115	470A105	471A 98	472A 93	473A 84	474A 86
D.1f	464A 98	465A112	465A105	466A118	468A129	468A117	469A116	472A 99	473A 93	473A 93	474A 93	475A113
D.1g	464A 97	465A111	466A125	467A131	467A121	468A115	471A107	472A 98	473A 90	473A 91	474A 92	474A 85
D.1h	462A 31	463A 31	464A 29	465A 35	466A 45	467A 41	468A 35	469A 37	470A 29	471A 31	472A 27	473A 27
F.												
F.1a	463A101	464A 83	466A128	466A113	468A130	468A110	470A113	487A108	471A 91	473A 97	473A 79	480A100
F.1b	466A128	466A128	466A128	466A113	467A117	468A110	469A109	487A108	471A 91	473A 97	473A 79	480A100
F.1e	463A101	464A 83	466A128	466A113	468A130	468A110	470A113	487A108	471A 91	473A 97	473A 79	480A100
F.1h	463A101	464A 83	465A 97	466A113	467A117	468A110	469A109	487A108	471A 91	473A 97	475A114	480A100
F.1i	463A101	464A 83	465A 97	466A113	467A117	468A110	470A113	487A108	474A 98	474A 99	474A100	474A 81
F.1j	463A101	464A 83	465A 97	466A113	467A117	468A110	470A113	487A108	474A 98	474A 99	474A100	480A100
F.1l	466A128	466A128	466A128	467A128		468A110	470A113	487A108	473A 96	473A 97	473A 79	480A100
H.												
H.60	462A 5	463A 4	464A 4	465A 4	466A 4	467A 4	468A 4	469A 5	470A 5	471A 5	472A 5	473A 5

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A.1	475A 50	476A 46	477A 50	478A 52	479A 34	480A 32	481A 36	482A 28	483A 28	484A 30	485A 28	486A 30
A.2aa	474A 9	475A 9	476A 11	477A 9	478A 9	479A 9	480A 9	481A 7	482A 7	483A 7	484A 7	485A 7
A.2c	474A 9	475A 9	476A 11	477A 9	478A 9	479A 9	480A 9	481A 7	482A 7	483A 7	484A 7	485A 7
A.3a	475A 50	476A 46	477A 50	478A 52	479A 34	480A 32	481A 36	482A 28	483A 28	484A 30	485A 28	486A 30
A.3b	475A 81	476A 75	477A 81	478A 82	479A 65	480A 62	481A 67	482A 59	483A 58	484A 61	485A 58	486A 61
A.3c	475A 50	476A 46	477A 50	478A 52	479A 34	480A 32	481A 36	482A 28	483A 28	484A 30	485A 28	486A 30
A.3d	474A 36	475A 42	476A 38	477A 42	478A 44	479A 26	480A 24	481A 23	482A 21	483A 22	484A 24	485A 22
A.3e	475A 50	476A 46	477A 50	478A 52	479A 34	480A 32	481A 36	482A 28	483A 28	484A 30	485A 28	486A 30
A.4	475A 50	476A 46	477A 50	478A 52	479A 34	480A 32	481A 36	482A 28	483A 28	484A 30	485A 28	486A 30
A.5	490A 94	490A 98	491A 95	491A 99	492A104	493A 78	493A 81	499A131	499A134	499A139	499A143	499A148
A.5a	501A 84	501A 90	501A 96	501A104	501A110	501A117	502A 82	502A 88	502A 93	502A 97	502A101	502A106
A.5b	501A 88	501A 94	501A102	501A108	501A115	501A121	502A 86	502A 91	502A 95	502A 99	502A104	502A108
A.6	475A 46	476A 42	477A 46	478A 48	479A 30	480A 28	481A 28	482A 24	483A 24	484A 26	485A 24	486A 26
A.6b	479B 86	479B 87	482B104	482B105	483B 4	484B 4	485B 4	486B 4	487B 4	488B 4	489B 4	490B 4
A.6c	475A 47	476A 43	477A 47	478A 49	479A 31	480A 29	481A 30	482A 25	483A 25	484A 27	485A 25	486A 27
A.6d	475A 48	476A 44	477A 48	478A 50	479A 32	480A 30	481A 32	482A 26	483A 26	484A 28	485A 26	486A 28
A.6e	479B 33	480B 57	481B 33	482B 57	483B 62	484B 24	485B 21	486B 17	487B 15	488B 14	489B 21	490B 14
A.6f	----	480B 58	481B 34	482B 58	483B 63	484B 25	485B 22	486B 18	487B 16	488B 15	489B 22	490B 15
A.7g	475A 49	476A 45	477A 49	478A 51	479A 33	480A 31	481A 34	482A 27	483A 27	484A 29	485A 27	486A 29
A.7h	475A 50	476A 46	477A 50	478A 52	479A 34	480A 32	481A 36	482A 28	483A 28	484A 30	485A 28	486A 30
A.8aa	474A 9	475A 9	476A 11	477A 9	478A 9	479A 9	480A 9	481A 7	482A 7	483A 7	484A 7	485A 7
A.8ac	474A 9	475A 9	476A 11	477A 9	478A 9	479A 9	480A 9	481A 7	482A 7	483A 7	484A 7	485A 7
A.8g	474A 9	475A 9	476A 11	477A 9	478A 9	479A 9	480A 9	481A 7	482A 7	483A 7	484A 7	485A 7
A.10a	474A 24	475A 27	476A 27	477A 26	478A 27	479A 18	480A 17	482A 86	482A 15	483A 14	484A 15	486A 84
A.10c	474A 27	475A 30	476A 30	477A 29	478A 30	479A 21	480A 20	481A 19	482A 18	483A 17	484A 18	485A 16
A.10d	474A 28	475A 31	476A 31	477A 30	478A 31	479A 22	480A 21	481A 20	482A 18	483A 18	484A 19	485A 17
A.10e	474A 26	475A 29	476A 29	477A 28	478A 29	479A 20	480A 19	481A 18	482A 17	483A 16	484A 17	485A 15
A.10f	474A 25	475A 28	476A 28	477A 27	478A 28	479A 19	480A 18	481A 17	482A 16	483A 15	484A 16	486A 85
A.11g	479B 27	480B 52	481B 27	482B 52	483B 19	484B 19	485B 15	486B 11	487B 10	488B 8	489B 16	490B 8
A.12e	505B 34	505B 38	505B 42	505B 46	505B 50	505B 54	505B 58	505B 62	505B 65	505B 69	505B 73	505B 77
A.13d	---	---	---	---	485A 92	485A 93	485A 94	485A 95	485A 96	485A 97	486A 90	486A 92
A.13e	483B105	483B106	483B107	483B108	483B 55	484B 18	494B158	494B159	494B160	494B161	494B162	494B163
A.13f	487A 87											
A.16a	515B 30	515B 30	----	515B 30	515B 30	515B 30	515B 30	515B 30	515B 30	515B 30	515B 30	515B 30
A.16b	499B 32	499B 32	499B 32	499B 32	499B 32	499B 32	499B 32	499B 32	499B 32	499B 32		
A.17	477A136	477A137	480A 98	480A 99	481A 99	481A 99	482A 87	485A 86	486A 86	486A 87	486A 88	488A 80
A.17c	485A 19	485A 19	485A 19	485A 19					485A 19	485A 19	485A 19	485A 19
B.												
B.52	475A108	476A112	477A116	478A118	479A 96	480A 92	481A 94	482A 82	483A 76	484A 78	485A 80	486A 80
B.53	475A107	476A114	477A115	478A120	479A 95	480A 91	481A 93	482A 81	483A 75	484A 77	485A 79	486A 79
C.												
C.1a	474A 14	475A 14	476A 16	477A 14	478A 14	479A 14	480A 14	481A 12	482A 12	483A 12	484A 12	485A 12
C.1ba	494B 28	494B 47	494B 71	494B 92	494B118	494B144	495B 32	495B 41	495B 51	495B 58	495B 62	495B 69
C.1d	494B 46	494B 70	494B 91	494B117	494B143	494B154	495B 40	495B 50	495B 57	495B 61	495B 68	495B 74
C.3	479B 4	480B 4	481B 4	482B 4	483B 6	484B 6	485B 8	486B 6	487B 6	488B 6	489B 6	490B 6
C.4d	475A 96	---	---	---	---	480A 75	481A 81	483A 80	483A 62	485A 84	485A 65	486A 66
C.4e	475A 96	476A 94	477A102	478A 98	479A 81	480A 75	481A 81	482A 68	483A 62	484A 66	485A 65	486A 66
C.4f	475A 96	476A 94	477A102	478A 98	479A 81	480A 75	481A 81	482A 68	483A 62	484A 66	485A 65	486A 66
C.4i	---	---	---	---	---	---	---	482A 68	484A 82	---	485A 65	486A 66
C.4k	475A 96	476A 94	477A102	478A 98	479A 81	480A 75	481A 81	482A 68	483A 62	484A 66	485A 65	486A 66
C.4l	475A 96	476A 94	477A102	478A 98	479A 81	480A 75	481A 81	482A 68	483A 62	484A 66	485A 65	486A 66
C.6	475A 93	476A 88	477A 98	478A 93	479A 76	480A 73	481A 79	482A 66	483A 61	484A 64	485A 63	486A 65
D.												
D.1a	475A102	476A106	477A111	478A111	479A 91	480A 86	481A 89	482A 76	483A 70	484A 72	485A 74	486A 74
D.1ba	475A104	476A108	477A113	478A113	479A 93	480A 88	481A 91	482A 78	483A 72	484A 74	485A 76	486A 76
D.1c	488A 72	488A 72	488A 72	488A 72	488A 72	488A 72	488A 72	488A 72	488A 72	488A 72	488A 72	488A 72
D.1d	475A106	476A110	477A114	478A116	479A 94	480A 89	481A 92	482A 80	483A 74	484A 76	485A 78	486A 78
D.1f	476A117	477A121	479A100	479A101	480A 96	480A 90	482A 89	483A 82	484A 82	485A 86	486A 89	487A 88
D.1g	476A116	476A109	478A123	478A115	480A 97	481A 98	482A 88	482A 79	483A 73	484A 75	485A 77	486A 77
D.1h	474A 33	475A 43	476A 39	477A 43	478A 45	479A 27	480A 25	481A 24	---	---	---	---
F												
F.1a	476A119	476A105	477A107	479A104	479A 87	480A 85	483A 83	483A 84	483A 66	485A 87	485A 73	492A 84
F.1b	480A101	480A102	480A103	480A104	480A105	486A101	484A 84	484A 85	484A 86	484A 68	486A 98	486A 73
F.1e	476A119	476A105	477A107	479A104	479A 87	480A 85	483A 83	483A 84	483A 66	485A 87	485A 73	492A 84
F.1h	475A100	476A105	477A107	478A109	479A 87	480A 85	481A 85	482A 71	483A 66	485A 87	485A 73	486A 73
F.1i	476A119	476A105	477A107	478A109	479A 87	480A 85	481A 85	482A 71	483A 66	484A 68	485A 73	486A 73
F.1j	476A119	476A105	477A107	478A109	479A 87	480A 85	481A 85	482A 71	483A 66	484A 68	485A 73	486A 73
F.1l	480A101	480A102	480A103	480A104	480A105	484A 83	484A 84	486A 95	486A 96	486A 97	486A 98	492A 84
F.1m	475A100	476A105	477A107	478A109	479A 87	480A 85	481A 85	482A 71	483A 66	484A 68	485A 73	486A 73
H.												
H.60	474A 5	475A 4	476A 5	477A 4	478A 4	479A 5	480A 5	481A 4	482A 4	483A 4	484A 4	485A 4

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A.2aa	486A 7	487A 7	488A 7	489A 7	490A 7	491A 7	492A 9	493A 7	494A 7	495A 7	496A 7	497A 7
A.2c	486A 7	487A 7	488A 7	491A 7	490A 7	491A 7	492A 9	493A 7	494A 7	495A 7	496A 7	497A 7
A.3a	487A 30	488A 31	489A 30	490A 34	491A 28	492A 30	493A 24	494A 26	495A 26	496A 28	497A 26	498A 30
A.3b	487A 61	488A 59	489A 61	490A 64	491A 59	492A 60	493A 55	494A 57	495A 56	496A 59	497A 57	498A 61
A.3c	487A 30	488A 31	489A 30	490A 34	491A 28	492A 30	493A 24	494A 26	495A 26	496A 28	497A 26	498A 30
A.3d	486A 24	487A 24	488A 20	489A 23	490A 23	491A 20	492A 25	493A 19	494A 20	495A 21	496A 23	497A 22
A.3e	487A 30	487A 31	489A 30	490A 34	491A 28	492A 30	493A 24	494A 26	495A 26	496A 28	497A 26	498A 30
A.4	487A 30	487A 31	489A 30	490A 34	491A 28	492A 30	493A 24	494A 26	495A 26	496A 28	497A 26	498A 30
A.5	499A152	499A156	499A159	499A163	499A166	499A170	501A124	501A128	501A132	501A135	503A125	503A127
A.5a	503A 84	503A 88	503A 92	503A 96	503A100	503A104	503A108	503A112	503A116	503A119	503A122	506A 80
A.5b	503A 86	503A 90	503A 94	503A 98	503A102	503A106	503A110	503A114	503A117	503A120	503A123	506A 81
A.6	488A 26	488A 27	489A 26	490A 26	491A 26	492A 28	493A 22	494A 24	495A 24	496A 26	497A 24	498A 26
A.6b	491B 4	492B 4	493B 4	494B 4	497B 43	498B 28	499B 22	499B 22	499B 22	500B 4	501B 4	502B 4
A.6c	487A 27	488A 28	489A 27	490A 28	491A 25	492A 30	493A 23	494A 25	495A 25	496A 26	497A 25	498A 27
A.6d	487A 28	488A 29	489A 28	490A 30	491A 26	499A 81	499A 82	499A 83	499A 84	499A 85	499A 86	499A 87
A.6e	491B 22	492B 14	493B 17	494B 24	495B 30	496B 20	497B 32	498B 19	499B 17	500B 29	---	502B 22
A.6f	491B 23	492B 15	493B 18	494B 25	495B 78	496B 21	497B 34	498B 20	499B 18	500B 30	501B 20	502B 23
A.7g	487A 29	488A 30	489A 29	490A 32	491A 27							
A.7h	487A 30	488A 31	489A 30	490A 34	491A 28	492A 30	493A 24	494A 26	495A 26	496A 28	497A 26	498A 30
A.8aa	486A 7	487A 7	488A 7	489A 7	490A 7	491A 7	492A 9	493A 7	494A 7	495A 7	496A 7	497A 7
A.8ac	486A 7	487A 7	488A 7	489A 7	490A 7	491A 7	492A 9	493A 7	494A 7	495A 7	496A 7	497A 7
A.8g	486A 7	487A 7	488A 7	489A 7	490A 7	491A 7	492A 9	493A 7	494A 7	495A 7	496A 7	497A 7
A.10a	486A 15	487A 14	488A 14	489A 16	490A 15	491A 14	492A 18	494A 76	494A 14	495A 15	496A 14	498A 78
A.10c	486A 18	487A 17	488A 17	489A 19	490A 18	491A 17	492A 21	493A 16	494A 17	495A 18	496A 17	497A 16
A.10d	486A 18	487A 18	488A 18	489A 20	490A 19	491A 18	492A 22	493A 17	494A 18	495A 19	496A 18	497A 17
A.10e	486A 17	487A 16	488A 16	489A 18	490A 17	491A 16	492A 20	493A 15	494A 16	495A 17	496A 16	497A 15
A.10f	486A 16	487A 15	488A 15	489A 17	490A 16	491A 15	492A 19	493A 14	494A 15	495A 16	496A 15	497A 14
A.11g	491B 15	492B 8	493B 6	494B 18	495B 22	496B 14	497B 26	498B 12	499B 12	500B 21	501B 13	502B 15
A.12e	505B 81	505B 85	505B 89	505B 93	510B 26	510B 30	510B 34	510B 38				
A.13d												
A.13e	494B164	494B165	494B166	503B 30	503B 31	503B 32	503B 33	503B 34	503B 35	503B 36	503B 37	503B 38
A.13f												
A.16a	515B 31	515B 31	515B 31	515B 31	515B 31	515B 31						
A.16b												
A.17												
A.17c	486A 21	487A 21	488A 21	494A 77	494A 77	494A 77	494A 77	494A 77	494A 77	494A 77	496A 21	497A 19
B.												
B.52	487A 78	488A 76	489A 76	490A 82	491A 80	492A 80	493A 74	494A 72	495A 68	496A 76	497A 70	498A 74
B.53	487A 80	488A 75	489A 78	490A 84	491A 82	492A 79	493A 76	494A 74	495A 70	496A 75	497A 72	498A 73
C.												
C.1a	486A 12	487A 13	488A 12	489A 12	490A 12	491A 12	492A 14	493A 12	494A 12	495A 12	496A 12	497A 12
C.1ba	496B 26	496B34	496B 39	496B 44	496B 52	496B 4	497B 4	498B 4	499B 4	500B 6	501B 6	502B 7
C.1d	486A 12	487A 14	488A 13	---	490A 14	491A 13	492A 17	493A 13	494A 13	495A 14	496A 13	497A 13
C.1d	496B 33	496B 38	496B 43	496B 51	496B 59	496B 10	497B 13	498B 7	499B 7	500B 12	501B 8	502B 10
C.3	491B 6	492B 6	493B 6	494B 6	495B 6	496B 11	497B 14	498B 9	499B 9	500B 14	501B 10	502B 12
C.3	486A 19	487A 19	488A 18	489A 21	490A 20	491A 19	492A 23	493A 18	494A 19	495A 20	496A 19	497A 18
C.4d	496A 81	496A 83	496A 85	496A 87	498A 79	499A 90	499A 92	499A 94	499A 96	499A 98	499A 99	499A100
C.4e	487A 67	488A 63	489A 66	490A 69	491A 65	492A 67	493A 63	494A 62	495A 58	496A 64	497A 61	498A 65
C.4f	487A 67	488A 63	489A 66	490A 69	491A 65	492A 67	493A 63	494A 62	495A 58	496A 64	497A 61	498A 65
C.4i	487A 67	488A 63	489A 66	490A 69	491A 65	492A 67	493A 63	494A 62	---	---	---	---
C.4k	487A 67	488A 63	489A 66	490A 69	491A 65	492A 67	493A 63	494A 62	495A 58	496A 64	497A 61	498A 65
C.4l	487A 67	488A 63	489A 66	490A 69	491A 65	492A 67	493A 63	494A 62	495A 58	496A 64	497A 61	498A 65
C.6	487A 65	488A 62	489A 65	490A 67	491A 66	492A 66	493A 63	494A 61	494A 57	496A 62	497A 60	498A 64
D.												
D.1a	487A 73	488A 69	489A 71	490A 76	491A 74	492A 73	493A 70	494A 68	495A 64	496A 71	497A 66	498A 68
D.1ba	487A 75	488A 71	489A 73	490A 78	491A 76	492A 75	493A 72	494A 70	495A 66	496A 73	497A 68	498A 70
D.1c	498A 71	498A 71	498A 71	498A 71	498A 71	498A 71	498A 71	498A 71	498A 71	498A 71	498A 71	498A 71
D.1d	487A 77	488A 74	489A 75	490A 80	491A 78	492A 77	493A 73	494A 71	495A 67	496A 74	497A 69	498A 72
D.1f	488A 81	489A 80	490A 86	490A 81	491A 79	492A 78	494A 79	495A 72	496A 80	497A 76	498A 83	500A 84
D.1g	487A 76	488A 73	489A 74	490A 79	491A 77	492A 76	494A 78	497A 74	497A 75	500A 82	500A 83	501A 78
F.												
F.1a	492A 85	492A 86	492A 87	492A 88	499A116	499A117	449A118	499A119	499A120	499A121	499A122	499A123
F.1b	489A 81	489A 82	490A 89	490A 75	491A 73	492A 69	493A 69	494A 67	504A 72	504A 73	504A 74	504A 75
F.1e	492A 85	492A 86	492A 87	492A 88	499A116	499A117	499A118	499A119	499A120	499A121	499A122	499A123
F.1h	487A 72	488A 65	492A 87	491A 86	491A 73	492A 69	493A 69	494A 67	495A 63	496A 67	497A 65	498A 67
F.1i	487A 72	488A 65	489A 67	490A 75	491A 73	492A 69	493A 69	494A 67	494A 63	496A 67	497A 65	498A 67
F.1j	487A 72	488A 65	489A 67	490A 75	491A 73	492A 69	493A 69	494A 67	495A 63	496A 67	497A 65	498A 67
F.1l	490A 87	490A 88	491A 85	491A 86								
F.1m	487A 72	488A 65	489A 67	490A 75	491A 73	492A 69	493A 69	494A 67	495A 63	496A 67	497A 65	498A 67
H.												
H.60	486A 4	487A 4	488A 4	489A 4	490A 4	491A 4	492A 5	493A 4	494A 4	495A 4	496A 4	497A 4

*See "Key" on pages 56-59.

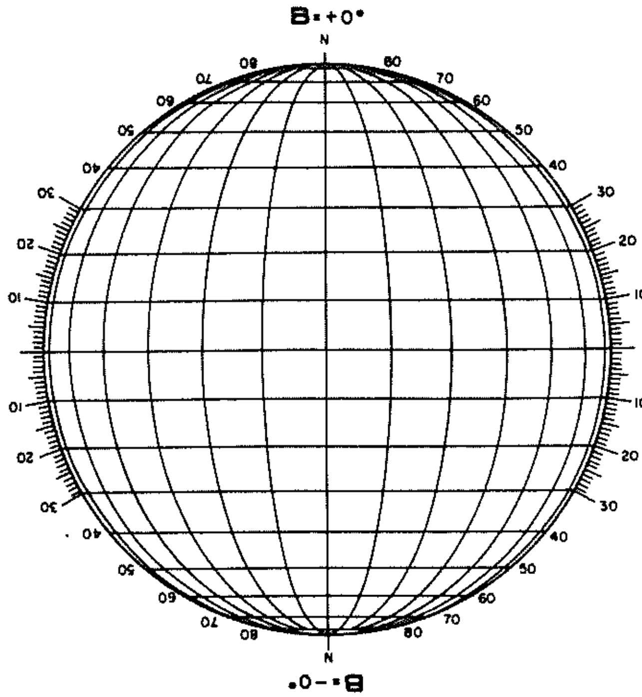
INDEX TO "SOLAR-GEOPHYSICAL DATA"

Key*	1986 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
A.												
A.1	499A 34	500A 29	501A 27	502A 27	503A 25	504A 27	505A 25	506A 25	507A 36	508A 29	509A 29	510A 27
A.2aa	498A 7	499A 9	500A 9	501A 7	502A 7	503A 7	504A 7	505A 7	506A 7	507A 9	508A 7	509A 7
A.2c	511A 81	511A 81	511A 81	511A 81	511A 81	511A 81	511A 81	511A 81	511A 81	511A 81	511A 81	511A 81
A.3a	499A 34	500A 29	501A 27	502A 27	503A 25	504A 27	505A 25	506A 25	507A 36	508A 29	509A 29	510A 27
A.3b	499A 65	500A 57	501A 58	502A 57	503A 56	504A 57	505A 56	506A 56	507A 66	508A 60	509A 59	510A 58
A.3c	499A 34	500A 29	501A 27		503A 25	504A 27	505A 25	506A 25	508A 89	508A 29	509A 29	510A 27
A.3d	498A 24	499A 30	500A 24	501A 22	502A 21	503A 19	504A 21	505A 20	506A 20	507A 24	508A 21	509A 20
A.3e	499A 34	500A 29	501A 27	502A 27	503A 25	504A 27	505A 25	506A 25	507A 36	508A 29	509A 29	510A 27
A.4	499A 34	500A 29	501A 27	502A 27	503A 25	504A 27	505A 25	506A 25	507A 36	508A 29	509A 29	510A 27
A.5	506A 89	506A 93	506A 96	507A115	507A119	508A108	508A113	509A 90	509A 93	511A106	511A110	511A114
A.5a	506A 83	506A 86	507A109	507A112	508A102	508A105	509A 84	509A 87	511A 95	511A 98	511A102	
A.5b	506A 84	506A 87	507A110	507A113	508A103	508A106	509A 85	509A 88	511A 96	511A100	511A104	
A.6	499A 32	500A 26	501A 24	502A 24	503A 22	504A 24	506A 75	506A 22	508A 88	508A 24	509A 22	510A 22
A.6b	503B 4	504B 4	505B 4	506B 4	507B 4	508B 4	509B 4	510B 4	511B 4	512A 4	513A 4	514A 4
A.6c	499A 33	500A 27	501A 25	502A 25	503A 23	504A 25	505A 23	506A 23	507A 30	508A 25	509A 23	510A 23
A.6d	499A 88	500A 28	501A 26	502A 26	503A 24	504A 26	505A 24	506A 24	507A 32	508A 28	509A 28	510A 26
A.6e	503B 23	504B 50	505B 26	506B 23	507B 23	508B 18	509B 27	510B 21	511B 20	512B 38	---	514B 19
A.6f	503B 24	504B 51	505B 27	506B 24	507B 24	508B 19	509B 28	510B 22	511B 21	512B 39	513B 23	514B 20
A.6g	507A 88	507A 90	507A 92	507A 94	507A 96	507A 98	507A100	507A102	507A 34	508A 26	509A 24	510A 24
A.7g												
A.7h	499A 34	500A 29	501A 27	502A 27	503A 25	504A 27	505A 25	506A 25	507A 36	508A 29	509A 29	510A 27
A.8aa	498A 7	499A 9	500A 9	501A 7	502A 7	503A 7	504A 7	505A 7	506A 7	507A 9	508A 7	509A 7
A.8ac	498A 7	499A 9	500A 9	501A 7	502A 7	503A 7	504A 7	505A 7	506A 7	507A 9	508A 7	509A 7
A.8g	498A 7	499A 9	500A 9	501A 7	502A 7	503A 7	504A 7	505A 7	506A 7	507A 9	508A 7	509A 7
A.10a	498A 14	500A 81	500A 16	---	502A 19	505A 76	505A 77	506A 74	508A 93	508A 94	508A 19	509A 18
A.10c	498A 17	---	---	501A 16	502A 16	503A 15	504A 16	505A 16	506A 16	507A 21	508A 17	509A 16
A.10d	498A 18	---	---	501A 17	502A 17	503A 16	504A 17	505A 17	506A 16	507A 22	508A 18	509A 17
A.10e	498A 16	499A 19	500A 18	501A 15	502A 15	503A 14	504A 15	505A 15	506A 15	507A 20	508A 16	509A 15
A.10f	498A 15	499A 18	500A 17	501A 14	502A 14	503A 13	504A 14	505A 14	506A 14	507A 19	508A 15	509A 14
A.11g	503B 15	504B 42	505B 18	506B 16	507B 15	508B 11	509B 19	510B 13	511B 13	512B 29	513B 16	514B 11
A.12e												
A.13d												
A.13e	503B 39	503B 40	511B 26	511B 27	511B 28	511B 29	511B 30	511B 31	511B 32	511B 33		
A.13f												
A.16a												
A.16b												
A.17		511A 82	511A 83	511A 84	511A 85	511A 86	511A 87	511A 88	511A 89	514A 99		
A.17c			512A 21									
B.												
B.52	499A 78	500A 76	501A 72	502A 74	503A 72	504A 68	505A 72	506A 70	507A 78	508A 84	509A 76	510A 72
B.53	499A 76	500A 74	501A 70	502A 72	503A 71	504A 70	505A 74	506A 72	507A 77	508A 83	509A 78	510A 74
C.												
C.1a	498A 12	499A 14	500A 14	501A 12	502A 12	503A --	504A 12	505A 12	506A 12	507A 14	508A 12	509A 12
C.1ba	503B 6	504B 6	505B 6	506B 6	507B 6	508B 6	509B 6	510B 7	511B 7	512B 6	513B 6	514B 6
C.1d	498A 13	499A 17	500A 15	501A 13	502A 13	503A 12	504A 13	505A 13	506A 13	507A 18	508A 14	509A 13
C.1d	503B 9	504B 14	505B 10	506B 8	507B 10	508B 8	509B 11	510B 9	511B 9	512B 14	513B 10	514B 8
C.3	503B 11	504B 16	505B 12	506B 10	507B 12	508B 10	509B 13	510B 11	511B 11	512B 16	513B 12	514B 10
C.3	498A 19	499A 20	500A 19	501A 18	502A 18	503A --	504A 18	505A 18	506A 18	507A 23	508A 20	509A --
C.4d	499A 67	501A 74	501A 62	515A	515A	515A	505A 62	506A 61	507A 68	508A 69	509A 65	510A 61
C.4e	499A 67	500A 63	501A 62	502A 63	503A 61	504A 58	505A 62	506A 61	508A 95	---	509A 65	510A 61
C.4f	499A 67	500A 63	501A 62	502A 63	503A 61	504A 58	505A 62	506A 61	507A 68	508A 69	509A 65	510A 61
C.4i	---	500A 63		---	503A 61	507A 82	507A 83	507A 84	---	---	---	---
C.4k	499A 67	500A 63	501A 62	502A 63	503A 61	504A 58	505A 62	506A 61	507A 68	508A 69	509A 65	510A 61
C.4l	499A 67	500A 63	501A 62	502A 63	503A 61	504A 58	505A 62	506A 61	507A 68	508A 69	509A 65	510A 61
C.6	499A 66	500A 60	501A 60	502A 61	503A 59	504A --	505A 60	506A 60	507A 67	508A 67	509A 63	510A 60
D.												
D.1a	499A 72	500A 70	501A 66	502A 68	503A 67	504A 64	505A 68	506A 66	507A 73	508A 79	509A 72	510A 67
D.1ba	499A 74	500A 72	501A 68	502A 70	503A 69	504A 66	505A 70	506A 68	507A 75	508A 81	509A 74	510A 69
D.1c	510A 70	510A 70	510A 70	510A 70	510A 70	510A 70	510A 70	510A 70	510A 70	510A 70	510A 70	510A 70
D.1d	499A 75	500A 73	501A 69	502A 71	503A 70	504A 67	505A 71	506A 69	507A 76	508A 82	509A 75	510A 71
D.1f	500A 84	501A 78	502A 81	503A 83	504A 84	505A 83	507A108	507A108	508A101	509A 83	511A 94	511A 94
D.1g	502A 79	502A 80	503A 82	507A105	508A 98	507A106	507A1107	508A 99	508A100	510A 89	511A 92	511A 93
F.												
F.1a	510A 81	504A 77	504A 78	505A 78	510A 82	510A 83	510A 84	510A 85	510A 86	512A 76	512A 77	512A 78
F.1b	510A 81	504A 77	504A 78	505A 78	510A 82	510A 83	510A 84	510A 85	510A 86	512A 76	512A 77	512A 78
F.1e	510A 81	504A 77	504A 78	505A 78	510A 82	510A 83	510A 84	510A 85	510A 86	512A 76	512A 77	512A 78
F.1h	510A 81	504A 77	504A 78	505A 78	510A 82	510A 83	510A 84	510A 85	510A 86	512A 76	512A 77	512A 78
F.1i	510A 81	504A 77	504A 78	505A 78	510A 82	510A 83	510A 84	510A 85	510A 86	512A 76	512A 77	512A 78
F.1j	510A 81	504A 77	504A 78	505A 78	510A 82	510A 83	510A 84	510A 85	510A 86	512A 76	512A 77	512A 78
F.1l	510A 81	---	---	---	510A 82	510A 83	510A 84	510A 85	510A 86	512A 76	512A 77	512A 78
F.1m	510A 81	504A 77	---	---	---	---	---	---	---	---	---	---
H.												
H.60	498A 4	499A 5	500A 5	501A 4	502A 4	503A 4	504A 4	505A 4	506A 4	507A 5	508A 4	509A 4

*See "Key" on pages 56-59.

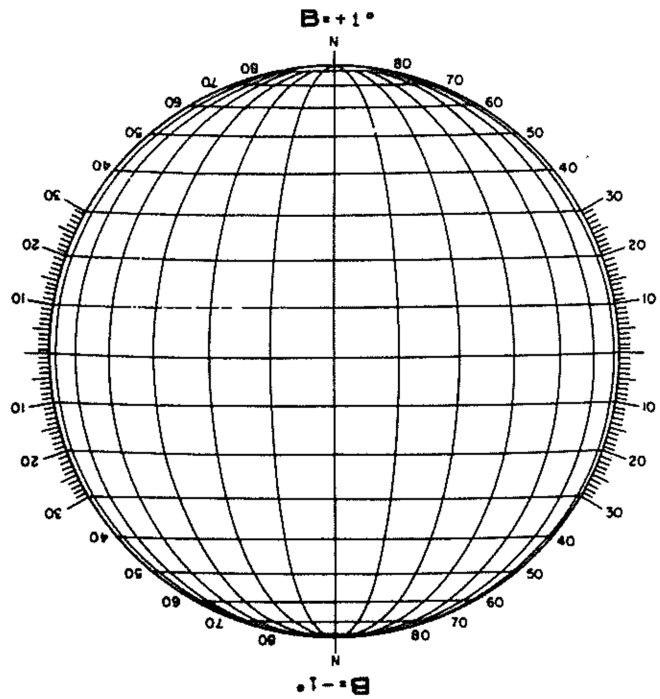
DAYS FROM CENTRAL MERIDIAN

June 3 - June 10
Dec 4 - Dec 11



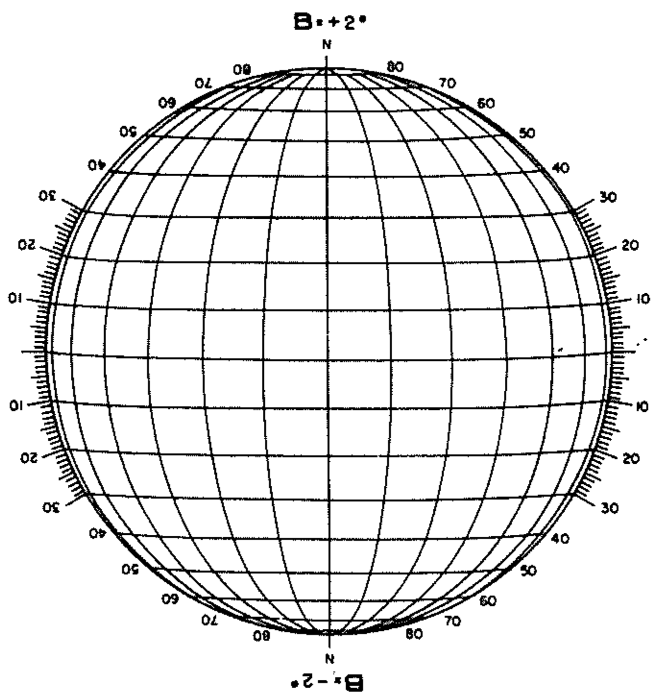
Dec 4 - Dec 11
June 3 - June 10

June 11 - June 18
Nov 26 - Dec 3



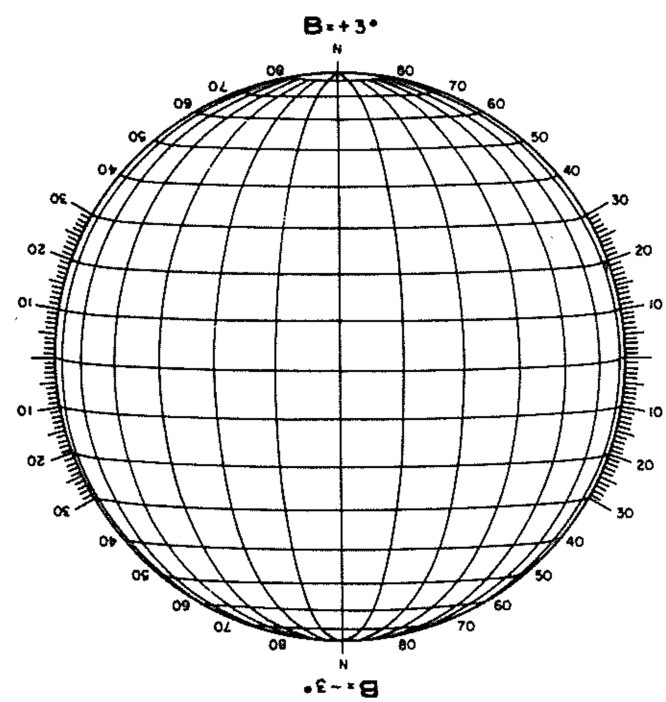
Dec 12 - Dec 19
May 25 - June 2

June 19 - June 27
Nov 18 - Nov 25



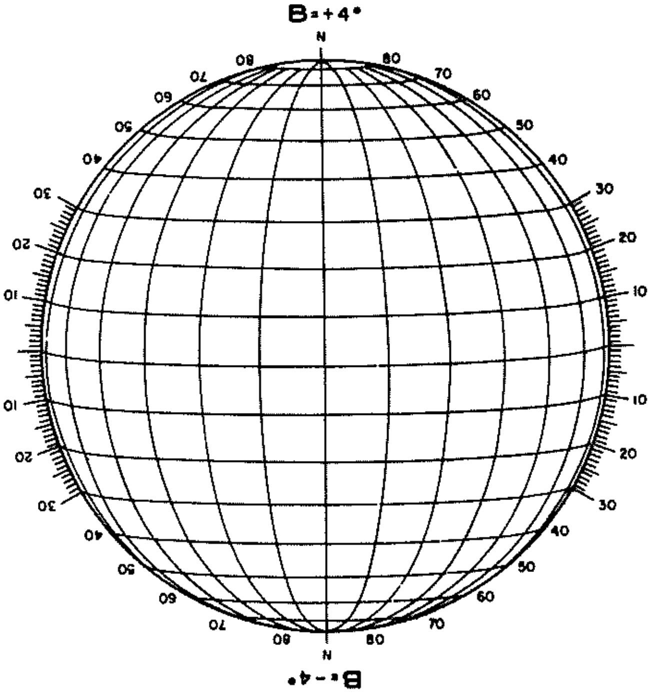
Dec 20 - Dec 27
May 17 - May 24

June 28 - July 6
Nov 10 - Nov 17



Dec 28 - Jan 4
May 8 - May 16

July 7 – July 16
Oct 31 – Nov 9



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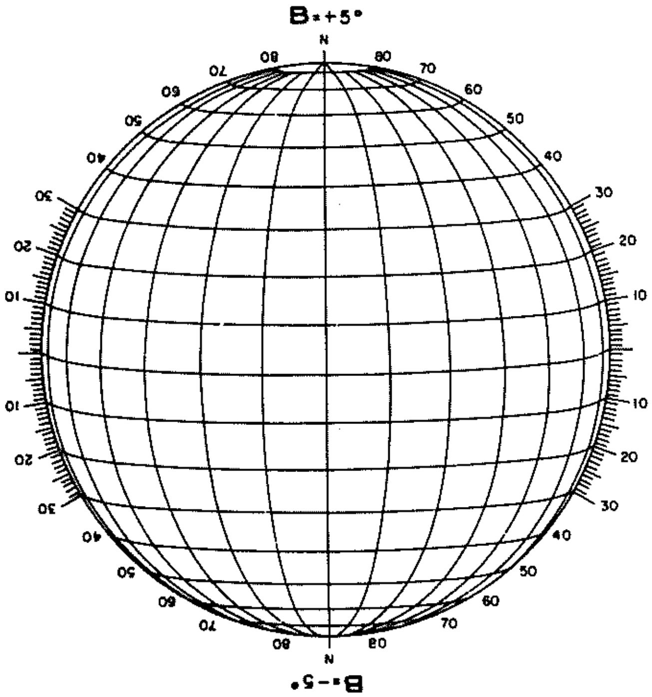
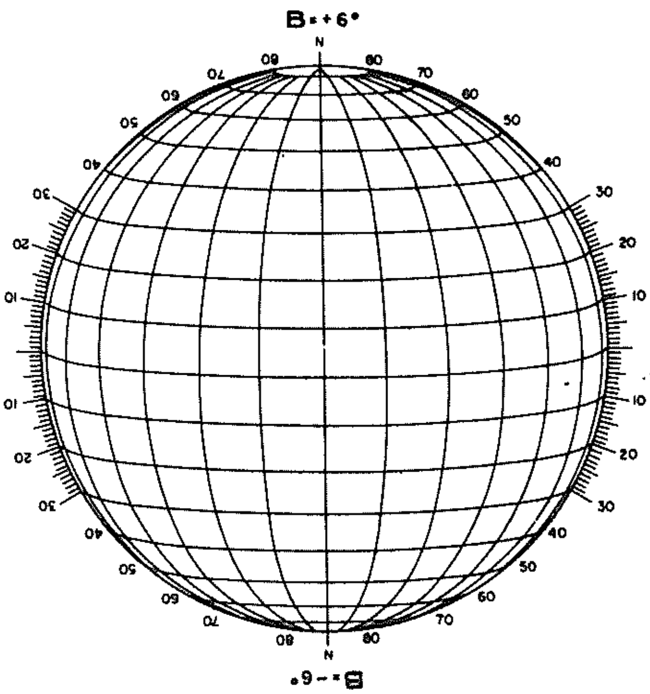
Jan 5 – Jan 14

July 17 – July 27
Oct 20 – Oct 30



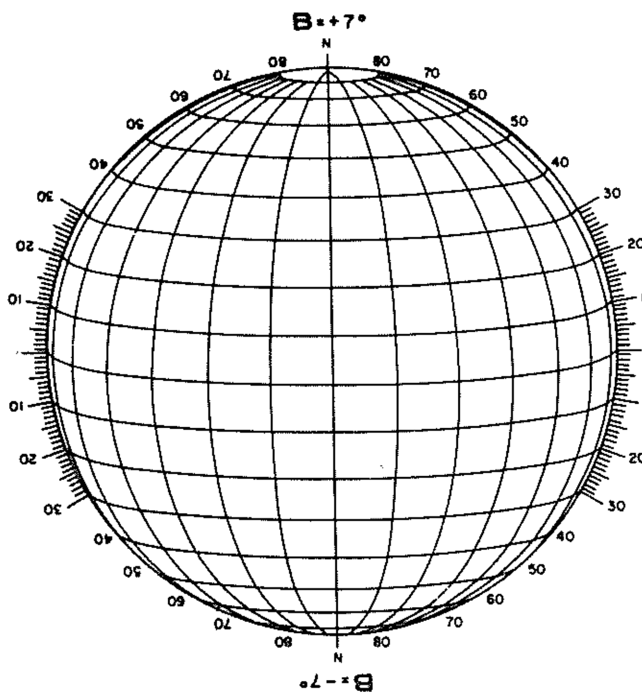
Apr 17 – Apr 27
Jan 15 – Jan 24

July 28 – Aug 12
Oct 5 – Oct 19



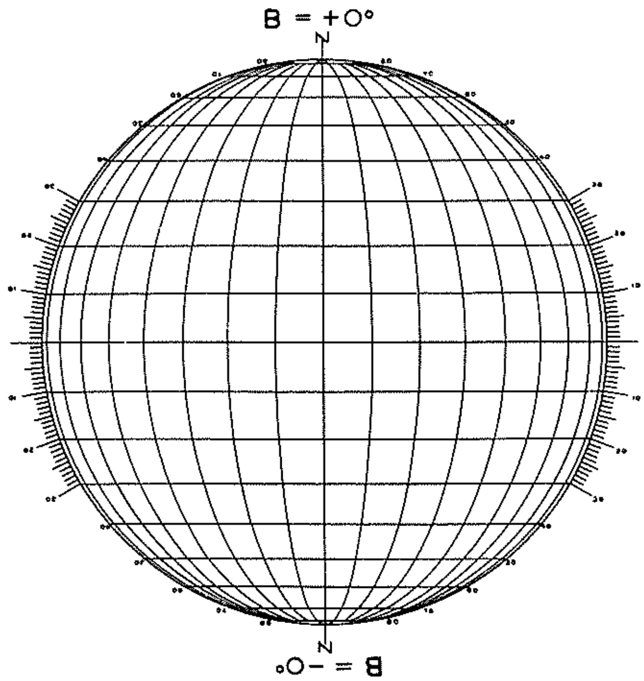
Apr 2 – Apr 16
Jan 25 – Feb 8

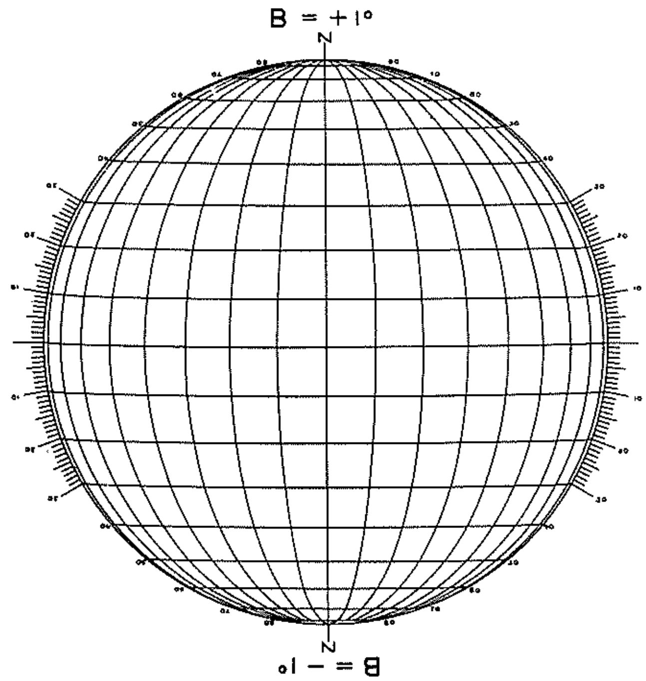
Aug 13 – Oct 4

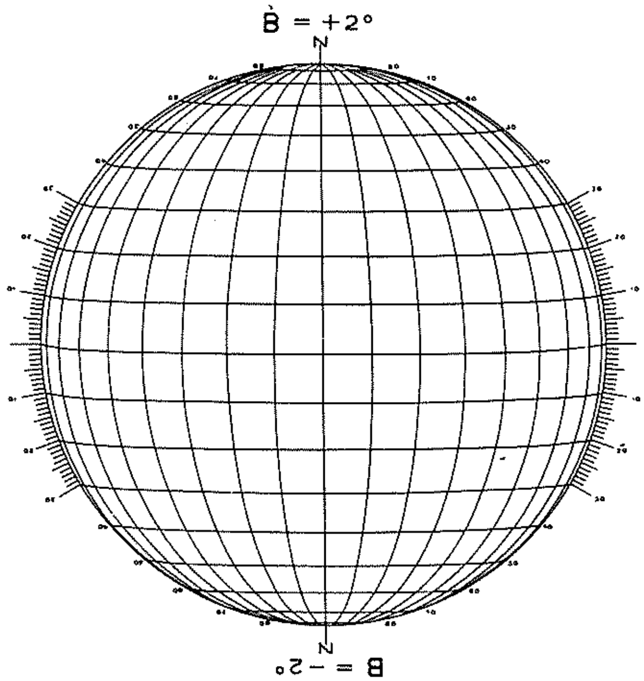


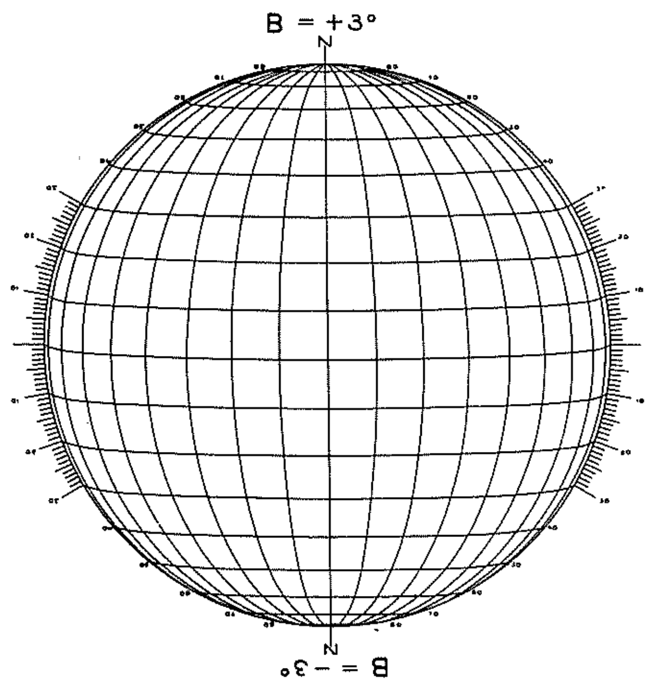
Feb 9 – Apr 1

DEGREES FROM CENTRAL MERIDIAN









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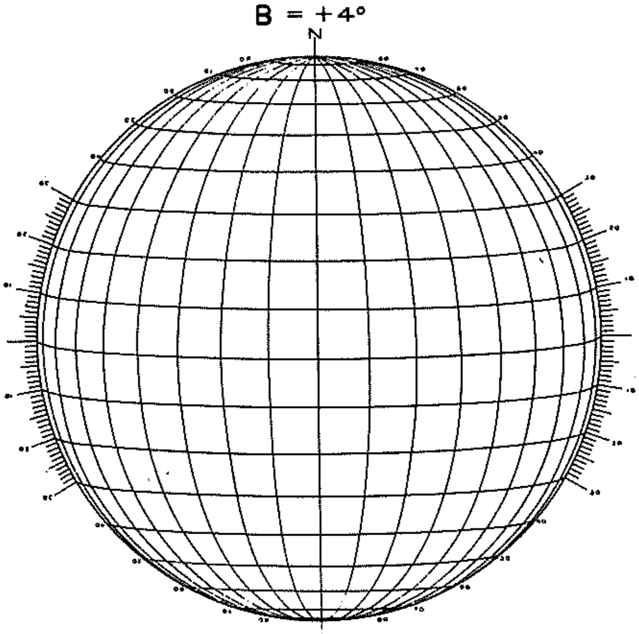

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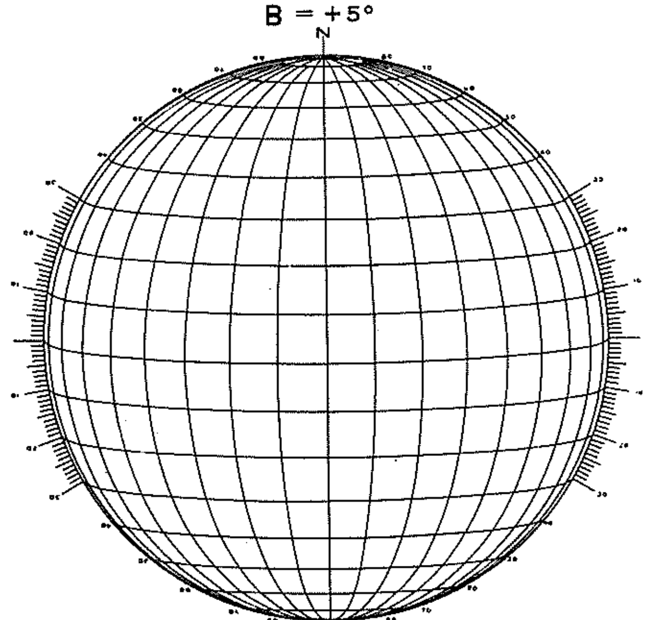

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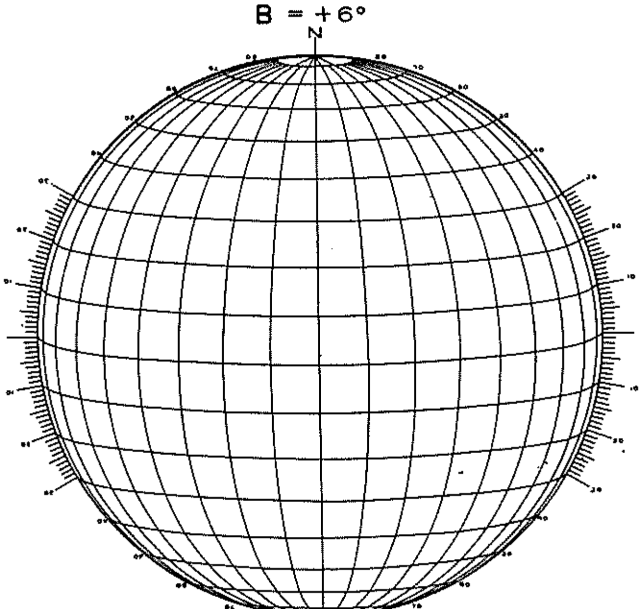

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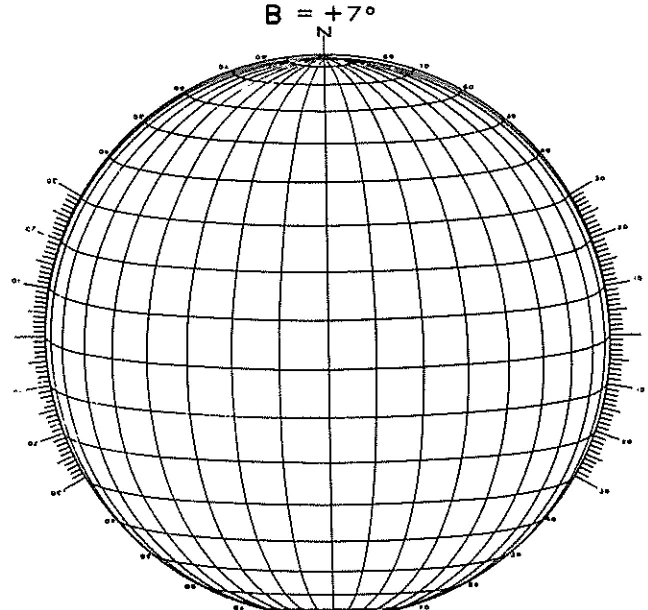

B = −7°

WORLD DATA CENTER A

FOR

SOLAR-TERRESTRIAL PHYSICS

The ICSU Panel on WDCs has recommended that it would be appropriate courtesy to acknowledge in publications that data were obtained from the originating station or investigator through the intermediary of the WDCs. The following statement is suggested:

"Data used in this study were provided by WDC-A for Solar-Terrestrial Physics, NOAA E/GC2, 325 Broadway, Boulder Colorado 80303, USA."