

OGO-4 DATA COVERAGE PLOTS

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The OGO-4 Data Coverage Plots were designed to serve two primary purposes: to indicate the availability of data and to provide a convenient means whereby the large-scale characteristics of the OGO-4 data can be compared to other pertinent geophysical data. The time-sharing nature of the OGO-4 telemetry schedule means that data "availability" must reflect not only the extent of data processing to date, but, more fundamentally, the periods during which data from this experiment were recorded. Following an explanation of the information displayed, the OGO-4 Data Coverage Plots for the period from July, 1967 to January, 1969 are presented in figures 3 to 39.

Figure 1 is a typical OGO-4 Data Coverage Plot on which twenty-six items have been indicated by boldface letters; the following is an explanation of these items.

A. This date indicates the last time the OGO-4 data on this plot were updated.

B. The average polar rate from the horizontal detector (H_1) in counts per second (c/s) is plotted logarithmically; the horizontal line with day tick marks represents a rate of 1 c/s. This detector responds primarily to protons with energies between 0.74 MeV and 4.50 MeV, although the energy dependent response of this detector is rather complex due to its passive collimation [1].

C. The average polar rate from the V_1 detector ($V_1\bar{V}_3$) in c/s is plotted logarithmically; the horizontal line with day tick marks

represents a rate of 1 c/s. This detector responds to electrons (≈ 0.4 to ≈ 1.0 MeV), protons (1.2 to 40 MeV) and alpha particles (4.8 to 160 MeV). The geometrical factor ranges from $1.058 \text{ cm}^2\text{-sr}$ for 1.3 MeV protons to $1.17 \text{ cm}^2\text{-sr}$ for 39 MeV protons [1].

D. The average polar rate from the V_2 detector ($V_2\bar{V}_3$) in c/s is plotted logarithmically; the horizontal line with day tick marks represents a rate of 1 c/s. This detector responds to electrons (≈ 0.7 to ≈ 1.0 MeV), protons (9.4 to 40 MeV), and alpha particles (37.6 to 160 MeV). The geometrical factor ranges from $1.49 \text{ cm}^2\text{-sr}$ for 10 MeV protons to $1.55 \text{ cm}^2\text{-sr}$ for 39 MeV protons [1].

E. The average polar rate for events representing coincident events in V_1 and V_2 ($V_1V_2\bar{V}_3$) in c/s is plotted logarithmically; the horizontal line with day tick marks represents a rate of 1 c/s. This rate corresponds to 9.4 to 40 MeV protons and 37.6 to 160 MeV alpha particles. The geometrical factor ranges from $1.085 \text{ cm}^2\text{-sr}$ for 10 MeV protons to $1.17 \text{ cm}^2\text{-sr}$ for 39 MeV protons [1].

F. The average polar rate from the V_3 detector in c/s is plotted logarithmically; the vertical scale is twice that used for the other OGO-4 rates, but, as before, a rate of 1 c/s is represented by the horizontal line with day tick marks. This more or less omni-directional detector responds to electrons (> 0.5 MeV), protons (> 9.3 MeV), alpha particles (> 37 MeV), and electromagnetic radiation (> 0.3 MeV).

G. Optical solar flares of importance greater than 1B observed by the world-wide system of solar observatories, which report to the World Data Center A, Upper Atmosphere Geophysics, Boulder, Colorado, are indicated by a small vertical line plotted at the time corresponding to the beginning of the flare [2]. The "importance" of the flare (e.g., 2N, 2B, 3B) is included; the importance scheme, adopted 1 January 1966 by IAU

Commission 10 is assigned as indicated in Table 1 [2], where the "corrected" area is designed to cope with the effects of the curvature of the sun. The relative intensity evaluation is a qualitative figure based upon the experience of each observatory.

TABLE 1

"Corrected" area in square degrees	Relative Intensity Evaluation		
	Faint	Normal	Brilliant
≤ 2.0	SF	SN	SB
2.1 - 5.1	1F	1N	1B
5.2 - 12.4	2F	2N	2B
12.5 - 24.7	3F	3N	3B
> 24.7	4F	4N	4B

H. Periods during which there was no flare patrol are indicated by horizontal lines of the appropriate length [2].

I. 2-12 Å solar x-ray flares in which the peak flux was at least four times the ambient flux are indicated by a vertical line [2]. These data were collected with University of Iowa experiments on Explorer 33 and Explorer 35 (see [3] and [4] for a description of the instrumentation).

J. Observations of the occurrence of type IV radio emission from the sun are indicated by a vertical line [2]. This radiation is normally associated with synchrotron radiation coincident with the acceleration of electrons during a solar flare [5]. Only five stations take part in these observations: Fort Davis (Texas), Culgoora (Australia), Boulder (Colorado), Sagamore Hill (Massachusetts), and Weissenau (GFR).

K. Normalized hourly average counting rates for two neutron monitors: Alert, Northwest Territories (*L*) and Deep River, Ontario (*M*) [6]. An offset equal to $\sim 5\%$ of the mean value has been added to the Alert (*L*) data prior

to plotting to avoid confusion between the two curves. Normalizations and a description of the instruments are given by J. F. Steljes [6].

N. The sector structure of the interplanetary magnetic field is indicated by the cross-hatched areas: a positive sector (field directed predominately away from the sun along the archimedian spiral angle) is indicated by an area above the horizontal line, a negative sector by an area below the line.

O. An indication of the source of the interplanetary magnetic field sector data is given by the letter plotted here: Wilcox and Colburn (W) [7,8] and/or data supplied privately by D. H. Fairfield (F). The minimum time resolution of the Wilcox and Colburn data is three hours, while that of the Fairfield data is one hour.

P. The >10 MeV solar proton fluxes plotted here were measured by the Solar Proton Monitoring Experiment on board Explorer 34 (IMP F) [2]. "The detector consists of a 3 mm cubic Li drifted solid state detector surrounded by a 170 mg/cm^2 (0.63 mm) Al shield." [2] The satellite passes through the earth's radiation zones at perigee, and the result shows up as a rapid excursion of the > 10 MeV proton flux approximately every 4.3 days.

Q. The standardized K-index of geomagnetic activity from twelve observatories between geomagnetic latitudes 47° and 63° are averaged to obtain K_p . The purpose of this planetary index is to indicate solar particle radiation by its geomagnetic effects. The quasi-logarithmic scale ranges from 0 (quiet) to 9 (very disturbed), and the values are expressed in thirds of a unit; for instance, $1\text{-}2/3$ is written as 2^- and $2\text{-}1/3$ as 2^+ . The format for plotting these data is modeled after

standard one adopted by J. Bartels at the Geophysikalisches Institut of the University of Göttingen; the legend is reproduced in figure 2 [2].

R, S, T, U. Geomagnetic storm sudden commencements are indicated by solid triangles (*R*) if confirmed and by open triangles (*S*) if unconfirmed. Magnetogram sudden impulses are indicated by solid diamonds (*T*) if confirmed and by open diamonds (*U*) if unconfirmed. An observation is considered to be confirmed if reported by ten or more stations. These data are tabulated by A. Romana for the International Association of Geomagnetism and Aeronomy Commission IV: Magnetic Activity and Disturbances [2].

V. OGO-4 data from this experiment are available in the playback mode, in which the data are recorded with an on-board tape recorder which is played back at a high bit rate once an orbit to transmit the data to a ground station, only at certain times: when the satellite is in the main commutator mode. The availability of this type of data is indicated by specifying the main commutator (labelled "MAINC" on the plot) as being either ON or OFF.

W. A horizontal line slightly below the "ON" level for the main commutator ("MAINC") indicator is used to indicate that the data has passed through the preliminary stages of the data processing procedure: data tapes abstracted and rate plots generated.

X. In addition to playback data (*V*, above), data from this experiment are available which have been collected at high bit rates in real time by direct telemetry to ground stations. Since this data collection procedure requires at least line-of-sight contact with the ground station, the durations of the data periods are typically quite short, averaging three to five minutes. The occurrence of a period of real time data is indicated by a small vertical line at a level corresponding to the station at which

the data were collected. These levels are identified by the abbreviation of the station (Y):

WNK = Winkfield, England
SNT = Santiago, Chile
ROS = Rossman, North Carolina
QUI = Quito, Ecuador
ACT = Ororal, Australia
MAD = Madagascar, Malagasy Republic
JOB = Johannesburg, Union of South Africa
SKA = Gilmore Creek, Alaska

Z. All time-related quantities, including the date on which the data were collected, are expressed in terms of Universal Time.

Figure Captions

1. A typical OGO-4 Data Coverage Plot. The twenty-six items indicated by boldface letters are discussed in the text.
2. Legend for interpretation of K_p data plotted on the OGO-4 Data Coverage Plots.
- 3-21. OGO-4 Data Coverage Plots for the period from July, 1967 to January, 1969 with the interplanetary sector structure information provided by Wilcox and Colburn [7,8].
- 22-39. OGO-4 Data Coverage Plots for the period from July, 1967 to December, 1968 with the interplanetary sector structure information provided privately by D. H. Fairfield.

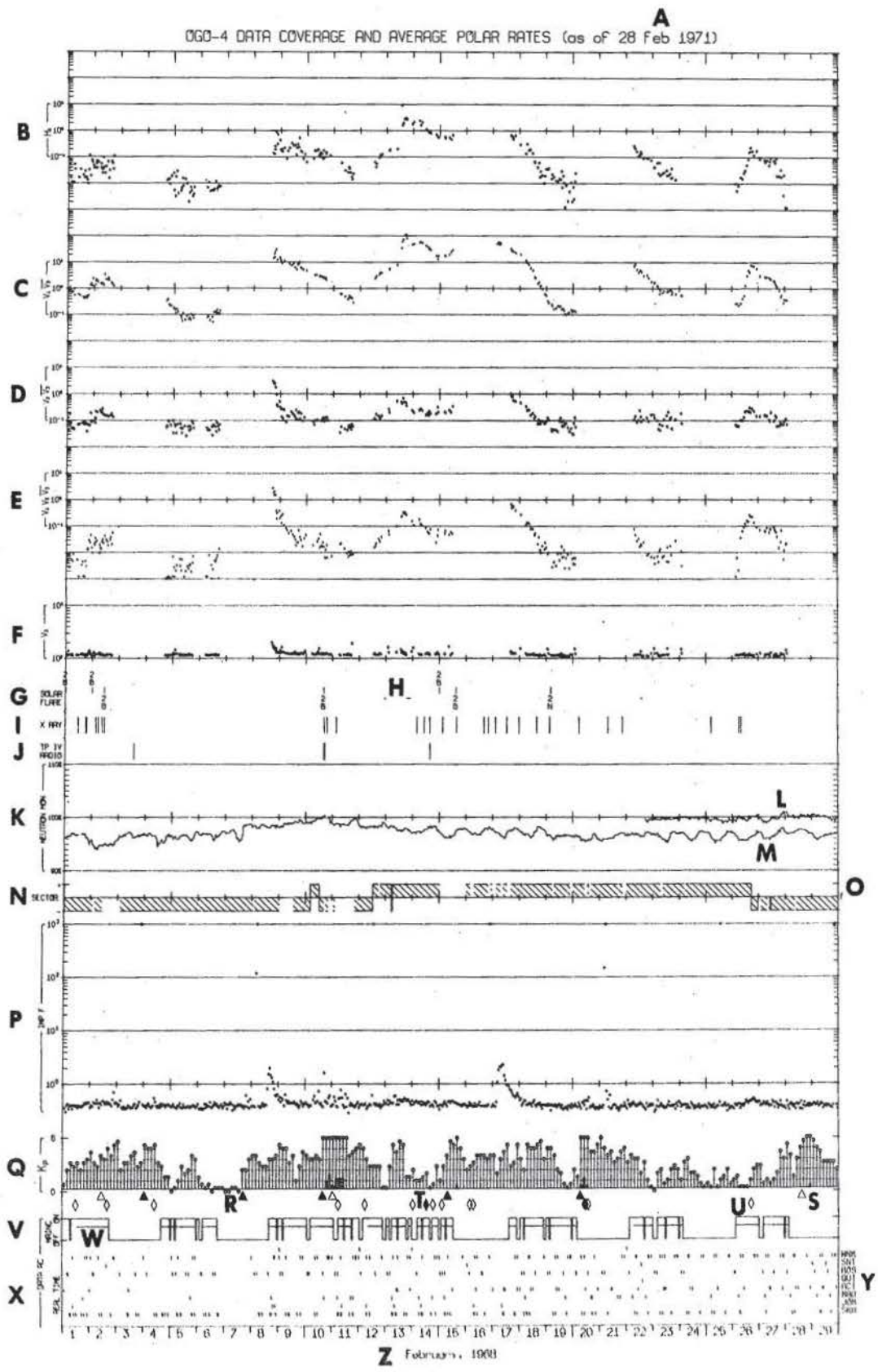


Figure 1

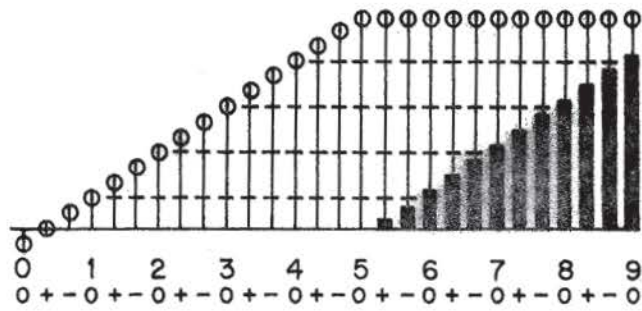


Figure 2

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

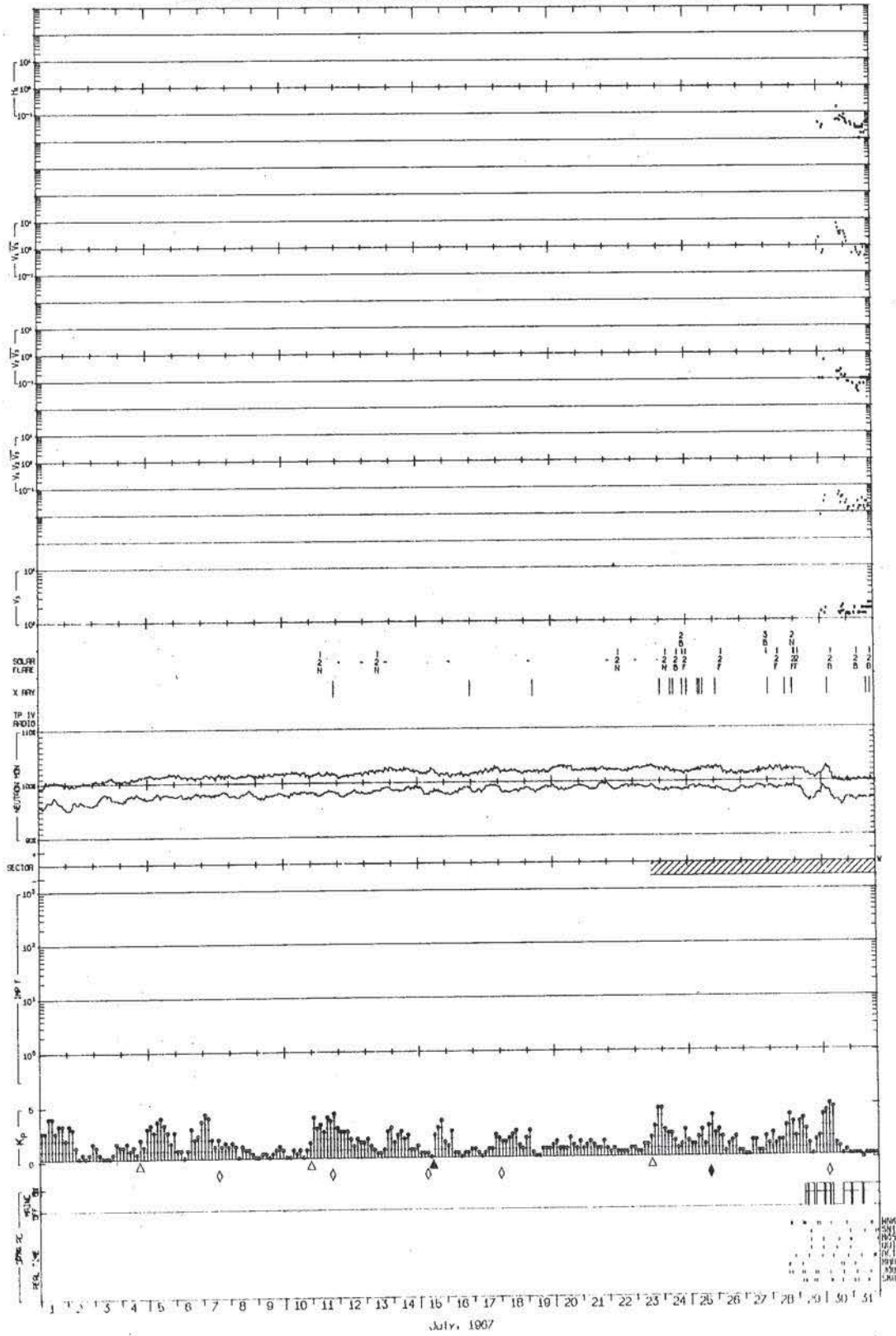


Figure 3

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

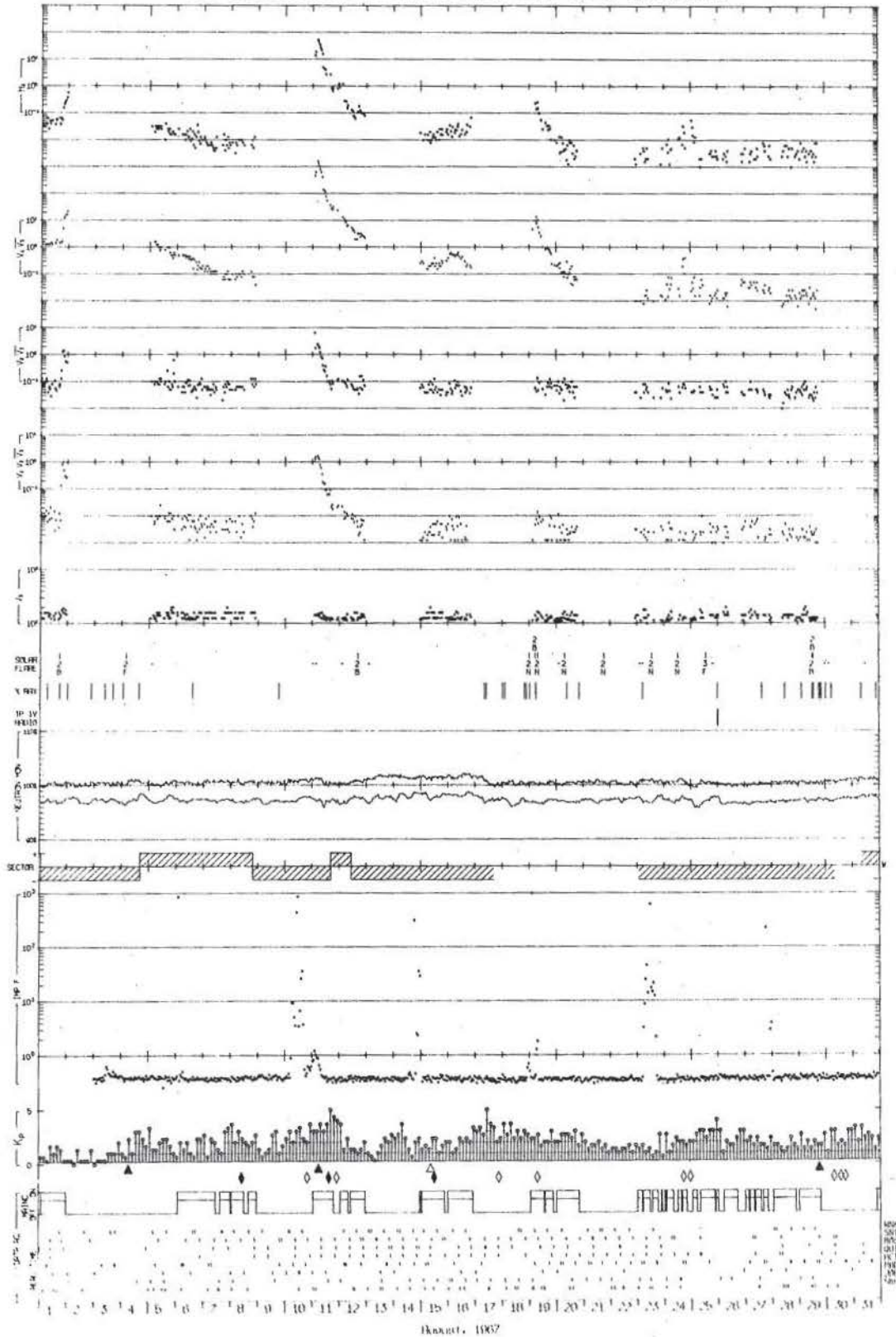


Figure 4

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

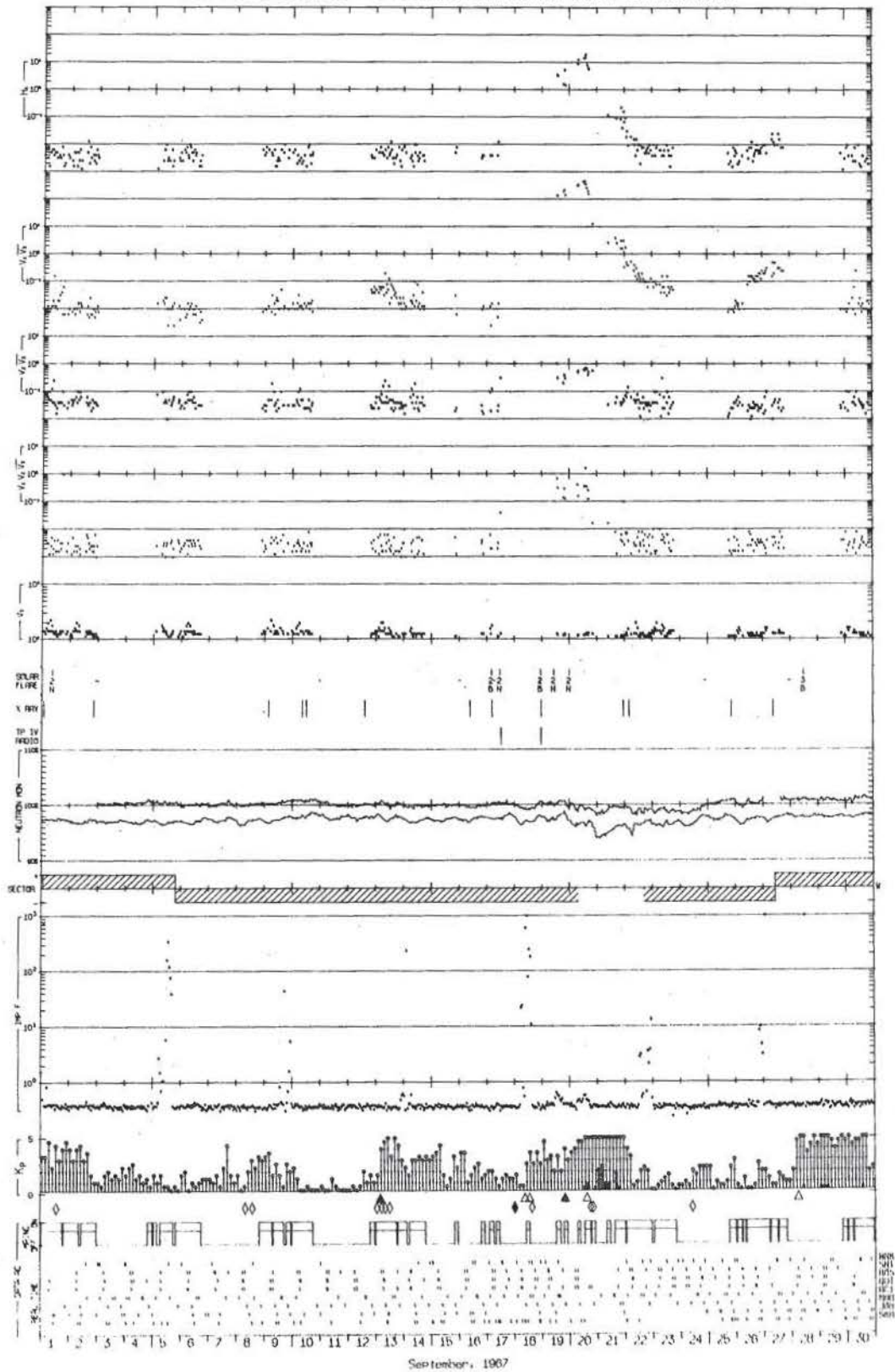


Figure 5

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

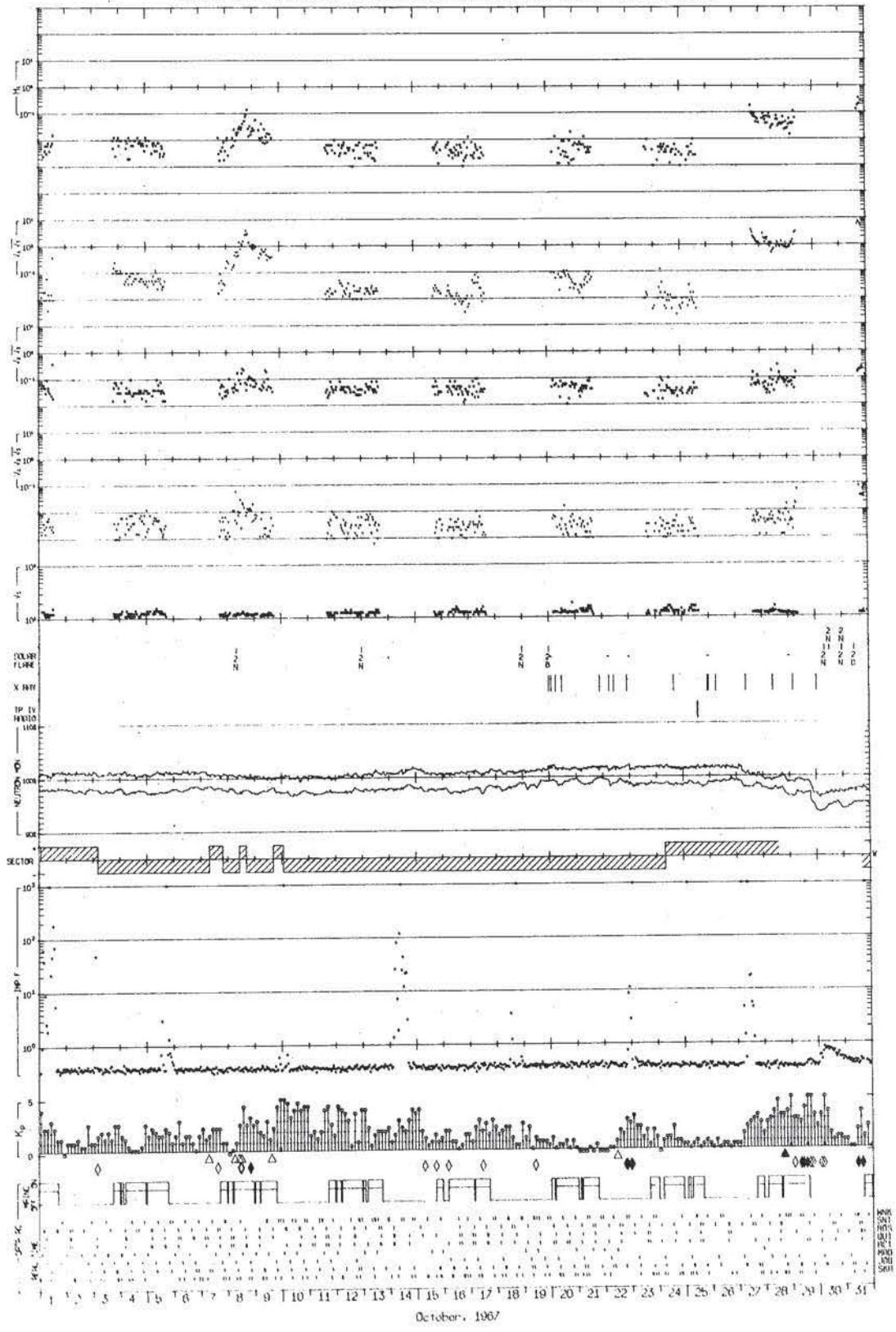


Figure 6

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

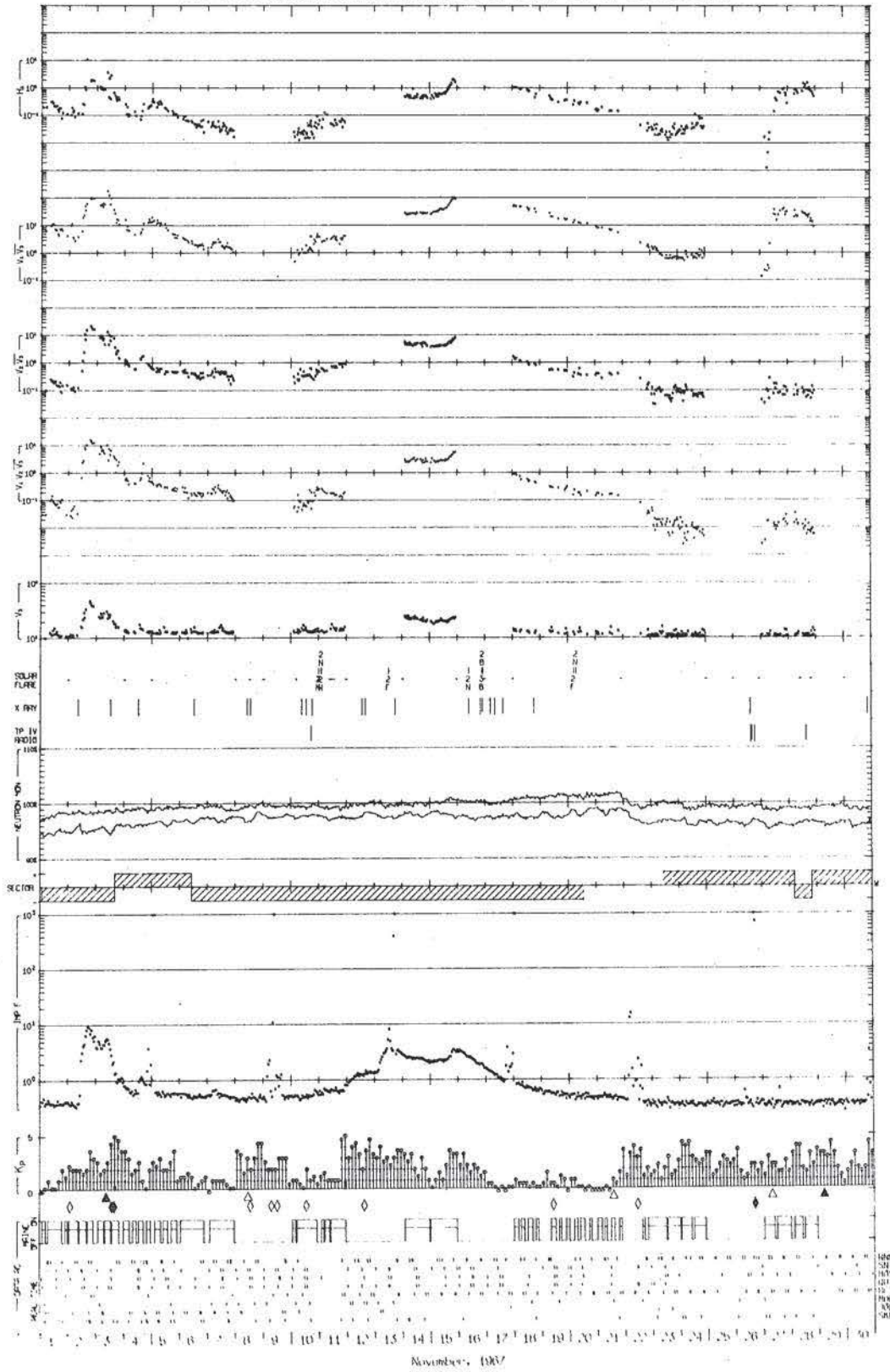


Figure 7

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

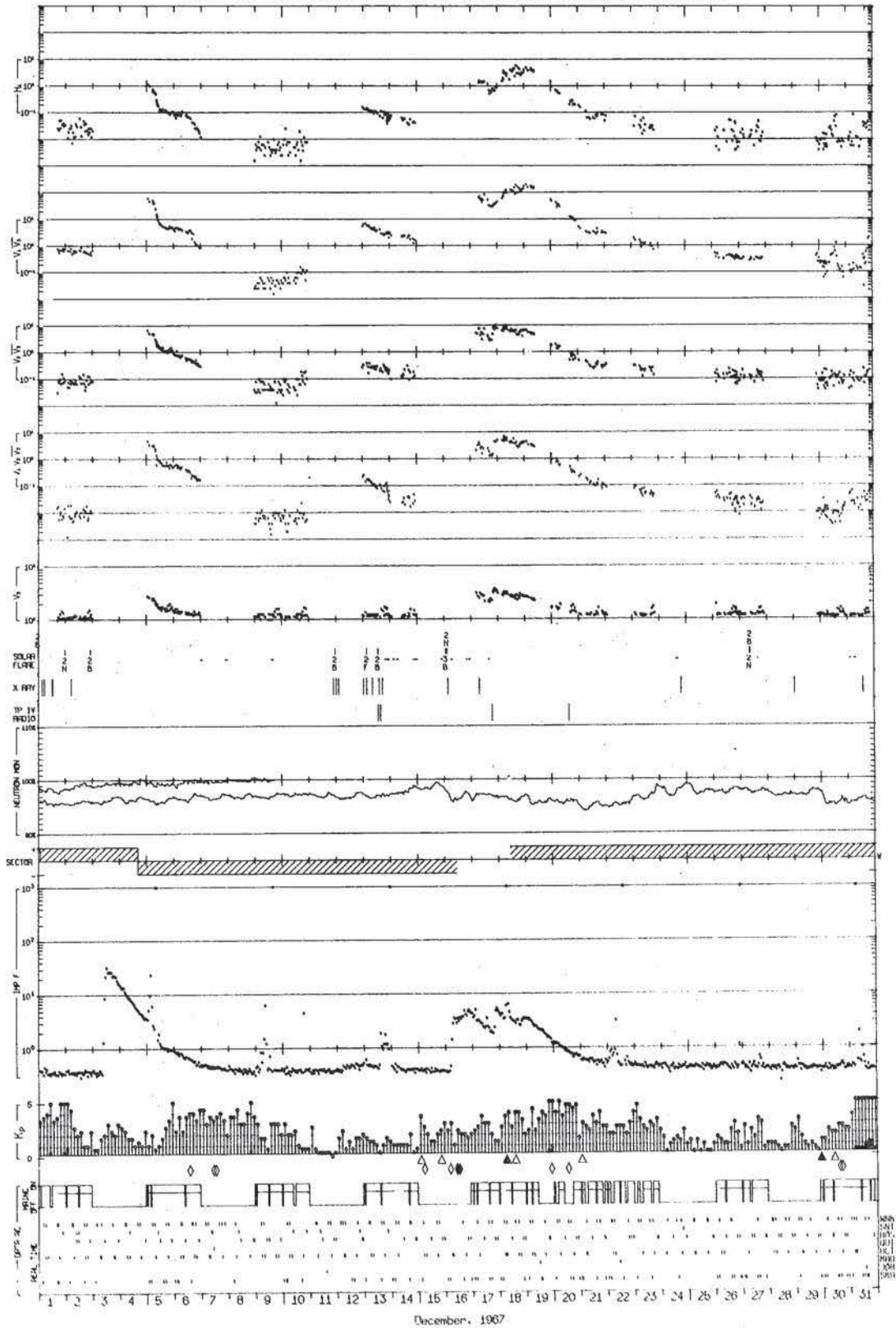
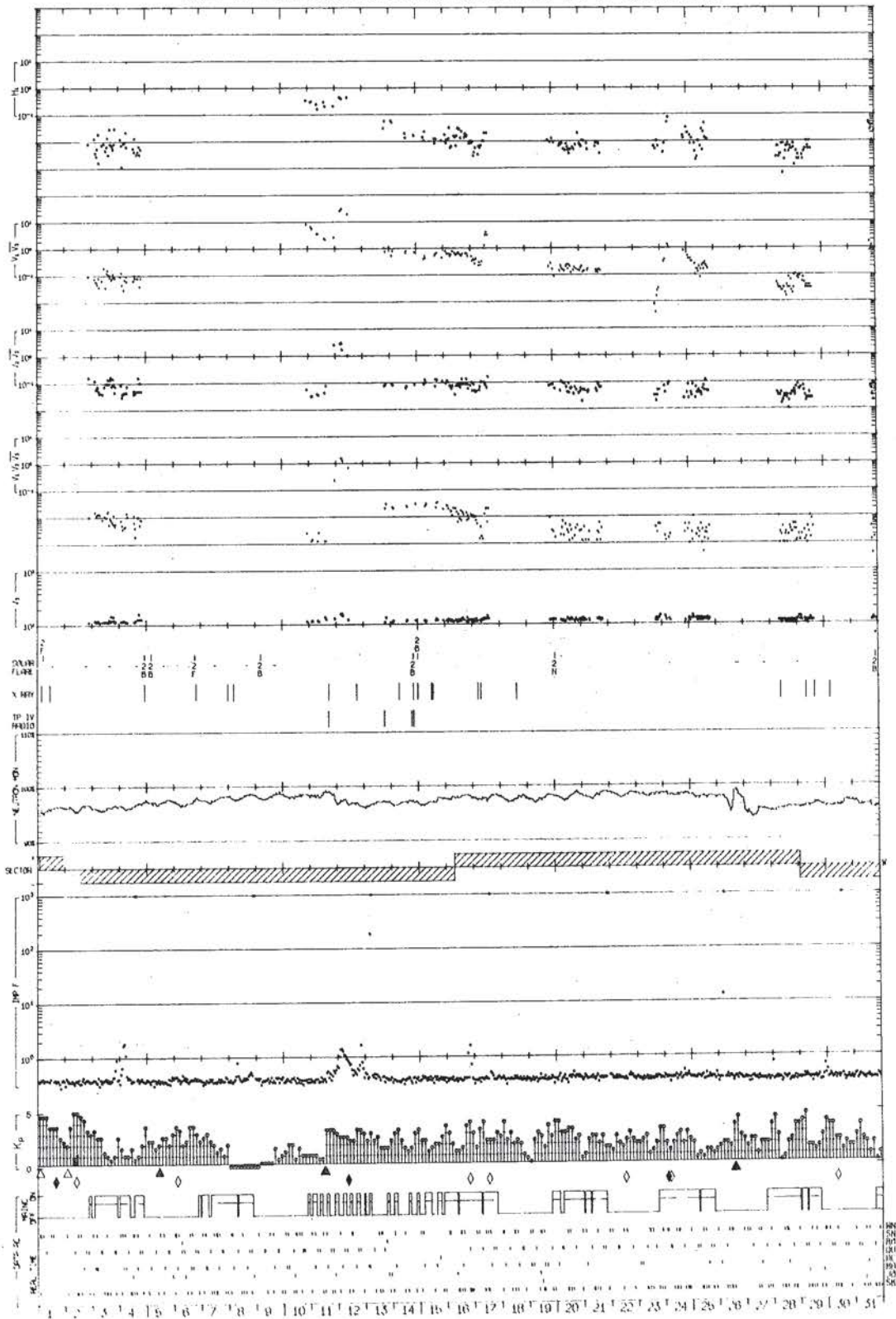


Figure 8

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)



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Figure 9

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

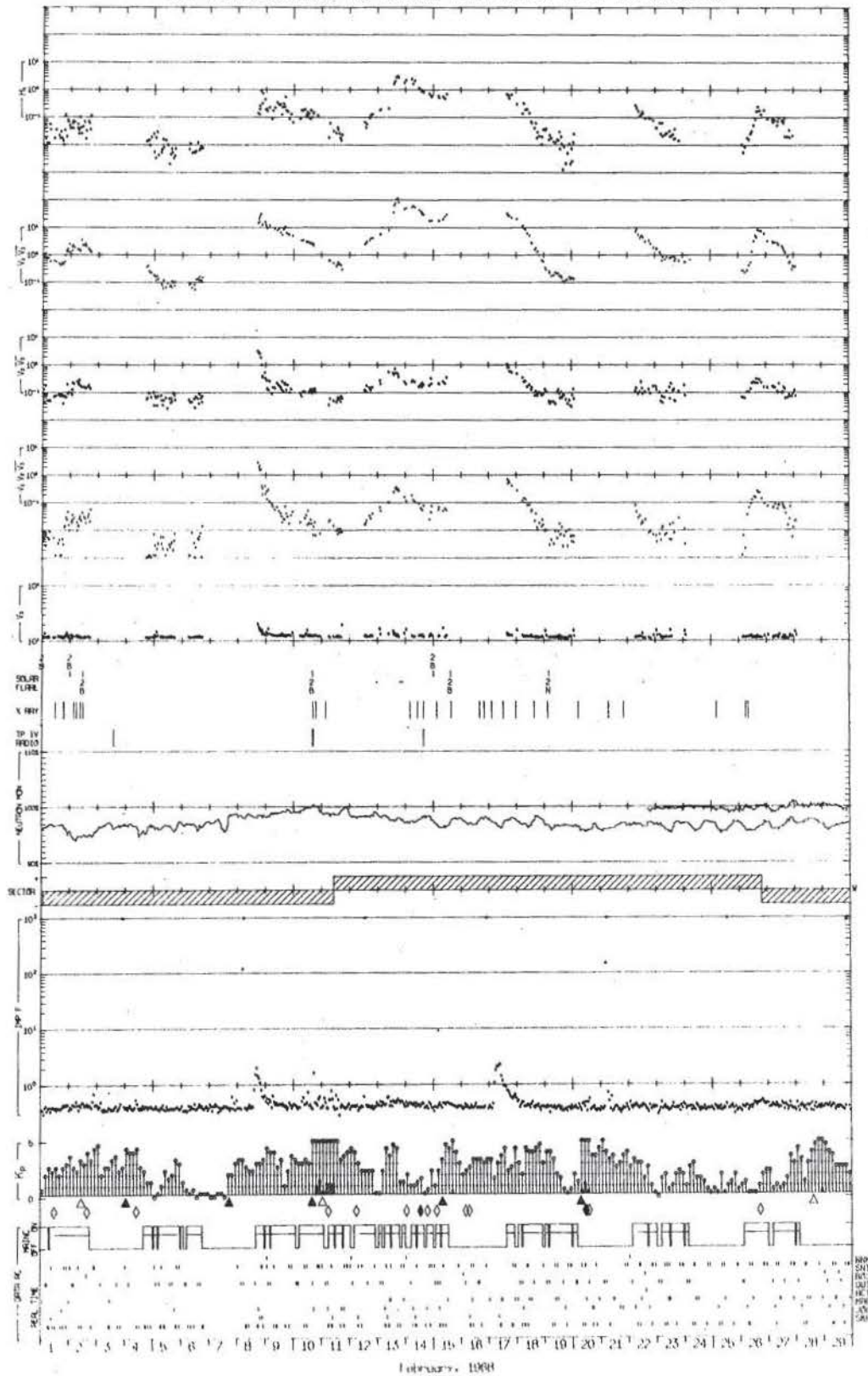


Figure 10

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 25 Feb 1971)

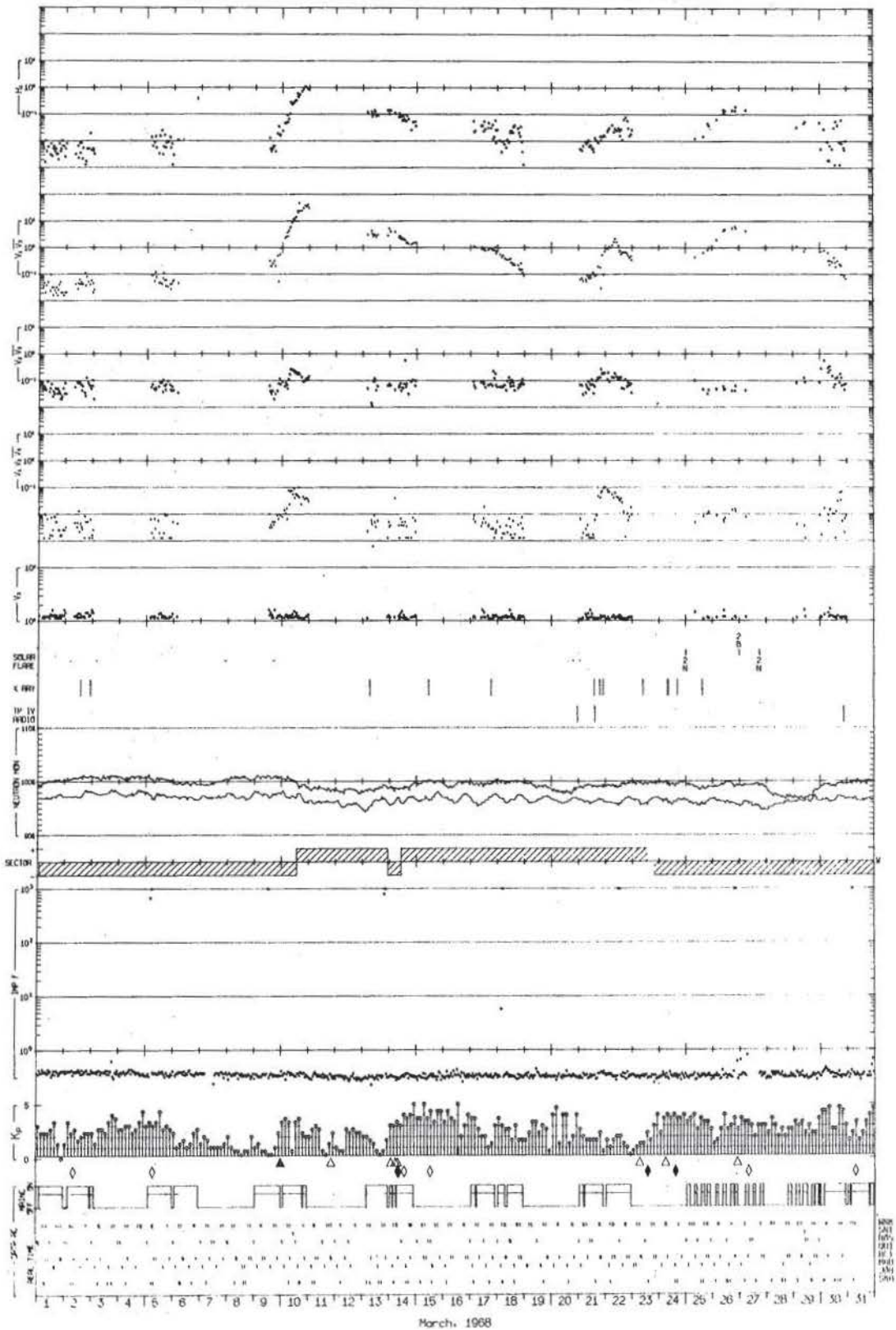
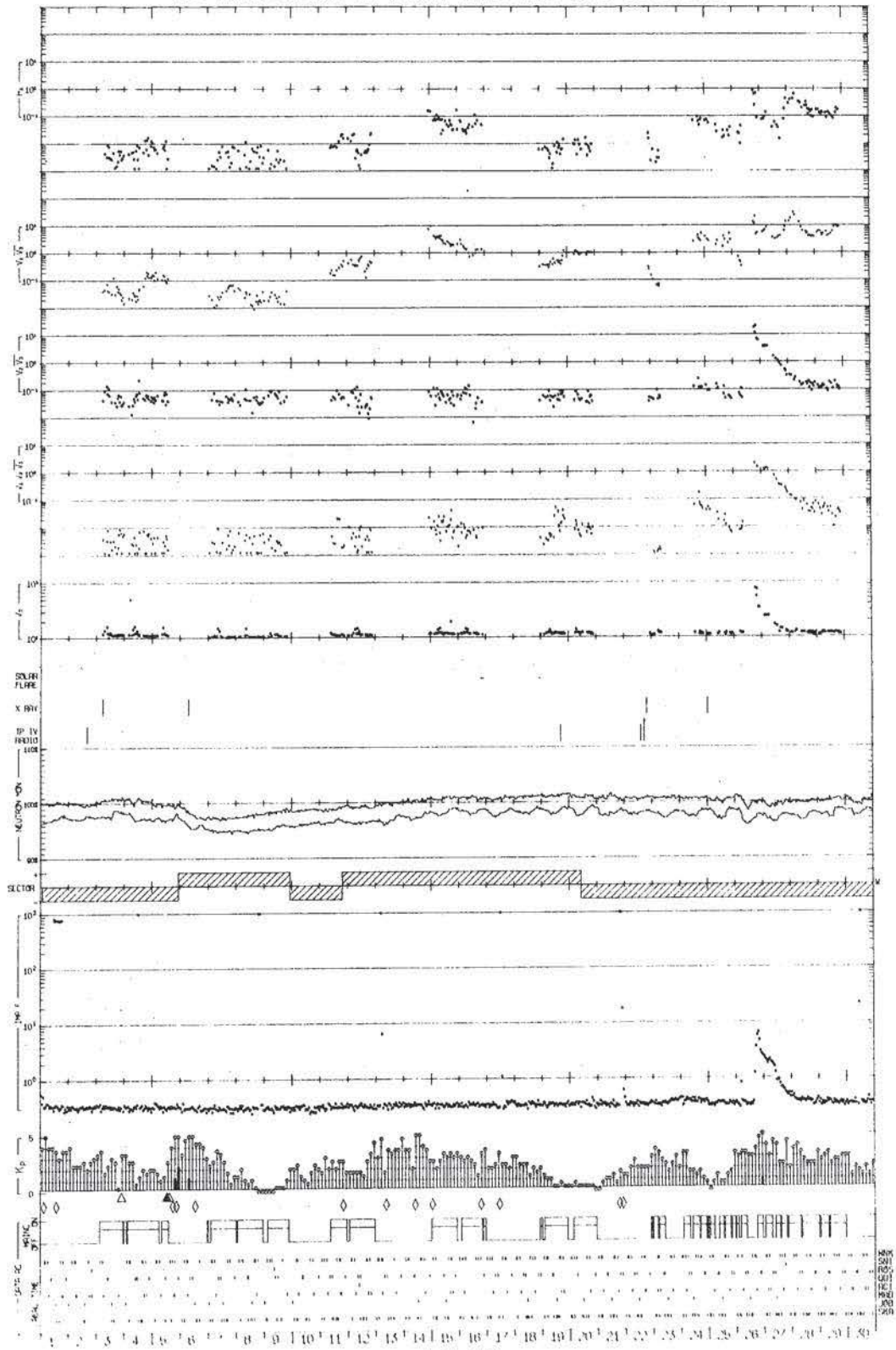


Figure 11

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)



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Figure 12

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

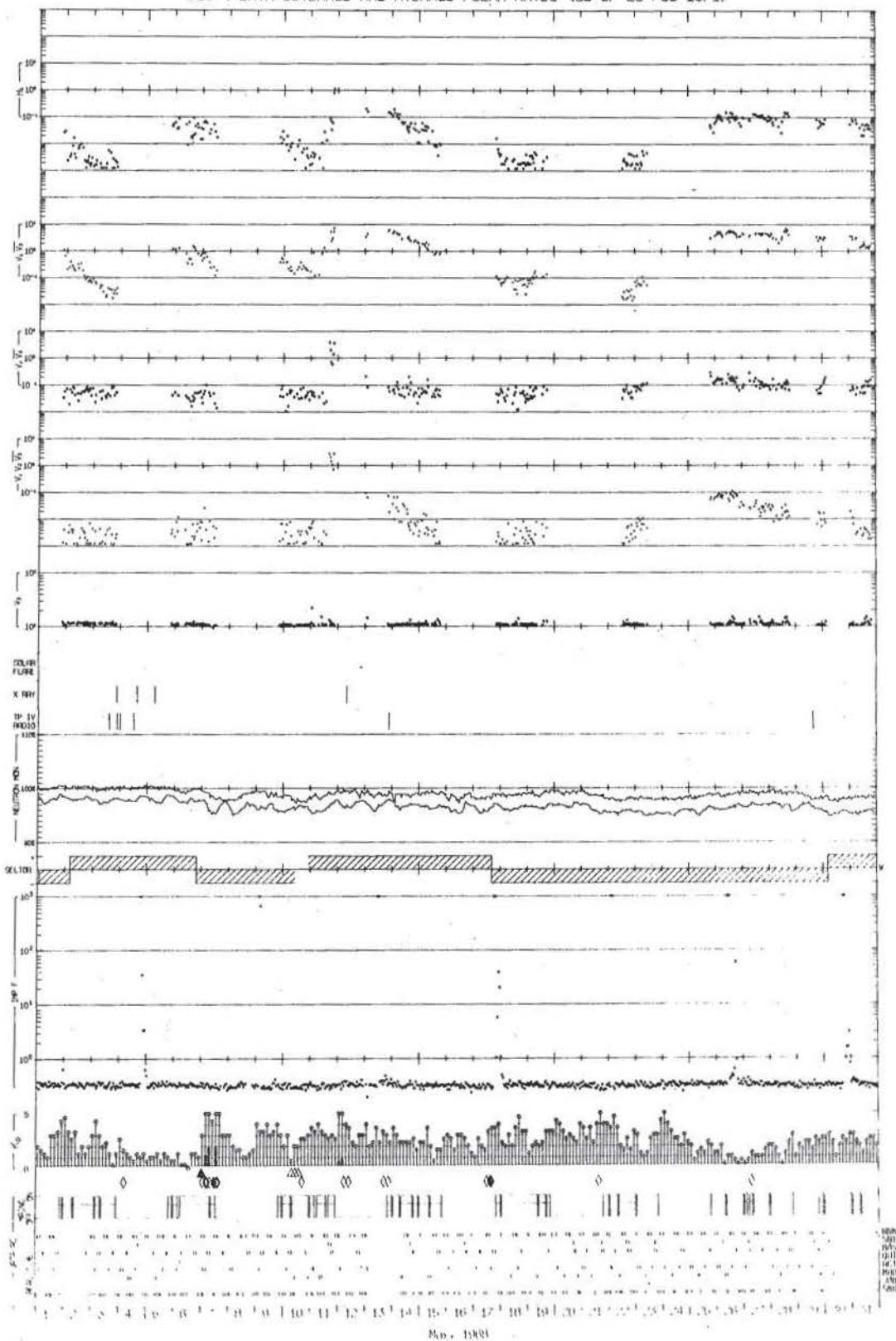


Figure 13

DGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

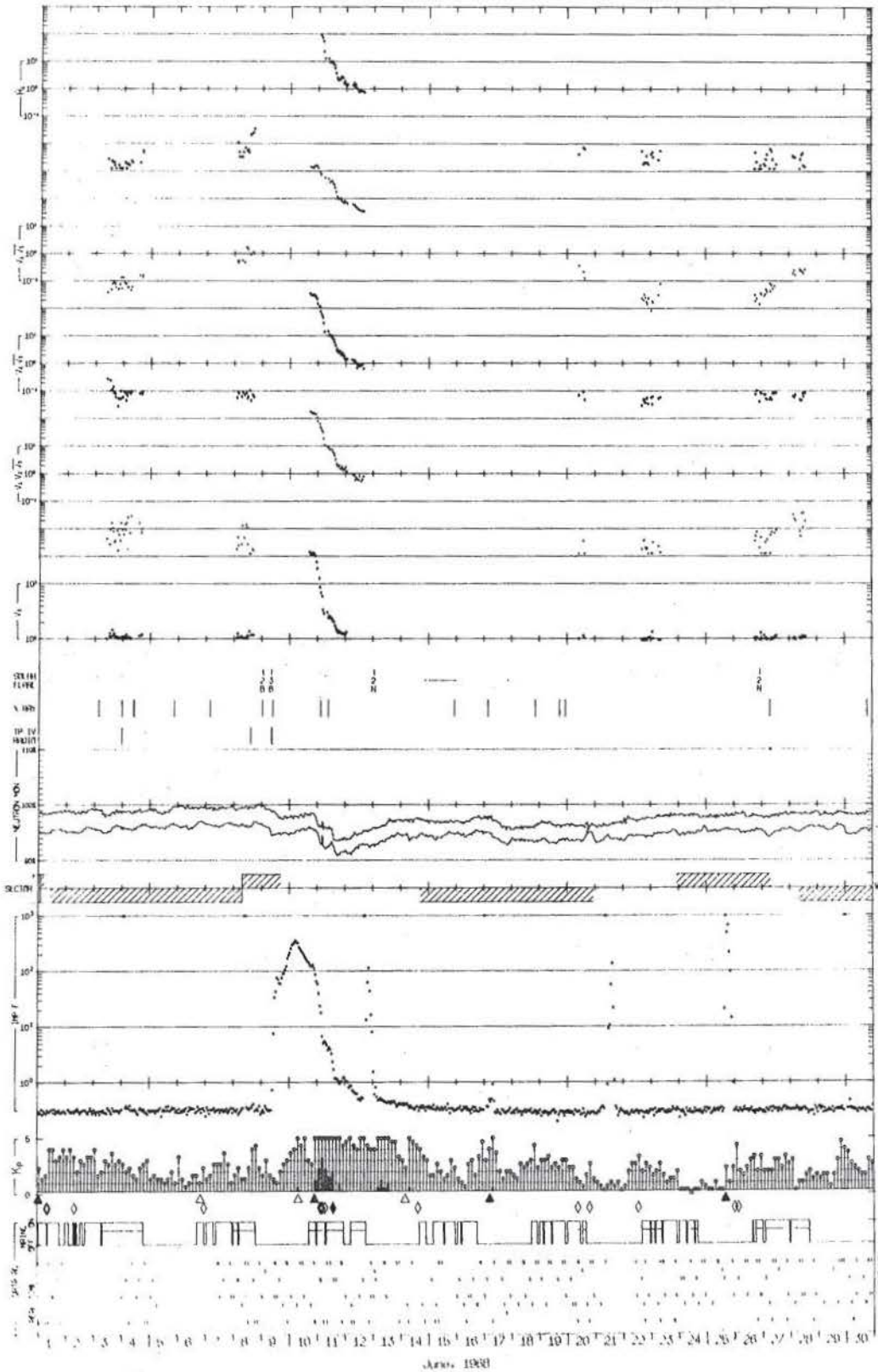


Figure 14

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

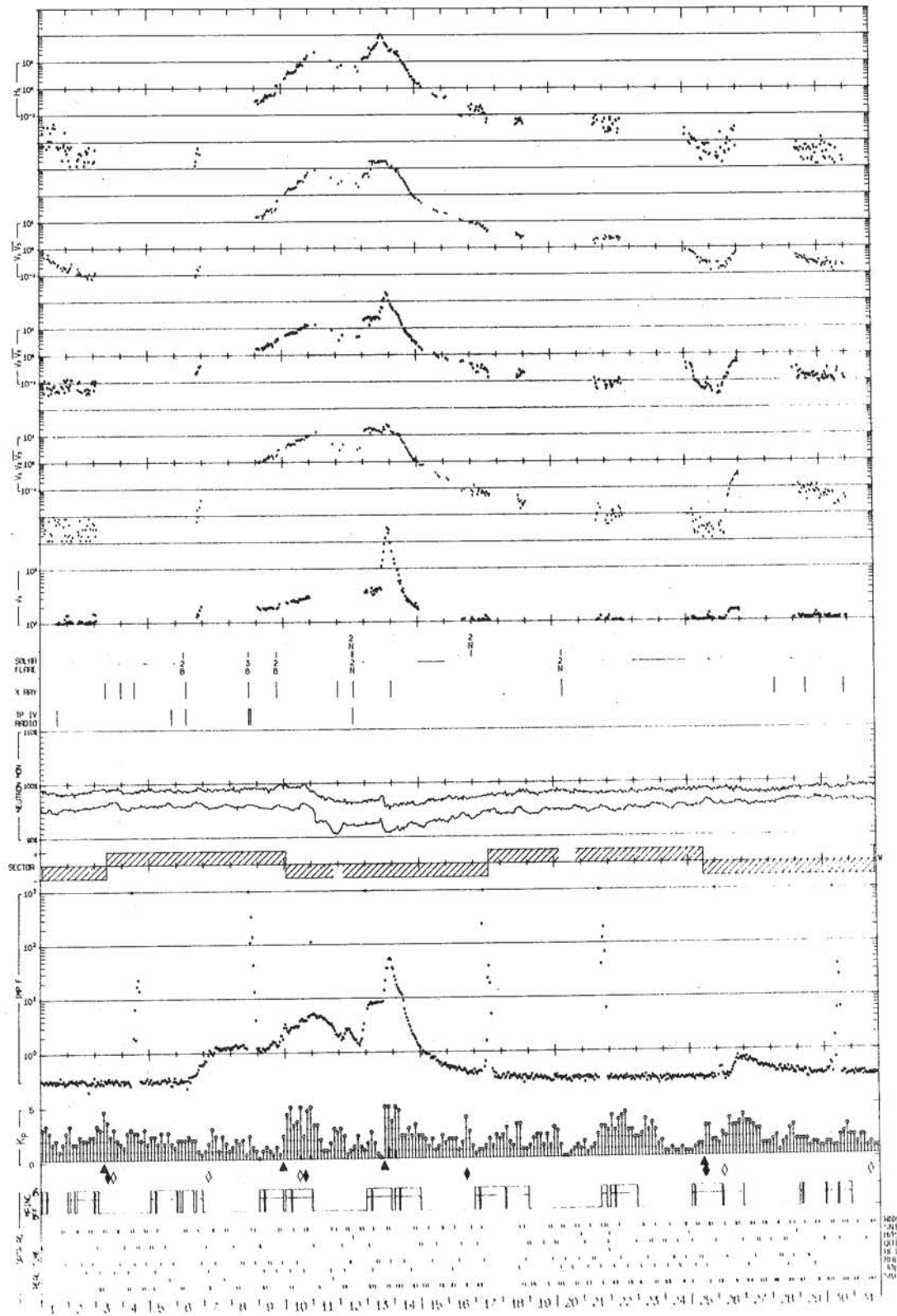


Figure 15

CGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

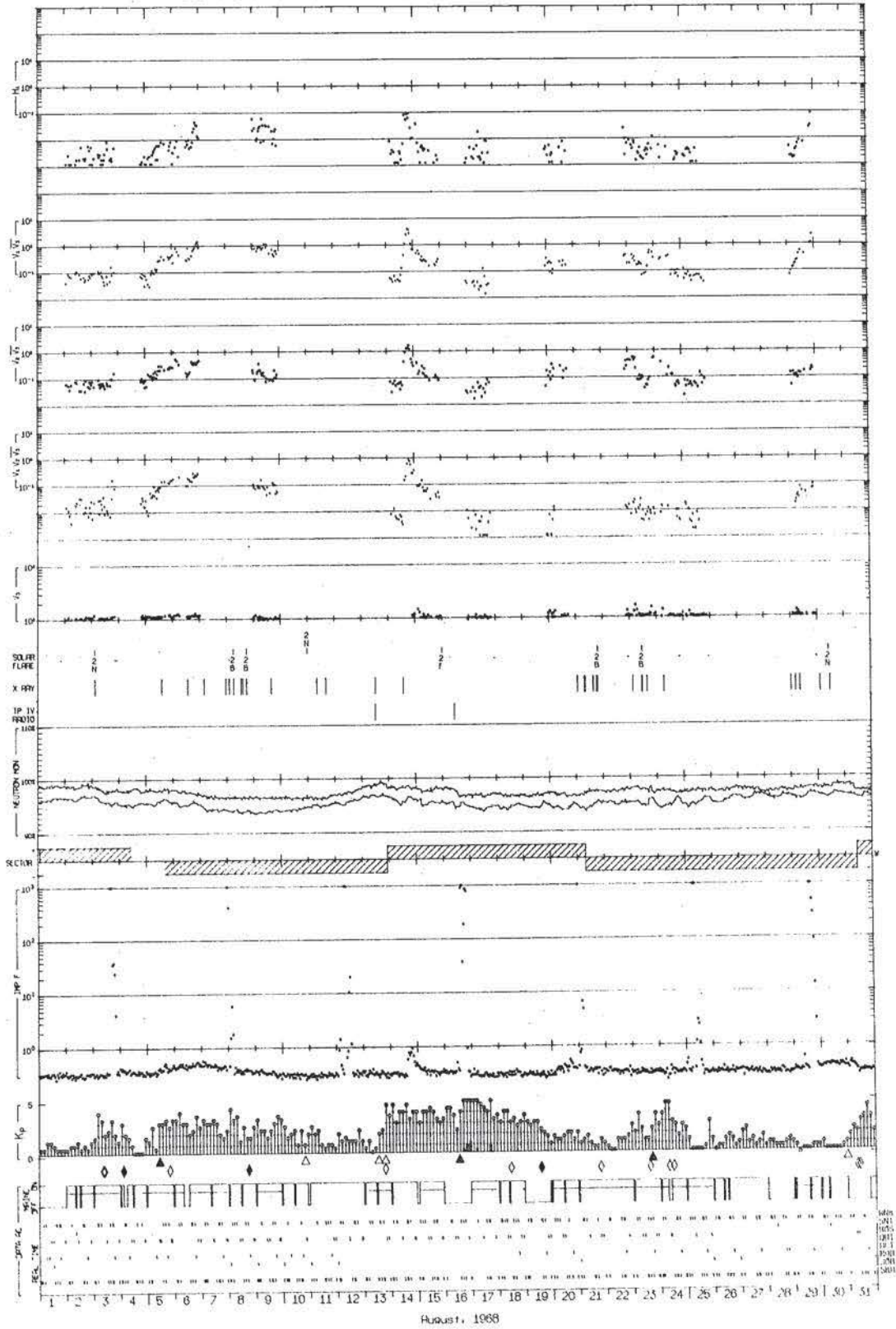


Figure 16

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

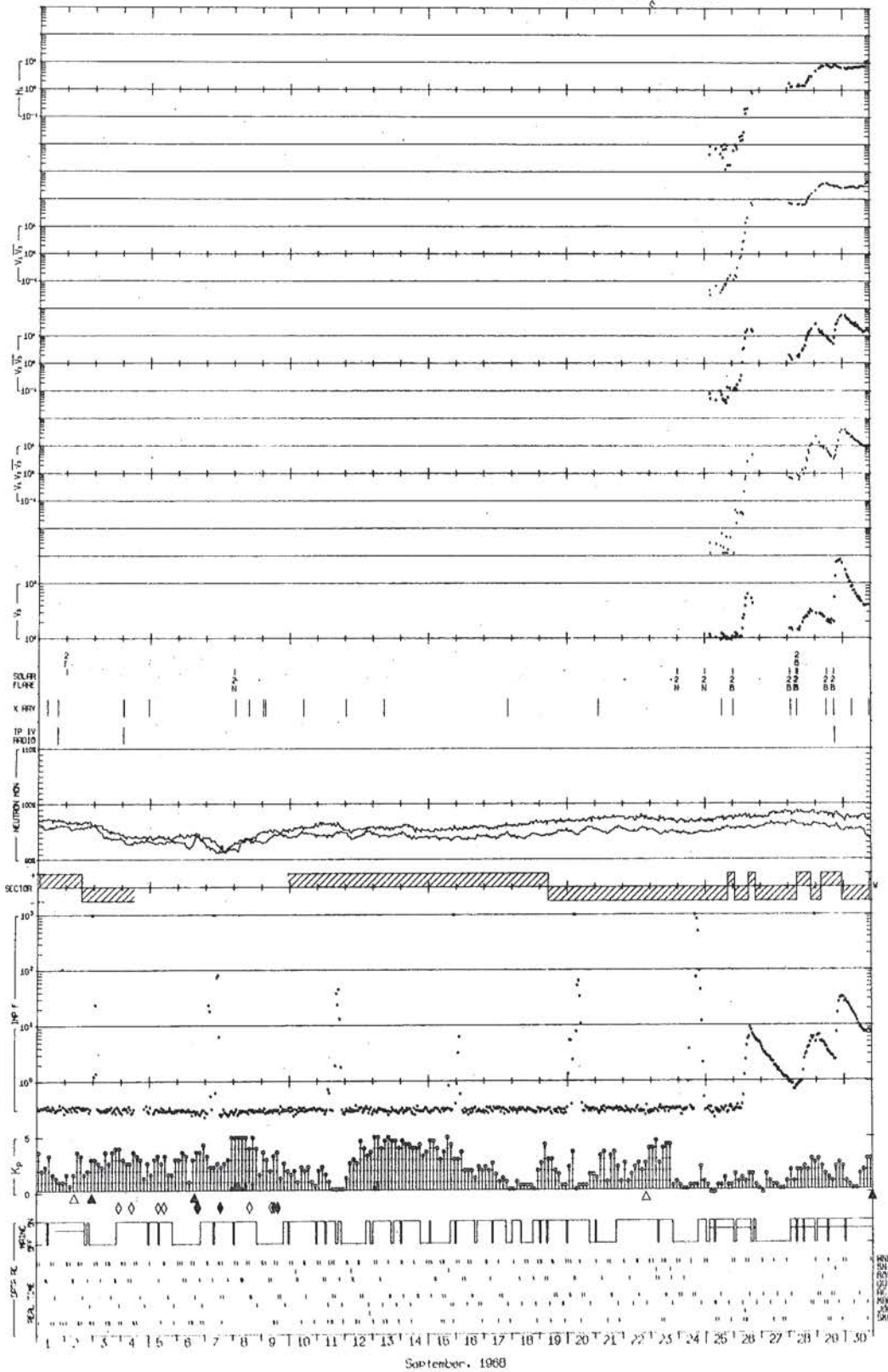


Figure 17

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

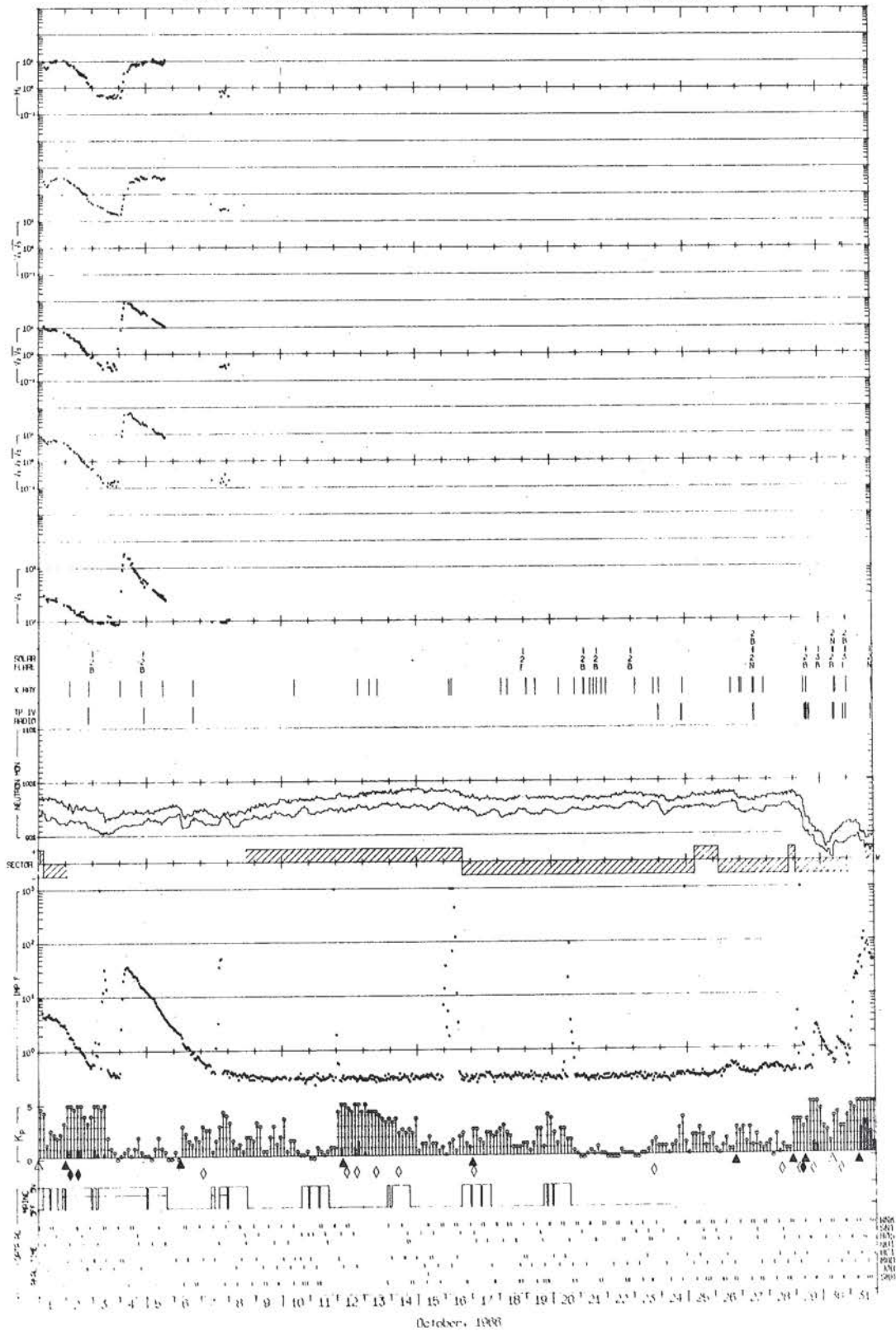


Figure 18

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 10 Mar 1971)

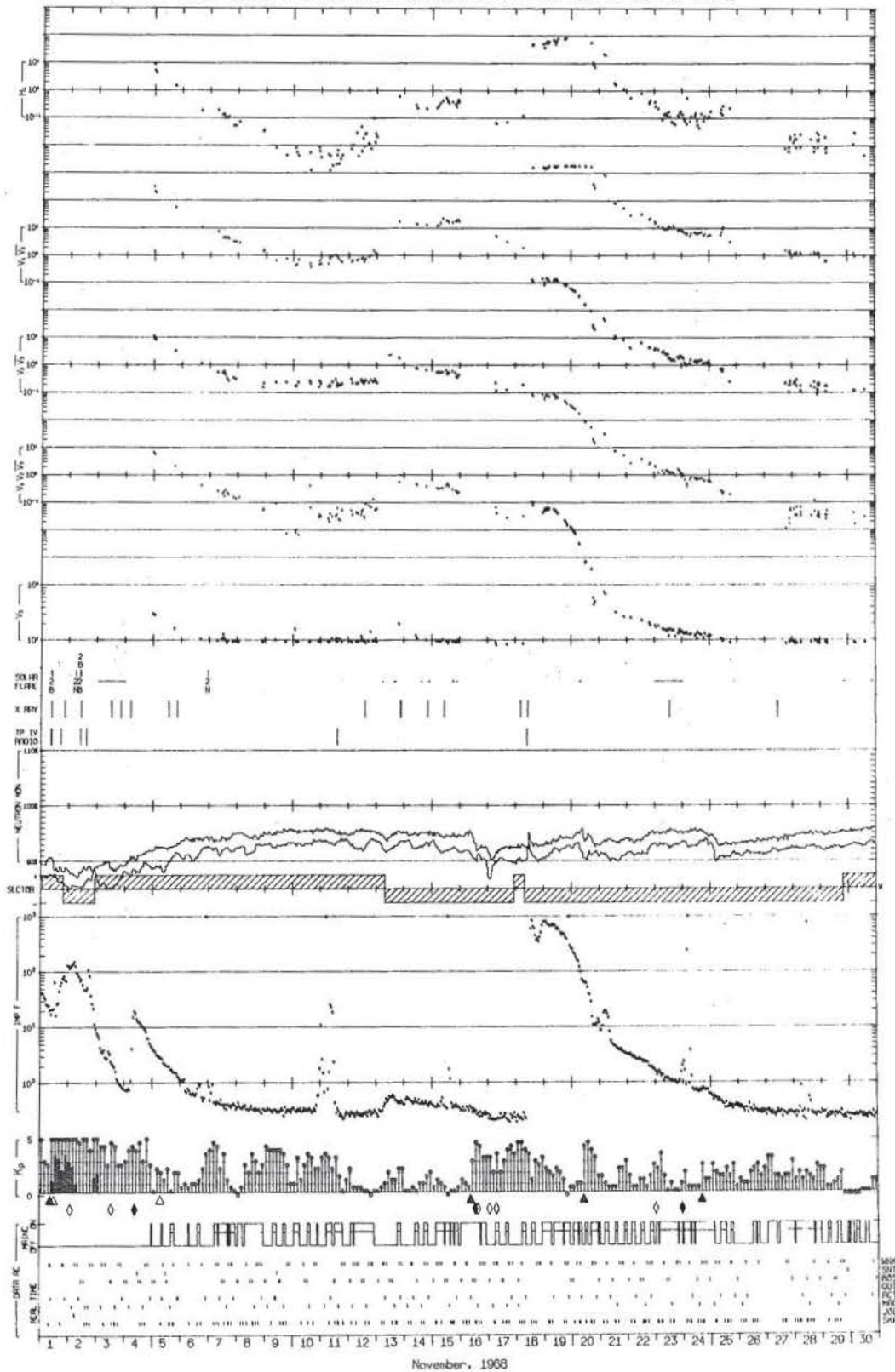


Figure 19

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 6 Mar 1971)

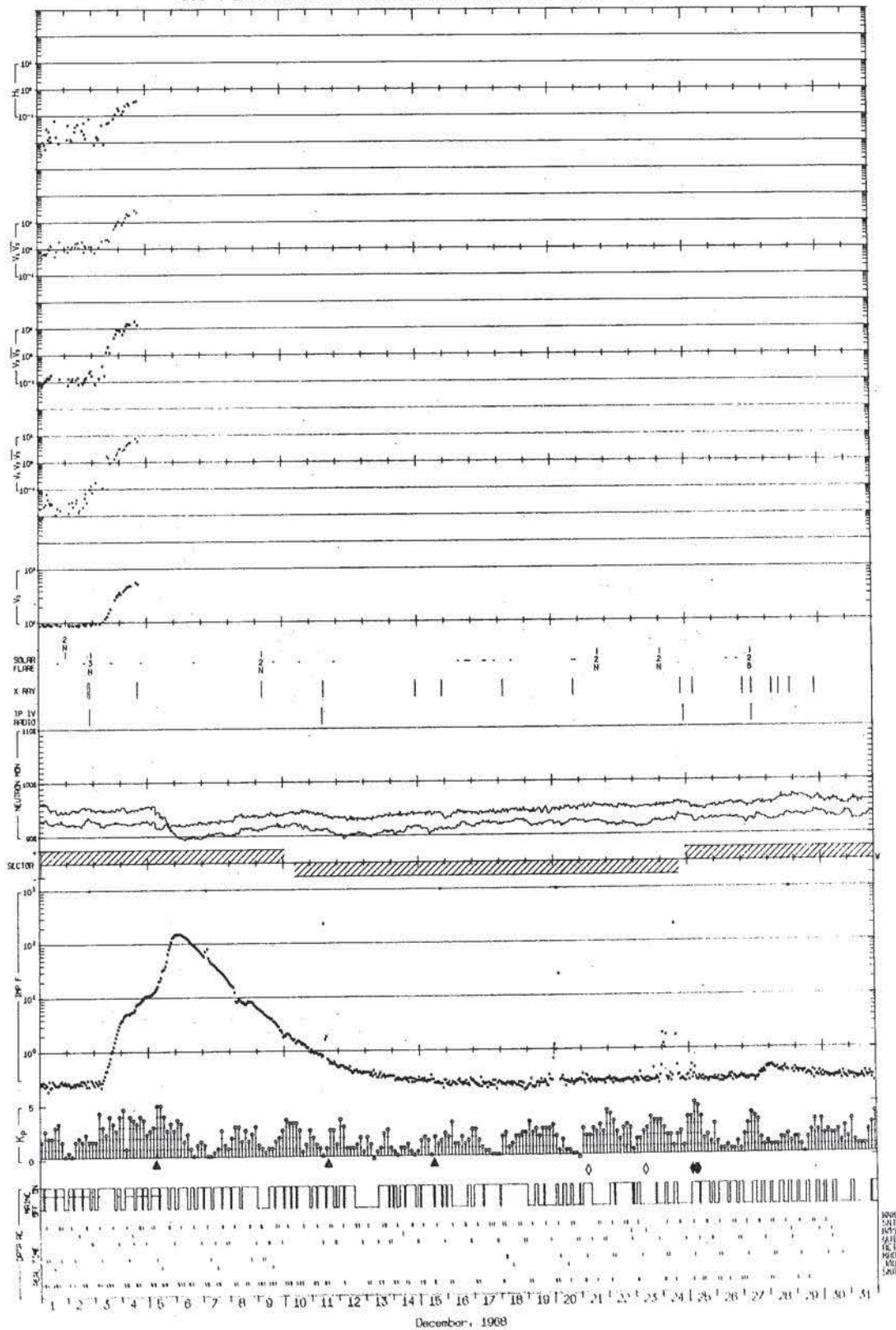


Figure 2C

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 20 Feb 1971)

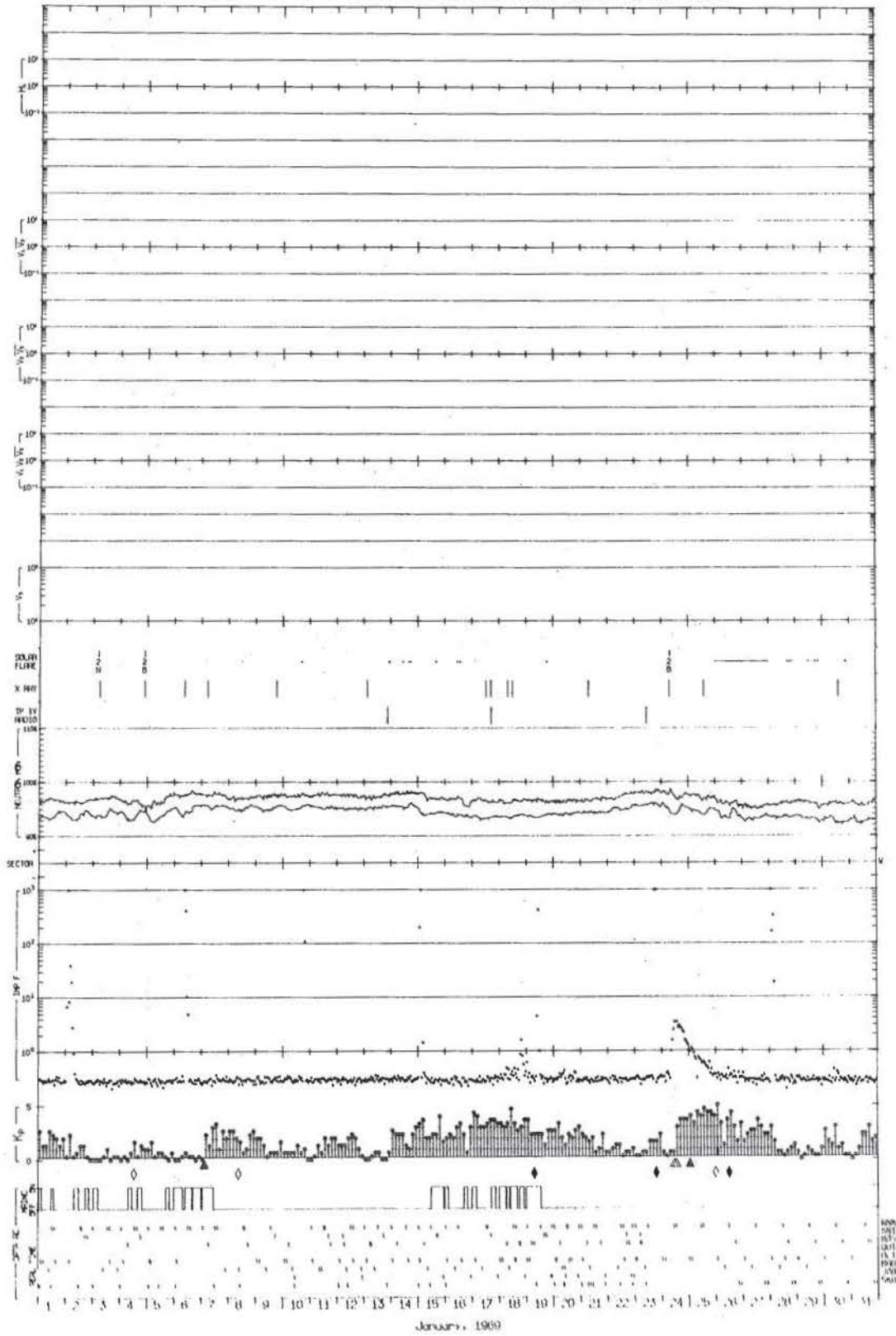


Figure 21

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

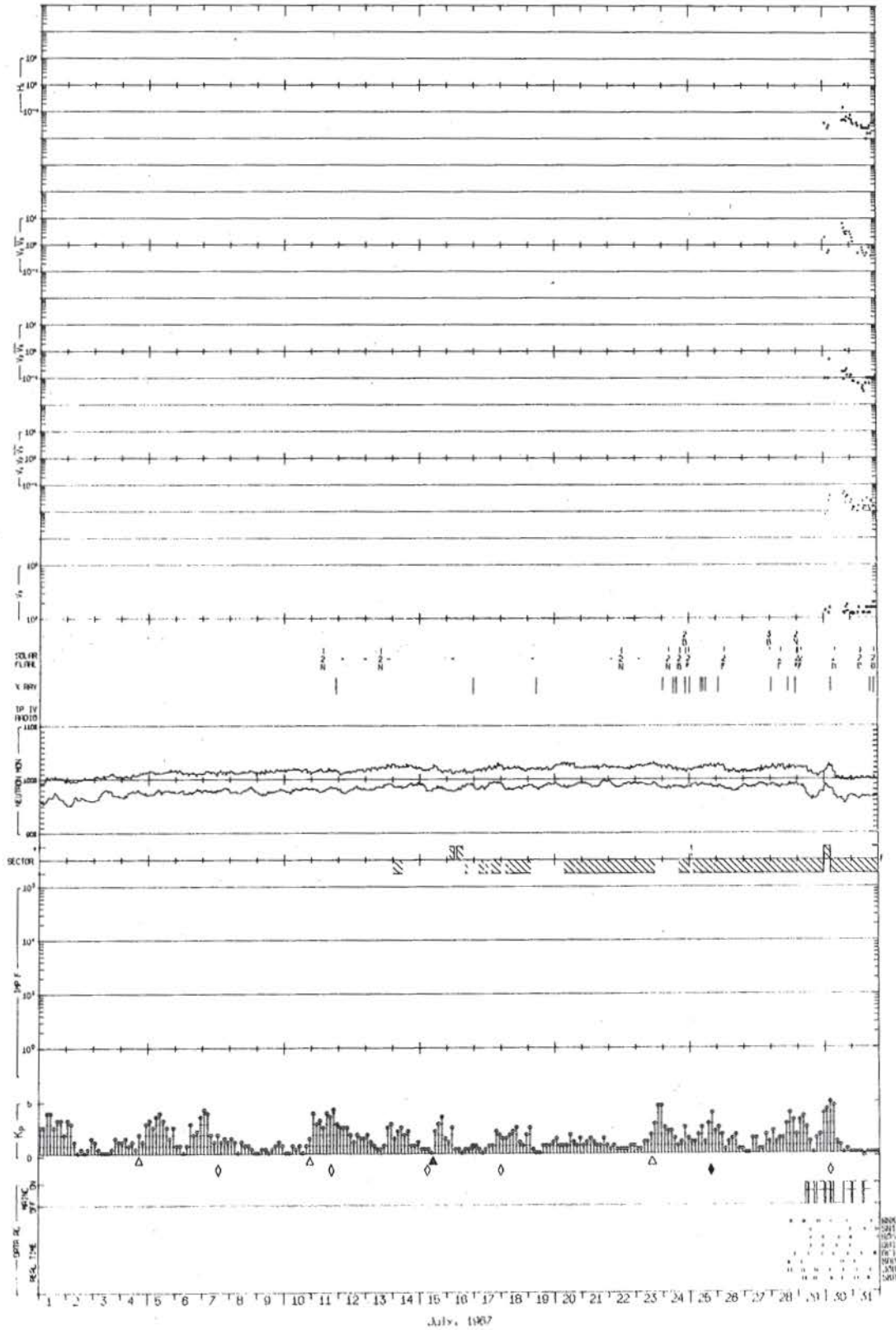


Figure 22

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

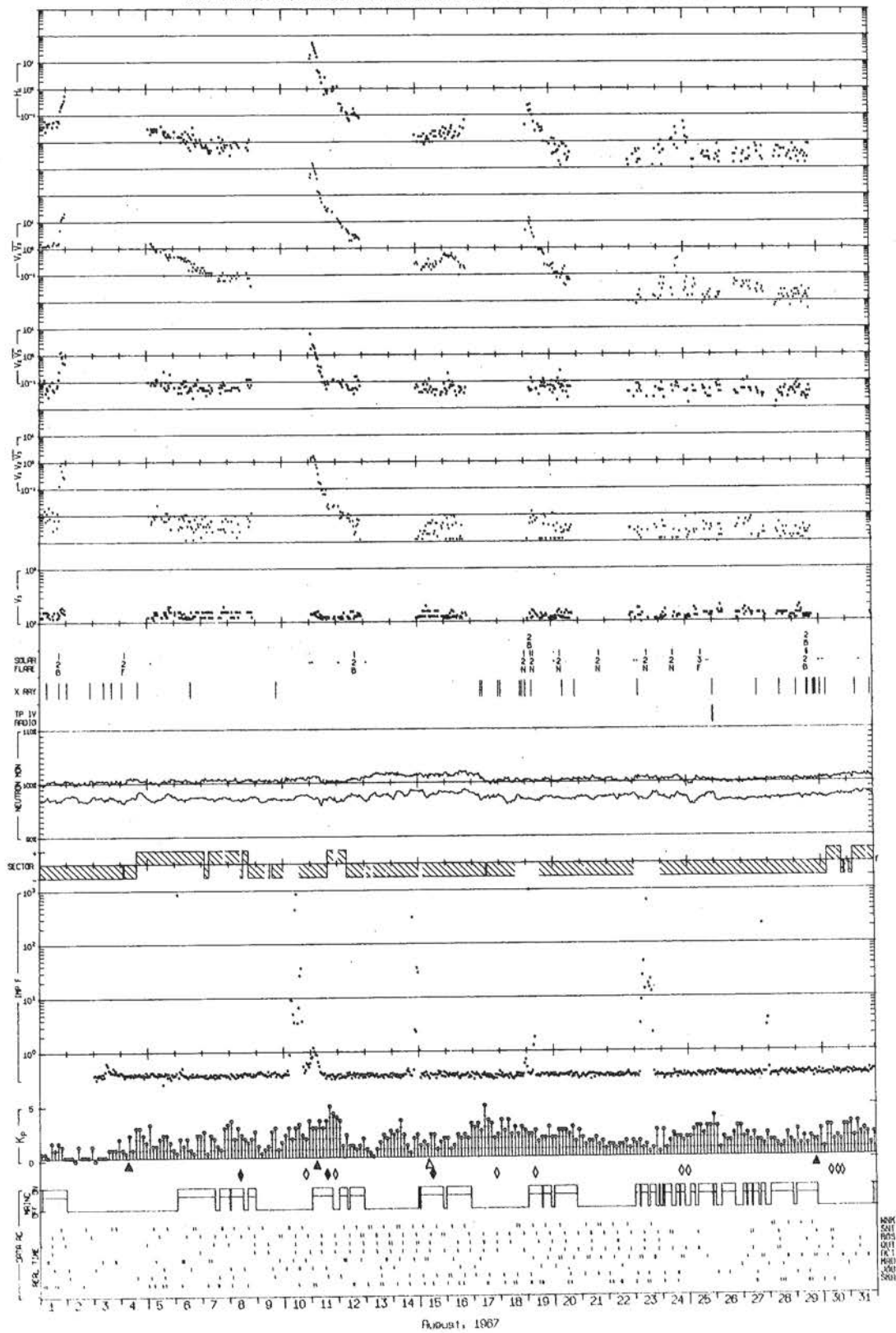


Figure 23

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

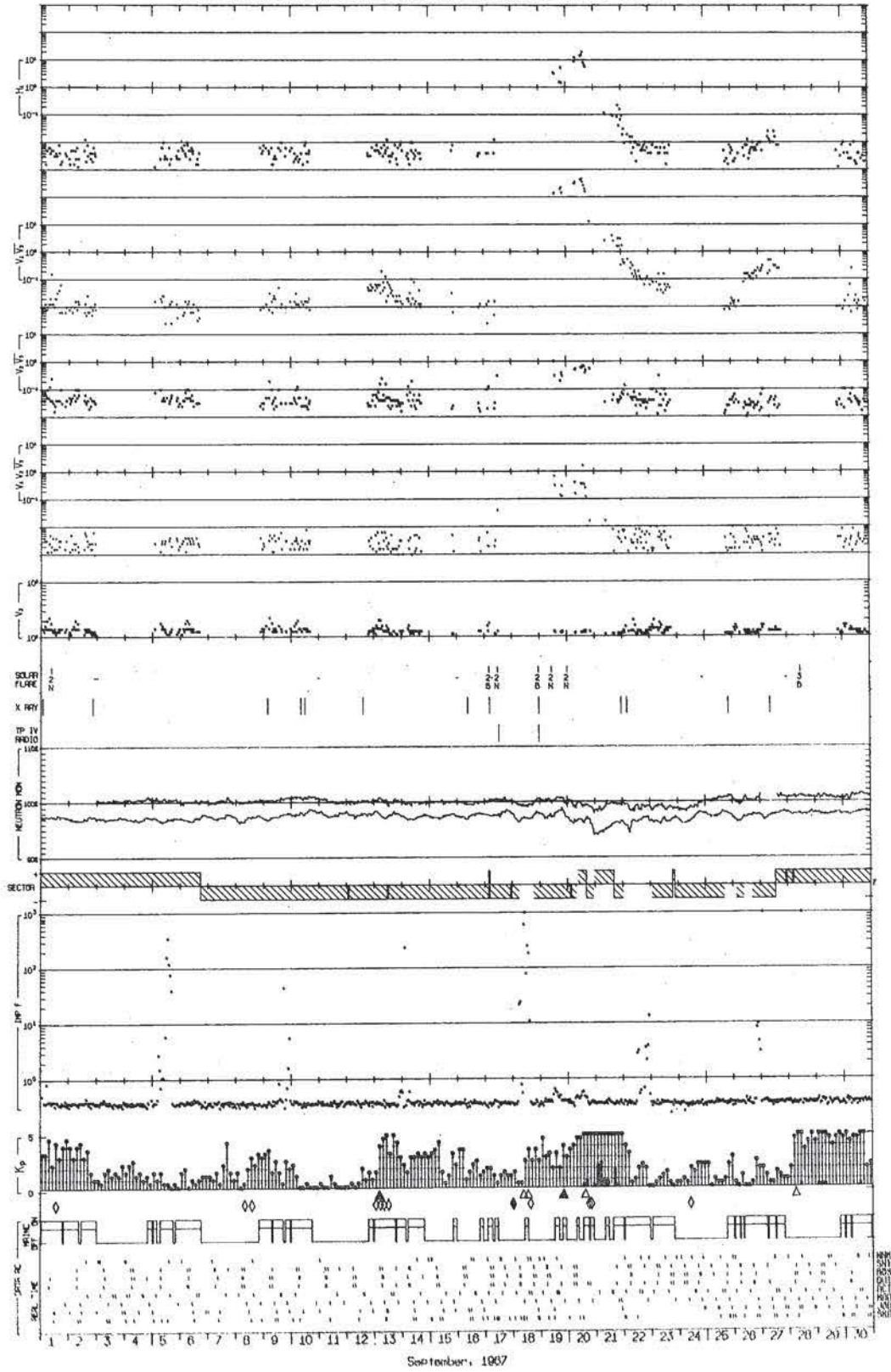


Figure 24

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

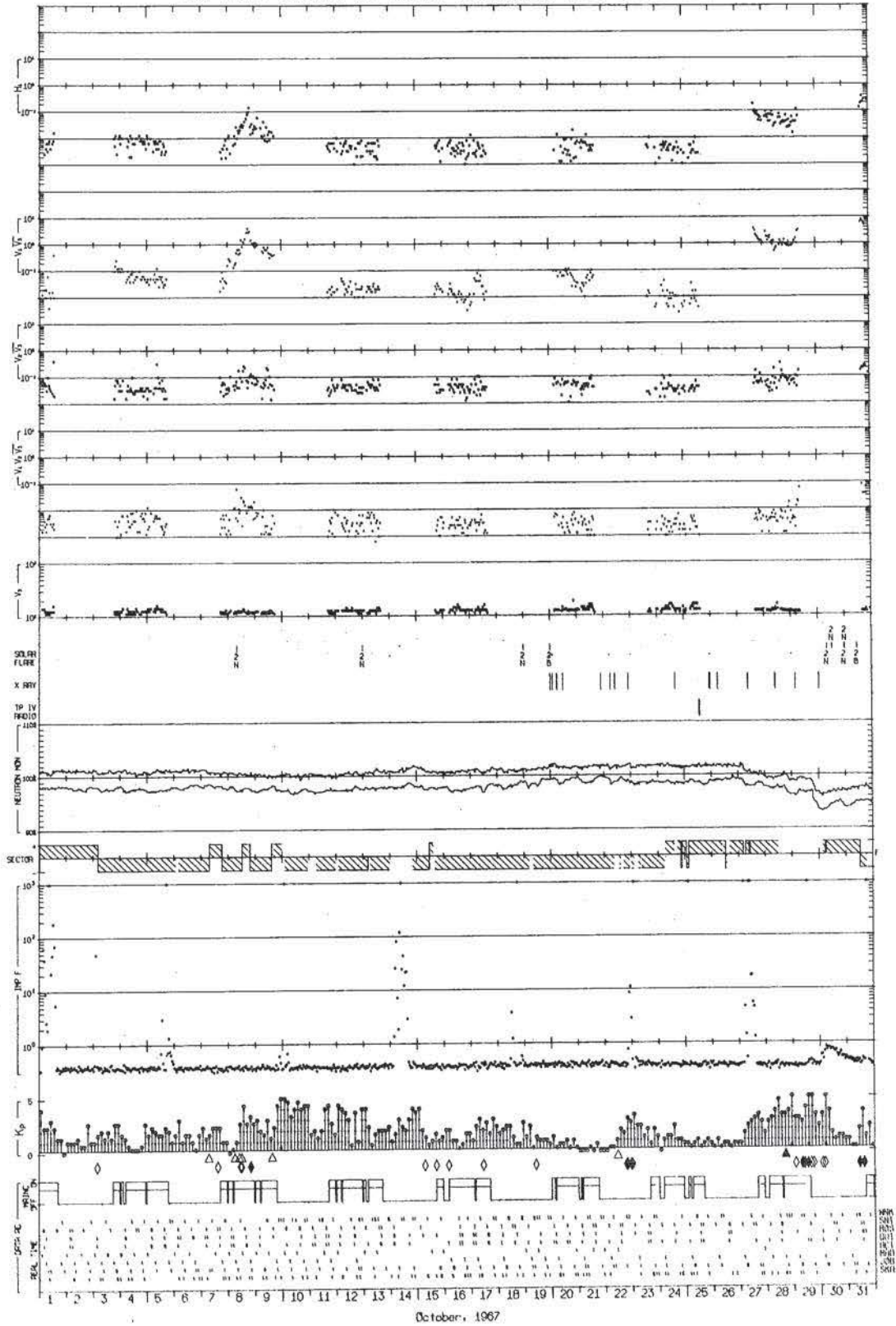


Figure 25

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

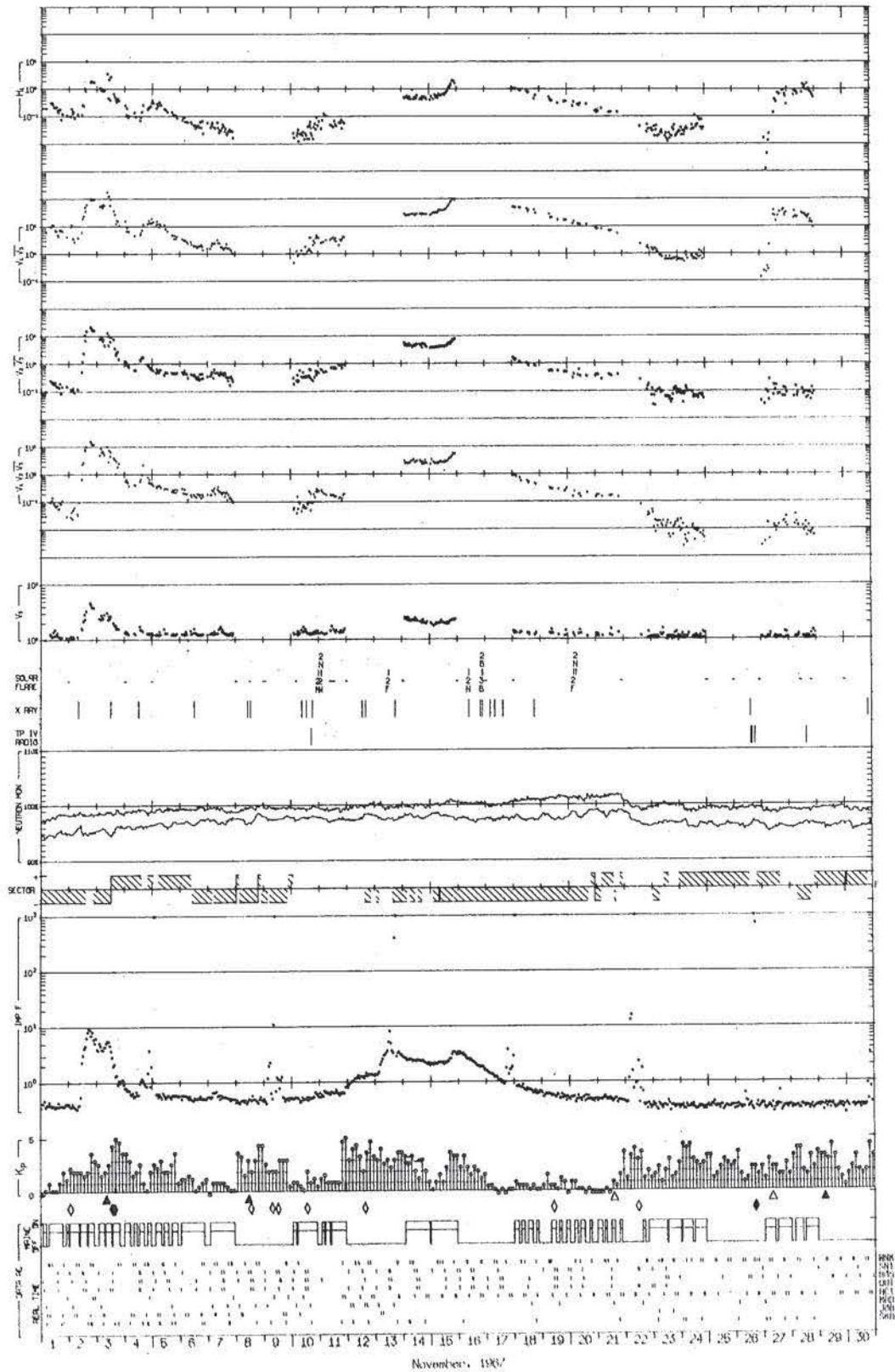


Figure 26

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

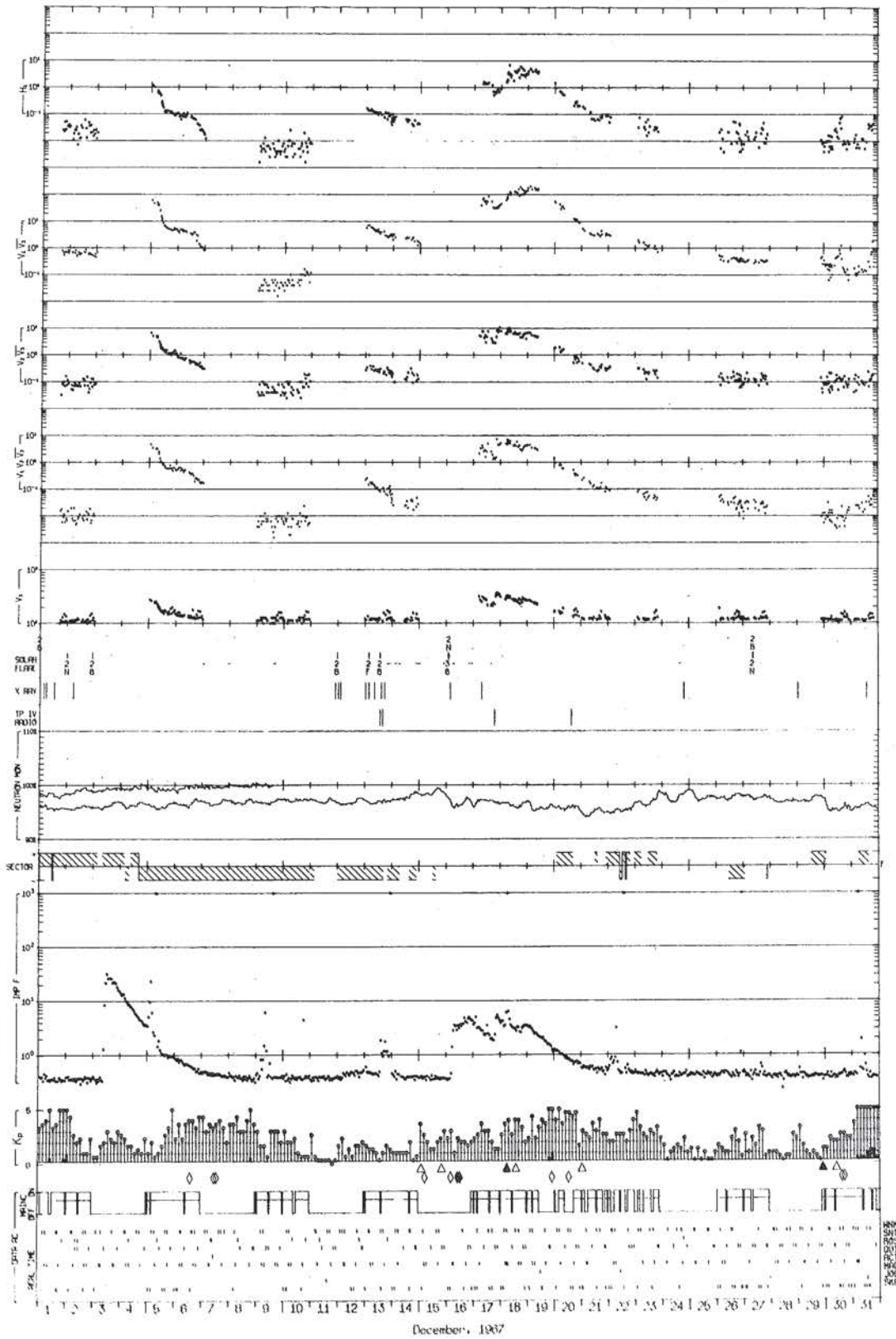


Figure 27

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

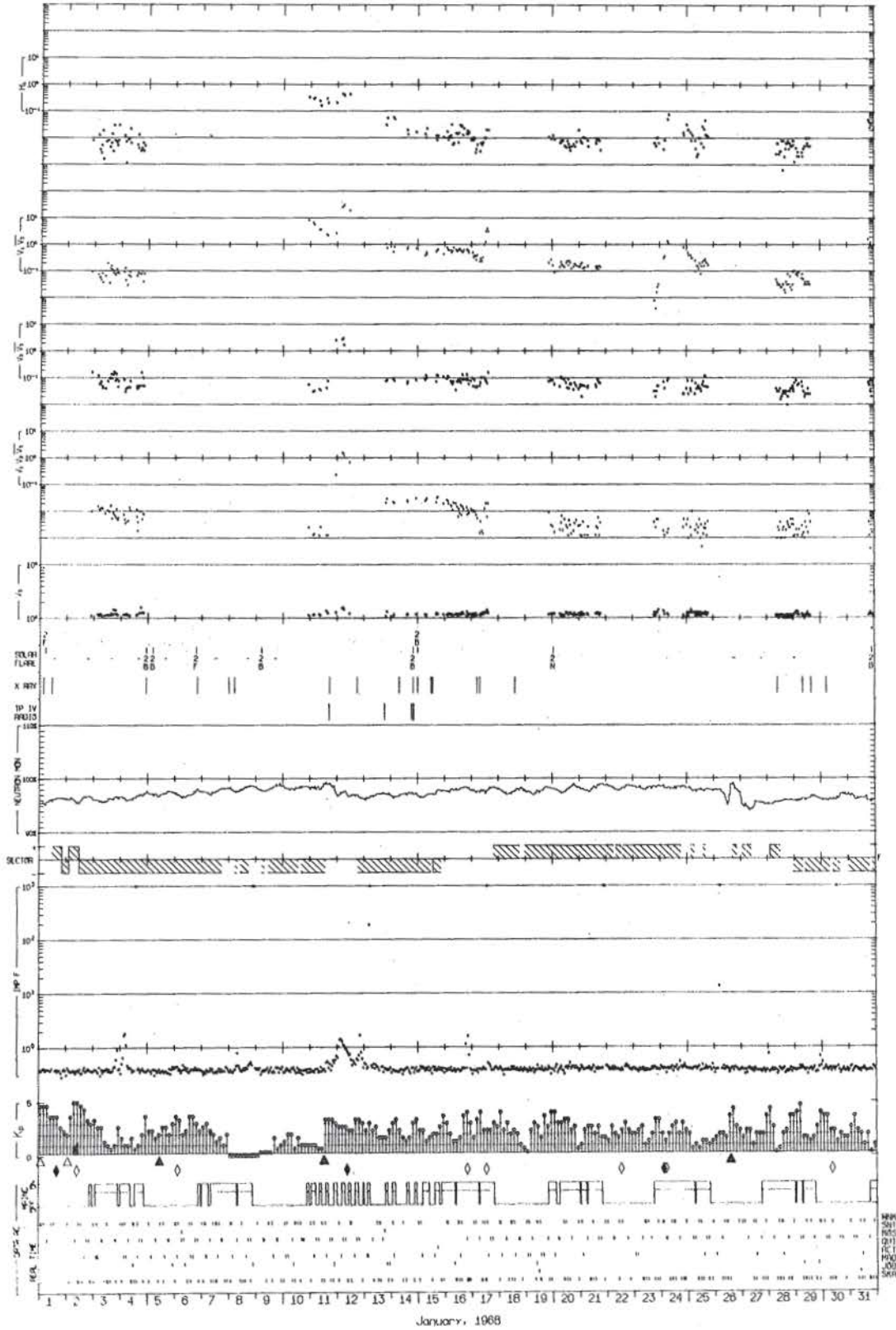


Figure 28

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

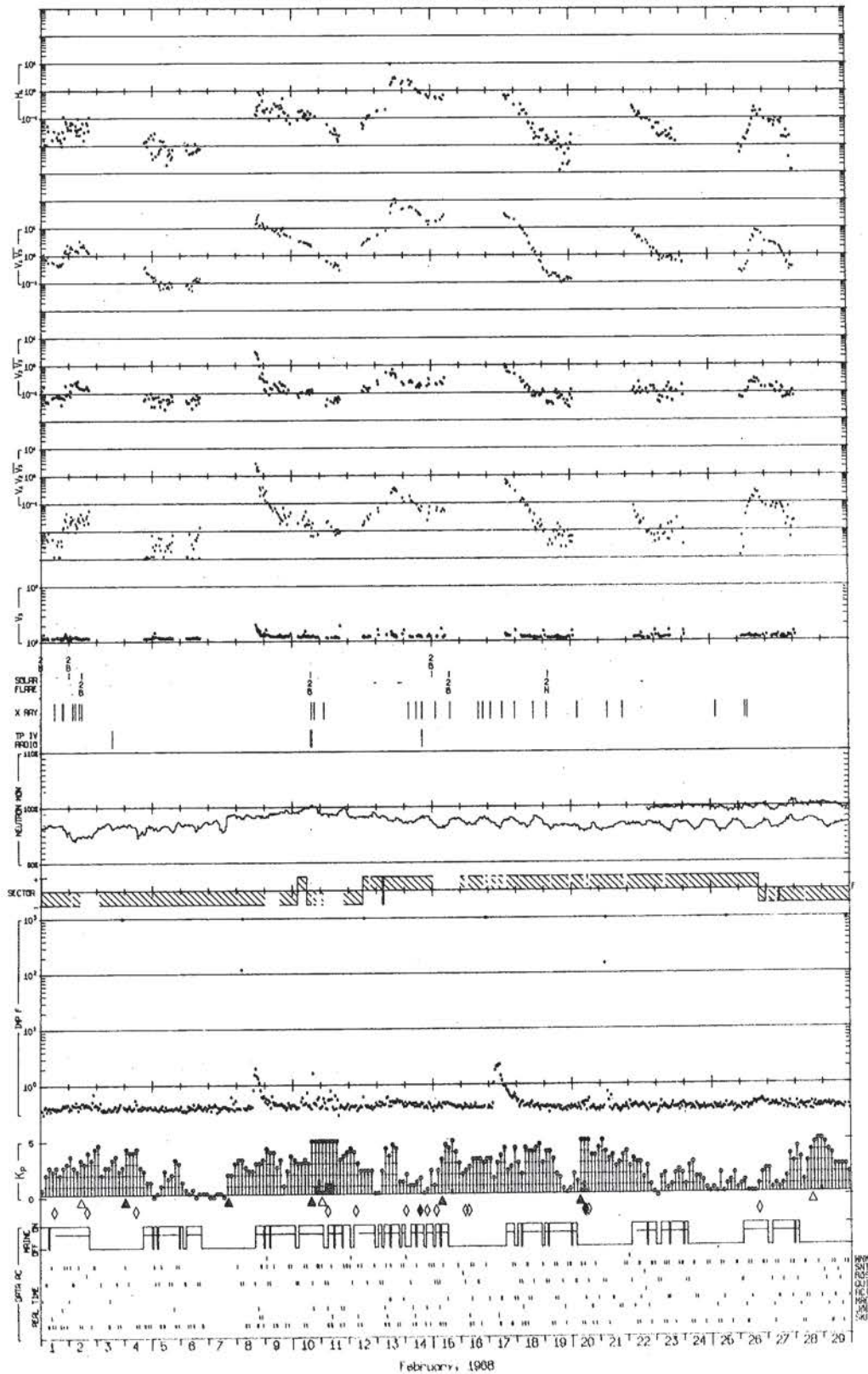


Figure 29

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

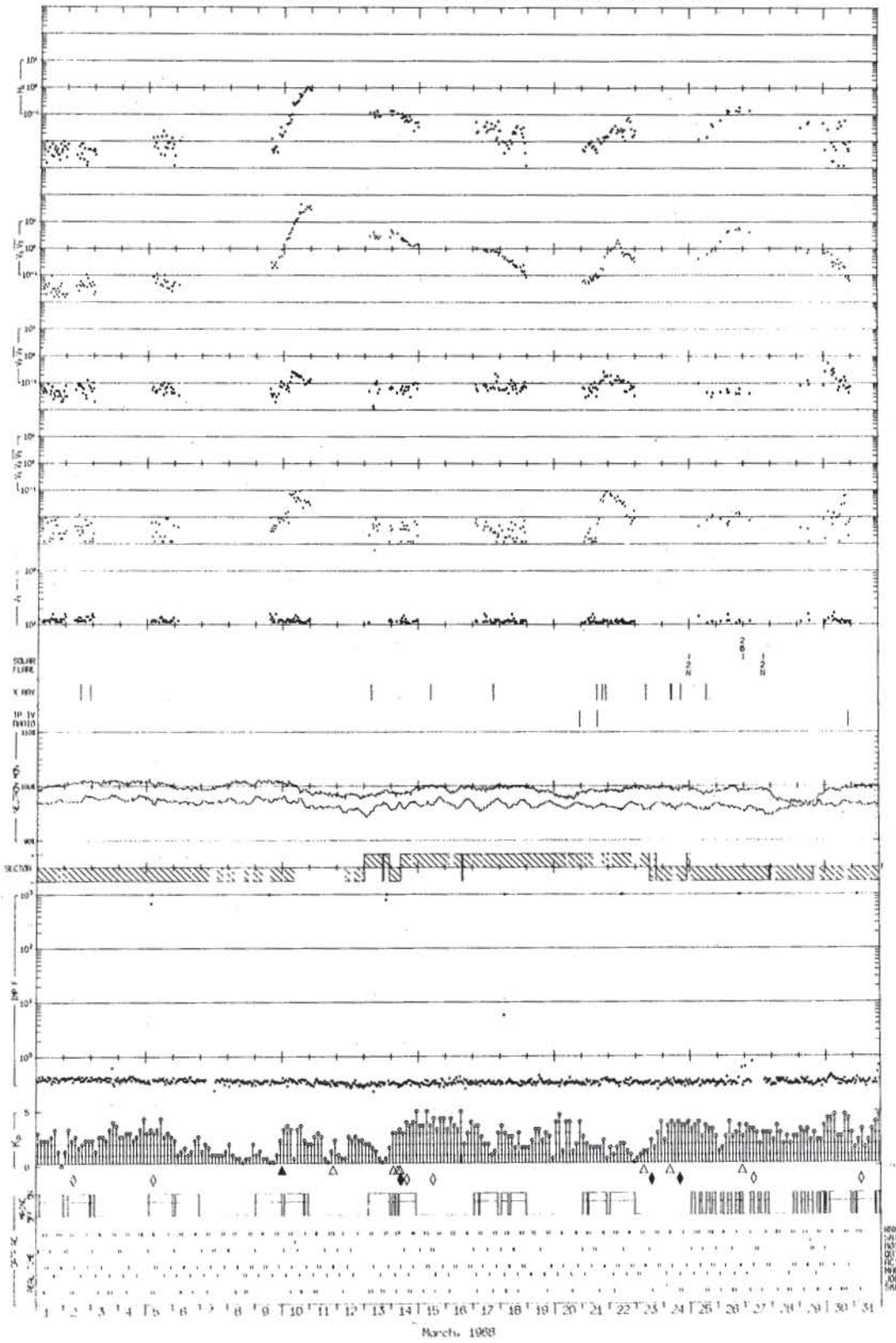


Figure 30

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

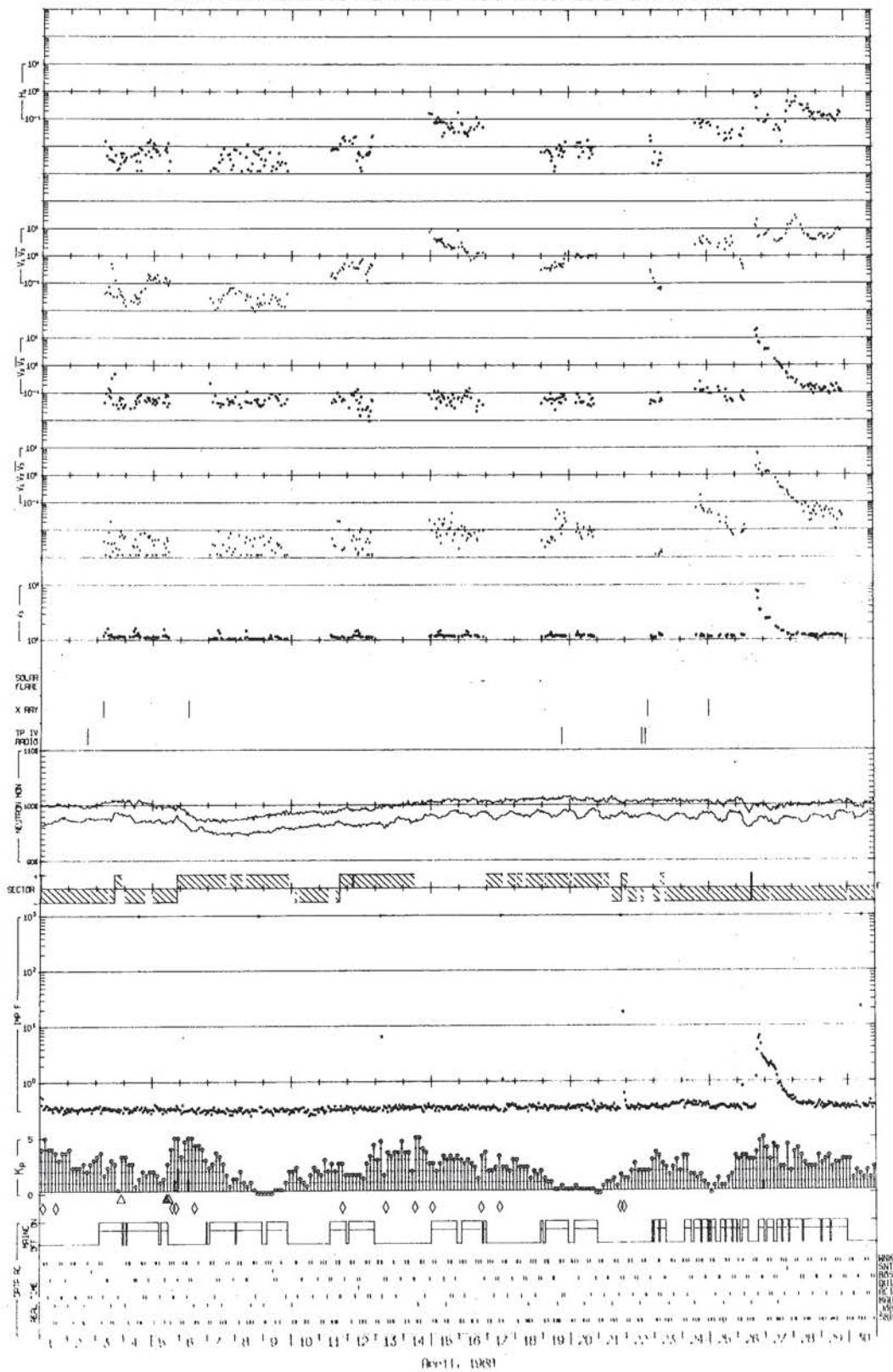


Figure 31

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

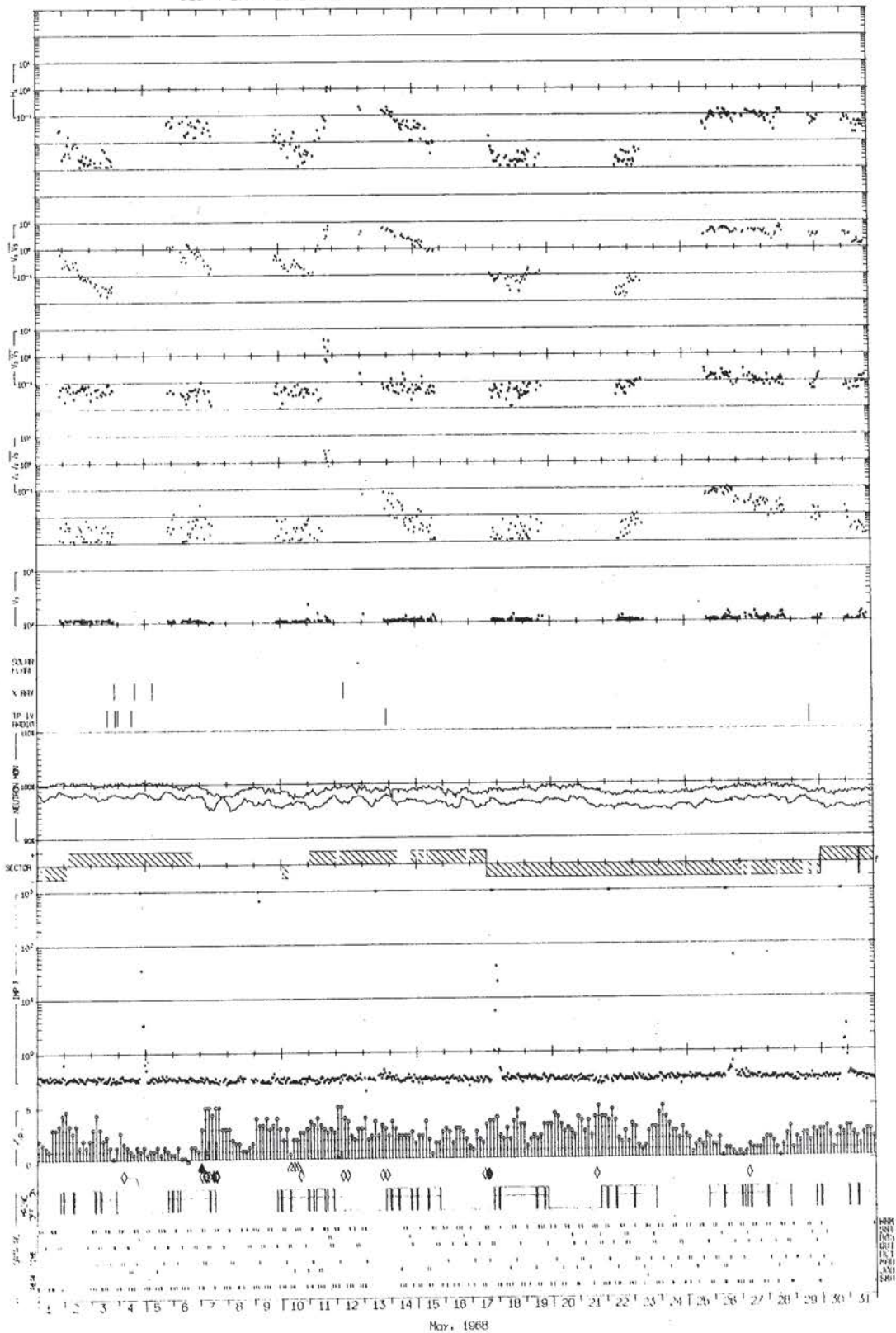


Figure 32

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

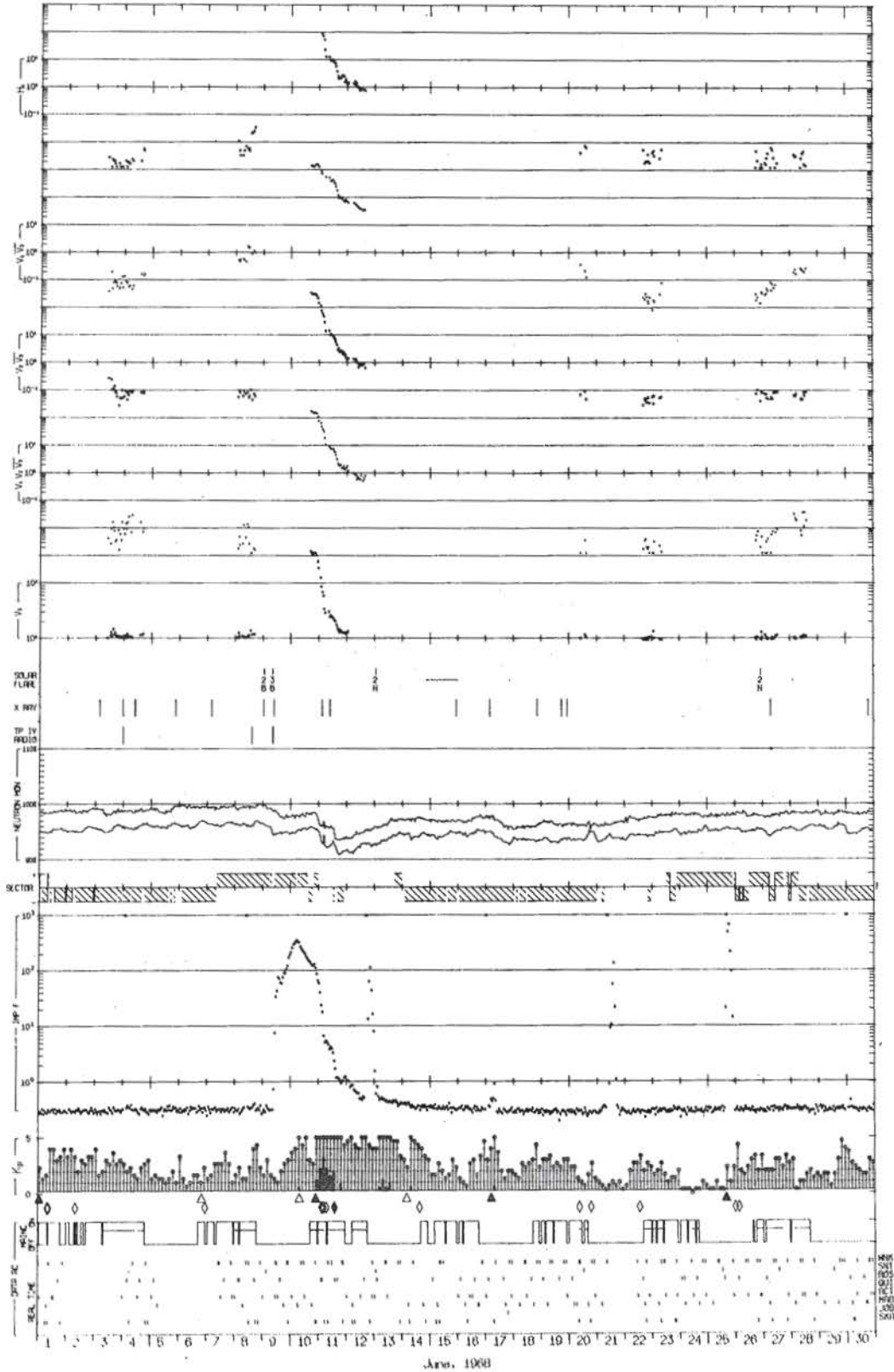


Figure 33

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

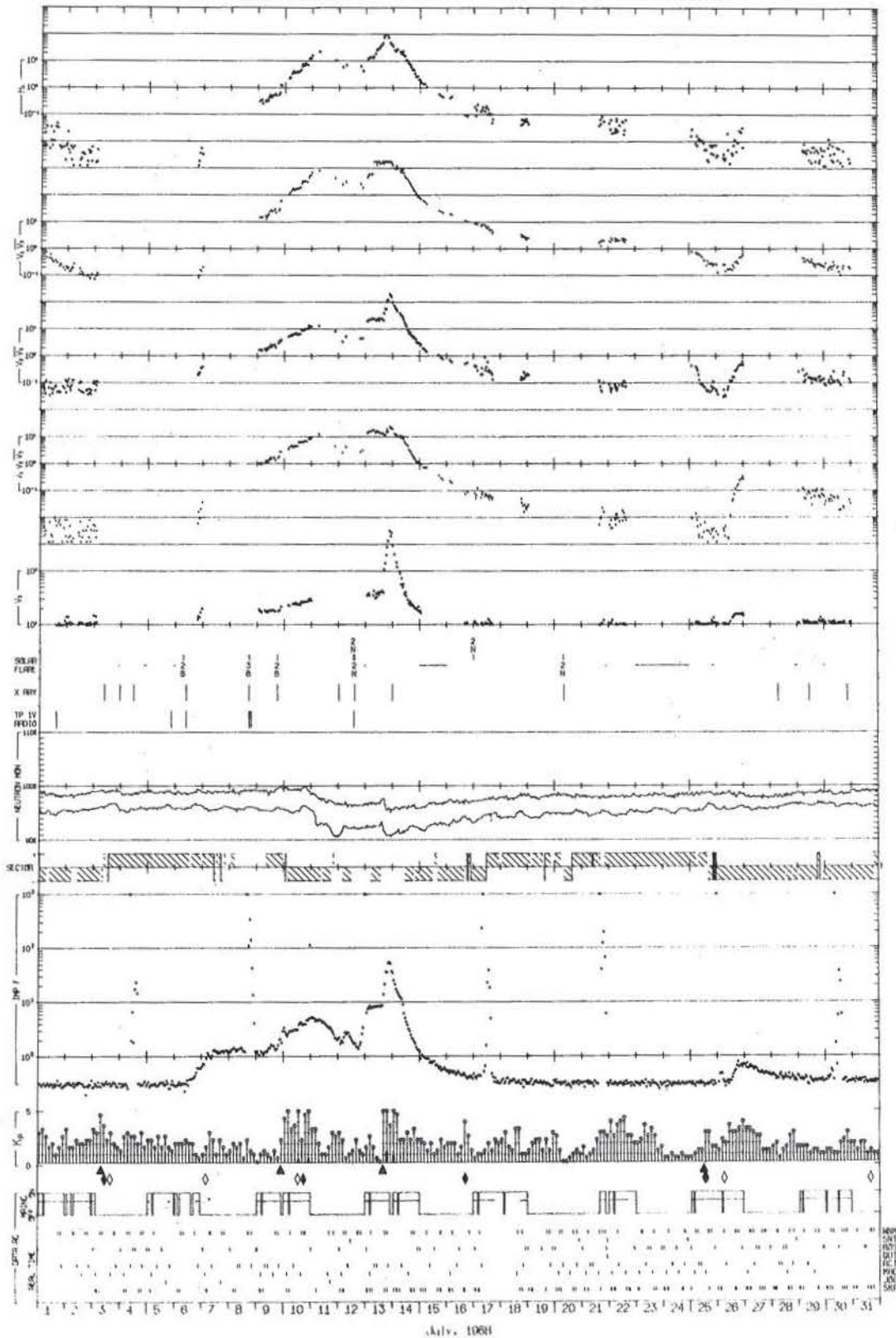


Figure 34

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

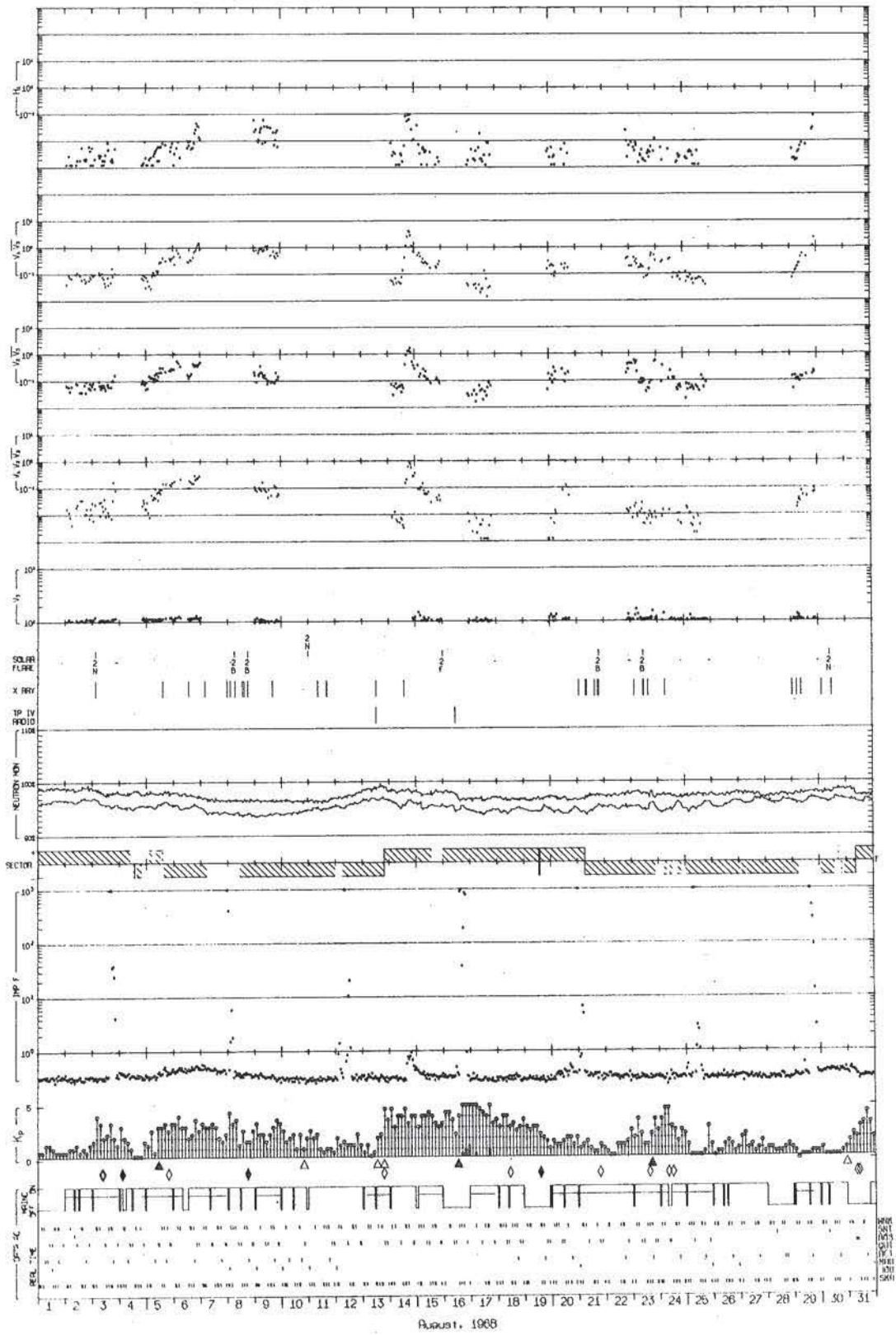


Figure 35

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 28 Feb 1971)

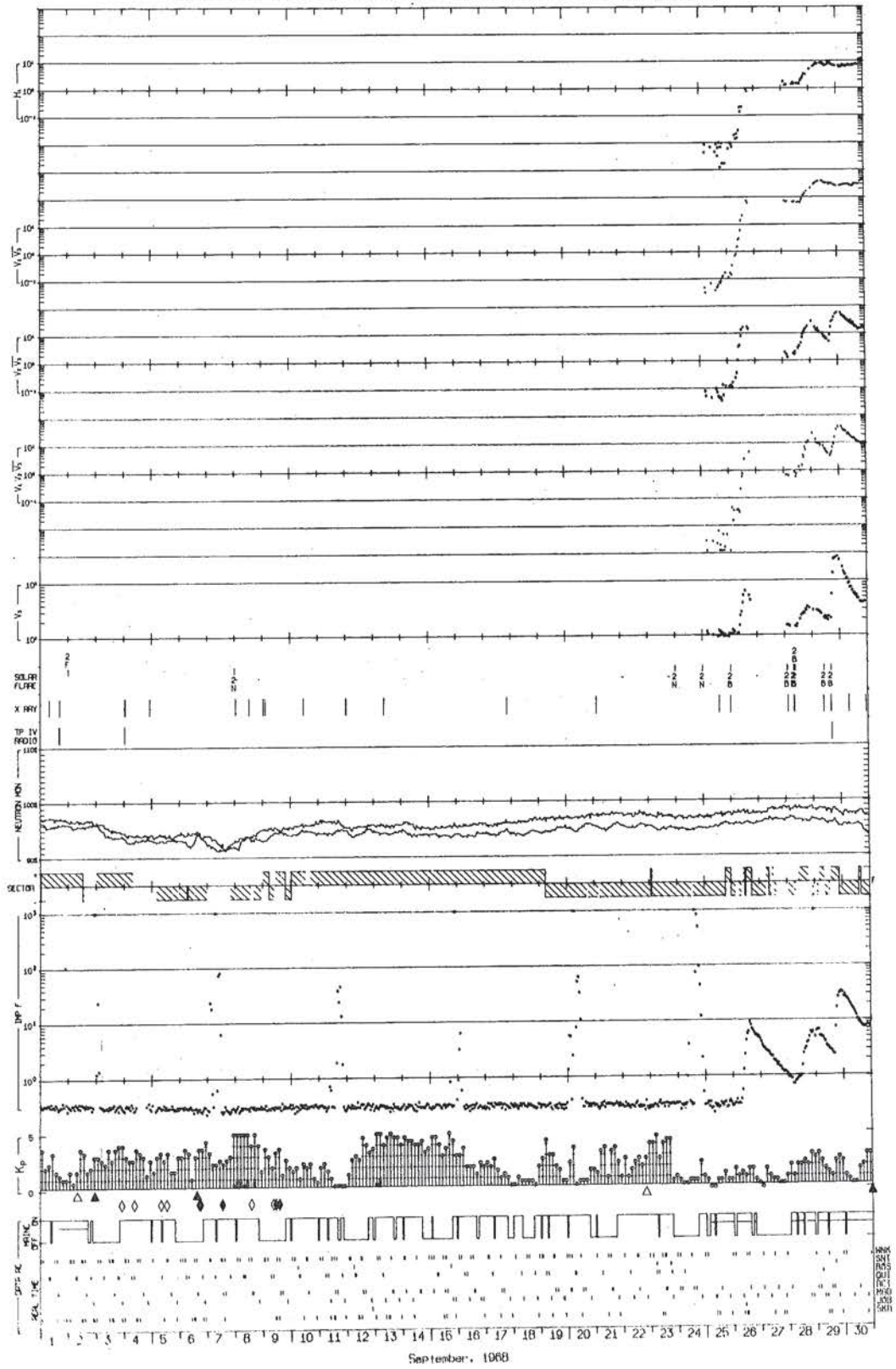


Figure 36

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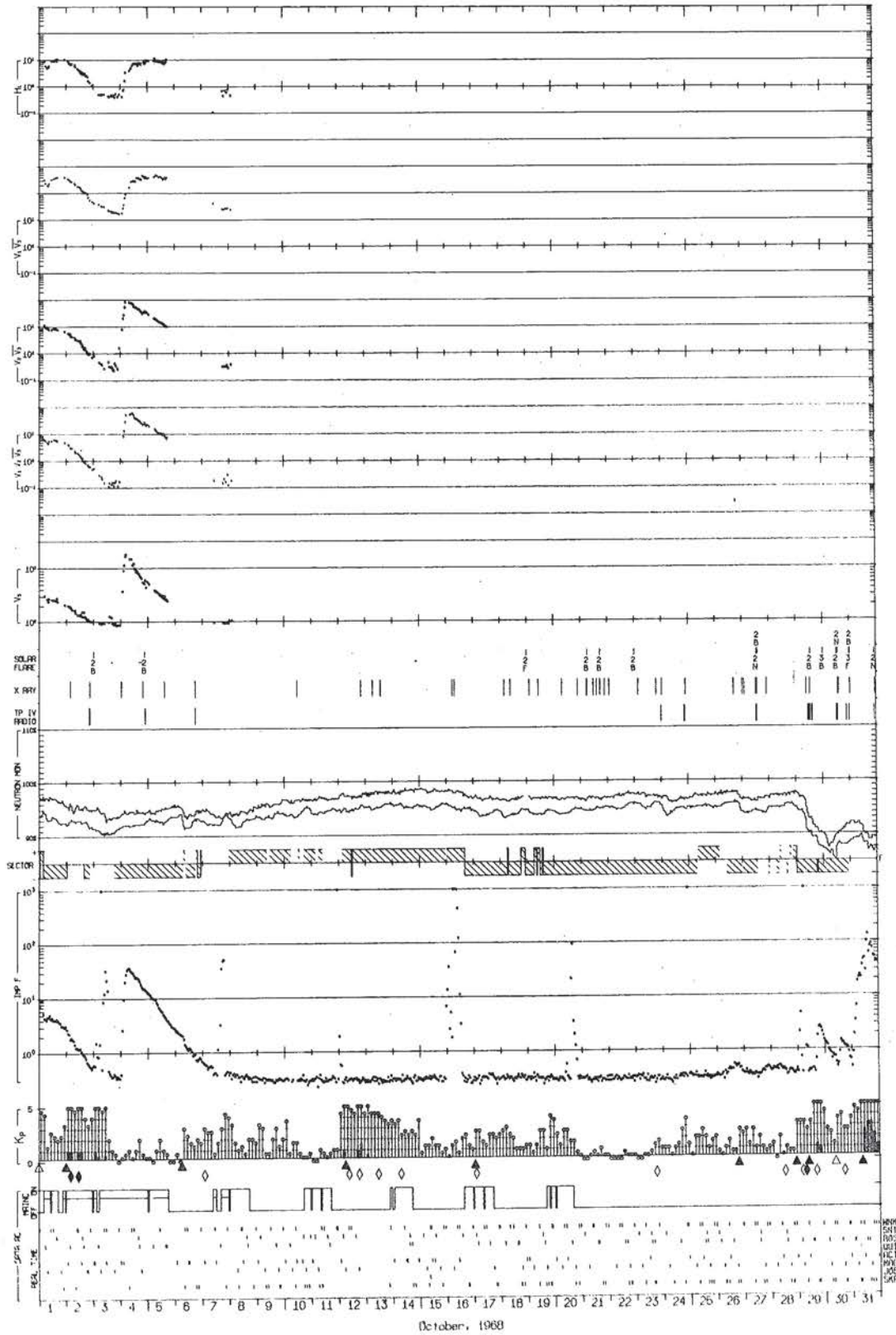


Figure 37

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 10 Mar 1971)

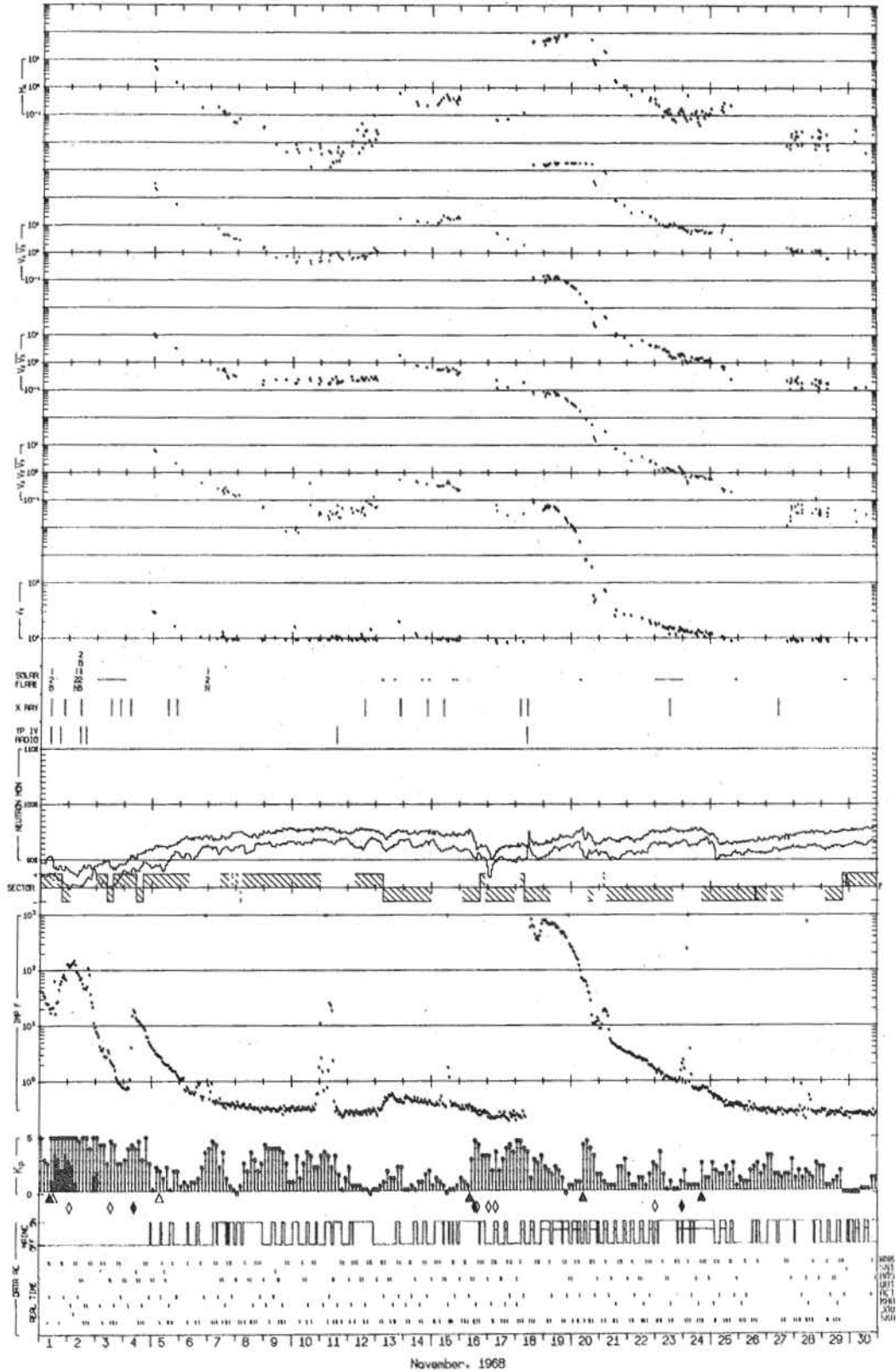


Figure 38

OGO-4 DATA COVERAGE AND AVERAGE POLAR RATES (as of 6 Mar 1971)

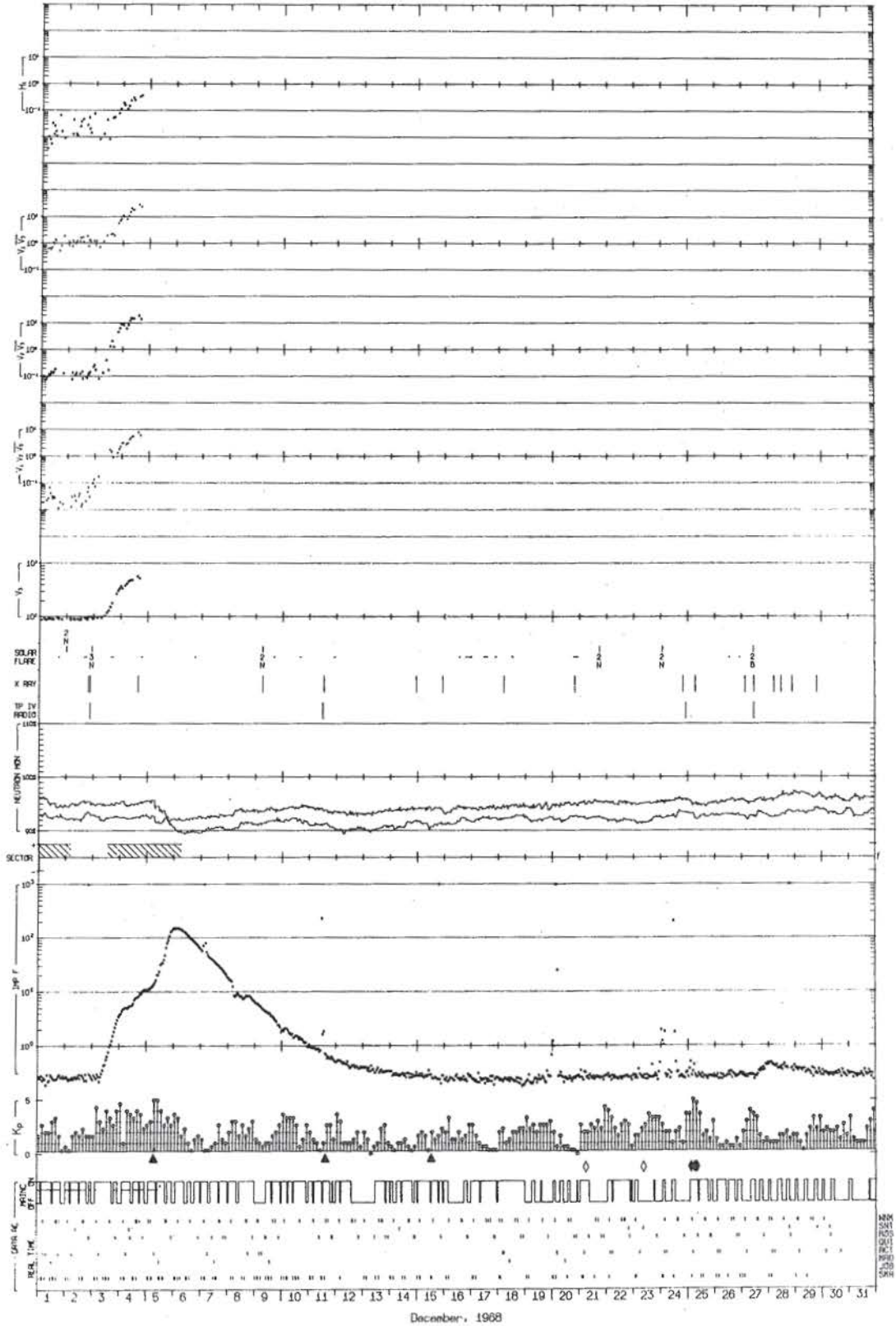


Figure 39

References

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3. J. A. Van Allen, "The Solar X-Ray Flare of July 7, 1966", J. Geophys. Res., 72, 5903, 1967.
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