

U. of Iowa 66-15

GRAPHIC SUMMARY OF THE RESPONSES  
OF THE UNIVERSITY OF IOWA  
CHARGED PARTICLE DETECTORS  
ON EXPLORER 12\*

by

L. A. Frank, R. C. Bohlin and R. J. DeCoster

Department of Physics and Astronomy  
University of Iowa  
Iowa City, Iowa

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Abstract

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Graphs of the responses of the University of Iowa charged particle detectors on Explorer 12 are displayed for the period extending from launch on 16 August 1961 to 6 December 1961 when transmission of data terminated. This graphic summary provides a convenient abridged dictionary of available data and a convenient guide for further processing of the data.

### Description of the Instrumentation

Explorer 12 was launched on 16 August 1961 into an orbit with initial apogee 83,600 km and perigee 6,700 km geocentric radial distances, inclination  $33^\circ$  and period 26.5 hours. Transmission of data extended from launch to 6 December 1961. At launch the line of apsides of the spacecraft orbit was within  $\sim 5^\circ$  of the solar direction as viewed from the center of the earth; hence the ranges of local times of the spacecraft position in the outer radiation zone ( $L \sim 4$ ) were approximately  $\sim 7:00$  to  $1:00$  and  $14:00$  to  $8:00$  for outbound and inbound passes, respectively, over the period of data reception.

The University of Iowa complement of detectors included a shielded ( $\sim 1 \text{ gm (cm)}^{-2}$ ) Anton type 302 G.M. tube, a magnetic spectrometer utilizing three thin-windowed ( $1.2 \text{ mg (cm)}^{-2}$  mica) Anton type 213 G.M. tubes, and three cadmium sulfide crystals for measurements of the total energy flux of protons  $E_p \gtrsim 1 \text{ keV}$  and electrons  $E_e \gtrsim 200 \text{ eV}$ . A summary of the characteristics of these various detectors is given in Table I. A more complete description has been given previously by Freeman [1964].

Table I  
Geometric Factors And Particle Energy Thresholds  
For The University Of Iowa Detectors On  
Explorer 12

| Detector                       | Symbol    | Omnidirectional                                                         |                                         |                                     | Unidirectional                  |                                                                                                   |                                        |
|--------------------------------|-----------|-------------------------------------------------------------------------|-----------------------------------------|-------------------------------------|---------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------------|
|                                |           | Shielding                                                               | Penetrating Particles                   | Geometric Factor (cm <sup>2</sup> ) | Shielding                       | Penetrating Particles Detected                                                                    | Geometric Factor (cm <sup>2</sup> -sr) |
| 302 G.M. Tube                  | 302       | 265 mg(cm) <sup>-2</sup> Mg<br>400 mg(cm) <sup>-2</sup> Stainless Steel | Protons > 23 MeV<br>Electrons ≥ 1.6 MeV | 0.6*                                | -----                           | -----                                                                                             | -----                                  |
| Electron Magnetic Spectrometer | SPL       | 3.5 g(cm) <sup>-2</sup> Pb                                              | **Protons > 70 MeV                      | 0.2                                 | 1.2 mg(cm) <sup>-2</sup> mica   | Electrons 40 keV ≤ E <sub>e</sub> ≤ 50 keV                                                        | 10 <sup>-5</sup>                       |
|                                | SPH       | 1 g(cm) <sup>-2</sup> Mg                                                | Electrons ≥ 20 MeV                      | 0.2                                 | 1.2 mg(cm) <sup>-2</sup> mica   | Electrons 80 keV ≤ E <sub>e</sub> ≤ 100 keV                                                       | 10 <sup>-5</sup>                       |
|                                | SPB       | 860 mg(cm) <sup>-2</sup> Stainless Steel                                |                                         | 0.2                                 | -----                           | -----                                                                                             | -----                                  |
| CdS Total Energy Flux Detector | CDSSTE*** | ~ 1 g(cm) <sup>-2</sup> Mg                                              | Protons ≥ 25 MeV<br>Electrons ≥ 3 MeV   | (0.66 sr)                           | -----                           | Electrons 200 eV ≤ E <sub>e</sub> ≤ 500 keV<br>Protons 1 keV ≤ E <sub>p</sub> ≤ 10 MeV<br>(LIGHT) | 3 × 10 <sup>-4</sup>                   |
|                                | CDSB***   | ~ 2.6 g(cm) <sup>-2</sup> Pb                                            | Protons ≥ 50 MeV<br>Electrons ≥ 6 MeV   | (12 sr)                             | (MAGNET)                        | Protons 1 keV ≤ E <sub>p</sub> ≤ 10 MeV<br>Electrons E <sub>e</sub> ≥ 250 keV<br>(LIGHT)          | 3 × 10 <sup>-4</sup>                   |
| CdS Light Monitor              | CDSO***   |                                                                         |                                         |                                     | 550 mg(cm) <sup>-2</sup> Quartz | (LIGHT)                                                                                           | 3 × 10 <sup>-4</sup>                   |

\* For detailed description, see Frank, Van Allen and Hills [1964]

\*\* Ackerson [private communication, 1966]

\*\*\* Freeman [1964]

The response of each detector was accumulated for 10.24 seconds by the on-board experiment encoder and the contents of the accumulators redundantly telemetered at the end of each sampling interval. The encoder accumulators were time-shared such that each detector response was sampled once every 79 seconds.

All unidirectional detectors were mounted on the spacecraft such that the axes of their fields-of-view were perpendicular to the spacecraft spin axis. Since the spin period of Explorer 12 was  $\sim 2$  seconds and the accumulation interval was 10.24 seconds, the telemetered response of the detectors is essentially a spin-average over several spacecraft rotations with the responses of all unidirectional detectors averaged over a common circle of directions on the celestial sphere. The spin axis of Explorer 12 was directed toward right ascension  $47^\circ$  and declination  $-27.5^\circ$  at launch. In the outer radiation zone the detectors were averaging predominantly over trapped particle pitch angles (the half-angle of the dumping cone at  $L = 5$  is  $\sim 5^\circ$ ).

All of the University of Iowa detectors operated satisfactorily over the period of data transmission with the exception of the background detector, SPB, of the

electron magnetic spectrometer. Failure of this G.M. tube occurred on 20 September 1961 during orbit 33 (compare with orbit 32 as shown in summary graphs); this detector provided usable data during the first 32 Explorer 12 orbits.

Notes on the Interpretation of the Graphs

The responses of each of the seven University of Iowa detectors are shown in chronological order in the following Figures. The data for each orbit of the satellite have been included on a single graph labelled with the corresponding orbit number and the Universal Times for the beginning and end times of data for each orbit (orbits begin and end at perigee). The responses of the detectors are in units of counts  $(\text{sec})^{-1}$  and are plotted as a function of U.T. during a given orbit. Each of these graphs is accompanied by a graph of several useful trajectory coordinates: SELAT and SELONG, solar ecliptic latitude and longitude; SMLAT and SMLONG, solar magnetospheric latitude and longitude; R, geocentric radial distance; M, geomagnetic latitude; and L, [McIlwain, 1961]. Reference to the plots of detector responses for orbit 2, as an example, shows that the count-rate profiles are characterized by occasional 'spikes' of two types; (1) the high count-rate 'spikes' of  $\sim 10^4$  counts  $(\text{sec})^{-1}$  in SPL, SPH, and SPB at  $\sim 1200$  U.T. 17 August and (2) 'inverted spikes' extending to 1 count  $(\text{sec})^{-1}$  at  $\sim 1500$  U.T. and  $\sim 2030$  U.T. in the CDSO

response. These 'spikes' are not to be accepted as trustworthy data and are attributable to improper records in the decommutated experimenter data tape and nonredundant read-outs of the corresponding detector, respectively. Periods during which telemetry is not available are indicated in the graph containing the trajectory information by the omission of these coordinates. For example, at ~ 1440 U.T. 17 August (orbit 2) a small segment of Explorer 12 transmissions either was not received or could not be processed.

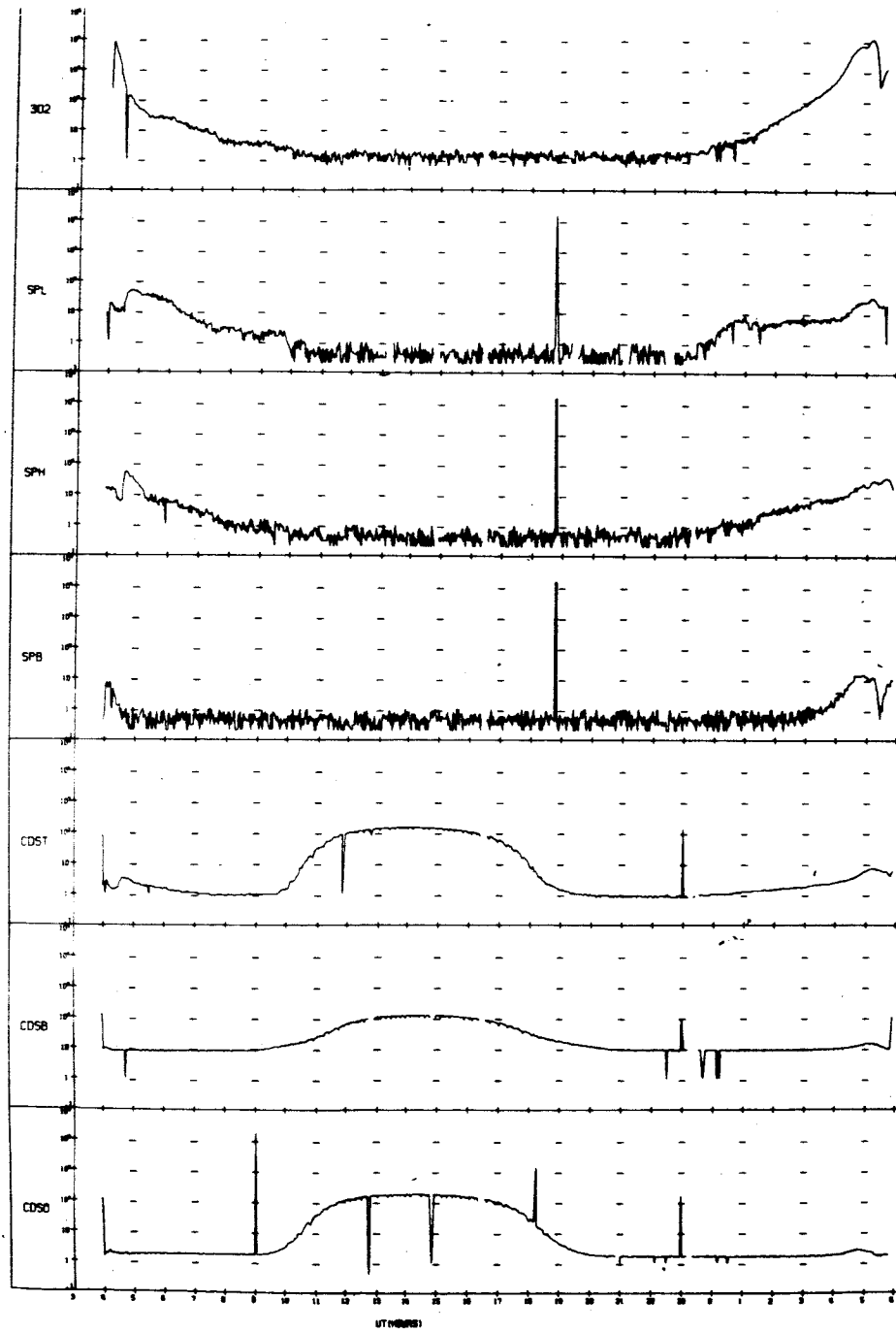
Interpretation of the responses of the various detectors has been previously discussed by O'Brien, Van Allen, Laughlin and Frank [1962], Freeman, Van Allen and Cahill [1963], Freeman [1964], Ackerson and Frank [1966], and Frank [1966].

References

- Ackerson, K. L., and L. A. Frank, Explorer 12 observations of energetic protons in the inner radiation zone, University of Iowa Research Report, 66-13, May 1966
- Frank, L. A., Explorer 12 observations of the temporal variations of low-energy electron intensities in the outer radiation zone during geomagnetic storms, University of Iowa Research Report, 66-8, March 1966.
- Freeman, J. W., The morphology of the electron distribution in the outer radiation zone and near the magnetospheric boundary as observed by Explorer XII, J. Geophys. Res., 69, 1691-1723, 1964.
- Freeman, J. W., J. A. Van Allen, and L. J. Cahill, Explorer 12 observations of the magnetospheric boundary and the associated solar plasma on September 13, 1961, J. Geophys. Res., 68, 2121-2130, 1963.
- McIlwain, C. E., Coordinates for mapping the distribution of magnetically trapped particles, J. Geophys. Res., 66, 3681-3691, 1961.
- O'Brien, B. J., J. A. Van Allen, C. D. Laughlin, and L. A. Frank, Absolute electron intensities in the heart of the earth's outer radiation zone, J. Geophys. Res., 67, 397-403, 1962.

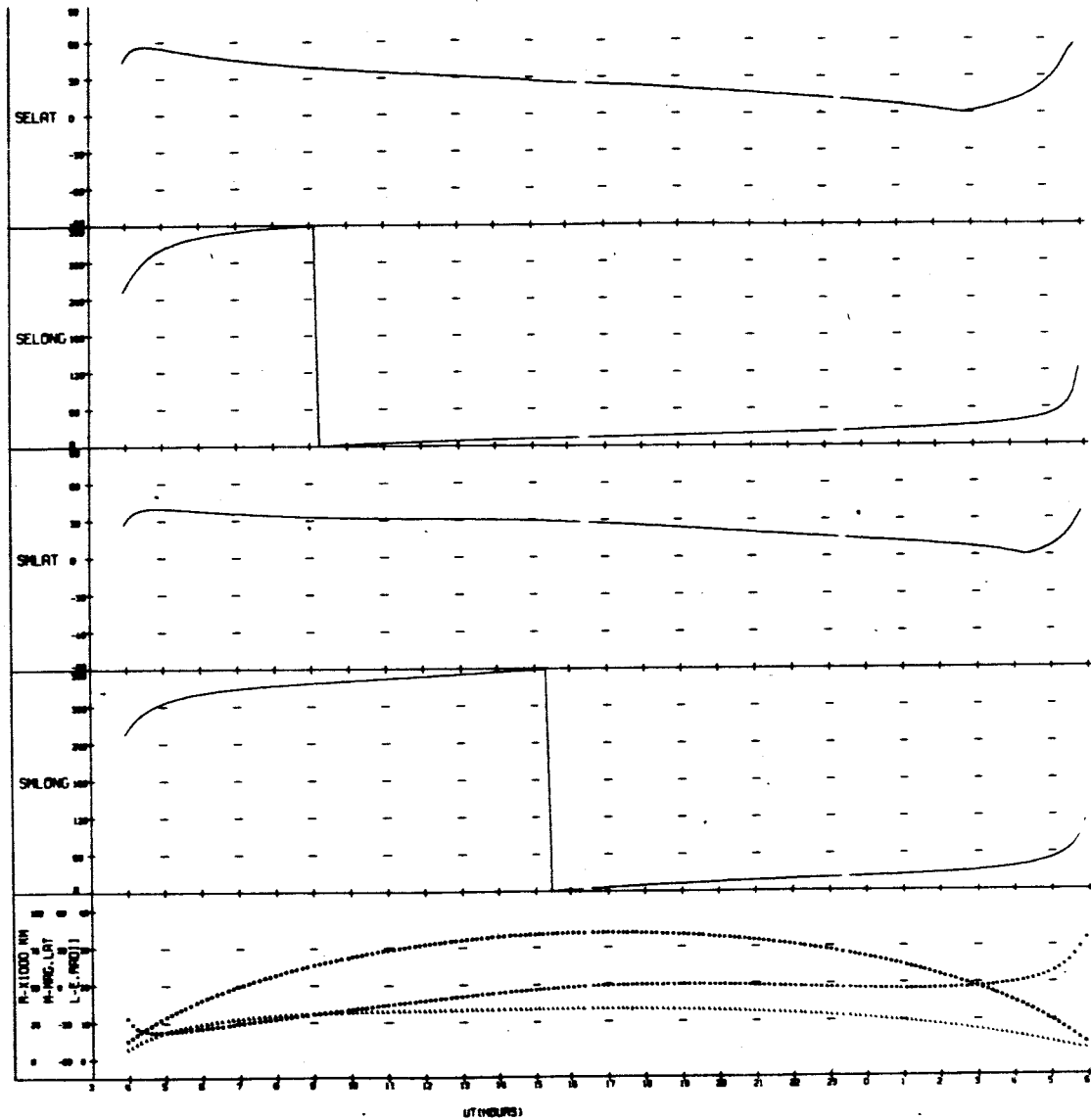
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# UNIVERSITY OF IOWA

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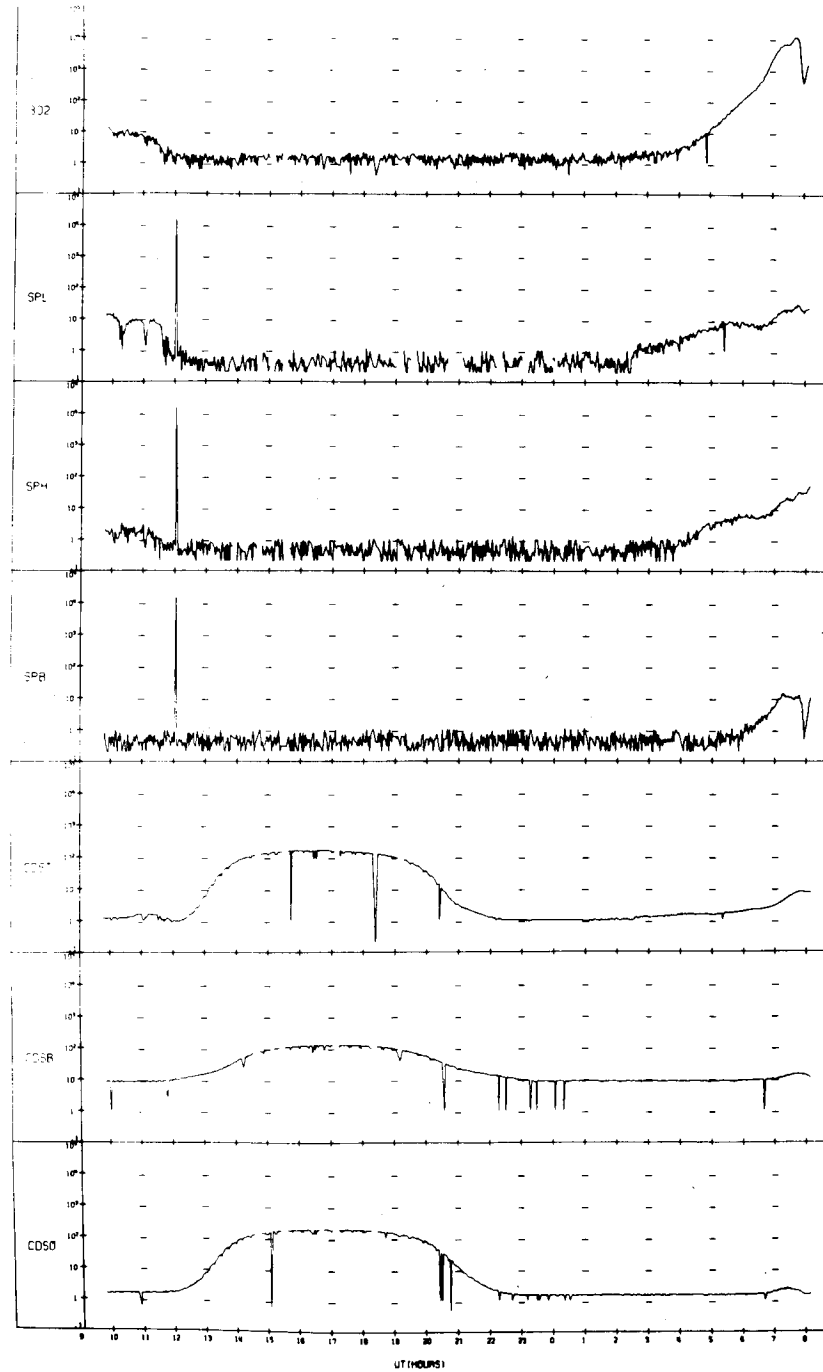


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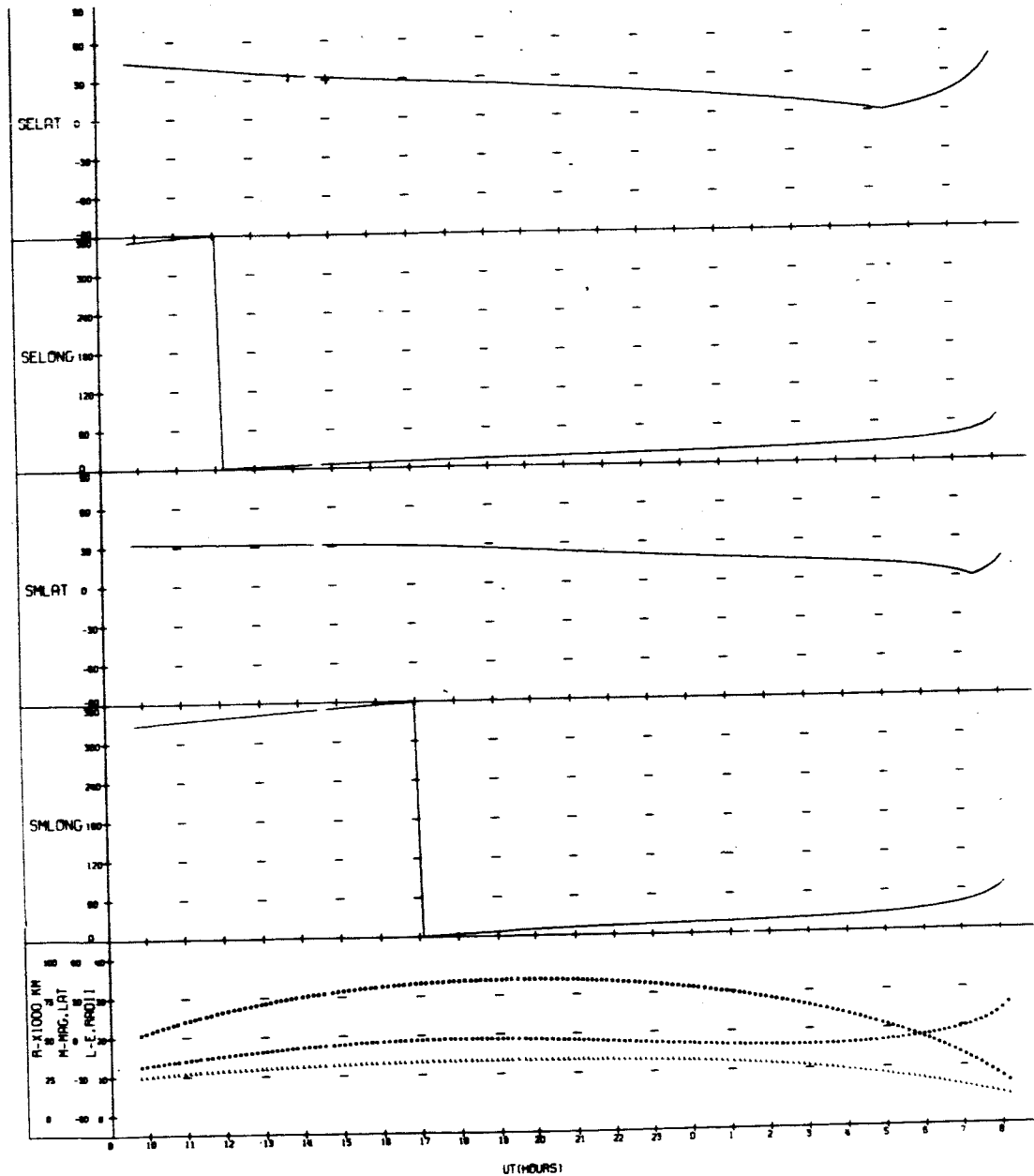


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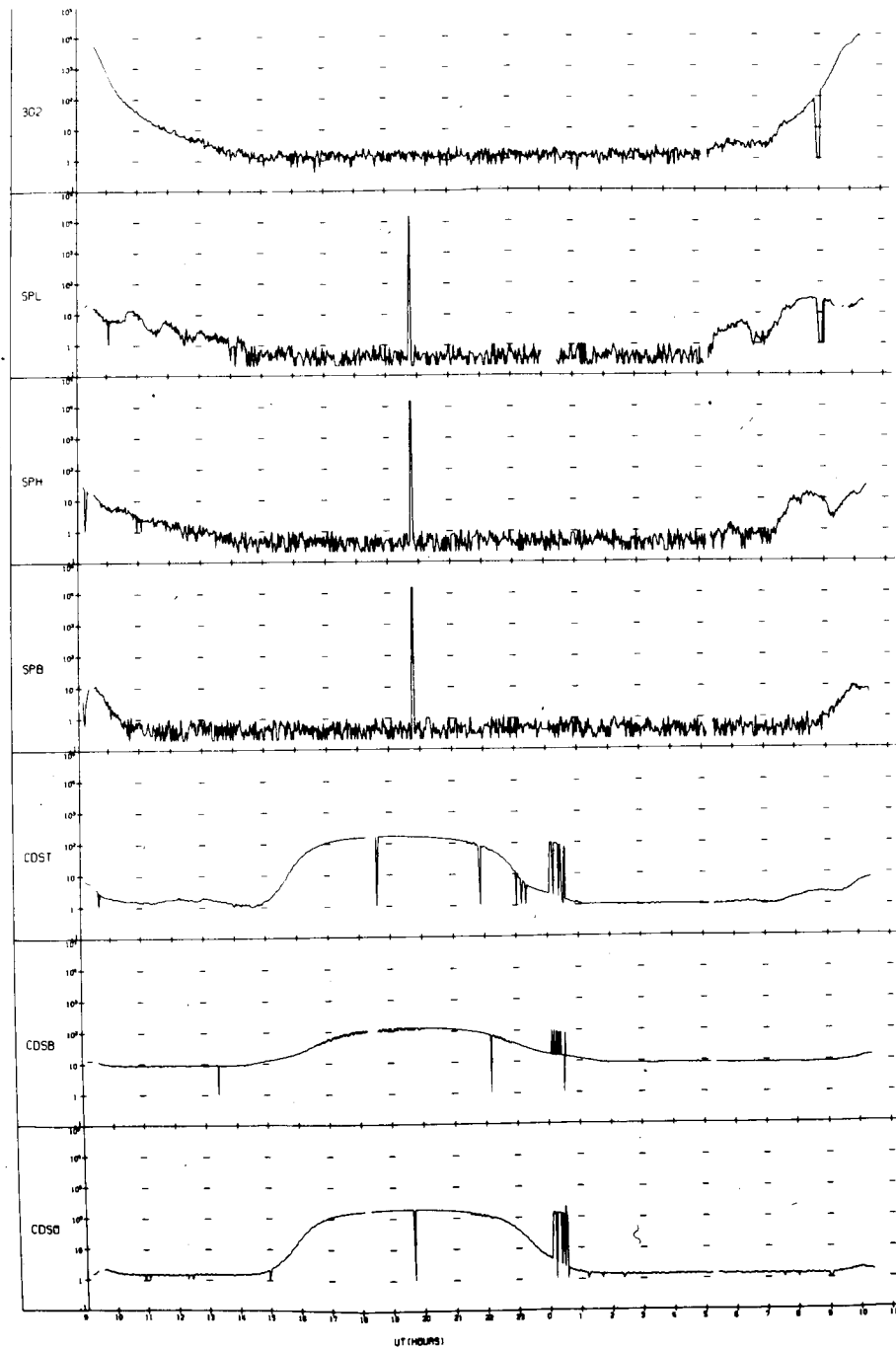
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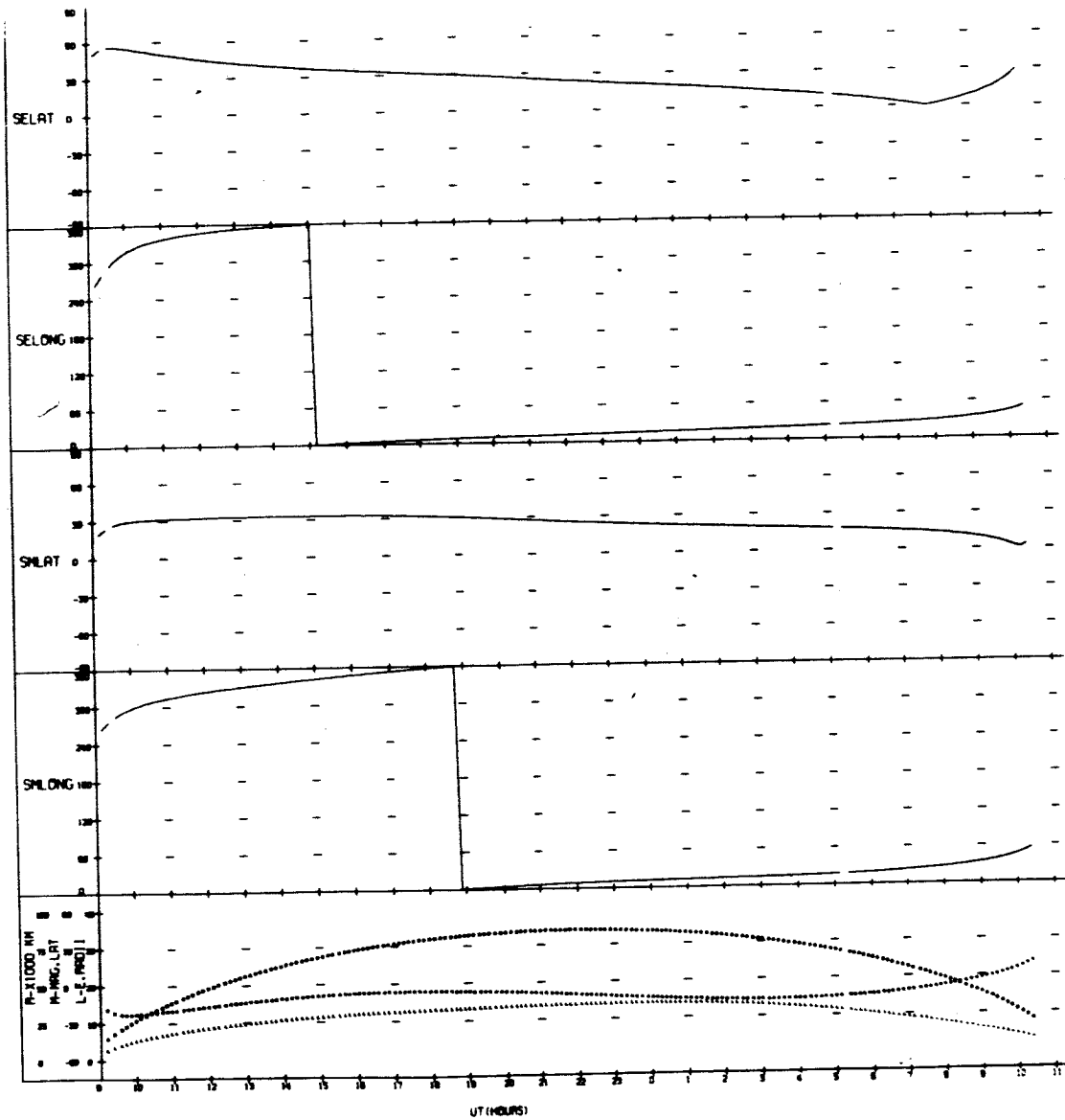


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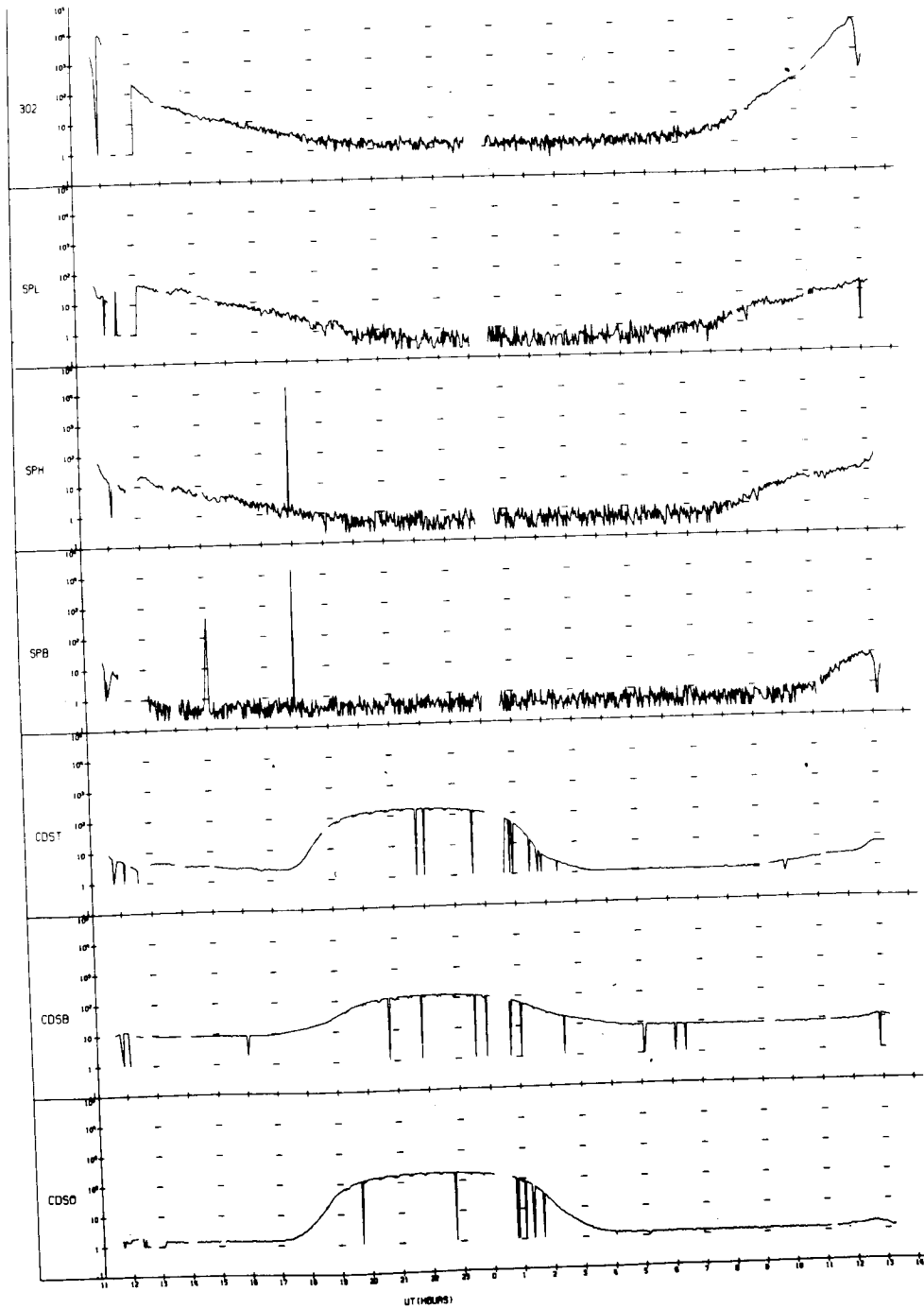


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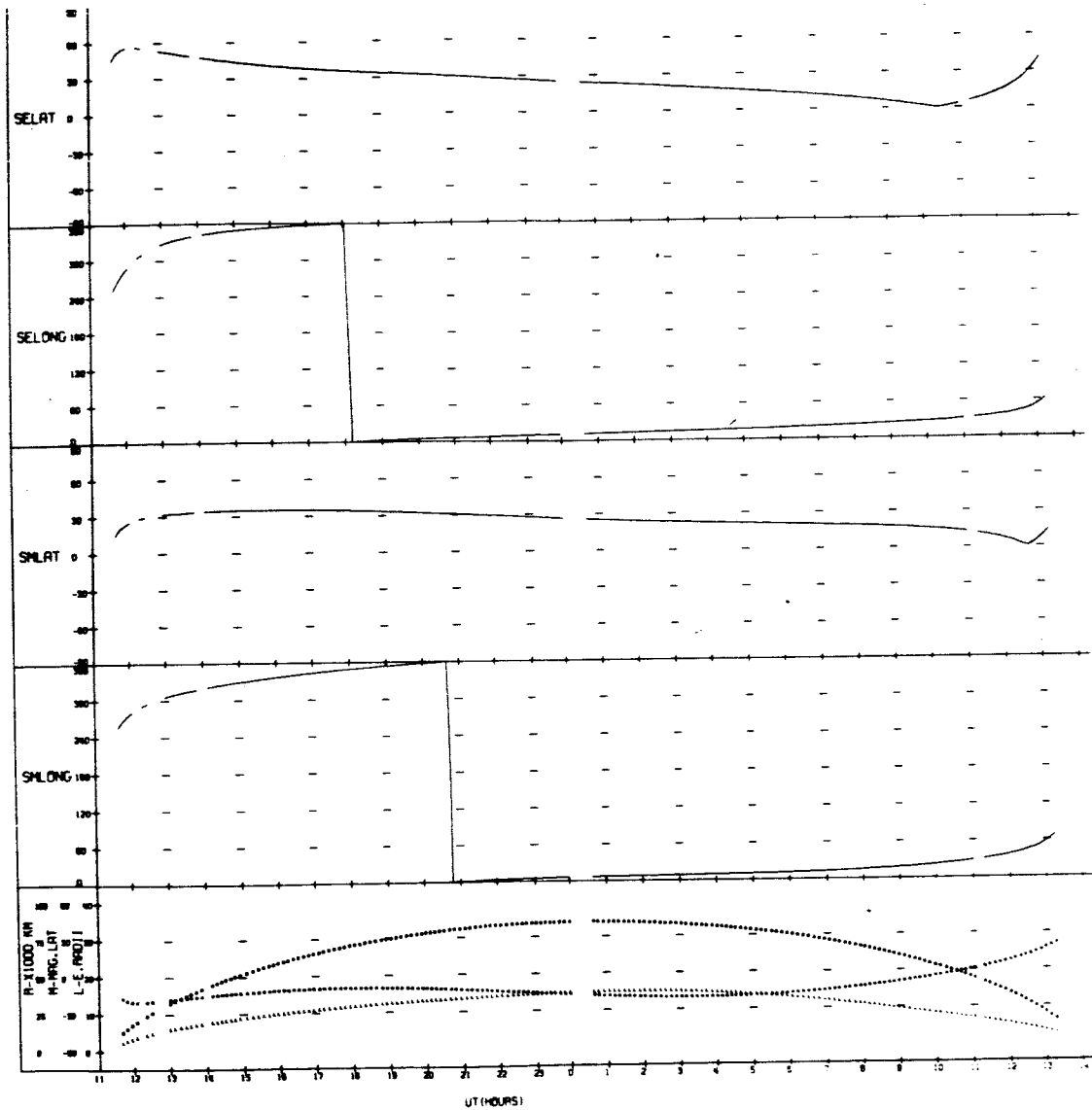


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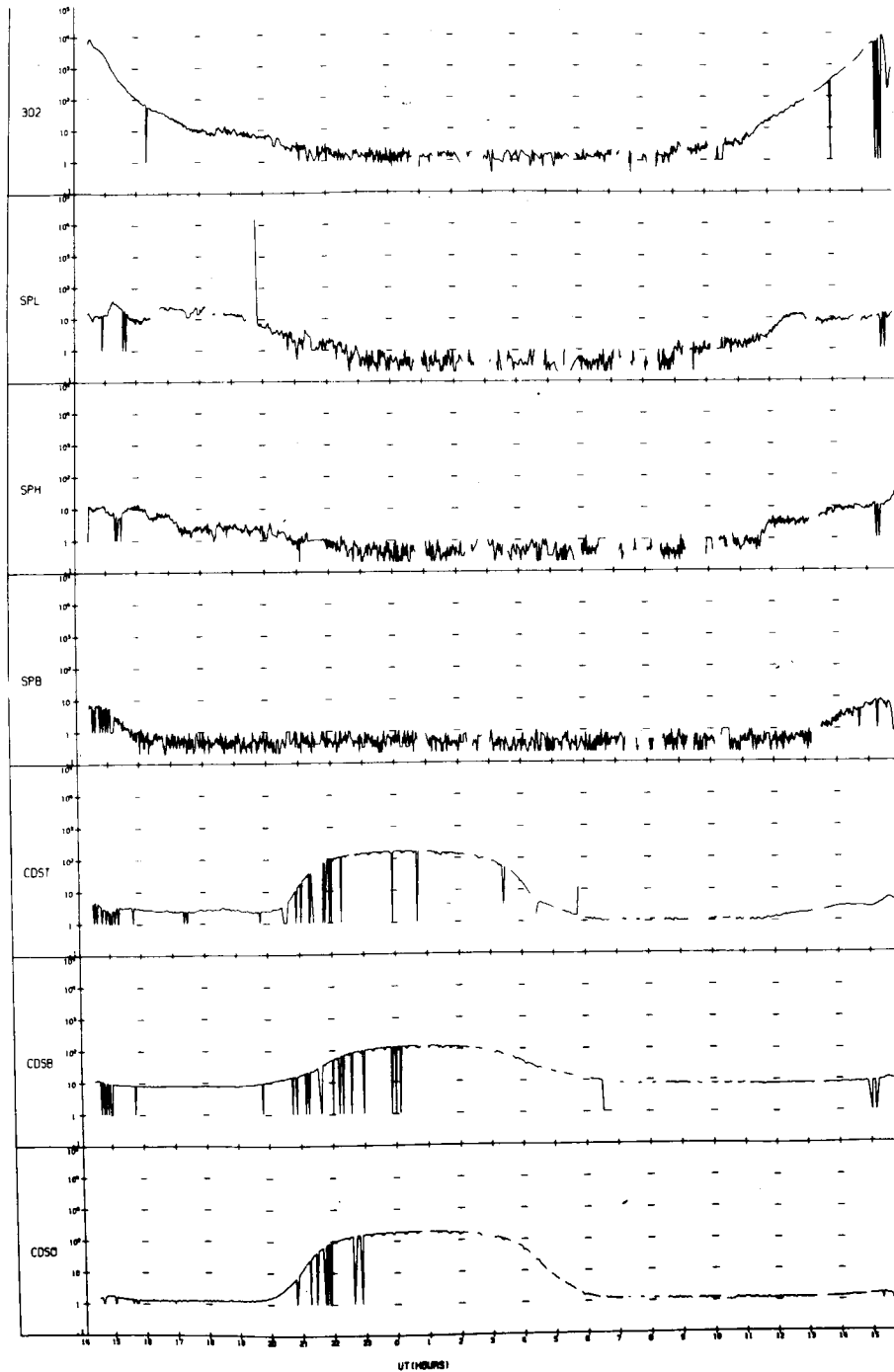


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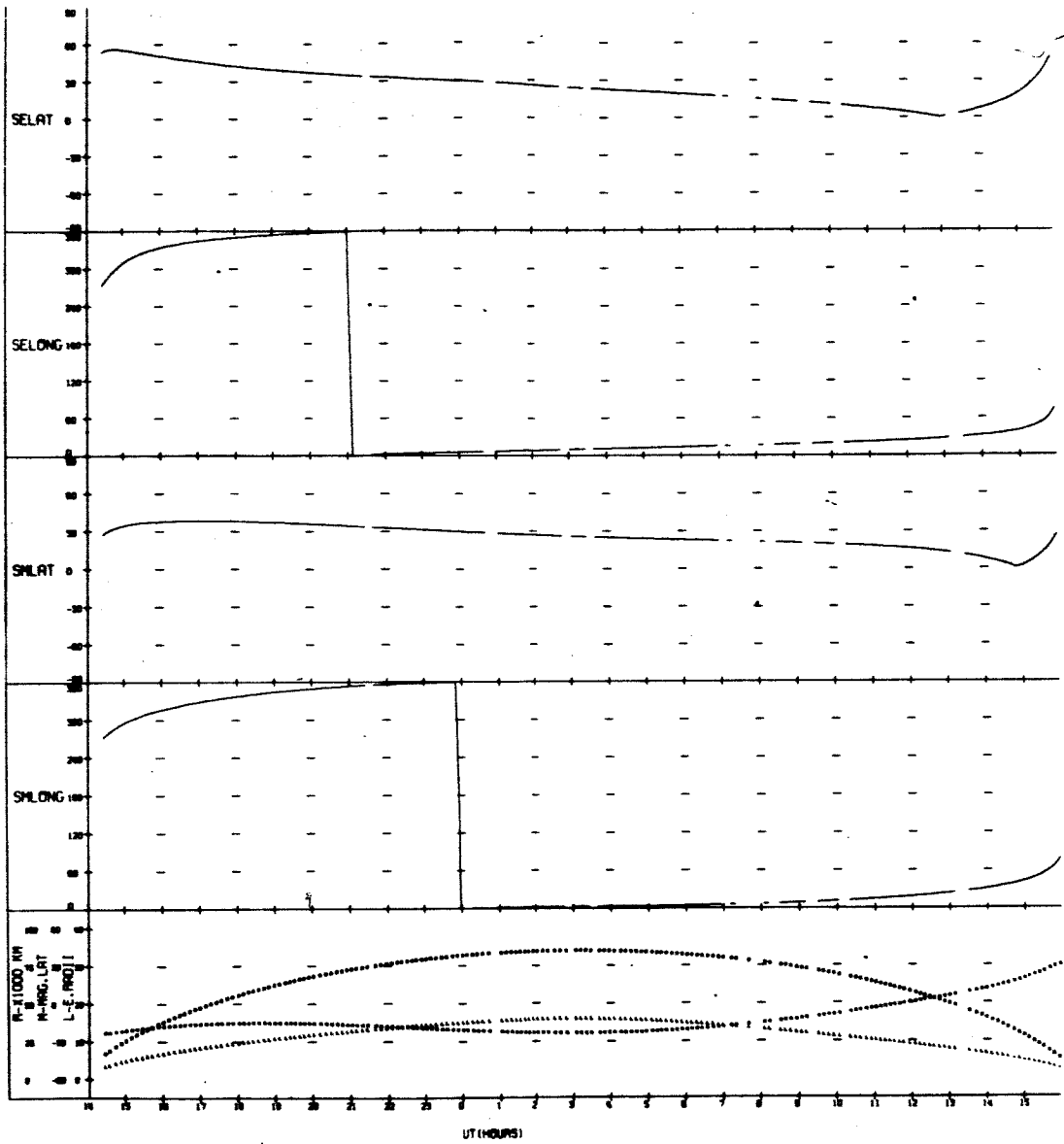


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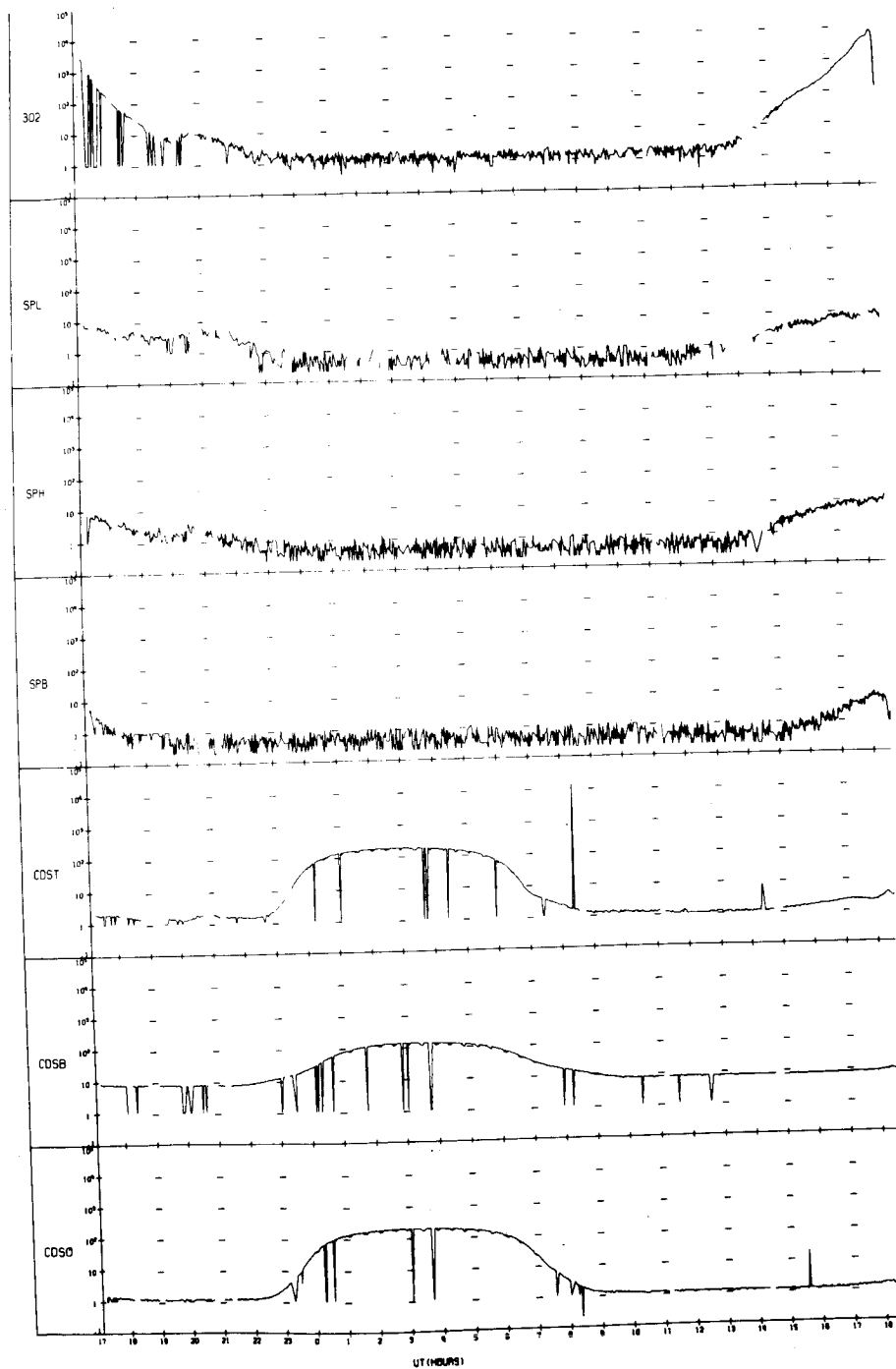
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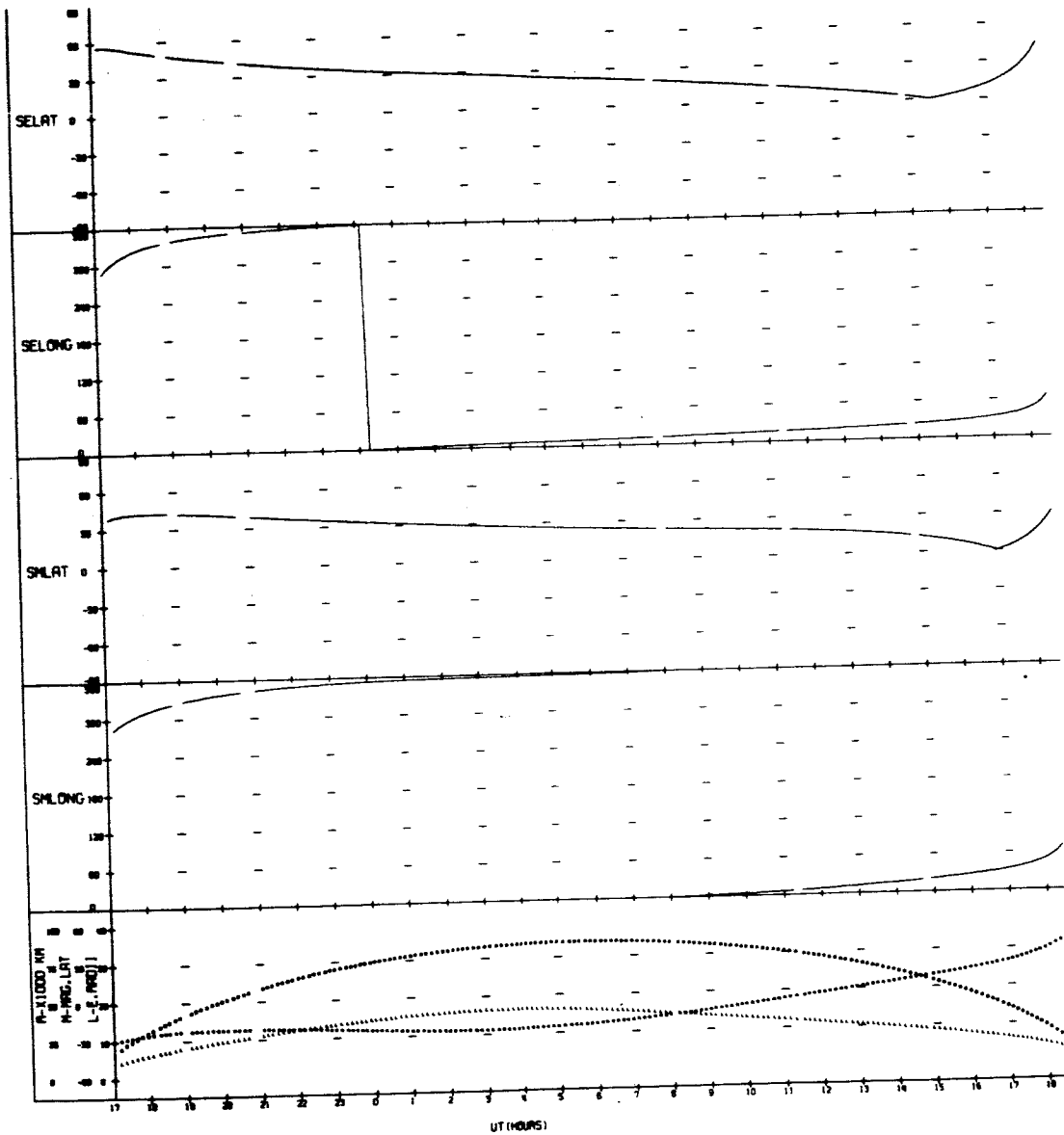


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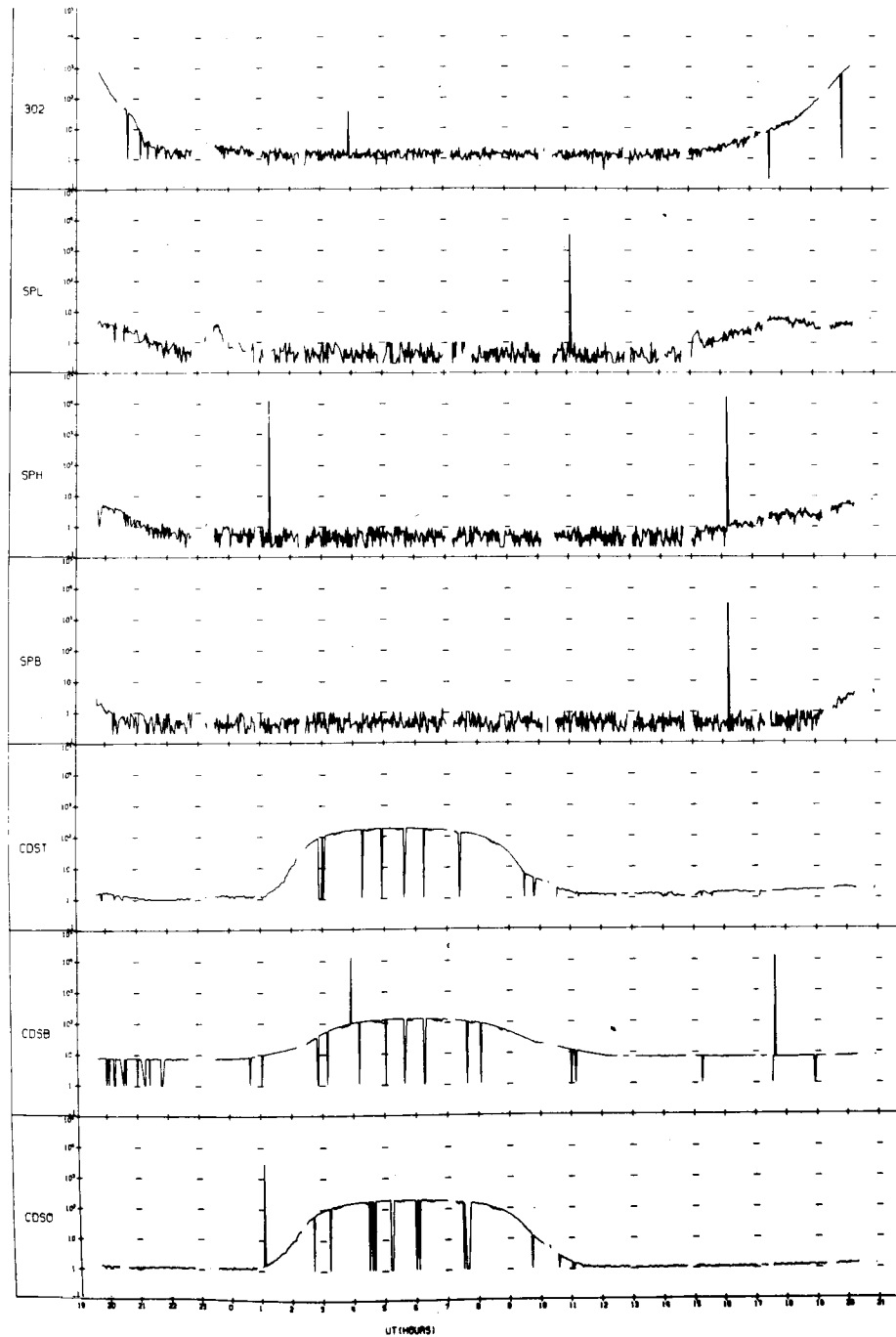
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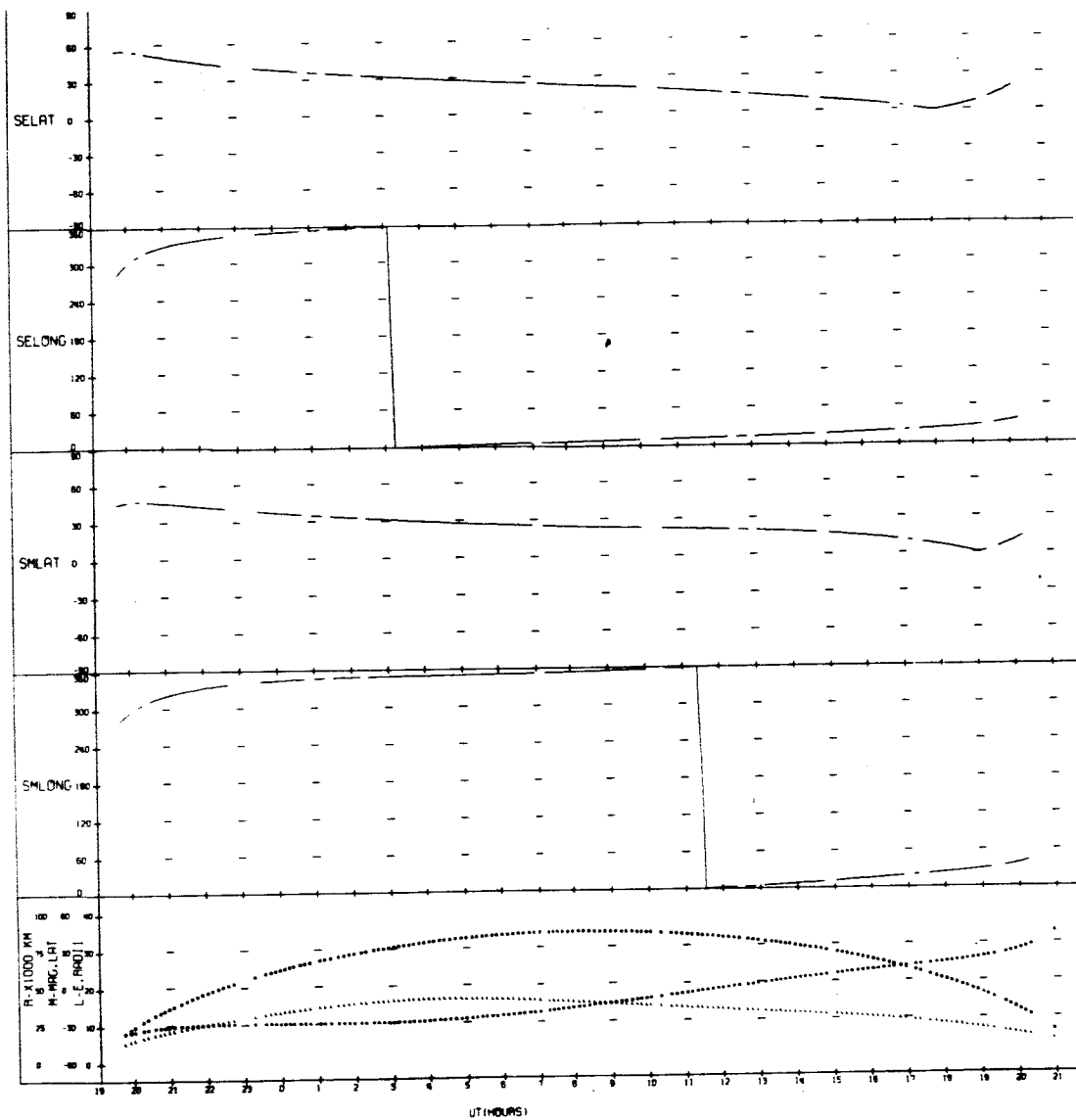


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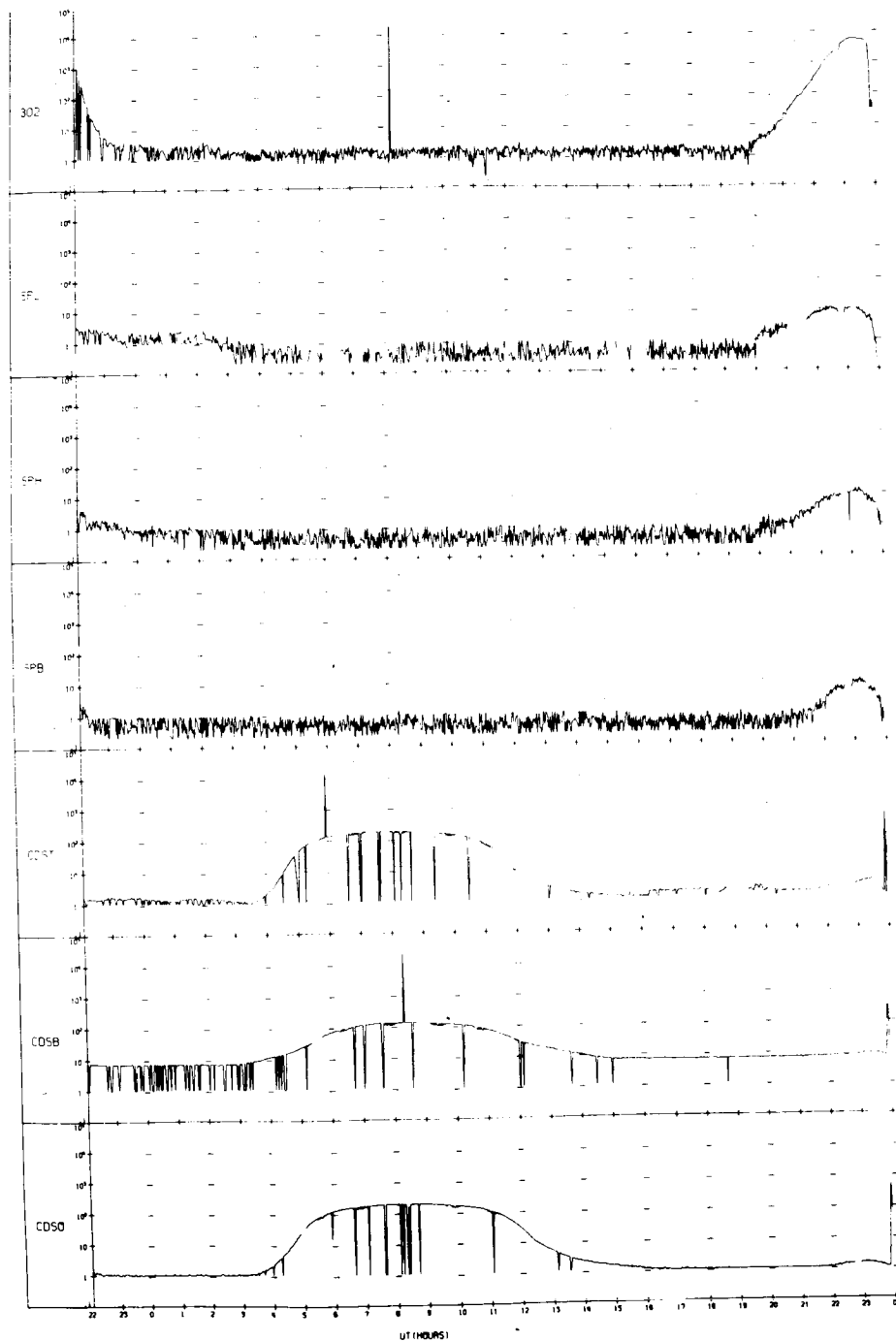
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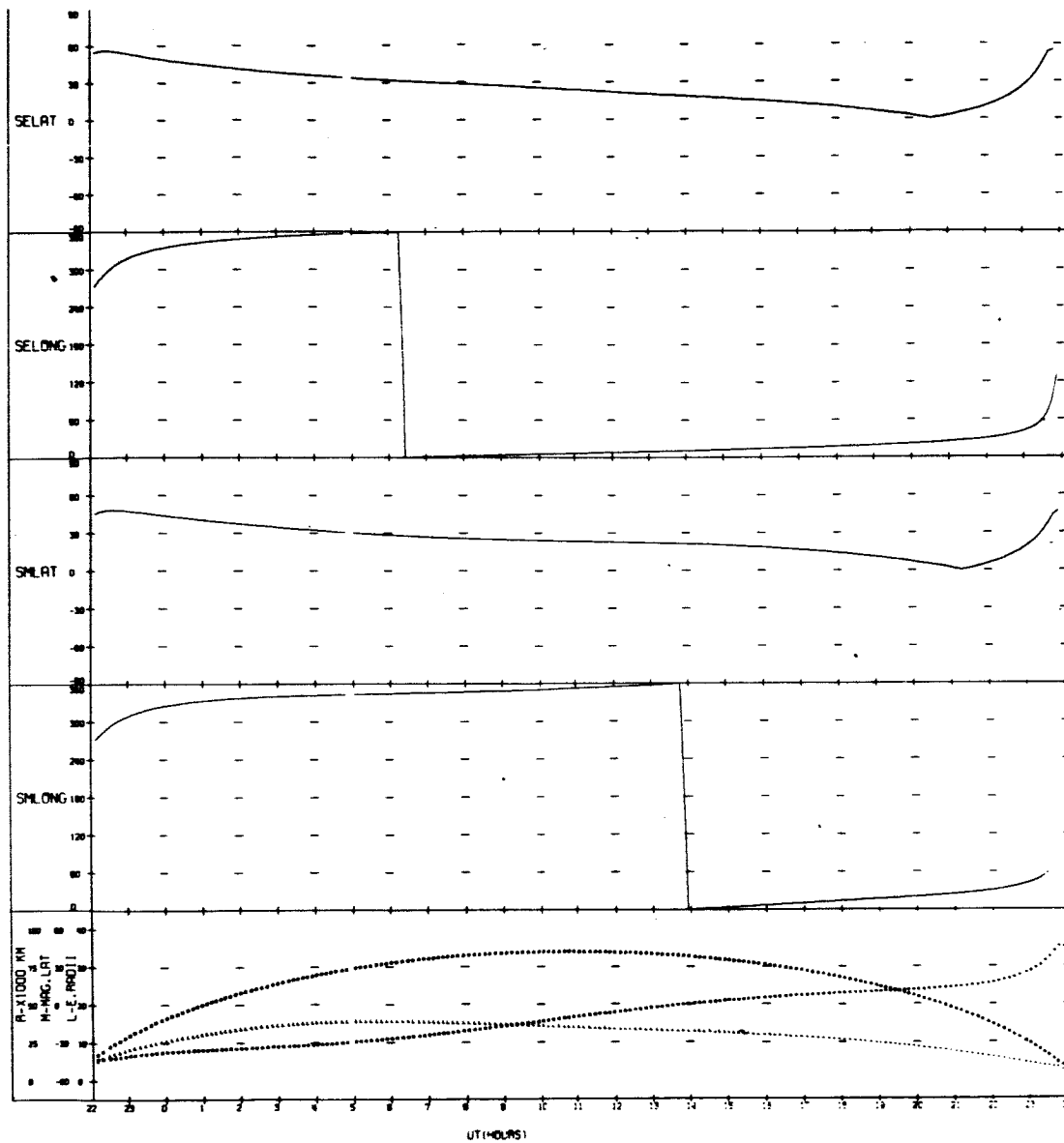


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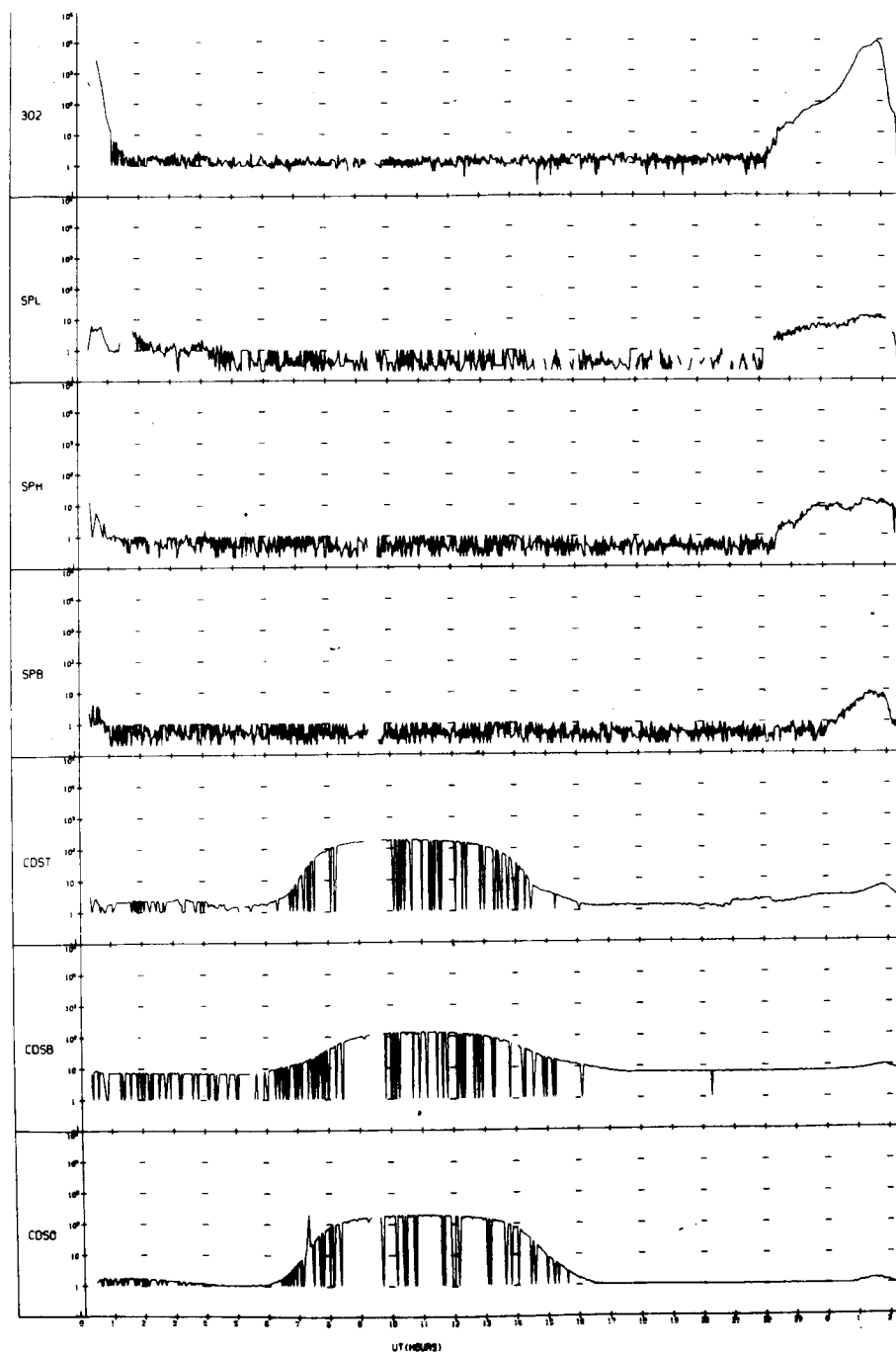
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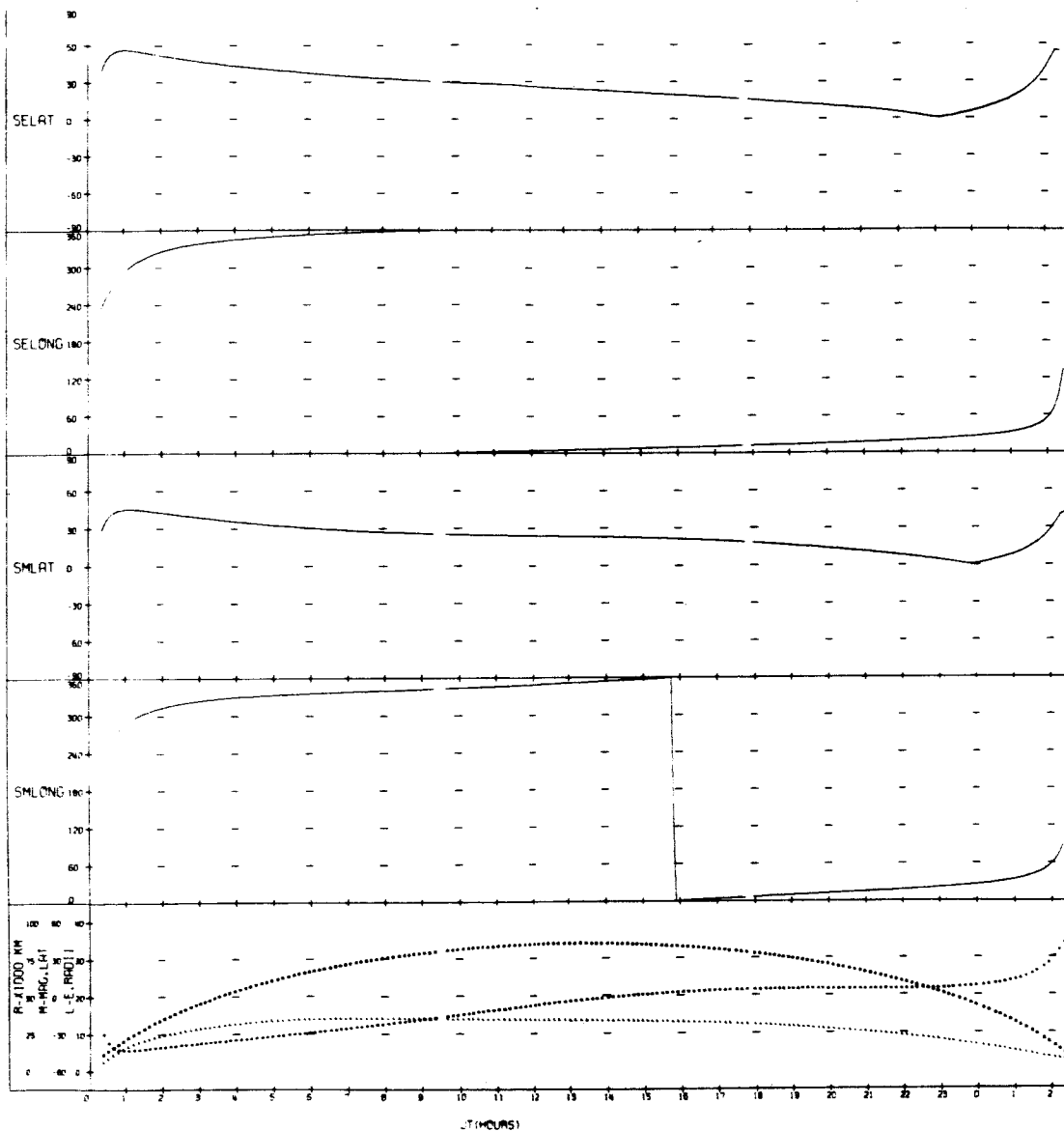
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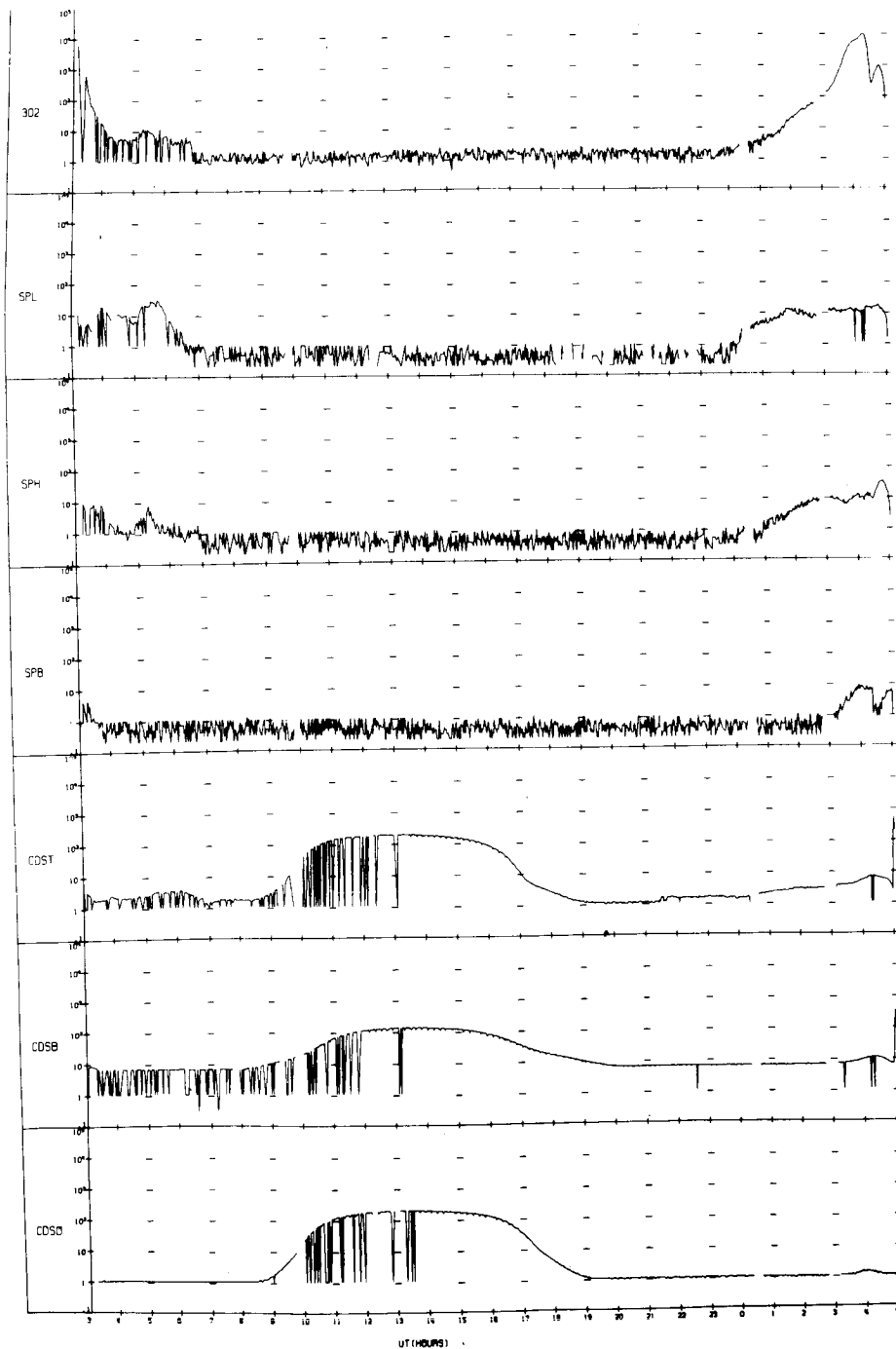
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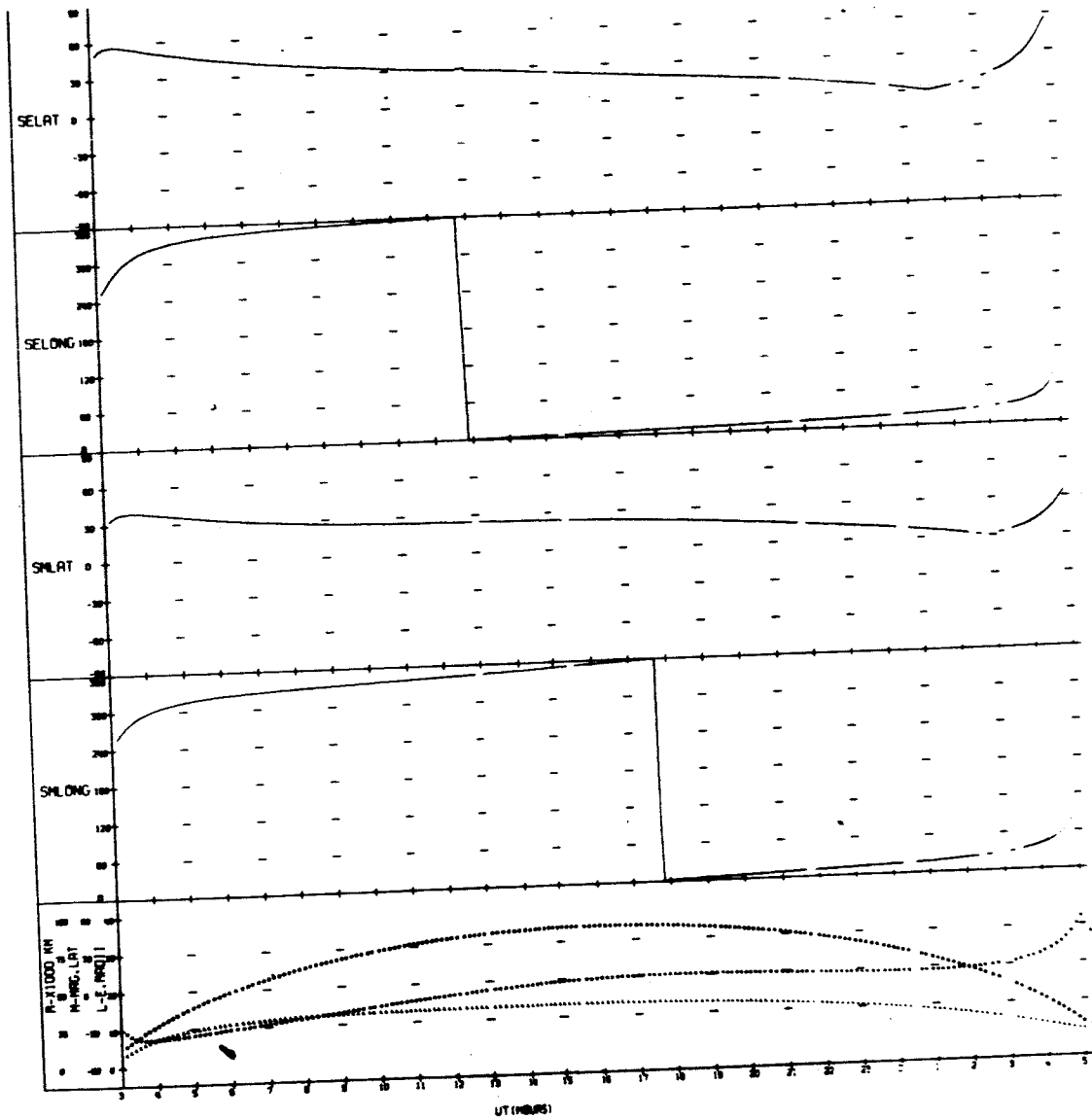
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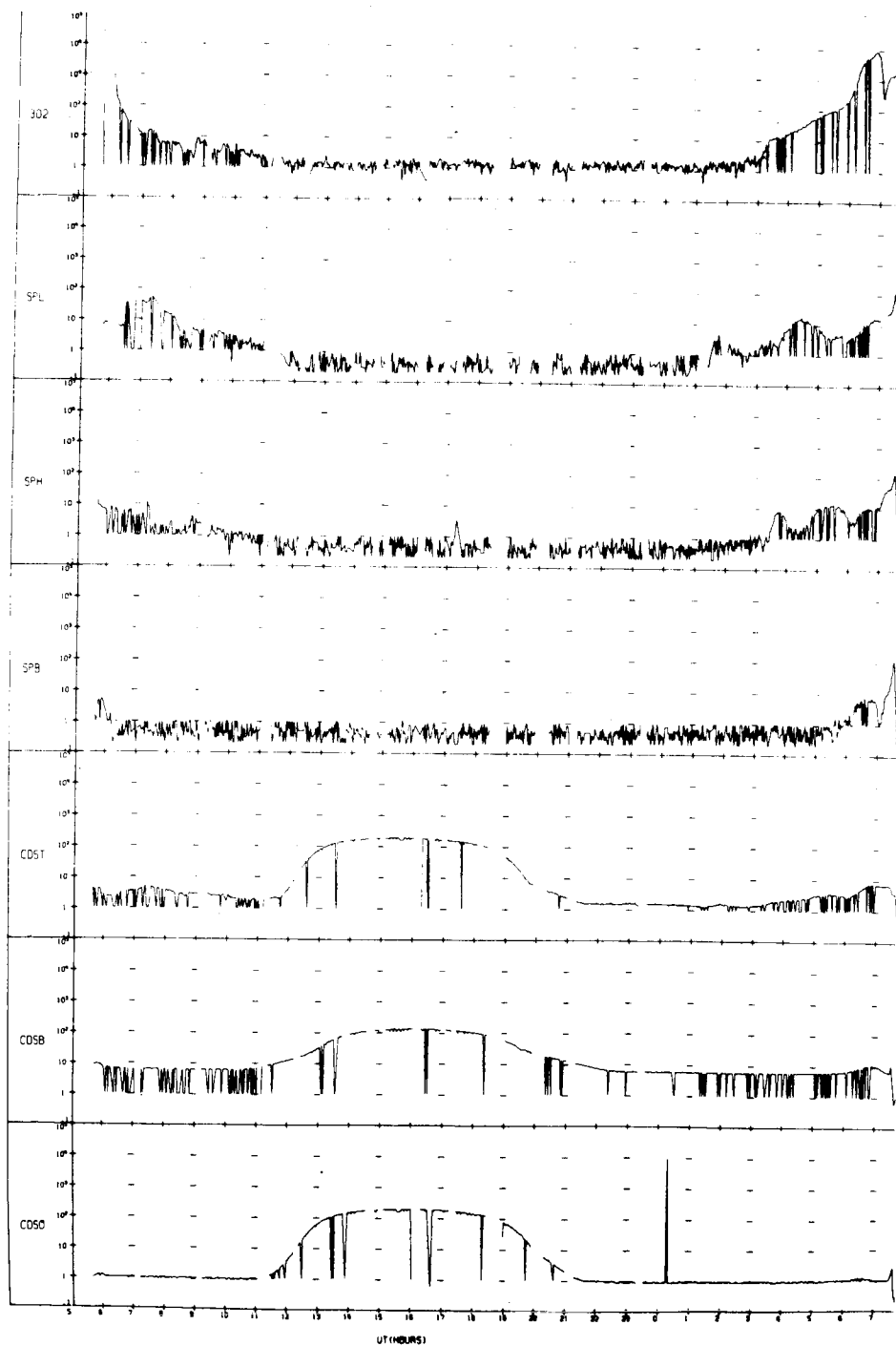


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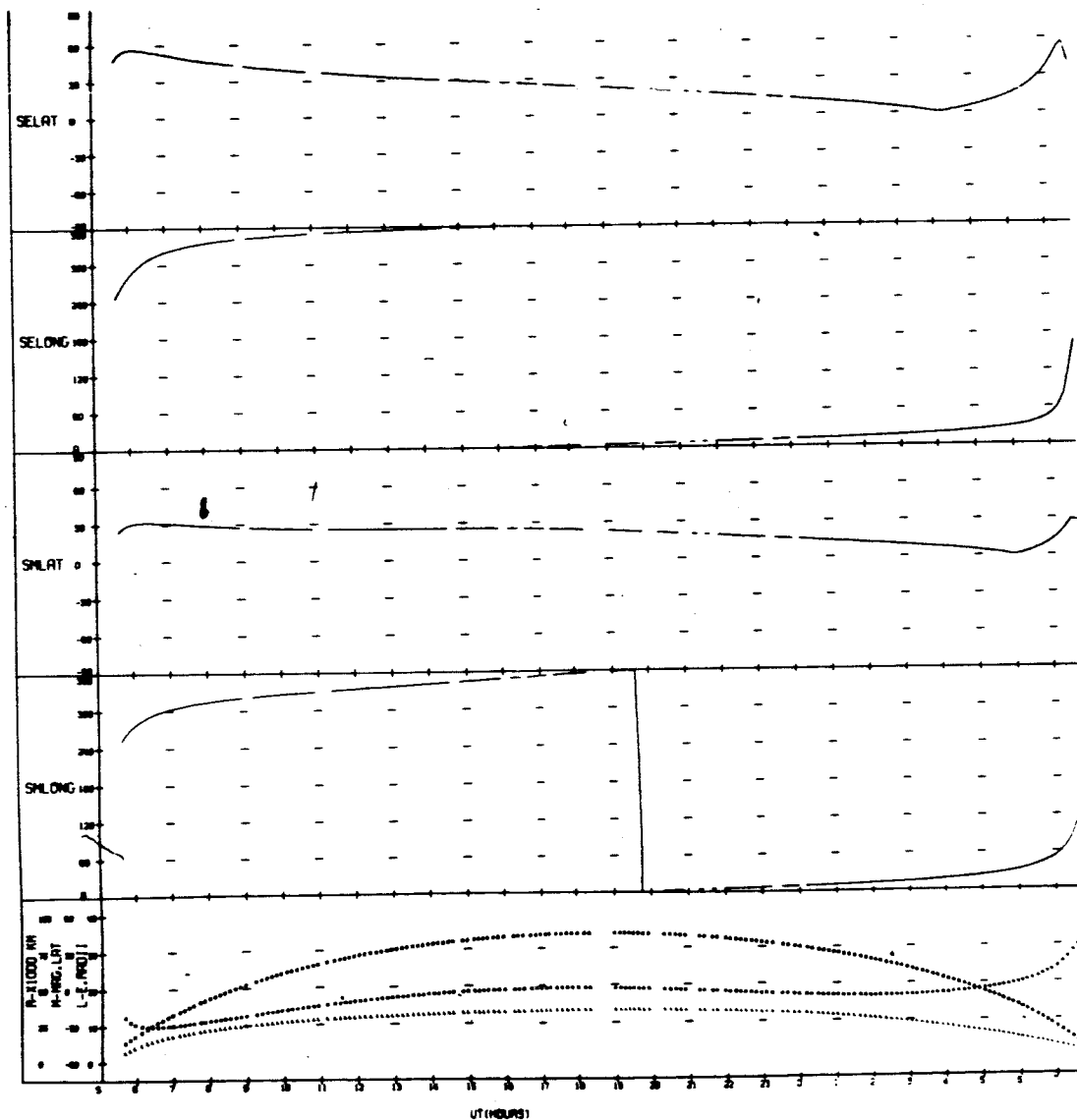
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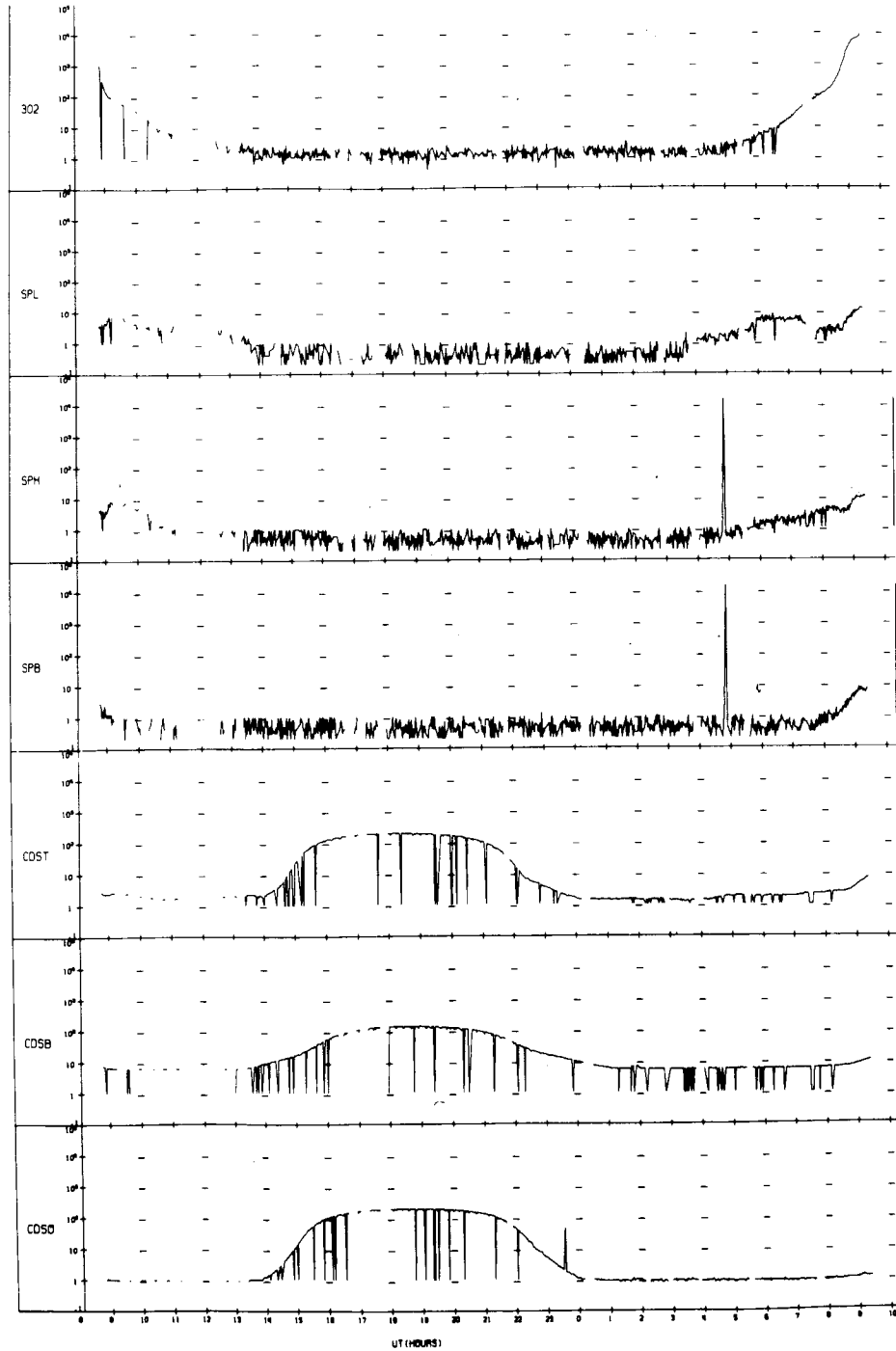


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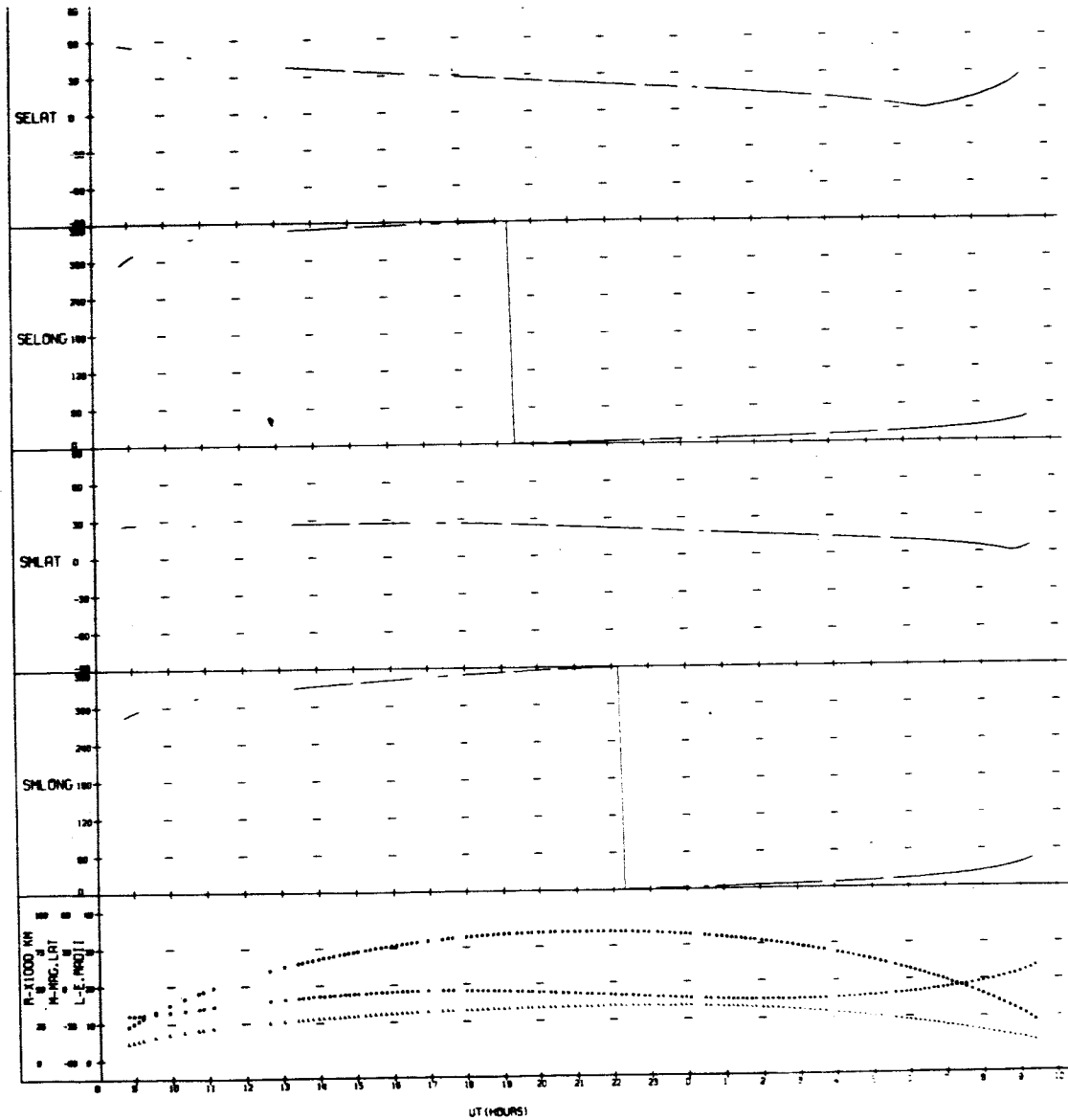


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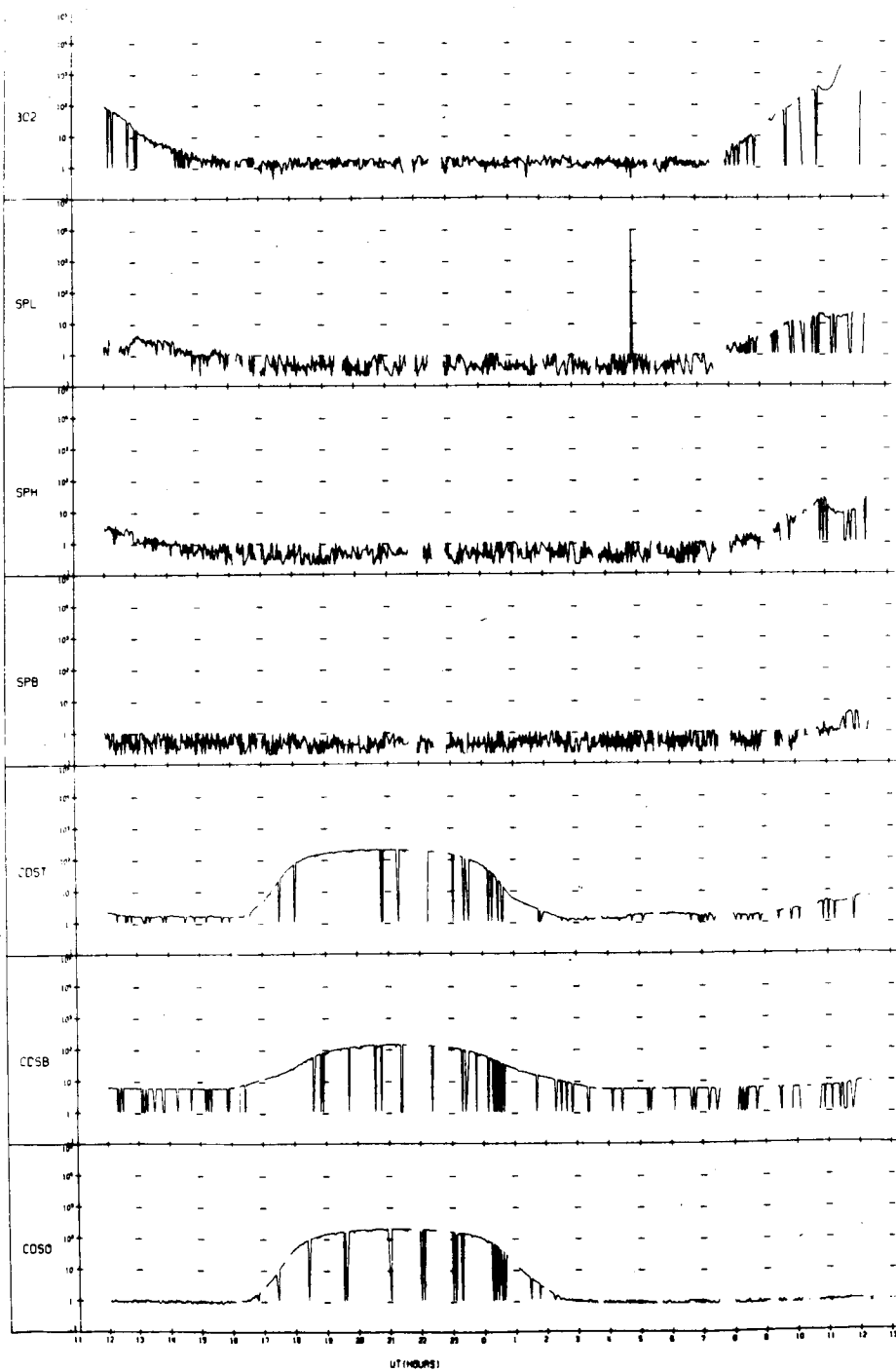


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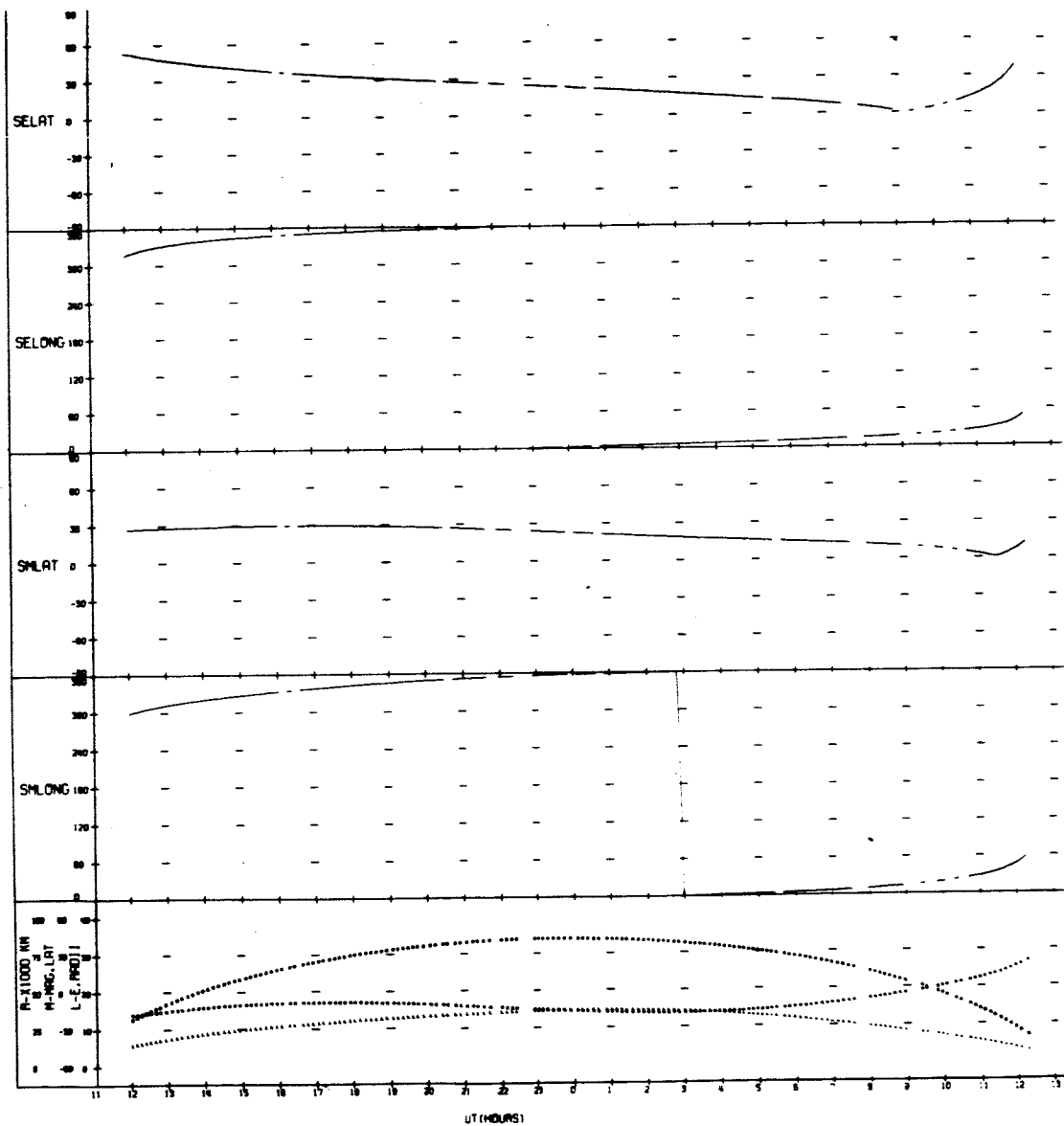
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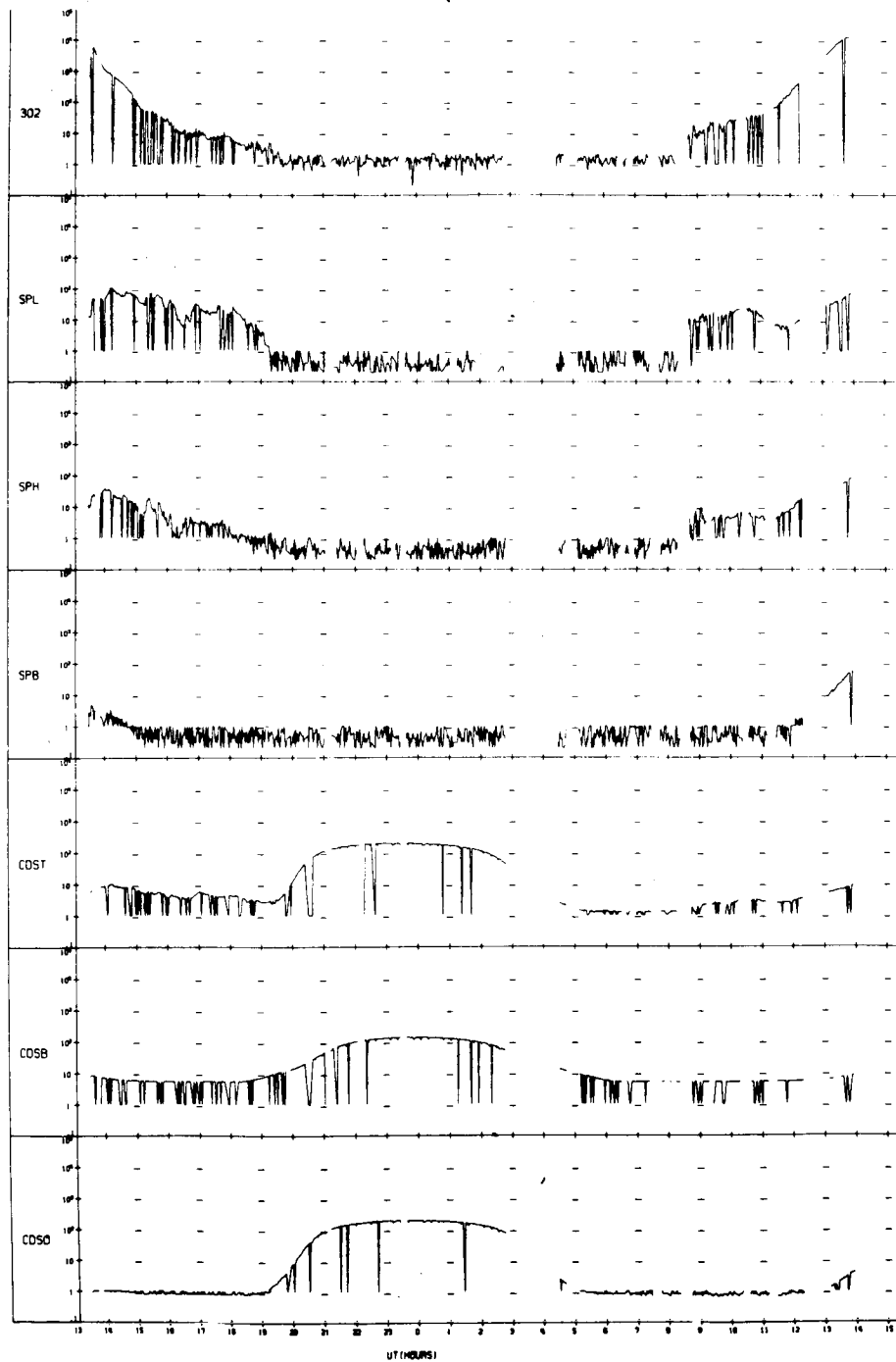
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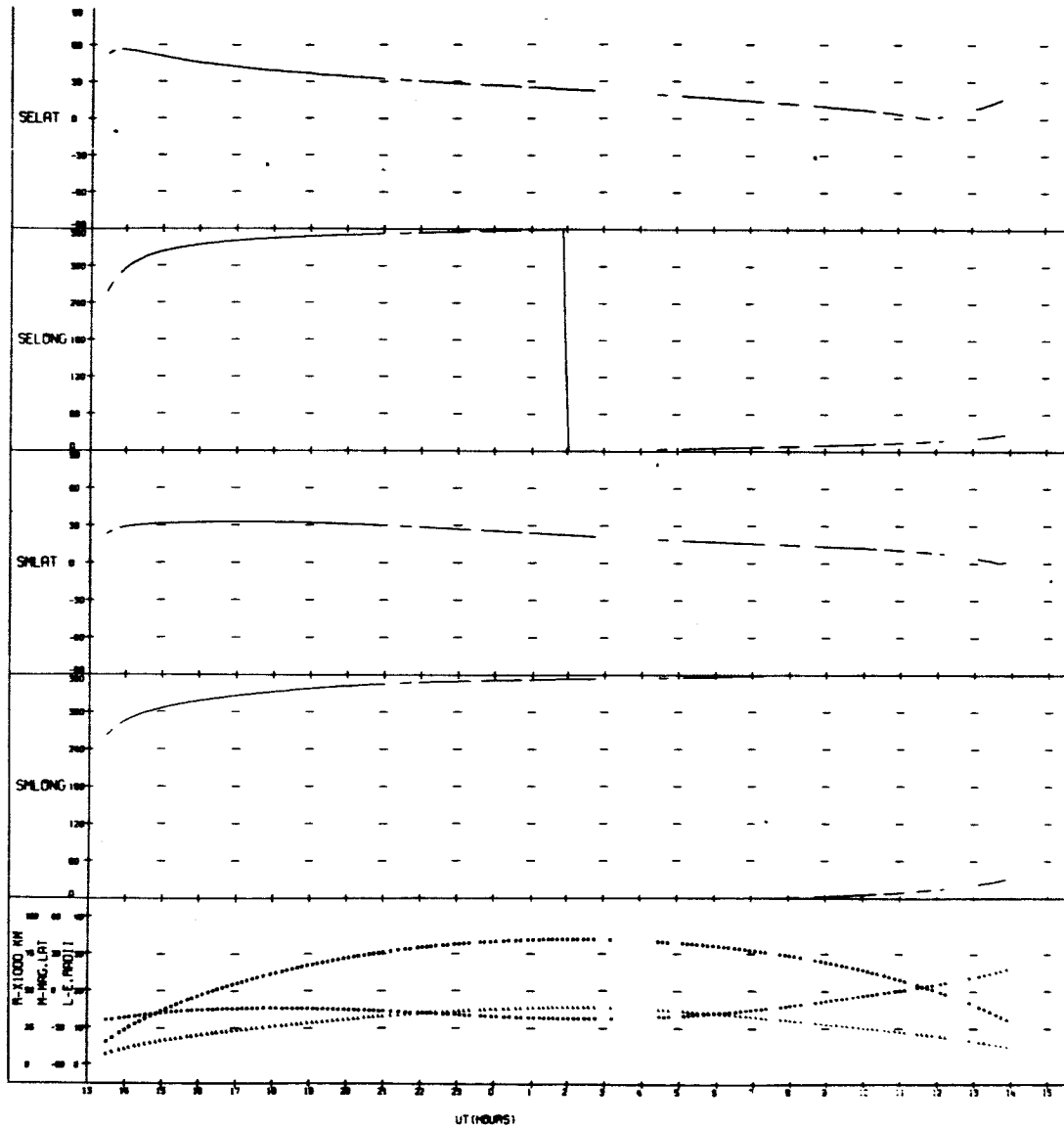


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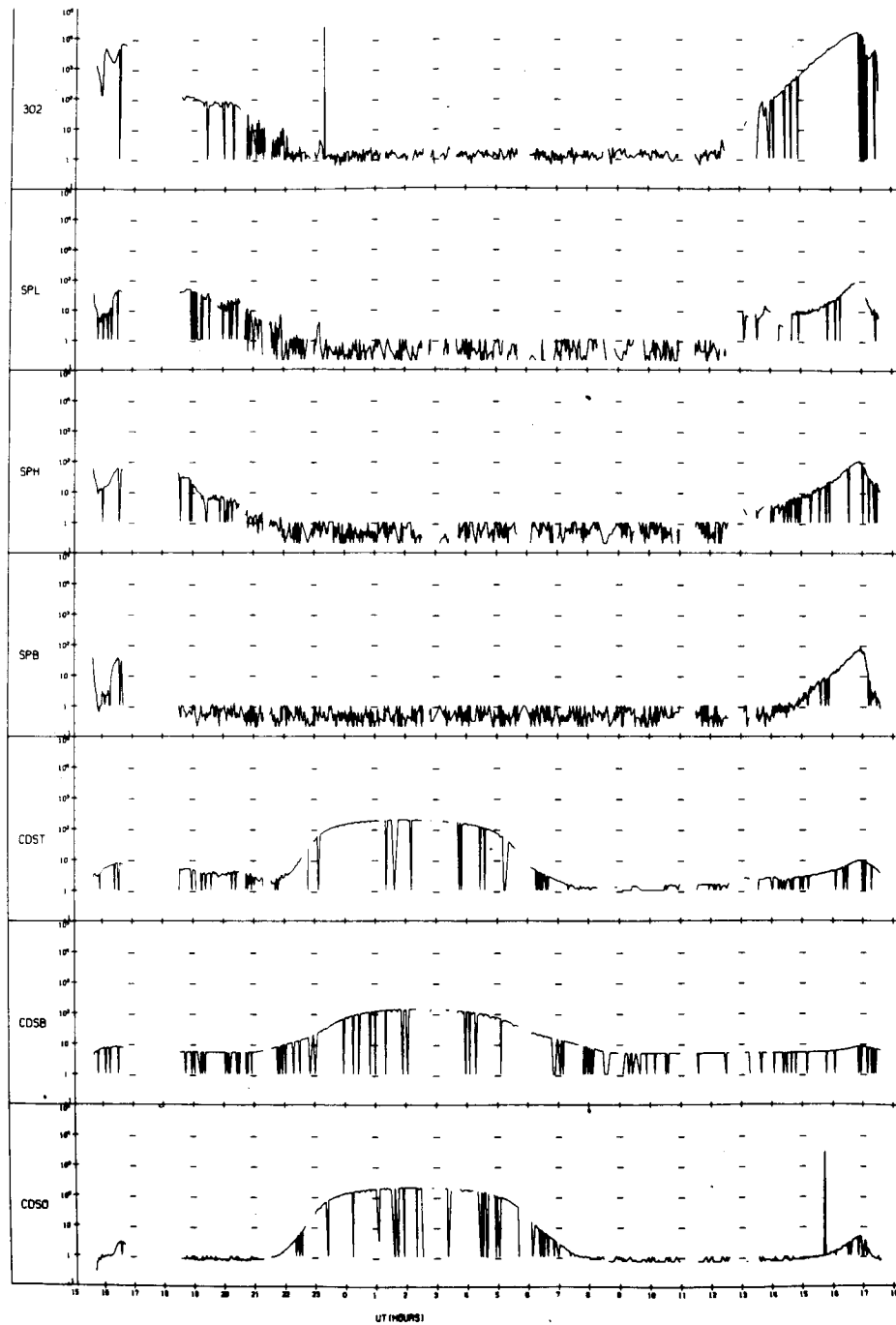


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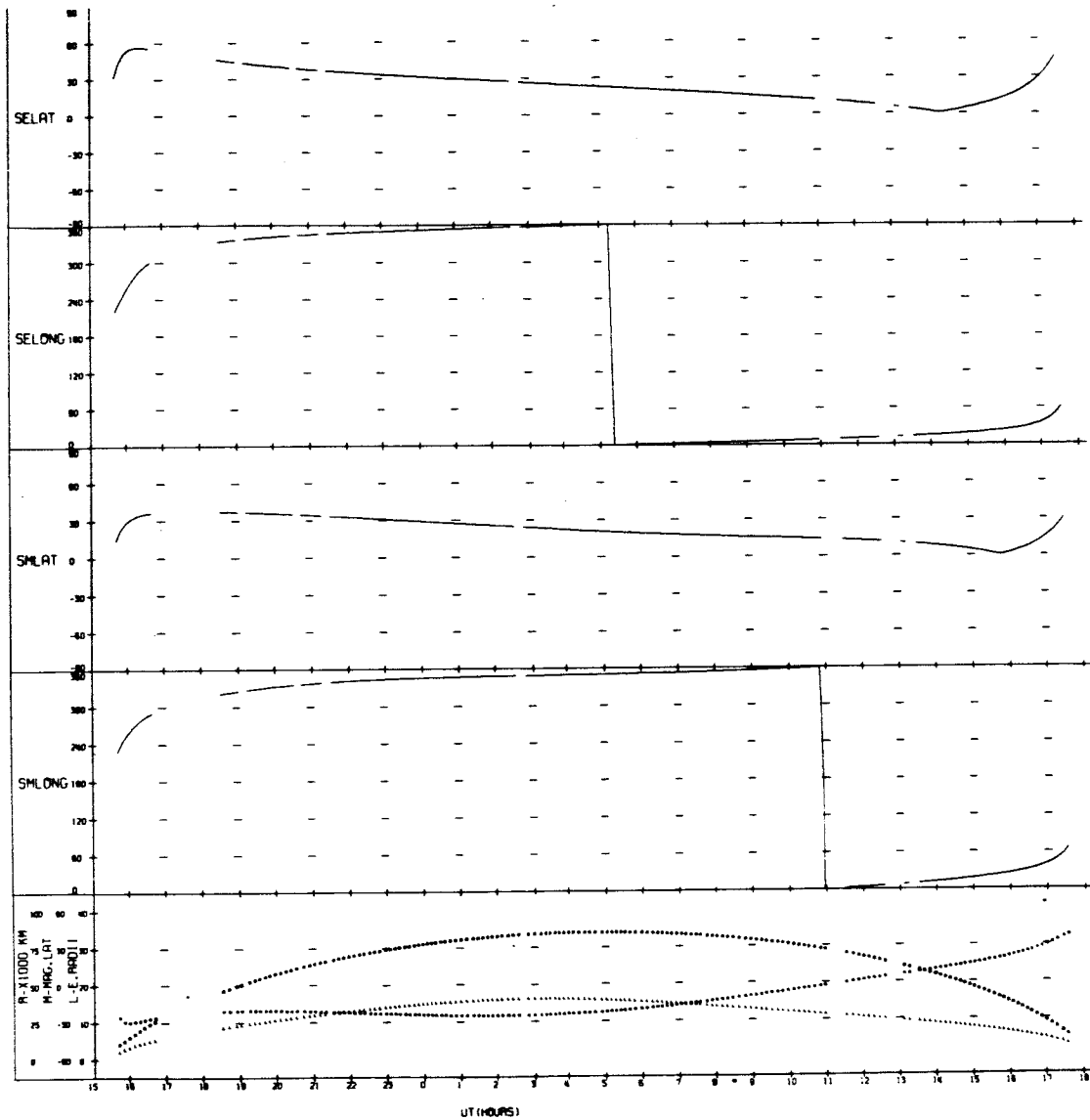
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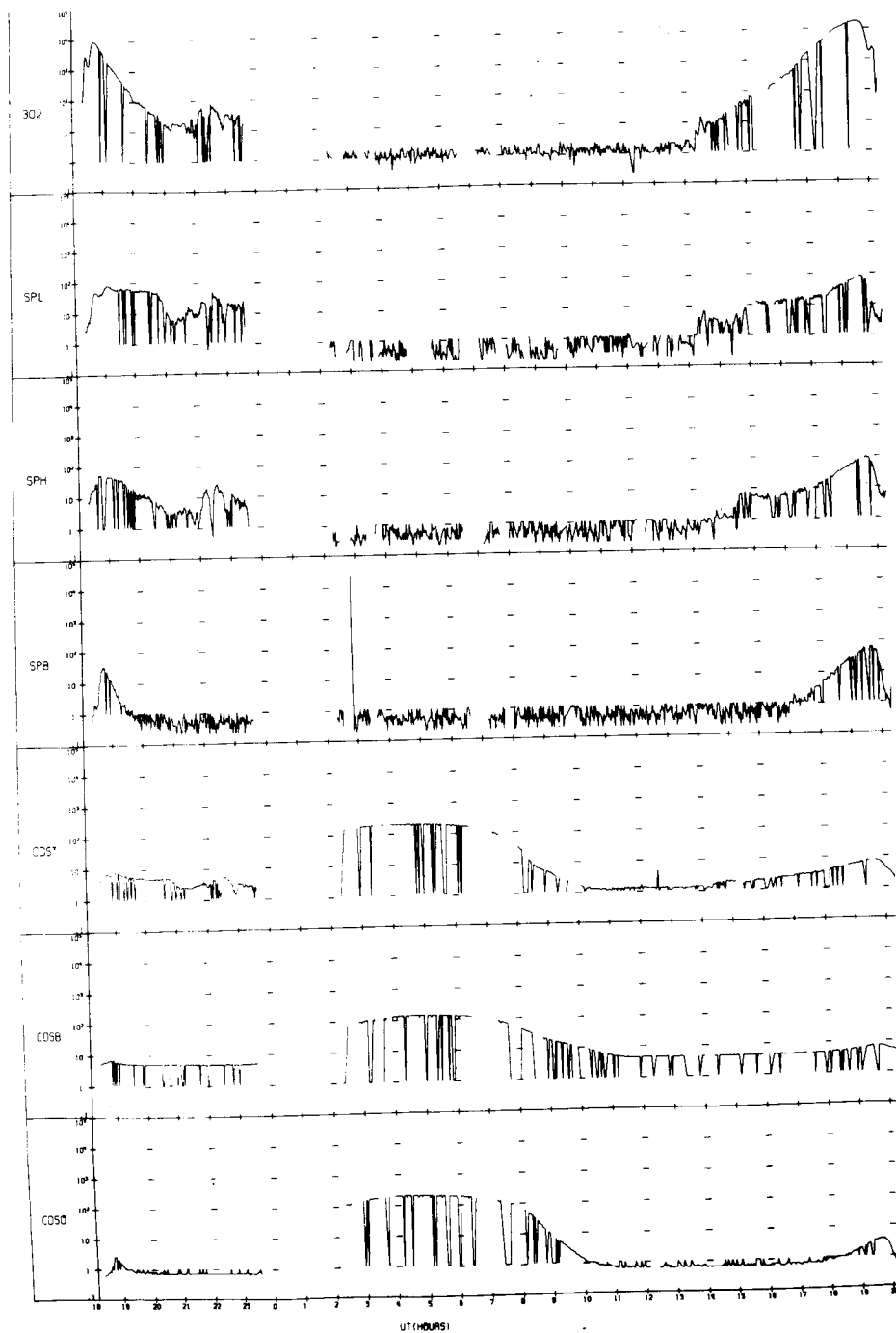
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 END 9/01/61/18:14



UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 15  
 BEGIN 8/31/61/15:42  
 END 9/01/61/18:14



UNIVERSITY OF IOWA  
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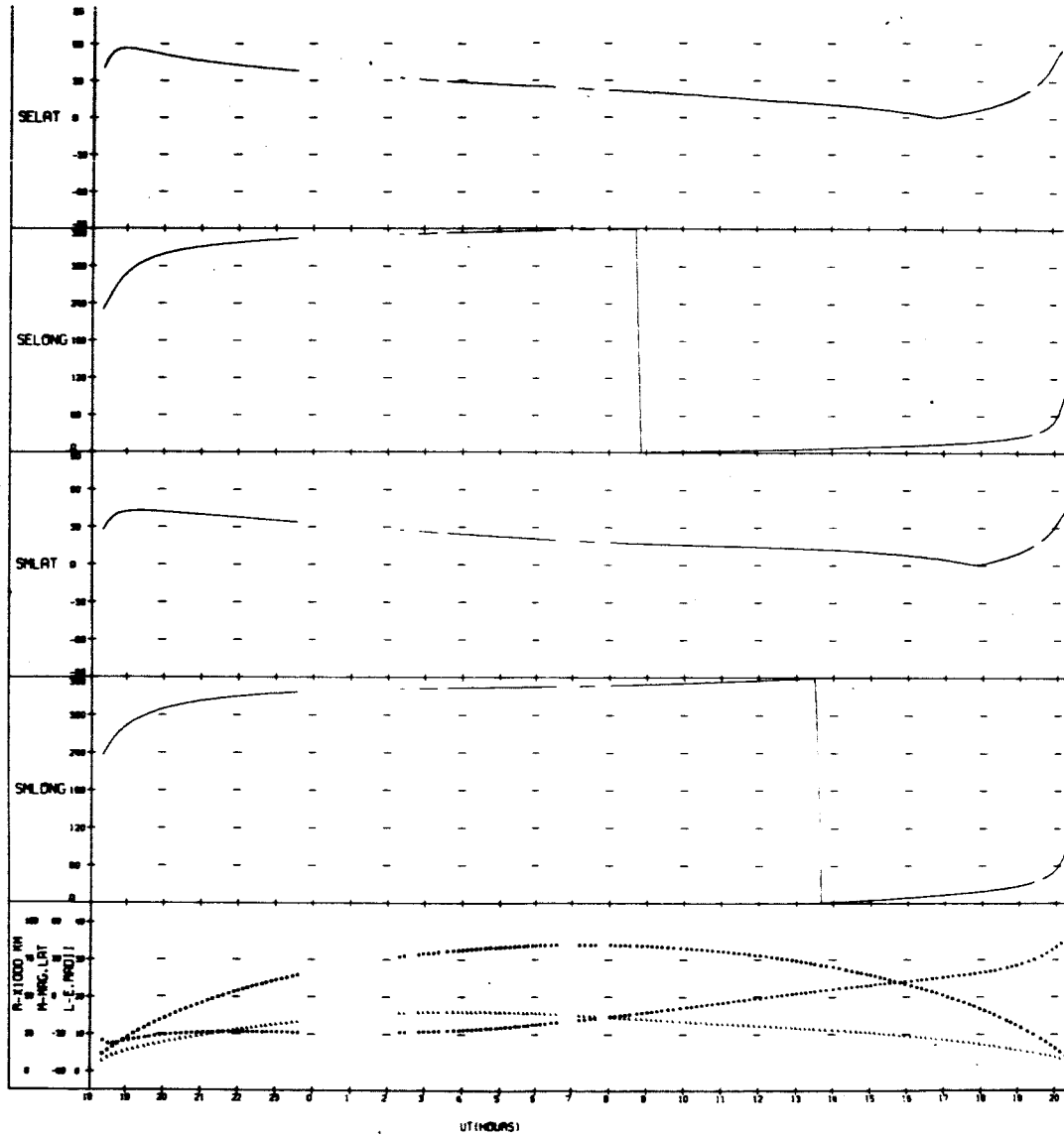


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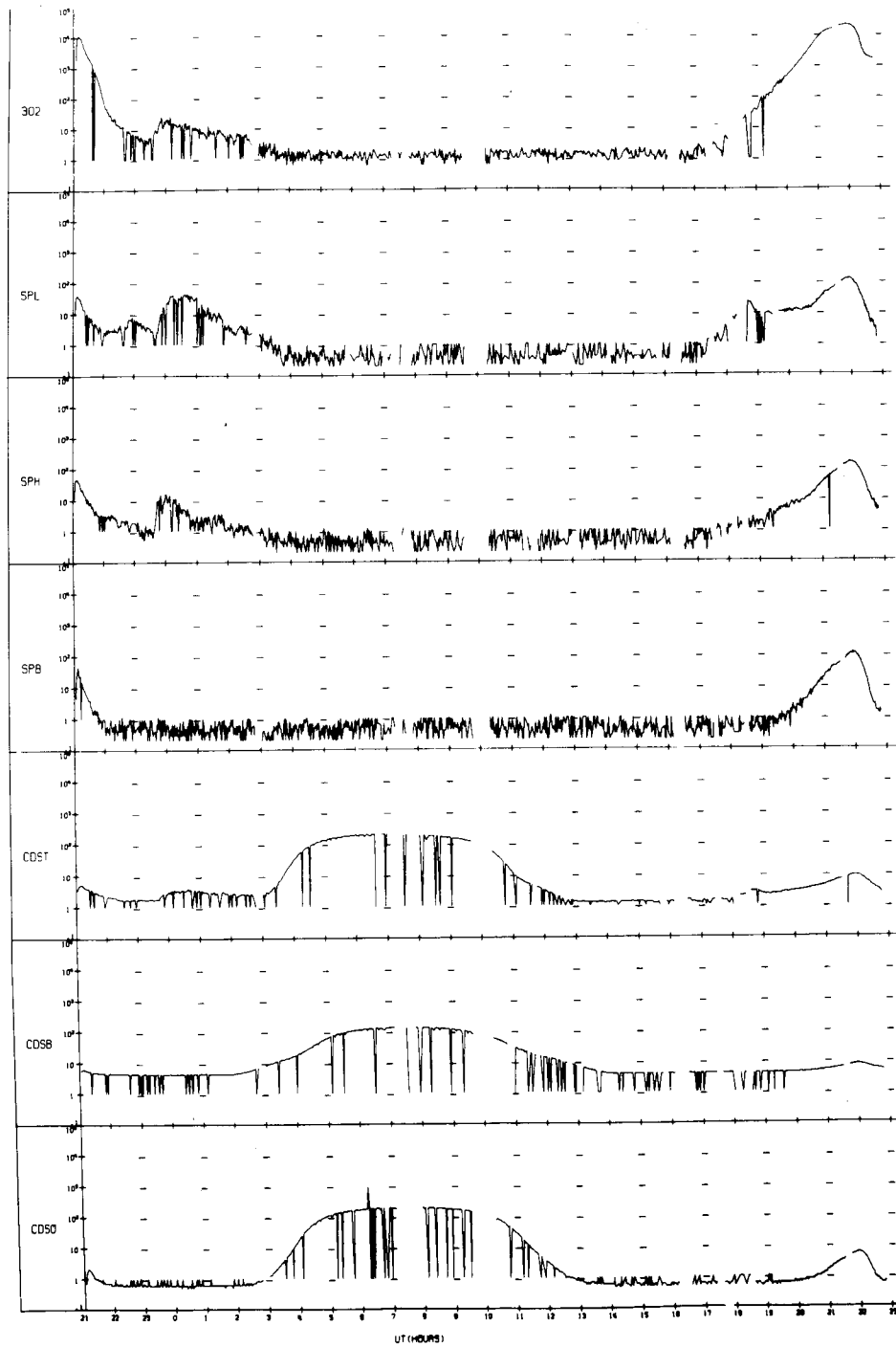
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END 9/02/61/20:20



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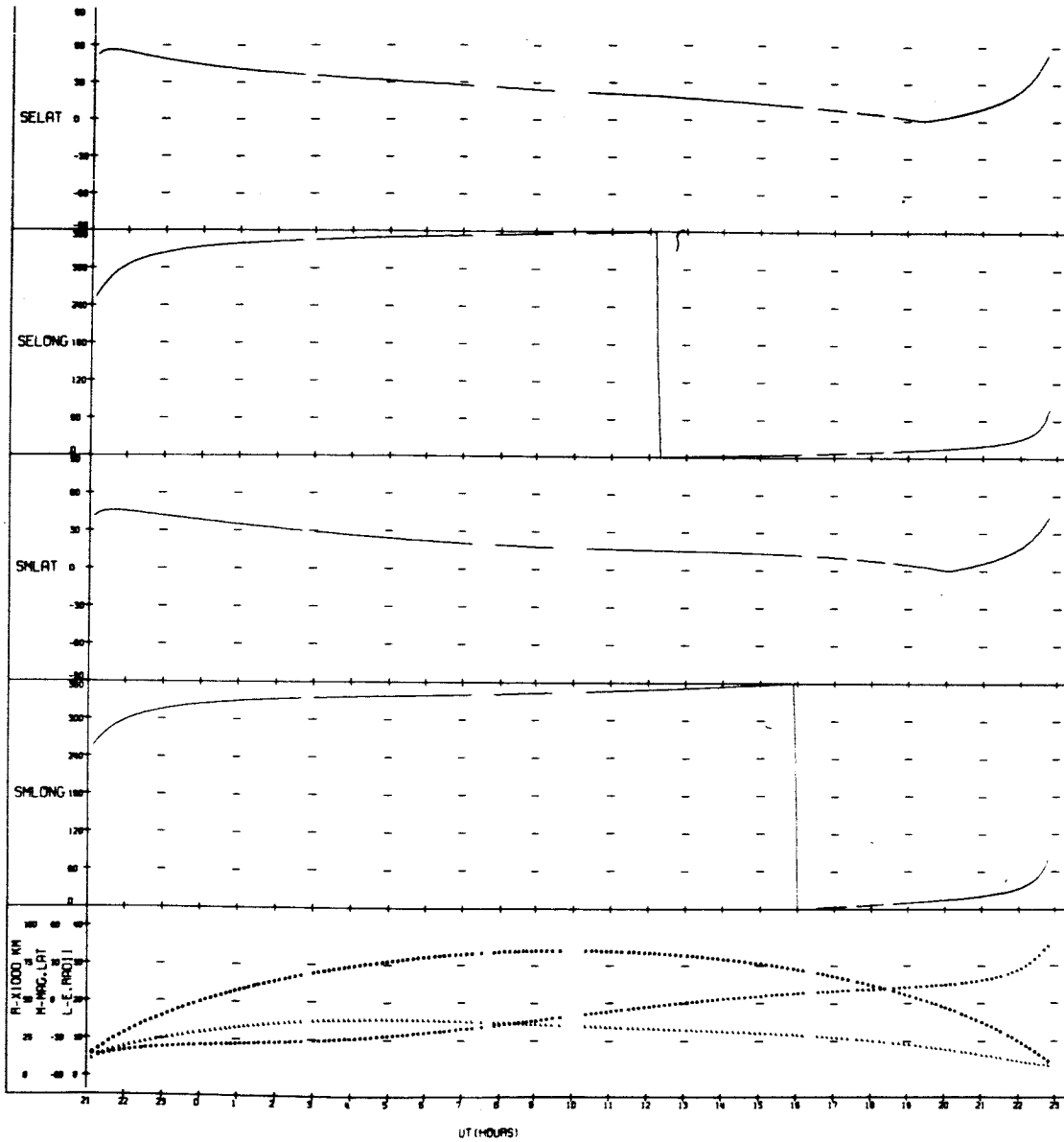


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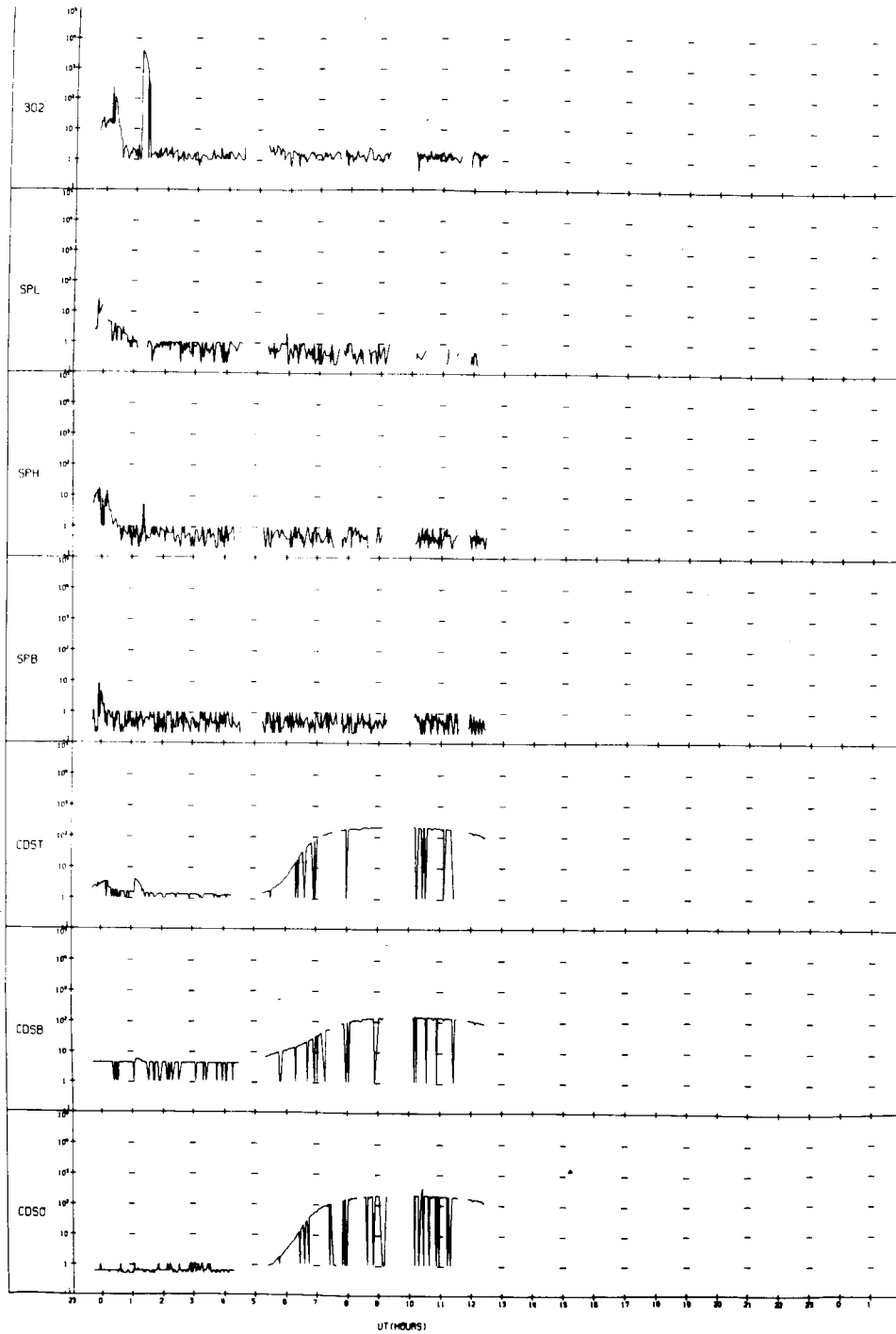
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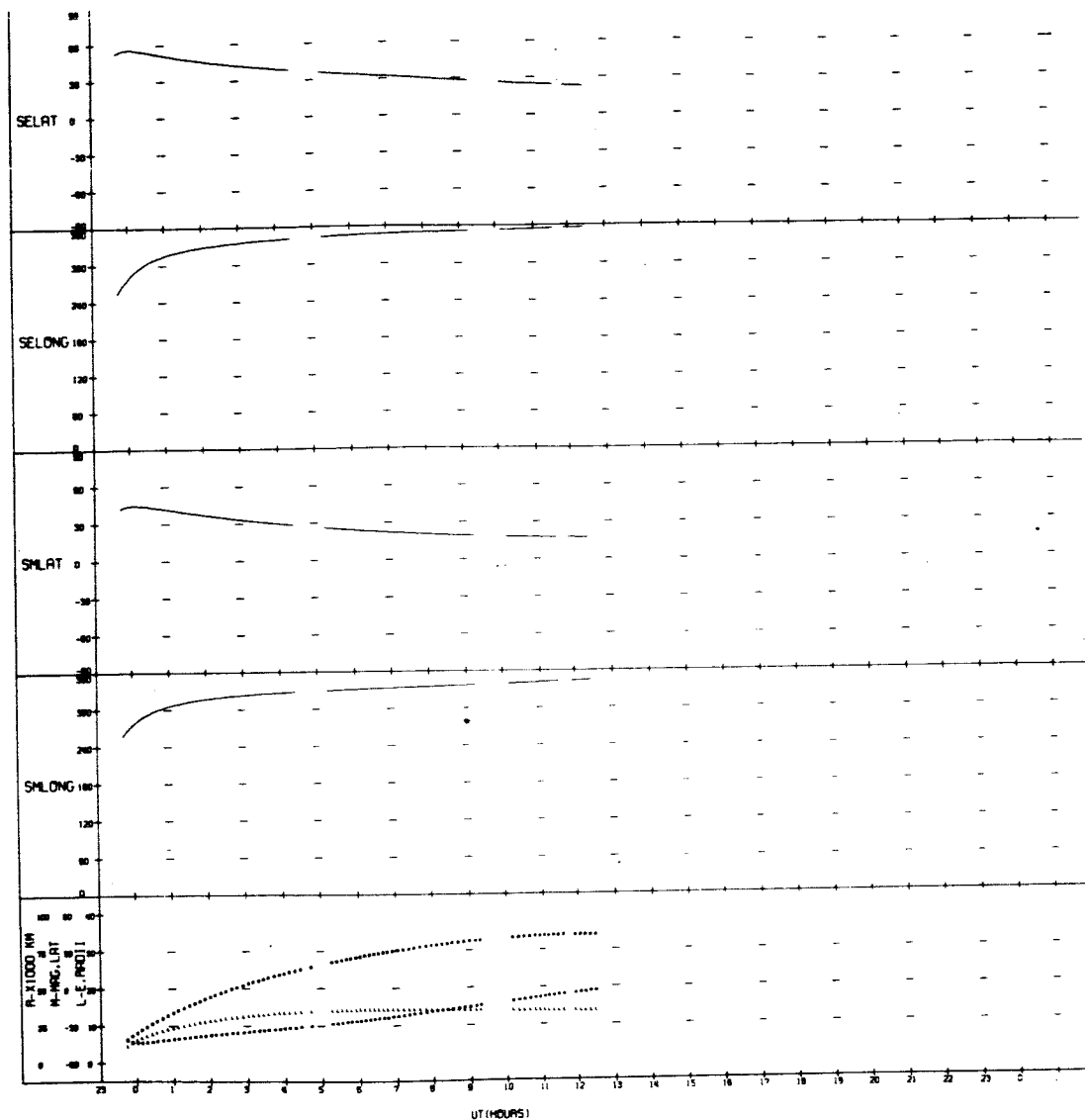
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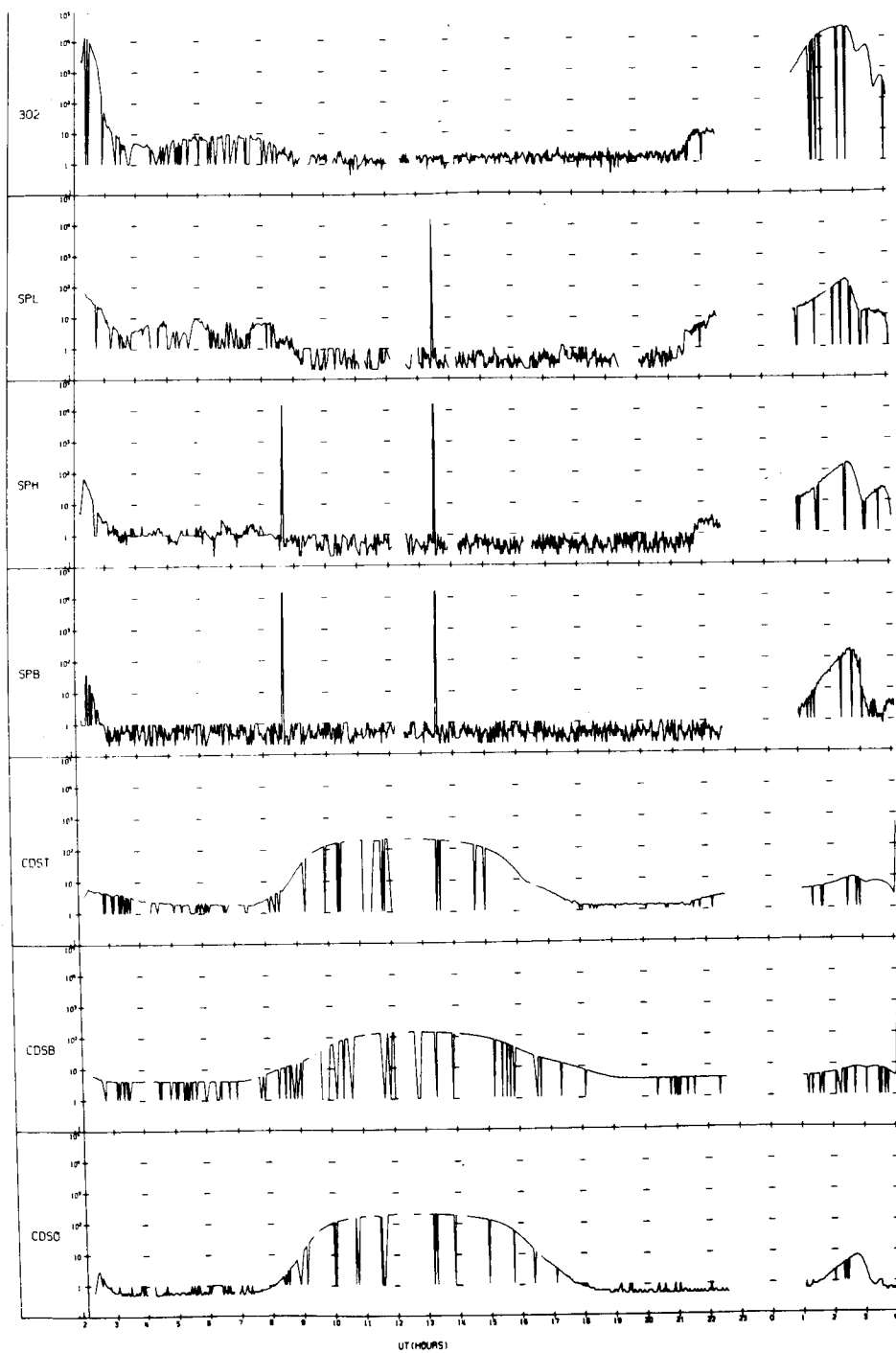
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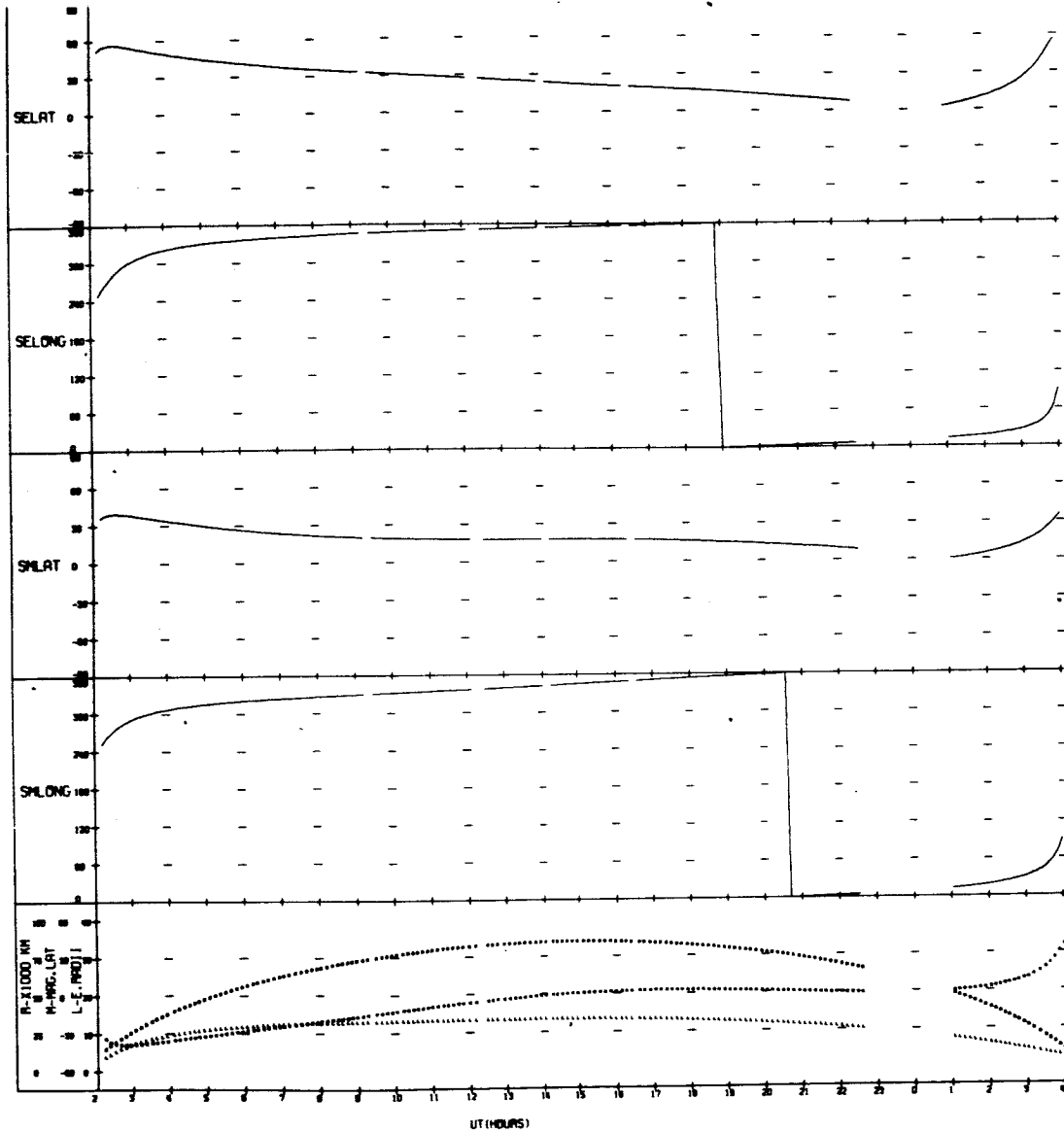
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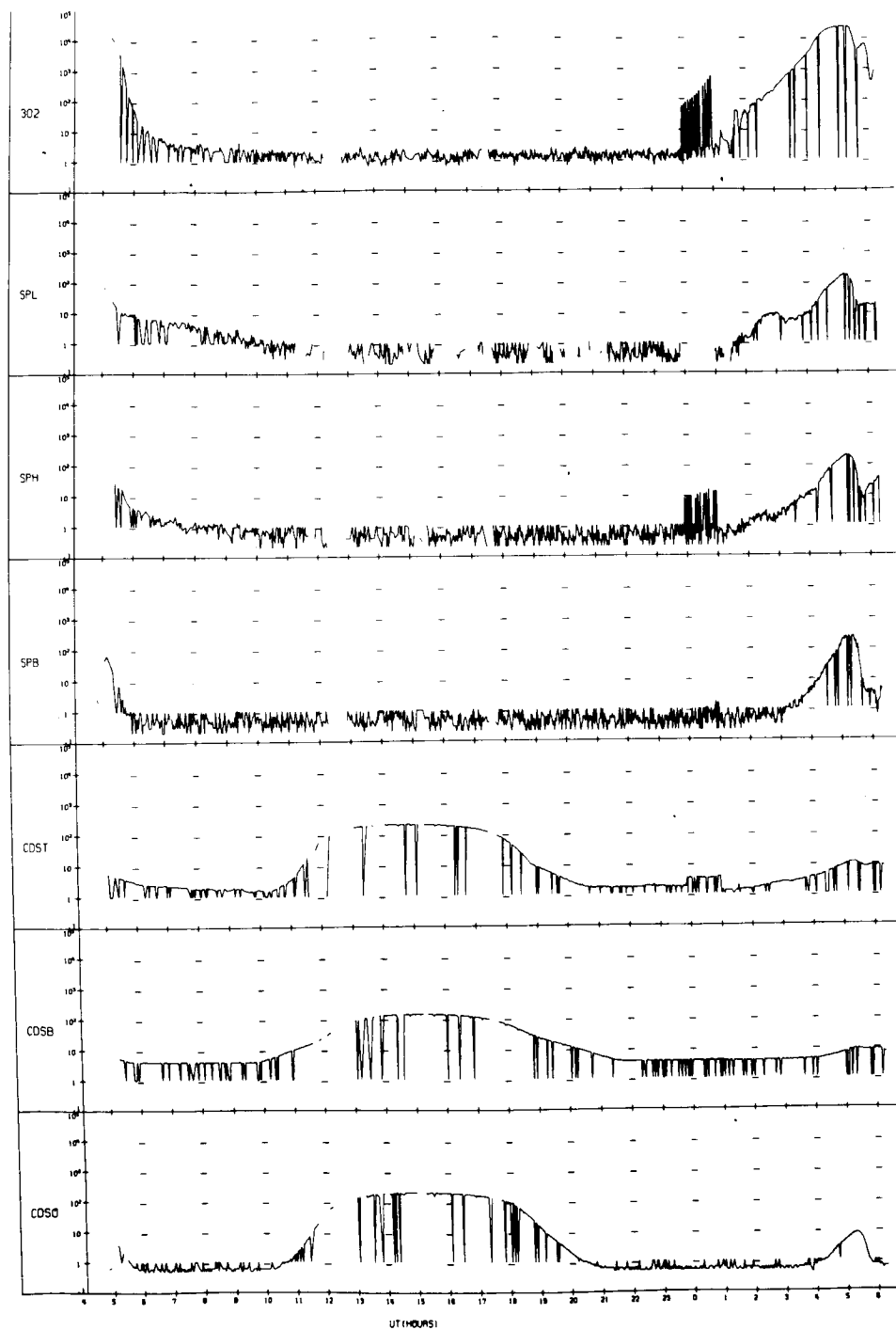
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 END 9/06/61/04:06



UNIVERSITY OF IOWA  
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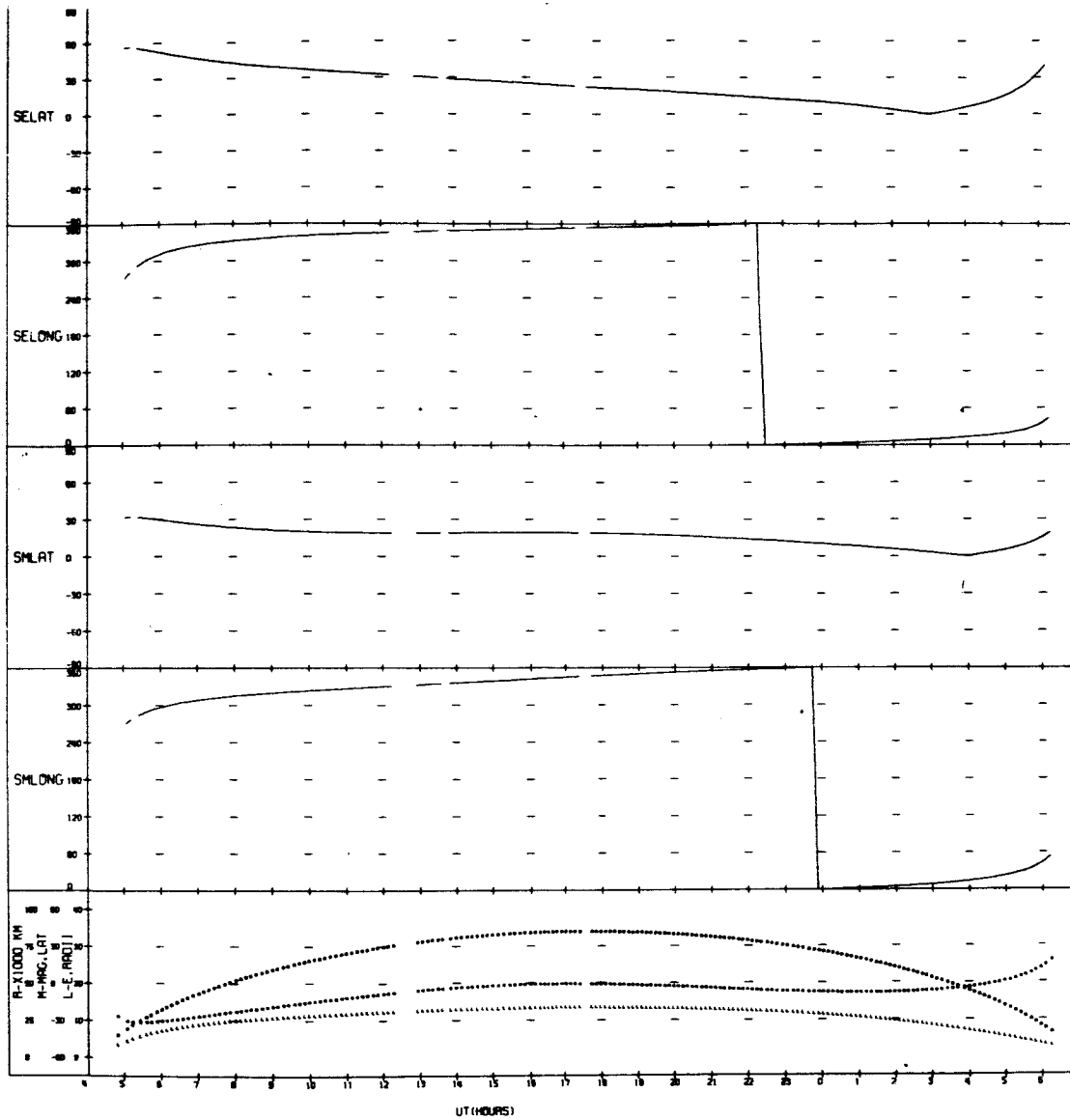


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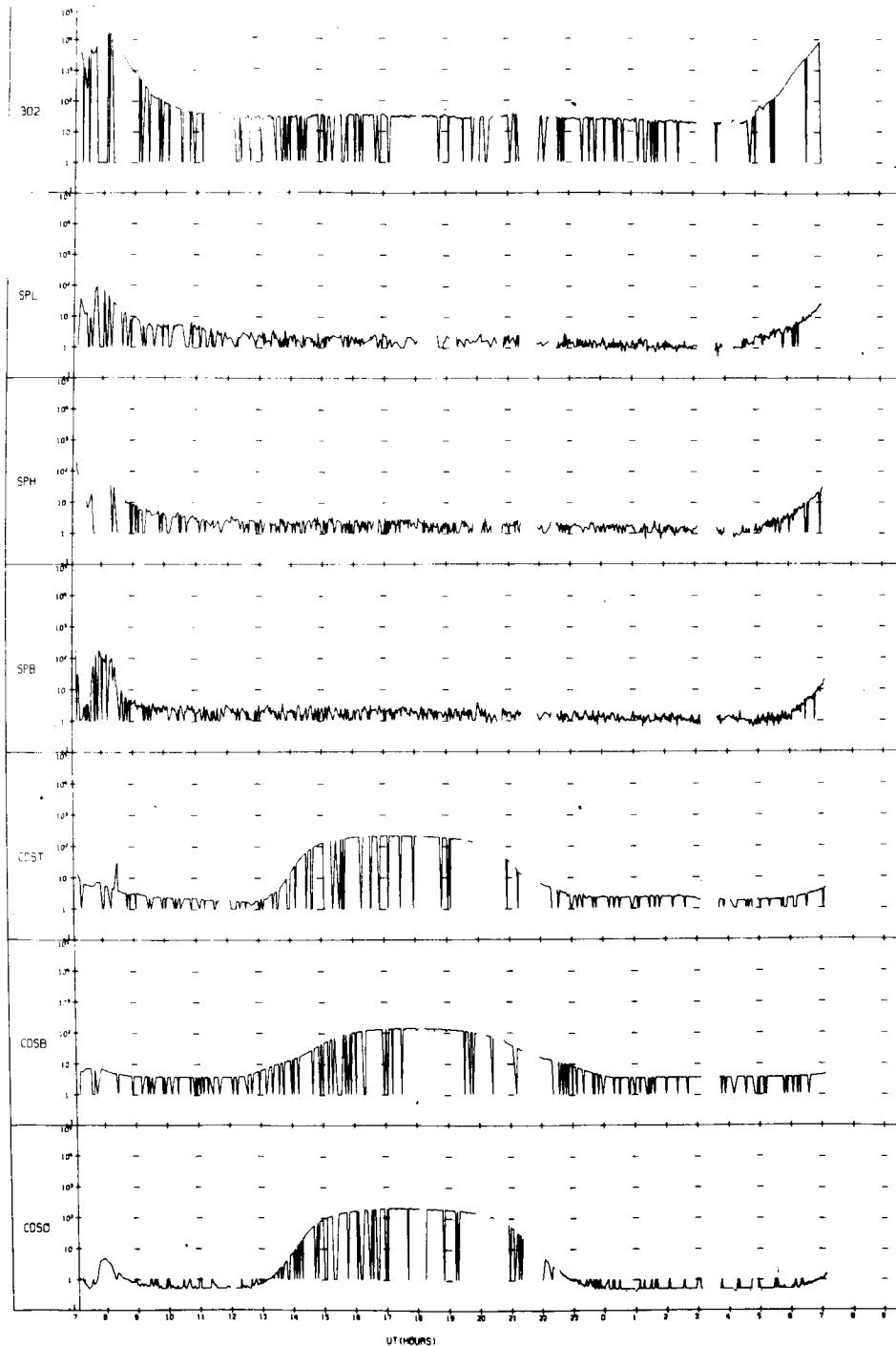


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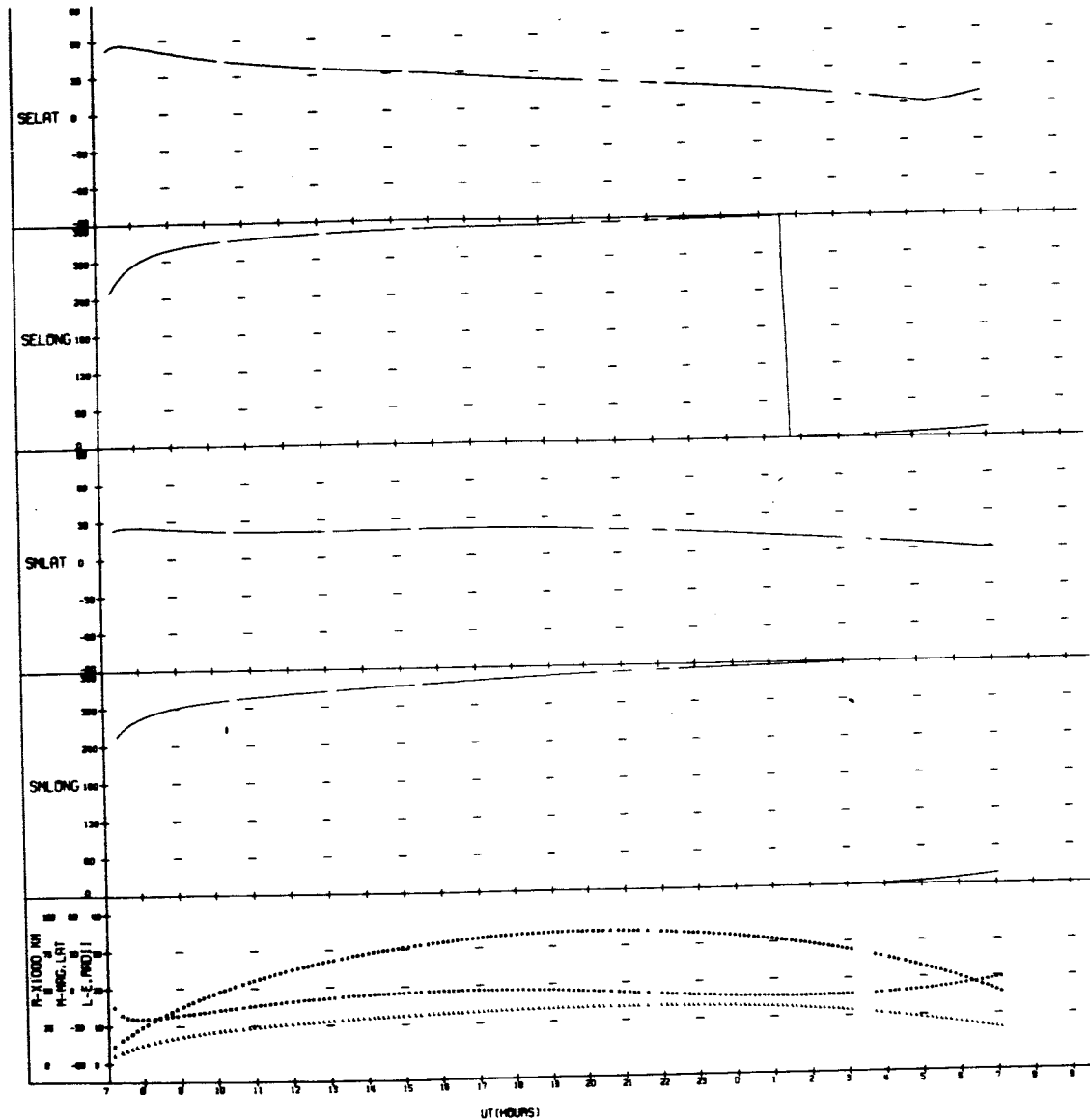


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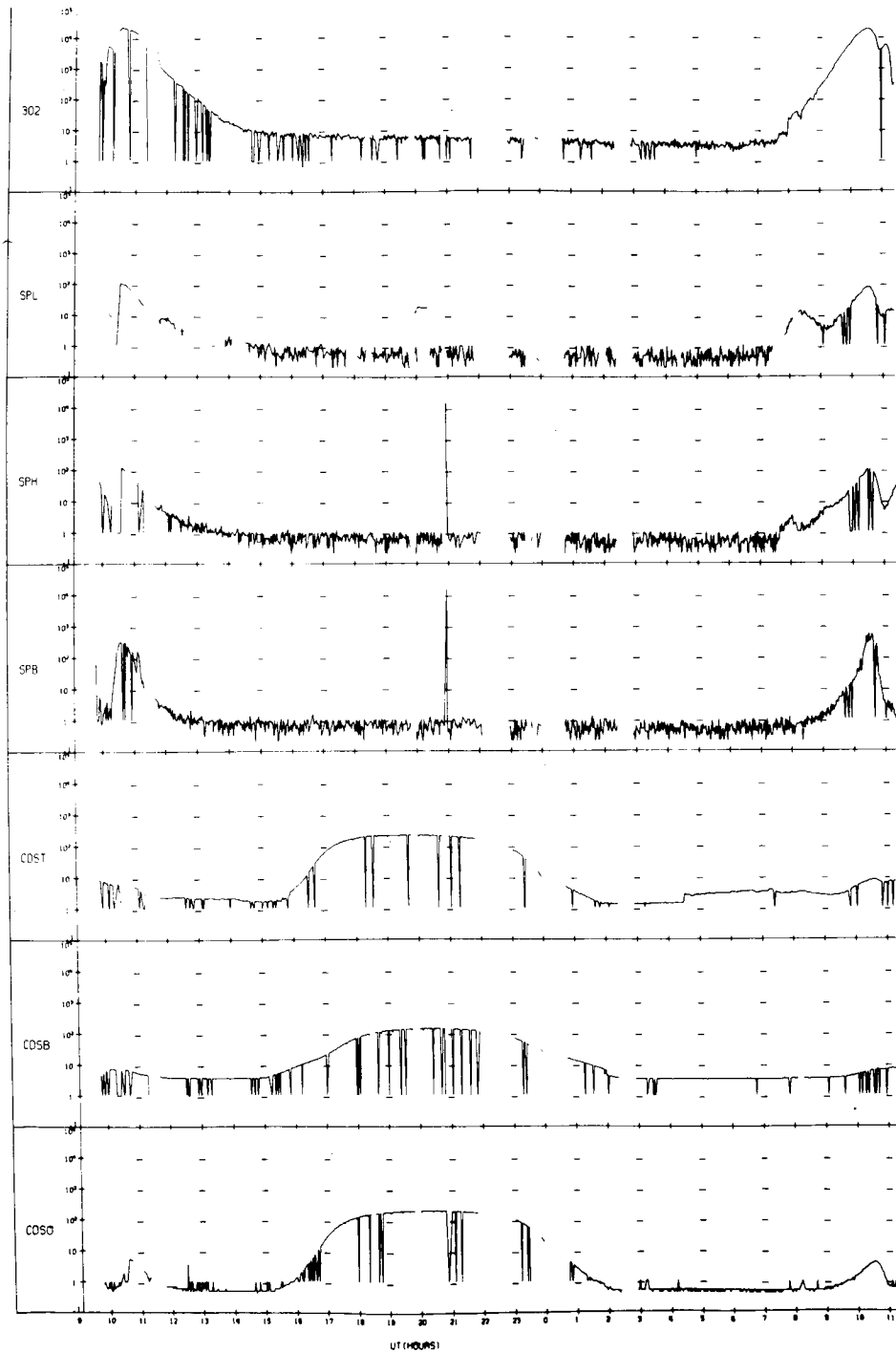
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 BEGIN 9/08/61/09:45  
 END 9/09/61/11:25

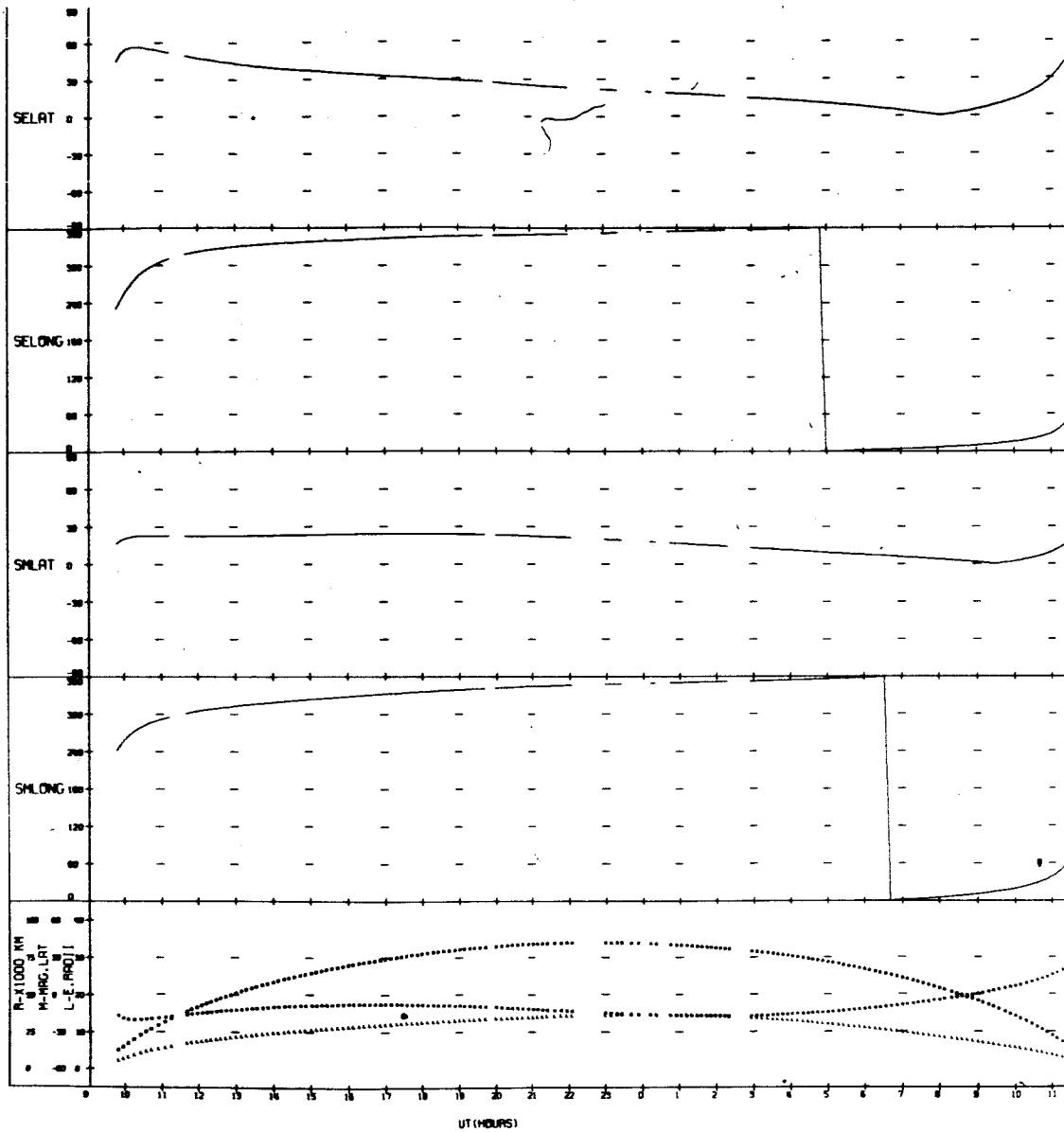


# UNIVERSITY OF IOWA

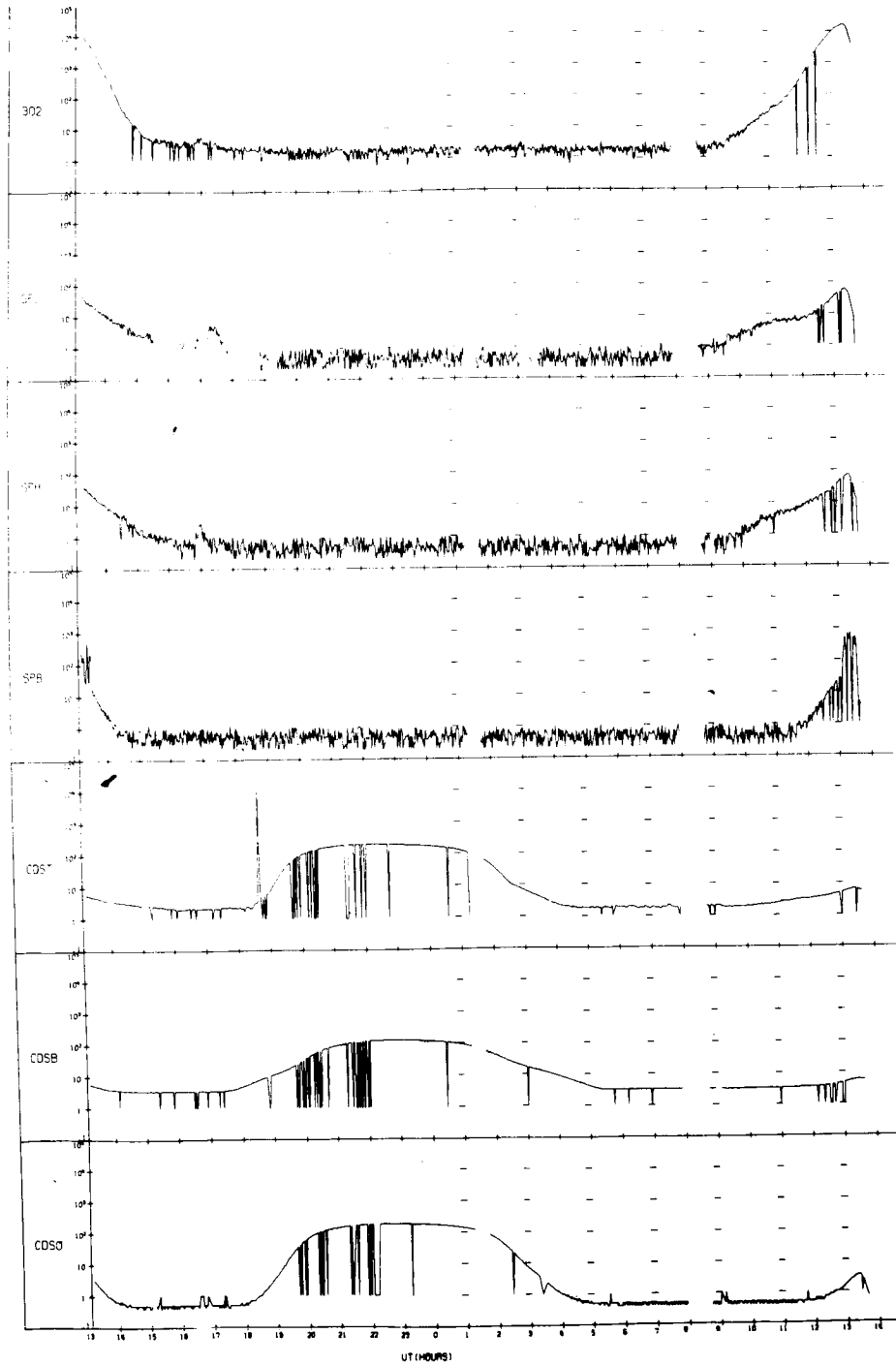
EXPLORER 12 ORBIT 22

BEGIN 9/08/61/09:45

END 9/09/61/11:25

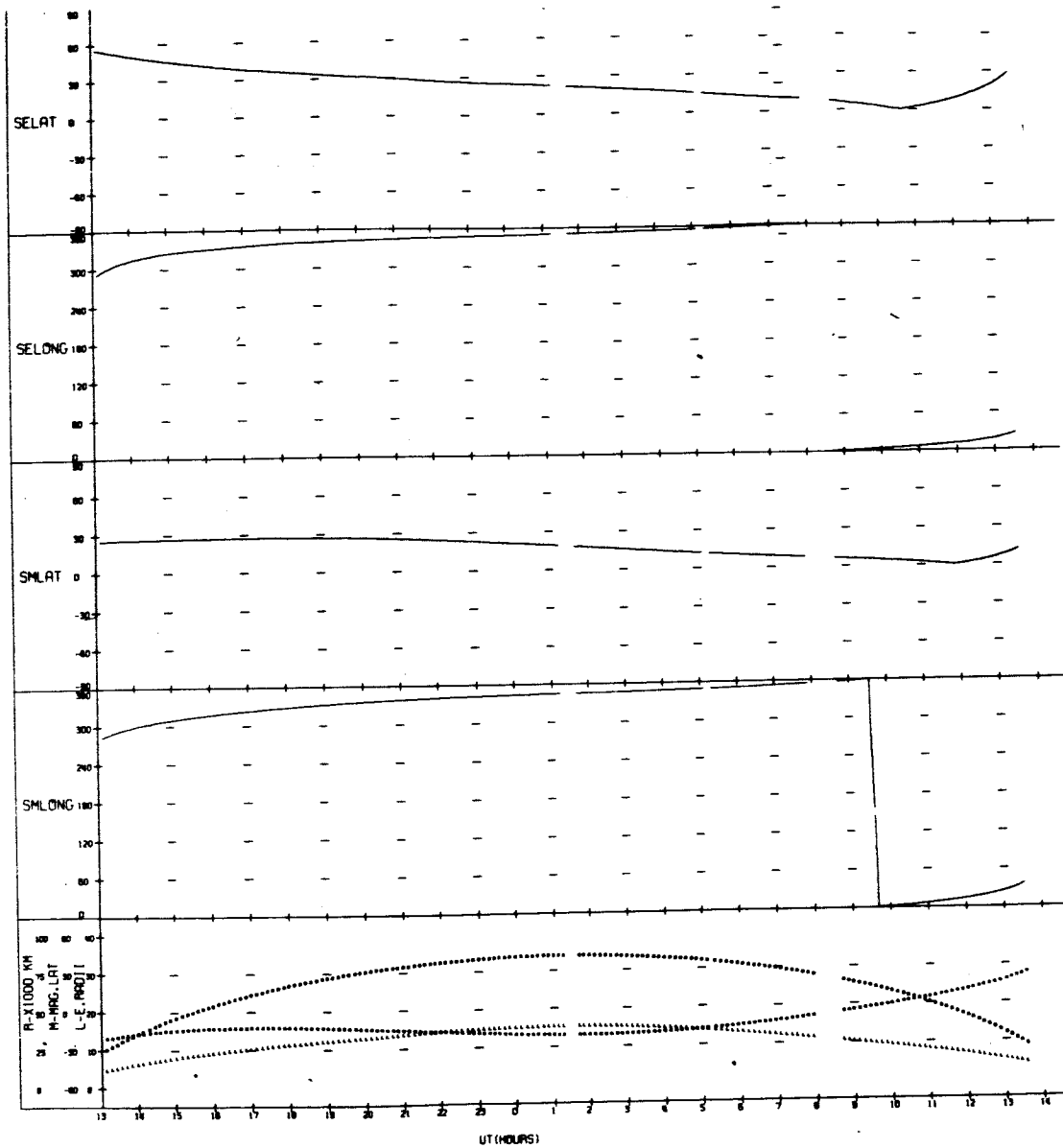


UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 23  
BEGIN 9/09/61 13:09  
END 9/10/61 04:43

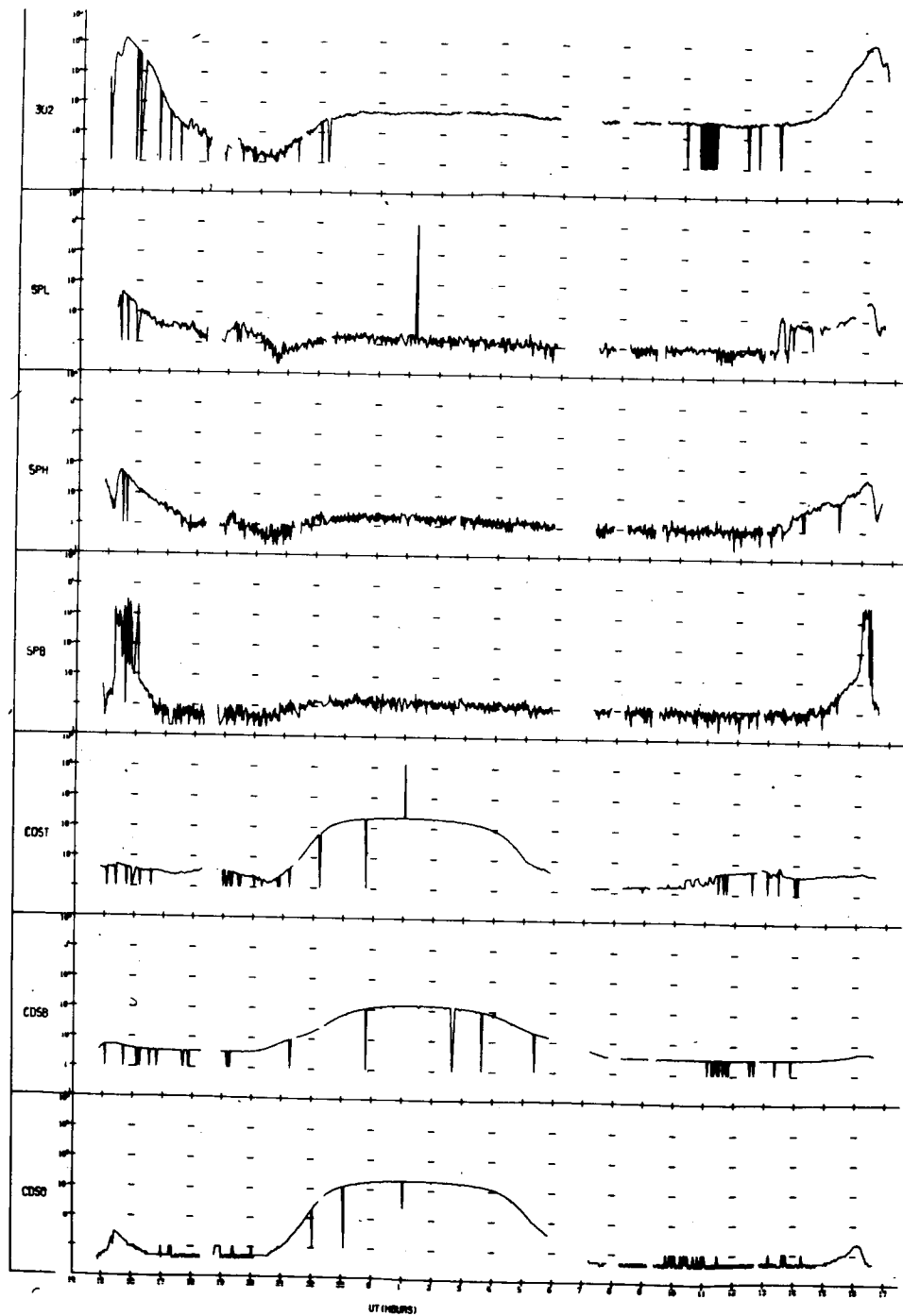


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 23  
 BEGIN 9/09/61/13:09  
 END 9/10/61/14:43



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 24  
BEGIN 9/10/61/14:51  
END 9/11/61/17:31

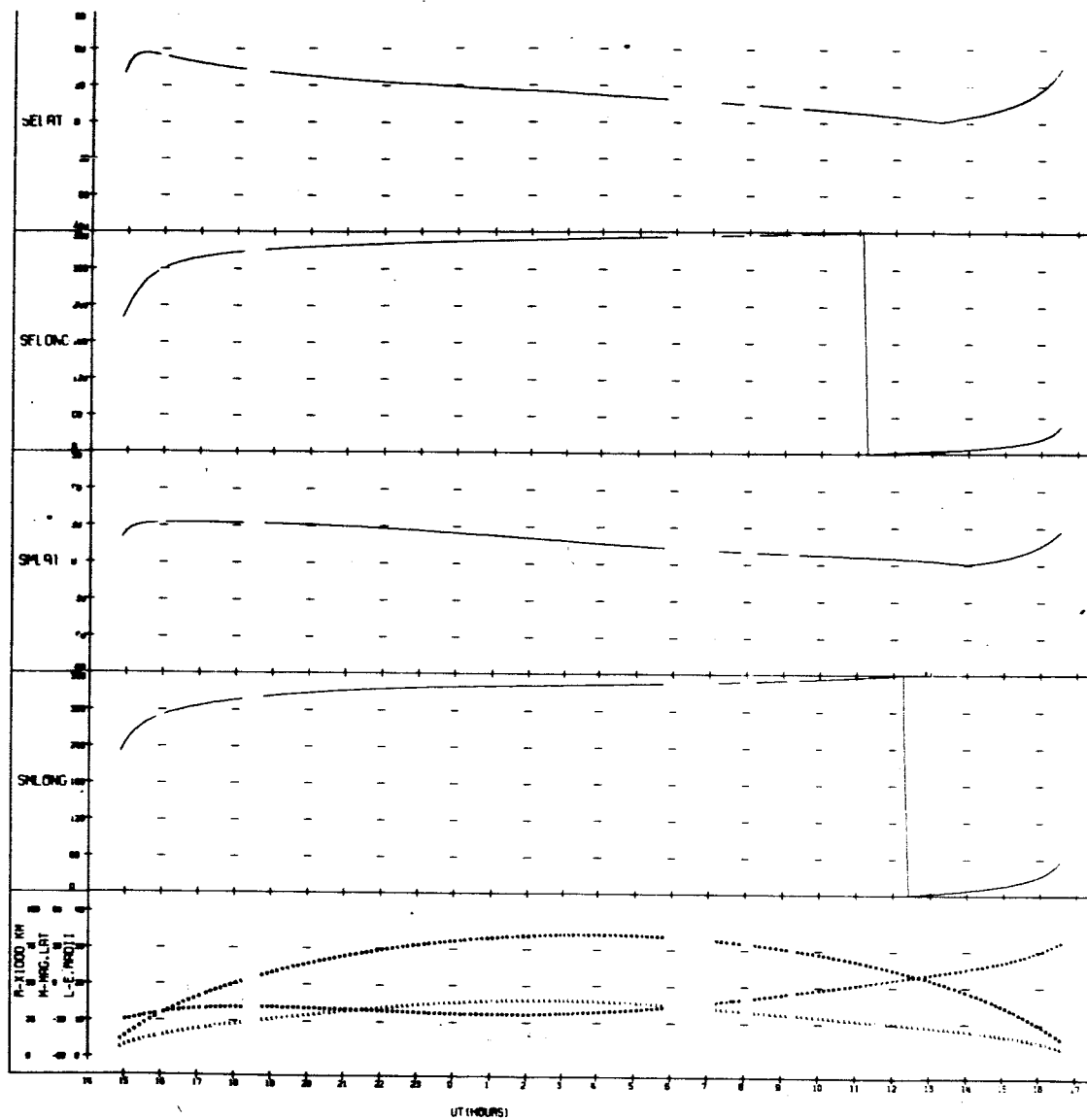


# UNIVERSITY OF IOWA

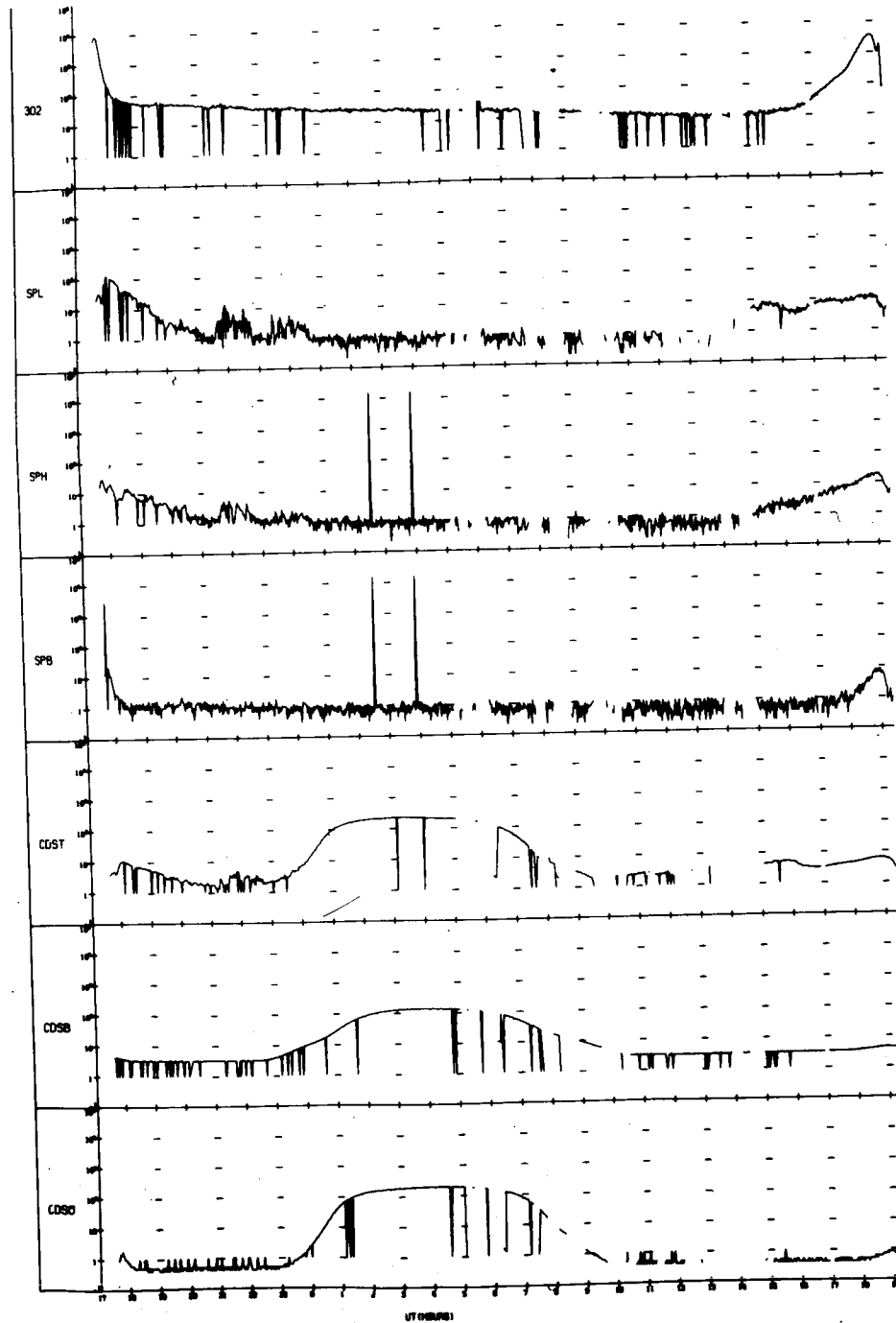
EXPLORER 12 ORBIT 24

BEGIN 9/10/61/14:51

END 9/11/61/17:31



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 25  
BEGIN 9/11/61 17:39  
END 9/12/61 19:23

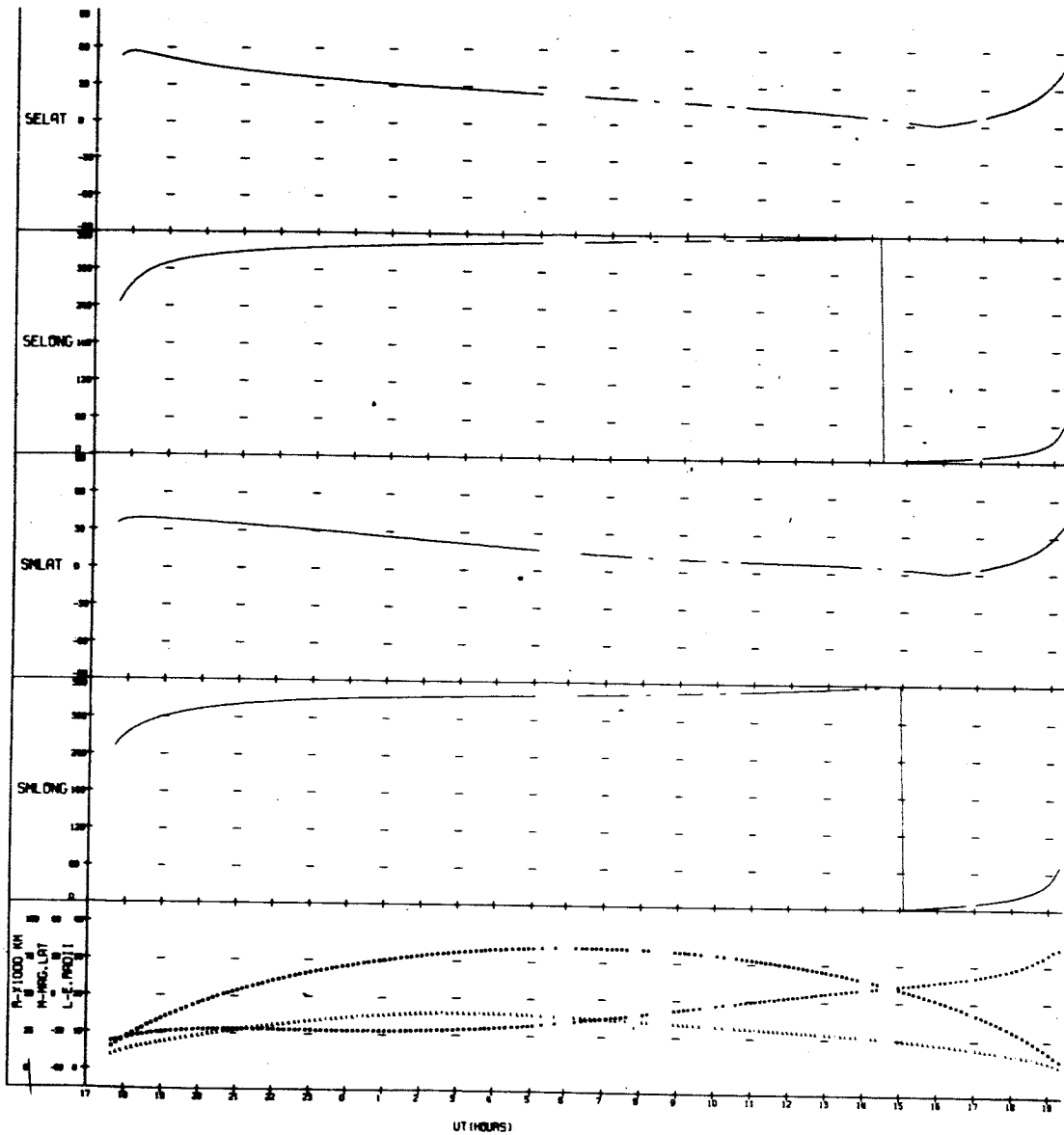


# UNIVERSITY OF IOWA

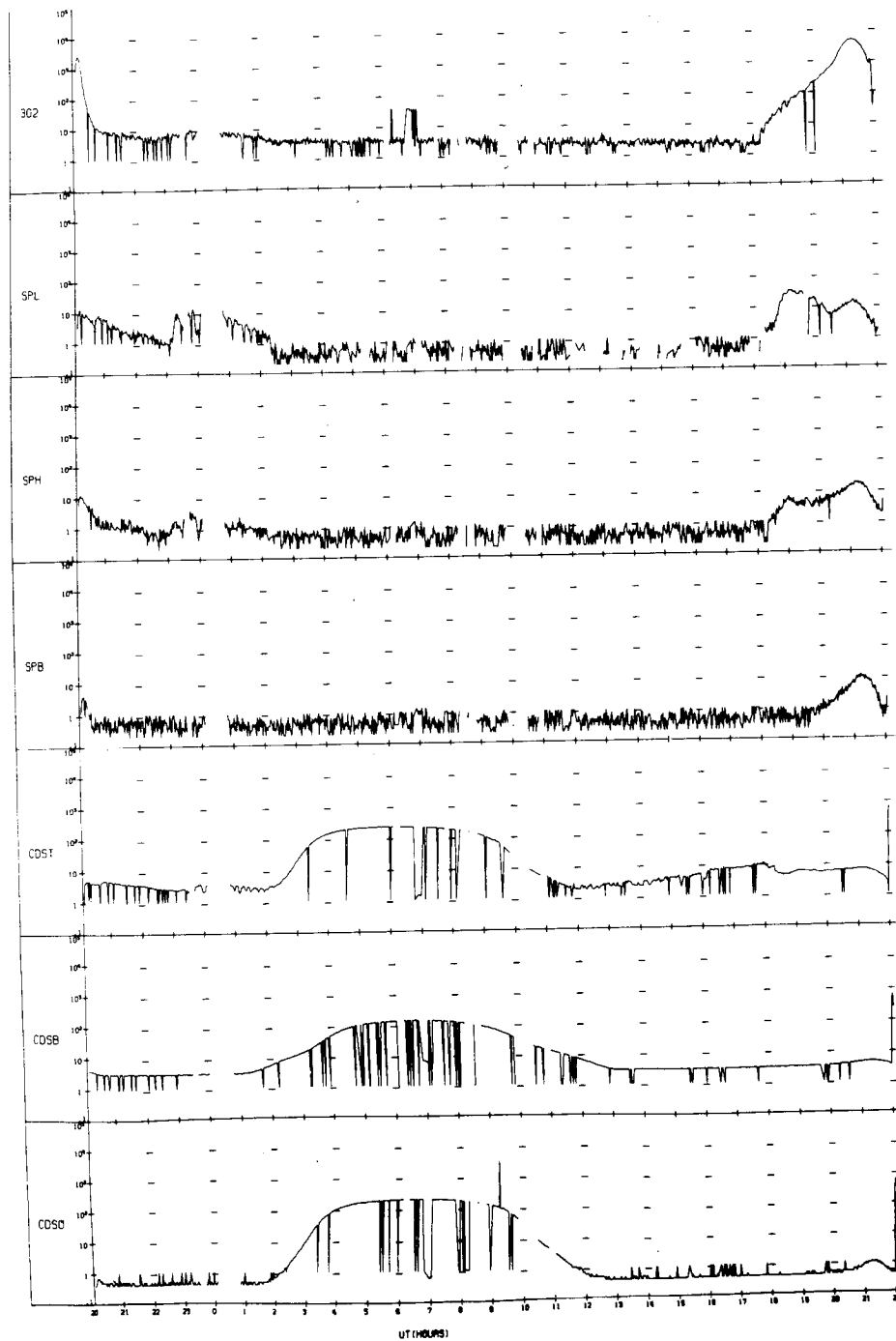
EXPLORER 12 ORBIT 25

BEGIN 9/11/61/17:39

END 9/12/61/19:23



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 26  
BEGIN 9/12/61/20:05  
END 9/13/61/22:20

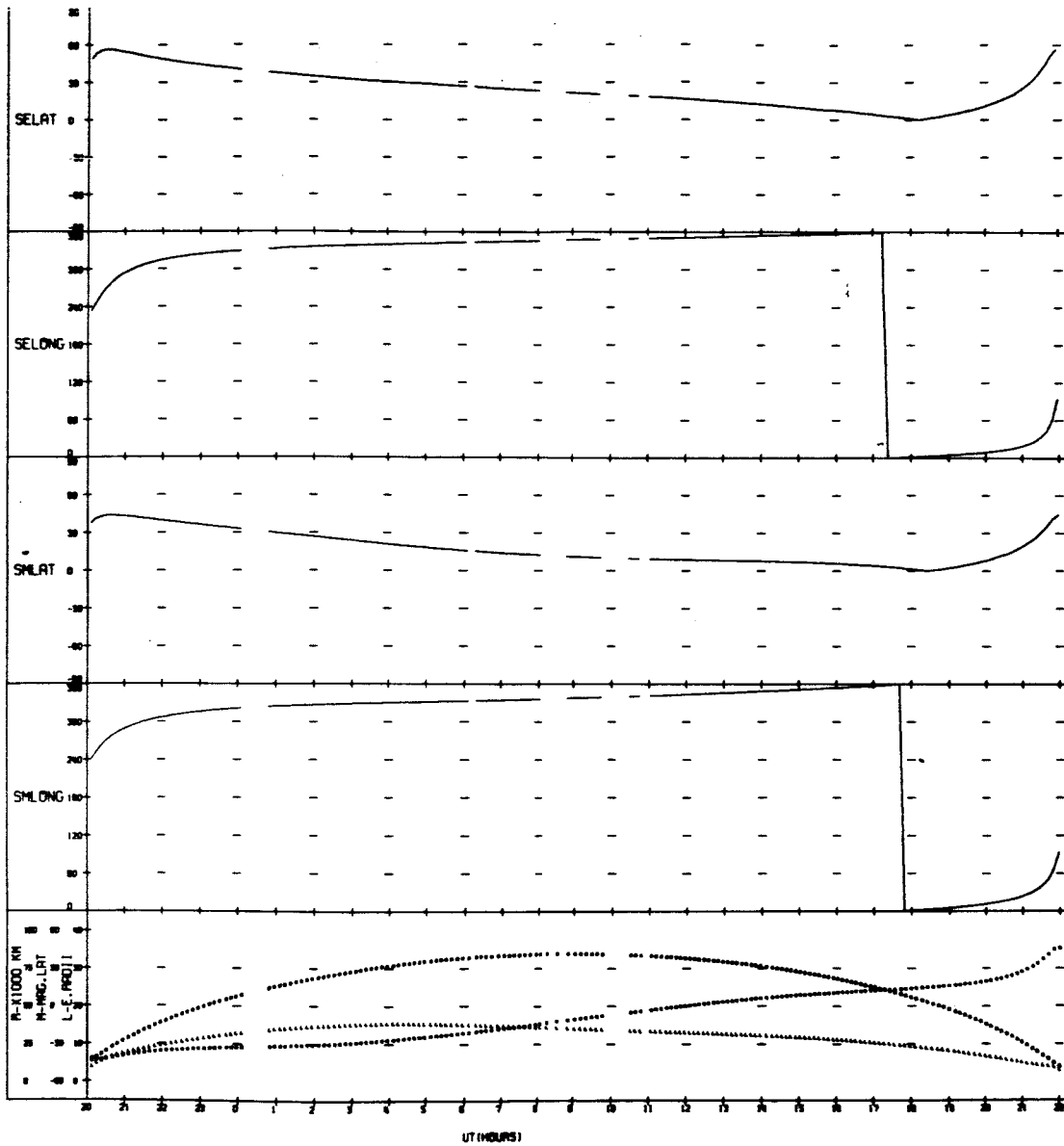


# UNIVERSITY OF IOWA

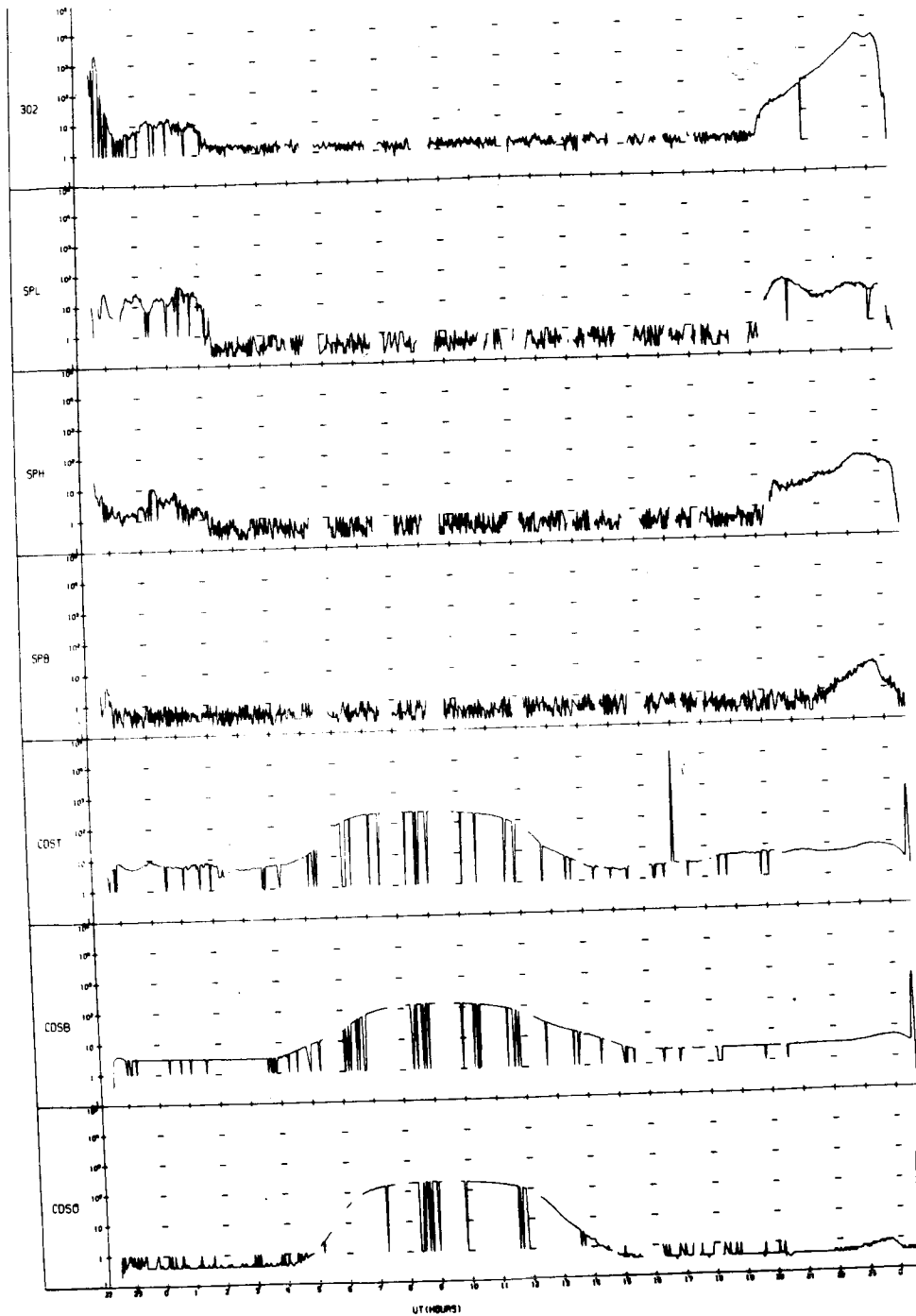
EXPLORER 12 ORBIT 26

BEGIN 9/12/61/20:05

END 9/13/61/22:20

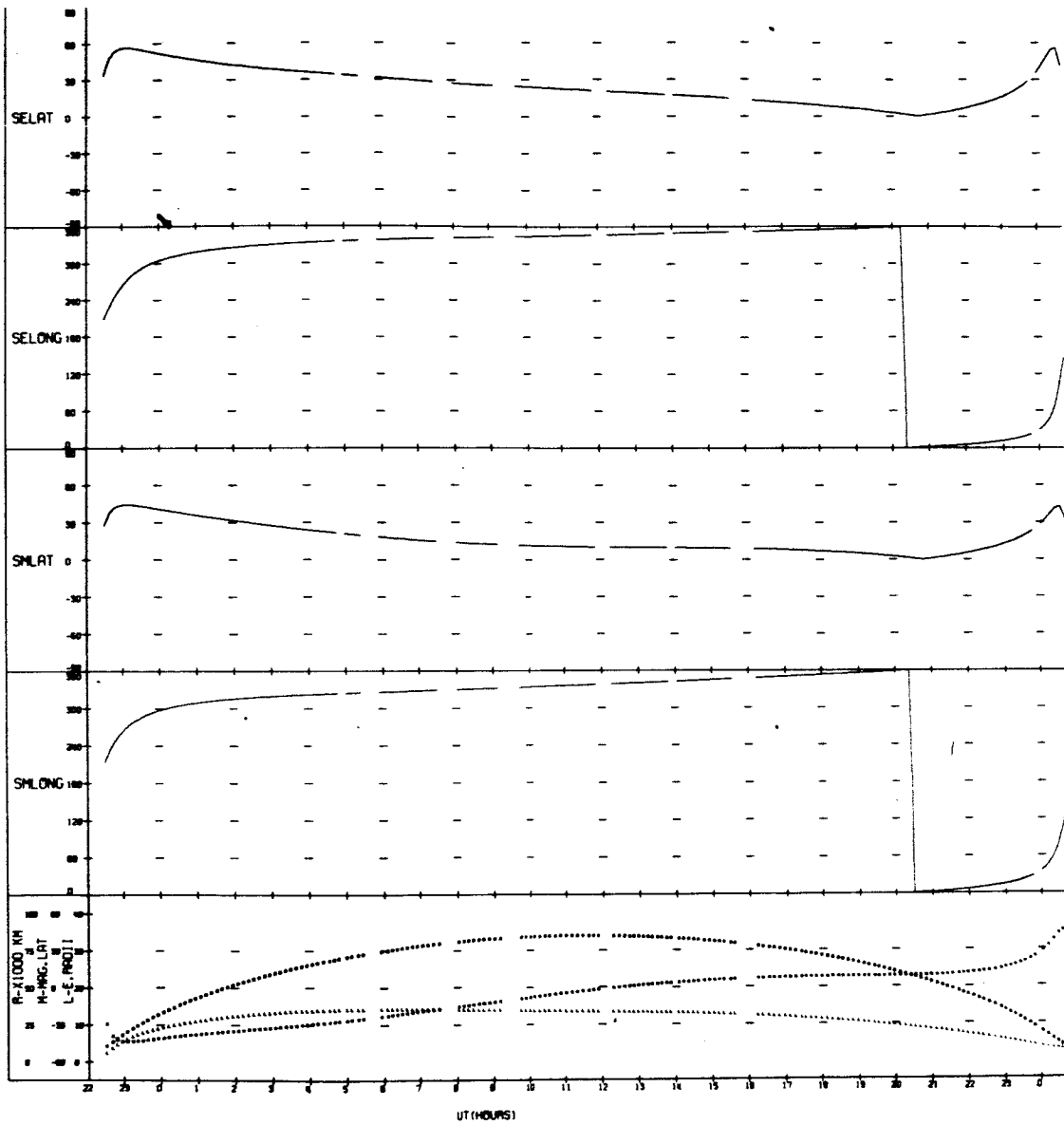


UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 27  
BEGIN 9/13/61/22:29  
END 9/15/61/00:42

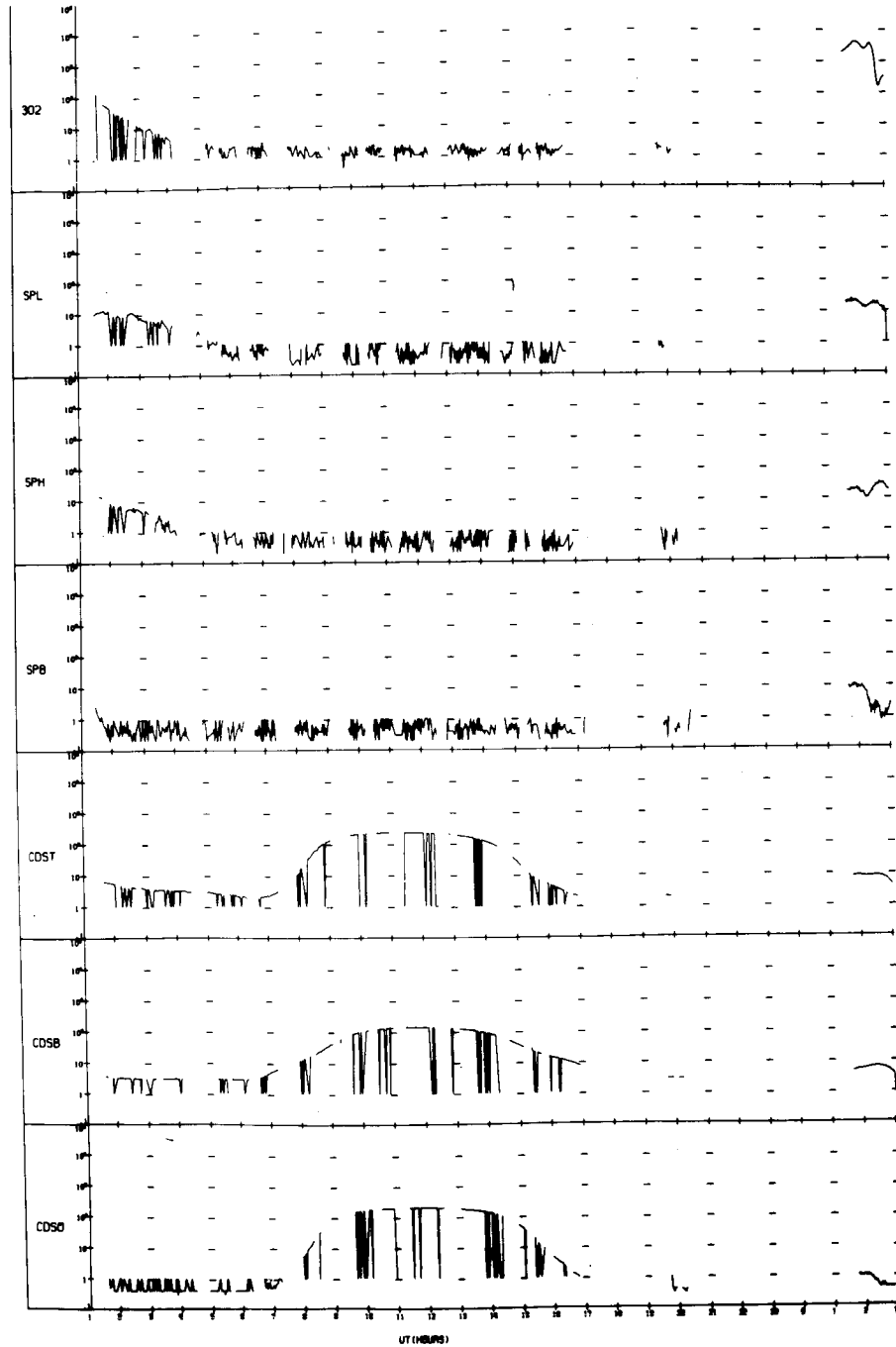


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 27  
 BEGIN 9/13/61/22:29  
 END 9/15/61/00:42



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 28  
BEGIN 9/15/61/01:29  
END 9/16/61/03:02

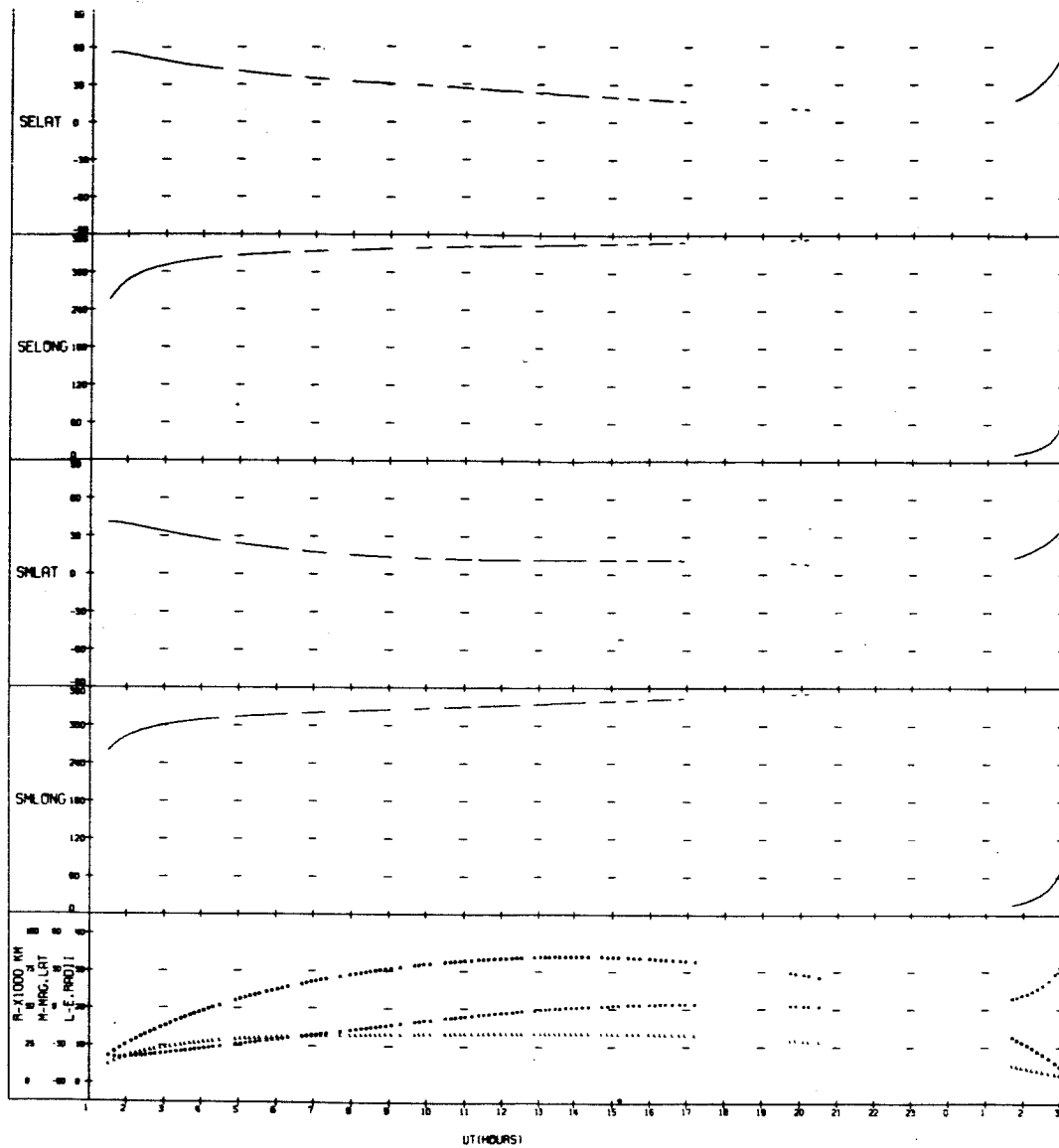


# UNIVERSITY OF IOWA

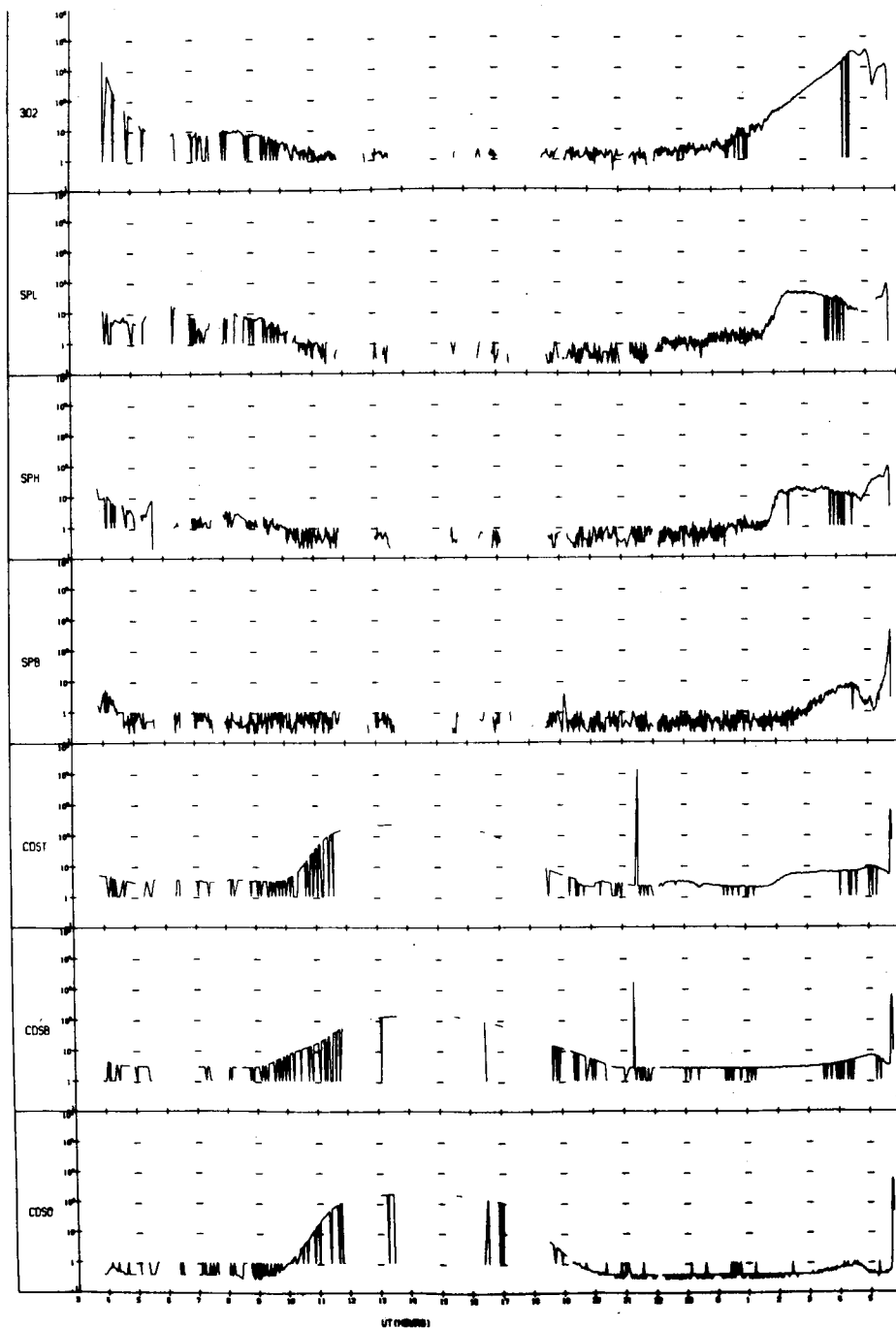
EXPLORER 12 ORBIT 28

BEGIN 9/15/61/01:29

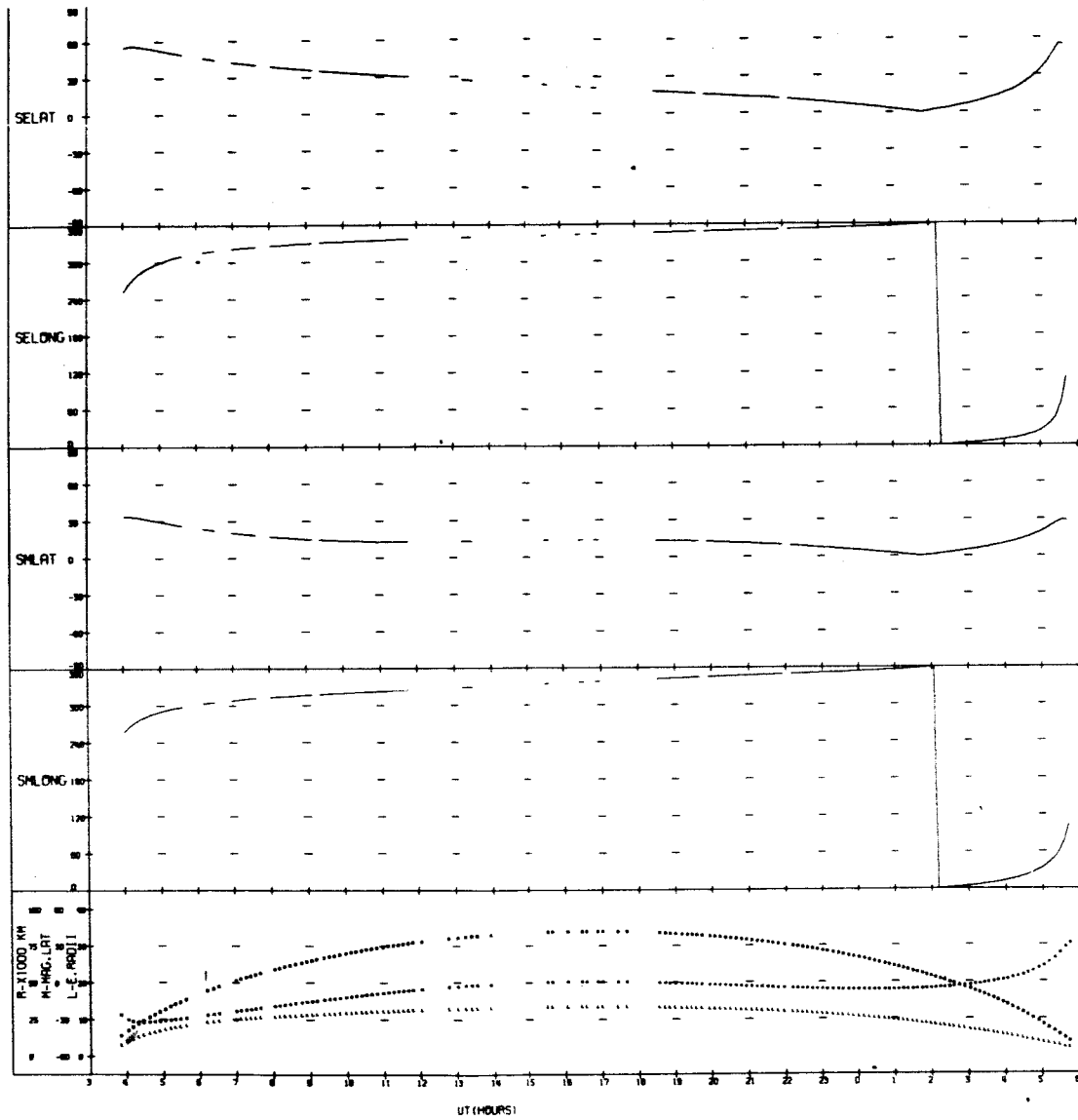
END 9/16/61/03:02



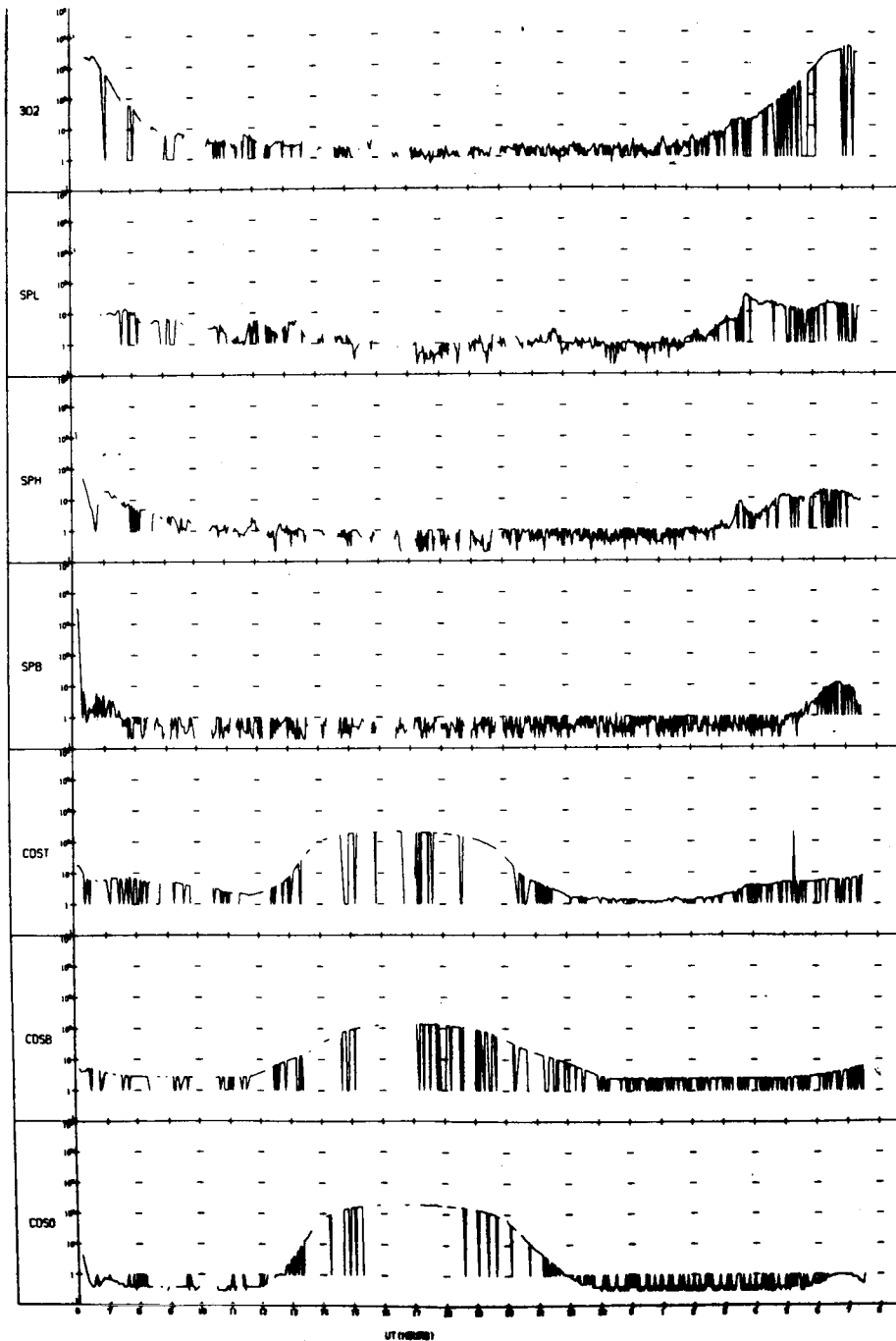
UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 29  
 BEGIN 9/16/61/03:49  
 END 9/17/61/06:01



EXPLORER 12 ORBIT 29  
BEGIN 9/16/61/03:49  
END 9/17/61/06:01



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 30  
BEGIN 9/17/61/06:07  
END 9/18/61/08:53

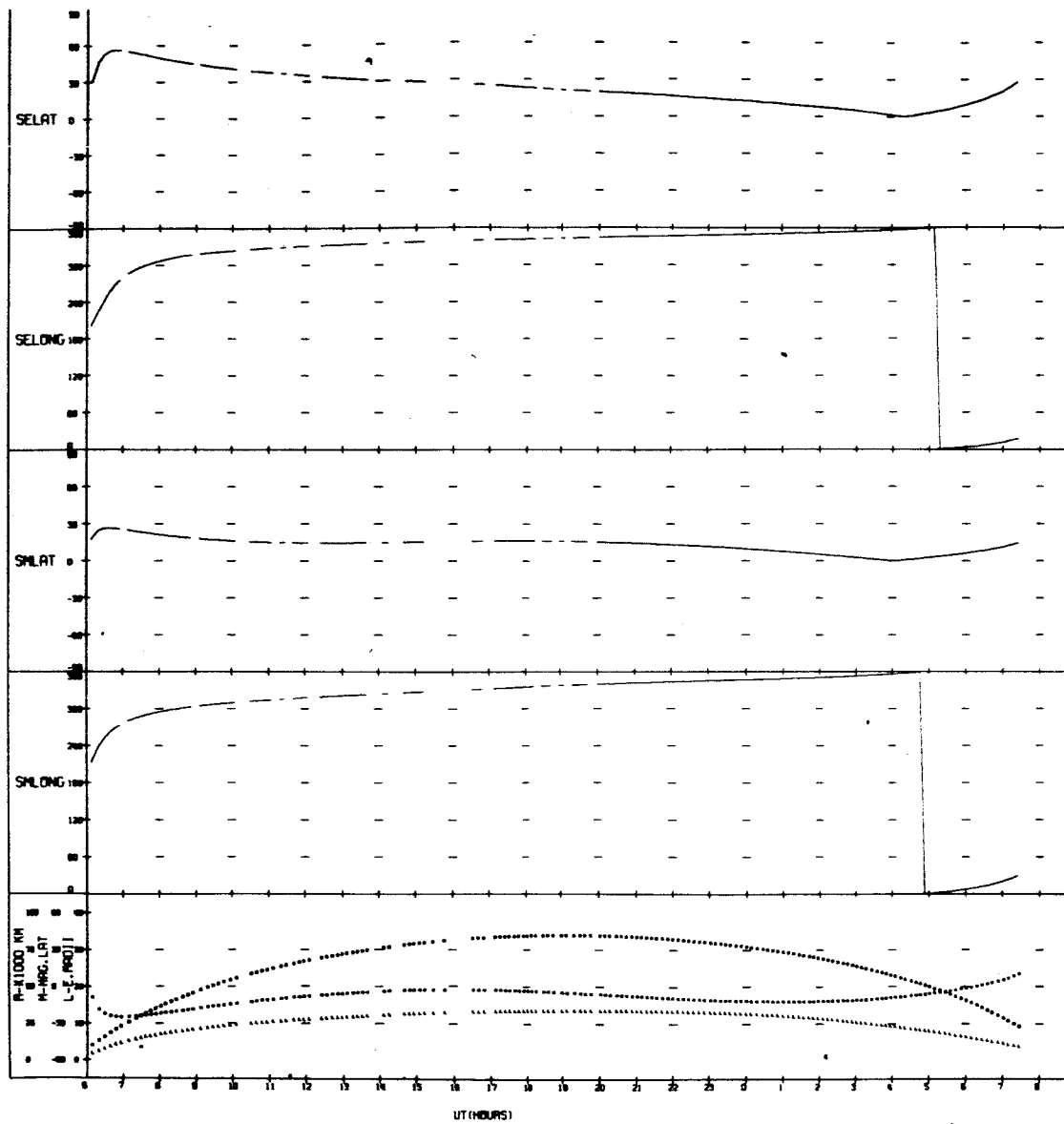


# UNIVERSITY OF IOWA

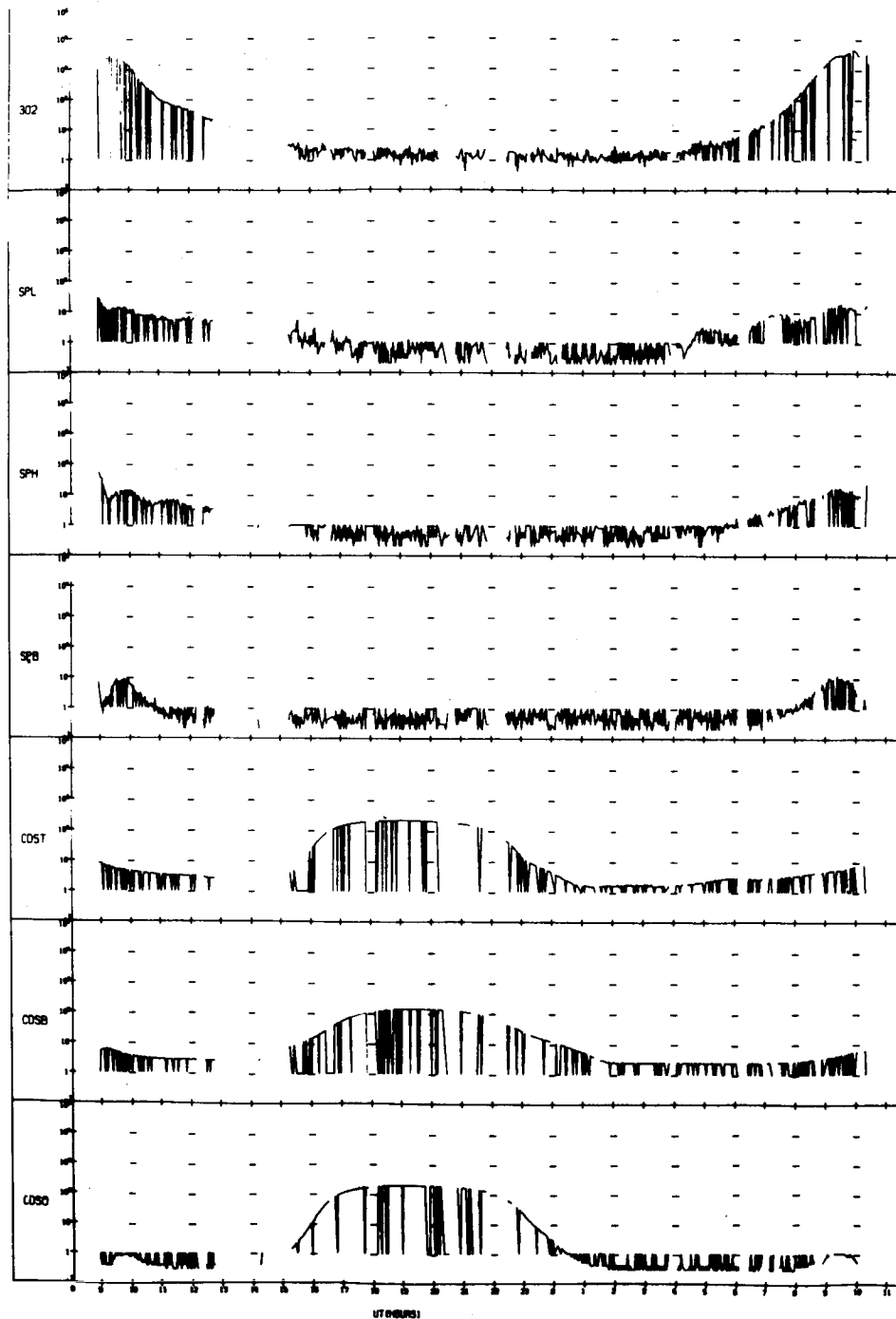
EXPLORER 12 ORBIT 30

BEGIN 9/17/61/06:07

END 9/18/61/08:53



UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 31  
 BEGIN 9/18/61/08:57  
 END 9/19/61/11:39

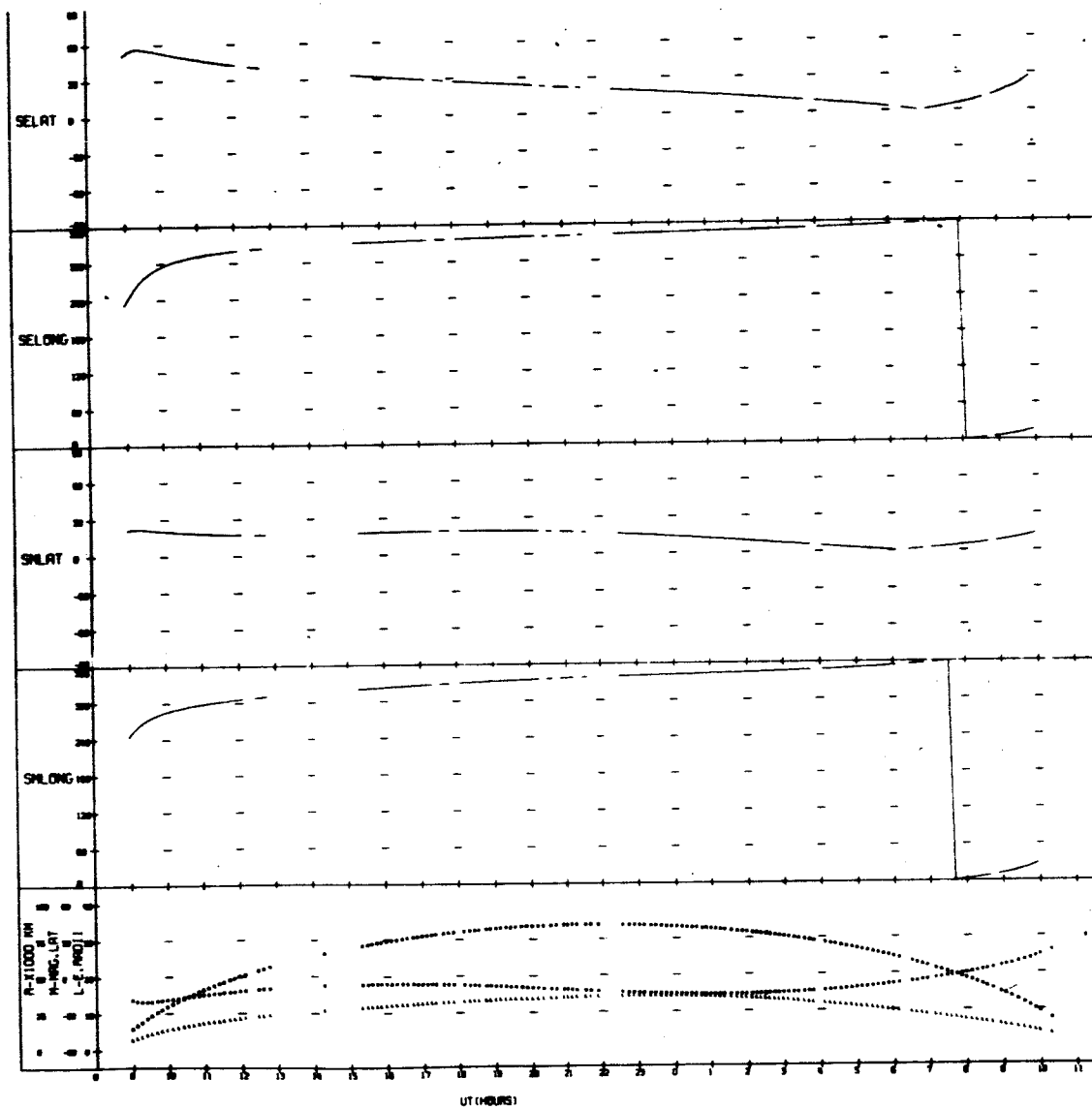


# UNIVERSITY OF IOWA

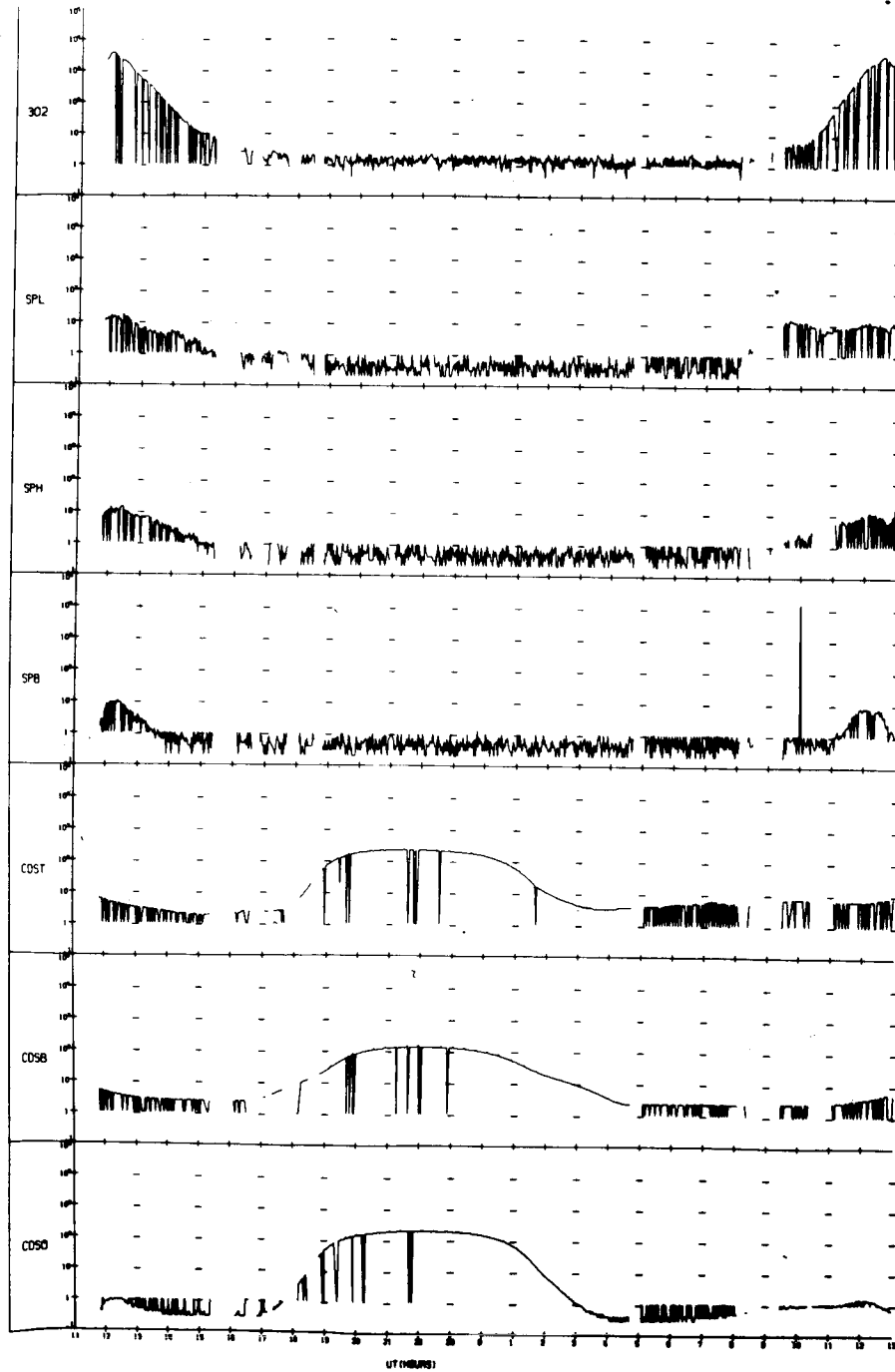
EXPLORER 12 ORBIT 31

BEGIN 9/18/61/08:57

END 9/19/61/11:39



UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 32  
 BEGIN 9/19/61/11:47  
 END 9/20/61/13:00

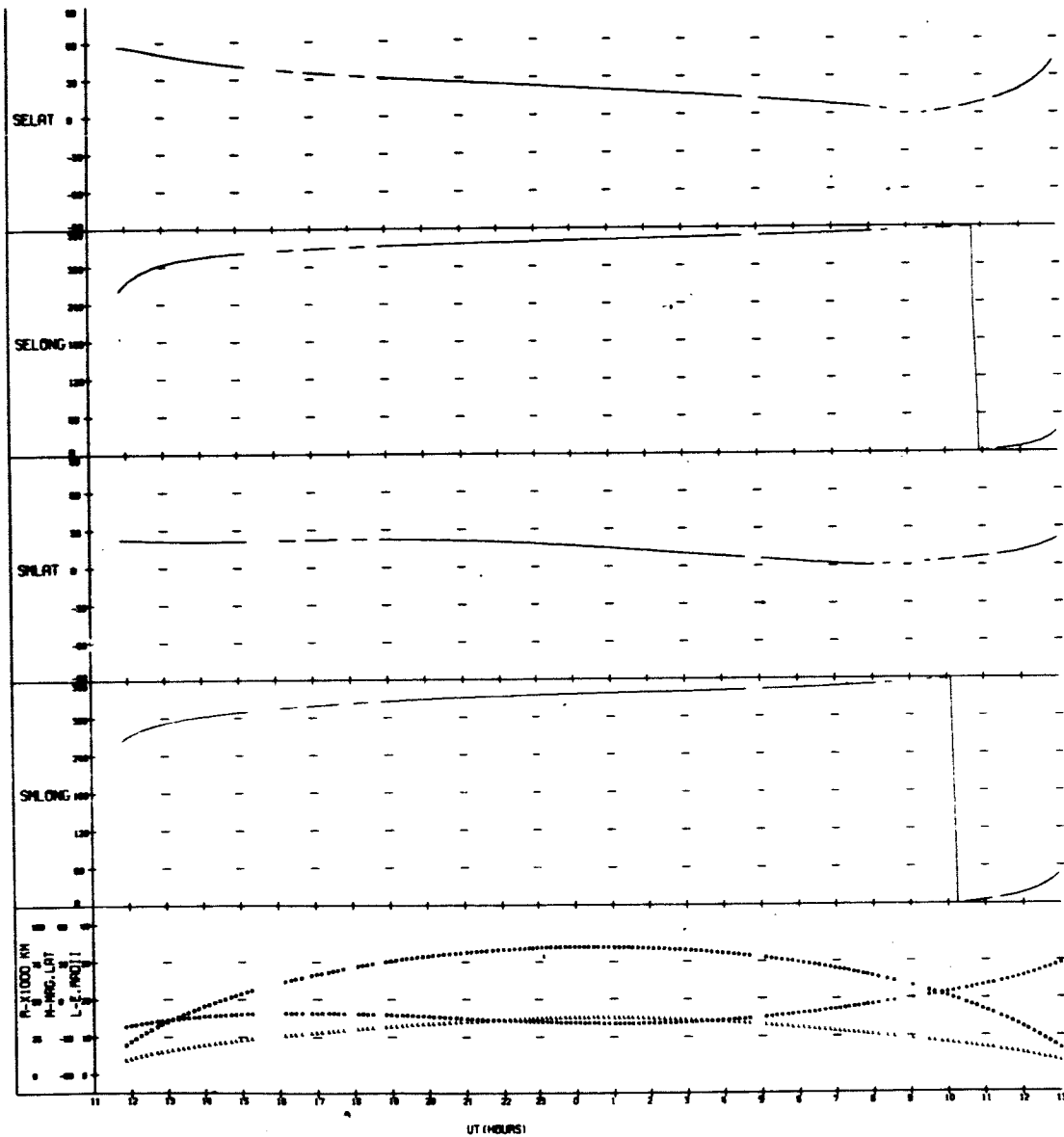


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 32

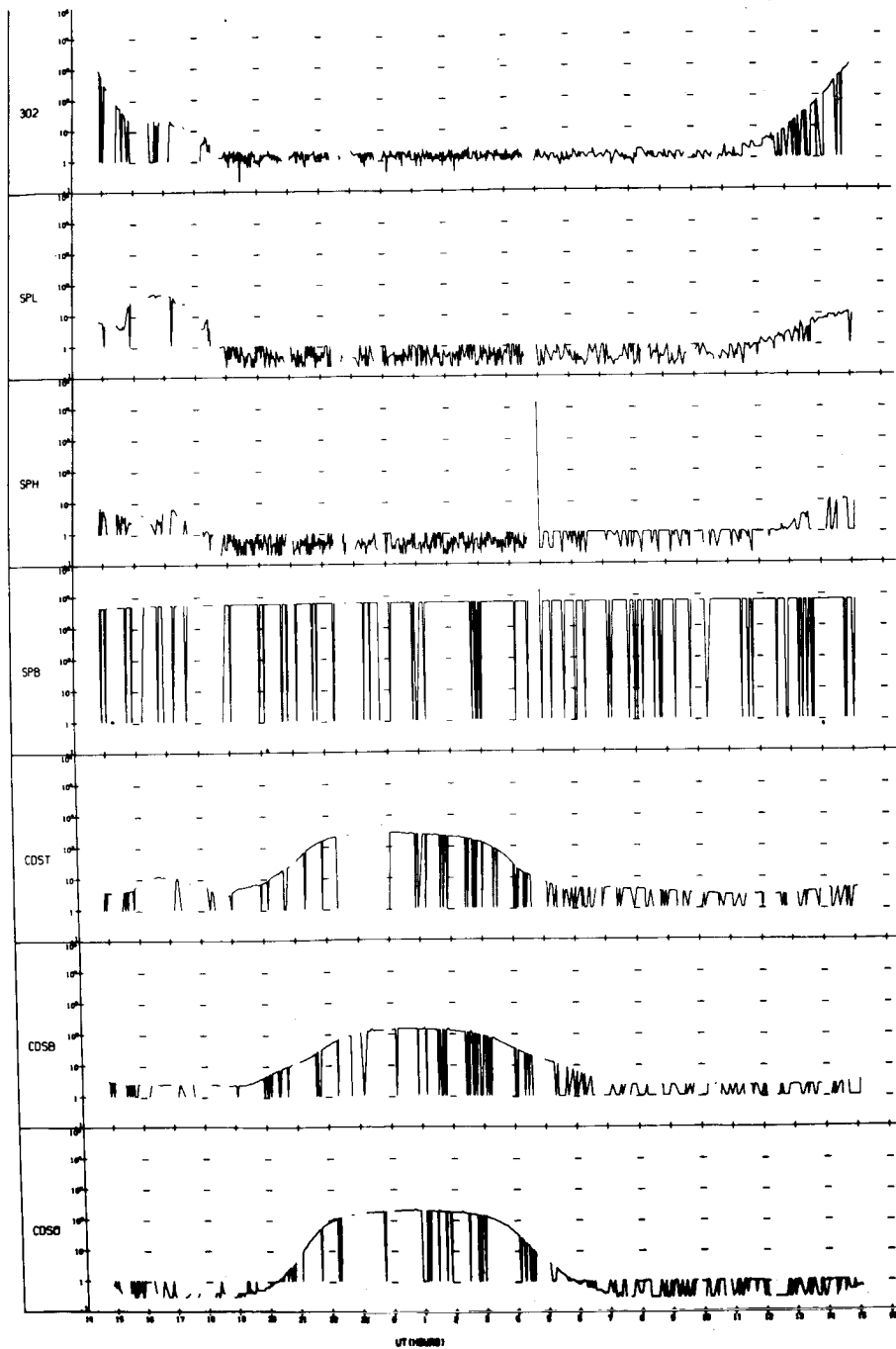
BEGIN 9/19/61/11:47

END 9/20/61/13:00



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 33  
 BEGIN 9/20/61/14:52  
 END 9/21/61/16:25

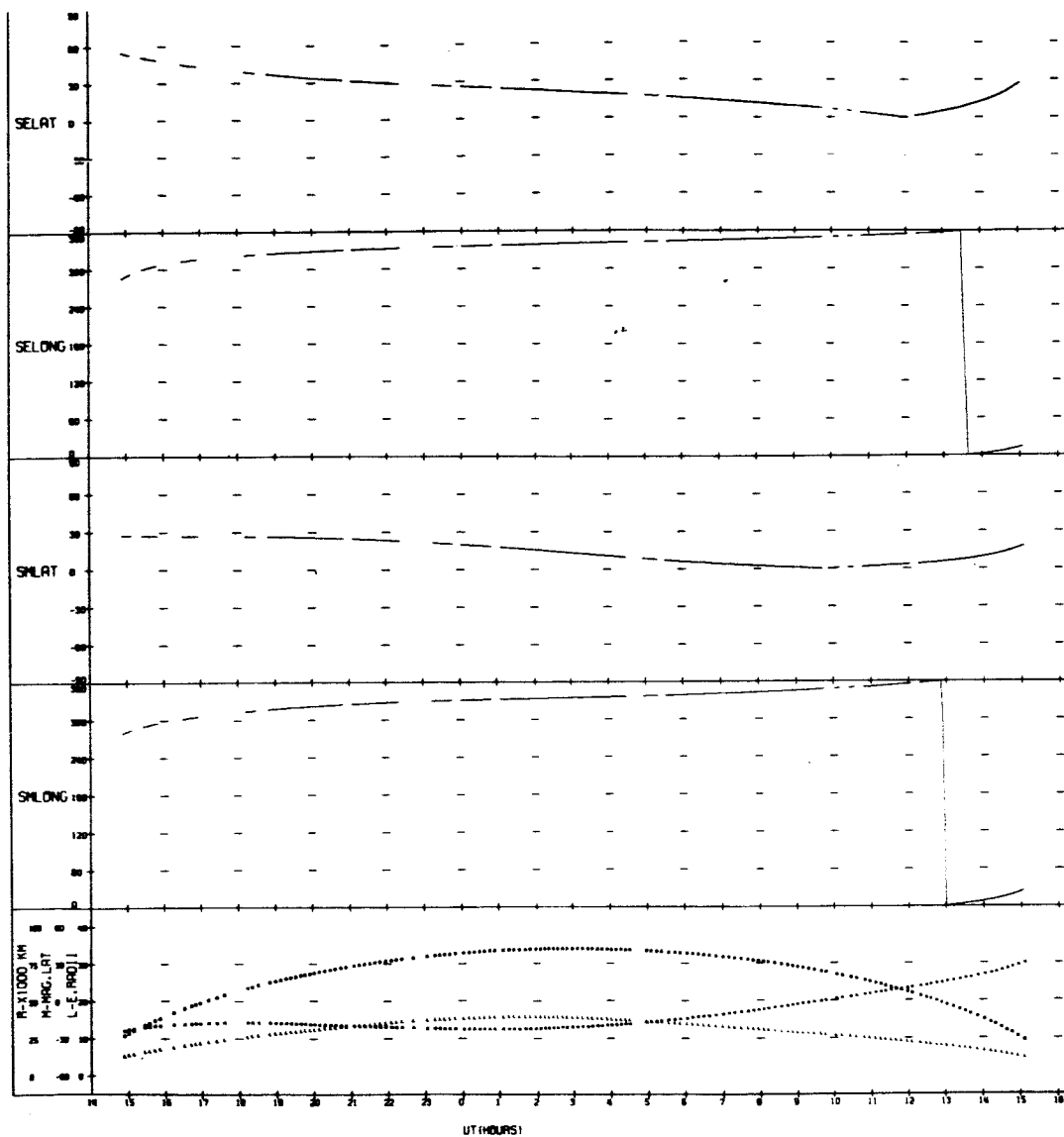


# UNIVERSITY OF IOWA

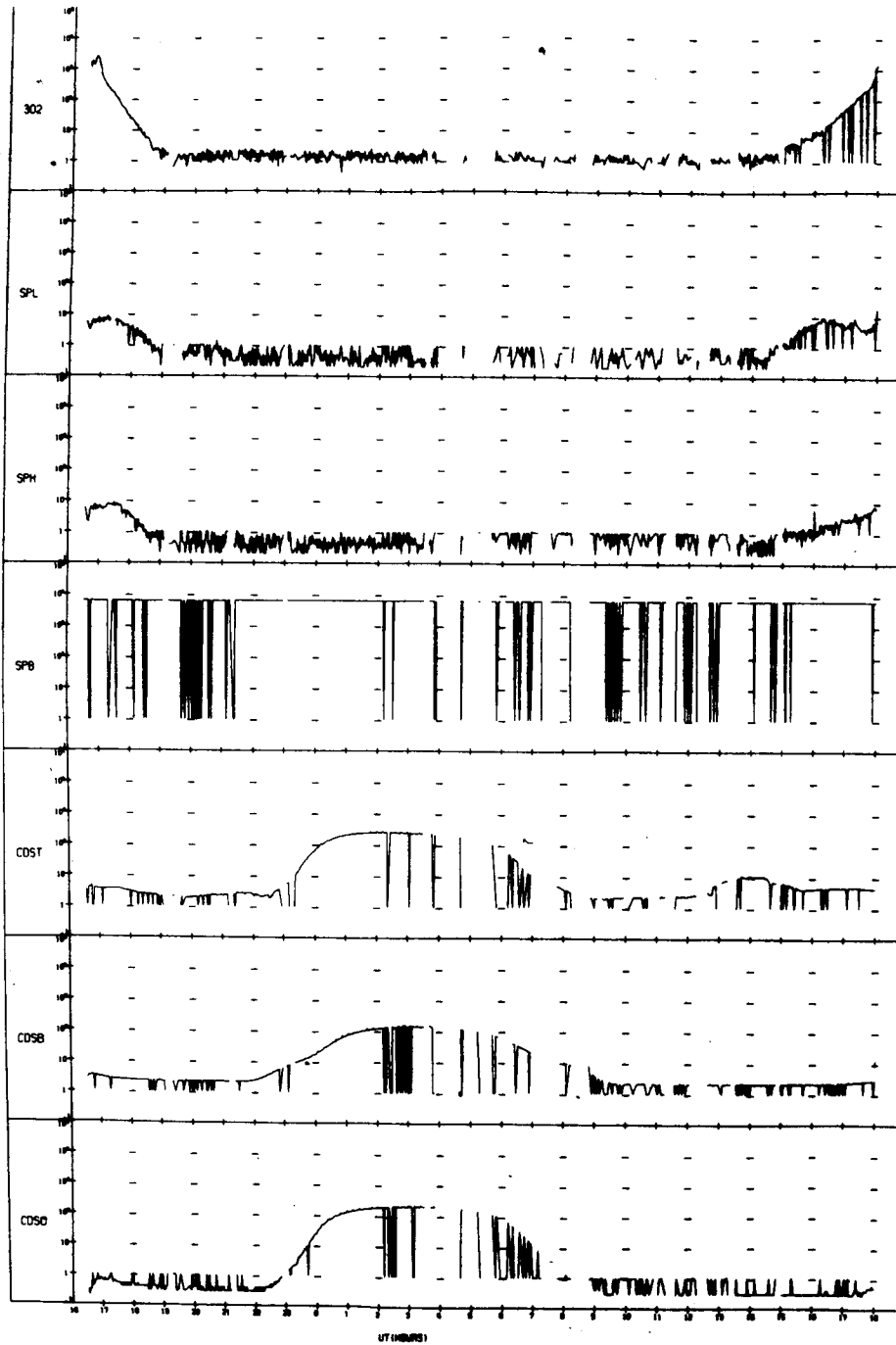
EXPLORER 12 ORBIT 33

BEGIN 9/20/61/14:52

END 9/21/61/16:25

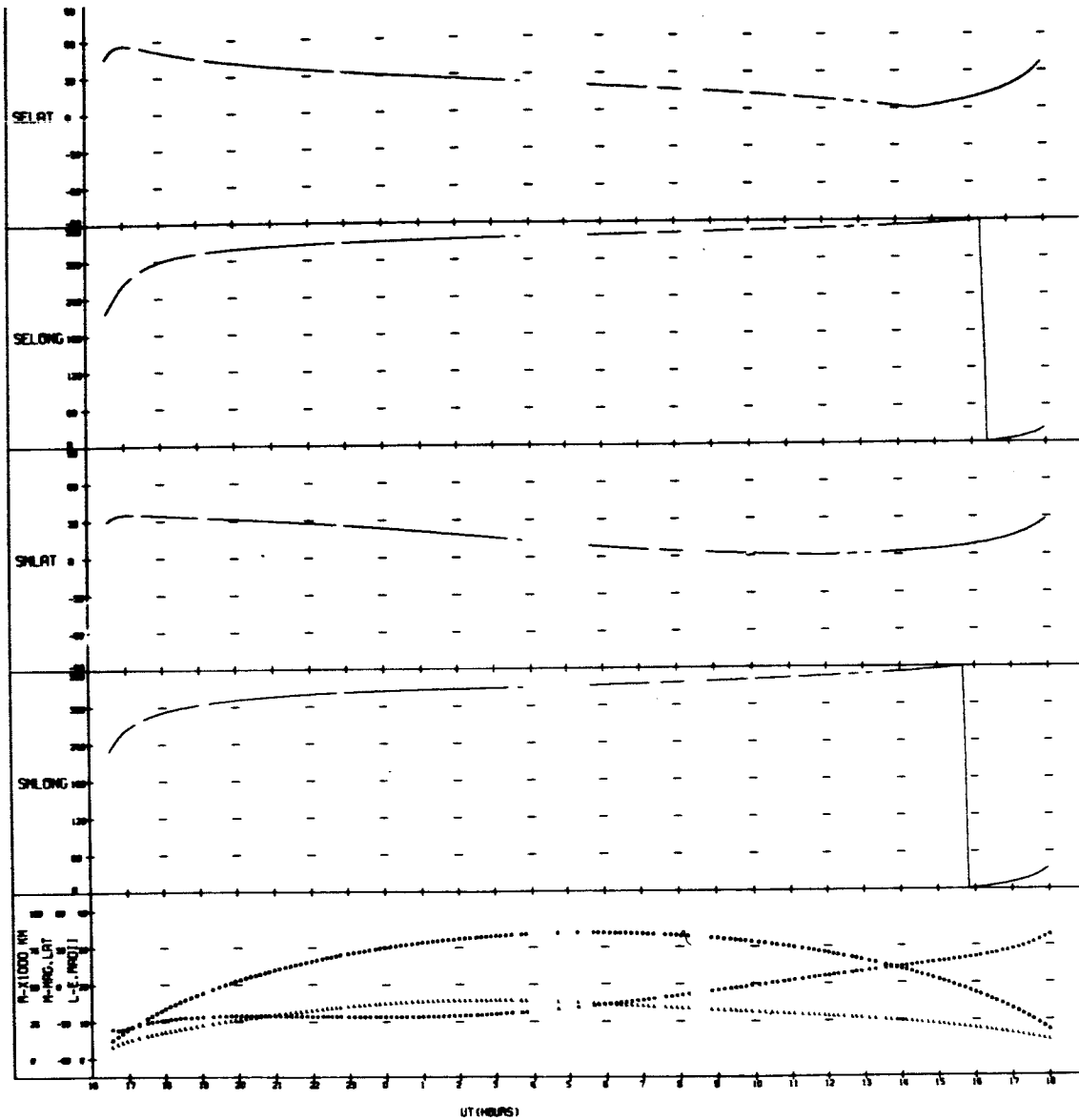


UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 34  
 BEGIN 9/21/61/16:32  
 END 9/22/61/18:58



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 34  
 BEGIN 9/21/61/16:32  
 END 9/22/61/18:58

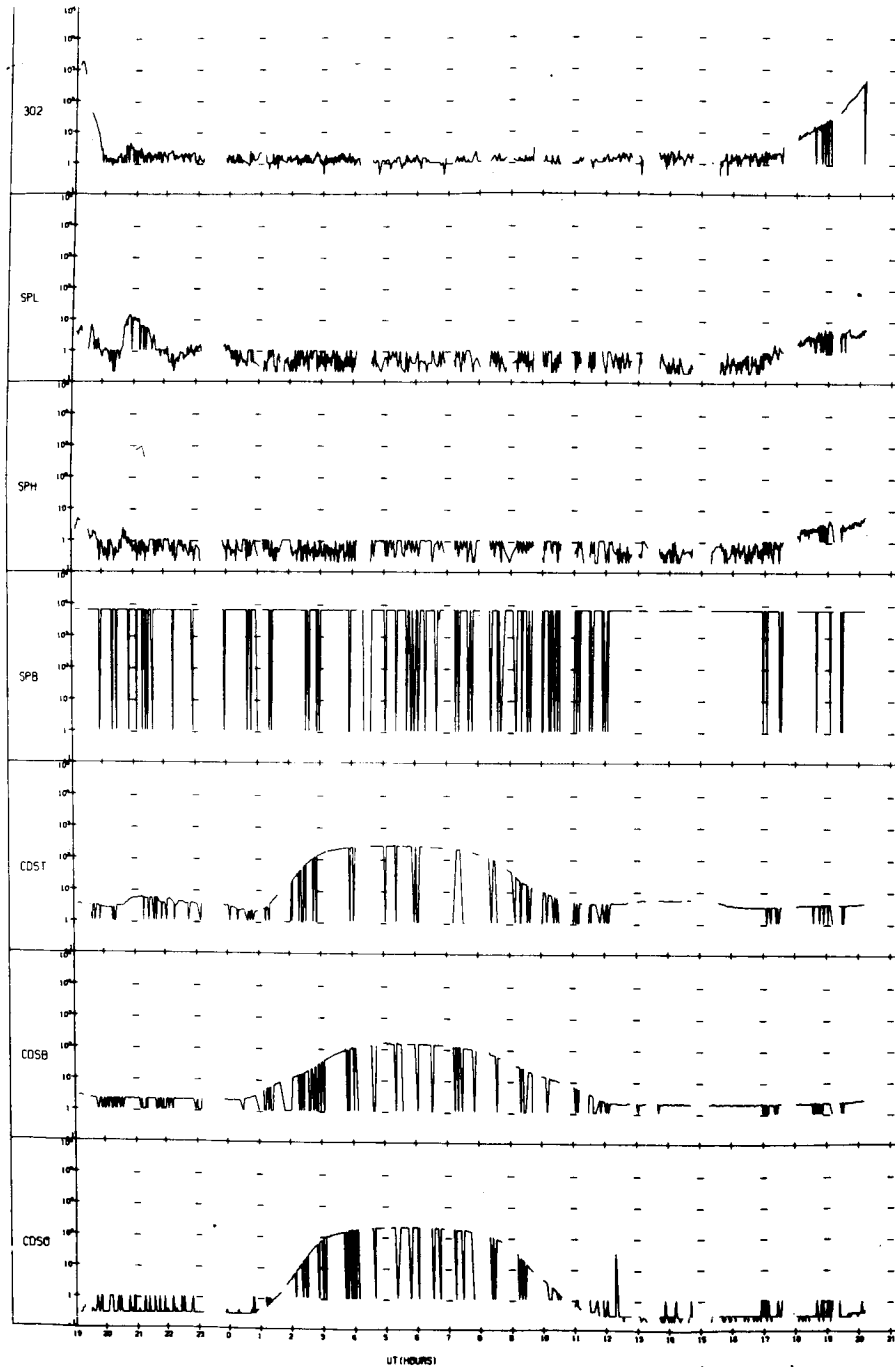


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 35

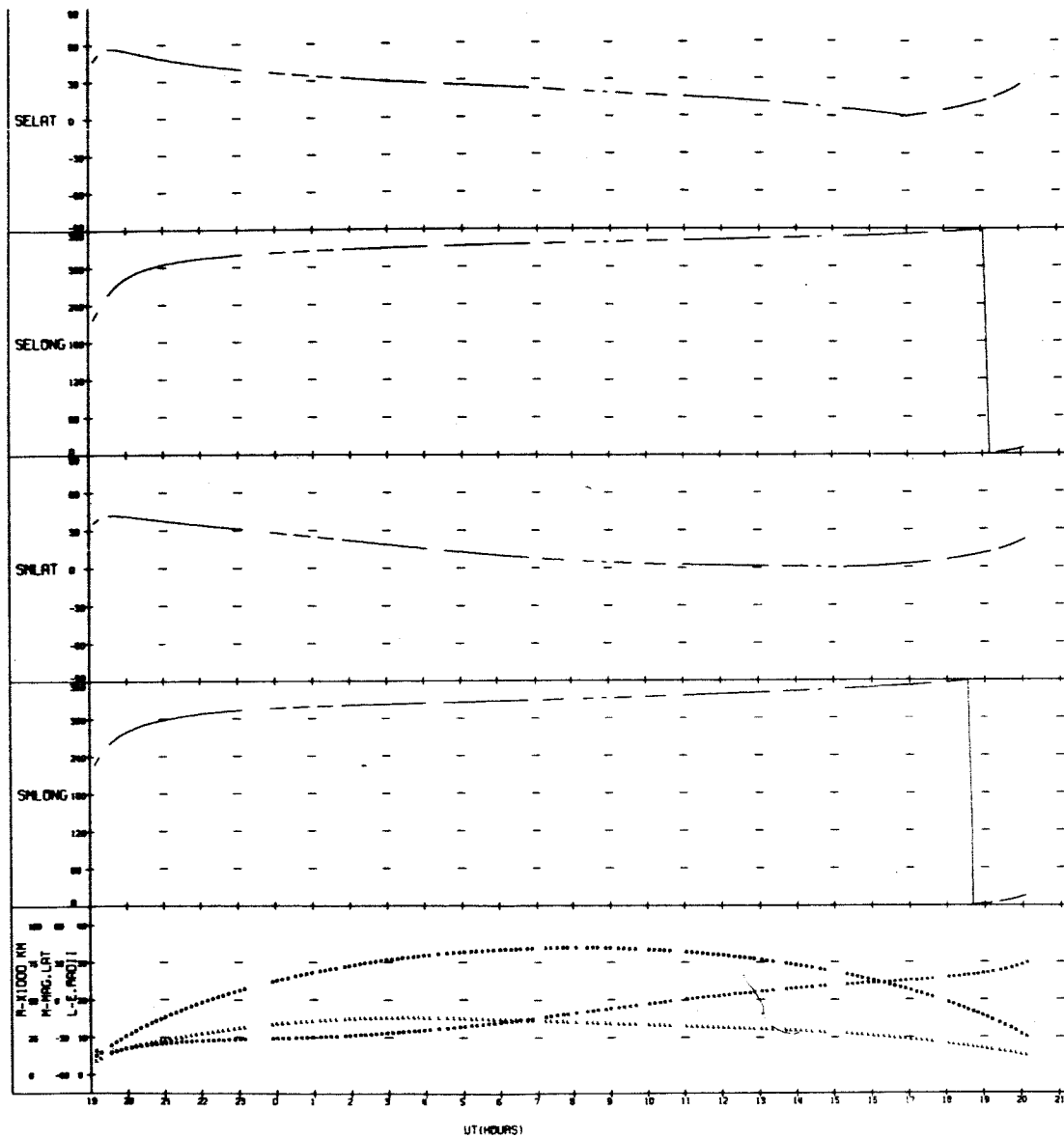
BEGIN 9/22/61/19:05

END 9/23/61/21:22

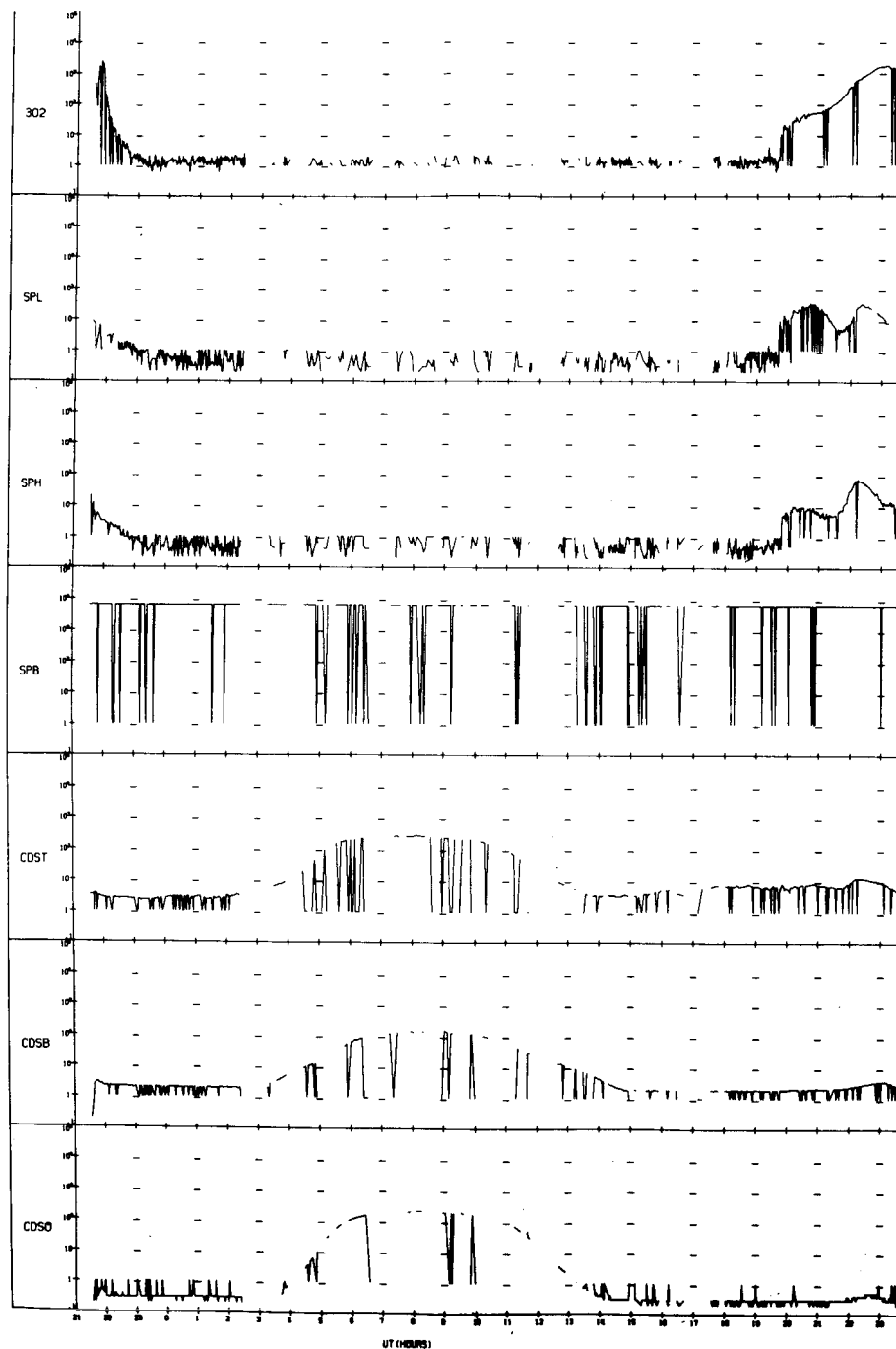


EXPLORER 12 ORBIT 35  
BEGIN 9/22/61/19:05  
END 9/23/61/21:22

EXPLORER 12 ORBIT 35  
BEGIN 9/22/61/19:05  
END 9/23/61/21:22



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 36  
BEGIN 9/23/61/21:33  
END 9/24/61/23:40

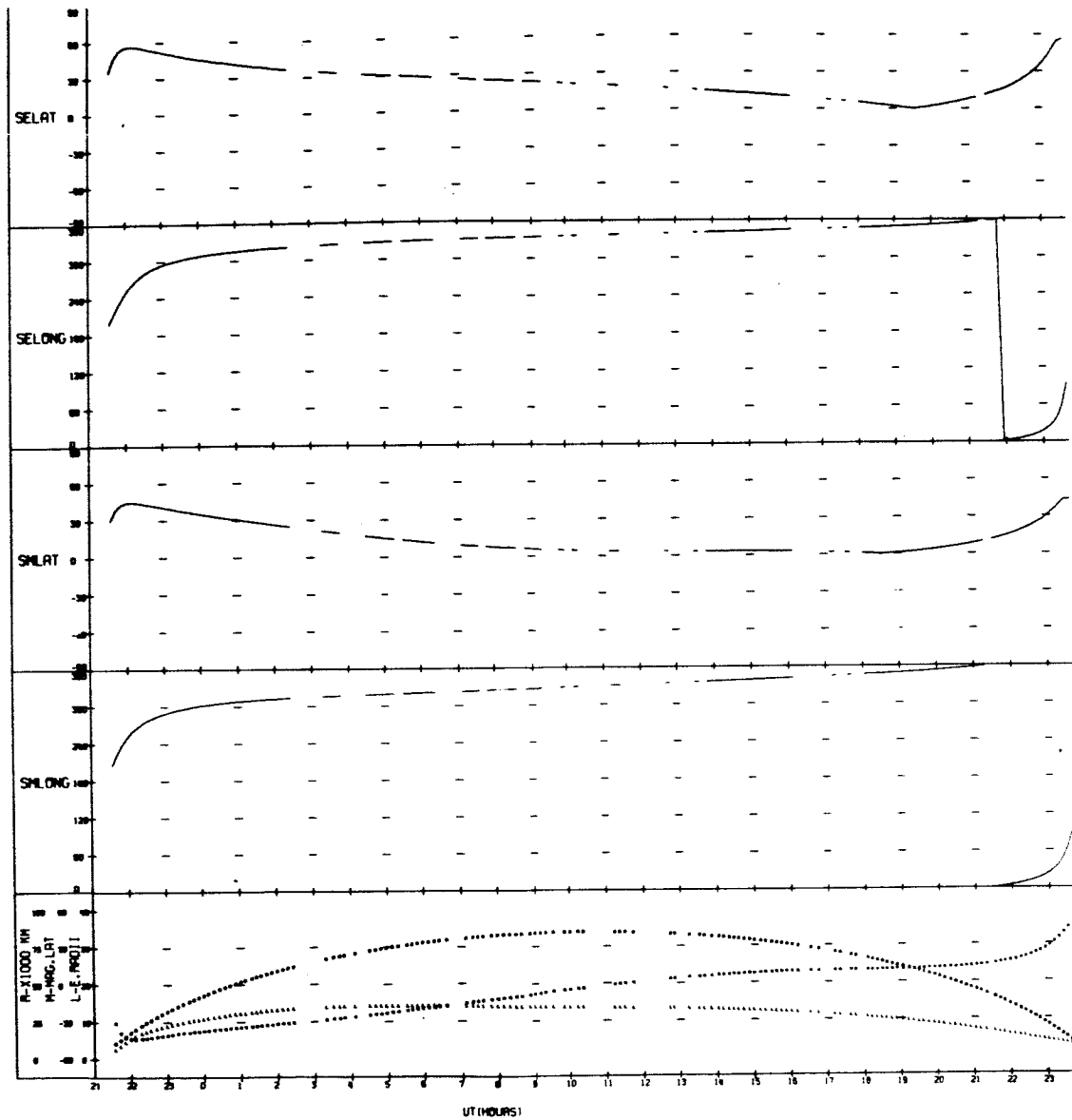


# UNIVERSITY OF IOWA

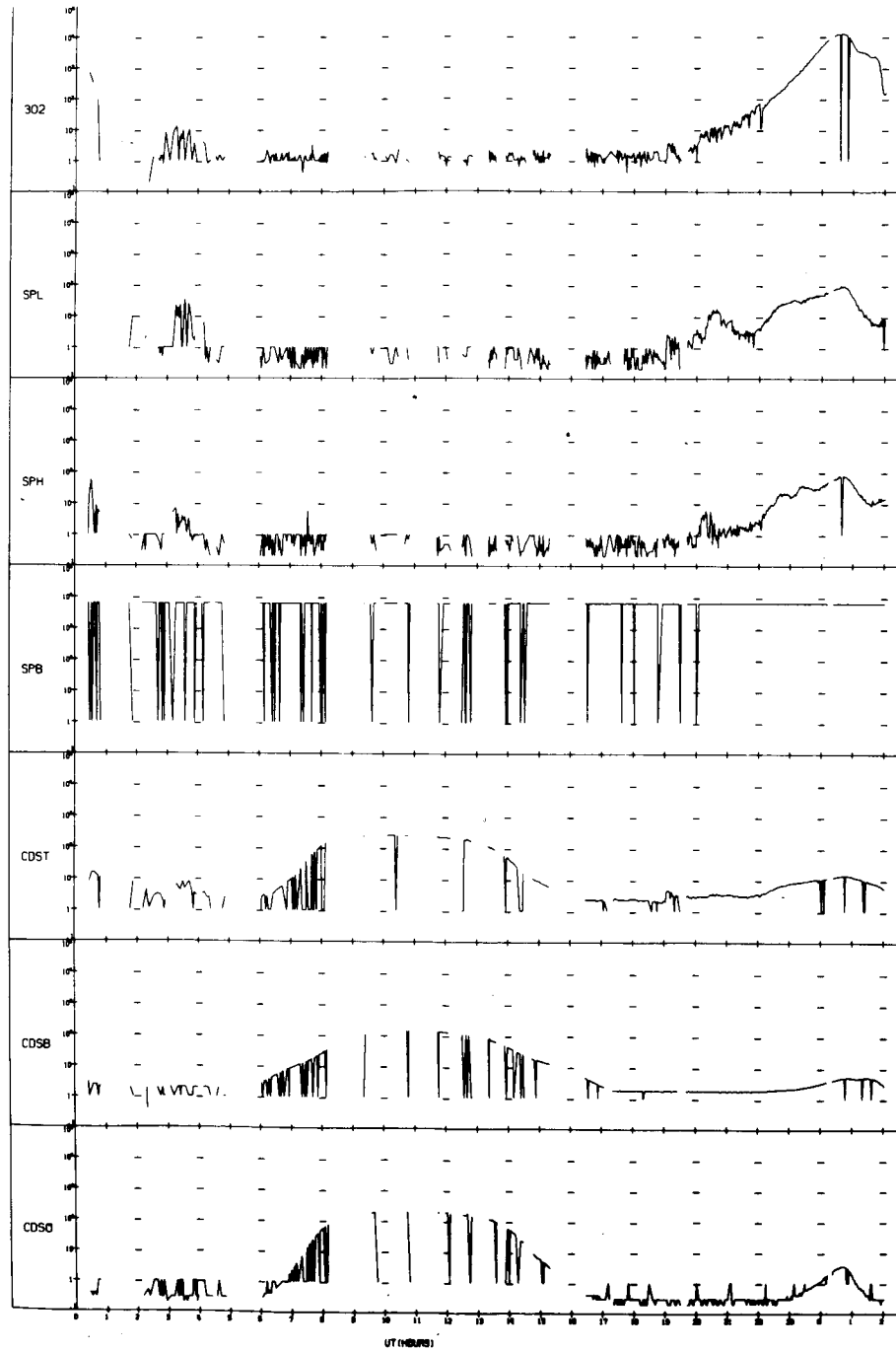
EXPLORER 12 ORBIT 36

BEGIN 9/23/61/21:33

END 9/24/61/23:40

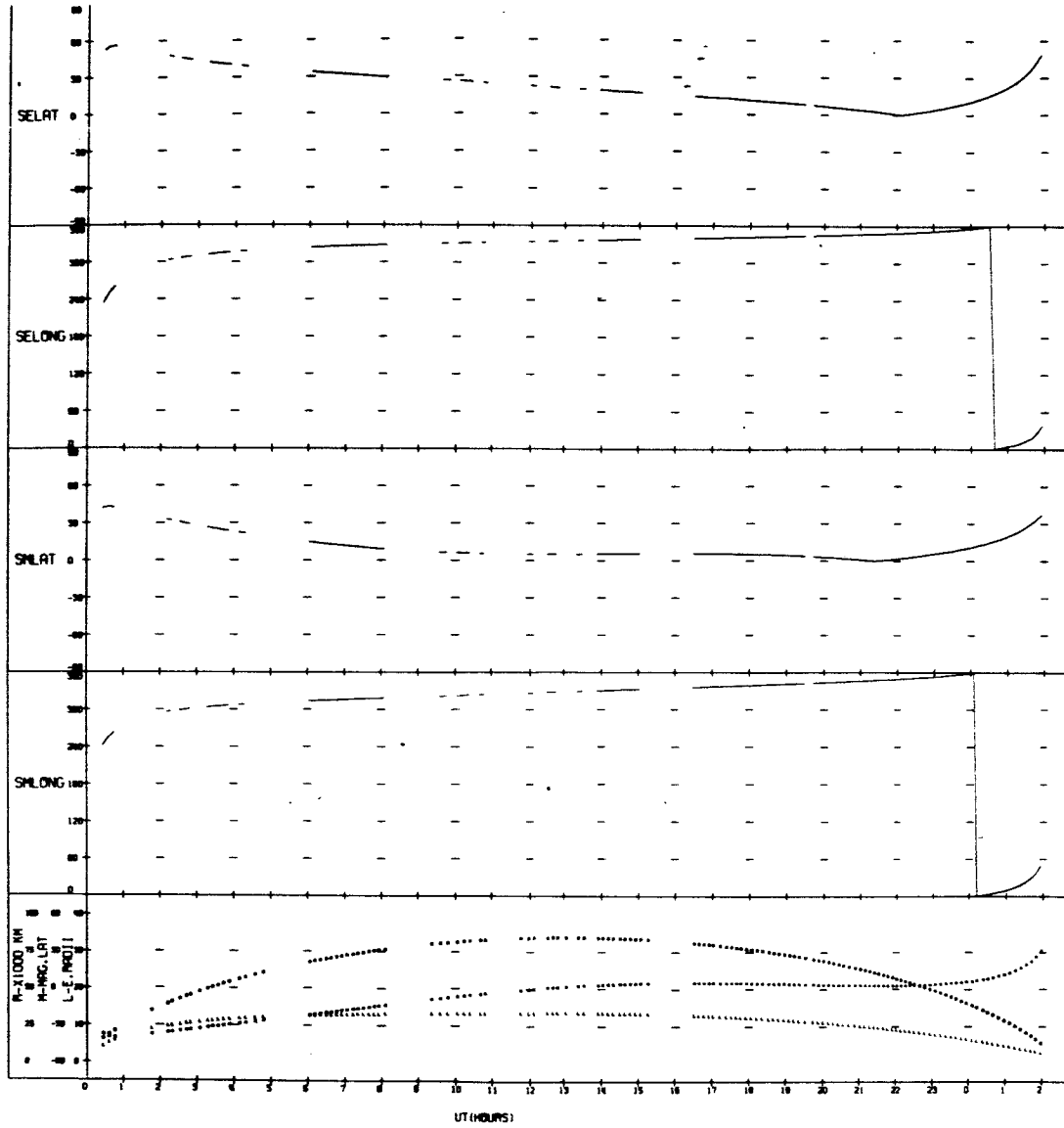


UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 37  
BEGIN 9/25/61/00:08  
END 9/26/61/02:42

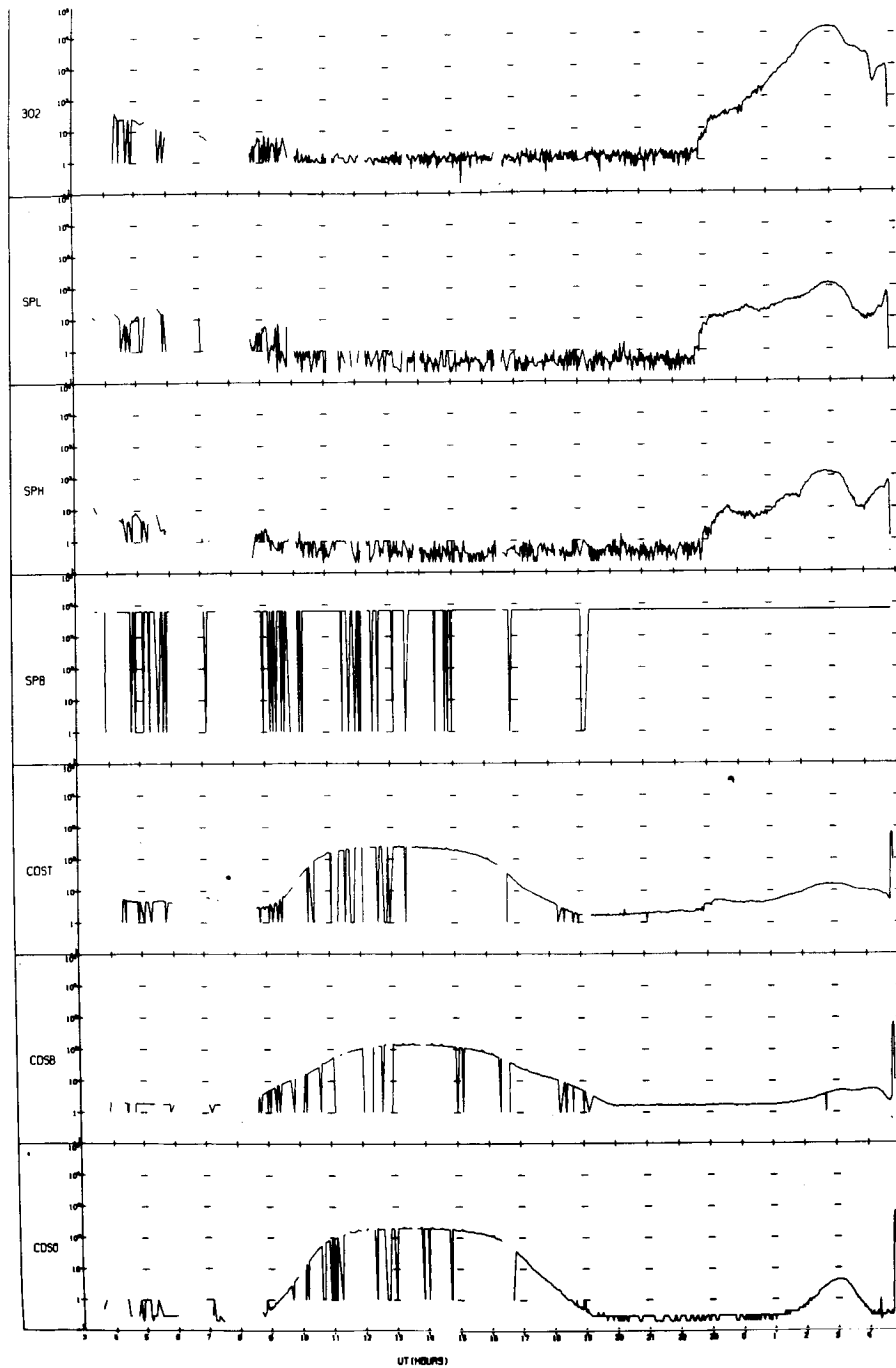


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 37  
 BEGIN 9/25/61/00:08  
 END 9/26/61/02:42



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 38  
BEGIN 9/26/61/03:32  
END 9/27/61/05:06

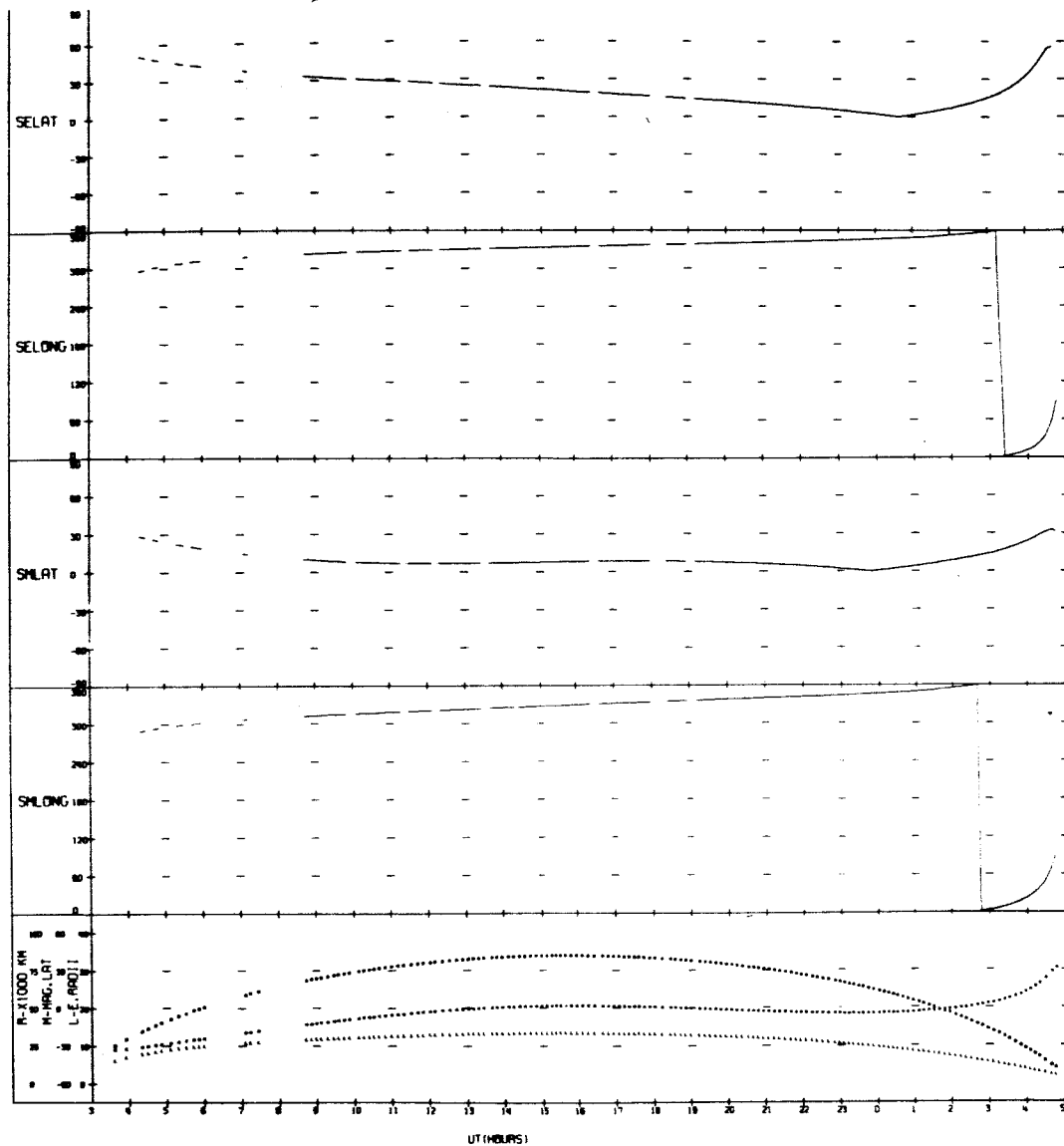


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 38

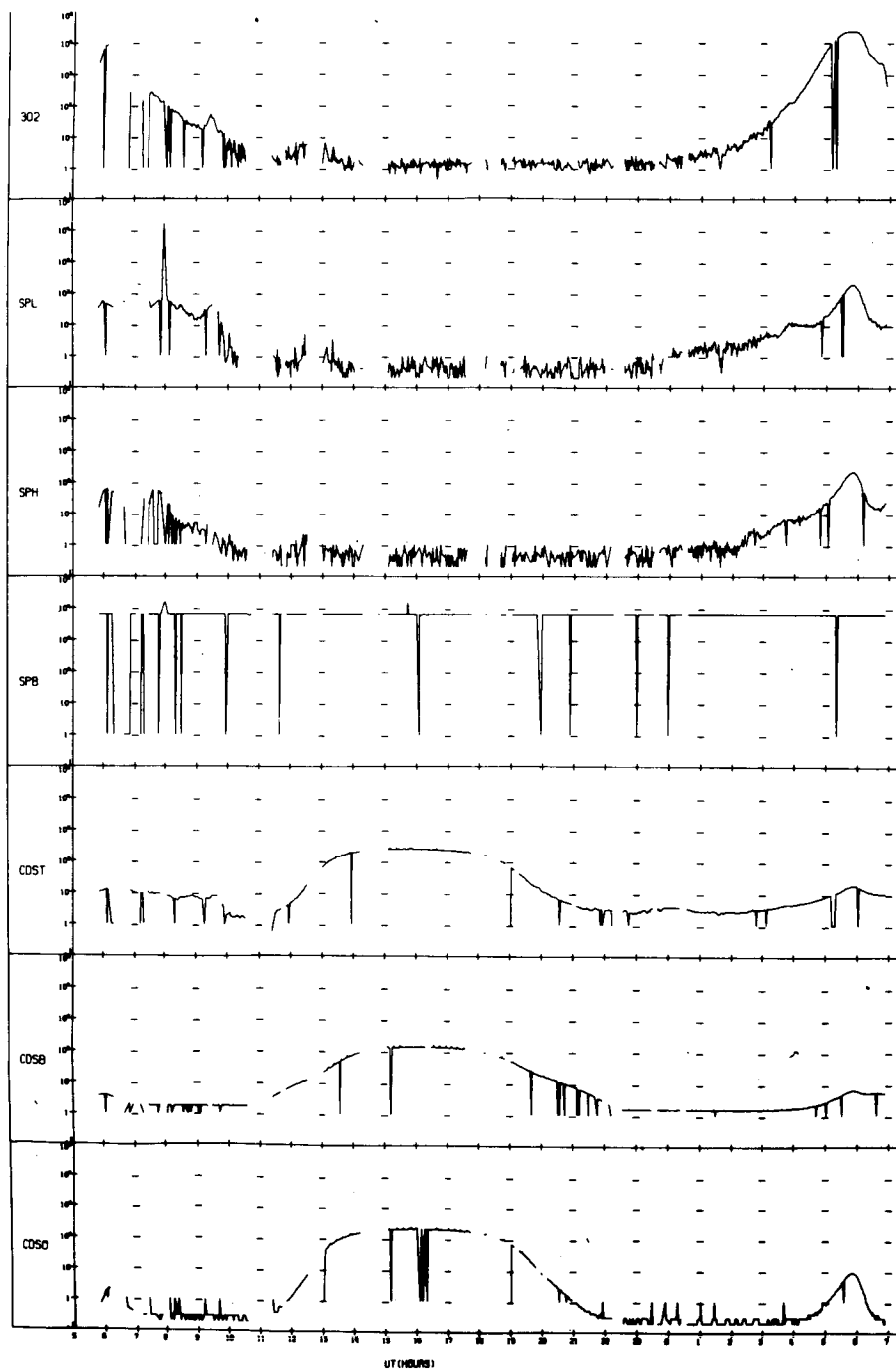
BEGIN 9/26/61/03:32

END 9/27/61/05:06



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 39  
 BEGIN 9/27/61/05:15  
 END 9/28/61/07:33

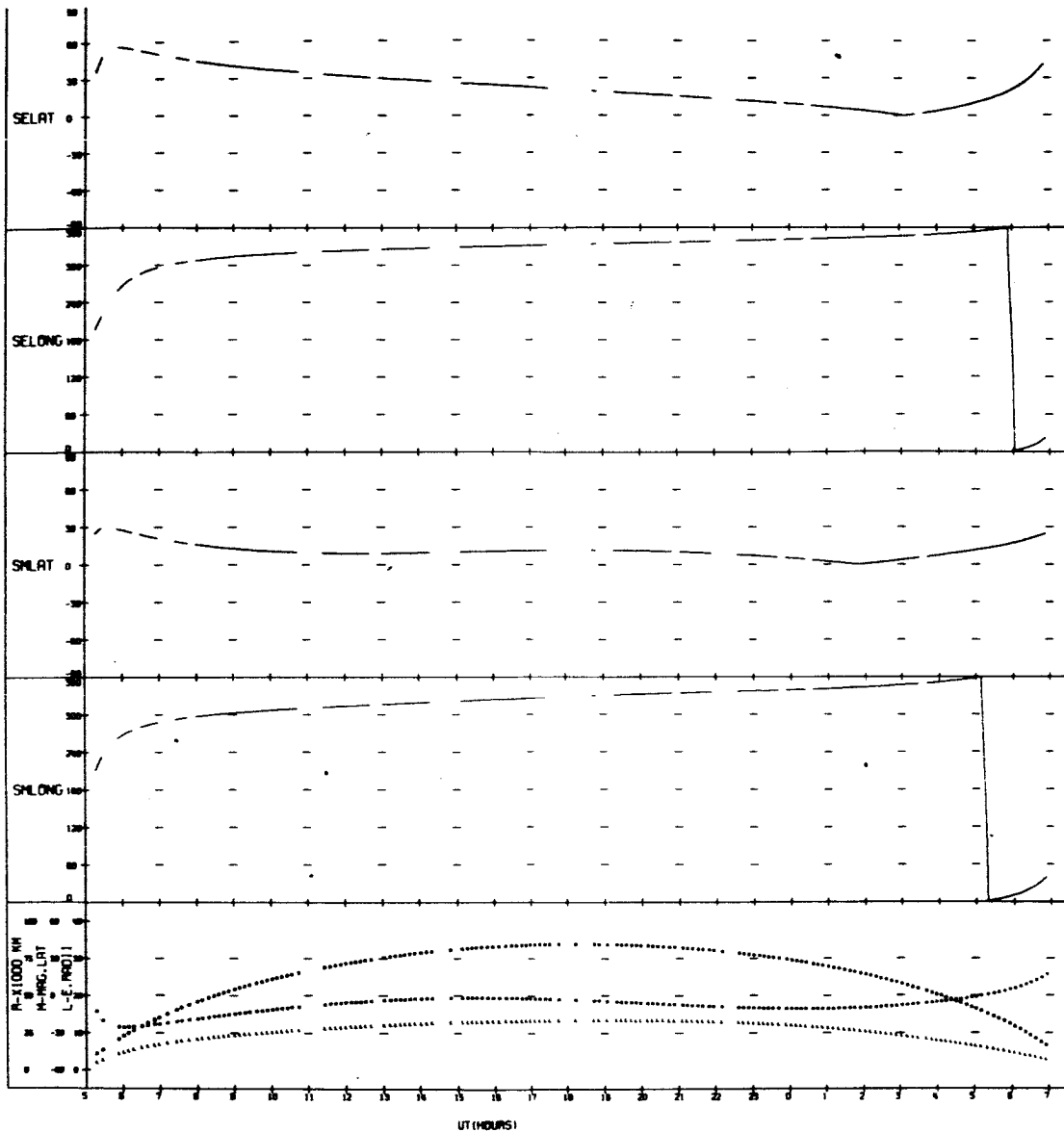


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 39

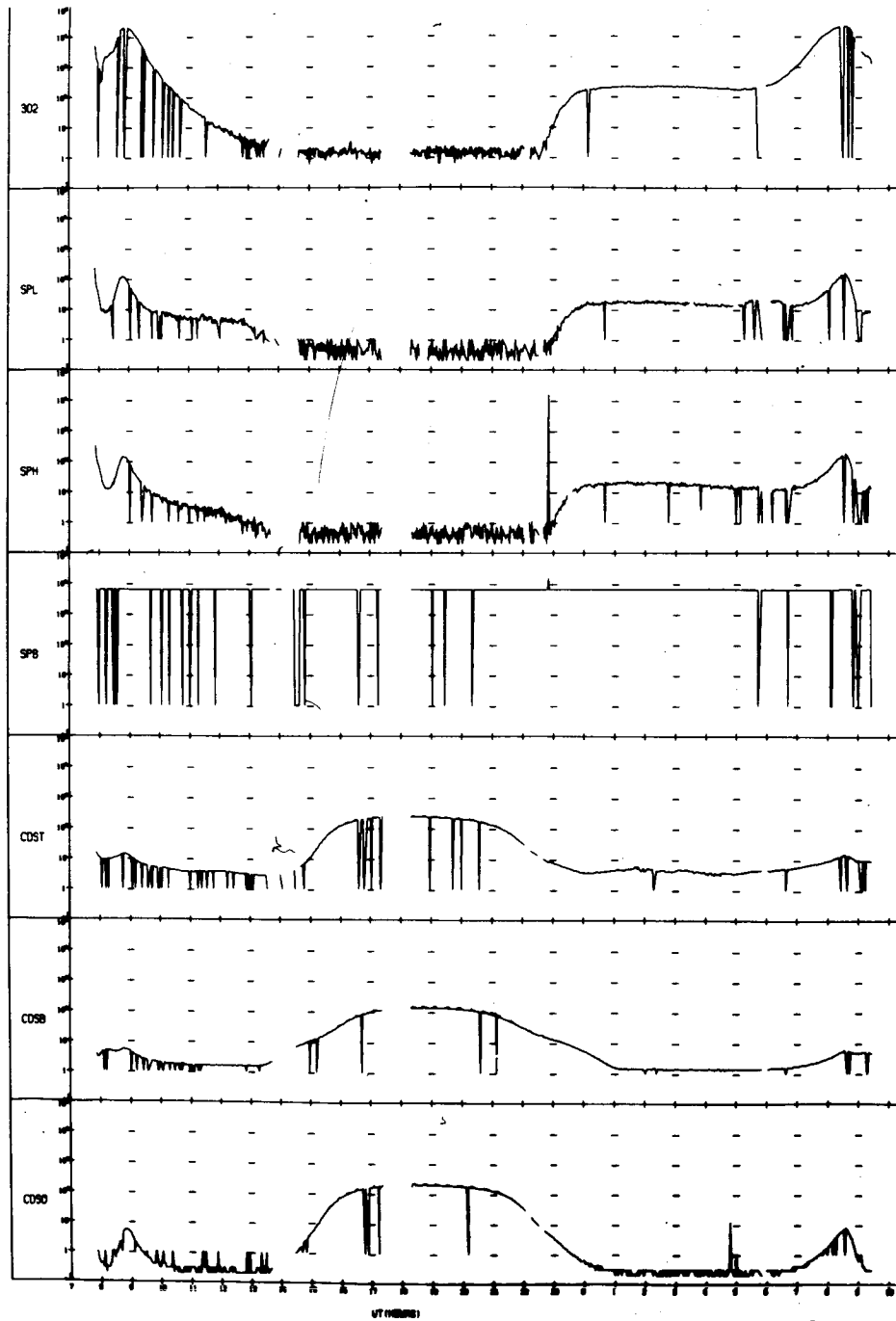
BEGIN 9/27/61/05:15

END 9/28/61/07:33



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 40  
 BEGIN 9/28/61/07:51  
 END 9/29/61/10:27

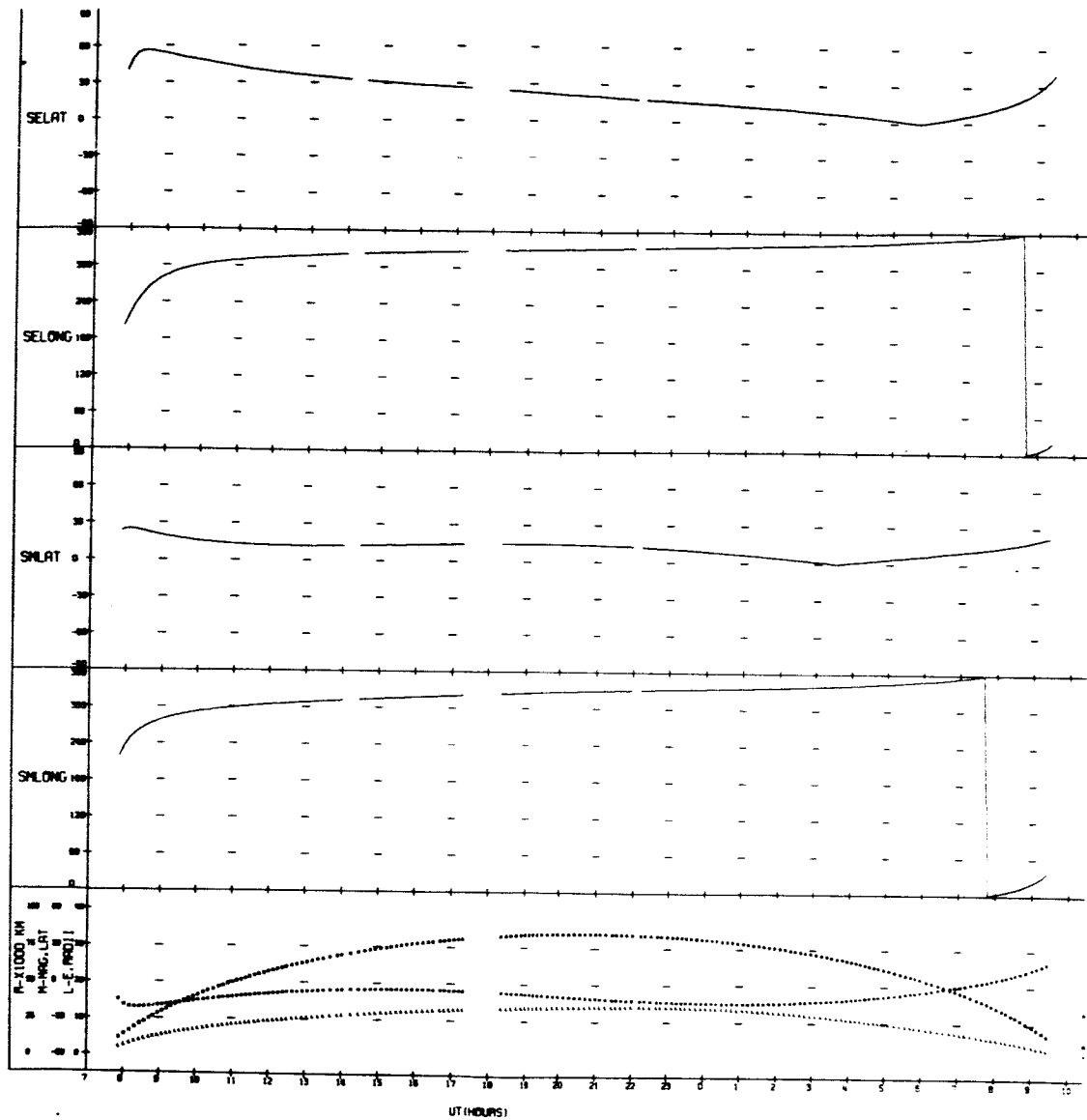


# UNIVERSITY OF IOWA

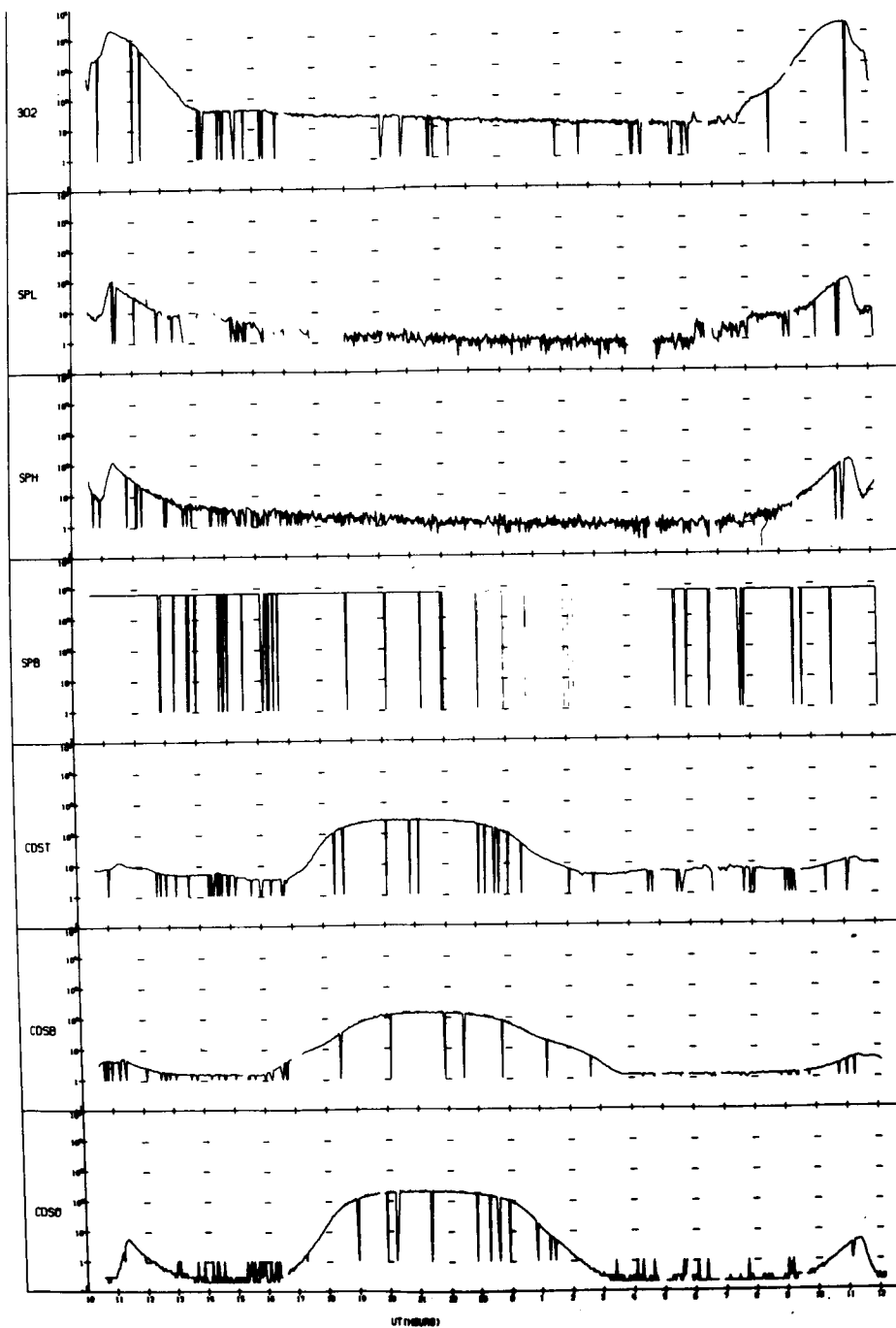
EXPLORER 12 ORBIT 40

BEGIN 9/28/61/07:51

END 9/29/61/10:27

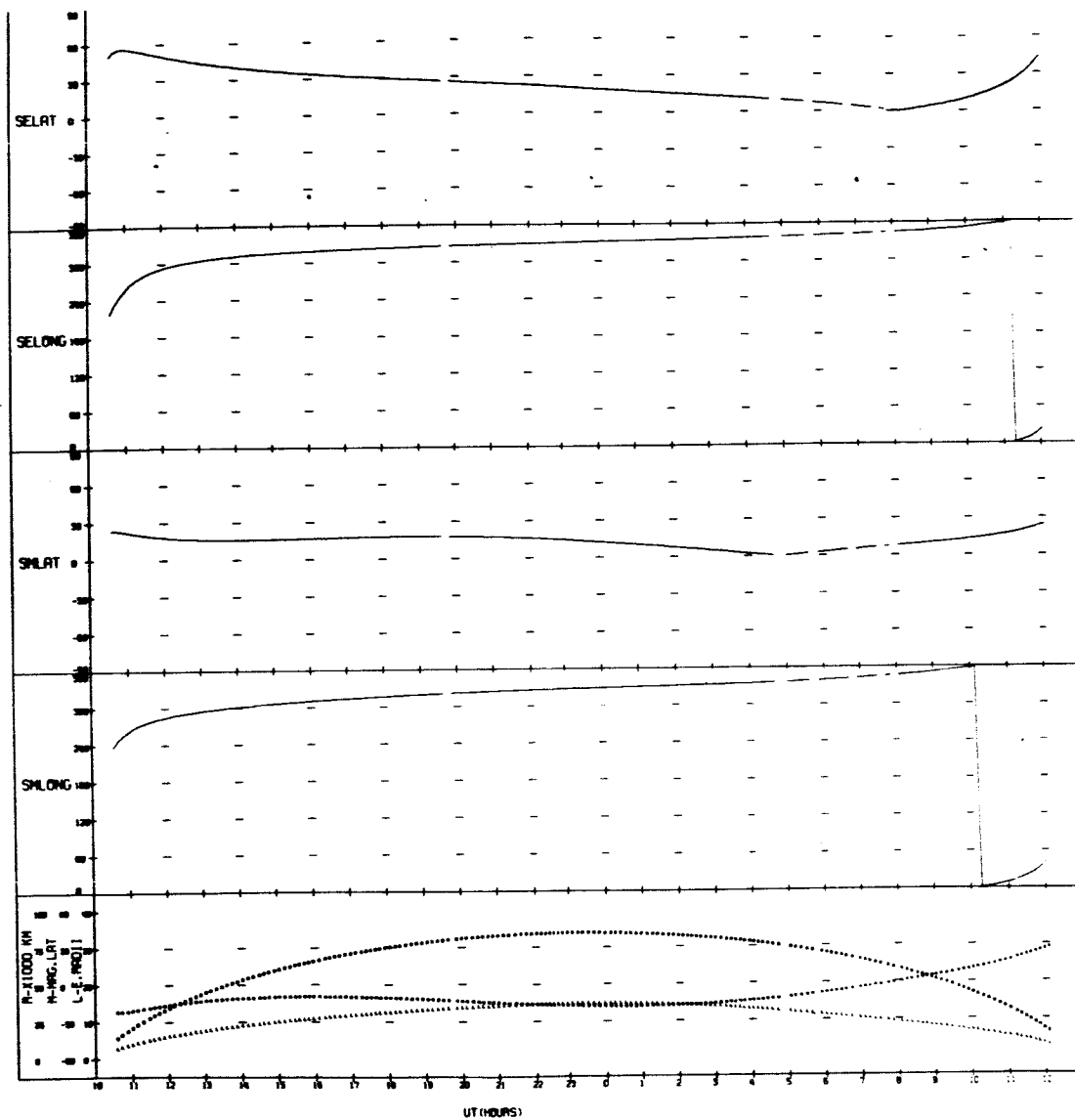


UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 41  
BEGIN 9/29/61/10:33  
END 9/30/61/12:56



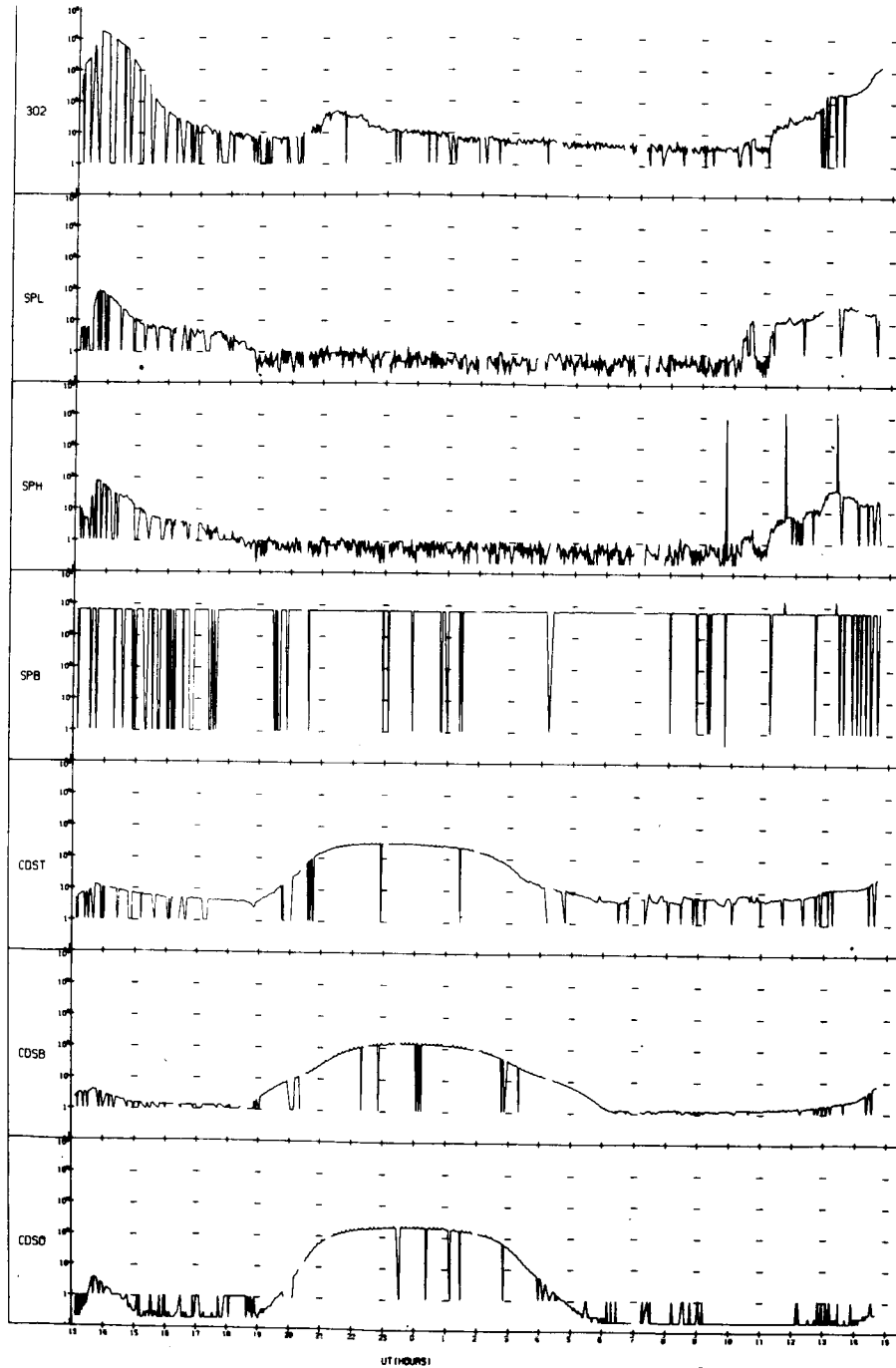
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 41  
 BEGIN 9/29/61/10:33  
 END 9/30/61/12:56



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 42  
 BEGIN 9/30/61/13:06  
 END 10/01/61/15:30

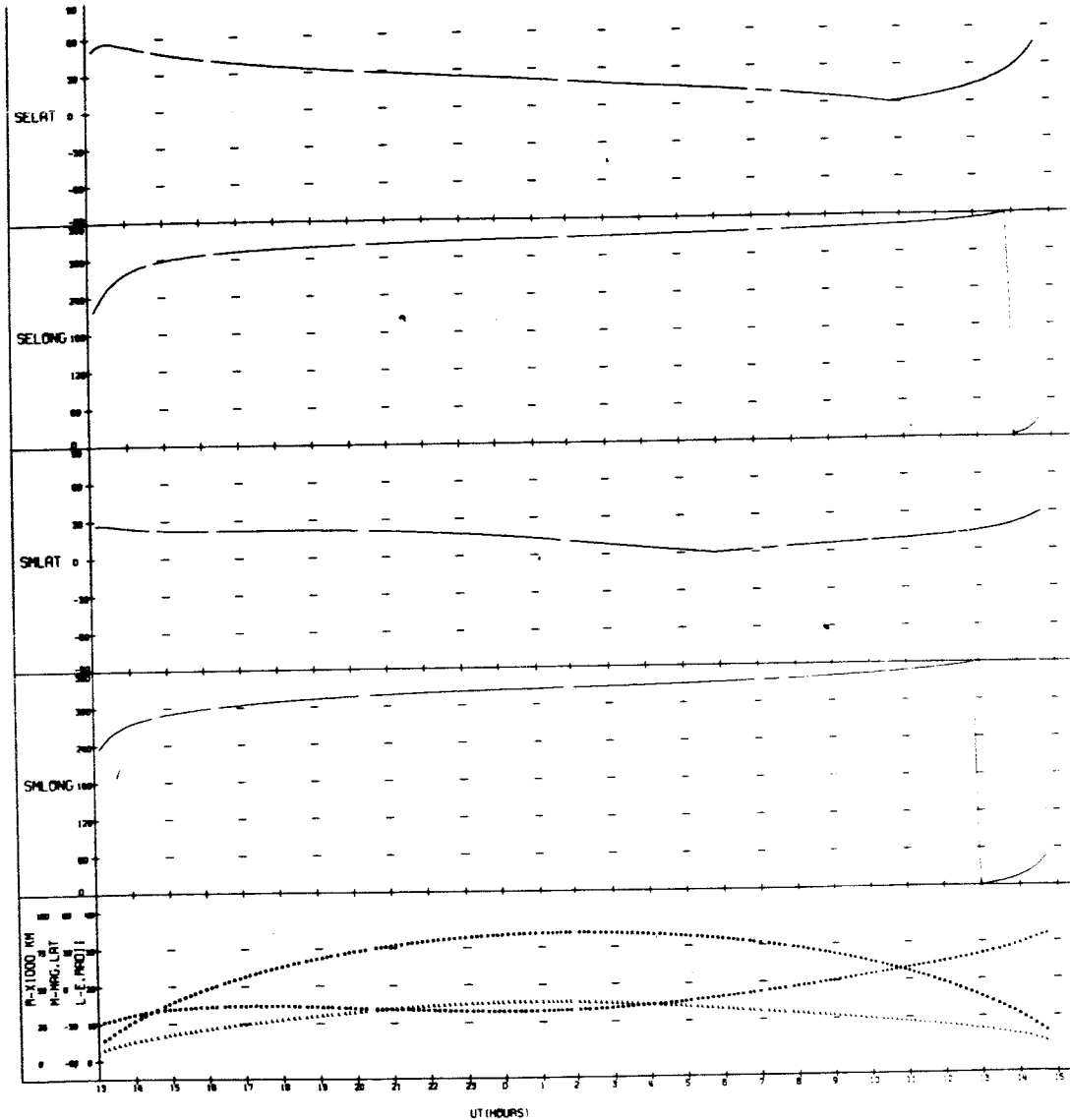


# UNIVERSITY OF IOWA

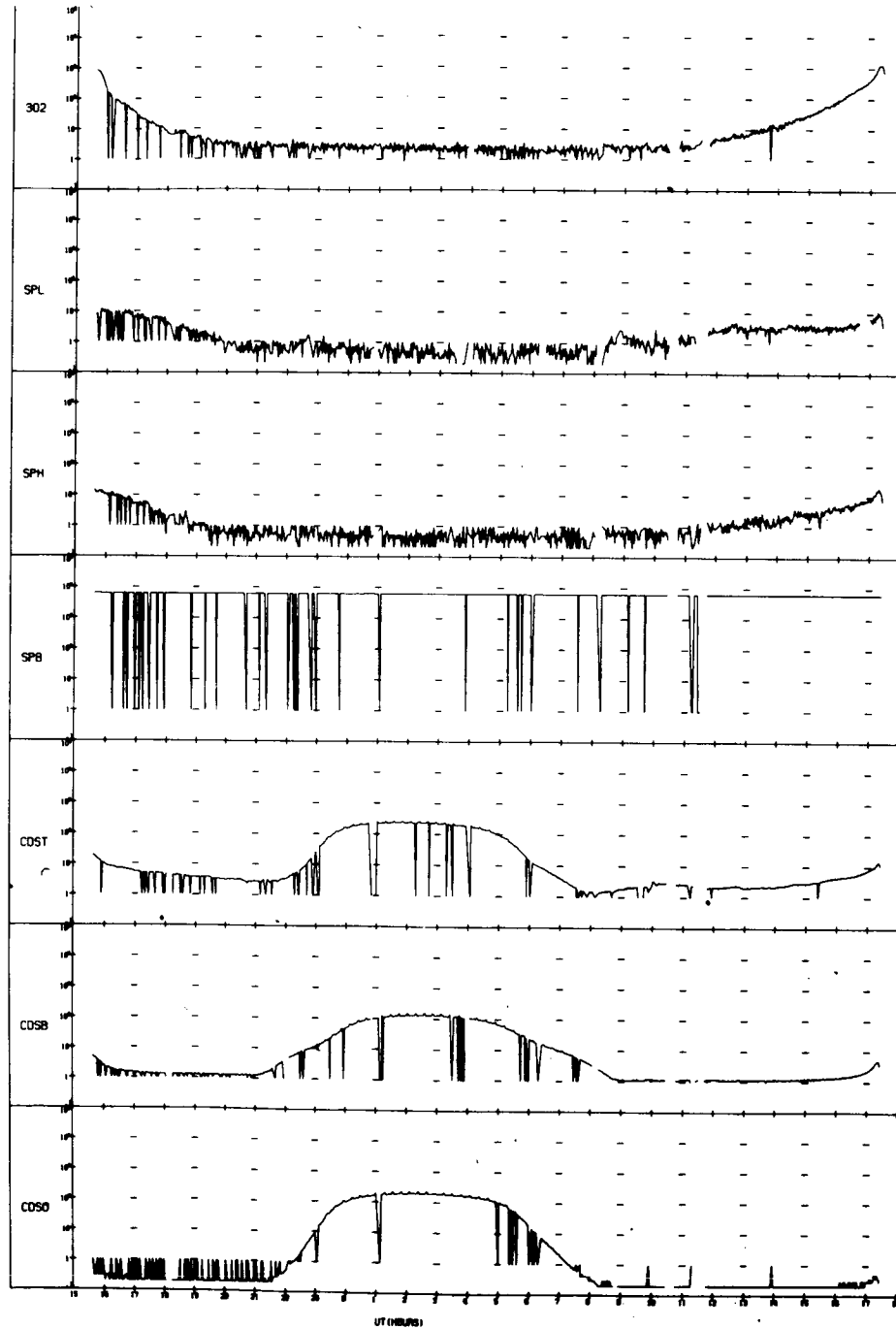
EXPLORER 12 ORBIT 42

BEGIN 9/30/61/13:06

END 10/01/61/15:30



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 43  
BEGIN 10/01/61/15:36  
END 10/02/61/18:01

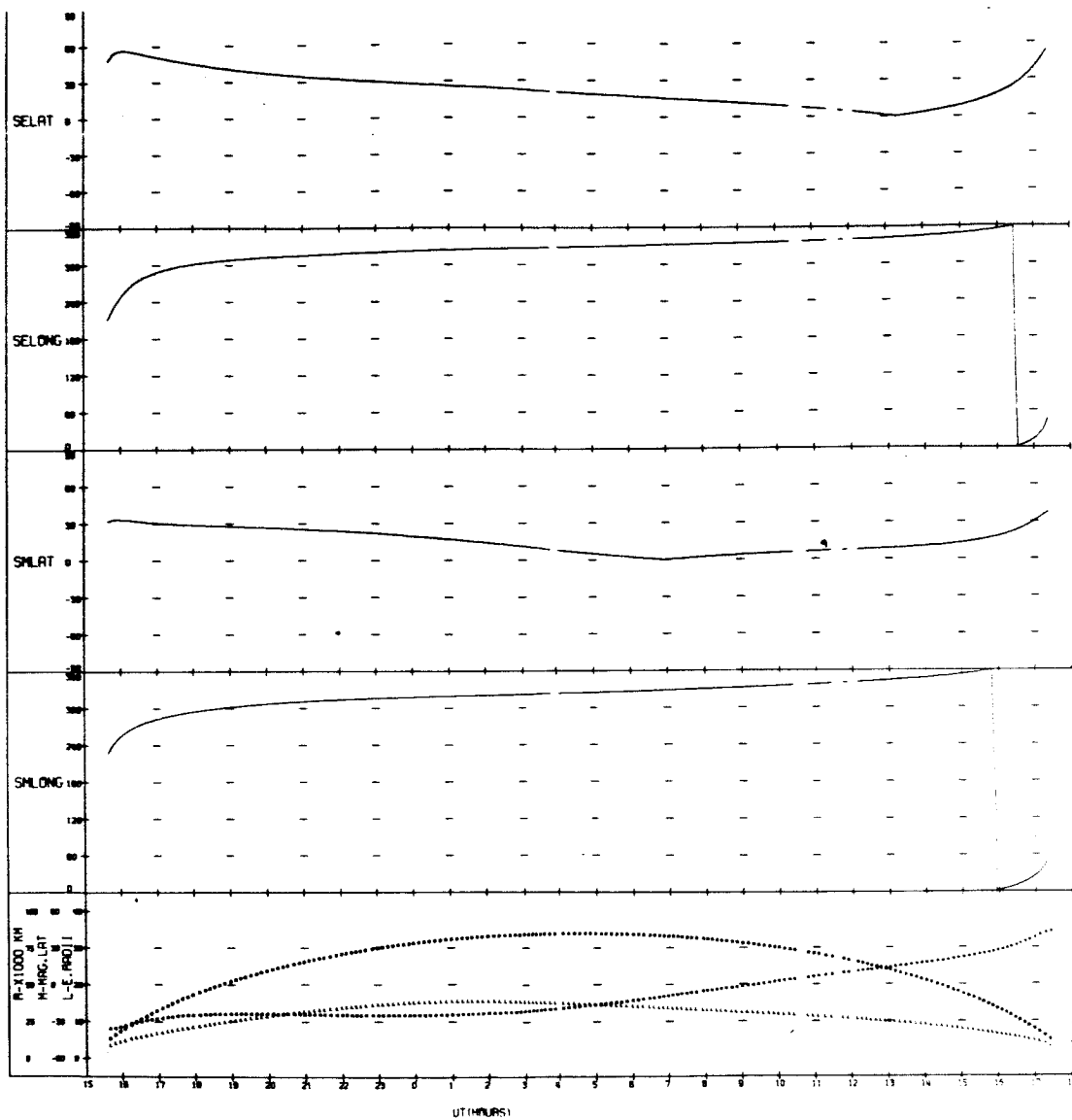


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 43

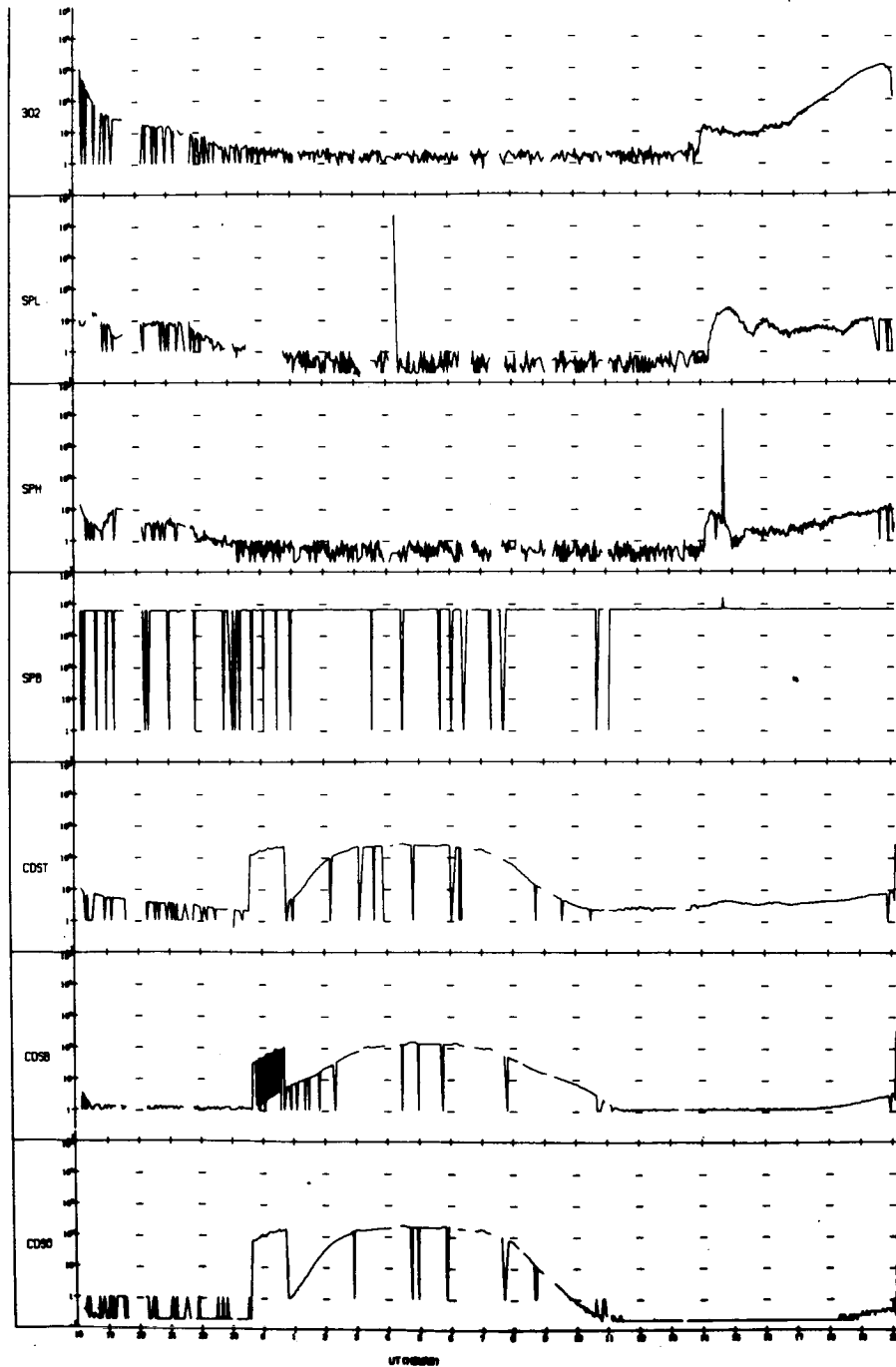
BEGIN 10/01/61/15:36

END 10/02/61/18:01



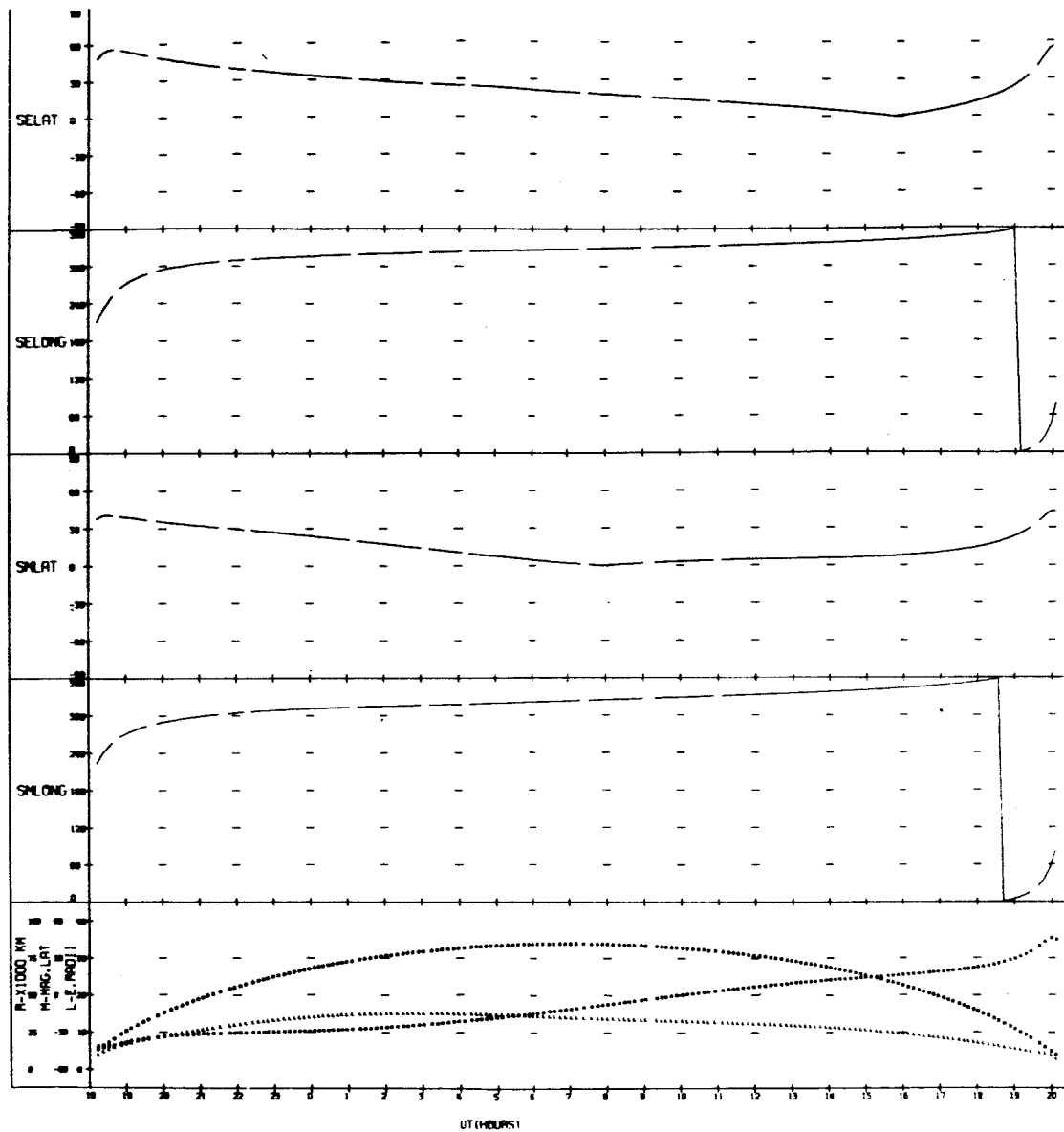
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 44  
 BEGIN 10/02/61/18:12  
 END 10/03/61/20:28



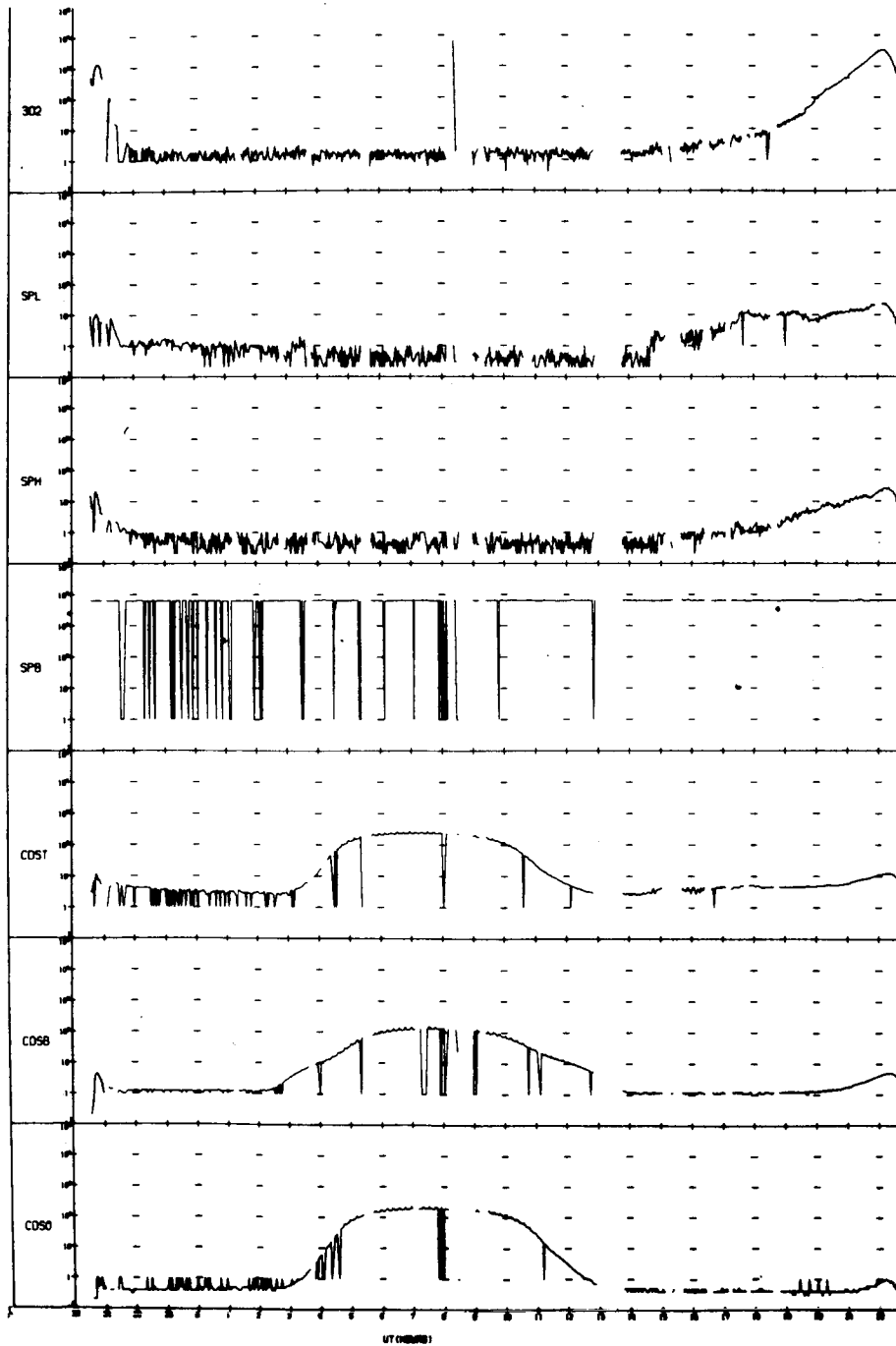
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 44  
 BEGIN 10/02/61/18:12  
 END 10/03/61/20:28



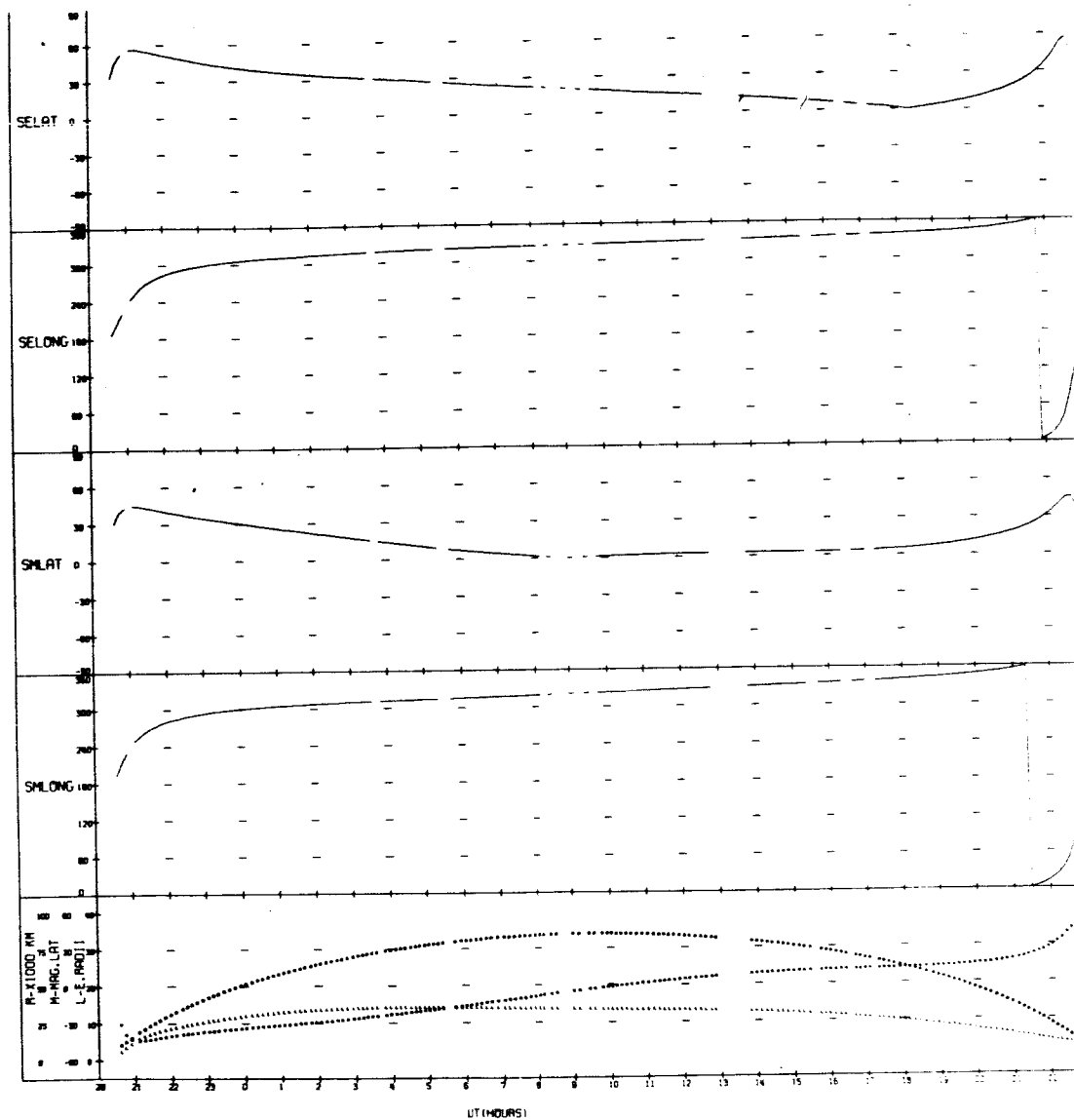
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 45  
 BEGIN 10/03/61/20:34  
 END 10/04/61/22:48



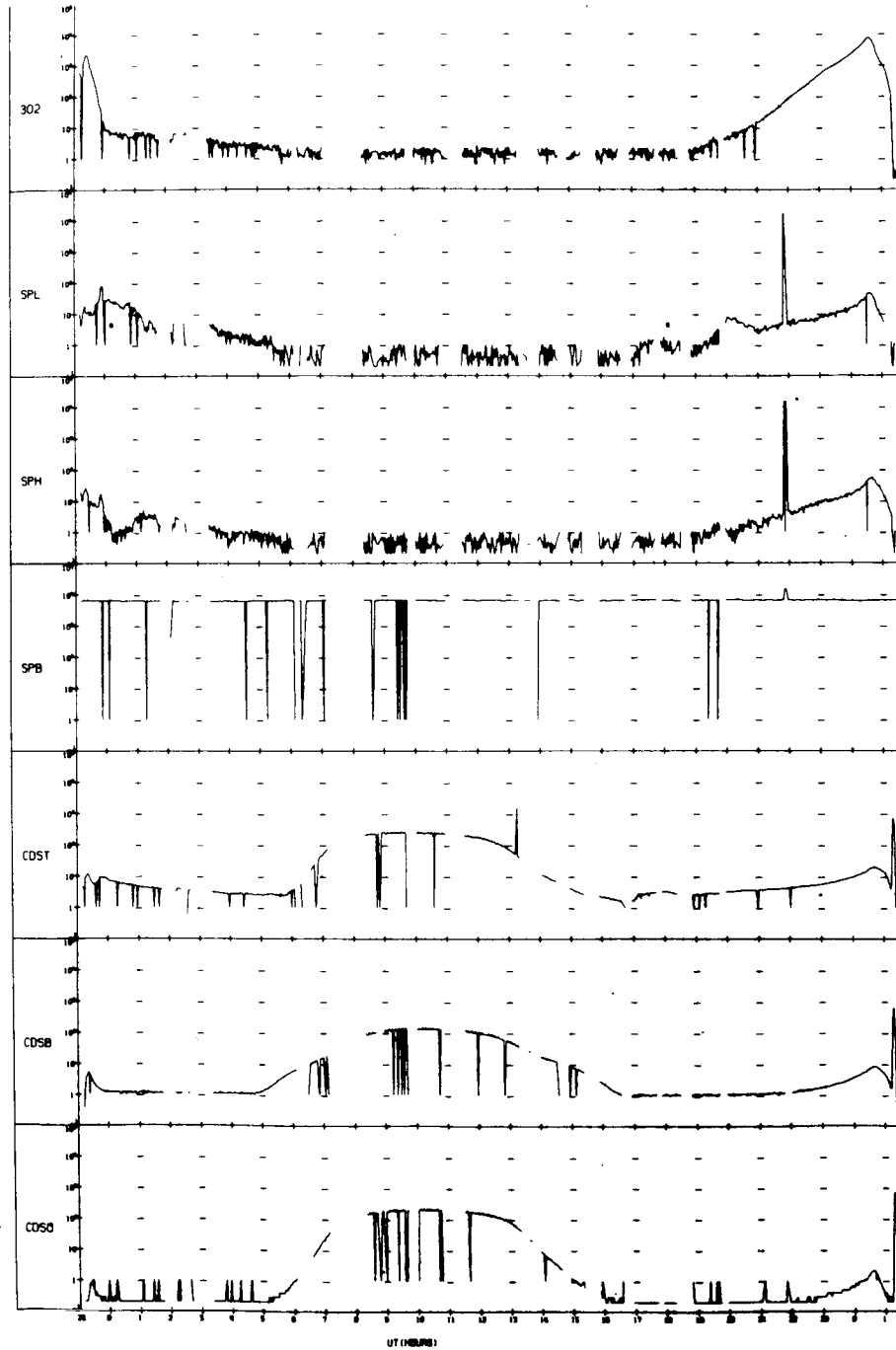
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 45  
 BEGIN 10/03/61/20:34  
 END 10/04/61/22:48



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 46  
 BEGIN 10/04/61/23:10  
 END 10/06/61/01:28

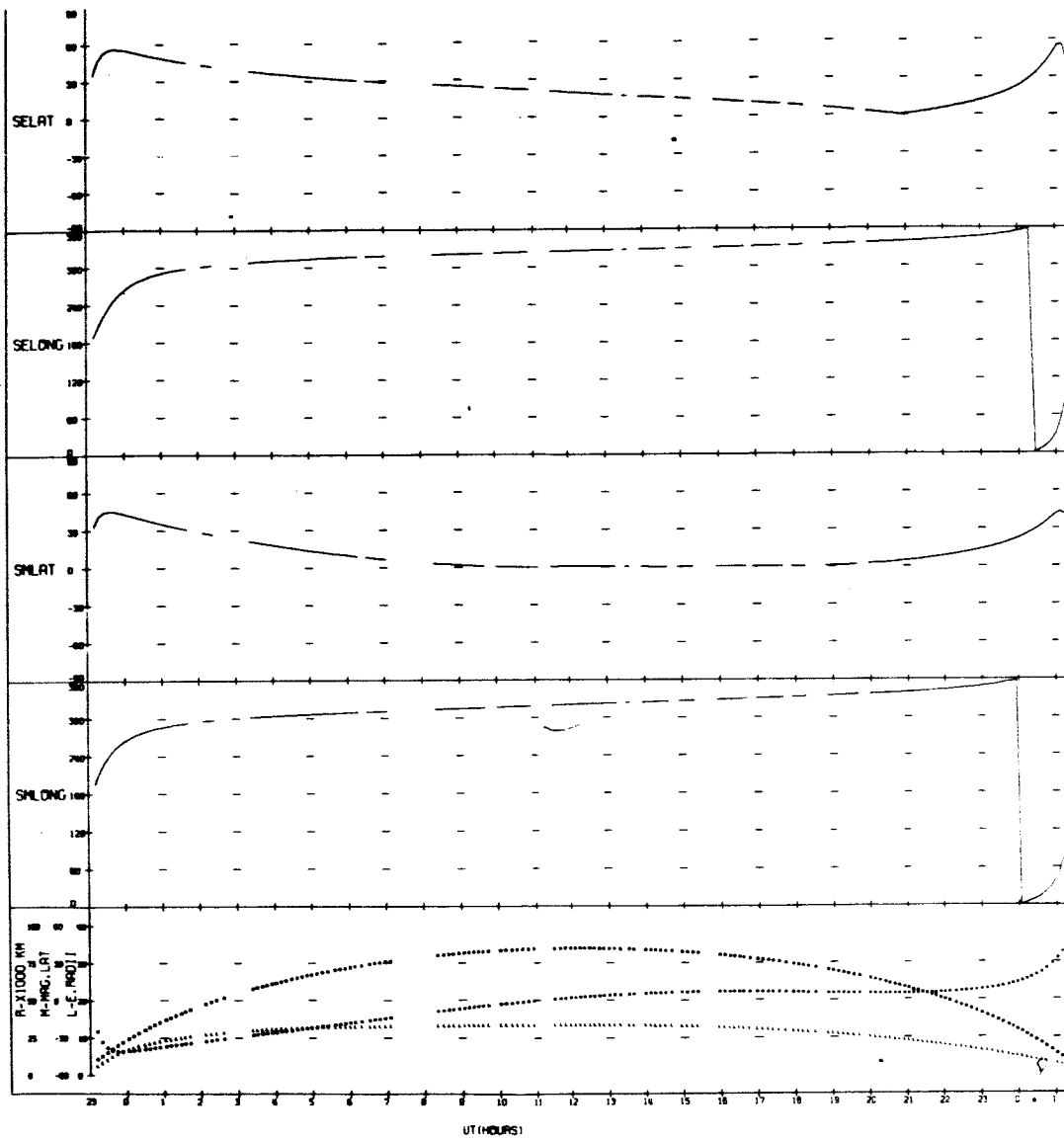


# UNIVERSITY OF IOWA

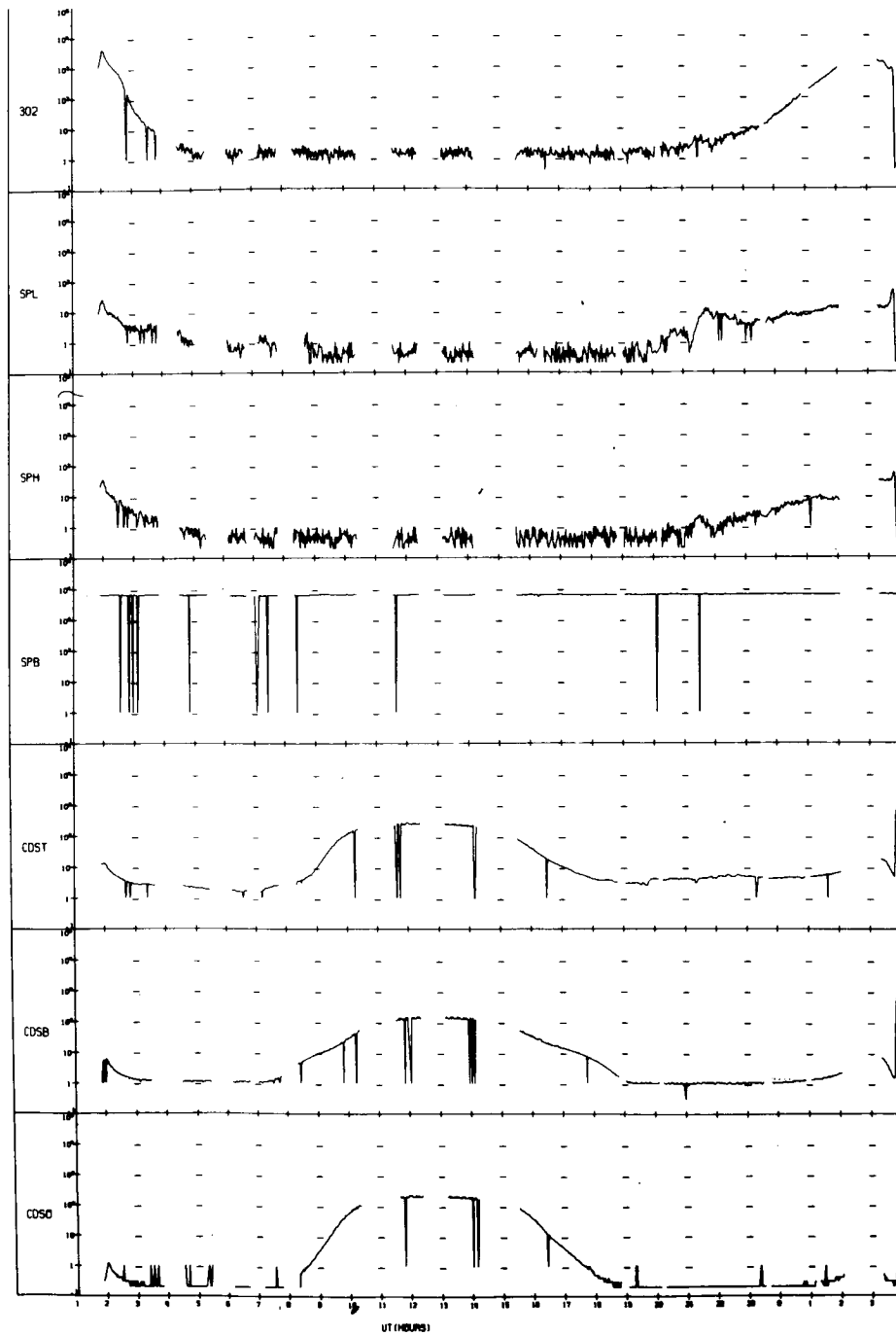
EXPLORER 12 ORBIT 46

BEGIN 10/04/61/23:10

END 10/06/61/01:28



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 47  
BEGIN 10/06/61/01:53  
END 10/07/61/04:06

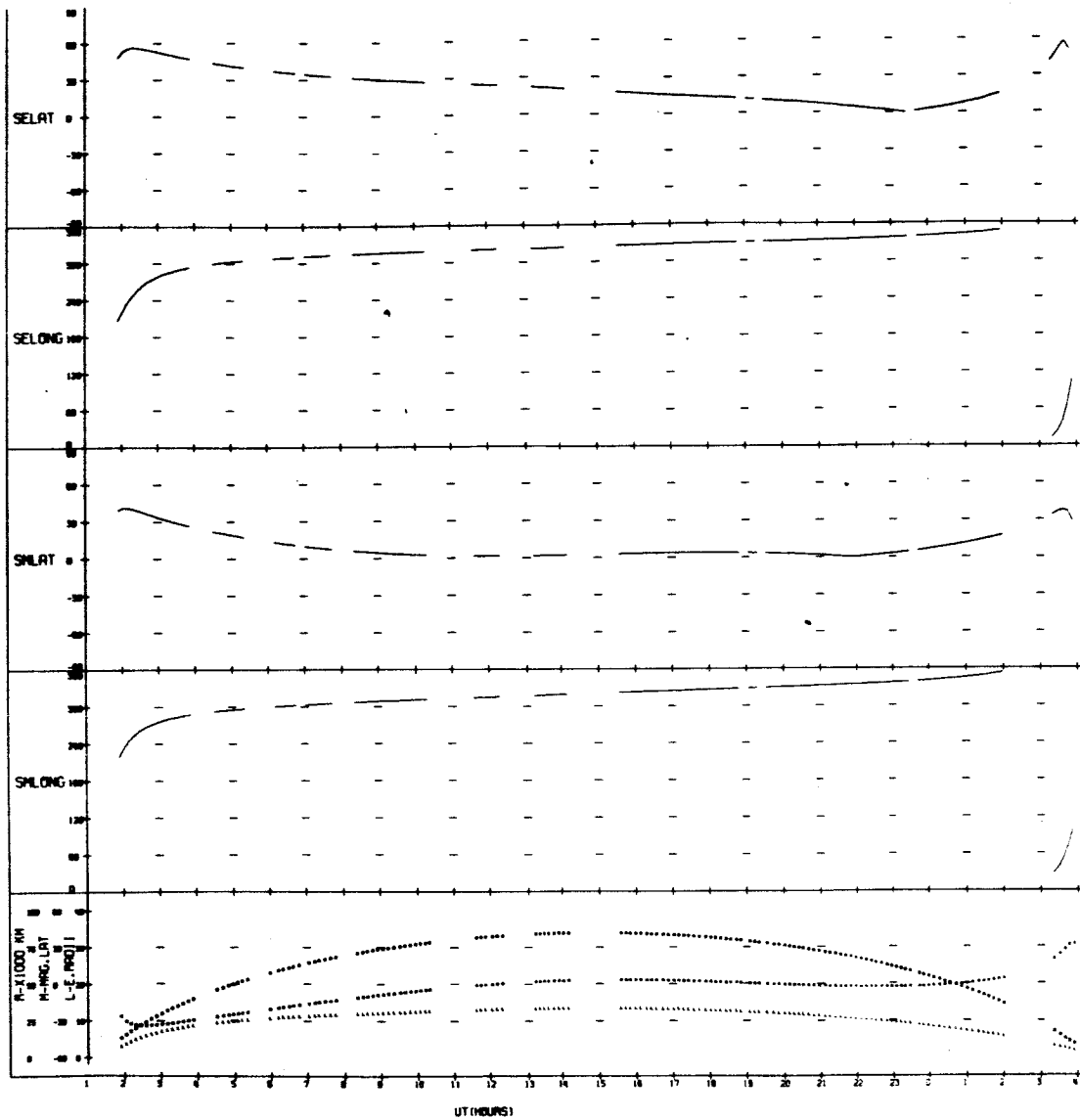


# UNIVERSITY OF IOWA

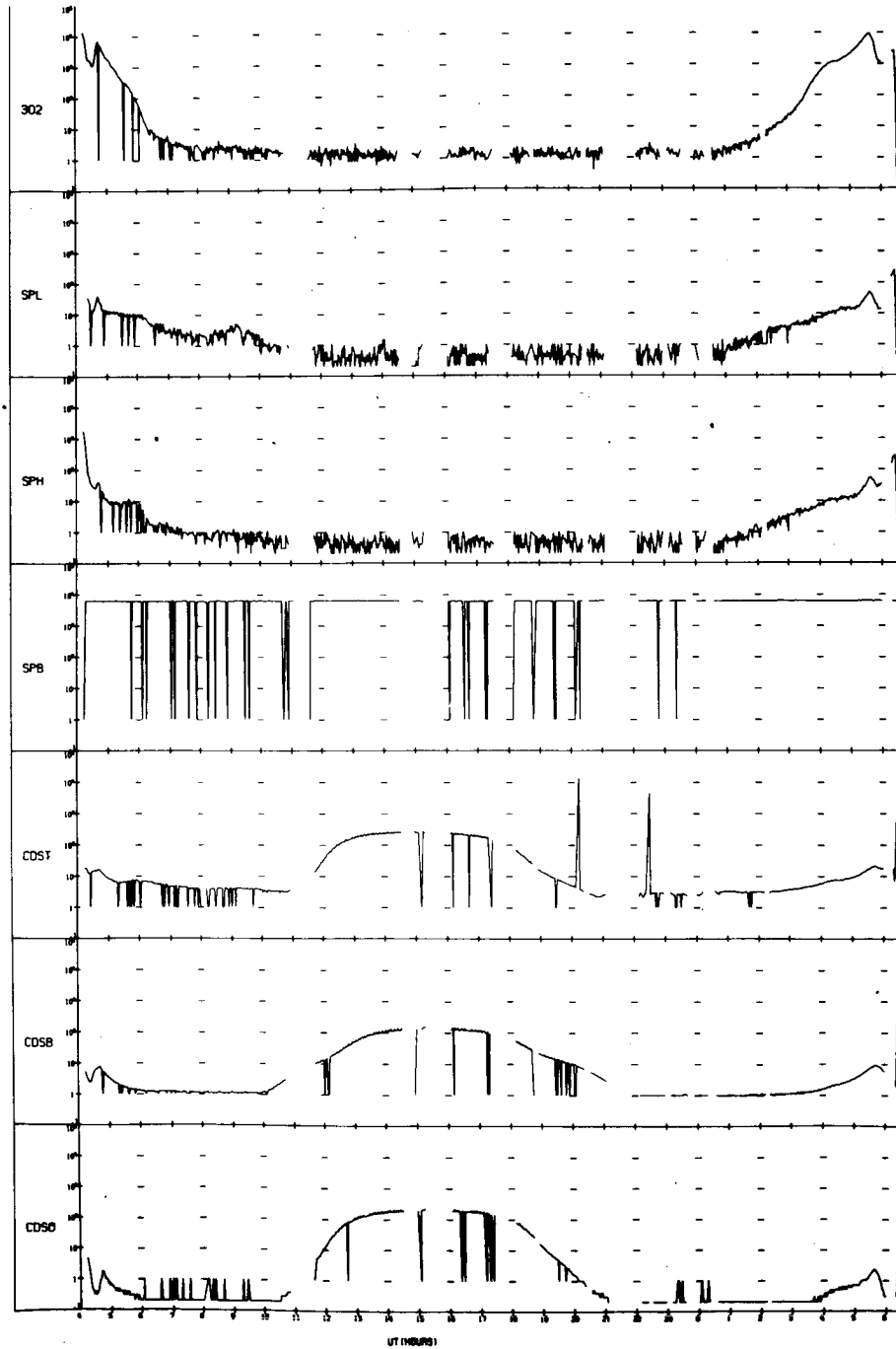
EXPLORER 12 ORBIT 47

BEGIN 10/06/61/01:53

END 10/07/61/04:06



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 48  
BEGIN 10/07/61/04:14  
END 10/08/61/06:35

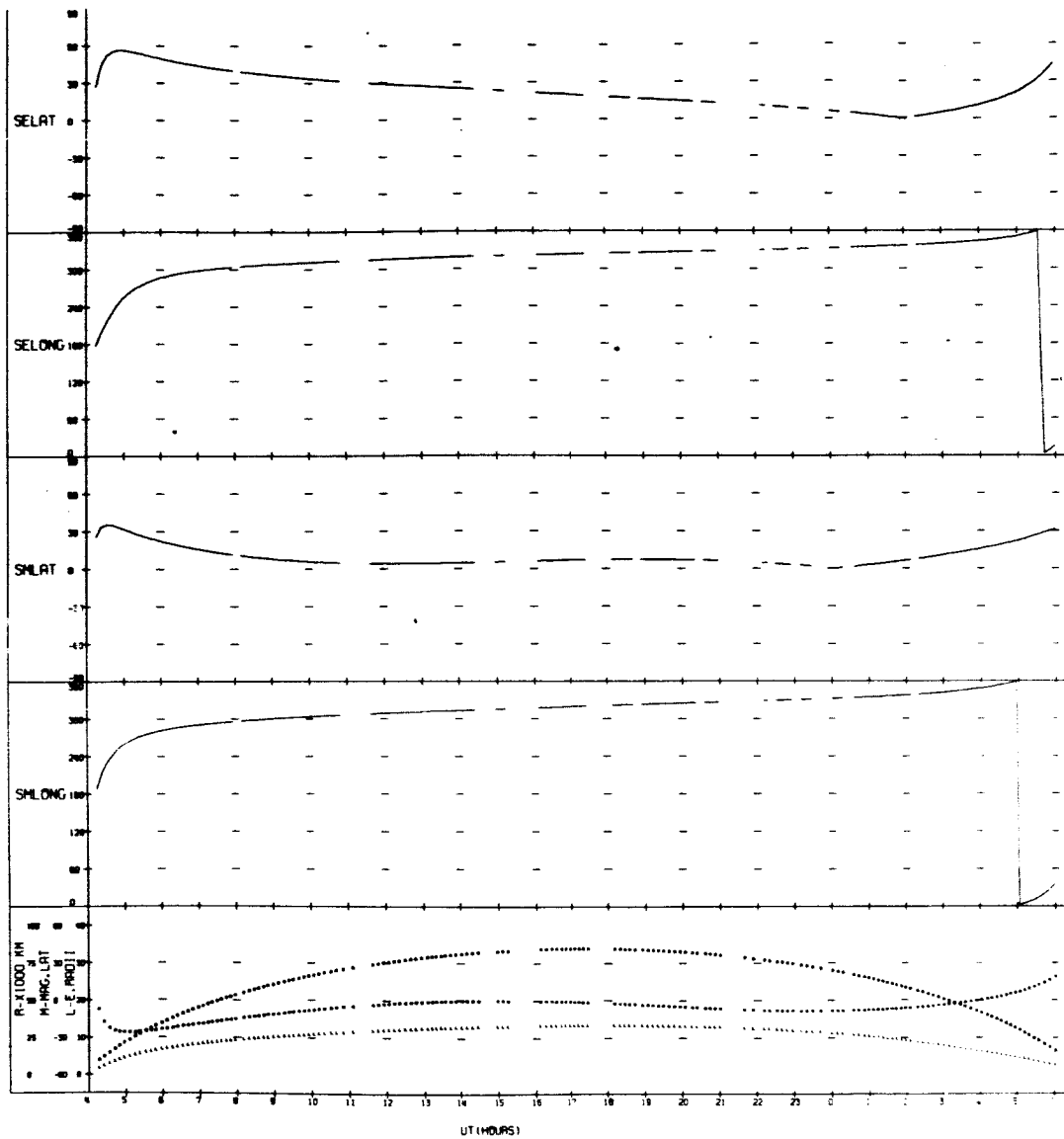


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 48

BEGIN 10/07/61/04:14

END 10/08/61/06:35

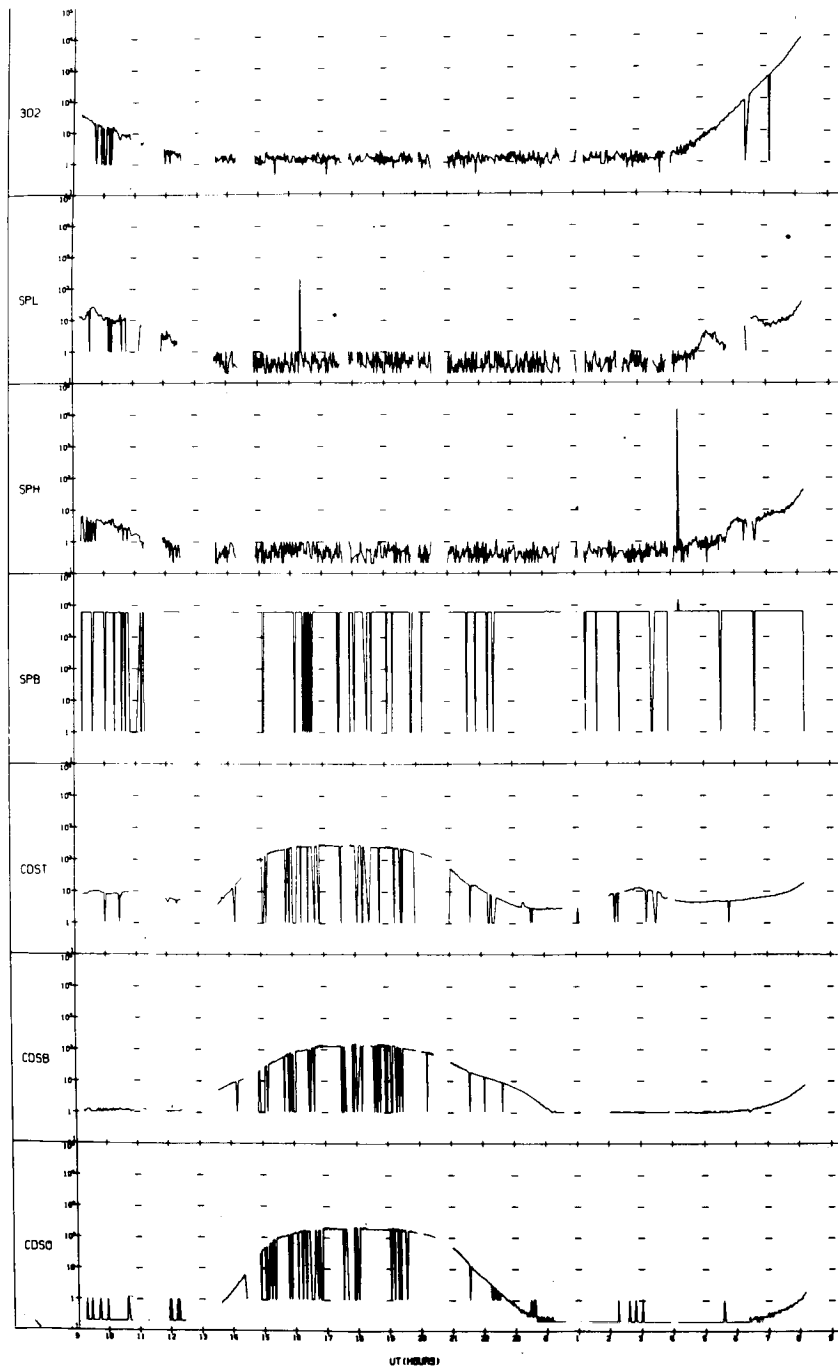


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 49

BEGIN 10/08/61/09:15

END 10/09/61/09:32

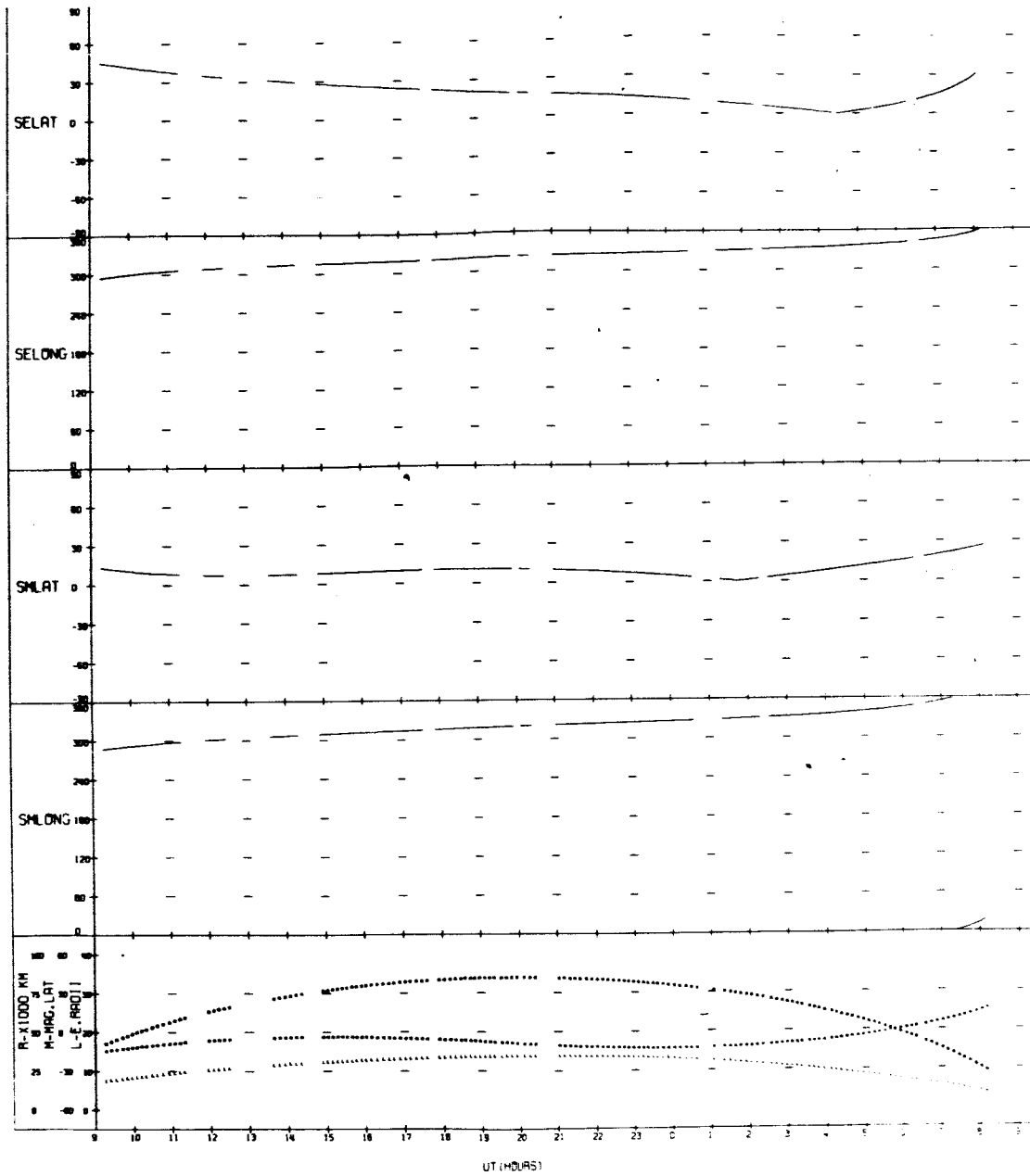


# UNIVERSITY OF IOWA

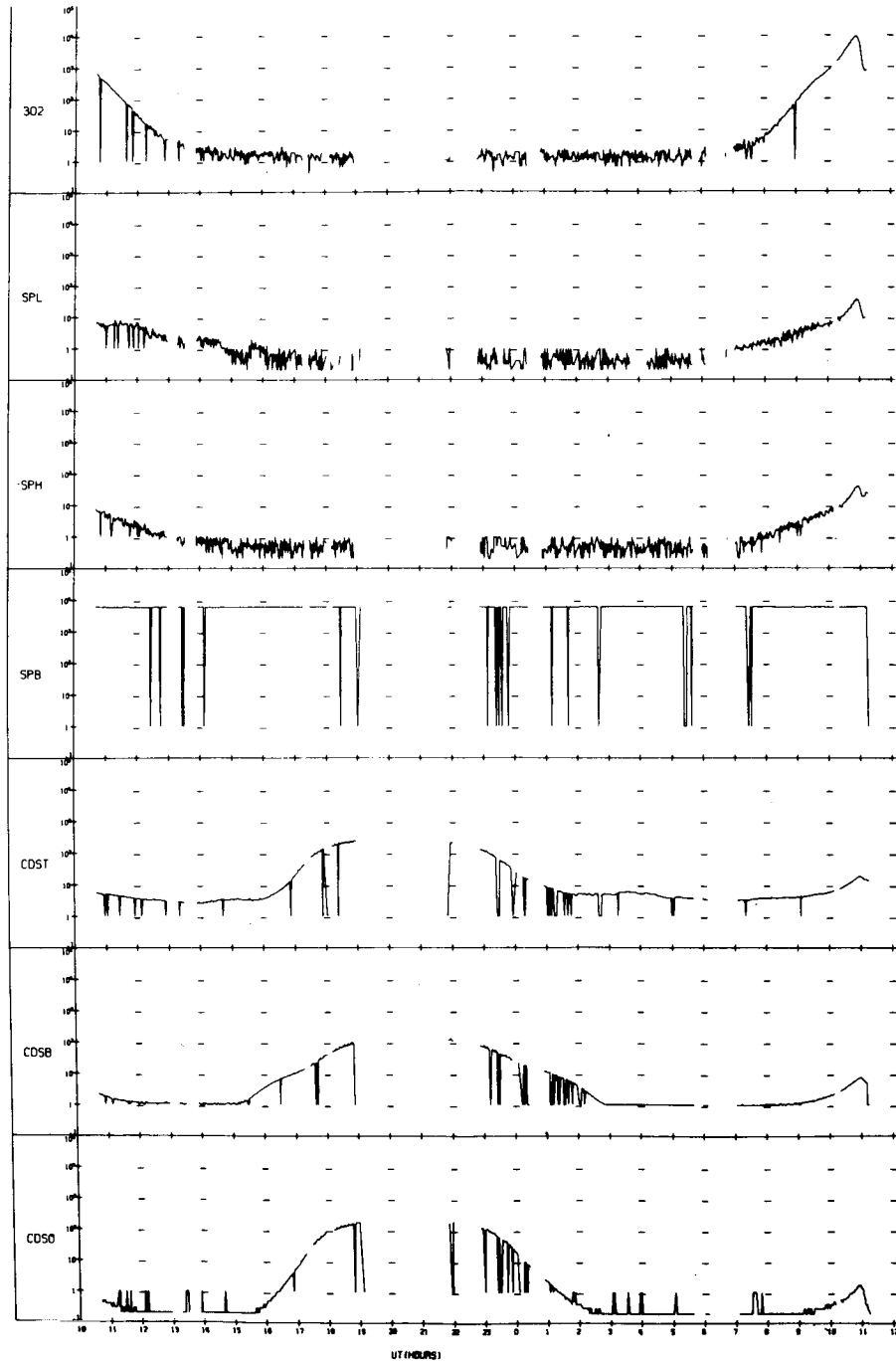
EXPLORER 12 ORBIT 49

BEGIN 10/08/61/09:15

END 10/09/61/09:32



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 50  
BEGIN 10/09/61/10:40  
END 10/10/61/12:09

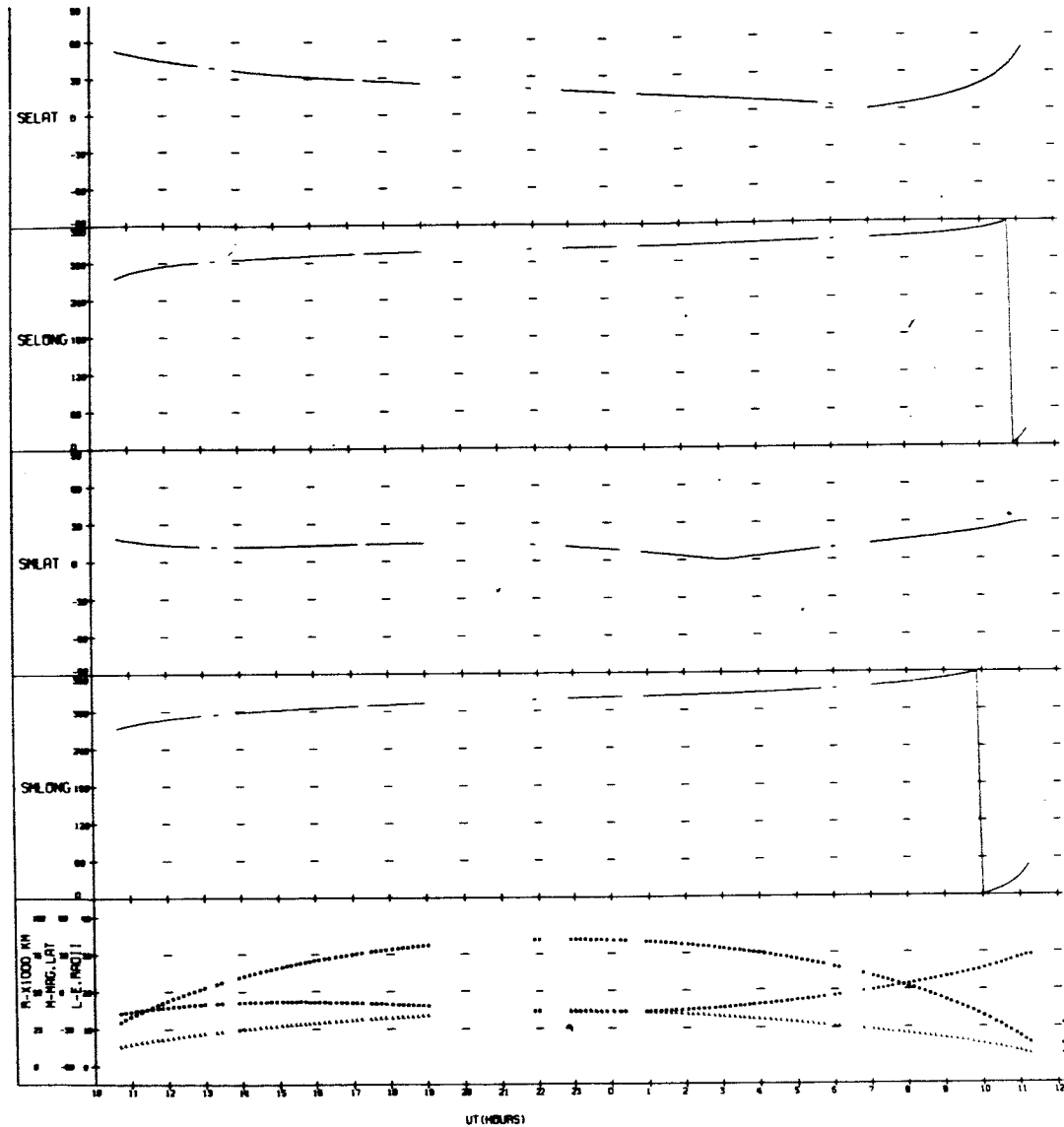


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 50

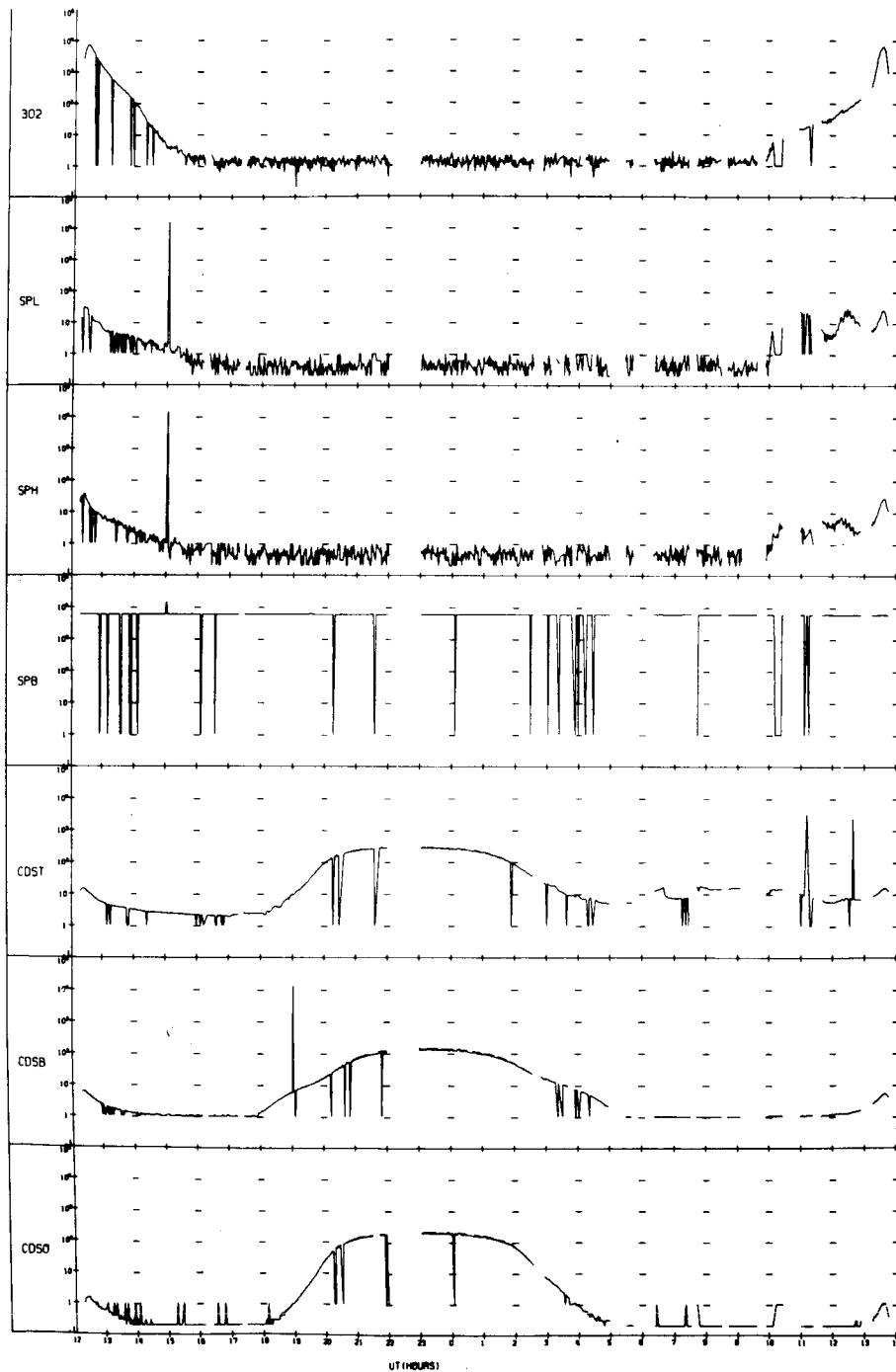
BEGIN 10/09/61/10:40

END 10/10/61/12:09



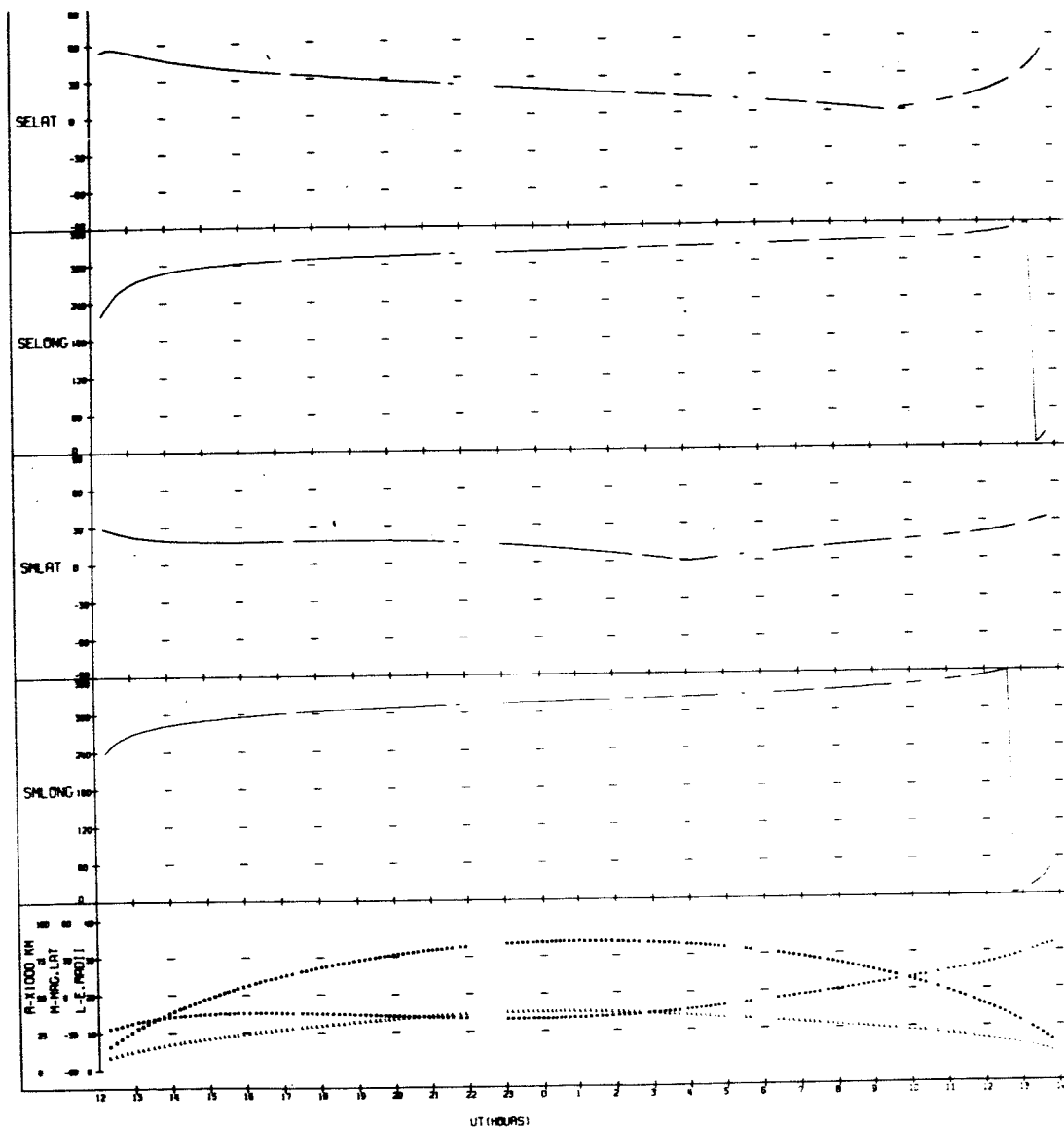
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 51  
 BEGIN 10/10/61/12:17  
 END 10/11/61/14:24



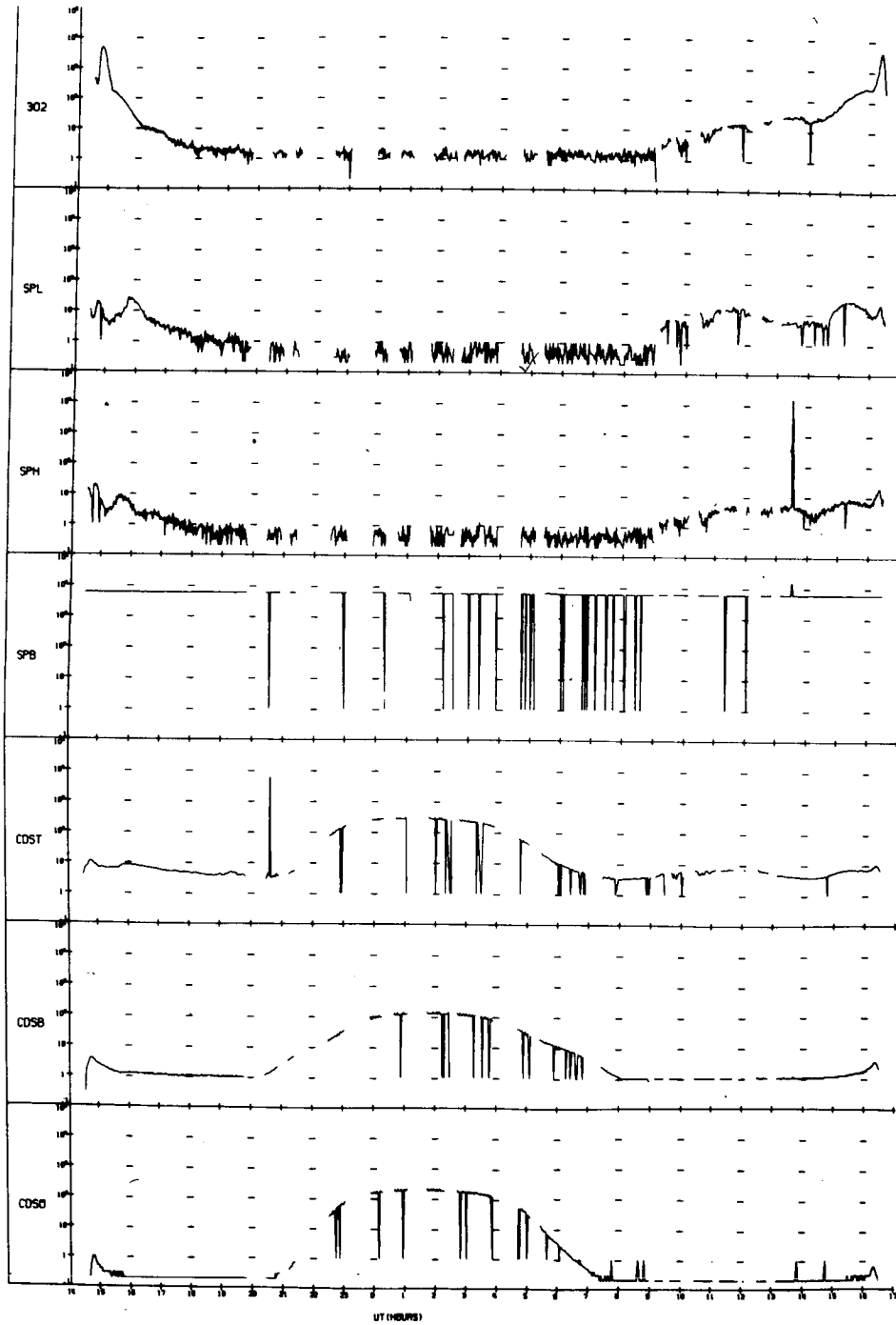
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 51  
 BEGIN 10/10/61/12:17  
 END 10/11/61/14:24



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 52  
 BEGIN 10/11/61/14:31  
 END 10/12/61/17:03

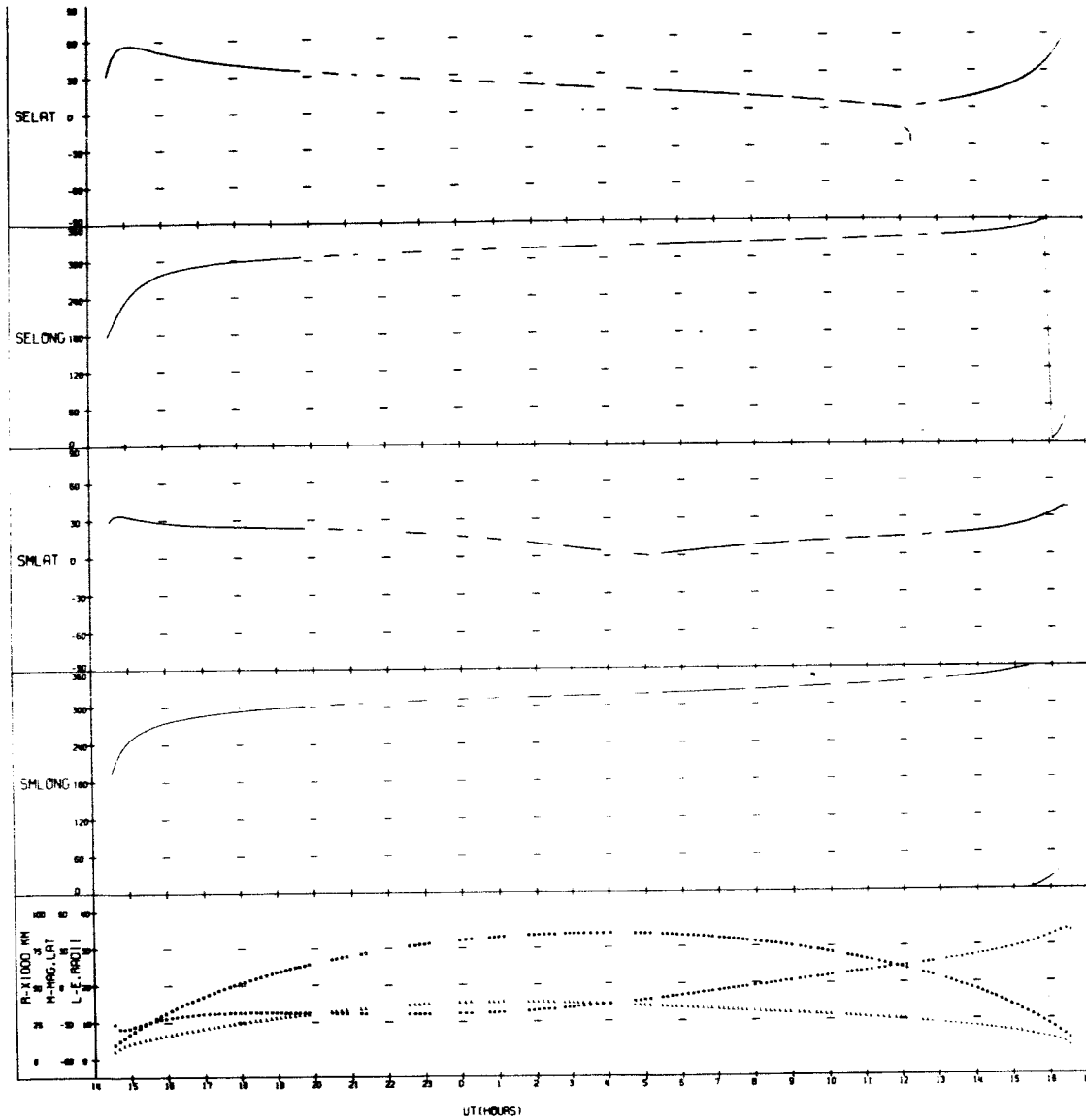


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 52

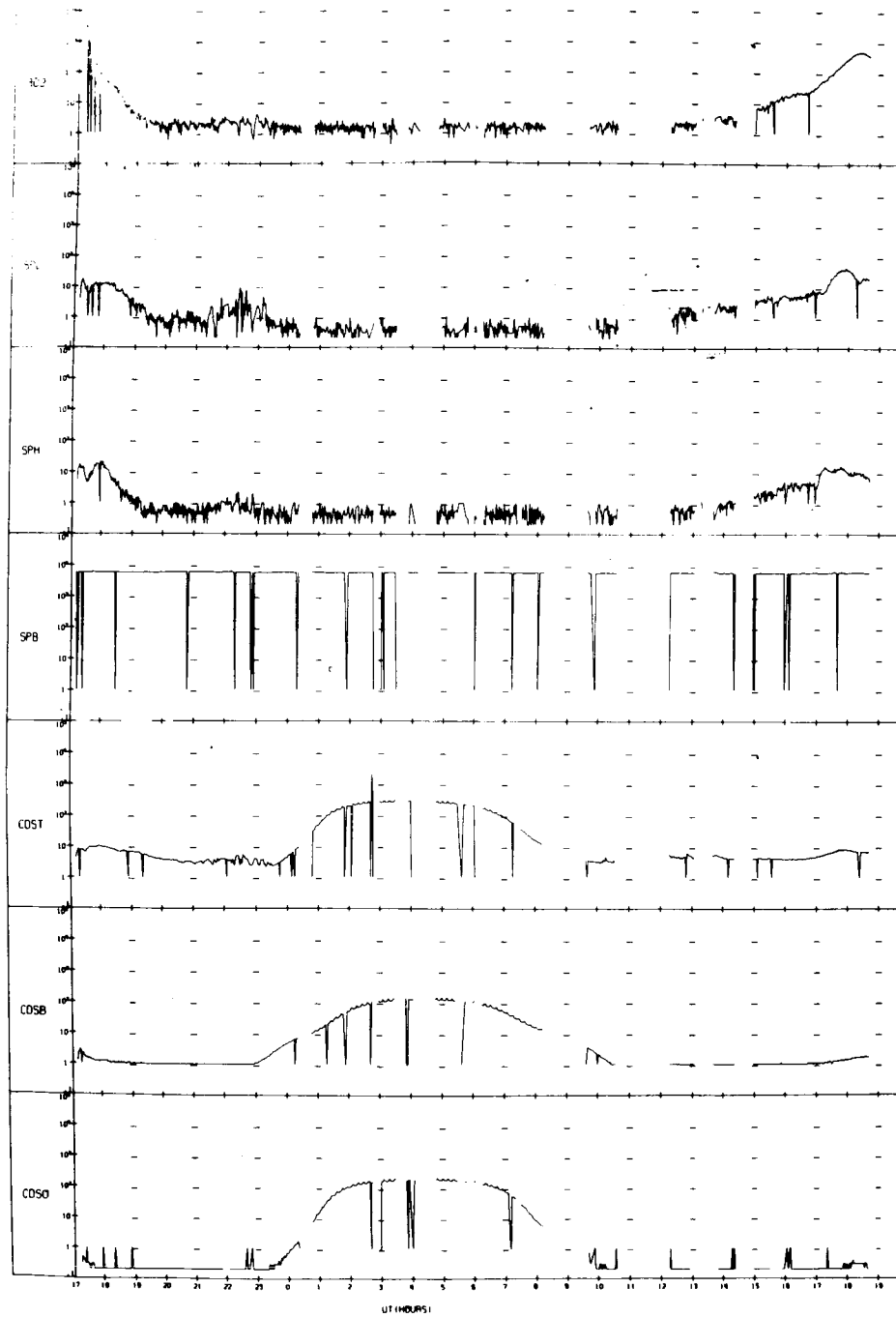
BEGIN 10/11/61/14:31

END 10/12/61/17:03



# UNIVERSITY OF IOWA

EXPLORES 12 ORBIT 53  
 BEGIN 10/12/61/17:10  
 END 10/13/61/19:48

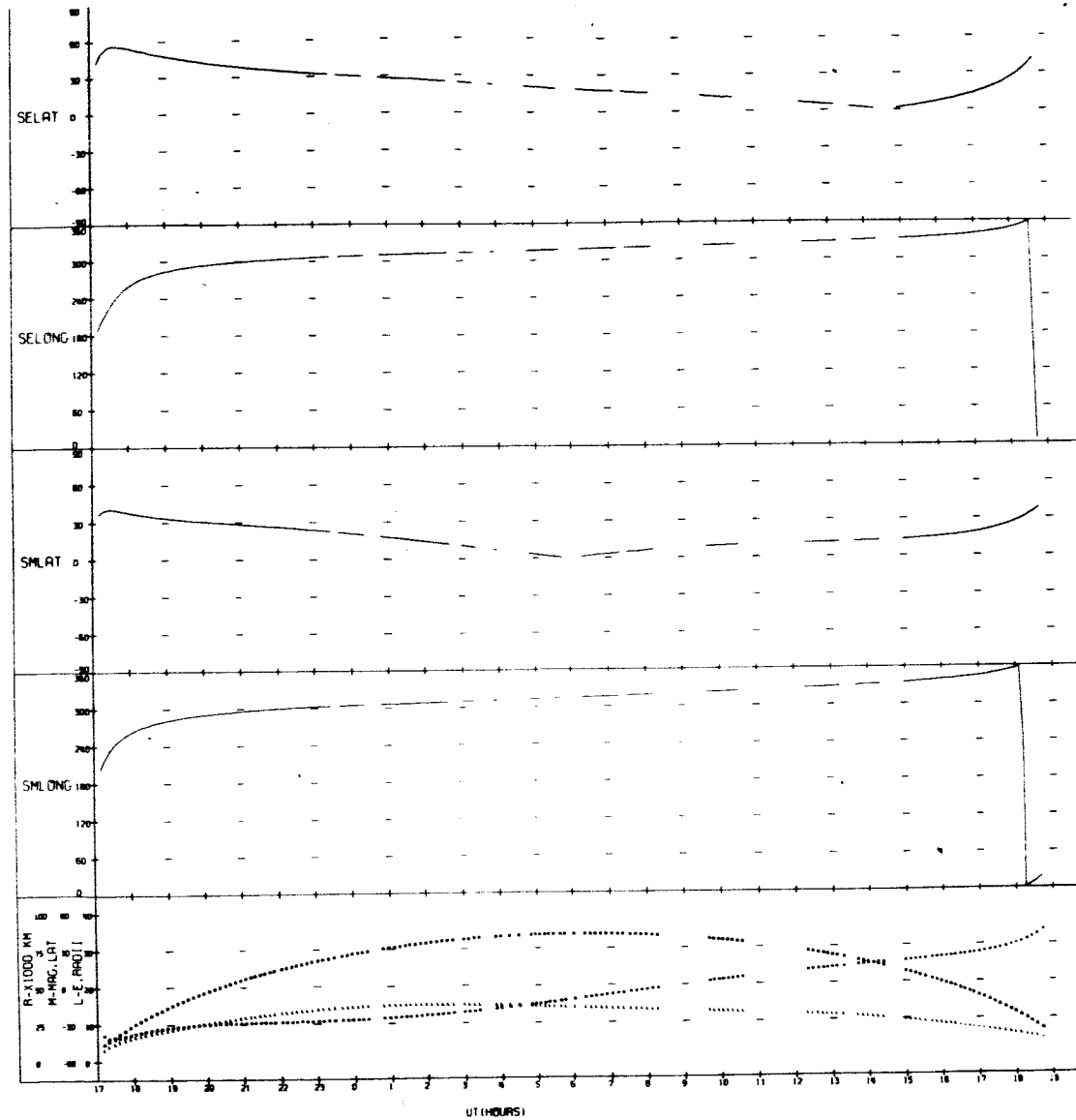


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 53

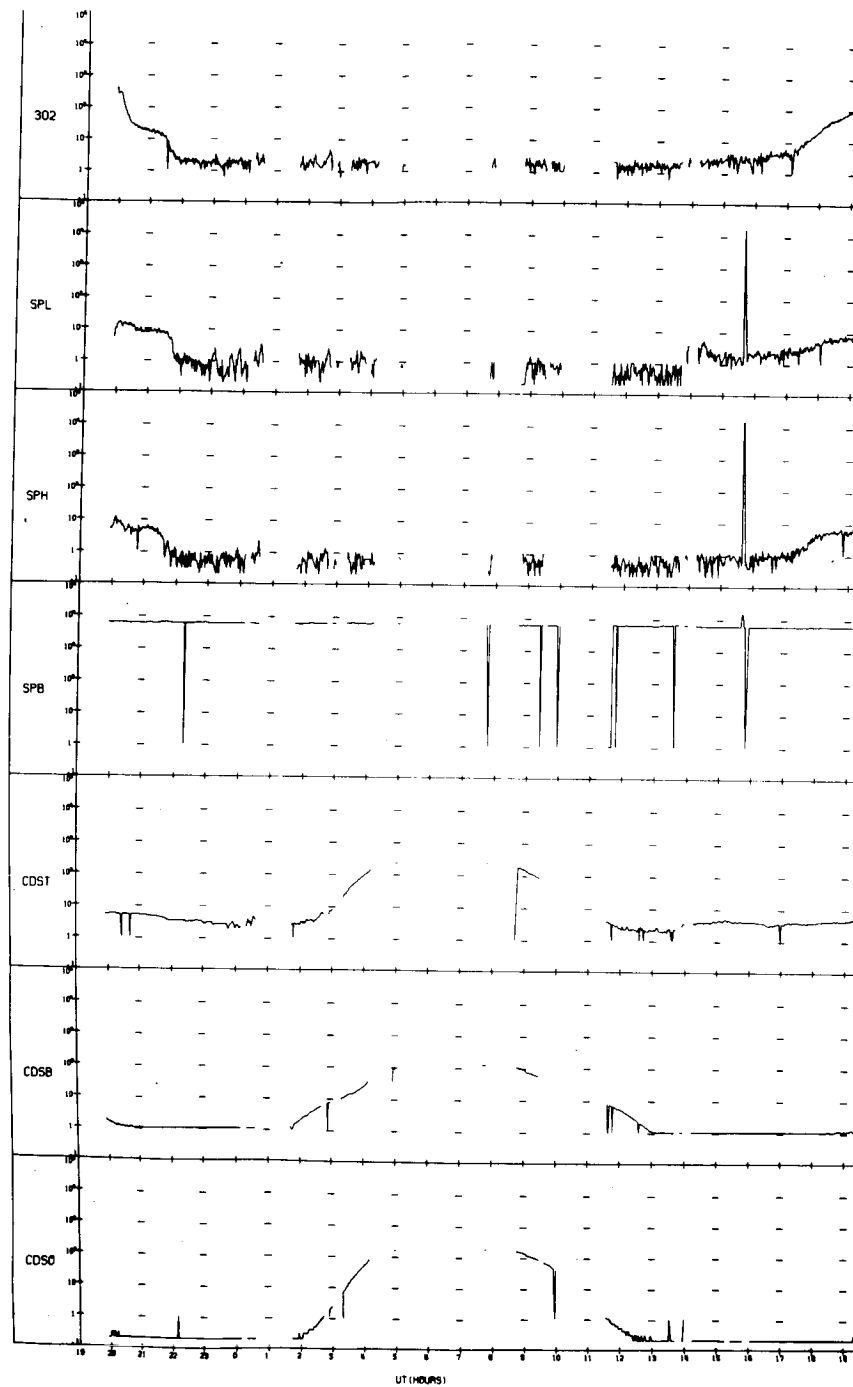
BEGIN 10/12/61/17:10

END 10/13/61/19:48



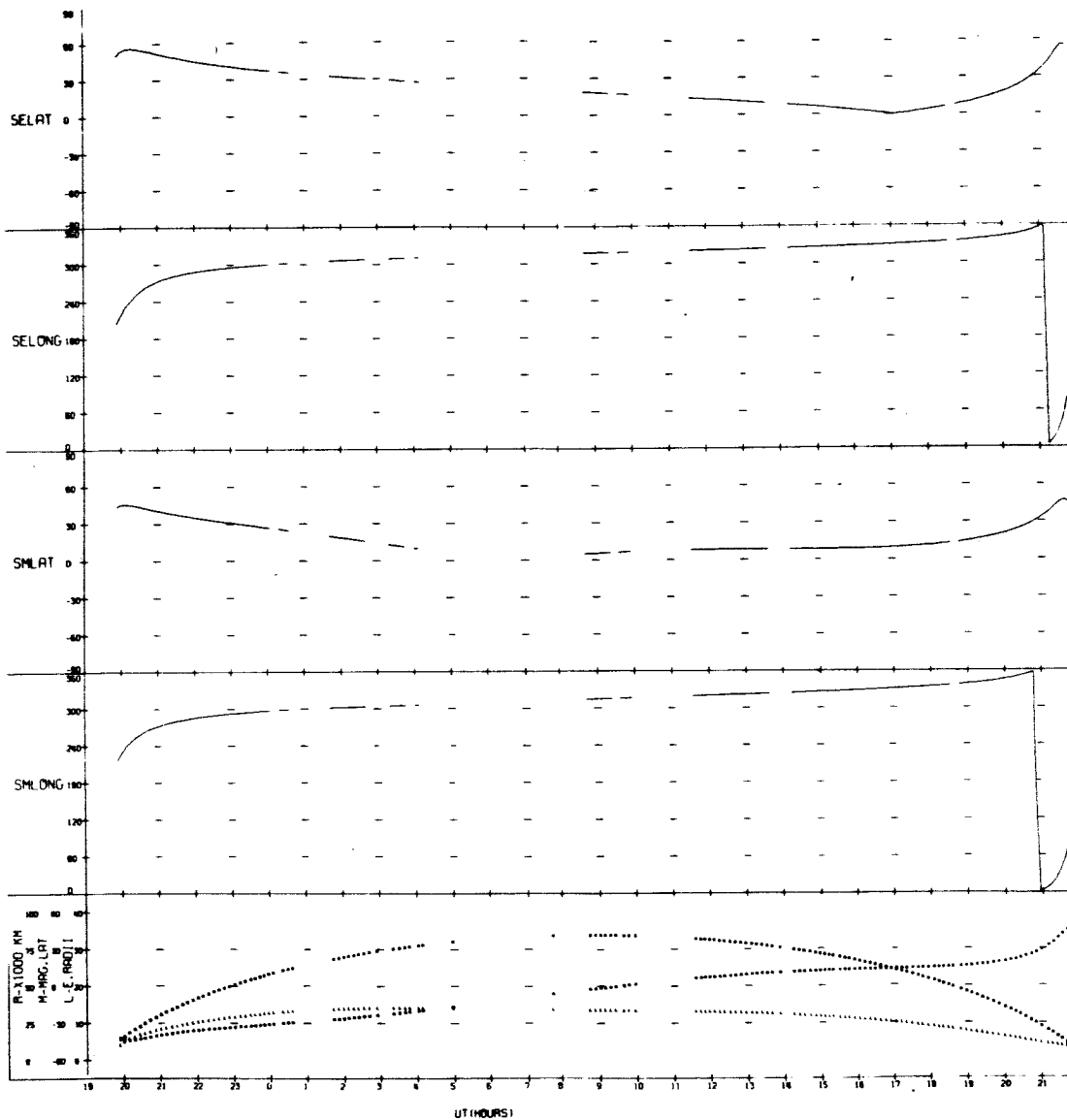
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 54  
 BEGIN 10/13/61/19:54  
 END 10/14/61/19:22



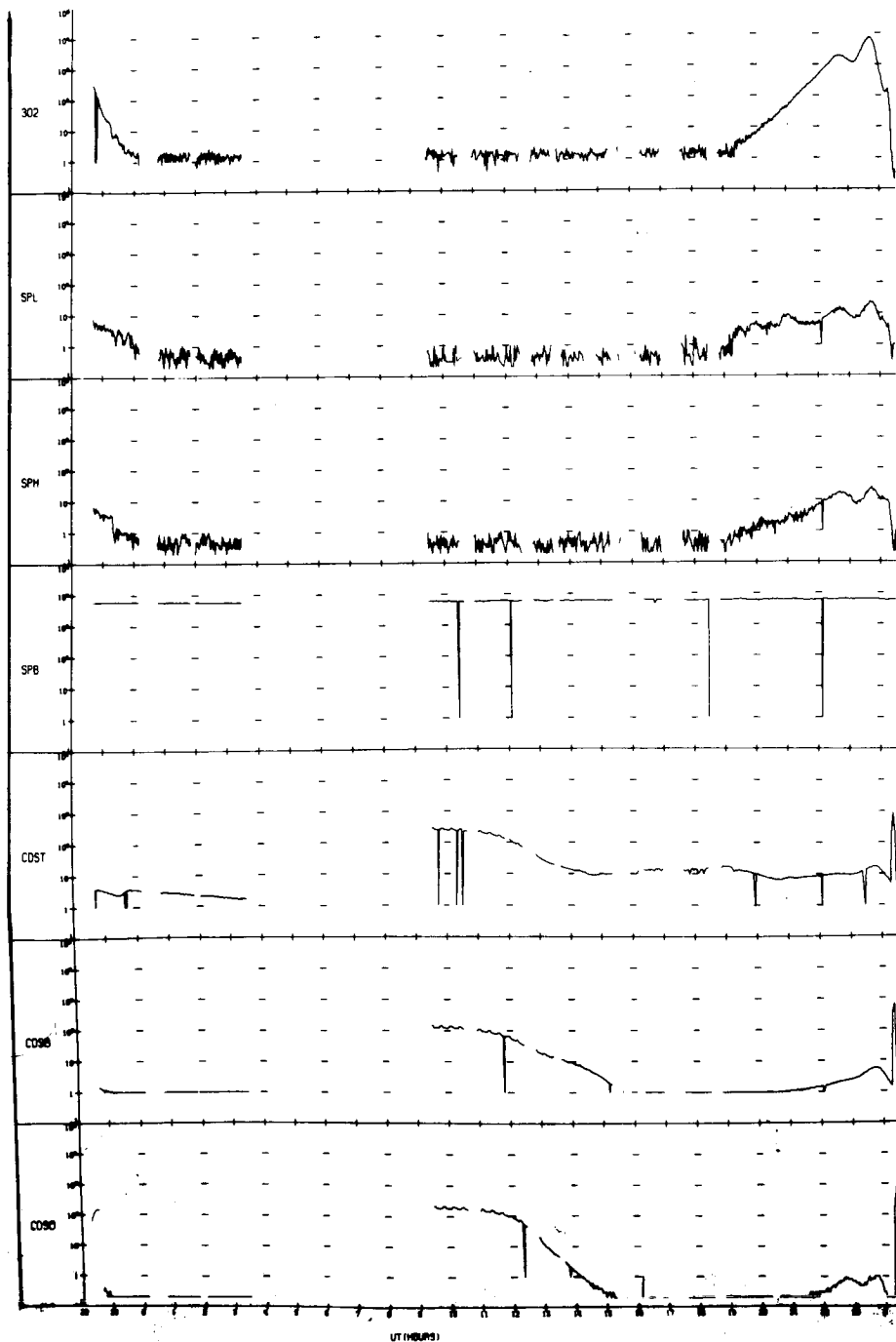
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 54  
 BEGIN 10/13/61/19:52  
 END 10/14/61/21:51

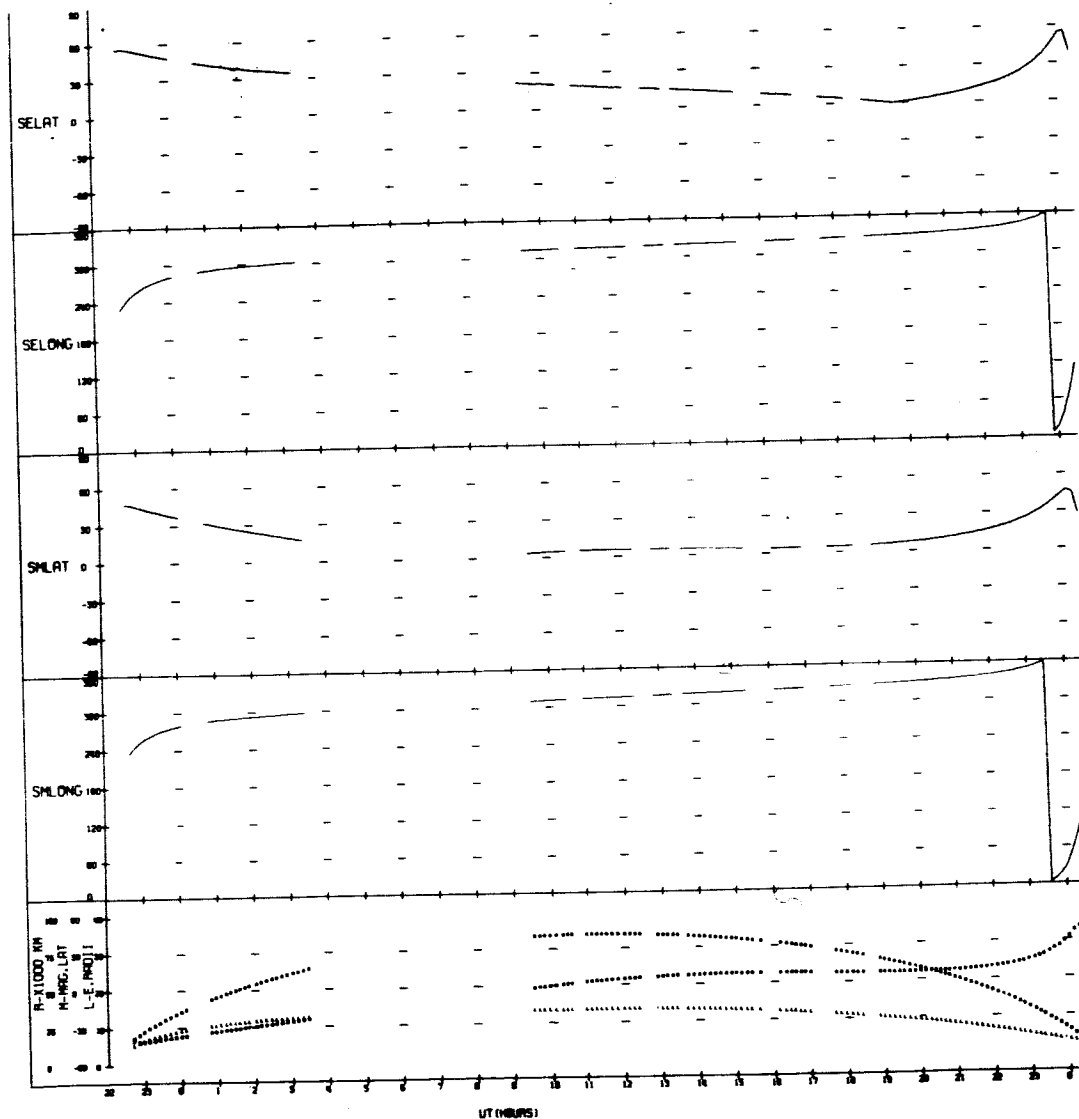


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 55  
 BEGIN 10/14/61/22:39  
 END 10/16/61/00:31

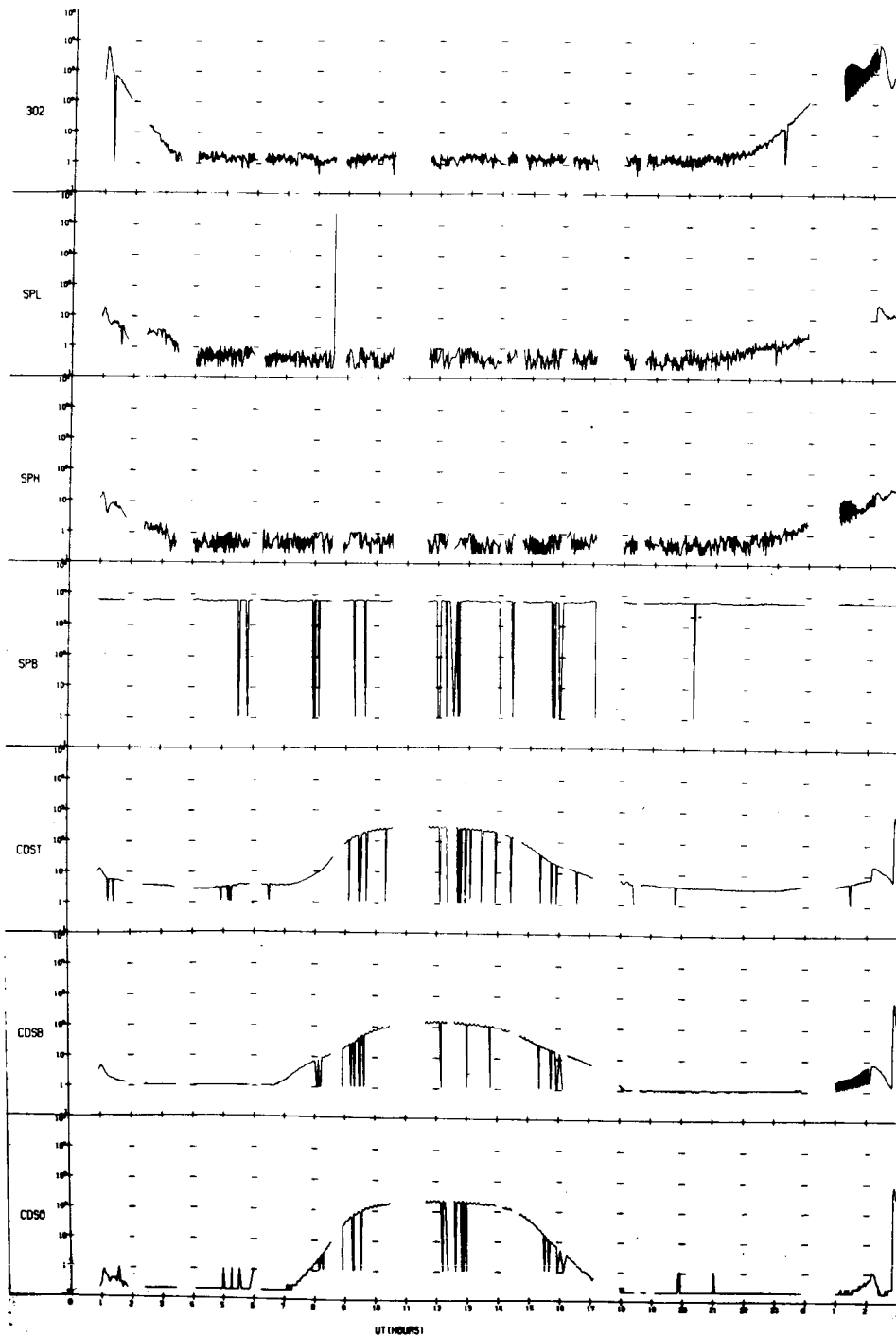


UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 55  
 BEGIN 10/14/61/22:39  
 END 10/16/61/00:31



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 56  
 BEGIN 10/16/61/00:54  
 END 10/17/61/02:59

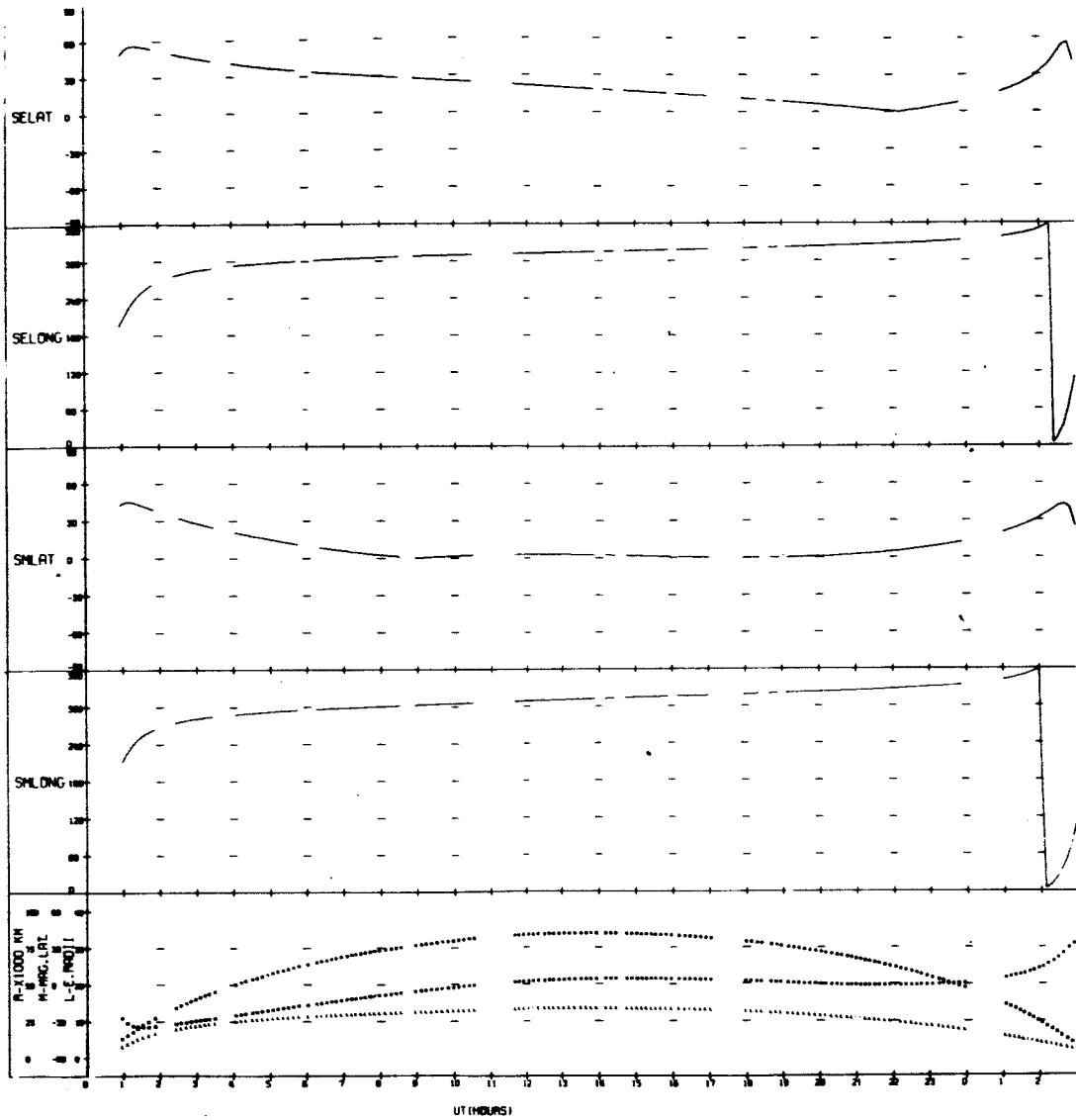


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 56

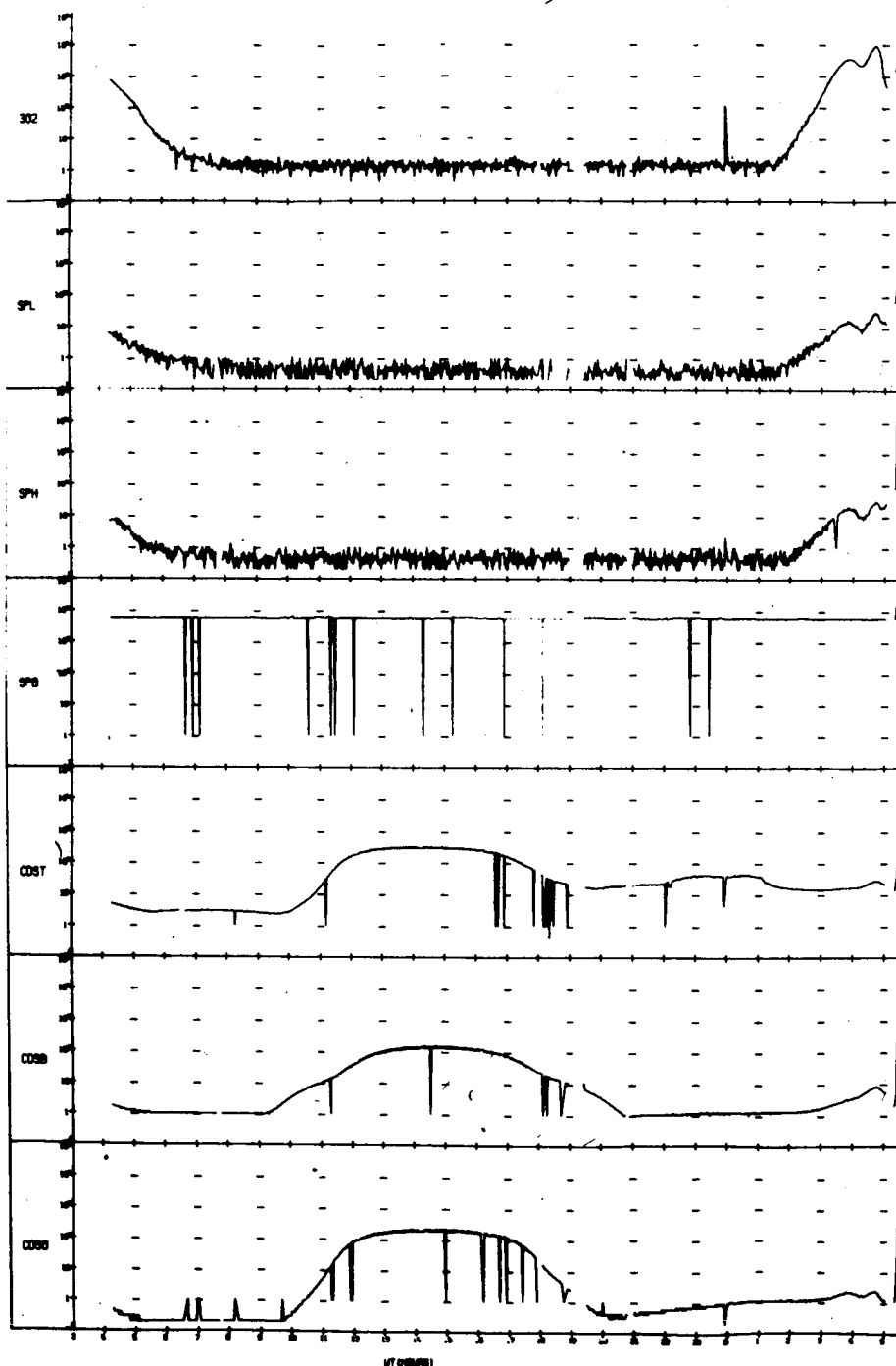
BEGIN 10/16/61/00:54

END 10/17/61/02:59



# UNIVERSITY OF IOWA

EXPLORE 12 ORBIT 57  
 BEGIN 10/17/61/03:27  
 END 10/18/61/05:37

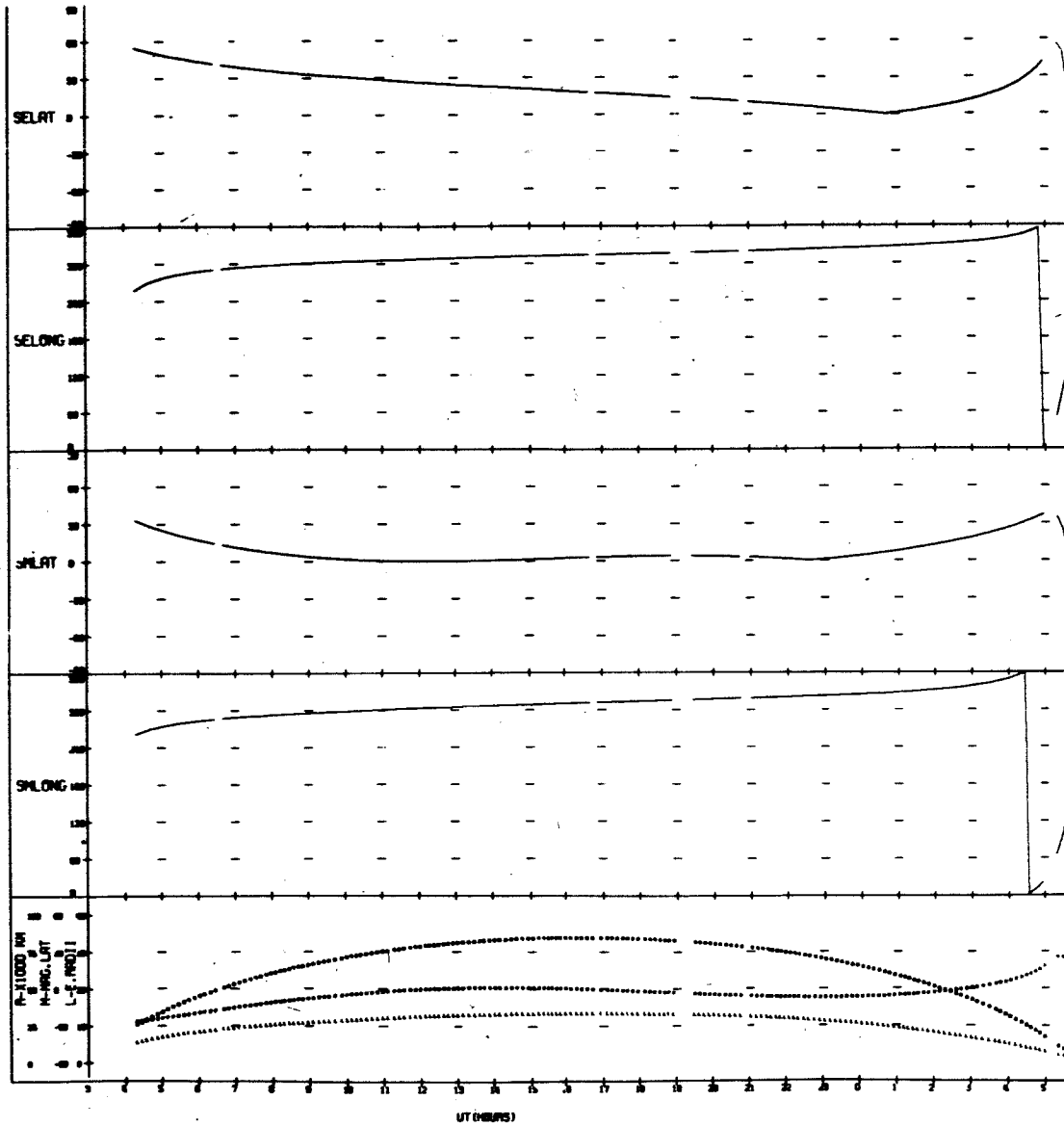


# UNIVERSITY OF IOWA

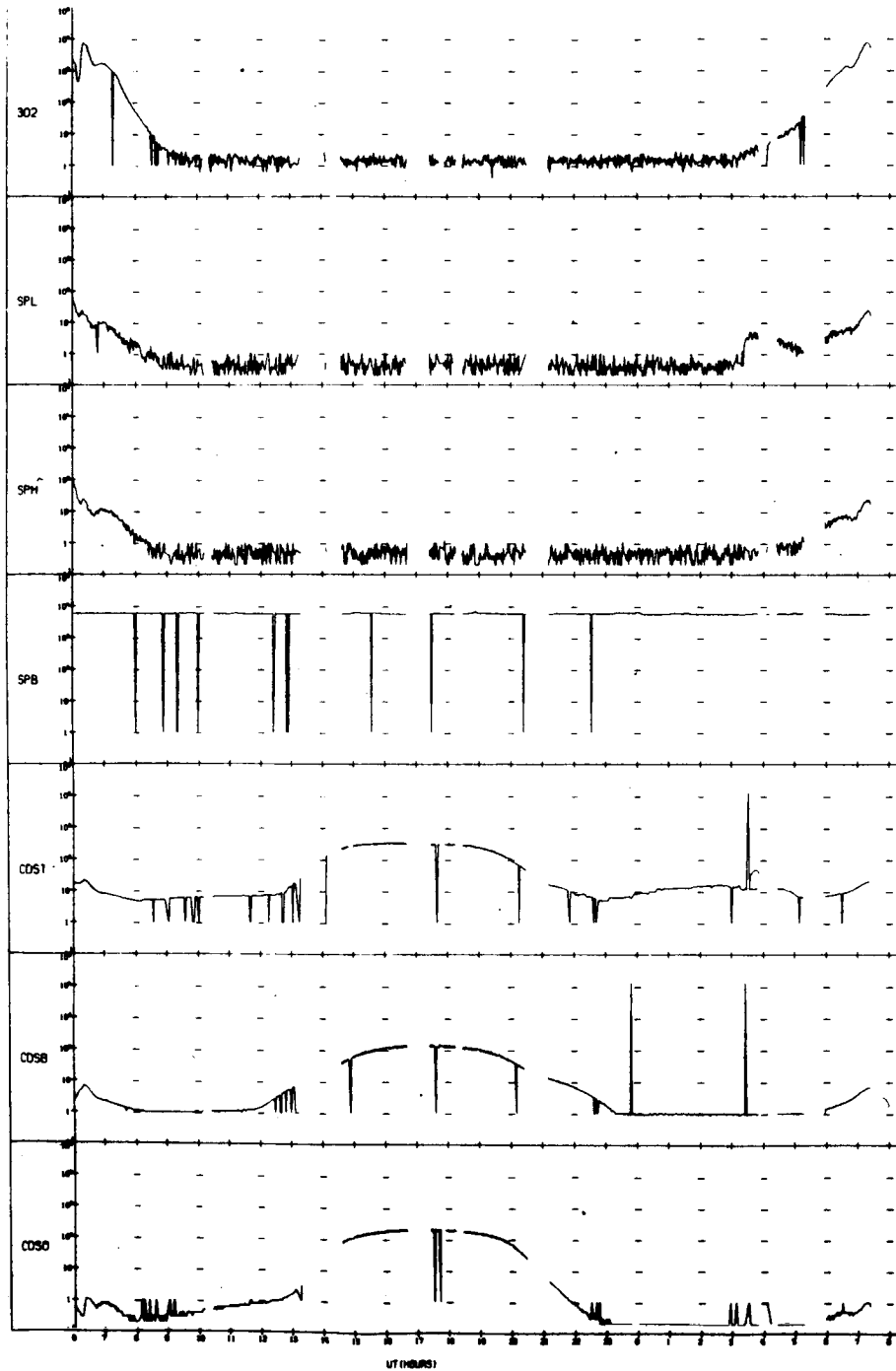
EXPLORER 12 ORBIT 57

BEGIN 10/17/61/03:27

END 10/18/61/05:37

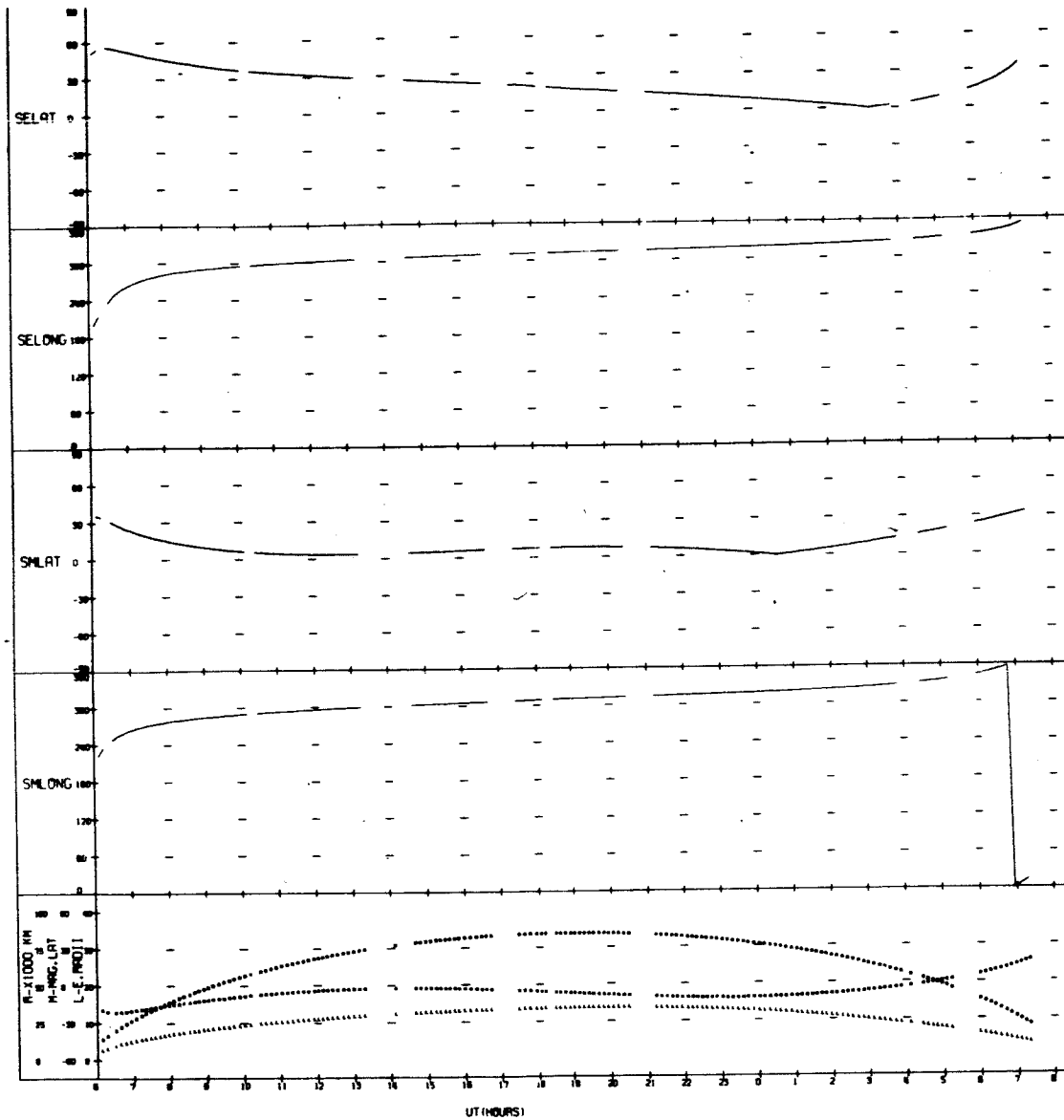


UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 58  
BEGIN 10/18/61/06:00  
END 10/19/61/08:31



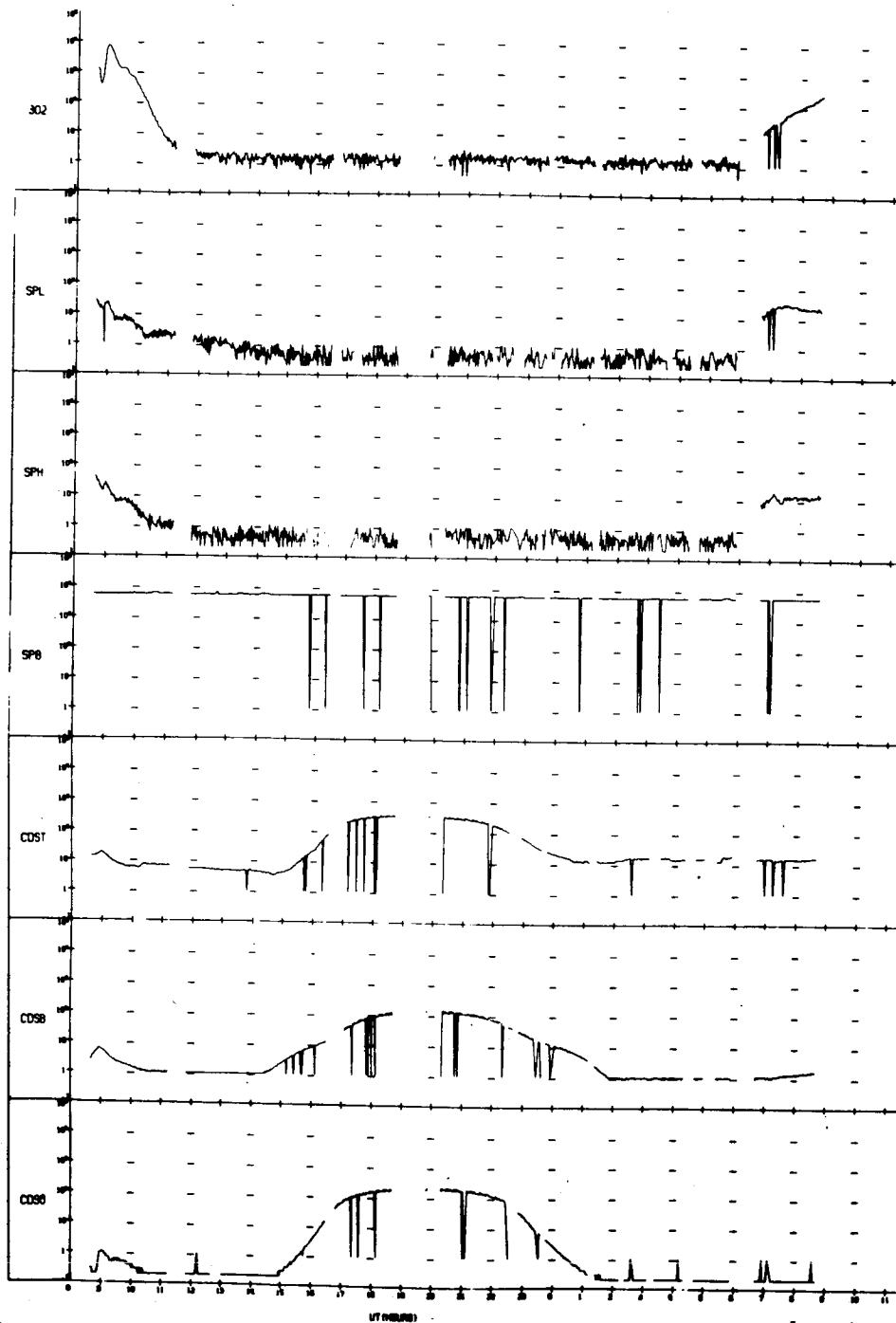
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 58  
 BEGIN 10/18/61/06:00  
 END 10/19/61/08:31



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 59  
 BEGIN 10/19/61/08:38  
 END 10/20/61/11:31

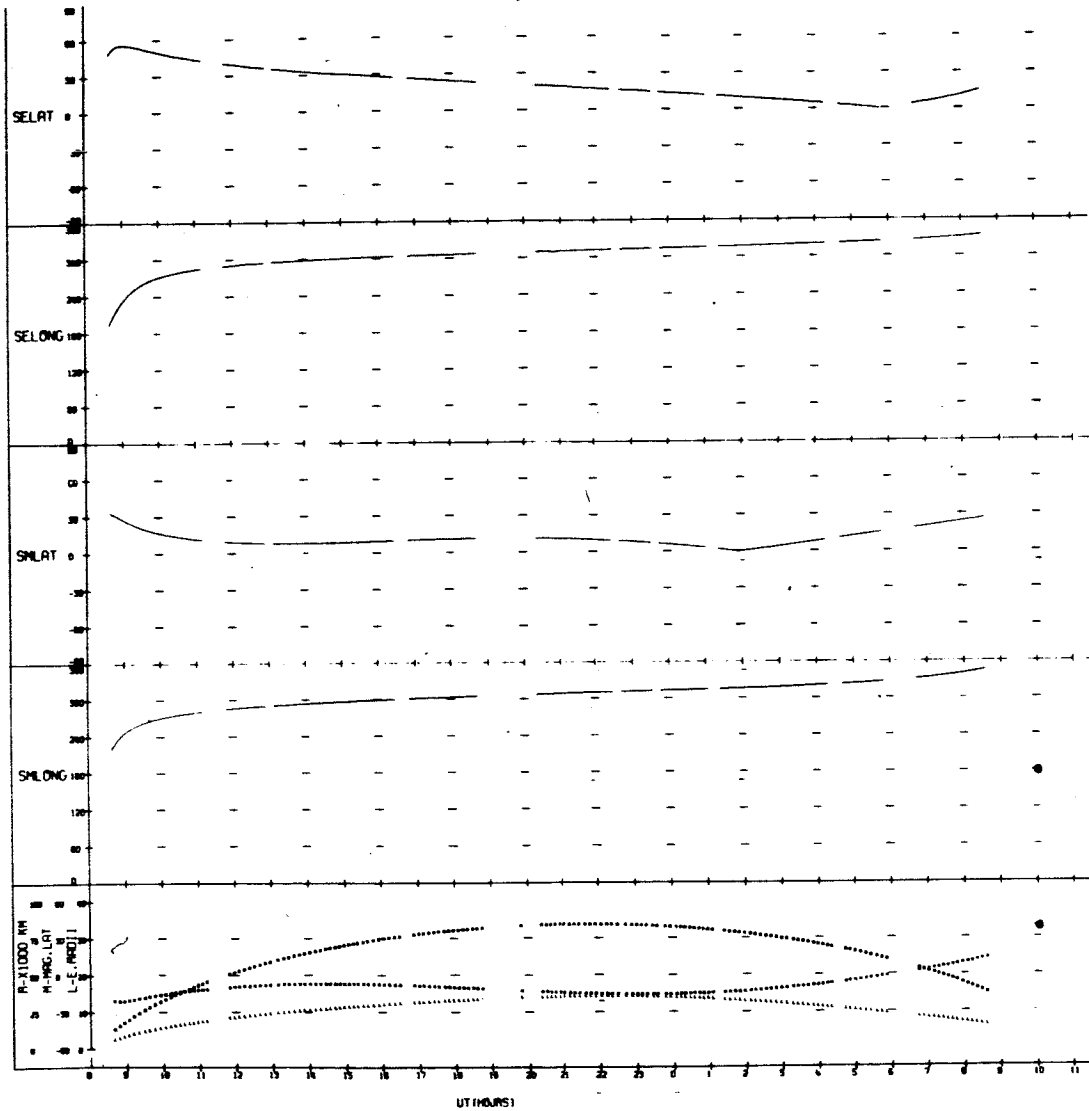


# UNIVERSITY OF IOWA

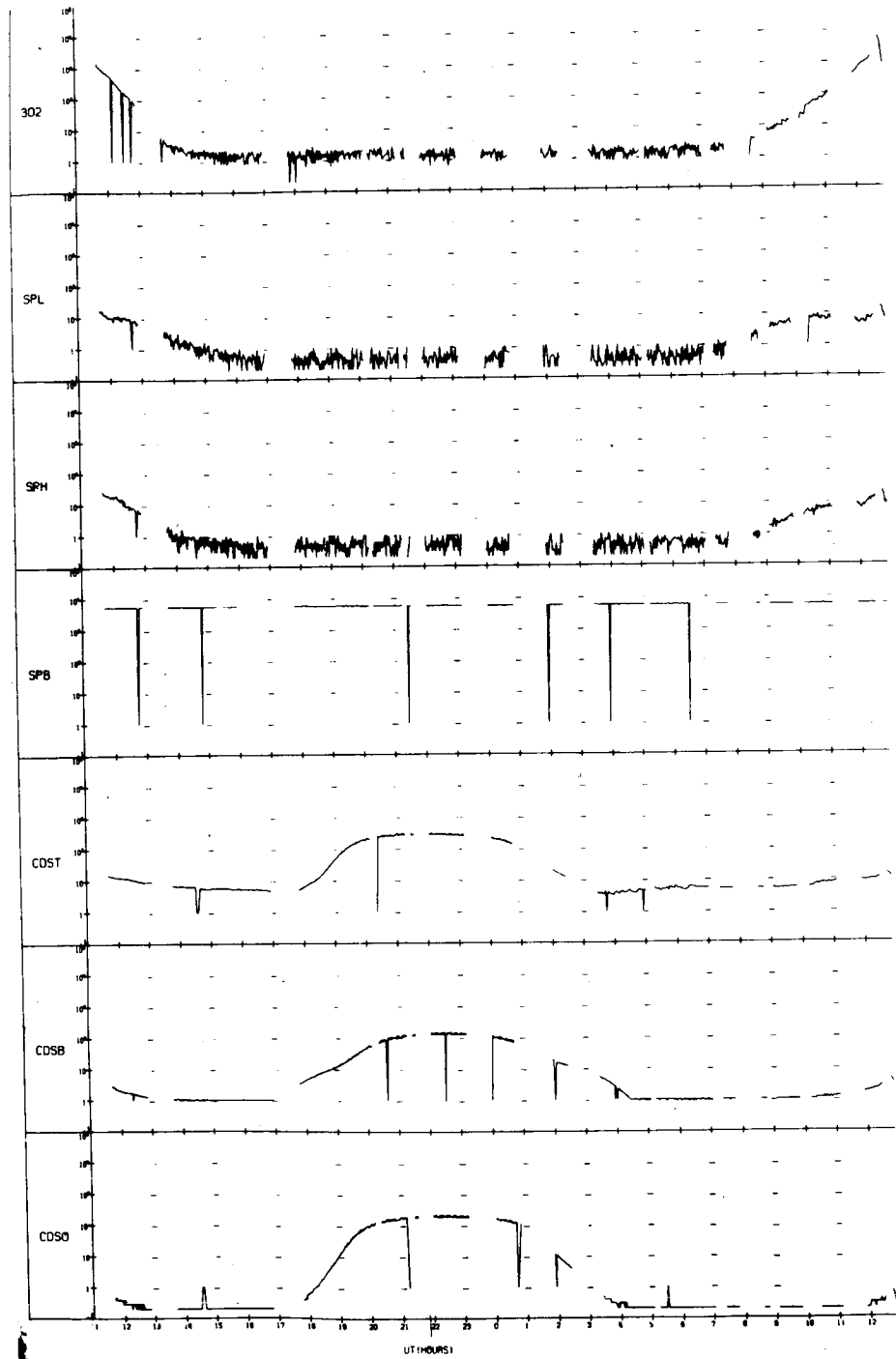
EXPLORER 12 ORBIT 59

BEGIN 10/19/61/08:38

END 10/20/61/11:31



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 60  
BEGIN 10/20/61/11:40  
END 10/21/61/12:50

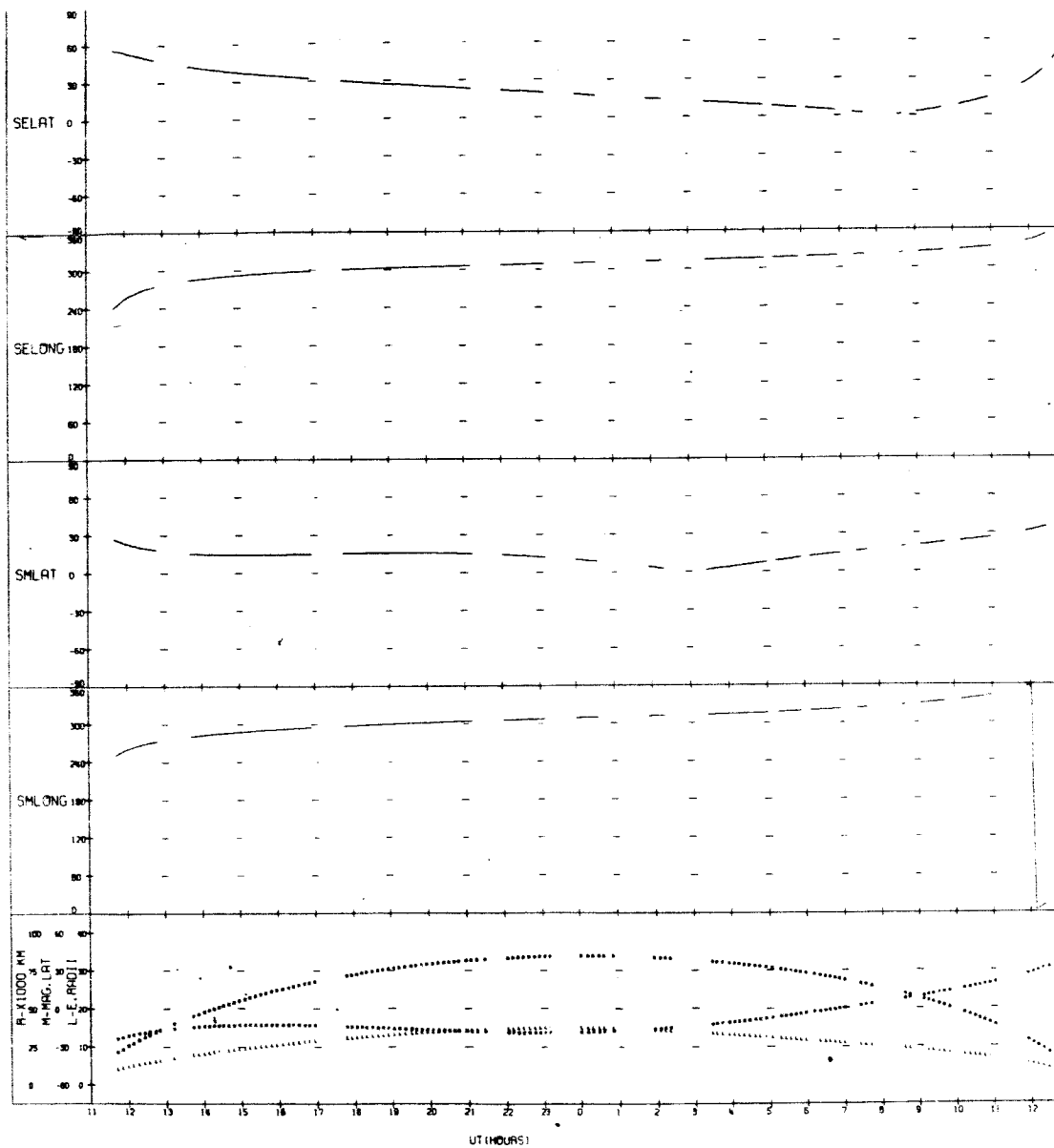


# UNIVERSITY OF IOWA

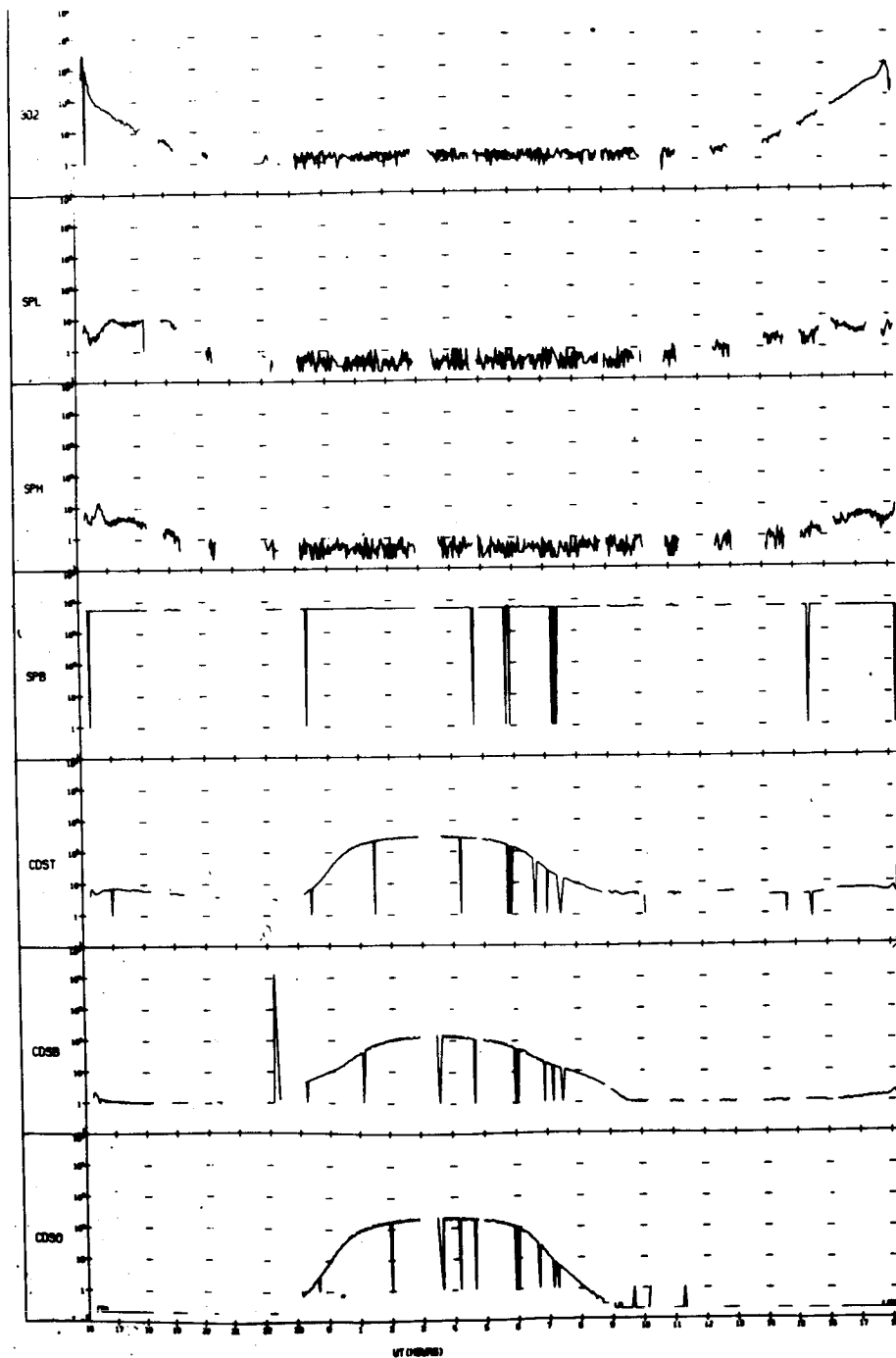
EXPLORER 12 ORBIT 60

BEGIN 10/20/61/11:40

END 10/21/61/12:50



UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 62  
 BEGIN 10/22/81/16:14  
 END 10/23/81/18:15

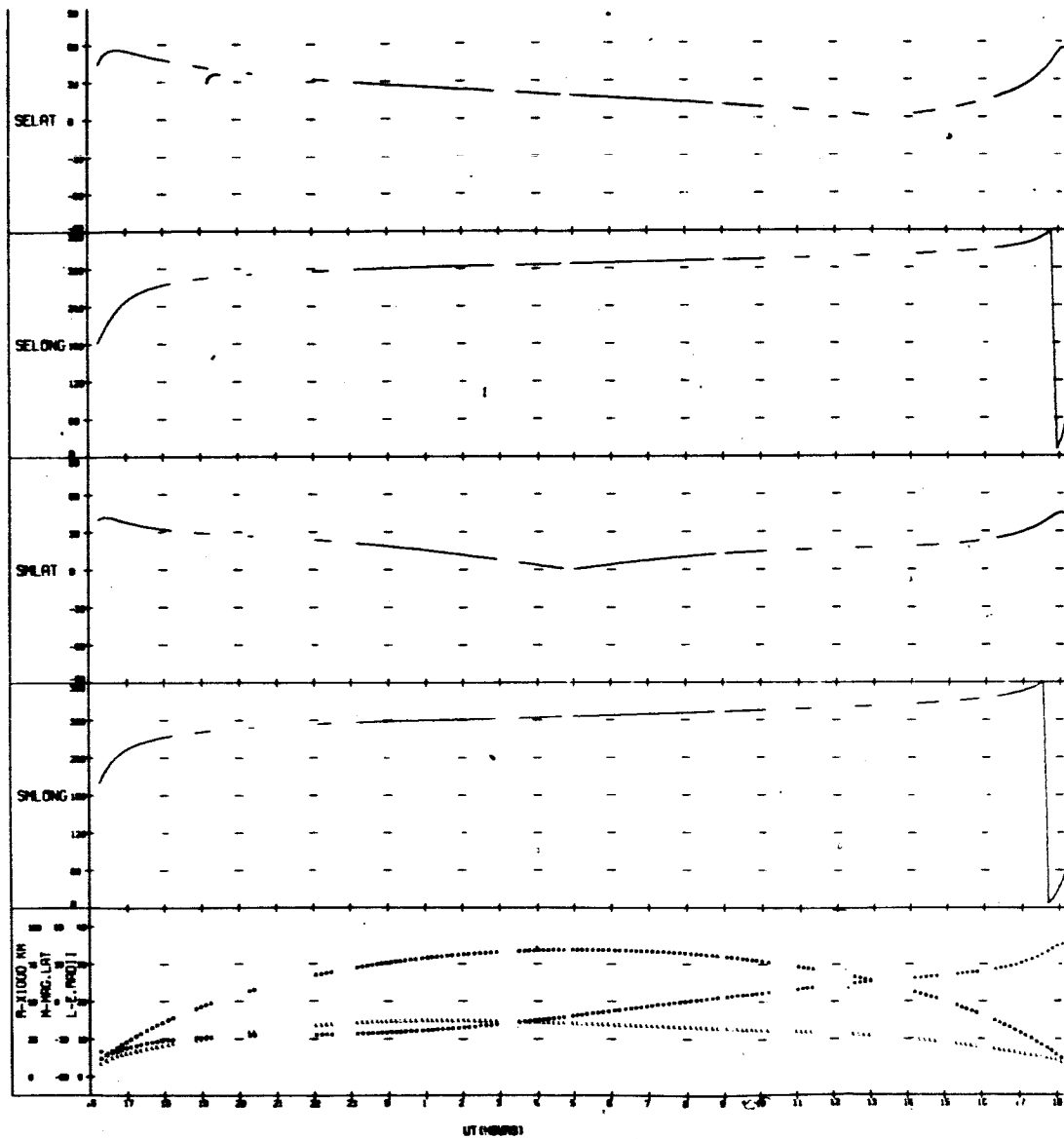


# UNIVERSITY OF IOWA

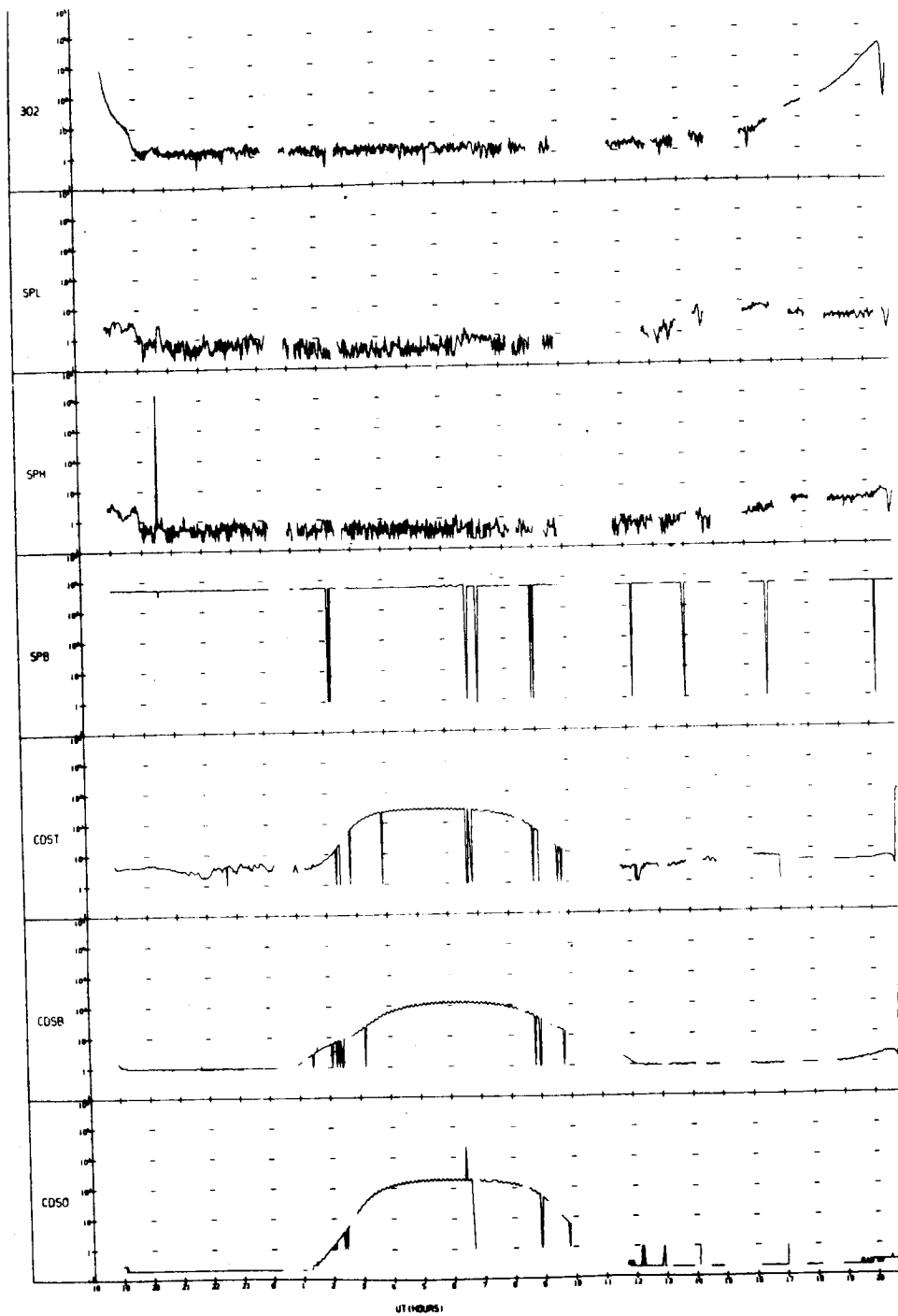
EXPLORER 12 ORBIT 62

BEGIN 10/22/61/16:14

END 10/23/61/18:15



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 63  
BEGIN 10/23/61/18:56  
END 10/24/61/20:54

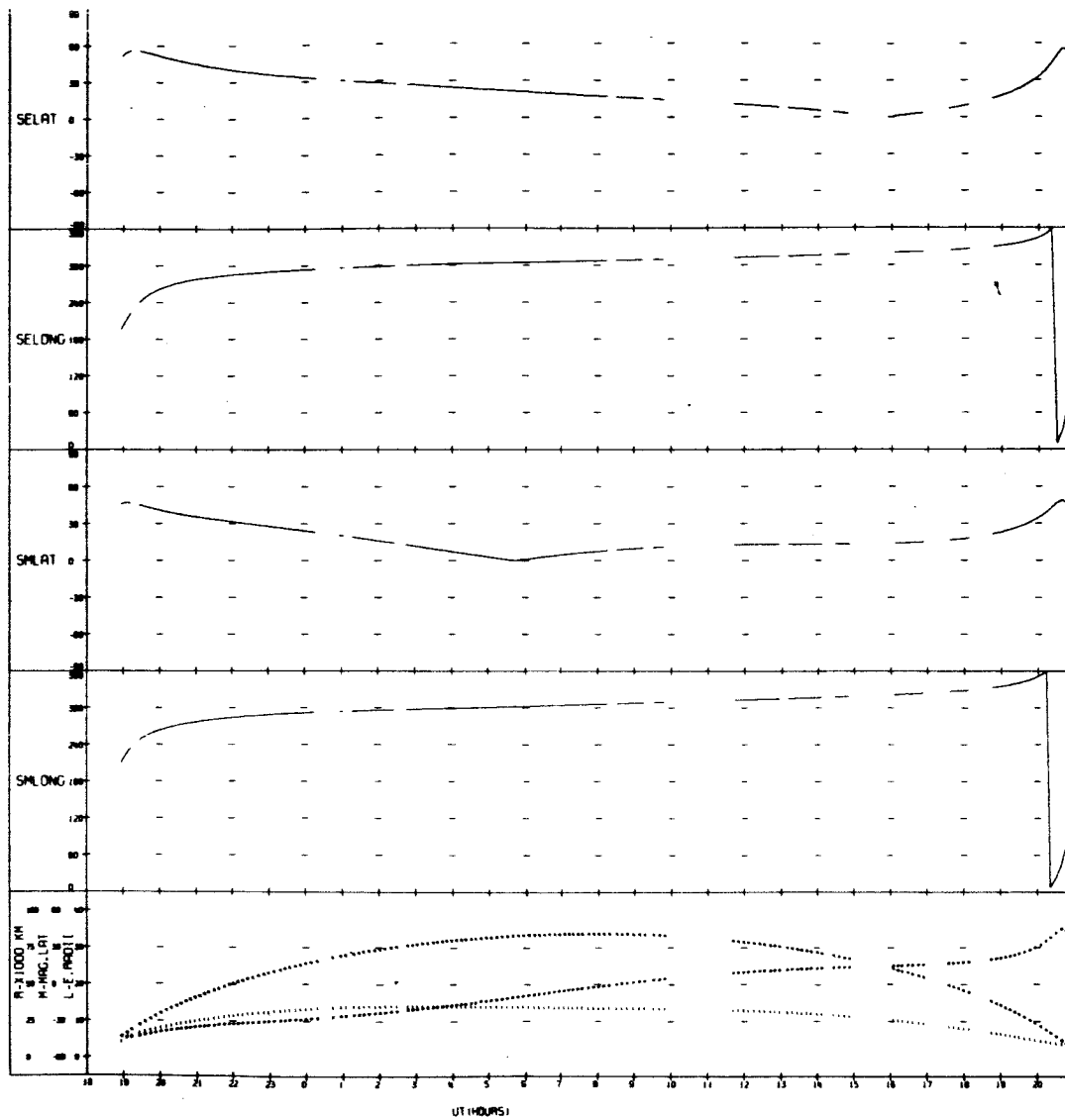


# UNIVERSITY OF IOWA

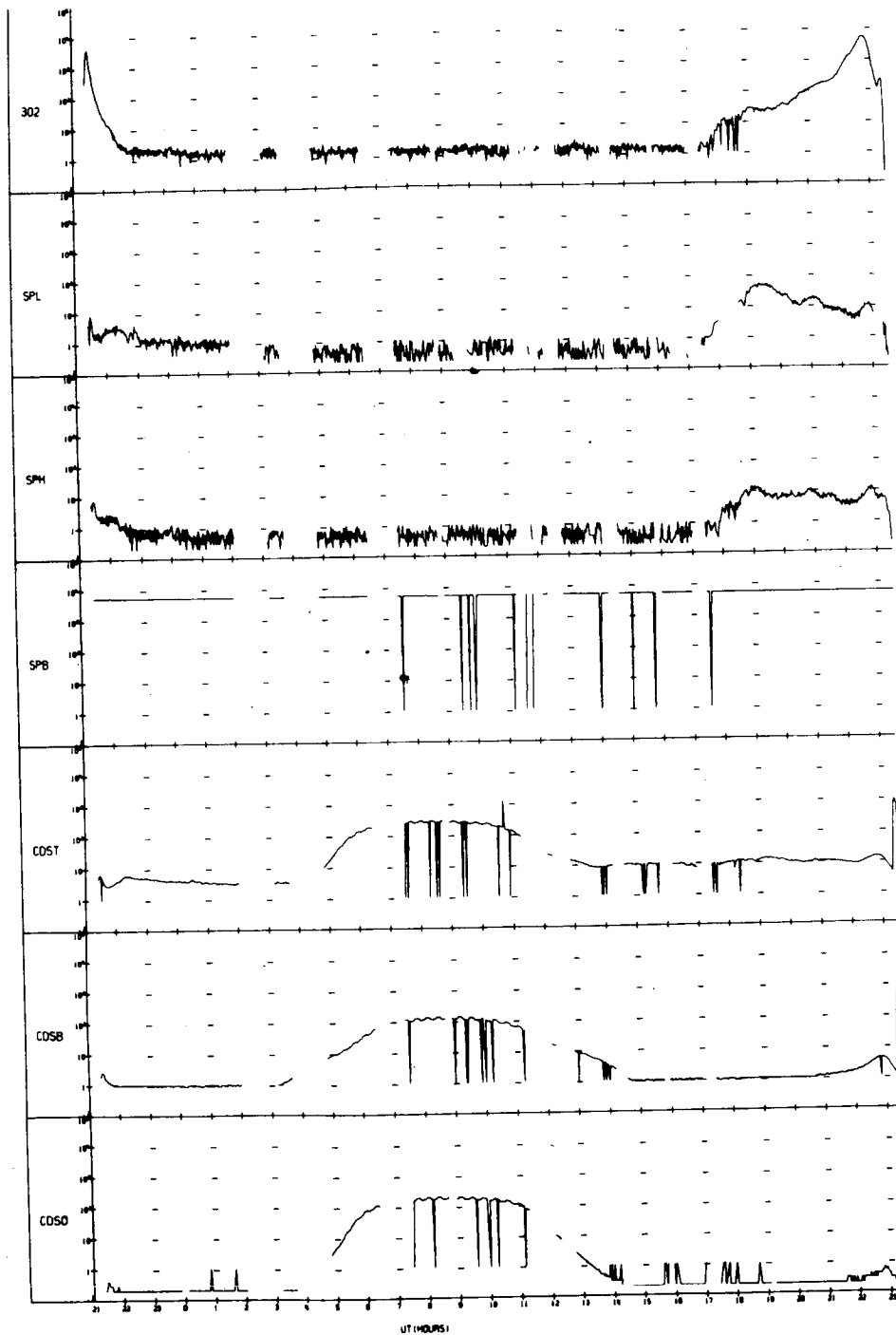
EXPLORER 12 ORBIT 63

BEGIN 10/23/61/18:56

END 10/24/61/20:54

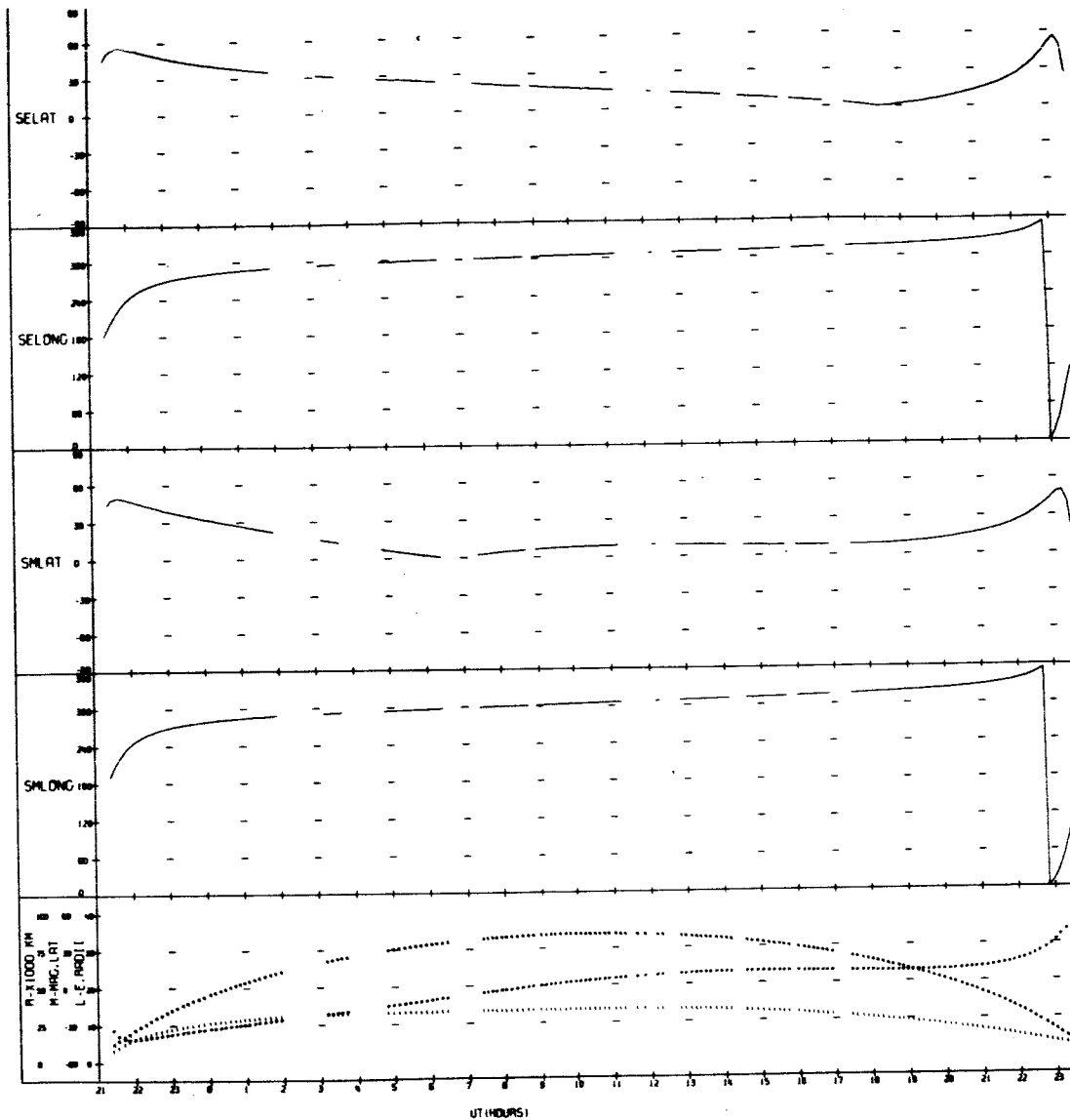


UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 64  
 BEGIN 10/24/61/21:23  
 END 10/25/61/23:33



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 64  
 BEGIN 10/24/61/21:23  
 END 10/25/61/23:33

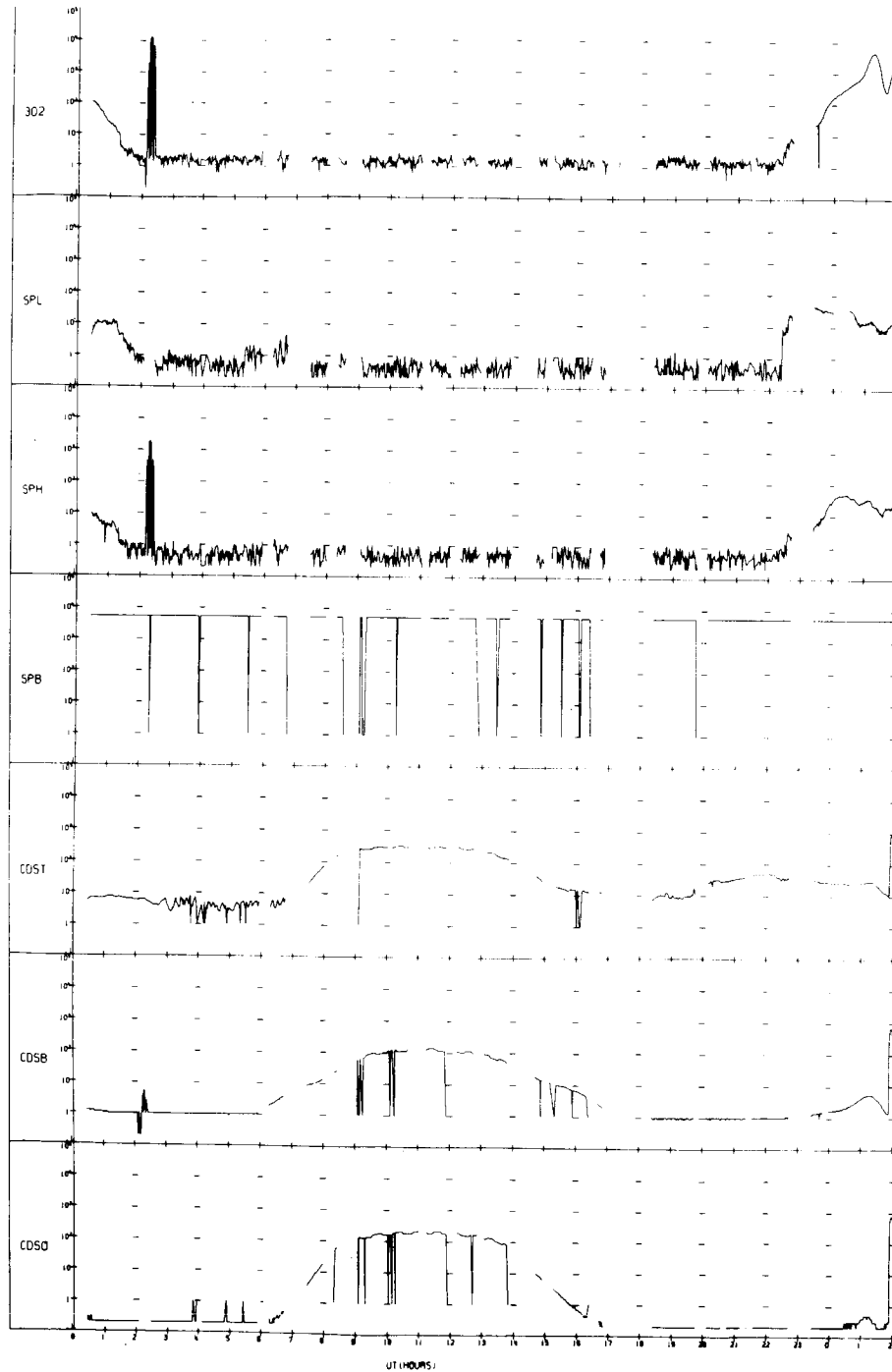


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT GS

REGIN 10/26/01/00:26

FNO 10/27/01/02:02

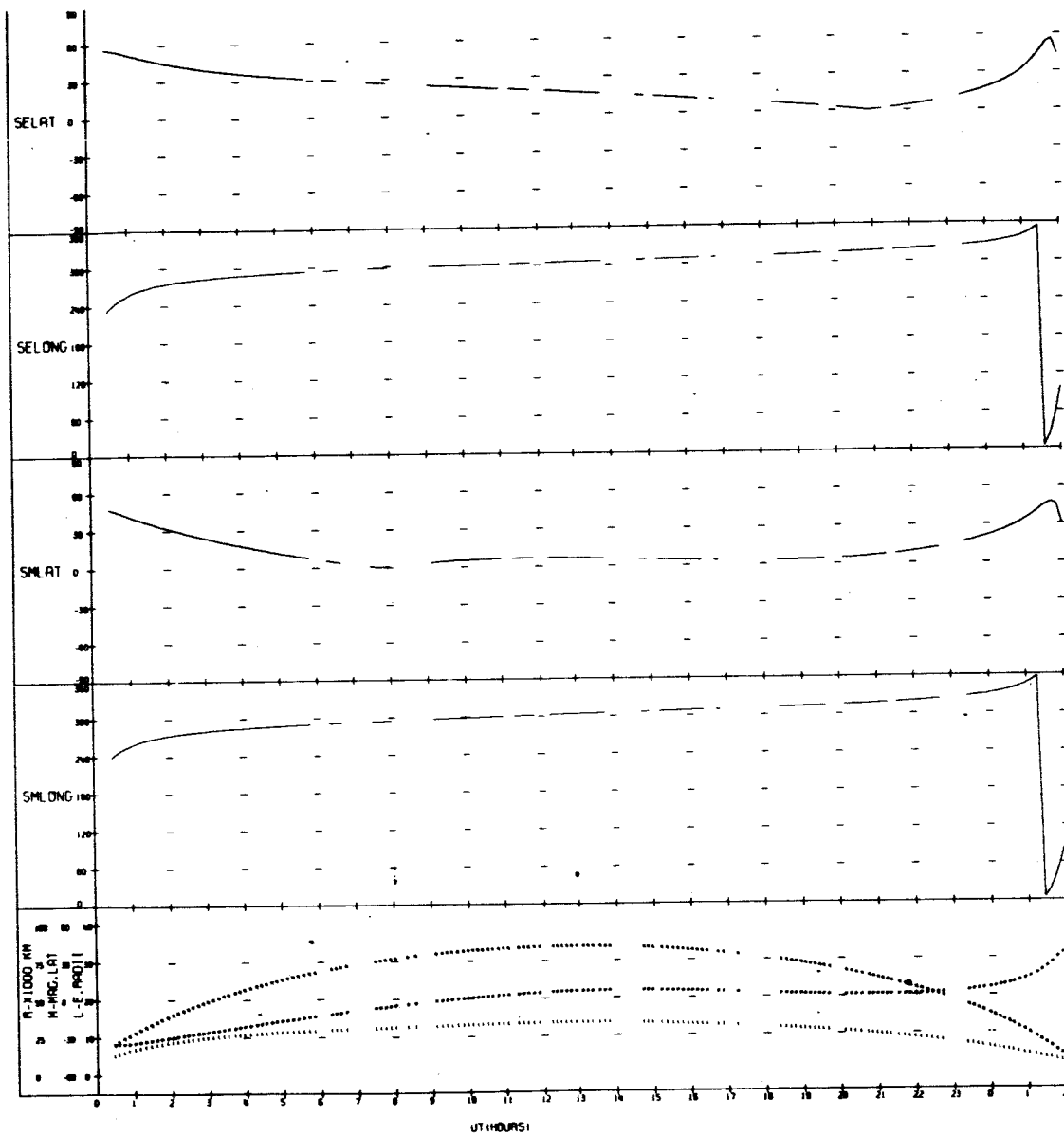


# UNIVERSITY OF IOWA

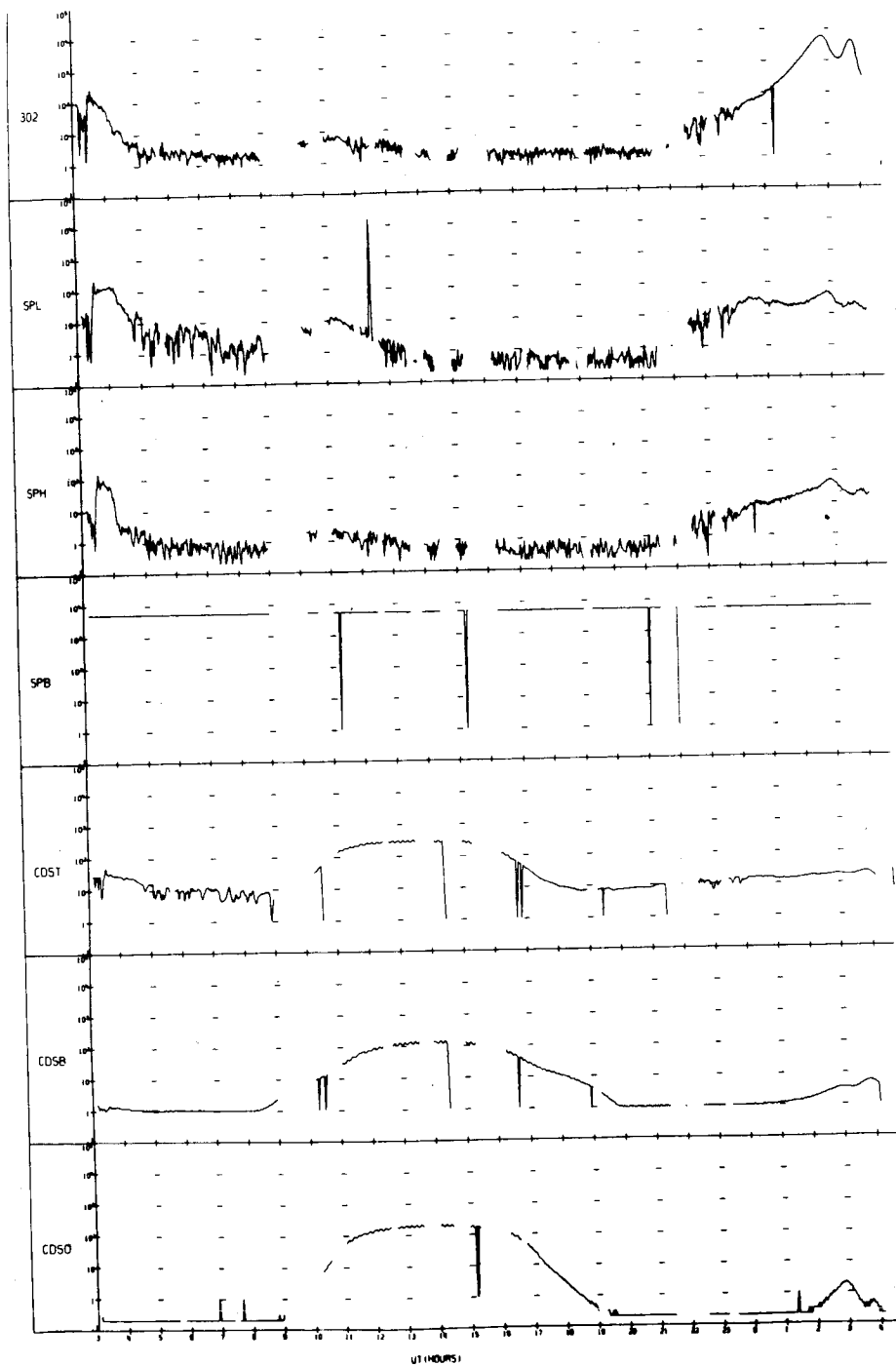
EXPLORER 12 ORBIT 65

BEGIN 10/26/61/00:26

END 10/27/61/02:02

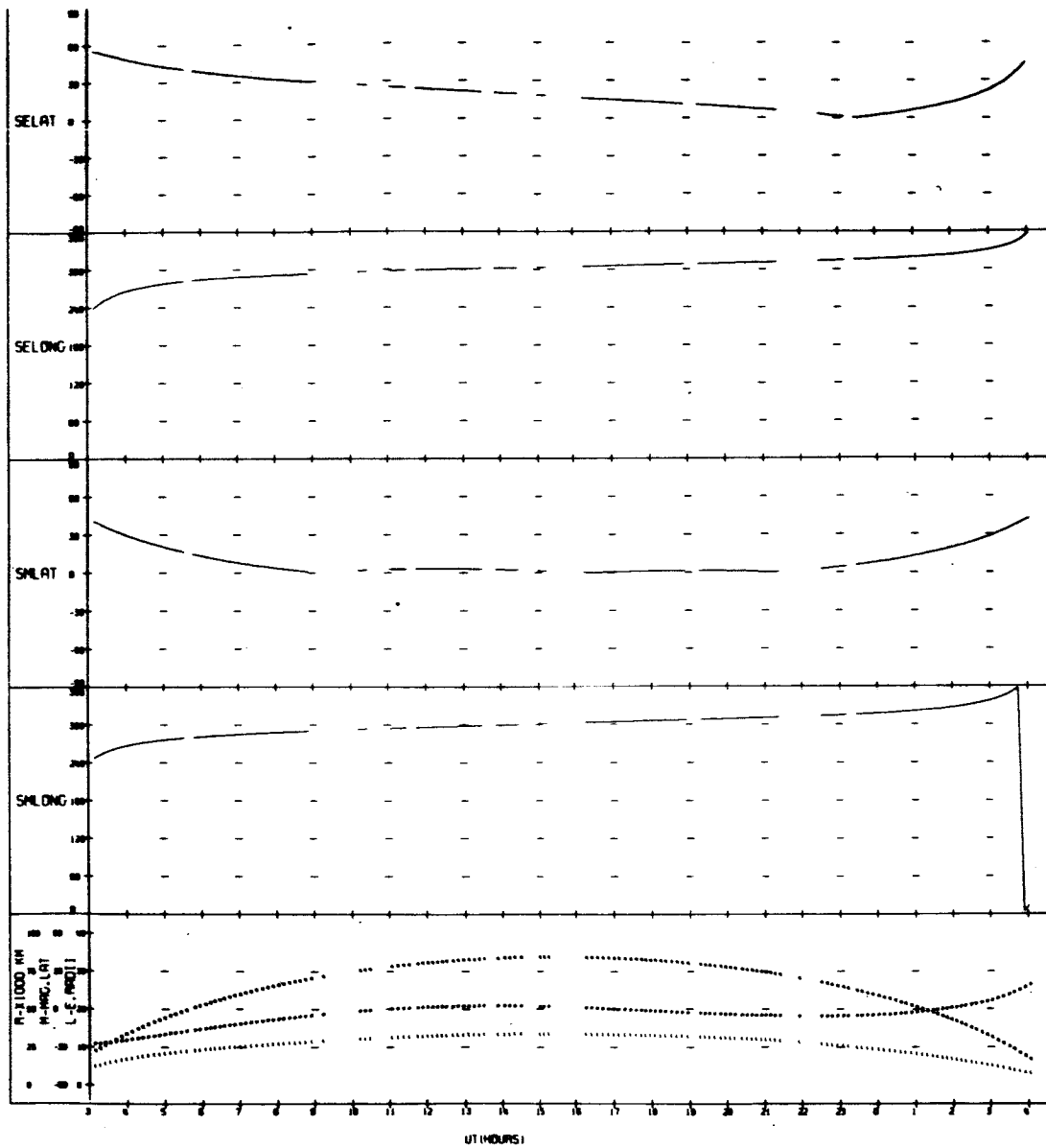


UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 66  
BEGIN 10/27/61/03:07  
END 10/28/61/04:42

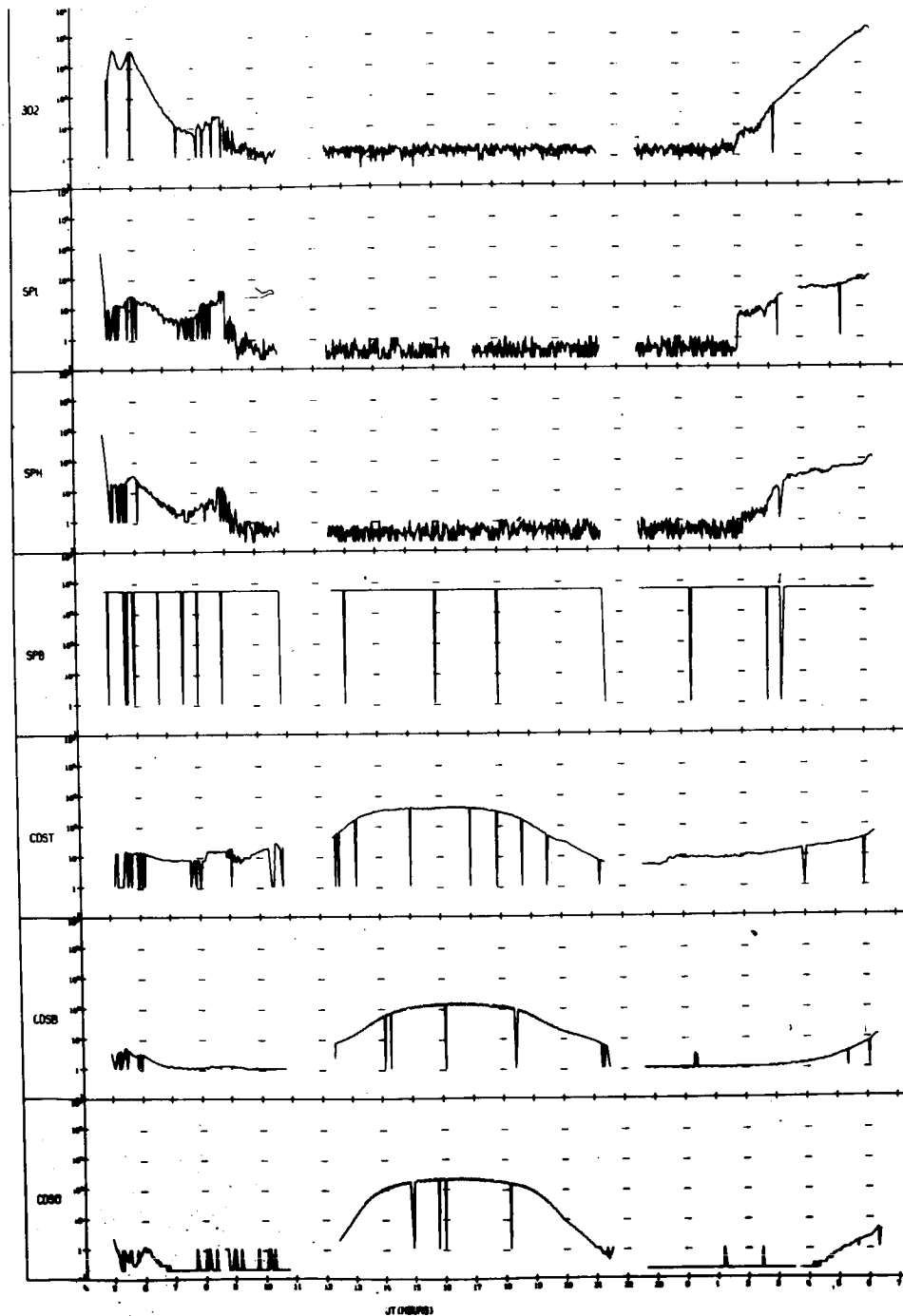


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 66  
 BEGIN 10/27/61/03:07  
 END 10/28/61/01:42



UNIVERSITY OF IOWA  
 EXPLOSER 12 ORBIT 67  
 BEGIN 10/28/61/04:57  
 END 10/29/61/07:33

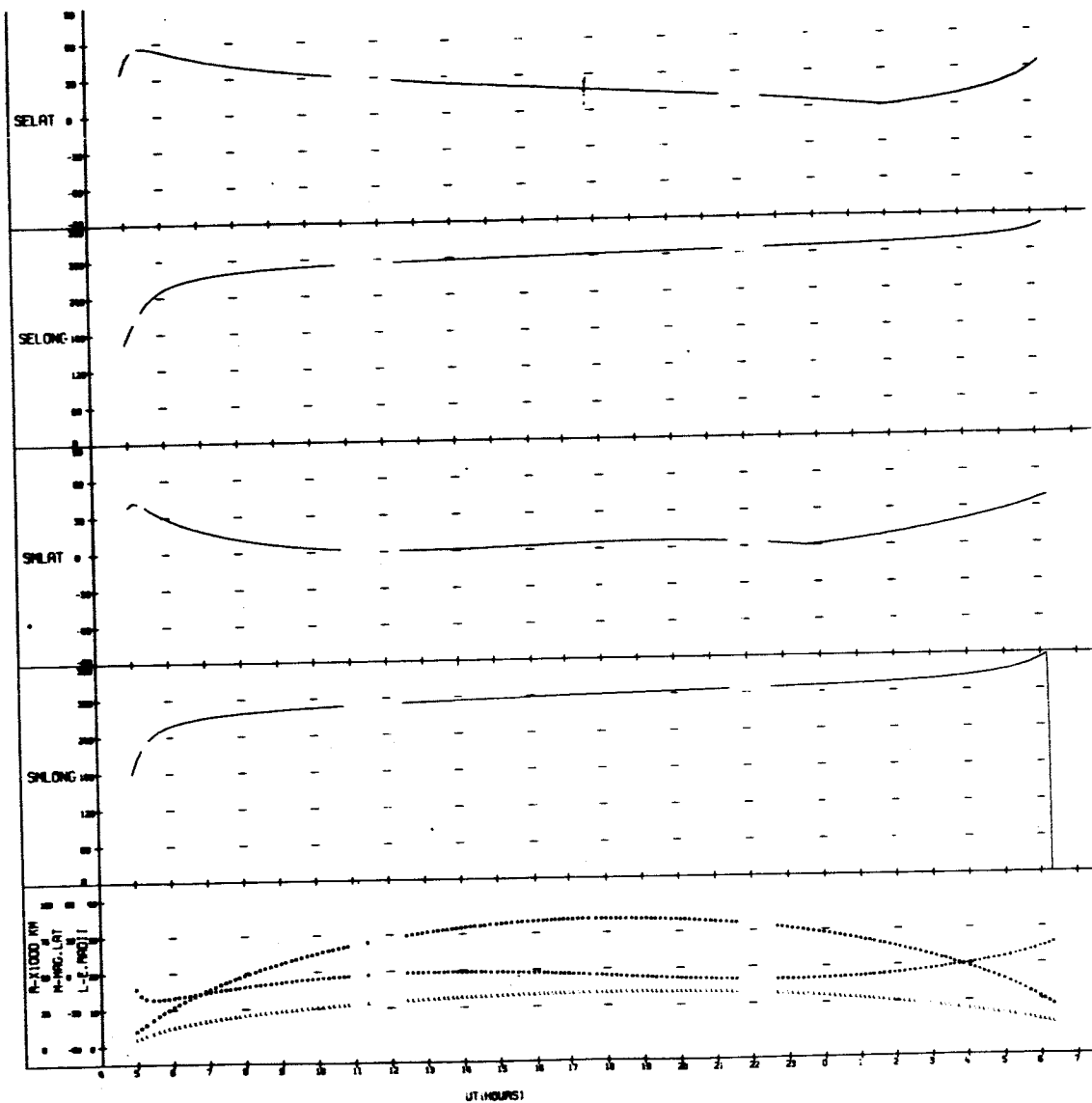


# UNIVERSITY OF IOWA

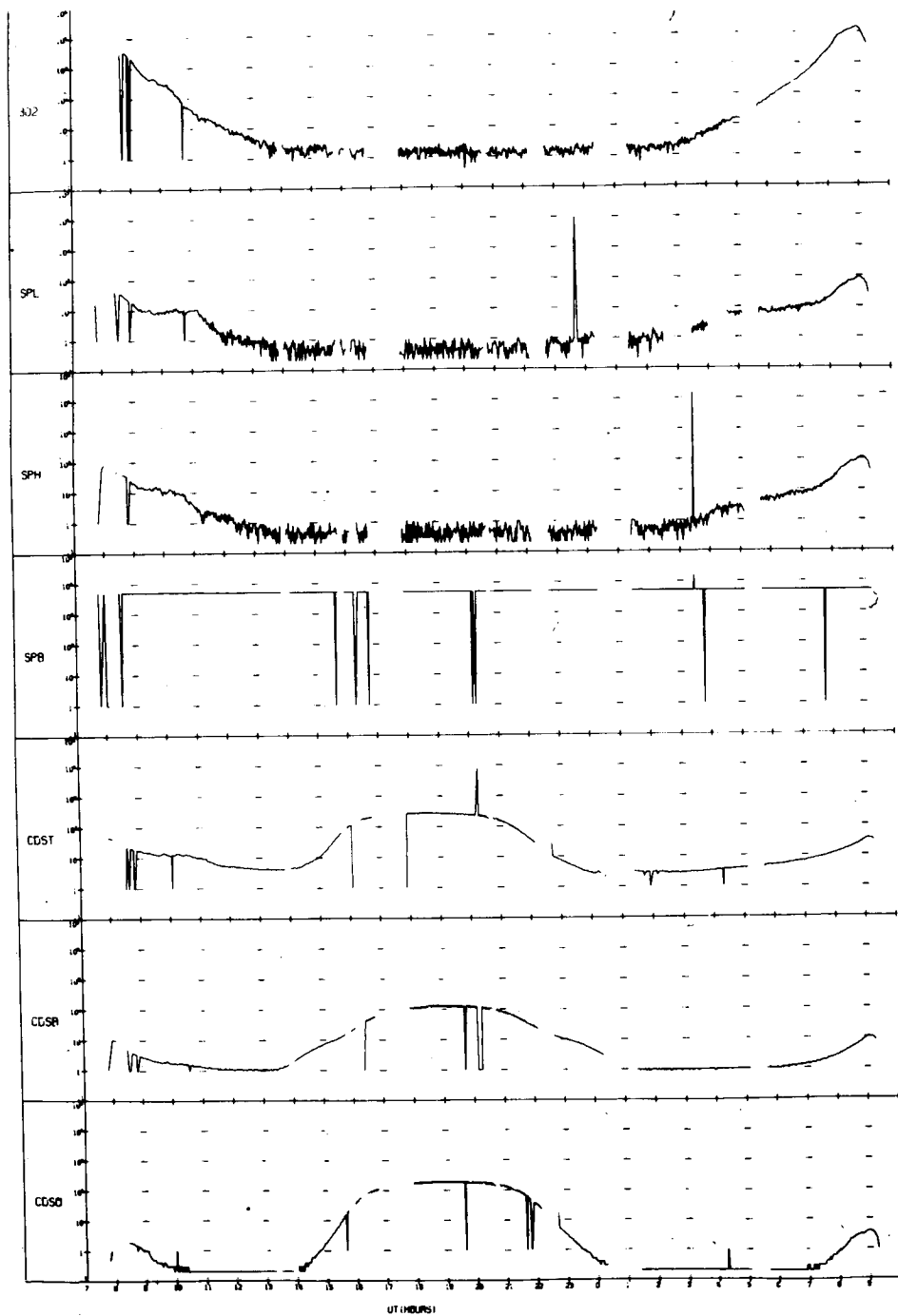
EXPLORER 12 ORBIT 67

BEGIN 10/28/61/04:57

END 10/29/61/07:33



UNIVERSITY OF IOWA  
EXPLORES 12 ORBIT C8  
REFIN 10 20 01 10:47  
END 10/30 01/10:02

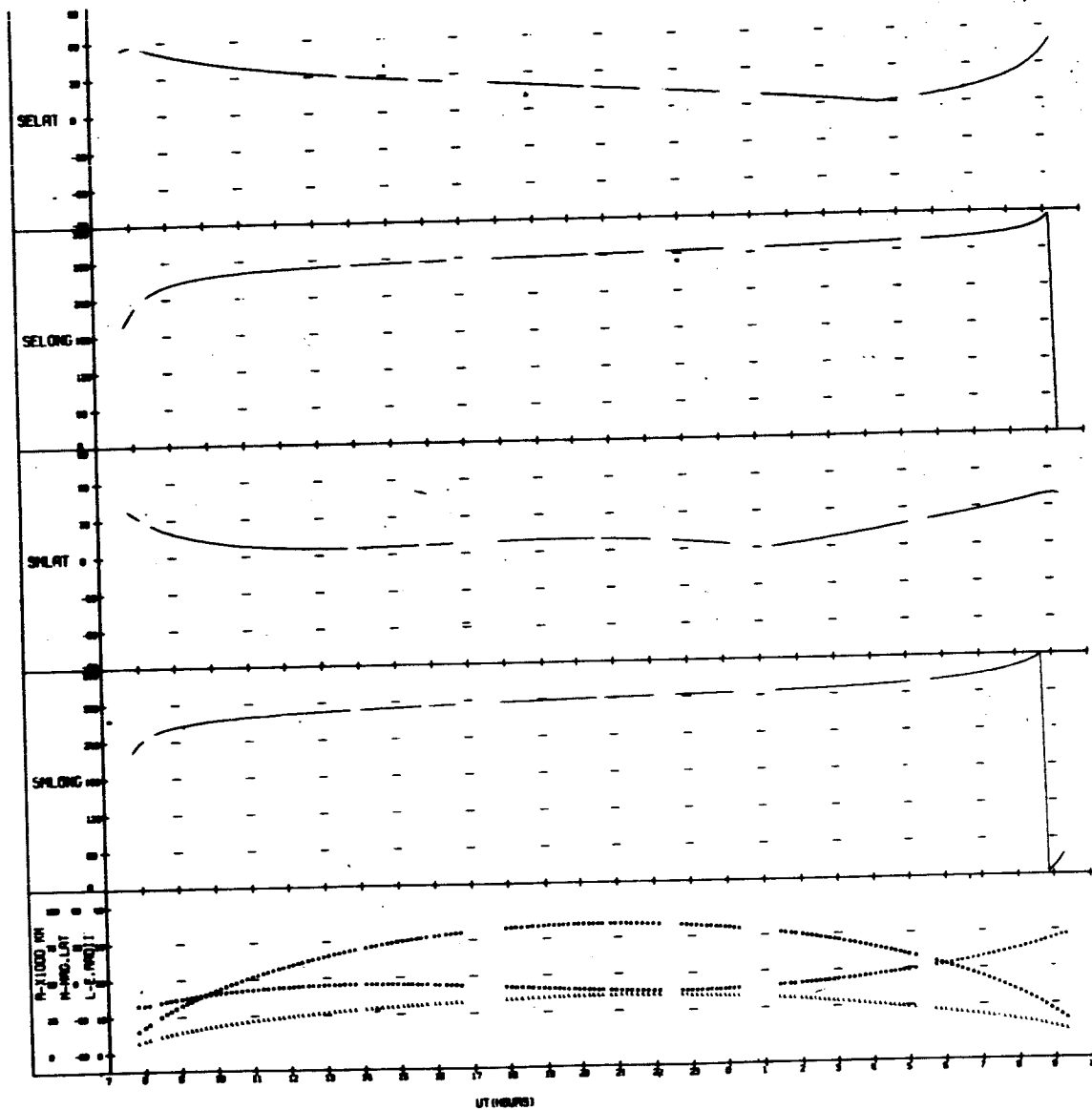


# UNIVERSITY OF IOWA

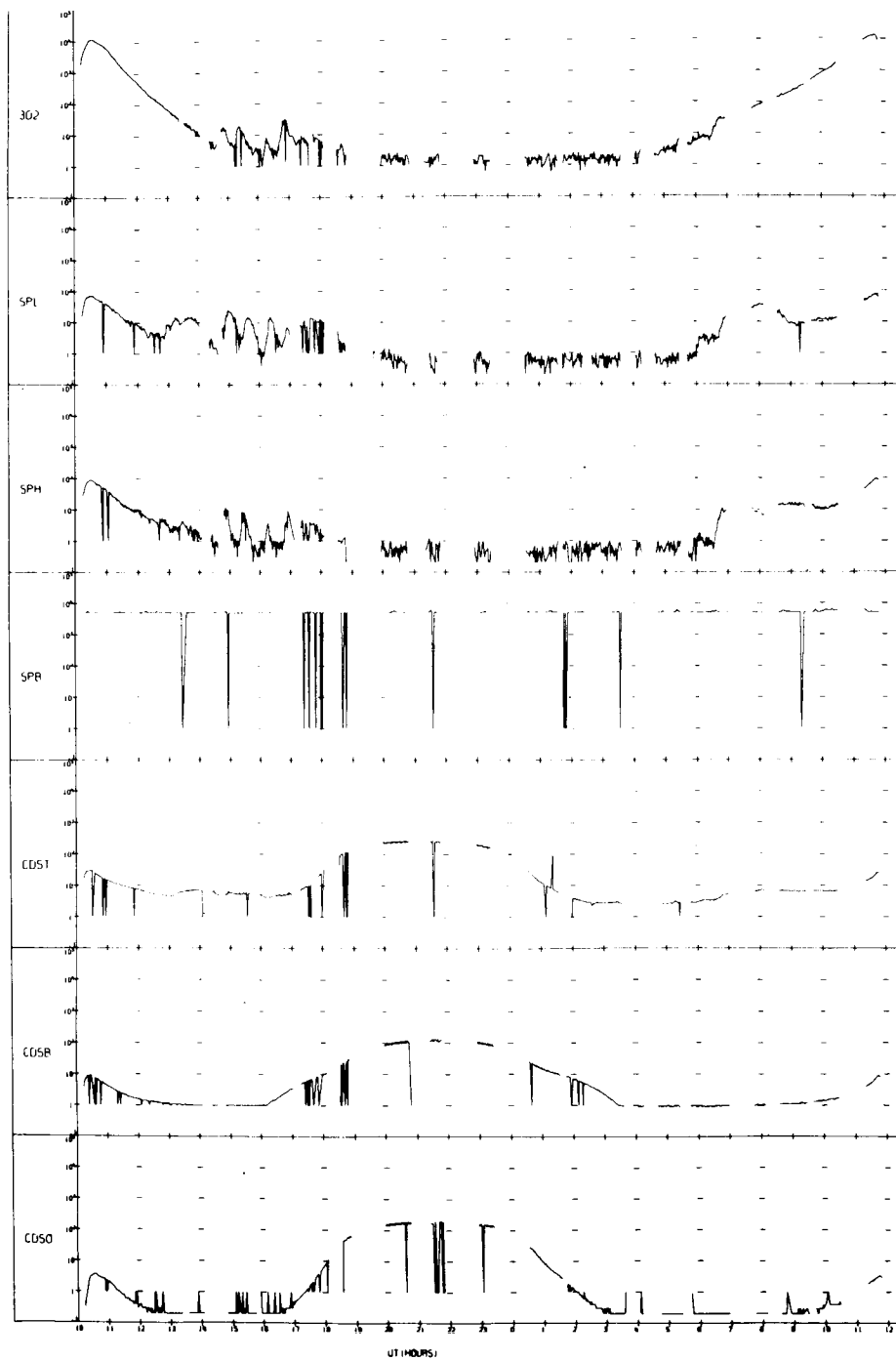
EXPLORER 12 ORBIT 68

BEGIN 10/29/61/07:47

END 10/30/61/10:02



UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 69  
 BEGIN 10/30/61/10:13  
 END 10/31/61/12:32

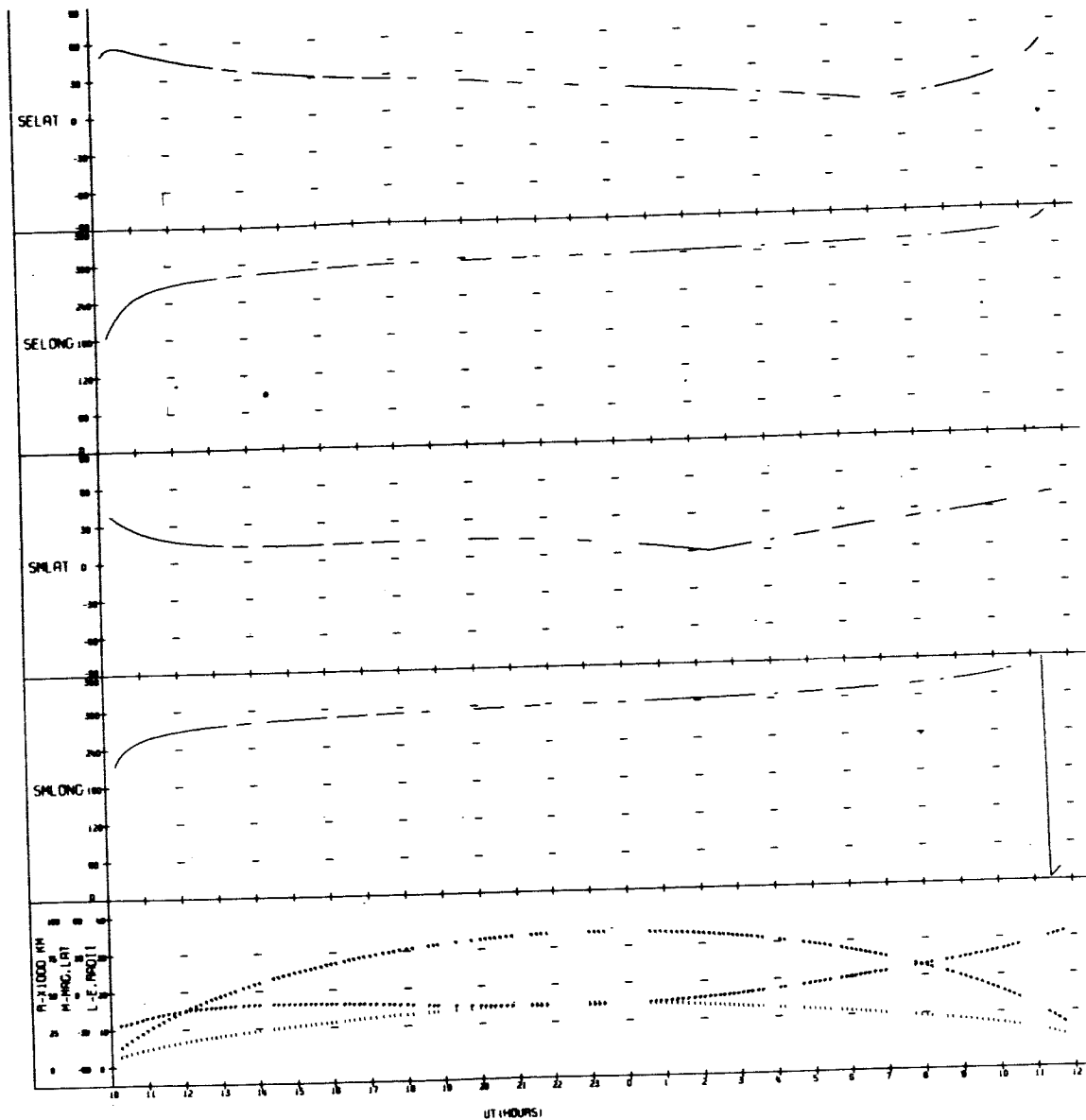


# UNIVERSITY OF IOWA

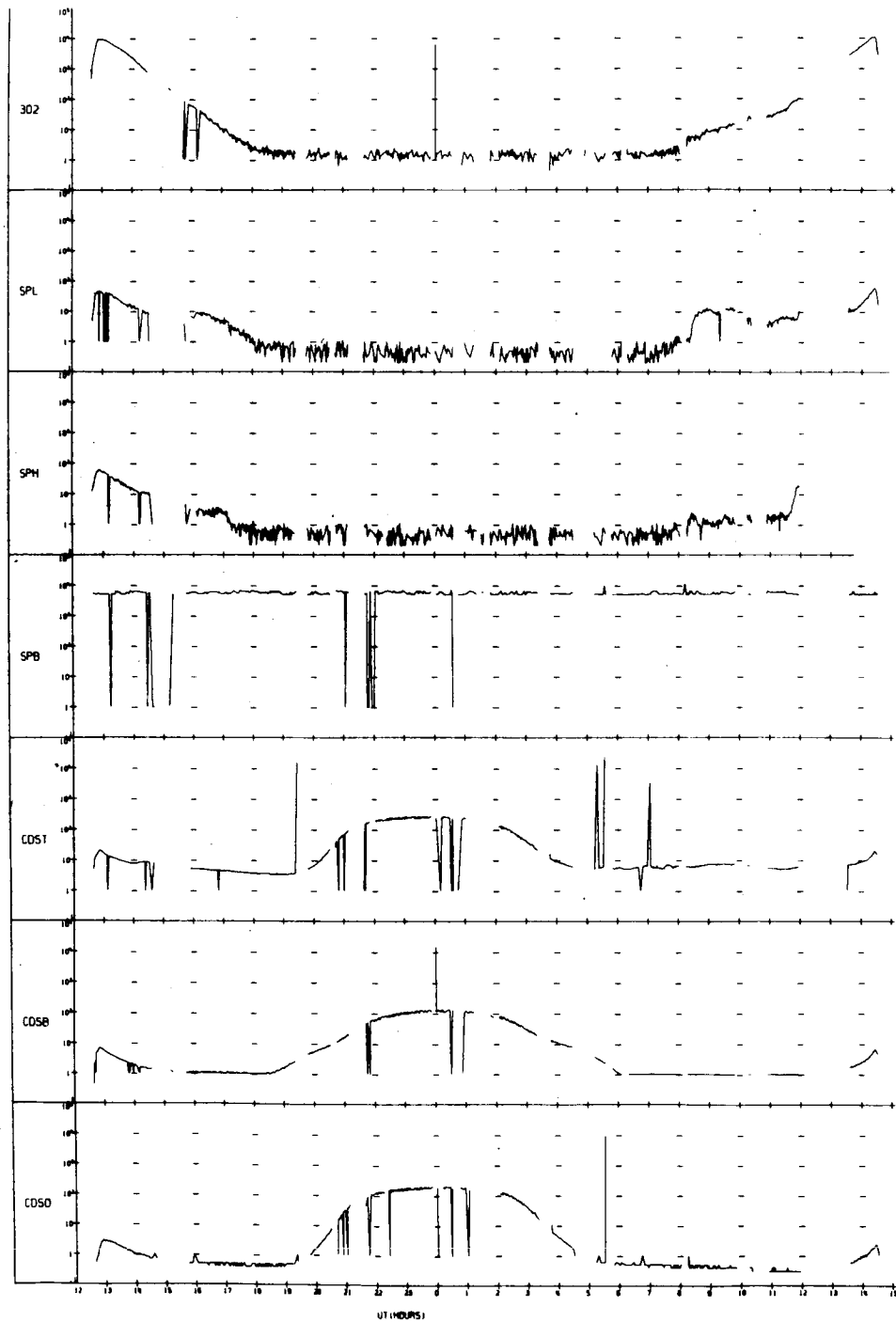
EXPLORER 12 ORBIT 69

BEGIN 10/30/61/10:13

END 10/31/61/12:32

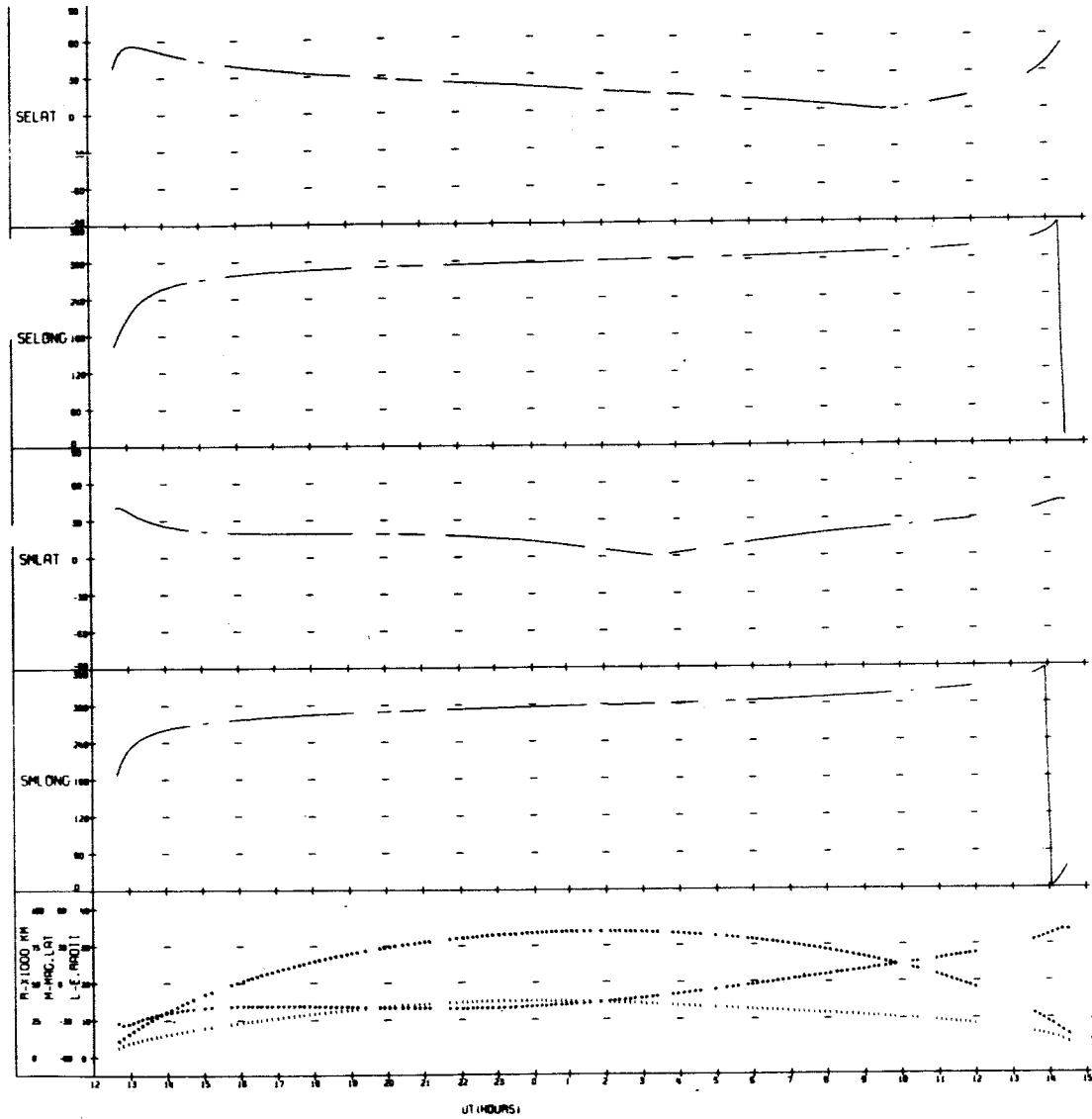


UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 70  
BEGIN 10/31/61/12:38  
END 11/01/61/15:09



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 70  
 BEGIN 10/31/61/12:38  
 END 11/01/61/15:09

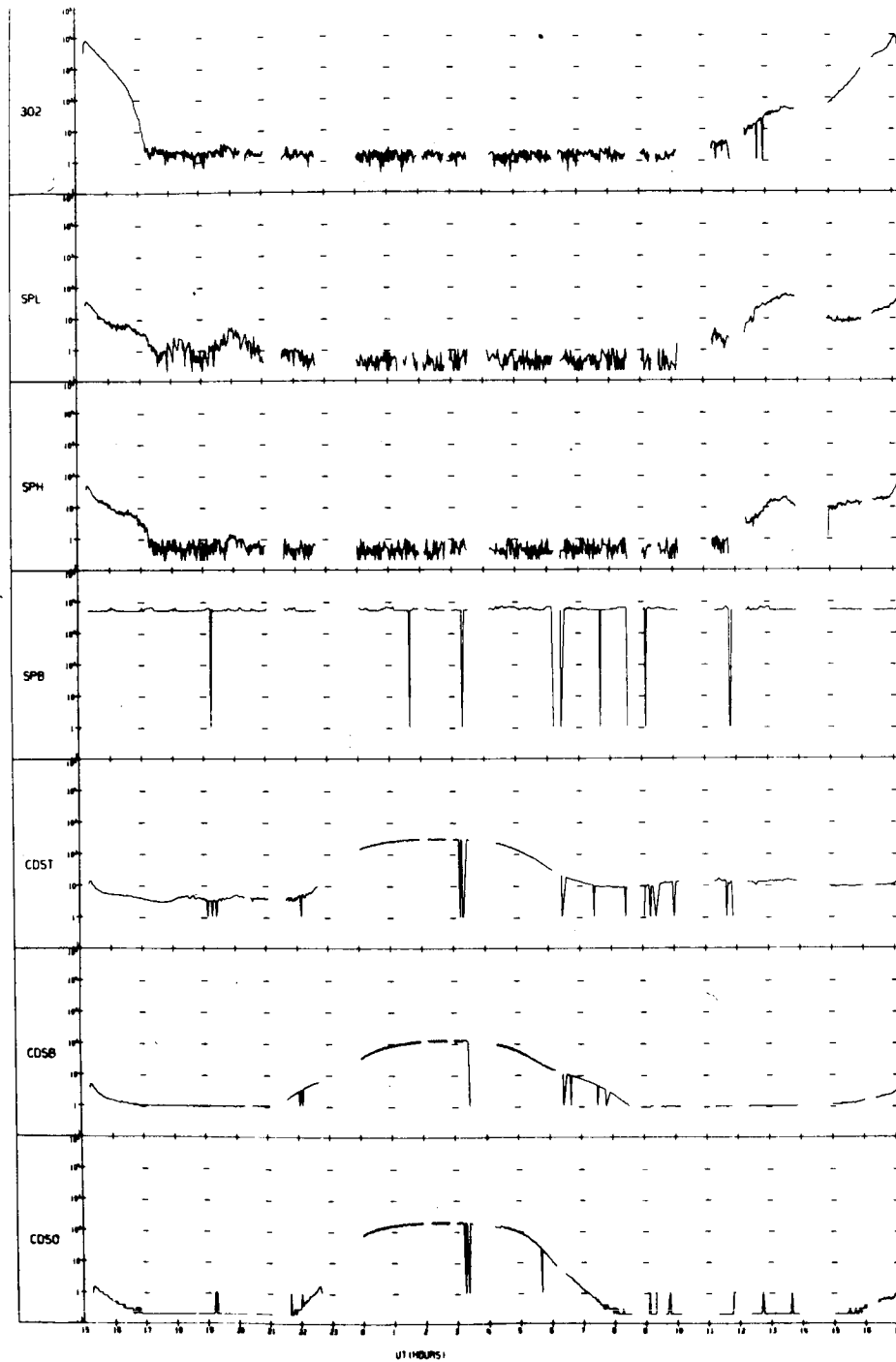


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 71

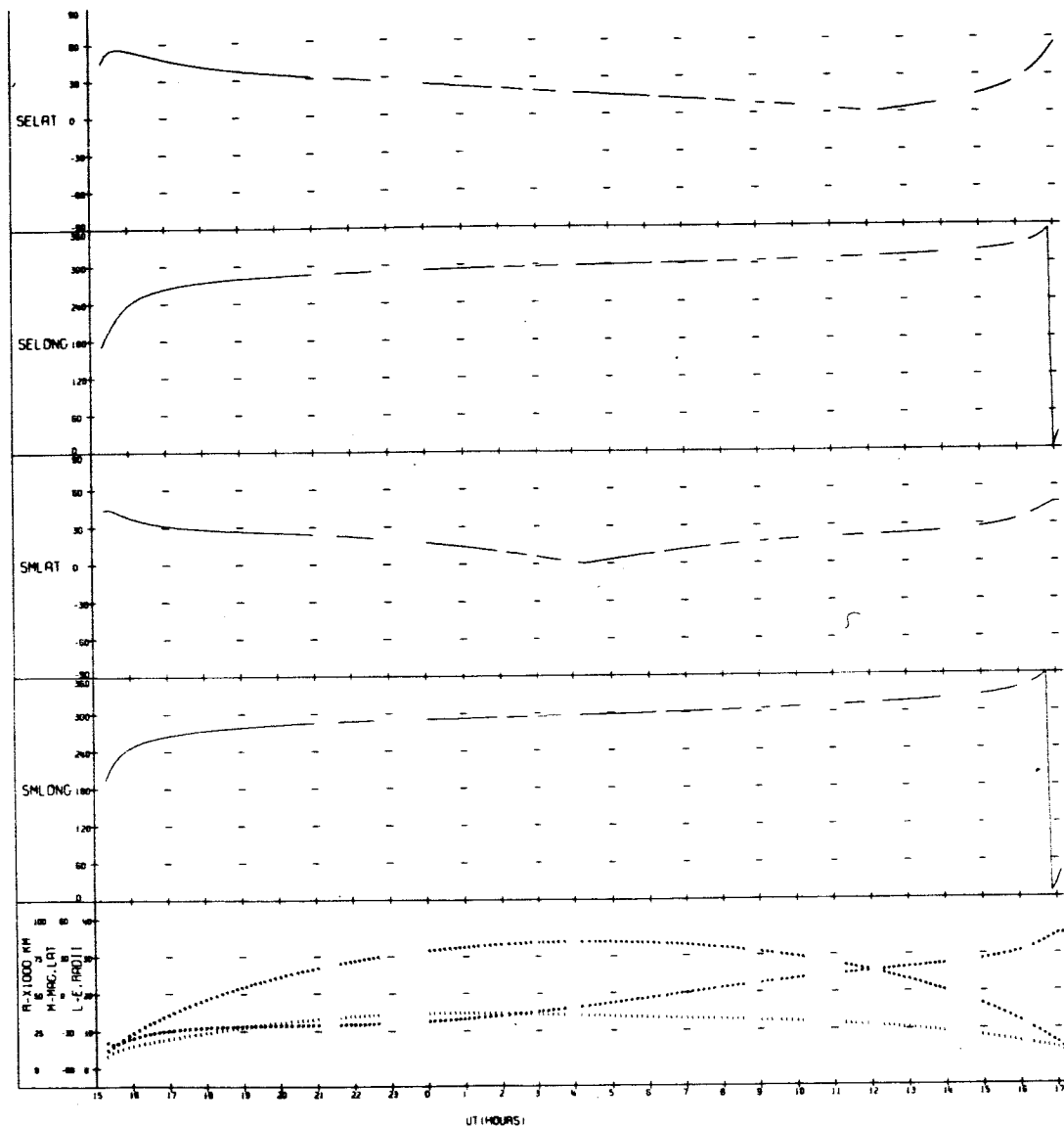
BEGIN 11/01/61/15:15

END 11/02/61/17:15

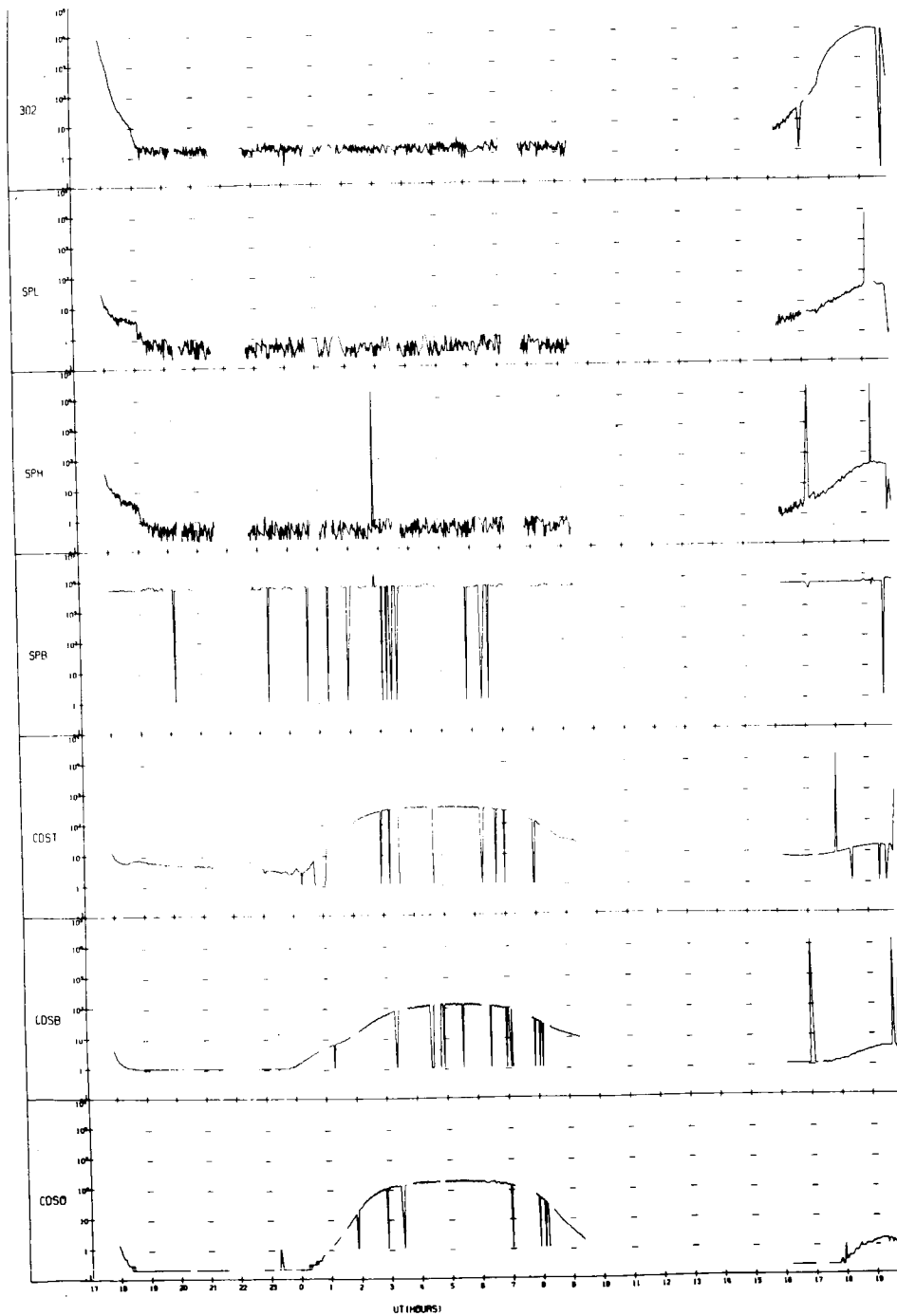


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 71  
 BEGIN 11/01/61/15:15  
 END 11/02/61/17:15



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 72  
BEGIN 11/02/61/17:55  
END 11/03/61/19:54

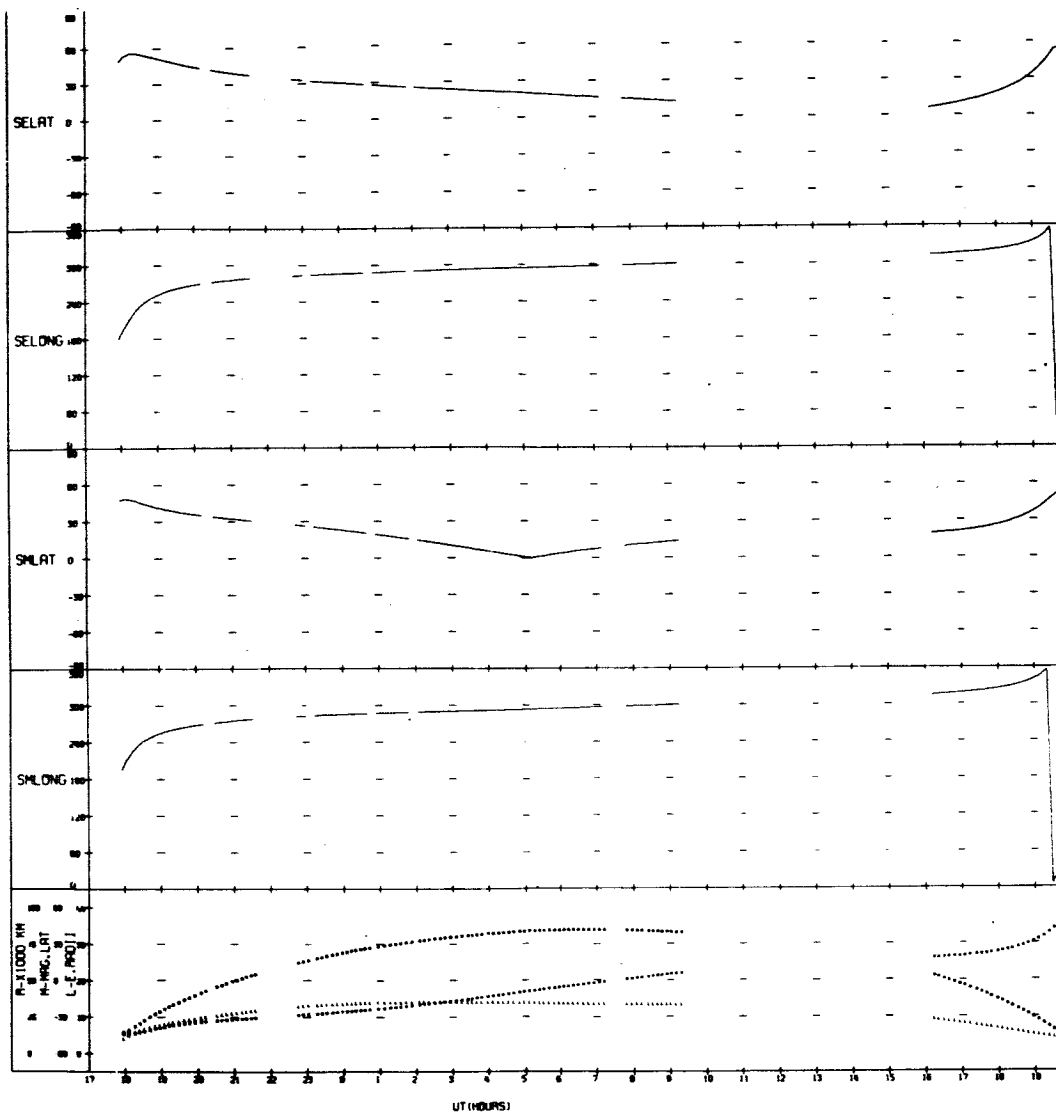


# UNIVERSITY OF IOWA

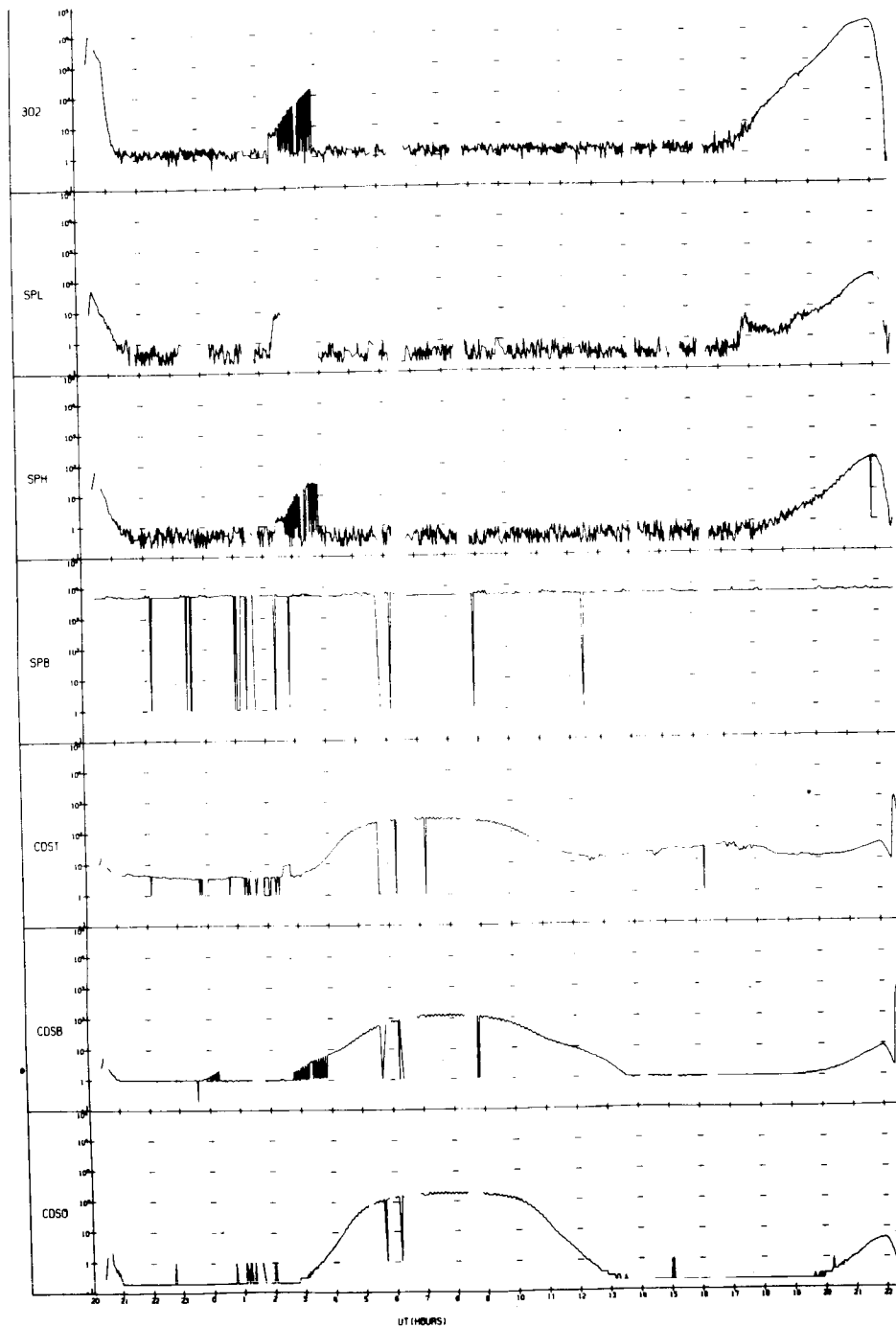
EXPLORER 12 ORBIT 72

BEGIN 11/02/61/17:55

END 11/03/61/19:54



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 73  
BEGIN 11/01/61/20:21  
END 11/04/61/22:36

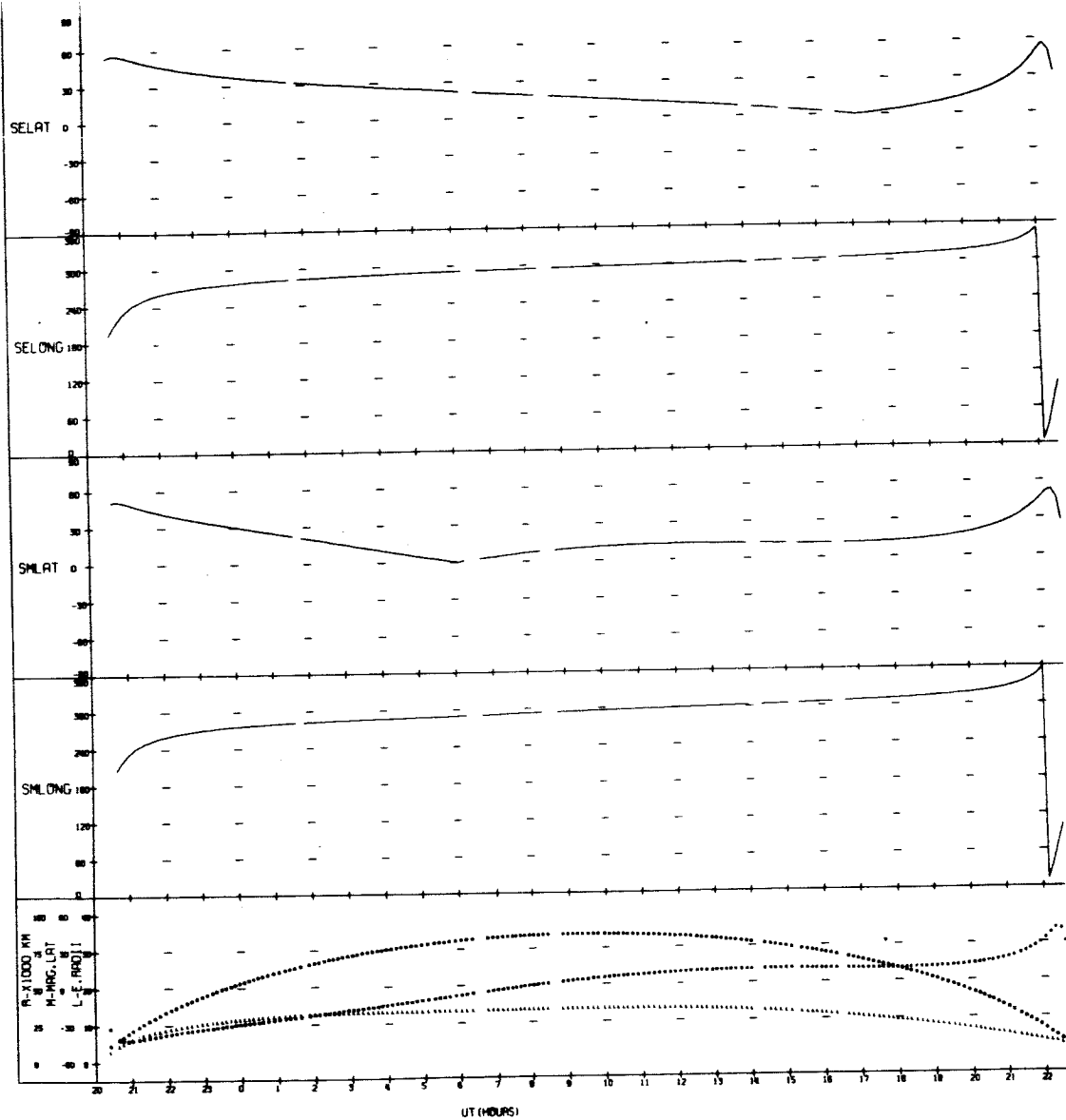


# UNIVERSITY OF IOWA

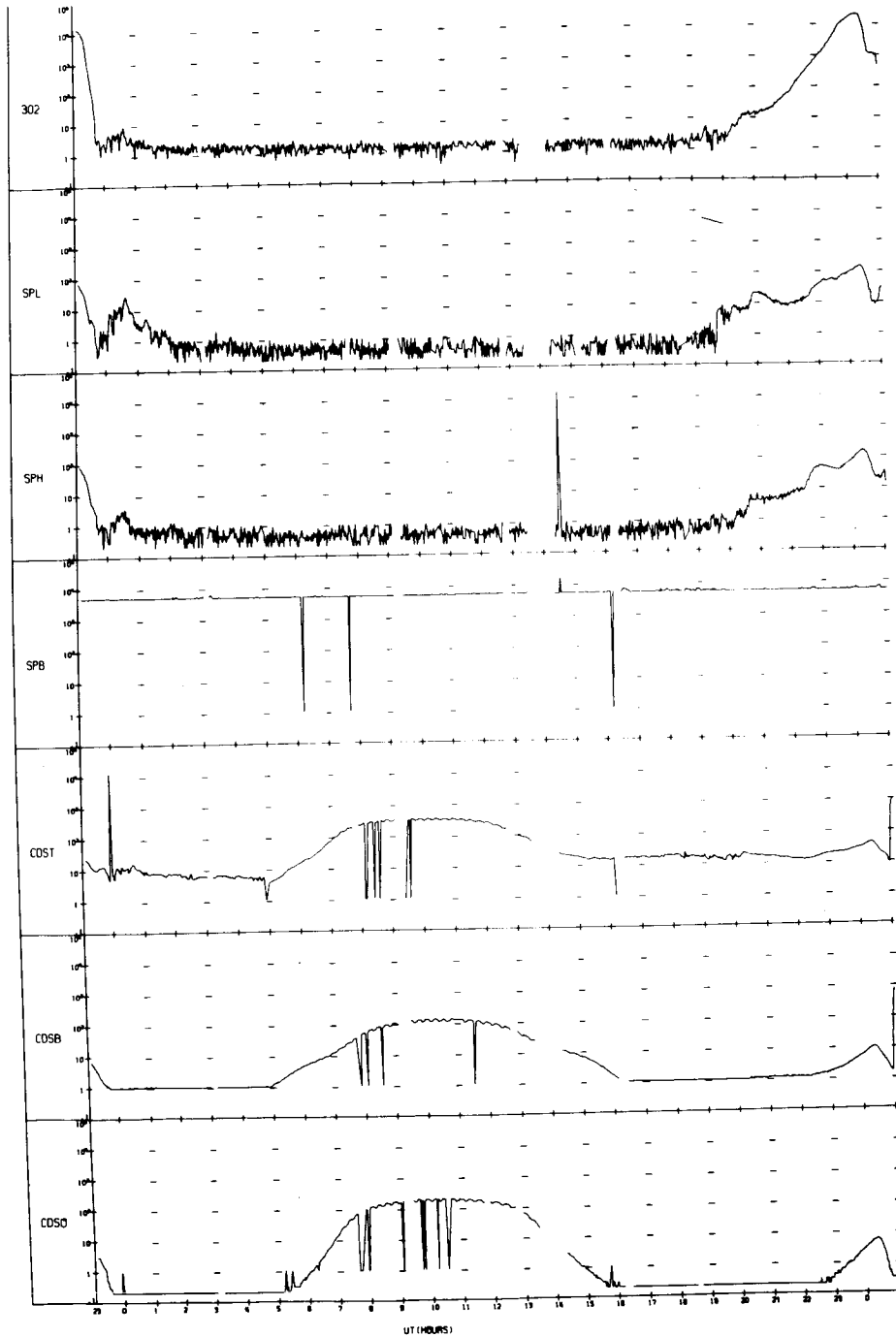
EXPLORER 12 ORBIT 73

BEGIN 11/03/61/20:21

END 11/04/61/22:36



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 74  
BEGIN 11/04/61/23:05  
END 11/06/61/01:04

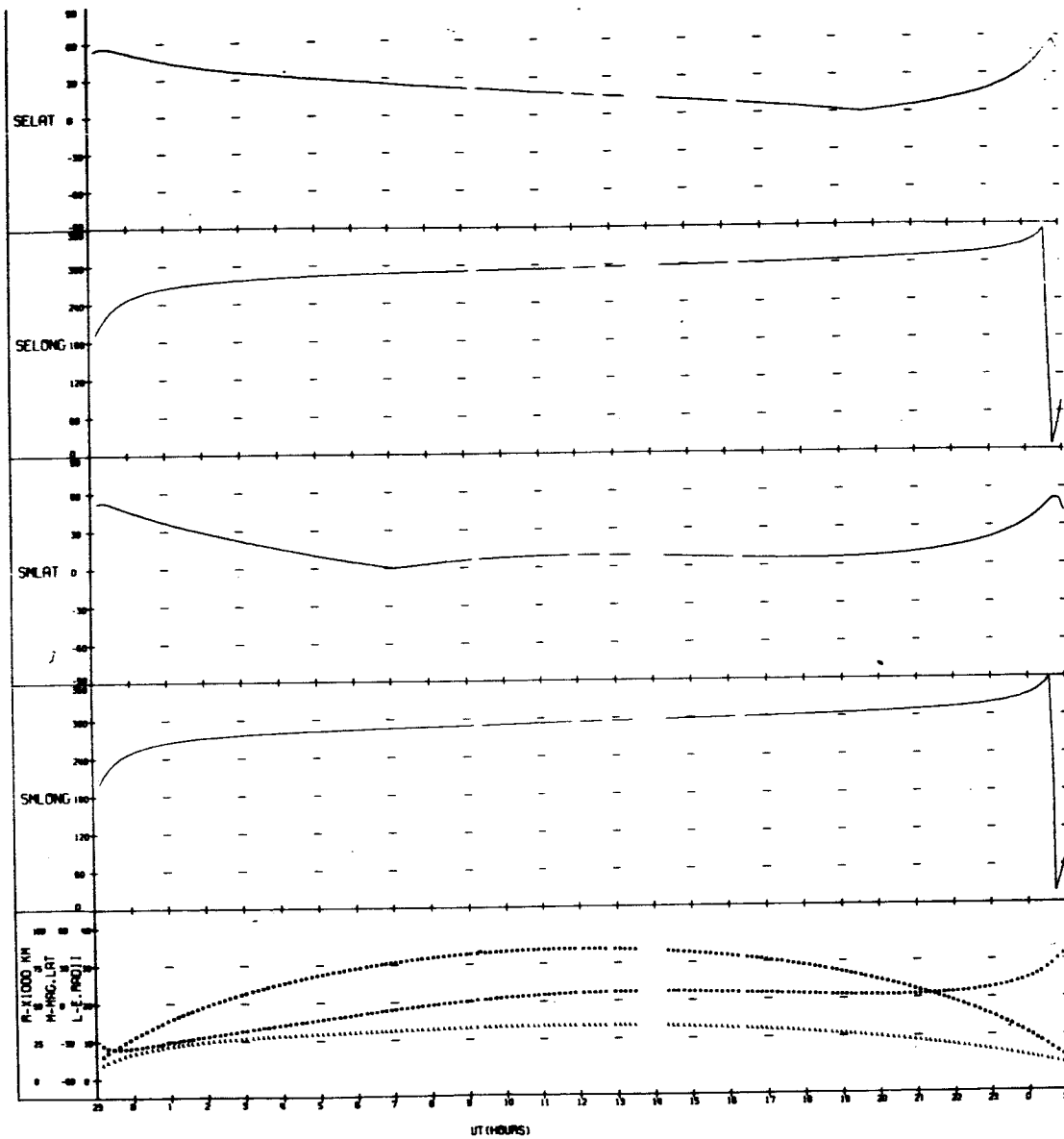


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 74

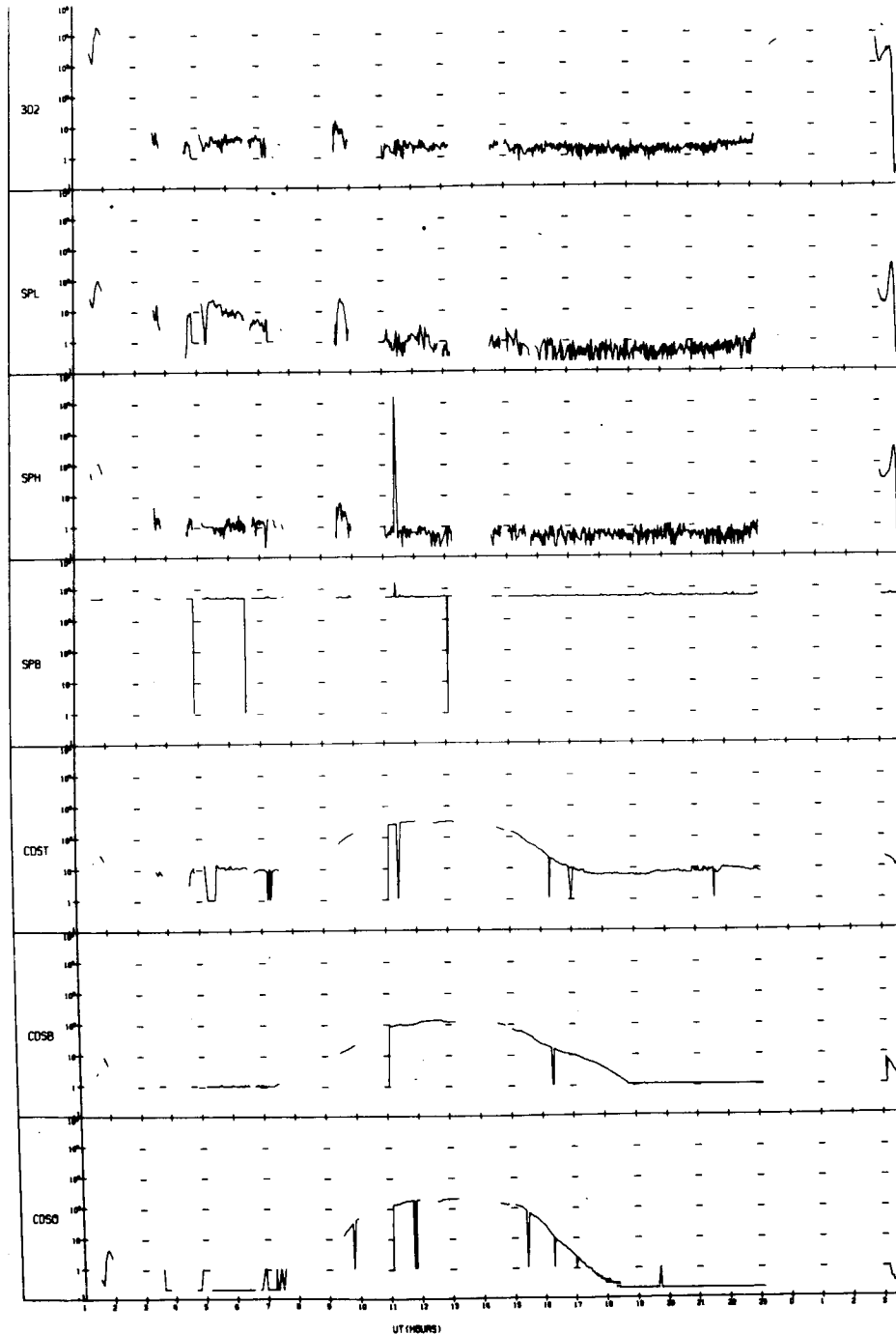
BEGIN 11/04/61/23:05

END 11/06/61/01:04



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 75  
 BEGIN 11/06/61/01:31  
 END 11/07/61/03:44

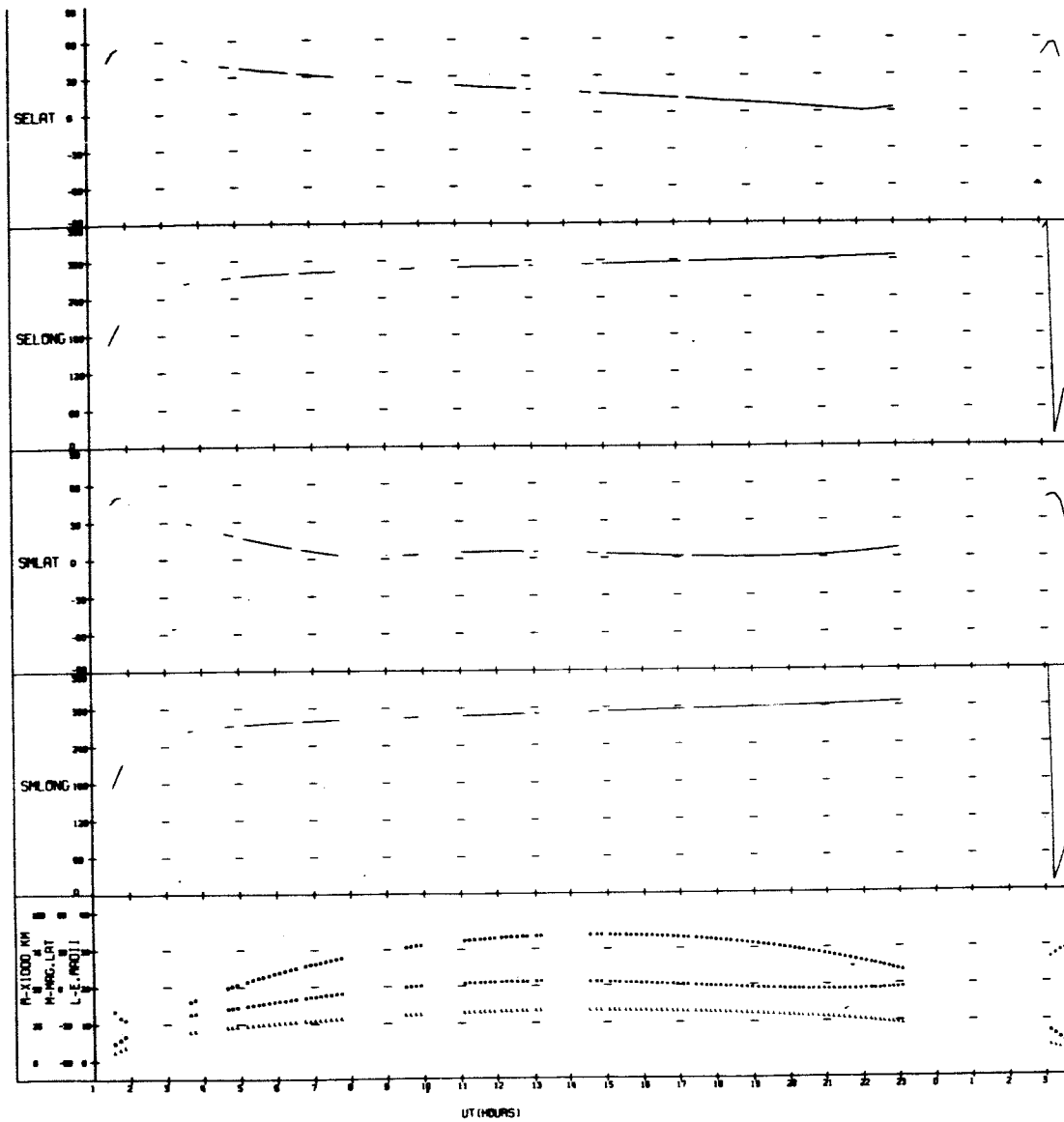


# UNIVERSITY OF IOWA

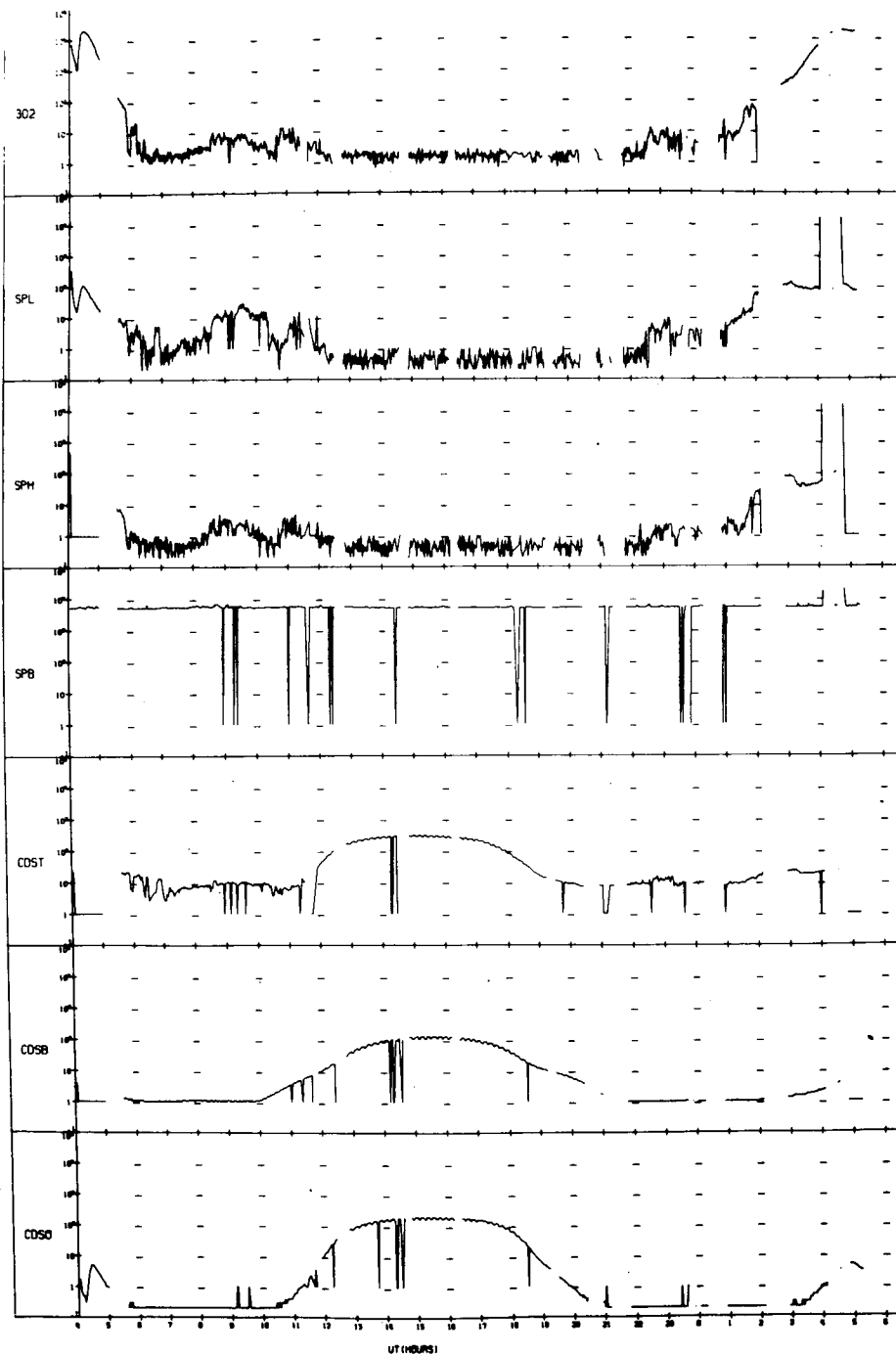
EXPLORER 12 ORBIT 75

BEGIN 11/06/61/01:31

END 11/07/61/03:44

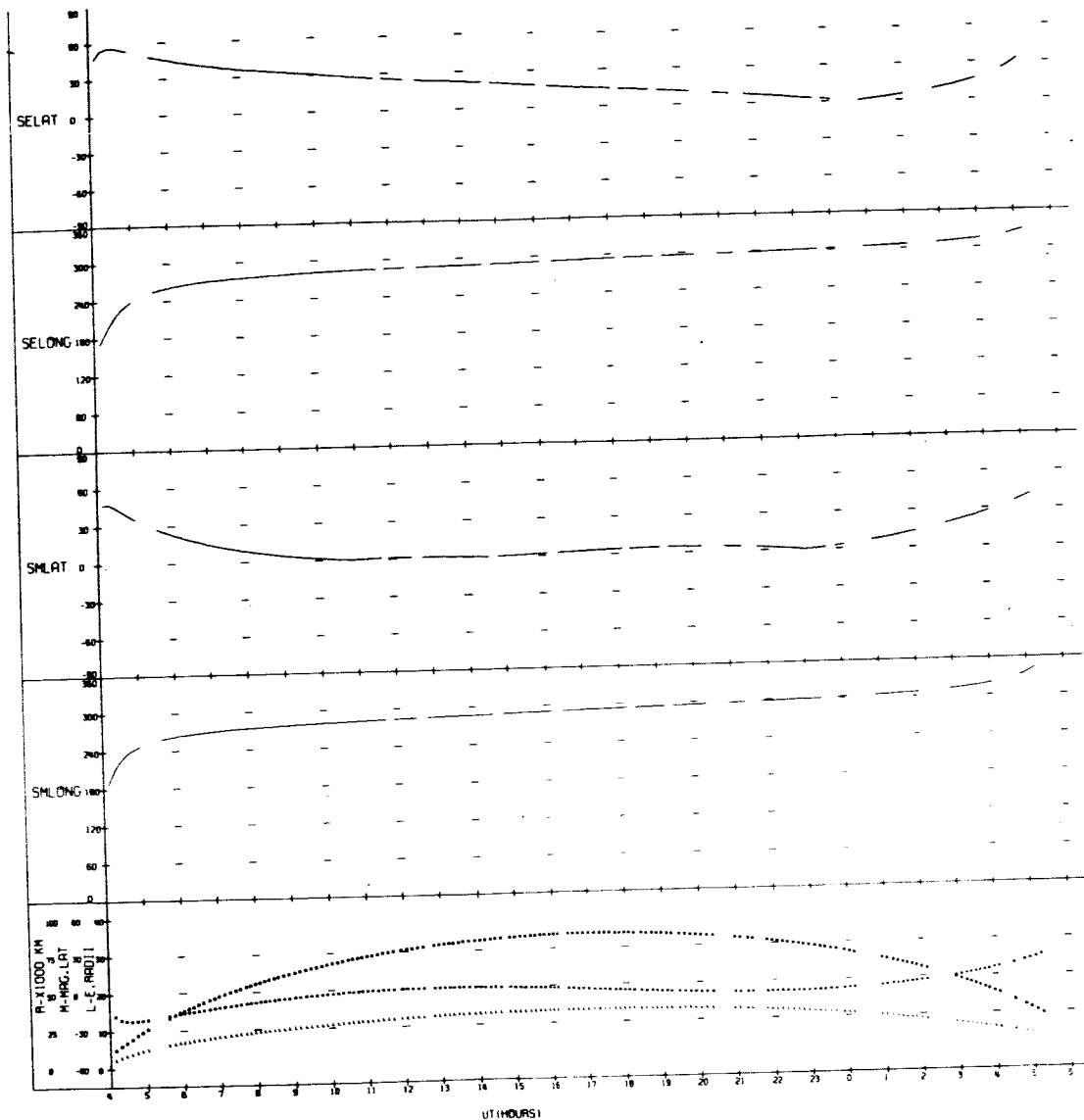


UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 76  
BEGIN 11/07/61/04:02  
END 11/08/61/06:35



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 75  
 BEGIN 11/07/61/04:02  
 END 11/08/61/06:35

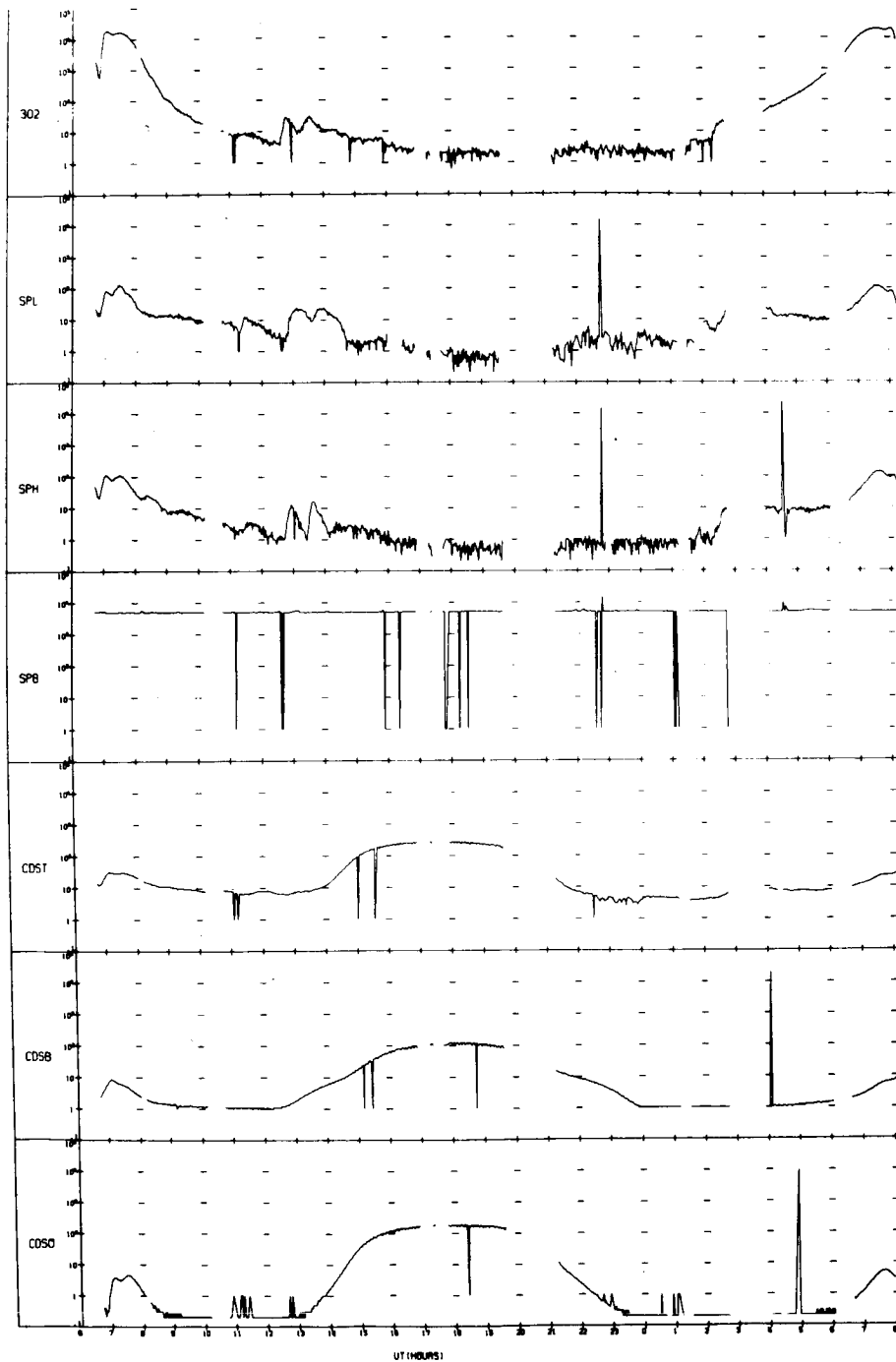


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 77

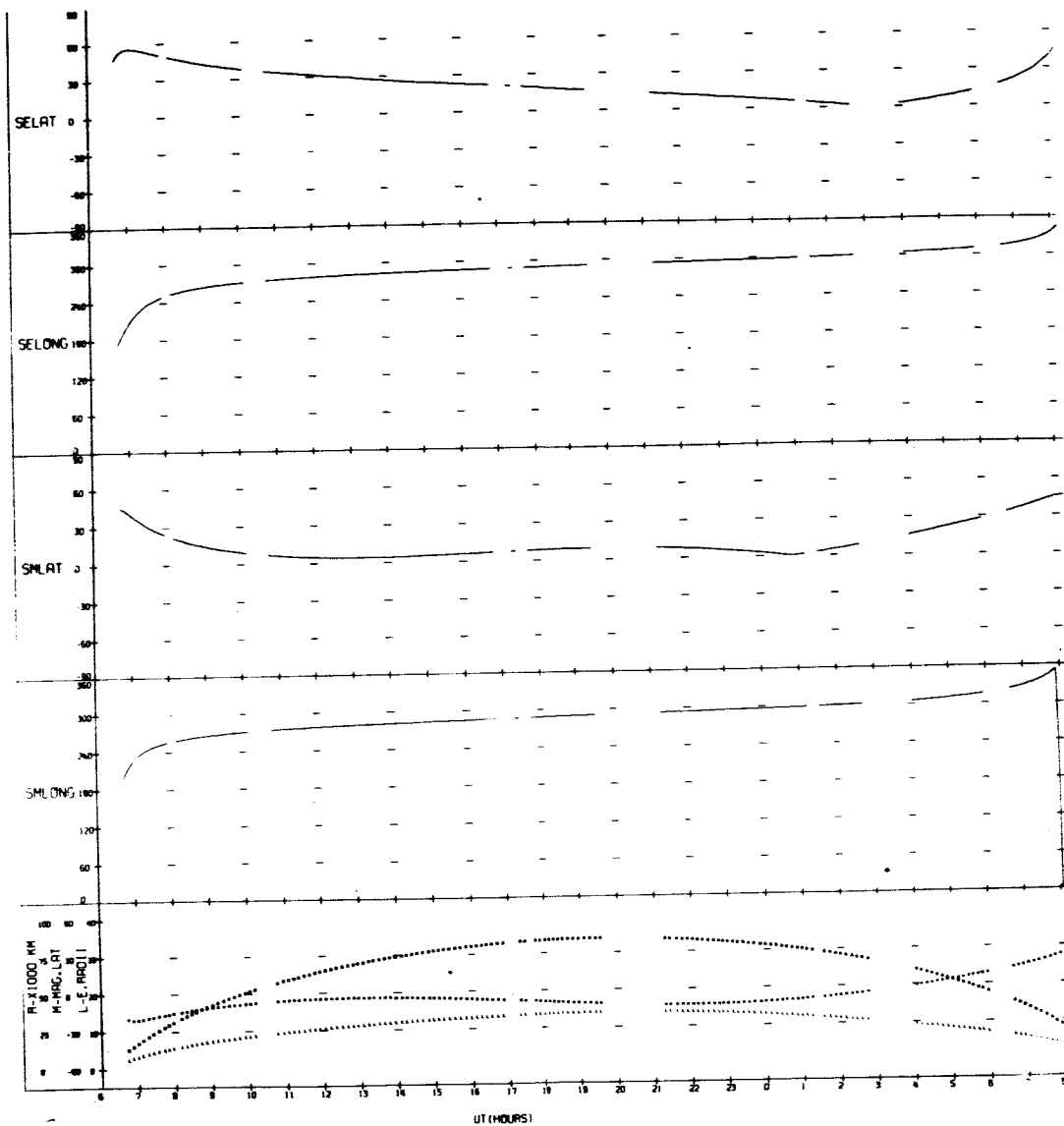
BEGIN 11/08/61/06:42

END 11/09/61/08:15

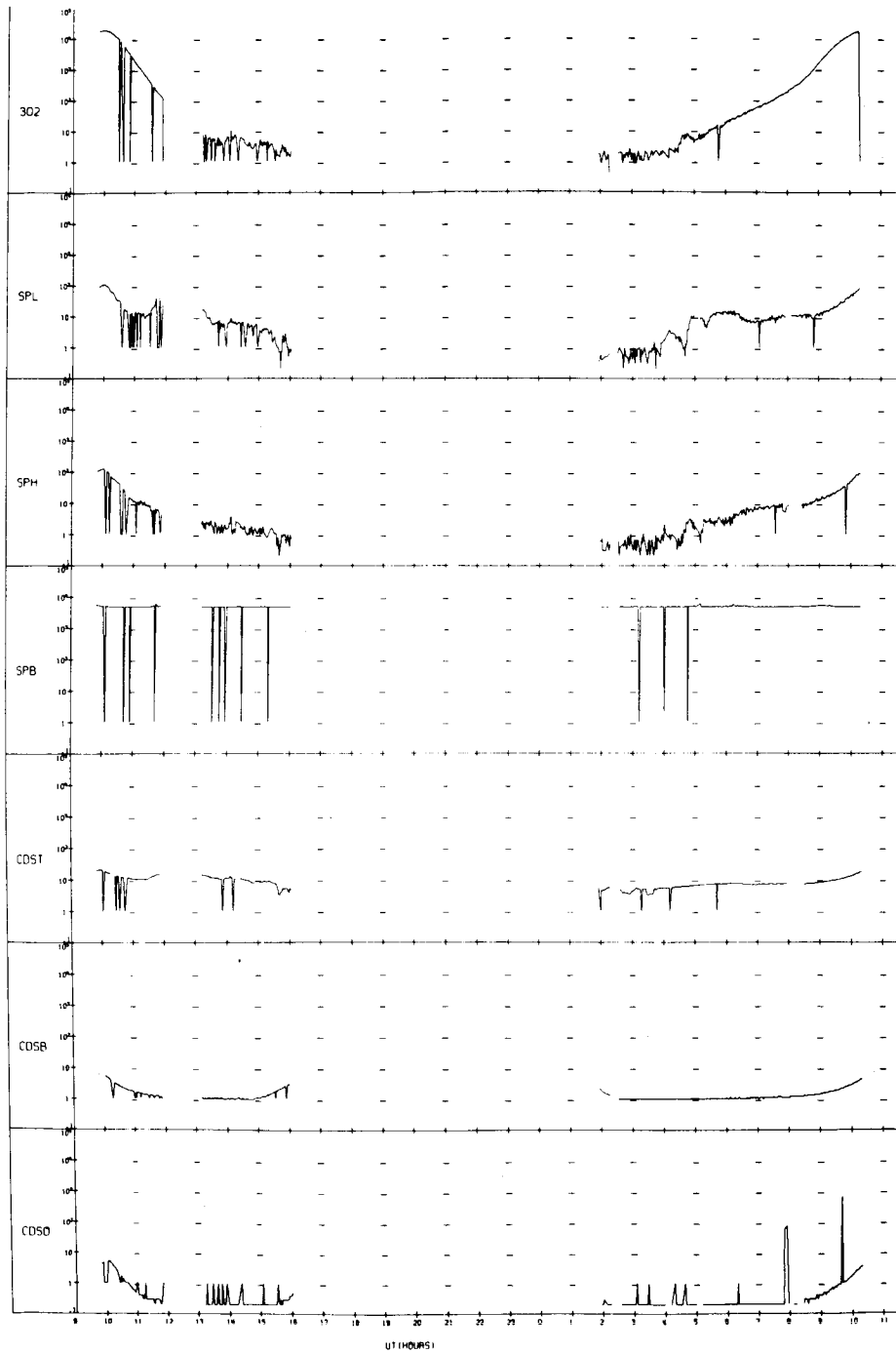


# UNIVERSITY OF IOWA

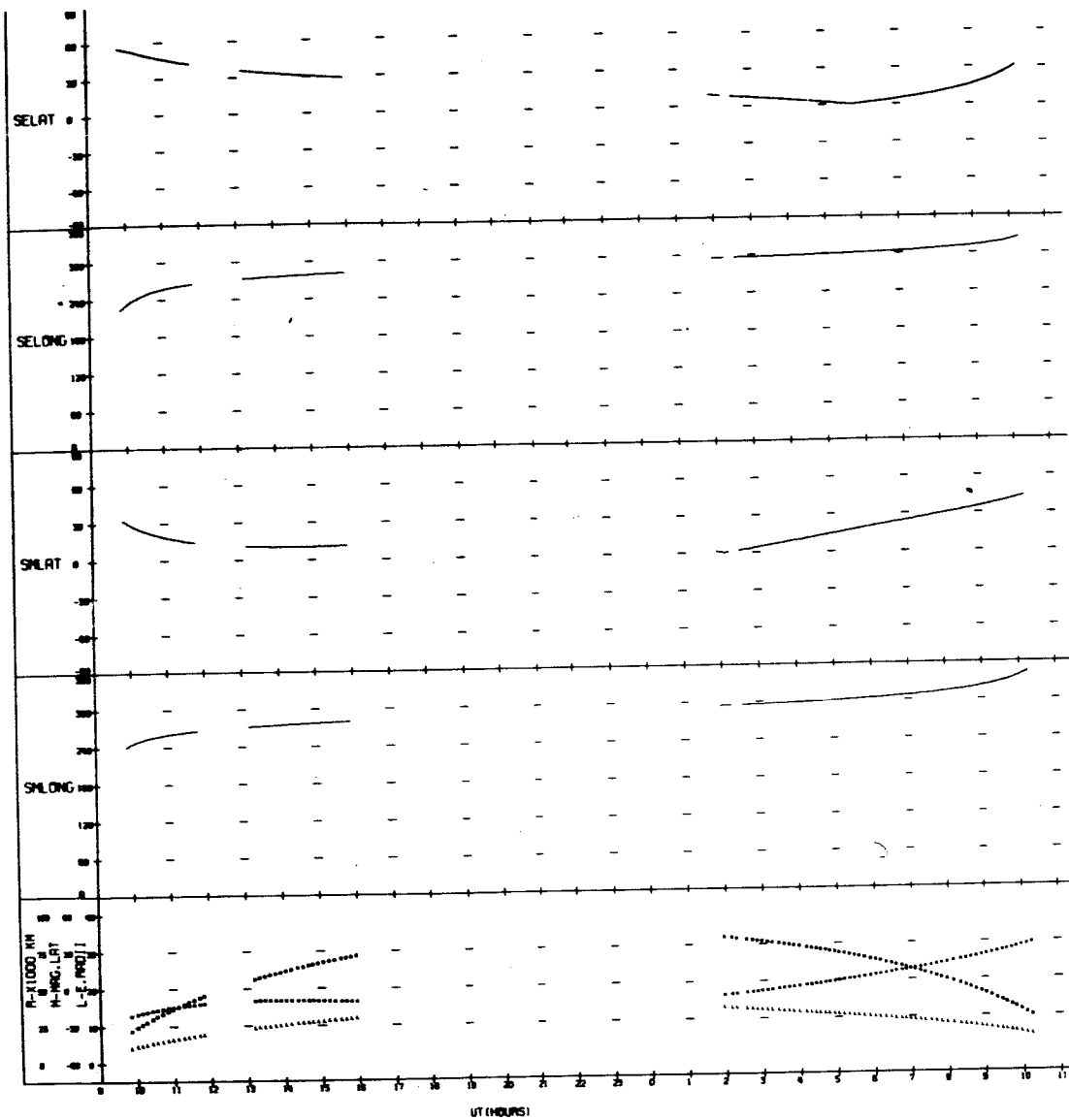
EXPLORER 12 ORBIT 77  
 BEGIN 11/08/61/06:42  
 END 11/09/61/08:15



UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 78  
 BEGIN 11/09/61/09:49  
 END 11/10/61/11:31

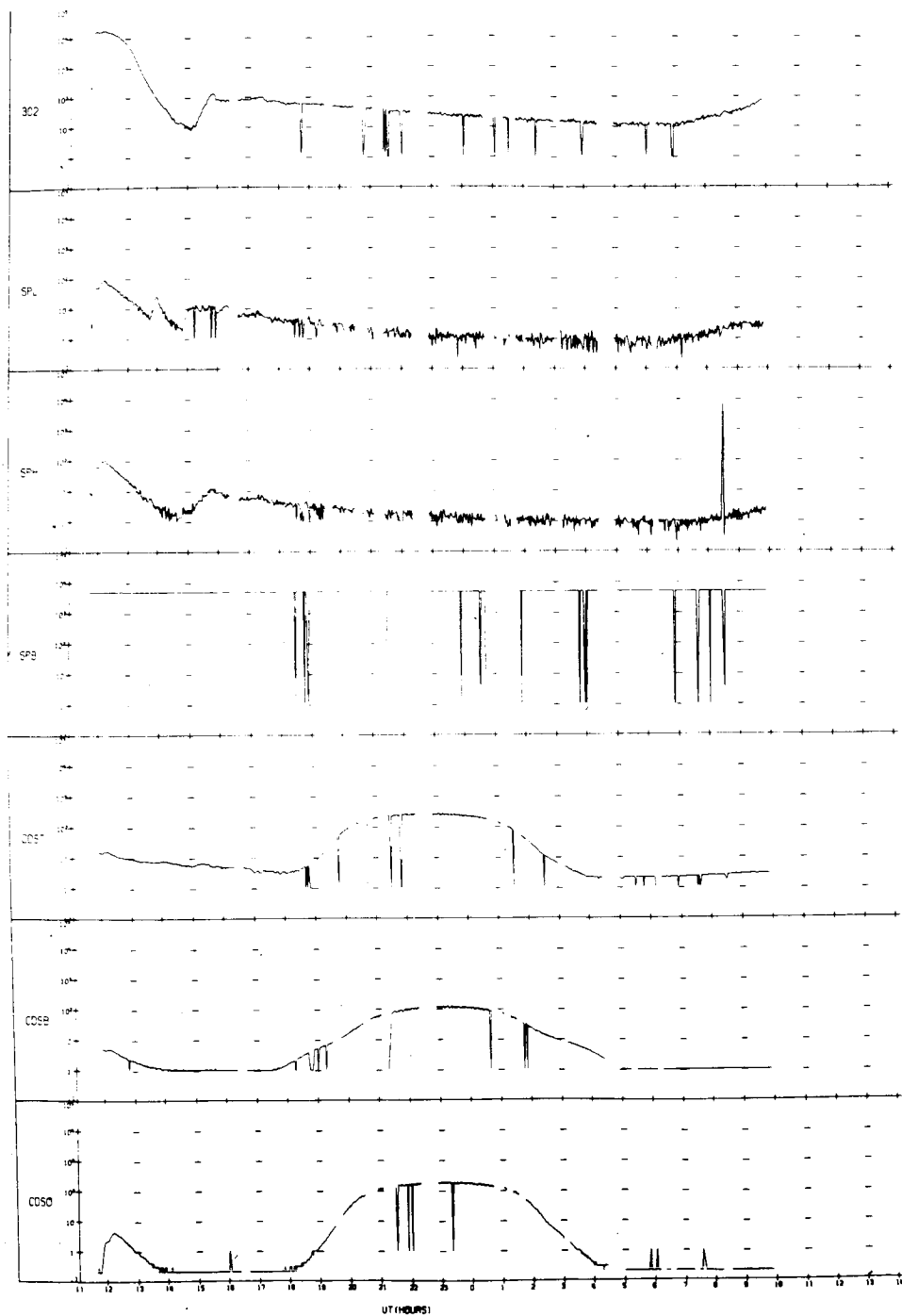


UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 78  
 BEGIN 11/09/61/09:49  
 END 11/10/61/11:31



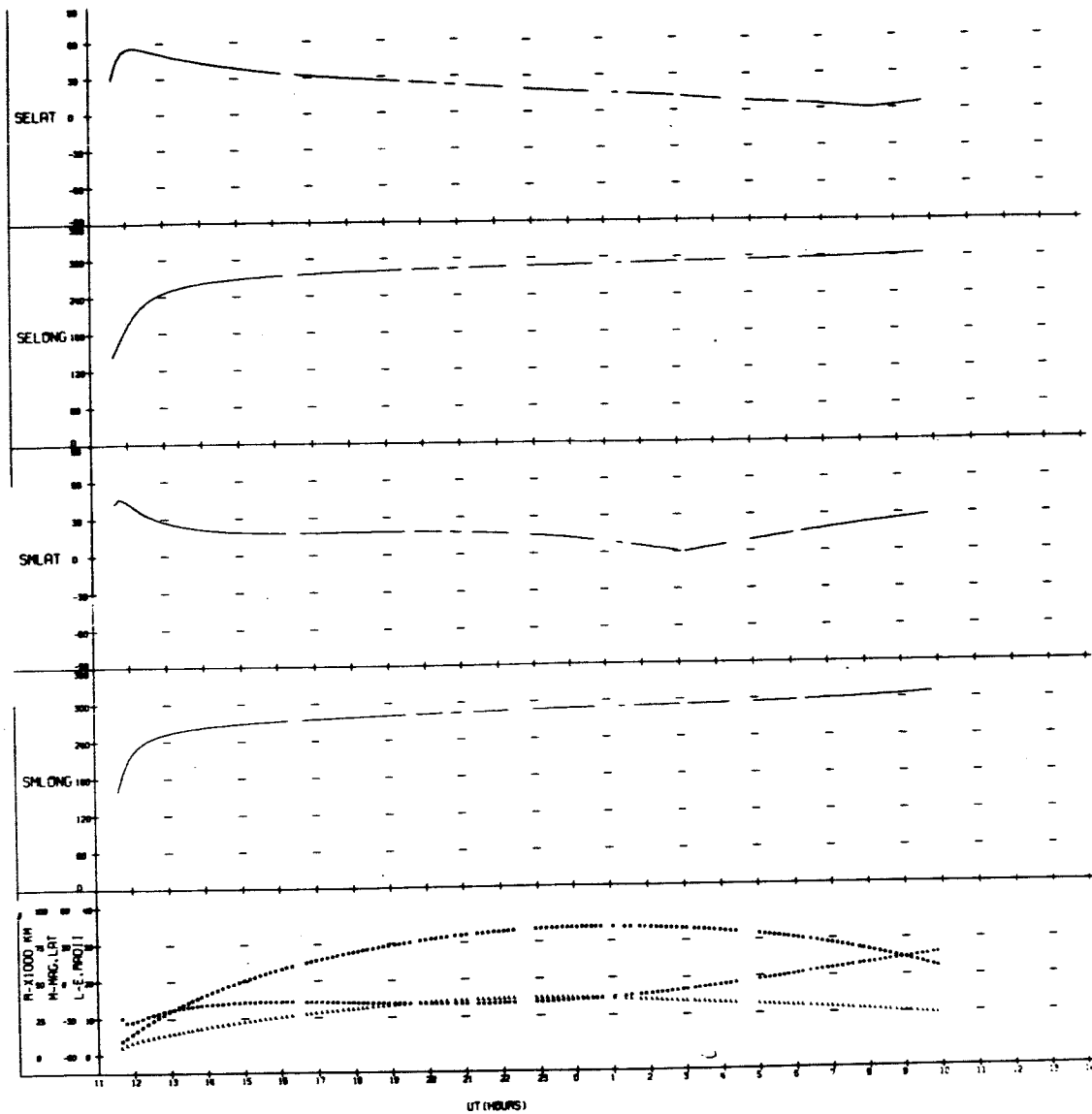
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT: 79  
 BEGIN 11/10/61 11:38  
 END 11/11 5:14:10



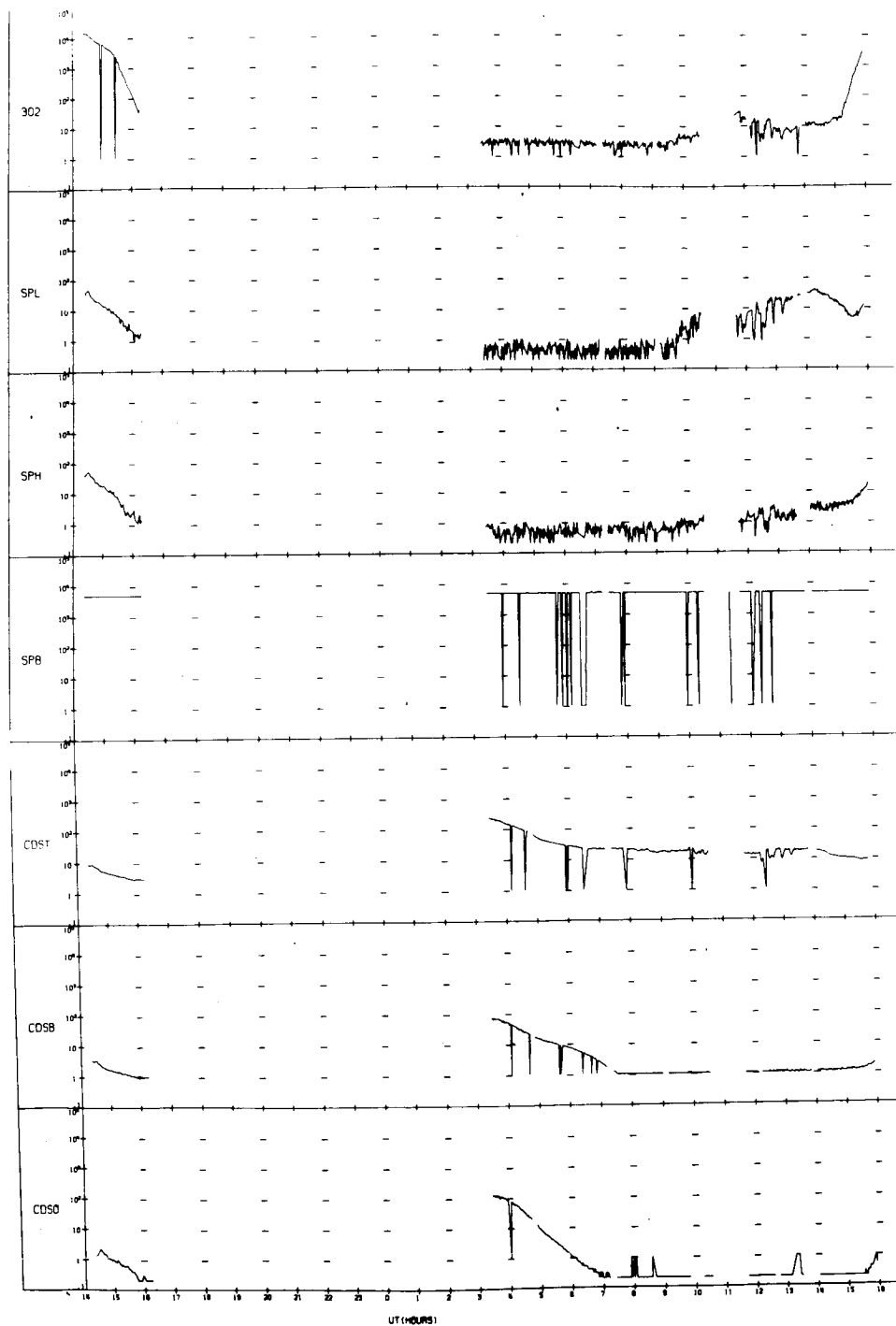
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 79  
 BEGIN 11/10/61/11:38  
 END 11/11/61/14:10

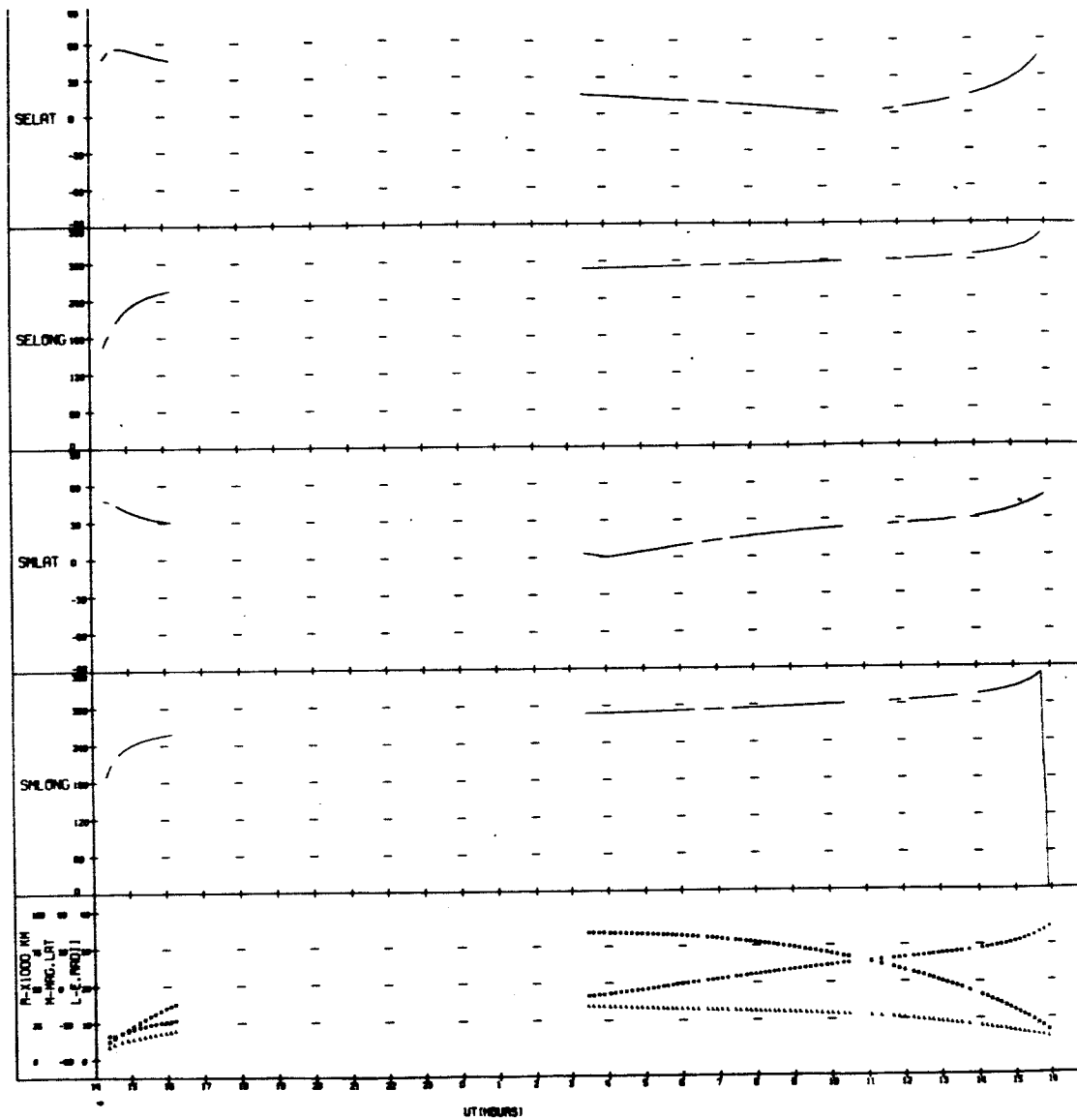


# UNIVERSITY OF IOWA

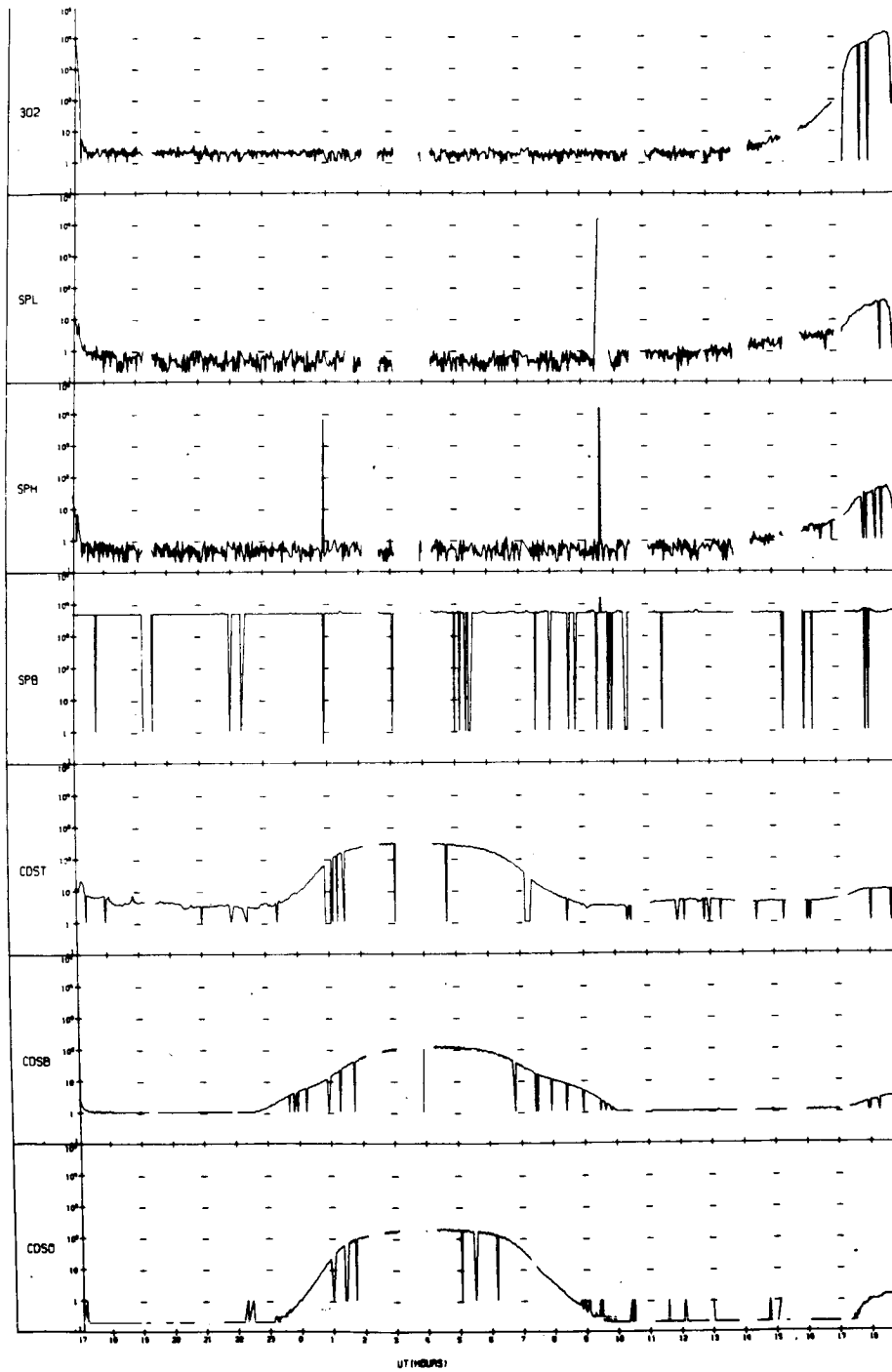
EXPLORER 12 ORBIT 80  
 BEGIN 11/11/61/14:22  
 END 11/12/61/16:53



UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 80  
 BEGIN 11/11/61/14:22  
 END 11/12/61/16:53

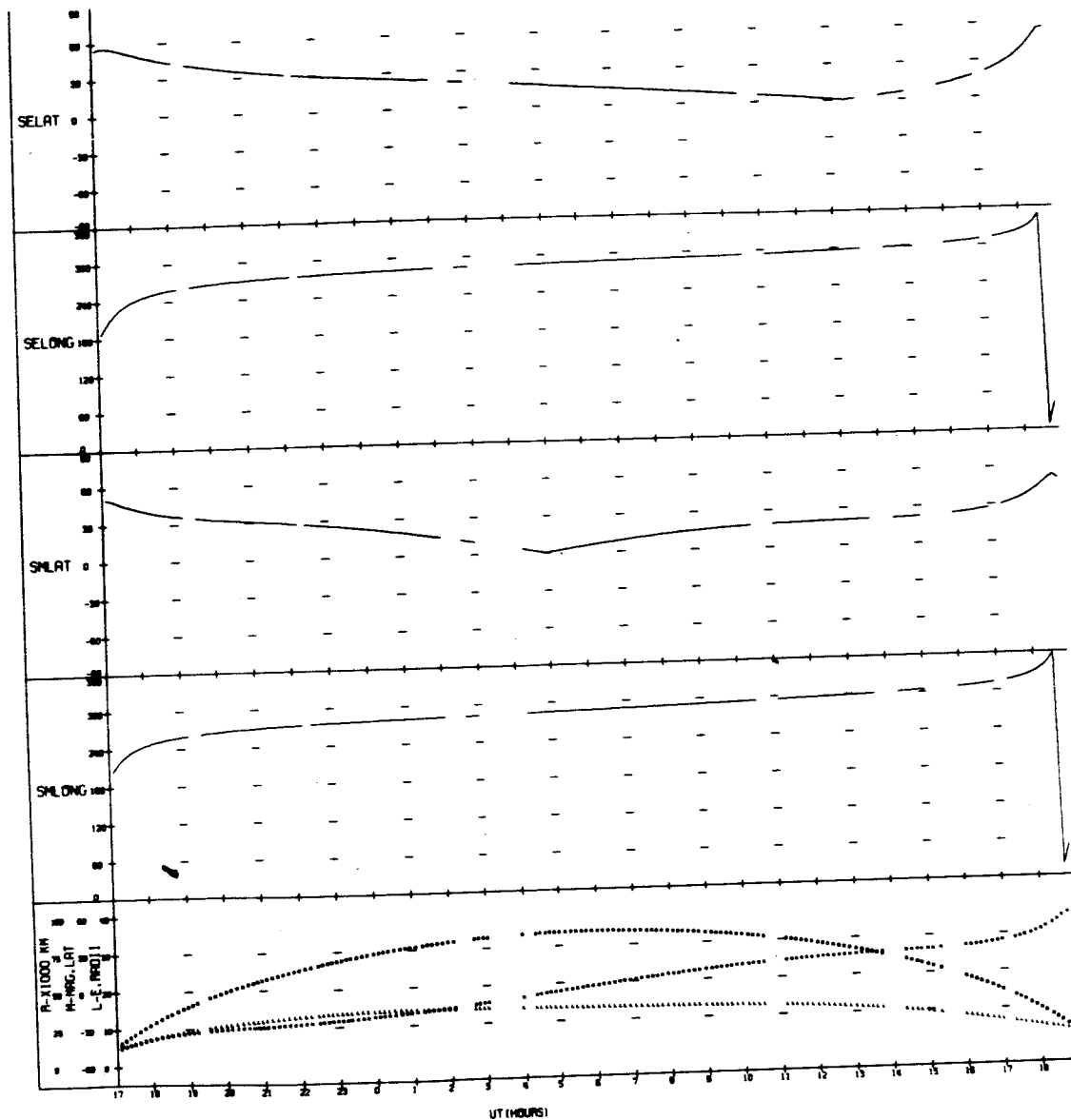


UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 81  
BEGIN 11/12/61/17:00  
END 11/13/61/18:57



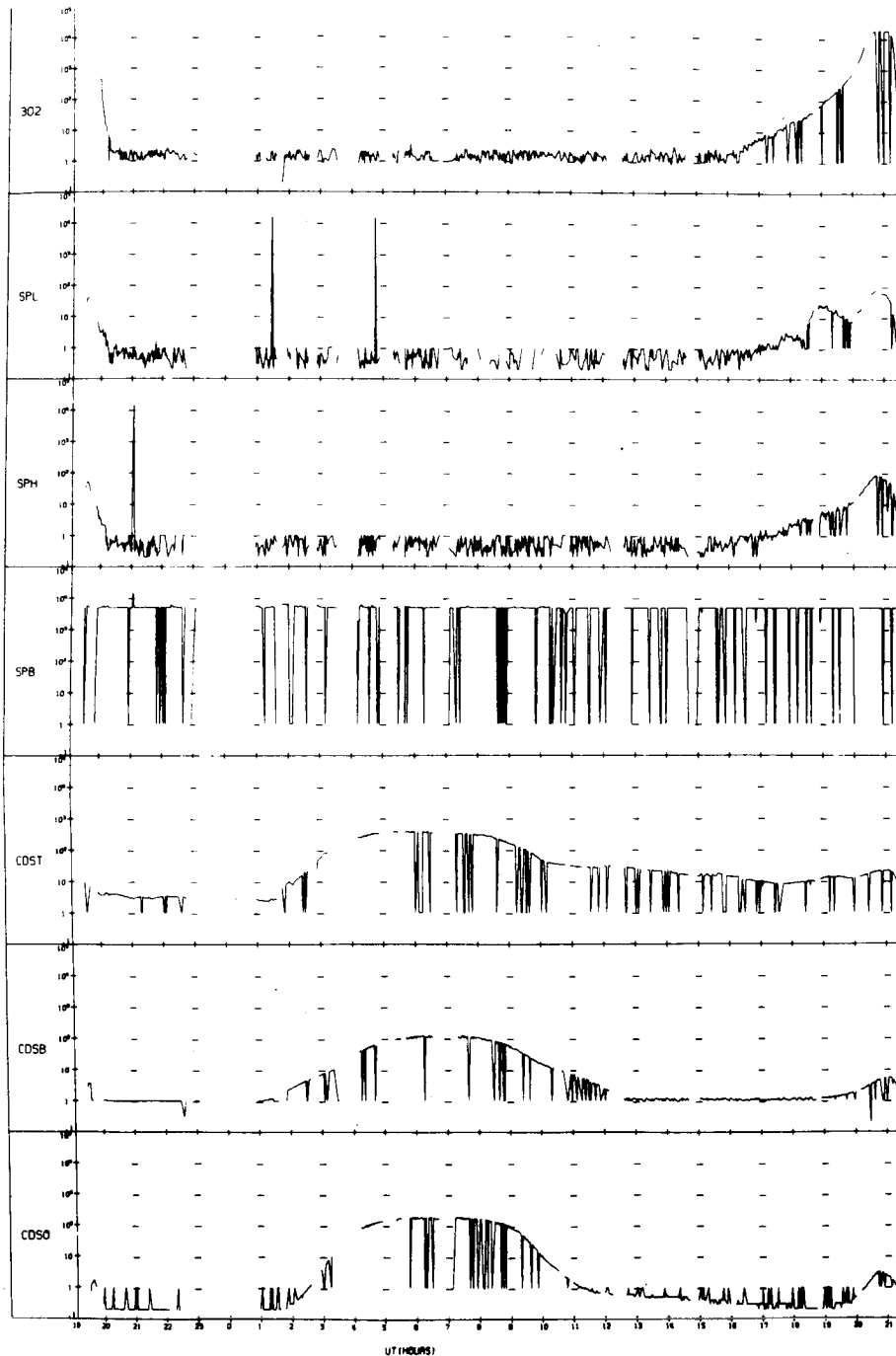
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 81  
 BEGIN 11/12/61/17:00  
 END 11/13/61/18:57



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 82  
 BEGIN 11/13/61/19:27  
 END 11/14/61/21:37

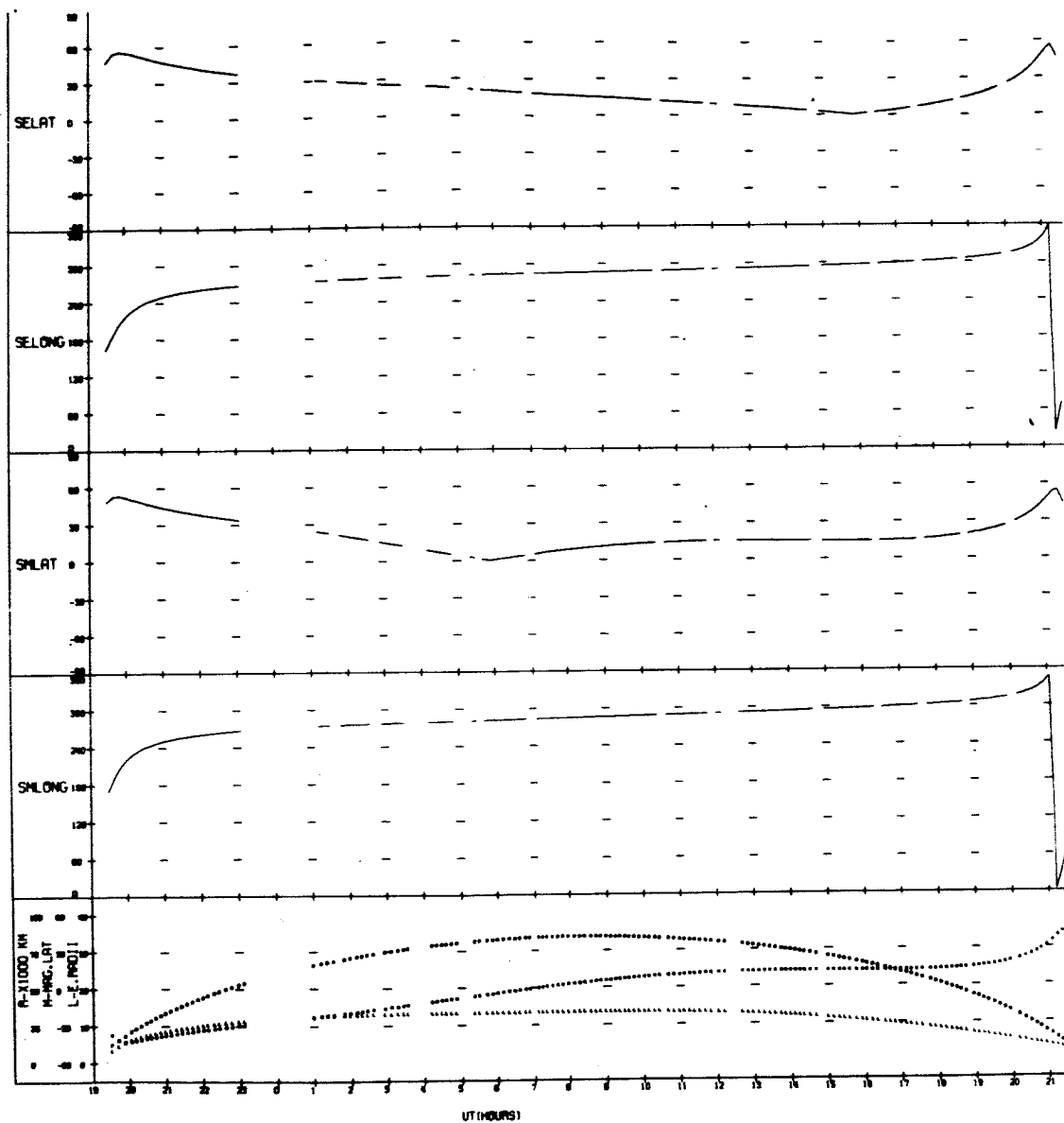


# UNIVERSITY OF IOWA

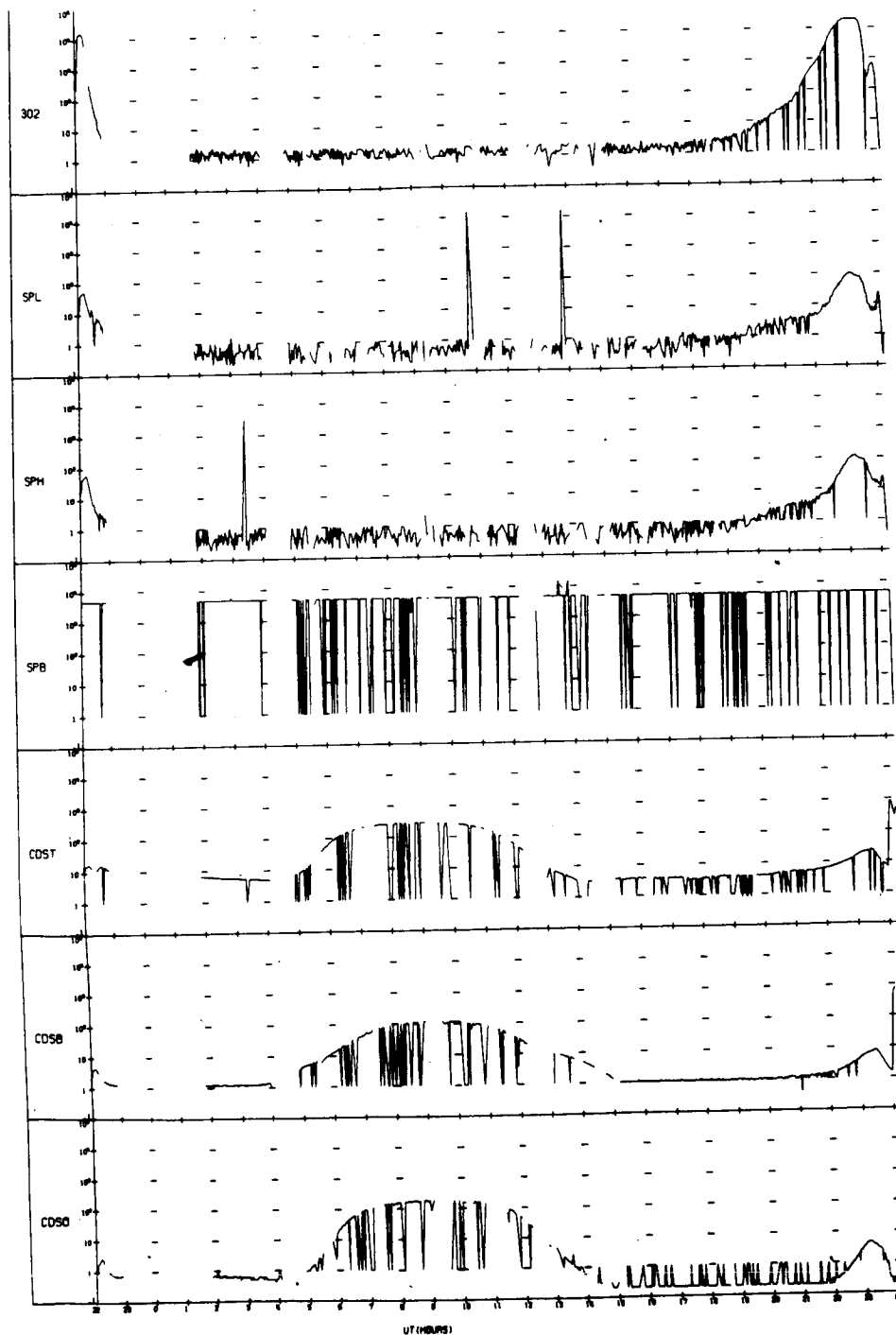
EXPLORER 12 ORBIT 82

BEGIN 11/13/61/19:27

END 11/14/61/21:37



UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 83  
 BEGIN 11/14/61/22:01  
 END 11/16/61/00:15

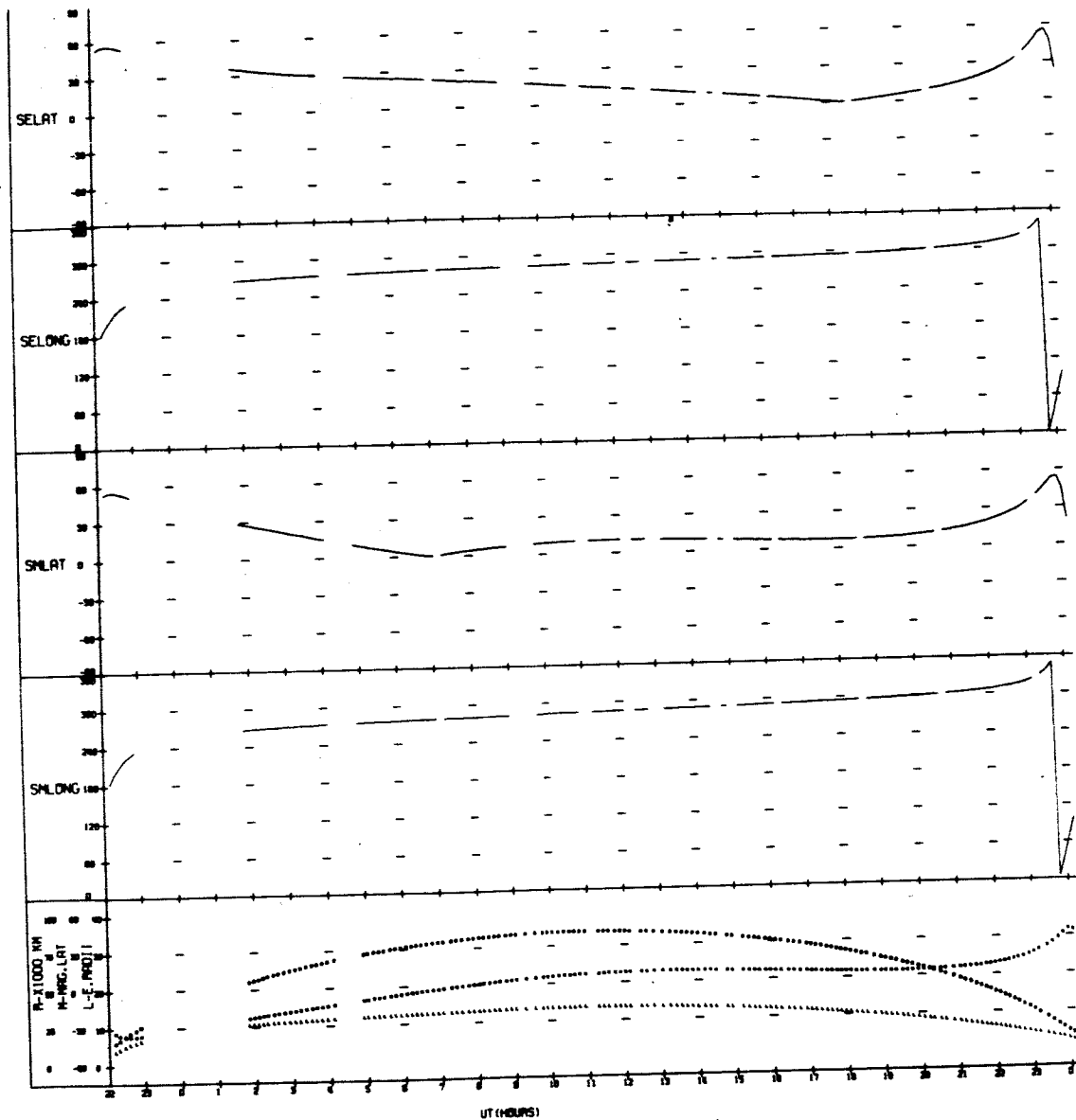


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 83

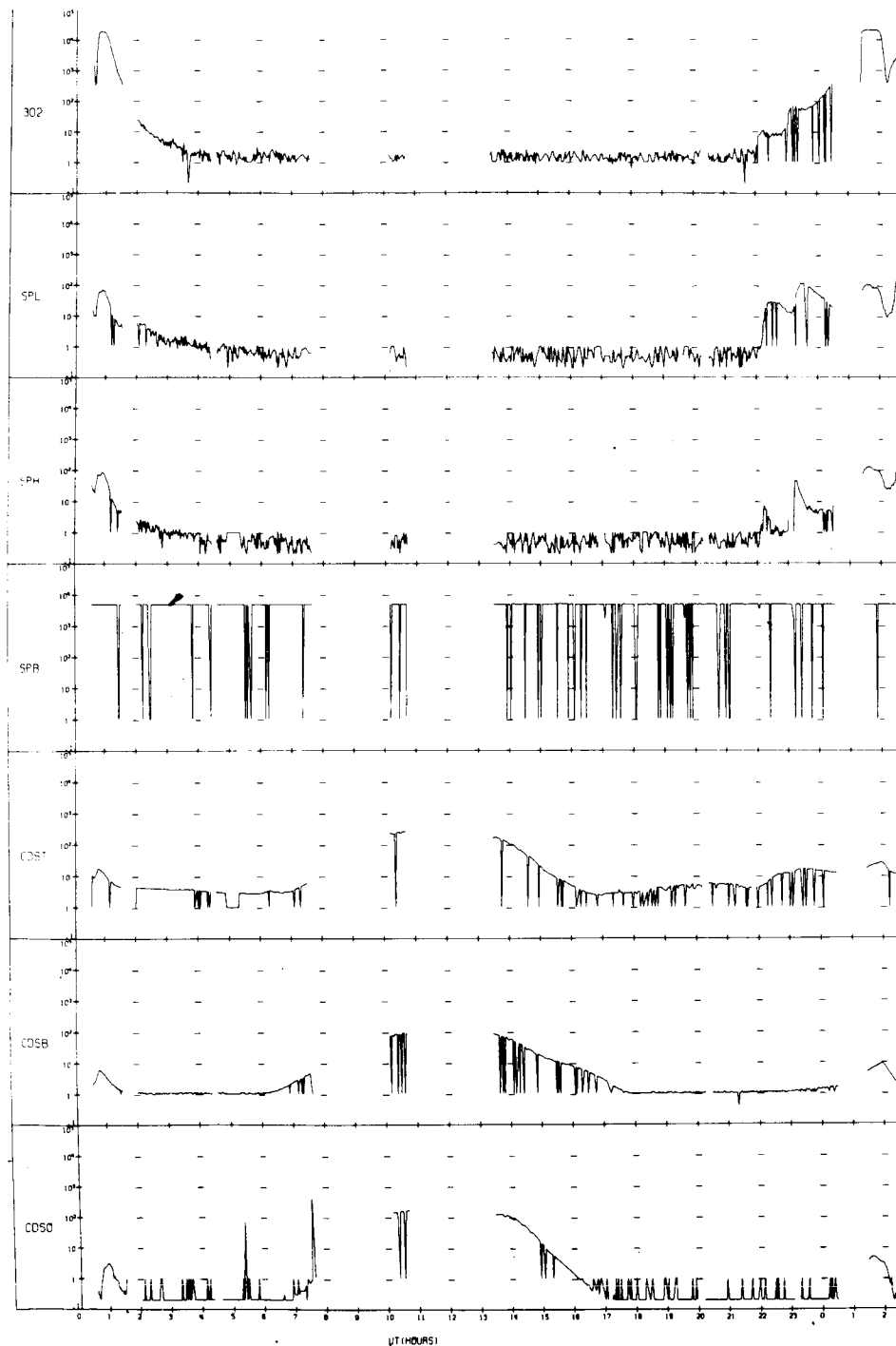
BEGIN 11/14/61/22:01

END 11/16/61/00:15



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 84  
 BEGIN 11/16/81/00:21  
 END 11/17/81/02:45

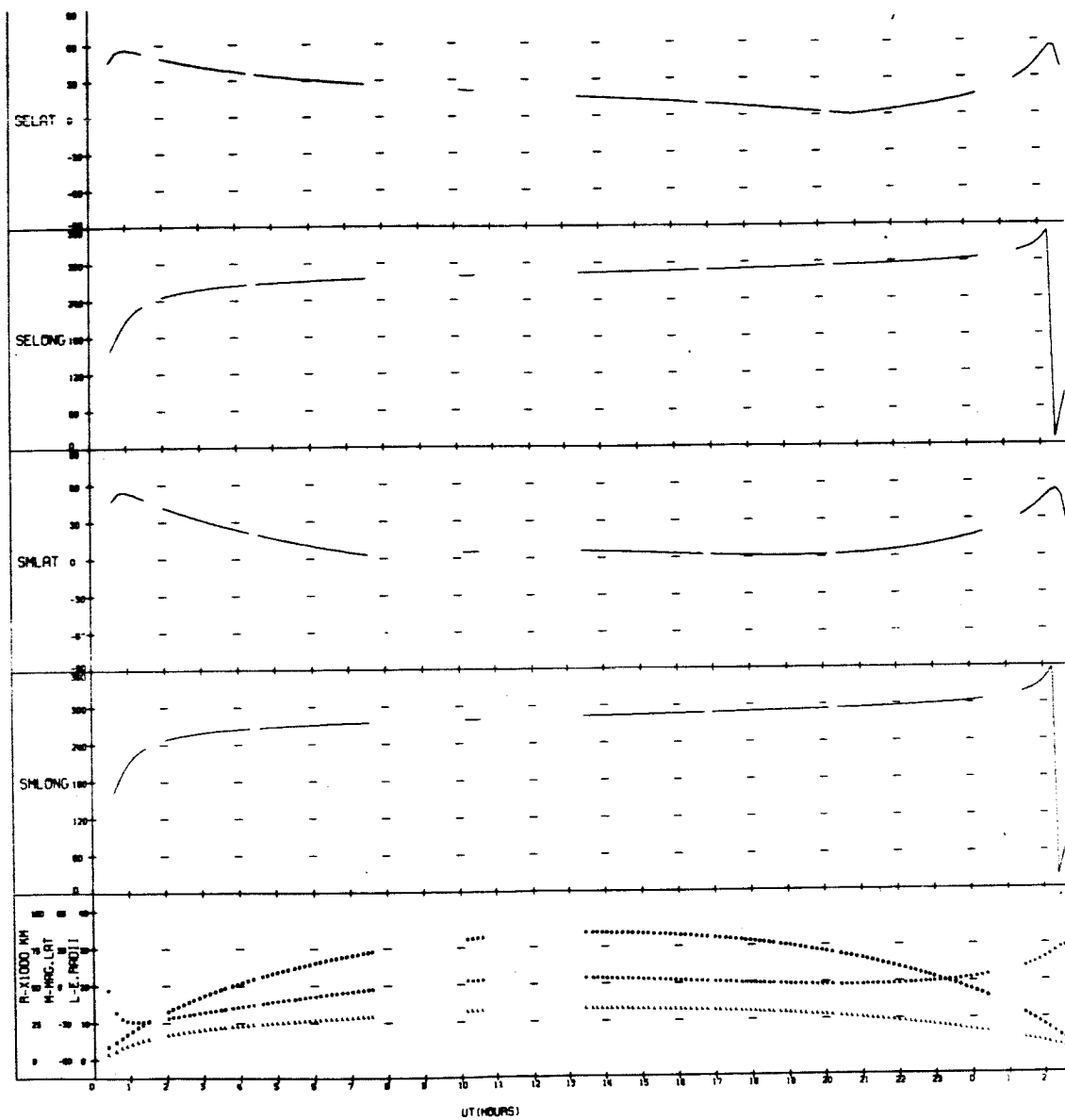


# UNIVERSITY OF IOWA

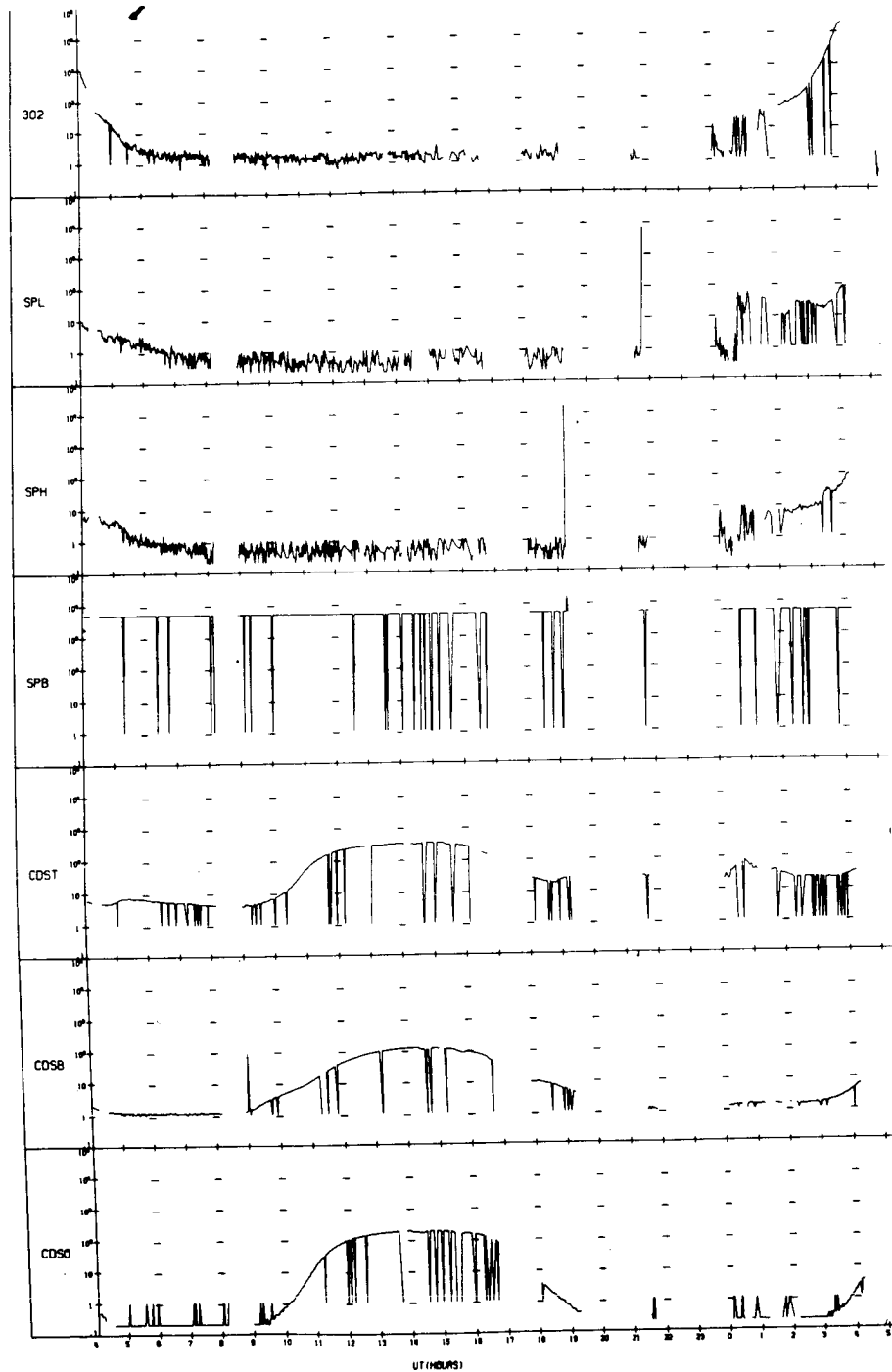
EXPLORER 12 ORBIT 84

BEGIN 11/16/61/00:21

END 11/17/61/02:45

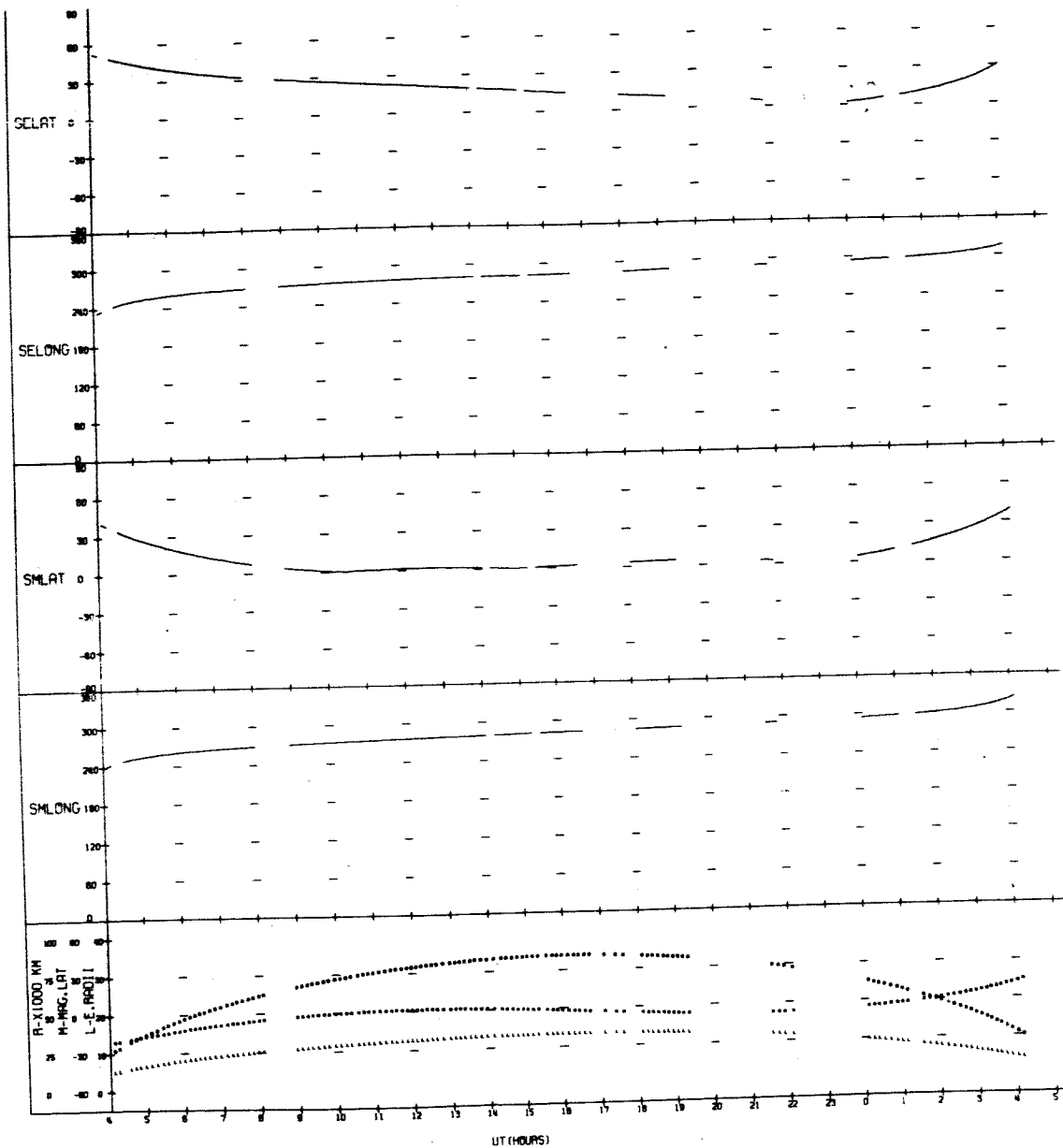


UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 85  
BEGIN 11/17/61/04:05  
END 11/18/61/05:21

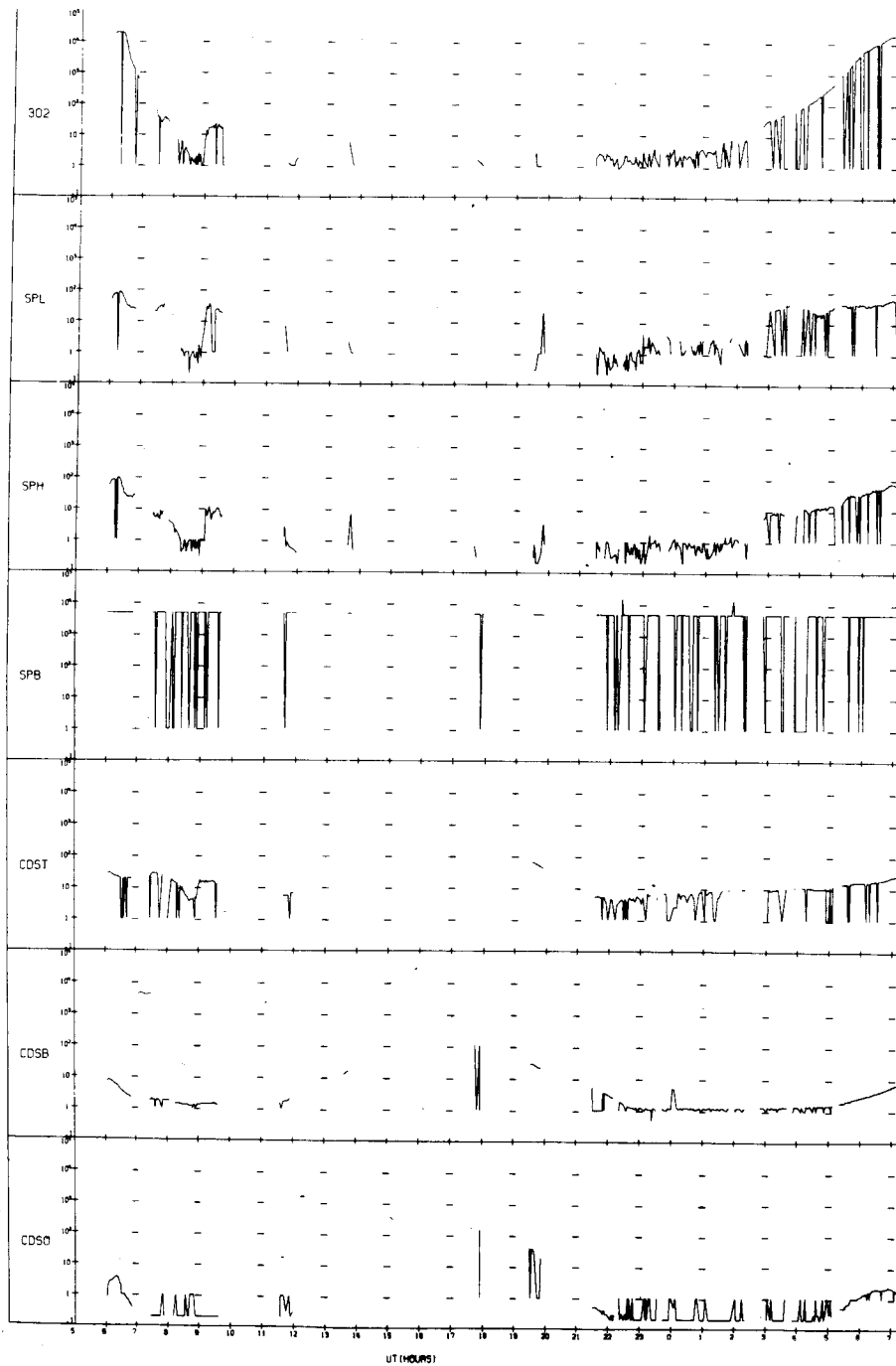


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 85  
 BEGIN 11/17/61/04:05  
 END 11/18/61/05:21

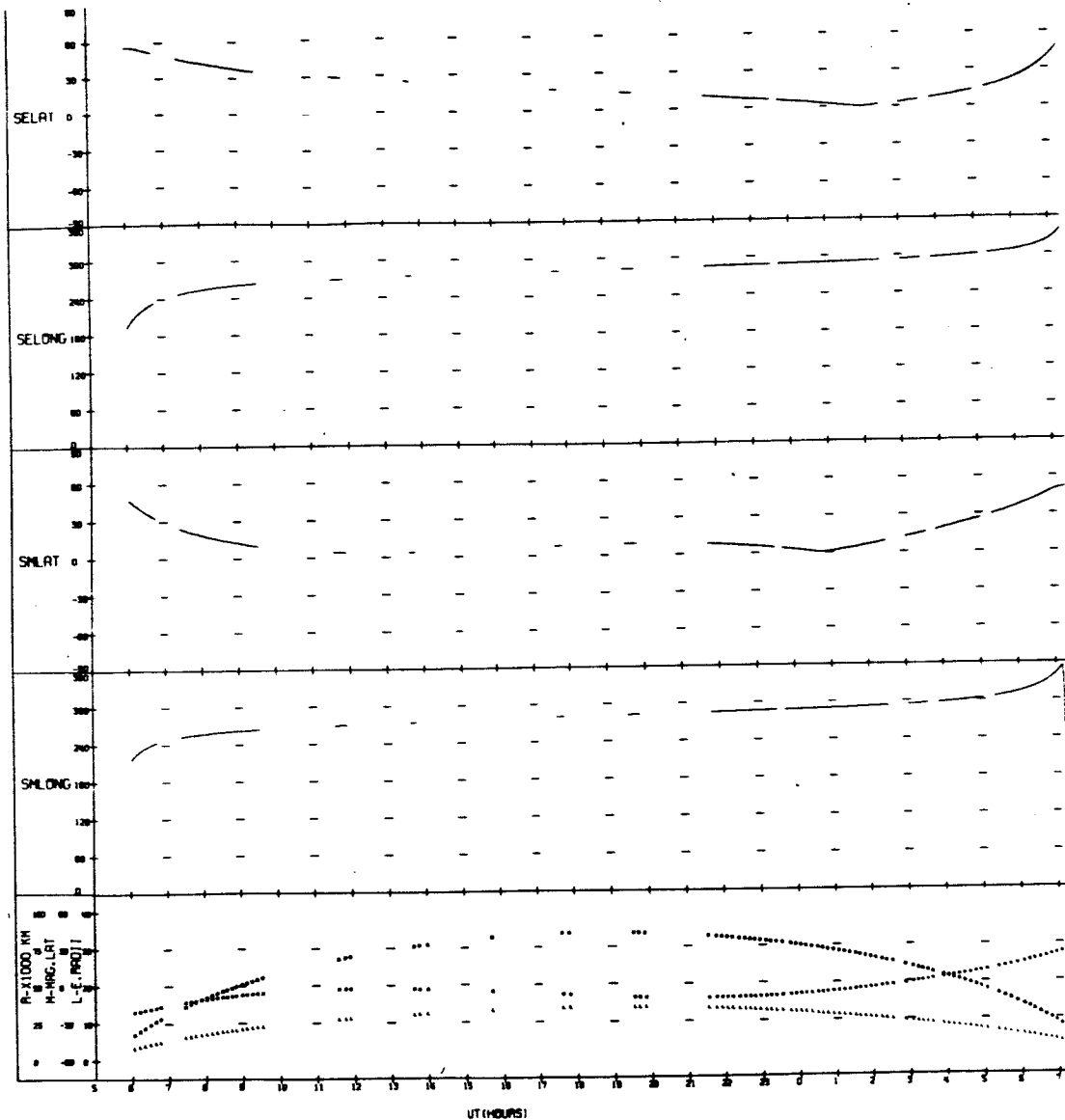


UNIVERSITY OF IOWA  
EXPLORER 12 CREDIT 86  
BEGIN 11/18/61/05:28  
END 11/19/61/07:20

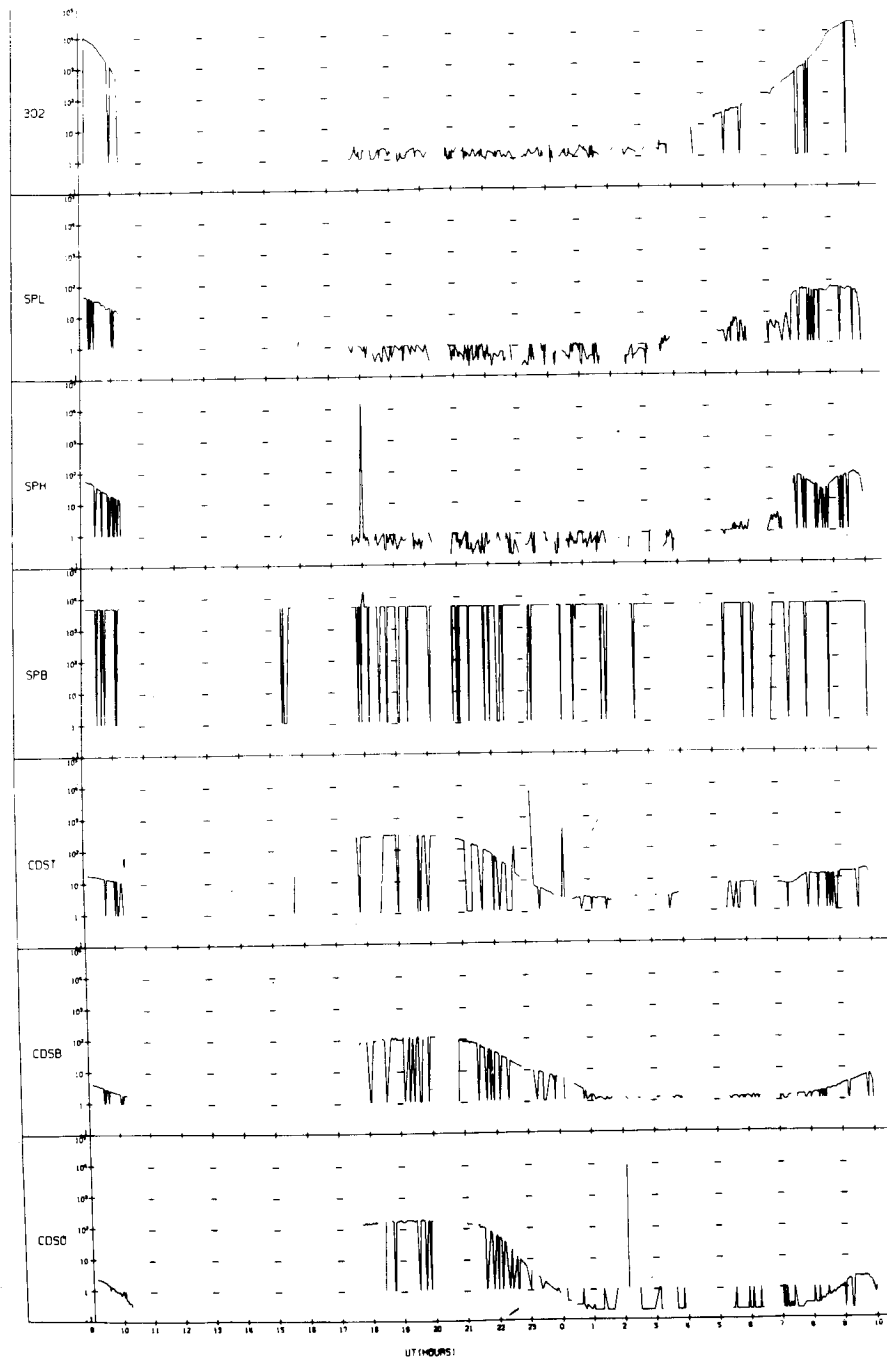


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 86  
 BEGIN 11/18/61/05:28  
 END 11/19/61/07:20



UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 87  
 BEGIN 11/19/81 09:08  
 END 11/20/81 10:35

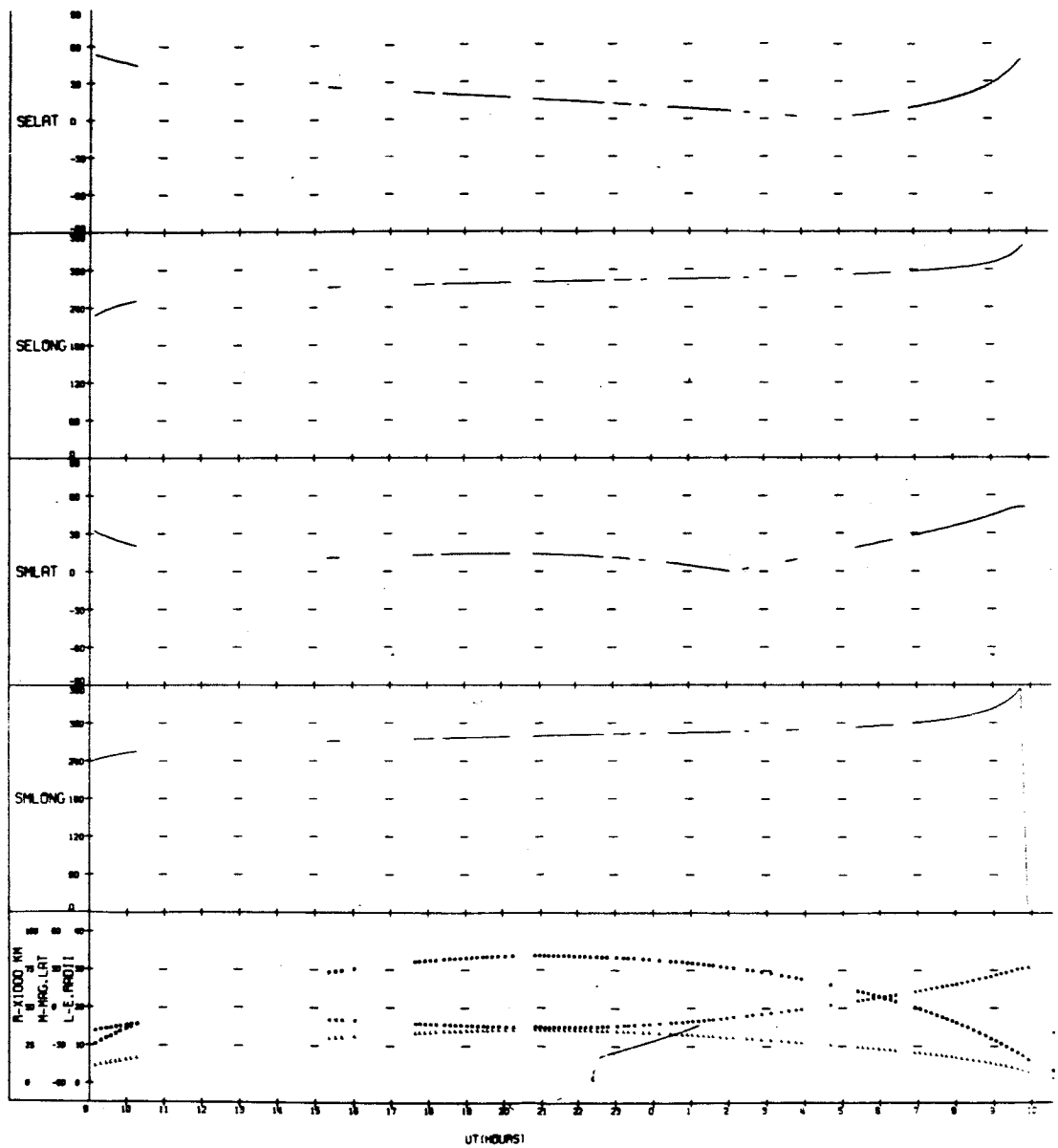


# UNIVERSITY OF IOWA

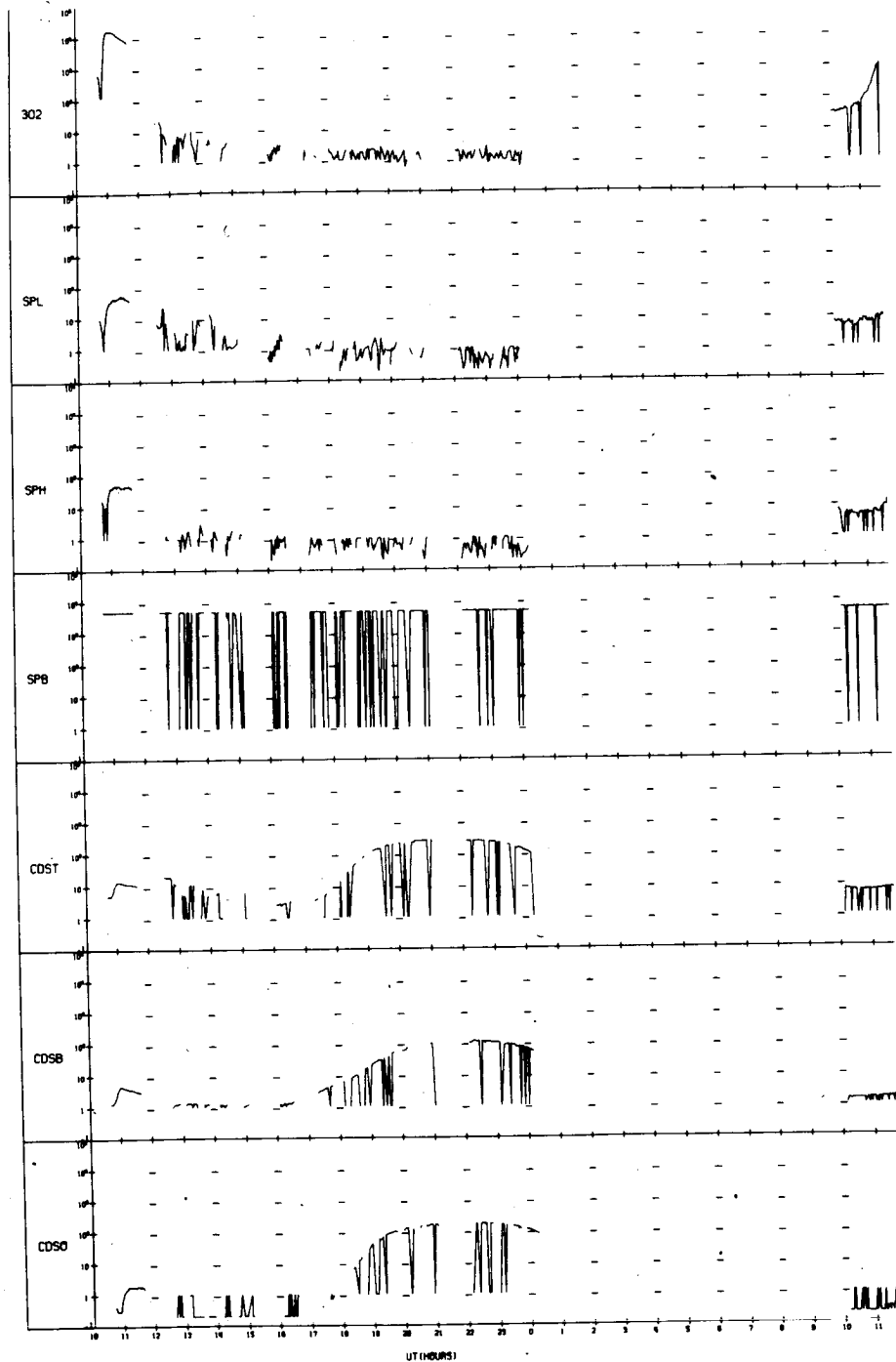
EXPLORER 12 ORBIT 87

BEGIN 11/19/61/09:08

END 11/20/61/10:35



UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 88  
 BEGIN 11/20/61/10:42  
 END 11/21/61/11:40

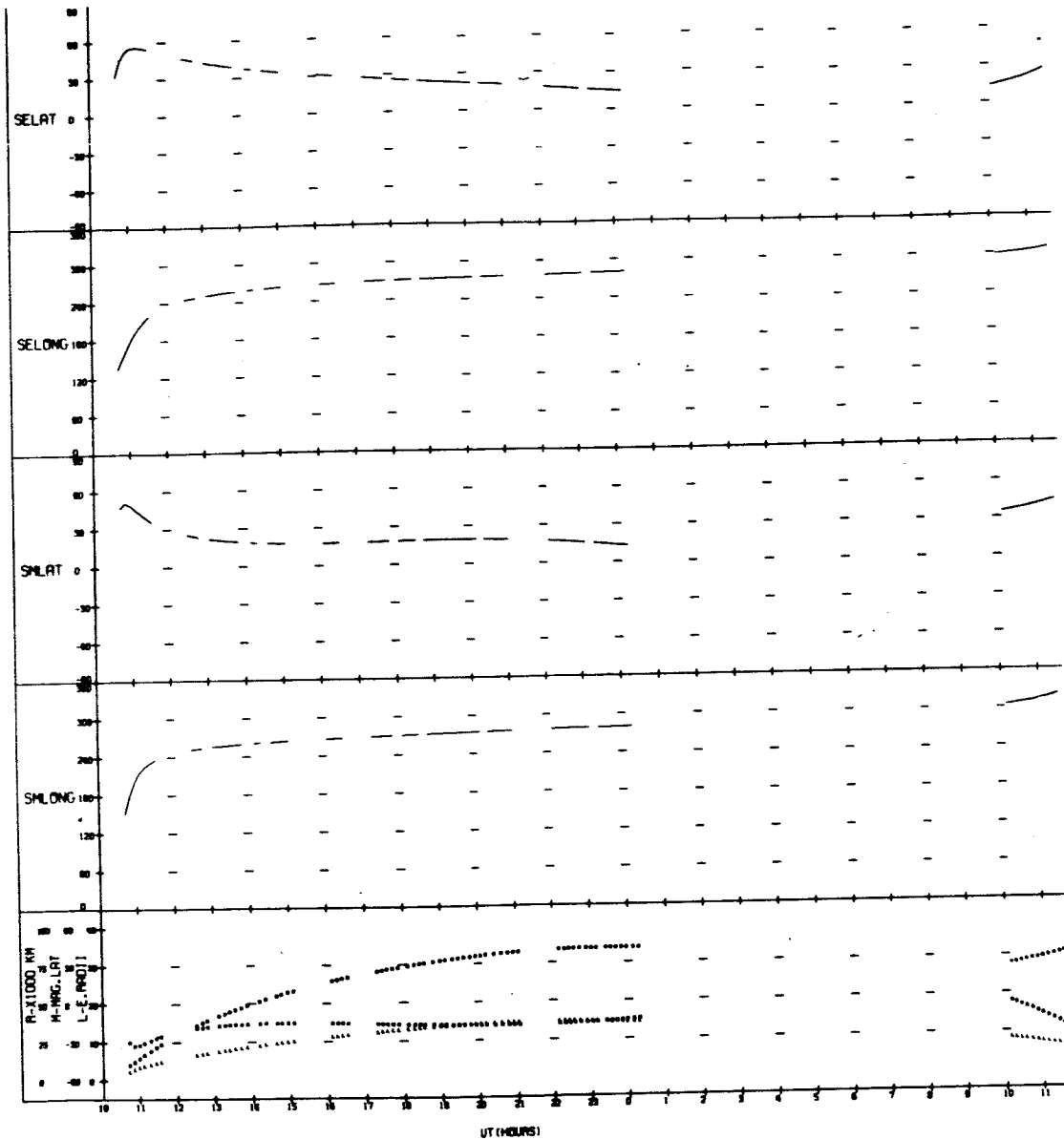


# UNIVERSITY OF IOWA

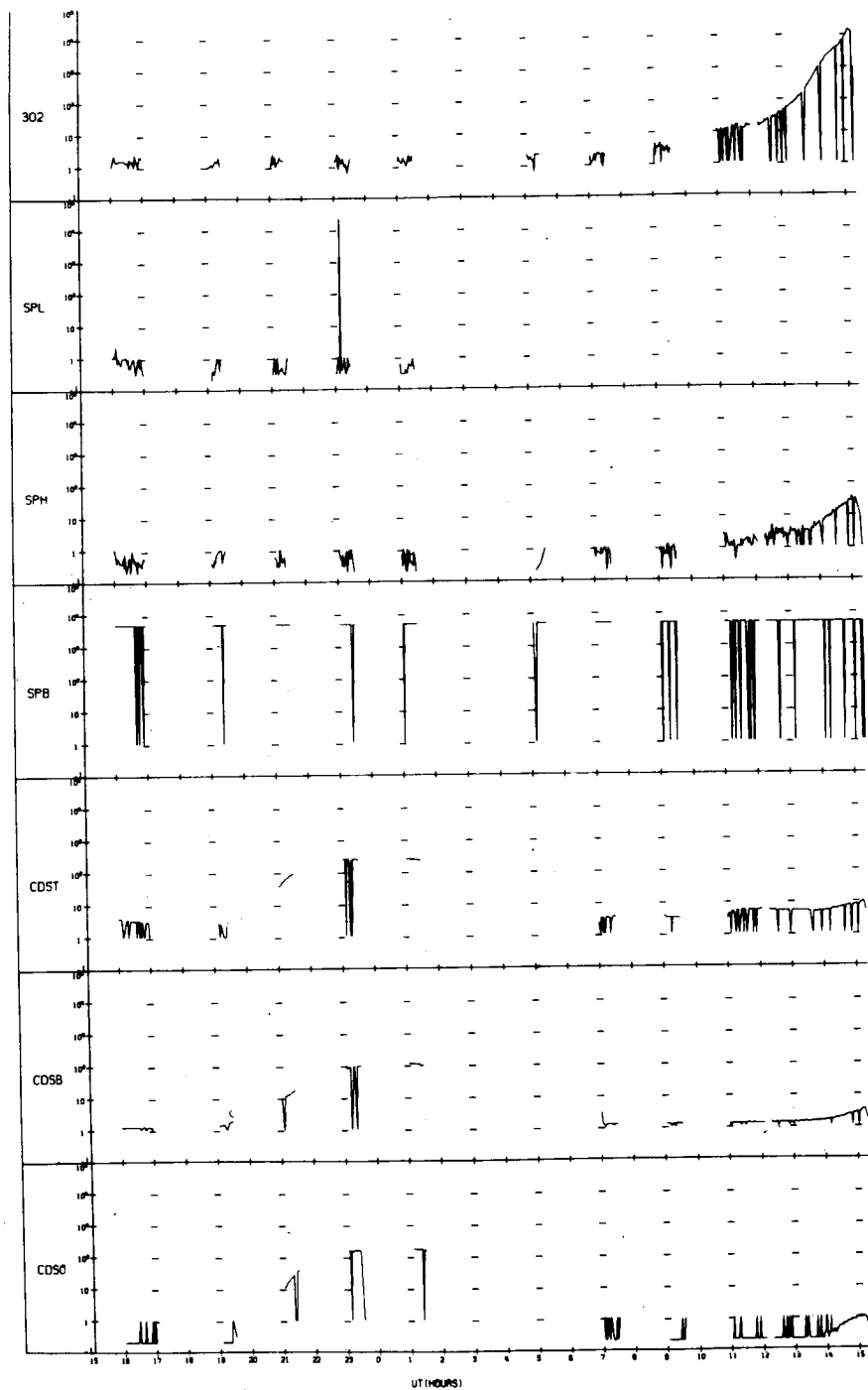
EXPLORER 12 ORBIT 88

BEGIN 11/20/61/10:42

END 11/21/61/11:40



UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 89  
 BEGIN 11/21/61/15:57  
 END 11/22/61/15:20

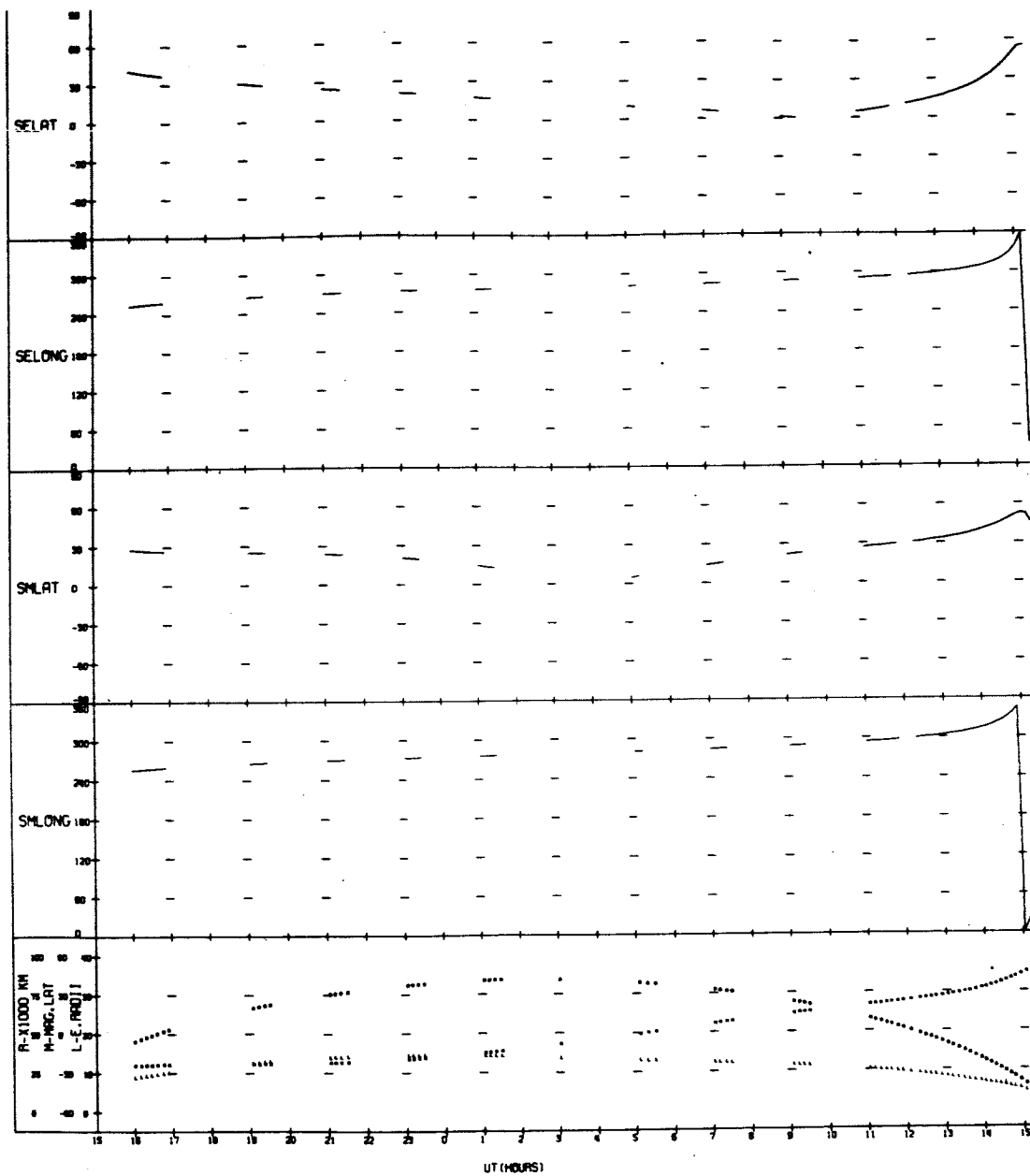


# UNIVERSITY OF IOWA

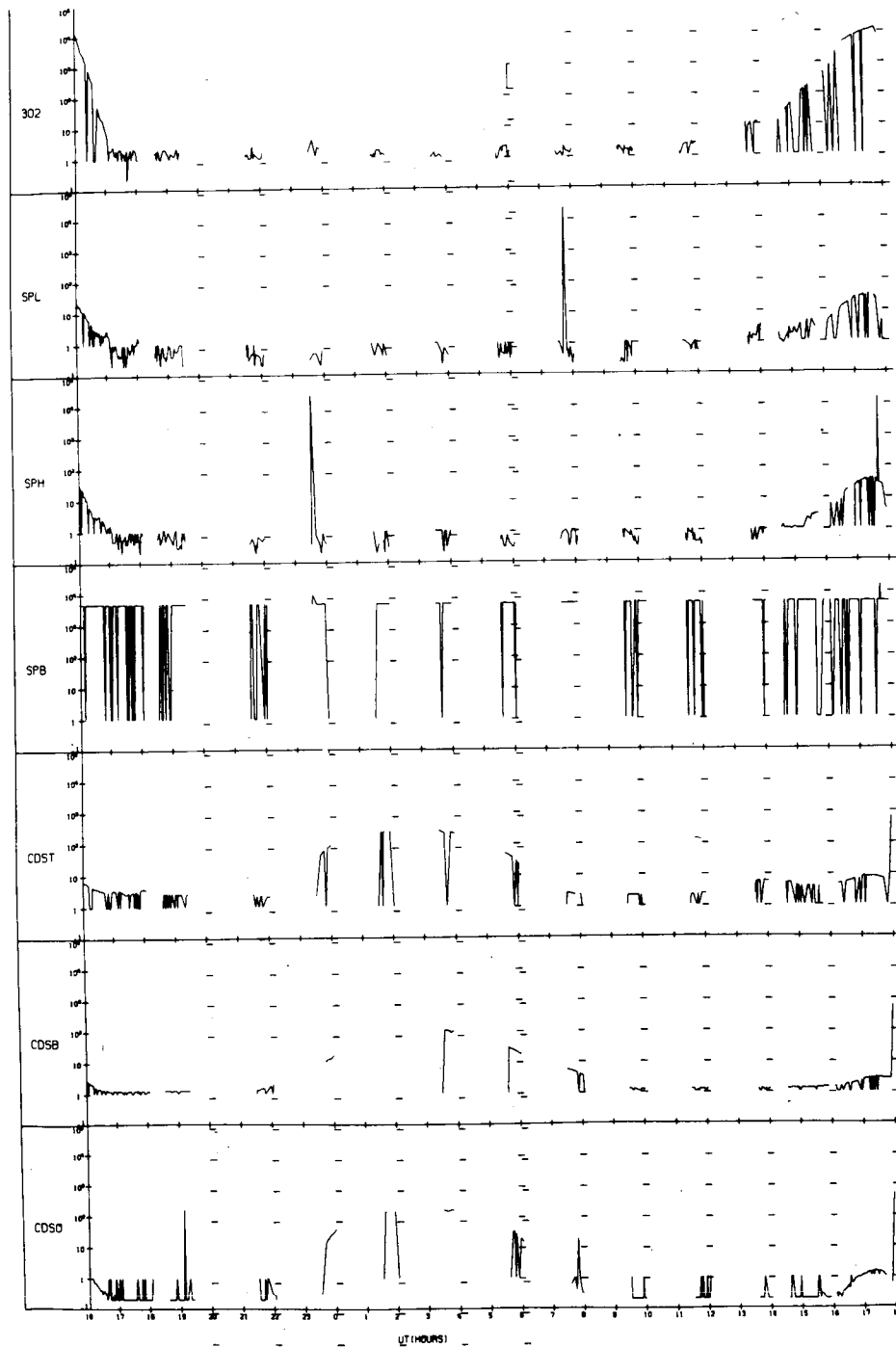
EXPLORER 12 ORBIT 89

BEGIN 11/21/61/15:57

END 11/22/61/15:20



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 90  
BEGIN 11/22/61/16:01  
END 11/23/61/18:15

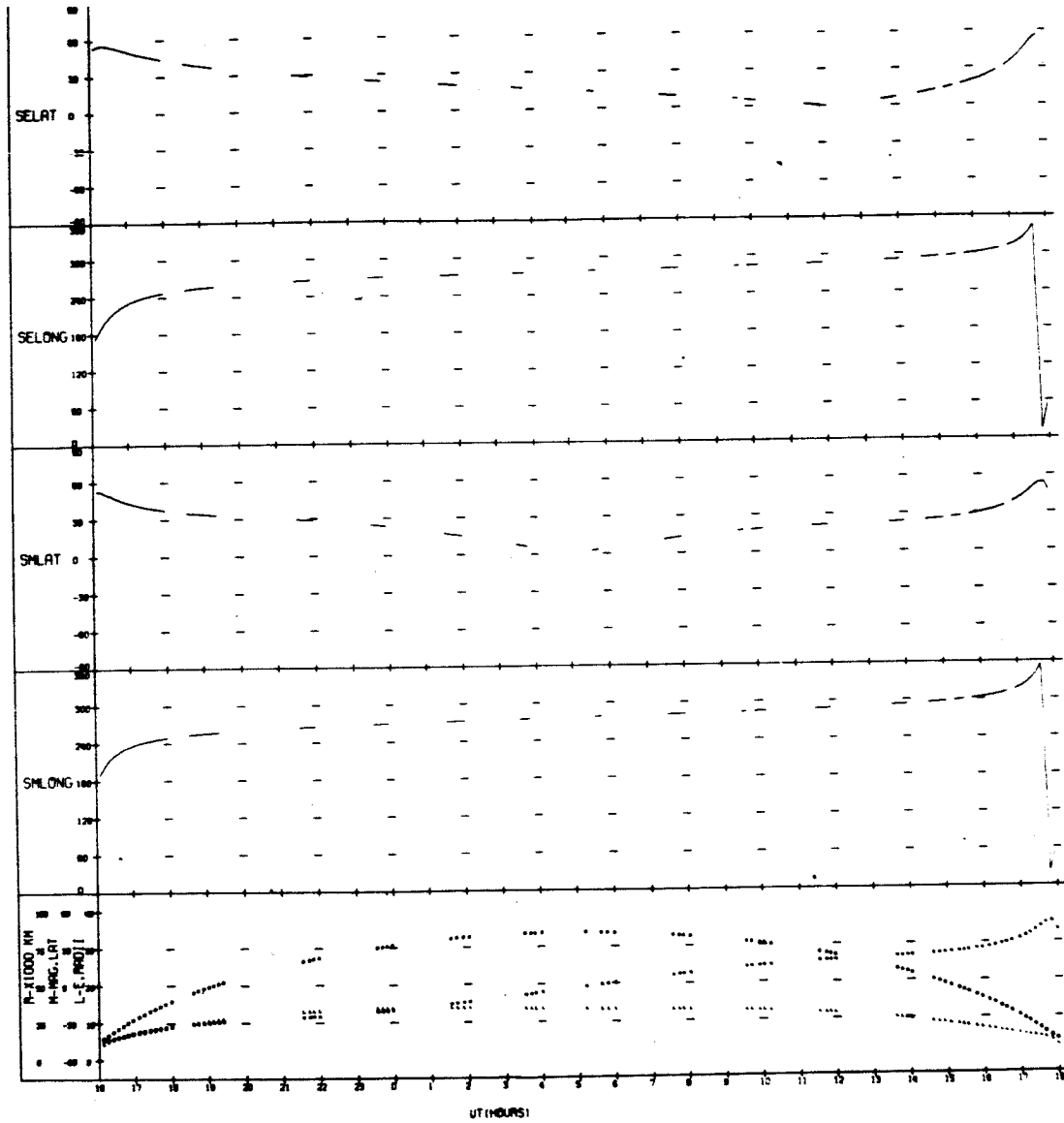


# UNIVERSITY OF IOWA

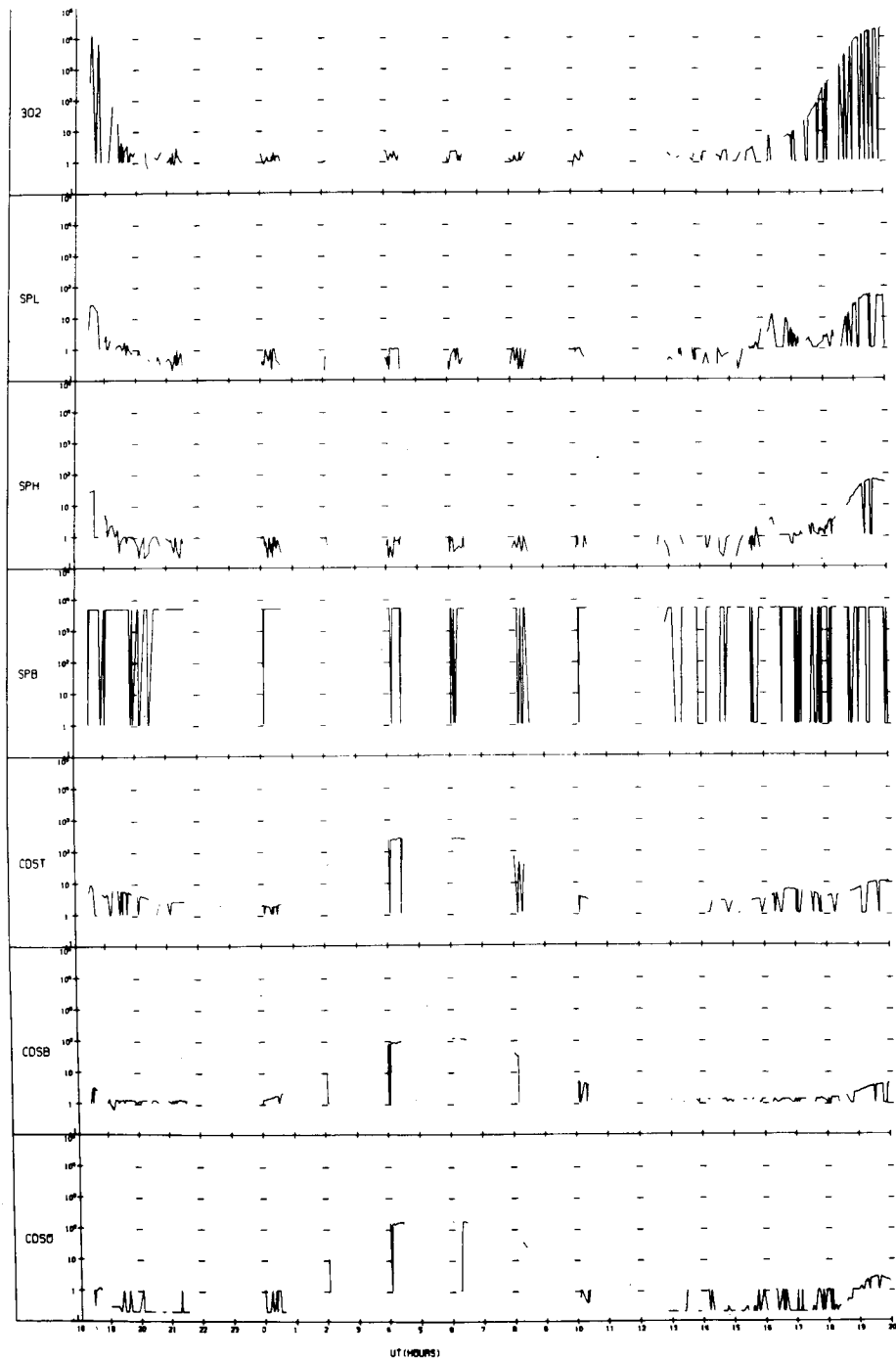
EXPLORER 12 ORBIT 90

BEGIN 11/22/61/16:01

END 11/23/61/18:15



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 91  
BEGIN 11/23/61/18:28  
END 11/24/61/20:01

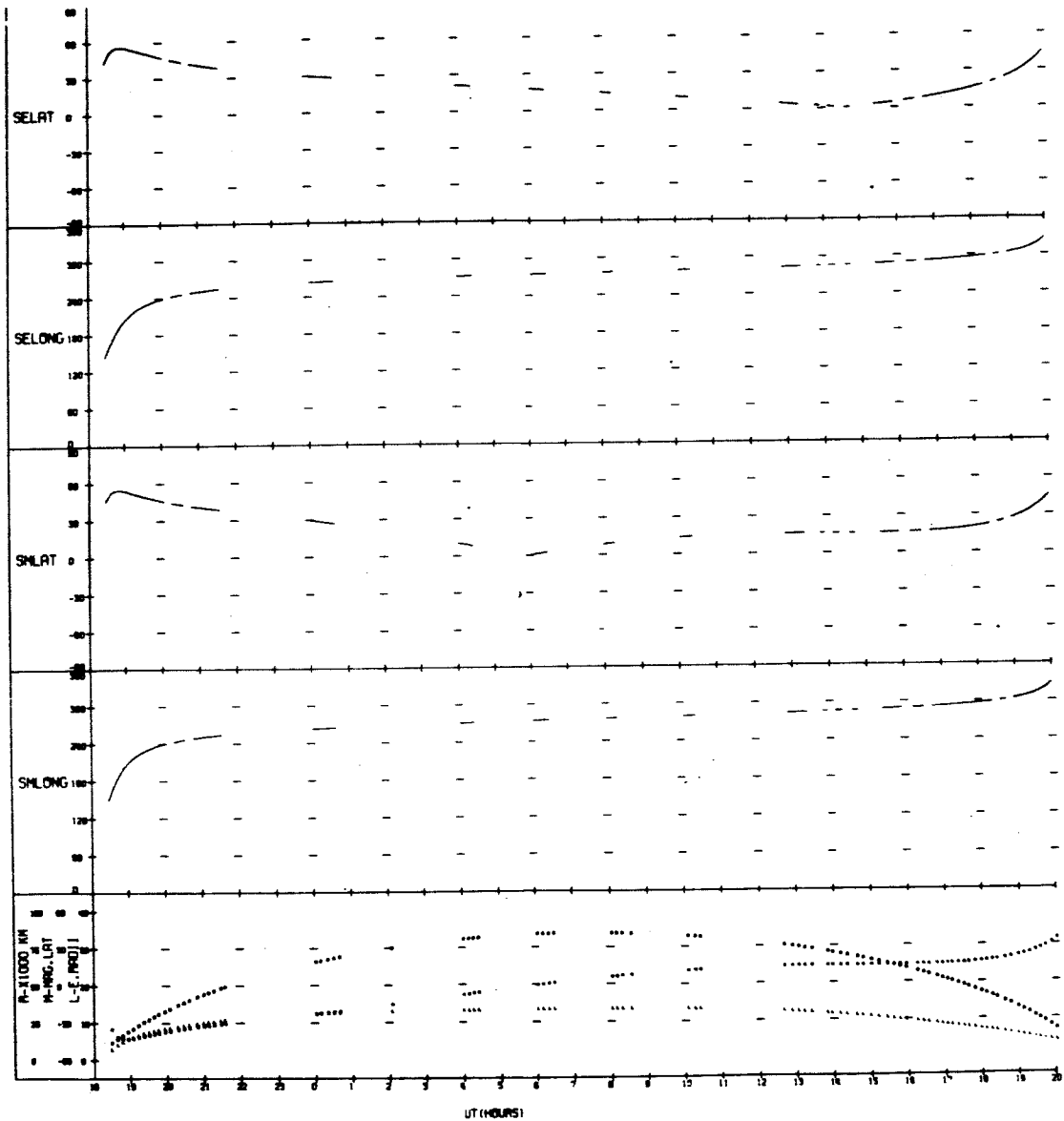


# UNIVERSITY OF IOWA

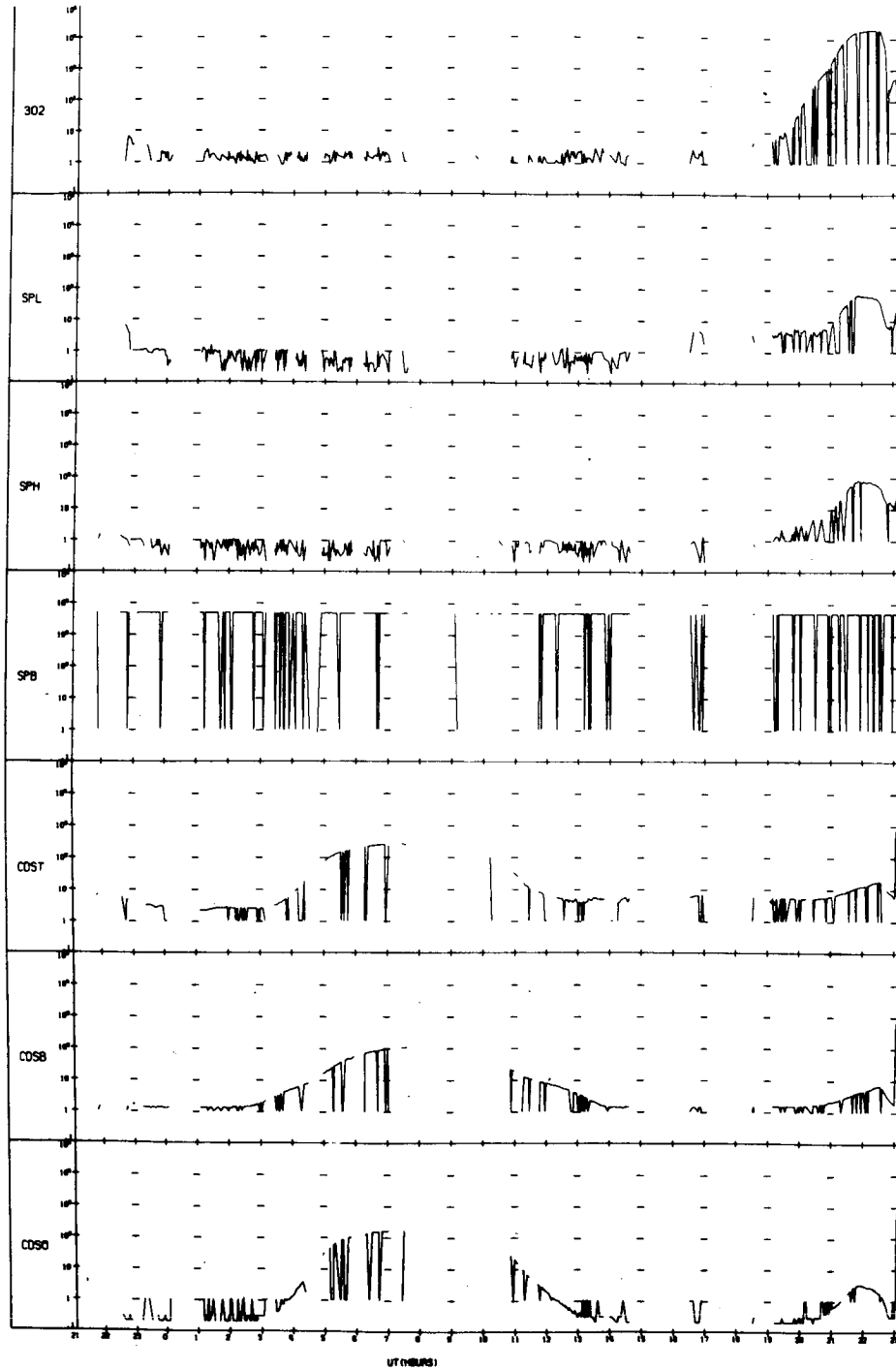
EXPLORER 12 ORBIT 91

BEGIN 11/23/61/18:28

END 11/24/61/20:01



UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 92  
 BEGIN 11/24/61/21:46  
 END 11/25/61/23:16

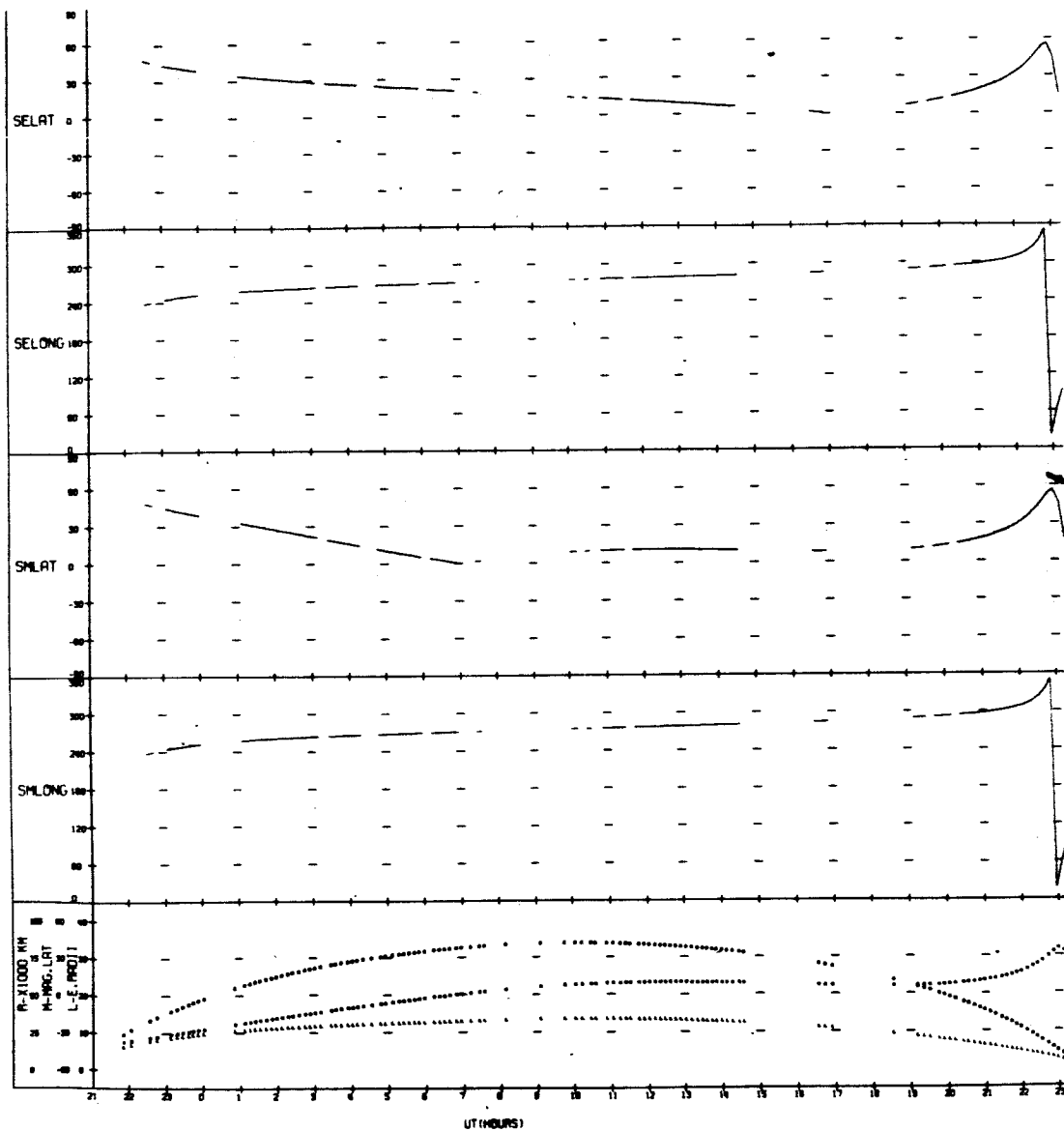


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 92

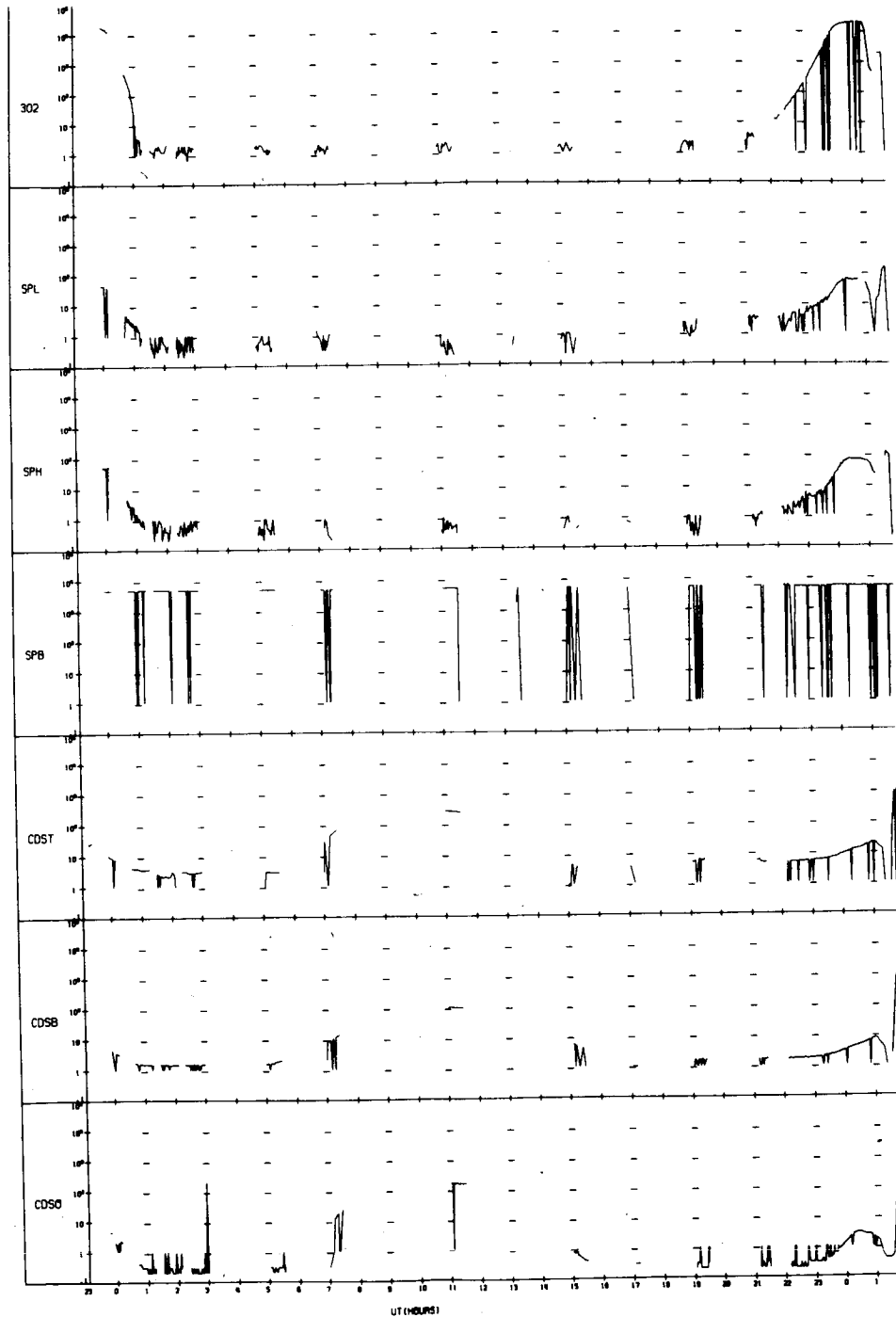
BEGIN 11/24/61/21:46

END 11/25/61/23:16



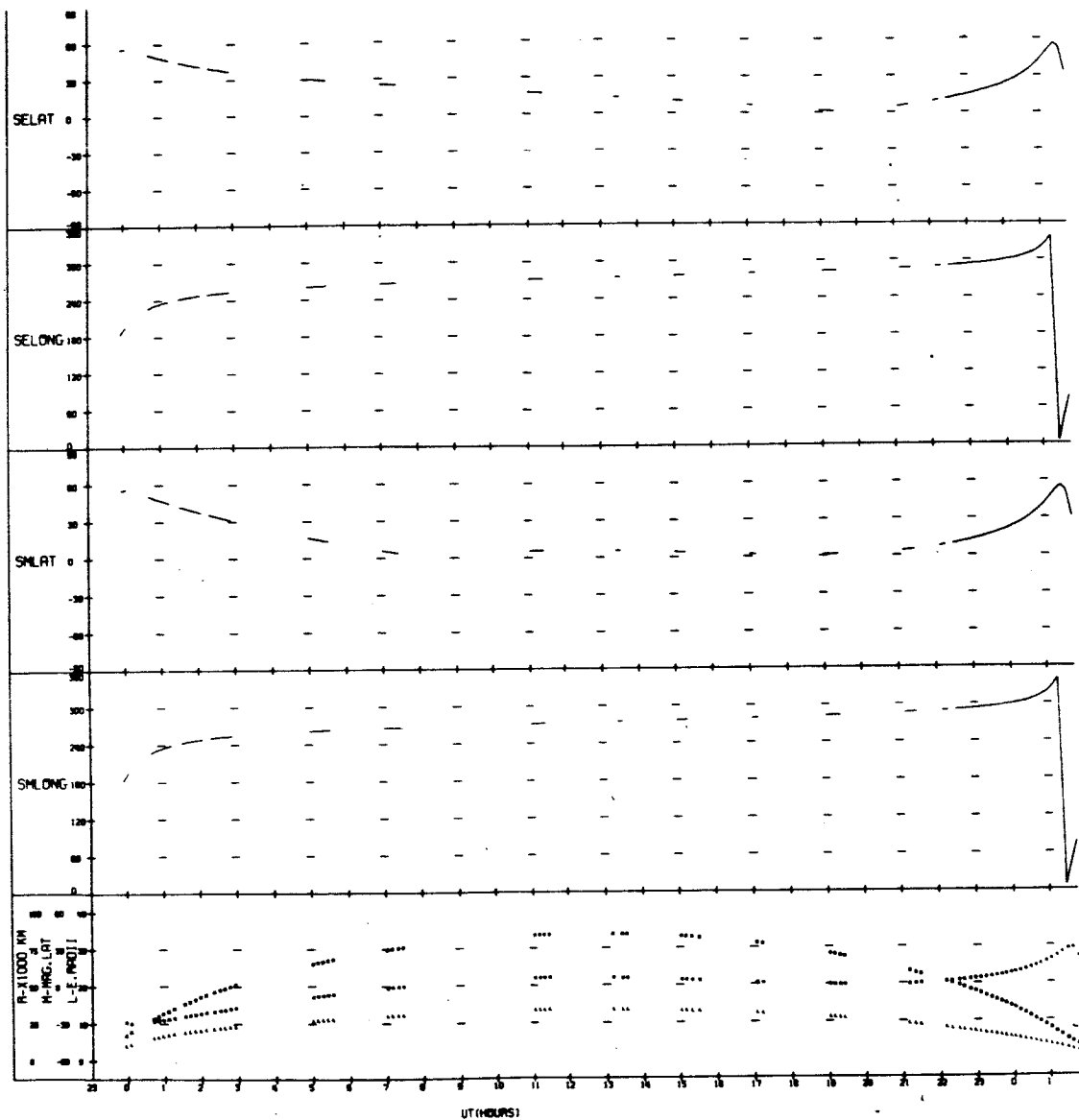
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 93  
 BEGIN 11/25/61/23:55  
 END 11/27/61/01:46

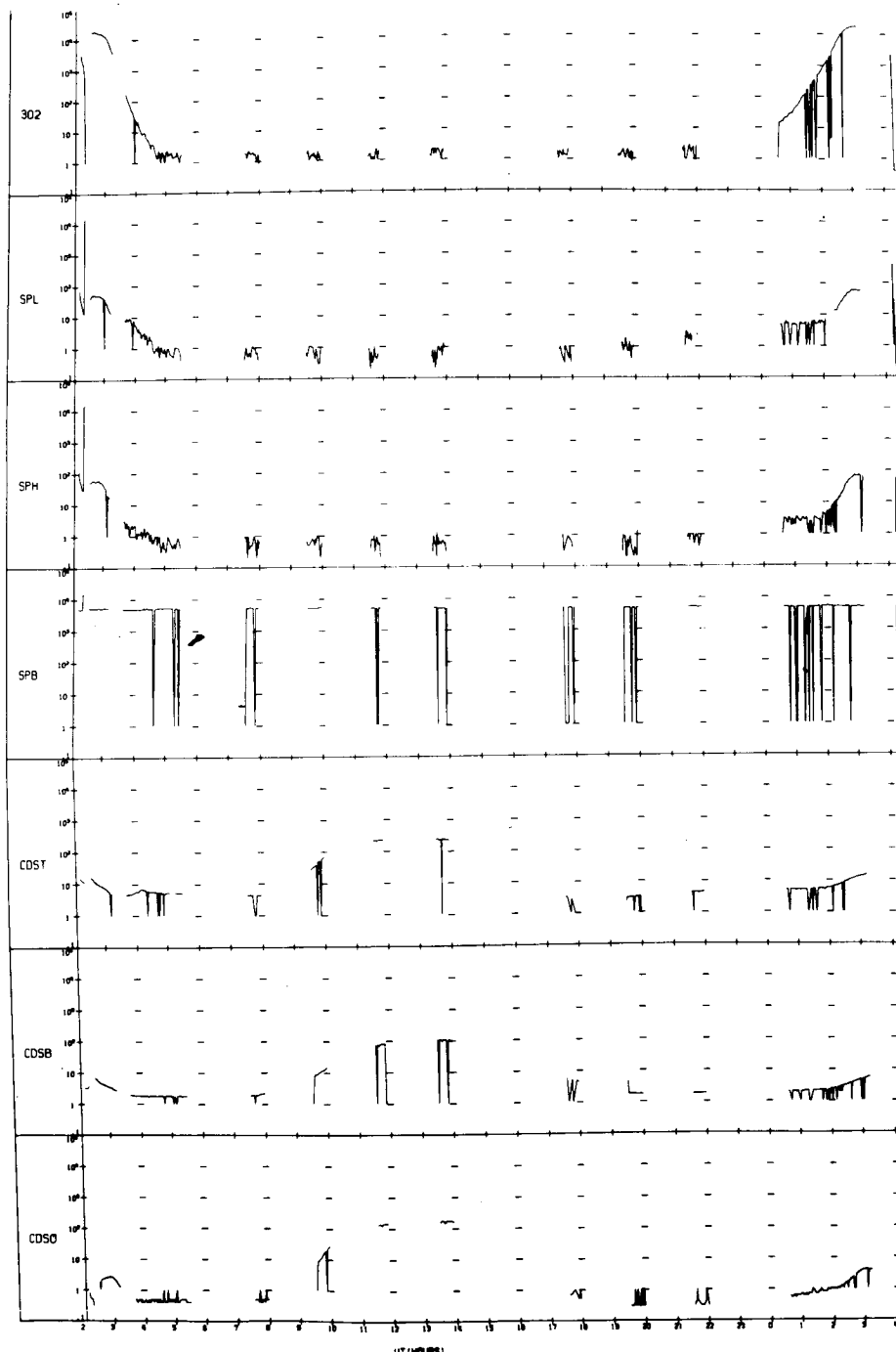


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 93  
 BEGIN 11/25/61/23:55  
 END 11/27/61/01:46

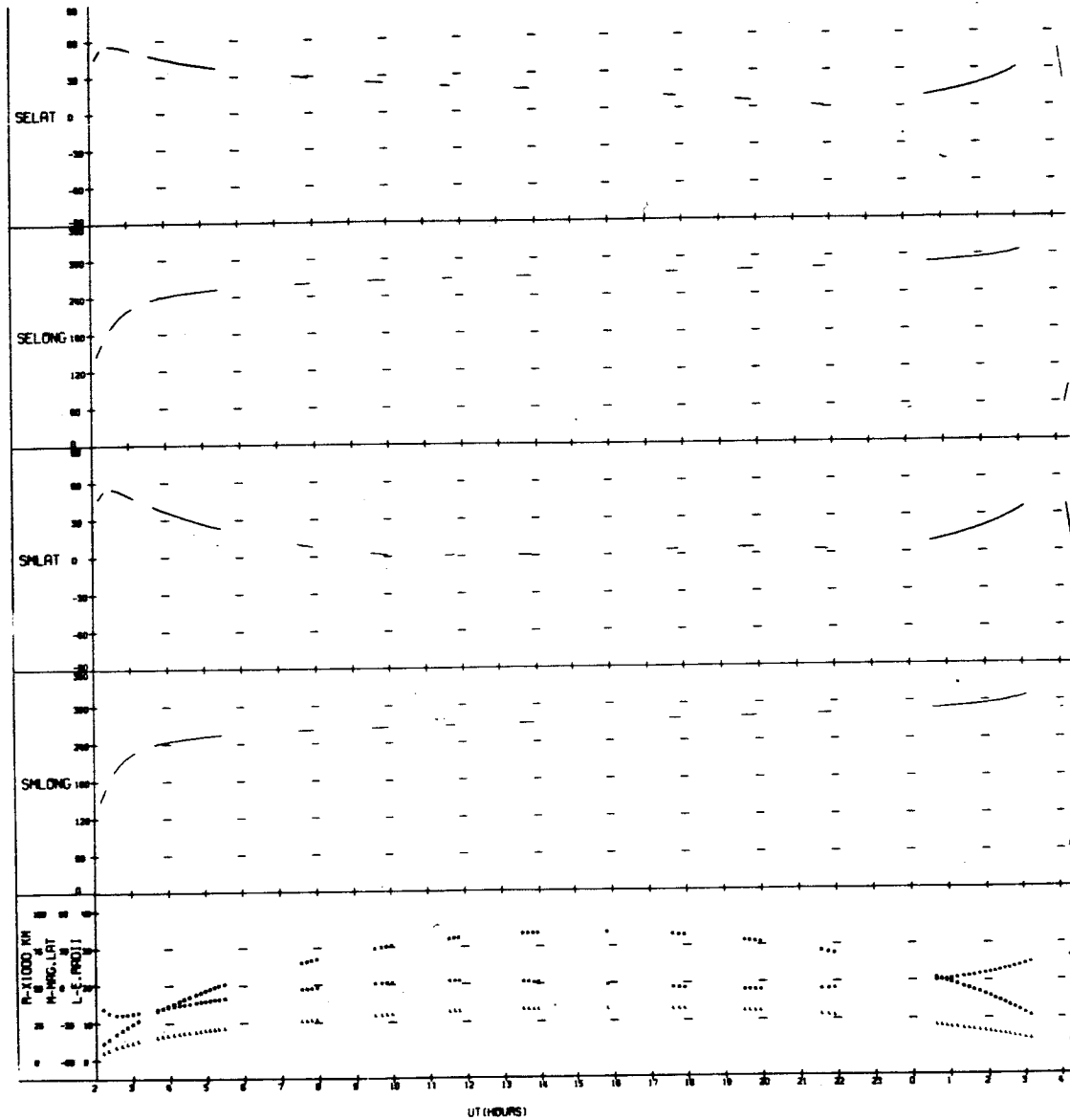


UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 94  
 BEGIN 11/27/61/02:08  
 END 11/28/61/04:24

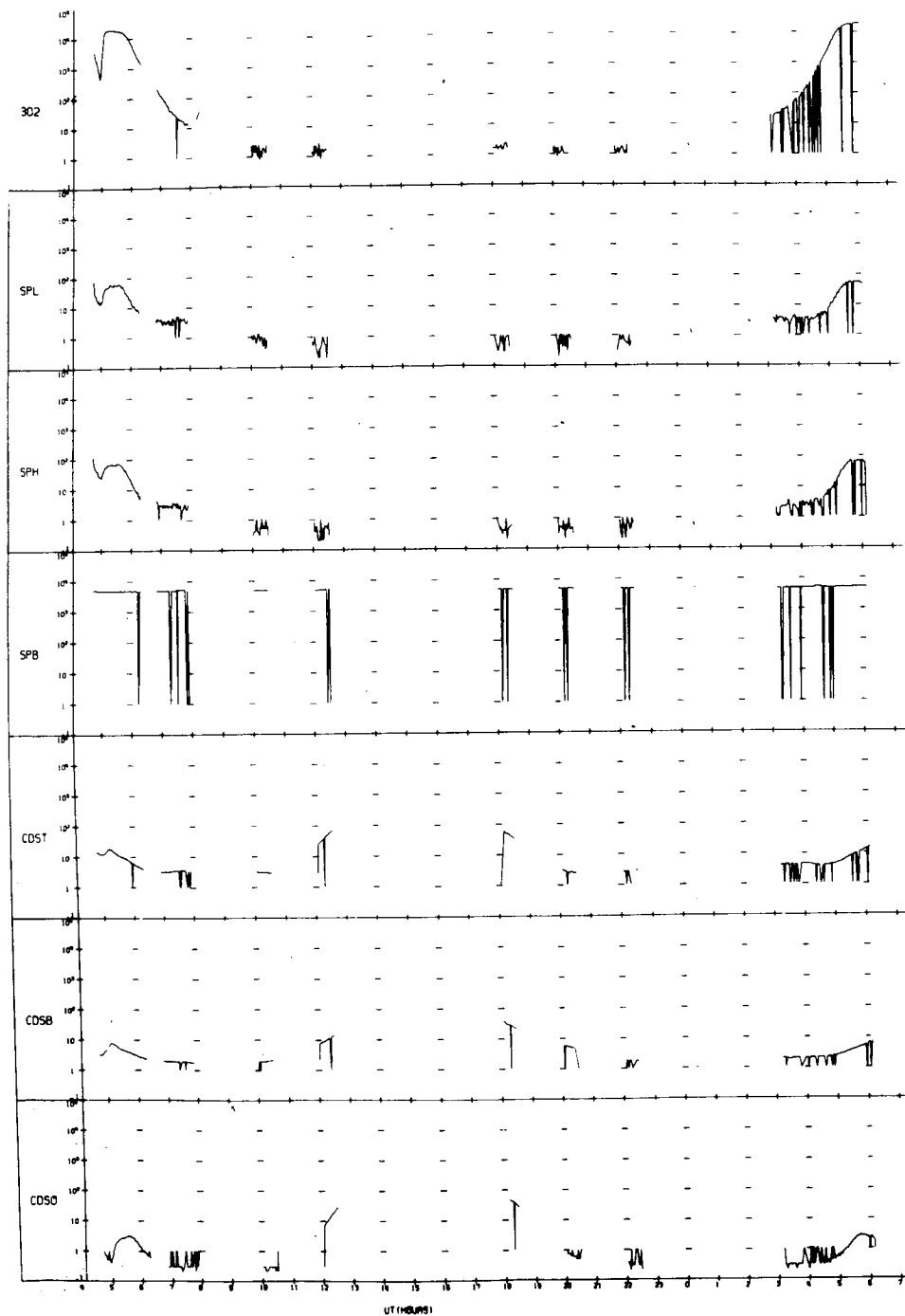


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 94  
 BEGIN 11/27/61/02:08  
 END 11/28/61/04:24

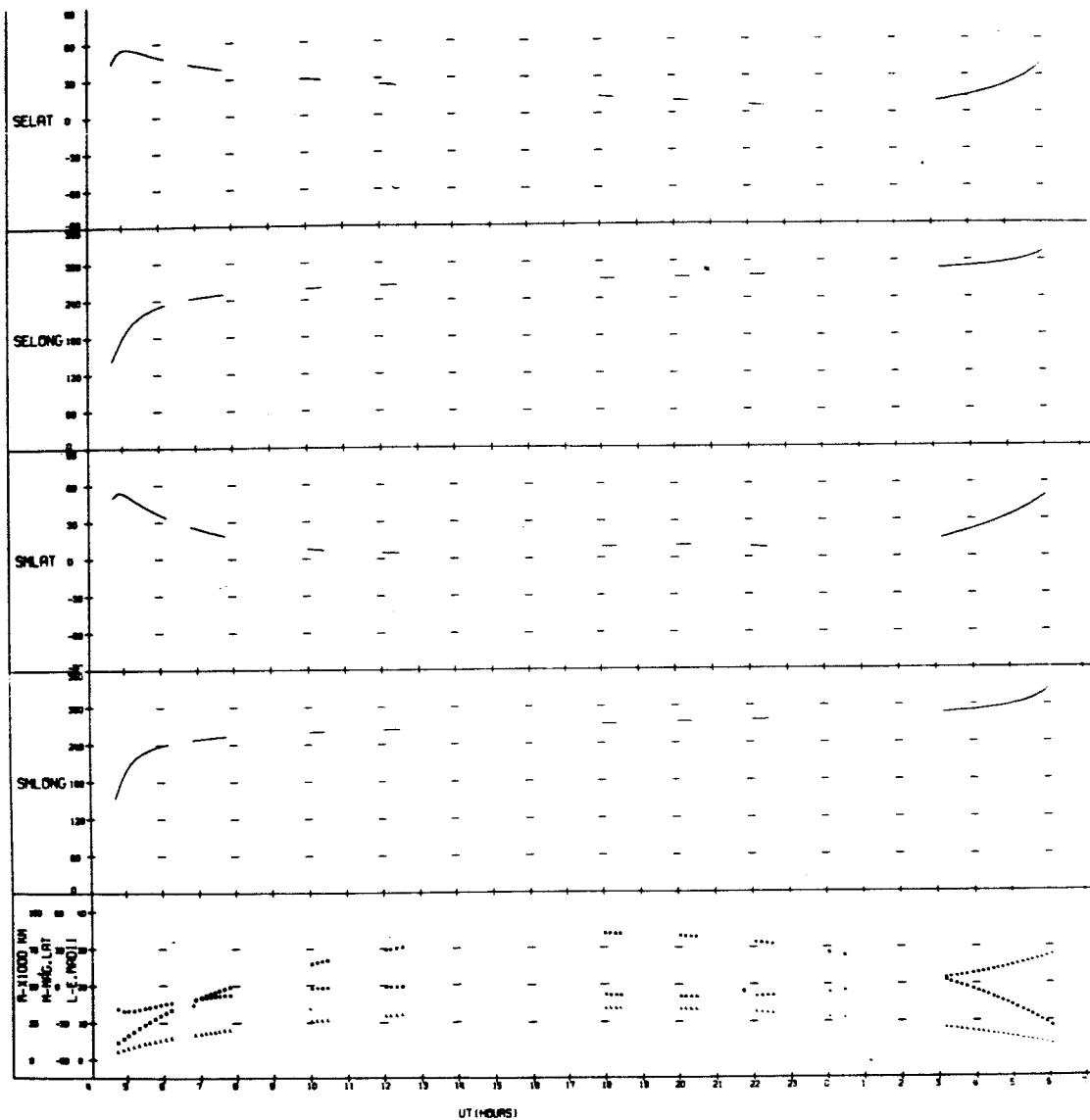


UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 95  
 BEGIN 11/28/61/04:42  
 END 11/29/61/07:21

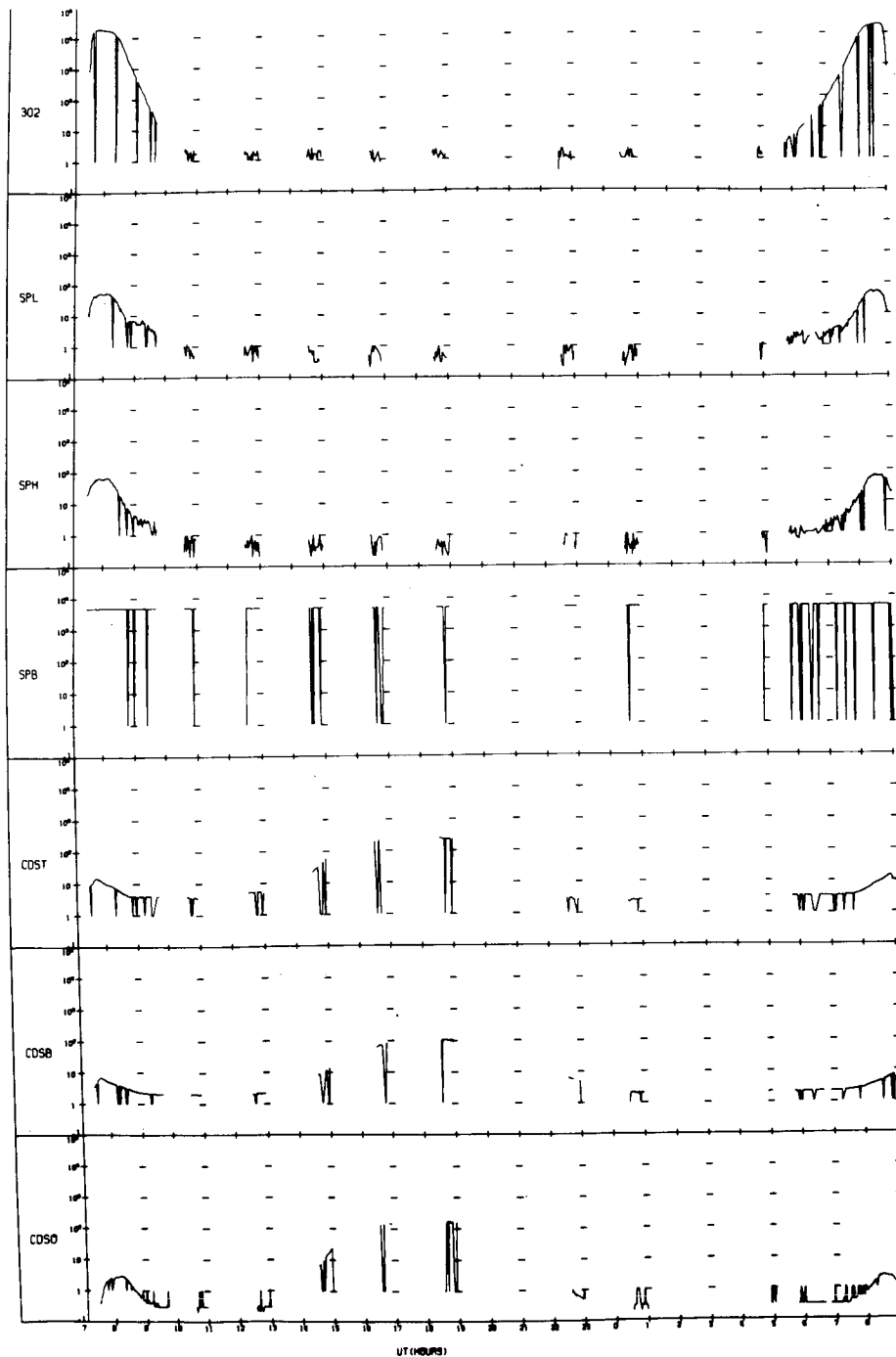


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 95  
 BEGIN 11/28/61/04:42  
 END 11/29/61/07:21



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 96  
BEGIN 11/29/61/07:27  
END 11/30/61/09:03

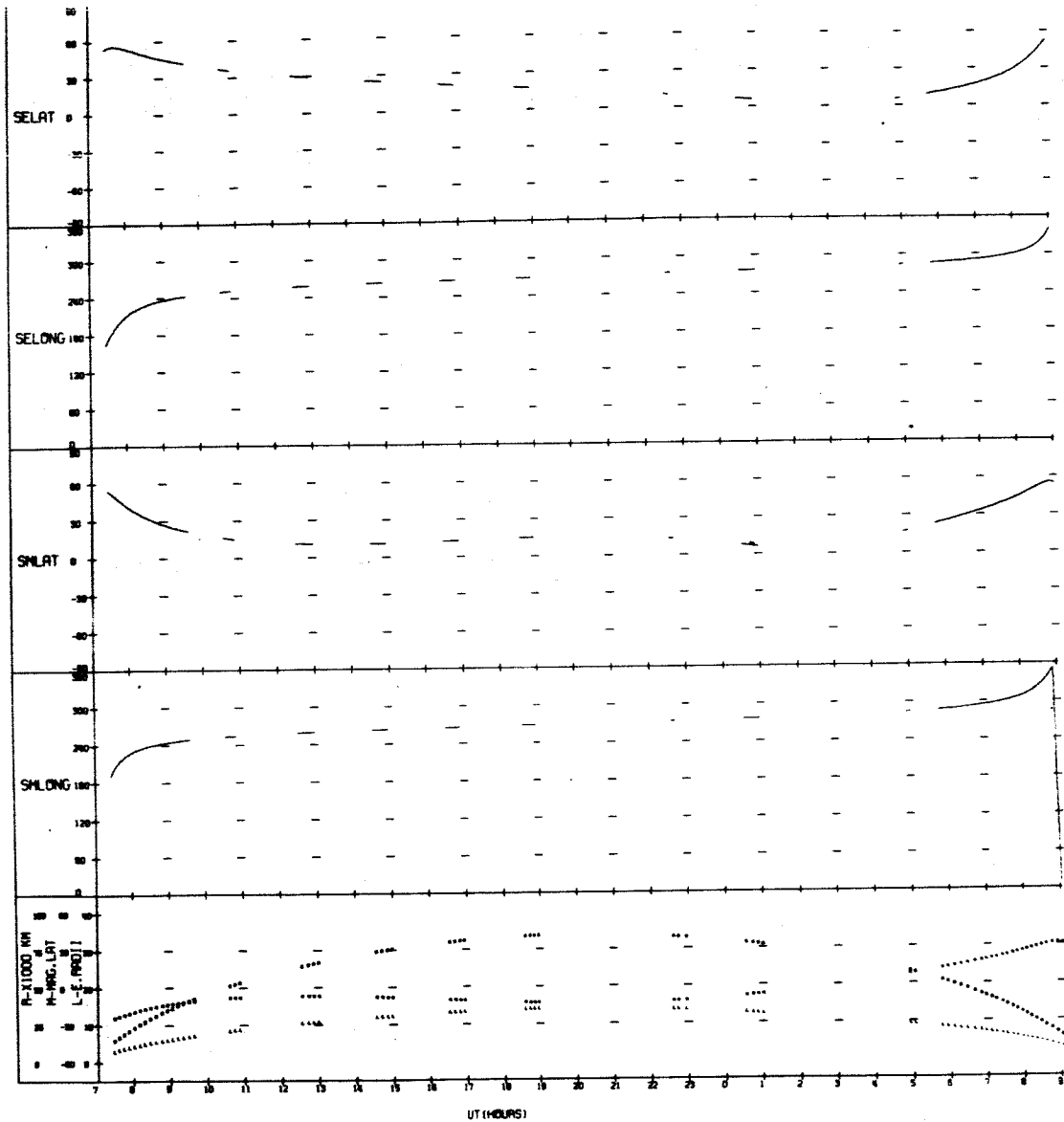


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 96

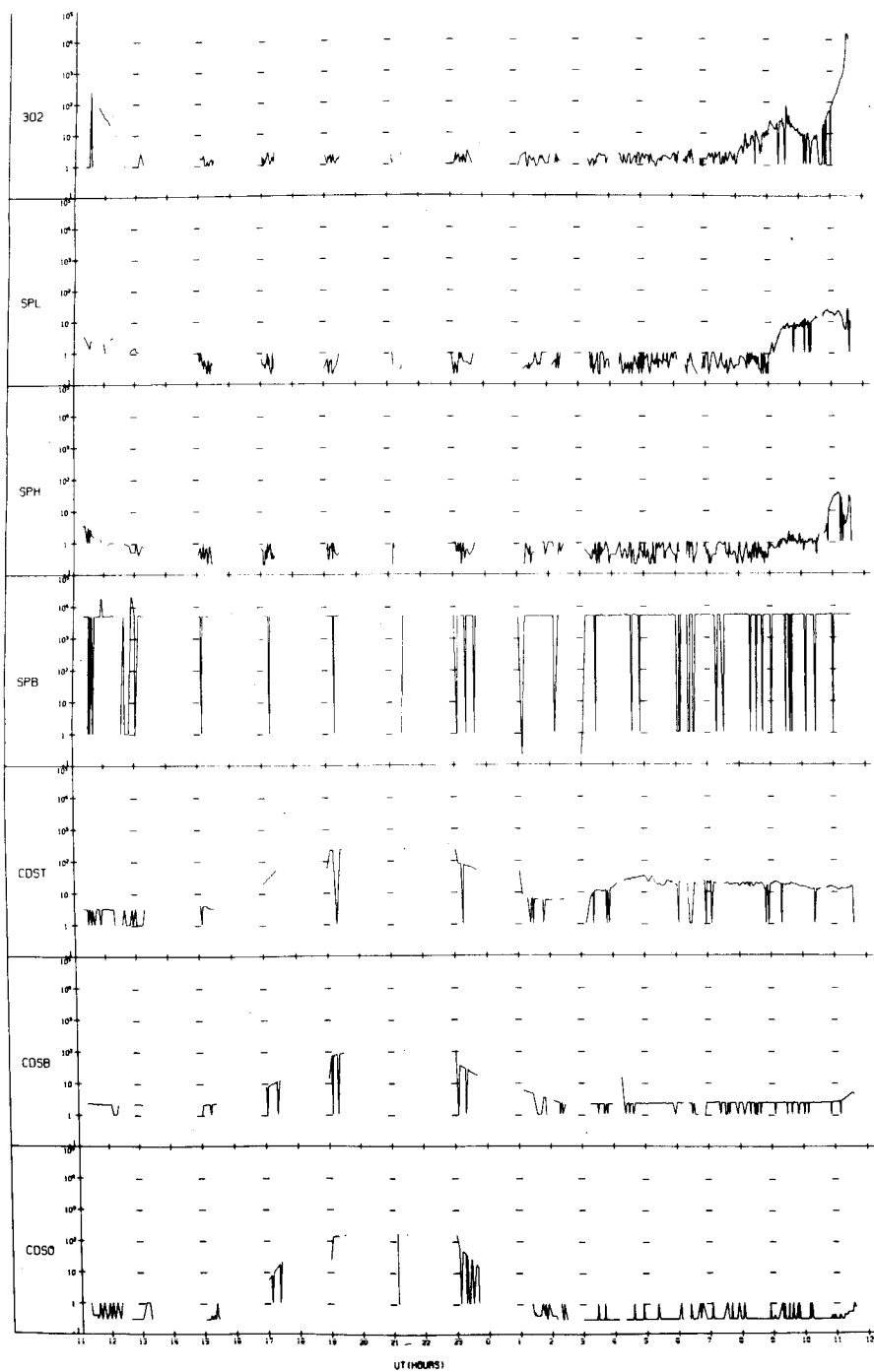
BEGIN 11/29/61/07:27

END 11/30/61/09:03



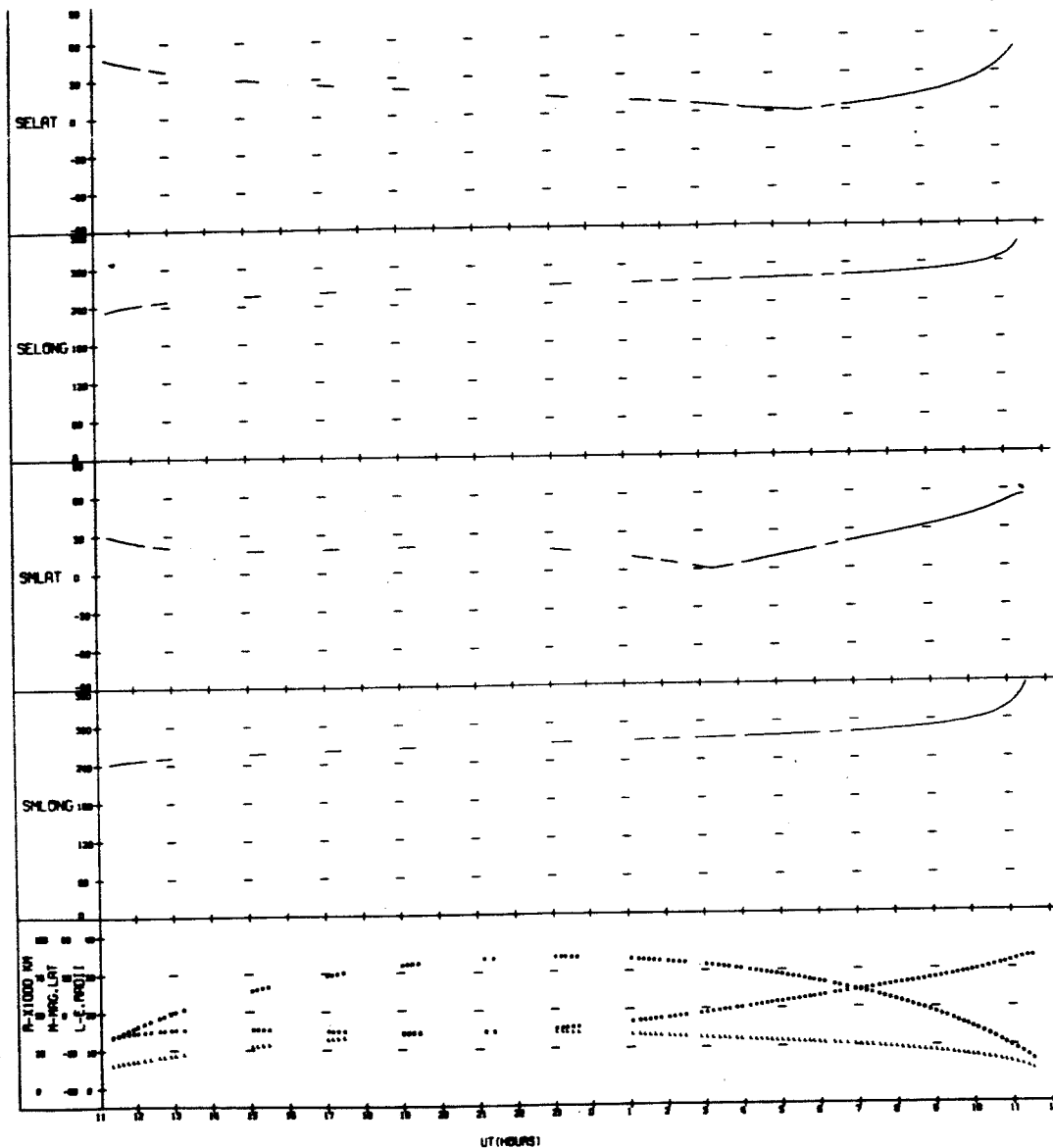
# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 97  
 BEGIN 11/30/61/11:18  
 END 12/01/61/12:13

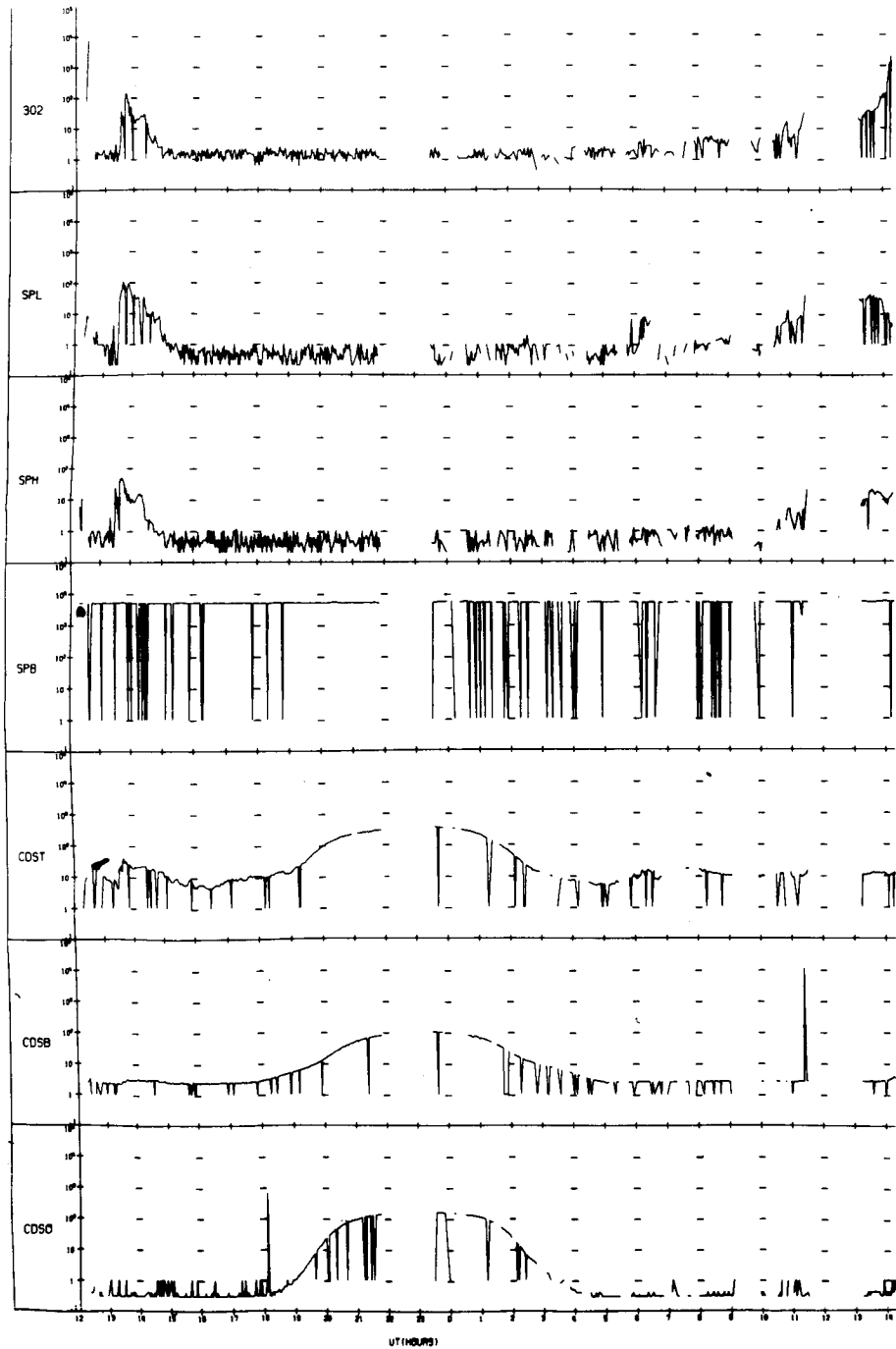


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 97  
 BEGIN 11/30/61/11:18  
 END 12/01/61/12:13



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 98  
BEGIN 12/01/61/12:21  
END 12/02/61/14:19

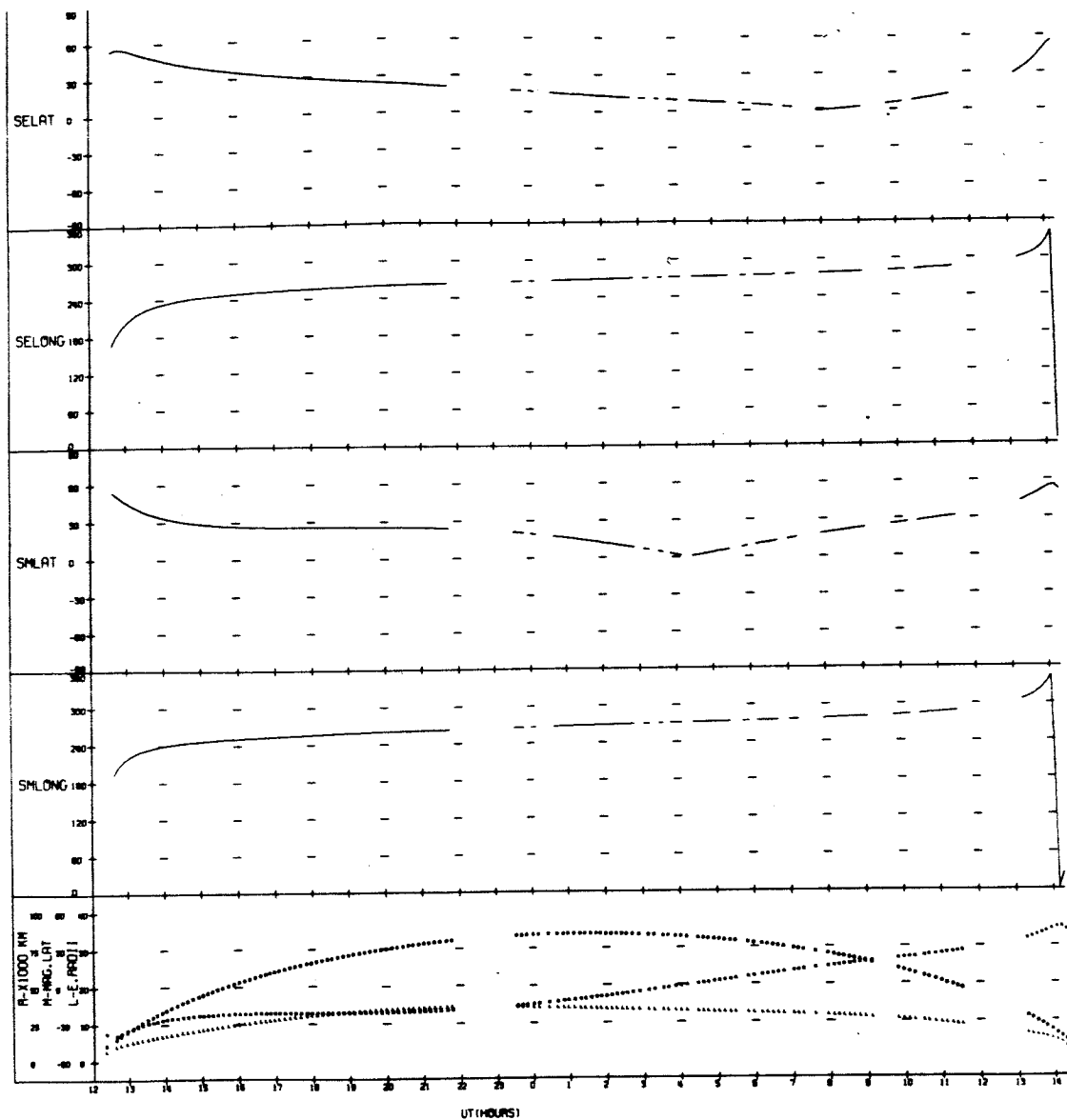


# UNIVERSITY OF IOWA

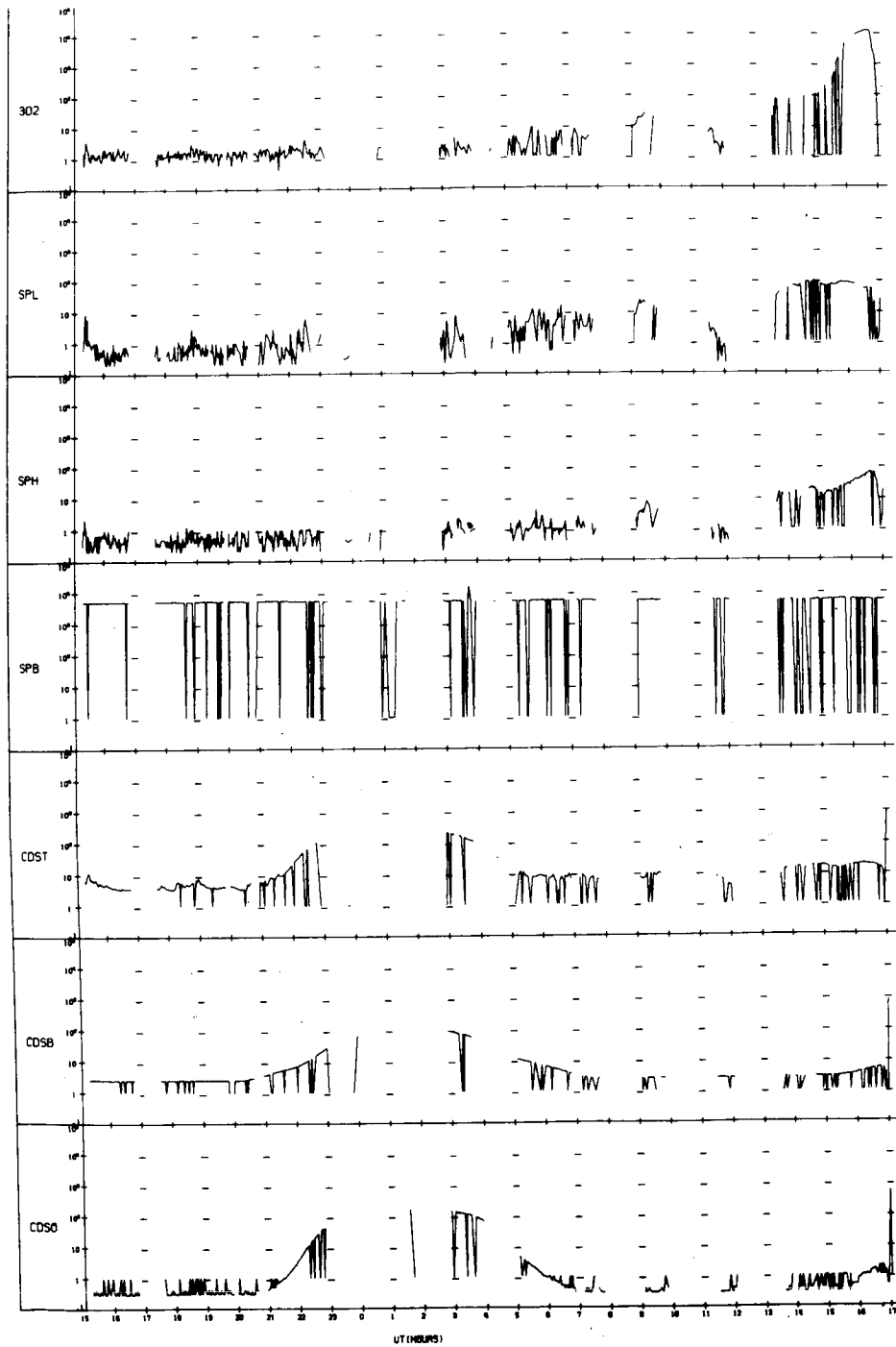
EXPLORER 12 ORBIT 98

BEGIN 12/01/61/12:21

END 12/02/61/14:19



UNIVERSITY OF IOWA  
EXPLORER 12 ORBIT 99  
BEGIN 12/02/61/15:17  
END 12/03/61/17:21

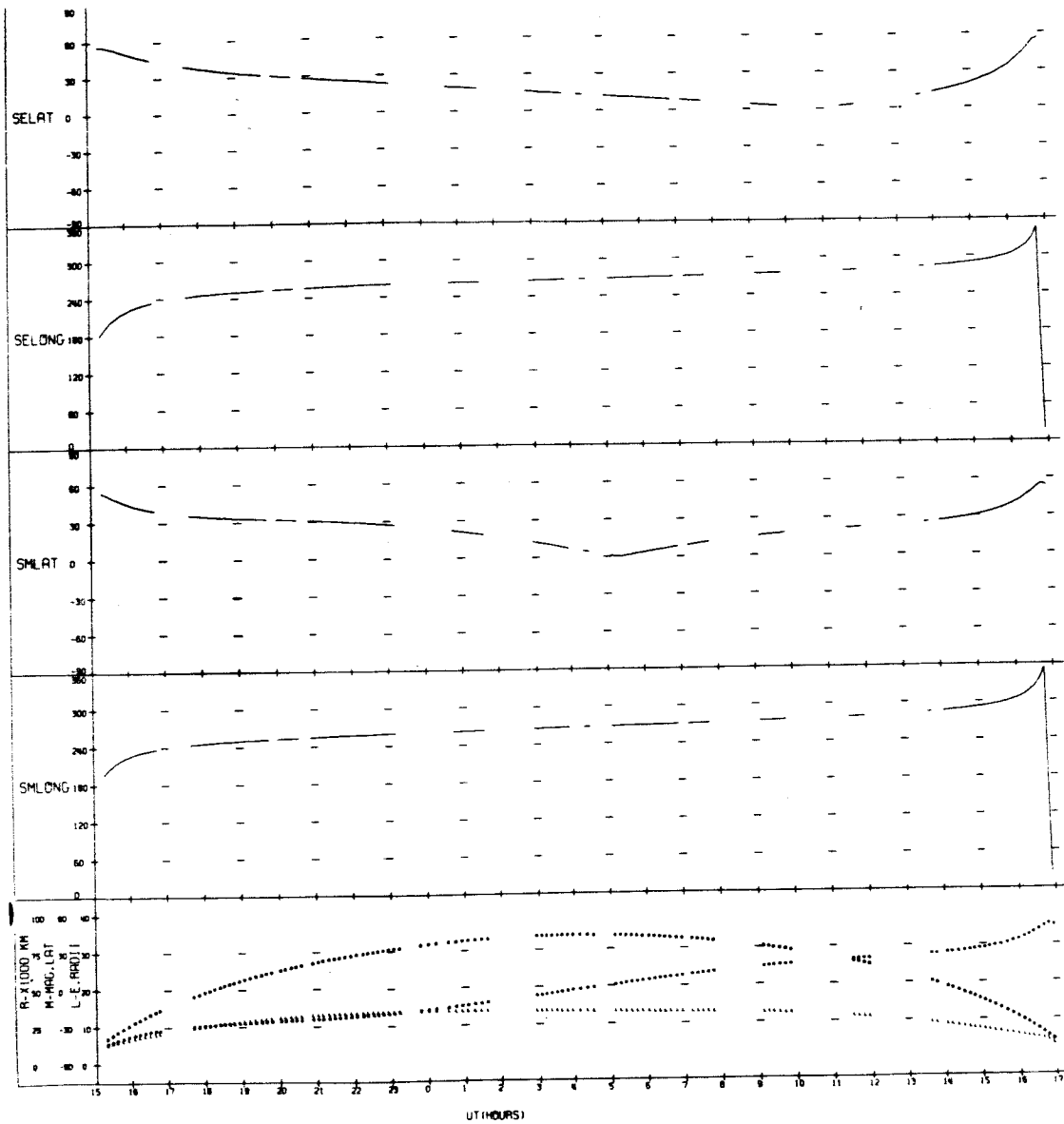


# UNIVERSITY OF IOWA

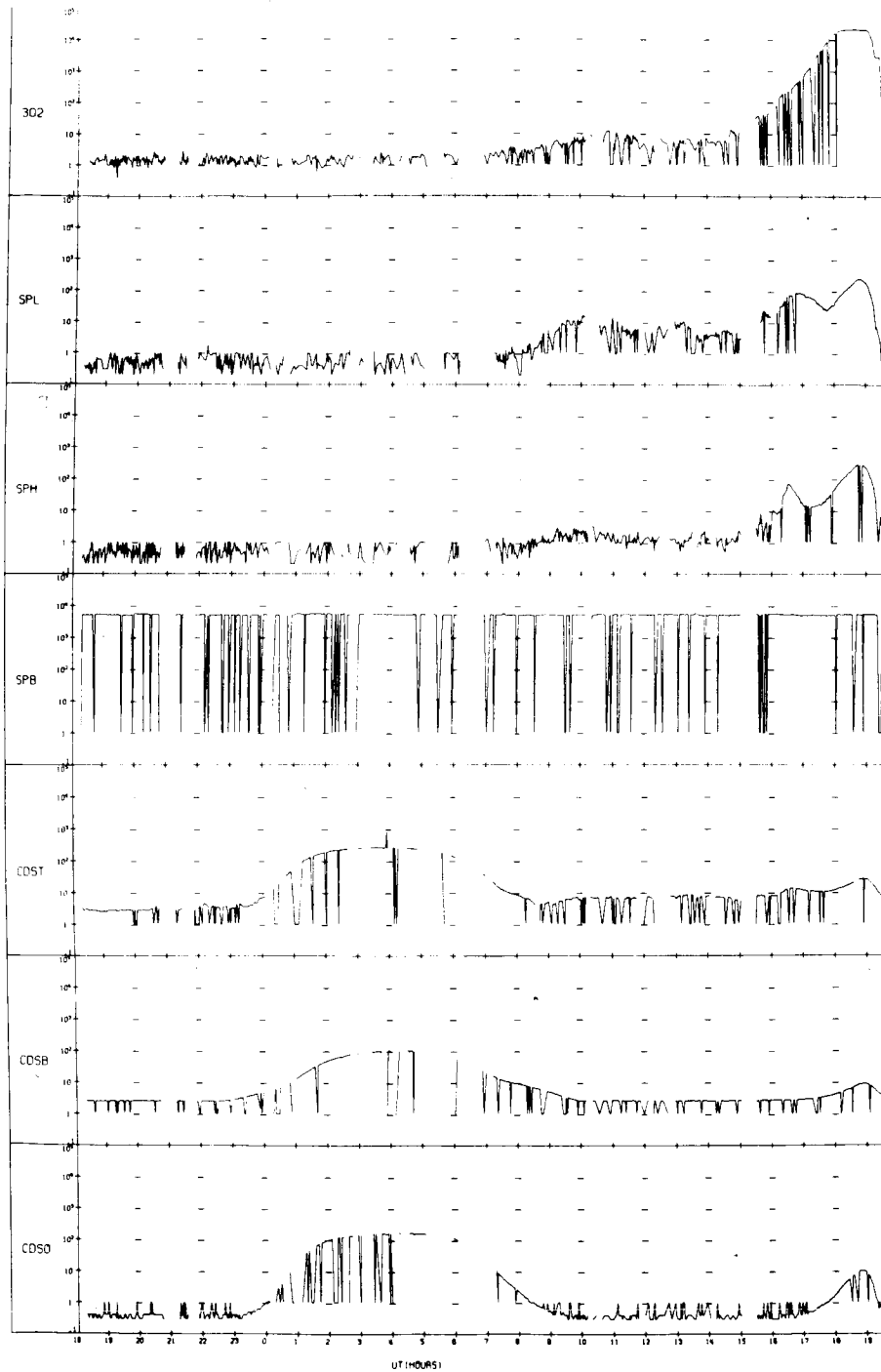
EXPLORER 12 DRBIT 99

BEGIN 12/02/51/15:17

END 12/03/61/17:21



UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 100  
 BEGIN 12/03/61/18:20  
 END 12/04/61/13:42

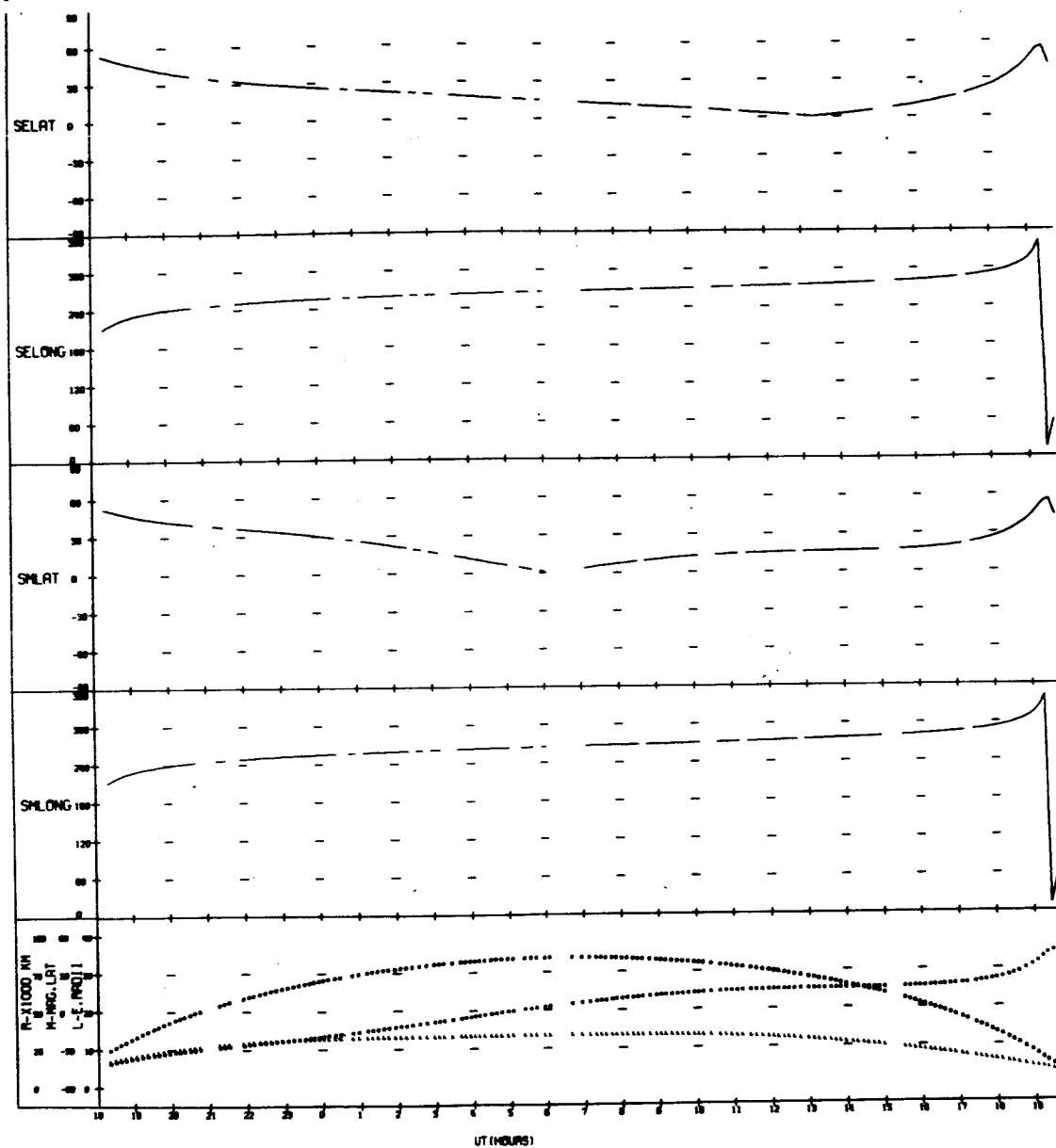


# UNIVERSITY OF IOWA

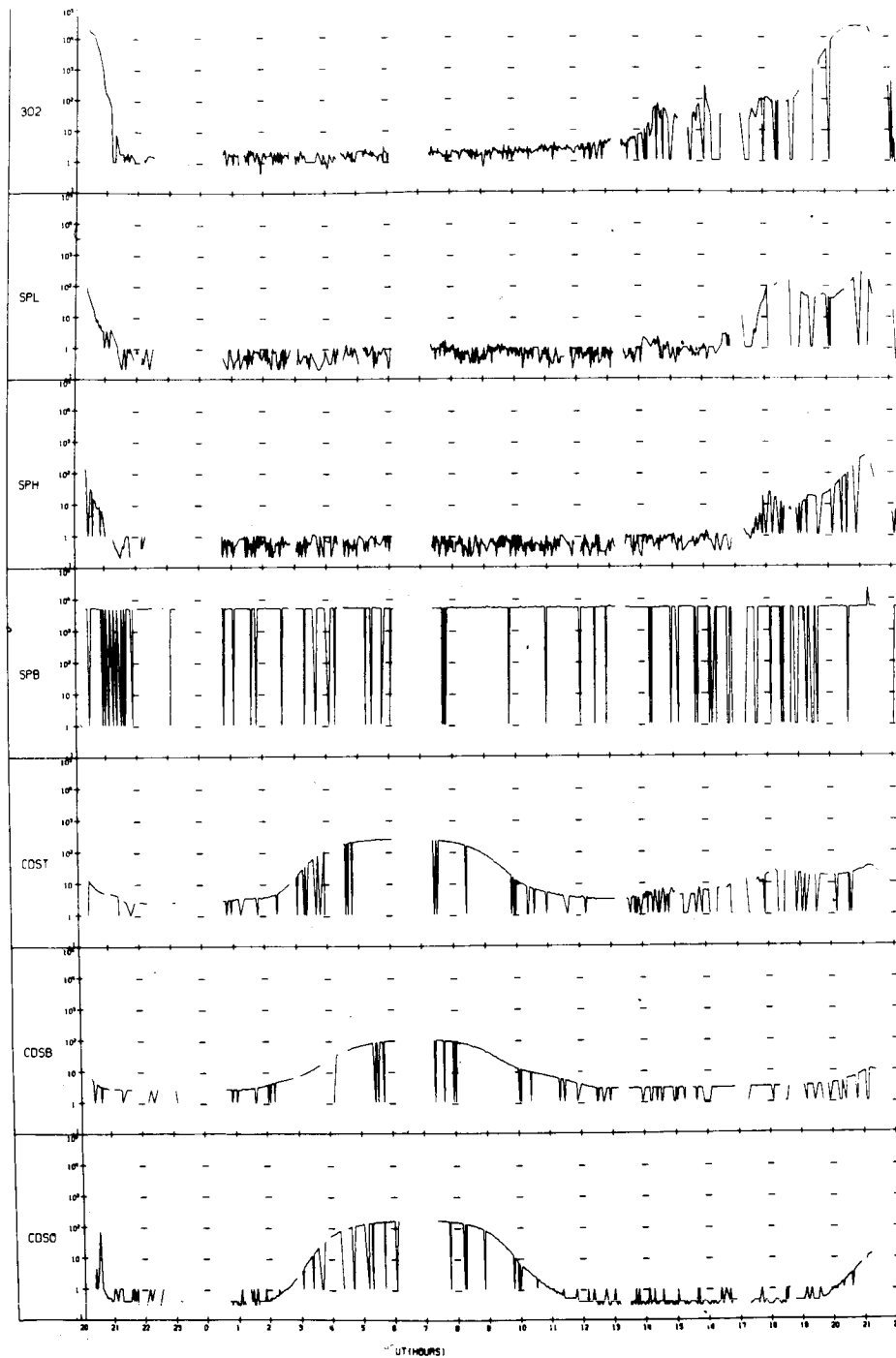
EXPLORER 12 ORBIT 100

BEGIN 12/03/61/18:20

END 12/04/61/19:42



UNIVERSITY OF IOWA  
 EXPLORER 12 ORBIT 101  
 BEGIN 12/04/61/20:19  
 END 12/05/61/22:17

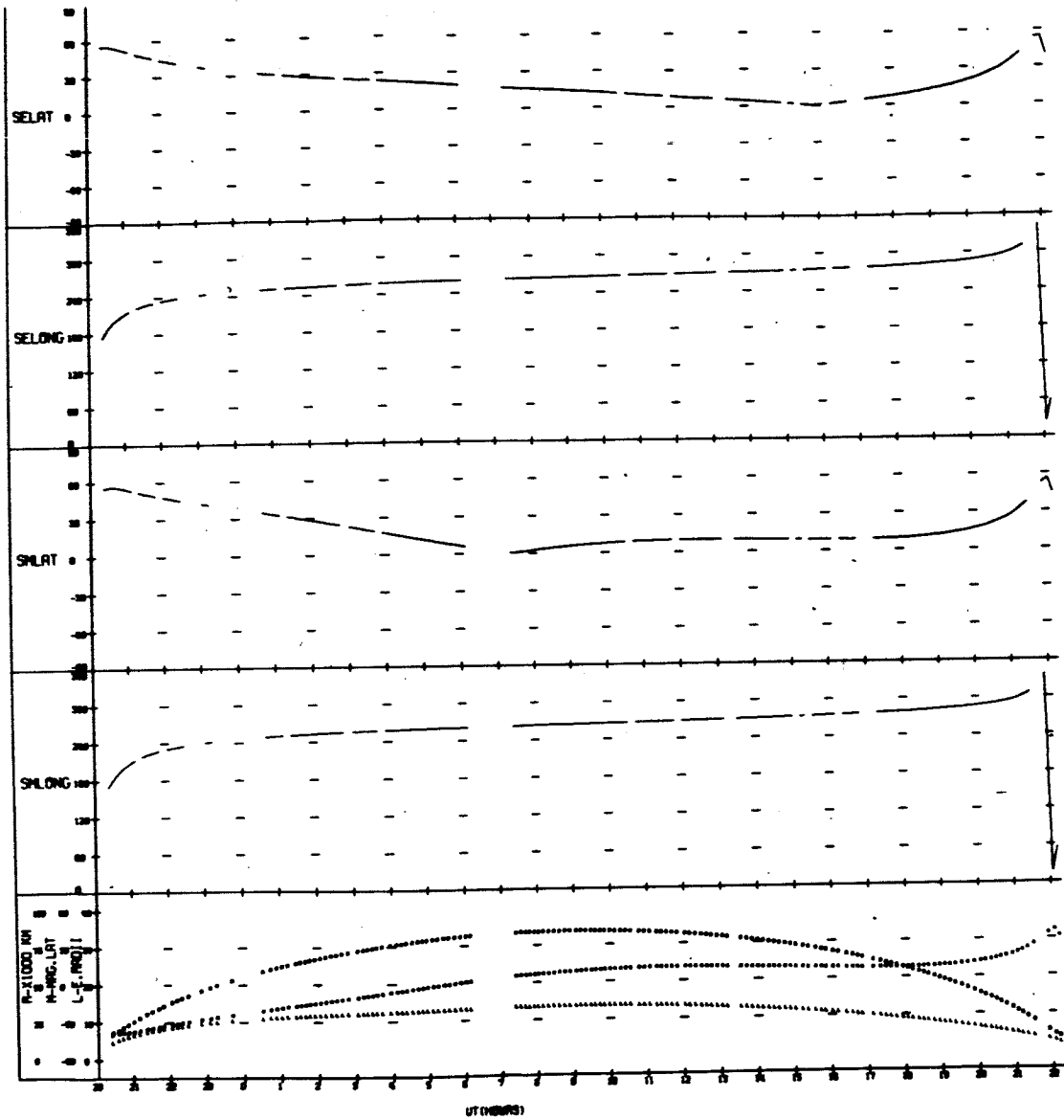


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 101

BEGIN 12/04/61/20:19

END 12/05/61/22:17

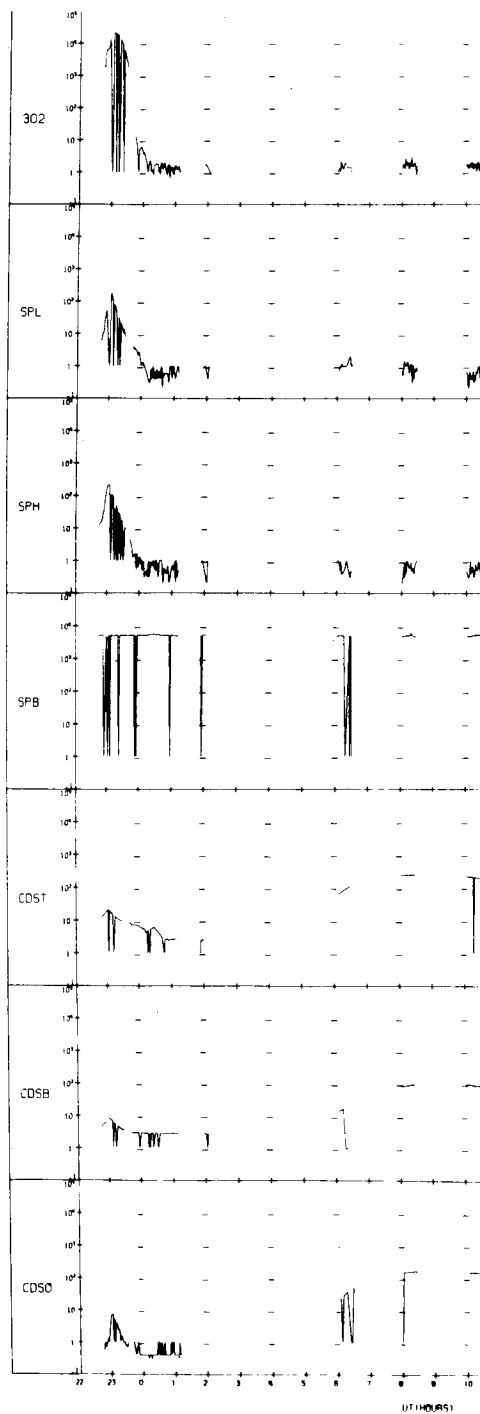


# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 102

BEGIN 12/05/51/22:43

END 12/06/61/10:29



# UNIVERSITY OF IOWA

EXPLORER 12 ORBIT 102  
 BEGIN 12/05/61/22:43  
 END 12/06/61/10:29

