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TRAPPED PARTICLE AND SOLAR PROTON RADIATION PREDICTIONS FOR ISEE (IME)

Mother-Daughter Mission

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Space and Earth Sciences Directorate
National Space Science Data Center

June 1974

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Foreword

At the request of the Energetic Particles Committee of the International Magnetospheric Explorer Project, a special orbital radiation study was conducted for the Mother-Daughter Mission in order to evaluate mission-encountered energetic particle fluxes.

Magnetic field calculations were performed with a current field model, extrapolated to the tentative spacecraft launch epoch with linear time terms.

Orbital flux integrations for elliptical flight paths were performed with the latest proton and electron environment models, using new improved computational methods.

Temporal variations in the ambient electron environment were considered and partially accounted for.

Finally, estimates of average energetic solar proton fluxes are given for a one year mission duration at selected integral energies ranging from E>10 to E>100 Mev; the predicted annual fluence relates to the period of maximum solar activity during the next solar cycle.

The results are presented in graphical and tabular form; they are analyzed, explained, and discussed.

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Introduction

The objective of the present study is to evaluate the charged particle fluxes incident on spacecrafts in very eccentric orbits, in support of the ISEE (IME) mission(s).

For this purpose, two flightpaths were considered having identical inclinations but different perigee altitudes (240 and 1364 kilometers, respectively). Apogee altitude was approximately the same for both cases (about 22 earth radii).

For each of the two perigee altitudes investigated, two nominal trajectories were generated, having identical orbital configurations but with their major axes rotated by 180° in the plane of orbit, which resulted in placing the initial apogee into opposite hemispheres. This was done in order to determine the corresponding variation in the vehicle-encountered particle intensities.

In reference to geomagnetic geometry, elliptical flightpaths with low perigee altitudes and large eccentricities (at any inclination) traverse the entire terrestrial radiation belt twice during each revolution, moving alternately through regions of magnetic dipole space of low L values ($1.0 < L < 2.8$: the "inner zone") and high L values ($2.8 < L < 12.0$*: the "outer zone"). A

*The upper boundary of the "outer zone" in the current electron models has been placed at about L=12. e.r., as against L=6.5 e.r. in the older models.

large part of the studied trajectories lies outside the Van Allen belt trapping regions ($L > 12$ earth radii).

Also, the orbits are for most of the time exposed to unattenuated interplanetary energetic solar proton fluxes; these are discussed in a subsequent section.

The breakdown of trajectories into segments according to L-ranges or "zones" is important in orbital radiation studies because each zone requires special treatment. The inner zone, for example, requires special consideration on account of the substantial "Starfish"* residuals (Teague and Stassinopoulos, 1972) that still populated this region in October, 1967, the effective date of the corresponding environment model used in the calculations. The outer zone also warrants special consideration because the trajectories pass through regions of magnetospheric space that are accessible to subrelativistic cosmic ray fluxes of solar origin. A detailed discussion of this is given in the section on "Energetic Solar Proton Fluxes".

Another important feature of the outer zone is the strong Local Time dependence of the ambient electron environment. The LT variations for high energy electrons (1-3 Mev) at about $5 < L < 6$ exceed one order of magnitude. These variations are due to the distortion of the magnetosphere caused by the solar wind (compression at local noon, elongation at local midnight).

*"Starfish" is the high altitude nuclear explosion over Johnston Island in the Pacific in July, 1962, which injected about 10^{29} energetic artificial electrons into the inner zone region of the Van Allen belts.

Theoretically, the new outer zone model, to be discussed in another paragraph, recognized this dependence and accounted for it by incorporating an analytic function for its calculation. However, the version distributed in card deck form for practical application purposes provides fluxes which are averaged over local time. The reason behind this simplification is that most users employ the model in orbit- or time-integration processes to missions which have durations of six months or more and the local time effects would be averaged out anyway. Hence, in order to save time, core, and effort, a local time averaged value, which is nearly equivalent to the fluxes at the dawn meridian, was inserted into the model in place of the analytic function.

Orbital flux integrations were performed with UNIFLUX, a "Unified Orbital Flux Integration and Analysis System" by Stassinopoulos and Gregory, (1972).

Two new environment models were used in the calculations: the AE5 by Teague and Vette (1972) for the inner zone electrons, and the AE4 by Singley and Vette (1971) for the outer zone electrons. Some observations on these models are in order.

Both are static models describing the environment as it existed back in October, 1967, at about solar maximum conditions. In constructing the models, it was possible to infer a change of the average quiet-time electron flux levels as a function of the solar cycle. However, a complete temporal description of the solar cycle dependence is not available at this time.

Besides, in the regions of space visited by the orbits considered in this study, there occur no appreciable changes in the time averaged fluxes.

Additional static versions of the AE5-AE4 models for the 1964 (1974) solar minimum epoch have just been released and will be incorporated into UNIFLUX for future applications.

As for the ISEE (IME) mission, now tentatively scheduled to fly in 1977, the present calculations were appropriately performed with the current solar max versions of the electron models because the launch date falls definitely into the next period of increased solar activity.

It should be noted that the artificial component contained in the solar max version of the AE5 model of epoch 1967, was still significantly predominant at some L values and for some energies. In order to update the model, the remaining artificials were exponentially decayed, using appropriate cut-off times and lifetimes. These were available as functions of energy and L in terms of approximate dates at which the Starfish fluxes had decayed down to natural background levels (Teague and Stassinopoulos, 1972) and apparent decay lifetimes for artificials (Stassinopoulos and Verzariu, 1971).

In contrast to the electrons, no special considerations are required for the proton results obtained from standard models long in use. Although they describe a static environment, this is a valid representation for these particles because experimental measurements have shown that no significant changes with time have occurred in the proton population. With the exception of the fringe areas of the trapping region, the possible error introduced by the static approximation lies well within the uncertainty factor attached to the models. Consequently, the proton data may be applied to any epoch without the need for an updating process.

We wish to emphasize that our calculations are only approximations although they are based on the best available data; as always, we strongly recommend that all persons receiving parts of this report be advised about the uncertainty in the data, as discussed in Appendix A.

Finally, an explanation regarding the attribute "standard" frequently used in the reformatted OFI (Orbital Flux Integration) Study Reports. The term is applied as a modifier to parameters, constants, or variables in order to indicate or refer to some specific value of these quantities that has been used without change over extended periods of time. Although override possibilities do exist in the UNIFLUX system, a routinely submitted production run will, by default option, always use these "standard" values. The term is also used in reference to established forms, style, processes, or procedures, as for example, "standard tables", "standard plots", "standard production runs", etc. A list of some quantities, values, or expressions modified by "standard" is given in Table 1.

Results: Analysis and Discussion

The outcome of our calculations is summarized in Tables 3 to 38, which are all computer produced. The tables are arranged in six sets, where every set pertains to one specific type of data: the first set contains the "L-band" tables; the second, the "Spectral Distribution and Exposure Index" tables; the third, the tables of "Peaks"; the fourth, the "Exposure Analysis" summary and the "Time Account" breakdown; the fifth, the tables of "Physical Perigee Positions"; and the sixth set, the "Energetic Solar Proton" tables. The first three sets contain two similar members for every trajectory considered in the study: one for protons and one for electrons, in that order. The last three sets contain only one member for each trajectory. The tables are further explained in Appendix B, where a more detailed description of their contents is given. Figure 1 is a guide to table arrangement, as they are produced by a standard production run of the Orbital Flux Integration (OFI) program UNIFLUX for a single trajectory.

Some of the tabulated data is also computer plotted in Figures 3 to 26, with additional Figures 27 to 34 containing plots of flightpath data. Finally, the manually produced Figure 35 gives the mean annual solar proton fluence for the trajectories considered in this study. As with the tables, the computer plots are arranged in five sets, where each set pertains to one specific type of data: the first set contains "Time and Flux Histograms";

the second, "Spectral Profiles"; the third, "Peaks per Orbit"; the fourth, trajectory "World Map Projections"; and the fifth, "B-L Space Tracings". Again, the first three sets contain two similar members for every mission: one for each type of particle considered. The last two sets contain only one member for every trajectory. Appendix C describes and explains the plots. Figure 2 is a guide to plot arrangement, as they are produced by a standard production run. The final plot (Figure 35) is explained in the section "Energetic Solar Proton Fluxes".

I. Spectral Profiles

For tabulated data consult Tables 11 - 18.

For plotted data consult Figures 11 - 18.

The integral spectra presented in this report are orbit integrated, statistically averaged, trapped particle spectra, characteristic of the specific trajectories that produced them.

Noteworthy are the electron spectra obtained from the new environment models AE5 and AE4, especially in regards to the steep fall-off to zero flux in the energy range of about 4 to 5 Mev. The apparent cutoff at these energies is probably due to the extensive decay of the high energy Starfish artificials by 1967, since no significant numbers of trapped naturals exist with energies greater than 4 - 5 Mev.

To be exact, there are only two very small areas in B-L space where the solar max models contain trapped electrons with the energies $E > 5$ Mev. These areas form "pockets" of high energy electrons on the magnetic equator in the L-ranges 1.45 - 1.75 and 3.65 - 4.10 earth radii. The inner zone pocket is obviously a Starfish remnant, on which the program will apply the appropriate decay function indicated, whereas the outer zone pocket appears to be a normal feature of the natural electron radiation belt because artificial electrons never populated that area.

With regards to the protons, it should be noted that the ISEE (IME) orbits experience very hard proton spectra above energies of about 50 Mev.

II. Peaks Per Orbit

Tabulated data is contained in Tables 19 - 26.

Plotted data is shown in Figures 19 - 26.

The absolute peaks P per revolution presented in this report have been obtained for standard OFI (Orbital Flux Integration) energies; that is: $E > 5.$ Mev for protons, and $E > .5$ Mev for electrons.

Because of the large eccentricity of the ISEE trajectory, coupled with the low perigee altitude and the relatively small inclination, the spacecraft consistently encounters trapping regions of maximum instantaneous intensity during its perigee passes. This produces the very high peak values appearing in the results for both species.

It should be noted that the $E > .5$ Mev electron peaks do not display substantial per-orbit variations (amplitude less than a factor of 2) whereas the $E > 5.$ Mev proton peaks show significant variations with amplitudes up to one order of magnitude. The larger per-orbit change in the proton peaks may be partly due to the fact that these particles are confined to a more restricted domain enclosed within the volume of a dipole magnetic shell of about L=3.8 earth radii, with equatorial maximum intensities occurring at about L=1.8 earth radii, which region is probably stronger affected by the distorting influence of the South Atlantic anomaly. In that case, perigee passes will lead alternately through more intense and less intense trapping regions since net orbit precession amounts to about .4 earth revolution..

III. Trajectory Data

See Figures 27 - 30 for World Map Projections

See Figures 31 - 34 for B-L Space Tracings.

A. World Map

World map projections of trajectories are by definition the surface traces of their subsatellite points.

The apparent westward drift of successive orbit tracings represents the "longitudinal precession" of the trajectory, resulting from the rotation of the geoid in reference to the orbit plane.

Under unperturbed dynamic conditions, the respective orbit period determines the nodal precession of the trajectory. For circular flight-paths, the period, and hence the precession, is a simple function of the geocentric distance, but for eccentric orbits the functional relationship is more complex. The proposed ISEE trajectories have a period of approximately 58.6 hours with a corresponding "net" precession of about .4 of a terrestrial revolution (the earth executes 2.4 rotations during one ISEE orbit period).

The maps clearly indicate the perigee hemisphere of each trajectory: North for Figures 27, 28 and South for Figures 29, 30. They also convey a measure of perigee drift (N-S variation). For reasons of clarity, the world map projections of the trajectories are not plotted for more than ten revolutions. The orbit numbers appear at the starting points for each revolution.

B. Magnetic Dipole Mapping

At large geocentric distances ($r_e > 6$), the quantities B and L have no physical meaning any more because of the interaction between solar wind and magnetosphere.

The noon-midnight distortion of the magnetosphere, produced by that interaction (compression in the solar and elongation in the anti-solar directions), causes a breakdown in the symmetry of the dipole magnetic shell parameter L and introduces significant external currents and fields, whose contributions substantially alter the apparent field strength B that is presently being obtained for a given position from the dipole terms of the internal field model applied in the calculations.

Therefore, in this study (as well as in every model of charged-particle radiation utilized), these variables are being employed only as ordering parameters.

The magnetic B-L space tracings of the high elliptical trajectories appear as long (horizontal) line segments on the plots (Figures 31 - 34), mostly paralleling the equator, strikingly displaying the transverse motion of the satellite in that space frame. The breaks and discontinuities at low L, high B positions in the contours are caused by the plotter, due to the very large jumps in the values of the variables (satellite's perigee speed), at high L, low B positions because of plotting limitations.

Incidentally, all inclinded trajectories cross, of course, the magnetic equator twice per period; however, the nodes (and hence the point where the curves are tangent to the equatorial contour) are shifted due to the rotation of the geoid. This displacement in B-L space is analogous to the precession in geodetic space.

Again, for reasons of clarity, only three orbits are plotted per graph; here also, the orbit numbers appear at the starting points of each revolution.

Energetic Solar Proton Fluxes

Good measurements of solar cycle 20 interplanetary cosmic ray fluxes at about 1 A.U. are now available. These interplanetary particles are also observed over the high latitude polar cap regions. However, at other latitudes the geomagnetic field effectively shields the earth from some of these cosmic rays by deflecting the lower energy particles while only particles with increasingly higher energy penetrate to lower latitudes.

In order to consider the effect of geomagnetic shielding from cosmic rays on an orbiting spacecraft, the total time spent by the vehicle in regions of space accessible to these particles has to be calculated, as a function of particle energy, for the entire lifetime of the satellite. In other words, the exposure of a spacecraft to these particles is in essence a function of trajectory altitude and inclination, and mission duration. Of course, this applies only to the years of increased solar activity, and whether a satellite will "see" energetic solar protons or not, even in accessible regions of the magnetosphere, depends on the epoch within the solar cycle, at which the mission is to be flown. If it coincides with the period of low solar activity (years of solar minimum), it most likely will not encounter any significant number of energetic solar protons, and vice versa.

Having calculated a mission-related exposure time for a specific trajectory, one can use experimentally determined low energy cosmic ray fluxes of solar origin from which the galactic background has been subtracted, to obtain vehicle-encountered energetic solar proton intensities. In the present study, the annual mean of event and cycle integrated proton fluxes of cycle 20, given by Stassinopoulos and King (1973) for energies ranging from E>10 Mev to E>100 Mev, were used to estimate cycle 21 intensities on the SOLRAD and TIMATION missions.

Although a thorough statistical treatment has now been worked out in regards to the probability of actual cycle 21 fluxes exceeding the predicted intensities (King, 1974), crude model confidence levels suffice for first order approximations, and are given below. However, the importance of such statistics must be emphasized; it is best demonstrated by the occurrence of the August 4 - 7, 1972, event, which was the largest recorded in solar cycles 19 and 20, its fluxes exceeding the accumulative total of all other cycle 20 events by about a factor of 2 for the E>10 Mev protons and by a factor of 4 for the E>30 and E>60 Mev particles. Therefore, caution is advisable when using the data presented in this report.

The probability that the fluxes estimated for the ISEE mission will be exceeded by an actual event, is about 33% for a one year mission duration, and about 40% for a two year mission duration.

Figure 35 shows the annual, omnidirectional, integral spectral profiles of vehicle-encountered energetic solar proton fluxes in units of total number of particles per square centimeter.

Note: These fluxes apply only to missions planned for periods of increased solar activity. It is not expected that solar-min missions will encounter energetic solar protons of any significance; at least, it is very unlikely (but not impossible) to have a major event occurring during the years of minimum solar activity. Thus, a 3 year mission, to be launched in mid 1974, will spend most of its lifetime in a solar min period. Hence, no solar protons have to be considered until about 1977. Thereafter, the predicted mean annual intensities should be applied to the remaining 0.5 years.

Caution: In evaluating the energetic solar proton radiation hazard please bear in mind that the probability of at least one anomalously large event occurring during the time interval 1977 - 1979 is high.

References

Cain, J. C., and S. J. Cain, "Derivation of the International Geomagnetic Reference Field (IGRF 10/68)", NASA Technical Note TN D-6237, August, 1971.

Hassit, A., and C. E. McIlwain, "Computer Programs for the Computation of B and L (May 1966)", Data User's Note NSSDC 67-27, National Space Science Data Center, Greenbelt, Maryland, March, 1967.

King, J. H., Models of the Trapped Radiation Environment, Volume IV: Low Energy Protons, NASA SP-3024, 1967.

King, J. H., "Solar Proton Fluences for 1977-1983 Space Missions", J. Spacecraft and Rockets, 11, 401-408, 1974.

Lavine, J. P., and J. I. Vette, Models of the Trapped Radiation Environment, Volume VI: High Energy Protons, NASA SP-3024, 1970.

Singley, G. W., and J. I. Vette, "A Model Environment for Outer Zone Electrons", NSSDC 72-13, National Space Science Data Center, Greenbelt, Maryland, July, 1972.

Stassinopoulos, E. G., and G. D. Mead, "ALLMAG, GDALMG, LINTRA: Computer Programs for Geomagnetic Field and Field-line Calculations", NSSDC 72-12, National Space Science Data Center, Greenbelt, Maryland, February, 1972.

Stassinopoulos, E. G., and P. Verzariu, "General Formula for Decay Lifetimes of Starfish Electrons", J. Geophys. Res., 76, 1841-1844, 1971.

Stassinopoulos, E. G., and J. H. King, "Empirical Solar Proton Model for Orbiting Spacecraft Application", IEEE Transactions on Aerospace and Electronic Systems, Vol. 10, No. 4, July 4, 1974.

Stassinopoulos, E. G., and C. Z. Gregory, "UNIFLUX: A Unified Orbital Flux Integration and Analysis System", to be published.

Stassinopoulos, E. G., K. A. Maale, and J. J. Hebert, "Trajectory Computations with the NSSDC Version of GEODYN and BLCONV Programs", NSSDC 73-16, National Space Science Data Center, Greenbelt, Maryland, December, 1973.

Teague, M. J., and E. G. Stassinopoulos, "A Model of the Starfish Flux in the Inner Radiation Zone", NASA-GSFC Report X-601-72-487, December, 1972.

Teague, M. J., and J. I. Vette, "The Inner Zone Electron Model AE-5", NSSDC 72-10, National Space Science Data Center, Greenbelt, Maryland, September, 1972.

APPENDIX A

General Background Information

For the specified flight paths, orbit tapes were generated with a constant integration stepsize of five minutes, and for a 600 hour flight duration each. This time interval is adequate for a sufficient sampling of the ambient environment allowing at least ten perigee passes. The following eccentric trajectories were thus produced at an inclination of 29 degrees prograde:

Case #	Perigee Altitude	Apogee Altitude	Perigee in Hemisphere
1	1366 km	18 e.r.	North
2	240 km	18 e.r.	North
3	1364 km	18 e.r.	South
4	240 km	18 e.r.	South

with the combined GEODYN-BLCONV system (Stassinopoulos et al , 1973), which subsequently converted the orbits from geodetic polar (h, λ, ϕ) into magnetic B-L coordinates with McIlwain's INVAR program of 1965 (Hassit and McIlwain, 1967) with the field routine ALLMAG by Stassinopoulos and Mead (1972), utilizing the IGRF (1965) geomagnetic field model by Cain and Cain (1971), calculted for the epoch 1973.0.

Orbital flux integrations were performed with Vette's current models of the environment, the new solar max AE5-AE4 for the inner and outer zone electrons, the AP6-AP7 for high energy protons, and the AP5 for low energy protons. All are static models which do not consider temporal variations; this includes the new electron models, at least as far as the present calculations are concerned. See text for further details on this matter.

The documents that describe these models are listed below:

Models	
AE4	Singley and Vette, 1972
AE5	Teague and Vette, 1972
AP5	King, 1967
AP6	Lavine and Vette, 1969
AP7	Lavine and Vette, 1970

The results, relating to omnidirectional, vehicle-encountered, integral, trapped particle fluxes, are presented in graphical and tabular form with the following unit conventions:

1. Daily averages: total trajectory integrated flux averaged into particles/cm^2 day,
2. Average instantaneous: time integrated average, characteristic of the orbit, in particles/cm^2 sec,
3. Totals per orbit: non-averaged, single-orbit integrated flux in particles/cm^2 orbit, and

4. Peaks per orbit: highest orbit-encountered instantaneous flux in particles/cm^2 sec,

where one orbit = one revolution.

Please note: We wish to emphasize the fact that the data presented in this report are only approximations. We do not believe the results to be any better than a factor of 2 for the protons and a factor of 3 for the electrons. It is advisable to inform all potential users about this uncertainty in the data. Please also remember that the electrons have appropriately been calculated with a model describing the environment at solar maximum, since the launch date (somewhere in 1977) definitely places the mission into a period of increased solar activity.

APPENDIX B

Description of Tables

a) The L-band Table:

The table contains 36 L-bands $\mathcal{L}_i$ of equal size, covering the range from L = 1.0 to L = 8.2 earth radii in constant increments of .2 earth radii. For the L-intervals determined in this way, orbital spectral functions

$$N(>E,E_N;\mathcal{L}_i) = \left[\sum_k J_k(>E;B)\right]_{\mathcal{L}_i} \Big/ \left[\sum_k J_k(>E_N;B)\right]_{\mathcal{L}_i} \qquad \overset{i=1,36}{\mathcal{L}_i : L_i < L \le L_{i+1}} \qquad (1)$$

are obtained at nine arbitrary energy levels such that the integral spectrum is equal to 1 for $E = E_N$, where E_N was taken to be 5. and .5 MeV for protons and electrons, respectively. The notation $\mathcal{L}_i$ is used to indicate the L-band from L_i to L_{i+1}, while J(>E;B) is the integral, omnidirectional flux yielded by the environment model used in the calculation. The spectral functions N are evaluated for the total flight time simulated in the study, where the summing index k selects all trajectory points lying in each $\mathcal{L}_i$.

The corresponding orbital distribution functions, representing fluxes above energy E_N, are given by

$$F(E;\mathcal{L}_i) = \Delta t \left[\sum_k J_k(>E;B)\right]_{\mathcal{L}_i} \qquad (2)$$

where Δt is the constant time increment of orbit integration, whose standard value is 60 seconds. The distribution functions are fluxes accumulated in their respective $\mathcal{L}_i$ bands over the total flight duration considered.

The orbital distribution functions are listed on the table at the bottom of each L-interval and are labeled "NORMFLUX." The nine integral energy levels selected for protons and electrons are given below in units of "MeV" for all particles:

Protons	Electrons
.1	.1
1.	.5*
3.	1.0
5.*	1.5
10.	2.0
20.	2.5
30.	3.0
50.	4.0
100.	5.0

where the normalization energy is indicated by a star (*).

b) <u>The Spectral Distribution and Exposure Index Table:</u>

This table has three parts:

I. The spectrum $\Psi_j(\Delta E)$ given in % for energy intervals that correspond to the energy levels of the previously discussed table (L-bands), with two special columns showing the total orbit integrated flux for these energy intervals averaged into instantaneous I_j^S and daily I_j^D intensitites

$$\Psi_j(\Delta E) = 100 \frac{I_j^D(\Delta E)}{F(>E_1)} \qquad j=1,9 \qquad (3)$$

where

$$F(>E_1) = C \sum_{k=1}^{k_0} J_k(>E_1;B,L)\Delta t \qquad (4)$$

$$I_j^D(\Delta E) = C \sum_{k=1}^{k_0} \Delta t \left\{ J_k(>E_j;B,L) - J_k(>E_{j+1};B,L) \right\} \qquad (5)$$

$$I_j^S(\Delta E) = I_j^D(\Delta E)/86400 \qquad (6)$$

$$C = \frac{24}{T} \quad , \quad T = k_0 \Delta t \qquad i=1,36$$

and where k_0 is the upper limit of k. It is equal to the total number of time increments considered in the study.

II. The composite orbit spectrum for integral energies, giving the total vehicle encountered fluxes averaged into daily $S^D(>E_j)$ and per second $S^S(>E_j)$ intensities for 30 discrete energy levels:

$$S^D(>E_j) = c\Delta t \sum_{m=0}^{T} J_m(>E_j) \qquad j=1,30 \qquad (7)$$

$$S^S(>E_j) = S^D(>E_j)/86400 \qquad (8)$$

where the summation is performed for the entire simulated mission duration T and includes all fluxes with energies greater than E_j.

III. The composite orbit spectrum for differential energies $S^S(=E_j)$ obtained from the instantaneous total vehicle encountered fluxes $S^S(>E_j)$ at the selected energy levels by analytic differentiation:

$$S^S(=E_j) = \frac{\partial S^S(>E_j)}{\partial E}$$

where the differential intensities are given in units of: particles per square centimeter per second per keV.

IV. The exposure index, given (for the normalization energy used in the L-band table) at nine successive intensity ranges R_n one order of magnitude apart, in terms of exposure duration $\tau(R_n)$, converted to hours, and total number of particles $\phi(>E_N;R_n)$ accumulated while in that intensity range. The notation R_n is used to indicate the intensity range from r_n to r_{n+1}:

$$\phi(>E_N;R_n) = \tau(R_n)\ \theta(>E_N;R_n) \qquad \begin{matrix} n=1,9 \\ R_n=r_n < r \le r_{n+1} \end{matrix} \tag{9}$$

$$\theta(>E_N;R_n) = \left[\sum_{\ell} J(>E_N;r)\right]_{R_n} \Big/ \zeta_n \tag{10}$$

$$\tau(R_n) = \Delta t\ \zeta_n \tag{11}$$

where ζ_n is the upper limit of ℓ in each R_n.

c) The Table of Peaks:

In this table, the absolute instantaneous peak flux encountered during each successive orbit (revolution) is listed for the indicated threshold energy. There are nine columns on this table. Column 1 is an orbit counting device, based on the period of the orbit when the trajectory lies in the equatorial plane and is circular, on the physical perigee in all elliptical cases, and on the equatorial crossing for circular inclined trajectories. Column 2 gives the peak flux. Columns 3, 4, and 5 indicate the spacecraft position in geocentric coordinates at which the peak was encountered, while columns 6, 7, and 8 determine respectively the time and the magnetic B-L coordinates for this event. It should be noted that for the purpose of orbital radiation studies all simulated flight paths start at $t_0 = 0$ hours. Finally, the last column indicates the total flux encountered during that particular orbit. It is advisable to disregard the last line on this table because many times that orbit is incomplete and the fluxes or positions shown do not correspond to true peaks.

d) <u>The Exposure Analysis Summary</u>:

The summary is contained in the left half of this table as a semi-independent and separate table. It indicates what percent of its total lifetime T the satellite spends in "flux free" regions of space, what percent of T in "high intensity" regions, and while in the latter, what percent of its total daily flux it accumulates.

In the context of this study, the term "flux free" applies to all regions of space where trapped particle fluxes are less than one proton or electron per square centimeter per second, having energies $E > 5.$, and $E > .5$ MeV for the protons and the electrons, respectively; by definition, this includes all regions outside the radiation belts. The concept of "trapped particle fluxes" is meant to include stably trapped, pseudo-trapped, and transient fluxes, as long as they are part of or contained in the environment models used and, in the case of transients or pseudos, their sources are considered powerful enough to supply them continuously in substantial numbers.

Similarly, we define as "high intensity" those regions of space where the instantaneous, integral, omnidirectional, trapped-particle flux is greater than 10^3 protons with energies $E > 5.$ MeV, and greater than 10^5 electrons with energies $E > .5$ MeV.

The values given in this table are statistical averages, obtained over extended intervals of mission time. However, they may vary significantly from one orbit to the next, when individual revolutions are considered.

e) The Time Account Breakdown:

The breakdown of orbit time is given in the right half of the table, in the same semi-independent form as the summary. The table shows the total lifetime spend by the vehicle in the inner zone T^i ($1.0 < L \leq 2.8$) and the outer zone T^o ($2.8 < L \leq 11.0$) of the trapped particle radiation belt, and also the percent duration spent outside that region ($L > 11.0$), which is denoted by T^e (T-external), such that for any mission.

$$T = T^i + T^o + T^e = 100\%$$

The confinement of the outer zone within the boundary of the $L = 11.0$ volume is arbitrary and has no physical meaning. It is intended only as a simplification to facilitate our calculations. The region considered "external" ($L > 11.0$) in this study is still partially a domain of the outer zone, at least as far out as $L = 12.0$ earth radii, according to the latest electron models (Singley and Vette, 1972).

A last item on this table: the inner zone time T^i may be subdivided into two parts: the percentage of time spent outside the trapping region ($1.0 < L \leq 1.1$) and inside the trapping region ($1.1 < L \leq 2.8$).

f) Table of Physical Perigees:

This table is produced only for elliptical orbits with non-trivial eccentricities.

It contains, for each period (revolution), the orbit time in hours at which perigee occurred and gives the perigee position in geocentric latitude (degrees), east longitude (degrees), and altitude (kilometers above sea level). It also gives the magnetic field strength B and the shell parameter L at that position and it lists the instantaneous, integral, trapped particle fluxes (standard energies) encountered at these B and L values.

As in the case of the "Peak" tables, it is again advisable to disregard the last line because frequently the orbit is incomplete and the indicated position may not correspond to a true perigee.

APPENDIX C

Description of Plots

a) The Time and Flux Histogram

This plot shows two curves superimposed on the same graph, namely, one each for the variables "time" and "flux". Both are given as functions of the parameter L (earth radii) within the range 1 L 10 on a semi-log scale. The plot depicts: (1) by a plain curve the characteristic trajectory intensities as obtained from the orbital integration process in terms of averaged, integral particle fluxes above a given energy, over constant L-bands of .1 earth radius width, and (2) by a contour marked with symbols the percent of total lifetime (%T) spent in each L-interval. The logarithmic ordinate relates to the time-flux variables. The printed numbers are powers of 10 and pertain to the fluxes; the scale values for the time curve are given in the upper part of the ordinate label: from 10^{-3} to 10^{2} percent of T. The type of particles, their integral energy, and the units, are all given in the lower part of the label. The label on top of the graph lists some useful information about the trajectory.

b) The Spectral Profile

A graphical presentation of the final spectral distribution, obtained from the orbital integration process. The plot is a semi-log graph, where the abscissa is a linear energy scale for integral particle energies E_o in Mev, and the ordinate is a logarithmic scale for the orbit integrated fluxes, given in daily averages for energies greater than E_o; the printed scale values are powers of 10.

c) Peaks Per Orbit

Here the absolute peak intensities, encountered per period, are plotted for the duration of the total flight time considered (1 period = 1 revolution = 1 orbit). The logarithmic ordinate relates to instantaneous particle fluxes of the environment at the indicated energy threshold, while the abscissa is a linear orbit enumeration.

d) World Map Grid Projection of Orbits

The trajectory is plotted for several revolutions on a global map produced by a Miller Cylindrical Projection. The contours of the continents have been omitted for clarity. The postiions of either equatorial crossing, of physical perigee, or of period commencement are indicated by numbers identifying the orbits shown in this graph. For all trajectories, the distance between successive sequential numbers is a measure of the orbit precession.

e) B-L Trace of Orbits

This plot shows the trace of the trajectory in B-L space on a semi-log scale. Several orbits are usually depicted, each identified by its sequential number. The magnetic equator is entered on all plots. The logarithmic ordinate relates to the field strength B in gauss; the printed values are exponents of 10. L is given in earth radii on the linear abscissa.

TABLE 1

Partial Listing of
Parameters, Constants, Variables, or Expressions
designated as "standard" in the text

1.	Standard Tables:	set of tables as listed in Figure 1, in the regular format described in Appendix B.
2.	Standard Plots:	set of plots as listed in Figure 2, in the regular format described in Appendix C.
3.	Standard Production Run:	a production run processed on default options.
4.	Standard Integration Stepsize:	constant time increment of orbit integration: 1' (60").
5.	Standard Energies:	protons E > 5. Mev and electrons E > .5 Mev.
6.	Standard Procedure:	established procedure normally followed vs. procedure followed in special cases.

Table 2

B and L Extrema of Elliptical ISEE (IME) Trajectories

Trajectory #	Perigee Hemisphere	Perigeee Altitude (km)	B-range (gamma)		L-range (earth radii)	
			B-min	B-max	L-min	L-max
1	North	1366	*	.22184	1.20	*
2	North	240	*	.38175	0.99	*
3	South	1364	*	.23927	1.28	*
4	South	240	*	.41023	1.09	*

*No values are available because calculation and storage of B and L is suspended beyond L = 12 earth radii by an (h, λ, ϕ) — sensitive test.

Table 3

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973.6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#1 29DEG ** INCLINATION= 29DEG ** PERIGEE= 1366KM ** APOGEE=140338KM ** B/L ORBIT TAPE: TD7963 ** PERIOD= 58.600 **

PROTONS

** SPECTRAL DISTRIBUTION : NORMALIZED BY FLUX OF ENERGY GREATER THAN 5.000MEV **

L - BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L - BANDS

ENERGY LEVELS >(MEV)	*1.0-1.2*	*1.2-1.4*	*1.4-1.6*	*1.6-1.8*	*1.8-2.0*	*2.0-2.2*	*2.2-2.4*	*2.4-2.6*	*2.6-2.8*	*2.8-3.0*	*3.0-3.2*	*3.2-3.4*
.1000	0.0	2.12E 00	2.17E 00	2.50E 00	5.13E 00	2.26E 01	1.28E 02	5.48E 02	2.13E 03	1.15E 04	3.88E 04	9.65E 04
1.000	0.0	1.53E 00	1.57E 00	1.81E 00	3.54E 00	1.08E 01	3.90E 01	1.26E 02	3.84E 02	1.51E 03	4.07E 03	8.41E 03
3.000	0.0	1.29E 00	1.41E 00	1.57E 00	2.05E 00	2.97E 00	4.70E 00	7.62E 00	1.18E 01	1.96E 01	2.87E 01	3.79E 01
5.000	0.0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
10.00	0.0	4.81E-01	2.86E-01	1.92E-01	1.46E-01	1.58E-01	1.59E-01	1.01E-01	7.51E-02	6.21E-02	5.34E-02	4.64E-02
20.00	0.0	2.51E-01	9.55E-02	4.16E-02	2.36E-02	2.49E-02	2.43E-02	1.10E-02	5.75E-03	1.87E-03	1.30E-03	8.50E-04
30.00	0.0	1.94E-01	6.25E-02	2.02E-02	9.51E-03	7.98E-03	7.05E-03	3.31E-03	1.30E-03	4.18E-05	0.0	0.0
50.00	0.0	1.17E-01	2.84E-02	5.15E-03	1.62E-03	8.61E-04	6.11E-04	3.07E-04	7.29E-05	0.0	0.0	0.0
100.0	0.0	7.62E-02	1.72E-02	2.83E-03	7.88E-04	3.33E-04	1.51E-04	1.62E-05	0.0	0.0	0.0	0.0
NORMFLUX=	0.0	2.98E 08	1.89E 09	4.25E 09	4.82E 09	2.87E 09	1.33E 09	6.92E 08	2.70E 08	7.03E 07	2.30E 07	8.14E 06

L - BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L - BANDS

ENERGY LEVELS >(MEV)	*3.4-3.6*	*3.6-3.8*	*3.8-4.0*	*4.0-4.2*	*4.2-4.4*	*4.4-4.6*	*4.6-4.8*	*4.8-5.0*	*5.0-5.2*	*5.2-5.4*	*5.4-5.6*	*5.6-5.8*
.1000	2.32E 05	8.96E 05	2.76E 06	2.12E 07	1.83E 09	1.59E 09	1.35E 09	1.33E 09	1.12E 09	8.75E 08	7.45E 08	5.91E 08
1.000	1.66E 04	4.70E 04	1.12E 05	5.60E 05	2.74E 07	1.16E 07	3.69E 06	1.48E 06	6.69E 05	3.12E 05	2.27E 05	1.56E 05
3.000	4.87E 01	7.11E 01	9.73E 01	1.99E 02	6.58E 03	1.51E 03	1.21E 01	0.0	0.0	0.0	0.0	0.0
5.000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.00	4.17E-02	2.99E-02	4.76E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.00	2.65E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	2.51E 06	5.23E 05	1.20E 05	1.19E 04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

L - BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L - BANDS

ENERGY LEVELS >(MEV)	*5.8-6.0*	*6.0-6.2*	*6.2-6.4*	*6.4-6.6*	*6.6-6.8*	*6.8-7.0*	*7.0-7.2*	*7.2-7.4*	*7.4-7.6*	*7.6-7.8*	*7.8-8.0*	*8.0-OVR*
.1000	5.06E 08	4.14E 08	3.08E 08	2.41E 08	1.18E 08	5.56E 07	2.16E 07	8.98E 06	3.79E 06	1.69E 06	6.80E 05	4.81E 05
1.000	1.26E 05	1.02E 05	8.27E 04	5.84E 04	3.79E 04	2.80E 04	1.74E 04	1.16E 04	7.94E 03	5.55E 03	3.63E 03	7.31E 03
3.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table [illegible] 4

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******************************************************************************************************************
** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES:          **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL  5:     IGRF 1965.0 80-TERM 10/68    * TIME= 1973.0 **
** VEHICLE : IME#1 29DEG ** INCLINATION= 29DEG ** PERIGEE= 1366KM ** APOGEE=140338KM ** B/L ORBIT TAPE: TD7963 ** PERIOD= 58.600 **
******************************************************************************************************************
                 ******************************   ELECTRONS   ***********************************
                 ** SPECTRAL DISTRIBUTION : NORMALIZED BY FLUX OF ENERGY GREATER THAN .5000MEV **
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ENERGY LEVELS >(MEV) — L - BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L - BANDS

ENERGY LEVELS >(MEV)	*1.0-1.2*	*1.2-1.4*	*1.4-1.6*	*1.6-1.8*	*1.8-2.0*	*2.0-2.2*	*2.2-2.4*	*2.4-2.6*	*2.6-2.8*	*2.8-3.0*	*3.0-3.2*	*3.2-3.4*
.1000	0.0	6.21E 00	1.24E 01	3.08E 01	3.35E 01	4.57E 01	5.19E 01	3.06E 01	1.33E 01	7.92E 00	5.99E 00	5.81E 00
.5000	0.0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1.000	0.0	8.74E-02	2.36E-01	1.89E-01	6.30E-02	4.01E-02	4.26E-02	7.89E-02	1.95E-01	3.19E-01	3.60E-01	3.92E-01
1.500	0.0	3.34E-02	1.28E-01	7.53E-02	1.49E-02	6.19E-03	5.73E-03	1.61E-02	7.50E-02	1.60E-01	1.76E-01	1.94E-01
2.000	0.0	1.71E-02	6.81E-02	3.01E-02	4.20E-03	1.48E-03	1.06E-03	3.69E-03	3.22E-02	8.01E-02	8.62E-02	9.61E-02
2.500	0.0	7.35E-03	2.60E-02	1.05E-02	1.11E-03	2.98E-04	1.51E-04	5.49E-04	8.98E-03	3.27E-02	3.75E-02	4.19E-02
3.000	0.0	2.71E-03	7.55E-03	3.16E-03	2.49E-04	3.30E-05	6.99E-06	2.95E-05	9.62E-04	8.24E-03	1.39E-02	1.53E-02
4.000	0.0	2.60E-05	8.26E-05	6.29E-05	3.61E-05	3.23E-07	0.0	5.30E-07	2.18E-05	2.22E-04	3.76E-04	4.19E-04
5.000	0.0	0.0	6.41E-08	1.06E-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	0.0	2.58E 10	4.68E 10	2.45E 10	2.35E 10	1.37E 10	9.32E 09	8.71E 09	6.90E 09	8.02E 09	1.14E 10	1.48E 10

ENERGY LEVELS >(MEV) — L - BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L - BANDS

ENERGY LEVELS >(MEV)	*3.4-3.6*	*3.6-3.8*	*3.8-4.0*	*4.0-4.2*	*4.2-4.4*	*4.4-4.6*	*4.6-4.8*	*4.8-5.0*	*5.0-5.2*	*5.2-5.4*	*5.4-5.6*	*5.6-5.8*
.1000	6.36E 00	5.93E 00	4.66E 00	3.83E 00	3.54E 00	3.33E 00	3.46E 00	3.66E 00	3.80E 00	3.86E 00	3.92E 00	3.94E 00
.5000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1.000	3.96E-01	3.83E-01	3.65E-01	3.55E-01	3.55E-01	3.54E-01	3.46E-01	3.37E-01	3.30E-01	3.23E-01	3.13E-01	2.84E-01
1.500	1.98E-01	1.92E-01	1.70E-01	1.50E-01	1.41E-01	1.33E-01	1.27E-01	1.21E-01	1.14E-01	1.07E-01	9.93E-02	8.72E-02
2.000	9.89E-02	9.57E-02	7.94E-02	6.37E-02	5.64E-02	5.03E-02	4.67E-02	4.37E-02	3.98E-02	3.55E-02	3.15E-02	2.68E-02
2.500	4.51E-02	4.76E-02	3.93E-02	2.84E-02	2.38E-02	2.01E-02	1.76E-02	1.55E-02	1.31E-02	1.08E-02	8.89E-03	7.36E-03
3.000	1.75E-02	2.02E-02	1.77E-02	1.26E-02	9.55E-03	7.29E-03	5.74E-03	4.54E-03	3.53E-03	2.75E-03	2.18E-03	1.82E-03
4.000	5.21E-04	6.69E-04	5.96E-04	3.94E-04	2.68E-04	1.85E-04	1.40E-04	1.08E-04	8.11E-05	6.00E-05	4.44E-05	3.18E-05
5.000	0.0	1.48E-07	3.10E-07	5.68E-08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	1.78E 10	2.43E 10	3.29E 10	4.22E 10	4.56E 10	5.06E 10	4.49E 10	4.57E 10	4.37E 10	3.92E 10	3.95E 10	3.52E 10

ENERGY LEVELS >(MEV) — L - BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L - BANDS

ENERGY LEVELS >(MEV)	*5.8-6.0*	*6.0-6.2*	*6.2-6.4*	*6.4-6.6*	*6.6-6.8*	*6.8-7.0*	*7.0-7.2*	*7.2-7.4*	*7.4-7.6*	*7.6-7.8*	*7.8-8.0*	*8.0-OVR*
.1000	3.96E 00	4.32E 00	5.12E 00	6.11E 00	7.01E 00	7.76E 00	9.47E 00	1.26E 01	1.68E 01	2.28E 01	3.12E 01	6.91E 01
.5000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1.000	2.55E-01	2.40E-01	2.36E-01	2.32E-01	2.09E-01	1.72E-01	1.47E-01	1.31E-01	1.18E-01	1.04E-01	9.16E-02	5.72E-02
1.500	7.60E-02	6.87E-02	5.48E-02	6.09E-02	5.17E-02	3.90E-02	3.13E-02	2.72E-02	2.36E-02	2.01E-02	1.70E-02	6.33E-03
2.000	2.26E-02	1.97E-02	1.78E-02	1.60E-02	1.28E-02	8.87E-03	6.69E-03	5.62E-03	4.72E-03	3.88E-03	3.16E-03	8.23E-04
2.500	6.09E-03	5.14E-03	4.42E-03	3.78E-03	2.88E-03	1.93E-03	1.41E-03	1.15E-03	9.43E-04	7.15E-04	5.28E-04	9.07E-05
3.000	1.54E-03	1.26E-03	9.81E-04	7.60E-04	5.60E-04	3.88E-04	2.86E-04	2.29E-04	1.78E-04	1.03E-04	5.38E-05	1.40E-05
4.000	2.27E-05	1.44E-05	7.87E-06	4.23E-06	1.92E-05	6.33E-07	0.0	0.0	0.0	0.0	0.0	0.0
5.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	3.19E 10	2.72E 10	2.34E 10	2.02E 10	1.55E 10	1.43E 10	1.04E 10	7.45E 09	5.35E 09	3.56E 09	2.14E 09	3.09E 09

Table 5

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** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#2 29DEG ** INCLINATION= 29DEG ** PERIGEE= 240KM ** APOGEE=140338KM ** B/L ORBIT TAPE: TD7963 ** PERIOD= 58.600 **

****

******************************** PROTONS ********************************

** SPECTRAL DISTRIBUTION : NORMALIZED BY FLUX OF ENERGY GREATER THAN 5.000MEV **

ENERGY LEVELS >(MEV)	L - B A N D S (M A G N E T I C S H E L L P A R A M E T E R I N E A R T H R A D I I) L - B A N D S											
	1.0-1.2	*1.2-1.4*	*1.4-1.6*	*1.6-1.8*	*1.8-2.0*	*2.0-2.2*	*2.2-2.4*	*2.4-2.6*	*2.6-2.8*	*2.8-3.0*	*3.0-3.2*	*3.2-3.4*
.1000	3.40E 00	2.14E 00	2.19E 00	2.58E 00	5.15E 00	2.17E 01	1.27E 02	5.19E 02	2.02E 03	1.05E 04	3.80E 04	9.36E 04
1.000	2.39E 00	1.54E 00	1.59E 00	1.86E 00	3.56E 00	1.05E 01	3.88E 01	1.20E 02	3.66E 02	1.40E 03	4.00E 03	8.20E 03
3.000	1.44E 00	1.30E 00	1.41E 00	1.59E 00	2.06E 00	2.93E 00	4.69E 00	7.47E 00	1.15E 01	1.90E 01	2.85E 01	3.76E 01
5.000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
10.00	6.75E-01	4.70E-01	2.88E-01	1.90E-01	1.45E-01	1.57E-01	1.60E-01	1.02E-01	7.56E-02	6.25E-02	5.37E-02	4.70E-02
20.00	4.88E-01	2.41E-01	9.74E-02	4.11E-02	2.36E-02	2.47E-02	2.43E-02	1.13E-02	5.92E-03	1.90E-03	1.32E-03	8.84E-04
30.00	4.55E-01	1.84E-01	6.43E-02	2.04E-02	9.72E-03	7.96E-03	7.00E-03	3.42E-03	1.39E-03	4.53E-05	0.0	0.0
50.00	3.94E-01	1.08E-01	2.99E-02	5.43E-03	1.74E-03	8.64E-04	6.02E-04	3.21E-04	8.54E-05	0.0	0.0	0.0
100.0	2.86E-01	7.03E-02	1.81E-02	2.98E-03	8.40E-04	3.37E-04	1.48E-04	1.81E-05	0.0	0.0	0.0	0.0
NORMFLUX=	1.30E 06	1.42E 08	1.18E 09	3.19E 09	3.16E 09	2.59E 09	1.11E 09	6.34E 08	2.55E 08	6.92E 07	2.28E 07	7.72E 06

ENERGY LEVELS >(MEV)	L - B A N D S (M A G N E T I C S H E L L P A R A M E T E R I N E A R T H R A D I I) L - B A N D S											
	3.4-3.6	*3.6-3.8*	*3.8-4.0*	*4.0-4.2*	*4.2-4.4*	*4.4-4.6*	*4.6-4.8*	*4.8-5.0*	*5.0-5.2*	*5.2-5.4*	*5.4-5.6*	*5.6-5.8*
.1000	2.26E 05	9.45E 05	2.82E 06	2.19E 07	1.86E 09	1.50E 09	1.36E 09	1.23E 09	1.05E 09	8.64E 08	7.32E 08	5.86E 08
1.000	1.63E 04	4.90E 04	1.13E 05	5.84E 05	2.72E 07	1.16E 07	3.91E 06	1.36E 06	6.97E 05	3.17E 05	2.29E 05	1.57E 05
3.000	4.83E 01	7.25E 01	9.66E 01	2.06E 02	6.37E 03	1.55E 03	1.21E 01	0.0	0.0	0.0	0.0	0.0
5.000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.00	4.20E-02	2.68E-02	3.83E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.00	3.08E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	2.75E 06	4.83E 05	1.08E 05	1.10E 04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

ENERGY LEVELS >(MEV)	L - B A N D S (M A G N E T I C S H E L L P A R A M E T E R I N E A R T H R A D I I) L - B A N D S											
	5.8-6.0	*6.0-6.2*	*6.2-6.4*	*6.4-6.6*	*6.6-6.8*	*6.8-7.0*	*7.0-7.2*	*7.2-7.4*	*7.4-7.6*	*7.6-7.8*	*7.8-8.0*	*8.0-OVR*
.1000	4.69E 08	4.27E 08	3.10E 08	2.21E 08	1.16E 08	5.28E 07	2.22E 07	8.30E 06	3.92E 06	1.53E 06	6.78E 05	4.64E 05
1.000	1.17E 05	1.07E 05	8.32E 04	5.45E 04	3.71E 04	2.65E 04	1.77E 04	1.11E 04	8.09E 03	5.07E 03	3.57E 03	7.09E 03
3.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 6

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973.6 WITH LIFETIMES: E.G.STASSINGPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#2 29DEG ** INCLINATION= 29DEG ** PERIGEE= 240KM ** APOGEE=140338KM ** B/L ORBIT TAPE: T07963 ** PERIOD= 58.600 **

ELECTRONS

** SPECTRAL DISTRIBUTION : NORMALIZED BY FLUX OF ENERGY GREATER THAN .5000MEV **

ENERGY LEVELS >(MEV) — L-BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L-BANDS

ENERGY LEVELS >(MEV)	*1.0-1.2*	*1.2-1.4*	*1.4-1.6*	*1.6-1.8*	*1.8-2.0*	*2.0-2.2*	*2.2-2.4*	*2.4-2.6*	*2.6-2.8*	*2.8-3.0*	*3.0-3.2*	*3.2-3.4*
.1000	3.94E 00	6.20E 00	1.18E 01	3.14E 01	3.41E 01	4.52E 01	5.19E 01	3.17E 01	1.36E 01	8.02E 00	6.06E 00	5.77E 00
.5000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1.000	5.11E-01	8.95E-02	2.45E-01	1.81E-01	6.02E-02	4.03E-02	4.25E-02	7.65E-02	1.90E-01	3.17E-01	3.58E-01	3.92E-01
1.500	3.23E-01	3.47E-02	1.35E-01	7.05E-02	1.39E-02	6.26E-03	5.72E-03	1.52E-02	7.14E-02	1.59E-01	1.75E-01	1.94E-01
2.000	1.51E-01	1.78E-02	6.97E-02	2.79E-02	3.86E-03	1.50E-03	1.06E-03	3.40E-03	3.01E-02	8.01E-02	8.58E-02	9.57E-02
2.500	4.45E-02	7.72E-03	2.59E-02	9.72E-03	9.84E-04	3.02E-04	1.51E-04	4.97E-04	8.23E-03	3.22E-02	3.75E-02	4.17E-02
3.000	1.18E-02	2.87E-03	7.56E-03	2.93E-03	2.09E-04	3.42E-05	6.96E-06	2.58E-05	8.70E-04	7.70E-03	1.39E-02	1.52E-02
4.000	7.31E-05	2.90E-05	7.97E-05	5.85E-05	2.96E-05	3.20E-07	0.0	4.91E-07	1.94E-05	2.08E-04	3.75E-04	4.17E-04
5.000	0.0	0.0	5.01E-08	8.24E-08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	1.99E 07	1.25E 10	3.13E 10	1.96E 10	1.62E 10	1.23E 10	7.70E 09	7.74E 09	6.29E 09	7.21E 09	1.12E 10	1.35E 10

ENERGY LEVELS >(MEV) — L-BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L-BANDS

ENERGY LEVELS >(MEV)	*3.4-3.6*	*3.6-3.8*	*3.8-4.0*	*4.0-4.2*	*4.2-4.4*	*4.4-4.6*	*4.6-4.8*	*4.8-5.0*	*5.0-5.2*	*5.2-5.4*	*5.4-5.6*	*5.6-5.8*
.1000	6.36E 00	5.89E 00	4.59E 00	3.84E 00	3.54E 00	3.33E 00	3.46E 00	3.67E 00	3.80E 00	3.86E 00	3.92E 00	3.94E 00
.5000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1.000	3.96E-01	3.83E-01	3.64E-01	3.55E-01	3.55E-01	3.53E-01	3.46E-01	3.37E-01	3.30E-01	3.23E-01	3.13E-01	2.84E-01
1.500	1.98E-01	1.91E-01	1.69E-01	1.50E-01	1.42E-01	1.33E-01	1.27E-01	1.21E-01	1.15E-01	1.07E-01	9.94E-02	8.73E-02
2.000	9.89E-02	9.55E-02	7.82E-02	6.38E-02	5.64E-02	5.03E-02	4.67E-02	4.37E-02	3.99E-02	3.55E-02	3.15E-02	2.68E-02
2.500	4.51E-02	4.78E-02	3.84E-02	2.84E-02	2.38E-02	2.01E-02	1.75E-02	1.54E-02	1.31E-02	1.08E-02	8.91E-03	7.36E-03
3.000	1.75E-02	2.03E-02	1.74E-02	1.26E-02	9.56E-03	7.28E-03	5.72E-03	4.53E-03	3.54E-03	2.76E-03	2.18E-03	1.82E-03
4.000	5.21E-04	6.76E-04	5.84E-04	3.95E-04	2.68E-04	1.84E-04	1.40E-04	1.08E-04	8.16E-05	6.03E-05	4.46E-05	3.18E-05
5.000	0.0	1.73E-07	2.95E-07	5.81E-08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	1.82E 10	2.43E 10	3.08E 10	3.86E 10	4.55E 10	4.76E 10	4.51E 10	4.19E 10	4.26E 10	3.81E 10	3.85E 10	3.47E 10

ENERGY LEVELS >(MEV) — L-BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L-BANDS

ENERGY LEVELS >(MEV)	*5.8-6.0*	*6.0-6.2*	*6.2-6.4*	*6.4-6.6*	*6.6-6.8*	*6.8-7.0*	*7.0-7.2*	*7.2-7.4*	*7.4-7.6*	*7.6-7.8*	*7.8-8.0*	*8.0-OVR*
.1000	3.96E 00	4.30E 00	5.15E 00	6.14E 00	7.01E 00	7.75E 00	9.46E 00	1.27E 01	1.69E 01	2.29E 01	3.12E 01	6.92E 01
.5000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1.000	2.56E-01	2.40E-01	2.36E-01	2.32E-01	2.09E-01	1.72E-01	1.47E-01	1.31E-01	1.18E-01	1.04E-01	9.15E-02	5.70E-02
1.500	7.62E-02	6.88E-02	6.47E-02	6.08E-02	5.17E-02	3.91E-02	3.13E-02	2.71E-02	2.35E-02	2.00E-02	1.70E-02	6.27E-03
2.000	2.27E-02	1.98E-02	1.77E-02	1.59E-02	1.27E-02	8.89E-03	6.69E-03	5.61E-03	4.71E-03	3.86E-03	3.16E-03	8.09E-04
2.500	6.12E-03	5.15E-03	4.40E-03	3.76E-03	2.88E-03	1.93E-03	1.41E-03	1.15E-03	9.38E-04	7.09E-04	5.27E-04	8.80E-05
3.000	1.55E-03	1.26E-03	9.75E-04	7.55E-04	5.60E-04	3.89E-04	2.86E-04	2.28E-04	1.76E-04	1.01E-04	5.38E-05	1.39E-05
4.000	2.28E-05	1.46E-05	7.75E-06	4.15E-06	1.92E-05	6.46E-07	0.0	0.0	0.0	0.0	0.0	0.0
5.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	2.96E 10	2.80E 10	2.35E 10	1.88E 10	1.52E 10	1.35E 10	1.06E 10	7.01E 09	5.48E 09	3.25E 09	2.11E 09	2.99E 09

Table 7

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG; MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#3 29DEG ** INCLINATION= 29DEG ** PERIGEE= 1364KM ** APOGEE=139633KM ** B/L ORBIT TAPE: TD6167 ** PERIOD= 58.600 **

PROTONS

** SPECTRAL DISTRIBUTION : NORMALIZED BY FLUX OF ENERGY GREATER THAN 5.000MEV **

L-BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L-BANDS

ENERGY LEVELS >(MEV)	*1.0-1.2*	*1.2-1.4*	*1.4-1.6*	*1.6-1.8*	*1.8-2.0*	*2.0-2.2*	*2.2-2.4*	*2.4-2.6*	*2.6-2.8*	*2.8-3.0*	*3.0-3.2*	*3.2-3.4*
.1000	0.0	2.13E 00	2.22E 00	2.35E 00	5.17E 00	2.09E 01	1.10E 02	4.81E 02	2.08E 03	1.14E 04	5.02E 04	1.14E 05
1.000	0.0	1.53E 00	1.61E 00	1.70E 00	3.57E 00	1.03E 01	3.47E 01	1.08E 02	3.61E 02	1.47E 03	5.04E 03	9.62E 03
3.000	0.0	1.31E 00	1.42E 00	1.53E 00	2.06E 00	2.94E 00	4.50E 00	7.18E 00	1.14E 01	1.94E 01	3.12E 01	3.99E 01
5.000	0.0	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
10.00	0.0	4.52E-01	2.96E-01	1.98E-01	1.47E-01	1.59E-01	1.64E-01	1.01E-01	7.58E-02	6.26E-02	5.24E-02	4.52E-02
20.00	0.0	2.22E-01	1.02E-01	4.33E-02	2.38E-02	2.56E-02	2.55E-02	1.14E-02	5.97E-03	1.90E-03	1.24E-03	6.21E-04
30.00	0.0	1.67E-01	6.70E-02	2.07E-02	9.63E-03	8.57E-03	7.48E-03	3.67E-03	1.42E-03	3.93E-05	0.0	0.0
50.00	0.0	9.48E-02	3.01E-02	5.01E-03	1.66E-03	1.00E-03	6.61E-04	3.93E-04	8.81E-05	0.0	0.0	0.0
100.0	0.0	6.10E-02	1.85E-02	2.80E-03	8.08E-04	3.79E-04	1.67E-04	1.99E-05	0.0	0.0	0.0	0.0
NORMFLUX=	0.0	4.30E 08	2.32E 09	4.49E 09	4.99E 09	1.80E 09	1.12E 09	5.84E 08	2.17E 08	5.82E 07	1.56E 07	5.56E 06

L-BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L-BANDS

ENERGY LEVELS >(MEV)	*3.4-3.6*	*3.6-3.8*	*3.8-4.0*	*4.0-4.2*	*4.2-4.4*	*4.4-4.6*	*4.6-4.8*	*4.8-5.0*	*5.0-5.2*	*5.2-5.4*	*5.4-5.6*	*5.6-5.8*
.1000	2.61E 05	9.96E 05	2.96E 06	3.07E 07	7.50E 08	5.38E 08	5.57E 08	4.49E 08	4.61E 08	4.42E 08	2.52E 08	2.35E 08
1.000	1.82E 04	5.12E 04	1.18E 05	7.71E 05	9.67E 05	3.67E 06	1.25E 06	5.22E 05	2.85E 05	1.66E 05	7.16E 04	6.13E 04
3.000	5.02E 01	7.36E 01	9.94E 01	2.52E 02	2.26E 03	4.26E 02	3.38E 00	0.0	0.0	0.0	0.0	0.0
5.000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.00	3.86E-02	2.85E-02	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.00	1.68E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	1.86E 06	4.13E 05	1.04E 05	8.37E 03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

L-BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L-BANDS

ENERGY LEVELS >(MEV)	*5.8-6.0*	*6.0-6.2*	*6.2-6.4*	*6.4-6.6*	*6.6-6.8*	*6.8-7.0*	*7.0-7.2*	*7.2-7.4*	*7.4-7.6*	*7.6-7.8*	*7.8-8.0*	*8.0-OVR*
.1000	2.13E 08	1.63E 08	1.19E 08	9.02E 07	5.54E 07	2.09E 07	8.05E 06	3.85E 06	1.63E 06	5.51E 05	3.13E 05	1.73E 05
1.000	5.43E 04	3.94E 04	3.01E 04	2.34E 04	1.72E 04	1.07E 04	6.66E 03	4.69E 03	3.44E 03	1.80E 03	1.72E 03	2.72E 03
3.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 8

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*************************************************************************************************************
** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES:                **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL  5:     IGRF 1965.0 80-TERM 10/68     * TIME= 1973.0 **
** VEHICLE : IME-3 29DEG ** INCLINATION= 29DEG ** PERIGEE= 1364KM ** APOGEE=139633KM ** B/L ORBIT TAPE: TD6167 ** PERIOD= 58.600 **
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                    ****************************** ELECTRONS ***********************************
                    ** SPECTRAL DISTRIBUTION : NORMALIZED BY FLUX OF ENERGY GREATER THAN .5000MEV **
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L - B A N D S (M A G N E T I C S H E L L P A R A M E T E R I N E A R T H R A D I I) L - B A N D S

ENERGY LEVELS >(MEV)	*1.0-1.2*	*1.2-1.4*	*1.4-1.6*	*1.6-1.8*	*1.8-2.0*	*2.0-2.2*	*2.2-2.4*	*2.4-2.6*	*2.6-2.8*	*2.8-3.0*	*3.0-3.2*	*3.2-3.4*
.1000	0.0	6.03E 00	1.06E 01	2.80E 01	3.34E 01	4.87E 01	5.38E 01	3.34E 01	1.33E 01	7.97E 00	5.95E 00	5.86E 00
.5000	0.0	1.00E 00	1.00E 00	1.00E 00	1.00E 0)	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1.000	0.0	9.74E-02	2.17E-01	2.14E-01	6.35E-02	3.99E-02	4.18E-02	7.71E-02	2.00E-01	3.18E-01	3.61E-01	3.93E-01
1.500	0.0	3.95E-02	1.17E-01	9.30E-02	1.50E-02	6.06E-03	5.61E-03	1.53E-02	7.93E-02	1.60E-01	1.77E-01	1.95E-01
2.000	0.0	2.08E-02	6.52E-02	3.87E-02	4.23E-03	1.45E-03	1.07E-03	3.38E-03	3.55E-02	8.05E-02	8.65E-02	9.65E-02
2.500	0.0	9.20E-03	2.66E-02	1.34E-02	1.11E-03	2.88E-04	1.57E-04	4.87E-04	1.04E-02	3.25E-02	3.76E-02	4.22E-02
3.000	0.0	3.50E-03	7.87E-03	3.93E-03	2.46E-04	3.00E-05	7.50E-06	2.46E-05	1.17E-03	7.89E-03	1.39E-02	1.54E-02
4.000	0.0	3.49E-05	7.61E-05	7.57E-05	3.53E-06	2.15E-07	0.0	3.72E-07	2.85E-05	2.14E-04	3.76E-04	4.23E-04
5.000	0.0	0.0	4.75E-08	1.64E-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	0.0	3.94E 10	6.94E 10	2.51E 10	2.45E 1)	9.13E 09	7.58E 09	7.23E 09	5.63E 09	6.62E 09	1.18E 10	1.49E 10

L - B A N D S (M A G N E T I C S H E L L P A R A M E T E R I N E A R T H R A D I I) L - B A N D S

ENERGY LEVELS >(MEV)	*3.4-3.6*	*3.6-3.8*	*3.8-4.0*	*4.0-4.2*	*4.2-4.4*	*4.4-4.6*	*4.6-4.8*	*4.8-5.0*	*5.0-5.2*	*5.2-5.4*	*5.4-5.6*	*5.6-5.8*
.1000	6.37E 00	5.95E 00	4.64E 00	3.82E 00	3.51E 0)	3.32E 00	3.46E 00	3.66E 00	3.80E 00	3.86E 00	3.92E 00	3.94E 00
.5000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 0)	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1.000	3.96E-01	3.84E-01	3.65E-01	3.55E-01	3.55E-01	3.53E-01	3.46E-01	3.38E-01	3.30E-01	3.23E-01	3.13E-01	2.85E-01
1.500	1.98E-01	1.92E-01	1.70E-01	1.50E-01	1.41E-01	1.33E-01	1.27E-01	1.22E-01	1.16E-01	1.07E-01	9.91E-02	8.74E-02
2.000	9.88E-02	9.58E-02	7.91E-02	6.34E-02	5.57E-02	5.00E-02	4.67E-02	4.38E-02	4.04E-02	3.55E-02	3.14E-02	2.68E-02
2.500	4.51E-02	4.75E-02	3.91E-02	2.82E-02	2.34E-02	1.99E-02	1.75E-02	1.55E-02	1.34E-02	1.08E-02	8.82E-03	7.38E-03
3.000	1.76E-02	2.01E-02	1.76E-02	1.24E-02	9.27E-03	7.16E-03	5.72E-03	4.56E-03	3.66E-03	2.77E-03	2.16E-03	1.83E-03
4.000	5.30E-04	6.65E-04	5.94E-04	3.88E-04	2.57E-04	1.80E-04	1.40E-04	1.09E-04	8.47E-05	6.04E-05	4.39E-05	3.20E-05
5.000	0.0	1.25E-07	3.12E-07	4.00E-08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	1.66E 10	2.41E 10	3.32E 10	4.45E 10	4.86E 1)	4.40E 10	4.58E 10	3.82E 10	4.41E 10	4.87E 10	3.44E 10	3.45E 10

L - B A N D S (M A G N E T I C S H E L L P A R A M E T E R I N E A R T H R A D I I) L - B A N D S

ENERGY LEVELS >(MEV)	*5.8-6.0*	*6.0-6.2*	*6.2-6.4*	*6.4-6.6*	*6.6-6.8*	*6.8-7.0*	*7.0-7.2*	*7.2-7.4*	*7.4-7.6*	*7.6-7.8*	*7.8-8.0*	*8.0-OVR*
.1000	3.96E 00	4.32E 00	5.13E 00	6.08E 00	7.00E 0)	7.78E 00	9.47E 00	1.25E 01	1.71E 01	2.30E 01	3.16E 01	7.15E 01
.5000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1.000	2.55E-01	2.40E-01	2.36E-01	2.32E-01	2.10E-01	1.71E-01	1.47E-01	1.32E-01	1.17E-01	1.04E-01	9.11E-02	5.51E-02
1.500	7.61E-02	6.87E-02	6.47E-02	6.10E-02	5.20E-02	3.87E-02	3.13E-02	2.73E-02	2.34E-02	2.00E-02	1.69E-02	5.69E-03
2.000	2.26E-02	1.97E-02	1.78E-02	1.60E-02	1.29E-02	8.78E-03	6.69E-03	5.65E-03	4.68E-03	3.85E-03	3.13E-03	6.90E-04
2.500	6.10E-03	5.13E-03	4.41E-03	3.79E-03	2.91E-03	1.90E-03	1.40E-03	1.16E-03	9.30E-04	7.05E-04	5.22E-04	6.84E-05
3.000	1.54E-03	1.25E-03	9.78E-04	7.65E-04	5.65E-04	3.84E-04	2.86E-04	2.30E-04	1.74E-04	9.93E-05	5.27E-05	1.24E-05
4.000	2.28E-05	1.43E-05	7.80E-06	4.29E-06	1.99E-05	5.78E-07	0.0	0.0	0.0	0.0	0.0	0.0
5.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	3.38E 10	2.71E 10	2.25E 10	1.92E 10	1.76E 1)	1.37E 10	9.77E 09	7.70E 09	5.86E 09	2.92E 09	2.49E 09	2.86E 09

Table 9

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** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **

** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973.6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **

** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **

** VEHICLE : IME#4 29DEG ** INCLINATION= 29DEG ** PERIGEE= 240KM ** APOGEE=138470KM ** B/L ORBIT TAPE: TD6167 ** PERIOD= 58.600 **

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******************************* PROTONS *************************************

** SPECTRAL DISTRIBUTION : NORMALIZED BY FLUX OF ENERGY GREATER THAN 5.000MEV **

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L - B A N D S (M A G N E T I C S H E L L P A R A M E T E R I N E A R T H R A D I I) L - B A N D S

ENERGY LEVELS >(MEV)	*1.0-1.2*	*1.2-1.4*	*1.4-1.6*	*1.6-1.8*	*1.8-2.0*	*2.0-2.2*	*2.2-2.4*	*2.4-2.6*	*2.6-2.8*	*2.8-3.0*	*3.0-3.2*	*3.2-3.4*
.1000	3.42E 00	1.97E 00	2.11E 00	2.49E 00	4.12E 00	2.23E 01	1.60E 02	5.12E 02	2.12E 03	1.17E 04	3.59E 04	7.88E 04
1.000	2.45E 00	1.43E 00	1.54E 00	1.80E 00	2.89E 00	1.08E 01	4.55E 01	1.14E 02	3.72E 02	1.51E 03	3.80E 03	7.16E 03
3.000	1.42E 00	1.26E 00	1.41E 00	1.56E 00	1.92E 00	2.99E 00	4.94E 00	7.28E 00	1.16E 01	1.95E 01	2.78E 01	3.57E 01
5.000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
10.00	7.02E-01	4.78E-01	2.63E-01	1.98E-01	1.50E-01	1.61E-01	1.51E-01	9.92E-02	7.49E-02	6.25E-02	5.50E-02	4.80E-02
20.00	5.26E-01	2.44E-01	7.91E-02	4.64E-02	2.52E-02	2.58E-02	2.25E-02	1.11E-02	5.76E-03	1.90E-03	1.37E-03	9.59E-04
30.00	4.94E-01	1.81E-01	4.80E-02	2.56E-02	1.05E-02	8.48E-03	6.73E-03	3.65E-03	1.33E-03	3.39E-05	0.0	0.0
50.00	4.35E-01	1.01E-01	1.85E-02	8.12E-03	1.86E-03	9.59E-04	6.23E-04	4.08E-04	7.64E-05	0.0	0.0	0.0
100.0	3.15E-01	6.60E-02	1.10E-02	4.33E-03	9.16E-04	3.63E-04	1.37E-04	1.83E-05	0.0	0.0	0.0	0.0
NORMFLUX=	1.03E 06	2.48E 08	2.00E 09	6.87E 08	4.00E 09	2.03E 09	9.27E 08	4.58E 08	2.19E 08	5.64E 07	1.38E 07	1.03E 07

L - B A N D S (M A G N E T I C S H E L L P A R A M E T E R I N E A R T H R A D I I) L - B A N D S

ENERGY LEVELS >(MEV)	*3.4-3.6*	*3.6-3.8*	*3.8-4.0*	*4.0-4.2*	*4.2-4.4*	*4.4-4.6*	*4.6-4.8*	*4.8-5.0*	*5.0-5.2*	*5.2-5.4*	*5.4-5.6*	*5.6-5.8*
.1000	2.04E 05	8.56E 05	2.67E 06	1.61E 07	7.11E 08	6.59E 08	5.46E 08	5.15E 08	3.77E 08	3.52E 08	2.61E 08	2.75E 08
1.000	1.50E 04	4.54E 04	1.07E 05	4.59E 05	1.07E 07	5.32E 06	1.50E 06	5.73E 05	2.18E 05	1.31E 05	7.60E 04	7.54E 04
3.000	4.70E 01	7.01E 01	9.56E 01	1.70E 02	2.54E 03	7.55E 02	6.95E 00	0.0	0.0	0.0	0.0	0.0
5.000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.00	4.26E-02	3.10E-02	3.40E-03	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.00	4.35E-04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	2.91E 06	5.24E 05	1.13E 05	1.39E 04	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

L - B A N D S (M A G N E T I C S H E L L P A R A M E T E R I N E A R T H R A D I I) L - B A N D S

ENERGY LEVELS >(MEV)	*5.8-6.0*	*6.0-6.2*	*6.2-6.4*	*6.4-6.6*	*6.6-6.8*	*6.8-7.0*	*7.0-7.2*	*7.2-7.4*	*7.4-7.6*	*7.6-7.8*	*7.8-8.0*	*8.0-OVR*
.1000	1.68E 08	1.48E 08	1.20E 08	8.67E 07	4.36E 07	2.33E 07	8.57E 06	3.15E 06	1.70E 06	6.68E 05	2.65E 05	1.88E 05
1.000	4.01E 04	3.62E 04	3.24E 04	2.22E 04	1.32E 04	1.17E 04	6.62E 03	4.05E 03	3.16E 03	2.16E 03	1.39E 03	2.82E 03
3.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 10

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973.6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#4 29DEG ** INCLINATION= 29DEG ** PERIGEE= 240KM ** APOGEE=138470KM ** B/L ORBIT TAPE: TD6167 ** PERIOD= 58.600 **

ELECTRONS

** SPECTRAL DISTRIBUTION : NORMALIZED BY FLUX OF ENERGY GREATER THAN .5000MEV **

L - BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L - BANDS

ENERGY LEVELS >(MEV)	*1.0-1.2*	*1.2-1.4*	*1.4-1.6*	*1.6-1.8*	*1.8-2.0*	*2.0-2.2*	*2.2-2.4*	*2.4-2.6*	*2.6-2.8*	*2.8-3.0*	*3.0-3.2*	*3.2-3.4*
.1000	3.37E 00	6.08E 00	1.49E 01	3.56E 01	3.29E 01	4.83E 01	5.23E 01	3.31E 01	1.31E 01	7.91E 00	6.24E 00	5.64E 00
.5000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1.000	5.51E-01	8.20E-02	2.86E-01	1.74E-01	7.00E-02	3.97E-02	4.43E-02	7.98E-02	2.01E-01	3.19E-01	3.54E-01	3.89E-01
1.500	3.67E-01	2.96E-02	1.61E-01	6.41E-02	1.74E-02	5.97E-03	5.98E-03	1.62E-02	7.94E-02	1.60E-01	1.73E-01	1.92E-01
2.000	1.86E-01	1.45E-02	7.63E-02	2.45E-02	5.01E-03	1.43E-03	1.04E-03	3.62E-03	3.52E-02	8.01E-02	8.46E-02	9.44E-02
2.500	6.27E-02	5.96E-03	2.66E-02	8.63E-03	1.36E-03	2.83E-04	1.38E-04	5.25E-04	1.02E-02	3.28E-02	3.73E-02	4.07E-02
3.000	1.91E-02	2.09E-03	7.26E-03	2.65E-03	3.16E-04	2.87E-05	5.98E-06	2.67E-05	1.13E-03	8.62E-03	1.39E-02	1.48E-02
4.000	1.49E-04	1.83E-05	9.56E-05	5.42E-05	4.67E-05	2.21E-07	0.0	3.95E-07	2.67E-05	2.31E-04	3.73E-04	4.07E-04
5.000	0.0	0.0	1.18E-07	5.80E-08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	1.15E 07	2.08E 10	3.39E 10	5.30E 09	2.03E 10	1.02E 10	6.94E 09	5.80E 09	5.64E 09	6.88E 09	7.68E 09	1.52E 10

L - BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L - BANDS

ENERGY LEVELS >(MEV)	*3.4-3.6*	*3.6-3.8*	*3.8-4.0*	*4.0-4.2*	*4.2-4.4*	*4.4-4.6*	*4.6-4.8*	*4.8-5.0*	*5.0-5.2*	*5.2-5.4*	*5.4-5.6*	*5.6-5.8*
.1000	6.35E 00	5.95E 00	4.61E 00	3.87E 00	3.57E 00	3.32E 00	3.46E 00	3.68E 00	3.80E 00	3.86E 00	3.92E 00	3.94E 00
.5000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1.000	3.96E-01	3.84E-01	3.64E-01	3.55E-01	3.55E-01	3.54E-01	3.46E-01	3.37E-01	3.29E-01	3.23E-01	3.13E-01	2.83E-01
1.500	1.98E-01	1.92E-01	1.69E-01	1.51E-01	1.43E-01	1.33E-01	1.27E-01	1.21E-01	1.14E-01	1.07E-01	9.94E-02	8.68E-02
2.000	9.90E-02	9.58E-02	7.86E-02	6.46E-02	5.72E-02	5.04E-02	4.67E-02	4.34E-02	3.97E-02	3.54E-02	3.15E-02	2.66E-02
2.500	4.51E-02	4.76E-02	3.88E-02	2.90E-02	2.43E-02	2.01E-02	1.76E-02	1.53E-02	1.30E-02	1.08E-02	8.92E-03	7.30E-03
3.000	1.74E-02	2.01E-02	1.75E-02	1.29E-02	9.85E-03	7.33E-03	5.74E-03	4.44E-03	3.52E-03	2.75E-03	2.18E-03	1.81E-03
4.000	5.15E-04	6.67E-04	5.89E-04	4.10E-04	2.79E-04	1.86E-04	1.40E-04	1.06E-04	8.08E-05	5.99E-05	4.46E-05	3.14E-05
5.000	0.0	1.43E-07	3.09E-07	7.85E-08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	1.74E 10	2.39E 10	2.96E 10	3.51E 10	4.36E 10	5.16E 10	4.52E 10	4.40E 10	3.68E 10	3.94E 10	3.49E 10	4.03E 10

L - BANDS (MAGNETIC SHELL PARAMETER IN EARTH RADII) L - BANDS

ENERGY LEVELS >(MEV)	*5.8-6.0*	*6.0-6.2*	*6.2-6.4*	*6.4-6.6*	*6.6-6.8*	*6.8-7.0*	*7.0-7.2*	*7.2-7.4*	*7.4-7.6*	*7.6-7.8*	*7.8-8.0*	*8.0-OVR*
.1000	3.96E 00	4.34E 00	5.16E 00	6.13E 00	6.99E 00	7.74E 00	9.50E 00	1.25E 01	1.66E 01	2.27E 01	3.12E 01	6.92E 01
.5000	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00	1.00E 00
1.000	2.52E-01	2.40E-01	2.36E-01	2.32E-01	2.10E-01	1.73E-01	1.46E-01	1.32E-01	1.18E-01	1.04E-01	9.16E-02	5.72E-02
1.500	7.47E-02	6.86E-02	6.46E-02	6.09E-02	5.20E-02	3.93E-02	3.13E-02	2.73E-02	2.37E-02	2.01E-02	1.70E-02	6.37E-03
2.000	2.22E-02	1.97E-02	1.77E-02	1.60E-02	1.29E-02	8.95E-03	6.68E-03	5.65E-03	4.76E-03	3.89E-03	3.16E-03	8.33E-04
2.500	5.95E-03	5.11E-03	4.39E-03	3.77E-03	2.91E-03	1.95E-03	1.40E-03	1.16E-03	9.52E-04	7.15E-04	5.29E-04	9.35E-05
3.000	1.51E-03	1.25E-03	9.71E-04	7.56E-04	5.55E-04	3.92E-04	2.85E-04	2.30E-04	1.81E-04	1.03E-04	5.41E-05	1.44E-05
4.000	2.17E-05	1.41E-05	7.68E-06	4.16E-06	1.97E-05	6.41E-07	0.0	0.0	0.0	0.0	0.0	0.0
5.000	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORMFLUX=	2.69E 10	2.45E 10	2.31E 10	1.88E 10	1.36E 10	1.48E 10	1.01E 10	6.46E 09	5.57E 09	3.51E 09	2.07E 09	2.99E 09

Table II

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*************************************************************************************************************
** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES:              **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG. MODEL  5:      IGRF 1965.0 80-TERM 10/68    * TIME= 1973.0 **
** VEHICLE : IME#1 29DEG ** INCLINATION= 29DEG ** PERIGEE= 1356KM ** APOGEE=140338KM ** B/L ORBIT TAPE: TD7963 ** PERIOD= 58.600 **
*************************************************************************************************************
                                   **************** PROTONS ****************
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***** SPECTRUM IN PERCENT DELTA ENERGY *****

ENERGY RANGES #/(MEV)/SEC	AVERAGED TOTAL FLUX #/CM**2/SEC	AVERAGED TOTAL FLUX #/CM**2/DAY	SPECTRUM PER CENT
.1000-1.000	2.788E 06	2.409E 11	90.103
1.000-3.000	2.852E 05	2.464E 10	9.218
3.000-5.000	1.334E 04	1.153E 05	0.431
5.000-10.00	6.276E 03	5.422E 08	0.203
10.00-20.00	1.068E 03	9.232E 07	0.035
20.00-30.00	1.465E 02	1.265E 07	0.005
30.00-50.00	1.022E 02	8.828E 06	0.003
50.00-100.0	2.300E 01	1.987E 06	0.001
100.0-OVER	3.342E 01	2.887E 06	0.001
TOTAL	3.094E 06	2.673E 11	100.000

****** COMPOSITE ORBIT SPECTRUM ******

ENERGY LEVELS >(MEV)	AVERAGED INTEG.FLUX #/CM**2/SEC	AVERAGED INTEG.FLUX #/CM**2/DAY	AVERAGED DIFFER.FLUX #/CM**2/SEC/KEV
.1000	3.094E 06	2.673E 11	5.016E 03
.5000	9.578E 05	8.276E 10	2.217E 03
1.000	3.062E 05	2.646E 10	5.261E-02
2.000	5.773E 04	4.988E 09	8.778E 01
3.000	2.099E-04	1.814E 09	1.947E 01
4.000	1.190E 04	1.028E 09	7.134E 00
5.000	7.649E 03	6.609E 08	3.506E-00
6.000	4.934E 03	4.263E 08	2.142E 00
7.000	3.204E 03	2.768E 08	1.268E 00
8.000	2.095E 03	1.810E 08	7.000E-01
9.000	1.695E 03	1.464E 08	4.103E-01
10.00	1.374E 03	1.187E 08	2.896E-01
11.00	1.116E 03	9.639E 07	2.303E-01
12.00	9.082E 02	7.847E 07	1.858E-01
13.00	7.410E 02	6.402E 07	1.495E-01
14.00	6.060E 02	5.236E 07	1.216E-01
15.00	4.968E 02	4.292E 07	9.177E-02
16.00	4.084E 02	3.528E 07	5.665E-02
18.00	3.522E 02	3.043E 07	3.321E-02
20.00	3.050E 02	2.636E 07	2.224E-02
25.00	2.171E 02	1.876E 07	1.405E-02
30.00	1.586E 02	1.370E 07	9.339E-03
35.00	1.187E 02	1.026E 07	6.705E-03
40.00	9.085E 01	7.849E 06	4.672E-03
45.00	7.095E 01	6.130E 06	3.031E-03
50.00	5.642E 01	4.875E 06	1.718E-03
55.00	5.334E 01	4.609E 06	1.043E-03
60.00	5.060E 01	4.372E 06	6.759E-04
80.00	4.107E 01	3.548E 06	3.752E-04
100.0	3.342E 01	2.887E 06	2.807E-04

EXPOSURE INDEX:ENERGY>5.000 MEV

INTENSITY RANGES #/CM**2/SEC	EXPOSURE DURATION (HOURS)	TOTAL # OF ACCUMULATED PARTICLES
ZERO FLUX	578.600	0.0
1.E0-1.E1	0.433	9.479E 03
1.E1-1.E2	2.200	2.978E-05
1.E2-1.E3	3.300	4.489E 06
1.E3-1.E4	3.433	5.313E 07
1.E4-1.E5	4.800	6.977E 08
1.E5-1.E6	5.967	7.750E 09
1.E6-1.E7	1.267	8.018E 09
1.E7-OVER	0.0	0.0
TOTAL	600.000	1.652E 10

Table 12

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#I 29DEG ** INCLINATION= 29DEG ** PERIGEE= 1366KM ** APOGEE=140338KM ** B/L ORBIT TAPE: TD7963 ** PERIOD= 58.600 **

**************** ELECTRONS ****************

***** SPECTRUM IN PERCENT DELTA ENERGY *****

ENERGY RANGES #/(MEV)/SEC	AVERAGED TOTAL FLUX #/CM**2/SEC	AVERAGED TOTAL FLUX #/CM**2/DAY	SPECTRUM PER CENT
.1000-.5000	2.932E 06	2.533E 11	88.548
.5000-1.000	2.741E 05	2.368E 10	8.277
1.000-1.500	6.534E 04	5.646E 09	1.973
1.500-2.000	2.396E 04	2.070E 09	0.724
2.000-2.500	9.651E 03	8.339E 08	0.291
2.500-3.000	3.997E 03	3.454E 08	0.121
3.000-4.000	2.119E 03	1.831E 08	0.064
4.000-5.000	5.708E 01	4.932E 06	0.002
5.000-OVER	1.008E-02	8.712E 02	0.000
TOTAL	3.311E 06	2.861E 11	100.000

****** COMPOSITE ORBIT SPECTRUM ******

ENERGY LEVELS >(MEV)	AVERAGED INTEG.FLUX #/CM**2/SEC	AVERAGED INTEG.FLUX #/CM**2/DAY	AVERAGED DIFFER.FLUX #/CM**2/SEC/KEV
.1000	3.311E 06	2.861E 11	3.707E 04
.1250	2.780E 06	2.402E 11	2.143E 04
.2500	1.227E 06	1.060E 11	7.376E 03
.3750	6.374E 05	5.507E 10	2.897E 03
.5000	3.792E 05	3.276E 10	1.481E 03
.6250	2.664E 05	2.302E 10	8.412E 02
.7500	1.903E 05	1.644E 10	4.769E 02
1.000	1.051E 05	9.083E 09	2.309E 02
1.250	6.429E 04	5.554E 09	1.251E 02
1.500	3.979E 04	3.438E 09	7.763E 01
1.750	2.507E 04	2.166E 09	5.217E 01
2.000	1.582E 04	1.367E 09	2.683E 01
2.500	6.174E 03	5.334E 08	1.242E 01
3.000	2.176E 03	1.880E 08	8.127E 00
3.125	1.528E 03	1.320E 08	5.231E 00
3.250	1.077E 03	9.308E 07	3.130E 00
3.375	7.625E 02	6.588E 07	2.303E 00
3.500	5.416E 02	4.679E 07	1.871E 00
3.625	3.081E 02	2.662E 07	1.305E 00
3.750	1.755E 02	1.516E 07	7.898E-01
3.875	1.000E 02	8.643E 06	4.831E-01
4.000	5.709E 01	4.933E 06	3.046E-01
4.125	2.554E 01	2.207E 06	1.686E-01
4.250	9.803E 00	8.470E 05	7.406E-02
4.375	3.661E 00	3.163E 05	2.550E-02
4.500	1.176E 00	1.016E 05	1.001E-02
4.625	4.521E-01	3.906E 04	0.0
4.750	1.446E-01	1.250E 04	0.0
4.875	4.071E-02	3.517E 03	0.0
5.000	1.008E-02	8.712E 02	0.0

EXPOSURE INDEX:ENERGY>.5000 MEV

INTENSITY RANGES #/CM**2/SEC	EXPOSURE DURATION (HOURS)	TOTAL # OF ACCUMULATED PARTICLES
ZERO FLUX	514.967	0.0
1.E0-1.E1	2.467	3.415E 04
1.E1-1.E2	2.333	3.227E 05
1.E2-1.E3	4.667	8.398E 06
1.E3-1.E4	7.267	1.013E 08
1.E4-1.E5	9.700	1.449E 09
1.E5-1.E6	13.000	2.078E 10
1.E6-1.E7	43.367	7.037E 11
1.E7-OVER	2.233	9.321E 10
TOTAL	600.000	8.192E 11

Table 13

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***************************************************************************************************************************
** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES:            **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5:     IGRF 1965.0 80-TERM 10/68     * TIME= 1973.0 **
** VEHICLE : IME#2 29DEG ** INCLINATION= 29DEG ** PERIGEE= 240KM ** APOGEE=140338KM ** B/L ORBIT TAPE: TD7963 ** PERIOD= 58.600 **
***************************************************************************************************************************
                                   **************** PROTONS ****************
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***** SPECTRUM IN PERCENT DELTA ENERGY *****

ENERGY RANGES #/(MEV)/SEC	AVERAGED TOTAL FLUX #/CM**2/SEC	AVERAGED TOTAL FLUX #/CM**2/DAY	SPECTRUM PER CENT
.1000-1.000	2.641E 06	2.281E 11	90.451
1.000-3.000	2.619E 05	2.263E 10	8.972
3.000-5.000	1.110E 04	9.589E 08	0.380
5.000-10.00	4.730E 03	4.086E 08	0.162
10.00-20.00	7.836E 02	6.770E 07	0.027
20.00-30.00	1.046E 02	9.034E 06	0.004
30.00-50.00	7.045E 01	6.087E 06	0.002
50.00-100.0	1.486E 01	1.284E 06	0.001
100.0-OVER	2.081E 01	1.798E 06	0.001
TOTAL	2.919E 06	2.522E 11	100.000

****** COMPOSITE ORBIT SPECTRUM ******

ENERGY LEVELS >(MEV)	AVERAGED INTEG.FLUX #/CM**2/SEC	AVERAGED INTEG.FLUX #/CM**2/DAY	AVERAGED DIFFER.FLUX #/CM**2/SEC/KEV
.1000	2.919E 06	2.522E 11	4.782E-03
.5000	8.893E 05	7.683E 10	2.095E 03
1.000	2.786E 05	2.408E 10	4.874E 02
2.000	4.963E 04	4.288E 09	7.861E 01
3.000	1.682E 04	1.453E 09	1.666E 01
4.000	9.000E 03	7.776E 08	5.790E 00
5.000	5.724E 03	4.945E 08	2.718E 00
6.000	3.665E 03	3.166E 08	1.622E 00
7.000	2.361E 03	2.040E 08	9.519E-01
8.000	1.531E 03	1.323E 08	5.224E-01
9.000	1.233E 03	1.065E 08	3.050E-01
10.00	9.943E 02	8.590E 07	2.145E-01
11.00	8.036E 02	6.943E 07	1.700E-01
12.00	6.507E 02	5.622E 07	1.367E-01
13.00	5.280E 02	4.562E 07	1.095E-01
14.00	4.293E 02	3.709E 07	8.869E-02
15.00	3.499E 02	3.023E 07	6.670E-02
16.00	2.858E 02	2.469E 07	4.107E-02
18.00	2.448E 02	2.115E 07	2.407E-02
20.00	2.107E 02	1.820E 07	1.604E-02
25.00	1.476E 02	1.275E 07	1.001E-02
30.00	1.051E 02	9.169E 06	6.568E-03
35.00	7.823E 01	6.759E 06	4.654E-03
40.00	5.901E 01	5.099E 06	3.202E-03
45.00	4.545E 01	3.927E 06	2.051E-03
50.00	3.567E 01	3.082E 06	1.146E-03
55.00	3.365E 01	2.908E 06	6.846E-04
60.00	3.187E 01	2.754E 06	4.382E-04
80.00	2.571E 01	2.222E 06	2.414E-04
100.0	2.081E 01	1.798E 06	1.798E-04

EXPOSURE INDEX:ENERGY>6.000 MEV

INTENSITY RANGES #/CM**2/SEC	EXPOSURE DURATION (HOURS)	TOTAL # OF ACCUMULATED PARTICLES
ZERO FLUX	581.533	0.0
1.E0-1.E1	0.467	1.088E 04
1.E1-1.E2	2.467	3.897E 05
1.E2-1.E3	3.100	4.786E 06
1.E3-1.E4	3.000	4.251E 07
1.E4-1.E5	3.700	5.609E 08
1.E5-1.E6	4.833	6.603E 09
1.E6-1.E7	0.900	5.152E 09
1.E7-OVER	0.0	0.0
TOTAL	600.000	1.236E 10

Table 14

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** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#2 29DEG ** INCLINATION= 29DEG ** PERIGEE= 240KM ** APOGEE=140338KM ** B/L ORBIT TAPE: TD7963 ** PERIOD= 58.600 **
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**************** ELECTRONS ****************

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***** SPECTRUM IN PERCENT DELTA ENERGY *****

ENERGY RANGES #/(MEV)/SEC	AVERAGED TOTAL FLUX #/CM**2/SEC	AVERAGED TOTAL FLUX #/CM**2/DAY	SPECTRUM PER CENT
.1000-.5000	2.518E 06	2.175E 11	87.866
.5000-1.000	2.490E 05	2.151E 10	8.688
1.000-1.500	6.163E 04	5.324E 09	2.150
1.500-2.000	2.252E 04	1.946E 09	0.786
2.000-2.500	8.925E 03	7.711E 08	0.311
2.500-3.000	3.674E 03	3.175E 08	0.128
3.000-4.000	1.964E 03	1.697E 08	0.069
4.000-5.000	5.387E 01	4.654E 06	0.002
5.000-OVER	8.672E-03	7.493E 02	0.000
TOTAL	2.866E 06	2.476E 11	100.000

****** COMPOSITE ORBIT SPECTRUM ******

ENERGY LEVELS >(MEV)	AVERAGED INTEG.FLUX #/CM**2/SEC	AVERAGED INTEG.FLUX #/CM**2/DAY	AVERAGED DIFFER.FLUX #/CM**2/SEC/KEV
.1000	2.866E 06	2.476E 11	3.165E 04
.1250	2.411E 06	2.083E 11	1.834E 04
.2500	1.077E 06	9.308E 10	6.339E 03
.3750	5.712E 05	4.935E 10	2.512E 03
.5000	3.477E 05	3.004E 10	1.307E 03
.6250	2.470E 05	2.134E 10	7.579E 02
.7500	1.782E 05	1.540E 10	4.386E 02
1.000	9.876E 04	8.533E 09	2.159E 02
1.250	6.019E 04	5.201E 09	1.178E 02
1.500	3.714E 04	3.209E 09	7.306E 01
1.750	2.324E 04	2.008E 09	4.881E 01
2.000	1.452E 04	1.263E 09	2.493E 01
2.500	5.692E 03	4.918E 08	1.144E 01
3.000	2.017E 03	1.743E 08	7.463E 00
3.125	1.425E 03	1.231E 08	4.817E 00
3.250	1.010E 03	8.725E 07	2.896E 00
3.375	7.178E 02	6.202E 07	2.149E 00
3.500	5.115E 02	4.420E 07	1.760E 00
3.625	2.909E 02	2.513E 07	1.231E 00
3.750	1.656E 02	1.431E 07	7.456E-01
3.875	9.442E 01	8.157E 06	4.561E-01
4.000	5.388E 01	4.655E 06	2.877E-01
4.125	2.409E 01	2.082E 06	1.592E-01
4.250	9.227E 00	7.972E 05	6.989E-02
4.375	3.436E 00	2.969E 05	2.400E-02
4.500	1.097E 00	9.474E 04	9.391E-03
4.625	4.215E-01	3.642E 04	0.0
4.750	1.336E-01	1.155E 04	0.0
4.875	3.656E-02	3.159E 03	0.0
5.000	8.672E-03	7.493E 02	0.0

EXPOSURE INDEX:ENERGY>.5000 MEV

INTENSITY RANGES #/CM**2/SEC	EXPOSURE DURATION (HOURS)	TOTAL # OF ACCUMULATED PARTICLES
ZERO FLUX	519.800	0.0
1.E0-1.E1	2.367	3.312E 04
1.E1-1.E2	2.533	3.610E 05
1.E2-1.E3	4.667	8.382E 06
1.E3-1.E4	7.100	1.005E 08
1.E4-1.E5	9.267	1.333E 09
1.E5-1.E6	12.333	1.936E 10
1.E6-1.E7	40.400	6.670E 11
1.E7-OVER	1.533	6.336E 10
TOTAL	600.000	7.512E 11

Talle 15

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG. MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#3 29DEG ** INCLINATION= 29DEG ** PERIGEE= 1364KM ** APOGEE=139633KM ** B/L ORBIT TAPE: TD6167 ** PERIOD= 58.600 **

**************** PROTONS ****************

***** SPECTRUM IN PERCENT DELTA ENERGY *****

ENERGY RANGES #/(MEV)/SEC	AVERAGED TOTAL FLUX #/CM**2/SEC	AVERAGED TOTAL FLUX #/CM**2/DAY	SPECTRUM PER CENT
.1000-1.000	2.435E 06	2.104E 11	90.920
1.000-3.000	2.247E 05	1.941E 10	8.389
3.000-5.000	1.107E 04	9.566E 08	0.413
5.000-10.00	6.013E 03	5.195E 08	0.225
10.00-20.00	1.077E 03	9.303E 07	0.040
20.00-30.00	1.541E 02	1.332E 07	0.006
30.00-50.00	1.159E 02	1.001E 07	0.004
50.00-100.0	2.677E 01	2.313E 06	0.001
100.0-OVER	4.007E 01	3.462E 06	0.001
TOTAL	2.678E 06	2.314E 11	100.000

****** COMPOSITE ORBIT SPECTRUM ******

ENERGY LEVELS >(MEV)	AVERAGED INTEG.FLUX #/CM**2/SEC	AVERAGED INTEG.FLUX #/CM**2/DAY	AVERAGED DIFFER.FLUX #/CM**2/SEC/KEV
.1000	2.678E 06	2.314E 11	4.459E-03
.5000	7.837E 05	6.771E 10	1.878E 03
1.000	2.432E 05	2.101E 10	4.259E 02
2.000	4.672E 04	4.036E 09	6.989E 01
3.000	1.850E 04	1.598E 09	1.583E 01
4.000	1.135E 04	9.806E 08	6.155E 00
5.000	7.426E 03	6.416E 08	3.215E 00
6.000	4.855E 03	4.195E 08	2.035E 00
7.000	3.198E 03	2.763E 08	1.223E 00
8.000	2.123E 03	1.834E 08	6.830E-01
9.000	1.731E 03	1.495E 08	4.037E-01
10.00	1.414E 03	1.221E 08	2.868E-01
11.00	1.157E 03	1.000E 08	2.297E-01
12.00	9.497E 02	8.205E 07	1.867E-01
13.00	7.811E 02	6.749E 07	1.514E-01
14.00	6.440E 02	5.564E 07	1.240E-01
15.00	5.323E 02	4.599E 07	9.395E-02
16.00	4.410E 02	3.810E 07	5.799E-02
18.00	3.847E 02	3.324E 07	3.384E-02
20.00	3.359E 02	2.910E 07	2.289E-02
25.00	2.455E 02	2.121E 07	1.486E-02
30.00	1.827E 02	1.579E 07	1.018E-02
35.00	1.387E 02	1.198E 07	7.502E-03
40.00	1.071E 02	9.253E 06	5.355E-03
45.00	8.402E 01	7.259E 06	3.532E-03
50.00	6.684E 01	5.775E 06	2.014E-03
55.00	6.327E 01	5.467E 06	1.216E-03
60.00	6.010E 01	5.193E 06	7.846E-04
80.00	4.903E 01	4.236E 06	4.373E-04
100.0	4.007E 01	3.462E 06	3.287E-04

EXPOSURE INDEX:ENERGY>5.000 MEV

INTENSITY RANGES #/CM**2/SEC	EXPOSURE DURATION (HOURS)	TOTAL # OF ACCUMULATED PARTICLES
ZERO FLUX	578.917	0.0
1.E0-1.E1	0.250	4.793E 03
1.E1-1.E2	2.333	2.983E 05
1.E2-1.E3	3.667	5.484E 06
1.E3-1.E4	3.250	4.883E 07
1.E4-1.E5	4.583	6.771E 08
1.E5-1.E6	5.583	6.691E 09
1.E6-1.E7	1.417	8.618E 09
1.E7-OVER	0.0	0.0
TOTAL	600.000	1.604E 10

Table 16

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*******************************************************************************************************************************
** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973.6 WITH LIFETIMES: E.G.STASSINOPCULOS&P.VERZARIU ** CUTOFF TIMES:              **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5:     IGRF 1965.0 80-TERM 10/68    * TIME= 1973.0 **
** VEHICLE : IME#[illegible] 29DEG ** INCLINATION= 29DEG ** PERIGEE= 1364KM ** APOGEE=139633KM ** B/L ORBIT TAPE: TD6167 ** PERIOD= 58.600 **
*******************************************************************************************************************************
                                   ****************  ELECTRONS  ****************
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***** SPECTRUM IN PERCENT DELTA ENERGY *****

ENERGY RANGES #/(MEV)/SEC	AVERAGED TOTAL FLUX #/CM**2/SEC	AVERAGED TOTAL FLUX #/CM**2/DAY	SPECTRUM PER CENT
.1000-.5000	2.870E 06	2.480E 11	88.023
.5000-1.000	2.835E 05	2.449E 10	8.693
1.000-1.500	6.614E 04	5.715E 09	2.028
1.500-2.000	2.436E 04	2.105E 09	0.747
2.000-2.500	1.006E 04	8.688E 08	0.308
2.500-3.000	4.232E 03	3.656E 08	0.130
3.000-4.000	2.228E 03	1.925E 08	0.068
4.000-5.000	5.763E 01	4.979E 06	0.002
5.000-OVER	1.044E-02	9.023E 02	0.000
TOTAL	3.261E 06	2.817E 11	100.000

****** COMPOSITE ORBIT SPECTRUM ******

ENERGY LEVELS >(MEV)	AVERAGED INTEG.FLUX #/CM**2/SEC	AVERAGED INTEG.FLUX #/CM**2/DAY	AVERAGED DIFFER.FLUX #/CM**2/SEC/KEV
.1000	3.261E 06	2.817E 11	3.571E 04
.1250	2.749E 06	2.375E 11	2.078E 04
.2500	1.236E 06	1.068E 11	7.263E 03
.3750	6.518E 05	5.631E 10	2.906E 03
.5000	3.905E 05	3.374E 10	1.512E 03
.6250	2.740E 05	2.368E 10	8.688E 02
.7500	1.942E 05	1.678E 10	4.912E 02
1.000	1.071E 05	9.251E 09	2.354E 02
1.250	6.585E 04	5.690E 09	1.268E 02
1.500	4.093E 04	3.537E 09	7.880E 01
1.750	2.609E 04	2.255E 09	5.343E 01
2.000	1.657E 04	1.432E 09	2.779E 01
2.500	6.517E 03	5.631E 08	1.311E 01
3.000	2.285E 03	1.975E 08	8.659E 00
3.125	1.585E 03	1.369E 08	5.552E 00
3.250	1.106E 03	9.559E 07	3.296E 00
3.375	7.759E 02	6.713E 07	2.389E 00
3.500	5.482E 02	4.737E 07	1.912E 00
3.625	3.117E 02	2.693E 07	1.324E 00
3.750	1.775E 02	1.533E 07	7.997E-01
3.875	1.011E 02	8.735E 06	4.890E-01
4.000	5.764E 01	4.980E 06	3.079E-01
4.125	2.574E 01	2.224E 06	1.701E-01
4.250	9.882E 00	8.538E 05	7.460E-02
4.375	3.693E 00	3.190E 05	2.568E-02
4.500	1.192E 00	1.030E 05	1.009E-02
4.625	4.605E-01	3.979E 04	0.0
4.750	1.480E-01	1.279E 04	0.0
4.875	4.209E-02	3.636E 03	0.0
5.000	1.044E-02	9.023E 02	0.0

EXPOSURE INDEX:ENERGY>.5000 MEV

INTENSITY RANGES #/CM**2/SEC	EXPOSURE DURATION (HOURS)	TOTAL # OF ACCUMULATED PARTICLES
ZERO FLUX	514.917	0.0
1.E0-1.E1	2.333	3.454E 04
1.E1-1.E2	2.250	2.990E 05
1.E2-1.E3	4.667	8.128E 06
1.E3-1.E4	7.250	9.960E 07
1.E4-1.E5	9.833	1.455E 09
1.E5-1.E6	13.750	2.225E 10
1.E6-1.E7	42.083	6.898E 11
1.E7-OVER	2.917	1.299E 11
TOTAL	600.000	8.436E 11

Table 17

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973.6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#4 29DEG ** INCLINATION= 29DEG ** PERIGEE= 240KM ** APOGEE=138470KM ** B/L ORBIT TAPE: TD6167 ** PERIOD= 58.600 **

**************** PROTONS ****************

***** SPECTRUM IN PERCENT DELTA ENERGY ***** ****** COMPOSITE ORBIT SPECTRUM ****** EXPOSURE INDEX:ENERGY>5.000 MEV

ENERGY RANGES #/(MEV)/SEC	AVERAGED TOTAL FLUX #/CM**2/SEC	AVERAGED TOTAL FLUX #/CM**2/DAY	SPECTRUM PER CENT	ENERGY LEVELS >(MEV)	AVERAGED INTEG.FLUX #/CM**2/SEC	AVERAGED INTEG.FLUX #/CM**2/DAY	AVERAGED DIFFER.FLUX #/CM**2/SEC/KEV	INTENSITY RANGES #/CM**2/SEC	EXPOSURE DURATION (HOURS)	TOTAL # OF ACCUMULATED PARTICLES
.1000-1.000	2.419E 06	2.090E 11	90.985	.1000	2.659E 06	2.297E 11	4.430E 03	ZERO FLUX	580.750	0.0
1.000-3.000	2.256E 05	1.949E 10	8.484	.5000	7.845E 05	6.778E 10	1.894E 03	1.E0-1.E1	1.000	2.251E 04
3.000-5.000	9.167E 03	7.920E 08	0.345	1.000	2.397E 05	2.071E 10	4.266E 02	1.E1-1.E2	2.583	3.818E 05
5.000-10.00	4.050E 03	3.499E 08	0.152	2.000	4.143E 04	3.580E 09	6.675E 01	1.E2-1.E3	2.833	3.673E 06
10.00-20.00	6.869E 02	5.935E 07	0.026	3.000	1.410E 04	1.219E 09	1.392E 01	1.E3-1.E4	3.583	4.551E 07
20.00-30.00	9.499E 01	8.207E 06	0.004	4.000	7.709E 03	6.661E 08	4.854E 00	1.E4-1.E5	3.917	5.916E 08
30.00-50.00	6.869E 01	5.935E 06	0.003	5.000	4.937E 03	4.265E 08	2.300E 00	1.E5-1.E6	4.417	8.568E 09
50.00-100.0	1.481E 01	1.280E 06	0.001	6.000	3.181E 03	2.749E 08	1.385E 00	1.E6-1.E7	0.917	4.455E 09
100.0-OVER	2.143E 01	1.851E 06	0.001	7.000	2.065E-03	1.784E 08	8.175E-01	1.E7-OVER	0.0	0.0
				8.000	1.351E 03	1.167E 08	4.509E-01			
TOTAL	2.658E 06	2.297E 11	100.000	9.000	1.093E 03	9.447E 07	2.641E-01	TOTAL	600.000	1.066E 10
				10.00	8.859E 02	7.662E 07	1.863E-01			
				11.00	7.209E-02	6.229E 07	1.482E-01			
				12.00	5.874E 02	5.076E 07	1.196E-01			
				13.00	4.798E 02	4.146E 07	9.629E-02			
				14.00	3.929E 02	3.394E 07	7.832E-02			
				15.00	3.225E 02	2.786E 07	5.904E-02			
				16.00	2.655E 02	2.294E 07	3.633E-02			
				18.00	2.299E 02	1.986E 07	2.121E-02			
				20.00	1.999E 02	1.727E 07	1.427E-02			
				25.00	1.433E 02	1.238E 07	9.141E-03			
				30.00	1.049E 02	9.066E 06	6.168E-03			
				35.00	7.841E 01	6.774E 06	4.482E-03			
				40.00	5.967E 01	5.155E 06	3.155E-03			
				45.00	4.616E 01	3.988E 06	2.051E-03			
				50.00	3.624E 01	3.131E 06	1.153E-03			
				55.00	3.424E 01	2.958E 06	6.852E-04			
				60.00	3.247E 01	2.605E 06	4.363E-04			
				80.00	2.633E 01	2.275E 06	2.410E-04			
				100.0	2.143E 01	1.851E 06	1.802E-04			

Table 18

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** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973.6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#4 29DEG ** INCLINATION= 29DEG ** PERIGEE= 240KM ** APOGEE=138470KM ** B/L ORBIT TAPE: TD6167 ** PERIOD= 58.600 **
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**************** ELECTRONS ****************
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***** SPECTRUM IN PERCENT DELTA ENERGY *****

ENERGY RANGES #/(MEV)/SEC	AVERAGED TOTAL FLUX #/CM**2/SEC	AVERAGED TOTAL FLUX #/CM**2/DAY	SPECTRUM PER CENT
.1000-.5000	2.361E 06	2.040E 11	87.437
.5000-1.000	2.424E 05	2.094E 10	8.978
1.000-1.500	6.022E 04	5.203E 09	2.230
1.500-2.000	2.223E 04	1.921E 09	0.823
2.000-2.500	8.791E 03	7.595E 08	0.326
2.500-3.000	3.596E 03	3.107E 08	0.133
3.000-4.000	1.911E 03	1.651E 08	0.071
4.000-5.000	5.260E 01	4.544E 06	0.002
5.000-OVER	9.078E-03	7.844E 02	0.000
TOTAL	2.700E 06	2.333E 11	100.000

****** COMPOSITE ORBIT SPECTRUM ******

ENERGY LEVELS >(MEV)	AVERAGED INTEG.FLUX #/CM**2/SEC	AVERAGED INTEG.FLUX #/CM**2/DAY	AVERAGED DIFFER.FLUX #/CM**2/SEC/KEV
.1000	2.700E 06	2.333E 11	2.948E 04
.1250	2.275E 06	1.966E 11	1.712E 04
.2500	1.028E 06	8.878E 10	5.955E 03
.3750	5.542E 05	4.788E 10	2.389E 03
.5000	3.392E 05	2.931E 10	1.260E 03
.6250	2.410E 05	2.082E 10	7.359E 02
.7500	1.742E 05	1.505E 10	4.270E 02
1.000	9.680E 04	8.363E 09	2.106E 02
1.250	5.914E 04	5.109E 09	1.153E 02
1.500	3.658E 04	3.161E 09	7.182E 01
1.750	2.289E 04	1.978E 09	4.817E 01
2.000	1.435E 04	1.240E 09	2.458E 01
2.500	5.559E 03	4.803E 08	1.122E 01
3.000	1.963E 03	1.696E 08	7.281E 00
3.125	1.387E 03	1.199E 08	4.690E 00
3.250	9.837E 02	8.499E 07	2.817E 00
3.375	6.997E 02	6.045E 07	2.091E 00
3.500	4.989E 02	4.311E 07	1.714E 00
3.625	2.838E 02	2.452E 07	1.201E 00
3.750	1.617E 02	1.397E 07	7.274E-01
3.875	9.218E 01	7.964E 06	4.448E-01
4.000	5.260E 01	4.545E 06	2.806E-01
4.125	2.351E 01	2.040E 06	1.556E-01
4.250	9.040E 00	7.811E 05	6.846E-02
4.375	3.365E 00	2.907E 05	2.352E-02
4.500	1.073E 00	9.270E 04	9.197E-03
4.625	4.110E-01	3.551E 04	0.0
4.750	1.302E-01	1.125E 04	0.0
4.875	3.678E-02	3.178E 03	0.0
5.000	9.078E-03	7.844E 02	0.0

EXPOSURE INDEX:ENERGY>.5000 MEV

INTENSITY RANGES #/CM**2/SEC	EXPOSURE DURATION (HOURS)	TOTAL # OF ACCUMULATED PARTICLES
ZERO FLUX	519.083	0.0
1.E0-1.E1	2.750	4.500E 04
1.E1-1.E2	2.167	3.275E 05
1.E2-1.E3	5.000	8.651E 06
1.E3-1.E4	7.250	1.035E 08
1.E4-1.E5	9.833	1.441E 09
1.E5-1.E6	13.000	2.067E 10
1.E6-1.E7	39.083	6.387E 11
1.E7-OVER	1.833	7.181E 10
TOTAL	600.000	7.327E 11

Table 19

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#1 29DEG ** INCLINATION= 29DEG ** PERIGEE= 1366KM ** APOGEE=140338KM ** B/L ORBIT TAPE: TD7963 ** PERIOD= 58.600 **

PROTONS

** TABLE OF PEAK AND TOTAL FLUXES PER PERIOD : ENERGY >5.000MEV **

PERIOD NUMBER	PEAK FLUX ENCOUNTERED #/CM**2/SEC	POSITION AT WHICH ENCOUNTERED LONGITUDE (DEG)	LATITUDE (DEG)	ALTITUDE (KM)	ORBIT TIME (HOURS)	FIELD(B) (GAUSS)	LINE(L) (E.R.)	TOTAL FLUX PER ORBIT #/CM**2/ORBIT
1	1.299E 06	-159.090	-10.94	4641.61	0.33333	0.06700	1.78	9.552E 08
2	1.151E 06	26.356	-5.39	3710.02	59.23331	0.07705	1.69	7.758E 08
3	2.108E 06	-132.337	-10.79	4818.16	118.23331	0.05923	1.77	2.458E 09
4	8.400E 05	52.743	-5.67	3669.37	177.06667	0.08538	1.65	5.674E 08
5	2.522E 06	-102.936	-11.97	5055.31	236.09998	0.05229	1.82	2.950E 09
6	5.471E 05	82.106	-7.71	3908.94	295.03296	0.09081	1.72	3.919E 08
7	2.502E 06	-80.126	-10.62	4728.16	354.09961	0.05469	1.79	2.894E 09
8	5.280E 05	109.142	-8.05	4269.73	412.99976	0.08642	1.79	4.730E 08
9	2.470E 06	-53.463	-9.93	4774.42	471.93311	0.05147	1.83	2.464E 09
10	5.340E 05	138.021	-8.71	4414.60	530.83301	0.08257	1.82	6.322E 08

Table 20

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#1 29DEG ** INCLINATION= 29DEG ** PERIGEE= 1366KM ** APOGEE=140338KM ** B/L ORBIT TAPE: TD7963 ** PERIOD= 58.600 **

************************ ELECTRONS ************************
** TABLE OF PEAK AND TOTAL FLUXES PER PERIOD : ENERGY >.5000MEV **

PERIOD NUMBER	PEAK FLUX ENCOUNTERED #/CM**2/SEC	POSITION AT WHICH ENCOUNTERED LONGITUDE (DEG)	LATITUDE (DEG)	ALTITUDE (KM)	ORBIT TIME (HOURS)	FIELD(B) (GAUSS)	LINE(L) (E.R.)	TOTAL FLUX PER ORBIT #/CM**2/ORBIT
1	1.547E 07	-175.856	-1.00	2740.22	0.20000	0.11545	1.41	8.628E 10
2	1.626E 07	12.045	2.17	2434.28	59.13332	0.11141	1.41	6.565E 10
3	1.691E 07	-148.604	-1.20	2934.06	118.09998	0.10363	1.44	9.349E 10
4	1.529E 07	43.561	-0.18	2804.69	176.99997	0.10666	1.46	5.564E 10
5	1.562E 07	-123.446	0.05	2697.79	235.93332	0.11086	1.43	8.490E 10
6	1.374E 07	68.326	- 0.47	2580.64	294.93311	0.12609	1.39	4.764E 10
7	1.205E 07	-101.933	2.13	2475.99	353.93311	0.12213	1.46	9.396E 10
8	1.331E 07	96.218	-0.47	2931.29	412.89966	0.12120	1.44	5.684E 10
9	1.082E 07	146.512	6.33	22360.17	470.13306	0.00353	4.47	8.710E 10
10	1.216E 07	125.435	-1.37	3052.17	530.73291	0.11791	1.47	6.767E 10

Table 21

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#2 29DEG ** INCLINATION= 29DEG ** PERIGEE= 240KM ** APOGEE=140338KM ** B/L ORBIT TAPE: TD7963 ** PERIOD= 58.600 **

PROTONS

** TABLE OF PEAK AND TOTAL FLUXES PER PERIOD : ENERGY >5.000MEV **

PERIOD NUMBER	PEAK FLUX ENCOUNTERED #/CM**2/SEC	POSITION AT WHICH ENCOUNTERED LONGITUDE (DEG)	LATITUDE (DEG)	ALTITUDE (KM)	ORBIT TIME (HOURS)	FIELD(B) (GAUSS)	LINE(L) (E.R.)	TOTAL FLUX PER ORBIT #/CM**2/ORBIT
1	8.925E 05	-149.653	-15.37	4313.26	0.33333	0.07454	1.77	8.446E 08
2	2.320E 06	-95.450	-15.37	4541.18	116.43332	0.05926	1.75	2.751E 09
3	2.285E 05	107.465	-13.02	3813.46	174.39998	0.10530	1.84	1.745E 08
4	2.320E 06	-41.001	-15.34	4426.69	232.46666	0.05542	1.80	2.333E 09
5	5.261E 05	16.938	23.05	4703.58	289.86646	0.06705	1.96	5.634E 08
6	8.211E 05	4.108	-11.42	3308.26	348.59961	0.08301	1.69	6.658E 08
7	1.250E 06	-141.277	-15.09	4578.56	406.69971	0.06704	1.79	1.699E 09
8	4.321E 05	60.015	-11.74	3624.67	464.63306	0.09370	1.76	2.377E 08
9	2.481E 06	-85.495	-15.35	4674.53	522.69971	0.05574	1.78	2.877E 09
10	2.258E 05	117.603	-13.42	3975.81	580.69971	0.10130	1.88	2.167E 08

Table 22

****

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **

** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **

** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **

** VEHICLE : IME#2 29DEG ** INCLINATION= 29DEG ** PERIGEE= 240KM ** APOGEE=140338KM ** B/L ORBIT TAPE: TD7963 ** PERIOD= 58.600 **

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************************ ELECTRONS *************************

** TABLE OF PEAK AND TOTAL FLUXES PER PERIOD : ENERGY >.5000MEV **

****

PERIOD NUMBER	PEAK FLUX ENCOUNTERED #/CM**2/SEC	POSITION AT WHICH ENCOUNTERED LONGITUDE (DEG)	LATITUDE (DEG)	ALTITUDE (KM)	ORBIT TIME (HOURS)	FIELD(B) (GAUSS)	LINE(L) (E.R.)	TOTAL FLUX PER ORBIT #/CM**2/ORBIT
1	1.310E 07	-162.249	-8.57	2572.65	0.23333	0.12500	1.42	8.555E 10
2	1.696E 07	-107.551	-8.89	2814.62	116.33333	0.10180	1.45	7.635E 10
3	9.395E 06	-61.814	-28.03	19818.37	117.33333	0.00466	4.53	7.683E 10
4	1.526E 07	-53.381	-8.73	2701.34	232.36664	0.09398	1.50	8.224E 10
5	1.049E 07	-11.529	4.64	21006.81	288.89966	0.00384	4.49	6.829E 10
6	1.456E 07	-5.579	-6.04	2221.73	348.53296	0.11399	1.44	6.663E 10
7	1.401E 07	-153.360	-8.73	2870.50	406.59961	0.11041	1.46	9.124E 10
8	1.006E 07	50.884	-6.74	2538.91	464.56641	0.12309	1.48	5.484E 10
9	1.619E 07	-97.385	-9.15	2963.62	522.59961	0.09514	1.49	9.599E 10
10	9.152E 06	-54.270	6.11	19425.91	579.16626	0.00499	4.52	5.311E 10

Table 23

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973.6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME-3 29DEG ** INCLINATION= 29DEG ** PERIGEE= 1364KM ** APOGEE=139633KM ** B/L ORBIT TAPE: TD6167 ** PERIOD= 58.600 **

PROTONS

** TABLE OF PEAK AND TOTAL FLUXES PER PERIOD : ENERGY >5.000MEV **

PERIOD NUMBER	PEAK FLUX ENCOUNTERED #/CM**2/SEC	POSITION AT WHICH ENCOUNTERED LONGITUDE (DEG)	LATITUDE (DEG)	ALTITUDE (KM)	ORBIT TIME (HOURS)	FIELD(B) (GAUSS)	LINE(L) (E.R.)	TOTAL FLUX PER ORBIT #/CM**2/ORBIT
1	1.085E 06	-54.587	-26.25	4985.98	58.58331	0.05097	1.97	1.526E 09
2	2.079E 06	79.626	14.84	5652.28	59.33331	0.05143	1.86	1.924E 09
3	4.697E 05	-96.777	9.43	4172.79	118.16666	0.07889	1.89	3.476E 08
4	2.308E 06	105.683	14.39	5578.01	177.16666	0.05340	1.82	2.350E 09
5	4.729E 05	-76.193	5.20	3425.63	235.91666	0.09233	1.74	3.589E 08
6	2.322E 06	130.195	12.61	4993.61	294.91626	0.06166	1.72	1.856E 09
7	6.636E 05	-44.616	7.91	3835.29	353.74976	0.07740	1.82	6.583E 08
8	2.248E 06	155.328	12.19	4810.27	412.74976	0.06309	1.71	1.580E 09
9	1.468E 06	-20.763	6.37	3719.20	471.58301	0.07344	1.68	1.590E 09
10	1.777E 06	177.038	8.63	4184.77	530.49976	0.07307	1.63	1.360E 09

Table 24

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*********************************************************************************************************************************
** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOSEP.VERZARIU ** CUTOFF TIMES:               **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL  5:      IGRF 1965.0 80-TERM 10/68    * TIME= 1973.0 **
** VEHICLE : IME#3 29DEG  ** INCLINATION= 29DEG ** PERIGEE= 1364KM ** APOGEE=139633KM ** B/L ORBIT TAPE: TO6167 ** PERIOD= 58.600 **
*********************************************************************************************************************************
                              ************************ ELECTRONS  **************************
                              ** TABLE OF PEAK AND TOTAL FLUXES PER PERIOD : ENERGY >.5000MEV **
                              ******************************************************************
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PERIOD NUMBER	PEAK FLUX ENCOUNTERED #/CM**2/SEC	POSITION AT WHICH ENCOUNTERED LONGITUDE (DEG)	LATITUDE (DEG)	ALTITUDE (KM)	ORBIT TIME (HOURS)	FIELD(B) (GAUSS)	LINE(L) (E.R.)	TOTAL FLUX PER ORBIT #/CM**2/ORBIT
1	1.243E 07	-141.634	-1.70	2351.52	0.16667	0.12522	1.36	6.411E 10
2	1.639E 07	61.153	4.18	3137.23	59.16664	0.10069	1.46	9.272E 10
3	1.052E 07	-60.800	-7.32	22126.88	175.33333	0.00333	4.58	5.547E 10
4	1.574E 07	86.984	3.46	3128.17	176.99997	0.10886	1.44	8.586E 10
5	1.360E 07	-88.501	-2.32	2434.13	235.83333	0.11754	1.45	5.477E 10
6	1.477E 07	121.024	7.24	3759.05	294.83301	0.08924	1.52	8.108E 10
7	1.349E 07	-70.066	-7.66	1970.37	353.58301	0.12658	1.38	6.482E 10
8	1.505E 07	145.867	6.48	3615.54	412.66626	0.09068	1.51	7.698E 10
9	1.614E 07	-46.594	-9.60	2044.22	471.41626	0.11458	1.40	8.939E 10
10	1.568E 07	166.444	1.98	3120.98	530.41626	0.10404	1.46	7.340E 10

Table 25

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** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#4 29DEG ** INCLINATION= 29DEG ** PERIGEE= 240KM ** APOGEE=138470KM ** B/L ORBIT TAPE: TD6167 ** PERIOD= 58.600 **
****

************************ PROTONS ************************
** TABLE OF PEAK AND TOTAL FLUXES PER PERIOD : ENERGY >5.000MEV **
****

PERIOD NUMBER	PEAK FLUX ENCOUNTERED #/CM**2/SEC	POSITION AT WHICH ENCOUNTERED LONGITUDE (DEG)	LATITUDE (DEG)	ALTITUDE (KM)	ORBIT TIME (HOURS)	FIELD(B) (GAUSS)	LINE(L) (E.R.)	TOTAL FLUX PER ORBIT #/CM**2/ORBIT
1	1.731E 06	102.413	18.70	5345.16	58.41664	0.05836	1.82	2.631E 09
2	1.805E 05	-60.251	13.92	3684.20	116.33333	0.09337	2.00	1.383E 08
3	1.560E 06	156.816	18.69	5372.89	174.41666	0.05621	1.86	1.240E 09
4	1.020E 06	-0.973	15.99	4355.95	232.33333	0.06716	1.83	9.070E 08
5	6.971E 05	-158.990	13.02	3451.13	290.24976	0.09321	1.59	4.812E 08
6	1.351E 06	59.545	18.90	5213.18	348.33301	0.05821	1.87	2.176E 09
7	2.459E 05	-103.276	14.18	3636.84	406.24976	0.09818	1.88	1.249E 08
8	1.729E 06	113.238	18.97	5259.64	464.33301	0.05983	1.81	1.831E 09
9	2.641E 05	-53.418	11.12	3108.55	522.16626	0.10453	1.79	2.026E 08
10	1.413E 06	168.094	18.55	5088.82	580.24976	0.06027	1.84	9.311E 08

Table 26

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*****************************************************************************************************************
** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES:          **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5:  IGRF 1965.0 80-TERM 10/68   * TIME= 1973.0 **
** VEHICLE : IME#4 29DEG ** INCLINATION= 29DEG ** PERIGEE= 240KM ** APOGEE=138470KM ** B/L-ORBIT TAPE: TD6167 ** PERIOD= 58.600 **
*****************************************************************************************************************
                         ************************  ELECTRONS  ************************
                         ** TABLE OF PEAK AND TOTAL FLUXES PER PERIOD : ENERGY >.5000MEV **
                         *****************************************************************
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PERIOD NUMBER	PEAK FLUX ENCOUNTERED #/CM**2/SEC	POSITION AT WHICH ENCOUNTERED LONGITUDE (DEG)	LATITUDE (DEG)	ALTITUDE (KM)	ORBIT TIME (HOURS)	FIELD(B) (GAUSS)	LINE(L) (E.R.)	TOTAL FLUX PER ORBIT #/CM**2/ORBIT
1	1.262E 07	93.913	14.52	3836.91	58.33331	0.08787	1.55	6.691E 10
2	9.271E 06	127.684	-5.79	20472.10	114.74997	0.00482	4.53	8.374E 10
3	1.159E 07	148.321	14.48	3883.70	174.33333	0.08364	1.57	7.635E 10
4	1.113E 07	-11.167	10.52	2926.54	232.24997	0.09684	1.54	8.122E 10
5	1.015E 07	31.819	-5.58	21878.98	288.58301	0.00357	4.60	6.164E 10
6	1.275E 07	-39.318	8.02	2366.88	348.16626	0.12462	1.36	9.620E 10
7	1.016E 07	-114.950	7.45	2294.96	406.16626	0.13680	1.45	5.053E 10
8	1.312E 07	-104.497	14.47	3815.08	464.24976	0.08887	1.54	8.592E 10
9	8.893E 06	144.516	-8.63	19667.29	520.66626	0.00539	4.48	5.762E 10
10	1.256E 07	159.075	13.81	3664.23	580.16626	0.08791	1.55	7.256E 10

Table 27

TABLE

IME#1 29DEG

ELLIPTCL

INCLINATION: 29 DEG

PERIGEE: 1366 KM

APOGEE: 140338 KM

DECAY DATE: 1973. 6.

**** EXPOSURE ANALYSIS ****

	PROTONS (E>5.000MEV)	ELECTRONS (E>.5000MEV)
PERCENT OF TOTAL LIFE-TIME SPENT IN FLUX-FREE REGIONS* OF SPACE :	96.43 %	85.83 %
PERCENT OF TOTAL LIFE-TIME SPENT IN HIGH-INTENSITY REGIONS+ OF VAN ALLEN BELTS :	2.58 %	9.77 %
PERCENT OF TOTAL DAILY FLUX ACCUMULATED IN HIGH-INTENSITY REGIONS:	99.97 %	99.81 %

****

* <1 PARTICLE/CM**2/SEC

\+ >1.E5 EL/CM**2/SEC OR 1.E3 PR/CM**2/SEC

TABLE

IME#1 29DEG

ELLIPTCL

INCLINATION: 29 DEG

PERIGEE: 1366 KM

APOGEE: 140338 KM

DECAY DATE: 1973. 6.

* PERCENT OF TOTAL LIFETIME SPENT INSIDE AND *
* OUTSIDE THE TRAPPED-PARTICLE RADIATION BELT *

INNER ZONE (1.0 < L < 2.8)	-TI-* :	2.08 %
OUTER ZONE (2.8 < L < 11.0)	-TO- :	95.48 %
EXTERNAL (L > 11.0)	-TE- :	2.44 %
TOTAL	:	100.00 %

*TIME IN INNER ZONE MAY BE SUBDIVIDED AS FOLLOWS:

OUTSIDE TRAPPING REGION : 0.0 %
(1.0 < L < 1.1)

INSIDE TRAPPING REGION : 2.08 %
(1.1 < L < 2.8)

TABLE

IME#2 29DEG

ELLIPTCL

INCLINATION: 29 DEG

PERIGEE: 240 KM

APOGEE: 140338 KM

DECAY DATE: 1973. 6.

TABLE

IME#2 29DEG

ELLIPTCL

INCLINATION: 29 DEG

PERIGEE: 240 KM

APOGEE: 140338 KM

DECAY DATE: 1973. 6.

**** EXPOSURE ANALYSIS ****

	PROTONS (E>5.000MEV)	ELECTRONS (E>.5000MEV)
PERCENT OF TOTAL LIFE-TIME SPENT IN FLUX-FREE REGIONS* OF SPACE :	96.92 %	86.63 %
PERCENT OF TOTAL LIFE-TIME SPENT IN HIGH-INTENSITY REGIONS+ OF VAN ALLEN BELTS :	2.07 %	9.04 %
PERCENT OF TOTAL DAILY FLUX ACCUMULATED IN HIGH-INTENSITY REGIONS:	99.96 %	99.81 %

****

* <1 PARTICLE/CM**2/SEC

* PERCENT OF TOTAL LIFETIME SPENT INSIDE AND *
* OUTSIDE THE TRAPPED-PARTICLE RADIATION BELT *

INNER ZONE (1.0 < L < 2.8)	-TI-* :	2.07 %
OUTER ZONE (2.8 < L < 11.0)	-TO- :	95.60 %
EXTERNAL (L > 11.0)	-TE- :	2.33 %
TOTAL	:	100.00 %

*TIME IN INNER ZONE MAY BE SUBDIVIDED AS FOLLOWS:

OUTSIDE TRAPPING REGION : 0.14 %
(1.0 < L < 1.1)

INSIDE TRAPPING REGION : 1.92 %
(1.1 < L < 2.8)

TABLE _

IME#3 29DEG

ELLIPTCL

INCLINATION: 29 DEG

PERIGEE: 1364 KM

APOGEE: 139633 KM

DECAY DATE: 1973. 6.

**** EXPOSURE ANALYSIS ****

	PROTONS (E>5.000MEV)	ELECTRONS (E>.5000MEV)
PERCENT OF TOTAL LIFE-TIME SPENT IN FLUX-FREE REGIONS* OF SPACE :	96.49 %	85.82 %
PERCENT OF TOTAL LIFE-TIME SPENT IN HIGH-INTENSITY REGIONS+ OF VAN ALLEN BELTS :	2.47 %	9.79 %
PERCENT OF TOTAL DAILY FLUX ACCUMULATED IN HIGH-INTENSITY REGIONS:	99.96 %	99.81 %

****

* <1 PARTICLE/CM**2/SEC

\+ >1.E5 EL/CM**2/SEC OR 1.E3 PR/CM**2/SEC

TABLE _

IME#3 29DEG

ELLIPTCL

INCLINATION: 29 DEG

PERIGEE: 1364 KM

APOGEE: 139633 KM

DECAY DATE: 1973. 6.

* PERCENT OF TOTAL LIFETIME SPENT INSIDE AND *
* OUTSIDE THE TRAPPED-PARTICLE RADIATION BELT *

INNER ZONE -TI-* : 2.03 %
(1.0 < L < 2.8)

OUTER ZONE -TO- : 95.57 %
(2.8 < L < 11.0)

EXTERNAL -TE- : 2.40 %
(L > 11.0)

TOTAL : 100.00 %

*TIME IN INNER ZONE MAY BE SUBDIVIDED AS FOLLOWS:

OUTSIDE TRAPPING REGION : 0.0 %
(1.0 < L < 1.1)

INSIDE TRAPPING REGION : 2.03 %
(1.1 < L < 2.8)

Table 30

TABLE

IME#4 29DEG

ELLIPTCL

INCLINATION: 29 DEG

PERIGEE: 240 KM

APOGEE: 138470 KM

DECAY DATE: 1973. 6.

**** EXPOSURE ANALYSIS ****

	PROTONS (E>5.000MEV)	ELECTRONS (E>.5000MEV)
PERCENT OF TOTAL LIFE-TIME SPENT IN FLUX-FREE REGIONS* OF SPACE :	96.79 %	86.51 %
PERCENT OF TOTAL LIFE-TIME SPENT IN HIGH-INTENSITY REGIONS+ OF VAN ALLEN BELTS :	2.14 %	8.93 %
PERCENT OF TOTAL DAILY FLUX ACCUMULATED IN HIGH-INTENSITY REGIONS:	99.96 %	99.79 %

****

* <1 PARTICLE/CM**2/SEC

\+ >1.E5 EL/CM**2/SEC OR 1.E3 PR/CM**2/SEC

TABLE

IME#4 29DEG

ELLIPTCL

INCLINATION: 29 DEG

PERIGEE: 240 KM

APOGEE: 138470 KM

DECAY DATE: 1973. 6.

* PERCENT OF TOTAL LIFETIME SPENT INSIDE AND *
* OUTSIDE THE TRAPPED-PARTICLE RADIATION BELT *

INNER ZONE (1.0 < L < 2.8)	-TI-* :	2.01 %
OUTER ZONE (2.6 < L < 11.0)	-TO- :	95.56 %
EXTERNAL (L > 11.0)	-TE- :	2.43 %
TOTAL	:	100.00 %

*TIME IN INNER ZONE MAY BE SUBDIVIDED AS FOLLOWS:

OUTSIDE TRAPPING REGION : 0.03 %
(1.0 < L < 1.1)

INSIDE TRAPPING REGION : 1.99 %
(1.1 < L < 2.8)

Table 31

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*******************************************************************************************************************
** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF-TIMES:            **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5:     IGRF 1965.0 80-TERM 10/68     * TIME= 1973.0 **
** VEHICLE : IME#1 29DEG ** INCLINATION= 29DEG ** PERIGEE= 1356KM ** APOGEE=140338KM ** B/L ORBIT TAPE: TD7963 ** PERIOD= 58.600 **
*******************************************************************************************************************
                                   ** POSITION OF PHYSICAL PERIGEE PER PERIOD **
                                   *********************************************
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PERIOD NUMBER	ORBIT TIME (HOURS)	LONGITUDE (DEG)	LATITUDE (DEG)	ALTITUDE (KM)	FIELD(B) (GAUSS)	LINE(L) (E.R.)	PROTONS E>5.000MEV	ELECTRONS E>.5000MEV
	************** POSITION OF PHYSICAL PERIGEE					**************	FLUX ENCOUNTERED AT THIS POSITION (#/CM**2/SEC)	
1	0.03333	152.09	16.52	1408.62	0.19533	1.20	1.987E 03	3.017E 03
2	58.96666	-22.12	19.57	1439.98	0.18566	1.40	1.299E 04	1.926E 06
3	117.89998	172.90	19.00	1509.88	0.18471	1.28	6.709E 03	2.983E 05
4	176.79999	4.12	20.01	1520.44	0.18007	1.33	1.309E 04	1.275E 06
5	235.73331	-163.73	20.47	1468.17	0.19383	1.35	6.038E 03	6.887E 05
6	294.73291	27.09	21.02	1427.93	0.19711	1.29	3.348E 03	1.067E 05
7	353.76636	-135.81	19.21	1494.57	0.20283	1.43	5.145E 03	6.251E 05
8	412.69971	57.73	19.19	1606.32	0.19270	1.26	2.867E 03	7.720E 04
9	471.59961	-108.27	19.18	1640.11	0.20681	1.59	7.862E 03	2.344E 05
10	530.53296	87.82	18.20	1618.67	0.20033	1.21	1.030E 03	1.945E 03

Table 32

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973, & WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#2 29DEG ** INCLINATION= 29DEG ** PERIGEE= 240KM ** APOGEE=140338KM ** B/L ORBIT TAPE: TD7963 ** PERIOD= 58.600 **

** PCSITICA OF FHYSICAL PERIGEE PER PERIOD **

PERIOD NUMBER	ORBIT TIME (HOURS)	LONGITUDE (DEG)	LATITUDE (DEG)	ALTITUDE (KM)	FIELD(B) (GAUSS)	LINE(L) (E.R.)	PROTONS E>5.000MEV	ELECTRONS E>.5000MEV
	POSITION OF PHYSICAL PERIGEE						FLUX ENCOUNTERED AT THIS POSITION (#/CM**2/SEC)	
1	0.03333	154.30	15.55	300.99	0.30623	1.03	0.0	0.0
2	116.09998	-158.41	18.35	376.93	0.29757	1.16	0.0	0.0
3	174.09998	46.70	19.24	384.86	0.32797	1.06	0.0	0.0
4	232.13332	-105.44	18.91	338.55	0.35954	1.32	0.0	0.0
5	290.23291	103.13	17.91	297.38	0.36911	0.99	0.0	0.0
6	348.33301	-52.07	18.37	352.39	0.33228	1.41	0.0	0.0
7	406.36646	156.47	17.79	461.39	0.28613	1.07	0.0	0.0
8	464.33301	-2.33	20.24	498.96	0.27775	1.14	0.0	0.0
9	522.33301	-156.56	20.81	487.46	0.29172	1.22	0.0	0.0
10	580.39966	58.73	17.67	455.71	0.32146	1.05	0.0	0.0

Table 33

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#3 29DEG ** INCLINATION= 29DEG ** PERIGEE= 1364KM ** APOGEE=139633KM ** B/L ORBIT TAPE: TD6167 ** PERIOD= 58.600 **

** POSITION OF PHYSICAL PERIGEE PER PERIOD **

PERIOD NUMBER	ORBIT TIME (HOURS)	LONGITUDE (DEG)	LATITUDE (DEG)	ALTITUDE (KM)	FIELD(B) (GAUSS)	LINE(L) (E.R.)	PROTONS E>5.000MEV	ELECTRONS E>.5000MEV
	************** POSITION OF PHYSICAL PERIGEE					**************	FLUX ENCOUNTERED AT THIS POSITION (#/CM**2/SEC)	
1	0.08333	-157.26	-10.62	1627.45	0.17681	1.28	1.249E 04	7.326E 06
2	58.91664	12.21	-21.38	1419.08	0.16942	1.62	3.794E 04	7.504E 05
3	117.83333	-157.07	-22.39	1508.65	0.21305	1.43	2.565E 03	2.927E 05
4	176.74997	38.45	-21.81	1554.06	0.17800	1.68	3.073E 04	4.211E 05
5	235.66666	-122.25	-19.85	1559.40	0.17518	1.32	1.740E 04	1.811E 06
6	294.58301	77.60	-17.40	1572.95	0.22129	1.54	2.585E 03	1.168E 05
7	353.49976	-87.31	-16.80	1590.35	0.14695	1.29	6.401E 04	5.142E 06
8	412.41626	101.88	-18.72	1654.42	0.23927	1.60	9.461E 02	3.011E 04
9	471.33301	-63.67	-18.42	1774.60	0.12526	1.36	1.498E 05	1.233E 07
10	530.24976	137.48	-15.10	1875.24	0.20935	1.52	5.169E 03	3.475E 05

Table 34

** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973.6 WITH LIFETIMES: E.G.STASSINGPOULOS&P.VERZARIU ** CUTOFF TIMES: **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL 5: IGRF 1965.0 80-TERM 10/68 * TIME= 1973.0 **
** VEHICLE : IME#4 29DEG ** INCLINATION= 29DEG ** PERIGEE= 240KM ** APOGEE=138470KM ** B/L ORBIT TAPE: TD6167 ** PERIOD= 58.600 **

** POSITION OF PHYSICAL PERIGEE PER PERIOD **

PERIOD NUMBER	ORBIT TIME (HOURS)	LONGITUDE (DEG)	LATITUDE (DEG)	ALTITUDE (KM)	FIELD(B) (GAUSS)	LINE(L) (E.R.)	PROTONS E>5.000MEV	ELECTRONS E>.5000MEV
1	57.99998	22.48	-22.50	305.74	0.27195	1.49	0.0	0.0
2	115.99997	-132.86	-23.38	394.53	0.31077	1.19	0.0	0.0
3	173.99997	78.45	-22.21	414.05	0.38086	1.48	0.0	0.0
4	231.99997	-65.35	-19.11	409.61	0.20971	1.14	4.110E 01	1.482E 02
5	289.99976	151.89	-14.96	464.22	0.36781	1.23	0.0	0.0
6	347.91626	-20.06	-23.04	484.16	0.21420	1.35	1.385E 03	7.300E 04
7	405.99976	-150.24	-13.43	570.00	0.27529	1.12	0.0	0.0
8	463.91626	36.19	-22.75	654.83	0.24366	1.55	2.981E 02	4.265E 03
9	521.91626	-104.36	-18.18	656.93	0.23056	1.15	2.324E 00	0.0
10	579.91626	112.99	-13.61	729.36	0.33853	1.26	0.0	0.0

POSITION OF PHYSICAL PERIGEE — FLUX ENCOUNTERED AT THIS POSITION (#/CM**2/SEC)

Table 35

```
*************************************************************************************************************************
** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES:             **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL  5:      IGRF 1965.0 80-TERM 10/68    * TIME= 1973.0 **
** VEHICLE : IME#1 29DEG  ** INCLINATION= 29DEG ** PERIGEE= 1356KM ** APOGEE=140338KM ** B/L ORBIT TAPE: T07963 ** PERIOD= 58.600 **
*************************************************************************************************************************
                                        ** ANNUAL ENERGETIC SOLAR PROTON FLUENCE **
                                        ************ (PARTICLES/CM**2) ************
                                        *******************************************
```

ENERGY LEVELS >(MEV)	FOR CUTOFF DIPOLE SHELL ***L>5***	DIPOLE CUTOFF SHELL	PERCENT EXPOSURE TIME
10.0	4.194E 09	L>4	96.43
20.0	2.179E 09	L>5	95.12
30.0	1.318E 09	L>6	93.72
40.0	8.628E 08	L>7	92.20
50.0	5.940E 08		
60.0	4.239E 08		
70.0	3.108E 08		
80.0	2.328E 08		
90.0	1.775E 08		
100.0	1.373E 08		

Table 36

```
*******************************************************************************************************
** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES:                **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL  5:     IGRF 1965.0 80-TERM 10/68    * TIME= 1973.0 **
** VEHICLE : IME#2 29DEG ** INCLINATION= 29DEG ** PERIGEE=  240KM ** APOGEE=140338KM ** B/L ORBIT TAPE: TD7963 ** PERIOD= 58.600 **
*******************************************************************************************************
                                   ** ANNUAL ENERGETIC SOLAR PROTON FLUENCE **
                                   ************ (PARTICLES/CM**2) ************
                                   ******************************************
```

ENERGY LEVELS >(MEV)	FOR CUTOFF DIPOLE SHELL ***L>5***	DIPOLE CUTOFF SHELL	PERCENT EXPOSURE TIME
10.0	4.201E 09	L>4	96.54
20.0	2.182E 09	L>5	95.29
30.0	1.320E 09	L>6	93.94
40.0	8.644E 08	L>7	92.45
50.0	5.951E 08		
60.0	4.247E 08		
70.0	3.114E 08		
80.0	2.333E 08		
90.0	1.778E 08		
100.0	1.376E 08		

Table 37

```
**************************************************************************************************************************
** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&R.VERZARIU ** CUTOFF TIMES:        **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL  5:     IGRF 1965.0 80-TERM 10/68    * TIME= 1973.0 **
** VEHICLE : IME-3 29DEG ** INCLINATION= 29DEG ** PERIGEE= 1364KM ** APOGEE=139633KM ** B/L ORBIT TAPE: TD6167 ** PERIOD= 58.600 **
**************************************************************************************************************************
                                   ** ANNUAL ENERGETIC SOLAR PRCTON FLUENCE **
                                   ************ (PARTICLES/CM**2) ************
                                   *******************************************
```

ENERGY LEVELS >(MEV)	FOR CUTOFF DIPOLE SHELL ***L>5***	DIPOLE CUTOFF SHELL	PERCENT EXPOSURE TIME
10.0	4.196E 09	L>4	96.46
20.0	2.180E 09	L>5	95.18
30.0	1.319E 09	L>6	93.72
40.0	8.633E 08	L>7	92.18
50.0	5.944E 08		
60.0	4.242E 08		
70.0	3.110E 08		
80.0	2.330E 08		
90.0	1.776E 08		
100.0	1.374E 08		

Table 38

```
***************************************************************************************************************************
** ORBITAL FLUX STUDY WITH COMPOSITE PARTICLE ENVIRONMENTS: VETTES AP5, AP6, AP7; AE4, AE5, FOR SOLAR MAXIMUM **** UNIFLX OF 1973 **
** ELECTRON FLUXES EXPONENTIALLY DECAYED TO 1973. 6 WITH LIFETIMES: E.G.STASSINOPOULOS&P.VERZARIU ** CUTOFF TIMES:             **
** MAGNETIC COORDINATES B AND L COMPUTED BY INVARA OF 1972 WITH ALLMAG, MODEL  5:      IGRF 1965.0 80-TERM 10/68     * TIME= 1973.0 **
** VEHICLE : IME#A 29DEG  ** INCLINATION= 29DEG ** PERIGEE=  240KM ** APOGEE=138470KM ** B/L ORBIT TAPE: TD6167 ** PERIOD= 58.600 **
***************************************************************************************************************************
```

** ANNUAL ENERGETIC SOLAR PROTON FLUENCE **
************ (PARTICLES/CM**2) ************
****

ENERGY LEVELS >(MEV)	FOR CUTOFF DIPOLE SHELL ***L>5***	DIPOLE CUTOFF SHELL	PERCENT EXPOSURE TIME
10.0	4.202E 09	L>4	96.58
20.0	2.183E 09	L>5	95.32
30.0	1.321E 09	L>6	93.96
40.0	8.646E 08	L>7	92.50
50.0	5.953E 08		
60.0	4.248E 08		
70.0	3.115E 08		
80.0	2.333E 08		
90.0	1.779E 08		
100.0	1.376E 08		

TABLE ARRANGEMENT

Computer Produced Output Tables for Orbital Flux Integrations.

Standard Production Runs with UNIFLUX Program.

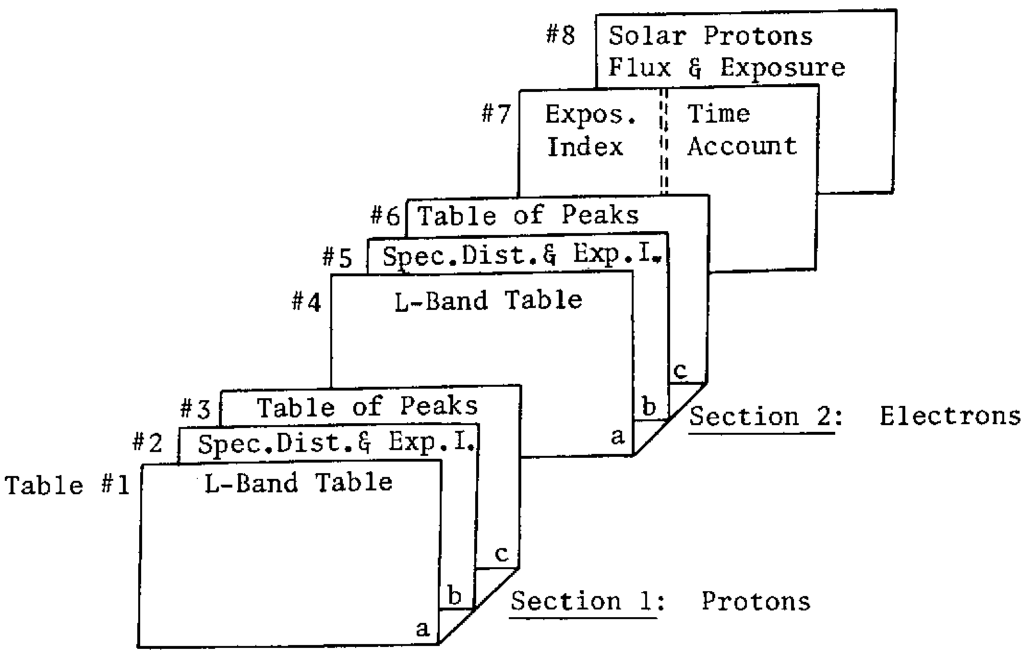


Figure 1: Set of tables produced for every trajectory considered in an orbital radiation study.

PLOT ARRANGEMENT

Computer Produced Plots for Orbital Flux Integrations.

Standard Production Runs with UNIFLUX Program.

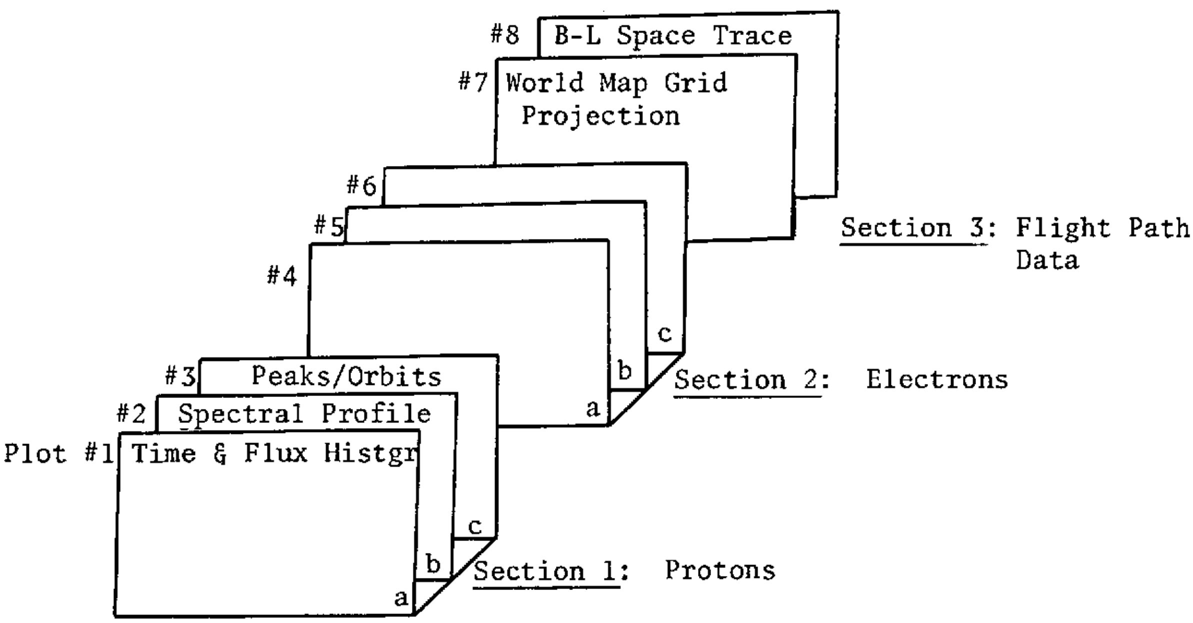


Figure 2: Set of plots produced for every trajectory considered in an orbital radiation study.

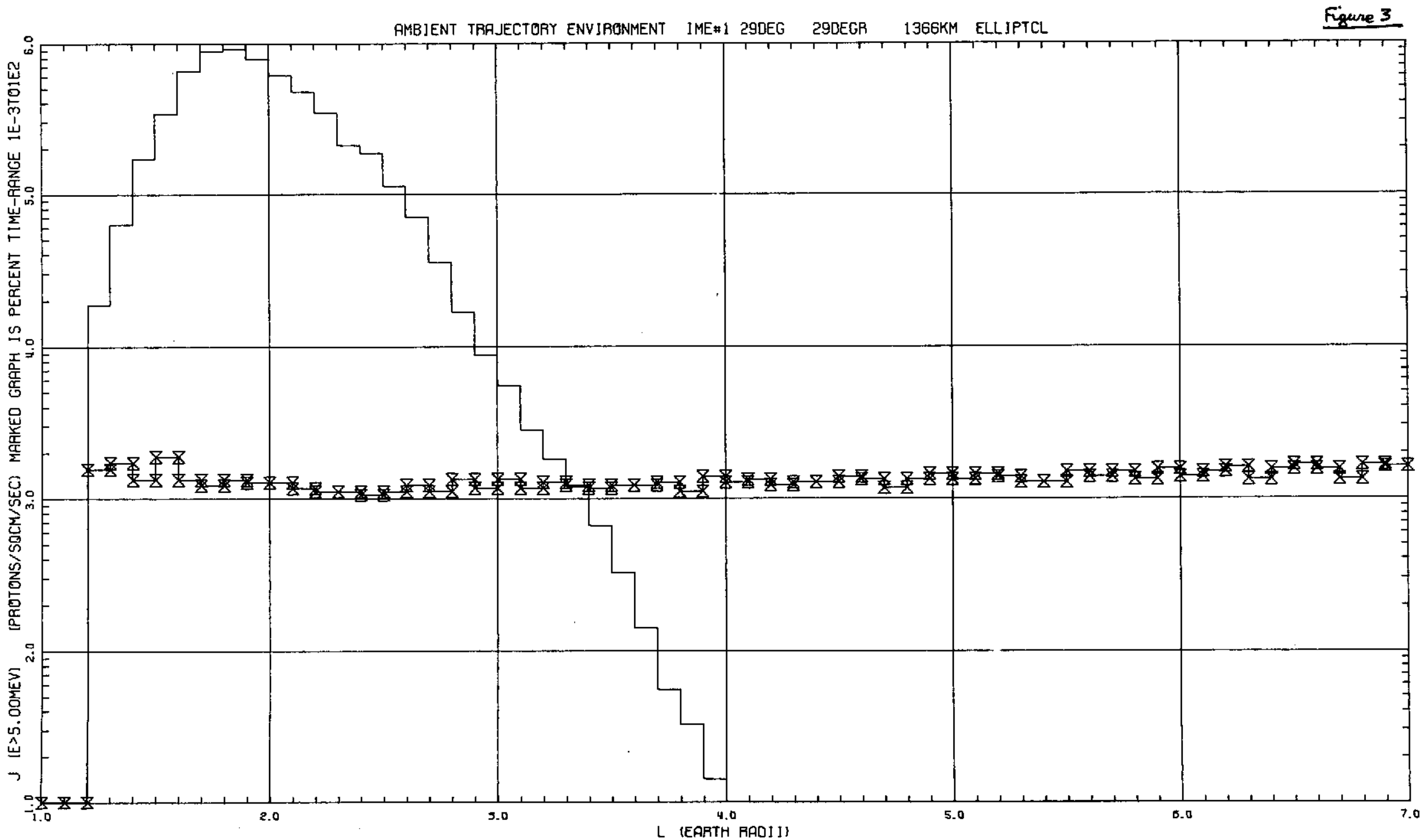


Figure 3
AMBIENT TRAJECTORY ENVIRONMENT IME#1 29DEG 29DEGR 1366KM ELLIPTCL
J (E>5.00MEV) (PROTONS/SQCM/SEC) MARKED GRAPH IS PERCENT TIME-RANGE 1E-3TO1E2
0
2.0
3.0
4.0
5.0
6.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
L (EARTH RADII)

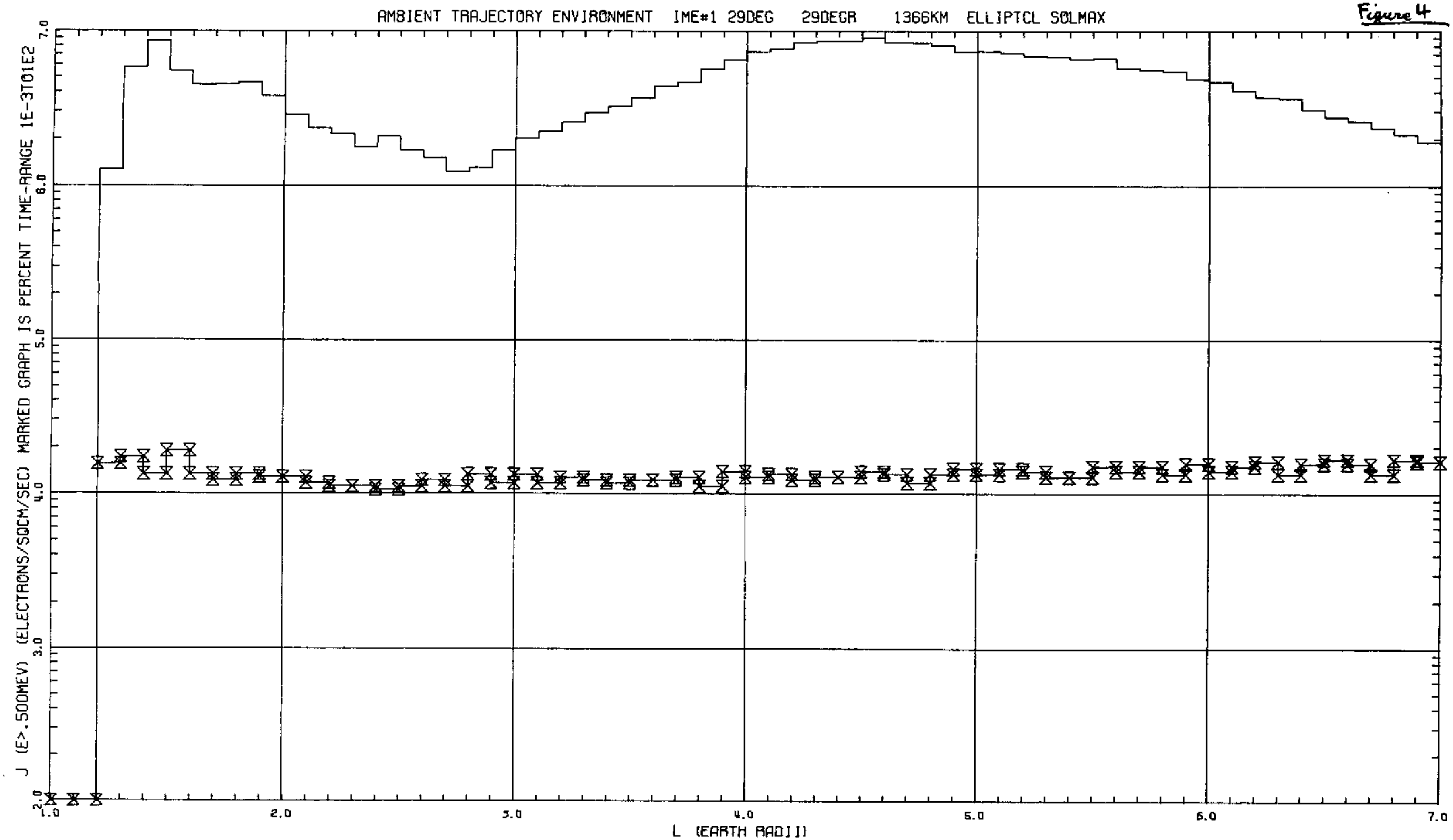
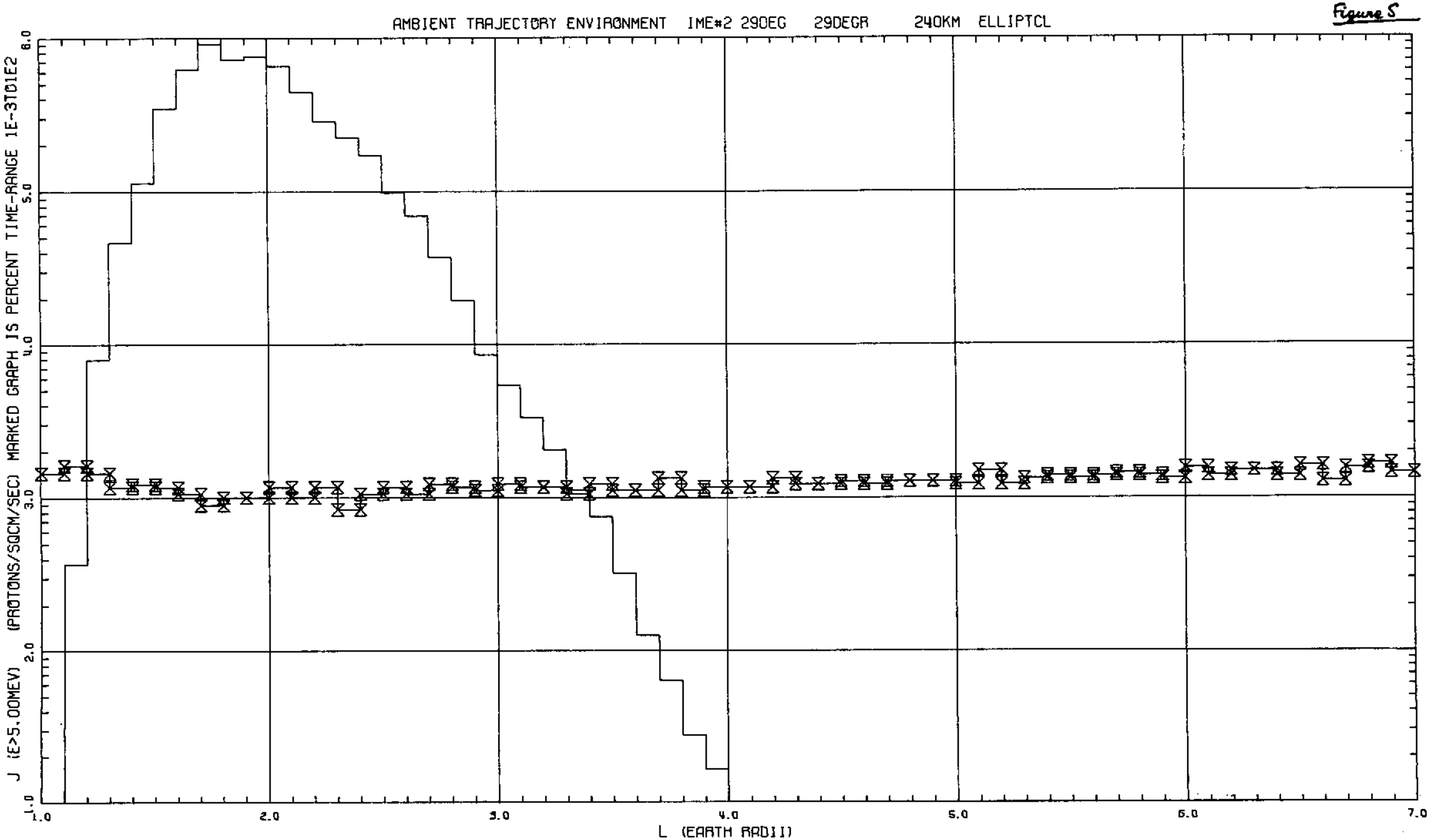
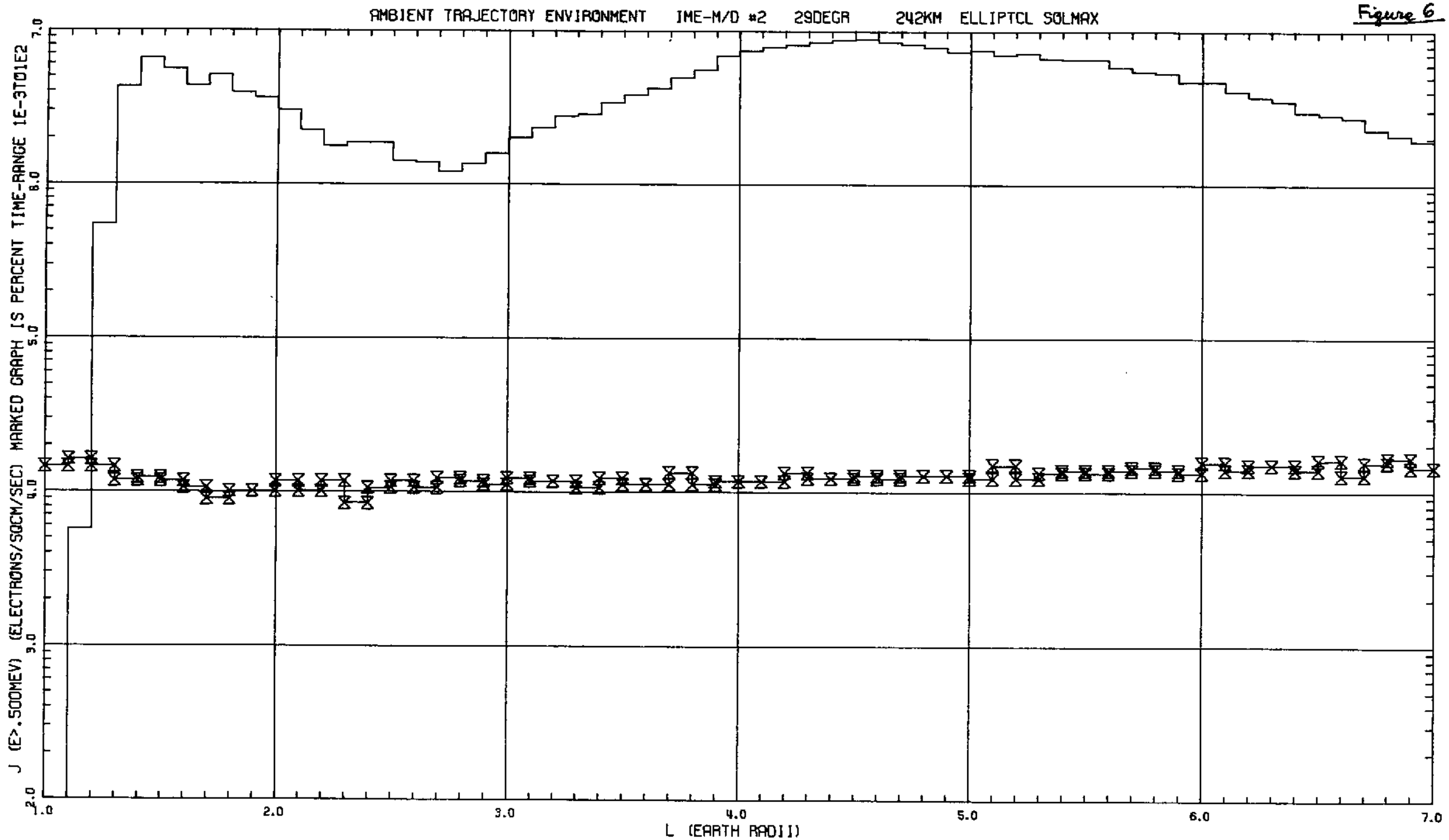


Figure 4
AMBIENT TRAJECTORY ENVIRONMENT IME#1 29DEG 29DEGR 1366KM ELLIPTCL SOLMAX
J (E>.500MEV) (ELECTRONS/SQCM/SEC) MARKED GRAPH IS PERCENT TIME-RANGE 1E-3TO1E2
L (EARTH RADII)
1.0
2.0
3.0
4.0
5.0
6.0
7.0

Figure 5

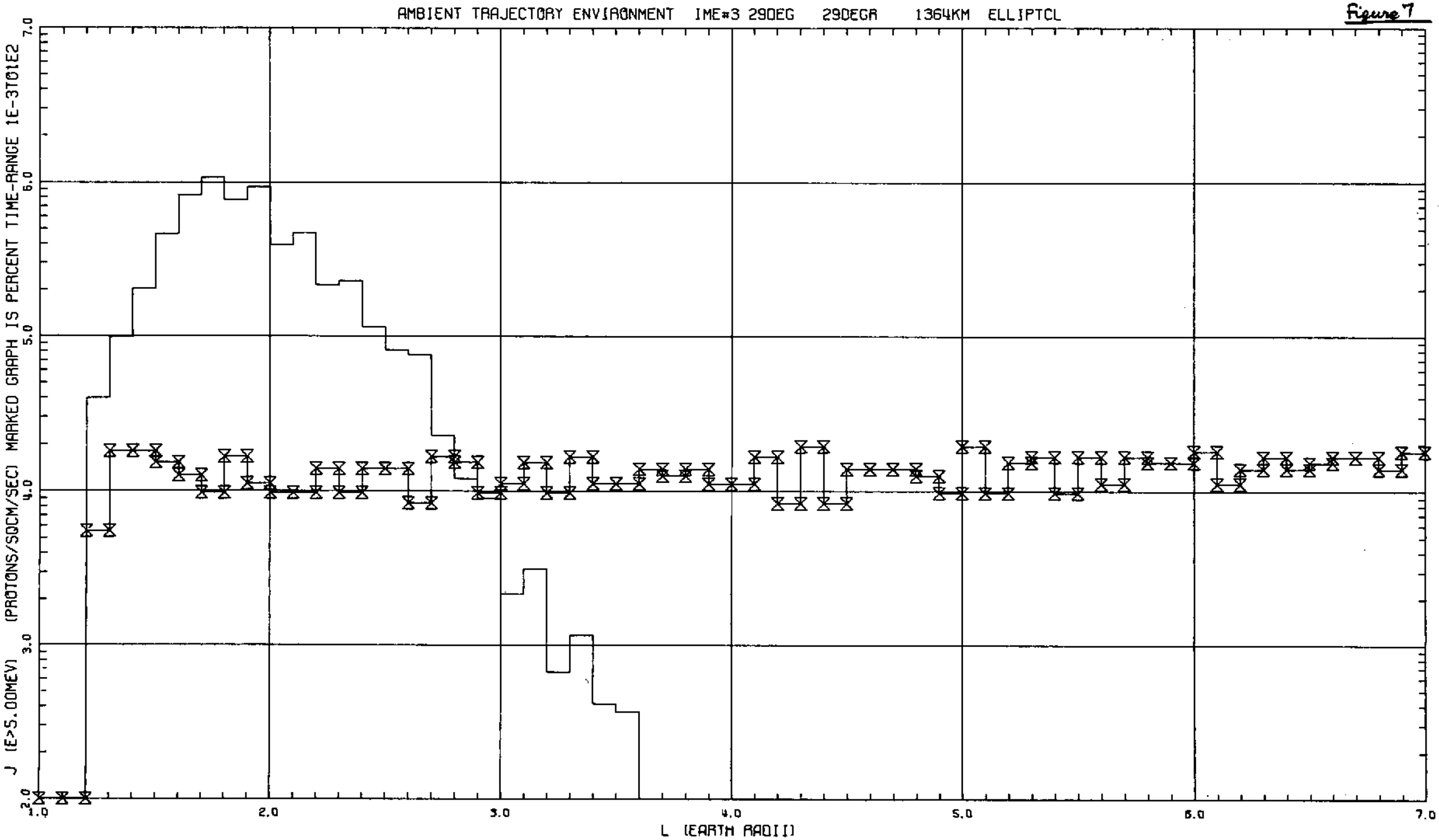

AMBIENT TRAJECTORY ENVIRONMENT IME#2 29DEG 29DEGR 240KM ELLIPTCL
J (E>5.00MEV) (PROTONS/SQCM/SEC) MARKED GRAPH IS PERCENT TIME-RANGE 1E-3TO1E2
1.0
2.0
3.0
4.0
5.0
6.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
L (EARTH RADII)



AMBIENT TRAJECTORY ENVIRONMENT IME-M/D #2 29DEGR 242KM ELLIPTCL SOLMAX
J (E>.500MEV) (ELECTRONS/SQCM/SEC) MARKED GRAPH IS PERCENT TIME-RANGE 1E-3TO1E2
L (EARTH RADII)
1.0
2.0
3.0
4.0
5.0
6.0
7.0

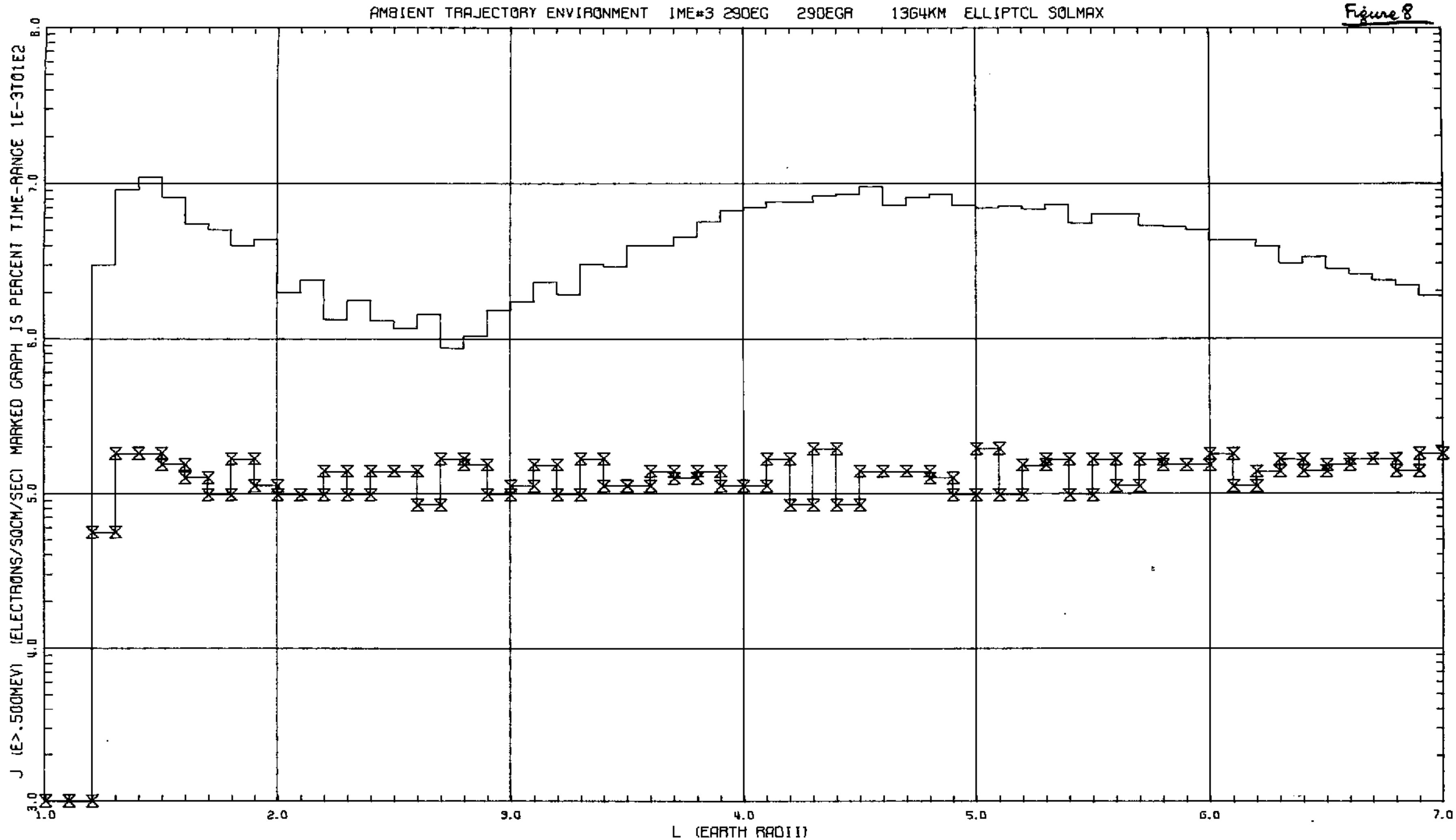
Figure 6

Figure 7

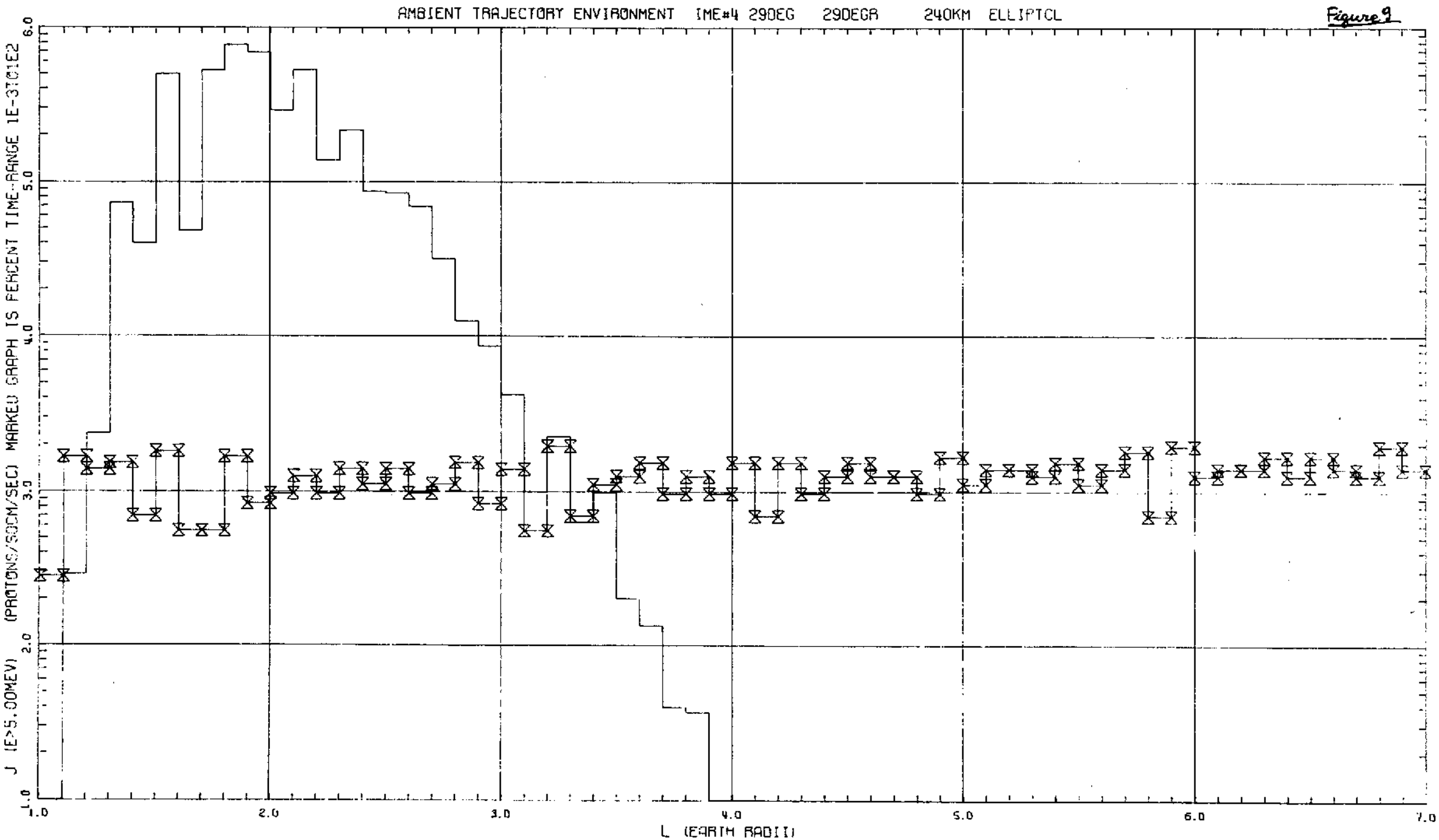


AMBIENT TRAJECTORY ENVIRONMENT IME#3 29DEG 29DEGR 1364KM ELLIPTCL
J (E>5.00MEV) (PROTONS/SQCM/SEC) MARKED GRAPH IS PERCENT TIME-RANGE 1E-3TO1E2
2.0
3.0
4.0
5.0
6.0
7.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
L (EARTH RADII)

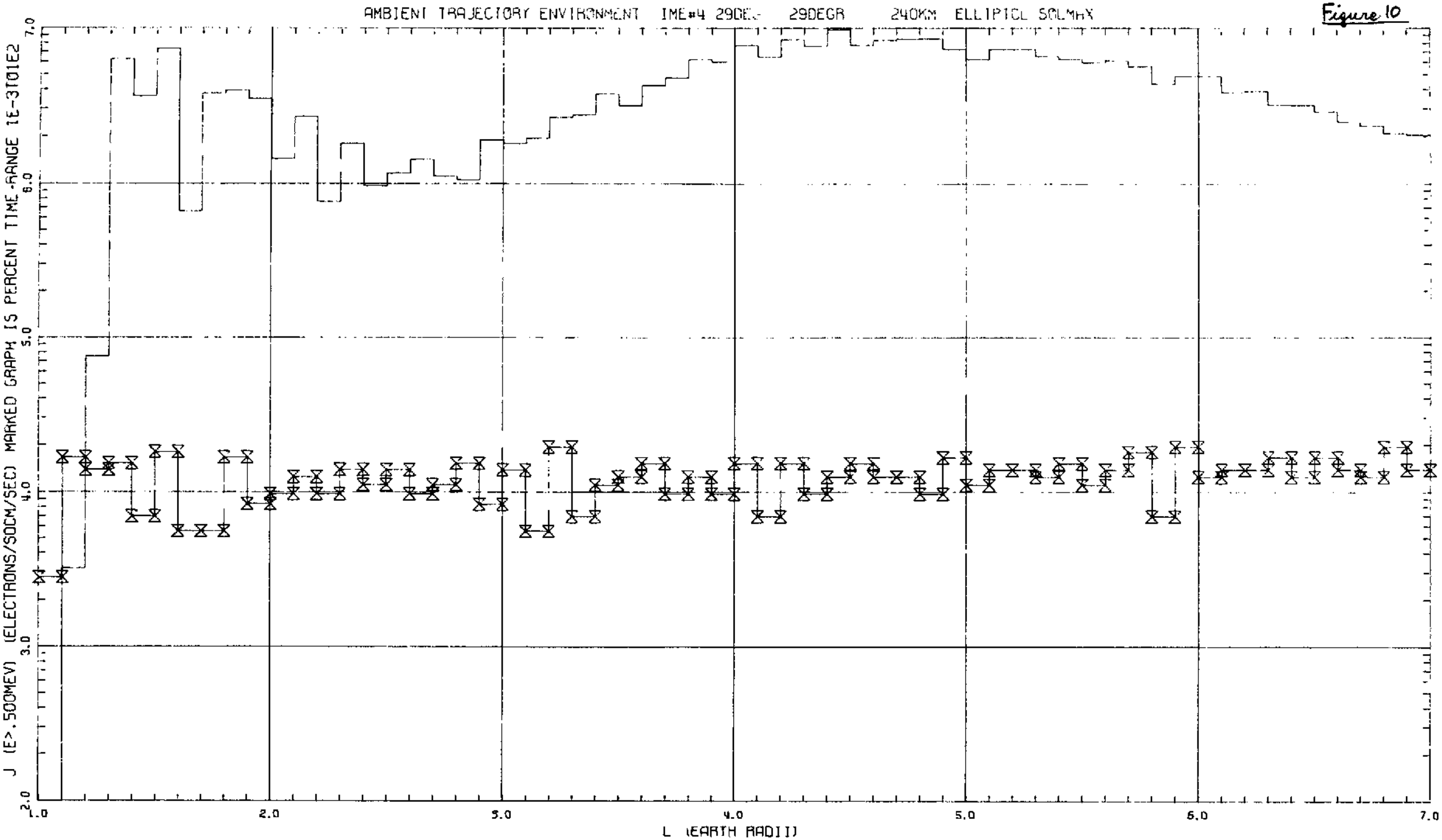
Figure 8

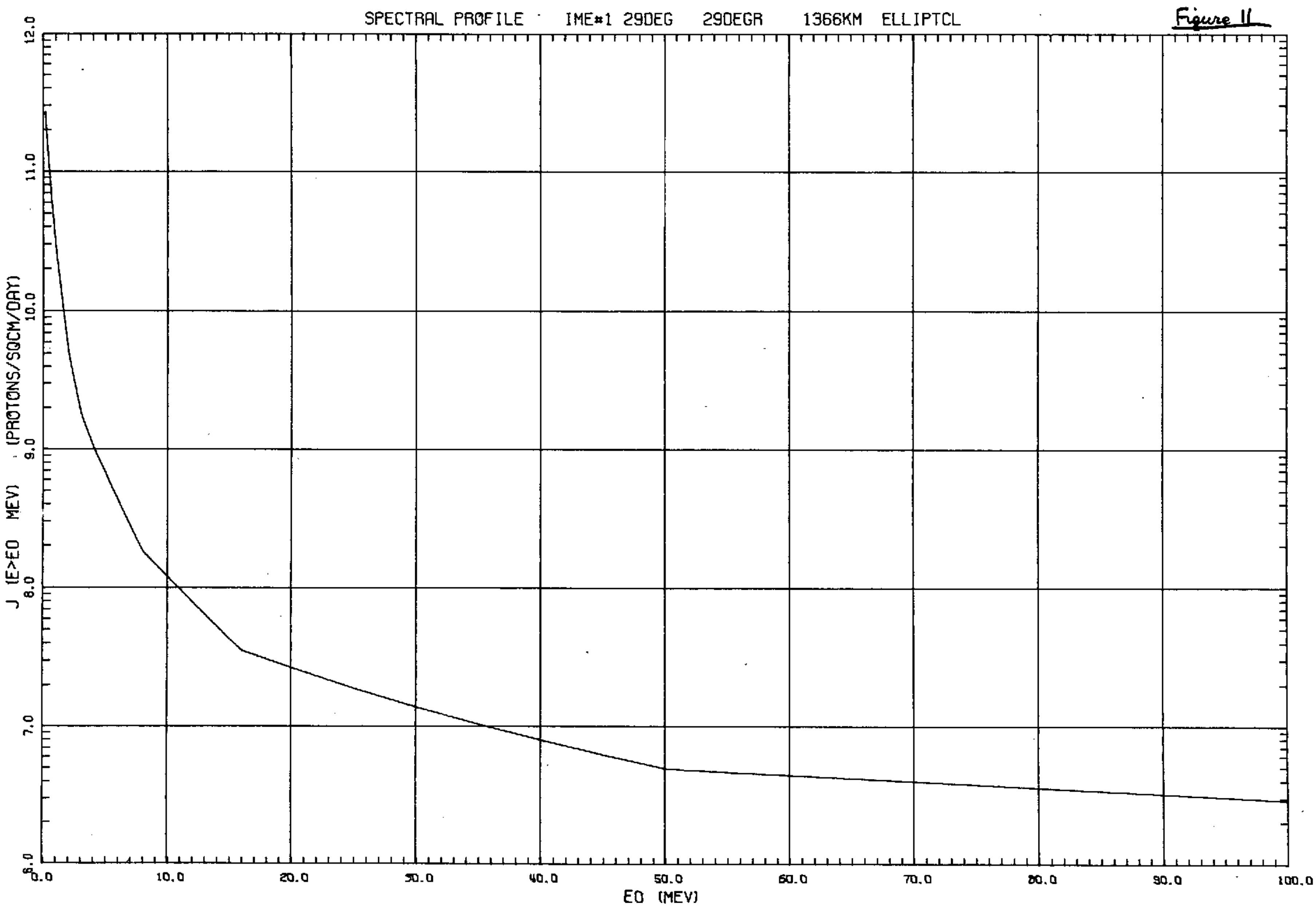


AMBIENT TRAJECTORY ENVIRONMENT IME#3 29DEG 29DEGR 1364KM ELLIPTCL SOLMAX
J (E>.500MEV) (ELECTRONS/SQCM/SEC) MARKED GRAPH IS PERCENT TIME-RANGE 1E-3TO1E2
3.0
4.0
5.0
6.0
7.0
8.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
L (EARTH RADII)

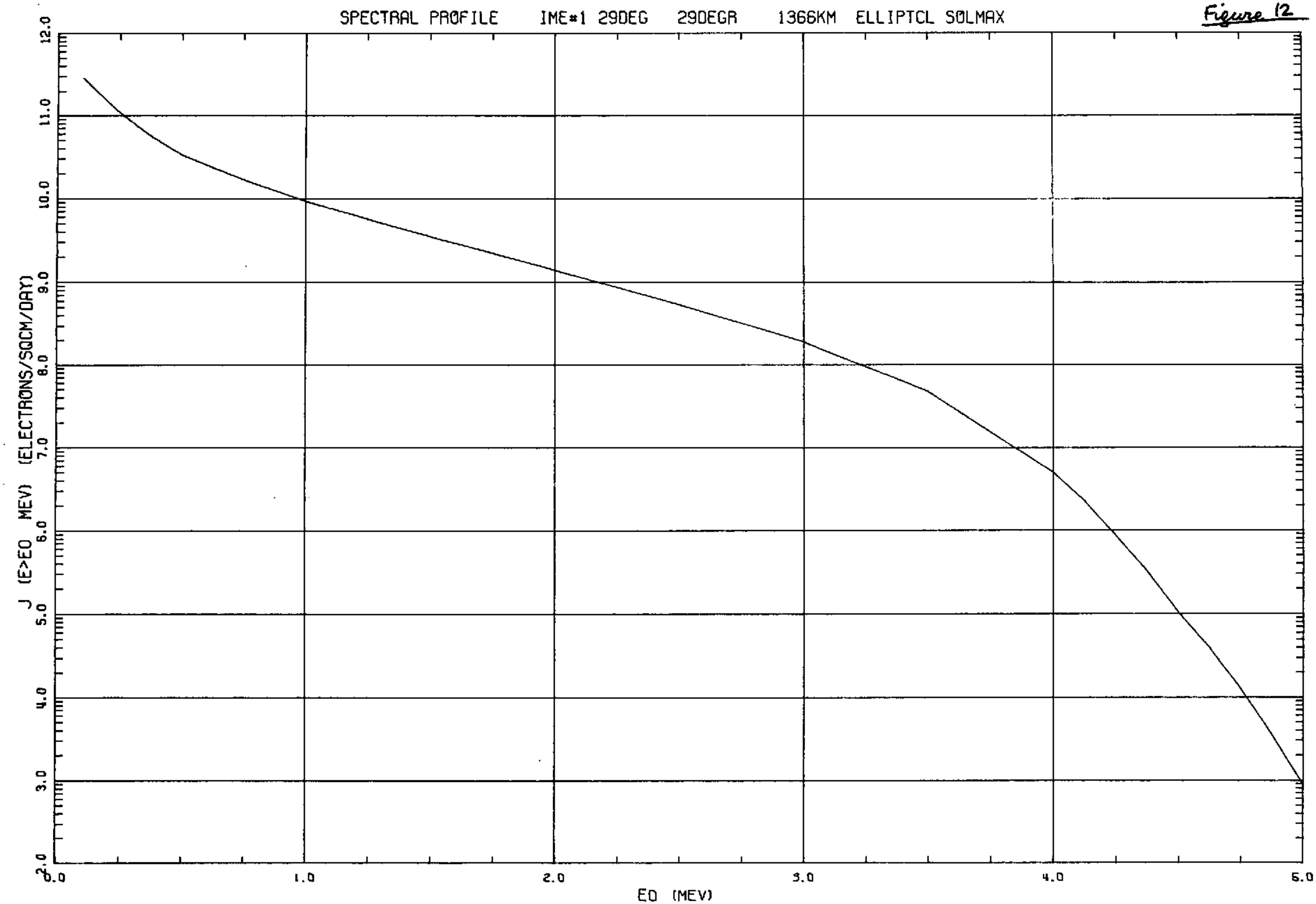


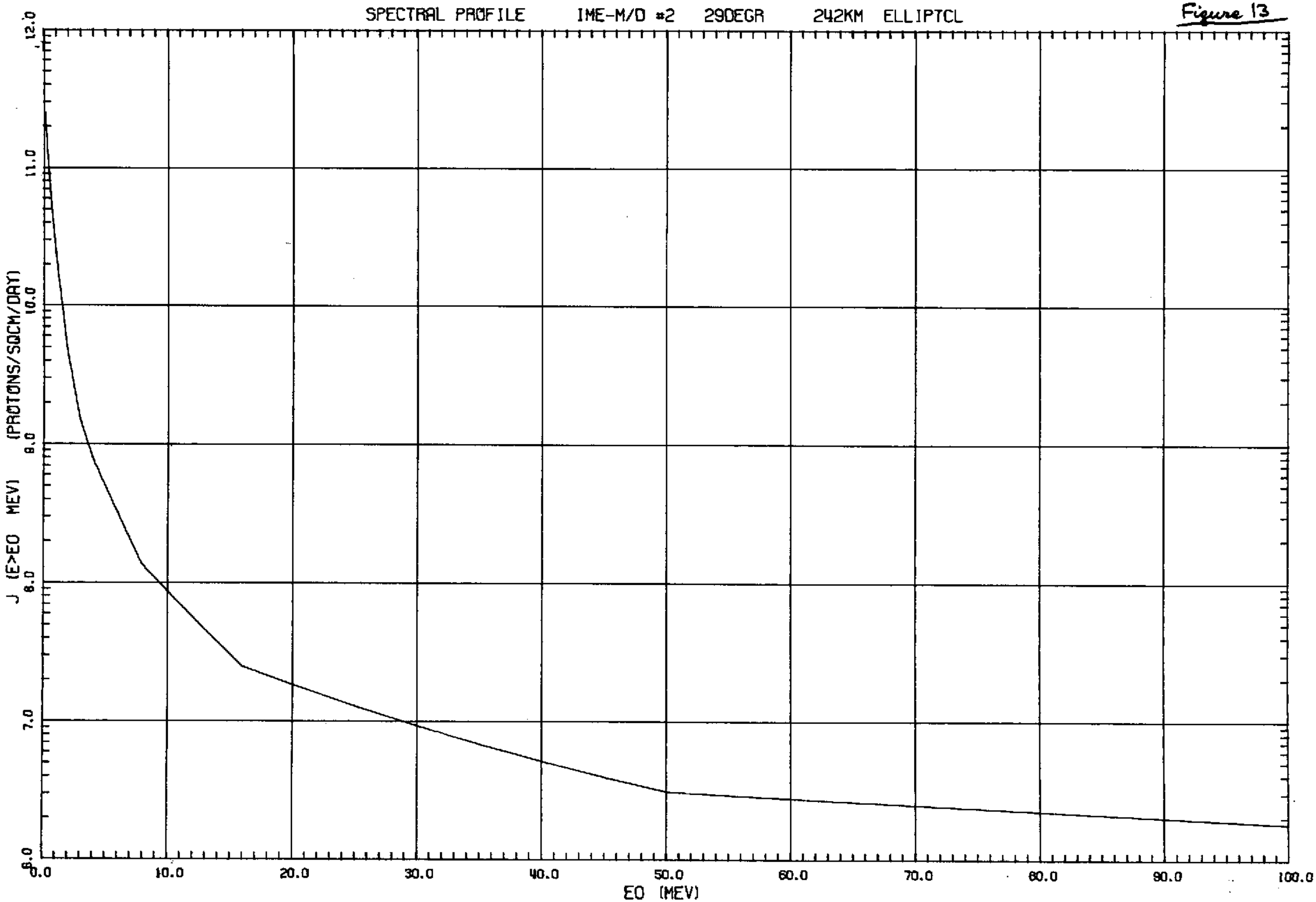
AMBIENT TRAJECTORY ENVIRONMENT IME#4 29DEG 29DEGR 240KM ELLIPTCL
Figure 9
J (E>5.00MEV) (PROTONS/SQCM/SEC) MARKED GRAPH IS PERCENT TIME-RANGE 1E-3TO1E2
1.0
2.0
3.0
4.0
5.0
6.0
7.0
L (EARTH RADII)


AMBIENT TRAJECTORY ENVIRONMENT IME#4 29DEG 29DEGR 240KM ELLIPTICL SOLMAX
Figure 10
J (E>.500MEV) (ELECTRONS/SQCM/SEC) MARKED GRAPH IS PERCENT TIME-RANGE 1E-3TO1E2
2.0
3.0
4.0
5.0
6.0
7.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
L (EARTH RADII)

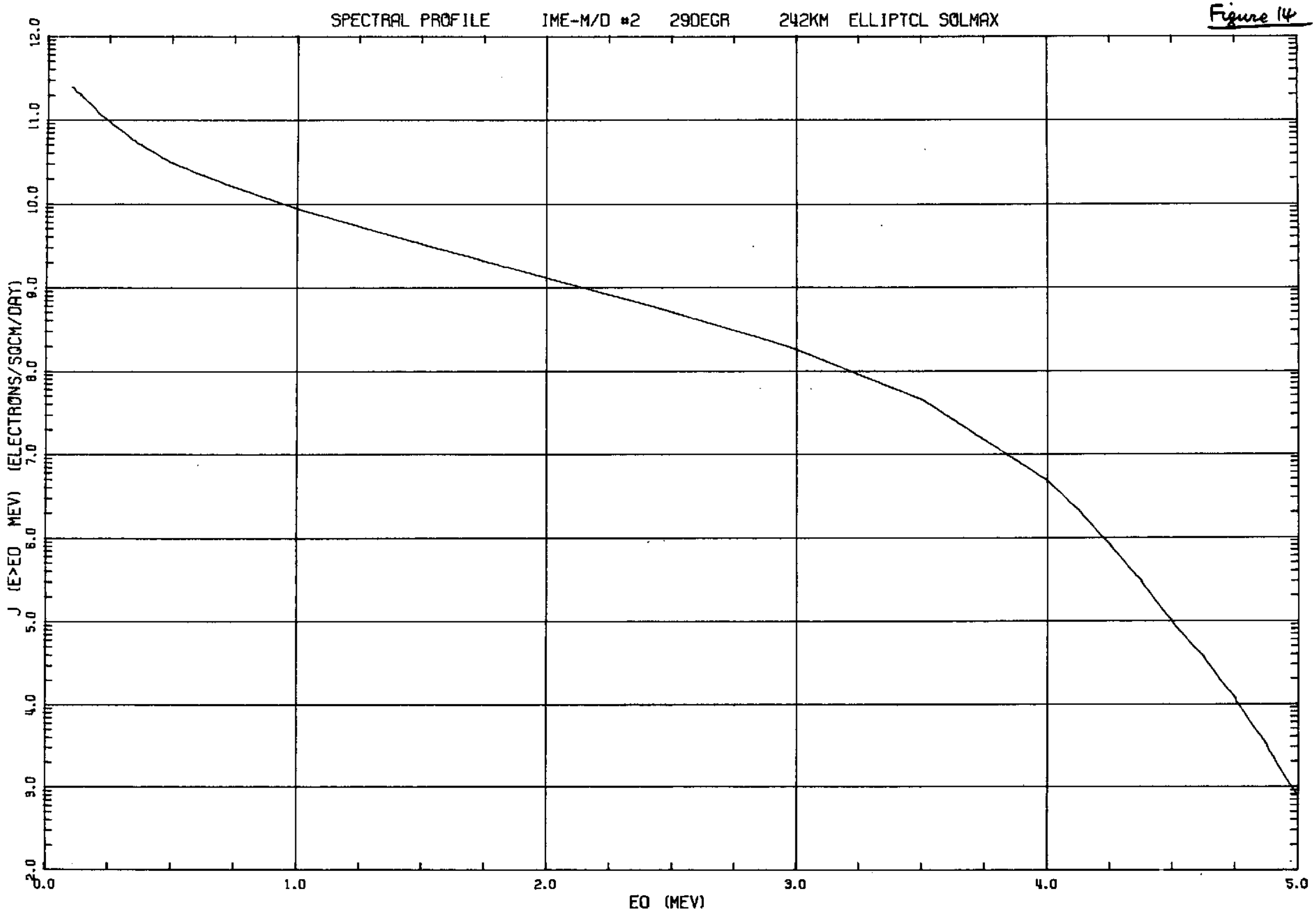


SPECTRAL PROFILE IME*1 29DEG 29DEGR 1366KM ELLIPTCL
Figure 11
J (E>E0 MEV) (PROTONS/SQCM/DAY)
E0 (MEV)
6.0
7.0
8.0
9.0
10.0
11.0
12.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0


SPECTRAL PROFILE IME*1 29DEG 29DEGR 1366KM ELLIPTCL SOLMAX
J (E>EO MEV) (ELECTRONS/SQCM/DAY)
EO (MEV)
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
0.0
1.0
2.0
3.0
4.0
5.0
Figure 12

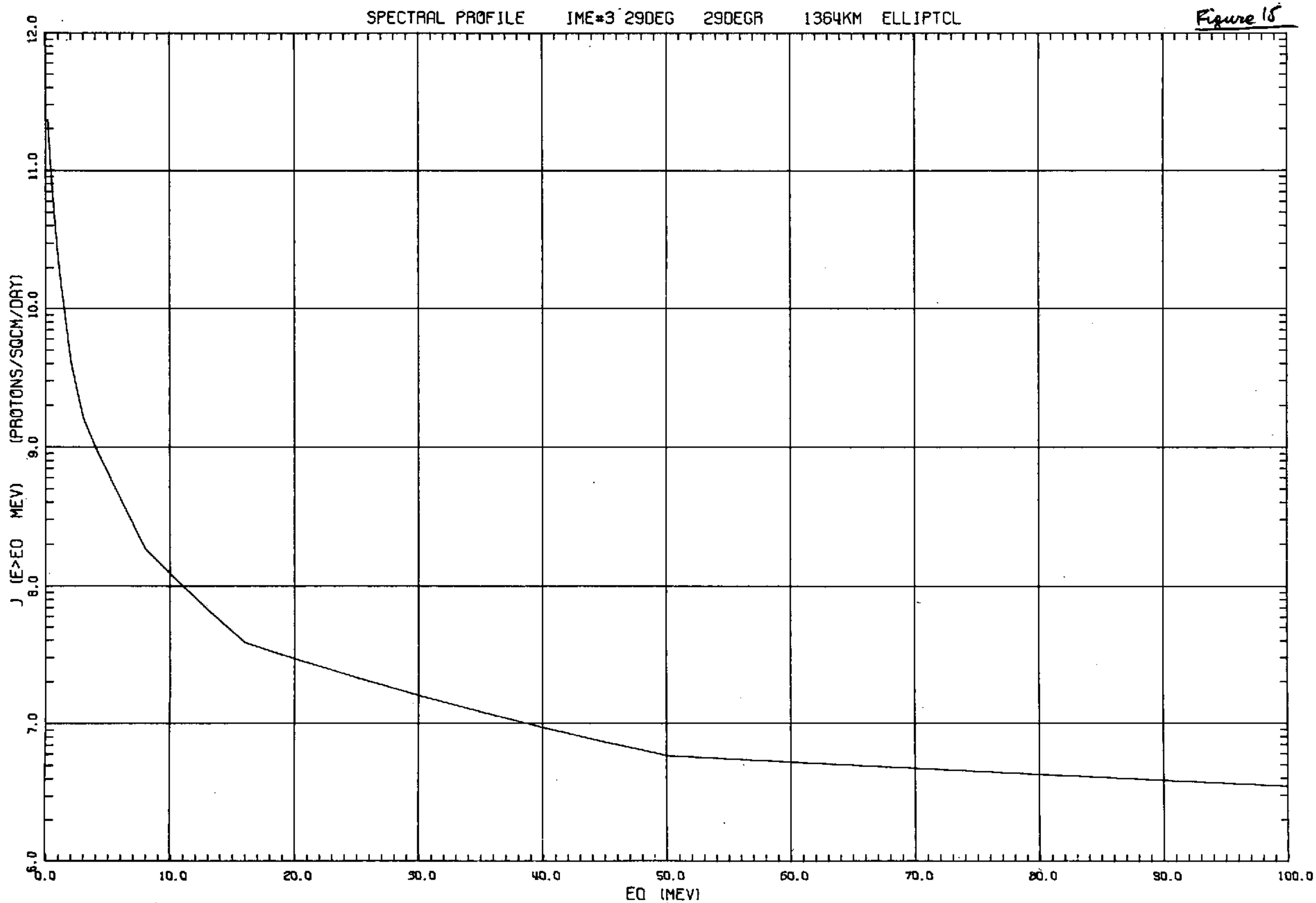


SPECTRAL PROFILE IME-M/D #2 290EGR 242KM ELLIPTCL
Figure 13
J (E>EO MEV) (PROTONS/SQCM/DAY)
12.0
11.0
10.0
9.0
8.0
7.0
6.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
EO (MEV)

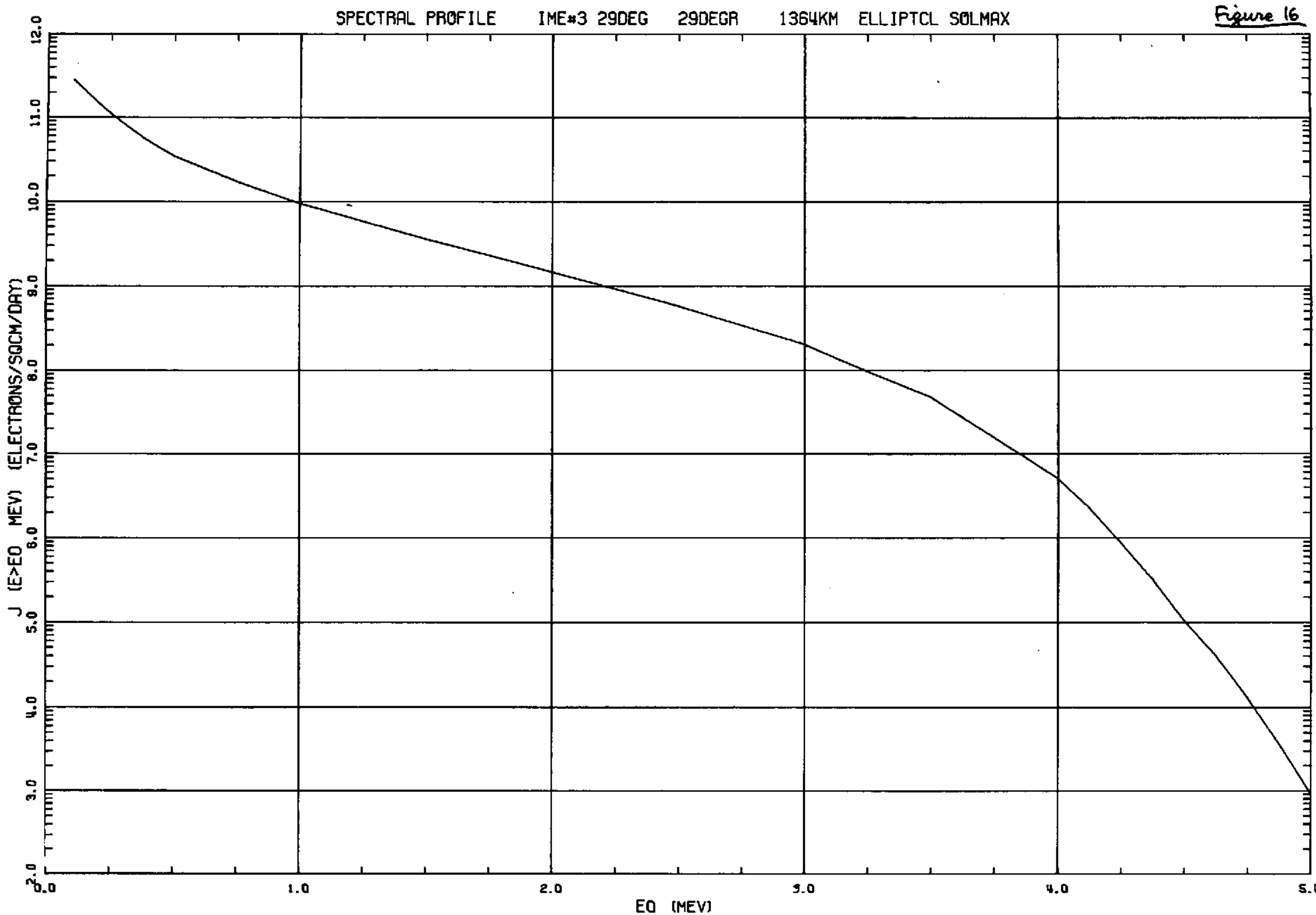


SPECTRAL PROFILE IME-M/D #2 29DEGR 242KM ELLIPTCL SOLMAX
Figure 14
J (E>EO MEV) (ELECTRONS/SQCM/DAY)
EO (MEV)
0.0
1.0
2.0
3.0
4.0
5.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0

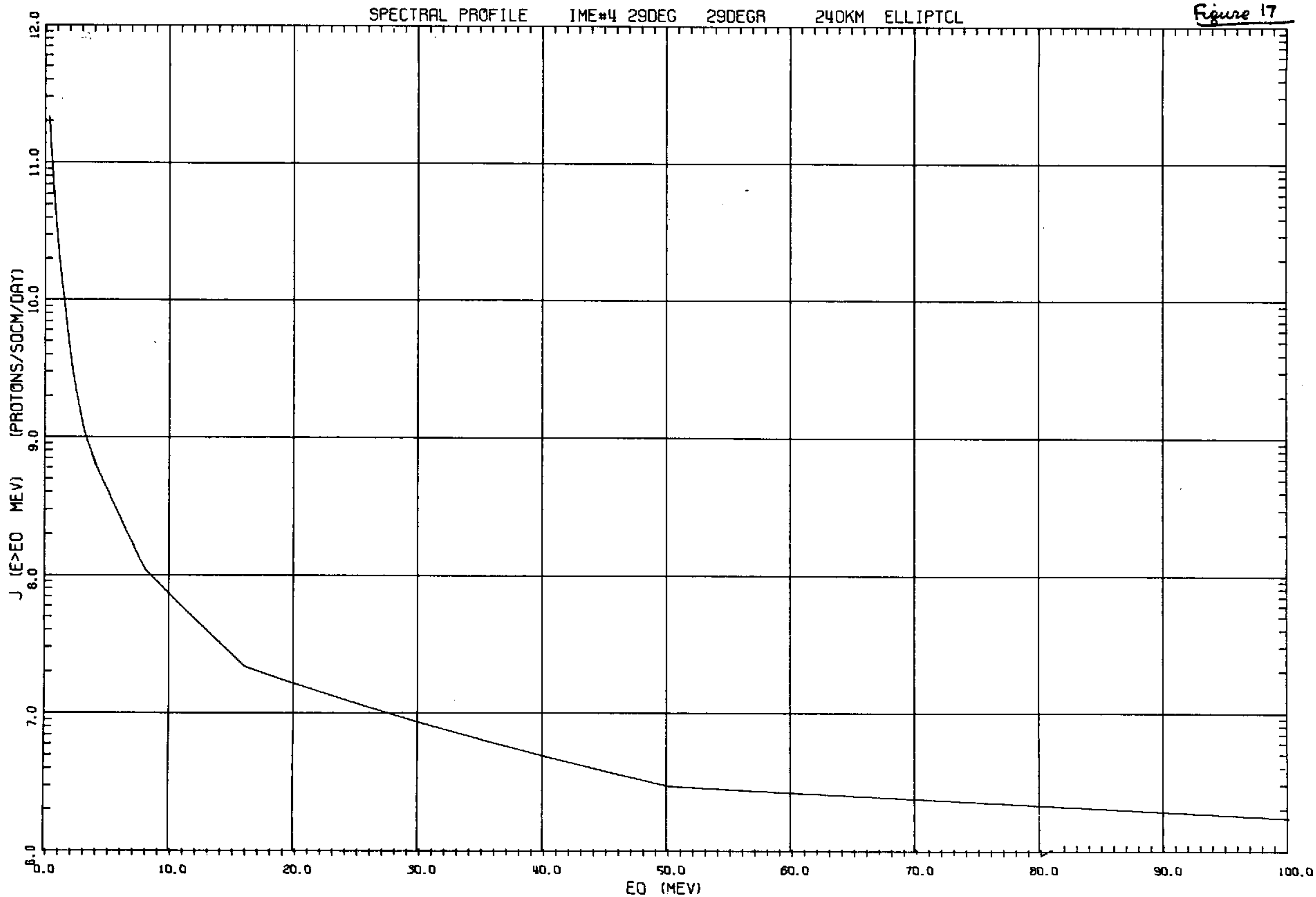
5. 400



SPECTRAL PROFILE IME=3 29DEG 29DEGR 1364KM ELLIPTCL
Figure 15
J (E>EO MEV) (PROTONS/SQCM/DAY)
12.0
11.0
10.0
9.0
8.0
7.0
6.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
EO (MEV)



SPECTRAL PROFILE IME#3 29DEG 29DEGR 1364KM ELLIPTCL SOLMAX
Figure 16
J (E>EO MEV) (ELECTRONS/SQCM/DAY)
EO (MEV)
0.0
1.0
2.0
3.0
4.0
5.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0


SPECTRAL PROFILE IME#4 29DEG 29DEGR 240KM ELLIPTCL
Figure 17
J (E>EO MEV) (PROTONS/SQCM/DAY)
12.0
11.0
10.0
9.0
8.0
7.0
6.0
0.0
10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
EO (MEV)

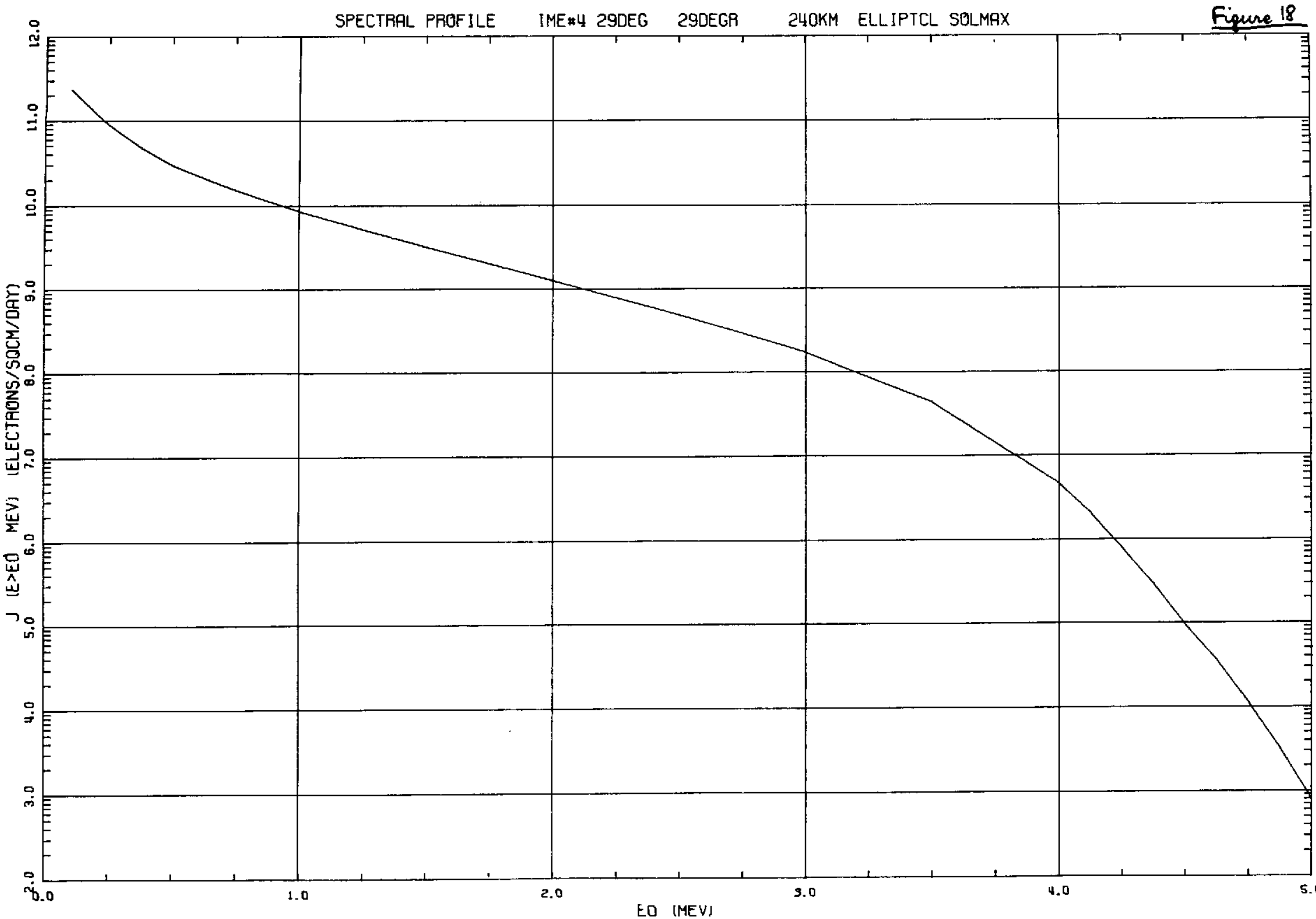
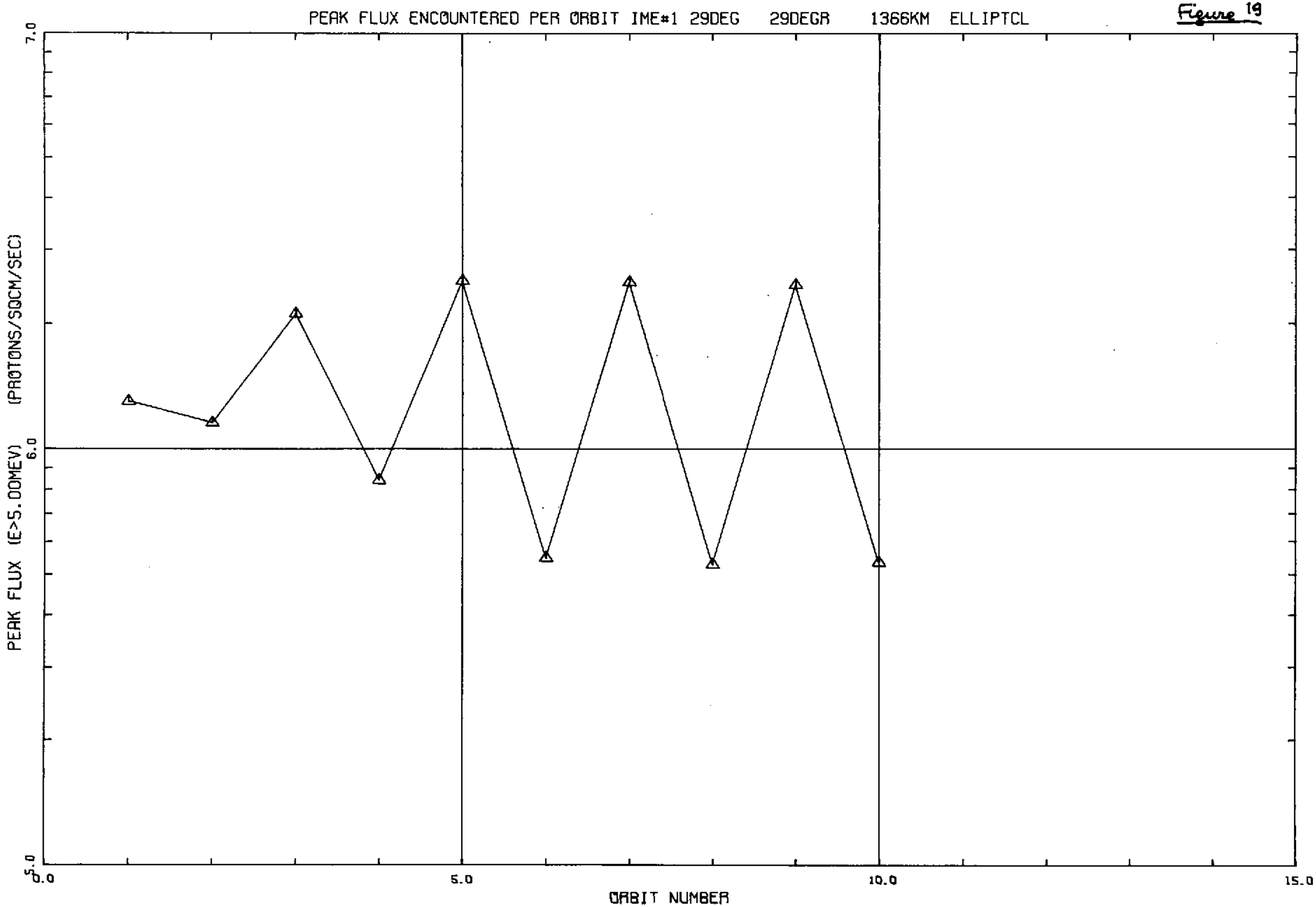
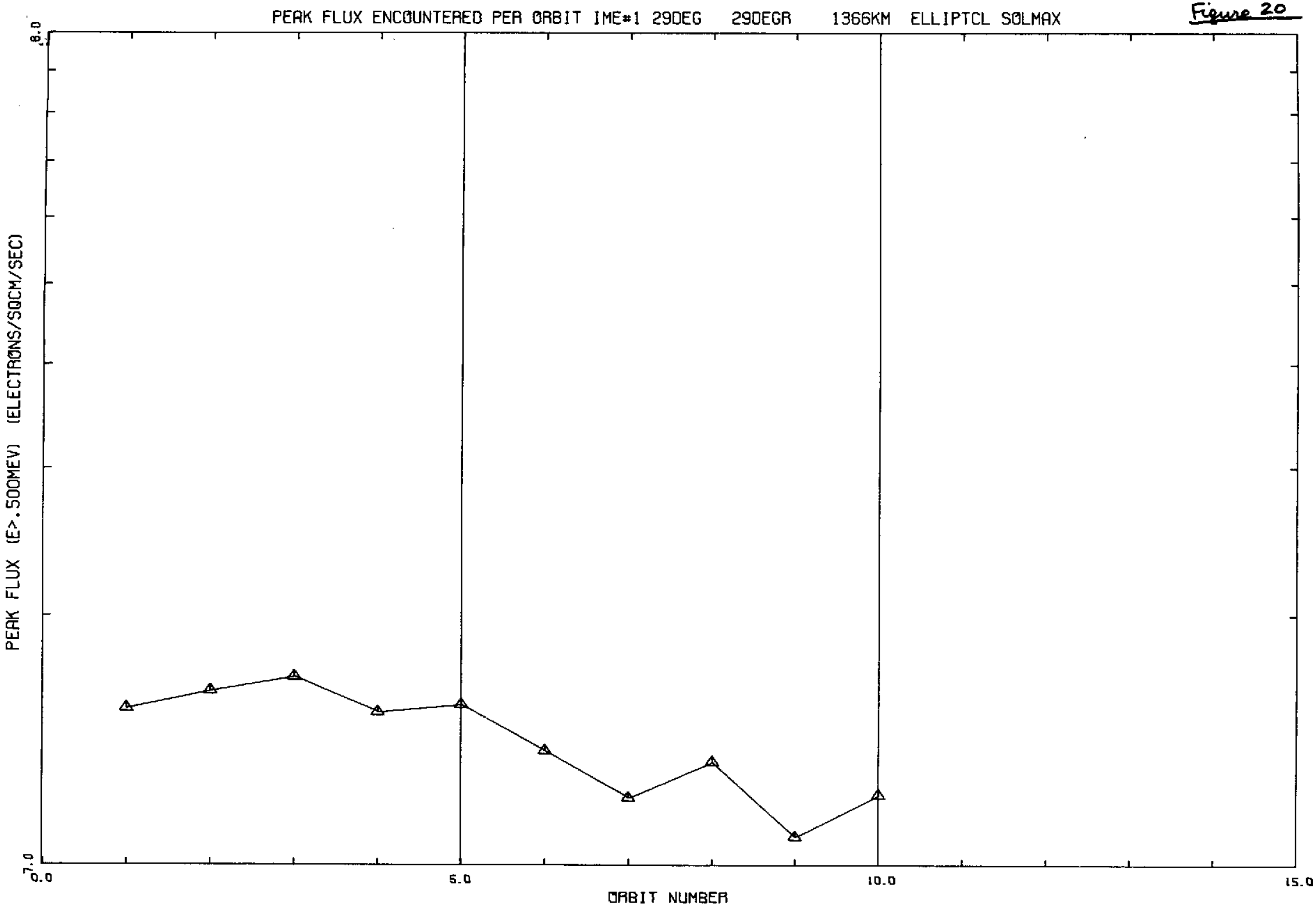

SPECTRAL PROFILE IME#4 29DEG 29DEGR 240KM ELLIPTCL SOLMAX
Figure 18
J (E>EO MEV) (ELECTRONS/SQCM/DAY)
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
0.0
1.0
2.0
3.0
4.0
5.0
EO (MEV)

Figure 19



PEAK FLUX ENCOUNTERED PER ORBIT IME#1 29DEG 29DEGR 1366KM ELLIPTCL
PEAK FLUX (E>5.00MEV) (PROTONS/SQCM/SEC)
7.0
6.0
5.0
0.0
5.0
10.0
15.0
ORBIT NUMBER

Figure 20



PEAK FLUX ENCOUNTERED PER ORBIT IME#1 29DEG 29DEGR 1366KM ELLIPTCL SOLMAX
PEAK FLUX (E>.500MEV) (ELECTRONS/SQCM/SEC)
8.0
7.0
0.0
5.0
10.0
15.0
ORBIT NUMBER

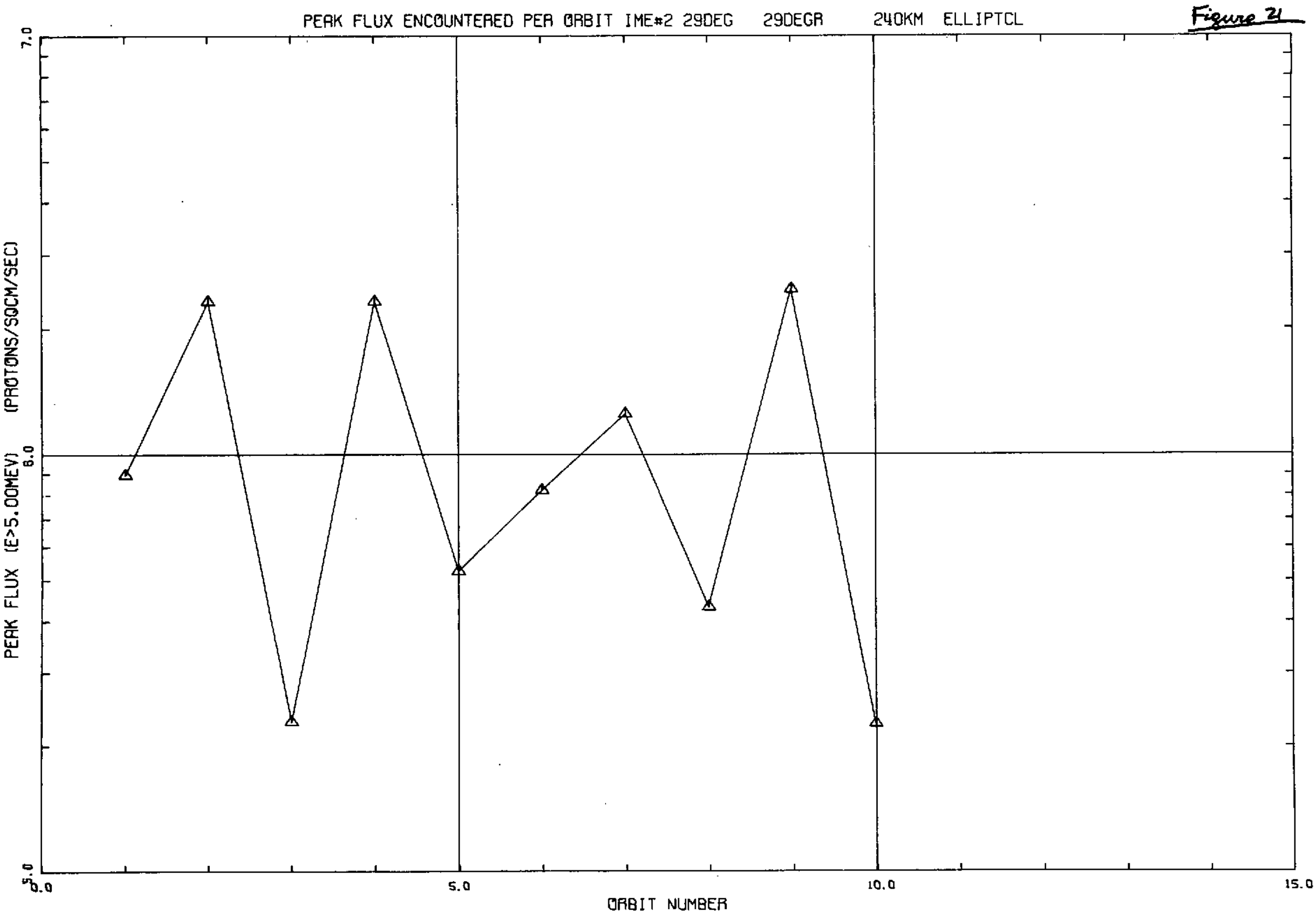


Figure 21
PEAK FLUX ENCOUNTERED PER ORBIT IME#2 29DEG 29DEGR 240KM ELLIPTCL
PEAK FLUX (E>5.00MEV) (PROTONS/SQCM/SEC)
7.0
6.0
5.0
0.0
5.0
10.0
15.0
ORBIT NUMBER

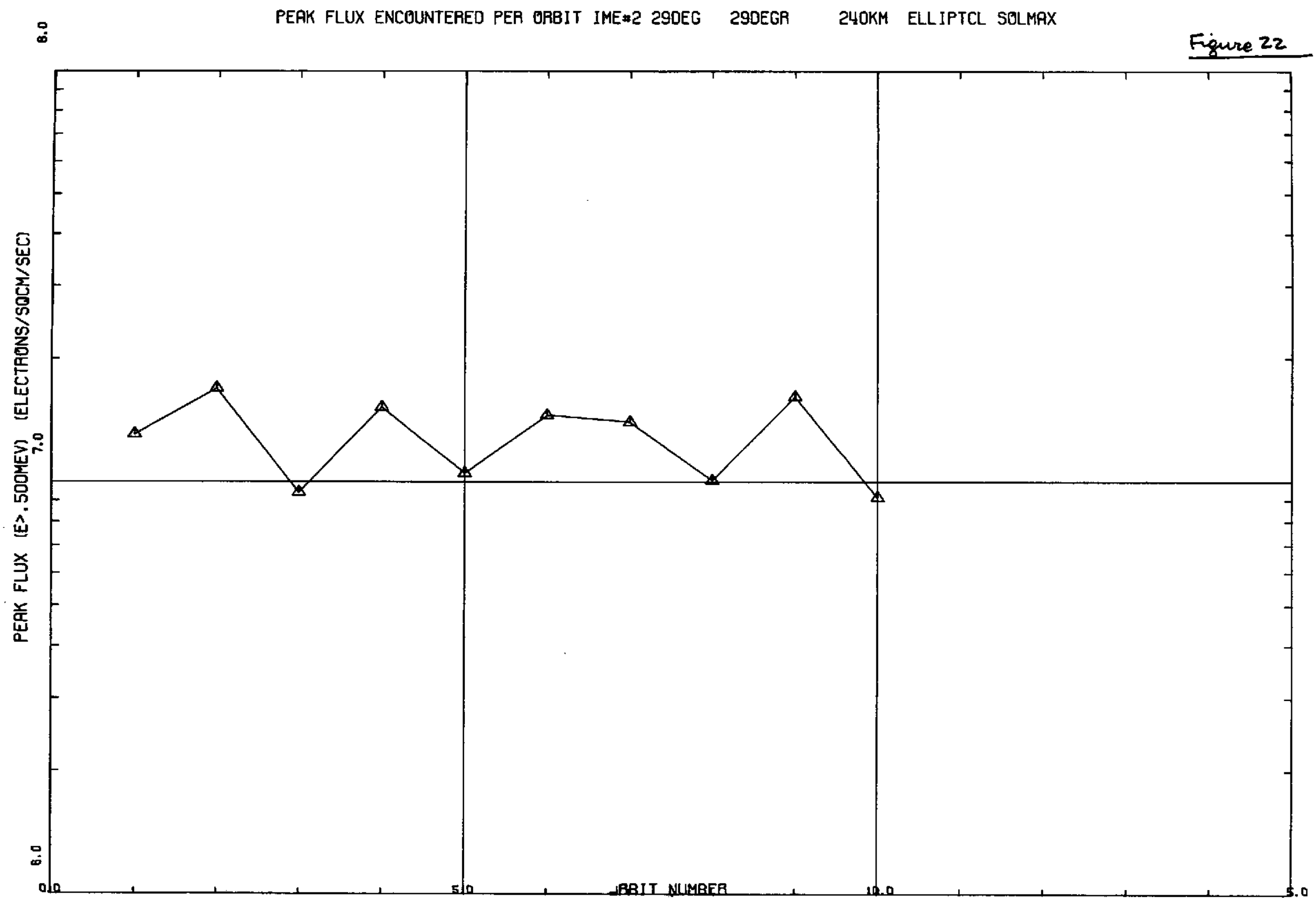

PEAK FLUX ENCOUNTERED PER ORBIT IME*2 29DEG 29DEGR 240KM ELLIPTCL SOLMAX
PEAK FLUX (E>.500MEV) (ELECTRONS/SQCM/SEC)
8.0
7.0
6.0
0.0
5.0
10.0
5.0
ORBIT NUMBER

Figure 22

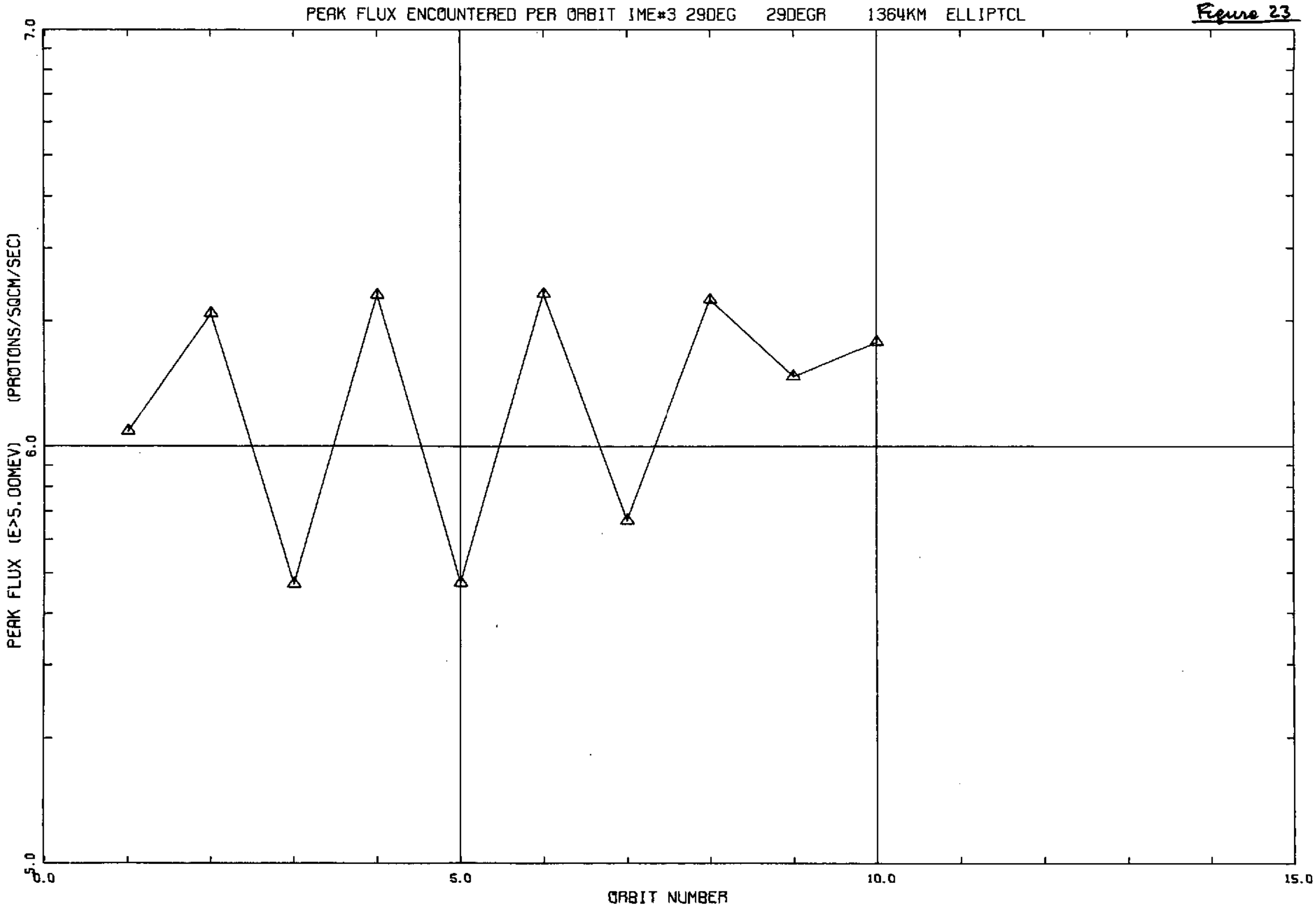
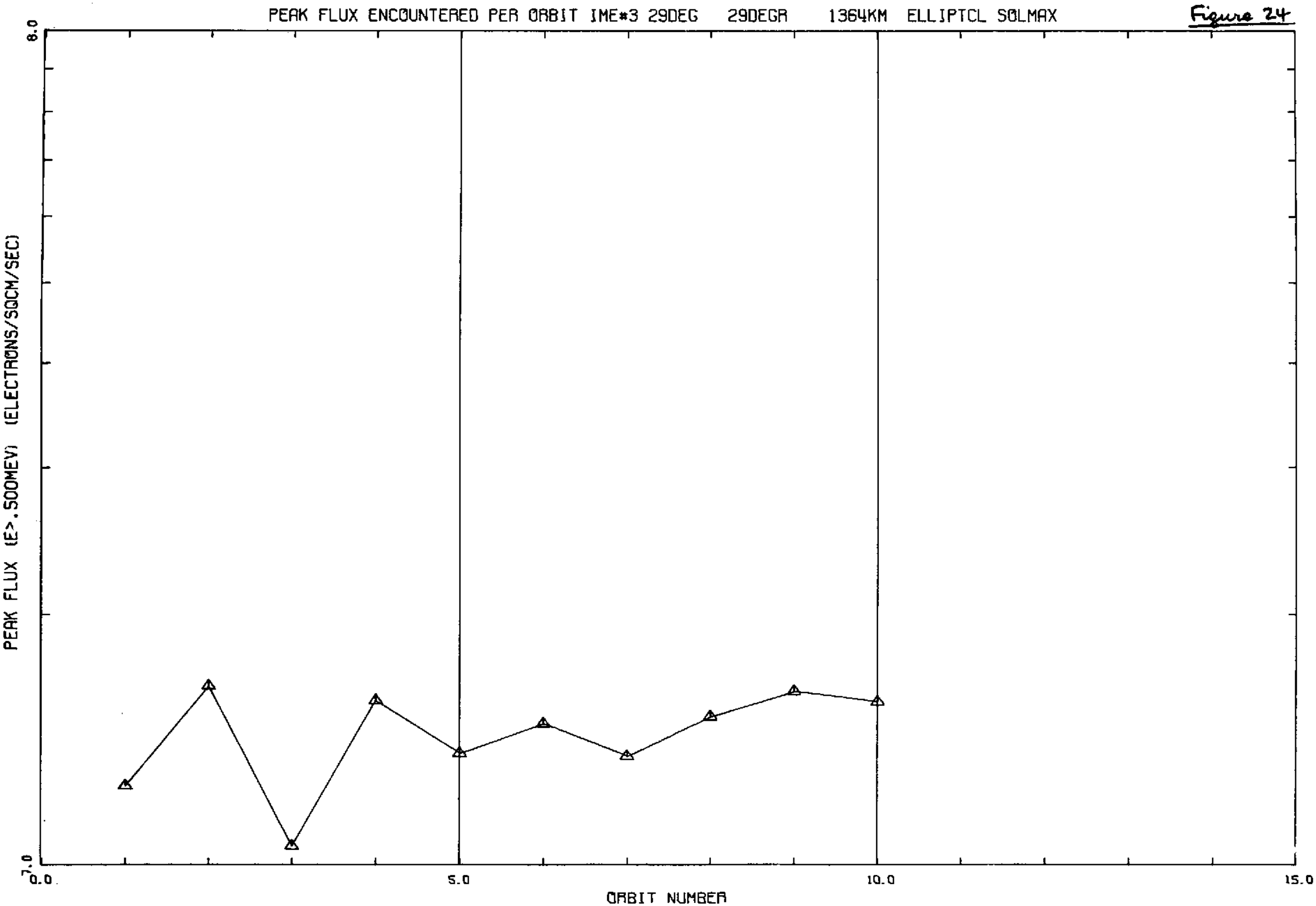

PEAK FLUX ENCOUNTERED PER ORBIT IME*3 29DEG 29DEGR 1364KM ELLIPTCL
PEAK FLUX (E>5.00MEV) (PROTONS/SQCM/SEC)
7.0
6.0
5.0
0.0
5.0
10.0
15.0
ORBIT NUMBER

Figure 23


PEAK FLUX ENCOUNTERED PER ORBIT IME#3 29DEG 29DEGR 1364KM ELLIPTCL SOLMAX
Figure 24
PEAK FLUX (E>.500MEV) (ELECTRONS/SQCM/SEC)
8.0
7.0
0.0
5.0
10.0
15.0
ORBIT NUMBER

PEAK FLUX ENCOUNTERED PER ORBIT IME#4 29DEG 29DEGR 240KM ELLIPTCL

Figure 25

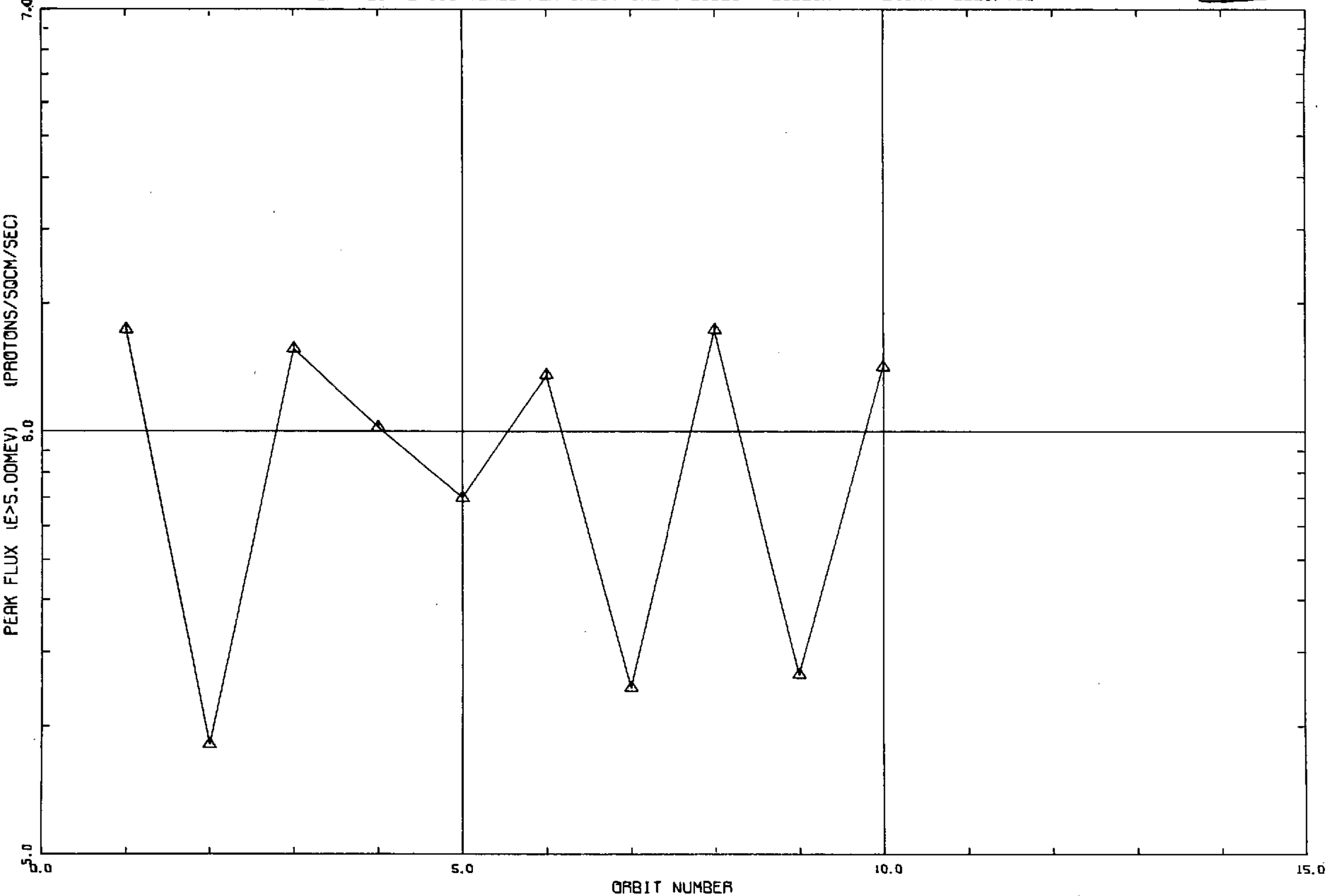


Figure 26

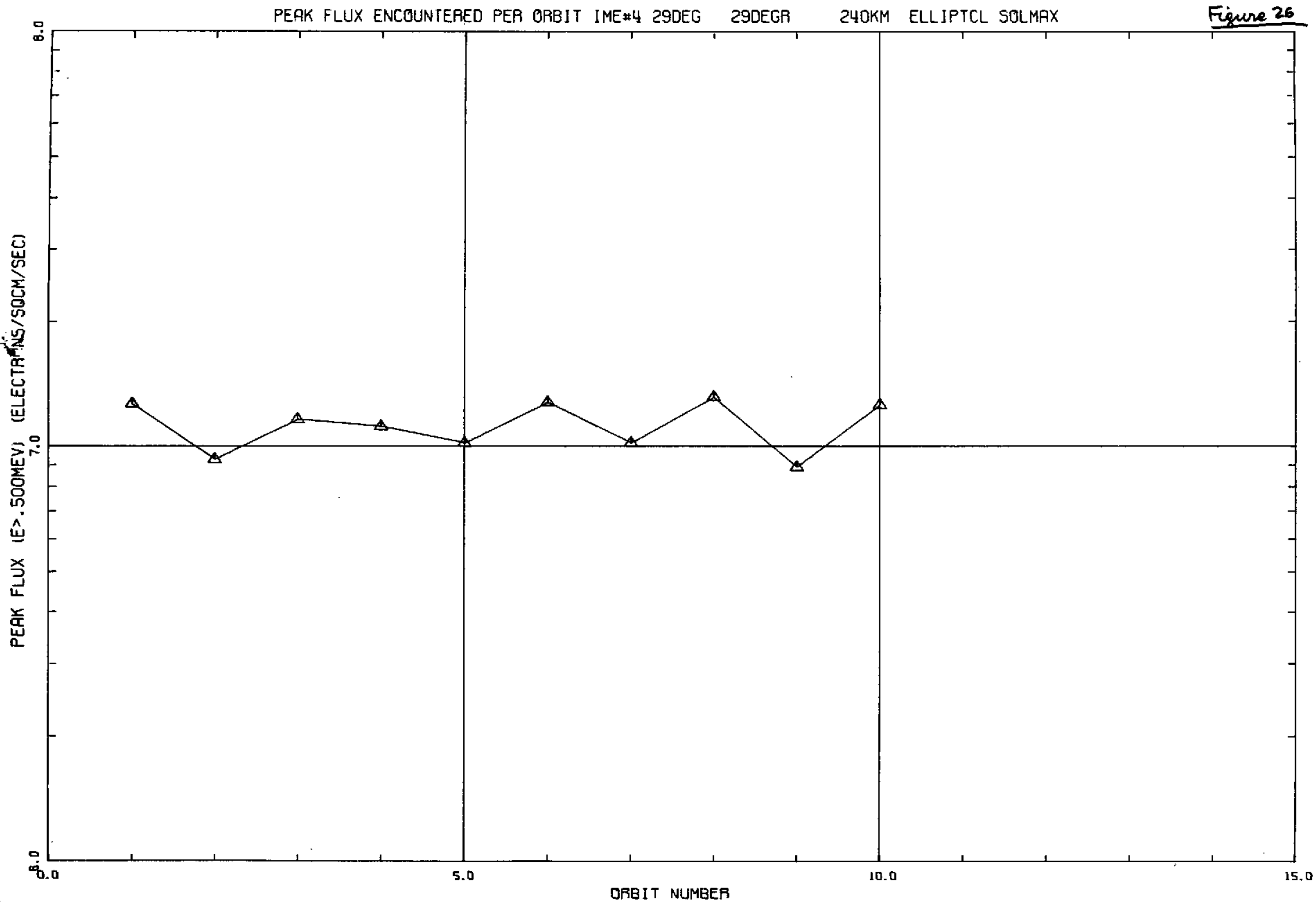

PEAK FLUX ENCOUNTERED PER ORBIT IME#4 29DEG 29DEGR 240KM ELLIPTCL SOLMAX
PEAK FLUX (E>.500MEV) (ELECTRONS/SQCM/SEC)
8.0
7.0
6.0
0.0
5.0
10.0
15.0
ORBIT NUMBER

Figure 27

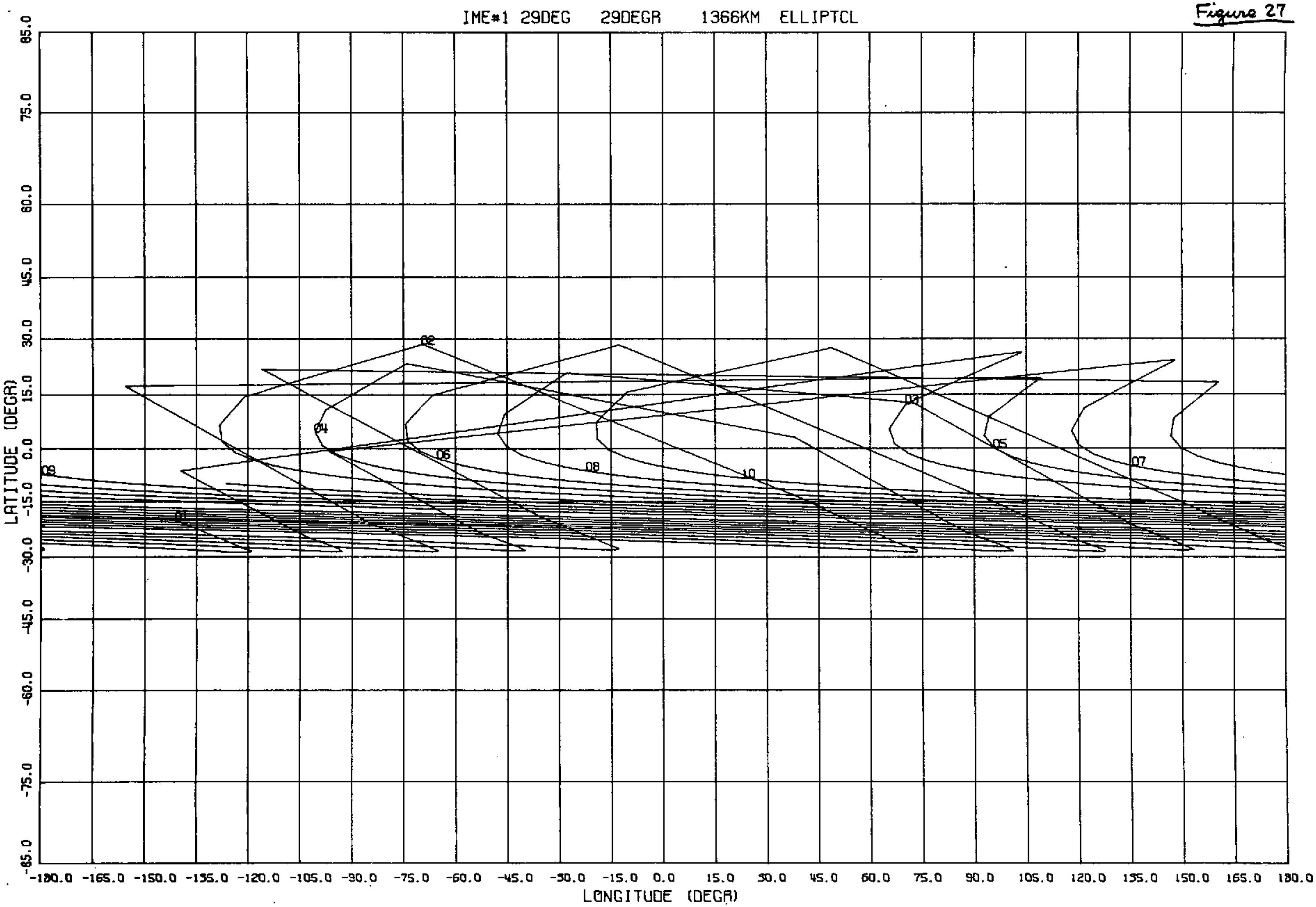
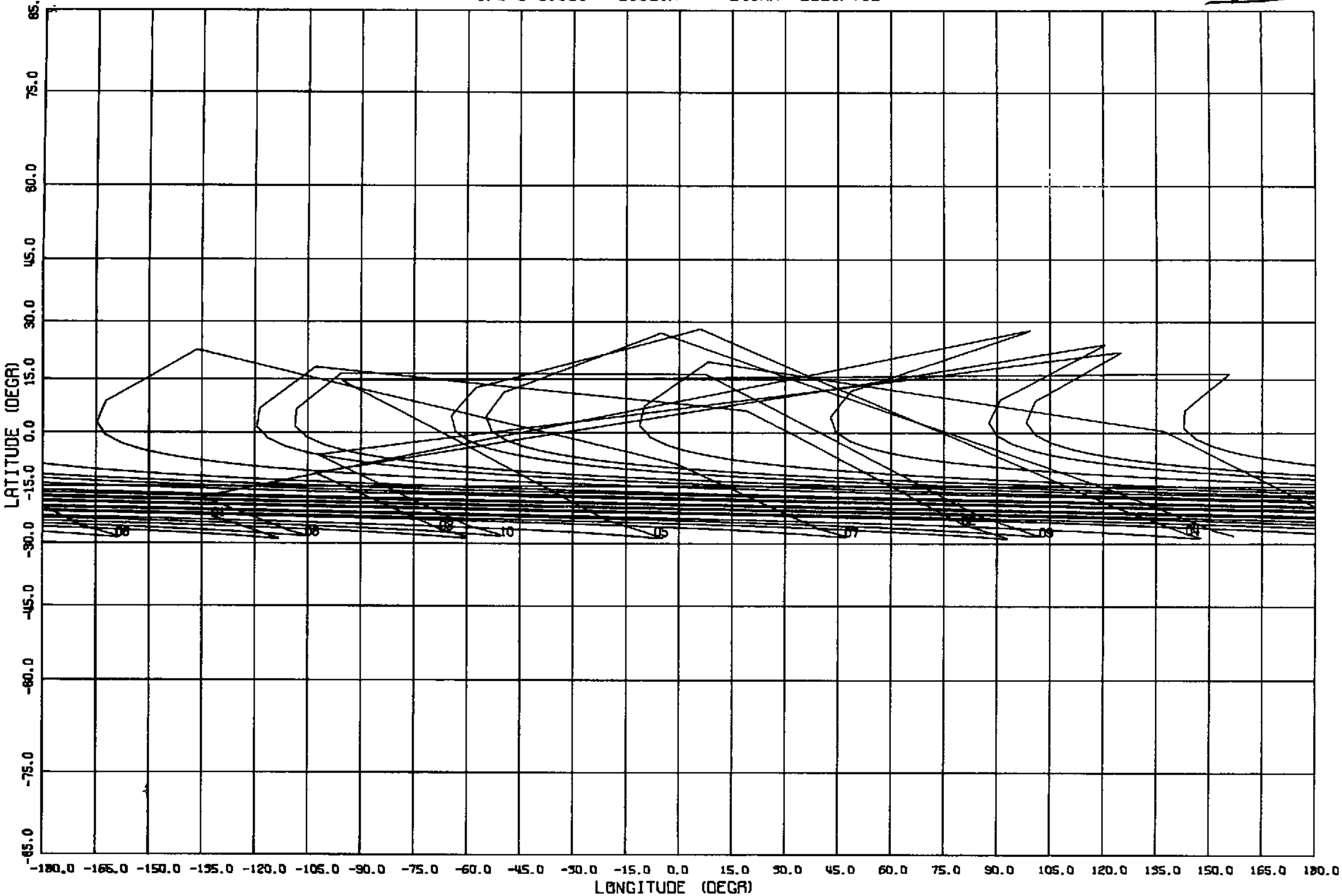

IME*1 29DEG 29DEGR 1366KM ELLIPTCL
LATITUDE (DEGR)
LONGITUDE (DEGR)
85.0
75.0
60.0
45.0
30.0
15.0
0.0
-15.0
-30.0
-45.0
-60.0
-75.0
-85.0
-180.0 -165.0 -150.0 -135.0 -120.0 -105.0 -90.0 -75.0 -60.0 -45.0 -30.0 -15.0 0.0 15.0 30.0 45.0 60.0 75.0 90.0 105.0 120.0 135.0 150.0 165.0 180.0
01
02
03
04
05
06
07
08
09
10

Figure 28

IME*2 29DEG 29DEGR 240KM ELLIPTCL



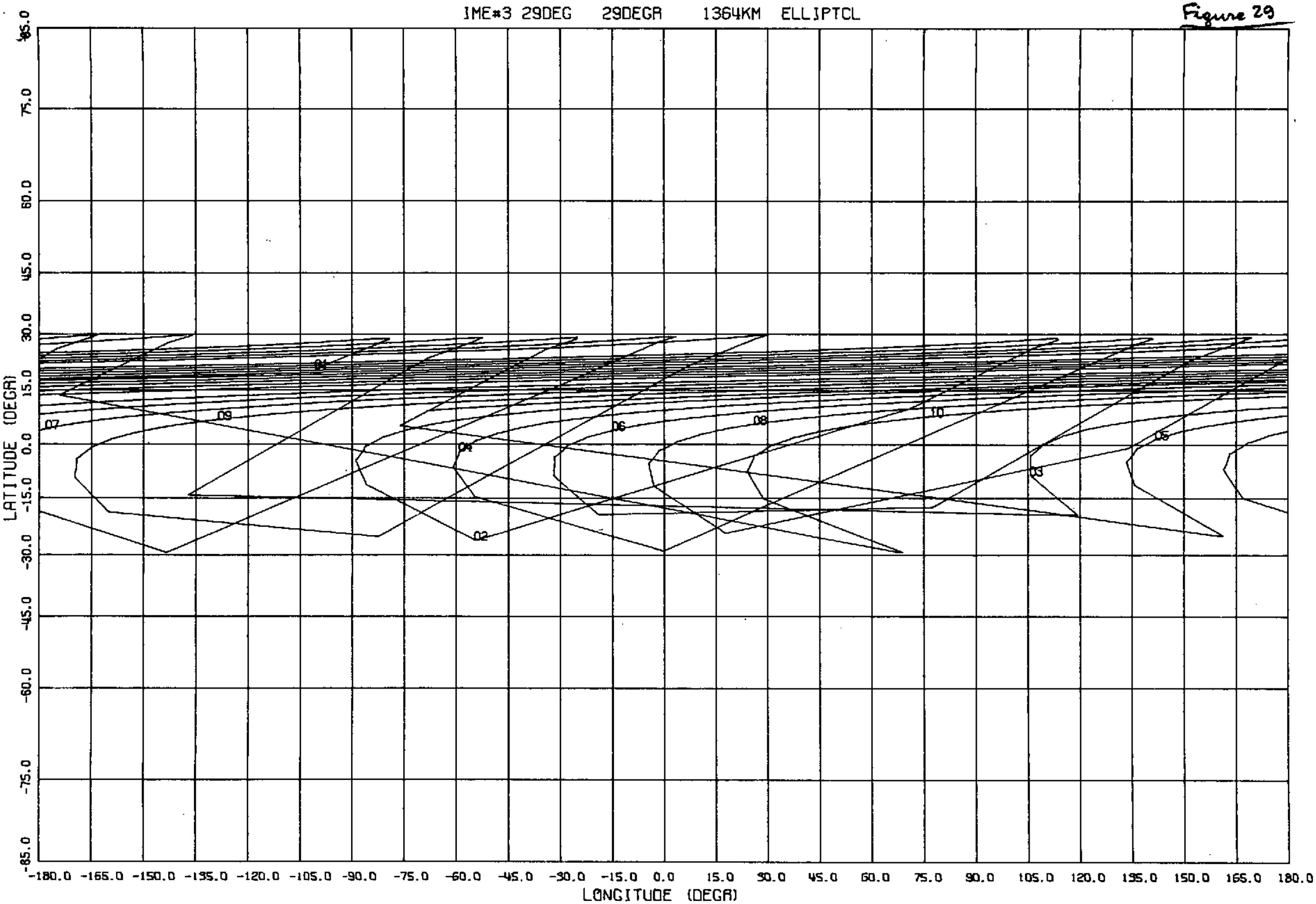
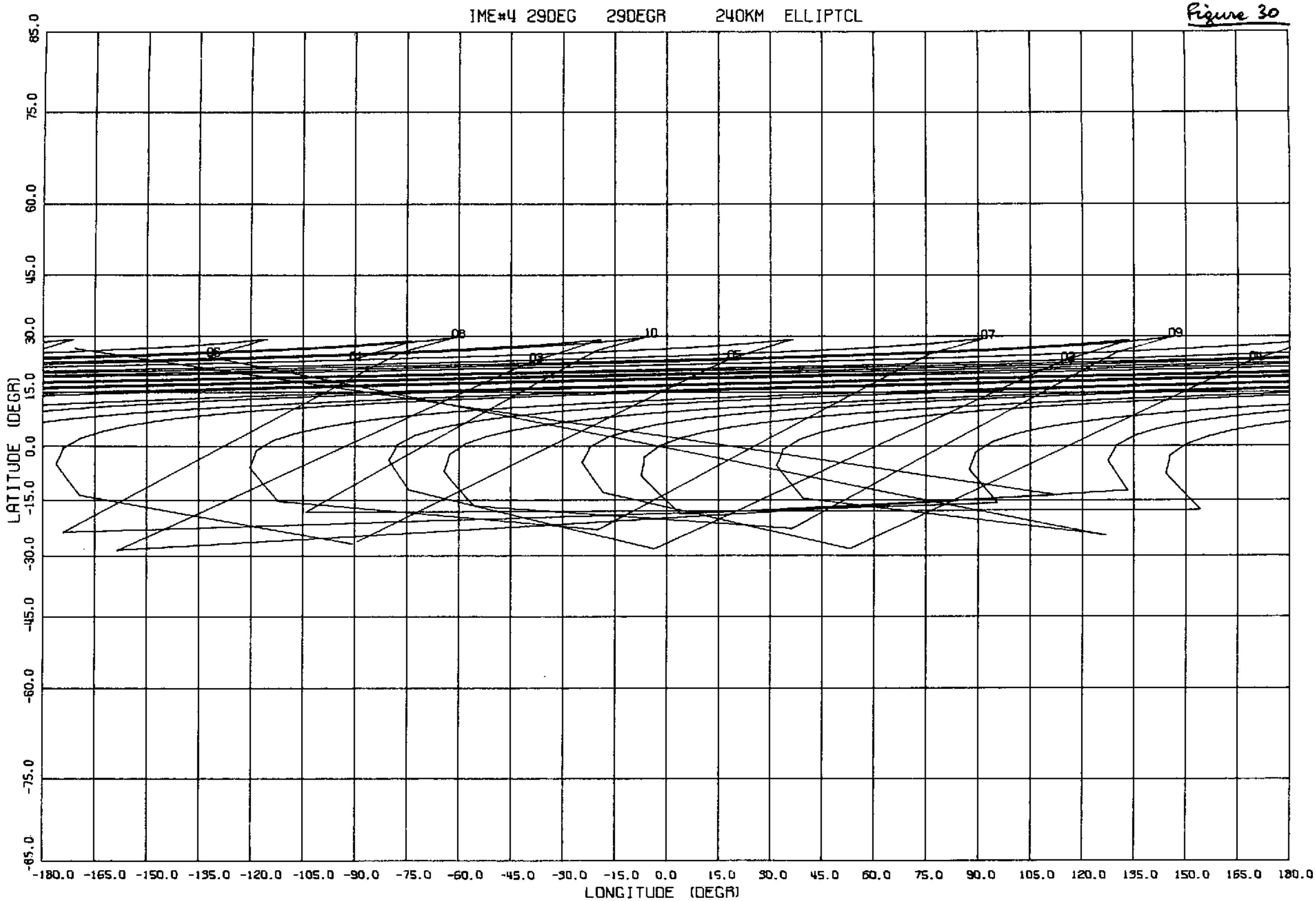

IME*3 29DEG 29DEGR 1364KM ELLIPTCL
Figure 29
LATITUDE (DEGR)
LONGITUDE (DEGR)
85.0
75.0
60.0
45.0
30.0
15.0
0.0
-15.0
-30.0
-45.0
-60.0
-75.0
-85.0
-180.0
-165.0
-150.0
-135.0
-120.0
-105.0
-90.0
-75.0
-60.0
-45.0
-30.0
-15.0
0.0
15.0
30.0
45.0
60.0
75.0
90.0
105.0
120.0
135.0
150.0
165.0
180.0
01
02
03
04
05
06
07
08
09
10

Figure 30



IME#4 29DEG 29DEGR 240KM ELLIPTCL
LATITUDE (DEGR)
85.0
75.0
60.0
45.0
30.0
15.0
0.0
-15.0
-30.0
-45.0
-60.0
-75.0
-85.0
-180.0 -165.0 -150.0 -135.0 -120.0 -105.0 -90.0 -75.0 -60.0 -45.0 -30.0 -15.0 0.0 15.0 30.0 45.0 60.0 75.0 90.0 105.0 120.0 135.0 150.0 165.0 180.0
LONGITUDE (DEGR)
08
10
07
09

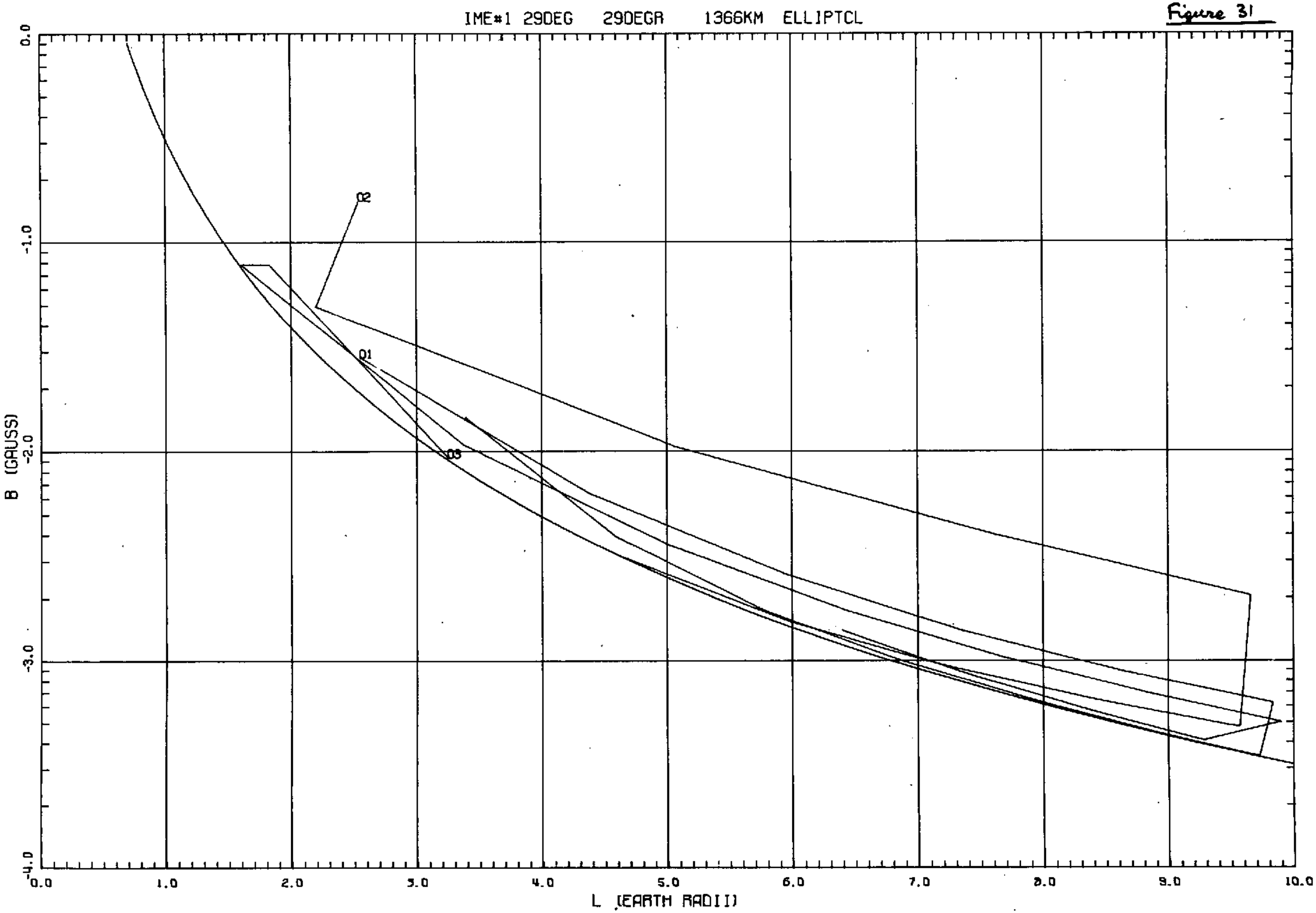

IME*1 29DEG 29DEGR 1366KM ELLIPTCL
B (GAUSS)
0.0
-1.0
-2.0
-3.0
-4.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
L (EARTH RADII)
02
01
03

Figure 31

Figure 32

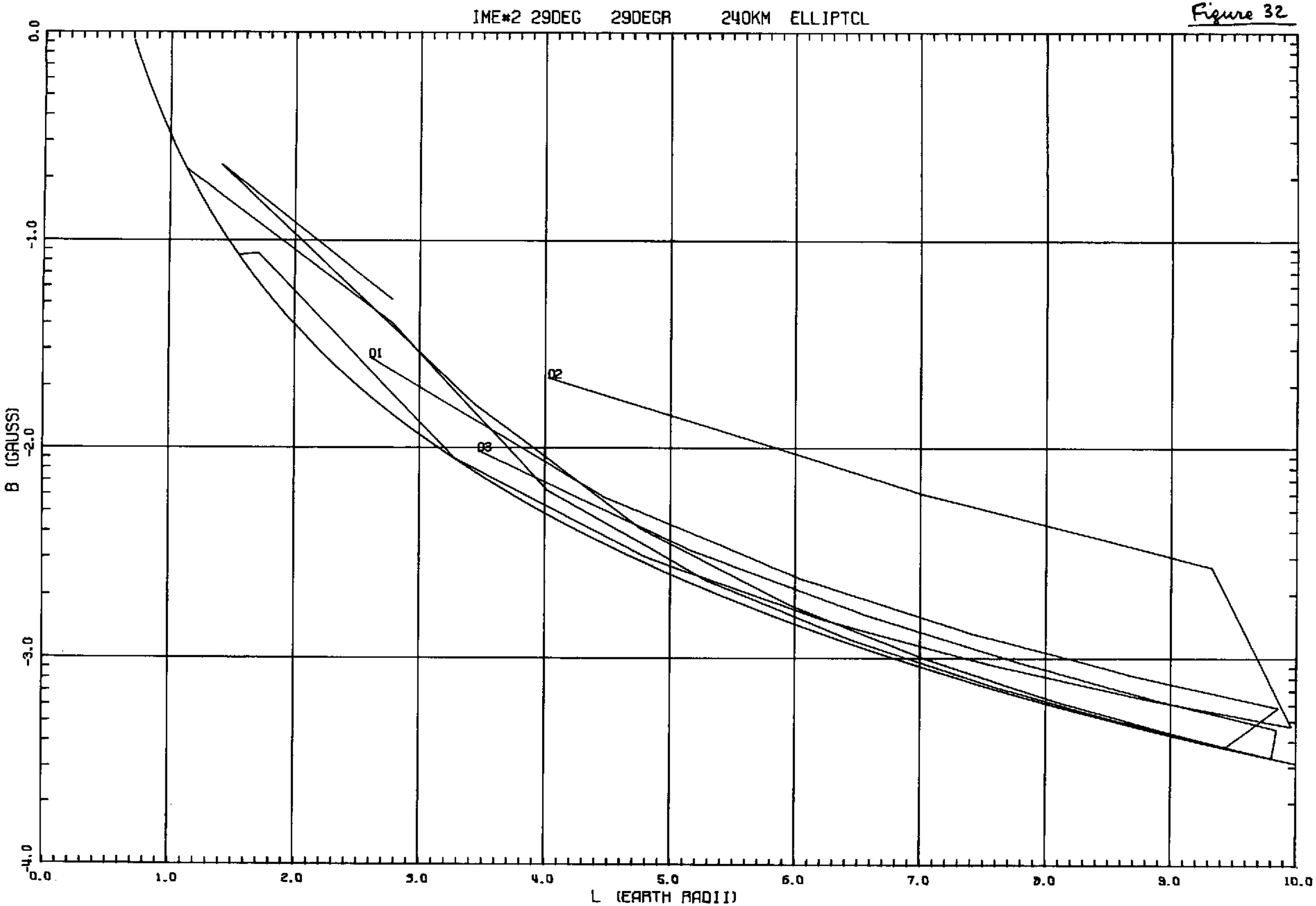
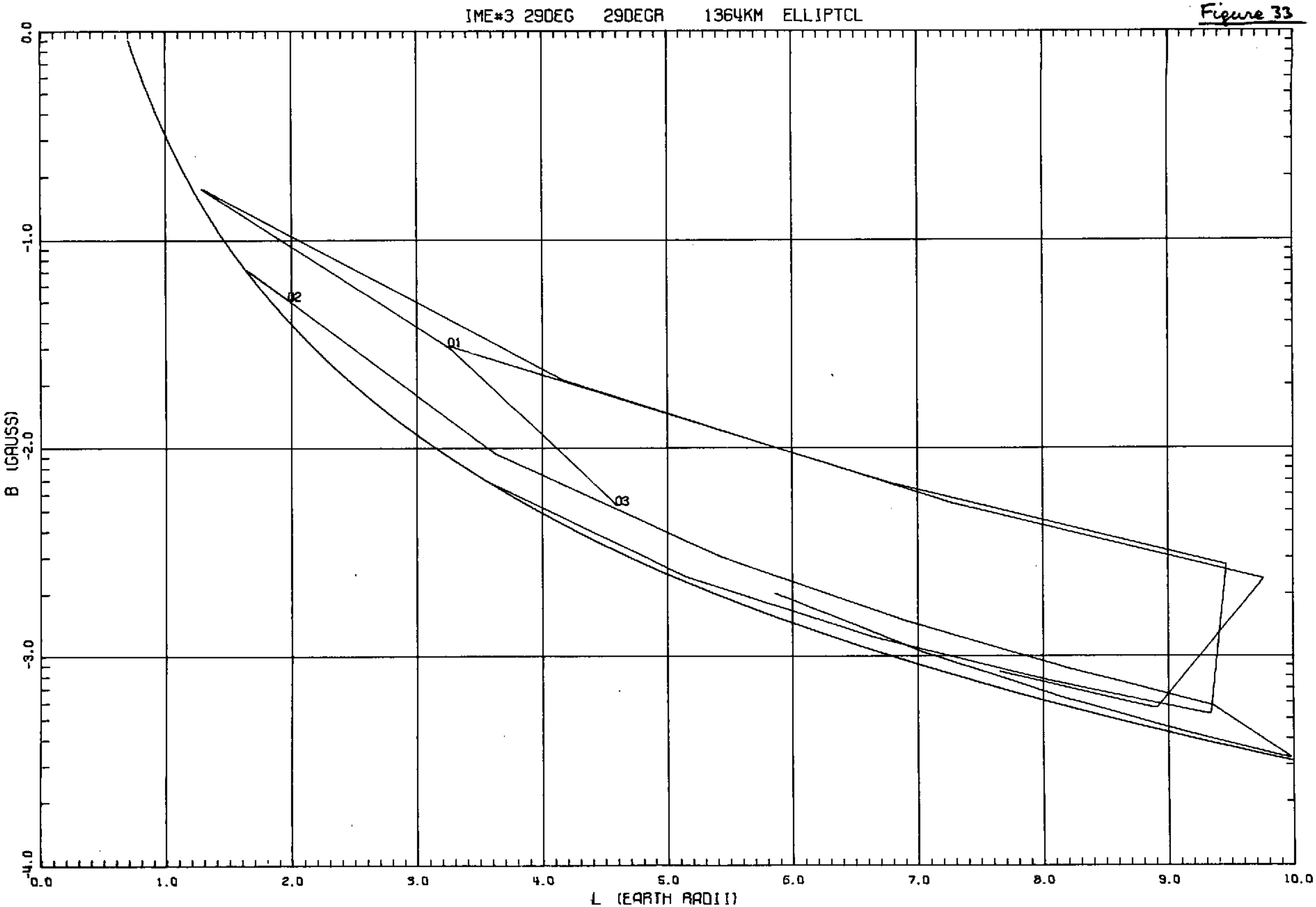
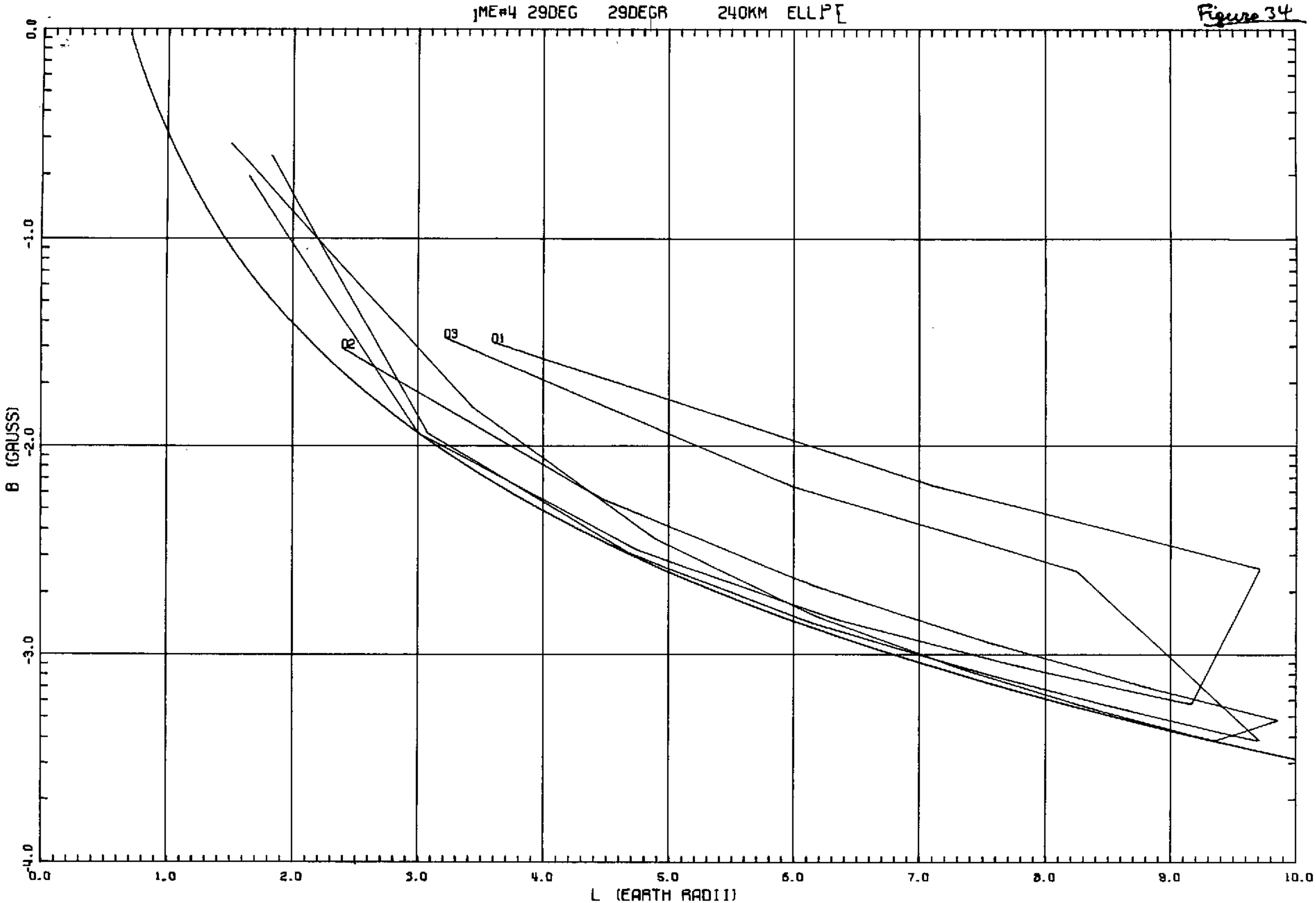

IME*2 29DEG 29DEGR 240KM ELLIPTCL
B (GAUSS)
0.0
-1.0
-2.0
-3.0
-4.0
L (EARTH RADII)
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
Q1
Q2
Q3

Figure 33



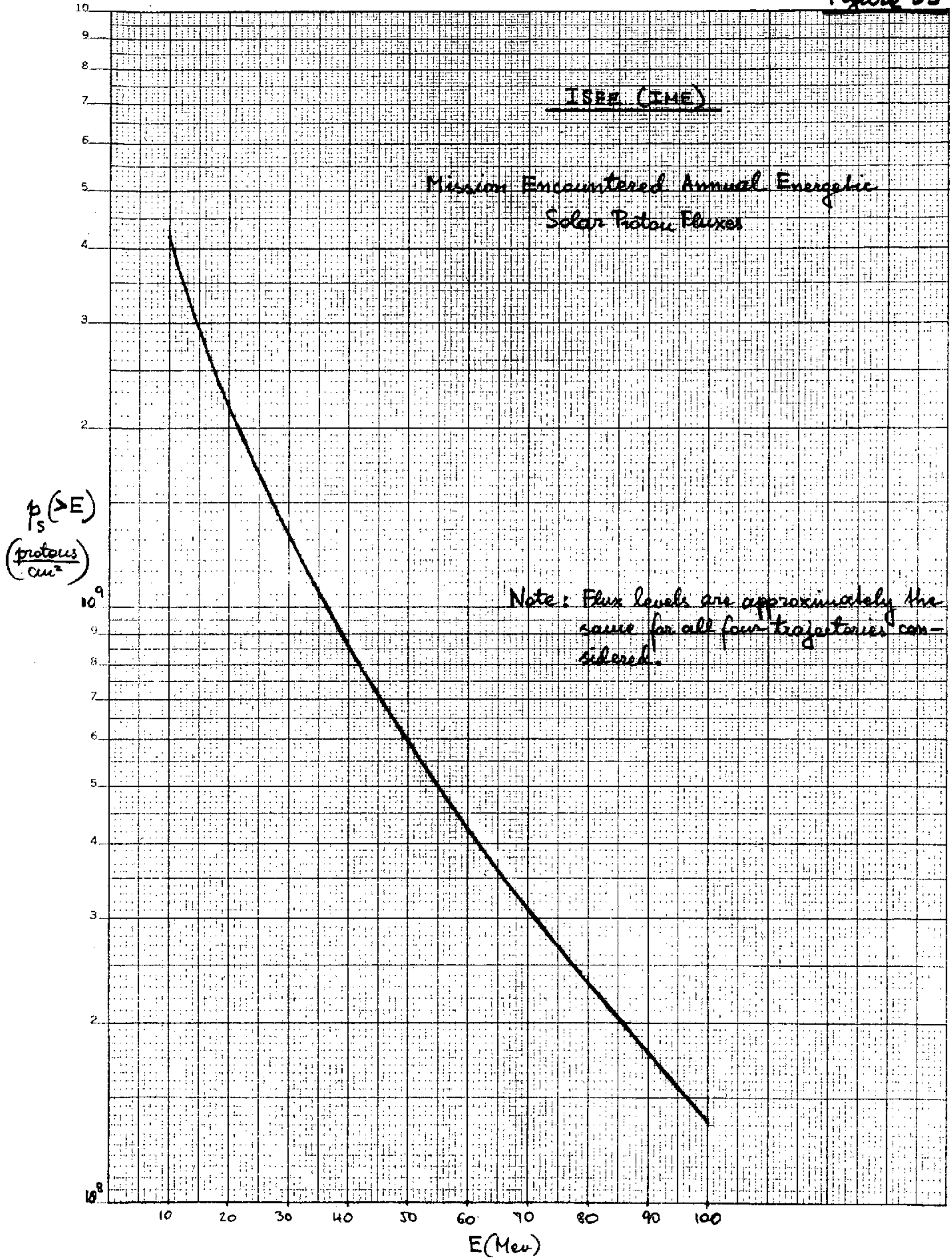
IME*3 29DEG 29DEGR 1364KM ELLIPTCL
B (GAUSS)
0.0
-1.0
-2.0
-3.0
-4.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
L (EARTH RADII)
01
02
03

Figure 34



]ME#4 29DEG 29DEGR 240KM ELLIPT
B (GAUSS)
0.0
-1.0
-2.0
-3.0
-4.0
L (EARTH RADII)
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
01
02
03

Figure 35


ISEE (IME)
Mission Encountered Annual Energetic Solar Proton Fluxes
Note: Flux levels are approximately the same for all four trajectories considered.
$\phi_s(>E)$
(protons/cm²)
10^9
10^8
10
9
8
7
6
5
4
3
2
9
8
7
6
5
4
3
2
10
20
30
40
50
60
70
80
90
100
E(Mev)