#480

ISEE-1
ION COMP MOMENTS & ENERGY SPECTRA
77-102A-12I SPMS-00560

ISEE-1
THERMAL ION MEASUREMENT DATA
77-102A-12D SPMS-00294

ISEE-1
SUMMARY:R-FILES (FORMAT 4)
77-102A-12F SPMS-00117

Table of Contents

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1. INTRODUCTION:

The documentation for this data set was originally on paper, kept in NSSDC's Data Set Catalogs (DSCs). The paper documentation in the Data Set Catalogs have been made into digital images, and then collected into a single PDF file for each Data Set Catalog. The inventory information in these DSCs is current as of July 1, 2004. This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system. The information existing in the DSCs is now not needed for locating the data files, but we did not remove that inventory information.

The offline tape datasets have now been migrated from the original magnetic tape to Archival Information Packages (AIP's).

A prior restoration may have been done on data sets, if a requestor of this data set has questions; they should send an inquiry to the request office to see if additional information exists.

2. ERRATA/CHANGE LOG:

NOTE: Changes are made in a text box, and will show up that way when displayed on screen with a PDF reader.

When printing, special settings may be required to make the text box appear on the printed output.

Version	Date	Person	Page	Description of Change
01				
02				

3 LINKS TO RELEVANT INFORMATION IN THE ONLINE NSSDC INFORMATION SYSTEM:

http://nssdc.gsfc.nasa.gov/nmc/

[NOTE: This link will take you to the main page of the NSSDC Master Catalog. There you will be able to perform searches to find additional information]

4. CATALOG MATERIALS:

a. Associated Documents To find associated documents you will need to know the document ID number and then click here. http://nssdcftp.gsfc.nasa.gov/miscellaneous/documents/

b. Core Catalog Materials

REQ. AGENT	RAND NO.	ACQ. AGENT
RLR		SK

ISEE-1

ION COMP MOMENTS & ENERGY SPECTRA

77-102A-12I SPMS-00560

This data set catalog consists of 6 tapes. The tapes are 6250 bpi, 9-track, multifiled, ASCII, created on the 11/780, and are in VAX/VMS BACKUP FORMAT. Each tape has 5 possible types of files ED, EX, MC, MD, and MS. To restore the data type the following command:

$ BACKUP/BACKUP {DEVICENAME} *.*

The D and C numbers, time span ,and number of files are as follows:

D#	C#	FILES	TIME SPANS
85421	28894	111	11/08/77 - 02/25/78
85422	28895	111	02/26/78 - 06/15/78
85423	28896	203	06/16/78 - 01/03/79
85424	28897	144	01/04/79 - 05/26/79
85425	28898	212	05/27/79 - 12/23/79
85426	28899	070	12/24/79 - 03/01/80

NASA
National Aeronautics and Space Administration

DATA ANALYSIS WORKSHOP CENTER

CDB TAPE DOCUMENTATION FORM

SECTION I. DATA SET DESCRIPTION (please print)

1. Data Set Name ISEE-1 Ion Composition Data (10eV/e to 16 keV/e) (Tape labels: ISEEMS)		
2. Scientific Contact Dr. O.W. Lennartsson	3. Telephone No. or Telex No. (415) 424-3259	
4. Address Lockheed Palo Alto Research Laboratories, 91-20, B/255, 2, 3251 Hanover Street		
5. City Palo Alto	6. State California	7. ZIP Code or Country 94304
8. Programmer Contact Dr. O.W. Lennartsson		

SECTION II. TAPE DESCRIPTION

1. No. of Tapes Submitted 6	2. Tape Density ☐ 800 bpi ☐ 1600 bpi 6250 bpi
3. No. of Files (per tape) variable	
4. No. of End of File Marks N/A (standard VAX/VMS backup format)	5. No. of Tracks ☐ 7 ☒ 9
6. Recording Parity N/A	7. Make and Model of Computer Used to Generate Tape DEC VAX-11/780 (VMS 5.4)
8. Are tapes written in binary, coded or both? (e.g. BCD) Using the VAX/VMS backup command. FORTRAN formatted files (ASCII)	
9. What floating point representation is used? (e.g. CDC 64 bit) VAX single precision floating point numbers (32 bit)	
10. What integer representation is used? single precision	
11. No. of Physical Records (per file) see printouts of tape directories	
12. Are original tapes to be returned? ☐ Yes ☒ No	
13. Start and Stop Time of Each File (If more space is needed, please attach.) Approximately equal to the beginning and end of each calendar day	

SECTION III. LOGICAL AND PHYSICAL RECORD FORMAT (please attach)

SECTION IV. TO BE FILLED IN BY DAWOC ONLY

	CDB No.
Date Received	Tape No.
Programmer ID	CON Name
Data Base	Date Loaded

601-79 (10/80)

Lockheed Missiles & Space Company, Inc.

Research and Development
3251 Hanover Street, Palo Alto, California 94304-1191
Dr. O.W. Lennartsson, 91-20, B/255, 2

November 14, 1991

Mr. Ralph Post
National Space Science Data Center
Bldg. 26, Room 119
Code 933
NASA/Goddard Space Flight Center
Greenbelt, MD 20771

Dear Mr. Post:

This is part #1 of a two-part shipment. This part consists of 6 magnetic tapes (6250 bpi; VAX/VMS BACKUP) with printouts of tape file listings and of the data user's guide. All files are in ASCII format. The guide is the last file on each tape. The other part of this shipment consists of 28 booklets with hardcopy plots. For further explanations, please contact Dr. Sumant Krishnaswamy of the NSSDC, Code 933.9 (SPAN NCF::SUMANT).

Best regards,

Walter Lennartsson

Walter Lennartsson

WL:lf

cc: Dr. S. Krishnaswamy

ISEE-1 ION COMPOSITION DATA (10 eV/e to 16 keV/e); A GUIDE TO READING THE ED-, MD-, MC-, MS-, AND EX-FILES

By O. W. Lennartsson

Lockheed Missiles and Space Company, Inc.
Research and Development
Palo Alto, California

Nov. 1991

PREFACE

The data and data formats described herein have been produced in cooperation with several people at the Lockheed Research and Development Division, in particular with R. D. Sharp, E. G. Shelley, W. K. Peterson, D. L. Carr, and W. E. Francis

The magnetic fields included here are based on ISEE-1 magnetometer data made available by C. T. Russell of the Institute for Geophysics and Planetary Physics at the University of California, Los Angeles, California. The processing and editing of the magnetometer data are the sole responsibility of the author.

Any questions regarding these data files should be directed to:

Dr. O. W. Lennartsson
Lockheed Missiles and Space Company, Inc.
Research and Development
Dept. 91-20, Bldg. 255
3251 Hanover St.
Palo Alto, CA 94304

Telephone: (415) 424-3259
Telefax: (415) 424-3333
SPAN: LOCKHD::LENN

1. INTRODUCTION

The ISEE-1 spacecraft (along with the ISEE-2) was launched on October 22, 1977, into an orbit with apogee at almost 23 RE (geocentric), perigee at about 300 km altitude, an inclination of 29 deg, and an orbital period of 57 hours. It was placed in a spinning mode with the axis nearly perpendicular to the solar ecliptic plane and with a period of approximately 3 seconds. It reentered almost 10 years later, on September 26, 1987.

The Lockheed Plasma Composition Experiment flown on ISEE-1 is one of a family of instruments using the same type of ion optics and covering nearly the same range of energies (0 eV/e to about 17 keV/e) which have also been flown on GEOS 1 and 2, Dynamics Explorer One, and AMPTE CCE [Shelley et al., IEEE Trans. Geosci. Electron., GE-16, 266, 1978]. The Principal Investigator of the ISEE-1 experiment during its development and during its several years of operation in orbit was R. D. Sharp. In the later phase of data analysis this role was transferred to O. W. Lennartsson. For a review of the first few years of data analysis see Sharp et al. in Energetic Ion Composition in the Earth's Magnetosphere, edited by R. G. Johnson, TERRAPUB, Tokyo, 231, 1983.

The ISEE-1 instrument consists of two nearly identical mass spectrometers with the respective fields of view centered 5 deg above and 5 deg below the spin plane, that is about 5 deg above and below the solar ecliptic plane. Each field of view is 10 deg wide along the spin plane, and 10 to 50 deg wide transverse to this plane, being the widest at the low energy end and gradually decreasing to 10 deg with increasing energy. All data used for this archiving were obtained with one spectrometer, the one viewing below the spin plane. Information on the instantaneous pitch angles is provided by the ISEE-1 Fluxgate Magnetometer [Russell, IEEE Trans. Geosci. Electron., GE-16, 239, 1978].

Each spectrometer consists of an electrostatic analyzer to select energy per charge, followed by a combined electrostatic and magnetic analyzer to select mass per charge. Both analyzer sections have particle detectors, so at each energy setting the experiment provides both the total ion flux and the partial flux at a selected mass per charge. The detector in the energy analyzer is offset from the center path of ions and corresponds to a view direction that is slightly different from the nominal mass spectrometer field of view, being more nearly within the spin plane. To be more specific, the two detectors have about the same size fields of view at all energies, but the "energy detector" central view direction varies, being some 15 deg away from the spin plane on the opposite side of the "mass detector" view direction at near-zero energies, and gradually approaching the spin plane with increasing energy.

Each combination of energy and mass is maintained for at least 1/16 sec in high telemetry bit rate and 1/4 sec in low (normal) bit rate. Different combinations are stepped through in a cyclic fashion according to various patterns controlled by a random access memory which is programmable from the ground. Some patterns, or "modes", may require only a couple of minutes per cycle, others may take 15 to 20 minutes.

The mass selections usually include one that blocks all ions from reaching the second detector, which is a modified Johnston electron multiplier, allowing intermittent measurements of the noise associated with penetrating radiation (mostly MeV electrons and associated bremsstrahlung). These measurements are

later used to correct the count rates of mass analyzed ions. The background count rate in the first detector, which is a so called spiraltron, is generally negligible and is not corrected for.

The maximum energy range is 0 eV/e (or spacecraft potential) to 17.9 keV/e, divided into 32 contiguous channels, but the lowest channel, from 0 eV/e to about 100 eV/e, is normally limited to energies above 10 eV/e by an RPA (retarding potential analyzer) in the entrance. That same RPA is used to provide "cold plasma" data from 0 to 100 eV/e (retarding within the lowest channel) during part of some measurement cycles. Because of measurement uncertainties associated with spacecraft charging and plasma convection, the "cold plasma" data have not been included here. The lowest "hot plasma" channel, the one covering 10 eV/e to 100 eV/e, has been used only sparingly for those same reasons.

All velocity moments, with one exception (see below), use 100 eV/e as the lower energy limit. As far as moments are concerned, the highest energy channel (above 16 keV/e) has not been used either, because of a slight variation over time of the mass peak locations in that channel. The energy range of moments is therefore generally 100 eV/e to (about) 16 keV/e, unless further limited by a particular instrument energy/mass scan mode (see below).

The mass range is from below 1 amu/e to about 150 amu/e, divided into 64 channels, but the most common scan cycles only sample 4 to 5 channels, corresponding to the principal ions, plus a background channel (below 1 amu/e).

2. ARCHIVAL DATA FORMAT

These archival data are a combination of ion data, magnetic field data, and s/c ephemeris, generally sorted by instrument energy/mass scan cycle and placed in five kinds of ASCII files, called the ED-, MD-, MC-, MS-, and EX-files, respectively. There is one set of these files for each day of data, and the date is part of the file names, represented by the last two digits of the year, followed by three digits for the day of the year, as for example ED78057.DAT, etc. The format and content of each kind of file are described in detail in following sections.

The ion data are a combination of velocity moments, calculated two different ways (using two different sets of assumptions about symmetry in velocity space), and energy and mass spectra. The velocity moments are calculated both from the total ion count rates in the energy analyzer, assuming that all counts are due to H+ ions (and using one set of symmetry assumptions), and from the partial count rates at M/Q = 1, 2, 4, and 16 in the mass analyzer, assuming those counts to be due to the four principal magnetospheric ions H+, He++, He+, and O+, respectively (and using both sets of symmetry assumptions). The "total ion" moments are listed in the ED-file, the partial (mass analyzed) moments are listed in the MD-file.

The energy spectra are based on mass analyzed counts only, and are listed in the MC-file for the same four principal ions (same four M/Q values), plus a fifth ion, namely the O++ (M/Q= 8). The five energy spectra are a compacted representation of the raw count rates at each energy (spin-averaged and maximum).

The mass spectra (when produced) show the accumulated raw counts (and number of samples) in each of the 64 mass channels in four energy ranges. These are listed in the MS-file.

The magnetic field data (time averaged) are listed in all of the ED-, MD-, MC-, and MS-files. In addition, the magnetic field measurements have been used in conjunction with the ion data to determine pitch angles and ion plasma beta.

The s/c ephemeris is also listed with the ion data in the ED-, MD-, MC-, and MS-files, but an extra set of half-hour interval parameters are listed in the EX-file. That file contains only ephemeris, and has been used to label certain data plots. These plots are available in hardcopy (see end of this document for description).

3. TIME COVERAGE

These data have been produced to cover the PRIME archival period for the ISEE-1 and ISEE-2, from launch (October 22, 1977) through February of 1980. The coverage is continuous with the following exceptions:

a. The initial two weeks were devoted to extensive in-flight testing and calibration of the experiment. The resulting data have not been used for this archiving, so the beginning date is day 312 of 1977.

b. The instrument was normally turned off for 1.5 to 2 hours at perigee, occasionally longer (primarily to avoid the inner radiation belts).

c. Extended periods of "cold plasma" measurements (a few tens of hours all together). No such measurements are included here, but they were normally carried out as brief (few minutes) interruptions of longer energy/mass scan cycles and do not normally show up as data gaps.

d. Solar wind measurements in the so called "sun-synchronous" mode. In this mode data were taken at an increased rate in a narrow spin angle sector around the sun direction, and no data were taken at other angles, in order to maintain the same average data rate per spin. These data have been judged too cumbersome to treat within the particular format of this archiving. The resulting data gaps are numerous and extensive, sometimes leaving an entire day blank.

e. Gaps in the data transmission/reception or poor quality reception. These are usually of modest duration (few hours) but fairly common.

4. NUMERICAL ACCURACY

The absolute calibration of the instrument is believed to have been accurate to better than 30% in the early phase of in-flight operations. This estimate is based mostly on pre-flight tests in the laboratory, but also on extensive early in-flight confirmation of the location and shape of major peaks in M/Q spectra. As discussed below (in connection with the MC-file), the mass analyzed portion of these archival data have been derived from counts acquired at the higher of two detector triggering levels, in order to minimize the effect of background.

This triggering level has become progressively less sensitive over the years, but it has been monitored, and the count rates have been adjusted accordingly, before being used in the moment calculations. These adjustments are believed to have maintained the absolute calibration accuracy to within about 30% to 35% during high (normal) sensitivity operations.

4.1 Normal High Sensitivity Mode

These estimates assume ideal conditions, however, which means that the differential flux of any ion species is isotropic within the field of view of each sampling, constant in energy over the width of each energy channel, and constant in time during each sampling. Any or all of these conditions may be violated in a real situation, and the resulting error may be significantly greater than 35%. To take an extreme example: if a phase space density is inferred from the count rate in the lowest energy channel, from between 10 eV/e and slightly beyond 100 eV/e, that count rate is divided by 40 eV/e (the weighted center energy). If in fact the ions all have energies near the lower or upper edges of this channel, then the phase space density will be either four times too small or almost three times too large. Errors of a similar magnitude may occur when the ion flux has an extremely narrow angular distribution, or when it varies rapidly in time. The energy distribution is of less concern at higher energies (smaller delta-E over E), but the potential error in phase space density due to narrow angular distributions can be large at any energy, especially in low (normal) bit rate, where the instrument sweeps through 30 deg of spin angle during a sampling (1/4 sec).

Summing (weighted) phase space densities into moments does reduce the relative measuring errors, but to infer complete three-dimensional moments from these data requires assumptions about that part of the unit sphere which is not being sampled. The potential new errors are impossible to calculate, of course, but they can be minimized by making realistic assumptions. The moments listed in the MD-file have been calculated two ways, using two entirely different sets of assumptions (see file description), each set being optimal in some part of the ISEE-1 environment. As can be seen from the listed numbers, the two ways of calculating number densities, for example, produce nearly the same result much of the time, at least in the magnetosphere. If the respective set of assumptions is correct, then the moment calculations are intrinsically accurate to within a few percent.

4.2 Low Sensitivity Mode

If operated normally, the particle counters will saturate when exposed to the high directional flux of H+ in the magnetosheath and solar wind. Even the He++ may cause saturation in these regions of space. To avoid this and to increase the dynamical range of the data, the instrument was designed to have a second commandable detector function that would reduce the sensitivity by about two orders of magnitude. This is accomplished in one case by turning off one of two power supplies (in the mass analyzer) and by shifting the power to another detector in the other case (in the energy analyzer). For the most part, this sensitivity change is programmed to occur automatically when the count rate exceeds a certain threshold, and to be deactivated at the start of the next group of commands, that is typically within 8 sec in low bit rate and within 2 sec in

high. New commands are activated at intervals that are multiples of 32 samplings, called "octaves", usually at every such octave. Normally the instrument maintains the same mass channel for one or more whole octaves at a time as well.

In theory this dual sensitivity function is simple enough, but it has several practical problems, especially when it is set to be automatic. The change to low sensitivity takes a finite known time (close to one second), but the telemetry bit stream does not allow the exact starting time to be shown, only the affected octave is flagged. Instead the time of change must be estimated from the sequence of count rates, which is hampered by rapid strong variations in the ion flux. In automatic operation it is also reset to normal in an automatic fashion (takes negligible time), so the change to low sensitivity may be repeated as often as every octave (or every other octave in high bit rate).

During the computer processing of these archival data, the transitions from high to low sensitivity have been treated as data dropouts, for simplicity, and only counts taken at least 1.5 seconds (1/2 spin) beyond the estimated start of each transition have been included, after multiplication by a constant scaling factor representing the end state (no such multiplication in the MS-file). This method avoids having the transient count rates multiplied by the wrong variable scaling factor, due to uncertainties in the exact timing, but it creates a systematic undersampling of the ion flux near its maximum and on one side of this maximum. The situation is further aggravated by the fact that these automatic sensitivity changes tend to occur where the ion fluxes have the strongest anisotropies and the narrowest energy distributions.

In view of these difficulties, all data obtained in low sensitivity mode should be treated with suspicion. They show the gross and qualitative plasma properties very well, but the tabulated numbers may be substantially wrong. If it is important to establish absolute values, it is worth comparing these numbers with archived data from some of the other particle instruments on the ISEE-1 and -2. The data most often obtained in this mode are those in the ED-file and the H+ data in the MD-, MC-, and MS-files. Sometimes the He++ data are also affected. All data obtained this way are clearly flagged (see file descriptions).

5. KNOWN ERRORS

All data, including the magnetic field data, have been screened very rigorously with respect to potential problems in the telemetry transmission and reception. Any time the telemetry quality flags suggest a potential problem, all data that could possibly be affected have been discarded without further investigation. In addition, every ion count rate and every magnetic field reading have been examined for clearly "unrealistic" values, that is unrealistically large values under given circumstances (given region of space). Such values have been discarded on an individual basis (sample by sample).

5.1 Ion Data

The remaining errors, as far as they are known, are very few and ought to be obvious from the wider context, especially when the various files are intercompared. One group of known errors consists of a few isolated "bursts of counts" in the MS-file (mass spectra) at M/Q values where no significant ions are to be

expected. Another group of suspected errors consists of a few isolated "bursts of ions" having strangely repetitive count rate and angle of motion, as evident in the MC-file.

5.2 Magnetic Field Data

These have more errors in them, unfortunately, but that is offset by the fact that expertly processed values can be obtained from other archival files supplied by the Principal Investigator for the ISEE-1 Fluxgate Magnetometer (C. T. Russell; NSSDC identification No. 77-102A-04). There are two main types of errors occurring here, one brief error often present at the gain changes (at most once or twice per orbit) due to a misalignment of the gain flag and the actual data on the tape, and another less common but longer lasting error that may appear in connection with certain offset corrections (related to the antenna flip status). These errors are more fully explained in the descriptions of the ED- and MD-files, along with methods to recognize the errors (see also description of hardcopy plots at the end of this document). Errors in the magnetic field only affect part of the ion data, namely the beta value and the moments that are based on pitch-angle binning (the second method used in the MD-file).

6. THE ED-FILE

This file contains data from a particle counter called the "energy detector", or "ED", which intersects the ions after energy analysis but before mass analysis. The count rates have been converted to certain velocity moments assuming that all counts are due to protons. These moments are thus not directly comparable to any of the moments in the MD-files, unless the protons are indeed the dominant species. Even in that case, there may often be significant differences between the ED and MD proton moments, because the ED and MD particle counters respond to ions with slightly different external angles of motion (see above), and the two sets of count rates are usually averaged over different times.

Since the ED count rates are independent of the mass channel selection, and the energy channels are normally scanned at a higher rate than are the mass channels, it is usually possible to obtain several consequtive sets of ED moments during each complete instrument scan cycle. This advantage has been utilized whenever possible, and the ED averaging intervals are more or less independent of the phase of the instrument cycle. The criterion most commonly used for defining the ED intervals is to have a "sufficiently dense" coverage in energy and spin phase angle. This criterion varies with different types of energy and mass scan patterns, but typically amounts to having at least every other energy channel sampled in each of 12 spin angle sectors (30 deg wide sectors). The missing matrix points are filled in by interpolation between adjacent points before the moments are calculated.

The criterion for ending each ED averaging interval is modified when the instrument is in low sensitivity mode (usually set by automatic triggering at extreme count rates) and, at the same time, the count rates show strong (10-fold or stronger) spin phase modulation. At such times the ED intervals are made equal to the instrument scan cycle. This situation occurs most often in the solar wind. The purpose is to suppress artificial oscillations in the moments caused (in some modes) by spin phase dependent energy samplings. The modification has not been applied uniformly throughout the entire data set, however, so there are periods of "strange" and non-physical modulations in the ED moments, especially in the densities. At any rate, all data taken in low sensitivity mode should be treated with care; they are not intended to represent accurate quantitative measurements, but they have been included to complete the gross qualitative picture and to provide continuity between times of normal magnetospheric data. All low sensitivity data are flagged as such (see below).

Unlike the MD data, the ED data have not been corrected for background counts due to penetrating radiation (not measured), but they are known to be much less affected by that problem than are the MD data (different kinds of detectors). The ED data also differ from the MD data in that no standard deviations are calculated from the combination of counts (a saving in CPU time and output volume). If necessary, approximate upper limits on the ED standard deviations can be estimated from the corresponding standard deviations in the MD-file (the MD data have additional variance associated with background correction).

6.1 File Format

The ED-file has been written by a formatted sequential FORTRAN WRITE:

```
      WRITE(9,210) IYYDDD,IUTSEC,BXED,BYED,BZED,BTED,ITHETB,IPHIB,
     *EDDNS,EDEMN,EDVEL,IEDANG,ACSEC,XCSEC,ENRG1,ENRG2,RX,RY,RZ

  210 FORMAT(2I6,4F8.1,I4,I5,3(1PE10.2),I5,2(0PF8.2),2F5.1,3F6.1)
```

The variable names represent the following quantities:

IYYDDD is the year (two digits) and day of year (three digits).

IUTSEC is the universal time in seconds at the midpoint of the averaging interval. The nominal length of each interval is defined by the distance between adjacent midpoints, but the actual length may vary somewhat because of time gaps (noise) in the data (see ACSEC below).

BXED, BYED, BZED, and BTED are the GSE components and absolute value, respectively, of the measured magnetic field, each averaged over the ED interval (for data quality check, see next section). The unit is "nanotesla" ("nT"), or equivalently, "gamma".

ITHETB and IPHIB are, respectively, the magnetic field elevation and longitude angles in GSE coordinates. ITHETB ranges from -90 deg (southward) to +90 deg (northward), IPHIB from -180 deg (antisunward) to +180 deg (antisunward), with 0 deg being sunward and 90 deg duskward. These angles have been calculated from the time averaged field components, and are rounded to the nearest integer.

EDDNS is the ion number density in "/cm3" (assuming protons) contained in the nominal energy range from 100 eV to about 16 keV (see also next section).

EDEMN is the "thermal" ion energy in "keV", that is the mean energy (0.1 - 16 keV) minus the energy associated with the common drift motion.

EDVEL is the common drift speed in "km/sec" in a plane parallel to the s/c spin plane, that is approximately in the solar ecliptic plane.

IEDANG is the longitudinal direction angle of that same drift, with 0 deg being sunward, and 90 deg duskward (-180 deg to +180 deg).

ACSEC is the number of seconds of data included in the moments. This number is normally at least 6% smaller than the length of the averaging interval, since neither the lowest nor the highest energy channels are included (may be further reduced by data gaps).

XCSEC is the number of seconds during the averaging interval when the ED detector was in low sensitivity mode. This number is almost always zero in the magnetosphere, but usually nonzero in the magnetosheath and solar wind. If nonzero, it implies that at least some of the count rates have been multiplied by a crude scaling factor (= 130) to compensate for the reduced sensitivity.

ENRG1 and ENRG2 are, respectively, the lower and upper energy limits used in the moment calculations, in units of "keV". These are normally 0.1 and 16.1, but may be modified in some modes (cf. comments on energies above).

RX, RY, and RZ are the GSM coordinates of the s/c (at midpoint of interval) in units of "earth radii". On the rare occasions when the GSM coordinates are unavailable (due to faulty ephemeris tape) the GSE coordinates are used instead (available on raw data tape). Those occasions are flagged in the EX-file (also flagged in the MC-, MD- and MS-files).

6.2 Further Explanations of Certain Variables.

The magnetic field values provided here may to some extent duplicate what has already been archived at the NSSDC by the magnetometer principal investigator (Prof. C. T. Russell; NSSDC identification number 77-102A-04), but are not intended to supplant those. The values derived here may not have been adequately screened against telemetry noise or adjusted for instrument anomalies, so it is recommended that the PI provided data be consulted whenever there is doubt about accuracy. There are two types of errors known to occur here:

a. When the magnetometer is commanded to low gain on the inbound leg of the s/c orbit, usually between R = 8 Re and = 5 Re, the corresponding flag may show up slightly too late on the raw data tape, resulting in a brief underrepresentation of the field by a factor of 32. This may last for about a minute or less (part of one major frame) and affects a single ED interval. This error ought to be fairly obvious in the ED data, and therefore traceable in the MD data as well (by comparing the times). The corresponding mismatch at high gain command on the outbound leg, that is a sudden 32-fold increase of the field, is usually discovered as "unreal" and corrected.

b. Occasionally, it appears that the wrong antenna flip status has been inferred from the raw data behavior (pertains to the s/c Y and Z coordinates), resulting in anomalous modulations of the GSE components. These modulations cause the sum BXED**2+BYED**2+BZED**2 to be much smaller than the square of the time-averaged absolute field strength BTED**2. It is recommended that the two measures of field strength be compared routinely, and that other magnetic field data be consulted if those two differ by more than a few percent. An additional (or alternative) check can be made using certain MD data (see below).

The velocity moments have been calculated from a 32 energy channel (covering the entire range from 10 eV to about 18 keV) by 12 spin angle sector (30 deg each) matrix of time-averaged count rates in the following steps:

I. A phase space density is assigned to each matrix point, using the local count rate when available, or interpolating between adjacent count rates if the point has not been sampled. The bottom and top energy channels are included in the interpolation procedure, when necessary, but not in the integration (summation) over energy.

II. Within each energy channel the phase space densities are weighted by cosines or sines of the spin angle (center of sector) and summed over angle to form two orthogonal projections. These projections are in turn weighted by energy and by an energy bandwidth (see below) and summed over energy channels, forming two orthogonal components, approximately the GSE X and Y components, of a vector that is proportional to number flow density. Both components are then divided by a total (scalar) sum of phase space densities weighted by the energy bandwidth and by the square root of the energy, that is by a sum proportional to number density, to form (approximate) X and Y drift velocity components, and an angle IEDANG.

III. A spherical coordinate system is envisioned with its polar axis along the drift velocity vector, that is in the GSE X-Y plane. It is now assumed that the phase space density has azimuthal symmetry in this coordinate system (rotational symmetry around drift velocity vector). The number density, drift speed (but not angle), and mean energy are recalculated by summing over solid angle and energy in this system. The solid angle weighting factors in this case are zones on a unit sphere, each defined at the intersection with the GSE X-Y plane by the boundaries of a 30 deg spin angle sector, or by one boundary and the drift velocity vector. These zones are partially overlapping, and summing over 12 spin angle sectors (typically = 14 zones) means covering the unit sphere twice, so a factor 1/2 is applied to each sum. The drift speed (EDVEL) and mean energy (EDEMN) are obtained by dividing flow density and energy density, respectively, by the number density (EDDNS). The mean energy is converted to "thermal" energy by subtracting the equivalent drift energy.

If the drift speed in step II is less than 14 km/sec (less than 1 eV energy), the coordinate system is instead aligned with the X-Y projection of the magnetic field, that is with the angle IPHIB, provided the elevation angle ITHETB is between -45 and +45 deg. If the latter is not the case, and if the drift speed is below 14 km/sec, the coordinate system is aligned with the s/c spin axis, and the phase space densities are treated as isotropic. Only density and mean energy are recalculated in these two cases.

The summation over energy treats each energy channel, except the second one (first channel not included), as a point measurement at the center energy, and takes the energy bandwidth to be the distance between adjacent channels in the trapezoidal fashion. At the second channel an extra term is added to extend the integral from the center energy downward to about 0.1 keV, assuming the flux to be a constant. This addition brings the mathematical energy range in better agreement with the instrumental range of acceptance.

The variable ACSEC is a sum of elementary time segments associated with each commanded setting of the power supplies controlling energy and mass channels. These elementary times are 1/4 sec during low bit rate operation (about 80% of the time) and 1/16 sec during high bit rate operation. These times include the resetting of the power supplies, however, and are slightly longer than the times associated with particle counting. For simplicity, the particle counting is interrupted for about 12% of the elementary time segments in both low and high bit rate operation to allow for resetting. The ACSEC therefore exceeds the actual particle counting time by about 14% in both cases.

7. THE MD-FILE

This file contains data from a particle counter called the "mass detector", or "MD", which receives the ions after both energy and mass analysis. Count rates of the four principal magnetospheric ion species, the H+, He++, He+, and O+, have been sorted by 32 energy channels (10 eV/e to 18 keV/e), 12 spin angle sectors (30 deg each) and 9 pitch-angle ranges (20 deg each) and averaged over each complete energy/mass scan cycle of the instrument. At the end of each cycle the averaged count rates have been converted to certain velocity moments using two different assumptions: the velocity distributions have rotational symmetry around either (A) the bulk flow vector or (B) the local magnetic field direction (see below). Note: the ion labels are applied to certain M/Q values (the instrument does not measure mass per se) and may be inappropriate in the magnetosheath and solar wind, especially at M/Q= 4 (He+).

The energy/mass scan cycles vary in length from a few minutes to about 20 min or more, depending on the instrument mode of operation. Each cycle may cover only a few mass channels and a reduced energy range, or it may cover the full energy range at each of 64 mass channels (load mode). The most common modes in the magnetosphere provide for multiple energy scans at each of 5 to 7 mass channels (including a background channel at M/Q < 1), where each energy scan may sample a different subset of the 32 energy channels (e.g. every fourth channel in four interleaving scans), and each energy channel is maintained for about four seconds (1.3 s/c spin cycles). In addition, each cycle may contain a few scans through all 64 mass channels at a few energies, as well as one or two brief scans through the RPA voltages in the lowest energy channel (cold plasma measurements not included here). In order to simplify tabulation of moments, no distinction is made here between different phases of a given cycle. That is, all moments are treated as averages over the same cycle, although different ions were in fact sampled at different phases (the same ion often more than once per cycle).

All MD moments have been corrected for background counts due to penetrating radiation (mostly MeV electrons and associated bremsstrahlung). This has been done by subtracting an average background, that is the average sampled during a given energy/mass scan cycle, from the average ion count rates in each energy and angle bin. As a consequence, normally non-negative moments such as number density may end up negative, when the count rate of a given ion is very close to background levels, and the count rate in the background channel happens to be on the high side due to normal statistical or temporal fluctuations. This is to be expected, and negative values ought to be included in any statistical averaging of number densities from these files, in order not to bias the result.

All MD moments have a standard deviation assigned to them. This one accounts for purely statistical uncertainties, those associated with Poisson counting statistics. In all cases but one, the tabulated value is an integer number between 0 and 999, which represents the ratio in percent (%) between the standard deviation and the absolute value of the moment itself, rounded downward (values greater than 999 assumed irrelevant). The one exception is the bulk flow angle (drift direction angle) in the GSE X-Y plane (spin plane), where the standard deviation is expressed as an angle between 0 and 360 deg, rounded to the nearest integer.

The variance (square of standard deviation) of a given moment, or a given combination of moments (as in bulk velocity and mean energy), has been calculated in a customary fashion by taking the partial derivative with respect to the count rate in each energy and angle bin included in the moment (in both numerator and denominator, where applicable), squaring the derivative, multiplying it with the variance of the associated count rate, and adding such terms over all bins. If the same count rate is used twice, in order to replace a missing sample in an adjacent bin (see below), its contribution to the variance is adjusted so as to reflect the reduced number of independent samplings. All standard deviations, except the one assigned to bulk flow angle (see below), include a contribution from the variance of the background measurement. The reason for the exception is that the background measurement, although subtracted from all other count rates, is a scalar (single number) that cancels out from the calculation of flow angle.

For various reasons, the data may be statistically insufficient to allow a given moment (or combination of moments) to be calculated. If the number density has been calculated to be a negative number (background measurement too high), for example, it makes no sense to even attempt to calculate a mean energy. And if only a few energy channels have been sampled (due to noisy data), it makes no sense to calculate any of the moments, since the output format presumes a certain degree of consistency. Whenever a moment calculation fails, the corresponding standard deviation is set equal to -1.

7.1 File Format

The MD-file has been written in groups of five lines (records), using formatted sequential FORTRAN WRITE statements as follows:

The first of five lines is a title line:

```
      WRITE(8,230)IYYDDD,JSTART,JSTOP,RX,RY,RZ,RT,DZ,IMLAT,TLOCL,
     *BXMD,BYMD,BZMD,BTMD,BETA,IDBETA,BCTR,MDTCR,
     *ENEMAX,IRATE,RSEY,RSEZ

  230 FORMAT(I6,2I5,5F6.1,I4,F5.1,4F8.1,1PE10.2,I3,1PE10.2,I3,
     *0PF5.1,I2,2F6.1)
```

The variable names represent the following quantities:

IYYDDD is the year (two digits) and day of year (three digits).

JSTART is the universal time in minutes at the beginning of the averaging interval, that is the time of the first good data in that interval. This is normally at the start of an energy/mass scan cycle, unless some initial data in that cycle are bad.

JSTOP is the universal time in minutes at the end of the averaging interval, that is the time of the last good data in that interval. This is normally at the end of an energy/mass scan cycle, unless the last data in that cycle are bad.

RX, RY, RZ, and RT are, respectively, the GSM X, Y, Z, and radial distance at the midpoint of the averaging interval, all in units of "earth radii" ("Re"). RY and RZ are set to 999. if GSM coordinates not available (RX same in GSE).

DZ is the distance in "earth radii" (at midpoint) from the nominal neutral sheet in the geotail according to Fairfield and Ness [J.Geophys. Res., 75, 7032, 1970]. This is only displayed for GSM X < -11 Re, otherwise set to 999. If no GSM coordinates available, it is set to 0.

IMLAT is the geomagnetic latitude in degrees (at midpoint), rounded to the nearest integer. This is set to 0, if no ephemeris tape available.

TLOCL is the geographic local time in hours and 1/10 hours (at midpoint). This is set to 0.0, if no ephemeris tape available.

BXMD, BYMD, BZMD, and BTMD are the GSE components and absolute value, respectively, of the measured magnetic field, each averaged over the whole MD interval (for data quality check, see next section). The unit is "nanotesla" ("nT"), or equivalently, "gamma".

BETA and IDBETA are a simplified representation of the ion plasma beta and its standard deviation (% of absolute value). Its definition is explained in the next section.

BCTR is the average background count rate in counts/sec.

MDTCR is a flag showing which of two detector pulse hight triggering levels has been used (= 2 in these data).

ENEMAX is the maximum energy sampled, in units of "keV/e", or equal to 16.1, whichever is smaller (16.1 is maximum in moments). Even if it is listed as 16.1 (typical) the moments of some ion species may sometimes be limited to lower energies, depending on the energy/mass scan mode (see next section).

IRATE is a flag showing which of two data accumulation (and telemetry transmission) rates has been used. The low or normal rate (80% of the time) is shown by IRATE = 1, the high rate by IRATE = 4. Note: low rate means four (4) samplings/sec, high rate means sixteen (16) samplings/sec.

RSEY and RSEZ are the GSE Y and Z (at midpoint of averaging interval) in units of "earth radii".

The next four lines list, respectively, the moments for H+ (K= 1), He++ (K= 2), He+ (K= 3), and O+ (K= 4) (that is actually for M/Q= 1, 2, 4, and 16):

```
      DO 270 K=1,4

      WRITE(8,240)DNS5,ID0,DNS8,ID1,EMN8,ID2,
     *VDRFT,ID3,IDRFT,ID4,
     *BGD,ID6,ACSEC,XCSEC,
     *IPAMIN,IPAMAX,DENS8,ID7,EPER8,ID8,EPAR8,ID9

  240 FORMAT(4(1PE10.2,I3),I5,I4,1PE10.2,I3,0PF7.2,0PF6.2,
     *I4,I4,1PE10.2,I3,2(1PE9.2,I3))

  270 CONTINUE
```

The variable names represent the following quantities:

DNS5 and ID0 are the number density in "/cm3" and standard deviation (% of absolute value) of ions with energies between 10 eV/e and about 100 eV/e, that is of ions in the lowest energy channel (with RPA voltage fixed at 10 V).

DNS8 and ID1 are the number density in "/cm3" and standard deviation (% of absolute value) of ions with energies between about 100 eV/e and 16 keV/e (normally).

EMN8 and ID2 are the mean energy in "keV" and standard deviation (%) of ions in the nominal energy range from 100 eV/e to 16 keV/e. Note: this is total energy, including bulk motion, and it is in units of "keV", not "keV/e".

VDRFT and ID3 are the common (among those ions) drift speed (bulk flow speed) in "km/sec" and standard deviation (%) of ions in that same energy range (100 eV/e - 16 keV/e). This drift speed is in the s/c spin plane, that is approximately in the GSE X-Y plane.

IDRFT and ID4 are the longitudinal direction angle of that same drift and its standard deviation, both in "degrees". IDRFT = 0 is sunward and = 90 is duskward (-180 deg to +180 deg). ID4 is between 0 and 360 deg.

These moments, from DNS5 through IDRFT, assume that the velocity distribution has rotational symmetry around the drift (flow) vector (in the GSE X-Y plane).

BGD and ID6 are the equivalent isotropic density in "/cm3", over the 100 eV/e to 16 keV/e range, and standard deviation (%) corresponding to the measured average background count rate. That is, BGD is equal to the total background correction of DNS8 (a number already subtracted from DNS8). The ID6, when expressed in absolute terms, is part of ID1.

ACSEC is the number of seconds of data included in the moments for that ion species. This number is normally a small fraction of the length of the averaging interval (energy/mass scan cycle).

XCSEC is the number of seconds during the averaging interval when the MD detector was in low sensitivity mode and, at the same time, was sampling that particular ion species. This number is almost always zero in the magnetosphere, but usually nonzero for H+ in the magnetosheath and solar wind. In the latter cases it is often nonzero for He++ ions as well. If it is

not zero, it implies that at least some of the count rates of that ion species have been multiplied by a crude scaling factor (= 65 for MDTCR = 2) to compensate for the reduced sensitivity.

IPAMIN and IPAMAX are the minimum and maximum pitch angles in "degrees" sampled for those ions, rounded to the nearest integer. Note: if the magnetic field is properly measured and corrected for magnetometer offsets, then the sum of these angles, IPAMIN + IPAMAX, should range between about 170 deg and 190 deg.

DENS8 and ID7 are the number density in "/cm3" and standard deviation (% of absolute value) of ions in the 100 eV/e - 16 keV/e range, assuming that the velocity distribution has rotational symmetry around the local magnetic field vector (see next section for further explanations).

EPER8 and ID8 are the mean perpendicular energy (perpendicular to magnetic field; two degrees of freedom) in "keV" and standard deviation (%) of ions in the 100 eV/e - 16 keV/e range, assuming that same kind of symmetry.

EPAR8 and ID9 are the mean parallel energy (parallel to magnetic field; one degree of freedom) in "keV" and standard deviation (%) of ions in the 100 eV/e - 16 keV/e range, assuming that same kind of symmetry.

7.2 Further Explanations of Certain Variables.

The magnetic field values provided here may to some extent duplicate what has already been archived at the NSSDC by the magnetometer principal investigator (Prof. C. T. Russell; NSSDC identification number 77-102A-04), but are not intended to supplant those. The values derived here may not have been adequately screened against telemetry noise or adjusted for instrument anomalies, so it is recommended that the PI provided data be consulted whenever there is doubt about accuracy. There are two types of errors known to occur here:

a. When the magnetometer is commanded to low gain on the inbound leg of the s/c orbit, usually between R = 8 Re and = 5 Re, the corresponding flag may show up slightly too late on the raw data tape, resulting in a brief underrepresentation of the field by a factor of 32. This may last for about a minute or less (part of one major frame) and affects a single MD interval. This error ought to be fairly obvious in the ED data, and therefore traceable in the MD data as well (by comparing the times). The corresponding mismatch at high gain command on the outbound leg, that is a sudden 32-fold increase of the field, is usually discovered as "unreal" and corrected.

b. Occasionally, it appears that the wrong antenna flip status has been inferred from the raw data behavior (pertains to the s/c Y and Z coordinates), resulting in anomalous modulations of the GSE components. These modulations cause the sum BXMD**2+BYMD**2+BZMD**2 to be much smaller than the square of the time-averaged absolute field strength BTMD**2. It is recommended that the two measures of field strength be compared routinely, and that other magnetic field data be consulted if those two differ by more than a few percent. An additional (or

alternative) check can be made by summing IPAMIN and IPAMAX. If the sum is several degrees smaller than 170 deg or several degrees larger than 190 deg, then the magnetic field should be in doubt.

The velocity moments have been calculated two ways, A and B, using either of two energy-angle matrices. Both matrices consist of 32 energy channels (covering the entire range from 10 eV/e to about 18 keV/e), but one has 12 spin angle sectors (30 deg each) and no pitch angles, the other has 9 pitch-angle sectors (20 deg each) and no spin angles. In method A, using 12 spin angle sectors, the calculations consist of the following steps:

A.I A phase space density and a corresponding standard deviation are assigned to each matrix point that has been sampled, using the local average count rate, minus an average background count rate, and the number of samplings. No interpolations are made at this stage.

A.II Within each energy channel that has been sampled (usually all have), except the bottom and top ones, the phase space densities are weighted by cosines or sines of the spin angle (center of sector) and summed over angle to form two orthogonal projections. At this stage the phase space densities are interpolated in angle, if some angular bins have no samples. These projections are in turn weighted by energy and by an energy bandwidth (see below) and summed over energy channels, forming two orthogonal components, approximately the GSE X and Y components, of a vector that is proportional to number flow density. Both components are then divided by a total (scalar) sum of phase space densities weighted by the energy bandwidth and by the square root of the energy, that is by a sum proportional to number density, to form (approximate) X and Y drift velocity components, and a drift angle IDRFT. Similar summations are carried out with the variances (square of standard deviations), using the corresponding partial derivatives (squared) as weights, to derive the standard deviation of the drift angle (ID4).

A.III A spherical coordinate system is envisioned with its polar axis along the drift velocity vector, that is in the GSE X-Y plane. It is now assumed that the phase space density has azimuthal symmetry in this coordinate system (rotational symmetry around drift velocity vector). The number density, flow density (but not angle), and energy density are recalculated by summing over solid angle and energy in this system. The solid angle weighting factors in this case are zones on a unit sphere, each defined at the intersection with the GSE X-Y plane by the boundaries of a 30 deg spin angle sector, or by one boundary and the drift velocity vector. These zones are partially overlapping, and summing over 12 spin angle sectors (typically = 14 zones) means covering the unit sphere twice, so a factor 1/2 is applied to each sum. The drift speed (VDRFT) and mean energy (EMN8) are obtained by dividing flow density and energy density, respectively, by the number density (DNS8). No drift energy is subtracted from this mean energy. The corresponding standard deviations (ID3, ID2, and ID1) are derived from similar sums of variances, using partial derivatives as weights.

A.IV The partial number density of ions in the bottom energy channel (DNS5) and the corresponding standard deviation (ID0) are also calculated in this coordinate system, although in this case the energy "sum" has a single term covering the channel width (10 eV/e to about 100 eV/e).

If the drift speed in step A.II corresponds to less than 1 eV (less than 14 km/sec for H+, less than 4 km/s for O+, etc.), then the coordinate system is instead aligned with the X-Y projection of the magnetic field (calculated from BXMD and BYMD), provided the field elevation angle (including BZMD) is between -45 and +45 deg. If the latter is not the case, and if the drift speed is below minimum, the coordinate system is aligned with the s/c spin axis, and the phase space densities are treated as isotropic. Only density and mean energy are recalculated in these two cases.

In method B, using 9 pitch-angle ranges (0.0 - 19.9, 20.0 - 39.9, etc.), the steps are as follows:

B.I A phase space density and a corresponding standard deviation are assigned to each matrix point that has been sampled, using the local average count rate, minus an average background count rate, and the number of samplings.

B.II If only part of the pitch-angle range has been sampled, which is often the case (indicated by IPAMIN and IPAMAX), then the empty angular bins near 0 deg and 180 deg are assigned the same phase space density as the nearest sampled bin (closer to 90 deg) at the same energy.

B.III A spherical coordinate system is envisioned with its polar axis along the magnetic field vector (arbitrary direction). It is now assumed that the phase space density has azimuthal symmetry in this coordinate system (rotational symmetry around magnetic field vector), which is to say that the phase space densities in the 9 pitch-angle bins represent the entire unit sphere. The number density and the parallel (axial) and perpendicular energy densities are calculated by summing over solid angle and energy in this system. When summing over solid angle, the parallel and perpendicular energies are represented by, respectively, the cosine square and the sine square of the pitch angle at the center of each bin. The solid angle weighting factors in this case are 9 contiguous zones on a unit sphere, each defined by the boundaries of a 20 deg pitch-angle sector. The two mean energies (EPAR8 and EPER8) are obtained by dividing the respective energy densities by the number density (DENS8). The corresponding standard deviations (ID9, ID8, and ID7) are derived from similar sums of variances, using partial derivatives as weights. Only the standard energy range (0.1 - 16 keV/e) is included here.

EPER8 and EPAR8 should have a ratio of 2:1 if the velocity distribution is isotropic (or if the count rates have been extrapolated from a single bin at 90 deg pitch angle), since EPER8 represents two degrees of freedom and EPAR8 only one. Due to rounding-off errors in the summation over angle, however, the isotropic ratio is not exactly 2, but about 1.969. More specifically, if statistical and instrumental errors are neglected, EPER8 is very nearly exact (about 0.02% too small), but EPAR8 is about 1.55% too large. Naturally, neither energy will be

very meaningful if the magnetic field is in error (see above).

The "ion plasma beta" listed in the title line, BETA, is actually calculated with method A. The ion pressure used here is equal to 2/3 (two degrees of freedom) of the sum of "thermal" energy densities of the four ion species, that is total energy densities minus the energy densities associated with the respective drift speed, as calculated assuming symmetry around the respective drift velocity vector. This pressure has been divided by a magnetic pressure based on BTMD. An alternative and more formally correct value may be calculated using the "gyrotropic" density DENS8 and perpendicular energy EPER8, although those quantities do not account for bulk flow (drift). In case the magnetic field is suspect, and other field measurements are available, the beta can only be recalculated with method A (using DNS8, EMN8, and VDRFT for each ion).

The summation over energy treats each energy channel, except the first and second ones, as a point measurement at the center energy, and takes the energy bandwidth to be the distance between adjacent sampled channels in the trapezoidal fashion, ignoring intermediate channels with no samples. At the second channel an extra term is added to extend the standard energy integral from the center of the channel downward to about 0.1 keV, assuming the flux to be a constant. This addition brings the mathematical energy range into better agreement with the instrumental range of acceptance. At the first energy channel, which is treated separately, the energy summation has only one term that includes the channel width (10 eV/e - 100 eV/e) as a factor (only DNS5 and ID0 calculated).

Since the summations are done after the completion of an energy/mass scan cycle, the energy channels have normally been sampled in a contiguous fashion, but the summation procedures are set up to accept gaps of as many as four channels (due to noisy data), before declaring the data insufficient.

Depending on the scan mode, the lowest and highest energy channels sampled may vary, and are sometimes different for different ions. The summation procedure uses the actual lower and upper channels, so the moments of different ions may on occasion cover different energy ranges. There are no flags to separate ions in that regard in the MD-file (insufficient space), but the actual energy coverage is shown for each ion in the MC-file (see below). See also the explanation of ENEMAX above.

The variable ACSEC is a sum of elementary time segments associated with each commanded setting of the power supplies controlling energy and mass channels. These elementary times are 1/4 sec during low bit rate operation (about 80% of the time) and 1/16 sec during high bit rate operation. These times include the resetting of the power supplies, however, and are slightly longer than the times associated with particle counting. For simplicity, the particle counting is interrupted for about 12% of the elementary time segments in both low and high bit rate operation to allow for resetting. The ACSEC therefore exceeds the actual particle counting time by about 14% in both cases.

8. THE MC-FILE

This file is essentially an abbreviated listing of the count rates that have been converted to velocity moments in the MD-file. All relevant energy channels are represented, but the spin angle bins have been replaced, in each separate energy channel, by the peak count, the time of the peak (in seconds), the spin angle of the peak (angle of motion of ions), a measure of the angular width of the ion flux, and the spin-averaged count rate with standard deviation. No pitch-angle information is listed, but the approximate pitch angle at the peak count can be derived from the spin angle and the magnetic field orientation.

Count rates are listed for five ion species, that is for the same four species included in the MD-file: H+, He++, He+, and O+ (actually for M/Q= 1, 2, 4, and 16), and, in addition, for doubly charged oxygen: O++ (M/Q= 8). The listing for O++ is usually incomplete (contains fill) because it has only been measured over part of the energy range, or it has not been measured at all, depending on the energy/mass scan mode. It is common to limit the measurement of the O++ to the lowest 24 energy channels (to energies below about 10 keV/e), to avoid contamination by the more abundant O+, whose M/Q response function partially overlaps with that of the O++ at the highest energies.

Usually the MC-file displays count rates from all 32 energy channels, but if the energy/mass scan cycle is limited to a lower portion of the energy range (as may be the case when the instrument has been commanded for solar wind or magnetosheath observations), then the MC-file is also limited to lower energies. In such cases, it is not uncommon to have a different energy coverage for different ions, but the MC-file lists the same number of channels (same number of lines) for all five ion species, displaying dummy fill where data are missing. The fill consists of -1 or -1.00.

Note: The MC-file is the only documentation of the actual energy ranges used in the MD-file, in case different ions have been measured over different energy ranges. The MD moment calculations will extend across missing intermediate energies, up to four contiguous missing channels (see above), but they will not extrapolate below or above the end channels, and they will not extend above 16 keV/e (or below 100 eV/e in most cases). The actual ranges can be deduced from the MC-file by the lowest and highest channels (lines) that have data (rather than fill). Usually the only places where the energy sweep is shortened and made different for different ions are in the solar wind and in the magnetosheath, as predicted from average magnetosphere configurations.

In order to simplify the file format, all averaged counts are treated as representing the whole energy/mass scan cycle, even though different ions were in fact sampled at different phases of the cycle (the same ion often more than once). However, the time labels on the peak counts do refer to the respective times of sampling, rounded downward to the whole second.

All MC counts and count rates are raw data, except when the instrument has been operating in low sensitivity mode. In that case the peak count and some counts included in the spin-averaged rate have been multiplied by a crude scaling factor (= 65) to compensate for the reduced sensitivity. Such counts are flagged accordingly (see below). None of the counts or count rates has been corrected for background counts due to penetrating radiation (mostly MeV electrons and associated bremsstrahlung). However, the average background count rate measured

during each energy/mass scan cycle is listed as average counts per sample, along with the sampling rate, which is expressed in number of samples per second here.

The MC counts and count rates may be converted to differential fluxes or phase space densities using the instrument parameters listed in a separate section below.

8.1 File Format

The MC-file has been written in groups of up to 34 lines (up to 33 records), using formatted sequential FORTRAN WRITE statements as follows:

The first line in each group has a single character indicating the format of the counts (1 or 2), the second line is a title line that also indicates how many lines (energy channels) are to follow in the current group:

```
      WRITE(11,243)IFORMT,IYYDDD,JSTART,JSTOP,RX,RY,RZ,RT,RSEY,RSEZ,
     *DZ,IMLAT,TLOCL,BXMD,BYMD,BZMD,BTMD,BETA,IDBETA,BGND,IDBGND,
     *MAXES0,NSPLPS

  243 FORMAT(I2/3I6,7F6.1,I4,F5.1,4F8.1,1PE10.2,I3,1PE9.2,I3,2I3)
```

The variable names represent the following quantities:

IFORMT is the format flag for the counts, showing either of two formats. The standard format (IFORMT = 1) lists the averaged count rates in floating point with two decimal places, the other one (IFORMT = 2) rounds them to the nearest integer in order to allow more positions for the peak counts (always integers) on the same line.

IYYDDD is the year (two digits) and day of year (three digits).

JSTART is the universal time in seconds (not minutes) at the beginning of the averaging interval, that is the time of the first good data in that interval. This is normally at the start of an energy/mass scan cycle, unless some initial data in that cycle are bad.

JSTOP is the universal time in seconds (not minutes) at the end of the averaging interval, that is the time of the last good data in that interval. This is normally at the end of an energy/mass scan cycle, unless the last data in that cycle are bad.

RX, RY, RZ, and RT are, respectively, the GSM X, Y, Z, and radial distance at the midpoint of the averaging interval, all in units of "earth radii" ("Re"). RY and RZ are set to 999. if GSM coordinates not available (RX same in GSE).

RSEY and RSEZ are the GSE Y and Z (at midpoint of averaging interval) in units of "earth radii".

DZ is the distance in "earth radii" (at midpoint) from the nominal neutral sheet in the geotail according to Fairfield and Ness [J.Geophys. Res., 75, 7032, 1970]. This is only displayed for GSM X < -11 Re, otherwise set to 999. If no GSM coordinates available, it is set to 0.

IMLAT is the geomagnetic latitude in degrees (at midpoint), rounded to the nearest integer. This is set to 0, if no ephemeris tape available.

TLOCL is the geographic local time in hours and 1/10 hours (at midpoint). This is set to 0.0, if no ephemeris tape available.

BXMD, BYMD, BZMD, and BTMD are the GSE components and absolute value, respectively, of the measured magnetic field, each averaged over the whole interval (for data quality check, see description of MD-file). The unit is "nanotesla" ("nT"), or equivalently, "gamma".

BETA and IDBETA are a simplified representation of the ion plasma beta and its standard deviation (% of absolute value). Its definition is explained in the description of the MD-file.

BGND and IDBGND are the average background count rate in counts per sample (not per second) and standard deviation (%).

MAXES0 is the number of lines to follow in the current group (usually = 32, sometimes less). Each line represents one energy channel, always starting with the lowest channel (10 eV/e - 100 eV/e), whether or not that channel was sampled, and running through the channels contiguously. MAXES0 is the number of the highest energy channel sampled at any phase of the energy/mass scan cycle.

NSPLPS is the number of samples per second taken during the current energy/mass scan cycle, either 4 (low bit rate) or 16 (high bit rate).

The next N = MAXES0 lines list counting data in N contiguous energy channels, starting at the bottom channel (I= 1), for H+ (J= 1), He++ (J= 2), He+ (J= 3), O+ (J= 4), and O++ (J= 5) (M/Q= 1, 2, 4, 16, and 8):

```
      DO 248 I=1,MAXES0

      IF(IFORMT.EQ.1)THEN
      WRITE(11,246)
     *(ACTR(J),IDCTR(J),IPCTR(J),IUTPC(J),IPDEG(J),IWDEG(J),J=1,5)

  246 FORMAT(X,F7.2,I3,I4,I5,I4,I4,4(F7.2,I3,I3,I5,I4,I4))

      ELSE
      WRITE(11,247)
     *(IACTR(J),IDCTR(J),IPCTR(J),IUTPC(J),IPDEG(J),IWDEG(J),J=1,5)

  247 FORMAT(X,I5,I3,I6,I5,I4,I4,4(I5,I3,I5,I5,I4,I4))

      ENDIF
  248 CONTINUE
```

The variable names represent the following quantities:

ACTR is the average (spin-averaged) count rate in floating point representation (IFORMT = 1), that is the average number of counts per sample (4 or 16 samples per second).

IACTR is an integer approximation of ACTR, that is ACTR rounded to the nearest integer. This format (IFORMT = 2) is used when some ion (usually H+) at some energy (usually around one keV) has a value of ACTR that would cause the standard format to overflow (IACTR is capped in the rare event that it would also overflow). This same integer representation is used for all ions at all energies, regardless of where the overflow would have ocurred. This condition is usually associated with a change of instrument operation to low sensitivity mode, so the largest IACTR values usually contain counts that have been "corrected", that is multiplied by a scaling factor (= 65), and are flagged accordingly (by IDCTR).

IDCTR is normally the Poisson standard deviation of ACTR (or IACTR), expressed in percent and rounded downward to an integer value. That is, IDCTR represents the ratio (in %) between the square root of the sum of counts and the sum of counts (sum = ACTR * No of samples). In case the instrument has been in low sensitivity mode at any time while a particular ACTR (or IACTR) was being averaged, the IDCTR is instead used as a flag and set equal to -9. In that case ACTR (or IACTR) contains "corrected" counts and should be treated with some care.

IPCTR is the maximum number of counts during any single sample (about 1/4:th or 1/16:th of a second) of a given ion at a given energy. If IDCTR= -9, then IPCTR probably contains a "correction factor" (= 65).

IUTPC is the (approximate) time of maximum count rate (IPCTR), expressed as integer number of seconds after the beginning of the current averaging interval. That is, the universal time in seconds is = JSTART + IUTPC.

IPDEG is the angle of motion in the s/c spin plane of those ions that cause the maximum count rate. The angle refers to the midpoint of the sampling interval (and the midpoint of the instrument field of view), and is rounded to the nearest integer. During each sampling interval the instrument sweeps (spins) through about 30 deg of angle in low bit rate (4 samplings/sec), and about 7.5 deg in high bit rate (16 samplings/sec).

IWDEG is a measure of the angular width (nearest integer) of the ion flux distribution around the maximum. It is a sum of two angles, one being the closest spin angle from IPDEG with a count rate less than 1/3 of IPCTR, the other being the most distant spin angle from IPDEG with a count rate at least 1/3 of IPCTR. That is, IWDEG is a crude measure of the full width at 1/3 of maximum. It is measured after IUTPC if more than 1/2 s/c spin remains, otherwise set to -1. If IPCTR is more than 3 times greater than any subsequent counts, IWDEG is set to 30 deg in low bit rate and 8 deg in high bit rate (or -1 if too close to end of interval).

8.2 Relevant Instrument Parameters.

To convert counts per sample, or CTS, to counts per second, or CTRATE, use

CTRATE = CTS *RATE /0.21865

where RATE = 1.0 in low bit rate, and RATE = 4.0 in high bit rate.

However, the count rates in the MC-file are raw counts and need to be adjusted for detector degradation (including peak counts and background). These count rates have been obtained at the higher of two pulse hight triggering levels in the MD particle detector, at the MDTCR = 2 level. The lower level, MDTCR = 1, provides a more nearly one to one detection level, that is one count for every ion entering the detector, but it also admits more false counts due to penetrating radiation than does the higher level. The reason for using the MDTCR = 2 level is to minimize the background. The lower sensitivity to ions is not a problem in itself as long as it is well known, since the count rate can be adjusted accordingly, but it has slowly declined over time, making it necessary to do periodic in-flight calibrations. These have consisted of intercomparing the count rates at the MDTCR = 1 and = 2 levels, which are both part of the instrument output, during times of extremely low background. Fortunately, the MDTCR = 1 level has shown no degradation, and can be used as a standard reference. The following table shows the results of these intercomparisons in the lowest and highest energy channels for the four principal ions (date refers to beginning of month). The intercomparisons for O++ (ION= 5) have been less extensive but suggest that the O+ (ION= 4) ratios can be used for the O++ as well.

```
c Ratios of MDTCR= 2 count rate to MDTCR= 1 count rate in flight;
c
c in lowest energy channel:
      DATA CMD01/
c  launch - Jan 78,    Jul 78,    Jan 79,    Jul 79,    Jan 80,    Jul 80
c ION= 1
     *        .90,       .81,       .60,       .48,       .36,       .24,
c ION= 2
     *        .95,       .90,       .80,       .70,       .60,       .50,
c ION= 3
     *        .95,       .85,       .70,       .60,       .50,       .40,
c ION= 4
     *        .95,       .89,       .75,       .65,       .55,       .45/
c
c in highest energy channel:
      DATA CMD32/
c  launch - Jan 78,    Jul 78,    Jan 79,    Jul 79,    Jan 80,    Jul 80
c ION= 1
     *        .94,       .93,       .82,       .72,       .61,       .50,
c ION= 2
     *        .97,       .95,       .90,       .85,       .80,       .75,
c ION= 3
     *        .97,       .95,       .90,       .85,       .80,       .75,
c ION= 4
     *        .97,       .95,       .90,       .85,       .80,       .75/
```

Intercomparisons have been made at many energies, and it appears that the ratios vary about linearly with energy channel number (1 through 32). That relation has been used when converting count rates to velocity moments in the MD-file, that is, the ratios have been interpolated linearly in energy channel number. They have also been interpolated linearly in time between the dates above. For dates beyond July of 1980 this scheme has been abandoned, and MDTCR = 1 counts have been used exclusively. Given count rates from before July 1980, these are thus to be adjusted by

CTRATE = CTRATE /CMD(IE, date, ION)

where IE is the energy channel No, and CMD(...) is obtained by linear interpolation in IE and date between the CMD01 and CMD32 in the table. For ION= 5 (O++) use the same numbers as for ION= 4 (O+).

There is actually one more adjustment that can be made to improve the one to one relationship between counts and ions in the MC-file. This one does not depend on the MDTCR level, but it depends somewhat on the energy/mass scan mode. To have exactly one count for every ion entering the MD detector, on average, requires that the power supplies controlling the M/Q separation be tuned exactly to the peak response for a given ion at every energy. This is impractical, but in all scan modes, except the so called "load mode", the single mass channel chosen to represent a given ion will have let that ion through at about 90% of peak response, or higher. In the "load mode", however, every mass channel has been sampled, and all counts at a response of 40% or higher have been used (for the five ions listed). The average response for those counts ranges between 70% and 90% of the peak, varying somewhat randomly from one energy channel to the next, but is mostly 80% to 85%.

Therefore, if the counts have been obtained in "load mode" it may be worth adjusting the time averaged counts (ACTR and IACTR) by another factor of about 1.2 (average over energy). The peak count rates (IPCTR) cannot be adjusted for this effect at this stage, since the mass channel No. is not listed. The "load mode" can be recognized from the MS-file (see below). By contrast, all counts used when calculating moments for the MD-file were adjusted for off-peak response on a sample by sample basis (after first summing over the mass peak in load mode).

Once adjusted, the count rates in the MC-file can be converted to differential flux "FLUX" and phase space density "F" with the following subroutine.

```
      SUBROUTINE AFLUX( ION, CTRATE, IE, FLUX, F )
c**** Input:  ION= 1 (H+), 2 (He++), 3 (He+), 4 (O+), or 5 (O++)
c****         CTRATE= counts per second (floating point), and
c****         IE= 1, 2, 3, ....., 32 (energy channel)
c****
c**** Output: "FLUX" in units of "/cm2/sec/ster/keV"
c****         "F" in units of "sec3/km6".
c****
      DIMENSION AM(5),Q(5) ! ion mass and charge units
      DATA AM/1.,4.,4.,16.,16./, Q/1.,2.,1.,1.,2./
c**** instrument energies (center of channels):
      DIMENSION ENERGY(32) ! "keV/e"
      DATA ENERGY/
     *   .040,   .212,   .410,   .628,   .851,  1.095,  1.353,  1.633,
     *  1.929,  2.244,  2.580,  2.934,  3.317,  3.718,  4.146,  4.599,
     *  5.080,  5.592,  6.132,  6.713,  7.333,  7.998,  8.701,  9.446,
     * 10.235, 11.076, 11.969, 12.917, 13.927, 14.999, 16.144, 17.364/
c**** instrument geometric factors, including delta-E:
      DIMENSION G(32,5) ! "1.0E-4 cm2 keV"
      DATA G/
c**** ION= 1:
     * 3.60,6.00,6.00,6.00,6.01,6.01,6.01,6.01,6.01,6.01,6.02,6.02,6.02,
     * 6.48,6.94,7.40,7.85,8.31,8.77,9.23,9.69,10.3,10.9,11.5,12.1,12.8,
     * 13.4,14.0,14.6,15.2,15.8,16.4,
c**** ION= 2:
     * 4.50,7.37,7.20,7.04,6.87,6.70,6.54,6.37,6.21,6.04,5.87,5.71,5.54,
     * 5.85,6.17,6.48,6.80,7.11,7.43,7.74,8.06,8.39,8.71,9.04,9.37,9.69,
     * 10.0,10.4,10.8,11.2,11.6,12.0,
c**** ION= 3:
     * 7.20,11.9,11.3,10.7,10.0,9.41,8.79,8.16,7.54,6.92,6.30,5.67,5.05,
     * 5.37,5.69,6.01,6.32,6.64,6.96,7.28,7.60,7.99,8.38,8.77,9.16,9.54,
     * 9.93,10.3,10.7,11.1,11.5,11.9,
c**** ION= 4:
     * 3.10,5.28,5.23,5.17,5.12,5.07,5.01,4.96,4.91,4.86,4.80,4.75,4.70,
     * 4.85,4.99,5.14,5.29,5.44,5.59,5.73,5.88,6.26,6.63,7.02,7.42,7.82,
     * 8.23,8.61,9.02,9.42,9.82,10.2,
c**** ION= 5:
     * 4.71,7.83,7.55,7.28,7.01,6.74,6.47,6.19,5.92,5.65,5.38,5.10,4.83,
     * 5.05,5.26,5.47,5.69,5.90,6.12,6.33,6.54,6.92,7.30,7.68,8.06,8.52,
     * 8.96,9.34,9.72,10.2,10.6,11.0/
c**** normalize:
      GDE= G(IE,ION)*1.0E-4
c**** differential flux:
      FLUX= CTRATE/GDE/Q(ION) ! "/cm2/s/sr/keV)"
c**** phase space density:
      F= 0.5449208*FLUX*AM(ION)*AM(ION)/Q(ION)/ENERGY(IE) ! "s3/km6"
      RETURN
      END
```

The energy channel widths (in keV/e) and the angular fields of view in each energy channel are inherent in the geometric factors listed in this subroutine (G-delta-E), but it may be of interest to know them separately:

The external energy bandwidth is defined by the internal energy resolution of the instrument, which is about a constant 5% at all energies, but the external bandwidth is not a constant fraction of energy, because the ions are pre-accelerated by about 3.0 kV before they enter energy analysis (energy selection). To obtain the absolute energy bandwidth to incoming ions, add 3.0 keV/e to the center energies listed in the subroutine, except the lowest energy, and take 5% of the sum. The lowest energy channel is different, due to the applied RPA voltage, and extends approximately between 10 eV/e and 100 eV/e (more precisely to about 110 eV/e).

As mentioned, the center of the instrument field of view (the one used here) points 5 deg below the spin plane, that is about 5 deg below the GSE X-Y plane (ion velocity vector pointing 5 deg above). In this plane the width is about 10 deg. In the perpendicular (GSE Z) direction it varies with energy (due to the pre-acceleration), from about 45 deg at 10 eV/e to 10 deg at 18 keV/e. To be more specific, if the center energies of the 32 energy channels are used as reference, the corresponding 32 angular widths are as follows (full width at 25% of max; in deg):

40.0, 30.0, 26.0, 22.5, 20.0, 18.0, 16.5, 15.5,
15.0, 14.0, 13.5, 13.0, 13.0, 12.5, 12.5, 12.0,
12.0, 11.5, 11.5, 11.0, 11.0, 11.0, 11.0, 10.5,
10.5, 10.5, 10.5, 10.5, 10.5, 10.0, 10.0, 10.0

9. THE MS-FILE

This file contains complete mass spectra in four energy ranges, provided the instrument energy/mass scan included complete mass scans at some energies (not always the case). The counts in this file are also from the MD detector, but they are normally not the same counts as those listed in the MC-file, which went into moment calculations for the MD-file. It is only in the mode called "load mode" that the same raw counts have been used in all three files with MD data. This particular mode (hardwired) consists of one complete 32-step energy scan in each successive mass channel over the complete 64 mass-channel range (four such scan cycles have been used to define a full cycle in high bit rate here). This scan mode is used infrequently, and can be recognized by the fact that the number of samplings in the MS-file (see below) add up to cover the entire averaging interval (entire scan cycle). In all other scan modes the mass spectra are obtained as separate and small parts of each energy/mass scan cycle, and are only used to provide data for the MS-file here. For simplicity, the same beginning and ending times are listed here as are listed in the MD-file, even if the mass spectra were obtained for brief intervals well inside those times.

The four mass spectra are listed in four vertical columns, with each line representing one mass channel, beginning with channel No. 1 at the top and ending with No. 64 at the bottom. Each column represents one energy range, with the energy increasing from left to right:

Leftmost energy range: channel No. 1 (about 10 eV/e - 100 eV/e).

Second to the right: channels No. 2 - 5 (about 100 eV/e - 1 keV/e)

Third to the right: channels No. 6 - 12 (about 1 keV/e - 3 keV/e)

Fourth to the right: channels No. 13 - 31 (about 3 keV/e - 16 keV/e)

The counts in each mass channel (on each line) are a sum of counts from all energy channels sampled within each energy range. Along with the sum of counts is the number of samples.

The MS-counts are pure raw counts; no "corrective" factor has been applied when the instrument has been operating in low sensitivity mode. However, each column has a flag above it showing how many of the samples in that column were taken in low sensitivity mode (without specifying mass channel). No background counts have been subtracted either.

Within each mass spectrum (each column) certain mass peaks may be found more often than others. The following is a listing of expected mass channel No. (1 through 64) at peak count rate for certain important M/Q:

M/Q= 16.00 about 16 to 17

= 8.00 about 21 to 22

= 4.00 about 29 to 30

= 2.66 about 35 to 36

= 2.00 about 40 to 41

= 1.50 about 45 to 46

= 1.00 about 55 to 56

9.1 File Format

The MS-file has been written in groups of 68 lines (65 records), using formatted sequential FORTRAN WRITE statements as follows:

The first line in each group is blank, the second and third make up a title, and the fourth lists (above each mass spectrum) the No. of samples taken in low sensitivity mode:

```
      WRITE(12,255)
     *IYYDDD,JSTART,JSTOP,RX,RY,RZ,RT,RSEY,RSEZ,DZ,IMLAT,TLOCL,
     *BXMD,BYMD,BZMD,BTMD,BETA,IDBETA,BGND,IDBGND,MAXEMS,NSPLPS,
     *(IMSLOW(I),I=1,4)

  255 FORMAT(X/I6,2I5,7F6.1,I4,F5.1/X,4F8.1,1PE10.2,I3,1PE9.2,I3,2I3/
     *X,4I13)
```

The variable names represent the following quantities:

IYYDDD is the year (two digits) and day of year (three digits).

JSTART is the universal time in minutes at the beginning of the averaging interval, that is the time of the first good data in that interval. This is normally at the start of an energy/mass scan cycle, unless some initial data in that cycle are bad.

JSTOP is the universal time in minutes at the end of the averaging interval, that is the time of the last good data in that interval. This is normally at the end of an energy/mass scan cycle, unless the last data in that cycle are bad.

RX, RY, RZ, and RT are, respectively, the GSM X, Y, Z, and radial distance at the midpoint of the averaging interval, all in units of "earth radii" ("Re"). RY and RZ are set to 999. if GSM coordinates not available (RX same in GSE).

RSEY and RSEZ are the GSE Y and Z (at midpoint of averaging interval) in units of "earth radii".

DZ is the distance in "earth radii" (at midpoint) from the nominal neutral sheet in the geotail according to Fairfield and Ness [J.Geophys. Res., 75, 7032, 1970]. This is only displayed for GSM X < -11 Re, otherwise set to 999. If no GSM coordinates available, it is set to 0.

IMLAT is the geomagnetic latitude in degrees (at midpoint), rounded to the nearest integer. This is set to 0, if no ephemeris tape available.

TLOCL is the geographic local time in hours and 1/10 hours (at midpoint). This is set to 0.0, if no ephemeris tape available.

BXMD, BYMD, BZMD, and BTMD are the GSE components and absolute value, respectively, of the measured magnetic field, each averaged over the whole interval (for data quality check, see description of MD-file). The unit is "nanotesla" ("nT"), or equivalently, "gamma".

BETA and IDBETA are a simplified representation of the ion plasma beta and its standard deviation (% of absolute value). Its definition is explained in the description of the MD-file.

BGND and IDBGND are the average background count rate in counts per sample (not per second) and standard deviation (%).

MAXEMS is the number of the highest energy channel included in the mass spectra (31 or lower).

NSPLPS is the number of samples per second taken during the current energy/mass scan cycle, either 4 (low bit rate) or 16 (high bit rate).

IMSLOW is the total number of samples taken in low sensitivity mode while gathering the mass spectrum below it (regardless of mass channel).

The next 64 lines, one for each mass channel, list the accumulated number of counts (sums) in each of four energy ranges (explained above), along with the corresponding number of samples:

```
      DO 258 J=1,64

      WRITE(12,257)((ISUM04(I),ISPL04(I)),I=1,4)

  257 FORMAT(X,4(I9,I4))

  258 CONTINUE
```

The variable names represent the following quantities:

ISUM04 is the accumulated number of counts within energy range I, regardless of instrument look angle.

ISPL04 is the corresponding number of samples (4 per seconds in low bit rate, 16 per seconds in high; cf. NSPLPS)

10. THE EX-FILE

This file contains auxiliary ISEE-1 ephemeris that may be used for labeling plots of data from the other files (see comments on existing plots at the end of this data user's guide). It is derived from separate ISEE ephemeris tapes which have a more complete set of coordinates, all listed once per minute. This file has a subset of the ephemeris, and it only lists this set every 30 minutes. If the ephemeris tape is unavailable (unreadable), it substitutes the GSE coordinates from the instrument data telemetry tape for the corresponding ephemeris coordinates, choosing these to be as closely as possible on the half hour, and fills the remaining positions with dummy numbers.

10.1 File Format

The EX-file always has 49 lines (records) which have been written with a formatted sequential FORTRAN WRITE as follows:

```
      MMMM=0
      DO 38 I=1,49
   36 WRITE(7,37)IYYDDD,MMMM,RX,RY,RZ,RT,DZ,IMLAT,TLOCL,RSEY,RSEZ,RL

   37 FORMAT(I6,I5,5F6.1,I4,F5.1,2X,3F6.1)

   38 MMMM=MMMM+30
```

The variable names represent the following quantities:

IYYDDD is the year (two digits) and day of year (three digits).

MMMM is the universal time in minutes.

RX, RY, RZ, and RT are the GSM X, Y, Z, and radial distance, respectively, all in units of "earth radii" ("Re"). RY and RZ are set to 999. if GSM coordinates not available (RX same in GSE).

DZ is the (calculated) distance in "earth radii" from the nominal neutral sheet in the geotail according to Fairfield and Ness [J.Geophys. Res., 75, 7032, 1970]. This is only displayed for GSM X < -11 Re, otherwise set to 999. If no GSM coordinates available, it is set to 0.

IMLAT is the geomagnetic latitude in degrees, rounded to the nearest integer. This is set to 0, if no ephemeris tape available.

TLOCL is the geographic local time in hours and 1/10 hours. This is set to 0, if no ephemeris tape available.

RSEY and RSEZ are the GSE Y and Z in "earth radii" (may have values even when no ephemeris tape available; same with RX and RT).

RL is McIlwain's L value. This is only defined in the inner magnetosphere, otherwise set to 0. (also when no ephemeris tape available).

11. GRAPHIC REPRESENTATION

A subset of the data in the ED- and MD-files is available in graphical form in a series of booklets, one booklet for each month of data. There are two pages of graphs for each day, each page covering 12 hours of universal time. Each page consists of a vertical stack of 7 panels. These panels show the following data items:

Panel 1 (top) shows the "total" ion density from the ED-file (EDDNS) and the partial densities of He++, He+, and O+ from the MD-file (DNS8). Note: the labels He+ and O+ may not be appropriate in the magnetosheath and solar wind, where heavier ions in high charge states may dominate weak count rates near those M/Q values, especially near M/Q= 4.

Panel 2 shows the He++/H+ density ratio from the MD-file (DNS8[He++]/DNS8[H+]). This panel and the top one are the only ones with MD-data, the ones below all have data from the ED-file only.

Panel 3 shows the ion "thermal" energy from the ED-file (EDEMN).

Panel 4 shows the "thermal" energy density from the ED-file multiplied by 2/3 (EDDNS*EDEMN*2./3.) along with the magnetic pressure and field strength based on the ED-averages. Note: the magnetic pressure and field strength are based on the square root of BXED**2 + BYED**2 + BZED**2 (not on BTED) in order to show more clearly those (rare) times when the magnetic field is flawed. Those times are mostly characterized by a sudden and/or strong reduction in the magnetic pressure/field strength which is not associated with a corresponding increase in the "thermal" energy density of the ions (total pressure not preserved). The brief (one data point) error in the magnetic field gain factor on many inbound passes is also clearly seen in this panel (errors discussed in connection with the ED- and MD-files above).

Panel 5 shows the ion drift speed (in GSE X-Y plane) from the ED-file (EDVEL).

Panel 6 shows the magnetic field elevation angle (relative GSE X-Y plane) from the ED-file (ITHETB).

Panel 7 (bottom) shows the ion drift angle (IEDANG) and magnetic longitude angle (IPHIB) in the GSE X-Y plane from the ED-file.

Below the bottom panel are the UT and assorted ephemeris. When ephemeris tape has not been available (very rare) only the geocentric distance (R) will show.

APPENDIX

SAMPLE PRINTOUTS OF DATA FILES

A1. Magnetosphere /Geomagnetically Quiet Day

(Low O^+/H^+ density ratio)

78064	94	-0.9	4.7	5.9	7.7	51	101	1.65E+00	2.08E+00	1.56E+01	33	92.00	0.00	0.1	16.1	-12.3	-11.3	-0.8
78064	242	-2.2	4.6	7.3	8.9	55	115	1.80E+00	2.13E+00	7.95E+00	73	168.00	0.00	0.1	16.1	-12.3	-11.3	-0.8
78064	374	-2.4	4.2	8.2	9.6	60	120	1.64E+00	2.23E+00	7.20E+00	88	60.00	0.00	0.1	16.1	-12.3	-11.3	-0.8
78064	438	-2.0	3.7	7.9	9.0	62	119	1.67E+00	2.23E+00	3.48E+00	-97	60.00	0.00	0.1	16.1	-12.3	-11.3	-0.8
78064	502	-1.2	3.7	6.7	7.8	60	108	1.71E+00	2.24E+00	1.95E+01	-30	60.00	0.00	0.1	16.1	-12.3	-11.3	-0.8
78064	582	0.6	4.9	5.2	7.2	47	83	1.84E+00	2.23E+00	1.79E+01	-7	88.00	0.00	0.1	16.1	-12.2	-11.3	-0.8
78064	666	1.9	6.4	5.4	8.6	39	73	1.68E+00	2.20E+00	1.74E+01	4	68.00	0.00	0.1	16.1	-12.2	-11.3	-0.8
78064	742	1.9	6.7	6.0	9.3	41	74	1.83E+00	2.11E+00	2.10E+01	72	60.00	0.00	0.1	16.1	-12.2	-11.3	-0.8
78064	805	1.6	6.3	6.1	9.0	43	76	1.84E+00	2.12E+00	3.21E+01	56	60.00	0.00	0.1	16.1	-12.2	-11.2	-0.8
78064	869	2.4	6.5	5.1	8.7	36	69	1.84E+00	2.02E+00	3.30E+01	21	60.00	0.00	0.1	16.1	-12.2	-11.2	-0.8
78064	933	4.2	7.8	4.6	10.0	27	62	1.90E+00	1.89E+00	2.57E+01	-28	60.00	0.00	0.1	16.1	-12.2	-11.2	-0.8
78064	1021	4.8	7.3	5.8	10.5	34	57	2.02E+00	1.69E+00	2.95E+01	-39	104.00	0.00	0.1	16.1	-12.1	-11.2	-0.8
78064	1177	6.5	12.0	6.0	14.9	24	62	2.47E+00	1.44E+00	4.34E+01	-36	168.00	0.00	0.1	16.1	-12.1	-11.2	-0.8
78064	1309	4.0	9.0	4.1	10.7	23	66	1.65E+00	1.86E+00	2.81E+01	-79	60.00	0.00	0.1	16.1	-12.1	-11.2	-0.8
78064	1373	1.3	7.4	4.2	8.6	29	80	1.76E+00	1.93E+00	2.77E+01	-123	60.00	0.00	0.1	16.1	-12.1	-11.2	-0.8
78064	1437	1.7	8.2	3.7	9.3	24	78	1.77E+00	1.98E+00	2.60E+01	-169	60.00	0.00	0.1	16.1	-12.1	-11.2	-0.8
78064	1517	4.9	11.2	3.2	12.7	15	67	2.03E+00	1.65E+00	2.29E+01	-225	88.00	0.00	0.1	16.1	-12.0	-11.2	-0.8
78064	1601	7.2	13.3	5.4	16.1	20	61	1.76E+00	1.47E+00	2.38E+01	85	68.00	0.00	0.1	16.1	-12.0	-11.2	-0.8
78064	1677	8.9	14.4	5.6	17.9	18	58	2.30E+00	1.12E+00	2.16E+01	26	60.00	0.00	0.1	16.1	-12.0	-11.2	-0.8
78064	1741	11.0	15.0	4.4	19.1	13	54	2.38E+00	1.10E+00	2.97E+01	18	60.00	0.00	0.1	16.1	-12.0	-11.2	-0.8
78064	1805	10.5	15.3	4.2	19.1	13	56	2.60E+00	1.11E+00	3.41E+01	-26	60.00	0.00	0.1	16.1	-12.0	-11.2	-0.8
78064	1869	10.6	13.5	5.3	17.9	17	52	2.46E+00	1.19E+00	1.68E+01	4	60.00	0.00	0.1	16.1	-11.9	-11.2	-0.8
78064	1957	10.2	14.0	4.1	17.8	13	54	2.21E+00	1.34E+00	1.91E+01	-61	104.00	0.00	0.1	16.1	-11.9	-11.1	-0.8
78064	2113	6.4	11.1	5.2	14.3	22	60	2.17E+00	1.62E+00	2.21E+01	-41	168.00	0.00	0.1	16.1	-11.9	-11.1	-0.8
78064	2261	1.2	9.0	7.0	11.5	38	82	1.77E+00	1.81E+00	2.44E+01	-48	87.75	0.00	0.1	16.1	-11.9	-11.1	-0.8
78064	2341	2.3	9.3	5.9	11.2	32	76	1.77E+00	1.79E+00	2.91E+01	-22	60.00	0.00	0.1	16.1	-11.8	-11.1	-0.8
78064	2405	4.3	9.9	5.3	12.0	26	66	1.81E+00	1.77E+00	2.60E+01	-43	60.00	0.00	0.1	16.1	-11.8	-11.1	-0.8
78064	2473	6.1	11.1	4.3	13.4	19	61	1.86E+00	2.15E+00	1.42E+01	-55	68.00	0.00	0.1	16.1	-11.8	-11.1	-0.8
78064	2541	6.2	11.3	3.8	13.4	16	61	1.69E+00	1.74E+00	1.25E+01	-82	60.00	0.00	0.1	16.1	-11.8	-11.1	-0.8
78064	2613	6.2	11.4	3.6	13.5	16	61	1.93E+00	1.57E+00	1.38E+01	-68	60.00	0.00	0.1	16.1	-11.8	-11.1	-0.8
78064	2677	6.4	11.5	3.7	13.7	16	61	1.86E+00	1.55E+00	8.51E+00	-80	60.00	0.00	0.1	16.1	-11.8	-11.1	-0.8
78064	2741	6.5	11.5	3.5	13.7	15	60	1.89E+00	1.56E+00	2.78E+01	-63	60.00	0.00	0.1	16.1	-11.8	-11.1	-0.8
78064	2805	6.1	11.0	3.4	13.0	15	61	1.85E+00	1.55E+00	3.71E+01	-60	60.00	0.00	0.1	16.1	-11.8	-11.1	-0.8
78064	2893	3.2	9.0	3.4	10.2	20	70	1.94E+00	1.54E+00	2.40E+01	-153	104.00	0.00	0.1	16.1	-11.7	-11.1	-0.8
78064	3048	2.0	9.4	5.0	11.0	27	78	1.86E+00	1.66E+00	8.80E+00	-134	168.00	0.00	0.1	16.1	-11.7	-11.1	-0.8
78064	3180	5.0	11.3	2.9	12.7	13	66	1.78E+00	1.68E+00	1.82E+01	-221	60.00	0.00	0.1	16.1	-11.7	-11.1	-0.8
78064	3244	5.5	12.9	3.1	14.3	13	67	1.65E+00	1.66E+00	1.63E+01	81	60.00	0.00	0.1	16.1	-11.7	-11.0	-0.8
78064	3408	6.3	12.7	3.7	14.7	15	64	1.93E+00	2.21E+00	1.38E+01	71	68.00	0.00	0.1	16.1	-11.6	-11.0	-0.8
78064	3476	6.2	12.7	3.6	14.6	14	64	1.66E+00	1.69E+00	1.86E+01	108	60.00	0.00	0.1	16.1	-11.6	-11.0	-0.8
78064	3548	5.8	12.5	3.3	14.2	13	65	1.94E+00	1.53E+00	1.50E+01	168	60.00	0.00	0.1	16.1	-11.6	-11.0	-0.8
78064	3612	5.8	12.1	4.1	14.1	17	64	1.91E+00	1.53E+00	9.34E+00	107	60.00	0.00	0.1	16.1	-11.6	-11.0	-0.8
78064	3676	6.2	11.9	4.2	14.0	17	63	1.92E+00	1.54E+00	1.70E+01	115	60.00	0.00	0.1	16.1	-11.5	-11.0	-0.8
78064	3828	6.9	11.6	5.0	14.4	20	59	1.98E+00	1.49E+00	1.31E+01	172	104.00	0.00	0.1	16.1	-11.5	-11.0	-0.8
78064	3984	5.9	11.8	6.2	14.6	25	64	1.96E+00	1.58E+00	1.19E+01	118	168.00	0.00	0.1	16.1	-11.5	-11.0	-0.8
78064	4116	7.3	13.4	4.1	15.8	15	61	1.77E+00	1.53E+00	2.15E+01	40	60.00	0.00	0.1	16.1	-11.4	-11.0	-0.7
78064	4180	8.0	14.2	4.5	17.0	16	60	1.79E+00	1.42E+00	1.84E+01	25	60.00	0.00	0.1	16.1	-11.4	-11.0	-0.7
78064	4244	7.0	11.9	5.6	15.0	22	60	1.76E+00	1.53E+00	1.62E+01	27	60.00	0.00	0.1	16.1	-11.4	-10.9	-0.7

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78064     2    18 -12.2 -11.3  -0.8  16.6    0.5    5  3.1     0.8      5.7      6.3      9.1  1.28E+01  0  9.22E-01  2 16.1 1  -9.8    5.6
 1.10E-01  5   1.57E+00  0  2.17E+00  0  8.25E+00 22    42  13  4.19E-03 11 124.00  0.00  24 146  1.58E+00  0 1.46E+00  0 7.17E-01  0
 8.07E-04 65   5.66E-02  2  6.72E+00  2  1.56E+01 40   -19  19  3.94E-03 11 124.00  0.00  39 137  5.52E-02  1 4.39E+00  2 2.39E+00  2
 0.00E+00 -1   7.86E-03 12  3.03E+00 18  5.29E+01 42   -41  23  5.11E-03 11 124.00  0.00  23 151  7.77E-03 10 2.26E+00 14 9.36E-01 17
 3.85E-03 74   1.85E-02 14  5.79E+00 11  4.81E+00260    21  76  1.45E-02 11 124.00  0.00  24 147  1.82E-02 13 3.94E+00 12 2.08E+00  9
78064    18    33 -12.0 -11.2  -0.8  16.4    0.6    5  3.1     7.1      12.2      4.7     15.1  3.46E+00  0  9.10E-01  2 16.1 1  -9.8    5.5
 3.18E-01  4   1.73E+00  0  1.43E+00  0  2.90E+01  4    12   2  4.13E-03 11 124.00  0.00   7 165  1.65E+00  0 8.98E-01  0 5.25E-01  0
 5.03E-04 97   6.60E-02  2  5.14E+00  2  1.15E+01 46   -20  20  3.89E-03 11 124.00  0.00   6 165  6.48E-02  2 3.38E+00  3 1.71E+00  2
 1.50E-03 35   5.78E-03 16  2.32E+00 33  2.92E+01 97  -126  95  5.04E-03 11 124.00  0.00   8 165  5.90E-03 15 1.55E+00 36 5.82E-01 45
 2.13E-03129   2.97E-02  9  3.92E+00 10  2.34E+01 36    66  16  1.43E-02 11 124.00  0.00   4 165  2.69E-02 10 2.32E+00 13 1.54E+00  9
78064    33    49 -11.8 -11.1  -0.8  16.2    0.7    6  3.1     4.9      10.4      4.5     12.6  5.37E+00  0  8.87E-01  2 16.1 1  -9.7    5.4
 2.02E-01  4   1.67E+00  0  1.67E+00  0  1.34E+01  9   -15   4  4.03E-03 11 123.75  0.00   8 161  1.59E+00  0 1.07E+00  0 6.04E-01  0
 0.00E+00 -1   6.09E-02  2  5.52E+00  2  1.63E+01 35   -19  16  3.79E-03 11 124.00  0.00  11 161  5.79E-02  2 3.52E+00  3 2.05E+00  2
 5.32E-04 70   5.45E-03 16  1.61E+00 56  4.55E+01 63  -112  31  4.91E-03 11 124.00  0.00   8 162  5.57E-03 15 1.22E+00 51 7.02E-01 39
-1.13E-03156   1.20E-02 21  5.08E+00 17 -1.00E+00 -1     0  -1  1.40E-02 11 124.00  0.00   5 166  1.36E-02 17 4.38E+00 13 1.26E+00 19
78064    56    65 -11.5 -11.0  -0.8  16.0    0.9    6  3.1     6.4      12.1      4.1     14.3  4.10E+00  1  7.62E-01  2 16.1 1  -9.7    5.3
 0.00E+00 -1   1.75E+00  0  1.53E+00  0  1.44E+01 12    102   7  2.86E-03 17  60.00  0.00   8 161  1.70E+00  0 9.30E-01  0 5.78E-01  0
 0.00E+00 -1   6.23E-02  3  5.80E+00  3  3.16E+01 27    119  20  3.22E-03 17  60.00  0.00  11 160  5.97E-02  3 3.78E+00  3 1.99E+00  2
 0.00E+00 -1   5.71E-03 21  2.29E+00 37 -1.00E+00 -1     0  -1  4.22E-03 17  68.00  0.00  11 161  5.62E-03 20 1.64E+00 35 9.21E-01 29
 3.68E-03 73   2.21E-02 13  4.58E+00 11  2.28E+01 47  -145  29  1.20E-02 17 124.00  0.00  11 162  2.32E-02 12 3.75E+00 10 1.26E+00 11
78064    65    80 -11.4 -10.9  -0.7  15.8    1.0    7  3.1     2.2      8.7      7.6     13.2  4.70E+00  0  9.57E-01  2 16.1 1  -9.6    5.2
 2.87E-01  3   1.67E+00  0  1.58E+00  0  1.40E+01  9    43   5  4.35E-03 11 124.00  0.00  10 158  1.68E+00  0 1.03E+00  0 5.35E-01  0
 1.01E-03 63   5.84E-02  2  4.92E+00  3  2.37E+01 25   -62  24  4.10E-03 11 124.00  0.00   5 164  6.04E-02  2 3.35E+00  3 1.65E+00  2
 2.66E-03 26   4.78E-03 19  1.69E+00 62  4.53E+01 73  -144 181  5.30E-03 11 124.00  0.00  19 155  5.40E-03 15 1.40E+00 40 4.19E-01 69
 8.46E-03 45   1.99E-02 14  4.78E+00 12  1.01E+01121  -148 116  1.51E-02 11 124.00  0.00  19 152  1.99E-02 11 3.16E+00 10 1.83E+00  9
78064    80    96 -11.2 -10.9  -0.7  15.6    1.1    7  3.2    -0.2      5.8      5.6      8.4  1.20E+01  0  8.28E-01  2 16.1 1  -9.6    5.1
 2.27E-01  4   1.84E+00  0  1.47E+00  0  1.18E+01 10   -23   5  3.76E-03 11 124.00  0.00  28 144  1.86E+00  0 9.71E-01  0 4.81E-01  0
 1.15E-03 50   6.23E-02  2  5.17E+00  2  1.14E+01 50    65  28  3.55E-03 11 124.00  0.00  29 142  6.15E-02  2 3.37E+00  2 1.79E+00  2
 1.23E-03 48   8.08E-03 12  1.56E+00 37  2.42E+01 80   149  77  4.59E-03 11 124.00  0.00  28 144  7.62E-03 11 1.43E+00 32 5.20E-01 35
 6.98E-03 47   2.50E-02 11  4.41E+00 11  1.39E+01 68    34  23  1.31E-02 11 124.00  0.00  19 153  2.15E-02 11 3.10E+00 12 1.73E+00  8
78064    96   111 -11.0 -10.8  -0.6  15.4 999.0    8  3.2    -2.0      5.6      7.5     10.5  7.78E+00  0  7.35E-01  2 16.1 1  -9.5    5.0
 3.47E-01  3   1.76E+00  0  1.55E+00  0  1.58E+01  8    34   6  3.34E-03 12 124.00  0.00  21 148  1.76E+00  0 1.01E+00  0 5.40E-01  0
 1.06E-03 55   6.25E-02  2  5.02E+00  2  6.27E+00 91    80  29  3.15E-03 12 124.00  0.00  21 150  6.17E-02  2 3.28E+00  2 1.80E+00  2
 8.55E-04 50   6.20E-03 14  2.71E+00 25  1.04E+01240   165  87  4.08E-03 12 124.00  0.00  32 138  5.77E-03 12 1.82E+00 23 6.84E-01 30
-3.84E-04439   2.43E-02 10  5.07E+00  9  2.27E+01 44     3  25  1.16E-02 12 124.00  0.00  33 141  2.48E-02  8 3.34E+00  7 1.43E+00  8
78064   111   127 -10.7 -10.7  -0.6  15.1 999.0    8  3.2     2.7      8.5      7.7     12.5  5.41E+00  0  8.05E-01  2 16.1 1  -9.5    4.9
 2.32E-01  4   1.57E+00  0  1.68E+00  0  2.00E+01  6    11   3  3.66E-03 12 124.00  0.00  17 152  1.54E+00  0 1.11E+00  0 5.88E-01  0
 1.13E-03 53   6.36E-02  2  5.68E+00  2  1.89E+01 31     4  15  3.45E-03 12 124.00  0.00  21 151  6.00E-02  2 3.91E+00  2 1.86E+00  2
 1.74E-03 37   7.14E-03 13  3.59E+00 15  1.26E+01180    58 159  4.46E-03 12 124.00  0.00  19 151  7.73E-03 11 2.49E+00 14 6.94E-01 25
 6.06E-03 59   2.65E-02 10  4.32E+00 11  2.65E+01 33   -63  28  1.27E-02 12 114.50  0.00  24 148  2.58E-02  9 3.03E+00 11 1.28E+00 11
78064   127   142 -10.5 -10.6  -0.5  14.9 999.0    9  3.2    -0.1      7.4      7.6     10.8  7.43E+00  0  7.47E-01  2 16.1 1  -9.4    4.9
 2.81E-01  3   1.68E+00  0  1.65E+00  0  1.38E+01 12    28   7  3.39E-03 12 124.00  0.00  26 144  1.69E+00  0 1.07E+00  0 5.78E-01  0
 2.04E-03 35   6.56E-02  2  5.69E+00  2  2.12E+01 27   121  32  3.20E-03 12 124.00  0.00  26 144  6.41E-02  1 3.84E+00  2 1.98E+00  2
 2.35E-03 31   8.16E-03 11  2.72E+00 18  3.17E+01 65   240  25  4.14E-03 12 124.00  0.00  25 144  7.90E-03  9 1.98E+00 15 8.10E-01 18
 4.56E-03 72   1.61E-02 15  5.46E+00 12  3.58E+01 40   -60  20  1.18E-02 12 124.00  0.00  26 144  1.72E-02 12 3.99E+00 10 1.53E+00 10
78064   142   158 -10.3 -10.5  -0.5  14.7 999.0    9  3.3     2.1      8.8      5.3     10.8  8.58E+00  0  8.75E-01  2 16.1 1  -9.3    4.7
 1.62E-01  4   1.88E+00  0  1.73E+00  0  1.33E+01 11  -116   7  3.98E-03 11 124.00  0.00  19 151  1.86E+00  0 1.17E+00  0 5.62E-01  0
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78064   158  1093 -12.2 -11.3  -0.8  16.6  -9.8   5.6   0.5   5  3.1     0.8     5.7     6.3     9.1  1.28E+01   0 2.02E-01 11 32  4
  21.19   5  42  189 185 360   0.56 33  2  255 352 360   0.25 50  1  381 184 360   0.44 37  2  509 252 360   0.31 44  1  448 228 360
  99.63   2 133  580  50 360   2.81 14  6  645 158 207   0.81 27  3  773 257 207   0.44 37  3  903 113 360   0.31 44  2  446  21 360
  62.50   3  75  194 328 360   2.50 15  5  257 288 266   0.81 27  3  384 268 157   0.13 70  2  515 243  30   0.25 50  1  452 342 360
 101.00   2 123  584 164 360   3.63 13  6  649 243 360   0.88 26  3  777  10 182   0.88 26  4  907 286 360   0.13 70  1  440   1 360
 167.50   1 189  184 253 360   4.56 11  7  248 302 360   0.81 27  2  376  11 360   0.31 44  2  504  79 360   0.38 40  1  456  66 360
 139.25   2 165  578 173 360   5.00 11  9  642 193 360   0.81 27  4  771 350  54   0.56 33  2  896   4 360   0.13 70  1  439 242 360
 111.13   2 141  199 200 360   4.94 11  8  260 283 360   0.88 26  4  388  22  69   0.25 50  1  517  90 360   0.25 50  1  460 268 360
  97.00   2 115  590 155 360   5.31 10 10  652 297 266   0.81 27  4  780 336 123   0.56 33  1  908 345 360   0.44 37  2  433 222 360
  76.31   2  95  180 140 360   4.69 11  8  245 277 296   0.63 31  3  375 223 207   0.25 50  1  500 266 360   0.25 50  1  464 293 360
  78.94   2  99  572 153 360   3.31 13  7  637 350 182   0.56 33  3  767 237  94   0.31 44  2  894 127 360   0.06100  1  431  15 360
  62.06   3  79  204  72 360   3.69 13  8  264   7 187   0.56 33  3  393 165 360   0.31 44  1  520  85 360   0.06100  1  470 343 360
  71.94   2  83  595 327 360   3.00 14  7  659  17 360   0.50 35  2  784  31 182   0.44 37  2  913 247 360   0.25 50  1  425  24 360
  74.38   2  99  176  85 360   3.38 13  6  242 253 296   1.06 24  2  369 232 360   0.69 30  2  498  89 360   0.13 70  1  473 279 360
  70.56   2  99  571   5 360   3.56 13  6  632  29 296   0.44 37  1  761 246 360   0.44 37  1  888 107 360   0.25 50  2  421 271 148
  75.88   2  87  205 279 360   3.63 13  7  270  28 266   0.56 33  2  397 308 360   0.19 57  1  524 229 360   0.06100  1  477  62 360
  80.56   2  95  597 234 360   3.56 13 10  663 101 207   0.31 44  1  788 174 360   0.38 40  2  919 238 360   0.25 50  1  416   9 360
  78.88   2  99  175 297 360   3.88 12  8  237  50 266   0.44 37  2  364 330 157   0.31 44  1  492  98 360   0.13 70  1  840 242 360
  70.38   2  87  567 340 360   4.38 11  8  631 271 360   0.25 50  1  756  14 360   0.50 35  2  887  78 360   0.13 70  1  836 158 360
  62.75   3  79  211 240 360   3.19 14  9  273 324 153   0.56 33  2  400 274 182   0.31 44  1  528  12 360   0.38 40  2  845  84 360
  45.25   3  75  601 348 360   3.19 14  7  666  96 207   0.31 44  2  792 317 182   0.56 33  2  922 203 360   0.25 50  1  832  14 360
  40.63   3  58  170  94 360   2.50 15  5  232 207 360   0.25 49  2  360 276 360   0.63 31  1  488 256 360   0.19 57  1  848  50 360
  26.00   4  38  562  19 360   2.25 16  6  627 187  94   0.38 40  1  752 231 360   0.88 26  3  880 329 360   0.25 50  1  828 261 360
  19.31   5  24  213  88 360   2.50 15  6  279 344 123   0.25 50  1  405 146 360   0.50 35  2  532  96  69   0.19 57  1  852 223 360
  12.81   6  22  607   8 360   1.19 22  4  668  62 182   0.31 44  1  796  12 360   0.94 25  3  924 139 148   0.19 57  2  824 117 157
   8.81   8  14  167  40 360   1.13 23  3  229 242 296   0.31 44  2  359 158 360   0.63 31  2  484 172 360   0.19 57  1  856 307 360
   8.13   8  11  558 266 360   0.94 25  3  623 103 360   0.31 44  2  750  23 360   0.50 35  2  876 156 157   0.31 44  3  821 181 207
   5.44  10  10  216 142 193   0.50 35  2  281 221 207   0.25 50  1  409 319 360   0.69 30  3  539 205 360   0.25 50  1  860  61 360
   5.75  10   9  612 270 360   0.69 30  2  677  48 360   0.50 35  2  804 298 360   0.50 35  2  935   2  -1   0.06100  1  816 279 360
   3.44  13   6  160 350 360   0.38 40  2  225  98 360   0.44 37  2  355  44 360   0.31 44  1  480 117 360   0.31 44  1  864 145 360
   2.25  16   7  611  92  94   0.13 70  1  674 353 360   0.19 57  1  800 185 360   0.56 33  4  929 312 118   0.31 44  1  812 107 360
   2.00  17   4  220 197 178   0.31 44  1  285 335 360   0.25 50  2  415 280 360   0.44 37  1  540 324 360   0.19 57  1  868 318 360
   1.18  19   3  554 211 266   0.22 44  1   10 196 360   0.33 70  1    7 201 360   0.36 24  2  810 289 360   0.28 44  1  744   3 360
1
78064  1093  2029 -12.0 -11.2  -0.8  16.4  -9.8   5.5   0.6   5  3.1     7.1    12.2     4.7    15.1  3.46E+00   0 1.99E-01 11 32  4
  51.75   3 213  191 272 178   0.38 40  1  253  55 360   1.31 21  9  384  89 360   0.38 40  2  508 103  94   0.25 50  1  449 257 360
 278.50   1 345  581  20 360   6.88  9 11  648  64 360   1.00 24  4  772  19 182   0.56 33  2  901 206 237   0.06100  1  445  84 360
  72.94   2  99  194 268 360   2.63 15  6  259  46 237   0.88 26  2  387  55 360   0.44 37  2  514  35 360   0.25 50  2  454  99 360
 148.75   2 221  587  40 360  10.44  7 19  651  59 360   0.94 25  5  779  69 123   0.25 50  2  906 349 153   0.31 44  2  443 266 360
 177.75   1 265  186  40 360   4.19 12  9  251 178 326   0.88 26  2  378  69 360   0.50 35  2  505  49 360   0.13 70  1  457 154 360
 137.25   2 237  578  24 360   8.81  8 14  641  14 326   0.56 33  2  771 231 360   0.88 26  3  899 299 118   0.19 57  1  438 335 360
 121.25   2 141  197 263 360   4.38 11 10  260 223 153   0.50 35  2  392 287 360   1.19 22  4  517  30 148   0.19 57  1  461 179 360
  89.69   2 221  590  65 266   6.50  9 11  652 207 242   0.81 27  3  782 153 178   1.19 22  4  910 103 153   0.25 50  1  434 221 360
  85.38   2 141  183  45 360   4.94 11 10  245 217 246   0.63 31  2  375 103 360   1.31 21 13  502  53  45   0.06100  1  466 140 360
  59.69   3 119  575  29 360   5.19 10 11  638 349 360   0.38 40  2  764 151 182   1.13 23  3  896 274 262   0.06100  1  429  19 360
  70.56   2  87  203 254 360   4.00 12  8  267 273 296   0.38 40  2  395 341 360   0.63 31  3  520  84 178   0.31 44  2  470 194 148
```

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78064    2   18 -12.2 -11.3  -0.8  16.6  -9.8   5.6   0.5   5  3.1
     0.8     5.7      6.3      9.1  1.28E+01   0 2.02E-01 11 25  4
       0        0        0        0
       0   1    1   4    0   2    0   2
       0   1    1   4    1   2    0   2
       0   1    0   4    2   2    0   2
       0   1    2   4    0   2    0   2
       3   1    0   4    0   2    0   2
       0   1    0   4    2   2    0   2
       0   1    0   4    0   2    0   2
       1   1    2   4    0   2    0   2
       0   1    0   4    0   2    0   2
       1   1    0   4    0   2    0   2
       2   1    1   4    0   2    0   2
       0   1    2   4    0   2    0   2
       0   1    2   4    0   2    0   2
       0   1    0   4    1   2    0   2
       0   1    3   4    0   2    2   2
       0   1    2   4    0   2    3   2
       0   1    0   4    1   2    2   2
       0   1    1   4    1   2    1   2
       0   1    0   4    1   2    1   2
       0   1    1   4    0   2    0   2
       1   1    0   4    1   2    1   2
       0   1    0   4    0   2    1   2
       0   1    0   4    0   2    0   2
       1   1    1   4    1   2    0   2
       0   1    0   4    0   2    0   2
       0   1    1   4    1   2    0   2
       0   1    2   4    0   2    0   2
       1   1    1   4    3   2    0   2
       0   1    3   4    1   2    0   2
       2   1    1   4    0   2    1   2
       0   1    0   4    0   2    2   2
       0   1    0   4    1   2    1   2
       1   1    0   4    0   2    0   2
       0   1    1   4    0   2    1   2
       0   1    0   4    2   2    2   2
       0   1    4   4    0   2    0   2
       0   1    0   4    0   2    1   2
       0   1    0   4    2   2    2   2
       3   1   10   4   11   2    3   2
       0   1   14   4    9   2    5   2
       0   1    4   4    4   2    3   2
       0   1    0   4    1   2    3   2
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       0   1    0   4    1   2    0   2
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       0   1    2   4    0   2    4   2
       0   1    1   4    1   2    0   2
       0   1    2   4    0   2    0   2
       0   1    2   4    1   2    0   2
       0   1    4   4    0   2    2   2
       8   1   36   4   16   2   25   2
      24   1  422   4  166   2   75   2
      38   1  860   4  292   2  113   2
      26   1  442   4  155   2   93   2
       5   1   37   4   18   2   36   2
       1   1    4   4    0   2    0   2
       0   1    0   4    0   2    0   2
       0   1    0   4    0   2    0   2
       0   1    1   4    0   2    0   2
       0   1    1   4    0   2    1   2
       0   1    0   4    0   2    1   2
       0   1    2   4    0   2    1   2
```

78064	0	-12.3	-11.3	-0.8	16.8	0.4	4	3.1	-9.8	5.6	0.0
78064	30	-12.0	-11.2	-0.8	16.4	0.6	5	3.1	-9.8	5.5	0.0
78064	60	-11.6	-11.0	-0.8	16.0	0.9	6	3.1	-9.7	5.3	0.0
78064	90	-11.2	-10.8	-0.7	15.6	1.1	7	3.2	-9.6	5.1	0.0
78064	120	-10.7	-10.7	-0.6	15.1	999.0	8	3.2	-9.5	4.9	0.0
78064	150	-10.3	-10.5	-0.5	14.7	999.0	9	3.3	-9.3	4.8	0.0
78064	180	-9.8	-10.3	-0.3	14.2	999.0	10	3.3	-9.2	4.6	0.0
78064	210	-9.3	-10.0	-0.2	13.7	999.0	11	3.4	-9.1	4.3	0.0
78064	240	-8.9	-9.8	0.0	13.2	999.0	12	3.4	-8.9	4.1	0.0
78064	270	-8.3	-9.5	0.1	12.7	999.0	12	3.5	-8.7	3.9	0.0
78064	300	-7.8	-9.2	0.2	12.1	999.0	13	3.5	-8.5	3.7	0.0
78064	330	-7.3	-8.9	0.3	11.5	999.0	13	3.6	-8.3	3.4	0.0
78064	360	-6.7	-8.6	0.4	10.9	999.0	13	3.7	-8.0	3.2	0.0
78064	390	-6.1	-8.2	0.5	10.2	999.0	12	3.8	-7.7	2.9	0.0
78064	420	-5.4	-7.8	0.5	9.5	999.0	12	3.9	-7.4	2.6	0.0
78064	450	-4.8	-7.4	0.5	8.8	999.0	11	4.0	-7.0	2.3	0.0
78064	480	-4.1	-6.9	0.4	8.0	999.0	10	4.1	-6.6	2.0	0.0
78064	510	-3.3	-6.3	0.3	7.2	999.0	8	4.3	-6.1	1.7	7.7
78064	540	-2.5	-5.7	0.1	6.2	999.0	6	4.5	-5.5	1.3	6.6
78064	570	-1.7	-4.9	0.0	5.2	999.0	3	4.8	-4.9	0.9	5.4
78064	600	-0.8	-4.0	-0.3	4.1	999.0	-2	5.3	-4.0	0.5	4.2
78064	630	0.2	-2.8	-0.5	2.8	999.0	-10	6.3	-2.8	0.1	3.0
78064	660	1.0	-0.9	-0.5	1.5	999.0	-26	9.5	-1.0	-0.4	2.0
78064	690	0.1	1.5	0.2	1.5	999.0	7	17.8	1.5	-0.1	1.4
78064	720	-1.7	2.1	1.0	2.9	999.0	23	20.8	2.2	0.6	3.4
78064	750	-3.1	2.1	1.7	4.1	999.0	25	22.1	2.4	1.2	5.1
78064	780	-4.3	2.0	2.2	5.2	999.0	24	22.8	2.4	1.7	6.6
78064	810	-5.4	1.8	2.6	6.2	999.0	23	23.2	2.3	2.1	8.0
78064	840	-6.3	1.5	3.0	7.2	999.0	22	23.5	2.2	2.5	9.4
78064	870	-7.2	1.2	3.4	8.0	999.0	21	23.8	2.0	2.9	11.0
78064	900	-8.0	0.8	3.6	8.8	999.0	20	24.0	1.9	3.2	0.0
78064	930	-8.7	0.4	3.9	9.5	999.0	19	0.1	1.7	3.6	0.0
78064	960	-9.4	0.0	4.1	10.2	999.0	18	0.3	1.5	3.8	0.0
78064	990	-10.0	-0.4	4.3	10.9	999.0	17	0.4	1.2	4.1	0.0
78064	1020	-10.6	-0.8	4.4	11.5	999.0	17	0.5	1.0	4.4	0.0
78064	1050	-11.2	-1.2	4.5	12.1	3.5	16	0.6	0.8	4.6	0.0
78064	1080	-11.7	-1.6	4.6	12.7	3.6	16	0.6	0.6	4.9	0.0
78064	1110	-12.2	-2.0	4.7	13.2	3.8	16	0.7	0.4	5.1	0.0
78064	1140	-12.7	-2.5	4.7	13.7	3.9	16	0.8	0.1	5.3	0.0
78064	1170	-13.1	-2.8	4.7	14.2	4.1	16	0.9	-0.1	5.5	0.0
78064	1200	-13.6	-3.2	4.7	14.7	4.3	17	0.9	-0.3	5.7	0.0
78064	1230	-14.0	-3.6	4.6	15.1	4.5	17	1.0	-0.5	5.8	0.0
78064	1260	-14.3	-3.9	4.6	15.6	4.7	18	1.0	-0.8	6.0	0.0
78064	1290	-14.7	-4.2	4.6	16.0	4.9	19	1.1	-1.0	6.2	0.0
78064	1320	-15.1	-4.6	4.6	16.4	5.2	19	1.1	-1.2	6.3	0.0
78064	1350	-15.4	-4.8	4.5	16.8	5.4	20	1.2	-1.4	6.5	0.0
78064	1380	-15.7	-5.1	4.5	17.1	5.7	21	1.2	-1.6	6.6	0.0
78064	1410	-16.0	-5.3	4.5	17.5	6.0	23	1.2	-1.8	6.8	0.0
78064	1440	-16.4	-5.6	4.6	17.9	6.3	24	1.3	-2.1	6.9	0.0

A2. Magnetosphere /Geomagnetically Disturbed Day

(High O+/H+ density ratio)

78124	123	48.6	23.8	-11.4	55.4	-12	26	1.60E-01	5.05E+00	1.91E+02	8	132.00	0.00	0.1	16.1	-10.7	0.1	2.8
78124	256	42.7	29.7	-13.7	53.9	-15	35	2.20E-01	4.69E+00	1.12E+02	6	116.00	0.00	0.1	16.1	-10.7	0.1	2.8
78124	350	39.3	32.7	-10.3	52.2	-11	40	3.28E-01	3.58E+00	9.24E+01	-16	60.00	0.00	0.1	16.1	-10.7	0.0	2.8
78124	418	40.3	32.6	-9.8	52.8	-11	39	2.53E-01	4.94E+00	6.24E+01	-13	56.00	0.00	0.1	16.1	-10.6	0.0	2.8
78124	544	40.5	31.6	-6.9	51.9	-8	38	2.09E-01	4.94E+00	4.29E+01	24	154.00	0.00	0.1	16.1	-10.6	0.0	2.8
78124	671	39.7	30.0	-9.3	50.6	-11	37	1.60E-01	5.68E+00	1.10E+02	27	64.00	0.00	0.1	16.1	-10.6	0.0	2.7
78124	757	34.4	28.0	-8.3	45.2	-11	39	2.34E-01	4.19E+00	1.29E+02	34	96.00	0.00	0.1	16.1	-10.5	0.0	2.7
78124	844	33.8	26.7	-10.1	44.3	-13	38	2.12E-01	4.51E+00	5.37E+01	18	66.00	0.00	0.1	16.1	-10.5	0.0	2.7
78124	933	37.1	25.8	-11.7	46.7	-15	35	1.85E-01	4.72E+00	1.12E+02	18	96.00	0.00	0.1	16.1	-10.5	0.0	2.7
78124	1047	40.1	25.3	-11.8	48.9	-14	32	1.80E-01	5.13E+00	1.36E+02	19	116.00	0.00	0.1	16.1	-10.4	0.0	2.7
78124	1141	45.7	23.7	-9.0	52.3	-10	27	2.09E-01	4.74E+00	8.66E+01	21	60.00	0.00	0.1	16.1	-10.4	0.0	2.6
78124	1209	47.2	22.7	-7.3	53.0	-8	26	2.12E-01	4.74E+00	1.85E+02	17	56.00	0.00	0.1	16.1	-10.4	0.0	2.6
78124	1305	52.3	23.4	-9.3	58.1	-9	24	3.33E-01	4.18E+00	1.78E+02	-1	116.00	0.00	0.1	16.1	-10.4	0.0	2.6
78124	1427	61.9	19.7	-10.4	65.9	-9	18	4.00E-01	4.13E+00	1.65E+02	-25	116.00	0.00	0.1	16.1	-10.3	-0.1	2.6
78124	1544	58.1	19.9	-16.6	63.7	-15	19	3.06E-01	3.95E+00	2.07E+02	-5	102.00	0.00	0.1	16.1	-10.3	-0.1	2.5
78124	1636	53.6	17.0	-17.6	59.0	-17	18	3.18E-01	4.38E+00	1.24E+02	-8	66.00	0.00	0.1	16.1	-10.3	-0.1	2.5
78124	1725	55.6	17.7	-18.5	61.3	-18	18	2.97E-01	4.50E+00	1.45E+02	-7	96.00	0.00	0.1	16.1	-10.2	-0.1	2.5
78124	1839	61.4	15.9	-17.5	65.9	-15	15	5.55E-01	3.24E+00	4.09E+01	-70	116.00	0.00	0.1	16.1	-10.2	-0.1	2.5
78124	1933	66.1	18.2	-11.0	69.4	-9	15	3.09E-01	4.66E+00	6.20E+01	6	60.00	0.00	0.1	16.1	-10.2	-0.1	2.5
78124	2001	59.7	17.4	-7.3	62.6	-7	16	3.14E-01	4.09E+00	1.87E+02	21	56.00	0.00	0.1	16.1	-10.1	-0.1	2.5
78124	2097	65.7	13.4	-5.2	67.3	-4	11	3.29E-01	3.75E+00	5.83E+01	-7	116.00	0.00	0.1	16.1	-10.1	-0.1	2.4
78124	2219	67.6	11.0	-5.0	68.8	-4	9	2.86E-01	3.67E+00	6.66E+01	-14	116.00	0.00	0.1	16.1	-10.1	-0.1	2.4
78124	2336	63.3	9.3	-2.8	64.1	-3	8	3.16E-01	3.83E+00	2.69E+01	-11	102.00	0.00	0.1	16.1	-10.0	-0.1	2.4
78124	2428	54.2	10.7	-0.5	55.3	-1	11	5.90E-01	3.93E+00	1.48E+01	-57	66.00	0.00	0.1	16.1	-10.0	-0.1	2.4
78124	2517	47.4	10.9	0.0	48.7	0	13	3.66E-01	4.36E+00	3.61E+01	-132	96.00	0.00	0.1	16.1	-10.0	-0.1	2.3
78124	2630	54.8	5.6	-2.6	55.3	-3	6	4.68E-01	4.35E+00	9.85E+01	-61	104.00	0.00	0.1	16.1	-9.9	-0.2	2.3
78124	2724	61.9	3.2	-3.7	62.1	-3	3	6.74E-01	5.63E+00	4.72E+01	-71	60.00	0.00	0.1	16.1	-9.9	-0.2	2.3
78124	2792	62.2	3.5	-5.0	62.6	-5	3	5.17E-01	4.41E+00	4.09E+01	-78	56.00	0.00	0.1	16.1	-9.9	-0.2	2.3
78124	2888	60.6	4.8	-6.0	61.2	-6	5	2.93E-01	4.37E+00	1.65E+02	-11	116.00	0.00	0.1	16.1	-9.8	-0.2	2.3
78124	3010	57.5	2.8	-8.9	58.4	-9	3	3.12E-01	4.71E+00	1.67E+02	-13	116.00	0.00	0.1	16.1	-9.8	-0.2	2.2
78124	3127	57.9	1.3	-9.1	58.7	-9	1	2.68E-01	5.11E+00	1.61E+02	-6	102.00	0.00	0.1	16.1	-9.8	-0.2	2.2
78124	3219	59.6	1.4	-9.6	60.4	-9	1	2.80E-01	5.17E+00	6.58E+01	-9	66.00	0.00	0.1	16.1	-9.7	-0.2	2.2
78124	3308	61.3	3.7	-10.7	62.4	-10	3	2.66E-01	5.72E+00	1.22E+02	-19	96.00	0.00	0.1	16.1	-9.7	-0.2	2.2
78124	3422	61.0	3.6	-10.8	62.0	-10	3	3.29E-01	5.21E+00	1.22E+02	-16	116.00	0.00	0.1	16.1	-9.6	-0.2	2.1
78124	3516	61.8	5.9	-12.4	63.3	-11	5	3.35E-01	5.81E+00	6.19E+01	-18	60.00	0.00	0.1	16.1	-9.6	-0.2	2.1
78124	3605	63.8	7.0	-12.0	65.4	-11	6	4.13E-01	5.02E+00	3.00E+01	-44	82.00	0.00	0.1	16.1	-9.6	-0.2	2.1
78124	3701	67.6	8.4	-12.8	69.3	-11	7	4.02E-01	5.17E+00	3.75E+01	-61	74.00	0.00	0.1	16.1	-9.5	-0.3	2.1
78124	3802	69.5	11.8	-17.6	72.7	-14	10	2.90E-01	4.63E+00	7.01E+01	-65	116.00	0.00	0.1	16.1	-9.5	-0.3	2.1
78124	3919	70.8	10.8	-20.3	74.5	-16	9	1.88E-01	4.60E+00	5.79E+01	-47	102.00	0.00	0.1	16.1	-9.5	-0.3	2.0
78124	4012	69.5	12.3	-19.2	73.1	-15	10	1.80E-01	4.64E+00	9.54E+00	-82	65.81	0.00	0.1	16.1	-9.4	-0.3	2.0
78124	4101	71.0	10.6	-18.5	74.2	-14	9	1.37E-01	5.29E+00	2.62E+01	-38	94.00	0.00	0.1	16.1	-9.4	-0.3	2.0
78124	4214	68.9	10.4	-16.4	71.6	-13	9	1.65E-01	4.37E+00	6.44E+01	-108	116.00	0.00	0.1	16.1	-9.4	-0.3	2.0
78124	4308	67.4	10.9	-14.9	69.9	-12	9	1.86E-01	4.48E+00	1.44E+01	-138	60.00	0.00	0.1	16.1	-9.3	-0.3	2.0
78124	4376	66.2	9.9	-13.8	68.4	-12	8	1.80E-01	4.49E+00	5.23E+01	-158	56.00	0.00	0.1	16.1	-9.3	-0.3	1.9
78124	4472	67.2	9.1	-12.1	68.9	-10	8	1.65E-01	4.50E+00	1.11E+01	-167	116.00	0.00	0.1	16.1	-9.3	-0.3	1.9
78124	4594	67.2	3.6	-9.0	68.0	-8	3	2.29E-01	3.71E+00	8.97E+01	-97	116.00	0.00	0.1	16.1	-9.2	-0.3	1.9
78124	4728	71.6	5.4	-7.9	74.0	-6	4	9.49E-02	5.25E+00	1.70E+02	-173	116.00	0.00	0.1	16.1	-9.2	-0.4	1.9

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 0.00E+00 -1  1.41E-01  1  3.86E+00  1  5.71E+01 10  242
-8.06E-05348  8.65E-04 62  2.10E+01 43  1.31E+02172   -1
 3.57E-04 84  7.30E-03 10  5.45E+00  9  2.92E+01 83 -133
 3.64E-03 60  4.17E-01  1  5.40E+00  1  2.60E+01  7  -70
78124   13   26 -10.4    0.0    2.6   10.7 999.0    4 23.8
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 3.28E-04129  4.21E-04135  0.00E+00 -1 -1.00E+00 -1    0
 2.61E-04120  6.52E-03 12  4.63E+00 11  7.32E+01 50 -146
 2.46E-03100  4.89E-01  1  4.44E+00  1  4.49E+01  3  -17
78124   26   40 -10.1   -0.1    2.5   10.4 999.0    4 23.8
 0.00E+00 -1  2.03E-01  1  3.89E+00  1  3.62E+01 12 -133
-2.92E-04100  2.99E-04196  1.32E+01140 -1.00E+00 -1    0
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78124   40   53  -9.9   -0.2    2.3   10.1 999.0    4 23.9
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78124   79   92  -9.0   -0.4    1.8    9.2 999.0    4 24.0
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 41.5    29.1    -9.9    51.9  2.82E-01  1  4.62E-01  2 16.1 4   1.4   2.4
  3  1.38E-03 16 120.00  0.00  10 180  1.06E-01  1 1.90E+00  2 2.14E+00  1
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  1  7.77E-03 15 104.00  0.00   9 180  2.03E-01  2 2.23E+00  2 1.77E+00  2
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   0.86 13  10   71 175  11   0.02100  1  132 204 360   0.09 40  1  254 254 360   0.11 37  3  378 181  76   0.05 57  1  320 184 360
  10.05  3  64  448 225 190   0.05 57  1  512 197 360   0.08 44  1  634 343 360   0.88 13  7  759  29 145   0.06 50  1  318 315 360
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1
78124   821  1613 -10.4   0.0   2.6  10.7   1.2   2.3 999.0   4 23.8    48.4    23.0   -11.3    55.3  2.48E-01  1 3.50E-02 13 32 16
   2.81  7  13   70 179 185   0.08 44  1  130 134 360   0.08 44  1  255  76 360   0.09 40  1  379 114 360   0.02100  1  322 110 360
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   5.06  5  34  455  14 207   0.00999  0  518 332 360   0.27 24  2  642 222 360   2.89  7 26  764 309  67   0.08 44  1  312 102 360
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   2.52  7  14   61 216 182   0.03 70  1  122 274 360   0.14 33  1  246 201 360   0.58 16  4  372 335 163   0.00999  0  340 140 360
   3.19  7  22  444 211 197   0.03 70  1  504  63 360   0.17 30  2  628 357 360   6.47  4 50  752   5 141   0.08 44  2  303  20 360
   2.13  8   9   83 226 192   0.06 50  1  143 166 360   0.20 27  2  269  44 360   1.14 11  9  391  13 360   0.05 57  1  341 273 360
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78124 0 13 -10.6 0.0 2.8 11.0 1.4 2.4 999.0 4 23.7
41.5 29.1 -9.9 51.9 2.82E-01 1 2.53E-02 16 25 16

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0	1	0	4	0	2	0	2
0	1	1	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	1	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	2	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	2	2
0	1	6	4	0	2	0	2
2	1	13	4	1	2	7	2
0	1	10	4	1	2	2	2
1	1	2	4	0	2	2	2
0	1	0	4	0	2	1	2
0	1	0	4	0	2	1	2
0	1	0	4	0	2	0	2
0	1	0	4	0	2	1	2
0	1	0	4	0	2	0	2
0	1	1	4	0	2	0	2
0	1	0	4	0	2	1	2

78124	0	-10.8	0.1	2.9	11.1	999.0	4	23.7	1.4	2.5	0.0
78124	30	-10.2	-0.1	2.5	10.5	999.0	4	23.8	1.1	2.2	0.0
78124	60	-9.6	-0.2	2.1	9.8	999.0	4	23.9	0.7	2.0	0.0
78124	90	-8.9	-0.4	1.7	9.1	999.0	3	0.0	0.4	1.7	0.0
78124	120	-8.2	-0.6	1.3	8.3	999.0	3	0.1	0.0	1.5	0.0
78124	150	-7.4	-0.8	0.9	7.5	999.0	2	0.3	-0.3	1.2	0.0
78124	180	-6.5	-1.0	0.6	6.6	999.0	0	0.5	-0.7	0.9	7.2
78124	210	-5.5	-1.2	0.2	5.7	999.0	-3	0.8	-1.1	0.6	6.0
78124	240	-4.4	-1.4	-0.2	4.6	999.0	-7	1.2	-1.4	0.2	4.9
78124	270	-3.0	-1.5	-0.6	3.4	999.0	-13	1.9	-1.6	-0.1	3.8
78124	300	-1.2	-1.4	-0.8	2.1	999.0	-27	3.7	-1.6	-0.4	2.8
78124	330	0.9	-0.4	-0.5	1.1	999.0	-20	10.7	-0.5	-0.4	1.2
78124	360	1.3	1.6	0.9	2.2	999.0	26	15.8	1.8	0.5	2.7
78124	390	0.7	3.0	1.8	3.6	999.0	32	17.8	3.3	1.2	4.9
78124	420	0.1	4.0	2.5	4.7	999.0	31	18.7	4.4	1.7	6.7
78124	450	-0.6	4.9	3.0	5.8	999.0	30	19.2	5.3	2.2	8.1
78124	480	-1.2	5.7	3.4	6.7	999.0	29	19.6	6.1	2.6	9.5
78124	510	-1.8	6.3	3.8	7.6	999.0	27	19.9	6.8	3.0	10.9
78124	540	-2.4	6.9	4.1	8.4	999.0	25	20.1	7.4	3.3	12.4
78124	570	-3.0	7.5	4.4	9.2	999.0	23	20.3	7.9	3.6	0.0
78124	600	-3.6	8.0	4.7	9.9	999.0	22	20.4	8.4	3.9	0.0
78124	630	-4.1	8.4	4.9	10.6	999.0	20	20.5	8.8	4.2	0.0
78124	660	-4.6	8.8	5.2	11.2	999.0	19	20.6	9.2	4.4	0.0
78124	690	-5.1	9.1	5.5	11.8	999.0	18	20.7	9.6	4.6	0.0
78124	720	-5.6	9.4	5.8	12.4	999.0	17	20.8	9.9	4.9	0.0
78124	750	-6.1	9.6	6.2	12.9	999.0	16	20.9	10.2	5.1	0.0
78124	780	-6.6	9.8	6.5	13.5	999.0	15	21.0	10.5	5.3	0.0
78124	810	-7.0	9.9	6.9	14.0	999.0	14	21.0	10.8	5.4	0.0
78124	840	-7.4	10.0	7.3	14.4	999.0	14	21.1	11.0	5.6	0.0
78124	870	-7.9	10.0	7.8	14.9	999.0	14	21.1	11.3	5.8	0.0
78124	900	-8.3	10.0	8.2	15.3	999.0	14	21.2	11.5	5.9	0.0
78124	930	-8.7	9.9	8.7	15.8	999.0	14	21.2	11.7	6.1	0.0
78124	960	-9.1	9.8	9.2	16.2	999.0	14	21.3	11.9	6.2	0.0
78124	990	-9.4	9.6	9.6	16.6	999.0	14	21.3	12.0	6.3	0.0
78124	1020	-9.8	9.4	10.1	16.9	999.0	15	21.4	12.2	6.5	0.0
78124	1050	-10.2	9.2	10.5	17.3	999.0	16	21.4	12.3	6.6	0.0
78124	1080	-10.5	9.0	10.9	17.6	999.0	16	21.4	12.5	6.7	0.0
78124	1110	-10.8	8.8	11.3	17.9	999.0	17	21.5	12.6	6.8	0.0
78124	1140	-11.2	8.6	11.6	18.3	7.8	18	21.5	12.7	6.9	0.0
78124	1170	-11.5	8.4	11.9	18.6	8.2	19	21.5	12.8	7.0	0.0
78124	1200	-11.8	8.2	12.2	18.8	8.6	21	21.6	12.9	7.1	0.0
78124	1230	-12.1	8.0	12.4	19.1	9.0	22	21.6	13.0	7.2	0.0
78124	1260	-12.4	7.9	12.6	19.4	9.4	23	21.6	13.0	7.2	0.0
78124	1290	-12.7	7.8	12.8	19.6	9.8	24	21.7	13.1	7.3	0.0
78124	1320	-12.9	7.8	12.9	19.9	10.1	25	21.7	13.2	7.4	0.0
78124	1350	-13.2	7.8	13.0	20.1	10.4	26	21.7	13.2	7.4	0.0
78124	1380	-13.5	7.9	13.0	20.3	10.7	27	21.7	13.3	7.5	0.0
78124	1410	-13.7	8.0	13.0	20.5	11.0	28	21.8	13.3	7.6	0.0
78124	1440	-14.0	8.1	13.0	20.8	11.2	29	21.8	13.3	7.6	0.0

Com 1

From: NCF::SUMANT "Sumant Krishnaswamy, NSSDC" 21-JAN-1992 15:34:03.12
To: POST
CC: SUMANT
Subj: VAX/VMS command files for Lennartsson's ISEE-1 data tapes

From: LPARL1::LENN 2-DEC-1991 14:50:22.53
To: NCF::SUMANT
CC: LENN
Subj: ISEE Data Archiving

Dear Sumant:

I will SPAN you four (4) VAX/VMS command files after this message. The four files are:

COPY_ISEEMS.COM -an interactive "intelligent" command file that copies data from my ISEEMS tapes to a VAX disk directory, using the VAX/VMS Backup Utility. It explains what it does in plain English on the screen, and asks the user for necessary input (which tape drive to use, which dates to copy, etc.). It is meant to be self-explanatory and "foolproof", but it would probably be wise to have someone at the NSSDC give it a "field test".

USER_TAPE.COM -a similar command file that copies the ISEEMS files from a disk directory to a new magnetic tape, using the COPY command. The commands will initialize the new tape at 1600 bpi and give it the tape label IONS (unless done already).

DELETE_ISEEMS.COM -an interactive command file for deleting my ISEEMS files from the disk, without deleting anything else that might reside in the same directory. It will give the user a chance to transfer the deleting to a batch job, in case he/she is in a hurry to enter some other commands on the screen (old files can be deleted while new files with other dates are being copied from tape).

REMOVE_ISEEMS_FILES.COM -a batch-type command file that can be submitted from the interactive delete file.

These command files can reside in some other directory besides the one used for data files, of course, but the submitting of REMOVE_ISEEMS_FILES to a batch queue by DELETE_ISEEMS requires that the command file directory name be known by the interactive file. As it is coded at this time, it assumes that all files reside in one and the same default directory (data and command files). This is easy to change by EDIT; only one line (near the beginning) of DELETE_ISEEMS needs changing.

In case a user requests a tape copy of some of the ISEEMS files, and somebody first copies (backs up) these to disk, I recommend that the disk files be copied to the new tape using the file name type *YYDDD.DAT, where YYDDD denotes the date (year and day of year) and the wild card character * accounts for each of the five files from that day. That way all files from the same date stay together on the new tape. This is done automatically by USER_TAPE.COM, which is extremely simple to use (try it). The Data User's Guide (called GUIDE.) is also copied by these command files, if they are told to do so (they ask for it).

By the way, have you and Ralph Post received the data shipments?

Regards,
Walter

From: LPARL1::LENN 2-DEC-1991 14:57:04.91
To: NCF::SUMANT
CC: LENN
Subj: ISEE Data Archiving/ Command file #1

Com 2

```
$!************** LOCKHEED PLASMA COMPOSITION EXPERIMENT ON ISEE-1 **************
$!                      ****** COPY_ISEEMS.COM ******
$!
$! Interactive command file for copying data from archival tapes (label: ISEEMS)
$!                      using the VAX/VMS Backup Utility
$!
$!                            by O. W. Lennartsson
$!                    Lockheed Missiles & Space Company, Inc.
$!                          Research and Development
$!                           Dept. 91-20, Bldg. 255
$!                            3251 Hanover Street
$!                            Palo Alto, CA 94304
$!
$! Telephone (415) 424-3259
$!
$! Developed under NASA Contract NAS5-33047
$!
$! The command language is that of VAX/VMS Version 5.4
$!
$! To execute this file, simply enter @COPY_ISEEMS, if the file resides in the
$! same directory used for the data files, otherwise specify directory name in
$! the command: @directory_nameCOPY_ISEEMS (your default directory should be the
$! one used for data files).
$!*******************************************************************************
$WRITE SYS$OUTPUT " "
$DEFAULT_DIR = F$LOGICAL("SYS$DISK")+F$DIRECTORY()
$WRITE SYS$OUTPUT "Your default directory is: ",''DEFAULT_DIR'
$WRITE SYS$OUTPUT "Is this where you want the files?"
$WRITE SYS$OUTPUT "If not, Ctrl/Y, reset default and reenter command."
$WRITE SYS$OUTPUT " "
$INQUIRE DUM "If directory OK, then press return"
$SET NOON
$WRITE SYS$OUTPUT " "
$INQUIRE NAME "Which tape drive? (enter name of device)"
$DRIVE= F$STRING(NAME)
$ALLOCATE 'DRIVE' TAPE
$IF $SEVERITY .EQ. 1 THEN GOTO DRIVE_OK
$WRITE SYS$OUTPUT "EXIT"
$WRITE SYS$OUTPUT "Reenter command if trying another drive."
$SET ON
$EXIT
$DRIVE_OK:
$SET ON
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "Mount tape on ''F$LOGICAL("TAPE")'"
$WRITE SYS$OUTPUT " "
$INQUIRE DUM "When tape mounted and on line (!), then press return"
$MOUNT/FOREIGN/DENSITY=6250 TAPE
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT -
 "If you only want to copy the Data User's Guide, enter Y (yes) here,"
$INQUIRE GUIDE -
 "otherwise press return again"
$IF GUIDE THEN SET NOON
$IF GUIDE THEN GOTO ONLY_GUIDE
```

com3

```
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "Data files are copied by date, starting with the ",-
 "first date entered,"
$WRITE SYS$OUTPUT "and ending with the second date (inclusive) ",-
 "-assuming one and the same year."
$WRITE SYS$OUTPUT "If data run into second year, reenter a new set ",-
 "of dates for that second year."
$WRITE SYS$OUTPUT -
 "It is OK to copy one single day also, that is second date = first date."
$IRWND=0
$NYOLD=0
$NEW_YEAR:
$WRITE SYS$OUTPUT " "
$INQUIRE P2 "What YEAR? (two digits)"
$LENGTH_OF_YEAR:
$LP2=F$LENGTH(P2)
$IF(LP2.EQ.2) THEN GOTO CHECK_YEAR
$INQUIRE P2 "Enter two digits for the year: 77 or 78 or 79 or 80"
$GOTO LENGTH_OF_YEAR
$WRONG_YEAR:
$INQUIRE P2 "Enter either of 77 or 78 or 79 or 80"
$CHECK_YEAR:
$NY=F$INTEGER(F$EXTRACT(0,2,P2))
$IF(NY.LT.77.OR.NY.GT.80) THEN GOTO WRONG_YEAR
$IF(NY.EQ.NYOLD) THEN GOTO YEAR_OK
$IF(NY.LT.NYOLD) THEN GOTO WRONG_ORDER_YEARS
$MNDAY=999
$MXDAY=0
$YEAR_OK:
$IRWRS=0
$WRITE SYS$OUTPUT " "
$INQUIRE P3 "First DAY to be copied? (one to three digits)"
$LP3=F$LENGTH(P3)
$IF(LP3.GT.3) THEN GOTO YEAR_OK
$IF(LP3.EQ.2) THEN P3:= "0''P3'"
$IF(LP3.EQ.1) THEN P3:= "00''P3'"
$ND=F$INTEGER(F$EXTRACT(0,3,P3))
$IF(NY.EQ.80) .AND. (ND.LT.1.OR.ND.GT.366) .OR. -
   (NY.NE.80) .AND. (ND.LT.1.OR.ND.GT.365) THEN GOTO YEAR_OK
$IF(ND.LE.MXDAY) THEN IRWRS=1
$IF(IRWRS.EQ.1) THEN GOTO OVERLAP1
$NO_OVERLAP1:
$ISTART=ND
$YEAR_STILL_OK:
$WRITE SYS$OUTPUT " "
$INQUIRE P3 "Last DAY to be copied? (in that same segment)"
$LP3=F$LENGTH(P3)
$IF(LP3.GT.3) THEN GOTO YEAR_STILL_OK
$IF(LP3.EQ.2) THEN P3:= "0''P3'"
$IF(LP3.EQ.1) THEN P3:= "00''P3'"
$ND=F$INTEGER(F$EXTRACT(0,3,P3))
$IF(NY.EQ.80) .AND. (ND.LT.1.OR.ND.GT.366) .OR. -
   (NY.NE.80) .AND. (ND.LT.1.OR.ND.GT.365) THEN GOTO YEAR_STILL_OK
$IF(ND.LT.ISTART) THEN GOTO WRONG_ORDER_DAYS
$IF(ND.GE.MNDAY) .AND. (IRWRS.EQ.1) THEN GOTO OVERLAP2
$NO_OVERLAP2:
$IRWRS=0
$ISTOP=ND
$IDAY=ISTART
$SET NOON
```

Cont

```
$BACKUP_TO_DISK:
$IF(IDAY.LT.MNDAY) THEN MNDAY=IDAY
$IF(IDAY.GT.MXDAY) THEN MXDAY=IDAY
$IF(IDAY.LE.9) THEN YYDDD= F$STRING(NY) + "00" + F$STRING(IDAY)
$IF(IDAY.GT.9) .AND. (IDAY.LE.99) THEN -
 YYDDD= F$STRING(NY) + "0" + F$STRING(IDAY)
$IF(IDAY.GT.99) THEN YYDDD= F$STRING(NY) + F$STRING(IDAY)
$IF(IDAY.EQ.ISTART) THEN YYDDD1=YYDDD
$IF(IRWND.EQ.0) THEN BACKUP/LOG TAPE:'YYDDD'.BCK 'DEFAULT_DIR'
$IF(IRWND.EQ.1) THEN BACKUP/REWIND/LOG TAPE:'YYDDD'.BCK 'DEFAULT_DIR'
$IRWND=0
$IDAY=IDAY+1
$IF(IDAY.LE.ISTOP) THEN GOTO BACKUP_TO_DISK
$NYOLD=NY
$WRITE SYS$OUTPUT " "
$IF(ISTOP.EQ.ISTART) THEN WRITE SYS$OUTPUT -
 "Last segment copied: a single day ",'YYDDD'
$IF(ISTOP.GT.ISTART) THEN WRITE SYS$OUTPUT -
 "Last segment copied: days ",'YYDDD1'," through ",'YYDDD'
$WRITE SYS$OUTPUT " "
$INQUIRE MORE -
 "Are there more data files to be copied from this tape? [Y/N]"
$IF MORE THEN GOTO NEW_YEAR
$WRITE SYS$OUTPUT " "
$INQUIRE GUIDE -
 "Do you want to copy the User's Guide? (last file on the tape) [Y/N]"
$ONLY_GUIDE:
$IF GUIDE THEN -
 BACKUP/LOG TAPE:GUIDE.BCK 'DEFAULT_DIR'
$IF $SEVERITY .EQ. 1 THEN GOTO REMOVE_TAPE
$DIR 'DEFAULT_DIR'GUIDE.
$IF $SEVERITY .EQ. 1 THEN GOTO REMOVE_TAPE
$IF GUIDE THEN WRITE SYS$OUTPUT " "
$IF GUIDE THEN WRITE SYS$OUTPUT "Tape already at end, must be rewound."
$IF GUIDE THEN -
 BACKUP/REWIND/LOG TAPE:GUIDE.BCK 'DEFAULT_DIR'
$GOTO REMOVE_TAPE
$WRONG_ORDER_DAYS:
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "First and last days in wrong order!"
$INQUIRE REDO "Want to reenter dates? [Y/N]"
$IF REDO THEN GOTO NEW_YEAR
$GOTO REMOVE_TAPE
$WRONG_ORDER_YEARS:
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "Going backwards in years (rewinding tape)?"
$INQUIRE SURE "Is this really the year you want? [Y/N]"
$IF SURE THEN IRWND=1
$IF SURE THEN NYOLD=0
$IF SURE THEN MNDAY=999
$IF SURE THEN MXDAY=0
$IF SURE THEN GOTO YEAR_OK
$INQUIRE REDO "Want to correct year? [Y/N]"
$IF REDO THEN GOTO NEW_YEAR
$GOTO REMOVE_TAPE
$OVERLAP1:
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "Caution:"
$IF(ND.LT.MXDAY) THEN WRITE SYS$OUTPUT -
 "First day precedes days already copied!"
```

Com 5

```
$IF(ND.EQ.MXDAY) THEN WRITE SYS$OUTPUT -
 "First day has already been copied once!"
$!IF(ND.EQ.MXDAY) THEN GOTO NEW_YEAR
$WRITE SYS$OUTPUT "Tape will have to be rewound."
$WRITE SYS$OUTPUT " "
$INQUIRE SURE "Is that what you want? [Y/N]"
$IF SURE THEN IRWND=1
$IF SURE THEN GOTO NO_OVERLAP1
$INQUIRE REDO "Want to correct dates? [Y/N]"
$IF REDO THEN GOTO NEW_YEAR
$GOTO REMOVE_TAPE
$OVERLAP2:
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "Caution:"
$IF(ND.GT.MNDAY) THEN WRITE SYS$OUTPUT -
 "Check your Last day entry!"
$IF(ND.EQ.MNDAY) THEN WRITE SYS$OUTPUT -
 "Last day has already been copied once!"
$!IF(ND.EQ.MNDAY) THEN GOTO YEAR_STILL_OK
$WRITE SYS$OUTPUT " "
$INQUIRE SURE "Are you satisfied with your dates? [Y/N]"
$IF SURE THEN GOTO NO_OVERLAP2
$INQUIRE REDO "Want to reenter both dates? [Y/N]"
$IF REDO THEN GOTO NEW_YEAR
$INQUIRE REDO "Want to reenter last day? [Y/N]"
$IF REDO THEN GOTO YEAR_STILL_OK
$REMOVE_TAPE:
$SET ON
$DISMOUNT 'DRIVE'
$DEALLOCATE 'DRIVE'
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "EXIT"
$WRITE SYS$OUTPUT "That's the end of this run."
$WRITE SYS$OUTPUT -
 "Tape is dismounted and ''F$LOGICAL("TAPE")' is deallocated."
$EXIT
```

Com 6

From: LPARL1::LENN 2-DEC-1991 14:58:29.85
To: NCF::SUMANT
CC: LENN
Subj: ISEE Data Archiving/ Command file #2

```
$!************** LOCKHEED PLASMA COMPOSITION EXPERIMENT ON ISEE-1 **************
$!                      ****** USER_TAPE.COM ******
$!
$! Interactive command file for copying ISEEMS data files from disk to a new
$!                magnetic tape using the VAX/VMS Copy Utility
$!
$!                          by O. W. Lennartsson
$!                   Lockheed Missiles & Space Company, Inc.
$!                         Research and Development
$!                          Dept. 91-20, Bldg. 255
$!                           3251 Hanover Street
$!                           Palo Alto, CA 94304
$!
$! Telephone (415) 424-3259
$!
$! Developed under NASA Contract NAS5-33047
$!
$! The command language is that of VAX/VMS Version 5.4
$!
$! To execute this file, simply enter @USER_TAPE, if the file resides in the
$! same directory used for the data files, otherwise specify directory name in
$! the command: @directory_name@USER_TAPE (your default directory should be the
$! one used for data files).  The new tape will be labeled IONS and will be
$! written at a density of 1600 bpi.
$!*******************************************************************************
$WRITE SYS$OUTPUT " "
$DEFAULT_DIR = F$LOGICAL("SYS$DISK")+F$DIRECTORY()
$WRITE SYS$OUTPUT "Your default directory is: ",''DEFAULT_DIR'
$WRITE SYS$OUTPUT "Is this where the ISEEMS files are?"
$WRITE SYS$OUTPUT "If not, Ctrl/Y, reset default and reenter command."
$WRITE SYS$OUTPUT " "
$INQUIRE DUM "If directory OK, then press return"
$SET NOON
$WRITE SYS$OUTPUT " "
$INQUIRE NAME "Which tape drive? (enter name of device)"
$DRIVE= F$STRING(NAME)
$ALLOCATE 'DRIVE' TAPE
$IF $SEVERITY .EQ. 1 THEN GOTO DRIVE_OK
$WRITE SYS$OUTPUT "EXIT"
$WRITE SYS$OUTPUT "Reenter command if trying another drive."
$SET ON
$EXIT
$DRIVE_OK:
$SET ON
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "Mount tape on ''F$LOGICAL("TAPE")'"
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "Make sure tape is on line."
$WRITE SYS$OUTPUT " "
$INQUIRE INIZLD -
 "Has tape already been initialized at 1600 bpi and labeled IONS? [Y/N]"
$IF INIZLD THEN GOTO INITIALIZED
$INITIALIZE/OVERRIDE=EXPIRATION/DENS=1600/PROT=(G:RW,W:RW) -
 'DRIVE' IONS
$INITIALIZED:
```

Com 7

```
$MOUNT/DENSITY=1600 'DRIVE' IONS TAPE
$WRITE SYS$OUTPUT " "
$INQUIRE GUIDE -
 "Do you want to copy the Data User's Guide at this point? [Y/N]"
$IF .NOT. GUIDE THEN GOTO DATA_NEXT
$SET NOON
$COPY/LOG 'DEFAULT_DIR'GUIDE. TAPE
$IF $SEVERITY .EQ. 1 THEN GOTO DATA_FILES
$WRITE SYS$OUTPUT " "
$INQUIRE DATA "Do you want to copy data files anyway? [Y/N]"
$IF .NOT. DATA THEN GOTO TAPEDIR_LIS
$SET ON
$GOTO DATA_NEXT
$DATA_FILES:
$WRITE SYS$OUTPUT " "
$INQUIRE DATA "And you also want to copy data files? [Y/N]"
$IF .NOT. DATA THEN GOTO TAPEDIR_LIS
$SET ON
$DATA_NEXT:
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "Data files are copied by date, starting with the ",-
 "first date entered,"
$WRITE SYS$OUTPUT "and ending with the second date (inclusive) ",-
 "-assuming one and the same year."
$WRITE SYS$OUTPUT "If data run into second year, reenter a new set ",-
 "of dates for that second year."
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT -
 "If you are copying one single day, then make last date = first date."
$NYOLD=0
$NEW_YEAR:
$WRITE SYS$OUTPUT " "
$INQUIRE P2 "What YEAR? (two digits)"
$LENGTH_OF_YEAR:
$LP2=F$LENGTH(P2)
$IF(LP2.EQ.2) THEN GOTO CHECK_YEAR
$INQUIRE P2 "Enter two digits for the year: 77 or 78 or 79 or 80"
$GOTO LENGTH_OF_YEAR
$WRONG_YEAR:
$INQUIRE P2 "Enter either of 77 or 78 or 79 or 80"
$CHECK_YEAR:
$NY=F$INTEGER(F$EXTRACT(0,2,P2))
$IF(NY.LT.77.OR.NY.GT.80) THEN GOTO WRONG_YEAR
$IF(NY.EQ.NYOLD) THEN GOTO YEAR_OK
$YY= F$STRING(NY)
$DIR/OUTPUT=DRECTRY.TMP 'DEFAULT_DIR'EX'YY'*.DAT
$IF $SEVERITY .EQ. 1 THEN GOTO YEAR_POSSIBLE
$DELETE DRECTRY.TMP;*
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "No files found from year ",'YY',"!"
$INQUIRE REDO "Want to reenter year? [Y/N]"
$IF REDO THEN GOTO NEW_YEAR
$GOTO REMOVE_TAPE
$YEAR_POSSIBLE:
$DELETE DRECTRY.TMP;*
$IF(NY.LT.NYOLD) THEN GOTO WRONG_ORDER_YEARS
$MNDAY=999
$MXDAY=0
$YEAR_OK:
$IRWRS=0
```

Com 8

```
$WRITE SYS$OUTPUT " "
$INQUIRE P3 "First DAY to be copied? (one to three digits)"
$LP3=F$LENGTH(P3)
$IF(LP3.GT.3) THEN GOTO YEAR_OK
$IF(LP3.EQ.2) THEN P3:= "0''P3'"
$IF(LP3.EQ.1) THEN P3:= "00''P3'"
$ND=F$INTEGER(F$EXTRACT(0,3,P3))
$IF(NY.EQ.80) .AND. (ND.LT.1.OR.ND.GT.366) .OR. -
   (NY.NE.80) .AND. (ND.LT.1.OR.ND.GT.365) THEN GOTO YEAR_OK
$IF(ND.LE.MXDAY) THEN IRWRS=1
$IF(IRWRS.EQ.1) THEN GOTO OVERLAP1
$NO_OVERLAP1:
$YYDDD= F$EXTRACT(0,2,P2) + F$EXTRACT(0,3,P3)
$DIR/OUTPUT=DRECTRY.TMP 'DEFAULT_DIR'*'YYDDD'.DAT
$IF $SEVERITY .EQ. 1 THEN GOTO GOOD_START
$DELETE DRECTRY.TMP;*
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "No files found with date ",'YYDDD',"!"
$INQUIRE REDO "Want to reenter dates? [Y/N]"
$IF REDO THEN GOTO NEW_YEAR
$GOTO REMOVE_TAPE
$GOOD_START:
$DELETE DRECTRY.TMP;*
$ISTART=ND
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT -
 "If it is doubtful that all days will fit on this tape,"
$WRITE SYS$OUTPUT "then try successive pairs of first and last days,"
$WRITE SYS$OUTPUT "and put remaining days on a new tape."
$WRITE SYS$OUTPUT -
 "(It is OK to copy one day at a time, that is last day = first day.)"
$YEAR_STILL_OK:
$WRITE SYS$OUTPUT " "
$INQUIRE P3 "Last DAY to be copied? (in that same segment)"
$LP3=F$LENGTH(P3)
$IF(LP3.GT.3) THEN GOTO YEAR_STILL_OK
$IF(LP3.EQ.2) THEN P3:= "0''P3'"
$IF(LP3.EQ.1) THEN P3:= "00''P3'"
$ND=F$INTEGER(F$EXTRACT(0,3,P3))
$IF(NY.EQ.80) .AND. (ND.LT.1.OR.ND.GT.366) .OR. -
   (NY.NE.80) .AND. (ND.LT.1.OR.ND.GT.365) THEN GOTO YEAR_STILL_OK
$IF(ND.LT.ISTART) THEN GOTO WRONG_ORDER_DAYS
$IF(ND.GE.MNDAY) .AND. (IRWRS.EQ.1) THEN GOTO OVERLAP2
$NO_OVERLAP2:
$IRWRS=0
$IF(ND.EQ.ISTART) THEN GOTO SINGLE_DAY
$YYDDD= F$EXTRACT(0,2,P2) + F$EXTRACT(0,3,P3)
$DIR/OUTPUT=DRECTRY.TMP 'DEFAULT_DIR'*'YYDDD'.DAT
$IF $SEVERITY .EQ. 1 THEN GOTO GOOD_STOP
$DELETE DRECTRY.TMP;*
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "No files found with date ",'YYDDD',"!"
$INQUIRE REDO "Want to reenter both dates? [Y/N]"
$IF REDO THEN GOTO NEW_YEAR
$INQUIRE REDO "Want to reenter last day? [Y/N]"
$IF REDO THEN GOTO YEAR_STILL_OK
$GOTO REMOVE_TAPE
$GOOD_STOP:
$DELETE DRECTRY.TMP;*
$SINGLE_DAY:
```

Com 9

```
$ISTOP=ND
$IDAY=ISTART
$SET NOON
$COPY_TO_TAPE:
$IF(IDAY.LT.MNDAY) THEN MNDAY=IDAY
$IF(IDAY.GT.MXDAY) THEN MXDAY=IDAY
$IF(IDAY.LE.9) THEN YYDDD= F$STRING(NY) + "00" + F$STRING(IDAY)
$IF(IDAY.GT.9) .AND. (IDAY.LE.99) THEN -
 YYDDD= F$STRING(NY) + "0" + F$STRING(IDAY)
$IF(IDAY.GT.99) THEN YYDDD= F$STRING(NY) + F$STRING(IDAY)
$IF(IDAY.EQ.ISTART) THEN YYDDD1=YYDDD
$COPY/LOG 'DEFAULT_DIR'*'YYDDD'.DAT TAPE
$IDAY=IDAY+1
$IF(IDAY.LE.ISTOP) THEN GOTO COPY_TO_TAPE
$NYOLD=NY
$WRITE SYS$OUTPUT " "
$IF(ISTOP.EQ.ISTART) THEN WRITE SYS$OUTPUT -
 "Last segment copied: a single day ",'YYDDD'
$IF(ISTOP.GT.ISTART) THEN WRITE SYS$OUTPUT -
 "Last segment copied: days ",'YYDDD1'," through ",'YYDDD'
$WRITE SYS$OUTPUT " "
$INQUIRE MORE -
 "Are there more data files to be copied to this tape? [Y/N]"
$IF MORE THEN GOTO NEW_YEAR
$WRITE SYS$OUTPUT " "
$INQUIRE GUIDE -
 "Do you want to add the Data User's Guide at the end? [Y/N]"
$IF GUIDE THEN -
 COPY/LOG 'DEFAULT_DIR'GUIDE. TAPE
$TAPEDIR_LIS:
$WRITE SYS$OUTPUT " "
$INQUIRE LISTING "Do you want a tape directory file (TAPEDIR.LIS)? [Y/N]"
$IF .NOT. LISTING THEN GOTO REMOVE_TAPE
$DIR/SIZE/DATE/OUTPUT='DEFAULT_DIR'TAPEDIR.LIS TAPE
$SET PROT=(G:RWED,W:RWED) TAPEDIR.LIS
$GOTO REMOVE_TAPE
$WRONG_ORDER_DAYS:
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "First and last days in wrong order!"
$INQUIRE REDO "Want to reenter dates? [Y/N]"
$IF REDO THEN GOTO NEW_YEAR
$GOTO REMOVE_TAPE
$WRONG_ORDER_YEARS:
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "Going backwards in years?"
$INQUIRE SURE "Is this really the year you want? [Y/N]"
$IF SURE THEN NYOLD=0
$IF SURE THEN MNDAY=999
$IF SURE THEN MXDAY=0
$IF SURE THEN GOTO YEAR_OK
$INQUIRE REDO "Want to correct year? [Y/N]"
$IF REDO THEN GOTO NEW_YEAR
$GOTO REMOVE_TAPE
$OVERLAP1:
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "Caution:"
$IF(ND.LT.MXDAY) THEN WRITE SYS$OUTPUT -
 "First day precedes days already copied!"
$IF(ND.EQ.MXDAY) THEN WRITE SYS$OUTPUT -
 "This day has already been copied!"
```

Com 10

```
$!IF(ND.EQ.MXDAY) THEN GOTO NEW_YEAR
$WRITE SYS$OUTPUT " "
$INQUIRE SURE "Are you sure there will be no duplication? [Y/N]"
$IF SURE THEN GOTO NO_OVERLAP1
$INQUIRE REDO "Want to correct dates? [Y/N]"
$IF REDO THEN GOTO NEW_YEAR
$GOTO REMOVE_TAPE
$OVERLAP2:
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "Caution:"
$IF(ND.GT.MNDAY) THEN WRITE SYS$OUTPUT -
 "Last day may be out of order!"
$IF(ND.EQ.MNDAY) THEN WRITE SYS$OUTPUT -
 "Last day has already been copied!"
$!IF(ND.EQ.MNDAY) THEN GOTO YEAR_STILL_OK
$WRITE SYS$OUTPUT " "
$INQUIRE SURE "Are you sure there will be no duplication? [Y/N]"
$IF SURE THEN GOTO NO_OVERLAP2
$INQUIRE REDO "Want to reenter both dates? [Y/N]"
$IF REDO THEN GOTO NEW_YEAR
$INQUIRE REDO "Want to reenter last day? [Y/N]"
$IF REDO THEN GOTO YEAR_STILL_OK
$REMOVE_TAPE:
$SET ON
$DISMOUNT 'DRIVE'
$DEALLOCATE 'DRIVE'
$!DELETE DRECTRY.TMP;*
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "EXIT"
$WRITE SYS$OUTPUT "That's the end of this run."
$WRITE SYS$OUTPUT -
 "Tape is dismounted and ''F$LOGICAL("TAPE")' is deallocated."
$EXIT
```

From: LPARL1::LENN 2-DEC-1991 14:59:31.22 Com 11
To: NCF::SUMANT
CC: LENN
Subj: ISEE Data Archiving/ Command file #3

```
$!************** LOCKHEED PLASMA COMPOSITION EXPERIMENT ON ISEE-1 **************
$!                      ****** DELETE_ISEEMS.COM ******
$!
$!   Interactive command file for deleting ISEEMS archival files from disk
$!   (can transfer the deleting to a batch job via REMOVE_ISEEMS_FILES.COM)
$!
$!                            by D. W. Lennartsson
$!                    Lockheed Missiles & Space Company, Inc.
$!                           Research and Development
$!                            Dept. 91-20, Bldg. 255
$!                             3251 Hanover Street
$!                             Palo Alto, CA 94304
$!
$! Telephone (415) 424-3259
$!
$! Developed under NASA Contract NAS5-33047
$!
$! The command language is that of VAX/VMS Version 5.4
$!
$! To execute this file, simply enter @DELETE_ISEEMS, if the file resides in the
$! same directory used for the data files, otherwise specify directory name in
$! the command: @directory_nameDELETE_ISEEMS (your default directory should be
$! the one used for data files).
$!*******************************************************************************
$WRITE SYS$OUTPUT " "
$DEFAULT_DIR = F$LOGICAL("SYS$DISK")+F$DIRECTORY()
$!
$!This directory may or may not be used for the command files.
$!If not, change next command line to appropriate directory:
$COMMAND_DIR = DEFAULT_DIR
$!
$WRITE SYS$OUTPUT "Your default directory is: ",''DEFAULT_DIR'
$WRITE SYS$OUTPUT "Is this where the ISEEMS data files are?"
$WRITE SYS$OUTPUT "If not, Ctrl/Y and reset."
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "Files are deleted by date, starting with the ",-
 "first day entered,"
$WRITE SYS$OUTPUT "and ending with the second day ",-
 "-assuming one and the same year."
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "If files run into second year, ",-
 "repeat this operation for that year's days."
$WRITE SYS$OUTPUT " "
$INQUIRE P2 "What YEAR? (two digits)"
$LENGTH_OF_YEAR:
$LP2=F$LENGTH(P2)
$IF(LP2.EQ.2) THEN GOTO CHECK_YEAR
$INQUIRE P2 "Enter two digits for the year: 77 or 78 or 79 or 80"
$GOTO LENGTH_OF_YEAR
$WRONG_YEAR:
$INQUIRE P2 "Enter either of 77 or 78 or 79 or 80"
$CHECK_YEAR:
$NY=F$INTEGER(F$EXTRACT(0,2,P2))
$IF(NY.LT.77.OR.NY.GT.80) THEN GOTO WRONG_YEAR
$YEAR_OK:
```

Com 12

```
$WRITE SYS$OUTPUT " "
$INQUIRE P3 "First DAY? (one to three digits)"
$LP3=F$LENGTH(P3)
$IF(LP3.GT.3) THEN GOTO YEAR_OK
$IF(LP3.EQ.2) THEN P3:= "0''P3'"
$IF(LP3.EQ.1) THEN P3:= "00''P3'"
$ND=F$INTEGER(F$EXTRACT(0,3,P3))
$IF(NY.EQ.80) .AND. (ND.LT.1.OR.ND.GT.366) .OR. -
   (NY.NE.80) .AND. (ND.LT.1.OR.ND.GT.365) THEN GOTO YEAR_OK
$YYDDD= F$EXTRACT(0,2,P2) + F$EXTRACT(0,3,P3)
$DIR/OUTPUT=DRECTRY.TMP 'DEFAULT_DIR'*'YYDDD'.DAT
$IF $SEVERITY .EQ. 0 THEN GOTO NO_FILE
$DELETE DRECTRY.TMP;*
$ISTART=ND
$YEAR_STILL_OK:
$WRITE SYS$OUTPUT " "
$INQUIRE P3 "Second DAY? (last day of same year to be deleted)"
$LP3=F$LENGTH(P3)
$IF(LP3.GT.3) THEN GOTO YEAR_STILL_OK
$IF(LP3.EQ.2) THEN P3:= "0''P3'"
$IF(LP3.EQ.1) THEN P3:= "00''P3'"
$ND=F$INTEGER(F$EXTRACT(0,3,P3))
$IF(NY.EQ.80) .AND. (ND.LT.1.OR.ND.GT.366) .OR. -
   (NY.NE.80) .AND. (ND.LT.1.OR.ND.GT.365) THEN GOTO YEAR_STILL_OK
$YYDDD= F$EXTRACT(0,2,P2) + F$EXTRACT(0,3,P3)
$DIR/OUTPUT=DRECTRY.TMP 'DEFAULT_DIR'*'YYDDD'.DAT
$IF $SEVERITY .EQ. 0 THEN GOTO NO_FILE
$DELETE DRECTRY.TMP;*
$ISTOP=ND
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "If you are deleting a large number of files it may ",-
 "take a few minutes."
$WRITE SYS$OUTPUT "In the meantime this terminal will be tied up, ",-
 "unless you transfer this job"
$WRITE SYS$OUTPUT "to a batch queue."
$WRITE SYS$OUTPUT " "
$INQUIRE BAT "Would you rather delete in BATCH? [Y/N]"
$IF .NOT. BAT THEN GOTO NO_BAT
$INQUIRE BATQU "Enter name of batch queue"
$SUBMIT/QUEUE='BATQU'/LOG_FILE='DEFAULT_DIR'/NOPRINT-
 /PARAM=('DEFAULT_DIR,'NY,'ISTART,'ISTOP) -
 'COMMAND_DIR'REMOVE_ISEEMS_FILES
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "This terminal is yours again"
$WRITE SYS$OUTPUT " "
$EXIT
$NO_BAT:
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "As you wish!"
$WRITE SYS$OUTPUT " "
$IDAY=ISTART
$DATA_DELETE:
$IF(IDAY.LE.9) THEN YYDDD= F$STRING(NY) + "00" + F$STRING(IDAY)
$IF(IDAY.GT.9) .AND. (IDAY.LE.99) THEN -
 YYDDD= F$STRING(NY) + "0" + F$STRING(IDAY)
$IF(IDAY.GT.99) THEN YYDDD= F$STRING(NY) + F$STRING(IDAY)
$DELETE 'DEFAULT_DIR'*'YYDDD'.DAT;*
$IDAY=IDAY+1
$IF(IDAY.GT.ISTOP) THEN GOTO FILES_LEFT
$GOTO DATA_DELETE
```

Com 13

```
$FILES_LEFT:
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "Files left:"
$WRITE SYS$OUTPUT " "
$DIR/SIZE=ALL/DATE/PROT ED*,EX*,MC*,MD*,MS*
$EXIT
$NO_FILE:
$WRITE SYS$OUTPUT " "
$WRITE SYS$OUTPUT "Files missing: No ED",'YYDDD',".DAT, etc."
$WRITE SYS$OUTPUT "Check dates and reenter command."
$DELETE DRECTRY.TMP;*
$EXIT
```

Com 14

From: LPARL1::LENN 2-DEC-1991 15:00:18.72
To: NCF::SUMANT
CC: LENN
Subj: ISEE Data Archiving/ Command file #4

```
$!************** LOCKHEED PLASMA COMPOSITION EXPERIMENT ON ISEE-1 **************
$!                    ****** REMOVE_ISEEMS_FILES.COM ******
$!
$!       Batch command file for deleting ISEEMS archival files from disk
$!         (must be submitted from the interactive DELETE_ISEEMS.COM)
$!
$!                              by O. W. Lennartsson
$!                    Lockheed Missiles & Space Company, Inc.
$!                           Research and Development
$!                            Dept. 91-20, Bldg. 255
$!                             3251 Hanover Street
$!                             Palo Alto, CA 94304
$!
$! Telephone (415) 424-3259
$!
$! Developed under NASA Contract NAS5-33047
$!
$! The command language is that of VAX/VMS Version 5.4
$!*******************************************************************************
$DEFAULT_DIR=P1
$SET DEFAULT 'DEFAULT_DIR'
$NY=F$INTEGER(P2)
$ISTART=F$INTEGER(P3)
$ISTOP=F$INTEGER(P4)
$SET NOON
$SET NOVERIFY
$IDAY=ISTART
$DATA_DELETE:
$IF(IDAY.LE.9) THEN YYDDD= F$STRING(NY) + "00" + F$STRING(IDAY)
$IF(IDAY.GT.9) .AND. (IDAY.LE.99) THEN -
 YYDDD= F$STRING(NY) + "0" + F$STRING(IDAY)
$IF(IDAY.GT.99) THEN YYDDD= F$STRING(NY) + F$STRING(IDAY)
$DELETE *'YYDDD'.DAT;*
$IDAY=IDAY+1
$IF(IDAY.LE.ISTOP) THEN GOTO DATA_DELETE
$SET VERIFY
$EXIT
```

2 digit year
Type
day of year
Dump of : DD 85421
Type: E D
Timespan: 11/08/77 - 02/25/78

```
Dump of file NCF_OPS_DATA:[OPERATIONS.RANEY.BACKUP]ED77315.DAT;1 on 20-FEB-1992 11:07:40.77
File ID (14084,26,0)   End of file block 16 / Allocated 18

Record number 1 (00000001), 132 (0084) bytes
                                                                    2 digit year  day of year
 20202020 302E3331 2D202020 312E392D 20202020 36303235 20203531 33373720  77315  5206    -9.1   -13.0      000000
 2031302B 4530382E 33202035 32312D20 35312D20 382E3631 20202020 312E342D -4.1     16.8 -15 -125  3.80E+01   000020
 30302E30 36202020 37393120 2032302B 4535362E 31202031 302D4535 302E3420  4.05E-01  1.65E+02  197   60.00 000040
 2020302E 31312D20 372E3420 2020312E 36312031 2E302020 30302E30 20202020     0.00  0.1 16.1   4.7 -11.0    000060
                                                                332E3620  6.3.............................. 000080

Record number 2 (00000002), 132 (0084) bytes

 20202020 372E3131 2D202020 392E342D 20202020 30373235 20203531 33373720  77315  5270    -4.9   -11.7      000000
 2031302B 4531342E 33202033 31312D20 32332D20 302E3631 20202020 312E382D -8.1     16.0 -32 -113  3.41E+01   000020
 30302E30 36202020 34303220 2032302B 4532302E 32202031 302D4534 392E3320  3.94E-01  2.02E+02  204   60.00 000040
 2020302E 31312D20 372E3420 2020312E 36312031 2E302020 30302E30 20202020     0.00  0.1 16.1   4.7 -11.0    000060
                                                                342E3620  6.4.............................. 000080
```

```
Dump of file NCF_OPS_DATA:[OPERATIONS.RANEY.BACKUP]ED77315.DAT;1 on 20-FEB-1992 12:01:17.50
File ID (14084,26,0)   End of file block 16 / Allocated 18

Record number 61 (0000003D), 132 (0084) bytes

 20202020 342E352D 20202020 392E312D 20202020 38323439 35203531 33373720  77315 59428    -1.9    -5.4     000000
 2032302D 4539372E 31202039 30312D20 35312020 312E3620 20202020 352E3120  1.5     6.1  15 -109  1.79E-02  000020
 30352E34 35322020 30383120 2032302B 4536342E 33202031 302D4532 332E3420  4.32E-01  3.46E+02  180  254.50 000040
 2020302E 30202020 302E3020 2020312E 36312031 2E302020 30302E34 36322020   264.00  0.1 16.1   0.0   0.0   000060
                                                                 302E3020  0.0.............................. 000080
```

ASCII LIST of ED

```
FILE 1      RECORD      1          132 BYTES
 77315  5206     -9.1    -13.0     -4.1     16.8 -15 -125  3.80E+01  4.05E-01  1.65E+02  197    60.00     0.00  0.1 16.1    4.7 -11.0    6.3
```

FILE 1 RECORD 61 132 BYTES

77315	59428	-1.9	-5.4	1.5	6.1	15	-109	1.79E-02	4.32E-01	3.46E+02	180	254.50	264.00	0.1	16.1	0.0	0.0	0.0

ISEE 1

THERMAL ION MEASUREMENTS DATA

77-102A-12D SPMS-00294

THIS DATA SET HAS BEEN RESTORED. ORIGINALLY IT CONTAINED 28 9-TRACK, 6250 BPI TAPES AND ONE TAPE AT 1600 BPI, ALL WRITTEN IN BINARY. THERE ARE 29 RESTORED TAPES. THE DR TAPES ARE 3480 CARTRIDGES AND THE DS TAPES ARE 9-TRACK, 6250 BPI. THE ORIGINAL TAPES WERE CREATED ON AN UNIVAC 11/80 COMPUTER AND THEY WERE RESTORED ON AN IBM 9021 COMPUTER. THE DR AND DS NUMBERS ALONG WITH THE CORRESPONDING D NUMBERS AND THE TIME SPANS ARE AS FOLLOWS:

DR#	DS#	D#	FILES	TIME SPAN
DR004090	DS004090	D042230	1	FILE 1: 11/29/77 - 11/30/77
DR004091	DS004091	D060132	8	FILE 1: 11/29/77 - 11/30/77 FILE 2: 01/21/78 - 01/21/78 FILE 3: 01/23/78 - 01/24/78 FILE 4: 02/20/78 - 02/21/78 FILE 5: 02/23/78 - 02/24/78 FILE 6: 03/17/78 - 03/17/78 FILE 7: 03/18/78 - 03/20/78 FILE 8: 03/22/78 - 03/22/78
DR004089	DS004089	D060133	7	FILE 1: 12/28/77 - 12/28/77 FILE 2: 12/23/77 - 12/24/77 FILE 3: 12/20/77 - 12/22/77 FILE 4: 11/25/77 - 11/25/77 FILE 5: 01/29/78 - 02/01/78 FILE 6: 03/05/78 - 03/05/78 FILE 7: 07/05/78 - 07/05/78
DR004094	DS004094	D060134	6	FILE 1: 01/14/78 - 01/14/78 FILE 2: 01/26/78 - 01/26/78 FILE 3: 01/28/78 - 01/29/78 FILE 4: 02/01/78 - 02/02/78 FILE 5: 04/28/78 - 04/30/78 FILE 6: 10/16/79 - 10/17/79
DR004092	DS004092	D060135	6	FILE 1: 01/16/78 - 01/16/78 FILE 2: 12/01/77 - 12/02/77 FILE 3: 12/09/77 - 12/10/77 FILE 4: 12/13/77 - 12/14/77 FILE 5: 12/16/77 - 12/17/77 FILE 6: 12/30/77 - 12/31/77
DR004095	DS004095	D060136	3	FILE 1: 04/02/78 - 04/04/78 FILE 2: 04/09/78 - 04/11/78 FILE 3: 04/11/78 - 04/13/78
DR004097	DS004097	D060137	2	FILE 1: 04/18/78 - 04/21/78 FILE 2: 04/21/78 - 04/23/78

77-102A-12D

DR#	DS#	D#	FILES	TIME SPAN
DR004096	DS004096	D060138	2	FILE 1: 04/13/78 - 04/16/78 FILE 2: 04/16/78 - 04/18/78
DR004098	DS004098	D060139	3	FILE 1: 04/23/78 - 04/25/78 FILE 2: 04/25/78 - 04/28/78 FILE 3: 05/15/78 - 05/17/78
DR004093	DS004093	D060140	5	FILE 1: 05/25/79 - 05/27/79 FILE 2: 01/09/78 - 01/09/78 FILE 3: 03/14/78 - 03/15/78 FILE 4: 12/15/79 - 12/16/79 FILE 5: 03/25/78 - 03/27/78
DR004099	DS004099	D060141	1	FILE 1: 05/26/78 - 05/29/78
DR004100	DS004100	D060142	7	FILE 1: 06/05/78 - 06/07/78 FILE 2: 06/19/78 - 06/21/78 FILE 3: 08/06/78 - 08/08/78 FILE 4: 08/09/78 - 08/10/78 FILE 5: 08/11/78 - 08/13/78 FILE 6: 08/11/78 - 08/13/78 FILE 7: 08/16/78 - 08/18/78
DR004101	DS004101	D060143	8	FILE 1: 07/01/78 - 07/02/78 FILE 2: 06/07/78 - 06/10/78 FILE 3: 07/06/78 - 07/08/78 FILE 4: 07/09/78 - 07/11/78 FILE 5: 07/23/78 - 07/25/78 FILE 6: 07/25/78 - 07/27/78 FILE 7: 07/28/78 - 07/30/78 FILE 8: 07/30/78 - 08/01/78
DR004103	DS004103	D060144	6	FILE 1: 08/20/78 - 08/23/78 FILE 2: 08/23/78 - 08/24/78 FILE 3: 09/04/78 - 09/05/78 FILE 4: 02/13/78 - 02/16/79 FILE 5: 02/16/79 - 02/16/79 FILE 6: 11/18/78 - 11/18/78
DR004102	DS004102	D060145	10	FILE 1: 09/28/78 - 09/30/78 FILE 2: 10/12/78 - 10/14/78 FILE 3: 06/10/78 - 06/12/78 FILE 4: 10/04/78 - 10/05/78 FILE 5: 10/05/78 - 10/07/78 FILE 6: 10/08/78 - 10/09/79 FILE 7: 10/10/78 - 10/12/78 FILE 8: 10/18/78 - 10/19/78 FILE 9: 12/23/78 - 12/25/78 FILE 10:11/22/78 - 11/23/78

DR#	DS#	D#	FILES	TIME SPAN
DR004105	DS004105	D060146	13	FILE 1: 11/27/78 - 11/28/78 FILE 2: 11/29/78 - 12/01/78 FILE 3: 12/04/78 - 12/06/78 FILE 4: 12/07/78 - 12/08/78 FILE 5: 12/09/78 - 12/10/78 FILE 6: 12/11/78 - 12/13/78 FILE 7: 12/13/78 - 12/15/78 FILE 8: 12/16/78 - 12/18/78 FILE 9: 12/18/78 - 12/20/78 FILE 10:12/21/78 - 12/22/78 FILE 11:12/28/78 - 12/29/78 FILE 12:12/30/78 - 12/31/78 FILE 13:02/04/79 - 02/06/79
DR004108	DS004108	D060147	5	FILE 1: 09/29/79 - 09/30/79 FILE 2: 10/04/79 - 10/06/79 FILE 3: 09/17/79 - 09/18/79 FILE 4: 09/15/79 - 09/17/79 FILE 5: 02/23/79 - 02/25/79
DR004104	DS004104	D060148	9	FILE 1: 01/14/79 - 01/15/79 FILE 2: 01/21/79 - 01/22/79 FILE 3: 01/24/79 - 01/25/79 FILE 4: 01/26/79 - 01/27/79 FILE 5: 02/01/79 - 02/04/79 FILE 6: 11/13/78 - 11/14/78 FILE 7: 11/15/78 - 11/16/78 FILE 8: 11/19/78 - 11/22/78 FILE 9: 11/25/78 - 11/26/78
DR004107	DS004107	D060149	8	FILE 1: 01/28/79 - 01/30/79 FILE 2: 07/21/79 - 07/23/79 FILE 3: 08/07/79 - 08/09/79 FILE 4: 08/12/79 - 08/13/79 FILE 5: 08/16/79 - 08/18/79 FILE 6: 08/22/79 - 08/23/79 FILE 7: 10/08/79 - 10/09/79 FILE 8: 10/24/79 - 10/25/79
DR004106	DS004106	D060150	7	FILE 1: 02/06/79 - 02/09/79 FILE 2: 01/03/79 - 01/06/79 FILE 3: 01/10/79 - 01/11/79 FILE 4: 01/11/79 - 01/13/79 FILE 5: 10/19/79 - 10/21/79 FILE 6: 10/22/79 - 10/23/79 FILE 7: 10/24/79 - 10/26/79
DR004088	DS004088	D060151	5	FILE 1: 02/09/79 - 02/11/79 FILE 2: 11/15/77 - 11/15/77 FILE 3: 01/11/78 - 01/11/78 FILE 4: 01/18/79 - 01/19/78 FILE 5: 02/04/78 - 02/04/78
DR004114	DS004114	D060152	6	FILE 1: 07/10/79 - 07/11/79 FILE 2: 07/12/79 - 07/14/79 FILE 3: 07/01/79 - 07/02/79 FILE 4: 07/13/79 - 07/15/79 FILE 5: 07/02/79 - 07/04/79 FILE 6: 08/09/79 - 08/11/79

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DR#	DS#	D#	FILES	TIME SPAN
DR004112	DS004112	D060153	6	FILE 1: 07/23/79 - 07/26/79 FILE 2: 08/26/79 - 08/28/79 FILE 3: 08/28/79 - 08/30/79 FILE 4: 09/05/79 - 09/06/79 FILE 5: 09/07/79 - 09/09/79 FILE 6: 05/06/79 - 05/08/79
DR004116	DS004116	D060154	9	FILE 1: 09/09/79 - 09/11/79 FILE 2: 09/20/79 - 09/20/79 FILE 3: 08/31/79 - 09/02/79 FILE 4: 07/19/79 - 07/20/79 FILE 5: 10/06/79 - 10/08/79 FILE 6: 11/11/79 - 11/12/79 FILE 7: 09/24/79 - 09/26/79 FILE 8: 09/26/79 - 09/28/79 FILE 9: 10/18/79 - 10/20/79
DR004109	DS004109	D060155	6	FILE 1: 10/28/79 - 10/29/79 FILE 2: 10/26/79 - 10/27/79 FILE 3: 06/25/79 - 06/26/79 FILE 4: 02/25/79 - 02/28/79 FILE 5: 03/02/79 - 03/04/79 FILE 6: 03/12/79 - 03/14/79
DR004111	DS004111	D060156	6	FILE 1: 11/04/79 - 11/06/79 FILE 2: 10/14/79 - 10/14/79 FILE 3: 11/06/79 - 11/08/79 FILE 4: 03/21/79 - 03/24/79 FILE 5: 03/24/79 - 03/26/79 FILE 6: 04/02/79 - 04/05/79
DR004110	DS004110	D060157	5	FILE 1: 11/20/79 - 11/22/79 FILE 2: 12/12/79 - 12/13/79 FILE 3: 12/22/79 - 12/23/79 FILE 4: 11/25/79 - 11/27/79 FILE 5: 03/04/79 - 03/07/79
DR004113	DS004113	D060158	5	FILE 1: 12/19/79 - 12/21/79 FILE 2: 11/15/79 - 11/17/79 FILE 3: 05/20/79 - 05/22/79 FILE 4: 06/01/79 - 06/03/79 FILE 5: 05/10/79 - 05/13/79
DR004115	DS004115	D060159	3	FILE 1: 12/24/79 - 12/25/79 FILE 2: 07/05/79 - 07/07/79 FILE 3: 07/14/79 - 07/16/79

REQ. AGENT	RAND NO.	ACQ. AGENT
VPL	V0064	HKH
SAR	V0299	HKH

ISEE-1

THERMAL ION MEASUREMENTS DATA

77-102A-12D

This data set catalog consists of 29 data tapes. The tapes are 9-track, 6250 BPI, Binary and are multi-filed, except D-42230, which is 1600 BPI. The tapes were created on the UNIVAC 11/80 computer. The D and C numbers along with the time spans are listed on the following pages.

ISEE 1 77-102A-12D

D#	C#	FILES	TIME SPAN
D-42230	C-21308	1	FILE 1: 11/29/77 - 11/30/77
D-60132	C-24959	8	FILE 1: 11/29/77 - 11/30/77 FILE 2: 01/21/78 - 01/21/78 FILE 3: 01/23/78 - 01/24/78 FILE 4: 02/20/78 - 02/21/78 FILE 5: 02/23/78 - 02/24/78 FILE 6: 03/17/78 - 03/17/78 FILE 7: 03/18/78 - 03/20/78 FILE 8: 03/22/78 - 03/22/78
D-60133	C-24960	7	FILE 1: 12/28/77 - 12/28/77 FILE 2: 12/23/77 - 12/24/77 FILE 3: 12/20/77 - 12/22/77 FILE 4: 11/25/77 - 11/25/77 FILE 5: 01/29/78 - 02/01/78 FILE 6: 03/05/78 - 03/05/78 FILE 7: 07/05/78 - 07/05/78
D-60134	C-24961	6	FILE 1: 01/14/78 - 01/14/78 FILE 2: 01/26/78 - 01/26/78 FILE 3: 01/28/78 - 01/29/78 FILE 4: 02/01/78 - 02/02/78 FILE 5: 04/28/78 - 04/30/78 FILE 6: 10/16/79 - 10/17/79
D-60135	C-24962	6	FILE 1: 01/16/78 - 01/16/78 FILE 2: 12/01/77 - 12/02/77 FILE 3: 12/09/77 - 12/10/77 FILE 4: 12/13/77 - 12/14/77 FILE 5: 12/16/77 - 12/17/77 FILE 6: 12/30/77 - 12/31/77
D-60136	C-24963	3	FILE 1: 04/02/78 - 04/04/78 FILE 2: 04/09/78 - 04/11/78 FILE 3: 04/11/78 - 04/13/78
D-60137	C-24964	2	FILE 1: 04/18/78 - 04/21/78 FILE 2: 04/21/78 - 04/23/78
D-60138	C-24965	2	FILE 1: 04/13/78 - 04/16/78 FILE 2: 04/16/78 - 04/18/78
D-60139	C-24966	3	FILE 1: 04/23/78 - 04/25/78 FILE 2: 04/25/78 - 04/28/78 FILE 3: 05/15/78 - 05/17/78
D-60140	C-24967	5	FILE 1: 05/25/79 - 05/27/79 FILE 2: 01/09/78 - 01/09/78

ISEE-1 77-102A-12D

D#	C#	FILES	TIME SPAN
D-60140	C-24967	5	FILE 3: 03/14/78 - 03/15/78 FILE 4: 12/15/79 - 12/16/79 FILE 5: 03/25/78 - 03/27/78
D-60141	C-24968	1	FILE 1: 05/26/78 - 05/29/78
D-60142	C-24969	7	FILE 1: 06/05/78 - 06/07/78 FILE 2: 06/19/78 - 06/21/78 FILE 3: 08/06/78 - 08/08/78 FILE 4: 08/09/78 - 08/10/78 FILE 5: 08/11/78 - 08/13/78 FILE 6: 08/11/78 - 08/13/78 FILE 7: 08/16/78 - 08/18/78
D-60143	C-24970	8	FILE 1: 07/01/78 - 07/02/78 FILE 2: 06/07/78 - 06/10/78 FILE 3: 07/06/78 - 07/08/78 FILE 4: 07/09/78 - 07/11/78 FILE 5: 07/23/78 - 07/25/78 FILE 6: 07/25/78 - 07/27/78 FILE 7: 07/28/78 - 07/30/78 FILE 8: 07/30/78 - 08/01/78
D-60144	C-24971	6	FILE 1: 08/20/78 - 08/23/78 FILE 2: 08/23/78 - 08/24/78 FILE 3: 09/04/78 - 09/05/78 FILE 4: 02/13/79 - 02/16/79 FILE 5: 02/16/79 - 02/16/79 FILE 6: 11/18/78 - 11/18/78
D-60145	C-24972	10	FILE 1: 09/28/78 - 09/30/78 FILE 2: 10/12/78 - 10/14/78 FILE 3: 06/10/78 - 06/12/78 FILE 4: 10/04/78 - 10/05/78 FILE 5: 10/05/78 - 10/07/78 FILE 6: 10/08/78 - 10/09/79 FILE 7: 10/10/78 - 10/12/78 FILE 8: 10/18/78 - 10/19/78 FILE 9: 12/23/78 - 12/25/78 FILE 10: 11/22/78 - 11/23/78
D-60146	C-24973	13	FILE 1: 11/27/78 - 11/28/78 FILE 2: 11/29/78 - 12/01/78 FILE 3: 12/04/78 - 12/06/78 FILE 4: 12/07/78 - 12/08/78 FILE 5: 12/09/78 - 12/10/78 FILE 6: 12/11/78 - 12/13/78 FILE 7: 12/13/78 - 12/15/78 FILE 8: 12/16/78 - 12/18/78

ISEE 77-102A-12D

D#	C#	FILES	TIME SPAN
D-60146	C-24973	13	FILE 9: 12/18/78 - 12/20/78 FILE 10: 12/21/78 - 12/22/78 FILE 11: 12/28/78 - 12/29/78 FILE 12: 12/30/78 - 12/31/78 FILE 13: 02/04/79 - 02/06/79
D-60147	C-24974	5	FILE 1: 09/29/79 - 09/30/79 FILE 2: 10/04/79 - 10/06/79 FILE 3: 09/17/79 - 09/18/79 FILE 4: 09/15/79 - 09/17/79 FILE 5: 02/32/79 - 02/25/79
D-60148	C-24975	9	FILE 1: 01/14/79 - 01/15/79 FILE 2: 01/21/79 - 01/22/79 FILE 3: 01/24/79 - 01/25/79 FILE 4: 01/26/79 - 01/27/79 FILE 5: 02/01/79 - 02/04/79 FILE 6: 11/13/78 - 11/14/78 FILE 7: 11/15/78 - 11/16/78 FILE 8: 11/19/78 - 11/22/78 FILE 9: 11/25/78 - 11/26/78
D-60149	C-24976	8	FILE 1: 01/28/79 - 01/30/79 FILE 2: 07/21/79 - 07/23/79 FILE 3: 08/07/79 - 08/09/79 FILE 4: 08/12/79 - 08/13/79 FILE 5: 08/16/79 - 08/18/79 FILE 6: 08/22/79 - 08/23/79 FILE 7: 10/08/79 - 10/09/79 FILE 8: 10/24/79 - 10/25/79
D-60150	C-24977	7	FILE 1: 02/06/79 - 02/09/79 FILE 2: 01/03/79 - 01/06/79 FILE 3: 01/10/79 - 01/11/79 FILE 4: 01/11/79 - 01/13/79 FILE 5: 10/19/79 - 10/21/79 FILE 6: 10/22/79 - 10/23/79 FILE 7: 10/24/79 - 10/26/79
D-60151	C-24978	5	FILE 1: 02/09/79 - 02/11/79 FILE 2: 11/15/77 - 11/15/77 FILE 3: 01/11/78 - 01/11/78 FILE 4: 01/18/79 - 01/19/78 FILE 5: 02/04/78 - 02/04/78
D-60152	C-24979	6	FILE 1: 07/10/79 - 07/11/79 FILE 2: 07/12/79 - 07/14/79 FILE 3: 07/01/79 - 07/02/79 FILE 4: 07/13/79 - 07/15/79

ISEE-1 77-102A-12D

D#	C#	FILES	TIME SPAN
D-60152	C-24979	6	FILE 5: 07/02/79 - 07/04/79 FILE 6: 08/09/79 - 08/11/79
D-60153	C-24980	6	FILE 1: 07/23/79 - 07/26/79 FILE 2: 08/26/79 - 08/28/79 FILE 3: 08/28/79 - 08/30/79 FILE 4: 09/05/79 - 09/06/79 FILE 5: 09/07/79 - 09/09/79 FILE 6: 05/06/79 - 05/08/79
D-60154	C-24981	9	FILE 1: 09/09/79 - 09/11/79 FILE 2: 09/20/79 - 09/20/79 FILE 3: 08/31/79 - 09/02/79 FILE 4: 07/19/79 - 07/20/79 FILE 5: 10/06/79 - 10/08/79 FILE 6: 11/11/79 - 11/12/79 FILE 7: 09/24/79 - 09/26/79 FILE 8: 09/26/79 - 09/28/79 FILE 9: 10/18/79 - 10/20/79
D-60155	C-24982	6	FILE 1: 10/28/79 - 10/29/79 FILE 2: 10/26/79 - 10/27/79 FILE 3: 06/25/79 - 06/26/79 FILE 4: 02/25/79 - 02/28/79 FILE 5: 03/02/79 - 03/04/79 FILE 6: 03/12/79 - 03/14/79
D-60156	C-24983	6	FILE 1: 11/04/79 - 11/06/79 FILE 2: 10/14/79 - 10/14/79 FILE 3: 11/06/79 - 11/08/79 FILE 4: 03/21/79 - 03/24/79 FILE 5: 03/24/79 - 03/26/79 FILE 6: 04/02/79 - 04/05/79
D-60157	C-24984	5	FILE 1: 11/20/79 - 11/22/79 FILE 2: 12/12/79 - 12/13/79 FILE 3: 12/22/79 - 12/23/79 FILE 4: 11/25/79 - 11/27/79 FILE 5: 03/04/79 - 03/07/79
D-60158	C-24985	5	FILE 1: 12/19/79 - 12/21/79 FILE 2: 11/15/79 - 11/17/79 FILE 3: 05/20/79 - 05/22/79 FILE 4: 06/01/79 - 06/03/79 FILE 5: 05/10/79 - 05/13/79
D-60159	C-24986	3	FILE 1: 12/24/79 - 12/25/79 FILE 2: 07/05/79 - 07/07/79 FILE 3: 07/14/79 - 07/16/79

National Aeronautics and
Space Administration

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama
35812

Rec'd 10/31/80 HKH

77-102A-12
ISEE 1
ION COMPOSITION EXP.

Reply to Attn of: ES53-80-242

October 2, 1980

TO: Goddard Space Flight Center
Attn: Code 601/James I. Vette

FROM: ES51/Charles R. Chappell

SUBJECT: Archiving of ISEE Thermal Plasma Data

I am enclosing a pair of example output formats we are producing which could be made available to the National Space Science Data Center (NSSDC) for archiving the thermal plasma observations from the Plasma Composition Experiment on ISEE. These two formats, a 1600 bpi, nine track magnetic tape and a set of microfiche plots, represent the output of the first level of thermal plasma processing for a "typical" ISEE pass through the magnetosphere. The data contain the count rates from the detectors of the Plasma Composition Experiment, the B-field measurements from the on-board magnetometers, and certain parameters from the ephemeris data tapes, all merged into a contiguous data stream and despun according to measurements from the on-board spin sensor. A detailed description of the tape and its contents is provided in the attachment, "Plasma Composition Experiment, Processed Data Tape, Thermal Ion Measurements."

The microfiche plot package is basically a graphics display of the contents of the tape. A partial description of the nature of the data in these plots and the instrument operating philosophy can be found in an article by Baugher, et.al., in the September 1980 Geophysical Research Letters. Another reference which would be of benefit to any potential user would be the "In-Orbit Operation Plan" of the "ISEE Experiment Requirements Document (Section X)."

The ultimate solution to the problem of communicating the details of the data to users will be a final calibration report based on flight and pre-flight data which is now under preparation here at MSFC and scheduled for completion after the first of the year. In the interim, particular questions about the instrument operation or the data not covered in the above references can be answered by Charles Baugher at MSFC (205-453-0029) or E. G. Shelley at Lockheed (415-493-4411).

The volume of data involved will be approximately 120 tapes for each year of ISEE operation. If you find the package acceptable the shipments can begin immediately. It is estimated that it will require approximately nine months to bring the transfer abreast of current incoming data shipments.

Charles Richard Chappell

Charles R. Chappell, Chief
Solar-Terrestrial Physics Division

PLASMA COMPOSITION EXPERIMENT
PROCESSED DATA TAPE
THERMAL ION MEASUREMENTS

The processed data tapes from the thermal ion measurements of the Plasma Composition Experiment on ISEE-1 are normally created from a merge of the PCM telemetry data tapes and the definative attitude ephemeris tapes with a substantial amount of preprocessing applied to unpack the telemetry format, determine instrument pointing directions, and collate the ion data with measurements of the magnetic field.

Since thermal ion measurements are generally obtained only when the spacecraft is in the magnetosphere, the tapes will not be inclusive of all the instruments' measurements. The primary exclusions will be periods when the spacecraft is in the solar wind and during periods of special studies in which the instrument is concentrating on specific energetic populations.

There will be two versions of each tape created. One is uncalibrated and one has been processed utilizing a set of "average" calibration parameters. These two versions are identical in format and differ only in their recorded values of the relative ion counts from the instruments' various detectors. The tapes are to be distinguished by their numbering system. Uncalibrated tapes are designated by a four digit number prefixed by the letters "PD" and calibrated tapes are prefixed by the letters "PC." The four digits refer to the day of the year at the start of the data on the tape and the last digit of the year the data was taken. Thus, the number PD 1088 would designate an uncalibrated tape whose data started on Day of Year 108, 1978. The number PC 1088 would designate the corresponding calibrated tape.

The tapes are written by a UNIVAC 11/80 computer onto 9 track, 6250 ~~1600~~ bpi tape, odd parity. The data is in physical records of 3020 - 36 bit words, with each physical record subdivided into 10 logical records of 302 words. The entire tape is a single file. The contents of each logical record is shown in Table I. In summary, each logical record contains certain header parameters, selected attitude data, thirty-two sequential measurements from each of the experiment's three ion sensor outputs, thirty-two corresponding measurements of the magnetic field components and thirty-two pitch angle calculations.

Accompanying each tape is a microfiche print of selected parameters from the tape. Table II shows one page of this print. The primary purpose of the print is to establish the exact data coverage on the tape, provide an approximate location of the spacecraft relative to the magnetosphere, and provide an indication of the instrument's operating status (on/off, etc.).

The microfiche package is headed by a table giving a spacecraft identifier (in this case ISEE), the year of the data, the day of the year of the data, the seconds of the start of the data on that particular page of the microfiche, and a reel number (an internal MSFC master reel). The processed data tape number corresponding to the microfiche packet is readily derivable from this header. As an example, a microfiche packet headed by "ISEE 1978/108/41387 - REEL 02075" would correspond to either PC 1088 or PD 1088.

TABLE I

ISEE PROCESSED DATA TAPE LOGICAL RECORD CONTENTS

WORD NO.	
1.	Number of useful words in this logical record (= 301).
2.	Instrument Status Sub-Commutator (an internal instrument control counter).
3.	Day of year of data (Jan 1 = 1)
4.*	Seconds of the day of the start of this 32 measurement sequence.
5.*	Satellite RPM.
6.*	Spacecraft speed in meters/sec (GSE).
7.*	The angle in degrees between the satellite spin axis and velocity vector.
8.	Year of the data.
9.*	The angle in radians between the projection of the satellite velocity vector into the ecliptic plane and the position of the sun.
10.*	The angle in degrees between the projection of the satellite velocity vector into the ecliptic plane and the pointing direction of the Plasma Composition Experiment (in the ecliptic plane) at the start of this 32 measurement sequence.
11.*	The change in above angle during one minor frame in degrees.
12.	An instrument operating program number used for bookkeeping.
13.	Sensor Identification (1 = Head A, 2 = Head B).
14.*	Average minor frame period in seconds.
15.	Energy Detector Gain Change Flag.
16.	Mass Detector Gain Change Flag.
17.**	Energy Detector Gain Sensitivity (HI, LO).
18.**	Mass Detector Gain Sensitivity (HI, LO).
19.**	Instrument Memory Instruction (CON, RET).

20.	Setting Repetition Control.
21.	Assignable Accumulator Control (ED, NORM).
22.**	Accumulator Dead Time (IN, OUT).
23.**	Operating Energy Analyzer (ESA, RPA).
24.**	Energy/Mass Matrix Fixed Scan Control: Energy Fixed, Mass Variable; Mass Fixed, Energy Variable (M,E).
25.	Fixed instrument setting of above fixed parameter.
26.*	Magnetic Local Time (= 999999 if attitude tape not merged).
27 - 33.*	Instrument house-keeping parameters.
34 - 36.*	Satellite X, Y, and Z position in meters (GSE).
37 - 39.*	Satellite X, Y, and Z position in meters (GSM).
40.*	McIlwain L parameter (dipole model).
41 - 43.*	Model magnetic field components Bx, By, Bz in gammas (GSE).
44.*	Total magnetic field strength in gammas.
45.*	Geomagnetic latitude of the spacecraft in degrees.
46.*	Geomagnetic longitude of the spacecraft in degrees.
47 - 78.	The 32 mass or energy steps executed in this 32 measurement sequence.
79 - 110.	Ion counts from the mass detector this 32 measurement sequence.
111 - 142.	Ion counts from the energy detector this 32 measurement sequence.
143 - 174.	Ion counts from the assignable detector (see word 20) this 32 measurement sequence.
175 - 206.	Spacecraft X component of measured magnetic field strength this 32 measurement sequence.
207 - 238.	Spacecraft Y component of measured magnetic field strength this 32 measurement sequence.
239 - 270.	Spacecraft Z component of measured magnetic field strength this 32 measurement sequence.

271 - 302.* Instrument pitch angle in degrees this 32 measurement sequence.

*Floating Point Numbers.

**ASCII Characters, Left Justified.

TABLE 2

DAY NUMBER= 324 DATE= NOV20,1977 HEAD= 2

TIME (HR:MN)	R.E. (RADII)	L.T. (HRS)	GMLAT (DEG)	L (RADII)	BXSC (GAMMA)	BYSC (GAMMA)	BZSC (GAMMA)	P.A. (DEG)	ENERGY (MODE)	GAIN (FLAG)	ED (COUNTS)	TIME (SEC)
08:27	3.95	4.36	40.78	7.05	-494	-484	220	73.1	RPA	0	105	30432.084
08:27	3.95	4.37	40.78	7.05	677	-144	222	151.4	RPA	0	217	30434.083
08:27	3.95	4.37	40.78	7.05	-247	646	227	41.0	RPA	0	129	30436.082
08:27	3.95	4.37	40.79	7.05	-403	-580	219	92.4	RPA	0	89	30438.081
08:27	3.96	4.37	40.79	7.06	690	-25	222	144.7	RPA	0	217	30440.080
08:27	3.96	4.37	40.79	7.06	-353	595	225	32.0	RPA	0	129	30442.079
08:27	3.96	4.37	40.79	7.06	-259	-620	218	91.9	RPA	0	89	30444.078
08:27	3.96	4.37	40.79	7.07	682	90	221	137.0	RPA	0	185	30446.077
08:27	3.96	4.37	40.79	7.07	-449	523	224	23.5	RPA	0	145	30448.076
08:27	3.96	4.37	40.80	7.07	-188	-588	217	101.2	RPA	0	105	30450.075
08:27	3.96	4.37	40.80	7.07	655	205	221	128.5	RPA	0	161	30452.074
08:27	3.97	4.37	40.80	7.08	-529	537	222	16.3	RPA	0	145	30454.073
08:27	3.97	4.37	40.80	7.08	-71	-682	216	110.6	RPA	0	129	30456.072
08:27	3.97	4.38	40.80	7.08	608	315	221	119.5	RPA	0	121	30458.071
08:27	3.97	4.38	40.80	7.09	-595	339	221	12.8	RPA	0	145	30460.070
08:27	3.97	4.38	40.80	7.09	44	-650	218	119.5	RPA	0	153	30462.069
08:27	3.97	4.38	40.81	7.09	544	414	221	7.4	RPA	0	113	30464.068
08:27	3.97	4.38	40.81	7.09	-642	231	219	136.9	RPA	0	145	30466.067
08:27	3.97	4.38	40.81	7.10	160	-662	215	128.4	RPA	0	177	30468.066
08:27	3.98	4.38	40.81	7.10	484	500	221	101.2	RPA	0	81	30470.066
08:27	3.98	4.38	40.81	7.10	-670	1.6	217	23.0	RPA	0	145	30472.065
08:27	3.98	4.38	40.81	7.11	271	-623	213	137.0	ESA	0	15	30474.064
08:27	3.98	4.38	40.81	7.11	370	572	220	91.8	ESA	0	12	30476.063
08:27	3.98	4.38	40.82	7.11	-678	0	217	31.4	ESA	0	33	30478.062
08:28	3.98	4.38	40.82	7.11	373	-585	213	144.9	ESA	0	29	30480.061
08:28	3.98	4.38	40.82	7.12	267	625	221	82.5	ESA	0	23	30482.060
08:28	3.99	4.39	40.82	7.12	-666	-115	214	40.3	ESA	0	33	30484.059
08:28	3.99	4.39	40.82	7.12	463	-490	212	151.8	ESA	0	85	30486.058
08:28	3.99	4.39	40.82	7.13	155	666	219	73.1	ESA	0	45	30488.057
08:28	3.99	4.39	40.82	7.13	-654	-227	213	49.6	RPA	0	113	30490.056
08:28	3.99	4.39	40.83	7.13	539	-403	212	156.4	RPA	0	145	30492.055
08:28	3.99	4.39	40.83	7.13	40	675	217	63.8	RPA	0	113	30494.054
08:28	3.99	4.39	40.83	7.14	-584	-333	212	59.0	RPA	0	121	30496.053
08:28	3.99	4.39	40.83	7.14	593	-302	212	157.3	RPA	0	81	30498.052
08:28	4.00	4.39	40.83	7.14	-72	671	217	54.7	RPA	0	125	30500.051
08:28	4.00	4.39	40.83	7.15	-516	-427	209	58.5	RPA	0	117	30502.050
08:28	4.00	4.39	40.83	7.15	640	-195	211	154.2	RPA	0	177	30504.049
08:28	4.00	4.39	40.83	7.15	-185	806	216	45.4	RPA	0	137	30506.049
08:28	4.00	4.40	40.84	7.15	-434	-606	208	77.9	RPA	0	137	30508.048
08:28	4.00	4.40	40.84	7.16	663	-81	211	148.4	RPA	0	233	30510.047
08:28	4.00	4.40	40.84	7.16	-293	738	215	35.2	RPA	0	161	30512.046
08:28	4.00	4.40	40.84	7.16	-340	-575	207	87.3	RPA	0	101	30514.045
08:28	4.01	4.40	40.84	7.17	665	31	212	141.1	RPA	0	233	30516.044
08:28	4.01	4.40	40.84	7.17	-390	542	214	27.5	RPA	0	185	30518.043
08:28	4.01	4.40	40.84	7.17	-235	-622	206	93.7	RPA	0	125	30520.042
08:28	4.01	4.40	40.85	7.17	645	145	210	132.8	RPA	0	185	30522.041
08:28	4.01	4.40	40.85	7.18	-476	455	212	19.3	RPA	0	169	30524.040
08:28	4.01	4.40	40.85	7.18	-125	-651	206	106.0	RPA	0	113	30526.039
08:28	4.01	4.40	40.85	7.18	612	254	211	124.0	RPA	0	161	30528.038
08:28	4.02	4.40	40.85	7.19	-547	375	211	13.5	RPA	0	161	30530.037

D-42230
ISEE-1
11/29/77 - 11/30/77

DUMP OF TAPE X-397

INPUT TAPE X-397 ON MT2
DATA INPUT H9 NF 1 FL 1 1 1

DAY 333 year 77

FILE 1 RECORD 1 LENGTH 13590BYTES

(0)	44CB4000	00000000	00000000	14[illegible]85A8	805F42CE	E6F7045F	99D02643	F1E7CDA0	00000[illegible]D	BC0FE79F
(40)	244C2B66	F042F64D	31200000	00000000	000023F7	FF067000	00000010	00000000	24124402	02412440
(80)	202193C9	C2000000	00102291	0402C249	38402029	14082202	68804020	00000001	B4251060	7B291549
(120)	C2022938	82200000	00012000	00000000	00000000	00000000	00000000	04D74BE0	B1B29C02	4C94D41B
(160)	2B734D74	BE0B1B2B	7398A44D	5EF6D9B4	2C03F5C5	00000000	00000000	00000000	00000000	000042D9
(200)	6123F42D	798DDD00	00000020	00000002	00000000	20000000	02000000	00200000	00020000	00002000
(240)	00000200	00000020	00000002	00000000	20000000	02000000	00200000	00020000	00002000	00000200
(280)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(320)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000020	00000001
(360)	00000000	10000000	02000000	00000000	00020000	00001000	00000300	00000000	00000001	00000000
(400)	20000000	01000000	00000000	00010000	00001000	00000000	00000010	00000002	00000000	10000000
(440)	01000000	00100000	00010000	00003000	00000100	00000000	00000002	00000000	10000000	03000000
(480)	00100000	00000000	00003000	00000200	00001900	00000040	00000002	00000000	10000000	02000000
(520)	00100000	00010000	00001000	00000700	00000110	00000020	00000002	70000000	14000000	00700000
(560)	00050000	00001000	00000200	00000020	00000001	00000000	30000000	07000000	01A00000	001F0000
(600)	00010000	00001500	00000060	00000002	00000000	40000000	00000000	00100000	00020000	00001000
(640)	00001600	000000A0	00000003	00000000	20000000	04000000	00200000	00000000	00003000	00000100
(680)	00000090	00000010	00000001	C0000000	16000000	00300000	00040000	00004000	00000100	00000010
(720)	00000000	00000000	20000000	04000000	00700000	001D0000	00012000	00001800	00000090	00000005
(760)	00030000	00000000	00000000	00000000	00020000	00005000	00000080	00000006	00000000	2FFFFFFF
(800)	FEFFFFFF	FF8FFFFF	FFF4FFFF	FFFF1FFF	FFFFF2FF	FFFFFF4F	FFFFFFF9	00000000	00000000	06000000
(840)	00D00000	00110000	0000E000	00000700	0000000F	FFFFFFF7	FFFFFFFF	0FFFFFFF	EDFFFFFF	FEDFFFFF
(880)	FFF1FFFF	FFFF8000	00000100	000000A0	0000000E	00000000	F0000000	09000000	001FFFFF	FFF9FFFF
(920)	FFFF4FFF	FFFFF200	0000003F	FFFFFFFB	FFFFFFFF	5FFFFFFF	F4FFFFFF	FF5FFFFF	FFF9FFFF	FFFFD000
(960)	00000300	00000080	0000000C	00000000	E0000000	0D000000	00A00000	0002FFFF	FFFF7FFF	FFFFF1FF
(1000)	FFFFFEFF	FFFFFFF1	FFFFFFFF	7FFFFFFF	FE000000	00500000	000C0000	00010000	00001000	000000D0
(1040)	00000005	FFFFFFFF	CFFFFFFF	F4FFFFFF	FF1FFFFF	FFF3FFFF	FFFF6FFF	FFFFFBFF	FFFFFFCF	FFFFFFFA
(1080)	FFFFFFFF	AFFFFFFF	FAFFFFFF	FFAFFFFF	FFFAFFFF	FFFFCFFF	FFFFFDFF	FFFFFFCF	FFFFFFFC	FFFFFFFF
(1120)	9FFFFFFF	F8FFFFFF	FF8FFFFF	FFF8FFFF	FFFF8FFF	FFFFF8FF	FFFFFF9F	FFFFFFFA	FFFFFFFF	BFFFFFFF
(1160)	FBFFFFFF	FFBFFFFF	FFFAFFFF	FFFF8FFF	FFFFF6FF	FFFFFF4F	FFFFFFF3	FFFFFFFF	2FFFFFFF	F3FFFFFF
(1200)	FF2FFFFF	FFF1FFFF	FFFF0FFF	FFFFF044	4667D144	44939743	43F5757F	E43E6B54	4E43CB53	7274367E
(1240)	DD0042F8	7F859427	09927742	E735E8A4	362F6AF0	43CC995E	643E343A	5343FC86	203444BB	21AC444E
(1280)	E184C444	1B129243	EB8EECD4	3CF4AC99	43607686	942EA2F5	7C42C490	1E742FBD	7347436E	B912043D
(1320)	0F11B943	EDEA7F94	44252C37	4448248F	94442C2C	5B43ECB7	C8343D6F	865943C7	74740437	94A5A344
(1360)	CB400000	00000001	00000014	D485A8C0	5742CEE6	F7045F99	D5A743F1	E7BB4000	00004DBC	0FE724E4
(1400)	471EEB08	42F64B4C	60000000	00000000	0023F7FF	06700000	00001000	00000024	12440202	41244020
(1440)	2193C9C2	00000000	10229104	02024938	40202914	08220268	80402000	000001B4	251060E3	00000000
(1480)	30000000	01000000	00100000	00000000	00000000	00000000	00000004	D74BB6DE	B29C08BD	F4D41AFA
(1520)	254D74BB	6DEB2B73	CAD14D5E	F056742C	03CC0700	00000000	00000000	00000000	00000000	0042D961
(1560)	4FC42D77	8C810000	00003000	00000300	00000030	00000003	00000000	30000000	03000000	00300000
(1600)	00030000	00003000	00000300	00000030	00000003	00000000	30000000	03000000	00300000	00030000
(1640)	00004000	00000400	00000040	00000004	00000000	40000000	04000000	00400000	00040000	00004000
(1680)	00000400	00000040	00000004	00000000	40000000	04000000	00400000	00040000	00003000	00000100
(1720)	00000010	00000000	00000000	20000000	01000000	00200000	00020000	00001000	00000000	00000000
(1760)	00000001	00000000	30000000	01000000	00100000	00010000	00002000	00000100	00000020	00000003
(1800)	00000000	40000000	00000000	00100000	00000000	00003000	00000300	00000000	00000000	00000000
(1840)	10000000	01000000	00200000	00020000	01490000	006CB000	000A7700	00005530	0000008D	00000014
(1880)	90000000	BC000000	0EB00000	008D0000	0002F000	00005E00	000011A0	00000149	0000004C	6000000D
(1920)	67000000	5B100000	02920000	00234000	00011A00	000008D0	0000002F	0000000E	B0000001	49000000
(1960)	14900000	02C10000	00553000	000A7700	00007E50	00000149	00000023	40000001	1A000000	08000000
(2000)	008D0000	003DB000	00078700	000060F0	00000178	00000008	D0000001	A7000000	08D00000	005E0000
(2040)	0005E000	00014900	00000EB0	0000011A	00000020	50000006	6D000000	3DB00000	02630000	00149000
(2080)	00011A00	00000BC0	0000008D	0000000B	C0000000	8D000000	05E00000	02630000	0031F000	00072900
(2120)	00006CB0	000003DB	00000008	D0000000	EB000000	1490FFFF	FFFF1FFF	FFFFF2FF	FFFFFF6F	FFFFFFFD
(2160)	00020000	30000000	08000000	00900000	00090000	00007000	00000400	0000000F	FFFFFFFA	FFFFFFFF
(2200)	5FFFFFFF	F3FFFFFF	FF4FFFFF	FFF7FFFF	FFFFAFFF	FFFFFE00	00000030	00000008	00000000	C0000000
(2240)	00000000	00A00000	0003FFFF	FFFFCFFF	FFFFF5FF	FFFFFF0F	FFFFFFEF	FFFFFFFF	3FFFFFFF	FA000000
(2280)	00300000	000B0000	00003000	00000900	000000E0	00000011	00000001	00000000	0A000000	00500000

(2320)	0000FFFF	FFFF8FFF	FFFFF8FF	FFFFFF6F	FFFFFFF7	FFFFFFFF	B0000000	01000000	00700000	000A0000
(2360)	0000C000	00000D00	000000E0	0000000C	00000000	70000000	00FFFFFF	FF8FFFFF	FFF4FFFF	FFFF3FFF
(2400)	FFFFF6FF	FFFFFFD0	00000005	00000000	C0000000	12000000	01300000	0010FFFF	FFFEFFFF	FFFFEEFF
(2440)	FFFFFECF	FFFFFFEC	FFFFFFFE	BFFFFFFF	EBFFFFFF	FEDFFFFF	FFEEFFFF	FFFEFFFF	FFFFF0FF	FFFFFF1F
(2480)	FFFFFFF2	FFFFFFFF	2FFFFFFF	F2FFFFFF	FF3FFFFF	FFF2FFFF	FFFF2FFF	FFFFF2FF	FFFFFF2F	FFFFFFF2
(2520)	FFFFFFFF	2FFFFFFF	F2FFFFFF	FF3FFFFF	FFF3FFFF	FFFF3FFF	FFFFF3FF	FFFFFF3F	FFFFFFF3	FFFFFFFF
(2560)	2FFFFFFF	F3FFFFFF	FF3FFFFF	FFF3436A	AF8E9436	CCBC2F43	C03E66D4	3CE54D97	43D9EF2B	743E9D16
(2600)	BA43F2CE	62943F98	8EAF43F8	FD6F843F	2D069643	E74A3884	3D54C48D	43C09A1B	B436A8FB	BB43635C
(2640)	3B643761	46F343C3	421FA43C	EC692743	D9D1FD34	3E9CAEB5	43FBA825	74444AE3	BD4444B6	10943F35
(2680)	CB0343DF	87900430	6F685643	61FB68B4	351334D2	4363BB6E	343C247E	ED43D5F6	F4243EB9	787A44CB
(2720)	40000000	00000200	000014D4	85A9004F	42CEE6F7	045F99D5	A743F1E7	BB400000	004DBC0F	E724E43D
(2760)	E37C4042	F64B4C60	00000000	00000000	23F7FF06	70000000	00100000	00002412	44020241	24402021
(2800)	93C9C200	00000010	22910402	02493840	20291408	22026880	40200000	0001B425	10614B22	93882202
(2840)	29388220	22938822	00000000	01000000	00000000	00000000	000014D7	4B8D0BB2	9C0F2F54	D41AC8D6
(2880)	4D74B8D0	BB2B73FC	FD4D5EE9	D3242C03	A2490000	00000000	00000000	00000000	00000000	42D9617B
(2920)	A42D758B	26000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(2960)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(3000)	00500000	00050000	00005000	00000500	00000050	00000005	00000000	50000000	05000000	00500000
(3040)	00050000	00005000	00000500	00000050	00000005	00000000	50000000	05000000	00100000	00000000
(3080)	00001000	00000300	00000010	00000002	00000000	20000000	01000000	00100000	00010000	00000000
(3120)	00000000	00000020	00000001	00000000	20000000	01000000	00100000	00030000	00004000	00000000
(3160)	00000000	00000000	00000000	10000000	00000000	00400000	00010000	00000000	00000100	00000020
(3200)	00000005	00000000	20000000	01000001	1A000000	02F00000	011A0000	00178000	00026300	00004C60
(3240)	00000787	00000072	90000004	C6000000	1D600000	00EB0000	000EB000	00005E00	000002F0	0000005E
(3280)	00000011	A0000002	63000000	49700000	08FF0000	006CB000	0002F000	000008D0	000000EB	00000017
(3320)	80000001	1A000000	05E00000	00BC0000	001D6000	0001D600	00002F00	000004C6	00000058	20000000
(3360)	00000000	03C00000	008D0000	001A7000	0001A700	00002F00	00000553	0000004F	50000004	0A000000
(3400)	1A700000	00BC0000	000BC000	0000BC00	000005E0	000000BC	00000011	A0000000	BC000000	20500000
(3440)	04390000	0066D000	0005E000	00002920	0000008D	00000014	90000001	1A000000	02F00000	00000000
(3480)	00149000	00014900	00002F00	000001A7	00000049	70000000	01000000	00110000	0000E000	00000700
(3520)	0000000F	FFFFFFF7	FFFFFFFF	2FFFFFFF	F0FFFFFF	FF3FFFFF	FFF90000	00001000	00000700	000000D0
(3560)	0000000D	00000000	A0000000	04FFFFFF	FFEFFFFF	FFF8FFFF	FFFF3FFF	FFFFF0FF	FFFFFF1F	FFFFFFF6
(3600)	FFFFFFFF	E0000000	05000000	00B00000	000D0000	0000C000	00000700	0000001F	FFFFFFFA	FFFFFFFF
(3640)	5FFFFFFF	F3000000	00700000	0000FFFF	FFFF7FFF	FFFFF2FF	FFFFFF0F	FFFFFFF2	FFFFFFFF	90000000
(3680)	01000000	00700000	000D0000	0000D000	00000C00	00000060	00000000	FFFFFFFF	7FFFFFFF	F3FFFFFF
(3720)	FF2FFFFF	FFF4FFFF	FFFF8FFF	FFFFFE00	00000050	0000000C	00000000	E0000000	0D000000	00900000
(3760)	0003FFFF	FFFFCFFF	FFFFF5FF	FFFFFF3F	FFFFFFF4	FFFFFFFF	A0000000	00FFFFFF	FF4FFFFF	FFF4FFFF
(3800)	FFFF5FFF	FFFFF5FF	FFFFFF6F	FFFFFFF5	FFFFFFFF	5FFFFFFF	F5FFFFFF	FF5FFFFF	FFF4FFFF	FFFF4FFF
(3840)	FFFFF3FF	FFFFFF2F	FFFFFFF1	FFFFFFFF	0FFFFFFF	F0FFFFFF	FF2FFFFF	FFF3FFFF	FFFF5FFF	FFFFF5FF
(3880)	FFFFFF5F	FFFFFFF5	FFFFFFF5	6FFFFFFF	F7FFFFFF	FF8FFFFF	FFF8FFFF	FFFF7FFF	FFFFF6FF	FFFFFF7F
(3920)	FFFFFFF7	FFFFFFFF	6FFFFFFF	F64442B4	16A4449F	A1314448	4EA0A444	0AD45643	EB0B4754	3D091B0A
(3960)	436FDDD8	04351224	95435543	F19437BA	842E43D3	C492D43E	75DE7343	FF8DE544	443B7D54	4441EB17
(4000)	B43F3FA2	6D43E65E	3B843D21	47844378	24CAD435	6A203243	4E07E9C4	367557CD	43CB54EA	C43E012C
(4040)	A243FA66	DAE4447D	1C91444B	FD58D444	285F0443	EEC30DA4	3D680C3F	4376DBB0	743597D0	E944CB40
(4080)	00000000	00030000	0014D485	A9404942	CEE6F704	5F9B4CE7	43F1E7FC	A0000000	4DBC0FE2	21E44D02
(4120)	489C42F6	4B4C6000	00000F00	00000023	F7FF0670	00000000	10000000	00241244	02024124	40202193
(4160)	C9C20000	00001022	91040202	49384020	29140822	02688040	20000000	01B42510	61B42713	CA44D221
(4200)	24A62000	00000310	00000000	00000000	00000000	00000000	00F4D74B	6338B29C	15A0C4D4	1A9788 4D
(4240)	74B6338B	2B742F29	4D5EE34F	E42C0378	8C000000	00000000	00000000	00000000	00000042	D961A774
(4280)	2D7389CA	00000000	60000000	06000000	00600000	00060000	00006000	00000600	00000060	00000006
(4320)	00000000	60000000	06000000	00600000	00060000	00006000	00000600	00000060	00000006	00000000
(4360)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(4400)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	01000000
(4440)	00100000	00020000	00003000	00000000	00000020	00000002	00000000	00000000	01000000	00200000
(4480)	00020000	00001000	00000200	00000000	00000000	00000000	20000000	01000000	00000000	00000000
(4520)	00002000	00000100	00000010	00000000	00000000	20000000	00000000	00100000	00000000	00001000
(4560)	00000100	00000020	00000003	00000468	00000023	40000002	05000000	02F00000	008D0000	0005E000
(4600)	0000BC00	000002F0	0000005E	0000002F	00000005	24300000	AD500000	0A190000	002F0000	0000EB00
(4640)	000005E0	00000000	00000002	F0000000	5E000000	05E00000	011A0000	00205000	00055300	00007290
(4680)	000006CB	0000005B	10000002	34000000	0EB00000	005E0000	000EB000	00002F00	000002F0	00000787
(4720)	0000001A	70000003	1F000000	08D00000	00EB0000	0005E000	00008D00	000005E0	00000234	00000011
(4760)	A0000002	05000000	66D00000	07290000	0040A000	00017800	00000BC0	0000008D	00000005	E0000000
(4800)	5E000000	05E00000	008D0000	0008D000	0001A700	00005530	000004F5	00000040	A0000003	4E000000
(4840)	03C00000	00EB0000	00000000	00005E00	000002F0	FFFFFFFF	6FFFFFFF	FB000000	00300000	000900 00
(4880)	0000E000	00000F00	000000D0	00000007	00000000	0FFFFFFF	F9FFFFFF	FF4FFFFF	FFF2FFFF	FFFF4FFF
(4920)	FFFFF900	00000000	00000004	00000000	70000000	08000000	00600000	0002FFFF	FFFFCFFF	FFFFFBFF

```
(  7600)  20000000  01FFFFFF  FFDFFFFF  FFF9FFFF  FFFF5FFF  FFFFF4FF  FFFFFF80  00000000  00000000  20000000
(  7640)  04000000  00300000  00020000  00000FFF  FFFFFEFF  FFFFFFCF  FFFFFFF9  FFFFFFFF  7FFFFFFF  F5FFFFFF
(  7680)  FF6FFFFF  FFFA0000  00000000  00000500  00000090  0000000A  00000000  40000000  00FFFFFF  FFCFFFFF
(  7720)  FFFAFFFF  FFFFAFFF  FFFFF800  00000020  00000000  FFFFFFFF  CFFFFFFF  F8FFFFFF  FF7FFFFF  FFF9FFFF
(  7760)  FFFFD000  00000200  00000070  00000009  00000000  80000000  03000000  000FFFFF  FFFCFFFF  FFFF8FFF
(  7800)  FFFFFAFF  FFFFFF9F  FFFFFFFA  FFFFFFFF  C0000000  00000000  00300000  00070000  00008000  00000700
(  7840)  0000003F  FFFFFFFC  FFFFFFFF  7FFFFFFF  F6FFFFFF  FF8FFFFF  FFFD0000  00000000  000001FF  FFFFFF1F
(  7880)  FFFFFFEE  FFFFFFFE  DFFFFFFF  ECFFFFFF  FEDFFFFF  FFEDFFFF  FFFECFFF  FFFFEBFF  FFFFFEBF  FFFFFFEB
(  7920)  FFFFFFFE  EFFFFFFF  F3FFFFFF  FF6FFFFF  FFF7FFFF  FFFFAFFF  FFFFFAFF  FFFFFFAF  FFFFFFF9  FFFFFFFF
(  7960)  7FFFFFFF  F5FFFFFF  FF3FFFFF  FFF2FFFF  FFFF2FFF  FFFFF2FF  FFFFFF2F  FFFFFFF1  FFFFFFFF  0FFFFFFF
(  8000)  F0FFFFFF  FF0FFFFF  FFEFFFFF  FFFF0FFF  FFFFF243  F2752F24  3E890BAD  43E7AFF6  143E7380  9F43DFBC
(  8040)  54D43D30  8F4443C6  38C2643C  1FF00443  C7D6A764  3D7BF01F  43DD4090  A43E8DFD  7DFD7DFD  7DFD7DFD
(  8080)  7DFD7DFD  7DFD7DFD  7DFD7DFD  7DFD7DFD  7DFD7DFD  7DFD7D

          FILE    INPUT      DATA RECORDS      MAX.          READ ERROR SUMMARY          INPUT RETRIES
                  RECS.        INPUT           SIZE       PERM  ZERO B   SHORT  UNDEF.  #RECS.  TOTAL#
            1     2091         2091            8103        0      0       0      0       0       0

EOJ         DUMP STOPPED AFTER FILE   1          # OF PERMANENT READ ERRORS  0

START TIME 11/13/85  10:12:24        STOP TIME 11/13/85  10:13:36

$$
$EXEC TPDUMP BD
$
```

PRINTED IN U.S.A.

77-102A-12F
Summary: R-Files (Format 4)

77-102A-12F SPMS-00117

ISEE 1 SUMMARY: R-FILES (FORMAT4)

THIS DATA SET CONSISTED OF 13 TAPES. THE TAPES WERE 9-TRACK, 1600 BPI, WRITEN IN BINARY FORMAT. THESE TAPES WERE CREATED ON AN IBM COMPUTER. THE TIME SPANS WERE UNABLE TO BE VERIFIED

DR#	DS#	DD#	FILES	TIME SPAN
		DD 076881	1517-1543	SOFTWARE TAPE
		DD 076882	1544-1573	SOFTWARE TAPE
		DD 076883	1574-1627	12/30/77 - 02/22/78
		DD 076884	1628-1681	02/23/78 - 04/06/78
		DD 076885	1682-1711	04/07/78 - 04/30/78
		DD 076886	1712-1723	05/01/78 - 05/10/78
		DD 076887	1724-1753	05/11/78 - 12/29/78
		DD 076888	1754-1789	/ / - / /
		DD 076889	1790-1840	12/30/78 - 02/09/79
		DD 076890	1841-1882	02/10/79 - 03/16/79
		DD 076891	1883-1912	03/17/79 - 06/16/79
		DD 076892	1920-1991	06/20/79 - 10/29/79
		DD 076893	2001-2056	10/30/79 - 12/30/79

ISEE 1

77-102A-12F

SUMMARY:R-FILES (FORMAT 4)

THIS DATASET CONSISTS OF 13, 9-TRACK. 1600 BPI, BINARY MAGNETIC TAPES THE TAPES WERE CREATED ON AN IBM COMPUTER. THE D AND C NUMBERS ALONG WITH THE TIME SPANS ARE AS FOLLOWS:

D#	C#	TIME SPANS
D-76881	C-28870	
D-76882	C-28871	
D-76883	C-28872	12/30/77-02/22/78
D-76884	C-28873	02/23/78-04/06/78
D-76885	C-28874	04/07/78-04/30/78
D-76886	C-28875	05/01/78-05/10/78
D-76887	C-28876	05/11/78-12/29/78
D-76888(THIS IS A CAPSTAN TAPE AND HAS TO BE REPLACED)		
D-76889	C-28777	12/30/78-02/09/79
D-76890	C-28778	02/10/79-03/16/79
D-76891	C-28879	03/17/79-06/19/79
D-76892	C-28880	06/20/79-10/29/79
D-76893	C-28881	10/29/79-12/30/79

ISEE 1

77-102A-12F

SUMMARY:R-FILES (FORMAT 4)

THIS DATASET CONSISTS OF 13, 9-TRACK, 1600 BPI, BINARY MAGNETIC TAPES. THE TAPES WERE CREATED ON AN CDC COMPUTER. THE D AND C NUMBERS ALONG WITH THE TIME SPANS ARE AS FOLLOWS:

D#	C#	FILES	TIME SPANS
D076881	C028870	27	PROGRAM TAPE
D076882	C028871	30	SOFTWARE TAPE
D076883	C028872	54	12/30/77 - 01/22/78
D076884	C028873	54	02/23/78 - 04/06/78
D076885	C028874	30	04/07/78 - 04/30/78
D076886	C028875	12	05/01/78 - 05/10/78
D076887	C028876	30	05/11/78 - 12/29/78
D076888	C033086	36	
D076889	C028777	51	12/30/78 - 02/09/79
D076890	C028778	42	02/10/79 - 03/16/79
D076891	C028879	36	03/17/79 - 06/19/79
D076892	C028880	81	06/20/79 - 10/29/79
D076893	C028881	57	10/29/79 - 12/30/79

need C# for
ISEE 1
77-102A-12F
D076888

ISEE.cat

C-033086

FULL DATASET LISTING OF 77-102A-12F

ISEE 1 SUMMARY: R-FILES (FORMAT4)

SYSTEM: MODE: BIN

MEDIA #	COPY #	RECEIVED	DENS	TR	FILES	LOCATION	TIME SPAN
DD076881	DC028870	10/22/1987	6250	9	36	044G06	
DD076882	DC028871	10/22/1987	6250	9	30	044G07	
DD076883	DC028872	10/22/1987	6250	9	54	044G08	12/30/1977 02/22/1978
DD076884	DC028873	10/22/1987	6250	9	54	044G09	02/23/1978 04/06/1978
DD076885	DC028874	10/22/1987	6250	9	30	044G10	04/07/1978 04/30/1978
DD076886	DC028875	10/22/1987	6250	9	12	044G11	05/01/1978 05/10/1978
DD076887	DC028876	10/22/1987	6250	9	30	044G12	05/11/1978 12/29/1978
DD076888		10/22/1987	6250	9	0	044G13	tape in library
DD076889	DC028877	10/22/1987	6250	9	51	044G14	12/30/1978 02/09/1979
DD076890	DC028878	10/22/1987	6250	9	42	044G15	02/10/1979 03/16/1979
DD076891	DC028879	10/22/1987	6250	9	36	044G16	03/17/1979 06/16/1979
DD076892	DC028880	10/22/1987	6250	9	19	044G17	06/20/1979 10/29/1979
DD076893	DC028881	10/22/1987	6250	9	57	044G18	10/30/1979 12/30/1979
DC028870	DD076881	02/11/1992	38000	9	36	018C35	
DC028871	DD076882	02/11/1992	38000	9	30	018C36	tape not in Library
DC028872	DD076883	02/11/1992	38000	9	54	018C37	12/30/1977 02/22/1978
DC028873	DD076884	02/11/1992	38000	9	54	018C38	02/23/1978 04/06/1978
DC028874	DD076885	02/11/1992	38000	9	30	018C39	04/07/1978 04/30/1978
DC028875	DD076886	02/11/1992	38000	9	12	018C40	05/01/1978 05/10/1978
DC028876	DD076887	02/11/1992	38000	9	30	018C41	05/11/1978 12/29/1978
DC028877	DD076889	02/11/1992	38000	9	51	018C42	12/30/1978 02/09/1979
DC028878	DD076890	02/11/1992	38000	9	42	018C43	02/10/1979 03/16/1979
DC028879	DD076891	02/11/1992	38000	9	36	018C44	03/17/1979 06/16/1979
DC028880	DD076892	02/11/1992	38000	9	19	018D01	06/20/1979 10/29/1979
DC028881	DD076893	02/11/1992	38000	9	57	018D02	10/30/1979 12/30/1979
DC033086		08/31/1999	38000	18	0	104/050	

FULL DATASET LISTING OF 77-102A-12F

ISEE 1 SUMMARY: R-FILES (FORMAT4)

SYSTEM: MODE: BIN

MEDIA #	COPY #	RECEIVED	DENS	TR	FILES	LOCATION	TIME SPAN	
DD076881	DC028870	10/22/1987	6250	9	36	044G06		
DD076882	DC028871	10/22/1987	6250	9	30	044G07		
DD076883	DC028872	10/22/1987	6250	9	54	044G08	12/30/1977	02/22/1978
DD076884	DC028873	10/22/1987	6250	9	54	044G09	02/23/1978	04/06/1978
DD076885	DC028874	10/22/1987	6250	9	30	044G10	04/07/1978	04/30/1978
DD076886	DC028875	10/22/1987	6250	9	12	044G11	05/01/1978	05/10/1978
DD076887	DC028876	10/22/1987	6250	9	30	044G12	05/11/1978	12/29/1978
DD076888		10/22/1987	6250	9	0	044G13		
DD076889	DC028877	10/22/1987	6250	9	51	044G14	12/30/1978	02/09/1979
DD076890	DC028878	10/22/1987	6250	9	42	044G15	02/10/1979	03/16/1979
DD076891	DC028879	10/22/1987	6250	9	36	044G16	03/17/1979	06/16/1979
DD076892	DC028880	10/22/1987	6250	9	19	044G17	06/20/1979	10/29/1979
DD076893	DC028881	10/22/1987	6250	9	57	044G18	10/30/1979	12/30/1979
DC028870	DD076881	02/11/1992	38000	9	36	018C35		
DC028871	DD076882	02/11/1992	38000	9	30	018C36		
DC028872	DD076883	02/11/1992	38000	9	54	018C37	12/30/1977	02/22/1978
DC028873	DD076884	02/11/1992	38000	9	54	018C38	02/23/1978	04/06/1978
DC028874	DD076885	02/11/1992	38000	9	30	018C39	04/07/1978	04/30/1978
DC028875	DD076886	02/11/1992	38000	9	12	018C40	05/01/1978	05/10/1978
DC028876	DD076887	02/11/1992	38000	9	30	018C41	05/11/1978	12/29/1978
DC028877	DD076889	02/11/1992	38000	9	51	018C42	12/30/1978	02/09/1979
DC028878	DD076890	02/11/1992	38000	9	42	018C43	02/10/1979	03/16/1979
DC028879	DD076891	02/11/1992	38000	9	36	018C44	03/17/1979	06/16/1979
DC028880	DD076892	02/11/1992	38000	9	19	018D01	06/20/1979	10/29/1979
DC028881	DD076893	02/11/1992	38000	9	57	018D02	10/30/1979	12/30/1979
DC033086		08/31/1999	38000	18	0	104/050		

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$NOP
$NOP
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$NOP   ************ KM2!16 ************
$EXE TPLIST ES

INPUT PARAMETERS ARE:  AS AL 1

 TAPE NO.   1                FILE NO.   1
 RECORD   1                  LENGTH   4 96
2 5   sG h8E  =E   A   @   A        A  B   E  iF   E   BFJ B r B*, B  &D  &D" &D  &C  ?F ( F   F
B  B?g  @a  D   L   Cn@ C   D   B   A   A  A@   ?   A  D@   ?   DX>^B   @             ||@   =  t
  t||@   J   C   A  /A> rF, $A y C   B 3?          E c>J  F k C   C   E6 3F   E  SF         5A ,z @
 EA   D.w C   A  yE  WB   D   L D C   Cr 1D Z B  NA K A . @@  @   A . A'ko@?  D  LB,  @
  ||@8 +>       +   ||@8 'D   Bo@ ALc A   E\ BA ocC4* B 7@   a    D  >J  [G ' C   C   Cb  F   E^f)F
          F? ?h>BAx  DDs C   A  yE  rB   D   L   C^_ C   *DB  B C-AtB A [ @  ?@4  A [ @)%3@:} DV  dB
 @                ||@P  >             ||@P "D r C   A  _A:P F  <A -{C ) B 5          \Ex >J  )G   C   C  'E
 'FF  E  <F            E v 16  BA|  DNu C   A  yE  fB  6C   B   B # E # BEZ C   BEZ BEZ BEZ CEZ Bh  B
h  B  CC # BEZ B   BEZ C   CEZ BEZjB * BEZ     CB # B   B@ ^B  `C   C   C s      B4
                                                    Bh              B
                  CEZ                              BEZ    [Ch          BEZ          BEZ AEZ Ch
                                               B   C7U>C&B CEZ C-A B #-C2  E   B  sB  gC  CB #bC   B  -C2  B
EZ6C   A # CEZ Bh  C   B *-C2 CB #TC 6FC   hCz  A  `C   CV_CC[ 8C j C & DEZ=C   Bh  CEZ B E C-A B  0
C   B  $C   B   C   BEZ C   BEZ6C   B   C        sB   Bx  C || BEZaC   CEZOCD  B   C   C  VC1 YC{XBC~
 CEZ C  6C   CEZ[Bh  Bh  B  $C   BEZ@C{  Bh  CEZ BEZ$C       -C2  B < B        C?  B_ @C{  EEZTC 6cC
 zC s C p C : C f[C&  C   C%- CEZ<C * B # C ( E   CZ /E   C ( BEZ CEZ A # BEZ BEZFC       $C  /B   E
 e     jC * B&B CEZ A # C    CEZ C G B oNC    C  ^Ch  C    C$
                BEZ               [Bh                                                               BEZ
IC <      CEZ     CEZ     sC        6C        CEZ BEZsC       BEZ BEZ BEZ      C (      CEZ      C
       CE       C   Cs (C6N EEZoCq| B  eC   B  <C * C  GC_  C  LC   E  (C6N[Bh  CEZ BEZpC o B  EC   E
  :CXD Bh  C   CEZ7C B^B   C +IC   C   C 0 Ca  C   Bx [Bh  B  [3h 6C  ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
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 TAPE NO.   1                FILE NO.   1
 RECORD   2                  LENGTH   4 96
2 5    B  3CU  CEZIC < B    C 4 B < BEZ CEZ B7U BEZ@C{  B # C   -C2 OC7U BEZ CEZ6C  [C    B  sC    CB|
C L      D    Cn mC    B    B    AEZ*C   B  CC # B   TC 6[Bh   C 4 B   B          BZo CEZ C 8      C@  C 4 Bx
 Eh  B  )C  nCF< B 6 C + DN#^Cj       vC4
                          BEZ                          EC                   Ch  C f E + Cey B   C_  BEZ C
   BM  B   BXD CEZ B ( B$  BZ  C   BXD C?  BK  B O B   B  :BXD B~  B   C    B    B Z CW  C   BA  C iRp
C o C1  B * 5   BEZ BX{ B   B-  B    C M B    Bn  BXD B  "B1  B   B1  C    B    B }SB~  CH  B.  B  LB
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ISEE-1
77-102A+12F
capstand tape
D 76888

TAPE NO. 1 FILE NO. 1
RECORD 3 LENGTH 4 96

Orgina/ Vax back-up
86248-86254 (P-10)
86461-86466 (D-11

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TAPE NO.   1              FILE NO.   1
RECORD   4                LENGTH   4 96
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TAPE NO.   1              FILE NO.   1
RECORD   5                LENGTH   4 96
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C <3C mjC { D E D=,)D C Cn 9C C |||C ./C WC ICb 7C B? #C$ B Bd A . B ` B YC B(
C F Bi\>C H B CC" LC &C C! B C|)
E + C Db Cb D Dhk\C C
\D C {DE CE 9D Do D C \D Dhk'E.V C C C \D D C Dy Cr E DD D GD
CE C
'E.V D {EE C D
C EE D EF C 'D.VUD Db CW C j C C CD D
CX||9D CW \C D{r D Co CE Chk|C (CW D CJ Dr 1D ? DLP/D D D D D 'E.V C c CE
C.V|C (UC \C C C C @ C CC 9 C C \D C + C CC 9 D C RCA5 C C C! C C Cr PD z
CD D D 3 Cd D.V C QD + C.V\C 'C.V\C {CE C C CE _C C {CE CW fC|| C IC E%C%
C C CJ C a CK=,Dr# Ee(KD # Cr D)aC D.V C Cb C C Cs7 C C \D D D \C D D
r C @ C VC VD @C D D oC C = C oDr aD e6D d Dy9 D 3 C
C \C
C fD|| 'E.V E.V D D + 'E.V C D \C \C D D C.
V <EC mE E5 "D} C C C $ C D B C C Dhk C% Chk C j\C C C C C
Do \C C + C C {CE C Cb C Cr D C6b C *Dw D V7DB RCA5^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
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TAPE NO. 1 FILE NO. 1
RECORD 6 LENGTH 4 96

2 5 C cC C C + C C E'D.V CUd C C fC|| C D.V CH C C Db C CW CH C C.V C{r
C C D KD ? C D+vLD D C j9C C C & C Cb C CJ C C \C cC C' 'D.V C z
>C; C RCA5 CE C C C# C D fDn C{G =D ,
\D C sD|||| 'D.V B B | B
C B : C B`] B |OB C v B C B | B 4 Bn C v B4 C' YB cB gB C v B k B1Y BZc B " Bo
B B (D PCV Cc BLiVC B B1Y Bf C B ;C j B w BF |B (C vsB vDC B B B! C B TsB v
BEv B& B B B 5C MC B X B$6MC WC"o
@E | C D . D ! D% D e D
cHD ||| D t D D C iDx C fDR .D agD D 4 Dx fD cDE D C C `D Co D D 5 Dn CrE Dm +
D z
D D 6 D . C < D C D9 C D C
||| C * C C+i Cqz CR C Dn OD D C ?D Y C& dD ?D8; C C CI TDX. Dn C q D C D6 v
C r7C CR $C C C e C t C HD CqMiCu C z LC $C C&U C a Cx fC DF) D C Cn||jC [C C +
iC.f C&LyC| CD C6J C vC r"Ck C% jC $ C \C LC tFC + C * CcM C+ibC fCR VC C&UfC D 56Cc
C{ C C jCD Cak C \C C1 C&U,C C (D% C C (C D CX D9 C C C D CK8iD
x C) C C Y Dn C ' D Ch Cy C |aD C Q D D C Q C1 gD C C
=EjF E ! D D 2EEZ 1E } D .E a D N D ` D E
D IDo EX. D Fx (D% TC(C r D esC% CS Ct gC9 cD C C * C } Cu hC CR C
b Cn 6C CE4 CEh Cgo C @D y Cjl D # C Cpd C1 D C SD! #D C ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
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TAPE NO. 1 FILE NO. 1
RECORD 7 LENGTH 4 96

TAPE NO. 1 FILE NO. 1
RECORD 8 LENGTH 4 96

C+ C fC|]C C LCY FC J CR_fC TNC ‖ C, [D@⊢ C C? D" C j Fs }[!G (E |D'{
:D D D c D % Df D \DN D& Do #D D v = 5) x m=D
OC5 B f C B B B B RgBu@ B B C B 8 B~]B6 C stBk B VB] B aB 1 Bq BS BA B2
B VC >C B} C C5C 1 C C C] @C< B!@ BSR BJ BP;GC ç C , B (B C|& B C C B B< tBk Bpx
B C B Z B |B tICG B) B 9CA mC B 2SC "C
F)GJ }a= E ! E
v2aE Dvv DT D "D4 E T E E 9D RD M CLD iD \D D Z D v Cx C WD C E? (D"> CX2 C E
D .DB
E E E E 8
E / D E? E HE lE FJ E ES Ewy E %D hD
D+ {Es #D 4"D)8D) 'E ` D D C D Cp C $ C H'E_Z C@- C D C^6 D : D f CbF D D nDS R
E7 F 7 E ‖E 6 E D (D` fDW8 D; D CwQ<D % C QD*94D B C Cx \C Cπ5GCS+ C < D C C p C)
C1] D C~ C9; C [o MD} E A F E, /EN# D DP 2[~ED 8 D#9<DWU D C p C D D C UC' CH \C
C C C D C9 C C) Cg CS ~D~ CS CS] 1'D 7¬E . F&c F #E E D D ~ D 8] &]C { D
-,FD`daD cD)D 8 Cd^ C, Cf C< D * D^ _D+# D 'gC g D- C{ C 5 C C#I D D CD N
Euy E <F v E Eb D E 8 E c D u Dx F E
b D ~ E |E2] D D F !Et OE F 7 E W&E 6]g Do D}# C CU GE`B D oC) J C GD
*9 D C C D \ C QC C D u7Di D v DC$ C E CT DD jD D 6E ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
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TAPE NO. 1 FILE NO. 1
RECORD 9 LENGTH 4 96

2058 C E A FAagE D H D L|D->9Dr C /Df |D D B%D S CZ cD C G.C M D6" C C &C ^qC D
D Cd C' C Cp ~D~ D CRc6E DT E F,Y E P DS Dtw DW /C C DDS DE{ D fFD C D t CcI
C CLE C C _C $ C UC <D C o C T C C Dd 3E D p Di C H G 'E DE QD}
J \D D \D \Ds D \ Dp Do \D]Dt D cD C D
E <D /D ttC@ C1 C F CP :C C C B QCC 0qCw Bu B ~ B Bh2 B{ oB* ByH B B B B 0
B B B BZ B. +CQ? B D]E Cm" C U C C4‖QC CE)SC k C C B B-L B B Ba B 0C
B B |8CC B B B C B C9 C C * Eo kC`g C
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TAPE NO. 1 FILE NO. 1
RECORD 1 LENGTH 4 96
2 5

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 TAPE NO.    1              FILE NO.    1
 RECORD   11                LENGTH   4 96
2 5
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 TAPE NO.    1              FILE NO.    1
 RECORD   12                LENGTH   4 96
2 5
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TAPE NO. 1 FILE NO. 1
RECORD 13 LENGTH 4 96
2 5

TAPE NO. 1 FILE NO. 1
RECORD 14 LENGTH 4 96

TAPE NO. 1 FILE NO. 1
RECORD 15 LENGTH 4 96

TAPE NO. 1 FILE NO. 1
RECORD 16 LENGTH 4 96

TAPE NO. 1 FILE NO. 1
RECORD 17 LENGTH 4 96

TAPE NO. 1 FILE NO. 1
RECORD 18 LENGTH 4 96

B B B B B>N BY B" B B] C / B B B B B B B B B B B B B B
B B B B B B B B B E>N BY B" B B\ C
E B B
B B B B B B B B B B B B B B B B B B B B B B B B B B
B BAN BT B! B B] B k C B B B B B B B B B B B B B B B B B
B B B B B B B B BAN BW B# B B\ B k Cb
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TAPE NO. 1 FILE NO. 1
RECORD 19 LENGTH 4 96

2:5: B B(; B BE BE B Bi B8c B B 8 B 8 B B N B B E Be Be BgK
B" B Bz BeY B B B B " B B Z Be B B Y C S

B B); B BE BE B Bi B8c B B 8 B 8 B B N B B E Bf Be BfK B# B B{
BeY B B B B " B B Z Be B C S B B); B BC BE E Bi B8c B B 8 B 8 B B N B
B E Be B c BgK B" B Bz B cY B B B E " B B Z Bd B C S B E); B BC EE B Ei
B8c B B 8 B 8 B B N B B E Be Bd BgK B" B Bz BeY B B B B " B B Z Bd B C
% B B(; B BE BE B Bi B7c B B 8 B 8 B B N B B E Bf Be BfK B# B B{ BeY B B
B B " B B Z Be B C
B); B E B B8c E
B B B Be BgK B BeY B B " B Z B C S B B(; B
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B Z Be B B Y C S B B); B BE BE B Bj B8c B E E B 8 E B N B B E Be Bc BgK B# B
Bz BeY B B B B " B B Z Bd B B Y C S B B(; B BC BE B Bh B7c B B 8 B 8 B B
N B B E Be Be BgK B" B Bz BeY B B B B " B B Z Be B B Y C S BE
B Be B B
B B); B BA BC B Bi B:c B B E B 8 B E N B E E Bb Bf BgK B" B Bz BcY B
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TAPE NO. 1 FILE NO. 1
RECORD 2 LENGTH 4 96

TAPE NO. 1 FILE NO. 1
RECORD 21 LENGTH 4 96

TAPE NO. 1 FILE NO. 1
RECORD 22 LENGTH 4 96

TAPE NO. 1 FILE NO. 1
RECORD 23 LENGTH 4 96
255

TAPE NO. 1 FILE NO. 1
RECORD 24 LENGTH 4 96
25

TAPE NO. 1 FILE NO. 1
RECORD 25 LENGTH 4 96
2 5

TAPE NO. 1 FILE NO. 1
RECORD 26 LENGTH 4 96
205 !

TAPE NO. 1 FILE NO. 1
RECORD 27 LENGTH 4 96

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C [Ch BEZ BEZ BEZ BEZ BEZ CEZ Bh BEZ C C Ch D mD dD D q D D D+
C Ea
[Eh [Ch D C C
CEZ BEZ BEZ C [Ch ID < D G D DY:sE7 Dh DB !D R C C oRC ad
C Bk. B # B TBe B? B B Bh $C CZ C C ‖+D D (DD >GD_ D vDZa D D D D D [E P
^E D H C* D ‖ C\ C ^=C $C B1 B B E BL B -C2 B [Ch IC < Cm C 'D C fRD aSD ID
<}D D D F D D N D > E8 ME D)D`8 D Cv C UCPn C ‖ C ‖ CEZ B 3v sB BEZ B B elCPn@C
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sC D D (D@ D D D D[D D E E }#DH D-A C ^ C #^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
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TAPE NO. 1 FILE NO. 1
RECORD 28 LENGTH 4 96

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A B AEZ EZ A #LB BEZ A B B B@ C GC E >C C9CSCN 9E@: DG C C ICt (CP Bxt B
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Ee D CH kCG CM YC B 1 B RBo 0B B 4GB_ B #B9 9BGa-B2 B B ICt Be C W C C C D]s
C 6D1 9D KD ?wD ED D L
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B]B B)h 1B A A B A , 3B B A w @ B SB A B eXB 'B c AY 3B A B
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y EY A BE(AY BB5 A ABq xBHM B "'B .Bb A -B ?E i A m;B A OB A)Bf3 A<n BS A f A
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TAPE NO. 1 FILE NO. 1
RECORD 29 LENGTH 4 96

TAPE NO. 1 FILE NO. 1
RECORD 3 LENGTH 4 96

B39339

Digital data described in this User's Guide are in NSSDC data set 77-102A-12F (Digital Data)
Plots are NSSDC data set 77-102A-12G

PLASMA COMPOSITION EXPERIMENT ON ISEE-1

DATA USER'S GUIDE

October 1986

Pages A3 and C3-C6 corrected ~1 May 8[illegible] in this version.

Compiled by W. Lennartsson

Lockheed Palo Alto Research Laboratory
Department 91-20, Building 255
3251 Hanover Street
Palo Alto, California 94304

TABLE OF CONTENTS

1. EXPERIMENT RATIONALE AND DESIGN

The following 5 pages are a reprint from a special issue of the IEEE Transactions on Geoscience Electronics dedicated to the instrumentation for the International Sun-Earth Explorer Spacecraft.

Plasma Composition Experiment on ISEE-A

E. G. SHELLEY, R. D. SHARP, R. G. JOHNSON, J. GEISS, P. EBERHARDT, H. BALSIGER, G. HAERENDEL, AND H. ROSENBAUER

Abstract—The plasma composition experiment on ISEE-A consists of a pair of high-sensitivity (~1 $cm^2 \cdot sr \cdot eV$) high-resolution ($M/\Delta M \approx 10$ at focus) energetic ion mass spectrometers. They cover the entire mass range from 1 AMU to > 150 AMU in 64 channels at each of 32 energy channels covering the energy per charge range from 0 to approximately 17 keV/e. The objectives of the experiment are to study the ion composition of the ring current, the plasma sheet, the plasmasphere, the magnetosheath, and the solar wind in order to establish the origin of the plasmas in the various regimes of the magnetosphere and to identify mass and charge dependent acceleration, transport, and loss processes.

I. Introduction

THE STUDY of the composition of the hot magnetospheric plasma is a new and rapidly developing field. The energetic ion mass spectrometers on ISEE-A are the first such instruments to be flown on any NASA spacecraft. An almost identical spectrometer on the ESA spacecraft GEOS was launched in May of 1977 and is currently making plasma composition measurements in the inner magnetosphere (L = 2.5–7).

Previous measurements with less sophisticated mass spectrometers on U.S. Department of Defense satellites and rockets [2]-[4] have revealed that heavy ions of ionspheric origin are a significant, and at times dominant, component of the observed magnetospheric plasma in the energy range up to 16 keV. The first data obtained with the ion composition experiment on GEOS have revealed that the plasmasphere must be considered as a third source in addition to the solar wind and ionosphere [5]. One of the principal aims of this experiment is to study the sources of this plasma and its acceleration, transport, and loss processes using the plasma composition to provide new information on the charge and mass dependence of the processes.

II. Experiment Goals

A particular challenge in the design of the ISEE experiment was the range of densities and temperatures expected in the widely different plasma regimes encountered along the orbit. There are important scientific questions outstanding in each of these regimes. Some of these specific questions which we hope to address with the ISEE experiment are as follows.

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E. G. Shelley, R. D. Sharp, and R. G. Johnson are with Lockheed Palo Alto Research Laboratory, Palo Alto, CA.

J. Geiss, P. Eberhardt, and H. Balsiger are with the University of Bern, Bern, Switzerland.

G. Haerendel is with the Max Planck Institute for Extraterrestrial Physics, Garching, Germany.

H. Rosenbauer is with the Max Planck Institute for Aeronomy, Lindau, Germany.

A. Ring Current

What is the composition of the ring current? How does it vary as a function of local time and radial distance during the different phases of a particular magnetic storm, between different storms, and between the storm-time and quiet-time? What is the relative importance of the ionosphere, the plasmasphere, and the solar wind as sources of the ring-current plasma? What are the acceleration mechanisms responsible for heating the relatively low-temperature plasmas available in either of these source regions into the high-temperature ring-current plasmas observed during magnetic storms? Hopefully, the identification of O^+ as a signature of the ionospheric source term, O^{++} as a signature of the plasmasphere source, and He^{++} as a signature of the solar wind source will allow us to address these questions in some detail. How does the ring current interact with the plasmasphere during the recovery phase? Does wave growth differ as the dominant component varies from one species to another? Is the evolution of the different species consistent with charge exchange processes being the dominant loss mechanisms? Are wave-particle interaction processes affected by the presence of small components of heavy ions?

B. Plasma Sheet

What is the origin of the plasma sheet? Does the relative contribution of the solar wind ions (e.g., He^{++}, $^3He^{++}$, O^{6+}) to ionospheric ions (O^+, He^+) change as a function of distance down the tail? Can ions from the plasmosphere (e.g., O^{++}) be identified in the tail? Does the He^{++}/H^+ ratio in the tail reflect changes in that same ratio in the solar wind? How long does it take such changes to appear in the plasma sheet? Where do they appear first? Can we follow the circulation of newly injected solar plasma by tracking changes in this parameter? What acceleration mechanisms operate to heat the plasma-sheet plasma to auroral energies? Can we utilize the differences in He^{++} and H^+ properties, for example, to identify electrostatic acceleration processes (which should be twice as effective on He^{++})? What other mass or charge-dependent processes are important?

C. Cold Plasma

How does the cold plasma density function as a regulator of the growth rate of the dominant instabilities and the wave-particle interactions processes which control the acceleration and precipitation of the magnetospheric plasma? How does the composition of the cold plasma affect these processes?

D. Solar Wind

Previous measurements of the solar wind composition with electrostatic analyzers have been limited to periods where the plasma temperature is sufficiently low that the different mass

0018-9413/78/0700-0266$00.75

groups can be resolved on the basis of their common velocity. With a mass spectrometer we can study the solar wind plasma composition also during periods of high ion temperature or when complicated ion distribution functions are encountered. Thus we shall be able to compare systematically several ion species (H, He, O, Fe) in the low-speed solar wind, in the fast-speed streams, or in plasma originating from above flares. Also we can investigate the behavior of different ions near turbulent structures and boundaries such as solar wind shocks, sector boundaries, the bow shock, and the magnetopause. There are likely to be different signatures of these boundary crossings in H^+ and He^{++}, for example, that could provide important added information on the mechanisms involved.

III. Instrument Description

The plasma composition experiment consists of two essentially identical mass spectrometers which can be operated independently. The spectrometers point 5° above the 5° below the ISEE-1 spin plane, respectively. Within the solar wind region both sensors are typically operated in the same mode to provide the desired angular coverage while in other plasma regions, where the anticipated distributions are less directed, the two sensors are operated in independent modes.

A. Ion Optics

The ion optics of the spectrometers are nearly identical to those of the mass spectrometer flown on the GEOS satellite and described in detail in [1]. Therefore, the discussion of the ion optics of this spectrometer will be brief, pointing out areas where the ISEE and GEOS spectrometers differ.

Fig. 1(a) is a photograph of one of the spectrometers with the cover removed and Fig. 1(b) is a schematic of the optical path, approximately to scale. The ions enter through the collimator section which establishes the limitations on both the azimuthal and elevation angles of acceptance. Immediately following the collimator is a three-grid retarding potential analyzer (RPA). The first and third grids are maintained at spacecraft ground while the intermediate grid potential is programmable between 60 mV and 100 V in 32 steps with approximately equal logarithmic intervals. After passing through the second ground grid of the RPA, all ions are accelerated through a potential of approximately -2950 V. The remainder of the analyzer system is maintained at this centerline potential. After pre-acceleration, the ions pass through a cylindrical electrostatic analyzer (EA) which is programmable in 32 steps covering the energy per charge range from 3000 to 20 000 eV such that $U_i = 1.063\ U_{i-1}$ with an energy resolution of approximately 5 percent. Here U_i is the mean energy per charge passed at step i. Due to the pre-acceleration, the lowest energy step of the EA passes all ions with external energies between zero (i.e., those cold ions which overcome the spacecraft potential and enter the collimator section with velocity equal to the satellite velocity) and approximately 100 eV. In this step the RPA is utilized to control the energy band pass such that

$$V_{\mathrm{RPA},k} \leqslant U_{0,k} \lesssim 100\ \mathrm{eV}$$

where $V_{\mathrm{RPA},k}$ is the kth voltage step on the RPA.

As indicated in Fig. 1(b), there are two spiraltrons (ED1 and ED2) positioned below the mass analyzer immediately following the EA. Each of these SEM's samples essentially the same component of the ion flux which enters the mass analyzer (MA) but is sensitive to all ions within the energy band, independent of mass. The sensitive area of ED1 is approximately 0.005 that of ED2 and the two detectors are independently operable. Their control will be discussed in more detail below, but in general only one is operated at any given time and is selected on the basis of expected ion count rate. They are biased negatively at the entrance so that the minimum ion energy is about 3 keV, thus minimizing the variation in detection efficiency. The major portion of the ion flux passing through the EA enters the MA through its entrance slit $S2$. The MA consists of a cylindrical electrostatic analyzer inside a magnetic field (~900 G) with the E field and B field very nearly perpendicular everywhere. The fields are so arranged that their forces on the ions are additive. The equation of motion for a normally incident ion traveling on the central ray of the MA is

$$\frac{2U}{R} = E_r(R) + \left(\frac{2Ze}{Mm}\,U\right)^{1/2} B_Z$$

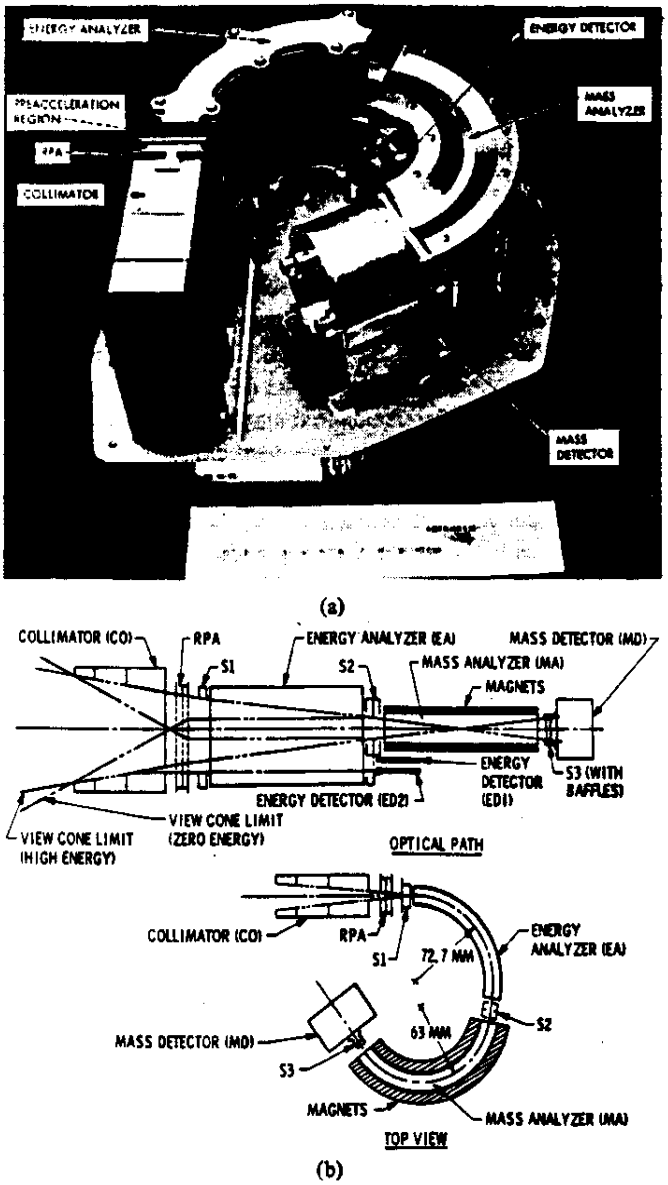


Fig. 1. (a) Photograph of one of the spectrometers with the cover removed. The major analyzer and detector elements are indicated. (b) A schematic diagram of the optical path of one of the spectrometers.

where (in MKS units) E_r is the radial electric field at R, Z the ion charge state, M the atomic weight (in AMU), e the elementary charge, m the atomic mass unit, and B_Z the vertical magnetic field intensity. The internal ion energy per charge U (in electronvolts per electron) is fixed by the EA. At each energy step, the electric field in the MA is programmable in 64 steps in such a way that the same mass always appears at essentially the same mass step. The range is such that step 63 corresponds to approximately 0.8 AMU and step 0 corresponds to approximately infinite mass. The ions which pass through slit $S3$ following the MA are detected by a Johnston electron multiplier (MD) modified as described in [1]. However, due to the wider dynamic range in ion fluxes expected over the ISEE orbit, we have developed a technique by which the MD sensitivity can be electronically controlled. This consists of independently controlling the bias across dynodes 1 through 4 and 4 through 20. By reducing the bias across dynodes 1 through 4 to about 20 V but maintaining the same total bias (3000 V) the sensitivity is reduced to approximately 0.04 of the normal sensitivity with no significant reduction in gain. In the high-sensitivity mode, both the ED and MD responses are approximately one count per second for a flux of 1 ion/cm$^2 \cdot$ s $\cdot$ sr $\cdot$ eV over the full energy range. For more details on the optics of this type of spectrometer one is referred to [1].

Fig. 2 shows some sample mass resolution curves for ions entering the instrument with an energy of 3.4 keV. The mass resolution $M/\Delta M$ (FWHM) ranges from greater than 10 at mass 1 to the order of 1.3 at mass 20. The full widths of the mass peaks at 10^{-3} of peak are approximately twice the FWHM values. Fig. 3 illustrates the dependence of mass resolution on mass and energy and also indicates the dependence of mass and energy on numbers. The lines indicate full width at 10^{-3} of peak. The resolution remains nearly constant below the focus line but decreases above this line due to decreased mass dispersion and loss of angular focusing at higher energies.

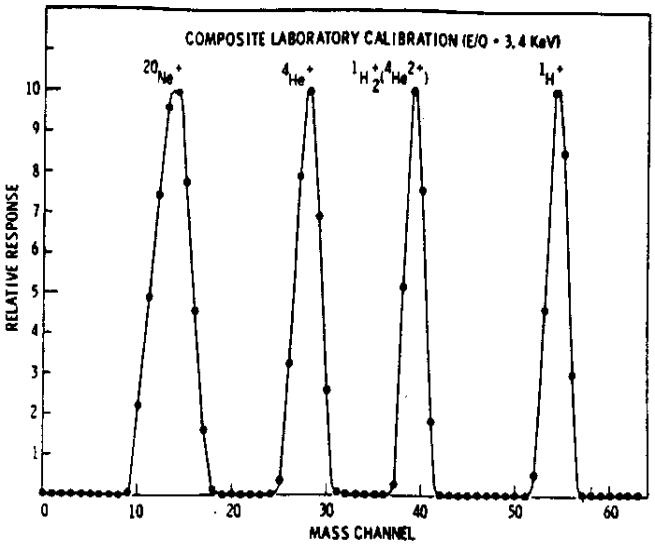


Fig. 2. Sample mass resolution curves from laboratory calibration. The beam scattered background between peaks is less than 10^{-4} of the peak rates.

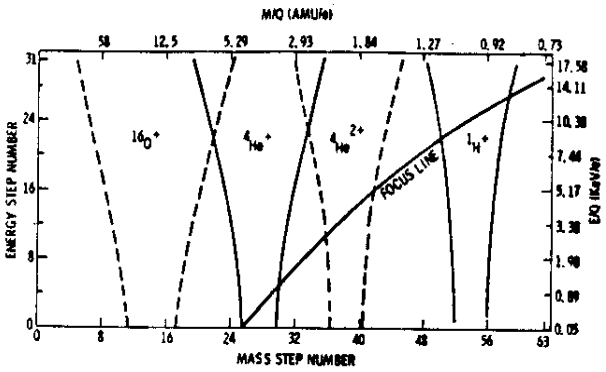


Fig. 3. Mass and energy dependence of the mass resolution. The curves indicate the peak widths at 10^{-3} of peak. The left margin indicates energy step number and the right shows energy per charge. The mass step numbers are indicated at the bottom and the mass per unit charge values are indicated at the top. The focus line is the theoretical line in the E/M plane at which the mass analyzer is focusing.

B. Instrument Control

The orbit of the ISEE-1 spacecraft carries it through a diversity of plasma regimes ranging from the high-density cold plasma of the inner plasmasphere through the relatively low-density hot plasma of the outer-ring current and plasma sheet and into the supersonic flow of the solar wind. These various plasma regimes differ significantly in their angular, spatial, and temporal structures as well as in their relative flux intensities. The mass spectrometers are capable of measurements in a 64 by 64 matrix of mass and energy analysis as well as having controllable detector sensitivities. It is neither desirable nor practical to cover the entire matrix of possible analyses in any given plasma regime. For these reasons, a relatively sophisticated control system has been developed. A block diagram of one of the instruments is shown in Fig. 4. There are two basic data gathering modes and two basic measurement sequence modes. The two data gathering modes are telemetry-synchronous (normal), in which data are accumulated over fixed regular periods dependent only on the telemetry rate, and sun-synchronous, in which data are gathered more rapidly in a specified portion of each satellite spin, buffered, and read out at the normal rate. This latter mode is intended primarily for measurements in the solar wind. The direction is programmable to $\frac{1}{128}$ of a spin (2.8°) and the period of each of 10 consecutive data accumulations is programmable to 2^{n-3} minor frames which corresponds to an angular rotation of 2^n (3.69°) at a spin rate of 19.7 r/min. The parameter n can take on the values 0 through 3. Data are acquired from one of the two ED's and from two independently programmable thresholds from the MD. In the normal data accumulation mode, data are accumulated from one of the two ED's and from both thresholds on the MD once per minor frame (0.250 s or 0.062 s). An alternate mode doubles the time resolution on the ED and eliminates the second MD threshold data.

The measurement sequencing modes consist of a simple fixed or "hard wired" mode plus an extremely flexible mode which utilizes a command reprogrammable 6 by 1024-bit random access memory (RAM). The fixed mode scans the entire mass-energy range, excluding the RPA steps, thus producing a 32-point energy spectrum at each of the 64 mass

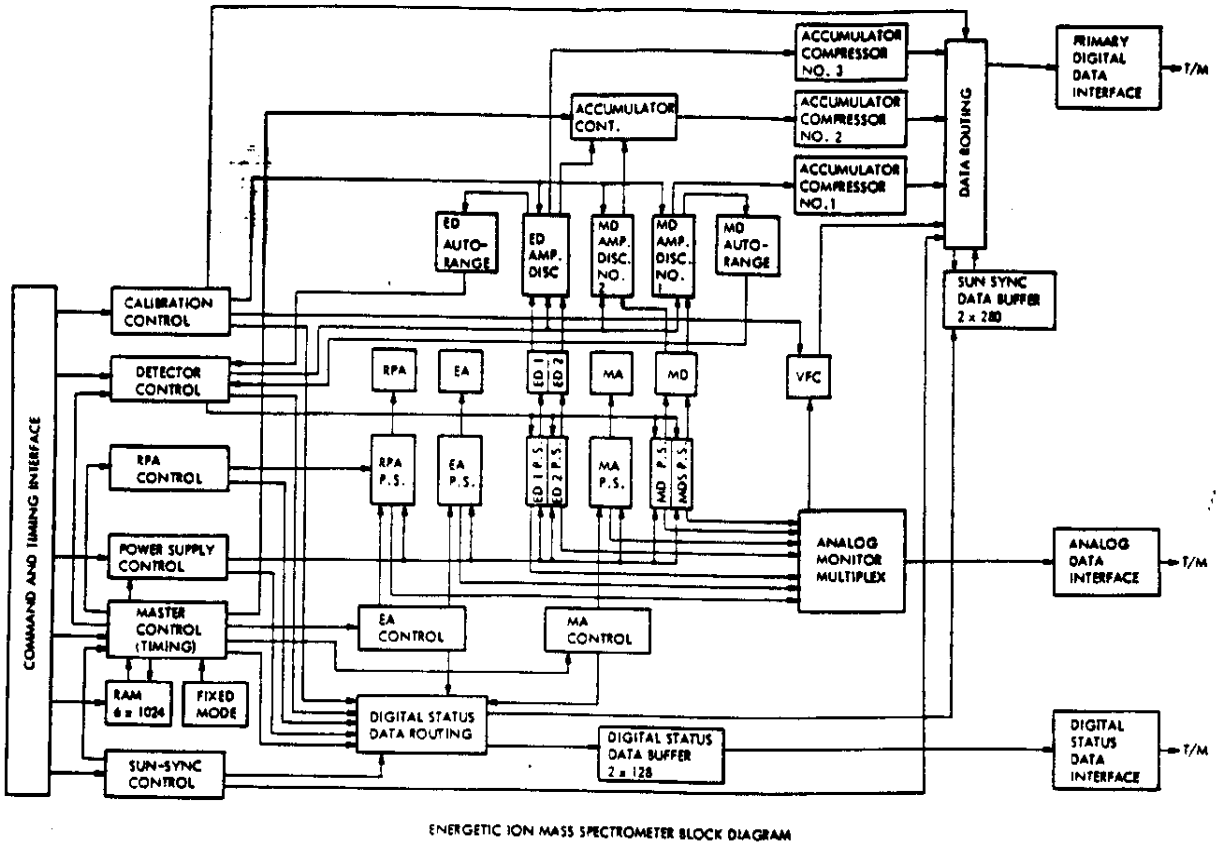


Fig. 4. Functional black diagram of the spectrometer electronics.

steps once every 512 s at the normal TM rate or 128 s at the fast TM rate. In this mode, the high-sensitivity detectors are automatically selected as are several other parameters which are under program control in the RAM mode. For the more versatile mode, the RAM can be programmed in any number (1-53) of control groups, each consisting of 19 six-bit control words. Within each of these groups one selects whether the mass step or energy step is to be varied and the step number for the fixed parameter and 16 independent values for the variable parameter are specified. In addition the dwell time, in units of 2^n minor frame (MF), for each measurements is selectable ($n < 7$), as are the energy mode (EA or RPA), the accumulator assignment and the ED and MD sensitivity. The instruction groups are executed in sequence. After execution of the last programmed group, indicated by a flag bit within the group, the sequence is repeated starting again with the first group. By this method of control one can either sequence rapidly through a small set of measurements (e.g., the ratio of two masses at a few energy steps) or dwell for long periods on each of many measurements (e.g., complete angular distributions at each energy step for many different masses). The RAM is loaded via a 37-bit serial command at a rate of 16 six-bit words per second. The selection of mode, fixed or RAM, is by pulse command.

The serial command is also used to program several other control functions in addition to programming the RAM. These functions include the sun-synchronous mode control, the power supply control by which the detector high-voltage bias potentials are selected and all high-voltage power supplies are independently enabled or disabled, the RPA control which establishes the RPA grid potential when operating in the EA mode, the detector control which selects one of four thresholds for the signals from each detector and enables or disables the ED and MD sensitivity auto-range, and the calibration control which selects one of several possible in-flight calibration modes. If the sensitivity auto-range, mentioned above, is enabled for the MD or ED, the sensitivity of that detector or detector pair will automatically be switched to the lowest range if the count exceeds approximately 6000 in a single MF (250 ms at low TM rate). At the beginning of each control group the sensisitivy is reset to the programmed value. If a detector is programmed to its low sensitivity the auto-range will turn it off until the beginning of a new control group. The states of all of the control registers other than the RAM are telemetered once per major frame (64 s in the low TM rate). All of the parameters under the control of the RAM are telemetered essentially as they are executed, thus tagging each measurement with the relevant identifiers.

This versatile experiment control approach has proven to be very successful in flight.

Acknowledgment

A complex experiment such as the one described here necessarily involves the efforts of a large number of people over a long period of time. Some of the major contributors to the design, development, and fabrication of the spectrometer to whom we would especially like to express our gratitude are T. C. Sanders, E. Hertzberg, J. Luther, and J. McDaniel of the

Lockheed Palo Alto Research Laboratory; and A. Ghielmetti and D. T. Young of the University of Berne.

References

[1] Balsiger, H., P. Eberhardt, J. Geiss, A. Ghielmetti, H. P. Walker, D. T. Young, H. Loidl, and H. Rosenbauer, "A satellite-borne ion mass spectrometer for the energy range 0 to 16 keV," *Space Sci. Instrum.*, vol. 2, p. 499, 1976.

[2] R. G. Johnson, R. D. Sharp, and E. G. Shelley, *Composition of the Hot Plasma in the Magnetosphere in Physics of the Hot Plasma in the Magnetosphere*, B. Hultqvest and L. Stenflo, Eds. New York: Plenum, 1976, p. 45.

[3] —, "Observations of ions of ionospheric origin in the storm-time ring current," *Geophys. Res. Lett.*, vol. 4, p. 403, 1977.

[4] J. Lynch, R. Leach, D. Pulliam, and F. Scherb, "Composition and energy spectrum variations of auroral ions," *J. Geophys. Res.*, vol. 82, p. 1951, 1977.

[5] D. Young, J. Geiss, H. Balsiger, P. Eberhardt, A. Ghielmetti, and H. Rosenbauer, "Discovery of the He^{2+} and O^{2+} ions of terrestrial origin in the outer magnetosphere," *Geophys. Res. Lett.*, vol. 4, p. 561, 1977.

2. BRIEF DESCRIPTION OF FORMAT4 DATA FORMAT

2.1 Introduction

Each orbital revolution of the ISEE-1 spacecraft is approximately 57 hours and 20 minutes. This represents a cumbersome amount of data from the instrument if each data point were to be plotted individually. In order to reduce the data to a more compact survey format, that still has a reasonable temporal resolution, each revolution has been subdivided into a set of time intervals ranging in length from 30 minutes to 3 hours. The length of each interval is a multiple of 30 minutes and has been chosen to be roughly proportional to the inverse of the s/c velocity. Within each such interval the ion count rates have been averaged over time in various bins according to the mass, energy, and direction of motion of the ions. Based on the averaged count rates a number of bulk parameters, such as number density, mean energy, flux, etc., have been derived for each time interval.

The next section contains a sample of averaged data from one time interval and gives a brief explanation of the various items. The complete data from any one time interval consist of 5 pages.

The mathematical methods that have been used to generate these data are explained in Appendix A, along with the necessary assumptions.

2.2 Explanation of Data Format

Data page 1:

Four complete mass spectra (64 mass channels) from different parts of the instrument energy window. The bottom spectrum has the true scale on the vertical axis (the common logarithm of the number of counts per second), whereas the upper spectra are successively displaced 5 decades from one another. The error bars on the data points show the standard deviation (+ and -) of the count rates (Poisson statistics). Count rates lower than or equal to $0.1\ s^{-1}$ are displayed on the horizontal axes. Data from the various energy channels are distinguished by the label "ES" in such a fashion that ES = 0 means data from the 1:st energy channel, ES = 1-4 means data from the 2:nd - 5:th energy channels, etc. The energy channels are numbered in order of increasing energy (see Appendix A, Eq. (1)) whereas the mass channels are numbered in order of decreasing mass. The five most commonly seen ion species have their peak count rates at approximately the following mass channel numbers (which increase slowly with energy):

		Low Energy	High Energy
O^+	≃	16	18
O^{++}	≃	21	23
He^+	≃	29	31
He^{++}	≃	40	41
H^+	≃	55	56

In the most commonly used modes of operation the instrument obtains complete mass spectra during a relatively minor portion of the instrument cycle, whereas it monitors the few mass channels of the above 5 ions during the major portion of the cycle.

The printed information at the top of the spectra show the day (60) and the year (79) of the data and the universal time in hours and minutes at the beginning (632) and the end (659) of the time interval. The label "MD 2" refers to a particular data processing mode. The background count rate has not been subtracted from the spectra.

The information labelled "PARAMETER RANGE" in the upper right hand corner contains a subset of the ISEE-1 ephemeris data, "R" through "L", at the beginning and end of the time interval, as well as the corresponding values of the measured magnetic field strength, "BRUS". The first 5 coordinates are in units of earth radii (DZ = 999 means that this coordinate has not been calculated), the "LT" (geographic local time) is in decimal hours, the "ML" (geomagnetic latitude) is in degrees and "L" is in earth radii. The magnetic field strength "BRUS" is in gammas (see Russell, C. T., the ISEE-1 and -2 flux gate magnetometers, IEEE Trans. Geosci. Electron., GE-16, 239, 1978).

Data pages 2-3

Differential flux spectra, versus energy per charge (kV) for the four major ion species H^+ ("MASS 1"), O^+ ("MASS 16"), He^{++} ("MASS 2"), and He^+ ("MASS 4"). Each species is represented by 6 spectra, corresponding to different directions of motion of the ions at the moment of detection. Each of these spectra has a "background spectrum" associated with it, plotted as a fine line, which shows the level at which the ion count rate is equal to the background count rate. This count rate has been subtracted from the signal count rates prior to the derivation of the flux spectra (see Appendix A). The top spectrum has a true vertical scale (the common logarithm of the flux), whereas the lower spectra are successively displaced 3 decades from one another.

The upper four spectra of each ion species are "perpendicular spectra" and are formed by ions that have their pitch angle α in the range $45^\circ \leq \alpha \leq 135^\circ$. These are ordered in terms of the direction of particle motion in the s/c spin plane, which is approximately the same as the solar ecliptic plane. The top spectrum is formed by ions which move within $\pm 45^\circ$ of the direction of the sun, the next three by ions that move within 45° of the duskward direction, the antisunward direction, and the dawnward direction, respectively. The sequence of the spectra is indicated by the labels "+x", "+y", "-x", and "-y", respectively, in accordance with the geocentric solar ecliptic coordinates. The bottom two spectra are "parallel spectra" and are formed (in downward order) by ions with $0^\circ \leq \alpha < 45^\circ$ and $135^\circ < \alpha \leq 180^\circ$, respectively, as indicated by the labels "+PAR" and "-PAR".

The error bars on the data points show the standard deviation associated with the counting statistics. The bottom level of any data point is set at 1/10 of the background level (the background has been subtracted). Data points at this level, which have small error bars, normally indicate that the actual values are much lower (see for example "MASS 2"). If a certain energy channel has no samples the corresponding data point is skipped.

Above each set of spectra are shown the day of the year, the year, and the U.T. at the beginning and the end of the time interval. Below each set of spectra are certain bulk parameters, which are a subset of the calculated parameters on the last data page (see below). The quantities "PAMIN" and "PAMAX" show the minimum and maximum pitch angles sampled during the time interval for each ion species.

Data page 4:

Bulk parameters derived from the count rate in an auxiliary particle detector, referred to as the "energy detector" (see Appendix A), which has no mass discrimination. These parameters have been derived repeatedly during the time interval, assuming that the signal is entirely due to H^+ ions. The corresponding velocity moments have been integrated over the energy range of

0.2 - 16 keV.

The method used in deriving these moments is a simplified combination of methods I and III in Appendix A (Moment calculations). The plasma samples at each energy have been ordered according to 12 spin-angle bins, but no distinction has been made between different pitch angles. Although the corresponding phase space density $f = f(\phi, E)$ is a function of spin angle and energy the moment calculations assume that f is independent of the angle out of the spin plane. This process is not self-consistent, of course, but is a fast procedure to account for a finite drift velocity $\vec{v}_d$ of the plasma in the s/c spin plane.

The 4 different panels show, from top to bottom, the number density, the mean energy in the plasma frame (that is the mean of $m(\vec{v} - \vec{v}_d)^2/2$), the absolute value of the inferred "drift velocity", $|\vec{v}_d|$, and the angle (within the spin plane) of this same velocity. The angle is plotted with a range of $0^o \pm 270^o$, in order to minimize oscillations between $\pm 180^o$. The angle 0^o is towards the sun. All four quantities are plotted versus universal time, with the time scale chosen according to the length of the time interval. Since all pitch angles are included, it is quite likely that a strong pitch-angle anisotropy will show up as a net drift velocity when the magnetic field direction is close to being in the s/c spin plane.

The purpose of these data is to show whether or not the plasma properties remain sufficiently invariant to justify an averaging of the mass spectrometer data over the entire interval.

The text above the top panel contains, besides the day, year, and U.T.-span, some information regarding the operation of the instrument. Of particular importance are the two quantities "EX" and "MX". These refer to the "energy detector" and "mass detector", respectively, and should normally be zero. If they are not zero it is necessary to treat the corresponding data with great caution, because an automatic gain change to low sensitivity has been activitated sometimes during the time interval (during as many seconds as the "EX" or "MX" show) but has not been properly accounted for in the computation of the moments. This gain change is a built-in feature of the instrument to minimize damage to the detectors due to very high count rates. Gain changes occur regularly in the magnetosheath and solar wind and require a separate data analysis.

Data page 5

This page lists all the moments calculated, along with the standard deviation in percent as carried over from the counting statistics. Since the background count rate has been subtracted from the signal it is possible to have a very large relative error in the end result. For practical reasons the error is displayed in integer format, using integer truncation and limiting the number to 999. Because of the background subtraction it is also possible to have a negative value on any quantity that is a linear function of the count rates. In this case the standard deviation refers to the absolute value of the quantity and can be used to estimate a probable upper limit on that same quantity.

Missing data: in many cases there are too few samples to allow a meaningful calculation of a certain quantity. Those cases are indicated by a standard deviation equal to -1.

Description of various items

The top line has, besides the time information, the following items:

"MD" refers to a particular data processing mode.

"IBGND" shows whether the background was sampled (=1) or not (=0).

"RATBG" is a ratio σ_1/σ_2 betwen two standard deviations of the average background count rate, derived by different methods. The first, σ_1, is derived from

$$\sigma_1^2 = N^{-1} \cdot (N-1)^{-1} \Sigma (c_\nu - \bar{c})^2,$$

where N is the number of samples, c_ν is the individual background sample, $\bar{c}$ is the time-averaged rate, and the sum is taken over all N samples. The second standard deviation, σ_2, is derived from Poisson statistics,

$$\sigma_2^2 = N^{-1} \cdot \bar{c}.$$

"BETA" is the total ion kinetic pressure perpendicular to $\vec{B}$, as measured, divided by the measured magnetic pressure. The kinetic presure only includes ions which have a statistically significant number density (in this case n > the smaller of "BGDENS" and "DNSULIM", as defined below). The magnetic pressure is an average of only two measurements, one at the beginning and one at the end of the time interval.

"BCTR" is the average number of background counts per second during the interval.

The second line defines the names of all the underlying quantities and refers to all of the four ion species ("ION" = H^+, He^{++}, etc.). The minimum and maximum pitch angles ("PAMN" and "PAMX") have already been defined above. The label "MTD" refers to different "methods" of calculating number density "DENS" (cm^{-3}), and mean energy "EMEAN" (keV), as follows:

Integration procedure	MTD	Energy range, keV/e
Assumption I in Appendix A	1	0.01-0.1
Isotropy in s/c frame	2	0.1-1
using $45^{\circ} \leq \alpha \leq 135^{\circ}$	3	1-16
	4	0.1-16
Assumption II in Appendix A	5	0.01-0.1
Gyrotropy in s/c frame	6	0.1-1
using all pitch angles	7	1-16
	8	0.1-16
Assumption III in Appendix A	9	0.01-0.1
Isotropy in plasma frame	10	0.1-1
using $45^{\circ} \leq \alpha \leq 135^{\circ}$	11	1-16
	12	0.1-16

Note: "EMEAN" denotes absolute energy (not E/Q). Out of these, the ones labelled 4, 8, and 12 can be found below the flux spectra on data pages 2 and 3, as

"DNS4" = "DENS (MTD = 4)", "EMN4" = "EMEAN (MTD = 4)", etc.

"VEXB" and "ANG" refer to the absolute value (in km/s) and direction (in $^{\circ}$) of the apparent drift velocity calculated in Eq. (8) in Appendix A. These numbers are also found below the flux spectra as "VL/AN". A velocity equal to -1 means that no velocity was calculated due to poor sampling. It should be kept in mind that this velocity is derived from fluxes that have been averaged over time in essentially one plane and it does not necessarily approximate the true plasma motion. It is also subject to biasing effects of temporal fluctuations in the particle fluxes. In all, the uncertainties in this velocity will show up as differences between the velocities of the four ion species. Naturally the correspoding "DENS" and "EMEAN" may also be biased. The standard deviation of these does not include the uncertainty in the velocity, but assumes the velocity to be exactly known. However, a significant difference between "DENS (MTD = 4)" and "DENS (MTD = 12)", for example should serve as a warning that "DENS (MTD = 4)" is not very accurate. The same warning would also apply to "DENS (MTD = 8)".

"TVFLUX" is the average flux in the s/c frame of reference within $45^{\circ} \leq \alpha \leq 135^{\circ}$, integrated in energy. The unit is cm^{-2} sec^{-1} $ster^{-1}$ and the four lines refer to the energy ranges, 0.01-0.1, 0.1-1, 1-16, and 0.1-16 keV/e, respectively in downward order.

"PLFLUX" is analogous to "TVFLUX", except that it refers to the field-aligned pitch-angle bins and only has three integrals in energy. The 12 lines refer in downward order to

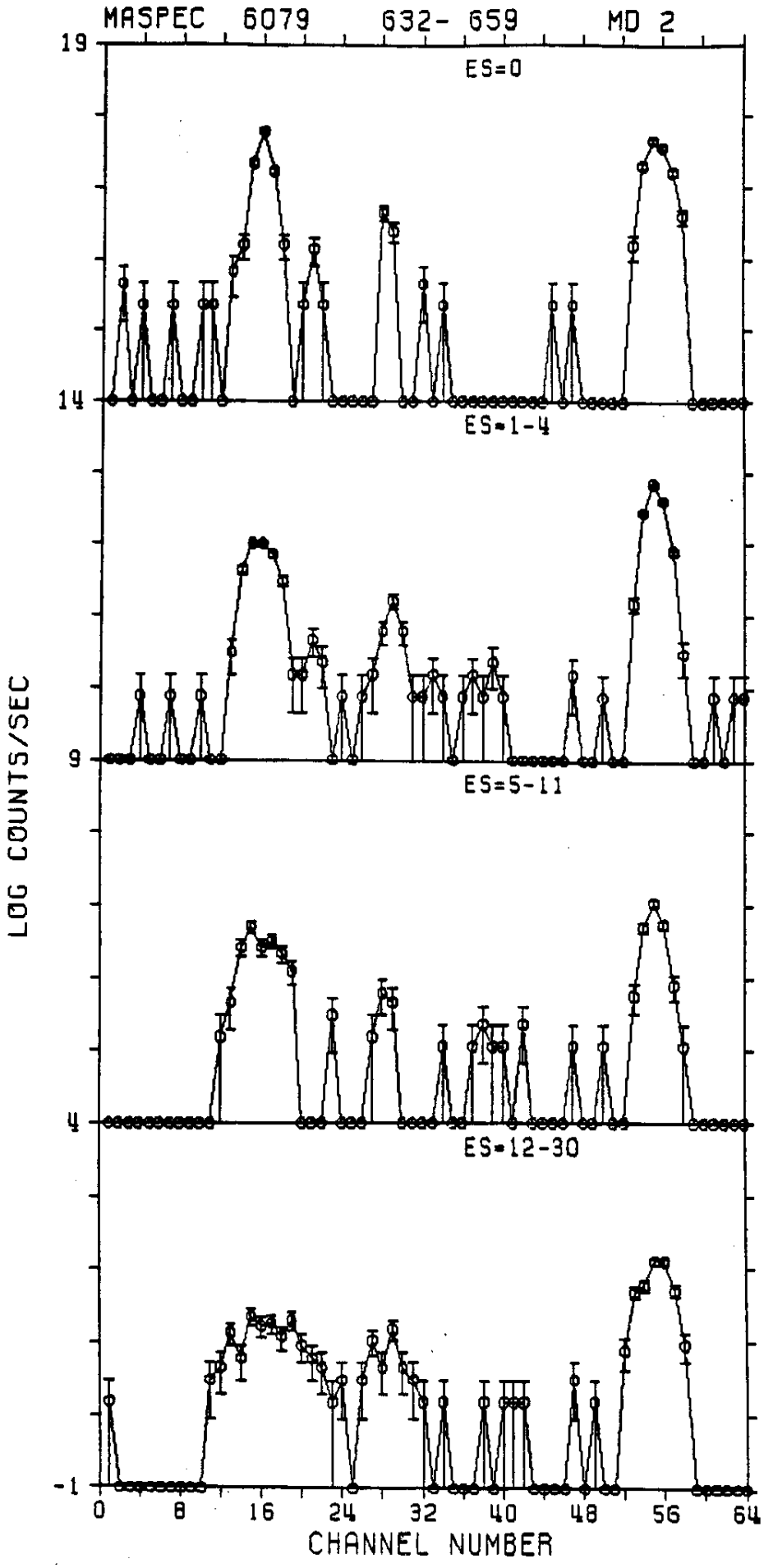
$0 \leq \alpha \leq 15^{\circ}$	0.01 - 0.1 0.1 - 1 1 - 16	keV/e
$15^{\circ} < \alpha < 45^{\circ}$	0.01 - 0.1 0.1 - 1 1 - 16	keV/e
$135^{\circ} < \alpha < 165^{\circ}$	0.01 - 0.1 0.1 - 1 1 - 16	keV/e
$165^{\circ} \leq \alpha \leq 180^{\circ}$	0.01 - 0.1 0.1 - 1 1 - 16	keV/e

"E-DENS" is the perpendicular kinetic pressure (= perp. energy density) in units of keV cm^{-3}, calculated as "(2/3) DENS (MTD = 4) • EMEAN (MTD = 4)."

"BGDENS" is the isotropic number density for each ion that corresponds to the background count level, when integrated from 0.1 to 16 keV/e. This quantity is to be compared with "DENS (MTD = 4)", for example, and is also found below the flux spectra as "BGD". Note: "BGDENS" has already been subtracted from the "DENS".

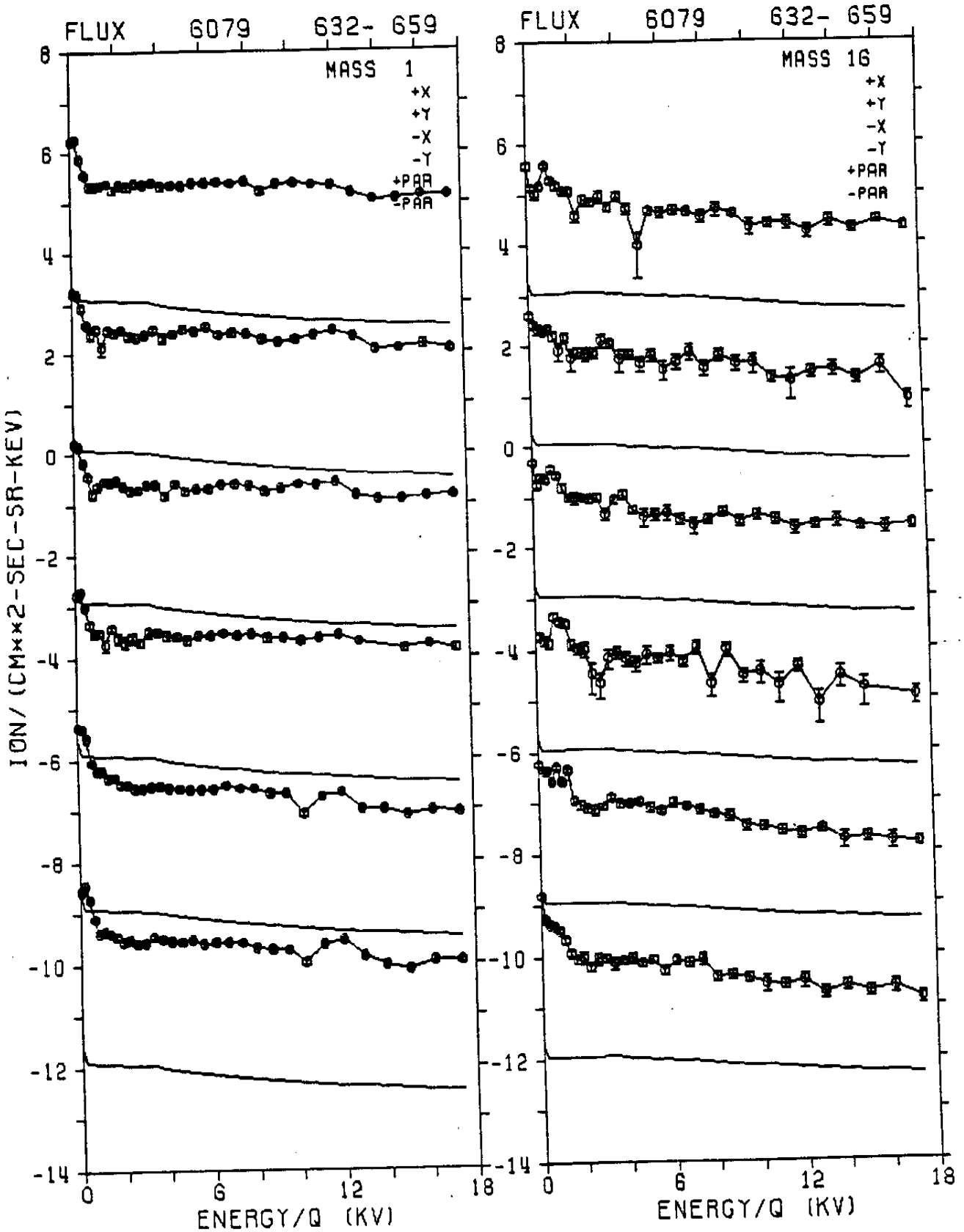
"DNSULIM" is the "upper limit" referred to in Equation (4c) in Appendix A integrated over 0.1-16 keV/e. That is a number three times as large as the total estimated contribution to the standard deviation of "DENS (MTD = 4)" from standard deviations of the background counts. In calculating this quantity the larger of the two background standard deviations is used (cf. "RATBG" above).

DATA PAGE 1



PARAMETER	RANGE	
R=	5.3	4.4
GSMX=	-1.0	-0.3
GSMY=	-4.8	-3.8
GSMZ=	-2.5	-2.2
DZ=	999.0	999.0
LT=	5.0	5.5
ML=	-23.0	-27.7
L=	6.8	6.0
BRUS=	249.8	445.0

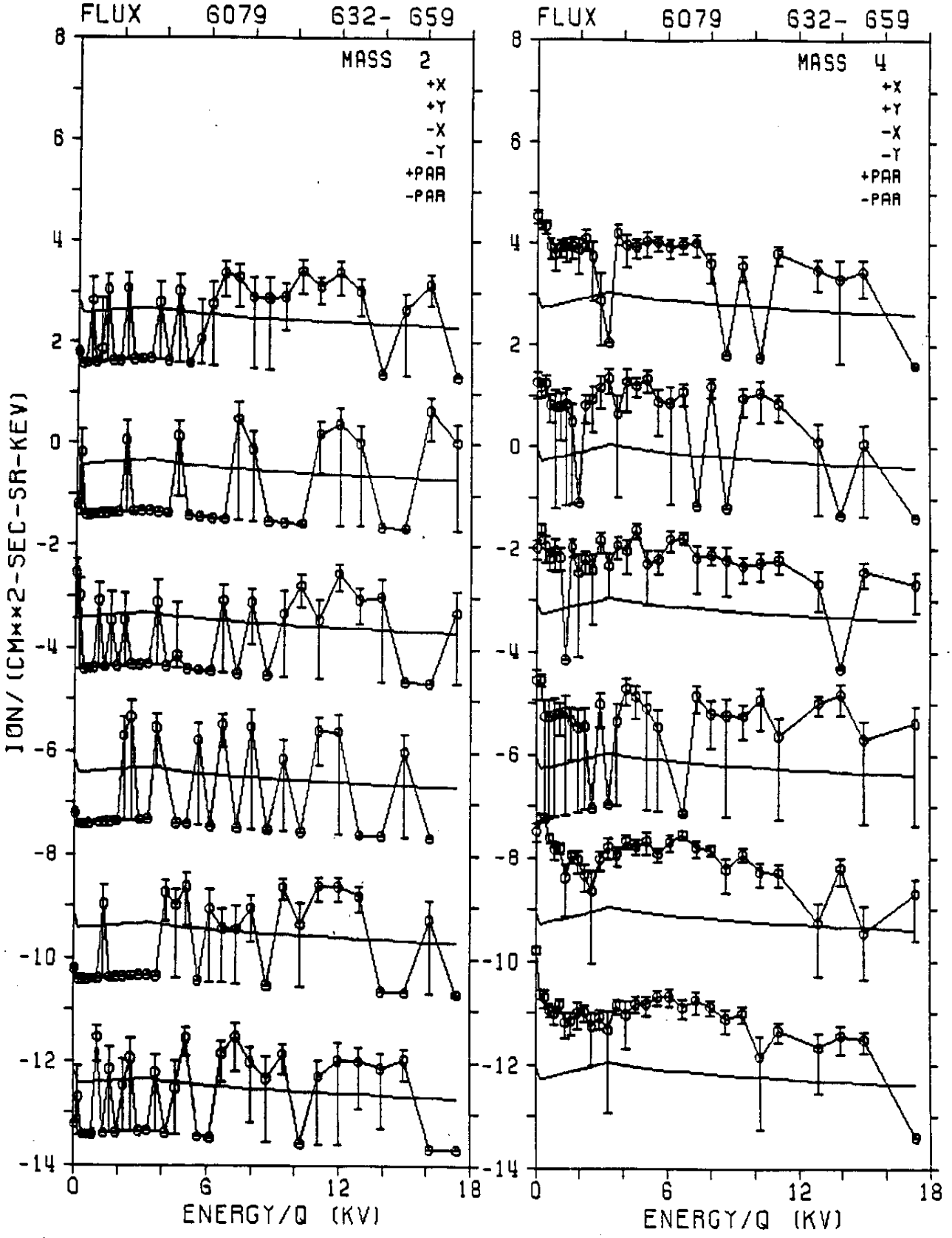
DATA PAGE 2



DNS4= 6.42E-01/ 0 EMN4= 4.02E+00/ 0
DNS8= 7.53E-01/ 0 EMN8= 3.43E+00/ 0
DNS12= 6.42E-01/ 0 EMN12= 4.02E+00/ 0
BGD= 1.76E-03/ 20 VL/AN= 6.1E+00/ -67
PAMIN= 18. PAMAX= 152.

DNS4= 7.58E-01/ 1 EMN4= 2.96E+00/ 2
DNS8= 8.52E-01/ 1 EMN8= 2.77E+00/ 1
DNS12= 7.74E-01/ 1 EMN12= 2.91E+00/ 2
BGD= 7.85E-03/ 20 VL/AN= 9.0E+00/-132
PAMIN= 18. PAMAX= 152.

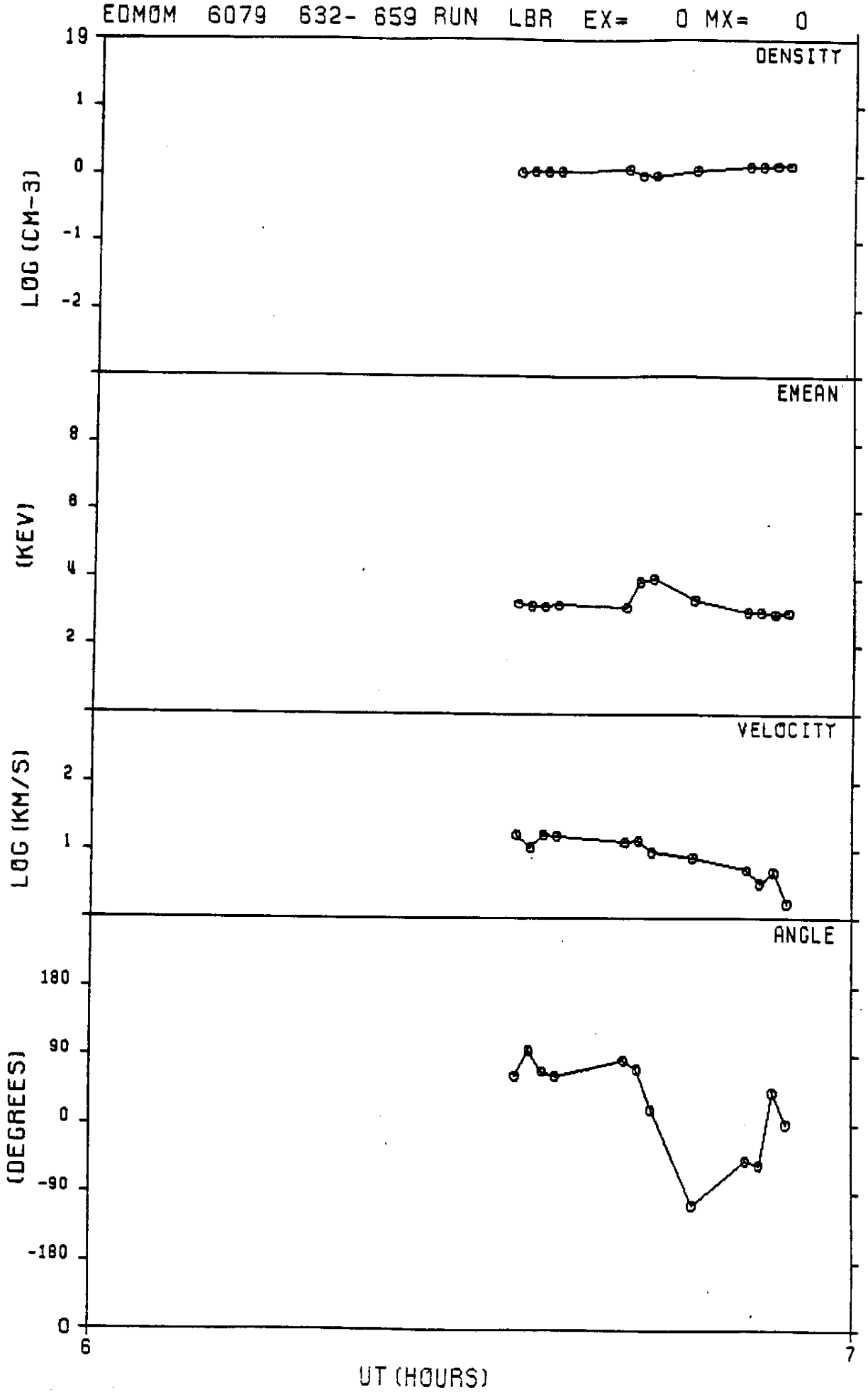
DATA PAGE 3



DNS4=	2.30E-03/ 26	EMN4=	2.13E+01/ 18
DNS8=	2.44E-03/ 24	EMN8=	2.05E+01/ 13
DNS12=	3.10E-03/ 65	EMN12=	1.57E+01/ 73
BGD=	2.15E-03/ 20	VL/AN=	1.7E+02/ -27
PAMIN=	18.	PAMAX=	152.

DNS4=	3.31E-02/ 4	EMN4=	4.41E+00/ 4
DNS8=	3.85E-02/ 4	EMN8=	4.18E+00/ 3
DNS12=	3.36E-02/ 4	EMN12=	4.35E+00/ 4
BGD=	2.93E-03/ 20	VL/AN=	1.6E+01/ 172
PAMIN=	18.	PAMAX=	152.

DATA PAGE 4


EDMOM 6079 632- 659 RUN LBR EX= 0 MX= 0
DENSITY
LOG (CM-3)
19
1
0
-1
-2
EMEAN
(KEV)
8
6
4
2
VELOCITY
LOG (KM/S)
2
1
ANGLE
(DEGREES)
180
90
0
-90
-180
0
6
7
UT (HOURS)

MD= 2 DATE= 6079 UT= 632 TO 659 IBGND= 1 RATBG= 1.04 BETA= 1.12E-02/ 0 BCTR= 4.34E-01

ION	PAMN	PAMX	MTD	DENS/SD%	EMEAN/SD%	VEXB/ANG	TVFLUX/SD%	PLFLUX/SD%	E-DENS/SD%	BGDENS/SD%	DNSULIM
H+	18.	152.	1	2.45E-01 3	4.00E-02 0	6.1E+00 -67	1.71E+05 3	0.00E+00 -1	1.72E+00 0	1.76E-03 20	1.19E-03
			2	2.62E-01 1	3.53E-01 1		5.03E+05 1	0.00E+00 -1			
			3	3.80E-01 0	6.55E+00 0		3.21E+06 0	0.00E+00 -1			
			4	6.42E-01 0	4.02E+00 0		3.71E+06 0	4.40E+05 4			
			5	3.14E-01 3	4.00E-02 0			1.43E+06 1			
			6	3.62E-01 1	3.55E-01 0			3.25E+06 1			
			7	3.91E-01 0	6.29E+00 0			2.74E+05 5			
			8	7.53E-01 0	3.43E+00 0			1.12E+06 2			
			9	0.00E+00 -1	0.00E+00 -1			3.30E+06 1			
			10	2.62E-01 1	3.53E-01 1			0.00E+00 -1			
			11	3.80E-01 0	6.55E+00 0			0.00E+00 -1			
			12	6.42E-01 0	4.02E+00 0			0.00E+00 -1			
HE++	18.	152.	1	1.38E-04289	8.00E-02 0	1.7E+02 -27	6.81E+01289	0.00E+00 -1	3.26E-02 16	2.15E-03 20	1.46E-03
			2	-1.53E-04139	0.00E+00 -1		-3.29E+02109	0.00E+00 -1			
			3	2.45E-03 21	2.01E+01 12		1.88E+04 17	0.00E+00 -1			
			4	2.30E-03 26	2.13E+01 18		1.85E+04 18	-1.35E+02188			
			5	3.21E-05999	8.00E-02 0			-7.63E+02 55			
			6	-1.89E-04124	0.00E+00 -1			2.20E+04 20			
			7	2.61E-03 19	1.93E+01 9			-1.35E+02188			
			8	2.44E-03 24	2.05E+01 13			0.00E+00 -1			
			9	0.00E+00 -1	0.00E+00 -1			2.18E+04 22			
			10	1.23E-03156	1.91E+00 90			0.00E+00 -1			
			11	1.87E-03 32	2.48E+01 23			0.00E+00 -1			
			12	3.10E-03 65	1.57E+01 73			0.00E+00 -1			
HE+	18.	152.	1	6.44E-03 21	4.00E-02 0	1.6E+01 172	2.24E+03 21	0.00E+00 -1	9.71E-02 5	2.93E-03 20	1.98E-03
			2	9.39E-03 8	4.21E-01 5		9.95E+03 8	0.00E+00 -1			
			3	2.37E-02 5	5.99E+00 3		9.65E+04 5	0.00E+00 -1			
			4	3.31E-02 4	4.41E+00 4		1.06E+05 5	3.26E+03 38			
			5	1.20E-02 18	4.00E-02 0			3.04E+04 6			
			6	1.22E-02 7	4.25E-01 4			1.45E+05 6			
			7	2.63E-02 5	5.92E+00 2			1.62E+04 17			
			8	3.85E-02 4	4.18E+00 3			1.38E+04 13			
			9	0.00E+00 -1	0.00E+00 -1			1.28E+05 7			
			10	9.55E-03 8	4.03E-01 5			0.00E+00 -1			
			11	2.41E-02 5	5.92E+00 3			0.00E+00 -1			
			12	3.36E-02 4	4.35E+00 4			0.00E+00 -1			
O+	18.	152.	1	2.58E-01 7	4.00E-02 0	9.0E+00-132	4.49E+04 7	0.00E+00 -1	1.49E+00 1	7.85E-03 20	5.32E-03
			2	3.35E-01 2	6.13E-01 1		2.19E+05 2	0.00E+00 -1			
			3	4.23E-01 1	4.81E+00 1		7.50E+05 1	0.00E+00 -1			
			4	7.58E-01 1	2.96E+00 2		9.70E+05 1	5.90E+04 9			
			5	3.52E-01 6	4.00E-02 0			3.67E+05 3			
			6	4.05E-01 2	5.73E-01 1			9.88E+05 2			
			7	4.48E-01 1	4.75E+00 1			1.58E+05 8			
			8	8.52E-01 1	2.77E+00 1			3.50E+05 3			
			9	0.00E+00 -1	0.00E+00 -1			8.20E+05 3			
			10	3.44E-01 2	6.04E-01 1			0.00E+00 -1			
			11	4.30E-01 1	4.76E+00 1			0.00E+00 -1			
			12	7.74E-01 1	2.91E+00 2			0.00E+00 -1			

3. REPRODUCING FORMAT4 HARDCOPY

Storing months or years of data in the full Format4 is rather unwieldy, regardless of storage medium. Only one of the 5 data pages of the Format4, the fourth page, has been provided in the form of hardcopy for each of the many processed time segments, as described in the next section. However, the remaining 4 pages can be easily reproduced from the data summary tapes provided (see Appendix E), using the combined analysis and plotting program that is also provided on tape (see Appendix C). This method has the additional advantage that the user himself can modify the data analysis and/or the plotting by editing the code which is written in Fortran. The data on the summary tapes have not been analyzed but consist of time averaged ion count rates, sorted by ion energy, direction of motion and species (H^+, He^{++}, He^+, and O^+), as well as ephemeris and other ancillary information (see Appendix D). The data analysis is performed automatically by the Fortran code prior to the plotting and can be modified if desired.

There are two versions of the analysis/plotting program (cf. Appendix C), each stored on a separate magnetic tape (1/2 inch, 9 track, 1600 bytes/inch). One version calls the Versatec Versaplot V07 graphics subroutines, and the other calls the Precision Visuals DI-3000 graphics subroutines. Both versions can be run with a single command from a computer terminal keyboard, once the code has been copied to the computer memory (disk space), but each version has its specific advantages and disadvantages. The Versaplot V07 version is the original program developed at the Lockheed Palo Alto Research Laboratory and may be the simplest to use, especially if the code is to be modified, but it requires that the current computer operating system supports a Versaplot V07 graphics algorithm. This version produces plots of the kind illustrated in the previous section. The DI-3000 version is a more recent and more complex program, as far as the plotting is concerned, but the Fortran code is device independent so this version can be run with several different graphics devices, including the high-resolution QMS Lasergrafix 1200. The plots produced by this version have some cosmetic improvements over those illustrated in the previous section. Both versions perform the data analysis in exactly the same fashion, however.

Whichever version of the analysis/plotting program is to be run the entire content of the plotting tape (64 blocks in the Versaplot version and 85 blocks in the DI-3000 version) should already be copied to a suitable directory in the computer memory (disk space). Unless it is modified by the user, the analysis/plotting program recognizes this directory as its default directory and presumes that it contains not only the program itself but also the data input (any one of the files from the data summary tapes), and it stores the output in this directory as well (plot files and printable files). This directory should therefore be authorized to use up to 40,000 blocks of space (with 512 bytes in each block).

The analysis/plotting program has been developed on a DEC VAX-11/780 and uses the VAX/VMS VERSION 3.0 command language. The source code is written in VAX-11 Fortran V3.0. If the program is to be run on such a computer, using the same or a higher level operating system, it should not require any modification, except perhaps an adjustment of the link statement that is part of the command stream (see Appendix B). The program is intended to run as a "push

button" process. The first time it is run it will compile and link automatically. The "push button" operation consists of entering a command from the key board of an interactive terminal with alphanumeric video display, provided a data file corresponding to one of the ISEE-1 orbital revolutions has already been copied to the same directory as the program (less than 4000 blocks). This command may be one of the following examples:

3.1 Running the Versaplot Version

If, for example, the data from revolution number 207 are to be analyzed and plotted, the first step is to copy file R207.DAT from the appropriate summary tape to the directory containing the program. The summary tapes are standard 1/2 inch tapes with 9 tracks and 1600 bytes/inch (see Appendix E). If it is most convenient to run the program in interactive mode, then enter the command

```
@ MASPLOT  207  I
```

This will produce a printable file OUT.DAT, which contains data page 5 of Format4 for each of the time segments (36 segments in this example) and two plot files named VECTR1.PLV and PARM.PLV, which together contain the accompanying data pages 1, 2, and 3. To produce the actual plots in hardcopy an additional command has to be entered, a command that must be tailored to the current operating system, depending on the particular Versaplot algorithm that is implemented.

Running the program interactively may be impractical, however, since it may require a considerable CPU time (up to 11-12 minutes). To run it in batch mode enter the shorter command

```
@ MASPLOT  207
```

This will return a request for the name of a batch queue to the screen, which has to be entered from the keyboard in order for the batch program to start running. The output is the same as in the interactive mode.

Note: if the program is to be run for the first time with the current operating system it may be necessary to change one line of the link command in the command file named MASPLOTB.COM (by editing) to ensure that it links to the proper library of system graphics subroutines. For more details on the program usage see comments in MASPLOTB.COM (Appendix B).

3.2 Running the DI-3000 Version

Running this version of the program is analogous to running the Versaplot version, except that it offers a choice of 3 plotting devices. If it is to be run with plotting device number 10, for example, and run in interactive mode, then enter the command

```
@ MPLOT  207  I  10
```

This will produce the same printable file OUT.DAT and, if device 10 is a QMS Lasergrafix 1200, a plot file named QMS.DAT which can then be plotted by entering the appropriate (system dependent) plot command from the keyboard.

To make the same run in batch mode enter the command

```
@ MPLOT  207  B  10
```

This will return a request for the batch queue name, which has to be entered from the keyboard.

If the device number is left out from these commands the program will run with a default device which is set to 9 and can be simply changed by inserting a different number in the command file named MPLOT.COM (by editing). To run the program in batch mode, using the default plotting device, simply enter the command

```
@ MPLOT  207
```

Note: the current operating system may use different device numbers than originally presumed in the program, even if the physical plotting devices are the same. In that case it is necessary to insert new numbers in the link-related commands in the command file named MPLOTB.COM (by editing). If the physical plotting devices are also different it may be necessary to modify the device driver name in the link commands as well. For more details on the program usage see comments in MPLOTB.COM (Appendix B).

3.3 On the Data Summary Files ("R-Files")

Although each separate data file corresponds to one orbital revolution of the ISEE-1 spacecraft the size of the different files varies a great deal (maximum size about 4000 blocks), mainly because different files contain a different number of time segments. Only those segments are included during which the instrument was being operated in a mode suitable for the Format4 data format.

A suitable mode of operation included complete scans of the entire energy range of the instrument, as well as monitoring the proper portions of the mass/charge range at regular intervals. Those segments during which the instrument was entirely dedicated to low-energy observations have been excluded, as have those segments during which it was dedicated to solar wind observations. The latter means that the size of the data files varies with the time of the year, being the largest during the winter and spring months when the ISEE-1 orbit was largely within the magnetosphere. Furthermore, the instrument was ordinarily turned off while the spacecraft traversed the inner radiation belts, as a precautionary means of prolonging the lifetime of the particle counters. This procedure, which was controlled by commands from the ground, sometimes generated inadvertantly long gaps in the data stream.

4. SUPPLEMENTARY HARDCOPY (AVAILABLE) (on fiche as NSSDC ID 77-102A-12G)

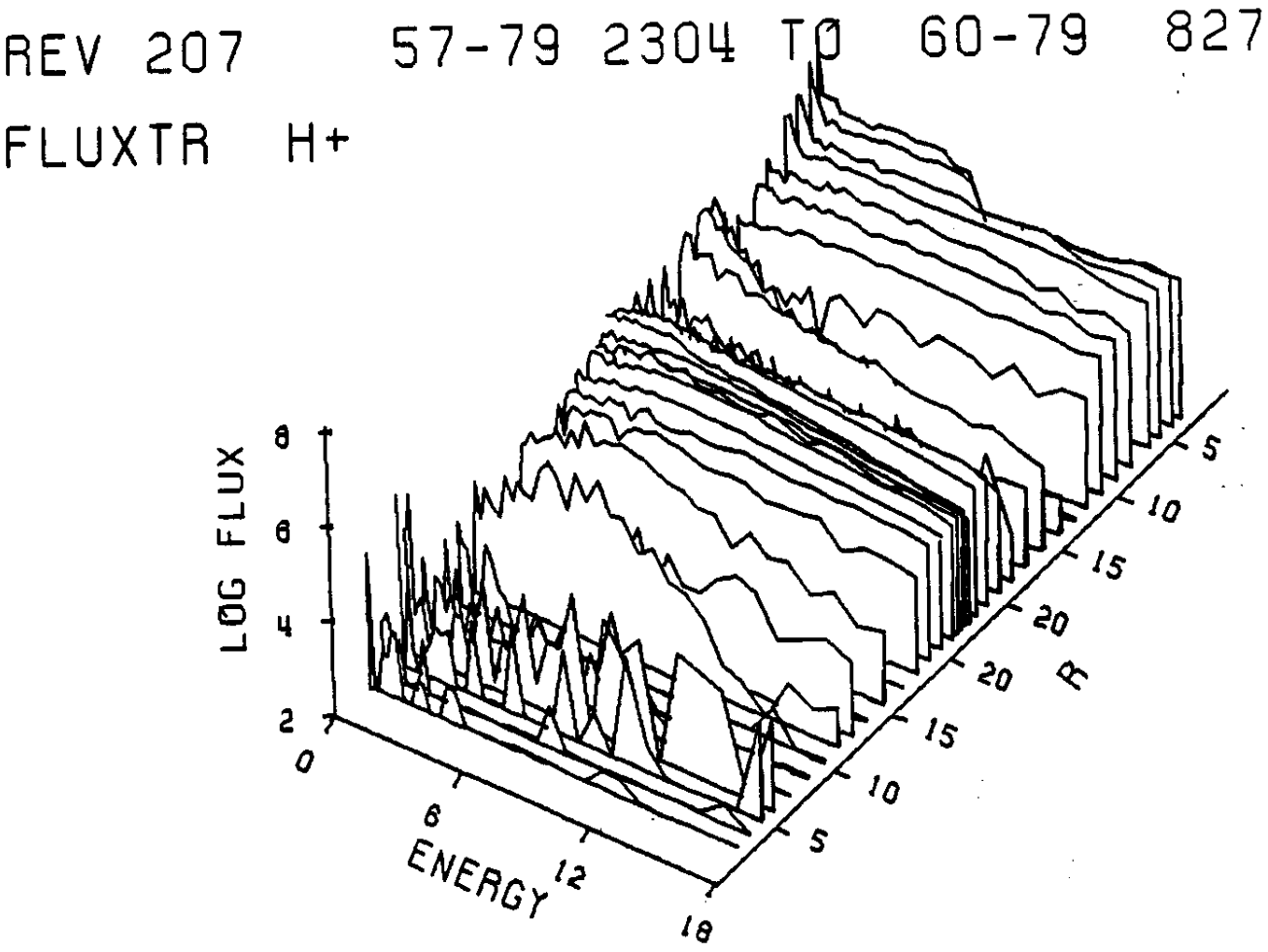
The principle purpose of data page 4 of Format 4 (see Section 2) is to provide a qualitative picture of the plasma environment, as observed by a conventional particle analyzer without mass discrimination. This data page substantially duplicates the information from some of the other particle instruments on the ISEE-1 and -2 spacecraft, but has the advantage of being readily available for comparison with the mass analyzer data.

In order to make it a practical instrument for the identification of various plasma regions, this data page has been produced in hardcopy for all the processed time segments and assembled into a library of bound volumes which accompanies the data summary tapes. Each volume in this library covers one orbital revolution of the ISEE-1 and thus corresponds directly to one data file ("R-file") on a summary tape. The format and content of this data page were already described in Section 2, but it should perhaps be mentioned here, as a further clarification, that each data point is plotted at a universal time that corresponds to the end of a data accumulation, a time when sufficient data have been accumulated to calculate complete moments. This typically occurs at intervals of 1-3 minutes, but may occur less frequently when portions of the data have been classified as "noisy" by the data analysis program and therefore been discarded.

In addition to the hardcopies of data page 4, each volume also has a series of 3-dimensional plots of differential flux spectra for different ions, altogether 7 plots, and a table of all the time segments covered in that volume. Each one of these 7 plots shows all the spectra of a certain kind that were obtained during a particular orbital revolution, arranged according to geocentric radial distance, as illustrated on the next page. The flux has been averaged over each time segment and is plotted in units of particles/(cm^2 sec steradian keV) versus energy in units of keV.

There are two plots each for the H^+ and the O^+, one showing "transverse" flux ("FLUXTR"), averaged over pitch angles between 45° and 135°, and one showing "parallel" flux ("FLUXPL"), averaged over pitch angles less than 45° and greater than 135°. There is only one plot each for the He^+ and the He^{++}, showing flux averaged over all pitch angles. The seventh plot is a representation of the background count rate (same for all energies), normalized with the instrument response function (energy dependent) to appear as a flux spectrum.

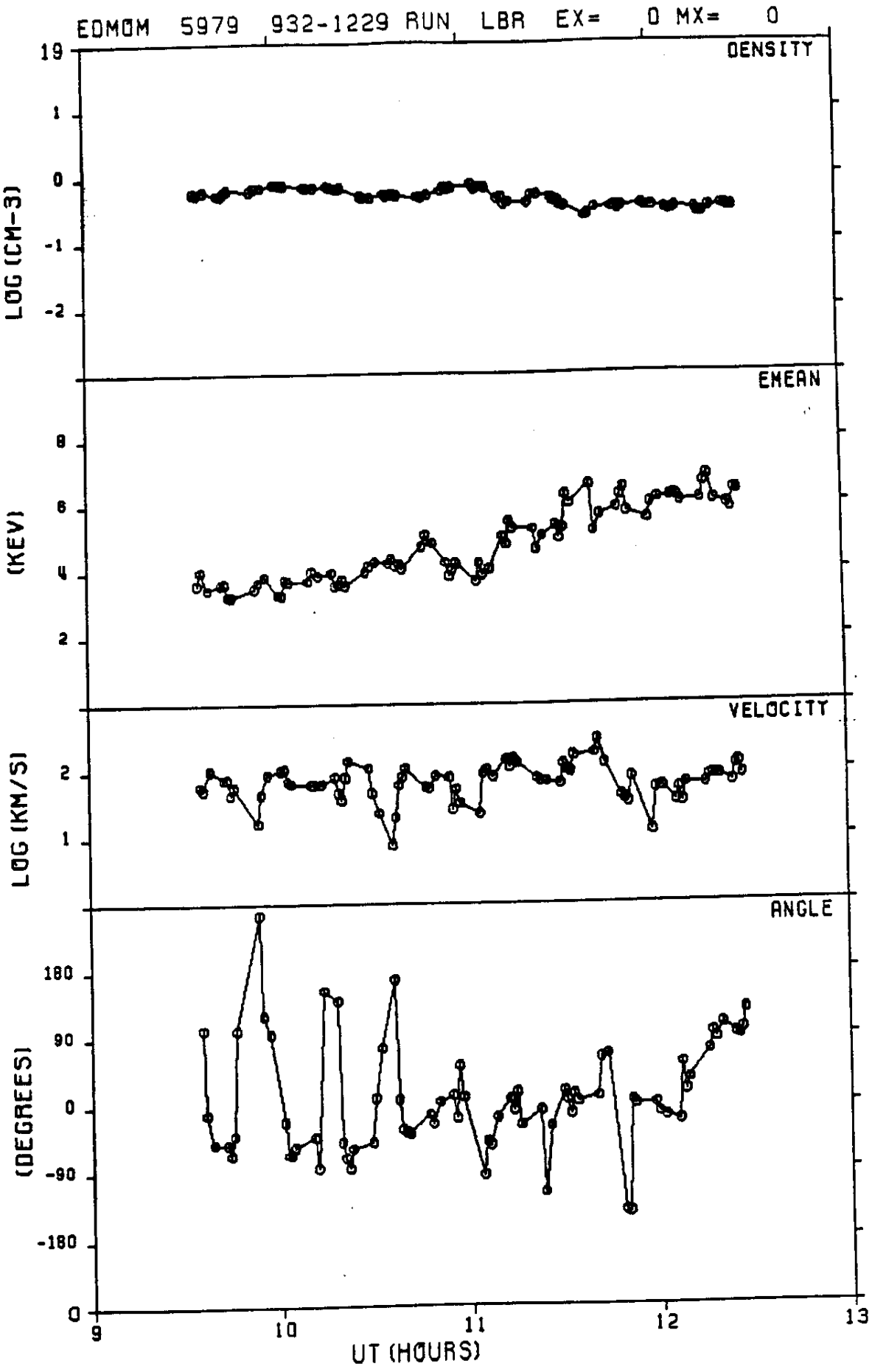
The purpose of these 3-D plots is to provide a compact illustration of the extent and type of data available from a particular orbital revolution. Even though these 7 plots show data from the mass analyzer, including all the four major ions, the information is almost purely qualitative and cannot replace the data on the summary tapes, only supplement. The following three pages are samples of the three kinds of hardcopies included in each volume.



One of 7 sets of spectra for a given orbital revolution. This one shows transverse flux of the H^+ (pitch angle between 45° and 135°). The other sets show parallel flux of the H^+ (pitch angle less than 45° or greater than 135°), transverse and parallel flux of the O^+, angularly averaged flux of the He^{++} and the He^+, and the flux equivalent of the background count rate.

SEGMENT	DAY	UT1	UT2	R1	R2	LT1	LT2	ML1	ML2
1	5779	2335	2359	2.3	3.3	19.8	21.8	58.5	56.6
2	5879	1	29	3.4	4.5	21.9	23.0	56.3	51.2
3	5879	32	59	4.6	5.5	23.1	23.7	50.8	47.4
4	5879	102	128	5.6	6.5	23.7	0.1	47.1	44.8
5	5879	132	229	6.8	8.2	0.1	0.6	44.6	41.7
6	5879	232	329	8.2	9.6	0.6	0.9	41.6	39.9
7	5879	332	429	9.7	11.0	0.9	1.1	39.8	38.6
8	5879	433	529	11.0	12.1	1.1	1.3	38.5	37.2
9	5879	534	629	12.2	13.2	1.3	1.4	37.0	35.4
10	5879	632	759	13.3	14.7	1.4	1.6	35.3	32.0
11	5879	802	959	14.7	16.3	1.6	1.7	31.8	25.7
12	5879	1002	1159	16.4	17.7	1.8	1.9	25.5	18.3
13	5879	1202	1359	17.8	18.9	1.9	2.0	18.2	11.0
14	5879	1402	1559	18.9	19.9	2.0	2.1	10.8	4.8
15	5879	1602	1859	19.9	21.0	2.1	2.2	4.7	0.0
16	5879	1902	2159	21.1	21.8	2.2	2.3	0.0	1.6
17	5879	2202	2319	21.8	22.1	2.3	2.4	1.6	4.0
18	5979	102	359	22.3	22.4	2.4	2.5	7.8	14.1
19	5979	402	629	22.4	22.3	2.5	2.6	14.2	16.3
20	5979	632	929	22.3	21.8	2.6	2.7	16.3	12.8
21	5979	932	1229	21.8	21.0	2.7	2.8	12.6	3.7
22	5979	1232	1529	21.0	19.9	2.8	2.9	3.5	-7.0
23	5979	1532	1729	19.9	18.9	2.9	3.0	-7.1	-12.8
24	5979	1733	1929	18.8	17.7	3.0	3.1	-13.0	-16.5
25	5979	1932	2129	17.7	16.3	3.1	3.2	-16.5	-17.5
26	5979	2133	2329	16.2	14.6	3.3	3.4	-17.4	-16.3
27	5979	2332	59	14.6	13.2	3.4	3.5	-16.3	-14.8
28	6079	103	159	13.1	12.1	3.5	3.6	-14.7	-13.9
29	6079	202	259	12.0	10.9	3.6	3.8	-13.9	-13.5
30	6079	302	358	10.8	9.6	3.8	4.0	-13.5	-13.8
31	6079	402	459	9.5	8.1	4.0	4.2	-13.9	-15.5
32	6079	502	535	8.0	7.1	4.2	4.4	-15.6	-17.4
33	6079	603	629	6.3	5.4	4.7	5.0	-19.6	-22.6
34	6079	632	659	5.3	4.4	5.0	5.5	-23.0	-27.7
35	6079	702	728	4.3	3.3	5.6	6.5	-28.3	-35.5
36	6079	732	739	3.1	2.8	6.7	7.2	-36.9	-39.6

One table of time segments (averaging intervals) for each orbital revolution. The numbers 1 and 2 refer to the beginning and end of each segment, and the letters R, LT and ML refer, respectively, to geocentric radial distance (R_E), geographic local time (hours and 1/10 hours), and geomagnetic latitude (degrees).



One set of graphs (one page) for each time segment of each orbital revolution. This is page 4 of Format4 (assuming total ion count rate is due to the H^+).

5. A NOTE ON THE CALIBRATION

As described in Section 1, the ions that are selected by the mass analyzer are counted two ways, using two different thresholds for the signal from the particle detector ("mass detector"). The lower threshold, called MD1, virtually ensures that every ion is counted, as long as the count rate stays below a certain saturation level, a level that is almost never reached in the magnetospheric plasmas. This threshold, however, also admits a comparatively high proportion of background counts caused by penetrating high-energy radiation (mostly MeV electrons and associated x-ray bremsstrahlung), which can be a serious problem in certain regions of the magnetosphere, especially in the radiation belts. This is less of a problem with the higher threshold, called MD2, but with that threshold the chances are greater that some of the ions selected by the mass analyzer are not counted either.

With the aging of the particle detector in orbit an increasing proportion of the ions has proved to be excluded by the MD2 threshold, making a periodic recalibration necessary. The procedure for this has been to intercompare the count rates at the two thresholds during conditions of minimum background, and assign a correction factor to the MD2 threshold that would make the two count rates equal. There is no indication that the MD1 threshold has excluded a significant proportion of the ions during the lifetime of the experiment.

The count rates stored on the data summary tapes are almost exclusively those obtained with the MD2 threshold. Which threshold has been used is indicated by the parameter "MDTCR" (word number 4), which is either 1 or 2 (see Appendix D). The count rates obtained with MD2, indicated by "MDTCR" = 2, are not corrected on the tapes, but the correction factor is calculated and applied by the analysis/plotting program.

The correction factor is a function not only of time but also of ion energy and species. The functional dependence on time is assumed to be linear between the dates when recalibrations were made (twice yearly). The calculation of the correction factor is done in that part of the analysis/plotting program which is called "FORMAT4.FOR", using parameters stored in the file called "COMMON.FOR". In the versaplot version of the program "FORMAT4" is the main program, in the DI-3000 version it is the first part of the subprogram called "DATANALYS.FOR" (see Appendices B and C).

6. KNOWN DATA ANOMALIES

The two principal areas where data quality is a concern are in the instrument performance and the data transmission to earth. Both areas were thoroughly researched prior to the production of the data summary tapes, and a number of computer routines were developed that would identify and correct or exclude erroneous data, but the end product is known to have certain remaining anomalies nevertheless.

6.1 Instrument Performance (Sensitivity Auto-Range)

As described in Section 1, the particle detectors can be operated at either of two sensitivity levels and can be programmed to switch automatically from high to low sensitivity if the count rate exceeds a certain limit (~ 6000 counts per minor frame). The latter is referred to as the sensitivity "auto-range" and has the dual purpose of preventing a saturation of the particle counting and prolonging the useful life span of the particle detectors. In this auto-range mode the sensitivity is automatically reset to the high level at the beginning of each control group in the instructions from the random access memory, typically every few seconds.

This auto-range feature was usually enabled during the first couple of years of operation of the experiment and affects a minor portion of the data, both on the summary tapes and on the hardcopies. The data that are affected are almost exclusively from the magnetosheath region or the solar wind and must be treated with great caution. Even though the instrument response is known at both sensitivity levels the state of transition from high to low level is quite difficult to treat in a routine fashion.

During the production of these time-averaged data the counts accumulated at low sensitivity have simply been treated as a data dropout and deleted, beginning with the minor frame where triggering occurred and ending with the last minor frame before the resetting to high level. This may be repeated many times during a given time segment. The aggregate time in seconds of all these deletions is shown at the top of the hardcopies of data page 4 of Format4, indicated by the variables EX and MX (cf. Section 2). The "EX" refers to the "energy detector", the one that receives ions of all M/Q simultaneously, the "MX" referes to the "mass detector", the one that only receives ions of a certain M/Q at a given time. Usually EX shows a greater aggregate time of deletion than MX, by a factor of 4-5, since the "energy detector" is subject to the proton flux also when the "mass detector" is only subject to minor ions. There is no consistent relationship between EX and MX, however, because the two detectors respond to ions with slightly different initial direction of motion (a few degrees) and thus respond differently to strongly directional ion flows.

It is advisable to avoid all time segments that have EX > 0 or MX > 0, since the selective exclusion of high count rates may introduce a systematic bias of one kind or another. If MX shows an aggregate time that is a significant fraction ($\geq$ 5%) of the whole time segment, for instance, it usually implies that the averaged count rate of protons is strongly underestimated in comparison with the count rates of minor ions, causing a bias in the apparent ion composition.

In order to facilitate the exclusion of time segments with MX > 0 those segments have been listed in a file named MXFLAG.DAT which is stored on the same magnetic-tapes as the analysis/plotting programs (see Appendix C). Each line in this file represents one time segment and contains the following three numbers:

orbital rev. number segment number index

The "segment number" is analogous to the segment numbers in the table on page 23. The "index" is a redundant number (either 1 or 2) representing a subjective classification of the segment. All time segments included in this list have MX > 0, regardless of this index.

6.2 Data Transmission (Telemetry Noise)

Identifying and eliminating the effects of occasional errors in the data transmission are never trivial but are especially difficult during routine data processing. There are basically two methods available, one that relies on the "data quality flags" (bits) in the transmitted signal, and another that relies on the often "conspicuous" appearance of erroneous data. Both methods were used extensively during the production of the summary tapes but it appears in retrospect that some spurious effects went undetected.

6.2.1 Erroneous count rates. Transmission errors often show up in the form of large random numbers occupying all of the bit positions reserved for the count rates, in contrast to the typically much smaller numbers representing true count rates, and can be filtered out by a simple computer routine. Occasionally, however, the erroneous numbers are also within the limits specified in such a routine and can only be recognized later on when viewed in a particular context. The latter situation appears to apply to the following time segments:

Rev. No.	Segment No.	Year	Day	U.T.
60	18	1978	72	17:31 - 19:33
211	4-11	1979	67-68	15:02 - 1:13
211	12-20	1979	68-69	2:06 - 1:59
211	21	1979	69	2:02 - 4:59
220	11-12	1979	89	10:00 - 13:59
220	14	1979	89	16:00 - 17:59
221	13	1979	91-92	23:32 - 1:28

These segments still have some useful data, which becomes evident upon inspection, but should be treated with caution. These are not necessarily the only segments containing erroneous count rates, but are the only such segments discovered at the time of this writing. It is advisable to keep in mind that apparent "anomalies" in the data may in fact be transmission errors.

6.2.2 Erroneous magnetic field. The data summary tapes include data from the ISEE-1 magnetometer (C. T. Russell, IEEE Trans. Geosci. Electron., GE-16, page 239, 1978), in both explicit (data words 11 and 12)and implicit forms (pitch angles), which have also been screened with respect to artificially large numbers. As with the count rates there are probably some erroneous values remaining on the data summary tapes.

There is, however, another and more subtle cause for erroneous magnetic fields, namely an occasional error in the transmitted flags (bits) that show the flip and gain status of the magnetometer. Especially the gain status (high or low) appears in retrospect to have been a matter of some confusion by the data averaging program, presumably in conjunction with transmission errors. Incorrect information about the gain status translates into a magnetic field that is in error by a factor of 32. Fortunately this error affects all three components of the magnetic field equally and usually has no effect on the pitch-angle calculation. It does affect the beta values, but those are not stored on the data summary tapes, but are calculated by the analysis/plotting program and can very easily be corrected afterwards, given the correct magnetic field (see Section 2 for a definition of the beta value used here). Examples of erroneous magnetic field magnitudes can be found in the following time segments:

Rev. No.	Segment No.	Year	Day	U.T.
55	29	1978	61	18:31 - 19:29
211	4-11	1979	67-68	15:02 - 1:13
211	12-20	1979	68-69	2:06 - 1:59
211	21-22	1979	69	2:02 - 6:59

APPENDIX A: DETAILED EXPLANATION OF FORMAT4

a.1 Experiment

The ISEE-1 spacecraft (along with ISEE-2) was launched on October 22, 1977, into an orbit with apogee at 23 R_E and perigee at about 300 km-altitude and with an inclination of 29° relative to the equatorial plane. The orbital period is about 57 hours. The plasma composition experiment consists of two identical ion mass spectrometers with fields of view centered 5° above and below the spacecraft spin plane, respectively. The spin plane is nearly parallel to the solar ecliptic plane, and the spin rate is approximately 20 rpm. For a technical description of the instrument, see Shelley, E. G., et al., Plasma Composition experiment on ISEE-A, IEEE Trans. Geosci. Electron., GE-16 266, 1978.

In brief, each mass spectrometer consists of an electrostatic energy analyzer followed by a mass analyzer with crossed electric and magnetic fields, and a particle detector in the form of a modified Johnston electron multiplier. Both spectrometers cover the energy per charge range from 0 eV/e to 17 keV/e in 32 channels and the mass range from < 1 to > 150 amu in 64 channels. The energy and mass ranges and scan rates are controlled through an onboard random access memory which can be programmed from the ground.

The data included in Format4 all derive from one of the two spectrometers, the one that has its field of view centered at 5° below the solar ecliptic plane. The instantaneous field of view extends over approximately 10° in the spin direction and over 10° - 35° in the perpendicular direction. The latter width varies with energy and is the largest at low energy and close to 10° for E/Q > 6 keV/e.

The center energy E_c of each of the 32 energy channels is, in order of increasing channel number and in units of keV/e:

1-8: 0.040, 0.21, 0.41, 0.63, 0.85, 1.10, 1.35, 1.63,

9-16 1.93, 2.24, 2.58, 2.93, 3.32, 3.72, 4.15, 4.60, (1)

17-24: 5.08, 5.59, 6.13, 6.71, 7.33, 8.00, 8.70, 9.45,

25-32: 10.2, 11.1, 12.0, 12.9, 13.9, 15.0, 16.1, 17.4.

With the exception of the lowest energy channel the energy bandwidth (FWHM) is approximately given by

$$E_c \pm \Delta E \approx E_c \pm 0.025\ (E_c + 3.0) \qquad (2)$$

The lowest energy channel basically extends from 0 eV/e to approximately 110 eV/e. However, all data in Format4 have been collected with a retarding potential of 10 eV/e applied to the entrance of the instrument, in order to exclude the major portion of the cold plasma in the plasmasphere. The cold plasma is studied in a separate mode of operation (utilizing a retarding potential analyzer in the instrument entrance) and is not included here. Hence,

Lowest energy channel: 10 eV/e - 110 eV/e (3)

The main particle counter. which records ions that have been selected according to mass per charge as well as energy per charge, is referred to as the "mass detector" in this data description. Besides this counter the instrument also has a channeltron counter placed in the stream of particles that have passed through the electrostatic analyzer but have not yet passed through the mass analyzer. This counter is referred to as the "energy detector" here. It is an auxiliary monitor of the energy distribution of the ions but has no mass discrimination. The main purpose of the "energy detector" is to provide data with higher time resolution than is possible with the "mass detector".

Each plasma sample is taken with fixed energy and mass channels and requires 1/4 or 1/16 seconds depending on the telemetry bit rate available. The slower bit rate (that is 1/4 sec sampling time) has typically been used during 4 out of 5 spacecraft orbits.

a.2 Data Interpretation

Background Subtraction

The signal from the particle counters often contains a non-negligible background due to penetrating high-energy particles (mostly MeV electrons). As far as the "mass detector" is concerned the background count rate is monitored by regularly resetting the mass analyzer to a mass-per-charge value of 0.7 amu (mass channel 64). The measured background count rate is subtracted from the count rates in the signal channels prior to any data interpretation This procedure leaves a certain error, due to statistical and other fluctuations in the count rates, which propagates through all the moment calculations. Consider for example the number density n of a given ion species. If the temporal fluctuations of the count rates over a given time period are entirely due to counting statistics (Poisson statistics) the error in n can be expressed as a standard deviaton σ_n,

$$n \pm \sigma_n, \tag{4a}$$

defined by

$$\sigma_n^2 = \sigma_n^2(b1) + \sigma_n^2(b2) + \sigma_n^2(ion), \tag{4b}$$

where $\sigma_n(b1)$ is due to the background subtraction, $\sigma_n(b2)$ is due to background contribution in the signal channels and $\sigma_n(ion)$ is due to the real ion counts. The first term in the background contribution, $\sigma_n^2(b1)$, can be calculated directly from the measured background count rate and can be used to estimate the second term, $\sigma_n^2(b2)$. The sum of the second and third term on the right hand side in (4b) can be derived from the count rates in the signal channels. of course. The standard deviation thus defined calculated according to Poisson statistics. and the corresponding standard deviation of all other quantities are shown as error bars in the plots and as percentage errors in the printed output.

In reality the temporal variations in the background counts are not purely random. however but have a systematic trend in many cases. Such a trend may increase the error, because the background and signal channels are sampled at

slightly different times. As a conservative standard, it is suggested that a density n of a certain ion species should satisfy

$$n > 3\sigma_n(b) = 3[\sigma_n^2(b1) + \sigma_n^2(b2)]^{1/2} \qquad (4c)$$

in order to be statistically significant. The right hand member in (4c) is used to define a quantity called "density upper limit." That is, if n does not satisfy (4c), the right hand member may be taken to be a probable upper limit on the real number density. As a further precaution, $\sigma_n(b1)$ is calculated in two ways. One is using formal Poisson statistics, the other is using the actually measured fluctuations of the background samples relative to the average background count rate over a given time period. The ratio between the "measured" standard deviation and the Poisson standard deviation is shown on data page 5 as "RATBG" (top line). In defining the "density upper limit" (called "DNSULIM" on data page 5) the larger of the two standard deviations is being used.

Angular Sampling

Each particle sample (1/4 or 1/16 sec) has been sorted into one of 16 angular bins, depending on the look direction of the instrument. These angular bins are defined in terms of two angles, one is the angle ϕ in the spacecraft spin plane (approx the solar ecliptic plane), the other is the angle α with respect to the measured magnetic field. Both angles refer to the direction of motion of particles at the midpoint of the sampling interval. The bins are defined as follows:

	bin no.		bin no.	
$0^\circ \leq \alpha \leq 15^\circ$	13	$-195^\circ \leq \phi < -165^\circ$	1	$\phi = 0^\circ$ is towards the sun (bin no. 7)
$15^\circ < \alpha < 45^\circ$	14	$-165^\circ \leq \phi < -135^\circ$	2	
$45^\circ \leq \alpha \leq 135^\circ$		$-135^\circ \leq \phi < -105^\circ$	3	
$135^\circ < \alpha < 165^\circ$	15	⋮	⋮	$\phi = 90^\circ$ is towards dusk (bin no. 10)
$165^\circ \leq \alpha \leq 180^\circ$	16	$135^\circ \leq \phi < 165^\circ$	12	

When the pitch angle is in the interval $45^\circ \leq \alpha \leq 135^\circ$ the angle ϕ in the spin plane is divided into 12 bins, each with a width of 30°. One bin is centered at $\phi = 0^\circ$ and corresonds to particles moving towards the sun. The bin that is centered at $\phi = 90^\circ$ corresponds to particles moving in the duskward direction. Hence, the angle ϕ is approximately the longitudinal angle in geocentric solar ecliptic coordinates.

The count rates within any given angular bin, and within given energy and mass channels, are averaged over time for specified time periods, usually varying from about 30 minutes to 3 hours, depending on the spacecraft location. The particular choice of these 16 angular bins is intended as a compromise between a good angular resolution and good counting statistics.

Moment Calculations

Since the instrument essentially only scans a 2-dimensional subregion of the particle velocity space, it is necessary to make certain assumptions about the angular distribution of the particles in order to calculate velocity moments. Three basically different assumptions have been used here, resulting in three sets of velocity moments, as follows.

I. The ion fluxes are assumed to be isotropic in the s/c frame of reference, and only those samples are included in the calculations which have the pitch angle in the range

$$45^{o} \leq \alpha \leq 135^{o} \tag{5}$$

Samples from a given energy channel, which satisfy (5), are averaged together regardless of spin angle ϕ, and the integral over velocity space is approximated by

$$\iiint \ldots v^{2} d\Omega dv \approx 4\pi \{\sum_{\varepsilon} \ldots v_{\varepsilon}^{2} \Delta v_{\varepsilon}\} \tag{6}$$

where $d\Omega$ is the solid angle element and ε denotes any of the 32 energy channels. The variable differential Δv_{ε} is generally defined by the distance between adjacent energy channels (see below). In many regions of the magnetosphere the samples are automatically restricted to (5) by the orientation of the magnetic field lines relative to the s/c spin plane.

II. The ion fluxes are assumed to be gyrotropic in the s/c frame of reference (that is, they depend on the pitch angle α but they do not depend on the gyro phase angle). In this case all samples are included in the calculations and are averaged separately within each of the 5 pitch-angle bins defined above. The moments are calculated by substituting the appropriate volume element in (6) with those actually sampled:

$$\iiint \ldots v^{2} d\Omega dv \approx \{4\pi - \sum_{\alpha} \Delta\Omega_{\alpha}\} \cdot \{\sum_{\varepsilon} \ldots v_{\varepsilon}^{2} \Delta v_{\varepsilon}\}_{\perp} + \sum_{\alpha} [\Delta\Omega_{\alpha} \cdot \{\sum_{\varepsilon} \ldots v_{\varepsilon}^{2} \Delta v_{\varepsilon}\}_{\alpha}], \tag{7}$$

where α refers to any of the four pitch-angle ranges not covered by (5), and "$\perp$" refers to "perpendicular" samples taken within (5). The solid angle elements $\Delta\Omega_{\alpha}$ can have the values 0.21 and 1.63 steradians. In case a bin has not been sampled, the phase space density there is assumed equal to that in the adjacent bin closer to 90^{o}.

III. The ion fluxes are assumed to be isotropic in a frame of reference that moves in the spin plane of the s/c. Only those samples that satisfy (5) are included in the calculations, and those are averaged separately within each of the twelve spin-angle bins. As a first step in these calculations, a plasma drift velocity (within the spin plane) is inferred by the following calculations.

$$v_{dx} = \{\frac{\pi}{4} \sum_{\phi} f(\epsilon,\phi) v_\epsilon^{\,3} \cos\phi\, \Delta v_\epsilon\} / \{\sum_{\phi} f(\epsilon,\phi)\, v_\epsilon^{\,2} \Delta v_\epsilon\} \qquad (8a)$$

$$v_{dy} = \{ \text{---"---"---} \sin\phi \text{ ---} \} / \{ \text{---"---} \} \qquad (8b)$$

where ϕ refers to the center angle of any of the 12 spin angle bins defined above, and $f(\epsilon, \phi)$ denotes the time averaged phase space density within each energy channel in each angular bin. In cases of missing samples f is interpolated between two adjacent and symmetrically located bins, in order to suppress an artificial angular dependence. The next step consists of transforming each measured kinetic energy of the particles $mv_\epsilon^2/2$, to the energy relative to the drifting plasma frame, $m(v')^2/2$:

$$(v')^2 = v_d^{\,2} + v_\epsilon^{\,2} - 2v_d v_\epsilon \cos\Psi \qquad (9)$$

where $v_d^{\,2} = v_{dx}^{\,2} + v_{dy}^{\,2}$, and Ψ is the angle between the plasma drift direction and the direction of motion of particles in a given sample. The final step is analogous to the calculations in I, except that v' is used instead of v_ϵ in (6). Actually, the quantity $v_\epsilon^{\,2}\Delta v_\epsilon$ in (6) is replaced with a quantity $v_{\epsilon'}^{\,2}\Delta v_{\epsilon'}$, which is formed by using two of the existing energy channels of the instrument, one of which gives the best approximation of $m(v')^2/2$. Any sample that corresponds to an energy $m(v')^2/2$ that falls outside of the energy window of the instrument is discarded in this context.

All three of the methods listed above employ the same routine of integration in energy, namely a trapezoidal integration. In the case of a number density, for example, it amounts to the following approximation:

$$\int f(\vec{v})\, v^2 dv = 2^{1/2} m^{-3/2} \int f(\vec{v})\, E^{1/2} dE$$

$$\approx 2^{1/2} m^{-3/2} \sum_i \{f'(E_i) E_i^{\,1/2} + f'(E_{i+1}) E_{i+1}^{\,1/2}\} \{E_{i+1} - E_i\}\, 2^{-1} \qquad (10)$$

where, in general, i denotes the integer number of an energy channel, E_i is the center energy of that channel, and the phase space density f' is obtained from the particle flux by multiplication with a factor $m^2/(2E_i)$. In a few cases, however, the integration is modified to begin or end at the edge of an energy channel, rather than at the center energy. This is done by adding an extra term, assuming a constant particle flux ($\sim f \cdot E$) throughout the energy channel.

Only those energy channels that have been sampled are included in the summation in (10). If samples are missing from an endpoint channel it is assumed that the flux in that channel would have been the same as in the closest sampled channel. If the number of unsampled channels exceed certain limits the integration in (10) is abandoned. This is indicated by a standard deviation equal to -1 (see data page 5).

Numerical Accuracy

There are many conditions affecting the accuracy of the calculated moments. One is, of course, the absolute calibration of the instrument. This is believed to be better than 30% and to affect the various mass and energy

channels in approximately the same fashion. Another condition is the counting statistics. This varies a great deal but is well known in each calculation. Almost all moments are calculated with a standard deviation resulting from the propagation of the individual standard deviations of the statistically independent samples.

The potentially worst conditions are associated with the assumptions in I-III above. Provided each assumption is correct and provided the statistical uncertainties are zero, the numerical procedures are themselves fairly acurate. The procedure in III, for example, has been thoroughly tested against simulated data representing a convecting Maxwell-Boltzmann distribution. With a convection in the spin plane at Mach numbers $\lesssim 3$ the procedure gave number densities and mean energies that were generally within a few % of the values obtained with no convection. The velocity defined by (8) proved to give a good reproduction of the exact velocity. The results were a considerable improvement over Procedure I. However, if the convection had a large angle with respect to the spin plane, Procedure III increased the errors relative to Procedure I. In reality, the drift velocity calculated in (8) can also be biased by temporal fluctuations in the sampled fluxes, and the resulting density and mean energy thus misleading.

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11/4/86

APPENDIX B: PRINTOUTS OF COMMAND FILES

The following 10 pages are printouts of two pairs of command files that are designed to run the Format4 analysis/plotting programs in as much of an automatic fashion as possible. The first pair (pages B2-B5) will run a plotting program that calls the Versatec Versaplot V07 subroutines, the second pair (page B6-B11) will run one that calls the Precision Visuals DI-3000 subroutines. The usage and function of each command file are explained by extensive comments (preceded by exclamation points).

D/281-27

```
$!*****************************************************************
$!******* Lockheed Plasma Composition Experiment on ISEE-1 ********
$!                    ***** MASPLOT.COM *****
$!                    ** VERSAPLOT version **
$! Interactive command file for starting MASPLOTB.COM (plotting
$! data from summary tapes according to Format 4).
$! The main purpose of this intermediate step in the processing is
$! to pass on the current default directory name to MASPLOTB.COM
$! so it can also be used when MASPLOTB.COM is run in batch mode.
$! How to get the plotting started:
$!
$!       Run this file interactively by:
$!
$!       @MASPLOT P1
$!                  or
$!       @MASPLOT P1 P2
$!
$!       where:
$!
$!       P1 = the orbital rev. number to be processed (part of the
$!            name of the input data file)
$!
$!       P2 = "I"   will run MASPLOTB.COM interactively
$!                  Warning: may take 11-12 minutes of cpu time!
$!
$!       P2 = any other value or blank (only P1 specified),
$!                  will run MASPLOTB.COM in batch mode. This will
$!                  return a prompting for the desired batch queue
$!
$! See comments in MASPLOTB.COM for more details.
$!
$! Footnote: to merely compile and/or link the source code use the
$!           same command, but replace the rev. number in P1 by
$!           either of the letters "C" (for compile), "L" (for
$!           link), or "CL" (for both). This will produce a list
$!           and/or a map which can be used for debugging, should
$!           that prove to be necessary.
$!           However, compilation and linking (without list or map)
$!           are done automatically during any routine run with
$!           data, if not done before.
$!****************************** O.W.L  ******************************
$DEFAULT_DIR = F$LOGICAL("SYS$DISK")+F$DIRECTORY()
$IF(P2.EQS."I")THEN GOTO INTERACTIVE
$IF(P1.EQS."")THEN WRITE SYS$OUTPUT -
 "No parameter, run aborted"
$IF(P1.EQS."")THEN EXIT
$INQUIRE BQ "Enter name of batch queue"
$SUBMIT/QUEUE='BQ'/PARAM=('P1,'DEFAULT_DIR) MASPLOTB
$EXIT
$INTERACTIVE:
$@MASPLOTB 'P1 'DEFAULT_DIR
$EXIT
```

```
$!******* LOCKHEED PLASMA COMPOSITION EXPERIMENT ON ISEE-1 ********
$!                    ***** MASPLOTB.COM *****
$!                    ** VERSAPLOT VERSION  **
$! COMMAND FILE FOR PLOTTING DATA FROM SUMMARY TAPES (FORMAT4)
$!       BY: O.W.LENNARTSSON, D/91-20, B/255.....PH: (415)-424-3259
$!       LOCKHEED PALO ALTO RESEARCH LABORATORY
$!       3251 HANOVER STREET
$!       PALO ALTO, CA 94304          DEVELOPED UNDER NASA CONTRACT
$!                                    NAS5-28702
$! THE COMMAND LANGUAGE IS THAT OF VAX/VMS VERSION 3.0
$! IT REQUIRES THAT A DATA FILE CORRESPONDING TO ONE OF THE ISEE-1
$! ORBITAL REVOLUTIONS HAS BEEN COPIED TO AN APPROPRIATE DIRECTORY
$! (SEE BELOW). THE DATA FILE HAS A NAME BASED ON THE REVOLUTION
$! NUMBER;
$!       DATA FILE NAME: R001.DAT, R002.DAT, ETC.
$! IT ALSO REQUIRES THAT THE FORTRAN SOURCE CODE (LISTED BELOW) HAS
$! BEEN COPIED TO SOME DIRECTORY (SEE BELOW), ALONG WITH AN OBJECT
$! FILE OF AUXILIARY PLOTTING SUBROUTINES AND A LISTING OF PERIGEE
$! AND APOGEE TIMES (PERLST1.DAT, FOR LABELLING THE PLOTS).
$!       THE FORTRAN CODE IS IN VAX-11 FORTRAN V3.0
$!       PLOT STATEMENTS ARE DESIGNED FOR VERSAPLOT-07
$!       CODE HAS ONLY BEEN TESTED ON A DEC VAX-11/780
$!       PLOTS HAVE ONLY BEEN TESTED ON A VERSATEC 1100
$!*****************************************************************
$!
$!       Keep this file in the same directory as MASPLOT.COM and
$!       run with the following command:
$!
$!       @MASPLOT P1
$!                  or
$!       @MASPLOT P1 P2
$!
$!       where:
$!
$!       P1 = the orbital rev. number to be processed (part of the
$!            name of the input data file)
$!
$!       P2 = "I"   will run MASPLOTB.COM interactively
$!                  Warning: may take 11-12 minutes of cpu time!
$!
$!       P2 = any other value or blank (only P1 specified),
$!                  will run MASPLOTB.COM in batch mode. This will
$!                  return a prompting for the desired batch queue
$!
$! Footnote: to merely compile and/or link the source code use the
$!           same command, but replace the rev. number in P1 by
$!           either of the letters "C" (for compile), "L" (for
$!           link), or "CL" (for both). This will produce a list
$!           and/or a map which can be used for debugging, should
$!           that prove to be necessary.
$!           However, compilation and linking (without list or map)
$!           are done automatically during any routine run with
$!           data, if not done before.
$!
$!*****************************************************************
$! ABOUT STORAGE SPACE:
$!
```

```
$! IN ITS PRIMITIVE FORM THIS COMMAND FILE USES A SINGLE DIRECTORY
$! FOR EVERYTHING, INPUT DATA, SOFTWARE, PRINTOUTS, AND PLOT FILES.
$! IT DEFINES THIS BY THE DEFAULT DIRECTORY NAME PASSED TO IT BY
$! MASPLOT.COM. THIS ARRANGEMENT MAY BE AWKWARD AND CAN BE ALTERED
$! BY EDITING THIS COMMAND FILE AND INSERTING SEPARATE DIRECTORY
$! NAMES IN THE THREE EQUATIONS BELOW.
$! NOTE: THE STORAGE SPACE MUST ACCOMMODATE THE FOLLOWING:
$!       INPUT DATA:  UP TO  4000 BLOCKS (512 BYTES EACH)
$!       OUTPUT DATA: UP TO 32000 BLOCKS
$!       SOFTWARE:    APPROX. 400 BLOCKS
$!
$! CURRENT DIRECTORY DISPOSITION:      (ALL THE SAME; EXAMPLE ONLY)
$!-----------------------------------------------------------------
$!
$! NEW PARAMETER P2 (=DEFAULT DIRECTORY), PASSED ON BY MASPLOT
$!
$INPUT_DIR  = P2                                          !("R-FILES")
$SOFT_DIR   = P2                                           !(SOFTWARE)
$OUTPUT_DIR = P2                                        !(PLOTS, ETC.)
$!
$!-----------------------------------------------------------------
$! START PROCESSING:
$SET DEFAULT 'SOFT_DIR'
$IF(P1.NES."C".AND.P1.NES."CL".AND.P1.NES."L"-
 .AND.F$SEARCH("FORMAT4.EXE").NES."") THEN GOTO RUN
$IF(P1.EQS."L") THEN GOTO LINK
$IF(P1.EQS."C".OR.P1.EQS."CL") THEN GOTO COMPILE_ALL
$IF(F$SEARCH("FORMAT4.OBJ").EQS."") THEN FOR/NOLIST FORMAT4
$IF(F$SEARCH("DATREDCTN.OBJ").EQS."") THEN FOR/NOLIST DATREDCTN
$IF(F$SEARCH("VRSPLOTS.OBJ").EQS."") THEN FOR/NOLIST VRSPLOTS
$GOTO LINK
$COMPILE_ALL:
$FOR/LIST FORMAT4,DATREDCTN,VRSPLOTS
$! NOTE: IN ADDITION TO THESE FORTRAN FILES THERE SHOULD ALSO BE
$! A FILE CONTAINING COMMON VECTORS, CALLED COMMON.FOR.
$IF(P1.EQS."C") THEN EXIT
$LINK:
$IF(P1.NES."CL".AND.P1.NES."L") THEN LINK := "LINK/NOMAP"
$IF(P1.EQS."CL".OR.P1.EQS."L")  THEN LINK := "LINK/MAP"
$! THE LINKING ALSO INCLUDES THE FILE NAMED VRSGENL.OBJ.
$! NOTE THAT THE OBJECT IMAGES ARE LINKED TO THE SYSTEM LIBRARY
$! OF GRAPHICS SUBROUTINES, WHICH HAS TO BE SPECIFIED ACCORDING
$! TO THE APPROPRIATE RULES AND DEVICE.
$LINK FORMAT4,DATREDCTN,VRSPLOTS,VRSGENL,-
$!----------- SYSTEM LIBRARY SPECS -MAY NEED CHANGING: -----------
 SYS$LIBRARY:NEWP1/LIB
$!-----------------------------------------------------------------
$IF(P1.EQS."L".OR.P1.EQS."CL") THEN EXIT
$RUN:
$LP1=F$LENGTH(P1)
$IF(LP1.GT.3.OR.P1.EQS."") THEN EXIT
$IF(LP1.EQ.2) THEN P1 := "0''P1'"
$IF(LP1.EQ.1) THEN P1 := "00''P1'"
$REVN = P1                                          !ORBITAL REV. NUMBER
$OPEN/WRITE NUMBER REV.DAT
$WRITE NUMBER REVN
$CLOSE NUMBER
```

```
$ASSIGN REV.DAT                  FOR005
$ASSIGN PERLST1.DAT              FOR007
$ASSIGN 'INPUT_DIR'R'REVN'.DAT FOR010
$SET DEFAULT 'OUTPUT_DIR'
$ASSIGN OUT.DAT                  FOR008                    !DATA PRINTOUT
$RUN 'SOFT_DIR'FORMAT4
$! PLOTTING OF *.PLV FILES MAY BE DONE HERE
$! PRINTING MAY BE DONE HERE
$! PRINT OUT.DAT
$! UNNECESSARY PLOT AND PRINT FILES MAY BE DELETED HERE
$! PURGE
$DELETE 'SOFT_DIR'REV.DAT;*
$DEASSIGN FOR005
$DEASSIGN FOR007
$DEASSIGN FOR008
$DEASSIGN FOR010
$EXIT
```

```
$!*****************************************************************
$!******* Lockheed Plasma Composition Experiment on ISEE-1 ********
$!                    ****** MPLOT.COM ******
$!                    *** DI-3000 version ***
$! Interactive command file for starting MPLOTB.COM (plotting
$! data from summary tapes according to Format 4).
$! The main purpose of this intermediate step in the processing is
$! to pass on the current default directory name to MPLOTB.COM
$! so it can also be used when MPLOTB.COM is run in batch mode.
$! How to get the plotting started:
$!
$!       Run this file interactively by:
$!
$!       @MPLOT P1
$!                  or
$!       @MPLOT P1 P2
$!                  or
$!       @MPLOT P1 P2 P3
$!
$!       where:
$!
$!       P1 = the orbital rev. number to be processed (part of the
$!            name of the input data file)
$!
$!       P2 = "I"    will run MPLOTB.COM interactively
$!                   Warning: may take 11-12 minutes of cpu time!
$!
$!       P2 = any other value or blank (only P1 specified),
$!                   will run MPLOTB.COM in batch mode. This will
$!                   return a prompting for the desired batch queue
$!
$!       P3 = the device number of the plot unit
$!
$!       P3 = blank (no third parameter) will cause MPLOTB to use
$!                   the following default device number:
$!
$DEFAULT_DEVICE := 9    !(Can be changed as desired by editing here)
$!
$! See comments in MPLOTB.COM for more details.
$!
$! Footnote: to merely compile and/or link the source code (link to
$!           the plotting device specified by P3), use the same
$!           command, but replace the rev. number in P1 by either
$!           of the letters "C" (for compile), "L" (for link), or
$!           "CL" (for both). This will produce a list and/or a map
$!           which can be used for debugging, if necessary.
$!           However, compilation and linking (without list or map)
$!           are done automatically during any routine run with
$!           data, if not done before.
$!****************************** O.W.L. ****************************
$DEFAULT_DIR = F$LOGICAL("SYS$DISK")+F$DIRECTORY()
$DEVICE = P3
$IF(DEVICE.NES."")THEN WRITE SYS$OUTPUT -
 "Device number passed on to MPLOTB.COM is ''DEVICE'"
$IF(DEVICE.EQS."")THEN WRITE SYS$OUTPUT -
 "No device number specified, so ''DEFAULT_DEVICE' will be used"
$IF(DEVICE.EQS."")THEN DEVICE = DEFAULT_DEVICE
```

```
$IF(P2.EQS."I")THEN GOTO INTERACTIVE
$IF(P1.EQS."")THEN WRITE SYS$OUTPUT -
 "No parameter, run aborted"
$IF(P1.EQS."")THEN EXIT
$INQUIRE BQ "Enter name of batch queue"
$SUBMIT/QUEUE='BQ'/PARAM=('P1,'DEFAULT_DIR,'DEVICE) MPLOTB
$EXIT
$INTERACTIVE:
$@MPLOTB 'P1 'DEFAULT_DIR 'DEVICE
$EXIT
```

```
$!******* LOCKHEED PLASMA COMPOSITION EXPERIMENT ON ISEE-1 ********
$!                    ****** MPLOTB.COM ******
$!                    *** DI-3000 VERSION  ***
$! COMMAND FILE FOR PLOTTING DATA FROM SUMMARY TAPES (FORMAT4)
$!       BY: O.W.LENNARTSSON, D/91-20, B/255.....PH: (415)-424-3259
$!           W.E.FRANCIS, D/91-20, B/255.....PH: (415)-424-3291
$!       LOCKHEED PALO ALTO RESEARCH LABORATORY
$!       3251 HANOVER STREET
$!       PALO ALTO, CA 94304          DEVELOPED UNDER NASA CONTRACT
$!                                    NAS5-28702
$! THE COMMAND LANGUAGE IS THAT OF VAX/VMS VERSION 3.0.
$! IT REQUIRES THAT A DATA FILE CORRESPONDING TO ONE OF THE ISEE-1
$! ORBITAL REVOLUTIONS HAS BEEN COPIED TO AN APPROPRIATE DIRECTORY
$! (SEE BELOW). THE DATA FILE HAS A NAME BASED ON THE REVOLUTION
$! NUMBER;
$!       DATA FILE NAME: R001.DAT, R002.DAT, ETC.
$! IT ALSO REQUIRES THAT THE FORTRAN SOURCE CODE (LISTED BELOW) HAS
$! BEEN COPIED TO SOME DIRECTORY (SEE BELOW), ALONG WITH AN OBJECT
$! FILE OF AUXILIARY PLOTTING SUBROUTINES AND A LISTING OF PERIGEE
$! AND APOGEE TIMES (PERLST1.DAT, FOR LABELLING THE PLOTS).
$!       THE FORTRAN CODE IS IN VAX-11 FORTRAN V3.0.
$!       PLOT STATEMENTS ARE DESIGNED FOR DI-3000.
$!       CODE HAS ONLY BEEN TESTED ON A DEC VAX-11/780.
$!       PLOTS HAVE ONLY BEEN TESTED ON A VERSATEC 1100
$!       AND A QMS LASERGRAPHIX 1200.
$!*************************************************************************
$!
$!       Keep this file in the same directory as MPLOT.COM and
$!       run with the following command:
$!
$!       @MPLOT P1
$!                  or
$!       @MPLOT P1 P2
$!                  or
$!       @MPLOT P1 P2 P3
$!
$!       where:
$!
$!       P1 = the orbital rev. number to be processed (part of the
$!            name of the input data file)
$!
$!       P2 = "I"    will run MPLOTB.COM interactively
$!                   Warning: may take 11-12 minutes of cpu time!
$!
$!       P2 = any other value or blank (only P1 specified),
$!                   will run MPLOTB.COM in batch mode. This will
$!                   return a prompting for the desired batch queue
$!
$!       P3 = the device number of the plot unit
$!
$!       P3 = blank (no third parameter) will cause MPLOTB to use
$!                   the default device number specified in MPLOT
$!
$! Footnote: to merely compile and/or link the source code (link to
$!           the plotting device specified by P3), use the same
$!           command, but replace the rev. number in P1 by either
$!           of the letters "C" (for compile), "L" (for link), or
```

```
$!           "CL" (for both). This will produce a list and/or a map
$!           which can be used for debugging, if necessary.
$!           However, compilation and linking (without list or map)
$!           are done automatically during any routine run with
$!           data, if not done before.
$!
$!*****************************************************************
$! ABOUT STORAGE SPACE:
$!
$! IN ITS PRIMITIVE FORM THIS COMMAND FILE USES A SINGLE DIRECTORY
$! FOR EVERYTHING, INPUT DATA, SOFTWARE, PRINTOUTS, AND PLOT FILES.
$! IT DEFINES THIS BY THE DEFAULT DIRECTORY NAME PASSED TO IT BY
$! MPLOT.COM. THIS ARRANGEMENT MAY BE AWKWARD AND CAN BE ALTERED
$! BY EDITING THIS COMMAND FILE AND INSERTING SEPARATE DIRECTORY
$! NAMES IN THE THREE EQUATIONS BELOW.
$! NOTE: THE STORAGE SPACE MUST ACCOMMODATE THE FOLLOWING:
$!       INPUT DATA:  UP TO  4000 BLOCKS (512 BYTES EACH)
$!       OUTPUT DATA: UP TO 32000 BLOCKS
$!       SOFTWARE:    UP TO  1760 BLOCKS
$!
$! CURRENT DIRECTORY DISPOSITION:      (ALL THE SAME; EXAMPLE ONLY)
$!---------------------------------------------------------------
$!
$! NEW PARAMETER P2 (=DEFAULT DIRECTORY), PASSED ON BY MPLOT
$!
$INPUT_DIR  = P2                                          !("R-FILES")
$SOFT_DIR   = P2                                           !(SOFTWARE)
$OUTPUT_DIR = P2                                        !(PLOTS, ETC.)
$!
$!---------------------------------------------------------------
$DEVICE = P3                                          !NUMBER OF PLOT UNIT
$!
$! THE DEVICE IS ASSUMED TO BE EITHER OF THESE:
$!       =  4:  FOR VERSADDR                                  (VERSATEC)
$!       =  9:  FOR VERSFDDR                (VERSATEC FANFOLD) DEFAULT
$!       = 10:  FOR QMS1200DDR                 (QMS LASERGRAFIX 1200)
$!
$! IF THE CURRENT OPERATING SYSTEM HAS THESE SAME (OR EQUIVALENT)
$! DEVICES DEFINED BY OTHER DEVICE NUMBERS (IN THE RANGE 0 - 12),
$! THEN IT IS NECESSARY TO EDIT THE LINK-RELATED COMMANDS BELOW.
$! IT MAY BE SUFFICIENT TO SIMPLY REPLACE THE NUMBERS 4, 9, OR 10
$! WITH THE CURRENT NUMBERS. IN SOME CASES IT MAY BE NECESSARY TO
$! CHANGE THE SYSTEM LIBRARY SPECIFICATIONS AS WELL.
$! NOTE: THE FORTRAN CODE (DIPLOTS.FOR) ASSUMES THAT THE DEVICE
$! NUMBER FALLS IN THE RANGE 0 - 12 AND WILL USE 9 AS A DEFAULT
$! IF THE INPUT NUMBER IS OUTSIDE OF THIS RANGE.
$!---------------------------------------------------------------
$! START PROCESSING:
$SET DEFAULT 'SOFT_DIR'
$IF(P1.NES."C".AND.P1.NES."CL".AND.P1.NES."L"-
 .AND.F$SEARCH("EXE.''DEVICE'").NES."") THEN GOTO RUN
$IF(P1.EQS."L") THEN GOTO LINK
$IF(P1.EQS."C".OR.P1.EQS."CL") THEN GOTO COMPILE_ALL
$IF(F$SEARCH("DIFORM4.OBJ").EQS."") THEN FOR/NOLIST DIFORM4
$IF(F$SEARCH("DATANALYS.OBJ").EQS."") THEN FOR/NOLIST DATANALYS
$IF(F$SEARCH("DIPLOTS.OBJ").EQS."") THEN FOR/NOLIST DIPLOTS
$GOTO LINK
```

```
$COMPILE_ALL:
$FOR/LIST DIFORM4,DATANALYS,DIPLOTS
$! NOTE: IN ADDITION TO THESE FORTRAN FILES THERE SHOULD ALSO BE
$! TWO FILES CONTAINING COMMON VECTORS, CALLED COMMON.FOR AND
$! PLTCOM.FOR, RESPECTIVELY.
$IF(P1.EQS."C") THEN EXIT
$LINK:
$IF(P1.NES."CL".AND.P1.NES."L") THEN LINK := "LINK/NOMAP"
$IF(P1.EQS."CL".OR.P1.EQS."L")  THEN LINK := "LINK/MAP"
$! THE LINKING ALSO INCLUDES THE FILE NAMED DIGENL.OBJ.
$! NOTE THAT THE OBJECT IMAGES ARE LINKED TO THE SYSTEM LIBRARY
$! OF GRAPHICS SUBROUTINES, WHICH HAS TO BE SPECIFIED ACCORDING
$! TO THE APPROPRIATE RULES AND DEVICE.
$IF(DEVICE.EQS."4") THEN GOTO 4          !VERSATEC (MAY NEED CHANGING)
$IF(DEVICE.EQS."9") THEN GOTO 9          !VERSATEC (MAY NEED CHANGING)
$IF(DEVICE.EQS."10")THEN GOTO 10         !LASER    (MAY NEED CHANGING)
$WRITE SYS$OUTPUT "Unexpected device number! Please use 4, 9,"-
 " or 10, or edit MPLOTB.COM as needed."
$EXIT
$4:                                                !INVALID DEVICE NUMBER
$LINK/EXE=EXE.'DEVICE' DIFORM4,DATANALYS,DIPLOTS,DIGENL,-
$!---------- SYSTEM LIBRARY SPECS -MAY NEED CHANGING: ----------
 SYS$DIREV4:VERSADDR,DILIB/L,SSLIB/L,UTILLIB/L,NEWP1/L,-
 DUMLIB/L,DILIB/L
$!-------------------------------------------------------------------
$GOTO LINKED
$9:
$LINK/EXE=EXE.'DEVICE' DIFORM4,DATANALYS,DIPLOTS,DIGENL,-
$!---------- SYSTEM LIBRARY SPECS -MAY NEED CHANGING: ----------
 SYS$DIREV4:VERSFDDR,DILIB/L,SSLIB/L,UTILLIB/L,NEWP1/L,-
 DUMLIB/L,DILIB/L
$!-------------------------------------------------------------------
$GOTO LINKED
$10:
$LINK/EXE=EXE.'DEVICE' DIFORM4,DATANALYS,DIPLOTS,DIGENL,-
$!---------- SYSTEM LIBRARY SPECS -MAY NEED CHANGING: ----------
 SYS$DIREV4:QMS1200DDR,DILIB/L,SSLIB/L,UTILLIB/L,NEWP1/L,-
 DUMLIB/L,DILIB/L
$!-------------------------------------------------------------------
$LINKED:
$IF(P1.EQS."L".OR.P1.EQS."CL") THEN EXIT
$RUN:
$LP1=F$LENGTH(P1)
$IF(LP1.GT.3.OR.P1.EQS."") THEN EXIT
$IF(LP1.EQ.2) THEN P1 := "0''P1'"
$IF(LP1.EQ.1) THEN P1 := "00''P1'"
$REVN = P1
$OPEN/WRITE NUMBER REVDEV.DAT                      !ORBITAL REV. NUMBER
$WRITE NUMBER REVN,",",DEVICE
$CLOSE NUMBER
$ASSIGN REVDEV.DAT              FOR005
$ASSIGN PERLST1.DAT             FOR007
$ASSIGN 'INPUT_DIR'R'REVN'.DAT FOR010
$SET DEFAULT 'OUTPUT_DIR'
$ASSIGN OUT.DAT                 FOR008                  !DATA PRINTOUT
$ASSIGN IODBL.DOC               FOR009                   !DEBUG OUTPU
$! THE DEVICE NUMBER IS READ IN FROM FOR005 DURING EXECUTION
```

```
$RUN 'SOFT_DIR'EXE.'DEVICE'
$! PLOTTING OF *.PLV OR QMS.DAT FILES MAY BE DONE HERE
$! PRINTING MAY BE DONE HERE
$! PRINT OUT.DAT
$! UNNECESSARY PLOT AND PRINT FILES MAY BE DELETED HERE
$! PURGE
$PURGE IODBL.DOC
$DELETE 'SOFT_DIR'REVDEV.DAT;*
$DEASSIGN FOR005
$DEASSIGN FOR007
$DEASSIGN FOR008
$DEASSIGN FOR009
$DEASSIGN FOR010
$EXIT
```

APPENDIX C: PLOTTING PROGRAM DIRECTORIES (TAPE)

The following 5 pages itemize the contents of the two analysis/plotting program tapes. Each tape has, in addition to the various program components, two small data files. One of these, named PERLST1.DAT, provides necessary input to the execution of the program whereas the other, named MXFLAG.DAT, is merely a listing of time segments affected by the sensitivity auto-range feature of the instrument and is included for the convenience of the data user.

D/281-27

NASA
National Aeronautics and Space Administration

CDB TAPE DOCUMENTATION FORM

SECTION I. DATA SET DESCRIPTION (please print)

1. Data Set Name Plasma Composition Experiment on ISEE-1, Plotting programs (Labels: MASPLT, MPLOT)		
2. Scientific Contact Dr. O. W. Lennartsson	**3. Telephone No. or Telex No.** (415) 424-3259	
4. Address Lockheed Palo Alto Res. Lab., Dept. 91-20, Bldg. 255, 3251 Hanover Street		
5. City Palo Alto	**6. State** California	**7. ZIP Code or Country** 94304
8. Programmer Contact Dr. O. W. Lennartsson or Mr. W. E. Francis (same address)		

SECTION II. TAPE DESCRIPTION

1. No. of Tapes Submitted 2	**2. Tape Density** ☐ 800 bpi ☒ 1600 bpi
3. No. of Files (per tape) 9 (MASPLT) and 10 (MPLOT)	
4. No. of End of File Marks N/A (standard VAX/VMS copy format)	**5. No. of Tracks** ☐ 7 ☒ 9
6. Recording Parity N/A	**7. Make and Model of Computer Used to Generate Tape** DEC VAC-11/780 (VMS 3.0)
8. Are tapes written in binary, coded or both? (e.g. BCD) binary ASCII	
9. What floating point representation is used? (e.g. CDC 64 bit) binary ASCII	
10. What integer representation is used? binary ASCII	
11. No. of Physical Records (per file) See following tape directories	
12. Are original tapes to be returned? ☐ Yes ☒ No	
13. Start and Stop Time of Each File (If more space is needed, please attach.) N/A	

SECTION III. LOGICAL AND PHYSICAL RECORD FORMAT (please attach) see following tape directori

SECTION IV. TO BE FILLED IN BY DAWOC ONLY

	CDB No.
Date Received	**Tape No.**
Programmer ID	**CON Name**
Data Base	**Date Loaded**

601-79 (10/80)

Plotting programs, tape # 1

```
Directory TAPE: MASPLT

COMMON.FOR;1                        File ID:  (1,1,1)
Size:          2/2                  Owner:    [A9120,LENN]
Created:  20-OCT-1981 00:00         Revised:   <None specified>
Expires:  31-MAY-1987 00:00         Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 2, Extend: 0, Global buffer count: 0
Record format:      VFC, 2 byte header, maximum 70 bytes
Record attributes:  Carriage return carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

DATREDCTN.FOR;1                     File ID:  (2,1,1)
Size:         13/13                 Owner:    [A9120,LENN]
Created:  22-SEP-1986 00:00         Revised:   <None specified>
Expires:  31-MAY-1987 00:00         Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 13, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 72 bytes
Record attributes:  Carriage return carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

FORMAT4.FOR;1                       File ID:  (3,1,1)
Size:          3/3                  Owner:    [A9120,LENN]
Created:   9-SEP-1986 00:00         Revised:   <None specified>
Expires:  31-MAY-1987 00:00         Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 3, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 72 bytes
Record attributes:  Carriage return carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

MASPLOT.COM;1                       File ID:  (4,1,1)
Size:          2/2                  Owner:    [A9120,LENN]
Created:  28-AUG-1986 00:00         Revised:   <None specified>
Expires:  31-MAY-1987 00:00         Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 2, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 67 bytes
Record attributes:  Carriage return carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

MASPLOTB.COM;1                      File ID:  (5,1,1)
Size:          3/3                  Owner:    [A9120,LENN]
Created:  11-SEP-1986 00:00         Revised:   <None specified>
Expires:  31-MAY-1987 00:00         Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 3, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 67 bytes
Record attributes:  Carriage return carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None
```

```
MXFLAG.DAT;1                          File ID:  (6,1,1)
Size:              3/3                Owner:    [A9120,LENN]
Created:  17-OCT-1983 00:00           Revised:   <None specified>
Expires:  31-MAY-1987 00:00           Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 3, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 9 bytes
Record attributes:  Fortran carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

PERLST1.DAT;1                         File ID:  (7,1,1)
Size:             27/27               Owner:    [A9120,LENN]
Created:  13-JUL-1982 00:00           Revised:   <None specified>
Expires:  31-MAY-1987 00:00           Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 27, Extend: 0, Global buffer count: 0
Record format:      VFC, 2 byte header, maximum 71 bytes
Record attributes:  Fortran carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

VRSGENL.OBJ;1                         File ID:  (8,1,1)
Size:              3/3                Owner:    [A9120,LENN]
Created:   1-MAY-1987 00:00           Revised:   <None specified>
Expires:  31-MAY-1987 00:00           Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 3, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 1019 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

VRSPLOTS.FOR;1                        File ID:  (9,1,1)
Size:              8/8                Owner:    [A9120,LENN]
Created:  28-AUG-1986 00:00           Revised:   <None specified>
Expires:  31-MAY-1987 00:00           Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 8, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 72 bytes
Record attributes:  Carriage return carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

Total of 9 files, 64/64 blocks.
```

Plotting programs, tape # 2

```
Directory TAPE: MPLOT

COMMON.FOR;1                    File ID:  (1,1,1)
Size:          2/2              Owner:    [A9120,LENN]
Created:  20-OCT-1981 00:00     Revised:   (None specified)
Expires:  31-MAY-1987 00:00     Backup:    (No backup done)
File organization:  Sequential
File attributes:    Allocation: 2, Extend: 0, Global buffer count: 0
Record format:      VFC, 2 byte header, maximum 70 bytes
Record attributes:  Carriage return carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

DATANALYS.FOR;1                 File ID:  (2,1,1)
Size:         16/16             Owner:    [A9120,LENN]
Created:  22-SEP-1986 00:00     Revised:   (None specified)
Expires:  31-MAY-1987 00:00     Backup:    (No backup done)
File organization:  Sequential
File attributes:    Allocation: 16, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 72 bytes
Record attributes:  Carriage return carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

DIFORM4.FOR;1                   File ID:  (3,1,1)
Size:          4/4              Owner:    [A9120,LENN]
Created:  27-AUG-1986 00:00     Revised:   (None specified)
Expires:  31-MAY-1987 00:00     Backup:    (No backup done)
File organization:  Sequential
File attributes:    Allocation: 4, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 72 bytes
Record attributes:  Carriage return carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

DIGENL.OBJ;1                    File ID:  (4,1,1)
Size:         14/14             Owner:    [A9120,LENN]
Created:   1-MAY-1987 00:00     Revised:   (None specified)
Expires:  31-MAY-1987 00:00     Backup:    (No backup done)
File organization:  Sequential
File attributes:    Allocation: 14, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 1021 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

DIPLOTS.FOR;1                   File ID:  (5,1,1)
Size:         10/10             Owner:    [A9120,LENN]
Created:  11-SEP-1986 00:00     Revised:   (None specified)
Expires:  31-MAY-1987 00:00     Backup:    (No backup done)
File organization:  Sequential
File attributes:    Allocation: 10, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 72 bytes
Record attributes:  Carriage return carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None
```

```
MPLOT.COM;1                          File ID:  (6,1,1)
Size:              2/2               Owner:    [A9120,LENN]
Created:  27-AUG-1986 00:00          Revised:   (None specified)
Expires:  31-MAY-1987 00:00          Backup:    (No backup done)
File organization:  Sequential
File attributes:    Allocation: 2, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 67 bytes
Record attributes:  Carriage return carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

MPLOTB.COM;1                         File ID:  (7,1,1)
Size:              5/5               Owner:    [A9120,LENN]
Created:  11-SEP-1986 00:00          Revised:   (None specified)
Expires:  31-MAY-1987 00:00          Backup:    (No backup done)
File organization:  Sequential
File attributes:    Allocation: 5, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 67 bytes
Record attributes:  Carriage return carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

MXFLAG.DAT;1                         File ID:  (8,1,1)
Size:              3/3               Owner:    [A9120,LENN]
Created:  17-OCT-1983 00:00          Revised:   (None specified)
Expires:  31-MAY-1987 00:00          Backup:    (No backup done)
File organization:  Sequential
File attributes:    Allocation: 3, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 9 bytes
Record attributes:  Fortran carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

PERLST1.DAT;1                        File ID:  (9,1,1)
Size:             27/27              Owner:    [A9120,LENN]
Created:  13-JUL-1982 00:00          Revised:   (None specified)
Expires:  31-MAY-1987 00:00          Backup:    (No backup done)
File organization:  Sequential
File attributes:    Allocation: 27, Extend: 0, Global buffer count: 0
Record format:      VFC, 2 byte header, maximum 71 bytes
Record attributes:  Fortran carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

PLTCOM.FOR;1                         File ID:  (10,1,1)
Size:              1/1               Owner:    [A9120,LENN]
Created:  27-AUG-1986 00:00          Revised:   (None specified)
Expires:  31-MAY-1987 00:00          Backup:    (No backup done)
File organization:  Sequential
File attributes:    Allocation: 1, Extend: 0, Global buffer count: 0
Record format:      Variable length, maximum 66 bytes
Record attributes:  Carriage return carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

Total of 10 files, 84/84 blocks.
```

APPENDIX D: EXPLANATION OF DATA TAPE WORDS

The following 3 pages are a printout of the subroutine originally used to write the files ("R-files") on the data summary tapes. The meaning of each word (symbol V) is explained by equations and comments in this subroutine.

The data files are sequential and unformatted (binary) and consist of a varying number of identical sets of words, where each set corresponds to a single segment of time-averaged data. The complete set of words in each segment has been written in two steps, as two logical records with a length of 26624 bytes each. These large logical records have been segmented by the writing process (Fortran default feature) and appear on the summary tapes as several more variable-length records (see Appendix E).

In order to be read by the analysis/plotting program any given data file (corresponding to a given orbital revolution of the ISEE-A) must first be copied to a disk, to that directory which is specified in the command files (see Appendix B). The reading of each set of words (each time segment) is done by two unformatted sequential READ statements, the exact reverse of the original writing. This reading is done in the main program (FORMAT4) of the Versaplot version of the analysis/plotting program and at the beginning of the analysis subprogram (DATANALYS) of the DI-3000 version (cf. Appendix C).

D/281-27

```
C**** SUBROUTINE FOR WRITING SUMMARY DATA FILES ("R-FILES")
      SUBROUTINE TPFILE
C**** WRITE ISEE4 AVERAGED DATA FROM EACH INTERVAL TO A FILE
C**** IN SUBDIRECTORY [CARR.ISDAT].
C**** AFTER A NUMBER OF FILES ARE GENERATED, THE DIRECTORY
C**** WILL BE COPIED TO A SUMMARY TAPE.
C**** TWO WRITES ARE NEEDED TO TRANSFER DATA IN EACH INTERVAL.
C**** 13312 TOTAL WORDS IN EACH INTERVAL (SOME ZERO FILL)
C**** ARE SPLIT INTO 2 RECORDS OF 6656 WORDS EACH,
C**** 6656 WORDS * 4 BYTES/WORD =26624 BYTES/WRITE.
      INCLUDE 'COMMON.FOR'
      DIMENSION V(6656)
C**** DEFINE FIRST RECORD ----------------------------------------
      V( 1)=FLOATJ(IDATE)              !DATE AT BEGINNING OF INTERVAL
      V( 2)=FLOATJ(IUTHMA)               !UT AT BEGINNING OF INTERVAL
      V( 3)=FLOATJ(IUTHMB)                     !UT AT END OF INTERVAL
      V( 4)=FLOATJ(MDTCR)      !TRIGGERING LEVEL OF COUNTER (1 OR 2)
      V( 5)=FLOATJ(IBGND)     !INDEX OF BACKGROUND SAMPLING (0 OR 1)
      V( 6)=FLOATJ(JRATE)                !TELEMETRY BIT RATE (1 OR 4)
C     ( 7) - (10) DELIMIT ENERGY RANGES IN MASS SPECTRA
      V( 7)=FLOATJ(IEMSPC(1))
      V( 8)=FLOATJ(IEMSPC(2))
      V( 9)=FLOATJ(IEMSPC(3))
      V(10)=FLOATJ(IEMSPC(4))
      V(11)=BFRST                  !MEASURED B AT BEGINNING OF INTERVAL
      V(12)=BLAST                        !MEASURED B AT END OF INTERVAL
C     (13) - (20) ARE MIN AND MAX PITCH ANGLES FOR 4 IONS
      V(13)=PAMIN(1)
      V(14)=PAMIN(2)
      V(15)=PAMIN(3)
      V(16)=PAMIN(4)
      V(17)=PAMAX(1)
      V(18)=PAMAX(2)
      V(19)=PAMAX(3)
      V(20)=PAMAX(4)
      V(21)=SUMBG1                             !SUM OF BACKGROUND COUNTS
      V(22)=SUMBG2                !SUM OF SQUARES OF BACKGROUND COUNTS
      V(23)=SPLBG                      !NUMBER OF BACKGROUND SAMPLINGS
      V(24)=BCTR                             !BACKGROUND COUNTS/SEC
      V(25)=BVAR                           !POISSON VARIANCE OF SAME
      V(26)=RATBG          !ACTUAL STANDARD DEV/POISSON STANDARD DEV
C**** ISEE-A EPHEMERIS DATA EXTRACTED FROM EPHEMERIS TAPE
C     (27) - (79) REFER TO BEGINNING OF INTERVAL
C     WORD NO. IN SUMMARY FILE              WORD NO. ON EPHEMERIS TAPE
C     (27) = DAY OF YEAR                                            1
C     (28) = UT(MILLISECONDS)                                       2
C     (29) = GEOCENTRIC LONGITUDE                                   3
C     (30) = GEOCENTRIC LATITUDE                                    4
C     (31) = GEOMAGNETIC LONGITUDE                                  5
C     (32) = GEOMAGNETIC LATITUDE                                   6
C     (33) = R     DISTANCE FROM CENTER OF EARTH(EARTH RADII)       8
C     (34) = GSEX       SATELLITE POSITION(EARTH RADII)             9
C     (35) = GSEY       SATELLITE POSITION(EARTH RADII)            10
C     (36) = GSEZ       SATELLITE POSITION(EARTH RADII)            11
C     (37) = GSMX       SATELLITE POSITION(EARTH RADII)            12
C     (38) = GSMY       SATELLITE POSITION(EARTH RADII)            13
C     (39) = GSMZ       SATELLITE POSITION(EARTH RADII)            14
```

```
C     (40) = SUB-SOLAR GEOMAGNETIC LONGITUDE                                27
C     (41) = SUB-SOLAR GEOMAGNETIC LATITUDE                                 28
C     (42) = ROW 1, COLUMN 1  TRANSFORM MATRIX  GSE TO GSM                  31
C     (43) = ROW 1, COLUMN 2  TRANSFORM MATRIX  GSE TO GSM                  32
C     (44) = ROW 1, COLUMN 3  TRANSFORM MATRIX  GSE TO GSM                  33
C     (45) = ROW 2, COLUMN 1  TRANSFORM MATRIX  GSE TO GSM                  34
C     (46) = ROW 2, COLUMN 2  TRANSFORM MATRIX  GSE TO GSM                  35
C     (47) = ROW 2, COLUMN 3  TRANSFORM MATRIX  GSE TO GSM                  36
C     (48) = ROW 3, COLUMN 1  TRANSFORM MATRIX  GSE TO GSM                  37
C     (49) = ROW 3, COLUMN 2  TRANSFORM MATRIX  GSE TO GSM                  38
C     (50) = ROW 3, COLUMN 3  TRANSFORM MATRIX  GSE TO GSM                  39
C     (51) = RIGHT ASCENSION  VELOCITY VECTOR                               51
C     (52) = DECLINATION      VELOCITY VECTOR                               52
C     (53) = VELOCITY MAGNITUDE(KM/SEC)                                     53
C     (54) = L VALUE (MCILWAIN)                                             54
C     (55) = B MAGNETIC FIELD STRENGTH(GAMMA)                               55
C     (56) = B/BO                                                           56
C     (57) = LONGITUDE  SUB-SOLAR POINT(DEG)                                61
C     (58) = LATITUDE   GEOCENTRIC EQUATORIAL INERTIAL                      62
C     (59) = GSEX  THEORETICAL GEOMAGNETIC FIELD(GAMMA)                     63
C     (60) = GSEY  THEORETICAL GEOMAGNETIC FIELD(GAMMA)                     64
C     (61) = GSEZ  THEORETICAL GEOMAGNETIC FIELD(GAMMA)                     65
C     (62) = DATE OF DATA(YR MO DA)                                         67
C     (63) = HEIGHT ABOVE SPHEROID(KM)                                      70
C     (64) = ASCENDING NODE NUMBER(PASS NUMBER)                             71
C     (65) = YEAR OF DATA                                                   72
C     (66) = DELX SEPARATION VECTOR (ISEE-A TO ISEE-B) GSE(KM)              73
C     (67) = DELY SEPARATION VECTOR (ISEE-A TO ISEE-B) GSE(KM)              74
C     (68) = DELZ SEPARATION VECTOR (ISEE-A TO ISEE-B) GSE(KM)              75
C     (69)   DELR SEPARATION DISTANCE(KM)                                   76
C     (70)   DELVX VELOCITY SEP VECTOR(KM/SEC)                              77
C     (71)   DELVY VELOCITY SEP VECTOR(KM/SEC)                              78
C     (72)   DELVZ VELOCITY SEP VECTOR(KM/SEC)                              79
C     (73)   DELV SEPARATION RATE(KM/SEC)                                   80
C     (74) = SPIN PERIOD(SEC)                                               81
C     (75) = RIGHT ASCENSION  SPIN AXIS ORIENTATION(DEG)                    82
C     (76)   DECLINATION      SPIN AXIS ORIENTATION(DEG)                    83
C     (77) = ATTITUDE QUALITY INDICATOR                                     84
C     (78) = DZ(EARTH RADII)
C     (79) = TLOCAL(HOUR)
C     (80)  - (132) SAME FOR MIDDLE OF INTERVAL
C     (133) - (185) SAME FOR END OF INTERVAL
C     NOTE: MOVER IS A SUBROUTINE THAT EQUATES CERTAIN COMPONENTS
C     OF ONE VECTOR (STARTING AT V(27) HERE) TO CERTAIN COMPONENTS
C     OF ANOTHER VECTOR (STARTING AT WPHM(1,1) HERE)
      CALL MOVER(WPHM(1,1),1,V(27),1,159)    !V(27)=WPHM(1,1), ETC.
C**** AVERAGED MASS SPECTROMETER DATA
C     ( 186) - (2233) ARE AVERAGED COUNTS/SEC IN EACH OF 2048 BINS,
C     INDEXED BY 32 ENERGIES (1:ST) BY 16 ANGLES (2:ND) BY 4 IONS
      CALL MOVER(SCNT(1,1,1),1,V(186),1,2048)
C     (2234) - (4281) ARE POISSON VARIANCES OF THOSE COUNTS/SEC
      CALL MOVER(SRSP(1,1,1),1 V(2234),1,2048)
C     (4282) - (6656) ARE ZERO FILL
      CALL MOVER(0,0,V(4282),1,2375)
      WRITE(10)V                                    !WRITE FIRST RECORD
C**** DEFINE SECOND RECORD
C     (   1) - (2048) ARE NUMBER OF SAMPLES IN EACH OF THOSE BINS
```

```
      CALL MOVER(SSPL(1,1,1),1,V(1),1,2048)
C     (2049) - (4096) ARE BACKGROUND COUNTS/SEC AVERAGED IN THE
C     SAME FASHION AS THE "SIGNAL COUNTS" (WEIGHTED AVERAGING)
      CALL MOVER(SBGX(1,1,1),1,V(2049),1,2048)
C     (4097) - (4352) ARE SUMS OF COUNTS IN EACH OF 256 BINS,
C     INDEXED BY 64 MASS STEPS (1:ST) BY 4 ENERGY RANGES (2:ND)
      CALL MOVER(SUM04(1,1),1,V(4097),1,256)
C     (4353) - (4608) ARE NUMBER OF SAMPLES IN THOSE BINS
      CALL MOVER(SPL04(1,1),1,V(4353),1,256)
C     (4609) - (6656) ARE NUMBER OF SAMPLES IN EACH OF 2048 BINS,
C     INDEXED BY 64 MASS STEPS (1:ST) BY 32 ENERGIES (2:ND)
      CALL MOVER(SPL32(1,1),1,V(4609),1,2048)
      WRITE(10)V                                    !WRITE SECOND RECORD
      RETURN
      END
```

Data tape #1 of NSSDC data set 77-102A-12F

Directory MTB0:[]

R030.DAT;1 File ID: (1,1,1)
Size: 924/924 Owner: [A9120,TREMBOIS]
Created: 1-AUG-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 924, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R031.DAT;1 File ID: (2,1,1)
Size: 924/924 Owner: [A9120,TREMBOIS]
Created: 3-AUG-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 924, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R033.DAT;1 File ID: (3,1,1)
Size: 112/112 Owner: [A9120,TREMBOIS]
Created: 3-AUG-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 112, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R036.DAT;1 File ID: (4,1,1)
Size: 196/196 Owner: [A9120,TREMBOIS]
Created: 5-AUG-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 196, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R037.DAT;1 File ID: (5,1,1)
Size: 252/252 Owner: [A9120,TREMBOIS]
Created: 3-AUG-1983 00:00 Revised: <None specified>

```
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 252, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R038.DAT;1                File ID:  (6,1,1)
Size:  448/448            Owner:  [A9120,TREMBOIS]
Created:  5-AUG-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 448, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R039.DAT;1                File ID:  (7,1,1)
Size:  532/532            Owner:  [A9120,TREMBOIS]
Created:  6-AUG-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 532, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R040.DAT;1                File ID:  (8,1,1)
Size:  532/532            Owner:  [A9120,TREMBOIS]
Created:  6-AUG-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 532, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R041.DAT;1                File ID:  (9,1,1)
Size:  616/616            Owner:  [A9120,TREMBOIS]
Created:  7-AUG-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 616, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
```

```
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R042.DAT;1                          File ID:  (10,1,1)
Size:           280/280             Owner:    [A9120,TREMBOIS]
Created:    7-AUG-1983 00:00        Revised:  <None specified>
Expires:    <None specified>        Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 280, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R043.DAT;1                          File ID:  (11,1,1)
Size:           1008/1008           Owner:    [A9120,TREMBOIS]
Created:    9-AUG-1983 00:00        Revised:  <None specified>
Expires:    <None specified>        Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 1008, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R044.DAT;1                          File ID:  (12,1,1)
Size:           364/364             Owner:    [A9120,TREMBOIS]
Created:   10-AUG-1983 00:00        Revised:  <None specified>
Expires:    <None specified>        Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 364, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R045.DAT;1                          File ID:  (13,1,1)
Size:           924/924             Owner:    [A9120,TREMBOIS]
Created:   10-AUG-1983 00:00        Revised:  <None specified>
Expires:    <None specified>        Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 924, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R046.DAT;1                          File ID:  (14,1,1)
```

```
Size:          196/196          Owner:    [A9120,TREMBOIS]
Created:  10-AUG-1983 00:00    Revised:   <None specified>
Expires:  <None specified>     Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 196, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R048.DAT;1                         File ID:  (15,1,1)
Size:          364/364          Owner:    [A9120,TREMBOIS]
Created:  11-AUG-1983 00:00    Revised:   <None specified>
Expires:  <None specified>     Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 364, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R050.DAT;1                         File ID:  (16,1,1)
Size:          840/840          Owner:    [A9120,TREMBOIS]
Created:  13-AUG-1983 00:00    Revised:   <None specified>
Expires:  <None specified>     Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 840, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R051.DAT;1                         File ID:  (17,1,1)
Size:          1008/1008        Owner:    [A9120,TREMBOIS]
Created:  13-AUG-1983 00:00    Revised:   <None specified>
Expires:  <None specified>     Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 1008, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R052.DAT;1                         File ID:  (18,1,1)
Size:          34/34            Owner:    [A9120,TREMBOIS]
Created:  13-AUG-1983 00:00    Revised:   <None specified>
Expires:  <None specified>     Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 34, Extend: 0, Global buffer count: 0, Version limit: 0
```

Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

Total of 18 files, 9554/9554 blocks.

Data tape #2

Directory MTB0:[]

R053.DAT;1 File ID: (1,1,1)
Size: 406/406 Owner: [A9120,TREMBOIS]
Created: 13-AUG-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 406, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R054.DAT;1 File ID: (2,1,1)
Size: 182/182 Owner: [A9120,TREMBOIS]
Created: 13-AUG-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 182, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R055.DAT;1 File ID: (3,1,1)
Size: 462/462 Owner: [A9120,TREMBOIS]
Created: 14-AUG-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 462, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R056.DAT;1 File ID: (4,1,1)
Size: 518/518 Owner: [A9120,TREMBOIS]
Created: 14-AUG-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 518, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R057.DAT;1 File ID: (5,1,1)
Size: 518/518 Owner: [A9120,TREMBOIS]
Created: 14-AUG-1983 00:00 Revised: <None specified>

```
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 518, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled:  None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R058.DAT;1                File ID:  (6,1,1)
Size:  971/971            Owner:  [A9120,TREMBOIS]
Created:  15-SEP-1981 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 971, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled:  None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R059.DAT;1                File ID:  (7,1,1)
Size:  504/504            Owner:  [A9120,TREMBOIS]
Created:  15-AUG-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 504, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled:  None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R060.DAT;1                File ID:  (8,1,1)
Size:  476/476            Owner:  [A9120,TREMBOIS]
Created:  17-AUG-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 476, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled:  None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R061.DAT;1                File ID:  (9,1,1)
Size:  504/504            Owner:  [A9120,TREMBOIS]
Created:  18-AUG-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 504, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
```

Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R062.DAT;1 File ID: (10,1,1)
Size: 462/462 Owner: [A9120,TREMBOIS]
Created: 22-AUG-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 462, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R063.DAT;1 File ID: (11,1,1)
Size: 462/462 Owner: [A9120,TREMBOIS]
Created: 23-AUG-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 462, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R064.DAT;1 File ID: (12,1,1)
Size: 574/574 Owner: [A9120,TREMBOIS]
Created: 24-AUG-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 574, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R065.DAT;1 File ID: (13,1,1)
Size: 448/448 Owner: [A9120,TREMBOIS]
Created: 26-AUG-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 448, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R066.DAT;1 File ID: (14,1,1)

```
Size:            490/490          Owner:     [A9120,TREMBOIS]
Created:  27-AUG-1983 00:00    Revised:   <None specified>
Expires:  <None specified>  Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 490, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R067.DAT;1                           File ID:  (15,1,1)
Size:            476/476          Owner:     [A9120,TREMBOIS]
Created:  27-AUG-1983 00:00    Revised:   <None specified>
Expires:  <None specified>  Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 476, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R068.DAT;1                           File ID:  (16,1,1)
Size:            294/294          Owner:     [A9120,TREMBOIS]
Created:  27-AUG-1983 00:00    Revised:   <None specified>
Expires:  <None specified>  Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 294, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R069.DAT;1                           File ID:  (17,1,1)
Size:           1028/1028         Owner:     [A9120,TREMBOIS]
Created:  17-SEP-1981 00:00    Revised:   <None specified>
Expires:  <None specified>  Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 1028, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R070.DAT;1                           File ID:  (18,1,1)
Size:            392/392          Owner:     [A9120,TREMBOIS]
Created:   1-SEP-1983 00:00    Revised:   <None specified>
Expires:  <None specified>  Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 392, Extend: 0, Global buffer count: 0, Version limit: 0
```

Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

Total of 18 files, 9167/9167 blocks.

APPENDIX E: DATA TAPE DIRECTORIES

Following this page are: (1) a completed CDB Tape Documentation Form and (2) directories of the data summary tapes. The latter are ordered by the ISEE-1 orbital revolution number, which is part of the data file name (e.g. file R207.DAT contains data from revolution number 207).

The directory of one tape is a contiguous listing of data files, beginning at the top of a new page, and corresponds directly to the labelling on the outside of the tape reel. No page numbers have been assigned to these directories, because the data coverage is not continuous in terms of revolution numbers, and additional summary tapes may be added later to fill some of the gaps. For that same reason there is neither a sequential numbering of the tapes. The tapes must be identified by the revolution numbers (file names) shown on the labels affixed to the reel. The files on each tape are stored in order of increasing revolution number, and every file on a particular tape is confined to that one tape.

D/281-27

NASA
National Aeronautics and Space Administration

CDB TAPE DOCUMENTATION FORM

SECTION I. DATA SET DESCRIPTION (please print)

1. Data Set Name Plasma Composition Experiment on ISEE-1 (Tape labels: ISAVG)		
2. Scientific Contact Dr. O. W. Lennartsson	**3. Telephone No. or Telex No.** (415) 424-3259	
4. Address Lockheed Palo Alto Res. Lab., Dept. 91-20, Bldg. 255, 3251 Hanover Street		
5. City Palo Alto,	**6. State** California	**7. ZIP Code or Country** 94304
8. Programmer Contact Dr. O. W. Lennartsson or Mr. W. E. Francis (same address)		

SECTION II. TAPE DESCRIPTION

1. No. of Tapes Submitted 11	**2. Tape Density** ☐ 800 bpi ☒ 1600 bpi
3. No. of Files (per tape) Variable	
4. No. of End of File Marks N/A (standard VAX/VMS copy format)	**5. No. of Tracks** ☐ 7 ☒ 9
6. Recording Parity N/A	**7. Make and Model of Computer Used to Generate Tape** DEC VAX-11/780 (VMS 3.0)
8. Are tapes written in binary, coded or both? (e.g. BCD) binary, using the VAX/VMS copy command, from an unformatted file	
9. What floating point representation is used? (e.g. CDC 64 bit) VAX single precision floating point numbers (32 bit)	
10. What integer representation is used? integers were converted to single precision floating point numbers	
11. No. of Physical Records (per file) see following tape directories	
12. Are original tapes to be returned? ☐ Yes ☒ No	
13. Start and Stop Time of Each File (If more space is needed, please attach.) In general approximately equal to the start and stop times of the corresponding ISEE-A orbital revolution (from perigee to perigee). For more precise times, see the accompanying library of hardcopies. (on fiche as NSSDC data set 77-102A-12G)	

SECTION III. LOGICAL AND PHYSICAL RECORD FORMAT (please attach) see following tape director

SECTION IV. TO BE FILLED IN BY DAWOC ONLY

	CDB No.
Date Received	**Tape No.**
Programmer ID	**CON Name**
Data Base	**Date Loaded**

601-79 (10/80)

Data tape # 3

Directory MTB0:[]

R071.DAT;1 File ID: (1,1,1)
Size: 868/868 Owner: [A9120,TREMBOIS]
Created: 30-AUG-1983 00:00 Revised: ‹None specified›
Expires: ‹None specified› Backup: ‹No backup done›
File organization: Sequential
File attributes: Allocation: 868, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2044 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R072.DAT;1 File ID: (2,1,1)
Size: 1028/1028 Owner: [A9120,TREMBOIS]
Created: 18-SEP-1981 00:00 Revised: ‹None specified›
Expires: ‹None specified› Backup: ‹No backup done›
File organization: Sequential
File attributes: Allocation: 1028, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R073.DAT;1 File ID: (3,1,1)
Size: 838/838 Owner: [A9120,TREMBOIS]
Created: 12-OCT-1981 00:00 Revised: ‹None specified›
Expires: ‹None specified› Backup: ‹No backup done›
File organization: Sequential
File attributes: Allocation: 838, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R074.DAT;1 File ID: (4,1,1)
Size: 988/988 Owner: [A9120,TREMBOIS]
Created: 25-JAN-1983 00:00 Revised: ‹None specified›
Expires: ‹None specified› Backup: ‹No backup done›
File organization: Sequential
File attributes: Allocation: 988, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R075.DAT;1 File ID: (5,1,1)
Size: 971/971 Owner: [A9120,TREMBOIS]
Created: 14-OCT-1981 00:00 Revised: ‹None specified›

```
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 971, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R076.DAT;1                File ID:  (6,1,1)
Size:  884/884            Owner:  [A9120,TREMBOIS]
Created:  29-JAN-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 884, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R077.DAT;1                File ID:  (7,1,1)
Size:  1018/1018          Owner:  [A9120,TREMBOIS]
Created:  14-AUG-1981 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 1018, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R078.DAT;1                File ID:  (8,1,1)
Size:  910/910            Owner:  [A9120,TREMBOIS]
Created:  29-JAN-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 910, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R079.DAT;1                File ID:  (9,1,1)
Size:  754/754            Owner:  [A9120,TREMBOIS]
Created:  30-JAN-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 754, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
```

Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R080.DAT;1 File ID: (10,1,1)
Size: 858/858 Owner: [A9120,TREMBOIS]
Created: 1-FEB-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 858, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

Total of 10 files, 9117/9117 blocks.

Data tape #4

```
Directory MTB0:[]

R081.DAT;1                File ID:  (1,1,1)
Size:          962/962    Owner:    [A9120,TREMBOIS]
Created:   3-FEB-1983 00:00   Revised:   <None specified>
Expires:   <None specified>   Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 962, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R082.DAT;1                File ID:  (2,1,1)
Size:          884/884    Owner:    [A9120,TREMBOIS]
Created:   3-FEB-1983 00:00   Revised:   <None specified>
Expires:   <None specified>   Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 884, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R083.DAT;1                File ID:  (3,1,1)
Size:          728/728    Owner:    [A9120,TREMBOIS]
Created:   3-FEB-1983 00:00   Revised:   <None specified>
Expires:   <None specified>   Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 728, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R084.DAT;1                File ID:  (4,1,1)
Size:          806/806    Owner:    [A9120,TREMBOIS]
Created:   8-FEB-1983 00:00   Revised:   <None specified>
Expires:   <None specified>   Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 806, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

Total of 4 files, 3380/3380 blocks.
```

Data tape #5

Directory MTB0:[]

R085.DAT;1 File ID: (1,1,1)
Size: 416/416 Owner: [A9120,TREMBOIS]
Created: 10-FEB-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 416, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R086.DAT;1 File ID: (2,1,1)
Size: 780/780 Owner: [A9120,TREMBOIS]
Created: 14-FEB-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 780, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R087.DAT;1 File ID: (3,1,1)
Size: 832/832 Owner: [A9120,TREMBOIS]
Created: 14-FEB-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 832, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R088.DAT;1 File ID: (4,1,1)
Size: 832/832 Owner: [A9120,TREMBOIS]
Created: 15-FEB-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 832, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R089.DAT;1 File ID: (5,1,1)
Size: 971/971 Owner: [A9120,TREMBOIS]
Created: 20-OCT-1981 00:00 Revised: <None specified>

```
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 971, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R090.DAT;1                File ID:  (6,1,1)
Size:  858/858  Owner:  [A9120,TREMBOIS]
Created:  17-FEB-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 858, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R091.DAT;1                File ID:  (7,1,1)
Size:  910/910  Owner:  [A9120,TREMBOIS]
Created:  20-FEB-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 910, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R092.DAT;1                File ID:  (8,1,1)
Size:  971/971  Owner:  [A9120,TREMBOIS]
Created:  26-OCT-1981 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 971, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R093.DAT;1                File ID:  (9,1,1)
Size:  754/754  Owner:  [A9120,TREMBOIS]
Created:  21-FEB-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 754, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
```

Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R094.DAT;1 File ID: (10,1,1)
Size: 936/936 Owner: [A9120,TREMBOIS]
Created: 25-FEB-1983 00:00 Revised: ‹None specified›
Expires: ‹None specified› Backup: ‹No backup done›
File organization: Sequential
File attributes: Allocation: 936, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

Total of 10 files, 8260/8260 blocks.

Data tape # 6

Directory MTA0:[]

R095.DAT;1 File ID: (1,1,1)
Size: 910/910 Owner: [A9120,TREMBOIS]
Created: 26-FEB-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 910, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R096.DAT;1 File ID: (2,1,1)
Size: 806/806 Owner: [A9120,TREMBOIS]
Created: 26-FEB-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 806, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R097.DAT;1 File ID: (3,1,1)
Size: 884/884 Owner: [A9120,TREMBOIS]
Created: 1-MAR-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 884, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R098.DAT;1 File ID: (4,1,1)
Size: 728/728 Owner: [A9120,TREMBOIS]
Created: 3-MAR-1983 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 728, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R099.DAT;1 File ID: (5,1,1)
Size: 754/754 Owner: [A9120,TREMBOIS]
Created: 8-MAR-1983 00:00 Revised: <None specified>

```
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 754, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R100.DAT;1                File ID:  (6,1,1)
Size:  364/364  Owner:  [A9120,TREMBOIS]
Created:  11-MAR-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 364, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R101.DAT;1                File ID:  (7,1,1)
Size:  702/702  Owner:  [A9120,TREMBOIS]
Created:  11-MAR-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 702, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R102.DAT;1                File ID:  (8,1,1)
Size:  468/468  Owner:  [A9120,TREMBOIS]
Created:  14-MAR-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 468, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R103.DAT;1                File ID:  (9,1,1)
Size:  338/338  Owner:  [A9120,TREMBOIS]
Created:  15-MAR-1983 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 338, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
```

```
Journaling enabled: None
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R104.DAT;1                          File ID:  (10,1,1)
Size:              338/338          Owner:    [A9120,TREMBOIS]
Created:  16-MAR-1983 00:00   Revised:   <None specified>
Expires:   <None specified>   Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 338, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R105.DAT;1                          File ID:  (11,1,1)
Size:              260/260          Owner:    [A9120,TREMBOIS]
Created:  17-MAR-1983 00:00   Revised:   <None specified>
Expires:   <None specified>   Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 260, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R106.DAT;1                          File ID:  (12,1,1)
Size:              364/364          Owner:    [A9120,TREMBOIS]
Created:  17-MAR-1983 00:00   Revised:   <None specified>
Expires:   <None specified>   Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 364, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

Total of 12 files, 6916/6916 blocks.
```

Data tape #7

Directory MTB0:[]

R183.DAT;1 File ID: (1,1,1)
Size: 657/657 Owner: [A9120,TREMBOIS]
Created: 26-JAN-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 657, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R184.DAT;1 File ID: (2,1,1)
Size: 486/486 Owner: [A9120,TREMBOIS]
Created: 27-JAN-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 486, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R185.DAT;1 File ID: (3,1,1)
Size: 657/657 Owner: [A9120,TREMBOIS]
Created: 28-JAN-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 657, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R186.DAT;1 File ID: (4,1,1)
Size: 571/571 Owner: [A9120,TREMBOIS]
Created: 1-FEB-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 571, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R187.DAT;1 File ID: (5,1,1)
Size: 685/685 Owner: [A9120,TREMBOIS]
Created: 4-FEB-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 685, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes

```
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R188.DAT;1                          File ID:  (6,1,1)
Size:           514/514             Owner:    [A9120,TREMBOIS]
Created:    4-FEB-1982 00:00        Revised:  <None specified>
Expires:    <None specified>        Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 514, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R189.DAT;1                          File ID:  (7,1,1)
Size:           742/742             Owner:    [A9120,TREMBOIS]
Created:    7-FEB-1982 00:00        Revised:  <None specified>
Expires:    <None specified>        Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 742, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R190.DAT;1                          File ID:  (8,1,1)
Size:           628/628             Owner:    [A9120,TREMBOIS]
Created:    8-FEB-1982 00:00        Revised:  <None specified>
Expires:    <None specified>        Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 628, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R191.DAT;1                          File ID:  (9,1,1)
Size:           799/799             Owner:    [A9120,TREMBOIS]
Created:    9-FEB-1982 00:00        Revised:  <None specified>
Expires:    <None specified>        Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 799, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R192.DAT;1                          File ID:  (10,1,1)
Size:           685/685             Owner:    [A9120,TREMBOIS]
Created:   14-FEB-1982 00:00        Revised:  <None specified>
Expires:    <None specified>        Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 685, Extend: 0, Global buffer count: 0, Version limit: 0
```

```
Record format:        Variable length, maximum 126 bytes
Record attributes:    No carriage control, Non-spanned
File protection:      System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:    None

R193.DAT;1                          File ID:  (11,1,1)
Size:           742/742             Owner:    [A9120,TREMBOIS]
Created:  17-FEB-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 742, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 126 bytes
Record attributes:    No carriage control, Non-spanned
File protection:      System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:    None

R194.DAT;1                          File ID:  (12,1,1)
Size:           714/714             Owner:    [A9120,TREMBOIS]
Created:  18-FEB-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 714, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 126 bytes
Record attributes:    No carriage control, Non-spanned
File protection:      System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:    None

R195.DAT;1                          File ID:  (13,1,1)
Size:           1142/1142           Owner:    [A9120,TREMBOIS]
Created:  30-OCT-1981 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 1142, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 126 bytes
Record attributes:    No carriage control, Non-spanned
File protection:      System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:    None

R196.DAT;1                          File ID:  (14,1,1)
Size:           1028/1028           Owner:    [A9120,TREMBOIS]
Created:   3-NOV-1981 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 1028, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 126 bytes
Record attributes:    No carriage control, Non-spanned
File protection:      System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:    None

R197.DAT;1                          File ID:  (15,1,1)
Size:           1056/1056           Owner:    [A9120,TREMBOIS]
Created:   3-NOV-1981 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
```

```
File attributes:    Allocation: 1056, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R198.DAT;1                          File ID:  (16,1,1)
Size:           1085/1085           Owner:    [A9120,TREMBOIS]
Created:    5-NOV-1981 00:00    Revised:    <None specified>
Expires:    <None specified>    Backup:     <No backup done>
File organization:  Sequential
File attributes:    Allocation: 1085, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R199.DAT;1                          File ID:  (17,1,1)
Size:           1028/1028           Owner:    [A9120,TREMBOIS]
Created:    5-NOV-1981 00:00    Revised:    <None specified>
Expires:    <None specified>    Backup:     <No backup done>
File organization:  Sequential
File attributes:    Allocation: 1028, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

Total of 17 files, 13219/13219 blocks.
```

Data tape #8

Directory MTB0:[]

R200.DAT;1 File ID: (1,1,1)
Size: 1056/1056 Owner: [A9120,TREMBOIS]
Created: 6-NOV-1981 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 1056, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R201.DAT;1 File ID: (2,1,1)
Size: 999/999 Owner: [A9120,TREMBOIS]
Created: 10-NOV-1981 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 999, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R202.DAT;1 File ID: (3,1,1)
Size: 608/608 Owner: [A9120,TREMBOIS]
Created: 24-NOV-1981 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 608, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R203.DAT;1 File ID: (4,1,1)
Size: 999/999 Owner: [A9120,TREMBOIS]
Created: 25-NOV-1981 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 999, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R204.DAT;1 File ID: (5,1,1)
Size: 971/971 Owner: [A9120,TREMBOIS]
Created: 29-NOV-1981 00:00 Revised: <None specified>

```
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 971, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R205.DAT;1                File ID:  (6,1,1)
Size:  1056/1056  Owner:  [A9120,TREMBOIS]
Created:  1-DEC-1981 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 1056, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R206.DAT;1                File ID:  (7,1,1)
Size:  1056/1056  Owner:  [A9120,TREMBOIS]
Created:  2-DEC-1981 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 1056, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R207.DAT;1                File ID:  (8,1,1)
Size:  1008/1008  Owner:  [A9120,TREMBOIS]
Created:  12-SEP-1986 00:00  Revised:  <None specified>
Expires:  22-MAR-1987 00:00  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 1008, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 2044 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:  System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R208.DAT;1                File ID:  (9,1,1)
Size:  1028/1028  Owner:  [A9120,TREMBOIS]
Created:  7-DEC-1981 00:00  Revised:  <None specified>
Expires:  <None specified>  Backup:  <No backup done>
File organization:  Sequential
File attributes:  Allocation: 1028, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:  Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
```

```
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R209.DAT;1                          File ID:  (10,1,1)
Size:           856/856             Owner:    [A9120,TREMBOIS]
Created:    8-DEC-1981 00:00        Revised:  <None specified>
Expires:    <None specified>        Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 856, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R210.DAT;1                          File ID:  (11,1,1)
Size:           1113/1113           Owner:    [A9120,TREMBOIS]
Created:    9-DEC-1981 00:00        Revised:  <None specified>
Expires:    <None specified>        Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 1113, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R211.DAT;1                          File ID:  (12,1,1)
Size:           914/914             Owner:    [A9120,TREMBOIS]
Created:   24-DEC-1981 00:00        Revised:  <None specified>
Expires:    <None specified>        Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 914, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R212.DAT;1                          File ID:  (13,1,1)
Size:           999/999             Owner:    [A9120,TREMBOIS]
Created:   28-DEC-1981 00:00        Revised:  <None specified>
Expires:    <None specified>        Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 999, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
Journaling enabled: None
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R213.DAT;1                          File ID:  (14,1,1)
```

Size: 1056/1056 Owner: [A9120,TREMBOIS]
Created: 28-DEC-1981 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 1056, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
Journaling enabled: None
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

Total of 14 files, 13719/13719 blocks.

Data tape # 9

Directory MTA0:[]

R215.DAT;1 File ID: (1,1,1)
Size: 1056/1056 Owner: [A9120,TREMBOIS]
Created: 4-JAN-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 1056, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R216.DAT;1 File ID: (2,1,1)
Size: 914/914 Owner: [A9120,TREMBOIS]
Created: 17-NOV-1981 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 914, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R217.DAT;1 File ID: (3,1,1)
Size: 1028/1028 Owner: [A9120,TREMBOIS]
Created: 19-JAN-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 1028, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R218.DAT;1 File ID: (4,1,1)
Size: 942/942 Owner: [A9120,TREMBOIS]
Created: 19-JAN-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 942, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R220.DAT;1 File ID: (5,1,1)
Size: 1056/1056 Owner: [A9120,TREMBOIS]
Created: 19-NOV-1981 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 1056, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes

```
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R221.DAT;1                          File ID:  (6,1,1)
Size:           914/914             Owner:    [A9120,TREMBOIS]
Created:  20-JAN-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 914, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R222.DAT;1                          File ID:  (7,1,1)
Size:           1028/1028           Owner:    [A9120,TREMBOIS]
Created:  20-JAN-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 1028, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R223.DAT;1                          File ID:  (8,1,1)
Size:           1056/1056           Owner:    [A9120,TREMBOIS]
Created:  21-JAN-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 1056, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R225.DAT;1                          File ID:  (9,1,1)
Size:           999/999             Owner:    [A9120,TREMBOIS]
Created:  21-JAN-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 999, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R235.DAT;1                          File ID:  (10,1,1)
Size:           1056/1056           Owner:    [A9120,TREMBOIS]
Created:  22-JAN-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 1056, Extend: 0, Global buffer count: 0, Version limit: 0
```

```
Record format:       Variable length, maximum 126 bytes
Record attributes:   No carriage control, Non-spanned
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:   None

R245.DAT;1                          File ID:  (11,1,1)
Size:           1085/1085           Owner:    [A9120,TREMBOIS]
Created:  25-JAN-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 1085, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:       Variable length, maximum 126 bytes
Record attributes:   No carriage control, Non-spanned
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:   None

R250.DAT;1                          File ID:  (12,1,1)
Size:           400/400             Owner:    [A9120,TREMBOIS]
Created:  22-FEB-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 400, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:       Variable length, maximum 126 bytes
Record attributes:   No carriage control, Non-spanned
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:   None

Total of 12 files, 11534/11534 blocks.
```

Data tape #10

Directory MTA0:[]

R255.DAT;1 File ID: (1,1,1)
Size: 571/571 Owner: [A9120,TREMBOIS]
Created: 27-FEB-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 571, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R256.DAT;1 File ID: (2,1,1)
Size: 657/657 Owner: [A9120,TREMBOIS]
Created: 27-FEB-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 657, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R261.DAT;1 File ID: (3,1,1)
Size: 343/343 Owner: [A9120,TREMBOIS]
Created: 1-MAR-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 343, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R262.DAT;1 File ID: (4,1,1)
Size: 115/115 Owner: [A9120,TREMBOIS]
Created: 4-MAR-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 115, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R265.DAT;1 File ID: (5,1,1)
Size: 314/314 Owner: [A9120,TREMBOIS]
Created: 4-MAR-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 314, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes

```
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R266.DAT;1                          File ID:  (6,1,1)
Size:           143/143             Owner:    [A9120,TREMBOIS]
Created:  11-MAR-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 143, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R269.DAT;1                          File ID:  (7,1,1)
Size:           200/200             Owner:    [A9120,TREMBOIS]
Created:  14-MAR-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 200, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R270.DAT;1                          File ID:  (8,1,1)
Size:           172/172             Owner:    [A9120,TREMBOIS]
Created:  14-MAR-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 172, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R273.DAT;1                          File ID:  (9,1,1)
Size:           286/286             Owner:    [A9120,TREMBOIS]
Created:  29-MAR-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 286, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R274.DAT;1                          File ID:  (10,1,1)
Size:           314/314             Owner:    [A9120,TREMBOIS]
Created:   5-APR-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 314, Extend: 0, Global buffer count: 0, Version limit: 0
```

```
Record format:        Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R277.DAT;1                          File ID:  (11,1,1)
Size:              29/29            Owner:    [A9120,TREMBOIS]
Created:    5-APR-1982 00:00    Revised:    <None specified>
Expires:    <None specified>    Backup:     <No backup done>
File organization:  Sequential
File attributes:     Allocation: 29, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R278.DAT;1                          File ID:  (12,1,1)
Size:              172/172          Owner:    [A9120,TREMBOIS]
Created:    5-APR-1982 00:00    Revised:    <None specified>
Expires:    <None specified>    Backup:     <No backup done>
File organization:  Sequential
File attributes:     Allocation: 172, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R280.DAT;1                          File ID:  (13,1,1)
Size:              286/286          Owner:    [A9120,TREMBOIS]
Created:    6-APR-1982 00:00    Revised:    <None specified>
Expires:    <None specified>    Backup:     <No backup done>
File organization:  Sequential
File attributes:     Allocation: 286, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R281.DAT;1                          File ID:  (14,1,1)
Size:              257/257          Owner:    [A9120,TREMBOIS]
Created:    7-APR-1982 00:00    Revised:    <None specified>
Expires:    <None specified>    Backup:     <No backup done>
File organization:  Sequential
File attributes:     Allocation: 257, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R282.DAT;1                          File ID:  (15,1,1)
Size:              115/115          Owner:    [A9120,TREMBOIS]
Created:    7-APR-1982 00:00    Revised:    <None specified>
Expires:    <None specified>    Backup:     <No backup done>
File organization:  Sequential
```

```
File attributes:    Allocation: 115, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R285.DAT;1                          File ID:  (16,1,1)
Size:           172/172             Owner:    [A9120,TREMBOIS]
Created:  21-APR-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 172, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R286.DAT;1                          File ID:  (17,1,1)
Size:           314/314             Owner:    [A9120,TREMBOIS]
Created:   6-MAY-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 314, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R289.DAT;1                          File ID:  (18,1,1)
Size:           200/200             Owner:    [A9120,TREMBOIS]
Created:  10-MAY-1982 00:00         Revised:  <None specified>
Expires:  None specified>           Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 200, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R290.DAT;1                          File ID:  (19,1,1)
Size:            58/58              Owner:    [A9120,TREMBOIS]
Created:  12-MAY-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 58, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R293.DAT;1                          File ID:  (20,1,1)
Size:           200/200             Owner:    [A9120,TREMBOIS]
Created:  25-MAY-1982 00:00         Revised:  <None specified>
Expires:  <None specified>          Backup:   <No backup done>
```

```
File organization:  Sequential
File attributes:    Allocation: 200, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R294.DAT;1                          File ID:  (21,1,1)
Size:           143/143             Owner:    [A9120,TREMBOIS]
Created:  27-MAY-1982 00:00    Revised:    <None specified>
Expires:  <None specified>     Backup:     <No backup done>
File organization:  Sequential
File attributes:    Allocation: 143, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R297.DAT;1                          File ID:  (22,1,1)
Size:           143/143             Owner:    [A9120,TREMBOIS]
Created:  27-OCT-1981 00:00    Revised:    <None specified>
Expires:  <None specified>     Backup:     <No backup done>
File organization:  Sequential
File attributes:    Allocation: 143, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R298.DAT;1                          File ID:  (23,1,1)
Size:           172/172             Owner:    [A9120,TREMBOIS]
Created:   4-JUN-1982 00:00    Revised:    <None specified>
Expires:  <None specified>     Backup:     <No backup done>
File organization:  Sequential
File attributes:    Allocation: 172, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R302.DAT;1                          File ID:  (24,1,1)
Size:           229/229             Owner:    [A9120,TREMBOIS]
Created:  18-JUN-1982 00:00    Revised:    <None specified>
Expires:  <None specified>     Backup:     <No backup done>
File organization:  Sequential
File attributes:    Allocation: 229, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:      Variable length, maximum 126 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R305.DAT;1                          File ID:  (25,1,1)
Size:           115/115             Owner:    [A9120,TREMBOIS]
Created:  23-JUN-1982 00:00    Revised:    <None specified>
```

Expires: ‹None specified› Backup: ‹No backup done›
File organization: Sequential
File attributes: Allocation: 115, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R306.DAT;1 File ID: (26,1,1)
Size: 229/229 Owner: [A9120,TREMBOIS]
Created: 24-JUN-1982 00:00 Revised: ‹None specified›
Expires: ‹None specified› Backup: ‹No backup done›
File organization: Sequential
File attributes: Allocation: 229, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R309.DAT;1 File ID: (27,1,1)
Size: 172/172 Owner: [A9120,TREMBOIS]
Created: 5-JUL-1982 00:00 Revised: ‹None specified›
Expires: ‹None specified› Backup: ‹No backup done›
File organization: Sequential
File attributes: Allocation: 172, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 126 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

Total of 27 files, 6121/6121 blocks.

Data tape # 11

Directory MTB0:[]

R310.DAT;1 File ID: (1,1,1)
Size: 182/182 Owner: [A9120,TREMBOIS]
Created: 26-AUG-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 182, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R313.DAT;1 File ID: (2,1,1)
Size: 182/182 Owner: [A9120,TREMBOIS]
Created: 9-SEP-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 182, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R314.DAT;1 File ID: (3,1,1)
Size: 208/208 Owner: [A9120,TREMBOIS]
Created: 9-SEP-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 208, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R315.DAT;1 File ID: (4,1,1)
Size: 182/182 Owner: [A9120,TREMBOIS]
Created: 16-SEP-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 182, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R317.DAT;1 File ID: (5,1,1)
Size: 130/130 Owner: [A9120,TREMBOIS]
Created: 2-OCT-1982 00:00 Revised: <None specified>
Expires: <None specified> Backup: <No backup done>
File organization: Sequential
File attributes: Allocation: 130, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes

```
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R318.DAT;1                          File ID:  (6,1,1)
Size:           260/260             Owner:    [A9120,TREMBOIS]
Created:   5-OCT-1982 00:00   Revised:   <None specified>
Expires:   <None specified>   Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 260, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R320.DAT;1                          File ID:  (7,1,1)
Size:           260/260             Owner:    [A9120,TREMBOIS]
Created:   4-OCT-1982 00:00   Revised:   <None specified>
Expires:   <None specified>   Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 260, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R321.DAT;1                          File ID:  (8,1,1)
Size:           182/182             Owner:    [A9120,TREMBOIS]
Created:   7-OCT-1982 00:00   Revised:   <None specified>
Expires:   <None specified>   Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 182, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R322.DAT;1                          File ID:  (9,1,1)
Size:           260/260             Owner:    [A9120,TREMBOIS]
Created:   7-OCT-1982 00:00   Revised:   <None specified>
Expires:   <None specified>   Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 260, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:        Variable length, maximum 2046 bytes
Record attributes:  No carriage control, Non-spanned
File protection:    System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:  None

R323.DAT;1                          File ID:  (10,1,1)
Size:           314/314             Owner:    [A9120,TREMBOIS]
Created:  28-OCT-1981 00:00   Revised:   <None specified>
Expires:   <None specified>   Backup:    <No backup done>
File organization:  Sequential
File attributes:    Allocation: 314, Extend: 0, Global buffer count: 0, Version limit: 0
```

```
Record format:       Variable length, maximum 126 bytes
Record attributes:   No carriage control, Non-spanned
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:   None

R324.DAT;1                          File ID:  (11,1,1)
Size:              440/440          Owner:    [A9120,TREMBOIS]
Created:   9-OCT-1982 00:00         Revised:  <None specified>
Expires:   <None specified>         Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 440, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:       Variable length, maximum 2046 bytes
Record attributes:   No carriage control, Non-spanned
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:   None

R325.DAT;1                          File ID:  (12,1,1)
Size:              50/50            Owner:    [A9120,TREMBOIS]
Created:   10-OCT-1982 00:00        Revised:  <None specified>
Expires:   <None specified>         Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 50, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:       Variable length, maximum 2046 bytes
Record attributes:   No carriage control, Non-spanned
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:   None

R326.DAT;1                          File ID:  (13,1,1)
Size:              390/390          Owner:    [A9120,TREMBOIS]
Created:   12-OCT-1982 00:00        Revised:  <None specified>
Expires:   <None specified>         Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 390, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:       Variable length, maximum 2046 bytes
Record attributes:   No carriage control, Non-spanned
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:   None

R328.DAT;1                          File ID:  (14,1,1)
Size:              387/387          Owner:    [A9120,TREMBOIS]
Created:   13-OCT 1982 00:00        Revised:  <None specified>
Expires:   <None specified>         Backup:   <No backup done>
File organization:  Sequential
File attributes:    Allocation: 387, Extend: 0, Global buffer count: 0, Version limit: 0
Record format:       Variable length, maximum 2046 bytes
Record attributes:   No carriage control, Non-spanned
File protection:     System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List:   None

R329.DAT;1                          File ID:  (15,1,1)
Size:              390/390          Owner:    [A9120,TREMBOIS]
Created:   14-OCT-1982 00:00        Revised:  <None specified>
Expires:   <None specified>         Backup:   <No backup done>
File organization:  Sequential
```

File attributes: Allocation: 390, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R330.DAT;1 File ID: (16,1,1)
Size: 286/286 Owner: [A9120,TREMBOIS]
Created: 14-OCT-1982 00:00 Revised: ‹None specified›
Expires: ‹None specified› Backup: ‹No backup done›
File organization: Sequential
File attributes: Allocation: 286, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R332.DAT;1 File ID: (17,1,1)
Size: 468/468 Owner: [A9120,TREMBOIS]
Created: 17-OCT-1982 00:00 Revised: ‹None specified›
Expires: ‹None specified› Backup: ‹No backup done›
File organization: Sequential
File attributes: Allocation: 468, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R333.DAT;1 File ID: (18,1,1)
Size: 182/182 Owner: [A9120,TREMBOIS]
Created: 16-OCT-1982 00:00 Revised: ‹None specified›
Expires: ‹None specified› Backup: ‹No backup done›
File organization: Sequential
File attributes: Allocation: 182, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

R334.DAT;1 File ID: (19,1,1)
Size: 312/312 Owner: [A9120,TREMBOIS]
Created: 17-OCT-1982 00:00 Revised: ‹None specified›
Expires: ‹None specified› Backup: ‹No backup done›
File organization: Sequential
File attributes: Allocation: 312, Extend: 0, Global buffer count: 0, Version limit: 0
Record format: Variable length, maximum 2046 bytes
Record attributes: No carriage control, Non-spanned
File protection: System:RWED, Owner:RWED, Group:RWED, World:RWED
Access Cntrl List: None

Total of 19 files, 5065/5065 blocks.

APPENDIX F: LISTING OF USEFUL PUBLISHED RESULTS

The following 4 pages are a listing of scientific papers that may provide a useful background to the data. These papers are all based in large part or entirely on data from the Plasma Composition Experiment on ISEE-1, specifically on data obtained in the energetic modes of operation. Some of these papers, as for example Lennartsson and Shelley (1986), are based on the particular set of data that is contained on the hardcopies and summary tapes described here. Other papers are based on data in a different format but are relevant examples of the potential applications and limitations of the current data (see for instance the Appendix of Lennartsson et al., 1985).

D/300-2

List of Publications
(Papers based in large part or entirely on the energetic ion data from the ISEE-1 Plasma Composition Experiment.)

Baker, D. N., T. A. Fritz, W. Lennartsson, B. Wilken, and H. W. Kroehl, The role of heavy ionospheric ions in the localization of substorm disturbances on 22 March 1979: CDAW-6, J. Geophys. Res., 90, 1273, 1985.

Balsiger, H., Composition of hot ions (0.1-16 keV/e) as observed by the GEOS and ISEE mass spectrometers and inferences for the origin and circulation of magnetospheric plasmas, Adv. Space Res., 1, 289, 1981.

Balsiger, H., On the composition of the ring current and the plasma sheet and what it tells about the sources of these hot plasmas, in High-Latitude Space Plasma Physics, B. Hultqvist and T. Hagfors, eds., Plenum Publishing Corp. London, 313, 1983.

Candidi, M. S. Orsini, and V. Formisano, The properties of ionospheric O^+ ions as observed in the magnetotail boundary layer and northern plasma lobe, J. Geophys. Res., 87, 9097, 1982.

Candidi, M., S. Orsini, and A. G. Ghielmetti, Observations of multiple ion beams in the magnetotail: evidence for a double proton population, J. Geophys. Res., 89, 2180, 1984.

Cattell, C., and F. Mozer, Experimental determination of the dominant wave mode in the active near-earth magnetotail, Geophys. Res. Lett., 13, 221, 1986.

Cattell, C. A., F. S. Mozer, E. W. Hones, Jr., R. R. Anderson, and R. D. Sharp, ISEE Observations of the plasmasheet boundary, plasmasheet, and neutral sheet: (1) electric field, magnetic field, plasma, and ion composition, J. Geophys. Res., 91, 5663, 1986.

Cladis, J. B., and W. E. Francis, The polar ionosphere as a source of the stormtime ring current, J. Geophys. Res., 90, 3465, 1985.

Cladis, J. B., and W. E. Francis, Transport of ions in presence of induced electric field and electrostatic turbulence: a double-spiral injection boundary, Advances in Space Research, Vol. 5, No. 4, 415, 1985.

Cladis, J. B. and O. W. Lennartsson, On the loss of O^+ ions (<17 keV/e) in the ring current during the recovery phase of a storm, Ion Acceleration in the Magnetosphere and Ionosphere, T. Chang, Editor, Geophysical Monograph 38, American Geophysical Union, Washington, D.C., 153, 1986.

Eastman, T. E., L. A. Frank, W. K. Peterson, and W. Lennartsson, The plasma sheet boundary layer, J. Geophys. Res., 89, 1553, 1984.

Fritz, T. A., D. N. Baker, R. L. McPherron, and W. Lennartsson, Implications of the 1100 UT March 22, 1979, CDAW-6 substorm event for the role of magnetic reconnection in the geomagnetic tail, Magnetic Reconnection in Space and Laboratory Plasmas, E. W. Hones, Jr., Editor, Geophysical Monograph 30, American Geophysical Union, Washington, D. C., 203, 1984.

Horita, R. E., E. Ungstrup, R. D. Sharp, R. R. Anderson, and R. J. Fitzenreiter, Counterstreaming hydrogen and oxygen ions observed in the magnetosphere on ISEE-1 Advances in Space Research, Vol. 5, No. 4, 421, 1985.

Huang, C. Y., L. A. Frank, W. K. Peterson, D. J. Williams, W. Lennartsson, D. G. Mitchell, R. C. Elphic, and C. T. Russell, Filamentary structures in the magnetotail lobes, J. Geophys. Res., 91, in press, 1986.

Johnson, R. G., Review of the hot plasma composition near geosynchronous altitude, in Proceedings of Spacecraft Charging Technology 1980 Conference, edited by N. J. Stevens and C. P. Pike, NASA CP-2182, 412, 1981.

Lennartsson, W., E. G. Shelley, R. D. Sharp, R. G. Johnson, and H. Balsiger, Some initial ISEE-1 results on the ring current composition and dynamics during the magnetic storm of December 11, 1977, Geophys. Res. Lett., 6, 483, 1979.

Lennartsson, W., R. D. Sharp, E. G. Shelley, R. G. Johnson, and H. Balsiger, Ion Composition and energy distribution during 10 magnetic storms, J. Geophys. Res., 86, 4678, 1981.

Lennartsson, W., and R. D. Sharp, A comparison of the 0.1-17 keV/e ion composition in the near equatorial magnetosphere between quiet and disturbed conditions, J. Geophys. Res., 87, 6109, 1982,

Lennartsson, W., and R. D. Sharp, Achievements of the plasma composition experiment on ISEE-1 during the IMS, Proc. Conf. Achievements of the IMS, ESA SP-217, 283, 1984.

Lennartsson, W., R. D. Sharp, and R. D. Zwickl, Substorm effects on the plasma sheet ion composition on March 22, 1979 (CDAW-6), J. Geophys. Res., 90, 1243, 1985.

Lennartsson, W., and R. D. Sharp, Relative contribution of terrestrial and solar wind ions in the plasma sheet, Advances in Space Research, Vol. 5, No. 4, 411, 1985.

Lennartsson, W., and E. G. Shelley, Survey of 0.1 - 16 keV/e plasmasheet ion composition J. Geophys. Res., 91, 3061, 1986.

Lennartsson, W., Dynamical features of the plasmasheet ion composition, density and energy, Proceedings of the Chapman Conference on Magnetotail Physics, Laurel, Maryland, October 28-31, 1985, in press, 1986.

Lennartsson, W., Plasma sheet ion composition at various levels of geomagnetic and solar activity, Physica Scripta, 35, in press, 1986.

Orsini, S., M. Candidi, H. Balsiger, A. Ghielmetti, Ionospheric ions in the near earth geomagnetic tail plasma lobes, Geophys. Res. Lett., 9, 163, 1982.

Orsini, S., M. Candidi, V. Formisano, H. Balsiger, A. Ghielmetti, and K. W. Ogilvie, The structure of the plasma sheet-lobe boundary in the earth's magnetotail, J. Geophys. Res., 89, 1573, 1984.

Orsini, S., E. Amata, M. Candidi, H. Balsiger, M. Stokholm, C. Huang, W. Lennartsson, and P. -A. Lindqvist, Cold streams of ionsopheric oxygen in the plasma sheet during the CDAW-6 event of March 22, 1979, J. Geophys. Res., 90, 4091, 1985.

Peterson, W. K., E. G. Shelley, R. D. Sharp, R. G. Johnson, J. Geiss, and H. Rosenbauer, H^+ and He^{++} in the dawnside magnetosheath, Geophys. Res. Lett., 6, 667, 1979.

Peterson, W. K., R. D. Sharp, E. G. Shelley, and R. G. Johnson, Energetic ion composition of the plasma sheet, J. Geophys. Res., 86, 761, 1981.

Peterson, W. K. E. G. Shelley, G. Haerendel, and G. Paschmann, Energetic ion composition in the subsolar magnetopause and boundary layer, J. Geophys. Res., 87, 2139, 1982.

Schmidt, W. K. H., H. Rosenbauer, E. G. Shelley, and J. Geiss, Uber sauerstoffionen im sonnenwind, Deutsche Physikalische Gesellschaft, Fruhjahrstagung Bochum, 1979.

Schmidt, W. K. H., H. Rosenbauer, J. Geiss, and E. G. Shelley, Heavey ions in the solar wind: First ISEE-1 results on Temperatures, Proceedings of the 4th Solar Wind Conference, Burghausen, West Germany, Springer Verlag, Berlin-Heidelberg-New York, 1980.

Schmidt, W. K. H., H. Rosenbauer, E. G. Shelley, and J. Geiss, On temperature and speed of He^{++} and O^{6+} ions in the solar wind, Geophys. Res. Lett., 7, 697, 1980.

Sharp, R. D., D. L. Carr, W. K. Peterson, and E. G. Shelley, Ion streams in the magnetotail, J. Geophys. Res., 86, 4639, 1981.

Sharp, R. D., W. Lennartsson, W. K. Peterson, and E. G. Shelley, The origins of the plasma in the distant plasma sheet, J. Geophys. Res., 87, 10420, 1982.

Sharp, R. D., W. Lennartsson, W. K. Peterson, and E. Ungstrup, The mass dependence of wave particle interactions as observed with the ISEE-1 energetic ion mass spectrometer, Geophys. Res. Lett., 10, 651, 1983.

Sharp, R. D., R. G. Johnson, W. Lennartsson, W. K. Peterson and E. G. Shelley, Hot plasma composition results from the ISEE-1 spacecraft, in Energetic Ion Composition in the Earth's Magnetosphere, edited by R. G. Johnson, Terra Scientific Publishing Co., Tokyo, Japan, and D. Reidel Publishing Co., Dordrecht, Holland, 231, 1983.

Sharp, R. D., W. Lennartsson, and R. J. Strangeway, The ionospheric contribution to the plasma environment in near-earth space, Radio Science, 20, 456, 1985.

Shelley, E. G., R. D. Sharp, R. G. Johnson, J. Geiss, P. Eberhardt, H. Balsiger, G. Haerendel, and H. Rosenbauer, Plasma composition experiment on ISEE-A, IEEE Trans. Geosci. Electr., GE-16, 266, 1978.

Shelley, E., G., D. A. Simpson, T. C. Sanders, E. Hertzberg, H. Balsiger and A. Ghielmetti, The energetic ion composition spectrometer (EIC) for the Dynamics Explorer-A, Space Science Instrumentation, 5, 443, 1981.

Shelley, E. G., Circulation of energetic ions of terrestrial origin in the magnetosphere, Advances in Space Research, Vol. 5, No. 4, 401, 1985.

Shelley, E. G., Magnetospheric energetic ions from the earth's ionosphere, Adv. Space Res., Vol. 6, in press, 1986.

Singer, H. J., C. T. Russell, M. G. Kivelson, T. A. Fritz, and O. W. Lennartsson, The spatial extent and structure of PC-3, -4, -5 pulsations near the magnetospheric equator, Geophys. Res. Lett., 6, 889, 1979.

Singer, H. J., W. J. Hughes, and C. T. Russell, Standing hydromagnetic waves observed by ISEE-1 and 2: radial extent and harmonic, J. Geophys. Res., 87, 3519, 1982.

Ungstrup, E., W. J. Heikkila, J. C. Foster, and W. Lennartsson, Compositional changes and time and density variations in the magnetosphere associated with Birkeland currents and particle acceleration, Adv. Space Res., Vol. 6, in press 1986.

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11/6/86