591

PIONEER VENUS 1

POSITIVE ION COMPOSITION MEASUREMENTS

78-051A-17B

OIMS HIGH RESOLUTION DATA BASE

78-051A-17C

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 This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system.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

PIONEER VENUS 1

12-SECOND ION DENSITIES (REPLACES 17A)

78-051A-17B PSPA-00240

THIS DATA SET HAS BEEN RESTORED. ORIGINALLY IT CONTAINED THREE 9-TRACK, 1600 BPI TAPES WRITTEN IN ASCII. THERE IS ONE RESTORED TAPE. THE DR TAPE IS A 3480 CARTRIDGE AND THE DS TAPE IS 9-TRACK, 6250 BPI. THE ORIGINAL TAPES WERE CREATED ON A PDP 11 COMPUTER AND WERE RESTORED ON THE MRS SYSTEM. THE DR AND DS NUMBERS ALONG WITH THE CORRESPONDING D NUMBERS AND THE TIME SPANS ARE AS FOLLOWS:

DR#	DS#	D#	FILES	TIME SPAN
DR004406	DS004406	D057426	1	12/05/78 - 05/29/84
		D075423	2	05/28/84 - 10/07/85
		D078589	3	10/20/85 - 02/18/87

REQ. AGENT	RAND NO	ACQ.AGENT
DEW DHG	V0188	WSC

PIONEER VENUS 1

POSITIVE ION COMPOSITION MEASUREMENTS

78-051A-17B

This data set catalog consists of 3 magnetic tapes. The tapes are 1600 BPI, 9-track, ASCII with 1 file of data per tape. The tape was created on a PDP 11/70 computer. The 'D' and 'C' numbers are as follows:

D#	C#	Time Span
D-57426	C-23124	12/05/78 - 05/29/84
D-75423	C-26397	05/28/84 - 10/06/85
D-78589	C-26803	10/20/85 - 02/18/87

March 11, 1988

March 9, 1988

TO: Ralph Post
NSSDC

RE: Archiving of Pioneer Venus OIMS data tapes

Enclosed is a tape containing OIMS data for PVO orbits 2500-3000. The format is the same as for the data provided to you on 12 June, 1987.

Some orbits are missing for various reasons, including the requirement for power sharing, in which the OIMS was turned off. Otherwise, the data appear to be nominal.

During the period covered by these data, the PVO is almost always well above the Venus ionosphere, and thus the OIMS typically is seeing only background noise levels. Thus for many orbits, only baseline data is present. Occasionally, the spacecraft dips into an extended ionosphere, and a brief interval of ionization is recorded.

Many of the caveats documented in my memos to you of June and November, 1987 continue to apply to these data. The data content and format is identified on the attached documentation which has been prepared by Joel Selekof, a programmer analyst working with me. Joel can be reached for information as necessary on 65779.

Harry A. Taylor, Jr.
Code 610

November 17, 1987

TO: Ralph Post
NSSDC

RE: Archiving of Pioneer Venus OIMS data tapes

Enclosed are seven tapes comprising an updated OIMS data base, to be added to the current archive of this data. These tapes contains data for orbits up to orbit 2500. Two blocks of missing orbits result from the superior conjunction during the second revolution, and from erroneous command configurations for the OIMS during revolution 3. Otherwise, occasional missing orbits result from problems with individual data tapes.

Many of the caveats documented in my memo to you of June 15, 1987 apply to these data. I believe it would be instructive however to update the existing documentation, to delineate all known uncertainties and caveats, and I will do so in a memo to follow shortly.

The data on these tapes is identified on the attached documentation which has largely been prepared by Joel Selekof, an programmer analyst working with me. Joel can be reached if necessary on 65779.

Harry

Harry A. Taylor, Jr.
Code 610

March 24, 1986

TO: Ralph Post
NSSDC/GSFC

RE: Submission of Pioneer Venus Ion Mass Spectrometer Data (UADS)

Attached is a magnetic tape containing OIMS data from the first 2000 orbits of the PVO. Also attached are (1) the data format instructions given to us by Ames for preparing the data, and (2) an updated narrative description of the data and cautions relative to its specific characteristics, for potential users.

The Documentation for Users is particularly important, owing to the fact that we have included in the file data of know uncertainties. I want to ensure that this data is archived so that any future requestor/user will obtain a copy of this documentation and the cautions contained therein. Please make an appropriate arrangement for this, and let me know when these data are made part of the NSSDC records. Thanks for your help.

Harry A. Taylor, Jr.

Harry A. Taylor, Jr.
Code 610/GSFC

March 1986

Documentation for Data from Pioneer Venus Orbiter Ion Mass Spectrometer (OIMS) : Characteristics and Cautions

1. The objectives and technical description of the OIMS instrument are described in the IEEE transactions on Geoscience and Remote Sensing (1980), part of which is attached for convenient reference.

2. The specifications for format and content of the data contained in the UADS files are also attached. Individual ion density values are provided for 12 of the most prominent ion species detected by the OIMS. Density values are inserted for all appropriate orbits through orbit 2000, covering the period from planet encounter in December 1978 through May, 1984. About 10% of all orbits are missing, due to inappropriate operating formats, gaps in allocation of data coverage, gaps in satellite communication during superior conjunction, etc. Otherwise, data from all remaining orbits are presented.

3. Calibration of the electronics system is accomplished daily by automatic procedures. Evidence to date indicates excellent stability of the amplifier systems, and no changes have been required in the conversion of measured ion currents to equivalent ion densities. On this basis, the observed densities are believed to be correct to within about 5 percent, considering only instrumental stability.

4. The tabulated ion concentrations are subject to several types of errors reslting mainly from the intense interaction between the solar wind and the ambient ionosphere. This interaction results in the presence of large ion drifts, reaching velocities in excess of 10 kilometers/sec, and in associated superthermal ion distributions in which the kinetic energies of ions may increase from ambient levels to tens of electron volts and beyond. The OIMS is designed to analyze thermal plasma, and as a consequence yields unique responses to these energetic perturbations, depending upon the intensity of the interaction.

In the lower ionosphere, uncertainties tend to occur primarily from the moderate ion drifts induced by the solar wind interaction. The orifice of the OIMS is directed parallel to the PVO spin axis, so that there is no modulation of the measured ion currents due to spin modulation of the angle of attact of incoming ions, due to spacecraft velocity. Nevertheless, due to the appreciable ion flows encountered even in the lower ionosphere, and due to the highly variable direction of these flows, the incoming ion currents are nevertheless modulated, much as they would be if the sensor were oriented away from the spin axis. The direction and velocity of these ion flows cannot be determined accurately from the OIMS measurments alons. Moreover, other plasma measuremnts aboard the PVO are inadequated to determine these parameters. Lacking such information, there is no way to account for the effective "spin modulation" of the densities and thus they remain in the presented data.

Due to the fact that the PVO spin rate of 12 seconds is comparable to the 12 second averaging time for insertion of this UADS data, and further that these times are not synchronized, the spin modulation apparent in the full resolution data (not included) are not so apparent in the UADS data. At times the UADS samples are taken from data samples near the maximum of the observed modulation in the ion densities, while at other times, the samples may occur near the minima. Since the amplitude of observed modulations may approach a factor of two at times, direct comparison of UADS values with high resolution data may result in some offsets, which may be understood by considering the foregoing characteristics. Owing to the considerable variability of the solar wind interaction, we do not necessarily expect persistent patterns in the modulation, and thus we do not expect persistent or systematic uncertatinties in the stated ion concentrations due to this interaction. Finally, since the three thermal plasma instruments on the PVO have differing sensitivities to ion flow effects, as well as different original sampling rates, one must expect to find differences between plasma concentrations due to the effect of ion flows.

As the PVO moves higher in the ionosphere, approachin the ionopause, the interaction with the solar wind becomes more intense, and the amplitude and direction of fast ion flows becomes more variable. With sufficient increase in the kinetic energies of incoming ions, the OIMS detects ions of a given mass to be shifted in energy, and thus the accuracy of the measurement is affected. When the amount of excess kinetic energy above the ambient level becomes of the order of 5-10 electron volts, the ions of mass 16 are resolved at correspondingly lower accelerating potentials, and in this example begin to appear in the mass "window" assigned to nitrogen ions. This in turn results in an anomalously high ion current for the minor nitrogen ions, and a correspondingly lower ion current for the oxygen ions.

In the ambient state, the ratio of atomic oxygen to atomic nitrogen ions is about ten to one, whereas in the ionopause region, the nitrogen ions may sometimes appear to become dominant, reflecting the enhanced energies of the ions. As in the previous case, since we cannot determine the directionality or the magnitude of the corresponding ion flows, we make no correction for these effects, and the user must exercise caution in interpreting the UADS data in the ionopause region.

As the PVO moves still further out into the ionosheath region, the ions appear to typically have superthermal energies such that individual masses are no longer coherently resolved within the OIMS, and incoming ions produce collecter currents, but are not otherwise resolved. These ion currents appear more or less at random within the different ion "windows" and are converted to densities, to reflect some information on activity, but these densities, observed above the ionopause are not believe to actually represent the ions indicated, and can be considered only as evidence of the presence of superthermal ions of undetermined mass and density. On the dayside, such densities are typically observed near and above about 350 kilometers on average, with some ionopause heights being much higher, and in some cases appreciably lower. On the nightside, the ionopause is sometimes observed to extend to several thousand kilometers, such that the ambient ion densities are believable to considerably higher altitudes, on average.

Finally, as the PVO encounters the bowshock, a characteristic increase in superthermal ion currents is also observed. Again, while these currents are converted automatically to densities, the densities and mass identifications cannot be taken literally, but rather are to be used only to indicate the locatiion and relative intensity of the superthermal ion buildup often seen at the bowshock. From analysis of the OIMS operation, it appears that the energies of the superthermal ions near the bowshock must be of the order of several hundred to a thousand electron volts, since coherent spectrometer resolution of individual ions is never observed in this region. However, whereas the masses and absolute concentrations of the superthermal ions are unresolved, the OIMS densities provide a sensitive indicator of the bowshock crossing, in a format ranging from a sharply defined and intense ledge of superthermals at the initial encounter, to a diffuse low level background of particles, a variation which appeart to reflect contrasting conditions of parallel and perpendicular shock formations. Owing to differences in particle excitation, as well as differences in sensor angle of attack, the bowshock superthermal ion signatures are not consistently observed on all orbits, nor on both inbound and outbound legs, but rather are quite variable.

In addition to naturally stimulated uncertainties, the OIMS data reflect an artifact of instrument response. This occurrs for ion concentrations of about 10^4/cc, and appears as an anomalous "flattening" of the profile of a given ion when plotted against altitude. This incorrect behavior is an artifact of the amplifier response, in which as the increasing ion current passes from a high gain to a low gain amplifier system, non-linearity in the transition produces a temporary "dead spot" in the movement of the ion profile to either higher or lower concentration. When the ionospheric condition is such that a given ion is being sampled at current levels close to the transition level, and the natural variability of the ion happens to be relatively low, the current, and thus the calculated density of that ion will briefly appear to stagnate near a density of about 10^4 and this will be rather apparent in any plot made of this particular data. In most instances, this effect is sufficiently obvious as to preclude misleading interpretation of the data.

TAPE SPECIFICATION

MODE : ASCII
DENSITY : 6250 ~~1600~~ BPI
TRACK : 9
FILES : 1
PROCESSOR : DEC PDP-11/70

TAPE STRUCTURE

DATA BLOCK 1
DATA BLOCK 2
.
.
.
DATA BLOCK n
EOF BLOCK.

BLOCK SIZE : 4960 bytes ; 40 Records / Block.
LOGICAL RECORD LENGTH : 124 bytes

FIRST RECORD OF BLOCK 1 : The format used is (I3, 12(1X, A4))

```
12  I001  I002  I004  I008  I012  I014  I016  I018  I028  I030  I032 I
↑ ↑     ↑     ↑     ↑     ↑     ↑     ↑     ↑     ↑     ↑     ↑    ↑
3 5     10    15    20    25    30    35    40    45    50    55   6
```

SECOND RECORD OF BLOCK 1 : The format used is (5(A4)), this record contains the format in which all the succeeding records are written.

```
(I8, I9, I5, I6, 12F8.0)
↑                      ↑
1                      20
```

THIRD RECORD OF BLOCK 1 : This record will contain zeros for the first four fields (date, time, orbit and time-tag), and in addition will have a fill value in each data value location. This value will be used by any program reading the data to identify fill data in subsequent reco.

```
0     0     0   09999999.9999999.9999999.9999999. - - - -
↑     ↑     ↑   ↑↑      ↑       ↑       ↑
8     17    22  28 29   37      45      53
```

DATA BLOCK FORMAT:

Actual data from record 4 of Block 1 and all the records from Block 2 thru End.

DATA TYPE	FORMAT	Contents.
Integer	I8	year and Julian day eg 1980005 ie Jan 5, 1980
Integer	I9	Time in milliseconds.
Integer	I5	Orbit number
Integer	I6	Time Tag (12 sec increments,
Real	12F8.0	Ion densities

These records contain the date, time, orbit and time-tag for each time which has any non-fill data

FILL DATA is 9999999.

PIONEER VENUS MISSION

INSTRUCTIONS FOR DATA SUBMISSIONS TO THE
NATIONAL SPACE SCIENCE DATA CENTER

A COMMITTEE REPORT

ROGER A. CRAIG
NASA AMES RESEARCH CENTER
August 11, 1983

I. BACKGROUND

The Unified Abstract Data System, UADS, was developed as a computer based, interactive system to provide Pioneer Venus Orbiter (PVO) experimenters quick and convenient access to data being acquired by the mission. Data were entered into a central facility by each experimenter through local terminals; the UADS software then sorted and cross-filed the data by orbit numbers. Each experimenter could then access any information from the central facility through his local terminal. The UADS proved invaluable in providing quick access to cross-compare results between experiments, especially in the early phases of the mission when rapid feed-back to Mission Control was critical.

The UADS further produced data files on magnetic tape, suitable for archival purposes with the National Space Science Data Center, NSSDC. The files so produced contained Low Frequency Data (LFD), Special Event Data (SED), and Composite Data (CD). Both the SED and CD record formats were defined and controlled by each experimenter. The LFD combined experimental results and orbital information in an unchanging, predefined format. The experimenters were responsible for entering data peculiar to their instrument, while the Pioneer Mission Office (PMO) supplied orbital parameters and experiment pointing information through a subset of the Supplementary Experimenter Data Record (SEDR).

The software for the UADS was developed, under contract, for this purpose by Bendix Corporation and the computing resources of Tymshare Corporation were purchased to serve as the central facility.

As the mission progressed, the need for rapid access to data, cross-referenced by orbit, decreased, and under the pressing need to reduce costs a decision was made by the PMO to terminate the contract with Tymshare Corporation as of January 1981. Without support from Tymshare Corporation the UADS would not be available for preparing NSSDC submissions, so the PMO agreed to develop a substitute system to provide archival data records.

II. PIONEER VENUS ARCHIVAL DATA AT THE NSSDC

In conformance with NASA policy, Pioneer Venus data are archived at the NSSDC, whose charter it is to acquire, store and disseminate space science data for further analysis beyond that provided by the principal investigators.

Pioneer Venus data have been archived with the NSSDC in the format produced by the software of the UADS. Various plans have been suggested to implement the continued submission to the archives now that the UADS has been terminated. Several plans were submitted for consideration to the May 6, 1983 meeting of the OMOP Committee. These were, in brief,

1. The experimenters send their data to the PMO, who periodically contract with a time sharing vendor to run, as a batch job, the archival feature of the UADS. The primary advantage of this would be to produce archival data in the same format as that already at the NSSDC with very little reconfiguration of any existing system. An important drawback is an estimated very high cost (about $30K for each six months of data processing).

2. The experimenters send their data to the PMO who will arrange to use an existing NASA Ames IBM 4341 computer to run a modified version of the archival feature of the UADS. The primary advantage of this approach would be that it will be relatively inexpensive to use.

Both plans (1) and (2) retain the tape formats used by the UADS. As is discussed below, this was argued to be an important drawback. On the basis of this a third plan was suggested, which is as follows:

3. The experimenters individually send their data directly to the NSSDC. Each experimenter would need to create a self-contained submission which would include experiment data, orbital parameters and experiment pointing information. This concept would result in NSSDC archives organized by experiment rather than by orbit. An advantage of this is that the PMO will no longer need to pay for the elaborate and expensive UADS. Further, data requests to the NSSDC are usually made for a single instrument; this approach would eliminate the need for a requestor to strip out the data of interest from records of all instruments.

This concept would also allow data to be provided to the NSSDC in a tape format which is more convenient to use than that provided by the UADS. The LFD file is recorded on tape both in 32-bit binary format and in IBM 360 floating point format; formats which may present conversion problems for a user employing a small system. Such a user, especially in a remote location, would have great difficulty reading such a tape, or be forced to develop conversion software.

III. COMMITTEE RECOMMENDATIONS

A committee was appointed to consider and recommend a procedure to implement the continued submissions of PVO data to the NSSDC. The committee consisted of:

Peter Ford,	MIT
Larry Brace,	GSFC
Robert Theis,	GSFC
Winifred Cameron	NSSDC
Pat Barclay,	Bendix Corporation
and Roger Craig	ARC, PMO

The committee discussed the above and agreed that the production of archival files which are easily accessible and usable to a variety of users was of high priority. It was agreed that to achieve this it is required that files be generated in a style more consistent with the usual NSSDC submissions, namely organized by instrument rather than by orbit. It was further agreed that in order to broaden the potential user base the UADS format (32-bit binary and IBM 360 floating point) be replaced with a more generally used format.

The results of committee discussions of the above are guidelines for submitting PVO data for the NSSDC. The guidelines are designed to:

1. standardize and improve the data formats for each experiment so that the tapes can be easily read by a requestor.

2. store the data by experiment,

3. provide for orderly updating of data,

4. provide for ultimate replacement of existing UADS generated archival tapes.

A new format was designed which is to be used by each experimenter for PVO NSSDC data experimenter, and can be easily read by computers expected to be accessible to a requester. One major difference between this and the existing LFD format is the use of text (ASCII) data formats, eliminating both binary and IBM floating point formats.

The proposed new submission format is self-defining in the sense that the first three records on each tape define the data parameters, value representations, and missing data (file) indicators. The first tape record defines the order in which the variables appear in the subsequent data records, in a manner similar to that used for SEDR trajectory data (SEDR file 5). The second tape record will contain a FORTRAN-compatible format list describing the field sizes and representations of each data value in the order defined in record 1. This format may be used to decode all subsequent records on the tape.

The third tape record will define a unique value associated with filler (missing) data for all variable fields. It is formatted according to the format used in record 2, and is immediately followed by the start of actual data records (records 4 and beyond).

The following is the proposed new format, with examples as applied to OETP instructions.

PROPOSED PIONEER VENUS NSSDC LOW-FREQUENCY DATA FORMAT

This document describes a suggested format to be used by all investigators for the submission of their data to the National Space Sciences Data Center. The overall specification will require that all data be coded into ASCII, and written onto standard 1/2 inch 1600-bpi 9-track tapes. The logical record length will be fixed for a given tape, as well as the physical blocksize. Blocksizes should be large enough to avoid wasting tape, but should not exceed 8000 bytes in order to avoid making excessive demands on user programs for memory. The first three records of any of these tapes will be formatted as follows:

Record 1: The format to be used is (13,n(1X,A4)) where "n" is the number of data items in each record.

```
*
4  ELTE  ELNE  MI    VS                                (for OETP)
7  ETEM  SPOT  TONE  TTWO  XVEL  YVEL  ZVEL            (for ORPA)
↑  ↑     ↑     ↑     ↑     ↑     ↑     ↑
3  5     10    15    20    25    30    35
```

Example 1: The first record in each tape file. Note that new value types with new 4-character designations can be added as necessary. The date, time, orbit and time-tag items are not included in the list, because they are common to all data records.

* number of data items "n"

Record 2: This record contains the format in which all succeeding records are written. The first 4 format items specify the date, time, orbit, and time-tag, and will appear in the same format on all tapes.

```
(I8,I9,I5,I6,4F9.2)        (Appropriate for OETP)
↑
1
```

Example 2: The second record in each tape file

Record 3: This record will contain zeroes for the first four fields (date, time, orbit, and time-tag), and in addition will have a fill value in each data value location. This value will be used by any program reading the data to identify fill data in subsequent input records.

```
0       0    0    0999999.99999999.99999999.99999999.99
↑       ↑    ↑    ↑        ↑        ↑        ↑        ↑
8       17   22   28       37       46       55       64
```

Example 3: The third record in each tape file. (Appropriate for OETP).

Record 4 to   : These records contain the date, time, orbit, and time-tag for each time which has any non-fill data.

```
1981207 43527786  879 -1788  2345.67 78543.89999999.99   16.20
      ↑         ↑    ↑     ↑        ↑        ↑        ↑        ↑
      8        17   22    28       37       46       55       64
```

Example 4: All records after the third in a tape file. (Appropriate for OETP).

As can be inferred from the above example, the date is coded as YEAR, DAY OF YEAR (1-366) with 19 included in the year. The time is in milliseconds of the day, orbit number is self-explanatory, and the time tag is the usual value ranging of the day from -1800 to 1800 in increments of 12.

The project-provided tape of SEDR information would be the source of the official dates and times to be used by all other investigators.

Nothing in the above format would preclude investigators from producing a tape containing the data from more than one experiment.

The external label on the tape should be type-written, and contain the following information:

- o Full name of experiment data contained on tape.[1]
- o Start date, time, and orbit number of data on the tape.
- o Stop date, time, and orbit number of data on the tape.
- o Production date of the tape.
- o The density (1600-bpi) and number of tracks (9) at which the tape was recorded.
- o An estimate of the amount of tape used.
- o The physical blocksize used in writing the tape.
- o A name and phone number of the individual responsible for the tape.

[1] Example: "Pioneer Venus Orbiter Electron Temperature Probe".

Each Experimenter will be responsible to modify his software accordingly and when appropriate, submit data tapes to the NSSDC. As data are updated, new tapes should be sent directly to the NSSDC with instructions as to which tapes it replaces, or appends.

Documentation is important in these submissions. All submissions must conform to the NSSDC instructions "Guidelines for Submitting Data to the National Space Science Data Center." These instructions delineate the kinds of documentation which must accompany shipments.

IV TIMETABLE

1. Submissions should be made to the NSSDC for each experiment by October 1, 1983 to complete the data set for orbits 1 to 1000.

2. Submissions should be made to the NSSDC for each experiment by November 1, 1983 to replace all data currently on file in the UADS format. As replacements are received, the NSSDC will destroy the data in the UADS format.

June 15, 1987

TO: Ralph Post
NSSDC

RE: Archiving of Pioneer Venus OIMS data tapes

Enclosed is a tape containing additional orbits to be inserted into the current archive of subject data. This new tape contains orbits which extend up to orbit 2500. The purpose of this memo is to update the caveats which apply in general to the data of this extended "UADS" archive (as well as the the initial UADS archive) and (2) to anticipate a new high resolution OIMS data archive which should appear in the future.

Users of the original UADS and the archive of orbits up to 2500 are cautioned as to the variation of OIMS "background level" as a function of telemetry bit-rate. The instrument was designed to perform optimally at the 1024 and 2048 bit-rates, where the bandwith/measurement integration times are such that the lowest possible noise or background level is realized. It can be seen in the archive that the base level of the ion densities reported for any ion drop consistently to a consistently low level whenever the 1024 and 2048 bit-rates are in use. As other bit-rates are selected, the noise level rises. These differences in background level are quite evident to the user, who can empirically determine the average noise level from the data for any bit rate. If the bit rate is not known to a user, of data from different orbits having different bit rates will provide self-evident overlaps of the different background levels. The amplitude of actual signals is unaffected by the this difference in background level; the difference in background should thus be simply ignored or blocked out of reproductions of the data.

Another caveat for the use and interpretation of OIMS archived data is that relating to superthermal ion content. As a consequence of the increasing periapsis altitudes of orbits beyond orbit 600, (on-board propulsion no longer used to sustain low altitude periapsis), OIMS measurements are sometimes made high above the Venus ionosphere. This is particularly true for most of the higher number orbits. Near and above the ionopause, the ions detected are primarily superthermal and cannot be interpreted accurately in terms of strict thermal ion densities. See enclosed IEEE instrument paper which discusses this characteristic.

Owing to the coding specifications for the project designed UADS format, we have been unable in the past to code the archived data fully to indicate the superthermal characteristics. Generally speaking the best indication of the presence of superthermal ion content is a change in scale-height and concentration of the nitrogen ion. As superthermal ions onset, the nitrogen ion measurements begin to be "contaimiated" with atomic oxygen ions, and thus the apparent nitrogen distribution tends to shift over to that the atomic oxygen ion. This is only a qualitative indication however, and thus for the most part the user must appreciate that at higher altitudes, uncertainties due to ionosphere motion and superthermal ion content are unavoidable possible problems.

Since there is no reliable information as to the three dimensional velocities of the ions from any PVO measurement, there is no way to reliably determine the fluxes and energies of the superthermal ions. In practice, all that can be done in the presence of the superthermal ions is to exhibit the ion concentrations with the caveat that the densities are not reliable, but that their presence indicates elevated or superthermal ion energies. In normal data processing, we code individual measurements of each ion to identify whether it does or does not exhibit superthermal ion energy. In the case that the measurement characteristics fall outside an allowable window of energy, allowing for some nominal uncertainties, the measurement is "flagged" and thereafter considered by the experimenter as being of superthermal nature. Unfortunately, there is no allocation within the UADS format for this type of flagged ion coding information.

We have had in operation for several years an independent archive of our highest resolution data. This "archive" is an active one, used in every day analysis in our research. When inserted into the NSSDC, this archive will contain not the 12 sec UADS data, but rather the highest resolution measurements available from the OIMS. In preparing the new archive, we have been able to include data flags which will indicate to the user the appropriate caution in discriminating between the superthermal and thermal ion measurements.

This new archive will also contain flags for data known to be spurious due to telemetry interference. Such measurements, which are really only "fill data" will be coded with a very high value, which will readily identify these entries as meaningless.

The OIMS experimenter has initiated and pushed for the objective of a superior high-resolution archive. Although the Project has supported the idea in principle, claims for needed additional funding from some experimenters has delayed any implementation of the plan. Since the OIMS data must be submitted in a common format with the other instruments, any delivery of the OIMS high resolution data base will be correspondingly delayed.

Please add the attached memo which technically describes the taped data to the records which document our current extended UADS archive of orbits 1-2000, as well as the initial UADS archive submitted by Ames. We will inform you in the near future of the availability of the high resolution data set, which will be much superior to any of the UADS data.

Harry A. Taylor, Jr

Harry A. Taylor, Jr
Code 610

Format of the Data on Tape

First record of block 1 : The format used is (I3,12(1X,A4))

12 I001 I002 I004 I008 I012 I014 I016 I018 I028 I030 I032 I044

Second record of block 1 : The format used is (5(A4)), this record contains the format in which all the succeeding records are written.

(I8,I9,I5,I6,12F8.0)

Third record of block 1 : This record will contain zeros for the first four fields (date, time, orbit # and time-tag), and in addition will have a fill value in each data value location. This value will be used by any program reading the data to identify fill data in subsequent records.

```
   0        0     0     09999999.9999999...................9999999.
   ^        ^     ^     ^         ^                         ^       ^
   8        17    22    28        37                        117     124
```

The numbers shown here are byte positions.

Data block format : The rest of the records of block 1 and all the blocks of the database are data records.

Year and julian day ** e.g)19790365 - format I8 - Data type: Integer

Time in Milliseconds - format I9 - Data type: Integer

Orbit Number - format I5 - Data type: Integer

Ion densities - format 12(F8.0) - Data type: Real

These records contain date, time, orbit # and time-tag for each time which has no fill data. Fill data is 9999999.

** Year and julian day is either in format YYYYODDD or YYYYDDD where YYYY is year and DDD is julian day. This is because the Ames Research Center changed the format from YYYYDDD to YYYYODDD.

12 June 1987

To: Ralph Post, NSSDC

From: Harry Taylor, Code 610

Re: Additional PV-OIMS data

We have prepared a tape containing PV-OIMS data for orbits 2001 through 2500. These data are in addition to the data for orbits 1-2000 which we have previously provided to the Data Center (Tape ID 78-051a-17). The format of the data conforms to the specifications of the document 'Instructions for Data Submissions to the NSSDC', by Roger Craig, Ames REsearch Center, August 11, 1983. Details of the data format are attached.

Any questions regarding the interpretation of the data should be addressed to me. My phone number is 286-6610.

TAPE SPECIFICATION

Mode	: ASCII
Density	: ~~1600 bpi~~ 6250 BPI
Tracks	: 9
Files	: 1
Processor	: Dec PDP 11/70

Tape Structure

Data Block 1
Data Block 2
|
|
Data Block n ; Where n is number of blocks
EOF Block

Logical length of record : 124 bytes
Block size : 4960 bytes

Bennett Ion Mass Spectrometers on the Pioneer Venus Bus and Orbiter

H. A. TAYLOR, JR., H. C. BRINTON, T. C. G. WAGNER, B. H. BLACKWELL, AND G. R. CORDIER

Abstract—Identical Bennett radio frequency ion mass spectrometer instruments on the Pioneer Venus Bus and Orbiter have provided the first *in-situ* measurements of the detailed composition of the planet's ionosphere. The sensitivity, resolution, and dynamic range are sufficient to provide measurements of the solar-wind-induced bow-shock, the ionopause, and highly structured distributions of up to 16 thermal ion species within the ionosphere. The use of adaptive scan and detection circuits and servo-controlled logic for ion mass and energy analysis permits detection of ion concentrations as low as 5 ions/cm^3 and ion flow velocities as large as 9 km/s for O^+. A variety of commandable modes provides ion sampling rates ranging from 0.1 to 1.6 s between measurements of a single constituent. A lightweight sensor and electronics housing are features of a compact instrument package.

I. Introduction

Owing to the weak intrinsic magnetic field of the planet, direct interaction between the solar wind and the Venusian ionosphere creates a more complex and variable structure than encountered in the Earth ionosphere. As a result, theoretical predictions advanced prior to the Pioneer Venus (PV) mission set the requirement for instrument capabilities exceeding those previously demonstrated in extensive flight experience with the Bennett spectrometer in the Earth ionosphere on the Orbiting Geophysical Observatory and Atmosphere Explorer missions.

The primary objective of the PV Ion Mass Spectrometer (IMS) investigations has been to make global measurements of the composition of the ionosphere and, to the extent possible, measure ion drift with sufficient accuracy to contribute to the understanding of the solar-wind-induced dynamics of the ionosphere. Development of three unique measurement functions, 1) the step-dwell peak sampling technique, 2) the charge/velocity servo system, and 3) the explore/adapt ion mass squencing system have proven to be essential for providing accurate ion concentration measurements compatible with both the data rate available from the spacecraft, and the high degree of variability encountered in the Venusian ionosphere.

II. Instrument Description

The Bus IMS (BIMS) and Orbiter IMS (OIMS) instruments are identical both electrically and mechanically, with the physical characteristics shown in Fig. 1. The instrument design and operational characteristics are similar to those of

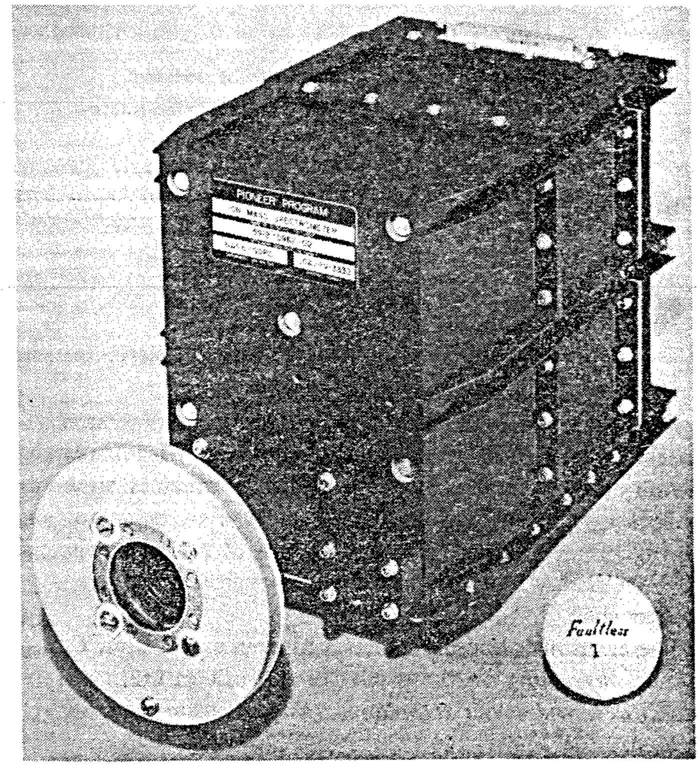

Fig. 1. The PV IMS instrument. Identical instruments were flown on the Bus (BIMS) and Orbiter (OIMS).

ion spectrometers flown on numerous rocket and satellite missions, including those on the Atmosphere Explorer-C and -E spacecraft [1]. The instrument consists of an analyzer tube and an electronics package. Ambient atmospheric ions sampled by the spectrometer enter the instrument through the analyzer orifice which is oriented as closely as possible in the direction of spacecraft motion, to enhance the collection of ions "scooped up" by the relatively rapid motion of the spacecraft through the thermal plasma. Both the BIMS and OIMS instruments were mounted with the analyzer axis parallel to the spacecraft spin axis; this ensures a relatively small angle of attack throughout the periapsis pass and eliminates spin modulation of the ion currents.

A. Mechanical Configuration

The mass analyzer, shown schematically in Fig. 2, consists of a lightweight aluminum tube enclosing a series of grids, spacers, and long drift spaces. The grids are 0.001-in diameter knitted tungsten mesh with approximately 90-percent transparency. The intergrid spacers are machined from poly-

Manuscript received September 1, 1979.
H. A. Taylor, Jr., and H. C. Brinton are with the NASA/Goddard Space Flight Center, Greenbelt, MD 20771.
G. R. Cordier, B. H. Blackwell, and T. C. G. Wagner are with the Norlin Communications, Inc., College Park, MD 20831.

0196-2892/80/0100-0044$00.75 © 1980 IEEE

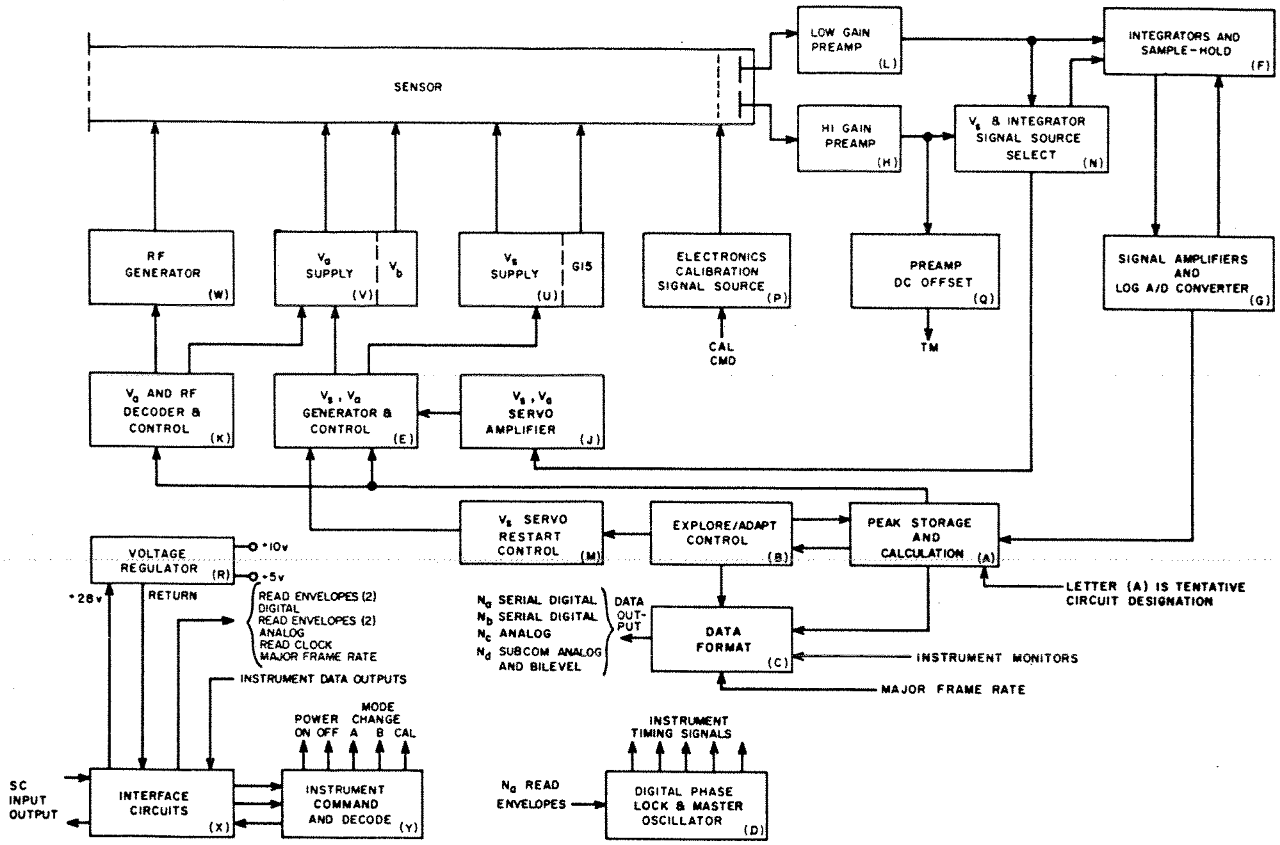

Fig. 3. System block diagram for the BIMS/OIMS instruments.

This additional term in the mass analysis equation is also automatically accommodated by the instrument servo.

The axial component of ion drift velocity and the value of spacecraft potential are determined by analysis of the servo coefficients included in the BIMS and OIMS data stream.

3) Adaptive Mass Scan: A second unique feature incorporated in the BIMS and OIMS instruments is the explore/adapt logic sequence for regulating the consecutive measurements of individual ion species. This is accomplished in two steps: 1) periodic exploration of all 16 preselected ion species, and 2) adaptive sequencing of repetitive ion measurements according to the relative significance of ion currents detected during the exploratory cycle.

Because of the significant variations in the distribution of the ions within the Venusian ionosphere, and the data rate limitations afforded by the PV mission, the explore/adapt measurement sequence was employed to insure the maximum possible repetition rate for sampling of species found to be prominent in a given altitude and/or local time range. Prompted by theoretical considerations, a total of 16 probable ion species to be identified in the Venusian ionosphere were selected and are identified in Table I. The sequence of ions listed in the table is sampled by stepping the accelerating potential V_a to the appropriate value for each amu. The explore/adapt concept is shown in Fig. 4. The basic explore/adapt cycle is repeated every 6.3 s, and consists of an explore interval during which a sequential search is made for each of the 16 species, followed by a series of shorter adapt intervals during which repeated measurements of as many as eight prominent ions detected during the explore interval are performed. If eight or more ions are detected during the explore interval, adapt measurements of the eight most prominent of these will be repeated to fill out the remainder of the 6.3 s cycle as shown in the upper part of Fig. 4, thereby providing a total of six measurements of the eight prominent ions and one measurement of up to eight less prominent ions during the 6.3-s cycle. If less than eight ions are detected during the initial explore interval, the adapt intervals will contain repeated measurements of the most prominent ions detected up to the maximum number of eight. Thus, as shown in the lower part of Fig. 4, if only one ion is detected during the explore interval, forty repeat measurements of the same ion are made during the adapt interval, providing maximum temporal and spatial resolution for that single specie. The explore/adapt sequence thereby provides a spatial resolution of measurements inversely proportional to the number of ions encountered and thus automatically adjusts the measurement sequence so that information returned is optimized relative to the conditions encountered during the mission.

Several commandable options extend the flexibility and reliability of the explore/adapt system. As appropriate to conditions encountered, the instrument may be commanded to 1) explore only, and 2) adapt to less than eight prominent ions.

4) Step-Dwell Ion Current Detection: As an improvement over previous designs, the BIMS/OIMS ion spectrum scan is accomplished by a step-dwell sequence of ion detection,

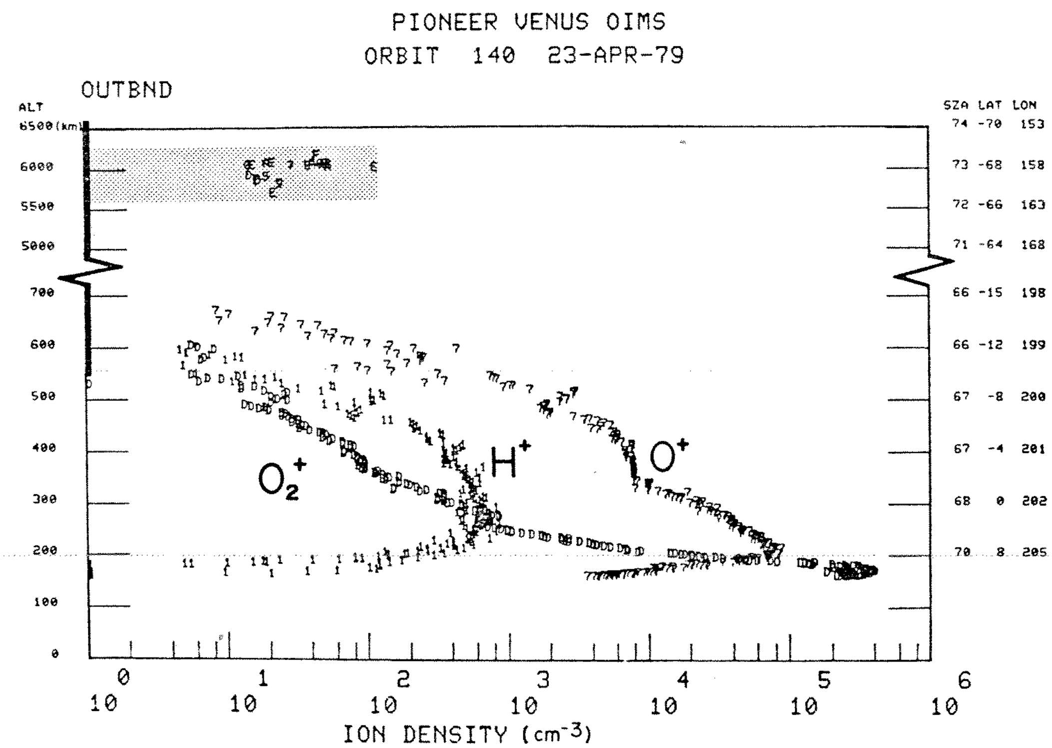

Fig. 5. An example of the scope and height resolution of measurements provided by the OIMS. For clarity only three of the 16 possible ion distributions are plotted. Measurements within shaded area result from the influx of superthermal particles of undetermined mass and concentration associated with the bow-shock region.

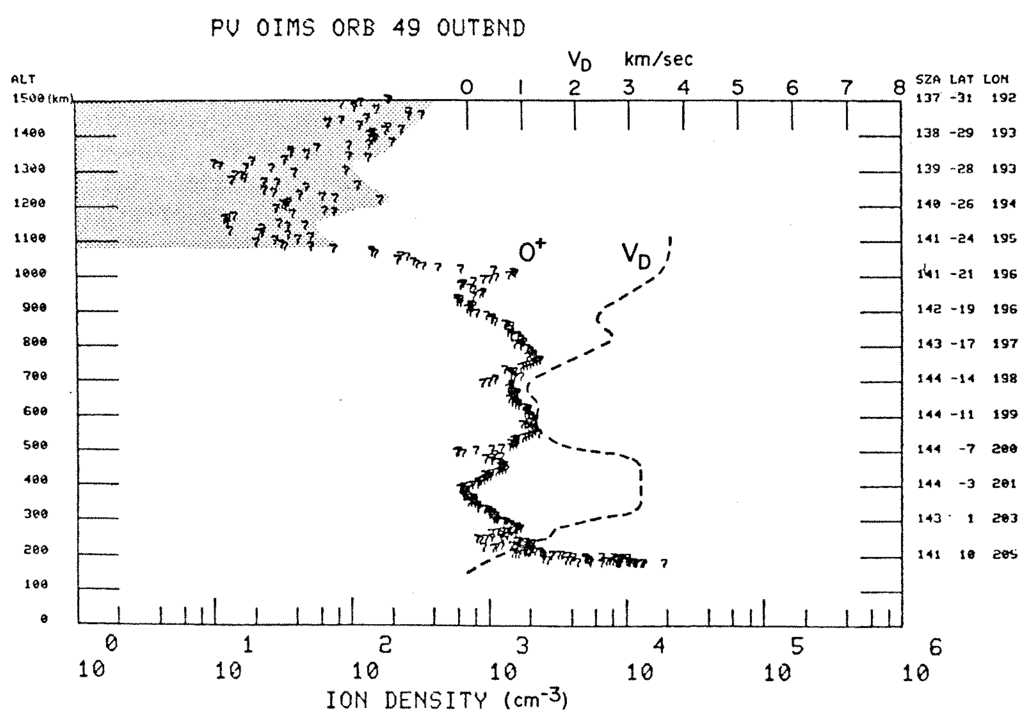

Fig. 6. Simultaneous measurements of irregularities in the concentration of O^+ and associated variations in the ion drift component V_D along the spectrometer axis. Shaded area indicates region of superthermal plasma encountered just above ionopause.

V_a parameters are set at nominal values predicted to be appropriate for periapsis. In this mode, the instrument is nonresponsive to changes in ion flow velocity and spacecraft charge.

In addition to the foregoing, the BIMS/OIMS instruments have a POWER ON/OFF command and an internal CALIBRATION command. The CALIBRATION command couples known currents into the two preamplifiers equivalent to ion currents detectable within the dynamic range of the instrument. These

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   2--  PRINT LF=1,B=1,CHAR                                                        00000110
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FATS040 TAPEIN IS NOT LABELED - LABELS=NO ASSUMED
                                    CHARACTERISTICS OF THE TAPE TO BE ANALYZED
                                           UNIT   SERIAL   DEN   TRTCH
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                                                FATAR DETAIL REPORT
 BLOCK  LNGTH/   MESSAGE/                   1...5...10...15...20...25...30...35...40...45...50...55...60...65...70...75...80
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Pioneer Venus 1
DR1DSOC4406

FATAR DETAIL REPORT

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9840150   381184 2001    -729999999.9999999.9999999.9999999.9999999.        0.        0.        0.         0.        0.         0.        0.
9840150   393184 2001    -609999999.9999999.9999999.9999999.        0.        0.        0.        0.         0.        0.         0.        0.
9840150   405184 2001    -489999999.9999999.9999999.9999999.        0.        0.        0.        0.         0.        0.         0.        0.
9840150   417184 2001    -369999999.9999999.9999999.9999999.9999999.        0.        0.        0.         0.        0.         0.        0.
9840150   429184 2001    -249999999.9999999.9999999.9999999.        0.        0.        0.        0.         0.        0.9999999.9999999.
  40150   441184 2001    -129999999.9999999.9999999.9999999.        0.        0.        0.        0.         0.9999999.         0.9999999.
   150   453184 2001      09999999.9999999.9999999.9999999.        0.        0.        0.9999999.         0.        0.         0.        0.
   150   465184 2001     249999999.9999999.9999999.9999999.        0.        0.        0.        0.         0.        0.         0.        0.
  40150   477184 2001     369999999.9999999.9999999.9999999.        0.        0.        0.        0.         0.        0.         0.        0.
9840150   489184 2001     489999999.9999999.9999999.9999999.9999999.        0.        0.        0.         0.        0.         0.        0.
9840150   501184 2001     609999999.9999999.9999999.9999999.        0.        0.        0.        0.         0.        0.         0.        0.
9840150   513184 2001     729999999.9999999.9999999.9999999.        0.9999999.        0.        0.         0.        0.         0.9999999.
9840150   525184 2001     849999999.9999999.9999999.9999999.9999999.        0.        0.        0.         0.9999999.         0.        0.
9840150   537184 2001     969999999.9999999.9999999.9999999.9999999.        0.        0.        0.         0.        0.         0.       27.
```

0-75423

YR DAY 5/28/84

5/28/84-10/07/85

```
$NOP
$NOP
$NOP ********* G1OUT ******
$EXEC TPLIST BS

INPUT PARAMETERS ARE:  AS FL=1=1 1 1 1

 TAPE NO.   1                FILE NO.   1
 RECORD   1                  LENGTH   4960
 12 I001  I002  I004  I008  I012  I014  I016  I018  I028  I030  I032  I044
                             (I8,I9,I5,I6,12F8.0)
                                                                0        0     0     0.9999999.9999999.99999
99.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.19840149 85917184 2001
-936      40.9999999.9999999.9999999.9999999.9999999.9999999.     192.9999999.9999999.9999999.9999999
.19840149 85929184 2001   -924        0.9999999.9999999.9999999.9999999.9999999.9999999.      0.999999
9.9999999.9999999.9999999.19840149 85941184 2001   -912       0.9999999.9999999.9999999.9999999.99999
99.9999999.       0.9999999.9999999.   1120.9999999.19840149 85953184 2001   -900       0.9999999.9999
999.9999999.9999999.9999999.9999999.      0.9999999.9999999.      0.9999999.19840149 85965184 2001
 -888     0.9999999.9999999.9999999.9999999.9999999.9999999.      0.9999999.9999999.      0.999999
9.19840149 85977184 2001   -876       0.9999999.9999999.9999999.     38.9999999.9999999.     66.99999
99.9999999.       0.9999999.19840149 85989184 2001   -864       0.      3.9999999.9999999.      0.9999
999.    62.      0.     571.9999999.        0.9999999.19840149 86001184 2001   -852       0.9999999.999
9999.9999999.     0.9999999.      0.      0.      0.9999999.      0.9999999.19840149 86013184 2001
 -840       0.      0.9999999.9999999.      0.9999999.      0.      0.9999999.9999999.9999999.99999
99.19840149 86025184 2001   -828       0.      0.9999999.9999999.      0.9999999.      0.      0.
  0.9999999.      0.9999999.19840149 86037184 2001   -816       0.      0.9999999.9999999.9999999.999
9999.      0.      0.      0.9999999.      0.9999999.19840149 86049184 2001   -804      16.      0.99
99999.9999999.    83.9999999.      0.      0.      0.9999999.      0.9999999.19840149 86061184 200
1   -792       0.      0.9999999.9999999.      0.9999999.      0.      0.      0.9999999.      0.9999
999.19840149 86073184 2001   -780       0.      0.9999999.9999999.      0.9999999.      0.9999999.
   0.9999999.      0.9999999.19840149 86085184 2001   -768       0.      0.9999999.9999999.      0.99
99999.      0.      0.      0.9999999.9999999.9999999.19840149 86097184 2001   -756       0.      0.9
999999.9999999.9999999.9999999.      0.      0.      0.9999999.      0.9999999.19840149 86109184 20
01   -744       0.      0.9999999.9999999.      0.9999999.      0.      0.      0.9999999.      0.999
9999.19840149 86121184 2001   -732       0.      0.9999999.9999999.      0.9999999.      0.      0.
    0.9999999.      0.9999999.19840149 86133184 2001   -720       0.      0.9999999.9999999.      0.9
999999.      0.      0.      0.9999999.      0.9999999.19840149 86145184 2001   -708       0.      0.
9999999.9999999.9999999.9999999.      0.      0.      0.9999999.      0.9999999.19840149 86157184 2
001   -6969999999.      0.9999999.9999999.      0.9999999.      0.      0.      0.9999999.      0.99
99999.19840149 86169184 2001   -684       0.      3.      7.9999999.      0.9999999.      0.      0.
     0.     29.     78.9999999.19840149 86181184 2001   -672      23.     13.      0.9999999.      0.
9999999.     30.      0.     33.     32.      0.    174.19840149 86193184 2001   -660       0.      0
.     0.9999999.9999999.9999999.      0.      0.      0.9999999.      0.      0.19840149 86205184
2001   -648       0.      0.      0.9999999.      0.9999999.      0.   1810.      0.      0.      0.
     0.19840149 86217184 2001   -636       0.      0.      0.9999999.      0.9999999.      0.      0.
   580.      0.      0.9999999.19840149 86229184 2001   -624       0.      0.      0.9999999.      0
.9999999.      0.      0.      0.      0.      0.      0.19840149 86241184 2001   -612       0.
0.      0.9999999.      0.9999999.9999999.      0.      0.      0.9999999.      0.19840149 86253184
 2001   -6009999999.      0.      0.9999999.      0.9999999.      0.      0.      0.      0.
     0.19840149 86265184 2001   -588       0.     19.      9.     30.    152.    285.     76.    252
.    160.    132.    516.      0.19840149 86277184 2001   -576     367.    189.      0.      0.
0.      0.   1070.    945.      0.      0.    539.    647.19840149 86289184 2001   -564       0.99999
99.      0.      0.      0.9999999.9999999.      0.      0.9999999.      0.      0.19840149 8630118
4 2001   -552       0.9999999.      0.9999999.      0.      0.      0.      0.      0.9999999.      0
.     0.19840149 86313184 2001   -540       0.9999999.      0.      0.      0.      0.
0.      0.      0.9999999.      0.19840149 86325184 2001   -528       0.9999999.    102.     70.
79.    323.      0.   1100.    226.     81.      0.      0.19840149 86337184 2001   -516      82.9999
999.9999999.     16.      0.      0.     48.    439.      0.      0.      0.9999999.19840149 863491
84 2001   -5049999999.9999999.9999999.9999999.      0.      0.      0.      0.      0.      0.
0.      0.

  TAPE NO.   1                FILE NO.   1
  RECORD   554                LENGTH   4092
19850280 82692235 2498    1929999999.9999999.9999999.9999999.9999999.9999999.      0.9999999.9999999
.9999999.9999999.9999999.19850280 82704235 2498    2049999999.9999999.9999999.9999999.9999999.999999
9.      0.9999999.9999999.9999999.9999999.9999999.19850280 82716235 2498    2169999999.9999999.99999
```

YR 1985   10/7

```
99.9999999.9999999.9999999.      0.9999999.9999999.9999999.9999999.9999999.19850280 82728235 2498
 2289999999.9999999.9999999.9999999.9999999.9999999.      0.9999999.9999999.9999999.9999999.9999999
.19850280 82740235 2498   2409999999.9999999.9999999.9999999.9999999.9999999.      0.9999999.999999
9.9999999.9999999.9999999.19850280 82752235 2498   2529999999.9999999.9999999.9999999.9999999.99999
99.    11.9999999.9999999.9999999.9999999.9999999.19850281 81555073 2499  -9609999999.9999999.9999
999.9999999.9999999.9999999.9999999.9999999.     18.9999999.9999999.9999999.19850281 82119073 2499
 -3969999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.
9.19850281 82131073 2499  -3849999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.99999
99.9999999.9999999.      0.19850281 82143073 2499  -3729999999.9999999.9999999.9999999.9999999.9999
999.9999999.9999999.9999999.9999999.9999999.      0.19850281 82155073 2499  -3609999999.9999999.999
9999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.      0.19850281 82167073 2499
  -3489999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.
 0.19850281 82179073 2499  -3369999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999
999.9999999.9999999.      0.19850281 82191073 2499  -3249999999.9999999.9999999.9999999.9999999.999
9999.9999999.9999999.9999999.9999999.9999999.      0.19850281 82203073 2499  -3129999999.9999999.99
99999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.      0.19850281 82215073 249
9  -3009999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.
  0.19850281 82227073 2499  -2889999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.999
9999.9999999.9999999.      0.19850281 82239073 2499  -2769999999.9999999.9999999.9999999.9999999.99
99999.9999999.9999999.9999999.9999999.9999999.      0.19850281 82251073 2499  -2649999999.9999999.9
999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.      0.19850281 82263073 24
99  -2529999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.
   0.19850281 82275073 2499  -2409999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.99
99999.9999999.9999999.      0.19850281 82287073 2499  -2289999999.9999999.9999999.9999999.9999999.9
999999.9999999.9999999.9999999.9999999.9999999.      0.19850281 82299073 2499  -2169999999.9999999.
9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.      0.19850281 82311073 2
499  -2049999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.
    0.19850281 82323073 2499  -1929999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9
999999.9999999.9999999.      0.19850281 82335073 2499  -1809999999.9999999.9999999.9999999.9999999.
9999999.9999999.9999999.9999999.9999999.9999999.      0.19850281 82347073 2499  -1689999999.9999999
.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.      0.19850281 82359073
2499  -1569999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.
     0.19850281 82371073 2499  -1449999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.
9999999.9999999.9999999.      0.19850281 82383073 2499  -1329999999.9999999.9999999.9999999.9999999
.9999999.9999999.9999999.9999999.9999999.9999999.      0.19850281 82395073 2499  -1209999999.999999
9.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.      0.19850281 82407073
 2499  -1089999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999.
      0.19850281 82419073 2499   -969999999.9999999.9999999.9999999.9999999.9999999.9999999.9999999
.9999999.9999999.9999999.   1470.

***** JOB DONE.
$WEO LPS


$$
```

REQ. AGENT
DHG

RAND NO.

ACQ. AGENT
DKB

PIONEER VENUS 1

OIMS HIGH RESOLUTION DATA BASE

78-051A-17C PSPA-00299

This data set catalog consists of 7 tapes. The original blocksize (36400) was halved (18200)*. The tapes are 9 track, 6250 bpi and are in VAX binary format.

The 'D' and 'C' numbers are as follows:

D#	C#	Files	Orbits	Time Span
D-78127	C-26762	14	1 - 800	12/05/78 - 02/13/81
D-78128	C-26763	14	801 - 1600	02/13/81 - 04/10/83
D-78129	C-26764	14	1601 - 3000	05/27/83 - 02/25/87
D-78130	C-27854	10	3030 - 3497	03/23/87 - 07/03/88
D-82859	C-28026	10	3531 - 4000	08/06/88 - 11/18/89
D-85475	C-28026	10	4001 - 4500	11/19/89 - 04/02/91
D-101124	C-030217	12	4500 - 5055	04/02/91 - 10/07/92

* The blocksize was reduced for readability on other systems.

D-78130

	ORBIT	YEAR/DAY
FILE 1	3030 - 3083	87/082 - 87/136
FILE 2	3083 - 3101	87/136 - 87/154
FILE 3	3101 - 3160	87/154 - 87/213
FILE 4	3160 - 3201	87/213 - 87/254
FILE 5	3201 - 3253	87/254 - 87/306
FILE 6	3253 - 3034	87/306 - 87/357
FILE 7	3304 - 3357	87/357 - 87/045
FILE 8	3357 - 3401	88/045 - 88/089
FILE 9	3401 - 3491	88/089 - 88/179
FILE 10	3491 - 3497	88/179 - 88/185

D-82859

	ORBIT	YEAR/DAY
FILE 1	3531 - 3551	88/219 - 88/239
FILE 2	3551 - 3601	88/239 - 88/289
FILE 3	3601 - 3652	88/302 - 88/340
FILE 4	3652 - 3701	88/340 - 89/023
FILE 5	3701 - 3753	89/023 - 89/075
FILE 6	3753 - 3900	89/075 - 89/222
FILE 7	3900 - 3900	89/222 - 89/222
FILE 8	3900 - 3901	89/222 - 89/223
FILE 9	3901 - 3951	89/223 - 89/273
FILE 10	3951 - 4000	89/273 - 89/322

D-85475

	ORBIT	YEAR/DAY
FILE 1	4001 - 4050	89/323 - 90/007
FILE 2	4051 - 4099	90/008 - 90/056
FILE 3	4101 - 4150	90/058 - 90/107
FILE 4	4166 - 4172	90/123 - 90/129
FILE 5	4204 - 4251	90/173 - 90/208
FILE 6	4251 - 4276	90/208 - 90/270
FILE 7	4313 - 4365	90/270 - 90/322
FILE 8	4365 - 4399	90/322 - 90/356
FILE 9	4401 - 4451	90/358 - 91/043
FILE 10	4451 - 4500	91/043 - 91/092

D-101124

	ORBIT	YEAR/DAY
FILE 1	4500 - 4551	91/092 - 91/143
FILE 2	4551 - 4601	91/143 - 91/193
FILE 3	4601 - 4651	91/193 - 91/242
FILE 4	4651 - 4701	91/243 - 92/292
FILE 5	4701 - 4751	91/291 - 91/342

D-78127

	ORBIT	YEAR/DAY
FILE 1	1 - 50	78/339 - 79/023
FILE 2	51 - 100	79/024 - 79/073
FILE 3	101 - 150	79/074 - 79/123
FILE 4	151 - 200	79/124 - 79/173
FILE 5	202 - 248	79/175 - 79/221
FILE 6	251 - 350	79/224 - 79/324
FILE 7	351 - 400	79/325 - 80/009
FILE 8	401 - 500	80/010 - 80/109
FILE 9	501 - 550	80/110 - 80/159
FILE 10	551 - 600	80/160 - 80/209
FILE 11	601 - 650	80/210 - 80/259
FILE 12	651 - 700	80/260 - 80/309
FILE 13	701 - 750	80/310 - 80/359
FILE 14	751 - 800	80/360 - 81/044

D-78128

	ORBIT	YEAR/DAY
FILE 1	801 - 900	81/044 - 81/144
FILE 2	901 - 950	81/145 - 81/194
FILE 3	951 - 1000	81/195 - 81/244
FILE 4	1001 - 1050	81/245 - 81/294
FILE 5	1051 - 1099	81/295 - 81/343
FILE 6	1101 - 1149	81/345 - 82/028
FILE 7	1151 - 1199	82/030 - 82/078
FILE 8	1201 - 1250	82/080 - 82/129
FILE 9	1251 - 1300	82/130 - 82/179
FILE 10	1301 - 1350	82/180 - 82/229
FILE 11	1351 - 1400	82/230 - 82/279
FILE 12	1401 - 1500	82/280 - 83/014
FILE 13	1501 - 1550	83/015 - 83/064
FILE 14	1553 - 1586	83/067 - 83/100

D-78129

	ORBIT	YEAR/DAY
FILE 1	1633 - 1799	83/147 - 83/313
FILE 2	1801 - 1895	83/315 - 83/044
FILE 3	1905 - 1950	84/053 - 84/099
FILE 4	1951 - 1999	84/099 - 84/148
FILE 5	2001 - 2098	84/149 - 84/246
FILE 6	2101 - 2200	84/249 - 84/348
FILE 7	2201 - 2299	84/349 - 84/081
FILE 8	2301 - 2371	85/083 - 85/153
FILE 9	2405 - 2499	85/187 - 85/281
FILE 10	2511 - 2575	85/293 - 85/357
FILE 11	2649 - 2700	86/066 - 86/117
FILE 12	2701 - 2794	86/118 - 86/212
FILE 13	2801 - 2900	86/218 - 86/318
FILE 14	2901 - 2997	86/318 - 87/050

FILE 6	4751 - 4801	91/342 - 92/028
FILE 7	4801 - 4851	92/028 - 92/077
FILE 8	4851 - 4901	92/077 - 92/127
FILE 9	4901 - 4961	92/127 - 92/188
FILE 10	4961 - 5001	92/188 - 92/228
FILE 11	5001 - 5050	92/228 - 92/276
FILE 12	5051 - 5055	92/277 - 92/281

78-051A-11C
ASC 591

RICE

Feb L-1

Leonard Kramer, Research Assistant
Department of Space Physics

February 23, 1993

Ralph Post
Hughes STX
Code 630, Bldg 26
NASA GSFC
Greenbelt, MD 20771

Dear Ralph:

This package contains three tapes which I am sending to you as our final submission of data for the Pioneer Venus Orbiter Ion Mass Spectrometer which finally burned up last September (and good riddance too!).

10/7/92

The tapes contain data for orbits 4501 to 5055 which cover dates from 91092 to 92281. They are 6250 bpi tapes and I reduced the block size to 3640 bytes per block with 10 logical records per block instead of the 100 logical records that I used previously. I hope that you will have an easier time reading them with the smaller block size.

Attached, you will also find a record map and a summary of the orbits contained on each tape. If you have even the slightest difficulty in reading these tapes please contact me and I will help in any way I can.

Sincerely,

Block 591

Leonard Kramer

xc: 1) Paul Cloutier, OIMS Principal Investigator
2) Larry Lasher, Project Science Chief

6100 South Main, Houston TX 77251-1892• (713) 527-4939 • (713)527-8101 ext. 3628

February 21, 1993

Feb L-2

Pioneer Venus Orbiter Ion Mass Spectrometer.

Tape orbit inventory.

	file	orbits
Tape 1	1	4500-4549
	2	4550-4699
	3	4600-4649
	4	4650-4699
Tape 2	1	4700-4749
	2	4750-4799
	3	4800-4849
Tape 3	1	4900-4949
	2	4950-4999
	3	5000-5049
	4	5050-5055

Tapes are unlabeled.
Block size: 3640 bytes per block.
Logical records per block: 10 logical records per block.

Logical record format attached.

Technical contact:

Leonard Kramer Rice University, (713) 527-4939

Feb L-3

Figure 2. Record format

WORD #	DESCRIPTION	BYTE	TYPE
1	orbit number	1-2	I*2
2	julian date (YYDDD)	3-6	I*4
3	time of day (UT,sec)	7-10	R*4
4	dwell time (between samples, msec)	11-12	I*2
5	bit rate (bits/sec)	13-14	I*2
6	venusian latitude (deg)	15-18	R*4
7	venusian longitude (deg)	19-22	R*4
8	altitude (km)	23-26	R*4
9	solar zenith angle (deg)	27-30	R*4
10	solar hour angle (hr)	31-34	R*4
11-65	mass (AMU, 55 samples)	35-144	I*2
66-120	density (ions/cm**3, 55 samples)	145-364	R*4

Feb L-4

Ames Research Center
Pioneer Project
Data Processing Group

To: PN-12; ALL Experimenters:

Please note that Orbits(s) 5016-5020 DOY(s) 243-247
has No Data for the following time interval:

ORBIT-DOY	TIME PERIOD	REASON
5016/243	242/2224-243/0015	No Tlm
	243/0131-243/0441	No Tlm
5017/244	243/2224-244/0017	No Tlm
	244/0130-244/0531	No Trk
5018/245	244/2254-245/0019	No Tlm
	245/0103-245/0539	No Trk
	245/0944-245/1129	No Trk
5019/246	246/0130-246/0516	No Trk
5020/247	247/0224-247/0356	No Trk

Rhonda Thompson
Data Analyst

April 22, 1988

TO: Ralph Post
NSSDC

RE: Archiving of Pioneer Venus OIMS data tapes

Enclosed is a tape containing full resolution OIMS data for PVO orbits 2500-3000. The format is the same as for the data provided to you on November 17, 1987.

Some orbits are missing for various reasons, including the requirement for power sharing, in which the OIMS was turned off. Otherwise, the data appear to be nominal.

During the period covered by these data, the PVO is almost always well above the Venus ionosphere, and thus the OIMS typically is seeing only background noise levels. Thus for many orbits, only baseline data is present. Occasionally, the spacecraft dips into an extended ionosphere, and a brief interval of ionization is recorded.

Many of the caveats documented in my memos to you of June and November, 1987 continue to apply to these data. The data content and format is identified on the attached documentation which has been prepared by Joel Selekof, a programmer analyst working with me. Joel can be reached for information as necessary on 65779.

Harry

Harry A. Taylor, Jr.
Code 610

PV OIMS HIGH-RESOLUTION DATA

FILE 1 ORBS 2501-2600

FILE 2 ORBS 2601-2700

FILE 3 ORBS 2701-2800

FILE 4 ORBS 2801-2900

FILE 5 ORBS 2901-3000

SEE PREVIOUS DOCUMENTATION FOR RECORD FORMAT, ETC.

DB-1

USER GUIDE

PV-OIMS HIGH RESOLUTION DATABASE (REVISED VERSION)

August 4, 1987

DB-2

PV-OIMS HIGH RESOLUTION DATABASE

The PV-OIMS high resolution database contains OIMS experiment data and orbit/attitude data for PV orbits 1-2500, including data for the period periapsis plus and minus 30 minutes for each orbit. There are 2 versions of the database, a 1600bpi version and a 6250bpi version. Tapes are written in binary format and were produced on a VAX-11/780 computer. The 1600bpi version is contained on 7 tapes; the 6250bpi version is contained on 2 tapes. Each tape is divided into files, with most files having 50 orbits. The user can therefore quickly get to any orbit by skipping the appropriate number of files. Each tape has 5 end-of-file marks after the last file. Figures 1A and 1B show the tape file layout for the 1600bpi and 6250 bpi versions.

The database has fixed length records with each record consisting of 120 words, totalling 364 bytes. The record format is given in Figure 2. The records are blocked with 100 records per block (36400 bytes per block). Each record represents one complete OIMS experiment data cycle (normally 6.3 seconds but this time can vary with the bit rate). Within each record there are 55 samples of mass and 55 samples of densities associated with those masses. The sequence of masses within a record will normally follow the OIMS "explore" mode, but this sequence will vary when the experiment is ocasionally in the "explore-adapt" mode.

To compute the time associated with a particular mass and density, the dwell time (word 4) should be used, along with the time of day (word 3). The dwell time is the time interval (milliseconds) between samples. Thus, for the "nth" sample, the time (in seconds) would be computed as follows:

TIME = UT + (n-1) * DWELL/1000.   (where UT is time of day)

The user should be aware that some of the densities have been coded. For example, a density of 1.E20 indicates that a density could not be computed for that point. (This can be due to several reasons such as telemetry inteference or a gap in data occurred). Also, a negative value of density represents a "flagged" data point and should be used with caution.

Figure 3 shows an example of a VAX program that would read the database, look for a desired orbit and time period, and write the data words to an output file.

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Figure 1A. Tape file organization for 1600bpi version

	File #	Orbit Range
Tape 1	1	1-50
	2	51-100
	3	101-150
	4	151-200
	5	201-250
Tape 2	1	251-350
	2	351-400
	3	401-500
	4	501-550
Tape 3	1	551-600
	2	601-650
	3	651-700
	4	701-750
	5	751-800
Tape 4	1	801-900
	2	901-950
	3	951-1000
	4	1001-1050
	5	1051-1100
	6	1101-1150

	File #	Orbit Range
Tape 5	1	1151-1200
	2	1201-1250
	3	1251-1300
	4	1301-1350
	5	1351-1400
Tape 6	1	1401-1500
	2	1501-1550
	3	1551-1600
	4	1601-1800
	5	1801-1900
	6	1901-1950
	7	1951-2000
Tape 7	1	2001-2100
	2	2101-2200
	3	2201-2300
	4	2301-2400
	5	2401-2500
Tape 8	1	2501-2600
	2	2601-2700
	3	2701-2800
	4	2801-2900
	5	2901-3000

These 8 tapes were copied onto
Δ78127-29,

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Figure 1B. Tape file organization for 6250bpi version

Tape 1

FILE #	ORBIT RANGE
1	1-50
2	51-100
3	101-150
4	151-200
5	201-250
6	251-350
7	351-400
8	401-500
9	501-550
10	551-600
11	601-650
12	651-700
13	701-750
14	751-800
15	801-900
16	901-950
17	951-1000
18	1001-1050
19	1051-1100
20	1101-1150

Tape 2

FILE #	ORBIT RANGE
1	1151-1200
2	1201-1250
3	1251-1300
4	1301-1350
5	1351-1400
6	1401-1500
7	1501-1550
8	1551-1600
9	1601-1800
10	1801-1900
11	1901-1950
12	1951-2000
13	2001-2100
14	2101-2200
15	2201-2300
16	2301-2400
17	2401-2500

Figure 2. Record format

WORD #	DESCRIPTION	BYTE	TYPE
1	orbit number	1-2	I*2
2	julian date (YYDDD)	3-6	I*4
3	time of day (UT,sec)	7-10	R*4
4	dwell time (between samples, msec)	11-12	I*2
5	bit rate (bits/sec)	13-14	I*2
6	venusian latitude (deg)	15-18	R*4
7	venusian longitude (deg)	19-22	R*4
8	altitude (km)	23-26	R*4
9	solar zenith angle (deg)	27-30	R*4
10	solar hour angle (hr)	31-34	R*4
11-65	mass (AMU, 55 samples)	35-144	I*2
66-120	density (ions/cm**3, 55 samples)	145-364	R*4

Figure 3. Example VAX program to read database, search for desired orbit and time period, and write data to a file

```
C READS HIGH RESOLUTION DATABASE AND CREATES A FILE FOR A GIVEN ORBIT
C AND TIME PERIOD.
C
      DIMENSION DENS(55)
      INTEGER*2 MASS(55),IORB,IBIT
      INTEGER*2 IDWELL
      LOGICAL*1 BDATA(364),BUF(36400)
      DATA IBLK/0/
      EQUIVALENCE (IORB,BDATA(1)), (JUL,BDATA(3)), (UT,BDATA(7)),
     X  (IDWELL,BDATA(11)),
     X  (IBIT,BDATA(13)), (VLAT,BDATA(15)), (VLON,BDATA(19)),
     X  (ALT,BDATA(23)), (SZA,BDATA(27)),
     X  (SHA,BDATA(31)), (MASS,BDATA(35)),
     X  (DENS,BDATA(145))
C
      OPEN (UNIT=4,NAME='HIRES.DAT',TYPE='NEW',FORM='UNFORMATTED')
C
      TYPE *, 'ENTER TAPE DRIVE NUMBER'
      ACCEPT *, LDRV
      CALL T_RWND (LDRV)
      CALL T_WAIT (LDRV,NS,NB)
      TYPE *, 'HOW MANY FILES TO SKIP?'
      ACCEPT *, NSKIP
      IF(NSKIP.NE.0) CALL T_SKPF (LDRV,NSKIP)
      TYPE *, 'WHICH ORBIT DO YOU WANT?'
      ACCEPT *, JJORB
      TYPE *, 'ENTER START AND STOP TIME (SEC)'
      ACCEPT *, IT1,IT2
      UT1=IT1
      UT2=IT2
C
C READ A BLOCK OF DATA (100 RECS) AND SEPARATE INTO RECORDS
C
   10 CALL T_READ (LDRV,BUF,36400)
      CALL T_WAIT (LDRV,NS,NB)
      IBLK=IBLK+1
C
C CHECK FOR END OF FILE
C
      IF(NS.EQ.1) GO TO 900
      NUM=0
      DO 200 J=1,100
      DO 100 I=1,364
      NUM=NUM+1
      BDATA(I)=BUF(NUM)
  100 CONTINUE
C
C CHECK FOR DESIRED ORBIT
C
      IF(IORB.LT.JJORB) GO TO 200
      IF(IORB.GT.JJORB) GO TO 900
C
C CHECK FOR DESIRED TIME
C
      IF(UT.LT.UT1) GO TO 200
```

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```
      IF(UT.GT.UT2) GO TO 200
      WRITE (4) IORB,JUL,UT,IDWELL,IBIT,VLAT,VLON,ALT,SZA,SHA,MASS,DENS
  200 CONTINUE
C
C READ NEXT BLOCK
C
      GO TO 10
C
  900 CALL T_RWND (LDRV)
      CALL T_WAIT (LDRV,NS,NB)
      STOP
      END
```

DUMP OF TAPE DIM53OUT

Tapes are VAX B/W. Bytes are switched!

D78129

Orbits 1601-3000
actual coverage: 1633-2997
5/27/83-2/25/87

orbit=1633

83147

INPUT TAPE DIM53OUTCN FT1
DATA INPUT FS NR 14 SR 1 1 1 SR 14 LAST 1

0661 0144CB

FILE 1 RECORD 1 LENGTH 18200BYTES

(0)	6106CB44	01002846	561CA800	AB026143	90BF2743	18734946	D04EE843	8777A942	03A70100	12000C00
(40)	20000400	1C001000	2C000200	18000E00	28000800	1E001100	38002000	20002000	20002000	20002000
(80)	20002000	20002000	20002000	20002000	20002000	20002000	20002000	20002000	20002000	20002000
(120)	20002000	20002000	20002000	20002000	20002000	20002000	20002000	20002000	20002000	20002000
(160)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	8C429BE4
(200)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(240)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(280)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(320)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(360)	00000000	6106CB44	01002846	89E3A800	AB026043	25402643	18004746	3C87E543	7442E63E	00000000
(400)	12000C00	20000400	1C001000	2C000200	18000E00	28000800	1E001100	38000100	A245A542	D2DB0100
(440)	1C001000	2C000200	18000E00	28000800	1E001100	38000100	12000C00	20000400	12000C00	20000400
(480)	18000E00	28000800	1E001100	38000100	12000C00	20000400	1C001000	00000000	1C001000	2C000200
(520)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(560)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(600)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(640)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(680)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(720)	00000000	00000000	6106CB44	01002946	BC4AA800	AB025E43	45BD2443	F8914546	64C2EA43	EE14AA42
(760)	E00F0100	12000C00	20000400	1C001000	2C000200	18000E00	28000800	1E001100	38000100	12000C00
(800)	20000400	1C001000	2C000200	18000E00	28000800	1E001100	38000100	12000C00	20000400	1C001000
(840)	2C000200	18000E00	28000800	1E001100	38000100	12000C00	20000400	1C001000	00000000	00000000
(880)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(920)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(960)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(1000)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(1040)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(1080)	00000000	00000000	00000000	6106CB44	01002946	EFE1A800	AB025C43	EF362343	A8284446	580EA43
(1120)	69E5AA42	33430100	12000C00	20000400	1C001000	2C000200	18000E00	28000800	1E001100	38000100
(1160)	12000C00	20000400	1C001000	2C000200	18000E00	28000800	1E001100	38000100	12000C00	20000400
(1200)	1C001000	2C000200	18000E00	28000800	1E001100	38000100	12000C00	20000400	1C001000	00000000
(1240)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(1280)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(1320)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(1360)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(1400)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(1440)	00000000	00000000	00000000	00000000	6106CB44	01002A46	9074A800	AB025B43	2BB92143	D8CE4246
(1480)	A44EEB43	B7BCAA42	49745100	12000C00	20000400	1C001000	2C000200	18000E00	28000800	1E001100
(1520)	38000100	12000C00	20000400	1C001000	2C000200	18000E00	28000800	1E001100	38000100	12000C00
(1560)	20000400	1C001000	2C000200	18000E00	28000800	1E001100	38000100	12000C00	20000400	1C001000
(1600)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(1640)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(1680)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(1720)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(1760)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(1800)	00000000	8B42436F	00000000	00000000	00000000	6106CB44	01002B46	C30BA800	AB025A43	212C2043
(1840)	D06E4046	4092EC43	8A83AA42	35A60100	12000C00	20000400	1C001000	2C000200	18000E00	28000800
(1880)	1E001100	38000100	12000C00	20000400	1C001000	2C000200	18000E00	28000800	1E001100	38000100
(1920)	12000C00	20000400	1C001000	2C000200	18000E00	28000800	1E001100	38000100	12000C00	20000400
(1960)	1C001000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(2000)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(2040)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(2080)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(2120)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(2160)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(2200)	43831E43	60FE3E46	18BEED43	7164AA42	67DA0100	12000C00	6106CB44	01002B46	25ACA800	AB025843
(2240)	28000800	1E001100	38001E00	1E001E00	1E001E00	1E001E00	20000400	1C001000	2C000200	18000E00
(2280)	1E001E00	1E001E00	1E001E00	1E001E00	1E001E00	1E001E00	1E001E00	1E001E00	1E001E00	1E001E00

i

(12920)	00000000	F0000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(12960)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(13000)	00000000	00000000	00000000	00000000	00000000	00000000	7DC2255B	00000000	00000000	00000000
(13040)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(13080)	00000000	00000000	00000000	00000000	00000000	00000000	B50B0A54	0100FC45	E28AA800	ABC28AC3
(13120)	F15ECEC2	2022C646	FE4BCB43	BEC35041	1CDE0100	12000C00	20000400	1C001000	2C000200	18000E00
(13160)	28000800	1E001100	38000100	12000C00	20000400	1C001000	2C000200	18000E00	28000800	1E001100
(13200)	38000100	12000C00	20000400	1C001000	2C000200	18000E00	28000800	1E001100	38000100	12000C00
(13240)	20000400	1C001000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(13280)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(13320)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(13360)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(13400)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(13440)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	B50B0A54	0100FE45	7CB4A800
(13480)	ABC28AC3	B0B3D2C2	F014C746	AC54CB43	6B495241	10BF0100	12000C00	20000400	1C001000	2C000200
(13520)	18000E00	28000800	1E001100	38000100	12000C00	20000400	1C001000	2C000200	18000E00	28000800
(13560)	1E001100	38000100	12000C00	20000400	1C001000	2C000200	18000E00	28000800	1E001100	38000100
(13600)	12000C00	20000400	1C001000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(13640)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(13680)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	9EC2EDF2	00000000
(13720)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(13760)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(13800)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	B50B0A54	0100FF45
(13840)	E2E2A800	ABC28BC3	9808D6C2	5022C846	E861CA43	CDCD5441	D8B40100	12000C00	20000400	1C001000
(13880)	2C000200	18000E00	28000800	1E001100	38000100	12000C00	20000400	1C001000	2C000200	18000E00
(13920)	28000800	1E001100	38000100	12000C00	20000400	1C001000	2C000200	18000E00	28000800	1E001100
(13960)	38000100	12000C00	20000400	1C001000	00000000	00000000	00000000	00000000	00000000	00000000
(14000)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(14040)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(14080)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(14120)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(14160)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	B50B0A54
(14200)	01000046	A488A800	AB028BC3	4D5CDAC2	303AC946	766FCA43	D2525641	CCAF0100	12000C00	20000400
(14240)	1C001000	2C000200	18000E00	28000800	1E001100	38000100	12000C00	20000400	1C001000	2C000200
(14280)	18000E00	28000800	1E001100	38000100	12000C00	20000400	1C001000	2C000200	18000E00	28000800
(14320)	1E001100	38000100	12000C00	20000400	1C001000	00000000	00000000	00000000	00000000	00000000
(14360)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(14400)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(14440)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(14480)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(14520)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(14560)	B50B0A54	01000146	D71FA800	ABC28BC3	C7AEDEC2	6C5CCA46	487DC943	86D85841	CCAF0100	12000C00
(14600)	20000400	1C001000	2C000200	18000E00	28000800	1E001100	38000100	12000C00	20000400	1C001000
(14640)	2C000200	18000E00	28000800	1E001100	38000100	12000C00	20000400	1C001000	2C000200	18000E00
(14680)	28000800	1E001100	38000100	12000C00	20000400	1C001000	00000000	00000000	00000000	00000000
(14720)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(14760)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(14800)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(14840)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(14880)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(14920)	00000000	B50B0A54	01000146	3EBEA800	AB028CC3	DF03E2C2	30BCCB46	4098C943	1B595A41	B0CD0100
(14960)	12000C00	20000400	1C001000	2C000200	18000E00	28000800	1E001100	38000100	12000C00	20000400
(15000)	1C001000	2C000200	18000E00	28000800	1E001100	38000100	12000C00	20000400	1C001000	2C000200
(15040)	18000E00	28000800	1E001100	38000100	12000C00	20000400	1C001000	00000000	00000000	00000000
(15080)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(15120)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(15160)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(15200)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(1524)	00000000	00000000	00000000	E8C2DA7E	00000000	00000000	00000000	00000000	00000000	00000000
(15280)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(15320)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(15360)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(15400)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(15440)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(15480)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(15520)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000

0BB5 = orbit 2997

01540A-87050