#627

PIONEER VENUS

SPECIAL EVENTS DATA (SED) TAPE

78-051A-18A,19B,19C
78-078D-01A,02A,04A,05A,07A
78-078E-01A,02A,02B,02C,04A
78-078F-01A,02A,02B,02C,04A
78-078G-01A,02A,02B,02C,04A

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 This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system.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

SPECIAL EVENTS DATA (SED) TAPE

THIS DATA SET HAS BEEN RESTORED. THERE WAS ORIGINALLY ONE 9-TRACK, 1600 BPI TAPE, WRITTEN IN ASCII. THERE IS ONE RESTORED TAPE. THE DR TAPE IS A 3480 CARTRIDGE AND THE DS TAPE IS A 9-TRACK, 6250 BPI. THE TAPE WAS CREATED ON AN IBM 360 COMPUTER. THE DR AND DS NUMBERS ALONG WITH THE CORRESPONDING D NUMBER AND TIME SPAN IS AS FOLLOWS

DR#	DS#	DD#	DC#
DR03815	DS03815	D54638	C23664

ID#	FILES	TIME SPAN
78-051A-18A	11-15,33-52,61-70	12-05/78 - 10/21/81
78-051A-19B	54	12/09/78 - 08/07/79
78-051A-19C	55	12/09/78 - 08/07/79
78-078D-01A	1-2,59	12/09/78
78-078D-02A	53	12/09/78
78-078D-04A	28	12/09/78
78-078D-05A	3-6,29-30	12/09/78
78-078D-07A	7-8	12/09/78
78-078E-01A	16-17,59-60	12/09/78
78-078E-02A	32	12/09/78
78-078E-02B	32	12/09/78
78-078E-02C	32	12/09/78
78-078E-04A	22-23	12/09/78
78-078F-01A	20-21,56,57,59	12/09/78
78-078F-02A	31	12/09/78
78-078F-02B	31	12/09/78
78-078F-02C	31	12/09/78
78-078F-04A	22,25	12/09/78
78-078G-01A	18,19,56,58,59	12/09/78
78-078G-02A	27	12/09/78
78-078G-02B	27	12/09/78
78-078G-02C	27	12/09/78
78-078G-04A	22,24	12/09/78

*FILES 9,10,26,28, HAVE USELESS DATA

REW. AGENT	RAND NO.	ACQ. AGENT
PAR	V0180	WSC

PIONEER VENUS

SPECIAL EVENTS DATA (SED) TAPE

This data set catalog consists of 1 tape containing 3 Pioneer Venus 1 and 20 Pioneer Venus Probes data sets. The tape is 9-track, 1600 BPI, ASCII with 80-byte card image records. It was created on NSSDC's MODCOMP IV computer from 2 blocked EBCDIC tapes created on the UADS (Unified Abstract Data System) IBM 360 computer. The following is a listing of the files ordered by data set ID with orbit numbers and time spans for each data set. The following pages contain a listing of the data set ID's with experiment and data set names, and a listing of the tape by file number and number of records.

The format for each data is either in the first file of a data set group or has been attached.

D-54638 C-23664

ID	FILES	TIME SPAN	ORBITS
78-051A-18A	11-15,33-52,61-70	12/05/78 - 10/21/81	1-740
78-051A-19B	54	12/09/78 - 08/07/79	5-246
78-051A-19C	55	12/09/78 - 08/07/79	5-246
78-078D-01A	1-2,59	12/09/78	5
78-078D-02A	53	12/09/78	5
78-078D-04A	28	12/09/78	5
78-078D-05A	3-6,29-30	12/09/78	5

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ID	FILES	TIME SPAN	ORBITS
78-078D-07A	7-8	12/09/78	5
78-078E-01A	16-17,59-60	12/09/78	5
78-078E-02A	32	12/09/78	5
78-078E-02B	32	12/09/78	5
78-078E-02C	32	12/09/78	5
78-078E-04A	22-23	12/09/78	5
78-078F-01A	20-21,56,57,59	12/09/78	5
78-078F-02A	31	12/09/78	5
78-078F-02B	31	12/09/78	5
78-078E-02C	31	12/09/78	5
78-078F-04A	22 & 25	12/09/78	5
78-078G-01A	18-19,56,58-59	12/09/78	5
78-078G-02A	27	12/09/78	5
78-078G-02B	27	12/09/78	5
78-078G-02C	27	12/09/78	5
78-078G-04A	22 & 24	12/09/78	5

Files 9,10 and 26 contain no useful information and should be ignored.

PIONEER VENUS SED TAPES

NSSDC ID	EXPERIMENT NAME	PI	DATA SET NAME
78-051A-18A	SOLAR WIND PLASMA ANALYZER	BARNES	SED DATE/VELOCITY DATA (ORBITS 1-740)
78-051A-19B	ATMOSPHERIC DRAG	KEATING	SED PV ATMOSPHERIC DRAG MODEL
78-051A-19C	ATMOSPHERIC DRAG	KEATING	SED PV ATMOSPHERIC DRAG OBS-ORBS 5-246
78-078D-01A	ATMOSPHERIC STRUCTURE	SEIFF	PRESSURE AND TEMPERATURE DATA
78-078D-02A	NEPHELOMETER	RAGENT	SED NEPHELOMETER BACKSCATTER CHANNEL DATA
78-078D-04A	GAS CHROMATOGRAPH	OYAMA	LOWER ATMOSPHERE COMPOSITION
78-078D-05A	INFRARED RADIOMETER	BOESE	SED PRE-ENTRY, DESCENT,& ONBOARD CALIBRATION DATA
78-078D-07A	SOLAR ENERGY PENETRATION	TOMASKO	SED SOLAR UP, DOWN, AND NET FLUX
78-078E-01A	ATMOSPHERIC STRUCTURE	SEIFF	SED LOW ATMOSPHERIC PROPERTIES
78-078E-02A	NEPHELOMETER	RAGENT	SED BACKSCATTER CHANNEL DATA
78-078E-02B	NEPHELOMETER	RAGENT	SED AMBIENT BACKGROUND RADIATION CHANNELS + SPECTRAL FUNCTIONS
78-078E-02C	NEPHELOMETER	RAGENT	SED TIME VS. TEMPERATURE DATA
78-078E-04A	INFRARED RADIOMETER	SUOMI	SED NET PLUX RADIOMETER DATA
78-078F-01A	ATMOSPHERIC STRUCTURE	SEIFF	SED LOW ATMOSPHERIC PROPERTIES
78-078F-02A	NEPHELOMETER	RAGENT	SED BACKSCATTER CHANNEL DATA
78-078F-02B	NEPHELOMETER	RAGENT	SED TIME VS. TEMPERATURE DATA
78-078F-02C	NEPHELOMETER	RAGENT	SED AMBIENT BACKGROUND RADIATION CHANNELS + SPECTRAL FUNCTIONS
78-078F-04A	INFRARED RADIOMETER	SUOMI	SED NET FLUX RADIOMETER
78-078G-01A	ATMOSPHERIC STRUCTURE	SEIFF	SED LOW ATMOSPHERIC PROPERTIES
78-078G-02A	NEPHELOMETER	RAGENT	SED BACKSCATTER CHANNEL DATA
78-078G-02B	NEPHELOMETER	RAGENT	SED AMBIENT BACKGROUND RADIATION CHANNELS + SPECTRAL FUNCTIONS
78-078G-02C	NEPHELOMETER	RAGENT	SED TIME VS. TEMPERATURE DATA
78-078G-04A	INFRARED RADIOMETER	SUOMI	SED NET FLUX RADIOMETER

PIONEER VENUS SED TAPE 001 FORMAT

	File	Filename	File Description	File Source	Logical Record Length (Bytes)	Physical Record Length (Bytes)	No. Physical Records in File
78-078D-01A	1	LASDESC	LAS Data Description	ARC	80	80	31
"	2	LASDATA	Sounder Probe Lower Atm STR Data	ARC	600	80	598
78-078D-05A	3	LIRDESC	LIR Data Description	ARC	50	80	52
"	4	LIRCALB	LIR On-board Calibration Data	ARC	63	80	63
"	5	LIRDESN	LIR Descent Data	ARC	500	80	494
"	6	LIRPRNT	LIR Pre-Entry Data	ARC	115	80	115
78-078D-07A	7	LSFRDOC	LSFR Data Description	U of Ariz	80	80	49
"	8	LSFRDAT	LSFR Flux Measurements	U of Ariz	80	80	378
	~~9~~	~~MSMODSC~~	Data Description of MSMODEL File	U of Bonn	80	80	8
	~~10~~	~~MSMODEL~~	Morning Side Model Rev. 3	U of Bonn	80	80	21
78-051A-18A	11	OPAPARAM	Description OPA File Contents	ARC	80	80	12
"	12	OPA	PV Proton Params Outside Bow Shock	ARC	80	80	27
"	13	OPA2	PV Proton Params Outside Bow Shock	ARC	80	80	29
"	14	OPA3	PV Proton Params Outside Bow Shock	ARC	80	80	30
"	15	OPA4	PV Proton Params Outside Bow Shock	ARC	80	80	32
78-078E-01A	16	SASDESC	SAS Data Description	ARC	80	80	28
"	17	SASDATA	North Probe Lower Atm Str Data	ARC	300	80	234
7 786-01A	18	SASDES1	SAS Day Probe Data Description	ARC	80	80	31

PIONEER VENUS SED TAPE 001 FORMAT (CONTD)

	File	Filename	File Description	File Source	Logical Record Length (Bytes)	Physical Record Length (Bytes)	No. Physical Records in File
78-078G-01A	19	SASDAT1	Day Probe Lower Atm Str Data	ARC	80	80	240
78-078F-01A	20	SASDES2	SAS Night Probe Data Description	ARC	80	80	28
"	21	SASDAT2	Night Probe Lower Atm Str Data	ARC	80	80	238
	22	SNFRDSC	Description of SNFR Data Files	U of Wisc	80	80	51
78-078E-04A	23	SNFR01	North Probe Net Flux Data	U of Wisc	80	80	62
78-078G-04A	24	SNFR02	Day Probe Net Flux Data	U of Wisc	80	80	62
78-078F-04A	25	SNFR03	Night Probe Flux Data	U of Wisc	80	80	62
	~~26~~	~~BNMS0~~	BNMS Data (Update 0)	U of Bonn	80	80	61
78-078G-02A,B,C	27	DAYPRB	PV Day Probe Nephelometer Data	ARC	80	80	5574
78-078D-04A	28	LGCDATA	LGC Atmospheric Composition Data	ARC	109	80	108
78-078D-05A	29	LIRDSC	LIR Description File	ARC	10	80	10
"	30	LIR002	Large Probe Infrared Radiometer	ARC	105	80	105
78-078F-02A,B,C	31	NIGHTP	PV Night Probe Nephelometer Data	ARC	80	80	3005
78-078E-02A,B,C	32	NORTHP	PV North Probe Nephelometer Data	ARC	80	80	2767
78-051A-18A	33	OPA007	Solar Wind Proton Bulk Vel.	ARC	80	80	28
"	34	OPA125	PV Proton Params Outside Bow Shock	ARC	80	80	22
"	35	OPA156	PV Proton Params Outside Bow Shock	ARC	80	80	22

PIONEER VENUS SED TAPE 001 FORMAT (CONTD)

78-051A-8A

File	Filename	File Description	File Source	Logical Record Length (Bytes)	Physical Record Length (Bytes)	No. Physical Records in File
36	OPA187	PV Proton Params Outside Bow Shock	ARC	80	80	17
37	OPA218	PV Proton Params Outside Bow Shock	ARC	80	80	24
38	OPA282	PV Proton Params Outside Bow Shock	ARC	80	80	19
39	OPA309	PV Proton Params Outside Bow Shock	ARC	80	80	27
40	OPA340	PV Proton Params Outside Bow Shock	ARC	80	80	20
41	OPA371	PV Proton Params Outside Bow Shock	ARC	80	80	23
42	OPA402	PV Proton Params Outside Bow Shock	ARC	80	80	13
43	OPA433	PV Proton Params Outside Bow Shock	ARC	80	80	21
44	OPA464	PV Proton Params Outside Bow Shock	ARC	35	80	26
45	OPA495	PV Proton Params Outside Bow Shock	ARC	35	80	22
46	OPA526	PV Proton Params Outside Bow Shock	ARC	35	80	25
47	OPA557	PV Proton Params Outside Bow Shock	ARC	35	80	31
48	OPA588	PV Proton Params Outside Bow Shock	ARC	35	80	26
49	OPA619	PV Proton Params Outside Bow Shock	ARC	35	80	20
50	OPA650	PV Proton Params Outside Bow Shock	ARC	35	80	14
51	OPA681	PV Proton Params Outside Bow Shock	ARC	35	80	22

PIONEER VENUS SED TAPE 001 FORMAT (CONTD)

	File	Filename	File Description	File Source	Logical Record Length (Bytes)	Physical Record Length (Bytes)	No. Physical Records in File
78-051A-18A	52	OPA712	PV Proton Params Outside Bow Shock	ARC	80	80	22
78-078D-02A	53	SOUNDP	PV Sounder Probe Nephelometer Data	ARC	80	80	10300
78-051A-19B	54	VDRAGM	Drag Model Composition and Density	Langley	80	80	149
78-051A-19C	55	VDRAGO	Drag Observations & Temperatures	Langley	80	80	209

No tape label. Single EOF separation. Three EOF's following last file.

Pioneer Venus SED pe 002 Format

	File		Filename	File Description	File Source	Logical Record Length (Bytes)	Physical Record Length (Bytes)	No. Physical Records in File
56	1	78-078F-01A G-01A	SASIN2	SAS Day and Night Probe Entry Data in SED	ARC	80	800	8
57	2	78-078F-01A	SASDAT5	SAS Night Probe Entry Data (Final)	ARC	80	800	136
58	3	78-078G-01A	SASDAT6	SAS Day Probe Entry Data (Final)	ARC	80	800	100
59	4	D-01A E-01A F-01A G-101A	SASIN3	SAS Day, Night, North Probe Entry Data is SED	ARC	80	800	10
60	5	78-078E-01A	SASDAT7	SAS North Probe Entry Data	ARC	80	800	79
61	6	78-051A 18C	OPAERR	SED FILE OPA897 Replaced by OPA896	ARC	80	800	
62	7		OPA743	PV Proton Parameters Outside Bow Shock	ARC	80	800	26
63	8		OPA774	PV Proton Parameters Outside Bow Shock	ARC	80	800	25
64	9		OPA805	PV Proton Parameters Outside Bow Shock	ARC	80	800	12
65	10		OPA836	PV Proton Parameters Outside Bow Shock	ARC	80	800	7
66	11		OPA896	PV Proton Parameters Outside Bow Shock	ARC	80	800	16
67	12		OPA927	PV Proton Parameters Outside Bow Shock	ARC	80	800	27
68	13		OPA958	PV Proton Parameters Outside Bow Shock	ARC	80	800	23
69	14		OPA989	PV Proton Parameters Outside Bow Shock	ARC	80	800	21
70	15		OPA1020	PV Proton Parameters Outside Bow Shock	ARC	80	800	20

No tape label. Single EOF seperation. Three EOF's following last file.

Enclosure 5(d)

78-078D-01A
78-078E-01A
78-078F-01A
78-078G-01A

NSSDC

Supporting Documentation

ATMOSPHERE STRUCTURE EXPERIMENT DATA

PIONEER VENUS ENTRY PROBE MISSION

Principal Investigator: Alvin Seiff
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Ames Research Center, NASA
Moffett Field, CA 94035

Co-Investigator: Donn B. Kirk — Ames Research Center, NASA
Richard E. Young — Ames Research Center, NASA
Simon C. Sommer — Ames Research Center, NASA
Robert C. Blanchard — Langley Research Center, NASA

Name of Spacecraft: Pioneer Venus Large Probe and Small Probes (3).

Name of Experiment: Comparative Atmosphere Structure Experiment

EXPERIMENT RATIONALE AND MOTIVATION

The primary objectives of the experiment were to measure the thermal structure of the atmosphere of Venus at the widely separated entry sites of the four Pioneer Venus probes with greater precision than previously available, and sufficient to define the contrasts in thermal structure with latitude and local clock hour. The expectation was that a successful definition of thermal contrasts could be related to and could provide insights into the atmospheric dynamics. It was also expected that details of the

Enclosure 3 (d.)

thermal structure could clarify mechanisms responsible for the high temperatures in the deep atmosphere, and could help define the cloud properties and formation processes. A second objective was to define the thermal structure above the clouds and up through the mesosphere where experimental data were previously lacking.

Measured properties were probe stagnation pressure and atmospheric recovery temperature in probe descent, from altitudes within the clouds ~65 km to the surface. Probe aerodynamic deceleration was measured during and after the period of high speed entry into the atmosphere, from ~130 km altitude to the surface.

INSTRUMENT DESCRIPTION

A detailed description of the sensors, the measurement concepts and approach, and the instrument electronics, including operating and sampling modes etc., has been published in the following paper:

1. Seiff, A., D. W. Juergens, and J. E. Leptich, "Atmosphere Structure Instruments on the Four Pioneer Venus Entry Probes". IEEE Transactions on Geoscience and Remote Sensing, GE-18, 1, Jan, 1980.

Accuracy estimates are provided therein. Ten copies of this paper are enclosed with this submittal to NSSDC, and more are available on request. Additional information on sensing accuracy, and in-flight functioning of the instrument is given in the comprehensive report on this experiment, published in the JGR Special Issue on Pioneer Venus:

2. Seiff, A., D. B. Kirk, R. E. Young, R. C. Blanchard, J. T. Findlay, G. M. Kelley, and S. C. Sommer, "Measurements of Thermal Structure and Thermal Contrasts in the Atmosphere of Venus, and Related Dynamical

Enclosure 2(d)

Observations--Results from the Four Pioneer Venus Probes", JGR Pioneer Venus Special Issue, Dec, 1980.

Probe entry locations and local Venus times of entry are given in the above reference.

DATA ON FILE AT NSSDC

The data obtained in probe descent have been submitted to NSSDC as the four complete files, one for each probe, entered in the Pioneer Venus computer data system, designated UADS (Unified Abstract Data System) under Special Event Data (SED). These data consist of ground received times (GRT), derived altitudes (see ref. 2), atmospheric pressures, temperatures, and derived densities, and compressibility factors, zeta = $p/(\rho RT)$. A narrative also available in UADS with the data gives estimated accuracies, which are, on pressure and density, 0.5% of reading; on temperature, 1 K; and on altitude, 0.4% of reading.

The pressure data tabulated have been corrected for offsets and sensor non-linearities, and for probe dynamic pressure due to the velocity of descent. The temperature data have been corrected for zero offset, for amplifier drift, and for dynamic temperature effects due to probe velocity. No thermal corrections have been applied to the temperature data, but by virtue of the sensor design, these were small, of the order of 0.5 K to 1 K (see ref. 2). They are therefore of the same order as the instrumental measurement uncertainties.

Densities were derived from the equation of state by use of a mean molecular weight of 43.44, which corresponds to a composition (by mole fraction) of 0.965 CO_2, 0.035 N_2, 180 ppm SO_2, 60 ppm Ar, and 30 ppm CO (ref. 2). Compressibility factors, zeta, taken from the NBS Tables for CO_2

by Hilsenrath et al., range from 0.999 at the highest altitudes to a minimum of 0.9925 around 25 km to a maximum of 1.009 at the surface.

Altitudes are referenced to 6052.0 km, which is the observed radius in the vicinity of the Large Probe (Sounder) landing site as determined by the Orbiter Radar Altimeter experiment. The associated uncertainty in radius is ~± 0.25 km. The four probes did not land at a common elevation, so that for the three small probes, final data values are tabulated at the landed elevations, from +0.98 km to - 0.65 km. The method used to define altitude, by integration of the equation of hydrostatic equilibrium, is described and evaluated in reference 2.

The data are based on the merging of two independent sets of data from redundant sensors (see ref. 1 and 2). Data entries for the Sounder probe are at 4 second intervals above 13 km, and at 32 sec intervals thereafter. For the three small probes, data intervals are 8 seconds in upper descent, 16 seconds in lower descent, and 32 seconds below 12 to 14 km. (See the narrative accompanying the data in UADS for further detail.) Below about 13 km, the temperature data were faulty, so in this region, extrapolated values are listed (see ref. 2 for a discussion of the extrapolation procedure).

CALIBRATION PROCEDURES

The temperature sensors were platinum resistance thermometers. They were calibrated in temperature baths against secondary standards at temperatures near 203, 273, 473, and 643 K. The calibration data were interpolated and extended by use of the resistance function of temperature for platinum, which is the basis of the International Practical Temperature Scale, IPTS--i.e., it is the current basis for definition of temperature in this range. Calibration accuracy is believed to be better than 0.05 K at the lower temperatures, and

Enclosure 5(d)

within 0.25 K over the full range. Calibrations were performed initially at the sensor level, and were repeated end-to-end with the electronics over a more limited temperature range, 253 to 393 K. These latter calibrations were used to select values of the electronics amplification factors which were used in decalibrating flight data. Reference readings taken during descent confirm that these amplification factors were stable within 0.25%, and corrections were applied for the small variations detected.

There were 12 pressure sensors on each probe, ranging from 80 mb full scale to 100 bars full scale. These were calibrated repeatedly over a period of months against secondary standards which had been calibrated against a dead-weight pressure source, i.e., a primary standard. The repeated calibrations were used to define long term drift rates and to eliminate sensors lacking stability. The knowledge of scale factor of the sensors flown is within ~0.25% or better. Sensor offsets at zero pressure were measured just prior to entry, and were known to within ~1 count or 0.2% of full scale on each range at the time of use in the Venus atmosphere.

The accelerometers were calibrated by means of their response to the earth's gravitational field, which had been measured at our several test sites by the USGS to within an accuracy of 0.2 ppm. The sensor calibrations at the several sites were consistent with the small differences in the gravitational acceleration at those sites. Calibrations were performed over a period of months to define stability. Of the 5 axial sensors flown, 4 were stable in scale factor over time periods of 3 months to within ~0.01%, and the fifth showed a drift in 3 months of 0.11%. Sensor biases were measured at zero input level just prior to entry. The bias stability of the sensors was of the order of 1 mg; i.e., the offset changes in descent could be of this order.

Enclosure 5(4)

DATA ACCURACY BY PROBE AND BY ALTITUDE INTERVAL

Here, we summarize the regions where accuracy was limited by factors other than basic sensor capability.

Offset jumps were experienced in the pressure channels at the higher pressures during descent. These are attributed to current leakage through the solid state switches, used to select on-line sensors, at times when diaphragms burst on low range off-line sensors. The offset jumps were accurately defined and corrected for, and the data indicate that there was generally no drift in the offset. However, because of this factor, we estimate that the pressures above 50 bars (i.e., below 10 km altitude) could be in error by 1% of reading, rather than 0.5% of reading. This problem was particularly of concern on the Day Probe, on which one of the two on-line sensors exhibited drift at pressures > 50 bars. See Ref. 2 for further discussion.

Data from the two independent temperature sensors generally agree within ~1 K. On the Night Probe, at 550 K, the difference rose to 2 K, and reached 3 K at 620 K, just prior to loss of temperature data. Hence, the temperature uncertainty in data from this probe is slightly greater than for the other 3 probes in the deep atmosphere, below 23 km. We have heavily weighted the data from the free wire sensor on all probes, because its known thermal errors are < 0.5 K (see ref. 2), and this sensor was used in the deep atmosphere data from the Night Probe as well.

ENTRY DATA AT ALTITUDES TO 136 KM

These data are still being analyzed. We expect to have them ready for submittal to NSSDC by early summer, 1981.

Enclosure 5(f) OPA

78-051A-18A
files 11-15
33-52
SED

DOCUMENTATION OF UADS CONTRIBUTIONS FROM OPA (ORBITS 1-365)

The contributions to UADS of data from the Pioneer Venus Orbiter Plasma Analyzer (OPA) consist of four parameters (when available) for each orbit: the reduced solar wind flow speed and proton number density observed just before the (first) inbound crossing of the bow shock of Venus, and the same quantities just after the (last) outbound crossing. It should be noted that these quantities are stored in the SED files rather than in the LFD files. All four parameters are available for 77 of the first 365 orbits; in the remaining cases in the files fewer are given, either because the orbit is entirely inside the bow shock during the inbound or outbound leg, or both, or because valid parameter fits to the raw data could not be made for the required times. In particular, 127 of the orbits have no entries; 31 of these cases reflect absence of data near superior conjunction, and the remaining 96 are due to failure of fit or to data gaps.

The reduced flow speed and density are obtained by a least-squares fit of a convecting isotropic Maxwellian proton velocity distribution, convolved through the instrument response function obtained from laboratory calibration, to the raw currents. The flow speed obtained by this procedure should normally be accurate (very conservative error bars would be ± 10%). The proton number density is generally less accurate (conservatively ± 50%).

Each SED file contains the data entered for 31 orbits. For each orbit for which data are given, the orbit number, times of measurement and reduced parameters are given. The units of velocity and and number density are, respectively, km/sec and protons/cm^3. The times of measurement are given in hours and minutes UT at the spacecraft; the precise time refers to the completion of the OPA measurement cycle (approx. 9 minutes) of 45 spin periods. The time of measurement is always within two measurement cycles of the inferred shock crossing.

SED-1

Enclosure 5(a)

78-055-02A, 02B, 02C

PIONEER VENUS

NEPHELOMETER (LN/SN) EXPERIMENTS

SOUNDER, DAY, NIGHT AND NORTH PROBES

DESCRIPTION OF DATA STORED IN UNITED ABSTRACT DATA SYSTEM (UADS)

BORIS RAGENT

AMES RESEARCH CENTER

MOFFETT FIELD CA 94035

and

JACQUES E. BLAMONT

SERVICE D'AERONOMIE DU CENTRE

NATIONAL DE LA RECHERCHE SCIENTIFIQUE

91, VERRIERES, FRANCE

Enclosure 3A

1.0 INTRODUCTION

This document describes the Pioneer Venus multi-probe nephelometer experiments data that are stored in the United Abstract Data System (UADS). A description of the mission parameters, probe characteristics, nephelometer experimental equipment, calibration procedures and presentations and interpretations of the data are given in Colin and Hunten, 1977, Colin, 1979, Ragent et al., 1980, and Ragent and Blamont, 1980.

Each of the probes that entered the atmosphere of Venus on December 8, 1978 at approximately 18 hours 59 minutes GMT carried an identical nephelometer experimental package. The nephelometer made measurements of the ambient atmospheric scattering cross section at an angle of approximately 172.5° to an incident light beam at a wavelength of about 900 nanometers, and also measured the ambient brightness of the atmosphere in two spectral channels. Internal experimental parameters were also monitored during the descent of the probes. The data received for each of these experiments from each of the probes (sounder, day, north and night) have been tabulated as a function of ground received time and entered into the UADS system. In order to correlate the ground received times with absolute altitude for each probe the user is referred to the data listings for the atmospheric structure (LAS/SAS) experiments tabulated in the UADS files.

The following sections describe these entries and the additional information that has been entered into the UADS listings giving the individual experimental parameters peculiar to that experiment.

2.0 BACKSCATTER CHANNEL

Appendix A is a sample listing of a portion of the data listed in the UADS system for the measured backscatter cross sections obtained during the descent of

Enclosure 3(a)

the night probe. The first portion of the listing under section 1.1 is a tabulation of the angular weighting or sensitivity function, f (θ), for the nephelometer as a function of scattering angle with respect to the direction of propagation of a nearly monochromatic incident light beam ($\Delta\lambda \approx 20$ nanometers) at a wavelength, λ, of approximately 900 nanometers. This weighting function has been normalized so that

$$\int_0^{180} f(\theta)\, d\theta = 1$$

Eq (2-1)

Under section 1.2 the actual measured cross sections are listed in units of $m^{-1}sr^{-1}$ as a function of ground reserved time (GMT). The data as listed also include the data baseline offsets, in order to illustrate the fluctuation of the data and to give some indication of baseline drift during the descent of the probe. It is necessary to subtract these baseline offsets from the data in order to obtain the true cross section. An accurate estimate of this baseline offset may be obtained by noting the value of the listed cross section in a relatively scattering-free region of the atmosphere, for example at times corresponding to altitudes below 30 kms (times after 19 hours 13 minutes for the night probe, for example). (A very slight correction for baseline drift due to instrument temperature changes has not been included in these data since the overall correction from entry to impact is of the order of one unit of binary quantization.)

The first data listed for each of the probes are readings of a monitoring target placed in the field of view of the instrument. This target is automatically removed from the field of view of the instrument upon instrument deployment as noted by the comment "Window Cover Open" for the day, north and night probes, or "Aeroshell Deployed" for the sounder probe. For several of the probes the time of impact is noted, and in the case of the day probe the data are

Enclosure 3(a)

tabulated from entry through impact and post-impact to instrument or probe failure.

3.0 AMBIENT BACKGROUND RADIATION CHANNELS

Appendix B is a sample listing of a portion of the data listed in the UADS system as received for the night probe "uv" and "visible" channels used to detect ambient radiation. As shown in the listing under section 2.1 the instrument reading, E, in either channel in "H", or instrument, units is given by

$$E_{uv,vis} = \int_{\lambda} R_{uv,vis}(\lambda)\, I(\lambda)\, d\lambda \qquad \text{Eq (3-1)}$$

where $R_{uv,vis}$ is the spectral response function for the uv or visible channels respectively in "H" units - $uw^{-1}\text{-}m^{+2}\text{-}sr^{+1}$, and $I(\lambda)$ is the ambient specific inensity in uw - $m^{-2}\text{-}sr^{-1}\text{-}nm^{-1}$ and λ is measured in nanometers.

Values for R (λ) as a function of λ are tabulated for both the uv and visible channels. Note that in addition to the main pass bands both channels had substantial spectral "leaks" at other wavelengths.

The readings obtained in the uv and visible channels are next tabulated under section 2.3. The times of window cover opening (day, night and north probes) or aeroshell deployment (sounder probes) are noted. For these data, again, the baseline offset has not been subtracted from the data presented so that the user may attempt to note small deviations from the baseline. Baseline offset values are approximately those values recorded by the instrument prior to window cover opening or aeroshell deployment. In one case (north probe) it will be noted that the baseline offset was zero or less and is tabulated as zero. For that case the baseline offset value could be reconstructed using calibration cycle data (not tabulated here) and the user is requested to consult the data

Enclosure 3(a)

shown in Ragent and Blamont, 1980, for the actual offset.

Because of spectral variations in the value of I (λ) as a function of altitude and the complex form of R(λ), consisting of several spectral pass bands, it is necessary to solve for I (λ) using equation 3-1 and models for the variation of the spectral shape and magnitude of the ambient radiation as a function of altitude.

Again all of the data received from each of the probes are tabulated from instrumental deployment until instrument or probe failure occurred.

4.0 INSTRUMENT TEMPERATURE

A sample of the housekeeping data of the instrument is tabulated in the UADS system as shown in Appendix C. This listing of temperature of the instrument at the location of the light emitting diode (LED) versus ground received time (GMT) is provided to indicate the range of internal environmental conditions experienced by the instrument.

Enclosure 3(a)

REFERENCES

Colin, L. and Hunten, D. M. (eds.), Pioneer Venus Experiment Descriptions, Space Science Reviews, 20, 451-525, June 1977.

Colin, L., Encounter with Venus, Science, 203, 743-745, Feb. 23, 1979.

Ragent, B., Wong, T., Blamont, J. E., Eskovitz, A. J., Harnett, L. M., and Pallai, A., Pioneer Venus Sounder and Small Probes Nephelometer Instrument, IEEE Trans. Geoscience and Remote Sensing, GE-18, 1, 111-117, Jan. 1980.

Ragent, B. and Blamont, J., The Structure of the Clouds of Venus: Results of the Pioneer Venus Nephelometer Experiment, JGR, in press.

1 PIONEER-VENUS NIGHT PROBE
NEPHELOMETER (SN) EXPERIMENT

APPENDIX A

1.0 BACKSCATTER CHANNEL

1.1 ANGULAR WEIGHTING (NIGHT PROBE) FUNCTION, F(THETA), FOR BACKSCATTER CHANNEL NORMALIZED SO THAT

INTEGRAL [F(THETA)D(THETA)] = 1

File 31

78-078F-02A

ANGLE (DEG)	F(THETA)
180.0	0.
179.0	0.011
178.0	0.022
177.0	0.035
176.0	0.057
175.0	0.087
174.0	0.116
173.5	0.127
173.0	0.135
172.5	0.138
172.0	0.137
171.5	0.133
171.0	0.125
170.0	0.101
169.0	0.069
168.0	0.042
167.0	0.024
166.0	0.012
165.0	0.007
164.0	0.005
163.0	0.004
162.0	0.003(5)
161.0	0.003
160.0	0.002
159.0	0.001
158.0	0.001
157.0	0.000

1

2. BACKSCATTER CHANNEL DATA (NIGHT PROBE)

NOTE: PLEASE SEE DATA OF ATMOSPHERIC STRUCTURE EXPERIMENT (SAS) TO OBTAIN ALTITUDE VS. TIME PROFILES

GMT (HR:MIN:SEC)	BACKSCATTER (1/M-STER)
18:58.20.6	3.12E-02
18:58.20.6	3.12E-02
BLACKOUT REGION	
18:59:48.6	3.12E-02
18:59:49.6	2.95E-02
WINDOW COVER OPEN	
18:59:50.6	1.31E-04
18:59:52.6	1.31E-04
18:59:54.6	1.31E-04
18:59:55.6	1.31E-04
18:59:56.6	1.31E-04
3:59:57.6	1.31E-04
18:59:58.6	1.31E-04
19: 0: .6	1.39E-04
19: 0: 1.6	1.31E-04
19: 0: 2.6	1.31E-04
19: 0: 3.6	1.31E-04
19: 0: 4.6	1.31E-04
19: 0: 5.6	1.56E-04
19: 0: 6.6	1.56E-04

p.7

IMPACT?
19:54:55.0 4.92E-03

78-075F-02C

2.0 AMBIENT BACKGROUND RADIATION CHANNELS
(NORTH PROBE)

1 SPECTRAL FUNCTIONS

2.1.1 DEFINITIONS

E(OUT) = INTEGRAL [R(LAMBDA)I(LAMBDA)D LAMBDA]

WHERE

E(OUT) = NEPHELOMETER READING IN "H" UNITS

R(LAMBDA) = SPECTRAL FUNCTION IN "H" UNITS /MICROWATT/METER SQUARED-STERADIAN)

I(LAMBDA) = SPECIFIC INTENSITY OF AMBIENT LIGHT
· IN MICRO WATTS-METER SQ/STERADIAN/ NANO METERS

LAMBDA = WAVELENGTH IN NANOMETERS

2.2 TABULATIONS OF R VERSUS LAMBDA FOR UV (BG1)
CHANNEL AND VISIBLE (BG2) CHANNEL

2.2.1 UV (BG1) CHANNEL

LAMBDA (NANOMETERS)	R H UNITS/ MICROWATTS/METER SQ-STERADIAN)
320	0.7E-04
325	1.8E-04
330	4.1E-04
335	8.0E-04
340	12.2E-04
345	16.3E-04
350	20.1E-04
355	23.6E-04
360	24.8E-04
365	25.1E-04
370	24.6E-04
375	20.6E-04
380	12.4E-04
385	5.5E-04
390	0.0E-04
...	...
680	0.0E-04
700	0.6E-04
710	1.5E-04
720	2.8E-04
730	5.0E-04
740	7.6E-04
750	7.6E-04
760	3.5E-04
770	1.8E-04
780	0.6E-04
790	0.3E-04
800	0.2E-04
850	0.8E-04
900	1.6E-04
950	1.9E-04
1000	1.6E-04
1050	1.1E-04
1100	0.8E-04
1150	0.2E-04

2.2.2 VISIBLE (BG2) CHANNEL

LAMBDA (NANOMETERS)	R (H UNITS/MICROWATTS/METER SQ-STERADIAN)
460	0.9E-04
470	2.6E-04
480	5.6E-04
490	11.0E-04
500	18.7E-04
510	24.9E-04
520	31.7E-04

p. 8

320	[illegible]
325	1.8E-04
330	4.1E-04
335	8.0E-04
340	12.2E-04
345	16.3E-04
350	20.1E-04
355	23.6E-04
360	24.8E-04
365	25.1E-04
370	24.6E-04
375	20.6E-04
380	12.4E-04
385	5.5E-04
390	0.0E-04
...	...
680	0.0E-04
700	0.6E-04
710	1.5E-04
720	2.8E-04
730	5.0E-04
740	7.6E-04
750	7.6E-04
760	3.5E-04
770	1.8E-04
780	0.6E-04
790	0.3E-04
800	0.2E-04
850	0.8E-04
900	1.6E-04
950	1.9E-04
1000	1.6E-04
1050	1.1E-04
1100	0.8E-04
1150	0.2E-04

2.2.2 VISIBLE (BG2) CHANNEL

LAMBDA (NANOMETERS)	R (H UNITS/MICROWATTS-SQ METER-STERADIAN)
460	0.9E-04
470	2.6E-04
480	5.6E-04
490	11.0E-04
500	18.7E-04
510	24.9E-04
520	31.7E-04
530	32.8E-04
540	30.1E-04
550	25.1E-04
560	18.3E-04
570	12.1E-04
580	7.3E-04
590	4.2E-04
600	2.2E-04
610	1.1E-04
620	0.6E-04
630	0.4E-04
640	0.3E-04
650	0.2E-04
660	0.1E-04
670	0.0E-04
800	0.03E-04
850	0.47E-04
900	0.95E-04
950	0.96E-04
1000	0.64E-04
1050	0.40E-04
1100	0.33E-04
1150	0.09E-04

2 AMBIENT RADIATION (NIGHT PROBE)

GMT (HR:MIN:SEC)	BACKGROUND 1 E, UV CHANNEL "H" UNITS	BACKGROUND 2 E, VISIBLE CHANNEL "H" UNITS
10:59:48.8	6.00E+00	
10:59:49.8		5.00E+00

p. 9

19:54:40.0		1.60E+01
19:54:44.0	3.20E+01	
19:54:48.0		1.60E+01
19:54:54.0	3.20E+01	
19:54:56.0		1.60E+01

78-078F-02B

3. INSTRUMENT TEMPERATURE AT LED LOCATION (NORTH PROBE)

TIME (GMT)	TEMPERATURE (DEG CENTIGRADE)
18:59:52.0	-1.01
19:00:48.0	-0.67
19:03:40.0	-0.34
19:05:20.0	0.00
19:07:36.0	0.34
19:09:28.0	0.67
19:11:28.0	1.01
19:12:48.0	1.34
19:14:16.0	1.68
19:17:53.5	2.69
19:18:57.5	3.02
19:20:33.5	3.36
19:21:05.5	3.69
19:21:53.5	4.03
19:22:41.5	4.37
19:23:29.5	4.71
19:24:49.5	5.38
19:25:37.5	5.71
19:26:19.6	6.05
19:26:57.6	6.39
19:27:29.6	6.72
19:28:01.6	7.06
19:29:05.6	7.73
19:29:37.6	8.07
19.30.09:6	8.40
19:30:41.6	8.74
19:31:13.6	9.08
19:31:29.6	9.41
19:32:01.6	9.75
19:32:33.6	10.00
19:33:21.6	10.76
19:33:53.6	11.09
19:34:09.6	11.43
19:34:41.6	11.76
19:35:13.6	12.10
19:35:29.6	12.44
19:36:01.6	12.77
19:36:17.6	13.11
19:36:33.6	13.45
19:37:37.6	14.12
19:34:53.6	14.45
19:38:09.6	14.79
19:38:41.6	15.13
19:38:57.6	15.46
19:39:13.6	15.80
19:39:45.6	16.13
19:40:01.6	16.47
19:40:17.6	16.81
19:40:49.6	17.14
19:41:05.6	17.48
19:41:53.6	18.15
19:42:09.6	18.49
19:42:25.6	18.82
19:42:41.6	19.16
19:42:57.6	19.50
19:43:13.6	19.83
19:43:45.6	20.17
19:44:01.6	20.50
19:44:17.6	20.84
19:44:49.6	21.51
19:45:05.6	21.85
19:46:09.6	22.86
19:46:25.6	23.19
19:46:41.6	23.53
19:46:57.6	23.87
19:47:13.6	24.20
19:47:29.6	24.54
19:47:45.6	24.87

p.10

Enclosure 5 (8)

Chemical Analysis of the lower Venus atmosphere was performed at three altitudes by the Sounder Probe Gas Chromatograph (SPGC), initially called the Large Probe Gas Chromatograph (LGC). Carbon dioxide and seven neutral minor constituents were determined from individual and direct measurement of peak areas by computerized curve-fitting. The instrument design and functions, and the data routine and statistics, are described in IEEE Transactions on Geoscience and Remote Sensing, GE-18 (No. 1), 85-93 (1980). The flight experiment is described in J. Geophysical Res., 85, (A13) 7891-902 (1980).

[redacted]

FILE 1 SED-1

Atm. Structure 78-078D 01 LAS

LOWER ATMOSPHERIC STATE PROPERTIES
FROM THE PIONEER VENUS SOUNDER PROBE

BASED ON MERGED DATA FROM P A AND P B PRESSURE SENSORS, T 1 AND T 2 TEMPERATURE SENSORS.

DATA ARE LISTED AT 4 SEC INTERVALS PRIOR TO TEMPERATURE SENSOR BREAKDOWN AT 13.1 KM, THEN, AT 32 SEC INTERVALS

GO IS GROUND LEVEL ACCELERATION DUE TO GRAVITY, AT THE LANDING SITE

RO IS PLANETARY RADIUS AT THE LANDING SITE PLUS OR MINUS 0.25 KM

ALTITUDE IS ABOVE LANDING SITE

MW IS ATMOSPHERIC MEAN MOLECULAR WEIGHT (INPUT)

ZETA IS REAL GAS COMPRESSIBILITY FACTOR = P/(RHO X R T)

ESTIMATED ABSOLUTE ACCURACIES: ON P, RHO.........0.5% OF READING
ON T..............1 K
ON ALTITUDE......0.4% OF READING

GRT (HR:MIN) IS CORRECT TO NEAREST .06 SEC. GRT (SEC) IS ROUNDED TO NEAREST SEC.

DESCENT VELOCITY RANGES FROM 39 TO 12 M/S ON PARACHUTE, 53 TO 11 M/S IN FREE FALL.

PARACHUTE JETTISON AT 45.4 KM, 19:06.3 GRT

LIS

FILE 2

LOWER ATMOSPHERE STATE PROPERTIES
FROM THE PIONEER VENUS SOUNDER PROBE

A. SEIFF, P.I.

R0 = 6052.0 KM
G0 = 8.8694 M/SEC2
MW = 43.44

GRT (HR:MIN)	GRT (SEC)	ALT (KM)	P (BARS)	T (DEG K)	RHO (KG/M3)	ZETA
18:49.646	67779	64.827	.9250E-01	246.3	.1964E+00	.9990
18:49.846	67791	64.336	.1013E+00	246.9	.2146E+00	.9990
18:49.913	67795	64.188	.1041E+00	246.6	.2207E+00	.9990
18:49.980	67799	64.034	.1071E+00	246.9	.2269E+00	.9990
18:50.046	67803	63.883	.1101E+00	247.2	.2330E+00	.9990
18:50.113	67807	63.732	.1132E+00	247.0	.2397E+00	.9990
18:50.180	67811	63.581	.1164E+00	247.6	.2458E+00	.9990
18:50.246	67815	63.433	.1196E+00	247.7	.2525E+00	.9990
18:50.313	67819	63.289	.1228E+00	248.2	.2588E+00	.9990
18:50.380	67823	63.144	.1261E+00	248.9	.2650E+00	.9990
18:50.446	67827	63.002	.1294E+00	249.3	.2715E+00	.9990
18:50.513	67831	62.864	.1327E+00	249.6	.2780E+00	.9990
18:50.580	67835	62.729	.1360E+00	250.3	.2841E+00	.9990
18:50.646	67839	62.588	.1395E+00	251.2	.2904E+00	.9990
18:50.713	67843	62.451	.1430E+00	252.2	.2966E+00	.9990
18:50.780	67847	62.321	.1464E+00	252.9	.3028E+00	.9989
18:50.846	67851	62.189	.1499E+00	253.5	.3093E+00	.9989
18:50.880	67853	62.122	.1517E+00	254.3	.3120E+00	.9989
18:50.946	67857	61.995	.1552E+00	254.8	.3186E+00	.9989
18:51.013	67861	61.862	.1589E+00	255.6	.3251E+00	.9989
18:51.080	67865	61.729	.1627E+00	255.9	.3325E+00	.9989
18:51.146	67869	61.603	.1664E+00	256.3	.3395E+00	.9989
18:51.213	67873	61.479	.1701E+00	256.6	.3468E+00	.9989
18:51.280	67877	61.354	.1739E+00	257.1	.3539E+00	.9989
18:51.346	67881	61.228	.1778E+00	258.0	.3605E+00	.9988
18:51.413	67885	61.102	.1818E+00	258.9	.3673E+00	.9988
18:51.480	67889	60.984	.1856E+00	259.8	.3737E+00	.9988
18:51.546	67893	60.868	.1894E+00	260.7	.3800E+00	.9988
18:51.613	67897	60.754	.1932E+00	261.6	.3863E+00	.9988
18:51.680	67901	60.639	.1971E+00	262.5	.3928E+00	.9987
18:51.746	67905	60.525	.2010E+00	263.6	.3989E+00	.9987
18:51.813	67909	60.411	.2050E+00	264.7	.4051E+00	.9987
18:51.879	67913	60.301	.2089E+00	265.6	.4114E+00	.9987
18:51.946	67917	60.187	.2130E+00	266.8	.4177E+00	.9987
18:52.013	67921	60.075	.2171E+00	267.5	.4247E+00	.9987
18:52.079	67925	59.965	.2212E+00	268.4	.4312E+00	.9986
18:52.146	67929	59.849	.2256E+00	269.1	.4386E+00	.9986
18:52.213	67933	59.729	.2302E+00	269.9	.4463E+00	.9986
18:52.279	67937	59.614	.2347E+00	270.3	.4543E+00	.9986
18:52.346	67941	59.506	.2390E+00	270.8	.4618E+00	.9986
18:52.413	67945	59.403	.2432E+00	271.3	.4690E+00	.9986
18:52.479	67949	59.301	.2474E+00	271.5	.4767E+00	.9986
18:52.546	67953	59.200	.2516E+00	271.7	.4845E+00	.9986
18:52.613	67957	59.094	.2561E+00	271.8	.4929E+00	.9986
18:52.679	67961	58.988	.2607E+00	272.0	.5014E+00	.9986
18:52.746	67965	58.879	.2655E+00	272.3	.5102E+00	.9986
18:52.813	67969	58.785	.2697E+00	272.5	.5179E+00	.9986

78-070D-05A (LIR)
FILE 3

Craig 8-448-5695
5404

THE DATA FROM THE PIONEER VENUS LIR EXPERIMENT ARE GIVEN IN THREE FILES (1) THE PRE-ENTRY DATA; (2) THE DESCENT DATA AND (3) THE ON-BOARD CALIBRATION DATA.

THE FILES ARE ARRANGED IN FIVE COLUMNS. FIRST IS THE GROUND RECEIVED TIME (GRT) IN HOURS, MINUTES AND SECONDS. THIS CAN BE RELATED TO ALTITUDE, PRESSURE, TEMPERATURE BY USE OF THE LAS FILE. THE UNITS FOR THE NEXT FOUR FILES ARE WATTS PER SQUARE METER. THE SECOND COLUMN, LABELED "A", IS FOR THE 3 TO 250 MICROMETER SPECTRAL BANDPASS. THE THIRD COLUMN, LABELED "B", IS FOR THE 6 TO 7 MICROMETER SPECTRAL BANDPASS. THE FOURTH COLUMN, LABELED "C", IS FOR THE 7 TO 8 MICROMETER SPECTRAL BANDPASS. THE FIFTH COLUMN, LABELED "D", IS FOR THE 8 TO 9 MICROMETER SPECTRAL BANDPASS.

A FACTOR OF "PI", WHICH HAD BEEN INCORRECTLY APPLIED, HAS BEEN REMOVED FROM THESE DATA, AND THE DATA HAVE HAD INSTRUMENT ELECTRONIC OFFSET CORRECTIONS APPLIED.

THE FIRST DATA RECEIVED AFTER AN INSTRUMENT CALIBRATION CYCLE IS DISTORTED BY A "MEMORY" EFFECT AND SHOULD BE DISCARDED OR USED WITH EXTREME CAUTION. THE EFFECT IS MOST EASILY SEEN IN FILE NUMBER ONE, THE PRE-ENTRY DATA, AT THE FOLLOWING TIMES 18:35:53, 18:39:05, AND 18:42:17.

THE ON-BOARD CALIBRATION DATA, FILE NUMBER THREE, INDICATE AN INCREASING SIGNAL DURING THE DESCENT PHASE OF THE MISSION. THIS WAS DUE TO INCREASING PROBE BUS-VOLTAGE; THE CALIBRATION SYSTEM WAS NOT ON REGULATED POWER. THIS TYPE OF CHANGE WAS OBSERVED DURING CALIBRATION OF THE INSTRUMENT. THE LAST CALIBRATION CYCLE ENDED 2 MINUTES, 18 SECONDS PRIOR TO IMPACT ON VENUS' SURFACE.

LIS

FILE4

78-051D-05A

FILE NUMBER THREE

LIR ON-BOARD CALIBRATION DATA

GRT	A	B	C	D
18:35:35	2032.9	207.6	173.4	133.6
18:35:41	2048.9	209.5	175.7	136.5
18:38:47	2592.2	278.6	228.5	172.7
18:38:53	2767.2	276.6	226.2	168.3
18:41:59	2672.1	292.3	236.5	177.0
18:42:05	2656.1	282.5	234.2	175.5
18:52:21	1761.3	172.1	147.0	114.8
18:52:27	1761.3	174.1	148.2	116.3
18:55:33	2048.9	207.6	174.6	133.6
18:55:39	2032.9	211.5	173.4	132.2
18:58:45	2096.8	213.5	179.2	136.5
18:58:51	2064.9	215.5	179.2	136.5
19:01:57	2080.9	211.5	181.5	138.0
19:02:03	2064.9	213.5	178.0	136.5
19:05:09	2080.9	219.4	178.0	136.5
19:05:15	2064.9	217.4	178.0	135.1
19:08:21	2080.9	225.3	180.3	135.1
19:08:27	2064.9	211.5	179.2	138.0
19:11:33	2096.8	219.4	182.6	138.0
19:11:39	2096.8	225.3	184.9	139.4
19:14:45	2160.7	235.2	191.8	145.2
19:14:51	2144.8	233.2	188.3	142.3
19:17:57	2224.7	239.1	202.1	152.4
19:01:23	2224.7	247.0	197.5	146.6
19:21:09	2320.5	262.8	211.3	153.8
19:21:15	2304.6	249.0	209.0	155.3
19:24:21	2384.5	274.6	218.2	164.0
19:24:27	2384.5	272.6	219.3	161.1
19:27:33	2464.4	284.5	227.3	162.5
19:27:39	2464.4	284.5	227.3	165.4
19:30:45	2560.2	294.3	235.4	169.8
19:30:51	2560.2	294.3	241.1	169.8
19:33:57	2608.2	308.1	243.4	174.1
19:34:03	2608.2	302.1	240.0	168.3

PIONEER-VENUS DAY PROBE
NEPHELOMETER (SN) EXPERIMENT

FILE 27

SN 78-0786-02A

(SN) SED Backscatter Channel Data

1.0 BACKSCATTER CHANNEL

1.1 ANGULAR WEIGHTING (DAY PROBE) FUNCTION, F(THETA), FOR BACKSCATTER CHANNEL NORMALIZED SO THAT

INTEGRAL [F(THETA)D THETA! = 1

ANGLE (DEG)	F(THETA)
180.0	0.
179.0	0.011
178.0	0.022
177.0	0.035
176.0	0.057
175.0	0.087
174.0	0.116
173.5	0.127
173.0	0.135
172.5	0.138
172.0	0.137
171.5	0.133
171.0	0.125
170.0	0.101
169.0	0.069
168.0	0.042
167.0	0.024
166.0	0.012
165.0	0.007
164.0	0.005
163.0	0.004
162.0	0.003(5)
161.0	0.003
160.0	0.002
159.0	0.001
158.0	0.001
157.0	0.000

1.2 BACKSCATTER CHANNEL DATA (DAY PROBE)

File 27 p. 2

NOTE: PLEASE SEE DATA OF ATMOSPHERIC STRUCTURE EXPERIMENT (SAS) TO OBTAIN ALTITUDE VS. TIME PROFILES

File 27 p.3

GMT (HR:MIN:SEC)	BACKSCATTER (1/M-STER)
18:54:42.8	1.26E-02
18:54:46.8	1.26E-02
BLACKOUT	
18:56:10.8	1.26E-02
18:56:11.8	1.19E-02
18:56:12.8	1.26E-02
WINDOW COVER OPEN	
18:56:14.8	4.90E-05
18:56:15.8	4.90E-05
18:56:16.8	3.85E-05
18:56:17.8	4.55E-05
18:56:18.8	4.55E-05
18:56:19.8	4.55E-05
18:56:20.8	4.90E-05
18:56:22.8	4.55E-05
18:56:24.8	4.20E-05
18:56:25.8	4.90E-05
18:56:26.8	4.55E-05
18:56:27.8	4.90E-05
18:56:28.8	4.20E-05
18:56:30.8	4.55E-05
18:56:31.8	5.25E-05
18:56:32.8	5.60E-05
18:56:33.8	4.90E-05
18:56:34.8	4.90E-05
18:56:35.8	5.60E-05
18:56:36.8	4.55E-05
18:56:38.8	4.55E-05
18:56:40.8	4.55E-05
18:56:41.8	4.90E-05
18:56:42.8	5.25E-05
18:56:43.8	6.65E-05
18:56:48.8	7.35E-05
18:56:49.8	8.40E-05
18:56:50.8	9.10E-05
18:56:51.8	9.10E-05
18:56:52.8	9.80E-05
18:56:54.8	7.70E-05
18:56:56.8	7.70E-05
18:56:57.8	8.05E-05
18:56:58.8	8.75E-05
18:56:59.8	9.10E-05
18:57: .8	8.75E-05
18:57: 2.8	9.45E-05
18:57: 3.8	9.80E-05
18:57: 4.8	9.45E-05
18:57: 5.8	9.10E-05
18:57: 6.8	9.80E-05
18:57: 7.8	9.45E-05
18:57: 8.8	9.45E-05
18:57:10.8	8.75E-05
18:57:12.8	8.75E-05
18:57:13.8	8.40E-05
18:57:14.8	8.40E-05
18:57:15.8	8.40E-05
18:57:16.8	8.75E-05
18:57:18.8	8.75E-05
18:57:19.8	8.40E-05
18:57:20.8	7.35E-05
18:57:21.8	7.35E-05

File 27 p.4

2.0 AMBIENT BACKGROUND RADIATION CHANNELS
(DAY PROBE)

2.1 SPECTRAL FUNCTIONS

2.1.1 DEFINITIONS

E(OUT) = INTEGRAL [R(LAMBDA)I(LAMBDA)D LAMBDA!

WHERE

E(OUT) = NEPHELOMETER READING IN "H" UNITS

R(LAMBDA) = SPECTRAL FUNCTION IN "H" UNITS/MICROWATT/METER SQUARED-STERADIA

I(LAMBDA) = SPECIFIC INTENSITY OF AMBIENT LIGHT
IN MICROWATTS/METER SQUARED-STERADIAN-NANOMETER

LAMBDA = WAVELENGTH IN NANOMETERS

2.2 TABULATIONS OF R VERSUS LAMBDA FOR UV (BG1)
CHANNEL AND VISIBLE (BG2) CHANNEL

2.2.1 UV (BG1) CHANNEL

LAMBDA (NANOMETERS)	R (H UNITS/MICROWATT-METER SQUARED-STERADIAN)
320	0.7E-04
325	1.8E-04
330	4.1E-04
335	8.0E-04
340	12.2E-04
345	16.3E-04
350	20.1E-04
355	23.6E-04
360	24.8E-04
365	25.1E-04
370	24.6E-04
375	20.6E-04
380	12.4E-04
385	5.5E-04
390	0.0E-04
...	...
680	0.0E-04
700	0.6E-04
710	1.5E-04
720	2.8E-04
730	5.0E-04
740	7.6E-04
750	7.6E-04
760	3.5E-04
770	1.8E-04
780	0.6E-04
790	0.3E-04
800	0.2E-04
850	0.8E-04
900	1.6E-04
950	1.9E-04
1000	1.6E-04
1050	1.1E-04
1100	0.8E-04
1150	0.2E-04

78-079C-02

SM 3

Reqd L

(SN) SED Amb Bkgr. SP fn
Background rad, spect fn

(SN) SED AmB. Bkgr. rad., SP. fn.

FILE 28

Last part of SED tape

PIONEER VENUS SOUNDER PROBE GAS CHROMATOGRAPH

VENUS LOWER ATMOSPHERE COMPOSITION

LGC

78-078D-04A

SAMPLE NO.	1		2		3	
GRT	18:58:09		19:07:39		19:18:09	
ALTITUDE*, KM	51.6		41.7		21.6	
PRESSURE, BARS	0.698	+-0.140 / +-0.017	2.91	+-0.17 / +-0.02	17.8	+-0.2 / +-0.02

GASES DETECTED	CONCENTRATION	+-3 SIGMA CONFIDENCE INTERVAL / +-1 SIGMA CONFIDENCE INTERVAL				
			%			
CARBON DIOXIDE	95.4	+-20.1 / +- 2.5	95.9	+-5.8 / +-0.7	96.4	+-1.0 / +-0.1
NITROGEN	4.6	+-0.14 / +-0.02	3.54	+-0.04 / +-0.005	3.41	+-0.01 / +-0.002
WATER	<0.06		0.519	+-0.068 / +-0.008	0.135	+-0.015 / +-0.002
			PPM			
OXYGEN	43.6	+-25.2 / +- 2.9	16.0	+-7.4 / +-0.9	-	

```


                            +-46.8                 +-13.6                +-2.3
 ARGON              60.5    ------         63.8    ------        67.2    -----
                            +- 5.5                 +- 1.6                +-0.3


                            +61.7-22.2             +-18.0                +-3.1
 CARBON MONOXIDE    32.2    ----------     30.2    ------        19.9    -----
                            +-7.2                  +- 2.1                +-0.4


                                                   +31.6-9.6             +5.54-3.91
 NEON               <8                     10.6    ---------     4.31    ----------
                                                   +-3.7                 +-0.65


                                                   +2000-0               +350-155
 SULFUR DIOXIDE    <600                    176     -------       185     --------
                                                   +296-0                +-43.1

 ------------------------------------------------------------------------------------
 UPPER LIMITS FOR
 UNDETECTED GASES               1                     2                     3

                                                     PPM
 ------------------------------------------------------------------------------------

 HYDROGEN                    <200                  < 70                  < 10

 METHANE                     < 10                  <  3                  <  0.6

 KRYPTON                     < 40                  < 10                  <  2

 ETHYLENE                    < 20                  <  7                  <  1

 ETHANE                      < 20                  <  7                  <  1

 HYDROGEN SULFIDE            < 40                  < 10                  <  2

 CARBONYL SULFIDE            < 40                  < 10                  <  2

 PROPANE                     < 90                  < 30                  <  5

 NITROUS OXIDE**             <200                  < 70                  < 10


  *INTERPOLATED FROM THE SOUNDER PROBE ATMOSPHERE STRUCTURE DATA (SEIFF, ET AL.).

 **OPTIMUM CASE, MAY BE CONSIDERABLY HIGHER UNDER SOME CIRCUMSTANCES.
LIS
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SED-002

File 1

(File 56)

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******** ******** ******** ******** ******** *******
BULLETIN SASIN2 CREATED: 06/12/81 10:51:02 BY ARCALL
******** ******** ******** ******** ******** ********
*
ATMOSPHERE STRUCTURE EXPERIMENT DATA TAKEN DURING ENTRY OF THE DAY AND NIGHT
PROBES (SMALL PROBES 2 AND 3) IN THE ALTITUDE RANGE FROM 137 KM TO 70 KM ARE
NOW ENTERED IN THE SED FILE, AS OF 6/12/81.  NARRATIVE ACCOMPANIES NIGHT
PROBE DATA.
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SBD-002
File 2

(File 57)

ATMOSPHERE STRUCTURE EXPERIMENT (LAS, SAS)

ALVIN SEIFF, PRINCIPAL INVESTIGATOR

DATA DERIVED FROM DECELERATIONS DURING ENTRY OF THE FOUR PIONEER VENUS PROBES INTO THE ATMOSPHERE OF VENUS.

1. LISTED POINTS CORRESPOND TO ACCELEROMETER SAMPLING TIMES.

2. ALL ALTITUDES ARE MEASURED RELATIVE TO THE 6052.0 KM RADIUS.

3. ATMOSPHERIC STATE PROPERTIES ARE GIVEN IN THE LAST THREE COLUMNS. DENSITY IS DERIVED FROM DECELERATION MEASUREMENTS; PRESSURE, FROM INTEGRATION OF MEASURED DENSITIES IN THE EQUATION OF HYDROSTATIC EQUILIBRIUM; AND TEMPERATURE FROM THE EQUATION OF STATE. SELECTED MEAN MOLECULAR WEIGHTS VARY WITH ALTITUDE, AND WERE DERIVED FROM ONMS AND BNMS DATA (SEIFF AND KIRK, 1981).

4. PROBE TRAJECTORY VARIABLES ARE GIVEN IN COLUMNS 3, 4, AND 5. PROBE VELOCITY, PATH ANGLE BELOW HORIZONTAL (GAM,DEG), AND ALTITUDE WERE CALCULATED FROM THE EQUATIONS OF MOTION AND THE MEASURED DECELERATIONS, STARTING FROM THE INITIAL VELOCITY AND PATH ANGLE AT ENTRY DETERMINED BY RADIO TRACKING PRIOR TO PROBE ENTRY. ALTITUDE AND VELOCITY AT MODE CHANGE FROM ENTRY TO DESCENT WERE CONSTRAINED TO MATCH ALTITUDE AND VELOCITY DERIVED FROM DESCENT MODE DATA. SMALL ADJUSTMENTS WERE MADE TO (A) THE TIME OF ENTRY AND (B) THE ACCELEROMETER SCALE-FACTOR RATIO ON THE 600G RANGE TO ACHIEVE THIS MATCH.

STATE PROPERTIES OF THE MIDDLE ATMOSPHERE OF VENUS

PIONEER VENUS NIGHT PROBE

THE ALTITUDE REFERENCE IS THE SOUNDER PROBE LANDING SITE AT 6052.0 KM, WHERE G = 8.8694 M/SEC**2

GRT(HR MIN) GRT(SEC) ALT(KM) V(KM/S) GAM(DEG) RHO(KG/M3) P(MB) T(DEGK)

(File 57) p.2

18 59.458	68367.48	137.1	11.583	-41.10	.688E-09	.246E-06	151.2
18 59.462	68367.73	135.2	11.585	-41.09	.127E-08	.399E-06	144.0
18 59.466	68367.98	133.3	11.586	-41.07	.232E-08	.683E-06	138.9
18 59.471	68368.23	131.4	11.587	-41.06	.379E-08	.116E-05	147.2
18 59.475	68368.48	129.5	11.589	-41.05	.741E-08	.204E-05	135.2
18 59.479	68368.73	127.6	11.590	-41.04	.134E-07	.366E-05	135.9
18 59.483	68368.98	125.7	11.592	-41.02	.273E-07	.683E-05	126.1
18 59.487	68369.23	123.8	11.593	-41.01	.535E-07	.131E-04	124.1
18 59.491	68369.48	121.9	11.594	-41.00	.113E-06	.260E-04	117.1
18 59.496	68369.73	120.0	11.596	-40.99	.231E-06	.529E-04	117.5
18 59.500*	68369.98	118.1	11.597	-40.97	.447E-06	.106E-03	122.0
18 59.504*	68370.23	116.2	11.598	-40.96	.827E-06	.207E-03	128.6
18 59.508	68370.48	114.3	11.600	-40.95	.150E-05	.390E-03	134.2
18 59.512	68370.73	112.4	11.601	-40.94	.263E-05	.718E-03	140.9
18 59.516	68370.98	110.5	11.602	-40.93	.442E-05	.128E-02	149.3
18 59.521	68371.23	108.6	11.603	-40.91	.809E-05	.227E-02	145.4
18 59.525	68371.48	106.7	11.603	-40.90	.130E-04	.395E-02	157.3
18 59.529	68371.73	104.8	11.603	-40.89	.213E-04	.669E-02	162.9
18 59.533	68371.98	102.9	11.602	-40.88	.351E-04	.112E-01	165.6
18 59.537*	68372.23	101.0	11.599	-40.86	.569E-04	.185E-01	169.1
18 59.541	68372.48	99.1	11.594	-40.85	.101E-03	.310E-01	160.2
18 59.546	68372.73	97.2	11.583	-40.84	.176E-03	.531E-01	156.9
18 59.550	68372.98	95.3	11.565	-40.83	.278E-03	.893E-01	167.2
18 59.554	68373.23	93.4	11.535	-40.81	.467E-03	.148E+00	165.5
18 59.558	68373.48	91.6	11.481	-40.80	.841E-03	.252E+00	156.3
18 59.562	68373.73	89.7	11.390	-40.79	.134E-02	.423E+00	165.3
18 59.566	68373.98	87.9	11.247	-40.78	.215E-02	.697E+00	169.3
18 59.571	68374.23	86.0	11.030	-40.77	.324E-02	.112E+01	180.0
18 59.575	68374.48	84.3	10.730	-40.76	.459E-02	.171E+01	194.4
18 59.579*	68374.73	82.5	10.325	-40.75	.664E-02	.253E+01	199.3
18 59.583*	68374.98	80.9	9.796	-40.74	.937E-02	.366E+01	204.2
18 59.587*	68375.23	79.3	9.143	-40.73	.129E-01	.513E+01	208.4
18 59.591*	68375.48	77.9	8.385	-40.73	.173E-01	.698E+01	211.5
18 59.596*	68375.73	76.6	7.544	-40.72	.231E-01	.923E+01	208.7
18 59.600*	68375.98	75.5	6.665	-40.72	.298E-01	.119E+02	208.5
18 59.604*	68376.23	74.4	5.815	-40.73	.365E-01	.148E+02	211.5
18 59.608*	68376.48	73.6	5.037	-40.74	.435E-01	.178E+02	214.4
18 59.612*	68376.73	72.8	4.357	-40.75	.496E-01	.209E+02	220.3
18 59.616	68376.98	72.1	3.787	-40.76	.545E-01	.239E+02	229.3
18 59.621	68377.23	71.9	3.308	-40.78	.601E-01	.268E+02	232.9

* INTERPOLATED ACCELERATION DATA