[redacted]

#504

VOYAGER 1

RADIO OCCULTATION BY SATURN'S RINGS

77-084A-02C

[redacted]

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 This inventory information is now no longer maintained in the DSCs, but is now managed in the inventory part of the NSSDC information system.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

VOYAGER 1

RADIO OCCULTATION-SATURN'S RINGS

77-084A-02C PSPA-00050

This data set has been restored. Originally there was one 9-track, 800 BPI tape, written in Binary. There is one restored tape. The original tape was created on an IBM 250A computer and was restored on an IBM 9021 computer. The DR tape is a 3480 cartridge and the DS tape is 9-track, 6250 BPI. The DR and DS number along with their corresponding D number and time span is as follows:

DR#	DS#	DD#	FILES	TIME SPAN
DR-005504	DS-005504	DD-056367	3	11/13/80

REQ. AGENT	REQ. NO.	ACQ. AGENT
DEW	V0179	WSC

VOYAGER 1

RADIO OCCULTATION BY SATURN'S RINGS

77-084A-02C

This data set catalog consists of 1 tape. The tape is 800 bpi, 9 track, with 3 files of data. The tape was created on a Data Eclipse S-250A computer. The D and C numbers are as follows:

D#	C#	Time Span
D-56367	C-23022	11/13/80

CENTER FOR RADAR ASTRONOMY

STANFORD UNIVERSITY
DEPARTMENT OF ELECTRICAL ENGINEERING
STANFORD, CALIFORNIA 94305

January 14, 1983

77-084A-02

National Space Science Data Center
NASA/Goddard Space Flight Center
Code 601
Greenbelt, Maryland 20771

RADIO OCCULTATION AT SATURN RINGS

Attn: Ralph Post

Under separate cover we are submitting to the NSSDC a tape containing results from the Voyager 1 Radio Occultation experiment at Saturn. The tape is identified as "Voyager 1 Radio Occultation by Saturns Rings," 800 BPI, 14 January 1983, 9 track. This tape constitutes a partial submission of radio science results from Saturn. Enclosed please find a copy of "Voyager 1 Radio Occultation by Saturn's Rings Archival Data Set," prepared by R.A. Simpson, 14 January, 1983, which describes the aforementioned tape and its contents in useful detail.

Questions regarding the status of Radio Science data for the NSSDC should be addressed to myself ((415) 497-3535), questions regarding the details of this tape or the documentation should be addressed to R.A. Simpson ((415) 497-3525).

Best regards,

Len Tyler

Len Tyler

ENC.

CENTER FOR RADAR ASTRONOMY

STANFORD UNIVERSITY
DEPARTMENT OF ELECTRICAL ENGINEERING
STANFORD, CALIFORNIA 94305

30 March 1983

National Space Science Data Center
NASA/Goddard Space Flight Center
Code 601
Greenbelt, MD 20771

77-084A-07C

Attn: Ralph Post

The archival data tape we sent (our letter of 14 January 1983) for the Voyager 1 Radio Occultation Experiment was improperly constructed. Although a valid data set in itself, it is not the data set described in the accompanying documentation.

Enclosed please find a replacement data tape and revised documentation.

Questions regarding the overall status of Radio Science data for Saturn should be addressed to Dr. G. Leonard Tyler, Principal Investigator, at the address above or at 415-497-3535.

Questions regarding this (or the previous) archival data set/tape should be directed to me (415-497-3525).

I apologize for the inconvenience this has caused. If you have records of those who have requested copies of our data set within the past two months, I would be glad to contact them to alert them to this error.

Yours truly,

R. A. Simpson

Richard A. Simpson
Senior Research Associate

enc.
cc: A. Collins
J. Cuzzi

Voyager Radio Science Experiment

Voyager 1

Radio Occultation by Saturn's Rings

Archival Data Set

Forwarded to NSSDC
14 January 1983
Revised: 22 March 1983

Prepared by: R.A. Simpson
Center for Radar Astronomy
Stanford Electronics Laboratories
Stanford University,
Stanford, CA 94305

415-497-3525

VOYAGER 1 RADIO OCCULTATION BY SATURN'S RINGS

Archival Data Set - Sent to NSSDC 24 March 1983

This tape contains reduced data from the Saturn's Rings Voyager 1 Radio Occultation Experiment, which was conducted on 13 November 1980 (Fig. 1). During the experiment the strength of the signals propagating through the rings at radio wavelengths 13 cm and 3.6 cm was measured. These tapes contain the amplitude measurements at each wavelength, supplementary information on experimental conditions and subsequent data reduction, and vectors defining the experimental geometry as reconstrcuted afterward.

This documentation includes a brief summary of the experiment, an outline of the data reduction, a description of the data record structure, and information on number conventions for the Data General Eclipse S-250A (on which this tape was generated).

The tape itself is 6250 ~~800~~-bpi, 9-track. Each physical record contains 600 16-bit words. Logical data are in a mixed format including 16-bit integers, 32-bit single precision floating point, 64-bit double precision floating point, and literal (8 bits per character, ASCII code).

Experiment

During the experiment the spacecraft telecommunications antenna was aimed directly toward earth. Telemetry modulation was suspended so that maximum transmitted power would appear at the carrier frequency. A highly stable on-board oscillator guaranteed maximum stability of this frequency during the Saturn encounter. Coherent transmissions, controlled by this oscillator, were made at 13 and 3.6 cm wavelengths. The transmitted signals had right circular polarization.

Signals were received on earth at the NASA Deep Space Network station near Madrid, Spain, using its 64-m diameter antenna (Fig. 2). Local oscillators at the station were driven from the same standard in each of four receivers so that coherence was maintained. Data were recorded from receivers at each wavelength using both left- and right-circular polarization. Only right-circular data are included here. An overall view of the experiment, including important equipment parameters, is given in Eshleman et al. ("Radio Science Investigations with Voyager," Space Science Reviews, 21, 2, 207-232, November 1977).

For more detailed information on the experiment and the data processing, the reader should consult the paper by G.L. Tyler et al. ("The Microwave Opacity of Saturn's Rings at Wavelengths of 3.6 and 13 cm from Voyager 1 Radio Occulation") in the special Voyager issue of Icarus (1983).

Data Reduction

Data were received at Stanford in the form of computer compatible tapes of 8-bit amplitude samples. Each of the four polarization/wavelength data sets was processed separately (Fig. 3). The sampling rate at 13 cm was 10^5 samples per second, corresponding to a bandwidth of 50 kHz; at 3.6 cm the sampling rate was $3\ 10^5$ samples/sec for a bandwidth of 150 kHz.

The data were digitally filtered and decimated to reduce the bandwidth and sampling rate. This was accomplished in steps, each being a factor of 8 reduction. Concurrently, the experimental geometry was reconstructed and drift of the signal (resulting from the relative motion of the spacecraft and receiving station, and small relativistic effects) was removed by a process of digital heterodyning.

From power spectra computed using successive time samples, the amplitude of the received signal was determined as a function of time using a fitting algorithm (program MBPOWERFIT2AP). The fitting procedure was constrained to the central frequency bin and the immediately adjacent two bins on either side; total number of points in the spectrum varied from 64 to 256, depending on signal-to-noise ratio. Frequency residuals were obtained during the same analysis and are included in the data on tape.

The Jet Propulsion Laboratory reconstructed the antenna pointing sequence. These data -- in conjunction with pre-flight antenna pattern measurements, the reconstructed observational geometry, and measurements of the system temperature for each receiver during the experiment -- may be used to estimate the expected signal amplitude at the receiver. These data have been included in the archival data set (program RINGDATAMERGE), but no corrections have been made. A simple subroutine (BEAM) to estimate antenna gain as a function of angle from boresite is appended to this documentation.

Data Description

Data included here is a composite set and closely approximates that published by Tyler et al. (1983). File 0 contains one record of identification data; file 1 contains 13 cm data, and file 2 contains 3.6 cm data. All physical records contain 300 integer words.

Integer words are 16-bit; unless otherwise indicated the term "word" will mean integer word in the descriptions which follow. Single precision floating point words are 32-bit and double precision floating point words are 64-bit. Negative numbers are represented as twos-complements of their positive values. Mantissa/exponent conventions are shown in the appended chart. Literal data are represented as 8-bit ASCII characters.

Except as noted:

1) vectors are in a heliocentric EME-1950.0 system,
2) vectors to and from planets are with respect to centers of mass,
3) linear dimensions are in meters,
4) angles are in degrees, and
4) time is in E.T. seconds from 1950.0 at the point where the event (e.g., emission, reception, intersection) occurs.

The "Saturn system" mentioned in the descriptions which follow uses the pole vector defined by the combined results of the Voyager radio and UVS occultations (Simpson *et al.*, *Bull. AAS*, *14*, p.731, 1982). In EME-1950.0 coordinates it is

$$\alpha_{50} = 38.429^0 \quad \delta_{50} = 83.324^0$$

The x-axis is toward the ascending node of the Saturn mean equator (of date) on the mean 1950.0 earth equator. A second Saturn system, based on the Sturms (F.M. Sturms, Jr., "Polynomial Expressions for Planetary Equators and Orbit Elements with Respect to the Mean 1950.0 Coordinate System," Technical Report 32-1508, Jet Propulsion Laboratory, Pasadena, CA, 1971) pole and equinox, is also used but only to obtain sub-intercept planetographic longitude λ (as per Desch and Kaiser, *Geophys. Res. Let.*, *8*, 253-256, 1981). Please refer to the attached figures for definitions.

The amount of integration required for a measurement is given in the table below; gaps in the table result from non-contiguity of data points or from inability to detect the signal. In most cases this can be inferred from the time spacing of the data records themselves.

	Radial Position (units of Saturn's Radius)	Integration Time (secs) (per data point)
File 1 (13 cm)	1.2200-1.5257	2.62
	1.5300-1.6400	10.49
	1.9483-2.0221	2.62
	2.0269-2.0340	10.49
	2.0500-2.2700	2.62
File 2 (3.6 cm)	1.2200-1.5257	0.22
	1.5420-1.6400	3.50
	1.9446-2.0269	0.22
	2.0269-2.0410	3.50
	2.0410-2.0453	0.22
	2.0453-2.0594	3.50
	2.0594-2.2700	0.22

NB: The version of this archival data set dated 14 January 1983 was mistakenly constructed using the "standard" Saturn pole adopted by the Voyager Project (namely, $\alpha_o = 38.554^0$ and $\delta_o = 83.316^0$), despite documentation to the contrary. The present version was constructed using an improved pole, which minimizes positional discrepancies between radio and UVS (Holberg *et al.*, *Nature*, 297, 115-120, 1982) occultation profiles.

DATA RECORDS

Numbering of words starts from 1. R indicates single precision floating point (real) word numbers (of which there are 300); D indicates double precision floating point word numbers (of which there are 150). Word numbers without prefixes are for integers (of which there are 600). MBPOWERFIT2AP is the program which generates the signal parameter estimates. RINGDATAMERGE adds geometrical factors, antenna pointing, and system temperature.

Word Number	Mnemonic	Description
MBPOWERFIT2AP estimates:		
R1	PKPWR	Peak power (negative values indicate failure to find peak)
R2	SDPWR	Standard deviation of peak power
R3	FPK	Frequency of peak
R4	SDFPK	Standard deviation of frequency of peak
R5	SIGMAX	Maximum signal
R6	PWRINT	Integrated power
R7	CORR	Correlation
R8	AVGN	Mean noise
R9	SDN	Standard deviation of noise
R10-R20		not used
System temperatures:		
R21	TSR	13 cm wavelength, right circular polarization
R22	TSL	left circular polarization
R23	TXR	3.5 cm wavelength, right circular polarization
R24	TXL	left circular polarization
Geometry at receive time:		
D13	t_R	Receive time, E.T. secs from 1950.0
53	DOYR	Receive time (UTC), day of year
54	HHR	hours
55	MIR	minutes
56	SSR	seconds
D15	DPDSR	fractional seconds
D16-D18	$\underline{r}_E$	Earth position
D19-D21	$\underline{v}_E$	Earth velocity
D22-D24	$\underline{r}_D$	DSS position
D25-D27	$\underline{v}_D$	DSS velocity
Geometry at transmit time:		
D28	t_T	Transmit time, E.T. secs from 1950.0
113	DOYT	Transmit time (UTC), day of year
114	HHT	hours
115	MIT	minutes
116	SST	seconds
D30	DPDST	fractional seconds
D31-D33	$\underline{r}_S$	Saturn position
D34-D36	$\underline{v}_S$	Saturn velocity
D37-D39	$\underline{r}_V$	Voyager position
D40-D42	$\underline{v}_V$	Voyager velocity
D43-D45	$\hat{u}_E$	High gain antenna boresite unit vector

Geometry at time of ray/ring-plane intersection:

D46	t_P	Intersection time, E.T. secs past 1950.0
185	DOYP	Intersection time (UTC), day of year
186	HHP	hours
187	MIP	minutes
188	SSP	seconds
189	DPDSP	fractional seconds
D49-D51	$\bar{r}_P'$	Intersection point position
D52-D54	$\bar{r}_P'$	Intersection point position in Saturn-centered, Saturn equator system
D55	$\lvert\bar{r}_P'\rvert$	Radial distance to intersection point (meters)
D56	$\lvert\bar{r}_P'\rvert$	(km)
D57	$\lvert\bar{r}_P'\rvert$	(Saturn radii)
D58	α_{P_1}	Azimuthal position of intersection point, in the Saturn equator from the ascending node on the EME50 equator
D59	α_{P_2}	Azimuthal position of intersection point, from the Saturn-earth line (see caption, Fig. 2)
D60	α_{P_3}	Azimuthal position of intersection point, from the Saturn-sun line (see caption, Fig. 2)
D61	λ	Longitude on Saturn of sub-intersection point, using Sturms frame and Desch and Kaiser (1981) rotation
245-299		not used
300	IOUTREC	Record number (on the original tapes; these will not be sequential on the archival tape)

DATA RECORD

INTEGER WORD NUMBER	1	2	3	4	5	6	7	8
0	R1 PKPWR		R2 SDPWR		R3 FPK		R4 SDFPK	
8	R5 SIGMAX		R6 PWRINT		R7 CORR		R8 AVGN	
16	R9 SDN							
24								
32								
40	R21 TSR		R22 TSL		R23 TXR		R24 TXL	
48	D13 t_R				DOYR	HHR	MIR	SSR
56	D15 DPDSR				D16 $\bar{r}_E$			
64	D17				D18			
72	D19 $\bar{V}_E$				D20			
80	D21				D22 $\bar{r}_D$			
88	D23				D24			
96	D25 $\bar{V}_D$				D26			
104	D27				D28 t_T			
112	DOYT	HHT	MIT	SST	D30 DPDST			
120	D31 $\bar{r}_S$				D32			
128	D33				D34 $\bar{V}_S$			
136	D35				D36			
144	D37 $\bar{r}_V$				D38			
152	D39				D40 $\bar{V}_V$			
160	D41				D42			
168	D43 $\hat{u}_B$				D44			
176	D45				D46 t_P			
184	DOYP	HHP	MIP	SSP	D48 DPDSP			
192	D49 $\bar{r}_P$				D50			
200	D51				D52 $\bar{r}_P'$			
208	D53				D54			
216	D55 $\lvert\bar{r}_P'\rvert$ (meters)				D56 $\lvert\bar{r}_P\rvert$ (km)			
224	D57 $\lvert\bar{r}_P'\rvert$ (Saturn radii)				D58 α_{P_1}			
232	D59 α_{P_2}				D60 α_{P_3}			
240	D61 λ							
248								
256								
264								
272								
280								
288								
296				IOUTREC				

FIGURES

1. Solar system geometry. Velocity vectors $\overline{v}_i$ may be associated with respective position vectors $\overline{r}_i$.

2. Simplified diagram of receiving/recording system at DSN station.

3. Simplified diagram of data processing system at Stanford.

4. Geometry at Saturn. The EME-1950.0 system is defined by unit vectors $\hat{u}_{x_{50}}$, $\hat{u}_{y_{50}}$, and $\hat{u}_{z_{50}}$. The Saturn mean equator coordinate system is defined by the Saturn pole $\hat{u}_{z_S}$ and by the ascending node of Saturn's equator on the earth mean equator of 1950.0 $\hat{u}_{x_S}$. Position of the ray intercept is given by $\overline{r}_P$ in heliocentric EME-1950.0 coordinates and by $\overline{r}_P'$ in Saturn mean equator coordinates. In the Saturn system, the ray intercept is also given by the radius $|\overline{r}_P|$ and azimuth α_{P_1}. If unit vectors $\hat{u}_E$ and $\hat{u}_S$ give the directions toward earth and the sun, respectively, then alternative definitions of the azimuthal position of the ray intercept (see text) become

$$\alpha_{P_2} = \alpha_{P_1} - \arctan\{(\hat{u}_E \cdot \hat{u}_{y_S})/(\hat{u}_E \cdot \hat{u}_{x_S})\}$$

and

$$\alpha_{P_3} = \alpha_{P_1} - \arctan\{(\hat{u}_S \cdot \hat{u}_{y_S})/(\hat{u}_S \cdot \hat{u}_{x_S})\}$$

The arctan functions are presumed to return values over the range 0-360°.

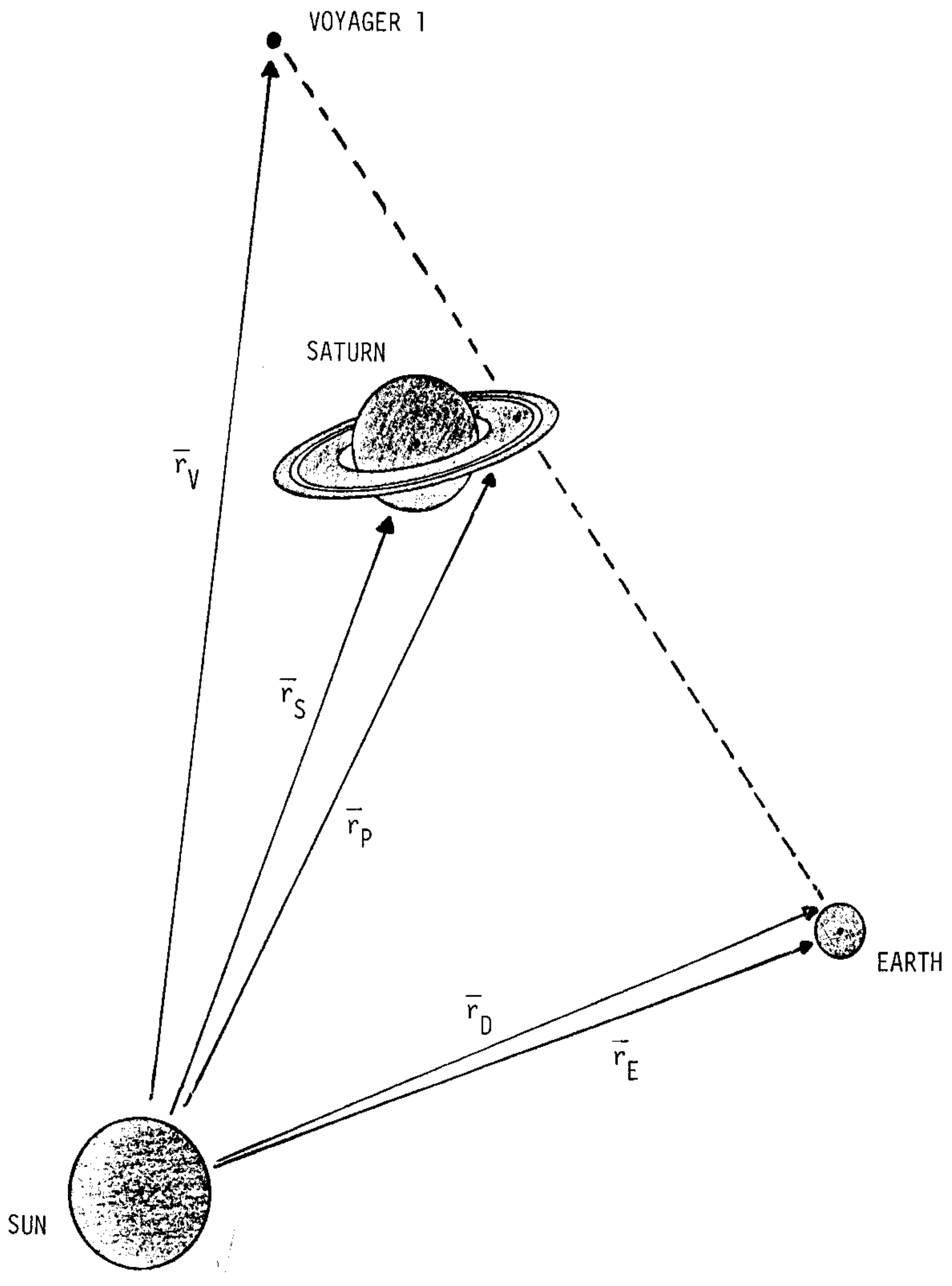


Figure 1

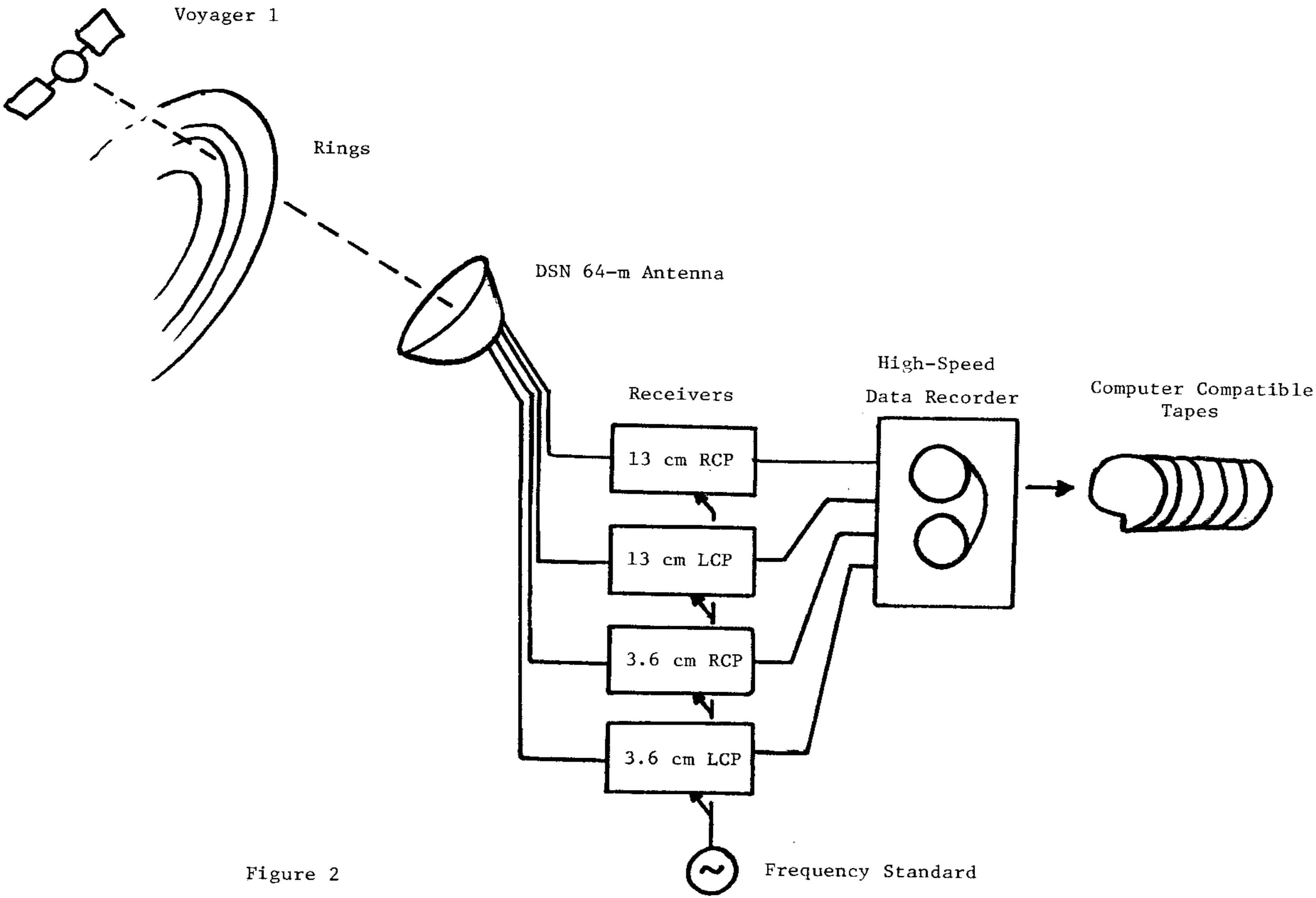

Voyager 1
Rings
DSN 64-m Antenna
Receivers
13 cm RCP
13 cm LCP
3.6 cm RCP
3.6 cm LCP
High-Speed
Data Recorder
Computer Compatible
Tapes
Frequency Standard

Figure 2

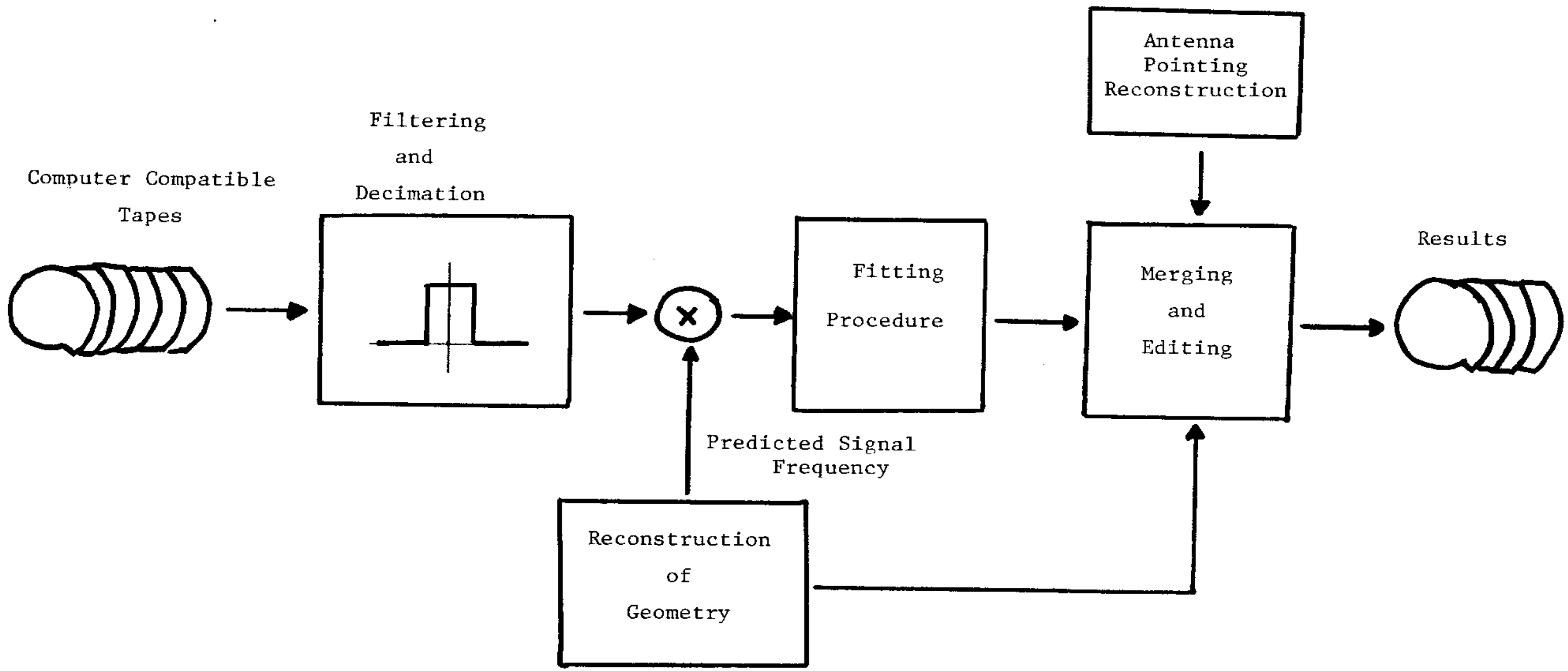

Antenna Pointing Reconstruction
Filtering and Decimation
Computer Compatible Tapes
Fitting Procedure
Merging and Editing
Results
Predicted Signal Frequency
Reconstruction of Geometry

Figure 3

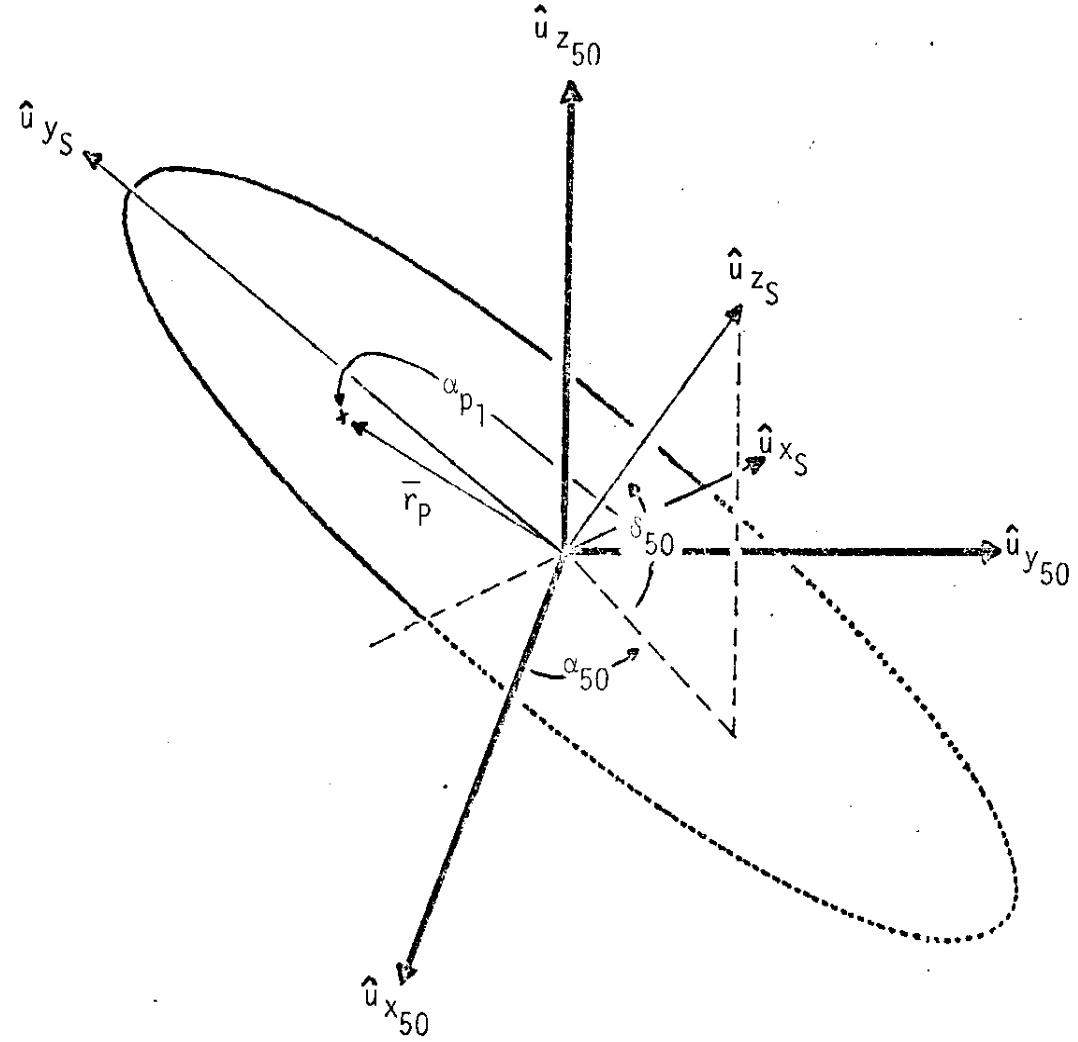

$\hat{u}_{z_{50}}$
$\hat{u}_{y_S}$
$\hat{u}_{z_S}$
α_{p_1}
$\hat{u}_{x_S}$
$\bar{r}_p$
δ_{50}
$\hat{u}_{y_{50}}$
α_{50}
$\hat{u}_{x_{50}}$

Figure 4

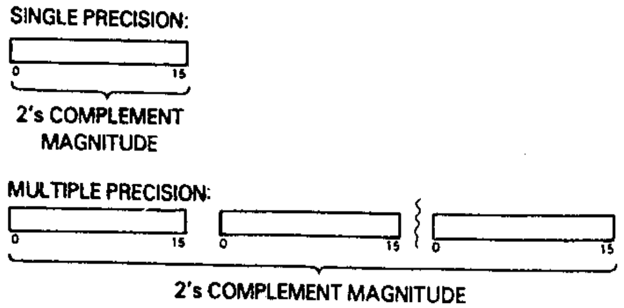
NUMBER CONVENTIONS

Integer Format

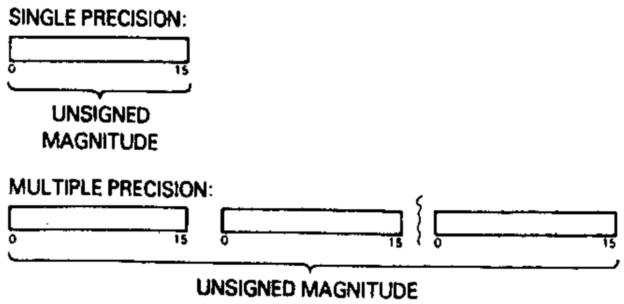
We represent a signed integer by a two's-complement number in one or more 16-bit words. The sign of the number is positive if bit 0 of the first word is 0 and negative if that bit is 1.

We represent an unsigned integer by using all the bits of one or more 16-bit words to represent the magnitude.

SIGNED INTEGERS



UNSIGNED INTEGERS



Single precision integers are one word (16 bits) long, and multiple precision integers are two or more words long. As an example, the table below shows the possible range of single and double precision numbers represented by this format:

	Single Precision	Double Precision
Unsigned	0 to 65,535	0 to 4,294,967,295
Signed	-32,768 to +32,767	-2,147,483,648 to +2,147,483,647

In addition, there is a *Carry* bit. A change in the value of the carry bit indicates a carry out during fixed point arithmetic operations.

Decimal Format

Unsigned decimal numbers are handled one decimal digit at a time. Each decimal digit is represented by bits 12-15 of a 16-bit word. Only the values $0\text{-}9_{16}$ are used; the carry bit is used for a decimal carry or borrow.

Logical Format

We represent logical entities as individual bits in a 16-bit word. Each bit is treated as a separate binary value. When two words are involved (logical AND or XOR, for example) only corresponding bits of each word interact. Examples of logical operations include:

- forming the logical AND of two words;
- forming the logical complement of a word;
- shifting the contents of a word left or right.

Floating Point Format

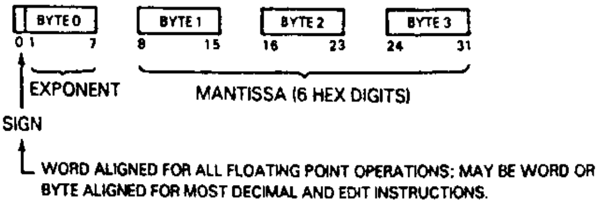
Word for word, floating point format provides a much larger range than integer format, at the expense of some precision. It also provides the ability to operate on fractions. The maximum range of floating point format is equivalent to a 16-word multiple precision integer. In addition, floating point operations are executed faster than most multiple precision integer operations.

We represent a floating point value using a 4-byte-wide (for single precision) or an 8-byte-wide (for double precision) number. The 4- or 8-byte aggregate contains 3 fields:

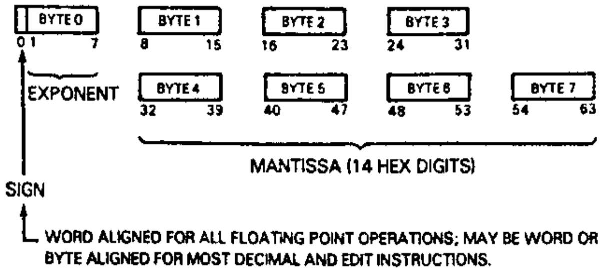
- a fractional part called the mantissa, which, at the end of all floating point mathematics operations, is always adjusted to be greater than or equal to 1/16 and less than 1 (i.e., *normalized*);
- an exponent, which is adjusted to maintain the correct value of the number;
- a sign.

Operations on numbers in memory employing the floating point arithmetic instructions require that the number be *word aligned*, that is, bit 0 of the first byte of the number is bit 0 of first word of a 2-word or 4-word area in memory. Certain operations on numbers in memory employing decimal or edit instructions allow the number to be either word aligned or *byte aligned*. Byte alignment means that bit 0 of the first byte of the number is either bit 0 or bit 8 of any word in memory.

SINGLE PRECISION (4 BYTES)



DOUBLE PRECISION (8 BYTES)



The magnitude of a floating point number is defined to be:

$$\text{MANTISSA X } 16^{\text{(TRUE VALUE OF THE EXPONENT)}}$$

We represent zero in floating point by a number with all bits zero, known as *true zero.* When a calculation results in a zero mantissa, the number is automatically converted to a true zero.

Sign

BIT 0 of the first byte is the sign bit. If the sign bit is 0, the number is positive. If the sign bit is 1, the number is negative.

Exponent

The right-most 7 bits of the first byte contain the exponent. We use *excess 64* representation. For both positive and negative exponents, the value is 64 greater than the true value of the exponent. The following table illustrates this:

EXPONENT FIELD	TRUE VALUE of EXPONENT
0	-64
64	0
127	63

Mantissa

Bytes 1-3 (single precision) or bytes 1-7 (double precision) contain the mantissa. By definition, the binary point lies *between* byte 0 and byte 1 of a floating point number. In order to keep the mantissa in the range of 1/16 to 1, the results of each floating point calculation are *normalized.* A mantissa is normalized by shifting it left one hex digit (4 bits) at a time, until the high-order four bits (the left-most four bits of byte 1) represent a nonzero quantity. For every hex digit shifted, the exponent is decreased by one.

NB: Negative integers are represented in two's complement. Negative floating point numbers are given in sign-magnitude form. This should be clear from a careful reading of the above, but at least one user has been misled.

RAS
2 March 83

APPENDIX

Subroutine BEAM

```
      FUNCTION BEAM(ANGLE,IBAND)
C
C FUNCTION RETURNS NORMALIZED GAIN AS A FUNCTION OF ANGLE   ANGLE   MEASURED
C   FROM THE VOYAGER SPACECRAFT TRANSMIT ANTENNA BORESITE. IF  ANGLE  IS
C   OUTSIDE THE MAIN LOBE,  -1.  IS RETURNED.   ANGLE IS IN RADIANS.
C   IBAND  IS  2HS  FOR S-BAND AND   2HX   FOR X-BAND.
C
      BEAM=-1.
      PI2=3.14159265/2.
      IF (IBAND.EQ.2HX ) THETA=102.73*ANGLE
      IF (IBAND.EQ.2HS ) THETA=28.02*ANGLE
      IF (ABS(THETA).GE.PI2) GO TO 90
      IF (IBAND.EQ.2HX ) BEAM=COS(THETA)**4.55
      IF (IBAND.EQ.2HS ) BEAM=COS(THETA)**3.47
   90 CONTINUE
      RETURN
      END
```

HEXADECIMAL DUMP OF FILE 1 AND FIRST 3 RECORDS OF FILE 2

```
    FILE    0        RECORD      0                   1200 (0480 HEX) BYTES    ASCII INTERPRETATION

0000      564F  5941  4745  5220  3120  5241  4449  4F20      VOYAGER 1 RADIO
0008      4F43  4355  4C54  4154  494F  4E20  4259  2053      OCCULTATION BY S
0010      4154  5552  4E53  2052  494E  4753  2E20  2020      ATURNS RINGS.
0018      2020  2020  2020  2020  2020  2020  2020  2020

                    *****  DUPLICATE OF ABOVE DATA  *****

0028      472E  204C  454F  4E41  5244  2054  594C  4552      G. LEONARD TYLER
0030      202D  2050  5249  4E43  4950  414C  2049  4E56       - PRINCIPAL INV
0038      4553  5449  4741  544F  522E  2020  2020  2020      ESTIGATOR.
0040      2020  2020  2020  2020  2020  2020  2020  2020

                    *****  DUPLICATE OF ABOVE DATA  *****

0050      4345  4E54  4552  2046  4F52  2052  4144  4152      CENTER FOR RADAR
0058      2041  5354  524F  4E4F  4D59  2E20  2020  2020       ASTRONOMY.
0060      2020  2020  2020  2020  2020  2020  2020  2020

                    *****  DUPLICATE OF ABOVE DATA  *****

0078      5354  414E  464F  5244  2045  4C45  4354  524F      STANFORD ELECTRO
0080      4E49  4353  204C  4142  4F52  4154  4F52  4945      NICS LABORATORIE
0088      532E  2020  2020  2020  2020  2020  2020  2020      S.
0090      2020  2020  2020  2020  2020  2020  2020  2020

                    *****  DUPLICATE OF ABOVE DATA  *****

00A0      5354  414E  464F  5244  2055  4E49  5645  5253      STANFORD UNIVERS
00A8      4954  592E  2020  2020  2020  2020  2020  2020      ITY.
00B0      2020  2020  2020  2020  2020  2020  2020  2020

                    *****  DUPLICATE OF ABOVE DATA  *****

00C8      5354  414E  464F  5244  2C20  4341  2020  3934      STANFORD, CA  94
00D0      3330  352E  2020  2020  2020  2020  2020  2020      305.
00D8      2020  2020  2020  2020  2020  2020  2020  2020

                    *****  DUPLICATE OF ABOVE DATA  *****

0250      2020  2020  0053  0003  0015  0010  0020  0009        .S........ ..

    FILE    1        RECORD      0                   1200 (0480 HEX) BYTES

0000      4256  0457  4114  860F  4250  D308  5E67  DFF7      BV.WA...BU..>G..
0008      4256  6C0F  4254  5070  CA5A  8F43  5F12  C863      BVL.BTPP.Z.C?..C
0010      3F13  0649  0000  0000  0000  0000  0000  0000      ?..I............
0018      0000  0000  0000  0000  0000  0000  0000  0000      ................

                    *****  DUPLICATE OF ABOVE DATA  *****

0028      421F  2500  4220  AC27  421F  5E26  4220  D066      B.%.B .'B.^&B .F
0030      485A  0F71  8270  AE78  013F  0004  002D  002B      HZ.Q.P.X.?....-.+
0038      4049  CF56  EAC6  0000  4A15  E673  E457  F050      @I.V....J..S.W.P
0040      4A1C  6A06  7A0F  6C95  49A9  5FF5  0867  F156      J.J.Z.L.I._..G.V
0048      C456  CA5F  E767  3C63  4443  73C3  08EA  CF59      .V._.G<CDCS...Y
0050      4410  40A0  8596  976B  4A15  E650  0629  09A9      D.@....kJ..P.)..
0058      4A16  6A47  6752  6907  49A9  65E5  67C0  2A5A      J.JG.Ri.I.e.g.*Z
```

```
0060    C450 0121 07EC 1ADA 4442 C93E 54C5 90AF    .J.!....0E.>I...
0068    4410 416E C1F6 E698 483A 0F5D 03E9 90A1    D.A.....H:.J....
0070    013E 0003 0012 0038 40DA 0E7F 0000 0000    .>......@.......
0078    C614 B0F4 9701 2F94 C9D4 E945 D000 C7CE    ....../....E....
0080    498C E9F6 838D 0F70 C510 926A 0498 55EE    I.......[......5.
0088    C422 F9A0 2E50 5D87 C3E6 A6D7 6366 C84F    ."...PJ.....C..O
0090    C614 6214 6E7A C61F C905 4877 F840 4E7C    ....Z.....H@.ML\
0098    498C EF66 32A7 5157 C42E 2800 287A 9916    I..H2.QW..+.&Z..
00A0    C450 D0F7 0F65 5360 4419 E513 9527 E330    .J...E3.D....'.0
00A8    40FE 93C7 8FAF 069C 401A F029 EEBF 0C19    @.........@..)....
00B0    3E0E 0CF3 5600 0879 483A 0F5D 04DA 0930    >...6..YH:.J...0
00B8    013E 0003 0012 0039 40A6 2A0E 16A2 0000    .>.....9@.*.....
00C0    C614 8109 9380 D845 C905 2EEC 7280 6DC7    ........E..+.R...
00C8    498C F0C0 8128 E907 C727 298F 6DF5 A833    I....(...')....3
00D0    473A 410A 85AE EDF2 E9E0 0000 0000 0000    G:A.E...........
00D8    4746 3265 840E 839E 4511 F866 71DA C16F    GF2C....E..RQ..0
00E0    4113 8566 3F22 AC91 4278 E905 40E1 383A    A..F?"..B...@.;:
00E8    42F6 8EFF 7598 DC06 42FA 1E45 3784 7AF3    B.N.X...B..E7.Z.
00F0    4269 16BE 90AC F000 0000 0000 0000 0060    B...............
00F8    0000 0000 0000 0000 0000 0000 0000 0000    ................

          *****  DUPLICATE OF ABOVE DATA  *****

0128    0000 0000 0000 00C8 2020 2020 2020 2020    ........
0130    2020 2020 2020 2020 2020 2020 2020 2020

          *****  DUPLICATE OF ABOVE DATA  *****

0250    2020 2020 0055 0003 0015 0010 0020 0009            .S....... ..

    FILE  1     RECORD    1              1200 (0400 HEX) BYTES

0000    4255 E78A 4115 9866 4230 D522 326C C675    BU..A..FBU.">L.U
0008    4255 9621 4255 9246 381C 07A2 3F17 6F8C    BU.!BS.L?...?.O.
0010    3F15 8669 0000 0000 0000 0000 0000 0000    ?...............
0018    0000 0000 0000 0000 0000 0000 0000 0000    ................

          *****  DUPLICATE OF ABOVE DATA  *****

0028    421F 2045 4220 AA34 421F 5C14 4220 CECC    B. EB .4B.\.B ..
0030    483A 0F71 8517 C52A 013E 0004 0028 0020    H:.Q...*.>...+.-
0038    40E8 E608 0733 0000 4A15 E672 F308 AF80    @....3..J..R....
0040    4A16 8A07 2AE1 F363 49A9 5FF9 D3A7 819E    J.J.*..CI.<-.....
0048    C458 CA42 7A63 E437 4443 73C0 85E2 EF78    .[.3Z..7DCS....x
0050    4410 409F 440E 5EE5 4A15 E64F 7258 80CF    D.@.D.^.J..ORL..
0058    4A18 8A48 3645 8830 49A9 83E8 5206 F23A    J.JH6E.0I.C.R..:
0060    C450 0118 42A2 95C5 4442 C92C 5851 D017    .J..B...DB,XQ..
0068    4410 4180 7A00 F000 483A 0F50 D688 88A6    D.A.Z...H:.J....
0070    013E 0003 0012 0038 4059 D964 0000 0000    .>......@Y......
0078    C614 D0F4 972C A1E5 C9D4 E948 6800 8546    ....../.....H..F
0080    498C E9F9 2ED7 1D24 C510 9269 459C 360D    I.......$...E.6.
0088    C422 F9A0 2028 D964 C3E6 A6D7 6AC5 981C    ."..-(.d....J...
0090    C614 6214 9600 4F7E C905 4887 5758 8605    ......O~..H.WX..
0098    498C EF6C 7075 46A6 C42E 2A11 0630 3EF7    I..LPVF...*..0>.
00A0    C450 00A8 06AD 5F14 4419 E50F 2046 C80C    .J...._.D... F..
00A8    40EE 9300 84D1 36F8 401A F088 FA6F 8F80    @.......6.@....o..
00B0    3EE1 8F7E 5C0E 7385 483A 0F50 0778 F732    >..~\.s.H:.J.x.2
00B8    013E 0003 0015 0000 404A 1810 151F 0000    .>......@J......
00C0    C614 8109 CD45 81FE C905 2C01 2877 7680    .....E....,.(wV.
00C8    498C F0C4 7E80 7EC1 C727 11A2 5D72 CEF5    I...~.~..'..]r..
```

```
00D0      473A  767C  412A  AE30  D960  0000  0000  0000     G:XNA*.0.@......
00D8      4746  5275  5262  2450  4512  00A0  9C42  1595     GFRSRBSPE.....0..
00E0      4115  6E50  69E6  88F7  4278  C002  0250  2216     A..P'....DL...F".
00E8      42F6  45FC  06E1  0151  42F9  F541  E9C6  F515     ..E.......A.....
00F0      4259  462E  02CF  4000  0000  0000  0000  0000     5.F.............
00F8      0000  0000  0000  0000  0000  0000  0000  0000     ................

                  *****  DUPLICATE OF ABOVE DATA  *****

0128      0000  0000  0000  0069  2020  2020  2020  2020     ........
0130      2020  2020  2020  2020  2020  2020  2020  2020

                  *****  DUPLICATE OF ABOVE DATA  *****

0250      2020  2020  0055  0005  0015  0010  0020  0009     .S........ ..

    FILE   1     RECORD    2              1200 (04B0 HEX) BYTES

0000      4255  1AE5  4115  7E9C  4230  D57E  5E00  7FE2     .U..A.I..0.I>...
0008      4255  2455  4252  C6DE  8612  7CA0  5F17  5F5C     .U.UB.....\.;.C.
0010      5F15  8689  0000  0000  0000  0000  0000  0000     ;...............
0018      0000  0000  0000  0000  0000  0000  0000  0000     ................

                  *****  DUPLICATE OF ABOVE DATA  *****

0028      421F  1861  4220  A642  421F  59FF  4220  C030     ....B ..B.Y.. ..
0030      463A  0F71  8766  06DB  013E  0004  0026  0030     F:.J.....>...+..
0038      4087  FC89  23A0  0000  4A15  E672  0519  0800     .....#....J..K...
0040      4A18  6A07  D8A4  59F0  49A9  5FFE  9E97  6F57     J.J...Y.I.←.....
0048      C45E  CA45  0E00  6ABE  4443  7560  9FDA  F085     .[.;....DCS.....
0050      4410  409E  0E66  2609  4A15  E64E  7E00  9C00     D.......J..T...
0058      4A18  6A46  E558  E384  49A9  63EC  FDED  6750     J.JH.X..I.C.....
0060      C450  0115  7C96  4845  4442  C91A  1C3E  F2C6     .J..\.HCDB...>..
0068      4410  416C  5205  6464  463A  0F50  D927  C3A6     D.A.R...F:.J.'..
0070      013E  0005  0015  0001  40F8  F469  0000  0000     .>..............
0078      C814  60F4  9758  1436  C904  E951  4600  4163     .....X.6....F.A.
0080      496C  E9F6  0222  5ACC  C310  9266  6690  4E64     I...."Z........
0088      C422  F9A0  2C01  5458  C3E6  A6D7  7060  6506     ."...,.TX....F.E.
0090      C614  6214  9D98  5DE6  C905  4696  B642  6A00     ......]...F..BJ.
0098      498C  EF70  AE43  0692  C42E  2922  1058  0F84     I..P.C....)".E..
00A0      C450  0056  FDCB  A238  4419  E30A  9C16  653C     .J.V....D.......K<
00A8      40FE  95E8  5478  5212  401A  F078  FFAC  8225     @...TXR.@....L...%
00B0      5EE5  773E  EA62  E509  463A  0F50  0A17  E553     ;.w>....F:.J....S
00B8      013E  0003  0013  0002  4029  0611  A867  0000     .>......@.......
00C0      C814  610A  0600  1DB0  C905  2C15  DE46  47F4     ...........,..FG.
00C8      498C  F4C6  70E5  7960  C726  F964  A04C  A86A     I...L.Y..&...L.J
00D0      473A  AF1E  049E  FF1B  3A1E  0000  0000  0000     G:......:.......
00D8      4746  72A6  DA95  A895  4512  060E  F047  1564     GFR.....E....G.D
00E0      4115  9743  20E0  6890  4278  9724  2060  837E     A..CL...BL..→..T
00E8      42F6  101E  0806  70FE  42F9  CC64  0568  1905     B.....P.B.....
00F0      4259  7558  036F  1000  0000  0000  0000  0000     B.UX.O..........
00F8      0000  0000  0000  0000  0000  0000  0000  0000     ................

                  *****  DUPLICATE OF ABOVE DATA  *****

0128      0000  0000  0000  00CA  2020  2020  2020  2020     ........
0130      2020  2020  2020  2020  2020  2020  2020  2020

                  *****  DUPLICATE OF ABOVE DATA  *****
```

-- PROGRAM NSSDC --

COPIES SELECTED SATURN RING OCCULTATION DATA FOR NSSDC ARCHIVE

VERSION OF 13 JAN 83 -- RAS

INPUT DATA SPECIFIED IN FILE: NSSDC.INPUTDATA
DATA COPIED AS FOLLOWS:

OUTPUT TAPE FILE: 0
VOYAGER 1 RADIO OCCULTATION BY SATURNS RINGS
G. LEONARD TYLER - PRINCIPAL INVESTIGATOR
CENTER FOR RADAR ASTRONOMY
STANFORD ELECTRONICS LABORATORIES
STANFORD UNIVERSITY
STANFORD, CA 94305

TODAY IS: 83: 3:21 16:32: 9

OUTPUT TAPE FILE: 1 X-BAND

INPUT FROM: TAPE	FILE	RANGE OF SATURN RADII		LAST OUTPUT RECORD
SCRA586	0	1.2200	1.3600	556
SCRA586	1	1.2200	1.5257	1396
SCRA586	3	1.5420	1.6400	1420
SCRA586	1	1.9446	2.0000	1579
SCRA586	2	1.9600	2.0269	1708
SCRA586	3	2.0269	2.0410	1709
SCRA586	2	2.0410	2.0453	1724
SCRA586	3	2.0453	2.0594	1727
SCRA586	2	2.0594	2.2700	2436

OUTPUT TAPE FILE: 2 S-BAND

INPUT FROM: TAPE	FILE	RANGE OF SATURN RADII		LAST OUTPUT RECORD
SCRA586	5	1.2200	1.5257	116
SCRA586	6	1.5300	1.6400	125
SCRA586	4	1.9485	2.0221	168
SCRA586	6	2.0269	2.0540	169
SCRA586	5	2.0500	2.2100	214
SCRA586	5	2.2180	2.2600	225
SCRA586	5	2.2674	2.2700	227

NB: Files 1 and 2 are reversed on the archival tape so that S-Band (13 cm) data precede X-Band (3.6 cm).

D56367
Voyager 1
77-084A-02C
11/13/80

DUMP OF TAPE DO-1

INPUT TAPE DO-1 ON TU1
DATA INPUT H9 NE 3 FL 3 1 1

FILE 1 RECORD 1 LENGTH 1200BYTES

(0)	564F5941	47455220	31205241	44494F20	4F434355	4C544154	494F4E20	42592053	41545552	4E532052
(40)	494E4753	00202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(80)	472E204C	454F4E41	52442054	594C4552	202D2050	52494E43	4950414C	20494E56	45535449	4741544F
(120)	52002020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(160)	43454E54	45522046	4F522052	41444152	20415354	524F4E4F	4D590020	20202020	20202020	20202020
(200)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(240)	5354414E	464F5244	20454C45	4354524F	4E494353	204C4142	4F524154	4F524945	53002020	20202020
(280)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(320)	5354414E	464F5244	20554E49	56455253	49545900	20202020	20202020	20202020	20202020	20202020
(360)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(400)	5354414E	464F5244	2C204341	20203934	33303500	20202020	20202020	20202020	20202020	20202020
(440)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(480)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(520)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(560)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(600)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(640)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(680)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(720)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(760)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(800)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(840)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(880)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(920)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(960)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1000)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1040)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1080)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1120)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1160)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	00530003	00150010	00200009

FILE	INPUT RECS.	DATA RECORDS INPUT	MAX. SIZE	READ ERROR SUMMARY PERM	ZERO B	SHORT	UNDEF.	INPUT RETRIES #RECS.	TOTAL#
1	1	1	1200	0	0	0	0	0	0

FILE 2 RECORD 1 LENGTH 1200BYTES

(0)	42568457	4114B6DF	4230D3D8	3E67DFF7	42566C6F	42545C70	BA5A8F43	3F12C863	3F13D649	00000000
(40)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(80)	421F2508	4220AC27	421F5E28	4220D068	483A0F71	B273AE78	013E0004	002B002B	4049CF56	EAC60000
(120)	4A15E673	E457E050	4A186A06	7ADF8C93	49A95FF5	08B7F186	C45BCA3F	F7673CB3	444373C3	6BEAEF59
(160)	441D40A0	8596976B	4A15E650	6629D9A9	4A186A47	873269D7	49A963E3	67C02A5A	C45D0121	07EC1ADA
(200)	4442C93E	54C59BAF	441D418E	C1FBF698	483A0F5D	D3F990A1	013E0003	00120032	40BABE7F	00000000
(240)	CB14B0F4	97012F94	C9D4E945	D000C7CE	498CE9FB	8B8BDF7B	C31092BA	049B35EE	C422F9A0	2E555D87
(280)	C3E6ABD7	6386C84F	CB14B214	8E7AC81F	C9D54877	F84D4C7C	498CEF68	32A75157	C42E2B00	267A9916
(320)	C45DD0F7	0F653380	4419E313	9527E330	40FE93C7	8FAFD69C	401AF029	EEBF0C19	3EDE0CF3	36D80879
(360)	483A0F5D	D4DA0930	013E0003	00120039	40AB2A0E	1BA20000	CB14B109	93B6DD45	C9D52BEC	725D8DC7
(400)	498CF0C0	8128B907	C727298F	BDF5A833	473A410A	65AEEDF2	B9E00000	00000000	47463263	B4BE839E
(440)	4511F86B	71DAC16E	41138566	3F22AC91	427BE9C5	4FE13B3A	42E66EFF	789BDC06	42FA1E45	37B47AF3
(480)	42B916DE	9BADF000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(520)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(560)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	000000C8
(600)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(640)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(680)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(720)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(760)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(800)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(840)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020

(880)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(920)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(960)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1000)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1040)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1080)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1120)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1160)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	00530003	00150010	00200009

FILE 2 RECORD 228 LENGTH 1200BYTES

(0)	425A6278	4119475D	4230D302	3E791C33	425A6EBC	4258608C	BB2653FE	3F197EF4	3F1C4710	00000000
(40)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(80)	421D85B2	421F65B7	421E2846	4220A4DC	483A0F75	2884A450	013E0004	003A0010	4055C52E	72D80000
(120)	4A15E536	2C32BBA0	4A186AEF	E93D148B	49A96648	CB63738F	C45BCDA6	48A11678	44436EEF	A2E32B57
(160)	441D3EF7	F78D36E8	4A15E50E	8DD5E640	4A186B2E	85D8C654	49A96A37	5CFFE75E	C45CF8DE	D44B0299
(200)	4442B1B3	115808A7	441D3EDD	3313DFEC	483A0F61	49EB670A	013E0003	0021002A	40CC87E8	00000003
(240)	CB14B0F4	D05C7143	C9D4F0D6	B5BE1376	498CE6DD	24BAB529	C31091BD	DE151BE8	C422F99E	A7F7B6AE
(280)	C3E6ABDF	F3C1D107	CB14B21E	6A2DBB28	C9D55CB8	2D1AD92D	498CF500	DECE602B	C42CFE54	58AB3CB5
(320)	C45D68CE	F432D668	4419D92B	24A88BC4	40FE8E2F	51AB6D49	401B23AC	398FD205	3EFFBF83	3FD88812
(360)	483A0F61	4AB04BB5	013E0003	0021002B	40816C93	00540000	CB14B155	89E41ECD	C9D5473C	B44C7CBD
(400)	498CF603	F4978ED5	C678F335	7683EBE1	47825A3F	F3C2DAAD	BA1E0000	00000000	47829250	CA5D24E0
(440)	45216D23	04B37E2C	41244E8C	BCB95EF2	425D51A7	DC13EB92	42D7D765	227D0699	42DB86D3	8ADFEA0B
(480)	42DFFECB	E1785000	00000000	00000000	00000000	00000000	00000000	00000005	00000000	00000000
(520)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(560)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	0000021A
(600)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(640)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(680)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(720)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(760)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(800)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(840)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(880)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(920)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(960)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1000)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1040)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1080)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1120)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1160)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	00530003	00150010	00200009

FILE	INPUT RECS.	DATA RECORDS INPUT	MAX. SIZE	READ ERROR SUMMARY PERM	ZERO B	SHORT	UNDEF.	INPUT RETRIES #RECS.	TOTAL#
2	228	229	1200	0	0	0	0	0	0

FILE 3 RECORD 1 LENGTH 1200BYTES

(0)	43199808	41591084	4292851F	3F46A38A	431997BF	43172AA1	3C3CDFE6	3F4D41A0	3F4D7B00	00000000
(40)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(80)	421F24CE	4220AC0F	421F5E0E	4220D055	483A0F71	B298933E	013E0004	002B002B	4069B41C	3EF90000
(120)	4A15E673	D8E86B70	4A186A06	8276D873	49A95EE5	43076AFE	C45BCA40	06BC93D6	444373C3	48A70A8F
(160)	441D40AC	764EAF0E	4A15E650	5A9399F1	4A186A47	8F847749	49A963E3	A2117EB3	C45D0120	C1B8848E
(200)	4442C93D	786ADBD7	441D418E	B2658E33	483A0F5D	D409829C	013E0003	00120038	40DAA37A	00000009
(240)	CB14B0F4	9703402C	C9D4E946	15B3F7FE	498CE9FB	6ECEBD2E	C31092B9	FB877673	C422F9A0	2E425227
(280)	C3E6ABD7	63D5B68C	CB14B214	8ED6D23B	C9D54878	B3517BAE	498CEE68	6641CB19	C42E2AF4	C8844DD3
(320)	C45DD0F3	4DD51863	4419E313	5F1F13F9	40FE93C7	15817346	401AF02D	1249D16F	3EDE37A7	4F801AED
(360)	483A0F5D	D4F9FC07	013E0003	00120039	40CB0CE5	7A600000	CB14B109	9673098B	C9D52BED	6E8769B2
(400)	498CF0C0	B1B34445	C727286C	A073D1B6	473A4473	1462C661	BA240000	00000000	474633E8	F6BF232B
(440)	4511F8CF	184150AE	411385D2	7EE18FAE	427BE711	6D4CB435	42F66D6B	A2D5BAA2	42EA1C51	6365103C
(480)	42B9191F	0D2E6000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(520)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(560)	00000000	00000000	00000000	00000000	00000000	00010000	00000000	00000000	00000000	0000095C
(600)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(640)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(680)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(720)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(760)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020

(800)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(840)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(880)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(920)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(960)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1000)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1040)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1080)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1120)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1160)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	00530003	00150010	00200009

FILE 3 RECORD 2439 LENGTH 1200BYTES

(0)	431D50F3	416220E3	4292873F	3F43E499	431D5F1A	431A7DC6	3C43FC6D	3F4BB670	3F521C78	00000000
(40)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(80)	421D8587	421F6567	421E27F7	4220A4FE	483A0F75	28DC75B9	013E0004	003A001D	40AD9697	6BBF0000
(120)	4A15E536	0CB4BEB0	4A186AF0	005F4750	49A96649	6BE89277	C45BCDA6	9EE26167	44436FEF	41C58138
(160)	441D3EF7	CD784922	4A15E5CE	6DF143DE	4A186B2E	9CB9B625	49A96A37	FD89F078	C45CF8DD	F2AAC9D2
(200)	4442B180	C5AEEF91	441D3EDD	080E30E6	483A0F61	4A53390A	013E0003	0021002B	402459E8	00000000
(240)	CB14B0F4	D0622063	C9D4F0D7	75B66E57	498CE6DC	D5991308	C31091BD	C517F955	C422F99E	A7D10227
(280)	C3E6ABDE	E49B0978	CB14B21E	6B24AED0	C9D55CBA	2DCE168D	498CF501	6CAE6743	C42CFE37	FB3B9C98
(320)	C45D68C4	AC01B8B9	4419D929	CC4B3AFD	40FE8E33	FD8FD80E	4E182389	73E38AE9	3EFEC246	83EF9708
(360)	483A0F61	4B0817CC	013E0003	0021002B	400938AA	7E010000	CB14B155	916AAC7F	C9D5473F	687EA7E1
(400)	498CF604	7A01FCC4	C678C115	742BE641	47826164	0FC3F939	B9A00000	00000000	47829943	733DDF18
(440)	45216EEA	5AE11E7C	4124517B	5DB4B789	4250501A	2A9A34FE	42D7D5D7	6AF91B40	42D88545	D763ABA5
(480)	42E0012C	8BBEF000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(520)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
(560)	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	000003B5
(600)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(640)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(680)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(720)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(760)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(800)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(840)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(880)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(920)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(960)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1000)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1040)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1080)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1120)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020	20202020
(1160)	20202020	20202020	20202020	20202020	20202020	20202020	20202020	00530003	00150010	00200009

FILE	INPUT RECS.	DATA RECORDS INPUT	MAX. SIZE	READ ERROR SUMMARY PERM	ZERO B	SHORT	UNDEF.	INPUT RETRIES #RECS.	TOTAL#
3	2439	2440	1200	1	0	0	0	0	0

EOJ DUMP STOPPED AFTER FILE 3 # OF PERMANENT READ ERRORS 1

START TIME 04/04/83 18:14:51 STOP TIME 04/04/83 18:16:09

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