#364

PIONEER 11

ENCOUNTER DATA SUMMARY, BINARY REDUCTION

AND INTERPLANETARY DATA SUMMARY

73-019A-05A, 05B + 05C

PIONEER 11

INTERPLANETARY DATA SUMMARY

73-019A-05C

This data set has been restored. There were originally 2 Binary 7-Track, 556 BPI tapes. There is one restored tape. The DR tape is a 3480 cartridge and the DS tape is 9-track, 6250 BPI. The tapes were created on a CDC 3600 computer. The DR and DS numbers along with the corresponding D numbers and the time spans are as follows:

DR#	DS#	D#	FILES	TIME SPAN
DR00846	DS00846	D31856	1	04/16/73 - 12/02/74
		D31857	2	12/03/74 - 05/31/77

Refer to 73-019A-05B

PIONEER 11

ENCOUNTER DATA SUMMARY

73-019A-05A

This data set has been restored. There were originally 4 Binary 7-Track, 556 BPI tapes. There is one restored tape. The DR tape is a 3480 cartridge and the DS tape is 9-track, 6250 BPI. The tapes were created on a CDC 3600 computer. The DR and DS numbers along with the corresponding D numbers and the time spans are as follows:

DR#	DS#	D#	FILES	TIME SPAN
DR00843	DS00843	D25186	1	11/25/74 - 11/29/74
		D25187	2	11/29/74 - 12/03/74
		D25188	3	12/03/74 - 12/07/74
		D25189	4	12/07/74 - 12/09/74

Refer to 73-019A-05B

PIONEER 11

ENCOUNTER BINARY REDUCTION

73-019A-05B

This data set has been restored. There was originally 1 Binary 7-Track, 556 BPI tape. There is one restored tape. The DR tape is a 3480 cartridge and the DS tape is 9-track, 6250 BPI. The tapes were created on a CDC 3600 computer. The DR and DS numbers along with the corresponding D number and the time spans are as follows:

DR#	DS#	D#	FILES	TIME SPAN
DR00844	DS00844	D25185	1	12/02/74 - 12/03/74

REQ. AGENT	RAND NO.	ACQ. AGENT
CAW	RC6736	LRD
VJP	RD1609	RWV

PIONEER 11

ENCOUNTER DATA SUMMARY, BINARY REDUCTION

AND INTERPLANETARY DATA SUMMARY

73-019A-05A, 05B + 05C

This data set consits of 4 Pioneer 11 05A, 1 Pioneer 11 05B and 2 Pioneer 11 05C data tapes. These tapes were created on the CDC 3600 computer. The tapes are 7 track, Binary, 556 BPI and have 1 file of data. The following tapes are listed below with their 'D' and 'C' numbers and time span.

73-019A-05A

D#	C#	TIME SPAN
D-25186	C-18552	11/25/74 - 11/29/74
D-25187	C-18553	11/29/74 - 12/03/74
D-25188	C-18554	12/03/74 - 12/07/74
D-25189	C-18555	12/07/74 - 12/09/74

73-019A-05B

D-25185	C-18556	12/02/74 - 12/03/74

73-019A-05C

D-31856	C-20349	4/16/73 - 12/02/74
D-31857	C-20350	12/03/74 - 5/31/77

4.0 UCSD/TRD DATA TAPES

The raw data tapes received at the laboratory are the EDR and EPH tapes, which are processed by our reduction program. The reduction program produces SUMMARY tapes which are described below, and BINARY REDUCTION tapes which contain each reading. The data are also fitted to a function of time and angle and the coefficients of this fit are given in the ANALYSIS tapes.

4.1 SUMMARY TAPES

4.1.1 Pioneer 10 Encounter Tape Contents

1 summary every commutation cycle (108 sec.)

TAPE	DATES	NO. of RECORDS
M44900	11-26-73	807
	11-27-73	+ 809 = 1616
	11-28-73	+ 807 = 2423
	11-29-73	+ 825 = 3248
M44901	11-30-73	814
	12-01-73	+ 828 = 1642
	12-02-73	+ 736 = 2378
	12-03-73	+ 806 = 3184
M44902	12-04-73	786
	12-05-73	+ 813 = 1599
	12-06-73	+ 866 = 2465
	12-07-73	+ 839 = 3304
M44903	12-08-73	814
	12-09-73	+ 809 = 1623
	12-10-73	+ 822 = 2445
	12-11-73	+ 815 = 3260
M44904	12-12-73	823
	12-13-73	+ 864 = 1687
	12-14-73	+ 831 = 2518
	12-15-73	+ 886 = 3404
M44905	12-16-73	858
	12-17-73	+ 834 = 1692
	12-18-73	+ 854 = 2546
	12-19-73	+ 813 = 3359

4.1.2 UCSD/TRD Pioneer Summary Tape Format

Pioneer summary tapes are single-file, multi-record tapes, written in odd parity on the CDC 3600. Each 300 word record contains one complete data summary, along with associated information. All numbers are written on the tape as positive binary integers. The tape format is as follows:
(tapes are 7-track, 556 bpi, 48 bit words)

Word Number	Name	Definition	Bias, Value or Units
1	SAT	Satellite Number	10 or 11
2	NFMOD	Mode of reduction: Earth traversal, Cruise or Jupiter Encounter	1-3
3	ISTART	Start time of summary	Cole time (ms) = 43,200,000 for Jan 1, 1972, 1200
4	ISTOP	Stop time of summary	Cole time (ms)
5	IDAY	Day of year	
6	IYR	4 digit year	
7	IDRTAP	5 digit name of EDR tape which produced the summary	
8	BRTAP	5 digit name of binary reduction tape associated with the summary	
9	IFF	1 digit code for data format, 1 = A, 2 = A/D, 3 = B, 4 = B/D	
10	IB	1 digit code for bit rate	1-8 . $[2^4, 2^5 \ldots 2^{11}$ (bits/sec)]
11	IBR(IB)	Bit rate as defined by IB	16-2048
12	RTLT	Round trip Light Time (for ISTART)	milliseconds
13	ICOMAL	Number of commutate alarms; currently unused (-2)	
14-16	PMIN(I),I=1,3	Minimum Pulse Temp., High Voltage Regulator current & Detector C Temp., respectively	PMIN(I)*1.E6+1.E8
17-19	PMAX(I),I=1,3	Maximum values of the above parameters	PMAX(I)*1.E6+1.E8
20-22	PAVE(I),I=1,3	Average values of the above I=2 not currently used.	PAVE(I)*1.E6+1.E8

PULSE DATA

Each parameter for pulse data can be sorted into one of 21 bins, depending on detector ID and high voltage status. Bins are labeled as follows:

I	Detector	I	Detector
1	C1	12	E3U
2	C2	13	M1H
3	C3	14	M2H
4	E1H	15	M3H
5	E2H	16	M1L
6	E3H	17	M2L
7	E1L	18	M3L
8	E2L	19	M1U
9	E3L	20	M2U
10	E1U	21	M3U
11	E2U		

Word Number	Name	Definition*	Bias
23-43	AVG(I)	Average number of counts/ reading	AVG(I)*1.E6
44-64	RMS(I)	RMS Deviation	RMS(I)*1.E6
65-85	RESMAX(I)	Maximum Residue	RESMAX(I)*1.E6+1.E8
86-106	RESMIN(I)	Minimum Residue	RESMIN(I)*1.E6+1.E8
107-127	NREAD(I)	Number of readings	None
128-148	NCOUNT(I)	Total counts	None
149-169	TOTIME(I)	Total time, in seconds	TOTIME*1.E6
170-190	AVGCR(I)	Average number of counts/ second	AVGCR(I)*1.E6
191-211	PROBER(I)	Probable Error (Counts/Second)	PROBER(I)*1.E10

* More extensive definitions are given at the end

ELECTROMETER DATA

Each parameter for electrometer data can be sorted into one of 6 bins, depending on detector ID. Bins are labeled as follows:

I	Detector
1	CDC
2	SEDC
3	SPDC
4	CAL1
5	CAL2
6	CAL3

Word Number	Name	Definition	Bias
212-217	AVG(I)	Average reading	AVG(I)*1.E6
218-223	RMS(I)	RMS Deviation(current)	RMS(I)*1.E18
224-229	RESMAX(I)	Maximum Residue(current)	RESMAX(I)*1.E6+1.E8
230-235	RESMIN(I)	Minimum Residue(current)	RESMIN(I)*1.E6+1.E8
236-241	AVGA(I)	Average Current	AVGA(I)*1.E18
242-247	EMAX(I)	Maximum Current	EMAX(I)*1.E18
248-253	EMIN(I)	Minimum Current	EMIN(I)*1.E18
254-259	MREAD(I)	Number of readings	None

TRAJECTORY DATA

Earth Traversal (NFMOD = 1)

Definitions are given alphabetically at the end

WORD NUMBER		NAME	
ISTART	ISTOP		
260	275	ATQCLT	
261	276	ATQLONG	
262	277	RADPE	
263	278	CLTPEE	
264	279	ALGPEE	
265	280	TLCPEE	
265-270 and 281-300		____	(SPARE)

TRAJECTORY DATA
Cruise (NFMOD = 2)

WORD NUMBER		NAME
ISTART	ISTOP	
260	275	ATCCLT
261	276	ATCLONG
262	277	RADPS
263	278	CLTPSC
264	279	ALGPSC
265	280	RADES
266	281	CLTESC
267	282	ALGESC
268	283	RADJS
269	284	CLTJSC
270	285	ALGJSC
286 - 300		____ (SPARE)

TRAJECTORY DATA

Jupiter Encounter (NFMOD = 3)

WORD NUMBER ISTART	WORD NUMBER ISTOP	NAME
260	275	ATCCLT
261	276	ATCLONG
262	277	RADPJ
263	278	CLTPJJ
264	279	ALGPJJ1R
265	280	TLCPJJ
266	281	RADPJM
267	282	CLTPJM
268	283	TLCPJM
269	284	B
270	285	EL
286	287	ALGPJJ3L
288-300		____ (SPARE)

Word 274 is RTLT corresponding to ISTOP

RESTART DATA

This information is written on the summary tape in order to provide the information necessary to restart the Pioneer data reduction program following any summary.

271	IREC	Physical record number in File 4 of EDR tape at ISTOP
272	NREC	Logical record number on binary reduction tape at ISTOP
273	ISREC	Physical record number on summary tape
274-300	---	Spare

OUTPUT FUNCTION DEFINITIONS

FUNCTION NAME	SYMBOL OR EQUATION	PRINTOUT ACCURACY	PRINTOUT RANGE
Average Count	$\overline{{}_jC}$	0.1%	10^{-4} to 10^{+9}
RMS Deviation	${}_j\sigma = \sqrt{\overline{{}_jC^2} - \left(\overline{{}_jC}\right)^2}$	0.1%	10^{-3} to 10^{+5}
Maximum Residue	$\dfrac{{}_jC_{max} - \overline{{}_jC}}{{}_j\sigma}$	1.0%	-99 to +99
Minimum Residue	$\dfrac{{}_jC_{min} - \overline{{}_jC}}{{}_j\sigma}$	1.0%	-99 to +99
Number of Readings	${}_jN$	Exact integer	0 to 99999
Total Counts	$\sum_{i=1}^{{}_jN} {}_jC_i$	0.1%	0 to 10^9
Total Time, Sec.	$\sum_{i=1}^{{}_jN} {}_jt_i$	½ sec.	0 to 99999.9
Average Count Rate, c/s	$\overline{{}_jCR}$	0.1%	10^{-4} to 10^{+7}
Probable Error, c/s	$\pm .6745 \sqrt{\Sigma_j C} / \Sigma\, t_i$	0.1%	10^{-4} to 10^{+4}

OTHER DEFINITIONS

PARAMETER NAME	MODE	PARAMETER	BODY	REF.POINT	REF.PLANE	UNITS
ALGESC	Traversal	Longitude	Earth	Sun	Ecliptic	-
ALGJSC	Cruise	"	Jupiter	Sun	"	Micro-radians
ALGPEE	Traversal	"	Pioneer S/C	Earth	Equator	"
ALGPJJ1R	Encounter	"	"	Jupiter	"	"
ALGPJJ3L	"	"	"	"	"	"
ALGPSC	Cruise	"	"	Sun	Ecliptic	"
ATCCLT	"	Colatitude	Spin Axis	Pioneer S/C	"	"
ATCCLT	Encounter	"	"	"	"	"
ATCLONG	Cruise	Longitude	"	"	"	"
ATCLONG	Encounter	"	"	"	"	"
ATQCLT	Traversal	Colatitude	"	"	E.Equator	"
ATQLONG	"	Longitude	"	"	"	"
B	Encounter	Magnetic Field D^2 Model (JGR 79, 3501, 1974)				Micro-gauss
CLTESC	Cruise	Colatitude	Earth	Sun	Ecliptic	Micro-radians
CLTJSC	"	"	Jupiter	Sun	"	"
CLTPEE	Traversal	"	Pioneer S/C	Earth	Equator	"
CLTPJJ	Encounter	"	"	Jupiter	"	"
CLTPJM	"	"	"	"	Mag.Equator	"
CLTPSC	Cruise	"	"	Sun	Ecliptic	"
EL	Encounter	L value - D2 Model (JGR 79, 3501, 1974)				Micro-radii
RADES	Cruise	Radius	Earth	Sun		Micro-AU
RADJS	"	"	Jupiter	Sun		"
RADPE	Traversal	"	Pioneer S/C	Earth		Micro-RE
RADPJ	Encounter	"	"	Jupiter		Micro-RJ
RADPJM	"	"	"	"	Mag.Equator	"
RADPS	Cruise	"	"	Sun		"
TLCPEE	Traversal	Local Time	"	Earth	Equator	Micro-hour
TLCPJJ	Encounter	"	"	Jupiter	"	"
TLCPJM	"	"	"	"	Mag.Equator	"

4.2 UCSD/TRD PIONEER 10 ANALYSIS TAPES

4.2.1 Analysis Tape Format

7 Tracks-even parity, 556 bpi

120 BCD characters per record (standard output tape)

CHARACTER	CORRESPONDING DATA	FORMAT	INTERPRETATION
1	----	1X	Blank space
2 - 3	IDA	I2	Detector Identification[1]
4 - 13	T(JC)	F10.5	Time in days + fraction 12:00 Jan. 1, 1972 = Day 1.5
14 - 23	CA(1)[2]	E10.3	Average counting rate D.C. Term[2]
24 - 33	CA(2)[2]	E10.3	Coefficient of SIN term of first harmonic[2]
34 - 43	CA(3)[2]	E10.3	Coefficient of COS term of first harmonic[2]
44 - 53	CA(4)[2]	E10.3	Coefficient of SIN term of second harmonic[2]
54 - 63	CA(5)[2]	E10.3	Coefficient of COS term of second harmonic[2]
64 - 73	CA(6)[2]	E10.3	Coefficient of SIN term of fourth harmonic[2]
74 - 83	CA(7)[2]	E10.3	Coefficient of COS term of fourth harmonic[2]
84 - 92	CA(8)[2]	E9.2	Coefficient of TIME term[2]
93 - 101	CA(9)[2]	E9.2	Coefficient of TIME squared term[2]
102 - 107	ERA	2PF6.1	RMS error[3]
108 - 110	NDAT	OPF3	Number of data points per fit[4]
111 - 113	NCOMCY	I3	Number of commutation cycles per fit
114 - 119	TW	5PF6	Full width of triangular weight function in days
120	"3"	1H3	Third generation of program

4.2.2 Analysis Tape Notes

1. The twelve files are in the following order:

FILE NUMBER	TRD CHANNEL	DETECTOR IDENTIFICATION	TIME INTERVAL IN COLE DAYS + FRACTION
1	M1	1	703.716-704.532
2	M2	2	703.810-704.466
3	M3	3	703.856-704.370
4	E1 (5)	4	702.774-705.950
5	E2	5	702.774-704.608
6	E3	6	702.773-704.600
7	C1	7	702.774-704.615
8	C2	8	702.774-704.590
9	C3	9	703.348-704.533
10	E1 - 2.6M1	4	703.716-704.532
11	E2 - 2.12M1	5	703.716-704.532
12	E3 - 1.12M1	6	703.716-704.532

2. The coefficients are connected to the data as follows:

Dead time corrected counting rate at time (T) = $CA(1) + CA(2)\ SIN\ \theta + CA(3)COS\ \theta$
$+ CA(4)\ SIN\ 2\theta + CA(5)COS\ 2\theta + CA(6)SIN\ 4\theta + CA(7)COS\ 4\theta$
$+ CA(8)(T-CT) + CA(9)(T-CT)^2 + error$

Where θ = azimuthal angle with respect to the closest approach to the direction of B.

And T = time in days + fraction, C T = time at which coefficients were calculated in cole days + fraction.

Day 703 on the Cole Calendar is December 3, 1973.

3. RMS error of square fit function with respect to data points.

4. Where data gaps exist, the number of data points per fit is reduced, resulting in a larger RMS error.

5. 2660 counts subtracted inbound, 3090 outbound, from channel E1 to account for power supply noise.

4.3 UCSD/TRD BINARY REDUCTION TAPES

The Binary Reduction Tapes (BRT's) are written in 7 track tape at 556 bits per inch by a CDC 3600 computer. All data are written as positive binary integers to facilitate decoding by different machines. (Padding and missing data are given negative values). The record length is 342 48-bit words, which is equivalent to 2736 six-bit characters.

4.3.1 BINARY TAPE FORMAT

	Earth Traversal (Launch)		Cruise		Encounter
1	TCOLE	1	TCOLE	1	TCOLE
2	IDV	2	IDV	2	IDV
3	CR	3	CR	3	CR
4	CRANGE	4	CRANGE	4	CRANGE
5	FLAGES	5	FLAGES	5	FLAGES
6	PP123	6	ANGSWP	6	PP123
7	PP456	7	ANGLS	7	PP456
8	ANGSWP	8	ANGLEC	8	ANGSWP
9	ANGLS	9	HCSXEC	9	ANGLS
10	HCSXEQ	10	HCSYEC	10	HCSXEC
11	HCSYEQ	11	HCSZEC	11	HCSYEC
12	HCSZEQ	12	ANGECLK	12	HCSZEC
13	ANGELOOK	.		13	BLOOKDEG (alias ANGELOOK)
14	ATQCLT	.		14	A.CCLT
15	ATQLONG	.		15	ATCLONG
16	SPNPD	289	TCOLE	16	SPNPD
17	ATFLAGS	290	RADPS	17	ATFLAGS
18	RADPE	291	CLTPSC	18	RADPJ
19	CLTPEE	292	ALGPSC	19	CLTPJJ
20	ALGPEE	293	RADES	20	ALGPJJIR (alias ALGPJJ)
21	TLCPEE	294	CLTESC	21	TLCPJJ
22	CLTPEC	295	ALGESC	22	CLTPJC
23	ALGPEC	296	RADJS	23	ALGPJC
24	ALGSEC	297	CLTJSC	24	ALGSJC
25	ANGD1SCE	298	ALGJSC	25	ANGD1SCJ
26	ANGSJP	299	ANGESP	26	ANGSJP
27	RADOOE	300	RTLT	27	RADPJN
28	CDCOOEE	301	ATCCLT	28	CLTPJN
29	RASOOEE	302	ATCLONG	29	TLCPJN
30	CLTONEC	303	SPNPD	30	ALGPJJ3L
31	ATOOOEC	304	ATFLAGS	31	ALGQJC
32	B	305	-2	32	B
33	L	306	-2	33	EL -alias L)
34	PHISV	.		34	PHISV

TRAVERSAL		CRUISE		ENCOUNTER	
35	RTLT			35	RTLT
36	FORM			36	FORM
37	BITR	336	PP123	37	BITR
38	SCNO	337	PP456	38	SCNO
39	STNO	338	FORM	39	STNO
40	ANGECLN	339	BITR	40	ANGECLN
41	-2	340	SCNO	41	-2
42	-2	341	STNO	42	-2
.		342	NFMOD	.	
.				.	
337	-2			337	-2
338	-2	12 words describe 1 data point.		338	-2
339	-2	24 data points per record.		339	-2
340	-2	Words 1-12 are repeated 24 times.		340	-2
341	-2			341	-2
342	NFMOD	18 words describe spacecraft position.		342	NFMOD
		Words 289-306 give the position for first data point in record.			
		Words 307-324 give the position for last data point in record.			
		Words 336 and 337 are averages over all data points in record.			
42 words describe 1 data point 8 data points per record. Words 1-42 are repeated 8 times.				42 words describe 1 data point. 8 data points per record. Words 1-42 are repeated 8 times.	

4.3.2 BINARY TAPE PARAMETER LIST

9/15/74

PARAMETER NAME	MODE	BINOUT POSITION	PARAMETER	BODY	REF. POINT	REF. PLANE	BINOUT UNITS	SOURCE	SOURCE UNITS	SOURCE LOCATION
ALCESC	* Traversal	Ref.	Longitude	Earth	Sun	Ecliptic	-	CELLNE or CELLNE + 360	Degrees	INTERP 7)
ALCESC	* Cruise	295	"	Earth	Sun	Ecliptic	Micro-radians	CELLNE	Degrees	INTERP 6)
ALCJSC	** Cruise	298	"	Jupiter	Sun	Ecliptic	"	ALTSJC + 180°	-	-
ALCOIC	Encounter	31	"	Io	Jupiter	Ecliptic	"	TBS	-	-
ALCOCEC	Traversal	31	"	Moon	Earth	Ecliptic	"	① DECOOEE, RASOOEE	-	-
ALCPEC	Traversal	23	"	Pioneer S/C	Earth	Ecliptic	"	② XCTPEC, YCTPEC, ZCTPEC	-	-
ALCPEE	Traversal	20	"	Pioneer S/C	Earth	Equator	"	EALONP	Degrees	INTERP 11)
ALCPJC	Encounter	23	"	Pioneer S/C	Jupiter	Ecliptic	"	③ XCPTJC, YCPTJC, ZCPTJC	-	-
ALCPJER	Encounter	20	"	Pioneer S/C	Jupiter	Equator	"	BILONP	Degrees	INTERP 3)
ALCPJSL	Encounter	30	"	Pioneer S/C	Jupiter	Equator	"			
ALCPSC	Cruise	292	"	Pioneer S/C	Sun	Ecliptic	"	CELLNP	Degrees	INTERP(4)
ALCSEC	Traversal	24	"	Sun	Earth	Ecliptic	"	ALCESC - 180°	-	-
ALCSJC	* Cruise	Ref.	"	Sun	Jupiter	Ecliptic	-	RASI	-	-
ALCSJC	* Encounter	24	"	Sun	Jupiter	Ecliptic	Micro-radians	RASI	-	-
ALLESC	Cruise	Ref.	Latitude	Earth	Sun	Ecliptic	-	CELLTE	Degrees	INTERP(5)
ALLJSC	Cruise	Ref.	"	Jupiter	Sun	Ecliptic	-	-ALTSJC	-	-
ALLOIC	Encounter	Ref.	"	Io	Jupiter	Ecliptic	-	TBS	-	-
ALLOIJ	Encounter	Ref.	"	Io	Jupiter	Equator	-	TBS	-	-
ALLPEE	Traversal	Ref.	"	Pioneer S/C	Earth	Equator	-	EALATP	Degrees	INTERP(10)
ALLPJJ	Encounter	Ref.	"	Pioneer S/C	Jupiter	Equator	-	BILATP	Degrees	INTERP(4)
ALLPSC	Cruise	Ref.	"	Pioneer S/C	Sun	Ecliptic	-	CELLTP	Degrees	INTERP(3)
ALLSJC	Cruise	Ref.	"	Sun	Jupiter	Ecliptic	-	DECS1	-	-
ANGBLOK	* Traversal	13	Angle between look vector and magnetic field				Micro-radians	TBS	-	-
ANGDISCE	Traversal	25	Ang. Semi diameter	Earth	Pioneer S/C		"	EASD	Degrees	INTERP(9)
ANGDISCJ	Encounter	25	Ang. Semi diameter	Jupitor	Pioneer S/C		"	ASASD	Degrees	INTERP(5)
ANGESP	Cruise	259	Earth/Sun/Spacecraft angle				"	ESPANG	Degrees	INTERP 11)
ANGLEC	Cruise	8	Angle between look vector and ecliptic plane				"	90° - ALEC	Radians	READ... 3)

BINARY TAPE PARAMETERS LIST

3/15/74

PARAMETER NAME	MODE	BINOUT POSITION	PARAMETER	BODY	REF.POINT	REF.PLANE	BINOUT UNITS	SOURCE	SOURCE UNITS	SOURCE LOCATION
ANGLS	* Traversal	9	Angle between look vector and sun vector				Micro-radians	ALS	Radians	READNG(5)
ANGLS	* Cruise	7	Angle between look vector and sun vector				"	ALS	Radians	READNG(5)
ANGLS	* Encounter	9	Angle between look vector and sun vector				"	ALS	Radians	READNG(9)
ANGSJP	* Traversal	26	Sun/Jupiter/Spacecraft angle				"	S5P	Degrees	INTERP(17)
ANGSJP	* Encounter	26	Sun/Jupiter/Spacecraft angle				"	S5P	Degrees	INTERP(6)
ANECLN	* Trav/Enc	40	Angle between look vector and ecliptic nadir of look vector (e.g: at asc node, = 90°)				"	SWPA	Radians	/SWPA/
ANGECLN	* Cruise	12	Angle between look vector and ecliptic nadir of look vector		"	"	"	SWPA	Radians	/SWPA/
ANGSWP	* Trav/Enc	8	Angular scan of look vector during data sample				"	ASW	Radians	READNG(6)
ANGSWP	* Cruise	6	Angular scan of look vector during data sample				"	ASW	Radians	READNG(6)
ATCCLT	* Cruise	301	Colatitude	Spin Axis	Pioneer S/C	Ecliptic	"	90° - ATCLAT	-	-
ATCCLT	* Encounter	14	Colatitude	Spin Axis	Pioneer S/C	Ecliptic	"	90° - ATCLAT	-	-
ATCLAT	* Cruise	Ref.	Latitude	Spin Axis	Pioneer S/C	Ecliptic	"	ATCLAT	Radians	/BROOM/
ATCLAT	* Encounter	Ref.	Latitude	Spin Axis	Pioneer S/C	Ecliptic	"	ATCLAT	Radians	/BROOM/
ATCLONG	* Cruise	302	Longitude	Spin Axis	Pioneer S/C	Ecliptic	"	ATCLNG	Radians	/BROOM/
ATCLONG	* Encounter	15	Longitude	Spin Axis	Pioneer S/C	Ecliptic	"	ATCLNG	Radians	/BROOM/
ATFLAGS	* Traversal	17	Attitude flags				(A)	(4) ISEC(1),AREF(KPOINT)	-	/EDR/,/ANGEL/
ATFLAGS	* Cruise	304	Attitude flags				(A)	(4) ISEC(1),AREF(KPOINT)	-	/EDR/,/ANGEL/
ATFLAGS	* Encounter	17	Attitude flags				(A)	(4) ISEC(1),AREF(KPOINT)	-	/EDR/,/ANGEL/
ATQCLT	Traversal	14	Colatitude	Spin Axis	Pioneer S/C	E.Equator	Mirero-radians	90° - ATQLAT	-	-
ATQLAT	Traversal	Ref.	Latitude	Spin Axis	Pioneer S/C	E.Equator	"	ATQDEC	Radians	/BROOM/
ATQLONG	Traversal	15	Longitude	Spin Axis	Pioneer S/C	E.Equator	"	ATQRASC	Radians	/BROOM/
B	* Traversal	32	Magnetic field				Micro-gauss	TBS	-	-
B	* Encounter	32	Magnetic field				Micro-gauss	TBS	-	-
BITR	* Traversal	37	Bit Rate				(1)	BR	$Seconds^{-1}$	IFIRST(7)
BITR	* Cruise	339	Bit Rate				(1)	BR	$Seconds^{-1}$	IFIRST(7)
BITR	* Encounter	37	Bit Rate				(1)	BR	$Seconds^{-1}$	IFIRST(7)
BLOOPTC	* Encounter	13	Angle between look vector and magnetic field				Micro-radians	TBS	-	-

BINARY TAPE PARAMETERS LIST

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PARAMETER NAME	MODE	BINOUT POSITION	PARAMETER	BODY	REF.POINT	REF.PLANE	BINOUT UNITS	SOURCE	SOURCE UNITS	SOURCE LOCATION
CDCOOEE	Traversal	28	Codeclination	Moon	Earth	Equator	Micro-Radians	90° - DECOOEE	-	-
CLTESC	Cruise	294	Colatitude	Earth	Sun	Ecliptic	"	90° - ALTESC	-	-
CLTJSC	** Cruise	297	Colatitude	Jupiter	Sun	Ecliptic	"	90° - ALTJSC	-	-
CLTOOEC	Traversal	30	Colatitude	Moon	Earth	Ecliptic	"	⑤ DECOOEE,RASOOEE	-	-
CLTPEC	Traversal	22	Colatitude	Pioneer S/C	Earth	Ecliptic	"	⑥ XCTPEC,YCTPEC,ZCTPEC	-	-
CLTPEE	Traversal	19	Colatitude	Pioneer S/C	Earth	Equator	"	90° - ALTPEE	-	-
CLTPJC	Encounter	22	Colatitude	Pioneer S/C	Jupiter	Ecliptic	"	⑦ XCTPJC,YCTPJC,ZCTPJC	-	-
CLTPJJ	Encounter	19	Colatitude	Pioneer S/C	Jupiter	Equator	"	90° - ALTPJJ	-	-
CLTPJM	Encounter	28	Colatitude	Pioneer S/C	Jupiter	Mag.Equator	"			
CLTPSC	Cruise	291	Colatitude	Pioneer S/C	Sun	Ecliptic	"	90° - ALTPSC	-	-
COSXEC	* Cruise	Ref.	X-direction cos.	Look Vector	Pioneer S/C	Ecliptic	±1	CSXEC	+1	/EROOM/
COSXEC	* Encounter	Ref.	X-direction cos.	Look Vector	Pioneer S/C	Ecliptic	"	CSXEC	"	/EROOM/
COSXEQ	Traversal	Ref.	X-direction cos.	Look Vector	Pioneer S/C	E.Equator	"	CSXEC	"	/EROOM/
COSYEC	* Cruise	Ref.	Y-direction cos.	Look Vector	Pioneer S/C	Ecliptic	"	CSYEC	"	/EROOM/
COSYEC	* Encounter	Ref.	Y-direction cos.	Look Vector	Pioneer S/C	Ecliptic	"	CSYEC	"	/EROOM/
COSYEQ	Traversal	Ref.	Y-direction cos.	Look Vector	Pioneer S/C	E.Equator	"	CSYEQ	"	/EROOM/
COSZEC	* Cruise	Ref.	Z-direction cos.	Look Vector	Pioneer S/C	Ecliptic	"	CSZEC	"	/EROOM/
COSZEC	* Encounter	Ref.	Z-direction cos.	Look Vector	Pioneer S/C	Ecliptic	"	CSZEC	"	/EROOM/
COSZEQ	Traversal	Ref.	Z-direction cos.	Look Vector	Pioneer S/C	E.Equator	-	CSZEQ	±	/EROOM/
CR	* Traversal	3	Count rate/Electrometer count				③	COUNTS	$Seconds^{-1}$	READ...3)
CR	* Cruise	3	Count rate/Electrometer count				③	COUNTS	$Seconds^{-1}$	READ...3)
CR	* Encounter	3	Count rate/Electrometer count				③	COUNTS	$Seconds^{-1}$	READ...3)
CRANGE	* Traversal	4	Encoder overflow/Electrometer range				⑧	RANG	0-1	IREAD(4)
CRANGE	* Cruise	4	Encoder overflow/Electrometer range				⑧	RANG	0-1	IREAD(4)
CRANGE	* Encounter	4	Encoder overflow/Electrometer range				⑧	RANG	0-1	IREAD(4)
DECOOEE	Traversal	Ref.	Declination	Moon	Earth	Equator	-	DECMOO	Degrees	INTERP(5)
DECS1	Cruise	Ref.	Latitude	Sun	Jupiter	Ecliptic	-	-HDEC5	-	-

BINARY TAPE PARAMETERS LIST

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PARAMETER NAME	MODE	BINOUT POSITION	PARAMETER	BODY	REF. POINT	REF. PLANE	BINOUT UNITS	SOURCE	SOURCE UNITS	SOURCE LOCATION
EL	* Traversal	33	L value				Micro-radii	TBS	-	-
EL	* Encounter	33	L value				Micro-radii	TBS	-	-
FLAGES	* Traversal	5	Data flags				©	FLAG	$0\text{-}7777_8$	IREAD 1)
FLAGES	* Cruise	5	Data flags				©	FLAG	$0\text{-}7777_8$	IREAD 1)
FLAGES	* Encounter	5	Data flags				©	FLAG	$0\text{-}7777_8$	IREAD 1)
FORM	* Traversal	36	Telemetry format				Ⓓ	FMT	A,A/D,B,B/D	IFIRST(9)
FORM	* Cruise	338	Telemetry format				Ⓓ	FMT	A,A/D,B,B/D	IF RS..9)
FORM	* Encounter	36	Telemetry format				Ⓓ	FMT	A,A/D B,B/D	IFIRST(9)
HDECS	Cruise	Ref.	Latitude	Jupiter	Sun	Ecliptic	-	HDECS	Degrees	I..ERP..)
HRS	Cruise	Ref.	Radius	Jupiter	Sun	Ecliptic	-	HRS	Kilometers	I..ERP 7)
HRAS	* Cruise	Ref.	Longitude	Jupiter	Sun	Ecliptic	-	HRAS	Degrees	I..ERP.9)
HRAS	* Encounter	Ref.	Longitude	Jupiter	Sun	Ecliptic	-	HRAS	Degrees	I..ERP.7)
HCSXEC	* Cruise	9	X-direction h.cos.	Look vector	Pioneer S/C	Ecliptic	$(0\text{-}2)*10^6$	1.-COSXEC	-	-
HCSXEC	* Encounter	10	X-direction h.cos.	Look vector	Pioneer S/C	Ecliptic	$(0\text{-}2)*10^6$	1.-COSXEC	-	-
HCSXEQ	Traversal	10	X-direction h.cos.	Look vector	Pioneer S/C	E.Equator	$(0\text{-}2)*10^6$	1.-COSXEQ	-	-
HCSYEC	* Cruise	10	Y-direction h.cos.	Look vector	Pioneer S/C	Ecliptic	$(0\text{-}2)*10^6$	1.-COSYEC	-	-
HCSYEC	* Encounter	11	Y-direction h.cos.	Look vector	Pioneer S/C	Ecliptic	$(0\text{-}2)*10^6$	1.-COSYEC	-	-
HCSYEQ	Traversal	11	Y-direction h.cos.	Look vector	Pioneer S/C	E.Equator	$(0\text{-}2)*10^6$	1.-COSYEQ	-	-
HCSZEC	* Cruise	11	Z-direction h.cos.	Look vector	Pioneer S/C	Ecliptic	$(0\text{-}2)*10^6$	1.-COSZEC	-	-
HCSZEC	* Encounter	12	Z-direction h.cos	Look vector	Pioneer S/C	Ecliptic	$(0\text{-}2)*10^6$	1.-COSZEC	-	-
HCSZEQ	Traversal	12	Z-direction h.cos	Look vector	Pioneer S/C	E. Equator	$(0\text{-}2)*10^6$	1.-COSZEQ	-	-
IDV	* Traversal	2	Detector ID/HV status				Ⓔ	Ⓢ IPP(13), IREAD(2)	0-1,1-16	/PP/./READ
IDV	* Cruise	2	Detector ID/HV status				Ⓔ	Ⓢ IPP(13),IREAD(2)	0-1,1-16	/PP/./READ
IDV	* Encounter	2	Detector ID/HV status				Ⓔ	Ⓢ IPP(13),IREAD(2)	0-1,1-16	/PP/./READ
NFMOD	* Traversal	342	Binary reduction tape format				Ⓕ	NFMOD	1-3	/CNTRL/
NFMOD	* Cruise	342	Binary reduction tape format				Ⓕ	NFMOD	1-3	/CNTRL/
NFMOD	* Encounter	342	Binary reduction tape format				Ⓕ	NFMOD	1-3	/CNTRL/

BINARY TAPE PARAMETERS LIST

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PARAMETER NAME	MODE	BINOUT POSITION	PARAMETER	BODY	REF. POINT	REF. PLANE	BINOUT UNITS		SOURCE	SOURCE UNITS	SOURCE LOCATION
PHINV	* Traversal	34	Adiabatic invariant for azimuth				TBS		TBS	-	-
PHINV	* Encounter	34	Adiabatic invariant for azimuth				TBS		TBS	-	-
PP123	* Traversal	6	Performance Parameters:	DC Bus voltage			Milli-volts	9	PP(1)	Volts	/PP/
				DC Bus current			Milli-amps	9	PP(3)	Amps	/PP/
				Platform Terperature			Deci-degrees	9	PP(5)	Degrees C	/PP/
PP123	* Cruise	336	Performance Parameters:	DC Bus voltage			Milli-volts	10	PP(1)	Volts	/PP/
				DC Bus current			Milli-amps	10	PP(3)	Amps	/PP/
				Platform temperature			Deci-degrees	10	PP(5)	Degrees C	/PP/
PP123	* Encounter	6	Performance Parameters:	DC Bus voltage			Milli-volts	9	PP(1)	Volts	/PP/
				DC Bus current			Milli-amps	9	PP(3)	Amps	/PP/
				Platform Temperature			Deci-degrees	9	PP(5)	Degrees C	/PP/
PP456	* Traversal	7	Performance Parameters:	Pulse Temperature			Deci-degrees	11	PP(7)	Degrees C	/PP/
				H.V.R.C.			10^{-8} amps	11	PP(9)	10^{-6} amps	/PP/
				Det. C Temperature			Deci-degrees	11	PP(11)	Degrees C	/PP/
PP456	* Cruise	337	Performance Parameters:	Pulse Temperature			Deci-degrees	12	PP(7)	Degrees C	/PP/
				H.V.R.C.			10^{-8} amps	12	PP(9)	10^{-6} amps	/PP/
				Det. C Temperature			Deci-degrees	12	PP(11)	Degrees C	/PP/
PP456	* Encounter	7	Performance Parameters:	Pulse Temperature			Deci-degrees	11	PP(7)	Degrees C	/PP/
				H.V.R.C.			10^{-8} amps	11	PP(9)	10^{-6} amps	/PP/
				Det. C Temperature			Deci-degrees	11	PP(11)	Degrees C	/PP/
RADES	+ Cruise	293	Radius	Earth	Sun		Micro-AU		REARSU	Km.	INTERP(10)
RADJS	+ Cruise	296	Radius	Jupiter	Sun		Micro-AU		RASI	-	-
RADMOE	+ Traversal	27	Radius	Moon	Earth		Micro-RE		REARMO	Km.	INTERP(3)
RADPE	+ Traversal	18	Radius	Pioneer S/C	Earth		Micro-RE		REARPR	Km.	INTERP(3)
RADPJ	+ Encounter	18	Radius	Pioneer S/C	Jupiter		Micro-RJ		RIMACR	Km.	INTERP(3)
RADPJM	Encounter	27	Radius	Pioneer S/C	Jupiter	Mag.Equator	Micro-RJ				
RAUPS	+ Cruise	290	Radius	Pioneer S/C	Sun		Micro-AU		NRANGP	Km.	INTERP(3)

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BINARY TAPE PARAMETERS LIST

PARAMETER NAME	MODE	BINOUT POSITION	PARAMETER	BODY	REF. POINT	REF. POINT	BINOUT UNITS	SOURCE	SOURCE UNITS	SOURCE LOCATION
RAS1	* Cruise	Ref.	Longitude	Sun	Jupiter	Ecliptic	-	HRAS-180°	-	-
RAS1	* Encounter	Ref.	Longitude	Sun	Jupiter	Ecliptic	-	HRAS-180°	-	-
RASCEE	Traversal	29	Right Asc.	Moon	Earth	Equator	Micro-radians	RTASCH	Degrees	IN.ERP(5)
RASPEE	Traversal	Ref.	Right Asc.	Pioneer S/C	Earth	Equator	-	RTASCP	Degrees	IN.ERP(5)
RASSEE	Traversal	Ref.	Right Asc.	Sun	Earth	Equator	-	RTASCS	Degrees	IN.ERP(5)
RS1	Cruise	Ref.	Distance to the Sun				-	HRS	-	-
RTLT	* Traversal	35	Round trip light time				Milli-seconds	RTLT	Milli-seconds	IFIRST(10)
RTLT	* Cruise	300	Round trip light time				"	RTLT	Milli-seconds	IFIRST(10)
RTLT	* Encounter	35	Round trip light time				"	RTLT	Milli-seconds	IFIRST(10)
SCNO	* Traversal	38	Spacecraft number				G	SAT	F or G	EDR File 1
SCNO	* Cruise	340	Spacecraft number				G	SAT	F or G	EDR File 1
SCNO	* Encounter	39	Spacecraft number				G	SAT	F or G	EDR File 1
SPNPD	* Traversal	16	Spin period				Micro-seconds	ASP	Seconds	Second(3)
SPNPD	* Cruise	303	Spin Period				"	ASP	Seconds	Second(3)
SPNPD	* Encounter	16	Spin Period				"	ASP	Seconds	Second(3)
STNO	* Traversal	39	Receiving station number				N	DSS	XXX_3	IFIRST(6)
STNO	* Cruise	341	Receiving station number				N	DSS	"	IFIRST(6)
STNO	* Encounter	39	Receiving station number				N	DSS	"	IFIRST(6)
TCOL	* Traversal	1	Cole Time				Milli-seconds	MSDATA	Milli-seconds	/CTIME/
TCOL	* Cruise	1	Cole Time				"	MSDATA	Milli-seconds	/CTIME/
TCOL	* Encounter	1	Cole Time				"	MSDATA	Milli-seconds	/CTIME/
TLCPEE	Traversal	21	Local Time	Pioneer S/C	Earth	Equator	Micro-hour	(13: RASPEE, RASSEE	-	-
TLCPJJ	Encounter	21	Local Time	Pioneer S/C	Jupiter	Equator	"	TBS	-	-
TLCPJM	Encounter	29	Local Time	Pioneer S/C	Jupiter	Mag.Equator	"			
XCTPEC	Traversal	Ref.	Cartesian X	Pioneer S/C	Earth	Ecliptic	-	XPGSFF	Km.	IN.ERP(13)
XCTPJC	Encounter	Ref.	Cartesian X	Pioneer S/C	Jupiter	Ecliptic	-	XP1SFF	Km.	IN.ERP(5)
YCTPEC	Traversal	Ref.	Cartesian Y	Pioneer S/C	Earth	Ecliptic	-	YPGSFF	Km.	IN.ERP(13)

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BINARY TAPE PARAMETERS LIST

PARAMETER NAME	MODE	BINOUT POSITION	PARAMETER	BODY	REF. POINT	REF. PLANE	BINOUT UNITS	SOURCE	SOURCE UNITS	SOURCE LOCATION
YCTPJC	Encounter	Ref.	Cartesian Y	Pioneer S/C	Jupiter	Ecliptic	-	YPISFF	Km.	INTERP(9)
ZCTPEC	Traversal	Ref.	Cartesian Z	Pioneer S/C	Earth	Ecliptic	-	ZPISFF	Km.	INTERP(15)
ZCTPJC	Encounter	Ref.	Cartesian Z	Pioneer S/C	Jupiter	Ecliptic	-	ZPISFF	Km.	INTERP(10)

** ALGJSC = ALGSJC + 180° = RAS1 + 180° = (HRA5 - 180°) + 180° = HRA5 = INTERP(9)

CLTJSC = 90° - ALTJSC = 90° - (- ALTSJC) = 90° - (- DECS1) = 90° - HDEC5 = 90° - INTERP(8)

* AU = 1.495985 × 10^{13} cm : Allen, Astrophysical Quantities, 1963.

RE = 6378.166 km. : ATS-E Orbit Tape Listing

RJ = 71372.0 km. :

* Caution: More than one entry exists under this name. Be sure you have selected the correct mode.

(1) ALCOOEC =
ATAN2 [CDSR * CW + SD * SW, CD * COS(RAS)] + PI
CDSR = CD * SR
CD = COS (DEC)
SD = SIN (DEC)
SR = SIN (RAS)
DEC = DECOOEE * FACTOR
RAS = RASOOEE * FACTOR
FACTOR = radians/degree = π/180. = 0.1745329
CW = COS (23°) = 0.917060093
SW = SIN (23°) = 0.398749015

(2) ALCTEC =
$\text{ACOS}\left|\text{XCTPEC/SQRT}\left[\text{XCTPEC}^2 + \text{YCTPEC}^2\right]\right| + \text{FAC}$
FAC = 0. or π

(3) ALCPJC =
$\text{ACOS}\left|\text{XCTPJC/SQRT}\left[\text{XCTPJC}^2 + \text{YCTPJC}^2\right]\right| + \text{FAC}$
FAC = 0. or π

(4) ATFLAGS =
RSHIFT [ATTFLGS, 18] .OR. LSHIFT [AREF + 2,6]
ATTFLGS = ISEC(1)
AREF = AREF (KPOINT)

(5) CLTOOEC =
π/2 - ASIN (SD * CW - CDSR * SW)
See ALCOOEC above

(6) CLTPEC =
$\text{ACOS}\left|\text{ZCTPEC/SQRT}\left[\text{XCTPEC}^2 + \text{YCTPEC}^2 + \text{ZCTPEC}^2\right]\right|$

(7) CLTPJC =
$\text{ACOS}\left|\text{ZCTPJC/SQRT}\left[\text{XCTPJC}^2 + \text{YCTPJC}^2 + \text{ZCTPJC}^2\right]\right|$

(8) IDW =
HVSTAT .OR. ID
HVSTAT = LSHIFT [IPP(13), 5]
ID = IREAD(2) + 1

(9) PP123 =
P1 .OR. P2 .OR. P3
P1 = LSHIFT [PP(1) * 1000., 32] and PP(1) = DC Bus Voltage
P2 = LSHIFT [PP(3) * 1000., 16] and PP(3) = DC Bus Current
P3 = PP(5) * 10. and PP(5) = Platform Temperature

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(10) PP123 = P1 .OR. P2 .OR. P3
P1 = LSHIFT [(PP1/CNT1) * 1000. , 32]
P2 = LSHIFT [(PP2/CNT2) * 1000. , 16]
P3 = (PP3/CNT3) * 10. + 1000.
PP1 = Running sum of good values of PP(1)
PP2 = Running sum of good values of PP(3)
PP3 = Running sum of good values of PP(5)
CNT1 = Counter for good values of PP(1)
CNT2 = Counter for good values of PP(3)
CNT3 = Counter for good values of PP(5)
PP(1) = DC Bus Voltage
PP(3) = DC Bus Current
PP(5) = Platform Temperature

(11) PP456 = P4 .OR. P5 .OR. P6
P4 = LSHIFT [PP(7) * 10. , 32] and PP(7) = Pulse Temp.
P5 = LSHIFT [PP(9) * 100. , 16] and PP(9) = H.V.R.C.
P6 = PP(11) * 10. and PP(11) = Det. C Temp.

(12) PP456 = P4 .OR. P5 .OR. P6
P4 = LSHIFT [(PP4/CNT4) * 10. + 1000. , 32]
P5 = LSHIFT [(PP5/CNT5) * 100. , 16]
P6 = (PP6/CNT6) * 10. + 1000.
PP4 = Running sum of good values of PP(7)
PP5 = Running sum of good values of PP(9)
PP6 = Running sum of good values of PP(11)
CNT4 = Counter for good values of PP(7)
CNT5 = Counter for good values of PP(9)
CNT6 = Counter for good values of PP(11)
PP(7) = Pulse Temp.
PP(9) = H.V.R.C.
PP(11) = Det. C Temp.

(13) TLCPEE = AMOD [(RASPEE - RASSEE + 540.) , 360.] / 15

Ⓐ ISEC(1) = ATTFLGS = ARIPPHEC, ASPNPDC, RAT, SPF = FLAG4, FLAG3, FLAG2, FLAG1
AREF (KPOINT) = AREF = AREFSELS
ATTFLAGS = ATTFLGS, AREFLSELS

ATTFLGS: 00 = ok
01 = old value
10 = value missing
11 = corrected value

AREFSELS: 00 = Error
01 = Star
10 = Sun B
11 = Sun A

FLAG4	FLAG3	FLAG2	FLAG1	AREF	Binary ATTFLAGS	Octal ATTFLAGS	Decimal ATTFLAGS
00	00	00	00	00	Any combination	0	0
01	01	01	01	01	of any five	↓	↓
10	10	10	10	10	binary numbers		
11	11	11	11	11	across the table	03 03 03 03 03	51130563

ATTFLAGS will range thus, without biasing :

0_2 = $00001100001100001100001100001100001100_2$

0_8 = 0303030303_8

0_{10} = 51130563_{10}

Ⓑ CRANGE = 0 : No overflow/low range

= 1 : Overflow/high range

Overflow refers to pulse data
Range refers to electrometer data

FLAGES :

BITS	ID	MEANING
1 - 2	DQ	Data quality as given on EDR tape. See DQ below.
3	P	Data or padded as given on EDR tape: 0 = data, 1 = fill
4	SCID	Discontinuity in SCID: 1 = yes, 0 = no
5	GMT	Discontinuity in Time: 1 = yes, 0 = no
6	TCF	Time correction flag as given on EDR tape. 1 = suspect, 0 = no correction
7		
8		
9		
10		Average value used
11		Reconstructed by average method
12		Word reconstructed by bit rate

DQ : 00 = Data is bad, no sync
01 = At least 2 indicators bad, data is suspect
10 = At least 1 indicator bad, data is suspect
11 = Data is good, all indicators good

BITS:	12	11	10	9	8	7	6	5	4	3	2	1
Value	0	0	0	0	0	0	0	0	0	0	0	0
	1	1	1	1	1	1	1	1	1	1	1	1

FLAGES will range thus:

$0_2 = 111111111111_2$

$0_8 = 7777_8$

$0_{10} = 4095_{10}$

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(D) FORM:

Format	Value
A	1
A/D	2
B	3
B/D	4
Illegal	5

FORM will thus range:

$1_{10} - 5_{10}$

(E) IDV:

Type Data:	Unbiased Value	Biased Value
CDC	0	1
SEDC	1	2
SFDC	2	3
-	3	4
C1	4	5
E1L	5	6
M1L	6	7
CAL1	7	8
C2	8	9
E2L	9	10
M2L	10	11
CAL2	11	12
C3	12	13
E3L	13	14

Type Data:	Unbiased Value	Biased Value
M3L	14	15
CAL3	15	16
E1H	16	17
E1U	17	18
M1H	18	19
M1U	19	20
E2H	20	21
E2U	21	22
M2H	22	23
M2U	23	24
E3H	24	25
E3U	25	26
M3H	26	27
M3U	27	28

IDV thus ranges after a +1 bias:

$1_{10} - 28_{10}$

$1_8 - 34_8$

$1_2 - 011100_2$

Bits:	5	4	3	2	1
Value:	0	0	0	0	0
	1	1	1	1	1

(F) MFMOD = 1 ; Earth Traversal

2 ; Interplanetary Cruise

3 ; Jupiter Encounter

(G) SCNO = 10_{10} = 12_8 ; Pioneer-10 = 10

= 11_{10} = 13_8 ; Pioneer-11 = 11

(H) STNO:

Name	Source Code	$STNO_{10}$	$STNO_2$	$STNO_8$
DSS 11	051	11	00001011	13
DSS 12	351	12	00001100	14
DSS 14	031	14	00001110	16
DSS 21	153	21	00010101	25
DSS 27, DSN Simulation Center (SIMCEN)	023	27	00011011	31
DSS 41	211	41	00101001	51
DSS 42	111	42	00101010	52
DSS 51	026	51	00110011	63
DSS 61	326	61	00111101	75
DSS 62	166	62	00111110	76
DSS 70, Cape Building AO	106	70	01000110	106
DSS 71	046	71	01000111	107
DSS 90, Merritt Island MSFN (MIL)	100	90	01011010	132
DSS 91, USNS Vanguard MSFN (VAN)	112	91	01011011	133
DSS 92, Bermuda MSFN (BDA)	114	92	01011100	134
DSS 93, Ascension MSFN (ACN)	117	93	01011101	135
DSS 94, Canary Island MSFN (CYI)	121	94	01011110	136
DSS 99, Boulder, Colorado	200	99	01100011	143
DSS 00, SFOF 1	310	0	00000000	0

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(I) BITR:

Bits/Second	Value Biased	Value Unbiased
16	1	0
32	2	1
64	3	2
128	4	3
256	5	4
512	6	5
1024	7	6
2048	8	7

The binary tape contains the unbiased value.

(J) CR: Count Rate = Counts/kilosecond

Electrometer Count = $* 10^3$

(K) Right-handed System I longitude as carried on JPL ephemeris tape.

(L) Left-handed System III longitude (I.A.U. definition), in Micro-radians.

READING, IREAD

1	FLAG	Int.
2	ID	Int.
3	COUNTS	Real
4	RANG	Int.
5	TIME	Int.
6	ASW	Real
7	ALEC	Real
8	ALS	Real
9	ACEL or AGLO	Real
10	Empty or AGLA	Real

FIRST, IFIRST

1	GMT	Int.
2	DAY	Int.
3	COLE TIME	Int.
4	TCP	Int.
5	SNR	Real
6	DSS	Int.
7	BR	Int.
8	MOD	Int.
9	FMT	Int.
10	RTLT	Int.
11	ESC	Int.
12	ACCT	Real
13	IPFT	Int.
14	NREDUN	Int.
15	NCOM	Int.
16	IADD	Int.

SECOND, ISEC

1	ATTFLGS	Int.
2	RAT	Real
3	ASP	Real
4	SPF	Int.
5	ARIPHC	Real
6	GMT112	Int.
7	C124	Int.
8	GMT124	Int.
9	C431	Int.

```
COMMON/ANGEL/IFLAG(3), RAT(3), ASP(3), ISPF(3), ARIPH(3), C112(3), AREF(3), ASTD(3), KPOINT
COMMON/BROOM/ATQDEC, ATQRASC, ATCLAT, ATCLNG, CSXEC, CSYEC, CSZEC, CZYEQ, CSZEQ
COMMON/CNTRL/SAT, TYPE, RSTRT1, EDRTAP, EDRSNO, NFMOD, TRJA, TRJB
COMMON/CTIME/MSDATA
COMMON/EDR/FIRST(36), SECOND(18), ARRAY(224), IPOINT, ICHG, KDEC, NREADS, NSCID, JPOINT, JCHG
COMMON/FP/FP(14)
COMMON/READNG/READNG(128), NTRIES, DTIME
```

INTERP (TRJDAT)

Traversal: Position	Source ID	Array TRAJ Origin	PC 262.04 Tape Parameter #
1	VICDAT	8	3
2	REARPR	34	11
3	REARMO	52	17
4	RTASCP	40	13
5	RTASCS	49	16
6	RTASCM	58	19
7	CELLNE	79	26
8	DECMOO	55	18
9	EASD	460	153
10	EALATP	181	60
11	EALONP	184	61
12	SSP	445	148
13	XPCSFF	97	32
14	YPCSFF	100	33
15	ZPCSFF	103	34
16	HOURAN	325	108
17	CELLTP	70	23
18	CELLNP	73	24

Cruise: Position	Source ID	Array TRAJ Origin	PC 262.04 Tape Parameter #
1	VICDAT	8	3
2	NRANGP	61	30
3	CELLTP	70	23
4	CELLNP	73	24
5	CELLTE	76	25
6	CELLNE	79	26
7	NRS	418	139
8	NDECS	415	138
9	NRAS	412	137
10	REARSU	43	14
11	ESPANG	256	85

Encounter: Position	Source ID	Array TRAJ Origin	PC 262.04 Tape Parameter #
1	VICDAT	8	3
2	BIMAGR	169	56
3	BILONP	199	66
4	BILATP	196	65
5	ASASD	469	156
6	SSP	445	148
7	NRAS	412	137
8	XPISFF	133	44
9	YPISFF	136	45
10	ZPISFF	139	46

Word in TRAJ = Tape Parameter * 3 + 1 after parameter 4

3/13/74

PP, IPP

1	DC Bus Voltage	Real
2	# in sum PP(1)	Int.
3	DC Bus Current	Real
4	# in sum PP(3)	Int.
5	Platform Temperature	Real
6	# in sum PP(5)	Int.
7	Pulse Temperature	Real
8	# in sum PP(7)	Int.
9	HVRC	Real
10	# in sum PP(9)	Int.
11	Det. C Temprature	Real
12	# in sum PP(11)	Int.
13	HV	Int.
14	# in sum PP(13)	Int.

PIONEER 11 BRT (x-372-373)

73-019A-05B DUPE OF D-25186

12/02/74 - 12/03/74

DAY 336

```
$JOB  14:45:58
$ASS IN MS5 SI TY
$EXEC DPOCT7 BS
 INPUT TAPE ON MS5
 DATA INPUT   1 3 3  1066,771742
  FILE  1      RECORD   1      LENGTH   2736 BYTES
```

(0)	000125665703	306300000000	000000320000	000017665310	000000000000	000000000000	000000033321	141365602102
(48)	000000470400	000000000000	030132720000	000006706772	000000000273	223700000000	015220260000	000000626644
(96)	000000001024	237000000000	057234510000	000012460346	000000005526	322200000000	000000050000	000037106613
(144)	000000000776	022300000000	017603400000	000035452316	000000000766	735600000000	070432510000	000013264620
(192)	000000000035	770200000000	044234560000	000037370315	000000001026	051000000000	371377450000	000027606650
(240)	777777777777	777500000000	000246140000	000057241570	777777777777	777500000000	224675700000	000000000004
(288)	000000000000	000700000000	000000130000	000000000016	000000001637	276077777777	777777757777	777777777775
(336)	000125665703	601600000000	000000320000	000016734326	000000000000	000000000000	000000033321	141365602102
(384)	000000470400	000000000000	030132720000	000007302651	000000000235	166100000000	002173050000	000003264154
(432)	000000001134	520700000000	057234510000	000012460346	000000005526	322200000000	000000050000	000037105731
(480)	000000000776	024400000000	017577030000	000035450213	000000000766	737700000000	070432250000	000013264620
(528)	000000000035	771100000000	044235020000	000037367436	000000001026	060600000000	371356120000	000027607305
(576)	777777777777	777500000000	000246160000	000057242447	777777777777	777500000000	224675700000	000000000004
(624)	000000000000	000700000000	000000130000	000000000016	000000002140	625377777777	777777757777	777777777775
(672)	000125665704	075100000000	000000320000	000017677640	000000000000	000000000000	000000033321	141365602102
(720)	000000470400	000000000000	030132720000	000007014044	000000000262	733200000000	010023440000	000006136537
(768)	000000001010	456200000000	057234510000	000012460346	000000005526	322200000000	000000050000	000037105050
(816)	000000000776	026500000000	017572450000	000035455073	000000000766	741700000000	070432010000	000013264620
(864)	000000000035	771700000000	044235270000	000037366560	000000001026	070200000000	371424070000	000027607733
(912)	777777777777	777500000000	000246200000	000057243300	777777777777	777500000000	224675700000	000000000004
(960)	000000000000	000700000000	000000130000	000000000016	000000002442	154677777777	777777757777	777777777775
(1008)	000125665704	370500000000	000000330000	000000000000	000000000000	000000000000	000000033321	141365602102
(1056)	010534154140	207000000000	030132720000	000006041022	000000000357	403200000000	033171540000	000007466452
(1104)	000000000565	755200000000	057234510000	000012460346	000000005526	322200000000	000000050000	000037104166
(1152)	000000000776	030600000000	017566100000	000035452770	000000000766	744000000000	070431550000	000013264620
(1200)	000000000035	772600000000	044235540000	000037365701	000000001026	077700000000	371402530000	000027610371
(1248)	777777777777	777500000000	000246230000	000057244157	777777777777	777500000000	224675700000	000000000004
(1296)	000000000000	000700000000	000000130000	000000000016	000000002743	606177777777	777777757777	777777777775
(1344)	000125665705	006100000000	000000030000	000000135600	000000000000	000000000000	000000033321	141365602102
(1392)	010534154140	207000000000	001471630000	000004610450	000000000501	161400000000	066702010000	000005612716
(1440)	000000000267	332000000000	057234510000	000012460346	000000005526	322200000000	000000050000	000037103007
(1488)	000000000776	033600000000	017557550000	000035447731	000000000766	747000000000	070431200000	000013264620
(1536)	000000000035	773700000000	044236120000	000037364526	000000001026	112700000000	371351470000	000027611223
(1584)	777777777777	777500000000	000246260000	000057245332	777777777777	777500000000	224675700000	000000000004
(1632)	000000000000	000700000000	000000130000	000000000016	000000000373	764077777777	777777757777	777777777775
(1680)	000125665705	301500000000	000000030000	000000133630	000000000000	000000000000	000000033321	141365602102
(1728)	010534154140	207000000000	001471630000	000004526337	000000000507	111100000000	072130730000	000002666233
(1776)	000000000272	534200000000	057234510000	000012460346	000000005526	322200000000	000000050000	000037102125
(1824)	000000000776	035700000000	017553200000	000035454610	000000000766	751000000000	070430740000	000013264620
(1872)	000000000035	774600000000	044236370000	000037363647	000000001026	122300000000	371417430000	000027611651
(1920)	777777777777	777500000000	000246300000	000057246163	777777777777	777500000000	224675700000	000000000004
(1968)	000000000000	000700000000	000000130000	000000000016	000000000675	415377777777	777777757777	777777777775
(2016)	000125665705	575200000000	000000030000	000000135600	000000000000	000000000000	000000033321	141365602102
(2064)	010534154140	207000000000	001471630000	000005277345	000000000433	420200000000	054756110000	000000405660
(2112)	000000000471	474100000000	057234510000	000012460346	000000005526	322200000000	000000050000	000037101243
(2160)	000000000776	040000000000	017546620000	000035452504	000000000766	753100000000	070430500000	000013264620
(2208)	000000000035	775400000000	044236640000	000037362770	000000001026	132000000000	371376070000	000027612306
(2256)	777777777777	777500000000	000246320000	000057247042	777777777777	777500000000	224675700000	000000000004
(2304)	000000000000	000700000000	000000130000	000000000016	000000001177	150777777777	777777757777	777777777775
(2352)	000125665706	070600000000	000000030000	000000135600	000000000000	000000000000	000000033321	141365602102
(2400)	010534154140	207000000000	001471630000	000006331771	000000000330	344700000000	027112450000	000000106653
(2448)	000000000720	313600000000	057234510000	000012460346	000000005526	322200000000	000000050000	000037100362
(2496)	000000000776	042000000000	017542240000	000035450401	000000000766	755100000000	070430240000	000013264620
(2544)	000000000035	776300000000	044237110000	000037362112	000000001026	141500000000	371354530000	000027612744
(2592)	777777777777	777500000000	000246340000	000057247720	777777777777	777500000000	224675700000	000000000004
(2640)	000000000000	000700000000	000000130000	000000000016	000000001500	602277777777	777777757777	777777777775
(2688)	777777777777	777577777777	777777757777	777777777775	777777777777	777577777777	777777750000	000000000003

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 FILE  1      RECORD   2      LENGTH   2736 BYTES
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(1152)	000000000277	011000000000	201721630000	000061531562	000000000303	460400000000	273441060000	000013266661
(1200)	000000000024	315100000000	030177310000	000055400320	000000000305	277500000000	642603330000	000011126016
(1248)	777777777777	777500000000	000074510000	000126774333	777777777777	777500000000	225051010000	000000000004
(1296)	000000000000	000700000000	000000130000	000000000077	000000000135	045177777777	777777757777	777777777775
(1344)	000125721245	762500000000	000000030000	000000421340	000000000000	000000000000	000000033321	141415002102
(1392)	010534161720	207000000000	001471560000	000004536354	000000000506	145600000000	070565060000	000005223722
(1440)	000000000475	070000000000	057225630000	000012460524	000000005526	552600000000	000000050000	000055551572
(1488)	000000000277	011500000000	201715330000	000061536467	000000000303	461100000000	273441240000	000013266661
(1536)	000000000024	314600000000	030177210000	000055401103	000000000305	272000000000	642652340000	000011126436
(1584)	777777777777	777500000000	000074510000	000127001540	777777777777	777500000000	225051010000	000000000004
(1632)	000000000000	000700000000	000000130000	000000000077	000000000436	464377777777	777777757777	777777777775
(1680)	000125721246	256200000000	000000030000	000000415420	000000000000	000000000000	000000033321	141415002102
(1728)	010534161720	207000000000	001471560000	000004575651	000000000502	375400000000	070722630000	000002257215
(1776)	000000000412	747600000000	057225630000	000012460524	000000005526	552600000000	000000050000	000055552374
(1824)	000000000277	012200000000	201711030000	000061534410	000000000303	461600000000	273441420000	000013266661
(1872)	000000000024	314300000000	030177100000	000055401665	000000000305	264100000000	642632400000	000011127066
(1920)	777777777777	777500000000	000074510000	000127007046	777777777777	777500000000	225051010000	000000000004
(1968)	000000000000	000700000000	000000130000	000000000077	000000000740	205577777777	777777757777	777777777775
(2016)	000125721246	551600000000	000000030000	000000415420	000000000000	000000000000	000000033321	141415002102
(2064)	010534161720	207000000000	001471560000	000005434045	000000000420	041400000000	051265200000	000000214776
(2112)	000000000441	220100000000	057225630000	000012460524	000000005526	552600000000	000000050000	000055553175
(2160)	000000000277	013000000000	201704530000	000061532333	000000000303	462300000000	273441600000	000013266661
(2208)	000000000024	314100000000	030176770000	000055402447	000000000305	256200000000	642612450000	000011127516
(2256)	777777777777	777500000000	000074510000	000127014352	777777777777	777500000000	225051010000	000000000004
(2304)	000000000000	000700000000	000000130000	000000000077	000000001241	624777777777	777777757777	777777777775
(2352)	000125721247	045200000000	000000030000	000000417370	000000000000	000000000000	000000033321	141415002102
(2400)	010534161720	207000000000	001471560000	000006466423	000000000314	772000000000	023254070000	000000243007
(2448)	000000000556	434400000000	057225630000	000012460524	000000005526	552600000000	000000050000	000055553775
(2496)	000000000277	013500000000	201700230000	000061530255	000000000303	463000000000	273441760000	000013266661
(2544)	000000000024	313600000000	030176660000	000055403231	000000000305	250300000000	642572520000	000011130146
(2592)	777777777777	777500000000	000074500000	000127021660	777777777777	777500000000	225051010000	000000000004
(2640)	000000000000	000700000000	000000130000	000000000077	000000001543	244177777777	777777757777	777777777775
(2688)	777777777777	777577777777	777777757777	777777777775	777777777777	777577777777	777777750000	000000000003
FILE 1	RECORD / 08260	LENGTH	2736 BYTES	DAY 337	12/03/74			
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(96)	000000000704	521700000000	057225630000	000012460524	000000005526	552600000000	000000050000	000055554576
(144)	000000000277	014300000000	201673730000	000061535162	000000000303	463500000000	273442140000	000013266661
(192)	000000000024	313300000000	030176560000	000055404013	000000000305	242500000000	642641520000	000011130566
(240)	777777777777	777500000000	000074500000	000127027067	777777777777	777500000000	225051010000	000000000004
(288)	000000000000	000700000000	000000130000	000000000077	000000002044	663377777777	777777757777	777777777775
(336)	000125721247	634200000000	000000030000	000000413450	000000000000	000000000000	000000033321	141415002102
(384)	010534161720	207000000000	001471560000	000007160343	000000000246	733500000000	004346260000	000005307173
(432)	000000000764	432700000000	057225630000	000012460524	000000005526	552600000000	000000050000	000055555377
(480)	000000000277	015000000000	201667430000	000061533104	000000000303	464200000000	273442320000	000013266661
(528)	000000000024	313100000000	030176450000	000055404575	000000000305	234600000000	642621570000	000011131216
(576)	777777777777	777500000000	000074500000	000127034375	777777777777	777500000000	225051010000	000000000004
(624)	000000000000	000700000000	000000130000	000000000077	000000002346	302577777777	777777757777	777777777775
(672)	000125721250	005600000000	000000050000	000057560751	000000000000	000000000000	000000033321	141415002102
(720)	010534161720	207000000000	030131510000	000007237434	000000000241	273000000000	002717610000	000004630356
(768)	000000000757	774400000000	057225630000	000012460524	000000005526	552600000000	000000050000	000055555730
(816)	000000000277	015300000000	201665050000	000061531753	000000000303	464500000000	273442420000	000013266661
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(912)	777777777777	777500000000	000074500000	000127037416	777777777777	777500000000	225051010000	000000000004
(960)	000000000000	000700000000	000000130000	000000000077	000000002276	105477777777	777777757777	777777777775
(1008)	000125721250	301200000000	000000050000	000061546515	000000000000	000000000000	000000033321	141415002102
(1056)	010534161720	207000000000	030131510000	000006463676	000000000315	242400000000	020155320000	000007102170
(1104)	000000000746	467700000000	057225630000	000012460524	000000005526	552600000000	000000050000	000055556531
(1152)	000000000277	016100000000	201660550000	000061527675	000000000303	465200000000	273442600000	000013266661
(1200)	000000000024	312400000000	030176270000	000055405677	000000000305	223500000000	642570660000	000011132104
(1248)	777777777777	777500000000	000074470000	000127044725	777777777777	777500000000	225051010000	000000000004
(1296)	000000000000	000700000000	000000130000	000000000077	000000002577	524677777777	777777757777	777777777775
(1344)	000125721250	574600000000	000000050000	000057155525	000000000000	000000000000	000000033321	141415002102
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