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GLOSSARY

AACS	Attitude and Articulation Control Subsystem
ADC	Analog-to-Digital Converter
AGC	Automatic Gain Control
BER	Bit Error Rate
BET	Bit Error Tolerance
BPI	Bit Per Inch
BPS	Bit Per Second
CCS	Computer Command Subsystem
CMD	Command
CPU	Central Processing Unit
CR	Cruise
CRS	Cosmic Ray Subsystem
CS	Circulator Switch
CTA	Compatibility Test Area
DACS	Data Capture Subsytem
DCMS	Decommutation Map (for standalone engineering data)
DCOM	Decommutation Map (for extracted engineering data)
DM	Data Mode
DN	Data Number
DPI	Data Presence Indicators
DQSW	Data Quality Status Word
DRS	Data Record System
DSN	Deep Space Network
DSS	Deep Space Station
EBEC	Estimated Bit Error Count
EDR	Experiment Data Record

GLOSSARY (cont'd)

EMF	Engineering Minor Frame
ENG	Engineering
ENGE	Extracted Engineering
ENGS	Standalone Engineering
EOF	End of File
ERT	Earth Received Time
FDS	Flight Data Subsystem
FDSC	Flight Data Subsystem Count
FID	Format Identification
GCF	Ground Communication Facility
GCI	Golay Correction Indicator
GDS	Ground Data System
GMT	Greenwich Mean Time
GS	General Science
GS&E	General Science and Engineering
HEX	Hexidecimal
HSDL	High-Speed Data Line
IBM	International Business Machines
IDR	Intermediate Data Record
IM	Image
I/O	Input/Output
IRG	Inter Record Gap
IRIS	Infrared Interferometer Spectrometer and Radiometer
ISR	Imaging Status Record
ISS	Imaging Science Subsystem

GLOSSARY (cont'd)

JPL	Jet Propulsion Laboratory
LC	Line Count in 60ms counter
LECP	Low Energy Charged Particle Subsystem
LSB	Least Significant Bit
MAG	Magnetometer Subsystem
MCCC	Mission Control and Computing Center
MDR	Master Data Record
MDS	Modulation Demodulation Subsystem
MF	Minor Frame
MIPL	Multimission Imaging Processing Lab
MIN	Minute
MJS77	Mariner Jupiter Saturn 77 (Voyager Project)
MOD	Modulation
MOD16	48 Minute Spacecraft Counter. Counts from 0 - 65535.
MOD60	48 Second Spacecraft Counter. Counts from 0 - 59.
MON	Monitor
MOS	Mission Operations System
MRT	MCCC Received Time
ms	Millisecond
MSB	Most Significant Bit
MTIS	Mission Test Imaging System
MTS	Mission Telemetry System
MWBDL	Multiple Wide-Band Data Line
NA	Narrow Angle
NE/FE	Near Encounter/Far Encounter
OC	Occultation

GLOSSARY (cont'd)

ODR	Original Data Record
PB	Playback
PLS	Plasma Subsystem
PN	Pseudo Noise
PPS	Photopolarimeter Subsystem
PRA	Planetary Radio Astronomy Subsystem
PTM	Proof Test Model
PWS	Plasma Wave Subsystem
QQC	Quantity, Quality and Continuity
RF P/B	Recorded Format Payback
R/S	Reed Solomon
RSS	Radio Science Subsystem
SAF	Spacecraft Assembly Facility
SASDRS	Spacecraft Analysis Subsystem Data Record Subsystem
SASFA	Spacecraft Analysis Subsystem File Access
S/C	Spacecraft
SCET	Spacecraft Event Time
SCP	Software Change Proposal
SDR	System Data Received
SEC	Second
SEDR	Supplementary Experiment Data Record
SIS	Software Interface Specification
SNR	Signal-to Noise Ratio
TBD	To Be Determined
TBS	To Be Supplied

GLOSSARY (cont'd)

TCM	Thrust Control Manuever
TM	Tape Mark
TPA	Telemetry Processor Assembly
UTC	Universal Time Code
UVS	Ultraviolet Spectrometer Subsystem
VGR	Voyager
WA	Wide Angle
WBDL	Wide Band Data Line
XMTR	Transmitter

SECTION II

OVERVIEW

2.1 GUIDELINES

The following guidelines were adhered to in the formulation of the EDR formats for each instrument subsystem:

a) Instrument status and command data contained in the telemetry subcom or instrument data will be duplicated and located in the EDR subheader for the record it corresponds to.

b) Each instrument's data will be passed to the EDR as it is represented in the downlink (i.e., without logarithmic expansion).

c) Engineering records will follow the corresponding instrument data on each EDR with the exception of MAG, where it will precede the instrument data.

d) During periods that science instrument-acquired data is not being transmitted to Earth, The engineering downlink will <u>not</u> be provided as a separate EDR to that science instrument, except on a special request basis.

e) Filler or spare bits in the EDR formats will be binary zeroes, except where noted otherwise in the format definition.

f) All binary or decimal data representations will be right-justified in the respective field.

g) Record type output to any data record must be selectable at program initialization.

h) OC-1, OC-2, GS-7, and GS-9 data modes will <u>not</u> be Golay or Reed-Soloman encoded nor will the cruise data modes.

i) (Deleted)

j) (Deleted)

k) Bit numbering is 31-0 in which Bit 31 is MSB and Bit 0 is LSB.

2.2 GENERALIZED MAGNETIC TAPE LAYOUT

With the exception of MAG, each EDR tape will have as its first record an Engineering Decommutaion Map followed by Instrument Data Records which correspond to the following Enginnering Data Record covering a specified period (normally 12 minutes). The Engineering Decommutation Map record will not be repeated until a change to that map occurs, at which time a new record will be written to the EDR tape. Each of the following instrument sections will define in detail the tape layout, record structure and contents of that instrument's EDR. The Decommutation Map Format is defined in Appendix A; The Engineering Record Format is defined in Appendix B. The Standard Record Header is defined in Appendix C. Appendix D shows the IBM Standard Tape Labeling scheme. The Monitor data Format is defined in Appendix E for Monitor 5-8 formatted data and Appendix F for Monitor 5-9 formatted data.

2.3 GENERALIZED RECORD STRUCTURE

Each instrument will have a common EDR header, unique science subheader and unique science data section in their instrument record structure. Each of the following instrument sections will define in detail that instrument's record structure. The common EDR header is defined in Appendix C.

2.4 MAGNETIC TAPE CHARACTERISTICS

Table 2.4-1 describes the EDR tape characteristics per instrument.

Tape Characetristics

Instrument	Tracks	BPI	Parity	Maximum Science Record Length
				32-bit words
CRS	9	1600	ODD	850
ENG	9	1600	ODD	965
IRIS	9	1600	ODD	1984
LECP	9	1600	ODD	1508
MAG	9	800	ODD	2820
PLS	9	6250	ODD	814
PPS	9	1600	ODD	635
PRA	9	1600	ODD	468
PWS	9	1600	ODD	216
UVS	9	800	ODD	1024
DECOM	9	1600	ODD	179

3.2 INFRARED INTERFEROMETER SPECTROMETER AND RADIOMETER (IRIS) EXPERIMENT

The IRIS EDR science record is designed to a 48-second instrument measurement period. Any data not present during the instrument measurement will be filled with binary zeroes.

A logical record corresponds to an instrument measurement period and in this instance is also the science physical record structure. The formats which follow are separated into two types. Type ONE is applicable to GS (except GS-6) and IM (imbedded GS&E) data modes and Type TWO corresponds to the OC and GS-6 data modes. There is no IRIS EDR format required during CR modes or for GS-8/GS-9 and UVS-5 data modes.

The science logical/physical record structure is diagrammed in Figure 3.2-1 and the physical magnetic tape lay-out is shown in Figure 3.2-2. The physical magnetic lay-out includes a change in decommutation maps during the time period covered by that EDR tape. Figure 3.2-3 and 3.2-4 and Table 3.2-1 define the structure and contents of the IRIS science record subheader for all acceptable data modes. Figure 3.2-5, 3.2-6 and Table 3.2-2 define the science record data block structure and contents for the GS (except GS-6) and imbedded GS&E data modes (except GS-6). Figures 3.2-7, 3.2-8 and Table 3.2-3 define the science record data block structure and contents for the OC and GS-6 data modes.

Appendix A contains the Decommutation Map record format. Appendix B describes the Engineering record format. Appendix C depicts the Record Header which will be Standard on all the physical records written to the IRIS EDR tape.

3.5 PHOTOPOLARIMETER (PPS) EXPERIMENT

The PPS EDR science record is designed to a 12-second instrument measurement period for OC data modes and to a 48-second instrument measurement cycle for GS data modes except GS-8/GS-9. PPS receives no instrument data in the GS-8/GS-9 data modes. Any data not present during the instrument measurement will be filled with binary zeroes.

A logical record corresponds to an instrument measurement period and is the science physical record in the GS data modes. A logical record corresponds to an instrument measurement period and five logical records are combined into one physical record in the GS data modes for a cycle time of 240-seconds. Missing PPS logical records will be represented by binary zeroes, including header and subheader. Logical record position within the physical record will be maintained. The formats which follow are applied to the GS, OC, and IM (Imbedded GS&E) data modes.

The science logical/physical record structure for the GS modes is diagrammed in Figure 3.6-1, the physical record structure in Figure 3.6-2 and the physical magnetic tape lay-out is shown in Figure 3.6-3. The physical magnetic lay-out includes a change in decommutation maps during the time period covered by that EDR tape. Figure 3.6-4 and Table 3.6-1 define the structure and contents of the PPS science record subheader for all data modes. Figure 3.6-5 and Table 3.6-2 define the science record data block structure for the GS modes. For the OC modes, the science logical/physical record structure is depicted in Figure 3.6-6. The science record data block for the OC modes is discussed in Figure 3.6-7 and Table 3.6-3.

Appendix A contains the Decommutation Map record format. Appendix B describes the Engineering record format. Appendix C depicts the Record Header which will be Standard on all the physical records written to the PPS EDR tape.

EDR DATA WORD	BITS 31 24	23 16	15 8	7 0	31 24	23 16	15 8	7 0
1	DATA WORD 1		DATA WORD 2		DATA WORD 3		DATA WORD 4	
3	DATA WORD 5		DATA WORD 6		DATA WORD 7		DATA WORD 8	
. . .					. . .			
799	DATA WORD 1597		DATA WORD 1598		DATA WORD 1599		DATA WORD 1600	

Figure 3.9-5 UVS Science Data Block Format (GS Modes)

Table 3.9-2 UVS EDR Science Data Block Table (GS Modes)

ITEM	WORD	BITS	DESCRIPTION	
1	1	31-16	Instrument data word 1	MF 1
2	1	31-16	Instrument data word 2	MF 1
3	2	31-16	Instrument data word 3	MF 1
4	2	31-16	Instrument data word 4	MF 1
.	.	.	.	
.	.	.	.	
1597	799	31-16	Instrument data word 1597	MF 80
1598	799	31-16	Instrument data word 1598	MF 80
1599	800	31-16	Instrument data word 1599	MF 80
1600	800	31-16	Instrument data word 1600	MF 80

EDR DATA WORD	BITS 31 24	23 16	15 8	7 0	31 24	23 16	15 8	7 0
1	DATA WORD 1		DATA WORD 2		DATA WORD 3		DATA WORD 4	
3	DATA WORD 5		DATA WORD 6		DATA WORD 7		DATA WORD 8	
. . .					. . .			
959	DATA WORD 1917		DATA WORD 1918		DATA WORD 1919		DATA WORD 1920	

Figure 3.9-6 UVS Science Data Block Format (OC Modes)

Table 3.9-3 UVS EDR Science Data Block Table (OC Modes)

ITEM	WORD	BITS	DESCRIPTION	
1	1	31-16	Instrument data word 1	MF n
2	1	31-16	Instrument data word 2	MF n
3	2	31-16	Instrument data word 3	MF n
4	2	31-16	Instrument data word 4	MF n
.	.	.	.	
.	.	.	.	
.	.	.	.	
1917	958	31-16	Instrument data word 1917	MF n + 7
1918	958	31-16	Instrument data word 1918	MF n + 7
1919	959	31-16	Instrument data word 1919	MF n + 7
1920	959	31-16	Instrument data word 1920	MF n + 7
			NOTE: n = 1, 9, 17, ... 73	

SECTION XI

EXPERIMENT DATA RECORDS DESCRIPTIONS

CR-5A

1 record every 12 mod 60 counts 9600 lines 12x48 seconds

11.1 COSMIC RAY SCIENCE (CRS) EXPERIMENT

The CRS EDR physical science record for CR-5A corresponds to a 9.6 minute measurement period. There are 5 physical records (segments) per 48 minute cycle of the MOD 60 counter. Any data not present within a given physical record is filled with zeros.

Four physical records correspond to three 768 second instrument cycles. The formats which follow are applicable to the CR-5A data mode.

The science logical/physical magnetic record structure is shown in Figure 11.1-1 and the physical magnetic tape organization is shown in Figure 11.1-2. Figure 11.1-3 and Table 11.1-1 define the structure and contents of the CRS science record subheader. Figure 11.1-4 and Table 11.1-2 define the structure and contents of the CRS science data block. The standard EDR science header is defined for CR-5A in Appendix C.

FIGURE 11.1-1

CRS EDR LOGICAL/PHYSICAL SCIENCE TAPE RECORDS

Standard Header (60-words)	Subheader (10-words)	Data Block (780-words)	60 MF 9.6 Minutes 850-words

All words are 32-bits.

One logical record contains a standard EDR header followed by a science subheader followed by a science data block. One logical record contains all the data from 60 telemetry frames relevant to the experiment.

One physical record contains one logical record, as defined above, for a total of 850 words (60 minor frames (MF); 9.6 Min).

FIGURE 11.1-2

CRS PHYSICAL TAPE ORGANIZATION
CR-5A

```
|-----------------------|
| IBM Standard Label    |
| 3-Physical Records    |
|-----------------------|
| Tape Mark             |
|-----------------------|
| Decom Map             |
|-----------------------|
| Science Record 1      |\
|-----------------------| \
|          .            |  \
|          .            |   |
|          .            |   |   First
|-----------------------|   |-- Data
| Science Record 5      |   |   Block (4)
|-----------------------|   |
| Decom Map (2)         |  /
|-----------------------| /
| Eng Record 1 (3)      |/
|-----------------------|
           .
           .
           .
|-----------------------|
| Science Record 1      |\
|-----------------------| \
|          .            |  \
|          .            |   |
|          .            |   |   Last
|-----------------------|   |-- Data
| Science Record 5      |   |   Block (4)
|-----------------------|   |
| Decom Map (2)         |  /
|-----------------------| /
| Eng Record 1 (3)      |/
|-----------------------|
| Tape Mark             |
|-----------------------|
| IBM Standard Trailer  |
| 2-Physical Records    |
|-----------------------|
| Tape Mark             |
|-----------------------|
| Tape Mark             |
|-----------------------|
```

NOTES

(1) Lines imply inter record gaps

(2) Present only if Decom Map changes during process interval

(3) Any Eng Record can be preceded by a Decom Map

(4) Data Blocks and Eng Records may contain up to 48 minutes of data. TTS record flush will result in less data being written into these Data Blocks

FIGURE 11.1-3

CRS SCIENCE SUBHEADER FORMAT
CR-5A

EDR WORD	BITS 31 16	15 0	31 16	15 0
1	CRS Command MF 1	CRS Command MF 39	CRS Command MF 59	Spare
3	Status-1 MF 1	Status-2 MF 6	Status-3 MF 11	Status-4 MF 16
5	Status-5 MF 21	Status-6 MF 26	Status-7 MF 31	Status-8 MF 36
7	Status-9 MF 41	Status-10 MF 46	Status-11 MF 51	Status-12 MF 56
9	Spare	Spare	Spare	Spare

Total block length is 10 EDR (10-bit) words
(60 MF; 15 status/command words)

MF shown are MF out of 60 MF

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Command Word Format

16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
ZEROS																

Status Word Format

Table 11.1-1

CRS EDR SCIENCE SUBHEADER BLOCK TABLE
CR-5A

ITEM	WORD	BITS	DESCRIPTION	
1	1	31-16	CRS Command Word	Subcom MF-19
2	1	15-0	CRS Command Word	Subcmo MF-39
3	2	31-16	CRS Command Word	Subcom MF-59
4	1	15-0	Spare	
5	3	31-16	CRS Status Word 1	Subcom MF-1
6	3	15-0	CRS Status Word 2	Subcom MF-6
7	4	31-16	CRS Status Word 3	Subcom MF-11
8	4	15-0	CRS Status Word 4	Subcom MF-16
9	5	31-16	CRS Status Word 5	Subcom MF-21
10	5	15-0	CRS Status Word 6	Subcom MF-26
11	6	31-16	CRS Status Word 7	Subcom MF-31
12	6	15-0	CRS Status Word 8	Subcom MF-36
13	7	31-16	CRS Status Word 9	Subcom MF-41
14	7	15-0	CRS Status Word 10	Subcom MF-46
15	8	31-16	CRS Status Word 11	Subcom MF-51
16	8	15-0	CRS Status Word 12	Subcom MF-56
17	9	31-16	Spare	
18	9	15-0	Spare	
19	10	31-16	Spare	
20	10	15-0	Spare	

FIGURE 11.1-4

CRS EDR SCIENCE DATA BLOCK FORMAT
CR-5A

MINOR FRAME	EDR WORD	BITS 31 16	15 0	31 16	15 0
1	1	PHA 1	PHA 1	PHA 1	PHA 1
	3	RATE 1	RATE 2	PHA 2	PHA 2
	5	PHA 2	PHA 2	RATE 3	PHA 3
	7	PHA 3	PHA 3	PHA 3	RATE 4
	8	PHA 4	PHA 4	PHA 4	PHA 4
	11	RATE 5	PHA 5	PHA 5	PHA 5
	13	PHA 5	RATE 6	PHA 6	PHA 6
2	15	PHA 6	PHA 6	RATE 7	RATE 8
	17	PHA 7	PHA 7	PHA 7	PHA 7
	19	RATE 9	PHA 8	PHA 8	PHA 8
	21	PHA 8	RATE 10	PHA 9	PHA 9
	23	PHA 9	PHA 9	RATE 11	PHA 10
	25	PHA 10	PHA 10	PHA 10	RATE 12

This structure repeats 29 more times for a total of 780 EDR (32-bit) words (60 Minor Frames; 1560 data words)

15 12	11 0
ZEROS	DATA

CRS DATA WORD FORMAT

TABLE 11.1-2

CRS EDR SCIENCE DATA BLOCK TABLE
CR-5A

ITEM	WORD	BITS	DESCRIPTION	
1	1	31-16	PHA 1 WORD	MF 1
2	1	15-0	PHA 1 WORD	MF 1
3	2	31-16	PHA 1 WORD	MF 1
4	2	15-0	PHA 1 WORD	MF 1
5	3	31-16	RATE WORD 1	MF 1
6	3	15-0	RATE WORD 2	MF 1
7	4	31-16	PHA 2 WORD	MF 1
8	4	15-0	PHA 2 WORD	MF 1
9	5	31-16	PHA 2 WORD	MF 1
10	5	15-0	PHA 2 WORD	MF 1
11	6	31-16	RATE WORD 3	MF 1
12	6	15-0	PHA 3 WORD	MF 1
13	7	31-16	PHA 3 WORD	MF 1
14	7	15-0	PHA 3 WORD	MF 1
15	8	31-16	PHA 3 WORD	MF 1
16	8	15-0	RATE WORD 4	MF 1
17	9	31-16	PHA 4 WORD	MF 1
18	9	15-0	PHA 4 WORD	MF 1
19	10	31-16	PHA 4 WORD	MF 1
20	10	15-0	PHA 4 WORD	MF 1
21	11	31-16	RATE WORD 5	MF 1
22	11	15-0	PHA 5 WORD	MF 1
23	12	31-16	PHA 5 WORD	MF 1
24	12	15-0	PHA 5 WORD	MF 1
25	13	31-16	PHA 5 WORD	MF 1
26	13	15-0	RATE WORD 6	MF 1
27	14	31-16	PHA 6 WORD	MF 2
28	14	15-0	PHA 6 WORD	MF 2
29	15	31-16	PHA 6 WORD	MF 2
30	15	15-0	PHA 6 WORD	MF 2
31	16	31-16	RATE WORD 7	MF 2
32	16	15-0	RATE WORD 8	MF 2
33	17	31-16	PHA 7 WORD	MF 2
34	17	15-0	PHA 7 WORD	MF 2
35	18	31-16	PHA 7 WORD	MF 2
36	18	15-0	PHA 7 WORD	MF 2
37	19	31-16	RATE WORD 9	MF 2
38	19	15-0	PHA 8 WORD	MF 2
39	20	31-16	PHA 8 WORD	MF 2
40	20	15-0	PHA 8 WORD	MF 2
41	21	31-16	PHA 8 WORD	MF 2
42	21	15-0	RATE WORD 10	MF 2

Continued next page

TABLE 11.1-2 (CONT'D)

CRS EDR SCIENCE DATA BLOCK TABLE
CR-5A

ITEM	WORD	BITS	DESCRIPTION	
43	22	31-16	PHA 9 WORD	MF 2
44	22	15-0	PHA 9 WORD	MF 2
45	23	31-16	PHA 9 WORD	MF 2
46	23	15-0	PHA 9 WORD	MF 2
47	24	31-16	RATE WORD 11	MF 2
48	24	15-0	PHA 10 WORD	MF 2
49	25	31-16	PHA 10 WORD	MF 2
50	25	15-0	PHA 10 WORD	MF 2
51	26	31-16	PHA 10 WORD	MF 2
52	26	15-0	RATE WORD 12	MF 2
			(This structure repeats 29 more times for a total block length of 780 32-bit words.)	

11.2 INFRARED INTERFEROMETER SPECTROMETER AND RADIOMETER (IRIS) EXPERIMENT

There is no IRIS data in the CR-5A data mode.

11.3 LOW ENERGY CHARGED PARTICLE (LECP) EXPERIMENT

The LECP EDR science physical record for CR-5A corresponds to a 192 second (3.2 minute) measurement period. Fifteen physical records are generated per 48 minute cycle of the MOD 60 counter. Any data not present within the physical record is filled with zeros.

The physical science record structure is shown in Figure 11.3-1 and the physical magnetic tape organization is shown in Figure 11.3-2. Figure 11.3-3 and Table 11.3-1 define the structure and contents of the LECP science record subheader. Figure 11.3-4 and Table 11.3-2 define the structure and contents of the LECP science logical records. The standard EDR header is defined for CR-5A in Appendix C.

A segment number (1-15) is assigned to each of the fifteen physical records that constitute LECP instrument cycles. Each numbered segment then always contains the same number and type of data words (both the subheader and the science data block).

FIGURE 11.3-1

LECP PHYSICAL SCIENCE RECORD
CR-5A

STANDARD HEADER (60 words)	SUBHEADER (1 words)	DATA BLOCK (80 words)	20 MF 3.2 Minutes 141 Words

All words are 32 bits in length.

One physical record contains a standard EDR Header followed by a science subheader followed by a science data block. One physical record contains all the data from 20 telemetry frames relevant to the experiment. Total record length is 141 words (20 MF; 3.2 Minutes).

FIGURE 11.3-2

LECP PHYSICAL TAPE ORGANIZATION
CR-5A

```
|-----------------------|
| IBM Standard Label    |
| 3-Physical Records    |
|-----------------------|
| Tape Mark             |
|-----------------------|
| Decom Map             |
|-----------------------|
| Science Record 1      |\
|-----------------------| \
|          .            |  \
|          .            |   |
|          .            |   |   First
|-----------------------|   |-- Data
| Science Record 15     |   |   Block (4)
|-----------------------|   |
| Decom Map (2)         |  /
|-----------------------| /
| Eng Record 1 (3)      |/
|-----------------------|
           .
           .
           .
|-----------------------|
| Science Record 1      |\
|-----------------------| \
|          .            |  \
|          .            |   |
|          .            |   |   Last
|-----------------------|   |-- Data
| Science Record 15     |   |   Block (4)
|-----------------------|   |
| Decom Map (2)         |  /
|-----------------------| /
| Eng Record 1 (3)      |/
|-----------------------|
| Tape Mark             |
|-----------------------|
| IBM Standard Trailer  |
| 2-Physical Records    |
|-----------------------|
| Tape Mark             |
|-----------------------|
| Tape Mark             |
|-----------------------|
```

NOTES

(1) Lines imply inter record gaps

(2) Present only if Decom Map changes during process interval

(3) Any Eng Record can be preceded by a Decom Map

(4) Data Blocks and Eng Records may contain up to 48 minutes of data. TTS record flush will result in less data being written into these Data Blocks

FIGURE 11.3-3

LECP SCIENCE SUBHEADER FORMAT
CR-5A

EDR WORD	BITS 31 – 16	BITS 15 – 0
1	LECP COMMAND - MF 2	SPARE

Total block length is 1 EDR (32 bit) words (20 MF; 1 CMD word)

Minor frames (MF) shown are MF out of 20 MF.

Table 11.3-1

LECP EDR SCIENCE SUBHEADER BLOCK TABLE
CR-5A

ITEM	WORD	BITS	DESCRIPTION
1	1	31-16	LECP COMMAND WORD - MF 2
2	1	15-0	SPARE

FIGURE 11.3-4

LECP EDR SCIENCE LOGICAL RECORD FORMAT
CR-5A

MF	EDR WORD	DESCRIPTION
1	1 thru 4	LECP INSTRUMENT DATA
2	5 thru 8	LECP INSTRUMENT DATA
3	9 thru 12	LECP INSTRUMENT DATA
4	13 thru 16	LECP INSTRUMENT DATA
5	17 thru 20	LECP INSTRUMENT DATA
6	21 thru 24	LECP INSTRUMENT DATA
7	25 thru 28	LECP INSTRUMENT DATA
8	29 thru 32	LECP INSTRUMENT DATA
9	33 thru 36	LECP INSTRUMENT DATA
10	37 thru 40	LECP INSTRUMENT DATA
11	41 thru 44	LECP INSTRUMENT DATA
12	45 thru 48	LECP INSTRUMENT DATA
13	49 thru 52	LECP INSTRUMENT DATA
14	53 thru 56	LECP INSTRUMENT DATA
15	57 thru 60	LECP INSTRUMENT DATA
16	61 thru 64	LECP INSTRUMENT DATA
17	65 thru 68	LECP INSTRUMENT DATA
18	69 thru 72	LECP INSTRUMENT DATA
19	73 thru 76	LECP INSTRUMENT DATA
20	77 thru 80	LECP INSTRUMENT DATA

This logical record length is 80 EDR (32 bit) words in length with data placed into proper minor frame location as received from input telemetry stream. (20 MF; 3.2 Minutes; 80 EDR words)

TABLE 11.3-2

LECP EDR SCIENCE RECORD TABLE
CR-5A

MINOR FRAME	SCT 60 MODULO 4	LINE COUNT	LECP BITS	DATA DESCRIPTION
1	0	001	1 - 8	PHA (8 LSB)
			9 - 48	PHA
			49 - 88	PHA
			89 - 128	PHA
2	0	161	1 - 40	PHA
			41 - 80	PHA
			81 - 120	PHA
			121 - 128	PHA (8 MSB)
3	0	321	1 - 32	PHA (32 LSB)
			33 - 72	PHA
			73 - 112	PHA
			113- 128	R/S 2, 1 (16 MSB)
4	0	481	1 - 24	R/S 2, 1 (24 LSB)
			25 - 64	R/S 2, 2
			65 - 104	R/S 2, 3
			105 - 128	R/S 2, 4 (24 MSB)
5	0	641	1 - 16	R/S 2, 4 (16 LSB)
			17 - 56	R/S 2, 5
			57 - 96	R/S 2, 6
			97 - 128	R/S 2, 7 (32 MSB)
6	1	001	1 - 8	R/S 2, 7 (8 LSB)
			9 - 48	R/S 2, 8
			49 - 88	PHA
			89 - 128	PHA
7	1	161	1 - 40	PHA
			41 - 80	PHA
			81 - 120	PHA
			121 - 128	PHA (8 MSB)
8	1	321	1 - 32	PHA (32 LSB)
			33 - 72	PHA
			73 - 112	PHA
			113 - 128	PHA (16 MSB)
9	1	481	1 - 24	PHA (24 LSB)
			25 - 64	PHA
			65 - 104	R/S 3, 1
			105 - 128	R/S 3, 2 (24 MSB)

TABLE 11.3-2 (CONT'D)

LECP EDR SCIENCE RECORD TABLE
CR-5A

MINOR FRAME	SCT 60 MODULO 4	LINE COUNT	LECP BITS	DATA DESCRIPTION
10	1	641	1 - 16	R/S 3, 2 (16 LSB)
			17 - 56	R/S 3, 3
			57 - 96	R/S 3, 4
			97 - 128	R/S 3, 5 (32 MSB)
11	2	001	1 - 8	R/S 3, 5 (8 LSB)
			9 - 48	R/S 3, 6
			49 - 88	R/S 3, 7
			89 - 128	R/S 3, 8
12	2	161	1 - 40	PHA
			41 - 80	PHA
			81 - 120	PHA
			121 - 128	PHA (8 MSB)
13	2	321	1 - 32	PHA (32 LSB)
			33 - 72	PHA
			73 - 112	PHA
			113- 128	PHA (16 MSB)
14	2	481	1 - 24	PHA (24 LSB)
			25 - 64	PHA
			65 - 104	PHA
			105 - 128	PHA (24 MSB)
15	2	641	1 - 16	PHA (16 LSB)
			17 - 56	PHA
			57 - 96	R/S 4, 1
			97 - 128	R/S 4, 2 (32 MSB)
16	3	001	1 - 8	R/S 4, 2 (8 LSB)
			9 - 48	R/S 4, 3
			49 - 88	R/S 4, 4
			89 - 128	R/S 4, 5
17	3	161	1 - 40	R/S 4, 6
			41 - 80	R/S 4, 7
			81 - 120	R/S 4, 8
			121 - 128	R/S 4, 9 (8 MSB)
18	3	321	1 - 32	R/S 4, 9 (32 LSB)
			33 - 72	R/S 4, 10
			73 - 112	R/S 4, 11
			113 - 128	R/S 4, 12 (16 MSB)

TABLE 11.3-2 (CONT'D)

LECP EDR SCIENCE RECORD TABLE
CR-5A

MINOR FRAME	SCT 60 MODULO 4	LINE COUNT	LECP BITS	DATA DESCRIPTION
19	3	481	1 - 24	R/S 4, 12 (24 LSB)
			25 - 64	R/S 4, 13
			65 - 104	R/S 3, 14
			105 - 128	R/S 3, 15 (24 MSB)
20	3	641	1 - 16	R/S 3, 15 (16 LSB)
			17 - 56	R/S 3, 16
			57 - 96	PHA
			97 - 128	PHA (32 MSB)

11.4 MAGNETOMETER (MAG) EXPERIMENT

The MAG EDR science physical record for CR-5A corresponds to a 192 second (3.2 minute) measurement period. Any data not present within the physical record is filled with zeros.

A MAG measurement cycle is 48 seconds. Hence, one physical records contains four MAG measurement cycles. There are fifteen physical records are generated per 48 minute cycle of the MOD 60 counter. The formats which follow are applicable to the CR-5A data mode.

The science logical/physical record structure is shown in Figure 11.4-1 and the physical magnetic tape organization is shown in Figure 11.4-2. Figure 11.4-3 define the structure and contents of the MAG science record subheader. Figure 11.4-4 define the structure and contents of the MAG science data block. A standard EDR header is defined for CR-5A in Appendix C.

A segment number (1-15) is assigned to each of the fifteen physical records that constitute PLS instrument cycles. Each numbered segment then always contains the same number and type of data words (both the subheader and the science data block).

FIGURE 11.4-1

MAG EDR LOGICAL/PHYSICAL SCIENCE RECORD
CR-5A

STANDARD HEADER (60 words)	SUBHEADER (108 words)	DATA BLOCK (260 words)	20 MF 3.2 Minutes 428 Words

All words are 32 bits in length.

One physical record contains a standard EDR Header followed by a science subheader followed by a science data block. One physical record contains all the data from 20 telemetry frames relevant to the experiment. Total record length is 428 words (20 MF; 3.2 Minutes).

FIGURE 11.4-2

MAG PHYSICAL TAPE ORGANIZATION
CR-5A

```
|-----------------------|
| IBM Standard Label    |
| 3-Physical Records    |
|-----------------------|
| Tape Mark             |
|-----------------------|
| Decom Map             |
|-----------------------|
| Science Record 1      |\
|-----------------------| \
|          .            |  \
|          .            |   |
|          .            |   |   First
|-----------------------|   |-- Data
| Science Record 15     |   |   Block (4)
|-----------------------|   |
| Decom Map (2)         |  /
|-----------------------| /
| Eng Record 1 (3)      |/
|-----------------------|
           .
           .
           .
|-----------------------|
| Science Record 1      |\
|-----------------------| \
|          .            |  \
|          .            |   |
|          .            |   |   Last
|-----------------------|   |-- Data
| Science Record 15     |   |   Block (4)
|-----------------------|   |
| Decom Map (2)         |  /
|-----------------------| /
| Eng Record 1 (3)      |/
|-----------------------|
| Tape Mark             |
|-----------------------|
| IBM Standard Trailer  |
| 2-Physical Records    |
|-----------------------|
| Tape Mark             |
|-----------------------|
| Tape Mark             |
|-----------------------|
```

NOTES

(1) Lines imply inter record gaps

(2) Present only if Decom Map changes during process interval

(3) Any Eng Record can be preceded by a Decom Map

(4) Data Blocks and Eng Records may contain up to 48 minutes of data. TTS record flush will result in less data being written into these Data Blocks

FIGURE 11.4-3

MAG SCIENCE SUBHEADER
CR-5A

MF shown are MF out of 20 MF

EDR WORD	BITS 31 – 16	BITS 15 – 0
1	MAG COMMAND 1 MF-3	MAG COMMAND 2 MF-4
2	PLS COMMAND M MF-6	PLS COMMAND E MF-20
3	MAG STAT 1 MF-1	MAG STAT 2 MF-1
4	MAG STAT 1 MF-6	MAG STAT 2 MF-6
5	MAG STAT 1 MF-11	MAG STAT 2 MF-11
6	MAG STAT 1 MF-16	MAG STAT 2 MF-16
7	START SCE IN MILLISECONDS OF THE DAY	
8	SPARE	SPARE
9	PLS DATA BLOCK	(SEE FIGURE 11.5-4)
.	.	
.	.	
.	.	
108	PLS DATA BLOCK (CONT'D)	

15 – 0
COMMAND WORD FORMAT

15 – 12	11 – 0
FILL	STATUS WORD FORMAT

FIGURE 11.4-4

MAG EDR SCIENCE DATA BLOCK FORMAT
CR-5A

SCT 60 MOD 4	MF	EDR WORD	BITS 31 24	23 16	15 8	7 0
0	1	1	MAG DATA	MAG DATA	MAG DATA	MAG DATA
		2	MAG DATA	MAG DATA	MAG DATA	MAG DATA
		3	MAG DATA	MAG DATA	MAG DATA	MAG DATA
		4	MAG DATA	MAG DATA	MAG DATA	MAG DATA
		5	MAG DATA	MAG DATA	MAG DATA	MAG DATA
		6	MAG DATA	MAG DATA	MAG DATA	MAG DATA
		7	MAG DATA	MAG DATA	MAG DATA	MAG DATA
		8	MAG DATA	MAG DATA	MAG DATA	MAG DATA
		9	MAG DATA	MAG DATA	MAG DATA	MAG DATA
		10	MAG DATA	MAG DATA	MAG DATA	MAG DATA
		11	MAG DATA	MAG DATA	MAG DATA	MAG DATA
		12	MAG DATA	MAG DATA	MAG DATA	MAG DATA
		13	MAG DATA	MAG DATA	MAG DATA	FILL

MAG words are 6 and 12 bits in length and will be the users responsibility to unpack the data for science processing. Refer to ECR #37734 for structure and contents of each minor frame of data.

The above structure represents 1 MF of MAG data in CR-5A and is repeated 20 times to form 1 physical record (20 MF; 3.2 minutes; 260 32-bit words).

CR-5A

11.5 PLASMA (PLS) EXPERIMENT

The PLS EDR science physical record for CR-5A corresponds to a 192 second (3.2 minute) measurement period. Any data not present within the physical record is filled with zeros.

A PLS measurement cycle is 192 seconds. Hence, one physical records contains one PLS measurement cycles. There are fifteen physical records are generated per 48 minute cycle of the MOD 60 counter. A full M-mode scan is returned every 96 minutes by an algorithm which automatically adjusts the two M start words to alternately return the lower 74 of 128 M channels (1 - 74) and then the upper 74 of 128 M channels (55 - 128) in two consecutive M-modes. The M start words are inserted into the telemetry stream as an indicator of the current configuration of PLS M-mode output. (See PD 618-131 "Functional Requirements, Voyager Interstellar Mission, Cruise Data System", Appendix A, Section 2, PLS Processing Modifications for more details.) The formats which follow are applicable to the CR-5A data mode.

The science logical/physical record structure is shown in Figure 11.5-1 and the physical magnetic tape organization is shown in Figure 11.5-2. Figure 11.5-3 define the structure and contents of the PLS science record subheader. Figure 11.5-4 define the structure and contents of the PLS science data block. A standard EDR header is defined for CR-5A in Appendix C.

A segment number (1-15) is assigned to each of the fifteen physical records that constitute PLS instrument cycles. Each numbered segment then always contains the same number and type of data words (both the subheader and science data block).

FIGURE 11.5-1

PLS EDR LOGICAL/PHYSICAL SCIENCE RECORD
CR-5A

STANDARD HEADER (60 words)	SUBHEADER (8 words)	DATA BLOCK (100 words)	20 MF 3.2 Minutes 168 Words

All words are 32 bits in length.

One physical record contains a standard EDR Header followed by a science subheader followed by a science data block. One physical record contains all the data from 20 telemetry frames relevant to the experiment. Total record length is 168 words (20 MF; 3.2 Minutes).

FIGURE 11.5-2

PLS PHYSICAL TAPE ORGANIZATION
CR-5A

```
|-----------------------|
| IBM Standard Label    |
| 3-Physical Records    |
|-----------------------|
| Tape Mark             |
|-----------------------|
| Decom Map             |
|-----------------------|
| Science Record 1      |\
|-----------------------| \
|          .            |  \
|          .            |   |
|          .            |   |   First
|-----------------------|   |-- Data
| Science Record 15     |   |   Block (4)
|-----------------------|   |
| Decom Map (2)         |  /
|-----------------------| /
| Eng Record 1 (3)      |/
|-----------------------|
          .
 .        .
          .
|-----------------------|
| Science Record 1      |\
|-----------------------| \
|          .            |  \
|          .            |   |
|          .            |   |   Last
|-----------------------|   |-- Data
| Science Record 15     |   |   Block (4)
|-----------------------|   |
| Decom Map (2)         |  /
|-----------------------| /
| Eng Record 1 (3)      |/
|-----------------------|
| Tape Mark             |
|-----------------------|
| IBM Standard Trailer  |
| 2-Physical Records    |
|-----------------------|
| Tape Mark             |
|-----------------------|
| Tape Mark             |
|-----------------------|
```

NOTES

(1) Lines imply inter record gaps

(2) Present only if Decom Map changes during process interval

(3) Any Eng Record can be preceded by a Decom Map

(4) Data Blocks and Eng Records may contain up to 48 minutes of data. TTS record flush will result in less data being written into these Data Blocks

FIGURE 11.5-3

PLS SCIENCE SUBHEADER
CR-5A

MF shown are MF out of 20 MF

EDR WORD	BITS 31 — 16	BITS 15 — 0
1	MAG COMMAND 1 MF-3	MAG COMMAND 2 MF-4
2	PLS COMMAND M MF-6	PLS COMMAND E MF-20
3	MAG STAT 1 MF-1	MAG STAT 2 MF-1
4	MAG STAT 1 MF-6	MAG STAT 2 MF-6
5	MAG STAT 1 MF-11	MAG STAT 2 MF-11
6	MAG STAT 1 MF-16	MAG STAT 2 MF-16
7	START SCE IN MILLISECONDS OF THE DAY	
8	SPARE	SPARE

15 — 0
COMMAND WORD FORMAT

15 — 12	11 — 0
FILL	STATUS WORD FORMAT

FIGURE 11.5-4

PLS EDR SCIENCE DATA BLOCK FORMAT
CR-5A

SCT 60 MOD 4	MF	EDR WORD	BITS 31 24	23 16	15 8	7 0
0	1	1	S-1	S-2	S-3	S-4
		2	S-5	S-6	S-7	S-8
		3	S-9	S-10	S-11	S-12
		4	S-13	S-14	S-15	S-16
		5	S-17	S-18	S-19	S-20

This structure repeats 19 more times for a total block length of 100 EDR (32-bit) words (20 MF; 3.2 minutes; 100 data words)

(See PD 618-131 "Functional Requirements, Voyager Interstellar Mission, Cruise Data System", Appendix A, Section 2, PLS Processing Modifications for more details on data block structure and measurement timing.)

11.6 PHOTOPOLARIMETER (PPS) EXPERIMENT

There is no PPS data in the CR-5A data mode.

11.7 PLANETARY RADIO ASTRONOMY (PRA) EXPERIMENT

The PRA EDR science physical record for CR-5A corresponds to a 6.4 minute measurement period. Any data not present within the physical record is filled with zeros.

A PRA measurement cycle is 96 minutes. Hence, there are fifteen physical records per instrument cycle. The formats which follow are applicable to the CR-5A data mode.

The science logical/physical record structure is shown in Figure 11.7-1 and the physical magnetic tape organization is shown in Figure 11.7-2. Figure 11.4-3 defines the structure and contents of the PRA science record subheader. Figure 11.7-4 defines the structure and contents of the PRA science data block. A standard EDR header is defined for CR-5A in Appendix C.

FIGURE 11.7-1

EDR LOGICAL/PHYSICAL SCIENCE RECORD
CR-5A

STANDARD HEADER (60 words)	SUBHEADER (2 words)	DATA BLOCK (70 words)	20 MF 40 Minutes 132 Words

All words are 32 bits in length.

One physical record contains a standard EDR Header followed by a science subheader followed by a science data block. One physical record contains all the data from 40 telemetry frames relevant to the experiment. Total record length is 132 words (40 MF; 6.4 Minutes).

FIGURE 11.7-2

PRA PHYSICAL TAPE ORGANIZATION
CR-5A

```
|-----------------------|
| IBM Standard Label    |
| 3-Physical Records    |
|-----------------------|
| Tape Mark             |
|-----------------------|
| Decom Map             |
|-----------------------|
| Science Record 1      |\
|-----------------------| \
|          .            |  \
|          .            |   |
|          .            |   |   First
|-----------------------|   |-- Data
| Science Record N (5)  |   |   Block (4)
|-----------------------|   |
| Decom Map (2)         |  /
|-----------------------| /
| Eng Record 1 (3)      |/
|-----------------------|
           .
           .
           .
|-----------------------|
| Science Record 1      |\
|-----------------------| \
|          .            |  \
|          .            |   |
|          .            |   |   Last
|-----------------------|   |-- Data
| Science Record N (5)  |   |   Block (4)
|-----------------------|   |
| Decom Map (2)         |  /
|-----------------------| /
| Eng Record 1 (3)      |/
|-----------------------|
| Tape Mark             |
|-----------------------|
| IBM Standard Trailer  |
| 2-Physical Records    |
|-----------------------|
| Tape Mark             |
|-----------------------|
| Tape Mark             |
|-----------------------|
```

NOTES

(1) Lines imply inter record gaps

(2) Present only if Decom Map changes during process interval

(3) Any Eng Record can be preceded by a Decom Map

(4) Data Blocks and Eng Records may contain up to 48 minutes of data. TTS record flush will result in less data being written into these Data Blocks

(5) There are eight science records for even MOD 2*16 counts and seven for odd MOD 2*16 counts.

FIGURE 11.7-3

PRA SCIENCE SUBHEADER
CR-5A

EDR WORD	BITS 31 — 16	BITS 15 — 0
1	PRA MODE CMD MF-8	PRA CONFIG. CMD MF-9
2	PRA MODE CMD MF-28	PRA CONFIG. CMD MF-29

Total block length is 2 EDR (32-bit) words
(40 minor frames; 6.4 minutes)

FIGURE 11.7-4

PRA EDR SCIENCE DATA
CR-5A

EDR WORD	BITS 31 24	23 16	15 8	7 0
1	SCAN 64L(1)	SCAN 64L(2)	SCAN 64R(1)	SCAN 64R(2)
2	PRA STAT(1)	PRA STAT(2)	POR COUNTER	SCAN 1L(1)
3	SCAN 1L(2)	SCAN 1R(1)	SCAN 1R(2)	SCAN 2L(1)
4	SCAN 2L(2)	SCAN 2R(1)	SCAN 2R(2)	SCAN 3L(1)
5	SCAN 3L(2)	SCAN 3R(1)	SCAN 3R(2)	SCAN 4L(1)
6	SCAN 4L(2)	SCAN 4R(1)	SCAN 4R(2)	SCAN 5L(1)
7	SCAN 5L(2)	SCAN 5R(1)	SCAN 5R(2)	SCAN 6L(1)
8	SCAN 6L(2)	SCAN 6R(1)	SCAN 6R(2)	SCAN 7L(1)
9	SCAN 7L(2)	SCAN 7R(1)	SCAN 7R(2)	SCAN 8L(1)
10	SCAN 8L(2)	SCAN 8R(1)	SCAN 8R(2)	PRA STAT(1)
11	PRA STAT(2)	POR COUNTER	SCAN 9L(1)	SCAN 9L(2)
12	SCAN 9R(1)	SCAN 9R(2)	SCAN 10L(1)	SCAN 10L(2)
13	SCAN 10R(1)	SCAN 10R(2)	SCAN 11L(1)	SCAN 11L(2)
14	SCAN 11R(1)	SCAN 11R(2)	SCAN 12L(1)	SCAN 12L(2)
15	SCAN 12R(1)	SCAN 12R(2)	SCAN 13L(1)	SCAN 13L(2)
16	SCAN 13R(1)	SCAN 13R(2)	SCAN 14L(1)	SCAN 14L(2)
17	SCAN 14R(1)	SCAN 14R(2)	SCAN 15L(1)	SCAN 15L(2)
18	SCAN 15R(1)	SCAN 15R(2)	SCAN 16L(1)	SCAN 16L(2)
19	SCAN 16R(1)	SCAN 16R(2)	PRA STAT(1)	PRA STAT(2)
20	POR COUNTER	SCAN 17L(1)	SCAN 17L(2)	SCAN 17R(1)
21	SCAN 17R(2)	SCAN 18L(1)	SCAN 18L(2)	SCAN 18R(1)
22	SCAN 18R(2)	SCAN 19L(1)	SCAN 19L(2)	SCAN 19R(1)
23	SCAN 19R(2)	SCAN 20L(1)	SCAN 20L(2)	SCAN 20R(1)
24	SCAN 20R(2)	SCAN 21L(1)	SCAN 21L(2)	SCAN 21R(1)
25	SCAN 21R(2)	SCAN 22L(1)	SCAN 22L(2)	SCAN 22R(1)
26	SCAN 22R(2)	SCAN 23L(1)	SCAN 23L(2)	SCAN 23R(1)
27	SCAN 23R(2)	SCAN 24L(1)	SCAN 24L(2)	SCAN 24R(1)
28	SCAN 24R(2)	PRA STAT(1)	PRA STAT(2)	POR COUNTER
29	SCAN 25L(1)	SCAN 25L(2)	SCAN 25R(1)	SCAN 25R(2)
30	SCAN 26L(1)	SCAN 26L(2)	SCAN 26R(1)	SCAN 26R(2)
31	SCAN 27L(1)	SCAN 27L(2)	SCAN 27R(1)	SCAN 27R(2)
32	SCAN 28L(1)	SCAN 28L(2)	SCAN 28R(1)	SCAN 28R(2)
33	SCAN 29L(1)	SCAN 29L(2)	SCAN 29R(1)	SCAN 29R(2)
34	SCAN 30L(1)	SCAN 30L(2)	SCAN 30R(1)	SCAN 30R(2)
35	SCAN 31L(1)	SCAN 31L(2)	SCAN 31R(1)	SCAN 31R(2)
36	SCAN 32L(1)	SCAN 32L(2)	SCAN 32R(1)	SCAN 32R(2)
37	PRA STAT(1)	PRA STAT(2)	POR COUNTER	SCAN 33L(1)
38	SCAN 33L(2)	SCAN 33R(1)	SCAN 33R(2)	SCAN 34L(1)
39	SCAN 34L(2)	SCAN 34R(1)	SCAN 34R(2)	SCAN 35L(1)
40	SCAN 35L(2)	SCAN 35R(1)	SCAN 35R(2)	SCAN 36L(1)

L = Left Hand Circular Polarization summation
R = Right Hand Circular Polarization summation
(1) = 8 most significant bits
(2) = 8 least significant bits

FIGURE 11.7-4 (CONT'D)

PRA EDR SCIENCE DATA
CR-5A

EDR WORD	BITS 31 24	23 16	15 8	7 0
41	SCAN 36L(2)	SCAN 36R(1)	SCAN 36R(2)	SCAN 37L(1)
42	SCAN 37L(2)	SCAN 37R(1)	SCAN 37R(2)	SCAN 38L(1)
43	SCAN 38L(2)	SCAN 38R(1)	SCAN 38R(2)	SCAN 39L(1)
44	SCAN 39L(2)	SCAN 39R(1)	SCAN 39R(2)	SCAN 40L(1)
45	SCAN 40L(2)	SCAN 40R(1)	SCAN 40R(2)	PRA STAT(1)
46	PRA STAT(2)	POR COUNTER	SCAN 41L(1)	SCAN 41L(2)
47	SCAN 41R(1)	SCAN 41R(2)	SCAN 42L(1)	SCAN 42L(2)
48	SCAN 42R(1)	SCAN 42R(2)	SCAN 43L(1)	SCAN 43L(2)
49	SCAN 43R(1)	SCAN 43R(2)	SCAN 44L(1)	SCAN 44L(2)
50	SCAN 44R(1)	SCAN 44R(2)	SCAN 45L(1)	SCAN 45L(2)
51	SCAN 45R(1)	SCAN 45R(2)	SCAN 46L(1)	SCAN 46L(2)
52	SCAN 46R(1)	SCAN 46R(2)	SCAN 47L(1)	SCAN 47L(2)
53	SCAN 47R(1)	SCAN 47R(2)	SCAN 48L(1)	SCAN 48L(2)
54	SCAN 48R(1)	SCAN 48R(2)	PRA STAT(1)	PRA STAT(2)
55	POR COUNTER	SCAN 49L(1)	SCAN 49L(2)	SCAN 49R(1)
56	SCAN 49R(2)	SCAN 50L(1)	SCAN 50L(2)	SCAN 50R(1)
57	SCAN 50R(2)	SCAN 51L(1)	SCAN 51L(2)	SCAN 51R(1)
58	SCAN 51R(2)	SCAN 52L(1)	SCAN 52L(2)	SCAN 52R(1)
59	SCAN 52R(2)	SCAN 53L(1)	SCAN 53L(2)	SCAN 53R(1)
60	SCAN 53R(2)	SCAN 54L(1)	SCAN 54L(2)	SCAN 54R(1)
61	SCAN 54R(2)	SCAN 55L(1)	SCAN 55L(2)	SCAN 55R(1)
62	SCAN 55R(2)	SCAN 56L(1)	SCAN 56L(2)	SCAN 56R(1)
63	SCAN 56R(2)	PRA STAT(1)	PRA STAT(2)	POR COUNTER
64	SCAN 57L(1)	SCAN 57L(2)	SCAN 57R(1)	SCAN 57R(2)
65	SCAN 58L(1)	SCAN 58L(2)	SCAN 58R(1)	SCAN 58R(2)
66	SCAN 59L(1)	SCAN 59L(2)	SCAN 59R(1)	SCAN 59R(2)
67	SCAN 60L(1)	SCAN 60L(2)	SCAN 60R(1)	SCAN 60R(2)
68	SCAN 61L(1)	SCAN 61L(2)	SCAN 61R(1)	SCAN 61R(2)
69	SCAN 62L(1)	SCAN 62L(2)	SCAN 62R(1)	SCAN 62R(2)
70	SCAN 63L(1)	SCAN 63L(2)	SCAN 63R(1)	SCAN 63R(2)

L = Left Hand Circular Polarization summation
R = Right Hand Circular Polarization summation
(1) = 8 most significant bits
(2) = 8 least significant bits

Total block length is 70 EDR (32-bit) words
(40 minor frames; 6.4 minutes)

11.8 PLASMA WAVE (PWS) EXPERIMENT

The PWS EDR science physical record for CR-5A corresponds to a 192 second (3.2 minute) measurement period. Fifteen physical records are generated per 48 minute cycle of the MOD 60 counter. Any data not present within the physical record is filled with zeros.

A PWS measurement cycle is 4 seconds. Hence there are 15 physical records (720 measurement cycles) per 48 minute period. The formats which follow are applicable to the CR-5A data mode.

The physical science record structure is shown in Figure 11.8-1, and the physical magnetic tape organization is shown in Figure 11.8-2. Figure 11.8-3 define the structure and contents of the PWS science record subheader. Figure 11.8-4 and Table 11.8-1 define the structure and contents of the PWS science logical records. The standard EDR header is defined for CR-5A in Appendix C.

A segment number (1-15) is assigned to each of the fifteen physical records that constitute PWS instrument cycles. Each numbered segment then always contains the same number and type of data words (both the subheader and the science data block).

FIGURE 11.8-1

PWS PHYSICAL SCIENCE RECORD
CR-5A

STANDARD HEADER (60 words)	SUBHEADER (20 words)	DATA BLOCK (55 words)	20 MF 3.2 Minutes 135 Words

All words are 32 bits in length.

One physical record contains a standard EDR Header followed by a science subheader followed by a science data block. One physical record contains all the data from 20 telemetry frames relevant to the experiment. Total record length is 135 words (20 MF; 3.2 Minutes).

FIGURE 11.8-2

PWS PHYSICAL TAPE ORGANIZATION
CR-5A

```
|-----------------------|
| IBM Standard Label    |
| 3-Physical Records    |
|-----------------------|
| Tape Mark             |
|-----------------------|
| Decom Map             |
|-----------------------|
| Science Record 1      |\
|-----------------------| \
|          .            |  \
|          .            |   |
|          .            |   |   First
|-----------------------|   |-- Data
| Science Record 15     |   |   Block (4)
|-----------------------|   |
| Decom Map (2)         |  /
|-----------------------| /
| Eng Record 1 (3)      |/
|-----------------------|
           .
           .
           .
|-----------------------|
| Science Record 1      |\
|-----------------------| \
|          .            |  \
|          .            |   |
|          .            |   |   Last
|-----------------------|   |-- Data
| Science Record 15     |   |   Block (4)
|-----------------------|   |
| Decom Map (2)         |  /
|-----------------------| /
| Eng Record 1 (3)      |/
|-----------------------|
| Tape Mark             |
|-----------------------|
| IBM Standard Trailer  |
| 2-Physical Records    |
|-----------------------|
| Tape Mark             |
|-----------------------|
| Tape Mark             |
|-----------------------|
```

NOTES

(1) Lines imply inter record gaps

(2) Present only if Decom Map changes during process interval

(3) Any Eng Record can be preceded by a Decom Map

(4) Data Blocks and Eng Records may contain up to 48 minutes of data. TTS record flush will result in less data being written into these Data Blocks

FIGURE 11.8-3

PWS SCIENCE SUBHEADER FORMAT
CR-5A

MF shown are MF out of 20 MF

EDR WORD	BITS 31 – 16		BITS 15 – 0	
1	PPS COMMAND	MF-1	CRS STATUS	MF-1
2	MAG 1 STATUS	MF-1	MAG 2 STATUS	MF-1
3	UVS ROF	MF-1	PWS STATUS	MF-1
4	LECP CONFIGURATION	MF-2	MAG COMMAND 1	MF-3
5	MAG COMMAND 2	MF-4	UVS MODE	MF-5
6	PLS MODE COMMAND M	MF-6	CRS STATUS	MF-6
7	MAG STATUS 1	MF-6	MAG 2 STATUS	MF-6
8	UVS ROL	MF-6	PWS STATUS	MF-6
9	PWS LEVEL COMMAND	MF-7	PRA MODE	MF-8
10	PRA CONFIGURATION	MF-9	FDS COMMAND COUNT	MF-10
11	FDS COMMAND 1	MF-11	CRS STATUS	MF-11
12	MAG 1 STATUS	MF-11	MAG 2 STATUS	MF-11
13	UVS ROF	MF-11	PWS STATUS	MF-11
14	FDS COMMAND 2	MF-12	FDS COMMAND 3	MF-13
15	FDS COMMAND 4	MF-14	FDS COMMAND 5	MF-15
16	FDS COMMAND 6	MF-16	CRS STATUS	MF-16
17	MAG 1 STATUS	MF-16	MAG 2 STATUS	MF-16
18	PPS UVS ROF	MF-16	PWS STATUS	MF-16
19	FDS COMMAND 7	MF-17	FDS COMMAND 8	MF-18
20	CRS COMMAND	MF-19	PLS MODE COMMAND E	MF-20

The structure of Status and Command measurements are as listed below.

15 – 12	11 – 0
FILL	STATUS

15 – 0
COMMAND

FIGURE 11.8-4

PWS EDR SCIENCE DATA BLOCK FORMAT
CR-5A

The following structure is for a single record segment (1 physical record; 3.2 minutes; 20 minor frames) composed of 20 minor telemetry frames. All 88 bits are from each minor frame is placed into the EDR record as indicated below. This structure is repeated for each of the 15 segments per MOD 2**16 counter.

EDR WORD	BITS 31 24	23 16	15 8	7 0
1	PWS MF-1	PWS MF-1	PWS MF-1	PWS MF-1
2	PWS MF-1	PWS MF-1	PWS MF-1	PWS MF-1
3	PWS MF-1	PWS MF-1	PWS MF-1	PWS MF-2
4	PWS MF-2	PWS MF-2	PWS MF-2	PWS MF-2
5	PWS MF-2	PWS MF-2	PWS MF-2	PWS MF-2
6	PWS MF-2	PWS MF-2	PWS MF-3	PWS MF-3
7	PWS MF-3	PWS MF-3	PWS MF-3	PWS MF-3
8	PWS MF-3	PWS MF-3	PWS MF-3	PWS MF-3
9	PWS MF-3	PWS MF-4	PWS MF-4	PWS MF-4
10	PWS MF-4	PWS MF-4	PWS MF-4	PWS MF-4
11	PWS MF-4	PWS MF-4	PWS MF-4	PWS MF-4
12	PWS MF-5	PWS MF-5	PWS MF-5	PWS MF-5
13	PWS MF-5	PWS MF-5	PWS MF-5	PWS MF-5
14	PWS MF-5	PWS MF-5	PWS MF-5	PWS MF-6
15	PWS MF-6	PWS MF-6	PWS MF-6	PWS MF-6
16	PWS MF-6	PWS MF-6	PWS MF-6	PWS MF-6
17	PWS MF-7	PWS MF-7	PWS MF-7	PWS MF-7
18	PWS MF-7	PWS MF-7	PWS MF-7	PWS MF-7
19	PWS MF-7	PWS MF-7	PWS MF-7	PWS MF-7
20	PWS MF-7	PWS MF-8	PWS MF-8	PWS MF-8
21	PWS MF-8	PWS MF-8	PWS MF-8	PWS MF-8
22	PWS MF-8	PWS MF-8	PWS MF-8	PWS MF-8
23	PWS MF-9	PWS MF-9	PWS MF-9	PWS MF-9
24	PWS MF-9	PWS MF-9	PWS MF-9	PWS MF-9
25	PWS MF-9	PWS MF-9	PWS MF-9	PWS MF-10
26	PWS MF-10	PWS MF-10	PWS MF-10	PWS MF-10
27	PWS MF-10	PWS MF-10	PWS MF-10	PWS MF-10
28	PWS MF-10	PWS MF-10	PWS MF-11	PWS MF-11
29	PWS MF-11	PWS MF-11	PWS MF-11	PWS MF-11
30	PWS MF-11	PWS MF-11	PWS MF-11	PWS MF-11
31	PWS MF-11	PWS MF-12	PWS MF-11	PWS MF-12
32	PWS MF-12	PWS MF-12	PWS MF-12	PWS MF-12
33	PWS MF-12	PWS MF-12	PWS MF-12	PWS MF-12

CONTINUED ON NEXT PAGE

FIGURE 11.8-4 (CONT'D)

PWS EDR SCIENCE DATA BLOCK FORMAT
CR-5A

EDR WORD	BITS 31 24	23 16	15 8	7 0
34	PWS MF-13	PWS MF-13	PWS MF-13	PWS MF-13
35	PWS MF-13	PWS MF-13	PWS MF-13	PWS MF-13
36	PWS MF-13	PWS MF-13	PWS MF-13	PWS MF-14
37	PWS MF-14	PWS MF-14	PWS MF-14	PWS MF-14
38	PWS MF-14	PWS MF-14	PWS MF-14	PWS MF-14
39	PWS MF-14	PWS MF-14	PWS MF-15	PWS MF-15
40	PWS MF-15	PWS MF-15	PWS MF-15	PWS MF-15
41	PWS MF-15	PWS MF-15	PWS MF-15	PWS MF-15
42	PWS MF-15	PWS MF-16	PWS MF-16	PWS MF-16
43	PWS MF-16	PWS MF-16	PWS MF-16	PWS MF-16
44	PWS MF-16	PWS MF-16	PWS MF-16	PWS MF-16
45	PWS MF-17	PWS MF-17	PWS MF-17	PWS MF-17
46	PWS MF-17	PWS MF-17	PWS MF-17	PWS MF-17
47	PWS MF-17	PWS MF-17	PWS MF-17	PWS MF-18
48	PWS MF-18	PWS MF-18	PWS MF-18	PWS MF-18
49	PWS MF-18	PWS MF-18	PWS MF-18	PWS MF-18
50	PWS MF-18	PWS MF-18	PWS MF-19	PWS MF-19
51	PWS MF-19	PWS MF-19	PWS MF-19	PWS MF-19
52	PWS MF-19	PWS MF-19	PWS MF-19	PWS MF-19
53	PWS MF-19	PWS MF-20	PWS MF-20	PWS MF-20
54	PWS MF-20	PWS MF-20	PWS MF-20	PWS MF-20
55	PWS MF-20	PWS MF-20	PWS MF-20	PWS MF-20

TABLE 11.8-1

PWS OUTPUT STRUCTURE
CR-5A

The following table represents the structure of each a single record segment (physical record; 3.2 minutes; 20 minor frames). The structure of each of the 15 record segments per MOD 2**16 counter are identical.

MINOR FRAME	SCT 60 MOD 4	LINE COUNT	BITS	DATA DESCRIPTION
1	0	001	1- 6	#SET 11, FILTER 16 (6 LSB)
			7-16	#SET 11, FILTER 8
			17-26	#SET 12, FILTER 9
			27-36	#SET 12, FILTER 1
			37-46	#SET 12, FILTER 10
			47-56	#SET 12, FILTER 2
			57-66	#SET 12, FILTER 11
			67-76	#SET 12, FILTER 3
			77-86	#SET 12, FILTER 12
			87-88	#SET 12, FILTER 4 (2 MSB)
2	0	161	1- 8	#SET 12, FILTER 4 (8 LSB)
			9-18	#SET 12, FILTER 13
			19-28	#SET 12, FILTER 5
			29-38	#SET 12, FILTER 14
			39-48	#SET 12, FILTER 6
			49-58	#SET 12, FILTER 15
			59-68	#SET 12, FILTER 7
			69-78	#SET 12, FILTER 16
			79-88	#SET 12, FILTER 8
3	0	321	1-10	SET 1, FILTER 9
			11-20	SET 1, FILTER 1
			21-30	SET 1, FILTER 10
			31-40	SET 1, FILTER 2
			41-50	SET 1, FILTER 11
			51-60	SET 1, FILTER 3
			61-70	SET 1, FILTER 12
			71-80	SET 1, FILTER 4
			81-88	SET 1, FILTER 13 (8 MSB)
4	0	481	1- 2	SET 1, FILTER 13 (2 LSB)
			3-12	SET 1, FILTER 5
			13-22	SET 1, FILTER 14
			23-32	SET 1, FILTER 6
			33-42	SET 1, FILTER 15
			43-52	SET 1, FILTER 7
			53-62	SET 1, FILTER 16
			63-72	SET 1, FILTER 8
			73-82	SET 2, FILTER 9
			83-88	SET 2, FILTER 1 (6 MSB)

TABLE 11.8-1 (CONT'D)

PWS OUTPUT STRUCTURE
CR-5A

MINOR FRAME	SCT 60 MOD 4	LINE COUNT	BITS	DATA DESCRIPTION
5	0	641	1- 4	SET 2, FILTER 1 (4 LSB)
			5-14	SET 2, FILTER 10
			15-24	SET 2, FILTER 2
			25-34	SET 2, FILTER 11
			35-44	SET 2, FILTER 3
			45-54	SET 2, FILTER 12
			55-64	SET 2, FILTER 4
			65-74	SET 2, FILTER 13
			75-84	SET 2, FILTER 5
			85-88	SET 2, FILTER 14 (4 MSB)
6	1	001	1- 6	SET 2, FILTER 14 (6 LSB)
			7-16	SET 2, FILTER 6
			17-26	SET 2, FILTER 15
			27-36	SET 2, FILTER 7
			37-46	SET 2, FILTER 16
			47-56	SET 2, FILTER 8
			57-66	SET 3, FILTER 9
			67-76	SET 3, FILTER 1
			77-86	SET 3, FILTER 10
			87-88	SET 3, FILTER 2 (2 MSB)
7	1	161	1- 8	SET 3, FILTER 2 (8 LSB)
			9-18	SET 3, FILTER 11
			19-28	SET 3, FILTER 3
			29-38	SET 3, FILTER 12
			39-48	SET 3, FILTER 4
			49-58	SET 3, FILTER 13
			59-68	SET 3, FILTER 5
			69-78	SET 3, FILTER 14
			79-88	SET 3, FILTER 6
8	1	321	1-10	SET 3, FILTER 15
			11-20	SET 3, FILTER 7
			21-30	SET 3, FILTER 16
			31-40	SET 3, FILTER 8
			41-50	SET 4, FILTER 9
			51-60	SET 4, FILTER 1
			61-70	SET 4, FILTER 10
			71-80	SET 4, FILTER 2
			81-88	SET 4, FILTER 11 (8 MSB)
9	1	481	1- 2	SET 4, FILTER 11 (2 LSB)
			3-12	SET 4, FILTER 3
			13-22	SET 4, FILTER 12
			23-32	SET 4, FILTER 4
			33-42	SET 4, FILTER 13
			43-52	SET 4, FILTER 5

TABLE 11.8-1 (CONT'D)

PWS OUTPUT STRUCTURE
CR-5A

MINOR FRAME	SCT 60 MOD 4	LINE COUNT	BITS	DATA DESCRIPTION
9	1	481	53-62	SET 4, FILTER 14
			63-72	SET 4, FILTER 6
			73-82	SET 4, FILTER 15
			83-88	SET 4, FILTER 7 (6 MSB)
10	1	641	1- 4	SET 4, FILTER 7 (4 LSB)
			5-14	SET 4, FILTER 16
			15-24	SET 4, FILTER 8
			25-34	SET 5, FILTER 9
			35-44	SET 5, FILTER 1
			45-54	SET 5, FILTER 10
			55-64	SET 5, FILTER 2
			65-74	SET 5, FILTER 11
			75-84	SET 5, FILTER 3
			85-88	SET 5, FILTER 12 (4 MSB)
11	2	001	1- 6	SET 5, FILTER 12 (6 LSB)
			7-16	SET 5, FILTER 4
			17-26	SET 5, FILTER 13
			27-36	SET 5, FILTER 5
			37-46	SET 5, FILTER 14
			47-56	SET 5, FILTER 6
			57-66	SET 5, FILTER 15
			67-76	SET 5, FILTER 7
			77-86	SET 5, FILTER 16
			87-88	SET 5, FILTER 8 (2 MSB)
12	2	161	1- 8	SET 5, FILTER 8 (8 LSB)
			9-18	SET 6, FILTER 9
			19-28	SET 6, FILTER 1
			29-38	SET 6, FILTER 10
			39-48	SET 6, FILTER 2
			49-58	SET 6, FILTER 11
			59-68	SET 6, FILTER 3
			69-78	SET 6, FILTER 12
			79-88	SET 6, FILTER 4
13	2	321	1-10	SET 6, FILTER 13
			11-20	SET 6, FILTER 5
			21-30	SET 6, FILTER 14
			31-40	SET 6, FILTER 6
			41-50	SET 6, FILTER 15
			51-60	SET 6, FILTER 7
			61-70	SET 6, FILTER 16
			71-80	SET 6, FILTER 8
			81-88	SET 7, FILTER 9 (8 MSB)
14	2	481	1- 2	SET 7, FILTER 9 (2 LSB)
			3-12	SET 7, FILTER 1

TABLE 11.8-1 (CONT'D)

PWS OUTPUT STRUCTURE
CR-5A

MINOR FRAME	SCT 60 MOD 4	LINE COUNT	BITS	DATA DESCRIPTION
14	2	481	13-22	SET 7, FILTER 10
			23-32	SET 7, FILTER 2
			33-42	SET 7, FILTER 11
			43-52	SET 7, FILTER 3
			53-62	SET 7, FILTER 12
			63-72	SET 7, FILTER 4
			73-82	SET 7, FILTER 13
			83-88	SET 7, FILTER 5 (6 MSB)
15	2	641	1- 4	SET 7, FILTER 5 (4 LSB)
			5-14	SET 7, FILTER 14
			15-24	SET 7, FILTER 6
			25-34	SET 7, FILTER 15
			35-44	SET 7, FILTER 7
			45-54	SET 7, FILTER 16
			55-64	SET 7, FILTER 8
			65-74	SET 9, FILTER 9
			75-84	SET 9, FILTER 1
			85-88	SET 9, FILTER 10 (4 MSB)
16	3	001	1- 6	SET 9, FILTER 10 (6 LSB)
			7-16	SET 9, FILTER 2
			17-26	SET 9, FILTER 11
			27-36	SET 9, FILTER 3
			37-46	SET 9, FILTER 12
			47-56	SET 9, FILTER 4
			57-66	SET 9, FILTER 13
			67-76	SET 9, FILTER 5
			77-86	SET 9, FILTER 14
			87-88	SET 9, FILTER 6 (2 MSB)
17	3	161	1- 8	SET 9, FILTER 6 (8 LSB)
			9-18	SET 9, FILTER 15
			19-28	SET 9, FILTER 7
			29-38	SET 9, FILTER 16
			39-48	SET 9, FILTER 8
			49-58	SET 10, FILTER 9
			59-68	SET 10, FILTER 1
			69-78	SET 10, FILTER 10
			79-88	SET 10, FILTER 2
18	3	321	1-10	SET 10, FILTER 11
			11-20	SET 10, FILTER 3
			21-30	SET 10, FILTER 12
			31-40	SET 10, FILTER 4
			41-50	SET 10, FILTER 13
			51-60	SET 10, FILTER 5
			61-70	SET 10, FILTER 14

TABLE 11.8-1 (CONT'D)

FWS OUTPUT STRUCTURE
CR-5A

MINOR FRAME	SCT 60 MOD 4	LINE COUNT	BITS	DATA DESCRIPTION
18	3	321	71-80	SET 10, FILTER 6
			81-88	SET 10, FILTER 15 (8 MSB)
19	3	481	1- 2	SET 10, FILTER 15 (2 LSB)
			3-12	SET 10, FILTER 7
			13-22	SET 10, FILTER 16
			23-32	SET 10, FILTER 8
			33-42	SET 11, FILTER 9
			43-52	SET 11, FILTER 1
			53-62	SET 11, FILTER 10
			63-72	SET 11, FILTER 2
			73-82	SET 11, FILTER 11
			83-88	SET 11, FILTER 3 (6 MSB)
20	3	641	1- 4	SET 11, FILTER 3 (4 LSB)
			5-14	SET 11, FILTER 12
			15-24	SET 11, FILTER 4
			25-34	SET 11, FILTER 13
			35-44	SET 11, FILTER 5
			45-54	SET 11, FILTER 14
			55-64	SET 11, FILTER 6
			65-74	SET 11, FILTER 15
			75-84	SET 11, FILTER 7
			85-88	SET 11, FILTER 16 (4 MSB)

Sampled in preceding SCT60 MOD 4 cycle

"SET 8 DATA" is discarded on the spacecraft due to LECP motor stepping interference.

11.9 ULTRAVIOLET SPECTROMETER (UVS) EXPERIMENT

The UVS EDR science physical record for CR-5A corresponds to a 4.0 minute measurement period. Twelve physical records are generated per 48 minute cycle of the MOD 60 counter. Any data not present within the physical record is filled with zeros.

A UVS measurement cycle is 4 minutes. Hence there are 12 physical records per 48 minute period. The formats which follow are applicable to the CR-5A data mode.

The physical science record structure is shown in Figure 11.9-1 and the physical magnetic tape organization is shown in Figure 11.9-2. Figure 11.9-3 define the structure and contents of the UVS science record subheader. Figure 11.9-4 and Table 11.9-1 define the structure and contents of the UVS science logical records. The standard EDR header is defined for CR-5A in Appendix C.

A segment number (1-12) is assigned to each of the twelve physical records that constitute UVS instrument cycles. Each numbered segment then always contains the same number and type of data words (both the subheader and the science data block).

FIGURE 11.9-1

UVS PHYSICAL SCIENCE RECORD
CR-5A

STANDARD HEADER (60 words)	SUBHEADER (4 words)	DATA BLOCK (30 words)	25 MF 4.0 Minutes 94 Words

All words are 32 bits in length.

One physical record contains a standard EDR Header followed by a science subheader followed by a science data block. One physical record contains all the data from 25 telemetry frames relevant to the experiment. Total record length is 94 32-bit words (25 MF; 4.0 Minutes).

FIGURE 11.9-2

UVS PHYSICAL TAPE ORGANIZATION
CR-5A

```
|-----------------------|
| IBM Standard Label    |
| 3-Physical Records    |
|-----------------------|
| Tape Mark             |
|-----------------------|
| Decom Map             |
|-----------------------|
| Science Record 1      |\
|-----------------------| \
|          .            |  \
|          .            |   |
|          .            |   |   First
|-----------------------|   |-- Data
| Science Record 12     |   |   Block (4)
|-----------------------|   |
| Decom Map (2)         |  /
|-----------------------| /
| Eng Record 1 (3)      |/
|-----------------------|
           .
           .
           .
|-----------------------|
| Science Record 1      |\
|-----------------------| \
|          .            |  \
|          .            |   |
|          .            |   |   Last
|-----------------------|   |-- Data
| Science Record 12     |   |   Block (4)
|-----------------------|   |
| Decom Map (2)         |  /
|-----------------------| /
| Eng Record 1 (3)      |/
|-----------------------|
| Tape Mark             |
|-----------------------|
| IBM Standard Trailer  |
| 2-Physical Records    |
|-----------------------|
| Tape Mark             |
|-----------------------|
| Tape Mark             |
|-----------------------|
```

NOTES

(1) Lines imply inter record gaps

(2) Present only if Decom Map changes during process interval

(3) Any Eng Record can be preceded by a Decom Map

(4) Data Blocks and Eng Records may contain up to 48 minutes of data. TTS record flush will result in less data being written into these Data Blocks

FIGURE 11.9-3

UVS SCIENCE SUBHEADER FORMAT
CR-5A

MF shown are MF out of 25 MF

EDR WORD	BITS 31 — 16		BITS 15 — 0	
1	UVS Mode	MF- A	UVS Mode	MF- B
2	UVS Readout Flags	MF- 1	UVS Readout Flags	MF- 6
3	UVS Readout Flags	MF-11	UVS Readout Flags	MF-16
4	UVS Readout Flags	MF-21	Spares	

where A = 5 for segment 1
45 for segment 2
65 for segment 3
85 for segment 4
105 for segment 5
145 for segment 6
165 for segment 7
185 for segment 8
205 for segment 9
245 for segment 10
265 for segment 11
285 for segment 12

B = 25 for segment 1
125 for segment 5
225 for segment 9

15 — 9	8 — 0
FILL	UVS Readout Flags

Structure of the UVS Readout Flags
9 bits right justified in a 16 bit field

FIGURE 11.9-4

UVS SCIENCE DATA BLOCK FORMAT
CR-5A

EDR WORD	BITS 31 24	BITS 23 16	BITS 15 8	BITS 7 0
1	CHANNEL 1	CHANNEL 2	CHANNEL 5	CHANNEL 6
2	CHANNEL 7	CHANNEL 8	CHANNEL 9	CHANNEL 10
3	CHANNEL 11	CHANNEL 12	CHANNEL 13	CHANNEL 14
4	CHANNEL 15	CHANNEL 16	CHANNEL 17	CHANNEL 18
5	CHANNEL 19	CHANNEL 20	CHANNEL 21	CHANNEL 22
6	CHANNEL 23	CHANNEL 24	CHANNEL 25	CHANNEL 26
7	CHANNEL 27	CHANNEL 28	CHANNEL 29	CHANNEL 30
8	CHANNEL 31	CHANNEL 32	CHANNEL 33	CHANNEL 34
9	CHANNEL 35	CHANNEL 36	CHANNEL 37	CHANNEL 38
10	CHANNEL 39	CHANNEL 40	CHANNEL 41	CHANNEL 42
11	CHANNEL 43	CHANNEL 44	CHANNEL 45	CHANNEL 46
12	CHANNEL 47	CHANNEL 48	CHANNEL 49	CHANNEL 50
13	CHANNEL 51	CHANNEL 52	CHANNEL 53	CHANNEL 54
14	CHANNEL 55	CHANNEL 56	CHANNEL 57	CHANNEL 58
15	CHANNEL 59	CHANNEL 60	CHANNEL 61	CHANNEL 62
16	CHANNEL 63	CHANNEL 64	CHANNEL 65	CHANNEL 66
17	CHANNEL 67	CHANNEL 68	CHANNEL 69	CHANNEL 70
18	CHANNEL 71	CHANNEL 72	CHANNEL 73	CHANNEL 74
19	CHANNEL 75	CHANNEL 76	CHANNEL 77	CHANNEL 78
20	CHANNEL 79	CHANNEL 80	CHANNEL 81	CHANNEL 82
21	CHANNEL 83	CHANNEL 84	CHANNEL 85	CHANNEL 86
22	CHANNEL 87	CHANNEL 88	CHANNEL 89	CHANNEL 90
23	CHANNEL 91	CHANNEL 92	CHANNEL 93	CHANNEL 94
24	CHANNEL 95	CHANNEL 96	CHANNEL 97	CHANNEL 98
25	CHANNEL 99	CHANNEL 100	CHANNEL 101	CHANNEL 102
26	CHANNEL 103	CHANNEL 104	CHANNEL 105	CHANNEL 106
27	CHANNEL 107	CHANNEL 108	CHANNEL 109	CHANNEL 110
28	CHANNEL 111	CHANNEL 112	CHANNEL 113	CHANNEL 114
29	CHANNEL 115	CHANNEL 116	CHANNEL 117	CHANNEL 118
30	CHANNEL 119	CHANNEL 120	CHANNEL 121	CHANNEL 122

Total block length is 30 EDR (32-bit) words
(25 MF; 4 minutes; 122 Data Words)

One 25 minor frame data block (segment) is required to output all 122 UVS channels being readout from the spacecraft in one 4.0 minute UVS instrument cycle. Channels 3, 4 and 123 through 128 are deleted on the spacecraft and not down linked from the spacecraft.

TABLE 11.9-1

UVS SCIENCE DATA BLOCK TABLE
CR-5A

EDR Word	Bits	Minor Frame	SCT 60 MOD 5	Line Count	UVS Data
1	31-24	2	0	161	Channel 1
1	23-16	2	0	161	Channel 2
1	16-8	2	0	161	Channel 5
1	7-0	2	0	161	Channel 6
2	31-24	2	0	161	Channel 7
2	23-16	2	0	161	Channel 8
2	16-8	3	0	321	Channel 9
2	7-0	3	0	321	Channel 10
3	31-24	3	0	321	Channel 11
3	23-16	3	0	321	Channel 12
3	16-8	3	0	321	Channel 13
3	7-0	3	0	321	Channel 14
4	31-24	4	0	481	Channel 15
4	23-16	4	0	481	Channel 16
4	16-8	4	0	481	Channel 17
4	7-0	4	0	481	Channel 18
5	31-24	4	0	481	Channel 19
5	23-16	4	0	481	Channel 20
5	16-8	5	0	641	Channel 21
5	7-0	5	0	641	Channel 22
6	31-24	5	0	641	Channel 23
6	23-16	5	0	641	Channel 24
6	16-8	5	0	641	Channel 25
6	7-0	5	0	641	Channel 26
7	31-24	7	1	161	Channel 27
7	23-16	7	1	161	Channel 28
7	16-8	7	1	161	Channel 29
7	7-0	7	1	161	Channel 30
8	31-24	7	1	161	Channel 31
8	23-16	7	1	161	Channel 32
8	16-8	8	1	321	Channel 33
8	7-0	8	1	321	Channel 34
9	31-24	8	1	321	Channel 35
9	23-16	8	1	321	Channel 36
9	16-8	8	1	321	Channel 37
9	7-0	8	1	321	Channel 38
10	31-24	9	1	481	Channel 39
10	23-16	9	1	481	Channel 40
10	16-8	9	1	481	Channel 41
10	7-0	9	1	481	Channel 42
11	31-24	9	1	481	Channel 43
11	23-16	9	1	481	Channel 44
11	16-8	10	1	641	Channel 45
11	7-0	10	1	641	Channel 46

TABLE 11.9-1 (CONT'D)

UVS SCIENCE DATA BLOCK TABLE
CR-5A

EDR Word	Bits	Minor Frame	SCT 60 MOD 5	Line Count	UVS Data
12	31-24	10	1	641	Channel 47
12	23-16	10	1	641	Channel 48
12	16-8	10	1	641	Channel 49
12	7-0	10	1	641	Channel 50
13	31-24	12	2	161	Channel 51
13	23-16	12	2	161	Channel 52
13	16-8	12	2	161	Channel 53
13	7-0	12	2	161	Channel 54
14	31-24	12	2	161	Channel 55
14	23-16	12	2	161	Channel 56
14	16-8	13	2	321	Channel 57
14	7-0	13	2	321	Channel 58
15	31-24	13	2	321	Channel 59
15	23-16	13	2	321	Channel 60
15	16-8	13	2	321	Channel 61
15	7-0	13	2	321	Channel 62
16	31-24	14	2	481	Channel 63
16	23-16	14	2	481	Channel 64
16	16-8	14	2	481	Channel 65
16	7-0	14	2	481	Channel 66
17	31-24	14	2	481	Channel 67
17	23-16	14	2	481	Channel 68
17	16-8	15	2	641	Channel 69
17	7-0	15	2	641	Channel 70
18	31-24	15	2	641	Channel 71
18	23-16	15	2	641	Channel 72
18	16-8	15	2	641	Channel 73
18	7-0	15	2	641	Channel 74
19	31-24	17	3	161	Channel 75
19	23-16	17	3	161	Channel 76
19	16-8	17	3	161	Channel 77
19	7-0	17	3	161	Channel 78
20	31-24	17	3	161	Channel 79
20	23-16	17	3	161	Channel 80
20	16-8	18	3	321	Channel 81
20	7-0	18	3	321	Channel 82
21	31-24	18	3	321	Channel 83
21	23-16	18	3	321	Channel 84
21	16-8	18	3	321	Channel 85
21	7-0	18	3	321	Channel 86
22	31-24	19	3	481	Channel 87
22	23-16	19	3	481	Channel 88
22	16-8	19	3	481	Channel 89
22	7-0	19	3	481	Channel 90

TABLE 11.9-1 (CONT'D)

UVS SCIENCE DATA BLOCK TABLE
CR-5A

EDR Word	Bits	Minor Frame	SCT 60 MOD 5	Line Count	UVS Data
23	31-24	19	3	481	Channel 91
23	23-16	19	3	481	Channel 92
23	16-8	20	3	641	Channel 93
23	7-0	20	3	641	Channel 94
24	31-24	20	3	641	Channel 95
24	23-16	20	3	641	Channel 96
24	16-8	20	3	641	Channel 97
24	7-0	20	3	641	Channel 98
25	31-24	22	4	161	Channel 99
25	23-16	22	4	161	Channel 100
25	16-8	22	4	161	Channel 101
25	7-0	22	4	161	Channel 102
26	31-24	22	4	161	Channel 103
26	23-16	22	4	161	Channel 104
26	16-8	23	4	321	Channel 105
26	7-0	23	4	321	Channel 106
27	31-24	23	4	321	Channel 107
27	23-16	23	4	321	Channel 108
27	16-8	23	4	321	Channel 109
27	7-0	23	4	321	Channel 110
28	31-24	24	4	481	Channel 111
28	23-16	24	4	481	Channel 112
28	16-8	24	4	481	Channel 113
28	7-0	24	4	481	Channel 114
29	31-24	24	4	481	Channel 115
29	23-16	24	4	481	Channel 116
29	16-8	25	4	641	Channel 117
29	7-0	25	4	641	Channel 118
30	31-24	25	4	641	Channel 119
30	23-16	25	4	641	Channel 120
30	16-8	25	4	641	Channel 121
30	7-0	25	4	641	Channel 122

SECTION XII

EXPERIMENT DATA RECORDS DESCRIPTIONS

UV-5A

UV-5A is identical to CR-5A with the exception of UVS data which is sampled at the GS-8 data rate. Engineering data is at the 10 bps rate. The UVS is commanded as in any GS&E data mode with a UVS command word issued every 60ms. However, the UVS command word appears in telemetry stream as in the CR-5A data mode; every 20th minor frame (3.2 minutes) in the CR-5A Command Subcom data.

12.1 COSMIC RAY SCIENCE (CRS) EXPERIMENT

The CRS EDR physical science record for UV-5A is identical to that of the CR-5A data mode. See section 11.1 for details. CRS data will be tagged as UV-5A.

12.2 INFRARED INTERFEROMETER SPECTROMETER AND RADIOMETER (IRIS) EXPERIMENT

There is no IRIS data in the UV-5A data mode.

12.3 LOW ENERGY CHARGED PARTICLE (LECP) EXPERIMENT

The LECP EDR physical science record for UV-5A is identical to that of the CR-5A data mode. See section 11.3 for details. CRS data will be tagged as UV-5A.

12.4 MAGNETOMETER (MAG) EXPERIMENT

The MAG EDR physical science record for UV-5A is identical to that of the CR-5A data mode. See section 11.4 for details. CRS data will be tagged as UV-5A.

12.5 PLASMA (PLS) EXPERIMENT

The PLS EDR physical science record for UV-5A is identical to that of the CR-5A data mode. See section 11.5 for details. CRS data will be tagged as UV-5A.

12.6 PHOTOPOLARIMETER (PPS) EXPERIMENT

There is no PPS data in the UV-5A data mode.

12.7 PLANETARY RADIO ASTRONOMY (PRA) EXPERIMENT

The PRA EDR physical science record for UV-5A is identical to that of the CR-5A data mode. See section 11.7 for details. CRS data will be tagged as UV-5A.

12.8 PLASMA WAVE (PWS) EXPERIMENT

The PWS EDR physical science record for UV-5A is identical to that of the CR-5A data mode. See section 11.8 for details. CRS data will be tagged as UV-5A.

12.9 ULTRAVIOLET SPECTROMETER (UVS) EXPERIMENT

The UVS EDR for UV-5A is designed to a 48-second instrument measurement period. The logical record corresponds to an instrument measurement period and is also the science physical record structure. Any data not present during the instrument measurement will be filled with binary zeroes.

The science logical/physical record structure is diagrammed in Figure 12-1 and the physical magnetic tape lay-out is shown in Figure 12-2. The physical magnetic lay-out includes a change in decommutation maps during the time period covered by that EDR tape. Figure 12-3 and Table 12-1 define the structure and contents of the UVS science record subheader. Figures 12-4, 12-5 and Table 12-2 define the UV-5A science data block structure and contents.

Appendix A contains the Decommutation Map record format. Appendix B describes the Engineering record format. Appendix C depicts the Record Header which will be Standard on all the physical records written to the UVS EDR tape.

STANDARD HEADER (60 32-BIT WORDS)	SUBHEADER (3 32-BIT WORDS)	SCIENCE DATA (GS = 800 32-BIT WORDS)	= 80 MF in 863 words in UV-5A mode

Figure 12-1 UVS EDR Tape Record (Science) (UV-5A)

STANDARD VOLUME (VOL 1) LABEL	IRG	STANDARD DATA SET (HDR 1) HEADER 1	IRG	STANDARD DATA SET (HDR 2) HEADER 2	IRG	TM	IRG	DECOMMUTATION MAP RECORD	IRG	SCIENCE RECORD 1

IRG	...	IRG	SCIENCE RECORD 60	IRG	ENGINEERING RECORD 1 (48 MINUTES)	IRG	...	IRG	SCIENCE RECORD 1	IRG	...	IRG	SCIENCE RECORD 60 (48 SECONDS)	IRG

DECOMMUTATION MAP RECORD +	IRG	ENGINEERING RECORD 2	IRG	SCI. REC.	...	LAST REC.	IRG	TM	IRG	EOF 1	IRG	EOF 2	IRG	TM	IRG	TM

\+ If Decom Map changed during processing interval for this EDR.

Figure 12-2 Physical Magnetic Tape Layout for UVS (UV-5A)

EDR DATA WORD	BITS 31 24	23 16	15 8	7 0	31 24	23 16	15 8	7 0
1	UVS COMMAND MOD 60 Count Modulo 4 = 0		SPARE		SPARE			
3	SPARE							

Figure 12-3 UVS Science Record Subheader Format (UV-5A)

Table 12-1 UVS Science Record Subheader Block Table (UV-5A)

ITEM	WORD	BITS	DESCRIPTION
1	1	31-16	Instrument FDS command 1 - Extracted in line count 641 of MOD60/modulo 4 = 0, 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, and 56. Records not containing this command will contain spares (zeros).
2	1	15-0	Spare
3	2	31-0	Spare
4	3	31-0	Spare

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
S P A R E								D A T A W O R D							

Figure 12-4 UVS Science Data Word (UV-5A)

EDR DATA WORD	BITS 31 24 23 16	15 8 7 0	31 24 23 16	15 8 7 0
1	DATA WORD 1	DATA WORD 2	DATA WORD 3	DATA WORD 4
3	DATA WORD 5	DATA WORD 6	DATA WORD 7	DATA WORD 8
. . .				
799	DATA WORD 1597	DATA WORD 1598	DATA WORD 1599	DATA WORD 1600

Figure 12-5 UVS Science Data Block Format (UV-5A)

Table 12-2 UVS EDR Science Data Block Table (UV-5A)

ITEM	WORD	BITS	DESCRIPTION	
1	1	31-16	Instrument data word 1	MF 1
2	1	15-0	Instrument data word 2	MF 1
3	2	31-16	Instrument data word 3	MF 1
4	2	15-0	Instrument data word 4	MF 1
.	.	.	.	
.	.	.	.	
1597	799	31-16	Instrument data word 1597	MF 5
1598	799	15-0	Instrument data word 1598	MF 5
1599	800	31-16	Instrument data word 1599	MF 5
1600	800	15-0	Instrument data word 1600	MF 5

Instrument data words are 10 bits in length and right justified in a 16 bit field.

The Standard Record Header described in the following pages is designed to be utilized as the record header for all physical records written to an EDR tape.

Part A of this section describes the Standard Record Header to be written as part of every GS or OC derived science record. The contents and record structure are described in Figure C-1 and Table C-1.

Part B of this section describes the Standard Record Header to be written as part of every CR-6 derived science record. The contents and record structure are described in Figure C-2 and Table C-2.

Part C of this section describes the Standard Record Header to be written as part of every Engineering derived science record. The contents and record structure are described in Figure C-3 and Table C-3.

Part D of this section describes the Standard Record Header to be written as part of every CR-2 derived science record. The contents and record structure are described in Figure C-4 and Table C-4.

Part E of this section describes the Standard Record Header to be written as part of every Monitor derived science record. The contents and record structure are described in Figure C-5 and Table C-5.

Part F of this section describes the Standard Record Header to be written as part of every CR-1 derived science record. The contents and record structure are described in Figure C-6 and Table C-6.

Part G of this section describes the Standard Record Header to be written as part of every CR-3 derived science record. The contents and record structure are described in Figure C-7 and Table C-7.

Part H of this section describes the Standard Record Header to be written as part of every CR-4 derived science record. The contents and record structure are described in Figure C-8 and Table C-8.

Part I of this section describes the Standard Record Header to be written as part of every CR-5 derived science record. The contents and record structure are described in Figure C-9 and Table C-9.

Part J of this section describes the Standard Record Header to be written as part of every CR-5A derived science record. The contents and record structure are described in Figure C-10 and Table C-10.

Part K of this section describes the Standard Record Header to be written as part of every UV-5A derived science record. The contents and record structure are described in Figure C-11 and Table C-11.

For interpretation of day number and hour of the day from hour of the year, divide the number of hours by 24. The whole number is the day, the remainder is the hour.

For interpretation of minute and seconds of the current minute, divide the number of minutes by 60. The whole number is the minutes, the remainder is the seconds.

PART A (GS, OC, IM)

Standard Record Header for low rate general science data from data modes GS-3, GS-5, GS-6, GS-7, GS-8, GS-9, OC-1, OC-2, or OC-3 or extracted from imaging data or playback data.

NOTE: Data Presence and Golay/Reed-Solomon Correction Flags.

1) GS Type Records:

A pair of 8-bit words appear in the standard header for each minor frame (160 per 80 MF record). The first word is used to indicate data presence, the second indicates Golay/Reed-Solomon correction. Only the 5 LSB bits are significant. Each of the 5 bits corresponds to one of the five 432-bit Golay segments that constitute one GS type MF (extracted).

The bit assignments are:

BIT	BITS OF MF REPRESENTED
4	1 - 432
3	433 - 864
2	865 - 1296
1	1297 - 1728
0	1728 - 2160
5, 6, 7	Spares (=0)

The bit definitions are:

For data presence	1 = filler data 0 = data present
For Golay Correction	1 = Golay corrected 0 = Not Golay corrected

For non-segmented (non-extracted) GS Type data and Reed-Solomon data, all the bits in the word are "ganged" together and set to one value (0 or 1).

2) Non-Golay Type Records:

Only data presence words are available and are defined as above for non-segmented GS type data. All bits are "ganged" and set to 0 or 1. The unused bits (Golay words in GS type records) are blocked as filler bits following the data presence words.

Table C-1

Standard (GS, OC, IM)

Experiment Data Record Header

Item	Word	Bits	Description
4	2	31-16	Physical Record Number - Sequential binary count of all physical records written on this EDR tape. The count is incremented by one (1) after each successful write. This number is initially set to one (1).
5	2	15-8	Data Mode - Contains the telemetry format with respect to data content and data rate. HEX MODE 00 = Engineering Zero - (See FID) 01 = CR-2 02 = CR-3 03 = CR-4 04 = CR-5 05 = CR-6 06 = CR-7 07 = CR-1 08 = GS-10A 09 = N/A 0A = GS-3 0B = N/A 0C = GS-7 0D = N/A 0E = GS-6 0F = GS-4 10 = N/A 11 = GS-2 12 = N/A 13 = N/A 14 = N/A 15 = N/A 16 = OC-2 17 = OC-1 18 = CR-5A 19 = GS-10 1A = GS-8 1B = N/A 1C = N/A 1D = UV-5A 1E = N/A 1F = N/A

Table C-1

Standard (GS, OC, IM)

Experiment Data Record Header

Item	Word	Bits	Description
6	2	7-6	Engineering Extraction Flag - Identifies whether the engineering data was extracted out of another data stream or was the primary data stream. 00 = stand-alone 11 = extracted
7	2	5	S/C Playback - Indicates that the data in this record in Spacecraft tape recorder playback data. 0 = no 1 = yes This flag is set only for data extracted from PB-1, PB-2, PB-3, PB-7, PB-8, PB-10, PB-12, PB-15 or PB-16 telemetry mode data. Will be set manually by DRS for PB-5.
8	2	4-0	Spare
			Starting Earth Received Time - Greenwich Mean Time (GMT) of the first PN bit of the first minor frame (MF) and contained in this record from which this record's prime data is extracted. Binary representation will be used.
9	3	31-16	Hour of Current Year - Binary hours since the beginning of the current year. See last paragraph Page C-2.
10	3	15-0	Seconds of Current Hour - Binary seconds since the beginning of current hour.

Table C-1

Standard (GS, OC, IM)

Experiment Data Record Header

Item	Word	Bits	Description
13	4	7-6	<u>Data Source</u> - Contains information as to wether the data was derived from an IDR or Multiple Wide Band data (which indicates that the data was logged at the station and then transmitted to JPL from the log tapes). 00 = Unused 01 = Real-Time 10 = IDR 11 = Replay
14	4	5-4	<u>Golay/Reed-Solomon Encoded Flag</u> - Indicates that the data in this record have been Golay or Reed-Solomon coded for transmission to Earth and decoded upon receipt at Earth, so any correction will be flagged in the header of this record. 00 = Not Decoded 01 = Golay Decoded 10 = Reed-Solomon Decoded 11 = Unused
15	4	3-0	<u>Segment Number</u> - Other than those in the table below are zeros: INSTRUMENT/ <u>DATA MODE</u> — MOD-60 <u>COUNT</u> PPS/OC-1/OC-2 — 1 — 1-20 2 — 21-40 3 — 41-60 4 — 61-80 PPS/GS — 1 — 0,5,10,...55 2 — GS=1-80 — 1,6,11,...56 3 — CR-1=1-80 — 2,7,12,...57 4 — CR-2=1-80 — 3,8,13,...58 5 — 4,9,14,...59

Table C-1

Standard (GS, OC, IM)

Experiment Data Record Header

Item	Word	Bits	Description
32	10	23-16	03 = 40 BPS 04 = 80 BPS 05 = 160 BPS 06 = 320 BPS 07 = 640 BPS 08 = 1200 BPS 09 = 1280 BPS 0A = 2560 BPS 0B = 7200 BPS 0C = 19,200 BPS 0D = 21,600 BPS 0E = 29866 $^{2}/_{3}$ 0F = 44,800 BPS 10 = 67,200 BPS 11 = 89,600 BPS 12 = 115,200 BPS 13 = 33,600 BPS 14 = 57,600 BPS 15 = 186 BPS 16 = 120 BPS 17 = 450 BPS 18 = 1,350 BPS 19 = 2,100 BPS 1A = 3,600 BPS 1B = 2,500 BPS 1C = 7,500 BPS 1D = 11 $^{2}/_{3}$ 1E = 5,600 BPS 1F = 9,600 BPS 20 = 47 BPS 21 = 8,400 BPS 22 = 12,800 BPS 23 = 14,400 BPS 24 = 4,800 BPS 25 = 4,200 BPS 26 = 16,800 BPS 27 = 10,800 BPS 28 = 22,400 BPS 29 = 25,200 BPS
33	10	15-8	<u>Efective Rate</u> - Contains the effective bit rate of this data within the downlink telemetry rate. (Refer to downlink telemetry rate code)
34	10	7-0	<u>FID</u> - Format ID word used only for Engineering record (Extracted from telemetry data stream) Bits <u>7 & 6 Format Type</u> 0 0 Engineering without AACS Memory Readout 0 1 Engineering with AACS Memory Readout 1 0 Imaging/Playback 1 1 GS&E Bits <u>5 & 4 Engineering Data Rate (bps)</u> 0 0 10 0 1 40 1 0 1200 1 1 2400, 3600 or 7200 (1200 recorded)

PART J

Standard Record Header for extracted data from data mode CR-5A.

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description
1	1	31-8	Project Identification - Identifies this tape as being written by the Voyager project. The letters M, J, and S will be written in BCD.
2	1	7-4	Record Identification - Identifies which experiment and data subgroup to which this record pretains. 0000 = Spare 0001 = CRS Science Record 0010 = IRIS (Unused in CR-5A data Mode) 0011 = LECP Science Record 0100 = MAG Science Record 0101 = PLS Science Record 0110 = PPS Science Record 0111 = PRA Science Record 1000 = PWS Science Record 1001 = UVS Science Record 1010 = RSS Science Record (Unused in CR-5A) 1011 = Engineering Record (DQSW = ZERO) 1100 = Unused 0101 = Imaging Status Record (Unused in CR-5A) 0110 = Monitor Record (DQSW = ZERO) 0111 = Decommutation Map Record (DQSW = ZERO)
3	1	3-0	Spacecraft Identification - Identifies the spacecraft transmitting this data. 0000 = Flt 2 (S/C 32) 0001 = Flt 1 (S/C 31) 0010 = PTM (Proof Test Module) 0011 = Unknown 0100 = SIM 1 (S/C 41) 0101 = SIM 2 (S/C 42) 0110 = Unknown . . . . . . 1111 = Unknown

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description
4	2	31-16	Physical Record Number - Sequential binary count of all physical records written on this EDR tape. The count is incremented by one (1) after each successful write. This number is initially set to one (1).
5	2	15-8	Data Mode - Contains the telemetry format with respect to data content and data rate. HEX MODE 00 = Engineering Zero - (See FID) 01 = CR-2 02 = CR-3 03 = CR-4 04 = CR-5 05 = CR-6 06 = CR-7 07 = CR-1 08 = GS-10A 09 = N/A 0A = GS-3 0B = N/A 0C = GS-7 0D = N/A 0E = GS-6 0F = GS-4 10 = N/A 11 = GS-2 12 = N/A 13 = N/A 14 = N/A 15 = N/A 16 = OC-2 17 = OC-1 18 = CR-5A 19 = GS-10 1A = GS-8 1B = N/A 1C = N/A 1D = UV-5A 1E = N/A 1F = N/A

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description
6	2	7-6	Engineering Extraction Flag - Identifies whether the engineering data was extracted out of another data stream or was the primary data stream. 00 = stand-alone 11 = extracted
7	2	5	S/C Playback - Indicates that the data in this record in Spacecraft tape recorder playback data. 0 = no 1 = yes This flag is set only for data extracted from PB-1, PB-2, PB-3, PB-7, PB-8, PB-10, PB-12, PB-15 or PB-16 telemetry mode data. Will be set manually by DRS for PB-5.
8	2	4-0	Spare
			Starting Earth Received Time - Greenwich Mean Time (GMT) of the first PN bit of the first minor frame (MF) and contained in this record from which this record's prime data is extracted. Binary representation will be used.
9	3	31-16	Hour of Current Year - Binary hours since the beginning of the current year. See last paragraph Page C-2.
10	3	15-0	Seconds of Current Hour - Binary seconds since the beginning of current hour.
11	4	31-16	Milliseconds of Current Second - Binary milliseconds of the current second.
12	4	15-8	Year - Binary year (i.e., 77, 78).

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description
13	4	7-6	<u>Data Source</u> - Contains information as to wether the data was derived from an IDR or Multiple Wide Band data (which indicates that the data was logged at the station and then transmitted to JPL from the log tapes). 00 = Unused 01 = Real-Time 10 = IDR 11 = Replay
14	4	5-4	<u>Golay/Reed-Solomon Encoded Flag</u> - Indicates that the data in this record have been Golay or Reed-Solomon coded for transmission to Earth and decoded upon receipt at Earth, so any correction will be flagged in the header of this record. 00 = Not Decoded 01 = Golay Decoded 10 = Reed-Solomon Decoded 11 = Unused
15	4	3-0	<u>Segment Number</u> - Other than those in the table below are zeros: INSTRUMENT/ DATA MODE — SEG NO. — SEGS WITH MFs — MOD-60 COUNT PRA — 1 — 1-40 — EVEN 0 2 — 41-80 — 8 3 — 81-120 — 16 4 — 121-160 — 24 5 — 161-200 — 32 6 — 201-240 — 40 7 — 241-280 — 48 8 — 281-20 — 56 9 — 21-60 — ODD 4 10 — 61-100 — 12 11 — 101-140 — 20 12 — 141-180 — 28 13 — 181-220 — 36 14 — 221-260 — 44 15 — 261-300 — 52

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description			
			INSTRUMENT/ DATA MODE	SEG NO.	SEGS WITH MFs	MOD-60 COUNT
			PLS, PWS, LECP	1	1-20	0
				2	21-40	4
				3	41-60	8
				4	61-80	12
				5	81-100	16
				6	101-120	20
				7	121-140	24
				8	141-160	28
				9	161-180	32
				10	181-200	36
				11	201-220	40
				12	221-240	44
				13	241-260	48
				14	261-280	52
				15	281-300	56
			MAG, UVS	1	1-25	0
				2	26-50	5
				3	51-75	10
				4	76-100	15
				5	101-125	20
				6	126-150	25
				7	151-175	30
				8	176-200	35
				9	201-225	40
				10	226-250	45
				11	251-275	50
				12	276-300	55
			CRS	1	1-60	0
				2	41-120	12
				3	81-180	24
				4	121-240	36
				5	241-300	48

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description
			Ending Earth Received Time - GMT of the first bit of the last MF that received and contained in this record's prime data is extracted.
16	5	31-16	Hour of Current Year - Binary hours since the beginning of the current year.
17	5	15-0	Seconds of Current Hour - Binary second since the beginning of the current hour.
18	6	31-16	Millisecond of Current Second Binary milliseconds.
19	6	15-8	Year - Binary year (i.e., 77, 78).
20	6	7-0	Software Version - Contains the identification (in binary) of the software system operating in the computer string which created the current record.
			Spacecraft Event Time - GMT that corresponds to the Spacecraft Time of the first MF from which this records prime data was extracted, in binary. The format is as follows:
21	7	31-16	Hour of Current Year - Binary hours since the beginning of the current year.
22	7	15-0	Seconds of Current Hour - Binary second since the beginning of the current hour.
23	8	31-16	Millisecond of Current Second Binary milliseconds.
24	8	15-8	Year - Binary year (i.e., 77, 78).
25	8	7-4	Spacecraft Event Time Flag - 0000 = input by NORT file 1111 = input by EDRPROC
26	8	3-0	FDSC Correction Flag - Indicates that the FDSC has been corrected. (1 = corrected, 0 = OK) Bit #3 - Spare Bit #2 - MOD 2**16 Bit #1 - MOD 60 Bit #0 - Line Count

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description
27	9	31-16	MOD 2 Counters - Contains the 16 bit MM subcom every 48 minutes.
28	9	15-8	MOD 60 Counter - Contains the modulo 60 spacecraft time as created within the FDS for the first minor frame received that is contained in this record. Is incremented by 1 every 48 seconds.
29	9 10	7-0 31-24	Line Count - Contains the ISS line count which ranges between 1 and 800. Increments every 60ms.
32	10	23-16	Downlink Telemetry Rate - Contains the rate at which the Voyager spacecraft transmitted this telemetry data to Earth.

HEX	RATE	HEX	RATE
00	= unused	15	= 186 BPS
01	= 10 BPS	16	= 120 BPS
02	= 20 BPS	17	= 450 BPS
03	= 40 BPS	18	= 1,350 BPS
04	= 80 BPS	19	= 2,100 BPS
05	= 160 BPS	1A	= 3,600 BPS
06	= 320 BPS	1B	= 2,500 BPS
07	= 640 BPS	1C	= 7,500 BPS
08	= 1200 BPS	1D	= 11 $^{2}/_{3}$
09	= 1280 BPS	1E	= 5,600 BPS
0A	= 2560 BPS	1F	= 9,600 BPS
0B	= 7200 BPS	20	= 47 BPS
0C	= 19,200 BPS	21	= 8,400 BPS
0D	= 21,600 BPS	22	= 12,800 BPS
0E	= 29,866 $^{2}/_{3}$ BPS	23	= 14,400 BPS
0F	= 44,800 BPS	24	= 4,800 BPS
10	= 67,200 BPS	25	= 4,200 BPS
11	= 89,600 BPS	26	= 16,800 BPS
12	= 115,200 BPS	27	= 10,800 BPS
13	= 33,600 BPS	28	= 22,400 BPS
14	= 57,600 BPS	29	= 25,200 BPS

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description
33	10	15-8	Efective Rate - Contains the effective bit rate of this data within the downlink telemetry rate. (Refer to downlink telemetry rate code)
34	10	7-0	FID - Format ID word used only for Engineering record (Extracted from telemetry data stream) Bits 7 & 6 Format Type 0 0 Engineering without AACS Memory Readout 0 1 Engineering with AACS Memory Readout 1 0 Imaging/Playback 1 1 GS&E Bits 5 & 4 Engineering Data Rate (bps) 0 0 10 0 1 40 1 0 1200 1 1 2400, 3600 or 7200 (1200 recorded) Bits 3,2,1 Engineering Data Mode 0 0 0 Launch 0 0 1 Cruise 0 1 0 Encounter 0 1 1 TCM 1 0 0 Special (Modified Cruise) 1 0 1 Science Maneuver 1 1 0 CCS Memory Readout 1 1 1 FDS Memory Readout Bits 0 Spacecraft ID 1 = FLT 1 (31) 0 = FLT 2 (32)
35	11	31-24	Bit Error Tolerance (BET) - Contains the binary PN bit error tolerance during frame synchronization.

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description
36	11	23-16	DSN Equipment Configuration - Contains the latest status of any change in station equipment configuration during the time corresponding to the first MF received in this record. BIT 23-21 = Receiver 001 = #1 010 = #2 011 = #3 100 = #4 BIT 20-18 = Subcarrier Demodulator (SDA) 001 = #1 010 = #2 011 = #3 100 = #4 BIT 17-16 = Telemetry Processor (TPA) 00 = Telemetry Processor (TPA) #1, Symbol Synchronizer (SSA) #1 (TPA #3 at conjoint station) 01 = TPA #1 (or 3), SSA #2 10 = TPA #2, SSA #3 11 = TPA #2, SSA #4
37	11	15-0	Receiver Automatic Gain Control (AGC) - Contains the AGC extracted from the GCF block from which the first minor frame was derived. (Binary)
38	12	31-24	DSN Station Number - Contains the identification number of the DSN station originating the data contained in the first minor frame received of this record. (Binary) See page D-12, Item 41.
39	12	23-16	Spare
40	12	15-0	Estimated Bit Error Count (EBEC) - Count of the number of bits in error.
41	13	31-16	Symbol Signal-to-Noise Ratio (SNR) - Contains the symbol SNR extracted from the GCF block from which the first minor frame received was derived. BINARY

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description
42	13	15-0	Decoder SNR - Contains the bit error rate out of the Data Decoder Assembly.
43	14	31-16	Physical Record Number - A. For individual EDRs: Unused (set to zeros) B. For combined EDRs (MDR): Physical record number in binary
44	14	15-8	DQSW - Data Quality Status Word for MF-1 through MF-8
45	14	7-0	DATA QUALITY INDICATORS (DQI) Bit 7 = Unused Bit 6 = Unused Bit 5 = Unused Bit 4 = PN Error Outside BET (0=none, 1=bit errors exceed Bit Error Tolerance) Bit 3 = PN Error Within BET (0=none, 1=bit errors) Bit 2 = Spare Bit 1 = Valid Data Flag (0=valid, 1=no data) Bit 0 = GCF Block Error (0=no, 1=yes)
46	15	31-16	DQSW/DQI for MF9-MF16
47	15	15-0	DQSW/DQI for MF17-MF24
48	16	31-16	DQSW/DQI for MF25-MF32
49	16	15-0	DQSW/DQI for MF33-MF40
50	17	31-16	DQSW/DQI for MF41-MF48
51	17	15-0	DQSW/DQI for MF49-MF56
52	18	31-16	DQSW/DQI for MF57-MF64
53	18	15-0	DQSW/DQI for MF65-MF72
54	19	31-16	DQSW/DQI for MF73-MF75

why 8/word?

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description
			<u>Data Presence</u>
			A 4-bit field for Data Presence Indication is supplied for up to 75 minor frames to which this header is applied. All 4 bits are set to zero if data is present, otherwise all bits are set to 1.
55	19	15-12	Data Presence Indicators for MF-1
56	19	11-8	Data Presence Indicators for MF-2
57	19	7-4	Data Presence Indicators for MF-3
58	19	3-0	Data Presence Indicators for MF-4
59	20	31-28	Data Presence Indicators for MF-5
60	20	27-24	Data Presence Indicators for MF-6
61	20	23-20	Data Presence Indicators for MF-7
62	20	19-16	Data Presence Indicators for MF-8
63	20	15-12	Data Presence Indicators for MF-9
64	20	11-8	Data Presence Indicators for MF-10
65	20	7-4	Data Presence Indicators for MF-11
66	20	3-0	Data Presence Indicators for MF-12
67	21	31-28	Data Presence Indicators for MF-13
68	21	27-24	Data Presence Indicators for MF-14
69	21	23-20	Data Presence Indicators for MF-15
70	21	19-16	Data Presence Indicators for MF-16
71	21	15-12	Data Presence Indicators for MF-17
72	21	11-8	Data Presence Indicators for MF-18
73	21	7-4	Data Presence Indicators for MF-19
74	21	3-0	Data Presence Indicators for MF-20
75	22	31-28	Data Presence Indicators for MF-21
76	22	27-24	Data Presence Indicators for MF-22
77	22	23-20	Data Presence Indicators for MF-23
78	22	19-16	Data Presence Indicators for MF-24
79	22	15-12	Data Presence Indicators for MF-25
80	22	11-8	Data Presence Indicators for MF-26
81	22	7-4	Data Presence Indicators for MF-27
82	22	3-0	Data Presence Indicators for MF-28
83	23	31-28	Data Presence Indicators for MF-29
84	23	27-24	Data Presence Indicators for MF-30
85	23	23-20	Data Presence Indicators for MF-31
86	23	19-16	Data Presence Indicators for MF-32
87	23	15-12	Data Presence Indicators for MF-33
88	23	11-8	Data Presence Indicators for MF-34
89	23	7-4	Data Presence Indicators for MF-35

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description
90	23	3-0	Data Presence Indicators for MF-36
91	24	31-28	Data Presence Indicators for MF-37
92	24	27-24	Data Presence Indicators for MF-38
93	24	23-20	Data Presence Indicators for MF-39
94	24	19-16	Data Presence Indicators for MF-40
95	24	15-12	Data Presence Indicators for MF-41
96	24	11-8	Data Presence Indicators for MF-42
97	24	7-4	Data Presence Indicators for MF-43
98	24	3-0	Data Presence Indicators for MF-44
99	25	31-28	Data Presence Indicators for MF-45
100	25	27-24	Data Presence Indicators for MF-46
101	25	23-20	Data Presence Indicators for MF-47
102	25	19-16	Data Presence Indicators for MF-48
103	25	15-12	Data Presence Indicators for MF-49
104	25	11-8	Data Presence Indicators for MF-50
105	25	7-4	Data Presence Indicators for MF-51
106	25	3-0	Data Presence Indicators for MF-52
107	26	31-28	Data Presence Indicators for MF-53
108	26	27-24	Data Presence Indicators for MF-54
109	26	23-20	Data Presence Indicators for MF-55
110	26	19-16	Data Presence Indicators for MF-56
111	26	15-12	Data Presence Indicators for MF-57
112	26	11-8	Data Presence Indicators for MF-58
113	26	7-4	Data Presence Indicators for MF-59
114	26	3-0	Data Presence Indicators for MF-60
115	27	31-28	Data Presence Indicators for MF-61
116	27	27-24	Data Presence Indicators for MF-62
117	27	23-20	Data Presence Indicators for MF-63
118	27	19-16	Data Presence Indicators for MF-64
119	27	15-12	Data Presence Indicators for MF-65
120	27	11-8	Data Presence Indicators for MF-66
121	27	7-4	Data Presence Indicators for MF-67
122	27	3-0	Data Presence Indicators for MF-68
123	28	31-28	Data Presence Indicators for MF-69
124	28	27-24	Data Presence Indicators for MF-70
125	28	23-20	Data Presence Indicators for MF-71
126	28	19-16	Data Presence Indicators for MF-72
127	28	15-12	Data Presence Indicators for MF-73
128	28	11-8	Data Presence Indicators for MF-74
129	28	7-4	Data Presence Indicators for MF-75
130	28	3-0	Spares
131	29	31-0	Spares
132	30	31-0	Spares

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description
133	31	31-0	Spares
134	32	31-0	Spares
135	33	31-0	Spares
136	34	31-0	Spares
137	35	31-0	Spares
138	36	31-0	Spares
139	37	31-0	Spares
140	38	31-0	Spares
141	39	31-0	Spares
142	40	31-0	Spares
143	41	31-0	Spares
144	42	31-0	Spares
145	43	31-0	Spares
146	44	31-0	Spares
147	45	31-0	Spares
148	46	31-0	Spares
149	47	31-0	Spares
150	48	31-0	Spares
151	49	31-0	Spares
152	50	31-0	Spares
153	51	31-0	Spares
154	52	31-0	Spares
155	53	31-0	Spares
156	54	31-0	Spares
157	55	31-0	Spares
158	56	31-0	Spares
159	57	31-0	Spares
160	58	31-0	Spares
161	59	31-0	Spares
162	60	31-24	DRS Data Type - Numbers are in HEX IRIS = 20 ISR = 29 CRS = 21 DCOM = 2A LECP = 22 MON 5-8 = 2B MAG = 23 ENGS = 2C PLS = 24 ENGE = 2D PPS = 25 DCMS = 2E PRA = 26 ENGC = 2F PWS = 27 MON 5-9 = 30 UVS = 28

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description
163	60	23-16	Golay/Reed-Solomon Correction Bit Error Count - Count of PN errors in a 48 second period (80 MF), corresponding to this major frame, which are in error. Maximum count displayed will be 255.
164	60	15-0	Golay/Reed-Solomon Bit Error Summation - Total number of bits modified by the Golay/Reed-Solomon Correction algorithm during a major frame.

PART K

Standard Record Header for extracted data from data mode UV-5A.

Table C-1

Standard (UV-5A)

Experiment Data Record Header

Item	Word	Bits	Description
1	1	31-8	Project Identification - Identifies this tape as being written by the Voyager project. The letters M, J, and S will be written in BCD.
2	1	7-4	Record Identification - Identifies which experiment and data subgroup to which this record pretains. 0000 = Spare 0001 = CRS Science Record 0010 = IRIS (Unused in CR-5A data Mode) 0011 = LECP Science Record 0100 = MAG Science Record 0101 = PLS Science Record 0110 = PPS Science Record 0111 = PRA Science Record 1000 = PWS Science Record 1001 = UVS Science Record 1010 = RSS Science Record (Unused in CR-5A) 1011 = Engineering Record (DQSW = ZERO) 1100 = Unused 0101 = Imaging Status Record (Unused in CR-5A) 0110 = Monitor Record (DQSW = ZERO) 0111 = Decommutation Map Record (DQSW = ZERO)
3	1	3-0	Spacecraft Identification - Identifies the spacecraft transmitting this data. 0000 = Flt 2 (S/C 32) 0001 = Flt 1 (S/C 31) 0010 = PTM (Proof Test Module) 0011 = Unknown 0100 = SIM 1 (S/C 41) 0101 = SIM 2 (S/C 42) 0110 = Unknown . . . . . . 1111 = Unknown

Table C-1

Standard (UV-5A)

Experiment Data Record Header

Item	Word	Bits	Description
4	2	31-16	Physical Record Number - Sequential binary count of all physical records written on this EDR tape. The count is incremented by one (1) after each successful write. This number is initially set to one (1).
5	2	15-8	Data Mode - Contains the telemetry format with respect to data content and data rate. HEX MODE 00 = Engineering Zero - (See FID) 01 = CR-2 02 = CR-3 03 = CR-4 04 = CR-5 05 = CR-6 06 = CR-7 07 = CR-1 08 = GS-10A 09 = N/A 0A = GS-3 0B = N/A 0C = GS-7 0D = N/A 0E = GS-6 0F = GS-4 10 = N/A 11 = GS-2 12 = N/A 13 = N/A 14 = N/A 15 = N/A 16 = OC-2 2 17 = OC-1 18 = CR-5A 29 19 = GS-10 1A = GS-8 GS-8 26 1B = N/A 1C = N/A 1D = UV-5A 1E = N/A 1F = N/A

Table C-1

Standard (UV-5A)

Experiment Data Record Header

Item	Word	Bits	Description
6	2	7-6	Engineering Extraction Flag - Identifies whether the engineering data was extracted out of another data stream or was the primary data stream. 00 = stand-alone 11 = extracted
7	2	5	S/C Playback - Indicates that the data in this record in Spacecraft tape recorder playback data. 0 = no 1 = yes This flag is set only for data extracted from PB-1, PB-2, PB-3, PB-7, PB-8, PB-10, PB-12, PB-15 or PB-16 telemetry mode data. Will be set manually by DRS for PB-5.
8	2	4-0	Spare
			Starting Earth Received Time - Greenwich Mean Time (GMT) of the first PN bit of the first minor frame (MF) and contained in this record from which this record's prime data is extracted. Binary representation will be used.
9	3	31-16	Hour of Current Year - Binary hours since the beginning of the current year. See last paragraph Page C-2.
10	3	15-0	Seconds of Current Hour - Binary seconds since the beginning of current hour.
11	4	31-16	Milliseconds of Current Second - Binary milliseconds of the current second.
12	4	15-8	Year - Binary year (i.e., 77, 78).

Table C-1

Standard (UV-5A)

Experiment Data Record Header

Item	Word	Bits	Description
13	4	7-6	<u>Data Source</u> - Contains information as to wether the data was derived from an IDR or Multiple Wide Band data (which indicates that the data was logged at the station and then transmitted to JPL from the log tapes). 00 = Unused 01 = Real-Time 10 = IDR 11 = Replay
14	4	5-4	<u>Golay/Reed-Solomon Encoded Flag</u> - Indicates that the data in this record have been Golay or Reed-Solomon coded for transmission to Earth and decoded upon receipt at Earth, so any correction will be flagged in the header of this record. 00 = Not Decoded 01 = Golay Decoded 10 = Reed-Solomon Decoded 11 = Unused
15	4	3-0	<u>Segment Number</u> - Other than those in the table below are zeros: INSTRUMENT/ DATA MODE — SEG NO. — SEGS WITH MFs — MOD-60 COUNT PRA — 1 — 1-40 — EVEN 0 2 — 41-80 — 8 3 — 81-120 — 16 4 — 121-160 — 24 5 — 161-200 — 32 6 — 201-240 — 40 7 — 241-280 — 48 8 — 281-20 — 56 9 — 21-60 — ODD 4 10 — 61-100 — 12 11 — 101-140 — 20 12 — 141-180 — 28 13 — 181-220 — 36 14 — 221-260 — 44 15 — 261-300 — 52

Table C-1

Standard (UV-5A)

Experiment Data Record Header

Item	Word	Bits	Description			
			INSTRUMENT/ DATA MODE	SEG NO.	SEGS WITH MFs	MOD-60 COUNT
			PLS, PWS, LECP	1	1-20	0
				2	21-40	4
				3	41-60	8
				4	61-80	12
				5	81-100	16
				6	101-120	20
				7	121-140	24
				8	141-160	28
				9	161-180	32
				10	181-200	36
				11	201-220	40
				12	221-240	44
				13	241-260	48
				14	261-280	52
				15	281-300	56
			MAG	1	1-25	0
				2	26-50	5
				3	51-75	10
				4	76-100	15
				5	101-125	20
				6	126-150	25
				7	151-175	30
				8	176-200	35
				9	201-225	40
				10	226-250	45
				11	251-275	50
				12	276-300	55
			CRS	1	1-60	0
				2	41-120	12
				3	81-180	24
				4	121-240	36
				5	241-300	48
			UVS	1		even
				2		odd

Table C-1

Standard (UV-5A)

Experiment Data Record Header

Item	Word	Bits	Description
			Ending Earth Received Time - GMT of the first bit of the last MF that received and contained in this record's prime data is extracted.
16	5	31-16	Hour of Current Year - Binary hours since the beginning of the current year.
17	5	15-0	Seconds of Current Hour - Binary second since the beginning of the current hour.
18	6	31-16	Millisecond of Current Second Binary milliseconds.
19	6	15-8	Year - Binary year (i.e., 77, 78).
20	6	7-0	Software Version - Contains the identification (in binary) of the software system operating in the computer string which created the current record.
			Spacecraft Event Time - GMT that corresponds to the Spacecraft Time of the first MF from which this records prime data was extracted, in binary. The format is as follows:
21	7	31-16	Hour of Current Year - Binary hours since the beginning of the current year.
22	7	15-0	Seconds of Current Hour - Binary second since the beginning of the current hour.
23	8	31-16	Millisecond of Current Second Binary milliseconds.
24	8	15-8	Year - Binary year (i.e., 77, 78).
25	8	7-4	Spacecraft Event Time Flag - 0000 = input by NORT file 1111 = input by EDRPROC
26	8	3-0	FDSC Correction Flag - Indicates that the FDSC has been corrected. (1 = corrected, 0 = OK) Bit #3 - Spare Bit #2 - MOD 2**16 Bit #1 - MOD 60 Bit #0 - Line Count

Table C-1

Standard (UV-5A)

Experiment Data Record Header

Item	Word	Bits	Description
27	9	31-16	MOD 2 Word Counter - Contains the modulo 2 word count of the data bits in the current MM subframe every 48 minutes.
28	9	15-8	MOD 60 Counter - Contains the modulo 60 spacecraft time as created within the FDS for the first minor frame received that is contained in this record. Is incremented by 1 every 48 seconds.
29	9 10	7-0 31-24	Line Count - Contains the ISS line count which ranges between 1 and 800. Increments every 60ms.
32	10	23-16	Downlink Telemetry Rate - Contains the rate at which the Voyager spacecraft transmitted this telemetry data to Earth.

HEX	RATE	HEX	RATE
00	= unused	15	= 186 BPS
01	= 10 BPS	16	= 120 BPS
02	= 20 BPS	17	= 450 BPS
03	= 40 BPS	18	= 1,350 BPS
04	= 80 BPS	19	= 2,100 BPS
05	= 160 BPS	1A	= 3,600 BPS
06	= 320 BPS	1B	= 2,500 BPS
07	= 640 BPS	1C	= 7,500 BPS
08	= 1200 BPS	1D	= 11 $^{2}/_{3}$
09	= 1280 BPS	1E	= 5,600 BPS
0A	= 2560 BPS	1F	= 9,600 BPS
0B	= 7200 BPS	20	= 47 BPS
0C	= 19,200 BPS	21	= 8,400 BPS
0D	= 21,600 BPS	22	= 12,800 BPS
0E	= 29,866$^{2}/_{3}$ BPS	23	= 14,400 BPS
0F	= 44,800 BPS	24	= 4,800 BPS
10	= 67,200 BPS	25	= 4,200 BPS
11	= 89,600 BPS	26	= 16,800 BPS
12	= 115,200 BPS	27	= 10,800 BPS
13	= 33,600 BPS	28	= 22,400 BPS
14	= 57,600 BPS	29	= 25,200 BPS

Table C-1

Standard (UV-5A)

Experiment Data Record Header

Item	Word	Bits	Description
33	10	15-8	Efective Rate - Contains the effective bit rate of this data within the downlink telemetry rate. (Refer to downlink telemetry rate code)
34	10	7-0	FID - Format ID word used only for Engineering record (Extracted from telemetry data stream) Bits 7 & 6 Format Type 0 0 Engineering without AACS Memory Readout 0 1 Engineering with AACS Memory Readout 1 0 Imaging/Playback 1 1 GS&E Bits 5 & 4 Engineering Data Rate (bps) 0 0 10 0 1 40 1 0 1200 1 1 2400, 3600 or 7200 (1200 recorded) Bits 3,2,1 Engineering Data Mode 0 0 0 Launch 0 0 1 Cruise 0 1 0 Encounter 0 1 1 TCM 1 0 0 Special (Modified Cruise) 1 0 1 Science Maneuver 1 1 0 CCS Memory Readout 1 1 1 FDS Memory Readout Bits 0 Spacecraft ID 1 = FLT 1 (31) 0 = FLT 2 (32)
35	11	31-24	Bit Error Tolerance (BET) - Contains the binary PN bit error tolerance during frame synchronization.

Table C-1

Standard (UV-5A)

Experiment Data Record Header

Item	Word	Bits	Description
36	11	23-16	DSN Equipment Configuration - Contains the latest status of any change in station equipment configuration during the time corresponding to the first MF received in this record. BIT 23-21 = Receiver 001 = #1 010 = #2 011 = #3 100 = #4 BIT 20-18 = Subcarrier Demodulator (SDA) 001 = #1 010 = #2 011 = #3 100 = #4 BIT 17-16 = Telemetry Processor (TPA) 00 = Telemetry Processor (TPA) #1, Symbol Synchronizer (SSA) #1 (TPA #3 at conjoint station) 01 = TPA #1 (or 3), SSA #2 10 = TPA #2, SSA #3 11 = TPA #2, SSA #4
37	11	15-0	Receiver Automatic Gain Control (AGC) - Contains the AGC extracted from the GCF block from which the first minor frame was derived. (Binary)
38	12	31-24	DSN Station Number - Contains the identification number of the DSN station originating the data contained in the first minor frame received of this record. (Binary) See page D-12, Item 41.
39	12	23-16	Spare
40	12	15-0	Estimated Bit Error Count (EBEC) - Count of the number of bits in error.
41	13	31-16	Symbol Signal-to-Noise Ratio (SNR) - Contains the symbol SNR extracted from the GCF block from which the first minor frame received was derived. BINARY

Table C-1

Standard (UV-5A)

Experiment Data Record Header

Item	Word	Bits	Description
42	13	15-0	Decoder SNR - Contains the bit error rate out of the Data Decoder Assembly.
43	14	31-16	Physical Record Number - A. For individual EDRs: Unused (set to zeros) B. For combined EDRs (MDR): Physical record number in binary
44	14	15-8	DQSW - Data Quality Status Word for MF-1 through MF-8
45	14	7-0	DATA QUALITY INDICATORS (DQI) Bit 7 = Unused Bit 6 = Unused Bit 5 = Unused Bit 4 = PN Error Outside BET (0=none, 1=bit errors exceed Bit Error Tolerance) Bit 3 = PN Error Within BET (0=none, 1=bit errors) Bit 2 = Spare Bit 1 = Valid Data Flag (0=valid, 1=no data) Bit 0 = GCF Block Error (0=no, 1=yes)
46	15	31-16	DQSW/DQI for MF9-MF16
47	15	15-0	DQSW/DQI for MF17-MF24
48	16	31-16	DQSW/DQI for MF25-MF32
49	16	15-0	DQSW/DQI for MF33-MF40
50	17	31-16	DQSW/DQI for MF41-MF48
51	17	15-0	DQSW/DQI for MF49-MF56
52	18	31-16	DQSW/DQI for MF57-MF64
53	18	15-0	DQSW/DQI for MF65-MF72
54	19	31-16	DQSW/DQI for MF73-MF75

Table C-1

Standard (UV-5A)

Experiment Data Record Header

Item	Word	Bits	Description
			Data Presence
			A 4-bit field for Data Presence Indication is supplied for up to 75 minor frames to which this header is applied. All 4 bits are set to zero if data is present, otherwise all bits are set to 1.
55	19	15-12	Data Presence Indicators for MF-1
56	19	11-8	Data Presence Indicators for MF-2
57	19	7-4	Data Presence Indicators for MF-3
58	19	3-0	Data Presence Indicators for MF-4
59	20	31-28	Data Presence Indicators for MF-5
60	20	27-24	Data Presence Indicators for MF-6
61	20	23-20	Data Presence Indicators for MF-7
62	20	19-16	Data Presence Indicators for MF-8
63	20	15-12	Data Presence Indicators for MF-9
64	20	11-8	Data Presence Indicators for MF-10
65	20	7-4	Data Presence Indicators for MF-11
66	20	3-0	Data Presence Indicators for MF-12
67	21	31-28	Data Presence Indicators for MF-13
68	21	27-24	Data Presence Indicators for MF-14
69	21	23-20	Data Presence Indicators for MF-15
70	21	19-16	Data Presence Indicators for MF-16
71	21	15-12	Data Presence Indicators for MF-17
72	21	11-8	Data Presence Indicators for MF-18
73	21	7-4	Data Presence Indicators for MF-19
74	21	3-0	Data Presence Indicators for MF-20
75	22	31-28	Data Presence Indicators for MF-21
76	22	27-24	Data Presence Indicators for MF-22
77	22	23-20	Data Presence Indicators for MF-23
78	22	19-16	Data Presence Indicators for MF-24
79	22	15-12	Data Presence Indicators for MF-25
80	22	11-8	Data Presence Indicators for MF-26
81	22	7-4	Data Presence Indicators for MF-27
82	22	3-0	Data Presence Indicators for MF-28
83	23	31-28	Data Presence Indicators for MF-29
84	23	27-24	Data Presence Indicators for MF-30
85	23	23-20	Data Presence Indicators for MF-31
86	23	19-16	Data Presence Indicators for MF-32
87	23	15-12	Data Presence Indicators for MF-33
88	23	11-8	Data Presence Indicators for MF-34
89	23	7-4	Data Presence Indicators for MF-35

Table C-1

Standard (UV-5A)

Experiment Data Record Header

Item	Word	Bits	Description
90	23	3-0	Data Presence Indicators for MF-36
91	24	31-28	Data Presence Indicators for MF-37
92	24	27-24	Data Presence Indicators for MF-38
93	24	23-20	Data Presence Indicators for MF-39
94	24	19-16	Data Presence Indicators for MF-40
95	24	15-12	Data Presence Indicators for MF-41
96	24	11-8	Data Presence Indicators for MF-42
97	24	7-4	Data Presence Indicators for MF-43
98	24	3-0	Data Presence Indicators for MF-44
99	25	31-28	Data Presence Indicators for MF-45
100	25	27-24	Data Presence Indicators for MF-46
101	25	23-20	Data Presence Indicators for MF-47
102	25	19-16	Data Presence Indicators for MF-48
103	25	15-12	Data Presence Indicators for MF-49
104	25	11-8	Data Presence Indicators for MF-50
105	25	7-4	Data Presence Indicators for MF-51
106	25	3-0	Data Presence Indicators for MF-52
107	26	31-28	Data Presence Indicators for MF-53
108	26	27-24	Data Presence Indicators for MF-54
109	26	23-20	Data Presence Indicators for MF-55
110	26	19-16	Data Presence Indicators for MF-56
111	26	15-12	Data Presence Indicators for MF-57
112	26	11-8	Data Presence Indicators for MF-58
113	26	7-4	Data Presence Indicators for MF-59
114	26	3-0	Data Presence Indicators for MF-60
115	27	31-28	Data Presence Indicators for MF-61
116	27	27-24	Data Presence Indicators for MF-62
117	27	23-20	Data Presence Indicators for MF-63
118	27	19-16	Data Presence Indicators for MF-64
119	27	15-12	Data Presence Indicators for MF-65
120	27	11-8	Data Presence Indicators for MF-66
121	27	7-4	Data Presence Indicators for MF-67
122	27	3-0	Data Presence Indicators for MF-68
123	28	31-28	Data Presence Indicators for MF-69
124	28	27-24	Data Presence Indicators for MF-70
125	28	23-20	Data Presence Indicators for MF-71
126	28	19-16	Data Presence Indicators for MF-72
127	28	15-12	Data Presence Indicators for MF-73
128	28	11-8	Data Presence Indicators for MF-74
129	28	7-4	Data Presence Indicators for MF-75
130	28	3-0	Spares
131	29	31-0	Spares
132	30	31-0	Spares

Table C-1

Standard (UV-5A)

Experiment Data Record Header

Item	Word	Bits	Description
133	31	31-0	Spares
134	32	31-0	Spares
135	33	31-0	Spares
136	34	31-0	Spares
137	35	31-0	Spares
138	36	31-0	Spares
139	37	31-0	Spares
140	38	31-0	Spares
141	39	31-0	Spares
142	40	31-0	Spares
143	41	31-0	Spares
144	42	31-0	Spares
145	43	31-0	Spares
146	44	31-0	Spares
147	45	31-0	Spares
148	46	31-0	Spares
149	47	31-0	Spares
150	48	31-0	Spares
151	49	31-0	Spares
152	50	31-0	Spares
153	51	31-0	Spares
154	52	31-0	Spares
155	53	31-0	Spares
156	54	31-0	Spares
157	55	31-0	Spares
158	56	31-0	Spares
159	57	31-0	Spares
160	58	31-0	Spares
161	59	31-0	Spares
162	60	31-24	DRS Data Type - Numbers are in HEX IRIS = 20 ISR = 29 CRS = 21 DCOM = 2A LECP = 22 MON 5-8 = 2B MAG = 23 ENGS = 2C PLS = 24 ENGE = 2D PPS = 25 DCMS = 2E PRA = 26 ENGC = 2F PWS = 27 MON 5-9 = 30 UVS = 28

Table C-1

Standard (CR-5A)

Experiment Data Record Header

Item	Word	Bits	Description
163	60	23-16	Golay/Reed-Solomon Correction Bit Error Count - Count of PN errors in a 48 second period (80 MF), corresponding to this major frame, which are in error. Maximum count displayed will be 255.
164	60	15-0	Golay/Reed-Solomon Bit Error Summation - Total number of bits modified by the Golay/Reed-Solomon Correction algorithm during a major frame.

SECTION VIII

EXPERIMENT DATA RECORD DESCRIPTIONS

8.1 COSMIC RAY SCIENCE (CRS) EXPERIMENT

The CRS EDR physical science record corresponds to a 9.6 minute measurement period. Any data not present within a given physical record is filled with zeroes.

Four physical records correspond to three 768 second instrument cycles. The formats which follow are applicable to the CR-5 data mode.

The science logical/physical record structure is shown in Figure 8.1-1 and the physical magnetic tape organization is shown in Figure 8.1-2. Figure 8.1-3 and Table 8.1-1 define the structure and contents of the CRS science record subheader. Figure 8.1-4 and Table 8.1-2 define the structure and contents of the CRS science data block. The standard EDR science header is defined for CR-5 in Appendix C.

8.5 PLASMA (PLS) EXPERIMENT

The PLS EDR science physical record corresponds to a 9.6 minute measurement period. Any data not present within a given physical record is filled with zeroes.

A full PLS measurement cycle requires 384 seconds. Here, a PLS sub-cycle of 192 seconds is defined to be one PLS instrument period. Hence there is one physical record per three PLS instrument periods. There are 5 physical records (15 PLS cycles) per 48 minute period. The formats which follow are applicable to the CR-5 data mode.

The science logical record structure is shown in Figure 8.5-1 and the physical magnetic tape organization is shown in Figure 8.5-2. Figure 8.5-3 and Table 8.5-1 define the structure and contents of the PLS science record subheader. Figure 8.5-4 and Table 8.5-2 define the structure and contents of the PLS science data block within a logical record. The standard EDR science header is defined for CR-5 in Appendix C.

8.8 PLASMA WAVE (PWS) EXPERIMENT

The PWS EDR science record corresponds to a 9.6 minute measurement period. Any data not present within a given physical record is filled with zeroes.

A PWS measurement cycle is 76.8 seconds. Hence there are 5 physical records (37.5 instrument cycles) per 48 minute period. The formats which follow are applicable to the CR-5 data mode.

The science logical/physical record structure is shown in Figure 8.8-1 and the physical magnetic tape organization is shown in Figure 8.8-2. Figure 8.8-3 and Table 8.8-1 define the structure and contents of the PWS science record subheader. Figure 8.8-4 and Table 8.8-2 define the structure and contents of the PWS science data block. The standard EDR science header is defined for CR-5 in Appendix C.

TABLE C-9

STANDARD EXPERIMENT DATA RECORD HEADER

ITEM	WORD	BITS	DESCRIPTION				
			INSTRUMENT/ DATA MODE	SEG NO.	SEGS WITH MFs	MOD16 COUNT	MOD60 COUNT
			PPS/CR-5	1	1-150	All	Int $\frac{SCT60}{30}$
				2	1-150	All	Int $\frac{SCT60}{30}$
			PWS/CR-6	1	1-50		
				2	51-100		
				3	101-150		
			LECP/CR-1,2	1	CR-1=1-80	All	Even
				2	CR-2=1-40	All	Odd
			LECP/CR-6	1	1-75		
				2	76-150		
			LECP/CR-5	1	1-60	All	0
			MAG/CR-5	2	61-120	All	12
				3	121-180	All	24
				4	181-240	All	36
				5	241-300	All	48
			MAG/CR-6	1	1-75		
				2	76-150		
			CRS/CR-6	1	1-30		
				2	31-60		
				3	61-90		
				4	91-120		
				5	121-150		

TABLE C-9

STANDARD EXPERIMENT DATA RECORD HEADER

ITEM	WORD	BITS	DESCRIPTION				
			INSTRUMENT/ DATA MODE	SEG NO.	SEGS WITH MFs	MOD16 COUNT	MOD60 COUNT
				3	1-60	0	24
						1	12
						2	0,48
						3	36
				4	1-60	0	36
						1	24
						2	12
						3	0,48
			UVS/GS	1	1-80	All	Even
				2	1-80	All	Odd
			UVS/OC-1	1	1-8		
				2	9-16		
				3	17-24		
				4	25-32		
				5	33-40		
				6	41-48		
				7	49-56		
				8	57-64		
				9	65-72		
				10	73-80		
			PLS/CR-6	1	1-75		
				2	76-150		
			IRIS/GS (if 144 Sec. Scan)	1	17-17	All	0,3,6...5
				2	17-17	All	1,4,7...5
				3	17-17	All	2,5,8...5
			Ending Earth Received Time - GMT of the first bit of the last MF that is received and contained in this record's prime data is extracted.				

ATTACHMENT 2

CRS, PLS, AND PWS SEGMENTED RECORD IDENTIFICATION

PLS and PWS Records

PLS records are of two types, the first (designated type A) consists of two complete instrument cycles followed by one-half of a cycle. The following record (designated type B) contains the completing half cycle followed by two complete instrument cycles. The two types of records alternate continuously.

Similarly, PWS type A records contain seven instrument cycles followed by half a cycle and the type B records consist of the completing half cycle followed by seven instrument cycles.

Given valid MOD 2^{16} and MOD 60 FDSC values, the following would hold:

Record Type	MOD 2^{16}	MOD 60
A	Even	0, 24, 48
A	Odd	12, 36
B	Even	12, 36
B	Odd	0, 24, 48

CRS Records

Four CRS physical records are required to complete three CRS instrument cycles. For convenience, the record types are labeled A, B, C, and D.

Given valid FDSC values, the following would hold:

Record Type	MOD 2^{16}	MOD 60
A	0	0, 48
	1	36
	2	24
	3	12
B	0	12
	1	0, 48
	2	36
	3	24
C	0	24
	1	12
	2	0, 48
	3	36
D	0	36
	1	24
	2	12
	3	0, 48