SAM-1-O-08105 Rev C

TELEMETRY PACKET DESCRIPTION

FOR THE

SAMPEX DATA PROCESSING UNIT (DPU)

NASA COOPERATIVE AGREEMENT #26979B

26 August 1991

Prepared for:

The University of Maryland, Space Physics Group

Prepared by:

Space Sciences Laboratory

THE AEROSPACE CORPORATION

El Segundo, CA 90245

Table of Contents

Table of Contents (continued)

August 26, 1991

1.0 DPU Telemetry Conventions

The DPU constructs telemetry packets of maximum length 512 bytes for transfer to the SEDS. The FSW-DPU ICD gives a complete description of the software interface specification between the DPU and the SEDS, and this document is meant only to give the specifics for handling of DPU output telemetry packets.

Based on the Application ID field within the packet header, the SEDS will either transmit the data immediately (Virtual Channel 0, VC0) or will store the packet data to bulk memory for transmission during the next ground contact (VC2). For bulk memory packet storage, the SEDS will truncate the packet prior to storage according to the Packet Length field given in the primary packet header. The Packet Length field will always be an odd integer and will indicate the number of data bytes included in the secondary header and the DPU data field excluding any zero padded region minus 1.

For multiple byte data items, the DPU will store the highest byte first within the telemetry stream followed by successively lower order bytes. With the exception of data contained in the Subcommed Science packet, the DPU will zero pad as necessary to align 16-bit data items on word boundaries within the packet area.

2.0 Telemetry Checksum Calculation

Every telemetry packet output by the DPU contains a 16-bit checksum within the secondary header. The checksum is computed as the least significant word (2 bytes) of the sum of all bytes within the packet.

3.0 Compression Algorithms

In order to make the most efficient use of the bulk memory storage and the real-time link, the DPU relies on 3 separate compression algorithms. Each of the compression algorithms is dedicated to a particular type of

data.

3.1 High-resolution Rate Data Compression

High-resolution rates are acquired by the DPU from HILT and PET with time resolution of 100 msecs. The relatively high rate of acquisition guarantees that the counting rates acquired will never exceed 16 bits. High-resolution rate packets are found only within the Subcommed Science packet, and each 16-bit value is compressed to an 8-bit value prior to storage within the packet.

The compressed output for the 16 to 8 bit compression algorithm is stored as $E_3E_2E_1E_0M_3M_2M_1M_0$ where E bits indicate the exponent of the compressed value and M bits indicate the resultant mantissa. To compute the decompressed value, N, use the following decompression algorithm.

```
if (E < 2)
  N = (E * 16) + M
else
  N = [ (16 + M + 0.5) * 2 ** (E - 1) ]
```

According to this compression scheme, the maximum N which can be specified is 63,488 and the maximum error is ± 3.125%.

3.2 Low-resolution Rate Data Compression

Low-resolution rate data is acquired from all four sensors at a rate of 1 readout per 6 seconds. The rates received via this method are all 24-bit rates and telemetry packetization relies on a 24 to 12 bit compression. As with high-resolution rate data, the low-resolution rates are found only within the Subcommed Science packet.

The compressed output for the 24 to 12 bit compression algorithm is stored as $E_4E_3E_2E_1E_0M_6M_5M_4M_3M_2M_1M_0$ where E bits indicate the exponent of the compressed value and M bits indicate the resultant mantissa. To compute the decompressed value, N, use the following decompression

algorithm.

N = Integer [(128 + M) * 2 ** (E - 8)]

According to this compression scheme, the maximum N which can be specified is 16,711,680 and the maximum error is -0.8%.

3.3 History Packet Rate Data Compression

History packets output by the DPU are designed to give quick-look data for an entire orbit (~96 minutes) prior to the time of the ground contact. Output of the history packets is triggered by a special Start of Ground Pass command sent from the SEDS to the DPU.

History packets contain a mixture of counting rates and housekeeping parameters. The rate data found within the history packet is either a 192-second sum (MAST & PET), or a 96-second sum (HILT & LEICA). The summed data items are passed through a 30 to 16 bit compression algorithm prior to storage within the history packet.

The compressed output for the 30 to 16 bit compression algorithm is stored as $E_4E_3E_2E_1E_0M_{10}M_9M_8M_7M_6M_5M_4M_3M_2M_1M_0$ where E bits indicate the exponent of the compressed value and M bits indicate the resultant mantissa. To compute the decompressed value, N, use the following decompression algorithm.

N = Integer [(2048 + M) * 2 ** (E - 12)]

According to this compression scheme, the maximum N which can be specified is 1,073,479,680 and the maximum error is - 0.025%.

4.0 Telemetry Packet Notation

In the telemetry packet description which follows, some clarification of the notation may be necessary. The general packet description consists of 3 columns of data necessary to locate any data item within the packet.

These are: *bytes*, *bits*, and *contents*. The contents field describes, in words, the high-level description of the data element to be found at the given location. Often times the content value is followed by "= N" where N is some integer value. This notation indicates that the specified field is always set to a particular value.

The bytes column describes the byte number, or numbers, which the selected item spans. A concatenation of bytes in specified in this column as N:M, where N is the highest byte number for the concatenation and M is the lowest byte number. In some instances N and M are not adjacent bytes in which case the concatenation shown as N:M indicates N:N+1:N+2:...:M-1:M. In some packet types (e.g. Subcommed Science) or in dataset definitions, the bytes column is replaced by an *offset* column which must be imposed on the byte number where the set begins to determine the actual starting byte number.

The bits columns dictates the bits to extract once the concatenation operation has been completed. Bit numbers range from 0 (least-significant bit) to 8n - 1 (most-significant) where n is the number of concatenated bytes. The high bit position is specified first, followed by a colon and the low bit position last. A bit specification of 10:0 indicates that an 11-bit field should be extracted.

August 26, 1991

Request for SEDS Echo Packet (Application ID = 50)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = command = 1
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 50
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 9
6	all	Reserved = 0
7	all	Function code = 0
8	all	Echo command byte #1
9	all	Echo command byte #2
10	all	Echo command byte #3
11	all	Echo command byte #4
12	all	Echo command byte #5
13	all	Echo command byte #6
14	all	Echo command byte #7
15	all	Echo command byte #8
16-511	all	unused = 0

Request for SEDS Stored Commands (Application ID = 51)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = command = 1
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 51
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 1
6	all	Reserved = 0
7	all	Function code = 0
8-511	all	unused = 0

August 26, 1991

Request for SEDS Memory Status (Application ID = 52)

Application ID 52 has been deleted.

NOTE:
VMS FILES HAVE
4 byte SESSION HEADER First

August 26, 1991

General Telemetry Packet Description

add 5 to all numbers

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = data = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application Process ID:
		= 33 : HILT history (VC0)
		= 34 : LEICA history (VC0)
		= 35 : MAST history (VC0)
		= 36 : PET history (VC0)
		= 37 : DPU history (VC0)
		= 38 : real-time HK (VC0)
		= 39 : real-time status (VC0)
		= 40 : real-time command error echo (VC0)
		= 41 : real-time DPU state change (VC0)
		= 42 : subcommed science packets (VC2)
		= 43 : EEPROM/LCA memory dump (VC2)
		= 44 : DPU memory dump (VC2)
		= 45 : DPU parameter dump (VC0 & VC2)
		= 46-48 : spares
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length (total number of bytes included in the secondary header and DPU data fields minus 1)
6:7	all	Time stamp : days since 24-May-68
8:10	all	Time stamp : seconds of day
11:12	all	Time stamp : milliseconds of second (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16-511	all	DPU Data field (see specific packet descriptions)

August 26, 1991

HILT history packet - part #1 (Application ID = 33)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 33
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 493
6:7	all	Time stamp : days since 24-May-68
8:10	all	Time stamp : seconds of day
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 1
17	all	Number of sets in packet = 12
18	all	Number of sets already sent = 0
19	all	Delta time per set (seconds) = 96
20-59	all	Parameter set #1 (most recent data)
60-99	all	Parameter set #2
100-139	all	Parameter set #3
140-179	all	Parameter set #4
180-219	all	Parameter set #5
220-259	all	Parameter set #6
260-299	all	Parameter set #7
300-339	all	Parameter set #8
340-379	all	Parameter set #9
380-419	all	Parameter set #10
420-459	all	Parameter set #11
460-499	all	Parameter set #12
500-511	all	unused = 0

HILT history packet - part #2 (Application ID = 33)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 33
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 493
6:7	all	Time stamp : days (same as part #1)
8:10	all	Time stamp : seconds (same as part #1)
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 2
17	all	Number of sets in packet = 12
18	all	Number of sets already sent = 12
19	all	Delta time per set (seconds) = 96
20-59	all	Parameter set #13
60-99	all	Parameter set #14
100-139	all	Parameter set #15
140-179	all	Parameter set #16
180-219	all	Parameter set #17
220-259	all	Parameter set #18
260-299	all	Parameter set #19
300-339	all	Parameter set #20
340-379	all	Parameter set #21
380-419	all	Parameter set #22
420-459	all	Parameter set #23
460-499	all	Parameter set #24
500-511	all	unused = 0

HILT history packet - part #3 (Application ID = 33)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 33
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 493
6:7	all	Time stamp : days (same as part #1)
8:10	all	Time stamp : seconds (same as part #1)
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 3
17	all	Number of sets in packet = 12
18	all	Number of sets already sent = 24
19	all	Delta time per set (seconds) = 96
20-59	all	Parameter set #25
60-99	all	Parameter set #26
100-139	all	Parameter set #27
140-179	all	Parameter set #28
180-219	all	Parameter set #29
220-259	all	Parameter set #30
260-299	all	Parameter set #31
300-339	all	Parameter set #32
340-379	all	Parameter set #33
380-419	all	Parameter set #34
420-459	all	Parameter set #35
460-499	all	Parameter set #36
500-511	all	unused = 0

August 26, 1991

HILT history packet - part #4 (Application ID = 33)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 33
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 493
6:7	all	Time stamp : days (same as part #1)
8:10	all	Time stamp : seconds (same as part #1)
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 4
17	all	Number of sets in packet = 12
18	all	Number of sets already sent = 36
19	all	Delta time per set (seconds) = 96
20-59	all	Parameter set #37
60-99	all	Parameter set #38
100-139	all	Parameter set #39
140-179	all	Parameter set #40
180-219	all	Parameter set #41
220-259	all	Parameter set #42
260-299	all	Parameter set #43
300-339	all	Parameter set #44
340-379	all	Parameter set #45
380-419	all	Parameter set #46
420-459	all	Parameter set #47
460-499	all	Parameter set #48
500-511	all	unused = 0

HILT history packet - part #5 (Application ID = 33)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 33
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 493
6:7	all	Time stamp : days (same as part #1)
8:10	all	Time stamp : seconds (same as part #1)
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 5
17	all	Number of sets in packet = 12
18	all	Number of sets already sent = 48
19	all	Delta time per set (seconds) = 96
20-59	all	Parameter set #49
60-99	all	Parameter set #50
100-139	all	Parameter set #51
140-179	all	Parameter set #52
180-219	all	Parameter set #53
220-259	all	Parameter set #54
260-299	all	Parameter set #55
300-339	all	Parameter set #56
340-379	all	Parameter set #57
380-419	all	Parameter set #58
420-459	all	Parameter set #59
460-499	all	Parameter set #60 (oldest data)
500-511	all	unused = 0

August 26, 1991

HILT history packet / Set definition

offset	bits	contents
0:1	all	Rate - HE1
2:3	all	Rate - HE2
4:5	all	Rate - HZ1
6:7	all	Rate - HZ2
8:9	all	Rate - SSD1
10:11	all	Rate - SSD2
12:13	all	Rate - SSD3
14:15	all	Rate - SSD4
16:17	all	Rate - PCFE
18:19	all	Rate - IK
20:21	all	Rate - PCRE
22:23	all	Rate - CsI
24:25	all	Rate - Strobe
26	all	HK - CV1_+10V
27	all	HK - CV1_-10V
28	all	HK - CV2_+10V
29	all	HK - CV2_-10V
30	all	HK - CV1_+5V
31	all	HK - CV2_+5V
32	all	HK - PRESSURE
33	all	HK - Temp_SSD
34	all	HK - Temp_DEL
35	all	HK - Temp_VLV
36	all	HK - HV_SSD
37	all	HK - HV_DRIFT
38	all	HK - HV_PC
39	all	unused = 0

LEICA history packet - part #1 (Application ID = 34)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 34
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 493
6:7	all	Time stamp : days since 24-May-68
8:10	all	Time stamp : seconds of day
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 1
17	all	Number of sets in packet = 16
18	all	Number of sets already sent = 0
19	all	Delta time per set (seconds) = 96
20-49	all	Parameter set #1 (most recent data)
50-79	all	Parameter set #2
80-109	all	Parameter set #3
110-139	all	Parameter set #4
140-169	all	Parameter set #5
170-199	all	Parameter set #6
200-229	all	Parameter set #7
230-259	all	Parameter set #8
260-289	all	Parameter set #9
290-319	all	Parameter set #10
320-349	all	Parameter set #11
350-379	all	Parameter set #12
380-409	all	Parameter set #13
410-439	all	Parameter set #14
440-469	all	Parameter set #15
470-499	all	Parameter set #16
500-511	all	unused = 0

August 26, 1991

LEICA history packet - part #2 (Application ID = 34)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 34
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 493
6:7	all	Time stamp : days (same as part #1)
8:10	all	Time stamp : seconds (same as part #1)
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 2
17	all	Number of sets in packet = 16
18	all	Number of sets already sent = 16
19	all	Delta time per set (seconds) = 96
20-49	all	Parameter set #17
50-79	all	Parameter set #18
80-109	all	Parameter set #19
110-139	all	Parameter set #20
140-169	all	Parameter set #21
170-199	all	Parameter set #22
200-229	all	Parameter set #23
230-259	all	Parameter set #24
260-289	all	Parameter set #25
290-319	all	Parameter set #26
320-349	all	Parameter set #27
350-379	all	Parameter set #28
380-409	all	Parameter set #29
410-439	all	Parameter set #30
440-469	all	Parameter set #31
470-499	all	Parameter set #32
500-511	all	unused = 0

August 26, 1991

LEICA history packet - part #3 (Application ID = 34)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 34
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 493
6:7	all	Time stamp : days (same as part #1)
8:10	all	Time stamp : seconds (same as part #1)
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 3
17	all	Number of sets in packet = 16
18	all	Number of sets already sent = 32
19	all	Delta time per set (seconds) = 96
20-49	all	Parameter set #33
50-79	all	Parameter set #34
80-109	all	Parameter set #35
110-139	all	Parameter set #36
140-169	all	Parameter set #37
170-199	all	Parameter set #38
200-229	all	Parameter set #39
230-259	all	Parameter set #40
260-289	all	Parameter set #41
290-319	all	Parameter set #42
320-349	all	Parameter set #43
350-379	all	Parameter set #44
380-409	all	Parameter set #45
410-439	all	Parameter set #46
440-469	all	Parameter set #47
470-499	all	Parameter set #48
500-511	all	unused = 0

August 26, 1991

LEICA history packet - part #4 (Application ID = 34)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 34
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 493
6:7	all	Time stamp : days (same as part #1)
8:10	all	Time stamp : seconds (same as part #1)
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 4
17	all	Number of sets in packet = 12
18	all	Number of sets already sent = 48
19	all	Delta time per set (seconds) = 96
20-49	all	Parameter set #49
50-79	all	Parameter set #50
80-109	all	Parameter set #51
110-139	all	Parameter set #52
140-169	all	Parameter set #53
170-199	all	Parameter set #54
200-229	all	Parameter set #55
230-259	all	Parameter set #56
260-289	all	Parameter set #57
290-319	all	Parameter set #58
320-349	all	Parameter set #59
350-379	all	Parameter set #60 (oldest data)
380-511	all	unused = 0

August 26, 1991

LEICA history packet / Set definition

offset	bits	contents
0:1	all	Rate - D4_Singl
2:3	all	Rate - D3_Singl
4:5	all	Rate - D2_Singl
6:7	all	Rate - D1_Singl
8:9	all	Rate - Triples
10:11	all	Rate - Doubles
12:13	all	Rate - Stop_Sgl
14:15	all	Rate - Strt_Sgl
16:17	all	Rate - IFC_Cnt
18:19	all	Rate - Protons
20:21	all	Rate - Low_Pri
22:23	all	Rate - High_Pri
24	all	HK - HV_Mon_1
25	all	HK - HV_Mon_2
26	all	HK - SSD_Temp
27	all	HK - Elec_Temp
28	all	HK - Foil_Tmp
29	all	HK - TOF_Temp

MAST history packet - part #1 (Application ID = 35)

tes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 35
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 505
6:7	all	Time stamp : days since 24-May-68
8:10	all	Time stamp : seconds of day
1:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 1
17	all	Number of sets in packet = 6
18	all	Number of sets already sent = 0
19	all	Delta time per set (seconds) = 192
0-101	all	Parameter set #1 (most recent data)
2-183	all	Parameter set #2
4-265	all	Parameter set #3
6-347	all	Parameter set #4
8-429	all	Parameter set #5
30-511	all	Parameter set #6

August 26, 1991

MAST history packet - part #2 (Application ID = 35)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 35
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 505
6:7	all	Time stamp : days (same as type #1)
8:10	all	Time stamp : seconds (same as type #1)
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 2
17	all	Number of sets in packet = 6
18	all	Number of sets already sent = 6
19	all	Delta time per set (seconds) = 192
20-101	all	Parameter set #7
102-183	all	Parameter set #8
184-265	all	Parameter set #9
266-347	all	Parameter set #10
348-429	all	Parameter set #11
430-511	all	Parameter set #12

MAST history packet - part #3 (Application ID = 35)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 35
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 505
6:7	all	Time stamp : days (same as type #1)
8:10	all	Time stamp : seconds (same as type #1)
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 3
17	all	Number of sets in packet = 6
18	all	Number of sets already sent = 12
19	all	Delta time per set (seconds) = 192
20-101	all	Parameter set #13
102-183	all	Parameter set #14
184-265	all	Parameter set #15
266-347	all	Parameter set #16
348-429	all	Parameter set #17
430-511	all	Parameter set #18

August 26, 1991

MAST history packet - part #4 (Application ID = 35)

ytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 35
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 505
6:7	all	Time stamp : days (same as type #1)
8:10	all	Time stamp : seconds (same as type #1)
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 4
17	all	Number of sets in packet = 6
18	all	Number of sets already sent = 18
19	all	Delta time per set (seconds) = 192
0-101	all	Parameter set #19
2-183	all	Parameter set #20
4-265	all	Parameter set #21
6-347	all	Parameter set #22
8-429	all	Parameter set #23
0-511	all	Parameter set #24

MAST history packet - part #5 (Application ID = 35)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 35
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 505
6:7	all	Time stamp : days (same as type #1)
8:10	all	Time stamp : seconds (same as type #1)
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 5
17	all	Number of sets in packet = 6
18	all	Number of sets already sent = 24
19	all	Delta time per set (seconds) = 192
20-101	all	Parameter set #25
02-183	all	Parameter set #26
84-265	all	Parameter set #27
266-347	all	Parameter set #28
348-429	all	Parameter set #29
430-511	all	Parameter set #30 (oldest data)

August 26, 1991

MAST history packet / Set definition

offset	bits	contents
0:1	all	Rate - H1ZR0
2:3	all	Rate - H1ZR1
4:5	all	Rate - H1ZR2
6:7	all	Rate - H1ZR3
8:9	all	Rate - Z1
10:11	all	Rate - Z2
12:13	all	Rate - PEN
14:15	all	Rate - ADC OR
16:17	all	Rate - Z1R0
18:19	all	Rate - Z1R1
20:21	all	Rate - Z1R2
22:23	all	Rate - Z1R3
24:25	all	Rate - Z2R0
26:27	all	Rate - LIVE TIME
28:29	all	Rate - M1X1
30:31	all	Rate - M1XS
32:33	all	Rate - M2Y1
34:35	all	Rate - M2YS
36:37	all	Rate - M3X1
38:39	all	Rate - M3XS
40:41	all	Rate - M4Y1
42:43	all	Rate - M4YS
44:45	all	Rate - D1
46:47	all	Rate - D2
48:49	all	Rate - D3
50:51	all	Rate - D4
52:53	all	Rate - D5
54:55	all	Rate - D6
56:57	all	Rate - G1
58:59	all	Rate - G2
60:61	all	Rate - D7
62:63	all	Rate - G35L
64:65	all	Rate - G47L

MAST history packet / Set definition (continued)

offset	bits	contents
66:67	all	Rate - G6L
68:69	all	Rate - HAZ
70:71	all	Rate - M12
72:73	all	Rate - L
74:75	all	Rate - H
76	all	HK - ANA-M Thermistor
77	all	HK - ANA-T Thermistor
78	all	HK - M1-M Thermistor
79	all	HK - M3-M Thermistor
80	all	HK - M7-M Thermistor
81	all	unused = 0

PET history packet - part #1 (Application ID = 36)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 36
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 499
6:7	all	Time stamp : days since 24-May-68
8:10	all	Time stamp : seconds of day
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 1
17	all	Number of sets in packet = 9
18	all	Number of sets already sent = 0
19	all	Delta time per set (seconds) = 192
20-73	all	Parameter set #1 (most recent data)
74-127	all	Parameter set #2
128-181	all	Parameter set #3
182-235	all	Parameter set #4
236-289	all	Parameter set #5
290-343	all	Parameter set #6
344-397	all	Parameter set #7
398-451	all	Parameter set #8
452-505	all	Parameter set #9
506-511	all	unused = 0

PET history packet - part #2 (Application ID = 36)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 36
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 499
6:7	all	Time stamp : days (same as type #1)
8:10	all	Time stamp : seconds (same as type #1)
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 2
17	all	Number of sets in packet = 9
18	all	Number of sets already sent = 9
19	all	Delta time per set (seconds) = 192
20-73	all	Parameter set #10
74-127	all	Parameter set #11
28-181	all	Parameter set #12
82-235	all	Parameter set #13
36-289	all	Parameter set #14
90-343	all	Parameter set #15
44-397	all	Parameter set #16
98-451	all	Parameter set #17
452-505	all	Parameter set #18
506-511	all	unused = 0

PET history packet - part #3 (Application ID = 36)

ts	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
:1	10:0	Application ID = 36
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 499
6:7	all	Time stamp : days (same as type #1)
:10	all	Time stamp : seconds (same as type #1)
:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
:15	all	Checksum
16	all	Packet Sequence Number = 3
17	all	Number of sets in packet = 9
	all	Number of sets already sent = 18
19	all	Delta time per set (seconds) = 192
-73	all	Parameter set #19
127	all	Parameter set #20
181	all	Parameter set #21
235	all	Parameter set #22
289	all	Parameter set #23
343	all	Parameter set #24
-397	all	Parameter set #25
-451	all	Parameter set #26
-505	all	Parameter set #27
-511	all	unused = 0

PET history packet - part #4 (Application ID = 36)

	bits	contents
)	7:5	Version Number = 0
)	4	Type = 0
)	3	Secondary Header Flag = 1
1	10:0	Application ID = 36
2	7:6	Segment Flags = 3
3	13:0	Source Sequence Counter
5	all	Packet Length = 499
:7	all	Time stamp : days (same as type #1)
0	all	Time stamp : seconds (same as type #1)
.2	all	Time stamp : milliseconds of day (unused = 0)
3	all	unused = 0
15	all	Checksum
16	all	Packet Sequence Number = 4
17	all	Number of sets in packet = 3
1	all	Number of sets already sent = 27
19	all	Delta time per set (seconds) = 192
73	all	Parameter set #28
27	all	Parameter set #29
81	all	Parameter set #30 (oldest data)
11	all	unused = 0

August 26, 1991

PET history packet / Set definition

offset	bits	contents
0:1	all	Rate - PLO
2:3	all	Rate - PHI
4:5	all	Rate - ELO
6:7	all	Rate - EHI
8:9	all	Rate - RNG
10:11	all	Rate - EWG
12:13	all	Rate - PEN
14:15	all	Rate - LIVE TIME
16:17	all	Rate - P1 ADC
18:19	all	Rate - ADC OR
20:21	all	Rate - P2 ADC
22:23	all	Rate - AL
24:25	all	Rate - P3 ADC
26:27	all	Rate - AH
28:29	all	Rate - P47 ADC
30:31	all	Rate - HAZ
32:33	all	Rate - P4
34:35	all	Rate - P5
36:37	all	Rate - P6
38:39	all	Rate - P7
40:41	all	Rate - P8
42:43	all	Rate - A3L
44:45	all	Rate - A4L
46:47	all	Rate - A57L
48:49	all	Rate - A68L
50	all	HK - P8RT Thermistor
51	all	HK - P1RT Thermistor
52	all	HK - ANART Thermistor
53	all	unused = 0

DPU history packet (Application ID = 37)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 37
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 373
6:7	all	Time stamp : days since 24-May-68
8:10	all	Time stamp : seconds of day
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Packet Sequence Number = 1
17	all	Number of sets in packet = 60
18	all	Number of sets already sent = 0
19	all	Delta time per set (seconds) = 96
20-25	all	Parameter set #1 (most recent data)
26-31	all	Parameter set #2
32-37	all	Parameter set #3
38-43	all	Parameter set #4
44-49	all	Parameter set #5
50-55	all	Parameter set #6
56-61	all	Parameter set #7
62-67	all	Parameter set #8
68-73	all	Parameter set #9
74-79	all	Parameter set #10
80-85	all	Parameter set #11
86-91	all	Parameter set #12
92-97	all	Parameter set #13
98-103	all	Parameter set #14
104-109	all	Parameter set #15

DPU history packet (continued)

bits	contents
all	Parameter set #16
all	Parameter set #17
all	Parameter set #18
all	Parameter set #19
all	Parameter set #20
all	Parameter set #21
all	Parameter set #22
all	Parameter set #23
all	Parameter set #24
all	Parameter set #25
all	Parameter set #26
all	Parameter set #27
all	Parameter set #28
all	Parameter set #29
all	Parameter set #30
all	Parameter set #31
all	Parameter set #32
all	Parameter set #33
all	Parameter set #34
all	Parameter set #35
all	Parameter set #36
all	Parameter set #37
all	Parameter set #38
all	Parameter set #39
all	Parameter set #40
all	Parameter set #41
all	Parameter set #42
all	Parameter set #43
all	Parameter set #44
all	Parameter set #45

DPU history packet (continued)

bytes	bits	contents
)0-295	all	Parameter set #46
)6-301	all	Parameter set #47
)2-307	all	Parameter set #48
)8-313	all	Parameter set #49
14-319	all	Parameter set #50
20-325	all	Parameter set #51
26-331	all	Parameter set #52
32-337	all	Parameter set #53
38-343	all	Parameter set #54
44-349	all	Parameter set #55
350-355	all	Parameter set #56
356-361	all	Parameter set #57
362-367	all	Parameter set #58
3[illegible]-373	all	Parameter set #59
3[illegible]-379	all	Parameter set #60 (oldest data)
380-511	all	unused = 0

August 26, 1991

DPU history packet / Set definition

offset	bits	contents
0	all	HK - VCC mon.
1	all	HK - +10V mon.
2	all	HK - -10V mon.
3	all	HK - +2.5V mon.
4	all	HK - Ground mon.
5	all	unused = 0

Real-time Housekeeping packet (Application ID = 38)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 38
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 89
6:7	all	Time stamp : days since 24-May-68
8:10	all	Time stamp : seconds of day
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	unused = 0
17	all	HILT - Temp : Vent valve
18	all	HILT - Temp : Main valve
19	all	HILT - Temp : Pressure Reg. (internal)
20	all	HILT - Temp : Analog Box (internal)
21	all	HILT - Temp : Sensor internal
22	all	HILT - Temp : Digital box
23	all	HILT - Temp : Digital electronics
24	all	HILT - Temp : HV Conv. PC
25	all	HILT - Temp : HV Conv. Drift
26	all	HILT - Temp : LV Conv. 1 Analog
27	all	HILT - Temp : LV Conv. 2 System
28	all	HILT - Temp : CsI external
29	all	HILT - -10V mon.
30	all	HILT - +5V mon.
31	all	HILT - +10V mon.
32	all	HILT - SSD bias
33	all	HILT - High voltage mon. (PC)
34	all	HILT - High voltage mon. (Drift)
35	all	HILT - Pressure mon. #1
36	all	HILT - Pressure mon. #2

Real-time Housekeeping packet (continued)

bytes	bits	contents
37	all	HILT - Regulation valve temp.
38	all	HILT - +13V mon. / converter 2
39	all	HILT - -13V mon. / converter 2
40	all	HILT - +10V mon. / converter 2
41	all	HILT - -10V mon. / converter 2
42	all	HILT - +5V mon. / converter 2
43	all	LEICA - +12V mon.
44	all	LEICA - +6V mon.
45	all	LEICA - +5V mon.
46	all	LEICA - -5V mon.
47	all	LEICA - -6V mon.
48	all	LEICA - -12V mon.
49	all	LEICA - HVMON1
50	all	LEICA - HVMON2
51	all	LEICA - Temp1
52	all	LEICA - Temp2
53	all	LEICA - Temp3
54	all	LEICA - Temp4
55	all	LEICA - HVCMON1 } these are the two
56	all	LEICA - HVCMON2 } monitored by SEPs
57	all	LEICA - HVMON1
58	all	LEICA - HVMON2
59	all	MAST - ANA-M Thermistor
60	all	MAST - ANA-T Thermistor
61	all	MAST - M1-M Thermistor
62	all	MAST - M3-M Thermistor
63	all	MAST - D7-M Thermistor
64	all	MAST - M1-M Thermistor
65	all	MAST - M3-M Thermistor
66	all	MAST - D7-M Thermistor

9/24/02

Real-time Housekeeping packet (continued)

tes	bits	contents
67	all	PET - P8RT Thermistor
68	all	PET - P1RT Thermistor
69	all	PET - ANART Thermistor
70	all	PET - P8RT Thermistor
71	all	PET - P1RT Thermistor
72	all	PET - ANART Thermistor
73	all	PET - P1RT Thermistor
74	all	PET - P8RT Thermistor
75	all	LVPS - +7.5V mon.
76	all	LVPS - +4.7V mon.
77	all	LVPS - -7.5V mon.
78	all	LVPS - -13.5V mon.
79	all	LVPS - -37.0V mon.
80	all	LVPS - ground mon.
	all	LVPS - ground mon.
82	all	LVPS - ground mon.
83	all	LVPS - ground mon.
84	all	LVPS - +37.0V mon.
85	all	LVPS - +13.5V mon.
86	all	LVPS - +10.0V mon.
87	all	LVPS - PET mon.
88	all	LVPS - MAST mon.
89	all	LVPS - PSA current mon.
90	all	LVPS - variable load mon.
91	all	DPU - VCC mon.
92	all	DPU - +10V mon.
93	all	DPU - -10V mon.
94	all	DPU - +2.5V mon.
95	all	DPU - Ground mon.
5-511	all	unused = 0

August 26, 1991

Real-time Status packet (Application ID = 39)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 39
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 115
6:7	all	Time stamp : days since 24-May-68
8:10	all	Time stamp : seconds of day
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	unused = 0
17	7	HILT : CsI 4 Disabled
17	6	HILT : CsI 3 Disabled
17	5	HILT : CsI 2 Disabled
17	4	HILT : CsI 1 Disabled
17	3	HILT : SSD Row 4 Enabled
17	2	HILT : SSD Row 3 Enabled
17	1	HILT : SSD Row 2 Enabled
17	0	HILT : SSD Row 1 Enabled
18	7	HILT : Override flag
18	6:4	HILT : Subcom Number
18	3	HILT : High Energy Mode ON
18	2	HILT : Int. Stimulation ON
18	1:0	HILT : Testcode = 01
19	7:5	HILT/XILINX : Watchdog Counter
19	4	HILT/XILINX : LCA-Select
19	3	HILT/XILINX : LCA Readback Mode
19	2	HILT/XILINX : LCA Masked Mode
19	1	HILT/XILINX : LCA Compare Mode
19	0	HILT/XILINX : Multiple Error

Real-time Status packet (continued)

bytes	bits	contents
20	7	HILT/XILINX : Single Error
20	6:0	HILT/XILINX : EEPROM Block Address (blocksize = 256 bytes)
21	all	HILT : Count of EEPROM pages with confirmed checksum errors (max = 128)
22-28	all	HILT : EEPROM page numbers with confirmed checksum errors (first 7 only)
29	all	HILT : Count of confirmed Watchdog errors
30	all	HILT : Count of confirmed XILINX errors
31	all	HILT : Count of XINIT pulses
32	all	HILT : Count of XPWROFF pulses
33	7	DPU/HILT : Cover Closed
33	6	DPU/HILT : Flow Reg. Valve Closed
33	5	DPU/HILT : Vent Valve Closed
33	4	DPU/HILT : Main Valve Closed
33	3	DPU/HILT : Cover Open
33	2	DPU/HILT : Flow Reg. Valve Open
33	1	DPU/HILT : Vent Valve Open
33	0	DPU/HILT : Main Valve Open
34	7	DPU/HILT : Pressure Threshold
34	6	DPU/HILT : High Voltage Disable
34	5	DPU/HILT : Main Valve Disable
34	4	DPU/HILT : spare
34	3	DPU/HILT : Pressure Regulation ON
34	2	DPU/HILT : High Voltage SSD Enabled
34	1	DPU/HILT : High Voltage Drift Enabled
34	0	DPU/HILT : High Voltage PC Enabled

Real-time Status packet (continued)

bytes	bits	contents
35	7	LEICA : SLOPE1
35	6	LEICA : SLOPE0
35	5	LEICA : SLANT6
35	4	LEICA : SLANT5
35	3	LEICA : SLANT4
35	2	LEICA : SLANT3
35	1	LEICA : SLANT2
35	0	LEICA : SLANT1
36	7	LEICA : SLANT0
36	6	LEICA : CALENA
36	5	LEICA : HV2ENA
36	4	LEICA : HV1ENA
36	3	LEICA : D4ENA
36	2	LEICA : D3ENA
36	1	LEICA : D2ENA
36	0	LEICA : D1ENA
37	all	LEICA : fixed value = A3 hex
38	7	MAST : Log Calibration
38	6	MAST : Ramp Calibration
38	5	MAST : ADC Calibration
38	4	MAST : Calibration Enabled
38	3	MAST : ACE Enabled
38	2:0	MAST : Spares
39	7	PET : Log Calibration
39	6	PET : Ramp Calibration
39	5	PET : ADC Calibration
39	4	PET : Calibration Enabled
39	3	PET : ACE Enabled
39	2	PET : LoZ Mode
39	1	PET : N Mode
39	0	PET : Spare

Real-time Status packet (continued)

bytes	bits	contents
40	7	MAST/PET LVPS : Oscillator On
40	6	MAST/PET LVPS : Oscillator Off
40	5	MAST/PET LVPS : MAST Power On
40	4	MAST/PET LVPS : MAST Power Off
40	3	MAST/PET LVPS : PET Power On
40	2	MAST/PET LVPS : PET Power Off
40	1:0	MAST/PET LVPS : Spares
41	7	DPU : System Initialization Complete
41	6	DPU : Ground Command Enabled
41	5	DPU : SEDS Interface Number
41	4	DPU : Degraded Mode Enabled
41	3	DPU : Clock Error
41	2	DPU : T/M Packet Overrun
41	1	DPU : Configuration List Error
41	0	DPU : SEDS/DPU Time Sync Error
42:43	all	DPU : Seconds until next quota collection
44:45	all	DPU : HILT running event quota / 256
46:47	all	DPU : LEICA running event quota / 256
48:49	all	DPU : MAST running event quota / 256
50:51	all	DPU : PET running event quota / 256
52:53	all	DPU : HILT running high-res rate quota / 256
54:55	all	DPU : PET running high-res rate quota / 256
56:57	all	DPU : General Command count
58:59	all	DPU : General Command error count
60:61	all	DPU : Time Command count
62:63	all	DPU : Time Command error count
64	all	DPU : Software version (BCD)
65	3:0	DPU : Number of good RAM pages (max = 7)
66-72	all	DPU : Memory page table map (numbers indicate indirect page ordering)
73	0:0	DPU : Analog oscillator selected

Real-time Status packet (continued)

bytes	bits	contents
74-78	all	DPU/MAST : Command word #1
79-83	all	DPU/MAST : Command word #2
84-88	all	DPU/MAST : Command word #3
89-93	all	DPU/MAST : Command word #4
94-98	all	DPU/MAST : Command word #5
99-103	all	DPU/MAST : Command word #6
104-108	all	DPU/PET : Command word #1
109-113	all	DPU/PET : Command word #2
114-118	all	DPU/PET : Command word #4
119	all	DPU : CONFIG register
120-121	all	DPU : PROM checksum
122-511	all	unused = 0

Real-time Command Error Echo (Application ID = 40)

bytes	bits	contents
0	7:5	Version Number = 0
0	4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 40
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 23
6:7	all	Time stamp : days since 24-May-68
8:10	all	Time stamp : seconds of day
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16-17	all	unused = 0
18:19	all	General Command count
20:21	all	General Command error count
22 29	all	Erroneous command data
30-511	all	unused = 0

Real-time DPU State Change (Application ID = 41)

bytes	bits	contents
0	7:5	Version Number = 0
0	4:4	Type = 0
0	3:3	Secondary Header Flag = 1
0:1	10:0	Application ID = 41
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 13
6:7	all	Time stamp : days since 24-May-68
8:10	all	Time stamp : seconds of day
11:12	all	Time stamp : milliseconds of second (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	unused = 0
17	all	DPU state number = 01 : program loaded and SEDS interface selected = 02 : all DPU configuration commands received = 03 : program time initialization complete = 04 : 5 consecutive command verification errors forced selection of new SEDS interface = 05 : normal operation achieved = 06 : configuration command error

Real-time DPU State Change (continued)

bytes	bits	contents
18	7	System Initialization Complete
18	6	Ground Command Enabled
18	5	SEDS Interface Number
18	4	Degraded Mode Enabled
18	3	Clock Error
18	2	T/M packet queue overrun
18	1	Configuration List Error
18	0	SEDS/DPU Time Sync Error
19	all	spare
20-511	all	unused = 0

August 26, 1991

SAMPEX Subcommed Science Packet (Application ID = 42)

bytes	bits	contents
0	7:5	Version Number = 0
0	4:4	Type = 0
0	3	Secondary Header Flag = 1
0:1	10:0	Application ID = 42
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length
6:7	all	Time stamp : days since 24-May-68
8:10	all	Time stamp : seconds of day
11:12	all	Time stamp : milliseconds of second (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	Subcom Type:
		= 0 : HILT Event Packet
		= 1 : LEICA Event Packet
		= 2 : MAST Event Packet
		= 3 : PET Event Packet
		= 4 : High-res HILT Rate Packet
		= 5 : High-res PET Rate Packet
		= 6-21 : Low-res Rate Packet (subcommed)
		= 22 : Analog Housekeeping Packet
		= 23 : Digital Status Packet
		= 24 : Command Error Echo
		= 25 : DPU State Change
		= 26 : DPU Parameter Dump
		= 27-255 : unused
17-511	all	depends on subcom type (see Subcom Data)

August 26, 1991

Subcom Data / HILT Event Packet

+5

bytes	bits	description
17	all	Number of events in this packet (max = 35)
18-31	all	HILT Event #1 (see HILT Event Description)
32-45	all	HILT Event #2
46-59	all	HILT Event #3
60-73	all	HILT Event #4
74-87	all	HILT Event #5
88-101	all	HILT Event #6
102-115	all	HILT Event #7
116-129	all	HILT Event #8
130-143	all	HILT Event #9
144-157	all	HILT Event #10
158-171	all	HILT Event #11
172-185	all	HILT Event #12
186-199	all	HILT Event #13
200-213	all	HILT Event #14
214-227	all	HILT Event #15
228-241	all	HILT Event #16
242-255	all	HILT Event #17
256-269	all	HILT Event #18
270-283	all	HILT Event #19
284-297	all	HILT Event #20
298-311	all	HILT Event #21
312-325	all	HILT Event #22
326-339	all	HILT Event #23
340-353	all	HILT Event #24
354-367	all	HILT Event #25
368-381	all	HILT Event #26
382-395	all	HILT Event #27
396-409	all	HILT Event #28
410-423	all	HILT Event #29
424-437	all	HILT Event #30
438-451	all	HILT Event #31
452-465	all	HILT Event #32

Subcom Data / HILT Event Packet (continued)

bytes	bits	description
466-479	all	HILT Event #33
480-493	all	HILT Event #34
494-507	all	HILT Event #35
508-511	all	unused = 0

August 26, 1991

Subcom Data / HILT Event Packet / Single Event

offset	bits	description
0	7	Time - Hours
0	6:4	Time - Tens of Minutes (BCD)
0	3:0	Time - Ones of Minutes (BCD)
1	7:4	Time - Tens of Seconds (BCD)
1	3:0	Time - Ones of Seconds (BCD)
2:3	15:4	Energy - Proportional Counter Rear (PCR)
3:4	11:0	Position - Proportional Counter Rear (PCR)
5:6	15:4	Energy - Proportional Counter Front (PCF)
6:7	11:0	Position - Proportional Counter Front (PCF)
8:9	15:4	Energy - Ionization Chamber (IK)
9:10	11:2	Energy - Solid State Detector (SSD)
10:11	9:0	Energy - Cesium Iodide (CsJ)
12	all	Time of Drift (ToD)
13	7	SSD Row 1 Flag
13	6	SSD Row 2 Flag
13	5	SSD Row 3 Flag
13	4	SSD Row 4 Flag
13	3	Event ID (HE1-N)
13	2	Event ID (HE2-N)
13	1	Event ID (HZ1-N)
13	0	Event ID (HZ2-N)

August 26, 1991

Subcom Data / LEICA Event Packet

bytes	bits	contents
17	all	Number of events in this packet (max = 32)
18-32	all	LEICA Event #1 (see LEICA Event Description)
33-47	all	LEICA Event #2 (15 bytes each)
48-62	all	LEICA Event #3
63-77	all	LEICA Event #4
78-92	all	LEICA Event #5
93-107	all	LEICA Event #6
108-122	all	LEICA Event #7
123-137	all	LEICA Event #8
138-152	all	LEICA Event #9
153-167	all	LEICA Event #10
168-182	all	LEICA Event #11
183-197	all	LEICA Event #12
198-212	all	LEICA Event #13
213-227	all	LEICA Event #14
228-242	all	LEICA Event #15
243-257	all	LEICA Event #16
258-272	all	LEICA Event #17
273-287	all	LEICA Event #18
288-302	all	LEICA Event #19
303-317	all	LEICA Event #20
318-332	all	LEICA Event #21
333-347	all	LEICA Event #22
348-362	all	LEICA Event #23
363-377	all	LEICA Event #24
378-392	all	LEICA Event #25
393-407	all	LEICA Event #26
408-422	all	LEICA Event #27
423-437	all	LEICA Event #28
438-452	all	LEICA Event #29
453-467	all	LEICA Event #30

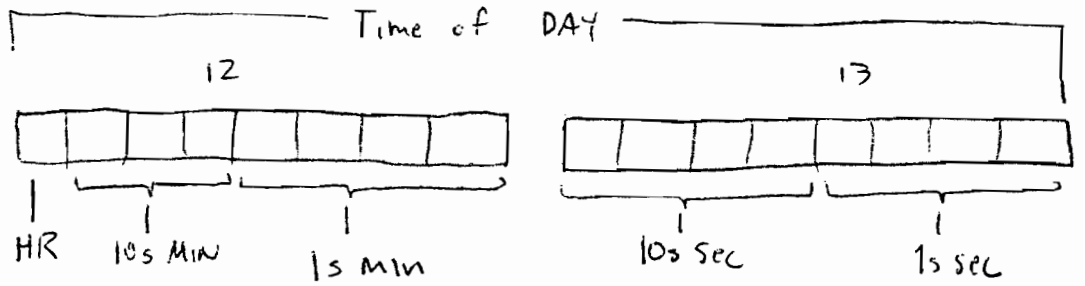
Subcom Data / LEICA Event Packet (continued)

bytes	bits	contents
468-482	all	LEICA Event #31
483-497	all	LEICA Event #32
498-511	all	unused = 0

August 26, 1991

Subcom Data / LEICA Event Packet / Single Event

offset	bits	description
0:1	15:4	Energy
1:2	11:0	Time of Flight (TOF)
3:4	15:4	Position 1, Start W
4:5	11:0	Position 2, Start S
6:7	15:4	Position 3, Start Z
7:8	11:0	Position 4, Stop W
9:10	15:4	Position 5, Stop S
10:11	11:0	Position 6, Stop Z
12:13	all	Time of Day
14	7	~~unused = 0~~ MULTISTART
14	6	CALENA
14	5	Priority ID bit = HIPRI
14	4	Calevent
14	3	Discriminator 4
14	2	Discriminator 3
14	1	Discriminator 2
14	0	Discriminator 1



Subcom Data / MAST Event Packet

bytes	bits	contents
17	all	Number of events in this packet (max = 20)
18-41	all	MAST Event #1 (see MAST Event Description)
42-65	all	MAST Event #2
66-89	all	MAST Event #3
90-113	all	MAST Event #4
114-137	all	MAST Event #5
138-161	all	MAST Event #6
162-185	all	MAST Event #7
186-209	all	MAST Event #8
210-233	all	MAST Event #9
234-257	all	MAST Event #10
258-281	all	MAST Event #11
282-305	all	MAST Event #12
306-329	all	MAST Event #13
330-353	all	MAST Event #14
354-377	all	MAST Event #15
378-401	all	MAST Event #16
402-425	all	MAST Event #17
426-449	all	MAST Event #18
450-473	all	MAST Event #19
474-497	all	MAST Event #20
498-511	all	unused = 0

August 26, 1991

Subcom Data / MAST Event Packet / Single Event

offset	bits	description
0	all	Event timetag offset (in seconds)
1	7:5	Last Detector Fired
1	4	G2 - High Level Guard
1	3	G1 - Low Level Guard
1	2:0	Sector Number
2	7	HIZ Event Flag
2	6	PEN Event Flag
2	5	Z2 Event Flag
2	4	Z1 Event Flag
2	3	CAL Event Flag
2	2	HAZ Event Flag
2	1:0	unused
3:4	15:4	M1X1 ADC
4:5	11:0	M1XS ADC
6:7	15:4	M2Y1 ADC
7:8	11:0	M2YS ADC
9:10	15:4	M3X1 ADC
10:11	11:0	M3XS ADC
12:13	15:4	M4Y1 ADC
13:14	11:0	M4YS ADC
15:16	15:4	D1 ADC
16:17	11:0	D2 ADC
18:19	15:4	D3 ADC
19:20	11:0	D4 ADC
21:22	15:4	D5 ADC
22:23	11:0	D6 ADC

Subcom Data / PET Event Packet

bytes	bits	contents
17	all	Number of events in this packet (max = 61)
18-25	all	PET Event #1 (see PET Event Description)
26-33	all	PET Event #2
34-41	all	PET Event #3
42-49	all	PET Event #4
50-57	all	PET Event #5
58-65	all	PET Event #6
66-73	all	PET Event #7
74-81	all	PET Event #8
82-89	all	PET Event #9
90-97	all	PET Event #10
98-105	all	PET Event #11
106-113	all	PET Event #12
114-121	all	PET Event #13
122-129	all	PET Event #14
130-137	all	PET Event #15
138-145	all	PET Event #16
146-153	all	PET Event #17
154-161	all	PET Event #18
162-169	all	PET Event #19
170-177	all	PET Event #20
178-185	all	PET Event #21
186-193	all	PET Event #22
194-201	all	PET Event #23
202-209	all	PET Event #24
210-217	all	PET Event #25
218-225	all	PET Event #26
226-233	all	PET Event #27
234-241	all	PET Event #28
242-249	all	PET Event #29
250-257	all	PET Event #30
258-265	all	PET Event #31
266-273	all	PET Event #32

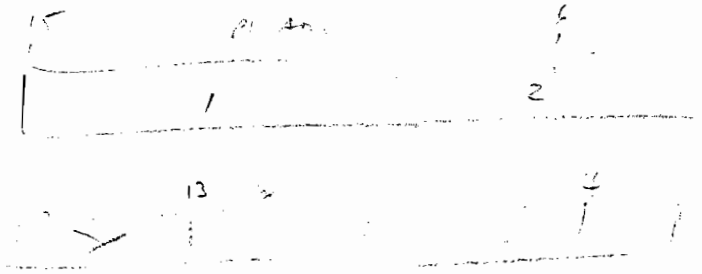
Subcom Data / PET Event Packet (continued)

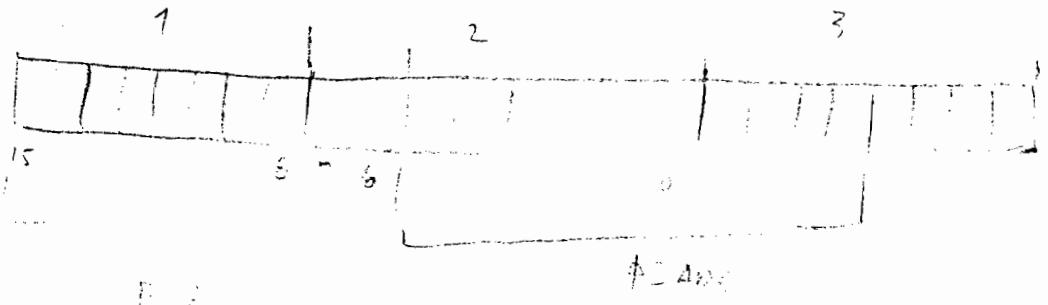
bytes	bits	contents
274-281	all	PET Event #33
282-289	all	PET Event #34
290-297	all	PET Event #35
298-305	all	PET Event #36
306-313	all	PET Event #37
314-321	all	PET Event #38
322-329	all	PET Event #39
330-337	all	PET Event #40
338-345	all	PET Event #41
346-353	all	PET Event #42
354-361	all	PET Event #43
362-369	all	PET Event #44
370-377	all	PET Event #45
378-385	all	PET Event #46
386-393	all	PET Event #47
394-401	all	PET Event #48
402-409	all	PET Event #49
410-417	all	PET Event #50
418-425	all	PET Event #51
426-433	all	PET Event #52
434-441	all	PET Event #53
442-449	all	PET Event #54
450-457	all	PET Event #55
458-465	all	PET Event #56
466-473	all	PET Event #57
474-481	all	PET Event #58
482-489	all	PET Event #59
490-497	all	PET Event #60
498-505	all	PET Event #61
506-511	all	unused = 0

August 26, 1991

Subcom Data / PET Event Packet / Single Event

offset	bits	description
0	all	Event timetag offset (in seconds)
1:2	15:6	P1 ADC
2:3	13:4	P2 ADC
3:4	11:2	P3 ADC
4:5	9:0	P47 ADC
6	7:5	Buffer Number
6	4	NMode - Indicates Neutral Mode
6	3:1	Sector Number
6	0	LOZMode - Indicates Gain State
7	7	P3 Discriminator Flag
7	6	P4 Discriminator Flag
7	5	P5 Discriminator Flag
7	4	P6 Discriminator Flag
7	3	P7 Discriminator Flag
7	2	P8 Discriminator Flag
7	1	AL - Low Level Guard
7	0	AH - High Level Guard





August 26, 1991

Subcom Data / High-res HILT Rate Packet

bytes	bits	contents
17-22	all	High-res Rate Block (time stamp + 0 s)
23-28	all	High-res Rate Block (time stamp + 0.1 s)
29-34	all	High-res Rate Block (time stamp + 0.2 s)
35-40	all	High-res Rate Block (time stamp + 0.3 s)
41-46	all	High-res Rate Block (time stamp + 0.4 s)
47-52	all	High-res Rate Block (time stamp + 0.5 s)
53-58	all	High-res Rate Block (time stamp + 0.6 s)
59-64	all	High-res Rate Block (time stamp + 0.7 s)
65-70	all	High-res Rate Block (time stamp + 0.8 s)
71-76	all	High-res Rate Block (time stamp + 0.9 s)
77-82	all	High-res Rate Block (time stamp + 1.0 s)
83-88	all	High-res Rate Block (time stamp + 1.1 s)
89-94	all	High-res Rate Block (time stamp + 1.2 s)
95-100	all	High-res Rate Block (time stamp + 1.3 s)
101-106	all	High-res Rate Block (time stamp + 1.4 s)
107-112	all	High-res Rate Block (time stamp + 1.5 s)
113-118	all	High-res Rate Block (time stamp + 1.6 s)
119-124	all	High-res Rate Block (time stamp + 1.7 s)
125-130	all	High-res Rate Block (time stamp + 1.8 s)
131-136	all	High-res Rate Block (time stamp + 1.9 s)
137-142	all	High-res Rate Block (time stamp + 2.0 s)
143-148	all	High-res Rate Block (time stamp + 2.1 s)
149-154	all	High-res Rate Block (time stamp + 2.2 s)
155-160	all	High-res Rate Block (time stamp + 2.3 s)
161-166	all	High-res Rate Block (time stamp + 2.4 s)
167-172	all	High-res Rate Block (time stamp + 2.5 s)
173-178	all	High-res Rate Block (time stamp + 2.6 s)
179-184	all	High-res Rate Block (time stamp + 2.7 s)
185-190	all	High-res Rate Block (time stamp + 2.8 s)
191-196	all	High-res Rate Block (time stamp + 2.9 s)
197-202	all	High-res Rate Block (time stamp + 3.0 s)
203-208	all	High-res Rate Block (time stamp + 3.1 s)
209-214	all	High-res Rate Block (time stamp + 3.2 s)

Subcom Data / High-res HILT Rate Packet (continued)

bytes	bits	contents
215-220	all	High-res Rate Block (time stamp + 3.3 s)
221-226	all	High-res Rate Block (time stamp + 3.4 s)
227-232	all	High-res Rate Block (time stamp + 3.5 s)
233-238	all	High-res Rate Block (time stamp + 3.6 s)
239-244	all	High-res Rate Block (time stamp + 3.7 s)
245-250	all	High-res Rate Block (time stamp + 3.8 s)
251-256	all	High-res Rate Block (time stamp + 3.9 s)
257-262	all	High-res Rate Block (time stamp + 4.0 s)
263-268	all	High-res Rate Block (time stamp + 4.1 s)
269-274	all	High-res Rate Block (time stamp + 4.2 s)
275-280	all	High-res Rate Block (time stamp + 4.3 s)
281-286	all	High-res Rate Block (time stamp + 4.4 s)
287-292	all	High-res Rate Block (time stamp + 4.5 s)
293-298	all	High-res Rate Block (time stamp + 4.6 s)
299-304	all	High-res Rate Block (time stamp + 4.7 s)
305-310	all	High-res Rate Block (time stamp + 4.8 s)
311-316	all	High-res Rate Block (time stamp + 4.9 s)
317-322	all	High-res Rate Block (time stamp + 5.0 s)
323-328	all	High-res Rate Block (time stamp + 5.1 s)
329-334	all	High-res Rate Block (time stamp + 5.2 s)
335-340	all	High-res Rate Block (time stamp + 5.3 s)
341-346	all	High-res Rate Block (time stamp + 5.4 s)
347-352	all	High-res Rate Block (time stamp + 5.5 s)
353-358	all	High-res Rate Block (time stamp + 5.6 s)
359-364	all	High-res Rate Block (time stamp + 5.7 s)
365-370	all	High-res Rate Block (time stamp + 5.8 s)
371-376	all	High-res Rate Block (time stamp + 5.9 s)
377-511	all	unused = 0

Subcom Data / High-res HILT Rate Packet / High-res Rate Block

offset	bits	contents
0	all	compressed SSD1
1	all	compressed SSD2
2	all	compressed SSD3
3	all	compressed SSD4
4	all	compressed PCRE
5	all	compressed IK

Subcom Data / High-res PET Rate Packet

bytes	bits	contents
17 + i	all	compressed P1 ADC (time tag + i * 0.1 secs)
		for i = 0, 479. Total coverage = 48 seconds.
497-511	all	unused = 0

August 26, 1991

Subcom Data / Low-res Rate Packets

bytes	bits	contents
17:18	15:4	HILT - HE1 Rate
18:19	11:0	HILT - HE2 Rate
20:21	15:4	HILT - HZ1 Rate
21:22	11:0	HILT - HZ2 Rate
23:24	15:4	depends on Subcom Type: = 6,14 : SSD1 = 7,15 : SSD2 = 8,16 : SSD3 = 9,17 : SSD4 = 10,18 : SSD1 = 11,19 : SSD2 = 12,20 : SSD3 = 13,21 : SSD4
24:25	11:0	depends on Subcom Type: = 6,14 : STROBE = 7,15 : PCF0 = 8,16 : IK0-AC = 9,17 : CSI = 10,18 : PCR0 = 11,19 : NO (PC * SSD) = 12,20 : PILE-UP = 13,21 : INVALID ARRAY
26:27	15:4	HILT - IDLE-HI Rate
27:28	11:0	HILT - IDLE-LO Rate
29:30	15:4	LEICA - D4 Singles
30:31	11:0	LEICA - D3 Singles
32:33	15:4	LEICA - D2 Singles
33:34	11:0	LEICA - D1 Singles
35:36	15:4	LEICA - Triples
36:37	11:0	LEICA - Doubles
38:39	15:4	LEICA - Stop Singles
39:40	11:0	LEICA - Start Singles
41:42	15:4	LEICA - IFC_Count

Subcom Data / Low-res Rate Packets (continued)

bytes	bits	contents
42:43	11:0	LEICA - Protons
44:45	15:4	LEICA - Low Priority
45:46	11:0	LEICA - High Priority
47:48	15:4	MAST - Z1SEC
48:49	11:0	MAST - ADC OR
50:51	15:4	MAST - LIVE TIME
51:52	11:0	MAST - PEN
53:54	15:4	MAST - Z1
54:55	11:0	MAST - Z2
56:57	15:4	MAST - HIZR0
57:58	11:0	MAST - HIZR1
59:60	15:4	MAST - HIZR2
60:61	11:0	MAST - HIZR3
62:63	15:4	MAST - HIZR4
63:64	11:0	MAST - HIZR5
65:66	15:4	MAST - HIZR6
66:67	11:0	depends on Subcom Type: = 6 : MAST - M1XSA = 7 : MAST - M1XSB = 8 : MAST - M2YSA = 9 : MAST - M2YSB = 10 : MAST - M3XSA = 11 : MAST - M3XSB = 12 : MAST - M4YSA = 13 : MAST - M4YSB = 14 : MAST - D1A = 15 : MAST - D1B = 16 : MAST - D2A = 17 : MAST - D2B = 18 : MAST - D3A = 19 : MAST - D3B = 20 : MAST - D4A = 21 : MAST - D4B

Subcom Data / Low-res Rate Packets (continued)

ytes	bits	contents
68:69	15:4	depends on Subcom Type: = 6 : MAST - M1X1 = 7 : MAST - M1XS = 8 : MAST - M2Y1 = 9 : MAST - M2YS = 10 : MAST - M3X1 = 11 : MAST - M3XS = 12 : MAST - M4Y1 = 13 : MAST - M4YS = 14 : MAST - D1 = 15 : MAST - D2 = 16 : MAST - D3 = 17 : MAST - D4 = 18 : MAST - D5 = 19 : MAST - D6 = 20 : MAST - G1 = 21 : MAST - G2

Subcom Data / Low-res Rate Packets (continued)

bytes	bits	contents
69:70	11:0	depends on Subcom Type: = 6 : MAST - D7 = 7 : MAST - G35L = 8 : MAST - G35H = 9 : MAST - G47L = 10 : MAST - G47H = 11 : MAST - G6L = 12 : MAST - G6H = 13 : MAST - HAZ = 14 : MAST - D5A = 15 : MAST - D5B = 16 : MAST - D6A = 17 : MAST - D6B = 18 : MAST - M12 = 19 : MAST - M34 = 20 : MAST - L = 21 : MAST - H
71:72	15:4	depends on Subcom Type: = 6,14 : MAST - Z1R0 = 7,15 : MAST - Z1R1 = 8,16 : MAST - Z1R2 = 9,17 : MAST - Z1R3 = 10,18 : MAST - Z1R4 = 11,19 : MAST - Z1R5 = 12,20 : MAST - Z1R6 = 13,21 : MAST - Z1R0

Subcom Data / Low-res Rate Packets (continued)

bytes	bits	contents
72:73	11:0	depends on Subcom Type: = 6,14 : MAST - Z2R0 = 7,15 : MAST - Z2R1 = 8,16 : MAST - Z2R2 = 9,17 : MAST - Z2R3 = 10,18 : MAST - Z2R4 = 11,19 : MAST - Z2R5 = 12,20 : MAST - Z2R6 = 13,21 : MAST - Z2R0
74:75	15:4	PET - PHI
75:76	11:0	PET - EHI
77:78	15:4	PET - PLO
78:79	11:0	PET - ELO
80:81	15:4	PET - EWG
81:82	11:0	PET - LIVE TIME
83:84	15:4	PET - PEN
84:85	11:0	PET - RNG
86:87	15:4	depends on Subcom Type: = 6,14 : PET - P1 ADC = 7,15 : PET - ADC OR = 8,16 : PET - P2 ADC = 9,17 : PET - AL = 10,18 : PET - P3 ADC = 11,19 : PET - AH = 12,20 : PET - P47 ADC = 13,21 : PET - HAZ

Subcom Data / Low-res Rate Packets (continued)

bytes	bits	contents
87:88	11:0	depends on Subcom Type: = 6 : PET - P4 single = 7 : PET - P5 single = 8 : PET - P6 single = 9 : PET - P7 single = 10 : PET - P8 single = 11 : PET - A3L single = 12 : PET - A3H single = 13 : PET - A4L single = 14 : PET - A4H single = 15 : PET - A57L single = 16 : PET - A57H single = 17 : PET - A68L single = 18 : PET - A68H single = 19 : PET - P1A single = 20 : PET - P3A single = 21 : PET - P3B single
88 - 89	all	spare = 0
90-511	all	unused = 0

August 26, 1991

Subcom Data / Analog Housekeeping Data Packet

s	bits	contents
17	all	HILT - Temp : Vent valve
18	all	HILT - Temp : Main valve
19	all	HILT - Temp : Pressure Reg. (internal)
20	all	HILT - Temp : Analog Box (internal)
21	all	HILT - Temp : Sensor internal
22	all	HILT - Temp : Digital box
23	all	HILT - Temp : Digital electronics
24	all	HILT - Temp : HV Conv. PC ✓
25	all	HILT - Temp : HV Conv. Drift
26	all	HILT - Temp : LV Conv. 1 Analog
27	all	HILT - Temp : LV Conv. 2 System
28	all	HILT - Temp : CsI external
29	all	HILT - -10V mon.
30	all	HILT - +5V mon.
31	all	HILT - +10V mon.
'	all	HILT - SSD bias
33	all	HILT - High voltage mon. (PC) HVPC
34	all	HILT - High voltage mon. (Drift) HVDR
35	all	HILT - Pressure mon. #1
36	all	HILT - Pressure mon. #2
37	all	HILT - Regulation valve temp.
38	all	HILT - +13V mon. / converter 2
39	all	HILT - -13V mon. / converter 2
40	all	HILT - +10V mon. / converter 2
41	all	HILT - -10V mon. / converter 2
42	all	HILT - +5V mon. /converter 2

Subcom Data / Analog Housekeeping Data Packet (continued)

es	bits	contents
43	all	LEICA - +12V mon.
44	all	LEICA - +6V mon.
45	all	LEICA - +5V mon.
46	all	LEICA - -5V mon.
47	all	LEICA - -6V mon.
48	all	LEICA - -12V mon.
49	all	LEICA - HVMON1
50	all	LEICA - HVMON2
51	all	LEICA - Temp1
52	all	LEICA - Temp2
53	all	LEICA - Temp3
54	all	LEICA - Temp4
55	all	LEICA - HVCMON1
56	all	LEICA - HVCMON2
57	all	LEICA - HVMON1
58	all	LEICA - HVMON2
59	all	MAST - ANA-M Thermistor
60	all	MAST - ANA-T Thermistor
61	all	MAST - M1-M Thermistor
62	all	MAST - M3-M Thermistor
63	all	MAST - D7-M Thermistor
64	all	MAST - M1-M Thermistor
65	all	MAST - M3-M Thermistor
66	all	MAST - D7-M Thermistor
67	all	PET - P8RT Thermistor
68	all	PET - P1RT Thermistor
69	all	PET - ANART Thermistor
70	all	PET - P8RT Thermistor
71	all	PET - P1RT Thermistor
72	all	PET - ANART Thermistor
73	all	PET - P1RT Thermistor
74	all	PET - P8RT Thermistor

Subcom Data / Analog Housekeeping Data Packet (continued)

bytes	bits	contents
75	all	LVPS - +7.5V mon.
76	all	LVPS - +4.7V mon.
77	all	LVPS - -7.5V mon.
78	all	LVPS - -13.5V mon.
79	all	LVPS - -37.0V mon.
80	all	LVPS - ground mon.
81	all	LVPS - ground mon.
82	all	LVPS - ground mon.
83	all	LVPS - ground mon.
84	all	LVPS - +37.0V mon.
85	all	LVPS - +13.5V mon.
86	all	LVPS - +10.0V mon.
87	all	LVPS - PET mon.
88	all	LVPS - MAST mon.
89	all	LVPS - PSA current mon.
90	all	LVPS - variable load mon.
91	all	DPU - VCC mon.
92	all	DPU - +10V mon.
93	all	DPU - -10V mon.
94	all	DPU - +2.5V mon.
95	all	DPU - Ground mon.
96-511	all	unused = 0

79 bytes
+ 1 spare
80 bytes
+ 4 8 times
84

August 26, 1991

Subcom Data / Digital Status Packet

bytes	bits	contents
17	7	HILT : Csl 4 Disabled
17	6	HILT : Csl 3 Disabled
17	5	HILT : Csl 2 Disabled
17	4	HILT : Csl 1 Disabled
17	3	HILT : SSD Row 4 Enabled
17	2	HILT : SSD Row 3 Enabled
17	1	HILT : SSD Row 2 Enabled
17	0	HILT : SSD Row 1 Enabled
18	7	HILT : Override flag
18	6:4	HILT : Subcom Number
18	3	HILT : High Energy Mode ON
18	2	HILT : Int. Stimulation ON
18	1:0	HILT : Testcode = 01
19	7:5	HILT/XILINX : Watchdog Counter
19	4	HILT/XILINX : LCA-Select
19	3	HILT/XILINX : LCA Readback Mode
19	2	HILT/XILINX : LCA Masked Mode
19	1	HILT/XILINX : LCA Compare Mode
19	0	HILT/XILINX : Multiple Error
20	7	HILT/XILINX : Single Error
20	6:0	HILT/XILINX : EEPROM Block Address (blocksize = 256 bytes)
21	all	HILT : Count of EEPROM pages with confirmed checksum errors (max = 128)
22-28	all	HILT : EEPROM page numbers with confirmed checksum errors (first 7 only)
29	all	HILT : Count of confirmed Watchdog errors
30	all	HILT : Count of confirmed XILINX errors
31	all	HILT : Count of XINIT pulses
32	all	HILT : Count of XPWROFF pulses

Subcom Data / Digital Status Packet (continued)

bytes	bits	contents
33	7	DPU/HILT : Cover Closed
33	6	DPU/HILT : Flow Reg. Valve Closed
33	5	DPU/HILT : Vent Valve Closed
33	4	DPU/HILT : Main Valve Closed
33	3	DPU/HILT : Cover Open
33	2	DPU/HILT : Flow Reg. Valve Open
33	1	DPU/HILT : Vent Valve Open
33	0	DPU/HILT : Main Valve Open
34	7	DPU/HILT : Pressure Threshold
34	6	DPU/HILT : High Voltage Disable
34	5	DPU/HILT : Main Valve Disable
34	4	DPU/HILT : spare
34	3	DPU/HILT : Pressure Regulation ON
34	2	DPU/HILT : High Voltage SSD Enabled
34	1	DPU/HILT : High Voltage Drift Enabled
34	0	DPU/HILT : High Voltage PC Enabled
35	7	LEICA : SLOPE1
35	6	LEICA : SLOPE0
35	5	LEICA : SLANT6
35	4	LEICA : SLANT5
35	3	LEICA : SLANT4
35	2	LEICA : SLANT3
35	1	LEICA : SLANT2
35	0	LEICA : SLANT1
36	7	LEICA : SLANT0
36	6	LEICA : CALENA
36	5	LEICA : HV2ENA
36	4	LEICA : HV1ENA
36	3	LEICA : D4ENA
36	2	LEICA : D3ENA
36	1	LEICA : D2ENA
36	0	LEICA : D1ENA
37	all	LEICA : fixed value = A3 hex

Subcom Data / Digital Status Packet (continued)

bytes	bits	contents
38	7	MAST : Log Calibration
38	6	MAST : Ramp Calibration
38	5	MAST : ADC Calibration
38	4	MAST : Calibration Enabled
38	3	MAST : ACE Enabled
38	2:0	MAST : Spares
39	7	PET : Log Calibration
39	6	PET : Ramp Calibration
39	5	PET : ADC Calibration
39	4	PET : Calibration Enabled
39	3	PET : ACE Enabled
39	2	PET : LoZ Mode
39	1	PET : N Mode
39	0	PET : Spare
40	7	MAST/PET LVPS : Oscillator On
40	6	MAST/PET LVPS : Oscillator Off
40	5	MAST/PET LVPS : MAST Power On
40	4	MAST/PET LVPS : MAST Power Off
40	3	MAST/PET LVPS : PET Power On
40	2	MAST/PET LVPS : PET Power Off
40	1:0	MAST/PET LVPS : Spares
41	7	DPU : System Initialization Complete
41	6	DPU : Ground Command Enabled
41	5	DPU : SEDS Interface Number
41	4	DPU : Degraded Mode Enabled
41	3	DPU : Clock Error
41	2	DPU : T/M Packet Overrun
41	1	DPU : Configuration List Error
41	0	DPU : SEDS/DPU Time Sync. Error

Subcom Data / Digital Status Packet (continued)

ytes	bits	contents
42:43	all	DPU : Seconds until next quota collection
44:45	all	DPU : HILT running event quota / 256
46:47	all	DPU : LEICA running event quota / 256
48:49	all	DPU : MAST running event quota / 256
50:51	all	DPU : PET running event quota / 256
52:53	all	DPU : HILT running high-res rate quota / 256
54:55	all	DPU : PET running high-res rate quota / 256
56:57	all	DPU : General Command count
58:59	all	DPU : General Command error count
60:61	all	DPU : Time Command count
62:63	all	DPU : Time Command error count
64	all	DPU : Software version (BCD)
65	3:0	DPU : Number of good RAM pages (max = 7)
66-72	all	DPU : Memory page table map (numbers indicate indirect page ordering)
73	0:0	DPU : Analog oscillator selected
74-78	all	DPU/MAST : Command word #1
79-83	all	DPU/MAST : Command word #2
84-88	all	DPU/MAST : Command word #3
89-93	all	DPU/MAST : Command word #4
94-98	all	DPU/MAST : Command word #5
99-103	all	DPU/MAST : Command word #6
104-108	all	DPU/PET : Command word #1
109-113	all	DPU/PET : Command word #2
114-118	all	DPU/PET : Command word #4
119	all	DPU : CONFIG register
120:121	all	DPU : PROM checksum
122-511	all	unused = 0

Subcom Data / Command Error Echo

bytes	bits	contents
17	all	unused = 0
18:19	all	General Command count
20:21	all	General Command error count
22-29	all	Erroneous command data
30-511	all	unused = 0

Subcom Data / DPU State Change

bytes	bits	contents
17	all	DPU state number = 1 : program loaded and SEDS interface selected = 2 : all DPU configuration commands received = 3 : program time initialization complete = 4 : 5 consecutive command verification errors forced selection of new SEDS interface = 5 : normal operation achieved = 6 : configuration command error
18	7	System Initialization Complete
18	6	Ground Command Enabled
18	5	SEDS Interface Number
18	4	Degraded Mode Enabled
18	3	Clock Error
18	2	T/M packet queue overrun
18	1	Configuration List Error
18	0	SEDS/DPU Time Sync. Error
19	all	spares
20-511	all	unused = 0

Subcom Data / DPU Parameter Dump

bytes	bits	contents
17	all	unused = 0
18	all	Enabled data sources mask
19	all	LVPS control mask
20	all	HILT valve and cover control mask
21	all	HILT high-voltage enable mask
22:23	all	HILT valve and cover cntrl timeout
24:25	all	HILT orbit event allocation / 256
26:27	all	LEICA orbit event allocation / 256
28:29	all	MAST orbit event allocation / 256
30:31	all	PET orbit event allocation / 256
32:33	all	HILT orbit HRR allocation / 256
34:35	all	PET orbit HRR allocation / 256
36	all	HILT event memory % reallocation
37	all	LEICA event memory % reallocation
38	all	MAST event memory % reallocation
39	all	PET event memory % reallocation
40	all	HILT HRR memory % reallocation
41	all	PET HRR memory % reallocation
42	all	HILT 1 second event quota - HE1
43	all	HILT 1 second event quota - HE2
44	all	HILT 1 second event quota - HZ1
45	all	HILT 1 second event quota - HZ2
46	all	LEICA 1 second event quota
47	all	LEICA 1 second lo-pri event quota
48	all	MAST 1 second event quota - HIZ
49	all	MAST 1 second event quota - PEN
50	all	MAST 1 second event quota - Z2
51	all	MAST 1 second event quota - Z1
52	all	MAST 1 second event quota - HAZ

Subcom Data / DPU Parameter Dump (continued)

bytes	bits	contents
53	all	PET 1 second event quota
54	all	HILT high-res. rate item selection
55	all	Enabled interfaces mask
56:57	all	PET high-resolution rate threshold
58:59	all	HILT high-res. rate threshold
60-511	all	unused = 0

HILT EEPROM/LCA Memory Dump (Application ID = 43)

bytes	bits	contents
0	7:5	Version Number = 0
0	4:4	Type = 0
0	3:3	Secondary Header Flag = 1
0:1	10:0	Application ID = 43
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 271
6:7	all	Time stamp : days since 24-May-68
8:10	all	Time stamp : seconds of day
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16	all	unused = 0
17	7:7	Dump Mode
if Dump Mode = 0:		
17	4:4	Dump Mask: LCA Unit Select
17	3:3	Dump Mask: Write EEPROM
17	2:2	Dump Mask: LCA Readback Mode
17	1:1	Dump Mask: LCA Masked Mode
17	0:0	Dump Mask: LCA Compare Mode
18:19	all	Memory Dump starting address for block
20:21	all	Dump Length (for this packet)
22-277	all	Contiguous 256-byte EEPROM/LCA data block
if Dump Mode = 1:		
17	2:0	Address for repetitive readback
18:19	all	= 0
20:21	all	Number of readouts included
22-277	all	Readback data
278-511	all	unused = 0

DPU Memory Dump (Application ID = 44)

bytes	bits	contents
0	7:5	Version Number = 0
0	4:4	Type = 0
0	3:3	Secondary Header Flag = 1
0:1	10:0	Application ID = 44
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 269
6:7	all	Time stamp : days since 24-May-68
8:10	all	Time stamp : seconds of day
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16-17	all	unused = 0
18:19	all	Memory Dump starting address for block
20-275	all	Contiguous 256-byte DPU memory block
276-511	all	unused = 0

DPU Parameter Dump (Application ID = 45)

bytes	bits	contents
0	7:5	Version Number = 0
0	4:4	Type = 0
0	3:3	Secondary Header Flag = 1
0:1	10:0	Application ID = 45
2	7:6	Segment Flags = 3
2:3	13:0	Source Sequence Counter
4:5	all	Packet Length = 53
6:7	all	Time stamp : days since 24-May-68
8:10	all	Time stamp : seconds of day
11:12	all	Time stamp : milliseconds of day (unused = 0)
13	all	unused = 0
14:15	all	Checksum
16-17	all	unused = 0
18	all	Enabled data sources mask
19	all	LVPS control mask
20	all	HILT valve and cover control mask
21	all	HILT high-voltage enable mask
22:23	all	HILT valve and cover cntrl timeout
24:25	all	HILT orbit event allocation / 256
26:27	all	LEICA orbit event allocation / 256
28:29	all	MAST orbit event allocation / 256
30:31	all	PET orbit event allocation / 256
32:33	all	HILT orbit HRR allocation / 256
34:35	all	PET orbit HRR allocation / 256
36	all	HILT event memory % reallocation
37	all	LEICA event memory % reallocation
38	all	MAST event memory % reallocation
39	all	PET event memory % reallocation
40	all	HILT HRR memory % reallocation
41	all	PET HRR memory % reallocation

DPU Parameter Dump (continued)

bytes	bits	contents
42	all	HILT 1 second event quota - HE1
43	all	HILT 1 second event quota - HE2
44	all	HILT 1 second event quota - HZ1
45	all	HILT 1 second event quota - HZ2
46	all	LEICA 1 second event quota
47	all	LEICA 1 second lo-pri event quota
48	all	MAST 1 second event quota - HIZ
49	all	MAST 1 second event quota - PEN
50	all	MAST 1 second event quota - Z2
51	all	MAST 1 second event quota - Z1
52	all	MAST 1 second event quota - HAZ
53	all	PET 1 second event quota
54	all	HILT high-res. rate item selection
55	all	Enabled interfaces mask
56:57	all	PET high-resolution rate threshold
58:59	all	HILT high-res. rate threshold
60-511	all	unused = 0