Subject: TIGER LDB science data format (draft)
From: Marty Olevitch, Washington U. Physics Dept.
Date: 21 Dec 2001

This document describes the format of the TIGER/LDB science data stream.

Science data event type codes and sizes

Code	Type	Approx. Frequency	Size (wds)	Size (bytes)	Size (bits)
1	Real data	5 per sec avg	168	336	2688
2	Pedestal calibration	80 per 20 min	168	336	2688
3	Light calibration	80 per 20 min	168	336	2688
4	Critical scalars hskp	every 1 min	17	34	272
5	Sensors housekeeping	every 4 min	61	122	976
6	Misc housekeeping	every 15 min	54	108	864
7	Scalars housekeeping	every 10 min	69	138	1104
8	Reply event	occasionally	47	94	752
9	High-priority SIP data	1.25 per sec?	97	194	1552
10	Low-priority SIP data	?	97	194	1552
11	No type 11 data				
12	Slow ARGOS hskp	every 6 min	14.5	29	232

NOTE A: Type 1 real data events are stored on the science flight CPU disk, and transmitted in line-of-sight (LOS) mode. They are not transmitted via SIP. The more compressed types 9 and 10 events are transmitted via SIP instead.

NOTE B: All calibration events (types 2 and 3) are stored on the flight disk and transmitted in LOS mode. Once per minute, one light and one ped cal is transmitted via SIP. Housekeeping events are both transmitted and stored on the flight disk as they are generated. Replies also.

NOTE C: High priority events are transmitted in preference to low priority events. Priority is determined by a simple sum of the signals in S1 and S2.

NOTE D: The data sent on the slow TDRSS channel consists of argos-format housekeepings and a smattering of high- or low-priority telemetry data.

Description of each event type

A. DATA EVENTS - includes real and calibration data (types 1 - 3)
(does not include telemetered data)
Total size = 168 wds = 2688 bits

16	12	8	4	0		
0	evt id pattern			type	0	0xBEF0+type
1	event number LSW				2	
2	event number MSW				4	
3	PC tick count LSW				6	
4	PC tick count MSW				8	
5	C0 4 lo	C0 pha 1			10	Aerogel Cerenkov - C0A
6	C0 4 m	C0 pha 2			12	
7	C0 4 hi	C0 pha 3			14	
8	C0 8 lo	C0 pha 5			16	
9	C0 8 m	C0 pha 6			18	
10	C0 8 hi	C0 pha 7			20	
11	C0 12 lo	C0 pha 9			22	C0B
12	C0 12 m	C0 pha 10			24	
13	C0 12 hi	C0 pha 11			26	
14	C0 16 lo	C0 pha 13			28	
15	C0 16 m	C0 pha 14			30	
16	C0 16 hi	C0 pha 15			32	
17	C0 20 lo	C0 pha 17			34	C0C
18	C0 20 m	C0 pha 18			36	
19	C0 20 hi	C0 pha 19			38	
20	C0 24 lo	C0 pha 21			40	
21	C0 24 m	C0 pha 22			42	
22	C0 24 hi	C0 pha 23			44	
23	C1 2 amp lo	C1 pha 1 regular			46	Plastic Cerenkov - C1A
24	C1 2 amp m	C1 pha 1 amplified			48	regular=1x; amplified=11x
25	C1 2 amp hi	C1 pha 2 regular			50	
26	C1 4 amp lo	C1 pha 3 regular			52	
27	C1 4 amp m	C1 pha 3 amplified			54	
28	C1 4 amp hi	C1 pha 4 regular			56	
29					58	

continued...

16	12	8	4	0	
29	C1 6 amp lo	C1 pha 5 regular		58	C1A - continued
30	C1 6 amp m	C1 pha 5 amplified		60	
31	C1 6 amp hi	C1 pha 6 regular		62	
32	C1 8 amp lo	C1 pha 7 regular		64	
33	C1 8 amp m	C1 pha 7 amplified		66	
34	C1 8 amp hi	C1 pha 8 regular		68	
35	C1 10 amp lo	C1 pha 9 regular		70	C1B
36	C1 10 amp m	C1 pha 9 amplified		72	
37	C1 10 amp hi	C1 pha 10 regular		74	
38	C1 12 amp lo	C1 pha 11 regular		76	
39	C1 12 amp m	C1 pha 11 amplified		78	
40	C1 12 amp hi	C1 pha 12 regular		80	
41	C1 14 amp lo	C1 pha 13 regular		82	
42	C1 14 amp m	C1 pha 13 amplified		84	
43	C1 14 amp hi	C1 pha 14 regular		86	
44	C1 16 amp lo	C1 pha 15 regular		88	
45	C1 16 amp m	C1 pha 15 amplified		90	
46	C1 16 amp hi	C1 pha 16 regular		92	
47	C1 18 amp lo	C1 pha 17 regular		94	C1C
48	C1 18 amp m	C1 pha 17 amplified		96	
49	C1 18 amp hi	C1 pha 18 regular		98	
50	C1 20 amp lo	C1 pha 19 regular		100	
51	C1 20 amp m	C1 pha 19 amplified		102	
52	C1 20 amp hi	C1 pha 20 regular		104	
53	C1 22 amp lo	C1 pha 21 regular		106	
54	C1 22 amp m	C1 pha 21 amplified		108	
55	C1 22 amp hi	C1 pha 22 regular		110	
56	C1 24 amp lo	C1 pha 23 regular		112	
57	C1 24 amp m	C1 pha 23 amplified		114	
58	C1 24 amp hi	C1 pha 24 regular		116	
59	S1 4 lo	S1 pha 1		118	S1
60	S1 4 m	S1 pha 2		120	
61	S1 4 hi	S1 pha 3		122	
62				124	

continued...

16	12	8	4	0		
62	S1 8 lo	S1 pha 5		124	S1 - continued	
63	S1 8 m	S1 pha 6		126		
64	S1 8 hi	S1 pha 7		128		
65	S2 4 lo	S2 pha 1		130	S2	
66	S2 4 m	S2 pha 2		132		
67	S2 4 hi	S2 pha 3		134		
68	S2 8 lo	S2 pha 5		136		
69	S2 8 m	S2 pha 6		138		
70	S2 8 hi	S2 pha 7		140		
71	S3 4 lo	S3 pha 1		142	S3	
72	S3 4 m	S3 pha 2		144		
73	S3 4 hi	S3 pha 3		146		
74	S3 8 lo	S3 pha 5		148		
75	S3 8 m	S3 pha 6		150		
76	S3 8 hi	S3 pha 7		152		
77	S4 4 lo	S4 pha 1		154	S4	
78	S4 4 m	S4 pha 2		156		
79	S4 4 hi	S4 pha 3		158		
80	S4 8 lo	S4 pha 5		160		
81	S4 8 m	S4 pha 6		162		
82	S4 8 hi	S4 pha 7		164		
83	HBX C 4 lo	HBX C pha 1		166	Hodo bottom X (coarse)	
84	HBX C 4 m	HBX C pha 2		168		
85	HBX C 4 hi	HBX C pha 3		170		
86	HBX C 8 lo	HBX C pha 5		172		
87	HBX C 8 m	HBX C pha 6		174		
88	HBX C 8 hi	HBX C pha 7		176		
89	HBX C 12 lo	HBX C pha 9		178		
90	HBX C 12 m	HBX C pha 10		180		
91	HBX C 12 hi	HBX C pha 11		182		
92	HBX F 2 lo	HBX C pha 13		184		
93	HBX F 2 m	HBX C pha 14		186		
94	HBX F 2 hi	HBX F pha 1		188	Hodo bottom X (fine)	
95				190		

continued...

16	12	8	4	0	
95	HBX F 6 lo	HBX F pha 3		190	Hodo bottom X (fine) - continued
96	HBX F 6 m	HBX F pha 4		192	
97	HBX F 6 hi	HBX F pha 5		194	
98	HBX F 10 lo	HBX F pha 7		196	
99	HBX F 10 m	HBX F pha 8		198	
100	HBX F 10 hi	HBX F pha 9		200	
101	HBX F 14 lo	HBX F pha 11		202	
102	HBX F 14 m	HBX F pha 12		204	
103	HBX F 14 hi	HBX F pha 13		206	
104	HBY C 4 lo	HBY C pha 1		208	Hodo bottom Y (coarse)
105	HBY C 4 m	HBY C pha 2		210	
106	HBY C 4 hi	HBY C pha 3		212	
107	HBY C 8 lo	HBY C pha 5		214	
108	HBY C 8 m	HBY C pha 6		216	
109	HBY C 8 hi	HBY C pha 7		218	
110	HBY C 12 lo	HBY C pha 9		220	
111	HBY C 12 m	HBY C pha 10		222	
112	HBY C 12 hi	HBY C pha 11		224	
113	HBY F 2 lo	HBY C pha 13		226	
114	HBY F 2 m	HBY C pha 14		228	
115	HBY F 2 hi	HBY F pha 1		230	Hodo bottom Y (fine)
116	HBY F 6 lo	HBY F pha 3		232	
117	HBY F 6 m	HBY F pha 4		234	
118	HBY F 6 hi	HBY F pha 5		236	
119	HBY F 10 lo	HBY F pha 7		238	
120	HBY F 10 m	HBY F pha 8		240	
121	HBY F 10 hi	HBY F pha 9		242	
122	HBY F 14 lo	HBY F pha 11		244	
123	HBY F 14 m	HBY F pha 12		246	
124	HBY F 14 hi	HBY F pha 13		248	
125				250	

continued...

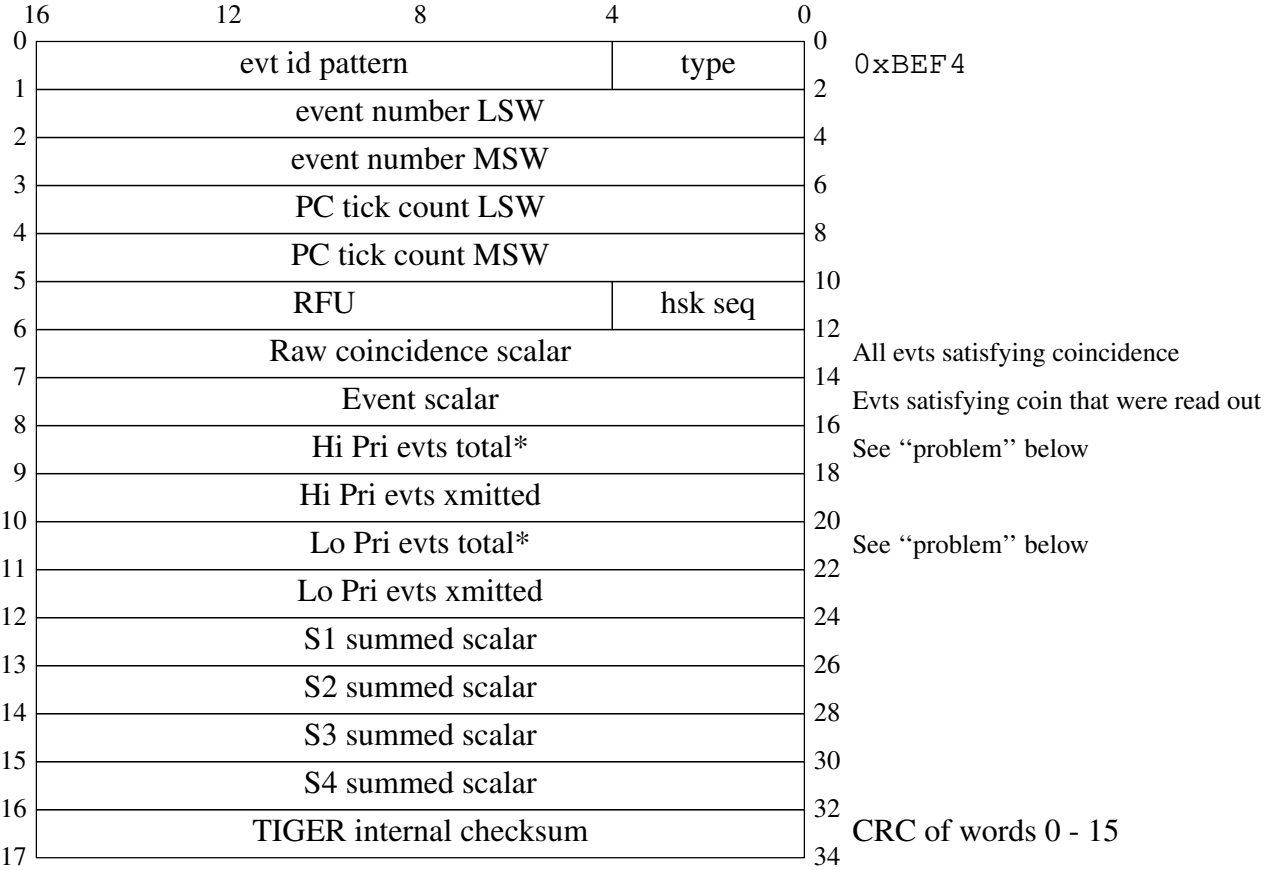
16	12	8	4	0	
125	HTX C 4 lo	HTX C pha 1		250	Hodo top X (coarse)
126	HTX C 4 m	HTX C pha 2		252	
127	HTX C 4 hi	HTX C pha 3		254	
128	HTX C 8 lo	HTX C pha 5		256	
129	HTX C 8 m	HTX C pha 6		258	
130	HTX C 8 hi	HTX C pha 7		260	
131	HTX C 12 lo	HTX C pha 9		262	
132	HTX C 12 m	HTX C pha 10		264	
133	HTX C 12 hi	HTX C pha 11		266	
134	HTX F 2 lo	HTX C pha 13		268	
135	HTX F 2 m	HTX C pha 14		270	
136	HTX F 2 hi	HTX F pha 1		272	Hodo top X (fine)
137	HTX F 6 lo	HTX F pha 3		274	
138	HTX F 6 m	HTX F pha 4		276	
139	HTX F 6 hi	HTX F pha 5		278	
140	HTX F 10 lo	HTX F pha 7		280	
141	HTX F 10 m	HTX F pha 8		282	
142	HTX F 10 hi	HTX F pha 9		284	
143	HTX F 14 lo	HTX F pha 11		286	
144	HTX F 14 m	HTX F pha 12		288	
145	HTX F 14 hi	HTX F pha 13		290	
146	HTY C 4 lo	HTY C pha 1		292	Hodo top Y (coarse)
147	HTY C 4 m	HTY C pha 2		294	
148	HTY C 4 hi	HTY C pha 3		296	
149	HTY C 8 lo	HTY C pha 5		298	
150	HTY C 8 m	HTY C pha 6		300	
151	HTY C 8 hi	HTY C pha 7		302	
152	HTY C 12 lo	HTY C pha 9		304	
153	HTY C 12 m	HTY C pha 10		306	
154	HTY C 12 hi	HTY C pha 11		308	
155	HTY F 2 lo	HTY C pha 13		310	
156	HTY F 2 m	HTY C pha 14		312	
157	HTY F 2 hi	HTY F pha 1		314	Hodo top Y (fine)
158				316	

continued...

16	12	8	4	0		
158	HTY F 6 lo	HTY F pha 3			316	Hodo top Y (fine) [cont.]
159	HTY F 6 m	HTY F pha 4			318	
160	HTY F 6 hi	HTY F pha 5			320	
161	HTY F 10 lo	HTY F pha 7			322	
162	HTY F 10 m	HTY F pha 8			324	
163	HTY F 10 hi	HTY F pha 9			326	
164	HTY F 14 lo	HTY F pha 11			328	
165	HTY F 14 m	HTY F pha 12			330	
166	HTY F 14 hi	HTY F pha 13			332	
167	TIGER internal checksum				334	CRC of words 0 - 166
168					336	

END OF DATA EVENT

B. CRITICAL SCALARS (1 minute) HOUSEKEEPING (type 4)
Total size = 17 wds = 272 bits



* There is a problem with the "Hi Pri evts total" and "Lo Pri evts total". When the priority detector is not in "fake" mode, the events going into these totals are counted twice. So the total should be twice as much as expected.

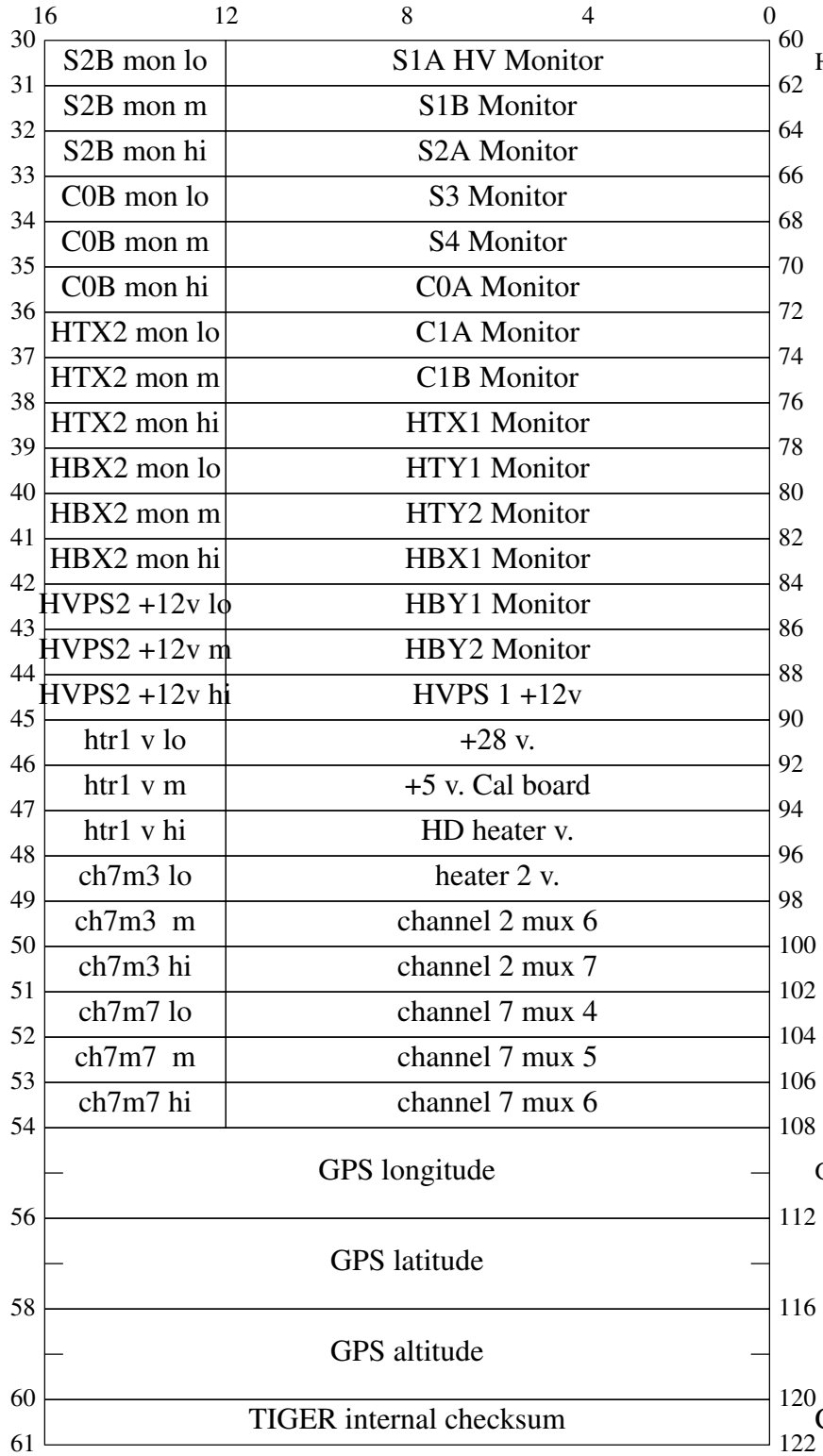
END OF CRITICAL SCALARS (1 min) HOUSEKEEPING

C. SENSORS (4 min) HOUSEKEEPING (type 5)

Total size = 61 wds = 976 bits

16	12	8	4	0		
0	evt id pattern			type	0	0xBEF5
1	event number LSW				2	
2	event number MSW				4	
3	PC tick count LSW				6	
4	PC tick count MSW				8	
5	RFU			hsk seq	10	
6	S1D tmp4 lo	S1A temp 1			12	Temperatures
7	S1D tmp4 m	S1B temp 2			14	
8	S1D tmp4 hi	S1C temp 3			16	
9	S4D tmp8 lo	S4A temp 5			18	
10	S4D tmp8 m	S4B temp 6			20	
11	S4D tmp8 hi	S4C temp 7			22	
12	C0DA tmp12 lo	C0 AB temp 9			24	
13	C0DA tmp12 m	C0 BC temp 10			26	
14	C0DA tmp12 hi	C0 CD temp 11			28	
15	HD tmp16 lo	VME A temp 13			30	
16	HD tmp16 m	VME B temp 14			32	
17	HD tmp16 hi	CPU temp 15			34	
18	C1-14 tmp20 lo	Belly band temp 17			36	
19	C1-14 tmp20 m	HBX HVPS 1 temp 18			38	
20	C1-14 tmp20 hi	C0-2 PMT base temp 19			40	
21	+5 CPU volt lo	temperature 21 (unassigned)			42	
22	+5 CPU volt m	temperature 22 (unassigned)			44	
23	+5 CPU volt hi	+28 v. current			46	
24	HD Pressure lo	PHA-1 +5 voltage			48	
25	HD Pressure m	PHA-1 +6 voltage			50	
26	HD Pressure hi	PHA-1 -6 voltage			52	
27	HVPS Cur lo	PHA-2 +5 voltage			54	
28	HVPS Cur m	PHA-2 +6 voltage			56	
29	HVPS Cur hi	PHA-2 -6 voltage			58	
30					60	

continued...



HVPS voltages for detector PMTs (0-2v)

GPS values (from SIP) are all floating point.

CRC of words 0 - 59

END OF SENSORS (4 min) HOUSEKEEPING

D. MISC (15 min) HOUSEKEEPING (type 6)

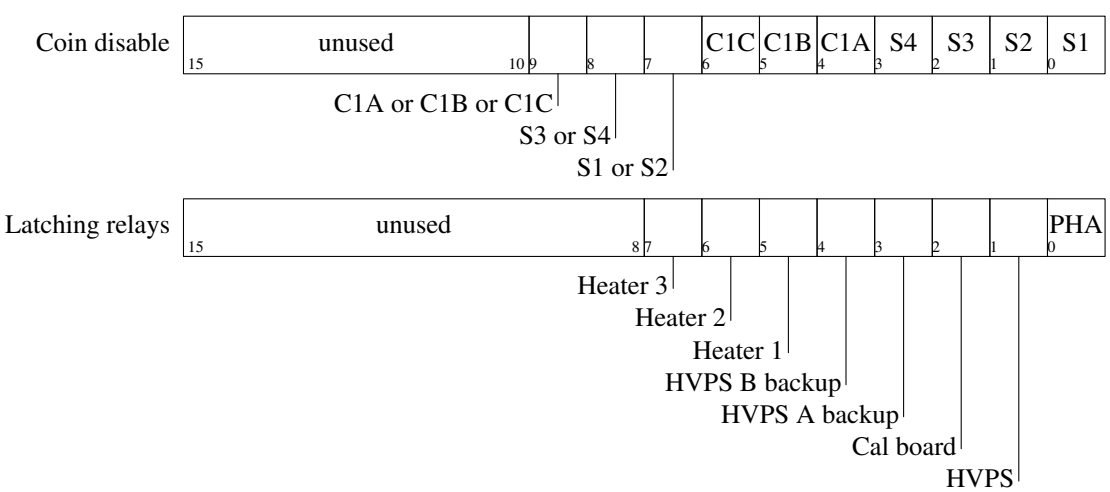
Total size = 54 wds = 864 bits

16	12	8	4	0		
0	evt id pattern			type	0	0xBEF6
1	event number LSW				2	
2	event number MSW				4	
3	PC tick count LSW				6	
4	PC tick count MSW				8	
5	RFU			hsk seq	10	
6	S4 disc lo	S1 discriminator			12	discriminators
7	S4 disc m	S2 discriminator			14	
8	S4 disc hi	S3 discriminator			16	
9	C1 bd 1 disc lo	C0 board 1 discriminator			18	
10	C1 bd 1 disc m	C0 board 2 discriminator			20	
11	C1 bd 1 disc hi	C0 board 3 discriminator			22	
12	C1 bd 5 disc lo	C1 board 2 discriminator			24	
13	C1 bd 5 disc m	C1 board 3 discriminator			26	
14	C1 bd 5 disc hi	C1 board 4 discriminator			28	
15	H 3 HBXF lo	C1 board 6 discriminator			30	
16	H 3 HBXF m	Hodo board 1 (HBXC) discrim			32	
17	H 3 HBXF hi	Hodo board 2 (HBXCF) discrim			34	
18	H 7 HBYF lo	Hodo board 4 (HBXFYC) discrim			36	
19	H 7 HBYF m	Hodo board 5 (HBYC) discrim			38	
20	H 7 HBYF hi	Hodo board 6 (HBYCF) discrim			40	
21	H 11 HTXFYC lo	Hodo board 8 (HTXC) discrim			42	
22	H 11 HTXFYC m	Hodo board 9 (HTXCF) discrim			44	
23	H 11 HTXFYC hi	Hodo board 10 (HTXF) discrim			46	
24	S1A dac lo	Hodo board 12 (HTYC) discrim			48	
25	S1A dac m	Hodo board 13 (HTYCF) discrim			50	
26	S1A dac hi	Hodo board 14 (HTYF) discrim			52	
27	S3 dac lo	S1B external dac			54	external dacs
28	S3 dac m	S2A external dac			56	
29	S3 dac hi	S2B external dac			58	
30					60	

continued...

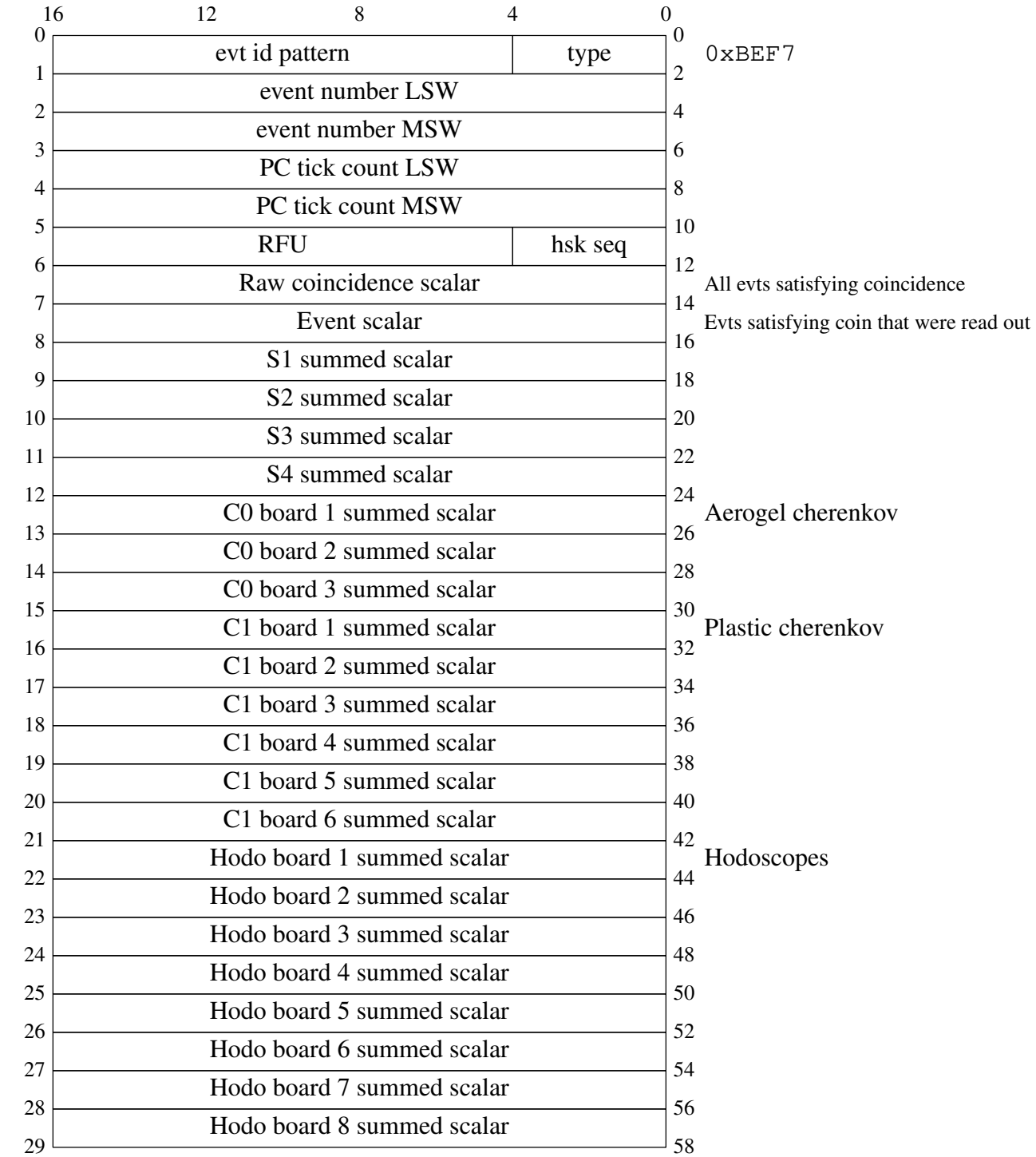
16	12	8	4	0	
30	C1A dac lo	S4 external dac			60
31	C1A dac m	C0A external dac			62
32	C1A dac hi	C0B external dac			64
33	HTX1 dac lo	C1B external dac			66
34	HTX1 dac m	HBX1 external dac			68
35	HTX1 dac hi	HBX2 external dac			70
36	LED1 dac lo	HTX2 external dac			72
37	LED1 dac m	HBY1 external dac			74
38	LED1 dac hi	HBY2 external dac			76
39	SPARE1 lo	LED2 external dac			78
40	SPARE1 m	LED3 external dac			80
41	SPARE1 hi	LED4 external dac			82
42	SPARE5 lo	SPARE2			84
43	SPARE5 m	SPARE3			86
44	SPARE5 hi	SPARE4			88
45	H amp lo	S LED amplitude			90
46	H amp m	C0 LED amplitude			92
47	H amp hi	C1 LED amplitude			94
48	HA2 HA1	C1	C0	S4 S3 S2 S1	96 LED pulse widths
49					98
50				HB2 HB1	100 (0=20 ns, 1=32, 2=44, 3=48)
51	Priority cut-off value				102
52	Coincidence disable pattern				104 See below
53	Latching relay bit pattern				106 See below
54	TIGER internal checksum				108 CRC of words 0 - 52

END OF MISC (15 min) HOUSEKEEPING



E. ALL SCALARS (10 minute) HOUSEKEEPING (type 7)

Total size = 69 wds = 1104 bits



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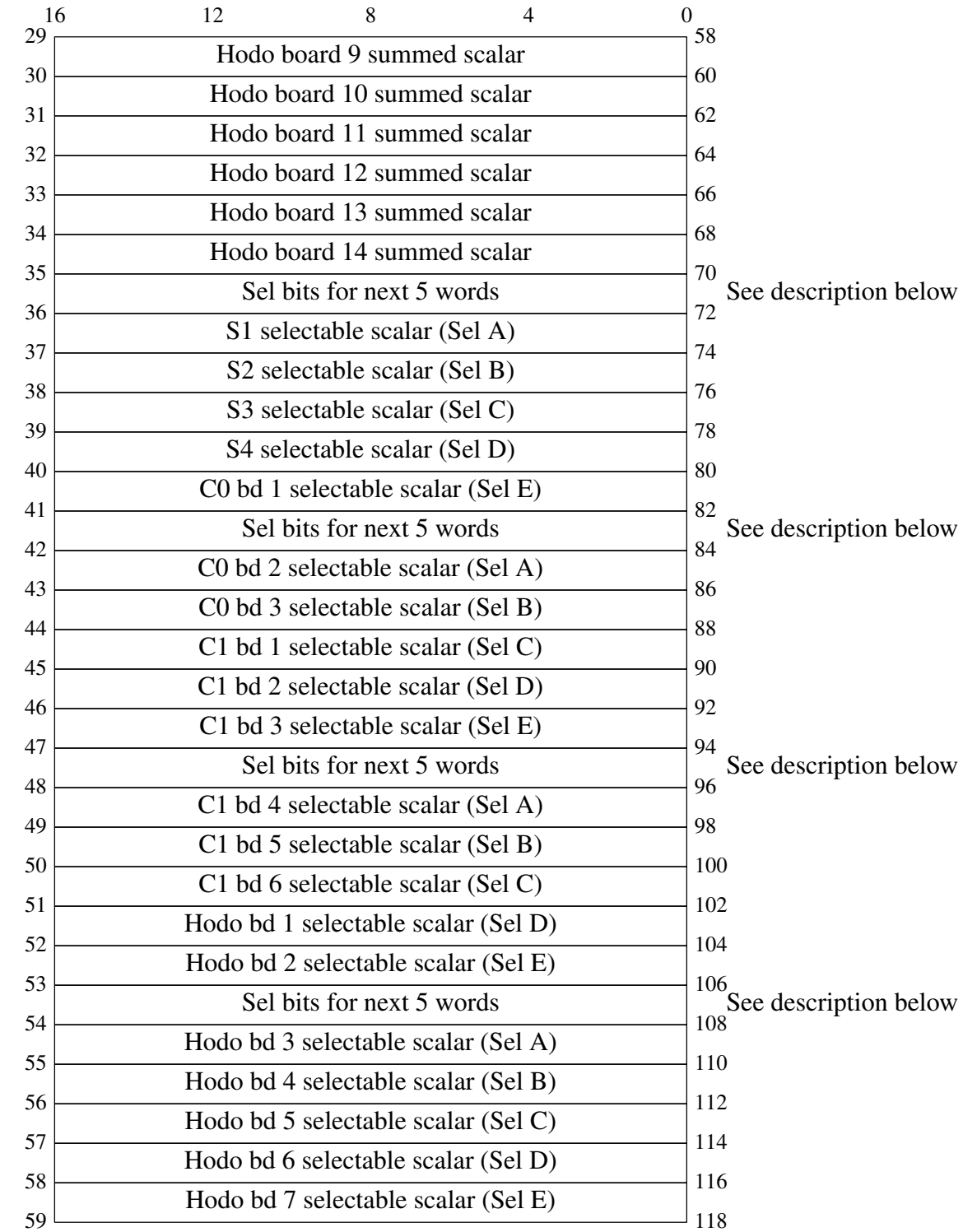
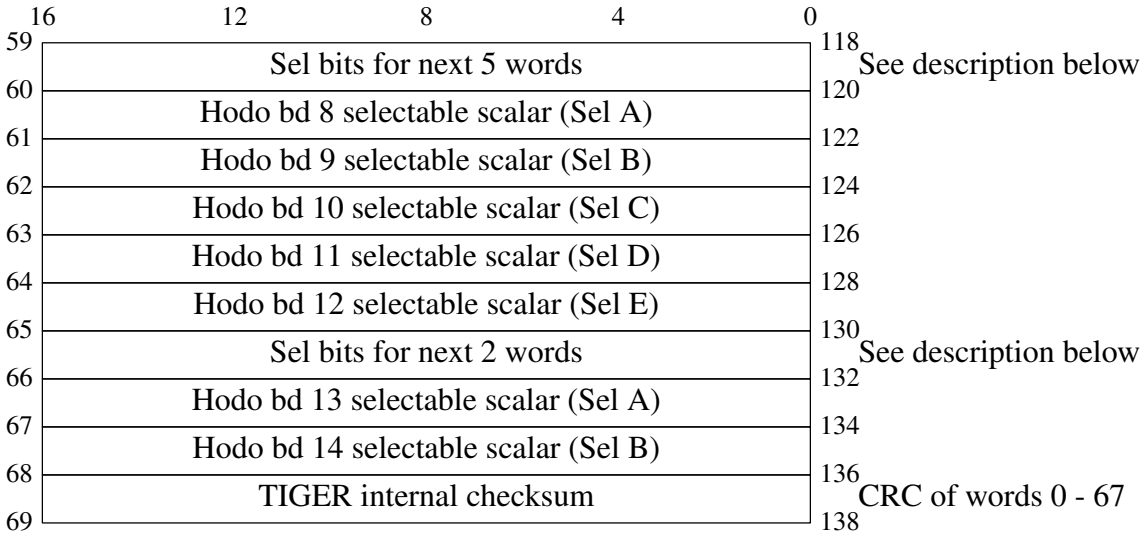
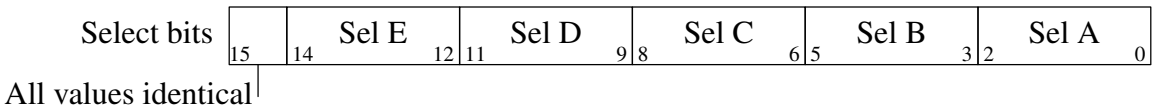

16
12
8
4
0
29
Hodo board 9 summed scalar
58
30
Hodo board 10 summed scalar
60
31
Hodo board 11 summed scalar
62
32
Hodo board 12 summed scalar
64
33
Hodo board 13 summed scalar
66
34
Hodo board 14 summed scalar
68
35
Sel bits for next 5 words
70
See description below
36
S1 selectable scalar (Sel A)
72
37
S2 selectable scalar (Sel B)
74
38
S3 selectable scalar (Sel C)
76
39
S4 selectable scalar (Sel D)
78
40
C0 bd 1 selectable scalar (Sel E)
80
41
Sel bits for next 5 words
82
See description below
42
C0 bd 2 selectable scalar (Sel A)
84
43
C0 bd 3 selectable scalar (Sel B)
86
44
C1 bd 1 selectable scalar (Sel C)
88
45
C1 bd 2 selectable scalar (Sel D)
90
46
C1 bd 3 selectable scalar (Sel E)
92
47
Sel bits for next 5 words
94
See description below
48
C1 bd 4 selectable scalar (Sel A)
96
49
C1 bd 5 selectable scalar (Sel B)
98
50
C1 bd 6 selectable scalar (Sel C)
100
51
Hodo bd 1 selectable scalar (Sel D)
102
52
Hodo bd 2 selectable scalar (Sel E)
104
53
Sel bits for next 5 words
106
See description below
54
Hodo bd 3 selectable scalar (Sel A)
108
55
Hodo bd 4 selectable scalar (Sel B)
110
56
Hodo bd 5 selectable scalar (Sel C)
112
57
Hodo bd 6 selectable scalar (Sel D)
114
58
Hodo bd 7 selectable scalar (Sel E)
116
59
118

continued...



END OF ALL SCALARS (10 minute) HOUSEKEEPING

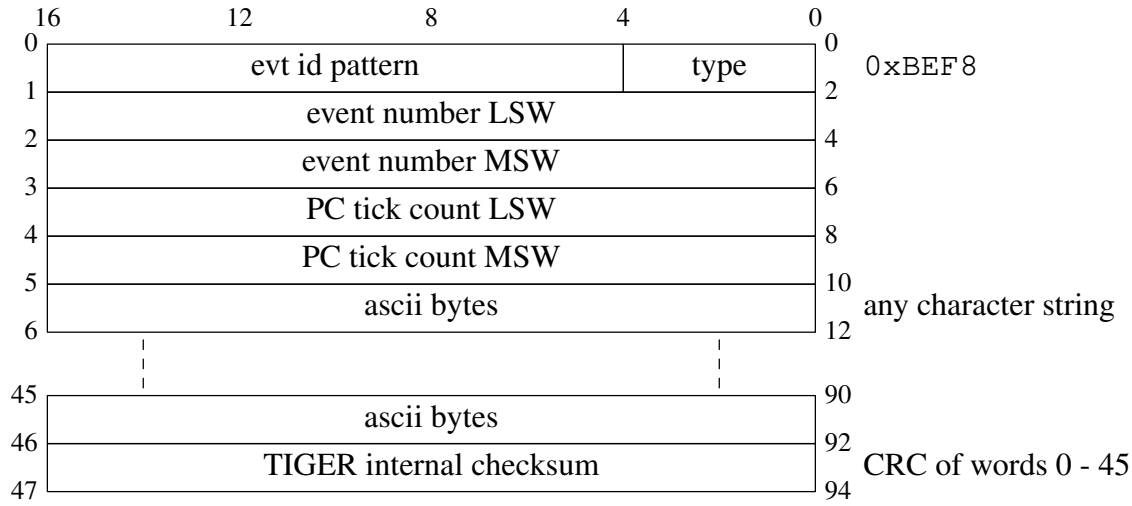
The ‘‘sel bits’’ word in fast hsk events looks like this. Each *Sel* item gives a value from 0-7 corresponding to which pha channel the selectable scalar is counting. If bit 15 is set, then all of the *Sel* values are identical.



F. REPLY EVENT (type 8)

Total size = 47 wds = 752 bits

A reply event is generated at infrequent, but unpredictable times. It is sent whenever some sort of response is required from the flight software, such as after a command from the ground. It is simply a sequence of ascii bytes containing a message.



END OF REPLY EVENT

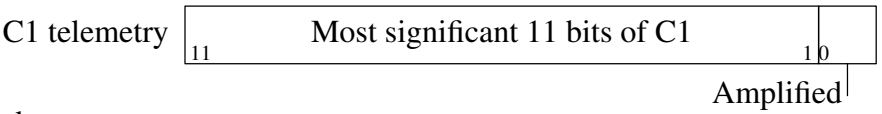
G. TELEMETRY DATA EVENTS - includes high- and low-priority data (types 9 and 10)
(does not include calibration or housekeeping events)
Total size = 97 wds = 1552 bits

16	12	8	4	0		
0	evt id pattern			type	0	0xBEF0+type
1	event number LSW				2	
2	event number MSW				4	
3	PC tick count LSW				6	
4	C0 4 lo	C0 pha 1			8	Aerogel Cerenkov - C0A
5	C0 4 m	C0 pha 2			10	
6	C0 4 hi	C0 pha 3			12	
7	C0 8 lo	C0 pha 5			14	
8	C0 8 m	C0 pha 6			16	
9	C0 8 hi	C0 pha 7			18	
10	C0 12 lo	C0 pha 9			20	C0B
11	C0 12 m	C0 pha 10			22	
12	C0 12 hi	C0 pha 11			24	
13	C0 16 lo	C0 pha 13			26	
14	C0 16 m	C0 pha 14			28	
15	C0 16 hi	C0 pha 15			30	
16	C0 20 lo	C0 pha 17			32	C0C
17	C0 20 m	C0 pha 18			34	
18	C0 20 hi	C0 pha 19			36	
19	C0 24 lo	C0 pha 21			38	
20	C0 24 m	C0 pha 22			40	
21	C0 24 hi	C0 pha 23			42	
22					44	

continued...

16	12	8	4	0		
22	C1 4 lo	C1 pha 1		44	Plastic Cerenkov - C1A	
23	C1 4 m	C1 pha 2		46	(IMPORTANT: see note * below)	
24	C1 4 hi	C1 pha 3		48		
25	C1 8 lo	C1 pha 5		50		
26	C1 8 m	C1 pha 6		52		
27	C1 8 hi	C1 pha 7		54		
28	C1 12 lo	C1 pha 9		56	C1B	
29	C1 12 m	C1 pha 10		58		
30	C1 12 hi	C1 pha 11		60		
31	C1 16 lo	C1 pha 13		62		
32	C1 16 m	C1 pha 14		64		
33	C1 16 hi	C1 pha 15		66		
34	C1 20 lo	C1 pha 17		68	C1C	
35	C1 20 m	C1 pha 18		70		
36	C1 20 hi	C1 pha 19		72		
37	C1 24 lo	C1 pha 21		74		
38	C1 24 m	C1 pha 22		76		
39	C1 24 hi	C1 pha 23		78		
40				80		

* In the telemetered data, for C1 each 12-bit value consists of the most significant 11-bits followed by a bit indicating whether this is the amplified (if set) or regular (if clear) value.



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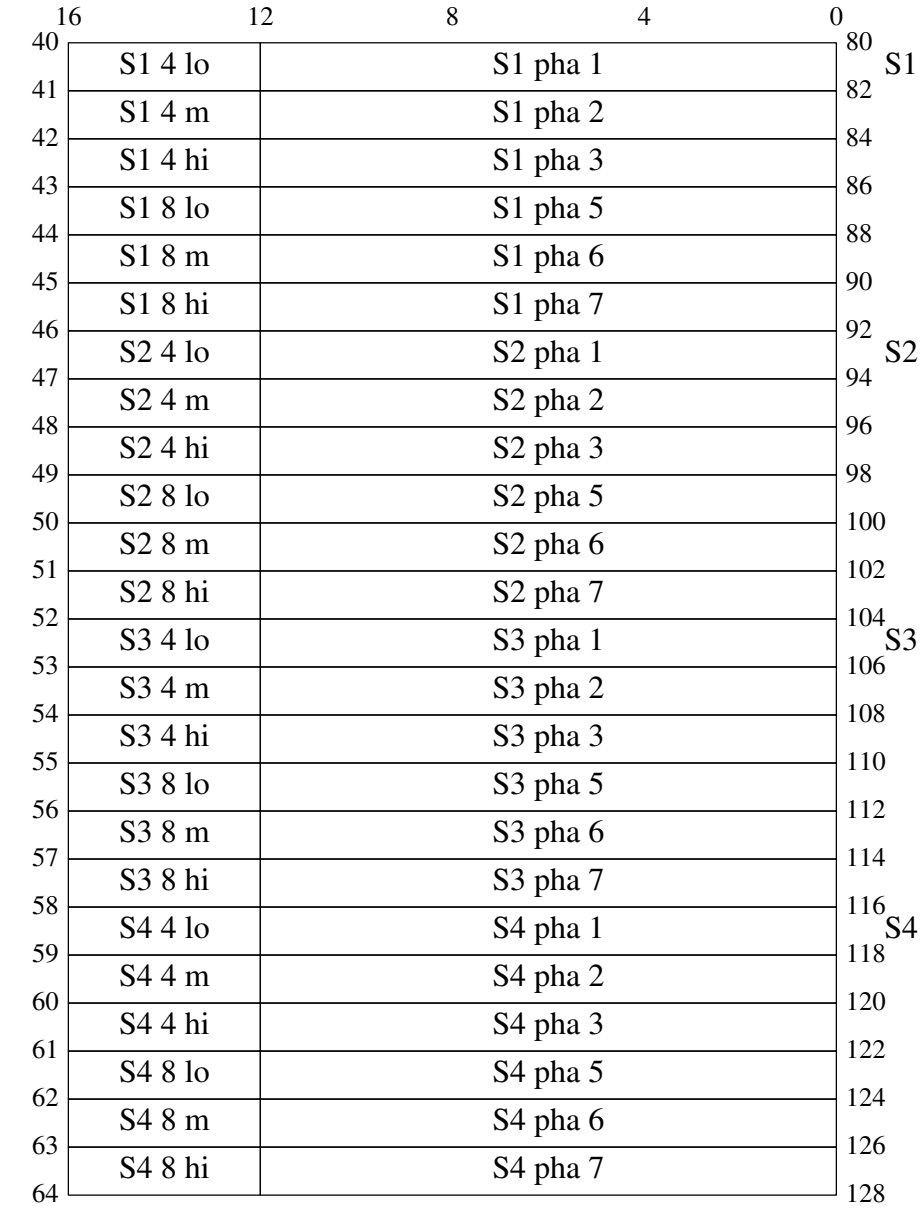

16
12
8
4
0
40
80
S1
S1 4 lo
S1 pha 1
41
82
S1 4 m
S1 pha 2
42
84
S1 4 hi
S1 pha 3
43
86
S1 8 lo
S1 pha 5
44
88
S1 8 m
S1 pha 6
45
90
S1 8 hi
S1 pha 7
46
92
S2
S2 4 lo
S2 pha 1
47
94
S2 4 m
S2 pha 2
48
96
S2 4 hi
S2 pha 3
49
98
S2 8 lo
S2 pha 5
50
100
S2 8 m
S2 pha 6
51
102
S2 8 hi
S2 pha 7
52
104
S3
S3 4 lo
S3 pha 1
53
106
S3 4 m
S3 pha 2
54
108
S3 4 hi
S3 pha 3
55
110
S3 8 lo
S3 pha 5
56
112
S3 8 m
S3 pha 6
57
114
S3 8 hi
S3 pha 7
58
116
S4
S4 4 lo
S4 pha 1
59
118
S4 4 m
S4 pha 2
60
120
S4 4 hi
S4 pha 3
61
122
S4 8 lo
S4 pha 5
62
124
S4 8 m
S4 pha 6
63
126
S4 8 hi
S4 pha 7
64
128

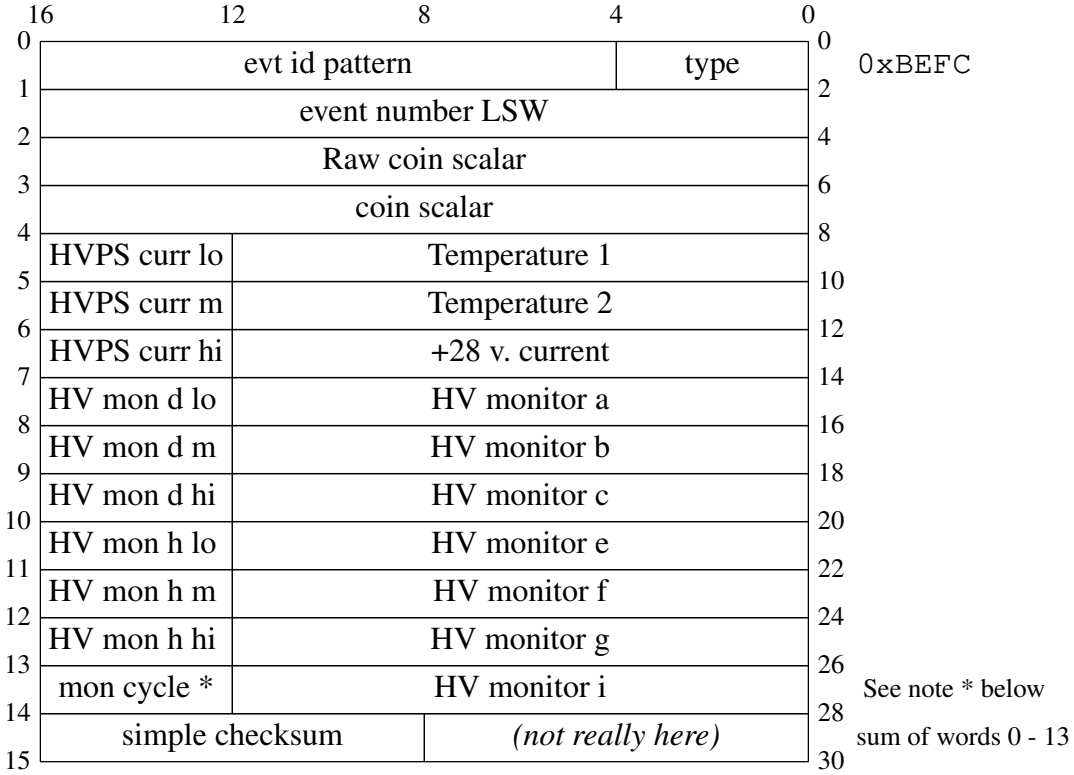
continued...

16	12	8	4	0		
64	pha no. (0-13)	Hodo bottom X coarse #1			128	Hodo bottom X
65	pha no. (0-13)	Hodo bottom X coarse #2			130	
66	pha no. (0-13)	Hodo bottom X coarse #3			132	
67	pha no. (0-13)	Hodo bottom X fine #1			134	
68	pha no. (0-13)	Hodo bottom X fine #2			136	
69	pha no. (0-13)	Hodo bottom X fine #3			138	
70	pha no. (0-13)	Hodo bottom X fine #4			140	
71	pha no. (0-13)	Hodo bottom X fine #5			142	
72	pha no. (0-13)	Hodo bottom Y coarse #1			144	Hodo bottom Y
73	pha no. (0-13)	Hodo bottom Y coarse #2			146	
74	pha no. (0-13)	Hodo bottom Y coarse #3			148	
75	pha no. (0-13)	Hodo bottom Y fine #1			150	
76	pha no. (0-13)	Hodo bottom Y fine #2			152	
77	pha no. (0-13)	Hodo bottom Y fine #3			154	
78	pha no. (0-13)	Hodo bottom Y fine #4			156	
79	pha no. (0-13)	Hodo bottom Y fine #5			158	
80	pha no. (0-13)	Hodo top X coarse #1			160	Hodo top X
81	pha no. (0-13)	Hodo top X coarse #2			162	
82	pha no. (0-13)	Hodo top X coarse #3			164	
83	pha no. (0-13)	Hodo top X fine #1			166	
84	pha no. (0-13)	Hodo top X fine #2			168	
85	pha no. (0-13)	Hodo top X fine #3			170	
86	pha no. (0-13)	Hodo top X fine #4			172	
87	pha no. (0-13)	Hodo top X fine #5			174	
88	pha no. (0-13)	Hodo top Y coarse #1			176	Hodo top Y
89	pha no. (0-13)	Hodo top Y coarse #2			178	
90	pha no. (0-13)	Hodo top Y coarse #3			180	
91	pha no. (0-13)	Hodo top Y fine #1			182	
92	pha no. (0-13)	Hodo top Y fine #2			184	
93	pha no. (0-13)	Hodo top Y fine #3			186	
94	pha no. (0-13)	Hodo top Y fine #4			188	
95	pha no. (0-13)	Hodo top Y fine #5			190	
96	TIGER internal checksum				192	CRC of words 0 - 95
97					194	

END OF TELEMETRY DATA EVENT

G. SLOW ARGOS HSK EVENTS - (type 12)

Total size = 14.5 wds = 29 bytes = 232 bits



END OF SLOW ARGOS EVENT

* ‘mon cycle’ tells which set of HV monitors is included: either the first 9 (if mon cycle is 0) or the second 9 (if mon cycle is 1).

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