

## Appendix G FPP Status List

FPP status in telemetry and data definition are described in this appendix.

Revision Record of FPP status list:

Revision Number	Date	Remarks
Rev. 1.0	2000.04.23	First version of FPP status list
Rev. 2.0	2000.06.09	FPP status list after 6 <sup>th</sup> J-US SOT design meeting
Rev. 3.0	2001.04.18	FPP status list for the proto-model test
Rev. 4.0	2002.02.28	Newly included CT diagnostic data definition
Rev. 4.1	2002.12.12	No change
Rev. 5.0 (draft)	2005.04.12	1, Included FPP flight model status detailed description document FPP01321 Rev G and status list in JAXA/ISAS format. 2, Described Section G.3 CT reference/live data 3, Described Section G.4 CT diagnostic data
Rev. 5.0	2005.05.20	1, Status list in JAXA/ISAS format Rev. 17

G.1. FPP Status Summary

This is the status list used for JAXA/ISAS SIB (satellite information base) entry.

Rev #	Date	Author	Description
3	17-Aug-04	Dnyanesh Mathur	1. Updated the SP status telemetry; Removed SP_MAP_STOKES; Updated positon info.
4	31-Aug-04	Dnyanesh Mathur	1. Corrected the Analog Electrical parameter positions
5	29-Sep-04	Dnyanesh Mathur	1. Corrected the Camera Status and Analog Temperature parameter positions
6	7-Oct-04	Dnyanesh Mathur	1. Added CT CCD configuration details 2. Corrected analog conversion coefficients 3. Minor changes to units and status definitions
7	5-Nov-04	Dnyanesh Mathur / Toshifumi Shimizu	1. Corrected CT configuration bit definitions 2. Corrected PMU Spin time units 3. Corrceted heater status bit definitons
8	15-Nov-04	Toshifumi Shimizu	1. Add word position in CCSDS packet 2. Corrected description of FG/SP/CT_PWR and HTR_CNV 3. Corrected two of CT configuration bit definitions 4. Signed DEC for FPP_DOP_VEL_RCV, FPP_DOP_VEL_USED
9	2-Dec-04	Toshifumi Shimizu	1. Signed DEC in unit of arcsec for FPP_CT_MAX_ERR_X, FPP_CT_MAX_ERR_Y, FPP_CT_AVG_ERR_X, FPP_CT_AVG_ERR_Y, FPP_CT_ERR_X, FPP_CT_ERR_Y, FPP_CT_OFFSET_X, FPP_CT_OFFSET_Y
10	5-Jan-05	Dnyanesh Mathur	1. Removed QHSS and PMP status items from 2-second packets (They are not used) and replaced them with PMU PWM limits
11	7-Jan-05	Dnyanesh Mathur	1. The PMU encoder select code is in PMU_MODE
12	25-Jan-05	Dnyanesh Mathur	1. Corrected bit positions of thermister range flags
13	16-Feb-05	Dnyanesh Mathur	1. Replaced FPP_SW_CT_VER by FPP_MSG_COUNT
14	6-Apr-05	Dnyanesh Mathur	1. Changed Status definition for FPP_MODE 2. FPP Mode type (Hex) 3. Changed type of FPP_CT_REFIMG_TIME to DEC and units to sec 4. Changed FPP_SCIF_STATUS to FPP_QHSS_STATUS 5. Chnaged FPP_CT_SW_VER to FPP_MSG_COUNT 6. Added bit field definitions for FG and SP DAC values
15	20-Apr-05	Toshifumi Shimizu	1. Changed status definition of FPP_CT_MODE

16	20-May-05	Toshifumi Shimizu	<p>1. Specified "Not used" for FPP_MD_PKT_Q_LEN, FPP_FG_PIC_STATE, FPP_SP_PIC_STATE</p> <p>2. Changed status definition</p> <p>(1) FPP_CT_GAIN: "0x00:12, 0x01:22, 0x02:30, 0x03:55" --&gt; DEC</p> <p>(2) FPP_CT_RUNSTDBY: DEC --&gt; "0x00:STBY, 0x01:RUN"</p> <p>(3) FPP_CT_DIAG: DEC --&gt; "0x00:OFF, 0x01:ON"</p> <p>(4) FPP_PWR_ON_ENA: "0x00:OFF, 0x01:ON" --&gt; "0x00:DIS, 0x01:ENA"</p> <p>3. Changed status name</p> <p>(1) FPP_CT_HRD_LIM_CNT --&gt; FPP_CTM_HRD_LIM_CNT</p> <p>(2) FPP_STR4_ST --&gt; FPP_STR4_TS</p> <p>4. Changed status descriptions</p> <p>(1) FPP_FG_ROI_START: "FG camera status" -&gt; "FG camera ROI start"</p> <p>(2) FPP_FG_ROI_END: "FG camera configuration" -&gt; "FG camera ROI end"</p> <p>(3) FPP_FG_CAM_CFG: "FG camera operational mode" -&gt; "FG camera configuration (status)"</p> <p>(4) FPP_SP_MAIN_ID: "SP ready flag ...." -&gt; "Main ID SP"</p> <p>(5) FPP_SP_READY: "Main ID SP" -&gt; "SP ready flag ...."</p> <p>(6) All of FPP_****_TS: description is moved to correct corresponding status.</p>
17	22-May-05	Dnyanesh Mathur	<p>1. Changed coefficients for the following analog items;</p> <p>FPP_HK_P5V</p> <p>FPP_HK_P15V</p> <p>FPP_HK_N15V</p> <p>FPP_ANALOG_GND</p> <p>FPP_SCAN_MON (Current -&gt; Voltage)</p> <p>FPP_FOCUS_MON (Current -&gt; Voltage)</p>

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FPP Status telemetry														
Mnemonic	Status Definition	c0	c1	c2	c3	c4	c5	unit	Bit #	Byte#	Size (Bits)	Description	Word position in CCSDS	
1	FPP_FG_READY	0x00:Not Ready 0x01:Ready							0	0	0	1 UB	Filtergraph Ready Flag; 0 = F/G processor is busy. It is processing a macro command and a macro command is queued for execution. If a new macro command is sent, the queued command will be lost.	
2	FPP_FG_MAIN_ID	HEX							1	1	0	7 UB	Main ID FG	
3	FPP_SP_READY	0x00:Not Ready 0x01:Ready							8	0	1	1 UB	Spectro-Polarimetergraph Ready Flag; 0 = F/G processor is busy. It is processing a macro command and a macro command is queued for execution. If a new macro command is sent, the queued command will be lost.	
4	FPP_SP_MAIN_ID	HEX							9	1	1	7 UB	Main ID SP	
5	FPP_PMU_POS1	DEC							16	0	2	8 UB	Modulator Position 1	
6	FPP_PMU_PWM_DC1	DEC							24	0	3	8 UB	Modulator Duty Cycle 1	
7	FPP_PMU_POS2	DEC							32	0	4	8 UB	Modulator Position 2	
8	FPP_PMU_PWM_DC2	DEC							40	0	5	8 UB	Modulator Duty Cycle 2	
9	FPP_PMU_POS3	DEC							48	0	6	8 UB	Modulator Position 3	
10	FPP_PMU_PWM_DC3	DEC							56	0	7	8 UB	Modulator Duty Cycle 3	
									64	0	8	0		APIID=644
11	FPP_STAT2_TIME	HEX							64	0	8	32 UL1	Packet Time in MDP Time Units (1/512 sec.) since MDP power up	74
12	FPP_STATE	0x00:Idle 0x01:FPP Active							96	0	12	8 UB	FPP State	78
13	FPP_MODE	HEX							104	0	13	8 UB	FPP Operational Mode	79
14	FPP_CT_MODE	HEX							112	0	14	16 IU1	CT Processor Mode	80
15	FPP_ERR_CODE	HEX							128	0	16	16 IU1	Error Code	82
16	FPP_ERR_TIME	HEX							144	0	18	32 UL1	LOBT at time of Error (In Seconds since 1/1/1971)	84
17	FPP_ERR_COUNT	DEC							176	0	22	8 UB	Error Count	86
18	FPP_ERR_PAR1	HEX							184	0	23	16 IU1	Error Parameter 1	89
19	FPP_ERR_PAR2	HEX							200	0	25	16 IU1	Error Parameter 2	91
20	FPP_ERR_PAR3	HEX							216	0	27	16 IU1	Error Parameter 3	93
21	FPP_ERR_PAR4	HEX							232	0	29	16 IU1	Error Parameter 4	95
22	FPP_FLAGS	HEX							248	0	31	16 IU1	Not Used	97
23	FPP_DOP_VEL_RCV	Signed DEC	0	1	0	0	0	0 m/s	264	0	33	16 IU1	Composite Velocity Received	99
24	FPP_SC_TIME	HEX							280	0	35	32 UL1	MDP Time Word	101
25	FPP_LOBT_HI	HEX							312	0	39	32 UL1	Local On Board Time in Seconds (set by FPP_SET_TIME command)	105
26	FPP_LOBT_LO	HEX							344	0	43	32 UL1	Local On Board Time (fractional seconds)	109
27	FPP_CMD_COUNT	DEC							376	0	47	8 UB	Command Count	113
28	FPP_CMD_STATUS	HEX							384	0	48	8 UB	Last Command Status	114
29	FPP_CMD_OPCODE	HEX							392	0	49	8 UB	Last Command Op Code	115
30	FPP_CMD_LENGTH	DEC							400	0	50	8 UB	Last Command Length	116
31	FPP_SD1_PKT_COUNT	DEC							408	0	51	16 IU1	Status 1 Packet Count	117
32	FPP_SD2_PKT_COUNT	DEC							424	0	53	16 IU1	Status 2 Packet Count	119
33	FPP_SD3_PKT_COUNT	DEC							440	0	55	16 IU1	Status 3 Packet Count	121
34	FPP_SD4_PKT_COUNT	DEC							456	0	57	16 IU1	Status 4 Packet Count	123
35	FPP_SD_Q_STAT	HEX							472	0	59	8 UB	HK Queue Status	125
36	FPP_MD_MAIN_ID	DEC							480	0	60	16 IU1	Mission Data Main ID	126
37	FPP_MD_PKT_COUNT	DEC							496	0	62	16 IU1	Mission Data Packet Count	128
38	FPP_MD_PKT_Q_LEN	DEC							512	0	64	16 IU1	Mission Data Packets (Not used)	130
39	FPP_MD_PKT_SIZE	DEC							528	0	66	17 UL1	Data Packet Size	132
40	FPP_MD_TLM_STATE	HEX							545	1	68	7 UB	Telemetry State	134
41	FPP_MD_Q_POS1	HEX							552	0	69	16 IU1	Not Used	135
42	FPP_MD_Q_POS2	HEX							568	0	71	16 IU1	Not Used	137
43	FPP_MD_Q_POS3	HEX							584	0	73	16 IU1	Not Used	139
44	FPP_DOP_VEL_USED	Signed DEC	0	1	0	0	0	0 m/s	600	0	75	16 IU1	Velocity used for Current FG Observable	141
45	FPP_FG_STATE	HEX							616	0	77	8 UB	Filtergraph State	143
46	FPP_FG_PIC_STATE	HEX							624	0	78	8 UB	Filtergraph Picture State (Not used)	144
47	FPP_FG_OBS_COUNT	DEC							632	0	79	32 UL1	Filtergraph Observable Count	145
48	FPP_FG_FRAME_COUNT	DEC							664	0	83	32 UL1	Filtergraph Frame Count	149
49	FPP_FG_PROD_COUNT	DEC							696	0	87	32 UL1	FG Product count	153
50	FPP_FG_OBS_ID	HEX							728	0	91	16 IU1	Filtergraph Observable ID	157
51	FPP_FG_FDB_ID	HEX							744	0	93	16 IU1	Filtergraph Frame Definition Block ID	159
52	FPP_FG_OBSFRM_CNT	DEC							760	0	95	8 UB	Filtergraph Observable Frame Count	161

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53	FPP_SP_STATE	HEX							768	0	96	8UB	Spectrograph State	162	
54	FPP_SP_PIC_STATE	HEX							776	0	97	8UB	Spectrograph Picture State (Not used)	163	
55	FPP_SP_OBS_ID	HEX							784	0	98	16IU1	Spectrograph Observable ID	164	
56	FPP_SP_MAP_ID	HEX							800	0	100	16UB	Spectrograph MAP ID	166	
57	FPP_SP_MAP_COUNT	DEC							816	0	102	32UL1	Spectrograph Map Count	168	
58	FPP_SP_FRAME_COUNT	DEC							848	0	106	32UL1	Spectrograph Frame Count	172	
59	FPP_SP_MAP_NUM_POS	DEC							880	0	110	16IU1	Spectrograph Positions in Map	176	
60	FPP_SP_SLIT_POS	DEC							896	0	112	16IU1	SP Slit position (Set by macro command processor)	178	
61	FPP_ME_STATE	HEX							912	0	114	8UB	ME task state (MEsVar)	180	
	FPP_ME_SPARE	-							920	0	115	8UB	ME task spare	181	
63	FPP_CTME_1ST_WORD	HEX							928	0	116	16IU1	CTM-E Status	182	
64	FPP_CTME_2ND_WORD	HEX							944	0	118	16IU1	CTM-E Measured angle data for X axis	184	
65	FPP_CTME_3RD_WORD	HEX							960	0	120	16IU1	CTM-E Measured angle data for Y axis	186	
66	FPP_CT_LAST_CMD	HEX							976	0	122	16IU1	Last Command sent to CTM-E (could be 8 bits)	188	
67	FPP_CT_MAX_ERR_X	Signed DEC	0	0.0005	0	0	0	0	arcsec	992	0	124	16IU1	CT Max Absolute Value Error X	190
68	FPP_CT_MAX_ERR_Y	Signed DEC	0	0.0005	0	0	0	0	arcsec	1008	0	126	16IU1	CT Max Absolute Value Error Y	192
69	FPP_CT_AVG_ERR_X	Signed DEC	0	0.0005	0	0	0	0	arcsec	1024	0	128	16IU1	Average CT Error X	194
70	FPP_CT_AVG_ERR_Y	Signed DEC	0	0.0005	0	0	0	0	arcsec	1040	0	130	16IU1	Average CT Error Y	196
71	FPP_CT_REFIMG_TIME	DEC							Sec	1056	0	132	16IU1	Time since last Ref Image D/L	198
	FPP_CT_CCD_CFG	HEX								1072	0	134	16IU1	CT CCD configuration	200
72	FPP_CT_PARCLK	DEC								1072	7	134	1UB	CT CCD configuration	200
73	FPP_CT_GAIN	DEC						e/DN		1073	5	134	2UB	CT CCD configuration	200
74	FPP_CT_DAC_OFFSET	DEC								1075	1	134	4UB	CT CCD configuration	200
75	FPP_CT_UNUSED	-								1079	0	134	1		200
76	FPP_CT_RUNSTDBY	0x00: STBY 0x01: RUN								1080	7	135	1UB	CT CCD configuration	201
77	FPP_CT_DIAG	0x00: OFF 0x01: ON								1081	6	135	1UB	CT CCD configuration	201
78	CT_CFG_NOT_USED	-								1082	4	135	2UB		201
79	FPP_CT_PROC_FLD	DEC								1084	2	135	2UB	CT CCD configuration	201
80	FPP_CT_PREAMP	DEC								1086	1	135	1UB	CT CCD configuration	201
81	FPP_CT_SERCLK	DEC								1087	0	135	1UB	CT CCD configuration	201
82	FPP_CT_CCD_DATA	-								1088	0	136	16	CT Status will be put in here (Currently unused)	202
83	FPP_DE_CONTAM_MODE	0x00:OFF 0x01:ON								1104	7	138	1UB	FG CCD Decontamination Mode	204
84	Unused									1105	1	138	2		204
85	FPP_PWR_ON_ENA	0x00:DIS 0x01:ENA								1107	4	138	1UB	Critical Command Enable	204
86	FPP_SP_PWR	0x00:OFF 0x01:ON								1108	3	138	1UB	SP CCD Camera Power Status	204
87	FPP_FG_PWR	0x00:OFF 0x01:ON								1109	2	138	1UB	FG CCD Camera Power Status	204
88	FPP_CT_PWR	0x00:OFF 0x01:ON								1110	1	138	1UB	Correlation Tracker Power	204
89	FPP_HTR_CNV	0x00:OFF 0x01:ON								1111	0	138	1UB	Operational Heater Power Converter Status	204
90	FPP_AMBI_STATUS	HEX								1112	0	139	16IU1	AMBI status	205
91	FPP_QHSS_STATUS	HEX								1128	0	141	16IU1	QHSS status	207
92	FPP_SW_SS_POS	DEC								1144	0	143	16IU1	Shadow value of Slit Scan position	209
93	FPP_SW_FM_POS	DEC								1160	0	145	16IU1	Shadow value of Focus Mechanism position	211
94	FPP_DEV_STATUS	HEX								1176	0	147	32UL1	2 bit status for each device	213
95	FPP_PMU_PWM_LMT_LO	DEC								1208	0	151	8UB	PMU Pulse Width Modulation Duty Cycle Low limit	217
96	FPP_PMU_PWM_LMT_HI	DEC								1216	0	152	8UB	PMU Pulse Width Modulation Duty Cycle High limit	218
97	FPP_NFI_MASK_POS	DEC								1224	0	153	8UB	Position of Mask wheel	219
98	FPP_BFL_FILT_POS	DEC								1232	0	154	8UB	BFI filter Position	220
99	FPP_WWV_POS	DEC								1240	0	155	8UB	Wedges Wheel Position	221
100	FPP_NFI_BLKFLT_POS	DEC								1248	0	156	8UB	Position of Blocking Filter Wheel	222
101	FPP_NFI_TF_ELM1_POS	DEC								1256	0	157	8UB	Tunable Filter Element 1 Position	223
102	FPP_NFI_TF_ELM2_POS	DEC								1264	0	158	8UB	Tunable Filter Element 2 Position	224
103	FPP_NFI_TF_ELM3_POS	DEC								1272	0	159	8UB	Tunable Filter Element 3 Position	225
104	FPP_NFI_TF_ELM4_POS	DEC								1280	0	160	8UB	Tunable Filter Element 4 Position	226
105	FPP_NFI_TF_ELM5_POS	DEC								1288	0	161	8UB	Tunable Filter Element 5 Position	227
106	FPP_NFI_TF_ELM6_POS	DEC								1296	0	162	8UB	Tunable Filter Element 6 Position	228
107	FPP_NFI_TF_ELM7_POS	DEC								1304	0	163	8UB	Tunable Filter Element 7 Position	229
108	FPP_NFI_TF_ELM8_POS	DEC								1312	0	164	8UB	Tunable Filter Element 8 Position	230
109	FPP_SP_SLITSCAN_POS	DEC								1320	0	165	16IU1	Slit Scan Position	231
110	FPP_FOCUS_POS	DEC								1336	0	167	16IU1	Position of Reimaging Lens	233
111	FPP_BFL_SHT_POS	DEC								1352	0	169	8UB	BB Shutter Position	235

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112	FPP_NFI_SHT_POS	DEC							1360	0	170	8UB	TF Shutter Position	236
113	FPP_BFI_EXP DUR	DEC						msec	1368	0	171	16IU1	BFI exposure duration	237
114	FPP_NFI_EXP DUR	DEC						msec	1384	0	173	16IU1	NFI exposure duration	239
115	FPP_PMU_SPIN_TIME	DEC	0	0.064				msec	1400	0	175	16IU1	PMU spin time	241
116	FPP_PMU_MODE	DEC							1416	0	177	8UB	PMU Encoder Selected (0 - A, 1 - B, 2 - Both A and B)	243
									1424	0	178	8		244
									1432	0	179	8		245
														APID=546
116	FPP_STAT3_TIME	HEX							0	0	0	32UL1	Packet Time in MDP Time Units (1/512 sec.) since MDP power up	10
117	FPP_MSG_COUNT	DEC							32	0	4	8UB	Cumulative message counter	14
118	FPP_OBS_SW_VER	HEX							40	0	5	8UB	Sequencer Software Version Number	15
119	FPP_CTRL_SW_VER	HEX							48	0	6	8UB	Control Software Version Number	16
120	FPP_COMM_SW_VER	HEX							56	0	7	8UB	Comm. Software Version Number	17
121	FPP_CPU_ONLINE	HEX							64	0	8	8UB	CPU booted and online	18
122	FPP_TM_STATE	HEX							72	0	9	8UB	Telemetry State (Not Used)	19
123	FPP_TM_MDPKT_COUNT	DEC							80	0	10	16IU1	Not Used (Originally assigned for Mission Data Packet Count)	20
124	FPP_ERR_CMD_COUNT	DEC							96	0	12	8UB	Command error count	22
125	FPP_TM_MSG_RCVD	DEC							104	0	13	16IU1	Telemetry Messages Received (Not Used)	23
126	FPP_CT_ERR_X	Signed DEC	0	0.0005	0	0	0	0 arcsec	120	0	15	16IU1	Last Valid Error X	25
127	FPP_CT_ERR_Y	Signed DEC	0	0.0005	0	0	0	0 arcsec	136	0	17	16IU1	Last Valid Error Y	27
128	FPP_CT_OFFSET_X	Signed DEC	0	0.0005	0	0	0	0 arcsec	152	0	19	16IU1	Commanded Offset	29
129	FPP_CT_OFFSET_Y	Signed DEC	0	0.0005	0	0	0	0 arcsec	168	0	21	16IU1	Commanded Offset	31
130	FPP_CTM_SFT_LIM_CNT	DEC							184	0	23	8UB	CTM Soft Limit Count	33
131	FPP_CTM_HRD_LIM_CNT	DEC							192	0	24	8UB	CTM Hard Limit Count	34
132	FPP_CT_SAT_ERR_CNT	DEC							200	0	25	8UB	CT Saturation Error Count	35
133	FPP_CT_RNG_ERR_CNT	DEC							208	0	26	8UB	CT Out of Range Count	36
134	FPP_SP_ROI_STRT	DEC							216	0	27	16IU1	SP camera ROI Start	37
135	FPP_SP_ROI_END	DEC							232	0	29	16UL1	SP camera ROI Stop	39
136	FPP_SP_CAM_CFG	HEX							248	0	31	16IU1	SP camera Configuration (Status)	41
137	FPP_SP_DAC	HEX							264	0	33	16IU1	SP CCD DAC	43
	FPP_SP_DAC_SEG_A	HEX							264	11	33	5UB	DAC, Segment A	
	FPP_SP_DAC_SEG_B	HEX							269	6	33	5UB	DAC, Segment B	
	Not Used								274	0	34	6UB	Not Used	
138	FPP_FG_ROI_STRT	DEC							280	0	35	16IU1	FG camera ROI start	45
139	FPP_FG_ROI_END	DEC							296	0	37	16IU1	FG camera ROI end	47
140	FPP_FG_CAM_CFG	HEX							312	0	39	16IU1	FG camera configuration (status)	49
141	FPP_FG_DAC	HEX							328	0	41	16	FG CCD DAC	51
	FPP_FG_DAC_SEG_A	HEX							328	11	41	5UB	FG CCD DAC for Segment A	
	FPP_FG_DAC_SEG_B	HEX							333	6	41	5UB	FG CCD DAC for Segment B	
	Not Used								338	0	42	6	Not Used	
142	FPP_CT_CAM_STATUS	HEX							344	0	43	16IU1	CT camera status (Not Used)	53
143	FPP_CT_CAM_CFG	HEX							360	0	45	0IU1	CT camera configuration (Not Used)	55
144	FPP_CT_CAM_MODE	HEX							360	0	45	16IU1	CT camera operational mode (Not Used)	55
145	FPP_AMBI_REG1	HEX							376	0	47	16IU1	AMBI Register 1	57
146	FPP_QHSS_STATE1	HEX							392	0	49	16IU1	QHSS State 1	59
147	FPP_SCIF_STATE1	HEX							408	0	51	16IU1	SCIF State 1	61
148	FPP_PMP_REG1	HEX							424	0	53	16IU1	PMP State 1	63
149	FPP_MW_STATUS	HEX							440	0	55	8UB	Status of Mask Wheel	65
150	FPP_WB_FW_STATUS	HEX							448	0	56	8UB	Status of wide band filter wheel	66
151	FPP_WB_SHTR_STATUS	HEX							456	0	57	8UB	Status of wide band shutter	67
152	FPP_SS_STATUS	HEX							464	0	58	8UB	Status of slit scan mechanism	68
153	FPP_WW_STATUS	HEX							472	0	59	8UB	Status of wedge wheel	69
154	FPP_NB_FW_STATUS	HEX							480	0	60	8UB	Status of narrow band filter wheel	70
155	FPP_NB_SHTR_STATUS	HEX							488	0	61	8UB	Status of narrow band shutter	71
156	FPP_FM_STATUS	HEX							496	0	62	8UB	Status of focus mechanism	72
157	FPP_TF_MTR1_STATUS	HEX							504	0	63	8UB	Status of tunable filter motor 1	73
158	FPP_TF_MTR2_STATUS	HEX							512	0	64	8UB	Status of tunable filter motor 2	74
159	FPP_TF_MTR3_STATUS	HEX							520	0	65	8UB	Status of tunable filter motor 3	75
160	FPP_TF_MTR4_STATUS	HEX							528	0	66	8UB	Status of tunable filter motor 4	76
161	FPP_TF_MTR5_STATUS	HEX							536	0	67	8UB	Status of tunable filter motor 5	77
162	FPP_TF_MTR6_STATUS	HEX							544	0	68	8UB	Status of tunable filter motor 6	78
163	FPP_TF_MTR7_STATUS	HEX							552	0	69	8UB	Status of tunable filter motor 7	79
164	FPP_TF_MTR8_STATUS	HEX							560	0	70	8UB	Status of tunable filter motor 8	80
165	FPP_PMU_STATUS	HEX							568	0	71	8UB	Status of PMU wheel	81
166	FPP_PMU_GAIN_OFFSET	HEX							576	0	72	8UB	PMU Gain and Offset	82
167	FPP_PMU_DELAY	DEC							584	0	73	8UB	PMU delay setting	83
168	FPP_PMU_DUTYCYCLE	DEC							592	0	74	8UB	PMU duty cycle	84
169	FPP_BFI_SHT_OPN_OBT	HEX							600	0	75	24UL1	Wide band shutter open time	85
170	FPP_NFI_SHT_OPN_OBT	HEX							624	0	78	24UL1	Narrow band shutter open time	88
171	FPP_BFI_SHT_CLS_OBT	HEX							648	0	81	24UL1	Wide band shutter close time	91

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172	FPP_NFI_SHT_CLS_OBT	HEX								672	0	84	24	UL1	Narrow band shutter close time	94
173	FPP_SPIN_TIME	DEC								696	0	87	16	IU1	Spin time of last device commanded	97
174	FPP_ANALOG_GND	AGENERICA	0.00E+00	1.22E-03	0	0	0	0	Volts	712	0	89	12	IU1	Analog Ground	99
175	FPP_HK_P5V	AVP5A	0.00E+00	2.03E-03	0	0	0	0	Volts	724	4	90	12	IU1	+5V Housekeeping board monitor	100
176	FPP_HK_P15V	AVP15A	-1.00E-01	6.14E-03	0	0	0	0	Volts	736	0	92	12	IU1	+15V Housekeeping Board Monitor Voltage	102
177	FPP_HK_N15V	AVN15A	1.20E-01	6.10E-03	0	0	0	0	Volts	748	4	93	12	IU1	-15V Housekeeping Board Monitor Voltage	103
178	FPP_P5V_SYS	AVP5	-1.35E+00	2.03E-03	0	0	0	0	Volts	760	0	95	12	IU1	+5V Power Module Monitor Voltage	105
179	FPP_P15V_SYS	AVP15	-4.41E+00	6.14E-03	0	0	0	0	Volts	772	4	96	12	IU1	+15V Power Monitor Voltage	106
180	FPP_N15V_SYS	AVN15	4.68E+00	6.10E-03	0	0	0	0	Volts	784	0	98	12	IU1	-15V Power monitor Voltage	108
181	FPP_P3V_SYS	AVP3	-1.27E-01	1.83E-03	0	0	0	0	Volts	796	4	99	12	IU1	+3.3V Power monitor Voltage	109
182	FPP_P15V_MECH	AVMTR15	-4.50E+00	6.14E-03	0	0	0	0	Volts	808	0	101	12	IU1	+15V Motor Monitor	111
183	FPP_P15V_MECH_CUR	MI	0.00E+00	2.40E-04	0	0	0	0	Amps	820	4	102	12	IU1	+15V Mechanism Current	112
184	FPP_P5V_CCD	AVCP5	0.00E+00	1.57E-03	0	0	0	0	Volts	832	0	104	12	IU1	+5V CCD Voltage	114
185	FPP_P15V_CCD	AVCP15	0.00E+00	4.73E-03	0	0	0	0	Volts	844	4	105	12	IU1	+15V CCD Voltage	115
186	FPP_N15V_CCD	AVCN15	0	-4.73E-03	0	0	0	0	Volts	856	0	107	12	IU1	-15V CCD Voltage	117
187	FPP_P36V_CCD	AVCP36	0	1.14E-02	0	0	0	0	Volts	868	4	108	12	IU1	+36V CCD Voltage	118
188	FPP_P30V_HTR	AVCP30	0	9.54E-03	0	0	0	0	Volts	880	0	110	12	IU1	+30V CCD Heater Voltage	120
189	FPP_P28V_PRI_CUR	PRICUR	0.04	1.60E-03	0	0	0	0	Amps	892	4	111	12	IU1	+28V Primary Current	121
190	FPP_FOCUS_MON	AGENERICA	0.00E+00	1.22E-03	0	0	0	0	Volts	904	0	113	12	IU1	Focus motor monitor voltage	123
191	FPP_SCAN_MON	AGENERICA	0.00E+00	1.22E-03	0	0	0	0	Volts	916	4	114	12	IU1	Slit scan motor monitor voltage	124
192	FPP_P30V_CCDHTR_CUR	CCDHTRCUR	0	2.40E-04	0	0	0	0	Amps	928	0	116	12	IU1	+30V CCD Heater Current	126
193	FPP_UNUSED_1									940	0	117	4			127
194	FPP_OPHTR1_DC	DEC							Percent	944	0	118	8	UB	Op Heater Zone 1 Duty Cycle (0 - 100)	128
195	FPP_OPHTR1_DB_HI	Signed DEC							Deg C	952	0	119	8	SB	Op Heater Zone 1 Dead Band High	129
196	FPP_OPHTR1_DB_LO	Signed DEC							Deg C	960	0	120	8	SB	Op Heater Zone 1 Dead Band Low	130
197	FPP_OPHTR2_DC	DEC							Percent	968	0	121	8	UB	Op Heater Zone 2 Duty Cycle	131
198	FPP_OPHTR2_DB_HI	Signed DEC							Deg C	976	0	122	8	SB	Op Heater Zone 2 Dead Band High	132
199	FPP_OPHTR2_DB_LO	Signed DEC							Deg C	984	0	123	8	SB	Op Heater Zone 2 Dead Band Low	133
200	FPP_OPHTR3_DC	DEC							Percent	992	0	124	8	UB	Op Heater Zone 3 Duty Cycle	134
201	FPP_OPHTR3_DB_HI	Signed DEC							Deg C	1000	0	125	8	SB	Op Heater Zone 3 Dead Band High	135
202	FPP_OPHTR3_DB_LO	Signed DEC							Deg C	1008	0	126	8	SB	Op Heater Zone 3 Dead Band Low	136
203	FPP_OPHTR4_DC	DEC							Percent	1016	0	127	8	UB	Op Heater Zone 4 Duty Cycle	137
204	FPP_OPHTR4_DB_HI	Signed DEC							Deg C	1024	0	128	8	SB	Op Heater Zone 4 Dead Band High	138
205	FPP_OPHTR4_DB_LO	Signed DEC							Deg C	1032	0	129	8	SB	Op Heater Zone 4 Dead Band Low	139
206	FPP_SP_CCDHTR_DC	DEC							Percent	1040	0	130	8	UB	SP CCD Heater Duty Cycle	140
207	FPP_SP_CCDHTR_DB_HI	Signed DEC							Deg C	1048	0	131	8	SB	SP CCD Heater Dead Band High	141
208	FPP_SP_CCDHTR_DB_LO	Signed DEC							Deg C	1056	0	132	8	SB	SP CCD Heater Dead Band Low	142
209	FPP_FG_CCDHTR_DC	DEC							Percent	1064	0	133	8	UB	FG CCD Heater Duty Cycle	143
210	FPP_FG_CCDHTR_DB_HI	Signed DEC							Deg C	1072	0	134	8	SB	FG CCD Heater Dead Band High	144
211	FPP_FG_CCDHTR_DB_LO	Signed DEC							Deg C	1080	0	135	8	SB	FG CCD Heater Dead Band Low	145
212	FPP_SP_CAM_TEMP	-	91.1719	-0.112614	6.16E-05	-1.77E-08	1.81E-12	0	degC	1088	4	136	12	IU2	Spectrograph Camera Temp (5 FPP)	146
213	FPP_FG_CAM_TEMP	-	91.1719	-0.112614	6.16E-05	-1.77E-08	1.81E-12	0	degC	1100	0	137	12	IU2	Filtergraph Camera Temp (4 FPP)	147
214	FPP_CT_CAM_TEMP	-	91.1719	-0.112614	6.16E-05	-1.77E-08	1.81E-12	0	degC	1112	4	139	12	IU2	Correlation Tracker Camera Temp (6 FPP)	149
215	FPP_PWR_HC_TEMP	-	91.1719	-0.112614	6.16E-05	-1.77E-08	1.81E-12	0	degC	1124	0	140	12	IU2	External sensor on a component (37 FPP)	150
216	FPP_PWR_IF_TEMP	-	91.1719	-0.112614	6.16E-05	-1.77E-08	1.81E-12	0	degC	1136	4	142	12	IU2	FPP Power Interface (25 FPP)	152
217	FPP_E_HW_TEMP	-	91.1719	-0.112614	6.16E-05	-1.77E-08	1.81E-12	0	degC	1148	0	143	12	IU2	FPP-E Hot Wall (22 FPP)	153
218	FPP_PWR_HW_TEMP	-	91.1719	-0.112614	6.16E-05	-1.77E-08	1.81E-12	0	degC	1160	4	145	12	IU2	FPP-PWR (Hot Wall) (23 FPP)	155
219	FPP_E_CPU_TEMP	-	91.1719	-0.112614	6.16E-05	-1.77E-08	1.81E-12	0	degC	1172	0	146	12	IU2	CPU Board Temp. (21 FPP)	156
220	FPP_E_IF_TEMP	-	91.1719	-0.112614	6.16E-05	-1.77E-08	1.81E-12	0	degC	1184	4	148	12	IU2	FPP-E Interface Temp (24 FPP)	158
221	FPP_STR1_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0	degC	1196	0	149	12	IU2	Op Heater Zone 1 (Struct-1; -X Wall) Temp. (7 FPP)	159
222	FPP_STR2_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0	degC	1208	4	151	12	IU2	Op Heater Zone 2 (Struct-2; -X Wall) Temp. (8 FPP)	161
223	FPP_STR3_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0	degC	1220	0	152	12	IU2	Op Heater Zone 3 (Struct-3; +X Wall) Temp. (9 FPP)	162
224	FPP_STR4_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0	degC	1232	4	154	12	IU2	Op Heater Zone 4 (Struct-4; +X Wall) Temp. (10 FPP)	164
225	FPP_POS_Y1_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0	degC	1244	0	155	12	IU2	Pos Y Wall 1 (35 FPP)	165
226	FPP_POS_Y2_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0	degC	1256	4	157	12	IU2	Pos Y Wall 2 (36 FPP)	167
227	FPP_NEG_Y1_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0	degC	1268	0	158	12	IU2	Neg Y Wall 1 (33 FPP)	168
228	FPP_NEG_Y2_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0	degC	1280	4	160	12	IU2	Neg Y Wall 2 (34 FPP)	170
229	FPP_TF1_TEMP	-	95.1978	-0.0857706	3.96E-05	-9.54E-09	8.78E-13	0	degC	1292	0	161	12	IU2	Tunable Filter Element 1 Temp. (11 FPP)	171
230	FPP_TF2_TEMP	-	95.1978	-0.0857706	3.96E-05	-9.54E-09	8.78E-13	0	degC	1304	4	163	12	IU2	Tunable Filter Element 2 Temp. (12 FPP)	173
231	FPP_TF3_TEMP	-	95.1978	-0.0857706	3.96E-05	-9.54E-09	8.78E-13	0	degC	1316	0	164	12	IU2	Tunable Filter Element 3 Temp. (13 FPP)	174
232	FPP_TF4_TEMP	-	95.1978	-0.0857706	3.96E-05	-9.54E-09	8.78E-13	0	degC	1328	4	166	12	IU2	Tunable Filter Element 4 Temp. (14 FPP)	176
233	FPP_TF5_TEMP	-	95.1978	-0.0857706	3.96E-05	-9.54E-09	8.78E-13	0	degC	1340	0	167	12	IU2	Tunable Filter Element 5 Temp. (15 FPP)	177
234	FPP_TF6_TEMP	-	95.1978	-0.0857706	3.96E-05	-9.54E-09	8.78E-13	0	degC	1352	4	169	12	IU2	Tunable Filter Element 6 Temp. (16 FPP)	179
235	FPP_TF7_TEMP	-	95.1978	-0.0857706	3.96E-05	-9.54E-09	8.78E-13	0	degC	1364	0	170	12	IU2	Tunable Filter Element 7 Temp. (17 FPP)	180
236	FPP_TF8_TEMP	-	95.1978	-0.0857706	3.96E-05	-9.54E-09	8.78E-13	0	degC	1376	4	172	12	IU2	Tunable Filter Element 8 Temp. (18 FPP)	182
237	FPP_MEB_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0	degC	1388	0	173	12	IU2	Mechanism Electronics (26 FPP)	183
238	FPP_VBFW_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0	degC	1400	4	175	12	IU2	Filterwheel 1 Temp. (27 FPP)	185
239	FPP_NBFW_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0	degC	1412	0	176	12	IU2	Filterwheel 2 Temp. (28 FPP)	186
240	FPP_FOC_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0	degC	1424	4	178	12	IU2	Reimaging Lens Temp. (31 FPP)	188
241	FPP_HTOMP_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0	degC	1436	0	179	12	IU2	Heat Dump 1 Temp. (32 FPP)	189

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242	FPP_SLIT_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0 degC	1448	4	181	12	I/U2	Slit Temp. (29 FPP)	191
243	FPP_MAIN_BS_TEMP	-	55.1553	-0.0972939	5.86E-05	-1.74E-08	1.88E-12	0 degC	1460	0	182	12	I/U2	Main BS Temp. (30 FPP)	192
244	FPP_SP_CCD_TEMP	-	-234.018	0.0481062	5.92E-06	0	0	0 degC	1472	4	184	12	I/U2	Spectrograph CCD Header Temp (2 FPP)	194
245	FPP_FG_CCD_TEMP	-	-234.018	0.0481062	5.92E-06	0	0	0 degC	1484	0	185	12	I/U2	Filtergraph CCD Header Temp (1 FPP)	195
246	FPP_CT_CCD_TEMP	-	-234.018	0.0481062	5.92E-06	0	0	0 degC	1496	4	187	12	I/U2	Correlation Tracker CCD Header Temp (3 FPP)	197
247	FPP_UNUSED_2								1508	0	188	12			198
248	FPP_MAIN_BS_TS	0: High Range 1: Low Range							1520	7	190	1	UB	Main BS Temp. (30 FPP); Temperature Range Flag	200
249	FPP_SLIT_TS	0: High Range 1: Low Range							1521	6	190	1	UB	Slit Temp. (29 FPP); Temperature Range Flag	200
250	FPP_HTDMP_TS	0: High Range 1: Low Range							1522	5	190	1	UB	Heat Dump 1 Temp. (32 FPP); Temperature Range Flag	200
251	FPP_FOC_TS	0: High Range 1: Low Range							1523	4	190	1	UB	Reimaging Lens Temp. (31 FPP); Temperature Range Flag	200
252	FPP_NBFW_TS	0: High Range 1: Low Range							1524	3	190	1	UB	Filterwheel 2 Temp. (28 FPP); Temperature Range Flag	200
253	FPP_WBFW_TS	0: High Range 1: Low Range							1525	2	190	1	UB	Filterwheel 1 Temp. (27 FPP); Temperature Range Flag	200
254	FPP_MEB_TS	0: High Range 1: Low Range							1526	1	190	1	UB	Mechanism Electronics (26 FPP); Temperature Range Flag	200
255	FPP_TF8_TS	0: High Range 1: Low Range							1527	0	190	1	UB	Tunable Filter Element 8 Temp. (18 FPP); Temperature Range Flag	200
256	FPP_TF7_TS	0: High Range 1: Low Range							1528	7	191	1	UB	Tunable Filter Element 7 Temp. (17 FPP); Temperature Range Flag	201
257	FPP_TF6_TS	0: High Range 1: Low Range							1529	6	191	1	UB	Tunable Filter Element 6 Temp. (16 FPP); Temperature Range Flag	201
258	FPP_TF5_TS	0: High Range 1: Low Range							1530	5	191	1	UB	Tunable Filter Element 5 Temp. (15 FPP); Temperature Range Flag	201
259	FPP_TF4_TS	0: High Range 1: Low Range							1531	4	191	1	UB	Tunable Filter Element 4 Temp. (14 FPP); Temperature Range Flag	201
260	FPP_TF3_TS	0: High Range 1: Low Range							1532	3	191	1	UB	Tunable Filter Element 3 Temp. (13 FPP); Temperature Range Flag	201
261	FPP_TF2_TS	0: High Range 1: Low Range							1533	2	191	1	UB	Tunable Filter Element 2 Temp. (12 FPP); Temperature Range Flag	201
262	FPP_TF1_TS	0: High Range 1: Low Range							1534	1	191	1	UB	Tunable Filter Element 1 Temp. (11 FPP); Temperature Range Flag	201
263	FPP_NEG_Y2_TS	0: High Range 1: Low Range							1535	0	191	1	UB	Neg Y Wall 2 (34 FPP); Temperature Range Flag	201
264	FPP_NEG_Y1_TS	0: High Range 1: Low Range							1536	7	192	1	UB	Neg Y Wall 1 (33 FPP); Temperature Range Flag	202
265	FPP_POS_Y2_TS	0: High Range 1: Low Range							1537	6	192	1	UB	Pos Y Wall 2 (36 FPP); Temperature Range Flag	202
266	FPP_POS_Y1_TS	0: High Range 1: Low Range							1538	5	192	1	UB	Pos Y Wall 1 (35 FPP); Temperature Range Flag	202
267	FPP_STR4_TS	0: High Range 1: Low Range							1539	4	192	1	UB	Op Heater Zone 4 (Struct-4; +X Wall) Temp. (10 FPP); Temperature Range Flag	202
268	FPP_STR3_TS	0: High Range 1: Low Range							1540	3	192	1	UB	Op Heater Zone 3 (Struct-3; +X Wall) Temp. (9 FPP); Temperature Range Flag	202
269	FPP_STR2_TS	0: High Range 1: Low Range							1541	2	192	1	UB	Op Heater Zone 2 (Struct-2; -X Wall) Temp. (8 FPP); Temperature Range Flag	202
270	FPP_STR1_TS	0: High Range 1: Low Range							1542	1	192	1	UB	Op Heater Zone 1 (Struct-1; -X Wall) Temp. (7 FPP); Temperature Range Flag	202
271	FPP_E_IF_TS	0: High Range 1: Low Range							1543	0	192	1	UB	FPP-E Interface Temp (24 FPP); Temperature Range Flag	202
272	FPP_E_CPU_TS	0: High Range 1: Low Range							1544	7	193	1	UB	CPU Board Temp. (21 FPP); Temperature Range Flag	203
273	FPP_PWR_HW_TS	0: High Range 1: Low Range							1545	6	193	1	UB	FPP-PWR (Hot Wall) (23 FPP); Temperature Range Flag	203
274	FPP_E_HW_TS	0: High Range 1: Low Range							1546	5	193	1	UB	FPP-E Hot Wall (22 FPP); Temperature Range Flag	203
275	FPP_PWR_IF_TS	0: High Range 1: Low Range							1547	4	193	1	UB	FPP Power Interface (25 FPP); Temperature Range Flag	203
276	FPP_PWR_HC_TS	0: High Range 1: Low Range							1548	3	193	1	UB	External sensor on a component (37 FPP); Temperature Range Flag	203
277	FPP_CT_CAM_TS	0: High Range 1: Low Range							1549	2	193	1	UB	Correlation Tracker Camera Temp (6 FPP); Temperature Range Flag	203
278	FPP_FG_CAM_TS	0: High Range 1: Low Range							1550	1	193	1	UB	Filtergraph Camera Temp (4 FPP); Temperature Range Flag	203
279	FPP_SP_CAM_TS	0: High Range 1: Low Range							1551	0	193	1	UB	Spectrograph Camera Temp (5 FPP); Temperature Range Flag	203



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280	FPP_OPHTR1_STAT	HEX							1552	0	194	8	UB	Operational Heater 1 Status.	204
281	FPP_OPHTR2_STAT	HEX							1560	0	195	8	UB	Operational Heater 2 Status	205
282	FPP_OPHTR3_STAT	HEX							1568	0	196	8	UB	Operational Heater 3 Status	206
283	FPP_OPHTR4_STAT	HEX							1576	0	197	8	UB	Operational Heater 4 Status	207
284	FPP_SPHTR_STAT	HEX							1584	0	198	8	UB	Spectro-Polarimeter CCD heater status	208
285	FPP_FGHTR_STAT	HEX							1592	0	199	8	UB	Filtergraph CCD heater status	209
Notes:															
1. The FPP database uses the following conventions for data types;															
														Unsigned Byte	
														signed Byte	
														Unsigned Longword	
														Signed Shortword	
														Unsigned 16 bits, Swapped	
2. The bits numbering shown is big-endian															
Bit Numbering	0	1	2	3	4	5	6	7							
	First							Last							
	MSB							LSB							
FPP_SP_CAM_TEMP	-	134.795	-0.198212	0.000173163	-8.06E-08	1.80E-11	-1.53E-15	degC	1088	4	136	12	IU2	Spectrograph Camera Temp (5 FPP)	
FPP_FG_CAM_TEMP	-	134.795	-0.198212	0.000173163	-8.06E-08	1.80E-11	-1.53E-15	degC	1100	0	137	12	IU2	Filtergraph Camera Temp (4 FPP)	
FPP_CT_CAM_TEMP	-	134.795	-0.198212	0.000173163	-8.06E-08	1.80E-11	-1.53E-15	degC	1112	4	139	12	IU2	Correlation Tracker Camera Temp (6 FPP)	
FPP_PWR_HC_TEMP	-	134.795	-0.198212	0.000173163	-8.06E-08	1.80E-11	-1.53E-15	degC	1124	0	140	12	IU2	External sensor on a component (37 FPP)	
FPP_PWR_IF_TEMP	-	134.795	-0.198212	0.000173163	-8.06E-08	1.80E-11	-1.53E-15	degC	1136	4	142	12	IU2	FPP Power Interface (25 FPP)	
FPP_E_HW_TEMP	-	134.795	-0.198212	0.000173163	-8.06E-08	1.80E-11	-1.53E-15	degC	1148	0	143	12	IU2	FPP-E Hot Wall (22 FPP)	
FPP_PWR_HW_TEMP	-	134.795	-0.198212	0.000173163	-8.06E-08	1.80E-11	-1.53E-15	degC	1160	4	145	12	IU2	FPP-PWR (Hot Wall) (23 FPP)	
FPP_E_CPU_TEMP	-	134.795	-0.198212	0.000173163	-8.06E-08	1.80E-11	-1.53E-15	degC	1172	0	146	12	IU2	CPU Board Temp. (21 FPP)	
FPP_E_IF_TEMP	-	134.795	-0.198212	0.000173163	-8.06E-08	1.80E-11	-1.53E-15	degC	1184	4	148	12	IU2	FPP-E Interface Temp. (24 FPP)	
FPP_STR1_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1196	0	149	12	IU2	Op Heater Zone 1 (Struct-1; -X Wall) Temp. (7 FPP)	
FPP_STR2_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1208	4	151	12	IU2	Op Heater Zone 2 (Struct-2; -X Wall) Temp. (8 FPP)	
FPP_STR3_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1220	0	152	12	IU2	Op Heater Zone 3 (Struct-3; +X Wall) Temp. (9 FPP)	
FPP_STR4_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1232	4	154	12	IU2	Op Heater Zone 4 (Struct-4; +X Wall) Temp. (10 FPP)	
FPP_POS_Y1_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1244	0	155	12	IU2	Pos Y Wall 1 (35 FPP)	
FPP_POS_Y2_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1256	4	157	12	IU2	Pos Y Wall 2 (36 FPP)	
FPP_NEG_Y1_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1268	0	158	12	IU2	Neg Y Wall 1 (33 FPP)	
FPP_NEG_Y2_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1280	4	160	12	IU2	Neg Y Wall 2 (34 FPP)	
FPP_TF1_TEMP	-	120.005	-0.125771	8.22E-05	-3.06E-08	5.75E-12	-4.25E-16	degC	1292	0	161	12	IU2	Tunable Filter Element 1 Temp. (11 FPP)	
FPP_TF2_TEMP	-	120.005	-0.125771	8.22E-05	-3.06E-08	5.75E-12	-4.25E-16	degC	1304	4	163	12	IU2	Tunable Filter Element 2 Temp. (12 FPP)	
FPP_TF3_TEMP	-	120.005	-0.125771	8.22E-05	-3.06E-08	5.75E-12	-4.25E-16	degC	1316	0	164	12	IU2	Tunable Filter Element 3 Temp. (13 FPP)	
FPP_TF4_TEMP	-	120.005	-0.125771	8.22E-05	-3.06E-08	5.75E-12	-4.25E-16	degC	1328	4	166	12	IU2	Tunable Filter Element 4 Temp. (14 FPP)	
FPP_TF5_TEMP	-	120.005	-0.125771	8.22E-05	-3.06E-08	5.75E-12	-4.25E-16	degC	1340	0	167	12	IU2	Tunable Filter Element 5 Temp. (15 FPP)	
FPP_TF6_TEMP	-	120.005	-0.125771	8.22E-05	-3.06E-08	5.75E-12	-4.25E-16	degC	1352	4	169	12	IU2	Tunable Filter Element 6 Temp. (16 FPP)	
FPP_TF7_TEMP	-	120.005	-0.125771	8.22E-05	-3.06E-08	5.75E-12	-4.25E-16	degC	1364	0	170	12	IU2	Tunable Filter Element 7 Temp. (17 FPP)	
FPP_TF8_TEMP	-	120.005	-0.125771	8.22E-05	-3.06E-08	5.75E-12	-4.25E-16	degC	1376	4	172	12	IU2	Tunable Filter Element 8 Temp. (18 FPP)	
FPP_MEB_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1388	0	173	12	IU2	Mechanism Electronics (26 FPP)	
FPP_WBFW_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1400	4	175	12	IU2	Filterwheel 1 Temp. (27 FPP)	
FPP_NBFW_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1412	0	176	12	IU2	Filterwheel 2 Temp. (28 FPP)	
FPP_FOC_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1424	4	178	12	IU2	Reimaging Lens Temp. (31 FPP)	
FPP_HTDMP_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1436	0	179	12	IU2	Heat Dump 1 Temp. (32 FPP)	
FPP_SLIT_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1448	4	181	12	IU2	Slit Temp. (29 FPP)	
FPP_MAIN_BS_TEMP	-	86.9055	-0.172802	0.000155522	-6.69E-08	1.04E-11	0	degC	1460	0	182	12	IU2	Main BS Temp. (30 FPP)	

## G.2. FPP Telemetry Status Descriptions

This section describes the definition of FPP telemetry status (page G-10 ~ G-75).



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**SOLAR-B FOCAL PLANE PACKAGE PROGRAM**

**FPP Status Data Description**

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**Contract Number: NAS8-01014**  
**CAGE Code: 65113**

Prepared by: **Lockheed Martin Missiles and Space**  
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## RECORD OF REVISIONS

Revision	Date	Summary of Changes
--	3 August 2, 2001	
A	22 January, 2002	Updated CT and CTM-E commands to better differentiate them.
B	15 July 2004	Changes and additions for the flight status data
C	29 September 2004	Corrected and added mnemonics
D	8 October 7, 2004	<ol style="list-style-type: none"> <li>1. Corrected position information numbers</li> <li>2. Corrected CCD configuration description</li> <li>3. Replaced unused CCD_STATUS items with CCD_DAC</li> <li>4. Added detailed description of temperature data layout</li> <li>5. Added the list of MEctrl states</li> <li>6. Added the list of temperature A/D monitors</li> <li>7. Removed obsolete items</li> </ol>
E	29 January, 2005	<ol style="list-style-type: none"> <li>1. Updated 2 second status packet items; Removed QHSS and PMP status and added shadow values of Slit Scan and Focus Mechanism positions.</li> <li>2. Corrected PMU_MODE to indicate encoder selection</li> <li>3. Added PMU PMU commanded duty cycle limits</li> <li>4. Corrected S/P and F/G CCD status</li> <li>5. Corrected bit positions for the thermister readout range indicators.</li> </ol>
F	8 March, 2005	1. Updated FPP_MODE
G	6 April, 2005	<ol style="list-style-type: none"> <li>1. Corrected description of the following items; FG_MAIN_ID, SP_MAIN_ID, FPP_STATE, PIC_STATE, SP_STATE, SP_OBS_ID, SP_MAP_ID, CT_AVG_ERR.</li> <li>2. Enhanced the description of the following items; CT_MODE, ERR_COUNT, DOP_VEL_RCV, LOBT_HI, LOBT_LO, CTME_{n}WORD, CT_MAX_ERR{X Y}, SP_CAM_CFG, FG_CAM_CFG.</li> <li>3. Added following items; MSG_COUNT, FOCUS_MON.</li> <li>4. Replaced, FPP_SCIF_STATUS by FPP_QHSS_STATUS</li> <li>5. Updated the error list</li> <li>6. Corrected item 14, CT_MODE.</li> </ol>

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## 1. INTRODUCTION

This document lists all the currently defined status telemetry items in Focal Plane Package instrument database v. 145. The lists include field definitions and the descriptions of each command parameter. The status data items are listed in the order in which they are down linked.

### 3. FPP Status Data List

The following is a list of all currently defined FPP status data items. They are listed in the order of their position in the 10 second status data packet.

Items 1 - 10 are output in response to FPP\_STATRQ1 command, nominally every 0.25 seconds. Items 1 - 104 are output in response to FPP\_STATRQ2 command, nominally, every 2 seconds. All items are output in response to FPP\_STATRQ3 command, nominally, every 10 seconds.

The bits are numbered from the least significant (bit 0) to the most significant (Bit 7, 15 or 31).

#### 1. FPP\_FG\_READY:

Length: 1 Bit

Position: Byte 0, Bit 0

Values: 0 = F/G processor is busy. It is processing a macro command and a macro command is queued for execution. If a new macro command is sent, the queued command will be lost.

1 = F/G processor can accept a macro command.

Note: The macro command may not execute immediately since the F/G may already be executing a macro command.

#### 2. FPP\_FG\_MAIN\_ID:

Position: Byte 0, Bit 1

Length: 7 Bits

Description: This field contains the LS 7 bits of the macro command currently being executed.

#### 3. FPP\_SP\_READY:

Length: 1 Bit

Position: Byte 1, Bit 0

Values: 0 = S/P processor is busy. It is processing a macro command and a macro command is queued for execution. If a new macro command is sent, the queued command will be lost.

1 = S/P processor can accept a macro command.

Note: The macro command may not execute immediately since the F/G may already be executing a macro command.

#### 4. FPP\_SP\_MAIN\_ID:

Position: Byte 1, Bit 1

Length: 7 Bits

Description: This field contains the LS 7 bits of the macro command currently being executed.

(0 is not a valid main id?).

**5. FPP\_PMU\_POS1:**

Position: Byte 2

Length: 8 Bits

Description: See description for #7;

**6. FPP\_PMU\_POS2:**

Position: Byte 4

Length: 8 Bits

Description: See description of #7;

**7. FPP\_PMU\_POS3:**

Position: Byte 6

Length: 8 Bits

Description: The PMU position is read every 0.1 seconds. These are placed in a 3 element circular queue. Since status 1 (or 4) data is output every 0.25 seconds, all PMU positions at the time of CCD readouts are available.

**8. FPP\_PWM\_DC1:**

Position: Byte 3

Length: 8 Bits

Description: See description for #10;

**9. FPP\_PWM\_DC2:**

Position: Byte 5

Length: 8 Bits

Description: See description for #10;

**10.FPP\_PWM\_DC3:**

Position: Byte 7

Length: 8 Bits

Description: Items 8 - 10 contain the duty cycle of the PMU motor at each 0.1 second mark. They are a measure of the uniformity of the rate of rotation of the PMU.

**11.FPP\_STAT2\_TIME:**

Position: Bytes 8 - 11

Length: 32 Bits

Description: Time when status 2 packet was generated in units of 1/500 seconds. This time is computed by adding the time required to generate the status 2 packet to the MDP time received with the status 2 request command.



**12.FPP\_STATE:**

Position: Byte 12

Length: 8 Bits

Description:

Value	Description
0	Not Used
1	FPP software is active
2	N/A
4	NA
8	N/A
16	NA
32	NA
64	NA
128	N/A

**13.FPP\_MODE:**

Position: Byte 13

Length: 8 Bits

Description:

Bit #	Description
0	0 – System tick generated from CT interrupts 1 – System tick generated from the Decrementer Interrupt
1 – 6	Not Used
7	0 – Observational Mode (Macro commands Accepted) 1 – Patch Mode (Memory Load) (No science operations)

**14.FPP\_CT\_MODE:**

Position: Byte 14 – 15

Length: 16 Bits

Description:

This mode is returned by the CT camera when it in RUN mode. When the CT is in STDBY mode, this value is set to zero.

Bit #	Description
0	0 = CT Idle; 1 = CT in RUN Mode
1	0 = Live Frame; 1 = Reference Frame (Verify)
2	0 = No Sum Overflow; 1 = Sum Overflow
3	0 = No MAD Overflow; 1 = MAD Overflow
4 – 5	8 bit field position for reference frame intensity measurement
6 – 15	Not Used

**15.FPP\_ERR\_CODE:**

Position: Byte 16 – 17

Length: 16 Bits

Description: See attached error code listing in Appendix A.

**16.FPP\_ERR\_TIME:**

Position: Byte 18 – 21

Length: 32 Bits

Description:

FPP Time (in seconds) at which the error was detected.

**17.FPP\_ERR\_COUNT:**

Position: Bytes 22

Length: 8 Bits

Description: Cumulative number of errors generated. (The message count, FPP\_MSG\_COUNT, does not increment on error).

**18.FPP\_ERR\_PAR1:**

Position: Bytes 23 – 24

Length: 16 Bits

Description: See Below;

**19.FPP\_ERR\_PAR2:**

Position: Bytes 25 – 26

Length: 16 Bits

Description: See Below;

**20.FPP\_ERR\_PAR3:**

Position: Bytes 27 – 28

Length: 16 Bits

Description: See Below;

**21.FPP\_ERR\_PAR4:**

Position: Bytes 29 – 30

Length: 16 Bits

Description: See Below;

These are four parameters which can be set when an error occurs. The details of these parameters depend upon the error code. See appendix B for description of error parameters.

**22.FPP\_OP\_FLAGS:**

Position: Bytes 31 – 32

Length: 16

Description: Flags control the operation of the software. This is not implemented.

**23.FPP\_DOP\_VEL\_RCV:**

Position: Bytes 33 – 34

Length: 16 Bits

Description: Copy of the Doppler velocity received with the last status request command. The units are meters/sec.

**24.FPP\_SC\_TIME:**

Position: Bytes 35 – 38

Length: 32 Bits

Description: Copy of the time word received with the last status request command.

**25.FPP\_LOBT\_HI:**

Position: Bytes 39 – 42

Length: 32 Bits

Description: The most significant 32 bits of FPP internal (Local On Board ) Time.

The most significant 9 bits represent the seconds elapsed since 1 – Jan – 1971 (after the FPP\_SET\_TIME command is sent)..The lower 23 bits are copied from the MDP time.

**26.FPP\_LOBT\_LO:**

Position: Bytes 43 – 46

Length: 32 Bits

Description: Fractional seconds of FPP internal time. Only the MS 9 bits are used. Bit 23 represents, 1.9531 ms.

**27.FPP\_CMD\_COUNT:**

Position: Byte 47

Length: 8 Bits

Description: Number of valid commands received, not including status request commands.

**28.FPP\_CMD\_STATUS:**

Position: Byte 48

Length: 8 Bits

Description: If the last command received was invalid, this field is set to 1. (Should set FPP\_ERR\_CODE and associated parameters)

**29.FPP\_CMD\_OPCODE:**

Position: Byte 49

Length: 8 Bits

Description: The Op code of the last valid command received. This is not updated for status request commands.

**30.FPP\_CMD\_LENGTH:**

Position: Byte 50

Length: 8 Bits

Description: The length of the last valid command received. This is not updated for status request commands.

**31.FPP\_SD1\_PKT\_COUNT:**

Position: Bytes 51 – 52

Length: 16 Bits

Description: Number of Status 1 packets sent.

**32.FPP\_SD2\_PKT\_COUNT:**

Position: Bytes 53 – 54

Length: 16 Bits

Description: Number of Status 2 packets sent.

**33.FPP\_SD3\_PKT\_COUNT:**

Position: Bytes 55 – 56

Length: 16 Bits

Description: Number of Status 3 packets sent.

**34.FPP\_SD4\_PKT\_COUNT:**

Position: Bytes 57 – 58

Length: 16 Bits

Description: Number of Status 4 packets sent. This counter is incremented only when a memory dump packet is transmitted. If no dump is in progress this counter is not incremented even in response to a status 4 request command.

**35.FPP\_SD\_Q\_STAT:**

Position: Byte 59

Length: 8 Bits

Description: Status of serial data port on the Spacecraft Interface board.

Value description

0 No Error

- 1 Error (attempt to start a transfer while port was busy)

**36.FPP\_MD\_MAIN\_ID:**

Position: Bytes 60 – 61

Length: 16 Bits

Description: The main ID of the data product packet currently being downlinked.

**37.FPP\_MD\_PKT\_COUNT:**

Position: Bytes 62 – 63

Length: 16 Bits

Description: Number of packets output via the mission data. Data Information Packets are counted as separate packets.

**38.FPP\_MD\_PKT\_Q\_LEN: (Not Used)**

Position: Bytes 64 – 65

Length: 16 Bits

**39.FPP\_MD\_PKT\_SIZE:**

Position: Bytes 66 – 67

Length: 17 Bits

Description: Size of mission data packet being down linked (in pixels – 16 bit units).

**40.FPP\_MD\_TLM\_STATE:**

Position: Byte 68

Length: 7 Bits

Description: Status of mission data port. This should nominally be zero. On error this status will contain a non-zero value.

**41.FPP\_MD\_Q\_POS1: (Not Used)**

Position: Bytes 69 – 70

Length: 16 Bits

**42.FPP\_MD\_Q\_POS2: (Not Used)**

Position: Bytes 71 – 72

Length: 16 Bits

**43.FPP\_MD\_Q\_POS3: (Not Used)**

Position: Bytes 73 – 74

Length: 16 Bits

**44.FPP\_DOP\_VEL\_USED:**

Position: Bytes 75 – 76

Length: 16 Bits

Description: The Doppler velocity used for current F/G macro command processing.

**45.FPP\_FG\_STATE:**

Position: Byte 77

Length: 8 Bits

Description: Gives an indication of current state of the F/G macro command processor.

Bit Value Description

0 0 F/G processor is idle

1 1 Processing a macro command

**46.FPP\_FG\_PIC\_STATE: (Not Used)**

Position: 78

Length: 8 Bits

**47.FPP\_FG\_OBS\_COUNT:**

Position: Bytes 79 – 82

Length: 32 Bits

Description: Number of macro commands executed.

**48.FPP\_FG\_FRAME\_COUNT:**

Position: 83 – 86

Length: 32 Bits

Description: Cumulative number of CCD exposures for F/G data products

**49.FPP\_FG\_PROD\_COUNT:**

Position: Bytes 87 – 90

Length: 32 Bits

Description: Cumulative number of data products generated.

**50.FPP\_FG\_OBS\_ID:**

Position: Bytes 91 – 92

Length: 16 Bits

Description: The Observable ID of the macro command currently being processed.

**51.FPP\_FG\_FDB\_ID:**

Position: Bytes 93 – 94

Length: 16 Bits

Description: The current frame definition descriptor

**52.FPP\_FG\_OBSFRM\_CNT:**

Position: Byte 95

length: 8 Bits

Description: The number exposures required for current observable.

**53.FPP\_SP\_STATE:**

Position: Byte 96

Length: 8 Bits

Description: S/P processing state

Bit#	Value	Description
0 (LS)	0	S/P processor is idle
	1	Processing a macro command
1	0	SP not paused
	1	SP is paused
2	0	No Pause pending
	1	Pause state is pending
3 – 7		Not Used

**54.FPP\_SP\_PIC\_STATE:**

Position: Byte 97

Length: 8 Bits

**55.FPP\_SP\_OBS\_ID:**

Position: Bytes 98 – 99

Length: 16 Bits

Description: This contains the first 16 bits of the currently executing macro command

**56.FPP\_SP\_MAP\_ID:**

Position: Byte 100 – 101

Length: 16 Bits

Description: This contains bits 17-32 of the currently executing macro command.

**57.FPP\_SP\_MAP\_COUNT:**

Position: Bytes 102 – 105

Length: 32 Bits

Description: cumulative number of S/P maps (I,Q,U,V sets) completed.

**58.FPP\_SP\_FRAME\_COUNT:**

Position: Bytes 106 – 109

Length: 32 Bits

Description: Number of CCD frame accumulations generated for S/P data products.

This is the number of times the S/P smart memories have been read out.

**59.FPP\_SP\_MAP\_NUM\_POS:**

Position: Bytes 110 – 111

Length: 16 Bits

Description: Number of positions in the current S/P Map.

**60.FPP\_SP\_SLIT\_POS:**

Position: Bytes 112 – 113

Length: 16 Bits

Description: The current position of the slit scan mechanism starting from 0.

**61.FPP\_ME\_STATE:**

Position: Byte 114

Length: 8 Bits

Description: See Table Below;

Number	State	Description
1	0	Idle
		States 1 – 10 indicate CTM_GO command handling
2	1	Manual; CT Module remain in this state until CTM_GO command is received
3	2	Preset
4	3	Post A
5	4	Wait A
6	5	Reset1
7	6	Enable
8	7	Wait for Reference Frame update
9	8	Post B
10	9	Wait B
11	10	Run; This state is reached upon successful completion of CTM_GO
		The states 16 – 24 handle TTM_RESET command
12	16	Open Loop
13	17	Post C
14	18	Wait C
15	19	Wait for CTM-E Ready
16	20	Continue
17	21	Check H Ld
18	22	Post D
19	23	Wait D



20	24	Send S/P GO command
		The states 32 – 44 indicate Out Of Range Condition Handling
21	32	In Range; Error Values In Range
22	33	High Limit; Error Values Out Of Range
23	34	Under;
24	35	Over
25	36	OvLst
26	37	Post E
27	38	Wait E
28	39	OvBsy
29	40	OvReq
30	41	OvChk
31	42	Post F
32	43	Wait F
33	44	OvGo
		States 48 – 56 indicate TTM_ANGLE_SET handling
34	48	POINT
35	49	PtOff
36	50	PtAng
37	51	PtBusy
38	52	PtRdy
39	53	PtChk
40	54	Post G
41	55	Wait G
42	56	PtGo
		States 64 – 65 indicate FPP_CTM_SERVO_OFF handling
43	64	Exit
44	65	Lower

**62.FPP\_ME\_SPARE: (Not Used)**

Position: Byte 115  
 Length: 8 Bits  
 Description: Not Used

**63.FPP\_CTME\_1ST\_WORD:**

Position: Bytes 116-117  
 Length: 16 Bits  
 Description: CTM-E Status word

**64.FPP\_CTME\_2ND\_WORD:**

Position: Bytes 118-119

Length: 16 Bits

Description: Tip-Tilt angle commanded by CTM-E for X – axis.

**65.FPP\_CTME\_3RD\_WORD:**

Position: Bytes 120-121

Length: 16 Bits

Description: Tip-Tilt angle commanded by CTM-E for Y – axis

**66.FPP\_CT\_LAST\_CMD:**

Position: Bytes 122-123

Length: 16 Bits

Description: Last command sent to CTM-E.

**67.FPP\_CT\_MAX\_ERR\_X:**

Position: Bytes 124-125

Length: 16 Bits

Description: Maximum CT error in X direction (not deviation from average) during the previous two second period..

**68.FPP\_CT\_MAX\_ERR\_Y:**

Position: Bytes 126-127

Length: 16 Bits

Description: Maximum CT error in Y direction (not deviation from average) during the previous two second period.

**69.FPP\_CT\_AVG\_ERR\_X:**

Position: Bytes 128-129

Length: 16 Bits

Description: The average CT error in X direction during the previous two second period

**70.FPP\_CT\_AVG\_ERR\_Y:**

Position: Bytes 130-131

Length: 16 Bits

Description: The average CT error in Y direction during the previous two second period.

**71.FPP\_CT\_REFIMG\_TIME:**

Position: Bytes 132 – 133

Length: 16 Bits

Description: Number of seconds elapsed since last reference image downlink.  
This is also the time since the reference image was updated.

**72.FPP\_CT\_CCD\_CFG:**

Position: Bytes 134 – 135

Length: 16 Bits

Description:

Byte #	Bit #'s	Description
135	7	1 - Run; 0 - Stdby
135	6	1 - Diagnostic Mode On; 0 - Diagnostic mode off
135	4-5	Not Used
135	2-3	Process field (Indicates which 8 bit field is used for checking DN level for new reference frame.)
135	1	Preamp
135	0	Serial clock direction
134	7	Parallel clock direction
134	5-6	Gain
134	1-4	DAC
134	0	Not Used

**73.FPP\_CT\_CCD\_DATA (Not Used)**

Position: 136 – 137

Length: 16 Bits

Description: This field is currently unused.

**74.FPP\_HTR\_CNV**

Position: Byte 138; Bit 0

Length: 1 Bit

Description: 0 = Heater converter Off;  
1 = Heater Converter On**75.FPP\_PWR\_ON\_ENA**

Position: Byte 138; Bit 4

Length: 1 Bit

Description: 0 = Power commands disabled;  
1 = Power commands enabled.This flag is reset when a power command is received.  
It times out after 34 seconds.**76.FPP\_CT\_PWR**

Position: Byte 138; Bit 1

Length: 1 Bit

Description: 0 = CT Power Off;  
1 = CT Power On**77.FPP\_SP\_PWR**

Position: Byte 138; Bit 3

Length: 1 Bit

Description: 0 = S/P Power Off;  
 1 = S/P Power On

**78.FPP\_FG\_PWR**

Position: Byte 138; Bit 2  
 Length: 1 Bit  
 Description: 0 = F/G Power Off;  
 1 = F/G Power On

**79.FPP\_AMBI\_STATUS:**

Position: Bytes 139 – 140  
 Length: 16 Bits  
 Description: Status of the AMBI chip

**80.FPP\_QHSS\_STATUS:**

Position: Bytes 141 – 142  
 Length: 16 Bits  
 Description: Status of QHSS chip

**81.FPP\_SW\_SS\_POS:**

Position: Bytes 143 – 144  
 Length: 16 Bits  
 Description: Shadow value of the Slit Scan position (Not the encoder position). Note that this value is used for computing the number of steps that the Slit Scan mechanism is to be moved since the encoder value can be off by 1.

**82.FPP\_SW\_FM\_STATUS:**

Position: Bytes 145 – 146  
 Length: 16 Bits  
 Description: Shadow value of the Focus Mechanism position (Not the encoder position). Note that this value is used for computing the number of steps that the Slit Scan mechanism is to be moved since the encoder value can be off by 1.

**83.FPP\_DEV\_STATUS:**

Position: Bytes 147 – 150  
 Length: 32 Bits

Description:

Bits Field	Description
0	Mask wheel READY (for commanding)
1	Mask wheel ERROR
2	Wide Band Filter wheel READY (for commanding)
3	Wide Band Filter wheel ERROR
4	Wide Band Shutter READY (for commanding)
5	Wide Band Shutter ERROR

6	Slit Scan Mechanism READY (for commanding)
7	Slit Scan mechanism ERROR
8	Wedge wheel READY (for commanding)
9	Wedge wheel ERROR
10	Narrow Band Filter wheel READY (for commanding)
11	Narrow Band Filter wheel ERROR
12	Narrow Band Shutter READY (for commanding)
13	Narrow Band Shutter ERROR
14	Focus mechanism READY (for commanding)
15	Focus mechanism ERROR
16	Tunable Filter Motor 1 READY (for commanding)
17	Tunable Filter Motor 1 ERROR
18	Tunable Filter Motor 2 READY (for commanding)
19	Tunable Filter Motor 2 ERROR
20	Tunable Filter Motor 3 READY (for commanding)
21	Tunable Filter Motor 3 ERROR
22	Tunable Filter Motor 4 READY (for commanding)
23	Tunable Filter Motor 4 ERROR
24	Tunable Filter Motor 5 READY (for commanding)
25	Tunable Filter Motor 5 ERROR
26	Tunable Filter Motor 6 READY (for commanding)
27	Tunable Filter Motor 6 ERROR
28	Tunable Filter Motor 7 READY (for commanding)
29	Tunable Filter Motor 7 ERROR
30	Tunable Filter Motor 8 READY (for commanding)
31	Tunable Filter Motor 8 ERROR

**84.FPP\_PMU\_PWM\_LMT\_LO**

Position: Byte 151

Length: 8 Bits

Description: Commanded lower limit for the duty of the PMU Pulse width modulation.

**85.FPP\_PMU\_PWM\_LMT\_HI**

Position: Byte 152

Length: 8 Bits

Description: Commanded lower limit for the duty of the PMU Pulse width modulation.

**86.FPP\_NFI\_MASK\_POS**

Position: Byte 153

Length: 8 Bits

Description: Encoder position of Mask wheel

Range: 0-179

**87.FPP\_BFI\_FILT\_POS**

Position: Byte 154

Length: 8 Bits

Description: Encoder position of Broad Band Filter Wheel

Range: 0 -179

**88.FPP\_WW\_POS**

Position: Byte 155

Length: 8 Bits

Description: BB Shutter encoder position

**89.FPP\_NFI\_BLKFLT\_POS**

Position: Byte 156

Length: 8 Bits

Description: Encoder position of Blocking Filter Wheel

Range: 0 -179

**90.FPP\_NFI\_TF\_ELM1\_POS**

Position: Byte 157

Length: 8 Bits

Description: Tunable Filter Element 1 encoder position

**91.FPP\_NFI\_TF\_ELM2\_POS**

Position: Byte 158

Length: 8 Bits

Description: Tunable Filter Element 2 encoder position

**92.FPP\_NFI\_TF\_ELM3\_POS**

Position: Byte 159

Length: 8 Bits

Description: Tunable Filter Element 3 encoder position

**93.FPP\_NFI\_TF\_ELM4\_POS**

Position: Byte 160

Length: 8 Bits

Description: Tunable Filter Element 4 encoder position

**94.FPP\_NFI\_TF\_ELM5\_POS**

Position: Byte 161

Length: 8 Bits

Description: Tunable Filter Element 5 encoder position

**95.FPP\_NFI\_TF\_ELM6\_POS**

Position: Byte 162

Length: 8 Bits  
Description: Tunable Filter Element 6 encoder position

**96.FPP\_NFI\_TF\_ELM7\_POS**

Position: Byte 163  
Length: 8 Bits  
Description: Tunable Filter Element 7 encoder position

**97.FPP\_NFI\_TF\_ELM8\_POS**

Position: Byte 164  
Length: 8 Bits  
Description: Tunable Filter Element 8 encoder position

**98.FPP\_SLITSCN\_POS**

Position: Bytes 165 – 166  
Length: 16 Bits  
Description: Slit Scan encoder position

**99.FPP\_FOCUS\_POS**

Position: Byte 167 – 168  
Length: 8 Bits  
Description: Encoder Position of Reimaging Lens

**100. FPP\_BFI\_SHT\_POS**

Position: Byte 169  
Length: 8 Bits  
Description: BFI Shutter encoder position

**101. FPP\_NFI\_SHT\_POS**

Position: Byte 170  
Length: 8 Bits  
Description: NFI Shutter encoder position

**102. FPP\_BFI\_EXPDUR**

Position: Bytes 171 – 172  
Length: 16 Bits  
Description: BFI Shutter Open Time in milliseconds

**103. FPP\_NFI\_SHT\_EXPDUR**

Position: Bytes 173 – 174

Length: 16 Bits  
Description: NFI Shutter Open Time in milliseconds

**104. PMU\_SPIN\_TIME**

Position: Bytes 175 – 176  
Length: 16 Bits  
Description: The Time required by the PMU wheel to complete one full rotation. Units are 64  $\mu$ Secs.

**105. FPP\_PMU\_MODE**

Position: Byte 177, Bit 0  
Length: 2 Bit  
Description: Encoder Used  
0 – Encoder A  
1 – Encoder B  
2 – Encoder A and B

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**106. FPP\_RESERVED\_**

Position: Bytes 178 – 179  
Length: 16 Bits  
Description: Reserved

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**107. FPP\_STAT3\_TIME**

Position: Byte 180 – 183  
Length: 32 Bits  
Description: Packet Time in MDP Time Units

**108. FPP\_MSG\_COUNT**

Position: Byte 184  
Length: 8 Bits  
Description: Cumulative number of messages generated. Messages are system events which may be of operational interest but does not constitute an exception. Codes greater than 0x8000 indicate a message. (Lower valued codes indicate errors).

**109. FPP\_OBS\_SW\_VER**

Position: Byte 185  
Length: 8 Bits  
Description: Software Build Number



**110. FPP\_CTRL\_SW\_VER**

Position: Byte 186  
Length: 8 Bits  
Description: Control Software Major Version Number

**111. FPP\_COMM\_SW\_VER**

Position: Byte 187  
Length: 8 Bits  
Description: Software Minor Version Number

**112. FPP\_CPU\_ONLINE**

Position: Byte 188  
Length: 8 Bits  
Description: CPU booted and is online

**113. FPP\_TM\_STATE (Not Used)**

Position: Byte 189  
Length: 8 Bits  
Description: Telemetry State

**114. FPP\_TM\_MDPKT\_COUNT (Not Used)**

Position: Bytes 190 – 191  
Length: 16 Bits  
Description: Mission Data Packet Count

**115. FPP\_ERR\_CMD\_COUNT**

Position: Byte 192  
Length: 8 Bits  
Description: Number of erroneous command received.

**116. FPP\_TM\_MSG\_RCVD (Not Used)**

Position: Bytes 193 – 194  
Length: 16 Bits  
Description: Telemetry messages received

**117. FPP\_CT\_ERR\_X**

Position: Bytes 195 – 196  
Length: 16 Bits  
Description: CT error signal X

**118. FPP\_CT\_ERR\_Y**

Position: Bytes 197 – 198  
Length: 16 Bits  
Description: CT error signal Y

**119. FPP\_CT\_OFFSET\_X**

Position: Bytes 199 – 200  
Length: 16 Bits  
Description: CT commanded offset angle in X direction

**120. FPP\_CT\_OFFSET\_Y**

Position: Bytes 201 – 202  
Length: 16 Bits  
Description: CT commanded offset angle in Y direction

**121. FPP\_CTM\_SFT\_LIM\_CNT**

Position: Byte 203  
Length: 8 Bits  
Description: Cumulative number of CTM-E Soft Limit status

**122. FPP\_CTM\_HRD\_LIM\_CNT**

Position: Byte 204  
Length: 8 Bits  
Description: Number of CTM-E Hard Limit status messages received. After 5 (changeable by FPP\_OP\_PARAM command) hard limit messages automatic recovery is attempted.

**123. FPP\_CT\_SAT\_ERR\_CNT**

Position: Byte 205  
Length: 8 Bits  
Description: CT Saturation error count

**124. FPP\_CT\_RNG\_ERR\_CNT**

Position: Byte 206  
Length: 8 Bits  
Description: CT out of range count. The range is 0 – 10 (Adjustable by FPP\_OP\_PARAM command). After 10 range errors automatic recovery is attempted.

**125. FPP\_SP\_ROI\_STRT**

Position: Byte 207 – 208  
Length: 16 Bits  
Description: SP Region of interest Start row number. Row 0 is the row closest to the serial port in the readout area, while Row 223 is the farthest.

**126. FPP\_SP\_ROI\_END**

Position: Byte 209 – 210  
 Length: 16 Bits  
 Description: SP Region of Interest end row number.

**127. FPP\_SP\_CAM\_CFG**

Position: Byte 211 – 212  
 Length: 16 Bits  
 Description: SP Camera Configuration

Bit Field	Description
0	Bad Command (Not Used)
1	Camera Locked (Not used)
2	Camera Busy (not used)
3	Serial Clock direction 0 – Move charge towards redundant preamp 1 – Move charge towards primary preamp
4 – 5	Parallel Summing Mode 0 – No Summing 1 – Two pixels summed 2 – Four pixels summed
6 – 7	Serial Summing Mode 0 – No Summing 1 – Two pixels summed 2 – Four pixels summed
8 – 9	Gain
10	Not Used
11	Pre Amp Selected 0 – Redundent 1 – Primary
12	Not Used
13	0 – Readout science data only; 1 – Readout science and engineering data
14	0 – Start Integrate or Readout now; 1 – Start integrate or Readout at next PMU pulse
15	0 – Shuttered exposure mode 1 – Shutterless exposure mode

**128. FPP\_SP\_DAC**

Position: Byte 214  
 Length: 16 Bits  
 Description: Shadow value of the last commanded DAC value.  
 Bits 0:4 - Segment A; Bits 5:9 - Segment B; Bits 10:15 - Not Used

**129. FPP\_FG\_ROI\_STRT**

Position: Byte 215 – 216

Length: 16 Bits

Description: FG Region of interest Start row number. Row 2047 is the row closest to the serial port in the readout area, while Row 0 is the farthest.

**130. FPP\_FG\_ROI\_END**

Position: Byte 217 – 218

Length: 16 Bits

Description: FG Region of Interest end row number

**131. FPP\_FG\_CAM\_CFG**

Position: Byte 219 – 220

Length: 16 Bits

Description: FG Camera Configuration.

Bit Field	Description
0	Bad Command (Not Used)
1	Camera Locked (Not Used)
2	Camera Busy (Not Used)
3	Serial Clock direction 1 – Move charge towards redundant preamp 0 – Move charge towards primary preamp
4 – 5	Parallel Summing Mode 0 – No Summing 1 – Two pixels summed 2 – Four pixels summed
6 – 7	Serial Summing Mode 0 – No Summing 1 – Two pixels summed 2 – Four pixels summed
8 – 9	Gain
10	Not Used
11	Pre Amp Selected
12	Not Used
13	0 – Readout science data only; 1 – Readout science and engineering data Mode
14	0 – Start Integrate or Readout now; 1 – Start integrate or Readout at next PMU pulse
15	0 – Shuttered exposure mode 1 – Shutterless exposure mode

**132. FPP\_FG\_DAC**

Position: Byte 221 – 222

Length: 8 Bits  
 Description: Shadow value of the last commanded DAC value.  
 Bits 0:4 - Segment A; Bits 5:9 - Segment B; Bits 10:15 - Not Used

**133. FPP\_CT\_CAM\_CFG (Not Used)**

Position: Byte 223 – 224  
 Length: 16 Bits  
 Description: Not Implemented

**134. FPP\_CT\_CAM\_MODE (Not Used)**

Position: Byte 225 – 226  
 Length: 16 Bits  
 Description: Not Implemented

**135. FPP\_AMBI\_REG1**

Position: Bytes 227 – 228  
 Length: 16 Bits  
 Description: AMBI Register 1

**136. FPP\_QHSS\_STATE1**

Position: Bytes 229 – 230  
 Length: 16 Bits  
 Description: QHSS state 1

**137. FPP\_SCIF\_STATE1**

Position: Bytes 231 – 232  
 Length: 16 Bits  
 Description: Spacecraft interface status as shown below;

	Bit Position (0 - LSB)	Description
1	0 – 15	
	16	MD1 buffer queued
	17	MD1 buffer busy (being output on mission data interface)
	18	MD1 Error (Commanded while busy)
	19	Not Used
	20 – 23	Not Used
	24	MD0 buffer queued
	25	MD0 buffer busy (being output on mission data interface)
	26	MD0 Error (Commanded while busy)
	27	Not Used

	28-31	Not Used
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**138. FPP\_PMP\_REG1**

Position: Bytes 233 – 234  
 Length: 16 Bits  
 Description: PMP register 1

**139. FPP\_MW\_STATUS**

Position: Byte 235  
 Length: 8 Bits  
 Description: Mask wheel status

Bit #	Description
0	READY; Completed previous operation; Waiting for new command
1	Electrical Position Bit 0
2	Electrical Position Bit 1
3	Electrical Position Bit 2
4	Waiting to pass encoder position 0; Value is 0 after position 0 has been passed;
5	Command error
6	Step Mode
7	Spin Timer done

**140. FPP\_WB\_FW\_STATUS**

Position: Byte 236  
 Length: 8 Bits  
 Description: Wide Band Filter wheel status.  
 The bit definitions are as in 139.

**141. FPP\_WB\_SHTR\_STATUS**

Position: Byte 237  
 Length: 8 Bits  
 Description: Wide Band Shutter status.

Bit #	Description
0	READY; Completed previous operation; Waiting for new command
1	Spare (always 0)
2	Command error
3	Step Mode
4	Encoder Channel A
5	Encoder Channel B

6	OPENOUT signal (Shutter open signal)
7	Spin Timer done

**142. FPP\_SS\_STATUS**

Position: Byte 238

Length: 8 Bits

Description: Slit Scan status.

Bit #	Description
0	READY; Completed previous operation; Waiting for new command
1	Hall sensor bit 0
2	Hall sensor bit 1
3	Hall sensor bit 2
4	Increment Limit (0 at edge)
5	Decrement Limit (0 at edge)
6	Spare (always 0)
7	Command Error

**143. FPP\_WW\_STATUS**

Position: Byte 239

Length: 8 Bits

Description: Wedge wheel status

Bit #	Description
0	READY; Completed previous operation; Waiting for new command
1	Electrical Position Bit 0
2	Electrical Position Bit 1
3	Electrical Position Bit 2
4	Waiting to pass encoder position 0; Value is 0 after position 0 has been passed;
5	Command error
6	Step Mode
7	Spin Timer done

**144. FPP\_NB\_FW\_STATUS**

Position: Byte 240

Length: 8 Bits

Description: Wide Band Filter wheel status.

The bit definitions are as in 139.

**145. FPP\_NB\_SHTR\_STATUS**

Position: Byte 241

Length: 8 Bits

Description: Narrow Band Shutter status.

Bit #	Description
0	READY; Completed previous operation; Waiting for new command
1	Spare (always 0)
2	Command error
3	Step Mode
4	Encoder Channel A
5	Encoder Channel B
6	OPENOUT signal (Shutter open signal)
7	Spin Timer done

**146. FPP\_FM\_STATUS**

Position: Byte 242

Length: 8 Bits

Description: Focus Mechanism status.

Bit #	Description
0	READY; Completed previous operation; Waiting for new command
1	Hall sensor bit 0
2	Hall sensor bit 1
3	Hall sensor bit 2
4	Increment Limit (0 at edge)
5	Decrement Limit (0 at edge)
6	Spare (always 0)
7	Command Error

**147. FPP\_TF\_MTR1\_STATUS**

Position: Byte 243

Length: 8 Bits

Description: Tunable filter motor 1 status

Bit #	Description
0	READY; Completed previous operation; Waiting for new command
1	Electrical Position Bit 0
2	Electrical Position Bit 1
3	Electrical Position Bit 2
4	Waiting to pass encoder position 0; Value is 0 after position 0 has been passed;



5	Command error
6	Step Mode
7	Spin Timer done

**148. FPP\_TF\_MTR2\_STATUS**

Position: Byte 244

Length: 8 Bits

Description: Tunable filter motor 2 status  
(For status bit definition see 147)**149. FPP\_TF\_MTR3\_STATUS**

Position: Byte 245

Length: 8 Bits

Description: Tunable filter motor 3 status  
(For status bit definition see 147)**150. FPP\_TF\_MTR4\_STATUS**

Position: Byte 246

Length: 8 Bits

Description: Tunable filter motor 4 status  
(For status bit definition see 147)**151. FPP\_TF\_MTR5\_STATUS**

Position: Byte 247

Length: 8 Bits

Description: Tunable filter motor 5 status  
(For status bit definition see 147)**152. FPP\_TF\_MTR6\_STATUS**

Position: Byte 248

Length: 8 Bits

Description: Tunable filter motor 6 status  
(For status bit definition see 147)**153. FPP\_TF\_MTR7\_STATUS**

Position: Byte 249

Length: 8 Bits

Description: Tunable filter motor 7 status  
(For status bit definition see 147)

**154. FPP\_TF\_MTR8\_STATUS**

Position: Byte 250  
 Length: 8 Bits  
 Description: Tunable filter motor 8 status  
 (For status bit definition see 147)

**155. FPP\_PMU\_STATUS**

Position: Byte 251  
 Length: 8 Bits  
 Description: PMU wheel status

Bit field	Description
0 – 3	PMU State machine state
4	No motor present
5	Run Open loop (PWM control disabled)
6	Command Error
7	Always 0

**156. FPP\_PMU\_GAIN\_OFFSET**

Position: Byte 252  
 Length: 8 Bits  
 Description: PMU gain ( Bits, 4:7) and Offset ( Bits, 0:3).

**157. FPP\_PMU\_DELAY**

Position: Byte 253  
 Length: 8 Bits  
 Description: Delay between PMU hexadecimal phase and the camera sync pulse. The range is 0 – 254 (0 to 0xFE) in 390 micro-second increments.

**158. FPP\_PMU\_DUTYCYCLE**

Position: Byte 254  
 Length: 8 Bits  
 Description: PMU Pulse Width Modulation duty cycle

**159. FPP\_BFI\_SHT\_OPN\_OBT**

Position: Bytes 255 – 257  
 Length: 24 Bits  
 Description: The wide band shutter open time in units of 4 micro-seconds.

**160. FPP\_NFI\_SHT\_OPN\_OBT**

Position: Bytes 258 – 260  
 Length: 24 Bits

Description: The narrow band shutter open time in units of 4 micro-seconds.

**161. FPP\_BFI\_SHT\_CLS\_OBT**

Position: Bytes 261 – 263

Length: 24 Bits

Description: The wide band shutter close time in units of 4 micro-seconds.

**162. FPP\_NFI\_SHT\_OPN\_OBT**

Position: Bytes 264 – 266

Length: 24 Bits

Description: The wide narrow band shutter close time in units of 4 micro-seconds.

**163. FPP\_SPIN\_TIME**

Position: Bytes 267 – 268

Length: 16 Bits

Description: The spin time, in units of 64 micro-seconds, for the last motor for which the spin time was read.

**164. FPP\_ANALOG\_GND\_SYS**

Position: Bytes 269.0 – 270.3

Length: 12 Bits

Description: +3.3V System analog ground Voltage

MSB							LSB	MSB							LSB
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
Byte 269							Byte 270								
FPP_ANALOG_GND_SYS															

Pattern A

**165. FPP\_HK\_P5V**

Position: Bytes 270.4 – 271.7

Length: 12 Bits

Description: +5V Monitor Voltage

MSB							LSB	MSB							LSB
0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
Byte 270							Byte 271								

				FPP_HK_P5V
--	--	--	--	------------

Pattern B

**166. FPP\_HK\_P15V**

Position: Bytes 272:(0-7) – 273:(0:3)

Length: 12 Bits

Description: +15V Monitor Voltage.

The bit field is arranged as in Pattern A (See FPP\_ANALOG\_GND\_SYS).

**167. FPP\_HK\_N15V**

Position: Bytes 273:(4-7) – 274:(0:7)

Length: 12 Bits

Description: -15V Monitor Voltage

The bit field is arranged as in Pattern B (See FPP\_HK\_P5V).

**168. FPP\_P5V\_SYS**

Position: Bytes 275:(0-7) – 276:(0:3)

Length: 12 Bits

Description: +5V System Voltage

The bit field is arranged as in Pattern A (See FPP\_ANALOG\_GND\_SYS).

**169. FPP\_P15V\_SYS**

Position: Bytes 276:(4-7) – 277:(0-7)

Length: 12 Bits

Description: +15V System Voltage

The bit field is arranged as in Pattern B (See FPP\_HK\_P5V).

**170. FPP\_N15V\_SYS**

Position: Bytes 278:(0-7) – 279:(0-3)

Length: 12 Bits

Description: -15V System Voltage

The bit field is arranged as in Pattern A (See FPP\_ANALOG\_GND\_SYS).

**171. FPP\_P3V\_SYS**

Position: Bytes 279 – 280

Length: 12 Bits

Description: +3.3V System Voltage

The bit field is arranged as in Pattern B (See FPP\_HK\_P5V).

**172. FPP\_P15V\_MECH**

Position: Bytes 281 – 282

Length: 12 Bits

Description: +15V Mechanism Voltage

The bit field is arranged as in Pattern A (See FPP\_ANALOG\_GND\_SYS).

**173. FPP\_P15V\_MECH\_CUR**

Position: Bytes 282 – 283

Length: 12 Bits

Description: +15V Mechanism Current

The bit field is arranged as in Pattern B (See FPP\_HK\_P5V).

**174. FPP\_P5V\_CCD**

Position: Bytes 284 – 285

Length: 12 Bits

Description: +5V CCD Voltage

The bit field is arranged as in Pattern A (See FPP\_ANALOG\_GND\_SYS).

**175. FPP\_P15V\_CCD**

Position: Bytes 285 – 286

Length: 12 Bits

Description: +15V CCD Voltage

The bit field is arranged as in Pattern B (See FPP\_HK\_P5V).

**176. 192. FPP\_N15V\_CCD**

Position: Bytes 287 – 288

Length: 12 Bits

Description: -15V CCD Voltage

The bit field is arranged as in Pattern A (See FPP\_ANALOG\_GND\_SYS).

**177. FPP\_P36V\_CCD**

Position: Bytes 288 – 289

Length: 12 Bits

Description: +36V CCD Voltage

The bit field is arranged as in Pattern B (See FPP\_HK\_P5V).

**178. FPP\_P30V\_HTR**

Position: Bytes 290 – 291

Length: 12 Bits

Description: +30V CCD Heater Voltage

The bit field is arranged as in Pattern A (See FPP\_ANALOG\_GND\_SYS).

**179. FPP\_P28V\_PRI\_CUR**

Position: Bytes 291 – 292

Length: 16 Bits

Description: +28V Primary Current

The bit field is arranged as in Pattern B (See FPP\_HK\_P5V).

**180. FPP\_FOCUS\_MON**

Position: Bytes 293 – 294

Length: 12 Bits

Description: Focus mechanism current monitor

The bit field is arranged as in Pattern A (See FPP\_ANALOG\_GND\_SYS).

**181. FPP\_SCAN\_MON**

Position: Bytes 294 – 295

Length: 12 Bits

Description: FPP Slit scan current monitor

The bit field is arranged as in Pattern B (See FPP\_HK\_P5V).

**182. FPP\_P30V\_CCDHTR\_CUR**

Position: Bytes 296 – 297

Length: 12 Bits

Description: +30V CCD Heater Current

The bit field is arranged as in Pattern A (See FPP\_ANALOG\_GND\_SYS).

**183. FPP\_OPHTR1\_DC**

Position: Bytes 298

Length: 8 Bits

Description: Op Heater Zone 1 duty cycle. Heater duty cycle while the temperature is between the low and high dead band temperatures. The duty cycle resolution is 1%.

**184. FPP\_OPHTR1\_DB\_HI**

Position: Bytes 299

Length: 8 Bits

Description: Op Heater Zone 1 dead band high. Above this temperature the heater is turned off. The units are in degrees Celcius.

**185. FPP\_OPHTR1\_DB\_LO**

Position: Bytes 300

Length: 8 Bits

Description: Op Heater Zone 1 dead band low. Below this temperature the heater is turned on continuously. The units are in degrees Celcius.

**186. FPP\_OPHTR2\_DC**

Position: Byte 301

Length: 8 Bits

Description: Op Heater Zone 2 duty cycle. Heater duty cycle while the temperature is between the low and high dead band temperatures. The duty cycle resolution is 1%.

**187. FPP\_OPHTR2\_DB\_HI**

Position: Byte 302

Length: 8 Bits

Description: Op Heater Zone 2 dead band high. Above this temperature the heater is turned off.

The units are in degrees Celcius.

**188. FPP\_OPHTR2\_DB\_LO**

Position: Byte 303

Length: 8 Bits

Description: Op Heater Zone 2 dead band low. Below this temperature the heater is turned on continuously. The units are in degrees Celcius.

**189. FPP\_OPHTR3\_DC**

Position: Bytes 304

Length: 8 Bits

Description: Op Heater Zone 3 duty cycle. Heater duty cycle while the temperature is between the low and high dead band temperatures. The duty cycle resolution is 1%.

**190. FPP\_OPHTR3\_DB\_HI**

Position: Bytes 305

Length: 8 Bits

Description: Op Heater Zone 3 dead band high. Above this temperature the heater is turned off. The units are in degrees Celcius.

**191. FPP\_OPHTR3\_DB\_LO**

Position: Bytes 306

Length: 8 Bits

Description: Op Heater Zone 3 dead band low. Below this temperature the heater is turned on continuously. The units are in degrees Celcius.

**192. FPP\_OPHTR4\_DC**

Position: Byte 307

Length: 8 Bits

Description: Op Heater Zone 4 duty cycle. Heater duty cycle while the temperature is between the low and high dead band temperatures. The duty cycle resolution is 1%.

**193. FPP\_OPHTR4\_DB\_HI**

Position: Byte 308

Length: 8 Bits

Description: Op Heater Zone 4 dead band high. Above this temperature the heater is turned off. The units are in degrees Celcius.

**194. FPP\_OPHTR4\_DB\_LO**

Position: Byte 309

Length: 8 Bits

Description: Op Heater Zone 4 dead band low. Below this temperature the heater is turned on continuously. The units are in degrees Celcius.

**195. FPP\_SP\_CCDHTR\_DC**

Position: Byte 310

Length: 8 Bits

Description: SP CCD Heater duty cycle. The duty cycle resolution is 5%. Any value below 5% will result in 0% duty cycle.

**196. FPP\_SP\_CCDHTR\_DB\_HI**

Position: Byte 311

Length: 8 Bits

Description: SP CCD Heater dead band high. The units are in degrees Celcius.

**197. FPP\_SP\_CCDHTR\_DB\_LO**

Position: Byte 312

Length: 8 Bits

Description: SP CCD Heater dead band low. The units are in degrees Celcius.

**198. FPP\_FG\_CCDHTR\_DC**

Position: Byte 313

Length: 8 Bits

Description: FG CCD Heater duty cycle. The duty cycle resolution is 5%. Any value below 5% will result in 0% duty cycle.

**199. FPP\_FG\_CCDHTR\_DB\_HI**

Position: Byte 314

Length: 8 Bits

Description: FG CCD Heater dead band high. The units are in degrees Celcius.

**200. FPP\_FG\_CCDHTR\_DB\_LO**

Position: Byte 315

Length: 8 Bits

Description: FG CCD Heater dead band low. The units are in degrees Celcius.



**201. FPP\_SP\_CAM\_TEMP**

Position: Bytes 316 – 317  
 Length: 12 Bits  
 Description: Spectrograph Camera temperature

Position: Bytes 316 – 317  
 Length: 12 Bits  
 Description: Spectrograph Camera temperature  
 Start Byte: 316  
 Offset: 4

The data base specifies the start byte and offset from the LS bit.  
 Hence, for FPP\_SP\_CAM, the start byte is 316 and offset is 4.

Temperature Data Layout pattern A.  
 Data Format in RAD6K

MSB	Byte 317		LSB	MSB	Byte 316		LSB
0		1		0		1	
xxxxxxxxxxxxxxxxxxxxxxxxxxxx			FPP_SP_CAM_TEMP				

Data received in EGSE

MSB	Byte 316		LSB	MSB	Byte 317		LSB
0		1		0		1	
FPP_SP_CAM_TEMP (Lo 8 Bits)				xxxxxxxxxxxxxxxxxxxxxxxxxxxx		FPP_SP_CAM_TEMP (Hi 4 Bits)	

**202. FPP\_FG\_CAM\_TEMP**

Position: Bytes 317 – 318  
 Length: 12 Bits  
 Description: Filtergraph Camera temperature

Start Byte: 317  
 Offset: 0

Temperature Data Layout Pattern B.  
 Data Format in RAD6K

MSB	Byte 318		LSB	MSB	Byte 317		LSB
	0	1		0	1		
FPP_FG_CAM_TEMP						xxxxxxxxxxxxxxxxxxxxxxxx	

Data received in EGSE

MSB	Byte 317		LSB	MSB	Byte 318		LSB
	0	1		0	1		
FPP_FG_CAM_TEMP (Lo 4 Bits)		xxxxxxxxxxxxxxxxxxxxxxxx		FPP_FG_CAM_TEMP (Hi 8 Bits)			

**203. FPP\_CT\_CAM\_TEMP**

Position: Bytes 319 – 320

Length: 12 Bits

Description: Filtergraph Camera temperature.

Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**204. FPP\_PWR\_HC\_TEMP**

Position: Bytes 320 – 321

Length: 12 Bits

Description: FPP PWR Hot Component Temperature.

Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**205. FPP\_PWR\_IF\_TEMP**

Position: Bytes 322 – 323

Length: 12 Bits

Description: FPP PWR Interface Temperature

Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**206. FPP\_E\_HW\_TEMP**

Position: Bytes 323 – 324

Length: 12 Bits

Description: FPP-E Hot Wall Temperature

Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**207. FPP\_PWR\_HW\_TEMP**

Position: Bytes 325 – 326

Length: 12 Bits

Description: FPP PWR Hot Wall Temperature

Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**208. FPP\_E\_CPU\_TEMP**

Position: Bytes 326 – 327

Length: 12 Bits

Description: FPP CPU Board Temperature

Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**209. FPP\_E\_IF\_TEMP**

Position: Bytes 328 – 329

Length: 12 Bits

Description: FPP-E Interface Temperature

Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**210. FPP\_STR1\_TEMP**

Position: Bytes 329 – 330

Length: 12 Bits

Description: Structure 1 Temperature

Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**211. FPP\_STR2\_TEMP**

Position: Bytes 331 – 332

Length: 12 Bits

Description: Structure 2 Temperature

Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**212. FPP\_STR3\_TEMP**

Position: Bytes 332 – 333

Length: 12 Bits

Description: Structure 3 Temperature

Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**213. FPP\_STR4\_TEMP**

Position: Bytes 334 – 335

Length: 12 Bits

Description: Structure 4 temperature

Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**214. FPP\_POS\_Y\_WALL\_TMP1**

Position: Bytes 335 – 336

Length: 12 Bits

Description: Pos Y Wall 1 temperature

Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**215. FPP\_POS\_Y\_WALL\_TMP2**

Position: Bytes 337 – 338

Length: 12 Bits

Description: Pos Y Wall 2 temperature

Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**216. FPP\_NEG\_Y\_WALL\_TMP1**

Position: Bytes 338 – 339

Length: 16 Bits

Description: Neg Y Wall 1 temperature

Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**217. FPP\_NEG\_Y\_WALL\_TMP2**

Position: Bytes 339 – 340

Length: 16 Bits

Description: Neg Y Wall 2 temperature

Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**218. FPP\_TF\_ELM1\_TEMP**

Position: Bytes 341 – 342

Length: 12 Bits

Description: Tunable Filter Element 1 temperature

Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**219. FPP\_TF\_ELM2\_TEMP**

Position: Bytes 342 – 343

Length: 12 Bits

Description: Tunable Filter Element 2 temperature

Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**220. FPP\_TF\_ELM3\_TEMP**

Position: Bytes 344 – 345

Length: 12 Bits

Description: Tunable Filter Element 3 temperature

Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**221. FPP\_TF\_ELM4\_TEMP**

Position: Bytes 345 – 346  
Length: 12 Bits  
Description: Tunable Filter Element 4 temperature  
Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**222. FPP\_TF\_ELM5\_TEMP**

Position: Bytes 346 – 347  
Length: 12 Bits  
Description: Tunable Filter Element 5 temperature  
Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**223. FPP\_TF\_ELM6\_TEMP**

Position: Bytes 348 – 349  
Length: 12 Bits  
Description: Tunable Filter Element 6 temperature  
Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**224. FPP\_TF\_ELM7\_TEMP**

Position: Bytes 350 – 351  
Length: 12 Bits  
Description: Tunable Filter Element 7 temperature  
Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**225. FPP\_TF\_ELM8\_TEMP**

Position: Bytes 352 – 353  
Length: 12 Bits  
Description: Tunable Filter Element 8 temperature  
Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**226. FPP\_MEB\_TEMP**

Position: Bytes 353 – 354  
Length: 12 Bits  
Description: Wideband Filter wheel temperature  
Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**227. FPP\_WBFW\_TEMP**

Position: Bytes 355 – 356  
Length: 12 Bits  
Description: **Mechanism Electronics Box temperature**  
Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**228. FPP\_NBFW\_TEMP**

Position: Bytes 356 – 357  
Length: 12 Bits  
Description: Narrow Band Filter wheel temperature  
Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**229. FPP\_FOC\_TEMP**

Position: Bytes 358 – 359  
Length: 12 Bits  
Description: Reimaging Lens temperature  
Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**230. FPP\_HTDMP\_TEMP**

Position: Bytes 359 – 360  
Length: 12 Bits  
Description: Heat Dump temperature  
Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**231. FPP\_SLIT\_TEMP**

Position: Bytes 361 – 362  
Length: 12 Bits  
Description: Slit temperature  
Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**232. FPP\_MAIN\_BS\_TEMP**

Position: Bytes 362 – 363  
Length: 12 Bits  
Description: FPP Bore sight temperature  
Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**233. FPP\_SP\_CCD\_TEMP**

Position: Bytes 364 – 365  
Length: 12 Bits  
Description: SP CCD temperature  
Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**234. FPP\_FG\_CCD\_TEMP**

Position: Bytes 366 – 367  
Length: 12 Bits

Description: FG CCD Temperature  
 Format of the data is the same as for FPP\_FG\_CAM\_TEMP.

**235. FPP\_CT\_CCD\_TEMP**

Position: Bytes 367 – 368  
 Length: 12 Bits  
 Description: CT CCD Temperature  
 Format of the data is the same as for FPP\_SP\_CAM\_TEMP.

**236. FPP\_THERMAL\_STATE**

Position: Bytes 370 – 373  
 Length: 32 Bits  
 Description: This field indicates if the temperature was read using the high resolution or the low resolution A/D converter for each temperature monitor. If the bit is set the temperature was read using the low resolution converter. The order from bit 0 to bit 31 is the same as items, 204 – 235, inclusive.

No	Temp Monitor	Bit Position	Byte Position
1	FPP_MAIN_BS_TS	7	190
2	FPP_SLIT_TS	6	190
3	FPP_HTDMP_TS	5	190
4	FPP_FOC_TS	4	190
5	FPP_NBFW_TS	3	190
6	FPP_WBFW_TS	2	190
7	FPP_MEB_TS	1	190
8	FPP_TF8_TS	0	190
9	FPP_TF7_TS	7	191
10	FPP_TF6_TS	6	191
11	FPP_TF5_TS	5	191
12	FPP_TF4_TS	4	191
13	FPP_TF3_TS	3	191
14	FPP_TF2_TS	2	191
15	FPP_TF1_TS	1	191
16	FPP_NEG_Y2_TS	0	191
17	FPP_NEG_Y1_TS	7	192
18	FPP_POS_Y2_TS	6	192
19	FPP_POS_Y1_TS	5	192
20	FPP_STR4_TS	4	192
21	FPP_STR3_TS	3	192
22	FPP_STR2_TS	2	192
23	FPP_STR1_TS	1	192

24	FPP_E_IF_TS	0	192
25	FPP_E_CPU_TS	7	193
26	FPP_PWR_HW_TS	6	193
27	FPP_W_HW_TS	5	193
28	FPP_PWR_IF_TS	4	193
29	FPP_PWR_HC_TS	3	193
30	FPP_CT_CAM_TS	2	193
31	FPP_FG_CAM_TS	1	193
32	FPP_SP_CAM_TS	0	193

**237. FPP\_OPHTR1\_STAT**

Position: Byte 374

Length: 8 Bits

Description: Op Heater Zone 1 status

Bit #	Description
0	1-> Htr Power On; 0-> Htr Pwr Off
1	1-> DC Ctrl Enabled; 0-> DC Ctrl Disabled
2	1-> Temp <= DB_Low; 0-> Temp > DB_Low
3	1-> Temp >= DB_High; 0-> Temp < DB_High
4 – 7	Temperature Monitor Channel

**238. FPP\_OPHTR2\_STAT**

Position: Byte 375

Length: 8 Bits

Description: Op Heater Zone 2 status

Format is as shown for FPP\_OPHTR1\_STAT.

**239. FPP\_OPHTR3\_STAT**

Position: Byte 376

Length: 8 Bits

Description: Op Heater Zone 3 status

Format is as shown for FPP\_OPHTR1\_STAT.

**240. FPP\_OPHTR4\_STAT**

Position: Byte 377

Length: 8 Bits

Description: Op Heater Zone 4 status

Format is as shown for FPP\_OPHTR1\_STAT.

**241. FPP\_FG\_CCDHTR\_STAT**

Position: Byte 378



Length: 8 Bits

Description: FG CCD Heater status

Format is as shown for FPP\_OPHTR1\_STAT.

**242. FPP\_SP\_CCDHTR\_STAT**

Position: Byte 379

Length: 8 Bits

Description: SP CCD Heater status

Format is as shown for FPP\_OPHTR1\_STAT.

## Appendix A – Error Codes

Messages that aren't really errors, are assigned codes greater than 0x8000. These do not increment the error count but they increment the message counter.

```
#definePRINTF_ERR 0x8001 // a printf in code
#defineMARGIN_VIOLATION_ERR 0x002 // margin zone got zapped

/* FG errors, task fg_obs and calls */
#defineFG_LOCK_ERR 0x101 // couldn't lock the FG devices
#defineFG_UNLOCK_ERR 0x102 // couldn't unlock the FG devices
#defineFG_NO_SUCH_FDB_ERR 0x103 // error in finding FDB
#defineFG_BAD_SYCN_OBS_ID_ERR 0x104 // bad synch in FG table
#defineFG_NO_SUCH_OBS_ID_ERR 0x105 // failure finding FG obs table for ID
#defineFG_ILLEGAL_MASK_ERR 0x106 // out of range mask position
#defineFG_NO_SUCH_GENFUNC_ERR 0x107 // no such gen function supported
#defineFG_BAD_OFFSET_OBS_ERR 0x108 // offset and nsize disagree in obs table
#defineFG_SHUTTER_START_ERR 0x109 // timed out on shutter start semaphore
#defineFG_INTEG_START_ERR 0x110 // timed out on integrate start semaphore
#defineFG_SHUTTER_CLOSE_ERR 0x111 // timed out on shutter close semaphore
#defineFG_TRANSFER_TOUT_ERR 0x112 // timed out waiting for transfer permission
#defineFG_EXPOSE_TOUT_ERR 0x113 // timed out waiting for expose semaphore

/* FG_LAST_READ_TOUT_ERR now a message */
#defineFG_LAST_READ_TOUT_ERR 0x8114 // waiting for previous FG to output
#defineFG_TUNABLE_FLT_ERR 0x115 //
#defineFG_BAD_IMAGE_NUM_ERR 0x116 // inappropriate # of images for a FG
#defineFG_PMU_START_STATE_ERR 0x117 // new set but PMU state still active
#defineFG_B_FILTER_TOUT_ERR 0x118 // a timeout on BFI filter wheel
#defineFG_N_FILTER_TOUT_ERR 0x119 // a timeout on NFI filter wheel
#defineFG_FILTER_NUM_ERR 0x120 // an illegal filter wheel position requested
#defineFG_SM_ZERO_ERR 0x121 // zero words in smart memory
#defineFG_SM_IMPOSSIBLE_ERR 0x122 // impossible error involving SM, see code
#defineFG_LOST_PENDING_ERR 0x124 // a pending FG macro was replaced by new one
#defineFG_BUFFER_TOUT_ERR 0x125 // timeout in check_fg_buf
#defineFG_BAD_FRAME_CNT_ERR 0x126 // sequence frame count out of range
#defineFG_BAD_PACKET_CNT_ERR 0x127 // sequence packet count out of range
#defineFG_RAW_FG_BUSY_ERR 0x128 // can't rawFGpacket because output is busy
#defineFG_RAW_SM_READ_ERR 0x129 // smemsize <= 1 for raw FG packet
#defineFG_RAW_SM_SIZE_ERR 0x130 // raw FG packet has 0 or illegal size
#defineFG_TOO_MANY_PACKETS_ERR 0x131 // error in output packet count
#defineFG_RAW_SM_BAD_DATA_ERR 0x132 // raw FG packet, bad status from getData
#defineFG_RAW_EMIT_PACKET_ERR 0x133 // raw FG packet, bad status from
emitPacket_SP
#defineFG_ILLEGAL_COMP_ERR 0x134 // illegal compression choice
#defineFG_BAD_NPAGES_ERR 0x135 // pages not 1 for full readout
#defineFG_SHORT_NPAGES_ERR 0x136 // readout short for full camera
```

```

#defineFG_PMU_SANITY_ERR      0x137 // FG PMU obs failed sanity count
#defineFG_SHUTTERLESS_ERR    0x138 // error in FG shutterless observation
#defineFG_MASK_TOUT_ERR      0x139 // timeout for mask motion
#defineFG_BAD_FOCUS_SCAN_RANGE 0x140 // bad focus range would hit stop
#defineFG_FOCUS_SCAN_TOUT    0x141 // timeout for focus motor
#defineFG_TF_MOTOR_TOUT      0x142 // timeout for TF motor
#defineFG_WAVE_CNT_ERR       0x143 // wave scan count too high
#defineFG_NOT_NARROWBAND_ERR 0x144 // wave scan received a broad band
#defineFG_LINE_NOT_UPDATABLE 0x145 // illegal attempt to update a line
#defineFG_SM_READ_ERR        0x146 // smart memory read error
#defineFG_SM_SHORT_ERR       0x147 // smart memory shortfall
#defineFG_SM_LONG_ERR        0x148 // smart memory length exceeds limit
#defineFG_BAD_TABLE_ERR      0x149 // bad table for a shutterless FG
#defineFG_RATIO_MISMATCH_ERR 0x150 // mismatched reads for ratio
#defineFG_BUGINRHS_ERR       0x151 // bug in sub-image RHS
#defineFG_BUGINLHS_ERR       0x152 // bug in sub-image LHS
#defineFG_SHUTTERLESS_TOUT_ERR 0x153 // timeout waiting for PMU state machine
#defineFG_SIDE_ERR           0x154 // side consistency error in sendFGhkPacket
/* FG_HK_TOUT_ERR is now a message */
#defineFG_HK_TOUT_ERR        0x8155 // waiting for last HK Packet
#defineFG_SIDE_CONFIG_ERR    0x156 // side consistency error from smem config
#defineFG_EMI_ERR           0x157 // attempt to run obsolete EMI macro command
#defineFG_PMU_BUF_OVRF_ERR   0x158 // overflow in the PMU image header buffer
#defineFG_EXP_BUF_OVRF_ERR   0x158 // overflow in the shuttered header buffer
#defineFG_BAD_MC             0x159 // bad macro command detected
#defineFG_BAD_FRAME_CNT_ERR  0x160 // sequence frame count out of range
#defineFG_GEN_FUNC_ERR       0x161 // generating function returned with an
error
#defineFG_GEN_STOP_ERR       0x162 // generating function returned because
of STOP
#defineFG_BAD_CUTOUT_ERR     0x163 // bad image cutout, should not happen
#defineFG_BAD_4BUF_CUTOUT_ERR 0x164 // bad image cutout for 4 buffer mode
/* SP errors, task sp_obs and calls */
#defineSP_LOCK_ERR           0x201 // couldn't lock the SP devices
#defineSP_UNLOCK_ERR        0x202 // couldn't unlock the SP devices
#defineSP_EXTRACT_SIZE_ERR   0x203 // bad extract table
#defineSP_PMU_START_STATE_ERR 0x204 // new set but PMU state still active
#defineSP_FRAME_SYNC_ERR     0x205 // problem with first camera reads
#defineSP_ACCUM_TOUT_ERR     0x206 //
#defineSP_SLIT_TOUT_ERR      0x207 // slit timed out
#defineSP_TOO_MANY_PACKETS_ERR 0x208 // error in output packet count
#defineSP_SIDE_ERR          0x209 // side consistency error in outputSP
#defineSP_HK_ERR            0x210 // problem with HK packet in outputSP
#defineSP_MEM_SIZE_ERR       0x211 // not expected amount of smart memory
#defineSP_I_BUG_ERR         0x212 // bug in SP I image
#defineSP_SM_SHORT_ERR       0x213 // smart memory shortfall
#defineSP_SM_READ_ERR        0x214 // smart memory read error
#defineSP_SM_COLUMN_ERR      0x215 // smart memory column is too small
#defineSP_EMIT_PACKET_ERR    0x216 // error in emitPacket_SP

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#define SP_RAW_SP_BUSY_ERR    0x217 // can't rawSPpacket because outputSP_busy is
on
#define SP_RAW_SM_READ_ERR    0x218 // smemsize <= 1 for raw SP packet
#define SP_RAW_SM_SIZE_ERR    0x219 // raw SP packet has 0 or illegal size
#define SP_RAW_SM_BAD_DATA_ERR 0x220 // raw SP packet, bad status from getData
#define SP_RAW_EMIT_PACKET_ERR 0x221 // raw SP packet, bad status from
emitPacket_SP
/* SP_OUTPUT_TOUT_ERR now a message */
#define SP_OUTPUT_TOUT_ERR    0x8222 // waiting for previous SP output
#define SP_LOST_PENDING_ERR   0x223 // a pending SP macro was replaced by new one
#define SP_BAD_FRAME_CNT_ERR  0x224 // sequence frame count out of range
#define SP_BAD_PACKET_CNT_ERR 0x225 // sequence packet count out of range
#define SP_SLIT_SETUP_ERR     0x226 // slit problem in setup
#define SP_SLIT_WAIT_ERR     0x227 // slit problem in setup
#define SP_REF_UPDATE_ERR     0x228 // timeout getting ref update semaphore
#define SP_IMAGE_BUF_OVRF_ERR 0x229 // overflow in the image header buffer
#define SP_SLIT_LOST_ERR     0x230 // expected and encoder position differ > 5
#define SP_BAD_FRAME_CNT_ERR  0x231 // mismatch with expected frame count
#define SP_SPCrash_ERR       0x232 // SPcrash recovery called

/* CMTask errors, use code 3 */

#define CM_INV_OPCODE_ERR     0x0302 // invalid opcode
#define CM_CMD_LEN_ERR        0x0303 // inconsistent command length
#define CM_INV_LEN_ERR        0x0304 // invalid command length (doesn't match
data base)
#define CM_CR_CMD_DIS_ERR     0x0305 // error in critical command enable
#define CM_DUMP_BUSY_ERR     0x8306 // IDLE != DumpBlk.dumpStatus()
#define CM_DIAG_CMD_ERR       0x8307 // not used?
#define CM_MEMLD_ADR_ERR      0x0308 // FPP_UPLOAD_EEPROM, bad address
#define CM_TOO_MANY_CHANS_ERR 0x8309 // too many diagnostic channels
#define CM_TIMEOUT_ERR        0x8310 // no command for 6 seconds (FEP down?)
#define CM_HRDUMP_ERR         0x0311 // Error in dumping data via high rate
#define CM_CMDLEN_GT_133      0x0312 // command received length is greater than
133 bytes

/* CT errors, use code 6 */
#define CT_NO_JITTER_BUF_ERR  0x601 // no buffer available for jitter output
#define CT_NO_AUGJITTER_BUF_ERR 0x602 // no buffer available for augmented
jitter output
/* CT_ALIVE_ERR now a message */
#define CT_ALIVE_ERR          0xA603 // not really an error, CT just came alive
#define CT_DIED_ERR           0x604 // watcher noticed that CT is dead
#define CT_LIVE_NOTSENT_ERR    0x605 // a ready live CT image not sent
#define CT_REF_NOTSENT_ERR     0x606 // a ready ref CT image not sent
#define CT_REF_REJECT_ERR      0x607 // a ref CT image had bad line count
#define CT_LIVE_REJECT_ERR     0x608 // a live CT image had bad line count
#define CT_FRAME_CNT_ERR       0x609 // bad CT frame counts, DMA mismatch?
#define CT_SHORT_INTERVAL_ERR  0x610 // a short interval since last CT interrupt
#define CT_LONG_INTERVAL_ERR   0x611 // a very long interval since last CT interrupt

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#defineCT_PMU_SYNCH_ERR      0x612  // a PMU isr request not processed in time
#defineCT_NOT_ALIVE_ERR     0x613  // a CT cmd refused because CT is not running
#defineCT_NOT_ON_ERR        0x614  // a CT cmd refused because CT is not even on

/* MC error, use code 8 */
#define MC_PMU_PHASE_ERR    0x0801  // PMU phase does not match expected phase
#define MC_INV_DEVNUM_ERR   0x0802  // Invalid device number (> 16)
#define MC_INV_CMD_ERR      0x0803  // Unrecognized motor command,
p1=opcode,p2=motor type
#define MC_INV_DEVTYP_ERR   0x0804  // Invalid device type
#define MC_INV_PRM_ERR      0x0805  // Invalid
parameter,p1=devtype,p2=prm#,p3,p4=inv prms
#define MC_DEV_ERR          0x0806  // device error (locked ?)
#define MC_BAD_SLIT_ERR     0x0807  // bad state when entering move method
#define MC_PTR_CORRUPTED    0x0808  // Linear motor pointer corrupted
#define MC_LINMTR_TOUT_ERR  0x0809  // timeout while stepping linear motor
#define MC_SSC_TIMEOUT      0x080A  // timeout during slit centering operation
#define MC_SS_CENTERED      0x8801  // Slit Scan Mechanism Centered

/* data product errors, use code 32 (20 hex) */
#defineDI_NO_DIAG_BUF_ERR   0x2001  // no buffer available for diagnostics output
#defineDI_ALREADY_ON_ERR    0xA002  // a diagnostic mode already in progress
#defineDI_NO_VALID_CHAN_ERR 0xA003  // no valid channel

/* CA errors, use code 16 (10 hex) */
#defineCA_DOEXP_BLOCKED_ERR 0x9001  // doExp blocked by a running macro command
#defineCA_DOEXP_FG_TOUT_ERR 0x1002  // FG doExp timed out on expose semaphore
#defineCA_DOEXP_SP_TOUT_ERR 0x1003  // SP doExp timed out on expose semaphore
#defineCA_FG_NOFFLAG_ERR    0x1004  // FG doExp timed out on frame flag
#defineCA_SP_NOFFLAG_ERR    0x1005  // SP doExp timed out on frame flag
#defineCA_BAD_CAMERA_ERR    0x9006  // the camera # is out of range
#defineCA_NO_SUCH_CMD_ERR   0x1007  // an invalid command
#defineCA_CAM_WAS_LOCKED_ERR 0x9008  // the requested camera was locked
#defineCA_ILLEGAL_CT_ERR    0x1009  // an illegal command for CT
#defineCA_ILLEGAL_CNFG_ERR  0x1010  // an illegal camera configuration
#defineCA_ILLEGAL_ROI_ERR   0x9011  // bad ROI start/stop combination
#defineCA_SHUTTER_CLOSE_ERR 0x1012  // timed out on shutter close semaphore
#defineCA_FG_PENDING_ERR    0x9013  // already a FG camera read pending?
#defineCA_SP_PENDING_ERR    0x9014  // already a SP camera read pending?
#defineCA_LOCK_ERR          0x9015  // camera command rejected because locked
#defineCA_FG_MACRO_LOCK_ERR 0x9016  // FG macro running
#defineCA_SP_MACRO_LOCK_ERR 0x9017  // SP macro running

/* OS uses code 10 (A hex) */
#defineOS_MACRO_SIZE_ERR    0x0A01  // unexpected macro command size

/* RF (Reference Frame Update) uses codes 0x0bxx */
#define RF_FRM_COUNT1_ERR   0x0b01  // Frame count did not change after 1000 checks
#define RF_FRM_COUNT2_ERR   0x0b02  // Frame count did not change after 1000 checks
#define RF_DN_LOW_ERR       0x0b03  // Image mean too low

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#define RF_OVERFLOW_ERR      0x0b04 // Sums Overflow error
#define RF_SRU_TIMEOUT_ERR   0x0b05 // Timed out waiting for semRefUpdate

/* smart memory, use code33 (hex 21) */
#define SMART_MEM_READ_ERR   0x2101 // smart memory read error
#define SMART_MEM_ALIGN_ERR  0x2102 // smart memory alignment error
#define SMART_MEM_DEST_ERR   0x2103 // smart memory destination error
#define SMART_MEM_COUNT_ERR  0x2104 // smart memory count error
#define SMART_MEM_ALIGN2_ERR 0x2105 // smart memory alignment 2 error
#define SMART_MEM_UNKNOWN_ERR 0x2106 // smart memory unknown error
#define SMART_MEM_SIDE_ERR   0x2107 // smart memory unknown error
#define SMART_MEM_RETRY_LMT_ERR 0x2108 // DMA could not be started after
5 tries
#define SMART_MEM_BUSY_ERR   0x2109 // DMA still active, retrying
#define SMART_MEM_INC_ERR    0x2110 // DMA incomplete or aborted
#define SMART_TOOLONG_ERR    0x2111 // not enough time for DMA
#define SMART_CMD_OVRFLW_ERR 0x2112 // too many command requests
#define SMART_CONFIG_ERR     0x2113 // config not successful
#define SMART_MEM_SYNC_ERR   0x2114 // command count changed in queue
#define SMART_MEM_CMD_ERR    0x2115 // timeout for a queued command
#define SMART_MEM_DEAD_DMA_ERR 0x2116 // timeout on Smart Memory DMA
#define SMART_MEM_ILLEGAL_ERR 0x2117 // illegal command in queue

/* heater/thermister errors, use code 14 hex */
#define BAD_DEADBAND_ERR     0x1401 // bad deadbands, lo > hi
#define THERM_READ_ERR      0x1402 // Bad thermister reading (0)
#define THERM_INDX_ERR      0x1403 // Bad thermister in alogMon

/* SCIF DMA and HK Errors */
#define DMA_RETRY_LMT_ERR    0x1901 // DMA could not be started after 10 tries
#define DMA_SRC_ADR_ERR     0x1902 // DMA source address error
#define DMA_DEST_ADR_ERR    0x1903 // DMA destination address error
#define DMA_MEMBASE_ERR     0x1904 // DMA base address error
#define DMA_BUSY_ERR        0x1905 // DMA still active, retrying
#define DMA_INCOMPLETE      0x1906 // DMA incomplete or aborted
#define DMA_REQ_TIMEOUT     0x1907 // Timed out waiting for semaphore
from dmaMg
#define DMA_CNT_ERR         0x1908 // Timed out waiting for semaphore from
dmaMg
#define DMA_SRC_RANGE_ERR   0x1909 // bad address in SCIF buffer
#define DMA_SRC_ALIGN_ERR   0x1910 // bad alignment in SCIF buffer
#define DMA_TOOLONG_ERR     0x1911 // not enough time for scif dma
#define DMA_STATE_ERR       0x1912 // mdState error, an internal error
#define SCIF_PREP_FILL_ERR  0x1913 // not enough time for scif dma
#define SCIF_DEAD_DMA_ERR   0x1914 // timeout on SCIF DMA
#define SCIF_SEND_SYNC_ERR  0x1915 // Sendflag was never cleared before next
/* make SCIF_DEAD_SEND_ERR a message */
#define SCIF_DEAD_SEND_ERR  0x9916 // timeout on SCIF Send
#define SCIF_HK_SIZE_ERR    0x1917 // bad size for HK packet
#define SCIF_HK_TIMEOUT_ERR 0x1918 // timeout for HK packet

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#define SCIF_HK_ALIGN_ERR      0x1919      // buffer alignment error
#define SCIF_HK_STATUS_ERR    0x1920      // HK SCIF status error
#define SCIF_SEND_LOCK_ERR    0x1921      // HK SCIF send lock error
#define HK_ANALOG_TIMEOUT_ERR  0x1922      // timeout in getAnalog
#define HK_SEMAPH_TIMEOUT_ERR  0x1923      // timeout in getAnalog semaphore
#define HK_BAD_RDYBIT_ERR     0x1924      // bit didn't zero in getAnalog

/* FPPCtrl Errors */
#define CTL_INV_ACTIVE_TASKS   0x1701      // The number of active tasks is < 21
#define CTL_TASK_SUSPENDED     0x1702      // Task has become suspended
#define EXC_ERROR              0x1721      // Exception error

/* dmaMg errors */
#define DMAMG_BEHIND_ERR       0xA201      // dmaMg counter lagging CT_Counter
#define DMAMG_AHEAD_ERR        0xA202      // dmaMg counter ahead of CT_Counter
#define DMAMG_MSG_ERR          0x2203      // dmaMg error with message receive
#define DMAMG_SEMAPHORE_ERR    0x2204      // dmaMg bad semaphore given or ?
#define DMAMG_TOOLONG_ERR      0xA205      // dmaMg delayed too long, skip this one

/* EEPROM Operation */
#define EEPROM_OP_OK           0x8000      // EEPROM operation completed OK
#define EEPROM_OP_ERR          0x8FFF      // EEPROM operation error

/* some debug messages */

#define DEBUG_MESSAGE_1        0xF001      // a message
#define DEBUG_MESSAGE_2        0xF002      // a message
#define DEBUG_MESSAGE_3        0xF003      // a message
#define DEBUG_MESSAGE_4        0xF004      // a message
#define DEBUG_MESSAGE_5        0xF005      // a message
#define DEBUG_MESSAGE_6        0xF006      // a message
#define DEBUG_MESSAGE_7        0xF007      // a message
#define DEBUG_MESSAGE_8        0xF008      // a message
#define DEBUG_MESSAGE_9        0xF009      // a message

```

## Appendix B – Alphabetical List of Status Items

1	<u>FPP_CTRL_SW_VER</u>	<u>28</u>
2	<u>FPP_AMBI_REG1</u>	<u>31</u>
3	<u>FPP_AMBI_STATUS:</u>	<u>23</u>
4	<u>FPP_ANALOG_GND_SYS</u>	<u>37</u>
5	<u>FPP_BFI_EXPDUR</u>	<u>27</u>
6	<u>FPP_BFI_FILT_POS</u>	<u>25</u>
7	<u>FPP_BFI_SHT_CLS_OBT</u>	<u>37</u>
8	<u>FPP_BFI_SHT_OPN_OBT</u>	<u>36</u>
9	<u>FPP_BFI_SHT_POS</u>	<u>26</u>
10	<u>FPP_CMD_COUNT:</u>	<u>14</u>

11	<u>FPP_CMD_LENGTH:</u>	<u>15</u>
12	<u>FPP_CMD_OPCODE:</u>	<u>15</u>
13	<u>FPP_CMD_STATUS:</u>	<u>14</u>
14	<u>FPP_COMM_SW_VER</u>	<u>28</u>
15	<u>FPP_CPU_ONLINE</u>	<u>28</u>
16	<u>FPP_CT_AVG_ERR_X:</u>	<u>22</u>
17	<u>FPP_CT_AVG_ERR_Y:</u>	<u>22</u>
18	<u>FPP_CT_CAM_CFG (Not Used)</u>	<u>31</u>
19	<u>FPP_CT_CAM_MODE (Not Used)</u>	<u>31</u>
20	<u>FPP_CT_CAM_STATUS (Not Used)</u>	<u>31</u>
21	<u>FPP_CT_CAM_TEMP</u>	<u>44</u>
22	<u>FPP_CT_CCD_CFG:</u>	<u>22</u>
23	<u>FPP_CT_CCD_DATA</u>	<u>22</u>
24	<u>FPP_CT_CCD_TEMP</u>	<u>48</u>
25	<u>FPP_CT_ERR_X</u>	<u>28</u>
26	<u>FPP_CT_ERR_Y</u>	<u>29</u>
27	<u>FPP_CT_LAST_CMD:</u>	<u>21</u>
28	<u>FPP_CT_MAX_ERR_X:</u>	<u>21</u>
29	<u>FPP_CT_MAX_ERR_Y:</u>	<u>21</u>
30	<u>FPP_CT_MODE:</u>	<u>12</u>
31	<u>FPP_CT_OFFSET_X</u>	<u>29</u>
32	<u>FPP_CT_OFFSET_Y</u>	<u>29</u>
33	<u>FPP_CT_PWR</u>	<u>23</u>
34	<u>FPP_CT_REFIMG_TIME:</u>	<u>22</u>
35	<u>FPP_CT_RNG_ERR_CNT</u>	<u>29</u>
36	<u>FPP_CT_SAT_ERR_CNT</u>	<u>29</u>
37	<u>FPP_CT_SW_VER</u>	<u>27</u>
38	<u>FPP_CTM_HRD_LIM_CNT</u>	<u>29</u>
39	<u>FPP_CTM_SFT_LIM_CNT</u>	<u>29</u>
40	<u>FPP_CTME_1ST_WORD:</u>	<u>21</u>
41	<u>FPP_CTME_2ND_WORD:</u>	<u>21</u>
42	<u>FPP_CTME_3RD_WORD:</u>	<u>21</u>
43	<u>FPP_DEV_STATUS:</u>	<u>24</u>
44	<u>FPP_DOP_VEL_RCV:</u>	<u>14</u>
45	<u>FPP_DOP_VEL_USED:</u>	<u>17</u>
46	<u>FPP_E_CPU_TEMP</u>	<u>44</u>
47	<u>FPP_E_HW_TEMP</u>	<u>44</u>
48	<u>FPP_E_IF_TEMP</u>	<u>44</u>
49	<u>FPP_ERR_CMD_COUNT</u>	<u>28</u>
50	<u>FPP_ERR_CODE:</u>	<u>12</u>
51	<u>FPP_ERR_COUNT:</u>	<u>13</u>
52	<u>FPP_ERR_PAR1:</u>	<u>13</u>
53	<u>FPP_ERR_PAR2:</u>	<u>13</u>
54	<u>FPP_ERR_PAR3:</u>	<u>13</u>
55	<u>FPP_ERR_PAR4:</u>	<u>13</u>
56	<u>FPP_ERR_TIME:</u>	<u>13</u>
57	<u>FPP_FG_CAM_CFG</u>	<u>30</u>



58	<u>FPP FG CAM TEMP</u>	<u>43</u>
59	<u>FPP FG CCD TEMP</u>	<u>48</u>
60	<u>FPP FG CCDHTR_DB_HI</u>	<u>42</u>
61	<u>FPP FG CCDHTR_DB_LO</u>	<u>42</u>
62	<u>FPP FG CCDHTR_DC</u>	<u>42</u>
63	<u>FPP FG CCDHTR_STAT</u>	<u>51</u>
64	<u>FPP FG DAC</u>	<u>31</u>
65	<u>FPP FG FDB_ID:</u>	<u>18</u>
66	<u>FPP FG FRAME_COUNT:</u>	<u>18</u>
67	<u>FPP FG MAIN_ID:</u>	<u>10</u>
68	<u>FPP FG OBS_COUNT:</u>	<u>17</u>
69	<u>FPP FG OBS_ID:</u>	<u>18</u>
70	<u>FPP FG OBSFRM_CNT:</u>	<u>18</u>
71	<u>FPP FG PIC_STATE:</u>	<u>17</u>
72	<u>FPP FG PROD_COUNT:</u>	<u>18</u>
73	<u>FPP FG PWR</u>	<u>23</u>
74	<u>FPP FG READY:</u>	<u>10</u>
75	<u>FPP FG ROI_END</u>	<u>30</u>
76	<u>FPP FG ROI_STRT</u>	<u>30</u>
77	<u>FPP FG STATE:</u>	<u>17</u>
78	<u>FPP FM STATUS</u>	<u>34</u>
79	<u>FPP FOC TEMP</u>	<u>47</u>
80	<u>FPP FOCUS_POS</u>	<u>26</u>
81	<u>FPP HK N15V</u>	<u>38</u>
82	<u>FPP HK P15V</u>	<u>38</u>
83	<u>FPP HK P5V</u>	<u>37</u>
84	<u>FPP HTDMP_TEMP</u>	<u>47</u>
85	<u>FPP HTR CNV</u>	<u>22</u>
86	<u>FPP LOBT_HI:</u>	<u>14</u>
87	<u>FPP LOBT_LO:</u>	<u>14</u>
88	<u>FPP_MAIN_BS_TEMP</u>	<u>48</u>
89	<u>FPP_MD_MAIN_ID:</u>	<u>16</u>
90	<u>FPP_MD_PKT_COUNT:</u>	<u>16</u>
91	<u>FPP_MD_PKT_Q_LEN: (Not Used)</u>	<u>16</u>
92	<u>FPP_MD_PKT_SIZE:</u>	<u>16</u>
93	<u>FPP_MD_Q_POS1: (Not Used)</u>	<u>16</u>
94	<u>FPP_MD_Q_POS2: (Not Used)</u>	<u>16</u>
95	<u>FPP_MD_Q_POS3: (Not Used)</u>	<u>16</u>
96	<u>FPP_MD_TLM_STATE:</u>	<u>16</u>
97	<u>FPP_ME_SPARE:</u>	<u>21</u>
98	<u>FPP_ME_STATE:</u>	<u>19</u>
99	<u>FPP_MEB_TEMP</u>	<u>47</u>
100	<u>FPP_MODE:</u>	<u>12</u>
101	<u>FPP_MW_STATUS</u>	<u>32</u>
102	<u>FPP_N15V_CCD</u>	<u>39</u>
103	<u>FPP_N15V_SYS</u>	<u>38</u>
104	<u>FPP_NB_FW_STATUS</u>	<u>34</u>

105	<u>FPP_NB_SHTR_STATUS</u>	<u>34</u>
106	<u>FPP_NBFW_TEMP</u>	<u>47</u>
107	<u>FPP_NEG_Y_WALL_TMP1</u>	<u>45</u>
108	<u>FPP_NEG_Y_WALL_TMP2</u>	<u>46</u>
109	<u>FPP_NFI_BLKFLT_POS</u>	<u>25</u>
110	<u>FPP_NFI_MASK_POS</u>	<u>25</u>
111	<u>FPP_NFI_SHT_EXPDUR</u>	<u>27</u>
112	<u>FPP_NFI_SHT_OPN_OBT</u>	<u>36</u>
113	<u>FPP_NFI_SHT_OPN_OBT</u>	<u>37</u>
114	<u>FPP_NFI_SHT_POS</u>	<u>26</u>
115	<u>FPP_NFI_TF_ELM1_POS</u>	<u>25</u>
116	<u>FPP_NFI_TF_ELM2_POS</u>	<u>25</u>
117	<u>FPP_NFI_TF_ELM3_POS</u>	<u>25</u>
118	<u>FPP_NFI_TF_ELM4_POS</u>	<u>25</u>
119	<u>FPP_NFI_TF_ELM5_POS</u>	<u>26</u>
120	<u>FPP_NFI_TF_ELM6_POS</u>	<u>26</u>
121	<u>FPP_NFI_TF_ELM7_POS</u>	<u>26</u>
122	<u>FPP_NFI_TF_ELM8_POS</u>	<u>26</u>
123	<u>FPP_OBS_SW_VER</u>	<u>27</u>
124	<u>FPP_OP_FLAGS:</u>	<u>13</u>
125	<u>FPP_OPHTR1_DB_HI</u>	<u>40</u>
126	<u>FPP_OPHTR1_DB_LO</u>	<u>40</u>
127	<u>FPP_OPHTR1_DC</u>	<u>40</u>
128	<u>FPP_OPHTR1_STAT</u>	<u>50</u>
129	<u>FPP_OPHTR2_DB_HI</u>	<u>40</u>
130	<u>FPP_OPHTR2_DB_LO</u>	<u>40</u>
131	<u>FPP_OPHTR2_DC</u>	<u>40</u>
132	<u>FPP_OPHTR2_STAT</u>	<u>50</u>
133	<u>FPP_OPHTR3_DB_HI</u>	<u>41</u>
134	<u>FPP_OPHTR3_DB_LO</u>	<u>41</u>
135	<u>FPP_OPHTR3_DC</u>	<u>41</u>
136	<u>FPP_OPHTR3_STAT</u>	<u>50</u>
137	<u>FPP_OPHTR4_DB_HI</u>	<u>41</u>
138	<u>FPP_OPHTR4_DB_LO</u>	<u>41</u>
139	<u>FPP_OPHTR4_DC</u>	<u>41</u>
140	<u>FPP_OPHTR4_STAT</u>	<u>50</u>
141	<u>FPP_P15V_CCD</u>	<u>39</u>
142	<u>FPP_P15V_MECH</u>	<u>38</u>
143	<u>FPP_P15V_MECH_CUR</u>	<u>38</u>
144	<u>FPP_P15V_SYS</u>	<u>38</u>
145	<u>FPP_P28V_PRI_CUR</u>	<u>39</u>
146	<u>FPP_P30V_CCDHTR_CUR</u>	<u>39</u>
147	<u>FPP_P30V_CCDHTR_CUR</u>	<u>40</u>
148	<u>FPP_P30V_HTR</u>	<u>39</u>
149	<u>FPP_P36V_CCD</u>	<u>39</u>
150	<u>FPP_P3V_SYS</u>	<u>38</u>
151	<u>FPP_P5V_CCD</u>	<u>39</u>

152	<u>FPP P5V_SYS</u>	<u>38</u>
153	<u>FPP PMP_REG1</u>	<u>32</u>
154	<u>FPP PMU_DELAY</u>	<u>36</u>
155	<u>FPP PMU_DUTYCYCLE</u>	<u>36</u>
156	<u>FPP PMU_GAIN_OFFSET</u>	<u>36</u>
157	<u>FPP PMU_MODE</u>	<u>27</u>
158	<u>FPP PMU_POS1:</u>	<u>11</u>
159	<u>FPP PMU_POS2:</u>	<u>11</u>
160	<u>FPP PMU_POS3:</u>	<u>11</u>
161	<u>FPP PMU_PWM_LMT_HI</u>	<u>24</u>
162	<u>FPP PMU_PWM_LMT_LO</u>	<u>24</u>
163	<u>FPP PMU_STATUS</u>	<u>36</u>
164	<u>FPP POS_Y_WALL_TMP1</u>	<u>45</u>
165	<u>FPP POS_Y_WALL_TMP2</u>	<u>45</u>
166	<u>FPP PWM_DC1:</u>	<u>11</u>
167	<u>FPP PWM_DC2:</u>	<u>11</u>
168	<u>FPP PWM_DC3:</u>	<u>11</u>
169	<u>FPP PWR_HC_TEMP</u>	<u>44</u>
170	<u>FPP PWR_HW_TEMP</u>	<u>44</u>
171	<u>FPP PWR_IF_TEMP</u>	<u>44</u>
172	<u>FPP PWR_ON_ENA</u>	<u>23</u>
173	<u>FPP QHSS_STATE1</u>	<u>31</u>
174	<u>FPP RESERVED</u>	<u>27</u>
175	<u>FPP_SC_TIME:</u>	<u>14</u>
176	<u>FPP_SCAN_MON</u>	<u>39</u>
177	<u>FPP_SCIF_STATE1</u>	<u>32</u>
178	<u>FPP_SCIF_STATUS:</u>	<u>23</u>
179	<u>FPP_SD_Q_STAT:</u>	<u>15</u>
180	<u>FPP_SD1_PKT_COUNT:</u>	<u>15</u>
181	<u>FPP_SD2_PKT_COUNT:</u>	<u>15</u>
182	<u>FPP_SD3_PKT_COUNT:</u>	<u>15</u>
183	<u>FPP_SD4_PKT_COUNT:</u>	<u>15</u>
184	<u>FPP_SLIT_TEMP</u>	<u>48</u>
185	<u>FPP_SLITSCN_POS</u>	<u>26</u>
186	<u>FPP_SP_CAM_CFG</u>	<u>30</u>
187	<u>FPP_SP_CAM_TEMP</u>	<u>42</u>
188	<u>FPP_SP_CCD_TEMP</u>	<u>48</u>
189	<u>FPP_SP_CCDHTR_DB_HI</u>	<u>42</u>
190	<u>FPP_SP_CCDHTR_DB_LO</u>	<u>42</u>
191	<u>FPP_SP_CCDHTR_DC</u>	<u>41</u>
192	<u>FPP_SP_CCDHTR_STAT</u>	<u>51</u>
193	<u>FPP_SP_DAC</u>	<u>30</u>
194	<u>FPP_SP_FRAME_COUNT:</u>	<u>19</u>
195	<u>FPP_SP_MAIN_ID:</u>	<u>10</u>
196	<u>FPP_SP_MAP_COUNT:</u>	<u>19</u>
197	<u>FPP_SP_MAP_ID:</u>	<u>19</u>
198	<u>FPP_SP_MAP_NUM_POS:</u>	<u>19</u>

199	<u>FPP_SP_OBS_ID:</u>	<u>19</u>
200	<u>FPP_SP_PIC_STATE:</u>	<u>19</u>
201	<u>FPP_SP_PWR</u>	<u>23</u>
202	<u>FPP_SP_READY:</u>	<u>10</u>
203	<u>FPP_SP_ROI_END</u>	<u>30</u>
204	<u>FPP_SP_ROI_STRT</u>	<u>29</u>
205	<u>FPP_SP_SLIT_POS:</u>	<u>19</u>
206	<u>FPP_SP_STATE:</u>	<u>18</u>
207	<u>FPP_SPIN_TIME</u>	<u>37</u>
208	<u>FPP_SS_STATUS</u>	<u>33</u>
209	<u>FPP_STAT2_TIME:</u>	<u>11</u>
210	<u>FPP_STAT3_TIME</u>	<u>27</u>
211	<u>FPP_STATE:</u>	<u>12</u>
212	<u>FPP_STR1_TEMP</u>	<u>45</u>
213	<u>FPP_STR2_TEMP</u>	<u>45</u>
214	<u>FPP_STR3_TEMP</u>	<u>45</u>
215	<u>FPP_STR4_TEMP</u>	<u>45</u>
216	<u>FPP_SW_FM_STATUS:</u>	<u>24</u>
217	<u>FPP_SW_SS_POS:</u>	<u>23</u>
218	<u>FPP_TF_ELM1_TEMP</u>	<u>46</u>
219	<u>FPP_TF_ELM2_TEMP</u>	<u>46</u>
220	<u>FPP_TF_ELM3_TEMP</u>	<u>46</u>
221	<u>FPP_TF_ELM4_TEMP</u>	<u>46</u>
222	<u>FPP_TF_ELM5_TEMP</u>	<u>46</u>
223	<u>FPP_TF_ELM6_TEMP</u>	<u>46</u>
224	<u>FPP_TF_ELM7_TEMP</u>	<u>47</u>
225	<u>FPP_TF_ELM8_TEMP</u>	<u>47</u>
226	<u>FPP_TF_MTR1_STATUS</u>	<u>34</u>
227	<u>FPP_TF_MTR2_STATUS</u>	<u>35</u>
228	<u>FPP_TF_MTR2_STATUS</u>	<u>35</u>
229	<u>FPP_TF_MTR4_STATUS</u>	<u>35</u>
230	<u>FPP_TF_MTR5_STATUS</u>	<u>35</u>
231	<u>FPP_TF_MTR6_STATUS</u>	<u>35</u>
232	<u>FPP_TF_MTR7_STATUS</u>	<u>35</u>
233	<u>FPP_TF_MTR8_STATUS</u>	<u>36</u>
234	<u>FPP_THERMAL_STATE</u>	<u>48</u>
235	<u>FPP_TM_MDPKT_COUNT</u>	<u>28</u>
236	<u>FPP_TM_MSG_RCVD</u>	<u>28</u>
237	<u>FPP_TM_STATE</u>	<u>28</u>
238	<u>FPP_WB_FW_STATUS</u>	<u>32</u>
239	<u>FPP_WB_SHTR_STATUS</u>	<u>33</u>
240	<u>FPP_WBFW_TEMP</u>	<u>47</u>
241	<u>FPP_WW_POS</u>	<u>25</u>
242	<u>FPP_WW_STATUS</u>	<u>33</u>
243	<u>PMU_SPIN_TIME</u>	<u>27</u>

### G.3. CT Reference/Live Data

Each CT reference or live image packet has a packet header consisting of 96 bytes. The first 32 bytes are the standard packet information for all science packets as defined in Table 6.8-1 (the first 30 of these) and Table 6.8-2 (the 2 bytes of compression information). The compression fields are set to zero since CT image data should not be compressed. The next 64 bytes (“data information”) are the CT specific data section shown in Table G.1-1.

#### G.3.1. “Data Information” Definition

The “data information” area is defined in Table G.1-1.

Table G.1-1 CT Ref/Live Data Information

Byte		Bit		Field Name	Comments
Pos	Size	Pos	Size		
0	4			MDP Packet time	
4	2			reference frame count	
6	2			CT frame count	
8	26			CT sums	13 values, each 16 bits
34	2			CT mode	
		0	10	unused	not used presently
		10	2	CT shift	
		12	1	MAD overflow	
		13	1	sum overflow	
		14	1	reference frame	doesn't work, always 0
		15	1	run	1 when CT is running
36	2			CT MAD	
38	2			current CT ref mean value	
40	2			next CT ref mean value	
42	2			reference count	increments for new ref
44	2			CTME command	sent to CTME
46	2			computed x error	sent to CTME
48	2			computed y error	sent to CTME
50	2			CTME status	
52	2			CTME x angle	
54	2			CTME y angle	
56	2			jitter count	
58	2			CT frame for MDP packet time	used for synchronizing
60	1			MDP rollover count	
61	1			jitter type	
62	2			focus position	

#### G.4. CT Diagnostic Data

Each CT diagnostic packet has a packet header consisting of 96 bytes. The first 32 bytes are the standard packet information for all science packets as defined in Table 6.8-1 (the first 30 of these) and Table 6.8-2 (the 2 bytes of compression information). The compression fields are set to zero since CT diagnostic data should not be compressed. The next 64 bytes are the diagnostic packet specific. These are listed in Table G.4-1.

##### G.4.1. "Data Information" Definition

The "data information" area is defined in Table G.4-1.

Table G.4-1 CT Diagnostic Data "Data Information"

Byte		Field Name	Comments
Pos	Size		
0	4	MDP Packet time	
4	4	Start Time	
8	4	CT frame count	
12	4	# Samples	1 <= # Samples <=16
16	1	Number of channels	
17	1	Number of ticks between samples	In units of 6.9ms
18	32	Array of channel ID's	
50	2	GCU configuration	
52	1	MS 7 bits of MDP clock time	
53	11	Not used	

##### G.4.2. "Data Area" Definition

There are three kinds of diagnostic mode; 1) jitter data, 2) augmented jitter data, and 3) analog sampling data (voltages, currents). In the "Diagnostic" mode, FPP software collects data at specified frequency. In jitter modes, FPP software collects data at 580 Hz. In analog sampling mode, the highest frequency is 580 Hz. However, selecting 16 diagnostic channels to be monitored at this frequency may interfere with other processing.

##### G.4.2.1. Jitter Mode Data

Jitter data consists of the following items;

- CT frame counter
- CT mode + CTME command

- computed X error
- computed Y error
- CTM-E X angle
- CTM-E Y angle
- CTM-E state

Each item is 16 bits wide.

These 7 words will be collected for each CT frame. The data will be accumulated for a period of 15 seconds. The accumulated data will be downlinked as a single packet. The length of the jitter data is  $7 \times 580 \times 15 = 60900$  words (121,800 bytes). Since the size should be multiples of 64bytes, 24 bytes null data is added at the end of the data.

#### G.4.2.2. Augmented Jitter Mode Data

The augmented has 28 I\*2 items, the first 7 are the same. They are:

- CT frame counter
- CT mode + CTME command
- computed X error
- computed Y error
- CTM-E X angle
- CTM-E Y angle
- CTM-E state

line count (current line, usually 0)

13 sums

CTmode

CTMAD

CTmeanCurrent

CTmeanNext

ref\_count

first pixel in cureent line

MEsVar - ME state variable

#### G.4.2.3. Analog Sampling Mode Data

Diagnostic data is collected for up to 16 specified channels. The channels may be device status data, analog monitors or various counters. A full list of valid channels is given in the document, 2B00623\_Rev\_H\_Details\_of\_FPP\_commands.doc (Appendix of FPP command list).

The 16 channel array may contain blanks or duplicates.

Diagnostic data is arranged as follows (for the case of 5 channels)

Byte #			
0	CT frame Counter	4	CT frame counter at the time of 1 <sup>st</sup> sample
4	Channel 1 Data	2	1 <sup>st</sup> sample of the first diagnostic channel selected
6	Channel 2 Data	2	1 <sup>st</sup> sample of the second diagnostic channel selected
8	Channel 3 Data	2	1 <sup>st</sup> sample of the 3 <sup>rd</sup> diagnostic channel selected
10	Channel 4 Data	2	1 <sup>st</sup> sample of the 4 <sup>th</sup> diagnostic channel selected
12	Channel 5 Data	2	1 <sup>st</sup> sample of the 5 <sup>th</sup> diagnostic channel selected
14	CT frame counter	4	CT frame counter at the time of 2 <sup>nd</sup> sample
18	Channel 1 Data	2	2 <sup>nd</sup> sample of the first diagnostic channel selected
20	Channel 2 Data	2	2 <sup>nd</sup> sample of the second diagnostic channel selected
22	Channel 3 Data	2	2 <sup>nd</sup> sample of the 3 <sup>rd</sup> diagnostic channel selected
24	Channel 4 Data	2	2 <sup>nd</sup> sample of the 4 <sup>th</sup> diagnostic channel selected
26	Channel 5 Data	2	2 <sup>nd</sup> sample of the 5 <sup>th</sup> diagnostic channel selected
2n+4	CT frame counter	4	CT frame counter at the time of n <sup>th</sup> sample
2n+6	Channel 1 Data	2	n <sup>th</sup> sample of the first diagnostic channel selected
2n+8	Channel 2 Data	2	n <sup>th</sup> sample of the second diagnostic channel selected
2n+10	Channel 3 Data	2	n <sup>th</sup> sample of the 3 <sup>rd</sup> diagnostic channel selected
2n+12	Channel 4 Data	2	n <sup>th</sup> sample of the 4 <sup>th</sup> diagnostic channel selected
2n+14	Channel 5 Data	2	n <sup>th</sup> sample of the 5 <sup>th</sup> diagnostic channel selected

In the case where 5 channels are monitored, if there are less than 14 bytes left in the buffer, they are left blank. The next sample is down linked in the next packet. .