| University of Michigan<br>Space Physics Research Laboratory | | |
|---|---|---|
| **TIDI Flight Software<br>Instrument Parameter<br>Dictionary** | CAGE No.<br>Drawing No.<br>Project<br>Contract No.<br>Page | 0TK63<br>055-3903A<br>TIDI<br>NASW-5-5049<br>1 of 65 |

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# TABLE OF CONTENTS

**1. INTRODUCTION ..... 8**

**2. ABBREVIATIONS AND ACRONYMS ..... 8**

**3. INSTRUMENT PARAMETERS ..... 8**

3.1. TEL_1_MIR_BARREL_TEMP ..... 8
3.2. SPARE_ANALOG_IN_1 ..... 8
3.3. TEL_1_PEDESTAL_TEMP ..... 8
3.4. TEL_2_MIR_BARREL_TEMP ..... 9
3.5. SPARE_ANALOG_IN_2 ..... 9
3.6. TEL_2_PEDESTAL_TEMP ..... 9
3.7. TEL_3_MIR_BARREL_TEMP ..... 9
3.8. SPARE_ANALOG_IN_3 ..... 9
3.9. TEL_3_PEDESTAL_TEMP ..... 9
3.10. TEL_4_MIR_BARREL_TEMP ..... 10
3.11. SPARE_ANALOG_IN_4 ..... 10
3.12. TEL_4_PEDESTAL_TEMP ..... 10
3.13. FW_HOUSING_TEMP ..... 10
3.14. PROFILER_HOUSE_BASE_TEMP ..... 10
3.15. POWER_SUP_DECK_TEMP ..... 10
3.16. FC_DECK_HYBRID_1553_TEMP ..... 11
3.17. PROFILER_ETAL_ROD_TEMP ..... 11
3.18. PROFILER_ETAL_LEAF_TEMP ..... 11
3.19. PROFILER_ETAL_POST_TEMP ..... 11
3.20. DA_DECK_AD_CONV_TEMP ..... 11
3.21. POWER_SUP_SC_INPUT_VOLTS ..... 11
3.22. POWER_SUP_SC_INST_CURR ..... 11
3.23. POWER_SUP_SC_OPER_HTR_CURR ..... 12
3.24. POWER_SUP_AVG_POS_6_CURR ..... 12
3.25. POWER_SUP_AVG_NEG_6_CURR ..... 12
3.26. POWER_SUP_POS_28_CAL_CURR ..... 12
3.27. PROFILER_SENS_PREAMP_TEMP ..... 12
3.28. PROFILER_SENS_WINDOW_TEMP ..... 12
3.29. TEL_1_POSITION ..... 13
3.30. TEL_1_POSITION_ERROR ..... 13
3.31. TEL_1_MOTOR_HOLD_CURR ..... 13
3.32. TEL_2_POSITION ..... 13
3.33. TEL_2_POSITION_ERROR ..... 13
3.34. TEL_2_MOTOR_HOLD_CURR ..... 13
3.35. TEL_3_POSITION ..... 14
3.36. TEL_3_POSITION_ERROR ..... 14
3.37. TEL_3_MOTOR_HOLD_CURR ..... 14
3.38. TEL_4_POSITION ..... 14
3.39. TEL_4_POSITION_ERROR ..... 14
3.40. TEL_4_MOTOR_HOLD_CURR ..... 14
3.41. CCD_TEMP ..... 15
3.42. CCD_SERH_DAC_VOLTS ..... 15
3.43. CCD_SERL_DAC_VOLTS ..... 15

3.44. CCD_PARH_DAC_VOLTS ..... 15
3.45. CCD_PARL_DAC_VOLTS ..... 15
3.46. CCD_SWH_DAC_VOLTS ..... 16
3.47. CCD_SWL_DAC_VOLTS ..... 16
3.48. CCD_TGH_DAC_VOLTS ..... 16
3.49. CCD_TGL_DAC_VOLTS ..... 16
3.50. CCD_P3H_DAC_VOLTS ..... 17
3.51. CCD_LG_DAC_VOLTS ..... 17
3.52. CCD_BIAS_DAC_VOLTS ..... 17
3.53. CCD_FETREF_DAC_VOLTS ..... 17
3.54. CCD_RD_DAC_VOLTS ..... 18
3.55. CCD_RG_DAC_VOLTS ..... 18
3.56. POWER_SUP_POS_5_VOLTS ..... 18
3.57. POWER_SUP_POS_15_VOLTS ..... 18
3.58. POWER_SUP_NEG_15_VOLTS ..... 19
3.59. POWER_SUP_SERVO_POS_6_V ..... 19
3.60. POWER_SUP_SERVO_NEG_6_V ..... 19
3.61. POWER_SUP_LAMP_POS_28_V ..... 19
3.62. POWER_SUP_CCD_POS_26_V ..... 19
3.63. SPARE_ANALOG_IN_5 ..... 19
3.64. SPARE_ANALOG_IN_6 ..... 19
3.65. SPARE_ANALOG_IN_7 ..... 20
3.66. SPARE_ANALOG_IN_8 ..... 20
3.67. SYS_EXPOSE_DOWN_CNT ..... 20
3.68. SYS_EXPOSURE_CNT ..... 20
3.69. TEL_1_PI_ENAB ..... 20
3.70. TEL_2_PI_ENAB ..... 21
3.71. TEL_3_PI_ENAB ..... 22
3.72. TEL_4_PI_ENAB ..... 22
3.73. PROFILER_ROD_PI_ENAB ..... 22
3.74. PROFILER_LEAF_PI_ENAB ..... 23
3.75. PROFILER_POST_PI_ENAB ..... 23
3.76. CCD_PI_ENAB ..... 23
3.77. FPA_HOUSING_PI_ENAB ..... 24
3.78. FW_HOUSING_PI_ENAB ..... 24
3.79. TEL_1_TEMP_SETPT ..... 24
3.80. TEL_1_PI_PRO_CO ..... 24
3.81. TEL_1_PI_INT_CO ..... 24
3.82. TEL_2_TEMP_SETPT ..... 25
3.83. TEL_2_PI_PRO_CO ..... 25
3.84. TEL_2_PI_INT_CO ..... 25
3.85. TEL_3_TEMP_SETPT ..... 25
3.86. TEL_3_PI_PRO_CO ..... 25
3.87. TEL_3_PI_INT_CO ..... 25
3.88. TEL_4_TEMP_SETPT ..... 25
3.89. TEL_4_PI_PRO_CO ..... 25
3.90. TEL_4_PI_INT_CO ..... 25
3.91. PROFILER_ROD_TEMP_SETPT ..... 26
3.92. PROFILER_ROD_PI_PRO_CO ..... 26
3.93. PROFILER_ROD_PI_INT_CO ..... 26
3.94. PROFILER_LEAF_TEMP_SETPT ..... 26

3.95. PROFILER_LEAF_PI_PRO_CO ..... 26
3.96. PROFILER_LEAF_PI_INT_CO ..... 26
3.97. PROFILER_POST_TEMP_SETPT ..... 26
3.98. PROFILER_POST_PI_PRO_CO ..... 27
3.99. PROFILER_POST_PI_INT_CO ..... 27
3.100. CCD_TEMP_SETPT ..... 27
3.101. CCD_PI_PRO_CO ..... 27
3.102. CCD_PI_INT_CO ..... 27
3.103. FPA_TEMP_SETPT ..... 27
3.104. FPA_PI_PRO_CO ..... 27
3.105. FPA_PI_INT_CO ..... 27
3.106. FW_TEMP_SETPT ..... 28
3.107. FW_PI_PRO_CO ..... 28
3.108. FW_PI_INT_CO ..... 28
3.109. TEL_1_HTR_DUT_CY ..... 28
3.110. TEL_2_HTR_DUT_CY ..... 28
3.111. TEL_3_HTR_DUT_CY ..... 28
3.112. TEL_4_HTR_DUT_CY ..... 28
3.113. PROFILER_ROD_HTR_DUT_CY ..... 29
3.114. PROFILER_LEAF_HTR_DUT_CY ..... 29
3.115. PROFILER_POST_HTR_DUT_CY ..... 29
3.116. CCD_HTR_DUT_CY ..... 29
3.117. FPA_HTR_DUT_CY ..... 29
3.118. FW_HTR_DUT_CY ..... 30
3.119. HTRS_GRP_1_OVERCURR ..... 30
3.120. HTRS_GRP_2_OVERCURR ..... 30
3.121. CCD_MIN_ERASE_TIME ..... 30
3.122. CCD_V_DUMP ..... 30
3.123. CCD_V_BIN_SIZE ..... 31
3.124. CCD_H_DUMP_2 ..... 31
3.125. CCD_USE_D_OUT ..... 31
3.126. CCD_CNTL_REG_2 ..... 31
3.127. CCD_CNTL_REG_3 ..... 31
3.128. CCD_SERH_DAC_CNTL ..... 31
3.129. CCD_SERL_DAC_CNTL ..... 32
3.130. CCD_PARH_DAC_CNTL ..... 32
3.131. CCD_PARL_DAC_CNTL ..... 32
3.132. CCD_SWH_DAC_CNTL ..... 32
3.133. CCD_SWL_DAC_CNTL ..... 32
3.134. CCD_TGH_DAC_CNTL ..... 33
3.135. CCD_TGL_DAC_CNTL ..... 33
3.136. CCD_P3H_DAC_CNTL ..... 33
3.137. CCD_LG_DAC_CNTL ..... 33
3.138. CCD_BIAS_DAC_CNTL ..... 33
3.139. CCD_FETREF_DAC_CNTL ..... 34
3.140. CCD_RD_DAC_CNTL ..... 34
3.141. CCD_RG_DAC_CNTL ..... 34
3.142. TEL_1_LATCHED_POS_ERR ..... 34
3.143. TEL_2_LATCHED_POS_ERR ..... 35
3.144. TEL_3_LATCHED_POS_ERR ..... 35
3.145. TEL_4_LATCHED_POS_ERR ..... 35

3.146. TEL_1_LATCHED_NEG_ERR ....35
3.147. TEL_2_LATCHED_NEG_ERR ....36
3.148. TEL_3_LATCHED_NEG_ERR ....36
3.149. TEL_4_LATCHED_NEG_ERR ....36
3.150. TEL_1_OVERCURRENT ....36
3.151. TEL_2_OVERCURRENT ....37
3.152. TEL_3_OVERCURRENT ....37
3.153. TEL_4_OVERCURRENT ....37
3.154. TELESCOPES_SETTLE_TIME ....37
3.155. TELESCOPES_DITHER_PW ....38
3.156. TEL_1_DITHER_FORCE ....38
3.157. TEL_2_DITHER_FORCE ....38
3.158. TEL_3_DITHER_FORCE ....38
3.159. TEL_4_DITHER_FORCE ....38
3.160. TEL_1_2_CONTROL_REG ....38
3.161. TEL_3_4_CONTROL_REG ....39
3.162. TEL_SHUT_STEP_RATE ....39
3.163. FW_1_HOLD_CURR_PW ....39
3.164. FW_2_HOLD_CURR_PW ....39
3.165. FW_SETTLE_TIME ....40
3.166. SYS_STAT_TM_PKT_RATE ....40
3.167. COMM_NULL_FILL_DELAY ....40
3.168. TELESCOPES_OBLATE_COMP_ENAB ....40
3.169. TELESCOPES_ATT_COMP_ENAB ....40
3.170. TELESCOPES_MECH_COMP_ENAB ....40
3.171. SYS_INHIB_SAFE_MODE ....41
3.172. TELESCOPES_SHUT_CLOSE_ANGLE ....41
3.173. TELESCOPES_SHUT_OPEN_ANGLE ....41
3.174. TIME_UTC_LEAP_SECONDS ....41
3.175. CONTROL_PRGM_ACTIVE_ID ....41
3.176. CONTROL_PRGM_EXECUTION_FLAG ....42
3.177. CONTROL_PRGM_HB_VALID ....42
3.178. CONTROL_PRGM_NEXT_CMD_OFFSET ....42
3.179. CONTROL_PRGM_EQUAL_FLAG ....42
3.180. CONTROL_PRGM_GT_FLAG ....42
3.181. TIME_UTC_DAY_NUMBER ....43
3.182. TIME_UTC_SEC_OF_DAY ....43
3.183. TIME_INST_SECONDS ....43
3.184. TIME_INST_CENTISECS ....43
3.185. TIME_SECS_SINCE_RESET ....43
3.186. COMM_LAST_CMD_SEQ_NUM ....43
3.187. COMM_CMD_REC_ERRORS ....44
3.188. COMM_CMD_PKT_COUNT ....44
3.189. COMM_ERR_PKT_COUNT ....44
3.190. COMM_ERR_Q_OVERFLOW ....44
3.191. CAL_HAK_LAMP_STATE ....44
3.192. CAL_NEON_LAMP_STATE ....45
3.193. CAL_INC_1_LAMP_STATE ....45
3.194. CAL_INC_2_LAMP_STATE ....45
3.195. TEL_1_SHUTTER_POS ....45
3.196. TEL_2_SHUTTER_POS ....45

3.197. TEL_3_SHUTTER_POS ..... 45
3.198. TEL_4_SHUTTER_POS ..... 46
3.199. FW_1_POSITION ..... 46
3.200. FW_2_POSITION ..... 46
3.201. FW_1_LATCHED_POS_ERR ..... 46
3.202. FW_2_LATCHED_POS_ERR ..... 46
3.203. FW_1_MAX_OVERSHOOT ..... 47
3.204. FW_2_MAX_OVERSHOOT ..... 47
3.205. SYS_EXECUTING_BOOT ..... 47
3.206. SYS_INST_AUTONOMY ..... 47
3.207. SYS_SUN_AVOID_STATE ..... 47
3.208. SYS_SAFE_MODE_STATE ..... 48
3.209. SYS_SCANNING_FLAG ..... 48
3.210. SYS_SCAN_TABLE_ID ..... 48
3.211. SYS_BIN_TABLE_ID ..... 48
3.212. SYS_REBOOT_FLAG ..... 48
3.213. POWER_SUP_SC_IN_RED_LIMIT ..... 48
3.214. POWER_SUP_SC_IN_RED_STAT ..... 49
3.215. SPACECRAFT_STAT_AGE ..... 49
3.216. SPACECRAFT_WARN_1_VAL_STAT ..... 49
3.217. SPACECRAFT_DAY_NIGHT_STAT ..... 49
3.218. SPACECRAFT_SAA_STAT ..... 49
3.219. SPACECRAFT_TIDI_PWR_STAT ..... 49
3.220. SPACECRAFT_WARN_2_VAL_STAT ..... 50
3.221. SPACECRAFT_YAW_STAT ..... 50
3.222. SPACECRAFT_PANEL_ROT_STAT ..... 50
3.223. SPACECRAFT_SUN_SAFE_ATT ..... 50
3.224. SPACECRAFT_LOW_VOLT_STAT ..... 51
3.225. SPACECRAFT_NADIR_PTG_STAT ..... 51
3.226. SPACECRAFT_RAM_DIR_STATUS ..... 51
3.227. SPACECRAFT_POS_VALID_STAT ..... 51
3.228. SPACECRAFT_ATT_VALID_STAT ..... 51
3.229. SPACECRAFT_SUN_V_VALID_STAT ..... 52
3.230. SPACECRAFT_LATITUDE ..... 52
3.231. SPACECRAFT_LONGITUDE ..... 52
3.232. SPACECRAFT_HEIGHT ..... 52
3.233. SPACECRAFT_VELOCITY_EAST ..... 52
3.234. SPACECRAFT_VELOCITY_NORTH ..... 52
3.235. SPACECRAFT_VELOCITY_UP ..... 53
3.236. SPACECRAFT_G_AND_C_TIME ..... 53
3.237. SPACECRAFT_SUN_VECTOR_X ..... 53
3.238. SPACECRAFT_SUN_VECTOR_Y ..... 53
3.239. SPACECRAFT_SUN_VECTOR_Z ..... 53
3.240. SPACECRAFT_ROLL ..... 53
3.241. SPACECRAFT_PITCH ..... 54
3.242. SPACECRAFT_YAW ..... 54
3.243. CONTROL_PRGM_VAR_1 THROUGH CONTROL_PRGM_VAR_32 ..... 54

**4. INSTRUMENT PARAMETERS LISTED ALPHABETICALLY ..... 55**

**5. INSTRUMENT PARAMETERS LISTED BY TYPE ..... 60**

# 1. Introduction

The purpose of this document is to describe the Instrument Parameters that are maintained by the TIDI flight software. For additional information (such as default values, engineering unit conversion factors etc.) see document 055-3519AC TIDI Instrument Parameter Definition.

# 2. Abbreviations and Acronyms

ADC Analog to Digital Converter

CCD Charge Coupled Device

CPHB Control Program Holding Buffer

CPGV Control Program Global Variable

DAC Digital to Analog Converter

FPA Focal Plane Assembly

GPS Global Positioning System

IP Instrument Parameter

MPP Multiphase Pinned

UTC Coordinated Universal Time

# 3. Instrument Parameters

### *3.1. Tel_1_Mir_Barrel_Temp*

| ID | Type | Short Description |
|---|---|---|
| 1 | Unsigned 12 bits | Telescope 1 mirror barrel temperature.<br>Not commandable. |

Sensor location: On the outside of the secondary optics housing on the telescope barrel.

Update frequency: 1 Hz

### *3.2. Spare_Analog_In_1*

| ID | Type | Short Description |
|---|---|---|
| 2 | Unsigned 12 bits | Spare analog input #1.<br>Not commandable. |

Sensor location: no sensor.

Update frequency: 1 Hz.

This input was previously used to monitor the Telescope 1 LVDT preamp temperature and is currently disconnected. It was disconnected to eliminate noise, caused by reading the sensor, from being coupled into the LVDT preamp. The analog input is still read at 1 Hz.

### *3.3. Tel_1_Pedestal_Temp*

| ID | Type | Short Description |
|---|---|---|
| 3 | Unsigned 12 bits | Telescope 1 pedestal temperature.<br>Not commandable. |

Sensor location: On the LVDT mounting bracket near the LVDT.

Update frequency: 1 Hz

### *3.4. Tel_2_Mir_Barrel_Temp*

| ID | Type | Short Description |
|---|---|---|
| 4 | Unsigned 12 bits | Telescope 2 mirror barrel temperature.<br>Not commandable. |

Sensor location: On the outside of the secondary optics housing on the telescope barrel.

Update frequency: 1 Hz

### *3.5. Spare_Analog_In_2*

| ID | Type | Short Description |
|---|---|---|
| 5 | Unsigned 12 bits | Spare analog input #2.<br>Not commandable. |

Sensor location: no sensor.

Update frequency: 1 Hz.

This input was previously used to monitor the Telescope 2 LVDT preamp temperature and is currently disconnected. It was disconnected to eliminate noise, caused by reading the sensor, from being coupled into the LVDT preamp. The analog input is still read at 1 Hz.

### *3.6. Tel_2_Pedestal_Temp*

| ID | Type | Short Description |
|---|---|---|
| 6 | Unsigned 12 bits | Telescope 2 pedestal temperature.<br>Not commandable. |

Sensor location: On the LVDT mounting bracket near the LVDT.

Update frequency: 1 Hz

### *3.7. Tel_3_Mir_Barrel_Temp*

| ID | Type | Short Description |
|---|---|---|
| 7 | Unsigned 12 bits | Telescope 3 mirror barrel temperature.<br>Not commandable. |

Sensor location: On the outside of the secondary optics housing on the telescope barrel.

Update frequency: 1 Hz

### *3.8. Spare_Analog_In_3*

| ID | Type | Short Description |
|---|---|---|
| 8 | Unsigned 12 bits | Spare analog input #3.<br>Not commandable. |

Sensor location: no sensor.

Update frequency: 1 Hz.

This input was previously used to monitor the Telescope 3 LVDT preamp temperature and is currently disconnected. It was disconnected to eliminate noise, caused by reading the sensor, from being coupled into the LVDT preamp. The analog input is still read at 1 Hz.

### *3.9. Tel_3_Pedestal_Temp*

| ID | Type | Short Description |
|---|---|---|
| 9 | Unsigned 12 bits | Telescope 3 pedestal temperature.<br>Not commandable. |

Sensor location: On the LVDT mounting bracket near the LVDT.

Update frequency: 1 Hz

### *3.10. Tel_4_Mir_Barrel_Temp*

| ID | Type | Short Description |
|---|---|---|
| 10 | Unsigned 12 bits | Telescope 3 mirror barrel temperature.<br>Not commandable. |

Sensor location: On the outside of the secondary optics housing on the telescope barrel.

Update frequency: 1 Hz

### *3.11. Spare_Analog_In_4*

| ID | Type | Short Description |
|---|---|---|
| 11 | Unsigned 12 bits | Spare analog input #4.<br>Not commandable. |

Sensor location: no sensor.

Update frequency: 1 Hz.

This input was previously used to monitor the Telescope 4 LVDT preamp temperature and is currently disconnected. It was disconnected to eliminate noise, caused by reading the sensor, from being coupled into the LVDT preamp. The analog input is still read at 1 Hz.

### *3.12. Tel_4_Pedestal_Temp*

| ID | Type | Short Description |
|---|---|---|
| 12 | Unsigned 12 bits | Telescope 4 pedestal temperature.<br>Not commandable. |

Sensor location: On the LVDT mounting bracket near the LVDT.

Update frequency: 1 Hz

### *3.13. FW_Housing_Temp*

| ID | Type | Short Description |
|---|---|---|
| 13 | Unsigned 12 bits | Filter wheel housing temperature.<br>Not commandable. |

Sensor location: On the outside of the bottom of the filter wheel shroud near the baseplate.

Update frequency: 1 Hz

### *3.14. Profiler_House_Base_Temp*

| ID | Type | Short Description |
|---|---|---|
| 14 | Unsigned 12 bits | Profiler housing baseplate temperature.<br>Not commandable. |

Sensor location: On the baseplate, at the bottom of the rod support mount.

Update frequency: 1 Hz

### *3.15. Power_Sup_Deck_Temp*

| ID | Type | Short Description |
|---|---|---|
| 15 | Unsigned 12 bits | Power supply deck temperature.<br>Not commandable. |

Sensor location: Mounted on the power supply deck PC board near the frame hot spot.

Update frequency: 1 Hz

### *3.16. FC_Deck_Hybrid_1553_Temp*

| ID | Type | Short Description |
|---|---|---|
| 16 | Unsigned 12 bits | Flight computer deck 1553 interface hybrid case temperature. Not commandable. |

Sensor location: Cemented on the 1553 interface hybrid case.

Update frequency: 1 Hz

### *3.17. Profiler_Etal_Rod_Temp*

| ID | Type | Short Description |
|---|---|---|
| 17 | Unsigned 12 bits | Etalon housing mounting rod temperature. Not commandable. |

Sensor location: Mounted on the eltalon housing near the rod attach point, 180° away from the Profiler_Etal_Leaf_Temp sensor.

Update frequency: 1 Hz

### *3.18. Profiler_Etal_Leaf_Temp*

| ID | Type | Short Description |
|---|---|---|
| 18 | Unsigned 12 bits | Etalon housing mounting leaf temperature. Not commandable. |

Sensor location: Mounted on the eltalon housing near the leaf attach point, 180° away from the Profiler_Etal_Rod_Temp sensor.

Update frequency: 1 Hz

### *3.19. Profiler_Etal_Post_Temp*

| ID | Type | Short Description |
|---|---|---|
| 19 | Unsigned 12 bits | Etalon housing mounting post temperature. Not commandable. |

Sensor location: Mounted on the cassegrain telescope housing next to the post attach point.

Update frequency: 1 Hz

### *3.20. DA_Deck_AD_Conv_Temp*

| ID | Type | Short Description |
|---|---|---|
| 20 | Unsigned 12 bits | Data acquisition deck analog to digital converter temperature. Not commandable. |

Sensor location: Mounted on DA deck circuit board next to the analog to digital converter.

Update frequency: 1 Hz

### *3.21. Power_Sup_SC_Input_Volts*

| ID | Type | Short Description |
|---|---|---|
| 21 | Unsigned 12 bits | Instrument power supply input voltage. Not commandable. |

Voltage sensing location: Power supply deck.

Update frequency: 1 Hz

Filtering: 10% to 90% rise in 2.2 seconds.

### *3.22. Power_Sup_SC_Inst_Curr*

| ID | Type | Short Description |
|---|---|---|
| 22 | Unsigned 12 | Instrument power supply input current. |

| | | |
|---|---|---|
| | bits | Not commandable. |

Current sensing location: Power supply deck.

Update frequency: 1 Hz

Filtering: 10% to 90% rise in 4 seconds.

### *3.23. Power_Sup_SC_Oper_Htr_Curr*

| ID | Type | Short Description |
|---|---|---|
| 23 | Unsigned 12 bits | Total operational heater current.<br>Not commandable. |

Current sensing location: Power supply deck.

Update frequency: 1 Hz

Filtering: 10% to 90% rise in 4 seconds.

### *3.24. Power_Sup_Avg_Pos_6_Curr*

| ID | Type | Short Description |
|---|---|---|
| 24 | Unsigned 12 bits | Average +6 Volt telescope servo current.<br>Not commandable. |

Current sensing location: Power supply deck.

Update frequency: 1 Hz

Filtering: 10% to 90% rise in 4 seconds.

### *3.25. Power_Sup_Avg_Neg_6_Curr*

| ID | Type | Short Description |
|---|---|---|
| 25 | Unsigned 12 bits | Average -6 Volt telescope servo current.<br>Not commandable. |

Current sensing location: Power supply deck.

Update frequency: 1 Hz

Filtering: 10% to 90% rise in 4 seconds.

### *3.26. Power_Sup_Pos_28_Cal_Curr*

| ID | Type | Short Description |
|---|---|---|
| 26 | Unsigned 12 bits | +28 Volt calibration lamp current.<br>Not commandable. |

Current sensing location: Cal lamp deck.

Update frequency: 1 Hz

Filtering: 10% to 90% rise in 1.1 seconds.

### *3.27. Profiler_Sens_Preamp_Temp*

| ID | Type | Short Description |
|---|---|---|
| 27 | Unsigned 12 bits | CCD preamp temperature.<br>Not commandable. |

Sensor location: Mounted on the bias board on the top of the profiler housing extension.

Update frequency: 1 Hz

### *3.28. Profiler_Sens_Window_Temp*

| ID | Type | Short Description |
|---|---|---|
| 28 | Unsigned 12 | CCD window temperature. |

| | | |
|---|---|---|
| | bits | Not commandable. |

Sensor location: Mounted on the side of the sensor housing near the radiator side of the housing (not near the window).

Update frequency: 1 Hz

### *3.29. Tel_1_Position*

| ID | Type | Short Description |
|---|---|---|
| 29 | Unsigned 12 bits | Telescope 1 position.<br>Not commandable. |

Voltage sensing location: Telescope servo deck.

Update frequency: 35 Hz.

The high update frequency is required to provide accurate telescope elevation status in science TM packets.

### *3.30. Tel_1_Position_Error*

| ID | Type | Short Description |
|---|---|---|
| 30 | Unsigned 12 bits | Telescope 1 position error.<br>Not commandable. |

Voltage sensing location: Telescope servo deck.

Update frequency: 1 Hz.

### *3.31. Tel_1_Motor_Hold_Curr*

| ID | Type | Short Description |
|---|---|---|
| 31 | Unsigned 12 bits | Telescope 1 motor holding current.<br>Not commandable. |

Voltage sensing location: Telescope servo deck.

Update frequency: 1 Hz.

### *3.32. Tel_2_Position*

| ID | Type | Short Description |
|---|---|---|
| 32 | Unsigned 12 bits | Telescope 2 position.<br>Not commandable. |

Voltage sensing location: Telescope servo deck.

Update frequency: 35 Hz.

The high update frequency is required to provide accurate telescope elevation status in science TM packets.

### *3.33. Tel_2_Position_Error*

| ID | Type | Short Description |
|---|---|---|
| 33 | Unsigned 12 bits | Telescope 2 position error.<br>Not commandable. |

Voltage sensing location: Telescope servo deck.

Update frequency: 1 Hz.

### *3.34. Tel_2_Motor_Hold_Curr*

| ID | Type | Short Description |
|---|---|---|
| 34 | Unsigned 12 bits | Telescope 2 motor holding current.<br>Not commandable. |

Voltage sensing location: Telescope servo deck.

Update frequency: 1 Hz.

### *3.35. Tel_3_Position*

| ID | Type | Short Description |
|---|---|---|
| 35 | Unsigned 12 bits | Telescope 3 position.<br>Not commandable. |

Voltage sensing location: Telescope servo deck.

Update frequency: 35 Hz.

The high update frequency is required to provide accurate telescope elevation status in science TM packets.

### *3.36. Tel_3_Position_Error*

| ID | Type | Short Description |
|---|---|---|
| 36 | Unsigned 12 bits | Telescope 3 position error.<br>Not commandable. |

Voltage sensing location: Telescope servo deck.

Update frequency: 1 Hz.

### *3.37. Tel_3_Motor_Hold_Curr*

| ID | Type | Short Description |
|---|---|---|
| 37 | Unsigned 12 bits | Telescope 3 motor holding current.<br>Not commandable. |

Voltage sensing location: Telescope servo deck.

Update frequency: 1 Hz.

### *3.38. Tel_4_Position*

| ID | Type | Short Description |
|---|---|---|
| 38 | Unsigned 12 bits | Telescope 4 position.<br>Not commandable. |

Voltage sensing location: Telescope servo deck.

Update frequency: 35 Hz.

The high update frequency is required to provide accurate telescope elevation status in science TM packets.

### *3.39. Tel_4_Position_Error*

| ID | Type | Short Description |
|---|---|---|
| 39 | Unsigned 12 bits | Telescope 4 position error.<br>Not commandable. |

Voltage sensing location: Telescope servo deck.

Update frequency: 1 Hz.

### *3.40. Tel_4_Motor_Hold_Curr*

| ID | Type | Short Description |
|---|---|---|
| 40 | Unsigned 12 bits | Telescope 4 motor holding current.<br>Not commandable. |

Voltage sensing location: Telescope servo deck.

Update frequency: 1 Hz.

### *3.41. CCD_Temp*

| ID | Type | Short Description |
|---|---|---|
| 41 | Unsigned 12 bits | CCD temperature.<br>Not commandable. |

Sensor location: Integrated on the CCD chip.

Update frequency: 1 Hz.

### *3.42. CCD_SERH_DAC_Volts*

| ID | Type | Short Description |
|---|---|---|
| 42 | Unsigned 12 bits | CCD serial register clock high rail voltage.<br>Not commandable. |

Voltage sensing location: On the CCD deck, directly on the DAC output.

Update frequency: 1 Hz.

CCD_SERH_DAC_Volts is the actual DAC output voltage. The DAC output voltage is set with the CCD_SERH_DAC_Cntl IP. When CCD_SERH_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_SERH_DAC_Cntl to a new value and seeing the new value reflected in CCD_SERH_DAC_Volts.

### *3.43. CCD_SERL_DAC_Volts*

| ID | Type | Short Description |
|---|---|---|
| 43 | Unsigned 12 bits | CCD serial register clock low rail voltage.<br>Not commandable. |

Voltage sensing location: On the CCD deck, directly on the DAC output.

Update frequency: 1 Hz.

CCD_SERL_DAC_Volts is the actual DAC output voltage. The DAC output voltage is set with the CCD_SERL_DAC_Cntl IP. When CCD_SERL_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_SERL_DAC_Cntl to a new value and seeing the new value reflected in CCD_SERL_DAC_Volts.

### *3.44. CCD_PARH_DAC_Volts*

| ID | Type | Short Description |
|---|---|---|
| 44 | Unsigned 12 bits | CCD parallel register clock high rail voltage.<br>Not commandable. |

Voltage sensing location: On the CCD deck, directly on the DAC output.

Update frequency: 1 Hz.

CCD_PARH_DAC_Volts is the actual DAC output voltage. The DAC output voltage is set with the CCD_PARH_DAC_Cntl IP. When CCD_PARH_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_PARH_DAC_Cntl to a new value and seeing the new value reflected in CCD_PARH_DAC_Volts.

### *3.45. CCD_PARL_DAC_Volts*

| ID | Type | Short Description |
|---|---|---|
| 45 | Unsigned 12 | CCD parallel register clock low rail voltage. |

| | | |
|---|---|---|
| | bits | Not commandable. |

Voltage sensing location: On the CCD deck, directly on the DAC output.

Update frequency: 1 Hz.

CCD_PARL_DAC_Volts is the actual DAC output voltage. The DAC output voltage is set with the CCD_PARL_DAC_Cntl IP. When CCD_PARL_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_PARL_DAC_Cntl to a new value and seeing the new value reflected in CCD_PARL_DAC_Volts.

### *3.46. CCD_SWH_DAC_Volts*

| ID | Type | Short Description |
|---|---|---|
| 46 | Unsigned 12 bits | CCD summing well clock high rail voltage.<br>Not commandable. |

Voltage sensing location: On the CCD deck, directly on the DAC output.

Update frequency: 1 Hz.

CCD_SWH_DAC_Volts is the actual DAC output voltage. The DAC output voltage is set with the CCD_SWH_DAC_Cntl IP. When CCD_SWH_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_SWH_DAC_Cntl to a new value and seeing the new value reflected in CCD_SWH_DAC_Volts.

### *3.47. CCD_SWL_DAC_Volts*

| ID | Type | Short Description |
|---|---|---|
| 47 | Unsigned 12 bits | CCD summing well clock low rail voltage.<br>Not commandable. |

Voltage sensing location: On the CCD deck, directly on the DAC output.

Update frequency: 1 Hz.

CCD_SWL_DAC_Volts is the actual DAC output voltage. The DAC output voltage is set with the CCD_SWL_DAC_Cntl IP. When CCD_SWL_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_SWL_DAC_Cntl to a new value and seeing the new value reflected in CCD_SWL_DAC_Volts.

### *3.48. CCD_TGH_DAC_Volts*

| ID | Type | Short Description |
|---|---|---|
| 48 | Unsigned 12 bits | CCD transfer gate clock high rail voltage.<br>Not commandable. |

Voltage sensing location: On the CCD deck, directly on the DAC output.

Update frequency: 1 Hz.

CCD_TGH_DAC_Volts is the actual DAC output voltage. The DAC output voltage is set with the CCD_TGH_DAC_Cntl IP. When CCD_TGH_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_TGH_DAC_Cntl to a new value and seeing the new value reflected in CCD_TGH_DAC_Volts.

### *3.49. CCD_TGL_DAC_Volts*

| ID | Type | Short Description |
|---|---|---|
| 49 | Unsigned 12 | CCD transfer gate clock low rail voltage. |

| | | |
|---|---|---|
| | bits | Not commandable. |

Voltage sensing location: On the CCD deck, directly on the DAC output.

Update frequency: 1 Hz.

CCD_TGL_DAC_Volts is the actual DAC output voltage. The DAC output voltage is set with the CCD_TGL_DAC_Cntl IP. When CCD_TGL_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_TGL_DAC_Cntl to a new value and seeing the new value reflected in CCD_TGL_DAC_Volts.

### *3.50. CCD_P3H_DAC_Volts*

| ID | Type | Short Description |
|---|---|---|
| 50 | Unsigned 12 bits | CCD MPP gate clock high rail voltage.<br>Not commandable. |

Voltage sensing location: On the CCD deck, directly on the DAC output.

Update frequency: 1 Hz.

CCD_P3H_DAC_Volts is the actual DAC output voltage. The DAC output voltage is set with the CCD_P3H_DAC_Cntl IP. When CCD_P3H_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_P3H_DAC_Cntl to a new value and seeing the new value reflected in CCD_P3H_DAC_Volts.

### *3.51. CCD_LG_DAC_Volts*

| ID | Type | Short Description |
|---|---|---|
| 51 | Unsigned 12 bits | CCD last gate voltage.<br>Not commandable. |

Voltage sensing location: On the CCD deck, directly on the DAC output.

Update frequency: 1 Hz.

CCD_LG_DAC_Volts is the actual DAC output voltage. The DAC output voltage is set with the CCD_LG_DAC_Cntl IP. When CCD_LG_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_LG_DAC_Cntl to a new value and seeing the new value reflected in CCD_LG_DAC_Volts.

### *3.52. CCD_BIAS_DAC_Volts*

| ID | Type | Short Description |
|---|---|---|
| 52 | Unsigned 12 bits | CCD dual-slope integrator bias voltage.<br>Not commandable. |

Voltage sensing location: On the CCD deck, directly on the DAC output.

Update frequency: 1 Hz.

CCD_BIAS_DAC_Volts is the actual DAC output voltage. The DAC output voltage is set with the CCD_BIAS_DAC_Cntl IP. When CCD_BIAS_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_BIAS_DAC_Cntl to a new value and seeing the new value reflected in CCD_BIAS_DAC_Volts.

### *3.53. CCD_FETREF_DAC_Volts*

| ID | Type | Short Description |
|---|---|---|
| 53 | Unsigned 12 | CCD Vdd reference FET voltage. |

| | | |
|---|---|---|
| | bits | Not commandable. |

Voltage sensing location: On the CCD deck, directly on the DAC output.

Update frequency: 1 Hz.

CCD_FETREF_DAC_Volts is the actual DAC output voltage. The DAC output voltage is set with the CCD_FETREF_DAC_Cntl IP. When CCD_FETREF_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_FETREF_DAC_Cntl to a new value and seeing the new value reflected in CCD_FETREF_DAC_Volts.

### *3.54. CCD_RD_DAC_Volts*

| ID | Type | Short Description |
|---|---|---|
| 54 | Unsigned 12 bits | CCD reset drain voltage.<br>Not commandable. |

Voltage sensing location: On the CCD deck, directly on the DAC output.

Update frequency: 1 Hz.

CCD_RD_DAC_Volts is the actual DAC output voltage. The DAC output voltage is set with the CCD_RD_DAC_Cntl IP. When CCD_RD_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_RD_DAC_Cntl to a new value and seeing the new value reflected in CCD_RD_DAC_Volts.

### *3.55. CCD_RG_DAC_Volts*

| ID | Type | Short Description |
|---|---|---|
| 55 | Unsigned 12 bits | CCD reset gate clock high rail voltage.<br>Not commandable. |

Voltage sensing location: On the CCD deck, directly on the DAC output.

Update frequency: 1 Hz.

CCD_RG_DAC_Volts is the actual DAC output voltage. The DAC output voltage is set with the CCD_RG_DAC_Cntl IP. When CCD_RG_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_RG_DAC_Cntl to a new value and seeing the new value reflected in CCD_RG_DAC_Volts.

### *3.56. Power_Sup_Pos_5_Volts*

| ID | Type | Short Description |
|---|---|---|
| 56 | Unsigned 12 bits | +5 Volt supply voltage.<br>Not commandable. |

Voltage sensing location: DA deck.

Update frequency: 1 Hz.

### *3.57. Power_Sup_Pos_15_Volts*

| ID | Type | Short Description |
|---|---|---|
| 57 | Unsigned 12 bits | +15 Volt supply voltage.<br>Not commandable. |

Voltage sensing location: DA deck.

Update frequency: 1 Hz.

### *3.58. Power_Sup_Neg_15_Volts*

| ID | Type | Short Description |
|---|---|---|
| 58 | Unsigned 12 bits | -15 Volt supply voltage.<br>Not commandable. |

Voltage sensing location: DA deck.

Update frequency: 1 Hz.

### *3.59. Power_Sup_Servo_Pos_6_V*

| ID | Type | Short Description |
|---|---|---|
| 59 | Unsigned 12 bits | +6 Volt servo motor supply voltage.<br>Not commandable. |

Voltage sensing location: Telescope servo deck.

Update frequency: 1 Hz.

### *3.60. Power_Sup_Servo_Neg_6_V*

| ID | Type | Short Description |
|---|---|---|
| 60 | Unsigned 12 bits | -6 Volt servo motor supply voltage.<br>Not commandable. |

Voltage sensing location: Telescope servo deck.

Update frequency: 1 Hz.

### *3.61. Power_Sup_Lamp_Pos_28_V*

| ID | Type | Short Description |
|---|---|---|
| 61 | Unsigned 12 bits | +28 Volt calibration lamp supply voltage.<br>Not commandable. |

Voltage sensing location: Calibration lamp deck.

Update frequency: 1 Hz.

### *3.62. Power_Sup_CCD_Pos_26_V*

| ID | Type | Short Description |
|---|---|---|
| 62 | Unsigned 12 bits | +26 Volt CCD supply voltage.<br>Not commandable. |

Voltage sensing location: Calibration lamp deck.

Update frequency: 1 Hz.

### *3.63. Spare_Analog_In_5*

| ID | Type | Short Description |
|---|---|---|
| 63 | Unsigned 12 bits | Spare analog input #5.<br>Not commandable. |

Voltage sensing location: not connected

Update frequency: 1 Hz.

### *3.64. Spare_Analog_In_6*

| ID | Type | Short Description |
|---|---|---|
| 64 | Unsigned 12 bits | Spare analog input #6.<br>Not commandable. |

Voltage sensing location: not connected

Update frequency: 1 Hz.

### *3.65. Spare_Analog_In_7*

| ID | Type | Short Description |
|---|---|---|
| 65 | Unsigned 12 bits | Spare analog input #7.<br>Not commandable. |

Voltage sensing location: not connected

Update frequency: 1 Hz.

### *3.66. Spare_Analog_In_8*

| ID | Type | Short Description |
|---|---|---|
| 66 | Unsigned 12 bits | Spare analog input #8.<br>Not commandable. |

Voltage sensing location: not connected

Update frequency: 1 Hz.

### *3.67. Sys_Expose_Down_Cnt*

| ID | Type | Short Description |
|---|---|---|
| 67 | Unsigned 12 bits | Scan table exposure down counter.<br>Not commandable. |

The number of CCD exposures remaining in the current scan table. Let's say that X equals the total number of exposures in the scan table.

Sys_Expose_Down_Cnt is set to X - 1 for the first exposure of the scan table and is decremented for each subsequent exposure in the scan table. For the last exposure of the scan table, Sys_Expose_Down_Cnt is set to zero.

Sys_Expose_Down_Cnt lags the actual erase-expose-convert cycle by one cycle. For example when Sys_Expose_Down_Cnt is X-1, the first erase-expose-convert cycle of the scan table has already been completed and the second cycle is in progress. When Sys_Expose_Down_Cnt is zero, the last erase-expose-convert of the scan table has already been completed and the first cycle of the table is in progress.

### *3.68. Sys_Exposure_Cnt*

| ID | Type | Short Description |
|---|---|---|
| 68 | Unsigned 12 bits | Scan table exposure up counter.<br>Not commandable. |

The number of CCD exposures that have occurred in the current scan table. Let's say that X equals the total number of exposures in the scan table.

Sys_Exposure_Cnt is set to zero for the first exposure of the scan table and is incremented for each subsequent exposure in the scan table. For the last exposure of the scan table, Sys_Exposure_Cnt is set to X - 1.

Sys_Exposure_Cnt lags the actual erase-expose-convert cycle by one cycle. For example when Sys_Exposure_Cnt is 0, the first erase-expose-convert cycle of the scan table has already been completed and the second cycle is in progress. When Sys_Exposure_Cnt is X-1, the last erase-expose-convert of the scan table has already been completed and the first cycle of the table is in progress.

### *3.69. Tel_1_PI_Enab*

| ID | Type | Short Description |
|---|---|---|
| 69 | Boolean (1 bit) | Telescope 1 temperature controller operational mode control .<br>Commandable. |

| | | |
|---|---|---|
| | | 0 = Direct control mode<br>1 = Automatic temperature control mode |

The instrument parameters used to control the operation of the Telescope 1 temperature controller are:

Sensor: Tel_1_Mir_Barrel_Temp
Mode Control: Tel_1_PI_Enab
Setpoint: Tel_1_Temp_Setpt
Proportional Coefficient: Tel_1_PI_Pro_Co
Integral Coefficient: Tel_1_PI_Int_Co
Heater Duty Cycle: Tel_1_Htr_Dut_Cy

If mode control is zero, the temperature controller operates in direct control mode. This means that the heater duty cycle is controlled only by command from the ground. Direct control mode is intended for testing only.

If the mode control is one, the temperature controller operates in closed-loop automatic temperature control mode. The heater duty cycle is controlled automatically to maintain the temperature at the setpoint.

The proportional coefficient determines the magnitude of response to temperature error (temperature error = sensor temperature - setpoint). The proportional coefficient actually defines a band of proportional response so that as the proportional coefficient increases, the temperature controller becomes less sensitive to temperature error.

The integral coefficient controls the response to accumulated (integrated) temperature error. As the integral coefficient increases, the temperature controller becomes more sensitive to accumulated temperature error.

If the temperature controller is in automatic mode and the proportional and integral coefficients are both zero, the temperature controller operates in bang-bang mode. In bang-bang mode, the heater duty cycle is set to 100% if the temperature is below the setpoint and 0% if the temperature is at or above the setpoint.

If the temperature controller is in automatic mode, the proportional coefficient is non-zero and integral coefficient is zero, the temperature controller operates in proportional mode. The heater duty cycle is controlled so that it is proportional to the magnitude of the temperature error.

If the temperature controller is in automatic mode and the proportional and integral coefficients are both non-zero, the temperature controller operates in proportional-integral mode. The heater duty cycle is dependent on both the magnitude of the temperature error and the integral of the temperature error.

### *3.70. Tel_2_PI_Enab*

| ID | Type | Short Description |
|---|---|---|
| 70 | Boolean (1 bit) | Telescope 2 temperature controller operational mode control . Commandable.<br>0 = Direct control mode<br>1 = Automatic temperature control mode |

The instrument parameters used to control the operation of the Telescope 2 temperature controller are:

Sensor: Tel_2_Mir_Barrel_Temp
Mode Control: Tel_2_PI_Enab
Setpoint: Tel_2_Temp_Setpt
Proportional Coefficient: Tel_2_PI_Pro_Co
Integral Coefficient: Tel_2_PI_Int_Co

Heater Duty Cycle: Tel_2_Htr_Dut_Cy
See Section 3.69 for a complete description of temperature controller operation.

### *3.71. Tel_3_PI_Enab*

| ID | Type | Short Description |
|---|---|---|
| 71 | Boolean (1 bit) | Telescope 3 temperature controller operational mode control .<br>Commandable.<br>0 = Direct control mode<br>1 = Automatic temperature control mode |

The instrument parameters used to control the operation of the Telescope 3 temperature controller are:

Sensor: Tel_3_Mir_Barrel_Temp
Mode Control: Tel_3_PI_Enab
Setpoint: Tel_3_Temp_Setpt
Proportional Coefficient: Tel_3_PI_Pro_Co
Integral Coefficient: Tel_3_PI_Int_Co
Heater Duty Cycle: Tel_3_Htr_Dut_Cy
See Section 3.69 for a complete description of temperature controller operation.

### *3.72. Tel_4_PI_Enab*

| ID | Type | Short Description |
|---|---|---|
| 72 | Boolean (1 bit) | Telescope 4 temperature controller operational mode control .<br>Commandable.<br>0 = Direct control mode<br>1 = Automatic temperature control mode |

The instrument parameters used to control the operation of the Telescope 4 temperature controller are:

Sensor: Tel_4_Mir_Barrel_Temp
Mode Control: Tel_4_PI_Enab
Setpoint: Tel_4_Temp_Setpt
Proportional Coefficient: Tel_4_PI_Pro_Co
Integral Coefficient: Tel_4_PI_Int_Co
Heater Duty Cycle: Tel_4_Htr_Dut_Cy
See Section 3.69 for a complete description of temperature controller operation.

### *3.73. Profiler_Rod_PI_Enab*

| ID | Type | Short Description |
|---|---|---|
| 73 | Boolean (1 bit) | Etalon housing mount rod temperature controller operational mode control .<br>Commandable.<br>0 = Direct control mode<br>1 = Automatic temperature control mode |

The instrument parameters used to control the operation of the etalon housing mount rod temperature controller are:

Sensor: Profiler_Etal_Rod_Temp
Mode Control: Profiler_Rod_PI_Enab
Setpoint: Profiler_Rod_Temp_Setpt
Proportional Coefficient: Profiler_Rod_PI_Pro_Co
Integral Coefficient: Profiler_Rod_PI_Int_Co
Heater Duty Cycle: Profiler_Rod_Htr_Dut_Cy

See Section 3.69 for a complete description of temperature controller operation.

### *3.74. Profiler_Leaf_PI_Enab*

| ID | Type | Short Description |
|---|---|---|
| 74 | Boolean (1 bit) | Etalon housing mount leaf temperature controller operational mode control .<br>Commandable.<br>0 = Direct control mode<br>1 = Automatic temperature control mode |

The instrument parameters used to control the operation of the etalon housing mount leaf temperature controller are:

| | |
|---|---|
| Sensor: | Profiler_Etal_Leaf_Temp |
| Mode Control: | Profiler_Leaf_PI_Enab |
| Setpoint: | Profiler_Leaf_Temp_Setpt |
| Proportional Coefficient: | Profiler_Leaf_PI_Pro_Co |
| Integral Coefficient: | Profiler_Leaf_PI_Int_Co |
| Heater Duty Cycle: | Profiler_Leaf_Htr_Dut_Cy |

See Section 3.69 for a complete description of temperature controller operation.

### *3.75. Profiler_Post_PI_Enab*

| ID | Type | Short Description |
|---|---|---|
| 75 | Boolean (1 bit) | Etalon housing mount post temperature controller operational mode control .<br>Commandable.<br>0 = Direct control mode<br>1 = Automatic temperature control mode |

The instrument parameters used to control the operation of the etalon housing mount post temperature controller are:

| | |
|---|---|
| Sensor: | Profiler_Etal_Post_Temp |
| Mode Control: | Profiler_Post_PI_Enab |
| Setpoint: | Profiler_Post_Temp_Setpt |
| Proportional Coefficient: | Profiler_Post_PI_Pro_Co |
| Integral Coefficient: | Profiler_Post_PI_Int_Co |
| Heater Duty Cycle: | Profiler_Post_Htr_Dut_Cy |

See Section 3.69 for a complete description of temperature controller operation.

### *3.76. CCD_PI_Enab*

| ID | Type | Short Description |
|---|---|---|
| 76 | Boolean (1 bit) | CCD temperature controller operational mode control .<br>Commandable.<br>0 = Direct control mode<br>1 = Automatic temperature control mode |

The instrument parameters used to control the operation of the CCD temperature controller are:

| | |
|---|---|
| Sensor: | CCD_Temp |
| Mode Control: | CCD_PI_Enab |
| Setpoint: | CCD_Temp_Setpt |
| Proportional Coefficient: | CCD_PI_Pro_Co |
| Integral Coefficient: | CCD_PI_Int_Co |
| Heater Duty Cycle: | CCD_Htr_Dut_Cy |

See Section 3.69 for a complete description of temperature controller operation.

### *3.77. FPA_Housing_PI_Enab*

| ID | Type | Short Description |
|---|---|---|
| 77 | Boolean (1 bit) | Focal plane assembly (FPA) temperature controller operational mode control .<br>Commandable.<br>0 = Direct control mode<br>1 = Automatic temperature control mode |

The instrument parameters used to control the operation of the FPA temperature controller are:

Sensor: Profiler_Sens_Window_Temp
Mode Control: FPA_Housing_PI_Enab
Setpoint: FPA_Temp_Setpt
Proportional Coefficient: FPA_PI_Pro_Co
Integral Coefficient: FPA_PI_Int_Co
Heater Duty Cycle: FPA_Htr_Dut_Cy

See Section 3.69 for a complete description of temperature controller operation.

### *3.78. FW_Housing_PI_Enab*

| ID | Type | Short Description |
|---|---|---|
| 78 | Boolean (1 bit) | Filter wheel housing temperature controller operational mode control .<br>Commandable.<br>0 = Direct control mode<br>1 = Automatic temperature control mode |

The instrument parameters used to control the operation of the FPA temperature controller are:

Sensor: FW_Housing_Temp
Mode Control: FW_Housing_PI_Enab
Setpoint: FW_Temp_Setpt
Proportional Coefficient: FW_PI_Pro_Co
Integral Coefficient: FW_PI_Int_Co
Heater Duty Cycle: FW_Htr_Dut_Cy

See Section 3.69 for a complete description of temperature controller operation.

### *3.79. Tel_1_Temp_Setpt*

| ID | Type | Short Description |
|---|---|---|
| 79 | Unsigned 12 bits | Telescope 1 temperature setpoint.<br>Commandable. |

See Section 3.69.

### *3.80. Tel_1_PI_Pro_Co*

| ID | Type | Short Description |
|---|---|---|
| 79 | Unsigned 12 bits | Telescope 1 temperature controller proportional coefficient.<br>Commandable. |

See Section 3.69.

### *3.81. Tel_1_PI_Int_Co*

| ID | Type | Short Description |
|---|---|---|
| 80 | Unsigned 12 bits | Telescope 1 temperature controller integral coefficient.<br>Commandable. |

See Section 3.69.

### *3.82. Tel_2_Temp_Setpt*

| ID | Type | Short Description |
|---|---|---|
| 82 | Unsigned 12 bits | Telescope 2 temperature setpoint.<br>Commandable. |

See Section 3.70.

### *3.83. Tel_2_PI_Pro_Co*

| ID | Type | Short Description |
|---|---|---|
| 83 | Unsigned 12 bits | Telescope 2 temperature controller proportional coefficient.<br>Commandable. |

See Section 3.70.

### *3.84. Tel_2_PI_Int_Co*

| ID | Type | Short Description |
|---|---|---|
| 84 | Unsigned 12 bits | Telescope 2 temperature controller integral coefficient.<br>Commandable. |

See Section 3.70.

### *3.85. Tel_3_Temp_Setpt*

| ID | Type | Short Description |
|---|---|---|
| 85 | Unsigned 12 bits | Telescope 3 temperature setpoint.<br>Commandable. |

See Section 3.71.

### *3.86. Tel_3_PI_Pro_Co*

| ID | Type | Short Description |
|---|---|---|
| 86 | Unsigned 12 bits | Telescope 3 temperature controller proportional coefficient.<br>Commandable. |

See Section 3.71.

### *3.87. Tel_3_PI_Int_Co*

| ID | Type | Short Description |
|---|---|---|
| 87 | Unsigned 12 bits | Telescope 3 temperature controller integral coefficient.<br>Commandable. |

See Section 3.71.

### *3.88. Tel_4_Temp_Setpt*

| ID | Type | Short Description |
|---|---|---|
| 88 | Unsigned 12 bits | Telescope 4 temperature setpoint.<br>Commandable. |

See Section 3.72 for a general description of the Telescope 4 temperature controller.

### *3.89. Tel_4_PI_Pro_Co*

| ID | Type | Short Description |
|---|---|---|
| 89 | Unsigned 12 bits | Telescope 4 temperature controller proportional coefficient.<br>Commandable. |

See Section 3.72.

### *3.90. Tel_4_PI_Int_Co*

| ID | Type | Short Description |
|---|---|---|

| | | |
|---|---|---|
| 90 | Unsigned 12 bits | Telescope 4 temperature controller integral coefficient.<br>Commandable. |

See Section 3.72.

### *3.91. Profiler_Rod_Temp_Setpt*

| ID | Type | Short Description |
|---|---|---|
| 91 | Unsigned 12 bits | Etalon housing mount rod temperature setpoint.<br>Commandable. |

See Section 3.73.

### *3.92. Profiler_Rod_PI_Pro_Co*

| ID | Type | Short Description |
|---|---|---|
| 92 | Unsigned 12 bits | Etalon housing mount rod temperature controller integral coefficient.<br>Commandable. |

See Section 3.73.

### *3.93. Profiler_Rod_PI_Int_Co*

| ID | Type | Short Description |
|---|---|---|
| 93 | Unsigned 12 bits | Etalon housing mount rod temperature controller proportional coefficient.<br>Commandable. |

See Section 3.73.

### *3.94. Profiler_Leaf_Temp_Setpt*

| ID | Type | Short Description |
|---|---|---|
| 94 | Unsigned 12 bits | Etalon housing mount leaf temperature setpoint.<br>Commandable. |

See Section 3.74.

### *3.95. Profiler_Leaf_PI_Pro_Co*

| ID | Type | Short Description |
|---|---|---|
| 95 | Unsigned 12 bits | Etalon housing mount leaf temperature controller integral coefficient.<br>Commandable. |

See Section 3.74.

### *3.96. Profiler_Leaf_PI_Int_Co*

| ID | Type | Short Description |
|---|---|---|
| 96 | Unsigned 12 bits | Etalon housing mount leaf temperature controller proportional coefficient.<br>Commandable. |

See Section 3.74.

### *3.97. Profiler_Post_Temp_Setpt*

| ID | Type | Short Description |
|---|---|---|
| 97 | Unsigned 12 bits | Etalon housing mount post temperature setpoint.<br>Commandable. |

See Section 3.75.

### *3.98. Profiler_Post_PI_Pro_Co*

| ID | Type | Short Description |
|---|---|---|
| 98 | Unsigned 12 bits | Etalon housing mount post temperature controller proportional coefficient.<br>Commandable. |

See Section 3.75.

### *3.99. Profiler_Post_PI_Int_Co*

| ID | Type | Short Description |
|---|---|---|
| 99 | Unsigned 12 bits | Etalon housing mount post temperature controller integral coefficient.<br>Commandable. |

See Section 3.75.

### *3.100. CCD_Temp_Setpt*

| ID | Type | Short Description |
|---|---|---|
| 100 | Unsigned 12 bits | CCD temperature setpoint.<br>Commandable. |

See Section 3.76.

### *3.101. CCD_PI_Pro_Co*

| ID | Type | Short Description |
|---|---|---|
| 101 | Unsigned 12 bits | CCD temperature controller proportional coefficient.<br>Commandable. |

See Section 3.76.

### *3.102. CCD_PI_Int_Co*

| ID | Type | Short Description |
|---|---|---|
| 102 | Unsigned 12 bits | CCD temperature controller integral coefficient.<br>Commandable. |

See Section 3.76.

### *3.103. FPA_Temp_Setpt*

| ID | Type | Short Description |
|---|---|---|
| 103 | Unsigned 12 bits | Focal plane assembly temperature setpoint.<br>Commandable. |

See Section 3.77.

### *3.104. FPA_PI_Pro_Co*

| ID | Type | Short Description |
|---|---|---|
| 104 | Unsigned 12 bits | Focal plane assembly temperature controller proportional coefficient.<br>Commandable. |

See Section 3.77.

### *3.105. FPA_PI_Int_Co*

| ID | Type | Short Description |
|---|---|---|
| 105 | Unsigned 12 bits | Focal plane assembly temperature controller integral coefficient.<br>Commandable. |

See Section 3.77.

### *3.106. FW_Temp_Setpt*

| ID | Type | Short Description |
|---|---|---|
| 106 | Unsigned 12 bits | Filter wheel housing temperature setpoint.<br>Commandable. |

See Section 3.78.

### *3.107. FW_PI_Pro_Co*

| ID | Type | Short Description |
|---|---|---|
| 107 | Unsigned 12 bits | Filter wheel housing temperature controller proportional coefficient.<br>Commandable. |

See Section 3.78.

### *3.108. FW_PI_Int_Co*

| ID | Type | Short Description |
|---|---|---|
| 108 | Unsigned 12 bits | Filter wheel housing temperature controller integral coefficient.<br>Commandable. |

See Section 3.78.

### *3.109. Tel_1_Htr_Dut_Cy*

| ID | Type | Short Description |
|---|---|---|
| 109 | Unsigned 8 bits | Telescope 1 heater duty cycle.<br>Commandable. |

Heater location: On the exterior of the underside of the telescope barrel (not the baffle barrel).

The heater duty cycle is commandable, but when the temperature controller is in automatic mode, the heater duty cycle is loaded by the temperature controller once per second. The heater duty cycle can vary between 0 and 99.7% (255 / 256 = 99.7%). See Section 3.69.

### *3.110. Tel_2_Htr_Dut_Cy*

| ID | Type | Short Description |
|---|---|---|
| 110 | Unsigned 8 bits | Telescope 2 heater duty cycle.<br>Commandable. |

Heater location: On the exterior of the underside of the telescope barrel (not the baffle barrel).

The heater duty cycle is commandable, but when the temperature controller is in automatic mode, the heater duty cycle is loaded by the temperature controller once per second. The heater duty cycle can vary between 0 and 99.7% (255 / 256 = 99.7%). See Section 3.70.

### *3.111. Tel_3_Htr_Dut_Cy*

| ID | Type | Short Description |
|---|---|---|
| 111 | Unsigned 8 bits | Telescope 3 heater duty cycle.<br>Commandable. |

Heater location: On the exterior of the underside of the telescope barrel (not the baffle barrel).

The heater duty cycle is commandable, but when the temperature controller is in automatic mode, the heater duty cycle is loaded by the temperature controller once per second. The heater duty cycle can vary between 0 and 99.7% (255 / 256 = 99.7%). See Section 3.71.

### *3.112. Tel_4_Htr_Dut_Cy*

| ID | Type | Short Description |
|---|---|---|
| 112 | Unsigned 8 bits | Telescope 4 heater duty cycle. |

| | | |
|---|---|---|
| | | Commandable. |

Heater location: On the exterior of the underside of the telescope barrel (not the baffle barrel).

The heater duty cycle is commandable, but when the temperature controller is in automatic mode, the heater duty cycle is loaded by the temperature controller once per second. The heater duty cycle can vary between 0 and 99.7% (255 / 256 = 99.7%). See Section 3.72.

### *3.113. Profiler_Rod_Htr_Dut_Cy*

| ID | Type | Short Description |
|---|---|---|
| 113 | Unsigned 8 bits | Etalon housing mount rod heater duty cycle.<br>Commandable. |

Heater location: Mounted on the etalon housing near the post attach point.

The heater duty cycle is commandable, but when the temperature controller is in automatic mode, the heater duty cycle is loaded by the temperature controller once per second. The heater duty cycle can vary between 0 and 99.7% (255 / 256 = 99.7%). See Section 3.73.

### *3.114. Profiler_Leaf_Htr_Dut_Cy*

| ID | Type | Short Description |
|---|---|---|
| 114 | Unsigned 8 bits | Etalon housing mount leaf heater duty cycle.<br>Commandable. |

Heater location: Mounted on the etalon housing near the leaf attach point.

The heater duty cycle is commandable, but when the temperature controller is in automatic mode, the heater duty cycle is loaded by the temperature controller once per second. The heater duty cycle can vary between 0 and 99.7% (255 / 256 = 99.7%). See Section 3.74.

### *3.115. Profiler_Post_Htr_Dut_Cy*

| ID | Type | Short Description |
|---|---|---|
| 115 | Unsigned 8 bits | Etalon housing mount post heater duty cycle.<br>Commandable. |

Heater location: Mounted around the circumference of the cassegrain telescope housing near the post attach point.

The heater duty cycle is commandable, but when the temperature controller is in automatic mode, the heater duty cycle is loaded by the temperature controller once per second. The heater duty cycle can vary between 0 and 99.7% (255 / 256 = 99.7%). See Section 3.75.

### *3.116. CCD_Htr_Dut_Cy*

| ID | Type | Short Description |
|---|---|---|
| 116 | Unsigned 8 bits | CCD heater duty cycle.<br>Commandable. |

Heater location: Mounted on the bottom of the cold finger below the CCD.

The heater duty cycle is commandable, but when the temperature controller is in automatic mode, the heater duty cycle is loaded by the temperature controller once per second. The heater duty cycle can vary between 0 and 99.7% (255 / 256 = 99.7%). See Section 3.76.

### *3.117. FPA_Htr_Dut_Cy*

| ID | Type | Short Description |
|---|---|---|
| 117 | Unsigned 8 bits | Focal plane assembly heater duty cycle.<br>Commandable. |

Heater location: Mounted on the circumference of the sensor housing near the front (window side) of the housing.

The heater duty cycle is commandable, but when the temperature controller is in automatic mode, the heater duty cycle is loaded by the temperature controller once per second. The heater duty cycle can vary between 0 and 99.7% (255 / 256 = 99.7%). See Section 3.77.

### *3.118. FW_Htr_Dut_Cy*

| ID | Type | Short Description |
|---|---|---|
| 118 | Unsigned 8 bits | Filter wheel housing heater duty cycle.<br>Commandable. |

Heater location: Mounted on the bottom of the filter wheel shroud.

The heater duty cycle is commandable, but when the temperature controller is in automatic mode, the heater duty cycle is loaded by the temperature controller once per second. The heater duty cycle can vary between 0 and 99.7% (255 / 256 = 99.7%). See Section 3.78.

### *3.119. Htrs_Grp_1_Overcurr*

| ID | Type | Short Description |
|---|---|---|
| 119 | Boolean (1 bit) | Heater group 1 overcurrent status.<br>Not commandable.<br>0 = Heater group 1 overcurrent condition has not occurred<br>1 = Heater group 1 overcurrent condition has occurred |

For the purpose of monitoring heater currents, the heaters are split into two groups of five heaters each as follows:

Heater Group 1: telescope 1, telescope 2, telescope 3, telescope 4 and etalon housing mount rod.

Heater Group 2: etalon housing mount post, etalon housing mount leaf, FPA, filter wheel housing and CCD.

The motor heater deck sets a status bit if it detects an overcurrent condition in either heater group. Htrs_Grp_1_Overcurr and Htrs_Grp_2_Overcurr reflect the state of the motor heater deck overcurrent status bits. The flight software disables all the heaters in a group when an overcurrent condition is detected. The heaters are not reenabled until the instrument is power cycled or the watchdog timer expires.

### *3.120. Htrs_Grp_2_Overcurr*

| ID | Type | Short Description |
|---|---|---|
| 120 | Boolean (1 bit) | Heater group 2 overcurrent status.<br>Not commandable.<br>0 = Heater group 2 overcurrent conditionhas not occurred<br>1 = Heater group 2 overcurrent condition has occurred |

See Section 3.119.

### *3.121. CCD_Min_Erase_Time*

| ID | Type | Short Description |
|---|---|---|
| 121 | Unsigned 12 bits | CCD minimum erase time (in milliseconds)<br>Commandable. |

CCD_Min_Erase_Time is used to set the erase-expose-convert cycle minimum allowable erase time. CCD_Min_Erase_Time is generally set to the minimum time required to actually erase the CCD.

### *3.122. CCD_V_Dump*

| ID | Type | Short Description |
|---|---|---|
| 122 | Unsigned 12 | CCD controller CCD_V_Dump register value (in rows) |

| | | |
|---|---|---|
| | bits | Commandable. |

CCD_V_Dump is used to set the vertical location of the CCD area of interest. For a more detailed explanation see document 055-3495 TIDI CCD Deck Interface Specification.

### *3.123. CCD_V_Bin_Size*

| ID | Type | Short Description |
|---|---|---|
| 123 | Unsigned 8 bits | CCD area of interest vertical bin size (in pixels)<br>Commandable. |

In spectral science mode, the value of CCD_V_Bin_Size is used to set the vertical size of the CCD area of interest. In image science mode, CCD_V_Bin_Size is ignored and the vertical bin size is set to one. For a more detailed explanation see document 055-3495 TIDI CCD Deck Interface Specification.

### *3.124. CCD_H_Dump_2*

| ID | Type | Short Description |
|---|---|---|
| 124 | Unsigned 12 bits | CCD horizontal dump 2 register value (in wells)<br>Commandable. |

CCD_H_Dump_2 is used to set the horizontal location of the CCD area of interest. For a more detailed explanation see document 055-3495 TIDI CCD Deck Interface Specification.

### *3.125. CCD_Use_D_Out*

| ID | Type | Short Description |
|---|---|---|
| 125 | Boolean (1 bit) | CCD use D-output control bit<br>Commandable.<br>0 = CCD is installed to use the A output.<br>1 = CCD is installed to use the D output. |

The value of CCD_Use_D_Out informs the flight software which way the CCD is physically installed. Depending on the the value of CCD_Use_D_Out, the flight software programs the CCD controller to use the A output or D output.

### *3.126. CCD_Cntl_Reg_2*

| ID | Type | Short Description |
|---|---|---|
| 126 | Unsigned 8 bits | CCD control register 2 value<br>Commandable. |

The value of CCD_Cntl_Reg_2 is copied directly to the CCD controller CCD_CONTROL_2 register. CCD_Control_2 register controls the CCD serial and parallel clock rates. For a more detailed explanation see document 055-3495 TIDI CCD Deck Interface Specification.

### *3.127. CCD_Cntl_Reg_3*

| ID | Type | Short Description |
|---|---|---|
| 127 | Unsigned 8 bits | CCD control register 3 value<br>Commandable. |

The value of CCD_Cntl_Reg_3 is copied to the CCD controller CCD_CONTROL_3 register. CCD_CONTROL_3 controls ADC gain and the CCD mode (MPP or non-MPP). When in spectral science mode, the ADC gain control information in CCD_CONTROL_3 is overridden by the gain information in the binning table. For a more detailed explanation see document 055-3495 TIDI CCD Deck Interface Specification.

### *3.128. CCD_SERH_DAC_Cntl*

| ID | Type | Short Description |
|---|---|---|

| | | |
|---|---|---|
| 128 | Unsigned 8 bits | CCD serial register clock high rail voltage control<br>Commandable. |

CCD_SERH_DAC_Cntl controls the CCD serial register clock high rail DAC output voltage level. When CCD_SERH_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_SERH_DAC_Cntl to a new value and seeing the new value reflected in CCD_SERH_DAC_Volts.

### *3.129. CCD_SERL_DAC_Cntl*

| ID | Type | Short Description |
|---|---|---|
| 129 | Unsigned 8 bits | CCD serial register clock low rail voltage control<br>Commandable. |

CCD_SERL_DAC_Cntl controls the CCD serial register clock low rail DAC output voltage level. When CCD_SERL_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_SERL_DAC_Cntl to a new value and seeing the new value reflected in CCD_SERL_DAC_Volts.

### *3.130. CCD_PARH_DAC_Cntl*

| ID | Type | Short Description |
|---|---|---|
| 130 | Unsigned 8 bits | CCD parallel register clock high rail voltage control<br>Commandable. |

CCD_PARH_DAC_Cntl controls the CCD parallel register clock high rail DAC output voltage level. When CCD_PARH_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_PARH_DAC_Cntl to a new value and seeing the new value reflected in CCD_PARH_DAC_Volts.

### *3.131. CCD_PARL_DAC_Cntl*

| ID | Type | Short Description |
|---|---|---|
| 131 | Unsigned 8 bits | CCD parallel register clock low rail voltage control<br>Commandable. |

CCD_PARL_DAC_Cntl controls the CCD parallel register clock low rail DAC output voltage level. When CCD_PARL_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_PARL_DAC_Cntl to a new value and seeing the new value reflected in CCD_PARL_DAC_Volts.

### *3.132. CCD_SWH_DAC_Cntl*

| ID | Type | Short Description |
|---|---|---|
| 132 | Unsigned 8 bits | CCD summing well clock high rail voltage control<br>Commandable. |

CCD_SWH_DAC_Cntl controls the CCD summing well clock high rail DAC output voltage level. When CCD_SWH_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_SWH_DAC_Cntl to a new value and seeing the new value reflected in CCD_SWH_DAC_Volts.

### *3.133. CCD_SWL_DAC_Cntl*

| ID | Type | Short Description |
|---|---|---|

| | | |
|---|---|---|
| 133 | Unsigned 8 bits | CCD summing well clock low rail voltage control<br>Commandable. |

CCD_SWL_DAC_Cntl controls the CCD summing well clock low rail DAC output voltage level. When CCD_SWL_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_SWL_DAC_Cntl to a new value and seeing the new value reflected in CCD_SWL_DAC_Volts.

### *3.134. CCD_TGH_DAC_Cntl*

| ID | Type | Short Description |
|---|---|---|
| 134 | Unsigned 8 bits | CCD transfer gate clock high rail voltage control<br>Commandable. |

CCD_TGH_DAC_Cntl controls the CCD transfer gate clock high rail DAC output voltage level. When CCD_TGH_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_TGH_DAC_Cntl to a new value and seeing the new value reflected in CCD_TGH_DAC_Volts.

### *3.135. CCD_TGL_DAC_Cntl*

| ID | Type | Short Description |
|---|---|---|
| 135 | Unsigned 8 bits | CCD transfer gate clock low rail voltage control<br>Commandable. |

CCD_TGL_DAC_Cntl controls the CCD transfer gate clock low rail DAC output voltage level. When CCD_TGL_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_TGL_DAC_Cntl to a new value and seeing the new value reflected in CCD_TGL_DAC_Volts.

### *3.136. CCD_P3H_DAC_Cntl*

| ID | Type | Short Description |
|---|---|---|
| 136 | Unsigned 8 bits | CCD MPP gate clock high rail voltage control<br>Commandable. |

CCD_P3H_DAC_Cntl controls the CCD MPP gate clock high rail DAC output voltage level. When CCD_P3H_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_P3H_DAC_Cntl to a new value and seeing the new value reflected in CCD_P3H_DAC_Volts.

### *3.137. CCD_LG_DAC_Cntl*

| ID | Type | Short Description |
|---|---|---|
| 137 | Unsigned 8 bits | CCD last gate voltage control<br>Commandable. |

CCD_LG_DAC_Cntl controls the CCD last gate DAC output voltage level. When CCD_LG_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_LG_DAC_Cntl to a new value and seeing the new value reflected in CCD_LG_DAC_Volts.

### *3.138. CCD_BIAS_DAC_Cntl*

| ID | Type | Short Description |
|---|---|---|

| | | |
|---|---|---|
| 138 | Unsigned 8 bits | CCD dual-slope integrator bias voltage control<br>Commandable. |

CCD_BIAS_DAC_Cntl controls the CCD dual-slope integrator bias voltage level. When CCD_BIAS_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_BIAS_DAC_Cntl to a new value and seeing the new value reflected in CCD_BIAS_DAC_Volts.

### *3.139. CCD_FETREF_DAC_Cntl*

| ID | Type | Short Description |
|---|---|---|
| 139 | Unsigned 8 bits | CCD Vdd reference FET voltage control<br>Commandable. |

CCD_FETREF_DAC_Cntl controls the CCD Vdd reference FET voltage level. When CCD_FETREF_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_FETREF_DAC_Cntl to a new value and seeing the new value reflected in CCD_FETREF_DAC_Volts.

### *3.140. CCD_RD_DAC_Cntl*

| ID | Type | Short Description |
|---|---|---|
| 140 | Unsigned 8 bits | CCD reset drain voltage control<br>Commandable. |

CCD_RD_DAC_Cntl controls the CCD reset drain voltage level. When CCD_RD_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_RD_DAC_Cntl to a new value and seeing the new value reflected in CCD_RD_DAC_Volts.

### *3.141. CCD_RG_DAC_Cntl*

| ID | Type | Short Description |
|---|---|---|
| 141 | Unsigned 8 bits | CCD reset gate clock high rail voltage control<br>Commandable. |

CCD_RG_DAC_Cntl controls the CCD reset gate clock high rail voltage level. When CCD_RG_DAC_Cntl is commanded to a new value, the new value is written to the DAC only at the beginning of the next CCD erase-expose-convert cycle. Therefore there may be a noticeable delay between commanding CCD_RG_DAC_Cntl to a new value and seeing the new value reflected in CCD_RG_DAC_Volts.

### *3.142. Tel_1_Latched_Pos_Err*

| ID | Type | Short Description |
|---|---|---|
| 142 | Boolean (1 bit) | Telescope 1 latched positive position error flag<br>Not commandable. |

Tel_1_Latched_Pos_Err reflects the state of the TEL_1_LATCHED_POS_ERROR status bit in the TS_ERRORS register on the telescope servo deck (see document 055-3477 TIDI Telescope Servo Deck Interface Specification). Tel_1_Latched_Pos_Err is set and latched whenever telescope 1 is out of position in the positive direction (towards the zenith). Tel_1_Latched_Pos_Err is set and latched when a telescope 1 movement is not completed within the allowed time. Tel_1_Latched_Pos_Err is also set and latched anytime telescope 1 is forced out of position.

Once set, Tel_1_Latched_Pos_Err remains set until the next Status TM packet is sent AND the telescope elevation is changed again without error.

### *3.143. Tel_2_Latched_Pos_Err*

| ID | Type | Short Description |
|---|---|---|
| 143 | Boolean (1 bit) | Telescope 2 latched positive position error flag<br>Not commandable. |

Tel_2_Latched_Pos_Err reflects the state of the TEL_2_LATCHED_POS_ERROR status bit in the TS_ERRORS register on the telescope servo deck (see document 055-3477 TIDI Telescope Servo Deck Interface Specification). Tel_2_Latched_Pos_Err is set and latched whenever telescope 2 is out of position in the positive direction (towards the zenith). Tel_2_Latched_Pos_Err is set and latched when a telescope 2 movement is not completed within the allowed time. Tel_2_Latched_Pos_Err is also set and latched anytime telescope 2 is forced out of position.

Once set, Tel_2_Latched_Pos_Err remains set until the next Status TM packet is sent AND the telescope elevation is changed again without error.

### *3.144. Tel_3_Latched_Pos_Err*

| ID | Type | Short Description |
|---|---|---|
| 144 | Boolean (1 bit) | Telescope 3 latched positive position error flag<br>Not commandable. |

Tel_3_Latched_Pos_Err reflects the state of the TEL_3_LATCHED_POS_ERROR status bit in the TS_ERRORS register on the telescope servo deck (see document 055-3477 TIDI Telescope Servo Deck Interface Specification). Tel_3_Latched_Pos_Err is set and latched whenever telescope 3 is out of position in the positive direction (towards the zenith). Tel_3_Latched_Pos_Err is set and latched when a telescope 3 movement is not completed within the allowed time. Tel_3_Latched_Pos_Err is also set and latched anytime telescope 3 is forced out of position.

Once set, Tel_3_Latched_Pos_Err remains set until the next Status TM packet is sent AND the telescope elevation is changed again without error.

### *3.145. Tel_4_Latched_Pos_Err*

| ID | Type | Short Description |
|---|---|---|
| 145 | Boolean (1 bit) | Telescope 4 latched positive position error flag<br>Not commandable. |

Tel_4_Latched_Pos_Err reflects the state of the TEL_4_LATCHED_POS_ERROR status bit in the TS_ERRORS register on the telescope servo deck (see document 055-3477 TIDI Telescope Servo Deck Interface Specification). Tel_4_Latched_Pos_Err is set and latched whenever telescope 4 is out of position in the positive direction (towards the zenith). Tel_4_Latched_Pos_Err is set and latched when a telescope 4 movement is not completed within the allowed time. Tel_4_Latched_Pos_Err is also set and latched anytime telescope 4 is forced out of position.

Once set, Tel_4_Latched_Pos_Err remains set until the next Status TM packet is sent AND the telescope elevation is changed again without error.

### *3.146. Tel_1_Latched_Neg_Err*

| ID | Type | Short Description |
|---|---|---|
| 146 | Boolean (1 bit) | Telescope 1 latched negative position error flag<br>Not commandable. |

Tel_1_Latched_Neg_Err reflects the state of the TEL_1_LATCHED_NEG_ERROR status bit in the TS_ERRORS register on the telescope servo deck (see document 055-3477 TIDI Telescope Servo Deck Interface Specification). Tel_1_Latched_Neg_Err is set and latched whenever telescope 1 is out of position in the negative direction (towards the nadir). Tel_1_Latched_Neg_Err is set and latched when a telescope 1 movement is not completed within the allowed time. Tel_1_Latched_Pos_Err is also set and latched anytime telescope 1 is forced out of position.

Once set, Tel_1_Latched_Neg_Err remains set until the next Status TM packet is sent AND the telescope elevation is changed again without error.

### *3.147. Tel_2_Latched_Neg_Err*

| ID | Type | Short Description |
|---|---|---|
| 147 | Boolean (1 bit) | Telescope 2 latched negative position error flag<br>Not commandable. |

Tel_2_Latched_Neg_Err reflects the state of the TEL_2_LATCHED_NEG_ERROR status bit in the TS_ERRORS register on the telescope servo deck (see document 055-3477 TIDI Telescope Servo Deck Interface Specification). Tel_2_Latched_Neg_Err is set and latched whenever telescope 2 is out of position in the negative direction (towards the nadir). Tel_2_Latched_Neg_Err is set and latched when a telescope 2 movement is not completed within the allowed time. Tel_2_Latched_Pos_Err is also set and latched anytime telescope 2 is forced out of position.

Once set, Tel_2_Latched_Neg_Err remains set until the next Status TM packet is sent AND the telescope elevation is changed again without error.

### *3.148. Tel_3_Latched_Neg_Err*

| ID | Type | Short Description |
|---|---|---|
| 148 | Boolean (1 bit) | Telescope 3 latched negative position error flag<br>Not commandable. |

Tel_3_Latched_Neg_Err reflects the state of the TEL_3_LATCHED_NEG_ERROR status bit in the TS_ERRORS register on the telescope servo deck (see document 055-3477 TIDI Telescope Servo Deck Interface Specification). Tel_3_Latched_Neg_Err is set and latched whenever telescope 3 is out of position in the negative direction (towards the nadir). Tel_3_Latched_Neg_Err is set and latched when a telescope 3 movement is not completed within the allowed time. Tel_3_Latched_Pos_Err is also set and latched anytime telescope 3 is forced out of position.

Once set, Tel_3_Latched_Neg_Err remains set until the next Status TM packet is sent AND the telescope elevation is changed again without error.

### *3.149. Tel_4_Latched_Neg_Err*

| ID | Type | Short Description |
|---|---|---|
| 149 | Boolean (1 bit) | Telescope 4 latched negative position error flag<br>Not commandable. |

Tel_4_Latched_Neg_Err reflects the state of the TEL_4_LATCHED_NEG_ERROR status bit in the TS_ERRORS register on the telescope servo deck (see document 055-3477 TIDI Telescope Servo Deck Interface Specification). Tel_4_Latched_Neg_Err is set and latched whenever telescope 4 is out of position in the negative direction (towards the nadir). Tel_4_Latched_Neg_Err is set and latched when a telescope 4 movement is not completed within the allowed time. Tel_4_Latched_Pos_Err is also set and latched anytime telescope 4 is forced out of position.

Once set, Tel_4_Latched_Neg_Err remains set until the next Status TM packet is sent AND the telescope elevation is changed again without error.

### *3.150. Tel_1_Overcurrent*

| ID | Type | Short Description |
|---|---|---|
| 150 | Boolean (1 bit) | Telescope 1 overcurrent error flag<br>Not commandable. |

Tel_1_Overcurrent is set when the TEL_1_OVER_CURR bit in the TS_MOTOR_CONTROL register on the telescope servo deck is set. TEL_1_OVER_CURR is set when the servo deck detects a servo overcurrent condition. TEL_1_OVER_CURR is cleared automatically by the servo deck 8 seconds after it is set.

When TEL_1_OVER_CURR is set by the servo deck, the flight software disables the telescope 1 servo drive. The only way to restore power to the servo drive is to reboot the flight software.

Tel_1_Overcurrent is cleared only after: a Status TM packet has been transmitted and TEL_1_OVER_CURR is cleared by the servo deck.

### *3.151. Tel_2_Overcurrent*

| ID | Type | Short Description |
|---|---|---|
| 151 | Boolean (1 bit) | Telescope 2 overcurrent error flag<br>Not commandable. |

Tel_2_Overcurrent is set when the TEL_2_OVER_CURR bit in the TS_MOTOR_CONTROL register on the telescope servo deck is set. TEL_2_OVER_CURR is set when the servo deck detects a servo overcurrent condition. TEL_2_OVER_CURR is cleared automatically by the servo deck 8 seconds after it is set.

When TEL_2_OVER_CURR is set by the servo deck, the flight software disables the telescope 2 servo drive. The only way to restore power to the servo drive is to reboot the flight software.

Tel_2_Overcurrent is cleared only after: a Status TM packet has been transmitted and TEL_2_OVER_CURR is cleared by the servo deck.

### *3.152. Tel_3_Overcurrent*

| ID | Type | Short Description |
|---|---|---|
| 152 | Boolean (1 bit) | Telescope 3 overcurrent error flag<br>Not commandable. |

Tel_3_Overcurrent is set when the TEL_3_OVER_CURR bit in the TS_MOTOR_CONTROL register on the telescope servo deck is set. TEL_3_OVER_CURR is set when the servo deck detects a servo overcurrent condition. TEL_3_OVER_CURR is cleared automatically by the servo deck 8 seconds after it is set.

When TEL_3_OVER_CURR is set by the servo deck, the flight software disables the telescope 3 servo drive. The only way to restore power to the servo drive is to reboot the flight software.

Tel_3_Overcurrent is cleared only after: a Status TM packet has been transmitted and TEL_3_OVER_CURR is cleared by the servo deck.

### *3.153. Tel_4_Overcurrent*

| ID | Type | Short Description |
|---|---|---|
| 153 | Boolean (1 bit) | Telescope 4 overcurrent error flag<br>Not commandable. |

Tel_4_Overcurrent is set when the TEL_4_OVER_CURR bit in the TS_MOTOR_CONTROL register on the telescope servo deck is set. TEL_4_OVER_CURR is set when the servo deck detects a servo overcurrent condition. TEL_4_OVER_CURR is cleared automatically by the servo deck 8 seconds after it is set.

When TEL_4_OVER_CURR is set by the servo deck, the flight software disables the telescope 4 servo drive. The only way to restore power to the servo drive is to reboot the flight software.

Tel_4_Overcurrent is cleared only after: a Status TM packet has been transmitted and TEL_4_OVER_CURR is cleared by the servo deck.

### *3.154. Telescopes_Settle_Time*

| ID | Type | Short Description |
|---|---|---|
| 154 | Unsigned 12 bit | Telescope settling time control (in tenths of milliseconds)<br>Commandable. |

The value of Telescopes_Settle_Time is copied to the appropriate servo controller settling time register (TS_SETTLE_1, TS_SETTLE_2, TS_SETTLE_3 or TS_SETTLE_4) when the next telescope elevation change is commanded. See document 055-3477 TIDI Telescope Servo Deck Interface Specification.

### *3.155. Telescopes_Dither_PW*

| ID | Type | Short Description |
|---|---|---|
| 155 | Unsigned 8 bit | Telescope dither pulse width control<br>Commandable. |

The value of Telescopes_Dither_PW is copied to the appropriate servo controller dither pulse width register (TS_DITHER_PW_1, TS_ DITHER_PW_2, TS_ DITHER_PW_3 or TS_ DITHER_PW_4) when the next telescope elevation change is commanded. See document 055-3477 TIDI Telescope Servo Deck Interface Specification.

### *3.156. Tel_1_Dither_Force*

| ID | Type | Short Description |
|---|---|---|
| 156 | Unsigned 8 bit | Telescope 1 dither force control<br>Commandable. |

The value of Tel_1_Dither_Force is copied to the servo controller telescope 1 dither force register, TS_DITHER_FORCE_1, when the next telescope 1 elevation change is commanded. See document 055-3477 TIDI Telescope Servo Deck Interface Specification.

### *3.157. Tel_2_Dither_Force*

| ID | Type | Short Description |
|---|---|---|
| 157 | Unsigned 8 bit | Telescope 2 dither force control<br>Commandable. |

The value of Tel_2_Dither_Force is copied to the servo controller telescope 2 dither force register, TS_DITHER_FORCE_2, when the next telescope 2 elevation change is commanded. See document 055-3477 TIDI Telescope Servo Deck Interface Specification.

### *3.158. Tel_3_Dither_Force*

| ID | Type | Short Description |
|---|---|---|
| 158 | Unsigned 8 bit | Telescope 3 dither force control<br>Commandable. |

The value of Tel_3_Dither_Force is copied to the servo controller telescope 3 dither force register, TS_DITHER_FORCE_3, when the next telescope 3 elevation change is commanded. See document 055-3477 TIDI Telescope Servo Deck Interface Specification.

### *3.159. Tel_4_Dither_Force*

| ID | Type | Short Description |
|---|---|---|
| 159 | Unsigned 8 bit | Telescope 4 dither force control<br>Commandable. |

The value of Tel_4_Dither_Force is copied to the servo controller telescope 4 dither force register, TS_DITHER_FORCE_4, when the next telescope 4 elevation change is commanded. See document 055-3477 TIDI Telescope Servo Deck Interface Specification.

### *3.160. Tel_1_2_Control_Reg*

| ID | Type | Short Description |
|---|---|---|
| 160 | 8 bits | Telescope 1 and 2 PID integrator and dither control<br>Commandable. |

The value of Tel_1_2_Control_Reg is used to control telescope 1 and 2 servo PID integrator and dither functions. Bits 0 and 1 of Tel_1_2_Control_Reg are ignored. Bits 2 through 7 are written to the servo deck TS_TEL_CONTROL register when the next telescope 1 or telescope 2 elevation change is commanded. See document 055-3477 TIDI Telescope Servo Deck Interface Specification for an explanation of the PID integrator and dither control functions.

### *3.161. Tel_3_4_Control_Reg*

| ID | Type | Short Description |
|---|---|---|
| 161 | 8 bits | Telescope 3 and 4 PID integrator and dither control<br>Commandable. |

The value of Tel_3_4_Control_Reg is used to control telescope 3 and 4 servo PID integrator and dither functions. Bits 0 and 1 of Tel_3_4_Control_Reg are ignored. Bits 2 through 7 are written to the servo deck TS_TEL_CONTROL register when the next telescope 3 or telescope 4 elevation change is commanded. See document 055-3477 TIDI Telescope Servo Deck Interface Specification for an explanation of the PID integrator and dither control functions.

### *3.162. Tel_Shut_Step_Rate*

| ID | Type | Short Description |
|---|---|---|
| 162 | 3 bits | Telescope shutter half-step rate<br>Commandable.<br>0 = 2061 Hz.<br>1 = 992 Hz.<br>2 = 658 Hz.<br>3 = 492 Hz.<br>4 = 393 Hz.<br>5 = 327 Hz.<br>6 = 280 Hz.<br>7 = 245 Hz. |

The value of Tel_Shut_Step_Rate controls the half-step rate of all the telescope shutters. One complete revolution takes 400 half-steps. See document 055-3444 TIDI Motor Heater Deck Interface Specification.

### *3.163. FW_1_Hold_Curr_PW*

| ID | Type | Short Description |
|---|---|---|
| 163 | Unsigned 8 bits | Filter wheel 1 holding current control<br>Commandable. |

The value of FW_1_Hold_Curr_PW controls the filter wheel 1 holding current. The value of FW_1_Hold_Curr_PW is copied to the motor heater deck fw1_holdpw register when filter wheel 1 commanded to a new position. See document 055-3444 TIDI Motor Heater Deck Interface Specification.

### *3.164. FW_2_Hold_Curr_PW*

| ID | Type | Short Description |
|---|---|---|
| 164 | Unsigned 8 bits | Filter wheel 2 holding current control<br>Commandable. |

The value of FW_2_Hold_Curr_PW controls the filter wheel 2 holding current. The value of FW_2_Hold_Curr_PW is copied to the motor heater deck fw2_holdpw register when filter wheel 2 commanded to a new position. See document 055-3444 TIDI Motor Heater Deck Interface Specification.

### *3.165. FW_Settle_Time*

| ID | Type | Short Description |
|---|---|---|
| 165 | Unsigned 8 bits | Filter wheel settling time (msec)<br>Commandable. |

The value of FW_Settle_Time is used by the flight software, along with a hard-coded estimated filter wheel movement time, to predict a total filter wheel move and settle time. The predicted filter wheel move and settle time is used, in part, to calculate the CCD erase time.

### *3.166. Sys_Stat_TM_Pkt_Rate*

| ID | Type | Short Description |
|---|---|---|
| 166 | Unsigned 8 bits | Status TM packet rate (seconds / packet)<br>Commandable. |

Sys_Stat_TM_Pkt_Rate is used to set the time between the transmission of Status TM packets.

### *3.167. Comm_Null_Fill_Delay*

| ID | Type | Short Description |
|---|---|---|
| 167 | Unsigned 8 bits | CCSDS TM packet null fill delay (seconds)<br>Commandable. |

Fixed length CCSDS TM packets (262 bytes long) carry all TM from the instrument to the spacecraft. Since the CCSDS TM packets carry variable length TIDI TM packets, it is often the case that partially filled CCSDS TM packets await completion causing a delay before their transmission. Comm_Null_Fill_Delay sets the maximum time that a partially filled CCSDS TM packet will wait before being completed with a Null TM packet and transmitted.

### *3.168. Telescopes_Oblate_Comp_Enab*

| ID | Type | Short Description |
|---|---|---|
| 168 | Boolean (1 bit) | Telescope elevation Earth oblateness and orbital eccentricity compensation control<br>Commandable.<br>0 = compensation disabled<br>1 = compensation enabled |

When Telescopes_Oblate_Comp_Enab is set, the flight software adjusts telescope elevations to compensate for Earth oblateness and spacecraft orbital eccentricity. The compensation is applied once when a telescope is moved to new position and is based on the oblateness and eccentricity conditions that existed when the move was started.

### *3.169. Telescopes_Att_Comp_Enab*

| ID | Type | Short Description |
|---|---|---|
| 169 | Boolean (1 bit) | Telescope elevation spacecraft attitude error compensation control<br>Commandable.<br>0 = compensation disabled<br>1 = compensation enabled |

When Telescopes_Att_Comp_Enab is set, the flight software adjusts telescope elevations to compensate for spacecraft attitude errors (variations from ideal pitch and roll). The compensation is applied once when a telescope is moved to new position and is based on the attitude errors that existed when the move was started.

### *3.170. Telescopes_Mech_Comp_Enab*

| ID | Type | Short Description |
|---|---|---|
| 170 | Boolean (1 bit) | Telescope elevation thermal-mechanical distortion compensation |

| | | |
|---|---|---|
| | | control<br>Commandable.<br>0 = compensation disabled<br>1 = compensation enabled |

When Telescopes_Mech_Comp_Enab is set, the flight software adjusts telescope elevations to compensate for telescope pedestal temperature and mechanical nonlinearity. The compensation is applied once when a telescope is moved to new position and is based on the telescope pedestal temperature at the time the move was started.

### *3.171. Sys_Inhib_Safe_Mode*

| ID | Type | Short Description |
|---|---|---|
| 171 | Boolean (1 bit) | Safe mode inhibit control<br>Commandable.<br>0 = safe mode enabled<br>1 = safe mode inhibited |

When Sys_Inhib_Safe_Mode is set, the instrument will not enter safe mode for any reason. If the instrument is in safe mode and Sys_Inhib_Safe_Mode is changed from zero to one, the instrument will exit safe mode. Sys_Inhib_Safe_Mode is intended to allow instrument testing on the spacecraft regardless of the state of the spacecraft guidance and navigation system.

### *3.172. Telescopes_Shut_Close_Angle*

| ID | Type | Short Description |
|---|---|---|
| 172 | Unsigned 8 bits | Telescope Sun avoidance close angle (cosine of the close angle * 255)<br>Commandable. |

If the angular difference between a telescope boresight and the Sun decreases to Telescopes_Shut_Close_Angle or less, the telescope enters Sun avoidance mode. In Sun avoidance mode, the telescope shutter is closed and the telescope is held at the lowest elevation (toward nadir). When in Sun avoidance mode, the telescope elevation is not commandable.

### *3.173. Telescopes_Shut_Open_Angle*

| ID | Type | Short Description |
|---|---|---|
| 173 | Unsigned 8 bits | Telescope Sun avoidance open angle (cosine of the open angle * 255)<br>Commandable. |

If the angular difference between a telescope boresight and the Sun increases to Telescopes_Shut_Close_Angle or more, the telescope exits Sun avoidance mode. When exiting Sun avoidance mode, the telescope shutter is opened.

### *3.174. Time_UTC_Leap_Seconds*

| ID | Type | Short Description |
|---|---|---|
| 174 | Unsigned 8 bits | UTC leap seconds<br>Commandable. |

Time_UTC_Leap_Seconds is the difference, in seconds, between GPS and UTC time. GPS time is supplied by the spacecraft, but UTC time is used to schedule instrument operation. Time_UTC_Leap_Seconds allows the flight software to convert GPS time to UTC and make it available to control programs.

### *3.175. Control_Prgm_Active_ID*

| ID | Type | Short Description |
|---|---|---|

| | | |
|---|---|---|
| 175 | Unsigned 16 bits | Active control program ID<br>Commandable. |

Control_Prgm_Active_ID contains a 16 bit value that is used to indentify the most recently executed control program. The control program must execute a Load Parameter command to set the value of Control_Prgm_Active_ID because its value is not set autonomously by the flight software.

### *3.176. Control_Prgm_Execution_Flag*

| ID | Type | Short Description |
|---|---|---|
| 176 | Boolean (1 bit) | Control program execution status flag<br>Not commandable.<br>0 = control program is not executing<br>1 = control program is executing |

Control_Prgm_Execution_Flag is set by the flight software whenever a control program is executing.

### *3.177. Control_Prgm_HB_Valid*

| ID | Type | Short Description |
|---|---|---|
| 177 | Boolean (1 bit) | Control program holding buffer (CPHB) validity flag<br>Not commandable.<br>0 = The CPHB may not contain a valid program<br>1 = The CPHB contains a valid program |

Control_Prgm_HB_Valid is set when the CPHB CRC has been calculated and is equal to 0. The CPHB CRC is calculated when a Validate CPHB command is executed or when a Start Control Program Execution command is executed. Control_Prgm_HB_Valid is cleared when an append to CPHB command is executed.

### *3.178. Control_Prgm_Next_Cmd_Offset*

| ID | Type | Short Description |
|---|---|---|
| 178 | Unsigned 16 bit | Control program next command offset (in bytes)<br>Not commandable. |

Control_Prgm_Next_Cmd_Offset is the byte offset, in the control program, of the next command to be executed. The first executable byte in the control program is at offset 0. Before a control program command is executed, Control_Prgm_Next_Cmd_Offset is adjusted to point at the next command in the control program.

### *3.179. Control_Prgm_Equal_Flag*

| ID | Type | Short Description |
|---|---|---|
| 179 | Boolean (1 bit) | Control program equal flag<br>Not commandable.<br>0 = false<br>1 = true |

The state of Control_Prgm_Equal_Flag is determined by the execution of the Compare command. If the source and destination arguments of the Compare command are equal, Control_Prgm_Equal_Flag is set. Otherwise Control_Prgm_Equal_Flag is cleared.

### *3.180. Control_Prgm_GT_Flag*

| ID | Type | Short Description |
|---|---|---|
| 180 | Boolean (1 bit) | Control program greater than flag<br>Not commandable. |

| | | |
|---|---|---|
| | | 0 = false<br>1 = true |

The state of Control_Prgm_Equal_Flag is determined by the execution of the Compare command. If the Compare command source argument is greater than the destination argument, Control_Prgm_GT_Flag is set. If the Compare command source argument is less than the destination argument, Control_Prgm_GT_Flag is cleared. If the arguments are equal, the state of Control_Prgm_Equal_Flag is undefined.

### *3.181. Time_UTC_Day_Number*

| ID | Type | Short Description |
|---|---|---|
| 181 | Unsigned 16 bits | Universal Time day number<br>Not commandable. |

Time_UTC_Day_Number is equal to the number of UTC days since midnight January 6, 1980.

More precisely, Time_UTC_Day_Number is equal to:

(Time_Inst_Seconds - Time_UTC_Leap_Seconds) MOD (24 * 3600)

### *3.182. Time_UTC_Sec_Of_Day*

| ID | Type | Short Description |
|---|---|---|
| 182 | Unsigned 32 bits | Universal Time second of day<br>Not commandable. |

Time_UTC_Sec_Of_Day is the number of seconds since the most recent UTC midnight

More precisely, Time_UTC_Sec_Of_Day is equal to:

(Time_Inst_Seconds - Time_UTC_Leap_Seconds) / (24 * 3600)

### *3.183. Time_Inst_Seconds*

| ID | Type | Short Description |
|---|---|---|
| 183 | Unsigned 32 bits | Instrument Time seconds<br>Not commandable. |

Time_Inst_Seconds is equal to the number of seconds since midnight January 6, 1980. Time_Inst_Seconds is synchronized with spacecraft time which is derived from GPS time.

### *3.184. Time_Inst_Centisecs*

| ID | Type | Short Description |
|---|---|---|
| 184 | Unsigned 8 bits | Instrument Time centiseconds<br>Not commandable. |

Time_Inst_Centisecs is equal to the number of hundredths of a second since the Time_Inst_Seconds last changed value.

### *3.185. Time_Secs_Since_Reset*

| ID | Type | Short Description |
|---|---|---|
| 185 | Unsigned 32 bits | Seconds since most recent CPU reset or instrument software boot<br>Not commandable. |

Time_Secs_Since_Reset is the number of seconds since the instrument was reset or the instrument software was booted. Time_Secs_Since_Reset is cleared whenever the instrument is reset or the instrument software is booted.

### *3.186. Comm_Last_CMD_Seq_Num*

| ID | Type | Short Description |
|---|---|---|
| 186 | Unsigned 11 | Most recently received CCSDS telecommand packet sequence |

| | | |
|---|---|---|
| | bits | source count<br>Not commandable. |

Comm_Last_CMD_Seq_Num is the least significant 11 bits of the 14 bit sequence source count of the most recently received CCSDS telecommand packet.

### *3.187. Comm_CMD_Rec_Errors*

| ID | Type | Short Description |
|---|---|---|
| 187 | Unsigned 16 bits | CCSDS telecommand packet error count<br>Not commandable. |

Comm_CMD_Rec_Errors is increased by one when any of the following CCSDS telecommand errors is detected:

1. Unexpected sequence source count (packet NOT rejected)
2. Invalid version number (packet rejected)
3. Invalid packet secondary header flag (packet rejected)
4. Invalid application process ID (packet rejected)
5. Invalid grouping flags (packet rejected)
6. Invalid packet length (packet rejected)
7. Invalid command block CRC (packet rejected)

### *3.188. Comm_CMD_Pkt_Count*

| ID | Type | Short Description |
|---|---|---|
| 188 | Unsigned 16 bits | CCSDS telecommand packet count<br>Not commandable. |

Comm_CMD_Pkt_Count is equal to the number of CCSDS packets received and not rejected. See Section 3.187 for a list of errors that cause packet rejection.

### *3.189. Comm_Err_Pkt_Count*

| ID | Type | Short Description |
|---|---|---|
| 189 | Unsigned 16 bits | Error report packet count<br>Not commandable. |

Comm_Err_Pkt_Count is equal to the number of error report packets that have been transmitted.

### *3.190. Comm_Err_Q_Overflow*

| ID | Type | Short Description |
|---|---|---|
| 190 | Boolean (1 bit) | Error report packet transmission queue overflowed<br>0 = queue did not overflow<br>1 = queue overflowed<br>Not commandable. |

Comm_Err_Q_Overflow is set when the flight software could not enqueue an error report packet because the error report packet queue was full. Comm_Err_Q_Overflow is cleared when a status TM packet has been transmitted.

### *3.191. Cal_HAK_Lamp_State*

| ID | Type | Short Description |
|---|---|---|
| 191 | Boolean (1 bit) | HAK calibration lamp status<br>0 = lamp off<br>1 = lamp on<br>Not commandable. |

Cal_HAK_Lamp_State reflects the current state of the HAK calibration lamp.

### *3.192. Cal_Neon_Lamp_State*

| ID | Type | Short Description |
|---|---|---|
| 192 | Boolean (1 bit) | Neon calibration lamp status<br>0 = lamp off<br>1 = lamp on<br>Not commandable. |

Cal_Neon_Lamp_State reflects the current state of the neon calibration lamp.

### *3.193. Cal_Inc_1_Lamp_State*

| ID | Type | Short Description |
|---|---|---|
| 193 | Boolean (1 bit) | Incandescent 1 calibration lamp status<br>0 = lamp off<br>1 = lamp on<br>Not commandable. |

Cal_Inc_1_Lamp_State reflects the current state of the incandescent 1 calibration lamp.

### *3.194. Cal_Inc_2_Lamp_State*

| ID | Type | Short Description |
|---|---|---|
| 194 | Boolean (1 bit) | Incandescent 2 calibration lamp status<br>0 = lamp off<br>1 = lamp on<br>Not commandable. |

Cal_Inc_2_Lamp_State reflects the current state of the incandescent 2 calibration lamp.

### *3.195. Tel_1_Shutter_Pos*

| ID | Type | Short Description |
|---|---|---|
| 195 | Boolean (1 bit) | Telescope 1 shutter status<br>When boot code is executing:<br>0 = shutter open<br>1 = shutter closed<br>When instrument software is executing:<br>0 = shutter closed<br>1 = shutter open<br>Not commandable. |

Tel_1_Shutter_Pos reflects the current state of the telescope 1 shutter.

### *3.196. Tel_2_Shutter_Pos*

| ID | Type | Short Description |
|---|---|---|
| 196 | Boolean (1 bit) | Telescope 2 shutter status<br>When boot code is executing:<br>0 = shutter open<br>1 = shutter closed<br>When instrument software is executing:<br>0 = shutter closed<br>1 = shutter open<br>Not commandable. |

Tel_2_Shutter_Pos reflects the current state of the telescope 2 shutter.

### *3.197. Tel_3_Shutter_Pos*

| ID | Type | Short Description |
|---|---|---|

| | | |
|---|---|---|
| 197 | Boolean (1 bit) | Telescope 3 shutter status<br>When boot code is executing:<br>0 = shutter open<br>1 = shutter closed<br>When instrument software is executing:<br>0 = shutter closed<br>1 = shutter open<br>Not commandable. |

Tel_3_Shutter_Pos reflects the current state of the telescope 3 shutter.

### *3.198. Tel_4_Shutter_Pos*

| ID | Type | Short Description |
|---|---|---|
| 198 | Boolean (1 bit) | Telescope 4 shutter status<br>When boot code is executing:<br>0 = shutter open<br>1 = shutter closed<br>When instrument software is executing:<br>0 = shutter closed<br>1 = shutter open<br>Not commandable. |

Tel_4_Shutter_Pos reflects the current state of the telescope 3 shutter.

### *3.199. FW_1_Position*

| ID | Type | Short Description |
|---|---|---|
| 199 | Unsigned 11 bits | Filter wheel 1 current position (0 to 199 steps)<br>Not commandable. |

FW_1_Position reflects the current position of filter wheel 1. The filter wheel position is read directly from the motor heater deck fw1_posn register when the status TM packet is created.

### *3.200. FW_2_Position*

| ID | Type | Short Description |
|---|---|---|
| 200 | Unsigned 11 bits | Filter wheel 2 current position (0 to 199 steps)<br>Not commandable. |

FW_2_Position reflects the current position of filter wheel 2. The filter wheel position is read directly from the motor heater deck fw2_posn register when the status TM packet is created.

### *3.201. FW_1_Latched_Pos_Err*

| ID | Type | Short Description |
|---|---|---|
| 201 | Boolean (1 bit) | Filter wheel 1 latched position error flag<br>Not commandable. |

FW_1_Latched_Pos_Err is set if either of the following conditions exist:

1. Immediately after executing a Set Filter Wheel 1 Position command, filter wheel 1 is not in the commanded position.
2. At the start of the CCD exposure period (the end of the erase period), the motor heater deck master status registers indicates that EITHER filter wheel is moving or is out of position.

FW_1_Latched_Pos_Err is cleared when a status TM packet has been transmitted.

### *3.202. FW_2_Latched_Pos_Err*

| ID | Type | Short Description |
|---|---|---|

| | | |
|---|---|---|
| 202 | Boolean (1 bit) | Filter wheel 2 latched position error flag<br>Not commandable. |

FW_2_Latched_Pos_Err is set if either of the following conditions exist:

1. Immediately after executing a Set Filter Wheel 2 Position command, filter wheel 2 is not in the commanded position.
2. At the start of the CCD exposure period (the end of the erase period), the motor heater deck master status registers indicates that EITHER filter wheel is moving or is out of position.

FW_2_Latched_Pos_Err is cleared when a status TM packet has been transmitted.

### *3.203. FW_1_Max_Overshoot*

| ID | Type | Short Description |
|---|---|---|
| 203 | Signed 8 bits | Filter wheel 1 maximum overshoot<br>Not commandable. |

FW_1_Max_Overshoot is equal to the maximum number of steps of overshoot that occurred during the most recent filter wheel 1 movement. FW_1_Max_Overshoot is read directly from the motor heater deck fw1_over register at the time the status TM packet is built.

### *3.204. FW_2_Max_Overshoot*

| ID | Type | Short Description |
|---|---|---|
| 204 | Signed 8 bits | Filter wheel 2 maximum overshoot<br>Not commandable. |

FW_2_Max_Overshoot is equal to the maximum number of steps of overshoot that occurred during the most recent filter wheel 2 movement. FW_2_Max_Overshoot is read directly from the motor heater deck fw2_over register at the time the status TM packet is built.

### *3.205. Sys_Executing_Boot*

| ID | Type | Short Description |
|---|---|---|
| 205 | Boolean (1 bit) | Executing boot code status flag<br>0 = executing instrument software<br>1 = executing boot code<br>Not commandable. |

Sys_Executing_Boot indicates whether the boot code or the instrument software is executing.

### *3.206. Sys_Inst_Autonomy*

| ID | Type | Short Description |
|---|---|---|
| 206 | Boolean (1 bit) | Instrument autonomy status flag<br>0 = normal (no autonomy condition exists)<br>1 = autonomy condition exists<br>Not commandable. |

The flight software sets Sys_Inst_Autonomy whenever the instrument input current (SC_Inst_Curr) exceeds its red limit (Power_Sup_SC_In_Red_Limit). The spacecraft should respond by powering down the instrument. Sys_Inst_Autonomy is cleared whenever SC_Inst_Curr is less than Power_Sup_SC_In_Red_Limit.

### *3.207. Sys_Sun_Avoid_State*

| ID | Type | Short Description |
|---|---|---|
| 207 | Boolean (1 bit) | Sun avoidance status flag<br>0 = no telescopes are avoiding the Sun<br>1 = a telescope is avoiding the Sun |

| | | |
|---|---|---|
| | | Not commandable. |

Sys_Sun_Avoid_State is set when any telescope is avoiding the Sun and is cleared when no telescopes are avoiding the Sun.

### *3.208. Sys_Safe_Mode_State*

| ID | Type | Short Description |
|---|---|---|
| 208 | Boolean (1 bit) | Safe mode status flag<br>0 = Not in safe mode<br>1 = In safe mode<br>Not commandable. |

Sys_Safe_Mode_State is set when the instrument is in safe mode and cleared when the instrument is not in safe mode.

### *3.209. Sys_Scanning_Flag*

| ID | Type | Short Description |
|---|---|---|
| 209 | Boolean (1 bit) | Scanning status flag<br>0 = Not scanning<br>1 = Scanning<br>Not commandable. |

Sys_Scanning_Flag is set when the instrument is scanning and cleared when the instrument is not scanning.

### *3.210. Sys_Scan_Table_ID*

| ID | Type | Short Description |
|---|---|---|
| 210 | Unsigned 16 bits | Scan table ID<br>Not commandable. |

Sys_Scan_Table_ID reflects the scan table ID contained in the most recently executed scan table.

### *3.211. Sys_Bin_Table_ID*

| ID | Type | Short Description |
|---|---|---|
| 211 | Unsigned 16 bits | Binning table ID<br>Not commandable. |

Sys_Bin_Table_ID reflects the binning table ID contained in the most recently used binning table.

### *3.212. Sys_Reboot_Flag*

| ID | Type | Short Description |
|---|---|---|
| 212 | Boolean (1 bit) | Reboot status flag<br>Not commandable. |

Sys_Reboot_Flag is set when the boot code or the instrument software begins execution. Sys_Reboot_Flag is cleared after a status TM packet has been transmitted.

### *3.213. Power_Sup_SC_In_Red_Limit*

| ID | Type | Short Description |
|---|---|---|
| 213 | Unsigned 12 bits | Spacecraft input current high red limit<br>Commandable. |

If Power_Sup_SC_Inst_Curr exceeds Power_Sup_SC_In_Red_Limit, the instrument autonomy flag (TD_AUT_BIT) in the instrument status word is set indicating to the spacecraft that the instrument should be powered down. The Sys_Inst_Autonomy and Power_Sup_SC_In_Red_Stat IPs are also set when Power_Sup_SC_Inst_Curr exceeds Power_Sup_SC_In_Red_Limit.

### *3.214. Power_Sup_SC_In_Red_Stat*

| ID | Type | Short Description |
|---|---|---|
| 214 | Boolean 1 bit | Spacecraft input current high red limit status<br>Not commandable. |

Power_Sup_SC_In_Red_Stat is set when Power_Sup_SC_Inst_Curr exceeds Power_Sup_SC_In_Red_Limit. Power_Sup_SC_In_Red_Stat is cleared when a status TM packet has been transmitted AND Power_Sup_SC_Inst_Curr is less than Power_Sup_SC_In_Red_Limit.

### *3.215. Spacecraft_Stat_Age*

| ID | Type | Short Description |
|---|---|---|
| 215 | Unsigned 32 bits | Spacecraft status message age (seconds)<br>Not commandable. |

Spacecraft_Stat_Age is equal to the number of seconds since the most recent spacecraft status message was received.

### *3.216. Spacecraft_Warn_1_Val_Stat*

| ID | Type | Short Description |
|---|---|---|
| 216 | Boolean (1 bit) | Spacecraft status message warning flag validity indicator 1<br>0 = The Spacecraft_Day_Night_Stat and Spacecraft_SAA_Stat flags are NOT valid<br>1 = The Spacecraft_Day_Night_Stat and Spacecraft_SAA_Stat flags are valid<br>Not commandable. |

Spacecraft_Warn_1_Val_Stat reflects the value of Bit 15 in Word 0 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.217. Spacecraft_Day_Night_Stat*

| ID | Type | Short Description |
|---|---|---|
| 217 | Boolean (1 bit) | Spacecraft status message day / night indicator<br>0 = spacecraft is on the night side of the terminator<br>1 = spacecraft is on the day side of the terminator<br>Not commandable. |

Spacecraft_Day_Night_Stat reflects the value of Bit 14 in Word 0 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.218. Spacecraft_SAA_Stat*

| ID | Type | Short Description |
|---|---|---|
| 218 | Boolean (1 bit) | Spacecraft status message South Atlantic Anomaly (SAA) indicator<br>0 = spacecraft is NOT in the SAA<br>1 = spacecraft is in the SAA<br>Not commandable. |

Spacecraft_SAA_Stat reflects the value of Bit 13 in Word 0 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.219. Spacecraft_TIDI_Pwr_Stat*

| ID | Type | Short Description |
|---|---|---|

| | | |
|---|---|---|
| 219 | Boolean (1 bit) | Spacecraft status message TIDI power down indicator<br>0 = Normal operation<br>1 = Spacecraft will remove power from TIDI within 10 seconds<br>Not commandable. |

Spacecraft_SAA_Stat reflects the value of Bit 9 in Word 0 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.220. Spacecraft_Warn_2_Val_Stat*

| ID | Type | Short Description |
|---|---|---|
| 220 | Boolean (1 bit) | Spacecraft status message warning flag validity indicator 2<br>0 = The Spacecraft_Yaw_Stat, Spacecraft_Panel_Rot_Stat and Spacecraft_Sun_Safe_Att flags are NOT valid<br>1 = The Spacecraft_Yaw_Stat, Spacecraft_Panel_Rot_Stat and Spacecraft_Sun_Safe_Att flags are valid<br>Not commandable. |

Spacecraft_Warn_2_Val_Stat reflects the value of Bit 7 in Word 0 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.221. Spacecraft_Yaw_Stat*

| ID | Type | Short Description |
|---|---|---|
| 221 | Boolean (1 bit) | Spacecraft status message yaw maneuver indicator<br>0 = Spacecraft is NOT doing a yaw maneuver<br>1 = Spacecraft is doing a yaw maneuver<br>Not commandable. |

Spacecraft_Yaw_Stat reflects the value of Bit 6 in Word 0 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.222. Spacecraft_Panel_Rot_Stat*

| ID | Type | Short Description |
|---|---|---|
| 222 | Boolean (1 bit) | Spacecraft status message solar panel rotation indicator<br>0 = Spacecraft solar panels are NOT rotating<br>1 = Spacecraft solar panels are rotating<br>Not commandable. |

Spacecraft_Panel_Rot_Stat reflects the value of Bit 5 in Word 0 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.223. Spacecraft_Sun_Safe_Att*

| ID | Type | Short Description |
|---|---|---|
| 223 | Boolean (1 bit) | Spacecraft status message spacecraft Sun safe attitude indicator<br>0 = Spacecraft is in nadir pointing or operational attitude mode<br>1 = Spacecraft is in Sun safe attitude mode<br>Not commandable. |

Spacecraft_Sun_Safe_Att reflects the value of Bit 4 in Word 0 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.224. Spacecraft_Low_Volt_Stat*

| ID | Type | Short Description |
|---|---|---|
| 224 | Boolean (1 bit) | Spacecraft status message low voltage indicator<br>0 = Voltage is within limits<br>1 = Voltage is low. Instruments will be turned off within 10 seconds.<br>Not commandable. |

Spacecraft_Low_Volt_Stat reflects the value of Bit 3 in Word 0 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.225. Spacecraft_Nadir_Ptg_Stat*

| ID | Type | Short Description |
|---|---|---|
| 225 | Boolean (1 bit) | Spacecraft status message nadir pointing indicator<br>0 = Spacecraft is in operational mode<br>1 = Spacecraft is in nadir pointing mode<br>Not commandable. |

Spacecraft_Nadir_Ptg_Stat reflects the value of Bit 1 in Word 0 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.226. Spacecraft_Ram_Dir_Status*

| ID | Type | Short Description |
|---|---|---|
| 226 | Boolean (1 bit) | Spacecraft status message ram direction pointing indicator<br>0 = -X axis is in the spacecraft ram direction<br>1 = +X axis is in the spacecraft ram direction<br>Not commandable. |

Spacecraft_Ram_Dir_Status reflects the value of Bit 1 in Word 0 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.227. Spacecraft_Pos_Valid_Stat*

| ID | Type | Short Description |
|---|---|---|
| 227 | Boolean (1 bit) | Spacecraft status message time offset, position and velocity validity indicator<br>0 = Spacecraft status message position and velocity are NOT valid<br>1 = Spacecraft status message position and velocity are valid<br>Not commandable. |

Spacecraft_Pos_Valid_Stat reflects the value of Bit 15 in Word 1 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.228. Spacecraft_Att_Valid_Stat*

| ID | Type | Short Description |
|---|---|---|
| 228 | Boolean (1 bit) | Spacecraft status message G & C time and attitude validity indicator<br>0 = G & C time and attitude are NOT valid<br>1 = G & C time and attitude are valid<br>Not commandable. |

Spacecraft_Att_Valid_Stat reflects the value of Bit 14 in Word 1 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.229. Spacecraft_Sun_V_Valid_Stat*

| ID | Type | Short Description |
|---|---|---|
| 229 | Boolean (1 bit) | Spacecraft status message G & C time and Sun vector validity indicator<br>0 = G & C time and Sun vector are NOT valid<br>1 = G & C time and Sun vector are valid<br>Not commandable. |

Spacecraft_Sun_V_Valid_Stat reflects the value of Bit 13 in Word 1 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.230. Spacecraft_Latitude*

| ID | Type | Short Description |
|---|---|---|
| 230 | Signed 32 bits | Spacecraft status message geodetic spacecraft latitude<br>Not commandable. |

Spacecraft_Latitude reflects the value of Words 2 and 3 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.231. Spacecraft_Longitude*

| ID | Type | Short Description |
|---|---|---|
| 231 | Unsigned 32 bits | Spacecraft status message geodetic spacecraft longitude<br>Not commandable. |

Spacecraft_Longitude reflects the value of Words 4 and 5 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.232. Spacecraft_Height*

| ID | Type | Short Description |
|---|---|---|
| 232 | Unsigned 32 bits | Spacecraft status message spacecraft height<br>Not commandable. |

Spacecraft_Height reflects the value of Words 6 and 7 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.233. Spacecraft_Velocity_East*

| ID | Type | Short Description |
|---|---|---|
| 233 | Signed 32 bits | Spacecraft status message spacecraft eastward velocity<br>Not commandable. |

Spacecraft_Velocity_East reflects the value of Words 8 and 9 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.234. Spacecraft_Velocity_North*

| ID | Type | Short Description |
|---|---|---|
| 234 | Signed 32 bits | Spacecraft status message spacecraft northward velocity |

| | | |
|---|---|---|
| | | Not commandable. |

Spacecraft_Velocity_North reflects the value of Words 10 and 11 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.235. Spacecraft_Velocity_Up*

| ID | Type | Short Description |
|---|---|---|
| 235 | Signed 32 bits | Spacecraft status message spacecraft upward velocity<br>Not commandable. |

Spacecraft_Velocity_Up reflects the value of Words 12 and 13 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.236. Spacecraft_G_and_C_Time*

| ID | Type | Short Description |
|---|---|---|
| 236 | Unsigned 32 bits | Spacecraft status message time when Sun vector and attitude are valid<br>Not commandable. |

Spacecraft_G_and_C_Time reflects the value of Words 14 and 15 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.237. Spacecraft_Sun_Vector_X*

| ID | Type | Short Description |
|---|---|---|
| 237 | Unsigned 16 bits | Spacecraft status message Sun unit vector X component<br>Not commandable. |

Spacecraft_Sun_Vector_X reflects the value of Word 17 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.238. Spacecraft_Sun_Vector_Y*

| ID | Type | Short Description |
|---|---|---|
| 238 | Unsigned 16 bits | Spacecraft status message Sun unit vector Y component<br>Not commandable. |

Spacecraft_Sun_Vector_Y reflects the value of Word 18 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.239. Spacecraft_Sun_Vector_Z*

| ID | Type | Short Description |
|---|---|---|
| 239 | Unsigned 16 bits | Spacecraft status message Sun unit vector Z component<br>Not commandable. |

Spacecraft_Sun_Vector_Z reflects the value of Word 19 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.240. Spacecraft_Roll*

| ID | Type | Short Description |
|---|---|---|
| 240 | Unsigned 32 bits | Spacecraft status message spacecraft roll<br>Not commandable. |

Spacecraft_Roll reflects the value of Words 20 and 21 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.241. Spacecraft_Pitch*

| ID | Type | Short Description |
|---|---|---|
| 241 | Unsigned 32 bits | Spacecraft status message spacecraft pitch<br>Not commandable. |

Spacecraft_Pitch reflects the value of Words 22 and 23 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.242. Spacecraft_Yaw*

| ID | Type | Short Description |
|---|---|---|
| 242 | Unsigned 32 bits | Spacecraft status message spacecraft yaw<br>Not commandable. |

Spacecraft_Yaw reflects the value of Words 24 and 25 of the most recently received spacecraft status message. See Section 3.0 of JHUAPL document 7363-9050 TIMED General Instrument Interface Specification for a detailed of the spacecraft status message.

### *3.243. Control_Prgm_Var_1 through Control_Prgm_Var_32*

| ID | Type | Short Description |
|---|---|---|
| 243 - 274 | Unsigned 32 bits | Control program global variables (CPGV) 1 through 32<br>Commandable. |

The CPGVs can be used for any purpose dreamed up by the instrument operator. The values of the CPGVs are changed only by command.

# 4. Instrument Parameters Listed Alphabetically

| Instrument Parameters Listed Alphabetically | |
|---|---|
| **IP Name** | **IP ID** |
| Cal_HAK_Lamp_State | 191 |
| Cal_Inc_1_Lamp_State | 193 |
| Cal_Inc_2_Lamp_State | 194 |
| Cal_Neon_Lamp_State | 192 |
| CCD_BIAS_DAC_Cntl | 138 |
| CCD_BIAS_DAC_Volts | 52 |
| CCD_Cntl_Reg_2 | 126 |
| CCD_Cntl_Reg_3 | 127 |
| CCD_FETREF_DAC_Cntl | 139 |
| CCD_FETREF_DAC_Volts | 53 |
| CCD_Htr_Dut_Cy | 116 |
| CCD_H_Dump_2 | 124 |
| CCD_LG_DAC_Cntl | 137 |
| CCD_LG_DAC_Volts | 51 |
| CCD_Min_Erase_Time | 121 |
| CCD_P3H_DAC_Cntl | 136 |
| CCD_P3H_DAC_Volts | 50 |
| CCD_PARH_DAC_Cntl | 130 |
| CCD_PARH_DAC_Volts | 44 |
| CCD_PARL_DAC_Cntl | 131 |
| CCD_PARL_DAC_Volts | 45 |
| CCD_PI_Enab | 76 |
| CCD_PI_Int_Co | 102 |
| CCD_PI_Pro_Co | 101 |
| CCD_RD_DAC_Cntl | 140 |
| CCD_RD_DAC_Volts | 54 |
| CCD_RG_DAC_Cntl | 141 |
| CCD_RG_DAC_Volts | 55 |
| CCD_SERH_DAC_Cntl | 128 |
| CCD_SERH_DAC_Volts | 42 |
| CCD_SERL_DAC_Cntl | 129 |
| CCD_SERL_DAC_Volts | 43 |
| CCD_SWH_DAC_Cntl | 132 |
| CCD_SWH_DAC_Volts | 46 |
| CCD_SWL_DAC_Cntl | 133 |
| CCD_SWL_DAC_Volts | 47 |
| CCD_Temp | 41 |
| CCD_Temp_Setpt | 100 |
| CCD_TGH_DAC_Cntl | 134 |
| CCD_TGH_DAC_Volts | 48 |
| CCD_TGL_DAC_Cntl | 135 |
| CCD_TGL_DAC_Volts | 49 |
| CCD_Use_D_Out | 125 |
| CCD_V_Bin_Size | 123 |
| CCD_V_Dump | 122 |
| Comm_CMD_Pkt_Count | 188 |
| Comm_CMD_Rec_Errors | 187 |
| Comm_Err_Pkt_Count | 189 |
| Comm_Err_Q_Overflow | 190 |
| Comm_Last_CMD_Seq_Num | 186 |
| Comm_Null_Fill_Delay | 167 |

| | |
|---|---|
| Control_Prgm_Active_ID | 175 |
| Control_Prgm_Equal_Flag | 179 |
| Control_Prgm_Execution_Flag | 176 |
| Control_Prgm_GT_Flag | 180 |
| Control_Prgm_HB_Valid | 177 |
| Control_Prgm_Next_Cmd_Offset | 178 |
| Control_Prgm_Var_1 | 243 |
| Control_Prgm_Var_10 | 252 |
| Control_Prgm_Var_11 | 253 |
| Control_Prgm_Var_12 | 254 |
| Control_Prgm_Var_13 | 255 |
| Control_Prgm_Var_14 | 256 |
| Control_Prgm_Var_15 | 257 |
| Control_Prgm_Var_16 | 258 |
| Control_Prgm_Var_17 | 259 |
| Control_Prgm_Var_18 | 260 |
| Control_Prgm_Var_19 | 261 |
| Control_Prgm_Var_2 | 244 |
| Control_Prgm_Var_20 | 262 |
| Control_Prgm_Var_21 | 263 |
| Control_Prgm_Var_22 | 264 |
| Control_Prgm_Var_23 | 265 |
| Control_Prgm_Var_24 | 266 |
| Control_Prgm_Var_25 | 267 |
| Control_Prgm_Var_26 | 268 |
| Control_Prgm_Var_27 | 269 |
| Control_Prgm_Var_28 | 270 |
| Control_Prgm_Var_29 | 271 |
| Control_Prgm_Var_3 | 245 |
| Control_Prgm_Var_30 | 272 |
| Control_Prgm_Var_31 | 273 |
| Control_Prgm_Var_32 | 274 |
| Control_Prgm_Var_4 | 246 |
| Control_Prgm_Var_5 | 247 |
| Control_Prgm_Var_6 | 248 |
| Control_Prgm_Var_7 | 249 |
| Control_Prgm_Var_8 | 250 |
| Control_Prgm_Var_9 | 251 |
| DA_Deck_AD_Conv_Temp | 20 |
| FC_Deck_Hybrid_1553_Temp | 16 |
| FPA_Housing_PI_Enab | 77 |
| FPA_Htr_Dut_Cy | 117 |
| FPA_PI_Int_Co | 105 |
| FPA_PI_Pro_Co | 104 |
| FPA_Temp_Setpt | 103 |
| FW_1_Hold_Curr_PW | 163 |
| FW_1_Latched_Pos_Err | 201 |
| FW_1_Max_Overshoot | 203 |
| FW_1_Position | 199 |
| FW_2_Hold_Curr_PW | 164 |
| FW_2_Latched_Pos_Err | 202 |
| FW_2_Max_Overshoot | 204 |
| FW_2_Position | 200 |
| FW_Housing_PI_Enab | 78 |
| FW_Housing_Temp | 13 |
| FW_Htr_Dut_Cy | 118 |
| FW_PI_Int_Co | 108 |

| | |
|---|---|
| FW_PI_Pro_Co | 107 |
| FW_Settle_Time | 165 |
| FW_Temp_Setpt | 106 |
| Htrs_Grp_1_Overcurr | 119 |
| Htrs_Grp_2_Overcurr | 120 |
| Power_Sup_Avg_Neg_6_Curr | 25 |
| Power_Sup_Avg_Pos_6_Curr | 24 |
| Power_Sup_CCD_Pos_26_V | 62 |
| Power_Sup_Deck_Temp | 15 |
| Power_Sup_Lamp_Pos_28_V | 61 |
| Power_Sup_Neg_15_Volts | 58 |
| Power_Sup_Pos_15_Volts | 57 |
| Power_Sup_Pos_28_Cal_Curr | 26 |
| Power_Sup_Pos_5_Volts | 56 |
| Power_Sup_SC_Input_Volts | 21 |
| Power_Sup_SC_Inst_Curr | 22 |
| Power_Sup_SC_In_Red_Limit | 213 |
| Power_Sup_SC_In_Red_Stat | 214 |
| Power_Sup_SC_Oper_Htr_Curr | 23 |
| Power_Sup_Servo_Neg_6_V | 60 |
| Power_Sup_Servo_Pos_6_V | 59 |
| Profiler_Etal_Leaf_Temp | 18 |
| Profiler_Etal_Post_Temp | 19 |
| Profiler_Etal_Rod_Temp | 17 |
| Profiler_House_Base_Temp | 14 |
| Profiler_Leaf_Htr_Dut_Cy | 114 |
| Profiler_Leaf_PI_Enab | 74 |
| Profiler_Leaf_PI_Int_Co | 96 |
| Profiler_Leaf_PI_Pro_Co | 95 |
| Profiler_Leaf_Temp_Setpt | 94 |
| Profiler_Post_Htr_Dut_Cy | 115 |
| Profiler_Post_PI_Enab | 75 |
| Profiler_Post_PI_Int_Co | 99 |
| Profiler_Post_PI_Pro_Co | 98 |
| Profiler_Post_Temp_Setpt | 97 |
| Profiler_Rod_Htr_Dut_Cy | 113 |
| Profiler_Rod_PI_Enab | 73 |
| Profiler_Rod_PI_Int_Co | 93 |
| Profiler_Rod_PI_Pro_Co | 92 |
| Profiler_Rod_Temp_Setpt | 91 |
| Profiler_Sens_Preamp_Temp | 27 |
| Profiler_Sens_Window_Temp | 28 |
| Spacecraft_Att_Valid_Stat | 228 |
| Spacecraft_Day_Night_Stat | 217 |
| Spacecraft_G_and_C_Time | 236 |
| Spacecraft_Height | 232 |
| Spacecraft_Latitude | 230 |
| Spacecraft_Longitude | 231 |
| Spacecraft_Low_Volt_Stat | 224 |
| Spacecraft_Nadir_Ptg_Stat | 225 |
| Spacecraft_Panel_Rot_Stat | 222 |
| Spacecraft_Pitch | 241 |
| Spacecraft_Pos_Valid_Stat | 227 |
| Spacecraft_Ram_Dir_Status | 226 |
| Spacecraft_Roll | 240 |
| Spacecraft_SAA_Stat | 218 |
| Spacecraft_Stat_Age | 215 |

| | |
|---|---|
| Spacecraft_Sun_Safe_Att | 223 |
| Spacecraft_Sun_Vector_X | 237 |
| Spacecraft_Sun_Vector_Y | 238 |
| Spacecraft_Sun_Vector_Z | 239 |
| Spacecraft_Sun_V_Valid_Stat | 229 |
| Spacecraft_TIDI_Pwr_Stat | 219 |
| Spacecraft_Velocity_East | 233 |
| Spacecraft_Velocity_North | 234 |
| Spacecraft_Velocity_Up | 235 |
| Spacecraft_Warn_1_Val_Stat | 216 |
| Spacecraft_Warn_2_Val_Stat | 220 |
| Spacecraft_Yaw | 242 |
| Spacecraft_Yaw_Stat | 221 |
| Spare_Analog_In_1 | 2 |
| Spare_Analog_In_2 | 5 |
| Spare_Analog_In_3 | 8 |
| Spare_Analog_In_4 | 11 |
| Spare_Analog_In_5 | 63 |
| Spare_Analog_In_6 | 64 |
| Spare_Analog_In_7 | 65 |
| Spare_Analog_In_8 | 66 |
| Sys_Bin_Table_ID | 211 |
| Sys_Executing_Boot | 205 |
| Sys_Expose_Down_Cnt | 67 |
| Sys_Exposure_Cnt | 68 |
| Sys_Inhib_Safe_Mode | 171 |
| Sys_Inst_Autonomy | 206 |
| Sys_Reboot_Flag | 212 |
| Sys_Safe_Mode_State | 208 |
| Sys_Scanning_Flag | 209 |
| Sys_Scan_Table_ID | 210 |
| Sys_Stat_TM_Pkt_Rate | 166 |
| Sys_Sun_Avoid_State | 207 |
| Telescopes_Att_Comp_Enab | 169 |
| Telescopes_Dither_PW | 155 |
| Telescopes_Mech_Comp_Enab | 170 |
| Telescopes_Oblate_Comp_Enab | 168 |
| Telescopes_Settle_Time | 154 |
| Telescopes_Shut_Close_Angle | 172 |
| Telescopes_Shut_Open_Angle | 173 |
| Tel_1_2_Control_Reg | 160 |
| Tel_1_Dither_Force | 156 |
| Tel_1_Htr_Dut_Cy | 109 |
| Tel_1_Latched_Neg_Err | 146 |
| Tel_1_Latched_Pos_Err | 142 |
| Tel_1_Mir_Barrel_Temp | 1 |
| Tel_1_Motor_Hold_Curr | 31 |
| Tel_1_Overcurrent | 150 |
| Tel_1_Pedestal_Temp | 3 |
| Tel_1_PI_Enab | 69 |
| Tel_1_PI_Int_Co | 81 |
| Tel_1_PI_Pro_Co | 80 |
| Tel_1_Position | 29 |
| Tel_1_Position_Error | 30 |
| Tel_1_Shutter_Pos | 195 |
| Tel_1_Temp_Setpt | 79 |
| Tel_2_Dither_Force | 157 |

| | |
|---|---|
| Tel_2_Htr_Dut_Cy | 110 |
| Tel_2_Latched_Neg_Err | 147 |
| Tel_2_Latched_Pos_Err | 143 |
| Tel_2_Mir_Barrel_Temp | 4 |
| Tel_2_Motor_Hold_Curr | 34 |
| Tel_2_Overcurrent | 151 |
| Tel_2_Pedestal_Temp | 6 |
| Tel_2_PI_Enab | 70 |
| Tel_2_PI_Int_Co | 84 |
| Tel_2_PI_Pro_Co | 83 |
| Tel_2_Position | 32 |
| Tel_2_Position_Error | 33 |
| Tel_2_Shutter_Pos | 196 |
| Tel_2_Temp_Setpt | 82 |
| Tel_3_4_Control_Reg | 161 |
| Tel_3_Dither_Force | 158 |
| Tel_3_Htr_Dut_Cy | 111 |
| Tel_3_Latched_Neg_Err | 148 |
| Tel_3_Latched_Pos_Err | 144 |
| Tel_3_Mir_Barrel_Temp | 7 |
| Tel_3_Motor_Hold_Curr | 37 |
| Tel_3_Overcurrent | 152 |
| Tel_3_Pedestal_Temp | 9 |
| Tel_3_PI_Enab | 71 |
| Tel_3_PI_Int_Co | 87 |
| Tel_3_PI_Pro_Co | 86 |
| Tel_3_Position | 35 |
| Tel_3_Position_Error | 36 |
| Tel_3_Shutter_Pos | 197 |
| Tel_3_Temp_Setpt | 85 |
| Tel_4_Dither_Force | 159 |
| Tel_4_Htr_Dut_Cy | 112 |
| Tel_4_Latched_Neg_Err | 149 |
| Tel_4_Latched_Pos_Err | 145 |
| Tel_4_Mir_Barrel_Temp | 10 |
| Tel_4_Motor_Hold_Curr | 40 |
| Tel_4_Overcurrent | 153 |
| Tel_4_Pedestal_Temp | 12 |
| Tel_4_PI_Enab | 72 |
| Tel_4_PI_Int_Co | 90 |
| Tel_4_PI_Pro_Co | 89 |
| Tel_4_Position | 38 |
| Tel_4_Position_Error | 39 |
| Tel_4_Shutter_Pos | 198 |
| Tel_4_Temp_Setpt | 88 |
| Tel_Shut_Step_Rate | 162 |
| Time_Inst_Centisecs | 184 |
| Time_Inst_Seconds | 183 |
| Time_Secs_Since_Reset | 185 |
| Time_UTC_Day_Number | 181 |
| Time_UTC_Leap_Seconds | 174 |
| Time_UTC_Sec_Of_Day | 182 |

# 5. Instrument Parameters Listed by Type

| Instrument Parameters Listed by Type | | |
|---|---|---|
| **IP Type** | **IP Name** | **IP ID** |
| CCD Control | CCD_BIAS_DAC_Cntl | 138 |
| CCD Control | CCD_Cntl_Reg_2 | 126 |
| CCD Control | CCD_Cntl_Reg_3 | 127 |
| CCD Control | CCD_FETREF_DAC_Cntl | 139 |
| CCD Control | CCD_H_Dump_2 | 124 |
| CCD Control | CCD_LG_DAC_Cntl | 137 |
| CCD Control | CCD_Min_Erase_Time | 121 |
| CCD Control | CCD_P3H_DAC_Cntl | 136 |
| CCD Control | CCD_PARH_DAC_Cntl | 130 |
| CCD Control | CCD_PARL_DAC_Cntl | 131 |
| CCD Control | CCD_RD_DAC_Cntl | 140 |
| CCD Control | CCD_RG_DAC_Cntl | 141 |
| CCD Control | CCD_SERH_DAC_Cntl | 128 |
| CCD Control | CCD_SERL_DAC_Cntl | 129 |
| CCD Control | CCD_SWH_DAC_Cntl | 132 |
| CCD Control | CCD_SWL_DAC_Cntl | 133 |
| CCD Control | CCD_TGH_DAC_Cntl | 134 |
| CCD Control | CCD_TGL_DAC_Cntl | 135 |
| CCD Control | CCD_Use_D_Out | 125 |
| CCD Control | CCD_V_Bin_Size | 123 |
| CCD Control | CCD_V_Dump | 122 |
| Control Program | Control_Prgm_Active_ID | 175 |
| Control Program | Control_Prgm_Equal_Flag | 179 |
| Control Program | Control_Prgm_Execution_Flag | 176 |
| Control Program | Control_Prgm_GT_Flag | 180 |
| Control Program | Control_Prgm_HB_Valid | 177 |
| Control Program | Control_Prgm_Next_Cmd_Offset | 178 |
| Control Program | Control_Prgm_Var_1 | 243 |
| Control Program | Control_Prgm_Var_10 | 252 |
| Control Program | Control_Prgm_Var_11 | 253 |
| Control Program | Control_Prgm_Var_12 | 254 |
| Control Program | Control_Prgm_Var_13 | 255 |
| Control Program | Control_Prgm_Var_14 | 256 |
| Control Program | Control_Prgm_Var_15 | 257 |
| Control Program | Control_Prgm_Var_16 | 258 |
| Control Program | Control_Prgm_Var_17 | 259 |
| Control Program | Control_Prgm_Var_18 | 260 |
| Control Program | Control_Prgm_Var_19 | 261 |
| Control Program | Control_Prgm_Var_2 | 244 |
| Control Program | Control_Prgm_Var_20 | 262 |
| Control Program | Control_Prgm_Var_21 | 263 |
| Control Program | Control_Prgm_Var_22 | 264 |
| Control Program | Control_Prgm_Var_23 | 265 |
| Control Program | Control_Prgm_Var_24 | 266 |
| Control Program | Control_Prgm_Var_25 | 267 |
| Control Program | Control_Prgm_Var_26 | 268 |
| Control Program | Control_Prgm_Var_27 | 269 |
| Control Program | Control_Prgm_Var_28 | 270 |
| Control Program | Control_Prgm_Var_29 | 271 |
| Control Program | Control_Prgm_Var_3 | 245 |
| Control Program | Control_Prgm_Var_30 | 272 |

| | | |
|---|---|---|
| Control Program | Control_Prgm_Var_31 | 273 |
| Control Program | Control_Prgm_Var_32 | 274 |
| Control Program | Control_Prgm_Var_4 | 246 |
| Control Program | Control_Prgm_Var_5 | 247 |
| Control Program | Control_Prgm_Var_6 | 248 |
| Control Program | Control_Prgm_Var_7 | 249 |
| Control Program | Control_Prgm_Var_8 | 250 |
| Control Program | Control_Prgm_Var_9 | 251 |
| Current | Power_Sup_Avg_Neg_6_Curr | 25 |
| Current | Power_Sup_Avg_Pos_6_Curr | 24 |
| Current | Power_Sup_Pos_28_Cal_Curr | 26 |
| Current | Power_Sup_SC_Inst_Curr | 22 |
| Current | Power_Sup_SC_Oper_Htr_Curr | 23 |
| Current | Tel_1_Motor_Hold_Curr | 31 |
| Current | Tel_1_Overcurrent | 150 |
| Current | Tel_2_Motor_Hold_Curr | 34 |
| Current | Tel_2_Overcurrent | 151 |
| Current | Tel_3_Motor_Hold_Curr | 37 |
| Current | Tel_3_Overcurrent | 152 |
| Current | Tel_4_Motor_Hold_Curr | 40 |
| Current | Tel_4_Overcurrent | 153 |
| Filter Wheel Control | FW_1_Hold_Curr_PW | 163 |
| Filter Wheel Control | FW_2_Hold_Curr_PW | 164 |
| Filter Wheel Control | FW_Settle_Time | 165 |
| Limit | Power_Sup_SC_In_Red_Limit | 213 |
| Limit | Power_Sup_SC_In_Red_Stat | 214 |
| Miscellaneous | Cal_HAK_Lamp_State | 191 |
| Miscellaneous | Cal_Inc_1_Lamp_State | 193 |
| Miscellaneous | Cal_Inc_2_Lamp_State | 194 |
| Miscellaneous | Cal_Neon_Lamp_State | 192 |
| Miscellaneous | Comm_CMD_Pkt_Count | 188 |
| Miscellaneous | Comm_CMD_Rec_Errors | 187 |
| Miscellaneous | Comm_Err_Pkt_Count | 189 |
| Miscellaneous | Comm_Err_Q_Overflow | 190 |
| Miscellaneous | Comm_Last_CMD_Seq_Num | 186 |
| Miscellaneous | Comm_Null_Fill_Delay | 167 |
| Miscellaneous | Sys_Bin_Table_ID | 211 |
| Miscellaneous | Sys_Executing_Boot | 205 |
| Miscellaneous | Sys_Expose_Down_Cnt | 67 |
| Miscellaneous | Sys_Exposure_Cnt | 68 |
| Miscellaneous | Sys_Inhib_Safe_Mode | 171 |
| Miscellaneous | Sys_Inst_Autonomy | 206 |
| Miscellaneous | Sys_Reboot_Flag | 212 |
| Miscellaneous | Sys_Safe_Mode_State | 208 |
| Miscellaneous | Sys_Scanning_Flag | 209 |
| Miscellaneous | Sys_Scan_Table_ID | 210 |
| Miscellaneous | Sys_Stat_TM_Pkt_Rate | 166 |
| Miscellaneous | Sys_Sun_Avoid_State | 207 |
| Miscellaneous | Telescopes_Att_Comp_Enab | 169 |
| Miscellaneous | Telescopes_Mech_Comp_Enab | 170 |
| Miscellaneous | Telescopes_Oblate_Comp_Enab | 168 |
| Miscellaneous | Telescopes_Shut_Close_Angle | 172 |
| Miscellaneous | Telescopes_Shut_Open_Angle | 173 |
| Miscellaneous | Time_Inst_Centisecs | 184 |
| Miscellaneous | Time_Inst_Seconds | 183 |
| Miscellaneous | Time_Secs_Since_Reset | 185 |
| Miscellaneous | Time_UTC_Day_Number | 181 |

| | | |
|---|---|---|
| Miscellaneous | Time_UTC_Leap_Seconds | 174 |
| Miscellaneous | Time_UTC_Sec_Of_Day | 182 |
| Position | FW_1_Position | 199 |
| Position | FW_2_Position | 200 |
| Position | Tel_1_Position | 29 |
| Position | Tel_1_Shutter_Pos | 195 |
| Position | Tel_2_Position | 32 |
| Position | Tel_2_Shutter_Pos | 196 |
| Position | Tel_3_Position | 35 |
| Position | Tel_3_Shutter_Pos | 197 |
| Position | Tel_4_Position | 38 |
| Position | Tel_4_Shutter_Pos | 198 |
| Position Error | FW_1_Latched_Pos_Err | 201 |
| Position Error | FW_1_Max_Overshoot | 203 |
| Position Error | FW_2_Latched_Pos_Err | 202 |
| Position Error | FW_2_Max_Overshoot | 204 |
| Position Error | Tel_1_Latched_Neg_Err | 146 |
| Position Error | Tel_1_Latched_Pos_Err | 142 |
| Position Error | Tel_1_Position_Error | 30 |
| Position Error | Tel_2_Latched_Neg_Err | 147 |
| Position Error | Tel_2_Latched_Pos_Err | 143 |
| Position Error | Tel_2_Position_Error | 33 |
| Position Error | Tel_3_Latched_Neg_Err | 148 |
| Position Error | Tel_3_Latched_Pos_Err | 144 |
| Position Error | Tel_3_Position_Error | 36 |
| Position Error | Tel_4_Latched_Neg_Err | 149 |
| Position Error | Tel_4_Latched_Pos_Err | 145 |
| Position Error | Tel_4_Position_Error | 39 |
| Spacecraft | Spacecraft_Att_Valid_Stat | 228 |
| Spacecraft | Spacecraft_Day_Night_Stat | 217 |
| Spacecraft | Spacecraft_G_and_C_Time | 236 |
| Spacecraft | Spacecraft_Height | 232 |
| Spacecraft | Spacecraft_Latitude | 230 |
| Spacecraft | Spacecraft_Longitude | 231 |
| Spacecraft | Spacecraft_Low_Volt_Stat | 224 |
| Spacecraft | Spacecraft_Nadir_Ptg_Stat | 225 |
| Spacecraft | Spacecraft_Panel_Rot_Stat | 222 |
| Spacecraft | Spacecraft_Pitch | 241 |
| Spacecraft | Spacecraft_Pos_Valid_Stat | 227 |
| Spacecraft | Spacecraft_Ram_Dir_Status | 226 |
| Spacecraft | Spacecraft_Roll | 240 |
| Spacecraft | Spacecraft_SAA_Stat | 218 |
| Spacecraft | Spacecraft_Stat_Age | 215 |
| Spacecraft | Spacecraft_Sun_Safe_Att | 223 |
| Spacecraft | Spacecraft_Sun_Vector_X | 237 |
| Spacecraft | Spacecraft_Sun_Vector_Y | 238 |
| Spacecraft | Spacecraft_Sun_Vector_Z | 239 |
| Spacecraft | Spacecraft_Sun_V_Valid_Stat | 229 |
| Spacecraft | Spacecraft_TIDI_Pwr_Stat | 219 |
| Spacecraft | Spacecraft_Velocity_East | 233 |
| Spacecraft | Spacecraft_Velocity_North | 234 |
| Spacecraft | Spacecraft_Velocity_Up | 235 |
| Spacecraft | Spacecraft_Warn_1_Val_Stat | 216 |
| Spacecraft | Spacecraft_Warn_2_Val_Stat | 220 |
| Spacecraft | Spacecraft_Yaw | 242 |
| Spacecraft | Spacecraft_Yaw_Stat | 221 |
| Spare | Spare_Analog_In_1 | 2 |

| | | |
|---|---|---|
| Spare | Spare_Analog_In_2 | 5 |
| Spare | Spare_Analog_In_3 | 8 |
| Spare | Spare_Analog_In_4 | 11 |
| Spare | Spare_Analog_In_5 | 63 |
| Spare | Spare_Analog_In_6 | 64 |
| Spare | Spare_Analog_In_7 | 65 |
| Spare | Spare_Analog_In_8 | 66 |
| Telescope Control | Telescopes_Dither_PW | 155 |
| Telescope Control | Telescopes_Settle_Time | 154 |
| Telescope Control | Tel_1_2_Control_Reg | 160 |
| Telescope Control | Tel_1_Dither_Force | 156 |
| Telescope Control | Tel_2_Dither_Force | 157 |
| Telescope Control | Tel_3_4_Control_Reg | 161 |
| Telescope Control | Tel_3_Dither_Force | 158 |
| Telescope Control | Tel_4_Dither_Force | 159 |
| Telescope Control | Tel_Shut_Step_Rate | 162 |
| Temperature | CCD_Temp | 41 |
| Temperature | DA_Deck_AD_Conv_Temp | 20 |
| Temperature | FC_Deck_Hybrid_1553_Temp | 16 |
| Temperature | FW_Housing_Temp | 13 |
| Temperature | Power_Sup_Deck_Temp | 15 |
| Temperature | Profiler_Etal_Leaf_Temp | 18 |
| Temperature | Profiler_Etal_Post_Temp | 19 |
| Temperature | Profiler_Etal_Rod_Temp | 17 |
| Temperature | Profiler_House_Base_Temp | 14 |
| Temperature | Profiler_Sens_Preamp_Temp | 27 |
| Temperature | Profiler_Sens_Window_Temp | 28 |
| Temperature | Tel_1_Mir_Barrel_Temp | 1 |
| Temperature | Tel_1_Pedestal_Temp | 3 |
| Temperature | Tel_2_Mir_Barrel_Temp | 4 |
| Temperature | Tel_2_Pedestal_Temp | 6 |
| Temperature | Tel_3_Mir_Barrel_Temp | 7 |
| Temperature | Tel_3_Pedestal_Temp | 9 |
| Temperature | Tel_4_Mir_Barrel_Temp | 10 |
| Temperature | Tel_4_Pedestal_Temp | 12 |
| Temperature Control | CCD_Htr_Dut_Cy | 116 |
| Temperature Control | CCD_PI_Enab | 76 |
| Temperature Control | CCD_PI_Int_Co | 102 |
| Temperature Control | CCD_PI_Pro_Co | 101 |
| Temperature Control | CCD_Temp_Setpt | 100 |
| Temperature Control | FPA_Housing_PI_Enab | 77 |
| Temperature Control | FPA_Htr_Dut_Cy | 117 |
| Temperature Control | FPA_PI_Int_Co | 105 |
| Temperature Control | FPA_PI_Pro_Co | 104 |
| Temperature Control | FPA_Temp_Setpt | 103 |
| Temperature Control | FW_Housing_PI_Enab | 78 |
| Temperature Control | FW_Htr_Dut_Cy | 118 |
| Temperature Control | FW_PI_Int_Co | 108 |
| Temperature Control | FW_PI_Pro_Co | 107 |
| Temperature Control | FW_Temp_Setpt | 106 |
| Temperature Control | Htrs_Grp_1_Overcurr | 119 |
| Temperature Control | Htrs_Grp_2_Overcurr | 120 |
| Temperature Control | Profiler_Leaf_Htr_Dut_Cy | 114 |
| Temperature Control | Profiler_Leaf_PI_Enab | 74 |
| Temperature Control | Profiler_Leaf_PI_Int_Co | 96 |
| Temperature Control | Profiler_Leaf_PI_Pro_Co | 95 |
| Temperature Control | Profiler_Leaf_Temp_Setpt | 94 |

| | | |
|---|---|---|
| Temperature Control | Profiler_Post_Htr_Dut_Cy | 115 |
| Temperature Control | Profiler_Post_PI_Enab | 75 |
| Temperature Control | Profiler_Post_PI_Int_Co | 99 |
| Temperature Control | Profiler_Post_PI_Pro_Co | 98 |
| Temperature Control | Profiler_Post_Temp_Setpt | 97 |
| Temperature Control | Profiler_Rod_Htr_Dut_Cy | 113 |
| Temperature Control | Profiler_Rod_PI_Enab | 73 |
| Temperature Control | Profiler_Rod_PI_Int_Co | 93 |
| Temperature Control | Profiler_Rod_PI_Pro_Co | 92 |
| Temperature Control | Profiler_Rod_Temp_Setpt | 91 |
| Temperature Control | Tel_1_Htr_Dut_Cy | 109 |
| Temperature Control | Tel_1_PI_Enab | 69 |
| Temperature Control | Tel_1_PI_Int_Co | 81 |
| Temperature Control | Tel_1_PI_Pro_Co | 80 |
| Temperature Control | Tel_1_Temp_Setpt | 79 |
| Temperature Control | Tel_2_Htr_Dut_Cy | 110 |
| Temperature Control | Tel_2_PI_Enab | 70 |
| Temperature Control | Tel_2_PI_Int_Co | 84 |
| Temperature Control | Tel_2_PI_Pro_Co | 83 |
| Temperature Control | Tel_2_Temp_Setpt | 82 |
| Temperature Control | Tel_3_Htr_Dut_Cy | 111 |
| Temperature Control | Tel_3_PI_Enab | 71 |
| Temperature Control | Tel_3_PI_Int_Co | 87 |
| Temperature Control | Tel_3_PI_Pro_Co | 86 |
| Temperature Control | Tel_3_Temp_Setpt | 85 |
| Temperature Control | Tel_4_Htr_Dut_Cy | 112 |
| Temperature Control | Tel_4_PI_Enab | 72 |
| Temperature Control | Tel_4_PI_Int_Co | 90 |
| Temperature Control | Tel_4_PI_Pro_Co | 89 |
| Temperature Control | Tel_4_Temp_Setpt | 88 |
| Voltage | CCD_BIAS_DAC_Volts | 52 |
| Voltage | CCD_FETREF_DAC_Volts | 53 |
| Voltage | CCD_LG_DAC_Volts | 51 |
| Voltage | CCD_P3H_DAC_Volts | 50 |
| Voltage | CCD_PARH_DAC_Volts | 44 |
| Voltage | CCD_PARL_DAC_Volts | 45 |
| Voltage | CCD_RD_DAC_Volts | 54 |
| Voltage | CCD_RG_DAC_Volts | 55 |
| Voltage | CCD_SERH_DAC_Volts | 42 |
| Voltage | CCD_SERL_DAC_Volts | 43 |
| Voltage | CCD_SWH_DAC_Volts | 46 |
| Voltage | CCD_SWL_DAC_Volts | 47 |
| Voltage | CCD_TGH_DAC_Volts | 48 |
| Voltage | CCD_TGL_DAC_Volts | 49 |
| Voltage | Power_Sup_CCD_Pos_26_V | 62 |
| Voltage | Power_Sup_Lamp_Pos_28_V | 61 |
| Voltage | Power_Sup_Neg_15_Volts | 58 |
| Voltage | Power_Sup_Pos_15_Volts | 57 |
| Voltage | Power_Sup_Pos_5_Volts | 56 |
| Voltage | Power_Sup_SC_Input_Volts | 21 |
| Voltage | Power_Sup_Servo_Neg_6_V | 60 |
| Voltage | Power_Sup_Servo_Pos_6_V | 59 |