

**2001 MARS SURVEYOR ORBITER
GAMMA RAY SPECTROMETER
FLIGHT SOFTWARE MESSAGE DICTIONARY**

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1 Introduction

1.1 Document Purpose

This document is intended to be used as a message dictionary to define all of the messages and error messages and their formats that can be generated for the GRS instrument.

1.2 Applicable Documents

2 GRS Messages

This section lists the format of the messages the GRS flight software generate

2.1 General GRS Message Format

The following diagram shows the format of a general GRS message. It is composed of a code (8 bits), a command id# (16 bits), a message (16 bits), and a time (16 bits).

Code (8 bits)
Commad ID# (16 bits)
Message (16 bits)
Time (16 bits)

2.1.1 CODE

The code is an 8 bit code signifying to the type of message that is being sent.

The code will be between 0 and 255. Each code will have a defined format of the data to follow.

2.1.2 COMMAND ID#

This 16 bit field is the command id for which the message was generated. If the message was not in response to a command this field will be zero or will contain information which is defined in the individual message definitions.

2.1.3 MESSAGE

This 16 bit field is for additional information about the message.

2.1.4 TIME

This 16 bit field contains the CEB time this message was generated. Some messages will use this field for other information. The individual messages information will contain the exact information contained.

3 SPECIFIC MESSAGES

3.1 MESSAGES

3.1.1 Orbit Period

- Priority - 0

Sent after calculation of an orbit duration. This is done at startup and when an Ascending Equator Crossing command is received.

MSG_ORBIT_PERIOD (8 bits)
Orbit time (32 bits)
CEB Time (16 bits)

- Orbit Time – the time in milliseconds of the next orbit
- CEB Time – the CEB time of this message

3.1.2 Pixel Periods

- Priority – 0

Sent when pixel durations are recalculated, when an equator crossing command is received.

MSG_PIXEL_PERIODS (8 bits)
Gamma Pixel (16 bits)
LANL Pixel (16 bits)
HEND Pixel (16 bits)

- Gamma Pixel – the gamma pixel period in milliseconds.
- LANL Pixel – the LANL pixel period in milliseconds.
- HEND Pixel – the HEND pixel period in milliseconds.

3.1.3 Engineering Table Change

- Priority - 4

Sent when a change is made to the Analog Table.

MSG_TABLE_CHANGE (8 bits)
Command ID# (16 bits)
Parameter (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Parameter – the table value id.
- CEB Time – the CEB time of this message

3.1.4 Spacecraft Time1

- Priority - 0

Sent in response to a spacecraft time command.

MSG_SC_TIME1 (8 bits)
SC TIME (upper) (32 bits)
CEB Rollover (16 bits)

- SC Time – the spacecraft time (seconds portion) at the issue of the time discrete.
- CEB Rollover – the CEB rollover count at the receipt of the time discrete.

3.1.5 Spacecraft Time2

- Priority - 0

Sent in response to a spacecraft time command.

MSG_SC_TIME2 (8 bits)
Padding (16 bits)
SC TIME (lower) (16 bits)
CEB Time (16 bits)

- SC Time – the spacecraft time (1/65635 of a second portion) at the issue of the time discrete.
- CEB Time – the CEB time at the receipt of the time discrete.

3.1.6 Spacecraft Time Delta

- Priority – 0

Sent in response to a S/C time command

MSG_SC_TIME_DELTA (8 bits)
Delta (32 bits)
CEB Time (16 bits)

- Delta – the calculated delta between S/C time and CEB time.
- CEB Time – the CEB time of this message

3.1.7 Ascending Equator Crossing

- Priority - 0

Sent in response to a spacecraft Ascending Equator Crossing command.

MSG_EQ_CROSS_ASC (8 bits)
Next Cross Time (32 bits)
CEB Time (16 bits)

- Next Cross Time – the spacecraft time at the next equator crossing
- CEB Time – the CEB time of this message

3.1.8 Command Done

- Priority – 1, 2

Sent at the execution of a command.

MSG_COMMAND_DONE (8 bits)
Command ID# (16 bits)
Completion Code (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Completion Code – if the command executed with no errors this value will be zero otherwise it will be the error message id of the last error that occurred..
- CEB Time – the CEB time of this message

3.1.9 Trace Level

- Priority - 4

Sent in response to a Change Trace Level command.

MSG_TRACE_LEVEL (8 bits)
Command ID# (16 bits)
Value (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Value - contains the new trace level.
- CEB Time – the CEB time of this message

3.1.10 Interrupt Count

- Priority - 4

Sent at gamma pixel intervals. One message per interrupt.

MSG_INTER_CNT (8 bits)
Count (16 bits)
Which Interrupt (16 bits)
CEB Time (16 bits)

- Count - the number of times an interrupt was called.
- Which Interrupt – the Interrupt the count is for. (MSG_DMA_INTER, MSG_SC_INTER, MSG_PIXEL_INTER, MSG_CEB1_INTER, MSG_CEB2_INTER)
- CEB Time – the CEB time of this message

3.1.11 Current Version

- Priority – 0

Sent in response to a Version Command

MSG_ VERSION (8 bits)
Command ID# (16 bits)
Version (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Version – the current version number.
- CEB Time – the CEB time of this message

3.1.12 Command Added to Delayed List

- Priority – 1,2

Sent when a command is added to the Delayed Commands List.

MSG_ ADDED_DELAYED (8 bits)
Command ID# (16 bits)
Delayed Count (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Delayed Count – the number of commands in the delayed list.
- CEB Time – the CEB time of this message

3.1.13 Timing

- Priority - 1

Sent a gamma pixel boundaries. This is the amount of time actually spent doing some sort of processing in the main loop.

MSG_ TIMING (8 bits)
Execution Time (32 bits)
CEB Time (16 bits)

- Execution Time – the execution time from heartbeat to heartbeat.
- CEB Time – the CEB time of this message

3.1.14 Interupt Timing

- Priority - 1

This is the amount of time spent in an interrupt during one gamma pixel.

MSG_INTERRUPT_TIMING (8 bits)
Execution Time (16 bits)
Interupt (16 bits)
CEB Time (16 bits)

- Execution Time – the time in the interupt from heartbeat to heartbeat.
- Interupt - the interupt.
- CEB Time – the CEB time of this message

3.1.15 Shutdown

- Priority - 0

Sent when a Shutdown command is received from the spacecraft.

MSG_SHUTDOWN (8 bits)
Reason (16 bits)
Rollover (16 bits)
CEB Time (16 bits)

- Reason – reason for the shutdown.
- Rollover – the CEB rollover counter.
- CEB Time – the CEB time of this message

3.1.16 Hend Power Change

- Priority - 0

MSG_HEND_POWER (8 bits)
Padding (16 bits)
On Off (16 bits)
CEB Time (16 bits)

- On Off – the state being switch to.
- CEB Time – the CEB time of this message

3.1.17 S/C Anneal Door Enable

- Priority - 0

MSG_ ANNEAL_CMD (8 bits)
Padding (16 bits)
Enable (16 bits)
CEB Time (16 bits)

- Enable – the state the enable switch was set to.
- CEB Time – the CEB time of this message

3.1.18 Heartbeat Count

- Priority – 0

Sent in response to a Heartbeat Count Command

MSG_ HEARTBEAT (8 bits)
Command ID# (16 bits)
Heartbeat Count (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Heartbeat Count – the number heartbeat messages sent.
- CEB Time – the CEB time of this message

3.1.19 Action Complete

- Priority – 1

Sent in response to a Delayed action being completed

MSG_ ACTION_COMPLETE (8 bits)
Padding (16 bits)
Action (16 bits)
CEB Time (16 bits)

- Padding - filler.
- Action – the action just completed.

- CEB Time – the CEB time of this message

3.1.20 Power State Change

- Priority – 3

Sent in response to an instrument being turned on or off

MSG_ POWER_CHANGE (8 bits)
On/Off (16 bits)
Instrument (16 bits)
CEB Time (16 bits)

- On/Off – On or Off (1 or 0).
- Instrument – the instrument being turned on or off (Gamma, LANL or one of the heaters).
- CEB Time – the CEB time of this message

3.1.21 Anneal State Change

- Priority – 0

The anneal process has switch to a different state

MSG_CHANGE_ANNEAL_STATE (8 bits)
State (16 bits)
padding (16 bits)
CEB Time (16 bits)

- State – state being switched to (ANNEAL_WARMUP1, ANNEAL_WARMUP2, ANNEAL_WARMUP3, ANNEAL_STEADY, ANNEAL_MONITOR, ANNEAL_DONE).
- CEB Time – the CEB time of this message

3.1.22 Executing Sequence

- Priority – 1

A sequence is being executed.

MSG_SEQ_EXEC (8 bits)
Side (16 bits)
Numcmds (16 bits)
Index (16 bits)

- Side – the eerpom side the sequence is from.
- Numcmds – the number of commands in the sequence.
- Index – the sequence number

3.1.23 Ramping Gamma

- Priority – 1

A ramp command has been sent to the gamma instrument.

MSG_GAMMA_RAMP (8 bits)
padding (16 bits)
DAC level (16 bits)
CEB Time (16 bits)

- DAC level – the level the DAC has just been set to.

3.1.24 Parameter Change

- Priority – 4

A parameter value has been changed.

MSG_PARAM_CHANGE (8 bits)
index (16 bits)
value (16 bits)
CEB Time (16 bits)

- index – the parameter index.
- Value – the value changed to.

3.1.25 S/C Anneal Enable

- Priority - 0

MSG_ ANNEAL_ ENABLE_ CMD (8 bits)
Padding (16 bits)
Enable (16 bits)
CEB Time (16 bits)

- Enable – the state the enable switch was set to.
- CEB Time – the CEB time of this message

3.1.26 Loader Completed EEPROM Check

- Priority - 0

MSG_ FSW_ EEPROM_ PASSED (8 bits)
Loaded FSW Version Number (16 bits)
MSG_ LOADER (16 bits)
CEB Time (16 bits)

- Loaded FSW Version Number – Current loaded FSW version number
- CEB Time – the CEB time of this message

3.1.27 Loader Memory Check Completed

- Priority - 0

MSG_ LDR_ MEM_ PASSED (8 bits)
Version Number (16 bits)
Which Program (16 bits)
CEB Time (16 bits)

- Version Number – Version number of current mini-loader when “Which Program” is MSG_MINI_MEM_CHECK or version number of current loader when “Which Program” is MSG_LDR_RAM_CHECK
- Which Program – which program passed the memory check:
 MSG_MINI_MEM_CHECK: RAM/EEPROM checks passed in mini-loader or
 MSG_LDR_RAM_CHECK: RAM check passed in loader
- CEB Time – the CEB time of this message.

3.1.28 Loader Initialization Done

- Priority - 0

MSG_LDR_INIT_DONE(8 bits)
Curr_loader (16 bits)
Curr_fsw (16 bits)
CEB Time (16 bits)

- Curr_loader – the side pattern (0xA00A or 0xB11B) of the current running loader
- Curr_fsw – the side pattern (0xA00A or 0xB11B) of the current loaded FSW
- CEB Time – the CEB time of this message

3.2 ERRORS

3.2.1 DMA Error

MSG_DMA_ERR (8 bits)
DMA Area (16 bits)
Bad Segment (16 bits)
CEB Time (16 bits)

- DMA Area – the DMA buffer that was bad
- Segment – the segment within the buffer that was bad
- CEB Time – the CEB time of this message

3.2.2 Spacecraft DMA buffer Not Read

There was not enough room in the internal buffer to store command information from the spacecraft.

MSG_SC_DATA_NOT_READ (8 bits)
bytes lost (16 bits)
#bytes available (16 bits)
CEB Time (16 bits)

- Bytes lost – number of bytes in DMA buffer.
- Bytes available – number of bytes available in the internal buffer.
- CEB Time – the CEB time of this message

3.2.3 Data Packet Not Sent

A Data packet has been over written and not transmitted to the spacecraft.

MSG_DATA_NOT_SENT (8 bits)
Packet Count (16 bits)
Packet (16 bits)
CEB Time (16 bits)

- Packet Count – The count of the packet not sent. This is the counter specific to the data type.
- Packet – the data packet that was not sent, ie Profile, Hi_Eng, etc.
- CEB Time – the CEB time of this message

3.2.4 Analog Parameter Unknown

The analog index is unknown.

MSG_TABLE_UNKNOWN (8 bits)
Command ID# (16 bits)
Parameter (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Parameter - index number (see .
- CEB Time – the CEB time of this message

3.2.5 Analog Setting Unknown

Attempt to set an unknown table entry.

MSG_TABLE_SETTING (8 bits)
Command ID# (16 bits)
Setting (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Setting -
- CEB Time – the CEB time of this message

3.2.6 Analog Table Change Out of Range

MSG_TABLE_VALUE (8 bits)
Command ID# (16 bits)
Value (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Value – the out of range value attempted to be set.
- CEB Time – the CEB time of this message

3.2.7 Too Many Commands For Delayed List

Sent if the Delayed Command List is full and an attempt is made to add another command.

MSG_2_MANY_CMDS (8 bits)
Command ID# (16 bits)
Delayed Size (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Delayed Size – Number of command already in the Delayed list.
- CEB Time – the CEB time of this message

3.2.8 Sequence does not Fit in Delayed List

Sent if the requested Sequence won't fit into the Delayed Command List.

MSG_SEQ_WONT_FIT (8 bits)
Command ID# (16 bits)
Sequence # (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Sequence # – Number of the sequence that won't fit into the Delayed list.
- CEB Time – the CEB time of this message

3.2.9 Bad Checksum

Sent if a command is received with a bad checksum.

MSG_BAD_CHECKSUM (8 bits)
Command ID# (16 bits)
Opcode (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Opcode – the opcode of the command.
- CEB Time – the CEB time of this message

3.2.10 Spacecraft Buffer not Read

If a command is received and the complete command has not been transmitted by the spacecraft.

MSG_NOT_READ_SCBUF (8 bits)
OP_Code# (16 bits)
Size (16 bits)
CEB Time (16 bits)

- Op Code – opcode of command.
- Size – the attempted read size
- CEB Time – the CEB time of this message

3.2.11 Old Command

If a command in the Delayed List is discovered to have a time or pixel that has already passed.

MSG_OLD_COMMAND (8 bits)
Command ID# (16 bits)
Pixel or Time Requested (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Pixel or Time – the requested pixel or time.
- CEB Time – the CEB time of this message

3.2.12 Hi Engineering Full

The Hi_Engineering buffer is full and no more values can be added.

MSG_HI_ENG_FULL (8 bits)
Analog Parameter (16 bits)
Value (16 bits)
CEB Time (16 bits)

- Analog Paramter – The index of the analog value.
- Value – the value of the reading
- CEB Time – the CEB time of this message

3.2.13 Gamma Queue Full

An attempt to add a command to the Gamma Command Queue failed because the queue was already full.

MSG_GAMMA_Q_FULL (8 bits)
Command ID# (16 bits)
of Commands in Q (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- # of Commands in Q – how many command are in the queue already
- CEB Time – the CEB time of this message

3.2.14 LANL Queue Full

An attempt to add a command to the LANL Command Queue failed because the queue was already full.

MSG_LANL_Q_FULL (8 bits)
Command ID# (16 bits)
of Commands in Q (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- # of Commands in Q – how many command are in the queue already
- CEB Time – the CEB time of this message

3.2.15 Bad Trace Level

An attempt to set a trace level that is out of range.

MSG_BAD_TRACE_LEVEL (8 bits)
Command ID# (16 bits)
Level Requested (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Level Requested – the out of range level.

- CEB Time – the CEB time of this message

3.2.16 Dump Too Long

A dump command was issued requesting too large a dump.

MSG_DUMP_TOO_LONG (8 bits)
Command ID# (16 bits)
Requested Size (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Requested Size – the size of the requested dump.
- CEB Time – the CEB time of this message

3.2.17 Dump Address Error

The address to dump is out of range.

MSG_DUMP_ADDRESS (8 bits)
Command ID# (16 bits)
Address (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Address – the requested address
- CEB Time – the CEB time of this message

3.2.18 Undefined Code Error

An undefined code interrupt has been received.

MSG_UNDEF_CODE_INTER (8 bits)
of Times (16 bits)
Padding (16 bits)
CEB Time (16 bits)

- # of Times - the count of how many times undefined interrupt has been called.
- CEB Time – the CEB time of this message

3.2.19 Divide By Zero Error

A divide by zero interrupt has been received.

MSG_DIV_ZERO_INTER (8 bits)
of Times (16 bits)
Padding (16 bits)
CEB Time (16 bits)

- # of Times - the count of how many times a divide by zero error has occurred.
- CEB Time – the time of the message.

3.2.20 Invalid Command

An invalid command has been received.

MSG_INVALID_CMD (8 bits)
Command ID# (16 bits)
Padding (16 bits)
CEB Time (16 bits)

- Command ID# - the id of the bad command.
- CEB Time – the time of the message

3.2.21 Equator Crossing Command Came too Late

Received an equator crossing command too close the the equator crossing time.

MSG_EQ_CROSS_TOO_LATE (8 bits)
Cross Time (32 bits)
CEB Time (16 bits)

- Cross Time - the of the upcoming equator crossing.
- CEB Time – the current CEB time.

3.2.22 EEPROM Write Failed

A write to EEPROM failed.

MSG_EEPROM_WRITE_FAIL (8 bits)
Padding (16 bits)
Type (16 bits)
CEB Time (16 bits)

- Type - the type of failure, WRITE_NOT_OK or WRITE_NOT_GOOD.
- CEB Time – the current CEB time.

3.2.23 Change Sequence Failed

An attempt to modify a sequence in EEPROM failed.

MSG_CHR_SEQ_FAILED (8 bits)
Command ID# (16 bits)
Sequence # (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Sequence # - the sequence to modify.
- CEB Time – the current CEB time.

3.2.24 Power Not OK

After an attempt to turn power on to an instrument the hardware did not show the power to be OK.

MSG_PWR_NOT_OK (8 bits)
Command ID# (16 bits)
Instrument (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Instrument - the instrument for which power on failed (GRS or LANL).
- CEB Time – the current CEB time.

3.2.25 No Data Available

There is no data to be transmitted from an instrument, even though the signal was received that data should be available.

MSG_NO_DATA (8 bits)
Data Count (16 bits)
Instrument (16 bits)
CEB Time (16 bits)

- Data Count – the count of what is available
- Instrument - the instrument for which there is no data (LANL).
- CEB Time – the current CEB time.

3.2.26 Incorrect Amount of Data

Did not receive the correct amount of data from an instrument.

MSG_BAD_SIZE (8 bits)
Data Count (16 bits)
Instrument (16 bits)
CEB Time (16 bits)

- Data Count – the count of what is available
- Instrument - the instrument for which data count is incorrect (LANL).
- CEB Time – the current CEB time.

3.2.27 LANL Register Mismatch

The LANL registers received at the beginning of the LANL data are not what was expected.

MSG_BAD_LANL_REG (8 bits)
Value (16 bits)
Register # (16 bits)
CEB Time (16 bits)

- Value – the value receive in the packet
- Register - the bad register number.
- CEB Time – the current CEB time.

3.2.28 Incorrect Lanl Pixel Number

The Pixel number received at the beginning of the LANL data was not what was expected.

MSG_BAD_LANL_PIX (8 bits)
LANL Pixel (16 bits)
Expected Pixel (16 bits)
CEB Time (16 bits)

- LANL Pixel – the received pixel number.
- Expected Pixel - the expected pixel number.
- CEB Time – the current CEB time.

3.2.29 Invalid CEB Timer

The CEB timer requested does not exist.

MSG_INVALID_CEB (8 bits)
Command Id (16 bits)
Requested CEB timer (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Requested CEB timer - the requested timer.
- CEB Time – the current CEB time.

3.2.30 No Commands in Sequence

The requested sequence has no commands in it.

MSG_NO_CMD_IN_SEQ (8 bits)
Command Id (16 bits)
Sequence # (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Sequence # – the index of the sequence.
- CEB Time – the current CEB time.

3.2.31 Anneal Door Not Enabled

MSG_DOOR_NOT_ENABLED (8 bits)
Command Id (16 bits)
Padding (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Padding - filler.
- CEB Time – the current CEB time.

3.2.32 Invalid Anneal Door Action

The door is already in the requested State.

MSG_DOOR_STATE (8 bits)
Command Id (16 bits)
Door State (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Door state - the existing state of the anneal door.
- CEB Time – the current CEB time.

3.2.33 Invalid Anneal Action

Already in the requested anneal state.

MSG_ANNEAL (8 bits)
Command Id (16 bits)
Anneal State (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Anneal state - the existing state of anneal.
- CEB Time – the current CEB time.

3.2.34 Instrument Not Powered

Cannot enable data from an instrument that is not yet powered.

MSG_NOT_POWERED (8 bits)
Command Id (16 bits)
Instrument (16 bits)
CEB Time (16 bits)

- Command Id - the command id this is a response to.
- Instrument - the requested instrument to turn collection on for.
- CEB Time – the current CEB time.

3.2.35 Door Movement Timed Out

The maximum amount of door movement time has passed. The door movement has been aborted.

MSG_DOOR_TIME (8 bits)
time (16 bits)
Open or Close (16 bits)
CEB Time (16 bits)

- Time – amount of time over.
- Open or Close - the operation current happening.
- CEB Time – the current CEB time.

3.2.36 Latch Movement Timed Out

The maximum amount of latch movement time has passed. The latch movement has been aborted.

MSG_LATCH_TIME (8 bits)
time (16 bits)
Open or Close (16 bits)
CEB Time (16 bits)

- Time – amount of time over.
- Open or Close - the operation current happening.
- CEB Time – the current CEB time.

3.2.37 Door Already Being Moved

The request to move the door is invalid since the door is already moving.

MSG_DOOR_ALREADY_MOVING (8 bits)
Padding (16 bits)
Open or Close (16 bits)
CEB Time (16 bits)

- Open or Close - the operation current happening.
- CEB Time – the current CEB time.

3.2.38 Door Dither not Detected During Close

The anneal door did not go into dither.

MSG_NO_DOOR_DITHER (8 bits)
Padding (16 bits)
Hi or Lo (16 bits)
CEB Time (16 bits)

- Hi or Lo - the dither reading not seen.
- CEB Time – the current CEB time.

3.2.39 Error Buffer Full

The error message buffer is full.

MSG_ERR_BUF_FULL (8 bits)
Type (16 bits)
Error Count (16 bits)
CEB Time (16 bits)

- Type – the error code causing the overflow.
- Error Count – actual count of errors.
- CEB Time – the current CEB time.

3.2.40 Message Buffer Full

The message buffer is full.

MSG_MSG_BUF_FULL (8 bits)
Type (16 bits)
Msg Count (16 bits)
CEB Time (16 bits)

- Type – the message causing the overflow
- Msg Count – Actual count of messages.
- CEB Time – the current CEB time.

3.2.41 Communication Error

There has been an error detected in communications with the spacecraft or HEND.

MSG_COM_ERR (8 bits)
Error (16 bits)
SC or HEND (16 bits)
CEB Time (16 bits)

- Error – the status of the read
- SC or HEND – reading fro Spacecraft or HEND.
- CEB Time – the current CEB time.

3.2.42 Util List is Full

The Delayed Actions list is full.

MSG_NOT_ADD_UTIL (8 bits)
Pad (16 bits)
Action (16 bits)
CEB Time (16 bits)

- Pad – filler
- Action – the action which was to have been preformed.
- CEB Time – the current CEB time.

3.2.43 Invalid Parameter Index

The given parameter index is invalid.

MSG_INVALID_INDEX (8 bits)
Command ID (16 bits)
Index (16 bits)
CEB Time (16 bits)

- Command Id – the id of the command.
- Index – the invalid index.
- CEB Time – the current CEB time.

3.2.44 Pixel Length Not Changed

The pixel could not be changed because the equator crossing was too near.

MSG_2_CLOSE_2_X (8 bits)
Command ID (16 bits)
Pixel type (16 bits)
CEB Time (16 bits)

- Command Id – the id of the command.
- Pixel Type – the pixel that was attempted to be changed (GAMMA, LANL, HEND).
- CEB Time – the current CEB time.

3.2.45 Power Override Failed

The power override has not been activated.

MSG_OVERRIDE (8 bits)
Command ID (16 bits)
Type (16 bits)
CEB Time (16 bits)

- Command Id – the id of the command.
- Type – the type of power that was being attempted to override (DOOR or ANNEAL).
- CEB Time – the current CEB time.

3.2.46 Gamma High Voltage

The gamma high voltage command did not execute because analog reading out of bounds or high voltage DAC command did not execute because high voltage is not enabled.

MSG_GAMMA_VOLTAGE (8 bits)
Command ID (16 bits)
Type (16 bits)
CEB Time (16 bits)

- Command Id – the id of the command.
- Type – the out of bounds reading or MSG_GAMMA_HV_OFF.
- CEB Time – the current CEB time.

3.2.47 Incorrect RAM Function Checksum

There has been an error found while doing checksumming in flight software.

MSG_FUNC_CHECKSUM (8 bits)
Function Index (16 bit)
Read Checksum (16 bits)
Calculated Checksum (16 bits)

- Function Index – the index of the function in the Function table.
- Read checksum – The value of the checksum as read from RAM.
- Calculated checksum – The calculated value of the checksum.

3.2.48 Gamma Hi-voltage Ramp Aborted

The ramping of gamma hi voltage has been aborted.

MSG_RAMP_ABORT (8 bits)
when (16 bit)
action (16 bits)
CEB Time (16 bits)

- when – time-out or startup.
- Action – ramping up, down, or initiating ramp
- CEB Time – the current CEB time.

3.2.49 Address and Size of Incorrect RAM Function Checksum

There has been an error found while doing checksumming in flight software and this is the address and size of the function read from EEPROM.

MSG_ADDR_CHECKSUM (8 bits)
Address (32 bit)
Size (16 bits)

- Address – the address of the function as read from EEPROM.
- size – The size of the function as read from EEPROM.

3.2.50 Anneal Not Enabled

The flag to allow annealing has not been enabled.

MSG_ANNEAL_NOT_ENABLED (8 bits)
Command Id (16 bit)
Pad (16 bits)
CEB time (16 bits)

- Command ID – the Id of the command that failed.

3.2.51 Can not set Parameter

The parameter that is attempted to be changed cannot be change with the update parameter command.

MSG_CANT_SET_PARAM (8 bits)
Command ID (16 bit)
Parameter Index (16 bits)
CEB Time (16 bits)

- Command ID – the id of the command.
- Index – The index of the parameter to be changed.

3.2.52 EEPROM state change not enabled.

The flag to EEPROM allow changing the state of EEPROM protection has not been enabled.

MSG_EEPROM_NOT_ENABLED (8 bits)
Command ID (16 bit)
Side (16 bits)
CEB time (16 bits)

- Command ID – the id of the command failing.
- side – The side of eeprom attempting to change protection on.

3.2.53 Invalid Sequence number.

The sequence number is invalid.

MSG_BAD_SEQ_NUM (8 bits)
num (16 bit)
Side (16 bits)
CEB time (16 bits)

- Num – the invalid sequence number.
- side – The side of eeprom attempting to change protection on.

3.2.54 RAM Check Failed

There has been an error found while doing RAM check in loader.

MSG_RAM_CHECK_FAIL (8 bits)
Num_bytes_checked (16 bit)
Start_addr_segment (16 bits)
CEB Time (16 bits)

- Num_bytes_checked – number of bytes plus 1 RAM checked by the Loader
- Start_addr_segment – start address segment of the RAM which has been checked
 A segment may begin at any 16-byte boundary.
- CEB Time – the current CEB time.

3.2.55 FSW EEPROM Memory Check Failed

There has been an error found while doing FSW EEPROM checksum check in loader.

MSG_FSW_EEPROM_CHECK_FAIL (8 bits)
Padding (16 bit)
Site_AorB (16 bits)
CEB Time (16 bits)

- Side_AorB – which side failed EEPROM check:
 0xA00A: EEPROM-A FSW or
 0xB11B: EEPROM-B FSW
- CEB Time – the current CEB time.

3.2.56 Mini Loader Memory Check Failed

There has been an error found while doing Loader EEPROM checksum check or RAM checks for the loader areas or DMA area in mini-loader.

MSG_MINI_MEM_CHECK_FAIL (8 bits)
Padding (16 bit)
which_area (16 bits)
CEB Time (16 bits)

- which_area – which memory area has error, there are 3 different area:
 0xA00A: EEPROM-A
 Loader working area (RAM 0x20000 to 0x2FFFF) or
 Loader code or IDT area (EEPROM)
- 0xB11B: EEPROM-B
 Loader working area (RAM 0x40000 to 0x4FFFF) or
 Loader code or IDT area (EEPROM)
- 0xDEAF: DMA SC Send/Receive area (0x6C000 to 0x6E7FF)
- CEB Time – the current CEB time.

3.2.57 Invalid Loader Command

There has been an valid format command received by the Loader. Since it is not a Loader command, it will not be handled by the loader.

MSG_NOT_LOADER_CMD (8 bits)
Command Id (16 bit)
OpCode (16 bits)
CEB Time (16 bits)

- Command Id – Number of the command.

- OpCode – The opcode of the command.
- CEB Time – the current CEB time.

3.2.58 Invalid Memory Address

There has been an invalid address found in the memory load command.

MSG_INVALID_MEM_ADDRESS (8 bits)
Address (16 bits)
pad (16 bits)
CEB Time (16 bits)

- Address – Number of the command.
- CEB Time – the current CEB time.

3.2.59 Bad Side Pattern

There has been an invalid side pattern found in the FSW preferred side EEPROM area or startup-side RAM area.

MSG_BAD_SIDE_PATTERN (8 bits)
Bad Side Pattern (16 bits)
Which Side Pattern (16 bits)
CEB Time (16 bits)

- Bad Side Pattern – Bad side pattern, neither 0xA00A nor 0xB11B.
- Which Side Pattern – MSG_BAD_STARTUP_SIDE or
MSG_BAD_PREFERRED_SIDE
- CEB Time – the current CEB time.

3.2.60 UART Interrupt In Loader Error

An UART interrupt has been received by the Loader.

MSG_UART_INTER_IN_LOADER (8 bits)
of Times (16 bits)
Padding (16 bits)
CEB Time (16 bits)

- # of Times - the count of how many times UART interrupt has been received by the loader.
- CEB Time – the CEB time of this message

UART Messages

3.2.61 Enter Function

MSG_ENTER (8 bits)
Roll Over (16 bits)
Function Id (16 bits)
CEB Time (16 bits)

- Function Id - the Id of the Function just entered.
- Roll Over – the rollover count of the CEB time.
- CEB Time – the current CEB time.

3.2.62 Exit Function

MSG_EXIT (8 bits)
Roll Over (16 bits)
Function Id (16 bits)
CEB Time (16 bits)

- Function Id - the Id of the Function just exited.
- Roll Over – the rollover count of the CEB time.
- CEB Time – the current CEB time.

3.2.63 Timing

- Priority - 1

MSG_TIMING (8 bits)
Execution Time (32 bits)
CEB Time (16 bits)

- Execution Time – the execution time from heartbeat to heartbeat.
- CEB Time – the CEB time of this message

3.2.64 Interrupt Timing

- Priority - 1

MSG_INTERRUPT_TIMING (8 bits)
Execution Time (16 bits)
Interrupt (16 bits)
CEB Time (16 bits)

- Execution Time – the time in the interrupt from heartbeat to heartbeat.
- Interrupt - the interrupt.
- CEB Time – the CEB time of this message