

HS Requirements to Design Traceability

HS Version 2.4.0

|  |  |  |  |
| --- | --- | --- | --- |
| **Requirement Number** | **Requirement Text** | **Software Design Element** | **Applicable Software Functions** |
| HS1000 | Upon receipt of a No-Op command, HS shall increment the HS Valid Command Counter and generate an event message. | Operation | HS\_NoopCmd |
| HS1001 | Upon receipt of a Reset command, HS shall reset the following housekeeping variables to a value of zero:   a) Valid Ground Command Counter  b) Ground Command Rejected Counter. | Operation | HS\_ResetCmd  HS\_ResetCounters |
| HS1002 | For all HS commands, if the length contained in the message header is not equal to the expected length, HS shall reject the command and issue an event message. | Operation | HS\_VerifyMsgLength |
| HS1003 | If HS accepts any command as valid, HS shall execute the command, increment the HS Valid Command Counter and issue an event message. | Operation | HS\_NoopCmd  HS\_ResetCmd  HS\_EnableAppMonCmd  HS\_DisableAppMonCmd  HS\_EnableEventMonCmd  HS\_DisableEventMonCmd  HS\_EnableAlivenessCmd  HS\_DisableAlivenessCmd  HS\_ResetResetsPerformedCmd  HS\_SetMaxResetsCmd  HS\_EnableCPUHogCmd  HS\_DisableCPUHogCmd  HS\_CustomCommands |
| HS1004 | If HS rejects any command, HS shall abort the command execution, increment the HS Command Rejected Counter and issue an error event message. | Operation | HS\_NoopCmd  HS\_ResetCmd  HS\_EnableAppMonCmd  HS\_DisableAppMonCmd  HS\_EnableEventMonCmd  HS\_DisableEventMonCmd  HS\_EnableAlivenessCmd  HS\_DisableAlivenessCmd  HS\_ResetResetsPerformedCmd  HS\_SetMaxResetsCmd  HS\_EnableCPUHogCmd  HS\_DisableCPUHogCmd  HS\_CustomCommands |
| HS2000 | The HS Application shall verify that each application defined in the Critical Application Table is executing. | Operation | HS\_ProcessMain  HS\_MonitorApplications |
| HS2000.1 | If the entry indicates that the application is a cFE Core Application and it has not executed for the corresponding table-defined number of HS execution cycles, HS shall perform one of the table-defined actions  a) cFE Processor Reset  b) Send an Event message  c) Send a Software Bus Message  d) Perform No Action | Operation | HS\_MonitorApplications |
| HS2000.1.1 | If the action is to perform a cFE Processor Reset and the Number of cFE Processor Resets is less than the <PLATFORM\_DEFINED> Max Number of cFE Processor Resets , HS shall  a) Increment the Number of cFE Processor Resets  b) Set the Watchdog servicing flag to False  c) Command the cFE Processor Reset. | Operation | HS\_MonitorApplications |
| HS2000.1.2 | If the action is to perform a cFE Processor Reset and the Number of cFE Processor Resets is greater-than-or-equal-to the <PLATFORM\_DEFINED> Max Number of cFE Processor Resets , HS shall   a) Send an event message | Operation | HS\_MonitorApplications |
| HS2000.2 | If the entry indicates that the application is not a cFE Core Application and it has not executed for the corresponding table-defined number of HS execution cycles, HS shall execute one of the table-defined actions:   a) Restart the Application (that failed to check-in)  b) cFE Processor Reset  c) Send an Event Message  d) Send a Software Bus Message  e) Perform No Action | Operation | HS\_MonitorApplications |
| HS2000.2.1 | If the action is to perform a cFE Processor Reset and the Number of cFE Processor Resets is less than the <PLATFORM\_DEFINED> Max Number of cFE Processor Resets , HS shall  a) Increment the Number of cFE Processor Resets  b) Set the Watchdog servicing flag to False  c) Command the cFE Processor Reset. | Operation | HS\_MonitorApplications |
| HS2000.2.2 | If the action is to perform a cFE Processor Reset and the Number of cFE Processor Resets is greater-than-or-equal-to the <PLATFORM\_DEFINED> Max Number of cFE Processor Resets , HS shall   a) Send an event message | Operation | HS\_MonitorApplications |
| HS2000.2.3 | If the action is to perform an Application Restart, HS shall disable the entry in the Critical Application Table | Operation | HS\_MonitorApplications |
| HS2000.3 | If the entry in the table references an unresolvable application (i.e. not registered with cFE), HS shall issue an event message | Operation | HS\_MonitorApplications |
| HS2001 | Upon receipt of an Enable Critical Application Monitoring Command, HS shall  a) Enable all entries in the Critical Application Table  b) Execute the Critical Application Table. | Operation | HS\_EnableAppMonCmd |
| HS2002 | Upon receipt of a Disable Critical Application Monitoring Command, HS shall stop processing the Critical Application Table. | Operation | HS\_DisableAppMonCmd |
| HS2003 | HS shall support up to <PLATFORM\_DEFINED> critical applications. | Operation | HS\_Default\_AppMon\_Tbl |
| HS2004 | Upon receipt of a Critical Application Table update indication, HS shall validate the Critical Application Table by validating the action | Operation | HS\_AcquirePointers  HS\_ValidateAMTable |
| HS2004.1 | If the Critical Application Table fails validation, HS shall issue an event message. | Operation | HS\_ValidateAMTable |
| HS3000 | The HS Application shall maintain the Execution Counters defined in the Execution Counter Table for up to <PLATFORM\_DEFINED> number of Items. | Operation | HS\_MonitorApplications |
| HS3000.1 | If the Item contained in the Execution Counter Table is unknown, HS shall   a) Set the Execution Counter value for that entry to 0xFFFFFFFF | Operation | HS\_MonitorApplications  HS\_ValidateXCTable |
| HS3001 | Upon receipt of an Execution Counter Table update indication, HS shall validate the Execution Counter Table. | Operation | HS\_AcquirePointers  HS\_ValidateXCTable |
| HS3001.1 | If the Execution Counter Table fails validation, HS shall issue an event message. | Operation | HS\_ValidateXCTable |
| HS4000 | During each HS execution cycle, HS shall check the status of the Update Watchdog Timer Flag. | Operation | HS\_ProcessMain |
| HS4000.1 | If it is set to TRUE, HS shall service the Watchdog Timer. | Operation | HS\_ProcessMain  CFE\_PSP\_WatchdogService |
| HS4000.2 | If it is set to FALSE, HS shall not service the Watchdog Timer. | Operation | HS\_ProcessMain  CFE\_PSP\_WatchdogService |
| HS5000 | The HS Application shall compare each received event message with the events defined in the Critical Event Table for up to <PLATFORM\_DEFINED> critical events. | Operation | HS\_ProcessCommands  HS\_MonitorEvent |
| HS5000.1 | If the event received is defined in the Critical Event Table, HS shall execute one of the following table-defined actions:  a) Restart Application that generated the Event  b) Perform cFE Processor Reset  c) Delete the Application that generated the Event  d) Send a Software Bus Message e) Perform No Action | Operation | HS\_MonitorEvent |
| HS5000.1.1 | If the action is to perform a cFE Processor Reset and the Number of cFE Processor Resets is less than the <PLATFORM\_DEFINED> Max Number of cFE Processor Resets , HS shall  a) Increment the Number of cFE Processor Resets  b) Set the Watchdog servicing flag to False  c) Command the cFE Processor Reset. | Operation | HS\_MonitorEvent |
| HS5000.1.2 | If the action is to perform a cFE Processor Reset and the Number of cFE Processor Resets is greater-than-or-equal-to the <PLATFORM\_DEFINED> Max Number of cFE Processor Resets , HS shall send an event message. | Operation | HS\_MonitorEvent |
| HS5000.2 | If the Application defined in the Critical Event Counter Table is unknown, HS shall increment Critical Event Table Invalid/Unknown Apps counter | Operation | HS\_MonitorEvent |
| HS5001 | Upon receipt of an Enable Critical Event Monitor Command, HS shall  a) Set the Enable Critical Event Monitoring to Enabled  b) Begin processing the Critical Event Table. | Operation | HS\_EnableEventMonCmd |
| HS5002 | Upon receipt of a Disable Critical Event Monitor Command, HS shall  a) Set the Enable Critical Event Monitoring to Disabled  b) Stop executing the Critical Event Table. | Operation | HS\_DisableEventMonCmd |
| HS5003 | HS shall support up to <PLATFORM\_DEFINED> critical events. | Operation | HS\_Default\_EventMon\_Tbl |
| HS5004 | Upon receipt of a Critical Event Table update indication, HS shall validate the Critical Event Table by validating the action | Operation | HS\_AcquirePointers  HS\_ValidateEMTable |
| HS5004.1 | If the Critical Event Table fails validation, HS shall issue an event message. | Operation | HS\_ValidateEMTable |
| HS6005 | During each HS execution cycle, HS shall send a <PLATFORM\_DEFINED> character(s) to the UART port every <PLATFORM\_DEFINED> second(s). | Operation | HS\_ProcessMain |
| HS6006 | Upon receipt of an Enable CPU Aliveness Indicator Command, HS shall begin sending the <PLATFORM\_DEFINED> heartbeat character(s) to the UART port. | Operation | HS\_EnableAlivenessCmd |
| HS6007 | Upon receipt of a Disable Aliveness Indicator Command, HS shall stop sending the <PLATFORM\_DEFINED> heartbeat character(s) to the UART port. | Operation | HS\_DisableAlivenessCmd |
| HS6008 | HS shall report peak CPU utilization during an interval of <PLATFORM\_DEFINED> HS execution cycles over the last <PLATFORM\_DEFINED> intervals. | Operation | HS\_CustomMonitorUtilization |
| HS6009 | HS shall report average CPU utilization over the last <PLATFORM\_DEFINED> intervals of <PLATFORM\_DEFINED> HS execution cycles each. | Operation | HS\_CustomMonitorUtilization |
| HS6010 | If the CPU utilization exceeds <PLATFORM\_DEFINED> % for <PLATFORM\_DEFINED> intervals and CPU Utilization Monitoring is enabled then HS shall issue an event message | Operation | HS\_CustomMonitorUtilization |
| HS6011 | Upon receipt of an Enable CPU utilization monitoring, HS shall begin monitoring CPU utilization. | Operation | HS\_EnableCPUHogCmd |
| HS6012 | Upon receipt of an Disable CPU utilization monitoring, HS shall stop monitoring CPU utilization | Operation | HS\_DisableCPUHogCmd |
| HS7000 | Upon receipt of a Reset Processor Resets Command, HS shall set the number of cFE Processor Resets commanded by HS to zero. | Operation | HS\_ResetResetsPerformedCmd |
| HS7001 | Upon receipt of a Set Max Processor Resets Command, HS shall set the Maximum number of cFE Processor Resets commanded by HS to the Command-specified value. | Operation | HS\_SetMaxResetsCmd |
| HS7100 | HS shall generate a housekeeping message containing the following:   a) Valid Ground Command Counter   b) Ground Command Rejected Counter   c) Critical Application Monitoring status (enable/disable)   d) Critical Application Monitoring status per table entry (enable/disable)   e) Number of CFE Processor resets (commanded by HS)   f) Maximum number of CFE Processor resets   g) Critical Event Monitoring status (enabled/disabled)   h) Count of Monitored Event Messages   i) CPU Aliveness Indicator (enabled/disabled)   j) Execution Counter, for each table entry   k) Number of Invalid/Unknown Apps contained in Critical Event Table.   l) Peak CPU Utilization   m) Average CPU utilization   n) CPU Utilization Monitoring Enabled/Disabled | Operation | HS\_HousekeepingReq |
| HS8000 | Upon cFE Power On Reset, HS shall initialize the following data to Zero (or the value specified for the item below) :  a) Valid Ground Command Counter  b) Ground Command Rejected Counter  c) Monitor Critical Applications to <PLATFORM\_DEFINED>  d) Critical Application Monitoring status per Application Enabled  e) Monitor Critical Events to <PLATFORM\_DEFINED>  f) CPU Aliveness Indicator to <PLATFORM\_DEFINED>  g) Watchdog Timer Flag set to TRUE  h) Set the Watchdog Timer to <PLATFORM\_DEFINED> value  i) Maximum number of CFE Processor resets to <PLATFORM\_DEFINED> value  j) Number of cFE Processor Resets (commanded by HS)  k) Number of Invalid/Unknown Apps contained in Critical Event Table l) Peak CPU Utilization  m) Average CPU utilization  n) CPU Utilization Monitoring Enabled/Disabled to <PLATFORM\_DEFINED | Initialization | HS\_AppInit |
| HS8001 | Upon cFE Processor Reset or HS Application Restart, HS preserves the following:  a) Number of cFE Processor Resets (commanded by HS)  b) Maximum number of cFE Processor Resets. | Initialization | HS\_AppInit |
| HS8002 | Upon any Initialization, HS shall subscribe to all event messages | Initialization | HS\_AppInit  HS\_SbInit |
| HS8003 | Upon any Initialization, HS shall load the Critical Application Table. | Initialization | HS\_AppInit  HS\_TblInit |
| HS8003.1 | If the Critical Application Table fails validation, HS shall issue an event message and disable Critical Application Monitoring. | Initialization | HS\_TblInit |
| HS8004 | Upon any Initialization, HS shall load the Critical Event Table. | Initialization | HS\_AppInit  HS\_TblInit |
| HS8004.1 | If the Critical Event Table fails validation, HS shall issue an event message and disable Critical Event Monitoring. | Initialization | HS\_TblInit |
| HS8005 | Upon any Initialization, HS shall load the Execution Counter Table. | Initialization | HS\_AppInit  HS\_TblInit |
| HS8005.1 | If the Execution Counter Table fails validation, HS shall:   a) Issue an event message   b) Report 0xFFFFFFFF for all <PLATFORM\_DEFINED> items in the table | Initialization | HS\_TblInit |
| HS8006 | Upon any initialization, HS shall wait until the cFE startup synch has been received indicating all Applications have started. | Initialization | HS\_AppMain |
| HS8006.1 | If the startup-synch is not received in <PLATFORM\_DEFINED> seconds, HS shall begin processing. | Initialization | HS\_AppMain |
| HS8007 | Upon any Initialization, HS shall load the Message Actions Table. | Initialization | HS\_AppInit  HS\_TblInit |
| HS8007.1 | If the Message Actions Table fails validation, HS shall issue an event message and disable the use of the Message Actions Table. | Initialization | HS\_TblInit |