

MD Requirements to Design Traceability

MD Version 2.4.0

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| **Requirement Number** | **Requirement Text** | **Software Design Element** | **Applicable Software Functions** |
| MD1000 | Upon receipt of a No-Op command, MD shall increment the MD Valid Command Counter and generate an event message. | Operation | MD\_ExecRequest  CFE\_EVS\_SendEvent |
| MD1001 | Upon receipt of a Reset command, MD shall reset the following housekeeping variables to a value of zero:   a) MD Valid Command Counter  b) MD Command Rejected Counter | Operation | MD\_ExecRequest  CFE\_EVS\_SendEvent |
| MD1002 | For all MD commands, if the length contained in the message header is not equal to the expected length, MD shall reject the command and issue an event message. | Operation | MD\_ExecRequest  MD\_SearchCmdHndlrTbl  CFE\_MSG\_GetSize  CFE\_EVS\_SendEvent |
| MD1003 | If Dwell Table ID specified in any MD command exceeds the <PLATFORM\_DEFINED> maximum number of allowable memory dwells, MD shall reject the command and issue an event message | Operation | MD\_TableIsInMask  MD\_ProcessStartCmd  MD\_ProcessStopCmd  MD\_ProcessJamCmd  MD\_ValidTableId  MD\_ProcessSignatureCmd |
| MD1004 | If MD accepts any command as valid, MD shall execute the command, increment the MD Valid Command Counter and issue an event message | Operation | MD\_ExecRequest  MD\_ProcessStartCmd  MD\_ProcessStopCmd  MD\_ProcessJamCmd  MD\_ProcessSignatureCmd |
| MD1005 | If MD rejects any command, MD shall abort the command execution, increment the MD Command Rejected Counter and issue an error event message | Operation | MD\_ExecRequest  MD\_ProcessStartCmd  MD\_ProcessStopCmd  MD\_ProcessJamCmd  MD\_ProcessSignatureCmd  CFE\_EVS\_SendEvent |
| MD1006 | The MD application shall generate an error event message if symbol table operations are initiated but not supported in the current target environment. | Operation | MD\_ValidTableEntry  CFS\_ResolveSymAddr |
| MD2000 | Upon receipt of a Start Dwell command, MD shall identify the command-specified tables as ENABLED and start processing the command-specified memory dwell tables, starting with the first entry, until one of the following:  a) an entry that has a zero value for the Number of Bytes field or  b) until it has processed the last entry in a Dwell Table: | Operation | MD\_ProcessStartCmd |
| MD2000.2 | If the sum of all of the 'delay between samples' for any memory dwell table being commanded to start equals 0, MD shall send an event to notify user that no processing will occur in the dwell table's current state. | Operation | MD\_ProcessStartCmd  CFE\_EVS\_SendEvent |
| MD2001 | Upon receipt of a Stop Dwell command, MD shall identify the command-specified memory dwell tables as DISABLED and stop processing the command-specified memory dwell tables | Operation | MD\_ProcessStopCmd |
| MD2001.1 | The following items shall be set to zero  a) For each Dwell:  1) Current Dwell Packet Index  2) Current Entry in the Dwell Table  3) Current Countdown counter | Operation | MD\_ProcessStopCmd |
| MD3000 | During each memory dwell cycle, MD shall collect data specified in each enabled memory dwell table which contains the following:  a) Table ID  b) <OPTIONAL> signature  c) For each desired sample up to <PLATFORM\_DEFINED> entries:  1) address  2) number of bytes  3) delay between samples. | Operation | MD\_AppMain  MD\_DwellLoop  MD\_GetDwellData |
| MD3000.1 | <OPTIONAL> Symbol Name and offset can be used in lieu of an absolute address | Operation | MD\_DwellLoop  MD\_GetDwellData |
| MD3000.2 | The collection shall be done for each entry in an active Memory Dwell Table, starting with the first entry, until one of the following :  a) it reaches an entry that has a zero value for the Number of Bytes parameter or  b) until it has processed the last entry in a Dwell Table.  The collection shall be done for each entry in an active Memory Dwell Table, starting with the first entry, until one of the following :  a) it reaches an entry that has a zero value for the Number of Bytes parameter or  b) until it has processed the last entry in a Dwell Table.  The collection shall be done for each entry in an active Memory Dwell Table, starting with the first entry, until one of the following :  a) it reaches an entry that has a zero value for the Number of Bytes parameter or  b) until it has processed the last entry in a Dwell Table. | Operation | MD\_DwellLoop |
| MD3000.3 | Data collection occurs only when a Dwell Table is both ENABLED and has a non-zero dwell rate. | Operation | MD\_DwellLoop |
| MD3001 | When MD collects all of the data specified in a memory dwell table (as defined in MD3000.2), MD shall issue a memory dwell message containing the following:  a) Table ID  b) <OPTIONAL> Signature  c) Number of bytes sampled  d) Data | Operation | MD\_DwellLoop  MD\_SendDwellPkt |
| MD3002 | Upon receipt of a Table Load, MD shall verify the contents of the table and if the table is invalid, reject the table. | Operation | MD\_AppMain  MD\_ManageDwellTable  MD\_TableValidationFunc  MD\_CopyUpdatedTbl |
| MD3002.2 | If any address fails validation, MD shall reject the table. Validation includes:  a) If a symbolic address is specified, Symbol Table is present and symbolic address is contained in the Symbol Table,  b) resolved address (numerical value of symbolic address if present + offset address) is within valid range  c) if resolved address is specified for a 2-byte dwell, address is an even value,  d) if resolved address is specified for a 4-byte dwell, address is an integral multiple of 4. | Operation | MD\_AppMain  MD\_ManageDwellTable  MD\_TableValidationFunc  MD\_ReadDwellTable  MD\_CheckTableEntries |
| MD3002.4 | <OPTIONAL> Symbol Name and offset can be used in lieu of an absolute address | Operation | MD\_ValidTableEntry  CFS\_ResolveSymAddr  MD\_CheckTableEntries  MD\_TableValidationFunc |
| MD3002.5 | If the Number of Bytes is not 0, 1, 2 or 4, MD shall reject the table | Operation | MD\_ValidTableEntry  MD\_ValidFieldLength  MD\_CheckTableEntries  MD\_TableValidationFunc |
| MD4000 | Upon receipt of a Jam Dwell command, MD shall update the command-specified memory dwell table with the command-specified information:  a) Dwell Table Index  b) Address  c) Number of bytes (0,1,2 or 4)  d) Delay Between Samples | Operation | MD\_ProcessJamCmd  MD\_UpdateTableDwellEntry |
| MD4000.1 | If the Dwell Table Index is greater than <PLATFORM\_DEFINED> maximum then MD shall reject the command | Operation | MD\_ValidTableId  MD\_ProcessJamCmd |
| MD4000.2 | If the command-specified address fails validation, MD shall reject the command. Validation includes: a) If a symbolic address is specified, Symbol Table is present and symbolic address is contained in the Symbol Table,  b) resolved address (numerical value of symbolic address if present + offset address) is within valid range  c) if resolved address is specified for a 2-byte dwell, address is an even value,  d) if resolved address is specified for a 4-byte dwell, address is an integral multiple of 4. | Operation | MD\_ProcessJamCmd  CFS\_ResolveSymAddr  CFS\_Verify16Aligned  CFS\_Verify32Aligned |
| MD4000.3 | If the Memory Dwell table being jammed is enabled and the sum of all of the 'delay between samples' for the memory dwell table equals 0, then MD shall issue an event message informing that the table will not be processing dwell packets in its current state. | Operation | MD\_ProcessJamCmd  CFE\_EVS\_SendEvent |
| MD4000.4 | <OPTIONAL> Symbol Name and offset can be used in lieu of an absolute address | Operation | MD\_ProcessJamCmd  CFS\_ResolveSymAddr |
| MD4000.5 | If the command-specified Number of Bytes is not 0, 1, 2 or 4, MD shall reject the command). | Operation | MD\_ProcessJamCmd  MD\_ValidFieldLength |
| MD5000 | <OPTIONAL> Upon receipt of a Set Dwell Table Signature Command, the signature field for the specified Dwell Table shall be set to the command-specified string. | Operation | MD\_ProcessSignatureCmd  MD\_UpdateTableSignature |
| MD5000.1 | If the command-specified signature exceeds the <PLATFORM\_DEFINED> maximum length then the command shall be rejected. Note that the signature must be 32 bit aligned. | Operation | MD\_ProcessSignatureCmd |
| MD8000 | MD shall generate a housekeeping message containing the following:  a) Valid Command Counter  b) Command Rejected Counter  c) For each Dwell:  1. Enable/Disable Status  2. Number of Dwell Addresses  3. Dwell Rate  4. Number of Bytes  5. Current Dwell Packet Index  6. Current Entry in the Dwell Table  7. Current Countdown counter | Operation | MD\_HkStatus  MD\_AppMain |
| MD9000 | Upon any Initialization of the MD Application (cFE Power On, cFE Processor Reset or MD Application Reset), MD shall initialize the following data to Zero:   a) Valid Command Counter  b) Command Rejected Counter | Initialization | MD\_AppInit |
| MD9001 | Upon cFE Power-on Reset, MD shall initialize each Memory Dwell table status to DISABLED | Initialization | MD\_InitTableServices  MD\_AppInit |
| MD9002 | Upon cFE Power-on Reset, MD shall initialize each Memory Dwell table to zero | Initialization | MD\_InitTableServices  MD\_InitControlStructures  MD\_AppInit |
| MD9003 | MD shall store the following information whenever it changes (in support of a cFE Processor Reset or MD Application Reset):  a) Enable/Disable Status for each Dwell  b) <OPTIONAL> signature for each dwell  c) Contents of each Dwell Table | Initialization, Termination | MD\_UpdateTableEnabledField  MD\_UpdateTableDwellEntry  MD\_UpdateTableSignature |
| MD9004 | On a cFE Processor Reset or a MD Application Reset, MD shall restore the information specified in MD9003 | Initialization | MD\_InitTableServices  MD\_InitControlStructures  MD\_AppInit |
| MD9004.1 | MD shall validate the data and if any data is invalid, MD shall:  a) disable the invalid dwell table  b) initialize table contents with default values | Initialization | MD\_TableValidationFunc  MD\_InitTableServices  MD\_InitControlStructures  MD\_AppInit |