
**NASA GSFC FLIGHT SOFTWARE SYSTEMS BRANCH**

# FSW VERSION DESCRIPTION DOCUMENT

# CFS MEMORY DWELL (MD) APPLICATION

**BUILD: MD 2.4.0**

**RELEASE DATE: 8/30/2021**

# 1.0 FSW VERSION DESCRIPTION

## 1.1 PURPOSE AND SUMMARY

The purpose of this build is to continue to refine the cFS Memory Dwell (MD) application product. This build provides various bug fixes and enhancements, but does not include any new functionality. The primary purpose of this release is to ensure compatibility between the MD application and cFS Caelum.

This document serves as the notification of the Build 2.4.0 release of the cFS MD application.

## 1.2 NEW/CHANGED FUNCTIONALITY IN THIS VERSION

Table 1.2-1 identifies the DCRs that have been implemented in this FSW version. For each DCR the "Key" column shows the corresponding DCR in the GSFC cFS tracking system.

Table 1.2-1 – DCRs Implemented in this Version

| Key | Summary | Description |
|---|---|---|
| GSFCCFS-1036 | Use sizeof(<SYMBOL_NAME>) instead of sizeof(<TYPE>) | Finding from JSC code review.<br><br>In several places, sizeof references a type instead of an actual symbol. This is a potential maintenance issue if the size of the field is changed.<br><br>md_dwell_tbl.c lines 327, 331, 335 |
| GSFCCFS-1037 | Return statements not needed in void functions | Finding in JSC code review |
| GSFCCFS-1261 | Update MD to use new cFE Message Module | |
| GSFCCFS-1421 | Migrate MD unit tests to distributed UT Assert | |
| GSFCCFS-1481 | MD does not build with eval-cert3 | |
| GSFCCFS-1583 | MD doxygen config file should be renamed for clarity | The filename "md_config.txt" suggests that this a configuration file for the app itself as opposed to a configuration file for doxygen. |
| GSFCCFS-1592 | MD should use const for function arguments where possible | |
| GSFCCFS-1617 | MD should use memcpy instead of CFE_PSP_MemCpy | |
| GSFCCFS-1624 | MD event messages do not allow for extended message IDs | Events that print out a messageID value use the 0x04X format specifier, which does not work for |

| | | |
|---|---|---|
| | | longer message IDs. |
| GSFCCFS-1706 | MD Should Initialize CmdCounter and CmdErrorCounter to 0 | It does not appear that MD is initializing the command and command error counter upon application initialization. This violates requirement MD9000. |
| GSFCCFS-1710 | MD should not pend forever on the software bus | |
| GSFCCFS-1718 | MD_CheckTableEntries behavior does not match documentation | The MD_CheckTableEntries function has an event message at the end in which it prints out the good, bad, and unused entry counts. A comment the function around the handling of a bad entry specifically states "Keep counting good,bad,unused, don't exit immediately". However, the loop in this function exits as soon as the first bad entry is found (because of a check of the Status variable in the loop condition). |

## 1.3 MISSING PLANNED FEATURES AND KNOWN PROBLEMS

Table 1.3-1 identifies currently open DCRs that are not addressed in this build. Any workarounds that may apply are identified.

Information on currently open DCRs is available at:

https://etdjira.gsfc.nasa.gov/projects/GSFCCFS/issues

Note that this is a restricted website that requires a server account. Additional DCRs may have been submitted after preparation of this VDD. A cFS MD DCR report containing a listing of open DCRs is available upon request for customers who do not have access to the restricted server. Please contact Elizabeth Timmons, elizabeth.timmons@nasa.gov.

Table 1.3-1 – Currently open DCRs

| Key | Summary | Description |
|---|---|---|
| GSFCCFS-1048 | Consider using an enum for MD error codes | In file md_dwell_pkt.c function MD_GetDwellData, all the "-1" status values could be replaced with an enum.<br><br>Finding from JSC code review. |
| GSFCCFS-764 | MD - Table Configuration is Not Consistent with Other Applications | MD currently gets the dwell tables from the CDS or zeros them out. The MD table design is not consistent with other cFS applications:<br><br>The MD task should allow the option to save |

| | | |
|---|---|---|
| | | or not save tables in the CDS (and therefore behave like the other applications).<br><br>The MD task should allow the option to have default tables in EEPROM (and therefore behave like the other applications).<br><br>The default address to be used, should a table not be found, should be user defined. 0 may not be a valid address.<br><br>The MD task doesn't use the CFE_TBL_Manage feature. |

## 2.0 DELIVERED PRODUCTS

Table 2-1 identifies the locations of FSW products relevant to this FSW Build. The version or date of the Build and where the product can be located are provided. Changes from a previous VDD are identified.

Table 2-1 – Delivered Products and their Locations

| Software Element | Changed with this Version? | New Version or Date | Location |
|---|---|---|---|
| Source Code of this FSW Build | Yes | 2.4.0 | https://github.com/nasa/md |
| Doxygen Documentation | Yes | N/A | https://github.com/nasa/md |
| Unit Test Data | Yes | 2.4.0 | https://github.com/nasa/md |
| FSW Make Files | Yes | 2.4.0 | https://github.com/nasa/md |

## 3.0 INSTALLATION PROCEDURES

In order to build and install the MD application, it must be added to the cFE CMake build system. This is done by modifying the TGTX_APPLIST in the cFE targets.cmake file. This is shown in the trivial example below.

```
SET(TGT1_NAME cpu1)
SET(TGT1_APPLIST md)
SET(TGT1_FILELIST cfe_es_startup.scr)
```

After MD is added to the targets.cmake file, it is built and installed using the standard cFE CMake build instructions. These instructions are available in cFE CMake documentation:

https://github.com/nasa/cFE/blob/main/cmake/README.md

## 4.0 CONFIGURATION SUMMARY AND VERSION IDENTIFICATION

This software can be found in the MD GitHub repository (https://github.com/nasa/MD) under the tag "2.4.0".

Verification of the version can be done by sending an MD NOOP command which produces an event message containing the version information. In addition, the initialization event message generated during the application startup provides the version information.

## ACRONYMS

ACS ..... Attitude Control System
C&DH ..... Command and Data Handling
cFS ..... Core Flight System
CM ..... Configuration Management
COTS ..... Commercial Off-The-Shelf
CPU ..... Central Processing Unit
DCR ..... Discrepancy/Change Request
ETU ..... Engineering Test Unit
FSB ..... Flight Software Branch
FSW ..... Flight Software
GSFC ..... Goddard Space Flight Center
I&T ..... Integration & Test
JSC ..... Johnson Space Center
MD ..... Memory Dwell
POSIX ..... Portable Operating System Interface
RTOS ..... Real-Time Operating System
SMP ..... Symmetric Multiprocessing
T&C ..... Telemetry and Command
TBD ..... To Be Determined
URL ..... Universal Resource Locator
VDD ..... Version Description Document