NASA GSFC FLIGHT SOFTWARE SYSTEMS BRANCH

FSW VERSION DESCRIPTION DOCUMENT

CFS HK APPLICATION

BUILD: HK 2.4.2

RELEASE DATE: APRIL 17, 2020

1.0   FSW VERSION DESCRIPTION

1.1   PURPOSE AND SUMMARY

The purpose of this build is to continue to refine the cFS Housekeeping (HK) application product. This build provides various bug fixes and enhancements, but does not include any new functionality.

This document serves as the notification of the Build 2.4.2.0 release of the cFS HK application.

Housekeeping (HK) version 2.4.2 is compatible with cFE builds 6.7.0 and above and OSAL builds 5.0 and above.

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GSFCCFS-1069	HK readme needs updates	Readme file contains out of date information on sources for cFE and OSAL.
GSFCCFS-997	HK Unit tests don't build without -m32	We should discuss using the recent fix for 64-bit support for elf2cfetbl and removing -m32 and building with a 64-bit toolchain on Linux. Using -m32 may cause other problems with other architectures down the road. Finding from JSC code review
GSFCCFS-996	Padding not needed for internal data	In HK_AppData_t, the spare byte is not needed. In fact, it is causing alignment issues. (Seems HK_HkPacket_t is aligned if CCSDS_TIME_SIZE == 6, but not if == 8. This has become a larger discussion.) BTW, HK_HkPacket_t also has padding.
GSFCCFS-995	HK_COPY_TABLE_FILENAME needs update	Should be changed from /cf/apps/hk_cpy_tbl.tbl to /cf/hk_cpu_tbl.tbl to work out-of-the-box with cFE 6.6 Finding from JSC code review

GSFCCFS-994	HK Check arguments for NULL	In HK_ProcessNewCopyTable, arguments CpyTblPtr and RtTblPtr are not checked for null before use. Group suggested checking for null and changing the function return type from void to int32 so that it can return error if an argument was null. Would likely require the addition of a new event message as well. Also applies to HK_TearDownOldCopyTable
GSFCCFS-993	HK Remove return statements from void functions	Finding from JSC code review. file hk_utils.c, function HK_CheckStatusOfTables file hk_app.c, functions: - HK_AppPipe - HK_SendCombinedHKCmd - HK_HousekeepingCmd - HK_NoopCmd - HK_ResetCtrsCmd - HK_ResetHkData
GSFCCFS-992	Uninitialized variables in HK	file hk_utils.c, functions: - HK_SendCombinedHkPacket - HK_CheckForMissingData - HK_SetFlagsToNotPresent - HK_TearDownOldCopyTable - HK_ProcessNewCopyTable - HK_ProcessIncomingHkData file hk_app.c, functions: - HK_AppMain - HK_AppPipe - HK_VerifyCmdLength Finding from JSC code review
GSFCCFS-990	HK potential null pointer dereference	Static code analysis - HK_AppData.CopyTablePtr might return from line 485 as NULL and gets de-referenced here. finding from JSC code review

GSFCCFS-989	HK: dead block in hk_utils.c	In hk_utils.c, starting at line 499 there is an "#if 0" block. Should investigate whether this can just be removed. Finding from JSC code review.
GSFCCFS-988	HK: Else if with no following else	hk_utils.c, lines 491, 528: else if with no following else (defensive programming) Finding in JSC code review
GSFCCFS-985	HK CMakeLists.txt doesn't build table	Need to add a line for cfe_add_table() Found in JSC code review of HK
GSFCCFS-902	HK must be tested with cFE 6.6	

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 HK 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	Change Request Type
GSFCCFS-1124	Update HK Doxygen user guide	Suggest updating the doxygen user guide file and adding a doxygen configuration file to allow users to successfully generate the doxygen guide themselves.	Enhancement
GSFCCFS-1090	Migrate HK unit tests to distributed UT Assert		Enhancement

GSFCCFS-1076	Change HK_UNDEFINED_ENTRY to an actual undefined value	The current value of HK_UNDEFINED_ENTRY in hk_utils.h is 0, which is a potentially valid entry value. We should consider changing the definition to something that is actually an undefinable value, for example 0xFFFF.	Defect
GSFCCFS-991	HK Count track times packet is not found	In file hk_utils.c function HK_SendCombinedHkPacket, Steven Seeger suggests: HK app hk packet could keep track of number of times packet is not found. HK_AppData.MissingDataCtr could be repurposed for this. Finding from JSC code review	Enhancement
GSFCCFS-987	HK Macro Change	In hk_utils.h suggest setting HK_INPUTMID_SUBSCRIBED to 1 instead of 0xFF. Finding in JSC code review.	Enhancement
GSFCCFS-986	Add HK_UNDEFINED_ENTRY check to hk_verify.h	Steven Seeger recommends adding the following check to hk_verify.h HK_UNDEFINED_ENTRY is #define to 0 in hk_utils.h. I would consider, since any uninitialized entries in the table will be zeroed out, to put: #if HK_UNDEFINED_ENTRY != 0 #error HK_UNDEFINED_ENTRY must be set to 0 #endif	Enhancement

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	2.4.2	https://github.com/nasa/hk
Doxygen Documentation	Yes	N/A	https://github.com/nasa/hk
Unit Test Data	Yes	2.4.2	https://github.com/nasa/hk
FSW Make Files	Yes	2.4.2	https://github.com/nasa/hk

3.0   INSTALLATION PROCEDURES

In order to build and install the HK 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 hk)
SET(TGT1_FILELIST cfe_es_startup.scr)
```

After HK 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/master/cmake/README.md

4.0   CONFIGURATION SUMMARY AND VERSION IDENTIFICATION

This software can be found in the HK GitHub repository (https://github.com/nasa/HK) under the tag "2.4.2".

Verification of the version can be done by sending an HK 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

HK …………………………………………………………………………………………….. Housekeeping

I&T…………………………………………………………………………………………….Integration & Test

JSC .... Johnson Space Center

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