XMM Optical Monitor

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DPU FLIGHT SOFTWARE TEST REPORTS FOR RELEASE 10

DOCUMENT: XMM-OM/UCSB/RP/0005

Signatures:

Author: Date: May 23, 2000

OM Project Office Date:

Distributed: Date:

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Section 1: Scope of Document

This document contains the test reports for software modifications for Release 10 of the DPU flight software, released May 2000.   The software modifications themselves are described in document XMMOM/UCSB/TC/0050. A complete description of the DPU testing philosophy and setup is given in XMMOM/UCSB/RP/0002.

Section 2: Test Reports

2.1 Test report for NCR 167

Problem

Magnifier tracking was not working due to guide star selection parameters not being tuned for the magnifier PSF.

Action

A new set of guide star selection parameters were created which are used only when the magnifier is being used. These have been tuned for the best focus setting of the magnifier (heater at –100%). The centroid-off center selection parameter was changed to calculate the value correctly. The DD_REF output is created now if tracking fails (see NCR 183) to aid tuning of guide star selection parameters.

Test

Used real data from OM with heater setting at –100% as input to Sun based DPU simulator to test the Choose Guide Star algorithm with the new selection parameters.

Results

Guide star selection was able was sucessful in finding suitable guide stars in the images tested.

Affected codes

```
su_scangs.c v. 1.28
su_locategs.c v. 1.26
whitedsp.c v. 1.68
shared_variables.c v. 1.21
shared_io_functions.c v. 1.26
shared_variables.c v. 1.21
su_initialize.c v. 1.40
white_default.h v. 1.24
white_shared_variables.h v. 1.23
white_static_variables.h v. 1.22
```

2.2 Test report for NCR 183

Problem

Improper handling of the condition when insufficient number of good guide stars are found.

Action

Implement the following responses to the condition
1. Tracking will be turned off.
2. Alert will be sent out promptly.
3. DD_REF will be generated.
4. DD_TRH will not be generated.
5. DPU will continue normal operation with subsequent exposure.

Note: It is required that the tracking be explicitly turned on at the end of each exposure such that the tracking-off configuration induced by this condition does not propagate to subsequent exposures.

Test

1. Configure the simulator to generate the condition that no good guide star is found.
2. Perform standard exposure.
3. Confirm the correct behavior and generation of data sets under the error condition.

Results

Excepted behavior is correctly generated.

Affected codes

`whitedsp.c v. 1.68`

2.3Test report for NCR 186

Problem

The Frame Cross Trailer in the fast mode data stream is not properly constructed.

Action

Identify the cause and the correct the problem.

Test

1. Implement and load the new DPU codes.
2. Perform exposures with fast mode windows.
3. Examine fast mode data stream and confirm correct construction of the frame crossing trailer.

Results

Fast Mode frame crossing trailers are correctly generated.

Affected codes

`blue.asm v. 1.35`

Note: The OM team continue to test the fast mode. There remain outstanding issues. Most significant is the 16-bit overflow issue. If this problem is reproduced in space and determined to be significant, a proposed solution has been distributed for consideration.

2.4Test report for NCR 193

Problem

The checking of memory access for writing single small word integer would have generated with a hard-coded number 0xa555. The code should report with the symbolically defined name DA_GADE_WSI. Since this logic path is rarely passed through, the problem is only found accidentally through inspection.

Action

Implement the correction.

Test

1. Write special code to generate this logic path.
2. Load and execute the special DPU codes.
3. Confirm the correct generation of the error message.

Results

Exception message is correctly generated.

Affected codes

`include/global_access.c: v. 1.16.`

2.5Test report for NCR 194

Issue

ICU cannot simultaneously handle significant SSI traffic and filter wheel movement. It is decided that a mechanism should be established to allow ICU to minimize the SSI traffic from the DPU to ICU.

Action

Implement a mechanism under which the DPU continues operation but transmits only the DPU heartbeats over the SSI interface every 9.76 seconds and nothing else. This SSI-inhibition configuration is invoked by loading a value 1 into the DPU local RAM address 0x5D52.

Test

1. Implement and load the new DPU codes.
2. Turn the DPU->ICU SSI on and off by loading the designated address with proper values.
3. Observe the DPU behavior.

Results

The DPU->ICU SSI interface is appropriately inhibited.

Note: Due to the initialization of the variable at the wrong location, Rel-10 implementation inhibits the DPU's transmission of the 'Jim' alert, 0xA511. While this does not affect the proper DPU operation, this could lead to confusion for ground operators. A special note should be included with release 10 that the Jim alert will not be generated. This error has been identified and will be corrected in the subsequent release.

Affected codes

```
cwhite.c v. 1.48
su_initialize.c v. 1.41
su_deliverdata.c v. 1.42
white_shared_variables.h v. 1.19
white_static_variables.h v. 1.19
shared_variables.c v. 1.22
```

2.6Test report for NCR 198

Problem

1. The red scrubbing cycle time is too short.

2. The latency of full report alert (A580/A588) of program error is too long. When the red DSP is in idle and performing FEC scrubbing full time, a multi-bit error, which cannot be corrected onboard, will be detected and reported every 15 seconds with DPU codes release 9b. This rate is too frequent for the ground operator to handle.

Action

1. Implement a minimum delay time for scrubbing. As of release 10, the scrubbing time is about 34 msec per DPU program blocks. There are about 3500 DPU program blocks. Thus the shortest cycle time of FEC scrubbing is about 2 minutes when the red DSP is idling

2. Implement the white DSP codes such that the red-white FEC error reporting area is checked more frequently. This will enable the prompt reporting of the FEC error will full information. This information is needed for proper and efficient correction of multi-bit error from the ground.

Test

1. Implement and load the new DPU codes.
2. Introduce single and multi-bit errors into the program area.
3. Observe the generation of the error alerts and measure the timing.

Results

The FEC error correction and scrubbing code behaves correctly.

Affected codes

```
whitedsp.c. v. 1.69
cwhite.c v. 1.48
su_compress.c v. 1.12
reddsp.c v. 1.27
red_shared_variables.h v. 1.10
red_static_variables.h v. 1.10
```

Appendix 1: List of Acronyms

CPU	Central Processor Unit
CVS	Concurrent Version System
CH	Cheng Ho
DEM	Digital Electronics Module (made up of DPU and ICU)
DPU	Digital Processing Unit (supplied by US)
ECR	Engineering Change Request
EOB	Electro-Optical Breadboard
ICU	Instrument Control Unit (supplied by MSSL)
LANL	Los Alamos National Laboratory
MSSL	Mullard Space Sciences Laboratory
NCR	Non-Conformance Report
SNL	Sandia National Laboratory
UCSB	University of California at Santa Barbara