XMM Optical Monitor

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Description of Changes to DPU Software October–December 1998

DOCUMENT: XMM-OM/UCSB/TC/0042 Version 1.0 22-Dec-98

Contents

The document describes changes of DPU code from October 1998 (tagged by "fm_dorn_ist_patch1 ") to Dec 98 ("release7") version. It summarizes the changes and fixes reported in the following ECR's and NCR's. The description of the revision versions indicates changes since the last delivery about Oct. 1, 1998. A separate section is included for versions that had "comment only" changes. For previous changes to the DPU flight software, see document XMMOM/UCSB/TC/0041 (available from UCSB web site.) For a description of ICU flight software testing, please see documents XMMOM/MSSL/SP/0207 and XMMOM/MSSL/SP/0208.

Work has begun in response to certain ECR's, but a few (ECR's 72, 74 and 77) are not yet completed. Since software changes from this work will be visible in the current release, routines that have been changed are included in the list below, even though the ECR's are still open and work is continuing.

List of NCRs/ECRS Described in this Document

NCR/ECR	Description	Status this Release
NCR 111	DPU crashes after power of/on using codes with red scrubbing	closed
NCR 114	DPU reports clock synchronization error	closed
NCR 115	DPU spontaneous reset following a 30,1 error from ICU	closed
NCR 119	ICU/DPU communication hang seen after 1 exposure	closed
NCR 120	Red DSP Power on problem	closed
NCR 123	DPU heartbeat status word field 9 designated to indicate tracking on/off status	closed
NCR 125	ICU crash ending in a status of 0072 after 191 hours.	closed
NCR 126	DPU stops communicating at busy spot after 23 hour run. DPU not responding to reset command sent by ICU.	closed
NCR 130	Blue fast mode not working	open
NCR 131	DP_WDW format correction	closed
ECR 70	Reset science and memory window to zero before configuring each exposure	closed
ECR 72	Implement codes/algorithms to allow normal exposure with user selectable bpe_binning and tracking_on, as commanded by the ICU commands IC_BPE_BINNING and IC_SET_TRK. The codes should include status reporting of their parameters from DPU to ICU.	open
ECR 73	Reorganize and co-locate compiled codes.	closed
ECR 74	Implement robust DPU window allocation to allow for 1024x 1024 acquisition of flat field data	open
ECR 77	Implement and test remaining RTRD modifications to DPUOS and C codes	open

1 NCR 111 - DPU crashes after power cycle using codes with red scrubbing

Explanation: Errors were seen when trying to boot up DPU following a power cycle. The cause was determined to be a few variables that were not properly initialized during boot sequence.

Affected codes:

- white/src/cc/whitedsp.c
- include/red_static_variables.h
- red/src/cc/reddsp.c

```
white/src/cc/whitedsp.c
----------------------------
revision 1.54
date: 1998/10/01 08:50:43;  author: ho;  state: Exp;  lines: +2 -1
CH19980930. Initialize dpucfg at the top of whitedsp.c

include/red_static_variables.h
----------------------------
revision 1.18
date: 1998/10/01 08:40:04;  author: ho;  state: Exp;  lines: +2 -1
CH19980930: Initialize dpucfg at the top of reddsp.c

red/src/cc/reddsp.c
----------------------------
revision 1.18
date: 1998/10/01 08:40:04;  author: ho;  state: Exp;  lines: +2 -1
CH19980930: Initialize dpucfg at the top of reddsp.c
```

2 NCR's 114/115/119/125/126 - DPU "busy spot problem"

Explanation: This is the so-called 'DPU Busy Spot' problem. It is related to the internal timing and resource allocation among the four processors inside the DPU. NCR114/115 were early manifestation of the problem and 'thought' corrected after a simplistic tuning of the DPU operation paramaters. NCR 125 was noted after 191 hours of execution, but the symptom is that of the busy spot problem. The problem was resolved after a concerted effort over a month. Hence, affected code list is fairly lengthy.

Affected codes:

- blue/src/blue.asm
- include/cwhite.h
- include/global_access.c
- include/hopper.asm
- include/red_default.h
- include/white.h
- include/white_default.h
- include/white_os_variables.h
- include/xmmom_std.asm
- red/src/asm/red.asm
- red/src/cc/reddsp.c
- white/src/asm/white.asm
- white/src/cc/cwhite.c
- white/src/cc/su_caldrft.c
- white/src/cc/su_deliverdata.c
- white/src/cc/su_locategs.c
- white/src/cc/su_scanbs.c

```
blue/src/blue.asm
----------------------------
revision 1.24
date: 1998/12/09 22:05:18;  author: jrklark;  state: Exp;  lines: +512 -420
JRM Klarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.

include/cwhite.h
----------------------------
revision 1.10
date: 1998/12/09 22:07:45;  author: jrklark;  state: Exp;  lines: +7 -3
JRM Klarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.

include/global_access.c
----------------------------
revision 1.13
date: 1998/12/10 21:22:58;  author: ho;  state: Exp;  lines: +7 -7
Cheng Ho, Dec 10, 1998: This is the version prior to Dec 9,
1998. Version 1.12 was checked in by mistaked and associated with NCRs
119, 125, and 126. The update of this version nullify versio
----------------------------
revision 1.12
date: 1998/12/09 22:09:24;  author: jrklark;  state: Exp;  lines: +7 -7
JRM Klarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
```

```
allocation among processors.

include/hopper.asm
----------------------------
revision 1.2
date: 1998/12/09 22:11:35;  author: jrklark;  state: Exp;  lines: +38 -38
JRM Klarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.

include/red_default.h
----------------------------
revision 1.12
date: 1998/12/09 22:13:55;  author: jrklark;  state: Exp;  lines: +3 -3
JRM Klarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.
----------------------------
revision 1.11
date: 1998/10/26 18:07:22;  author: ho;  state: Exp;  lines: +2 -2
Cheng Ho, 1998oct26: Adjusted red SAA parameter (4x52 -> 4x48).
NCR114 and 115 present in v.1.10 are fixed as confirmed by 110 hours
continous DEM operation without symptoms. Further optimization of Red
SAA highly desirable.

include/white.h
----------------------------
revision 1.15
date: 1998/12/09 22:15:41;  author: jrklark;  state: Exp;  lines: +5 -2
JRM Klarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.

include/white_default.h
----------------------------
revision 1.14
date: 1998/12/09 22:17:10;  author: jrklark;  state: Exp;  lines: +2 -2
JRM Klarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.

include/white_os_variables.h
----------------------------
revision 1.7
date: 1998/12/09 22:18:16;  author: jrklark;  state: Exp;  lines: +5 -1
JRM Klarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.

include/xmmom_std.asm
----------------------------
revision 1.6
date: 1998/12/09 22:19:29;  author: jrklark;  state: Exp;  lines: +78 -346
JRM Klarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.
```

```
red/src/asm/red.asm
----------------------------
revision 1.12
date: 1998/12/09 22:00:20;  author: jrklark;  state: Exp;  lines: +12 -69
JRM Klarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.

red/src/cc/reddsp.c
----------------------------
revision 1.20
date: 1998/12/09 21:58:15;  author: jrklark;  state: Exp;  lines: +10 -4
JRM Klarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.

white/src/asm/white.asm
----------------------------
revision 1.27
date: 1998/12/09 21:54:06;  author: jrklark;  state: Exp;  lines: +6894 -6907
JRM Klarkowski, 120998: Major in-code comments update.
NCR 119, 125, 126. DPU busy spot crash problem. Problem is corrected by
software optimization and global bus allocation among processors.

white/src/cc/cwhite.c
----------------------------
revision 1.41
date: 1998/12/09 21:29:49;  author: jrklark;  state: Exp;  lines: +27 -10
Jim KLarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.

white/src/cc/su_caldrft.c
----------------------------
revision 1.24
date: 1998/12/09 21:40:14;  author: jrklark;  state: Exp;  lines: +3 -3
JRM Klarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.

white/src/cc/su_deliverdata.c
----------------------------
revision 1.38
date: 1998/12/09 21:41:43;  author: jrklark;  state: Exp;  lines: +49 -32
JRM Klarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.

white/src/cc/su_locategs.c
----------------------------
revision 1.24
date: 1998/12/09 18:15:59;  author: ho;  state: Exp;  lines: +22 -2
Cheng Ho, Dec 9, 1998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.
```

```
white/src/cc/su_scanbs.c
----------------------------
revision 1.27
date: 1998/12/09 21:42:59;  author: jrklark;  state: Exp;  lines: +14 -10
JRM Klarkowski, 120998: NCR 119, 125, 126. DPU busy spot crash
problem. Problem is corrected by software optimization and global bus
allocation among processors.
```

3 NCR 120 - Red DSP Power on problem

Explanation: Occasionally the DPU would hang during bootup. A fix was implmented by shuffling the order of a few events during bootup and the problem has not been seen again.

Affected codes:

- include/red_shared_variables.h
- include/red_static_variables.h
- red/src/cc/reddsp.c

```
include/red_shared_variables.h
----------------------------
revision 1.8
date: 1998/10/26 17:42:05;  author: ho;  state: Exp;  lines: +3 -2
Cheng Ho, 1998oct26: Implement work around for NCR120 present in v.1.7

include/red_static_variables.h
----------------------------
revision 1.9
date: 1998/10/26 17:40:47;  author: ho;  state: Exp;  lines: +4 -1
Cheng Ho, 1998oct25: implement a workaround for NCR120 present in v.1.8

red/src/cc/reddsp.c
----------------------------
revision 1.19
date: 1998/10/26 17:43:42;  author: ho;  state: Exp;  lines: +7 -6
Cheng Ho 1998oct26: Implement workaround for NCR120 present in v.1.18
```

4 NCR 123 - DPU heartbeat status word field 9 designated to indicate tracking on/off status

Explanation: Previously there was not communication of the tracking on/off status from the DPU to the ICU. A formerly unused status word has been designated to contain this information. This change has no effect on the telemetry command interface with the spacecraft.

Affected codes:

- include/white_control.h
- white/src/cc/cwhite.c
- white/src/cc/su_initialize.c
- white/src/cc/su_scanbs.c

```
include/white_control.h
----------------------------
revision 1.11
date: 1998/12/10 04:45:32;  author: ho;  state: Exp;  lines: +5 -3
Cheng Ho, Dec 9, 1998: NCR123. These code modifications will have the
9-th bit of the heartbeat status word carry the current setting of the
tracking, 1=on, 0=off.

white/src/cc/cwhite.c
----------------------------
revision 1.42
date: 1998/12/10 04:39:28;  author: ho;  state: Exp;  lines: +2 -1
CHeng Ho, Dec 9, 1998: NCR123. These code modifications will have the
9-th bit of the heartbeat status word carry the current setting of the
tracking, 1=on, 0=off.

white/src/cc/su_initialize.c
----------------------------
revision 1.33
date: 1998/12/10 04:39:31;  author: ho;  state: Exp;  lines: +3 -1
CHeng Ho, Dec 9, 1998: NCR123. These code modifications will have the
9-th bit of the heartbeat status word carry the current setting of the
tracking, 1=on, 0=off.

white/src/cc/su_scanbs.c
----------------------------
revision 1.28
date: 1998/12/10 04:39:33;  author: ho;  state: Exp;  lines: +3 -2
Cheng Ho, Dec 9, 1998: NCR123. These code modifications will have the
9-th bit of the heartbeat status word carry the current setting of the
tracking, 1=on, 0=off.
```

5 NCR 130 - Blue fast mode not working

Explanation:

Blue fast mode not functional after codes changes for NCR119/125/126. As a result of the recent major DPU code overhaul to address NCR 119/125/126, the blue fast mode was found to be not working on December 8. The DPU resets itself.

Severity: Major.

Not implemented in this release.

6 NCR 131 - DP_WDW format correction

Explanation:

The n_dtw field in the DP_WDW gives the valid detector window plus one. This is due to DPU internal allocation where dtw_0 has been designated as unsed by BPE but counted by the DPU. Following the agreement to conform to this convention between DPU and ICU, the ENG portion of the DPU codes need to be modified for compliance.

Severity: Minor.

Affected codes:

- white/src/cc/whitedsp.c

```
white/src/cc/whitedsp.c
----------------------------
revision 1.57
date: 1998/12/17 21:26:56;  author: ho;  state: Exp;  lines: +11 -9
Cheng Ho, Dec 17, 1998: NCR131 (offshoot from NCR128). Change the
engineering mode DP_WDW output to conform with the n_dtw (+1)
convention, excluding ENG4 and 5, which already uases up ALL 16
entries in the DTW table.
----------------------------
revision 1.56
date: 1998/12/10 04:42:25;  author: ho;  state: Exp;  lines: +11 -1
Cheng Ho, Dec 9, 1998: NCR131. This code modification makes the DP_WDW
data set generated by the ENG mode conforms to the ndtw convention that it
include window 0 in the count.
```

7 ECR 70 - Reset science and memory window to zero before configuring for each exposure

Affected codes:

- su_dowindow.c

```
su_dowindow.c
----------------------------
revision 1.27
date: 1998/09/22 05:38:09;  author: ho;  state: Exp;  lines: +3 -1
CH19980921. Clean up the SCW and MMW entries in su_dowindow.c before
setting them to the allocated value.
```

8 ECR 72 - Implement codes/algorithms to allow normal exposure with user selectable bpe_binning and tracking_on

... as commanded by the ICU commands IC_BPE_BINNING and IC_SET_TRK. The codes should include status reporting of there parameters from DPU to ICU.

Explanation:

Not implemented by this release.

Affected codes:

- white/src/cc/su_deliverdata.c

```
white/src/cc/su_deliverdata.c
----------------------------
revision 1.39
date: 1998/12/11 04:13:17;  author: ho;  state: Exp;  lines: +3 -2
Cheng Ho, Dec 10, 1998: ECR72/74. This is a slightly revised version
of 1.38 which has a cvs log mistakenly referring to the wrong NCR. The
code modification is to break up image mode data into different chunks
which will be downlinked as soon as available.
```

9 ECR 73 - Reorganize and co-locate compiled codes.

Explanation: Put compiled codes in single directory. Affects only executable code segments after compiling. No effect on source code.

Affected codes: eeprom directory

10 ECR 74 - Implement robust DPU window allocation to allow 1024 x 1024 acquisition of flat field data.

Explanation:

Not implemented at this release.

Affected codes:

- include/white_shared_variables.h
- include/white_static_variables.h
- white/src/cc/shared_io_functions.c
- white/src/cc/shared_variables.c
- white/src/cc/su_dowindow.c
- white/src/cc/su_initialize.c
- white/src/cc/su_locategs.c
- white/src/cc/whitedsp.c

```
include/white_shared_variables.h
----------------------------
revision 1.15
date: 1998/11/04 19:06:21;  author: ho;  state: Exp;  lines: +2 -1
Cheng Ho 1998nov04: ECR74. Implement more robust flat field algorithm.

include/white_static_variables.h
----------------------------
revision 1.15
date: 1998/11/04 19:06:22;  author: ho;  state: Exp;  lines: +4 -1
Cheng Ho 1998nov04: ECR74. Implement more robust flat field algorithm.

white/src/cc/shared_io_functions.c
----------------------------
revision 1.24
date: 1998/11/04 19:02:05;  author: ho;  state: Exp;  lines: +3 -1
Cheng Ho 1998nov04: Implement more robust flat field algorithm.

white/src/cc/shared_variables.c
----------------------------
revision 1.17
date: 1998/11/04 19:04:36;  author: ho;  state: Exp;  lines: +2 -1
Cheng Ho 1998nov04: Implement more robust flat field algorithm.

white/src/cc/su_dowindow.c
----------------------------
revision 1.28
date: 1998/11/04 19:03:26;  author: ho;  state: Exp;  lines: +79 -47
Cheng Ho 1998nov04: Implement more robust flat field algorithm.

white/src/cc/su_initialize.c
----------------------------
revision 1.31
date: 1998/11/04 19:04:37;  author: ho;  state: Exp;  lines: +2 -1
Cheng Ho 1998nov04: Implement more robust flat field algorithm.

white/src/cc/su_locategs.c
----------------------------
```

```
revision 1.22
date: 1998/11/04 19:04:38;  author: ho;  state: Exp;  lines: +14 -1
Cheng Ho 1998nov04: Implement more robust flat field algorithm.

white/src/cc/whitedsp.c
----------------------------
revision 1.55
date: 1998/11/04 19:00:39;  author: ho;  state: Exp;  lines: +155 -143
Cheng Ho 1998nov04: ECR74, implement more robust flat field algorithm
```

11 ECR 77 - Implement and test remaining RTRD modifications to DPUOS and C codes

Explanation:

Not implemented at this release.

Affected codes:

12 Comment-Only Code Changes

The following routines had updates only by changing in-code comments:

12.1 white/src/asm/white.asm

```
white/src/asm/white.asm
----------------------------
revision 1.26
date: 1998/11/18 06:13:54;  author: ho;  state: Exp;  lines: +6907 -5644
Cheng Ho/Jim Klarkowski, Nov 17, 1998: Major update of in-code comments.
```

12.2 white/src/asm/white.asm

```
white/src/cc/su_caldrft.c
----------------------------
revision 1.23
date: 1998/11/12 07:03:08;  author: ho;  state: Exp;  lines: +59 -58
Cheng Ho, 1998nov12: Major in-code comments upate.
```

12.3 white/src/cc/su_dowindow.c

```
white/src/cc/su_dowindow.c
----------------------------
revision 1.29
date: 1998/11/12 07:03:10;  author: ho;  state: Exp;  lines: +347 -354
Cheng Ho, 1998nov12: Major in-code comments upate.
```

12.4 white/src/cc/su_init_exp.c

```
white/src/cc/su_init_exp.c
----------------------------
revision 1.10
date: 1998/11/12 07:03:14;  author: ho;  state: Exp;  lines: +31 -36
Cheng Ho, 1998nov12: Major in-code comments upate.
```

12.5 white/src/cc/su_initialize.c

```
white/src/cc/su_initialize.c
----------------------------
revision 1.32
date: 1998/11/12 07:03:16;  author: ho;  state: Exp;  lines: +264 -82
Cheng Ho, 1998nov12: Major in-code comments upate.
```

12.6 white/src/cc/su_locategs.c

```
white/src/cc/su_locategs.c
----------------------------
revision 1.23
date: 1998/11/12 07:03:18;  author: ho;  state: Exp;  lines: +127 -166
Cheng Ho, 1998nov12: Major in-code comments upate.
```

12.7 white/src/cc/su_rtrd.c

```
white/src/cc/su_rtrd.c
----------------------------
revision 1.3
date: 1998/11/12 07:03:20;  author: ho;  state: Exp;  lines: +97 -127
Cheng Ho, 1998nov12: Major in-code comments upate.
```

12.8 white/src/cc/su_scanbs.c

```
white/src/cc/su_scanbs.c
----------------------------
revision 1.26
date: 1998/11/12 07:03:22;  author: ho;  state: Exp;  lines: +154 -191
Cheng Ho, 1998nov12: Major in-code comments upate.
```

12.9 white/src/cc/su_scangs.c

```
white/src/cc/su_scangs.c
----------------------------
revision 1.25
date: 1998/11/12 07:03:25;  author: ho;  state: Exp;  lines: +102 -118
Cheng Ho, 1998nov12: Major in-code comments upate.
```