XMM Optical Monitor

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Description of Changes to DPU Software Sep 1999-May 2000 (Release 10)

DOCUMENT: XMM-OM/UCSB/TC/0050 Version 1.0 05-May-00

Contents

The document describes changes of DPU code from Sep 1999 (tagged by "release9b") to May 2000 ("release10") version. It summarizes the changes and fixes reported in the ECR's and NCR's below. The description of the revision versions indicates changes since the last delivery of Sep 99. For previous changes to the DPU flight software, see documents XMMOM/UCSB/TC/0041, 0042, 0043, 0045 (available from UCSB web site.) Test reports specific to the changes described in this document are found in XMMOM/UCSB/RP/0005. For a description of ICU flight software and other testing performed at MSSL please see document XMMOM/MSSL/SP/0232.

ECR 77 has modifications included in this release, but is not yet closed.

List of NCRs/ECRS Described in this Document

NCR/ECR	Description	Status this Release
NCR 167	Difficulty tracking with magnifier images	open
NCR 183	Turn off tracking when no good guide stars are found	closed
NCR 186	Fast mode data contain internal inconsistency seen as more slices sampled than commanded in some tracking frame.	open
NCR 193	Error capture of single SW integer write generates wrong alert id	closed
NCR 194	DPU alerts on SSI to ICU during filter wheel move can cause loss of FW position.	closed
NCR 198	Scrubbing reports errors too often (when not busy) and sometimes too late (when busy).	closed

1 NCR 167 - Difficulty tracking with magnifier images

Explanation:

Due to the differences in the magnifier PSF, a different set of selection criteria for the IC_CHOOSE_GUIDE_STAR (CGS) task are needed to allow selection of magnified tracking guide stars.

Also a new centroiding algorithm was written to cope with the tracking being so bad that the guide stars partially leave the tracking window. Given the stability of the telescope and the fact that it has not been well tested this has been turned off by default.

To help debug the CGS algorithm a method of dumping the the tracking guide star windows into memory for later examination was also implemented. This feature has been turned off in the code by default.

Changes were also made in the generation of the DD_REF, which is now output when no good guide stars are found to aid in further debugging of the CVS routine in orbit.

Affected codes:
- white/src/cc/su_scangs.c
- white/src/cc/su_locategs.c
- white/src/cc/whitedsp.c
- white/src/cc/shared_variables.c
- white/src/cc/shared_io_functions.c
- white/src/cc/shared_variables.c
- white/src/cc/su_initialize.c
- include/white_default.h
- include/white_shared_variables.h
- include/white_static_variables.h

```
white/src/cc/su_scangs.c
----------------------------
revision 1.28
date: 2000/04/13 01:28:48;  author: jak;  state: Exp;  lines: +67 -63
Changed the way centroid off centre quality is calculated. Also monkeyed
with the output of the sun sim to make it easy to see why stars had failed
CGS.
----------------------------
revision 1.27
date: 2000/02/14 16:01:50;  author: ho;  state: Exp;  lines: +7 -3
CH2000-02-14: NCR 167. Tentative check-in for mag tracking. Subject to more tuni
ng.
----------------------------
revision 1.26
date: 1999/10/29 17:37:53;  author: jak;  state: Exp;  lines: +37 -1
Jamie Kennea, 1999 Oct 29: NCR 167 magnifer tracking problem: Added new
code to swap in magnifier guide star selection parameters.

white/src/cc/su_locategs.c
----------------------------
revision 1.26
date: 2000/04/13 01:27:28;  author: jak;  state: Exp;  lines: +6 -6
Disabled the alternative centroiding algorithm for magnifier tracking as
it's untested.
----------------------------
revision 1.25
date: 2000/02/14 15:36:40;  author: ho;  state: Exp;  lines: +81 -13
2000-02-14: CH. NCR 167. Use starightforward summing for magnifier tracking.
```

```
white/src/cc/whitedsp.c
----------------------------
revision 1.68
date: 2000/03/16 06:40:29;  author: ho;  state: Exp;  lines: +17 -13
2000 Mar 15 CH: 1) or_rm_07, 2) shut_up_dpu

1) Send out DD_REF under a5d7 condition, DD_REF key on
tracking_command_on and DD_TRH key on tracking_on.

2) Add robust logic to IC_ABORT_DPU command, such that it can use
safely with the inhibit_ssi trick.

white/src/cc/shared_variables.c
----------------------------
revision 1.21
date: 2000/02/14 15:55:28;  author: ho;  state: Exp;  lines: +6 -1
CH 2000-02-14: Added capability to dump TGS images. Controlled by TGS_CUMP_IMAGE
 flag.
Should be turned off.

white/src/cc/shared_io_functions.c
----------------------------
revision 1.26
date: 2000/02/14 15:55:29;  author: ho;  state: Exp;  lines: +7 -3
CH 2000-02-14: Added capability to dump TGS images. Controlled by TGS_CUMP_IMAGE flag.
Should be turned off.

white/src/cc/shared_variables.c
----------------------------
revision 1.21
date: 2000/02/14 15:55:28;  author: ho;  state: Exp;  lines: +6 -1
CH 2000-02-14: Added capability to dump TGS images. Controlled by TGS_CUMP_IMAGE flag.
Should be turned off.

white/src/cc/su_initialize.c
----------------------------
revision 1.40
date: 2000/02/14 16:20:15;  author: ho;  state: Exp;  lines: +11 -1
CH2000-02-14: Added capability to dump TGS image. Controlled by TGS_DUMP_IMAGE flag.
Should be turned off.

include/white_default.h
----------------------------
revision 1.24
date: 2000/04/13 01:29:59;  author: jak;  state: Exp;  lines: +5 -5
Changed some of the magnifier CGS parameters to optimise for the heater =
-100% focal setting.
----------------------------
revision 1.23
date: 2000/02/14 15:42:26;  author: ho;  state: Exp;  lines: +17 -4
2000-02-14 CH: Added capability to dump TGS image. Controlled by TGS_DUMP
flag.
Should be turned off (0).
----------------------------
revision 1.22
date: 1999/11/01 22:49:02;  author: jak;  state: Exp;  lines: +3 -3
Jamie Kennea Nov 1 1999: Fixed silly mistake in white_default.h
```

```
----------------------------
revision 1.21
date: 1999/10/29 17:26:30;  author: jak;  state: Exp;  lines: +14 -3

Jamie Kennea, 1999 Oct 29: NCR 167 magnifer tracking problem: Added new
guide star selection parameters for magnifier tracking.

include/white_shared_variables.h
----------------------------
revision 1.18
date: 2000/02/14 15:46:59;  author: ho;  state: Exp;  lines: +10 -1
2000-02-14 CH:   Added capability to dump TGS image. Controlled by TGS_DUMP_IMAGE flag.
Should be turned off (0).

include/white_static_variables.h
----------------------------
revision 1.18
date: 2000/02/14 15:47:00;  author: ho;  state: Exp;  lines: +7 -1
2000-02-14 CH:   Added capability to dump TGS image. Controlled by TGS_DUMP_IMAGE flag.
Should be turned off (0).
```

2 NCR 183 - Turn off tracking when no good guide stars are found

Explanation:

In the situation where no good guide stars where found and a A5D7 (DA_NO_GOOD_GS) alert was issued, tracking was not turned off internally in previous release of the code. This lead to errors when attempting to track on zero guide stars, which manifested itself as the generation of many A5B2 (DA_GADE_RANGE_ERROR) alerts during the exposure.

Affected codes:
- white/src/cc/cwhite.c
- white/src/cc/whitedsp.c
- white/src/cc/shared_variables.c
- white/src/cc/su_initialize.c
- include/white_shared_variables.h
- include/white_static_variables.h

```
white/src/cc/cwhite.c
----------------------------
revision 1.47
date: 2000/03/16 06:32:10;  author: ho;  state: Exp;  lines: +6 -1
2000 Mar 15 CH: 1) OM_RM07, 2) shut_up_dpu.
1) Added codes to distinguish commanded tracking off or DPU internally off.
2) Implement inhibit_ssi to supress DPU DA alerts except for HB.

white/src/cc/whitedsp.c
----------------------------
revision 1.68
date: 2000/03/16 06:40:29;  author: ho;  state: Exp;  lines: +17 -13
2000 Mar 15 CH: 1) or_rm_07, 2) shut_up_dpu

1) Send out DD_REF under a5d7 condition, DD_REF key on
tracking_command_on and DD_TRH key on tracking_on.

2) Add robust logic to IC_ABORT_DPU command, such that it can use
safely with the inhibit_ssi trick.

white/src/cc/shared_variables.c
----------------------------
revision 1.22
date: 2000/03/16 06:33:45;  author: ho;  state: Exp;  lines: +5 -1
2000 Mar 15 CH: 2) OR_RM_07, 2) shut_up_dpu.
1) Add variable tracking_command_on.
2) Add variable inhibit_ssi.

white/src/cc/su_initialize.c
----------------------------
revision 1.41
date: 2000/03/16 06:41:29;  author: ho;  state: Exp;  lines: +4 -1
2000 Mar 15 CH: 1) or_rm_07, 2) shut_up_dpu. Initialize the new variables.

include/white_shared_variables.h
----------------------------
revision 1.19
date: 2000/03/16 06:48:09;  author: ho;  state: Exp;  lines: +3 -1
```

```
2000 Mar 25 CH: 1) or_rm_07, 2) shut_up_dpu. Added new variables.

include/white_static_variables.h
----------------------------
revision 1.19
date: 2000/03/16 06:48:09;  author: ho;  state: Exp;  lines: +18 -1
2000 Mar 25 CH: 1) or_rm_07, 2) shut_up_dpu. Added new variables.
```

3 NCR 186 - Fast mode data contain internal inconsistency seen as more slices sampled than commanded in some tracking frame.

Explanation:

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

A new scheme for internal DPU fast mode data storage, FAST24, has been implemented to fix problems with byte overflow of the fast mode data in small word memory (16 bit words). The FAST24 scheme moves the storage of fast mode data in big word memory (24 bit words), and moves image storage into small word memory. This is currently turned off by default by compile flag.

Affected codes:

- blue/src/blue.asm

```
blue/src/blue.asm
----------------------------
revision 1.35
date: 2000/04/18 18:15:28;  author: ho;  state: Exp;  lines: +58 -1
CH20000418: NCR186. Preliminary codes to implement the FAST24 scheme.
This scheme will get around the 16-bit dynamic range overflow problem
in the fast mode. Consult with ESA/MSSL requirements for the
appropriate time to turn on the FAST24 flag and ddliver after thorough
testing.
----------------------------
revision 1.34
date: 2000/02/14 15:53:07;  author: ho;  state: Exp;  lines: +280 -41
CH2000-02-14: NCR186. Blue fast mode codes. Correct for FCT creation procedure.
```

4 NCR 193 - Error capture of single SW integer write generates wrong alert id.

Explanation:

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.

Affected codes:

- include/global_access.c

```
include/global_access.c
----------------------------
revision 1.16
date: 2000/02/14 15:51:35;  author: ho;  state: Exp;  lines: +2 -2
CH2000-02-14: Correct coding error for error capture DA_GADE_WSI. Was hard-coded for
0xa555. Corrected to symbolic name DA_GADE_WSI.
```

5 NCR 194 - DPU alerts on SSI to ICU during filter wheel move can cause loss of FW position.

Explanation:

Goto Safe Mode can lose filter wheel position. If the DPU is sending alerts or data during the filter wheel movement of a goto safe command, this traffic on the SSI can interrupt the filter wheel on its way to blocked.

Affected codes: • white/src/cc/su_deliverdata.c
• white/src/cc/whitedsp.c
• white/src/cc/cwhite.c
• white/src/cc/shared_variables.c
• include/white_shared_variables.h
• include/white_static_variables.h

```
white/src/cc/su_deliverdata.c
----------------------------
revision 1.42
date: 2000/03/16 06:34:57;  author: ho;  state: Exp;  lines: +14 -1
2000 Mar 15: shut_up_dpu. Turn off DP data output keying on inhibit_ssi.

white/src/cc/whitedsp.c
----------------------------
revision 1.68
date: 2000/03/16 06:40:29;  author: ho;  state: Exp;  lines: +17 -13
2000 Mar 15 CH: 1) or_rm_07, 2) shut_up_dpu

1) Send out DD_REF under a5d7 condition, DD_REF key on
tracking_command_on and DD_TRH key on tracking_on.

2) Add robust logic to IC_ABORT_DPU command, such that it can use
safely with the inhibit_ssi trick.

white/src/cc/cwhite.c
----------------------------
revision 1.47
date: 2000/03/16 06:32:10;  author: ho;  state: Exp;  lines: +6 -1
2000 Mar 15 CH: 1) OM_RM07, 2) shut_up_dpu.
1) Added codes to distinguish commanded tracking off or DPU internally off.
2) Implement inhibit_ssi to supress DPU DA alerts except for HB.

white/src/cc/shared_variables.c
----------------------------
revision 1.22
date: 2000/03/16 06:33:45;  author: ho;  state: Exp;  lines: +5 -1
2000 Mar 15 CH: 2) OR_RM_07, 2) shut_up_dpu.
1) Add variable tracking_command_on.
2) Add variable inhibit_ssi.

include/white_shared_variables.h
----------------------------
revision 1.19
date: 2000/03/16 06:48:09;  author: ho;  state: Exp;  lines: +3 -1
2000 Mar 25 CH: 1) or_rm_07, 2) shut_up_dpu. Added new variables.
```

```
include/white_static_variables.h
----------------------------
revision 1.19
date: 2000/03/16 06:48:09;  author: ho;  state: Exp;  lines: +18 -1
2000 Mar 25 CH: 1) or_rm_07, 2) shut_up_dpu. Added new variables.

white/src/cc/su_initialize.c
----------------------------
revision 1.41
date: 2000/03/16 06:41:29;  author: ho;  state: Exp;  lines: +4 -1
2000 Mar 15 CH: 1) or_rm_07, 2) shut_up_dpu. Initialize the new variables.
```

6 NCR 198 - Repeated detection of multi-bit errors by scrubbing code continues to send alerts.

Explanation:

Occurance of a multiple bit error would cause the alert to be repeated every scrubbing cycle (roughly every 20 seconds). This would result in the REPEX display quickly filling with alerts and may cause other alerts to be missed. The scrubbing code has been altered to report a multiple bit every 3 minutes so as not to overload the REPEX display.

Also multiple bit errors were often being reported too late, this has been fixed by moving the check to cwhite.c so it is called more often.

Affected codes:
- red/src/cc/reddsp.c
- white/src/cc/cwhite.c
- white/src/cc/whitedsp.c
- white/src/cc/su_compress.c
- include/dpucfg_map.h
- include/red_shared_variables.h
- include/red_static_variables.h
- include/white_control.h

```
red/src/cc/reddsp.c
----------------------------
revision 1.27
date: 2000/04/18 17:55:20;  author: ho;  state: Exp;  lines: +17 -9
CH20000418: NCR198. Tuned scrubbing codes to correct wrong
initialization if reporting starts with multi-bit error.

white/src/cc/cwhite.c
----------------------------
revision 1.48
date: 2000/04/18 17:39:58;  author: ho;  state: Exp;  lines: +140 -1
CH20000418: NCR198. Move check_fec_error too cwhite.c to ba called at
multiple locations in whitedsp.c.

white/src/cc/whitedsp.c
----------------------------
revision 1.69
date: 2000/04/18 17:45:42;  author: ho;  state: Exp;  lines: +16 -84
CH20000418: NCR198. Extract check/report_fec_error routine and
relocate it to cwhite.c.  Call check_fec_error from multiple location
for a more prompt response.

Add PROMPT_DD_REF flag for debugging. This flag should be turned off
by default.

white/src/cc/su_compress.c
----------------------------
revision 1.12
date: 2000/04/18 17:48:04;  author: ho;  state: Exp;  lines: +9 -1
CH20000418: NCR198. Add calles to check_fec_error reporting,
specifically from red scrubbing.

include/dpucfg_map.h
----------------------------
```

```
revision 1.14
date: 2000/04/18 17:59:08;  author: ho;  state: Exp;  lines: +4 -1
CH20000418: NCR198. Trivial change. Insert warning comments of not
changing the memory map near the error report aray area.

include/red_shared_variables.h
----------------------------
revision 1.10
date: 2000/04/18 18:00:56;  author: ho;  state: Exp;  lines: +5 -2
CH20000418: NCR198. Add variables to allow for delay control in red
scrubbing.

include/red_static_variables.h
----------------------------
revision 1.10
date: 2000/04/18 18:00:56;  author: ho;  state: Exp;  lines: +11 -1
CH20000418: NCR198. Add variables to allow for delay control in red
scrubbing.

include/white_control.h
----------------------------
revision 1.15
date: 2000/04/18 18:04:52;  author: ho;  state: Exp;  lines: +4 -1
CH20000418: NCR198. Add CHECK_FEC flag to controlled all checking of
fec/scrubbing error reported by red/blue in various white software
modules.
```