4.28_V2.2 Flight Software Standard Patch F Optional Patch G

Last Revised: December 8, 2015
Filename: sw_stdfoptg

BRIEF FUNCTIONAL DESCRIPTION:

This procedure loads the standard F patches and five optional G patches. The changes from sw_stdeoptf consist of one standard patch. The text describing the changes in the patches in this procedure are included below the italic note:

The set of standard release F patches is loaded into a common address space so that each optional patch can be loaded independently of the others, provided the load order defined in the patch combination certification is maintained.

Patches eventhist, ctireport1, and ctireport2 require that smtimedlookup is also loaded;

The ACIS Flight SW team recommends that the optional patches be loaded together with the standard patches; therefore this procedure first removes any patches which may have been installed and then proceeds to load the standard patches followed by the optional patches.

This procedure loads "standard Rev. F" and optional patches from "optional Rev. G". Refer to the release notes for standard patches, optional patches, and patch combination certification (see references below).

Revision C of the buscrash2 patch has been included in this standard load, to address the Trickle Bias Anomaly.

This procedure will change the flight software version from 50 to version 53. Ground software should be changed to reflect the version change once this procedure is executed.

The FOT should implement the loading of the patches (steps 3.1 through step 8.1) as six realtime command loads in order to maximize the uplink efficiency. The command system should be configured with a blocking factor of 90 and a minimum time delay of 3 s.

The following procedure loads the Standard F and smtimedlookup / cc3x3 / eventhist / compress all / txings optional set of patches into the ACIS instrument, and dumps the load to the ground for verification. It then executes a warm boot and loads and starts DEA housekeeping.

This procedure implements the following basic operations:

1. Confirm the current state of ACIS by verifying BEP HW and SW LEDs
2. Reset the contents of the patch list to remove any existing patches, dump the contents of the patch list to verify that the list is empty
3. Load the "standard Rev. F" patch load
4. Load the smtimedlookup patch (part of "optional Rev. G")
5. Load the cc3x3 patch (part of "optional Rev. G")
6. Load the eventhist patch (part of "optional Rev. G")
7. Load the compressall patch (part of the "optional Rev. G")

8. Load the txings patch (part of the "optional Rev. G")
9. Load the patch load version number (53)
10. Dump the contents of the patch list to verify the load
11. Warm boot the BEP to activate the new load and verify proper BEP boot
12. Start the DEA housekeeping and verify proper reporting

Refer to the Standard Patch Release Notes, for MIT 36-58010 Rev. G and MIT 36-58032.32 Rev C, for a detailed description of the effects of this patch load.

The telemetry verifiers for the procedure will be:

1. ACIS Ops will confirm the current status of the BEP
2. A command echo for the reset patch list command
3. A command echo for the 1st dumpPatchlist command
4. A single bepReadReply packet for the 1st empty dump
5. A series of command echoes for the addPatch commands. The SOT will verify that each Result field of each commandEcho packet has a value of 1.
6. A command echo for the dumpPatchlist command
7. A series of bepReadReply packets for the dump command
8. A comparison of the dumped patchlist to expected values.
9. A bepStartupMessage packet with a modified "version == 53" field.
10. A verification of the focal plane temperatures once the housekeeping has started.

ACIS flight software personnel will review the contents of the various dumps after the procedure has been run.

ASSUMED INSTRUMENT STATE:
This assumes that DPA-A and/or DPA-B is on and the flight SW is running on either BEP-A or BEP-B.

SPECIAL INITIAL CONDITIONS:
The OCC command system must be configured with "Minimum Time Delay of 3 s" and a "Blocking Factor" of 90.
Spacecraft telemetry should be in Format 2 when the patches are loaded in order to ensure that all command verifiers can be included in the telemetry stream.

OPERATIONAL CONSTRAINTS/CAUTIONS:
In order to avoid truncating a dump, each dumpPatchlist command must be followed by at least a 30 second delay.

After successfully uplinking patches and rebooting the BEP, two other items are needed:

- Reset the focal plane temperature to the desired value

- Reload the parameters for the threshold crossings patch.

CONTINGENCY PLANS:
In case of a problem that may arise during the procedure, the following contingencies may be followed:

1. If there is a failure to confirm a telemetry verifier, ACIS flight software personnel will visually determine, via bi-levels, if the ACIS FIFO needs to be cleared. If it does, the FIFO will be cleared via Step 13. If the FIFO did not need to be cleared, ACIS Ops has the discretion to restart the procedure at 2.1, or to continue on from this point.

   Should the FIFO clear procedure be executed and is successful, the ACIS operator will observe the following responses. First, in PMON, the operator will see the correct command echo from the stuck command. Next, also in PMON, the "Serial Command" column will show "UNUSED", and the "Result Code" column will show "NO_HANDLER". Lastly, the bilevels will return to their nominal values. 1STAT7ST will read 0 indicating FIFO Empty, and 1STAT6ST will read 1, indicating FIFO Not Full.

   If the FIFO does not need to be cleared and the problem cannot be determined, a full ACIS system dump will be executed, using SOP_ACIS_FSW_DUMP to obtain the ACIS diagnostic information. The patchlist will be cleared, if necessary, and the present version of software will continue to run. Should ACIS reboot, however, it will revert to Version 11 of the ACIS software.

2. If there is a failure to confirm the patch list dump (step 10), first repeat step 10, dumping the patch list, to confirm that there wasn't a downlink corruption. If the list is confirmed, continue to the next step(11), otherwise, restart from step 2.1 and reload the patches. If SOT cannot confirm telemetry verifiers for reasons other than telemetry corruption, run SOP_ACIS_FSW_DUMP to obtain the ACIS diagnostic information and then reload version 50 patches (SOT Procedure 4.27, v. 2.1, sw_stdeoptf, FOT SOP_ACIS_SW_STDEOPTF).

3. If the warm boot of the BEP fails (step 11), retry the reboot (step 11). If this continues to fail, dump additional information for diagnostic purposes (SOT Procedure 1.10, v 2.2 sw_dump, FOT SOP_ACIS_FSW_DUMP and reload version 50 patches (SOT Procedure 4.27, v. 2.1, sw_stdeoptf, FOT SOP_ACIS_SW_STDEOPTF).

4. If there is a comm loss during the procedure, request a new comm. The time at which the new comm is needed depends on the point of loss of signal. The only vulnerability would occur if comm was dropped before the complete patch set was loaded (completion of step 8). If the BEP then rebooted spontaneously, it would return to version 11 flight software.

REFERENCES:

1. MIT 36-58010 Rev G (ECO 36-1048) Flight Software Patch Release F, Optional Release G.

2. MIT 36-58021.04 Rev H (ECO 36-1049) Flight Software Patch Release F-G-H Certification.

CHANGE HISTORY:

V0.1

- Initial version, revised from 4.27_V2.1 Flight Software Standard Patch E Optional Patch F.

V1.0

- Minor text edits; ready to send to MIT team.

V1.1

- Minor text edits.

V2.0

- For release to the FOT.

V2.1

- Corrected location of comparison image

V2.2

- Added cautions about FP temperature setting and txings parameters.

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Table 1: **ACIS eventhist, cc3x3, smtimedlookup, compressall, and txings Flight Software Patch Revision F and FIXFIFO command**

Step no.	Title (Revision 4.28_V2.2)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
1	Verify current ACIS status							
1.1	Verify HW LEDs	2.0			BEP Select	1STAT4ST	0 or 1	
					BEP Not in Reset	1STAT5ST	1	
					BEP FIFO Not Full	1STAT6ST	1	
					BEP FIFO Not Empty	1STAT7ST	0	
1.2	Verify SW LEDs	2.0			BEP is running	1STAT0ST	0 or 1	
					Science run status	1STAT1ST	1	
					Watchdog boot	1STAT2ST	1	
					BEP initialization	1STAT3ST	0	
2	Reset the Patchlist							
2.1	Empty the Patchlist	1	removePatches	AUALLPATCH				
2.2	Read the empty Patchlist	1	dumpPatchlist	RU_0000001				
3	Load Standard Patches							
3.1	Load “standard Rev. F” patches	1	addPatch	WUSTANDF01				
				WUSTANDF02				
				WUSTANDF03				
				WUSTANDF04				
				WUSTANDF05				
				WUSTANDF06				
				WUSTANDF07				
				WUSTANDF08				
				WUSTANDF09				
				WUSTANDF10				
				WUSTANDF11				
				WUSTANDF12				
				WUSTANDF13				
				WUSTANDF14				
				WUSTANDF15				
				WUSTANDF16				
				WUSTANDF17				

Table 2: (CONT) **ACIS eventhist, cc3x3, smtimedlookup, compressall, and txings Flight Software Patch Revision F and FIXFIFO command**

Step no.	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
1									
1.1			2	0/1 indicates BEP A/B is selected		Y	2		
			2	1 means BEP not in reset					
			2	1 means FIFO not full					
			2	1 means not FIFO empty					
1.2			2	this bit toggles to indicate BEP is running					
			2	1 means science idle					
			2	1 means no watchdog boot					
			1	0 means BEP SW is running		Y	2		
2									
2.1	Verify cmdResult == 1		A			Y	2		
	commandEcho 326								
2.2	Verify cmdResult == 1		B	bepReadReply, ACIS EGSE verifies		Y	2		
	commandEcho 65			single packet reply					
3									
3.1	commandEcho 13715		A	Expect to send 34 packets.		Y	2		
	commandEcho 13717		A	Total load size: 3656 bytes.					
	commandEcho 13718		A	Verify cmdResult == 1 for each packet					
	commandEcho 13721		A						
	commandEcho 13722		A						
	commandEcho 13724		A						
	commandEcho 13727		A						
	commandEcho 13728		A						
	commandEcho 13731		A						
	commandEcho 13733		A						
	commandEcho 13734		A						
	commandEcho 13737		A						
	commandEcho 13738		A						
	commandEcho 13740		A						
	commandEcho 13743		A						
	commandEcho 13745		A						
	commandEcho 13746		A						

Table 1: **ACIS eventhist, cc3x3, smtimedlookup, compressall, and txings Flight Software Patch Revision F and FIXFIFO command(Page 2)**

Step no.	Title (Revision 4.28_V2.2)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
				WUSTANDF18 WUSTANDF19 WUSTANDF20 WUSTANDF21 WUSTANDF22 WUSTANDF23 WUSTANDF24 WUSTANDF25 WUSTANDF26 WUSTANDF27 WUSTANDF28 WUSTANDF29 WUSTANDF30 WUSTANDF31 WUSTANDF32 WUSTANDF33 WUSTANDF34				
4	Load SM Timed Lookup Patch							
4.1	Load opt_smtl patches part of “optional Rev. G”	5	addPatch	WUSTMLUG01 WUSTMLUG02 WUSTMLUG03 WUSTMLUG04 WUSTMLUG05 WUSTMLUG06 WUSTMLUG07 WUSTMLUG08 WUSTMLUG09 WUSTMLUG10 WUSTMLUG11 WUSTMLUG12				
5	Load CC3x3 Mode Patch							
5.1	Load opt_cc3x3 patches	5	addPatch	WUCC3X3G01				

Table 2: (CONT) **ACIS eventhist, cc3x3, smtimedlookup, compressall, and txings Flight Software Patch Revision F and FIXFIFO command(Page 2)**

Step no.	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
	commandEcho 13748		A						
	commandEcho 13751		A						
	commandEcho 13752		A						
	commandEcho 13755		A						
	commandEcho 13757		A						
	commandEcho 13758		A						
	commandEcho 13760		A						
	commandEcho 13763		A						
	commandEcho 13765		A						
	commandEcho 13766		A						
	commandEcho 13769		A						
	commandEcho 13770		A						
	commandEcho 13772		A						
	commandEcho 13775		A						
	commandEcho 13777		A						
	commandEcho 13778		A						
	commandEcho 13780		A						
4									
4.1	commandEcho 13784		A	Expect to send 12 packets.		Y	2		
	commandEcho 13787		A	Total load size: 3696 bytes.					
	commandEcho 13789		A	Verify cmdResult == 1 for each packet					
	commandEcho 13790		A						
	commandEcho 13793		A						
	commandEcho 13794		A						
	commandEcho 13796		A						
	commandEcho 13799		A						
	commandEcho 13800		A						
	commandEcho 13803		A						
	commandEcho 13805		A						
	commandEcho 13806		A						
5									
5.1	commandEcho 13811		A	Expect to send 13 packets.		Y	2		

Table 1: **ACIS eventhist, cc3x3, smtimedlookup, compressall, and txings Flight Software Patch Revision F and FIXFIFO command(Page 3)**

Step no.	Title (Revision 4.28_V2.2)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
	part of "optional Rev. G"			WUCC3X3G02 WUCC3X3G03 WUCC3X3G04 WUCC3X3G05 WUCC3X3G06 WUCC3X3G07 WUCC3X3G08 WUCC3X3G09 WUCC3X3G10 WUCC3X3G11 WUCC3X3G12 WUCC3X3G13				
6	Load the Event Histogram Patch							
6.1	Load opt_eventhist patches part of "optional Rev. G"	5	addPatch	WUEVHSTG01 WUEVHSTG02 WUEVHSTG03 WUEVHSTG04 WUEVHSTG05 WUEVHSTG06 WUEVHSTG07 WUEVHSTG08 WUEVHSTG09 WUEVHSTG10 WUEVHSTG11 WUEVHSTG12 WUEVHSTG13 WUEVHSTG14 WUEVHSTG15				
7	Load Compress All Patch							
7.1	Load opt_compressall patches part of "optional Rev. G"	5	addPatch	WUCMPRSG01 WUCMPRSG02 WUCMPRSG03				

Table 2: (CONT) **ACIS eventhist, cc3x3, smtimedlookup, compressall, and txings Flight Software Patch Revision F and FIXFIFO command(Page 3)**

Step no.	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
	commandEcho 13813		A	Total load size: 4620 bytes.					
	commandEcho 13814		A	Verify cmdResult == 1 for each packet					
	commandEcho 13817		A						
	commandEcho 13818		A						
	commandEcho 13820		A						
	commandEcho 13823		A						
	commandEcho 13824		A						
	commandEcho 13827		A						
	commandEcho 13829		A						
	commandEcho 13830		A						
	commandEcho 13833		A						
	commandEcho 13834		A						
6									
6.1	commandEcho 13839		A	Expect to send 15 packets.		Y	2		
	commandEcho 13841		A	Total load size: 5892 bytes.					
	commandEcho 13842		A	Verify cmdResult == 1 for each packet					
	commandEcho 13844		A						
	commandEcho 13847		A						
	commandEcho 13848		A						
	commandEcho 13851		A						
	commandEcho 13853		A						
	commandEcho 13854		A						
	commandEcho 13857		A						
	commandEcho 13858		A						
	commandEcho 13860		A						
	commandEcho 13863		A						
	commandEcho 13864		A						
	commandEcho 13867		A						
7									
7.1	commandEcho 13870		A	Expect to send 8 packets.		Y	2		
	commandEcho 13872		A	Total load size: 2352 bytes.					
	commandEcho 13875		A	Verify cmdResult == 1 for each packet					

Table 1: **ACIS eventhist, cc3x3, smtimedlookup, compressall, and txings Flight Software Patch Revision F and FIXFIFO command(Page 4)**

Step no.	Title (Revision 4.28_V2.2)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
				WUCMPRSG04 WUCMPRSG05 WUCMPRSG06 WUCMPRSG07 WUCMPRSG08				
8	Load Threshold Crossing Patch							
8.1	Load opt_txings patches part of “optional Rev. G”	5	addPatch	WUTXINGG01 WUTXINGG02 WUTXINGG03 WUTXINGG04 WUTXINGG05 WUTXINGG06 WUTXINGG07 WUTXINGG08 WUTXINGG09 WUTXINGG10 WUTXINGG11 WUTXINGG12 WUTXINGG13				
9	Patch the version number							
9.1	Load the version number patch	1	addPatch	WUFSV00035				
10	Dump Installed Patches							
10.1	Dump Patchlist	1	dumpPatchlist	RU_0000001				
11	Activate Patches							
11.1	Set Boot Modifier off	0.1	DPA FS Boot Mod.	1BMODIBM(0)				
11.2	Set Warm Boot Flag on	0.1	DPA Warm Boot	1WRMBTSB(1)				
11.3	Halt BEP	0.1	Halt BEP	1RSETIRT(1)				
11.4	Restart BEP	1	Restart BEP	1RSETIRT(0)				

Table 2: (CONT) **ACIS eventhist, cc3x3, smtimedlookup, compressall, and txings Flight Software Patch Revision F and FIXFIFO command(Page 4)**

Step no.	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
	commandEcho 13877		A						
	commandEcho 13878		A						
	commandEcho 13881		A						
	commandEcho 13882		A						
	commandEcho 13884		A						
8									
8.1	commandEcho 13889		A	Expect to send 13 packets.		Y	2		
	commandEcho 13890		A	Total load size: 3144 bytes.					
	commandEcho 13892		A	Verify cmdResult == 1 for each packet					
	commandEcho 13895		A						
	commandEcho 13896		A						
	commandEcho 13899		A						
	commandEcho 13901		A						
	commandEcho 13902		A						
	commandEcho 13904		A						
	commandEcho 13907		A						
	commandEcho 13909		A						
	commandEcho 13910		A						
	commandEcho 13913		A						
9									
9.1	Verify cmdResult == 1			Expect to send 1 packet.		Y	2		
	commandEcho 13919			Total load size 16 bytes.					
				Sets the version number to 53.					
10									
10.1	Verify cmdResult == 1			bepReadReply, ACIS EGSE verifies reply		Y	2		
	commandEcho 65			against file $ACISDOOLSDIR/bin/linux/					
				/wufgh_acom_compare.dumpedPatches.1.dat					
11									
11.1				disables uplink boot		Y	2		
11.2						Y	2		
11.3						Y	2		
11.4	bepStartupMessage			ACIS EGSE verifies		Y	2		

Table 1: **ACIS eventhist, cc3x3, smtimedlookup, compressall, and txings Flight Software Patch Revision F and FIXFIFO command(Page 5)**

Step no.	Title (Revision 4.28_V2.2)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
11.5	Verify BEP Boot	2.0						
11.6	Verify HW LEDs	2.0			BEP Select	1STAT4ST	0 or 1	
					BEP Not in Reset	1STAT5ST	1	
					BEP FIFO Not Full	1STAT6ST	1	
					BEP FIFO Not Empty	1STAT7ST	0	
11.7	Verify SW LEDs	2.0			BEP is running	1STAT0ST	0 or 1	
					Science run status	1STAT1ST	1	
					Watchdog boot	1STAT2ST	1	
					BEP initialization	1STAT3ST	0	
12	Execute DEA HK run							
12.1	Load Board 11 DEA HK	1	loadDeaBlock	WD00001024				
12.2	Start DEA Hkp run	1	startDEA	XDZ0000005				
13	Contingency FIFO Clear							
13.1-C	Fix FIFO Command	1	clearFIFO	FF_FIXFIFO				
13.2-C	Verify HW LEDs	2.0			BEP FIFO Not Full	1STAT6ST	1	
					BEP FIFO Empty	1STAT7ST	0	
	Total Time	45						

Table 2: (CONT) **ACIS eventhist, cc3x3, smtimedlookup, compressall, and txings Flight Software Patch Revision F and FIXFIFO command(Page 5)**

Step no.	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
				“version” field == 53 decimal					
11.5	Verify bepStartupMessage:		A			Y	2		
	bepTickCounter < 10; version =53;		A						
	watchdogFlag = 0, patchValidFlag =1		A						
	warmbootFlag = 1		A						
	Verify swHousekeeping messages:								
	startingBepTickCounter < 10;		B						
	endingBepTickCounter=		B						
	=startingBepTickCounter+ ∼645								
	version =53		A						
11.6			2	0/1 indicates BEP A/B is selected		Y	2		
			2	1 means BEP not in reset					
			2	1 means FIFO not full					
			2	1 means not FIFO empty					
11.7			2	this bit toggles to indicate BEP is running					
			2	1 means science idle					
			2	1 means no watchdog boot					
			1	0 means BEP SW is running		Y	2		
12									
12.1	Check cmdResult == OK		B	Load Fullhouse DEA housekeeping			1or2		
	commandEcho 225			parameter block into slot 4					
12.2	Check cmdResult == OK		B	get FP temp			1or2		
	commandEcho 18			should be stable and ±2 C of desired value					
13									
13.1-C			A	Expect to send 1 packet of 256 bytes		Y	2		
13.2-C			2	1 means FIFO not full					
			2	0 means FIFO empty					
	Check cmdResult = NO_HANDLER		2			Y	2		
	commandEcho 0 UNUSED		2			Y	2		