4.27_V2.1 Flight Software Standard Patch E Optional Patch F

Last Revised: August 23, 2011
Filename: sw_stdeoptf

BRIEF FUNCTIONAL DESCRIPTION:

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

The set of standard release E 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. There was one change to the optional patches as described below.
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. E" and optional patches from "optional Rev. F". Refer to the release notes for standard patches, optional patches, and patch combination certification (see references below).

The optional patch txings has been added, to report high background radiation levels based on threshold counts.

This procedure will change the flight software version from 48 to version 50. 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 five 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 E and SmTimedLookup/CC3x3/Event Histogram/CompressAll/txings optional set of patches into the ACIS instrument, and dumps the load to the ground for verification.

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. E" patch load
4. Load the smTimedLookup patch (part of "optional Rev. F")
5. Load the CC3x3 patch (part of "optional Rev. F")
6. Load the Event Histogram patch (part of "optional Rev. F")
7. Load the compressAll patch (part of the "optional Rev. F")
8. Load the txings patch (part of the "optional Rev. F")

9. Load the patch load version number
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 Revs. D and E and MIT 36-58080.33 Rev A, 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 == 50" 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.

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_61055_SW_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_61055_SW_dump to obtain the ACIS diagnostic information and then execute SOP_ACIS_SW_STDEOPTE.

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 2.1 sw_dump, FOT SOP_61055) and load version 48 patches (SOT Procedure 4.26, v. 2.3, sw_stdeopte, FOT SOP_ACIS_SW_STDEOPTE_FIFO).

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 E (ECO 36-1042) Flight Software Patch Release E, Optional Release E.

2. MIT 36-58021.04 Rev E (ECO 36-1043) Flight Software Patch Release E-E-F Certification.

3. MIT 36-58010 Rev F (ECO 36-1045) Flight Software Patch Release E, Optional Release F.

4. MIT 36-58021.04 Rev G (ECO 36-1046) Flight Software Patch Release E-F-G Certification.

CHANGE HISTORY:

V0.1

- Initial version, copied from 4.26_V2.3 Flight Software Event Histogram and CC 3x3, Compress All, and Timed Lookup Patch Revision E.

V1.0

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

V2.0

- Incorporated MIT comments; Sent to FOT.

V2.1

- Minor text edits.

Table 1: **ACIS Event Histogram, CC 3x3, smTimedLookup and CompressAll, txings and FIXFIFO Flight Software Patch Revision F**

Step #	Title (Revision 4.27_V2.1)	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. E” patches	1	addPatch	WUSTANDE01				
				WUSTANDE02				
				WUSTANDE03				
				WUSTANDE04				
				WUSTANDE05				
				WUSTANDE06				
				WUSTANDE07				
				WUSTANDE08				
				WUSTANDE09				
				WUSTANDE10				
				WUSTANDE11				
				WUSTANDE12				
				WUSTANDE13				
				WUSTANDE14				
				WUSTANDE15				
				WUSTANDE16				
				WUSTANDE17				

Table 2: (CONT) **ACIS Event Histogram, CC 3x3, smTimedLookup and CompressAll, txings and FIXFIFO Flight Software Patch Revision F**

Step #	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 9935		A	Expect to send 37 packets.		Y	2		
	commandEcho 9937		A	Total load size: 2644 bytes.					
	commandEcho 9938		A	Verify cmdResult == 1 for each packet					
	commandEcho 9940		A						
	commandEcho 9943		A						
	commandEcho 9944		A						
	commandEcho 9947		A						
	commandEcho 9949		A						
	commandEcho 9950		A						
	commandEcho 9953		A						
	commandEcho 9954		A						
	commandEcho 9956		A						
	commandEcho 9959		A						
	commandEcho 9960		A						
	commandEcho 9963		A						
	commandEcho 9965		A						
	commandEcho 9966		A						

Table 1: **ACIS Event Histogram, CC 3x3, smTimedLookup and CompressAll, txings and FIXFIFO Flight Software Patch Revision F(Page 2)**

Step #	Title (Revision 4.27_V2.1)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
				WUSTANDE18				
				WUSTANDE19				
				WUSTANDE20				
				WUSTANDE21				
				WUSTANDE22				
				WUSTANDE23				
				WUSTANDE24				
				WUSTANDE25				
				WUSTANDE26				
				WUSTANDE27				
				WUSTANDE28				
				WUSTANDE29				
				WUSTANDE30				
				WUSTANDE31				
				WUSTANDE32				
				WUSTANDE33				
				WUSTANDE34				
				WUSTANDE35				
				WUSTANDE36				
				WUSTANDE37				
4	Load SM Timed Lookup Patch							
4.1	Load opt_smtl patches	5	addPatch	WUSTMLUF01				
	part of “optional Rev. E”			WUSTMLUF02				
				WUSTMLUF03				
				WUSTMLUF04				
				WUSTMLUF05				
				WUSTMLUF06				
				WUSTMLUF07				
				WUSTMLUF08				
				WUSTMLUF09				
				WUSTMLUF10				
				WUSTMLUF11				

Table 2: (CONT) **ACIS Event Histogram, CC 3x3, smTimedLookup and CompressAll, txings and FIXFIFO Flight Software Patch Revision F(Page 2)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
	commandEcho 9968		A						
	commandEcho 9971		A						
	commandEcho 9973		A						
	commandEcho 9974		A						
	commandEcho 9977		A						
	commandEcho 9978		A						
	commandEcho 9980		A						
	commandEcho 9983		A						
	commandEcho 9985		A						
	commandEcho 9986		A						
	commandEcho 9988		A						
	commandEcho 9991		A						
	commandEcho 9992		A						
	commandEcho 9995		A						
	commandEcho 9997		A						
	commandEcho 9998		A						
	commandEcho 10000		A						
	commandEcho 10003		A						
	commandEcho 10005		A						
	commandEcho 10006		A						
4									
4.1	commandEcho 11141		A	Expect to send 12 packets.		Y	2		
	commandEcho 11142		A	Total load size 3696 bytes.					
	commandEcho 11145		A	Verify cmdResult == 1 for each packet					
	commandEcho 11146		A						
	commandEcho 11148		A						
	commandEcho 11151		A						
	commandEcho 11153		A						
	commandEcho 11154		A						
	commandEcho 11156		A						
	commandEcho 11159		A						
	commandEcho 11160		A						

Table 1: **ACIS Event Histogram, CC 3x3, smTimedLookup and CompressAll, txings and FIXFIFO Flight Software Patch Revision F(Page 3)**

Step #	Title (Revision 4.27_V2.1)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
				WUSTMLUF12				
5 5.1	Load CC3x3 Mode Patch Load opt_cc3x3 patches part of “optional Rev. E”	 5	 addPatch	 WUCC3X3F01 WUCC3X3F02 WUCC3X3F03 WUCC3X3F04 WUCC3X3F05 WUCC3X3F06 WUCC3X3F07 WUCC3X3F08 WUCC3X3F09 WUCC3X3F10 WUCC3X3F11 WUCC3X3F12 WUCC3X3F13				
6 6.1	Load the Event Histogram Patch Load opt_eventhist patches part of “optional Rev. E”	 5	 addPatch	 WUEVHSTF01 WUEVHSTF02 WUEVHSTF03 WUEVHSTF04 WUEVHSTF05 WUEVHSTF06 WUEVHSTF07 WUEVHSTF08 WUEVHSTF09 WUEVHSTF10 WUEVHSTF11 WUEVHSTF12 WUEVHSTF13 WUEVHSTF14 WUEVHSTF15				
7	Load Compress All Patch							

Table 2: (CONT) **ACIS Event Histogram, CC 3x3, smTimedLookup and CompressAll, txings and FIXFIFO Flight Software Patch Revision F(Page 3)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
	commandEcho 11163		A						
5									
5.1	commandEcho 11166		A	Expect to send 13 packets.		Y	2		
	commandEcho 11169		A	Total load size 4620 bytes.					
	commandEcho 11170		A	Verify cmdResult == 1 for each packet					
	commandEcho 11172		A						
	commandEcho 11175		A						
	commandEcho 11176		A						
	commandEcho 11179		A						
	commandEcho 11181		A						
	commandEcho 11182		A						
	commandEcho 11184		A						
	commandEcho 11187		A						
	commandEcho 11189		A						
	commandEcho 11190		A						
6									
6.1	commandEcho 11194		A	Expect to send 15 packets.		Y	2		
	commandEcho 11196		A	Total load size 5892 bytes.					
	commandEcho 11199		A	Verify cmdResult == 1 for each packet					
	commandEcho 11201		A						
	commandEcho 11202		A						
	commandEcho 11204		A						
	commandEcho 11207		A						
	commandEcho 11208		A						
	commandEcho 11211		A						
	commandEcho 11213		A						
	commandEcho 11214		A						
	commandEcho 11216		A						
	commandEcho 11219		A						
	commandEcho 11221		A						
	commandEcho 11222		A						
7									

Table 1: **ACIS Event Histogram, CC 3x3, smTimedLookup and CompressAll, txings and FIXFIFO Flight Software Patch Revision F(Page 4)**

Step #	Title (Revision 4.27_V2.1)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
7.1	Load opt_compressall patches	5	addPatch	WUCMPRSF01 WUCMPRSF02 WUCMPRSF03 WUCMPRSF04 WUCMPRSF05 WUCMPRSF06 WUCMPRSF07 WUCMPRSF08				
8	Load Threshold Crossing Patch							
8.1	Load opt_txings patches	5	addPatch	WUTXINGF01 WUTXINGF02 WUTXINGF03 WUTXINGF04 WUTXINGF05 WUTXINGF06 WUTXINGF07 WUTXINGF08 WUTXINGF09 WUTXINGF10 WUTXINGF11 WUTXINGF12 WUTXINGF13				
9	Patch the version number							
9.1	Load the version number patch	1	addPatch	WUFSV00032				
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)				

Table 2: (CONT) **ACIS Event Histogram, CC 3x3, smTimedLookup and CompressAll, txings and FIXFIFO Flight Software Patch Revision F(Page 4)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
7.1	commandEcho 11226 commandEcho 11228 commandEcho 11231 commandEcho 11232 commandEcho 11235 commandEcho 11237 commandEcho 11238 commandEcho 11241		A A A A A A A A	Expect to send 8 packets. Total load size 2352 bytes. Verify cmdResult == 1 for each packet		Y	2		
8 8.1	 commandEcho 11244 commandEcho 11247 commandEcho 11249 commandEcho 11250 commandEcho 11252 commandEcho 11255 commandEcho 11256 commandEcho 11259 commandEcho 11261 commandEcho 11262 commandEcho 11264 commandEcho 11267 commandEcho 11269		 A A A A A A A A A A A A A	 Expect to send 13 packets. Total load size 3112 bytes. Verify cmdResult == 1 for each packet		 Y	 2		
9 9.1	 Verify cmdResult == 1 commandEcho 11293			 Expect to send 1 packet. Total load size 8 bytes. Sets the version number to 50.		 Y	 2		
10 10.1	 Verify cmdResult == 1 commandEcho 65			 bepReadReply, ACIS EGSE verifies reply against file /nfs/benz/h1/beavis/ /wuefg_acom_compare.dumpedPatches.1.dat		 Y	 2		
11 11.1				 disables uplink boot		 Y	 2		

Table 1: **ACIS Event Histogram, CC 3x3, smTimedLookup and CompressAll, txings and FIXFIFO Flight Software Patch Revision F(Page 5)**

Step #	Title (Revision 4.27_V2.1)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
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)				
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	

Table 2: (CONT) **ACIS Event Histogram, CC 3x3, smTimedLookup and CompressAll, txings and FIXFIFO Flight Software Patch Revision F(Page 5)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
11.2						Y	2		
11.3						Y	2		
11.4	bepStartupMessage			ACIS EGSE verifies		Y	2		
				“version” field == 50 decimal					
11.5	Verify bepStartupMessage:		A			Y	2		
	bepTickCounter < 10; version =50;		A						
	watchdogFlag = 0, patchValidFlag =1		A						
	warmbootFlag = 1		A						
	Verify swHousekeeping messages:								
	startingBepTickCounter < 10;		B						
	endingBepTickCounter=		B						
	=startingBepTickCounter+ ~645								
	version =50		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		

Table 1: **ACIS Event Histogram, CC 3x3, smTimedLookup and CompressAll, txings and FIXFIFO Flight Software Patch Revision F(Page 6)**

Step #	Title (Revision 4.27_V2.1)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
					BEP FIFO Empty	1STAT7ST	0	
	Total Time	36.5						

Table 2: (CONT) **ACIS Event Histogram, CC 3x3, smTimedLookup and CompressAll, txings and FIXFIFO Flight Software Patch Revision F(Page 6)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos