4.26_V2.2 Flight Software Standard Patch E Optional Patch E

Last Revised: March 16, 2010
Filename: sw_stdeopte

BRIEF FUNCTIONAL DESCRIPTION:

This procedure loads the standard E patches and four optional E patches. The changes from sw_stdcoptc are within the standard E patches, and in one optional patch. The text describing the changes in the patches in this procedure is included below the italic note on MIT identifiers:

The new 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.

NOTE on MIT version identifiers: Numeric revision identifiers are preliminary, and, although logged and controlled, have not been subjected to peer review and sign-off. Letter revision identifiers reflect items which have undergone peer review and sign-off. This procedure loads "standard Rev. E" and optional patches from "optional Rev. E". Refer to the release notes for standard patches, optional patches, and patch combination certification (see references below).

The standard patches have been changed to include two new patches, *badpix* and *buscrash2*. The *badpix* patch corrects the row addresses of bad pixels and bad columns that are to be flagged in the FEP bias maps . The *buscrash2* patch corrects the *biasThief* code so that it checks whether a FEP is powered up before it tries to copy its bias map into a telemetry packet. The optional patch *untricklebias* was updated to work correctly with *buscrash2*. Refer to the release notes for flight software standard patch D optional patch D and flight software standard patch E optional patch E, with patch combination Revision F certification, for more details. The standard patch E, *buscrash2* patch corrects a bug found in flight software standard patch D, *buscrash2*.

Flight software standard patch D optional patch D was never uplinked to ACIS.

This procedure will change the flight software version from 44 to version 48. 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 7.1) as four 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 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. E")
5. Load the CC3x3 patch (part of "optional Rev. E")
6. Load the Event Histogram patch (part of "optional Rev. E")
7. Load the compressAll patch (part of the "optional Rev. E")
8. Load the patch load version number
9. Dump the contents of the patch list to verify the load
10. Warm boot the BEP to activate the new load and verify proper BEP boot
11. Start the DEA housekeeping and verify proper reporting

Refer to the Standard Patch Release Notes, for MIT 36-58010 Revs. D and E 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 bepStartupMessage packet with a modified "version == 48" field
9. 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, there are two courses of action. If we have not yet loaded the event histogram patch, we will restart from step 2.1 and reload the patches. If we have already loaded the event histogram patch, we will proceed through step 9 and dump the patch list. If the dump of the patches verifies against the reference file, we will proceed with the warm boot in step 10, 'Warm boot the BEP'. If the patch list does not verify, we will dump the patches one more time. If the same discrepancy exists, we will return to step 2.1 and load the patches again. If the patch list verifies, we will proceed with the warm boot in step 10.

2. If there is a failure to confirm the patch list dump (step 9), first repeat step 9, dumping the patch list, to confirm that there wasn't a downlink corruption. If the list is confirmed, continue to the next step(10), 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_STDCOPTC.

3. If the warm boot of the BEP fails (step 10), retry the reboot (step 10). 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 44 patches (SOT Procedure 4.25, v. 2.1, sw_stdcoptc, FOT SOP_ACIS_SW_STDCOPTC).

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 7). If the BEP then rebooted spontaneously, it would return to version 11 flight software.

REFERENCES:

1. MIT 36-58010, Standard Patch Release, Revs. D and E
2. MIT 36-58020, Optional Patch Release, Revs. D and E
3. MIT 36-58021.04, Flight Software Patch Release E-E-F Certification
4. MIT 36-58030.31 Rev A, Flight S/W patch to correct location of bad pixels in bias maps.
5. MIT 36-58030.32, Rev B, Flight S/W patch to prevent BEP bus crash on FEP power-down.
6. MIT 36-58030.33, Rev B, Flight S/W patch update to write bias maps from science task

CHANGE HISTORY:

V0.1

- Initial version, copied from 4.25_V2.1 Flight Software Event Histogram and CC 3x3, Compress All, and Timed Lookup Patch Revision C.

V1.0

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

V2.0

- Incorporated MIT comments; Sent to FOT.

V2.1

- Change in byte count; Sent to FOT.

V2.2

- Added details in Contingency section; Sent to FOT.

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

Step #	Title (Revision 4.26_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. 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 Flight Software Patch Revision E**

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 Flight Software Patch Revision E(Page 2)**

Step #	Title (Revision 4.26_V2.2)	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 part of "optional Rev. E"	5	addPatch	WUSTMLUB01 WUSTMLUB02 WUSTMLUB03 WUSTMLUB04 WUSTMLUB05 WUSTMLUB06 WUSTMLUB07 WUSTMLUB08 WUSTMLUB09 WUSTMLUB10 WUSTMLUB11				

Table 2: (CONT) **ACIS Event Histogram, CC 3x3, smTimedLookup and CompressAll Flight Software Patch Revision E(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 10010		A	Expect to send 12 packets.		Y	2		
	commandEcho 10012		A	Total load size 3696 bytes.					
	commandEcho 10015		A	Verify cmdResult == 1 for each packet					
	commandEcho 10016		A						
	commandEcho 10019		A						
	commandEcho 10021		A						
	commandEcho 10022		A						
	commandEcho 10025		A						
	commandEcho 10026		A						
	commandEcho 10028		A						
	commandEcho 10031		A						

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

Step #	Title (Revision 4.26_V2.2)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
				WUSTMLUB12				
5 5.1	Load CC3x3 Mode Patch Load opt_cc3x3 patches part of “optional Rev. E”	 5	 addPatch	 WUCC3X3E01 WUCC3X3E02 WUCC3X3E03 WUCC3X3E04 WUCC3X3E05 WUCC3X3E06 WUCC3X3E07 WUCC3X3E08 WUCC3X3E09 WUCC3X3E10 WUCC3X3E11 WUCC3X3E12 WUCC3X3E13				
6 6.1	Load the Event Histogram Patch Load opt_eventhist patches part of “optional Rev. E”	 5	 addPatch	 WUEVHSTE01 WUEVHSTE02 WUEVHSTE03 WUEVHSTE04 WUEVHSTE05 WUEVHSTE06 WUEVHSTE07 WUEVHSTE08 WUEVHSTE09 WUEVHSTE10 WUEVHSTE11 WUEVHSTE12 WUEVHSTE13 WUEVHSTE14 WUEVHSTE15				
7	Load Compress All Patch							

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

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
	commandEcho 10033		A						
5									
5.1	commandEcho 10068		A	Expect to send 13 packets.		Y	2		
	commandEcho 10071		A	Total load size 4620 bytes.					
	commandEcho 10072		A	Verify cmdResult == 1 for each packet					
	commandEcho 10075		A						
	commandEcho 10077		A						
	commandEcho 10078		A						
	commandEcho 10081		A						
	commandEcho 10082		A						
	commandEcho 10084		A						
	commandEcho 10087		A						
	commandEcho 10088		A						
	commandEcho 10091		A						
	commandEcho 10093		A						
6									
6.1	commandEcho 10036		A	Expect to send 15 packets.		Y	2		
	commandEcho 10039		A	Total load size 5892 bytes.					
	commandEcho 10040		A	Verify cmdResult == 1 for each packet					
	commandEcho 10043		A						
	commandEcho 10045		A						
	commandEcho 10046		A						
	commandEcho 10048		A						
	commandEcho 10051		A						
	commandEcho 10053		A						
	commandEcho 10054		A						
	commandEcho 10057		A						
	commandEcho 10058		A						
	commandEcho 10060		A						
	commandEcho 10063		A						
	commandEcho 10065		A						
7									

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

Step #	Title (Revision 4.26_V2.2)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
7.1	Load opt_compressall patches	5	addPatch	WUCMPRSB01 WUCMPRSB02 WUCMPRSB03 WUCMPRSB04 WUCMPRSB05 WUCMPRSB06 WUCMPRSB07 WUCMPRSB08				
8	Patch the version number							
8.1	Load the version number patch	1	addPatch	WUFSV00030				
9	Dump Installed Patches							
9.1	Dump Patchlist	1	dumpPatchlist	RU_0000001				
10	Activate Patches							
10.1	Set Boot Modifier off	0.1	DPA FS Boot Mod.	1BMODIBM(0)				
10.2	Set Warm Boot Flag on	0.1	DPA Warm Boot	1WRMBTSB(1)				
10.3	Halt BEP	0.1	Halt BEP	1RSETIRT(1)				
10.4	Restart BEP	1	Restart BEP	1RSETIRT(0)				
10.5	Verify BEP Boot	2.0						
10.6	Verify HW LEDs	2.0			BEP Select	1STAT4ST	0 or 1	

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

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
7.1	commandEcho 10096 commandEcho 10099 commandEcho 10101 commandEcho 10102 commandEcho 10105 commandEcho 10106 commandEcho 10108 commandEcho 10111		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	Verify cmdResult == 1 commandEcho 10139			Expect to send 1 packet. Total load size 8 bytes. Sets the version number to 48.		Y	2		
9									
9.1	Verify cmdResult == 1 commandEcho 65			bepReadReply, ACIS EGSE verifies reply against file /nfs/benz/h1/beavis/ /wueef_bcom.dumpedPatches.1.dat		Y	2		
10									
10.1				disables uplink boot		Y	2		
10.2						Y	2		
10.3						Y	2		
10.4	bepStartupMessage			ACIS EGSE verifies “version” field == 48 decimal		Y	2		
10.5	Verify bepStartupMessage: bepTickCounter < 10; version =44; watchdogFlag = 0, patchValidFlag =1 warmbootFlag = 1 Verify swHousekeeping messages: startingBepTickCounter < 10; endingBepTickCounter= =startingBepTickCounter+ ∼645 version =48		A A A A B B A			Y	2		
10.6			2	0/1 indicates BEP A/B is selected		Y	2		

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

Step #	Title (Revision 4.26_V2.2)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
					BEP Not in Reset	1STAT5ST	1	
					BEP FIFO Not Full	1STAT6ST	1	
					BEP FIFO Not Empty	1STAT7ST	0	
10.7	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	
11	Execute DEA HK run							
11.1	Load Board 11 DEA HK	1	loadDeaBlock	WD00001024				
11.2	Start DEA Hkp run	1	startDEA	XDZ0000005				
	Total Time	36.5						

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

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
			2	1 means BEP not in reset					
			2	1 means FIFO not full					
			2	1 means not FIFO empty					
10.7			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		
11									
11.1	Check cmdResult == OK		B	Load Fullhouse DEA housekeeping			1or2		
	commandEcho 225			parameter block into slot 4					
11.2	Check cmdResult == OK		B	get FP temp			1or2		
	commandEcho 18			should be stable and ± 2 C of desired value					
	confirm DEAhk values								