4.25_V2.1 Flight Software Standard Patch C Optional Patch C

Last Revised: September 4, 2008
Filename: sw_stdcoptc

BRIEF FUNCTIONAL DESCRIPTION:

This procedure loads the standard C patches and four optional patches. The changes from sw_evhcc3x3_catl are all within the standard C patches, the optional source code has not changed. The text describing the changes in the standard patches in this procedure is included below in italics:

The source codes of the optional patches release C are unchanged. The new set of standard release C patches is compiled and 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.

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. C" and optional patches from "optional Rev. C". 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, *tlmbusy* and *buscrash*. The *tlmbusy* patch prevents the BEP from writing anomalous telemetry when the method TlmManager::post() is called while the BEP is busy with other tasks. The *buscrash* patch will prevent the BEP from having a bus crash if any FEP is powered down during a bias. Refer to the release notes for standard patches, optional patches, and patch combination Revision B certification for more details.

This procedure will change the flight software version from 31 to version 44. 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 C and Event Histogram/CC3x3/SmTimedLookup/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. C" patch load
4. Load the smTimedLookup patch (part of "optional Rev. C")
5. Load the Event Histogram patch (part of "optional Rev. C")

6. Load the CC3x3 patch (part of "optional Rev. C")
7. Load the compressAll patch (part of the "optional Rev. C")
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 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 bepStartupMessage packet with a modified "version == 44" 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 to 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.

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 31 patches (SOT Procedure 4.23, v. 2.3, sw_evhcc3x3_catl, FOT SOP_ACIS_SW_EVHCC3X3_CATL).

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 36-58020, Standard Patch Release, Rev. C

2. MIT 36-58020, Optional Patch Release, Rev. C

3. MIT 36-58021.02, Flight Software Patch Release C-C-D Certification, combination B

CHANGE HISTORY:

V0.1

- Initial version, copied from 4.23_V2.3 Flight Software Event Histogram and CC 3x3, Compress All, and Timed Lookup Patch Revision C.

V0.2

- Minor text edits. Added the DEA housekeeping start up as part of the SOP.

V1.0

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

V1.1

- Incorporated MIT comments.

V2.0

- Additional comments.

V2.1

- Change to command for the flight software version.

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

Step #	Title (Revision 4.25_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. C” patches	1	addPatch	WUSTANDC01				
				WUSTANDC02				
				WUSTANDC03				
				WUSTANDC04				
				WUSTANDC05				
				WUSTANDC06				
				WUSTANDC07				
				WUSTANDC08				
				WUSTANDC09				
				WUSTANDC10				
				WUSTANDC11				
				WUSTANDC12				
				WUSTANDC13				
				WUSTANDC14				
				WUSTANDC15				
				WUSTANDC16				
				WUSTANDC17				

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

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 8098		A	Expect to send 28 packets.		Y	2		
	commandEcho 8100		A	Total load size: 2172 bytes.					
	commandEcho 8103		A	Verify cmdResult == 1 for each packet					
	commandEcho 8104		A						
	commandEcho 8107		A						
	commandEcho 8109		A						
	commandEcho 8110		A						
	commandEcho 8112		A						
	commandEcho 8115		A						
	commandEcho 8117		A						
	commandEcho 8118		A						
	commandEcho 8121		A						
	commandEcho 8122		A						
	commandEcho 8124		A						
	commandEcho 8127		A						
	commandEcho 8129		A						
	commandEcho 8130		A						

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

Step #	Title (Revision 4.25_V2.1)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
				WUSTANDC18				
				WUSTANDC19				
				WUSTANDC20				
				WUSTANDC21				
				WUSTANDC22				
				WUSTANDC23				
				WUSTANDC24				
				WUSTANDC25				
				WUSTANDC26				
				WUSTANDC27				
				WUSTANDC28				
4	Load SM Timed Lookup Patch							
4.1	Load opt_smtl patches	5	addPatch	WUSTMLUA01				
	part of "optional Rev. C"			WUSTMLUA02				
				WUSTMLUA03				
				WUSTMLUA04				
				WUSTMLUA05				
				WUSTMLUA06				
				WUSTMLUA07				
				WUSTMLUA08				
				WUSTMLUA09				
				WUSTMLUA10				
				WUSTMLUA11				
				WUSTMLUA12				
5	Load the Event Histogram Patch							
5.1	Load opt_eventhist patches	5	addPatch	WUEVHSTD01				
	part of "optional Rev. C"			WUEVHSTD02				
				WUEVHSTD03				
				WUEVHSTD04				
				WUEVHSTD05				
				WUEVHSTD06				
				WUEVHSTD07				

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

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
	commandEcho 8132		A						
	commandEcho 8135		A						
	commandEcho 8136		A						
	commandEcho 8139		A						
	commandEcho 8141		A						
	commandEcho 8142		A						
	commandEcho 8144		A						
	commandEcho 8147		A						
	commandEcho 8149		A						
	commandEcho 8150		A						
	commandEcho 8153		A						
4									
4.1	commandEcho 8156	A	Expect to send 12 packets.		Y	2			
	commandEcho 8159		A	Total load size 3696 bytes.					
	commandEcho 8160		A	Verify cmdResult == 1 for each packet					
	commandEcho 8163		A						
	commandEcho 8165		A						
	commandEcho 8166		A						
	commandEcho 8169		A						
	commandEcho 8170		A						
	commandEcho 8172		A						
	commandEcho 8175		A						
	commandEcho 8177		A						
	commandEcho 8178		A						
5									
5.1	commandEcho 8183		A	Expect to send 15 packets.		Y	2		
	commandEcho 8184		A	Total load size 5892 bytes.					
	commandEcho 8187		A	Verify cmdResult == 1 for each packet					
	commandEcho 8189		A						
	commandEcho 8190		A						
	commandEcho 8193		A						
	commandEcho 8194		A						

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

Step #	Title (Revision 4.25_V2.1)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
				WUEVHSTD08 WUEVHSTD09 WUEVHSTD10 WUEVHSTD11 WUEVHSTD12 WUEVHSTD13 WUEVHSTD14 WUEVHSTD15				
6 6.1	Load CC3x3 Mode Patch Load opt_cc3x3 patches part of “optional Rev. C”	 5	 addPatch	 WUCC3X3D01 WUCC3X3D02 WUCC3X3D03 WUCC3X3D04 WUCC3X3D05 WUCC3X3D06 WUCC3X3D07 WUCC3X3D08 WUCC3X3D09 WUCC3X3D10 WUCC3X3D11 WUCC3X3D12 WUCC3X3D13				
7 7.1	Load Compress All Patch Load opt_compressall patches	 5	 addPatch	 WUCMPRSA01 WUCMPRSA02 WUCMPRSA03 WUCMPRSA04 WUCMPRSA05 WUCMPRSA06 WUCMPRSA07 WUCMPRSA08				
8	Patch the version number							

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

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
	commandEcho 8196		A						
	commandEcho 8199		A						
	commandEcho 8200		A						
	commandEcho 8203		A						
	commandEcho 8205		A						
	commandEcho 8206		A						
	commandEcho 8208		A						
	commandEcho 8211		A						
6									
6.1	commandEcho 8214		A	Expect to send 13 packets.		Y	2		
	commandEcho 8217		A	Total load size 4620 bytes.					
	commandEcho 8218		A	Verify cmdResult == 1 for each packet					
	commandEcho 8220		A						
	commandEcho 8223		A						
	commandEcho 8224		A						
	commandEcho 8227		A						
	commandEcho 8229		A						
	commandEcho 8230		A						
	commandEcho 8233		A						
	commandEcho 8234		A						
	commandEcho 8236		A						
	commandEcho 8239		A						
7									
7.1	commandEcho 8242		A	Expect to send 8 packets.		Y	2		
	commandEcho 8244		A	Total load size 2352 bytes.					
	commandEcho 8247		A	Verify cmdResult == 1 for each packet					
	commandEcho 8248		A						
	commandEcho 8251		A						
	commandEcho 8253		A						
	commandEcho 8254		A						
	commandEcho 8256		A						
8									

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

Step #	Title (Revision 4.25_V2.1)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
8.1	Load the version number patch	1	addPatch	WUFSV002C				
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	
					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				

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

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
8.1	Verify cmdResult == 1			Expect to send 1 packet.		Y	2		
	commandEcho 8285			Total load size 16 bytes.					
				Sets the version number to 44.					
9									
9.1	Verify cmdResult == 1			bepReadReply, ACIS EGSE verifies reply		Y	2		
	commandEcho 65			against file /nfs/benz/h1/beavis/					
				/wuccd_bcom.dumpedPatches.2.dat					
10									
10.1				disables uplink boot		Y	2		
10.2						Y	2		
10.3						Y	2		
10.4	bepStartupMessage			ACIS EGSE verifies		Y	2		
				“version” field == 44 decimal					
10.5	Verify bepStartupMessage:		A			Y	2		
	bepTickCounter < 10; version =44;		A						
	watchdogFlag = 0, patchValidFlag =1		A						
	warmbootFlag = 1		A						
	Verify swHousekeeping messages:								
	startingBepTickCounter < 10;		B						
	endingBepTickCounter=		B						
	=startingBepTickCounter+ ~645								
	version =44		A						
10.6			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					
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		

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

Step #	Title (Revision 4.25_V2.1)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
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 C(Page 5)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
11.2	commandEcho 225 Check cmdResult == OK commandEcho 18 confirm DEAhk values		B	parameter block into slot 4 get FP temp should be stable and ± 2 C of desired value			1or2		