1.24_V2.0 EVENT HISTOGRAM ON THE INTERNAL CAL SOURCE WITH ACIS-I

Last Revised: June 27, 1999

BRIEF FUNCTIONAL DESCRIPTION:
ACIS contains an Fe55 source inside its camera housing which continually illuminates the focal plane when the ACIS door is closed. The source is highly collimated so that most of the events occur on the S2 and S3 CCDs. The telemetry format called "Event Histogram" is expected to be used heavily when ACIS is in the next-in-line mode. Even though this procedure explicitly calls for the internal cal source for this particular test, this mode will probably be most useful for the external cal source during flight. The PBs are designed to optimize the telemetry utilization in format 1; however the procedure will work in format 2 also. The procedure assumes $\sim$ 25 m of TLM FMT 2 time after the startScience command has been sent to guarantee that the bias maps get down and 5 m of TLM FMT 2 time before the stopScience command is sent to clear the event buffer. The instrument can stay in TLM fmt 1 for many hours during the science run itself but at least 90 m in TLM FMT 1 are desired to make the data acquisition sensible.

The sequence of actions will be:

1. warm boot and start DEA housekeeping if necessary
2. configure the instrument to collect imaging array data
3. start the science run including a complete dump of the configuration information and wait 25 m for the bias maps to get down in TLM FMT 2
4. switch the spacecraft to TLM FMT 1
5. acquire data *for at least 90 m in TLM FMT 1*
6. switch the spacecraft to TLM FMT 2, wait five minutes
7. end the science run
8. return to thermal standby if necessary

ASSUMED INSTRUMENT STATE:
Assumes that the instrument is in the canonical thermal standby mode.
Assumes that the "standard Rev. A and optional Rev. A" patches have been loaded.

SPECIAL INITIAL CONDITIONS:
Assumes the spacecraft starts the procedure in TLM FMT 2 and switches to TLM FMT 1 for the bulk of the run, and then back to FMT 2 five minutes before the end of the run.

OPERATIONAL CONSTRAINTS/CAUTIONS:

REFERENCES:

CHANGE HISTORY:

V1.0

- initial version, copied from ACIS-S procedure, 1.21_V1.3

V2.0

- ACIS Team signed-off version
- added step 3.14 to wait 25 m for the bias maps to come down while staying in TLM FMT 2
- added step 6 to switch back to TLM FMT 2, 5 minutes before issuing the stopScience command
- added step 7 to end the science run
- changed expected version number of flight SW to 27 in step 1.5 since the Event Histogram mode is needed for this procedure
- changed expected value of "1STAT7ST" in step 1.6
- edited comment in "Description" column in step 3.2 to indicate that no data will be aquired from the S3 CCD
- added comment in step 8.2 to verify that the FEPs and video boards are off
- edited "Brief Functional Description", "Sequence of Actions", "Special Initial Conditions", and "Assumed Instrument State" to be consistent with these changes

Table 1: **Event Histogram on the Internal Cal Source with ACIS-I**

Step #	Title (Revision 1.24_V2.0)	Time Req (m)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
1	Warm Boot and Start DEA HKP if needed							
1.1	Set Boot modifier off	1	DPA FS Boot Mod	1BMODIBM(0)				
1.2	Set warm boot flag on	1	DPA Warm Boot	1WRMBTSB(1)				
1.3	Halt BEP	1	DPA Cmd Reset	1RSETIRT(1)				
1.4	Restart BEP	1		1RSETIRT(0)				
1.5	Check BEP A Boot	2.0						
1.6	Check HW LEDs	2.0			BEP Select	1STAT4ST	0	
					BEP FIFO Not Full	1STAT6ST	1	
					BEP FIFO Not Empty	1STAT7ST	0	
1.7	Check SW LEDs	2.0			BEP initialization	1STAT3ST	0	
					Watchdog boot	1STAT2ST	1	
					Science run status	1STAT1ST	1	
						1STAT0ST	0or1	
1.8	Load Board 11 DEA HK	1	loadDeaBlock	WD00001024				
1.9	Start DEA Hkp run	1	startDEA	XDZ0000005				
2	Configure for imaging							
2.1	Power up imaging video boards & FEPs	1	changeConfigSetting	WSPOW0CF3F				
					DEA Input V A	1DE28AVO	28.0–34.0	V
					DEA Input I A	1DEICACU	1.2–1.5	A
					DPA Input V A	1DP28AVO	28.0-34.0	V
					DPA Input I A	1DPICACU	1.1–1.4	A
					DPA Input V B	1DP28BVO	28.0–34.0	V

Table 2: (CONT) **Event Histogram on the Internal Cal Source with ACIS-I**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
1									
1.1				disables boot from uplink		Y	2		
1.2				enable Warm boot		Y	2		
1.3				Hold active BEP reset line		Y	2		
1.4				Release BEP reset line		Y	2		
1.5	Check bepStartupMessage:		A			Y	2		
	bepTickCounter $<$ 10; version =27;		A	Version 27 includes the Event Histogram Patch.					
	warmBootFlag = 1, patchValidFlag =1		A						
	Check swHousekeeping messages:								
	startingBepTickCounter $<$ 10;		B						
	endingBepTickCounter=		B						
	=startingBepTickCounter+640								
	version =27		A	Version 27 includes the Event Histogram Patch.					
1.6			2	0 indicates BEP A is selected		Y	2		
			2	1 means FIFO not full					
			2	1 means FIFO not empty					
1.7			1	0 means BEP SW is running		Y	2		
			2	1 means no watchdog boot					
			2	1 means science idle					
			2	this bit toggles to indicate BEP is running					
1.8	Check cmdResult == OK		B	Load Fullhouse DEA housekeeping		Y	2		
	commandEcho 225			parameter block into slot 4					
1.9	deaHousekeepingData		B	get FP temp, should be stable and		Y	2		
	commandEcho 18			± 2 C of desired value					
2									
2.1	Check cmdResult == OK		A			Y	2	60k	
	commandEcho 359		2	Expect DEA side A = 42 ± 3 W.					
			2	Current is noisy, so an average is needed.					
			2	Expect DPA Side A = 38 ± 2 W.					
			2						
			2	Expect DPA Side B = 33 ± 2 W.					

Table 1: **Event Histogram on the Internal Cal Source with ACIS-I(Page 2)**

Step #	Title (Revision 1.24_V2.0)	Time Req (m)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
					DPA Input I B	1DPICBCU	1.0–1.2	A
3	Collect ACIS-I data							
3.1	Load parameter block	1	loadTeBlock	WT000C4014				
3.2	Start science	1	startScience	XTZ0000005				
3.3	dump default TE PBs	0.1	dumpParameterSlots	RT_0000001				
3.4	dump default CC PBs	0.1	dumpParameterSlots	RC_0000001				
3.5	dump default 2D PBs	0.1	dumpParameterSlots	R2_0000001				
3.6	dump default 1D PBs	0.1	dumpParameterSlots	R1_0000001				
3.7	dump default DeaHk PBs	0.1	dumpParameterSlots	RD_0000001				
3.8	dump system config.	0.1	dumpSysConfig	RS_0000001				
3.9	dump bad pixel list	0.5	dumpBadPixels	RP_0000001				
3.10	dump bad TE columns	0.1	dumpBadTeColumn	R4_0000001				
3.11	dump bad CC columns	0.1	dumpBadCcColumn	R3_0000001				
3.12	dump Huffman tables	0.5	dumpHuffman	RH_0000001				
3.13	dump patches	2	dumpPatchlist	RU_0000001				
3.14	Wait for bias maps	25						
4	Switch to tlm fmt 1							
4.1	Switch to tlm fmt 1	2						
5	Acquire data							

Table 2: (CONT) **Event Histogram on the Internal Cal Source with ACIS-I(Page 2)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
			2						
3									
3.1	Check cmdResult == OK commandEcho 745		B	collect data with ACIS-I		Y	2	60k	
3.2	Check cmdResult == OK commandEcho 58		B	run I0–I3, S2, S3, no data acquired from S3		Y	2	60k	
3.3	Check cmdResult == OK commandEcho 78		B		*psci* should not indicate any errors regarding "truncated blocks" for any of these dumps.	Y	2	60k	
3.4	Check cmdResult == OK commandEcho 75		B			Y	2	60k	
3.5	Check cmdResult == OK commandEcho 72		B			Y	2	60k	
3.6	Check cmdResult == OK commandEcho 71		B			Y	2	60k	
3.7	Check cmdResult == OK commandEcho 63		B			Y	2	60k	
3.8	Check cmdResult == OK commandEcho 66		B			Y	2	60k	
3.9	Check cmdResult == OK commandEcho 83		B			Y	2	60k	
3.10	Check cmdResult == OK commandEcho 80		B			Y	2	60k	
3.11	Check cmdResult == OK commandEcho 77		B			Y	2	60k	
3.12	Check cmdResult == OK commandEcho 68		B			Y	2	60k	
3.13	Check cmdResult == OK commandEcho 65		B			Y	2	60k	
3.14				Need FMT 2 to get bias maps down.			2	60k	
4									
4.1				Spacecraft command			1		
5									

Table 1: **Event Histogram on the Internal Cal Source with ACIS-I(Page 3)**

Step #	Title (Revision 1.24_V2.0)	Time Req (m)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
5.1	Wait for data acquisition	90						
6	Switch to tlm fmt 2							
6.1	Switch to tlm fmt 2	5						
7	End science run.							
7.1	Stop Science	1	stopScience	AA00000000				
8	Return to Thermal Standby Only if necessary.							
8.1	Power down video boards and FEPs	1	changeConfigSetting	WSPOW00000				
8.2	dump system config.	0.1	dumpSysConfig	RS_0000001				
8.3	Check DPA and DEA pwr				DPA Input V A	1DP28AVO	28.0–34.0	V
					DPA Input I A	1DPICACU	0.35–0.43	A
					DPA Input V B	1DP28BVO	28.0–34.0	V
					DPA Input I B	1DPICBCU	0.26–0.32	A
					DEA Input I A	1DEICACU	0.62–0.75	A
					DEA Input V A	1DEP3AVO	28.0-34.0	V
	Total Time	142.9						

Table 2: (CONT) **Event Histogram on the Internal Cal Source with ACIS-I(Page 3)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
5.1				length of run depends on time available, 90 m is the practical minimum			1	60k	
6									
6.1				Need FMT 2 to clear the event buffer.			2		
7									
7.1	Check cmdResult == OK commandEcho 1539	scienceReport	B			Y	2	60k	
8									
8.1	Check cmdResult == OK commandEcho 773		A	 return to thermal standby state		Y	1	60k	
8.2	Check cmdResult == OK commandEcho 66		B	verify FEPs and video boards off		Y	1		
8.3			1 1 1 1 1	Expect 12 W for side A, power consumption should be more stable than I or V. Expect 9 W for side B, power consumption should be more stable than I or V. DEA A Power should be 21 ± 3 W, current is noisy, so an average is needed		Y	1		