1.27_V2.1 RAW MODE DATA FOR BIAS ALGORITHM OPTIMIZATION

Last Revised: July 29, 1999
Filename: raw_bias

BRIEF FUNCTIONAL DESCRIPTION:

ACIS allows raw pixel data (without bias subtraction or event recognition) to be telemetered from the instrument. Unfortunately, these data consume a large amount of telemetry. For example, one full frame of raw data takes $\sim$ 9 minutes to telemeter with no compression at 24 kbs and $\sim$ 4 minutes to telemeter with a compression factor of 2.5 at 24 kbs. Therefore, these data will be collected infrequently. This procedure collects at least 26 raw frames each from CCDs S2 and S3 late in the OAC transfer orbit phase. These data will be used on the ground to optimize the bias algorithm to exclude charge produced by cosmic rays and X-rays from the bias maps. These data are essential since the predominant cosmic-ray species on orbit (protons) is much more massive and energetic than at ground level (muons), and the on-orbit flux is much higher.

The sequence of actions will be:

1. start a DEA HKP run if necessary
2. configure the instrument to collect imaging array data with 6 video boards up
3. execute the science run, collect 26 or more raw frames each from CCDs S2 and S3, including a dump of all the configuration information
4. reconfigure back to the thermal standby state if necessary

ASSUMED INSTRUMENT STATE:

Assumes the focal plane temperature is -120 C.
Assumes the instrument is in the canonical thermal standby state.
Assumes the standard patches are loaded.
Assumes the sw_teignore optional patch is loaded, sw version = 28.
Assumes no other optional patches are loaded.

SPECIAL INITIAL CONDITIONS:

Procedure 1.26_V2.0 must have been executed prior to running this procedure to reset the patch list and then load the "Standard" and "TE Ignore Initial Frames" patches.
Assumes the spacecraft is in TLM FMT 2 throughout the procedure to telemeter the raw frames in a reasonable amount of time.

OPERATIONAL CONSTRAINTS/CAUTIONS:

SPECIAL FINAL CONDITIONS:

Procedure 1.12_V2.0 should be executed after this procedure to remove the "TE Ignore Initial Frames" patch and to reload the "Standard", "Event Histogram", and "CC 3x3 " patches.

REFERENCES:

1. MIT 36-58010, Standard Patch Release, Rev. A
2. MIT 36-58020, Optional Patch Release, Rev. A

CHANGE HISTORY:

V1.0

- Initial version, copied from the procedure "Raw Data from Each CCD" (raw_data), 1.14_V2.0
- Revised the procedure title, date, and filename
- Revised the brief functional description
- Revised the sequence of actions
- Revised the assumed instrument state
- Added a special initial condition specifying that the procedure "Flight Software TE Ignore Initial Frames" patch (sw_teignore), 1.26_V2.0 must have been executed prior to running this procedure
- Added a special initial condition that the spacecraft must be in TLM FMT 2 throughout this procedure
- Added a special final condition specifying that the procedure "Flight Software Event Histogram and CC 3x3 Patch" (sw_evhcc3x3), 1.12_V2.0 must be executed immediately after this procedure
- Added two references
- Deleted the old steps 2, 3, 6–9
- Renumbered the old steps 4, 5, & 10 to 2, 3, & 4, respectively
- Edited step 2 to power up all FEPs and the imaging array video boards
- Revised the command mnemonics, command echos, and description fields in steps 3.1 and 3.2
- Revised the time estimates in steps 3.15 and 3.17
- Revised the description and set Real-Time Contact to "Y" in step 3.15
- Revised step 4 to return to thermal standby mode only if necessary
- Changed the "DEA Input V A" mnemonic in step 4.3 from "1DEP3AVO" to "1DE28AVO"
- Revised the table caption
- Changed the Latex command
  input{raw_data.tab} to
  input{raw_bias.tab}

V1.1

- Updated the version number and revision date
- Changed text "must be executed immediately after" to "should be executed after" in the special final condition
- Changed time delays to 0.1 min in steps 3.1, 3.2, 3.3, and 4.1
- Changed TLM Criterion from "A" to "B" in steps 3.1, 3.2, 3.3, 3.16, and 4.1

V2.0

- ACIS team signed-off version

V2.1

- changed command ID in step 3.1 from "1192" to "1212"

Table 1: **Collect Raw Mode Data for Bias Algorithm Optimization Procedure**

Step #	Title (Revision 1.27_V2.1)	Time Req (m)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
1	Start DEA HK if necessary							
1.1	Load Board 11 DEA HK	1	loadDeaBlock	WD00001024				
1.2	Start DEA Hkp run	1	startDEA	XDZ0000005				
2	Configure for Imaging							
2.1	Power up imaging vid	1	changeConfigSetting	WSPOW0CF3F				
	boards & FEPs				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
					DPA Input I B	1DPICBCU	1.0–1.2	A
3	Imaging Science run							
3.1	Load parameter block	0.1	loadTeBlock	WT00141014				
3.2	Load 2D window block	0.1	load2dBlock	W200009014				
3.3	Start science	0.1	startScience	XTZ0000005				
3.4	dump default TE PBs	0.1	dumpParameterSlots	RT_0000001				
3.5	dump default CC PBs	0.1	dumpParameterSlots	RC_0000001				
3.6	dump default 2D PBs	0.1	dumpParameterSlots	R2_0000001				
3.7	dump default 1D PBs	0.1	dumpParameterSlots	R1_0000001				
3.8	dump default DeaHk PBs	0.1	dumpParameterSlots	RD_0000001				
3.9	dump system config.	0.1	dumpSysConfig	RS_0000001				

Table 2: (CONT) **Collect Raw Mode Data for Bias Algorithm Optimization Procedure**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
1									
1.1	Check cmdResult == OK commandEcho 225		B	Load Fullhouse DEA housekeeping parameter block into slot 4		Y	2		
1.2	Check cmdResult == OK commandEcho 18		B	get FP temp, should be stable and ± 2 C of desired value		Y	2		
2									
2.1	Check cmdResult == OK commandEcho 359		B			Y	2	60k	
			2	Expect DEA side A					
			2	power $= 42 \pm 3$ W					
			2	Expect DPA Side A					
			2	$= 38 \pm 2$ W					
			2	Expect DPA Side B					
			2	$= 33 \pm 2$ W					
3									
3.1	Check cmdResult == OK commandEcho 1212		B	clock ACIS-I CCDs		Y	2	60k	
3.2	Check cmdResult == OK commandEcho 804		B	accept raw data from S2 & S3, exclude I0-I3		Y	2	60k	
3.3	Check cmdResult == OK commandEcho 58		B			Y	2	60k	
3.4	Check cmdResult == OK commandEcho 78		B		*psci* should not indicate any errors regarding "truncated blocks" for any of these dumps.	Y	2	60k	
3.5	Check cmdResult == OK commandEcho 75		B			Y	2	60k	
3.6	Check cmdResult == OK commandEcho 72		B			Y	2	60k	
3.7	Check cmdResult == OK commandEcho 71		B			Y	2	60k	
3.8	Check cmdResult == OK commandEcho 63		B			Y	2	60k	
3.9	Check cmdResult == OK commandEcho 66		B			Y	2	60k	

Table 1: **Collect Raw Mode Data for Bias Algorithm Optimization Procedure(Page 2)**

Step #	Title (Revision 1.27_V2.1)	Time Req (m)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
3.10	dump bad pixel list	0.5	dumpBadPixels	RP_0000001				
3.11	dump bad TE columns	0.1	dumpBadTeColumn	R4_0000001				
3.12	dump bad CC columns	0.1	dumpBadCcColumn	R3_0000001				
3.13	dump Huffman tables	0.5	dumpHuffman	RH_0000001				
3.14	dump patches	2	dumpPatchlist	RU_0000001				
3.15	Wait for data acquisition	220						
3.16	Stop Science	1	stopScience	AA00000000				
3.17	Wait for telemetry	20						
4	Return to Thermal Standby **Only if necessary**							
4.1	Power down video boards and FEPs	0.1	changeConfigSetting	WSPOW00000				
4.2	dump system config.	0.1	dumpSysConfig	RS_0000001				
4.3	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	1DE28AVO	28.0-34.0	V
	Total Time	248.3						

Table 2: (CONT) **Collect Raw Mode Data for Bias Algorithm Optimization Procedure(Page 2)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
3.10	Check cmdResult == OK commandEcho 83		B			Y	2	60k	
3.11	Check cmdResult == OK commandEcho 80		B			Y	2	60k	
3.12	Check cmdResult == OK commandEcho 77		B			Y	2	60k	
3.13	Check cmdResult == OK commandEcho 68		B			Y	2	60k	
3.14	Check cmdResult == OK commandEcho 65		B			Y	2	60k	
3.15			A	collect at least 26 frames from S2 & S3		Y	2	60k	
3.16	Check cmdResult == OK commandEcho 1539		B	scienceReport		Y	2	60k	
3.17			A			Y	2	60k	
4									
4.1	Check cmdResult == OK commandEcho 773		B	return to thermal standby state		Y	2	60k	
4.2	Check cmdResult == OK commandEcho 66		B				1or2		
4.3			2 2 2 2 2	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			1or2		