4.29_V2.2 TURN ON DEA A AND TEST VIDEO BOARDS

Last Revised: October 2, 2017
Filename: deaa_on_test_vid

BRIEF FUNCTIONAL DESCRIPTION:

This is a procedure which powers up the DEA side A, powers up all 10 video boards, and powers up all 6 FEPs. It then executes an ACIS-I bias-only science run and an ACIS-S bias-only science run in order to get calibrated housekeeping data from the video boards. It then powers down all video boards and FEPs. It should be safe to execute under any condition except a spacecraft power or thermal emergency.

The sequence of actions for this procedure will be:

1. Verify that DEA B is powered off and disabled (see Constraints/Cautions, below)
2. Verify that DEA A is receiving power from the spacecraft
3. Enable and turn on DEA power supply side A
4. Verify that DEA B is still off
5. Verify that the DH heater is not powered from side A
6. Warm boot the BEP
7. Execute a DEA housekeeping run
8. Set the focal plane temperature to -119.7 °C
9. Power up all 10 video boards
10. Execute an ACIS-I bias-only science run to capture calibrated video housekeeping data
11. Execute an ACIS-S bias-only science run to capture calibrated video housekeeping data
12. Power down the 10 video boards and the 6 FEPs

ASSUMED INSTRUMENT STATE:

1. Assumes that the PSMC has power from the spacecraft.
2. Assumes that DEA B is off.
3. Assumes that both sides of the DPA are on.
4. Assumes that the DEA was previously powered from side A. If it was instead powered from side B, the board 11 relays must be reset in addition to powering on DEA A.

SPECIAL INITIAL CONDITIONS:

OPERATIONAL CONSTRAINTS/CAUTIONS:

In normal operations, only one side of the DEA should be powered on (a) to prevent conflict for control of the focal plane temperature controller, (b) to avoid excess current draw from the spacecraft,(c) to avoid over-heating within the PSMC, and (d) to avoid placing a board 11 relay into the "magnetic neutral position".

The DEA power status is normally indicated by the values of the 1DEPSA and 1DEPSB flags, which should not both be 1 simultaneously. Before sending the command to power on DEA A, the

DEA Input Voltage A 1DE28AVO should be checked to make sure that DEA A is receiving power from the spacecraft.

The DEA input current monitors (1DEIC[AB]CU) are noisy. To give an indication of what variation may be expected, figures 1 and 2 show the behavior of the A-side DEA current with a ten-sample running average for two situations in which all video boards were powered down. Note that when either side of the DEA is unpowered, the corresponding current monitor, 1DEICACU for side A, or 1DEICBCU for side B, will be unreliable. They will read 16–18 A when unpowered, as of Telemetry Database (TDB) v14. This is expected and not a problem.

If the DEA powers off unexpectedly during a bakeout, the FP bakeout heater will lose power and this heater will NOT be re-enabled when the DEA side A power is restored. Additional SW commands are necessary to activate the FP bakeout heater. The DH bakeout heater is unaffected by a power loss to the DEA and will therefore still be executing a bakeout if power is lost to the DEA.

The parameters for the threshold crossings patch, txings, will revert to defaults when this is run. They should be restored to their desired values.

After successful execution, *the FP temperature control will be regulated at -119.7 °C (if the spacecraft thermal environment allows), and DEA interface A/D will be in high-resolution mode.*

REFERENCES:

CHANGE HISTORY:

V2.0

- Branched off from "deaa_on" atomic procedure V2.2
- Add commands to power video boards on and off
- Add bias-only science runs

V2.1

- Added a step to verify DEA-B is off at the beginning of the procedure
- Added text regarding power status issues and expected current behavior to the Operational Constraints/Cautions section. Also updated the expected FP temperature control.
- Removed language about what to do if the DPA is unpowered since we do not expect to run this procedure if that is the case.
- Removed input current check for DEA B; added warning to text.
- Corrected introduction to indicate that we will be powering down all video boards and all FEPs at the end
- Corrected numbering in table: 5.2 → 6.2
- Corrected number of FEPMAN_POWEROFF messages in Step 6.1 of the table

V2.2

- Added a step to verify that the DEA is being powered from the spacecraft
- Added a step to warmboot the BEP after powering on DEA-A

- Added a step to execute a DEA housekeeping run after warmbooting the BEP
- Added a step to set the focal plane temperature after the DEA housekeeping run
- Added comments about what will happen to the bakeout heaters if the DEA powers off during a bakeout
- Noted that after this procedure the DEA interface A/D will be in high-resolution mode.
- Added a note that this procedure assumes that the DEA was powered from side A and what to do if it was not

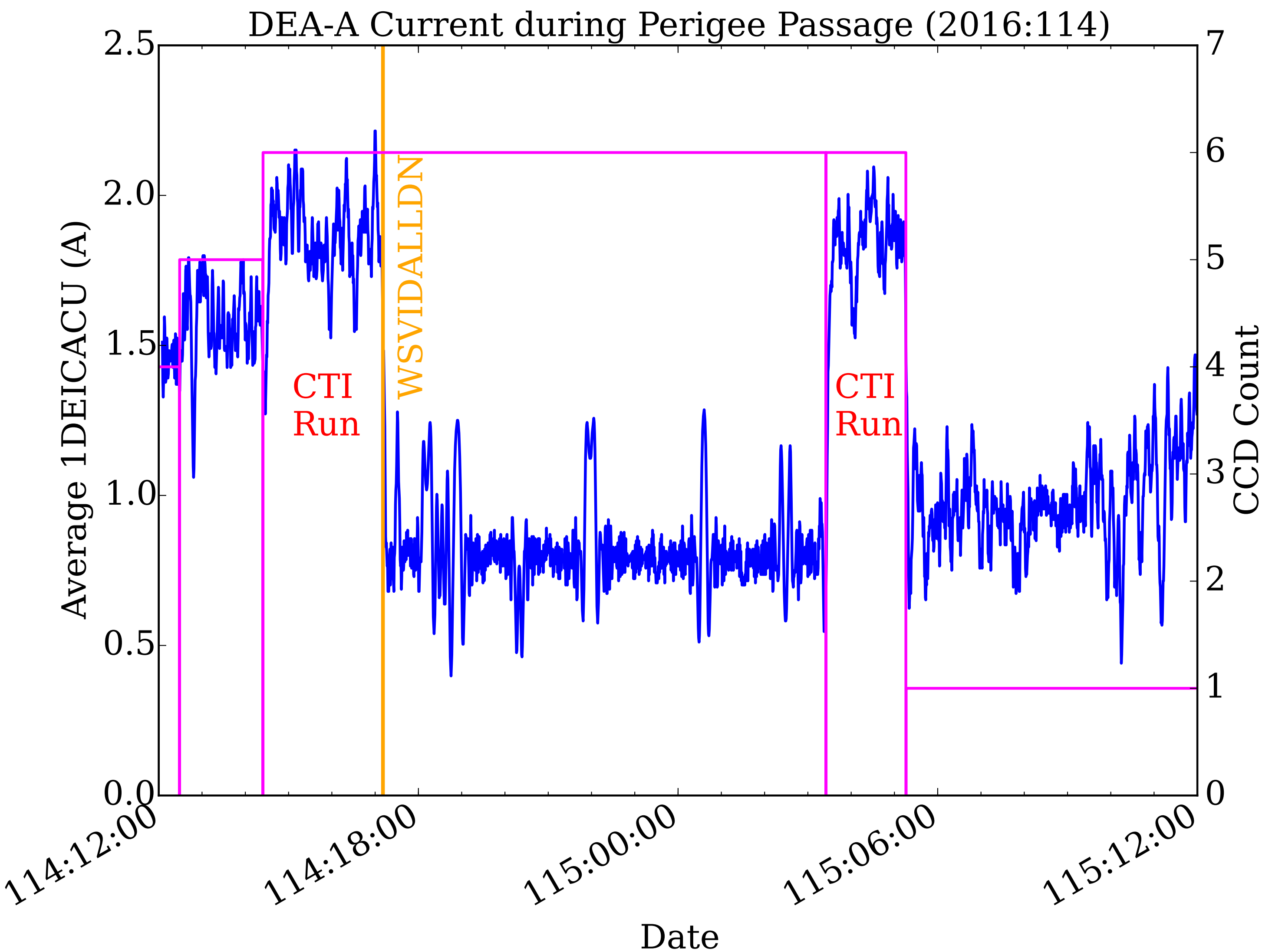

Figure 1: Average behavior of 1DEICACU during a perigee passage. All video boards are powered off after the issuing of the WSVIDALLDN command, which is marked by the orange line in the plot.

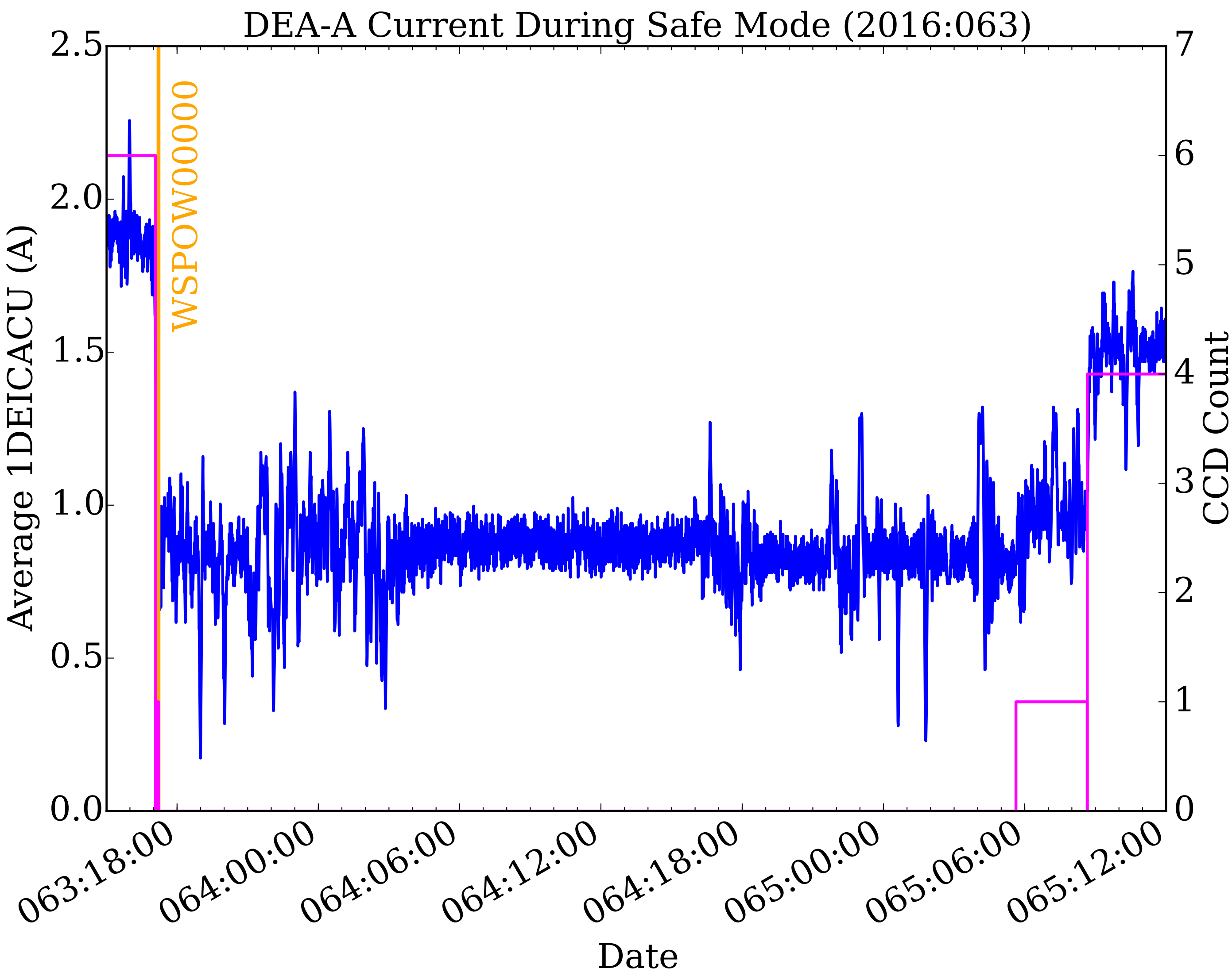

Figure 2: Average behavior of 1DEICACU during a safe mode. All video boards are powered off after the issuing of the WSPOW00000 command, which is marked by the orange line in the plot.

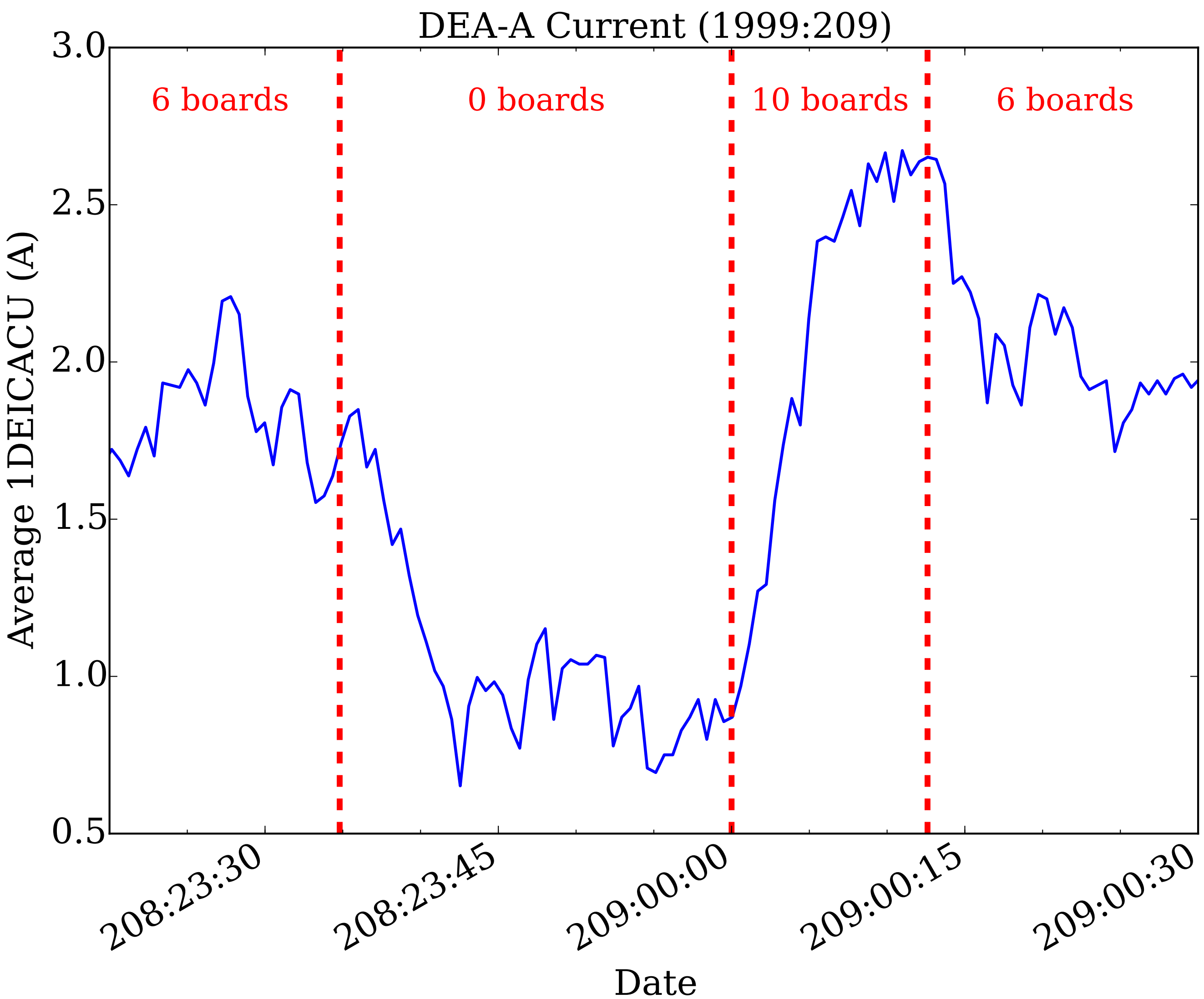

Figure 3: Average behavior of 1DEICACU with different numbers of video boards powered on. The plot is a 10-sample running average of the current readings.

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Table 1: **TURN ON DEA A AND TEST VIDEO BOARDS(Page 1)**

Step #	Title (Revision 4.29_V2.2)	Time (mins)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value
1	**Turn on DEA A**						
1.1	Verify DEA B is off				DEA B ENB/DIS	1DEPSBX	DIS
					DEA B ON/OFF	1DEPSB	OFF
					DEA Input V B	1DE28BVO	25.0–34.0
					DEA +28 V B	1DEP3BVO	0.0 ± 0.5
					DEA +24 V B	1DEP2BVO	0.0 ± 0.5
					DEA +15 V B	1DEP1BVO	0.0 ± 0.5
					DEA +6 V B	1DEP0BVO	0.0 ± 0.5
					DEA -6 V B	1DEN0BVO	0.0 ± 0.5
					DEA -15 V B	1DEN1BVO	0.0 ± 0.5
1.2	Verify DEA A is receiving power				DEA Input V A	1DE28AVO	25.0-34.0
1.3	Enable DEA PS A	1	DEA PS A En	1DEPSAEN	DEA A ENB/DIS	1DEPSAX	ENB
1.4	DEA Power A On	1	DEA PS On A	1DEPSAON	DEA A ON/OFF	1DEPSA	ON
					DEA Input V A	1DE28AVO	25.0–34.0
					DEA +28 V A	1DEP3AVO	> 26.0
					DEA +24 V A	1DEP2AVO	24.0–26.0
					DEA +15 V A	1DEP1AVO	15.0–17.0
					DEA +6 V A	1DEP0AVO	5.6–6.7
					DEA -6 V A	1DEN0AVO	-7.0–-5.7
					DEA -15 V A	1DEN1AVO	-17.0–-15.0
					DEA Input I A	1DEICACU	0.7–0.9

Table 1: **TURN ON DEA A AND TEST VIDEO BOARDS(Page 1)**

Step #	**Units**	**Telemetry EGSE**	**Other Verifier**	**Crit**	**Description**	**Notes**	**RT Con**	**Tlm Fmt**	**Min Alt**	**SIM Pos**
1										
1.1								1,2,4,6		
	V									
	V									
	V									
	V									
	V									
	V									
	V									
1.2	V			1						
1.3				2				1,2,4,6		
1.4				2				1,2,4,6		
	V			2	Expect DEA side A power					
	V			2	24 ± 4 W, current is noisy					
	V			1	so average needed (see figures).					
	V			2						
	V			2	**FP Temp unregulated**					
	V			2	**DEA Interface A/D**					
	V			2	**in low-res mode**					
	A			2						

Table 1: **TURN ON DEA A AND TEST VIDEO BOARDS(Page 2)**

Step #	Title (Revision 4.29_V2.2)	Time (mins)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value
1.5	Verify DEA B is off				DEA B ENB/DIS DEA B ON/OFF DEA Input V B DEA +28 V B DEA +24 V B DEA +15 V B DEA +6 V B DEA -6 V B DEA -15 V B	1DEPSBX 1DEPSB 1DE28BVO 1DEP3BVO 1DEP2BVO 1DEP1BVO 1DEP0BVO 1DEN0BVO 1DEN1BVO	DIS OFF 25.0–34.0 0.0 ± 0.5 0.0 ± 0.5 0.0 ± 0.5 0.0 ± 0.5 0.0 ± 0.5 0.0 ± 0.5
2	**Heater States**						
2.1	Verify heaters are not powered on side A				DA HTR EN/DIS A DA HTR ON/OFF A DA BAKE OUT EN/DIS A DA BAKE OUT ON/OFF A	1DAHTAEN 1DAHTAON 1DABOAEN 1DABOAON	DIS OFF DIS OFF
3	**Warm boot BEP**						
3.1	Set Boot modifier off		DPA FS Boot Modifier	1BMODIBM(0)			
3.2	Set warm boot flag		DPA Warm Boot	1WRMBTSB(1)			
3.3	Halt active BEP		Halt BEP	1RSETIRT(1)			
3.4	Restart active BEP		Restart BEP	1RSETIRT(0)			

Table 1: **TURN ON DEA A AND TEST VIDEO BOARDS(Page 2)**

Step #	**Units**	**Telemetry EGSE**	**Other Verifier**	**Crit**	**Description**	**Notes**	**RT Con**	**Tlm Fmt**	**Min Alt**	**SIM Pos**
1.5	 V V V V V V V							1,2,4,6		
2										
2.1				2 2 2 2						
3										
3.1					disables boot from uplink	LF 4.4.1		1,2,4,6		
3.2					Warm boot active BEP	LF 4.4.1		1,2,4,6		
3.3					Hold active BEP reset line	LF 4.4.1		1,2,4,6		
3.4					Release BEP reset line			1,2,4,6		

Table 1: **TURN ON DEA A AND TEST VIDEO BOARDS(Page 3)**

Step #	Title (Revision 4.29_V2.2)	Time (mins)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value
3.5	Check BEP Boot	2					
3.6	Check HW LEDs	1			BEP Select BEP FIFO Not Full BEP FIFO Not Empty	1STAT4ST 1STAT6ST 1STAT7ST	0or1 1 0
3.7	Check SW LEDs	1			BEP initialization Watchdog boot Science run status	1STAT3ST 1STAT2ST 1STAT1ST 1STAT0ST	0 1 1 0or1
4	**Execute DEA Housekeeping run**						
4.1	Load Board 11 DEA HK	1	loadDeaBlock	WD00001024			
4.2	Start DEA HK run	1	startDEA	XDZ0000005			
5	**Set FP temp to -121 C**						
5.1	Set FP temp to -121 C	2	ChangeConfigSetting	WSFTNEG121			
5.2	Dump system config		dumpSysConfig	RS_0000001			

Table 1: **TURN ON DEA A AND TEST VIDEO BOARDS(Page 3)**

Step #	Units	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
3.5		Check bepStartupMessage:		A				1,2,4,6		
		bepTickCounter < 10; version =??;		A	version # depends on					
		warmbootFlag = 1, patchValidFlag =1		A	loaded patches (if any)					
		Check swHousekeeping messages:								
		startingBepTickCounter < 10;		B						
		endingBepTickCounter=		B	**DEA Interface A/D**					
		=startingbeptickcounter+640			**in high-res mode**					
		version =??		A						
3.6				2	0/1 indicates BEP A/B selected			1,2,4,6		
				2	1 means FIFO not full					
				2	1 means FIFO not empty					
3.7				2	0 means BEP SW is running			1,2,4,6		
				2	1 means no watchdog boot					
				2	1 means science idle					
				2	bit toggles ⇒ BEP is running					
4										
4.1		commandEcho 225 Check cmdResult == OK		B	Load Fullhouse DEA hkp parameter block into slot 4			1,2,4,6		
4.2		commandEcho 18 Check cmdResult == OK confirm DEAhk values		B				1,2,4,6		
5										
5.1		Check cmdResult == OK commandEcho 1220		1	get FP temp		Y	1,2,4,6		
5.2		Check cmdResult == OK commandEcho 66		B			Y	1,2,4,6		

Table 1: **TURN ON DEA A AND TEST VIDEO BOARDS(Page 4)**

Step #	**Title (Revision 4.29_V2.2)**	**Time (mins)**	**Command Description**	**Command Mnemonic**	**Telemetry Description**	**Telemetry Mnemonic**	**Expected Value**
6	**Power up all boards**						
6.1	Power up all video boards	1	changeConfigSetting	WSVIDALLUP	 DEA Input I A DEA +15 V A	1DEPSA 1DEICACU 1DEP1AVO	ON 2.3–2.7 15.0–17.0
6.2	Power up all FEPs	2	changeConfigSetting	WSFEPALLUP	DPA Input I A DPA Input I B	1DPICACU 1DPICBCU	1.1–1.6 1.1–1.6
6.3	Dump System Config.	1	dumpSysConfig	RS_0000001			
7	**Science run on ACIS-I**						
7.1	Load Faint TE pblock	1	loadTeBlock	WT00C66014			

Table 1: **TURN ON DEA A AND TEST VIDEO BOARDS(Page 4)**

Step #	Units	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
6										
6.1		Verify cmdResult==OK		A	Wait for all video boards to					
		commandEcho 768			power up					
				2	Fail if DEA-A powers down					
	A			2	Current is noisy so average					
	V			2	needed (Figure 3).					
			pmon	A	10 DEACCD_POWERON msgs					
6.2		Verify cmdResult==OK		A	Messages:		Y	1,2	60k	
		commandEcho 89								
			pmon	A	30 FEP_WRITEMEM					
			pmon	A	6 FEP_EXECMEM					
			pmon	A	6 FEPMAN_POWERON					
			pmon	A	6 FEPMAN_STARTLOAD					
			pmon	A	6 FEPMAN_ENDLOAD					
	A				Should be valid for BEP A or B					
	A				Should be valid for BEP A or B					
6.3		Verify cmdResult==OK commandEcho 66		B			Y	1,2	60k	
7					Skip if video housekeeping not desired					
7.1		Verify cmdResult==OK commandEcho 14458		A			Y	1,2	60k	

Table 1: **TURN ON DEA A AND TEST VIDEO BOARDS(Page 5)**

Step #	**Title (Revision 4.29_V2.2)**	**Time (mins)**	**Command Description**	**Command Mnemonic**	**Telemetry Description**	**Telemetry Mnemonic**	**Expected Value**
7.2	Start bias-only run	3	startScience	X2Z0000005			
8	**Science run on ACIS-S**						
8.1	Load Faint TE pblock	1	loadTeBlock	WT00C68014			
8.2	Start bias-only run	3	startScience	X2Z0000005			
9	**Power down all boards**						
9.1	Power down all video boards and FEPs	1	changeConfigSetting	WSPOW00000	DEA Input I A DPA Input I A DPA Input I B	1DEICACU 1DPICACU 1DPICBCU	0.7–0.9 0.4–0.6 0.4–0.6
9.2	Dump System Config.	1	dumpSysConfig	RS_0000001			
	Total time:	24					

Table 1: **TURN ON DEA A AND TEST VIDEO BOARDS(Page 5)**

Step #	Units	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
7.2		Verify cmdResult==OK commandEcho 48	scienceReport	A	Verify terminationCode==2 in scienceReport		Y	1,2	60k	
8					Skip if video housekeeping not desired					
8.1		Verify cmdResult==OK commandEcho 14460		A			Y	1,2	60k	
8.2		Verify cmdResult==OK commandEcho 48	scienceReport	A	Verify terminationCode==2 in scienceReport		Y	1,2	60k	
9										
9.1		Verify cmdResult==OK commandEcho 773		A			Y	1,2	60k	
	A			2	Noisy current; average needed Messages:					
			pmon	A	10 DEACCD_POWEROFF					
			pmon	A	6 FEPMAN_POWEROFF					
	A A									
9.2		Verify cmdResult==OK commandEcho 66		B			Y	1,2	60k	