2.5_V2.0 BEP/DEA Power Combinations

Last Revised: June 27, 1999

BRIEF FUNCTIONAL DESCRIPTION:

This activity tests the operation of the DPA Sides A and B in combination with the DEA Side A This activity is based on the ACIS Long Form Functional Procedure (see MIT Document 36-01301.01 Rev. E).

The activity consists of the following main steps:

1. Turn off both sides of the DPA, turn on DPA A and verify BEP A boot
2. Power up I0,I1,I2 video boards and FEPS and perform a science run and check the power levels while clocking only I0,I1,I2.
3. Power off all boards and check power, power off DPA A.
4. Power on DPA Side B, select BEP B and boot, check power levels
5. Power up I3,S2,S3 video boards and FEPS and perform a 2nd science run and check power levels while clocking only I3,S2,S3.
6. Power off all boards and FEPs
7. Switch back to BEP A in charge

The behavior of the system is verified using: engineering voltage and current measurements; command echoes; the DEA housekeeping values obtained at the start of each science run; and the science reports. This procedure has been modified from the thermal vac procedure to leave the DEA A on throughout the procedure in order to preserve the control of the focal plane temperature.

ASSUMED INSTRUMENT STATE:
Assumes the instrument starts in the canonical thermal standby state.

SPECIAL INITIAL CONDITIONS:
Spacecraft telemetry is desired to be in Format 2 during the science runs.

OPERATIONAL CONSTRAINTS/CAUTIONS:
This procedure will remove patches in both BEPs.
This procedure power-cycles DPA boards and will vary the power consumption of ACIS during the execution of the procedure.

REFERENCES:
ACIS Long Form Functional Procedure - MIT Document 36-01301.01 Rev. E

CHANGE HISTORY:

V1.2

- removed commands which powered-down and powered-up DEA A in previous steps 1.3,1.4, 1.11,1.12,3.3,3.4,4.3,4.4,6.3,6.4,7.3 and 7.4

- added commands to select BEP B and then do a warm boot in steps 4.3-4.6
- updated text description to indicate the procedure preserves thermal control of the focal plane

V1.3

- deleted commands in old step one to power down video boards and FEPs
- changed HW TLM verifiers for the DPA off and on in steps 1.1, 1.3 and 1.6
- added steps 1.7, 1.8, 1.9 to verify BEP A boot
- added commandEcho values for all the SW command packets
- changed HW TLM verifiers in steps 3.3 and 3.4 to verify that DPA A is off
- changed HW TLM verifiers in steps 4.1 and 4.2 to verify that DPA
- added steps 4.7 and 4.8 to verify that BEP B boots
- modified step 7 to switch back to BEP A without powering down DPA B

V2.0

- ACIS Team signed-off version
- changed expected value of "1STAT7ST" in steps 1.8,4.7, and 7.6

Table 1: **ACIS DPA/DEA Power Combination Test**

Step #	Title (Revision 2.5_V2.0)	Time Req (m)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
1	Turn off DPA B & A							
1.1	DPA Power B off	1	DPA PS Off B	1DPPSBOF	DPA PS B ON/OFF	1DPPSB	OFF	
					DPA B +5V Voltage	1DPP0BVO	0.0 ± 0.2	V
					DPA Input Current	1DPICBCU	< 0.2	A
1.2	Disable DPA Power B	0.1	DPA PS Disable B	1DPPSBDS	DPA PS B ENB/DIS	1DPPSBX	DIS	
1.3	DPA Power A off	1	DPA PS Off A	1DPPSAOF				
					DPA Input V A	1DPP0AVO	0.0 ± 0.2	V
					DPA Input I A	1DPICACU	< 0.2	A
1.4	Disable DPA Power A	0.1	DPA PS Disable A	1DPPSADS				
1.5	Enable DPA PS A	0.1	DPA PS A En	1DPPSAEN				
1.6	Turn on DPA PS A	2	DPA PS A On	1DPPSAON	DPA A ON/OFF	1DPPSA	ON	
					DPA A ENB/DIS	1DPPSAX	ENB	
					DPA Input V A	1DP28AVO	28.0–34.0	V
					DPA Input I A	1DPICACU	0.35–0.43	A
					DPA +5V	1DPP0AVO	4.9–5.5	V
1.7	Check BEP A Boot	2.0						
1.8	Check HW LEDs	2.0			BEP Select	1STAT4ST	0	
					BEP FIFO Not Full	1STAT6ST	1	
					BEP FIFO Not Empty	1STAT7ST	0	
1.9	Check SW LEDs	2.0			BEP initialization	1STAT3ST	0	
					Watchdog boot	1STAT2ST	1	
					Science run status	1STAT1ST	1	
						1STAT0ST	0or1	
2	Run BEP A/DEA A							
2.1	Power up imaging boards	1	changeConfigSetting	WSI0I1I2				

Table 2: (CONT) **ACIS DPA/DEA Power Combination Test**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
1									
1.1			2			Y	1or2		
1.2			2		SF 4.9	Y	1or2		
1.3					SF 4.9	Y	1or2		
1.4				power supply current <0.2 Amps	SF 4.9	Y	1or2		
1.5				No verifier before power is on	SF 4.4.1	Y	1or2		
1.6			2		SF 4.4.1	Y	1or2		
				Expect about 12 Watts for side A, power consumption should be more stable than I or V.					
1.7	Check bepStartupMessage:		A			Y	1or2		
	bepTickCounter < 10; version =11;		A						
	watchdogFlag = 0, patchValidFlag =1		A						
	Check swHousekeeping messages:								
	startingBepTickCounter < 10;		B						
	endingBepTickCounter=		B						
	=startingBepTickCounter+640								
	version =11		A						
1.8			2	0 indicates BEP A is selected		Y	1or2		
			2	1 means FIFO not full					
			2	1 means FIFO not empty					
1.9			2	0 means BEP SW is running		Y	1or2		
			2	1 means no watchdog boot					
			2	1 means science idle					
			2	this bit toggles to indicate BEP is running					
2					LF 4.3.1				
2.1	Check cmdResult == 1		A	Power I0,I1,I2 video boards.	SF 4.4.3	Y	2		

Table 1: **ACIS DPA/DEA Power Combination Test(Page 2)**

Step #	Title (Revision 2.5_V2.0)	Time Req (m)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
					DEA Input V A	1DE28AVO	28	V
					DEA Input I A	1DEICACU	1.13	A
2.2	Power up Side-A FEPs	1.5	changeConfigSetting	WSFEP012				
					DPA Input V A	1DP28AVO	28	V
					DPA Input I A	1DPICACU	1.4	A
2.3	Load parameter block	1	loadTeBlock	WT0001A014				
2.4	Start science	8	startScience	XTZ0000005				
2.5	Verify nominal operation	5						
2.6	Stop Science	1	stopScience	AA00000000				
3	Power-down							
3.1	Power off video boards	1	changeConfigSetting	WSVIDALLDN				
3.2	Power off FEPs	1	changeConfigSetting	WSFEPALLDN				
3.3	DPA Power A off	1	DPA PS Off A	1DPPSAOF				
					DPA Input V A	1DPP0AVO	0.0 ± 0.2	V
					DPA Input I A	1DPICACU	< 0.2	A
3.4	Disable DPA Power A	0.1	DPA PS Disable A	1DPPSADS				
4	Power DPA B/BEP B							
4.1	Enable DPA PS B	0.1	DPA PS B En	1DPPSBEN				
4.2	Turn on DPA PS B	2	DPA PS B On	1DPPSBON	DPA B ON/OFF	1DPPSB	ON	
					DPA B ENB/DIS	1DPPSBX	ENB	
					DPA Input V B	1DP28BVO	28.0–34.0	V
					DPA Input I B	1DPICBCU	0.26–0.32	A

Table 2: (CONT) **ACIS DPA/DEA Power Combination Test(Page 2)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
	commandEcho = 170								
				Expect DEA side A power at about					
				31.5 Watts, current is noisy.					
2.2	Check cmdResult == 1		A	turn on FEPs 0,1,2	SF 4.4.4	Y	1or2		
	commandEcho = 169								
				Expect DPA Side A					
				power at about 38 Watts					
2.3	Check cmdResult == OK		A	only clock I0,I1,I2.	SF 4.5.1	Y	1or2		
	commandEcho = 172								
2.4	Check cmdResult == 1		A	DEA Side A power to about 49 Watts	SF 4.5.1	Y	2		
	commandEcho = 58			DPA Side A power to about 40 Watts	SF 4.5.1				
	exposureTeFaintBias			about 0 Watts on DPA side B,					
				Compare DEA tlm to Short Form					
				Appendix D					
2.5			B	Run monitor_noise on ACIS GSE	SF 4.5.2	Y	2		
2.6	Check cmdResult == 1		A	scienceReport	SF 4.5.3	Y	2		
	commandEcho = 1539			Check terminationCode == 1					
3					LF 4.7				
3.1	Check cmdResult == 1		A		SF 4.7	Y	1or2		
	commandEcho = 1541			DEA Side A power at about 21 Watts					
3.2	Check cmdResult == 1		A		SF 4.7	Y	1or2		
	commandEcho = 1542								
3.3					SF 4.9	Y	1or2		
3.4					SF 4.9	Y	1or2		
4									
4.1				No verifier before power is on	SF 4.4.1	Y	1or2		
4.2			2		SF 4.4.1	Y	1or2		
				Expect about 9 Watts for side B,					
				power consumption should be more					

Table 1: **ACIS DPA/DEA Power Combination Test(Page 3)**

Step #	Title (Revision 2.5_V2.0)	Time Req (m)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
					DPA +5V	1DPP0BVO	4.9–5.5	V
4.3	Select BEP B	1		1BSELICL(1)				
4.4	Set warm boot flag on	1	DPA Warm Boot	1WRMBTSB(1)				
4.5	Halt BEP	1	DPA Command Reset	1RSETIRT(1)				
4.6	Restart BEP	1		1RSETIRT(0)				
4.7	Check HW LEDs	2.0			BEP Select	1STAT4ST	1	
					BEP FIFO Not Full	1STAT6ST	1	
					BEP FIFO Not Empty	1STAT7ST	0	
4.8	Check SW LEDs	2.0			BEP initialization	1STAT3ST	0	
					Watchdog boot	1STAT2ST	1	
					Science run status	1STAT1ST	1	
						1STAT0ST	0or1	
5	Run BEP B/DEA A							
5.1	Power up I3,S2,S3 video boards	1	changeConfigSetting	WSI3S2S3				
					DEA Input V A	1DE28AVO	28	V
					DEA Input I A	1DEICACU	1.13	A
5.2	Power up FEPs	1.5	changeConfigSetting	WSFEP345				
					DPA Input V B	1DP28BVO	28	V
					DPA Input I B	1DPICBCU	1.4	A
5.3	Load parameter block	1	loadTeBlock	WT0001A014				
5.4	Start science	8	startScience	XTZ0000005				

Table 2: (CONT) **ACIS DPA/DEA Power Combination Test(Page 3)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
				stable than I or V.					
4.3				1BSELICL=1 selects BEP B		Y	1or2		
4.4				Warm boot active BEP	LF 4.4.1	Y	1or2		
4.5				Hold active BEP reset line	LF 4.4.1	Y	1or2		
4.6	bepStartupMessage		A	Release BEP reset line	LF 4.4.1	Y	1or2		
				Check startup messages					
				bepTickCounter < 10; version =11					
				watchdogFlag = 0, patchvalid Flag = 1					
				warmbootFlag = 1					
				Check swHousekeeping messages					
				startingBepTickCounter < 10;					
				endingBepTickCounter =					
				(startingBepTickCounter +640)					
4.7			2	1 indicates BEP B is selected		Y	1or2		
			2	1 means FIFO not full					
			2	1 means FIFO not empty					
4.8			2	0 means BEP SW is running		Y	1or2		
			2	1 means no watchdog boot					
			2	1 means science idle					
			2	this bit toggles to indicate BEP is running					
5					LF 4.3.1				
5.1	Check cmdResult == 1		A	Power I3,S2,S3 video boards.	SF 4.4.3	Y	1or2		
	commandEcho = 528			Expect DEA side A power at about					
				31.5 Watts, current is nosiy.					
5.2	Check cmdResult == 1		A	Turn on FEPs 3,4,5.	SF 4.4.4	Y	1or2		
	commandEcho = 526			Expect DPA Side B					
				at about 38 Watts					
5.3	Check cmdResult == 1		A	only clock I3,S2,S3.	SF 4.5.1	Y	1or2		
	commandEcho = 172								
5.4	Check cmdResult == 1		A	DEA Side A power to about 49 Watts	SF 4.5.1	Y	2		
	commandEcho = 58			About 0 Watts on DPA Side A	SF 4.5.1				
	exposureFaintBias			About 40 Watts on DPA side B	SF 4.5.1				

Table 1: **ACIS DPA/DEA Power Combination Test(Page 4)**

Step #	Title (Revision 2.5_V2.0)	Time Req (m)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
5.5	Verify nominal operation	5						
5.6	Stop Science	1	stopScience	AA00000000				
6	Power-down							
6.1	Power off video boards	1	changeConfigSetting	WSVIDALLDN				
6.2	Power off FEPs	1	changeConfigSetting	WSFEPALLDN				
7	Switch back to BEP-A							
7.1	Halt BEP	1	DPA Command Reset	1RSETIRT(1)				
7.2	Select BEP A	1		1BSELICL(0)				
7.3	Enable DPA PS A	0.1	DPA PS A En	1DPPSAEN	DPA A ENB/DIS	1DPPSAX	ENB	
7.4	Turn on DPA PS A	1	DPA PS A On	1DPPSAON	DPA A ON/OFF	1DPPSA	ON	
					DPA A ENB/DIS	1DPPSAX	ENB	
					DPA Input V A	1DP28AVO	28.0–34.0	V
					DPA Input I A	1DPICACU	0.35–0.43	A
					DPA +5V	1DPP0AVO	4.9–5.5	V
7.5	Check BEP A Boot	2.0						
7.6	Check HW LEDs	2.0			BEP Select	1STAT4ST	0	
					BEP FIFO Not Full	1STAT6ST	1	
					BEP FIFO Not Empty	1STAT7ST	0	
7.7	Check SW LEDs	2.0			BEP initialization	1STAT3ST	0	
					Watchdog boot	1STAT2ST	1	

Table 2: (CONT) **ACIS DPA/DEA Power Combination Test(Page 4)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
				Compare DEA telemetry to SF App. D.					
5.5			A	Run monitor_noise on ACIS GSE	SF 4.5.2	Y	2		
5.6	Check cmdResult == 1		A	scienceReport	SF 4.5.3	Y	2		
	commandEcho = 1539								
6					LF 4.7				
6.1	Check cmdResult == 1		A		SF 4.7	Y	1or2		
	commandEcho = 1541								
6.2	Check cmdResult == 1		A		SF 4.7	Y	1or2		
	commandEcho = 1542								
7									
7.1				Hold active BEP reset line	LF 4.4.1	Y	1or2		
7.2				1BSELICL=0 selects BEP A		Y	1or2		
7.3			2		SF 4.4.1	Y	1or2		
7.4			2		SF 4.4.1	Y	1or2		
			1						
			2	Expect 12 W for side A, power					
			2	consumption should be more					
			2	stable than I or V.					
7.5	Check bepStartupMessage:		A			Y	1or2		
	bepTickCounter < 10; version =11;		A						
	watchdogFlag = 0, patchValidFlag =1		A						
	warmbootFlag = 0		A						
	Check swHousekeeping messages:								
	startingBepTickCounter < 10;		B						
	endingBepTickCounter=		B						
	=startingBepTickCounter+640								
	version =11		A						
7.6			2	0 indicates BEP A is selected		Y	1or2		
			2	1 means FIFO not full					
			2	1 means FIFO not empty					
7.7			2	0 means BEP SW is running		Y	1or2		
			2	1 means no watchdog boot					

Table 1: **ACIS DPA/DEA Power Combination Test(Page 5)**

Step #	Title (Revision 2.5_V2.0)	Time Req (m)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
					Science run status	1STAT1ST 1STAT0ST	1 0or1	
	Total Time	69.6						

Table 2: (CONT) **ACIS DPA/DEA Power Combination Test(Page 5)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
			2 2	1 means science idle this bit toggles to indicate BEP is running					