4.5_V2.7 TURN ON DEA A

Last Revised: July 24, 2017
Filename: deaa_on

BRIEF FUNCTIONAL DESCRIPTION:

This is an "atomic" procedure which simply powers up the DEA side A. 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

ASSUMED INSTRUMENT STATE:

1. Assumes that the PSMC has power from the spacecraft.
2. Assumes that DEA B is off.
3. 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, and (c) to avoid over-heating within the PSMC.

The DEA power status is normally indicated by the values of the 1DEPSA and 1DEPSB flags, which should not both be 1 simultaneously. However, if neither side of the DPA is receiving power (*i.e.*, if 1DPP0AVO and 1DPP0BVO are simultaneously reading 0.0 ± 0.5 V), the DEA flag values will be unreliable and the DEA voltage channels (1DEP[0123][AB]VO) should instead be used to determine which sides of the DEA are powered).

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.

After successful execution, *the FP temperature control will be unregulated, and DEA interface A/D will be in low-resolution mode.*

REFERENCES:

CHANGE HISTORY:

V1.2

- changed filenames from "turnon_deaa" to "deaa_on"
- added text to explain the confusion with the logical verifiers

V1.3

- changed HW TLM verifier in step 1.2 to "1DEN1AVO" from "DEN1AVO"
- changed criticality of +24 V to 1
- changed TLM FMT to 1,2,4or6
- added step 1.3 to verify that DEA B is still off
- added comments to warn that the FP temp will be set to 0 K after the DEA A is powered

V2.0

- ACIS Team signed-off version
- changed HW TLM verifier in step 1.3 to "1DEN1BVO"
- edited "Operational Constraints & Cautions"

V2.1

- Update expected 1DE28AVO range
- Changed formatting of "Tlm Fmt" in table
- Changed time column from units of seconds to minutes in table
- Changed text in table column "Description"
- Updated expected voltage errors in Step 1.3

V2.2

- Update expected 1DEICACU range
- Add plots showing the behavior of 1DEICACU

V2.3

- Added a step to verify DEA-B is off at the beginning of the procedure
- Moved the text regarding power status issues and expected current behavior from the Functional Description to the Operational Constraints/Cautions section. Also updated the expected FP temperature control.

V2.4

- Fixed incorrect 1DEN0AVO and 1DEN1AVO voltages in table

V2.5

- Removed input current check for DEA B; added warning to text.

V2.6

- Added check of input voltage for DEA A before sending the turn-on command
- Adjusted values of "Crit" column in table.
- Note that a bakeout will be interrupted if the DEA powers off, provide details

V2.7

- Added a note that this procedure assumes that the DEA was powered from side A and what to do if it wasn't

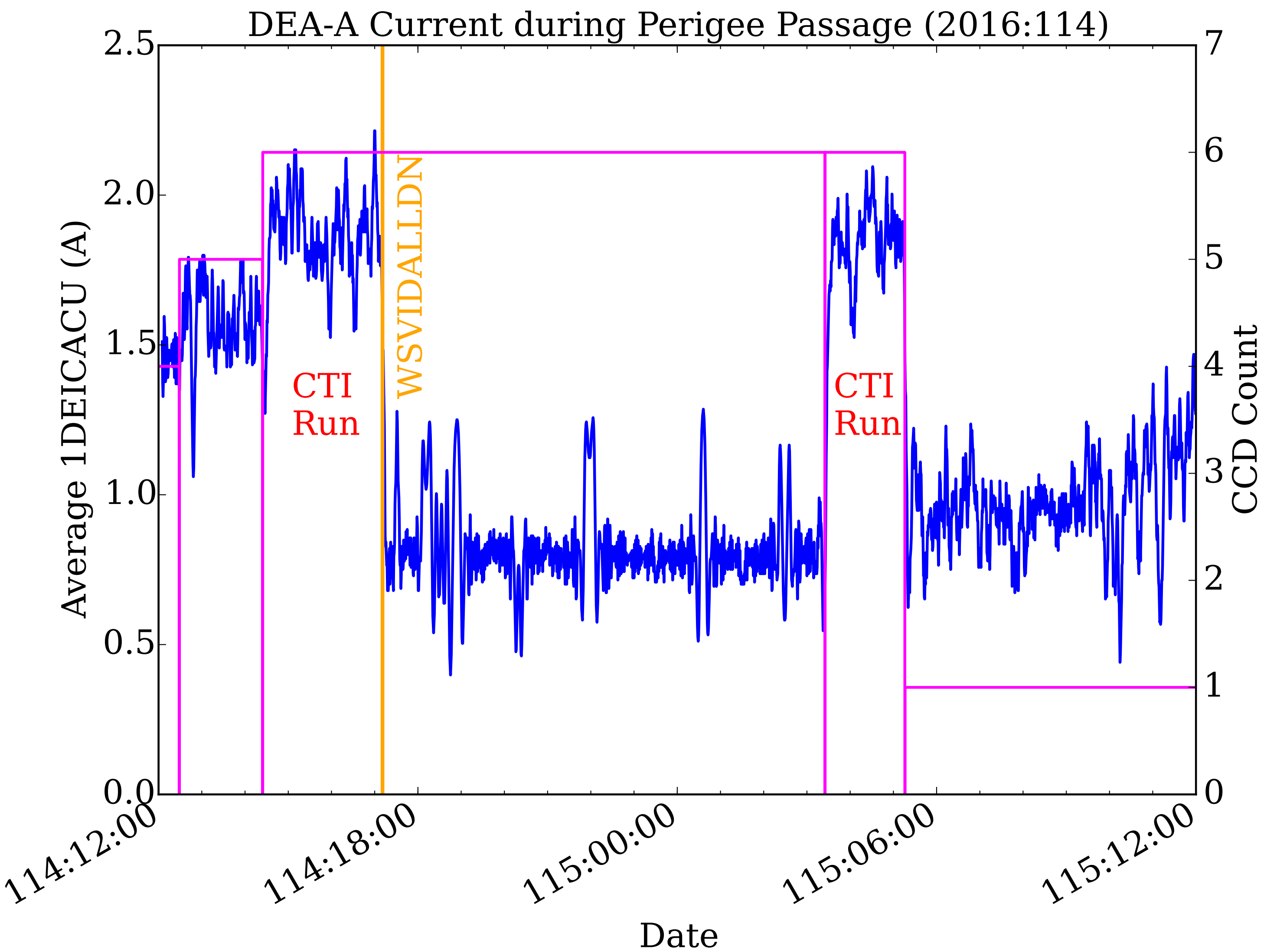

Figure 1: Ten-sample running average behavior of 1DEICACU during a perigee passage. All video boards are powered off after the issuing of the WSVIDALLDN command, which is marked by the orange line in the plot.

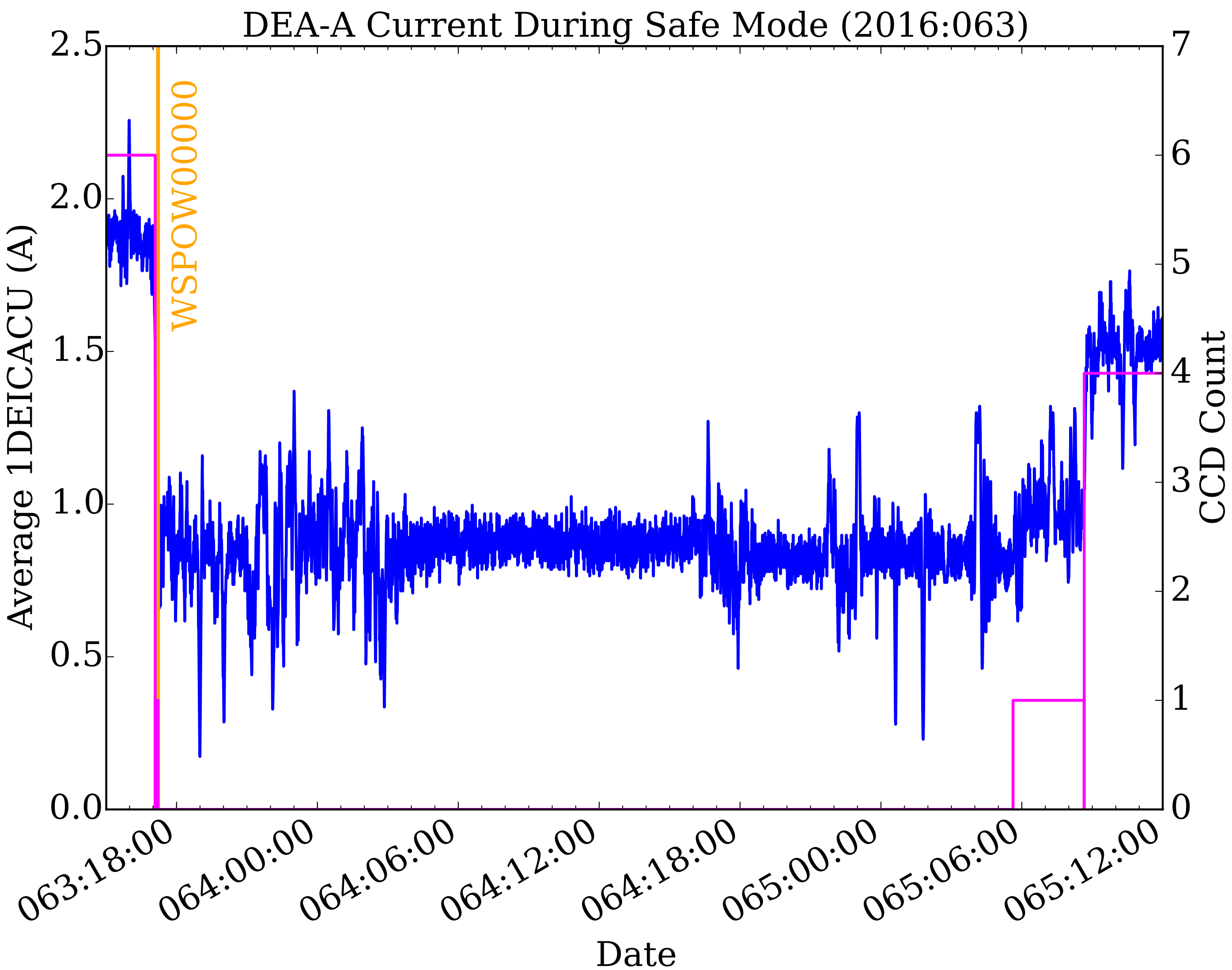

Figure 2: Ten-sample running average behavior of 1DEICACU during a safe mode. All video boards are powered off after the issuing of the WSPOW00000 command, which is marked by the orange line in the plot.

Table 1: **TURN ON DEA A(Page 1)**

Step #	**Title (Revision 4.5_V2.7)**	**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 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
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 DEA Input V A DEA +28 V A DEA +24 V A DEA +15 V A DEA +6 V A DEA -6 V A DEA -15 V A DEA Input I A	1DEPSA 1DE28AVO 1DEP3AVO 1DEP2AVO 1DEP1AVO 1DEP0AVO 1DEN0AVO 1DEN1AVO 1DEICACU	ON 25.0–34.0 > 26.0 24.0–26.0 15.0–17.0 5.6–6.7 -7.0–-5.7 -17.0–-15.0 0.7–0.9

Table 1: **TURN ON DEA A(Page 1)**

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

Table 1: **TURN ON DEA A(Page 2)**

Step #	Title (Revision 4.5_V2.7)	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
	Total time:	2					

Table 1: **TURN ON DEA A(Page 2)**

Step #	**Units**	**Telemetry EGSE**	**Other Verifier**	**Crit**	**Description**	**Notes**	**RT Con**	**Tlm Fmt**	**Min Alt**	**SIM Pos**
1.5				1	Ignore verifier if DPA A and B unpowered			1,2,4,6		
				1	Ignore verifier if DPA A and B unpowered					
	V			2						
	V			2						
	V			1						
	V			2						
	V			2						
	V			2						
	V			2						