2.9_V2.0 FULL BAKEOUT

Last Revised: June 28,1999
Filename: full_bakeout

BRIEF FUNCTIONAL DESCRIPTION:
BRIEF FUNCTIONAL DESCRIPTION: The CCDs and the optical-blocking filter will develop a layer of contamination with time as the SC outgasses. ACIS is only exposed to these contaminants after its door is opened during the OV phase (the door then remains open for the rest of the mission). The contaminants are removed by heating the focal plane up to 30 C and allowing some time for the materials to offgas from ACIS. The thermal time constants are on the order of hours so this activity is currently projected to take 10 hours on orbit.

Current thinking states that ACIS must be in the focal position for this activity. The effectiveness (and therefore the required frequency) of this activity is uncertain at this time. Preliminary studies by TRW systems engineering indicates that this activity may be required once every two weeks just after the door is opened, with declining frequency afterwards. All these issues are highly uncertain at the present time and will need to be vigorously reviewed in the future.

The sequence of actions will be:

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1. verify the initial Camera Body, Warm & Cold Radiators and FP temperatures
2. enable FP bakeout and start heating FP to +30
3. Enable and turn on the DA housing bakeout heater once the FP temperature exceeds -60 C, heat DA housing to +25 C
4. Wait for FP temperature to stabilize at +30 C and Camera Body to stabilize at +25 c

ASSUMED INSTRUMENT STATE:
Assumes the instrument is in the canonical thermal standby state (the FEPs and video boards must be off !!!!).

SPECIAL INITIAL CONDITIONS:

OPERATIONAL CONSTRAINTS/CAUTIONS:
THIS PROCEDURE LEAVES THE INSTRUMENT IN BAKEOUT MODE, IT MUST BE ROUTINELY MONITORED DURING THIS TIME.
The little and large vent valves must already be open.
The turning off of the FEPs and analog electronics should be verified before the heaters are turned on.
CARD ACIS-002
CARD ACIS-007

REFERENCES:
ACIS Long Form Functional Test Procedure (36-01301.01)
CHANGE HISTORY:

V1.2

- changed filenames from "full_bakeout_cold" to "full_bakeout"

V1.3

- deleted commands in step 1 to turn on the housing heater on side B
- added HW TLM verifiers in step 1 to check the Camera Body, Warm and Cold Radiators temperatures
- moved start of a possibly needed DEA HKP run to step 1 from step 2
- added a command in step 2.2. to disable warm boot in case the BEP watchdog resets during the bakeout
- added a sump system configuration command in step 2.6
- changed HW TLM verifiers in step 3.3 to 1CBAT and 1CBBT
- deleted steps 5–7 which take the instrument out of bakeout and moved them to a new procedure called "full_bkout_off"

V2.0

- ACIS Team signed-off version
- changed expected value of the cold radiator and the time required in step 2.7
- changed the expected value of the warm and cold radiators in step 4.1

Table 1: **Full Bakeout Procedure**

Step #	Title (Revision 2.9_V2.0)	Time Req (m)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
1.0	Verify Initial Temperatures							
1.1	Verify HW Temperatures				Camera Body T A	1CBAT	-60	C
					Camera Body T B	1CBBT	-60	C
					Cold Radiator T A	1CRAT	~ -130	C
					Cold Radiator T B	1CRBT	~ -130	C
					Warm Radiator T A	1WRAT	~ -90	C
					Warm Radiator T B	1WRBT	~ -90	C
1.2	Load Board 11 DEA HK *if necessary*	1	loadDeaBlock	WD00001024				
1.3	Start DEA Hkp run *if necessary*	1	startDEA	XDZ0000005				
1.4	verify FP temperature	2			FP Temp		~ -120	C
2.0	Start heating FP to +30 C							
2.1	verify power consumption	10			DEA Input I	1DEICACU	0.60–0.78	A
					DEA Input V	1DE28AVO	27.0-35.0	V
2.2	Set warm boot flag off	1	DPA Cold Boot	1WRMBTSB(0)				
2.3	Upload bakeout patch	1	writeBep	WBBOEN_ENB				
2.4	Enable the FP BO htr	1	changeConfigSetting	WSBAKENABL				
2.5	Set FP temp to +30 C	1	changeConfigSetting	WSFTPOS_30				
2.6	dump system config.	0.1	dumpSysConfig	RS_0000001				
2.7	wait for FP temp rise	30			FP Temp		-60	C
					Cold Radiator T A	1CRAT	~ -110	C
					Cold Radiator T B	1CRBT	~ -110	C
3.0	Start heating DH to +25 C							
3.1	Housing Bakeout Enb B	2	Housing B.O. Ena B	1HBOBEN	DA BO B Enb/Dis	1DABOBEN	ENB	
3.2	Housing Bakeout On B	2	Housing B.O. On B	1HBOBON	DA BO B On/Off	1DABOBON	ON	
					DA Htr Output V B	1DAHBVO	28.0–34.0	V
					DA Htr Current B	1DAHBCU	~ 2.0	A

Table 2: (CONT) **Full Bakeout Procedure**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
1.0									
1.1			2	should be at -60 C		Y	1or2		
			2	should be at -60 C					
				depends on starting point of FP temp.					
			2						
			2						
1.2	Check cmdResult == OK		B	Load Fullhouse DEA housekeeping		Y	1or2		
	commandEcho 225			parameter block into slot 4					
1.3	deaHousekeepingData		B	get FP temp, should be stable and		Y	1or2		
	commandEcho 18			± 2 C of desired value.					
1.4	deaHousekeepingData		A	verify FP temp stable at desired temp.		Y	1or2		
2.0									
2.1			2	DEA A Power should be 21 ± 3 W,		Y	1or2		
				current is noisy so an avg. is needed		Y	1or2		
2.2				disable Warm boot if BEP watchdogs		Y	1or2		
2.3	Check cmdResult == OK		A	Enable the "enable"		Y	1or2		
	commandEcho 101								
2.4	Check cmdResult == OK		A	enable the FP bakeout heater	If *psci* indicates a	Y	1or2		
	commandEcho 114				SWSTAT_DEAMAN_BADCNTLREG				
2.5	Check cmdResult == OK		A	Set desired FP temp to +30 C,	or SWSTAT_DEABOARD_ERROR,	Y	1or2		
	commandEcho 159			FP bakeout htr comes on.	bakeout enabled failed.				
2.6	Check cmdResult == OK		B	get data to verify bakeout enable	run *psci -a -l* to examine	Y	1or2		
	commandEcho 66				SysConfig packets.				
2.7	deaHousekeepingData		A	wait for FP temp to exceed -60 C	Time depends on starting T	P	1or2		
				cold radiator temp should increase					
3.0									
3.1						Y	1or2		
3.2						Y	1or2		
			2						
			2						

Table 1: **Full Bakeout Procedure (Page 2)**

Step #	Title (Revision 2.9_V2.0)	Time Req (m)	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
3.3	monitor Camera Body temp	60			Camera Body T A	1CBAT	> -60	C
					Camera Body T B	1CBBT	> -60	C
4.0	Verify FP and Camera Body Temp Stable							
4.1	wait for stabilization	480			FP Temp		$+30$	C
					Camera Body T A	1CBAT	$+25 \pm 2$	C
					Camera Body T B	1CBBT	$+25 \pm 2$	C
					Cold Radiator T A	1CRAT	~ -44	C
					Cold Radiator T B	1CRBT	~ -44	C
					Warm Radiator T A	1WRAT	~ -32	C
					Warm Radiator T B	1WRBT	~ -32	C
	Total Time	592.1						

Table 2: (CONT) **Full Bakeout Procedure (Page 2)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
3.3			2 2	wait for temp to rise significantly above -60 C		P	1or2		
4.0 4.1	 deaHousekeepingData		 A 2 2 2 2 2 2	 verify FP temp stabilizes at +30 C should be at +25 C should be at +25 C cold radiator temp should increase	 Time depends on starting T	 P	 1or2		