1.1_V2.0 OPEN SMALL VENT VALVE

Last Revised: June 23,1999
Filename: open_svv

BRIEF FUNCTIONAL DESCRIPTION:
The small (previously referred to as "little") vent valve is planned to be opened once on orbit. The current plan would open the valve while *AXAF* is still in the shuttle bay, 40 mins after the payload bay doors have been opened. The valve is opened to allow any residual gas in the ACIS detector housing to escape. There are two redundant vent valves located in parallel downstream of a porous plug. Thus, the opening of either of these valves will be sufficient but it is planned to open both. Since the pumping speed is limited by the porous plug, no advantage in time or final pressure can be realized by opening both valves. There is no telemetry verifier that the valves have opened. The only way to verify the opening of the valves is to monitor the reading of the internal pressure monitor. Once opened the little valve should not be closed, since the risk of contaminants reaching the focal plane through this path is negligible. Initialy, the pressure will drop by a factor of two every 30 minutes. Typically in ground operations, 3 hours was the standard waiting time or until the rate of change was less than 1 torr per 30 minutes. The eventual pressure should read 0 ± 2 torr.

The sequence of actions will be:

1. enable and turn on DPA power supply side A
2. turn on the pressure transducers A & B, check the pressure, validate expectations
3. enable and open the little valve mechanism A & B
4. disable the little vent valve mechanism A & B
5. turn off and disable the DPA power supply side A
6. monitor the pressure as spacecraft telemetry is available
7. turn off the pressure transducers A & B

ASSUMED INSTRUMENT STATE:
Assumes that the PSMC has power from the spacecraft.

SPECIAL INITIAL CONDITIONS:
Assumes that the spacecraft has power and connections for commanding and telemetry while in the shuttle bay.
Assumes the telemetry is in FMT 6.

OPERATIONAL CONSTRAINTS/CAUTIONS:
There is no telemetry verifier and therefore it is crucial that the internal pressure be monitored. Both pressure monitors may be read out, so they are both typically used.
CARD ACIS-005

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

CHANGE HISTORY:

V1.2

- changed filenames from "open_lvv" to "open_svv"

V1.3

- changed title of procedure to say "Small Vent Valve"
- changed expected value of verifiers in step 1.2 from "E" to "ENB" and "5.0" to "4.9–5.5"
- changed criticality of verifier "1DPP0AVO" to 1 in steps 1.2 and 5.2
- changed expected value of verifiers in steps 2.1 and 2.2 from "1" to "ON"
- changed expected value of verifiers in steps 2.3 and 2.4 from "0–2 T" to "0-10 T", changed criticality to "2"
- changed duration in step 2.3 to 6 minutes
- changed expected value of verifiers in steps 3.1 and 3.3 from "1" to "ENB"
- changed expected value of verifiers in steps 4.1 and 4.2 from "0" to "DIS"
- changed expected value of verifiers in step 5.1 from "OFF" to "ON"
- changed expected value of verifiers in step 5.2 from "0 V" to "0.0 ± 0.2 V", "28.0–32.0 V", and "0.0–0.1 A"
- changed expected value of verifiers in steps 6.1 and 6.2 from "0 T" to "0-2 T", changed criticality to "2"
- changed verifiers to be checked in steps 7.1 and 7.2 from 1PRDBAON & 1PRDBBON to 1HOPAPR & 1HOPBPR
- deleted "CMD EGSE" and "SEQ KEY" from the LaTeX table
- edited the text in the *Brief Functional Description*

V1.4

- changed expected values of the initial pressure to "-12 to +2 T" in steps 2.3 and 2.4
- changed order of Enable and On commands in section 3 so that both valves are enabled first and then both valves are commanded open
- put verifiers that DPA is off after step 5.1 instead of step 5.2, removed verifier 1DPPSA
- added filename identification at top of procedure

V1.5

- changed expected values of the DPA A input voltage and current in step 1.2 to 28.0–34.0 V and 0.35–0.43 A

V2.0

- ACIS Team signed-off version, identical to previous version 1.5

Table 1: **Small Vent Valve Opening Procedure**

Step #	Title (Revision 1.1_V2.0)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
1.0	Turn on DPA Power Supply							
1.1	Enable DPA PS A	2	DPA PS A En	1DPPSAEN				
1.2	Turn on DPA PS A	10	DPA PS A On	1DPPSAON	DPA A on	1DPPSA	ON	
					DPA A Enb	1DPPSAX	ENB	
					DPA +5V	1DPP0AVO	4.9–5.5	V
					DPA Input Voltage	1DP28AVO	28.0–34.0	V
					DPA Input Current	1DPICACU	0.35–0.43	A
2.0	Measure Initial Pressure							
2.1	turn on Pressure Transducer A	2	XDCR A on	1PRESAON	Pressure XDCR A	1PRDBAON	ON	
2.2	turn on Pressure Transducer B	2	XDCR B on	1PRESBON	Pressure XDCR B	1PRDBBON	ON	
2.3	Measure Pressure A	6			Differential Housing Pressure A	1HOPRAPR	-12– +2	T
2.4	Measure Pressure B				Differential Housing Pressure B	1HOPRBPR	-12– +2	T
3.0	Open Valves							
3.1	Enable valve A	0.1	Enable valve A	1LVCAEN	Little valve Enabled A	1LVDBAON	ENB	
3.2	Enable valve B	4	Enable valve B	1LVCBEN	Little valve enabled B	1LVDBBON	ENB	
3.3	Open valve A	0.1	Open valve A	1LVCOAON	Little valve open A	NONE		
3.4	Open valve B	0.1	Open valve B	1LVCOBON	Little valve open B	NONE		
4.0	Disable Valves							
4.1	Disable valve A	0.1	Disable A	1LVCADS	Disable A	1LVDBAON	DIS	
4.2	Disable valve B	0.1	Disable B	1LVCBDS	Disable B	1LVDBBON	DIS	
5.0	Turn off DPA Power Supply							
5.1	Turn off DPA PS A	2	DPA PS A Off	1DPPSAOF				
					DPA +5V	1DPP0AVO	0.0 ± 0.2	V
					DPA Input Current	1DPICACU	0.0–0.1	A
5.2	Disable DPA PS A	6	DPA PS A En	1DPPSADS				
6.0	Monitor Pressure Drop							
6.1	Monitor Pressure A	180			Differential Housing Pressure A	1HOPRAPR	0 ± 2	T
6.2	Monitor Pressure B				Differential Housing Pressure B	1HOPRBPR	0 ± 2	T

Table 2: (CONT) **Small Vent Valve Opening Procedure**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
1.0									
1.1				No verifier before power is on		Y	6		
1.2			1			Y	6		
			1						
			1						
			2	Expect 12 ± 2 W for side A, power consumption					
			2	should be more stable than I or V.					
2.0									
2.1			2			Y	6		
2.2			2			Y	6		
2.3			2	If P>10 T, OBF may be damaged,		Y	6		
				consult ACIS engineering team					
2.4			2			Y	6		
3.0									
3.1			1			Y	6		
3.2			1	SOT verifies both enables.		Y	6		
3.3			1			Y	6		
3.4			1			Y	6		
4.0									
4.1			2			Y	6		
4.2			2			Y	6		
5.0									
5.1				HW serial digital verifiers go to 1 once power is off.		Y	6		
			1						
			2						
5.2				No verifier after power is off.		Y	6		
6.0									
6.1			1			P	6		
6.2			1			P	6		

Table 1: **Small Vent Valve Opening Procedure(Page 2)**

Step #	Title (Revision 1.1_V2.0)	Time Req	Command Description	Command Mnemonic	Telemetry Description	Telemetry Mnemonic	Expected Value	Units
7.0	Turn Off Pressure XDCRs							
7.1	turn off Pressure Transducer A	2	XDCR A off	1PRESAOF	Differential Housing Pressure A	1HOPRAPR	-21.1	T
7.2	turn off Pressure Transducer B	2	XDCR B off	1PRESBOF	Differential Housing Pressure B	1HOPRBPR	-19.1	T
	Total Time	218.5						

Table 2: (CONT) **Small Vent Valve Opening Procedure(Page 2)**

Step #	Telemetry EGSE	Other Verifier	Crit	Description	Notes	RT Con	Tlm Fmt	Min Alt	SIM Pos
7.0									
7.1			2				6		
7.2			2				6		