RCS Health Check
File: H_FCP_AOC_5011.xls
Author: dsalt-hp

Procedure Summary

Objectives

The objective of this Herschel ACMS procedure is to lists all activities necessary to assess the health and status of the RCS.

The procedure involves the following activities:
- verify LCL status
- check consistancy of LV status
- verify external temperatures of RCS-A or RCS-B
- determine RCS active and redundant branch
- verify catbed temps. of active and redundant RCS branch
- verify tank data and common temperature nodes

Summary of Constraints

n/a

Spacecraft Configuration

Start of Procedure

n/a

End of Procedure

n/a

Reference File(s)

Input Command Sequences

Output Command Sequences

Referenced Displays

ANDs	GRDs	SLDs
WALC1584		
WALC2584		
ZAA01999		
ZAA06999		
ZAZ86999		
ZAZ88999		
ZAZ89999		
ZAZ84999		
ZAZ87999		
ZAA04999		

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Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
03/08/08	1	1	Created	dsalt-hp	
02/02/09	2	2	Checked-in for FOP release (02/02/09)	dsalt-hp	

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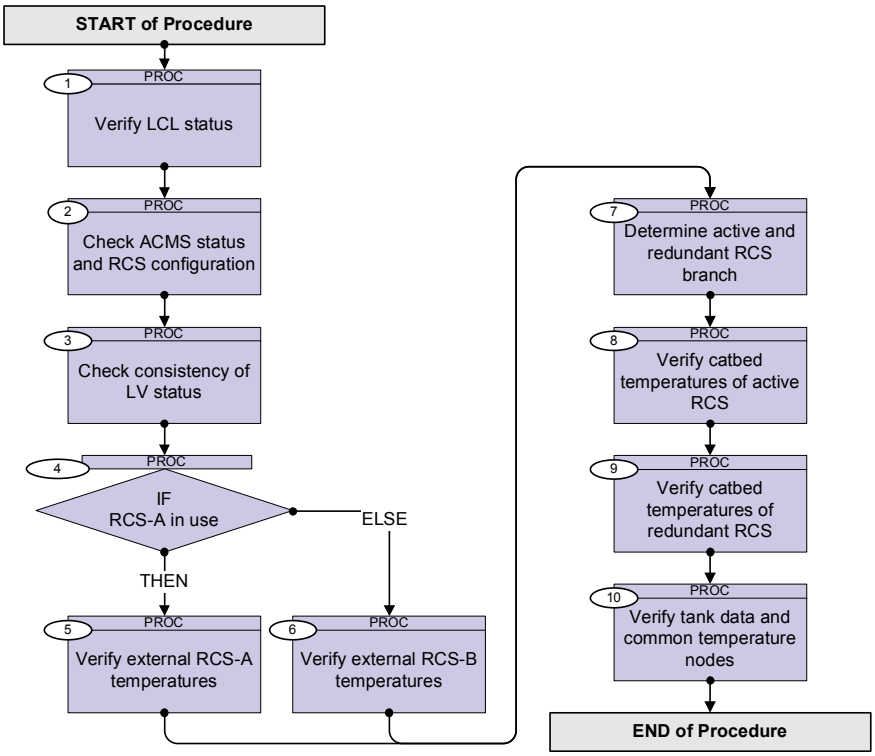
Procedure Flowchart Overview



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Beginning of Procedure		
		PROC Procedure Properties *SSID :*		
1		*Verify LCL status*		Next Step: 2
		***** NOTE ***** ***All of the RCS related temperatures/ranges need to be stated in all the relevant steps of this procedure!***		
		***** ALERT ***** ***In the pre-separation state, all of the following LCLs will be OFF***		
		Verify Telemetry **CBH_N_L17_S** **WMA2H565**	**= ON**	AND=WALC1584
		Verify Telemetry **CBH_R_L18_S** **WM12H565**	**= OFF**	AND=WALC1584
		LCL_17 and LCL_18 power the two sets of catalytic bed heaters which raise the temperature of the catalyst above the minimum safety level. These heaters cannot be controlled by the ACC, and the power is provided directly from the LCL. In the default configuration, only the nominal set of survival heaters should be powered.		
		Verify Telemetry **RcsThrsA_L45_1S** **WM22D565**	**= ON**	AND=WALC2584
		Verify Telemetry **RcsThrsA_L45_2S** **WM22J565**	**= ON**	AND=WALC2584
		Verify Telemetry **RcsThrsB_L46_1S** **WM92D565**	**= ON**	AND=WALC2584
		Verify Telemetry **RcsThrsB_L46_2S** **WM92J565**	**= ON**	AND=WALC2584
		Verify Telemetry **RcsLvA_L47_1S** **WM12E565**	**= ON**	AND=WALC2584
		Verify Telemetry **AccLvA_L47_2S** **WM12J565**	**= ON**	AND=WALC2584
		Verify Telemetry **AccLvB_L48_1S** **WMA2E565**	**= ON**	AND=WALC2584
		Verify Telemetry **AccLvB_L48_2S** **WMA2J565**	**= ON**	AND=WALC2584

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
2		*Check ACMS status and RCS configuration*		Next Step: 3
2.1		*Acquire ACMS execution mode (nominal / survival)*		□
		Verify Telemetry **SpacecraftMode AESME002**	**= Nominal** **= Survival**	AND=ZAA01999
2.2		*Acquire RCS selection for nominal and survival modes*		□
		Verify Telemetry **Nom Conf RCS AESCF002**	**= RCS-A** **= RCS-B**	AND=ZAA01999
		Verify Telemetry **Surv Conf RCS AESCM001**	**= RCS-A** **= RCS-B**	AND=ZAA01999
3		*Check consistency of LV status*		Next Step: 4
3.1		*Determine expected status of LVA and LVB*		□

		The determination of the expected status of the latch is based on relatively simple logic which, however, is impossible to code in MOIS because it requires programming constructs (if/else, nested if's) which MOIS does not provide.
		For this reason, it is given here as pseudo code that the operator will have to follow to determine the expected status of the latch valves "manually".
		
		IF (RcsNom == RCSA AND RcsSurv == RCSA) THEN
		LVA = Open
		LVB = Closed
		ELSE IF (RcsNom == RCSB AND RcsSurv == RCSB) THEN
		LVA = Closed
		LVB = Open
		ELSE
		IF (AcmsExecMode == Nominal) THEN
		IF (RcsNom == RCSA) THEN
		LVA = Open
		LVB = Closed
		ELSE		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch

		LVA = Closed
		LVB = Open
		END IF
		ELSE
		IF (RcsSurv == RCSA) THEN
		LVA = Open
		LVB = Closed
		ELSE
		LVA = Closed
		LVB = Open
		END IF
		END IF
		END IF		

3.2		*Verify the status of the latch valves in TM*		
		Verify Telemetry **RCS-A LV open** **AMTL1109**		AND=ZAA06999
		Verify Telemetry **RCS-A LV closed** **AMTL2109**		AND=ZAA06999
		Verify Telemetry **RCS-B LV open** **AMTL3109**		AND=ZAA06999
		Verify Telemetry **RCS-B LV closed** **AMTL4109**		AND=ZAA06999
		The status of both LV's in TM must be consistent with the expected LV configuration determined in the previous step.		
4		*IF* *RCS-A in use*		Next Step: THEN 5 ELSE 6

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verification is carried out only for the RCS branch which is either in active use (branch selected for the current ACNS mode) or must be ready for use (this applies to the branch selected for use in Survival Mode). The check in principle could be extended also for the branch that has been excluded from further use during the mission, however, operational restrictions on the allowed ranges of parameters would not apply to this branch and limits for the verification of parameters would be difficult to specify. *In general, no specific values or ranges have been indicated as verification criteria in the procedure, since the values depend strongly on the environment in which the procedure is executed. In particular, there is a large difference between temperature ranges expected when the procedure is executed during operations in flight and in a test environment on ground.*		
5		*Verify external RCS-A temperatures*		Next Step: 7
		Verify Telemetry **ThermAvgTemp022** **DEA8D170**		AND=ZAZ86999
		Verify Telemetry **ThermAvgTemp042** **DEAA1170**		AND=ZAZ88999
		Verify Telemetry **ThermAvgTemp041** **DEAA0170**		AND=ZAZ88999
		Verify Telemetry **ThermAvgTemp023** **DEA8E170**		AND=ZAZ86999
		Verify Telemetry **ThermAvgTemp044** **DEAA3170**		AND=ZAZ88999
		Verify Telemetry **ThermAvgTemp051** **DEAAA170**		AND=ZAZ89999
		The temperatures used in the verification criteria above are those the CDMU ASW derives by averaging data from three individual thermistors mounted on the same thermal node. *The positions of the nodes are as follows:* *#22 - FCV A1A* *#42 - FCV A2A* *#41 - FCV C1A* *#23 - FCV C2A* *#44 - FCV C3A* *#51 - FCV C4A*		
6		*Verify external RCS-B temperatures*		Next Step: 7

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry **ThermAvgTemp003** **DEA7A170**		AND=ZAZ84999
		Verify Telemetry **ThermAvgTemp009** **DEA80170**		AND=ZAZ84999
		Verify Telemetry **ThermAvgTemp008** **DEA7F170**		AND=ZAZ84999
		Verify Telemetry **ThermAvgTemp004** **DEA7B170**		AND=ZAZ84999
		Verify Telemetry **ThermAvgTemp028** **DEA93170**		AND=ZAZ87999
		Verify Telemetry **ThermAvgTemp010** **DEA81170**		AND=ZAZ84999
		The temperatures used in the verification criteria above are those the CDMU ASW derives by averaging data from three individual thermistors mounted on the same thermal node. *The positions of the nodes are as follows:* *#03 - FCV A1B* *#09 - FCV A2B* *#08 - FCV C1B* *#04 - FCV C2B* *#28 - FCV C3B* *#10 - FCV C4B*		
7		*Determine active and redundant RCS branch*		Next Step: 8
		The ACMS ASW manages the thruster data separately for the branch designated as "active" and "unused". This distinction is also reflected in housekeeping TM and is therefore necessary also in any procedure that uses data assigned to the active and unused branch. The checks for the unused branch may be skipped altogether if that branch is totally eliminated from use; i.e., in the case in which the active branch is selected for both nominal and survival modes.		

		The assignement of the "active" and "unused" branch can be derived from the following logic.
		
		IF (AcmsExecMode == Nominal AND RcsNom == RCSA
		OR AcmsExecMode == Survival AND RcsSurv == RCSA)
		ActiveRcs = RCSA
		UnusedRCS = RCSB
		ELSE
		ActiveRcs = RCSB
		UnusedRcs = RCSA
		END IF		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
8		*Verify catbed temperatures of active RCS*		Next Step: 9
		Verify Telemetry **A1D1 Ttemp act** **AETTA001**		AND=ZAA04999
		Verify Telemetry **A2D2 Ttemp act** **AETTB001**		AND=ZAA04999
		Verify Telemetry **C1F1 Ttemp act** **AETTC001**		AND=ZAA04999
		Verify Telemetry **C2F2 Ttemp act** **AETTD001**		AND=ZAA04999
		Verify Telemetry **C3U1 Ttemp act** **AETTE001**		AND=ZAA04999
		Verify Telemetry **C4U2 Ttemp act** **AETTF001**		AND=ZAA04999
		The expected temperatures for the thrusters of the active depend on the operating mode of the ACMS and the intended operational use.		
9		*Verify catbed temperatures of redundant RCS*		Next Step: 10
		Verify Telemetry **A1D1 Ttmp unuse** **AETUA001**		AND=ZAA04999
		Verify Telemetry **A2D2 Ttmp unuse** **AETUB001**		AND=ZAA04999
		Verify Telemetry **C1F1 Ttmp unuse** **AETUC001**		AND=ZAA04999
		Verify Telemetry **C2F2 Ttmp unuse** **AETUD001**		AND=ZAA04999
		Verify Telemetry **C3U1 Ttmp unuse** **AETUE001**		AND=ZAA04999
		Verify Telemetry **C4U2 Ttmp unuse** **AETUF001**		AND=ZAA04999
10		*Verify tank data and common temperature nodes*		Next Step: END
		Verify Telemetry **RCS pressure** **AMTPR109**		AND=ZAA04999
		Verify Telemetry **RCS tank1 temp** **AMTT1109**		AND=ZAA04999
		Verify Telemetry **RCS tank3 temp** **AMTT3109**		AND=ZAA04999

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		End of Procedure		