DLCM anomaly
File: H_CRP_CCU_DLCR.xls
Author: E. Picallo

Procedure Summary

Objectives

This procedure describes the steps to identify adn recover for
form a DLCM anomaly.

A detailed analysis of the possible anomalies during DLCM can be
found in HP-2-PANT-AN-0032 "CCU Failure Mode Analyses" (pags 58
to 63), e.g:
- no heater current when DLCM mode is "heating"
- no DLCM heating status in HK although heated correctly
(measurement in data set as expected)
- continuous heating status (after the heating period)
- no arm activation or no arm desactivation
- anomalies in current or voltage measurements (not measured,
unstable, zero or at full scale...)

The recovery action, according to HP-2-PANT-AN-0032, shall be to
switch OFF the CCU that is not operating correctly and use only
the other CCU to perform the DLCM.

Summary of Constraints

In case of a permanent CCU failure, it will switched OFF and
declared invalid (i.e. the corresponding sensors and HK data
shall not be acquired anymore). Then, only the remaining CCU
shall be used for acquisition of cryostat temperatures and
pressures, and for DLCM or valves operation.

Spacecraft Configuration

Start of Procedure

CCU A and CCU B ON

End of Procedure

one CCU ON and one CCU OFF

Reference File(s)

Input Command Sequences

Output Command Sequences

Referenced Displays

ANDs	GRDs	SLDs
ZAZ9P999		

Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF

Status   : Version 2 - Unchanged
Last Checkin: 06/04/09

DLCM anomaly
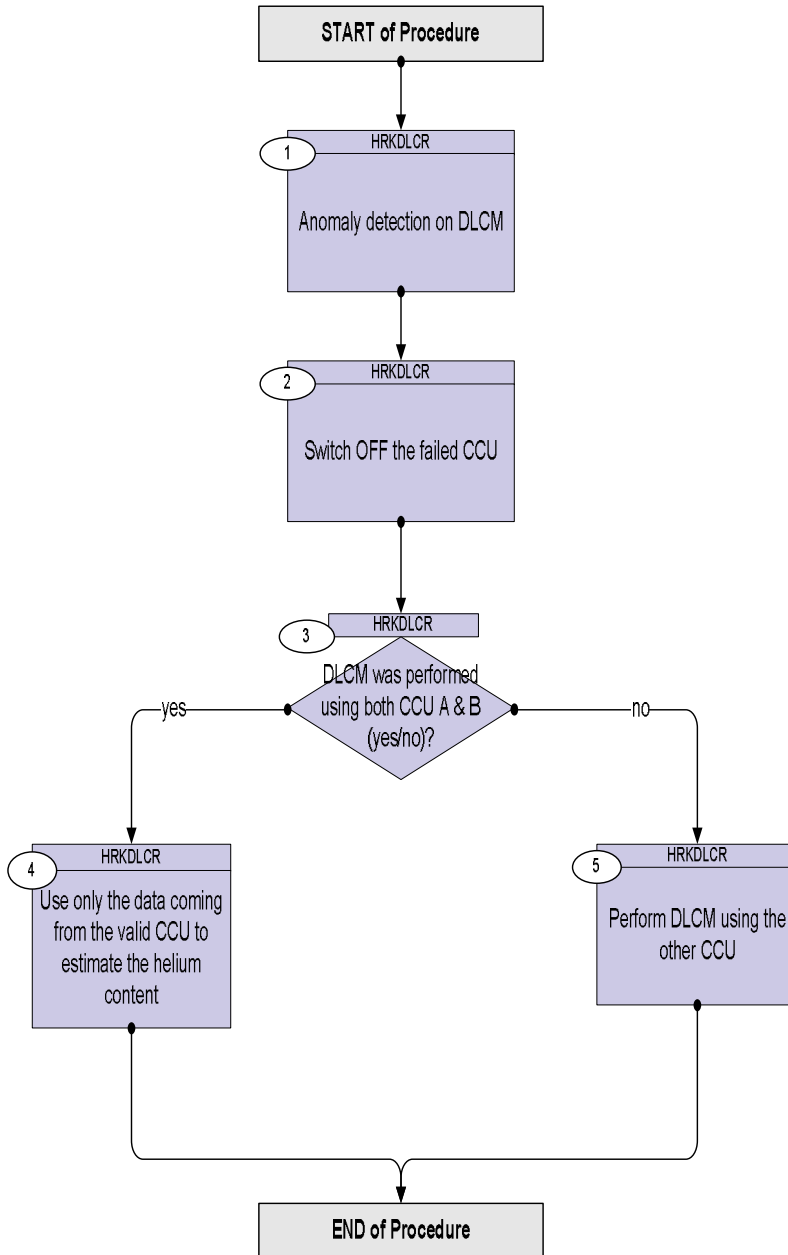File: H_CRP_CCU_DLCR.xls
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24/02/09	2.1	1	Created	E. Picallo	
06/04/09	2.3	2	Step 1 (detection of an anomaly) most likely performed during a DLCM run (H_FCP_CCU_DLCM) comment added	E. Picallo	

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Procedure Flowchart Overview

START of Procedure

1   HRKDLCR

Anomaly detection on DLCM

2   HRKDLCR

Switch OFF the failed CCU

3   HRKDLCR

DLCM was performed
using both CCU A & B
(yes/no)?

yes   no

4   HRKDLCR

Use only the data coming
from the valid CCU to
estimate the helium
content

5   HRKDLCR

Perform DLCM using the
other CCU

END of Procedure

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Beginning of Procedure		
		TC Seq. Name :HRKDLCR (DLCM anomaly) *TimeTag Type:* *Sub Schedule ID:*		
1		*Anomaly detection on DLCM*		Next Step: 2
		One of the described anomalies in HP-2-PANT-AN-0032 is detected during the DLCM execution, e.g: **- no heater current when DLCM mode is "heating"** **- no DLCM heating status in HK although heated correctly (measurement in data set as expected)** **- continuous heating status (after the heating period)** **- no arm activation or no arm desactivation** **- anomalies in current or voltage measurements (not measured, unstable, zero or at full scale...)**		
		So, the detection of a DLCM anomaly most likely will be observed during the execution of procedure H_FCP_CCU_DLCM . For completnees the list of CCU telemetry parameters that can be affected by the anomaly are reported in this step		
1.1		*Detection of any anomaly on CCU A parameters during DLCM*		
1.1.1		*Check DLCM status in HK data*		
		Verify the CCU A arming mode telemetry 　　　　**DLCMHArm_st A**　　　　**KM037300**		AND=ZAZ9P999
		Verify State of CCU A DLCM heater Telemetry 　　　　**DLCMheat_stat MA**　　　　**KM634300**		AND=ZAZ9P999
		Verify State of CCU A DLCM sequencer (execution phase) 　　　　**DLCM_stat MA**　　　　**KM622300**		AND=ZAZ9P999
		Verify CCU A Pre-Post Calibration status Telemetry 　　　　**Pre_post_cal MA**　　　　**KM628300**		AND=ZAZ9P999
1.1.2		*Check DLCM voltage and current*		
		Verify Voltage DLCM1 heater CCU A Telemetry 　　　　**CCU_A_DLCM_V**　　　　**KD272300**		AND=ZAZ9P999
		Verify Current DLCM1 heater CCU A Telemetry 　　　　**CCU_A_DLCM_I**　　　　**KD273300**		AND=ZAZ9P999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
1.1.3		*Check DLCM temperature evolution*		
		Verify DLCM2 temperature Telemetry **C100_0_T102** **KD200302**		AND=ZAZ9P999
		Verify DLCM1 temperature Telemetry **C100_0_T105** **KD201302**		AND=ZAZ9P999
1.1.4		*Check DLCM Pre/Post-heating measurement parameters*		
		Verify Mur of CCU A in pre-heating calibration Telemetry **CCU_A_Mur_pre** **KD600300**		AND=ZAZ9P999
		Verify Mu0 of CCU A in pre-heating calibration Telemetry **CCU_A_Mu0_pre** **KD601300**		AND=ZAZ9P999
		Verify Mir of CCU A in pre-heating calibration Telemetry **CCU_A_Mir_pre** **KD602300**		AND=ZAZ9P999
		Verify Mi0 of CCU A in pre-heating calibration Telemetry **CCU_A_Mi0_pre** **KD603300**		AND=ZAZ9P999
		Verify Mi0 of CCU A in post-heating calibration Telemetry **CCU_A_Mi0_post** **KD610300**		AND=ZAZ9P999
		Verify Mir of CCU A in post-heating calibration Telemetry **CCU_A_Mir_post** **KD611300**		AND=ZAZ9P999
		Verify Mu0 of CCU A in post-heating calibration Telemetry **CCU_A_Mu0_post** **KD612300**		AND=ZAZ9P999
		Verify Mur of CCU A in post-heating calibration Telemetry **CCU_A_Mur_post** **KD613300**		AND=ZAZ9P999
1.2		*Detection of any anomaly on CCU B parameters during DLCM*		
1.2.1		*Check DLCM status in HK data*		
		Verify the CCU B arming mode telemetry **DLCMHArm_st B** **KM037301**		AND=ZAZ9P999
		Verify State of CCU B DLCM heater Telemetry **DLCMheat_stat MB** **KM634301**		AND=ZAZ9P999
		Verify State of CCU B DLCM sequencer (execution phase) **DLCM_stat MB** **KM622301**		AND=ZAZ9P999
		Verify CCU B Pre-Post Calibration status Telemetry **Pre_post_cal MB** **KM628301**		AND=ZAZ9P999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
1.2.2		*Check DLCM voltage and current*		
		Verify Voltage DLCM2 heater CCU B Telemetry **CCU_B_DLCM_V** **KD272301**		AND=ZAZ9P999
		Verify Current DLCM2 heater CCU B Telemetry **CCU_B_DLCM_I** **KD273301**		AND=ZAZ9P999
1.2.3		*Check DLCM temperature evolution*		
		Verify DLCM1 Temperature Telemetry **C100_0_T101** **KD200303**		AND=ZAZ9P999
		Verify DLCM2 Temperature Telemetry **C100_0_T104** **KD201303**		AND=ZAZ9P999
1.2.4		*Check DLCM Pre/Post-heating measurement parameters*		
		Verify Mur of CCU B in pre-heating calibration Telemetry **CCU_B_Mur_pre** **KD600301**		AND=ZAZ9P999
		Verify Mu0 of CCU B in pre-heating calibration Telemetry **CCU_B_Mu0_pre** **KD601301**		AND=ZAZ9P999
		Verify Mir of CCU B in pre-heating calibration Telemetry **CCU_B_Mir_pre** **KD602301**		AND=ZAZ9P999
		Verify Mi0 of CCU B in pre-heating calibration Telemetry **CCU_B_Mi0_pre** **KD603301**		AND=ZAZ9P999
		Verify Mi0 of CCU B in post-heating calibration Telemetry **CCU_B_Mi0_post** **KD610301**		AND=ZAZ9P999
		Verify Mir of CCU B in post-heating calibration Telemetry **CCU_B_Mir_post** **KD611301**		AND=ZAZ9P999
		Verify Mu0 of CCU B in post-heating calibration Telemetry **CCU_B_Mu0_post** **KD612301**		AND=ZAZ9P999
		Verify Mur of CCU B in post-heating calibration Telemetry **CCU_B_Mur_post** **KD613301**		AND=ZAZ9P999
2		*Switch OFF the failed CCU*		Next Step: 3
		Call the contingency procedure H_CRP_CCU_CCUR to switch OFF the failed CCU		
		Execute Procedure: **H_CRP_CCU_CCUR** **CCU Anomaly**		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
3		*DLCM was performed using both CCU A & B (yes/no)?*		Next Step: yes 4 no 5
4		*Use only the data coming from the valid CCU to estimate the helium content*		Next Step: END
5		*Perform DLCM using the other CCU*		Next Step: END
		In the called procedure, H_FCP_CCU_DLCM, choose the option to perform a DLCM using only the healthy CCU.		
		Execute Procedure: **H_FCP_CCU_DLCM** **CCU DLCM**		

	End of Procedure