NCA activation
File: H_LEO_EPS_NCA.xls
Author: E. Picallo

Procedure Summary

Objectives

This procedure describes the steps needed to activate the NCA (Non Contaminator Actuator).

Summary of Constraints

At the start of the procedue the telescope temperature and Helium teperature are verified but it is not the only driver criteria for cryo cover openning. The cryo cover openning criteria is defined in the Herschel CoP Timeline.

The thermal prerequisites for cryo cover opening are:
• Helium temperature (average T101-T105) shall be below 2 K (approximately 13 days after launch for a delayed launch)
• Telescope temperature shall be below 150 K (approximately 6 days without decontamination)

The NCA are switched ON/OFF through ASW TCs(8,4,112,5/3); thus the status of the ASW function "PCDU Management" has to be "running".

In order to verify the telescope and cryostat temperatures both CCUs shall be ON, the ASW function "Payload Management" has to be "running" and both CCUs shall be in Monitoring Mode

Spacecraft Configuration

Start of Procedure

CDMU in default configuration;
Thermal prerequisites for cryo cover opening satisfied;
H CoP Timeline cryo cover openning criteria satisfied;
NCA closed

End of Procedure

CDMU in default configuration;
NCA opened

Reference File(s)

Input Command Sequences

Output Command Sequences

HLWNCA

Referenced Displays

ANDs	GRDs	SLDs
ZAZ9J999		(None)
ZAZ9N999		
ZAZ83999		

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Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
24/07/08	1	1	Created	E. Picallo	
28/10/08	2	2	cryo cover openning criteria (M1 tempe <120K) updated	E. Picallo	
25/03/09	2.2	3	Cryo cover openning criteria is defined in the Herschel CoP Timeline.	E. Picallo	
08/04/09		3.01	Validation : Step 3 TC DCB07170 description corrected	E. Picallo	
10/04/09		4	Thermal prerequisites for cryo cover opening added Set VC ID for Red High Priority Standard TC added	E. Picallo	
22/04/09	2.3	4.01	Validation : opening cryostat is likely to be detected on the gyro measurement comment added	E. Picallo	

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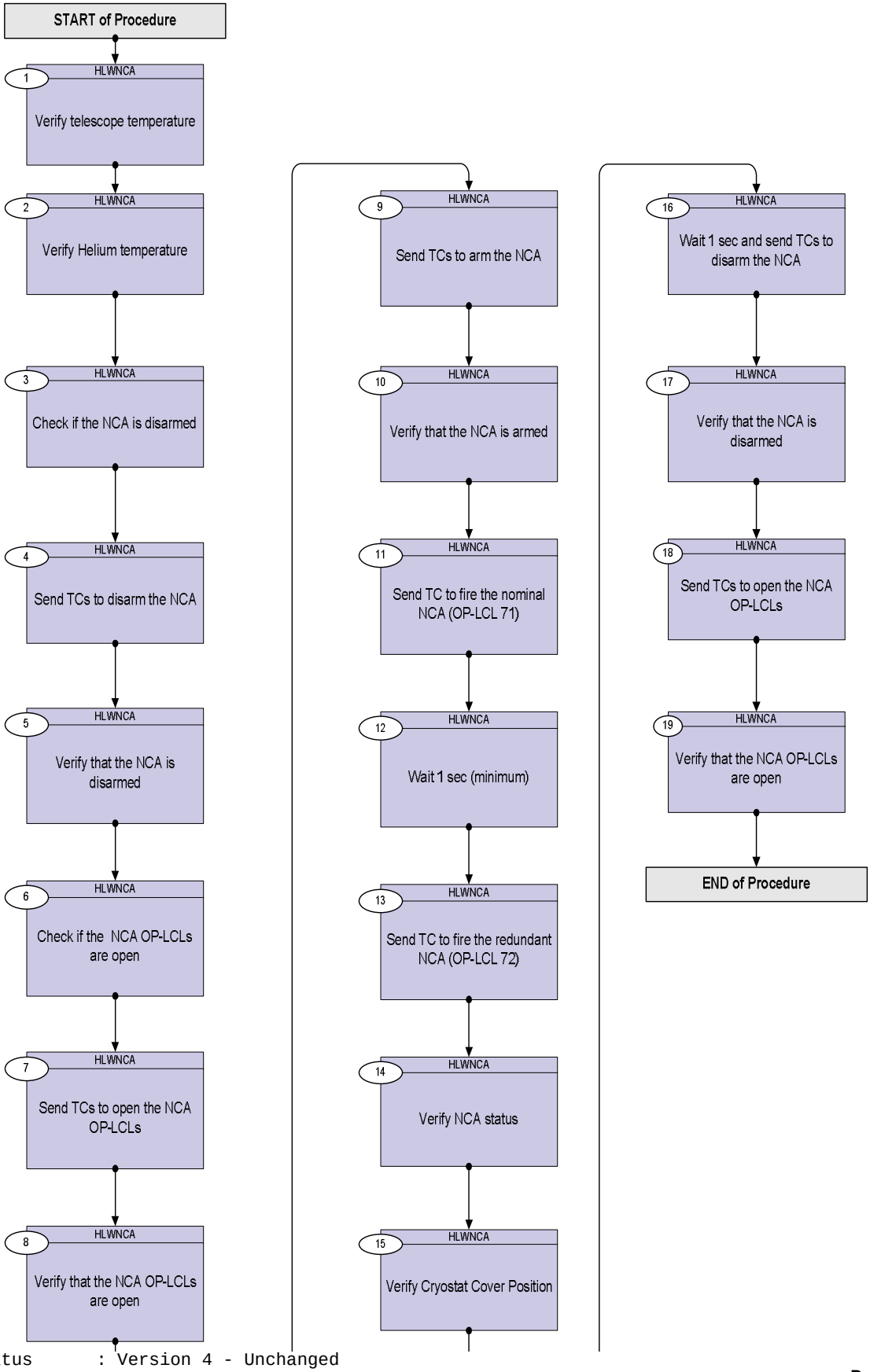
Procedure Flowchart Overview



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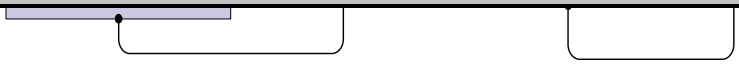

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Beginning of Procedure		
		TC Seq. Name :HLWNCA (NCA activation) *TimeTag Type:* N *Sub Schedule ID:*		
1		*Verify telescope temperature*		Next Step: 2
1.1		*Verify M1 temperature*		
		Verify on telescope; M1 THA ; T21-5 (A) **PT1000_T331** **KD253302**	**< 150.0 K**	AND=ZAZ9J999
		Verify on telescope; M1 THA' ; T22-5 (A) **PT1000_T333** **KD254302**	**< 150.0 K**	AND=ZAZ9J999
		Verify on telescope; M1 THC ; T23-5 (A) **PT1000_T335** **KD255302**	**< 150.0 K**	AND=ZAZ9J999
		Verify on telescope; M1 THC' ; T24-5 (A) **PT1000_T337** **KD256302**	**< 150.0 K**	AND=ZAZ9J999
		Verify on telescope; M1 THA'' ; T16-5 (B) **PT1000_T332** **KD248303**	**< 150.0 K**	AND=ZAZ9J999
		Verify on telescope; M1 THB ; T17-5 (B) **PT1000_T334** **KD249303**	**< 150.0 K**	AND=ZAZ9J999
		Verify on telescope; M1 THB' ; T18-5 (B) **PT1000_T336** **KD250303**	**< 150.0 K**	AND=ZAZ9J999
		Verify on telescope; M1 THB'' ; T19-5 (B) **PT1000_T338** **KD251303**	**< 150.0 K**	AND=ZAZ9J999
		Verify on telescope; M1 THC'' ; T20-5 (B) **PT1000_T340** **KD252303**	**< 150.0 K**	AND=ZAZ9J999
1.2		*Verify M2 temperature*		
		Verify on telescope; M2 THX ; T25-5 (A) **PT1000_T339** **KD257302**	**< 150.0 K**	AND=ZAZ9J999
		Verify on telescope; M2 THY ; T26-5 (A) **PT1000_T341** **KD258302**	**< 150.0 K**	AND=ZAZ9J999
		Verify on telescope; M2 THZ ; T30-5 (B) **PT1000_T342** **KD262303**	**< 150.0 K**	(None)
2		*Verify Helium temperature*		Next Step: 3

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify DLCM-1 tank lower bulkhead -x-y ; T1-0 (B) **C100_0_T101** **KD200303**		AND=ZAZ9N999
		Verify DLCM-1, tank lower bulkhead; -x-y; T2-0 (A) **C100_0_T105** **KD201302**		AND=ZAZ9N999
		Verify DLCM-2, tank lower bulkhead; -x+y; T2-0 (B) **C100_0_T104** **KD201303**		AND=ZAZ9N999
		Verify DLCM-2, tank lower bulkhead; -x+y ; T1-0 (A) **C100_0_T102** **KD200302**		AND=ZAZ9N999
		The Helium temperature (average T101-T105) shall be below 2 K		
3		*Check if the NCA is disarmed*		Next Step: 4
		Verify Nominal NCA Arming status Telemetry **NCA_N_ARM_STS** **WM33A565**	**= OPEN**	AND=ZAZ83999
		Verify Redundant NCA Arming status Telemetry **NCA_R_ARM_STS** **WM83A565**	**= OPEN**	AND=ZAZ83999
4		*Send TCs to disarm the NCA*		Next Step: 5
		Safety step in case of failing status.		
		Execute High Priority from CPDU A NCA Disarm Telecommand **NCA Disarm** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : NCA Disarm - High Priority Standard	**DCA07170**	
		Modify the VC Id to be used. Set the VC ID to 1		
		Execute High Priority from CPDU B NCA Disarm Telecommand **NCA Disarm -R** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : NCA Disarm -R - High Priority Standard	**DCB07170**	
		Modify the VC Id to be used. Set the VC ID to 0		
5		*Verify that the NCA is disarmed*		Next Step: 6
		Verify Nominal NCA Arming status Telemetry **NCA_N_ARM_STS** **WM33A565**	**= OPEN**	AND=ZAZ83999

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Redundant NCA Arming status Telemetry **NCA_R_ARM_STS** **WM83A565**	**= OPEN**	AND=ZAZ83999
6		*Check if the NCA OP-LCLs are open*		Next Step: 7
		Verify output status of nominal NCA OP-LCL Telemetry **NCA_N_L71_1_S** **WM32F565**	**= OFF**	AND=ZAZ83999
		Verify output status of nominal NCA OP-LCL Telemetry **NCA_N_L71_2_S** **WM32M565**	**= OFF**	AND=ZAZ83999
		Verify output status of redundant NCA OP-LCL Telemetry **NCA_R_L72_1_S** **WM82F565**	**= OFF**	AND=ZAZ83999
		Verify output status of redundant NCA OP-LCL Telemetry **NCA_R_L72_2_S** **WM82M565**	**= OFF**	AND=ZAZ83999
7		*Send TCs to open the NCA OP-LCLs*		Next Step: 8
		Safety step in case of failing status.		
		Execute switch OFF the nominal NCA OP-LCL Telecommand **SwOff_NCA_N_L71** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : PCDU: TC(8,4,112,3) PLM NCA Actuators Nom - switch LCL_71 off	**DC71B170**	
		Execute switch OFF the redundant NCA OP-LCL Telecommand **SwOff_NCA_R_L72** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : PCDU: TC(8,4,112,3) PLM NCA Actuators Red - switch LCL_72 off	**DC72B170**	
8		*Verify that the NCA OP-LCLs are open*		Next Step: 9
		Verify output status of nominal NCA OP-LCL Telemetry **NCA_N_L71_1_S** **WM32F565**	**= OFF**	AND=ZAZ83999
		Verify output status of nominal NCA OP-LCL Telemetry **NCA_N_L71_2_S** **WM32M565**	**= OFF**	AND=ZAZ83999
		Verify output status of redundant NCA OP-LCL Telemetry **NCA_R_L72_1_S** **WM82F565**	**= OFF**	AND=ZAZ83999

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify output status of redundant NCA OP-LCL Telemetry **NCA_R_L72_2_S** **WM82M565**	**= OFF**	AND=ZAZ83999
9		*Send TCs to arm the NCA*		Next Step: 10
		Execute High Priority from CPDU A NCA Arm Telecommand **NCA Arm** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : NCA Arm - High Priority Standard	**DCA06170**	
		Modify the VC Id to be used. Set the VC ID to 1		
		Execute High Priority from CPDU B NCA Arm Telecommand **NCA Arm -R** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : NCA Arm -R - High Priority Standard	**DCB06170**	
		Modify the VC Id to be used. Set the VC ID to 0		
10		*Verify that the NCA is armed*		Next Step: 11
		Verify Nominal NCA Arming status Telemetry **NCA_N_ARM_STS** **WM33A565**	**= CLOSE**	AND=ZAZ83999
		Verify Redundant NCA Arming status Telemetry **NCA_R_ARM_STS** **WM83A565**	**= CLOSE**	AND=ZAZ83999
11		*Send TC to fire the nominal NCA (OP-LCL 71)*		Next Step: 12
		Execute Telecommand **SwOn_NCA_N_L71** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : PCDU: TC(8,4,112,5) PLM NCA Actuators Nom - switch LCL_71 on	**DC71D170**	
12		*Wait 1 sec (minimum)*		Next Step: 13

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
13		*Send TC to fire the redundant NCA (OP-LCL 72)*		Next Step: 14
		Execute Telecommand **SwOn_NCA_R_L72** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : PCDU: TC(8,4,112,5) PLM NCA Actuators Red - switch LCL_72 on	**DC72D170**	
14		*Verify NCA status*		Next Step: 15
		NCA OP-LCLs are closed for 250 ms and current is between 4.2 A and 5.2 A **After 800 ms the NCA OP-LCLs are open and current is about 0 A** ***WARNING: It is not possible acquire OP-LCLs status and current within 250 ms.***		
		Verify output status of nominal NCA OP-LCL Telemetry **NCA_N_L71_1_S** **WM32F565**	**= OFF**	AND=ZAZ83999
		Verify output status of nominal NCA OP-LCL Telemetry **NCA_N_L71_2_S** **WM32M565**	**= OFF**	AND=ZAZ83999
		Verify output status of redundant NCA OP-LCL Telemetry **NCA_R_L72_1_S** **WM82F565**	**= OFF**	AND=ZAZ83999
		Verify output status of redundant NCA OP-LCL Telemetry **NCA_R_L72_2_S** **WM82M565**	**= OFF**	AND=ZAZ83999
		Verify Telemetry **NCA_N_L71_I** **WM311565**	**>= 0.00 A** **<= 0.10 A**	AND=ZAZ83999
		Verify Telemetry **NCA_R_L72_I** **WM811565**	**>= 0.00 A** **<= 0.10 A**	AND=ZAZ83999
15		*Verify Cryostat Cover Position*		Next Step: 16
		Verify Telemetry **NCA_Status_N** **ZMP20999**	**= OPEN**	AND=ZAZ83999
		Verify Telemetry **NCA_Status_R** **ZMP21999**	**= OPEN**	AND=ZAZ83999
		Note: the opening of the cryostat is likely to be detected on the gyro measurement, for typically 30s. This however is not a direct indication of the opening.		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
16		*Wait 1 sec and send TCs to disarm the NCA*		Next Step: 17
		Execute High Priority from CPDU A NCA Disarm Telecommand **NCA Disarm** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : NCA Disarm - High Priority Standard	**DCA07170**	
		Execute High Priority from CPDU B NCA Disarm Telecommand **NCA Disarm -R** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : NCA Disarm -R - High Priority Standard	**DCB07170**	
17		*Verify that the NCA is disarmed*		Next Step: 18
		Verify Nominal NCA Arming status Telemetry **NCA_N_ARM_STS** **WM33A565**	**= OPEN**	AND=ZAZ83999
		Verify Redundant NCA Arming status Telemetry **NCA_R_ARM_STS** **WM83A565**	**= OPEN**	AND=ZAZ83999
18		*Send TCs to open the NCA OP-LCLs*		Next Step: 19
		Execute switch OFF the nominal NCA OP-LCL Telecommand **SwOff_NCA_N_L71** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : PCDU: TC(8,4,112,3) PLM NCA Actuators Nom - switch LCL_71 off	**DC71B170**	
		Execute switch OFF the redundant NCA OP-LCL Telecommand **SwOff_NCA_R_L72** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : PCDU: TC(8,4,112,3) PLM NCA Actuators Red - switch LCL_72 off	**DC72B170**	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
19		*Verify that the NCA OP-LCLs are open*		Next Step: END
		Verify output status of nominal NCA OP-LCL Telemetry **NCA_N_L71_1_S** **WM32F565**	**= OFF**	AND=ZAZ83999
		Verify output status of nominal NCA OP-LCL Telemetry **NCA_N_L71_2_S** **WM32M565**	**= OFF**	AND=ZAZ83999
		Verify output status of redundant NCA OP-LCL Telemetry **NCA_R_L72_1_S** **WM82F565**	**= OFF**	AND=ZAZ83999
		Verify output status of redundant NCA OP-LCL Telemetry **NCA_R_L72_2_S** **WM82M565**	**= OFF**	AND=ZAZ83999
End of Procedure				