Start Decontamination heating
File: H_LEO_SYS_DEC1.xls
Author: E. Picallo

Procedure Summary

Objectives

This procedure describes the steps needed to start the decontamination of the mirrors M1 and M2

In order to balance the power budget in pre-op phase, an operational strategy has been implemented: in a first decontamination phase, to switch ON only 5 out the 7 heater lines on the M1 and both heater lines on M2. When stabilisation is reached, switch ON the two remaining heater lines on M1.

Summary of Constraints

Due to power constraints, the following pre-conditions are required to start decontamination and shall remain valid during the entire warm-up phase:
- Spacecraft mode shall be either SAM (Instruments OFF) or NOM but with instruments OFF
- ACMS shall be SAM or OCM / Sun pointing (SAA < 1º)
- Battery shall be at 99% EOC with Vbatt > 25,32 V
- The RWLs shall be OFF or STBY (i.e. can be ON but not commanded)

The warm-up phase should take ~8 hs.

Once in steady-state phase, the decontamination power need will decrease from ~570W to ~290W. Thus, the constraints on ACMS mode to be Sun pointing and no RWL commanding are not anymore applicable (i.e. ACMS can be set in SCM and RWLs run-in can be activated).

There is enough power margin during the steady state decontamination phase to cope with the wheel run in spikes of max 90 W per wheel for a few minutes.

The Cryostat cover shall be closed to protect FPU.

The spacecraft shall be in visibility for all the procedure execution.

TCS Dgn. Packet shall be enabled.

Spacecraft Configuration

Start of Procedure

The nominal HPS shall be ON (1,2,4,6,9)
Decontamination heating function stopped
ACMS mode in SAM or OCM/Sun pointing
Battery 99% full charged
RWLs OFF or in STBY (i.e. can be ON but not commanded)
Cryostat cover closed
Instruments OFF

End of Procedure

Decontamination heating function running
HPSs 1,2,4,6,9,10,15,17,18 ON

Reference File(s)

Input Command Sequences

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Output Command Sequences

HLYDEC1

Referenced Displays

ANDs	GRDs	SLDs
ZAZ9J999		(None)

Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
01/08/08	1	1	Created	E. Picallo	
04/09/08		2	TCS Diag Pkt added (updated with SDB v.7)	E. Picallo	
05/11/08		3	Dec. temperature thresholds corrected (RAW values) MOT dec. entries default thresholds corrected (RAW values) MOT dec. entries enabled in AFS and AFO	E. Picallo	
07/11/08		4	Enable MOT & EAT entries after start dec. function correction	E. Picallo	
08/01/09	2	5	Decontamination RAW threshold updated according to H-P-2-ASP-ID-1418 issue 4 cal. points	E. Picallo	
23/02/09	2.1	6	Pre-conditions check added Switch ON redundant lines on M1 at start of steady-state	E. Picallo	
24/03/09	2.2	7	refernce to procedure "H_FCP_AOC_D3FD" Define/Enable/Disable DTM for FD added	E. Picallo	

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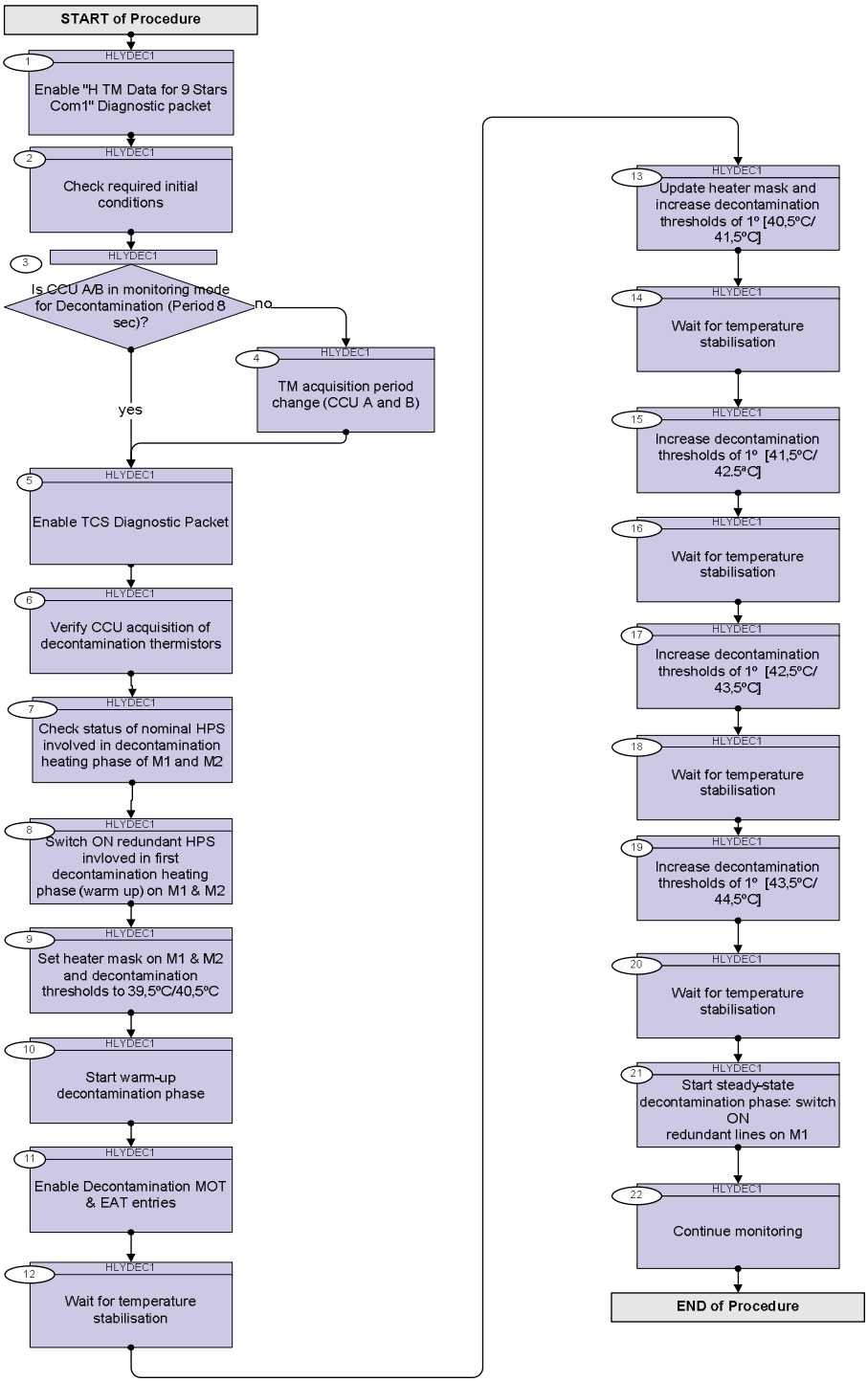
Procedure Flowchart Overview



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Beginning of Procedure		
		TC Seq. Name :HLYDEC1 (StartDecontamination) Start the decontamination of the mirrors M1 and M2 *TimeTag Type: N* *Sub Schedule ID:*		
1		*Enable "H TM Data for 9 Stars Com1" Diagnostic packet*		Next Step: 2
		It is required to enable the Diagnostic Packet in order to monitor the Sun asp angle.		
		Call procedure "H_FCP_AOC_D3FD" Define/Enable/Disable DTM for FD **1) Acquire the list of the current enabled TM packets** **2) Verify if the "H TM Data for 9 Stars Com1" (SPID 240011990) Diagnostic packet is enabled** **3) If it is disabled, enable it**		
2		*Check required initial conditions*		Next Step: 3
		Due to power constraints, the following conditions are required to start the decontamination warm-up: **- ACMS in SAM or OCM / Sun pointing (Z axis) i.e. SAA < 1º** **- Vbatt > 25,32 V (battery at 99% charge)** **- RWLs OFF or in STBY (i.e. can be ON but not commanded)**		
2.1		*Check ACMS mode and Sun Aspect Angle*		
		Verify Telemetry **AcmsMode AESMG002**	**= OCM** **= SAM**	(None)
		Verify Telemetry **AcmsSubstate AESMF002**	**= OCM Pointing** **= SAM Sun Point**	(None)
		Verify Telemetry **Sun asp angle AESAN002**	**< 1 degree (0.017 rad)**	(None)
2.1.1		*Confirm sun pointing attitude*		
		Verify Telemetry **Sunvector X BRF AEUVX001**	**approx. 0**	(None)
		Verify Telemetry **Sunvector Y BRF AEUVY001**	**approx. 0**	(None)

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry **Sunvector Z BRF** **AEUVZ001**	**approx. 1**	(None)
		Verify Telemetry **Est ang rate X** **AESR7001**	**~0 rd/s**	(None)
		Verify Telemetry **Est ang rate Y** **AESR8001**	**~0 rd/s**	(None)
		Verify Telemetry **Est ang rate Z** **AESR9001**	**~0 rd/s**	(None)
2.2		*Check batteries charge status*		
		The telescope decontamination can be started when the battery is at 99% EOC (Vbatt > 25.32 V) **During LEOP, the battery shall be 99% charged after ~3 hours.**		
		Verify Telemetry **TM_VBATT_BDR_1** **WMT02565**	**>= 25.32 V**	(None)
		Verify Telemetry **TM_VBATT_BDR_2** **WMT03565**	**>= 25.32 V**	(None)
2.3		*Check RWLs status*		
		During the decontamination warm-up, the RWLs can be powered ON but in STBY (i.e. no RWL biasing ongoing and they can not be commanded).		
		Verify Telemetry **RWL1 power** **AE4P3002**	**= OFF** **= ON**	(None)
		Verify Telemetry **RWL2 power** **AE4P4002**	**= OFF** **= ON**	(None)
		Verify Telemetry **RWL3 power** **AE4P5002**	**= OFF** **= ON**	(None)
		Verify Telemetry **RWL4 power** **AE4P6002**	**= OFF** **= ON**	(None)
		Verify Telemetry **CurrentBiasAid** **AESM9002**	**= Standby** **= Stopped**	(None)

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
3		*Is CCU A/B in monitoring mode for Decontamination (Period 8 sec)?*		Next Step: no 4 yes 5
4		*TM acquisition period change (CCU A and B)*		Next Step: 5
		Select the monitoring mode for decontamination: set acquisition period to 8 seconds for all sensor except spre ones and enable the diagnostic packets CCU A/B monit#2		
		Execute Procedure: **H_FCP_CCU_ACQP** **CCU acquisition period update**		
5		*Enable TCS Diagnostic Packet*		Next Step: 6
		It is required to enable the TCS Diagnostic Packet in order to monitor the M1 & M2 median temperature parameters.		
		Call procedure "Enable or disable the generation of an housekeeping or diagnostic packet" H_FCP_DHS_3033 **1) Acquire the list of the current enabled TM packets** **2) Verify if the TCS Diagnostic packet is enabled: TCS -> subtype=26, packet-ID=100** **3) If it is disabled, enable it**		
		Execute Procedure: **H_FCP_DHS_3033** **Enable or disable the generation of an housekeeping or diagnostic packet**		
6		*Verify CCU acquisition of decontamination thermistors*		Next Step: 7
		The primary mirror M1 provides 3 sets of 3 thermistors. **The secondary mirror M2 provides 1 set of 3 thermistors.**		
		Nominal thermistors used for temperature determination (used to calculate the temperature median algorithm): **For M1 decontamination are TH A (T331), TH A'' (T332), TH C (T335).** **For M2 decontamination are TH X (T339), TH Y (T341), TH Z (T342).**		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
6.1		*Verify M1 Thermistors*		
		The nominal thermal sensors to be used for M1 decontamination are TH A (T331), TH A'' (T332), TH C (T335)		
		Verify on telescope; M1 THA ; T21-5 (A) **PT1000_T331 KD253302**		AND=ZAZ9J999
		Verify on telescope; M1 THA'' ; T16-5 (B) **PT1000_T332 KD248303**		AND=ZAZ9J999
		Verify on telescope; M1 THC ; T23-5 (A) **PT1000_T335 KD255302**		AND=ZAZ9J999
6.2		*Verify M2 Thermistors*		
		The nominal thermal sensors to be used for M2 decontamination are TH X (T339), TH Y (T341), TH Z (T342)		
		Verify on telescope; M2 THX ; T25-5 (A) **PT1000_T339 KD257302**		AND=ZAZ9J999
		Verify on telescope; M2 THY ; T26-5 (A) **PT1000_T341 KD258302**		AND=ZAZ9J999
		Verify on telescope; M2 THZ ; T30-5 (B) **PT1000_T342 KD262303**		AND=ZAZ9J999
7		*Check status of nominal HPS involved in decontamination heating phase of M1 and M2*		Next Step: 8
7.1		*Check status of nominal HPS involved in decontamination heating phase of M1 (HPS 2,4,6 and 9)*		
		There are 7 heaters lines for M1 (4N+3R): **M1 heater line 3 (HPS 02 HCS 1 N)** **M1 heater line 4 (HPS 17 HCS 1 R)** **M1 heater line 5 (HPS 04 HCS 1 N)** **M1 heater line 6 (HPS 15 HCS 1 R)** **M1 heater line 7 (HPS 06 HCS 1 N)** **M1 heater line 8 (HPS 09 HCS 1 N)** **M1 heater line 9 (HPS 18 HCS 1 R)**		
		Verify Telemetry **GRP2_HPS_STS WM22G565**	**= ON**	AND=ZAZ9J999
		Verify Telemetry **GRP4_HPS_STS WM32G565**	**= ON**	AND=ZAZ9J999

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry **GRP6_HPS_STS WM42G565**	**= ON**	AND=ZAZ9J999
		Verify Telemetry **GRP9_HPS_STS WM52H565**	**= ON**	AND=ZAZ9J999
7.2		*Check status of nominal HPS involved in decontamination heating phase of M2 (HPS1)*		□
		There are 2 heaters lines for M2 (1N+1R): **M2 heater line 1 (HPS 01 HCS 1 N)** **M2 heater line 2 (HPS 10 HCS 1 R)**		
		Verify Telemetry **GRP1_HPS_STS WM12G565**	**= ON**	AND=ZAZ9J999
8		*Switch ON redundant HPS invloved in first decontamination heating phase (warm up) on M1 & M2*		Next Step: 9
		Redundant heater line 4 on M1 (HPS 17 HCS 1 R) **Redundant heater line 6 on M1 (HPS 15 HCS 1 R)**		
		Redundant heater line 2 on M2 (HPS 10 HCS 1 R)		
8.1		*Switch ON HPS17*		□
		Execute Telecommand **PcduSwOnHps17** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : PCDU:TC(8,4,112,5) switch On HPS 17	**DCC17170**	
		Verify Telemetry **GRP17_HPS_STS WM92H565**	**= ON**	AND=ZAZ9J999
8.2		*Switch ON HPS15*		□
		Execute Telecommand **PcduSwOnHps15** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : PCDU:TC(8,4,112,5) switch On HPS 15	**DCC15170**	
		Verify Telemetry **GRP15_HPS_STS WM82H565**	**= ON**	AND=ZAZ9J999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
8.3		*Switch ON HPS10*		
		Execute Telecommand **PcduSwOnHps10** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : PCDU:TC(8,4,112,5) switch On HPS 10	**DCC10170**	
		Verify Telemetry **GRP10_HPS_STS** **WM62G565**	**= ON**	AND=ZAZ9J999
9		*Set heater mask on M1 & M2 and decontamination thresholds to 39,5ºC/40,5ºC*		Next Step: 10
		In the first phase, the proposed strategy is to switch ON only 5 of the 7 heater lines of M1 and both lines of M2, then: **- M1 heater mask: 0000 0000 0011 1011 = 0x003B = 59 (selecting lines 1,2,4,5,6 and excluding lines 3 & 7)** **- M2 heater mask: 0000 0000 0000 0011 = 0x0003 = 3 (using both lines 1 & 2)**		
		Execute Telecommand **Decont - Heater mask** *Command Parameter(s) :* **Decont - M1 heater 7** **ZHB17999** **Decont - M1 heater 6** **ZHB16999** **Decont - M1 heater 5** **ZHB15999** **Decont - M1 heater 4** **ZHB14999** **Decont - M1 heater 3** **ZHB13999** **Decont - M1 heater 2** **ZHB12999** **Decont - M1 heater 1** **ZHB11999** **Decont - M2 heater 2** **ZHB22999** **Decont - M2 heater 1** **ZHB21999** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TC(8,4,113,1) to update the M1 and M2 active heaters	**ZCB03999** **NOTACTIVE** (Def) **ACTIVE** (Def) **ACTIVE** (Def) **ACTIVE** (Def) **NOTACTIVE** (Def) **ACTIVE** (Def) **ACTIVE** (Def) **ACTIVE** (Def) **ACTIVE** (Def)	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand **Decont - Tresholds** *Command Parameter(s) :* **Decont - M1 - TMIN** **ZHB06999** **Decont - M1 - TMAX** **ZHB07999** **Decont - M2 - TMIN** **ZHB08999** **Decont - M2 - TMAX** **ZHB09999** **Decont - Cont Check** **ZHB10999** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TC(8,4,113,1) to update the tresholds - TMIN - TMAX - Cont check	**ZCB04999** **39.5 degC** **40.5 degC** **39.5 degC** **40.5 degC** **0.5 degC** (Def)	
9.1		*Report decontamination heating parameters*		□
		Execute Procedure: **H_LEO_SYS_DECS** **Decontamination Heating Status Report**		
10		*Start warm-up decontamination phase*		Next Step: 11
10.1		*Acquire the status of the function*		□
		Default status of the function is "Stopped"		
		Verify Telemetry **DhSts** **DEG17170**	**= Stopped**	AND=ZAZ9J999
10.2		*Send TC(8,1,113) to start the function*		□
		Start Decontamination Heating telecommand is used for switching on the function.		
		Execute Telecommand **StartDecontHeat** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : Start Decontamination Heationg TC(8,1,113)	**DC13M170**	
10.3		*Verify that the function has been started*		□

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry **DhSts DEG17170**	**= Running**	AND=ZAZ9J999
11		*Enable Decontamination MOT & EAT entries*		Next Step: 12
		Dedicated MOT and EAT entries are defined to switch OFF both M2 HPSs if the M2 median temperature exceeds the Tmaxmax threshold. **These entries are disabled by default, so they must be enabled after starting the decontamination.**		
11.1		*Enable Decontamination MOT entries*		□
		There are 2 entries are defined in the MOT related to decontamination: **Parameter ID Monitoring ID Event ID** **M2 median temp (2049) 200 40960** **M2 median temp (2049) 201 40961**		
		Execute Telecommand **EnabMonitOfParam_Templ** *Command Parameter(s) :* **N_Repetition DH041170** **ParameterId DH042170** **MonitorId DH043170** **ParameterId DH042170** **MonitorId DH043170** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TEMPLATE Enable Monitoring of Parameter, TC(12,1)	**DCT26170** **2 <dec>** **2049 <dec>** **200 <dec>** **2049 <dec>** **201 <dec>**	
11.2		*Report Monitoring List to check the decontamination entries*		□
		Execute Telecommand **ReportMonitList** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TEMPLATE Report current monitoring list, TC(12,8) no appl. data	**DC51F170**	
11.3		*Enable Decontamination EAT related entries*		□

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		There are 2 entries are defined in the EAT related to decontamination: **APID Event ID Action TC** **16(CDMS) 40960 Switch OFF HPS1 TC(8,4,112,3)** **16(CDMS) 40961 Switch OFF HPS10 TC(8,4,112,3)**		
		Execute Telecommand **EnableActions** *Command Parameter(s) :* **N_Repetition DH041170** **APID_for_EAT_TC DH236170** **EventId DH146170** **APID_for_EAT_TC DH236170** **EventId DH146170** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TEMPLATE Enable Actions TC(19,4)	**DCT84170** **2 <dec>** **CDMS** (Def) **40960 <dec>** **CDMS** (Def) **40961 <dec>**	
11.4		*Report EAT table to check the decontamination EAT entries*		□
		Execute Telecommand **ReptEvtActTable** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TEMPLATE Report The contents of the event/action table TC(19,6)	**DCT86170**	
12		*Wait for temperature stabilisation*		Next Step: 13
		Wait until the median temperature on M1 and M2 oscillate between the selected thresholds [39,5ºC/40,5ºC]		
		Decontamination warm-up phase does not allow for extra power consumption peaks nor sun depointing (not compatible of wheel run in spikes or reorientations for deltaV maneuver).		
		Duration of warm-up phase depends on start-up temperature and environment and is estimated to last approximately 8 hours if started at T0+8 hours.		
		Verify M1 median temperature Telemetry **DhM1Temp DE800171**	**>= 39.5 <dec>** **<= 40.5 <dec>**	AND=ZAZ9J999
		Verify M2 median temperature Telemetry **DhM2Temp DE801171**	**>= 39.5 <dec>** **<= 40.5 <dec>**	AND=ZAZ9J999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify reception of TM packets: **TM(5,1,113,1) -> generated when M1 Heating is switch ON** **TM(5,1,113,2) -> generated when M1 Heating is switch OFF** **TM(5,1,113,3) -> generated when M2 Heating is switch ON** **TM(5,1,113,4) -> generated when M2 Heating is switch OFF**		
		Verify Packet Reception **CdmuAsw Event 5-1 M1 Decontamination Heating ON** **Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_109** **16** **5** **1** **28929** **0**	
		Verify Packet Reception **CdmuAsw Event 5-1 M1 Decontamination Heating OFF** **Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_187** **16** **5** **1** **28930** **0**	
		Verify Packet Reception **CdmuAsw Event 5-1 M2 Decontamination Heating ON** **Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_188** **16** **5** **1** **28931** **0**	
		Verify Packet Reception **CdmuAsw Event 5-1 M2 Decontamination Heating OFF** **Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_189** **16** **5** **1** **28932** **0**	
13		*Update heater mask and increase decontamination thresholds of 1º [40,5ºC/41,5ºC]*		Next Step: 14

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand **Decont - Tresholds** *Command Parameter(s) :* **Decont - M1 - TMIN ZHB06999** **Decont - M1 - TMAX ZHB07999** **Decont - M2 - TMIN ZHB08999** **Decont - M2 - TMAX ZHB09999** **Decont - Cont Check ZHB10999** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TC(8,4,113,1) to update the tresholds - TMIN - TMAX - Cont check	**ZCB04999** **40.5 degC** **41.5 degC** **40.5 degC** **41.5 degC** **0.5 degC** (Def)	
13.1		*Report decontamination heating parameters*		□
		Execute Procedure: **H_LEO_SYS_DECS** **Decontamination Heating Status Report**		
14		*Wait for temperature stabilisation*		Next Step: 15
		Wait until the median temperature on M1 and M2 oscillate between the selected thresholds [40,5ºC/41,5ºC]		
		Verify M1 median temperature Telemetry **DhM1Temp DE800171**	**>= 40.5 <dec>** **<= 41.5 <dec>**	AND=ZAZ9J999
		Verify M2 median temperature Telemetry **DhM2Temp DE801171**	**>= 40.5 <dec>** **<= 41.5 <dec>**	AND=ZAZ9J999
		Verify reception of TM packets: **TM(5,1,113,1) -> generated when M1 Heating is switch ON** **TM(5,1,113,2) -> generated when M1 Heating is switch OFF** **TM(5,1,113,3) -> generated when M2 Heating is switch ON** **TM(5,1,113,4) -> generated when M2 Heating is switch OFF**		
		Verify Packet Reception **CdmuAsw Event 5-1 M1 Decontamination Heating ON Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_109** **16** **5** **1** **28929** **0**	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Packet Reception **CdmuAsw Event 5-1 M1 Decontamination Heating OFF Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_187** **16** **5** **1** **28930** **0**	
		Verify Packet Reception **CdmuAsw Event 5-1 M2 Decontamination Heating ON Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_188** **16** **5** **1** **28931** **0**	
		Verify Packet Reception **CdmuAsw Event 5-1 M2 Decontamination Heating OFF Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_189** **16** **5** **1** **28932** **0**	
15		*Increase decontamination thresholds of 1º [41,5ºC/42.5ªC]*		Next Step: 16
		Execute Telecommand **Decont - Tresholds** *Command Parameter(s) :* **Decont - M1 - TMIN** **ZHB06999** **Decont - M1 - TMAX** **ZHB07999** **Decont - M2 - TMIN** **ZHB08999** **Decont - M2 - TMAX** **ZHB09999** **Decont - Cont Check** **ZHB10999** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TC(8,4,113,1) to update the tresholds - TMIN - TMAX - Cont check	**ZCB04999** **41.5 degC** **42.5 degC** **41.5 degC** **42.5 degC** **0.5 degC** (Def)	
15.1		*Report decontamination heating parameters*		
		Execute Procedure: **H_LEO_SYS_DECS** **Decontamination Heating Status Report**		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
16		*Wait for temperature stabilisation*		Next Step: 17
		Wait until the median temperature on M1 and M2 oscillate between the selected thresholds [41,5ºC/42,5ºC]		
		Verify M1 median temperature Telemetry **DhM1Temp DE800171**	**>= 41.5 <dec>** **<= 42.5 <dec>**	AND=ZAZ9J999
		Verify M2 median temperature Telemetry **DhM2Temp DE801171**	**>= 41.5 <dec>** **<= 42.5 <dec>**	AND=ZAZ9J999
		Verify reception of TM packets: **TM(5,1,113,1) -> generated when M1 Heating is switch ON** **TM(5,1,113,2) -> generated when M1 Heating is switch OFF** **TM(5,1,113,3) -> generated when M2 Heating is switch ON** **TM(5,1,113,4) -> generated when M2 Heating is switch OFF**		
		Verify Packet Reception **CdmuAsw Event 5-1 M1 Decontamination Heating ON Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_109** **16** **5** **1** **28929** **0**	
		Verify Packet Reception **CdmuAsw Event 5-1 M1 Decontamination Heating OFF Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_187** **16** **5** **1** **28930** **0**	
		Verify Packet Reception **CdmuAsw Event 5-1 M2 Decontamination Heating ON Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_188** **16** **5** **1** **28931** **0**	
		Verify Packet Reception **CdmuAsw Event 5-1 M2 Decontamination Heating OFF Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_189** **16** **5** **1** **28932** **0**	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
17		*Increase decontamination thresholds of 1º [42,5ºC/43,5ºC]*		Next Step: 18
		Execute Telecommand **Decont - Tresholds** *Command Parameter(s) :* **Decont - M1 - TMIN ZHB06999** **Decont - M1 - TMAX ZHB07999** **Decont - M2 - TMIN ZHB08999** **Decont - M2 - TMAX ZHB09999** **Decont - Cont Check ZHB10999** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TC(8,4,113,1) to update the tresholds - TMIN - TMAX - Cont check	**ZCB04999** **42.5 degC** (Def) **43.5 degC** **42.5 degC** (Def) **43.5 degC** **0.5 degC** (Def)	
17.1		*Report decontamination heating parameters*		□
		Execute Procedure: **H_LEO_SYS_DECS** **Decontamination Heating Status Report**		
18		*Wait for temperature stabilisation*		Next Step: 19
		Wait until the median temperature on M1 and M2 oscillate between the selected thresholds [42,5ºC/43,5ºC]		
		Verify M1 median temperature Telemetry **DhM1Temp DE800171**	**>= 42.5 <dec>** **<= 43.5 <dec>**	AND=ZAZ9J999
		Verify M2 median temperature Telemetry **DhM2Temp DE801171**	**>= 42.5 <dec>** **<= 43.5 <dec>**	AND=ZAZ9J999
		Verify reception of TM packets: **TM(5,1,113,1) -> generated when M1 Heating is switch ON** **TM(5,1,113,2) -> generated when M1 Heating is switch OFF** **TM(5,1,113,3) -> generated when M2 Heating is switch ON** **TM(5,1,113,4) -> generated when M2 Heating is switch OFF**		

Start Decontamination heating
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Packet Reception **CdmuAsw Event 5-1 M1 Decontamination Heating ON Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_109** **16** **5** **1** **28929** **0**	
		Verify Packet Reception **CdmuAsw Event 5-1 M1 Decontamination Heating OFF Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_187** **16** **5** **1** **28930** **0**	
		Verify Packet Reception **CdmuAsw Event 5-1 M2 Decontamination Heating ON Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_188** **16** **5** **1** **28931** **0**	
		Verify Packet Reception **CdmuAsw Event 5-1 M2 Decontamination Heating OFF Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_189** **16** **5** **1** **28932** **0**	
19		*Increase decontamination thresholds of 1º [43,5ºC/44,5ºC]*		Next Step: 20
		Execute Telecommand **Decont - Tresholds** *Command Parameter(s) :* **Decont - M1 - TMIN** **ZHB06999** **Decont - M1 - TMAX** **ZHB07999** **Decont - M2 - TMIN** **ZHB08999** **Decont - M2 - TMAX** **ZHB09999** **Decont - Cont Check** **ZHB10999** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TC(8,4,113,1) to update the tresholds - TMIN - TMAX - Cont check	**ZCB04999** **43.5 degC** **44.5 degC** **43.5 degC** **44.5 degC** **0.5 degC** (Def)	
19.1		*Report decontamination heating parameters*		

Start Decontamination heating
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Procedure: **H_LEO_SYS_DECS** **Decontamination Heating Status Report**		
20		*Wait for temperature stabilisation*		Next Step: 21
		Wait until the median temperature on M1 and M2 oscillate between the selected thresholds [43,5ºC/44,5ºC]		
		Verify M1 median temperature Telemetry **DhM1Temp DE800171**	**>= 43.5 <dec>** **<= 44.5 <dec>**	AND=ZAZ9J999
		Verify M2 median temperature Telemetry **DhM2Temp DE801171**	**>= 43.5 <dec>** **<= 44.5 <dec>**	AND=ZAZ9J999
		Verify reception of TM packets: **TM(5,1,113,1) -> generated when M1 Heating is switch ON** **TM(5,1,113,2) -> generated when M1 Heating is switch OFF** **TM(5,1,113,3) -> generated when M2 Heating is switch ON** **TM(5,1,113,4) -> generated when M2 Heating is switch OFF**		
		Verify Packet Reception **CdmuAsw Event 5-1 M1 Decontamination Heating ON Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_109** **16** **5** **1** **28929** **0**	
		Verify Packet Reception **CdmuAsw Event 5-1 M1 Decontamination Heating OFF Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_187** **16** **5** **1** **28930** **0**	
		Verify Packet Reception **CdmuAsw Event 5-1 M2 Decontamination Heating ON Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_188** **16** **5** **1** **28931** **0**	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Packet Reception **CdmuAsw Event 5-1 M2 Decontamination Heating OFF Herschel** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**D_EvRp_189** **16** **5** **1** **28932** **0**	
21		*Start steady-state decontamination phase: switch ON redundant lines on M1*		Next Step: 22
		M1 heater line 9 (HPS 18 HCS 1 R)		
21.1		*Switch ON HPS18*		□
		Execute Telecommand **PcduSwOnHps18** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : PCDU:TC(8,4,112,5) switch On HPS 18	**DCC18170**	
		Verify Telemetry **GRP18_HPS_STS** **WMA2G565**	**= ON**	AND=ZAZ9J999
21.2		*Set M1 Heater Mask to activate all M1 heater lines*		□
		Execute Telecommand **Decont - Heater mask** *Command Parameter(s) :* **Decont - M1 heater 7** **ZHB17999** **Decont - M1 heater 6** **ZHB16999** **Decont - M1 heater 5** **ZHB15999** **Decont - M1 heater 4** **ZHB14999** **Decont - M1 heater 3** **ZHB13999** **Decont - M1 heater 2** **ZHB12999** **Decont - M1 heater 1** **ZHB11999** **Decont - M2 heater 2** **ZHB22999** **Decont - M2 heater 1** **ZHB21999** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TC(8,4,113,1) to update the M1 and M2 active heaters	**ZCB03999** **ACTIVE** **ACTIVE** (Def) **ACTIVE** (Def) **ACTIVE** (Def) **ACTIVE** **ACTIVE** (Def) **ACTIVE** (Def) **ACTIVE** (Def) **ACTIVE** (Def)	
21.3		*Report decontamination heating parameters*		□

Start Decontamination heating
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Procedure: **H_LEO_SYS_DECS** **Decontamination Heating Status Report**		
		NOTE: once in steady-state phase, the decontamination power need will decrease from ~570W to ~290W. Thus, the constraints on ACMS mode to be Sun pointing and no RWLs commanding are not anymore applicable (i.e. ACMS can be set in SCM are RWL run-in can be activated).		
22		*Continue monitoring*		Next Step: END
		During decontamination, monitor the values of the involved thermistors and the median temperatures on M1 & M2, which should be in the range [43,5ºC/44,5ºC] **The nominal thermistors used for temperature determination are:** **For M1 decontamination are TH A (T331), TH A'' (T332), TH C (T335).** **For M2 decontamination are TH X (T339), TH Y (T341), TH Z (T342).**		
22.1		*Verify M1 Thermistors*		□
		Verify on telescope; M1 THA ; T21-5 (A) **PT1000_T331** **KD253302**		AND=ZAZ9J999
		Verify on telescope; M1 THA'' ; T16-5 (B) **PT1000_T332** **KD248303**		AND=ZAZ9J999
		Verify on telescope; M1 THC ; T23-5 (A) **PT1000_T335** **KD255302**		AND=ZAZ9J999
22.2		*Verify M2 Thermistors*		□
		Verify on telescope; M2 THX ; T25-5 (A) **PT1000_T339** **KD257302**		AND=ZAZ9J999
		Verify on telescope; M2 THY ; T26-5 (A) **PT1000_T341** **KD258302**		AND=ZAZ9J999
		Verify on telescope; M2 THZ ; T30-5 (B) **PT1000_T342** **KD262303**		AND=ZAZ9J999
22.3		*Verify median temperatures on M1 & M2*		□

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify M1 median temperature Telemetry **DhM1Temp** **DE800171**	**>= 43.5 <dec>** **<= 44.5 <dec>**	AND=ZAZ9J999
		Verify M2 median temperature Telemetry **DhM2Temp** **DE801171**	**>= 43.5 <dec>** **<= 44.5 <dec>**	AND=ZAZ9J999
		End of Procedure		