Telescope decontamination during Telescope cool down
File: H_COP_SYS_DEC2.xls
Author: E. Picallo

Procedure Summary

Objectives

This procedure describes the steps needed to perform the Telescope decontamination during Telescope cool down.

The procedure must be initiated when the telescope temperature is bellow 200K to avoid FDIR triggering and above 170K order to start decontamination in steady-state phase with temperature thresholds set to [170K , 171K].
It is propsed to start the procedure execution at the time when the telescope reaches the 175K reference point. This might have to be advanced even further.

Three heater lines out of seven on M1 and both heater lines on M2 are turned ON.

Note: According to the latest H-CoP Timeline, the decontamination shall stabilize the telescope at 170 K starting on day H0+4.25 for a total of 25 days.

Summary of Constraints

The decontamination must be started in steady-state phase to ensure that the decontamination power need is about 20W average and ~360W peak. Thus, the constraints on ACMS mode to be Sun pointing and no RWL commanding are not applicable (i.e. ACMS can be set in SCM and RWLs run-in can be activated).

It is proposed to use only 3 lines on M1 (lines 4, 6 and 7) and both heater lines on M2 in order to have a peak consumption of ~360W.

The Cryostat cover shall be closed to protect FPU.

The decontamination shall not start earlier than 48h after the maximum Helium temperature has been reached.

TCS Dgn. Packet shall be enabled.

The 10 new pair of MOT/EAT shall be defined according to procedure H_COP_SYS_DECD (Decontamination MOT and EAT entries definition) since they are not part of the default CDMU ASW 3.10 on-board MOT/EAT tables

Spacecraft Configuration

Start of Procedure

Telescope cooldown to <200K and > 175K
Decontamination nominal HPS 1 and 6 shall be ON
Decontamination heating function stopped
Battery 99% fully charged
Cryostat cover closed
Instruments OFF

End of Procedure

Telescope temperature stabilize at [170K 171K]
Decontamination nominal HPS 1 and 6 shall be ON
Decontamination redundant HPS 10, 15 and 17 shall be ON
Decontamination heating function running
Battery 99% fully charged
Cryostat cover closed
Instruments OFF

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Reference File(s)

Input Command Sequences

Output Command Sequences

HCYDEC2

Referenced Displays

ANDs	GRDs	SLDs
ZAZ9J999	ZGZ3F999	
	ZGZ3G999	

Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
05/03/09	2.1	1	Created	E. Picallo	
19/03/09		2	Telescope decontamination at 170 K starting on day H0+7 for 15 days until H0+22	E. Picallo	
24/03/09	2.2	3	reference to procedure "H_FCP_AOC_D3FD" Define/Enable/Disable DTM for FD added	E. Picallo	
02/04/09		4	Updated according to TAS-F Telescope decontamination new strategy & inputs for FOP	E. Picallo	
10/04/09		5	Decontamination shall not start earlier than 48h after the maximum Helium temperature has been reached.	E. Picallo	
15/04/09		6	Decontamiantion lines used for M1 are 4, 6 & 7 update	E. Picallo	
18/04/09	2.3	7	start procedure execution at the time when the telescope reaches 175K	E. Picallo	
27/04/09		8	TCs to enable 10 new pair of MOT/EAT entries added	E. Picallo	
05/05/09	2.4	9	Call to H_COP_SYS_DECD (Decontamination MOT and EAT entries definition) added	E. Picallo	
12/04/10	3	10	Decont - Tresholds correction at step #8	E. Picallo	

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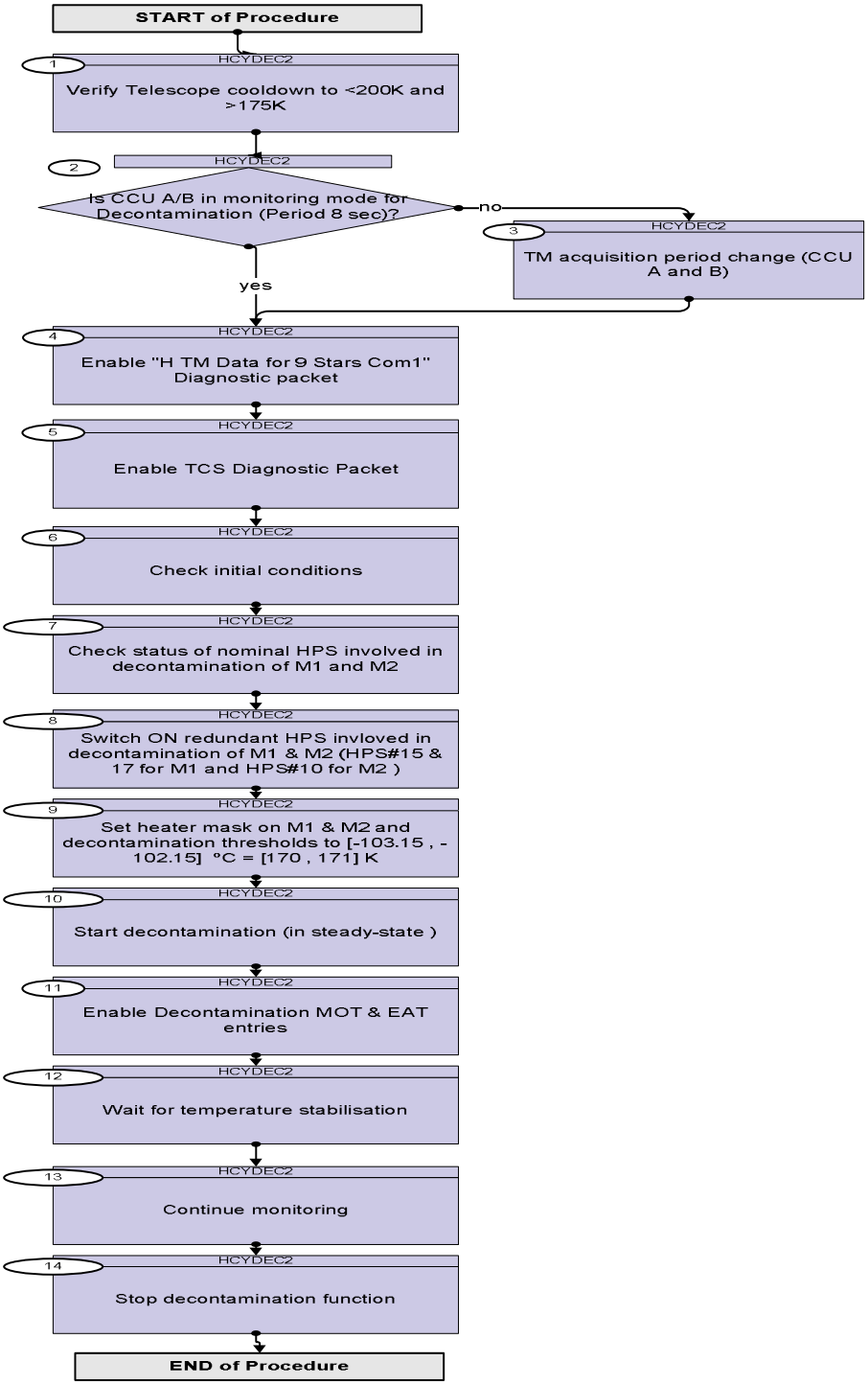
Procedure Flowchart Overview



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Beginning of Procedure		
		TC Seq. Name :HCYDEC2 (Decont.during COP) Telescope decontamination during Telescope cool down *TimeTag Type: N* *Sub Schedule ID:*		
1		*Verify Telescope cooldown to <200K and >175K*		Next Step: 2
		Initiate the procedure after the telescope temperaure is bellow 200K to avoid FDIR triggering and before the telescope temperature has dropped down to 175 K, for two reasons: **i) the energy request on the battery is lower,** **ii) there is no need to have intermediate steps (to maintain the temperature gradients lower than 50K) to heat up from cold steady state to 170 K.**		
		Telescope shall reach a temperature of 175 K on day H0+4.25 days		
1.1		*Verify M1 Thermistors*		
		Nominal M1 thermistors used for temperature determination (used to calculate the temperature median algorithm) are: TH A (T331), TH A'' (T332), TH C (T335).		
		Verify on telescope; M1 THA ; T21-5 (A) **PT1000_T331 KD253302**	**> 175.0 K** **< 200.0 K**	AND=ZAZ9J999
		Verify on telescope; M1 THA'' ; T16-5 (B) **PT1000_T332 KD248303**	**> 175.0 K** **< 200.0 K**	AND=ZAZ9J999
		Verify on telescope; M1 THC ; T23-5 (A) **PT1000_T335 KD255302**	**> 175.0 K** **< 200.0 K**	AND=ZAZ9J999
1.2		*Verify M2 Thermistors*		
		Nominal M2 thermistors used for temperature determination (used to calculate the temperature median algorithm) are: TH X (T339), TH Y (T341), TH Z (T342).		
		Verify on telescope; M2 THX ; T25-5 (A) **PT1000_T339 KD257302**	**> 175.0 K** **< 200.0 K**	AND=ZAZ9J999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify on telescope; M2 THY ; T26-5 (A) **PT1000_T341** **KD258302**	**> 175.0 K** **< 200.0 K**	AND=ZAZ9J999
		Verify on telescope; M2 THZ ; T30-5 (B) **PT1000_T342** **KD262303**	**> 175.0 K** **< 200.0 K**	AND=ZAZ9J999
2		*Is CCU A/B in monitoring mode for Decontamination (Period 8 sec)?*		Next Step: no 3 yes 4
3		*TM acquisition period change (CCU A and B)*		Next Step: 4
		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**		
4		*Enable "H TM Data for 9 Stars Com1" Diagnostic packet*		Next Step: 5
		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**		
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**		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Procedure: **H_FCP_DHS_3033** **Enable or disable the generation of an housekeeping or diagnostic packet**		
6		*Check initial conditions*		Next Step: 7
		The Telescope decontamination during coold down shall start decontamination in steady-state phase (expected decontamination power consumption is 20 W average, 360 W peak). Thus, the constraints on ACMS mode to be Sun pointing and no RWLs commanding are not applicable i.e. ACMS can be set in SCM.		
6.1		*Check ACMS mode and Sun Aspect Angle*		□
		Verify Telemetry **AcmsMode** **AESMG002**		AND=ZAZ9J999
		Verify Telemetry **AcmsSubstate** **AESMF002**		AND=ZAZ9J999
		Verify Telemetry **Sun asp angle** **AESAN002**		AND=ZAZ9J999
6.1.1		*Verify sun pointing attitude*		□
		Verify Telemetry **Sunvector X BRF** **AEUVX001**		AND=ZAZ9J999
		Verify Telemetry **Sunvector Y BRF** **AEUVY001**		AND=ZAZ9J999
		Verify Telemetry **Sunvector Z BRF** **AEUVZ001**		AND=ZAZ9J999
		Verify Telemetry **Est ang rate X** **AESR7001**		AND=ZAZ9J999
		Verify Telemetry **Est ang rate Y** **AESR8001**		AND=ZAZ9J999
		Verify Telemetry **Est ang rate Z** **AESR9001**		AND=ZAZ9J999
6.2		*Check batteries charge status*		□
		The telescope decontamination can be started when the battery is at 99% EOC (Vbatt > 25.32 V)		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry **TM_VBATT_BDR_1 WMT02565**	**>= 25.32 V**	AND=ZAZ9J999
		Verify Telemetry **TM_VBATT_BDR_2 WMT03565**	**>= 25.32 V**	AND=ZAZ9J999
7		*Check status of nominal HPS involved in decontamination of M1 and M2*		Next Step: 8
		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)**		
		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) ***		
		*** It is proposed to use only 3 lines on M1 (lines 4, 6 and 7) both heater lines on M2 in order to have peak consumption of ~360W.**		
7.1		*Check status of nominal HPS involved in decontamination of M1 & M2 (HPS#6 for M1 and HPS#1 for M2)*		
		Verify Telemetry **GRP6_HPS_STS WM42G565**	**= ON**	AND=ZAZ9J999
		Verify Telemetry **GRP1_HPS_STS WM12G565**	**= ON**	AND=ZAZ9J999
8		*Switch ON redundant HPS invloved in decontamination of M1 & M2 (HPS#15 & 17 for M1 and HPS#10 for M2)*		Next Step: 9
8.1		*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**	

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry **GRP15_HPS_STS WM82H565**	**= ON**	AND=ZAZ9J999
8.2		*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
8.3		*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 [-103.15 , -102.15] ºC = [170 , 171] K*		Next Step: 10
		Initiate the telescope decontamination function during the cool down phase, with the following parameters: **M1 mask ON: lines 4, 6 and 7** **M1 mask OFF: lines 3, 5, 8 and 9** **M2 mask ON: lines 1 and 2** **M2 mask OFF: none** **M1 lower threshold = 170K = –103.15℃** **M1 upper threshold = 171K = –102.15℃** **M2 lower threshold = 170K = –103.15℃** **M2 upper threshold = 171K = –103.15℃**		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		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) **NOTACTIVE** **ACTIVE** (Def) **ACTIVE** (Def) **NOTACTIVE** (Def) **ACTIVE** (Def) **NOTACTIVE** **ACTIVE** (Def) **ACTIVE** (Def)	
		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** **-103.15 degC** **-102.15 degC** **-103.15 degC** **-102.15 degC** **0.5 degC** (Def)	
9.1		*Report decontamination heating parameters*		□
		Execute Procedure: **H_LEO_SYS_DECS** **Decontamination Heating Status Report**		
10		*Start decontamination (in steady-state)*		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

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
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*		
		Verify Telemetry **DhSts** **DEG17170**	**= Running**	AND=ZAZ9J999
11		*Enable Decontamination MOT & EAT entries*		Next Step: 12
11.1		*Define (if not already perfomed) the 10 new pair of MOT/EAT Decontamiantion entries*		
		Execute Procedure: **H_COP_SYS_DECD** **Decontamination MOT and EAT entries definition**		
11.2		*Enable Decontamination MOT entries*		
		There are 10 entries defined in the MOT related to decontamination: **Parameter ID — Monitoring ID — Event ID** **M1 median temp (2048) 216 40976** **M1 median temp (2048) 217 40977** **M1 median temp (2048) 218 40978** **M1 median temp (2048) 219 40979** **M1 median temp (2048) 220 40980** **M2 median temp (2049) 224 40984** **M2 median temp (2049) 225 40985** **M2 median temp (2049) 226 40986** **M2 median temp (2049) 227 40987** **M2 median temp (2049) 228 40988** **These entries are disabled by default, so they must be enabled after starting the decontamination**		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand **EnabMonitOfParam_Templ**	**DCT26170**	
		Command Parameter(s) : **N_Repetition DH041170** **ParameterId DH042170** **MonitorId DH043170** **ParameterId DH042170** **MonitorId DH043170** **ParameterId DH042170** **MonitorId DH043170** **ParameterId DH042170** **MonitorId DH043170** **ParameterId DH042170** **MonitorId DH043170** **ParameterId DH042170** **MonitorId DH043170** **ParameterId DH042170** **MonitorId DH043170** **ParameterId DH042170** **MonitorId DH043170** **ParameterId DH042170** **MonitorId DH043170** **ParameterId DH042170** **MonitorId DH043170**	**10 <dec>** **2048 <dec>** **216 <dec>** **2048 <dec>** **217 <dec>** **2048 <dec>** **218 <dec>** **2048 <dec>** **219 <dec>** **2048 <dec>** **220 <dec>** **2049 <dec>** **224 <dec>** **2049 <dec>** **225 <dec>** **2049 <dec>** **226 <dec>** **2049 <dec>** **227 <dec>** **2049 <dec>** **228 <dec>**	
		TC Control Flags : **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TEMPLATE Enable Monitoring of Parameter, TC(12,1)		
11.3		*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**	
11.4		*Enable Decontamination EAT related entries*		□

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		There are 10 entries defined in the EAT related to decontamination: **APID Event ID Action TC** **For M1:** **16(CDMS) 40976 Switch OFF HPS1 TC(8,4,112,3)** **16(CDMS) 40977 Switch OFF HPS6 TC(8,4,112,3)** **16(CDMS) 40978 Switch OFF HPS10 TC(8,4,112,3)** **16(CDMS) 40979 Switch OFF HPS15 TC(8,4,112,3)** **16(CDMS) 40980 Switch OFF HPS17 TC(8,4,112,3)** **For M2:** **16(CDMS) 40984 Switch OFF HPS1 TC(8,4,112,3)** **16(CDMS) 40985 Switch OFF HPS6 TC(8,4,112,3)** **16(CDMS) 40986 Switch OFF HPS10 TC(8,4,112,3)** **16(CDMS) 40987 Switch OFF HPS15 TC(8,4,112,3)** **16(CDMS) 40988 Switch OFF HPS17 TC(8,4,112,3)** **These entries are disabled by default, so they must be enabled after starting the decontamination.**		
		Execute Telecommand **EnableActions** *Command Parameter(s) :* **N_Repetition DH041170** **APID_for_EAT_TC DH236170** **EventId DH146170** **APID_for_EAT_TC DH236170** **EventId DH146170** **APID_for_EAT_TC DH236170** **EventId DH146170** **APID_for_EAT_TC DH236170** **EventId DH146170** **APID_for_EAT_TC DH236170** **EventId DH146170** **APID_for_EAT_TC DH236170** **EventId DH146170** **APID_for_EAT_TC DH236170** **EventId DH146170** **APID_for_EAT_TC DH236170** **EventId DH146170** **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** **10 <dec>** **CDMS** (Def) **40976 <dec>** **CDMS** (Def) **40977 <dec>** **CDMS** (Def) **40978 <dec>** **CDMS** (Def) **40979 <dec>** **CDMS** (Def) **40980 <dec>** **CDMS** (Def) **40984 <dec>** **CDMS** (Def) **40985 <dec>** **CDMS** (Def) **40986 <dec>** **CDMS** (Def) **40987 <dec>** **CDMS** (Def) **40988 <dec>**	
11.5		*Report EAT table to check the decontamination EAT entries*		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		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: **[-103.15 , -102.15] ºC = [170 , 171] K**		
12.1		*Verify M1 Thermistors*		□
		Verify on telescope; M1 THA ; T21-5 (A) **PT1000_T331** **KD253302**	**>= 170.0 K** **<= 171.0 K**	AND=ZAZ9J999
		Verify on telescope; M1 THA'' ; T16-5 (B) **PT1000_T332** **KD248303**	**>= 170.0 K** **<= 171.0 K**	AND=ZAZ9J999
		Verify on telescope; M1 THC ; T23-5 (A) **PT1000_T335** **KD255302**	**>= 170.0 K** **<= 171.0 K**	AND=ZAZ9J999
12.2		*Verify M2 Thermistors*		□
		Verify on telescope; M2 THX ; T25-5 (A) **PT1000_T339** **KD257302**	**>= 170.0 K** **<= 171.0 K**	AND=ZAZ9J999
		Verify on telescope; M2 THY ; T26-5 (A) **PT1000_T341** **KD258302**	**>= 170.0 K** **<= 171.0 K**	AND=ZAZ9J999
		Verify on telescope; M2 THZ ; T30-5 (B) **PT1000_T342** **KD262303**	**>= 170.0 K** **<= 171.0 K**	AND=ZAZ9J999
12.3		*Verify median temperatures on M1 & M2*		□
		Verify M1 median temperature Telemetry **DhM1Temp** **DE800171**	**<= -102.15 <dec>** **>= -103.15 <dec>**	AND=ZAZ9J999
		Verify M2 median temperature Telemetry **DhM2Temp** **DE801171**	**<= -102.15 <dec>** **>= -103.15 <dec>**	AND=ZAZ9J999

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
12.4		*Verify reception of decontamination packets*		
		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**		
		Monitor the related HCS status, after reception of Event 5-1: **M1 Decontamination Heating ON ->** **Decont_4_G17H1_S must be ON,** **Decont_6_G15H1_S must be ON,** **Decont_7_G6H1_S must be ON** **M1 Decontamination Heating OFF ->** **Decont_4_G17H1_S must be OFF,** **Decont_6_G15H1_S must be OFF,** **Decont_7_G6H1_S must be OFF** **M2 Decontamination Heating ON ->** **Decont_1_G1H1_S must be ON,** **Decont_2_G10H1_S must be ON** M**2 Decontamination Heating OFF ->** **Decont_1_G1H1_S must be OFF,** **Decont_2_G10H1_S must be OFF**		
12.5		*Verify TM(5,1) M1 Decontamination Heating ON*		
		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 Telemetry **Decon4_G17H1_S** **WM91G565**	**= ON**	GRD=ZGZ3F999
		Verify Telemetry **Decon6_G15H1_S** **WM81G565**	**= ON**	GRD=ZGZ3F999
		Verify Telemetry **Decon7_G6H1_S** **WM41A565**	**= ON**	GRD=ZGZ3F999
12.6		*Verify TM(5,1) M1 Decontamination Heating OFF*		

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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 Telemetry **Decon4_G17H1_S** **WM91G565**	**= OFF**	GRD=ZGZ3F999
		Verify Telemetry **Decon6_G15H1_S** **WM81G565**	**= OFF**	GRD=ZGZ3F999
		Verify Telemetry **Decon7_G6H1_S** **WM41A565**	**= OFF**	GRD=ZGZ3F999
12.7		*Verify TM(5,1) M2 Decontamination Heating ON*		□
		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 Telemetry **Decon1_G1H1_S** **WM11A565**	**= ON**	GRD=ZGZ3G999
		Verify Telemetry **Decon2_G10H1_S** **WM61A565**	**= ON**	GRD=ZGZ3G999
12.8		*Verify TM(5,1) M2 Decontamination Heating OFF*		□
		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**	
		Verify Telemetry **Decon1_G1H1_S** **WM11A565**	**= OFF**	GRD=ZGZ3G999
		Verify Telemetry **Decon2_G10H1_S** **WM61A565**	**= OFF**	GRD=ZGZ3G999
13		*Continue monitoring*		Next Step: 14

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Keep monitoring M1/M2 thermistors and M1/M2 median temperatures on, which should remain in the range: [-103.15 , -102.15] ºC = [170 , 171] K **Expected duty cycle: M1 ~ 7% and M2 ~ 5%** **According to the H-COP timeline the decontamination function stabilize the telescope at [170 , 171] K starting on day H0+4 for a total of 25 days until H0+28.**		
13.1		*Verify M1 Thermistors*		
		Verify on telescope; M1 THA ; T21-5 (A) **PT1000_T331 KD253302**	**>= 170.0 K** **<= 171.0 K**	AND=ZAZ9J999
		Verify on telescope; M1 THA'' ; T16-5 (B) **PT1000_T332 KD248303**	**>= 170.0 K** **<= 171.0 K**	AND=ZAZ9J999
		Verify on telescope; M1 THC ; T23-5 (A) **PT1000_T335 KD255302**	**>= 170.0 K** **<= 171.0 K**	AND=ZAZ9J999
13.2		*Verify M2 Thermistors*		
		Verify on telescope; M2 THX ; T25-5 (A) **PT1000_T339 KD257302**	**>= 170.0 K** **<= 171.0 K**	AND=ZAZ9J999
		Verify on telescope; M2 THY ; T26-5 (A) **PT1000_T341 KD258302**	**>= 170.0 K** **<= 171.0 K**	AND=ZAZ9J999
		Verify on telescope; M2 THZ ; T30-5 (B) **PT1000_T342 KD262303**	**>= 170.0 K** **<= 171.0 K**	AND=ZAZ9J999
13.3		*Verify median temperatures on M1 & M2*		
		Verify M1 median temperature Telemetry **DhM1Temp DE800171**	**<= -102.15 <dec>** **>= -103.15 <dec>**	AND=ZAZ9J999
		Verify M2 median temperature Telemetry **DhM2Temp DE801171**	**<= -102.15 <dec>** **>= -103.15 <dec>**	AND=ZAZ9J999
13.4		*Verify reception of decontamination packets*		

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**		
		Monitor the related HCS status, after reception of Event 5-1: **M1 Decontamination Heating ON ->** **Decont_4_G17H1_S must be ON,** **Decont_6_G15H1_S must be ON,** **Decont_7_G6H1_S must be ON** **M1 Decontamination Heating OFF ->** **Decont_4_G17H1_S must be OFF,** **Decont_6_G15H1_S must be OFF,** **Decont_7_G6H1_S must be OFF** **M2 Decontamination Heating ON ->** **Decont_1_G1H1_S must be ON,** **Decont_2_G10H1_S must be ON** M**2 Decontamination Heating OFF ->** **Decont_1_G1H1_S must be OFF,** **Decont_2_G10H1_S must be OFF**		
13.5		*Verify TM(5,1) M1 Decontamination Heating ON*		
		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 Telemetry **Decon4_G17H1_S** **WM91G565**	**= ON**	GRD=ZGZ3F999
		Verify Telemetry **Decon6_G15H1_S** **WM81G565**	**= ON**	GRD=ZGZ3F999
		Verify Telemetry **Decon7_G6H1_S** **WM41A565**	**= ON**	GRD=ZGZ3F999
13.6		*Verify TM(5,1) M1 Decontamination Heating OFF*		

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 Telemetry **Decon4_G17H1_S** **WM91G565**	**= OFF**	GRD=ZGZ3F999
		Verify Telemetry **Decon6_G15H1_S** **WM81G565**	**= OFF**	GRD=ZGZ3F999
		Verify Telemetry **Decon7_G6H1_S** **WM41A565**	**= OFF**	GRD=ZGZ3F999
13.7		*Verify TM(5,1) M2 Decontamination Heating ON*		□
		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 Telemetry **Decon1_G1H1_S** **WM11A565**	**= ON**	GRD=ZGZ3G999
		Verify Telemetry **Decon2_G10H1_S** **WM61A565**	**= ON**	GRD=ZGZ3G999
13.8		*Verify TM(5,1) M2 Decontamination Heating OFF*		□
		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**	
		Verify Telemetry **Decon1_G1H1_S** **WM11A565**	**= OFF**	GRD=ZGZ3G999
		Verify Telemetry **Decon2_G10H1_S** **WM61A565**	**= OFF**	GRD=ZGZ3G999
14		*Stop decontamination function*		Next Step: END

Telescope decontamination during Telescope cool down
File: H_COP_SYS_DEC2.xls
Author: E. Picallo

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Call procedure H_COP_SYS_DEC0 to Stop Decontamination heating during Telescope cool down		
		Execute Procedure: **H_COP_SYS_DEC0** **Stop Decontamination heating during Telescope cool down**		
		End of Procedure		