Switchover from R to N TMTC
File: H_CRP_EPS_IFRN.xls
Author: E. Picallo

Procedure Summary

Objectives

This procedure describes the steps needed to switch from the redundant(RT 6) to the nominal (RT 5) PCDU TMTC module.

Summary of Constraints

Both PCDU TMTC modules nominal and redundant are assumed to be healthy.

Before switching OFF the Red 1553 RT (TMTC R) it is necessary to disable the relevant entry in the EAT and disable the communication between PCDU and CDMU on the 1553 S/C bus.

Before switching ON the Nom 1553 RT (TMTC N) it is necessary to invert the default status for the nominal and redundant role in UIU table.

Re-enable of EAT entry ID 157 and communication on the bus are executed after the Nom 1553 RT (TMTC N) is switched ON.

TMTC nominal and redundant are switched OFF and ON through TC(2,1) that does not update automatically the UIU.

Moreover:
- the EAT entry is enabled/disabled through TC(19,4/5) thus the status of the ASW function "Event/Action Management" has to be "running";
- the role of nominal/redundant in UIU table is changed through TC(8,4,116,19) thus the status of the ASW function "FDIR Management" has to be "running".

Spacecraft Configuration

Start of Procedure

CDMU in default configuration;
Communication between CDMU and PCDU via redundant 1553 I/F, remote terminal address 6 (redundant TMTC module).

End of Procedure

CDMU in default configuration;
Communication between CDMU and PCDU via nominal 1553 I/F, remote terminal address 5 (nominal TMTC module);
All HPSs are ON even if some were OFF before the re-configuration;
State of all LCLs maintained.

Reference File(s)

Input Command Sequences

Output Command Sequences

HRWIFRN

Referenced Displays

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ANDs	GRDs	SLDs
ZAZ7H999		
ZAZ7L999		
ZAZ7K999		

Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
28/07/08	1	1	Created	E. Picallo	
19/09/08		2	TC DC005161 (Configure SDBFDIR) M12 / F12 flag setting update	E. Picallo	
09/01/09	2	3	CDMU ASW V3.8 and BSW V2.4 alignment	E. Picallo	
20/03/09	2.2	4	recommendation to execute the procedure using the MTL added	E. Picallo	
07/04/09		5	TMTC nominal and redundant are switched OFF and ON through TC(2,1)	E. Picallo	
10/04/09	2.3	6	Set VC ID for Red High Priority Standard TC added	E. Picallo	
06/07/09	2.5	7	Re-enable EAT ID 157 before enable communication nominal 1553 RT (TMTC N)□ Procedure using the MTL	E. Picallo	

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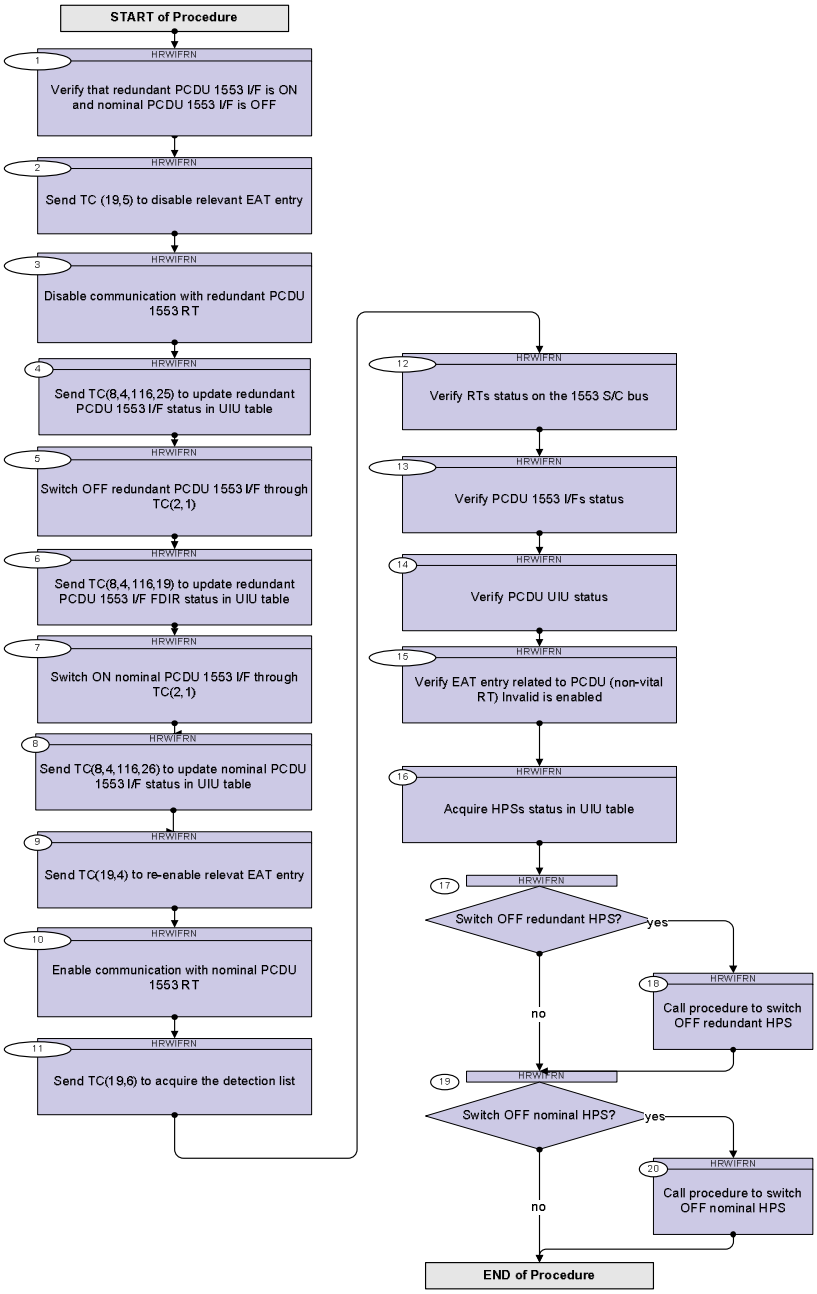
Procedure Flowchart Overview



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Beginning of Procedure		
		TC Seq. Name :HRWIFRN (Switchover R-N TMTC) Switchover from R to N TMTC *TimeTag Type: B* *Sub Schedule ID:*		
1		*Verify that redundant PCDU 1553 I/F is ON and nominal PCDU 1553 I/F is OFF*		Next Step: 2
		Verify PCDU 1553 I/F Module #2 Status N Telemetry **PCDU_1553_M2_N** **WMB03565**	**= ON**	AND=ZAZ7H999
		Verify PCDU 1553 I/F Module #2 Status R Telemetry **PCDU_1553_M2_R** **WMB05565**	**= ON**	AND=ZAZ7H999
		Verify PCDU 1553 I/F Module #1 Status N Telemetry **PCDU_1553_M1_N** **WMB02565**	**= OFF**	AND=ZAZ7H999
		Verify PCDU 1553 I/F Module #1 Status R Telemetry **PCDU_1553_M1_R** **WMB04565**	**= OFF**	AND=ZAZ7H999
2		*Send TC (19,5) to disable relevant EAT entry*		Next Step: 3
		When this request is received, the action-telecommand associated with the event TM (5,x,157) PCDU (non-vital RT) Invalid shall be disabled. **In the TC(19,5) it is necessary to set the following parameters:** **N, number of events to be disabled, equal to 1.** **APID, identifier of the Application Process generating this event report, equal to 16 (CDMU).** **Event ID, identifier of the event to be disabled, equal to 157.**		
	ET=+00.00.00 UT=+	Execute Telecommand **DisableActions** *Command Parameter(s) :* **N_Repetition** **DH041170** **APID_for_EAT_TC** **DH236170** **EventId** **DH146170** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TEMPLATE Disable Actions TC(19,5)	**DCT85170** **1 <dec>** (Def) **CDMS** (Def) **157 <dec>**	
3		*Disable communication with redundant PCDU 1553 RT*		Next Step: 4

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		In the TC(8,4,10,1) it is necessary to set, in this case, the following parameters: **- Remote terminal address = 6 (redundant PCDU 1553 I/F)** **- Status of the RT= off (M0=1,F0=0)** **- Status of the RT = invalid (M4=1,F4=0)** **The remaining parameters of the TC have been set but they are not important because are masked.**		
	ET=+00.00.05 UT=+	Execute Telecommand **ConfigureSDBFDIR** *Command Parameter(s) :* **RTA DH011161** **M0 DH030161** **M1 DH031161** **M2 DH032161** **M3 DH033161** **M4 DH034161** **M5 DH035161** **M6 DH036161** **M7 DH037161** **F0 DH018161** **F1 DH019161** **F2 DH020161** **F3 DH021161** **F4 DH022161** **F5 DH023161** **F6 DH024161** **F7 DH025161** **M12 DH051161** **M_C DH043161** **M8 DH038161** **M9 DH039161** **M10 DH040161** **M11 DH041161** **F12 DH050161** **CNT DH042161** **F8 DH026161** **F9 DH027161** **F10 DH028161** **F11 DH029161** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : Configure SDB FDIR	**DC005161** **PCDU B** **Update status** **Ignore Flag** **Ignore Flag** **Ignore Flag** **Update status** **Ignore Flag** **Ignore Flag** **Ignore Flag** **OFF** **Dead** **Sick TC** **Sick TM** **Invalid** **Non-vital** **NOMINAL** **OFF** **Ignore Flag** **Ignore CNT** **Ignore Flag** **Ignore Flag** **Ignore Flag** **Ignore Flag** **DISABLED** **LoopCnt1** **Bus A** **Unhealthy** **Unhealthy** **DISABLED**	
4		*Send TC(8,4,116,25) to update redundant PCDU 1553 I/F status in UIU table*		Next Step: 5

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+00.00.05 UT=+	Execute Telecommand **H_FdirMarkUnitOff_Templ** *Command Parameter(s) :* **H_ConfStsUnitId DHZ00170** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TEMPLATE FDIR: Mark Unit OFF, TC(8,4,116,25), Herschel Version	**DC91H159** **PcduTmtcB**	
5		*Switch OFF redundant PCDU 1553 I/F through TC(2,1)*		Next Step: 6
		Note that when the TM/TC R is turned OFF the state of all LCLs and HPSs is maintained		
	ET=+00.00.05 UT=+	Execute Telecommand **PCDU_1553_IF_B_OFF_Nom** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : PCDU 1553 I/F B OFF Nominal - High Level	**DCH42170**	
	ET=+00.00.05 UT=+	Execute Telecommand **PCDU_1553_IF_B_OFF_Red** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : PCDU 1553 I/F B OFF Redundant - High Level	**DCH58170**	
6		*Send TC(8,4,116,19) to update redundant PCDU 1553 I/F FDIR status in UIU table*		Next Step: 7
		After the execution of this TC the TMTC N is considered the nominal I/F while the TMTC R is considered the redundant I/F.		

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+00.00.05 UT=+	Execute Telecommand **FdirSelNomUnit_Templ** *Command Parameter(s) :* **FdirUnitAorB** **DH064170** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TEMPLATE Fdir Select Nominal Unit TC(8,4,116,19)	**DCT31170** **PCDU_TMTC_A**	
7		*Switch ON nominal PCDU 1553 I/F through TC(2,1)*		Next Step: 8
		Note that when the nominal TM/TC is turned ON all HPSs are automatically turned ON (even if some were OFF) while the state of all LCLs is maintained and confirmed at microslave terminal level, thus the LCLs can be commanded without any further constraints.		
	ET=+00.00.05 UT=+	Execute Telecommand **PCDU_1553_IF_A_ON_Nom** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : PCDU 1553 I/F A ON Nominal - High Level	**DCH07170**	
	ET=+00.00.05 UT=+	Execute Telecommand **PCDU_1553_IF_A_ON_Red** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : PCDU 1553 I/F A ON Redundant - High Level	**DCH23170**	
8		*Send TC(8,4,116,26) to update nominal PCDU 1553 I/F status in UIU table*		Next Step: 9
	ET=+00.00.05 UT=+	Execute Telecommand **H_FdirMarkUnitOn_Templ** *Command Parameter(s) :* **H_ConfStsUnitId** **DHZ00170** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : TEMPLATE FDIR: Mark Unit On, TC(8,4,116,26), Herschel Version	**DC93H159** **PcduTmtcA**	

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
9		*Send TC(19,4) to re-enable relevat EAT entry*		Next Step: 10
		When this request is received, the action telecommand associated with the event TM (5,x,157) PCDU (non-vital RT) Invalid shall be enabled. **In the TC(19,4) it is necessary to set the following parameters:** **N, number of events to be enabled, equal to 1.** **APID, identifier of the Application Process generating this event report, equal to 16 (CDMU).** **Event ID, identifier of the event to be enabled, equal to 157.**		
	ET=+00.00.05 UT=+	Execute Telecommand **EnableActions** *Command Parameter(s) :* **N_Repetition DH041170** **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** **1 <dec>** (Def) **CDMS** (Def) **157 <dec>**	
10		*Enable communication with nominal PCDU 1553 RT*		Next Step: 11
		In the TC(8,4,10,1) it is necessary to set, in this case, the following parameters: **- Remote terminal address = 5 (nominal PCDU 1553 I/F)** **- Status of the RT= on (M0=1,F0=1)** **- Status of the RT = valid (M4=1,F4=1)** **- RT Nominal/Redundant = Nominal (M6=1,F6=1)** **The remaining parameters of the TC have been set but they are not important because are masked.**		
	ET=+00.00.05 UT=+	Execute Telecommand **ConfigureSDBFDIR** *Command Parameter(s) :* **RTA DH011161** **M0 DH030161** **M1 DH031161** **M2 DH032161** **M3 DH033161** **M4 DH034161** **M5 DH035161** **M6 DH036161** **M7 DH037161** **F0 DH018161** **F1 DH019161**	**DC005161** **PCDU A** **Update status** **Ignore Flag** **Ignore Flag** **Ignore Flag** **Update status** **Ignore Flag** **Update status** **Ignore Flag** **ON** **Dead**	

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		F2 DH020161 **F3 DH021161** **F4 DH022161** **F5 DH023161** **F6 DH024161** **F7 DH025161** **M12 DH051161** **M_C DH043161** **M8 DH038161** **M9 DH039161** **M10 DH040161** **M11 DH041161** **F12 DH050161** **CNT DH042161** **F8 DH026161** **F9 DH027161** **F10 DH028161** **F11 DH029161** *TC Control Flags :* **GBM IL DSE** **--Y -- ---** *Subsch. ID : 10* Det. descr. : Configure SDB FDIR	**Sick TC** **Sick TM** **Valid** **Non-vital** **NOMINAL** **OFF** **Ignore Flag** **Ignore CNT** **Ignore Flag** **Ignore Flag** **Ignore Flag** **Ignore Flag** **DISABLED** **LoopCnt1** **Bus A** **Unhealthy** **Unhealthy** **DISABLED**	
11		*Send TC(19,6) to acquire the detection list*		Next Step: 12
	ET=+00.00.05 UT=+	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		*Verify RTs status on the 1553 S/C bus*		Next Step: 13
12.1		*Verify redundant RT status on the 1553 S/C bus*		□
		Verify Telemetry **PCDUB_On_Off DEFB1160**	**= OFF**	AND=ZAZ7H999
		Verify Telemetry **PCDUB_Val_Inval DEFB5160**	**= Invalid**	AND=ZAZ7H999
12.2		*Verify nominal RT status on the 1553 S/C bus*		□
		Verify Telemetry **PCDUA_On_Off DEFAG160**	**= ON**	AND=ZAZ7H999

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry **PCDUA_Val_Inval DEFAK160**	**= Valid**	AND=ZAZ7H999
		Verify Telemetry **PCDU_No_Re_RTA DEFDM160**	**= NOMINAL**	AND=ZAZ7H999
		Notice that the parameter DEFDM160 is for the overall PCDU it indicates the I/F "Active", that is the RT used to communicate where: **- RT 5 (I/F A) is always the nominal one.** **- RT 6 (I/F B) is always the redundant one.**		
13		*Verify PCDU 1553 I/Fs status*		Next Step: 14
13.1		*Verify redundant PCDU 1553 I/F is OFF*		□
		Verify PCDU 1553 I/F Module #2 Status N Telemetry **PCDU_1553_M2_N WMB03565**	**= OFF**	AND=ZAZ7H999
		Verify PCDU 1553 I/F Module #2 Status R Telemetry **PCDU_1553_M2_R WMB05565**	**= OFF**	AND=ZAZ7H999
13.2		*Verify nominal PCDU 1553 I/F is ON*		□
		Verify PCDU 1553 I/F Module #1 Status N Telemetry **PCDU_1553_M1_N WMB02565**	**= ON**	AND=ZAZ7H999
		Verify PCDU 1553 I/F Module #1 Status R Telemetry **PCDU_1553_M1_R WMB04565**	**= ON**	AND=ZAZ7H999
14		*Verify PCDU UIU status*		Next Step: 15
		Verify unit status Telemetry **Pcdu1FuncSts DEG03170**	**= On**	AND=ZAZ7L999
		Verify Telemetry **Pcdu1Use DEN00170**	**= In_Use**	AND=ZAZ7L999
		Verify default status Telemetry **Pcdu1LogSts DEN01170**	**= Nominal**	AND=ZAZ7L999
		Verify FDIR status Telemetry **Pcdu1FailSts DEN02170**	**= Not_Failed**	AND=ZAZ7L999
		Verify unit status Telemetry **Pcdu2FuncSts DEG02170**	**= Off**	AND=ZAZ7L999
		Verify Telemetry **Pcdu2Use DEN03170**	**= Not_In_Use**	AND=ZAZ7L999
		Verify default status Telemetry **Pcdu2LogSts DEN04170**	**= Redundant**	AND=ZAZ7L999

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify FDIR status Telemetry **Pcdu2FailSts DEN05170**	**= Not_Failed**	AND=ZAZ7L999
15		*Verify EAT entry related to PCDU (non-vital RT) Invalid is enabled*		Next Step: 16
		Verify Packet Reception **TM 19-7 Event-Action Table Content Report** *Packet Details:* **APID:** **Type:** **Subtype:** **PI1:** **PI2:**	**EvtActTblRpt** **16** **19** **7**	
		Verify that TM(19,7) have been received and that action related to PCDU (non-vital RT) Invalid is enabled (Event ID 157)		
16		*Acquire HPSs status in UIU table*		Next Step: 17
		Since when the TM/TC R is turned ON all HPSs are automatically turned ON by the PCDU (even if some were OFF), it is necessary to check the UIU table to know what HPSs were OFF before the switchover. **In order to restore the original HPS configuration, ie only 9 HPS ON, the Ground shall switch OFF the 9 HPS currently flagged as OFF in the UIU.**		
16.1		*Verify Nominal HPSs status in UIU table*		□
		Verify Telemetry **Hps1FuncSts DEG77170**		AND=ZAZ7K999
		Verify Telemetry **Hps2FuncSts DEG81170**		AND=ZAZ7K999
		Verify Telemetry **Hps3FuncSts DEG85170**		AND=ZAZ7K999
		Verify Telemetry **Hps4FuncSts DEG89170**		AND=ZAZ7K999
		Verify Telemetry **Hps5FuncSts DEG93170**		AND=ZAZ7K999
		Verify Telemetry **Hps6FuncSts DEG97170**		AND=ZAZ7K999
		Verify Telemetry **Hps7FuncSts DEH01170**		AND=ZAZ7K999
		Verify Telemetry **Hps8FuncSts DEH05170**		AND=ZAZ7K999

Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry **Hps9FuncSts DEH09170**		AND=ZAZ7L999
16.2		*Verify Redundant HPSs status in UIU table*		
		Verify Telemetry **Hps10FuncSts DEG41170**		AND=ZAZ7L999
		Verify Telemetry **Hps11FuncSts DEG45170**		AND=ZAZ7K999
		Verify Telemetry **Hps12FuncSts DEG49170**		AND=ZAZ7K999
		Verify Telemetry **Hps13FuncSts DEG53170**		AND=ZAZ7K999
		Verify Telemetry **Hps14FuncSts DEG57170**		AND=ZAZ7K999
		Verify Telemetry **Hps15FuncSts DEG61170**		AND=ZAZ7K999
		Verify Telemetry **Hps16FuncSts DEG65170**		AND=ZAZ7K999
		Verify Telemetry **Hps17FuncSts DEG69170**		AND=ZAZ7K999
		Verify Telemetry **Hps18FuncSts DEG73170**		AND=ZAZ7K999
17		*Switch OFF redundant HPS?*		Next Step: yes 18 no 19
		WARNING: ***If it is necessary to switch OFF more than one redundant HPS the procedure must be called more times.***		
18		*Call procedure to switch OFF redundant HPS*		Next Step: 19
		Execute Procedure: **H_CRP_TCS_HPR0** **Redundant HPS switch OFF**		
19		*Switch OFF nominal HPS?*		Next Step: yes 20 no END

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		WARNING: ***If it is necessary to switch OFF more than one nominal HPS the procedure must be called more times.***		
20		*Call procedure to switch OFF nominal HPS*		Next Step: END
		Execute Procedure: **H_CRP_TCS_HPN0** **Nominal HPS switch OFF**		
		End of Procedure		