

Configuration check after XPNDs or TWTAs failure  
File: H\_CRP\_TTC\_TTCR.xls  
Author: E. Picallo



## Procedure Summary

### Objectives

This procedure describes the steps needed to check the TTC-S configuration after the recovery (TTC chain switchover) performed on-board by the ASW (through the Event-Action Table, EAT) following:

- 1) BSW TM (5,2,160/161)(XPND1/2 1553 Invalid RT, event ID 0x00A0/00A1) triggered by the SDB DLL FDIR;
- 2)Event IDs 0x9218/19/28/29 (EPC1/2 Helix Current Out Of Limits) detected through the Monitoring Table (MOT);
- 3) Event IDs 0x921A/1B (RX1/2 Supply Power Out Of Limits) detected through the MOT and the FDIR Cross Correlated Table (FCCT).

### Summary of Constraints

The ASW at the reception of one of the previous events:  
-disables the relevant MOT entries;  
-disables the relevant EAT entries;  
-disables communication with nominal XPND 1553 RT;  
-switches OFF the nominal TTC units and updates the Unit In Use (UIU) table marking them "OFF" and "failed";  
-configures the RFDN SWs to have the same antenna configuration;  
-configures the redundant XPND, switches ON the redundant TTC units and updates the UIU table marking them "ON";  
-enables communication with redundant XPND 1553 RT;  
-enables MOT entries for the redundant TTC units.

### Spacecraft Configuration

#### Start of Procedure

CDMU in default configuration.  
Downlink enabled via redundant channel.  
Nominal channel marked failed in UIU table.

#### End of Procedure

CDMU in default configuration.  
Downlink enabled via redundant channel.  
Nominal channel marked failed in UIU table.

### Reference File(s)

#### Input Command Sequences

#### Output Command Sequences

HRRTTCR1  
HRRTTCR2

### Referenced Displays

ANDs      GRDs      SLDs

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ZAZ7I999 (None)  
 ZAZ7J999  
 ZAZ7M999

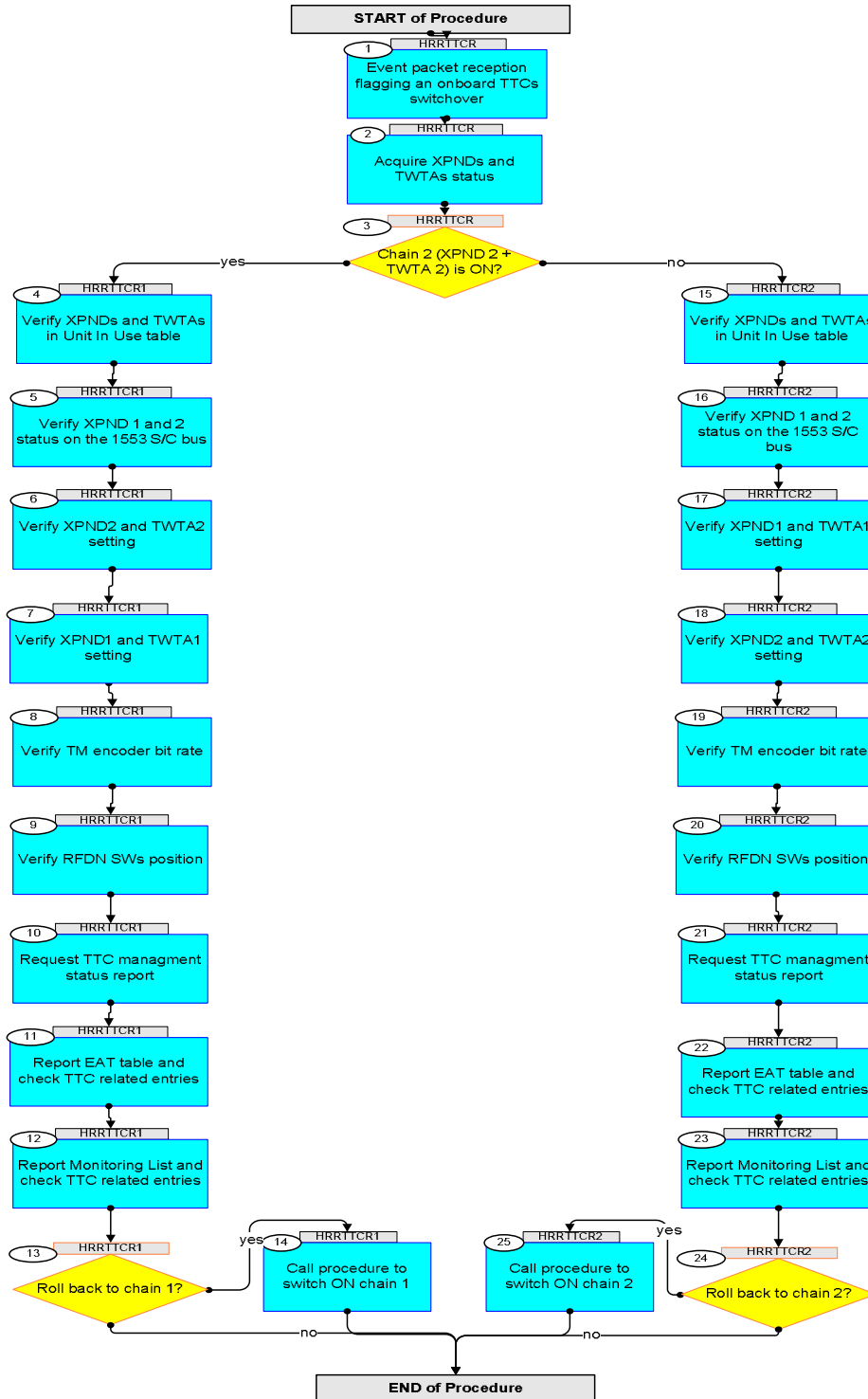
**Configuration Control Information**

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
15/07/08		1	Created	R. Miniscalco	
30/07/08	1	1.01	Validation : FOP reference procedure call updated	E. Picallo	
06/11/08	2	2	Event packet reception added Analog parameters expected values updated	E. Picallo	
14/03/09	2.2	2.01	Validation : Rx Voltage and current ANDs updated	E. Picallo	
25/09/09	2.5	3	TM check Xpnd1Tx_L23_S , Xpnd1Tx_L23_I updated TM check Xpnd2Tx_L16_S , Xpnd2Tx_L16_I updated	E. Picallo	

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## Procedure Flowchart Overview



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
<b>Beginning of Procedure</b>				
TC Seq. Name : HRRTTCR (XPNDorTWTA fail Init) Configuration check after XPNDs or TWTAs failure  TimeTag Type: Sub Schedule ID:  <input type="checkbox"/>				
1		Event packet reception flagging an onboard TTCs switchover		Next Step: 2
		Verify Packet Reception <b>CdmuBsw Event 5-2 XPND 1 non-vital RT Invalid</b> Packet Details: <div style="text-align: right;">             APID: 16              Type: 5              Subtype: 2              PI1: 160              PI2: 160           </div>	(5,2)-0560	
		Verify Packet Reception <b>CdmuBsw Event 5-2 XPND 2 non-vital RT Invalid</b> Packet Details: <div style="text-align: right;">             APID: 16              Type: 5              Subtype: 2              PI1: 161              PI2: 161           </div>	(5,2)-0561	
		Verify Packet Reception <b>CdmuAsw Event 5-2 Evt_Mot_Exc_Id_0x9218</b> Packet Details: <div style="text-align: right;">             APID: 16              Type: 5              Subtype: 2              PI1: 37400              PI2: 0           </div>	D_EvRpMo9218	
		Verify Packet Reception <b>CdmuAsw Event 5-2 Evt_Mot_Exc_Id_0x9219</b> Packet Details: <div style="text-align: right;">             APID: 16              Type: 5              Subtype: 2              PI1: 37401              PI2: 0           </div>	D_EvRpMo9219	
		Verify Packet Reception <b>CdmuAsw Event 5-2 Evt_Mot_Exc_Id_0x9228</b> Packet Details: <div style="text-align: right;">             APID: 16              Type: 5              Subtype: 2              PI1: 37416              PI2: 0           </div>	D_EvRpMo9228	
		Verify Packet Reception <b>CdmuAsw Event 5-2 Evt_Mot_Exc_Id_0x9229</b> Packet Details: <div style="text-align: right;">             APID: 16              Type: 5              Subtype: 2              PI1: 37417              PI2: 0           </div>	D_EvRpMo9229	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Packet Reception CdmuAsw Event 5-2 Evt_Mot_Exc_Id_0x921A Packet Details: APID: 16 Type: 5 Subtype: 2 PI1: 37402 PI2: 0	D_EvRpMo921A	
		Verify Packet Reception CdmuAsw Event 5-2 Evt_Mot_Exc_Id_0x921B Packet Details: APID: 16 Type: 5 Subtype: 2 PI1: 37403 PI2: 0	D_EvRpMo921B	
2		Acquire XPNDs and TWTAs status		Next Step: 3
2.1		Verify Chain 1 (XPND 1 + TWTA 1) status		<input type="checkbox"/>
		Verify Tx1 Status Telemetry TX1 ON-OFF Stat RMB15442		AND=ZAZ7I999
		Verify EPC1 Status Telemetry EPC1_ONOFF_STS RMB05439		AND=ZAZ7J999
		Verify TWT1 Status Telemetry TWT1_ONOFF_STS RMB09439		AND=ZAZ7J999
2.2		Verify Chain 2 (XPND 2 + TWTA 2) status		<input type="checkbox"/>
		Verify TX2 Status Telemetry TX2 ON-OFF Stat RMB16442		AND=ZAZ7I999
		Verify EPC2 Status Telemetry EPC2_ONOFF_STS RMB07439		AND=ZAZ7J999
		Verify TWT2 Status Telemetry TWT2_ONOFF_STS RMB10439		AND=ZAZ7J999
3		Chain 2 (XPND 2 + TWTA 2) is ON?		Next Step: no 15 yes 4

TC Seq. Name : HRRTTCR1 (XPNDorTWTAFailChain1)  
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TimeTag Type: N  
 Sub Schedule ID:

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
4		Verify XPNDs and TWTAs in Unit In Use table		Next Step: 5
4.1		XPND2 UIU table status verification		<input type="checkbox"/>
		Verify Telemetry XpndRx2FuncSts DEL62170	= On	AND=ZAZ7M999
		Verify Telemetry XpndRx2Use DEL60170	= In_Use	AND=ZAZ7M999
		Verify Telemetry XpndRx2LogSts DEL61170	= Redundant	AND=ZAZ7M999
		Verify Telemetry XpndRx2FailSts DEL63170	= Not_Failed	AND=ZAZ7M999
		Verify Telemetry XpndTx2FuncSts DEL31170	= On	AND=ZAZ7M999
		Verify Telemetry XpndTx2Use DEL33170	= In_Use	AND=ZAZ7M999
		Verify Telemetry XpndTx2LogSts DEL32170	= Redundant	AND=ZAZ7M999
		Verify Telemetry XpndTx2FailSts DEL30170	= Not_Failed	AND=ZAZ7M999
4.2		TWTA2 UIU table status verification		<input type="checkbox"/>
		Verify Telemetry Twta2FuncSts DEL23170	= On	AND=ZAZ7M999
		Verify Telemetry Twta2Use DEL25170	= In_Use	AND=ZAZ7M999
		Verify Telemetry Twta2LogSts DEL24170	= Redundant	AND=ZAZ7M999
		Verify Telemetry Twta2FailSts DEL22170	= Not_Failed	AND=ZAZ7M999
		Verify Telemetry Epc2FuncSts DEG29170	= On	AND=ZAZ7M999
		Verify Telemetry Epc2Use DEG31170	= In_Use	AND=ZAZ7M999
		Verify Telemetry Epc2LogSts DEG30170	= Redundant	AND=ZAZ7M999
		Verify Telemetry Epc2FailSts DEG28170	= Not_Failed	AND=ZAZ7M999
		Verify Telemetry TwtAmp2FuncSts DEH17170	= On	AND=ZAZ7M999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry TwtAmp2Use DEH19170	= In_Use	AND=ZAZ7M999
		Verify Telemetry TwtAmp2LogSts DEH18170	= Redundant	AND=ZAZ7M999
		Verify Telemetry TwtAmp2FailSts DEH16170	= Not_Failed	AND=ZAZ7M999
4.3		XPND1 UIU table status verification		<input type="checkbox"/>
		Verify Telemetry XpndRx1FuncSts DEL58170	= On	AND=ZAZ7M999
		Verify Telemetry XpndRx1Use DEL56170	= Not_In_Use	AND=ZAZ7M999
		Verify Telemetry XpndRx1LogSts DEL57170	= Nominal	AND=ZAZ7M999
		Verify Telemetry XpndRx1FailSts DEL59170	= Failed	AND=ZAZ7M999
		Verify Telemetry XpndTx1FuncSts DEL27170	= Off	AND=ZAZ7M999
		Verify Telemetry XpndTx1Use DEL29170	= Not_In_Use	AND=ZAZ7M999
		Verify Telemetry XpndTx1LogSts DEL28170	= Nominal	AND=ZAZ7M999
		Verify Telemetry XpndTx1FailSts DEL26170	= Failed	AND=ZAZ7M999
4.4		TWTA1 UIU table status verification		<input type="checkbox"/>
		Verify Telemetry TwtalFuncSts DEL19170	= Off	AND=ZAZ7M999
		Verify Telemetry TwtalUse DEL21170	= Not_In_Use	AND=ZAZ7M999
		Verify Telemetry TwtalLogSts DEL20170	= Nominal	AND=ZAZ7M999
		Verify Telemetry TwtalFailSts DEL18170	= Failed	AND=ZAZ7M999
		Verify Telemetry Epc1FuncSts DEG25170	= Off	AND=ZAZ7M999
		Verify Telemetry Epc1Use DEG27170	= Not_In_Use	AND=ZAZ7M999
		Verify Telemetry Epc1LogSts DEG26170	= Nominal	AND=ZAZ7M999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry Epc1FailSts                    DEG24170	= Failed	AND=ZAZ7M999
		Verify Telemetry TwtAmplFuncSts                DEH13170	= Off	AND=ZAZ7M999
		Verify Telemetry TwtAmplUse                    DEH15170	= Not_In_Use	AND=ZAZ7M999
		Verify Telemetry TwtAmplLogSts                DEH14170	= Nominal	AND=ZAZ7M999
		Verify Telemetry TwtAmplFailSts                DEH12170	= Failed	AND=ZAZ7M999
5		Verify XPND 1 and 2 status on the 1553 S/C bus		Next Step: 6
5.1		XPND2 RT status on the 1553 S/C bus Verification		□
		Verify Telemetry XPND2On_Off                    DEFD1160	= ON	AND=ZAZ7I999
		Verify Telemetry XPND2Val_Inval                DEFD5160	= Valid	AND=ZAZ7I999
5.2		XPND1 RT status on the 1553 S/C bus Verification		□
		Verify Telemetry XPND1On_Off                    DEFCE160	= OFF	AND=ZAZ7I999
		Verify Telemetry XPND1Val_Inval                DEFCE160	= Invalid	AND=ZAZ7I999
6		Verify XPND2 and TWA2 setting		Next Step: 7
6.1		RX2 power line status verification		□
		Verify FCL4 (XPND2 Rx ) voltage Telemetry Xpnd2_Rx_FCL4_V                WM403565	>= 27.96 V <= 28.71 V	(None)
		Verify FCL4 (XPND2 Rx) current Telemetry Xpnd2_Rx_FCL4_I                WM402565	>= 0.20 A <= 0.35 A	AND=ZAZ7I999
6.2		RX2 Analogue Telemetry verification		□



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		<b>Verify that the bit rate of redundant receiver is set to the default RX rate in the current S/C mode (4 kbps if S/C Nominal or Earth Acquisition mode, 125 bps in the other modes).</b>		
		Verify Receiver 2 bit rate Telemetry RX2 125-4K Stat RMB18442		AND=ZAZ7I999
		Verify RX2 AGC Level Telemetry XPD2_RX2_AGC_LV RMB10442		AND=ZAZ7I999
		Verify RX2 PLL SPE Telemetry XPD2_RX2_PLL_SP RMB12442	<= 130.0 kHz >= -130.0 kHz	AND=ZAZ7I999
		Verify RX2 Supply Voltage Telemetry XPND2_RX2_SUP_V RMB08442	>= 4.8 V <= 5.5 V	AND=ZAZ7I999
		Verify Rx2 temperature Telemetry RX2_TEMP RMB04442		AND=ZAZ7I999
6.3		<i>TX2 power line status verification</i>		<input type="checkbox"/>
		Verify LCL16 ( XPND2 Tx ) voltage Telemetry Xpnd2Tx_L16_S WM92C565	= ON	AND=ZAZ7I999
		Verify LCL16 ( XPND2 Tx ) current Telemetry Xpnd2Tx_L16_I WM908565	>= 0.41 A <= 0.55 A	AND=ZAZ7I999
6.4		<i>TX2 Analogue Telemetry verification</i>		<input type="checkbox"/>
		Verify TX2 Status Telemetry TX2 ON-OFF Stat RMB16442	= ON	AND=ZAZ7I999
		Verify RF2 Output Power Telemetry XPD2_RF2_OUT_PW RMB14442	<= 4.0 dbmW >= -4.8 dbmW	AND=ZAZ7I999
		Verify TX2 Supply Voltage Telemetry XPND2_TX2_SUP_V RMB06442	>= 6.0 V <= 6.9 V	AND=ZAZ7I999
		Verify TX2 Temperature Telemetry TX2_TEMP RMB03442		AND=ZAZ7I999
6.5		<i>TX2 Status via 1553 S/C bus verification</i>		<input type="checkbox"/>
		<b>Verify that the XPND redundant transmitter configuration is according to the XPND TX nominal configuration prior to the TTC chain switch over</b>		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify XPND2 status (correct TM input clock and 1 of the 4 TM modes active) X2 Status - XS RMB43442	= TM mode active	AND=ZAZ7I999
		Verify Low Rate-1 status Telemetry X2 LowRate-1 MD RMB51442		AND=ZAZ7I999
		Verify Low Rate-2 status Telemetry X2 LowRate-2 MD RMB52442		AND=ZAZ7I999
		Verify Medium Rate Modulator status Telemetry X2 MedRate-MRM RMB50442		AND=ZAZ7I999
		Verify High Rate status Telemetry X2 HIRateMD-HRM RMB49442		AND=ZAZ7I999
		Verify Ranging Modulator status Telemetry X2 Rang MD - RM RMB48442		AND=ZAZ7I999
		Verify Coherent Mode status Telemetry X2 Coher MOD-CM RMB47442		AND=ZAZ7I999
		Verify Ranging Modulation Index Telemetry X2 RNGMD ID-RMI RMB53442	= 0.6 rad	AND=ZAZ7I999
		Verify Telemetry Modulation Index Telemetry X2 TM MD ID-TMI RMB54442	= 1.2 rad	AND=ZAZ7I999
		Verify Power level at transmitter output Telemetry X2 OutPowLevSet RMB56442	= -4 dbmW	AND=ZAZ7I999
		Verify Internal Bit Pattern Generator status Telemetry X2 IntBitPatGen RMB55442	= OFF	AND=ZAZ7I999
		Verify External Reference status Telemetry X2 Ext Ref - ER RMB46442	= OFF	AND=ZAZ7I999
		Verify RX2 Lock status Telemetry X2 Rx Lock - RL RMB45442	= Locked	AND=ZAZ7I999
		Verify RX1 AGC Level Telemetry X2 AGC TMUpnk RMB41442		AND=ZAZ7I999
		Verify PLL Phase Error Telemetry X2 RX PLL PhErr RMB40442		AND=ZAZ7I999
		Verify Squelch status Telemetry X2 SqlchSts-SS RMB44442	= ON	AND=ZAZ7I999
		Verify Tx2 TC Bit Rate Telemetry X2 TcBitRateTCB RMB62442		AND=ZAZ7I999
6.6		TWTA2 Status verification		□
		Verify OPLCL50 (TWTA 2) Status Telemetry TwtA_2_L50_1S WM92E565	= ON	AND=ZAZ7J999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry Twta_2_L50_I WM910565	>= 2.2 A <= 2.8 A	AND=ZAZ7J999
		Verify EPC2 Status Telemetry EPC2_ONOFF_STS RMB07439	= ON	AND=ZAZ7J999
		Verify EPC2 Anode Voltage Telemetry EPC2_ANODE_VOLT RMB03439	<= 1058.0 V >= 998.0 V	AND=ZAZ7J999
		Verify EPC2 Helix current Telemetry EPC2_HELIX_CURR RMB04439	>= 0.46 mA <= 1.59 mA	AND=ZAZ7J999
		Verify EPC2 Automatic Restart Status Telemetry EPC2_AUT_RSTART RMB08439	= NOTACTIVE	AND=ZAZ7J999
		Verify EPC2 Temperature Telemetry EPC2_TEMP RMB12439		AND=ZAZ7J999
		Verify TWT2 Status Telemetry TWT2_ONOFF_STS RMB10439	= ON	AND=ZAZ7J999
7		Verify XPND1 and TWT A1 setting		Next Step: 8
7.1		Rx1 power line status verification		<input type="checkbox"/>
		Verify FCL3 (XPND1 Rx ) voltage Telemetry Xpnd1_Rx_FCL3_V WM703565		(None)
		Verify FCL3 (XPND1 Rx) current Telemetry Xpnd1_Rx_FCL3_I WM702565		AND=ZAZ7I999
7.2		Rx1 Analogue Telemetry verification		<input type="checkbox"/>
		Verify RX1 AGC Level Telemetry XPD1_RX1_AGC_LV RMB09442		AND=ZAZ7I999
		Verify RX1 PLL SPE Telemetry XPD1_RX1_PLL_SP RMB11442		AND=ZAZ7I999
		Verify Receiver 1 bit rate Telemetry RX1_125-4K Stat RMB17442		AND=ZAZ7I999
		Verify Rx1 Supply Voltage Telemetry XPND1_RX1_SUP_V RMB07442		AND=ZAZ7I999
		Verify Rx1 temperature Telemetry RX1_TEMP RMB02442		AND=ZAZ7I999
7.3		TX1 power line status verification		<input type="checkbox"/>

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify LCL23 ( XPND1 Tx ) status Telemetry Xpnd1Tx_L23_S WM12D565	= ON	AND=ZAZ7I999
		Verify LCL23 ( XPND1 Tx ) current Telemetry Xpnd1Tx_L23_I WM109565	>= 0.3 A <= 0.4 A	AND=ZAZ7I999
7.4		TX1 Analogue Telemetry verification		□
		Verify Tx1 Status Telemetry TX1 ON-OFF Stat RMB15442	= OFF	AND=ZAZ7I999
		Verify RF1 Output Power Telemetry XPD1_RF1_OUT_PW RMB13442		AND=ZAZ7I999
		Verify Tx1 Supply Voltage Telemetry XPND1_TX1_SUP_V RMB05442		AND=ZAZ7I999
		Verify Tx1 Temperature Telemetry TX1_TEMP RMB01442		AND=ZAZ7I999
7.5		TWT1 Status verification		□
		Verify OPLCL49 (TWT1 1) Status Telemetry Twt1_1_L49_1S WM22E565	= OFF	AND=ZAZ7J999
		Verify TWT1 current Telemetry Twt1_1_L49_I WM210565	>= 0.0 A <= 0.1 A	AND=ZAZ7J999
		Verify EPC1 Status Telemetry EPC1_ONOFF_STS RMB05439	= OFF	AND=ZAZ7J999
		Verify EPC1 Anode Voltage Telemetry EPC1_ANODE_VOLT RMB01439		AND=ZAZ7J999
		Verify EPC1 Helix current Telemetry EPC1_HELIX_CURR RMB02439		AND=ZAZ7J999
		Verify EPC1 Automatic Restart Status Telemetry EPC1_AUT_RSTART RMB06439	= NOTACTIVE	AND=ZAZ7J999
		Verify EPC1 Temperature Telemetry EPC1_TEMP RMB11439		AND=ZAZ7J999
		Verify TWT1 Status Telemetry TWT1_ONOFF_STS RMB09439	= OFF	AND=ZAZ7J999
8		Verify TM encoder bit rate		Next Step: 9
		Verify Telemetry TME_BITRATE DEMRF160		AND=ZAZ7J999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
9		Verify RFDN SWs position		Next Step: 10
		<b>Verify that the RFDN configuration sets the relevant switches position, in order to connect the redundant TWTA, according to the configuration prior to the TTC switch over (to MGA if S/C Nominal or Earth Acquisition mode or LGA1 for the other modes) and associate redundant receiver to LGA1 or LGA2 antenna respectively.</b>		
		Verify RFDN SW1 Position A Telemetry RFDN SW1 Pos A RMB05436		AND=ZAZ7J999
		Verify RFDN SW1 Position B Telemetry RFDN SW1 Pos B RMB09436		AND=ZAZ7J999
		Verify RFDN SW2 Position A Telemetry RFDN SW2 Pos A RMB06436		AND=ZAZ7J999
		Verify RFDN SW2 Position B Telemetry RFDN SW2 Pos B RMB10436		AND=ZAZ7J999
		Verify RFDN SW3 Position A Telemetry RFDN SW3 Pos A RMB07436		AND=ZAZ7J999
		Verify RFDN SW3 Position B Telemetry RFDN SW3 Pos B RMB11436		AND=ZAZ7J999
		Verify RFDN SW4 Position A Telemetry RFDN SW4 Pos A RMB08436		AND=ZAZ7J999
		Verify RFDN SW4 Position B Telemetry RFDN SW4 Pos B RMB12436		AND=ZAZ7J999
10		Request TTC management status report		Next Step: 11
		Execute Telecommand  TtcReportStatus  TC Control Flags :  Subsch. ID : 10 Det. descr. : TTC: Report TTC Management Status TC(8,5,115)  GBM IL DSE --Y -- ---	DC30F170	
		<b>Check that all the information of the TTC Management function is consistent</b>		
11		Report EAT table and check TTC related entries		Next Step: 12

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		Execute Telecommand <p style="text-align: right;"><b>ReptEvtActTable</b></p> TC Control Flags : <p style="text-align: right;">GBM IL DSE --Y -- --</p> Subsch. ID : 10 Det. descr. : TEMPLATE Report The contents of the event/action table TC(19,6)	DCT86170	
		<b>Check that the following EAT entries are disabled:</b> <b>EventID Event Description</b> 0x00A0 XPND1_NOT_VIT_RT_INV 0x00A1 XPND2_NOT_VIT_RT_INV 0x9218 EPC1_HelixCur_OutHi_Lim 0x9219 EPC2_HelixCur_OutHi_Lim 0x9228 EPC1_HelixCur_OutLo_Lim 0x9229 EPC2_HelixCur_OutLo_Lim 0x921A XPND1 RX Failure 0x921B XPND2 RX Failure		
12		Report Monitoring List and check TTC related entries		Next Step: 13
		Execute Telecommand <p style="text-align: right;"><b>ReportMonitList</b></p> TC Control Flags : <p style="text-align: right;">GBM IL DSE --Y -- --</p> Subsch. ID : 10 Det. descr. : TEMPLATE Report current monitoring list, TC(12,8) no appl. data	DC51F170	
		<b>Verify that the TTC entries status are as follows</b> <b>Monitoring ID= 17,76,77 (TTC Chain 1) are disabled , and</b> <b>Monitoring ID= 18,96,97 (TTC Chain 2) are enabled</b>  <b>where:</b> <b>MonID Parameter ID</b> 17 XPND1_RX_Power:DID_ASW_CCC_RES_5:6 76 DID_EPC1_HELIX_CURRENT (4.25 mA Threshold) 77 DID_EPC1_HELIX_CURRENT (0.6 mA Threshold)  18 XPND2_RX_Power:DID_ASW_CCC_RES_5:7 96 DID_EPC2_HELIX_CURRENT (4.25 mA Threshold) 97 DID_EPC2_HELIX_CURRENT (0.6 mA Threshold)		
13		Roll back to chain 1?		Next Step: yes 14 no END
14		Call procedure to switch ON chain 1		Next Step: END

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Procedure: H_CRP_TTC_T10R Switch to chain 1 after XPND1 or TWTAl failure		
TC Seq. Name :HRRTTCR2 (XPNDorTWTAFailChain2) Configuration check after XPND2 or TWTA2 failure  TimeTag Type: Sub Schedule ID:  <input type="checkbox"/>				
15		Verify XPNDs and TWTAs in Unit In Use table		Next Step: 16
15.1		XPND1 UIU table status verification		<input type="checkbox"/>
		Verify Telemetry XpndRx1FuncSts DEL58170 = On		AND=ZAZ7M999
		Verify Telemetry XpndRx1Use DEL56170 = In_Use		AND=ZAZ7M999
		Verify Telemetry XpndRx1LogSts DEL57170 = Redundant		AND=ZAZ7M999
		Verify Telemetry XpndRx1FailSts DEL59170 = Not_Failed		AND=ZAZ7M999
		Verify Telemetry XpndTx1FuncSts DEL27170 = On		AND=ZAZ7M999
		Verify Telemetry XpndTx1Use DEL29170 = In_Use		AND=ZAZ7M999
		Verify Telemetry XpndTx1LogSts DEL28170 = Redundant		AND=ZAZ7M999
		Verify Telemetry XpndTx1FailSts DEL26170 = Not_Failed		AND=ZAZ7M999
15.2		TWTAl UIU table status verification		<input type="checkbox"/>
		Verify Telemetry TwtalFuncSts DEL19170 = On		AND=ZAZ7M999
		Verify Telemetry TwtalUse DEL21170 = In_Use		AND=ZAZ7M999
		Verify Telemetry TwtalLogSts DEL20170 = Redundant		AND=ZAZ7M999
		Verify Telemetry TwtalFailSts DEL18170 = Not_Failed		AND=ZAZ7M999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry Epc1FuncSts DEG25170	= On	AND=ZAZ7M999
		Verify Telemetry Epc1Use DEG27170	= In_Use	AND=ZAZ7M999
		Verify Telemetry Epc1LogSts DEG26170	= Redundant	AND=ZAZ7M999
		Verify Telemetry Epc1FailSts DEG24170	= Not_Failed	AND=ZAZ7M999
		Verify Telemetry TwtAmp1FuncSts DEH13170	= On	AND=ZAZ7M999
		Verify Telemetry TwtAmp1Use DEH15170	= In_Use	AND=ZAZ7M999
		Verify Telemetry TwtAmp1LogSts DEH14170	= Redundant	AND=ZAZ7M999
		Verify Telemetry TwtAmp1FailSts DEH12170	= Not_Failed	AND=ZAZ7M999
15.3		<i>XPND2 UIU table status verification</i>		☐
		Verify Telemetry XpndRx2FuncSts DEL62170	= On	AND=ZAZ7M999
		Verify Telemetry XpndRx2Use DEL60170	= Not_In_Use	AND=ZAZ7M999
		Verify Telemetry XpndRx2LogSts DEL61170	= Nominal	AND=ZAZ7M999
		Verify Telemetry XpndRx2FailSts DEL63170	= Failed	AND=ZAZ7M999
		Verify Telemetry XpndTx2FuncSts DEL31170	= Off	AND=ZAZ7M999
		Verify Telemetry XpndTx2Use DEL33170	= Not_In_Use	AND=ZAZ7M999
		Verify Telemetry XpndTx2LogSts DEL32170	= Nominal	AND=ZAZ7M999
		Verify Telemetry XpndTx2FailSts DEL30170	= Failed	AND=ZAZ7M999
15.4		<i>TWTA2 UIU table status verification</i>		☐
		Verify Telemetry TwtA2FuncSts DEL23170	= Off	AND=ZAZ7M999
		Verify Telemetry TwtA2Use DEL25170	= Not_In_Use	AND=ZAZ7M999



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry Twta2LogSts DEL24170	= Nominal	AND=ZAZ7M999
		Verify Telemetry Twta2FailSts DEL22170	= Failed	AND=ZAZ7M999
		Verify Telemetry Epc2FuncSts DEG29170	= Off	AND=ZAZ7M999
		Verify Telemetry Epc2Use DEG31170	= Not_In_Use	AND=ZAZ7M999
		Verify Telemetry Epc2LogSts DEG30170	= Nominal	AND=ZAZ7M999
		Verify Telemetry Epc2FailSts DEG28170	= Failed	AND=ZAZ7M999
		Verify Telemetry TwtAmp2FuncSts DEH17170	= Off	AND=ZAZ7M999
		Verify Telemetry TwtAmp2Use DEH19170	= Not_In_Use	AND=ZAZ7M999
		Verify Telemetry TwtAmp2LogSts DEH18170	= Nominal	AND=ZAZ7M999
		Verify Telemetry TwtAmp2FailSts DEH16170	= Failed	AND=ZAZ7M999
16		Verify XPND 1 and 2 status on the 1553 S/C bus		Next Step: 17
16.1		XPND1 RT status on the 1553 S/C bus Verification		<input type="checkbox"/>
		Verify Telemetry XPND1On_Off DEFCG160	= ON	AND=ZAZ7I999
		Verify Telemetry XPND1Val_Inval DEFCK160	= Valid	AND=ZAZ7I999
16.2		XPND2 RT status on the 1553 S/C bus Verification		<input type="checkbox"/>
		Verify Telemetry XPND2On_Off DEFD1160	= OFF	AND=ZAZ7I999
		Verify Telemetry XPND2Val_Inval DEFD5160	= Invalid	AND=ZAZ7I999
17		Verify XPND1 and TWTAs setting		Next Step: 18
17.1		Rx1 power line status verification		<input type="checkbox"/>

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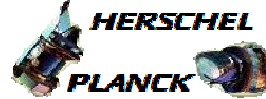
Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify FCL3 (XPND1 Rx ) voltage Telemetry Xpnd1_Rx_FCL3_V WM703565	>= 27.96 V <= 28.71 V	(None)
		Verify FCL3 (XPND1 Rx) current Telemetry Xpnd1_Rx_FCL3_I WM702565	>= 0.20 A <= 0.35 A	AND=ZAZ7I999
17.2		Rx1 Analogue Telemetry verification		□
		<b>Verify that the bit rate of redundant receiver is set to the default RX rate in the current S/C mode (4 kbps if S/C Nominal or Earth Acquisition mode, 125 bps in the other modes).</b>		
		Verify RX1 AGC Level Telemetry XPD1_RX1_AGC_LV RMB09442		AND=ZAZ7I999
		Verify RX1 PLL SPE Telemetry XPD1_RX1_PLL_SP RMB11442	<= 130.0 kHz >= -130.0 kHz	AND=ZAZ7I999
		Verify Receiver 1 bit rate Telemetry RX1_125-4K Stat RMB17442		AND=ZAZ7I999
		Verify Rx1 Supply Voltage Telemetry XPND1_RX1_SUP_V RMB07442	>= 4.8 V <= 5.5 V	AND=ZAZ7I999
		Verify Rx1 temperature Telemetry RX1_TEMP RMB02442		AND=ZAZ7I999
17.3		TX1 power line status verification		□
		Verify LCL23 ( XPND1 Tx ) status Telemetry Xpnd1Tx_L23_S WM12D565	= ON	AND=ZAZ7I999
		Verify LCL23 ( XPND1 Tx ) current Telemetry Xpnd1Tx_L23_I WM109565	>= 0.41 A <= 0.55 A	AND=ZAZ7I999
17.4		TX1 Analogue Telemetry verification		□
		Verify Tx1 Status Telemetry TX1 ON-OFF Stat RMB15442	= ON	AND=ZAZ7I999
		Verify RF1 Output Power Telemetry XPD1_RF1_OUT_PW RMB13442	<= -4.2 dbmW >= -5.2 dbmW	AND=ZAZ7I999
		Verify Tx1 Supply Voltage Telemetry XPND1_TX1_SUP_V RMB05442	>= 6.0 V <= 6.9 V	AND=ZAZ7I999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Tx1 Temperature Telemetry TX1_TEMP RMB01442		AND=ZAZ7I999
17.5		TX1 Status via 1553 S/C bus verification		<input type="checkbox"/>
		<b>Verify that the XPND redundant transmitter configuration is according to the XPND TX nominal configuration prior to the TTC chain switch over</b>		
		Verify XPND1 status (TM input clock and lof4 TM modes active) X1 Status - XS RMB22442	= TM mode active	AND=ZAZ7I999
		Verify Low Rate-1 status Telemetry X1 LowRate-1 MD RMB30442		AND=ZAZ7I999
		Verify Low Rate-2 status Telemetry X1 LowRate-2 MD RMB31442		AND=ZAZ7I999
		Verify Medium Rate Modulator status Telemetry X1 MedRate-MRM RMB29442		AND=ZAZ7I999
		Verify High Rate status Telemetry X1 HIRateMD-HRM RMB28442		AND=ZAZ7I999
		Verify Ranging Modulator status Telemetry X1 Rang MOD-RM RMB27442		AND=ZAZ7I999
		Verify Coherent Mode status Telemetry X1 Coher MOD-CM RMB26442		AND=ZAZ7I999
		Verify Ranging Modulation Index Telemetry X1 RNGMD ID-RMI RMB32442	= 0.6 rad	AND=ZAZ7I999
		Verify Telemetry Modulation Index Telemetry X1 TM MD ID-TMI RMB33442	= 1.2 rad	AND=ZAZ7I999
		Verify Power level at transmitter output Telemetry X1 OutPowLevSet RMB35442	= -4 dbmW	AND=ZAZ7I999
		Verify Internal Bit Pattern Generator status Telemetry X1 IntBitPatGen RMB34442	= OFF	AND=ZAZ7I999
		Verify External Reference status Telemetry X1 Ext Ref - ER RMB25442	= OFF	AND=ZAZ7I999
		Verify RX1 Lock status Telemetry X1 Rx Lock - RL RMB24442	= Locked	AND=ZAZ7I999
		Verify RX1 AGC Level Telemetry X1 AGC TMUplnk RMB20442		AND=ZAZ7I999
		Verify PLL Phase Error Telemetry X1 RX PLL PhErr RMB19442	<= 130.0 kHz >= -130.0 kHz	AND=ZAZ7I999
		Verify Squelch status Telemetry X1 SqlchSt - SS RMB23442	= ON	AND=ZAZ7I999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Tx1 TC Bit Rate Telemetry <b>X1 TcBitRateTCB</b> <b>RMB61442</b>		AND=ZAZ7I999
17.6		<i>TWTA1 Status verification</i>		<input type="checkbox"/>
		Verify OPLCL49 (TWTA 1) Status Telemetry <b>Twta_1_L49_1S</b> <b>WM22E565</b>	= ON	AND=ZAZ7J999
		Verify TWTA1 current Telemetry <b>Twta_1_L49_I</b> <b>WM210565</b>	>= 2.2 A <= 2.8 A	AND=ZAZ7J999
		Verify EPC1 Status Telemetry <b>EPC1_ONOFF_STS</b> <b>RMB05439</b>	= ON	AND=ZAZ7J999
		Verify EPC1 Anode Voltage Telemetry <b>EPC1_ANODE_VOLT</b> <b>RMB01439</b>	>= 1077.0 V <= 1137.0 V	AND=ZAZ7J999
		Verify EPC1 Helix current Telemetry <b>EPC1_HELIX_CURR</b> <b>RMB02439</b>	>= 0.19 mA <= 1.20 mA	AND=ZAZ7J999
		Verify EPC1 Automatic Restart Status Telemetry <b>EPC1_AUT_RSTART</b> <b>RMB06439</b>	= NOTACTIVE	AND=ZAZ7J999
		Verify EPC1 Temperature Telemetry <b>EPC1_TEMP</b> <b>RMB11439</b>		AND=ZAZ7J999
		Verify TWT1 Status Telemetry <b>TWT1_ONOFF_STS</b> <b>RMB09439</b>	= ON	AND=ZAZ7J999
18		<i>Verify XPND2 and TWTA2 setting</i>		Next Step: 19
18.1		<i>RX2 power line status verification</i>		<input type="checkbox"/>
		Verify FCL4 (XPND2 Rx ) voltage Telemetry <b>Xpnd2_Rx_FCL4_V</b> <b>WM403565</b>		(None)
		Verify FCL4 (XPND2 Rx) current Telemetry <b>Xpnd2_Rx_FCL4_I</b> <b>WM402565</b>		AND=ZAZ7I999
18.2		<i>RX2 Analogue Telemetry verification</i>		<input type="checkbox"/>
		Verify Receiver 2 bit rate Telemetry <b>RX2_125-4K_Stat</b> <b>RMB18442</b>		AND=ZAZ7I999
		Verify RX2 AGC Level Telemetry <b>XPND2_RX2_AGC_LV</b> <b>RMB10442</b>		AND=ZAZ7I999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify RX2 PLL SPE Telemetry XPND2_RX2_PLL_SP RMB12442	<= 130.0 kHz >= -130.0 kHz	AND=ZAZ7I999
		Verify RX2 Supply Voltage Telemetry XPND2_RX2_SUP_V RMB08442		AND=ZAZ7I999
		Verify Rx2 temperature Telemetry RX2_TEMP RMB04442		AND=ZAZ7I999
18.3		TX2 power line status verification		<input type="checkbox"/>
		Verify LCL16 ( XPND2 Tx ) voltage Telemetry Xpnd2Tx_L16_S WM92C565	= ON	AND=ZAZ7I999
		Verify LCL16 ( XPND2 Tx ) current Telemetry Xpnd2Tx_L16_I WM908565	>= 0.3 A <= 0.4 A	AND=ZAZ7I999
18.4		TX2 Analogue Telemetry verification		<input type="checkbox"/>
		Verify TX2 Status Telemetry TX2 ON-OFF Stat RMB16442	= OFF	AND=ZAZ7I999
		Verify RF2 Output Power Telemetry XPD2_RF2_OUT_PW RMB14442		AND=ZAZ7I999
		Verify TX2 Supply Voltage Telemetry XPND2_TX2_SUP_V RMB06442		AND=ZAZ7I999
		Verify TX2 Temperature Telemetry TX2_TEMP RMB03442		AND=ZAZ7I999
18.5		TWTA2 Status verification		<input type="checkbox"/>
		Verify OPLCL50 (TWTA 2) Status Telemetry Twta_2_L50_1S WM92E565	= OFF	AND=ZAZ7J999
		Verify Telemetry Twta_2_L50_I WM910565	>= 0.0 A <= 0.10 A	AND=ZAZ7J999
		Verify EPC2 Status Telemetry EPC2_ONOFF_STS RMB07439	= OFF	AND=ZAZ7J999
		<b>Anode voltage and helix current telemetries become active only when the high voltage is applied to the TWT</b>		
		Verify EPC2 Anode Voltage Telemetry EPC2_ANODE_VOLT RMB03439		AND=ZAZ7J999
		Verify EPC2 Helix current Telemetry EPC2_HELIX_CURR RMB04439		AND=ZAZ7J999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify EPC2 Automatic Restart Status Telemetry EPC2_AUT_RSTART RMB08439	= NOTACTIVE	AND=ZAZ7J999
		Verify EPC2 Temperature Telemetry EPC2_TEMP RMB12439		AND=ZAZ7J999
		Verify TWT2 Status Telemetry TWT2_ONOFF_STS RMB10439	= OFF	AND=ZAZ7J999
19		Verify TM encoder bit rate		Next Step: 20
		Verify Telemetry TME_BITRATE DEMRF160		AND=ZAZ7J999
20		Verify RFDN SWs position		Next Step: 21
		<b>Verify that the RFDN configuration sets the relevant switches position, in order to connect the redundant TWTA, according to the configuration prior to the TTC switch over (to MGA if S/C Nominal or Earth Acquisition mode or LGA1 for the other modes) and associate redundant receiver to LGA1 or LGA2 antenna respectively.</b>		
		Verify RFDN SW1 Position A Telemetry RFDN SW1 Pos A RMB05436		AND=ZAZ7J999
		Verify RFDN SW1 Position B Telemetry RFDN SW1 Pos B RMB09436		AND=ZAZ7J999
		Verify RFDN SW2 Position A Telemetry RFDN SW2 Pos A RMB06436		AND=ZAZ7J999
		Verify RFDN SW2 Position B Telemetry RFDN SW2 Pos B RMB10436		AND=ZAZ7J999
		Verify RFDN SW3 Position A Telemetry RFDN SW3 Pos A RMB07436		AND=ZAZ7J999
		Verify RFDN SW3 Position B Telemetry RFDN SW3 Pos B RMB11436		AND=ZAZ7J999
		Verify RFDN SW4 Position A Telemetry RFDN SW4 Pos A RMB08436		AND=ZAZ7J999
		Verify RFDN SW4 Position B Telemetry RFDN SW4 Pos B RMB12436		AND=ZAZ7J999
21		Request TTC managment status report		Next Step: 22

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand <p style="text-align: right;"><b>TtcReportStatus</b></p> DC30F170  <i>TC Control Flags :</i> <p style="text-align: right;">GBM IL DSE --Y -- ---</p> Subsch. ID : 10 Det. descr. : TTC: Report TTC Management Status TC(8,5,115)		
		<b>Check that all the information of the TTC Management function is consistent</b>		
22		Report EAT table and check TTC related entries		Next Step: 23
		Execute Telecommand <p style="text-align: right;"><b>ReptEvtActTable</b></p> DCT86170  <i>TC Control Flags :</i> <p style="text-align: right;">GBM IL DSE --Y -- ---</p> Subsch. ID : 10 Det. descr. : TEMPLATE Report The contents of the event/action table TC(19,6)		
		<b>Check that the following EAT entries are disabled:</b> EventID Event Description 0x00A0 XPND1_NOT_VIT_RT_INV 0x00A1 XPND2_NOT_VIT_RT_INV 0x9218 EPC1_HelixCur_OutHi_Lim 0x9219 EPC2_HelixCur_OutHi_Lim 0x9228 EPC1_HelixCur_OutLo_Lim 0x9229 EPC2_HelixCur_OutLo_Lim 0x921A XPND1 RX Failure 0x921B XPND2 RX Failure		
23		Report Monitoring List and check TTC related entries		Next Step: 24
		Execute Telecommand <p style="text-align: right;"><b>ReportMonitList</b></p> DC51F170  <i>TC Control Flags :</i> <p style="text-align: right;">GBM IL DSE --Y -- ---</p> Subsch. ID : 10 Det. descr. : TEMPLATE Report current monitoring list, TC(12,8) no appl. data		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		<p>Verify that the TTC entries status are as follows            Monitoring ID= 17,76,77 (TTC Chain 1) are enabled , and            Monitoring ID= 18,96,97 (TTC Chain 2) are disabled</p> <p>where:  <b>MonID Parameter ID</b>            17 XPND1_RX_Power: DID_ASW_CCC_RES_5:6            76 DID_EPC1_HELIX_CURRENT (4.25 mA Threshold)            77 DID_EPC1_HELIX_CURRENT (0.6 mA Threshold)</p> <p>18 XPND2_RX_Power: DID_ASW_CCC_RES_5:7            96 DID_EPC2_HELIX_CURRENT (4.25 mA Threshold)            97 DID_EPC2_HELIX_CURRENT (0.6 mA Threshold)</p>		
24		Roll back to chain 2?		Next Step: yes 25 no END
25		Call procedure to switch ON chain 2		Next Step: END
		<p>Execute Procedure:  <b>H_CRP_TTC_T20R</b>            Switch to chain 2 after XPND2 or TWTA2 failure</p>		
<b>End of Procedure</b>				