

Tx1 and TM encoder in use configuration for MR  
File: H\_CRP\_TTC\_T1MR.xls  
Author: E. Picallo



## Procedure Summary

### Objectives

This procedure describes the steps needed to change the TM bit rate to 150 kbps when the downlink and the uplink are already established.

This procedure does not use the logical addressing, thus must be executed under Ground control (the commands used cannot be inserted in the MTL).

### Summary of Constraints

XPND1 and the TM encoder are configured using TC(8,4,115,9), TC(8,4,115,18) and TC(8,4,115,20), thus the status of the ASW function "TTC Management" has to be "running".

Note that:

- the value of the TM modulation index is always 1.2;
- the value of the RNG modulation index, when CM and RNG are ON, is always 0.6;
- the value of the Output power level is always - 4dBm;
- the External reference and Internal bit pattern generator are always OFF.

If the ASW function "On board Scheduling" is stopped the TCs can not be added into the MTL.  
If the function is running, up to four time-tagged TCs are released per second.

It is recommended to command ON the coherent and ranging mode parameters by Ground only after confirmation of onboard lock.

### Spacecraft Configuration

#### Start of Procedure

CDMU in default configuration;  
Downlink active via TX1 and TWTAl;  
TM bit rate set to any value;  
XPND configuration: CM OFF or CM ON and RNG OFF or CM ON and RNG ON.

#### End of Procedure

CDMU in default configuration;  
Downlink active via TX1 and TWTAl;  
TM bit rate equal to 150 kbps;  
XPND configuration: CM and RNG unchanged

### Reference File(s)

#### Input Command Sequences

#### Output Command Sequences

HRRT1MR1  
HRRT1MR2  
HRRT1MR3

### Referenced Displays

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**ANDs**      **GRDs**      **SLDs**  
 ZAZ7I999  
 ZAZ7J999

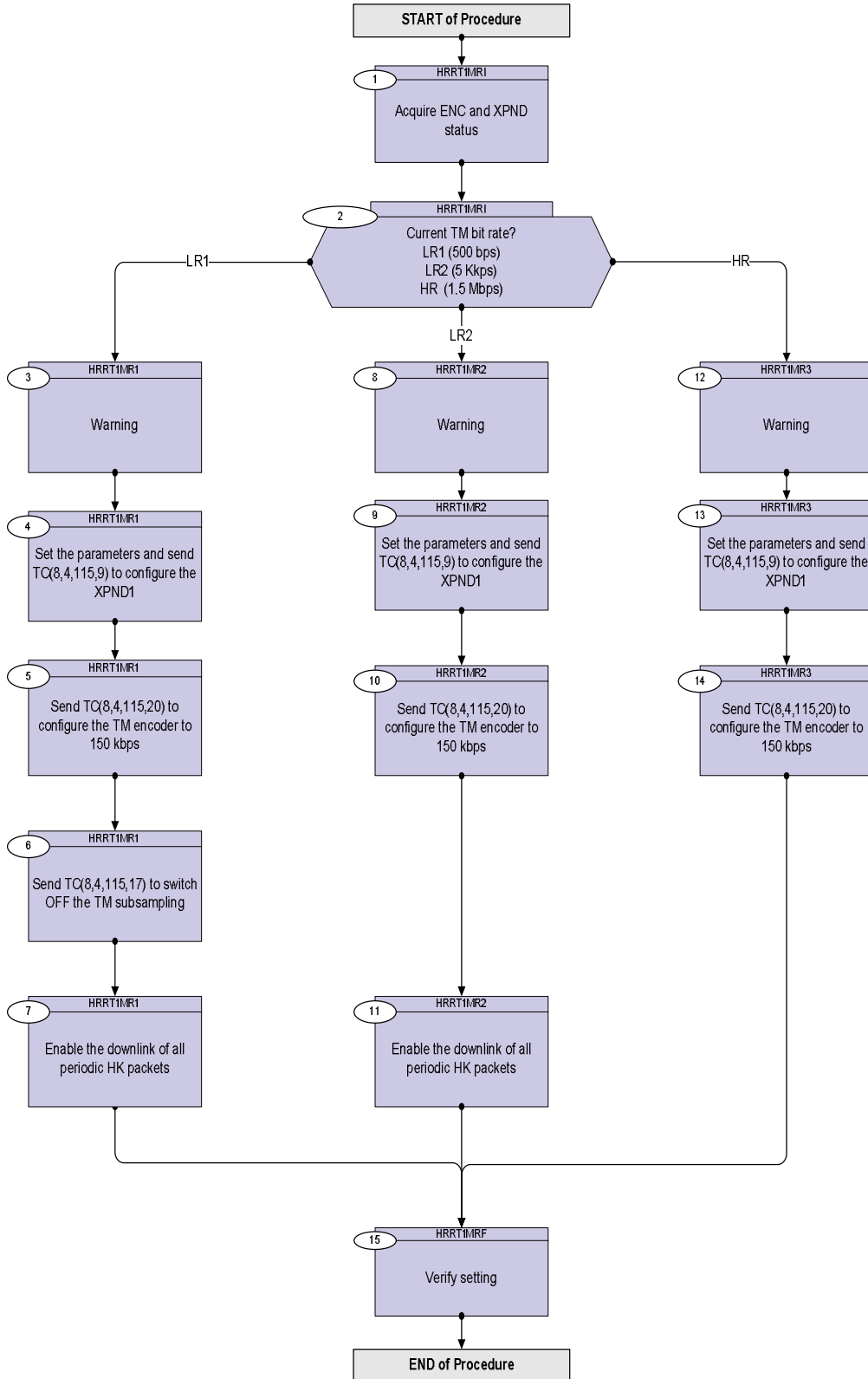
**Configuration Control Information**

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
30/07/08	1	1	Created	E. Picallo	
16/12/08	2	2	TC DCT18170 Configure Xpnd mask update TCs XPND Config & TM ENC Config blocked TC XPND Config do not update CM and RM	E. Picallo	
14/03/09	2.2	2.01	Validation : Verification RNG mod status corrected	E. Picallo	
07/04/09	2.3	3	Step 6: wrong command description, the TC DC03F170 is a TC(8,4,115,17) corrected	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 : HRRT1MRI (Tx1 for MR initial) Tx1 and TM encoder in use configuration for MR  TimeTag Type: N Sub Schedule ID:  <input type="checkbox"/>				
1		Acquire ENC and XPND status		Next Step: 2
		Verify AGC/Uplink Level Telemetry X1 AGC TMUplnk RMB20442	>= -141.0 dbmW	AND=ZAZ7I999
		Verify RX Lock status Telemetry X1 Rx Lock - RL RMB24442	= Locked	AND=ZAZ7I999
		Verify Telemetry TME_BITRATE DEMRF160		AND=ZAZ7J999
		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	= OFF	AND=ZAZ7I999
		Verify High Rate status Telemetry X1 HIRateMD-HRM RMB28442		AND=ZAZ7I999
		Verify Coherent Mode status Telemetry X1 Coher MOD-CM RMB26442		AND=ZAZ7I999
		Verify Ranging Modulator status Telemetry X1 Rang MOD-RM RMB27442		AND=ZAZ7I999
2		Current TM bit rate? LR1 (500 bps) LR2 (5 Kkps) HR (1.5 Mbps)		Next Step: LR1 3 LR2 8 HR 12
TC Seq. Name : HRRT1MR1 (Tx1 from LR1 to MR) Tx1 and TM encoder configuration from LR1 to MR  TimeTag Type: N Sub Schedule ID:  <input type="checkbox"/>				
3		Warning		Next Step: 4

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4		<p>Set the parameters and send TC(8,4,115,9) to configure the XPND1</p>		Next Step: 5																																																																																							
		<p>Execute Telecommand</p> <p style="text-align: center;">XpndConfigure_Templ</p> <p>Command Parameter(s) :</p> <table border="0"> <tr> <td>XpndId</td> <td>DH018170</td> <td>XpndA (Def)</td> </tr> <tr> <td>XpndConfMask1Unus</td> <td>DH220170</td> <td>11 &lt;bin&gt;</td> </tr> <tr> <td>XpndConfMask1_ER</td> <td>DH221170</td> <td>ON</td> </tr> <tr> <td>XpndConfMask1_CM</td> <td>DH222170</td> <td>OFF (Def)</td> </tr> <tr> <td>XpndConfMask1_RM</td> <td>DH223170</td> <td>OFF (Def)</td> </tr> <tr> <td>XpndConfMask1_HRM</td> <td>DH224170</td> <td>ON</td> </tr> <tr> <td>XpndConfMask1_MRM</td> <td>DH225170</td> <td>ON</td> </tr> <tr> <td>XpndConfMask1LRM1</td> <td>DH226170</td> <td>ON</td> </tr> <tr> <td>XpndConfMask1LRM2</td> <td>DH227170</td> <td>ON</td> </tr> <tr> <td>XpndConfMask1_RMI</td> <td>DH228170</td> <td>Update</td> </tr> <tr> <td>XpndConfMask1_TMI</td> <td>DH229170</td> <td>Update</td> </tr> <tr> <td colspan="3"> </td> </tr> <tr> <td>XpndConfMask2_PG</td> <td>DH230170</td> <td>ON</td> </tr> <tr> <td>XpndConfMask2Unus</td> <td>DH231170</td> <td>1111111111 &lt;bin&gt;</td> </tr> <tr> <td>XpndConfMask2OPLS</td> <td>DH232170</td> <td>Update</td> </tr> <tr> <td>XpndConfDW1Unus</td> <td>DH020170</td> <td>0 &lt;dec&gt; (Def)</td> </tr> <tr> <td>XpndConfDW1_ER</td> <td>DH021170</td> <td>OFF (Def)</td> </tr> <tr> <td>XpndConfDW1_CM</td> <td>DH022170</td> <td>OFF (Def)</td> </tr> <tr> <td>XpndConfDW1_RM</td> <td>DH023170</td> <td>OFF (Def)</td> </tr> <tr> <td>XpndConfDW1_HRM</td> <td>DH024170</td> <td>OFF (Def)</td> </tr> <tr> <td>XpndConfDW1_MRM</td> <td>DH025170</td> <td>ON</td> </tr> <tr> <td>XpndConfDW1LRM1</td> <td>DH026170</td> <td>OFF (Def)</td> </tr> <tr> <td>XpndConfDW1LRM2</td> <td>DH027170</td> <td>OFF (Def)</td> </tr> <tr> <td>XpndConfDW1_RMI</td> <td>DH028170</td> <td>0.6</td> </tr> <tr> <td>XpndConfDW1_TMI</td> <td>DH029170</td> <td>1.2</td> </tr> <tr> <td>XpndConfDW2_PG</td> <td>DH030170</td> <td>OFF (Def)</td> </tr> <tr> <td>XpndConfDW2Unus</td> <td>DH031170</td> <td>0 &lt;dec&gt; (Def)</td> </tr> <tr> <td colspan="3"> </td> </tr> <tr> <td>XpndConfDW2OPLS</td> <td>DH032170</td> <td>-4</td> </tr> </table> <p>TC Control Flags :</p> <p style="text-align: right;">GBM IL DSE -SY -- ---</p> <p>Subsch. ID : 10    Det. descr. : TEMPLATE Configure Xpnd TC(8,4,115,9)</p>	XpndId	DH018170	XpndA (Def)	XpndConfMask1Unus	DH220170	11 <bin>	XpndConfMask1_ER	DH221170	ON	XpndConfMask1_CM	DH222170	OFF (Def)	XpndConfMask1_RM	DH223170	OFF (Def)	XpndConfMask1_HRM	DH224170	ON	XpndConfMask1_MRM	DH225170	ON	XpndConfMask1LRM1	DH226170	ON	XpndConfMask1LRM2	DH227170	ON	XpndConfMask1_RMI	DH228170	Update	XpndConfMask1_TMI	DH229170	Update				XpndConfMask2_PG	DH230170	ON	XpndConfMask2Unus	DH231170	1111111111 <bin>	XpndConfMask2OPLS	DH232170	Update	XpndConfDW1Unus	DH020170	0 <dec> (Def)	XpndConfDW1_ER	DH021170	OFF (Def)	XpndConfDW1_CM	DH022170	OFF (Def)	XpndConfDW1_RM	DH023170	OFF (Def)	XpndConfDW1_HRM	DH024170	OFF (Def)	XpndConfDW1_MRM	DH025170	ON	XpndConfDW1LRM1	DH026170	OFF (Def)	XpndConfDW1LRM2	DH027170	OFF (Def)	XpndConfDW1_RMI	DH028170	0.6	XpndConfDW1_TMI	DH029170	1.2	XpndConfDW2_PG	DH030170	OFF (Def)	XpndConfDW2Unus	DH031170	0 <dec> (Def)				XpndConfDW2OPLS	DH032170	-4		
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		<b>Notice that in the configuration of the XPND the coherent mode is unchanged. Although if the receiver losses lock for more than 0.2 s, then the transponder reverts back to noncoherent mode. When receiver locks again, the transponder automatically returns to the memorised mode.</b>		
5		Send TC(8,4,115,20) to configure the TM encoder to 150 kbps		Next Step: 6
		Execute Telecommand <p style="text-align: right;"><b>TtcConfTmEncInUseMedium</b></p> TC Control Flags : <p style="text-align: right;">GBM IL DSE -E- -- ---</p> Subsch. ID : 10 Det. descr. : TTC: Config TM Enc In Use Mode Medium 150 kbps, TC(8,4,115,20)	DC22F170	
6		Send TC(8,4,115,17) to switch OFF the TM subsampling		Next Step: 7
		Execute Telecommand <p style="text-align: right;"><b>TtcSwitchTmSubsamploff</b></p> TC Control Flags : <p style="text-align: right;">GBM IL DSE --Y -- ---</p> Subsch. ID : 10 Det. descr. : TTC: Switch TM Subsampling Off TC(8,4,115,17)	DC03F170	
7		Enable the downlink of all periodic HK packets		Next Step: 15
		Execute procedures H_FCP_DHS_1003 (Set the default values for the TRANSMIT/STORAGE flags with TC(14,5)) H_FCP_DHS_1009 ( Enable the default HK (essential + periodic) packets with TC(14,1))		
TC Seq. Name :HRRT1MR2 (Tx1 from LR2 to MR) Tx1 and TM encoder in use configuration from LR2 to MR  TimeTag Type: N Sub Schedule ID:  <input type="checkbox"/>				

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Tx1 and TM encoder in use configuration for MR  
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 Author: E. Picallo



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		<b>Notice that in the configuration of the XPND the coherent mode is unchanged. Although if the receiver losses lock for more than 0.2 s, then the transponder reverts back to noncoherent mode. When receiver locks again, the transponder automatically returns to the memorised mode.</b>		
10		Send TC(8,4,115,20) to configure the TM encoder to 150 kbps		Next Step: 11
		Execute Telecommand  <b>TtcConfTmEncInUseMedium</b>  TC Control Flags :  GBM IL DSE -E- - - - -  Subsch. ID : 10 Det. descr. : TTC: Config TM Enc In Use Mode Medium 150 kbps, TC(8,4,115,20)	DC22F170	
11		Enable the downlink of all periodic HK packets		Next Step: 15
		Execute procedures  H_FCP_DHS_1003 (Set the default values for the TRANSMIT/STORAGE flags with TC(14,5))  H_FCP_DHS_1009 ( Enable the default HK (essential + periodic) packets with TC(14,1))		
TC Seq. Name :HRRT1MR3 (Tx1 from HR to MR)  TimeTag Type: N Sub Schedule ID:  <input type="checkbox"/>				
12		Warning		Next Step: 13
		<b>The current TM bit rate is not MR. Therefore a TM bit rate switch will be performed.</b>  <b>A specific feature of this switching, is that it shall be done by several TC. Specifically, separate TC will be necessary to set-up the TM encoder, and the XPND.</b>  <b>In the time interval between those TC, the TM flux will be some TM disruption, and no CLCW will be available to acknowledge the TC. Therefore send those TCs blocked (encoded in a single CLTU) or send TCs TT.</b>		



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13		Set the parameters and send TC(8,4,115,9) to configure the XPND1		Next Step: 14																																																																																																																																								
		Execute Telecommand <p style="text-align: right;">XpndConfigure_Templ</p> Command Parameter(s) : <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; text-align: right;">XpndId</td> <td style="width: 20%;">DH018170</td> <td style="width: 30%;">XpndA (Def)</td> <td style="width: 20%;"></td> </tr> <tr> <td style="text-align: right;">XpndConfMask1Unus</td> <td>DH220170</td> <td>11 &lt;bin&gt;</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfMask1_ER</td> <td>DH221170</td> <td>ON</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfMask1_CM</td> <td>DH222170</td> <td>OFF (Def)</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfMask1_RM</td> <td>DH223170</td> <td>OFF (Def)</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfMask1_HRM</td> <td>DH224170</td> <td>ON</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfMask1_MRM</td> <td>DH225170</td> <td>ON</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfMask1LRM1</td> <td>DH226170</td> <td>ON</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfMask1LRM2</td> <td>DH227170</td> <td>ON</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfMask1_RMI</td> <td>DH228170</td> <td>Update</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfMask1_TMI</td> <td>DH229170</td> <td>Update</td> <td></td> </tr> <tr> <td colspan="4"> </td> </tr> <tr> <td style="text-align: right;">XpndConfMask2_PG</td> <td>DH230170</td> <td>ON</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfMask2Unus</td> <td>DH231170</td> <td>1111111111 &lt;bin&gt;</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfMask2OPLS</td> <td>DH232170</td> <td>Update</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfDW1Unus</td> <td>DH020170</td> <td>0 &lt;dec&gt; (Def)</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfDW1_ER</td> <td>DH021170</td> <td>OFF (Def)</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfDW1_CM</td> <td>DH022170</td> <td>OFF (Def)</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfDW1_RM</td> <td>DH023170</td> <td>OFF (Def)</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfDW1_HRM</td> <td>DH024170</td> <td>OFF (Def)</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfDW1_MRM</td> <td>DH025170</td> <td>ON</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfDW1LRM1</td> <td>DH026170</td> <td>OFF (Def)</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfDW1LRM2</td> <td>DH027170</td> <td>OFF (Def)</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfDW1_RMI</td> <td>DH028170</td> <td>0.6</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfDW1_TMI</td> <td>DH029170</td> <td>1.2</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfDW2_PG</td> <td>DH030170</td> <td>OFF (Def)</td> <td></td> </tr> <tr> <td style="text-align: right;">XpndConfDW2Unus</td> <td>DH031170</td> <td>0 &lt;dec&gt; (Def)</td> <td></td> </tr> <tr> <td colspan="4"> </td> </tr> <tr> <td style="text-align: right;">XpndConfDW2OPLS</td> <td>DH032170</td> <td>-4</td> <td></td> </tr> <tr> <td colspan="4"> </td> </tr> <tr> <td colspan="2">TC Control Flags :</td> <td style="text-align: right;">GBM IL DSE</td> <td></td> </tr> <tr> <td colspan="2"></td> <td style="text-align: right;">-SY -- ---</td> <td></td> </tr> <tr> <td colspan="2">Subsch. ID : 10</td> <td></td> <td></td> </tr> <tr> <td colspan="2">Det. descr. : TEMPLATE Configure Xpnd TC(8,4,115,9)</td> <td></td> <td></td> </tr> </table>	XpndId	DH018170	XpndA (Def)		XpndConfMask1Unus	DH220170	11 <bin>		XpndConfMask1_ER	DH221170	ON		XpndConfMask1_CM	DH222170	OFF (Def)		XpndConfMask1_RM	DH223170	OFF (Def)		XpndConfMask1_HRM	DH224170	ON		XpndConfMask1_MRM	DH225170	ON		XpndConfMask1LRM1	DH226170	ON		XpndConfMask1LRM2	DH227170	ON		XpndConfMask1_RMI	DH228170	Update		XpndConfMask1_TMI	DH229170	Update						XpndConfMask2_PG	DH230170	ON		XpndConfMask2Unus	DH231170	1111111111 <bin>		XpndConfMask2OPLS	DH232170	Update		XpndConfDW1Unus	DH020170	0 <dec> (Def)		XpndConfDW1_ER	DH021170	OFF (Def)		XpndConfDW1_CM	DH022170	OFF (Def)		XpndConfDW1_RM	DH023170	OFF (Def)		XpndConfDW1_HRM	DH024170	OFF (Def)		XpndConfDW1_MRM	DH025170	ON		XpndConfDW1LRM1	DH026170	OFF (Def)		XpndConfDW1LRM2	DH027170	OFF (Def)		XpndConfDW1_RMI	DH028170	0.6		XpndConfDW1_TMI	DH029170	1.2		XpndConfDW2_PG	DH030170	OFF (Def)		XpndConfDW2Unus	DH031170	0 <dec> (Def)						XpndConfDW2OPLS	DH032170	-4						TC Control Flags :		GBM IL DSE				-SY -- ---		Subsch. ID : 10				Det. descr. : TEMPLATE Configure Xpnd TC(8,4,115,9)					
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		Execute Telecommand  <b>TtcConfTmEncInUseMedium</b>  <i>TC Control Flags :</i>  Subsch. ID : 10 Det. descr. : TTC: Config TM Enc In Use Mode Medium 150 kbps, TC(8,4,115,20)  GBM IL DSE -E- - - - -	DC22F170	
TC Seq. Name : HRRT1MRF (Tx1 for MR final)  TimeTag Type: Sub Schedule ID:  <input type="checkbox"/>				
15		Verify setting		Next Step: END
		Verify Telemetry  <b>TME_BITRATE</b> <b>DEMRF160</b>	= 150 Kbps	AND=ZAZ7J999
		Verify Telemetry  <b>BSW_TM_MODE</b> <b>DEMF0160</b>	= AllVc	AND=ZAZ7J999
		Verify Medium Rate Modulator status Telemetry <b>X1 MedRate-MRM</b> <b>RMB29442</b>	= ON	AND=ZAZ7I999
		Verify Coherent Mode status Telemetry <b>X1 Coher MOD-CM</b> <b>RMB26442</b>		AND=ZAZ7I999
		Verify Ranging Modulator status Telemetry <b>X1 Rang MOD-RM</b> <b>RMB27442</b>		AND=ZAZ7I999
		Verify RNG Modulation Index Telemetry <b>X1 RNGMD ID-RMI</b> <b>RMB32442</b>	= 0.6 rad	AND=ZAZ7I999
<b>End of Procedure</b>				