

Configure TM/TC after Mode Drop
File: H_CRP_SYS_TMTC.xls
Author: F. Keck



Procedure Summary

Objectives

After FDIR forced mode transitions the TM/TC
a) has dropped to 500/125, or
b) remained on medium, but lost default configuration

This procedure increases the TM/TC rate to 5k/4k if CEB or NNO is the active ground station (including a special TM storage/transmission configuration).

During LEOP the TM/TC rate can be increased to 150k/4k via LGA (TBC if in operational orbit possible as well).

For medium TM rate the default TM storage/transmission will be configured as well.

Summary of Constraints

CEB or NNO ground station is active.

Spacecraft Configuration

Start of Procedure

Non-nominal TM/TC configuration

End of Procedure

TM/TC rate = 5k/4k
Special TM storage/transmission configuration
or
TM/TC rate = 150k/4k
Default TM storage/transmission configuration

Reference File(s)

Input Command Sequences

HFRUMR1
HFD1003
HFD1009A
HFD1009E
HFRUBR2
HRRTUL22
HRDHKCY1
HRDHKCY2
HFD3040A
HFR2BR1
HFRUCM1
HFRUMR1

Output Command Sequences

HCYTMTC

Referenced Displays

ANDs GRDs SLDs

Configuration Control Information

Status : Version 7 - Updated
Last Checkin: 11/08/2011

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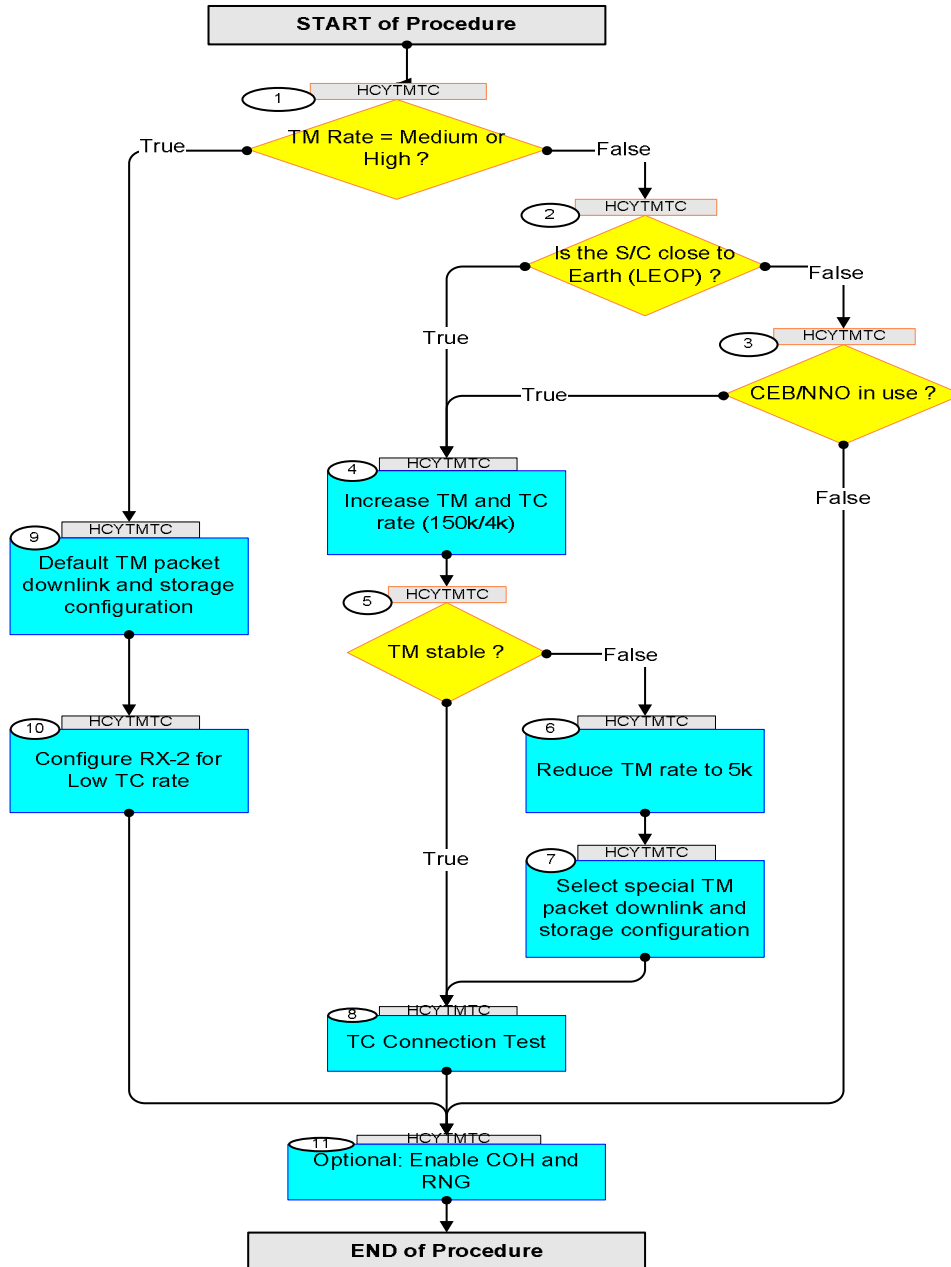


DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
19/12/2008		1	Created	F. Keck	
06/01/2009	2	1.01	Validation : Updated procedure call	F. Keck	
23/02/2009		1.02	Validation : Removing unnecessary procedure call.	F. Keck	
04/03/2009	2.1	1.03	Validation : Added option to activate coherent and ranging	F. Keck	
24/03/2009	2.2	1.04	Validation : Link Budget added as annex	F. Keck	
15/04/2009	2.3	2	Increasing procedure version	F. Keck	
18/07/2009		3	Restoration of default TM configuration added if TM rate remained medium after the FDIR (e.g. when in EAM).	F. Keck	
22/09/2009		4	Set RX-2 back to low TC rate when in medium TM rate. Use medium TM rate via LGA when on CEB or NNO.	F. Keck	
05/10/2009	2.5	5	Adding the command sequences to speed up the execution of the procedure.	F. Keck	
12/03/2010	3	6	Updates to run this procedure in parallel with DTCP procedure	F. Keck	
11/08/2011	3.1	7	Adding some comments.	F. Keck	

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Procedure Flowchart Overview



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
Beginning of Procedure				
<p><i>TC Seq. Name : HCYTMTC (Configure TM/TC)</i></p> <p><i>TimeTag Type: B</i> <i>Sub Schedule ID:</i></p> <p style="text-align: center;"><input type="checkbox"/></p>				
1		<i>TM Rate = Medium or High ?</i>		Next Step: False 2 True 9
		When running this procedure after a CDMU level 3 FDIR, it's possible that the SPACON (who runs the DTCP procedure in parallel) has already increased the TM rate from medium to high (which does not cause any harm).		
2		<i>Is the S/C close to Earth (LEOP) ?</i>		Next Step: False 3 True 4
		During LEOP it's possible to use medium TM rate with every ground station.		
3		<i>CEB/NNO in use ?</i>		Next Step: False 11 True 4
		In-flight tests showed that it's possible to use medium TM rate via LGA (on CEB or NNO only).		
4		<i>Increase TM and TC rate (150k/4k)</i>		Next Step: 5
		Coordinate activities with Ground Station.		
4.1		<i>Increase TM to 150k</i>		<input type="checkbox"/>
		The following sequences are maintained by procedure: H_FCP_TTC_TUMR Tx and TM encoder in use configuration for MR		
		Inform ECC before changing TM rate.		
		Execute Sequence HFRTUMR1 Txuse from LR1 to MR v05 Sequence Grouping = - This Sequence Reference is not included in the generated sequence SSID : 0		SEQ
		Inform ECC about the changed TM rate. Wait until TM is back and stable.		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Sequence HFD1003 Nominal TRA/STO flag v14 Sequence Grouping = - This Sequence Reference is not included in the generated sequence SSID : 0		SEQ
		Execute Sequence HFD1009A Enable ess period HK v10 Sequence Grouping = - This Sequence Reference is not included in the generated sequence SSID : 0		SEQ
		Execute Sequence HFD1009E Enable diag ASW BSW v10 Sequence Grouping = - This Sequence Reference is not included in the generated sequence SSID : 0		SEQ
4.2		Increase TC to 4k		□
		The following sequence is maintained by procedure: H_FCP_TTC_RUBR Select RX in use TC bit rate		
		Inform ECC before changing TC rate.		
		Execute Sequence HFRRUBR2 RX in use for HR v02 Sequence Grouping = - This Sequence Reference is not included in the generated sequence SSID : 0		SEQ
		Inform ECC about the changed TC rate.		
5		TM stable ?		Next Step: False 6 True 8
		Check if missing TM frames are reported by the NCTRS or MCS.		
6		Reduce TM rate to 5k		Next Step: 7
		Coordinate activities with Ground Station.		
		The following sequence is maintained by procedure: H_CRP_TTC_TUL2 Tx and TM encoder in use configuration for LR2		

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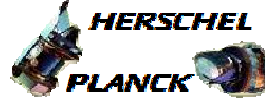
Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Inform ECC before changing TM rate.		
		Execute Sequence HRRTUL22 Txuse from MR to LR2 v04 Sequence Grouping = - This Sequence Reference is not included in the generated sequence SSID : 0		SEQ
		Inform ECC about the changed TM rate. Wait until TM is back and stable.		
7		<i>Select special TM packet downlink and storage configuration</i>		Next Step: 8
		The following sequences are maintained by procedure: H_CRP_DHS_HKCY Cycle through HK / Periodic / Diag CDMU packets		
		Execute Sequence HRDHKCY1 CycleNessHK1 v04 Sequence Grouping = - This Sequence Reference is not included in the generated sequence SSID : 0		SEQ
		Run following sequence on a dedicated MSTK:		
		Execute Sequence HRDHKCY2 CycleNessHK2 v04 Sequence Grouping = - This Sequence Reference is not included in the generated sequence SSID : 0		SEQ
8		<i>TC Connection Test</i>		Next Step: 11
		The following sequence is maintained by procedure: H_FCP_DHS_3040 Perform connection test		
		Execute Sequence HFD3040A CDMU connection test v11 Sequence Grouping = - This Sequence Reference is not included in the generated sequence SSID : 0		SEQ
9		<i>Default TM packet downlink and storage configuration</i>		Next Step: 10

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		The following sequence is maintained by procedure: H_FCP_DHS_1003 Nominal TRANSMIT/STORAGE settings		
		Execute Sequence HFD1003 Nominal TRA/STO flag v14 Sequence Grouping = - This Sequence Reference is not included in the generated sequence <i>SSID : 0</i>		SEQ
		The following sequence is maintained by procedure: H_FCP_DHS_1009 Enable default HK packets		
		Execute Sequence HFD1009A Enable ess period HK v10 Sequence Grouping = - This Sequence Reference is not included in the generated sequence <i>SSID : 0</i>		SEQ
		Execute Sequence HFD1009E Enable diag ASW BSW v10 Sequence Grouping = - This Sequence Reference is not included in the generated sequence <i>SSID : 0</i>		SEQ
10		<i>Configure RX-2 for Low TC rate</i>		Next Step: 11
		Nominal RX configuration: RX-1 on high TC rate RX-2 on low TC rate At this step both RX are on high TC rate. Configure RX-2 back to low TC rate.		
		The following sequence is maintained by procedure: H_FCP_TTC_R2BR Select RX2 TC bit rate		
		Execute Sequence HFRR2BR1 RX2 for Low rate v02 Sequence Grouping = - This Sequence Reference is not included in the generated sequence <i>SSID : 0</i>		SEQ
11		<i>Optional: Enable COH and RNG</i>		Next Step: END

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Only if in medium TM rate (Ranging not possible in high TM rate).		
		The following sequence is maintained by procedure: H_FCP_TTC_TUCM Transponder in use Coherent Mode Activation/Deactivation		
		Execute Sequence HFRTUCM1 TX in use CM ON v02 Sequence Grouping = - This Sequence Reference is not included in the generated sequence <i>SSID : 0</i>		SEQ
		The following sequence is maintained by procedure: H_FCP_TTC_TURM Transponder in use Ranging Activation/Deactivation		
		Execute Sequence HFRTURM1 TX in use RM ON v02 Sequence Grouping = - This Sequence Reference is not included in the generated sequence <i>SSID : 0</i>		SEQ
		Inform ECC to start Ranging.		
End of Procedure				

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Link Budget

Link budget limits for MBR over Kourou

LGA1 with MBR

	deg	dBi	Ax. Rat.	Herschel			Planck		
				S/No	Margin / Max distance		S/No	Margin / Max distance	
					3 dB	0 dB		3 dB	0 dB
Theta Angle	0	9.0	0	55.5	1,274	0.0 dB	56.6	1.1 dB	1.1 dB
	30	5.5	1.5	52.0	852	1,203	53.1	859	1,214
	60	3.0	1.75	49.5	639	902	50.6	644	910
	90	-3.0	5.5	43.5	320	452	44.6	323	456
Nom EIRP (-3 dBi)				11.4 dBW			11.5 dBW		
Nominal Slant Range:				1800 *1000km			1,600 *1000 km		

MGA with MBR

	deg	dBi	Ax. Rat.	Herschel			Planck		
				S/No	Margin / Max distance		S/No	Margin / Max distance	
					3 dB	0 dB		3 dB	0 dB
Theta Angle	0	18.5	0	65.2	9.7 dB	9.7 dB	66.1	10.6 dB	10.6 dB
	10	16.0	0.2	62.7	7.2 dB	7.2 dB	63.6	8.1 dB	8.1 dB
	15	13.0	0.3	59.7	4.2 dB	4.2 dB	60.6	5.1 dB	5.1 dB
	20	5.0	0.5	51.7	823	1,162	52.6	811	1,146
	25	0.0		46.7	463	654	47.6	456	644
Nom EIRP (13 dBi)				27.5 dBW			27.47 dBW		
Nominal Slant Range:				1800 *1000km			1,600 *1000 km		

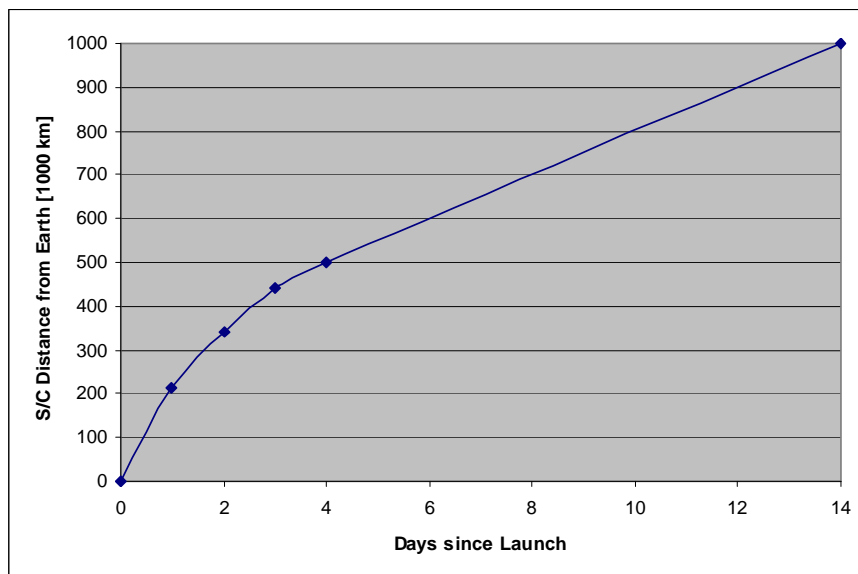
S/No req 55.5 dBHz

Note:

For the actual antenna gain, the following data is given:

- (a) If the link margin is more than 3 dB, this margin is shown in green
- (b) If the link margin is less than 3 dB, the slant range in 1000km is given to achieve either 3dB or 0dB margin

For Kourou, a G/T of 41 dB/K is taken (LNA upgraded), the official link budgets consider 38 dB/K



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Link Budget

Link budget limits for MBR over NewNorcia

LGA1 with MBR

	deg	dBi	Ax. Rat.	Herschel			Planck		
				S/No	Margin / Max distance		S/No	Margin / Max distance	
					3 dB	0 dB		3 dB	0 dB
Theta Angle	0	9.0	0	64.6	9.1 dB	9.1 dB	66.2	10.7 dB	10.7 dB
	30	5.5	1.5	61.1	5.6 dB	5.6 dB	62.7	7.2 dB	7.2 dB
	60	3.0	1.75	58.6	3.1 dB	3.1 dB	60.2	4.7 dB	4.7 dB
	90	-3.0	5.5	52.6	913	1,289	54.2	975	1,378
				Nom EIRP (-3 dBi)	11.4 dBW			11.5 dBW	
				Nominal Slant Range:	1800 *1000km			1,600 *1000 km	

MGA with MBR

	deg	dBi	Ax. Rat.	Herschel			Planck		
				S/No	Margin / Max distance		S/No	Margin / Max distance	
					3 dB	0 dB		3 dB	0 dB
Theta Angle	0	18.5	0	74.8	19.3 dB	19.3 dB	75.7	20.2 dB	20.2 dB
	10	16.0	0.2	72.3	16.8 dB	16.8 dB	73.2	17.7 dB	17.7 dB
	15	13.0	0.3	69.3	13.8 dB	13.8 dB	70.2	14.7 dB	14.7 dB
	20	5.0	0.5	61.3	5.8 dB	5.8 dB	62.2	6.7 dB	6.7 dB
	25	0.0		56.3	1,397	0.8 dB	57.2	1,133	1.7 dB
				Nom EIRP (13 dBi)	27.5 dBW			27.47 dBW	
				Nominal Slant Range:	1800 *1000km			1,600 *1000 km	

S/No req 55.5 dBHz

Note:

For the actual antenna gain, the following data is given:

- (a) If the link margin is more than 3 dB, this margin is shown in green
- (b) If the link margin is less than 3 dB, the slant range in 1000km is given to achieve either 3dB or 0dB margin