

Switch TTC chain 1 to MGA
File: H_COP_TTC_TTC1.xls
Author: E. Picallo



Procedure Summary

Objectives

This procedure describes the steps needed to perform the switch to MGA for TTC chain 1 during commissioning.
This means to configure:

D/L path: TX1 - TWTA1 - MGA
U/L path: MGA - RX1 (LGA1 - RX2)
U/L rate: Rx1 4 kpbs, Rx2 125 bps

Summary of Constraints

The MGA communication is possible with NNO on the following basis:

- if SSCE < 15 degs in SAM
- if SSCE < 40 degs in OCM/SCM with SAA = 25 degs
- Large SSCE angles requires depoint the S/C to Earth for communication.

The MGA FOV can be exceeded in case of large slews eg. Gyro calibration SAA 25 degs OR power constrains eg. decontamination. In these cases the TTC should be configure to use LGAs prior the manoeuvre.

Theta crossover of LGA/ MGA gain is approx. 21 degs, so assuming SAA ~0 then MGA will give better link margin than LGA for any SSCE values less than 21 degs.

The SSCE crossover is different for SAA not equal to 0, if large slews away from the Earth were performed (leading to > 21 deg earth offset)

The TTC config. is selected through ASW TC(8,4,115,X); thus the ASW function "TTC Management" has to be running.

It is always possible to have MRB through LGA over NNO.
It is possible to have MBR through LGA over KRU upto 639000 KM (with 3 dB margin, 60 degs Theta angle)

Spacecraft Configuration

Start of Procedure

CDMU in default configuration;
RX1 TC rate 4kbps , RX1 TC rate 125 bps
TX1 ON and TX2 OFF, TM rate 150kbps
RFDN configuration: BBAB (LGA on TX1&RX1 / MGA on RX2)

End of Procedure

CDMU in default configuration;
RX1 TC rate 4kbps , RX1 TC rate 125 bps
TX1 ON and TX2 OFF, TM rate 150kbps
RFDN configuration: ABAB (MGA on TX1&RX1 / LGA-1 on TX2&RX2)

Reference File(s)

Input Command Sequences

Output Command Sequences

HCRTTC1

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Referenced Displays

ANDs **GRDs** **SLDs**
 ZAZ9T999

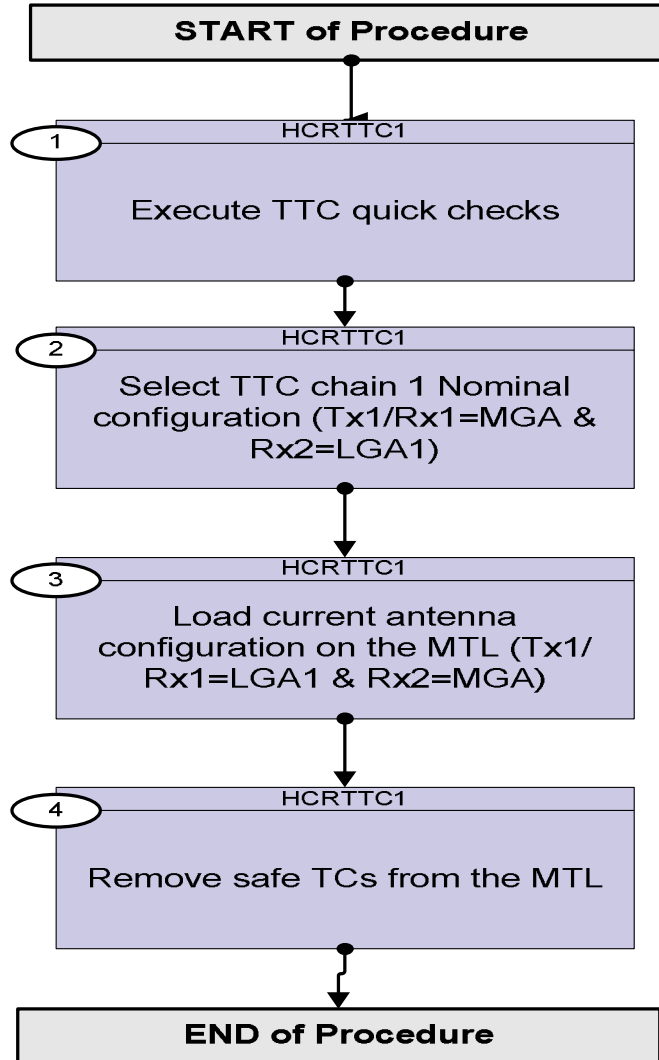
Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
02/03/09	2.1	1	Created	E. Picallo	
30/03/09		2	Load Safe initial RFDN configuration into MTL added	E. Picallo	
30/03/09	2.3	3	sequence generation	E. Picallo	

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Procedure Flowchart Overview



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
Beginning of Procedure				
TC Seq. Name : HCR TTC1 (Switch TTC1 to MGA) Switch TTC chain 1 to MGA TimeTag Type: B Sub Schedule ID: <input type="checkbox"/>				
1		Execute TTC quick checks		Next Step: 2
		Execute Procedure: H_LEO_TTC_CHECK TTC S/S Check-out after separation		
		Expected antenna configuration is Rx1 on LGA-1 and Rx2 on MGA.		
1.1		Check MTL status is running		<input type="checkbox"/>
		Verify Telemetry MtlSts DEH26170 = Running		AND=ZAZ9T999
		Verify Telemetry MtlTcCnt DE82F170 = 0		AND=ZAZ9T999
2		Select TTC chain 1 Nominal configuration (Tx1/Rx1=MGA & Rx2=LGA1)		Next Step: 3
		WARNING These commands need to be uploaded into MTL about 10 minutes in the future.		
2.1		Switch OFF the TWTA in use		<input type="checkbox"/>
		WARNING: the downlink has to be disabled before moving RFDN switches.		
		The following command will Switch OFF the TWT Amplifier (TWT), the EPC and the OP-LCL TWTA in use.		
	ET=+00.00.00 UT=+	Execute Telecommand TtcCommandTwtaInUseOff TC Control Flags : Subsch. ID : 10 Det. descr. : Ttc Command Twta In Use Off TC(8,4,115,1)	DC08E170	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
2.2		Switch OFF XPND TX in use RF output		<input type="checkbox"/>
		The following command switch OFF the TX in use; the status of the XPND LCL does not change (it remains closed) as well as the configuration of the TX on the 1553 S/C bus (it remains "ON" and "Valid").		
	ET+=00.00.05 UT=+	Execute Telecommand TtcCommandTxInUseOff TC Control Flags : GBM IL DSE --Y -- -- Subsch. ID : 10 Det. descr. : Ttc Command Tx InUse Off TC(8,4,115,1)	DC05E170	
2.3		Send TCs to move the SWs NOM1		<input type="checkbox"/>
		Nominal/Earth acquisition (NOM1) RFDN SWs position ABAB D/L path: TX1 - TWTA1 - MGA U/L path: MGA - RX1 (LGA1 - RX2)		
		WARNING: if the commands are sent in real time, after the execution of the first pair of commands ("arm" and "fire") Ground station has to re-sweep the uplink to re-acquire the lock and send the second pair of TCs.		
	ET+=00.00.05 UT=+	Execute Telecommand RfdnArmSW1_SW2LogB TC Control Flags : GBM IL DSE --Y -- -- Subsch. ID : 10 Det. descr. : Rfdn Arm SW1/SW2 (logical) Position B TC(8,4,115,6)	DC57E170	
	ET+=00.00.05 UT=+	Execute Telecommand RfdnFireSW1_SW2_log_B TC Control Flags : GBM IL DSE --Y -- -- Subsch. ID : 10 Det. descr. : Rfdn Fire SW1/SW2 (logical) Position B TC(8,4,115,8)	DC77E170	
	ET+=00.00.05 UT=+	Execute Telecommand RfdnArmSW3_SW4LogB TC Control Flags : GBM IL DSE --Y -- -- Subsch. ID : 10 Det. descr. : Rfdn Arm SW3/SW4 (logical) Position B TC(8,4,115,6)	DC58E170	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+00.00.05 UT=+	Execute Telecommand RfdnFireSW3_SW4_log_B TC Control Flags : Subsch. ID : 10 Det. descr. : Rfdn Fire SW3/SW4 (logical) Position B TC(8,4,115,8) GBM IL DSE --Y -- --	DC78E170	
2.4		Switch ON TX RF output in use		<input type="checkbox"/>
	ET=+00.00.05 UT=+	Execute Telecommand TtcCommandTxInUseOn TC Control Flags : Subsch. ID : 10 Det. descr. : Ttc Command Tx InUse On TC(8,4,115,2) GBM IL DSE -SY -- --	DC15E170	
2.5		Switch ON TWTA in use (OPLCL+EPC+TWT)		<input type="checkbox"/>
	ET=+00.00.05 UT=+	Execute Telecommand TtcCommandTwtaInUseOn TC Control Flags : Subsch. ID : 10 Det. descr. : Ttc Command Twta In Use On TC(8,4,115,2) GBM IL DSE -E- -- --	DC18E170	
2.6		Check correct uplink of TCs into MTL		<input type="checkbox"/>
		Verify Telemetry MtlTcCnt DE82F170 = 8 <dec>		AND=ZAZ9T999
3		Load current antenna configuration on the MTL (Tx1/Rx1=LGA1 & Rx2=MGA)		Next Step: 4
		WARNING These commands need to be uploaded into MTL about 1 hour in the future to cover against a RFDN SW failure in configuring MGA, while FDIR Mode=AFS.		
3.1		Switch OFF the TWTA in use		<input type="checkbox"/>
		WARNING: the downlink has to be disabled before moving RFDN switches.		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		The following command will Switch OFF the TWT Amplifier (TWT), the EPC and the OP-LCL TWTA in use.		
	ET=+00.59.25.000 UT=+	Execute Telecommand TtcCommandTwtaInUseOff TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 10 Det. descr. : Ttc Command Twta In Use Off TC(8,4,115,1)	DC08E170	
3.2		Switch OFF XPND TX in use RF output		<input type="checkbox"/>
		The following command switch OFF the TX in use; the status of the XPND LCL does not change (it remains closed) as well as the configuration of the TX on the 1553 S/C bus (it remains "ON" and "Valid").		
	ET=+00.00.05 UT=+	Execute Telecommand TtcCommandTxInUseOff TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 10 Det. descr. : Ttc Command Tx InUse Off TC(8,4,115,1)	DC05E170	
3.3		Send TCs to move the SWs to SUN1		<input type="checkbox"/>
		Sun acquisition otherwise (SUN1) RFDN SWs position BBAB D/L path: TX1 - TWTA1 - LGA1 U/L path: LGA1 - RX1 (MGA - RX2)		
		WARNING: if the commands are sent in real time, after the execution of the first pair of commands ("arm" and "fire") Ground station has to re-sweep the uplink to re-acquire the lock and send the second pair of TCs.		
	ET=+00.00.05 UT=+	Execute Telecommand RfdnArmSW1_SW2_log_A TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 10 Det. descr. : Rfdn Arm Command SW1/SW2 (logical) Position A TC(8,4,115,5)	DC47E170	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+00.00.05 UT=+	Execute Telecommand RfdnFireSW1_SW2_log_A TC Control Flags : Subsch. ID : 10 Det. descr. : Rfdn Fire SW1/SW2 (logical) Position A TC(8,4,115,7) GBM IL DSE --Y -- --	DC67E170	
	ET=+00.00.05 UT=+	Execute Telecommand RfdnArmSW3_SW4LogB TC Control Flags : Subsch. ID : 10 Det. descr. : Rfdn Arm SW3/SW4 (logical) Position B TC(8,4,115,6) GBM IL DSE --Y -- --	DC58E170	
	ET=+00.00.05 UT=+	Execute Telecommand RfdnFireSW3_SW4_log_B TC Control Flags : Subsch. ID : 10 Det. descr. : Rfdn Fire SW3/SW4 (logical) Position B TC(8,4,115,8) GBM IL DSE --Y -- --	DC78E170	
3.4		Switch ON TX RF output in use		<input type="checkbox"/>
	ET=+00.00.05 UT=+	Execute Telecommand TtcCommandTxInUseOn TC Control Flags : Subsch. ID : 10 Det. descr. : Ttc Command Tx InUse On TC(8,4,115,2) GBM IL DSE -SY -- --	DC15E170	
3.5		Switch ON TWTA in use (OPLCL+EPC+TWT)		<input type="checkbox"/>
	ET=+00.00.05 UT=+	Execute Telecommand TtcCommandTwtaInUseOn TC Control Flags : Subsch. ID : 10 Det. descr. : Ttc Command Twta In Use On TC(8,4,115,2) GBM IL DSE -E- -- --	DC18E170	
3.6		Check correct uplink of TCs into MTL		<input type="checkbox"/>

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry MtlTcCnt DE82F170	= 16 <dec>	AND=ZAZ9T999
4		Remove safe TCs from the MTL		Next Step: END
		The 8 telecommands related to the safe antenna configuration (included in step #3) have to be removed after the expected re-acquisition of signal that is about 3 minutes after switch TWTA ON (step #2.5)		
		Execute Procedure: H_FCP_DHS_3024 Normal MTL maintenance		
		WARNING TC to delete MTL content over a time interval is not exported in the relevant TC sequence and needs to be filled with the expected absolute times. Refer to step #14 (Del MTLTC over time) in procedure H_FCP_DHS_3024.		
		Verify Telemetry MtlTcCnt DE82F170	= 0 <dec>	AND=ZAZ9T999
End of Procedure				