

Switch RX2 to MGA  
 File: H\_LEO\_TTC\_MGAR.xls  
 Author: E. Picallo



## Procedure Summary

### Objectives

This procedure describes the steps needed to perform the switch to MGA on RX-2 as part of the LEOP activities.

### Summary of Constraints

Being the MGA selection on RX-2 executed through MTL and being FDIR Mode=AFS, the procedure implements for safety MTL commands in the future to re-enforce the current configuration in case of a RFDN SW failure, that is not handled when in AFS.

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

### Spacecraft Configuration

#### Start of Procedure

CDMU in default configuration;  
 RX1 = RX2 TC rate 4kbps  
 TX1 ON and TX2 OFF, TM rate 5kbps  
 During LEOP RFDN configuration: BBBB (LGA on TX1&RX1 / LGA2/3 on RX2)  
 During commissioning RFDN configuration: ABAB (MGA on TX1&RX1 / LGA-1 on TX2&RX2)

#### End of Procedure

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

### Reference File(s)

#### Input Command Sequences

#### Output Command Sequences

HLRMGAR1  
 HLRMGAR2

### Referenced Displays

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

### Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
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Status : Version 2 - Unchanged  
 Last Checkin: 16/04/09

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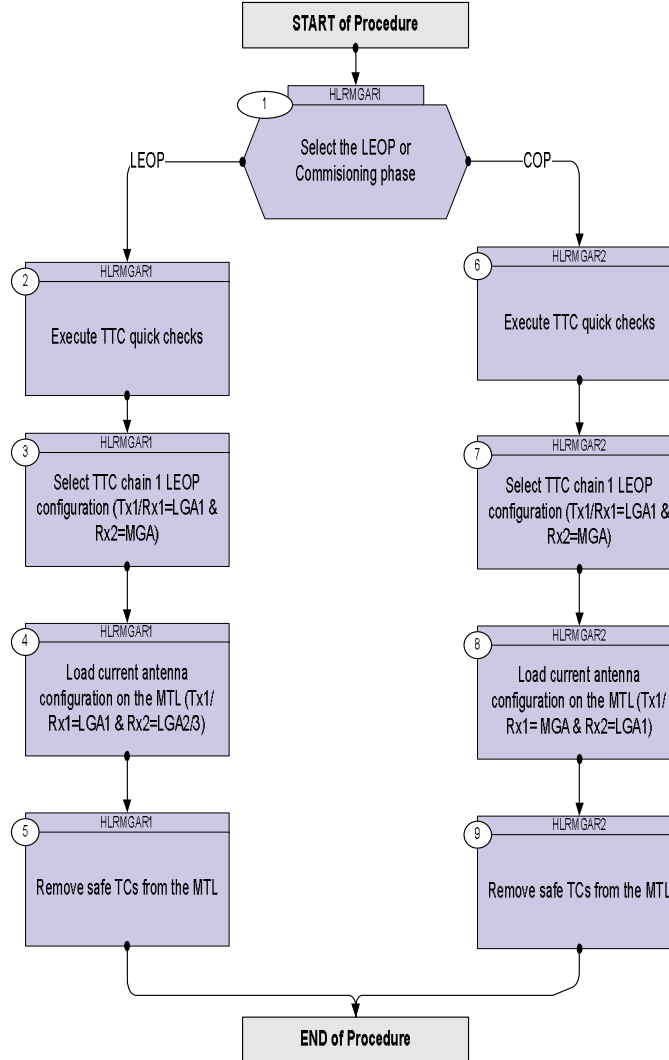


30/03/09		1	Created	E. Picallo	
16/04/09	2.3	2	TTC LGA Nominal Selection during COP for ACMS PTG check case added (ref. H_COP_TTC_GOLG_02)	E. Picallo	

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## Procedure Flowchart Overview





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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
3.1		Switch OFF the TWTA in use		<input type="checkbox"/>
		<b>WARNING: the downlink has to be disabled before moving RFDN switches.</b>		
		<b>The following command will Switch OFF the TWT Amplifier (TWT), the EPC and the OP-LCL TWTA in use.</b>		
	ET=+00.00.00 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"/>
		<b>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").</b>		
	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"/>
		<b>Sun acquisition otherwise (SUN1) RFDN SWs position BBAB</b>  D/L path: TX1 - TWTA1 - LGA1 U/L path: LGA1 - RX1 (MGA - RX2)		
		<b>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.</b>		
	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 <b>RfdnFireSW1_SW2_log_A</b>  TC Control Flags :  Subsch. ID : 10 Det. descr. : Rfdn Fire SW1/SW2 (logical) Position A TC(8,4,115,7)	DC67E170	
	ET=+00.00.05 UT=+	Execute Telecommand <b>RfdnArmSW3_SW4LogB</b>  TC Control Flags :  Subsch. ID : 10 Det. descr. : Rfdn Arm SW3/SW4 (logical) Position B TC(8,4,115,6)	DC58E170	
	ET=+00.00.05 UT=+	Execute Telecommand <b>RfdnFireSW3_SW4_log_B</b>  TC Control Flags :  Subsch. ID : 10 Det. descr. : Rfdn Fire SW3/SW4 (logical) Position B TC(8,4,115,8)	DC78E170	
3.4		Switch ON TX RF output in use		<input type="checkbox"/>
	ET=+00.00.05 UT=+	Execute Telecommand <b>TtcCommandTxInUseOn</b>  TC Control Flags :  Subsch. ID : 10 Det. descr. : Ttc Command Tx InUse On TC(8,4,115,2)	DC15E170	
3.5		Switch ON TWTA in use (OPLCL+EPC+TWT)		<input type="checkbox"/>
	ET=+00.00.05 UT=+	Execute Telecommand <b>TtcCommandTwtaInUseOn</b>  TC Control Flags :  Subsch. ID : 10 Det. descr. : Ttc Command Twta In Use On TC(8,4,115,2)	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	= 8 <dec>	AND=ZAZ9T999
4		Load current antenna configuration on the MTL (Tx1/Rx1=LGA1 & Rx2=LGA2/3)		Next Step: 5
		<b>WARNING</b> 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.		
4.1		Switch OFF the TWTA in use		<input type="checkbox"/>
		<b>WARNING: the downlink has to be disabled before moving RFDN switches.</b>		
		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 :  Subsch. ID : 10 Det. descr. : Ttc Command Twta In Use Off TC(8,4,115,1)  GBM IL DSE --Y -- ---	DC08E170	
4.2		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 :  Subsch. ID : 10 Det. descr. : Ttc Command Tx InUse Off TC(8,4,115,1)  GBM IL DSE --Y -- ---	DC05E170	
4.3		Send TCs to move the SWs to SUR1		<input type="checkbox"/>
		<b>Launch/Sun acquisition after separation/Survival (SUR1) RFDN SWs position BBBB</b>  D/L path: TX1 - TWTA1 - LGA1 U/L path: LGA1 - RX1 (LGA2/3 - RX2)		





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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	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	
4.6		Check correct uplink of TCs into MTL		<input type="checkbox"/>
		Verify Telemetry  MtlTcCnt DE82F170	= 16 <dec>	AND=ZAZ9T999
5		Remove safe TCs from the MTL		Next Step: END
		<b>The 8 telecommands related to the safe antenna configuration (included in step #4) have to be removed after the expected re-acquisition of signal that is about 3 minutes after switch TWTA ON (step #3.5)</b>		
		Execute Procedure: H_FCP_DHS_3024 Normal MTL maintenance		
		<b>WARNING</b> 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
<p>TC Seq. Name :HLRMGAR2 (Switch RX2toMGA COP)          Switch RX2 to MGA during COP</p> <p>TimeTag Type: B          Sub Schedule ID:  <input type="checkbox"/></p>				
6		Execute TTC quick checks		Next Step: 7
		Execute Procedure: H_LEO_TTC_CHECK TTC S/S Check-out after separation		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		<b>During commissioning the expected antenna configuration is Rx1 on MGA and Rx2 on LGA-1.</b>		
6.1		Check MTL status is running		<input type="checkbox"/>
		Verify Telemetry MtlSts DEH26170	= Running	AND=ZAZ9T999
		Verify Telemetry MtlTcCnt DE82F170	= 0 <dec>	AND=ZAZ9T999
7		Select TTC chain 1 LEOP configuration (Tx1/Rx1=LGA1 & Rx2=MGA)		Next Step: 8
		<b>WARNING</b> These commands need to be uploaded into MTL about 10 minutes in the future.		
7.1		Switch OFF the TWTA in use		<input type="checkbox"/>
		<b>WARNING: the downlink has to be disabled before moving RFDN switches.</b>		
		<b>The following command will Switch OFF the TWT Amplifier (TWT), the EPC and the OP-LCL TWTA in use.</b>		
	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)  GBM IL DSE --Y -- --	DC08E170	
7.2		Switch OFF XPND TX in use RF output		<input type="checkbox"/>
		<b>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").</b>		
	ET=+00.00.05 UT=+	Execute Telecommand TtcCommandTxInUseOff  TC Control Flags :  Subsch. ID : 10 Det. descr. : Ttc Command Tx InUse Off TC(8,4,115,1)  GBM IL DSE --Y -- --	DC05E170	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
7.3		Send TCs to move the SWs to SUN1		<input type="checkbox"/>
		<b>Sun acquisition otherwise (SUN1) RFDN SWs position BBAB</b>  D/L path: TX1 - TWTA1 - LGA1 U/L path: LGA1 - RX1 (MGA - RX2)		
		<b>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.</b>		
	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	
	ET+=00.00.05 UT=+	Execute Telecommand  RfdnFireSW1_SW2_log_A  TC Control Flags :  GBM IL DSE --Y -- ---  Subsch. ID : 10 Det. descr. : Rfdn Fire SW1/SW2 (logical) Position A TC(8,4,115,7)	DC67E170	
	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	
	ET+=00.00.05 UT=+	Execute Telecommand  RfdnFireSW3_SW4_log_B  TC Control Flags :  GBM IL DSE --Y -- ---  Subsch. ID : 10 Det. descr. : Rfdn Fire SW3/SW4 (logical) Position B TC(8,4,115,8)	DC78E170	
7.4		Switch ON TX RF output in use		<input type="checkbox"/>

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+00.00.05 UT=+	Execute Telecommand  <b>TtcCommandTxInUseOn</b>  TC Control Flags :  Subsch. ID : 10 Det. descr. : Ttc Command Tx InUse On TC(8,4,115,2)  GBM IL DSE -SY -- ---	DC15E170	
7.5		Switch ON TWTA in use (OPLCL+EPC+TWT)		<input type="checkbox"/>
	ET=+00.00.05 UT=+	Execute Telecommand  <b>TtcCommandTwtaInUseOn</b>  TC Control Flags :  Subsch. ID : 10 Det. descr. : Ttc Command Twta In Use On TC(8,4,115,2)  GBM IL DSE -E- -- ---	DC18E170	
7.6		Check correct uplink of TCs into MTL		<input type="checkbox"/>
		Verify Telemetry  <b>MtlTcCnt</b> <b>DE82F170</b>	= 8 <dec>	AND=ZAZ9T999
8		Load current antenna configuration on the MTL (Tx1/Rx1= MGA & Rx2=LGA1)		Next Step: 9
		<b>WARNING</b> 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.		
8.1		Switch OFF the TWTA in use		<input type="checkbox"/>
		<b>WARNING: the downlink has to be disabled before moving RFDN switches.</b>		
		<b>The following command will Switch OFF the TWT Amplifier (TWT), the EPC and the OP-LCL TWTA in use.</b>		
	ET=+00.59.25. 000 UT=+	Execute Telecommand  <b>TtcCommandTwtaInUseOff</b>  TC Control Flags :  Subsch. ID : 10 Det. descr. : Ttc Command Twta In Use Off TC(8,4,115,1)  GBM IL DSE --Y -- ---	DC08E170	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
8.2		Switch OFF XPND TX in use RF output		<input type="checkbox"/>
		<b>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").</b>		
	ET=+00.00.05 UT=+	Execute Telecommand  <b>TtcCommandTxInUseOff</b>  TC Control Flags :  GBM IL DSE --Y -- ---  Subsch. ID : 10 Det. descr. : Ttc Command Tx InUse Off TC(8,4,115,1)	DC05E170	
8.3		Send TCs to move the SWs to NOM1		<input type="checkbox"/>
		<b>Nominal/Earth acquisition (NOM1) RFDN SWs position ABAB</b>  D/L path: TX1 - TWTA1 - MGA U/L path: MGA - RX1 (LGA1 - RX2)		
		<b>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 sent the second pair of TCs.</b>		
	ET=+00.00.05 UT=+	Execute Telecommand  <b>RfdnArmSW1_SW2LogB</b>  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  <b>RfdnFireSW1_SW2_log_B</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  <b>RfdnArmSW3_SW4LogB</b>  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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	ET=+00.00.05 UT=+	Execute Telecommand <b>RfdnFireSW3_SW4_log_B</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	
8.4		Switch ON TX RF output in use		<input type="checkbox"/>
	ET=+00.00.05 UT=+	Execute Telecommand <b>TtcCommandTxInUseOn</b>  TC Control Flags :  Subsch. ID : 10 Det. descr. : Ttc Command Tx InUse On TC(8,4,115,2)  GBM IL DSE -SY -- --	DC15E170	
8.5		Switch ON TWTA in use (OPLCL+EPC+TWT)		<input type="checkbox"/>
	ET=+00.00.05 UT=+	Execute Telecommand <b>TtcCommandTwtaInUseOn</b>  TC Control Flags :  Subsch. ID : 10 Det. descr. : Ttc Command Twta In Use On TC(8,4,115,2)  GBM IL DSE -E- -- --	DC18E170	
8.6		Check correct uplink of TCs into MTL		<input type="checkbox"/>
		Verify Telemetry <b>Mt1TcCnt</b> <b>DE82F170</b>	<b>= 16 &lt;dec&gt;</b>	AND=ZAZ9T999
9		Remove safe TCs from the MTL		Next Step: END
		<b>The 8 telecommands related to the safe antenna configuration (included in step #8) have to be removed after the expected re-acquisition of signal that is about 3 minutes after switch TWTA ON (step #7.5)</b>		
		Execute Procedure: <b>H_FCP_DHS_3024</b> <b>Normal MTL maintenance</b>		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		<b>WARNING</b> 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
<b>End of Procedure</b>				