

TTC S/S LEOP Quick Check-out
File: H_LEO_TTC_LCHK.xls
Author: E. Picallo



Procedure Summary

Objectives

This procedure describes the steps to check the status of the TTC S/S and RF link during LEOP:

- wait for TM reception from S/C
- verify TX state
- verify RX state
- verify TWT state
- verify antenna configuration
- check Rx lock condition
- TC link test by sending test TCs

Summary of Constraints

S/C in ground station visibility

Spacecraft Configuration

Start of Procedure

Ground station pass preparation procedure completed
LCL23/16 (XPND1/2 Tx) closed;
TM bit rate MBR 5 kbps (first AOS) or 150 Kbps (from the second pass on) or 500 bps (SUN or Survival);
ranging OFF;
coherent mode OFF;
ranging modulation index 0,6;
TM modulation index 1,2;
output power -4 dbm;
TWTAL/2 ON (EPCL/2 ON , TWT1/2 ON)
TC bit rate 4 kbps (nominally) or 125 bps (SUN or Survival);
Omni-directional coverage (first AOS or Survival)
or AntRx1Config =LGA1 & Antrx2Config =MGA (in SUN/second pass)

End of Procedure

TTC-Link health verified;
LCL23/16 (XPND1/2 Tx) closed;
TM bit rate MBR 5 kbps (first AOS) or 150 Kbps (from the second pass on) or 500 bps (SUN or Survival);
ranging OFF;
coherent mode OFF;
ranging modulation index 0,6;
TM modulation index 1,2;
output power -4 dbm;
TWTAL/2 ON (EPCL/2 ON , TWT1/2 ON)
TC bit rate 4 kbps (nominally) or 125 bps (SUN or Survival);
Omni-directional coverage (first AOS or Survival)
or AntRx1Config =LGA1 & Antrx2Config =MGA (in SUNsecond pass)

Reference File(s)

Input Command Sequences

Output Command Sequences

HLRLCHK

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 Author: E. Picallo



Referenced Displays

ANDs GRDs SLDs
 ZAZ7I999
 ZAZ7J999
 ZAZAO999
 ZAA08999

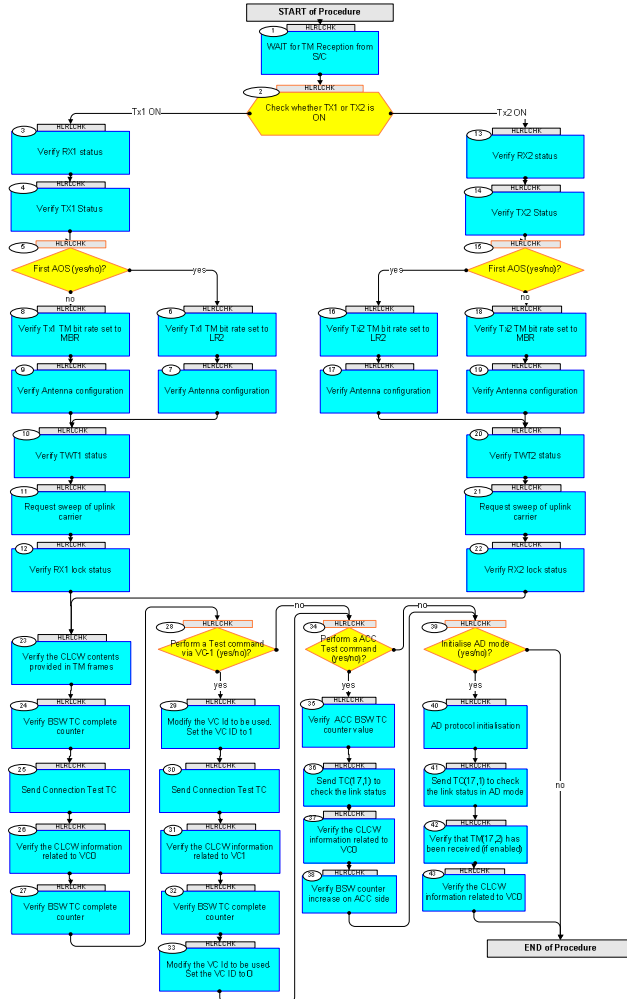
Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
12/01/09	2	1	Created	E. Picallo	
28/02/09	2.1	2	Verify Rx lock condition after carrier sweep	E. Picallo	
18/03/09	2.2	3	Selection of MGA on RX-2 for second pass added	E. Picallo	
08/04/09		4	Report RX AGC level and SPE PL telemetry reading to OM added	E. Picallo	
16/04/09	2.3	5	Update to use dedicated VC0 & VC1 CLCW TM parameters Option to test VC1 added	E. Picallo	
05/05/09	2.4	6	Options to initaliase AD mode and test TC to ACC added	E. Picallo	
30/06/09	2.5	6.01	Validation : Verify Tx1 Status based on TX1 ON-OFF Status TM Verify Tx2 Status based on TX2 ON-OFF Status TM	E. Picallo	

TTC S/S LEOP Quick Check-out
 File: H_LEO_TTC_LCHK.xls
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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 :HLRLCHK (TTC LEOP Quick Check) TTC S/S Quick Check-out during LEOP TimeTag Type: N Sub Schedule ID: <input type="checkbox"/>				
1		WAIT for TM Reception from S/C		Next Step: 2
To be started at expected S/C ground station visibility				
2		Check whether TX1 or TX2 is ON		Next Step: Tx1 ON 3 Tx2 ON 13
Nominally TTC chain 1 shall be ON. In non nominal condition, Survival mode or TTC failure, the TTC chain 2 is switch ON.				
2.1		Check if TX1 status ON		<input type="checkbox"/>
		Verify Telemetry TX1 ON-OFF Stat RMB15442	= ON	AND=ZAZ7I999
		Verify TX1 Output Power Telemetry XPD1_RF1_OUT_PW RMB13442	<= -4.0 dbmW >= -4.8 dbmW	AND=ZAZ7I999
2.2		OR Check if TX2 status ON		<input type="checkbox"/>
		Verify Telemetry TX2 ON-OFF Stat RMB16442	= ON	AND=ZAZ7I999
		Verify TX2 Output Power Telemetry XPD2_RF2_OUT_PW RMB14442	<= -4.0 dbmW >= -4.5 dbmW	AND=ZAZ7I999
3		Verify RX1 status		Next Step: 4
		Verify Rx1 FCL3 current Telemetry Xpnd1_Rx_FCL3_I WM702565	>= 0.20 A <= 0.35 A	AND=ZAZ7I999
		Verify Rx1 Supply Voltage Telemetry XPND1_RX1_SUP_V RMB07442	>= 4.8 V <= 5.2 V	AND=ZAZ7I999
		Verify RX1 AGC Level Telemetry XPD1_RX1_AGC_LV RMB09442	>= -130.0 dbmW	AND=ZAZ7I999

TTC S/S LEOP Quick Check-out
 File: H_LEO_TTC_LCHK.xls
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify RX1 PLL SPE Telemetry XPD1_RX1_PLL_SP RMB11442		AND=ZAZ7I999
		Verify RX1 Lock status Telemetry X1 Rx Lock - RL RMB24442	= No locked	AND=ZAZ7I999
		Verify RX1 Squelch status Telemetry X1 SqlchSt - SS RMB23442	= OFF	AND=ZAZ7I999
		Verify RX1 bit rate Telemetry RX1 125-4K Stat RMB17442	= 4 Kbps	AND=ZAZ7I999
		Note: In non nominal condition (Sun Acquisition mode): RX1 TC bit rate is set to 125 bps.		
		Report the RX1 AGC Level to OM		
		Report the RX1 PLL SPE to OM		
4		Verify TX1 Status		Next Step: 5
		To confirm main transmission parameter		
		Verify Coherent Mode status Telemetry X1 Coher MOD-CM RMB26442	= OFF	AND=ZAZ7I999
		Verify Ranging Mode status Telemetry X1 Rang MOD-RM RMB27442	= OFF	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
5		First AOS (yes/no)?		Next Step: yes 6 no 8
6		Verify Tx1 TM bit rate set to LR2		Next Step: 7
		At first AOS (S/C in Sun Acquisition after separation): Tx1 TM bit rate is set to 5 Kbps (LR2)		
		Verify Low Rate-2 status Telemetry X1 LowRate-2 MD RMB31442		AND=ZAZ7I999
		In non nominal condition (Sun Acquisition mode): Tx1 TM bit rate is 500 bps (LR1).		
		Verify Low Rate-2 status Telemetry X1 LowRate-1 MD RMB30442		AND=ZAZ7I999
7		Verify Antenna configuration		Next Step: 10

TTC S/S LEOP Quick Check-out
 File: H_LEO_TTC_LCHK.xls
 Author: E. Picallo



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry AntRx1Config XD036992	= LGA-1	AND=ZAZ7J999
		Verify Telemetry AntRx2Config XD037992	= LGA-2	AND=ZAZ7J999
		Note: In non nominal condition (Sun Acquisition mode): AntRx1Config =LGA1 & AntRx2Config =MGA.		
8		Verify Tx1 TM bit rate set to MBR		Next Step: 9
		During LEOP from the second pass on the Tx1 TM bit rate is set by Ground at 150 Kbps (MBR)		
		Verify Medium Rate status Telemetry X1 MedRate-MRM RMB29442		AND=ZAZ7I999
		In non nominal condition (Sun Acquisition mode): Tx1 TM bit rate is 500 bps (LR1).		
		Verify Low Rate-2 status Telemetry X1 LowRate-1 MD RMB30442		AND=ZAZ7I999
9		Verify Antenna configuration		Next Step: 10
		During LEOP from the second pass on the Rx1 is connected to MGA		
		Verify Telemetry AntRx1Config XD036992	= LGA-1	AND=ZAZ7J999
		Verify Telemetry AntRx2Config XD037992	= MGA	AND=ZAZ7J999
10		Verify TWT1 status		Next Step: 11
		Verify TWT1 Status Telemetry TWT1_ONOFF_STS RMB09439	= ON	AND=ZAZ7J999
		Verify EPC1 Helix current Telemetry EPC1_HELIX_CURR RMB02439	>= 0.19 mA <= 1.20 mA	AND=ZAZ7J999
11		Request sweep of uplink carrier		Next Step: 12
12		Verify RX1 lock status		Next Step: 23
		Verify RX1 AGC Level Telemetry XPD1_RX1_AGC_LV RMB09442	>= -130.0 dbmW	AND=ZAZ7I999

TTC S/S LEOP Quick Check-out
 File: H_LEO_TTC_LCHK.xls
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify RX1 Lock status Telemetry X1 Rx Lock - RL RMB24442	= Locked	AND=ZAZ7I999
		Verify RX1 Squelch status Telemetry X1 SqlchSt - SS RMB23442	= ON	AND=ZAZ7I999
13		Verify RX2 status		Next Step: 14
		Verify Rx2 FCL4 current Telemetry Xpnd2_Rx_FCL4_I WM402565	>= 0.20 A <= 0.35 A	AND=ZAZ7I999
		Verify Rx2 Supply Voltage Telemetry XPND2_RX2_SUP_V RMB08442	>= 4.8 V <= 5.2 V	AND=ZAZ7I999
		Verify RX2 AGC Level Telemetry XPD2_RX2_AGC_LV RMB10442	>= -130.0 dbmW	AND=ZAZ7I999
		Verify RX2 PLL SPE Telemetry XPD2_RX2_PLL_SP RMB12442		AND=ZAZ7I999
		Verify RX2 Lock status Telemetry X2 Rx Lock - RL RMB45442	= No locked	AND=ZAZ7I999
		Verify RX2 Squelch status Telemetry X2 SqlchSts-SS RMB44442	= OFF	AND=ZAZ7I999
		Verify RX2 bit rate Telemetry RX2 125-4K Stat RMB18442	= 4 Kbps	AND=ZAZ7I999
		In case of TTC chain switch over: Rx2 TC bit rate is set to 4 Kbps. In case of Survival mode: Rx2 TC bit rate is set to 125 bps.		
		Report the RX2 AGC Level to OM		
		Report the RX2 PLL SPE to OM		
14		Verify TX2 Status		Next Step: 15
		Verify Coherent Mode status Telemetry X2 Coher MOD-CM RMB47442	= OFF	AND=ZAZ7I999
		Verify Ranging Mode status Telemetry X2 Rang MD - RM RMB48442	= OFF	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

TTC S/S LEOP Quick Check-out
 File: H_LEO_TTC_LCHK.xls
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
15		First AOS (yes/no)?		Next Step: yes 16 no 18
16		Verify Tx2 TM bit rate set to LR2		Next Step: 17
		At first AOS (S/C in Sun Acquisition after separation): Tx2 TM bit rate is 5 Kbps (LR2).		
		Verify Low Rate-2 status Telemetry X2 LowRate-2 MD RMB52442		AND=ZAZ7I999
		In case of Survival mode: TX2 TM bit rate is set to 500 bps (LR1).		
		Verify Low Rate-1 status Telemetry X2 LowRate-1 MD RMB51442		AND=ZAZ7I999
17		Verify Antenna configuration		Next Step: 20
		Verify Telemetry AntRx2Config XD037992 = LGA-1		AND=ZAZ7J999
		Verify Telemetry AntRx1Config XD036992 = LGA-2		AND=ZAZ7J999
		In case of TTC chain switch over or Survival mode: AntRx2Config = LGA1 & AntRx1Config = LGA2.		
18		Verify Tx2 TM bit rate set to MBR		Next Step: 19
		During LEOP from the second pass on: Tx2 TM bit rate is set by Ground at 150 Kbps (MBR)		
		Verify Medium Rate status Telemetry X2 MedRate-MRM RMB50442		AND=ZAZ7I999
		In case of Survival mode: TX2 TM bit rate is set to 500 bps (LR1).		
		Verify Low Rate-1 status Telemetry X2 LowRate-1 MD RMB51442		AND=ZAZ7I999
19		Verify Antenna configuration		Next Step: 20
		During LEOP from the second pass on: Rx1 is connected to MGA		
		Verify Telemetry AntRx2Config XD037992 = LGA-1		AND=ZAZ7J999

TTC S/S LEOP Quick Check-out
 File: H_LEO_TTC_LCHK.xls
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry AntRx1Config XD036992	= MGA	AND=ZAZ7J999
		In case of TTC chain switch over or Survival mode: AntRx2Config = LGA1 & AntRx1Config = LGA2.		
20		Verify TWT2 status		Next Step: 21
		Verify TWT2 Status Telemetry TWT2_ONOFF_STS RMB10439	= ON	AND=ZAZ7J999
		Verify EPC2 Helix current Telemetry EPC2_HELIX_CURR RMB04439	>= 0.19 mA <= 1.46 mA	AND=ZAZ7J999
21		Request sweep of uplink carrier		Next Step: 22
22		Verify RX2 lock status		Next Step: 23
		Verify RX2 AGC Level Telemetry XPD2_RX2_AGC_LV RMB10442	>= -130.0 dbmW	AND=ZAZ7I999
		Verify RX2 Lock status Telemetry X2 Rx Lock - RL RMB45442	= Locked	AND=ZAZ7I999
		Verify RX2 Squelch status Telemetry X2 SqlchSts-SS RMB44442	= ON	AND=ZAZ7I999
23		Verify the CLCW contents provided in TM frames		Next Step: 24
		Verify Telemetry NO RF AVAIL. XD165991	= Valid RF	AND=ZAZ7J999
		Verify Telemetry NO B/T LOCK XD195991	= Valid BitLock	AND=ZAZ7J999
23.1		Verify CLCW information related to VC0		☐
		Verify Telemetry VIRTUALCH.IDENT. XD163991	= VC0 TTRA Pdec	AND=ZAZ7J999
		Verify Telemetry FARM B CNT. XD170991	BD_NO	AND=ZAZ7J999
		Verify Telemetry REPORT VALUE XD172991	AD_NO	AND=ZAZ7J999
23.2		Verify CLCW information related to VC1		☐

TTC S/S LEOP Quick Check-out
 File: H_LEO_TTC_LCHK.xls
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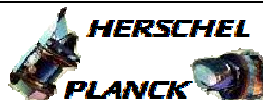
Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry VIRTUALCH.IDENT. XD192991	= VC1 TTRB Pdec	AND=ZAZ7J999
		Verify Telemetry FARM B CNT. XD199991	BD_N1	AND=ZAZ7J999
		Verify Telemetry REPORT VALUE XD201991	AD_N1	AND=ZAZ7J999
24		Verify BSW TC complete counter		Next Step: 25
		Verify Telemetry BSW_TC_Complete DELAF160	NN	AND=ZAZA0999
25		Send Connection Test TC		Next Step: 26
		Execute Telecommand ConnectionTest TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 10 Det. descr. : Perform Connection Test	DC810180	
26		Verify the CLCW information related to VC0		Next Step: 27
		If BD mode is set Verify Telemetry FARM B CNT. XD170991	BD_NO + 1	AND=ZAZ7J999
		If AD mode is set Verify Telemetry REPORT VALUE XD172991	AD_NO + 1	AND=ZAZ7J999
27		Verify BSW TC complete counter		Next Step: 28
		Verify Telemetry BSW_TC_Complete DELAF160	NN + 1	AND=ZAZA0999
28		Perform a Test command via VC-1 (yes/no)?		Next Step: yes 29 no 34
29		Modify the VC Id to be used. Set the VC ID to 1		Next Step: 30
30		Send Connection Test TC		Next Step: 31

TTC S/S LEOP Quick Check-out
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand ConnectionTest <i>TC Control Flags :</i> Subsch. ID : 10 Det. descr. : Perform Connection Test GBM IL DSE --Y -- --	DC810180	
31		Verify the CLCW information related to VC1		Next Step: 32
		If BD mode is set Verify Telemetry FARM B CNT. XD199991	BD_N1 + 1	AND=ZAZ7J999
		If AD mode is set Verify Telemetry REPORT VALUE XD201991	AD_N1 + 1	AND=ZAZ7J999
32		Verify BSW TC complete counter		Next Step: 33
		Verify Telemetry BSW_TC_Complete DELAF160	NN + 2	AND=ZAZA0999
33		Modify the VC Id to be used. Set the VC ID to 0		Next Step: 34
34		Perform a ACC Test command (yes/no)?		Next Step: yes 35 no 39
35		Verify ACC BSW TC counter value		Next Step: 36
		Verify Telemetry BSW_TC_TO_BSW AEHKF050	Note current value	AND=ZAA08999
36		Send TC(17,1) to check the link status		Next Step: 37
		Execute Telecommand ConnectionTest <i>TC Control Flags :</i> Subsch. ID : 20 Det. descr. : Perform Connection Test GBM IL DSE --Y -- --	AC810070	
37		Verify the CLCW information related to VC0		Next Step: 38

TTC S/S LEOP Quick Check-out
 File: H_LEO_TTC_LCHK.xls
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		If BD mode is set Verify Telemetry FARM B CNT.	XD170991	BD_NO + 2 AND=ZAZ7J999
		If AD mode is set Verify Telemetry REPORT VALUE	XD172991	AD_NO + 2 AND=ZAZ7J999
38		Verify BSW counter increase on ACC side		Next Step: 39
		Verify Telemetry BSW_TC_TO_BSW	AEHKF050	Previous value + 1 AND=ZAA08999
39		Initialise AD mode (yes/no)?		Next Step: yes 40 no END
		During LEOP the first pass has to be performed in BD mode. Starting form the second passs use AD mode.		
40		AD protocol initialisation		Next Step: 41
		In the 'Uplink Configuration' Tab of the TC SPACON application set the value of V(S) to 0.		
		After having set the value click on the 'Generate Packet' button.		
		Check that BD mode is still selected in the Manual Stack application.		
		Execute Telecommand FARM1 Unlock Directive	GCUNL000	
		TC Control Flags : Subsch. ID : 30 Det. descr. : FARM1 Unlock Directive	GBM IL DSE --Y -- ---	
		Execute Telecommand FARM1 SET V-R- Directive	GCSET000	
		Command Parameter(s) : V-R- Value	GPVAL000 0 <dec>	
		TC Control Flags : Subsch. ID : 30 Det. descr. : FARM1 SET V-R- Directive	GBM IL DSE --Y -- ---	
		NOW Select AD mode in the Manual Stack application.		

TTC S/S LEOP Quick Check-out
 File: H_LEO_TTC_LCHK.xls
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41		Send TC(17,1) to check the link status in AD mode		Next Step: 42
		At the reception of this TC, the CDMU will generate a TM(17,2) ("link connection report").		
		Execute Telecommand TC Control Flags : Subsch. ID : 10 Det. descr. : Perform Connection Test	ConnectionTest GBM IL DSE --Y -- ---	DC810180
42		Verify that TM(17,2) has been received (if enabled)		Next Step: 43
		Verify Packet Reception Packet Details:	Link Connection Report APID: 16 Type: 17 Subtype: 2 PI1: PI2:	LnkConnecRep
43		Verify the CLCW information related to VC0		Next Step: END
		Verify Telemetry REPORT VALUE	XD172991	Previous value + 1 AND=ZAZ7J999
End of Procedure				