

LO functional test  
 File: H\_COP\_HIF\_RFL7.xls  
 Author: R. Biggins



## Procedure Summary

### Objectives

The objective of this procedure is to execute the standard functional test of the Local Oscillator Unit. It consists of a switch of each of the LO-band at the default frequencies and safe voltages, as well as an IV Curve characterization of the multipliers.

Based on procedure:  
 HIFI-COP-1.2-LO\_FT (v1)

### Summary of Constraints

Note that this procedure is made up of 2 sequences.  
 The second sequence is executed via the following TPF file:  
 HCHRFL7Y\_LO\_FT\_4A\_vvvv.IPF

### Spacecraft Configuration

**Start of Procedure**  
 n/a

**End of Procedure**  
 n/a

### Reference File(s)

**Input Command Sequences**

**Output Command Sequences**  
 HCHRFL7X  
 HCHRFL7Y

### Referenced Displays

**ANDs**      **GRDs**      **SLDs**  
 ZAZ9C999

### Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
31/10/08		1	Created	R. Biggins	
27/11/08	2	2	Updates due to updates from D. Teyssier - Step 3 and 4 moved to the second sequence - Last 2 parameters of TC HIFI_P_Configure_FCU (step 5) changed to FP	R. Biggins	
08/04/09	2.3	3	Changes due to updates from D. Teyssier - Step 3 removed - HIFI_non_periodic_hk_FCU TC removed from step 5 - TC flags updated	R. Biggins	
10/09/09	2.5	4	Updates based on comments by D. Teyssier - Pause added after step 5 and 6 - TC HC198289 added before HC019289 quintuplet	R. Biggins	

Status : Version 6 - Updated  
 Last Checkin: 08/01/10

LO functional test  
File: H\_COP\_HIF\_RFL7.xls  
Author: R. Biggins

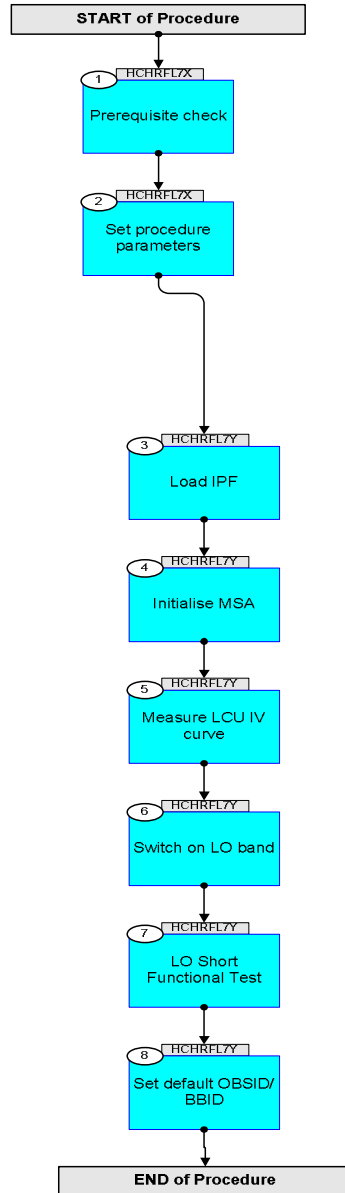


07/01/10		5	All ET times removed	R. Biggins	
08/01/10	3	6	Update due to MOIS error in generating FPs	R. Biggins	

LO functional test  
File: H\_COP\_HIF\_RFL7.xls  
Author: R. Biggins



## Procedure Flowchart Overview





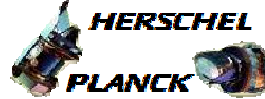


LO functional test  
 File: H\_COP\_HIF\_RFL7.xls  
 Author: R. Biggins



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.01	HIFI_Configure_FCU_Power  <b>HIFI_Configure_FCU_Power</b>  Command Parameter(s) : HIFI_BB_ID                  HP001197 HF_CPR_Mixer_H_S          HP203191 HF_CPR_Mixer_V_S          HP204191 HF_CPR_Chopper_S          HP205191 HF_CPR_UCH_S              HP206191 HF_CPR_UCV_S              HP207191  TC Control Flags : GBM IL DSE --Y -- ---  Subsch. ID : 70  Det. descr. : Switch ON or OFF the five FCU-boards (mixer H/V, chopper, IF HV)	HC027289  C800001 <hex> ON (Def) ON (Def) ON (Def) ON (Def) ON (Def) ON (Def)	
	ET=+ UT=+00.00.00	HIFI_R_Configure_FCU  <b>HIFI_R_Configure_FCU</b>  Command Parameter(s) : HIFI_BB_ID                  HP001197 HF_CPR_MX BAND              HP202191 HF_CH1_DPFPFP1              HP176191 HF_CH2_FIF1_Drain_V          HP177191 HF_CH2_FIF1_Drain_C          HP178191 HF_CH2_FIF2_Drain_V          HP179191 HF_CH2_FIF2_Drain_C          HP180191 HF_CH2_SIF1_Drain_V          HP181191 HF_CH2_SIF1_Drain_C          HP182191 HF_CH2_SIF2_Drain_V          HP183191 HF_CH2_SIF2_Drain_C          HP184191  HF_CH2_SIF3_Drain_V          HP185191 HF_CH2_SIF3_Drain_C          HP186191 HF_CV1_DPFPFP1              HP191191 HF_CV2_FIF1_Drain_V          HP192191 HF_CV2_FIF1_Drain_C          HP193191 HF_CV2_FIF2_Drain_V          HP194191 HF_CV2_FIF2_Drain_C          HP195191 HF_CV2_SIF1_Drain_V          HP196191 HF_CV2_SIF1_Drain_C          HP197191 HF_CV2_SIF2_Drain_V          HP198191 HF_CV2_SIF2_Drain_C          HP199191 HF_CV2_SIF3_Drain_V          HP200191 HF_CV2_SIF3_Drain_C          HP201191 HF_CPR_CH_SINE_S              HP211191 HF_CPR_CH_LOOP_S              HP210191	HC183289  C800001 <hex> 4 <dec> 227 <dec> (Def) 0.75 V 4.0 mA 0.65 V 3.0 mA 0.85 V 2.5 mA 0.75 V 2.1 mA  0.7 V 2.5 mA 227 <dec> (Def) 0.75 V 4.0 mA 0.65 V 3.0 mA 0.9 V 2.5 mA 0.75 V 1.9 mA 0.75 V 2.5 mA ON (Def) CLOSE (Def)	

LO functional test  
 File: H\_COP\_HIF\_RFL7.xls  
 Author: R. Biggins



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		HF_CPR_CHFPG1 HP212191 HF_CPR_CHFPG2 HP213191 HF_CPR_CHFPG1 HP214191 HF_CPR_CHFPG2 HP215191 HF_CPR_CHFPG2 HP216191 HF_CPR_Cal_Heater_C HP217191 HF_CH1_MXBIAS_V HP172191 HF_CH1_MX_MG_C HP173191 HF_CV1_MXBIAS_V HP187191 HF_CV1_MX_MG_C HP188191 HF_R_Chopper_Rot HP455191 HF_CH1_DFACT_C HP174191 HF_CV1_DFACT_C HP189191  Subsch. ID : 70  Det. descr. : Configure the FCU-subsystem (redundant)	17 <dec> 201 <dec> (Def) 1010 <dec> 885 <dec> (Def) 149 <dec> (Def) 1.1 mA 1.780 mV 15.0 mA 1.780 mV 15.0 mA -2.33 V A B	
	ET=+ UT=+00.00.03	HIFI_CH1_MX_MG_C  Command Parameter(s) : HIFI_BB_ID                  HP001197 HF_CH1_MX_MG_C                  HP173191  Subsch. ID : 70 Det. descr. : Send single command to set H mixer magnet current	HIFI_CH1_MX_MG_C  HC096289  C800001 <hex> 5.25 mA	
	ET=+ UT=+00.00.00	HIFI_CV1_MX_MG_C  Command Parameter(s) : HIFI_BB_ID                  HP001197 HF_CV1_MX_MG_C                  HP188191  Subsch. ID : 70 Det. descr. : Send single command to set V mixer magnet current	HIFI_CV1_MX_MG_C  HC099289  C800001 <hex> 5.3 mA	
	ET=+ UT=+00.00.01	HIFI_HL_Normal  Command Parameter(s) : HIFI_BB_ID                  HP001197  Subsch. ID : 70 Det. descr. : Send single command to switch LCU to normal mode	HIFI_HL_Normal  HC082289  E2F0001 <hex>	
	ET=+ UT=+00.00.00	HIFI_Conf_nom_LCU_ch0  Command Parameter(s) : HIFI_BB_ID                  HP001197  Subsch. ID : 70 Det. descr. : Create macro-command to switch off the bands	HIFI_Conf_nom_LCU_ch0  HC049289  E2F0001 <hex>	

LO functional test  
 File: H\_COP\_HIF\_RFL7.xls  
 Author: R. Biggins



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.10	HIFI_HL_heater  <b>HIFI_HL_heater</b>  Command Parameter(s) : HIFI_BB_ID                  HP001197 HL_heater                  HP397194  Subsch. ID : 70 Det. descr. : Send single command to control the LCU heater	HC086289  E2F0001 <hex> 6.0 V	
		Verify Telemetry  HL_Channel_S                  HM003194	= OFF	AND=ZAZ9C999
		Verify Telemetry  HL_MODE_S                  HM258194	= normal	AND=ZAZ9C999
5		Measure LCU IV curve		Next Step: 6
	ET=+ UT=+00.00.00	HIFI_measure_LCU_IV  <b>HIFI_measure_LCU_IV</b>  Command Parameter(s) : HIFI_BB_ID                  HP001197 HIF_LCU_diode                  HP072197 HIF_LCU_IV_delay                  HP073197  TC Control Flags :  GBM IL DSE --Y -- ---  Subsch. ID : 70 Det. descr. : Perform IV-measurement on an LOU-diode	HC108289  E4F0001 <hex> M1_4a 90 <dec>	
	ET=+ UT=+00.01.32	HIFI_measure_LCU_IV  <b>HIFI_measure_LCU_IV</b>  Command Parameter(s) : HIFI_BB_ID                  HP001197 HIF_LCU_diode                  HP072197 HIF_LCU_IV_delay                  HP073197  Subsch. ID : 70 Det. descr. : Perform IV-measurement on an LOU-diode	HC108289  E4F0002 <hex> M2_4a 90 <dec>	
		SPACON:  Confirmation from the HIFI representative should be requested before continuing.		
6		Switch on LO band		Next Step: 7



LO functional test  
 File: H\_COP\_HIF\_RFL7.xls  
 Author: R. Biggins



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.01.32	HIFI_HL_Normal  HIFI_HL_Normal  Command Parameter(s) : HIFI_BB_ID                  HP001197  TC Control Flags :  GBM IL DSE --Y -- ---  Subsch. ID : 70 Det. descr. : Send single command to switch LCU to normal mode	HC082289  E2A0001 <hex>	
	ET=+ UT=+00.00.01	HIFI_Conf_safe_LCU_ch4a  HIFI_Conf_safe_LCU_ch4a  Command Parameter(s) : HIFI_BB_ID                  HP001197 HL_freq_nx                  HP436194 HL_LSU_main                  HP438194 HL_LSU_offset                  HP439194 HL_D2_step                  HP437194 HL_Drain2_4A_V                  HP345194 HL_Curlim2                  HP291194 HL_macro_checksum                  HP440194  Subsch. ID : 70 Det. descr. : Create macro-command to configure LCU band 4a to safe setting	HC056289  1 2 3 4 5 6 7 8	
	ET=+ UT=+00.00.20	Execute Telecommand  HIFI_LCU_read_settings  Subsch. ID : 70 Det. descr. : Requests setting parameters from LCU RAM page 7A	HC198289	
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk  HIFI_LCU_macro_tuning_hk  Command Parameter(s) : HIF_LCU_memmacro                  HP068197  Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_TM1 (Def)	
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk  HIFI_LCU_macro_tuning_hk  Command Parameter(s) : HIF_LCU_memmacro                  HP068197  Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_TM2	

LO functional test  
 File: H\_COP\_HIF\_RFL7.xls  
 Author: R. Biggins



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk <b>HIFI_LCU_macro_tuning_hk</b> Command Parameter(s) : HIF_LCU_memmacro                  HP068197 Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_TM3	
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk <b>HIFI_LCU_macro_tuning_hk</b> Command Parameter(s) : HIF_LCU_memmacro                  HP068197 Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_TM	
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk <b>HIFI_LCU_macro_tuning_hk</b> Command Parameter(s) : HIF_LCU_memmacro                  HP068197 Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_G	
	ET=+ UT=+00.00.02	HIFI_LCU_Single <b>HIFI_LCU_Single</b> Command Parameter(s) : HIFI_BB_ID                  HP001197 LCU_cmd                  HP234194 Subsch. ID : 70 Det. descr. : Send a single command to LCU	HC101289  E210001 <hex> HL_CLR_ERR	
	ET=+ UT=+00.00.01	HIFI_HL_heater <b>HIFI_HL_heater</b> Command Parameter(s) : HIFI_BB_ID                  HP001197 HL_heater                  HP397194 Subsch. ID : 70 Det. descr. : Send single command to control the LCU heater	HC086289  9 10	
		Verify Telemetry HL_Channel_S                  HM003194	= 4a	AND=ZAZ9C999
		Verify Telemetry HL_MODE_S                  HM258194	= normal	AND=ZAZ9C999
		SPACON:  Confirmation from the HIFI representative should be requested before continuing.		

LO functional test  
 File: H\_COP\_HIF\_RFL7.xls  
 Author: R. Biggins



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
7		LO Short Functional Test		Next Step: 8
		Verify: Monitor the following parameter and ensure that any occurrences of a 'FAULT' condition are communicated immediately to the HIFI representative (use AND HA004289).  HM259194 HL_error_word_S		
	ET=+ UT=+00.00.00	HIFI_HL_Normal  HIFI_HL_Normal  Command Parameter(s) : HIFI_BB_ID                  HP001197  TC Control Flags :  GBM IL DSE --Y -- ---  Subsch. ID : 70 Det. descr. : Send single command to switch LCU to normal mode	HC082289  E2A0002 <hex>	
	ET=+ UT=+00.00.01	HIFI_Conf_safe_LCU_ch4a  HIFI_Conf_safe_LCU_ch4a  Command Parameter(s) : HIFI_BB_ID                  HP001197 HL_freq_nx                  HP436194 HL_LSU_main                  HP438194 HL_LSU_offset                  HP439194 HL_D2_step                  HP437194 HL_Drain2_4A_V                  HP345194 HL_Curlim2                  HP291194 HL_macro_checksum                  HP440194  Subsch. ID : 70 Det. descr. : Create macro-command to configure LCU band 4a to safe setting	HC056289  11 12 13 14 15 16 17 18	
	ET=+ UT=+00.00.20	Execute Telecommand  HIFI_LCU_read_settings  Subsch. ID : 70 Det. descr. : Requests setting parameters from LCU RAM page 7A	HC198289	
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk  HIFI_LCU_macro_tuning_hk  Command Parameter(s) : HIF_LCU_memmacro                  HP068197  Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_TM1 (Def)	

LO functional test  
 File: H\_COP\_HIF\_RFL7.xls  
 Author: R. Biggins



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk HIFI_LCU_macro_tuning_hk Command Parameter(s) : HIF_LCU_memmacro                  HP068197 Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_TM2	
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk HIFI_LCU_macro_tuning_hk Command Parameter(s) : HIF_LCU_memmacro                  HP068197 Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_TM3	
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk HIFI_LCU_macro_tuning_hk Command Parameter(s) : HIF_LCU_memmacro                  HP068197 Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_TM	
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk HIFI_LCU_macro_tuning_hk Command Parameter(s) : HIF_LCU_memmacro                  HP068197 Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_G	
	ET=+ UT=+00.00.02	HIFI_LCU_Single HIFI_LCU_Single Command Parameter(s) : HIFI_BB_ID                  HP001197 LCU_cmd                  HP234194 Subsch. ID : 70 Det. descr. : Send a single command to LCU	HC101289  E210002 <hex> HL_CLR_ERR	
	ET=+ UT=+00.00.01	HIFI_HL_heater HIFI_HL_heater Command Parameter(s) : HIFI_BB_ID                  HP001197 HL_heater                  HP397194 Subsch. ID : 70 Det. descr. : Send single command to control the LCU heater	HC086289  19 20	

LO functional test  
 File: H\_COP\_HIF\_RFL7.xls  
 Author: R. Biggins



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.20	HIFI_HL_Normal  HIFI_HL_Normal  Command Parameter(s) : HIFI_BB_ID                  HP001197  Subsch. ID : 70 Det. descr. : Send single command to switch LCU to normal mode	HC082289  E2A0003 <hex>	
	ET=+ UT=+00.00.01	HIFI_Conf_safe_LCU_ch4a  HIFI_Conf_safe_LCU_ch4a  Command Parameter(s) : HIFI_BB_ID                  HP001197 HL_freq_nx                  HP436194 HL_LSU_main                  HP438194 HL_LSU_offset                  HP439194 HL_D2_step                  HP437194 HL_Drain2_4A_V                  HP345194 HL_Curlim2                  HP291194 HL_macro_checksum                  HP440194  Subsch. ID : 70 Det. descr. : Create macro-command to configure LCU band 4a to safe setting	HC056289  21 22 23 24 25 26 27 28	
	ET=+ UT=+00.00.20	Execute Telecommand  HIFI_LCU_read_settings  Subsch. ID : 70 Det. descr. : Requests setting parameters from LCU RAM page 7A	HC198289	
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk  HIFI_LCU_macro_tuning_hk  Command Parameter(s) : HIF_LCU_memmacro                  HP068197  Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_TM1 (Def)	
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk  HIFI_LCU_macro_tuning_hk  Command Parameter(s) : HIF_LCU_memmacro                  HP068197  Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_TM2	

LO functional test  
 File: H\_COP\_HIF\_RFL7.xls  
 Author: R. Biggins



Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk HIFI_LCU_macro_tuning_hk Command Parameter(s) : HIF_LCU_memmacro                  HP068197 Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_TM3	
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk HIFI_LCU_macro_tuning_hk Command Parameter(s) : HIF_LCU_memmacro                  HP068197 Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_TM	
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk HIFI_LCU_macro_tuning_hk Command Parameter(s) : HIF_LCU_memmacro                  HP068197 Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_G	
	ET=+ UT=+00.00.02	HIFI_LCU_Single HIFI_LCU_Single Command Parameter(s) : HIFI_BB_ID                  HP001197 LCU_cmd                  HP234194 Subsch. ID : 70 Det. descr. : Send a single command to LCU	HC101289  E210003 <hex> HL_CLR_ERR	
		Verify: Verify the content of the following ANDs with the HIFI representative:  HA004289 LCU_status2 HA013289 LCU_4a		
	ET=+ UT=+00.00.01	HIFI_Housekeeping_on HIFI_Housekeeping_on Command Parameter(s) : HIF_HK_rate                  HP012197 HIF_FCU_S                  HP006197 HIF_LCU_S                  HP007197 HIF_WBSV_S                  HP009197 HIF_WBSH_S                  HP008197 HIF_HRSV_S                  HP011197 HIF_HRSH_S                  HP010197  TC Control Flags : GBM IL DSE --Y -- ---	HC016289  1_pkt_per_4_s ON (Def) ON (Def) ON (Def) ON (Def) ON (Def) ON (Def)	

