

LO functional test  
 File: H\_COP\_HIF\_RFLC.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:  
 HCHRFLCY\_LO\_FT\_6B\_vvvv.IPF

### Spacecraft Configuration

**Start of Procedure**  
 n/a

**End of Procedure**  
 n/a

### Reference File(s)

**Input Command Sequences**

**Output Command Sequences**  
 HCHRFLCX  
 HCHRFLCY

### 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 7 - Updated  
 Last Checkin: 11/01/10

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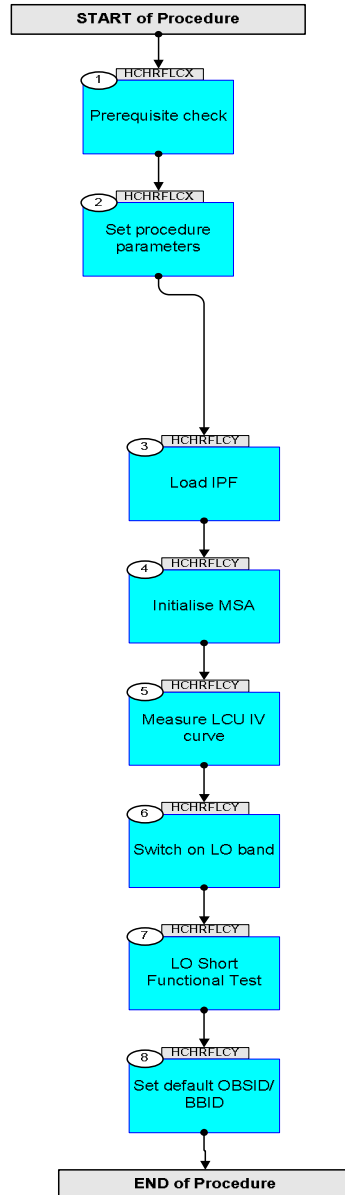


07/01/10		5	All ET times removed	R. Biggins	
08/01/10		6	Update due to MOIS error in generating FPs	R. Biggins	
11/01/10	3	7	Update due to MOIS associating incorrect calibration curves to imported FPs	R. Biggins	

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## Procedure Flowchart Overview







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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> 6 <dec> 227 <dec> (Def) 0.75 V 4.0 mA 0.65 V 3.0 mA 0.57 V 3.5 mA 0.8 V 1.85 mA  0.57 V 3.5 mA 227 <dec> (Def) 0.75 V 4.0 mA 0.65 V 3.0 mA 0.57 V 3.5 mA 0.57 V 3.5 mA 0.57 V 3.5 mA 0.57 V 3.5 mA ON (Def) CLOSE (Def)	

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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 6.0 mV 0.0 mA (Def) 6.0 mV 0.0 mA (Def) -2.33 V A B	
	ET=+ UT=+00.00.03	HIFI_CH1_MXBIAS_V  HIFI_CH1_MXBIAS_V  Command Parameter(s) : HIFI_BB_ID HP001197 HF_CH1_MXBIAS_V HP172191  Subsch. ID : 70 Det. descr. : Send single command to set H mixer bias voltage	HC095289  C800001 <hex> 0.6 mV	
	ET=+ UT=+00.00.00	HIFI_CV1_MXBIAS_V  HIFI_CV1_MXBIAS_V  Command Parameter(s) : HIFI_BB_ID HP001197 HF_CV1_MXBIAS_V HP187191  Subsch. ID : 70 Det. descr. : Send single command to set V mixer bias voltage	HC098289  C800001 <hex> 0.6 mV	
	ET=+ UT=+00.00.01	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  E2F0001 <hex>	
	ET=+ UT=+00.00.00	HIFI_Conf_nom_LCU_ch0  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	HC049289  E2F0001 <hex>	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.10	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  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  HIFI_measure_LCU_IV  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_6b 90 <dec>	
	ET=+ UT=+00.01.32	HIFI_measure_LCU_IV  HIFI_measure_LCU_IV  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_6b 109 <dec>	
		SPACON:  Confirmation from the HIFI representative should be requested before continuing.		
6		Switch on LO band		Next Step: 7



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.01.51	HIFI_HL_Normal  <b>HIFI_HL_Normal</b>  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_nom_LCU_ch6b  <b>HIFI_Conf_nom_LCU_ch6b</b>  Command Parameter(s) : HIFI_BB_ID                  HP001197 HL_freq_nx                  HP436194 HL_LSU_main                  HP438194 HL_LSU_offset                HP439194 HL_D2_step                  HP437194 HL_PL_6B_C                  HP375194 HL_M1_6B_V                  HP376194 HL_M2_6B_V                  HP377194 HL_Gate1_6B_V                HP378194 HL_Gate2_6B_V                HP379194 HL_Drain1_6B_V              HP380194  HL_Curlim1                  HP290194 HL_Drain2_6B_V              HP381194 HL_Curlim2                  HP291194 HL_macro_checksum            HP440194  Subsch. ID : 70 Det. descr. : Create macro-command to configure LCU band 6b	HC046289  1 2 3 4 5 6 7 8 9 10 11  12 13 14 15	
	ET=+ UT=+00.00.20	Execute Telecommand  <b>HIFI_LCU_read_settings</b>  Subsch. ID : 70 Det. descr. : Requests setting parameters from LCU RAM page 7A	HC198289	
	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_TM1 (Def)	

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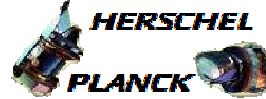
Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk HIFI_LCU_macro_tuning_hk Command Parameter(s) : HIF_LCU_memmacro                  HP068197 Subsch. ID : 70 Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_TM2	
	ET=+ 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  E210001 <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  16 17	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry HL_Channel_S HM003194	= 6b	AND=ZAZ9C999
		Verify Telemetry HL_MODE_S HM258194	= normal	AND=ZAZ9C999
		SPACON: Confirmation from the HIFI representative should be requested before continuing.		
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_nom_LCU_ch6b  HIFI_Conf_nom_LCU_ch6b  Command Parameter(s) : HIFI_BB_ID HP001197 18 HL_freq_nx HP436194 19 HL_LSU_main HP438194 20 HL_LSU_offset HP439194 21 HL_D2_step HP437194 22 HL_PL_6B_C HP375194 23 HL_M1_6B_V HP376194 24 HL_M2_6B_V HP377194 25 HL_Gate1_6B_V HP378194 26 HL_Gate2_6B_V HP379194 27 HL_Drain1_6B_V HP380194 28  HL_Curlim1 HP290194 29 HL_Drain2_6B_V HP381194 30 HL_Curlim2 HP291194 31 HL_macro_checksum HP440194 32  Subsch. ID : 70 Det. descr. : Create macro-command to configure LCU band 6b	HC046289	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.20	Execute Telecommand  <b>HIFI_LCU_read_settings</b>  <i>Subsch. ID : 70</i> Det. descr. : Requests setting parameters from LCU RAM page 7A	HC198289	
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk  <b>HIFI_LCU_macro_tuning_hk</b>  <i>Command Parameter(s) :</i> <b>HIF_LCU_memmacro                      HP068197</b>  <i>Subsch. ID : 70</i> 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  <b>HIFI_LCU_macro_tuning_hk</b>  <i>Command Parameter(s) :</i> <b>HIF_LCU_memmacro                      HP068197</b>  <i>Subsch. ID : 70</i> Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_TM2	
	ET=+ UT=+00.00.02	HIFI_LCU_macro_tuning_hk  <b>HIFI_LCU_macro_tuning_hk</b>  <i>Command Parameter(s) :</i> <b>HIF_LCU_memmacro                      HP068197</b>  <i>Subsch. ID : 70</i> 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>  <i>Command Parameter(s) :</i> <b>HIF_LCU_memmacro                      HP068197</b>  <i>Subsch. ID : 70</i> 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>  <i>Command Parameter(s) :</i> <b>HIF_LCU_memmacro                      HP068197</b>  <i>Subsch. ID : 70</i> Det. descr. : Requests one of the eight LCU intermediate housekeeping-sets	HC019289  HSK_G	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	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  E210002 <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  33 34	
	ET=+ UT=+00.00.20	HIFI_HL_Normal  <b>HIFI_HL_Normal</b>  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_nom_LCU_ch6b  <b>HIFI_Conf_nom_LCU_ch6b</b>  Command Parameter(s) : HIFI_BB_ID                  HP001197 HL_freq_nx                  HP436194 HL_LSU_main                  HP438194 HL_LSU_offset               HP439194 HL_D2_step                  HP437194 HL_PL_6B_C                  HP375194 HL_M1_6B_V                  HP376194 HL_M2_6B_V                  HP377194 HL_Gate1_6B_V              HP378194 HL_Gate2_6B_V              HP379194 HL_Drain1_6B_V             HP380194  HL_Curlim1                  HP290194 HL_Drain2_6B_V             HP381194 HL_Curlim2                  HP291194 HL_macro_checksum           HP440194  Subsch. ID : 70 Det. descr. : Create macro-command to configure LCU band 6b	HC046289  35 36 37 38 39 40 41 42 43 44 45  46 47 48 49	
	ET=+ UT=+00.00.20	Execute Telecommand  <b>HIFI_LCU_read_settings</b>  Subsch. ID : 70 Det. descr. : Requests setting parameters from LCU RAM page 7A	HC198289	

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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_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	
	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	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify: Verify the content of the following ANDs with the HIFI representative:  <b>HA004289 LCU_status2</b> <b>HA018289 LCU_6b</b>		
	ET=+ UT=+00.00.01	HIFI_Housekeeping_on  <b>HIFI_Housekeeping_on</b>  <i>Command Parameter(s) :</i> <b>HIF_HK_rate</b> HP012197 <b>HIF_FCU_S</b> HP006197 <b>HIF_LCU_S</b> HP007197 <b>HIF_WBSV_S</b> HP009197 <b>HIF_WBSH_S</b> HP008197 <b>HIF_HRSV_S</b> HP011197 <b>HIF_HRSH_S</b> HP010197  <i>TC Control Flags :</i> <b>GBM IL DSE</b> <b>--Y -- ---</b>  <i>Subsch. ID : 70</i> <i>Det. descr. : Sets periodic housekeeping packet generation period</i>	HC016289  <b>1_pkt_per_4_s</b> ON (Def) ON (Def) ON (Def) ON (Def) ON (Def) ON (Def)	
		Verify: The following <b>TM(3,25)</b> packets should be produced once every 4 seconds:  <b>HIFI_essential_HK</b> (APID 1025) <b>HIFI_HK_rev_7</b> (APID 1027)		
8		<i>Set default OBSID/BBID</i>		Next Step: END
	ET=+ UT=+00.00.01	HIFI_Set_OBS_ID  <b>HIFI_Set_OBS_ID</b>  <i>Command Parameter(s) :</i> <b>HIFI_BB_ID</b> HP001197 <b>HIFI_OBS_ID</b> HP000197  <i>TC Control Flags :</i> <b>GBM IL DSE</b> <b>--Y -- ---</b>  <i>Subsch. ID : 70</i> <i>Det. descr. : Set Observation-ID and Building-Block-ID</i>	HC014289  <b>0 &lt;hex&gt;</b> (Def) <b>0 &lt;hex&gt;</b> (Def)	
		Verify Telemetry  <b>BB_ID_per_hk</b> HM004190	<b>= 0 &lt;hex&gt;</b>	AND=ZAZ9C999
		Verify Telemetry  <b>OBS_ID_per_hk</b> HM003190	<b>= 0 &lt;hex&gt;</b>	AND=ZAZ9C999
<b>End of Procedure</b>				