

IF Chain Functional Test  
 File: H\_COP\_HIF\_NIF5.xls  
 Author: R. Biggins



## Procedure Summary

### Objectives

The objective of this procedure is to check the functionality of the IF chain up to the spectrometers.

- Set TM rate to 1 packet/s
- Initialise FPU
- Turn on shot noise for mixers
- Tune WBS
- Set TM rate to 4 packet/s

Based on procedure:  
 HIFI-COP-1.2-IF\_FT (v3)

### Summary of Constraints

Real-time science packets should be enabled for downlink for HIFI analysis

### Spacecraft Configuration

**Start of Procedure**

HIFI in STANDBY II or PRIMARY mode

**End of Procedure**

### Reference File(s)

**Input Command Sequences**

**Output Command Sequences**

HCHNIF5

### Referenced Displays

ANDs	GRDs	SLDs
ZAZ9C999		
HA038289		
HA039289		
ZAZ9D999		

### Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
31/10/08	2	1	Created	R. Biggins	
24/02/09		2	Updates due to SVT-2/SOVT-2 testing - Summary updated - WBS tuning lasers (step 5) changed to FP	R. Biggins	
24/02/09		2.01	Validation : Modification history updated due to MOIS error	R. Biggins	

IF Chain Functional Test  
File: H\_COP\_HIF\_NIF5.xls  
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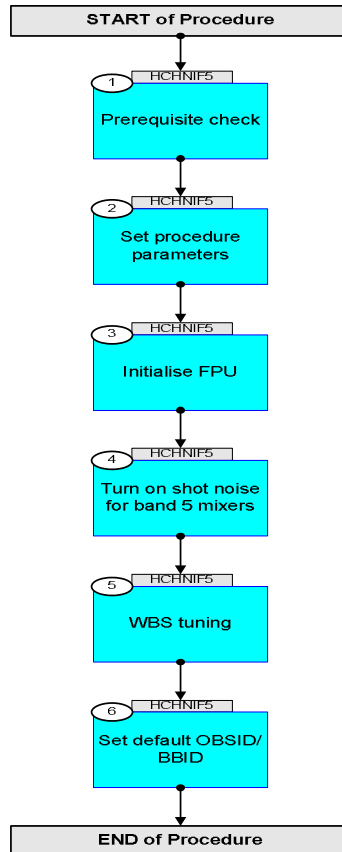


24/02/09	2.1	3	Updates from D. Teyssier - HIFL_Tune_HRS TC added (step 5)	R. Biggins	
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## Procedure Flowchart Overview



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
<b>Beginning of Procedure</b>				
<p>TC Seq. Name : HCHNIF5 (IF Chain Test)</p> <p>TimeTag Type: B            Sub Schedule ID:</p> <p style="text-align: center;">□</p>				
1		Prerequisite check		Next Step: 2
1.1		HSC/ICC input		□
		Verify that the HSC has supplied a valid OBSID value:  OBS_ID = 0xnnnn nnnn		
		Verify with the HIFI ICC that the correct lasers are turned ON:  Laser 1 ON: HWH_LZR1 = ON HWH_LZR2 = OFF HWV_LZR1 = ON HWV_LZR2 = OFF  Laser 2 ON (default): HWH_LZR1 = OFF HWH_LZR2 = ON HWV_LZR1 = OFF HWV_LZR2 = ON		
1.2		Verify initial conditions		□
		Verify Telemetry  HI_Prime_red                      HM009190	= HIFI_prime	AND=ZAZ9C999
2		Set procedure parameters		Next Step: 3
	ET=+00.00.01 UT=+00.00.01	HIFI_Set_OBS_ID  Command Parameter(s) : HIFI_BB_ID                      HP001197 HIFI_OBS_ID                     HP000197  Subsch. ID : 70 Det. descr. : Set Observation-ID and Building-Block-ID	HIFI_Set_OBS_ID  HC014289	17700001 <hex> OBS_ID
		Verify Telemetry  BB_ID_per_hk                     HM004190	= 17700001 <hex>	AND=ZAZ9C999

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		Verify Telemetry <p style="text-align: center;">OBS_ID_per_hk                      HM003190</p>	OBS_ID	AND=ZAZ9C999
	ET=+00.00.00 UT=+00.00.00	HIFI_Housekeeping_on <p style="text-align: center;">HIFI_Housekeeping_on</p> Command Parameter(s) : <p style="margin-left: 40px;">             HIF_HK_rate                      HP012197                      1_pkt_per_s              HIF_FCU_S                      HP006197                      ON (Def)              HIF_LCU_S                      HP007197                      ON (Def)              HIF_WBSV_S                      HP009197                      ON (Def)              HIF_WBSH_S                      HP008197                      ON (Def)              HIF_HRSV_S                      HP011197                      ON (Def)              HIF_HRSH_S                      HP010197                      ON (Def)           </p> Subsch. ID : 70 Det. descr. : Sets periodic housekeeping packet generation period	HC016289	
		Verify: The following TM(3,25) packets should be produced once every second:  <p>HIFI_essential_HK (APID 1024)            HIFI_HK_rev_7 (APID 1026)</p>		
3		Initialise FPU		Next Step: 4
	ET=+00.00.01 UT=+00.00.01	HIFI_Configure_FCU_Power <p style="text-align: center;">HIFI_Configure_FCU_Power</p> Command Parameter(s) : <p style="margin-left: 40px;">             HIFI_BB_ID                      HP001197                      1C200001 &lt;hex&gt;              HF_CPR_Mixer_H_S                      HP203191                      ON (Def)              HF_CPR_Mixer_V_S                      HP204191                      ON (Def)              HF_CPR_Chopper_S                      HP205191                      ON (Def)              HF_CPR_UCH_S                      HP206191                      ON (Def)              HF_CPR_UCV_S                      HP207191                      ON (Def)           </p> Subsch. ID : 70 Det. descr. : Switch ON or OFF the five FCU-boards (mixer H/V, chopper, IF HV)	HC027289	
	ET=+00.00.00 UT=+00.00.00	HIFI_P_Configure_FCU <p style="text-align: center;">HIFI_P_Configure_FCU</p> Command Parameter(s) : <p style="margin-left: 40px;">             HIFI_BB_ID                      HP001197                      1C200001 &lt;hex&gt;              HF_CPR_MX BAND                      HP202191                      5 &lt;dec&gt;              HF_CH1_DPFPF1                      HP176191                      0 &lt;dec&gt;              HF_CH2_FIF1_Drain_V                      HP177191                      0.75 V              HF_CH2_FIF1_Drain_C                      HP178191                      4.0 mA              HF_CH2_FIF2_Drain_V                      HP179191                      0.65 V              HF_CH2_FIF2_Drain_C                      HP180191                      3.0 mA              HF_CH2_SIF1_Drain_V                      HP181191                      0.8 V              HF_CH2_SIF1_Drain_C                      HP182191                      2.5 mA              HF_CH2_SIF2_Drain_V                      HP183191                      0.8 V              HF_CH2_SIF2_Drain_C                      HP184191                      2.5 mA           </p>	HC182289	

IF Chain Functional Test  
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		HF_CH2_SIF3_Drain_V HP185191 HF_CH2_SIF3_Drain_C HP186191 HF_CV1_DPFPP1 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  HF_CPR_CHFPG1 HP212191 HF_CPR_CHFPG2 HP213191 HF_CPR_CHFPZ1 HP214191 HF_CPR_CHFPZ2 HP215191 HF_CPR_CHFPP2 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_P_Chopper_Rot HP454191 HF_CH1_DFACT_C HP174191 HF_CV1_DFACT_C HP189191	0.7 V 2.8 mA 0 <dec> 0.75 V 4.0 mA 0.65 V 3.0 mA 0.8 V 2.5 mA 0.8 V 2.5 mA 0.8 V 2.5 mA ON (Def) CLOSE (Def)	
		Subsch. ID : 70  Det. descr. : Configure the FCU-subsystem (prime)		
	ET=+00.00.03 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  1C200001 <hex> 5.5 mA	
	ET=+00.00.00 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  1C200001 <hex> 10.8 mA	

IF Chain Functional Test  
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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:  HA038289 FCU_H_device HA039289 FCU_V_device HA042289 FCU_PR_power HA044289 FPU_common		
4		Turn on shot noise for band 5 mixers		Next Step: 5
	ET=+00.00.01 UT=+00.00.01	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  E3C0001 <hex> 0.0 mA (Def)	
	ET=+00.00.00 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  E3C0001 <hex> 0.0 mA (Def)	
		Verify Telemetry HF_AH1_MXMG_C                  HM040191	= 0.0 mA	AND=HA038289
		Verify Telemetry HF_AV1_MXMG_C                  HM131191	= 0.0 mA	AND=HA039289
	ET=+00.00.01 UT=+00.00.01	HIFI_CH1_MXBIAIS_V  Command Parameter(s) : HIFI_BB_ID                  HP001197 HF_CH1_MXBIAIS_V          HP172191  Subsch. ID : 70 Det. descr. : Send single command to set H mixer bias voltage	HIFI_CH1_MXBIAIS_V  HC095289  0 <hex> (Def) 5.0 mV	
	ET=+00.00.00 UT=+00.00.00	HIFI_CV1_MXBIAIS_V  Command Parameter(s) : HIFI_BB_ID                  HP001197 HF_CV1_MXBIAIS_V          HP187191  Subsch. ID : 70 Det. descr. : Send single command to set V mixer bias voltage	HIFI_CV1_MXBIAIS_V  HC098289  0 <hex> (Def) 5.0 mV	

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 File: H\_COP\_HIF\_NIF5.xls  
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry HF_AH1_MXBIAS_V      HM029191	= 5.0 mV	AND=HA038289
		Verify Telemetry HF_AV1_MXBIAS_V      HM120191	= 5.0 mV	AND=HA039289
5		WBS tuning		Next Step: 6
	ET=+00.00.01 UT=+00.00.01	HIFI_Configure_WBS_H HIFI_Configure_WBS_H Command Parameter(s) : HIFI_BB_ID            HP001197 HWH_LASER1_S        HP158193 HWH_LASER2_S        HP159193 HWH_Heater            HP160193 HWH_Latchup_S        HP161193 HWH_ATT_Band_4        HP157193 HWH_ATT_Band_3        HP156193 HWH_ATT_Band_2        HP155193 HWH_ATT_Band_1        HP154193 HWH_ATT_IN            HP153193  Subsch. ID : 70 Det. descr. : Configure WBS-H	HC032289  E350001 <hex> HWH_LZR1 HWH_LZR2 0 <dec> (Def) Levell 7 dB 7 dB 7 dB 7 dB 15 dB	
	ET=+00.00.00 UT=+00.00.00	HIFI_Configure_WBS_V HIFI_Configure_WBS_V Command Parameter(s) : HIFI_BB_ID            HP001197 HWV_LASER1_S        HP168193 HWV_LASER2_S        HP169193 HWV_Heater            HP170193 HWV_Latchup_S        HP171193 HWV_ATT_Band_4        HP167193 HWV_ATT_Band_3        HP166193 HWV_ATT_Band_2        HP165193 HWV_ATT_Band_1        HP164193 HWV_ATT_IN            HP163193  Subsch. ID : 70 Det. descr. : Configure WBS-H	HC033289  E350001 <hex> HWV_LZR1 HWV_LZR2 0 <dec> (Def) Levell 7 dB 7 dB 7 dB 7 dB 15 dB	
		Verify Telemetry HWH_Laser1_S            HM017193	HWH_LZR1	AND=ZAZ9D999
		Verify Telemetry HWH_Laser2_S            HM016193	HWH_LZR2	AND=ZAZ9D999
		Verify Telemetry HWV_Laser1_S            HM056193	HWV_LZR1	AND=ZAZ9D999
		Verify Telemetry HWV_Laser2_S            HM055193	HWV_LZR2	AND=ZAZ9D999



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+00.00.01 UT=+00.00.01	HIFI_Tune_WBS  HIFI_Tune_WBS  <i>Command Parameter(s) :</i> HIFI_BB_ID                  HP001197 HIF_WBS_tune_target          HP074197  <i>Subsch. ID : 70</i> Det. descr. : Find optimal setting for WBS attenuators	HC144289   E130001 <hex> 80 <dec>	
	ET=+00.00.10 UT=+00.00.10	Execute Telecommand  HIFI_Tune_HRS  <i>Command Parameter(s) :</i> HIFI_BB_ID                  HP001197  <i>Subsch. ID : 70</i> Det. descr. : Find optimal setting for HRS attenuators	HC143289   E110001 <hex>	
	ET=+00.00.10 UT=+00.00.10	HIFI_config_spectroscopy  HIFI_config_spectroscopy  <i>Command Parameter(s) :</i> HIFI_BB_ID                  HP001197 HIF_N_WBS_START              HP021197 HIF_R_HRS                  HP022197 HIF_N_WBS_INTEGR             HP023197 HIF_N_HRS_INTEGR             HP024197 HIF_DEL_HRS               HP025197 HIF_DEL_WBS               HP026197 HIF_T_ACC_WBS              HP027197 HIF_T_ACC_HRS              HP028197 HIF_WBSH_OFFSET1             HP029197 HIF_WBSH_WIDTH1              HP030197  HIF_WBSH_OFFSET2             HP031197 HIF_WBSH_WIDTH2              HP032197 HIF_WBSH_OFFSET3             HP033197 HIF_WBSH_WIDTH3              HP034197 HIF_WBSH_OFFSET4             HP035197 HIF_WBSH_WIDTH4              HP036197 HIF_WBSV_OFFSET1             HP037197 HIF_WBSV_WIDTH1              HP038197 HIF_WBSV_OFFSET2             HP039197 HIF_WBSV_WIDTH2              HP040197 HIF_WBSV_OFFSET3             HP041197 HIF_WBSV_WIDTH3              HP042197 HIF_WBSV_OFFSET4             HP043197 HIF_WBSV_WIDTH4              HP044197 HIF_HRS_RSHIFT               HP045197	HC150289   0 <hex> (Def) 4 <dec> 1 <dec> (Def) 4 <dec> 4 <dec> 2 <dec> 4 <dec> 945 <dec> 929 <dec> 36 <dec> 1976 <dec>  2084 <dec> 1976 <dec> 4132 <dec> 1976 <dec> 6180 <dec> 1976 <dec> 36 <dec> 1976 <dec> 2084 <dec> 1976 <dec> 4132 <dec> 1976 <dec> 6180 <dec> 1976 <dec> 0 <dec> (Def)	

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 File: H\_COP\_HIF\_NIF5.xls  
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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		HIF_WBS_RSHIFT HP046197 HIF_HRSH_SEL HP047197 HIF_HRSV_SEL HP048197 HIF_WBS_packing HP049197  TC Control Flags : GBM IL DSE ---- Subsch. ID : 70 Det. descr. : Specify parameters for next spectroscopy measurement	3 <dec> 255 <dec> (Def) 255 <dec> (Def) 16_bits_format	
	ET=+00.00.00 UT=+00.00.00	HIFI_Spectr_total_power HIFI_Spectr_total_power  Command Parameter(s) : HIFI_BB_ID HP001197  Subsch. ID : 70 Det. descr. : Start total-power spectroscopy measurement	HC151289  E160001 <hex>	
	ET=+00.00.07 UT=+00.00.07	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  Subsch. ID : 70 Det. descr. : Sets periodic housekeeping packet generation period	HC016289  1_pkt_per_4_s 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:  HIFI_essential_HK (APID 1024) HIFI_HK_rev_7 (APID 1026)		
6		Set default OBSID/BBID		Next Step: END
	ET=+00.00.01 UT=+00.00.01	HIFI_Set_OBS_ID HIFI_Set_OBS_ID  Command Parameter(s) : HIFI_BB_ID HP001197 HIFI_OBS_ID HP000197  Subsch. ID : 70 Det. descr. : Set Observation-ID and Building-Block-ID	HC014289  0 <hex> (Def) 0 <hex> (Def)	

IF Chain Functional Test  
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		Verify Telemetry BB_ID_per_hk                      HM004190	= 0 <hex>	AND=ZAZ9C999
		Verify Telemetry OBS_ID_per_hk                      HM003190	= 0 <hex>	AND=ZAZ9C999
<b>End of Procedure</b>				