

HIFI Recovery - EXPERT
File: H_CRP_HIF_XPRT.xls
Author: R. Biggins



Procedure Summary

Objectives

The objective of this procedure is to recover from the case where the HIFI autonomous checks have detected a problem and have disabled communication between the ICU and LCU

It is intended that this procedure can be run by the HIFI expert only.

Summary of Constraints

Triggered by:
TM(5,4) from HIFI [APID 1025]

This procedure is for the case when:
- a previous attempt at recovery has failed (either a critical memory area, or no TM is received from HIFI)
- it is during a period when the on-call engineer is the HIFI expert (can be executed instead of H_CRP_HIF_CALL)
- During a period when the DTCP is during working hours and the HIFI expert is available (can be executed instead of H_CRP_HIF_SPCN or H_CRP_HIF_CALL)

Spacecraft Configuration

Start of Procedure

HIFI in StandbyI mode

End of Procedure

HIFI in DissipativeI or DissipativeII mode

Reference File(s)

Input Command Sequences

Output Command Sequences

HRHXPRT0
HRHXPRT2
HRHXPRT3
HRHXPRT4
HRHXPRT6
HRHXPRT5
HRHXPRT7

Referenced Displays

ANDs	GRDs	SLDs
ZAZEB999		
HA004289		

Configuration Control Information

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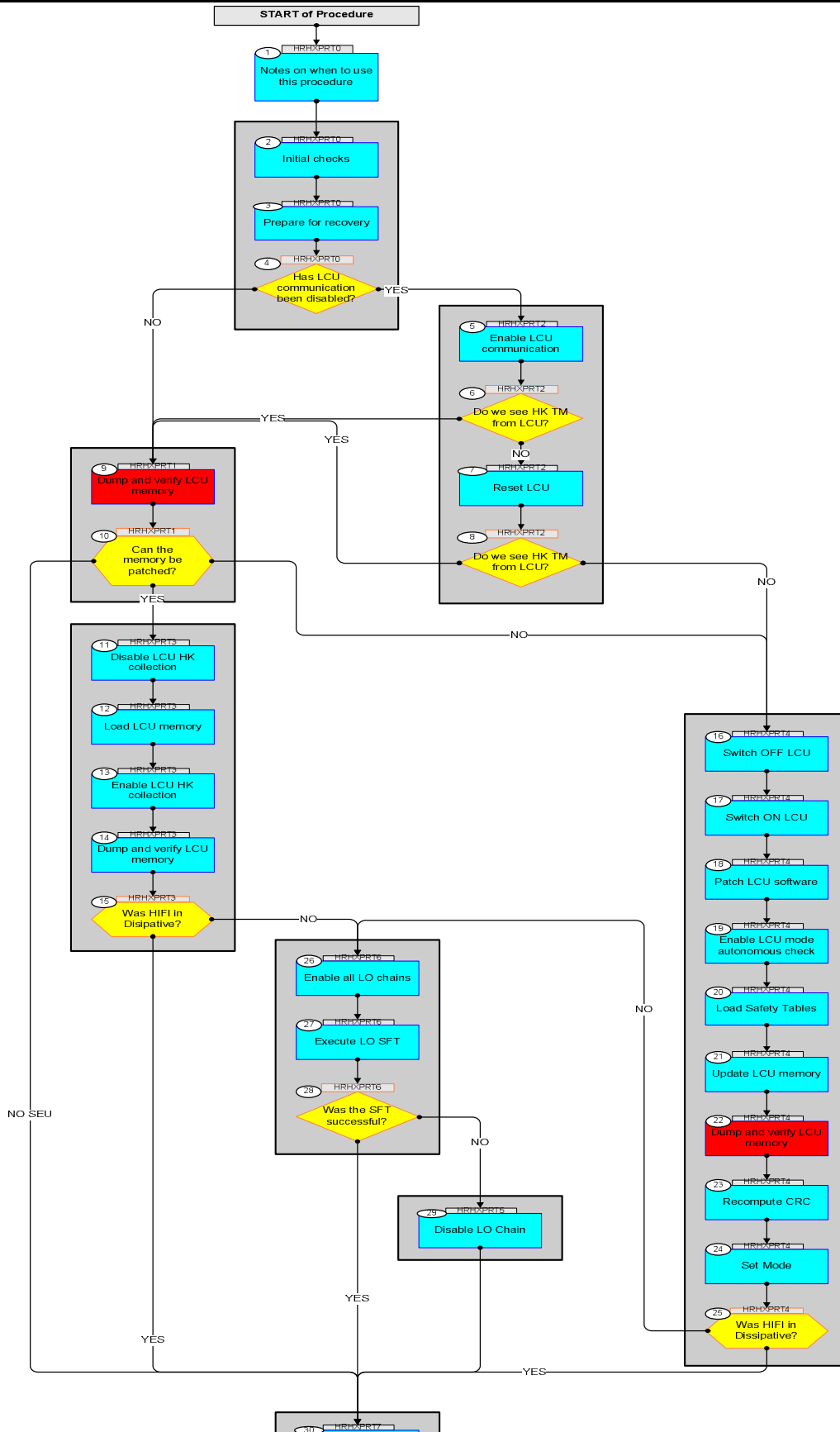


DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
26/02/2010		1	Created	R. Biggins	
08/04/2010	3	2	Updated due to initial testing	R. Biggins	
07/05/2010		3	Complete rewrite due to new HIFI software	R. Biggins	
08/06/2010		4	Update due to comments by D. Teyssier and C. Risacher	R. Biggins	
29/06/2010		5	Update to correct ET/UT problems	R. Biggins	
01/07/2010		5.01	Validation : Editorial: TM check added to verify LCU CRC check	R. Biggins	
02/07/2010	3.1	6	- TM check added to step 30 - Enabling of HIFI MTL set to manual release	R. Biggins	

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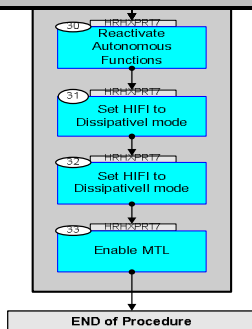
Procedure Flowchart Overview



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Procedure Flowchart Overview



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
Beginning of Procedure				
<p><i>TC Seq. Name :HRHXPRT0 (Recovery - Block 1.1)</i></p> <p><i>TimeTag Type: N</i> <i>Sub Schedule ID:</i></p> <p style="text-align: center;">□</p>				
1		Notes on when to use this procedure		Next Step: 2
		<p>This procedure is for the case when:</p> <ul style="list-style-type: none"> - a previous attempt at recovery has failed (either a critical memory area, or no TM is received from HIFI) - it is during a period when the on-call engineer is the HIFI expert (can be executed instead of H_CRP_HIF_CALL) - During a period when the DTCP is during working hours and the HIFI expert is available (can be executed instead of H_CRP_HIF_SPCN or H_CRP_HIF_CALL) 		
2		Initial checks		Next Step: 3
		Note: LCU current (+/- 0.1A) HiFiLCU_R_L54_I WM409565	see below	AND=ZAZEB999
		Note: LCU commanding HI_LCU_commands HM049190		AND=ZAZEB999
		Note: HIFI mode HL_MODE_S HM258194		AND=ZAZEB999
		<p>NOTE:</p> <ul style="list-style-type: none"> - Find the TM(5,4) [APID 1025] which identifies which autonomous action has stopped communication and verify that HIFI is in the expected state 		
		<p>TM(5,4) HIFI_LCU_nonresponse</p> <p>The LCU is not responding; there has been a communications problem between the ICU and LCU</p> <p><i>Expected state:</i></p> <ul style="list-style-type: none"> - HIFI set to Standby1 mode (not visible) - LCU commanding disabled 		
		<p>TM(5,4) HIFI_R_LCU_in_standby0</p> <p>HIFI has been found in an unexpected mode</p> <p><i>Expected state:</i></p> <ul style="list-style-type: none"> - HIFI set to Standby0 mode (not visible) - LCU commanding disabled 		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch									
		TM(5,4) HIFI_R_LCUCRC_mismatch An SEU has been detected in an unknown area of the memory. <i>Expected state:</i> - HIFI set to Standby1 mode (not visible) - LCU commanding disabled											
		TM(5,4) HIFI_LCUCRC_mismatch_table An SEU has been detected in the tables area of the memory. <i>Expected state:</i> - HIFI set to Standby1 mode											
		TM(5,4) HIFI_LCUCRC_mismatch_safe An SEU has been detected in a safe area of the memory <i>Expected state:</i> - HIFI set to Standby1 mode (may or may not be visible) - LCU commanding may or may not be disabled											
		TM(5,4) HIFI_LCUCRC_mismatch_critical An SEU has been detected in a critical area of the memory. <i>Expected state:</i> - HIFI set to Standby1 mode (not visible) - LCU commanding disabled											
		CALL - HIFI communication: Call the HIFI on-call representative and inform him that a TM(5,4) packet has been recieved, and provide the above details (including the time of the packet).											
3		Prepare for recovery		Next Step: 4									
3.1		Disable MTL		<input type="checkbox"/>									
	ET=+ UT=+00.00.00	Execute Telecommand <p style="text-align: right;">DisableRelOfTcs_Templ</p> <i>Command Parameter(s) :</i> <table style="width: 100%; border: none;"> <tr> <td style="text-align: right;">N_Repetition</td> <td style="text-align: right;">DH041170</td> <td style="text-align: right;">1 <dec> (Def)</td> </tr> <tr> <td style="text-align: right;">SubscheduleId</td> <td style="text-align: right;">DH053170</td> <td style="text-align: right;">70 <dec></td> </tr> <tr> <td style="text-align: right;">M_nrOfApidS</td> <td style="text-align: right;">DH054170</td> <td style="text-align: right;">0 <dec></td> </tr> </table> <i>TC Control Flags :</i> <p style="text-align: right;">GBM IL DSE --Y -- ---</p> <i>Subsch. ID : 10</i> <i>Det. descr. : TEMPLATE DisableReleaseOfTcs, TC(11,2)</i>	N_Repetition	DH041170	1 <dec> (Def)	SubscheduleId	DH053170	70 <dec>	M_nrOfApidS	DH054170	0 <dec>	DCT23170	
N_Repetition	DH041170	1 <dec> (Def)											
SubscheduleId	DH053170	70 <dec>											
M_nrOfApidS	DH054170	0 <dec>											

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.05	Execute Telecommand RetStatusOfCmdSchedule <i>Subsch. ID : 10</i> Det. descr. : TEMPLATE ReportStatusOfCmdSchedule, TC(11,18), no appl. data	DCT25170	
		Verify: Using the OBQD, verify that subschedule 70 is disabled		
3.2		<i>Disable autonomous checks</i>		<input type="checkbox"/>
		Verify Telemetry HI_au_LCU_mem_S HM123190	= ON or OFF	AND=ZAZEB999
		Verify Telemetry HI_au_LCUmode_S HM124190	= ON	AND=ZAZEB999
		Verify Telemetry HI_au_LCUresp_S HM125190	= ON	AND=ZAZEB999
	ET=+ UT=+00.00.00	HIFI_Set_OBS_ID HIFI_Set_OBS_ID <i>Command Parameter(s) :</i> HIFI_BB_ID HP001197 HIFI_OBS_ID HP000197 <i>TC Control Flags :</i> GBM IL DSE --Y -- --- <i>Subsch. ID : 70</i> Det. descr. : Set Observation-ID and Building-Block-ID	HC014289 0 <hex> (Def) 00000999 <hex>	
	ET=+ UT=+00.00.02	HIFI_LCU_mem_check_off HIFI_LCU_mem_check_off <i>Subsch. ID : 70</i> Det. descr. : Disables autonomous function to check LCU-checksum	HC206289	
	ET=+ UT=+00.00.02	HIFI_LCUmode_check_off HIFI_LCUmode_check_off <i>Subsch. ID : 70</i> Det. descr. : Disables autonomous function to check LCU-standby0 mode	HC204289	
	ET=+ UT=+00.00.02	HIFI_LCUonresp_chck_off HIFI_LCUonresp_chck_off <i>Subsch. ID : 70</i> Det. descr. : Disables autonomous function to check LCU-HouseKeeping responses	HC202289	
		Verify Telemetry HI_au_LCU_mem_S HM123190	= OFF	AND=ZAZEB999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch																					
		<p>CALL - HIFI communication:</p> <p>After the LCU memory has been dumped, HIFI should be informed as to which memory area(s) have been affected by an SEU. Note that if the problem was resolved by a software reset of the LCU, there may not be any SEU</p> <p>HIFI to confirm whether the memory image should be uplinked</p>																							
		<p><i>NOTE: Based on the LCU Memory Map, a patch may not be possible if it is in a critical (red) area.</i></p>																							
10		Can the memory be patched?		Next Step: YES 11 NO 16 NO SEU 30																					
<p>TC Seq. Name :HRHXPRT3 (Recovery - Block 2.1)</p> <p>TimeTag Type: N</p> <p>Sub Schedule ID:</p> <p>□</p>																									
11		Disable LCU HK collection		Next Step: 12																					
	ET=+ UT=+00.00.00	<p>Execute Telecommand</p> <p style="text-align: center;">HIFI_Housekeeping_on</p> <p>Command Parameter(s) :</p> <table border="0"> <tr> <td>HIF_HK_rate</td> <td>HP012197</td> <td>1_pkt_per_s</td> </tr> <tr> <td>HIF_FCU_S</td> <td>HP006197</td> <td>ON (Def)</td> </tr> <tr> <td>HIF_LCU_S</td> <td>HP007197</td> <td>OFF</td> </tr> <tr> <td>HIF_WBSV_S</td> <td>HP009197</td> <td>ON (Def)</td> </tr> <tr> <td>HIF_WBSH_S</td> <td>HP008197</td> <td>ON (Def)</td> </tr> <tr> <td>HIF_HRSV_S</td> <td>HP011197</td> <td>ON (Def)</td> </tr> <tr> <td>HIF_HRSH_S</td> <td>HP010197</td> <td>ON (Def)</td> </tr> </table> <p>TC Control Flags :</p> <p style="text-align: right;">GBM IL DSE --Y -- ---</p> <p>Subsch. ID : 70 Det. descr. : Sets periodic housekeeping packet generation period</p>	HIF_HK_rate	HP012197	1_pkt_per_s	HIF_FCU_S	HP006197	ON (Def)	HIF_LCU_S	HP007197	OFF	HIF_WBSV_S	HP009197	ON (Def)	HIF_WBSH_S	HP008197	ON (Def)	HIF_HRSV_S	HP011197	ON (Def)	HIF_HRSH_S	HP010197	ON (Def)	HC016289	
HIF_HK_rate	HP012197	1_pkt_per_s																							
HIF_FCU_S	HP006197	ON (Def)																							
HIF_LCU_S	HP007197	OFF																							
HIF_WBSV_S	HP009197	ON (Def)																							
HIF_WBSH_S	HP008197	ON (Def)																							
HIF_HRSV_S	HP011197	ON (Def)																							
HIF_HRSH_S	HP010197	ON (Def)																							
12		Load LCU memory		Next Step: 13																					
		<p>Memory load: Execute the following procedure</p> <p>PROCEDURE: H_CRP_OBS_LCUP [n/a]</p>																							

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
13		Enable LCU HK collection		Next Step: 14
	ET=+ UT=+00.00.00	Execute Telecommand HIFI_Housekeeping_on Command Parameter(s) : 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) TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 70 Det. descr. : Sets periodic housekeeping packet generation period	HC016289	
14		Dump and verify LCU memory		Next Step: 15
		PROCEDURE: H_CRP_OBS_LCUD [n/a]		
15		Was HIFI in Disipative?		Next Step: NO 26 YES 30
		If an LO band was active at the time of the occurrence (i.e. HIFI was in normal mode), the HIFI must undertake a health assessment to ensure that the system is nominal.		
TC Seq. Name :HRHXPRT4 (Recovery - Block 2.2) TimeTag Type: N Sub Schedule ID: <input type="checkbox"/>				
16		Switch OFF LCU		Next Step: 17
		NOTE: Although following commands may be executed with HIFI being non-prime, it would be preferable if there are no other instrument (PACS or SPIRE) commands due for execution during the DTCP.		
		FP value: The value for the LCU CRC should be taken from AND HA004289: HD246194 HL_exp_checksum (careful with radix)		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		WARNING: It is very important to ensure that the value entered is correct - if it is not then HIFI will disable the LCU again, and the procedure will have to be restarted from the beginning.		
16.1		Disable heater		<input type="checkbox"/>
		NOTE: The LCU LCL current should also decrease by approximately 0.3A		
	ET=+ UT=+00.00.00	Execute Telecommand HIFI_HL_heater Command Parameter(s) : HIFI_BB_ID HP001197 HL_heater HP397194 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 70 Det. descr. : Send single command to control the LCU heater	HC086289 ELF0001 <hex> 0.0 V (Def)	
		Verify Telemetry HL_Eheater HM791194	= 0.0 V	AND=ZAZEB999
		Verify: LCU current decrease by approximately 0.3A HiFiLCU_R_L54_I WM409565	decrease	AND=ZAZEB999
16.2		Switch OFF Local Oscillator Subsystem		<input type="checkbox"/>
	ET=+ UT=+00.00.03	HIFI_notify_PDU_status HIFI_notify_PDU_status Command Parameter(s) : 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 -- --- Subsch. ID : 70 Det. descr. : Notifies the power status of the subssystems to the OBS	HC015289 ON OFF (Def) ON ON ON ON	
		Verify Telemetry HI_LCU_S HM000194	= OFF	AND=ZAZEB999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.04	Execute Telecommand SwOff_HiFiLCU_R_L54 TC Control Flags : Subsch. ID : 10 Det. descr. : PCDU: TC(8,4,112,3) HIFI LCU Red - switch LCL_54 off GBM IL DSE --Y -- ---	DC54B170	
		Verify: LCU LCL status HiFiLcuR_L54_1S WM42D565	= OFF	AND=ZAZEB999
		Verify: LCU LCL current HiFiLCU_R_L54_I WM409565	= 0.0 A	AND=ZAZEB999
17		Switch ON LCU		Next Step: 18
		Note that there is a 10 minute delay before the LCU LCL is switched on (auto release from manual stack)		
17.1		Switch ON LO Subsystem		<input type="checkbox"/>
	ET=+ UT=+00.10.00	Execute Telecommand SwOn_HiFiLCU_R_L54 Subsch. ID : 10 Det. descr. : PCDU: TC(8,4,112,5) HIFI LCU Red - switch LCL_54 on	DC54D170	
		Verify: LCU LCL status HiFiLcuR_L54_1S WM42D565	= ON	AND=ZAZEB999
		Verify: LCU LCL current (+/- 0.25A) HiFiLCU_R_L54_I WM409565	= 0.9 A	AND=ZAZEB999
	ET=+ UT=+00.00.05	HIFI_notify_PDU_status Command Parameter(s) : HIF_FCU_S HP006197 HIF_LCU_S HP007197 HIF_WBSV_S HP009197 HIF_WBSH_S HP008197 HIF_HRSV_S HP011197 HIF_HRSR_S HP010197 Subsch. ID : 70 Det. descr. : Notifies the power status of the subsystems to the OBS	HC015289	
		Verify Telemetry BB_ID_per_hk HM004190	= 1DE70006 <hex>	AND=ZAZEB999
		Verify Telemetry OBS_ID_per_hk HM003190	OBS_ID	AND=ZAZEB999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry HI_LCU_S HM000194	= ON	AND=ZAZEB999
		Verify Telemetry (RED OOL) HL_MODE_S HM258194	= standby0	AND=ZAZEB999
17.2		Set HK rate		<input type="checkbox"/>
	ET=+ UT=+00.00.05	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_s ON (Def) ON (Def) ON (Def) ON (Def) ON (Def) ON (Def)	
17.3		Set default OBSID/BBID		<input type="checkbox"/>
		A minimum of 2 minutes should be taken to allow currents to stabilise		
	ET=+ UT=+00.02.00	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)	
		Verify Telemetry BB_ID_per_hk HM004190	= 0 <hex>	AND=ZAZEB999
		Verify Telemetry OBS_ID_per_hk HM003190	= 0 <hex>	AND=ZAZEB999
18		Patch LCU software		Next Step: 19
		NOTE: Confirm with HIFI as to whether the TM is nominal and MOC can proceed.		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		PROCEDURE: H_FCP_HIF_CUPM [HFHCUPM] FP: OBS_ID = 00000999 <hex> IPF: HFHCUPMY_LCUPATCH_vvvv.IPF HFHCUPMZ_LCUPATCH_vvvv.IPF		
19		<i>Enable LCU mode autonomous check</i>		Next Step: 20
	ET=+ UT=+00.00.00	HIFI_Set_OBS_ID HIFI_Set_OBS_ID Command Parameter(s) : HIFI_BB_ID HP001197 HIFI_OBS_ID HP000197 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 70 Det. descr. : Set Observation-ID and Building-Block-ID	HC014289 1EF20001 <hex> 00000999 <hex>	
	ET=+ UT=+00.00.03	Execute Telecommand HIFI_HL_Standby Command Parameter(s) : HIFI_BB_ID HP001197 Subsch. ID : 70 Det. descr. : Send single command to switch LCU to standby	HC081289 E920001 <hex>	
		Verify Telemetry HL_MODE_S HM258194	= standby1	AND=ZAZEB999
	ET=+ UT=+00.00.02	Execute Telecommand HIFI_LCUmode_check_on Command Parameter(s) : HIF_N_breach HP013197 Subsch. ID : 70 Det. descr. : Enables autonomous function to check LCU standby0 mode	HC203289 1 <dec>	
		Verify Telemetry HI_au_LCUmode_S HM124190	= ON	AND=ZAZEB999
20		<i>Load Safety Tables</i>		Next Step: 21
		WARNING: When executing the next procedure, ensure that the second SET_OBSID TC (OBSID and BBID set to 0) of the sequence HFHRLUT is moved on the manual stack to after the RUTx sequences.		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		PROCEDURE: H_FCP_HIF_RLUT [HFHRLUT] FP: OBS_ID = 00000999 <hex> IPF: HFHRUT0_00010450_vvvv.IPF HFHRUT1_04510900_vvvv.IPF HFHRUT2_09011350_vvvv.IPF HFHRUT3_13511800_vvvv.IPF HFHRUT4_18012250_vvvv.IPF HFHRUT5_22512700_vvvv.IPF HFHRUT6_27013150_vvvv.IPF HFHRUT7_31513600_vvvv.IPF HFHRUT8_36014050_vvvv.IPF HFHRUT9_40514500_vvvv.IPF		
		HFHNUTA_45014900_vvvv.IPF HFHNUTB_49015400_vvvv.IPF HFHNUTC_54015850_vvvv.IPF HFHNUTD_58516300_vvvv.IPF HFHNUTE_63016750_vvvv.IPF HFHNUTF_67517200_vvvv.IPF HFHNUTG_72017650_vvvv.IPF HFHNUTH_76517905_vvvv.IPF		
21		Update LCU memory		Next Step: 22
	ET=+ UT=+00.00.02	HIFI_LCU_Single HIFI_LCU_Single Command Parameter(s) : HIFI_BB_ID HP001197 LCU_cmd HP234194 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 70 Det. descr. : Send a single command to LCU	HC101289 1EE00001 <hex> HL_DEF_SAFE	
22		Dump and verify LCU memory		Next Step: 23
		Memory dump: Execute the following procedure PROCEDURE: H_CRP_OBS_LCUD [n/a]		
		Ensure that there are no changes between the dumped image and the uplinked image.		
23		Recompute CRC		Next Step: 24

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.01	HIFI_check_LCU_memory HIFI_check_LCU_memory Command Parameter(s) : HIFI_BB_ID HP001197 HIF_step_time_ms HP079197 HIF_check_crc HP233197 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 70 Det. descr. : Compares checksum of LCU with specified value	HC168289 1EE00001 <hex> 3000 ms LCU_CRC	
		Verify Telemetry HL_ptv_checksum HD247194	= 0 <dec>	AND=ZAZEB999
24		Set Mode		Next Step: 25
24.1		Disable Temperature monitoring		<input type="checkbox"/>
	ET=+ UT=+00.00.02	HIFI_LOU_T_check_off HIFI_LOU_T_check_off TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 70 Det. descr. : Disables autonomous function to check LOU temperature	HC196289	
		Verify Telemetry HI_auto_LOU_S HM122190	= OFF	AND=ZAZEB999
24.2		Set HIFI to Normal Mode		<input type="checkbox"/>
	ET=+ UT=+00.00.01	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 1DCA0001 <hex>	
		Verify Telemetry HL_MODE_S HM258194	= normal	AND=ZAZEB999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
24.3		Set HIFI to Standby1 Mode		<input type="checkbox"/>
	ET=+ UT=+00.00.03	Execute Telecommand HIFI_HL_Standby 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 standby	HC081289 E920001 <hex>	
		Verify Telemetry HL_MODE_S HM258194	= standby1	AND=ZAZEB999
24.4		Enable Temperature monitoring		<input type="checkbox"/>
		HIFI to confirm that LOU temperatures are within the correct limits		
	ET=+ UT=+00.00.02	HIFI_LOU_T_check_on HIFI_LOU_T_check_on Command Parameter(s) : HIF_N_breach HP013197 HIF_LOU_Max_T HP460197 HIF_LOU_Min_T HP461197 TC Control Flags : GBM IL DSE ---Y -- --- Subsch. ID : 70 Det. descr. : Enables autonomous function to check LOU temperature	HC197289 10 <dec> (Def) 140.0 K 115.0 K	
		Verify Telemetry HI_auto_LOU_S HM122190	= ON	AND=ZAZEB999
24.5		Switch on Heater		<input type="checkbox"/>
		NOTE: The LCU LCL current should also increase by approximately 0.4A		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.02	Execute Telecommand HIFI_HL_heater Command Parameter(s) : HIFI_BB_ID HP001197 HL_heater HP397194 TC Control Flags : GBM IL DSE --Y -- -- Subsch. ID : 70 Det. descr. : Send single command to control the LCU heater	HC086289 ELF0001 <hex> 6.0 V	
		Verify Telemetry HL_Eheater HM791194	= 6.0 V	AND=ZAZEB999
		Verify: LCU current increase by approximately 0.4A HiFiLCU_R_L54_I WM409565	increase	AND=ZAZEB999
25		Was HIFI in Dissipative?		Next Step: YES 30 NO 26
		If an LO band was active at the time of the occurrence (i.e. HIFI was in normal mode), the HIFI must undertake a health assessment to ensure that the system is nominal.		
TC Seq. Name :HRHXPRT6 (Recovery - Block 3.2) TimeTag Type: N Sub Schedule ID: <input type="checkbox"/>				
26		Enable all LO chains		Next Step: 27
26.1		Switch on Heater		<input type="checkbox"/>
	ET=+ UT=+00.00.02	Execute Telecommand 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 ELF0001 <hex> 6.0 V	
		Verify Telemetry HL_Eheater HM791194	= 6.0 V	AND=ZAZEB999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
26.2		Enable All LO Chains		<input type="checkbox"/>
	ET=+ UT=+00.00.10	HIFI_Conf_LCU_internal HIFI_Conf_LCU_internal Command Parameter(s) : HIFI_BB_ID HP001197 HL_bandmask HP444194 HL_ign_lsu_ftm HP445194 HL_ign_lsu_lck HP446194 HL_LSU_delta_f HP443194 Subsch. ID : 70 Det. descr. : Commands Internal parameters (bandmask, ign-flags delta_f)	HC034289 0EB90001 <hex> 3FFF <hex> RESET (Def) RESET (Def) 100 <hex>	
27		Execute LO SFT		Next Step: 28
		NOTE: - Confirm which band is to be used - Confirm which version of IPF to be used (first locate the latest IPF using a filter on the Manual Stack - Load TPF dialog box) - Confirm the LOU chain temperatures are within limits		
		Band 1a = H_COP_HIF_RFL1 Band 1b = H_COP_HIF_RFL2 Band 2a = H_COP_HIF_RFL3 Band 2b = H_COP_HIF_RFL4 Band 3a = H_COP_HIF_RFL5 Band 3b = H_COP_HIF_RFL6 Band 4a = H_COP_HIF_RFL7 Band 4b = H_COP_HIF_RFL8 Band 5a = H_COP_HIF_RFL9 Band 5b = H_COP_HIF_RFLA Band 6a = H_COP_HIF_RFLB Band 6b = H_COP_HIF_RFLC Band 7a = H_COP_HIF_RFLD Band 7b = H_COP_HIF_RFLE		
		PROCEDURE: H_COP_HIF_RFLx [HCHRFLx] FP: OBS_ID = 00000999 <hex> IPF: HCHRFLx_LO_FT_xx_vvvv.IPF		
28		Was the SFT successful?		Next Step: NO 29 YES 30
		CALL - HIFI communication: Confirm with the HIFI representative whether the SFT is successful		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
<p><i>TC Seq. Name :HRHXPRT5 (Recovery - Block 3.1)</i></p> <p><i>TimeTag Type: N</i> <i>Sub Schedule ID:</i></p> <p>□</p>				
29		Disable LO Chain		Next Step: 30
		Verify with HIFI which band should be disabled, and set the FP BANDMASK as follows:		
		Band 1a - 3FFE Band 1b - 3FFD Band 2a - 3FFB Band 2b - 3FF7 Band 3a - 3FEF Band 3b - 3FDF Band 4a - 3FBF Band 4b - 3F7F Band 5a - 3EFF Band 5b - 3DFF Band 6a - 3BFF Band 6b - 37FF Band 7a - 2FFF Band 7b - 1FFF		
	ET=+ UT=+00.00.10	HIFI_Conf_LCU_internal HIFI_Conf_LCU_internal <i>Command Parameter(s) :</i> HIFI_BB_ID HP001197 EB70001 <hex> HL_bandmask HP444194 BANDMASK HL_ign_lsu_ftm HP445194 RESET (Def) HL_ign_lsu_lck HP446194 RESET (Def) HL_LSU_delta_f HP443194 256 <dec> <i>TC Control Flags :</i> GBM IL DSE --Y -- --- <i>Subsch. ID : 70</i> Det. descr. : Commands Internal parameters (bandmask, ign-flags delta_f)	HC034289	
<p><i>TC Seq. Name :HRHXPRT7 (Recovery - Block 4)</i></p> <p><i>TimeTag Type: N</i> <i>Sub Schedule ID:</i></p> <p>□</p>				
30		Reactivate Autonomous Functions		Next Step: 31
		Formal Parameter value: The value for the FP should be taken from ZAZEB999: HD246194 HL_exp_checksum		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.01	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 434569217 <dec>	
	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 434569217 <dec> 6.0 V	
	ET=+ UT=+00.00.05	HIFI_HL_dissipative HIFI_HL_dissipative Command Parameter(s) : HIFI_BB_ID HP001197 Subsch. ID : 70 Det. descr. : Send single command to start dissipative mode	HC199289 434307073 <dec>	
	ET=+ UT=+00.00.10	HIFI_Configure_FCU_Power HIFI_Configure_FCU_Power 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 Subsch. ID : 70 Det. descr. : Switch ON or OFF the five FCU-boards (mixer H/V, chopper, IF HV)	HC027289 18380001 <hex> ON (Def) ON (Def) ON (Def) ON (Def) ON (Def)	
	ET=+ UT=+00.00.00	HIFI_R_Configure_FCU HIFI_R_Configure_FCU Command Parameter(s) : HIFI_BB_ID HP001197 HF_CPR_MXBAND HP202191 HF_CH1_DPFPF1 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	HC183289 406323201 <dec> 0 <dec> (Def) 0 <dec> 0.075 V (Def) 0.5 mA (Def) 0.075 V (Def) 0.5 mA (Def) 0.075 V (Def) 0.5 mA (Def) 0.075 V (Def) 0.5 mA (Def) 0.075 V (Def) 0.5 mA (Def)	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		HF_CH2_SIF3_Drain_V HP185191 HF_CH2_SIF3_Drain_C HP186191 HF_CV1_DPFP1 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_CHFP1 HP212191 HF_CPR_CHFP2 HP213191 HF_CPR_CHFPZ1 HP214191 HF_CPR_CHFPZ2 HP215191 HF_CPR_CHFPZ2 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	0.075 V (Def) 0.5 mA (Def) 0 <dec> 0.075 V (Def) 0.5 mA (Def) 0.075 V (Def) 0.5 mA (Def) 0.075 V (Def) 0.5 mA (Def) 0.075 V (Def) 0.5 mA (Def) 0.075 V (Def) 0.5 mA (Def) 0.075 V (Def) 0.5 mA (Def) 0.075 V (Def) 0.5 mA (Def) 0.075 V (Def) 0.5 mA (Def) ON (Def) CLOSE (Def)	
		Subschr. ID : 70 Det. descr. : Configure the FCU-subsystem (redundant)		
	ET=+ UT=+00.00.03	HIFI_CH1_MX_MG_C Command Parameter(s) : HIFI_BB_ID HP001197 HF_CH1_MX_MG_C HP173191 Subschr. ID : 70 Det. descr. : Send single command to set H mixer magnet current	HIFI_CH1_MX_MG_C HC096289 406323201 <dec> 0.5 mA	
	ET=+ UT=+00.00.00	HIFI_CV1_MX_MG_C Command Parameter(s) : HIFI_BB_ID HP001197 HF_CV1_MX_MG_C HP188191 Subschr. ID : 70 Det. descr. : Send single command to set V mixer magnet current	HIFI_CV1_MX_MG_C HC099289 406323201 <dec> 0.5 mA	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.01	HIFI_Config_HRS_H_att_lo HIFI_Config_HRS_H_att_lo Command Parameter(s) : HIFI_BB_ID HP001197 HRH_switch HP091192 HRH_1U_ATT HP105192 HRH_1L_ATT HP106192 HRH_2U_ATT HP107192 HRH_2L_ATT HP108192 HRH_3U_ATT HP109192 HRH_3L_ATT HP110192 HRH_4U_ATT HP111192 HRH_4L_ATT HP112192 HRH_Up_OL1_M HP093192 HRH_Up_OL1_A HP092192 HRH_Up_OL2_M HP095192 HRH_Up_OL2_A HP094192 HRH_Up_OL3_M HP097192 HRH_Up_OL3_A HP096192 HRH_Up_OL4_M HP099192 HRH_Up_OL4_A HP098192 HRH_Down_OL5_M HP101192 HRH_Down_OL5_A HP100192 HRH_Down_OL6_M HP103192 HRH_Down_OL6_A HP102192 HRH_Down_OL7_M HP104192 Subsch. ID : 70 Det. descr. : Configure the attenuators and local oscillators of HRS-H	HC028289 434765825 <dec> H (Def) 15.5 dB (Def) 15.5 dB (Def) 15.5 dB (Def) 15.5 dB (Def) 15.5 dB (Def) 15.5 dB (Def) 15.5 dB (Def) 15.5 dB (Def) 67 <dec> 5 <dec> 69 <dec> 7 <dec> 71 <dec> 9 <dec> 74 <dec> 1 <dec> 51 <dec> (Def) 5 <dec> (Def) 49 <dec> (Def) 0 <dec> (Def) 7 <dec>	
	ET=+ UT=+00.00.00	HIFI_Config_HRS_V_att_lo HIFI_Config_HRS_V_att_lo Command Parameter(s) : HIFI_BB_ID HP001197 HRV_switch HP121192 HRV_1U_ATT HP135192 HRV_1L_ATT HP136192 HRV_2U_ATT HP137192 HRV_2L_ATT HP138192 HRV_3U_ATT HP139192 HRV_3L_ATT HP140192 HRV_4U_ATT HP141192 HRV_4L_ATT HP142192 HRV_Up_OL1_M HP123192	HC030289 434765825 <dec> V 15.5 dB (Def) 15.5 dB (Def) 15.5 dB (Def) 15.5 dB (Def) 15.5 dB (Def) 15.5 dB (Def) 15.5 dB (Def) 15.5 dB (Def) 15.5 dB (Def) 76 <dec>	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		HRV_Up_OL1_A HP122192 HRV_Up_OL2_M HP125192 HRV_Up_OL2_A HP124192 HRV_Up_OL3_M HP127192 HRV_Up_OL3_A HP126192 HRV_Up_OL4_M HP129192 HRV_Up_OL4_A HP128192 HRV_Down_OL5_M HP131192 HRV_Down_OL5_A HP130192 HRV_Down_OL6_M HP133192 HRV_Down_OL6_A HP132192 HRV_Down_OL7_M HP134192 Subsch. ID : 70 Det. descr. : Configure the attenuators and local oscillators of HRS-V	3 <dec> 78 <dec> 5 <dec> 80 <dec> 7 <dec> 82 <dec> 9 <dec> 51 <dec> (Def) 5 <dec> (Def) 49 <dec> (Def) 0 <dec> (Def) 7 <dec>	
	ET=+ UT=+00.00.01	HIFI_Config_HRS_H_blocks HIFI_Config_HRS_H_blocks Command Parameter(s) : HIFI_BB_ID HP001197 HRH_Block_1 HP113192 HRH_Block_2 HP114192 HRH_Block_3 HP115192 HRH_Block_4 HP116192 HRH_Block_5 HP117192 HRH_Block_6 HP118192 HRH_Block_7 HP119192 HRH_Block_8 HP120192 Subsch. ID : 70 Det. descr. : Configure the autocorrelation blocks of HRS-H	HC029289 434765825 <dec> corr_wide corr_wide corr_wide corr_wide corr_wide corr_wide corr_wide corr_wide	
	ET=+ UT=+00.00.00	HIFI_Config_HRS_V_blocks HIFI_Config_HRS_V_blocks Command Parameter(s) : HIFI_BB_ID HP001197 HRV_Block_1 HP143192 HRV_Block_2 HP144192 HRV_Block_3 HP145192 HRV_Block_4 HP146192 HRV_Block_5 HP147192 HRV_Block_6 HP148192 HRV_Block_7 HP149192 HRV_Block_8 HP150192 Subsch. ID : 70 Det. descr. : Configure the autocorrelation blocks of HRS-V	HC031289 434765825 <dec> corr_wide corr_wide corr_wide corr_wide corr_wide corr_wide corr_wide corr_wide	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.01	HIFI_switch_zero_WBS_H HIFI_switch_zero_WBS_H Command Parameter(s) : HIFI_BB_ID HP001197 HW_Zero_S HP162193 Subsch. ID : 70 Det. descr. : Send single command to control the WBS-H zero-switch	HC078289 439287809 <dec> ON (Def)	
	ET=+ UT=+00.00.00	HIFI_switch_zero_WBS_V HIFI_switch_zero_WBS_V Command Parameter(s) : HIFI_BB_ID HP001197 HW_Zero_S HP162193 Subsch. ID : 70 Det. descr. : Send single command to control the WBS-V zero-switch	HC079289 439287809 <dec> ON (Def)	
	ET=+ 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 1A2F0001 <hex> OFF (Def) OFF (Def) 0 <dec> (Def) Level1 7 dB 7 dB 7 dB 7 dB 15 dB	
	ET=+ 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 1A2F0001 <hex> OFF (Def) OFF (Def) 0 <dec> (Def) Level1 7 dB 7 dB 7 dB 7 dB 15 dB	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.02	Execute Telecommand 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_10_s ON (Def) ON (Def) ON (Def) ON (Def) ON (Def) ON (Def)	
		Verify Telemetry HL_MODE_S HM258194	= dissipative	AND=ZAZEB999
32		Set HIFI to DissipativeII mode		Next Step: 33
		CALL - HIFI communication: Confirm with the HIFI representative whether HIFI is required to be set into DissipativeII mode. If DissipativeII is not required, the procedure defined in this step should be skipped.		
		Set HIFI to DissipativeII mode: Execute the following procedure PROCEDURE: H_FCP_HIF_2Dxx [HFH2Dxx] FPs: OBSID = 999 <hex> xx = band indicated by HIFI, such as 1A, 1B, etc.		
33		Enable MTL		Next Step: END
		WARNING - HIFI communication: The following TCs should be executed at the end of the DTCP only at a time agreed with the HIFI representative to ensure no conflicts between MTL commanding		
	ET=+ UT=+00.00.00	Execute Telecommand EnableRelOfTcs_Templ Command Parameter(s) : N_Repetition DH041170 SubscheduleId DH053170 M_nrOfApid DH054170 TC Control Flags : GBM IL DSE --Y -- -- Subsch. ID : 10 Det. descr. : TEMPLATE EnableReleaseOfTcs, TC(11,1)	DCT22170 1 <dec> (Def) 70 <dec> 0 <dec>	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.05	Execute Telecommand RetStatusOfCmdSchedule Subsch. ID : 10 Det. descr. : TEMPLATE ReportStatusOfCmdSchedule, TC(11,18), no appl. data	DCT25170	
		Verify: Using the OBQD, verify that subschedule 70 is enabled		
End of Procedure				