

SPIRE ON, DPU\_START - Switch ON the nominal SPIRE units  
 File: H\_COP\_SPI\_NSON.xls  
 Author: R. Biggins



## Procedure Summary

### Objectives

The objective of this procedure is to switch on SPIRE PRIME.  
 This involves CDMU commanding for the LCLs and SPIRE commanding.  
 (LCLs are switched on, the SPIRE DPU is booted from the secondary  
 partition of the EEPROM and started.)

This procedure is based upon:  
 Name:DPU\_START\_SP  
 Version number:1  
 Generated:11/05/2009  
 Desc:\$Id\$ Boot the DPU from secondary

### Summary of Constraints

INPUT:  
 - The SECONDARY partition should be copied to the EEPROM upon DPU  
 switch on  
 - Expected ASW version?  
 NOTE: ONLY the secondary partition can be booted for SPIRE Nom.

### Spacecraft Configuration

**Start of Procedure** SPIRE is OFF

**End of Procedure** SPIRE sub-mode is DPU\_ON

### Reference File(s)

Input Command Sequences

Output Command Sequences

### Referenced Displays

ANDs GRDs SLDs  
 ZAZ96999

### Configuration Control Information

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
26/02/2009		1	Created	L.Lucas-hp	
02/03/2009	2.1	2	Added Set Mode to reflect DPU On Mode	L.Lucas-hp	
20/04/2009	2.3	3	Created	L.Lucas-hp	
04/05/2009		4	As only the secondary partition can be booted, this command has now been added to the export for this sequence	L.Lucas-hp	
04/05/2009	2.4	5	Checking for ETs, none found	L.Lucas-hp	

Status : Version 7 - Updated  
 Last Checkin: 14/12/2010

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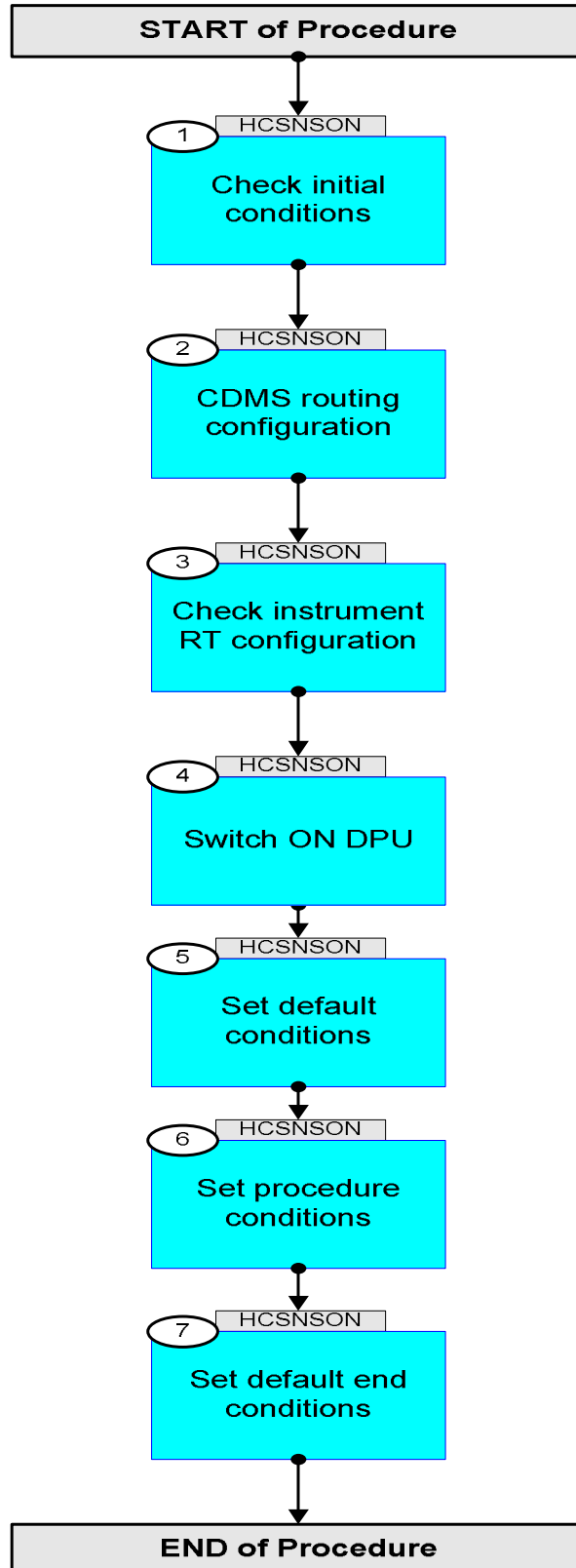


18/05/2009	2.5	6	JIT Updates to procedure received from SPIRE	L.Lucas-hp	
14/12/2010	3.1	7	Update due to comments by SPIRE based on new operations concept	R. Biggins	

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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>				
TC Seq. Name : HCSN SON (Switch ON (NOM))				
TimeTag Type: N				
Sub Schedule ID:				
□				
1		Check initial conditions		Next Step: 2
		Verify: SPIRE has been switched off for at least 4 minutes		
1.1		SPIRE input		□
		Note: For SPIRE Prime, only the secondary partition can be and will be booted (step 4.4).		
		Verify that the expected DPU software version number has been supplied by the SPIRE ICC (Step 4.6)		
1.2		Bus status		□
		Verify Bus configuration		
		Verify: Active 1553 bus <b>Active_Bus_A_B</b> <b>DEFJ1160</b> = <b>BUS_A</b> AND=ZAZ96999		
		Verify: 1553 bus FDIR status <b>SDB_FDIR</b> <b>DEFJ4160</b> = <b>ENABLED</b> AND=ZAZ96999		
		Verify: SDB handling status <b>BSW_SDB_ENAB</b> <b>DEF60160</b> = <b>ENABLED</b> AND=ZAZ96999		
		Verify bus health status		
		Verify: Bus (side A) health status <b>BusA_HealthySts</b> <b>DEFJ2160</b> = <b>Healthy</b> AND=ZAZ96999		
		Verify: Bus (side B) health status <b>BusB_HealthySts</b> <b>DEFJ3160</b> = <b>Healthy</b> AND=ZAZ96999		
1.3		Nominal instrument LCLs		□
		Verify: DPU LCL status <b>SpirHsdN_L11_1S</b> <b>WM32C565</b> = <b>OFF</b> AND=ZAZ96999		
		Verify: FCU LCL status <b>SpirHsfN_L51_1S</b> <b>WM42C565</b> = <b>OFF</b> AND=ZAZ96999		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
1.4		<i>Redundant instrument LCLs</i>		<input type="checkbox"/>
		Verify: DPU LCL status <b>SpirHsdR_L12_1S</b> <b>WM82C565</b>	<b>= OFF</b>	AND=ZAZ96999
		Verify: FCU LCL status <b>SpirHsfR_L52_1S</b> <b>WM72C565</b>	<b>= OFF</b>	AND=ZAZ96999
1.5		<i>Temperature</i>		<input type="checkbox"/>
		TBD		
2		<i>CDMS routing configuration</i>		Next Step: 3
2.1		<i>Verify Packet Routing</i>		<input type="checkbox"/>
	ET=+ UT=+00.00.00	Execute Telecommand <b>RepDownlinkTMStorage</b>  Subsch. ID : 10 Det. descr. : Report Telemetry Packets Down-linking/ Storage Status	<b>DC141160</b>	
		Verify Packet Reception <b>Telemetry Packets DownLinking-Storage Status Report</b> Packet Details:  APID: 16 Type: 14 Subtype: 7 PI1: PI2:	<b>(14,7)-1400</b>	
3		<i>Check instrument RT configuration</i>		Next Step: 4
3.1		<i>Remote Terminal configuration</i>		<input type="checkbox"/>
		Verify Telemetry <b>SPIRE_VitalNonV</b> <b>DED52161</b>	<b>= NonVital</b>	AND=ZAZ96999
		Verify Telemetry <b>SPIRE_TmRetry</b> <b>DED54161</b>	<b>= ON</b>	AND=ZAZ96999
3.2		<i>Remote Terminal Status</i>		<input type="checkbox"/>
		Nominal units		
		Verify Telemetry <b>SPIREA_OnOff</b> <b>DED1G161</b>	<b>= OFF</b>	AND=ZAZ96999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry SPIREA_DeadAliv DED1H161	= Alive	AND=ZAZ96999
		Verify Telemetry SPIREA_WellsiTC DED1Z161	= Well	AND=ZAZ96999
		Verify Telemetry SPIREA_WellsiTM DED1J161	= Well	AND=ZAZ96999
		Verify Telemetry SPIREA_ValidInv DED1K161	= Invalid	AND=ZAZ96999
		Redundant units		
		Verify Telemetry SPIREB_OnOff DED21161	= OFF	AND=ZAZ96999
		Verify Telemetry SPIREB_DeadAliv DED22161	= Alive	AND=ZAZ96999
		Verify Telemetry SPIREB_WellsiTC DED23161	= Well	AND=ZAZ96999
		Verify Telemetry SPIREB_WellsiTM DED24161	= Well	AND=ZAZ96999
		Verify Telemetry SPIREB_ValidInv DED25161	= Invalid	AND=ZAZ96999
4		Switch ON DPU		Next Step: 5
4.1		Set Bus Profile		<input type="checkbox"/>
	ET=+ UT=+00.00.00	Execute Telecommand SelectActiveSCBP Command Parameter(s) : SCBP DH049160 Subsch. ID : 10 Det. descr. : Select Active SCBP from SCBP Table	DC819160 SCBP_03	
		Verify Telemetry BSW_SDB_ActProf DEF5F160	= 3 <dec>	AND=ZAZ96999
4.2		Disable FDIR & Start Instrument RT interrogations		<input type="checkbox"/>
		<b>WARNING:</b> The following TC disables the SDB FDIR for the WHOLE spacecraft. Since there is no other alternative to the switch on sequence, it is vital that the FDIR is disabled for as short a time as possible.		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.00	Execute Telecommand  ConfigureSDBFDIR  Command Parameter(s) : RTA DH011161 SPIRE A M0 DH030161 Update status M1 DH031161 Ignore Flag M2 DH032161 Update status M3 DH033161 Update status M4 DH034161 Update status M5 DH035161 Ignore Flag M6 DH036161 Update status M7 DH037161 Ignore Flag F0 DH018161 ON F1 DH019161 Alive  F2 DH020161 Well TC F3 DH021161 Well TM F4 DH022161 Valid F5 DH023161 Non-vital F6 DH024161 NOMINAL F7 DH025161 ON M12 DH051161 Ignore Flag M_C DH043161 Ignore CNT M8 DH038161 Ignore Flag M9 DH039161 Ignore Flag M10 DH040161 Ignore Flag M11 DH041161 Update status F12 DH050161 ENABLED CNT DH042161 LoopCnt1 F8 DH026161 Bus A  F9 DH027161 Healthy F10 DH028161 Healthy F11 DH029161 DISABLED  Subsch. ID : 10 Det. descr. : Configure SDB FDIR	DC005161	
		Wait up to 1 minute for the generation of the D_H_Hk_P64 packet from the CDMU (APID = 18)		
		Verify Telemetry SPIRE_NomRed DED53161	= NOMINAL	AND=ZAZ96999
		Verify Telemetry SPIREA_OnOff DED1G161	= ON	AND=ZAZ96999
		Verify Telemetry SPIREA_WellsiTC DED1Z161	= Well	AND=ZAZ96999
		Verify Telemetry SPIREA_WellsiTM DED1J161	= Well	AND=ZAZ96999
		Verify Telemetry SPIREA_ValidInv DED1K161	= Valid	AND=ZAZ96999
4.3		Power ON DPU		<input type="checkbox"/>

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Switching ON the DPU LCL will initialise BSW. This will initially execute memory checks (failures will generate <b>TM(5,4)</b> packets) and then generate <b>TM(5,1)</b> [Boot_ROM_Check] packets every 10 seconds.  <b>WARNING:</b> It is vital to send the FORCE_BOOT TC within 210 seconds otherwise the DPU stops sending <b>TM(5,1)</b> packets (after 21 packets) and then the SVM will invalidate the RT		
	ET=+ UT=+00.00.00	Execute Telecommand  <b>SwOn_SpireHSPDU_N_L11</b>  <i>TC Control Flags :</i>  GBM IL DSE --Y -- --  <i>Subsch. ID : 10</i> Det. descr. : PCDU: TC(8,4,112,5) SPIRE HSDPU Nom - switch LCL_11 on	DC11D170	
		Verify: DPU LCL status <b>SpirHsdN_L11_1S</b> <b>WM32C565</b>	= ON	AND=ZAZ96999
		Verify: DPU LCL current (+/- 0.5A) <b>SpireHsN_L11_I</b> <b>WM308565</b>	= 0.425 A	AND=ZAZ96999
4.4		<i>Boot DPU</i>		<input type="checkbox"/>
		Sending of the FORCE_BOOT TCs will generate a <b>TM(5,1)</b> [TC_ACKNOWLEDGE] packet from the BSW. On ASW startup, three <b>TM(5,1)</b> [No_MCU_Response_Error, No_SCU_Response_Error, No_DCU_Response_Error] packets are expected as the units are not switched on.  Only the SECONDARY partition can be booted for SPIRE NOM.		
	ET=+ UT=+00.00.00	Execute Telecommand  <b>FORCE_BOOT_SECONDARY</b>  <i>TC Control Flags :</i>  GBM IL DSE --Y -- --  <i>Subsch. ID : 370</i> Det. descr. : LOAD OBS FROM SECONDARY PARTITION OF EEPROM AND BOOT	SCD0A505	
4.5		<i>Verify Housekeeping</i>		<input type="checkbox"/>
		Verify the TM is being generated. Check Packet History: Critical 3,25, 1280 (Critical_HK_Parameter_Report) Nominal HK 3,25, 1282 (Nominal_HK_Parameter_Report)		
		The following version check should ensure that the expected software version is running.		



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry OBSVER1 SM0EN500	Version	AND=ZAZ96999
		Verify Telemetry OBSVER2 SM0FN500	Sub-version	AND=ZAZ96999
		Verify Telemetry OBSVER3 SM05F500	Revision	AND=ZAZ96999
4.6		Re-enable SDB FDIR		<input type="checkbox"/>
	ET=+ UT=+00.00.00	Execute Telecommand  ConfiguresSDBFDIR  Command Parameter(s) :  RTA DH011161 SPIRE A M0 DH030161 Ignore Flag M1 DH031161 Ignore Flag M2 DH032161 Ignore Flag M3 DH033161 Ignore Flag M4 DH034161 Ignore Flag M5 DH035161 Ignore Flag M6 DH036161 Ignore Flag M7 DH037161 Ignore Flag F0 DH018161 ON F1 DH019161 Alive  F2 DH020161 Well TC F3 DH021161 Well TM F4 DH022161 Valid F5 DH023161 Non-vital F6 DH024161 NOMINAL F7 DH025161 ON M12 DH051161 Ignore Flag M_C DH043161 Ignore CNT M8 DH038161 Ignore Flag M9 DH039161 Ignore Flag M10 DH040161 Ignore Flag M11 DH041161 Update status F12 DH050161 ENABLED CNT DH042161 LoopCnt1 F8 DH026161 Bus A  F9 DH027161 Healthy F10 DH028161 Healthy F11 DH029161 ENABLED  Subsch. ID : 10 Det. descr. : Configure SDB FDIR	DC005161	
		Verify: 1553 bus FDIR status SDB_FDIR DEFJ4160	= ENABLED	AND=ZAZ96999
5		Set default conditions		Next Step: 6
		Note that a <b>TM(5,1)</b> packet [New_Step_Report] is generated after each of the following SET_OBS_STEP telecommands		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.00	SET_OBS_STEP  SET_OBS_STEP  Command Parameter(s) : OBSERVATION_STEP SP03N500  Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SC003500  0 <hex>	
	ET=+ UT=+00.00.01	SET_BBID  SET_BBID  Command Parameter(s) : BUILDING_BLOCK_ID SP01N500  Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SC001500  80010001 <hex>	
		Verify Telemetry  BBFULLTYPE SM2LN500	= ClearObs	AND=ZAZ96999
	ET=+ UT=+00.00.00	SET_OBS_STEP  SET_OBS_STEP  Command Parameter(s) : OBSERVATION_STEP SP03N500  Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SC003500  1 <hex>	
	ET=+ UT=+00.00.01	SET_OBSID  SET_OBSID  Command Parameter(s) : OBSERVATION_ID SP00N500  Subsch. ID : 370 Det. descr. : SET OBSERVATION IDENTIFIER	SC000500  00000000 <hex>	
		Verify Telemetry  OBSID SM10N500	= 00000000 <hex>	AND=ZAZ96999
	ET=+ UT=+00.00.00	SET_OBS_STEP  SET_OBS_STEP  Command Parameter(s) : OBSERVATION_STEP SP03N500  Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SC003500  0 <hex>	
	ET=+ UT=+00.00.01	SET_BBID  SET_BBID  Command Parameter(s) : BUILDING_BLOCK_ID SP01N500  Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SC001500  80000000 <hex>	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry BBFULLTYPE SM2LN500	= Null	AND=ZAZ96999
	ET=+ UT=+00.00.00	SET_OBS_STEP SET_OBS_STEP Command Parameter(s) : OBSERVATION_STEP SP03N500 Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SC003500 0 <hex>	
	ET=+ UT=+00.00.01	SET_BBID SET_BBID Command Parameter(s) : BUILDING_BLOCK_ID SP01N500 Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SC001500 80020001 <hex>	
		Verify Telemetry BBFULLTYPE SM2LN500	= StartObs	AND=ZAZ96999
6		Set procedure conditions		Next Step: 7
	ET=+ UT=+00.00.00	RESET_DRCU_COUNTERS RESET_DRCU_COUNTERS Subsch. ID : 370 Det. descr. : RESET DRCU COUNTERS	SCD00505	
		Verify that the TRESET parameter has the same value as the THSK parameter TRESET SM01T500	same as THSK	AND=ZAZ96999
		THSK SM00T500	any	AND=ZAZ96999
		Note that a TM(5,1) packet [New_Step_Report] is generated after each of the following SET_OBS_STEP telecommands		
	ET=+ UT=+00.00.00	SET_OBS_STEP SET_OBS_STEP Command Parameter(s) : OBSERVATION_STEP SP03N500 Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SC003500 1 <hex>	
	ET=+ UT=+00.00.01	SET_OBSID SET_OBSID Command Parameter(s) : OBSERVATION_ID SP00N500 Subsch. ID : 370 Det. descr. : SET OBSERVATION IDENTIFIER	SC000500 OBS_ID	

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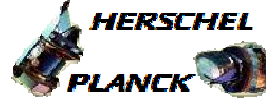
Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry <b>OBSID</b> <b>SM10N500</b>	<b>OBS_ID</b>	AND=ZAZ96999
	ET=+ UT=+00.00.00	SET_OBS_STEP  Command Parameter(s) : <b>OBSERVATION_STEP</b> <b>SP03N500</b>  Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	<b>SC003500</b>  <b>0 &lt;hex&gt;</b>	
	ET=+ UT=+00.00.01	SET_BBID  Command Parameter(s) : <b>BUILDING_BLOCK_ID</b> <b>SP01N500</b>  Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	<b>SC001500</b>  <b>80000000 &lt;hex&gt;</b>	
		Verify Telemetry <b>BBFULLTYPE</b> <b>SM2LN500</b>	<b>= Null</b>	AND=ZAZ96999
	ET=+ UT=+00.00.00	SET_OBS_MODE  Command Parameter(s) : <b>OBSERVING_MODE</b> <b>SP02N500</b>  Subsch. ID : 370 Det. descr. : SET OBSERVING MODE	<b>SC002500</b>  <b>0 &lt;hex&gt;</b>	
		Verify Telemetry <b>MODE</b> <b>SM00M500</b>	<b>= DPU_ON</b>	AND=ZAZ96999
6.1		Verify TM		□
		Verify Telemetry is refreshing once per second <b>TM2N</b> <b>SMT1N500</b>	<b>Incrementing</b>	AND=ZAZ96999
		Verify Telemetry is refreshing once per second <b>THSK</b> <b>SM00T500</b>	<b>Incrementing</b>	AND=ZAZ96999
		Verify Telemetry <b>MODE</b> <b>SM00M500</b>	<b>= DPU_ON</b>	AND=ZAZ96999
7		Set default end conditions		Next Step: END
		Note that a <b>TM(5,1)</b> packet [New_Step_Report] is generated after each of the following SET_OBS_STEP telecommands		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
	ET=+ UT=+00.00.00	SET_OBS_STEP  SET_OBS_STEP  Command Parameter(s) : OBSERVATION_STEP SP03N500  Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SC003500  0 <hex>	
	ET=+ UT=+00.00.01	SET_BBID  SET_BBID  Command Parameter(s) : BUILDING_BLOCK_ID SP01N500  Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SC001500  80000000 <hex>	
		Verify Telemetry  BBFULLTYPE SM2LN500	= Null	AND=ZAZ96999
	ET=+ UT=+00.00.00	SET_OBS_STEP  SET_OBS_STEP  Command Parameter(s) : OBSERVATION_STEP SP03N500  Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SC003500  0 <hex>	
	ET=+ UT=+00.00.01	SET_BBID  SET_BBID  Command Parameter(s) : BUILDING_BLOCK_ID SP01N500  Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SC001500  80030001 <hex>	
		Verify Telemetry  BBFULLTYPE SM2LN500	= EndObs	AND=ZAZ96999
	ET=+ UT=+00.00.00	SET_OBS_STEP  SET_OBS_STEP  Command Parameter(s) : OBSERVATION_STEP SP03N500  Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SC003500  1 <hex>	
	ET=+ UT=+00.00.01	SET_OBSID  SET_OBSID  Command Parameter(s) : OBSERVATION_ID SP00N500  Subsch. ID : 370 Det. descr. : SET OBSERVATION IDENTIFIER	SC000500  00000000 <hex>	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry <b>OBSID</b> <b>SM10N500</b>	= 00000000 <hex>	AND=ZAZ96999
	ET=+ UT=+00.00.00	SET_OBS_STEP <b>SET_OBS_STEP</b> Command Parameter(s) : <b>OBSERVATION_STEP</b> <b>SP03N500</b> Subsch. ID : 370 Det. descr. : SET OBSERVATION STEP	SC003500 0 <hex>	
	ET=+ UT=+00.00.01	SET_BBID <b>SET_BBID</b> Command Parameter(s) : <b>BUILDING_BLOCK_ID</b> <b>SP01N500</b> Subsch. ID : 370 Det. descr. : SET BUILDING BLOCK IDENTIFIER	SC001500 80000000 <hex>	
		Verify Telemetry <b>BBFULLTYPE</b> <b>SM2LN500</b>	= Null	AND=ZAZ96999

**End of Procedure**