

Patch memory of the redundant STR  
File: H\_FCP\_AOC\_4S62.xls  
Author: dsalt-hp



## Procedure Summary

### Objectives

The objective of this Herschel ACMS procedure is to patch the EEPROM and/or the RAM memory of the STR configured as redundant (STRR).

The procedure involves the following activities:

- verifying initial ACMS mode is SAM
- load and enable DTM (SA10)
- commanding STRR reset
- send STRR memory load TCs, as necessary
- dumping updated STRR memory
- commanding STRR to STB with or without RAM load
- verifying STRR status
- commanding STRR to AAD mode
- disable and remove DTM (SA10)

### Summary of Constraints

The redundant STR is assumed to be powered prior to executing the procedure. There are no restrictions on ACMS mode.

The worst case duration of a STR memory load depends on the rate with which memory load TC's are sent. The maximum rate with which data can be sent to the STR by the ACC is 56 32-bit words in a single ACMS cycle equivalent to 224 words / second.

The loading of STR memory is carried out using a dedicated TC provided by the ACC ASW. The size of the TC packet imposes limitations on the number of words that can be uplinked in a single command. If the TC's are sent directly from ground, packet size limitations restrict the number of 32-bit data words to 55; for TC's sent through the MTL the maximum is reduced further to 52 words.

The maximum size of an STR memory block that can be uploaded is 512 kb, which requires 2384 TC's. If the TC's are sent at a rate of one command per second, the time required will be close to 40 minutes.

### Spacecraft Configuration

#### Start of Procedure

Spacecraft initial conditions:  
- S/C nominal

#### End of Procedure

Spacecraft final conditions:  
- as initial conditions but with updated STRR memory

### Reference File(s)

#### Input Command Sequences

#### Output Command Sequences

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HFA4S62A  
 HFA4S62B  
 HFA4S62C  
 HFA4S62D  
 HFA4S62E  
 HFA4S62F  
 HFA4S62G

**Referenced Displays**

ANDs	GRDs	SLDs
ZAA01999		
ZAA00999		
ZAA02999		
ZAAA3999		
ZAAAD999		

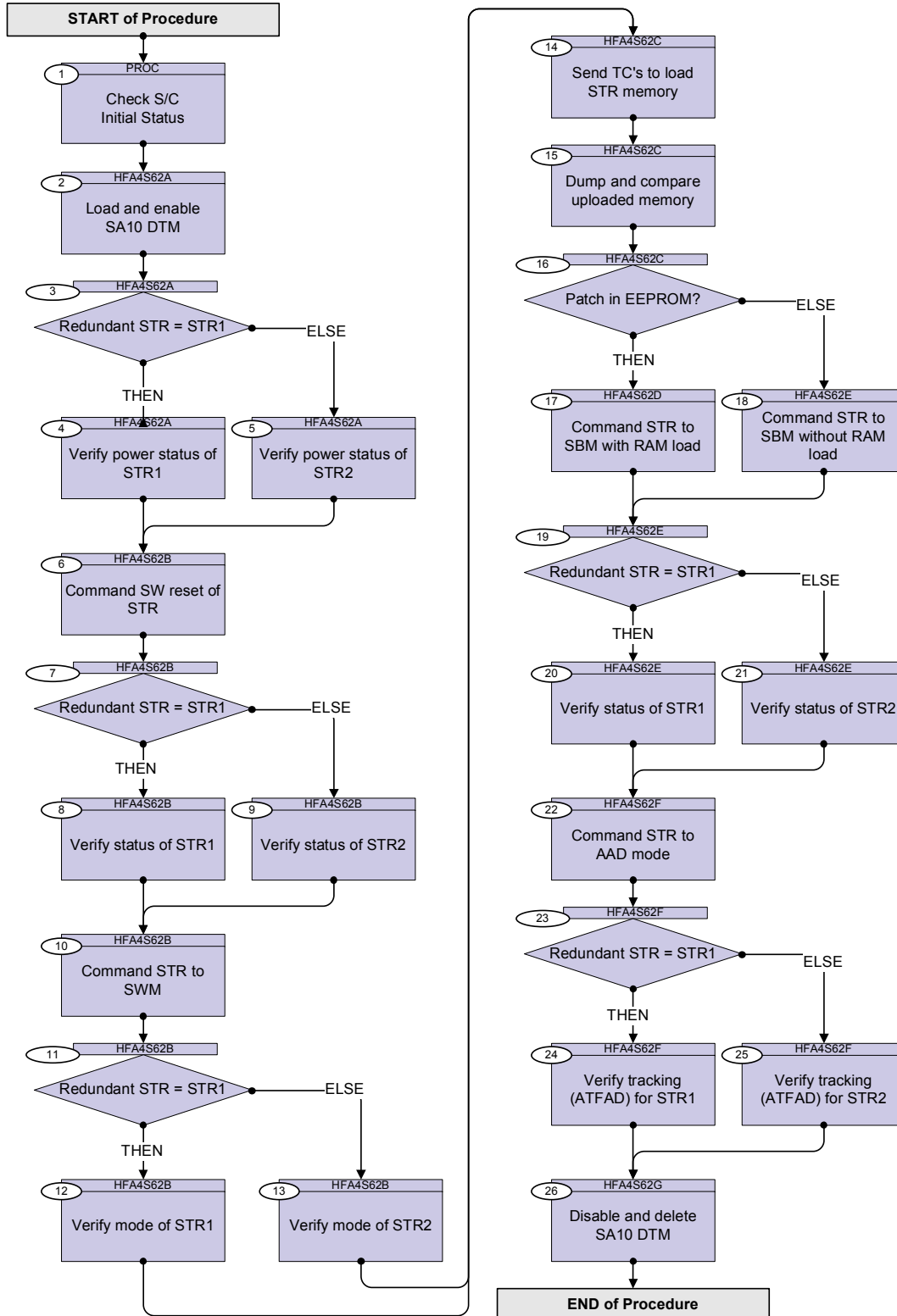
**Configuration Control Information**

DATE	FOP ISSUE	VERSION	MODIFICATION DESCRIPTION	AUTHOR	SPR REF
03/08/08	1	1	Created	dsalt-hp	

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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>				
PROC Procedure Properties				
SSID :				
1		Check S/C Initial Status		Next Step: 2
1.1		Check S/C mode status		<input type="checkbox"/>
		Verify Telemetry SpacecraftMode                    AESME002	= Nominal	AND=ZAA01999
		Verify Telemetry AcmsMode                            AESMG002	= SAM	AND=ZAA01999
		Verify Telemetry AcmsSubstate                    AESMF002	= SAM Sun Point	AND=ZAA01999
1.2		Check Star Tracker status, configuration & health		<input type="checkbox"/>
		Verify Telemetry STR1 power                        AE4P1002	= OFF	AND=ZAA00999
		Verify Telemetry STR2 power                        AE4P2002	= OFF	AND=ZAA00999
		Verify Telemetry Curr STR in use                    AES18002	= STR 1 = STR 2	AND=ZAA01999
		Verify Telemetry STR1 Health Sts                    AES31002	= Healthy	AND=ZAA01999
		Verify Telemetry STR2 Health Sts                    AES32002	= Healthy	AND=ZAA02999
HFA4S62A Define DTM SA10				
SSID :				
2		Load and enable SA10 DTM		Next Step: 3

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand <p style="text-align: right;">TC32H STR SA10D1 Super</p> Command Parameter(s) : HK Packet ID AH3PK109 TC3x_SID AHW04109 Interval AH3SA109 DID number AH3PA109 DID number AH3PA109 DID number AH3PA109 DID number AH3PA109 DID number AH3PA109 DID number AH3PA109 DID number AH3PA109 DID number AH3PA109 DID number AH3PA109	ACZYA109  100 <dec> (Def) DTM Str12Sa10s (Def) 4 <dec> (Def) 16447 <dec> (Def) 16447 <dec> (Def) 16447 <dec> (Def) 16447 <dec> (Def) 16780 <dec> (Def) 16780 <dec> (Def) 16780 <dec> (Def)	
		TC Control Flags : <p style="text-align: right;">GBM IL DSE            --Y -- ---</p> SSID : 20		
		Download packet definition to verify correct uplinking		
		Execute Telecommand <p style="text-align: right;">Report Diag Report Def</p> Command Parameter(s) : Number of pkts AH3NP109 HK Packet ID AH3PK109	AC311109  1 <dec> (Def) 100 <dec>	
		TC Control Flags : <p style="text-align: right;">GBM IL DSE            --Y -- ---</p> SSID : 20		
		Enable packet if correct uplinking has been confirmed		
		Execute Telecommand <p style="text-align: right;">EnableTmGen</p> Command Parameter(s) : N AH017070 Sub-Type AH019070 Packet-ID AH020070	AC900070  1 <dec> (Def) Diag Report 100 <dec>	
		TC Control Flags : <p style="text-align: right;">GBM IL DSE            --Y -- ---</p> SSID : 20		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
3		Redundant STR = STR1		Next Step: THEN 4 ELSE 5
4		Verify power status of STR1		Next Step: 6
		Verify Telemetry STR1 power                      AE4P1002                      = ON		AND=ZAA0999
5		Verify power status of STR2		Next Step: 6
		Verify Telemetry STR2 power                      AE4P2002                      = ON		AND=ZAA0999
HFA4S62B      STR to SWM				
SSID :				
6		Command SW reset of STR		Next Step: 7
		Execute Telecommand  STRred SW RESET	ACYHJ109	
		Command Parameter(s) : STRCfG DF86 Cmd                      AH8J3001                      Enable 86 STRCfG DD86 Cmd                      AH8J4001                      Enable 86 STRCfG Nrof WrD                      AHFX8001                      1 <dec> (Def) STRCfG Data WrD                      AHFX9001                      1 <dec>		
		TC Control Flags :  GBM IL DSE --Y -- ---		
		SSID : 20		
		Execute Telecommand  Fire Cmd STR config	ACZ4M109	
		Command Parameter(s) : FireFun DF86Cmd                      AH8F1001                      Enable 86 FireFun DD86Cmd                      AH8F2001                      Enable 86		
		TC Control Flags :  GBM IL DSE --Y -- ---		
		SSID : 20		
		The STR reset command with the reset type set to 1 causes a SW reset in which only some initialisations are carried out. In particular, the contents of the RAM are entirely preserved.		

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
7		Redundant STR = STR1		Next Step: THEN 8 ELSE 9
8		Verify status of STR1		Next Step: 10
		Wait 30 seconds for the new mode to be reflected in TM		
		<i>Normal sensor management functions, including acquisition of HK data and health checking are partly or totally disabled in the STR INI mode. Therefore, the only meaningful checks after a reset are the verification of operating mode and double-bit errors in the EEPROM (the contents of the EEPROM are checked and corrected in INI)</i>		
		Verify Telemetry Operating Mode AMX12074	= Initialisation	AND=ZAAA3999
		Verify Telemetry 2 Errors PROM AMX18074	= No failure	AND=ZAAA3999
9		Verify status of STR2		Next Step: 10
		Verify Telemetry STR2 Mode AMX12075	= Initialisation	AND=ZAAAD999
		Verify Telemetry STR2 2errEEPROM AMX18075	= No failure	AND=ZAAAD999
10		Command STR to SWM		Next Step: 11
		Execute Telecommand STRred SWM Command Parameter(s) : STRCfG DF86 Cmd AH8J3001 STRCfG DD86 Cmd AH8J4001 STRCfG Nrof WrD AHFX8001 STRCfG Data WrD AHFX9001 TC Control Flags : GBM IL DSE --Y -- -- SSID : 20	ACYHZ109 Enable 86 Enable 86 1 <dec> (Def) 0 <dec>	

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand  <div style="text-align: right;">Fire Cmd STR config</div> Command Parameter(s) : FireFun DF86Cmd            AH8F1001        Enable 86 FireFun DD86Cmd            AH8F2001        Enable 86  TC Control Flags : GBM IL DSE --Y -- ---  SSID : 20	ACZ4M109	
		Wait 30 seconds to allow mode change to be reflected in TM		
11		Redundant STR = STR1		Next Step: THEN 12 ELSE 13
12		Verify mode of STR1		Next Step: 14
		Verify Telemetry  <div style="text-align: right;">Operating Mode                    AMX12074</div>	= SW Maintenance	AND-ZAAA3999
13		Verify mode of STR2		Next Step: 14
		Verify Telemetry  <div style="text-align: right;">STR2 Mode                        AMX12075</div>	= SW Maintenance	AND-ZAAAD999
HFA4S62C    Load STR mem				
SSID :				
14		Send TC's to load STR memory		Next Step: 15
		Execute Telecommand  <div style="text-align: right;">Load STR-red SW</div> Command Parameter(s) : STRSw DF86 Cmd            AH8U1001        Enable 86 STRSw DD86 Cmd            AH8U2001        Enable 86 STRSw STR Mem             AHFXM001        <dec> (Def) STRSw Checksum            AHFXK001        <dec> (Def) STRSw Nr Words            AHFXN001        1 <dec> (Def) STRSw Data Word            AHFXD001        <dec> (Def)  TC Control Flags : GBM IL DSE --Y -- ---  SSID : 20  This Telecommand will not be included in the export	ACZ6P109	



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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Repeat the previous step until all data have been uploaded.		
		<i>The command above has been included only in order to identify the TC used for the loading of STR memory. Exporting of the TC has been deliberately suppressed, since the format of the TC depends on the number of words to be loaded. The user must generate all the necessary instances of the TC according to the location and size of the target memory area.</i>		
15		Dump and compare uploaded memory		Next Step: 16
		Execute Telecommand <p style="text-align: center;"><b>Dump STR-red SW</b></p> Command Parameter(s) : STRSw DF86 Cmd            AH8U1001 STRSw DD86 Cmd            AH8U2001 STRSw STR Mem             AHFXM001 STRSw Nr Words            AHFXN001  TC Control Flags : <p style="text-align: center;">GBM IL DSE --Y -- ---</p> SSID : 20 This Telecommand will not be included in the export	ACZ8P109	Enable 86 Enable 86 <dec> (Def) <dec> (Def)
		The maximum rate with which the ACC can acquire memory dump data from the STR is 56 words / seconds. There is also an additional overhead due to the generation of service 6 TM packets. The worst case duration of a memory dump (corresponding to the full 512 kbyte size of the memory) is about 42 minutes.		
16		Patch in EEPROM?		Next Step: THEN 17 ELSE 18
HFA4S62D    SBM with RAM load				
SSID :				
17		Command STR to SBM with RAM load		Next Step: 19

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand  STRred STAND_BY  Command Parameter(s) : STRCfG DF86 Cmd           AH8J3001           Enable 86 STRCfG DD86 Cmd           AH8J4001           Enable 86 STRCfG Nrof WrD           AHFX8001           10 <dec> (Def) STRCfG Data WrD           AHFX9001           0 <dec> STRCfG Data WrD           AHFX9001           0 <dec> STRCfG Data WrD           AHFX9001           0 <dec> STRCfG Data WrD           AHFX9001           0 <dec> STRCfG Data WrD           AHFX9001           0 <dec> STRCfG Data WrD           AHFX9001           0 <dec> STRCfG Data WrD           AHFX9001           0 <dec> STRCfG Data WrD           AHFX9001           0 <dec> STRCfG Data WrD           AHFX9001           0 <dec>  STRCfG Data WrD           AHFX9001           0 <dec> STRCfG Data WrD           AHFX9001           0 <dec>  TC Control Flags : GBM IL DSE --Y -- ---  SSID : 20	ACYHL109	
		Execute Telecommand  Fire Cmd STR config  Command Parameter(s) : FireFun DF86Cmd           AH8F1001           Enable 86 FireFun DD86Cmd           AH8F2001           Enable 86  TC Control Flags : GBM IL DSE --Y -- ---  SSID : 20	ACZ4M109	
		If the EEPROM has been patched, the contents of the RAM should be reloaded during transition to SBM		
HFA4S62E      SBM no RAM load				
SSID :				
18		Command STR to SBM without RAM load		Next Step: 19

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Execute Telecommand  STRred STAND_BY  Command Parameter(s) : STRCfG DF86 Cmd           AH8J3001       Enable 86 STRCfG DD86 Cmd           AH8J4001       Enable 86 STRCfG Nrof WrD           AHFX8001       10 <dec> (Def) STRCfG Data WrD           AHFX9001       1 <dec> STRCfG Data WrD           AHFX9001       0 <dec> STRCfG Data WrD           AHFX9001       0 <dec> STRCfG Data WrD           AHFX9001       0 <dec> STRCfG Data WrD           AHFX9001       0 <dec> STRCfG Data WrD           AHFX9001       0 <dec> STRCfG Data WrD           AHFX9001       0 <dec> STRCfG Data WrD           AHFX9001       0 <dec> STRCfG Data WrD           AHFX9001       0 <dec>  STRCfG Data WrD           AHFX9001       0 <dec> STRCfG Data WrD           AHFX9001       0 <dec>  TC Control Flags : GBM IL DSE --Y -- ---  SSID : 20	ACYHL109	
		Execute Telecommand  Fire Cmd STR config  Command Parameter(s) : FireFun DF86Cmd           AH8F1001       Enable 86 FireFun DD86Cmd           AH8F2001       Enable 86  TC Control Flags : GBM IL DSE --Y -- ---  SSID : 20	ACZ4M109	
		The TC selects the SBM option without reloading of the RAM from EEPROM.		
19		Redundant STR = STR1		Next Step: THEN 20 ELSE 21
20		Verify status of STR1		Next Step: 22
		Verify Telemetry Operating Mode           AMX12074	= Standby	AND=ZAAA3999
		Verify Telemetry Mode Transition           AMX10074	= Cmd mode trans	AND=ZAAA3999
		Verify Telemetry 1 Error in PROM           AMX16074	= No failure	AND=ZAAA3999
		Verify Telemetry PROM loading           AMX17074	= No failure	AND=ZAAA3999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry 2 Errors PROM AMX18074	= No failure	AND=ZAAA3999
		Verify Telemetry AsicRam Overflow AMX1B074	= No failure	AND=ZAAA3999
		Verify Telemetry Timeout on HK AMX1E074	= No failure	AND=ZAAA3999
		Verify Telemetry Timeout on EOF AMX1D074	= No failure	AND=ZAAA3999
		Verify Telemetry Last TC Status AMX1G074	= No failure	AND=ZAAA3999
		Verify Telemetry TEC Curr Fail AMX24074	= No failure	AND=ZAAA3999
		Verify Telemetry Voltage 3 Fail AMX27074	= No failure	AND=ZAAA3999
		Verify Telemetry Voltage 2 Fail AMX26074	= No failure	AND=ZAAA3999
		Verify Telemetry Voltage 3 Fail AMX25074	= No failure	AND=ZAAA3999
		<i>STR housekeeping functions, including temperature control of the CCD, are suspended in software maintenance mode. The time necessary to bring the CCD temperature to nominal values when thermal control is re-started in standby mode depends on external conditions and may be as long as 10 minutes.</i>		
		Verify Telemetry Optic Temp Fail AMX28074	= No failure	AND=ZAAA3999
		Verify Telemetry CCD Temp 1 Fail AMX2A074	= No failure	AND=ZAAA3999
		Verify Telemetry CCD Temp 2 Fail AMX29074	= No failure	AND=ZAAA3999
		Verify Telemetry Generic Fault AMX2B074	= No failure	AND=ZAAA3999
		All analog HK parameters should have values within the nominal operating range. This applies also to CCD temperatures, even though the control of the thermoelectric cooler is not active in INI and SWM modes.		
		Verify Telemetry STR1 HK Volt 1 AMX1Y074		AND=ZAAA3999
		Verify Telemetry STR1 HK Volt 2 AMX1Z074		AND=ZAAA3999
		Verify Telemetry STR1 HK Volt 3 AMX20074		AND=ZAAA3999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry STR1 CCD temp 1 AMX1V074		AND=ZAAA3999
		Verify Telemetry STR1 CCD temp 2 AMX1W074		AND=ZAAA3999
		Verify Telemetry STR1 Optic temp AMX1X074		AND=ZAAA3999
		Verify Telemetry STR1 TEC Curr AMX21074		AND=ZAAA3999
		Verify Telemetry SEU Count AMX2F074		AND=ZAAA3999
		Verify Telemetry Mean CCDGlobBkg AMX2N074		AND=ZAAA3999
		Verify Telemetry RMS CCD LocBkg AMX2K074		AND=ZAAA3999
21		Verify status of STR2		Next Step: 22
		Verify Telemetry STR2 Mode AMX12075	= Standby	AND=ZAAAD999
		Verify Telemetry STR2 Mode trans AMX10075	= Cmd mode trans	AND=ZAAAD999
		Verify Telemetry STR2 1errEEPROM AMX16075	= No failure	AND=ZAAAD999
		Verify Telemetry STR2 PROM load AMX17075	= No failure	AND=ZAAAD999
		Verify Telemetry STR2 2errEEPROM AMX18075	= No failure	AND=ZAAAD999
		Verify Telemetry STR2 ASIC RAM AMX1B075	= No failure	AND=ZAAAD999
		Verify Telemetry STR2 timeout HK AMX1E075	= No failure	AND=ZAAAD999
		Verify Telemetry STR2 timeoutEOF AMX1D075	= No failure	AND=ZAAAD999
		Verify Telemetry STR2 last TC st AMX1G075	= No failure	AND=ZAAAD999
		Verify Telemetry STR2 TECcurfail AMX24075	= No failure	AND=ZAAAD999
		Verify Telemetry STR2 volt1 fail AMX27075	= No failure	AND=ZAAAD999
		Verify Telemetry STR2 volt2 fail AMX26075	= No failure	AND=ZAAAD999

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Step No.	Time	Activity/Remarks	TC/TLM	Display/ Branch
		Verify Telemetry STR2 volt3 fail AMX25075	= No failure	AND=ZAAAD999
		Verify Telemetry STR2 opticTfail AMX28075	= No failure	AND=ZAAAD999
		<i>STR housekeeping functions, including temperature control of the CCD, are suspended in software maintenance mode. The time necessary to bring the CCD temperature to nominal values when thermal control is re-started in standby mode depends on external conditions and may be as long as 10 minutes.</i>		
		Verify Telemetry STR2 CCDtmp1fai AMX2A075	= No failure	AND=ZAAAD999
		Verify Telemetry STR2 CCDtmp2fai AMX29075	= No failure	AND=ZAAAD999
		Verify Telemetry STR2 hlth summ AMX2B075	= No failure	AND=ZAAAD999
		<i>All analog HK parameters should have values within the nominal operating range. This applies also to CCD temperatures, even though the control of the thermoelectric cooler is not active in INI and SWM modes.</i>		
		Verify Telemetry STR2 HK Volt 1 AMX1Y075		AND=ZAAAD999
		Verify Telemetry STR2 HK Volt 2 AMX1Z075		AND=ZAAAD999
		Verify Telemetry STR2 HK Volt 3 AMX20075		AND=ZAAAD999
		Verify Telemetry STR2 CCD temp 1 AMX1V075		AND=ZAAAD999
		Verify Telemetry STR2 CCD temp 2 AMX1W075		AND=ZAAAD999
		Verify Telemetry STR2 Optic temp AMX1X075		AND=ZAAAD999
		Verify Telemetry STR2 TEC Curr AMX21075		AND=ZAAAD999
		Verify Telemetry STR2 SEU cntr AMX2F075		AND=ZAAAD999
		Verify Telemetry STR2 Mean CCDg1 AMX2N075		AND=ZAAAD999
		Verify Telemetry STR2 RMS CCDloc AMX2K075		AND=ZAAAD999



