

Patch memory of the main STR  
File: H\_FCP\_AOC\_4S61.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 main (STRM).

The procedure involves the following activities:

- verifying initial ACMS mode is SAM
- commanding STRM reset
- sending STRM memory load TCs, as necessary
- dumping updated STRM memory
- commanding STRM to STB with or without RAM load
- verifying STRM status
- commanding STR to AAD mode

### Summary of Constraints

The ACMS must be in SAM.

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 with ACMS in SAM

#### End of Procedure

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

### Reference File(s)

#### Input Command Sequences

#### Output Command Sequences

HFA4S61A  
HFA4S61B  
HFA4S61C  
HFA4S61D  
HFA4S61E

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**Referenced Displays**

**ANDs**      **GRDs**      **SLDs**  
 ZAA01999  
 ZAA05999

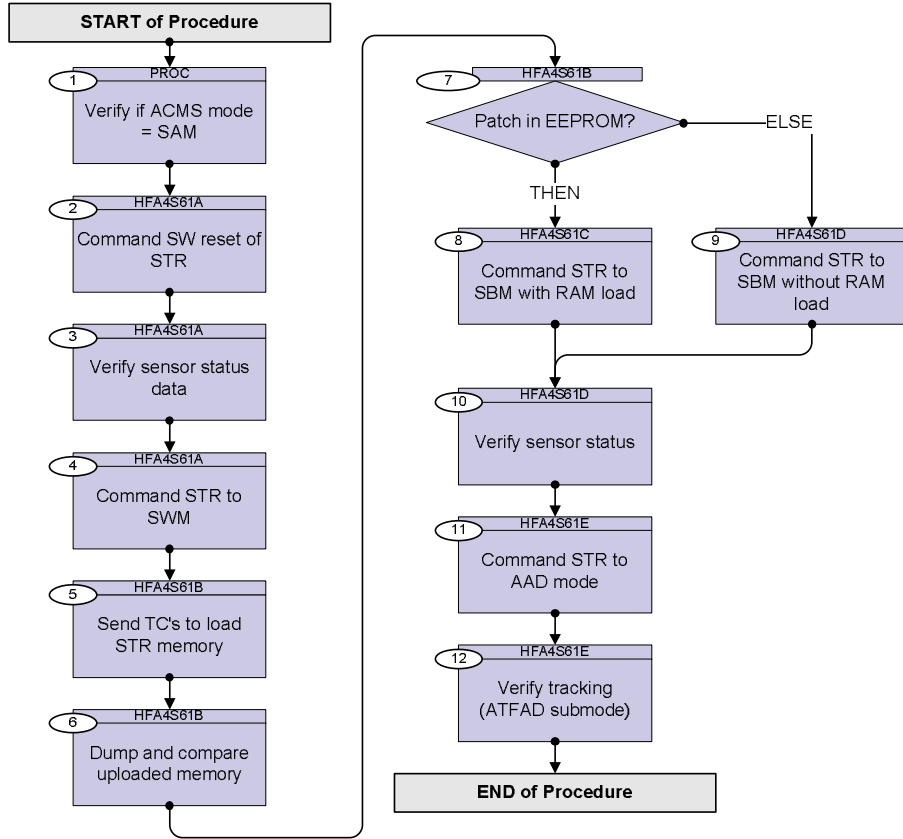
**Configuration Control Information**

| 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                             |      | Verify if ACMS mode = SAM  |          | Next Step:<br>2 |
|                               |      | Verify Telemetry<br><br>AcmsMode AESMG002 = SAM  |          | AND=ZAA01999    |
| HFA4S61A STR to SWM           |      |  |          |                 |
| SSID :                        |      |  |          |                 |
| 2                             |      | Command SW reset of STR  |          | Next Step:<br>3 |
|                               |      | Execute Telecommand<br><br>STRmain SW RESET<br><br>Command Parameter(s) :<br>STRCfg DF86 Cmd AH8J3001 Enable 86<br>STRCfg DD86 Cmd AH8J4001 Enable 86<br>STRCfg Nrof Wrđ AHFX8001 1 <dec> (Def)<br>STRCfg Data Wrđ AHFX9001 1 <dec><br><br>TC Control Flags :<br>GBM IL DSE<br>--Y -- ---<br><br>SSID : 20 | ACYHH109 |                 |
|                               |      | Execute Telecommand<br><br>Fire Cmd STR config<br><br>Command Parameter(s) :<br>FireFun DF86Cmd AH8F1001 Enable 86<br>FireFun DD86Cmd AH8F2001 Enable 86<br><br>TC Control Flags :<br>GBM IL DSE<br>--Y -- ---<br><br>SSID : 20  | ACZ4M109 |                 |
|                               |      | 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.  |          |                 |
| 3                             |      | Verify sensor status data  |          | Next Step:<br>4 |

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| Step No.  | Time | Activity/Remarks  | TC/TLM           | Display/ Branch |
|---|------|---|------------------|-----------------|
|   |      | Wait 20 seconds to make sure the STR status is correctly reflected in TM after the commanded mode transition.   |                  |                 |
|   |      | <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<br><div style="text-align: right;">STRM Mode                      AEX04001</div>   | = Initialisation | AND=ZAA05999    |
|   |      | Verify Telemetry<br><div style="text-align: right;">STRM 2err EEPROM                      AEX08001</div>  | = No failure     | AND=ZAA05999    |
| 4   |      | Command STR to SWM  |                  | Next Step:<br>5 |
|   |      | Execute Telecommand<br><div style="text-align: right;">STRmain SWM</div> <p>Command Parameter(s) :</p> <pre> STRCfg DF86 Cmd                      AH8J3001                      Enable 86 STRCfg DD86 Cmd                      AH8J4001                      Enable 86 STRCfg Nrof Wrđ                      AHFX8001                      1 &lt;dec&gt; (Def) STRCfg Data Wrđ                      AHFX9001                      0 &lt;dec&gt; </pre> <p>TC Control Flags :</p> <pre> GBM IL DSE --Y -- --- </pre> <p>SSID : 20</p> | ACYHY109         |                 |
|   |      | Execute Telecommand<br><div style="text-align: right;">Fire Cmd STR config</div> <p>Command Parameter(s) :</p> <pre> FireFun DF86Cmd                      AH8F1001                      Enable 86 FireFun DD86Cmd                      AH8F2001                      Enable 86 </pre> <p>TC Control Flags :</p> <pre> GBM IL DSE --Y -- --- </pre> <p>SSID : 20</p>   | ACZ4M109         |                 |
|   |      | Wait 30 seconds to allow mode change to be reflected in TM  |                  |                 |
|   |      | Verify Telemetry<br><div style="text-align: right;">STRM Mode                      AEX04001</div>   | = SW Maintenance | AND=ZAA05999    |
| <p>HFA4S61B      Load STR Mem</p> <p>SSID :</p> |      |   |                  |                 |

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| Step No.        | Time     | Activity/Remarks  | TC/TLM         | Display/ Branch |           |                |          |           |               |          |             |                |          |             |                |          |               |                 |          |             |          |  |
|-----------------|----------|---|----------------|-----------------|-----------|----------------|----------|-----------|---------------|----------|-------------|----------------|----------|-------------|----------------|----------|---------------|-----------------|----------|-------------|----------|--|
| 5               |          | Send TC's to load STR memory  |                | Next Step:<br>6 |           |                |          |           |               |          |             |                |          |             |                |          |               |                 |          |             |          |  |
|                 |          | <p><b>NOTE:</b><br/>           The <u>command below has been included only in order to identify the TC used for the loading of STR memory.</u><br/>           Exporting of the TC has been deliberately suppressed, since the format of the TC depends on the number of words to be loaded.</p> <p>The user must generate all the necessary instances of the TC according to the location and size of the target memory area.</p>   |                |                 |           |                |          |           |               |          |             |                |          |             |                |          |               |                 |          |             |          |  |
|                 |          | <p>Execute Telecommand</p> <p style="text-align: right;">Load STR-main SW</p> <p>Command Parameter(s) :</p> <table border="0"> <tr> <td>STRSw DF86 Cmd</td> <td>AH8U1001</td> <td>Enable 86</td> </tr> <tr> <td>STRSw DD86 Cmd</td> <td>AH8U2001</td> <td>Enable 86</td> </tr> <tr> <td>STRSw STR Mem</td> <td>AHFXM001</td> <td>&lt;dec&gt; (Def)</td> </tr> <tr> <td>STRSw Checksum</td> <td>AHFXK001</td> <td>&lt;dec&gt; (Def)</td> </tr> <tr> <td>STRSw Nr Words</td> <td>AHFXN001</td> <td>1 &lt;dec&gt; (Def)</td> </tr> <tr> <td>STRSw Data Word</td> <td>AHFXD001</td> <td>&lt;dec&gt; (Def)</td> </tr> </table> <p>TC Control Flags :</p> <p style="text-align: right;">GBM IL DSE<br/>--Y -- ---</p> <p>SSID : 20</p> <p>This Telecommand will not be included in the export</p> | 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) | ACZ5P109 |  |
| 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)   |                |                 |           |                |          |           |               |          |             |                |          |             |                |          |               |                 |          |             |          |  |
|                 |          | Repeat the previous step until all data have been uploaded.   |                |                 |           |                |          |           |               |          |             |                |          |             |                |          |               |                 |          |             |          |  |
| 6               |          | Dump and compare uploaded memory  |                | Next Step:<br>7 |           |                |          |           |               |          |             |                |          |             |                |          |               |                 |          |             |          |  |
|                 |          | <p>Execute Telecommand</p> <p style="text-align: right;">Dump STR-main SW</p> <p>Command Parameter(s) :</p> <table border="0"> <tr> <td>STRSw DF86 Cmd</td> <td>AH8U1001</td> <td>Enable 86</td> </tr> <tr> <td>STRSw DD86 Cmd</td> <td>AH8U2001</td> <td>Enable 86</td> </tr> <tr> <td>STRSw STR Mem</td> <td>AHFXM001</td> <td>&lt;dec&gt; (Def)</td> </tr> <tr> <td>STRSw Nr Words</td> <td>AHFXN001</td> <td>&lt;dec&gt; (Def)</td> </tr> </table> <p>TC Control Flags :</p> <p style="text-align: right;">GBM IL DSE<br/>--Y -- ---</p> <p>SSID : 20</p> <p>This Telecommand will not be included in the export</p>  | STRSw DF86 Cmd | AH8U1001        | Enable 86 | STRSw DD86 Cmd | AH8U2001 | Enable 86 | STRSw STR Mem | AHFXM001 | <dec> (Def) | STRSw Nr Words | AHFXN001 | <dec> (Def) | ACZ7P109       |          |               |                 |          |             |          |  |
| STRSw DF86 Cmd  | AH8U1001 | Enable 86   |                |                 |           |                |          |           |               |          |             |                |          |             |                |          |               |                 |          |             |          |  |
| STRSw DD86 Cmd  | AH8U2001 | Enable 86   |                |                 |           |                |          |           |               |          |             |                |          |             |                |          |               |                 |          |             |          |  |
| STRSw STR Mem   | AHFXM001 | <dec> (Def)   |                |                 |           |                |          |           |               |          |             |                |          |             |                |          |               |                 |          |             |          |  |
| STRSw Nr Words  | AHFXN001 | <dec> (Def)   |                |                 |           |                |          |           |               |          |             |                |          |             |                |          |               |                 |          |             |          |  |
|                 |          | <p><b>NOTE:</b><br/>           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.</p>  |                |                 |           |                |          |           |               |          |             |                |          |             |                |          |               |                 |          |             |          |  |

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|----------------------------|------|---|-----------------|--------------------------------|
| 7                          |      | Patch in EEPROM?  |                 | Next Step:<br>THEN 8<br>ELSE 9 |
| HFA4S61C SBM with RAM load |      |   |                 |                                |
| SSID :                     |      |   |                 |                                |
| 8                          |      | Command STR to SBM with RAM load  |                 | Next Step:<br>10               |
|                            |      | Execute Telecommand   |                 |                                |
|                            |      | <b>STRmain STAND_BY</b>   | <b>ACYHK109</b> |                                |
|                            |      | Command Parameter(s) :  |                 |                                |
|                            |      | STRCfg DF86 Cmd                   AH8J3001           Enable 86                                      |                 |                                |
|                            |      | STRCfg DD86 Cmd                   AH8J4001           Enable 86                                      |                 |                                |
|                            |      | STRCfg Nrof Wrđ                   AHFX8001           10 <dec> (Def)                                 |                 |                                |
|                            |      | STRCfg Data Wrđ                   AHFX9001           0 <dec>  |                 |                                |
|                            |      | STRCfg Data Wrđ                   AHFX9001           0 <dec>  |                 |                                |
|                            |      | STRCfg Data Wrđ                   AHFX9001           0 <dec>  |                 |                                |
|                            |      | STRCfg Data Wrđ                   AHFX9001           0 <dec>  |                 |                                |
|                            |      | STRCfg Data Wrđ                   AHFX9001           0 <dec>  |                 |                                |
|                            |      | STRCfg Data Wrđ                   AHFX9001           0 <dec>  |                 |                                |
|                            |      | STRCfg Data Wrđ                   AHFX9001           0 <dec>  |                 |                                |
|                            |      | STRCfg Data Wrđ                   AHFX9001           0 <dec>  |                 |                                |
|                            |      | STRCfg Data Wrđ                   AHFX9001           0 <dec>  |                 |                                |
|                            |      | STRCfg Data Wrđ                   AHFX9001           0 <dec>  |                 |                                |
|                            |      | STRCfg Data Wrđ                   AHFX9001           0 <dec>  |                 |                                |
|                            |      | STRCfg Data Wrđ                   AHFX9001           0 <dec>  |                 |                                |
|                            |      | STRCfg Data Wrđ                   AHFX9001           0 <dec>  |                 |                                |
|                            |      | TC Control Flags :  |                 |                                |
|                            |      | GBM IL DSE  |                 |                                |
|                            |      | --Y -- ---  |                 |                                |
|                            |      | SSID : 20   |                 |                                |
|                            |      | Execute Telecommand   |                 |                                |
|                            |      | <b>Fire Cmd STR config</b>  | <b>ACZ4M109</b> |                                |
|                            |      | Command Parameter(s) :  |                 |                                |
|                            |      | FireFun DF86Cmd                   AH8F1001           Enable 86                                      |                 |                                |
|                            |      | FireFun DD86Cmd                   AH8F2001           Enable 86                                      |                 |                                |
|                            |      | TC Control Flags :  |                 |                                |
|                            |      | GBM IL DSE  |                 |                                |
|                            |      | --Y -- ---  |                 |                                |
|                            |      | SSID : 20   |                 |                                |
|                            |      | If the EEPROM has been patched, the contents of the RAM should be reloaded during transition to SBM |                 |                                |
| HFA4S61D SBM no RAM load   |      |   |                 |                                |
| SSID :                     |      |   |                 |                                |

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| Step No. | Time | Activity/Remarks  | TC/TLM           | Display/ Branch  |
|----------|------|---|------------------|------------------|
| 9        |      | Command STR to SBM without RAM load   |                  | Next Step:<br>10 |
|          |      | Execute Telecommand<br>STRmain STAND_BY<br><br>Command Parameter(s) :<br>STRCfg DF86 Cmd           AH8J3001    Enable 86<br>STRCfg DD86 Cmd           AH8J4001    Enable 86<br>STRCfg Nrof Wrd           AHFX8001    10 <dec> (Def)<br>STRCfg Data Wrd           AHFX9001    1 <dec><br>STRCfg Data Wrd           AHFX9001    0 <dec><br>STRCfg Data Wrd           AHFX9001    0 <dec><br>STRCfg Data Wrd           AHFX9001    0 <dec><br>STRCfg Data Wrd           AHFX9001    0 <dec><br>STRCfg Data Wrd           AHFX9001    0 <dec><br>STRCfg Data Wrd           AHFX9001    0 <dec><br>STRCfg Data Wrd           AHFX9001    0 <dec><br>STRCfg Data Wrd           AHFX9001    0 <dec><br><br>STRCfg Data Wrd           AHFX9001    0 <dec><br>STRCfg Data Wrd           AHFX9001    0 <dec><br><br>TC Control Flags :<br>GBM IL DSE<br>--Y -- ---<br><br>SSID : 20 | ACYHK109         |                  |
|          |      | Execute Telecommand<br>Fire Cmd STR config<br><br>Command Parameter(s) :<br>FireFun DF86Cmd           AH8F1001    Enable 86<br>FireFun DD86Cmd           AH8F2001    Enable 86<br><br>TC Control Flags :<br>GBM IL DSE<br>--Y -- ---<br><br>SSID : 20   | ACZ4M109         |                  |
|          |      | The TC selects the SBM option without reloading of the RAM from EEPROM.   |                  |                  |
| 10       |      | Verify sensor status  |                  | Next Step:<br>11 |
|          |      | TM verification should be executed after about 30 seconds to make sure that data have been updated in essential housekeeping TM.  |                  |                  |
|          |      | Verify Telemetry<br>STRM Mode           AEX04001    = Standby   | = Standby        | AND=ZAA05999     |
|          |      | Verify Telemetry<br>STRM Mode trans    AEX02001    = Cmd mode trans   | = Cmd mode trans | AND=ZAA05999     |
|          |      | Verify Telemetry<br>STRM 1errEEPROM    AEX06001    = No failure   | = No failure     | AND=ZAA05999     |
|          |      | Verify Telemetry<br>STRM PROM load     AEX07001    = No failure   | = No failure     | AND=ZAA05999     |



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| Step No.                 | Time | Activity/Remarks   | TC/TLM       | Display/ Branch  |
|--------------------------|------|--|--------------|------------------|
|                          |      | Verify Telemetry<br>STRM 2err EEPRM                    AEX08001  | = No failure | AND=ZAA05999     |
|                          |      | Verify Telemetry<br>STRM ASIC RAM                        AEX0B001  | = No failure | AND=ZAA05999     |
|                          |      | Verify Telemetry<br>STRM timeout HK                      AEX0E001  | = No failure | AND=ZAA05999     |
|                          |      | Verify Telemetry<br>STRM timeoutEOF                      AEX0D001  | = No failure | AND=ZAA05999     |
|                          |      | Verify Telemetry<br>STRM lastTC sts                        AEX0G001  | = No failure | AND=ZAA05999     |
|                          |      | Verify Telemetry<br>STRM TECcurfail                        AEX11001  | = No failure | AND=ZAA05999     |
|                          |      | Verify Telemetry<br>STRM volt1 fail                        AEX14001  | = No failure | AND=ZAA05999     |
|                          |      | Verify Telemetry<br>STRM volt2 fail                        AEX13001  | = No failure | AND=ZAA05999     |
|                          |      | Verify Telemetry<br>STRM volt3 fail                        AEX12001  | = No failure | AND=ZAA05999     |
|                          |      | Wait 10 minutes to achieve stable CCD temperature.   |              |                  |
|                          |      | <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<br>STRM opticTfail                        AEX15001  | = No failure | AND=ZAA05999     |
|                          |      | Verify Telemetry<br>STRM CCDt1fail                        AEX17001   | = No failure | AND=ZAA05999     |
|                          |      | Verify Telemetry<br>STRM CCDt2fail                        AEX16001   | = No failure | AND=ZAA05999     |
|                          |      | Verify Telemetry<br>STRM hlth summ                        AEX18001   | = No failure | AND=ZAA05999     |
| HFA4S61E    STR to ATFAD |      |  |              |                  |
| SSID :                   |      |  |              |                  |
| 11                       |      | Command STR to AAD mode  |              | Next Step:<br>12 |



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|-------------------------|------|--|--------|-----------------|
|                         |      | Verify Telemetry<br><b>STRM Att qual                    AEXMY001</b>   |        | AND=ZAA05999    |
|                         |      | <i>Verification of housekeeping parameters and error status specified in detail above can be repeated periodically throughout the STR installation procedure. The sensor output can also be verified, but no specific criteria can be provided in the procedure for the attitude quaternion.</i> |        |                 |
| <b>End of Procedure</b> |      |  |        |                 |