

Patch STRmain Memory
File: H_FCP_AOC_8PMM.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 STRM.

The procedure involves the following activities:

- verifying initial ACMS mode
- uplink safety TCs to MTL
- command STRM to Standby via disabling reconfiguration & declaring STRM unhealthy
- command STRM reset
- command STRM to SWM mode
- patch STRM EEPROM, as necessary (calls H_FCP_OCC_2282)
- patch STRM RAM, as necessary (calls H_FCP_OCC_2284)
- command STRM to STB with RAM load, as necessary
- command STRM RESET without RAM load, as necessary
- command STRM to STB without RAM load, as necessary
- command STR to AAD mode
- delete safety TCs from MTL
- update S/C velocity in STRM (calls H_FCP_AOC_4S41)

Summary of Constraints

The ACMS may be in SAM/OCM/SCM.

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 STRM memory patched

Reference File(s)

Input Command Sequences

Output Command Sequences

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HFA8PMMMA
 HFA8PMMB
 HFA8PMMC
 HFA8PMMD

Referenced Displays

| ANDs | GRDs | SLDs |
|----------|------|------|
| ZAA00999 | | |
| ZAA01999 | | |
| ZAA05999 | | |
| ZAA02999 | | |
| ZAA06999 | | |

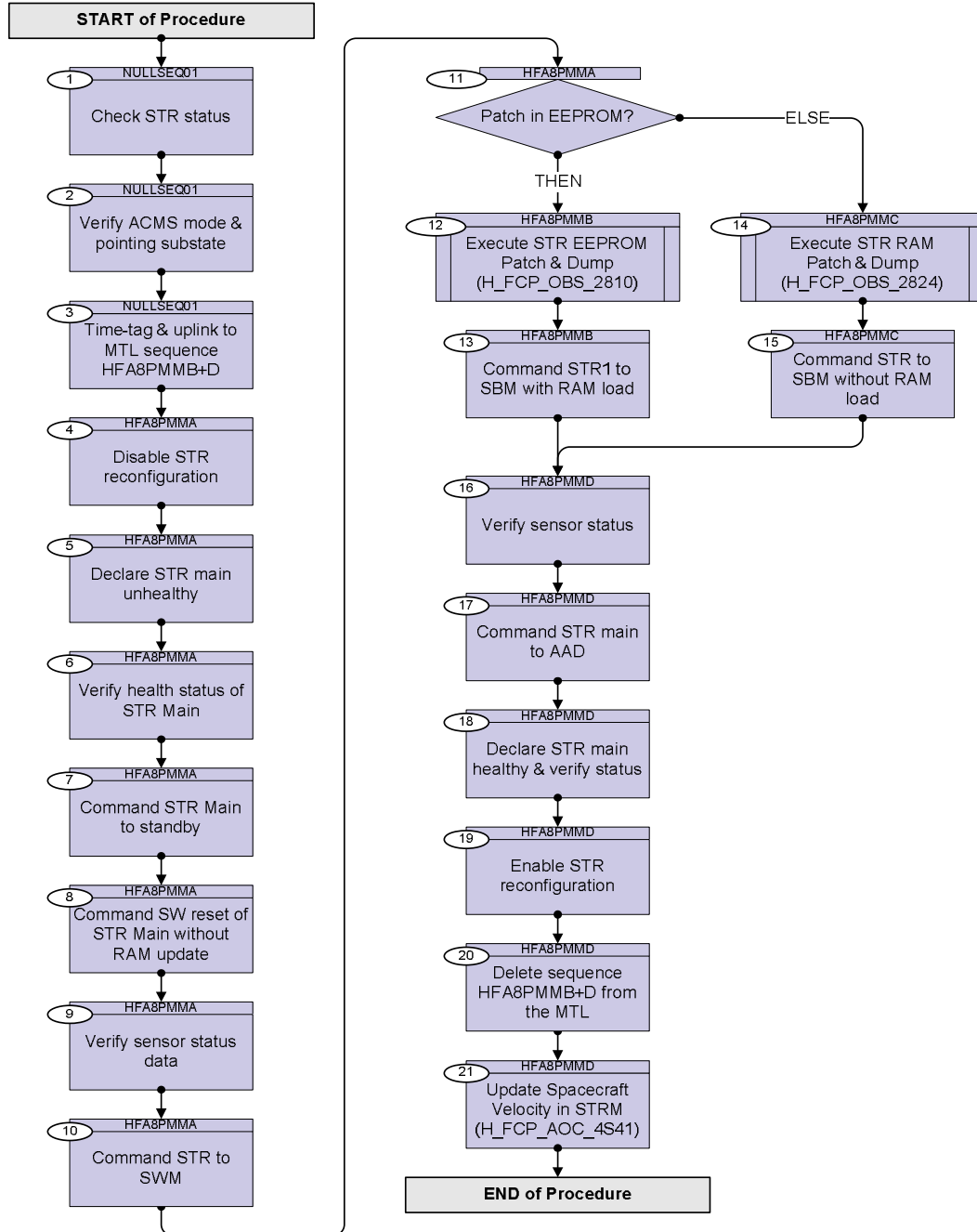
Configuration Control Information

| DATE | FOP ISSUE | VERSION | MODIFICATION DESCRIPTION | AUTHOR | SPR REF |
|------------|-----------|---------|--------------------------|----------|---------|
| 17/05/2011 | 3.1 | 1 | Created | dsalt-hp | |

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Procedure Flowchart Overview



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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|---|------|--|----------------------------------|-----------------|
| Beginning of Procedure | | | | |
| TC Seq. Name : NULLSEQ01 (Null Sequence 01) | | | | |
| TimeTag Type: Sub Schedule ID: □ | | | | |
| 1 | | Check STR status | | Next Step: 2 |
| | | Verify Telemetry STR1 power AE4P1002 | <to be read> | AND=ZAA00999 |
| | | Verify Telemetry STR2 power AE4P2002 | <to be read> | AND=ZAA00999 |
| | | Verify Telemetry Comm bus STR1 AES75002 | <to be read> | AND=ZAA01999 |
| | | Verify Telemetry Comm bus STR2 AES76002 | <to be read> | AND=ZAA01999 |
| | | Verify Telemetry Curr STR in use AES18002 | <to be read> | AND=ZAA01999 |
| | | Verify Telemetry STRM Mode AEX04001 | <to be read> | AND=ZAA05999 |
| 2 | | Verify ACMS mode & pointing substate | | Next Step: 3 |
| | | Verify Telemetry AcmsMode AESMG002 | <> SBM | AND=ZAA01999 |
| | | Verify Telemetry AcmsSubstate AESMF002 | = OCM Pointing = SCM Pointing | AND=ZAA01999 |
| | | IF ACMS does not settle into a stable pointing substate within the expected time (i.e after the Tslew value of last pointing TC) THEN abandon this procedure ELSE continue to next step... | | |
| 3 | | Time-tag & uplink to MTL sequence HFA8PMMB+D | | Next Step: 4 |

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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|---|------|--|----------|-----------------|
| | | <p>***** SAFETY ACTION *****</p> <p>To ensure STRM is back in the control loop during the next OD, load sequence HFA8PMMB and HFA8PMMD onto the Manual Stack & define the execution start time <u>10 minutes before the end of the current pass</u></p> | | |
| | | Uplink the time-tagged sequence HFA8PMMB and HFA8PMMD and verify the TCs on the MTL | | |
| <p>TC Seq. Name : HFA8PMMA (Ready STRM for patch)</p> <p>TimeTag Type: Sub Schedule ID: <input type="checkbox"/></p> | | | | |
| 4 | | Disable STR reconfiguration | | Next Step: 5 |
| | | Load sequence HFA8PMMA on the Manual Stack and uplink in accordance with the following steps | | |
| | | Execute Telecommand <p style="text-align: center;">Dis STR reconfiguration</p> Command Parameter(s) : DisRcf DF86Cmd AH8W1001 Enable 86 DisRcf DD86Cmd AH8W2001 Enable 86 TC Control Flags : <p style="text-align: right;">GBM IL DSE --Y -- ---</p> Subsch. ID : 20 Det. descr. : TC(8,1) - Disable reconfiguration - Dis STR reconfiguration | ACZGT109 | |
| | | Execute Telecommand <p style="text-align: center;">Fire Disable Reconfig</p> Command Parameter(s) : FireFun DF86Cmd AH8F1001 Enable 86 FireFun DD86Cmd AH8F2001 Enable 86 TC Control Flags : <p style="text-align: right;">GBM IL DSE --Y -- ---</p> Subsch. ID : 20 Det. descr. : TC(8,4) Fire Command - Fire Disable Reconfig | ACZ8M109 | |
| 5 | | Declare STR main unhealthy | | Next Step: 6 |

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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|------|---|---|--------------------------|
| | | Execute Telecommand mSTR unhealthy defSGM <i>Command Parameter(s) :</i> UnHlthDF86 Cmd AHFH1001 UnHlth DD86Cmd AHFH2001 <i>TC Control Flags :</i> GBM IL DSE --Y -- -- <i>Subsch. ID : 20</i> <i>Det. descr. : TC(8,1) - mSTR unhealthy defSGM</i> | ACYH9109 Enable 86 Disable 86 | |
| 6 | | Verify health status of STR Main | | Next Step: 7 |
| 6.1 | | STR main = STR1? | | <input type="checkbox"/> |
| | | Verify Telemetry Curr STR in use AES18002 | = STR 1 | AND=ZAA01999 |
| 6.2 | | Check health status of STR1 | | <input type="checkbox"/> |
| | | Verify Telemetry STR1 Health Sts AES31002 | = Unhealthy | AND=ZAA02999 |
| 6.3 | | STR main = STR2? | | <input type="checkbox"/> |
| | | Verify Telemetry Curr STR in use AES18002 | = STR 2 | AND=ZAA01999 |
| 6.4 | | Check health status of STR2 | | <input type="checkbox"/> |
| | | OR Verify Telemetry STR2 Health Sts AES32002 | = Unhealthy | AND=ZAA02999 |
| 7 | | Command STR Main to standby | | Next Step: 8 |

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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|------|---|-----------|-----------------|
| | | Execute Telecommand <p style="text-align: center;">STRmain STAND_BY</p> 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> STRCfG Data WrD AHFX9001 0 <dec> TC Control Flags : <p style="text-align: center;">GBM IL DSE</p> <p style="text-align: center;">--Y -- ---</p> Subsch. ID : 20 Det. descr. : TC(8,1) Command STR config - STRmain STAND_BY | ACYHK109 | |
| | | <i>The stand-by command is used in the version which suppresses the SW load from EEPROM to RAM</i> | | |
| | | Execute Telecommand <p style="text-align: center;">Fire Cmd STR config</p> Command Parameter(s) : FireFun DF86Cmd AH8F1001 Enable 86 FireFun DD86Cmd AH8F2001 Enable 86 TC Control Flags : <p style="text-align: center;">GBM IL DSE</p> <p style="text-align: center;">--Y -- ---</p> Subsch. ID : 20 Det. descr. : TC(8,4) Fire Command - Fire Cmd STR config | ACZ4M109 | |
| | | Wait 40 seconds to allow STR mode to be updated in TM | | |
| | | Verify Telemetry <p style="text-align: center;">STRM Mode AEX04001</p> | = Standby | AND=ZAA05999 |
| 8 | | Command SW reset of STR Main without RAM update | | Next Step: 9 |

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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|------|--|----------|------------------|
| | | Execute Telecommand <p style="text-align: center;">STRmain SW RESET</p> 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 : <p style="text-align: right;">GBM IL DSE --Y -- ---</p> Subsch. ID : 20 Det. descr. : TC(8,1) Command STR config - STRmain SW RESET | ACYHH109 | |
| | | Execute Telecommand <p style="text-align: center;">Fire Cmd STR config</p> Command Parameter(s) : FireFun DF86Cmd AH8F1001 Enable 86 FireFun DD86Cmd AH8F2001 Enable 86 TC Control Flags : <p style="text-align: right;">GBM IL DSE --Y -- ---</p> Subsch. ID : 20 Det. descr. : TC(8,4) Fire Command - Fire Cmd STR config | ACZ4M109 | |
| | | <p>***** NOTE *****</p> <p>These TCs will result in the following set of events:</p> <ul style="list-style-type: none"> - AccBsw Event 5-2 (AccBsw Event 5-2 ACB Tx Failed) - AccAsw TM_5_1_16449 (Scv Error) - AccAsw TM_5_1_16405 (Fdir Str Command Check) - AccAsw TM_5_1_16450 (Scv Error Resolved) <p>This is a natural response of the ACC 1553 bus and can be ignored.</p> | | |
| | | <p>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.</p> | | |
| 9 | | Verify sensor status data | | Next Step: 10 |
| | | Wait 20 seconds to make sure the STR status is correctly reflected in TM after the commanded mode transition. | | |

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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|--|------|--|--------|------------------|
| <p>TC Seq. Name : HFA8PMMB (Patch EEPROM)</p> <p>TimeTag Type: Sub Schedule ID: <input type="checkbox"/></p> | | | | |
| 12 | | Execute STR EEPROM Patch & Dump (H_FCP_OBS_2810) | | Next Step: 13 |
| | | Execute Procedure: H_FCP_OBS_2810 Load STR OBS in EEPROM | | |
| | | <p>***** NOTE *****</p> <p>This procedure involves 3 key steps to:</p> <p>1) dump the selected range of EEPROM addresses from STRM using TC=ACZ7P109, which dumps a <u>minimum of 12 words</u></p> <p>2) patch a selected range of EEPROM addresses in... - STR1 using TC=ACZ1P109, or - STR2 using TC=ACZ2P109, or - STRM using TC=ACZ5P109, or - STRR using TC=ACZ6P109</p> <p>3) re-dump the selected range of EEPROM addresses from STRM using TC=ACZ7P109, which dumps a <u>minimum of 12 words</u></p> | | |
| 13 | | Command STR1 to SBM with RAM load | | Next Step: 16 |
| | | Load sequence HFA8PMMB on the Manual Stack and uplink in accordance with the following steps | | |
| | | Execute Telecommand | | |
| | | <p style="text-align: center;">STR1 STAND_BY</p> <p style="text-align: center;">ACZM3109</p> <p>Command Parameter(s) :</p> <pre> 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> </pre> | | |

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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|--|------|--|--|------------------|
| | | STRCfg Data Wrđ AHFX9001 STRCfg Data Wrđ AHFX9001 TC Control Flags : Subsch. ID : 20 Det. descr. : TC(8,1) Command STR config - STR1 STAND_BY GBM IL DSE --Y -- --- | 0 <dec> 0 <dec> | |
| | | Execute Telecommand Fire Cmd STR config Command Parameter(s) : FireFun DF86Cmd AH8F1001 FireFun DD86Cmd AH8F2001 TC Control Flags : Subsch. ID : 20 Det. descr. : TC(8,4) Fire Command - Fire Cmd STR config GBM IL DSE --Y -- --- | ACZ4M109 Enable 86 Enable 86 | |
| | | If the EEPROM has been patched, the contents of the RAM should be reloaded during transition to SBM | | |
| TC Seq. Name : HFA8PMMC (Patch RAM) TimeTag Type: Sub Schedule ID: <input type="checkbox"/> | | | | |
| 14 | | Execute STR RAM Patch & Dump (H_FCP_OBS_2824) | | Next Step: 15 |
| | | Execute Procedure: H_FCP_OBS_2824 Execute STR RAM memory patch and dump | | |
| | | ***** WARNING ***** This sequence has still to be developed | | |
| 15 | | Command STR to SBM without RAM load | | Next Step: 16 |
| | | Load sequence HFA8PMMC on the Manual Stack and uplink in accordance with the following steps | | |

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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|------|--|------------------|------------------|
| | | Verify Telemetry STRM Mode trans AEX02001 | = Cmd mode trans | AND=ZAA05999 |
| | | Verify Telemetry STRM 1errEEPROM AEX06001 | = No failure | AND=ZAA05999 |
| | | Verify Telemetry STRM PROM load AEX07001 | = No failure | AND=ZAA05999 |
| | | Verify Telemetry STRM 2err EEPRM AEX08001 | = No failure | AND=ZAA05999 |
| | | Verify Telemetry STRM ASIC RAM AEX0B001 | = No failure | AND=ZAA05999 |
| | | Verify Telemetry STRM timeout HK AEX0E001 | = No failure | AND=ZAA05999 |
| | | Verify Telemetry STRM timeoutEOF AEX0D001 | = No failure | AND=ZAA05999 |
| | | Verify Telemetry STRM lastTC sts AEX0G001 | = No failure | AND=ZAA05999 |
| | | Verify Telemetry STRM TECcurfail AEX11001 | = No failure | AND=ZAA05999 |
| | | Verify Telemetry STRM volt1 fail AEX14001 | = No failure | AND=ZAA05999 |
| | | Verify Telemetry STRM volt2 fail AEX13001 | = No failure | AND=ZAA05999 |
| | | Verify Telemetry 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 30 minutes.</i> | | |
| | | Verify Telemetry STRM opticTfail AEX15001 | = No failure | AND=ZAA05999 |
| | | Verify Telemetry STRM CCDt1fail AEX17001 | = No failure | AND=ZAA05999 |
| | | Verify Telemetry STRM CCDt2fail AEX16001 | = No failure | AND=ZAA05999 |
| | | Verify Telemetry STRM hlth summ AEX18001 | = No failure | AND=ZAA05999 |
| 17 | | Command STR main to AAD | | Next Step: 18 |

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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|-------------------------|----------------------|---|----------|-------------------|
| | ET=+00.03.00 UT=+ | Execute Telecommand En STR reconfiguration Command Parameter(s) : EnaRcf DF86Cmd AH8E3001 Enable 86 EnaRcf DD86Cmd AH8E4001 Enable 86 TC Control Flags : GBM IL DSE --Y -- -- Subsch. ID : 20 Det. descr. : TC(8,1) - Enable reconfiguration - En STR reconfiguration | ACZGN109 | |
| 20 | | Delete sequence HFA8PMMB+D from the MTL | | Next Step: 21 |
| | | <p>***** WARNING *****</p> <p>If timetagged versions of these TCs were uplinked to the MTL, deleted them now via procedure: H_FCP_DHS_3024 (Steps 10-13)</p> <p><u>ALTERNATIVELY</u></p> <p>Request the Spacon to delete the TCs from the MTL</p> | | |
| | | Execute Procedure: H_FCP_DHS_3024 Normal MTL maintenance | | |
| 21 | | Update Spacecraft Velocity in STRM (H_FCP_AOC_4S41) | | Next Step: END |
| | | <p>***** NOTE *****</p> <p>Commanding the STR to Stand-by with a RAM load from EEPROM in Step 13 overwrites the current Spacecraft Velocity Vector (SVV) values with zeros. These values must therefore be re-written via a TPF=SVV provided by Flight Dynamics, which should be delivered along with the TPF=DPT.</p> | | |
| | | Execute Procedure: H_FCP_AOC_4S41 Update S/C orbital velocity in STR | | |
| End of Procedure | | | | |