

Pacs\_LoadDpuObsw\_Rescue\_Redundant  
 File: H\_FCP\_PAC\_RRDM.xls  
 Author: R. Biggins



## Procedure Summary

### Objectives

The objective of this procedure is to load a new OBSW for the redundant DPU via rescue mode

- Switch to PACS bus profile
- Disable SDB FDIR for PACS RTA
- Disable SDB FDIR for whole spacecraft
- Enable RT interrogations for PACS RTA
- Power on nominal DPU
- Enable SDB FDIR for whole spacecraft
- Disable TFL-TM/TC FDIR for PACS RTA
- Load new OBSW using H\_FCP\_OBS\_4112
- Boot new ASW
- Enable TFL-TM/TC FDIR for PACS RTA
- Write new OBSW to EEPROM
- Disable RT interrogations for PACS RTA
- Power off redundant DPU

Based on procedure:  
 Pacs\_LoadDpuObsw\_Rescue\_Redundant\_05\_10\_2007

### Summary of Constraints

PACS has been switched off for at least 4 minutes.

This procedure is valid to load the DPU OBSW version 9.03

### Spacecraft Configuration

**Start of Procedure**

- PACS is OFF
- All PACS units powered OFF
  - UIU table shows PACS units OFF

**End of Procedure**

- PACS is OFF
- All PACS units powered OFF
  - UIU table shows PACS units OFF

### Reference File(s)

**Input Command Sequences**

**Output Command Sequences**

HFPRRDM

### Referenced Displays

ANDs      GRDs      SLDs  
 ZAZ9B999

### Configuration Control Information

| DATE | FOP ISSUE | VERSION | MODIFICATION DESCRIPTION | AUTHOR | SPR REF |
|------|-----------|---------|--------------------------|--------|---------|
|------|-----------|---------|--------------------------|--------|---------|

Status : Version 10 - Unchanged  
 Last Checkin: 31/03/09

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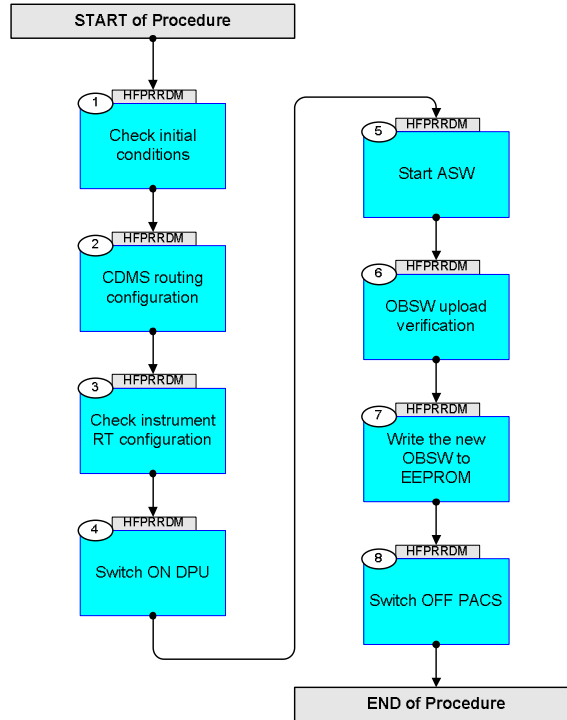


|          |     |       |   |            |  |
|----------|-----|-------|---|------------|--|
| 20/09/07 |     | 1     | Created   | R. Biggins |  |
| 22/11/07 |     | 2     | - Time tags added to SVM commands<br>- FDIR updated to be disabled throughout procedure<br>- Editorial updates  | R. Biggins |  |
| 03/12/07 |     | 3     | TC and TM updated for DPU UM v2.8<br>Editorial updates  | R. Biggins |  |
| 22/01/08 |     | 4     | Update due to initial testing against the simulator:<br>- TCs updated due to new DB<br>- Bus profile selection TC added<br>- Execution times removed  | R. Biggins |  |
| 03/03/08 |     | 5     | Update due to testing against MOC Simulator and comments by S. Pezzuto:<br>- Editorial updates  | R. Biggins |  |
| 03/03/08 |     | 6     |   | R. Biggins |  |
| 27/05/08 | 1   | 7     | Updates due to SVT-1 testing:<br>- TC to start RT interrogations updated (step 4.3)<br>- TC to enable FDIR moved from step 8.3 to step 4.5<br>- Expected LCL currents updated<br>- Comments added/updated<br>- Flags updated<br>- AND updated for all TM parameters | R. Biggins |  |
| 23/10/08 | 2   | 8     | Updates due to new procedures from industry<br>- Step 4.2 and 4.3 combined<br>- TC DC005161 database definition updated   | R. Biggins |  |
| 18/03/09 | 2.2 | 9     | Final updates before flight<br>- Summary updated<br>- TC flags updated<br>- Procedure description/title updated<br>- Memory checks updated to reflect current software versions   | R. Biggins |  |
| 31/03/09 |     | 10    | Update to ensure that the TFL-TM/TC FDIR is disabled during the memory load.  | R. Biggins |  |
| 17/04/09 | 2.3 | 10.01 | Validation : Editorial updates due to comments from project/industry  | 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 : HFPRRDM (Load DPU - Res (Red))<br><br>TimeTag Type: N<br>Sub Schedule ID:<br><br><input type="checkbox"/> |      |   |        |                          |
| 1  |      | Check initial conditions  |        | Next Step:<br>2          |
|  |      | Verify: Redundant PACS units have been switched off for at least 4 minutes  |        |                          |
| 1.1  |      | PACS input  |        | <input type="checkbox"/> |
|  |      | Verify that the PACS ICC has indicated whether the software should be written to the primary or secondary partition of the EEPROM (step 7)<br><br>WRITE_PN = 1 or 2 |        |                          |
|  |      | Verify that the correct information has been supplied by the ICC:<br><br>Software Image (verify with OBSM engineer)<br>Software Version/Subversion number (step 7)  |        |                          |
|  |      | The FP NR_WORDS should be set as follows (see step 7):<br><br>DPU OBSW v9.03 = 10CC1  |        |                          |
| 1.2  |      | Spacecraft mode   |        | <input type="checkbox"/> |
|  |      | Verify Telemetry<br><br>CurrentMode DEL34170 = Nominal  |        | AND=ZAZ9B999             |
|  |      | Verify Telemetry<br><br>ACC_A_MODE AEE8G050 = Nominal   |        | AND=ZAZ9B999             |
| 1.3  |      | Bus status  |        | <input type="checkbox"/> |
|  |      | Verify Bus configuration  |        |                          |
|  |      | Verify: Active 1553 bus<br>Active_Bus_A_B DEFJ1160 = BUS_A  |        | AND=ZAZ9B999             |
|  |      | Verify: 1553 bus FDIR status<br>SDB_FDIR DEFJ4160 = ENABLED   |        | AND=ZAZ9B999             |
|  |      | Verify: SDB handling status<br>BSW_SDB_ENAB DEF60160 = ENABLED  |        | AND=ZAZ9B999             |

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| Step No. | Time                 | Activity/Remarks  | TC/TLM           | Display/ Branch          |
|----------|----------------------|---|------------------|--------------------------|
|          |                      | Verify bus health status  |                  |                          |
|          |                      | Verify: Bus (side A) health status<br><b>BusA_HealthySts</b> <b>DEFJ2160</b>  | <b>= Healthy</b> | AND=ZAZ9B999             |
|          |                      | Verify: Bus (side B) health status<br><b>BusB_HealthySts</b> <b>DEFJ3160</b>  | <b>= Healthy</b> | AND=ZAZ9B999             |
| 1.4      |                      | Redundant instrument LCLs   |                  | <input type="checkbox"/> |
|          |                      | Verify: DPU LCL status<br><b>PacsD_R_L42_S</b> <b>WM42B565</b>  | <b>= OFF</b>     | AND=ZAZ9B999             |
|          |                      | Verify: SPU LCL status<br><b>PacsS_R_L36_S</b> <b>WM62A565</b>  | <b>= OFF</b>     | AND=ZAZ9B999             |
|          |                      | Verify: BOLC LCL status<br><b>PacsB_R_L28_1S</b> <b>WM32D565</b>  | <b>= OFF</b>     | AND=ZAZ9B999             |
|          |                      | Verify: Dec/Mec2 LCL status<br><b>PacsMec2_L69_1S</b> <b>WM62E565</b>   | <b>= OFF</b>     | AND=ZAZ9B999             |
| 1.5      |                      | Nominal instrument LCLs   |                  | <input type="checkbox"/> |
|          |                      | Verify: DPU LCL status<br><b>PacsD_N_L41_S</b> <b>WM72B565</b>  | <b>= OFF</b>     | AND=ZAZ9B999             |
|          |                      | Verify: SPU LCL status<br><b>PacsS_N_L35_S</b> <b>WM52A565</b>  | <b>= OFF</b>     | AND=ZAZ9B999             |
|          |                      | Verify: BOLC LCL status<br><b>PacsB_N_L27_1S</b> <b>WM82D565</b>  | <b>= OFF</b>     | AND=ZAZ9B999             |
|          |                      | Verify: Dec/Mec1 LCL status<br><b>PacsMec1_L65_1S</b> <b>WM52E565</b>   | <b>= OFF</b>     | AND=ZAZ9B999             |
| 2        |                      | CDMS routing configuration  |                  | Next Step:<br>3          |
|          | ET=+<br>UT=+00.00.00 | Execute Telecommand<br><b>RepDownlinkTMStorage</b><br><br>TC Control Flags :<br><br>Subsch. ID : 10<br>Det. descr. : Report Telemetry Packets Down-linking/<br>Storage Status | <b>DC141160</b>  |                          |

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| Step No. | Time | Activity/Remarks   | TC/TLM | Display/ Branch          |
|----------|------|--|--------|--------------------------|
|          |      | It should be verified that telemetry packets for ALL PACS Redundant APIDs should be transmitted to ground (Transmit_Flag = ENABLED) EXCEPT for TM(21,x) which should be stored in the SSMM (Storage_Flag = ENABLED, Transmit_Flag = DISABLED).<br><br>This should be verified on the VPD |        |                          |
|          |      | Verify Packet Reception<br><b>Telemetry Packets DownLinking-Storage Status Report (14,7)-1400</b><br>Packet Details:<br>APID:      16<br>Type:      14<br>Subtype:   7<br>PI1:<br>PI2:   |        |                          |
| 3        |      | Check instrument RT configuration  |        | Next Step:<br>4          |
| 3.1      |      | Remote Terminal configuration  |        | <input type="checkbox"/> |
|          |      | Verify Telemetry<br>PACS_VitalNonV                  DED5G161                  = NonVital   |        | AND=ZAZ9B999             |
|          |      | Verify Telemetry<br>PACS_TmRetry                  DED5Z161                  = ON   |        | AND=ZAZ9B999             |
| 3.2      |      | Remote Terminal Status   |        | <input type="checkbox"/> |
|          |      | Redundant units  |        |                          |
|          |      | Verify Telemetry<br>PACSB_OnOff                  DED31161                  = OFF   |        | AND=ZAZ9B999             |
|          |      | Verify Telemetry<br>PACSB_DeadAliv                  DED32161                  = Alive  |        | AND=ZAZ9B999             |
|          |      | Verify Telemetry<br>PACSB_WellsiTC                  DED33161                  = Well   |        | AND=ZAZ9B999             |
|          |      | Verify Telemetry<br>PACSB_WellsiTM                  DED34161                  = Well   |        | AND=ZAZ9B999             |
|          |      | Verify Telemetry<br>PACSB_ValidInv                  DED35161                  = Invalid  |        | AND=ZAZ9B999             |
|          |      | Nominal units  |        |                          |
|          |      | Verify Telemetry<br>PACSA_OnOff                  DED2G161                  = OFF   |        | AND=ZAZ9B999             |
|          |      | Verify Telemetry<br>PACSA_DeadAliv                  DED2H161                  = Alive  |        | AND=ZAZ9B999             |
|          |      | Verify Telemetry<br>PACSA_WellsiTC                  DED2Z161                  = Well   |        | AND=ZAZ9B999             |

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| Step No. | Time                 | Activity/Remarks  | TC/TLM  | Display/ Branch          |
|----------|----------------------|---|---|--------------------------|
|          |                      | Verify Telemetry<br>PACSA_WellsiTM DED2J161   | = Well  | AND=ZAZ9B999             |
|          |                      | Verify Telemetry<br>PACSA_ValidInv DED2K161   | = Invalid   | AND=ZAZ9B999             |
| 4        |                      | Switch ON DPU   |   | Next Step:<br>5          |
|          |                      | <b>WARNING:</b> Before proceeding, the OBSM engineer should insert the memory load commands after the TC (DC05161) to disable the TFL-TM/TC FDIR. These should be uplinked automatically with the TC to <b>FORCE BOOT (DPU_LLSW_LOAD_TC_BOOT, step 5) set to automatically execute</b> after the last memory load TC. |   |                          |
| 4.1      |                      | Set Bus Profile   |   | <input type="checkbox"/> |
|          | ET=+<br>UT=+00.00.00 | Execute Telecommand<br>SelectActiveSCBP<br>Command Parameter(s) :<br>SCBP DH049160<br>TC Control Flags :<br>GBM IL DSE<br>--Y -- --<br>Subsch. ID : 10<br>Det. descr. : Select Active SCBP from SCBP Table  | DC819160<br>SCBP_04   |                          |
|          |                      | Verify: Bus profile<br>BSW_SDB_ActProf DEF5F160   | = 4 <dec>   | AND=ZAZ9B999             |
| 4.2      |                      | Disable SDB FDIR and enable RT interrogations   |   | <input type="checkbox"/> |
|          |                      | <b>NOTE:</b><br>The following TC acts in the following order:<br>- disables the SDB FDIR for the whole spacecraft<br>- updates the RTA status   |   |                          |
|          | ET=+<br>UT=+00.00.00 | Execute Telecommand<br>ConfiguresDBFDIR<br>Command Parameter(s) :<br>RTA DH011161<br>M0 DH030161<br>M1 DH031161<br>M2 DH032161<br>M3 DH033161<br>M4 DH034161<br>M5 DH035161<br>M6 DH036161<br>M7 DH037161<br>F0 DH018161<br>F1 DH019161   | DC005161<br>PACS B<br>Update status<br>Ignore Flag<br>Ignore Flag<br>Ignore Flag<br>Update status<br>Ignore Flag<br>Update status<br>Ignore Flag<br>ON<br>Alive |                          |

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| Step No. | Time                 | Activity/Remarks  | TC/TLM   | Display/ Branch          |
|----------|----------------------|---|--|--------------------------|
|          |                      | F2 DH020161<br>F3 DH021161<br>F4 DH022161<br>F5 DH023161<br>F6 DH024161<br>F7 DH025161<br>M12 DH051161<br>M_C DH043161<br>M8 DH038161<br>M9 DH039161<br>M10 DH040161<br>M11 DH041161<br>F12 DH050161<br>CNT DH042161<br>F8 DH026161<br><br>F9 DH027161<br>F10 DH028161<br>F11 DH029161<br><br>TC Control Flags :<br><br>Subsch. ID : 10<br>Det. descr. : Configure SDB FDIR<br><br>GBM IL DSE<br>--Y -- --- | Well TC<br>Well TM<br>Valid<br>Non-vital<br>NOMINAL<br>ON<br>Ignore Flag<br>Ignore CNT<br>Ignore Flag<br>Ignore Flag<br>Ignore Flag<br>Update status<br>ENABLED<br>LoopCnt1<br>Bus A<br><br>Healthy<br>Healthy<br>DISABLED |                          |
|          |                      | Wait up to 1 minute for the generation of the D_H_Hk_P64 packet from the CDMU (APID = 18)   |  |                          |
|          |                      | Verify: 1553 bus FDIR status<br>SDB_FDIR DEFJ4160   | = DISABLED   | AND=ZAZ9B999             |
|          |                      | Verify Telemetry<br>PACS_NomRed DED5H161  | = REDUNDANT  | AND=ZAZ9B999             |
|          |                      | Verify Telemetry<br>PACSB_OnOff DED31161  | = ON   | AND=ZAZ9B999             |
|          |                      | Verify Telemetry<br>PACSB_ValidInv DED35161   | = Valid  | AND=ZAZ9B999             |
| 4.3      |                      | Switch on DPU LCL   |  | <input type="checkbox"/> |
|          |                      | Switching ON the DPU LCL will initialise BSW. This will initially execute memory checks (failures will generate TM(5,4) packets) and then generate TM(5,1) [EVENT_REPORT_3_32776] packets every 10 seconds.   |  |                          |
|          | ET=+<br>UT=+00.00.00 | Execute Telecommand<br>SwOn_PacsD_R_L42<br><br>TC Control Flags :<br><br>Subsch. ID : 10<br>Det. descr. : PCDU: TC(8,4,112,5) PACS DPU Red - switch LCL_42 on<br><br>GBM IL DSE<br>--Y -- ---   | DC42D170   |                          |
|          |                      | Verify: DPU LCL status<br>PacsD_R_L42_S WM42B565  | = ON   | AND=ZAZ9B999             |



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| Step No. | Time                 | Activity/Remarks  | TC/TLM           | Display/ Branch          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
|----------|----------------------|---|------------------|--------------------------|---------|-----|----------|-------------|-----|----------|-------------|----|----------|-------------|----|----------|-------------|----|----------|-------------|-----|----------|---------------|-----|----------|---------------|----|----------|-------------|----|----------|-------------|-----|----------|-------------|-----------------|----------|---------------|-----|----------|----------|-----|----------|----------|----|----------|-------|--|--|
|          |                      | Verify: DPU LCL current (+/- 0.1A)<br><b>PacsD_R_L42_I</b> <b>WM407565</b>  | <b>= 0.49 A</b>  | AND=ZAZ9B999             |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| 4.4      |                      | <i>Enable SDB FDIR and disable TFL-TM/TC FDIR</i>   |                  | <input type="checkbox"/> |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
|          |                      | <b>NOTE:</b><br>The following TC acts in the following order:<br>- enables the SDB FDIR for the whole spacecraft<br>- disables the TFL-TM/TC FDIR for the PACS RTA  |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
|          | ET=+<br>UT=+00.00.02 | Execute Telecommand<br><br><b>ConfiguresSDBFDIR</b><br><br>Command Parameter(s) :<br><br><table style="margin-left: 40px;"> <tr><td>RTA</td><td>DH011161</td><td>PACS B</td></tr> <tr><td>M0</td><td>DH030161</td><td>Ignore Flag</td></tr> <tr><td>M1</td><td>DH031161</td><td>Ignore Flag</td></tr> <tr><td>M2</td><td>DH032161</td><td>Ignore Flag</td></tr> <tr><td>M3</td><td>DH033161</td><td>Ignore Flag</td></tr> <tr><td>M4</td><td>DH034161</td><td>Ignore Flag</td></tr> <tr><td>M5</td><td>DH035161</td><td>Ignore Flag</td></tr> <tr><td>M6</td><td>DH036161</td><td>Update status</td></tr> <tr><td>M7</td><td>DH037161</td><td>Ignore Flag</td></tr> <tr><td>F0</td><td>DH018161</td><td>ON</td></tr> <tr><td>F1</td><td>DH019161</td><td>Alive</td></tr> </table>   | RTA              | DH011161                 | PACS B  | 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 | Update status | M7 | DH037161 | Ignore Flag | F0 | DH018161 | ON          | F1  | DH019161 | Alive       | <b>DC005161</b> |          |               |     |          |          |     |          |          |    |          |       |  |  |
| RTA      | DH011161             | PACS B  |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| 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             | Update status   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| M7       | DH037161             | Ignore Flag   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| F0       | DH018161             | ON  |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| F1       | DH019161             | Alive   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
|          |                      | <table style="margin-left: 40px;"> <tr><td>F2</td><td>DH020161</td><td>Well TC</td></tr> <tr><td>F3</td><td>DH021161</td><td>Well TM</td></tr> <tr><td>F4</td><td>DH022161</td><td>Valid</td></tr> <tr><td>F5</td><td>DH023161</td><td>Non-vital</td></tr> <tr><td>F6</td><td>DH024161</td><td>NOMINAL</td></tr> <tr><td>F7</td><td>DH025161</td><td>ON</td></tr> <tr><td>M12</td><td>DH051161</td><td>Update status</td></tr> <tr><td>M_C</td><td>DH043161</td><td>Ignore CNT</td></tr> <tr><td>M8</td><td>DH038161</td><td>Ignore Flag</td></tr> <tr><td>M9</td><td>DH039161</td><td>Ignore Flag</td></tr> <tr><td>M10</td><td>DH040161</td><td>Ignore Flag</td></tr> <tr><td>M11</td><td>DH041161</td><td>Update status</td></tr> <tr><td>F12</td><td>DH050161</td><td>DISABLED</td></tr> <tr><td>CNT</td><td>DH042161</td><td>LoopCnt1</td></tr> <tr><td>F8</td><td>DH026161</td><td>Bus A</td></tr> </table> | F2               | DH020161                 | Well TC | F3  | DH021161 | Well TM     | F4  | DH022161 | Valid       | F5 | DH023161 | Non-vital   | F6 | DH024161 | NOMINAL     | F7 | DH025161 | ON          | M12 | DH051161 | Update status | M_C | DH043161 | Ignore CNT    | M8 | DH038161 | Ignore Flag | M9 | DH039161 | Ignore Flag | M10 | DH040161 | Ignore Flag | M11             | DH041161 | Update status | F12 | DH050161 | DISABLED | CNT | DH042161 | LoopCnt1 | F8 | DH026161 | Bus A |  |  |
| F2       | DH020161             | Well TC   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| F3       | DH021161             | Well TM   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| F4       | DH022161             | Valid   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| F5       | DH023161             | Non-vital   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| F6       | DH024161             | NOMINAL   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| F7       | DH025161             | ON  |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| M12      | DH051161             | Update status   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| M_C      | DH043161             | Ignore CNT  |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| M8       | DH038161             | Ignore Flag   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| M9       | DH039161             | Ignore Flag   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| M10      | DH040161             | Ignore Flag   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| M11      | DH041161             | Update status   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| F12      | DH050161             | DISABLED  |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| CNT      | DH042161             | LoopCnt1  |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| F8       | DH026161             | Bus A   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
|          |                      | <table style="margin-left: 40px;"> <tr><td>F9</td><td>DH027161</td><td>Healthy</td></tr> <tr><td>F10</td><td>DH028161</td><td>Healthy</td></tr> <tr><td>F11</td><td>DH029161</td><td>ENABLED</td></tr> </table><br>Subsch. ID : 10<br>Det. descr. : Configure SDB FDIR  | F9               | DH027161                 | Healthy | F10 | DH028161 | Healthy     | F11 | DH029161 | ENABLED     |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| F9       | DH027161             | Healthy   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| F10      | DH028161             | Healthy   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| F11      | DH029161             | ENABLED   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
|          |                      | Wait up to 1 minute for the generation of the D_H_Hk_P64 packet from the CDMU (APID = 18)   |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
|          |                      | Verify: 1553 bus FDIR status<br><b>SDB_FDIR</b> <b>DEFJ4160</b>   | <b>= ENABLED</b> | AND=ZAZ9B999             |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
| 4.5      |                      | <i>Load OBSW</i>  |                  | <input type="checkbox"/> |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |
|          |                      | OBSM engineer to execute the commands generated in the procedure <b>H_FCP_OBS_4112</b> .  |                  |                          |         |     |          |             |     |          |             |    |          |             |    |          |             |    |          |             |     |          |               |     |          |               |    |          |             |    |          |             |     |          |             |                 |          |               |     |          |          |     |          |          |    |          |       |  |  |

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| Step No. | Time                 | Activity/Remarks  | TC/TLM   | Display/ Branch          |
|----------|----------------------|---|--|--------------------------|
|          |                      | The OBSM procedure will generate a saved stack file and uplink the load commands to PACS. It will also verify that the load is successful by checksum verification of the on-board image.                                   |  |                          |
| 5        |                      | Start ASW   |  | Next Step:<br>6          |
|          | ET=+<br>UT=+00.00.15 | DPU_LLSW_LOAD_TC_BOOT<br><br>Subsch. ID : 90<br>Det. descr. : LOAD THE OBS FROM DATA MEMORY TO PROGRAM MEMORY AND BOOT  | DPU_LLSW_LOAD_TC_BOOT<br><br>PC031380  |                          |
|          |                      | Verify: The following <b>TM(3,25)</b> packets should be generated:<br><br>PACS_essential_HK (APID 1153)<br>PACS_NO_PRIME_HK (APID 1155)   |  |                          |
|          |                      | The following version check should ensure that the expected software version is running.  |  |                          |
|          |                      | Verify Telemetry<br>DP_SW_VERS_ID PM050380  | Version  | AND=ZAZ9B999             |
|          |                      | Verify Telemetry<br>DP_SW_SUBVERS_ID PM051380   | Subversion   | AND=ZAZ9B999             |
| 5.1      |                      | Enable TFL-TM/TC FDIR   |  | <input type="checkbox"/> |
|          | ET=+<br>UT=+00.00.00 | Execute Telecommand<br><br>Command Parameter(s) :<br><br>RTA DH011161<br>M0 DH030161<br>M1 DH031161<br>M2 DH032161<br>M3 DH033161<br>M4 DH034161<br>M5 DH035161<br>M6 DH036161<br>M7 DH037161<br>F0 DH018161<br>F1 DH019161 | ConfigureSDBFDIR<br><br>DC005161<br><br>PACS B<br>Ignore Flag<br>Ignore Flag<br>Ignore Flag<br>Ignore Flag<br>Ignore Flag<br>Ignore Flag<br>Ignore Flag<br>Ignore Flag<br>OFF<br>Alive |                          |

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| Step No. | Time                 | Activity/Remarks   | TC/TLM  | Display/ Branch |
|----------|----------------------|--|---|-----------------|
|          |                      | F2 DH020161<br>F3 DH021161<br>F4 DH022161<br>F5 DH023161<br>F6 DH024161<br>F7 DH025161<br>M12 DH051161<br>M_C DH043161<br>M8 DH038161<br>M9 DH039161<br>M10 DH040161<br>M11 DH041161<br>F12 DH050161<br>CNT DH042161<br>F8 DH026161  | Well TC<br>Well TM<br>Invalid<br>Vital<br>NOMINAL<br>OFF<br>Update status<br>Ignore CNT<br>Ignore Flag<br>Ignore Flag<br>Ignore Flag<br>Ignore Flag<br>ENABLED<br>LoopCnt1<br>Bus A |                 |
|          |                      | F9 DH027161<br>F10 DH028161<br>F11 DH029161<br><br>TC Control Flags :<br><br>Subsch. ID : 10<br>Det. descr. : Configure SDB FDIR<br><br>GBM IL DSE<br>--Y -- ---   | Healthy<br>Healthy<br>ENABLED   |                 |
| 6        |                      | OBSW upload verification   |   | Next Step:<br>7 |
|          |                      | The following checks will verify the contents of the DPU Program Memory (RAM)  |   |                 |
|          |                      | For PACS DPU OBSW v9.03:<br><br>CHECKSUM1 = 2411<br>CHECKSUM2 = 23A2   |   |                 |
|          | ET=+<br>UT=+00.00.03 | DPU_MEMORY_CHECK<br><br>Command Parameter(s) :<br>DPU_MEMORY_BLOCK_ID PP009380<br>DPU_MEMORY_ADDR PP003380<br>DPU_DATA_LENGTH PP008380<br><br>TC Control Flags :<br><br>Subsch. ID : 90<br>Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA<br><br>GBM IL DSE<br>--Y -- --- | PC029380<br><br>100 <hex><br>4000 <hex><br>5457 <dec>   |                 |
|          |                      | Verify: DPU memory checksum<br>CHECKSUM PM132380   | CHECKSUM1   | AND=ZAZ9B999    |

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| Step No. | Time                 | Activity/Remarks  | TC/TLM   | Display/ Branch   |
|----------|----------------------|---|--|-------------------|
|          | ET=+<br>UT=+00.00.01 | DPU_MEMORY_CHECK<br><br>DPU_MEMORY_CHECK<br><br>Command Parameter(s) :<br>DPU_MEMORY_BLOCK_ID      PP009380<br>DPU_MEMORY_ADDR            PP003380<br>DPU_DATA_LENGTH            PP008380<br><br>TC Control Flags :<br><br>GBM IL DSE<br>--Y -- ---<br><br>Subsch. ID : 90<br>Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA   | PC029380<br><br>100 <hex><br>5551 <hex><br>65535 <dec>   |                   |
|          |                      | Verify: DPU memory checksum<br><br>CHECKSUM                    PM132380   | CHECKSUM2  | AND=ZAZ9B999      |
| 7        |                      | Write the new OBSW to EEPROM  |  | Next Step:<br>8   |
|          |                      | <b>WARNING:</b> The relevant authority (TBD) should be informed that the DPU EEPROM is being written to in order to monitor the total number of write cycles as the EEPROM has only a limited number of cycles.   |  |                   |
|          |                      | The NR_WORDS FP should be set as follows:<br><br>DPU OBSW v9.03 = 10CC1   |  |                   |
|          | ET=+<br>UT=+00.00.00 | Execute Telecommand<br><br>DPU_START_OBCP<br><br>Command Parameter(s) :<br>PROCEDURE_ID            PP012380<br>NUMBER_OF_TIMES        PP010380<br>PAR_ID                    PP011380<br>PAR_VALUE                PP017380<br>PAR_ID                    PP011380<br>PAR_VALUE                PP017380<br>PAR_ID                    PP011380<br>PAR_VALUE                PP017380<br>PAR_ID                    PP011380<br>PAR_VALUE                PP017380<br>PAR_ID                    PP011380<br>PAR_VALUE                PP017380<br>PAR_ID                    PP011380 | PC012380<br><br>WRITE_IN_EEPROM<br>5 <dec><br>1 <dec><br>4000 <hex><br>2 <dec><br>NR_WORDS<br>3 <dec><br>WRITE_PN<br>4 <dec><br>426116354 <dec><br>5 <dec> |                   |
|          |                      | PAR_VALUE                    PP017380<br><br>TC Control Flags :<br><br>GBM IL DSE<br>--Y -- ---<br><br>Subsch. ID : 90<br>Det. descr. : START AN OBCP WITH THE COMMANDED PARAMETERS   | 0 <dec>  |                   |
| 8        |                      | Switch OFF PACS   |  | Next Step:<br>END |

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| Step No. | Time                 | Activity/Remarks   | TC/TLM   | Display/ Branch          |
|----------|----------------------|--|--|--------------------------|
| 8.1      |                      | Stop the instrument RT interrogation   |  | <input type="checkbox"/> |
|          | ET=+<br>UT=+00.00.00 | Execute Telecommand<br><br>ConfigureSDBFDIR<br><br>Command Parameter(s) :<br><br>RTA           DH011161<br>M0            DH030161<br>M1            DH031161<br>M2            DH032161<br>M3            DH033161<br>M4            DH034161<br>M5            DH035161<br>M6            DH036161<br>M7            DH037161<br>F0            DH018161<br>F1            DH019161                        | DC005161<br><br>PACS B<br>Update status<br>Ignore Flag<br>Ignore Flag<br>Ignore Flag<br>Update status<br>Ignore Flag<br>Ignore Flag<br>Ignore Flag<br>OFF<br>Alive     |                          |
|          |                      | F2            DH020161<br>F3            DH021161<br>F4            DH022161<br>F5            DH023161<br>F6            DH024161<br>F7            DH025161<br>M12           DH051161<br>M_C           DH043161<br>M8            DH038161<br>M9            DH039161<br>M10           DH040161<br>M11           DH041161<br>F12           DH050161<br>CNT           DH042161<br>F8            DH026161 | Well TC<br>Well TM<br>Invalid<br>Non-vital<br>NOMINAL<br>OFF<br>Ignore Flag<br>Ignore CNT<br>Ignore Flag<br>Ignore Flag<br>Ignore Flag<br>ENABLED<br>LoopCnt1<br>Bus A |                          |
|          |                      | F9            DH027161<br>F10           DH028161<br>F11           DH029161<br><br>TC Control Flags :<br><br>Subsch. ID : 10<br>Det. descr. : Configure SDB FDIR<br><br>GBM IL DSE<br>--Y -- ---  | Healthy<br>Healthy<br>ENABLED  |                          |
|          |                      | Wait up to 1 minute for the generation of the D_H_Hk_P64 packet from the CDMU (APID = 18)  |  |                          |
|          |                      | Verify Telemetry<br><br>PACSB_OnOff            DED31161  | = OFF  | AND=ZAZ9B999             |
|          |                      | Verify Telemetry<br><br>PACSB_ValidInv        DED35161   | = Invalid  | AND=ZAZ9B999             |
| 8.2      |                      | Switch off DPU LCL   |  | <input type="checkbox"/> |

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| Step No.                | Time                 | Activity/Remarks   | TC/TLM   | Display/ Branch |
|-------------------------|----------------------|--|----------|-----------------|
|                         | ET=+<br>UT=+00.00.00 | Execute Telecommand<br><br>SwOff_PacsD_R_L42<br><br><i>TC Control Flags :</i><br><br>GBM IL DSE<br>--Y -- --<br><br>Subsch. ID : 10<br>Det. descr. : PCDU: TC(8,4,112,3) PACS DPU Red -<br>switch LCL_42 off | DC42B170 |                 |
|                         |                      | Verify Telemetry<br><br>PacsD_R_L42_S                      WM42B565  | = OFF    | AND=ZAZ9B999    |
| <b>End of Procedure</b> |                      |  |          |                 |