

Check SPU software (Redundant)
 File: H_FCP_PAC_RCSM.xls
 Author: R. Biggins



Procedure Summary

Objectives

The objective of this procedure is to check the on-board software for the redundant SPU

- Enable RT interrogationd for PACS B
- Switch ON DPU
- Switch ON SPU
- Establish SPU-DPU links
- Execute SPU red and blue memory checks
- Check and verify EEPROM contents
- Copy HLSW (red and blue) to EEPROM
- Check and verufy SPU RAM contents
- Switch OFF PACS

Based on procedures:

Pacs_switch_On_Dpu_SPULLSW_Redundant_30_01_2007
 Pacs_Spu_MemCheck_All_13_8_05_10_2007
 PACS_Switch_Off_Redundant_28_07_2007

Summary of Constraints

PACS has been switched off for at least 4 minutes.

This procedure is valid for the SPU software version 13.96

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

HFPRCSM

Referenced Displays

ANDs GRDs SLDs
 ZAZ9A999

Configuration Control Information

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

Status : Version 7 - Unchanged
 Last Checkin: 20/03/09

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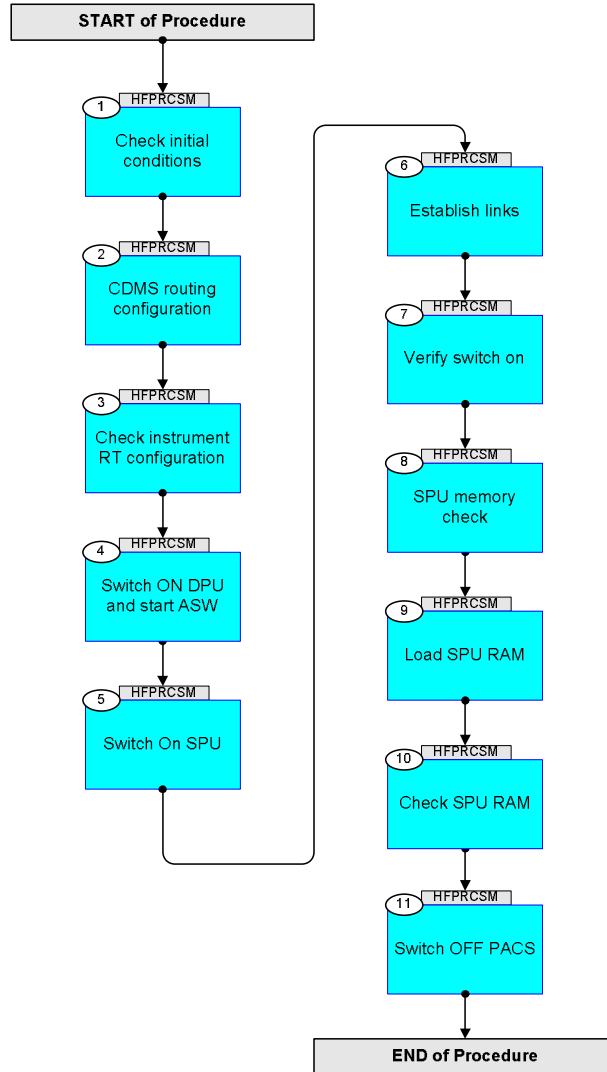


| | | | | | |
|----------|-----|------|---|------------|--|
| 20/09/07 | | 1 | Created | R. Biggins | |
| 22/11/07 | | 1.01 | Validation : - Time tags added to SVM commands - Editorial updates | R. Biggins | |
| 04/12/07 | | 2 | TC and TM updated for SPU UM v3.2.2, software version 13.8 | R. Biggins | |
| 21/01/08 | | 3 | Update due to initial testing against the simulator: - TCs updated due to new DB - Editorial updates | R. Biggins | |
| 03/03/08 | | 4 | Update due to testing against MOC Simulator and comments by S. Pezzuto: - Telecommand flags updated - Telemetry check added to step 6.2 - Editorial updates | R. Biggins | |
| 27/05/08 | 1 | 5 | Updates due to SVT-1 testing: - TC to start RT interrogations updated (step 4.3) - TC to enable FDIR moved from step 11.4 to step 4.5 - TC to disable RT interrogations moved to before LCL switch off - SPU memory check checksum values (EEPROM) moved to attachment - SPU memory check checksum values (RAM) moved to attachment - Expected LCL currents updated - Comments added/updated - Flags updated - AND updated for all TM parameters | R. Biggins | |
| 23/10/08 | 2 | 6 | Updates due to new procedures from industry - Step 4.2 and 4.3 combined - TC DC005161 database definition updated | R. Biggins | |
| 20/03/09 | 2.2 | 7 | Final updates before flight - Summary updated - TC flags updated - Memory checks updated to reflect current software versions | R. Biggins | |
| 17/04/09 | 2.3 | 7.01 | 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 |
|--|------|--|--------|-----------------|
| Beginning of Procedure | | | | |
| TC Seq. Name : HFPRCSM (Check SPU s/w (Red)) | | | | |
| TimeTag Type: N | | | | |
| Sub Schedule ID: | | | | |
| □ | | | | |
| 1 | | Check initial conditions | | Next Step: 2 |
| | | Verify: PACS has been switched off for at least 4 minutes | | |
| 1.1 | | PACS input | | □ |
| | | Verify that the PACS ICC has indicated whether the DPU is to be booted from the primary or secondary partition (step 4.4) DPU_PRTN = 1 or 2 | | |
| 1.2 | | Spacecraft mode | | □ |
| | | Verify Telemetry CurrentMode DEL34170 = Nominal | | AND=ZAZ9A999 |
| | | Verify Telemetry ACC_A_MODE AEE8G050 = Nominal | | AND=ZAZ9A999 |
| 1.3 | | Bus status | | □ |
| | | Verify Bus configuration | | |
| | | Verify: Active 1553 bus Active_Bus_A_B DEFJ1160 = BUS_A | | AND=ZAZ9A999 |
| | | Verify: 1553 bus FDIR status SDB_FDIR DEFJ4160 = ENABLED | | AND=ZAZ9A999 |
| | | Verify: SDB handling status BSW_SDB_ENAB DEF60160 = ENABLED | | AND=ZAZ9A999 |
| | | Verify bus health status | | |
| | | Verify: Bus (side A) health status BusA_HealthySts DEFJ2160 = Healthy | | AND=ZAZ9A999 |
| | | Verify: Bus (side B) health status BusB_HealthySts DEFJ3160 = Healthy | | AND=ZAZ9A999 |

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|----------|------|--|------------|--------------------------|
| 3 | | Check instrument RT configuration | | Next Step: 4 |
| 3.1 | | Remote Terminal configuration | | <input type="checkbox"/> |
| | | Verify Telemetry PACS_VitalNonV DED5G161 | = NonVital | AND=ZAZ9A999 |
| | | Verify Telemetry PACS_TmRetry DED5Z161 | = ON | AND=ZAZ9A999 |
| 3.2 | | Remote Terminal Status | | <input type="checkbox"/> |
| | | Redundant units | | |
| | | Verify Telemetry PACSB_OnOff DED31161 | = OFF | AND=ZAZ9A999 |
| | | Verify Telemetry PACSB_Dealiv DED32161 | = Alive | AND=ZAZ9A999 |
| | | Verify Telemetry PACSB_WellsiTC DED33161 | = Well | AND=ZAZ9A999 |
| | | Verify Telemetry PACSB_WellsiTM DED34161 | = Well | AND=ZAZ9A999 |
| | | Verify Telemetry PACSB_ValidInv DED35161 | = Invalid | AND=ZAZ9A999 |
| | | Nominal units | | |
| | | Verify Telemetry PACSA_OnOff DED2G161 | = OFF | AND=ZAZ9A999 |
| | | Verify Telemetry PACSA_Dealiv DED2H161 | = Alive | AND=ZAZ9A999 |
| | | Verify Telemetry PACSA_WellsiTC DED2Z161 | = Well | AND=ZAZ9A999 |
| | | Verify Telemetry PACSA_WellsiTM DED2J161 | = Well | AND=ZAZ9A999 |
| | | Verify Telemetry PACSA_ValidInv DED2K161 | = Invalid | AND=ZAZ9A999 |
| 4 | | Switch ON DPU and start ASW | | Next Step: 5 |
| 4.1 | | Set Bus Profile | | <input type="checkbox"/> |

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|----------|----------------------|---|--------------------------------|--------------------------|
| | | F9 DH027161 F10 DH028161 F11 DH029161 TC Control Flags : Subsch. ID : 10 Det. descr. : Configure SDB FDIR GBM IL DSE --Y -- --- | Healthy Healthy DISABLED | |
| | | Wait up to 1 minute for the generation of the D_Hk_P64 packet from the CDMU (APID = 18) | | |
| | | Verify: 1553 bus FDIR status SDB_FDIR DEFJ4160 | = DISABLED | AND=ZAZ9A999 |
| | | Verify Telemetry PACS_NomRed DED5H161 | = REDUNDANT | AND=ZAZ9A999 |
| | | Verify Telemetry PACSB_OnOff DED31161 | = ON | AND=ZAZ9A999 |
| | | Verify Telemetry PACSB_ValidInv DED35161 | = Valid | AND=ZAZ9A999 |
| 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=+ UT=+00.00.00 | Execute Telecommand SwOn_PacsD_R_L42 TC Control Flags : Subsch. ID : 10 Det. descr. : PCDU: TC(8,4,112,5) PACS DPU Red - switch LCL_42 on | DC42D170 | |
| | | Verify: DPU LCL status PacsD_R_L42_S WM42B565 | = ON | AND=ZAZ9A999 |
| | | Verify: DPU LCL current (+/- 0.1A) PacsD_R_L42_I WM407565 | = 0.49 A | AND=ZAZ9A999 |
| 4.4 | | DPU Force Boot | | <input type="checkbox"/> |
| | | Sending the FORCE_BOOT TC will generate a TM(5,1) [EVENT_REPORT_3_33041] packet from the BSW. | | |

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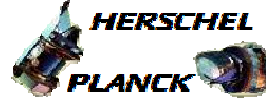
| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|----------------------|---|---|--------------------------|
| | ET=+ UT=+00.00.15 | DPU_LLSW_FORCE_BOOT DPU_LLSW_FORCE_BOOT Command Parameter(s) : DPU_STRUCTURE_ID PP002380 DPU_PARTITION PP267380 Subsch. ID : 90 Det. descr. : FORCE THE BOOT OF THE DPU LLSW FROM EEPROM | PC032380 1 <dec> (Def) DPU_PRTN | |
| | | Verify: The following TM(3,25) packets should be produced: PACS_essential_HK (APID 1153) PACS_NO_PRIME_HK (APID 1155) | | |
| 4.5 | | Re-enable SDB FDIR | | <input type="checkbox"/> |
| | ET=+ UT=+00.00.00 | Execute Telecommand ConfigureSDBFDIR Command Parameter(s) : 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 Ignore Flag M7 DH037161 Ignore Flag F0 DH018161 OFF F1 DH019161 Alive F2 DH020161 Well TC F3 DH021161 Well TM F4 DH022161 Invalid F5 DH023161 Non-vital F6 DH024161 NOMINAL F7 DH025161 OFF M12 DH051161 Ignore Flag M_C DH043161 Ignore CNT M8 DH038161 Ignore Flag M9 DH039161 Ignore Flag M10 DH040161 Ignore Flag M11 DH041161 Update status F12 DH050161 ENABLED CNT DH042161 LoopCnt1 F8 DH026161 Bus A F9 DH027161 Healthy F10 DH028161 Healthy F11 DH029161 ENABLED TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 10 Det. descr. : Configure SDB FDIR | DC005161 | |

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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|----------------------|--|-----------|--------------------------|
| | | Wait up to 1 minute for the generation of the D_Hk_P64 packet from the CDMU (APID = 18) | | |
| | | Verify: 1553 bus FDIR status SDB_FDIR DEFJ4160 | = ENABLED | AND=ZAZ9A999 |
| 5 | | Switch On SPU | | Next Step: 6 |
| | ET=+ UT=+00.00.00 | Execute Telecommand SwOn_PacsS_R_L36 TC Control Flags : GBM IL DSE --Y -- -- Subsch. ID : 10 Det. descr. : PCDU: TC(8,4,112,5) PACS SPU Red - switch LCL_36 on | DC36D170 | |
| | | Verify: SPU LCL status PacsS_R_L36_S WM62A565 | = ON | AND=ZAZ9A999 |
| | | Verify: SPU LCL current (+/- 0.1A) PacsS_R_L36_I WM606565 | = 0.4 A | AND=ZAZ9A999 |
| 6 | | Establish links | | Next Step: 7 |
| 6.1 | | DPU reset of 1355 | | <input type="checkbox"/> |
| | ET=+ UT=+00.00.28 | DPU_RESET_1355 DPU_RESET_1355 Subsch. ID : 90 Det. descr. : DPU RESET THE 1355 CHIP | PC025380 | |
| 6.2 | | DPU - SPU links | | <input type="checkbox"/> |
| | | WARNING: the following TCs must be sent with the exact time delay as defined | | |
| | | Sending this TC will generate the following TM(5,1) packets: EVENT_REPORT_5_28 - Unexp 1355 ACK EVENT_REPORT_0_14 - SPUS DEAD | | |

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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|----------------------|---|--|-----------------|
| | ET=+ UT=+00.00.10 | Initialise DPU - blue SPU links <p style="text-align: right;">DPU_START_OBCP</p> <i>Command Parameter(s) :</i> PROCEDURE_ID PP012380 NUMBER_OF_TIMES PP010380 PAR_ID PP011380 PAR_VALUE PP017380 PAR_ID PP011380 PAR_VALUE PP017380 <i>TC Control Flags :</i> <p style="text-align: right;">GBM IL DSE --Y -- ---</p> Subsch. ID : 90 Det. descr. : START AN OBCP WITH THE COMMANDED PARAMETERS | PC012380 START_1355_LINK 2 <dec> (Def) 1 <dec> 1 <dec> 2 <dec> 1 <dec> | |
| | | Sending this TC will generate the following TM(5,1) packets: EVENT_REPORT_5_28 - Unexp 1355 ACK EVENT_REPORT_0_10 - SPUL DEAD | | |
| | ET=+ UT=+00.00.04 | Initialise DPU - red SPU links <p style="text-align: right;">DPU_START_OBCP</p> <i>Command Parameter(s) :</i> PROCEDURE_ID PP012380 NUMBER_OF_TIMES PP010380 PAR_ID PP011380 PAR_VALUE PP017380 PAR_ID PP011380 PAR_VALUE PP017380 Subsch. ID : 90 Det. descr. : START AN OBCP WITH THE COMMANDED PARAMETERS | PC012380 START_1355_LINK 2 <dec> (Def) 1 <dec> 2 <dec> 2 <dec> 1 <dec> | |
| | | Verify Telemetry <p style="text-align: right;">DP_SPS_LINK PM020380</p> | = ON | AND=ZAZ9A999 |
| | | Verify Telemetry <p style="text-align: right;">DP_SPL_LINK PM021380</p> | = ON | AND=ZAZ9A999 |
| 6.3 | | SPU Memory self test: dump blue | | ☐ |

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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch | | | | | | | | | |
|---------------------|----------------------|---|---------------------|--------------------------|------------|-----------------|----------|---------|-----------------|----------|----------|----------|--|
| | ET=+ UT=+00.00.04 | <p>DPU_MEMORY_DUMP</p> <p style="text-align: right;">DPU_MEMORY_DUMP</p> <p>Command Parameter(s) :</p> <table border="0"> <tr> <td>DPU_MEMORY_BLOCK_ID</td> <td>PP009380</td> <td>5100 <hex></td> </tr> <tr> <td>DPU_MEMORY_ADDR</td> <td>PP003380</td> <td>0 <hex></td> </tr> <tr> <td>DPU_DATA_LENGTH</td> <td>PP008380</td> <td>17 <dec></td> </tr> </table> <p>TC Control Flags :</p> <p style="text-align: right;">GBM IL DSE --Y -- ---</p> <p>Subsch. ID : 90 Det. descr. : DUMP OF A DPU MEMORY AREA</p> | DPU_MEMORY_BLOCK_ID | PP009380 | 5100 <hex> | DPU_MEMORY_ADDR | PP003380 | 0 <hex> | DPU_DATA_LENGTH | PP008380 | 17 <dec> | PC028380 | |
| DPU_MEMORY_BLOCK_ID | PP009380 | 5100 <hex> | | | | | | | | | | | |
| DPU_MEMORY_ADDR | PP003380 | 0 <hex> | | | | | | | | | | | |
| DPU_DATA_LENGTH | PP008380 | 17 <dec> | | | | | | | | | | | |
| | | <p>Verify: The following TM(6,6) packet should be produced:</p> <p>PACS_MEMORY_DUMP (APID 1153)</p> | | | | | | | | | | | |
| | | <p>For PACS SPU OBSW v13.96:</p> <p>0x 0000 0001 0x 0007 FFFF 0x 0000 6823 0x 0000 6823</p> <p>Although the rest of the dump should be 0x0000 0000, it is not unexpected if it is not. This should be analysed by PACS offline</p> | | | | | | | | | | | |
| 6.4 | | SPU Memory self test: dump red | | <input type="checkbox"/> | | | | | | | | | |
| | ET=+ UT=+00.00.01 | <p>DPU_MEMORY_DUMP</p> <p style="text-align: right;">DPU_MEMORY_DUMP</p> <p>Command Parameter(s) :</p> <table border="0"> <tr> <td>DPU_MEMORY_BLOCK_ID</td> <td>PP009380</td> <td>7100 <hex></td> </tr> <tr> <td>DPU_MEMORY_ADDR</td> <td>PP003380</td> <td>0 <hex></td> </tr> <tr> <td>DPU_DATA_LENGTH</td> <td>PP008380</td> <td>17 <dec></td> </tr> </table> <p>TC Control Flags :</p> <p style="text-align: right;">GBM IL DSE --Y -- ---</p> <p>Subsch. ID : 90 Det. descr. : DUMP OF A DPU MEMORY AREA</p> | DPU_MEMORY_BLOCK_ID | PP009380 | 7100 <hex> | DPU_MEMORY_ADDR | PP003380 | 0 <hex> | DPU_DATA_LENGTH | PP008380 | 17 <dec> | PC028380 | |
| DPU_MEMORY_BLOCK_ID | PP009380 | 7100 <hex> | | | | | | | | | | | |
| DPU_MEMORY_ADDR | PP003380 | 0 <hex> | | | | | | | | | | | |
| DPU_DATA_LENGTH | PP008380 | 17 <dec> | | | | | | | | | | | |
| | | <p>Verify: The following TM(6,6) packet should be produced:</p> <p>PACS_MEMORY_DUMP (APID 1153)</p> | | | | | | | | | | | |

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|----------|----------------------|--|--|-----------------|
| | | For PACS SPU OBSW v13.96: 0x 0000 0001 0x 0007 FFFF 0x 0000 6823 0x 0000 6823 Although the rest of the dump should be 0x0000 0000, it is not unexpected if it is not. This should be analysed by PACS offline | | |
| 7 | | Verify switch on | | Next Step: 8 |
| | | Verify Telemetry DP_SPUS_HK PM026380 | = NO NEW HK | AND=ZAZ9A999 |
| | | Verify Telemetry DP_SPUL_HK PM027380 | = NO NEW HK | AND=ZAZ9A999 |
| 8 | | SPU memory check | | Next Step: 9 |
| 8.1 | | Check table segments in SPU EEPROM | | ☐ |
| | | The following checks will verify the contents of the SPU Program Memory (EEPROM) | | |
| | | For PACS SPU OBSW v13.96: CHECKSUM1 = FEB0 CHECKSUM2 = DDCD | | |
| | ET=+ UT=+00.00.00 | DPU_MEMORY_CHECK_RAW Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | DPU_MEMORY_CHECK PC029380 8300 <hex> 100 <hex> 100 <hex> | |
| | | Verify: SPU memory checksum CHECKSUM PM132380 | CHECKSUM1 | AND=ZAZ9A999 |

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|----------|----------------------|--|---|--------------------------|
| | ET=+ UT=+00.00.01 | Check init table segment DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> 300 <hex> 224 <hex> | |
| | | Verify: SPU memory checksum CHECKSUM PM132380 | CHECKSUM2 | AND=ZAZ9A999 |
| 8.2 | | Check program code segment in SPU EEPROM | | <input type="checkbox"/> |
| | | The following checks will verify the contents of the SPU Program Memory (EEPROM) | | |
| | | Uplink the memory check commands one by one and verify the received checksums (PM132380) against the corresponding expected values in Attachment 1. | | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> A00 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> 1200 <hex> 800 <hex> | |

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| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> 1A00 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> 2200 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> 2A00 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> 3200 <hex> 800 <hex> | |

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| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> 4A00 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> 5200 <hex> 800 <hex> | |

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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|----------------------|--|---|-----------------|
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> 5A00 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> 6200 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> 6A00 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> 7200 <hex> 800 <hex> | |

Check SPU software (Redundant)
 File: H_FCP_PAC_RCSM.xls
 Author: R. Biggins



| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|----------------------|---|---|--------------------------|
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> 7A00 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8300 <hex> 8200 <hex> 39F <hex> | |
| 9 | | Load SPU RAM | | Next Step: 10 |
| | | WARNING: The relevant authority (TBD) should be informed that the SPU 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. | | |
| 9.1 | | Load SPU Red HLSW from EEPROM to RAM | | <input type="checkbox"/> |
| | ET=+ UT=+00.00.01 | SPUL_LLSW_LOAD_EEPROM SPUL_LLSW_LOAD_EEPROM Command Parameter(s) : SPUL_EEPROM_MEMORY_ID PP040390 SPUL_EEPROM_START_ADDR PP042390 SPUL_RAM_MEMORY_ID PP041390 SPUL_RAM_START_ADDR PP043390 SPUL_DATA_LENGTH_HLSW PP038390 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : LOAD SPU HLSW FROM EEPROM FOR RED SPU | PC070390 3 <hex> 100 <hex> 1 <hex> 100 <hex> 1E0 <hex> | |

Check SPU software (Redundant)
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 Author: R. Biggins



| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|----------------------|---|--|--------------------------|
| | ET=+ UT=+00.00.02 | SPUL_LLSW_LOAD_EEPROM SPUL_LLSW_LOAD_EEPROM Command Parameter(s) : SPUL_EEPROM_MEMORY_ID PP040390 SPUL_EEPROM_START_ADDR PP042390 SPUL_RAM_MEMORY_ID PP041390 SPUL_RAM_START_ADDR PP043390 SPUL_DATA_LENGTH_HLSW PP038390 Subsch. ID : 90 Det. descr. : LOAD SPU HLSW FROM EEPROM FOR RED SPU | PC070390 3 <hex> 300 <hex> 1 <hex> 300 <hex> 700 <hex> | |
| | ET=+ UT=+00.00.02 | SPUL_LLSW_LOAD_EEPROM SPUL_LLSW_LOAD_EEPROM Command Parameter(s) : SPUL_EEPROM_MEMORY_ID PP040390 SPUL_EEPROM_START_ADDR PP042390 SPUL_RAM_MEMORY_ID PP041390 SPUL_RAM_START_ADDR PP043390 SPUL_DATA_LENGTH_HLSW PP038390 Subsch. ID : 90 Det. descr. : LOAD SPU HLSW FROM EEPROM FOR RED SPU | PC070390 3 <hex> a00 <hex> 1 <hex> a00 <hex> a600 <hex> | |
| 9.2 | | Load SPU Blue HLSW from EEPROM to RAM | | <input type="checkbox"/> |
| | ET=+ UT=+00.00.02 | SPUS_LLSW_LOAD_EEPROM SPUS_LLSW_LOAD_EEPROM Command Parameter(s) : SPUS_EEPROM_MEMORY_ID PP058400 SPUS_EEPROM_START_ADDR PP060400 SPUS_RAM_MEMORY_ID PP059400 SPUS_RAM_START_ADDR PP061400 SPUS_DATA_LENGTH_HLSW PP056400 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : LOAD SPU HLSW FROM EEPROM FOR BLUE SPU | PC069400 3 <hex> 100 <hex> 1 <hex> 100 <hex> 1E0 <hex> | |
| | ET=+ UT=+00.00.02 | SPUS_LLSW_LOAD_EEPROM SPUS_LLSW_LOAD_EEPROM Command Parameter(s) : SPUS_EEPROM_MEMORY_ID PP058400 SPUS_EEPROM_START_ADDR PP060400 SPUS_RAM_MEMORY_ID PP059400 SPUS_RAM_START_ADDR PP061400 SPUS_DATA_LENGTH_HLSW PP056400 Subsch. ID : 90 Det. descr. : LOAD SPU HLSW FROM EEPROM FOR BLUE SPU | PC069400 3 <hex> 300 <hex> 1 <hex> 300 <hex> 700 <hex> | |

Check SPU software (Redundant)
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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|----------------------|--|-----------|--------------------------|
| | ET=+ UT=+00.00.02 | SPUS_LLSW_LOAD_EEPROM SPUS_LLSW_LOAD_EEPROM Command Parameter(s) : SPUS_EEPROM_MEMORY_ID PP058400 SPUS_EEPROM_START_ADDR PP060400 SPUS_RAM_MEMORY_ID PP059400 SPUS_RAM_START_ADDR PP061400 SPUS_DATA_LENGTH_HLSW PP056400 Subsch. ID : 90 Det. descr. : LOAD SPU HLSW FROM EEPROM FOR BLUE SPU | PC069400 | |
| 10 | | Check SPU RAM | | Next Step: 11 |
| 10.1 | | Check table segments in SPU RAM | | <input type="checkbox"/> |
| | | The following checks will verify the contents of the SPU Program Memory (RAM) | | |
| | | For PACS SPU OBSW v13.8: CHECKSUM1 = FEB0 CHECKSUM2 = FAF3 | | |
| | ET=+ UT=+00.00.00 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 | |
| | | Verify: SPU memory checksum CHECKSUM PM132380 | CHECKSUM1 | AND=ZAZ9A999 |
| | ET=+ UT=+00.00.01 | Check init table segment DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 | |
| | | Verify: SPU memory checksum CHECKSUM PM132380 | CHECKSUM2 | AND=ZAZ9A999 |

Check SPU software (Redundant)
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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|----------------------|--|---|-----------------|
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- -- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8100 <hex> 2200 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- -- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8100 <hex> 2A00 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- -- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8100 <hex> 3200 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- -- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8100 <hex> 3A00 <hex> 800 <hex> | |

Check SPU software (Redundant)
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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|----------------------|--|---|-----------------|
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8100 <hex> 4200 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8100 <hex> 4A00 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8100 <hex> 5200 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8100 <hex> 5A00 <hex> 800 <hex> | |

Check SPU software (Redundant)
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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|----------------------|--|---|-----------------|
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8100 <hex> 6200 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8100 <hex> 6A00 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8100 <hex> 7200 <hex> 800 <hex> | |
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8100 <hex> 7A00 <hex> 800 <hex> | |

Check SPU software (Redundant)
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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|----------------------|---|--|--------------------------|
| | ET=+ UT=+00.00.01 | DPU_MEMORY_CHECK_RAW DPU_MEMORY_CHECK Command Parameter(s) : DPU_MEMORY_BLOCK_ID PP009380 DPU_MEMORY_ADDR PP003380 DPU_DATA_LENGTH PP008380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : REQUEST FOR A CHECKSUM OF A SPECIFIED MEMORY AREA | PC029380 8100 <hex> 8200 <hex> 39F <hex> | |
| 11 | | Switch OFF PACS | | Next Step: END |
| 11.1 | | Go to SAFE MODE | | <input type="checkbox"/> |
| | | Sending the following TC will generate a TM(5,1) [EVENT_REPORT_6_3 - NACK] packet. | | |
| | ET=+ UT=+00.00.00 | DPU_START_OBCP_RAW DPU_START_OBCP Command Parameter(s) : PROCEDURE_ID PP012380 NUMBER_OF_TIMES PP010380 TC Control Flags : GBM IL DSE --Y -- --- Subsch. ID : 90 Det. descr. : START AN OBCP WITH THE COMMANDED PARAMETERS | PC012380 24 <dec> 0 <dec> | |
| | | Verify Telemetry DP_TM_RATE PM049380 | = SAFE | AND=ZAZ9A999 |
| 11.2 | | Stop the instrument RT interrogation | | <input type="checkbox"/> |
| | ET=+ UT=+00.00.00 | Execute Telecommand ConfiguresSDBFDIR Command Parameter(s) : RTA DH011161 M0 DH030161 M1 DH031161 M2 DH032161 M3 DH033161 M4 DH034161 M5 DH035161 M6 DH036161 M7 DH037161 F0 DH018161 F1 DH019161 | DC005161 PACS B Update status Ignore Flag Ignore Flag Ignore Flag Update status Ignore Flag Ignore Flag Ignore Flag OFF Alive | |

Check SPU software (Redundant)
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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|----------|----------------------|---|---|-----------------|
| | | F2 DH020161 F3 DH021161 F4 DH022161 F5 DH023161 F6 DH024161 F7 DH025161 M12 DH051161 M_C DH043161 M8 DH038161 M9 DH039161 M10 DH040161 M11 DH041161 F12 DH050161 CNT DH042161 F8 DH026161 F9 DH027161 F10 DH028161 F11 DH029161 TC Control Flags : Subsch. ID : 10 Det. descr. : Configure SDB FDIR GBM IL DSE --Y -- --- | Well TC Well TM Invalid Non-vital NOMINAL OFF Ignore Flag Ignore CNT Ignore Flag Ignore Flag Ignore Flag Ignore Flag Ignore Flag ENABLED LoopCnt1 Bus A Healthy Healthy ENABLED | |
| | | Wait up to 1 minute for the generation of the D_H_Hk_P64 packet from the CDMU (APID = 18) | | |
| | | Verify Telemetry PACSB_OnOff DED31161 | = OFF | AND=ZAZ9A999 |
| | | Verify Telemetry PACSB_ValidInv DED35161 | = Invalid | AND=ZAZ9A999 |
| 11.3 | | Switch OFF LCLs | | □ |
| | ET=+ UT=+00.00.00 | Execute Telecommand SwOff_PacSS_R_L36 TC Control Flags : Subsch. ID : 10 Det. descr. : PCDU: TC(8,4,112,3) PACS SPU Red - switch LCL_36 off GBM IL DSE --Y -- --- | DC36B170 | |
| | ET=+ UT=+00.00.01 | Execute Telecommand SwOff_PacsD_R_L42 Subsch. ID : 10 Det. descr. : PCDU: TC(8,4,112,3) PACS DPU Red - switch LCL_42 off | DC42B170 | |
| | | Verify Telemetry PacsS_R_L36_S WM62A565 | = OFF | AND=ZAZ9A999 |
| | | Verify Telemetry PacsD_R_L42_S WM42B565 | = OFF | AND=ZAZ9A999 |

Check SPU software (Redundant)
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| Step No. | Time | Activity/Remarks | TC/TLM | Display/ Branch |
|-------------------------|------|------------------|--------|-----------------|
| End of Procedure | | | | |

ATTACHMENT 1

SPU EEPROM contents

H_FCP_PAC_RCSM

Checksums for step 8.2

Block ID: 8300

SPU OBSW version 13.96

| DPU_MEMORY_ADDR | DPU_DATA_LENGTH | Checksum (HEX) |
|-----------------|-----------------|----------------|
| A00 | 800 | F921 |
| 1200 | 800 | 6B58 |
| 1A00 | 800 | 19D7 |
| 2200 | 800 | A26B |
| 2A00 | 800 | 21F8 |
| 3200 | 800 | 3FF2 |
| 3A00 | 800 | 4118 |
| 4200 | 800 | 6FB8 |
| 4A00 | 800 | 092F |
| 5200 | 800 | 5D08 |
| 5A00 | 800 | CACF |
| 6200 | 800 | CBFD |
| 6A00 | 800 | FDEE |
| 7200 | 800 | 3B4F |
| 7A00 | 800 | EC6B |
| 8200 | 39F | 2AB0 |

Doc No. : PT-HMOC-OPS-FOP-6001-OPS-OAH
Fop Issue : 3.0
Issue Date: 13/04/10

Check SPU software (Redundant)
File: H_FCP_PAC_RCSM.xls
Author: R. Biggins

Status : Version 7 - Unchanged
Last Checkin: 20/03/09

ATTACHMENT 1

SPU PM RAM contents

H_FCP_PAC_RCSM

Checksums for step 10.2

Block ID: 8100

SPU OBSW version 13.96

| DPU_MEMORY_ADDR | DPU_DATA_LENGTH | Checksum (HEX) |
|-----------------|-----------------|----------------|
| A00 | 800 | F921 |
| 1200 | 800 | 6B58 |
| 1A00 | 800 | 19D7 |
| 2200 | 800 | A26B |
| 2A00 | 800 | 21F8 |
| 3200 | 800 | 3FF2 |
| 3A00 | 800 | 4118 |
| 4200 | 800 | 6FB8 |
| 4A00 | 800 | 092F |
| 5200 | 800 | 5D08 |
| 5A00 | 800 | CACF |
| 6200 | 800 | CBFD |
| 6A00 | 800 | FDEE |
| 7200 | 800 | 3B4F |
| 7A00 | 800 | EC6B |
| 8200 | 39F | 2AB0 |

Doc No. : PT-HMOC-OPS-FOP-6001-OPS-OAH
Fop Issue : 3.0
Issue Date: 13/04/10

Check SPU software (Redundant)
File: H_FCP_PAC_RCSM.xls
Author: R. Biggins

Status : Version 7 - Unchanged
Last Checkin: 20/03/09