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# Introduction

The primary objective of this document is to describe the in-flight commissioning plan of the SWA flight instrument. The proposed tests will demonstrate that the performance of the instrument meets the operational requirements. The aim is to define activities with an emphasis on performing tests that require real time contact with the spacecraft.

# Reference Documents

The documents listed below form a part of this document, to the extent specified and described herein.

|  |  |  |
| --- | --- | --- |
| Ref. | No | Title |
| NR1 | SOL-EST-IF-0050 | Solar Orbiter Experiment Interface Document Part A |
| NR2 | SOL-EST-RS-1937 | Solar Orbiter Product Assurance Requirements for Instruments |
| NR3 | SO-SWA-MSSL-SP-006 | SWA Instrument Scientific Requirements Report |
| NR4 | SO-SWA-MSSL-PL-006 | SWA Product Assurance Plan |
| NR5 | MSSL-SO-SWA-EID-B | SWA EID-B |
| NR6 | SO-SWA-LPP-LP-039\_MCP Acceptance Test | LPP MCP Acceptance and characterisation Plan |
| NR7 | SO-SWA-LPP-RP-078\_1\_1-MCP\_test\_report\_PartI | MCP detector characterisation test report |
| NR8 | SO-SWA-LPP-RP-092 EAS Det FM1 Test Report rev 1-4.pdf | LPP detector sub-system test report FM1 |
| NR9 | SO-SWA-LPP-RP-093 EAS Det FM2 Test Report rev 1-2.pdf | LPP detector sub-system test report FM2 |
| NR10 | SO-SWA-MSSL-SP-012\_EAS-DPU\_Interface\_Specification\_Issue\_2.pdf | EAS-DPU Interface Specification |
| NR11 | SO-SWA-MSSL-PL-013 | SWA EAS Calibration Plan |
| NR12 | SO-SWA-MSSL-UM-002 | SWA Instrument User manual |

# Acronym and Abbreviation List

|  |  |
| --- | --- |
| Abbreviation | Meaning |
| AD | Applicable Document |
| EAS | Electron Analyser System |
| EID | Experiment Interface Document |
| FMECA | Failure Modes, Effects and Criticality Analysis  |
| ESA | European Space Agency |
| MSSL | Mullard Space Science Laboratory |
| N/A | Not Applicable |
| PA | Product Assurance |
| SWA | Solar Wind Analyser |
| TBC | To Be Confirmed |
| TBD | To Be Defined |

# General requirements

## Spacecraft Location and Plasma Environment

To be included

## Required Configuration of the Spacecraft

There is no particular spacecraft configuration required during SWA commission.

## Spacecraft Pointing

There is no designated pointing required during the SWA commission phase.

## Spacecraft-generated Gases

SWA commissioning, particularly involving high voltages, should not begin until sufficient time has elapsed for spacecraft outgassing to be essentially complete. It has been estimated that at least 20 days are required after launch, following assessment of data from TQCM.

No thruster firing should occur during SWA commissioning, and a sufficient time should be allowed between any thruster firing and the start of commissioning.

## Telemetry

A telemetry requirement of xxx will be required for SWA commissioning

## Required Configuration of other Instruments

It is accepted by SWA that some other instruments are powered on during the SWA commission. However if SWA feel that the other instruments are causing interference to SWA commission, then SWA will request that those instruments be powered down. It is also expected that no other instrument commanding will take place during SWA commission periods.

## Inter-Experiment Links - Service 20

The IEL inputs to SWA are from

* MAG
* RPW

Until completion of commissioning of each sensor, IEL inputs will be disabled at the DPU.

## Verification process during commissioning

### Performance Verification

Following each command in the commissioning sequence the experimenter will either confirm that the command was executed as expected or recommend that a contingency plan is executed.

### Spacecraft EGSE Real-time Housekeeping Parameters

Checking of the housekeeping parameters will be performed using the spacecraft EGSE. Visual checking of the real time housekeeping by a SWA team member viewing the ESOC video display.  **Unless otherwise stated, each command in the commissioning sequences given should be followed by inspection of the housekeeping by an SWA team member before the next command in the sequence is sent.**

### Real-time SWA Housekeeping Parameters

Visual checking of the near-real time housekeeping data by an SWA team member viewing the SWA EGSE display. Data will be acquired via tbd mechanism. The EGSE provides a range of graphical displays for the interpretation of the housekeeping and science data and will have limit checking similar to that used for ground testing. Specific parameters which will be checked in this way are listed in the detailed procedures in this document.

### Real-time SWA Science Data

Real-time assessment of science data from the SWA sensors will be required during commissioning. Interpretation and visualisation of the data will use SWA provided EGSE, both for engineering and science assessments.

## Order of commissioning of the DPU and SWA sensors

The basic order of commissioning of the different SWA units is as follows:

* DPU
* HIS
* PAS
* EAS
* All SWA

The outline plan for SWA commission is provided in the MOC NECP Timeline plan. Currently this is illustrated in Table 4.1

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **NECP Phase** | **NECP number** | **Date** | **Day** | **Start Time** | **End Time** | **Duration** | **One Way Light Time (Seconds)** | **Comments** |
|   | IA-SW | 27 Feb | Thurs | 15:22 | 23:22 | 08:00 | 32-34 | FSW Upload |
| SWA-2 | IA-2 | 02 Mar | Mon | 15:06 | 23:06 | 08:00 | 39-43 | DPU & EAS  |
| SWA-3 | IA-3 | 03 Mar | Tues | 15:42 | 23:00 | 07:18 | 39-43 | HIS & EAS |
|   | IA-3 | 05 Mar | Thurs | 14:53 | 22:53 | 08:00 | 39-43 |   |
|   | IA-3 | 09 Mar | Mon | 11:06 | 19:06 | 08:00 | 52-59 |   |
|   | IA-3 | 10 Mar | Tues | 11:02 | 19:02 | 08:00 | 52-59 | HIS on overnight 19:02-05:02 |
|   | IA-3 | 11 Mar | Wed | 10:58 | 17:58 | 07:00 | 52-59 |   |
| SWA-4 | IA-4 | 19 Mar | Thurs | 10:22 | 18:17 | 07:55 | 61-68 | PAS & EAS. PAS left on overnight |
|   | IA-4 | 20 Mar | Fri | 12:32 | 20:32 | 08:00 | 61-68 | EAS left powered on |
| SWA-5 | IA-5 | 24 Mar | Tues | 13:23 | 20:23 | 07:00 | 70-76 | EAS |
|   | IA-5 | 25 Mar | Wed | 12:55 | 20:29 | 07:34 | 70-76 |   |
|   | IA-5 | 26 Mar | Thurs | 13:12 | 21:12 | 08:00 | 70-76 |   |
|   | IA-5 | 31 Mar | Tues | 12:37 | 20:28 | 07:51 | 79-85 |   |
| SWA-6 | IA-6 | 01 Apr | Wed | 12:36 | 20:36 | 08:00 | 79-85 | SWA |
|   | IA-6 | 03 Apr | Fri | 12:23 | 20:23 | 08:00 | 79-85 |  SWA stays on |
|   |   | 12 May | Tues |   |   |   | 185-212 | Interference Campaign |
|  | IM-IIC | 14 May | Thurs | 05:57 | 11:57 | 06:00:00 | 185-212 | IIC |

Table 4.1 MOC Timeline for each SWA commission phase (version 3.2)

# SWA Commissioning flow

The overall commissioning flow for the SWA instrument is as follows:

* In the first instance, the DPU will be commissioned to the extent that the unit is powered, service 20 response is verified and relevant tests required prior to sensor turn-on are carried out
* The next step will be to turn on the individual sensors and commission them, one at a time. This will include performing sensor functional tests, commissioning of high voltages, performing engineering mode tests as required and carrying out optimisation of instrument performance, with the emphasis on tests requiring real time contact with the spacecraft
* Following completion of commissioning of each of the three sensors, the DPU will be commissioned for operation of all three sensors and step through the suite level commissioning process. This process will
	+ Demonstrate Normal Mode operation
	+ Demonstrate Burst and Triggered mode operation. MAG and RPW will require to be commissioned and operational for this step
	+ Perform suite level performance optimisation, particularly carrying out tests where real time contact is required
* Following demonstration of suite level operation, the instrument suite will be operated for a period of time, possibly in parallel with other instruments being commissioned.
* Finally, the Suite will participate in inter-instrument operations and interference campaigns

The rest of the section details the commissioning plan for the DPU and each individual sensor.

# SWA2 (IA-2)

During this sectionthe following is done:

DPU powered on

DPU commissioned

Software patch loaded

EAS powered on

EAS powered off

DPU powered off

## DPU Power Up

|  |  |  |  |
| --- | --- | --- | --- |
| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents**  | **Comments** |
| **DPU Power Up** |
|  | Power DPU on  | IA-FCP-012 |  |
|  | Configure the DPU into OPS | IA-FCP-030 |  |

## DPU Commission

|  |  |  |  |
| --- | --- | --- | --- |
| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
|  | DPU Diagnostic HK TestSwitch DPU Diagnostic HK on Switch DPU Diagnostic HK off | **PDOR\_SSWA\_DPU\_Diag\_Comm\_00001.SOL**ZIA58050, PIA58050 = DPU\_TC\_CNT\_HK Wait 00:00:01 (1 second)ZIA58050, PIA58050 = DPU\_VALID\_PAR\_HK Wait 00:00:01 (1 second)ZIA58050, PIA58050 = DPU\_HW\_DIAG\_HKWait 00:00:01 (1 second)ZIA58050, PIA58050 = DPU\_MAX\_DUR\_HKWait 00:00:01 (1 second)ZIA58050, PIA58050 = DPU\_FDIR\_ST\_HKWait 00:00:01 (1 second)ZIA58050, PIA58050 = DPU\_FDIR\_MON\_HKWait 00:00:01 (1 second)ZIA58050, PIA58050 = DPU\_MON\_DER\_HKWait 00:00:01 (1 second)ZIA58050, PIA58050 = DPU\_TM\_CNTZIA58050, PIA58050 = DPU\_ERR\_CNTWait 00:01:00 (60 seconds)ZIA58051, PIA58050 = DPU\_TC\_CNT\_HKWait 00:00:01 (1 second)ZIA58051, PIA58050 = DPU\_VALID\_PAR\_HKWait 00:00:01 (1 second)ZIA58051, PIA58050 = DPU\_HW\_DIAG\_HKWait 00:00:01 (1 second)ZIA58051, PIA58050 = DPU\_MAX\_DUR\_HKWait 00:00:01 (1 second)ZIA58051, PIA58050 = DPU\_FDIR\_ST\_HKWait 00:00:01 (1 second)ZIA58051, PIA58050 = DPU\_FDIR\_MON\_HKWait 00:00:01 (1 second)ZIA58051, PIA58050 = DPU\_MON\_DER\_HKWait 00:00:01 (1 second)ZIA58050, PIA58050 = DPU\_TM\_CNTWait 00:00:01 (1 second)ZIA58051, PIA58050 = DPU\_ERR\_CNT | 1 second between each TC1 second between each TC |

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | DPU Memory Dumps Dump RAMDump MRAM1Dump DPU\_PROMDump DPU\_MRAM2 | **PDOR\_SSWA-DPU\_MemDump\_00001.SOL**ZIA58054, PIA58056 = DPU\_RAM PIA60330 = 0x40 00 00 00 PIA60329 = 10 Wait 00:00:01 (1 second)ZIA58054, PIA58056 = DPU\_MRAM1 PIA60330 = 0x10 00 00 00 PIA60329 = 10Wait 00:00:01 (1 second)ZIA58054, PIA58056 = DPU\_PROM PIA60330 = 0x00 00 00 00 PIA60329 = 10Wait 00:00:01 (1 second)ZIA58054, PIA58056 = DPU\_MRAM2 PIA60330 = 0x10 00 00 00 PIA60329 = 10 |  |
|  | DPU memory writes and checksWrite to RAMChecksum RAMChecksum MRAM1Checksum PROMChecksum MRAM2 | **MDOR\_SSWA-DPU\_Write\_00001.SOL**ZIA58053, PIA58056 = DPU\_RAM PIA60330 = 0x40 70 00 00 PIA60329 = 4 PIA60432 = 0xAB PIA60432 = 0xCD PIA60432 = 0xEF PIA60432 = 0x01Wait 00:00:01 (1 second)ZIA58055, PIA58056 = DPU\_RAM PIA60330 = 0x40 70 00 00 PIA60329 = 4Wait 00:00:01 (1 second)ZIA58055, PIA58056 = DPU\_MRAM1 PIA60330 = 0x10 1E 10 00 PIA60329 = 52Wait 00:00:01 (1 second)ZIA58055, PIA58056 = DPU\_PROM PIA60330 = 0x00 00 00 00 PIA60329 = 100Wait 00:00:01 (1 second)ZIA58055, PIA58056 = DPU\_MRAM2 PIA60330 = 0x10 1E 10 00 PIA60329 = 52 | Result should be = 1186Result should be Result should be 22271Result should be = |
|  | DPU Invalid TC testNot a valid address Not a valid length Check dump abort while not dumping | **PDOR\_SSWA-DPU\_InValTC\_00001.SOL**ZIA58055, PIA58056 = DPU\_RAM PIA60330 = 0x00 00 00 00 PIA60329 = 16000 Wait 00:00:01 (1 second)ZIA58055, PIA58056 = DPU\_RAM PIA60330 = 0x40 00 00 00 PIA60329 = 0x80 00 00Wait 00:00:01 (1 second)ZIA58056 | TM,YIA58152TM(1,8) SWA\_CMD\_INVALID\_START\_ADDRTM,YIA58153TM(1,8) SWA\_CMD\_INVALID\_LENGTHTM,YIA58155 TM(1,8) SWA\_CMD\_NO\_DUMP\_ONGOING |

## DPU SW Patch

|  |  |  |  |
| --- | --- | --- | --- |
| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
|  |  | **MDOR\_SSWA-FSW-patch\_00001.SOL**  |  |

## EAS Power Up

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Power Up and Configure EAS1Zero EAS1 MCPModify config ParamsAccept the new valuesZero EAS1 HVModify config ParamsAccept the new valuesPower EAS1 onPOST macro on EAS1IDLE macro on EAS1Request EAS1 HKRUN macro on EAS1 | **PDOR\_SSWA-EAS1\_Comm\_IA2\_00001.SOL**ZIA58706, PIA60133 = 1 PIA60136 = 0x100B PIA60135 = 6 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00ZIA58708ZIA58706, PIA60133 = 1 PIA60136 = 0x1003 PIA60135 = 6 PIA60134 = 0xDE PIA60134 = 0xB8 PIA60134 = 0x51 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00ZIA58708ZIA58760ZIA58934, PIA60739 = POSTZIA58753Wait 00:00:01 (1 second)ZIA58782Wait 00:00:01 (1 second)ZIA58758Wait 00:00:20 (20 second) | Examine HK before proceeding |
|  | Power Up and Configure EAS2Zero EAS2 MCPModify config ParamsAccept the new valuesZero EAS2 HVModify config ParamsAccept the new valuesPower EAS2 onPOST macro on EAS2IDLE macro on EAS2Request EAS2 HKRUN macro on EAS2 | **PDOR\_SSWA-EAS2\_Comm\_IA2\_00001.SOL**ZIA58706, PIA60133 = 1 PIA60136 = 0x200B PIA60135 = 6 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00ZIA58708ZIA58706, PIA60133 = 1 PIA60136 = 0x2003 PIA60135 = 6 PIA60134 = 0xDE PIA60134 = 0xB8 PIA60134 = 0x51 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00ZIA58708ZIA58808ZIA58936,PIA60740,EQUAL,POSTZIA58801Wait 00:00:01 (1 second)ZIA58830Wait 00:00:01 (1 second)ZIA58806Wait 00:00:20 (20 second) | Examine HK before proceeding |

Leave EAS 1&2 powered on for duration of SWA2 (IA2)

## End of IA-2 Power Down

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Power down EAS1 | IA-FCP-004 |  |
|  | Power down EAS2 | IA-FCP-005 |  |
|  | Power down DPU | IA-FCP-002 |  |

# SWA-3 (IA-3)

During this sectionthe following is done:

DPU powered on

EAS powered on

EAS Heater on

HIS powered on

HIS commission

HIS powered off

EAS powered off

DPU powered off

### HIS Commission

The HIS sensor will make use of high downlink rates and proximity to other space assets in the Near-Earth Commissioning Phase (NECP) to perform the following activities:

1. Initial turn-on and HV commissioning. This will include a slow ramp-up of the post-acceleration and MCP high voltage supplies, possibly over several hours. Near real time monitoring of HK, low-latency (LL) and science data (for counting rates) will be required (for this test only).
2. Initial characterization of science operations, including data compression and prioritization performance, species identification.
3. Collection of initial MCP efficiency gain curve.
4. Cross-calibration with plasma composition instruments at L1, specifically SWICS on ACE and STICS on Wind, and other SWA sensors.

Comparisons will be made between many data products, including charge state ratios, relative elemental abundances and absolute densities. It may be necessary to uplink new table values in order to adjust the instrument operation or data compression schemes based on experience gained in these observations. Any new parameter values uploaded will have been tested before with the simulated system and an instrument prototype. Normal monitoring of Low Latency science and housekeeping data will be required. Verification of proper science performance of the HIS sensor and its flight software / table parameters will only possible after conducting all of these tests, though base level functionality should be possible within a few days of science data collection.

Day 1: allotted time - Low Voltage

Day 2: 7-8 hours – MCP full

Day 3: 6-7 hours – PA

Day 4: 6-8 hours - EAIS

Day 5 day: 4-5 hours – Normal Science

Day 5 or Day 2 night: 12 hours – SSD Noise Threshold

### HIS Requirements

1. HIS NECP activities should begin no sooner than 4 weeks from launch.
2. Spacecraft pointing should be nominal.
3. Communications should support near real time turn around of commands (< 1 min) and downlink of resultant data.
4. No other sensor should be operated during activity 1.
5. There are no restrictions for operating other instruments/sensors during any of the subsequent activities.

## SWA-3 Day 1

### Power up DPU

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Power DPU on  | IA-FCP-012 |  |
|  | Configure the DPU | IA-FCP-030 |  |

## Power up EAS

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Power Up and Configure EAS1Zero EAS1 MCPModify config ParamsAccept the new valuesZero EAS1 HVModify config ParamsAccept the new valuesPower EAS1 onConfigure EAS1 | **PDOR\_SSWA-EAS1\_Comm\_Config\_00001.SOL**ZIA58706, PIA60133 = 1 PIA60136 = 0x100B PIA60135 = 6 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00ZIA58708ZIA58706, PIA60133 = 1 PIA60136 = 0x1003 PIA60135 = 6 PIA60134 = 0xDE PIA60134 = 0xB8 PIA60134 = 0x51 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00ZIA58708IA-FCP-014IA-FCP-040 |  |
|  | Power Up and Configure EAS2Zero EAS2 MCPModify config ParamsAccept the new valuesZero EAS2 HVModify config ParamsAccept the new valuesPower EAS2 onConfigure EAS2 | **PDOR\_SSWA-EAS2\_Comm\_Config\_00001.SOL**ZIA58706, PIA60133 = 1 PIA60136 = 0x200B PIA60135 = 6 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00ZIA58708ZIA58706, PIA60133 = 1 PIA60136 = 0x2003 PIA60135 = 6 PIA60134 = 0xDE PIA60134 = 0xB8 PIA60134 = 0x51 PIA60134 = 0x00 PIA60134 = 0x00 PIA60134 = 0x00ZIA58708IA-FCP-015IA-FCP-050 |  |

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Turn the manual heater on for EAS1Master Control RegisterHeater Control | **PDOR\_SSWA-EAS1\_Partial\_Heater\_00001.SOL**ZIA58776, PIA60423 = 0x00 PIA60424 = 0x40 PIA60425 = 0x60ZIA58824, PIA60423 = 0x00 PIA60424 = 0x00 PIA60425 = 0xE8 | Control EAS heaters to ¾ max0xE8 |
|  | Turn the manual heater on for EAS2Master control RegisterHeater Control | **PDOR\_SSWA-EAS2\_Partial\_Heater\_00001.SOL**ZIA58824, PIA60423 = 0x00 PIA60424 = 0x40 PIA60425 = 0x60ZIA58757, PIA60773 = 0x00  PIA60774 = 0x00 PIA60775 = 0xE8 | Control EAS1 heaters to ¾ max0xE8 |

### Power up HIS

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Power HIS on  | IA-FCP-017 |  |

## HIS Commission

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

## End of IA-3 Power Down

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Power down HIS | IA-FCP-007 |  |
|  | Power down EAS1 | IA-FCP-004 |  |
|  | Power down EAS2 | IA-FCP-005 |  |
|  | Power down DPU | IA-FCP-002 |  |

# SWA-4 (IA-4)

During this sectionthe following is done:

DPU powered on

EAS powered on

EAS Heater on

PAS powered on

PAS commission

PAS powered off

EAS & DPU are left powered on

## SWA-4 Day 1

## Power up DPU

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Power DPU on  | IA-FCP-012 |  |
|  | Configure the DPU | IA-FCP-030 |  |

## Power up EAS

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Power Up and Configure EAS1 | **PDOR\_SSWA-EAS1\_Comm\_Config\_00001.SOL** |  |
|  | Power Up and Configure EAS2 | **PDOR\_SSWA-EAS2\_Comm\_Config\_00001.SOL** |  |

## Configure EAS Heaters

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Turn the manual heater on for EAS1Master Control RegisterHeater Control | **PDOR\_SSWA-EAS1\_Full\_Heater\_00001.SOL**ZIA58776, PIA60423 = 0x00 PIA60424 = 0x40 PIA60425 = 0x60ZIA58824, PIA60423 = 0x00 PIA60424 = 0x01 PIA60425 = 0x60 | Control EAS heaters to max0x160 |
|  | Turn the manual heater on for EAS2Master control RegisterHeater Control | **PDOR\_SSWA-EAS2\_Full\_Heater\_00001.SOL**ZIA58824, PIA60423 = 0x00 PIA60424 = 0x40 PIA60425 = 0x60ZIA58757, PIA60773 = 0x00  PIA60774 = 0x01 PIA60775 = 0x60 | Control EAS1 heaters to max0x160 |

## PAS Power On

Be sure that the “commissioning” patch of PAS has been installed to DPU (see section 6.3). If this patch has not been installed, send the patch commands HERE.

Unblock all dangerous TCs

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Power Up PASEnable PAS HKDisable Monitor Parameters ( 29 parameters )Power on PAS | **PDOR\_SSWA-PAS\_CommPowerOn\_00001.SOL**ZIA58050, PIA58050 = PAS\_SENS\_HKZIA58064, PIA60452 = 28 NUM\_OF\_MON\_ID PIA60449 = V\_MON\_C\_MI  PIA60449 = V\_MON\_L\_MI PIA60449 = I\_MON\_C\_MI PIA60449 = I\_MON\_L\_MI PIA60449 = T\_MON\_C\_MI PIA60449 = T\_MON\_L\_MI PIA60449 = P24\_VCEMOUT\_MI PIA60449 = P5\_VCEMOUT\_MI PIA60449 = P12\_VHTOUT\_MI PIA60449 = M12\_VHTOUT\_MI PIA60449 = P3V\_3\_FPGA\_OMI PIA60449 = P1V\_5\_FPGA\_OMI PIA60449 = TEMP\_DCDC\_MI PIA60449 = TEMP\_FPGA\_MI PIA60449 = HK\_IP24V\_CEMMI PIA60449 = HK\_IP5V\_CEMMI PIA60449 = HK\_IP12V\_HTMI PIA60449 = HK\_IM12V\_HTMI PIA60449 = HK\_I3V3\_FPGAMI PIA60449 = HK\_IP28V\_PRIMI PIA60449 = HK\_IP28V\_PRIMI PIA60449 = HK\_MHV\_POSMI PIA60449 = HK\_MHV\_NEGMI PIA60449 = TEMP\_HVPS\_MI PIA60449 = HK\_IP28V\_PRSCI PIA60449 = PASampOverCurr PIA60449 = PASSPWHB\_MI} PIA60449 = PASMISSACK\_MIZIA58858 | Receive and check at least 3 HK packets and check the contents |

Wait the and of the ground action, about 8 minutes.

## Ramp up PAS MHV

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Configure PASSet the Master control register to Standby Set the heater offEnable MHV Set the main HV to 650 V Set the main HV to 1300 VSet the main HV to 1950 VSet the main HV to 2600 VSet the main HV to 3900 VSet the main HV to 4550 VSet the main HV to 5200 VSet the main HV to 5850 VSet the main HV to 6500 V | **PDOR\_SSWA-PAS\_CommConfig\_00001.SOL**ZIA58863, PIA60343 = 0x0000001A ZIA58947, PIA60848 = OFF HEATHER  PIA60849 = 0x000 DUTY\_CYCLEZIA58863, PIA60343 = 0x0000001E ZIA58869, PIA60344 = 0x00000199PAUSEZIA58869, PIA60344 = 0x00000333PAUSEZIA58869, PIA60344 = 0x000004CCPAUSEZIA58869, PIA60344 = 0x00000666PAUSEZIA58869, PIA60344 = 0x00000999PAUSEZIA58869, PIA60344 = 0x00000B33PAUSEZIA58869, PIA60344 = 0x00000CCCPAUSEZIA58869, PIA60344 = 0x00000E66PAUSEZIA58869, PIA60344 = 0x00000FFFPAUSE | Wait to get at least 30 HK (300 s) packets. Check HV value and stability before proceedingWait to get at least 30 HK (300 s) packets. Check HV value and stability before proceeding.Wait to get at least 30 HK (300 s) packets.Check HV value and stability before proceeding.Wait to get at least 30 HK (300 s) packets.Check HV value and stability before proceeding.Wait to get at least 30 HK (300 s) packets.Check HV value and stability before proceeding.Wait to get at least 30 HK (300 s) packets.Check HV value and stability before proceeding.Wait to get at least 30 HK (300 s) packets.Check HV value and stability before proceeding.Wait to get at least 30 HK (300 s) packets.Check HV value and stability before proceeding.Wait to get at least 30 HK (300 s) packets.Check HV value and stability before proceeding. |

## PAS Engineering stepping

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Load the engineering tableStart Engineering schemeQuery Stop Engineering schemeAbort Sequencer activity | **PDOR\_SSWA-PAS\_Eng\_Stepping\_00001.SOL**ZIA58875, PIA60709 = 0x06004E8 PIA60711 = 0x416448 PIA60708 = 0x126FBD PIA60706 = 0x1251B9 PIA60707 = 0x125F76 PIA60710 = 0x00003CZIA58873, PIA60347 = 0x00000003PAUSEZIA58873, PIA60347 = 0x00000000PAUSEZIA58873, PIA60347 = 0x000000FF  | Wait for the first HK with indication of the stepping voltage, at least 8 minutes.Wait for the first HK with indication of the end of the stepping voltage. At least 20 minutes. |

## PAS Detector commission

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Load the conf tableLoad Static tableLoad Static tableTurn Pre Amps onLoad Static tableStart Static schemeSet HV to 250VSet HV to 500VSet HV to 750VSet HV to 1000VSet HV to 1250VSet HV to 1500VSet HV to 1550VSet HV to 1600VSet HV to 1650VSet HV to 1700VSet HV to 1750VSet HV to 1800VSet HV to 1850VSet HV to 1900VAbort Sequencer activitySet HV to 1000VEnable the Monitoring parametersTurn PAS Preamps Off | **PDOR\_SSWA-PAS\_Detector\_Comm\_00001.SOL**ZIA58874, PIA60800 = 0x28F5C21A  PIA60801 = 0x3D700B85  PIA60802 = 0x1E063D70  PIA60803 = 0x1FD70A3C PIA60804 = 0xF5C25614  PIA60805 = 0x7A6A3D70 PIA60806 = 0x7E147A8F PIA60807 = 0x0A3D870A PIA60808 = 0x3D6147AE PIA60809 = 0x38F5C220  PIA60810 = 0xA3D7328F PIA60811 = 0x5C570A3D PIA60812 = 0x3147AE08  PIA60813 = 0xF5C20B85  PIA60814 = 0x1E228F5C  PIA60815 = 0x6B1E0DF1  PIA60816 = 0x6872F8A0  PIA60817 = 0x62937DEA  PIA60818 = 0x94932892ZIA58874, PIA60819 = 0x8DCF94B7  PIA60820 = 0xA892FBB7  PIA60821 = 0x96EFCF00  PIA60822 = 0x001585CD  PIA60823 = 0x800EB851  PIA60824 = 0x0EB85111 PIA60825 = 0xC28F1999  PIA60826 = 0x991D1EB8; PIA60827 = 0x191EB814  PIA60828 = 0x28F513D7  PIA60829 = 0x0A10F5C2  PIA60830 = 0x12E14714  PIA60831 = 0x28F50C28  PIA60832 = 0xF508F5C2 ZIA58874, PIA60833 = 0x123D7012  PIA60834 = 0xE1471428  PIA60835 = 0xF50147AE PIA60836 = 0x0B851E63 PIA60837 = 0x610070BF PIA60838 = 0x8000003E PIA60839 = 0x9C28F580 PIA60840 = 0x08008008  PIA60841 = 0x00800800  PIA60842 = 0x80080080  PIA60843 = 0x08008008  PIA60844 = 0x00000400 ZIA58862, PIA58062 = ONZIA58862, PIA58063 = ON ZIA58876, PIA60700 = 0x000000ZIA58876, PIA60713 = 0x000008ZIA58876, PIA60705 = 0x000040ZIA58876, PIA60712 = 0x000000ZIA58876, PIA60704 = 0x000009ZIA58876, PIA60720 = 0x000001 (K)ZIA58876, PIA60721 = 0x000001ZIA58873, PIA60347 = 0x00000001PAUSEZIA58868, PIA60344 = 0x0000009DPAUSEZIA58868, PIA60344 = 0x0000013BPAUSEZIA58868, PIA60344 = 0x000001D8PAUSEZIA58868, PIA60344 = 0x00000276PAUSEZIA58868, PIA60344 = 0x00000313PAUSEZIA58868, PIA60344 = 0x000003B1PAUSEZIA58868, PIA60344 = 0x000003D0PAUSEZIA58868, PIA60344 = 0x000003F0PAUSEZIA58868, PIA60344 = 0x0000040FPAUSEZIA58868, PIA60344 = 0x0000042F PAUSEZIA58868, PIA60344 = 0x0000044E PAUSEZIA58868, PIA60344 = 0x0000046E PAUSEZIA58868, PIA60344 = 0x0000048D PAUSEZIA58868, PIA60344 = 0x000004ADPAUSEZIA58873, PIA60347 = 0x000000FF ZIA58868, PIA60344 = 0x00000276 ZIA58063, PIA60452 = 27 PIA60449 = V\_MON\_C\_MI  PIA60449 = V\_MON\_L\_MI PIA60449 = I\_MON\_C\_MI PIA60449 = I\_MON\_L\_MI PIA60449 = T\_MON\_C\_MI PIA60449 = T\_MON\_L\_MI PIA60449 = P24\_VCEMOUT\_MI PIA60449 = P5\_VCEMOUT\_MI PIA60449 = P12\_VHTOUT\_MI PIA60449 = M12\_VHTOUT\_MI PIA60449 = P3V\_3\_FPGA\_OMI PIA60449 = P1V\_5\_FPGA\_OMI PIA60449 = TEMP\_DCDC\_MI PIA60449 = TEMP\_FPGA\_MI PIA60449 = HK\_IP24V\_CEMMI PIA60449 = HK\_IP5V\_CEMMI PIA60449 = HK\_IP12V\_HTMI PIA60449 = HK\_IM12V\_HTMI PIA60449 = HK\_I3V3\_FPGAMI PIA60449 = HK\_IP28V\_PRIMI PIA60449 = HK\_IP28V\_PRIMI PIA60449 = HK\_MHV\_POSMI PIA60449 = HK\_MHV\_NEGMI PIA60449 = TEMP\_HVPS\_MI PIA60449 = HK\_IP28V\_PRSCI PIA60449 = PASSPWHB\_MI PIA60449 = PASMISSACK\_MIZIA58862, PIA58062, EQUAL, OFF PIA58063, EQUAL, OFF | Such configuration is possible if the Sequencer is patched to the “Commissioning” version ONLY. If NOT, K = 13500 (0x003F48)Wait at least for the first science packetWait for the HK with the corresponding CEMs HV, Continue if there is no problem with Science data and HK dataWAIT AT LEAST 1 hourFrom this point the step is 50 V and we can stop at any moment when the count rate is saturatedWait for the HK with the corresponding CEMs HV, Continue if there is no problem with Science data and HK data.If saturated, skip to the endWAIT AT LEAST 30 MinutesGet at least one HK packet to be sure that HV stepping is finishedWait for the HK with the corresponding CEMs HV |

After execution of this TC, leave PAS ON until the next day commissioning activity.

## SWA-4 Day 2

## Resume PAS CEM nominal voltage in static scheme

Obtain the PAS HK packets from the previous night and analyse before proceeding.

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Power on pre ampsStart the static schemeSet CEM HV to 1250VSet CEM HV to 1500VSet CEM HV to 1550VSet CEM HV to 1600VSet CEM HV to 1650VSet CEM HV to 1700VSet CEM HV to 1750VSet CEM HV to 1800VSet CEM HV to 1850VSet CEM HV to 1900VDisable Monitoring parametersRamp the CEM HV back to NOMINAL in 200V stepsRamp the Main HV back in 1000V stepsRamp the Main HV to 5000VRamp the Main HV to 4000VRamp the Main HV to 3000VRamp the Main HV to 2000VRamp the Main HV to 1000VRamp the Main HV to 0V | **PDOR\_SSWA-PAS\_NomCEM\_Static\_00001.SOL**ZIA58862, PIA58062 = ON  PIA58063 = ONZIA58873, PIA60347 = 0x00000001PAUSEZIA58868, PIA60344 = 0x00000313 ; 1250 VPAUSEZIA58868, PIA60344 = 0x000003B1 ; 1500 VPAUSEZIA58868, PIA60344 = 0x000003D0 ; 1550 VPAUSEZIA58868, PIA60344 = 0x000003F0 ; 1600 VPAUSEZIA58868, PIA60344 = 0x0000040F ; 1650 VPAUSEZIA58868, PIA60344 = 0x0000042F ; 1700 VPAUSEZIA58868, PIA60344 = 0x0000044E; 1750 VPAUSEZIA58868, PIA60344 = 0x0000046E; 1800 VPAUSEZIA58868, PIA60344 = 0x0000048D; 1850 VPAUSEZIA58868, PIA60344 = 0x000004AD; 1900 VPAUSEZIA58064, PIA60452 = 28  PIA60449 = V\_MON\_C\_MI  PIA60449 = V\_MON\_L\_MI PIA60449 = I\_MON\_C\_MI PIA60449 = I\_MON\_L\_MI PIA60449 = T\_MON\_C\_MI PIA60449 = T\_MON\_L\_MI PIA60449 = P24\_VCEMOUT\_MI PIA60449 = P5\_VCEMOUT\_MI PIA60449 = P12\_VHTOUT\_MI PIA60449 = M12\_VHTOUT\_MI PIA60449 = P3V\_3\_FPGA\_OMI PIA60449 = P1V\_5\_FPGA\_OMI PIA60449 = TEMP\_DCDC\_MI PIA60449 = TEMP\_FPGA\_MI PIA60449 = HK\_IP24V\_CEMMI PIA60449 = HK\_IP5V\_CEMMI PIA60449 = HK\_IP12V\_HTMI PIA60449 = HK\_IM12V\_HTMI PIA60449 = HK\_I3V3\_FPGAMI PIA60449 = HK\_IP28V\_PRIMI PIA60449 = HK\_IP28V\_PRIMI PIA60449 = HK\_MHV\_POSMI PIA60449 = HK\_MHV\_NEGMI PIA60449 = TEMP\_HVPS\_MI PIA60449 = HK\_IP28V\_PRSCI PIA60449 = PASampOverCurr PIA60449 = PASSPWHB\_MI PIA60449 = PASMISSACK\_MIZIA58857, PIA60790 = 0x0000  PIA60791 = **0x0NOMINAL** PIA60792 = 0x00B2 PIA60793 = 0x0006 PAUSEZIA58869, PIA60344 = 0x00000C4E Wait 1 minZIA58869, PIA60344 = 0x000009D8Wait 1 minZIA58869, PIA60344 = 0x00000762Wait 1 minZIA58869, PIA60344 = 0x000004ECWait 1 minZIA58869, PIA60344 = 0x00000276Wait 1 minZIA58869, PIA60344 = 0x00000000 | Wait for the HK with the corresponding CEMs HV, Continue if there is no problem with Science data and HK dataFrom this point the step is 50 V and we can stop at any moment when the count rate is saturatedIf saturated, skip to the endWait 1 hourWait for ground acrtion plus 30 minsAt this stage we should know what the NOMINAL CEM HV is = **0x0NOMINAL** |

## Normal Science Check

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Set the standby stateSet the PAS configSet CEM HV to 1250VSet CEM HV to 1500VEnable monitoring parametersStart science cyclogramStop ScienceSwitch off the preampsDisable the monitoring parametersRamp down the HVPower OFF PAS | **PDOR\_SSWA-PAS\_NormSciComm\_00001.SOL**ZIA58948ZIA58853PAUSEZIA58856, PIA60791 = 0x0000  PIA60790= **0x0NOMINAL** PIA60792 = 0x0052 PIA60793 = 0x0032 PAUSEZIA58063, PIA60452 = 28  PIA60449 = V\_MON\_C\_MI  PIA60449 = V\_MON\_L\_MI PIA60449 = I\_MON\_C\_MI PIA60449 = I\_MON\_L\_MI PIA60449 = T\_MON\_C\_MI PIA60449 = T\_MON\_L\_MI PIA60449 = P24\_VCEMOUT\_MI PIA60449 = P5\_VCEMOUT\_MI PIA60449 = P12\_VHTOUT\_MI PIA60449 = M12\_VHTOUT\_MI PIA60449 = P3V\_3\_FPGA\_OMI PIA60449 = P1V\_5\_FPGA\_OMI PIA60449 = TEMP\_DCDC\_MI PIA60449 = TEMP\_FPGA\_MI PIA60449 = HK\_IP24V\_CEMMI PIA60449 = HK\_IP5V\_CEMMI PIA60449 = HK\_IP12V\_HTMI PIA60449 = HK\_IM12V\_HTMI PIA60449 = HK\_I3V3\_FPGAMI PIA60449 = HK\_IP28V\_PRIMI PIA60449 = HK\_IP28V\_PRIMI PIA60449 = HK\_MHV\_POSMI PIA60449 = HK\_MHV\_NEGMI PIA60449 = TEMP\_HVPS\_MI PIA60449 = HK\_IP28V\_PRSCI PIA60449 = PASampOverCurr PIA60449 = PASSPWHB\_MI PIA60449 = PASMISSACK\_MIWait 1 minuteZIA58943, PIA60777 = 0x16Wait for 1 hourZIA58944ZIA58862, PIA58062 = OFF  PIA58063 = OFFZIA58064, PIA60452 = 28  PIA60449 = V\_MON\_C\_MI  PIA60449 = V\_MON\_L\_MI PIA60449 = I\_MON\_C\_MI PIA60449 = I\_MON\_L\_MI PIA60449 = T\_MON\_C\_MI PIA60449 = T\_MON\_L\_MI PIA60449 = P24\_VCEMOUT\_MI PIA60449 = P5\_VCEMOUT\_MI PIA60449 = P12\_VHTOUT\_MI PIA60449 = M12\_VHTOUT\_MI PIA60449 = P3V\_3\_FPGA\_OMI PIA60449 = P1V\_5\_FPGA\_OMI PIA60449 = TEMP\_DCDC\_MI PIA60449 = TEMP\_FPGA\_MI PIA60449 = HK\_IP24V\_CEMMI PIA60449 = HK\_IP5V\_CEMMI PIA60449 = HK\_IP12V\_HTMI PIA60449 = HK\_IM12V\_HTMI PIA60449 = HK\_I3V3\_FPGAMI PIA60449 = HK\_IP28V\_PRIMI PIA60449 = HK\_IP28V\_PRIMI PIA60449 = HK\_MHV\_POSMI PIA60449 = HK\_MHV\_NEGMI PIA60449 = TEMP\_HVPS\_MI PIA60449 = HK\_IP28V\_PRSCI PIA60449 = PASampOverCurr PIA60449 = PASSPWHB\_MI PIA60449 = PASMISSACK\_MIZIA58857, PIA60790 = 0x0000  PIA60791= **0x0NOMINAL** PIA60792 = 0x00B2 PIA60793 = 0x0006 PAUSEZIA58859 | Wait for the HK to show MHV = 6500V.About 10 minsWait about 20 mins to confirm CEM is nominalWait for a full cycle of science data.Ensure all science packets have stoppedWait the HK with the CEM V less than 200 V.About 60 sEnsure PAS is OFF |

DPU & EAS remains powered on with all HV ramped down.

# SWA-5 (IA-5)

During this sectionthe following is done:

EAS commission

## SWA-5 Day1

If possible, EAS is left powered with heaters on at the end of IA-4. If this is the case then skip to section 9.1.7.

## DPU Power Up

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Power DPU on  | IA-FCP-012 |  |
|  | Configure the DPU | IA-FCP-030 |  |

## EAS Power Up

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Power Up and Configure EAS1 | **PDOR\_SSWA-EAS1\_Comm\_Config\_00001.SOL** |  |
|  | Power Up and Configure EAS2 | **PDOR\_SSWA-EAS2\_Comm\_Config\_00001.SOL** |  |

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Turn the manual heater on for EAS1 | **PDOR\_SSWA-EAS1\_Full\_Heater\_00001.SOL** |  |
|  | Turn the manual heater on for EAS2 | **PDOR\_SSWA-EAS2\_Full\_Heater\_00001.SOL** |  |

## EAS1 Electronics Commission

**The HEM and MCP is ramped to zero at this point. Do we need to ramp them up?**

**Blue Text to be discussed**

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | EAS1 Electronics CommissionEng mode 9 (FPGA SELF TEST)Post-Eng mode macro Eng mode 7 (Modulator sweep test)Post-Eng mode macro Eng mode 5 (Threshold Sweep)Post-Eng mode macro Eng mode 6 (Stim test)Post-Eng mode macro  | **PDOR\_SSWA-EAS1\_ElectComm\_00001.SOL**ZIA58795, PIA60165 = 5ZIA58934, PIA60739 = POST\_ENGZIA58793ZIA58934, PIA60739 = POST\_ENGZIA58791, PIA60454 = 0xFF PA1 stim PIA60455 = 0xFF PA2 stim PIA60040 = 0x724 Start Thresh PIA60039 = 0x477 End Thresh PIA60041 = 0x76 Thresh step PIA60106 = 0x0 MCP value PIA60171 = 0xA MCP wait PIA60165 = 2 Acq timeZIA58934, PIA60739 = POST\_ENGZIA58792, PIA60457 = 0xFF Stim high PIA60458 = 0x32 Stim low PIA60459 = 0x29 Stim step PIA60106 = 0x0 MCP value PIA60171 = 0xA MCP wait PIA60165 = 2 Acq timeZIA58934, PIA60739 = POST\_ENG |  |

## EAS2 Electronics Commission

**The HEM and MCP is ramped to zero at this point. Do we need to ramp them up?**

**Blue Text to be discussed**

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | EAS2 Electronics CommissionEng mode 9 (FPGA SELF TEST)Post-Eng mode macro Eng mode 7 (Modulator sweep test)Post-Eng mode macro Eng mode 5 (Threshold Sweep)Post-Eng mode macro Eng mode 6 (Stim test)Post-Eng mode macro  | **PDOR\_SSWA-EAS2\_ElectComm\_00001.SOL**ZIA58843, PIA60165 = 5ZIA58936, PIA60740 = POST\_ENGZIA58841ZIA58936, PIA60740 = POST\_ENGZIA58839, PIA60454 = 0xFF PA1 stim PIA60455 = 0xFF PA2 stim PIA60040 = 0x724 Start Thresh PIA60039 = 0x477 End Thresh PIA60041 = 0x76 Thresh step PIA60106 = 0x0 MCP value PIA60171 = 0xA MCP wait PIA60165 = 2 Acq timeZIA58936, PIA60740 = POST\_ENGZIA58840, PIA60457 = 0xFF Stim high PIA60458 = 0x32 Stim low PIA60459 = 0x29 Stim step PIA60106 = 0x0 MCP value PIA60171 = 0xA MCP wait PIA60165 = 2 Acq timeZIA58936, PIA60740 = POST\_ENG |  |

## SWA-5 Day 2

## EAS1 MCP Commission

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Configure EAS1 for MCP CommissionSet hemisphere voltage max to 800VSet EAS1 deflector ratios to zeroLoad the EAS1 threshold values Change EAS Cadence to HIGHStart normal mode on EAS1  | **PDOR\_SSWA-EAS1\_MCP\_Config\_00001.SOL**ZIA58767, PIA60441 = 0x02 PIA60442 = 0x9C PIA60443 = 0x80ZIA58765, PIA60474 = 0x00 PIA60475 = 0x00 PIA60578 = 0x00 PIA60589 = 0x00 PIA60600 = 0x00 PIA60611 = 0x00 PIA60622 = 0x00 PIA60633 = 0x00 PIA60644 = 0x00 PIA60655 = 0x00 PIA60476 = 0x00 PIA60487 = 0x00 PIA60498 = 0x00 PIA60509 = 0x00 PIA60520 = 0x00 PIA60531 = 0x00 PIA60542 = 0x00 PIA60553 = 0x00 PIA60564 = 0x00 PIA60575 = 0x00 PIA60579 = 0x00 PIA60580 = 0x00 PIA60581 = 0x00 PIA60582 = 0x00 PIA60583 = 0x00 PIA60584 = 0x00 PIA60585 = 0x00 PIA60586 = 0x00 PIA60587 = 0x00 PIA60588 = 0x00 PIA60590 = 0x00 PIA60591 = 0x00 PIA60592 = 0x00 PIA60593 = 0x00 PIA60594 = 0x00 PIA60595 = 0x00 PIA60596 = 0x00 PIA60597 = 0x00 PIA60598 = 0x00 PIA60599 = 0x00 PIA60601 = 0x00 PIA60602 = 0x00 PIA60603 = 0x00 PIA60604 = 0x00 PIA60605 = 0x00 PIA60606 = 0x00 PIA60607 = 0x00 PIA60608 = 0x00 PIA60609 = 0x00 PIA60610 = 0x00 PIA60612 = 0x00 PIA60613 = 0x00 PIA60614 = 0x00 PIA60615 = 0x00 PIA60616 = 0x00 PIA60617 = 0x00 PIA60618 = 0x00 PIA60619 = 0x00 PIA60620 = 0x00 PIA60621 = 0x00 PIA60623 = 0x00 PIA60624 = 0x00 PIA60625 = 0x00 PIA60626 = 0x00 PIA60627 = 0x00 PIA60628 = 0x00 PIA60629 = 0x00 PIA60630 = 0x00 PIA60631 = 0x00 PIA60632 = 0x00 PIA60634 = 0x00 PIA60635 = 0x00 PIA60636 = 0x00 PIA60637 = 0x00 PIA60638 = 0x00 PIA60639 = 0x00 PIA60640 = 0x00 PIA60641 = 0x00 PIA60642 = 0x00 PIA60643 = 0x00 PIA60645 = 0x00 PIA60646 = 0x00 PIA60647 = 0x00 PIA60648 = 0x00 PIA60649 = 0x00 PIA60650 = 0x00 PIA60651 = 0x00 PIA60652 = 0x00 PIA60653 = 0x00 PIA60654 = 0x00 PIA60656 = 0x00 PIA60657 = 0x00 PIA60658 = 0x00 PIA60659 = 0x00 PIA60660 = 0x00 PIA60661 = 0x00ZIA58797, PIA60174 = 0x5F40 PIA60185 = 0x5F41 PIA60196 = 0x5F42 PIA60200 = 0x5F43 PIA60201 = 0x5F44 PIA60202 = 0x5F45 PIA60203 = 0x6586 PIA60204 = 0x6587 PIA60205 = 0x66C8 PIA60175 = 0x5F49 PIA60176 = 0x5F4A PIA60177 = 0x5F4B PIA60178 = 0x5F4C PIA60179 = 0x5F4D PIA60180 = 0x5F4E PIA60181 = 0x5F4F PIA60182 = 0x5F40 PIA60183 = 0x5F41 PIA60184 = 0x5F42 PIA60186 = 0x5F43 PIA60187 = 0x5F44 PIA60188 = 0x5F45 PIA60189 = 0x5F46 PIA60190 = 0x5F47 PIA60191 = 0x5F48 PIA60192 = 0x5F49 PIA60193 = 0x5F4A PIA60194 = 0x5CCB PIA60195 = 0x5F4C PIA60197 = 0x5F4D PIA60198 = 0x5F4E PIA60199 = 0x5F4FZIA58728, PIA60096 = 0 PIA60097 = 0 PIA60099 = 1 PIA60098 = 1ZIA58771, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0x2 |  |
|  | Commission EAS1 MCPStop normal mode on EAS1 Perform Eng Mode 3[Conversion = 1.022 ]Set the EAS1 MCP back by 25VStart normal mode on EAS1  | **PDOR\_SSWA-EAS1\_MCP\_Comm\_00001.SOL**ZIA58771, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0x0ZIA58789, PIA60101 = [Start MCP] PIA60100 = [Final MCP] PIA60102 = 0x33 ;Step MCP PIA60437 = 1 ;1st ramp time PIA60444 = 1 ;Inter ramp time PIA60165 = 20 ;Acq time PIA60760 = 0x20 Hem bin PIA60761 = 0x8 ;Def number PIA60762 = SWEEP\_MACRO ;ctrlWait 00:00:30 (30 seconds)ZIA58784, PIA60218 = [MCP Value]ZIA58771, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0x2 | This PDOR has the following sequence of procedures run for 57 times. Each loop has the following inputs.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Start MCP** | **Final MCP** | **MCP Value** |
|  | **PIA60101** | **PIA60100** | **PIA60218** |
| 1 | 33 | 34 | 19 |
| 2 | 66 | 67 | 4C |
| 3 | 99 | 9A | 7F |
| 4 | CC | CD | B2 |
| 5 | FF | 100 | E5 |
| 6 | 132 | 133 | 119 |
| 7 | 165 | 166 | 14C |
| 8 | 198 | 199 | 17F |
| 9 | 1CB | 1CC | 1B2 |
| 10 | 1FF | 200 | 1E5 |
| 11 | 232 | 233 | 218 |
| 12 | 265 | 266 | 24B |
| 13 | 298 | 299 | 27E |
| 14 | 2CB | 2CC | 2B1 |
| 15 | 2FE | 2FF | 2E4 |
| 16 | 331 | 332 | 318 |
| 17 | 364 | 365 | 34B |
| 18 | 397 | 398 | 37E |
| 19 | 3CA | 3CB | 3B1 |
| 20 | 3FE | 3FF | 3E4 |
| 21 | 431 | 432 | 417 |
| 22 | 464 | 465 | 44A |
| 23 | 497 | 498 | 47D |
| 24 | 4CA | 4CB | 4B0 |
| 25 | 4FD | 4FE | 4E3 |
| 26 | 530 | 531 | 517 |
| 27 | 563 | 564 | 54A |
| 28 | 596 | 597 | 57D |
| 29 | 5C9 | 5CA | 5B0 |
| 30 | 5FD | 5FE | 5E3 |
| 31 | 630 | 631 | 616 |
| 32 | 663 | 664 | 649 |
| 33 | 696 | 697 | 67C |
| 34 | 6C9 | 6CA | 6AF |
| 35 | 6FC | 6FD | 6E2 |
| 36 | 72F | 730 | 716 |
| 37 | 762 | 763 | 749 |
| 38 | 795 | 796 | 77C |
| 39 | 7C8 | 7C9 | 7AF |
| 40 | 7FC | 7FD | 7E2 |
| 41 | 82F | 830 | 815 |
| 42 | 862 | 863 | 848 |
| 43 | 895 | 896 | 87B |
| 44 | 8C8 | 8C9 | 8AE |
| 45 | 8FB | 8FC | 8E1 |
| 46 | 92E | 92F | 915 |
| 47 | 961 | 962 | 948 |
| 48 | 994 | 995 | 97B |
| 49 | 9C7 | 9C8 | 9AE |
| 50 | 9FB | 9FC | 9E1 |
| 51 | A19 | A1A | A0A |
| 52 | A38 | A39 | A28 |
| 53 | A56 | A57 | A47 |
| 54 | A75 | A76 | A66 |
| 55 | A94 | A95 | A84 |
| 56 | AB2 | AB3 | AA3 |
| 57 | AD1 | AD2 | AC2 |

 |
| **SWA Operator Confirm to Proceed Round the Loop** **SWA Operator to check Counts in 3d packets and EM3 packets** |
|  | Post EAS1 MCP CommissionStop normal mode on EAS1 Set the EAS1 MCP to 2695V = 0xAC2Start normal mode on EAS1 Stop normal mode on EAS1  | **PDOR\_SSWA-EAS1\_Post\_MCP\_Comm\_00001.SOL**ZIA58771, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0x0ZIA58784, PIA60218 = 0xAC2ZIA58771, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0x2Wait 00:15:00 (900 seconds)ZIA58771, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0x0 |  |

## SWA-5 Day 3

## EAS2 MCP Commission

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Configure EAS2 for MCP CommissionSet EAS2 hemisphere voltage max to 800VSet EAS2 deflector ratiosLoad the EAS2 threshold values Start normal mode on EAS2  | **PDOR\_SSWA-EAS2\_MCP\_Config\_00001.SOL**ZIA58815, PIA60441 = 0x02 PIA60442 = 0x9C PIA60443 = 0x80ZIA58813, PIA60474 = 0x00 PIA60475 = 0x00 PIA60578 = 0x00 PIA60589 = 0x00 PIA60600 = 0x00 PIA60611 = 0x00 PIA60622 = 0x00 PIA60633 = 0x00 PIA60644 = 0x00 PIA60655 = 0x00 PIA60476 = 0x00 PIA60487 = 0x00 PIA60498 = 0x00 PIA60509 = 0x00 PIA60520 = 0x00 PIA60531 = 0x00 PIA60542 = 0x00 PIA60553 = 0x00 PIA60564 = 0x00 PIA60575 = 0x00 PIA60579 = 0x00 PIA60580 = 0x00 PIA60581 = 0x00 PIA60582 = 0x00 PIA60583 = 0x00 PIA60584 = 0x00 PIA60585 = 0x00 PIA60586 = 0x00 PIA60587 = 0x00 PIA60588 = 0x00 PIA60590 = 0x00 PIA60591 = 0x00 PIA60592 = 0x00 PIA60593 = 0x00 PIA60594 = 0x00 PIA60595 = 0x00 PIA60596 = 0x00 PIA60597 = 0x00 PIA60598 = 0x00 PIA60599 = 0x00 PIA60601 = 0x00 PIA60602 = 0x00 PIA60603 = 0x00 PIA60604 = 0x00 PIA60605 = 0x00 PIA60606 = 0x00 PIA60607 = 0x00 PIA60608 = 0x00 PIA60609 = 0x00 PIA60610 = 0x00 PIA60612 = 0x00 PIA60613 = 0x00 PIA60614 = 0x00 PIA60615 = 0x00 PIA60616 = 0x00 PIA60617 = 0x00 PIA60618 = 0x00 PIA60619 = 0x00 PIA60620 = 0x00 PIA60621 = 0x00 PIA60623 = 0x00 PIA60624 = 0x00 PIA60625 = 0x00 PIA60626 = 0x00 PIA60627 = 0x00 PIA60628 = 0x00 PIA60629 = 0x00 PIA60630 = 0x00 PIA60631 = 0x00 PIA60632 = 0x00 PIA60634 = 0x00 PIA60635 = 0x00 PIA60636 = 0x00 PIA60637 = 0x00 PIA60638 = 0x00 PIA60639 = 0x00 PIA60640 = 0x00 PIA60641 = 0x00 PIA60642 = 0x00 PIA60643 = 0x00 PIA60645 = 0x00 PIA60646 = 0x00 PIA60647 = 0x00 PIA60648 = 0x00 PIA60649 = 0x00 PIA60650 = 0x00 PIA60651 = 0x00 PIA60652 = 0x00 PIA60653 = 0x00 PIA60654 = 0x00 PIA60656 = 0x00 PIA60657 = 0x00 PIA60658 = 0x00 PIA60659 = 0x00 PIA60660 = 0x00 PIA60661 = 0x00ZIA58845, PIA60174 = 0x5F40 PIA60185 = 0x5F41 PIA60196 = 0x5F42 PIA60200 = 0x5F43 PIA60201 = 0x5F44 PIA60202 = 0x5F45 PIA60203 = 0x6586 PIA60204 = 0x6587 PIA60205 = 0x66C8 PIA60175 = 0x5F49 PIA60176 = 0x5F4A PIA60177 = 0x5F4B PIA60178 = 0x5F4C PIA60179 = 0x5F4D PIA60180 = 0x5F4E PIA60181 = 0x5F4F PIA60182 = 0x5F40 PIA60183 = 0x5F41 PIA60184 = 0x5F42 PIA60186 = 0x5F43 PIA60187 = 0x5F44 PIA60188 = 0x5F45 PIA60189 = 0x5F46 PIA60190 = 0x5F47 PIA60191 = 0x5F48 PIA60192 = 0x5F49 PIA60193 = 0x5F4A PIA60194 = 0x5CCB PIA60195 = 0x5F4C PIA60197 = 0x5F4D PIA60198 = 0x5F4E PIA60199 = 0x5F4FZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0x2 |  |
|  | Commission EAS2 MCPStop normal mode on EAS2 Perform Eng Mode 3[Conversion = 1.022 ]Set the EAS2 MCP back by 25VStart normal mode on EAS2  | **PDOR\_SSWA-EAS2\_MCP\_Comm\_00001.SOL**ZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0ZIA58837, PIA60101 = [Start MCP] PIA60100 = [Final MCP] PIA60102 = 0x33 ;Step MCP PIA60437 = 1 ;1st ramp time PIA60444 = 1 ;Inter ramp time PIA60165 = 20 ;Acq time PIA60760 = 0x20 Hem bin PIA60761 = 0x8 ;Def number PIA60762 = SWEEP\_MACRO ;ctrlWait 00:00:30 (30 seconds)ZIA58832, PIA60218 = [MCP Value]ZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0x2 | This PDOR has the following sequence of procedures run for 57 times. Each loop has the following inputs.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Start MCP** | **Final MCP** | **MCP Value** |
|  | **PIA60101** | **PIA60100** | **PIA60218** |
| 1 | 33 | 34 | 19 |
| 2 | 66 | 67 | 4C |
| 3 | 99 | 9A | 7F |
| 4 | CC | CD | B2 |
| 5 | FF | 100 | E5 |
| 6 | 132 | 133 | 119 |
| 7 | 165 | 166 | 14C |
| 8 | 198 | 199 | 17F |
| 9 | 1CB | 1CC | 1B2 |
| 10 | 1FF | 200 | 1E5 |
| 11 | 232 | 233 | 218 |
| 12 | 265 | 266 | 24B |
| 13 | 298 | 299 | 27E |
| 14 | 2CB | 2CC | 2B1 |
| 15 | 2FE | 2FF | 2E4 |
| 16 | 331 | 332 | 318 |
| 17 | 364 | 365 | 34B |
| 18 | 397 | 398 | 37E |
| 19 | 3CA | 3CB | 3B1 |
| 20 | 3FE | 3FF | 3E4 |
| 21 | 431 | 432 | 417 |
| 22 | 464 | 465 | 44A |
| 23 | 497 | 498 | 47D |
| 24 | 4CA | 4CB | 4B0 |
| 25 | 4FD | 4FE | 4E3 |
| 26 | 530 | 531 | 517 |
| 27 | 563 | 564 | 54A |
| 28 | 596 | 597 | 57D |
| 29 | 5C9 | 5CA | 5B0 |
| 30 | 5FD | 5FE | 5E3 |
| 31 | 630 | 631 | 616 |
| 32 | 663 | 664 | 649 |
| 33 | 696 | 697 | 67C |
| 34 | 6C9 | 6CA | 6AF |
| 35 | 6FC | 6FD | 6E2 |
| 36 | 72F | 730 | 716 |
| 37 | 762 | 763 | 749 |
| 38 | 795 | 796 | 77C |
| 39 | 7C8 | 7C9 | 7AF |
| 40 | 7FC | 7FD | 7E2 |
| 41 | 82F | 830 | 815 |
| 42 | 862 | 863 | 848 |
| 43 | 895 | 896 | 87B |
| 44 | 8C8 | 8C9 | 8AE |
| 45 | 8FB | 8FC | 8E1 |
| 46 | 92E | 92F | 915 |
| 47 | 961 | 962 | 948 |
| 48 | 994 | 995 | 97B |
| 49 | 9C7 | 9C8 | 9AE |
| 50 | 9FB | 9FC | 9E1 |
| 51 | A19 | A1A | A0A |
| 52 | A38 | A39 | A28 |
| 53 | A56 | A57 | A47 |
| 54 | A75 | A76 | A66 |
| 55 | A94 | A95 | A84 |
| 56 | AB2 | AB3 | AA3 |
| 57 | AD1 | AD2 | AC2 |

 |
| **SWA Operator Confirm to Proceed Round the Loop** **SWA Operator to check Counts in 3d packets and EM3 packets** |
|  | Post EAS2 MCP CommissionStop normal mode on EAS2 Set the EAS2 MCP to 2695V = 0xAC2Start normal mode on EAS2 Stop normal mode on EAS2 | **PDOR\_SSWA-EAS2\_Post\_MCP\_Comm\_00001.SOL**ZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0ZIA58832, PIA60218 = 0xAC2ZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 2Wait 00:15:00 (900 seconds)ZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0 |  |

## SWA-5 Day 4

## EAS 1 Engineering Modes

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Perform Eng mode 4 on EAS1Stop normal mode on EAS1Eng mode 4 (Threshold Sweep)Run post-eng mode macro on EAS1 Start normal mode on EAS21 | **PDOR\_SSWA-EAS1\_EngMode4\_00001.SOL**ZIA58771, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0ZIA58790, PIA60104 = 0x724 Start Thresh PIA60103 = 0x477 End Thresh PIA60105 = 0x200 Thresh step PIA60106 = 0x0 MCP Value PIA60165 = 0xA MCP wait PIA60851 = 2 Acq time PIA60760 = 0x20 Hem bin PIA60761 = 0x8 Def numberZIA58934,PIA60739, EQUAL,POST\_ENGZIA58771, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 2 |  |
|  | Perform Eng mode 5 on EAS1Stop normal mode on EAS1Eng mode 5 (Threshold Sweep)Run post-eng mode macro on EAS1 Start normal mode on EAS1 | **PDOR\_SSWA-EAS1\_EngMode5\_00001.SOL**ZIA58771, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0ZIA58791, PIA60454 = 0xFF PA1 stim PIA60455 = 0xFF PA2 stim PIA60040 = 0x724 Start Thresh PIA60039 = 0x477 End Thresh PIA60041 = 0x76 Thresh step PIA60106 = 0x0 MCP value PIA60171 = 0xA MCP wait PIA60165 = 2 Acq timeZIA58934, PIA60739 = POST\_ENGZIA58771, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 2 |  |
|  | Perform Eng mode 6 on EAS1Stop normal mode on EAS1Eng mode 6 (Stim Sweep)Run post-eng mode macro on EAS1 Start normal mode on EAS1 | **PDOR\_SSWA-EAS1\_EngMode6\_00001.SOL**ZIA58771, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0ZIA58792, PIA60457 = 0xFF Stim high PIA60458 = 0x32 Stim low PIA60459 = 0x29 Stim step PIA60106 = 0x0 MCP value PIA60171 = 0xA MCP wait PIA60165 = 2 Acq timeZIA58934, PIA60739 = POST\_ENGZIA58771, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 2 |  |
|  | Perform Eng mode 3 on EAS1Stop normal mode on EAS1Eng mode 3 (Gain Test)Run post-eng mode macro on EAS1 Start normal mode on EAS1 | **PDOR\_SSWA-EAS1\_EngMode3\_00001.SOL**ZIA58771, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0x0ZIA58789, PIA60101 = [Start MCP] PIA60100 = [Final MCP] PIA60102 = 0x33 ;Step MCP PIA60437 = 1 ;1st ramp time PIA60444 = 1 ;Inter ramp time PIA60165 = 20 ;Acq time PIA60760 = 0x20 Hem bin PIA60761 = 0x8 ;Def number PIA60762 = SWEEP\_MACRO ;ctrlZIA58934, PIA60739 = POST\_ENGZIA58771, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 2 |  |

## EAS 2 Engineering Modes

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Perform Eng mode 4 on EAS2Stop normal mode on EAS2Eng mode 4 (Threshold Sweep)Run post-eng mode macro on EAS2 Start normal mode on EAS2 | **PDOR\_SSWA-EAS2\_EngMode4\_00001.SOL**ZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0ZIA58838, PIA60104 = 0x724 Start Thresh PIA60103 = 0x477 End Thresh PIA60105 = 0x200 Thresh step PIA60106 = 0x0 MCP Value PIA60165 = 0xA MCP wait PIA60851 = 2 Acq time PIA60760 = 0x20 Hem bin PIA60761 = 0x8 Def numberZIA58936,PIA60740, EQUAL,POST\_ENGZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 2 |  |
|  | Perform Eng mode 5 on EAS2Stop normal mode on EAS2Eng mode 5 (Threshold Sweep)Run post-eng mode macro on EAS2Start normal mode on EAS2 | **PDOR\_SSWA-EAS2\_EngMode5\_00001.SOL**ZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0ZIA58839, PIA60454 = 0xFF PA1 stim PIA60455 = 0xFF PA2 stim PIA60040 = 0x724 Start Thresh PIA60039 = 0x477 End Thresh PIA60041 = 0x76 Thresh step PIA60106 = 0x0 MCP value PIA60171 = 0xA MCP wait PIA60165 = 2 Acq timeZIA58936, PIA60740 = POST\_ENGZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 2 |  |
|  | Perform Eng mode 6 on EAS2Stop normal mode on EAS2Eng mode 6 (Stim Sweep)Run post-eng mode macro on EAS1 Start normal mode on EAS2 | **PDOR\_SSWA-EAS2\_EngMode6\_00001.SOL**ZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0ZIA58840, PIA60457 = 0xFF Stim high PIA60458 = 0x32 Stim low PIA60459 = 0x29 Stim step PIA60106 = 0x0 MCP value PIA60171 = 0xA MCP wait PIA60165 = 2 Acq timeZIA58936, PIA60740 = POST\_ENGZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 2 |  |
|  | Perform Eng mode 3 on EAS2Stop normal mode on EAS2Eng mode 3 (Gain Test)Run post-eng mode macro on EAS2Start normal mode on EAS2 | **PDOR\_SSWA-EAS2\_EngMode3\_00001.SOL**ZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0ZIA58837, PIA60101 = [Start MCP] PIA60100 = [Final MCP] PIA60102 = 0x33 ;Step MCP PIA60437 = 1 ;1st ramp time PIA60444 = 1 ;Inter ramp time PIA60165 = 20 ;Acq time PIA60760 = 0x20 Hem bin PIA60761 = 0x8 ;Def number PIA60762 = SWEEP\_MACRO ;ctrlZIA58936, PIA60740 = POST\_ENGZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 2 |  |

## EAS Deflectors

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Adjust Deflectors on EAS1Stop Normal Mode on EAS1Adjust the Deflector Ratios | **PDOR\_SSWA-EAS1\_Deflectors\_00001.SOL**ZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0ZIA58765, PIA60474 = 0x00 PIA60475 = 0x00 PIA60578 = 0x00 PIA60589 = 0x00 PIA60600 = 0x00 PIA60611 = 0x00 PIA60622 = 0x00 PIA60633 = 0x00 PIA60644 = 0x00 PIA60655 = 0x00 PIA60476 = 0x00 PIA60487 = 0x00 PIA60498 = 0x00 PIA60509 = 0x00 PIA60520 = 0x00 PIA60531 = 0x00 PIA60542 = 0x00 PIA60553 = 0x00 PIA60564 = 0x00 PIA60575 = 0x00 PIA60579 = 0x00 PIA60580 = 0x00 PIA60581 = 0x00 PIA60582 = 0x00 PIA60583 = 0x00 PIA60584 = 0x00 PIA60585 = 0x00 PIA60586 = 0x00 PIA60587 = 0x00 PIA60588 = 0x00 PIA60590 = 0x00 PIA60591 = 0x00 PIA60592 = 0x00 PIA60593 = 0x00 PIA60594 = 0x00 PIA60595 = 0x00 PIA60596 = 0x00 PIA60597 = 0x00 PIA60598 = 0x00 PIA60599 = 0x00 PIA60601 = 0x00 PIA60602 = 0x00 PIA60603 = 0x00 PIA60604 = 0x00 PIA60605 = 0x00 PIA60606 = 0x00 PIA60607 = 0x00 PIA60608 = 0x00 PIA60609 = 0x00 PIA60610 = 0x00 PIA60612 = 0x00 PIA60613 = 0x00 PIA60614 = 0x00 PIA60615 = 0x00 PIA60616 = 0x00 PIA60617 = 0x00 PIA60618 = 0x00 PIA60619 = 0x00 PIA60620 = 0x00 PIA60621 = 0x00 PIA60623 = 0x00 PIA60624 = 0x00 PIA60625 = 0x00 PIA60626 = 0x00 PIA60627 = 0x00 PIA60628 = 0x00 PIA60629 = 0x00 PIA60630 = 0x00 PIA60631 = 0x00 PIA60632 = 0x00 PIA60634 = 0x00 PIA60635 = 0x00 PIA60636 = 0x00 PIA60637 = 0x00 PIA60638 = 0x00 PIA60639 = 0x00 PIA60640 = 0x00 PIA60641 = 0x00 PIA60642 = 0x00 PIA60643 = 0x00 PIA60645 = 0x00 PIA60646 = 0x00 PIA60647 = 0x00 PIA60648 = 0x00 PIA60649 = 0x00 PIA60650 = 0x00 PIA60651 = 0x00 PIA60652 = 0x00 PIA60653 = 0x00 PIA60654 = 0x00 PIA60656 = 0x00 PIA60657 = 0x00 PIA60658 = 0x00 PIA60659 = 0x00 PIA60660 = 0x00 PIA60661 = 0x00 |  |
|  | Adjust Deflectors on EAS2Stop Normal Mode on EAS2Adjust the Deflector Ratios | **PDOR\_SSWA-EAS2\_Deflectors\_00001.SOL**ZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0ZIA58813, PIA60474 = 0x00 PIA60475 = 0x00 PIA60578 = 0x00 PIA60589 = 0x00 PIA60600 = 0x00 PIA60611 = 0x00 PIA60622 = 0x00 PIA60633 = 0x00 PIA60644 = 0x00 PIA60655 = 0x00 PIA60476 = 0x00 PIA60487 = 0x00 PIA60498 = 0x00 PIA60509 = 0x00 PIA60520 = 0x00 PIA60531 = 0x00 PIA60542 = 0x00 PIA60553 = 0x00 PIA60564 = 0x00 PIA60575 = 0x00 PIA60579 = 0x00 PIA60580 = 0x00 PIA60581 = 0x00 PIA60582 = 0x00 PIA60583 = 0x00 PIA60584 = 0x00 PIA60585 = 0x00 PIA60586 = 0x00 PIA60587 = 0x00 PIA60588 = 0x00 PIA60590 = 0x00 PIA60591 = 0x00 PIA60592 = 0x00 PIA60593 = 0x00 PIA60594 = 0x00 PIA60595 = 0x00 PIA60596 = 0x00 PIA60597 = 0x00 PIA60598 = 0x00 PIA60599 = 0x00 PIA60601 = 0x00 PIA60602 = 0x00 PIA60603 = 0x00 PIA60604 = 0x00 PIA60605 = 0x00 PIA60606 = 0x00 PIA60607 = 0x00 PIA60608 = 0x00 PIA60609 = 0x00 PIA60610 = 0x00 PIA60612 = 0x00 PIA60613 = 0x00 PIA60614 = 0x00 PIA60615 = 0x00 PIA60616 = 0x00 PIA60617 = 0x00 PIA60618 = 0x00 PIA60619 = 0x00 PIA60620 = 0x00 PIA60621 = 0x00 PIA60623 = 0x00 PIA60624 = 0x00 PIA60625 = 0x00 PIA60626 = 0x00 PIA60627 = 0x00 PIA60628 = 0x00 PIA60629 = 0x00 PIA60630 = 0x00 PIA60631 = 0x00 PIA60632 = 0x00 PIA60634 = 0x00 PIA60635 = 0x00 PIA60636 = 0x00 PIA60637 = 0x00 PIA60638 = 0x00 PIA60639 = 0x00 PIA60640 = 0x00 PIA60641 = 0x00 PIA60642 = 0x00 PIA60643 = 0x00 PIA60645 = 0x00 PIA60646 = 0x00 PIA60647 = 0x00 PIA60648 = 0x00 PIA60649 = 0x00 PIA60650 = 0x00 PIA60651 = 0x00 PIA60652 = 0x00 PIA60653 = 0x00 PIA60654 = 0x00 PIA60656 = 0x00 PIA60657 = 0x00 PIA60658 = 0x00 PIA60659 = 0x00 PIA60660 = 0x00 PIA60661 = 0x00 |  |

## EAS Thresholds

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Adjust Thresholds on EAS1Stop Normal Mode on EAS1Adjust the Thresholds | **PDOR\_SSWA-EAS1\_Thresholds\_00001.SOL**ZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0ZIA58797, PIA60174 = 0x5F40 PIA60185 = 0x5F41 PIA60196 = 0x5F42 PIA60200 = 0x5F43 PIA60201 = 0x5F44 PIA60202 = 0x5F45 PIA60203 = 0x6586 PIA60204 = 0x6587 PIA60205 = 0x66C8 PIA60175 = 0x5F49 PIA60176 = 0x5F4A PIA60177 = 0x5F4B PIA60178 = 0x5F4C PIA60179 = 0x5F4D PIA60180 = 0x5F4E PIA60181 = 0x5F4F PIA60182 = 0x5F40 PIA60183 = 0x5F41 PIA60184 = 0x5F42 PIA60186 = 0x5F43 PIA60187 = 0x5F44 PIA60188 = 0x5F45 PIA60189 = 0x5F46 PIA60190 = 0x5F47 PIA60191 = 0x5F48 PIA60192 = 0x5F49 PIA60193 = 0x5F4A PIA60194 = 0x5CCB PIA60195 = 0x5F4C PIA60197 = 0x5F4D PIA60198 = 0x5F4E PIA60199 = 0x5F4F |  |
|  | Adjust Thresholds on EAS2Stop Normal Mode on EAS2Adjust the Thresholds | **PDOR\_SSWA-EAS2\_Thresholds\_00001.SOL**ZIA58819, PIA60031 = MBOX1 PIA60446 = 0 PIA60447 = 0 PIA60448 = 0ZIA58845, PIA60174 = 0x5F40 PIA60185 = 0x5F41 PIA60196 = 0x5F42 PIA60200 = 0x5F43 PIA60201 = 0x5F44 PIA60202 = 0x5F45 PIA60203 = 0x6586 PIA60204 = 0x6587 PIA60205 = 0x66C8 PIA60175 = 0x5F49 PIA60176 = 0x5F4A PIA60177 = 0x5F4B PIA60178 = 0x5F4C PIA60179 = 0x5F4D PIA60180 = 0x5F4E PIA60181 = 0x5F4F PIA60182 = 0x5F40 PIA60183 = 0x5F41 PIA60184 = 0x5F42 PIA60186 = 0x5F43 PIA60187 = 0x5F44 PIA60188 = 0x5F45 PIA60189 = 0x5F46 PIA60190 = 0x5F47 PIA60191 = 0x5F48 PIA60192 = 0x5F49 PIA60193 = 0x5F4A PIA60194 = 0x5CCB PIA60195 = 0x5F4C PIA60197 = 0x5F4D PIA60198 = 0x5F4E PIA60199 = 0x5F4F |  |

At this point, EAS 1&2 are now initially commissioned for use.

## EAS 1&2 Contingency Plans

The following procedure are to be used in the event of any issues with EAS.

| **Step N°** | **Non Expected Outcome** | **FCP ID or PDOR title & contents** | **Action** |
| --- | --- | --- | --- |
|  | **EAS1 Temperature too high / too cold**TM, YIA58201,NIA00907, LIMIT,280, 310 EAS1\_EOPTEMPTM, YIA58201,NIA00915, LIMIT,280, 310 EAS1\_EHVGENTHERTM, YIA58201,NIA00916, LIMIT,280, 310 EAS1\_EHVMODTHER | **PDOR\_SSWA-EAS1\_Heater\_00001.SOL**ZIA58757, PIA60773 = 0x00  PIA60774 = 0xnn PIA60775 = 0xnn | Reduce the EAS1 Heater. Default = 0x00 0x01 0x60 |
|  | **EAS2 Temperature too high / too cold**TM, YIA58202,NIA10907, LIMIT,280, 310 EAS2\_EOPTEMPTM, YIA58201,NIA10915, LIMIT,280, 310 EAS2\_EHVGENTHERTM, YIA58201,NIA10916, LIMIT,280, 310 EAS2\_EHVMODTHER | **PDOR\_SSWA-EAS2\_Heater\_00001.SOL**ZIA58805, PIA60773 = 0x00  PIA60774 = 0xnn PIA60775 = 0xnn | Reduce the EAS2 Heater. Default = 0x00 0x01 0x60 |
|  | **EAS1 Electron Counts are too high**TM, YIA58921 TM(21,3) SSID=18 SWA\_TM\_SCI\_EAS1\_ENG\_3-4\_RAW\_FIRST | **PDOR\_SSWA-EAS1 MCP\_00001.SOL**ZIA58784, PIA60218 = 0xnnn | Reduce EAS1 MCP level |
|  | **EAS2 Electron Counts are too high**TM, YIA58921 TM(21,3) SSID=18 SWA\_TM\_SCI\_EAS1\_ENG\_3-4\_RAW\_FIRST | **PDOR\_SSWA-EAS2 MCP\_00001.SOL**ZIA58832, PIA60218 = 0xnnn | Reduce EAS2 MCP level |

# SWA Commissioning Procedure (SWA-6, IA-6)

Cadences, BM

## Normal mode operation demonstration

## Burst & Triggered mode

# Inter-instrument campaign (SWA-7, IA-7)

# Interference campaign (IW-6.3)

The interference campaign is being managed by the SOC. The following PDORs and FCPs will be used during this campaign.

# Appendix 1. List of PDORs

|  |  |  |
| --- | --- | --- |
| **PDOR title**  | **Number of TC** | **Comments** |
| PDOR\_SSWA\_DPU\_Diag\_Comm\_00001.SOL |  |  |
| PDOR\_SSWA-DPU\_MemDump\_00001.SOL |  |  |
| PDOR\_SSWA-DPU\_InValTC\_00001.SOL |  |  |
| PDOR\_SSWA-EAS1\_Comm\_IA2\_00001.SOL |  |  |
| PDOR\_SSWA-EAS2\_Comm\_IA2\_00001.SOL |  |  |
| PDOR\_SSWA-EAS1\_Comm\_Config\_00001.SOL |  |  |
| PDOR\_SSWA-EAS2\_Comm\_Config\_00001.SOL |  |  |
| PDOR\_SSWA-EAS1\_Partial\_Heater\_00001.SOL | 2 |  |
| PDOR\_SSWA-EAS2\_Partial\_Heater\_00001.SOL | 2 |  |
| PDOR\_SSWA-EAS1\_Full\_Heater\_00001.SOL | 2 |  |
| PDOR\_SSWA-EAS2\_Full\_Heater\_00001.SOL | 2 |  |
| PDOR\_SSWA-PAS\_CommPowerOn\_00001.SOL |  |  |
| PDOR\_SSWA-PAS\_CommConfig\_00001.SOL |  |  |
| PDOR\_SSWA-PAS\_Eng\_Stepping\_00001.SOL |  |  |
| PDOR\_SSWA-PAS\_Detector\_Comm\_00001.SOL |  |  |
| PDOR\_SSWA-PAS\_NomCEM\_Static\_00001.SOL |  |  |
| PDOR\_SSWA-PAS\_NormSciComm\_00001.SOL |  |  |
| PDOR\_SSWA-EAS1\_ElectComm\_00001.SOL |  |  |
| PDOR\_SSWA-EAS2\_ElectComm\_00001.SOL |  |  |
| PDOR\_SSWA-EAS1\_MCP\_Config\_00001.SOL |  |  |
| PDOR\_SSWA-EAS1\_MCP\_Comm\_00001.SOL |  |  |
| PDOR\_SSWA-EAS1\_Post\_MCP\_Comm\_00001.SOL |  |  |
| PDOR\_SSWA-EAS2\_MCP\_Config\_00001.SOL |  |  |
| PDOR\_SSWA-EAS2\_MCP\_Comm\_00001.SOL |  |  |
| PDOR\_SSWA-EAS2\_Post\_MCP\_Comm\_00001.SOL | 4 |  |
| PDOR\_SSWA-EAS1\_EngMode4\_00001.SOL | 4 |  |
| PDOR\_SSWA-EAS1\_EngMode5\_00001.SOL | 4 |  |
| PDOR\_SSWA-EAS1\_EngMode6\_00001.SOL | 4 |  |
| PDOR\_SSWA-EAS1\_EngMode3\_00001.SOL | 4 |  |
| PDOR\_SSWA-EAS2\_EngMode4\_00001.SOL | 4 |  |
| PDOR\_SSWA-EAS2\_EngMode5\_00001.SOL | 4 |  |
| PDOR\_SSWA-EAS2\_EngMode6\_00001.SOL | 4 |  |
| PDOR\_SSWA-EAS2\_EngMode3\_00001.SOL | 4 |  |
| PDOR\_SSWA-EAS1\_Deflectors\_00001.SOL | 2 |  |
| PDOR\_SSWA-EAS2\_Deflectors\_00001.SOL | 2 |  |
| PDOR\_SSWA-EAS1\_Thresholds\_00001.SOL | 2 |  |
| PDOR\_SSWA-EAS2\_Thresholds\_00001.SOL | 2 |  |
|  |  |  |

# Appendix 1. List of MDORs

|  |  |  |
| --- | --- | --- |
| **MDOR title**  | **Number of TC** | **Comments** |
| MDOR\_SSWA-DPU\_Write\_00001.SOL |  |  |
| MDOR\_SSWA-FSW-patch\_00001.SOL |  |  |
|  |  |  |