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**CONTENTS**

1 Introduction 5

2 Reference Documents 5

3 Acronym and Abbreviation List 6

4 General requirements 7

4.1 Spacecraft Location and Plasma Environment 7

4.2 Required Configuration of the Spacecraft 7

4.3 Spacecraft Pointing 7

4.4 Spacecraft-generated Gases 7

4.5 Telemetry 7

4.6 Required Configuration of other Instruments 7

4.7 Inter-Experiment Links - Service 20 7

4.8 Verification process during commissioning 8

4.8.1. Performance Verification 8

4.8.2. Spacecraft EGSE Real-time Housekeeping Parameters 8

4.8.3. Real-time SWA Housekeeping Parameters 8

4.8.4. Real-time SWA Science Data 8

4.9 Order of commissioning of the DPU and SWA sensors 8

5 SWA Commissioning flow 1

6 SWA2 (IA-2) 2

6.1 DPU Power Up 2

6.2 DPU Commission 3

6.3 DPU SW Patch 9

6.4 EAS Power Up 9

6.5 End of IA-2 Power Down 14

7 SWA-3 (IA-3) 15

7.1 SWA-3 Day 1 15

Power up DPU 15

Power up EAS 16

4.8.5. Power up HIS 20

HIS Commission 21

End of IA-3 Power Down 22

8 SWA-4 (IA-4) 23

8.1 SWA-4 Day 1 23

Power up DPU 23

Power up EAS 24

Configure EAS Heaters 24

PAS Power On 25

Ramp up PAS MHV 28

PAS Engineering stepping 30

PAS Detector commission 32

8.2 SWA-4 Day 2 41

Resume PAS CEM nominal voltage in static scheme 41

Normal Science Check 47

9 SWA-5 (IA-5) 53

9.1 SWA-5 Day1 53

DPU Power Up 53

EAS Power Up 53

EAS1 Electronics Commission 54

EAS2 Electronics Commission 57

9.2 SWA-5 Day 2 59

EAS1 MCP Commission 59

9.3 SWA-5 Day 3 72

EAS2 MCP Commission 72

9.4 SWA-5 Day 4 84

EAS 1 Engineering Modes 84

EAS 2 Engineering Modes 89

EAS Deflectors 94

EAS Thresholds 106

9.5 EAS 1&2 Contingency Plans 112

10 SWA Commissioning Procedure (SWA-6, IA-6) 114

10.1 Normal mode operation demonstration 114

10.2 Burst & Triggered mode 114

11 Inter-instrument campaign (SWA-7, IA-7) 114

12 Interference campaign 114

# 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 Test  Switch 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\_HK  Wait 00:00:01 (1 second)  ZIA58050, PIA58050 = DPU\_MAX\_DUR\_HK  Wait 00:00:01 (1 second)  ZIA58050, PIA58050 = DPU\_FDIR\_ST\_HK  Wait 00:00:01 (1 second)  ZIA58050, PIA58050 = DPU\_FDIR\_MON\_HK  Wait 00:00:01 (1 second)  ZIA58050, PIA58050 = DPU\_MON\_DER\_HK  Wait 00:00:01 (1 second)  ZIA58050, PIA58050 = DPU\_TM\_CNT  ZIA58050, PIA58050 = DPU\_ERR\_CNT  Wait 00:01:00 (60 seconds)  ZIA58051, PIA58050 = DPU\_TC\_CNT\_HK  Wait 00:00:01 (1 second)  ZIA58051, PIA58050 = DPU\_VALID\_PAR\_HK  Wait 00:00:01 (1 second)  ZIA58051, PIA58050 = DPU\_HW\_DIAG\_HK  Wait 00:00:01 (1 second)  ZIA58051, PIA58050 = DPU\_MAX\_DUR\_HK  Wait 00:00:01 (1 second)  ZIA58051, PIA58050 = DPU\_FDIR\_ST\_HK  Wait 00:00:01 (1 second)  ZIA58051, PIA58050 = DPU\_FDIR\_MON\_HK  Wait 00:00:01 (1 second)  ZIA58051, PIA58050 = DPU\_MON\_DER\_HK  Wait 00:00:01 (1 second)  ZIA58050, PIA58050 = DPU\_TM\_CNT  Wait 00:00:01 (1 second)  ZIA58051, PIA58050 = DPU\_ERR\_CNT | 1 second between each TC  1 second between each TC |

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | DPU Memory Dumps  Dump RAM  Dump MRAM1  Dump DPU\_PROM  Dump 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 = 10  Wait 00:00:01 (1 second)  ZIA58054, PIA58056 = DPU\_PROM  PIA60330 = 0x00 00 00 00  PIA60329 = 10  Wait 00:00:01 (1 second)  ZIA58054, PIA58056 = DPU\_MRAM2  PIA60330 = 0x10 00 00 00  PIA60329 = 10 |  |
|  | DPU memory writes and checks  Write to RAM  Checksum RAM  Checksum MRAM1  Checksum PROM  Checksum 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 = 0x01  Wait 00:00:01 (1 second)  ZIA58055, PIA58056 = DPU\_RAM  PIA60330 = 0x40 70 00 00  PIA60329 = 4  Wait 00:00:01 (1 second)  ZIA58055, PIA58056 = DPU\_MRAM1  PIA60330 = 0x10 1E 10 00  PIA60329 = 52  Wait 00:00:01 (1 second)  ZIA58055, PIA58056 = DPU\_PROM  PIA60330 = 0x00 00 00 00  PIA60329 = 100  Wait 00:00:01 (1 second)  ZIA58055, PIA58056 = DPU\_MRAM2  PIA60330 = 0x10 1E 10 00  PIA60329 = 52 | Result should be = 1186  Result should be  Result should be 22271  Result should be = |
|  | DPU Invalid TC test  Not 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 00  Wait 00:00:01 (1 second)  ZIA58056 | TM,YIA58152TM(1,8) SWA\_CMD\_INVALID\_START\_ADDR  TM,YIA58153TM(1,8) SWA\_CMD\_INVALID\_LENGTH  TM,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 EAS1  Zero EAS1 MCP  Modify config Params  Accept the new values  Zero EAS1 HV  Modify config Params  Accept the new values  Power EAS1 on  POST macro on EAS1  IDLE macro on EAS1  Request EAS1 HK  RUN 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 = 0x00  ZIA58708  ZIA58706, PIA60133 = 1  PIA60136 = 0x1003  PIA60135 = 6  PIA60134 = 0xDE  PIA60134 = 0xB8  PIA60134 = 0x51  PIA60134 = 0x00  PIA60134 = 0x00  PIA60134 = 0x00  ZIA58708  ZIA58760  ZIA58934, PIA60739 = POST  ZIA58753  Wait 00:00:01 (1 second)  ZIA58782  Wait 00:00:01 (1 second)  ZIA58758  Wait 00:00:20 (20 second) | Examine HK before proceeding |
|  | Power Up and Configure EAS2  Zero EAS2 MCP  Modify config Params  Accept the new values  Zero EAS2 HV  Modify config Params  Accept the new values  Power EAS2 on  POST macro on EAS2  IDLE macro on EAS2  Request EAS2 HK  RUN 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 = 0x00  ZIA58708  ZIA58706, PIA60133 = 1  PIA60136 = 0x2003  PIA60135 = 6  PIA60134 = 0xDE  PIA60134 = 0xB8  PIA60134 = 0x51  PIA60134 = 0x00  PIA60134 = 0x00  PIA60134 = 0x00  ZIA58708  ZIA58808  ZIA58936,PIA60740,EQUAL,POST  ZIA58801  Wait 00:00:01 (1 second)  ZIA58830  Wait 00:00:01 (1 second)  ZIA58806  Wait 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 EAS1  Zero EAS1 MCP  Modify config Params  Accept the new values  Zero EAS1 HV  Modify config Params  Accept the new values  Power EAS1 on  Configure 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 = 0x00  ZIA58708  ZIA58706, PIA60133 = 1  PIA60136 = 0x1003  PIA60135 = 6  PIA60134 = 0xDE  PIA60134 = 0xB8  PIA60134 = 0x51  PIA60134 = 0x00  PIA60134 = 0x00  PIA60134 = 0x00  ZIA58708  IA-FCP-014  IA-FCP-040 |  |
|  | Power Up and Configure EAS2  Zero EAS2 MCP  Modify config Params  Accept the new values  Zero EAS2 HV  Modify config Params  Accept the new values  Power EAS2 on  Configure 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 = 0x00  ZIA58708  ZIA58706, PIA60133 = 1  PIA60136 = 0x2003  PIA60135 = 6  PIA60134 = 0xDE  PIA60134 = 0xB8  PIA60134 = 0x51  PIA60134 = 0x00  PIA60134 = 0x00  PIA60134 = 0x00  ZIA58708  IA-FCP-015  IA-FCP-050 |  |

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** | |
| --- | --- | --- | --- | --- |
|  | Turn the manual heater on for EAS1  Master Control Register  Heater Control | **PDOR\_SSWA-EAS1\_Partial\_Heater\_00001.SOL**  ZIA58776, PIA60423 = 0x00  PIA60424 = 0x40  PIA60425 = 0x60  ZIA58824, PIA60423 = 0x00  PIA60424 = 0x00  PIA60425 = 0xE8 | | Control EAS heaters to ¾ max  0xE8 |
|  | Turn the manual heater on for EAS2  Master control Register  Heater Control | **PDOR\_SSWA-EAS2\_Partial\_Heater\_00001.SOL**  ZIA58824, PIA60423 = 0x00  PIA60424 = 0x40  PIA60425 = 0x60  ZIA58757, PIA60773 = 0x00  PIA60774 = 0x00  PIA60775 = 0xE8 | | Control EAS1 heaters to ¾ max  0xE8 |

### 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** | |
| --- | --- | --- | --- | --- |
|  |  |  | |  |
|  |  |  | |  |
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|  |  |  | |  |

## 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 EAS1  Master Control Register  Heater Control | **PDOR\_SSWA-EAS1\_Full\_Heater\_00001.SOL**  ZIA58776, PIA60423 = 0x00  PIA60424 = 0x40  PIA60425 = 0x60  ZIA58824, PIA60423 = 0x00  PIA60424 = 0x01  PIA60425 = 0x60 | Control EAS heaters to max  0x160 |
|  | Turn the manual heater on for EAS2  Master control Register  Heater Control | **PDOR\_SSWA-EAS2\_Full\_Heater\_00001.SOL**  ZIA58824, PIA60423 = 0x00  PIA60424 = 0x40  PIA60425 = 0x60  ZIA58757, PIA60773 = 0x00  PIA60774 = 0x01  PIA60775 = 0x60 | Control EAS1 heaters to max  0x160 |

## 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 PAS  Enable PAS HK  Disable Monitor Parameters ( 29 parameters )  Power on PAS | **PDOR\_SSWA-PAS\_CommPowerOn\_00001.SOL**  ZIA58050, PIA58050 = PAS\_SENS\_HK  ZIA58064, 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\_MI  ZIA58858 | 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 PAS  Set the Master control register to Standby  Set the heater off  Enable MHV  Set the main HV to 650 V  Set the main HV to 1300 V  Set the main HV to 1950 V  Set the main HV to 2600 V  Set the main HV to 3900 V  Set the main HV to 4550 V  Set the main HV to 5200 V  Set the main HV to 5850 V  Set the main HV to 6500 V | **PDOR\_SSWA-PAS\_CommConfig\_00001.SOL**  ZIA58863, PIA60343 = 0x0000001A  ZIA58947, PIA60848 = OFF HEATHER  PIA60849 = 0x000 DUTY\_CYCLE  ZIA58863, PIA60343 = 0x0000001E  ZIA58869, PIA60344 = 0x00000199  PAUSE  ZIA58869, PIA60344 = 0x00000333  PAUSE  ZIA58869, PIA60344 = 0x000004CC  PAUSE  ZIA58869, PIA60344 = 0x00000666  PAUSE  ZIA58869, PIA60344 = 0x00000999  PAUSE  ZIA58869, PIA60344 = 0x00000B33  PAUSE  ZIA58869, PIA60344 = 0x00000CCC  PAUSE  ZIA58869, PIA60344 = 0x00000E66  PAUSE  ZIA58869, PIA60344 = 0x00000FFF  PAUSE | 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.  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 table  Start Engineering scheme  Query Stop Engineering scheme  Abort Sequencer activity | **PDOR\_SSWA-PAS\_Eng\_Stepping\_00001.SOL**  ZIA58875, PIA60709 = 0x06004E8  PIA60711 = 0x416448  PIA60708 = 0x126FBD  PIA60706 = 0x1251B9  PIA60707 = 0x125F76  PIA60710 = 0x00003C  ZIA58873, PIA60347 = 0x00000003  PAUSE  ZIA58873, PIA60347 = 0x00000000  PAUSE  ZIA58873, 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 table  Load Static table  Load Static table  Turn Pre Amps on  Load Static table  Start Static scheme  Set HV to 250V  Set HV to 500V  Set HV to 750V  Set HV to 1000V  Set HV to 1250V  Set HV to 1500V  Set HV to 1550V  Set HV to 1600V  Set HV to 1650V  Set HV to 1700V  Set HV to 1750V  Set HV to 1800V  Set HV to 1850V  Set HV to 1900V  Abort Sequencer activity  Set HV to 1000V  Enable the Monitoring parameters  Turn 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 = 0x94932892  ZIA58874, 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 = ON  ZIA58862, PIA58063 = ON  ZIA58876, PIA60700 = 0x000000  ZIA58876, PIA60713 = 0x000008  ZIA58876, PIA60705 = 0x000040  ZIA58876, PIA60712 = 0x000000  ZIA58876, PIA60704 = 0x000009  ZIA58876, PIA60720 = 0x000001 (K)  ZIA58876, PIA60721 = 0x000001  ZIA58873, PIA60347 = 0x00000001  PAUSE  ZIA58868, PIA60344 = 0x0000009D  PAUSE  ZIA58868, PIA60344 = 0x0000013B  PAUSE  ZIA58868, PIA60344 = 0x000001D8  PAUSE  ZIA58868, PIA60344 = 0x00000276  PAUSE  ZIA58868, PIA60344 = 0x00000313  PAUSE  ZIA58868, PIA60344 = 0x000003B1  PAUSE  ZIA58868, PIA60344 = 0x000003D0  PAUSE  ZIA58868, PIA60344 = 0x000003F0  PAUSE  ZIA58868, PIA60344 = 0x0000040F  PAUSE  ZIA58868, PIA60344 = 0x0000042F  PAUSE  ZIA58868, PIA60344 = 0x0000044E  PAUSE  ZIA58868, PIA60344 = 0x0000046E  PAUSE  ZIA58868, PIA60344 = 0x0000048D  PAUSE  ZIA58868, PIA60344 = 0x000004AD  PAUSE  ZIA58873, 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\_MI  ZIA58862, 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 packet  Wait for the HK with the corresponding CEMs HV, Continue if there is no problem with Science data and HK data  WAIT AT LEAST 1 hour  From this point the step is 50 V and we can stop at any moment when the count rate is saturated  Wait 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 end  WAIT AT LEAST 30 Minutes  Get at least one HK packet to be sure that HV stepping is finished  Wait 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 amps  Start the static scheme  Set CEM HV to 1250V  Set CEM HV to 1500V  Set CEM HV to 1550V  Set CEM HV to 1600V  Set CEM HV to 1650V  Set CEM HV to 1700V  Set CEM HV to 1750V  Set CEM HV to 1800V  Set CEM HV to 1850V  Set CEM HV to 1900V  Disable Monitoring parameters  Ramp the CEM HV back to NOMINAL in 200V steps  Ramp the Main HV back in 1000V steps  Ramp the Main HV to 5000V  Ramp the Main HV to 4000V  Ramp the Main HV to 3000V  Ramp the Main HV to 2000V  Ramp the Main HV to 1000V  Ramp the Main HV to 0V | **PDOR\_SSWA-PAS\_NomCEM\_Static\_00001.SOL**  ZIA58862, PIA58062 = ON  PIA58063 = ON  ZIA58873, PIA60347 = 0x00000001  PAUSE  ZIA58868, PIA60344 = 0x00000313 ; 1250 V  PAUSE  ZIA58868, PIA60344 = 0x000003B1 ; 1500 V  PAUSE  ZIA58868, PIA60344 = 0x000003D0 ; 1550 V  PAUSE  ZIA58868, PIA60344 = 0x000003F0 ; 1600 V  PAUSE  ZIA58868, PIA60344 = 0x0000040F ; 1650 V  PAUSE  ZIA58868, PIA60344 = 0x0000042F ; 1700 V  PAUSE  ZIA58868, PIA60344 = 0x0000044E; 1750 V  PAUSE  ZIA58868, PIA60344 = 0x0000046E; 1800 V  PAUSE  ZIA58868, PIA60344 = 0x0000048D; 1850 V  PAUSE  ZIA58868, PIA60344 = 0x000004AD; 1900 V  PAUSE  ZIA58064, 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\_MI  ZIA58857, PIA60790 = 0x0000  PIA60791 = **0x0NOMINAL**  PIA60792 = 0x00B2  PIA60793 = 0x0006  PAUSE  ZIA58869, PIA60344 = 0x00000C4E  Wait 1 min  ZIA58869, PIA60344 = 0x000009D8  Wait 1 min  ZIA58869, PIA60344 = 0x00000762  Wait 1 min  ZIA58869, PIA60344 = 0x000004EC  Wait 1 min  ZIA58869, PIA60344 = 0x00000276  Wait 1 min  ZIA58869, PIA60344 = 0x00000000 | Wait for the HK with the corresponding CEMs HV, Continue if there is no problem with Science data and HK data  From this point the step is 50 V and we can stop at any moment when the count rate is saturated  If saturated, skip to the end  Wait 1 hour  Wait for ground acrtion plus 30 mins  At 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 state  Set the PAS config  Set CEM HV to 1250V  Set CEM HV to 1500V  Enable monitoring parameters  Start science cyclogram  Stop Science  Switch off the preamps  Disable the monitoring parameters  Ramp down the HV  Power OFF PAS | **PDOR\_SSWA-PAS\_NormSciComm\_00001.SOL**  ZIA58948  ZIA58853  PAUSE  ZIA58856, PIA60791 = 0x0000  PIA60790= **0x0NOMINAL**  PIA60792 = 0x0052  PIA60793 = 0x0032  PAUSE  ZIA58063, 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\_MI  Wait 1 minute  ZIA58943, PIA60777 = 0x16  Wait for 1 hour  ZIA58944  ZIA58862, PIA58062 = OFF  PIA58063 = OFF  ZIA58064, 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\_MI  ZIA58857, PIA60790 = 0x0000  PIA60791= **0x0NOMINAL**  PIA60792 = 0x00B2  PIA60793 = 0x0006  PAUSE  ZIA58859 | Wait for the HK to show MHV = 6500V.  About 10 mins  Wait about 20 mins to confirm CEM is nominal  Wait for a full cycle of science data.  Ensure all science packets have stopped  Wait the HK with the CEM V less than 200 V.  About 60 s  Ensure 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 Commission  Eng 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 = 5  ZIA58934, PIA60739 = POST\_ENG  ZIA58793  ZIA58934, PIA60739 = POST\_ENG  ZIA58791, 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 time  ZIA58934, PIA60739 = POST\_ENG  ZIA58792, PIA60457 = 0xFF Stim high  PIA60458 = 0x32 Stim low  PIA60459 = 0x29 Stim step  PIA60106 = 0x0 MCP value  PIA60171 = 0xA MCP wait  PIA60165 = 2 Acq time  ZIA58934, 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 Commission  Eng 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 = 5  ZIA58936, PIA60740 = POST\_ENG  ZIA58841  ZIA58936, PIA60740 = POST\_ENG  ZIA58839, 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 time  ZIA58936, PIA60740 = POST\_ENG  ZIA58840, PIA60457 = 0xFF Stim high  PIA60458 = 0x32 Stim low  PIA60459 = 0x29 Stim step  PIA60106 = 0x0 MCP value  PIA60171 = 0xA MCP wait  PIA60165 = 2 Acq time  ZIA58936, 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 Commission  Set hemisphere voltage max to 800V  Set EAS1 deflector ratios to zero  Load the EAS1 threshold values  Change EAS Cadence to HIGH  Start normal mode on EAS1 | **PDOR\_SSWA-EAS1\_MCP\_Config\_00001.SOL**  ZIA58767, PIA60441 = 0x02  PIA60442 = 0x9C  PIA60443 = 0x80  ZIA58765, 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  ZIA58797, 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  ZIA58728, PIA60096 = 0  PIA60097 = 0  PIA60099 = 1  PIA60098 = 1  ZIA58771, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 0x2 |  |
|  | Commission EAS1 MCP  Stop normal mode on EAS1  Perform Eng Mode 3  [Conversion = 1.022 ]  Set the EAS1 MCP back by 25V  Start normal mode on EAS1 | **PDOR\_SSWA-EAS1\_MCP\_Comm\_00001.SOL**  ZIA58771, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 0x0  ZIA58789, 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 ;ctrl  Wait 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 Commission  Stop normal mode on EAS1  Set the EAS1 MCP to 2695V = 0xAC2  Start 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 = 0x0  ZIA58784, PIA60218 = 0xAC2  ZIA58771, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 0x2  Wait 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 Commission  Set EAS2 hemisphere voltage max to 800V  Set EAS2 deflector ratios  Load the EAS2 threshold values  Start normal mode on EAS2 | **PDOR\_SSWA-EAS2\_MCP\_Config\_00001.SOL**  ZIA58815, PIA60441 = 0x02  PIA60442 = 0x9C  PIA60443 = 0x80  ZIA58813, 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  ZIA58845, 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  ZIA58819, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 0x2 |  |
|  | Commission EAS2 MCP  Stop normal mode on EAS2  Perform Eng Mode 3  [Conversion = 1.022 ]  Set the EAS2 MCP back by 25V  Start normal mode on EAS2 | **PDOR\_SSWA-EAS2\_MCP\_Comm\_00001.SOL**  ZIA58819, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 0  ZIA58837, 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 ;ctrl  Wait 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 Commission  Stop normal mode on EAS2  Set the EAS2 MCP to 2695V = 0xAC2  Start 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 = 0  ZIA58832, PIA60218 = 0xAC2  ZIA58819, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 2  Wait 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 EAS1  Stop normal mode on EAS1  Eng 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 = 0  ZIA58790, 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 number  ZIA58934,PIA60739, EQUAL,POST\_ENG  ZIA58771, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 2 |  |
|  | Perform Eng mode 5 on EAS1  Stop normal mode on EAS1  Eng 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 = 0  ZIA58791, 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 time  ZIA58934, PIA60739 = POST\_ENG  ZIA58771, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 2 |  |
|  | Perform Eng mode 6 on EAS1  Stop normal mode on EAS1  Eng 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 = 0  ZIA58792, PIA60457 = 0xFF Stim high  PIA60458 = 0x32 Stim low  PIA60459 = 0x29 Stim step  PIA60106 = 0x0 MCP value  PIA60171 = 0xA MCP wait  PIA60165 = 2 Acq time  ZIA58934, PIA60739 = POST\_ENG  ZIA58771, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 2 |  |
|  | Perform Eng mode 3 on EAS1  Stop normal mode on EAS1  Eng 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 = 0x0  ZIA58789, 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 ;ctrl  ZIA58934, PIA60739 = POST\_ENG  ZIA58771, 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 EAS2  Stop normal mode on EAS2  Eng 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 = 0  ZIA58838, 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 number  ZIA58936,PIA60740, EQUAL,POST\_ENG  ZIA58819, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 2 |  |
|  | Perform Eng mode 5 on EAS2  Stop normal mode on EAS2  Eng mode 5 (Threshold Sweep)  Run post-eng mode macro on EAS2  Start normal mode on EAS2 | **PDOR\_SSWA-EAS2\_EngMode5\_00001.SOL**  ZIA58819, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 0  ZIA58839, 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 time  ZIA58936, PIA60740 = POST\_ENG  ZIA58819, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 2 |  |
|  | Perform Eng mode 6 on EAS2  Stop normal mode on EAS2  Eng 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 = 0  ZIA58840, PIA60457 = 0xFF Stim high  PIA60458 = 0x32 Stim low  PIA60459 = 0x29 Stim step  PIA60106 = 0x0 MCP value  PIA60171 = 0xA MCP wait  PIA60165 = 2 Acq time  ZIA58936, PIA60740 = POST\_ENG  ZIA58819, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 2 |  |
|  | Perform Eng mode 3 on EAS2  Stop normal mode on EAS2  Eng mode 3 (Gain Test)  Run post-eng mode macro on EAS2  Start normal mode on EAS2 | **PDOR\_SSWA-EAS2\_EngMode3\_00001.SOL**  ZIA58819, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 0  ZIA58837, 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 ;ctrl  ZIA58936, PIA60740 = POST\_ENG  ZIA58819, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 2 |  |

## EAS Deflectors

| **Step N°** | **Commanding Flow** | **FCP ID or PDOR title & contents** | **Comments** |
| --- | --- | --- | --- |
|  | Adjust Deflectors on EAS1  Stop Normal Mode on EAS1  Adjust the Deflector Ratios | **PDOR\_SSWA-EAS1\_Deflectors\_00001.SOL**  ZIA58819, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 0  ZIA58765, 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 EAS2  Stop Normal Mode on EAS2  Adjust the Deflector Ratios | **PDOR\_SSWA-EAS2\_Deflectors\_00001.SOL**  ZIA58819, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 0  ZIA58813, 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 EAS1  Stop Normal Mode on EAS1  Adjust the Thresholds | **PDOR\_SSWA-EAS1\_Thresholds\_00001.SOL**  ZIA58819, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 0  ZIA58797, 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 EAS2  Stop Normal Mode on EAS2  Adjust the Thresholds | **PDOR\_SSWA-EAS2\_Thresholds\_00001.SOL**  ZIA58819, PIA60031 = MBOX1  PIA60446 = 0  PIA60447 = 0  PIA60448 = 0  ZIA58845, 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\_EOPTEMP  TM, YIA58201,NIA00915, LIMIT,280, 310 EAS1\_EHVGENTHER  TM, 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\_EOPTEMP  TM, YIA58201,NIA10915, LIMIT,280, 310 EAS2\_EHVGENTHER  TM, 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 |  |  |
|  |  |  |