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**Author:** **Gethyn Lewis**

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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 order of commissioning of the different SWA units is as follows (tbc):

* 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** | **Start Time** | **End Time** | **Duration** | **One Way Light Time (Seconds)** | **Comments** |
| SWA-2 | IA-2 | 05/03/20 | 14:56:00 | 22:56:00 | 08:00:00 | 39-43 | DPU |
| SWA-3 | IA-3 | 09/03/20 | 11:06:00 | 19:06:00 | 08:00:00 | 52-59 | HIS |
|  | IA-3 | 10/03/20 | 11:02:00 | 19:02:00 | 08:00:00 | 52-59 |  |
|  | IA-3 | 11/03/20 | 10:58:00 | 17:58:00 | 07:00:00 | 52-59 |  |
|  | IA-3 | 12/03/20 | 10:53:00 | 18:03:48 | 07:10:48 | 52-59 |  |
|  | IA-3 | 13/03/20 | 11:49:00 | 18:49:00 | 07:00:00 | 52-59 |  |
| SWA-4 | IA-4 | 19/03/20 | 10:22:00 | 18:17:12 | 07:55:12 | 61-68 | PAS |
|  | IA-4 | 20/03/20 | 12:32:00 | 20:32:00 | 08:00:00 | 61-68 |  |
| SWA-5 | IA-5 | 24/03/20 | 13:26:00 | 20:26:00 | 07:00:00 | 70-76 | EAS |
|  | IA-5 | 25/03/20 | 13:20:00 | 20:54:48 | 07:34:48 | 70-76 |  |
|  | IA-5 | 26/03/20 | 13:15:00 | 21:15:00 | 08:00:00 | 70-76 |  |
|  | IA-5 | 31/03/20 | 12:45:00 | 20:36:36 | 07:51:36 | 79-85 |  |
| SWA-6 | IA-6 | 01/04/20 | 12:39:00 | 20:39:00 | 08:00:00 | 79-85 | SWA |
|  | IA-6 | 03/04/20 | 12:26:00 | 20:26:00 | 08:00:00 | 79-85 |  |
| SWA-7 | IA-7 | 13/05/20 | 06:00:00 | 14:00:00 | 08:00:00 | 185-212 | IIC |

Table 4.1 MOC Timeline for each SWA commission phase

# 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.

# SWA-DPU Power On Procedure

This procedure will be required at the start of every subsequent SWA commission section.

|  |  |  |  |
| --- | --- | --- | --- |
| **Step N°** | **Commanding Flow** | **PDOR or FCP** | **Comments** |
|  | ; Switch on SWA with HPC  **TC, ZCSD11D2,** **PCSB0036\_:SPV** := “UNIT\_A” | IA-FCP-012 | ; Parameter to be checked in TM(5,1) SID= 43796 SWA\_E\_BOOT\_EVENT  **TM, YIA58452, NIA01633, EQUAL, BootEvent** |
|  | ; Wait 00:00:20 (20 seconds) | IA-FCP-0112 |  |
|  | ; Send a Service 9 synchronization packet | IA-FCP-012 |  |
|  | ; Wait 00:00:36 (36 seconds) | IA-FCP-012 |  |
|  | ; Send command to leave Boot Mode  **TC, ZIA58735** | IA-FCP-012 |  |
|  | ; Wait 00:00:08 (8 seconds) from last TC. | IA-FCP-012 |  |
|  | ; Enable S20 with a frequency of 8Hz (125 msec) | IA-FCP-012 |  |
|  | ; Wait 00:00:01 (1 second) | IA-FCP-012 |  |
|  | ; Send a Service 9 synchronization packet | IA-FCP-012 | ; Reception of:  **TM, YIA58452** ;TM(5,1) SID=43796 SWA\_E\_BOOT\_EVENT  ; Parameter to be checked  **TM, YIA58452, NIA01633, EQUAL, BootEvent** |
|  | ; Wait 00:01:00 (60 seconds) | IA-FCP-012 |  |
|  | ; Perform the SpW connection test  **TC, ZIA58001** | IA-FCP-012 | ; Reception of:  **TM,YIA58061 ;** TM(17,2) SID=0 SWA\_TM\_CT\_REP |
|  | ; Check telemetry after Time Synch | IA-FCP-012 | ; Reception of:  **TM, YIA58200**  Coarse Time = 0 |
|  | ; Check sensor currents | IA-FCP-030 | ; Parameter to be checked  **TM, YIA58200,NIA00837, LIMIT, 100,200** ; Eng DCDC current  **TM,,NIA00833, LIMIT, 0,10**; Eng EAS1 current  **TM,,NIA00832, LIMIT, 0,10**; Eng EAS2 current  **TM,,NIA00835, LIMIT, 0,10**; Eng PAS current  **TM,,NIA00834, LIMIT, 0,10**; Eng HIS current  ; Time packet is now synchronised with onboard time |
|  | ; Switch DPU into OPS mode  **TC, ZIA58703** | IA-FCP-030 | ; Parameter to be checked  **TM, YIA58445, NIA01633, EQUAL, DpuOpsState** |
|  | ; Wait 00:00:40 (40 seconds) | IA-FCP-030 |  |
|  | ; Check Flight Software | IA-FCP-030 | ; Parameter to be noted  **TM, YIA58902,NIA01529** ; FSW\_NOMINAL\_VERSION  **TM, YIA58902,NIA01530** ; FSW\_NOMINAL\_SUBVERSION  **TM, YIA58902,NIA01531** ; FSW\_NOMINAL\_CRC |
|  | ; Adjust the HK rate  **TC, ZIA58052, PIA58050, EQUAL, DPU\_HK**  **TC, ZIA58052, PIA58052, EQUAL, 10.0** (10 seconds) |  | ; Wait 40 seconds |

# DPU Commissioning Procedure (SWA-2, IA-2)

|  |  |  |  |
| --- | --- | --- | --- |
| **Step N°** | **Commanding Flow** | **PDOR or FCP** | **Comments** |
| **; DPU HK Packets Tests** | | | |
|  | ; Switch DPU TC count HK on  **TC, ZIA58050, PIA58050, EQUAL, DPU\_TC\_CNT\_HK** |  | ; Reception of at least one:  **TM,YIA58204 ;** TM(3,26) SID=4 SWA\_TM\_DPU\_RECEIVED\_TC\_CNT\_HK |
|  | ; Switch DPU TC count HK off  **TC, ZIA58051, PIA58050, EQUAL, DPU\_TC\_CNT\_HK** |  |  |
|  | ; Switch DPU validity parameters HK on  **TC, ZIA58050, PIA58050, EQUAL, DPU\_VALID\_PAR\_HK** |  | ; Reception of at least one:  **TM,YIA58205 ;** TM(3,26) SID=5 SWA\_TM\_DPU\_VALIDITY\_PARAM\_HK |
|  | ; Switch DPU validity parameters HK off  **TC, ZIA58051, PIA58050, EQUAL, DPU\_VALID\_PAR\_HK** |  |  |
|  | ; Switch DPU diagnostic parameters HK on  **TC, ZIA58050, PIA58050, EQUAL, DPU\_HW\_DIAG\_HK** |  | ; Reception of at least one:  **TM,YIA58206 ;** TM(3,26) SID=6 SWA\_TM\_DPU\_HW\_DIAGN\_PARAM\_HK |
|  | ; Switch DPU diagnostic parameters HK off  **TC, ZIA58051, PIA58050, EQUAL, DPU\_HW\_DIAG\_HK** |  |  |
|  | ; Switch DPU maximum duration HK on  **TC, ZIA58050, PIA58050, EQUAL, DPU\_MAX\_DUR\_HK** |  | ; Reception of at least one:  **TM,YIA58207 ;** TM(3,26) SID=7 SWA\_TM\_MAX\_DURATION\_SSID\_HK |
|  | ; Switch DPU maximum manager duration HK off  **TC, ZIA58051, PIA58050, EQUAL, DPU\_MAX\_DUR\_HK** |  |  |
|  | ; Switch DPU FDIR parameters HK on  **TC, ZIA58050, PIA58050, EQUAL, DPU\_FDIR\_ST\_HK** |  | ; Reception of at least one:  **TM,YIA58208 ;** TM(3,26) SID=8 SWA\_TM\_FDIR\_STATUS\_PARAMS\_HK |
|  | ; Switch DPU FDIR parameters HK off  **TC, ZIA58051, PIA58050, EQUAL, DPU\_FDIR\_ST\_HK** |  |  |
|  | ; Switch DPU derived HK on  **TC, ZIA58050, PIA58050, EQUAL, DPU\_FDIR\_MON\_HK** |  | ; Reception of at least one:  **TM,YIA58209 ;** TM(3,26) SID=9 SWA\_TM\_DPU\_FDIR\_MONITOR\_PARAMS\_HK |
|  | ; Switch DPU derived HK off  **TC, ZIA58051, PIA58050, EQUAL, DPU\_FDIR\_MON\_HK** |  |  |
|  | ; Switch DPU derived HK on  **TC, ZIA58050, PIA58050, EQUAL, DPU\_MON\_DER\_HK** |  | ; Reception of at least one:  **TM,YIA58210 ;** TM(3,26) SID=10 SWA\_TM\_DPU\_DERIVED\_PARAMS\_HK |
|  | ; Switch DPU derived HK off  **TC, ZIA58051, PIA58050, EQUAL, DPU\_MON\_DER\_HK** |  |  |
|  | ; Switch DPU TM counters HK on  **TC, ZIA58050, PIA58050, EQUAL, DPU\_TM\_CNT** |  | ; Reception of at least one:  **TM,YIA58214 ;** TM(3,26) SID=12 SWA\_DPU\_TM\_CNT\_HK |
|  | ; Switch DPU TM Counters HK off  **TC, ZIA58050, PIA58050, EQUAL, DPU\_TM\_CNT** |  |  |
|  | ; Switch DPU error counters HK on  **TC, ZIA58050, PIA58050, EQUAL, DPU\_ERR\_CNT** |  | ; Reception of at least one:  **TM,YIA58215 ;** TM(3,26) SID=13 SWA\_DPU\_ERR\_CNT\_HK |
|  | ; Switch DPU error counters HK off  **TC, ZIA58051, PIA58050, EQUAL, DPU\_ERR\_CNT** |  |  |
| **; DPU Memory Tests** | | | |
|  | ; Dump RAM  **TC, ZIA58054, PIA58056, EQUAL, DPU\_RAM**  **TC, ZIA58054, PIA60330, EQUAL, 0x40 00 00 00**  **TC, ZIA58054, PIA60329, EQUAL, 10** |  | ; Parameters to be checked  **TM, YIA58164, NIA01547#1, EQUAL, DPU\_RAM** |
|  | ; Dump MRAM  **TC, ZIA58054, PIA58056, EQUAL, DPU\_MRAM1**  **TC, ZIA58054, PIA60330, EQUAL, 0x10 00 00 00**  **TC, ZIA58054, PIA60329, EQUAL, 10** |  | ; Parameters to be checked  **TM, YIA58173 NIA01547#1, EQUAL, DPU\_MRAM1** |
|  | ; Dump PROM  **TC, ZIA58054, PIA58056, EQUAL, DPU\_PROM**  **TC, ZIA58054, PIA60330, EQUAL, 0x00 00 00 00**  **TC, ZIA58054, PIA60329, EQUAL, 10** |  | ; Parameters to be checked  **TM, YIA58174 NIA01547#1, EQUAL, DPU\_PROM** |
|  | ; Dump MRAM2  **TC, ZIA58054, PIA58056, EQUAL, DPU\_MRAM2**  **TC, ZIA58054, PIA60330, EQUAL, 0x10 00 00 00**  **TC, ZIA58054, PIA60329, EQUAL, 10** |  | ; Parameters to be checked  **TM, YIA58179 NIA01547#1, EQUAL, DPU\_MRAM2** |
|  | ; Write to RAM  **TC, ZIA58053, PIA58056, EQUAL, DPU\_RAM**  **TC, ZIA58053, PIA60330, EQUAL, 0x40 70 00 00**  **TC, ZIA58053, PIA60329, EQUAL, 4**  **TC, ZIA58053, PIA60432, EQUAL, 0xAB**  **TC, ZIA58053, PIA60432, EQUAL, 0xCD**  **TC, ZIA58053, PIA60432, EQUAL, 0xEF**  **TC, ZIA58053, PIA60432, EQUAL, 0x01** |  |  |
|  | ; Check RAM  **TC, ZIA58055, PIA58056, EQUAL, DPU\_RAM**  **TC, ZIA58055, PIA60330, EQUAL, 0x40 70 00 00**  **TC, ZIA58055, PIA60329, EQUAL, 4** |  | ; Parameters to be checked  **TM, YIA58165, NIA01547#1, EQUAL, DPU\_RAM**  **TM, YIA58165, NIA01550, EQUAL, 1186** |
|  | ; Check MRAM1  **TC, ZIA58055, PIA58056, EQUAL, DPU\_MRAM1**  **TC, ZIA58055, PIA60330, EQUAL, 0x10 1E 10 00**  **TC, ZIA58055, PIA60329, EQUAL, 52** |  | ; Parameters to be checked  **TM, YIA58165, NIA01547#1, EQUAL, DPU\_MRAM1**  **TM, YIA58165, NIA01550, EQUAL, 16815 (Dependant on SW version)** |
|  | ; Check PROM  **TC, ZIA58055, PIA58056, EQUAL, DPU\_PROM**  **TC, ZIA58055, PIA60330, EQUAL, 0x00 00 00 00**  **TC, ZIA58055, PIA60329, EQUAL, 100** |  | ; Parameters to be checked  **TM, YIA58165, NIA01547#1, EQUAL, DPU\_PROM**  **TM, YIA58165, NIA01550, EQUAL, 22271** |
|  | ; Check MRAM2  **TC, ZIA58055, PIA58056, EQUAL, DPU\_MRAM2**  **TC, ZIA58055, PIA60330, EQUAL, 0x10 1E 10 00**  **TC, ZIA58055, PIA60329, EQUAL, 52** |  | ; Check the contents of the  **TM, YIA58165, NIA01547#1, EQUAL, DPU\_MRAM2**  **TM, YIA58165, NIA01550, EQUAL, 16815 (Dependant on SW version)** |
|  | ; Check not valid address  **TC, ZIA58055, PIA58056, EQUAL, DPU\_RAM**  **TC, ZIA58055, PIA60330, EQUAL, 0x00 00 00 00**  **TC, ZIA58055, PIA60329, EQUAL, 16000** |  | ; Reception of:  **TM,YIA58152 ;** TM(1,8) SWA\_CMD\_INVALID\_START\_ADDR |
|  | ; Check not valid length  **TC, ZIA58055, PIA58056, EQUAL, DPU\_RAM**  **TC, ZIA58055, PIA60330, EQUAL, 0x40 00 00 00**  **TC, ZIA58055, PIA60329, EQUAL, 0x80 00 00** |  | ; Reception of:  **TM,YIA58153 ;** TM(1,8) SWA\_CMD\_INVALID\_LENGTH |
|  | ; Check dump abort while not dumping  **TC, ZIA58056** |  | ; Reception of:  **TM,YIA58155 ;** TM(1,8) SWA\_CMD\_NO\_DUMP\_ONGOING |

# SWA FSW Table Patch

Patch for EAS Moments

# HIS Commissioning Procedure (SWA-3, IA-3)

# PAS Commissioning Procedure (SWA-4, IA-4)

## PAS Power On & HV Ramp Up (SWA-4-1)

|  |  |  |  |
| --- | --- | --- | --- |
| **Step N°** | **Commanding Flow** | **PDOR or FCP** | **Comments** |
|  | Unblock all dangerous TCs |  |  |
|  | ; Enable PAS HK  **TC, ZIA58050, PIA58050, EQUAL, PAS\_SENS\_HK** |  |  |
|  | ; Disable Monitor Parameters ( 29 parameters )  **TC, ZIA58064, PIA60452, EQUAL, 28** ; NUM\_OF\_MON\_ID  **TC,, PIA60449, EQUAL, V\_MON\_C\_MI**  **TC,, PIA60449, EQUAL, V\_MON\_L\_MI**  **TC,, PIA60449, EQUAL, I\_MON\_C\_MI**  **TC,, PIA60449, EQUAL, I\_MON\_L\_MI**  **TC,, PIA60449, EQUAL, T\_MON\_C\_MI**  **TC,, PIA60449, EQUAL, T\_MON\_L\_MI**  **TC,, PIA60449, EQUAL, P24\_VCEMOUT\_MI**  **TC,, PIA60449, EQUAL, P5\_VCEMOUT\_MI**  **TC,, PIA60449, EQUAL, P12\_VHTOUT\_MI**  **TC,, PIA60449, EQUAL, M12\_VHTOUT\_MI**  **TC,, PIA60449, EQUAL, P3V\_3\_FPGA\_OMI**  **TC,, PIA60449, EQUAL, P1V\_5\_FPGA\_OMI**  **TC,, PIA60449, EQUAL, TEMP\_DCDC\_MI**  **TC,, PIA60449, EQUAL, TEMP\_FPGA\_MI**  **TC,, PIA60449, EQUAL, HK\_IP24V\_CEMMI**  **TC,, PIA60449, EQUAL, HK\_IP5V\_CEMMI**  **TC,, PIA60449, EQUAL, HK\_IP12V\_HTMI**  **TC,, PIA60449, EQUAL, HK\_IM12V\_HTMI**  **TC,, PIA60449, EQUAL, HK\_I3V3\_FPGAMI**  **TC,, PIA60449, EQUAL, HK\_IP28V\_PRIMI**  **TC,, PIA60449, EQUAL, HK\_IP28V\_PRIMI**  **TC,, PIA60449, EQUAL, HK\_MHV\_POSMI**  **TC,, PIA60449, EQUAL, HK\_MHV\_NEGMI**  **TC,, PIA60449, EQUAL, TEMP\_HVPS\_MI**  **TC,, PIA60449, EQUAL, HK\_IP28V\_PRSCI**  **TC,, PIA60449, EQUAL, PASampOverCurr**  **TC,, PIA60449, EQUAL, PASSPWHB\_MI}**  **TC,, PIA60449, EQUAL, PASMISSACK\_MI** |  |  |
|  | ; Power on PAS  **TC, ZIA58858** |  | ; Receive and check at least 3 HK packets and check the contents |
|  | Wait the and of the ground action, about 8 min |  |  |
|  | ; SWA\_TC\_PAS\_WR\_MASTER\_CTRL\_REG ( 1 parameters )  **TC, ZIA58863, PIA60343, EQUAL, 0x0000001A** ; Standby |  |  |
|  | ; SWA\_TC\_PAS\_SET\_OPEN\_LOOP ( 2 parameters )  **TC, ZIA58947, PIA60848, EQUAL, OFF** ; HEATHER  **TC, ZIA58947, PIA60849, EQUAL, 0x000** ; DUTY\_CYCLE |  |  |
|  | ; SWA\_TC\_PAS\_WR\_MASTER\_CTRL\_REG ( 1 parameters )  **TC, ZIA58863, PIA60343, EQUAL, 0x0000001E** ; Enable MHV |  |  |
|  | ; SWA\_TC\_PAS\_SET\_MAIN\_HV ( 1 parameters )  **TC, ZIA58869, PIA60344, EQUAL, 0x00000199** ; HV 650 V |  | Wait to get at least 30 HK (300 s) packets. Check HV value and stability. Then go on. |
|  | Wait the and of the ground action, about 10 min |  |  |
|  | ; SWA\_TC\_PAS\_SET\_MAIN\_HV ( 1 parameters )  **TC, ZIA58869, PIA60344, EQUAL, 0x00000333** ; HV 1300V |  | Wait to get at least 30 HK (300 s) packets. Check HV value and stability. Then go on. |
|  | Wait the and of the ground action, about 10 min |  |  |

# EAS Commissioning Procedure (SWA-5, IA-5)

## EAS1 Power Up

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Step N°** | **Commanding Flow** | | **PDOR or FCP** | **Comments** |
|  | ; Log spacecraft pressure readings  ENSURE LAST THRUSTER FIRE GT 8 | |  | Is pressure better than **XX**?  (Yes) Proceed  (No) Consult commissioning team lead |
|  | ; Log EAS 1 temperature | |  | Is EAS 1 temperature less than **XX**?  (Yes) Proceed  (No) Consult commissioning team lead |
|  | ; Lower the EAS1 MCP voltage to zero before powering on  **TC,ZIA58706, PIA60133,EQUAL,1**  **TC,ZIA58706, PIA60136,EQUAL,0x100B**  **TC,ZIA58706, PIA60135,EQUAL,6**  **TC,ZIA58706, PIA60134,EQUAL,0x00**  **TC,ZIA58706, PIA60134,EQUAL,0x00**  **TC,ZIA58706, PIA60134,EQUAL,0x00**  **TC,ZIA58706, PIA60134,EQUAL,0x00**  **TC,ZIA58706, PIA60134,EQUAL,0x00**  **TC,ZIA58706, PIA60134,EQUAL,0x00** | |  |  |
|  | ; Accept the new values  **TC, ZIA58708** | |  |  |
|  | ; Lower the EAS1 HEM voltage to zero before powering on  **TC,ZIA58706, PIA60133,EQUAL,1**  **TC,ZIA58706, PIA60136,EQUAL,0x1003**  **TC,ZIA58706, PIA60135,EQUAL,6**  **TC,ZIA58706, PIA60134,EQUAL,0xDE**  **TC,ZIA58706, PIA60134,EQUAL,0xB8**  **TC,ZIA58706, PIA60134,EQUAL,0x51**  **TC,ZIA58706, PIA60134,EQUAL,0x00**  **TC,ZIA58706, PIA60134,EQUAL,0x00**  **TC,ZIA58706, PIA60134,EQUAL,0x00** | |  |  |
|  | ; Accept the new values  **TC, ZIA58708** | |  |  |
|  | ; Power on EAS1 on  **TC, ZIA58760** | | IA-FCP-014 | ; Check EAS1 current in DPU HK  **TM,YIA58200, NIA00833, LIMIT, 60,150** |
|  | ; Enable EAS1 HK  **TC, ZIA58050, PIA58050, EQUAL, EAS1\_SENS\_HK** | | IA-FCP-040 |  |
|  | ; Run the EAS1 post transition macro  **TC, ZIA58934,PIA60739,EQUAL,POST** | | IA-FCP-040 |  |
|  | ; Run the EAS1 idle transition macro  **TC, ZIA58753** | | IA-FCP-040 |  |
|  | ; Request EAS1 HK packet  **TC, ZIA58782** | | IA-FCP-040 | ; Check EAS1 HK parameters before continuing  **TM,YIA58201,NIA00903, LIMIT,2.5, 4.0** ; EAS1\_E33VD  **TM,,NIA00905, LIMIT,1.0, 2.0** ; EAS1\_E15VD  **TM,,NIA00907, LIMIT,280, 310** ; EAS1\_EOPTEMP  **TM,,NIA00909, LIMIT,1500, 2500** ; EAS1\_EHVOUTV  **TM,,NIA00910, LIMIT,0, 1** ; EAS1\_EMCPV  **TM,,NIA00911, LIMIT,0, 1** ; EAS1\_EGRIDV  **TM,,NIA00912, LIMIT,2, 10** ; EAS1\_E10VAPOSV  **TM,,NIA00914, LIMIT,25, 30** ; EAS1\_E28POSV  **TM,,NIA00915, LIMIT,280, 310** ; EAS1\_EHVGENTHER  **TM,,NIA00916, LIMIT,280, 310** ; EAS1\_EHVMODTHER |
| **CONSULT SWA OPERATIVE FOR GO AHEAD** | | | | |
|  | | ; Check the EAS1 HEM is zero  **TC, ZIA58785, PIA58061,EQUAL, CmdReadNewMcpHv** | IA-FCP-040 | ; Check the HEM HV is zero  **TM, YIA58904, NIA01503#1, EQUAL, 0x0** ; EAS1 HV Max  **TM, YIA58904, NIA01503#2, EQUAL, 0x0** ; EAS1 HV Max |
|  | | ; Run the EAS1 run transition macro  **TC, ZIA58758** | IA-FCP-040 |  |
|  | | ; Wait 00:00:20 (20 seconds) | IA-FCP-040 | ; Check EAS1 MCP and Grid voltage in EAS1 HK  **TM, YIA58201,NIA00910, LIMIT,0, 1** ; EAS1\_EMCPV  **TM, YIA58201,NIA00911, LIMIT,-10, 0** ; EAS1\_EGRIDV |

## EAS2 Power Up

|  |  |  |  |
| --- | --- | --- | --- |
| **Step N°** | **Commanding Flow** | **PDOR or FCP** | **Comments** |
|  | ; Log EAS 2 temperature |  | Is EAS 2 temperature less than **XX**?  (Yes) Proceed  (No) Consult commissioning team lead |
|  | ; Lower the EAS2 MCP voltage to zero before powering on  **TC,ZIA58706, PIA60133,EQUAL,1**  **TC,ZIA58706, PIA60136,EQUAL,0x200B**  **TC,ZIA58706, PIA60135,EQUAL,6**  **TC,ZIA58706, PIA60134,EQUAL,0x00**  **TC,ZIA58706, PIA60134,EQUAL,0x00**  **TC,ZIA58706, PIA60134,EQUAL,0x00**  **TC,ZIA58706, PIA60134,EQUAL,0x00**  **TC,ZIA58706, PIA60134,EQUAL,0x00**  **TC,ZIA58706, PIA60134,EQUAL,0x00** |  |  |
|  | ; Accept the new values  **TC, ZIA58708** |  |  |
|  | ; Lower the EAS2 HEM voltage to zero before powering on  **TC,ZIA58706, PIA60133,EQUAL,1**  **TC,ZIA58706, PIA60136,EQUAL,0x2003**  **TC,ZIA58706, PIA60135,EQUAL,6**  **TC,ZIA58706, PIA60134,EQUAL,0xDE**  **TC,ZIA58706, PIA60134,EQUAL,0xB8**  **TC,ZIA58706, PIA60134,EQUAL,0x51**  **TC,ZIA58706, PIA60134,EQUAL,0x00**  **TC,ZIA58706, PIA60134,EQUAL,0x00**  **TC,ZIA58706, PIA60134,EQUAL,0x00** |  |  |
|  | ; Accept the new values  **TC, ZIA58708** |  |  |
|  | ; Switch EAS2 on  **TC, ZIA58808** | IA-FCP-015 | ; Check EAS2 current in DPU HK  **TM,YIA58200, NIA00832, LIMIT, 60,150** |
|  | ; Enable EAS2 HK  **TC, ZIA58050, PIA58050, EQUAL, EAS2\_SENS\_HK** | IA-FCP-050 |  |
|  | ; Run the EAS2 post transition macro  **TC, ZIA58936,PIA60740,EQUAL,POST** | IA-FCP-050 |  |
|  | ; Run the EAS2 idle transition macro  **TC, ZIA58801** | IA-FCP-050 |  |
|  | ; Wait 00:00:30 (30 seconds) to allow HK to refresh | IA-FCP-050 |  |
|  | ; Request EAS2 HK packet  **TC, ZIA58830** | IA-FCP-050 | ; Check EAS2 HK parameters before continuing  **TM,YIA58202,NIA10903, LIMIT,2.5, 4.0** ; EAS2\_E33VD  **TM,,NIA10905, LIMIT,1.0, 2.0** ; EAS2\_E15VD  **TM,,NIA10907, LIMIT,280, 310** ; EAS2\_EOPTEMP  **TM,,NIA10909, LIMIT,1500, 2500** ; EAS2\_EHVOUTV  **TM,,NIA10910, LIMIT,0, 1** ; EAS2\_EMCPV  **TM,,NIA10911, LIMIT,0, 1** ; EAS2\_EGRIDV  **TM,,NIA10912, LIMIT,2, 10** ; EAS2\_E10VAPOSV  **TM,,NIA10914, LIMIT,25, 30** ; EAS2\_E28POSV  **TM,,NIA10915, LIMIT,280, 310** ; EAS2\_EHVGENTHER  **TM,,NIA10916, LIMIT,280, 310** ; EAS2\_EHVMODTHER |
| **CONSULT SWA OPERATIVE FOR GO AHEAD** | | | |
|  | ; Check the HV Max is low  **TC, ZIA58833, PIA58061,EQUAL, CmdReadHemHigVol** | IA-FCP-050 | ; Check the HV Max is low  **TM, YIA58905, NIA01503#1, EQUAL, 0x0** ; EAS2 HV Max  **TM, YIA58905, NIA01503#2, EQUAL, 0x0** ; EAS2 HV Max |
|  | ; Run the EAS2 run transition macro  **TC, ZIA58806** | IA-FCP-050 |  |
|  | ; Wait 00:00:20 (20 seconds) | IA-FCP-050 | ; Check MCP and Grid voltages in EAS2 HK  **TM, YIA58202,NIA10910, LIMIT,0, 1** ; EAS2\_EMCPV  **TM, YIA58202,NIA10911, LIMIT,0, 1** ; EAS2\_EGRIDV |

## EAS Heaters

|  |  |  |  |
| --- | --- | --- | --- |
| **Step N°** | **Commanding Flow** | **PDOR or FCP** | **Comments** |
|  |  |  | ; Obtain  **TM,YIA58201, NIA00907;** EAS1\_EOPTEMP  **TM,YIA58202, NIA10907;** EAS2\_EOPTEMP  Obtain SC Survival heater duty cycle |
|  | ; Set the master control register for manual heater on EAS1  **TC, ZIA58776, PIA60423, EQUAL, 0x00**  **TC,, PIA60424, EQUAL, 0x40**  **TC,, PIA60425, EQUAL, 0x60** |  |  |
|  | ; Set the master control register for manual heater on EAS2  **TC, ZIA58824, PIA60423, EQUAL, 0x00**  **TC,, PIA60424, EQUAL, 0x40**  **TC,, PIA60425, EQUAL, 0x60** |  |  |
|  | ; Turn the manual heater on for EAS1 FM  **TC, ZIA58757, PIA60773, EQUAL, 0x00**  **TC,, PIA60774, EQUAL, 0x01**  **TC,, PIA60775, EQUAL, 0x60** |  |  |
|  | ; Turn the manual heater on for EAS2  **TC, ZIA58805, PIA60773, EQUAL, 0x00**  **TC,, PIA60774, EQUAL, 0x01**  **TC,, PIA60775, EQUAL, 0x60** |  |  |
|  |  |  | ; Monitor EAS temperatures.  ; Monitor Survival heater as it switches off  ; Ensure EAS temperature stabilises between -10 and +10 degrees. |
|  |  |  | ; If EAS temperature increases at too fast a rate, the heater current can be reduced. |

## 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** | **PDOR or FCP** | **Comments** |
|  | ; Perform Eng mode 9 on EAS1 (FPGA SELF TEST)  **TC, ZIA58795, PIA60165, EQUAL, 5** ; Acq time |  | **ASSESS DATA TO CONTINUE** |
|  | ; Run post-eng mode macro on EAS1  **TC, ZIA58934,PIA60739,EQUAL,POST\_ENG** |  |  |
|  | ; Perform Eng mode 7 on EAS1 (Modulator sweep test)  **TC, ZIA58793** |  | **ASSESS DATA TO CONTINUE** |
|  | ; Run post-eng mode macro on EAS1  **TC, ZIA58934,PIA60739,EQUAL,POST\_ENG** |  |  |
|  | ; Switch to Eng mode 5 on EAS1 (Threshold Sweep)  **TC, ZIA58791, PIA60454, EQUAL, 0xFF** ; PA1 stim  **TC, ZIA58791, PIA60455, EQUAL, 0xFF** ; PA2 stim  **TC, ZIA58791, PIA60040, EQUAL, 0x724** ; Start Thresh  **TC, ZIA58791, PIA60039, EQUAL, 0x477** ; End Thresh  **TC, ZIA58791, PIA60041, EQUAL, 0x76** ; Thresh step  **TC, ZIA58791, PIA60106, EQUAL, 0x0** ; MCP value  **TC, ZIA58791, PIA60171, EQUAL, 0xA** ; MCP wait  **TC, ZIA58791, PIA60165, EQUAL, 2** ; Acq time |  | **ASSESS DATA TO CONTINUE** |
|  | ; Run post-eng mode macro on EAS1  **TC, ZIA58934,PIA60739,EQUAL,POST\_ENG** |  |  |
|  | ; Switch to Eng mode 6 on EAS1 (Stim Test)  **TC, ZIA58792, PIA60457, EQUAL, 0xFF** ; Stim high  **TC, ZIA58792, PIA60458, EQUAL, 0x32** ; Stim low  **TC, ZIA58792, PIA60459, EQUAL, 0x29** ; Stim step  **TC, ZIA58792, PIA60106, EQUAL, 0x0** ; MCP value  **TC, ZIA58792, PIA60171, EQUAL, 0xA** ; MCP wait  **TC, ZIA58792, PIA60165, EQUAL, 2** ; Acq time |  | **ASSESS DATA TO CONTINUE** |
|  | ; Run post-eng mode macro on EAS1  **TC, ZIA58934,PIA60739,EQUAL,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** | **PDOR or FCP** | **Comments** |
|  | ; Perform Eng mode 9 on EAS2 (FPGA SELF TEST)  **TC, ZIA58843, PIA60165, EQUAL, 5** ; Acq time |  | **ASSESS DATA TO CONTINUE** |
|  | ; Run post-eng mode macro on EAS2  **TC, ZIA58936,PIA60740,EQUAL,POST\_ENG** |  |  |
|  | ; Perform Eng mode 7 on EAS2 (Modulator sweep test)  **TC, ZIA58841** |  | **ASSESS DATA TO CONTINUE** |
|  | ; Run post-eng mode macro on EAS2  **TC, ZIA58936,PIA60740,EQUAL,POST\_ENG** |  |  |
|  | ; Switch to Eng mode 5 on EAS2  **TC, ZIA58839, PIA60454, EQUAL, 0xFF** ; PA1 stim  **TC, ZIA58839, PIA60455, EQUAL, 0xFF** ; PA2 stim  **TC, ZIA58839, PIA60040, EQUAL, 0x724** ; Start Thresh  **TC, ZIA58839, PIA60039, EQUAL, 0x477** ; End Thresh  **TC, ZIA58839, PIA60041, EQUAL, 0x76** ; Thresh step  **TC, ZIA58839, PIA60106, EQUAL, 0x0** ; MCP value  **TC, ZIA58839, PIA60171, EQUAL, 0xA** ; MCP wait  **TC, ZIA58839, PIA60165, EQUAL, 2** ; Acq time |  | **ASSESS DATA TO CONTINUE** |
|  | ; Run post-eng mode macro on EAS2  **TC, ZIA58936,PIA60740,EQUAL,POST\_ENG** |  |  |
|  | ; Switch to Eng mode 6 on EAS2  **TC, ZIA58840, PIA60457, EQUAL, 0xFF** ; Stim high  **TC, ZIA58840, PIA60458, EQUAL, 0x32** ; Stim low  **TC, ZIA58840, PIA60459, EQUAL, 0x29** ; Stim step  **TC, ZIA58840, PIA60106, EQUAL, 0x0** ; MCP value  **TC, ZIA58840, PIA60171, EQUAL, 0xA** ; MCP wait  **TC, ZIA58840, PIA60165, EQUAL, 2** ; Acq time |  | **ASSESS DATA TO CONTINUE** |
|  | ; Run post-eng mode macro on EAS2  **TC, ZIA58936,PIA60740,EQUAL,POST\_ENG** |  |  |

## EAS1 MCP Commission

| **Step N°** | **Commanding Flow** | **PDOR or FCP** | **Comments** |
| --- | --- | --- | --- |
|  | ; Set EAS1 hemisphere voltage max to 800V  **TC, ZIA58767, PIA60441, EQUAL, 0x02**  **TC, ZIA58767, PIA60442, EQUAL, 0x9C**  **TC, ZIA58767, PIA60443, EQUAL, 0x80** |  |  |
|  | ; Set EAS1 deflector ratios to zero  **TC, ZIA58765, PIA60474, EQUAL, 0x00**  **TC,, PIA60475, EQUAL, 0x00**  **TC,, PIA60578, EQUAL, 0x00**  **TC,, PIA60589, EQUAL, 0x00**  **TC,, PIA60600, EQUAL, 0x00**  **TC,, PIA60611, EQUAL, 0x00**  **TC,, PIA60622, EQUAL, 0x00**  **TC,, PIA60633, EQUAL, 0x00**  **TC,, PIA60644, EQUAL, 0x00**  **TC,, PIA60655, EQUAL, 0x00**  **TC,, PIA60476, EQUAL, 0x00**  **TC,, PIA60487, EQUAL, 0x00**  **TC,, PIA60498, EQUAL, 0x00**  **TC,, PIA60509, EQUAL, 0x00**  **TC,, PIA60520, EQUAL, 0x00**  **TC,, PIA60531, EQUAL, 0x00**  **TC,, PIA60542, EQUAL, 0x00**  **TC,, PIA60553, EQUAL, 0x00**  **TC,, PIA60564, EQUAL, 0x00**  **TC,, PIA60575, EQUAL, 0x00**  **TC,, PIA60579, EQUAL, 0x00**  **TC,, PIA60580, EQUAL, 0x00**  **TC,, PIA60581, EQUAL, 0x00**  **TC,, PIA60582, EQUAL, 0x00**  **TC,, PIA60583, EQUAL, 0x00**  **TC,, PIA60584, EQUAL, 0x00**  **TC,, PIA60585, EQUAL, 0x00**  **TC,, PIA60586, EQUAL, 0x00**  **TC,, PIA60587, EQUAL, 0x00**  **TC,, PIA60588, EQUAL, 0x00**  **TC,, PIA60590, EQUAL, 0x00**  **TC,, PIA60591, EQUAL, 0x00**  **TC,, PIA60592, EQUAL, 0x00**  **TC,, PIA60593, EQUAL, 0x00**  **TC,, PIA60594, EQUAL, 0x00**  **TC,, PIA60595, EQUAL, 0x00**  **TC,, PIA60596, EQUAL, 0x00**  **TC,, PIA60597, EQUAL, 0x00**  **TC,, PIA60598, EQUAL, 0x00**  **TC,, PIA60599, EQUAL, 0x00**  **TC,, PIA60601, EQUAL, 0x00**  **TC,, PIA60602, EQUAL, 0x00**  **TC,, PIA60603, EQUAL, 0x00**  **TC,, PIA60604, EQUAL, 0x00**  **TC,, PIA60605, EQUAL, 0x00**  **TC,, PIA60606, EQUAL, 0x00**  **TC,, PIA60607, EQUAL, 0x00**  **TC,, PIA60608, EQUAL, 0x00**  **TC,, PIA60609, EQUAL, 0x00**  **TC,, PIA60610, EQUAL, 0x00**  **TC,, PIA60612, EQUAL, 0x00**  **TC,, PIA60613, EQUAL, 0x00**  **TC,, PIA60614, EQUAL, 0x00**  **TC,, PIA60615, EQUAL, 0x00**  **TC,, PIA60616, EQUAL, 0x00**  **TC,, PIA60617, EQUAL, 0x00**  **TC,, PIA60618, EQUAL, 0x00**  **TC,, PIA60619, EQUAL, 0x00**  **TC,, PIA60620, EQUAL, 0x00**  **TC,, PIA60621, EQUAL, 0x00**  **TC,, PIA60623, EQUAL, 0x00**  **TC,, PIA60624, EQUAL, 0x00**  **TC,, PIA60625, EQUAL, 0x00**  **TC,, PIA60626, EQUAL, 0x00**  **TC,, PIA60627, EQUAL, 0x00**  **TC,, PIA60628, EQUAL, 0x00**  **TC,, PIA60629, EQUAL, 0x00**  **TC,, PIA60630, EQUAL, 0x00**  **TC,, PIA60631, EQUAL, 0x00**  **TC,, PIA60632, EQUAL, 0x00**  **TC,, PIA60634, EQUAL, 0x00**  **TC,, PIA60635, EQUAL, 0x00**  **TC,, PIA60636, EQUAL, 0x00**  **TC,, PIA60637, EQUAL, 0x00**  **TC,, PIA60638, EQUAL, 0x00**  **TC,, PIA60639, EQUAL, 0x00**  **TC,, PIA60640, EQUAL, 0x00**  **TC,, PIA60641, EQUAL, 0x00**  **TC,, PIA60642, EQUAL, 0x00**  **TC,, PIA60643, EQUAL, 0x00**  **TC,, PIA60645, EQUAL, 0x00**  **TC,, PIA60646, EQUAL, 0x00**  **TC,, PIA60647, EQUAL, 0x00**  **TC,, PIA60648, EQUAL, 0x00**  **TC,, PIA60649, EQUAL, 0x00**  **TC,, PIA60650, EQUAL, 0x00**  **TC,, PIA60651, EQUAL, 0x00**  **TC,, PIA60652, EQUAL, 0x00**  **TC,, PIA60653, EQUAL, 0x00**  **TC,, PIA60654, EQUAL, 0x00**  **TC,, PIA60656, EQUAL, 0x00**  **TC,, PIA60657, EQUAL, 0x00**  **TC,, PIA60658, EQUAL, 0x00**  **TC,, PIA60659, EQUAL, 0x00**  **TC,, PIA60660, EQUAL, 0x00**  **TC,, PIA60661, EQUAL, 0x00** |  |  |
|  | ; Load the EAS1 threshold values  **TC, ZIA58797, PIA60174, EQUAL, 0x5F40**  **TC,, PIA60185, EQUAL, 0x5F41**  **TC,, PIA60196, EQUAL, 0x5F42**  **TC,, PIA60200, EQUAL, 0x5F43**  **TC,, PIA60201, EQUAL, 0x5F44**  **TC,, PIA60202, EQUAL, 0x5F45**  **TC,, PIA60203, EQUAL, 0x6586**  **TC,, PIA60204, EQUAL, 0x6587**  **TC,, PIA60205, EQUAL, 0x66C8**  **TC,, PIA60175, EQUAL, 0x5F49**  **TC,, PIA60176, EQUAL, 0x5F4A**  **TC,, PIA60177, EQUAL, 0x5F4B**  **TC,, PIA60178, EQUAL, 0x5F4C**  **TC,, PIA60179, EQUAL, 0x5F4D**  **TC,, PIA60180, EQUAL, 0x5F4E**  **TC,, PIA60181, EQUAL, 0x5F4F**  **TC,, PIA60182, EQUAL, 0x5F40**  **TC,, PIA60183, EQUAL, 0x5F41**  **TC,, PIA60184, EQUAL, 0x5F42**  **TC,, PIA60186, EQUAL, 0x5F43**  **TC,, PIA60187, EQUAL, 0x5F44**  **TC,, PIA60188, EQUAL, 0x5F45**  **TC,, PIA60189, EQUAL, 0x5F46**  **TC,, PIA60190, EQUAL, 0x5F47**  **TC,, PIA60191, EQUAL, 0x5F48**  **TC,, PIA60192, EQUAL, 0x5F49**  **TC,, PIA60193, EQUAL, 0x5F4A**  **TC,, PIA60194, EQUAL, 0x5CCB**  **TC,, PIA60195, EQUAL, 0x5F4C**  **TC,, PIA60197, EQUAL, 0x5F4D**  **TC,, PIA60198, EQUAL, 0x5F4E**  **TC,, PIA60199, EQUAL, 0x5F4F** |  |  |
|  | ; Change EAS Cadence to HIGH  **TC, ZIA58728, PIA60096, EQUAL, 0**  **TC,, PIA60097, EQUAL, 0**  **TC,, PIA60099, EQUAL, 1**  **TC,, PIA60098, EQUAL, 1** |  |  |
|  | **Perform the following 50 times** | | |
|  | ; Stop normal mode on EAS1  **TC, ZIA58771, PIA60031, EQUAL, MBOX1**  **TC, ZIA58771, PIA60446, EQUAL, 0**  **TC, ZIA58771, PIA60447, EQUAL, 0**  **TC, ZIA58771, PIA60448, EQUAL, 0x0** |  |  |
|  | ; Perform Eng Mode 3  [Conversion = 1.022 ]  **TC, ZIA58789, PIA60101, EQUAL,** Start MCP  **TC, ZIA58789, PIA60100, EQUAL,** Final MCP  **TC, ZIA58789, PIA60102, EQUAL, 0x33** ;Step MCP  **TC, ZIA58789, PIA60437, EQUAL, 1** ;1st ramp time  **TC, ZIA58789, PIA60444, EQUAL, 1** ;Inter ramp time  **TC, ZIA58789, PIA60165, EQUAL, 20** ;Acq time  **TC, ZIA58789, PIA60760, EQUAL, 0x20** Hem bin  **TC, ZIA58789, PIA60761, EQUAL, 0x8** ;Def number  **TC, ZIA58789, PIA60762, EQUAL, SWEEP\_MACRO** ;ctrl |  | ; Each loop has these inputs   |  |  |  | | --- | --- | --- | |  | **Start MCP** | **Final MCP** | |  | **PIA60101** | **PIA60100** | | 1 | 33 | 34 | | 2 | 66 | 67 | | 3 | 99 | 9A | | 4 | CC | CD | | 5 | FF | 100 | | 6 | 132 | 133 | | 7 | 165 | 166 | | 8 | 198 | 199 | | 9 | 1CB | 1CC | | 10 | 1FF | 200 | | 11 | 232 | 233 | | 12 | 265 | 266 | | 13 | 298 | 299 | | 14 | 2CB | 2CC | | 15 | 2FE | 2FF | | 16 | 331 | 332 | | 17 | 364 | 365 | | 18 | 397 | 398 | | 19 | 3CA | 3CB | | 20 | 3FE | 3FF | | 21 | 431 | 432 | | 22 | 464 | 465 | | 23 | 497 | 498 | | 24 | 4CA | 4CB | | 25 | 4FD | 4FE | | 26 | 530 | 531 | | 27 | 563 | 564 | | 28 | 596 | 597 | | 29 | 5C9 | 5CA | | 30 | 5FD | 5FE | | 31 | 630 | 631 | | 32 | 663 | 664 | | 33 | 696 | 697 | | 34 | 6C9 | 6CA | | 35 | 6FC | 6FD | | 36 | 72F | 730 | | 37 | 762 | 763 | | 38 | 795 | 796 | | 39 | 7C8 | 7C9 | | 40 | 7FC | 7FD | | 41 | 82F | 830 | | 42 | 862 | 863 | | 43 | 895 | 896 | | 44 | 8C8 | 8C9 | | 45 | 8FB | 8FC | | 46 | 92E | 92F | | 47 | 961 | 962 | | 48 | 994 | 995 | | 49 | 9C7 | 9C8 | | 50 | 9FB | 9FC | |
|  | ; Wait 00:00:30 (30 seconds) |  |  |
|  | ; Set the EAS1 MCP back by 25V  **TC, ZIA58784, PIA60218, EQUAL,** MCP Value |  | ; Each loop has these inputs   |  |  | | --- | --- | |  | **MCP Value** | |  | **PIA60218** | | 1 | 19 | | 2 | 4C | | 3 | 7F | | 4 | B2 | | 5 | E5 | | 6 | 119 | | 7 | 14C | | 8 | 17F | | 9 | 1B2 | | 10 | 1E5 | | 11 | 218 | | 12 | 24B | | 13 | 27E | | 14 | 2B1 | | 15 | 2E4 | | 16 | 318 | | 17 | 34B | | 18 | 37E | | 19 | 3B1 | | 20 | 3E4 | | 21 | 417 | | 22 | 44A | | 23 | 47D | | 24 | 4B0 | | 25 | 4E3 | | 26 | 517 | | 27 | 54A | | 28 | 57D | | 29 | 5B0 | | 30 | 5E3 | | 31 | 616 | | 32 | 649 | | 33 | 67C | | 34 | 6AF | | 35 | 6E2 | | 36 | 716 | | 37 | 749 | | 38 | 77C | | 39 | 7AF | | 40 | 7E2 | | 41 | 815 | | 42 | 848 | | 43 | 87B | | 44 | 8AE | | 45 | 8E1 | | 46 | 915 | | 47 | 948 | | 48 | 97B | | 49 | 9AE | | 50 | 9E1 | |
|  | ; Start normal mode on EAS1  **TC, ZIA58771, PIA60031, EQUAL, MBOX1**  **TC, ZIA58771, PIA60446, EQUAL, 0**  **TC, ZIA58771, PIA60447, EQUAL, 0**  **TC, ZIA58771, PIA60448, EQUAL, 0x2** |  |  |
|  | SWA Operator to check Counts in 3d packets and EM3 packets | | |
|  | **SWA Operator Confirm to Proceed Round the Loop** | | |
|  | **Perform the following 7 times** | | |
|  | ; Stop normal mode on EAS1  **TC, ZIA58771, PIA60031, EQUAL, MBOX1**  **TC, ZIA58771, PIA60446, EQUAL, 0**  **TC, ZIA58771, PIA60447, EQUAL, 0**  **TC, ZIA58771, PIA60448, EQUAL, 0x0** |  |  |
|  | ; Perform Eng Mode 3  [Conversion = 1.022 ]  **TC, ZIA58789, PIA60101, EQUAL,** Start MCP  **TC, ZIA58789, PIA60100, EQUAL,** Final MCP  **TC, ZIA58789, PIA60102, EQUAL, 0x33** ;Step MCP  **TC, ZIA58789, PIA60437, EQUAL, 1** ;1st ramp time  **TC, ZIA58789, PIA60444, EQUAL, 1** ;Inter ramp time  **TC, ZIA58789, PIA60165, EQUAL, 20** ;Acq time  **TC, ZIA58789, PIA60760, EQUAL, 0x20** Hem bin  **TC, ZIA58789, PIA60761, EQUAL, 0x8** ;Def number  **TC, ZIA58789, PIA60762, EQUAL, SWEEP\_MACRO** ;ctrl |  | ; Each loop has these inputs   |  |  |  | | --- | --- | --- | |  | **Start MCP** | **Final MCP** | |  | **PIA60101** | **PIA60100** | | 1 | A19 | A1A | | 2 | A38 | A39 | | 3 | A56 | A57 | | 4 | A75 | A76 | | 5 | A94 | A95 | | 6 | AB2 | AB3 | | 7 | AD1 | AD2 | |
|  | ; Wait 00:00:30 (30 seconds) |  |  |
|  | ; Set the EAS1 MCP back by 25V  **TC, ZIA58784, PIA60218, EQUAL,** MCP Value |  | ; Each loop has these inputs   |  |  | | --- | --- | |  | **MCP Value** | |  | **PIA60218** | | 1 | A0A | | 2 | A28 | | 3 | A47 | | 4 | A66 | | 5 | A84 | | 6 | AA3 | | 7 | AC2 | |
|  | ; Start normal mode on EAS1  **TC, ZIA58771, PIA60031, EQUAL, MBOX1**  **TC, ZIA58771, PIA60446, EQUAL, 0**  **TC, ZIA58771, PIA60447, EQUAL, 0**  **TC, ZIA58771, PIA60448, EQUAL, 0x2** |  |  |
|  | SWA Operator to check Counts in 3d packets and EM3 packets | | |
|  | **SWA Operator Confirm to Proceed Round the Loop** | | |
|  | ; Stop normal mode on EAS1  **TC, ZIA58771, PIA60031, EQUAL, MBOX1**  **TC, ZIA58771, PIA60446, EQUAL, 0**  **TC, ZIA58771, PIA60447, EQUAL, 0**  **TC, ZIA58771, PIA60448, EQUAL, 0x0** |  |  |
|  | ; Set the EAS1 MCP to 2695V = 0xAC2  **TC, ZIA58784, PIA60218, EQUAL, 0xAC2** |  |  |
|  | ; Start normal mode on EAS1  **TC, ZIA58771, PIA60031, EQUAL, MBOX1**  **TC, ZIA58771, PIA60446, EQUAL, 0**  **TC, ZIA58771, PIA60447, EQUAL, 0**  **TC, ZIA58771, PIA60448, EQUAL, 0x2** |  |  |
|  | ; Wait 00:15:00 (900 seconds) |  |  |
|  | ; Stop normal mode on EAS1  **TC, ZIA58771, PIA60031, EQUAL, MBOX1**  **TC, ZIA58771, PIA60446, EQUAL, 0**  **TC, ZIA58771, PIA60447, EQUAL, 0**  **TC, ZIA58771, PIA60448, EQUAL, 0x0** |  |  |

## EAS2 MCP Commission

| **Step N°** | **Commanding Flow** | **PDOR or FCP** | **Comments** |
| --- | --- | --- | --- |
|  | ; Set EAS2 hemisphere voltage max to 800V  **TC, ZIA58815, PIA60441, EQUAL, 0x02**  **TC, ZIA58815, PIA60442, EQUAL, 0x9C**  **TC, ZIA58815, PIA60443, EQUAL, 0x80** |  |  |
|  | ; Set EAS2 deflector ratios  **TC, ZIA58813, PIA60474, EQUAL, 0x80**  **TC, ZIA58813, PIA60475, EQUAL, 0x00**  **TC, ZIA58813, PIA60578, EQUAL, 0x00**  **TC, ZIA58813, PIA60589, EQUAL, 0x00**  **TC, ZIA58813, PIA60600, EQUAL, 0x00**  **TC, ZIA58813, PIA60611, EQUAL, 0x00**  **TC, ZIA58813, PIA60622, EQUAL, 0x00**  **TC, ZIA58813, PIA60633, EQUAL, 0x00**  **TC, ZIA58813, PIA60644, EQUAL, 0x00**  **TC, ZIA58813, PIA60655, EQUAL, 0x00**  **TC, ZIA58813, PIA60476, EQUAL, 0x00**  **TC, ZIA58813, PIA60487, EQUAL, 0x00**  **TC, ZIA58813, PIA60498, EQUAL, 0x00**  **TC, ZIA58813, PIA60509, EQUAL, 0x00**  **TC, ZIA58813, PIA60520, EQUAL, 0x00**  **TC, ZIA58813, PIA60531, EQUAL, 0x00**  **TC, ZIA58813, PIA60542, EQUAL, 0x00**  **TC, ZIA58813, PIA60553, EQUAL, 0x00**  **TC, ZIA58813, PIA60564, EQUAL, 0x00**  **TC, ZIA58813, PIA60575, EQUAL, 0x00**  **TC, ZIA58813, PIA60579, EQUAL, 0x00**  **TC, ZIA58813, PIA60580, EQUAL, 0x00**  **TC, ZIA58813, PIA60581, EQUAL, 0x00**  **TC, ZIA58813, PIA60582, EQUAL, 0x00**  **TC, ZIA58813, PIA60583, EQUAL, 0x00**  **TC, ZIA58813, PIA60584, EQUAL, 0x00**  **TC, ZIA58813, PIA60585, EQUAL, 0x00**  **TC, ZIA58813, PIA60586, EQUAL, 0x00**  **TC, ZIA58813, PIA60587, EQUAL, 0x00**  **TC, ZIA58813, PIA60588, EQUAL, 0x00**  **TC, ZIA58813, PIA60590, EQUAL, 0x00**  **TC, ZIA58813, PIA60591, EQUAL, 0x00**  **TC, ZIA58813, PIA60592, EQUAL, 0x00**  **TC, ZIA58813, PIA60593, EQUAL, 0x00**  **TC, ZIA58813, PIA60594, EQUAL, 0x00**  **TC, ZIA58813, PIA60595, EQUAL, 0x00**  **TC, ZIA58813, PIA60596, EQUAL, 0x00**  **TC, ZIA58813, PIA60597, EQUAL, 0x00**  **TC, ZIA58813, PIA60598, EQUAL, 0x00**  **TC, ZIA58813, PIA60599, EQUAL, 0x00**  **TC, ZIA58813, PIA60601, EQUAL, 0x00**  **TC, ZIA58813, PIA60602, EQUAL, 0x00**  **TC, ZIA58813, PIA60603, EQUAL, 0x00**  **TC, ZIA58813, PIA60604, EQUAL, 0x00**  **TC, ZIA58813, PIA60605, EQUAL, 0x00**  **TC, ZIA58813, PIA60606, EQUAL, 0x00**  **TC, ZIA58813, PIA60607, EQUAL, 0x00**  **TC, ZIA58813, PIA60608, EQUAL, 0x00**  **TC, ZIA58813, PIA60609, EQUAL, 0x00**  **TC, ZIA58813, PIA60610, EQUAL, 0x00**  **TC, ZIA58813, PIA60612, EQUAL, 0x00**  **TC, ZIA58813, PIA60613, EQUAL, 0x00**  **TC, ZIA58813, PIA60614, EQUAL, 0x00**  **TC, ZIA58813, PIA60615, EQUAL, 0x00**  **TC, ZIA58813, PIA60616, EQUAL, 0x00**  **TC, ZIA58813, PIA60617, EQUAL, 0x00**  **TC, ZIA58813, PIA60618, EQUAL, 0x00**  **TC, ZIA58813, PIA60619, EQUAL, 0x00**  **TC, ZIA58813, PIA60620, EQUAL, 0x00**  **TC, ZIA58813, PIA60621, EQUAL, 0x00**  **TC, ZIA58813, PIA60623, EQUAL, 0x00**  **TC, ZIA58813, PIA60624, EQUAL, 0x00**  **TC, ZIA58813, PIA60625, EQUAL, 0x00**  **TC, ZIA58813, PIA60626, EQUAL, 0x00**  **TC, ZIA58813, PIA60627, EQUAL, 0x00**  **TC, ZIA58813, PIA60628, EQUAL, 0x00**  **TC, ZIA58813, PIA60629, EQUAL, 0x00**  **TC, ZIA58813, PIA60630, EQUAL, 0x00**  **TC, ZIA58813, PIA60631, EQUAL, 0x00**  **TC, ZIA58813, PIA60632, EQUAL, 0x00**  **TC, ZIA58813, PIA60634, EQUAL, 0x00**  **TC, ZIA58813, PIA60635, EQUAL, 0x00**  **TC, ZIA58813, PIA60636, EQUAL, 0x00**  **TC, ZIA58813, PIA60637, EQUAL, 0x00**  **TC, ZIA58813, PIA60638, EQUAL, 0x00**  **TC, ZIA58813, PIA60639, EQUAL, 0x00**  **TC, ZIA58813, PIA60640, EQUAL, 0x00**  **TC, ZIA58813, PIA60641, EQUAL, 0x00**  **TC, ZIA58813, PIA60642, EQUAL, 0x00**  **TC, ZIA58813, PIA60643, EQUAL, 0x00**  **TC, ZIA58813, PIA60645, EQUAL, 0x00**  **TC, ZIA58813, PIA60646, EQUAL, 0x00**  **TC, ZIA58813, PIA60647, EQUAL, 0x00**  **TC, ZIA58813, PIA60648, EQUAL, 0x00**  **TC, ZIA58813, PIA60649, EQUAL, 0x00**  **TC, ZIA58813, PIA60650, EQUAL, 0x00**  **TC, ZIA58813, PIA60651, EQUAL, 0x00**  **TC, ZIA58813, PIA60652, EQUAL, 0x00**  **TC, ZIA58813, PIA60653, EQUAL, 0x00**  **TC, ZIA58813, PIA60654, EQUAL, 0x00**  **TC, ZIA58813, PIA60656, EQUAL, 0x00**  **TC, ZIA58813, PIA60657, EQUAL, 0x00**  **TC, ZIA58813, PIA60658, EQUAL, 0x00**  **TC, ZIA58813, PIA60659, EQUAL, 0x00**  **TC, ZIA58813, PIA60660, EQUAL, 0x00**  **TC, ZIA58813, PIA60661, EQUAL, 0x00** |  |  |
|  | ; Load the EAS2 threshold values  **TC, ZIA58845, PIA60174, EQUAL, 0x5F40**  **TC,, PIA60185, EQUAL, 0x5F41**  **TC,, PIA60196, EQUAL, 0x5F42**  **TC,, PIA60200, EQUAL, 0x5F43**  **TC,, PIA60201, EQUAL, 0x5F44**  **TC,, PIA60202, EQUAL, 0x5F45**  **TC,, PIA60203, EQUAL, 0x6586**  **TC,, PIA60204, EQUAL, 0x6587**  **TC,, PIA60205, EQUAL, 0x66C8**  **TC,, PIA60175, EQUAL, 0x5F49**  **TC,, PIA60176, EQUAL, 0x5F4A**  **TC,, PIA60177, EQUAL, 0x5F4B**  **TC,, PIA60178, EQUAL, 0x5F4C**  **TC,, PIA60179, EQUAL, 0x5F4D**  **TC,, PIA60180, EQUAL, 0x5F4E**  **TC,, PIA60181, EQUAL, 0x5F4F**  **TC,, PIA60182, EQUAL, 0x5F40**  **TC,, PIA60183, EQUAL, 0x5F41**  **TC,, PIA60184, EQUAL, 0x5F42**  **TC,, PIA60186, EQUAL, 0x5F43**  **TC,, PIA60187, EQUAL, 0x5F44**  **TC,, PIA60188, EQUAL, 0x5F45**  **TC,, PIA60189, EQUAL, 0x5F46**  **TC,, PIA60190, EQUAL, 0x5F47**  **TC,, PIA60191, EQUAL, 0x5F48**  **TC,, PIA60192, EQUAL, 0x5F49**  **TC,, PIA60193, EQUAL, 0x5F4A**  **TC,, PIA60194, EQUAL, 0x5CCB**  **TC,, PIA60195, EQUAL, 0x5F4C**  **TC,, PIA60197, EQUAL, 0x5F4D**  **TC,, PIA60198, EQUAL, 0x5F4E**  **TC,, PIA60199, EQUAL, 0x5F4F** |  |  |
|  | **Perform the following 50 times** | | |
|  | ; Stop normal mode on EAS2  **TC, ZIA58819, PIA60031, EQUAL, MBOX1**  **TC, ZIA58819, PIA60446, EQUAL, 0**  **TC, ZIA58819, PIA60447, EQUAL, 0**  **TC, ZIA58819, PIA60448, EQUAL, 0x0** |  |  |
|  | ; Perform Eng Mode 3  [Conversion = 1.022 ]  **TC, ZIA58837, PIA60101, EQUAL,** Start MCP  **TC, ZIA58837, PIA60100, EQUAL,** Final MCP  **TC, ZIA58837, PIA60102, EQUAL, 0x33** ;Step MCP  **TC, ZIA58837, PIA60437, EQUAL, 1** ;1st ramp time  **TC, ZIA58837, PIA60444, EQUAL, 1** ;Inter ramp time  **TC, ZIA58837, PIA60165, EQUAL, 20** ;Acq time  **TC, ZIA58837, PIA60760, EQUAL, 0x20** Hem bin  **TC, ZIA58837, PIA60761, EQUAL, 0x8** ;Def number  **TC, ZIA58837, PIA60762, EQUAL, SWEEP\_MACRO** ;ctrl |  | ; Each loop has these inputs   |  |  |  | | --- | --- | --- | |  | **Start MCP** | **Final MCP** | |  | **PIA60101** | **PIA60100** | | 1 | 33 | 34 | | 2 | 66 | 67 | | 3 | 99 | 9A | | 4 | CC | CD | | 5 | FF | 100 | | 6 | 132 | 133 | | 7 | 165 | 166 | | 8 | 198 | 199 | | 9 | 1CB | 1CC | | 10 | 1FF | 200 | | 11 | 232 | 233 | | 12 | 265 | 266 | | 13 | 298 | 299 | | 14 | 2CB | 2CC | | 15 | 2FE | 2FF | | 16 | 331 | 332 | | 17 | 364 | 365 | | 18 | 397 | 398 | | 19 | 3CA | 3CB | | 20 | 3FE | 3FF | | 21 | 431 | 432 | | 22 | 464 | 465 | | 23 | 497 | 498 | | 24 | 4CA | 4CB | | 25 | 4FD | 4FE | | 26 | 530 | 531 | | 27 | 563 | 564 | | 28 | 596 | 597 | | 29 | 5C9 | 5CA | | 30 | 5FD | 5FE | | 31 | 630 | 631 | | 32 | 663 | 664 | | 33 | 696 | 697 | | 34 | 6C9 | 6CA | | 35 | 6FC | 6FD | | 36 | 72F | 730 | | 37 | 762 | 763 | | 38 | 795 | 796 | | 39 | 7C8 | 7C9 | | 40 | 7FC | 7FD | | 41 | 82F | 830 | | 42 | 862 | 863 | | 43 | 895 | 896 | | 44 | 8C8 | 8C9 | | 45 | 8FB | 8FC | | 46 | 92E | 92F | | 47 | 961 | 962 | | 48 | 994 | 995 | | 49 | 9C7 | 9C8 | | 50 | 9FB | 9FC | |
|  | ; Wait 00:00:30 (30 seconds) |  |  |
|  | ; Set the EAS2 MCP back by 25V  **TC, ZIA58832, PIA60218, EQUAL,** MCP Value |  | ; Each loop has these inputs   |  |  | | --- | --- | |  | **MCP Value** | |  | **PIA60218** | | 1 | 19 | | 2 | 4C | | 3 | 7F | | 4 | B2 | | 5 | E5 | | 6 | 119 | | 7 | 14C | | 8 | 17F | | 9 | 1B2 | | 10 | 1E5 | | 11 | 218 | | 12 | 24B | | 13 | 27E | | 14 | 2B1 | | 15 | 2E4 | | 16 | 318 | | 17 | 34B | | 18 | 37E | | 19 | 3B1 | | 20 | 3E4 | | 21 | 417 | | 22 | 44A | | 23 | 47D | | 24 | 4B0 | | 25 | 4E3 | | 26 | 517 | | 27 | 54A | | 28 | 57D | | 29 | 5B0 | | 30 | 5E3 | | 31 | 616 | | 32 | 649 | | 33 | 67C | | 34 | 6AF | | 35 | 6E2 | | 36 | 716 | | 37 | 749 | | 38 | 77C | | 39 | 7AF | | 40 | 7E2 | | 41 | 815 | | 42 | 848 | | 43 | 87B | | 44 | 8AE | | 45 | 8E1 | | 46 | 915 | | 47 | 948 | | 48 | 97B | | 49 | 9AE | | 50 | 9E1 | |
|  | ; Start normal mode on EAS2  **TC, ZIA58819, PIA60031, EQUAL, MBOX1**  **TC, ZIA58819, PIA60446, EQUAL, 0**  **TC, ZIA58819, PIA60447, EQUAL, 0**  **TC, ZIA58819, PIA60448, EQUAL, 0x2** |  |  |
| SWA Operator to check Counts in 3d packets and EM3 packets | | | |
|  | **SWA Operator Confirm to Proceed Round the Loop** | | |
|  | **Perform the following 7 times** | | |
|  | ; Stop normal mode on EAS2  **TC, ZIA58819, PIA60031, EQUAL, MBOX1**  **TC, ZIA58819, PIA60446, EQUAL, 0**  **TC, ZIA58819, PIA60447, EQUAL, 0**  **TC, ZIA58819, PIA60448, EQUAL, 0x0** |  |  |
|  | ; Perform Eng Mode 3  [Conversion = 1.022 ]  **TC, ZIA58837, PIA60101, EQUAL,** Start MCP  **TC, ZIA58837, PIA60100, EQUAL,** Final MCP  **TC, ZIA58837, PIA60102, EQUAL, 0x33** ;Step MCP  **TC, ZIA58837, PIA60437, EQUAL, 1** ;1st ramp time  **TC, ZIA58837, PIA60444, EQUAL, 1** ;Inter ramp time  **TC, ZIA58837, PIA60165, EQUAL, 20** ;Acq time  **TC, ZIA58837, PIA60760, EQUAL, 0x20** Hem bin  **TC, ZIA58837, PIA60761, EQUAL, 0x8** ;Def number  **TC, ZIA58837, PIA60762, EQUAL, SWEEP\_MACRO** ;ctrl |  | ; Each loop has these inputs   |  |  |  | | --- | --- | --- | |  | **Start MCP** | **Final MCP** | |  | **PIA60101** | **PIA60100** | | 1 | A19 | A1A | | 2 | A38 | A39 | | 3 | A56 | A57 | | 4 | A75 | A76 | | 5 | A94 | A95 | | 6 | AB2 | AB3 | | 7 | AD1 | AD2 | |
|  | ; Wait 00:00:30 (30 seconds) |  |  |
|  | ; Set the EAS2 MCP back by 25V  **TC, ZIA58832, PIA60218, EQUAL,** MCP Value |  | ; Each loop has these inputs   |  |  | | --- | --- | |  | **MCP Value** | |  | **PIA60218** | | 1 | A0A | | 2 | A28 | | 3 | A47 | | 4 | A66 | | 5 | A84 | | 6 | AA3 | | 7 | AC2 | |
|  | ; Start normal mode on EAS2  **TC, ZIA58819, PIA60031, EQUAL, MBOX1**  **TC, ZIA58819, PIA60446, EQUAL, 0**  **TC, ZIA58819, PIA60447, EQUAL, 0**  **TC, ZIA58819, PIA60448, EQUAL, 0x2** |  |  |
| SWA Operator to check Counts in 3d packets and EM3 packets | | | |
|  | **SWA Operator Confirm to Proceed Round the Loop** | | |
|  | ; Stop normal mode on EAS2  **TC, ZIA58819, PIA60031, EQUAL, MBOX1**  **TC, ZIA58819, PIA60446, EQUAL, 0**  **TC, ZIA58819, PIA60447, EQUAL, 0**  **TC, ZIA58819, PIA60448, EQUAL, 0x0** |  |  |
|  | ; Set the EAS2 MCP to 2695V = 0xAC2  **TC, ZIA58832, PIA60218, EQUAL, 0xAC2** |  |  |
|  | ; Start normal mode on EAS2  **TC, ZIA58819, PIA60031, EQUAL, MBOX1**  **TC, ZIA58819, PIA60446, EQUAL, 0**  **TC, ZIA58819, PIA60447, EQUAL, 0**  **TC, ZIA58819, PIA60448, EQUAL, 0x2** |  |  |
|  | ; Wait 00:15:00 (900 seconds) |  |  |
|  | ; Stop normal mode on EAS2  **TC, ZIA58819, PIA60031, EQUAL, MBOX1**  **TC, ZIA58819, PIA60446, EQUAL, 0**  **TC, ZIA58819, PIA60447, EQUAL, 0**  **TC, ZIA58819, PIA60448, EQUAL, 0x0** |  |  |

## EAS 1&2 Further Sensor Commission

| **Step N°** | **Commanding Flow** | **PDOR or FCP** | **Comments** |
| --- | --- | --- | --- |
|  | ; Perform Eng mode 4 on EAS1 (Threshold Sweep)  **TC, ZIA58790, PIA60104, EQUAL, 0x724** ; Start Thresh  **TC, ZIA58790, PIA60103, EQUAL, 0x477** ; End Thresh  **TC, ZIA58790, PIA60105, EQUAL, 0x200** ; Thresh step  **TC, ZIA58790, PIA60106, EQUAL, 0x0** ; MCP Value  **TC, ZIA58790, PIA60165, EQUAL, 0xA** ; MCP wait  **TC, ZIA58790, PIA60851, EQUAL, 2** ; Acq time  **TC, ZIA58790, PIA60760, EQUAL, 0x20** Hem bin  **TC, ZIA58790, PIA60761, EQUAL, 0x8** ;Def number |  | **ASSESS DATA TO CONTINUE** |
|  | ; Run post-eng mode macro on EAS1  **TC, ZIA58934,PIA60739, EQUAL,POST\_ENG** |  |  |
|  | ; Perform Eng mode 4 on EAS2 (Threshold Sweep)  **TC, ZIA58838, PIA60104, EQUAL, 0x724** ; Start Thresh  **TC, ZIA58838, PIA60103, EQUAL, 0x477** ; End Thresh  **TC, ZIA58838, PIA60105, EQUAL, 0x200** ; Thresh step  **TC, ZIA58838, PIA60106, EQUAL, 0x0** ; MCP value  **TC, ZIA58838, PIA60165, EQUAL, 0xA** ; MCP wait  **TC, ZIA58838, PIA60851, EQUAL, 2** ; Acq time  **TC, ZIA58838, PIA60760, EQUAL, 0x20** Hem bin  **TC, ZIA58838, PIA60761, EQUAL, 0x8** ;Def number |  | **ASSESS DATA TO CONTINUE** |
|  | ; Run post-eng mode macro on EAS2  **TC, ZIA58936, PIA60740, EQUAL,POST\_ENG** |  |  |
|  |  |  |  |
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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** | **PDOR or FCP** | **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 |  | Reduce the EAS1 Heater. Default = 0x00 0x01 0x60  **TC, ZIA58757, PIA60773, EQUAL, 0x00**  **TC,, PIA60774, EQUAL, 0xnn**  **TC,, PIA60775, EQUAL, 0xnn** |
|  | 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 |  | Reduce the EAS2 Heater. Default = 0x00 0x01 0x60  **TC, ZIA58805, PIA60773, EQUAL, 0x00**  **TC,, PIA60774, EQUAL, 0xnn**  **TC,, PIA60775, EQUAL, 0xnn** |
|  | EAS1 Electron Counts are too high  **TM, YIA58921** ; TM(21,3) SSID=18 SWA\_TM\_SCI\_EAS1\_ENG\_3-4\_RAW\_FIRST |  | Reduce EAS1 MCP level  **TC, ZIA58832, PIA60218, EQUAL, 0xnnn** |
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# SWA Commissioning Procedure (SWA-6, IA-6)

## Normal mode operation demonstration

## Burst & Triggered mode

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

# Interference campaign