# XMM Optical Monitor

MULLARD SPACE SCIENCE LABORATORY
UNIVERSITY COLLEGE LONDON
Author: Nigel R Bray

# MSSL XMM OM EM Integration Plan (Telescope Module)

DOCUMENT: XMM-OM/MSSL/SP/0122.01

Distribution:

| | | |
|---|---|---|
| XMM-OM Project Office | R Hunt | |
| ESA PX | H Eggel | |
| | S Thürey | |
| CSL | P Rochus | |
| | S Roose | |
| Pennsylvania State University | S Horner | |
| Royal Greenwich Observatory | R Bingham | |
| University College London | J Fordham | |
| Mullard Space Science Laboratory | N Bray | |
| | G Davidson | |
| | R Card | |
| | M Carter | |
| | R Chaudery | |
| | A Dibbens | |
| | H Huckle | |
| | H Kawakami | |
| | T Kennedy | |
| | T Patrick | |
| | D Self | |
| | P Smith | |
| | P Thomas | |
| | M Whillock | |
| | K Mason | |
| | A Smith | |

| | | | |
|---|---|---|---|
| Author: | NR Bray | Date: | 24-Oct-96 |
| OM Project Office | | Date: | |
| Distributed: | | Date: | |

| Issue | Date | Changes |
|---|---|---|
| | | |
| | | |
| | | |

| | |
|---|---|
| Machine File-System Directory: | \\mssli7\data\projects\XMM-OM/MSSL/SP/0122.01 |
| Document File Name: | EM Integration Plan.doc |
| Application: | MS Word 7 |
| Included files: | |
| Print Date (this): | 24-Oct-96 @ 21:12 |
| Printer: | Postscript |

## 1. Scope

The OM integration commences when sub-systems are assembled together and tested for their compatibility with each other and with the instrument requirements. Two phases are envisaged. The Off-Line Integration includes a set of independent tests which can be performed in parallel on the bench. The System Integration involves connecting each unit in turn to build up the complete model.

The requirements for the Engineering Model are limited to those that are applicable to the functional operation and electromagnetic representation of the Flight Model.

The integrated EM telescope tube (OM1) contains all the electronic units and mechanisms, but excludes the Image Intensifier and Optics.

Thus the delivered EM shall not be capable of capturing any images or meaningful data from the camera head.

The EM is required to be delivered to ESTEC on 31-May-97.

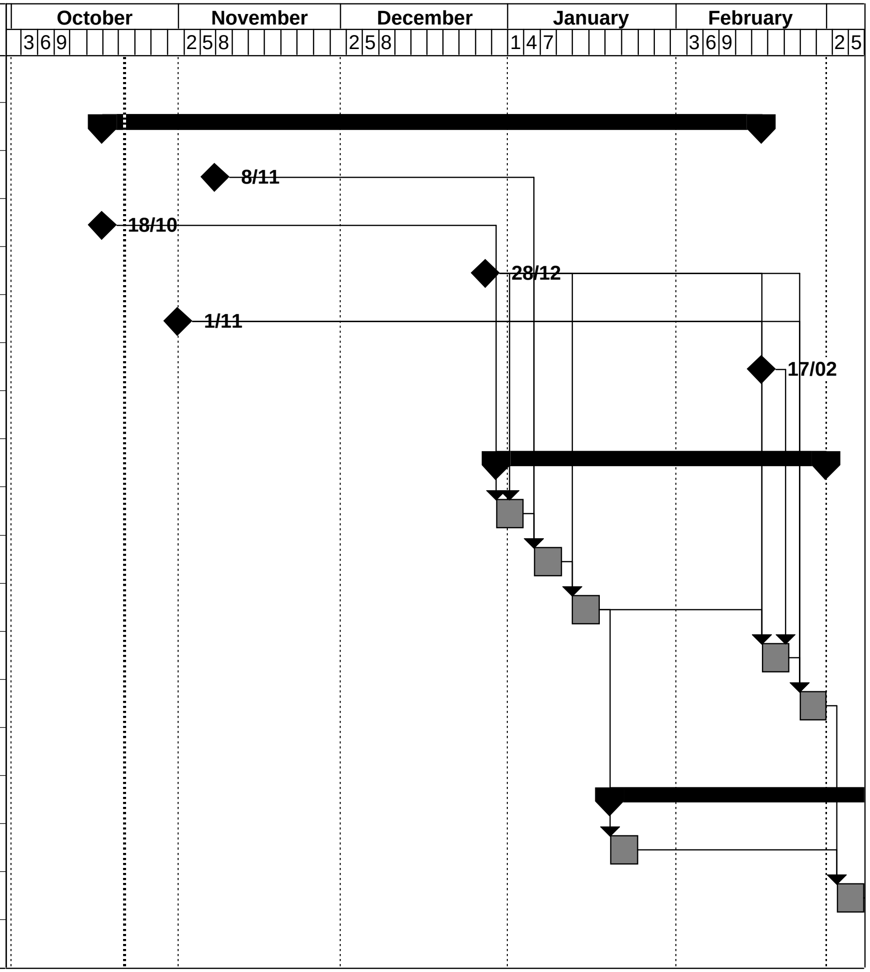
The schedule presented here defines the dates when units are needed and the time available for each stage of the integration.

## 2. Acronyms

HV - High Voltage
II - Image Intensifier
BCH - Blue Camera Head
BPE - Blue Processing Electronics
FW&D - Filter Wheel and Dichroic
TMPSU - Telescope Module Power Supply
DPU - Data Processing Unit
ICU - Instrument Control Unit
EGSE - Electrical Ground Support Equipment
OGSE - Optical Ground Support Equipment

# 3. Integration Plan

| ID | Task Name | Duration | Start | Finish | Predecessors |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | **Completed Units** | **17.2w** | **18 Oct '96** | **17 Feb '97** | |
| 3 | HV | 0d | 8 Nov '96 | 8 Nov '96 | |
| 4 | BCH | 0d | 18 Oct '96 | 18 Oct '96 | |
| 5 | BPE | 0d | 28 Dec '96 | 28 Dec '96 | |
| 6 | FW&D | 0d | 1 Nov '96 | 1 Nov '96 | |
| 7 | TMPSU | 0d | 17 Feb '97 | 17 Feb '97 | |
| 8 | | | | | |
| 9 | **Off-Line Integrations** | **9w** | **30 Dec '96** | **28 Feb '97** | |
| 10 | b) BCH-BPE | 1w | 30 Dec '96 | 3 Jan '97 | 4,5 |
| 11 | d) HV-BPE | 1w | 6 Jan '97 | 10 Jan '97 | 3,5,10 |
| 12 | f) BPE-DPU | 1w | 13 Jan '97 | 17 Jan '97 | 5,11 |
| 13 | e) BPE-FW&D-TMPSU | 1w | 17 Feb '97 | 21 Feb '97 | 5,6,7,12 |
| 14 | g) BPE-TMPSU-ICU | 1w | 24 Feb '97 | 28 Feb '97 | 5,6,13 |
| 15 | | | | | |
| 16 | **System Integration** | **8w** | **20 Jan '97** | **14 Mar '97** | |
| 17 | 2) HV-BCH-BPE | 1w | 20 Jan '97 | 24 Jan '97 | 12 |
| 18 | 3) HV-BCH-BPE-TMPSU | 1w | 3 Mar '97 | 7 Mar '97 | 17,14 |
| 19 | 4) HV-BCH-BPE-FW&D-TMPSU | 1w | 10 Mar '97 | 14 Mar '97 | 18 |



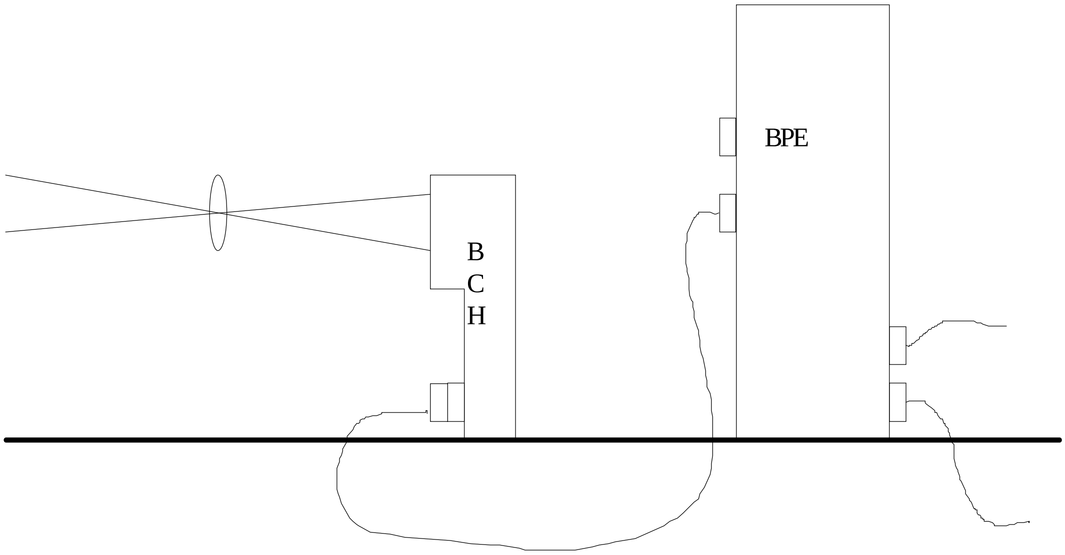
## 4. Integration Sequence

| Configuration: | | a | b | c | d | e | f | g | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Internal Units | | | | | | | | | | | | |
| Blue Mechanics | | | | | | | | | ● | ● | ● | ● |
| Internal Harness | | | | | | | | | ● | ● | ● | ● |
| HV | | ● | | | ● | | | | ● | ● | ● | ● |
| II | | ● | | ● | | | | | ● | ● | ● | ● |
| BCH | ● | | ● | ● | | | | | ● | ● | ● | ● |
| BPE | | | ● | | ● | ● | ● | ● | | ● | ● | ● |
| FW&D | | | | | | ● | | | | | | ● |
| TMPSU | ● | | | | | ● | | ● | | | ● | ● |
| External Units | | | | | | | | | | | | |
| ICU | | | | | | | | ● | | | | |
| DPU | | | | | | | ● | | | | | |
| Support Equipment | | | | | | | | | | | | |
| OGSE | | | | | | | | | ● | ● | ● | ● |
| BCH-EGSE | ● | | | | | | | | ● | | | |
| HV-EGSE | | ● | | | | | | | ● | | | |
| BPE-EGSE | | | ● | | ● | | ● | ● | | ● | ● | |
| TMPSU-EGSE | ● | | | | | | | | | | | |
| SYSTEM-EGSE | | | | | | ● | ● | ● | | ● | ● | ● |
| Test Type | | | | | | | | | | | | |
| Intensified Image | | ● | | ● | | | | | ● | | | |
| Processed Image | | | ● | | | | | | | ● | ● | ● |
| Functional/Control | | | | | ● | ● | | | | | | ● |
| Interface | | | | | | | ● | ● | | | | ● |

# 5. Detailed Test Procedures

## 5.1 Off-Line Integrations

b) BCH-BPE




Aims

- to verify clocking of camera head
- to acquire clean image data from camera head
- to produce centroided events

Details of test(s) to be performed

Use the BPE-EGSE to control the BPE and acquire data

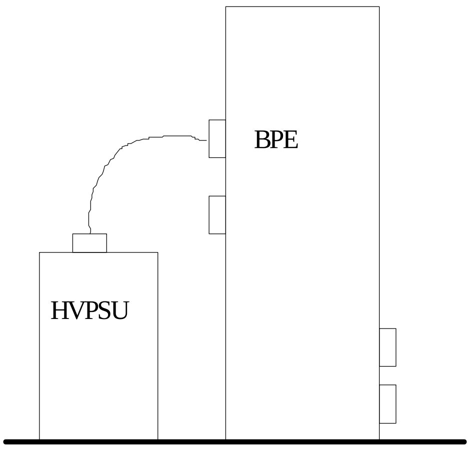
◊ snap frame images from the BCH

compare the images received with those received when operating the camera head stand alone using its own EGSE.

◊ centrioded events from the BPE

ensure that OGSE is generating suitable images and correct centrioded events are being detected.

d) HV-BPE



## Aims

- to control the HV via BPE
- to observe stable high voltage rails

## Details of test(s) to be performed

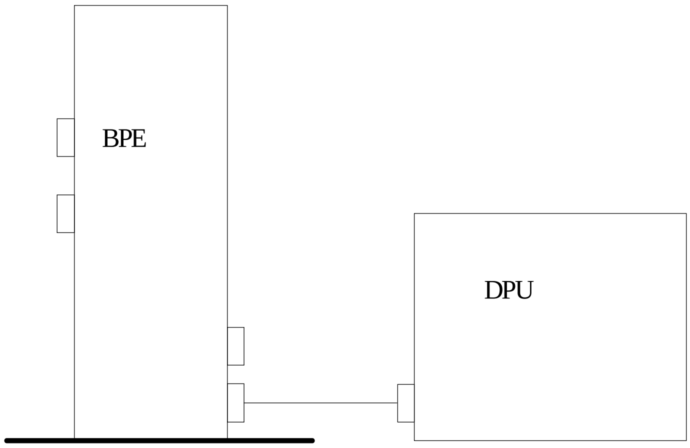
Use the BPE-EGSE to control the BPE

◊ switch on and off the HV and monitor its status

check operation of normal HV on/off characteristics, investigate control of maximum and minimum voltages

◊ measure the HV outputs

## f) BPE-DPU




## Aims

- Verify Data capture interface to DPU

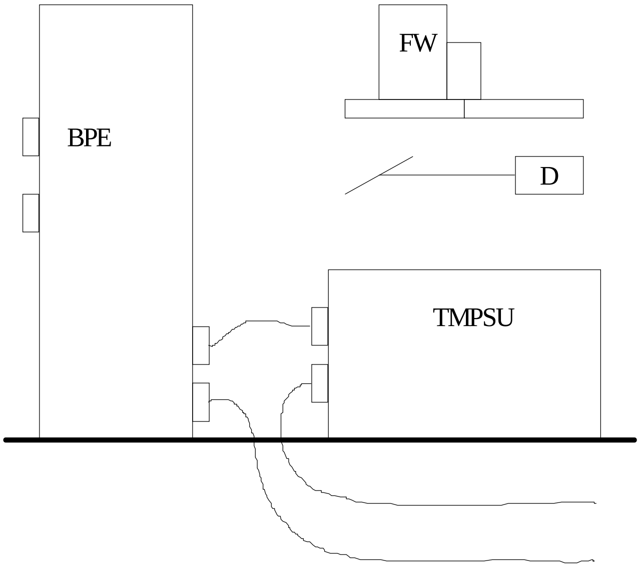
## Details of test(s) to be performed

Use BPE-EGSE to simulate the BCH and System EGSE to collect DPU data

◊ Generate point source camera data

Verify DPU image data

## e) BPE-FW&D-TMPSU




## Aims

- Verify TMPSU functionality interacting with BPE and FW&D

## Details of test(s) to be performed

Operate TMPSU from System EGSE and perform short functional tests on BPE

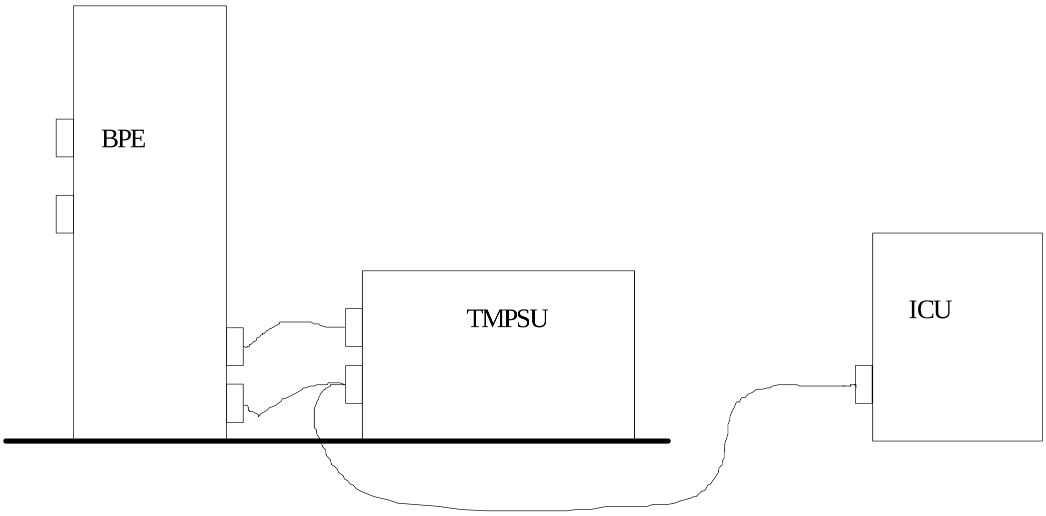
◊ Drive filter wheel

check running at full speed without loss of steps, check coarse and fine sensors all through ICB

◊ Drive dichroic

confirm operation

## g) BPE-TMPSU-ICU



## Aims
- Validate ICB commanding

## Details of test(s) to be performed

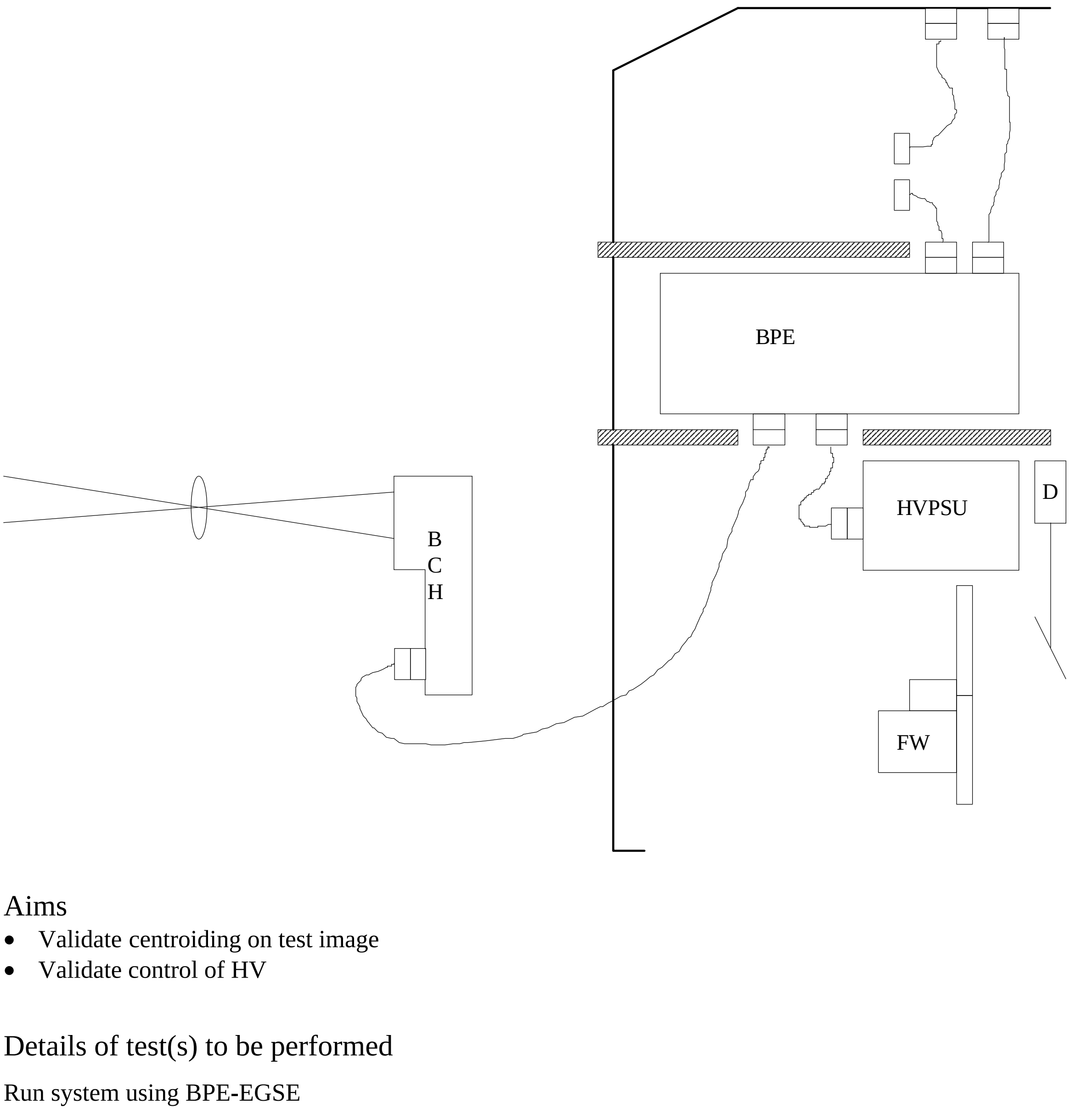
Establish error free communication on ICB with all units connected.

◊ Send and receive all types of command on the ICB, whilst checking for errors, repeatedly.

Confirm no errors found after long term tests.

## 5.2 System Integration

### 2) HV-BCH-BPE




## Aims
- Validate centroiding on test image
- Validate control of HV

## Details of test(s) to be performed

Run system using BPE-EGSE

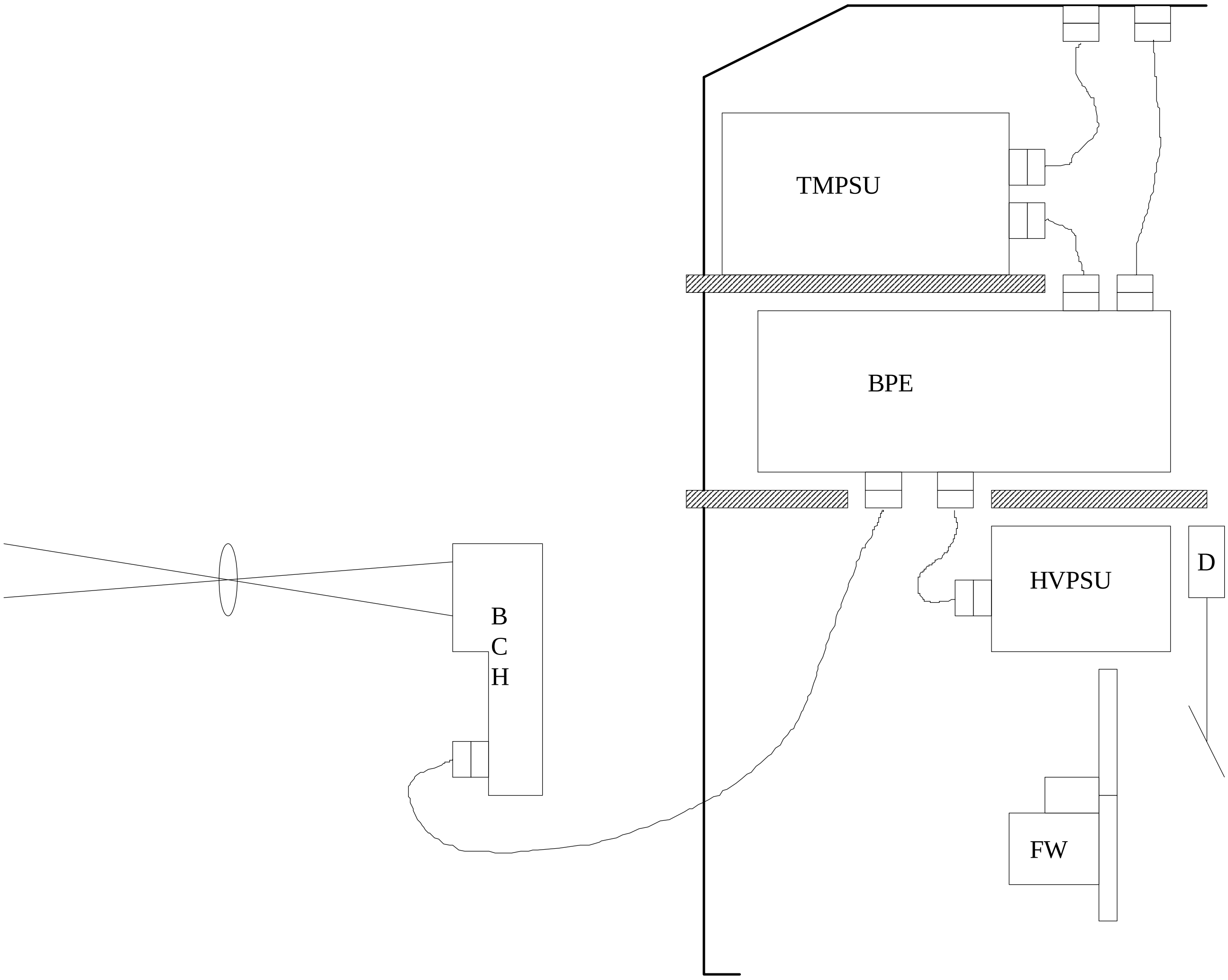
◊ Collect centroided data

confirm accumulated image is of ‘good quality’

◊ Control HV

Verify feedback from ICB monitors

3) HV-BCH-BPE-TMPSU




## Aims

- to validate centroiding
- to establish output from successful full functional test

## Details of test(s) to be performed

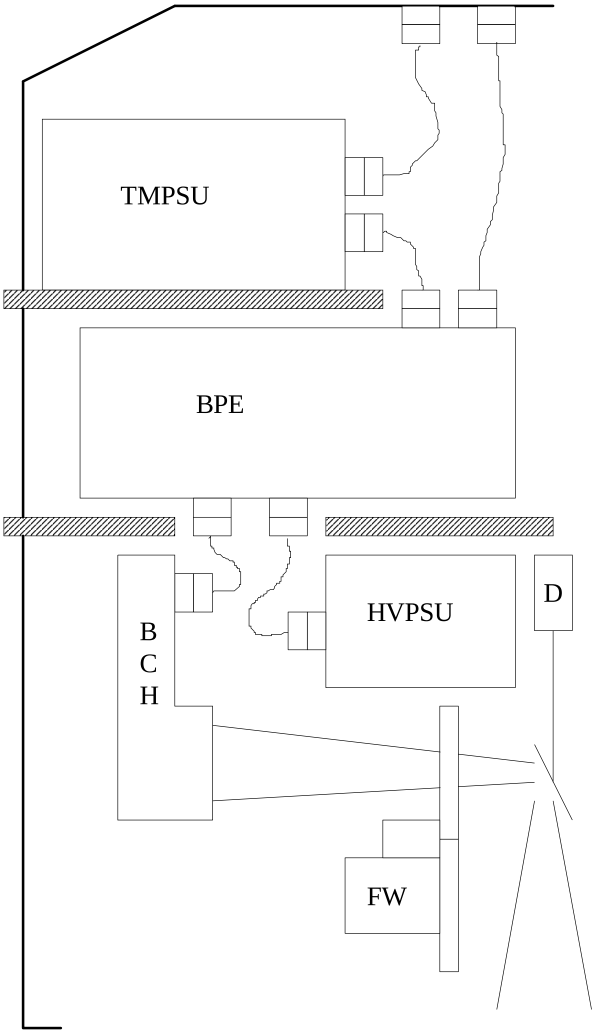
Use System EGSE and DEM

◊ Acquire centroided events from BPE

◊ Perform full functional test

Save results with current set-up for comparison with next test.

4) HV-BCH-BPE-FW&D-TMPSU




## Aims

- to validate integrated system

## Details of test(s) to be performed

Use System EGSE and DEM

◊ Perform full functional test

Compare results with previous set-up and verify that the camera head mounted internally operates the same