Istituto di Astrofisica e Planetologia Spaziali

Serena Integrated Test (SIT#2) Report

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DISTRIBUTION

Name	organisation
SERENA Team	
ESA Project Team	ESA/Estec
ASI-INAF agreement procedure responsible	ASI

CHANGE LOG

date	Issue	revision	Section	reason for change
September 2017	1	0	All	First Issue

ACRONYMS

AD	Applicable Document
AFT	Abbreviated Functional Test
AIT	Assembling. Integration & Testing
AIV	Assembling. Integration & Verification
AN	As Necessary
AUT	Article Under Test
CGS	Compagnia Generale per lo Spazio
CP	Control Point
DAS	Data Acquisition System
ECSS	European Cooperation for Space Standardization
FEM	Finite Element Model
FM	Flight Model
I/F	Interface
MP	Measurement Point
PA	Product Assurance
P/N	Part number. Also called Configuration Item C.I.
QA	Quality Assurance
REQ	Requirement
RD	Reference Document
RS	Reference System
SCU	System Control Unit
SIT	Serena Integrated Test
SS	SubSystem
SW	Software
TBC	To Be Confirmed
TBD	To Be Defined
TBW	To Be Written

APPLICABLE DOCUMENTS

#	Name	Reference
[AD1]	SIT#2-Test Plan	BC-SRN-PL-64292_SIT_PLAN_Iss1_rev1
[AD2]	SERENA EICD	BC-SRN-ICD-03000
[AD3]	TV facility specification.pdf	
[AD4]	SIT_mech_interface.pdf	
[AD5]	SERENA Calibration Plan	BC-SRN-PL-00030
[AD6]	SIT#3 Report	
[AD7]	SIT#2 Report	BC-SRN-TR-64293-01-03_SIT2
[AD8]	SERENA User Manual	BC-SRN-UM-03001
[AD9]	SERENA PI-EGSE Quick start guide	BC-SRN-UM-03000
[AD10]	Elena FUNCTIONAL TEST PROCEDURE	BC-SRN-PR-32006 iss3

Contents

1 INTRODUCTION: SERENA INTEGRATED TEST

Serena Integrated Test is an activity planned to verify overall SERENA functionality [AD5]. It is a unique test to verify the Sensors and the System Control Unit (i.e the Serena SW) with all the sensors interconnected and operating in science mode.
Several verification have been done at Unit level and at SERENA level, on the satellite and on bench (w/wo simulators). Nevertheless, it was never possible to turn on all the SERENA units with HV on, hence with detectors running and real data. The reason is that the High Vacuum condition is required for all the SERENA sensors.
Thanks to the availability of SERENA Flight Spares and of appropriate facility this test has been performed.
This document is a report of the campaign prepared in 2016 and performed at Bern University from 30 Jan 2017 up to 10 Mar 2017.

2 PARTICIPANTS AND GENERAL RESPONSIBILITY

The campaign has involved all the Co-Pi teams and it has been coordinated by the PI team with the support of OHB-AMDL. The set-up, the test plan, the operations and the activities have been done with the participation of all the teams. The representative persons have taken part to the test on-site or remotely connected during the activity. Each unit had instrument responsible and test conductor.
The facility is under University of Bern responsibility.
The management and coordination under PI responsibility.
Also ESA representatives participate to the activity.

3 TEST ARTICLES AND HARDWARE

The test article consists of all SERENA FS instrument composed by 4 units: ELENA FS, PICAM FS; MIPA FS, STROFIO EM and System Control Unit. The System Control Unit (SCU) is inside ELENA Box (SCU-FS) and all the system is connected to the MIS through ELENA box.

The table list all the used hardware:

Hardware:	model	GSE
Elena	FS	Instr-GSE
Mipa	FS	Instr. GSE
Picam	FS	Instr. GSE
Strofio	EM (sensor+electr.box)	Instr. GSE
SCU	FS	PI-GSE
MIS		
SERENA inter-connection	Flight cables	
Chamber - MIS connection	ELENA TVTC cables	

Also, dedicated stimuli (signal source) for real data has been implemented to verify Ion sensors (MIPA-PICAM). The sources consist of filaments able to produce charge particles. They are provided and assembled by IRF.

MIPA	IRF source (#2)
PICAM	IRF source (#1)

The Flight configuration consists of the 4 instruments connected to Elena unit which is the unit in direct interface with S/C (or MIS) for power and data distribution.

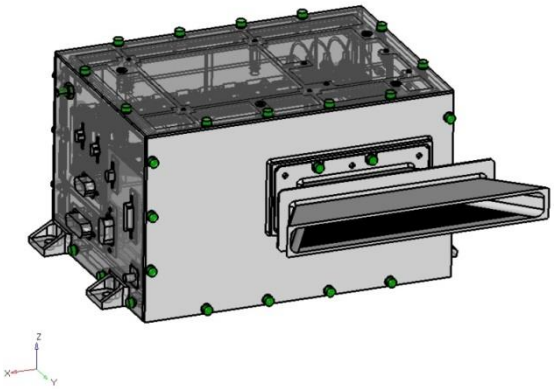


Figure 1 Serena ELENA unit

The Elena unit is a electronic box with a mechanical interface that is described as per [AD8] and an electrical interface that is described as per [AD2]

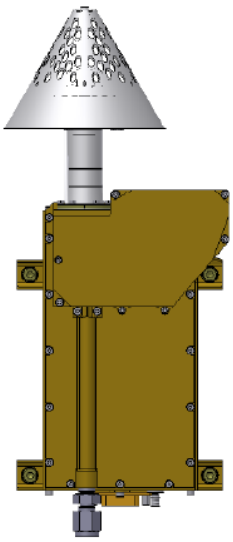


Figure 2 Serena MIPA unit

The Mipa unit is an electronic box with a mechanical interface that is described as per [AD4] and an electrical interface that is described as per [AD2]

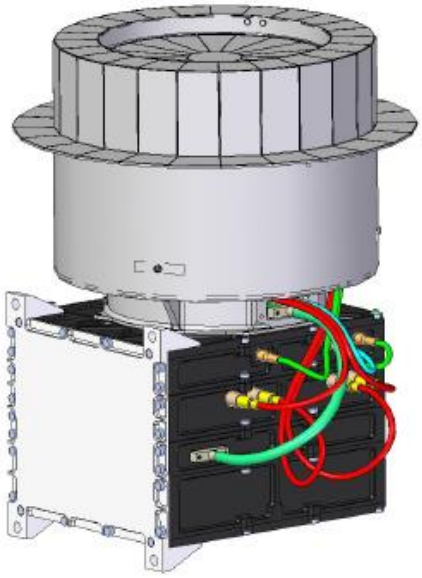


Figure 3 Serena PICAM unit

The Picam unit is an electronic box with a mechanical interface that is described as per [AD4] and an electrical interface that is described as per [AD2]

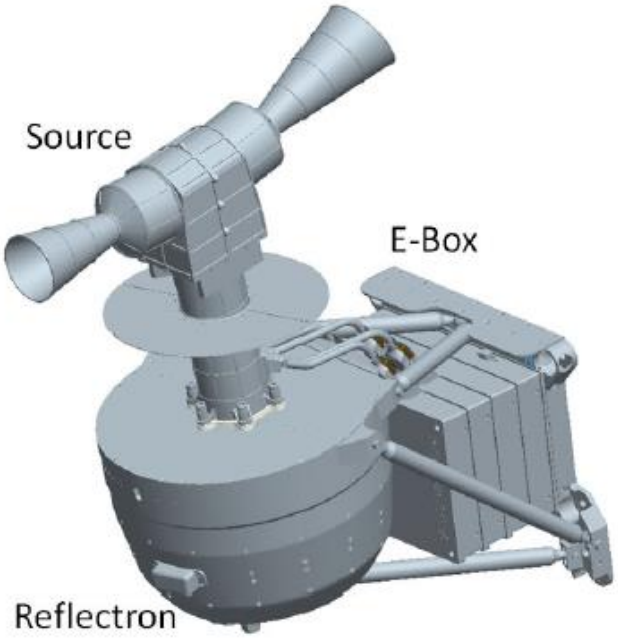


Figure 4 Serena STROFIO unit

The Strofio unit is an electronic box with a mechanical interface that is described as per [AD2] and an electrical interface that is described as per [AD3]. The STROFIO Flight model is presently

integrated on satellite but the STROFIO EM model is available for SIT: STROFIO EM is composed by the sensor and a separate electronic box (not usable in vacuum).

The 4 units are nominally linked by the internal harness as depicted in the following block diagram:

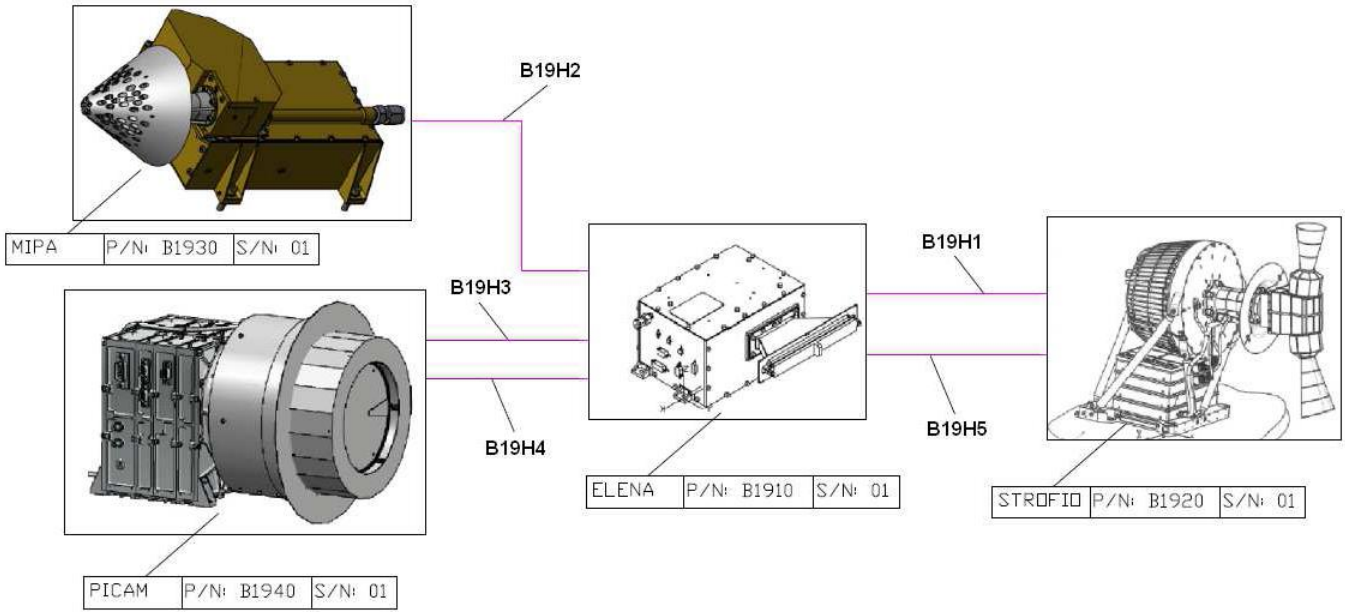


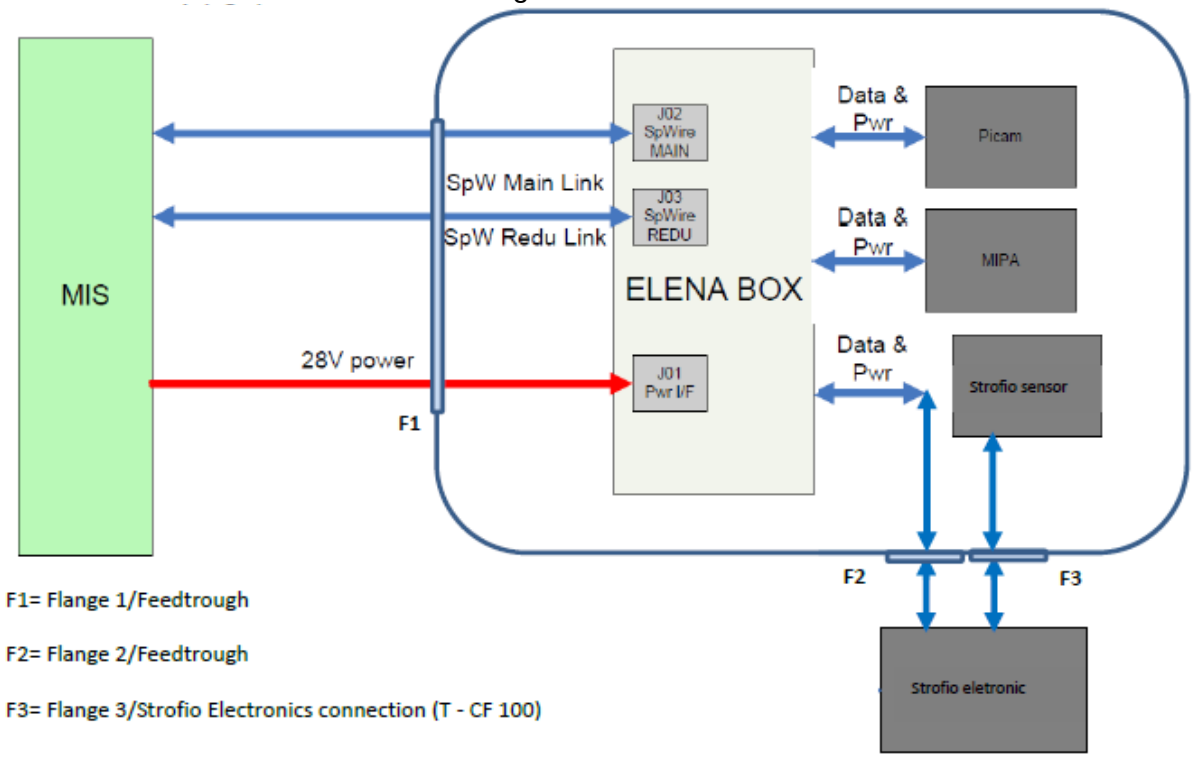
Figure 5 Serena internal harness

The internal harness is composed by 5 cables:

- ELENA - STROFIO PWR Cable / PTI: B19H1
- ELENA - MIPA Cable / PTI: B19H2
- ELENA - PICAM PWR Cable / PTI: B19H3
- ELENA - PICAM Spacewire Cable / PTI: B19H4
- ELENA - STROFIO Data Cable / PTI: B19H5

ELENA is the unit in direct interface with MIS for Power and Data distribution with 2 Spacewire cables (main and redundant) and 1 cable for Power.

This configuration has been adapted for the in-vacuum set-up in the chamber as in the next schematic and described in the following:



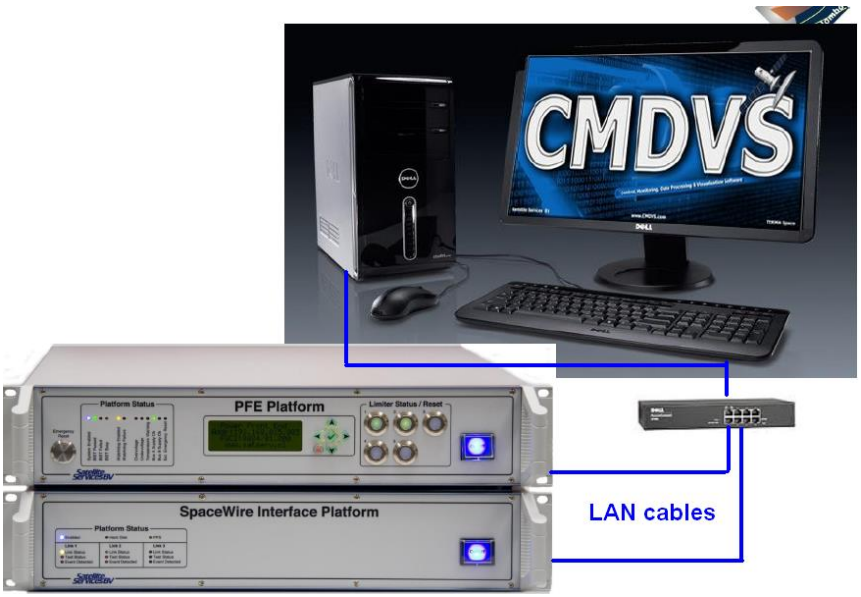
F1= Flange 1/Feedtrough

F2= Flange 2/Feedtrough

F3= Flange 3/Strofio Electronics connection (T - CF 100)

The SERENA package is controlled by MIS composed by:

- Module 1: Power Front End – PFE
- Module2: Space Wire Front End -SWFE
- 1 PC
- 2 monitors
- 1 router



The SERENA GSE is composed by the PI-GSE and Instruments GSE (for MIPA-PICAM-STROFIO-ELENA) connected as in the schematic:

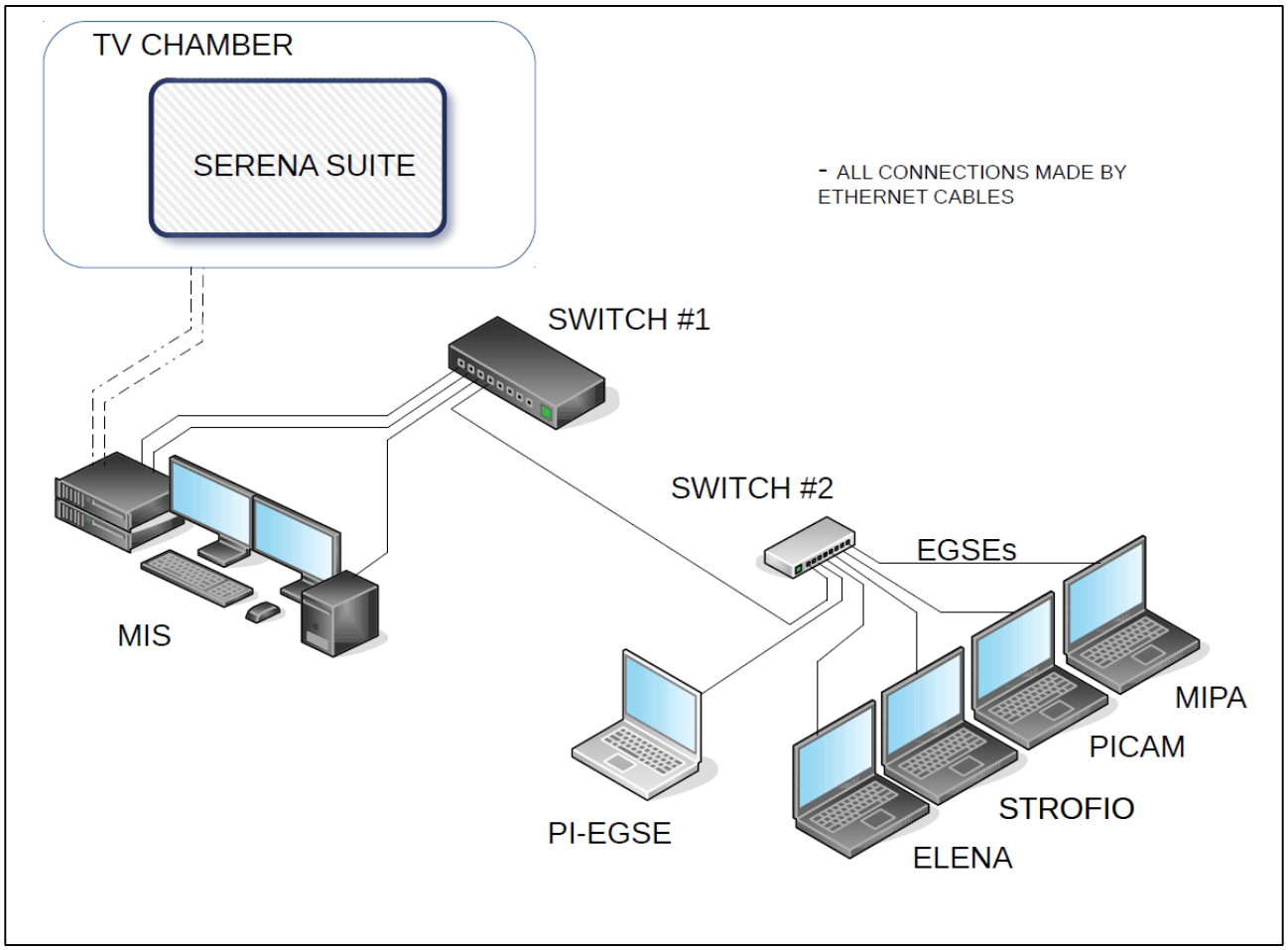
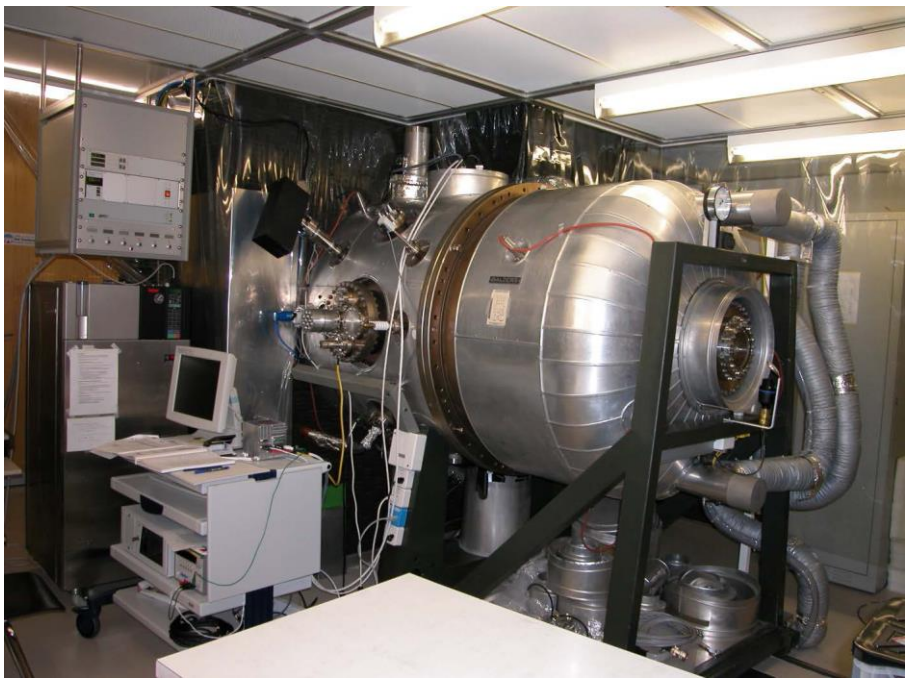


Fig 6 MIS and GSE connection scheme

Each GSE is connected to the PI-GSE by Ethernet cables with allowed IP address [AD11_BC-SRN-UM-03000_Iss4].
Also an external PI-GSE access has been implemented to have real time remote connection allowing participation of colleagues not on site.

4 VACUUM CHAMBER - TEST FACILITY

The facility is the large TV chamber facility [AD4] at Phys Institute in Bern (ref. prof. P. Wurz). With coordination of Bern team (D. Piazza, T. De Roche) and university staff.



(courtesy from Bern team - TV facility specification document)

5 SET-UP

All the sensors have been accommodated inside the chamber and fixed on the vacuum table with few changes respect to the planned set-up [AD1]. Each unit needed of a specific mechanical interface made for the test [AD4]. Five feedthroughs have been used to connect the in vacuum set-up to the external system (MIS and STROFIO box). Strofio has a specific sensor-electr. box connection achieved with a dedicated T flange for the feedthroughs.
In the figure below the realized set-up inside the chamber.

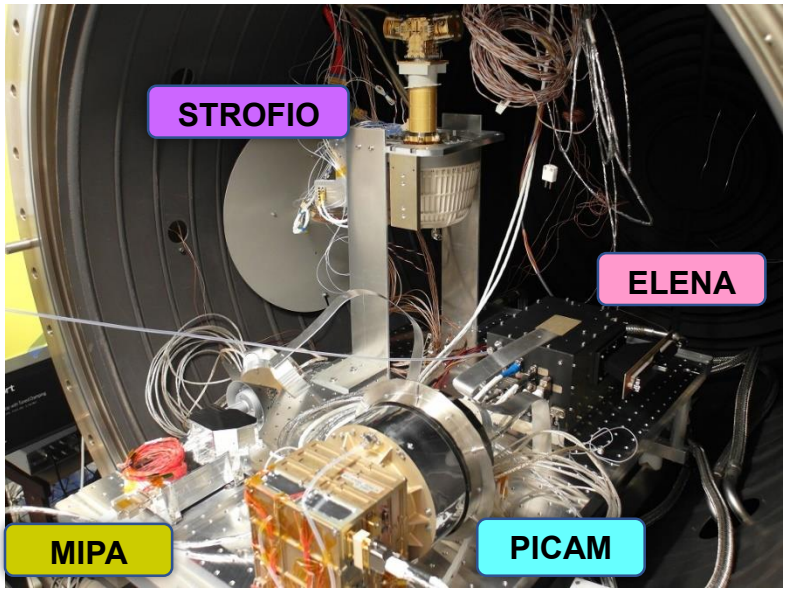
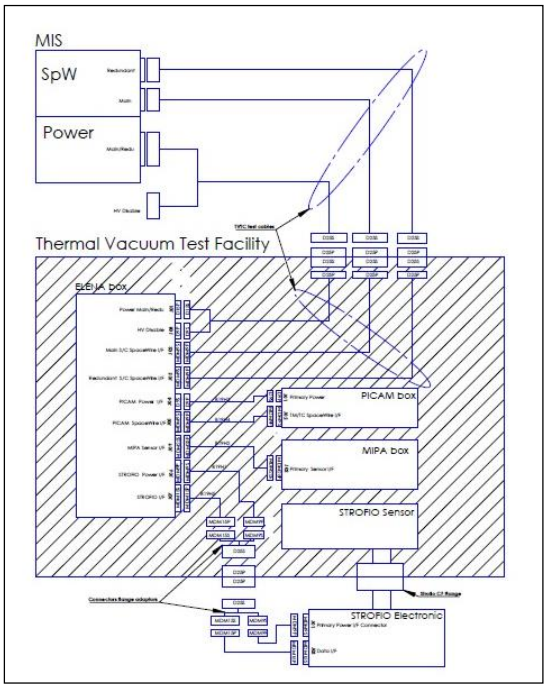


Figura 1 SERENA set-up inside vacuum chamber

To connect all the sensors to the MIS the following connection scheme has been implemented



Other feedthroughs have been used for signal sources: IRF sources required six feedthroughs with LEMO10 on the outside and 4mm Banana on the inside.

6 TEST PERFORMED

The scope of the present test is to perform representative operative test for Serena experiment. Up to now it was never possible to perform a full representative SERENA test in science mode because vacuum condition is requested for operation of all the 4 SERENA sensors.
The only performed SERENA tests in integrated configuration has done with ELENA-SCU + emulators (MIPA-PICAM-STROFIO) on bench (SIT#3 in Milan) or with only ELENA-SCU in vacuum+emulators in air (SIT#2/3 in Rome). In any case with simulated data and without HV.

The goal of the present test is
1. to have units running and generating real data (in vacuum condition).
2. to verify OBCP command not performed during system test (with HV on).
3. to perform selected Science operation scenario and investigate demanding cases (SCU resource limit, SW verification).

The approved schedule is in the table below

	Week 1 – Test preparation
Jan 27	Transportation (ELENA FS-PICAM FS-STROFIO EM-MIPA FS)
Jan 28	
Jan 29	
Jan 30	Incoming/Inspection - Bench test (SS level)
Jan 31	Set-up installation; AFT before vacuum pump. SS
Feb 1	Set-up installation; AFT before vacuum pump. SS/AFT SERENA level [AD12]
Feb 2	Vacuum pumping
Feb 3	Vacuum pumping
Feb 4	Vacuum pumping
Feb 5	Vacuum pumping
	Week 2 – Test 1 – OBCP verification
Feb 6	*Preliminary Switch-on (AFT in vacuum condition) [AD12]*
Feb 7	ELENA OBCP (switch on-off-HV… test) MIPA OBCP (switch on-off –HV…test)
Feb 8	PICAM OBCP (switch on-off… test) STROFIO OBCP (switch on-off… test))
Feb 9	SERENA OBCP test (switch on- emergency switch off (2min))
Feb 10	*Margin*
Feb 11	
Feb 12	
	Week 3 – Test 2 – SIT test - Operation scenario– w/wo stimuli
Feb 13	Single unit Science modes verification
Feb 14	Single unit Science modes verification
Feb 15	**Operation scenario test 1**
Feb 16	**Operation scenario test 1**
Feb 17	*Margin*

Feb 18	
Feb 19	
	Week 4 - Test 2 – SIT test - Operation scenario– w/wo stimuli
Feb 20	Operation scenario test 2
Feb 21	Operation scenario test 3
Feb 22	*Margin*
Feb 23	End of test
Feb 24	
Feb 25	
Feb 26	

The test has been extended up to March 10 for opened NCRs, further SW updates and added validation test.

Also a LONG TERM test of 24hours has been done.

6.1 Preliminary activity

Each team has inspected, preliminary tested and prepared the set-up with unit accommodation in the vacuum chamber.

Figura 2 MIPA (left) and STROFIO (right) team activity

Then the connections have been implemented and the SERENA configuration preliminary tested in air (no HV) with AFT. After the success of this test, the vacuum condition has been applied with 4 days of preliminary vacuum pumping and bake-out @ 80°C.
Also in vacuum condition the AFT has been performed.

6.2 Units running and generating real data in vacuum condition

At the appropriate vacuum level each team had available time to perform preliminary check of the instrument, in particular to verify TC, TM, modes and functionality connected to SCU. Also they perofrm the slow ramp up of the HV and use science mode with real data (if applicable).
Several events have been pointed out and partially overcome in this phase.

6.3 OBCP procedure verification with HV on

The SERENA OBCP test performed in ESTEC skipped the HV steps because no vacuum condition has been guaranteed at system level. To verify the HV procedure the OBCP has been partially translated by ASD to be used on MIS during SIT in Bern. The following tcl are available for OBCP verification (from SERENA_OBCP_URD_BC-ASD-SP-00171_2dr_2016-12-13 document):

SERENA Emergency Off	KSE04182SEEM
ELENA Switch-on	KSE04183ELON
STROFIO Switch-on	KSE04186STON
MIPA Switch-off	KSE04188MIOF
PICAM Switch-off	KSE04189PIOF
Enable MIPA HV	KSE04191MIHV (new)
PICAM Standby	KSE04192PISB (new)
PICAM Data Acquisition	KSE04193PIDA (new)

The OBCPs have been manually modified by Serena team for solving the points that the automatic translation to .tcl language from original OBCP SW language was not able to correctly perform. [AD1]

Specific scripts that allow to perform the test with MIS and providing the missing .tcl has been prepared [SIT-OBCP-Test Note, by OHB-I *F. Camozzi*]. The sequence and procedure have been checked in advance at IAPS in January 2017 with MIS and SERENA suite (ELENA FS and emulators).
Because of the provided OBCP .tcl are only a part of the overall Serena OBCPs is not possible to operate the instruments only with OBCPs execution. Therefore, in order to test the provided OBCPs the missing transitions of the units have been performed using the standard .tcl scripts (used during IST verifications AIV at unit and system level testing) or via manually TCs sent by MIS. [AD1]

After preliminary check of the units, the procedure needed to be further refined: several important outputs to refine the OBCP have been reported in Appendix 1: SERENA HV OBCP verification – draft 1.1).

After the changes implementation in the .tcl files the test has been successfully done.

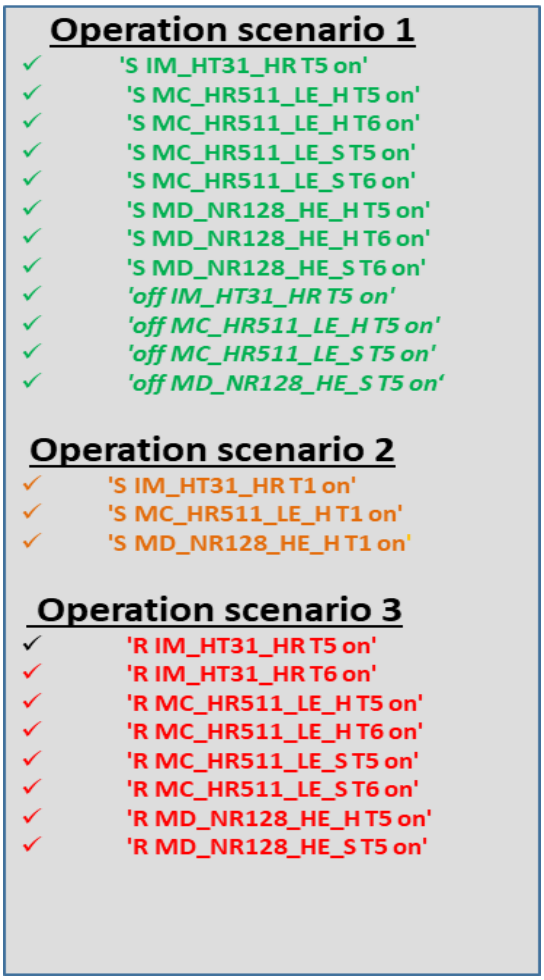
6.4 Selected science operation scenario

To perform a representative test, it was proposed to investigate different operation scenarios and more demanding cases.

For this reason, 3 operation scenarios test have been planned and perofrmed:

- **Operation scenario 1** -> Selected operation modes from nominal present timeline **Operation scenario 2** -> demanding case, i.e MIPA demanding mode ELENA-STROFIO in baseline mode, and PICAM in growing demanding mode
- **Operation scenario 3** -> demanding new case (ELENA R demanding case, MIPA-PICAM-STROFIO baseline mode)

The proposed operation scenarios [AD1] are listed in the table



Legend for table :

S IM_HT31_HR T5 on
ELENA mode S
PICAM mode IM_HT31_HR
MIPA mode T5
STROFIO mode on

Off=no science mode (stand by)

Legend for modes	
STROFIO	N = Nominal
ELENA	S = Sectors 32 "Extended Histogram type" R = Rational "Event-by-Event"
PICAM	1 = IM_HT_HR31 (High Time and Spatial Resolution Image) 8_S = MC_HR511_LE_S (High Resolution TOF, Low Energy Resolution - Single pulse) 8_H = MC_HR511_LE_S (High Resolution TOF, Low Energy Resolution - Hadamard pulse) 13_S = MD_NR128_HE (High Energy Resolution - Single pulse) 13_H = MD_NR128_HE (High Energy Resolution - Hadamard pulse)
MIPA	1 = Full slow 5 = Plasma dynamics 1 (basic) 6 = Mass resolution 2

Operation scenario condition and results.

All the instruments have been operated in science mode:

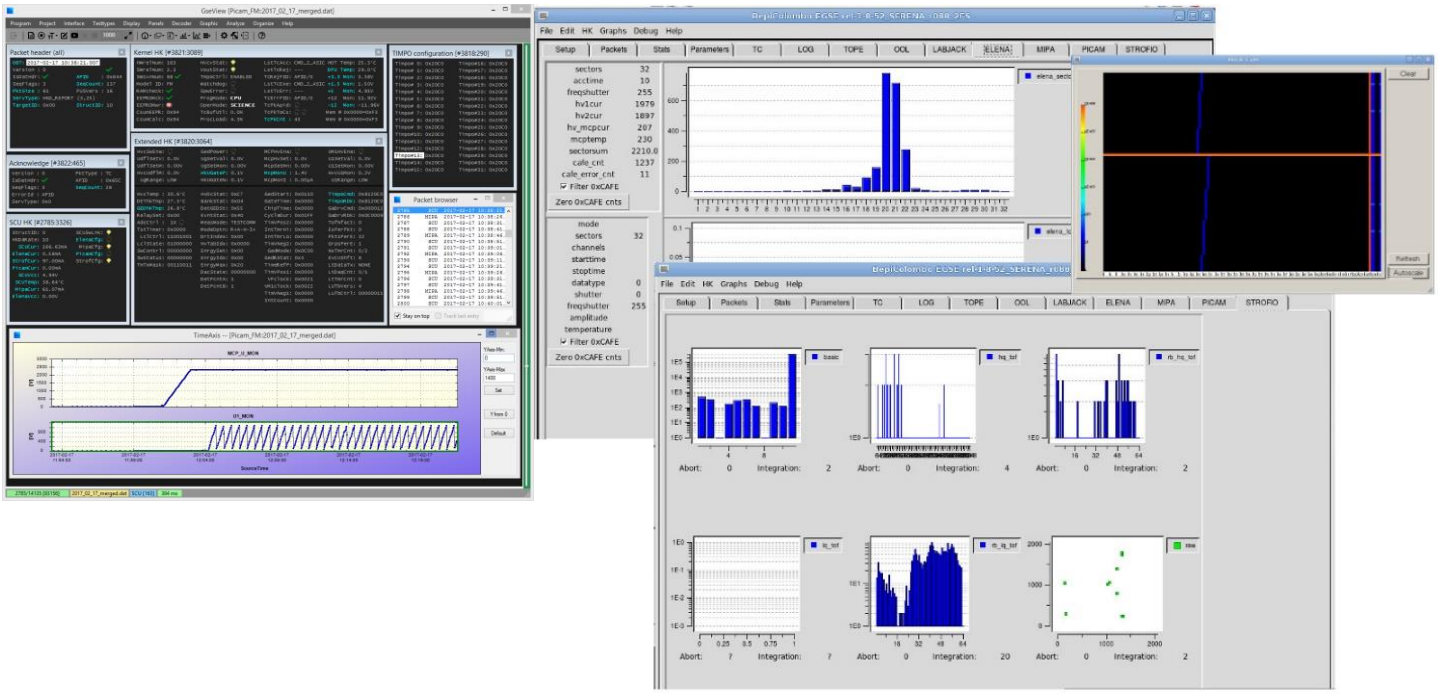


Figura 3 GSE pictures of SERENA sensors Science mode

It was not possible to have always real signals for science data: the ion sources for MIPA and PICAM are not detectable. MIPA decided to use Pulse generator to have no empty packets and PICAM used MCP to detect background noise. The same for ELENA. STROFIO had signal from the residual gas of the chamber.

Due to several constraints and discovered problems after preliminary test, in some cases different configurations have been accorded to proceed with the test verification of operation scenario, with the goal to have maximum information in the most representative cases.

For example it has been decided by MIPA team to use Test Mode (T*) instead of T Science mode because of failure of TC for Pulse Generator. It has been chosen to avoid high telemetry modes of PICAM and MIPA together after HK stop due to a limit in the SCU traffic. STROFIO defined specific parameters to avoid loss of packets etc…
All the activity has been reported in Appendix 2 (Test diary).

The test has provided a lot of information and the necessity to update the SERENA SW:

During the overall test 5 NCRs have been opened related to TC, SERENA traffic and SW and here below mentioned:

- BC-SRN-NC-03065
- BC-SRN-NC-03066
- BC-SRN-NC-03067
- BC-SRN-NC-03068
- BC-SRN-NC-03069

For this reason the SIT has been extended for two added weeks, thanks to facility availability:
In the first added week the OHB-AMDL provided on-site support to verify and fix the problem with SW modification. After preliminary success test, the SW has been updated and the test version has been installed on SCU (SERENA_FM_v 4_0_1_beta4).
The validation of the uploaded SW has been done with the most representative scenarios in the second added week. (see Appendix 2, yellow highlights)

The Bern campaign ended on March 10 and ELENA FS has been sent in Rome at IAPS for ELENA FS calibration campaign.

Added SIT activity in Rome

Further SW modification and test has been done in Rome to close the NCRs. OHB-AMDL efforts has been supported by Pi-team at IAPS up to the end of March 2017.

The set-up has been prepared in cleanroom on bench with ELENA FS (+SCU) and MIPA, PICAM, STROFIO emulators.

This added activity allowed to update the SERENA SW and close most of the NCRs

At the end of this activity the SERENA team agreed with the PI to use the modified SW version for SERENA flight model on MPO: the SW has been uploaded on ETB for SERENA requested IST test and then in ESTEC on the MPO for IST and OBCP test of April/May 2017.

7 CONCLUSION

The SIT campaign in Bern has been a unique opportunity to have for the first time the SERENA experiment operating in vacuum condition.
The numerous test performed at unit and system level in the connected configuration has allowed to solve a lot of unknown issues and refine several procedures. Only few open points are still under investigation.

The SERENA SW has been validated for flight configuration on board the MPO. All the specific updates performed to accomplish the requested points for the operation scenario will allow to fulfill the SERENA performances.

8 APPENDIX 1_ OBCP

SERENA HV OBCP verification – draft 1.1
Summary notes

ELENA switch-on KSE04183ELON

-Enable HV: in the procedure the switch-on of HV board with **+-12V** is missing -> inserted in the procedure the TC-Confirm Critical and TC-Enable 12V

-HV set value: the values of deflectors are not all the flight one (ok for env. test on ground)

Positive HV deflector: +1kV -> **+4.5kV**
Negative HV -1kV -> ok -1kV
MCP voltage : 0.5kV -> **2.15 kV**

(-> waiting time for ramp up to be modified accordingly)

-the ramp down of HV is without ramp -> should be modified to have safe condition of HV sw-off

-Science configuration? Which parameters? -> mode S…

STROFIO switch-on KSE04186STON

Unit model option : EM -> skip boot

HK Strofio Status (TC ZSE05002) changed to better monitor the status in this case: PSE08005 =4800 -> =16

Macro used: macro4

MIPA Enable HV-on KSE04191MIHV

HV ramp up changed (step 1 in the MIS script): not possible to start Main HV and CEM in the same time and wait for 300s -> Changed the script to have sequence of ramps and waiting times accordingly (in this case 150s for Main and 150s for CEM)

MIPA switch-off KSE04188MIOF

HV switch off changed (step 5 and 8 in the MIS script): not possible to start ramp down Main HV and CEM in the same time -> Changed the script to have sequence of ramps and waiting times accordingly (in this case 150s for Main and 150s for CEM)

Step 6 and 9 : HV >100V -> HV>400V

PICAM Data Acquisition KSE04193PIDA

Checked by Harald -> test ok

PICAM Standby KSE04192PISB

Checked by Harald -> test ok

PICAM switch-off KSE04189PIOF

Checked by Harald -> test ok

SERENA EMERGENCY OFF KSE04182SEEM

MIPA changes related to the HV issue ramp time (changed step).

Test configuration :

(all SERENA units ON with HV enabled)

- ELENA switch-on (KSE04183ELON)

Analyser HV +/-1kV, MCP =0,5kV

- MIPA HV on (KSE04191MIHV)

CEM=800V, Main 2200V

- PICAM on

All HV enabled- Low voltage for MCP (@250V)

- STROFIO on (KSE04186STON)

(change hk rate @16)
Heater = 550V, MCP= 2200V

(current 0,81A, voltage 27,8V, power 22,5W)

1st verification: Em OFF in 2 minutes
v_shutdown =2

➔ Test performed without problem (recorded run time: 2min and 30s)

Switch On again (same configuration)

2nd verification: Em OFF in 20 seconds
v_shutdown =0

➔ Test performed without problem (recorded run time: 22 s)

9 APPENDIX 2_ OPERATION SCENARIO

TEST REPORT	date	description	unit status note				
			MIPA	PICAM	STROFIO	ELENA	
Preliminary test							
'S MC_HR511_LE_S T1 on'	14/02/2017	tested for 40min: OK. (ELENA also switched from S to SO_32 and S). Problem occurred after sending MPA TC pulse generator (TC/TM blocked)					
Operation scenario 1							
'S MC_HR511_LE_S T5 on'	14/02/2017		note: MPA no HV	no compression			
'S IM_HT_HR31 T5 on'	15/02/2017	start time18:53, duration=30' from the last swon No errors	note1: no pulse generator for Mpa	no compression	note2: Strofio -Raw data ZSE05050(par 0,10), ZSE05050(par 1,1,10)		
		Decided to use MIPA TESTMODE(*) with parameters of mode 0 ('T0') to have not empty science packets. *Following the philosophy of growing in demanding case, an agreement to proceed adding an 'Operation scenario 1* has been done, after verification of T0****					
Test run verification (MPA in T0*):							
'S MC_HR511_LE_H T0* on'	15/02/2017	Starting test time 12:18, last instrument switch on ELENA at 12:51 ok, no errors. ->It is concluded it can be used	test mode : set sci variables (TC ZSE04069) par(5,5,4,1,0,0,0)	no compression	Raw data ZSE05050(par 0,5), ZSE05050(par 1,1,10)		
'S MC_HR511_LE_H T5 on'	16/02/2017	Starting Time 15:15 up to 15:55	HV off	same before	same before		
'S MC_HR511_LE_H T6 on'	16/02/2017	Starting time 15:57	HV off				
'S MC_HR511_LE_H T5 on'	16/02/2017	Starting time at 16:17 up to 16:45	HV on				
'S MC_HR511_LE_H T6 on'	16/02/2017	Starting time at 16:53 up to 17:30	HV on				
'S MC_HR511_LE_S T5 on'		no					
'S MC_HR511_LE_S T6 on'		no					
'S MD_NR128_HE_H T5 on'	16/02/2017	starting time 17:45 (after MPA and PICAM in stand-by mode), all the other instrument run in the same mode: **End of test 18:34**(about 40 minutes operating after MPA ramp up).	HV on?				
'S MD_NR128_HE_H T6 on'	16/02/2017	Starting time 18:42 (than ramp up MPA HV), all the other instrument run in the same mode. End of test 19:13	HV on				
'S MD_NR128_HE_S T6 on'	16/02/2017	Starting Time 19:17 16/02/2017, end time 20:12					
'S MD_NR128_HE_S T5 on'	16/02/2017	Starting Time 20:15 (error in TC ZSE0466 but repeated goes on, after this error on the EGSE we have "MPA LAST CRITICAL ERROR" NSE0M002, probably related to the TC error?!), **end time 20:55**					

Operation scenario 1*			**MIPA**	**PICAM**	**STROFIO**	**ELENA**
'S MC_HR511_LE_S T0* on'	17/02/2017	Starting time 10:15, duration **of the test 47 minutes.** Problems: -MPA receives science empty matrix (Why??!). -When we activate MPA pulse generator PICAM receive data science every 20 seconds instead of 2 second but without missing packets. When MPA is off PICAM restart to receive the data every 2 seconds as expected.	test mode : set sci variables (TC ZSE04069) par(5,5,4,1,0,0,0)	compression ON		
'S MC_HR511_LE_H T0* on'	17/02/2017	starting time 12:54, end at 13:30 (also in this test MPA receives science empty matrix…)	test mode : set sci variables (TC ZSE04069) par(5,5,4,1,0,0,0)	compression ON		
'S MD_NR128_HE_S T0* on'	17/02/2017	starting time 17:30 Failed test because at last instrument on (ELENA) the PICAM science HK stopped to arrive. MPA always with science matrix empty. Impossible perform the PICAM switch off standard procedure. SCU sw off has been necessary check of Picam (sw on again): ok	test mode : set sci variables (TC ZSE04069) par(5,5,4,1,0,0,0)	compression ON		
'S MD_NR128_HE_S T0* on'	20/02/2017	starting time 10:40 Change switch-on order: PICAM-ELENA-STROFIO-MPA When Mpa transit in science, PICAM HK stopped as yesterday. The instrument has been switched off normally while PICAM needs the SCU switch off.		PICAM MCP 300V compression ON		ELENA with MCP at -1kV
we decide to investigate and to proceed with mode 13 of picam and less demanding or different modes of the others						
'off MD_NR128_HE_S T5* off'	20/02/2017	Test duration 10 minutes. We have not empty matrix for MPA now. Science packet for MPA every 20s.		PICAM compression off.		
'off MD_NR128_HE_S T5* off'	20/02/2017	In this configuration PICAM stops receiving HK. The problem seems to be that the limit in compression for SCU is 2kbytes/s and in this mode PICAM exceeds this limit.		PICAM compression on.		
'off MD_NR128_HE_S off off'	20/02/2017	also with PICAM compression on it works properly		PICAM compression on.		
'S MC_HR511_LE_S T5* on'	20/02/2017	PICAM-MPA-ELENA-STROFIO. Duration test 40 minutes.No problem.		PICAM compression off.		
S MC_HR511_LE_S T5* on'	20/02/2017	Duration of the test 40 minutes.No problem.		PICAM compression on.		
'S MD_NR128_HE_S T5* on'	no					
'S MD_NR128_HE_S T6* on'	no					
'S MC_HR511_LE_H T5* on'	21/07/2017	it has been decide to proceed with no empty packets (when possible) New script of PICAM to have no-empty packets : TCSE_SER_PICAM_STBY_SIM.tcl (simulated science mode). We turn on the instrument with the sequence SCU-PICAM-MPA-ELENA-STROFIO. Duration of the test 10 minutes. No problems		PICAM compression on		
'S MC_HR511_HE_H T5* on'	21/07/2017	Duration of the test about 3 hours. No problems		PICAM compression on		
'S MC_HR511_HE_H T6* on'	21/07/2017	Duration of the test about 40 min. No problems.		PICAM compression on		
'S MC_HR511_HE_H T0* on'	21/07/2017	Duration of the test about 40 min. No problems.		PICAM compression on		

Operation scenario 3								
'R off-off- on'	21/02/2017	ok						
'R M_HT_HR31 off on'	21/02/2017	ok						
'R off T5 on'	21/02/2017	ELENA lost packets every 30-40 sec						
'R off T5* on'	21/02/2017	ELENA lost packets every 30-40 sec						
'R M_HT_HR31 T5* on'	21/02/2017	ELENA lost packets every 30-40 sec			PICAM compression on			
'R off T5 off'	*no*							
'R M_HT_HR31 T6 on'	*no*							
'R MC_HR511_HE_H T5* on'	21/02/2017	ELENA lost packets every 30-40 sec			PICAM compression on			
'R MC_HR511_HE_H T6* on'	21/02/2017	ELENA lost packets every 30-40 sec			PICAM compression on			
'R MC_HR511_HE_H off off'	22/02/2017	We use option for picam TM at 8kB/s (equivalent to mode 13) ok - 10min			PICAM compression on			
'R MC_HR511_HE_H off on'	22/02/2017	Strofio on. Loss of Stofio packets to be ignored (NCR to be opened) Elena lost packet every 80 (sec). Change PICAM TM at 4KB/s. now we can monitor the R events and we optimise ELENA setting to have no empty packets: the rate of lost packets increases. Transit to mode S . Elena lost packets (but we are at 1s rate (!)) PICAM in stby -> no lost packets						S: abbasso soglia e non vedo il noise neanche ad HW=200 e con MCP a -2,2kV (?!)
'S MC_HR511_HE_H off on' 'R MC_HR511_HE_H off on'	22/02/2017	PICAM at 2kB/s (modo 7 nominal) Elena lost packet every 10 or 50 sec. ELENA modo S. PICAM TM < 2kB/s (step duration =10)> Elena lost packet every 30/90 sec. ELENA modo R. PICAM at 1kB. idem. Restarting from stby : idem PICAM in stby -> no lost packets						(NB abbiamo alzato MCP a -2,25KV e soglia HW 210 per avere pacchetti con segnale...ma abbiamo solo 7-8 c/s).
'R off T0* on'		Start 17:04. note: T0* with empty packets. Stop after 15min. Few Elena lost packets. (to be checked on data)						
'R off T6* on'		Start 17:20, stop 17:44. T6* (no empty packets). Elena lost packet (every 40-80 sec.)						
'R MC_HR511_HE_H T6* on'		start 17:46. Elena lost packet (every 20s)						nota: investigare su rate perdita pacchetti
'R MC_HR511_LE_S T5 on'	*no*							
'R MC_HR511_LE_S T6 on'	*no*							
'R MD_NR128_HE_H T5 on'	*no*							
'R MD_NR128_HE_S T5 on'	*no*							

Operation scenario 2 (with SERENA_FM_V4_0_1_Beta4 -yellow fill)						
S IM_HT_HR31 T1 on'	03/03/2017	Strofio on with OBCP (then TC 5050 0-10,5051 0-2-2-10), ELENA (HV on, MCP @-2150), PICAM (compression off, HV on), MIPA (compression on, pulse generator (1-3), HV off, alarm in ToF board). We see a warning "out of limit" on the MCP temperature (see Harald note). We see a significant power drop for PICAM (~50mA) and a slight drop for MIPA and SCU when we switch on MIPA (If we switch off MIPA the consumption came back as before the MIPA switch on). Problem with Strofio no HK and science that has been interrupted after just 13 minute of running (from the Strofio switch on). No packet losts. All the instrument was switched off normally while Strofio by ZSE01039.		Harald on skype convesation:The negative spikes in the MCP temperature are related to a reset of the detector electronics at the end of each sweep. The MCP temperature monitor becomes negative when the detector is reset or not initialized.		
off off off on'	03/03/2017	Strofio on with OBCP (then TC 5050 0-10,5051 0-2-2-10), also alone after about 20 minutes science stopped while HK keep coming.WE can't switch off the intrument also with ZSE01039 but we have to switch off SCU.				
'off off off on'	05/03/2017	Strofio on with OBCP (then TC 5050 0-50,5051 0-1-2-2, 5002 0-40 as suggested by Mark). In this configuration run about 2 hours without TM loss.				
S IM_HT_HR31 T1 on'	06/03/2017	Strofio on with OBCP (then TC 5050 0-50,5051 0-1-2-2, 5002 0-40 as suggested by Mark), PICAM (compression off, HV on),MIPA (error in TC ZSE04001, repeted is ok;compression on, pulse generator (1-3), HV off, Alarm in ToF board), ELENA (HV on, MCP @-2150). We see as usual a power drop for PICAM (~50mA) and a slight drop for MIPA and SCU when we switch on MIPA. Duration of the test about 40 min. No problems.				
'S MC_HR511_LE_H T1 on'	06/03/2017	PICAM (compression off, HV on),all the other instruments as before. In this mode no problem in the current monitor of PICAM.Duration of the test about 40 min. No problems.				
'S MD_NR128_LE_H T1 on'	06/03/2017	PICAM (compression off, HV on),all the other instruments as before. In this mode no problem in the current monitor of PICAM.Duration of the test about 50 min. No problems.				
S MD_NR128_LE_H T5 on'	06/03/2017	PICAM (compression ~~on~~ off, HV on), MIPA(compression on, 1 cycles,pulse generator (1,3)). Other instrument as preavious scenario.Duration of the test about 40 min. No problems.		at 15:05 -16:49(MIS hours) we thought to switch on PICAM compression.Verified by Harald that the compression was off.		
S MD_NR128_LE_H T6 on'	06/03/2017	MIPA(compression on, 1 cycles,pulse generator (1,3)). Other instrument as preavious scenario. ELENA lost 1 sceince and 1 HK packets.Duration of the test about 50 min. No problems.				
S MD_NR128_LE_H T5 on'	08/03/2017	PICAM (compression on,HV on), MIPA (compression on,HV off, pulse generator (1-3),ELENA (HV on, MCP@-2150),Strofio (TC 5050:(0-50), TC 5051 (0-1-2-2), TC 5002(0-40)). ELENA loses 3/281 science packets.No problems for other instruments. Test duration 45 minutes.		We loaded the new script "LCSE_PICAM" with correction for activation of PICAM compression (only in the start of the script).We didn't observe the drop in PICAM corrent consumption when we switched on MIPA. A slight drop when ELENA was switched on.		
S MD_NR128_LE_H T6 on'	08/03/2017	MIPA (compression on, HV off, pulse generator (1-3), other instruments as previous scenario.ELENA lost 1/218 science packet and 1/110 HK packet. No other problems.Test duration 40 minutes.		We loaded the new script "LCSE_PICAM" with correction for activation of PICAM compression (only in the start of the script).		
'S MC_HR511_LE_H T6 on'	08/03/2017	(coming from scenario 'R MC_HR511_LE_H off on'):ELENA(HV on, MCP@-2150), PICAM (sompression on, HV on), MIPA (Compression on, HV off, pulse (1-3)),Strofio (TC 5050:(0-50), TC 5051 (0-1-2-2), TC 5002(0-40)). Just ELENA lost 2/209 science packets. Test duration 40 minutes.				ELENA with same HV treshold (=220) of this morning now at around 18 pm we have 70000 cts/10s instead of 10cts/10s. After about 20 minutes without packet lost we put the HV treshold @230 and DC-->10
S IM_HT_HR31 T6 on'	08/03/2017	PICAM (sompression on, HV on), other intruments as before. Just ELENA lost 2/204 science packets and 1/103 HK packet. Test duration 40 minutes.				

Operation scenario 3									
R off T6 on'	06/03/2017	PICAM in standby,ELENA loses 10/984. Test duration 30 minutes.							
'R MC_HR511_LE_H off on'	06/03/2017	PICAM (compression ~~on~~-off,Hv on), MIPA in standby. ELENA loses 0 packets. Test duration 30 minutes.			17:22-17:57(MIS hour) we thought to switch in compression mode. Verified by Harald that the compression was off.				
R MC_HR511_LE_H T6 on'	06/03/2017	PICAM (compression off, HV on),ELENA loses 10/11100. Test duration 30 minutes							
'R MC_HR511_LE_H off on'	08/03/2017	PICAM (compression on, HV on), ELENA (HV on,MCP@-2150),Strofio (TC 5050:(0-50), TC 5051 (0-1-2-2), TC 5002(0-40)), MIPA in standby. Time duration about 40 minutes. No problems.			We loaded the new script "LCSE_PICAM" with correction for activation of PICAM compression (only in the start of the script).				
LONG TERM TEST (24H)									
'S MC_HR511_HE_H T6 on'*	22/02/2017	Start @ 19:30							
		From the beginning loss of Strofio packets (see NCR) to be ignored. Loss of ELENA packet (under investigation)							
	23/02/2017	End test @19:30 No evidence of any problem.							