

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-OPS-OAI
No. 256
Week 33
20.08.07
Routine Phase

Prepared by: M.J.H. Walker (OPS-OAI) and INTEGRAL FCT

LIST OF CONTENTS

1	General.....	3
2	Summary of Activities.....	3
3	Satellite Status.....	3
3.1	Platform.....	3
3.1.1	AOCS.....	3
3.1.2	Power.....	3
3.1.3	Thermal.....	3
3.1.4	OBDH.....	3
3.1.5	RFS.....	4
3.2	Payload.....	4
3.2.1	SPI.....	4
3.2.2	IBIS.....	5
3.2.3	JEM-X.....	6
3.2.4	OMC.....	6
3.2.5	IREM.....	6
4	Ground Facilities.....	7
4.1	Mission Operations Centre.....	7
4.2	Ground Stations & Network.....	7
4.3	Science Ground Segment.....	7
4.3.1	ISOC.....	7
4.3.2	ISDC.....	7
5	Special Events.....	8
6	Anomalies.....	8
7	Future Milestones.....	8
8	Appendix.....	9
8.1	Overview of Revolutions.....	9
8.2	Consumables.....	9
8.2.1	Detailed Fuel Book-keeping.....	9
8.3	Detailed Satellite Information.....	9
8.3.1	AOCS SUMMARY OPERATIONS REPORT, 11/08/2007 – 17/08/2007.....	9
8.3.2	SPI Operations.....	13
8.3.3	IBIS Operations.....	22
8.3.4	JEM-X Operations.....	27
8.3.5	OMC Operations.....	32
8.3.6	IREM Operations.....	33

DISTRIBUTION LIST

Addressees	Copy	Addressees	Copy
D/OPS		ESA HQ	
G. Winters D/OPS	1	D. Southwood D/SCI	1
J. F. Kaufeler OPS-G	1		
N. Bobrinsky OPS-ON	1	ESTEC	
J. Dodsworth OPS-OA	1	J. Louet SCI-P	1
	1		1
	1	ESTEC / PG	
M. Schmidt	1	G. Sarri	
R. Southworth	1		
F. Di Marco	1	ESTEC/RSSD	1
F. Cordero	1	M. Kessler SCI-SD	
M. Walker	1	C. Winkler	
P. Lippi	1	A. Parmar	
R. Lemme	1		
S. Fahmy	1		
O. Bergogne	1	ISDC	
SPACONs	1	T. Courvoisier	1
I. Bayliss	1	R. Walter	1
G. Di Girolamo	1	N. Mowlavi	1
F. Dreger	1	ISDC Shift Team	1
G. Gienger	1		1
S. Pallaschke	1	ALENIA	
W. Hell	1	M. Montagna	
K.J. Schulz	1	F. Ravera	1
M.A. Larsen	1		1
		PI / Instrument Teams	1
M. Butkovic	1	J. P. Roques – SPI	1
D. Heinzer	1	G. La Rosa – IBIS	
U. Feucht	1	P. Ubertini – IBIS	
Shift - Coord	1	S. Brandt – JEM X	1
Scheduling Office	1	E. De Miguel - OMC	1
T. Beck	1	W. Hajdas – IREM	
J. Wardill	1		
M. Unal	1	JPL / Goldstone	1
P. Maldari	1	D. Holmes	1
		J. Valencia	1
		Jesse Velasco	1
Redu		DSN - MPSETD	1
B. Demellenne			1
ESAC	1		
P. Kretschmar			1
V. Gomez SCI-O			1
E. Kuulkers	1		1
C Gonzales	1		1
ESTEC/SCI-A			
Nicola Rando	1		

1 General

The Flight Control Team at MOC has compiled this report with some input provided by the Flight Dynamics Team, ISOC and ISDC.

It addresses the activities from 11.08.07 until 17.08.07 (both dates inclusive) and covers the revolutions 590 and 591.

2 Summary of Activities

The operations were performed according to the planning inputs from ISOC combined with some manual commanding by MOC.

The targets of these revolutions consisted of a series of a raster dither of Orion OB1 (RA 05:17:00.30, DEC +01:47:17.7).

Note: Some further information concerning the activities is provided in the Appendix.

3 Satellite Status

3.1 Platform

The performance of the platform was good. No new unexpected behaviour / malfunction was identified.

3.1.1 AOCS

The AOCS operations were performed from the timeline during this period.

1 slew was missed from TL, during the observation period, due to problem with the IMCS.

The fuel consumption over the period between 11/07/2007 and 16/08/2007 was 0.0489 Kg. The remaining propellant is in the order of 144.9293 Kg.

Note: Some more information concerning the AOCS operations and the fuel budget is provided in the Appendix.

3.1.2 Power

The EPS is working nominally; available power from the arrays is of the order of 2100W.

3.1.3 Thermal

The thermal control of the satellite is working well. The temperatures are currently all within the specified operational limits.

3.1.4 OBDH

The OBDH subsystem is working flawlessly. No on-board communications problem has been identified.

3.1.5 RFS

The RF subsystem is working properly. The link margin is sufficient to ensure proper TM reception and execution of commands with the ranging channel enabled.

3.2 Payload

3.2.1 SPI

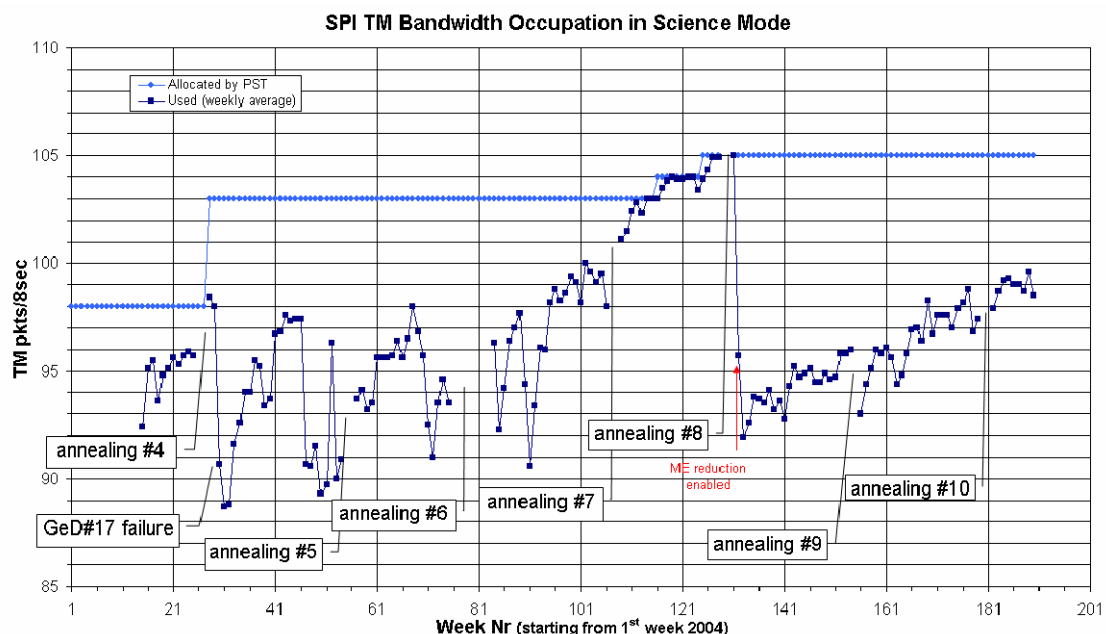
Following the 10th annealing, which ended on 17th June, the overall status of the gamma-ray spectrometer is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution and is therefore operating at a lower HV setting of 3.5kV (instead of 4kV). Detector #2 is failed since 06.12.2003 and detector #17 since 17.07.2004.

The Stirling compressors are working nominally, maintaining the Germanium detectors at 80 +/-1K.

On 17.08.2007 at 15:02Z, an anomaly, probably an SEU, occurred on the Payload Power Board 3A Group Switch 2, which changed status to OPEN. As a consequence, SPI went into NOT RUNNING state flagging a WATCH-DOG error. To recovery SPI a full DPE power cycle was required and this was completed on 18.08.2007 at 00:57Z (Anomaly Report INT_SC-199).

During science operations, the instrument was kept in photon-by-photon mode with spectra TM enabled. The assigned TM bandwidth in the science observation windows was 105 packets/cycle. The average telemetry occupation when the TM allocation was 105 packets/cycle was 98.5 packets/cycle.

The following plot shows the assigned and the average occupation of the SPI TM bandwidth.



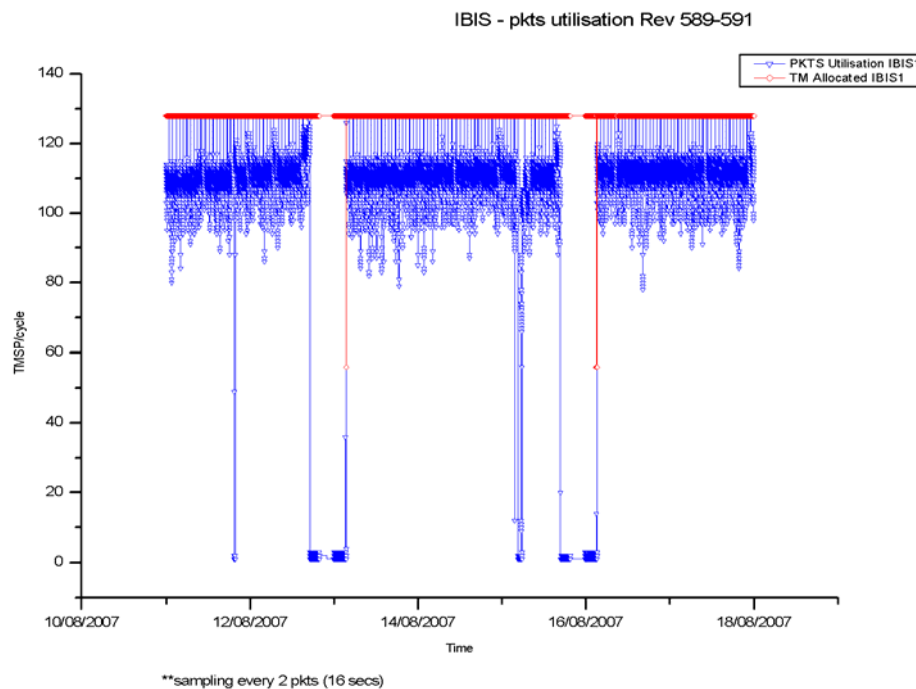
Note: Some more information concerning the SPI operations is provided in the Appendix.

3.2.2 IBIS

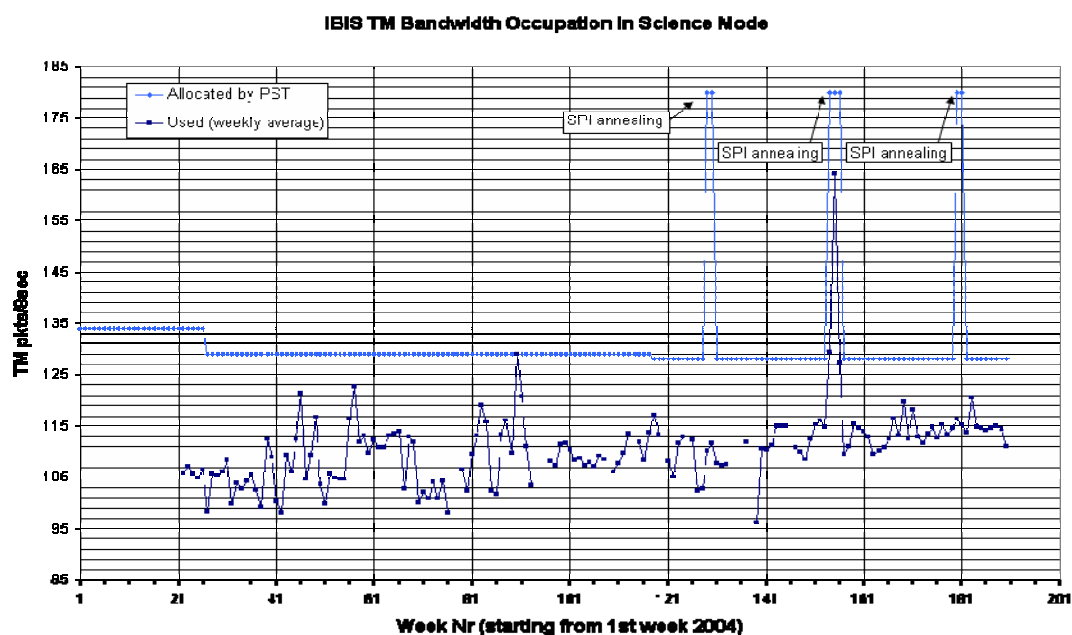
The overall status of the unit is nominal.

During the reporting period, the PST allocation to IBIS was 128 TMPS/cycle. The IBIS mean bandwidth utilisation during the observation period (when IBIS was in Science mode) was 111.00 TMPS/cycle, down 3.42 on last week.

A plot of the IBIS TM utilisation during the observation period is shown below:



A plot of the IBIS weekly bandwidth utilisation since 2004 is shown below:



Note: Some more information concerning the IBIS operations is provided in the Appendix.

3.2.3 JEM-X

The status of both JEM-X units is nominal.

JEM-X operations were performed by the automatic Timeline.

JEM-X1 was operated in Data Taking mode with a TM allocation of 8 packets/cycle.
JEM-X2 was dormant (DPE OFF) with no TM slots allocated.

Note: Some more information concerning the JEM-X operations is provided in the Appendix.

3.2.4 OMC

The status of OMC is nominal.

OMC operations were performed by the automatic Timeline. OMC was operated in Science Normal mode during science observations, with a TM allocation of 5 packets/cycle.

During this reporting period, 139 of the 141 planned science pointings for OMC were executed nominally, 2 were lost.

Note: Some more information concerning the OMC operations is provided in the Appendix.

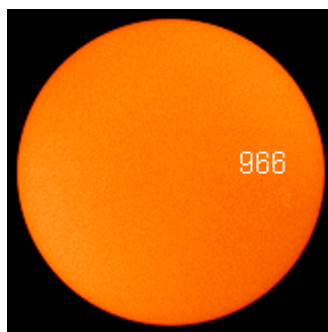
3.2.5 IREM

The overall status of the unit is nominal.

Solar Activity

The observation period was characterised by low solar activity.

Sunspot 966 was present early in the week, but faded away without posing a threat of strong solar flares.



Reference: www.spaceweather.com

Note: Some more information concerning the IREM operations is provided in the Appendix Section 8.3.6.

4 Ground Facilities

The Operational ground facilities performance was good this week. One pointing was lost due to ground problems. The overall performance was well over the 95% requirement.

4.1 Mission Operations Centre

The performance of the MOC was good this week. The HFA task crashed, which led to further problems with the FD system and the loss of a pointing. The overall performance though, was well over the 95% requirement.

4.2 Ground Stations & Network

The performance of the ground stations and Network was good this week. There were however 6 occasions of a TM drop from Redu, 3 from VIL2 and a late handover and VC-7 drop from DSS27 and another VC7 drop from DSS24, all without impact. There was also 3 occasions of brief drops in the link with ISDC. The overall performance was well over the 95% requirement.

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

PSFs are available and observations have been planned up to revolution 600.

TSFs have been received up to revolution 598.

2. Observation status

ECS files have been received and processed up to revolution 583.

3. ISOC Science Data Archive

No news, the bulk processing reported last week is ongoing.

4. ISOC system

Version 15.3 has been released on 14 August.

5. Problems

None.

4.3.2 ISDC

Status of ISDC observation processing on 20/08/2007:

- Latest Standard Analysis completed: observation 04200730033 (Galactic disk latitude scans, Revolution 580) on 10/08/2007.

- Latest products archived: observation 04200730033 (Galactic disk latitude scans, Revolution 580) on 10/08/2007.

- Latest observation products sent to the observer: observation 04200730033 (Galactic disk latitude scans, Revolution 580) on 12/08/2007.

5 Special Events

6 Anomalies

The following problem was reported that impacted operations:

- On DoY 223, at 07:52, the JEMX-1 DPE crashed. A recovery was performed involving reloading the SW on the DPE and DFEE, and the unit returned to Data-Taking at 14:26:50.
- On DoY 227, at 04:43:15, an IREM SEU (#52) caused OMC and IBIS to switch to SAFE mode. A recovery was performed, with OMC in stand-by at 05:19:09, IBIS in science mode at 05:52. IREM was recovered at 06:41. The impact was the loss of OMC & IBIS data for pointing 05900049.
- On DoY 229, at 15:02, the SPI DPE crashed. A recovery was performed also involving reloading the DPE S/W, returning the unit to Photon mode at 00:57 the following morning.
- On DoY 229, at 21:48, the HFA task died and was re-started. However, the FD system stopped receiving data. FD on-call support restarted the applications, and a recovery was performed. The impact was the loss of pointing 05910044.

The following anomaly reports were entered into the ARTS system this week.

AR id	Date Created	Subject	Segment	Status
INT-2945	2007-08-14	VC 7 Link Interruption while DSN tracking	NASA Station	Pending
INT-2946	2007-08-15	Wrong display of TM in OOL Display	IMCS	Closed
INT-2947	2007-08-16	Incorrect GS ID in TM	NCTRS	Pending
INT-2948	2007-08-16	Problems with LTA on idda	IMCS	Pending
INT_SC-198	2007-08-17	IBIS: VETO VDM05, VDM06 and VDM07 High Voltage break down	Payload	Open
INT_SC-199	2007-08-20	SPI DPE1 Watch-Dog Reset	Payload	Open
INT_SC-200	2007-08-22	IREM Anomaly: Reset of IREM_CSCI S/W #52, 15/08/2007	Payload	Open
INT_SC-201	2007-08-24	JEMX DPE crash	Payload	Open

7 Future Milestones

The following activities are foreseen in the next few weeks.

- Lunar eclipse on 11th September 2007, at the end of revolution 599.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 590

The observations in revolution 590 consisted entirely of a raster dither of Orion OB1 (RA 05:17:00.30, DEC +01:47:17.7), which lasted ~57.4 hours.

Revolution 591

The observations in revolution 591 consisted entirely of a raster dither of Orion OB1 (RA 05:17:00.30, DEC +01:47:17.7), which lasted ~57.4 hours.

Throughout these observations, all instruments were in their nominal science modes, except JEM-X2, which is switched off. The TM allocation was IBIS 128; SPI 105; JEM-X1 8; JEM-X2 0; OMC 5.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2007-07-23T11:36:03.000Z	145.1565	F	Automatic TM processing.
2007-07-26T01:48:26.000Z	145.1445	F	Automatic TM processing.
2007-07-27T11:40:54.000Z	145.1059	F	Automatic TM processing.
2007-07-29T01:38:02.000Z	145.0879	F	Automatic TM processing.
2007-07-30T11:09:09.000Z	145.0703	F	Automatic TM processing.
2007-08-01T01:24:49.000Z	145.0600	F	Automatic TM processing.
2007-08-02T11:01:26.000Z	145.0420	F	Automatic TM processing.
2007-08-04T01:16:18.000Z	145.0150	F	Automatic TM processing.
2007-08-07T01:00:58.000Z	145.0070	F	Automatic TM processing.
2007-08-08T10:31:41.000Z	144.9942	F	Automatic TM processing.
2007-08-10T00:46:01.000Z	144.9782	F	Automatic TM processing.
2007-08-11T11:03:17.000Z	144.9673	F	Automatic TM processing.
2007-08-13T00:34:17.000Z	144.9600	F	Automatic TM processing.
2007-08-14T10:51:56.000Z	144.9388	F	Automatic TM processing.
2007-08-16T00:19:20.000Z	144.9293	F	Automatic TM processing.

This report was generated Fri Aug 17 08:00:21 GMT 2007

8.3 Detailed Satellite Information

This section contains some detailed information concerning the various subsystems of the satellite and instruments.

8.3.1 AOCS SUMMARY OPERATIONS REPORT, 11/08/2007 – 17/08/2007

The AOCS operations were executed from the Automatic Timeline.

During this period, 57 Open Loop Slews, 86 Closed Loop Slews and 5 Momentum Biases were executed.

1 slew (CSL) was missed from TL, during the observation period, due to problem with the HFA (History File Archive) task of the IMCS.

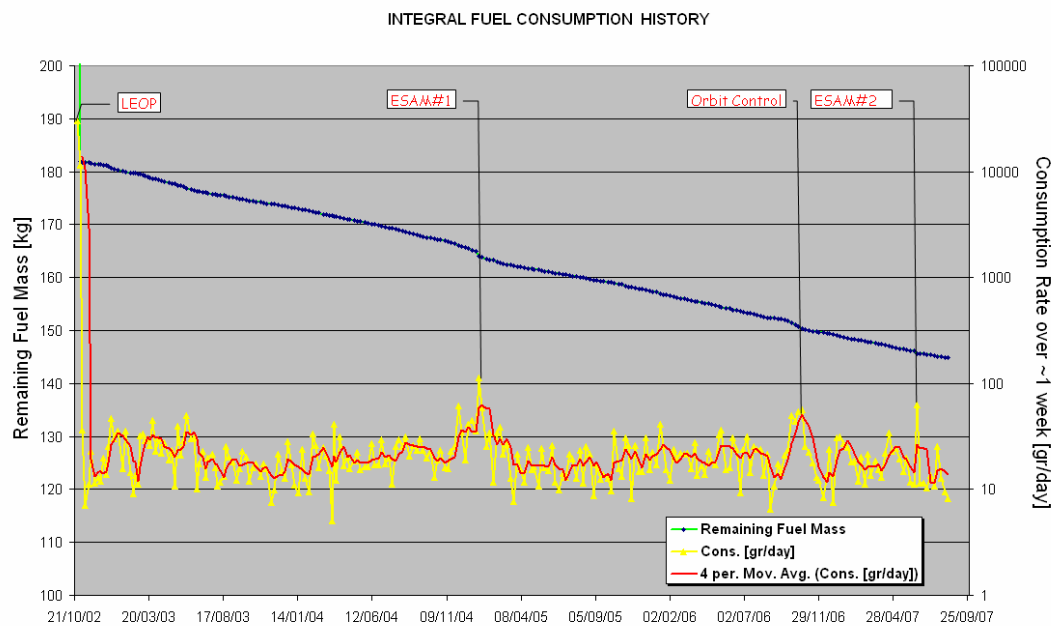
This is equivalent to $\sim 0.7\%$ of the total number of slews planned (144).

Orbit Control

No update.

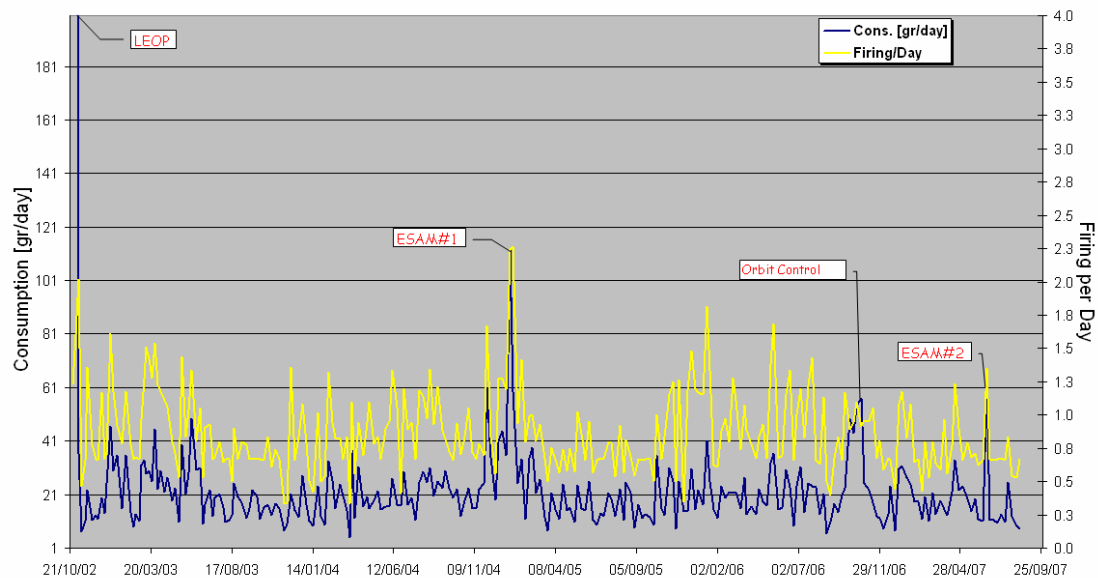
Fuel consumption

The fuel consumption (total, grams per day) over the period between 01/11/2002 and 16/08/2007 is reported in the plot below.



The plot above consider the ESAM fuel consumption spread over period of ~ 1 week.
 The firing per day over the period between 01/11/2002 and 16/08/2007 is reported in the plot below.

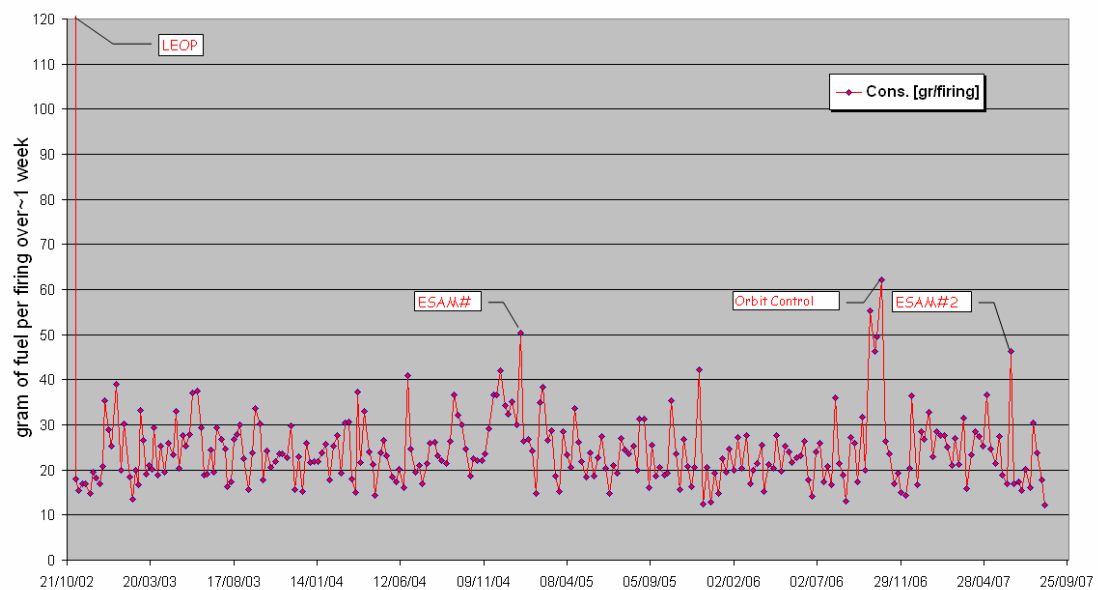
INTEGRAL FIRING PER DAY HISTORY



The plot above consider the ESAM fuel consumption spread over period of ~1 week.

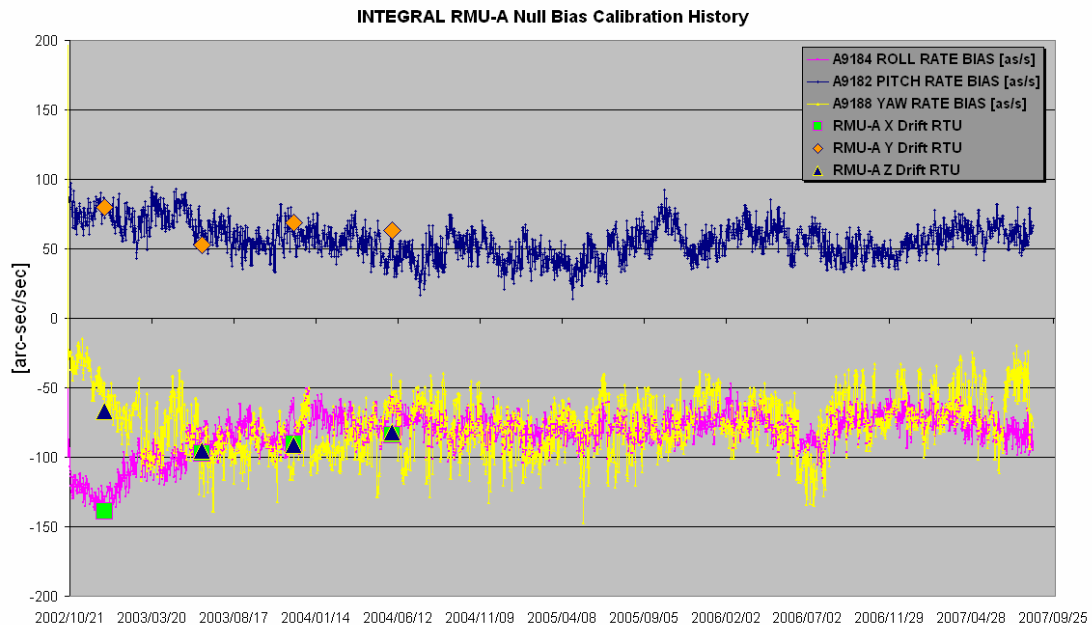
The fuel per firing over the period between 01/11/2002 and 16/08/2007 is reported in the plot below.

INTEGRAL FUEL MASS PER FIRING HISTORY

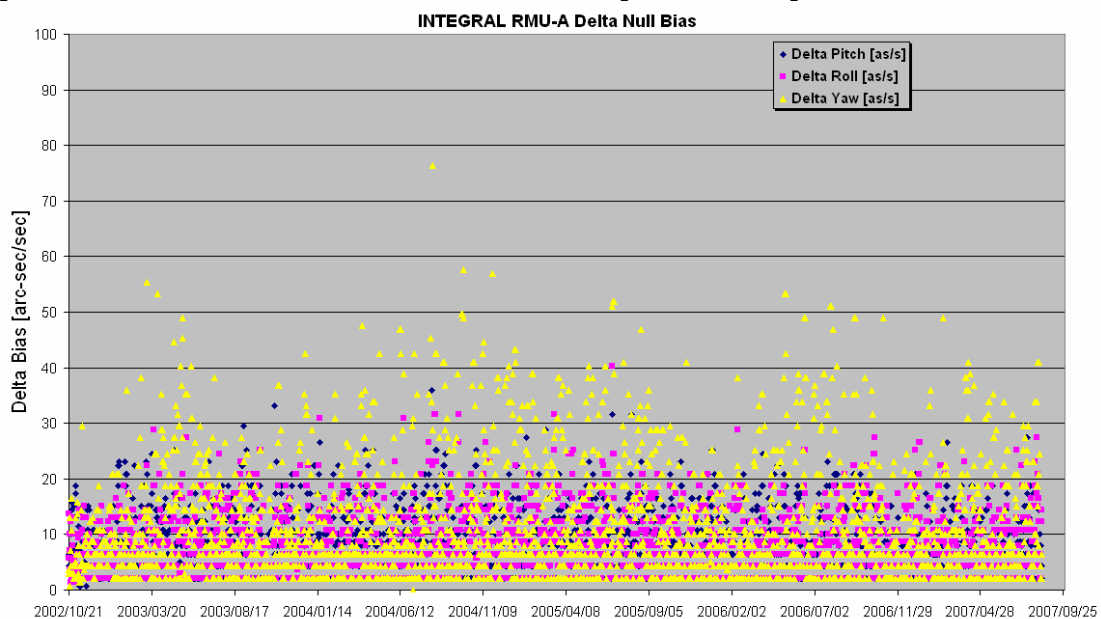


The RMU-A null bias calibration

The RMU-A null bias calibration history, on pitch, roll and yaw channel over the period between 01/11/2002 and 17/08/2007 is reported in the plot below.



The RMU-A delta null bias calibration history, on pitch, roll and yaw channel over period between 01/11/2002 and 17/08/2007 is reported in the plot below.



11/08/2007 (Day of Year 223, Revolution 589)

Nothing to report.

12/08/2007 (Day of Year 224, Revolution 589)

Nothing to report.

13/08/2007 (Day of Year 225, Revolution 589-590)

Nothing to report.

14/08/2007 (Day of Year 226, Revolution 590)

Nothing to report.

15/08/2007 (Day of Year 227, Revolution 590)

Nothing to report.

16/08/2007 (Day of Year 228, Revolution 590-591)

Nothing to report.

17/08/2007 (Day of Year 229, Revolution 591)

IMCS HFA task problem: at 21:48z the HFA (History File Archive) task on IMCS-A stopped, causing no TM distribution to the FDS and the failing of update process for the next coming activities: the slew 05910044 was lost. The update for slew 05910045 was not suspended and when kicking in it could not find the mapping after the previous slew. The update job was aborted.

A manual recovery was performed at 22:24z and the next slew 05910045 manually updated in TL.

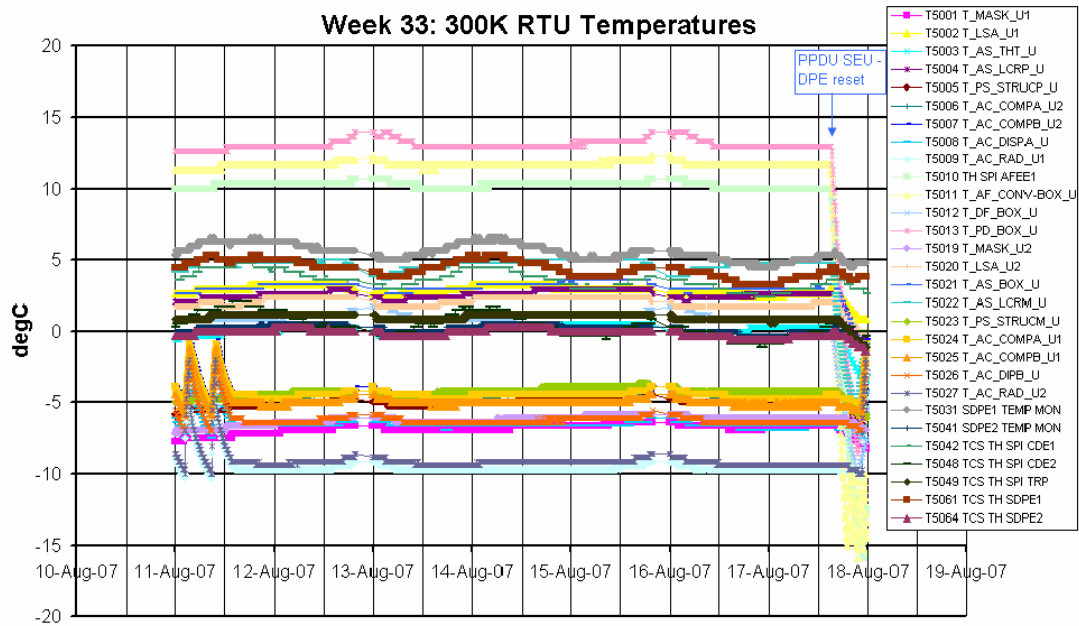
At 22:49 a false event on STR, caused the loss of guide star, Mi 8.3 at CCD location [5313, 21674], and the IMU 1 automatic switch ON by the ACC. This event occurred still during the recovery of the problem with HFA.

For safety reason, read as jitter in sun position due to IMU control and invalidity of the sun steering law parameter previously updated, the slew 05910045 was again updated in TL. For completeness, offline investigation shown that the movement due to the IMU residual drift was ~ 1 arcsec (negligible only in this specific case).

The following slew was missed in TL: 05910044(CSL).

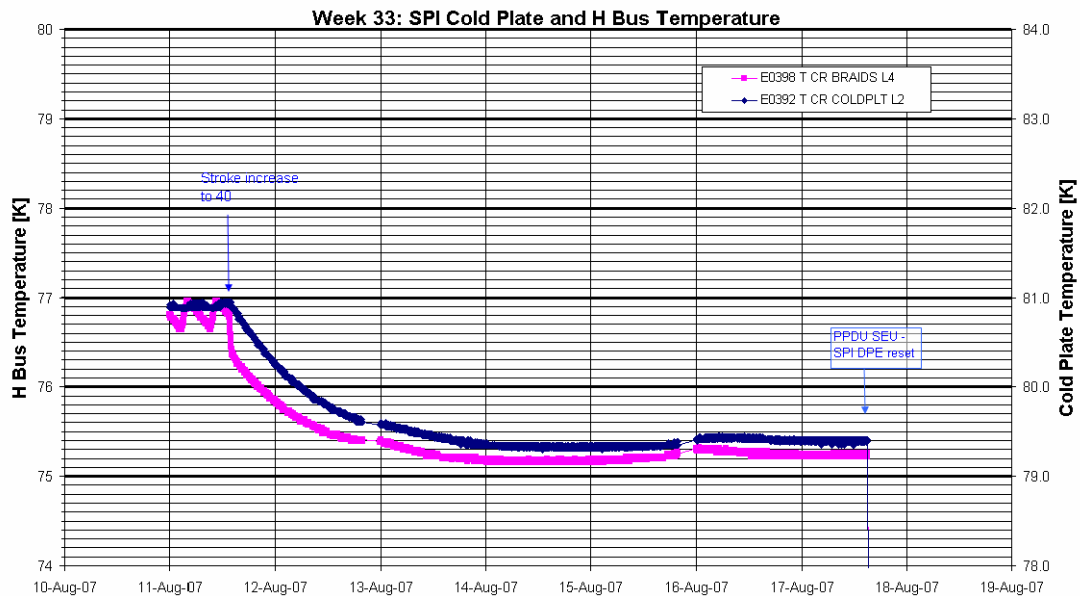
8.3.2 SPI Operations

Unit Temperatures: All the equipment temperatures are inside the operational limits. The following plot shows their evolution during the reporting period.



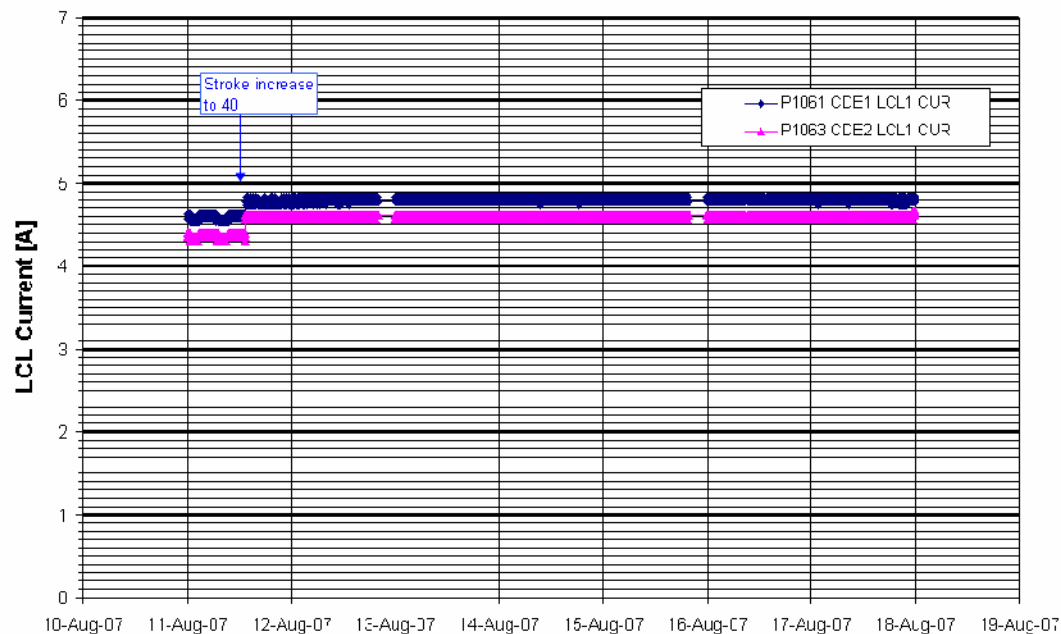
Stirling Compressors and Cryostat: The performance of the compressors is nominal. The cold plate temperature was maintained in the range 80K +/-1K. On 2007-08-11 at 13:35:03Z the stroke of all four compressors was increased from 39 to 40 as the cold plate temperature (TM parameter E0392) had reached 80.9K.

The following plot shows the evolution of the cold plate and H bus temperatures during the reporting period.



The following plot shows the evolution of the CDE currents during the reporting period.

Week 33: SPI CDE1 and CDE2 LCL Currents



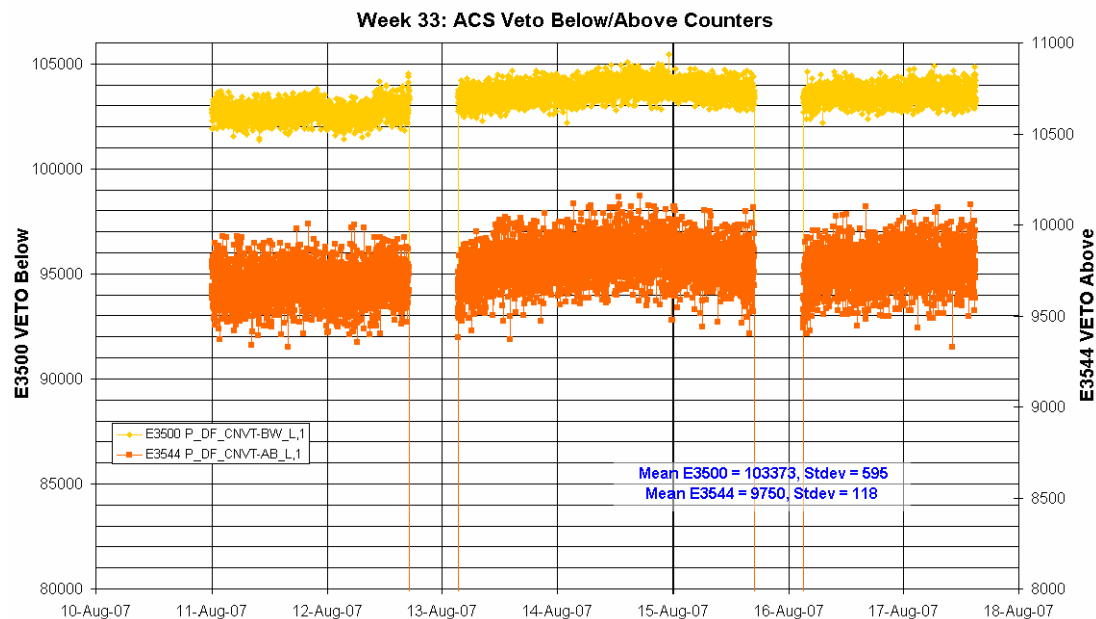
DPE & IASW: The DPE health and IASW performance is nominal. The IASW version installed is v433 patch #1 with the spectra scaling factor set to 9/19 SE. The average TM bandwidth occupation of SPI was 98.5 packets/cycle over the science window, when the TM allocation was 105 packets/cycle.

The following plot shows the IASW performance in terms of TM bandwidth, event buffer occupation and DPE CPU load during the reporting period.



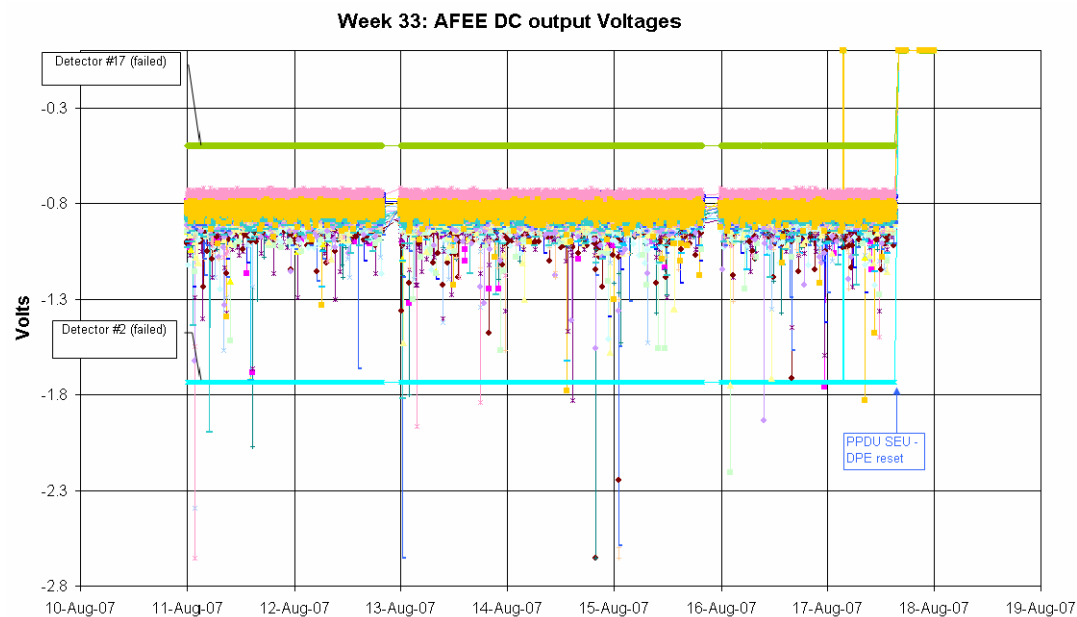
ACS: The performance of the ACS is nominal, except for FEE #81 which remains switched off since the anomaly on 29/10/2006 (INT_SC-162) and FEE #57 which is still OFF due to the anomaly on 5/8/2003 (INT_SC-61).

The following plot shows the ACS overall count rate evolution during the reporting period:

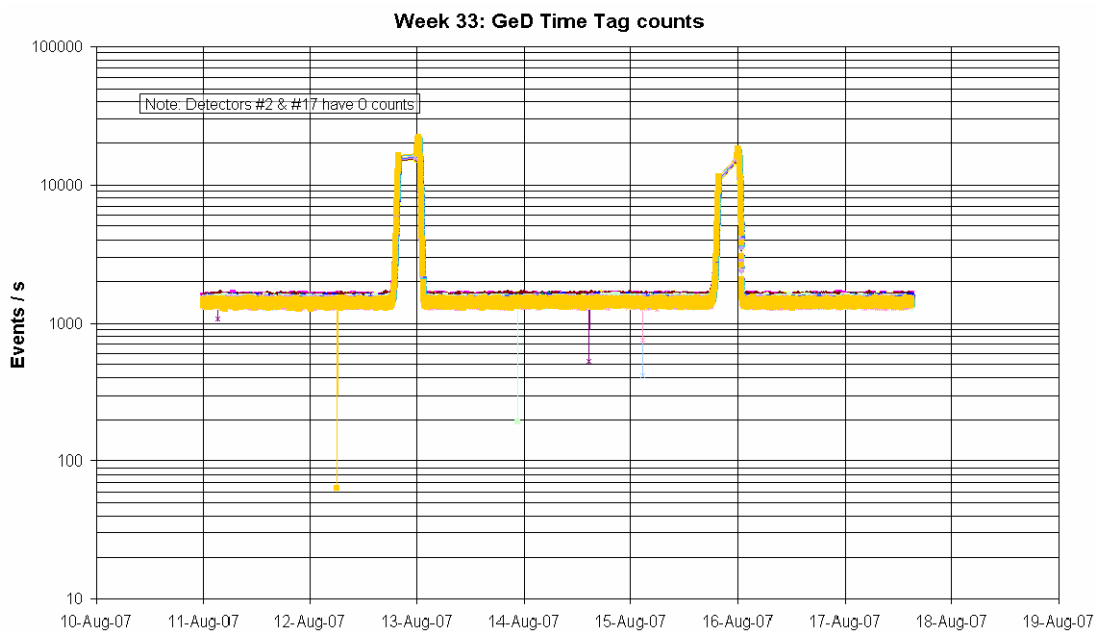
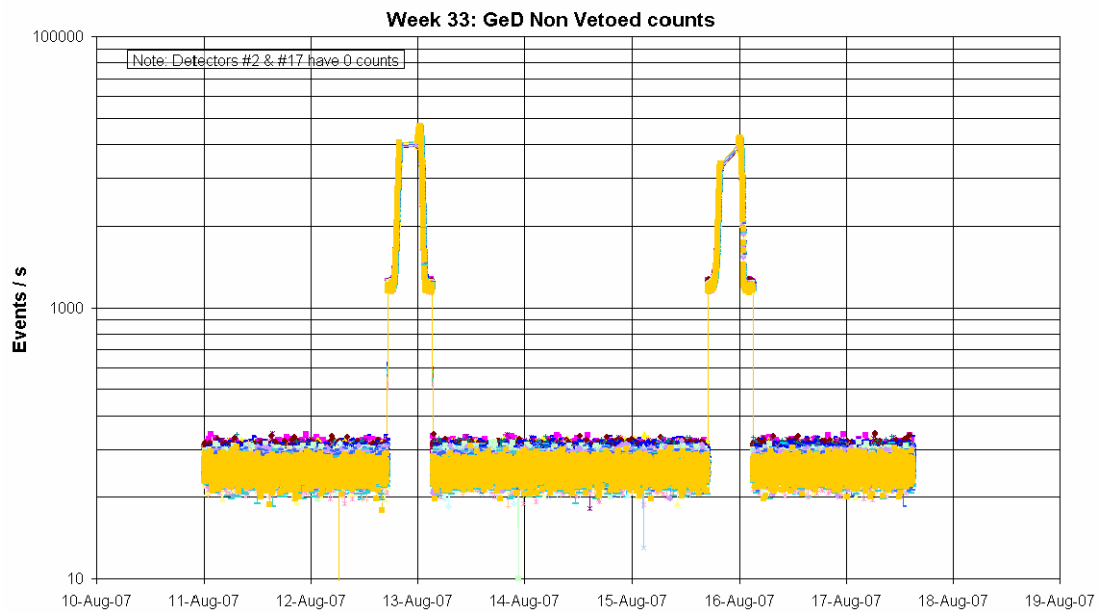


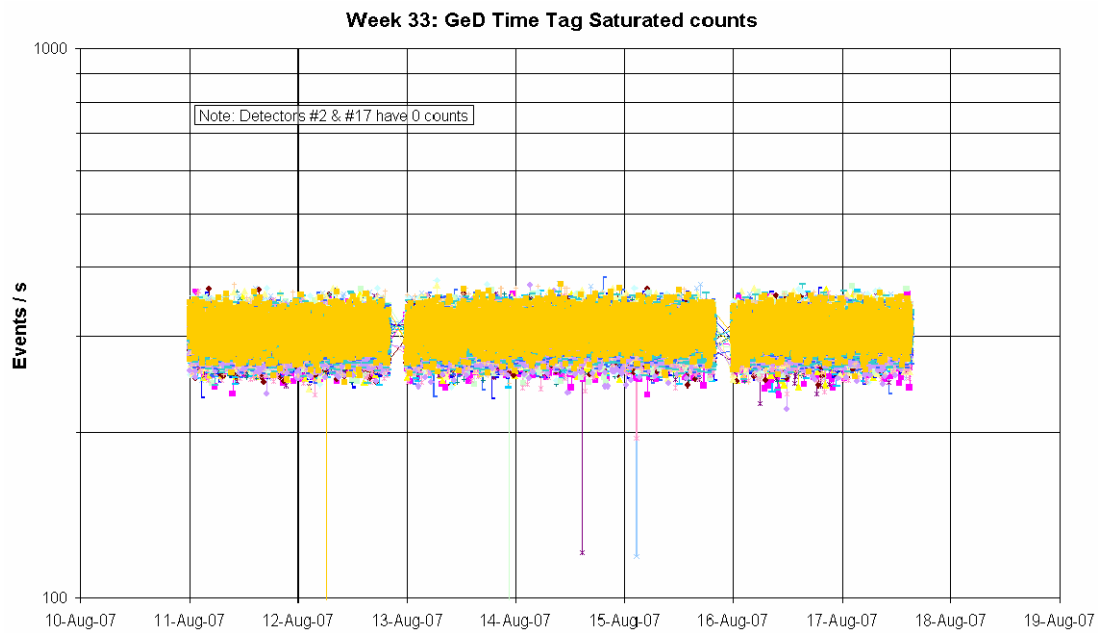
AFEE: The health of the AFEE is nominal. The performance of the AFEE and the detectors is nominal, except for the Ge detector #12 which is showing a slightly degraded energy resolution and is therefore operated at a lower HV setting of 3.5kV (instead of 4kV).

The following plot shows the dc voltage offset of the detector channels during the reporting period. The values are nominal. Detector #2 is failed since 06.12.2003 and detector #17 is failed since 17.07.2004. The data on 17.08.2007 at ~3:30Z should be disregarded as this is due to a wrong time-stamping by the Mission Control System of packets received during the DPE reset, before the DPE time was resynchronised.

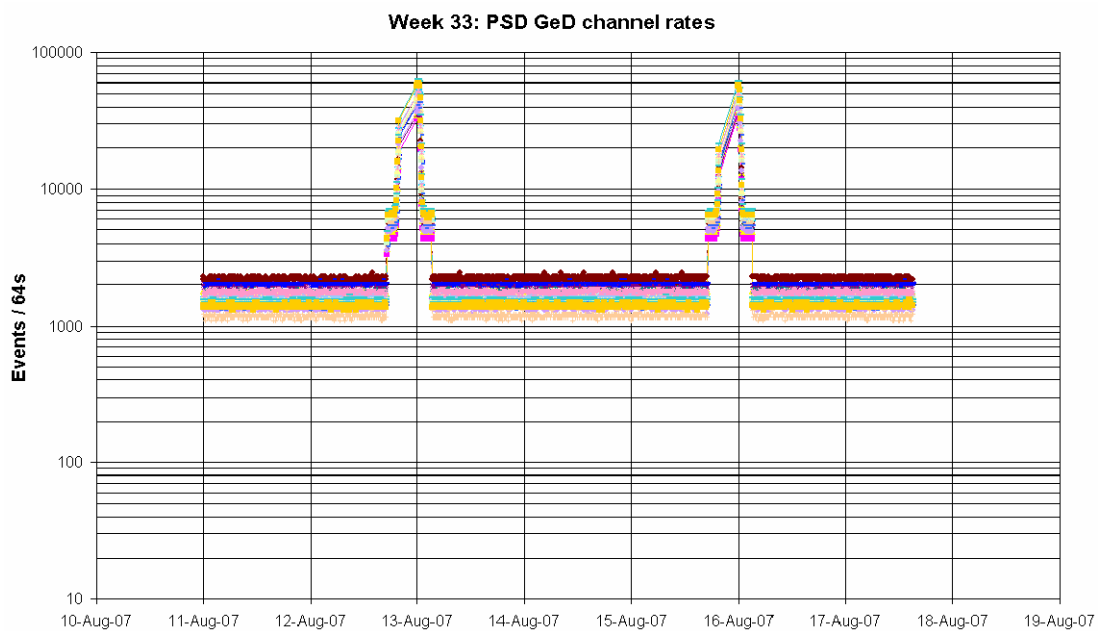


DFEE: The performance of the unit is nominal. The following plots show the Non Vetoes, Time Tag and Time Tag Saturated Event Count Rates during the reporting period.





PSD: The health of the unit is nominal. The following plot shows the PSD channel rates during the reporting period.



Event Log:

The following non-nominal events occurred on SPI during the reporting period:

- 34 occurrences of OEM APID 1024 ID 243 EXCEPTION SPI1 SPECTRA BUILDING NOT COMPLETED were received throughout the week. As they were each single occurrences, no action was taken. However, as the occurrence of this OEM is becoming more frequent, the SPI PI will be consulted to check whether a modification of the spectra scaling factor may be required.
- On 2007-08-13 at 03:15:51Z (packet time) the ACS parameters E2101-E2116; E2150-E2179; E2250-E2279; E2350-E2379 and E3164-E3193 all went OOL

value 0 raw. They are all in the periodic housekeeping packet SPID 60601. The building of this packet started 53secs before the reconfiguration of the ACS at belt exit (at 03:16:44Z) and so the ACS parameters being zero was likely due to the acquisition of these blocks being exactly at the time the ACS switch-on was occurring. They returned within limits when the next packet was received at 03:18:31Z.

- On 17/08/2007 (DoY 2007.229) at 15:02Z, an anomaly, probably an SEU, occurred on the Payload Power Board 3A Group Switch 2 (TM parameter P2118) which went OPEN. As a consequence, SPI went into NOT RUNNING state flagging a WATCH-DOG error. This happened in revolution 591, away from radiation belts, at the beginning of pointing 05910037. Details are as follows (see also Anomaly Report INT_SC-199):

Symptoms:

At 2007-08-17T15:02:40Z the following OEM was generated on board:

2007.229.15.02.40.800 2007.229.15.02.43.541 129 RealTime 82 EXCEPTION EX
OBIH TM ST11 WRONG RBI STATUS

FIX6		0
D0006	MESS CLASS	NON-FATAL ANOM
D0008	MESS ID	82EX RBIST ILL
FIX8		0
D0009	PT ADDRESS	SPI1 BUSADDR
D0077	RESET STATE	NOT RESET
D0078	WAIT STATE	NOT WAIT
D0079	DMA BUSY	DMA NOT BUSY
D0080	RUNNING STATE	NOT RUNNING
D0081	PARITY ERROR	NO ERROR
D0082	INV LITTON CODE	VALID LITTON
FIX1		0
D0083	WRONG INTER	NO ERROR
D0084	TM TRANS	NO REQUEST
D0085	ANOMALY IND	WD EXT FLAG
D0086	TC RECEIPT	NOT READY
D0087	SW INDIC	TBDBYACC/ICU

>> Indicating that the SPI DPE1 had a WATCH-DOG anomaly and was in NOT RUNNING state.

In the next TM cycle (at 2007-08-17T15:02:42Z), the following parameters were seen for the first time in TM:

P2118	P BD3A GSW2 STA	OPEN
P2121	LCL STA AF2 DT A	OPEN
P2120	LCL STA PSD A	OPEN
P2119	LCL STA DFEE-A	OPEN.

>> Indicating that the switch BD 3A GSW2 was OPEN as well as all subsequent LCL: SPI AFEE, PSD and DFEE.

At the same time (at 2007-08-17T15:02:42Z) the following OEM was generated on board:

2007.229.15.02.42.577 2007.229.15.02.51.496 129 Real Time 91 EXCEPTION EX
OBIH TC ST9 WRONG RBI STATUS

D0079	DMA BUSY	DMA
D0080	RUNNING STATE	NOT
D0083	WRONG INTER	NO

D0085	ANOMALY IND	NO
D0086	TC RECEIPT	NOT
D0006	MESS CLASS	NON-FATAL
D0008	MESS ID	91EX
FIX5		0
D0089	PT APID	1025
FIX2		0
D0096	TCP SSC OEM	8195

>> Indicating that the SPI DPE1 was hung up in a wrong state. This OEM was permanently produced until the Broadcast Packet distribution was disabled.

In the next TM cycle (at 2007-08-17T15:02:50Z) the previously listed power parameters were flagged in the OOL display with Status Consistency Check Fail. In addition the following TM parameters were reported OOL as well:

P2117	LCL CUR AF2 DT A	Low-Low	0A
D6503	SPI1 RUNNING	STATUS	NOT RUNNING.

>> Indicating that the BD3 GSW2 was not fed anymore and that the anomaly on the Power Board forced SPI DPE1 into a NOT RUNNING state.

Recovery:

- o At 15:07Z, SPI1 was disabled from the timeline.

After investigations and discussions with SPI PI (Jean-Pierre Roques) and Federico Cordero, it was decided to try and perform a recovery from WD reset as per CRP_SPI1_9531.

- o At 15:42Z, CRP_SPI1_0061 was executed to switch OFF all SPI sub-assemblies,

- o At 15:55Z, a reboot was attempting: DPE to SUSPEND and then to RUNNING, but failed, the DPE remained in NOT RUNNING. As a consequence of this reboot, the following OEM was received (generated on board at 15:03:06Z):

```
2007.229.15.03.06.171 2007.229.16.00.11.646 1024 RealTime 0 EVENT SPI1
CAUSE OF CPU RESET
E9072 CAUSE CPU RESET WD
E9079 MESS CLASS 0
E9080 MESS ID 0
FIX16 0
FIX16 0
```

>> Indicating the SPI DPE1 cause of CPU reset: WATCH-DOG.

- o At 16:13Z, FCP_SPI1_0064 was executed to disable the BCP distribution. At this point OEM APID 129 ID 91 EX OBIH TC ST9 WRONG RBI STATUS stopped.

Further discussions lead to try an empty boot as per procedure FCP_SPI1_9521.

- o At 16:24Z, TC D7203 from CRP_SPI1_9531 was sent to put SPI in the required state to perform the empty boot: WAIT and NOT RUNNING.

- o At 16:30Z, FCP_SPI1_9521 was performed.
- o At 16:44Z, a check of CSSW HK TM was performed as per procedure FCP_SPI1_9500.
- o At 16:53Z, the SPI IASW was activated as per procedure FCP_SPI1_0041. The IASW mode went to STAND-BY1 with S/W version = 400Hex instead of 433 Hex.
Therefore it was decided to perform a complete DPE reset of the instrument following procedure CRP_SPI1_3090.
- o At 17:10Z, step 4 of the procedure was performed, sending IASW into STAND-BY 2.
- o At 17:12Z, following FCP_SPI1_0065 the SPI DPE1 was switched OFF.
- o At 17:21Z, following FCP_SPI1_0044 the DPE and CSSW were activated.
- o At 17:36Z, the SPI S/W version 4.3.3.1 was successfully loaded on board following procedure FCP_SPI1_9810.
- o At 20:45Z, the SPI IASW was activated as per procedure FCP_SPI1_0041. The IASW mode went to STAND-BY1 and this time with S/W version = 433 Hex.
- o At 21:15Z, the BCP distribution was enabled as per FCP_SPI1_0042.
- o At 21:21Z, FCP_EPS_1515 was executed to close the Payload Power Board 3A GSW2.
- o At 21:29Z, FCP_SPI1_0043 was executed to switch ON all sub-assemblies.
- o At 21:45Z, all TC from FCP_SPI1_0045 to perform extended TM check were loaded on the Manual Stack when a task of the Mission Control System failed. This caused problems with the Flight Dynamic Machines. The whole recovery was completed around 22:30Z.
- o At 22:37Z, IASW was sent in CONF as per step 17 of main procedure CRP_SPI1_3090.
- o At 22:38Z, the PSD sub-assembly was activated as per FCP_SPI1_0171.
- o At 23:11Z, the DFEE sub-assembly was activated as per FCP_SPI1_0174.
- o At 23:13Z, the ACS sub-assembly was activated as per FCP_SPI1_0177.
- o At 23:53Z, TC E0020 and E0028 were uplinked several times to refresh TM.
- o At 00:20Z, the AFEE sub-assembly was activated as per FCP_SPI1_0173.
- o At 00:50Z, the Event Designator EEORTM01 was sent as per main procedure CRP_SPI1_3090 step 23.
- o At 00:57Z, the SPI IASW was sent into PHOTON mode with sub-assemblies into OPER mode as per CRP_SPI1_3090 step 24.

Following the recovery, the status and performances of SPI seemed nominal.

A more detailed TM check was performed the next day (18/08/2007) and the following last operation was performed:

o At 12:19Z, the TSW ANTFR2A was set OPEN as per FCP_TCS_1122.

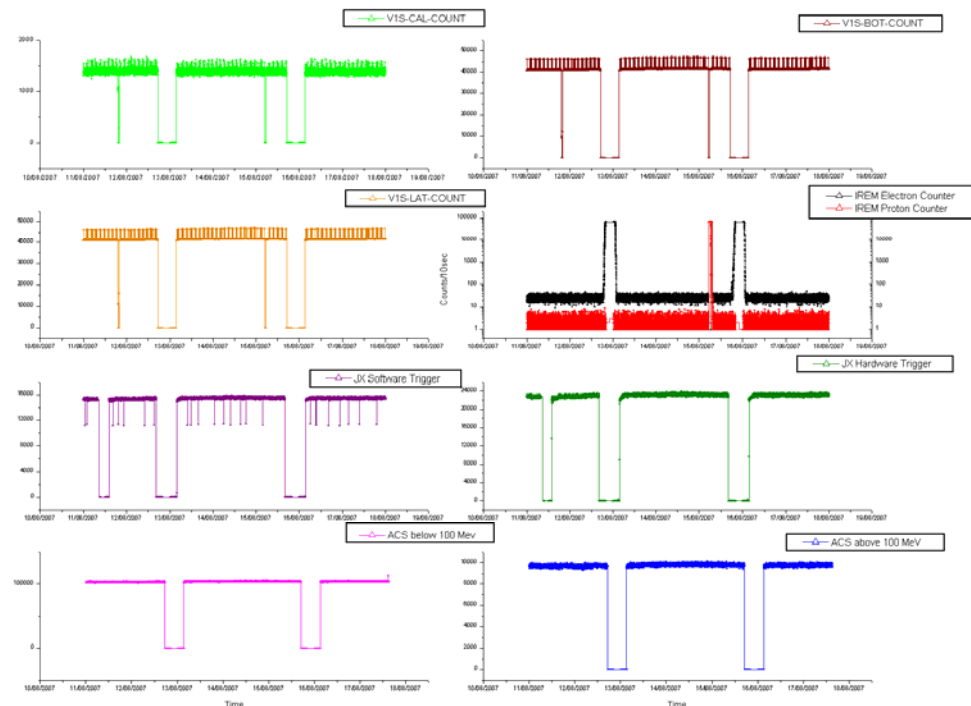
8.3.3 IBIS Operations

IBIS Event Counters Plots ISGRI Counters:



VETO vs Payloads Counters:

IBIS-VETO vs Payloads Counters Rev 589-591

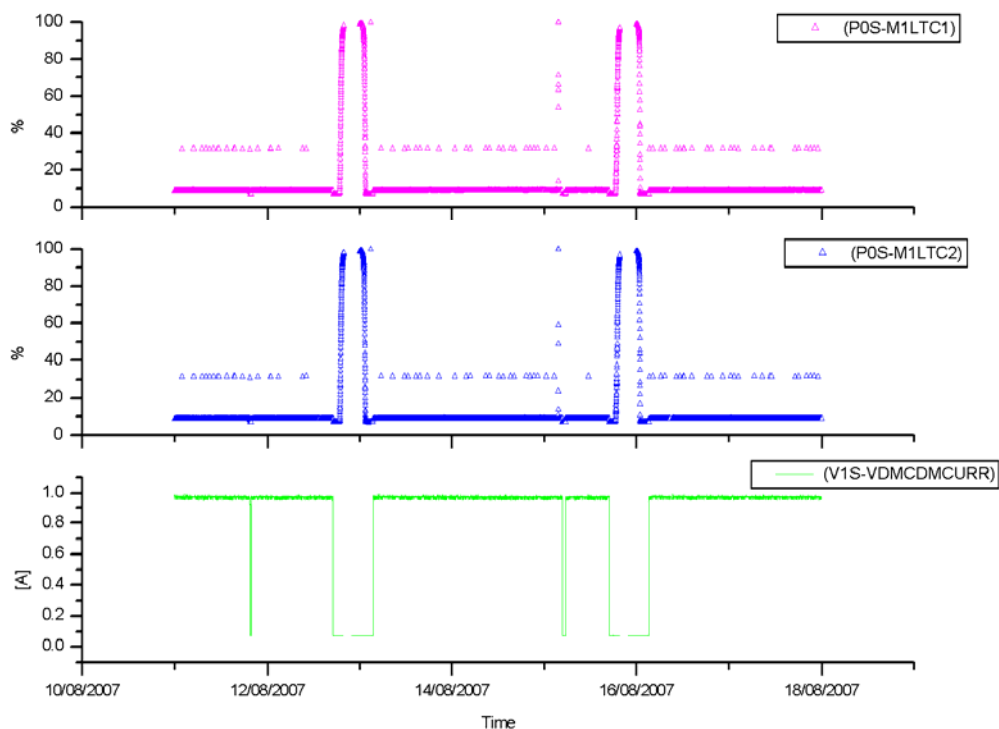


**with the exception of IREM counters (counts/10sec), all the plots are reporting counts/sec sampling every 5 pkts (40 sec)

The week was characterised by low radiation as reported by the payload.

VETO Current:

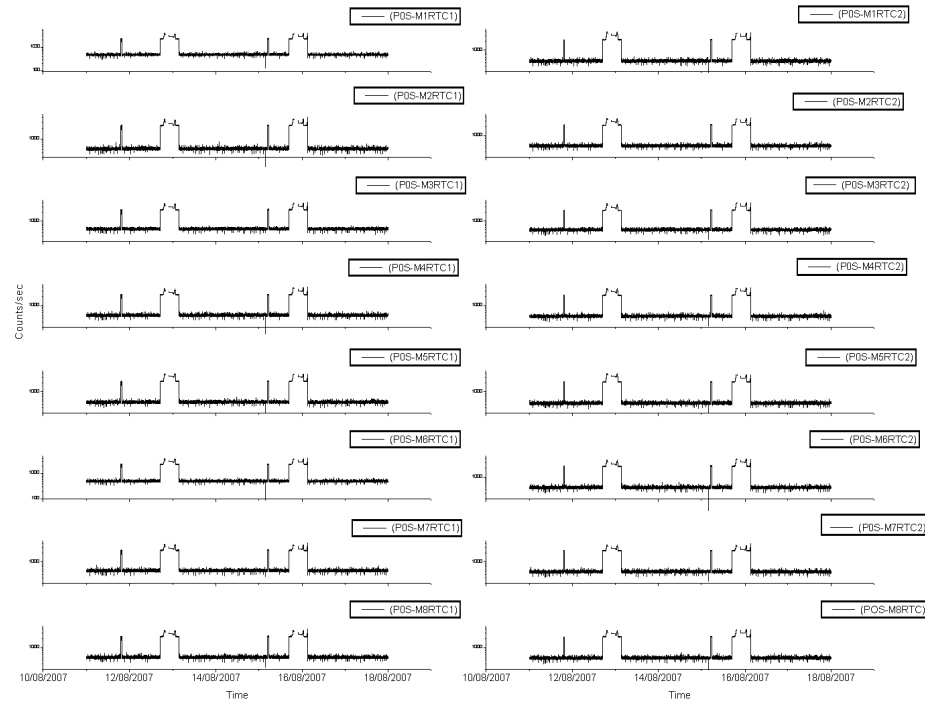
IBIS-VETO Current & PICsIT dead times Rev 589-591



**sampling every 4 pkts (32 secs)

PICsIT Counters:

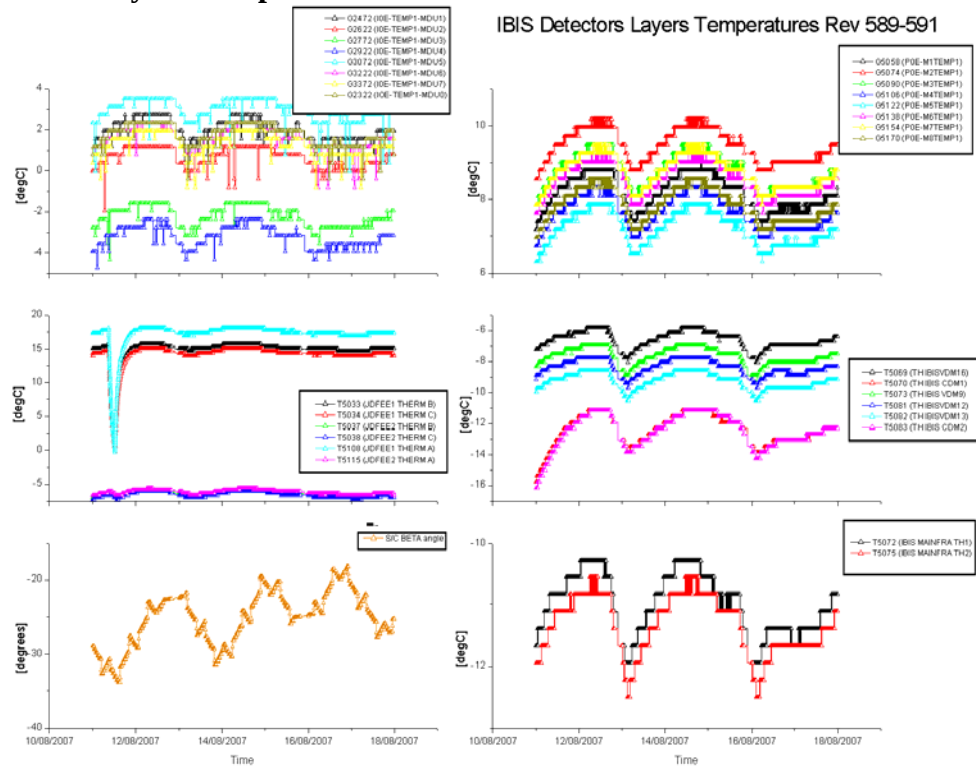
IBIS - PICsIT Counters Rev 589-591



**sampling every 4 pkts (32 secs)

IBIS Detectors Layers Temperatures:

IBIS Detectors Layers Temperatures Rev 589-591



**sampling every 8 pkts (64 secs)

IBIS daily report:

The usual Out Of Limits on TM parameter G8015 (S1E-A2_PMT_V), families G5002 (P0S-Mi_RTC1) and G5003 (P0S-Mi_RTC2), families G2000 (I0E-OVFWPXADD-Mi) were reported at Radiation Belts passage.

2007-08-11 (DOY 223, Rev 589)

At 19:19:14Z a VETO VDM05, VDM06 and VDM07 High Voltage break down occurred. The details are as follows (see also Anomaly Report INT_SC-198):

At 19:19:14Z, the following OEM (class 2, ID 186) was reported:

IBIS1 VETO PMTXX IS ON AND CORRESPONDING HV MONITORING IS ABOUT ZERO;

at the same time, the following TM parameters were reported Out Of Limit Low-Low:

- G6039 (V1S-VDM05HV) with value = 329.54V,
- G6040 (V1S-VDM06HV) with value = 314.92V,
- G6041 (V1S-VDM07HV) with value = 325.61V.

3 TM cycles later (24s), VDM05 and VDM07 recovered themselves. Their HV were back to nominal values, 991.74 and 1083.25 respectively.

VDM06 HV however broke down to a value ~0V (-60.8V).

Before the anomaly (19:19:06Z) the main VETO parameters reported nominal values:

G6012 (VETO current)= 1.62 A

G6013 (VETO VDM/CDM current)= 0.98 A

G6061 (VETO CAL counter)= 1396 /s

G6062 (VETO BOT counter)= 41144 /s

G6063 (VETO LAT counter)= 41136 /s

G6039 (VETO VDM05 HV)= 991.74 V

G6040 (VETO VDM06 HV)= 1005.76 V

G6041 (VETO VDM07 HV)= 1089.36 V

During the anomaly (19:19:14Z), the currents dropped down due to the HV break-down of VDM #05, #06 and #07, as well as the count-rates (due to missing contribution of these modules):

G6012 (VETO current)= 1.59 A

G6013 (VETO VDM/CDM current)= 0.93 A

G6061 (VETO CAL counter)= 1360 /s

G6062 (VETO BOT counter)= 35232 /s

G6063 (VETO LAT counter)= 35568 /s

G6039 (VETO VDM05 HV)= 329.54 V

G6040 (VETO VDM06 HV)= 314.92 V

G6041 (VETO VDM07 HV)= 331.72 V

At the next TM cycle (19:19:22z), the count-rates became stable at much lower values:

G6061 (VETO CAL counter)= 1040 /s

G6062 (VETO BOT counter)= 9408 /s

G6063 (VETO LAT counter)= 10992 /s

3 TM cycles after the anomaly, at 19:19:38Z, both VDM05 and VDM07 recovered themselves, and VDM06 HV dropped down to ~0V:

G6012 (VETO current)= 1.59 A
G6013 (VETO VDM/CDM current)= 0.92 A
G6061 (VETO CAL counter)= 1000 /s
G6062 (VETO BOT counter)= 9432 /s
G6063 (VETO LAT counter)= 11048 /s
G6039 (VETO VDM05 HV)= 991.74 V
G6040 (VETO VDM06 HV)= -60.8 V
G6041 (VETO VDM07 HV)= 1083.25 V

No special radiation was reported at the time of the anomaly, according to the SEIS tool.

However it can be noted that JEM-X DFEE crashed on the same day at 07:52Z.

The anomaly was recovered by the operator following the recovery action V-HV-1:

- 1- At 19:29:12Z, set IBIS-IASW in Stand-By (TC G0125)
- 2- At 19:29:45Z, set IBIS-VETO in Stand-By (TC G0601)
- 3- At 19:47:50Z, set IBIS-VETO in Nominal (TC G0600)
- 4- At 19:48:54Z, set IBIS-IASW in Science Standard (TC G0129).

At 19:47:54Z VETO was in Nominal and the main VETO parameters were nominal:

G6012 (VETO current)= 1.61 A
G6013 (VETO VDM/CDM current)= 0.97 A
G6039 (VETO VDM05 HV)= 985.72 V
G6040 (VETO VDM06 HV)= 1005.76 V
G6041 (VETO VDM07 HV)= 1083.25 V

At the next TM cycle, the count-rates became stable at nominal values:

G6061 (VETO CAL counter)= 1364 /s
G6062 (VETO BOT counter)= 40904 /s
G6063 (VETO LAT counter)= 40896 /s.

It must be noticed that this is the first time 3 VDMs report a HV break-down at the same time. The impact of VDM HV break-down on the Calibration Counter is currently unclear.

Following the anomaly, IBIS operations continued nominally.

2007-08-12 (DOY 224, Rev 589-590) to 2007-08-14 (DOY 226, Rev 590)

IBIS operations executed nominally.

2007-08-15 (DOY 227, Rev 590-591)

At 03:39:50Z the TM parameter families G5068 and G5072 failed status consistency check (value = TRUE). These are the PDM semimodule FIFO error flags. At 03:41:29Z the TM parameters families G5002 and G5003 for the PDM semimodule

counters also went OOL (value = 0). As these were followed at 03:44:45Z by OEM APID 1280 ID 132 EVENT IBIS1 IASW HEPI RESYNCHRONIZED, indicating that HEPI resynchronised autonomously, by which time all the above parameters had returned within limits, no action was taken.

Due to an IREM SEU (see anomaly report INT_SC-200), IBIS transitioned autonomously to Safe configuration at 04:43:24Z It was recovered as follows:

- 05:28:03Z FCP_IBIS1_0803 IBIS EXIT FROM SAFE MODE
- 05:50:53Z ED GESTAN02 uplinked with the planned observation parameters and commanding to IBIS from the Timeline re-enabled.

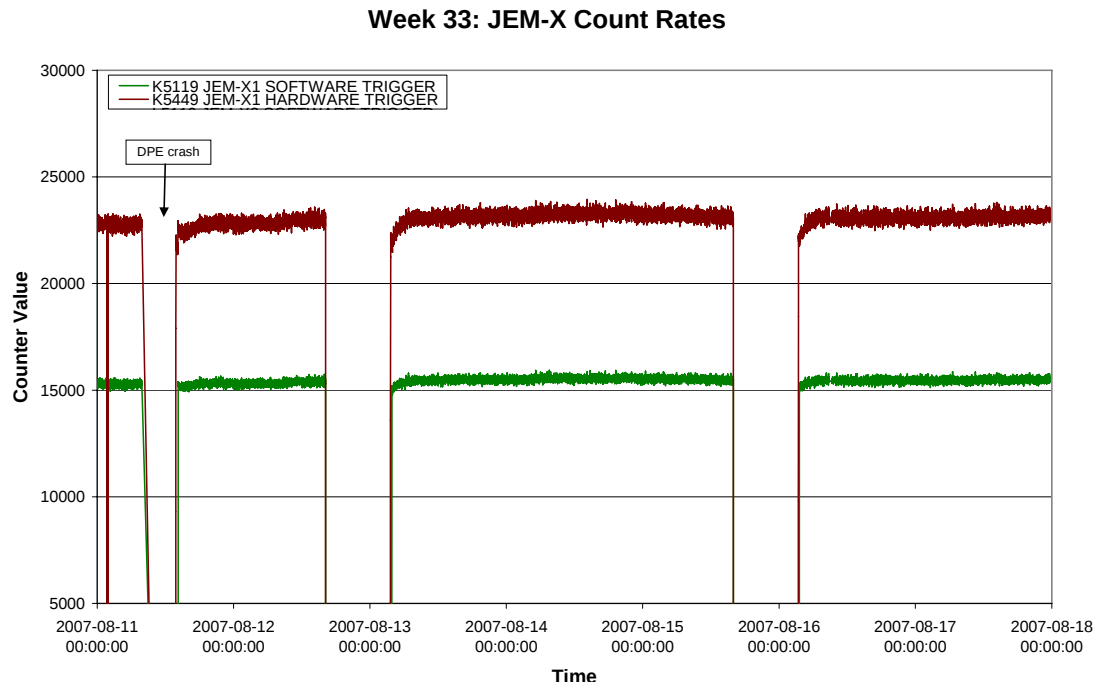
2007-08-16 (DOY 228, Rev 591) to 2007-08-17 (DOY 229, Rev 591)

IBIS operations executed nominally.

8.3.4 JEM-X Operations

JEM-X Count Rates

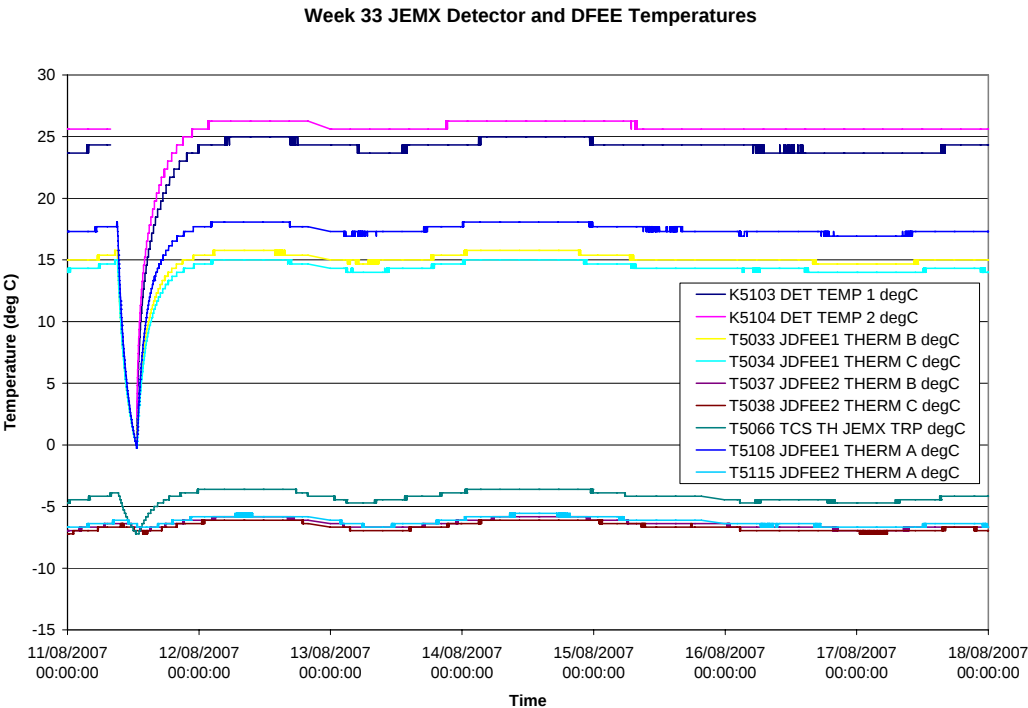
JEM-X count rates over the reporting period are displayed in the following graph¹. The data on 11.08.2007 at ~1:30Z should be disregarded as this is due to a wrong time-stamping by the Mission Control System of packets received during the DPE reset, before the DPE time was resynchronised.



¹ Data sampled (1 frame in 4) and smoothed to remove spikes in S/W Trigger due to flushing of buffer after slews.

JEM-X Temperatures

JEM-X Detector and DFEE temperatures, along with the temperature on the detector bench between the two units, over the reporting period are displayed in the following graph².



JEM-X Daily Report

2007-08-11 (DOY 223, Rev 589)

At 07:52:21Z, an anomaly occurred on the JEM-X1 DPE. Prior to the DPE anomaly, the status of JEM-X1 had been nominal, with all HK parameters within limits and no unusual OEMs being issued.

The symptoms of the anomaly were as follows:

1) The following OEMs were received:

2007.223.07.52.14.754	2007.223.07.52.21.259	129	RealTime	82
EXCEPTION	EX OBIH TM ST11 WRONG RBI STATUS			
FIX6			0	
D0006	MESS CLASS		NON-FATAL	
D0008	MESS ID		82EX	
FIX8			0	
D0009	PT ADDRESS		JEMX1BUSADDR	
D0077	RESET STATE		RESET	
D0078	WAIT STATE		NOT	
D0079	DMA BUSY		DMA	
D0080	RUNNING STATE		NOT	
D0081	PARITY ERROR		NO	

² Data sampled (1 frame in 8)

```

D0082          INV LITTON CODE          VALID
FIX1           0
D0083          WRONG INTER             NO
D0084          TM TRANS                 NO
D0085          ANOMALY IND              NO
D0086          TC RECEIPT               NOT
D0087          SW INDIC                 TBDBYACC/ICU
2007.223.07.52.18.363  2007.223.07.52.29.237  129  RealTime  91
EXCEPTION      EX OBIH TC ST9 WRONG RBI STATUS 2
D0079          DMA BUSY                 DMA
D0080          RUNNING STATE            NOT
D0083          WRONG INTER             NO
D0085          ANOMALY IND              NO
D0086          TC RECEIPT               NOT
D0006          MESS CLASS                NON-FATAL
D0008          MESS ID                  91EX
FIX5           0
D0089          PT APID                  1537
FIX2           0
D0096          TCP SSC OEM              8195
  
```

>> Indicating that the RBI (Remote Bus Interface) protocol communication with the JEM-X1 DPE is correct but the DPE delivers an RBI status which is not correct with respect to the checks performed by the RBI S/W, in this case that the JEM-X1 DPE has reset and is in NOT RUNNING state.

```

2007.223.07.52.29.324  65535  OBEVhandler  imca
INFORMATION            LOG2007.211.16.43.44.085 R 1536 0 0 "JEM-X1
CAUSE OF CPU RESET" K9072=0 K9079=0 K9080=0 FIX16=0 FIX16=65535.
  
```

>> Indicating that the JDPE1 CPU has reset

```

2007.223.07.53.41.325  65535  OBEVhandler  imca
ERROR                 LOG2007.211.16.44.54.210 R 1536 2 4 "JEM-X1 CSSW INT
ER BUF OVER" FIX6=0 K9079=0 K9080=14 K9074=1 K9077=0
  
```

>> Indicating a JDPE1 CSSW internal error - buffer overflow

```

2007.223.07.53.41.328  65535  OBEVhandler  imca
ERROR                 LOG2007.211.16.44.54.210 R 1536 3 3 "JEM-X1 TC REP TC
SBFULL" FIX6=0 K9079=0 K9080=1 FIX8=32 K9068=3 FIX2=3 K9069=16383
  
```

>> Indicating a rejected/failed TC report due to the JDPE1 TC sub-buffer being full

These last two OEMs ("JEM-X1 CSSW INT ER BUF OVER" and "JEM-X1 TC REP TC SBFULL") then continued to be received every TM cycle (8 seconds).

2) All the HK TM parameters from the JEM-X1 DPE were invalid. However, the JEM-X1 DFEE LCL A (TM parameter P2106) was closed, and the LCL current parameter P2004 was reporting a nominal value of ~1.1A. This indicated that probably no data was being received from the JEM-X1 DPE (i.e. empty packets).

The DPE Local On-board Time was reset to zero and this had the effect that the correlated packet time was the time of the last LOBT wraparound (2007.211.16.43Z). This is reflected in the reported creation time of the OEMs from the DPE reported in point 1) above.

The above 2 sets of symptoms are consistent with a reset of the JEM-X1 DPE, in which the CSSW is initialised but the IASW is not initialised. Thus all TM parameters

Doc. Title : INTEGRAL Mission Report #256
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
Date : 20/08/07

Issue : 1
Rev. : 0
Page : 30

values supplied by the IASW are zero, and the DPE buffer overflows due to the received broadcast packet TCs which are not executed due to the IASW not being started (hence the OEMs "JEM-X1 CSSW INT ER BUF OVER" and "JEM-X1 TC REP TC SBFULL" being generated every TM cycle).

Recovery actions:

Following the recovery actions suggested for repeated occurrences of the OEM "CSSW INT ER BUF OVER" in the Integral User Manual (Section 5.8.8.2.2.3.1.1), a full power cycle of the DPE and DFEE, including the reloading of all the DPE and DFEE patches, was then performed according to CRP_JEM1_5020. As in the previous case of a JEM-X1 DPE reset, FCP_JEM_9010 JEM-X1 DFEE SWITCH OFF was replaced by CRP_JEM1_9010 JEMX1 UNCONDITIONED DFEE SWITCH OFF in Step 2 of this procedure. The operations were performed as follows:

09:05Z CRP_JEM1_9010 JEMX1 UNCONDITIONED DFEE SWITCH OFF executed successfully.

09:12Z FCP_JEM1_9001 JEMX1 DISABLE BCP DISTRIBUTION. The Broadcast Packet Distribution to JEM-X1 was stopped at 09:13:49Z, after which the OEMs ("JEM-X1 CSSW INT ER BUF OVER" and "JEM-X1 TC REP TC SBFULL") stopped.

09:16Z FCP_JEM1_9000 JEMX1 DPE SWITCH OFF started and JDPE1 switched off. OEM Real Time Exception 81 EXCE OBIH TM 1 9 INVALID OR NOT RECEIVED RBI RESPONSE received from the CDMU as expected.

09:24Z FCP_JEM1_0010 JEMX1 DPE AND CSSW ACTIVATION started.

At 09.26 Z the JPDE1 was switched on and the following OEM was received as expected:

2007.223.09.26.44.616	2007.223.09.26.44.623	129	RealTime	82
EXCEPTION	EX OBIH TM ST11 WRONG RBI STATUS			
FIX6			0	
D0006	MESS CLASS		NON-FATAL	
D0008	MESS ID		82EX	
FIX8			0	
D0009	PT ADDRESS		JEMX1BUSADDR	
D0077	RESET STATE		RESET	
D0078	WAIT STATE		NOT	
D0079	DMA BUSY		DMA	
D0080	RUNNING STATE		NOT	
D0081	PARITY ERROR		NO	
D0082	INV LITTON CODE		VALID	
FIX1			0	
D0083	WRONG INTER		NO	
D0084	TM TRANS		NO	
D0085	ANOMALY IND		WD	
D0086	TC RECEIPT		NOT	
D0087	SW INDIC		TBDBYACC/ICU	
2007.223.09.27.09.359	2007.223.09.27.09.365	1536	RealTime	0
EVENT	JEM-X1 CAUSE OF CPU RESET			
K9072	CAUSE CPU RESET		POWER	
K9079	MESS CLASS		0	
K9080	MESS ID		0	

FIX16 0
 FIX16 0

As part of this procedure, the following was then performed:

09:48Z FCP_JEM1_9810 JEMX1 LOAD NEW SW VERSION, to load the DPE image IIMG_P_JM1_0129_00006_F_X_000_000_2.INT. The following OEMs were generated as expected during this procedure:

2007.223.09.50.14.758	2007.223.09.50.20.677	129	RealTime	82
EXCEPTION	EX OBIH TM ST11 WRONG RBI STATUS			
FIX6		0		
D0006	MESS CLASS		NON-FATAL	
D0008	MESS ID		82EX	
FIX8		0		
D0009	PT ADDRESS		JEMX1BUSADDR	
D0077	RESET STATE		NOT	
D0078	WAIT STATE		WAIT	
D0079	DMA BUSY		DMA	
D0080	RUNNING STATE		NOT	
D0081	PARITY ERROR		NO	
D0082	INV LITTON CODE		VALID	
FIX1		0		
D0083	WRONG INTER		NO	
D0084	TM TRANS		NO	
D0085	ANOMALY IND		NO	
D0086	TC RECEIPT		READY	
D0087	SW INDIC		TBDBYACC/ICU	

>received when the JDPE1 was commanded to WAIT state by TC D7503.

2007.223.11.58.03.848	2007.223.11.58.12.619	129	RealTime	81
EXCEPTION	EXCE OBIH TM 1 9 INVALID OR NOT RECEIVED RBI RESPONSE			
FIX6		0		
D0006	MESS CLASS		NON-FATAL	
D0008	MESS ID		81EXCE	
FIX8		0		
D0009	PT ADDRESS		JEMX1BUSADDR	
D0011	OBDBH BUS SR		10913	

>received when the JDPE1 RELAY0 was commanded OFF to restart the DPE CSSW after the patch as per step 11.

At 2007.223.11.58.37Z OEM APID 1536 ID 0 "JEM-X1 CAUSE OF CPU RESET" K9072=0 K9079=0 K9080=0 FIX16=0 FIX16=65535 was received when the JDPE1 RELAY0 was commanded back ON.

N.B. 34 occurrences of the OEM APID 129 Real Time Rejection 31 ME LOADPT EXEC STILL IN PROGRESS were received during the patch process, due to patch TCs failing as the previous patch TC was still being executed. In all cases, the failed TC was then re-uplinked later.

12:06Z FCP_JEM1_0011 JEMX1 IASW DPE PATCH FOR BCP PID INTERPRETATION

12:12Z FCP_JEM1_0015 JEMX1 IASW ACTIVATION. Once the IASW was started. At 2007.223.12.12.29Z OEM APID 1536 ID 231 "JEM-X1 AUTO EVENT 1" FIX6=0 K9079=0 K9080=0 K5419=80 K5420=65535 was received. This was correct and indicated that upon activation the IASW registered that the shutdown level

should be LV OFF (as the DFEE was off) instead of its initial value of NORMAL [0 RAW].

12:25Z FCP_JEM1_0016 JEMX1 ENABLE BCP DISTRIBUTION

12:33Z FCP_JEM1_0017 JEMX1 IASW EXTENDED TM CHECK

12:38Z FCP_JEM1_0020 JEMX1 DFEE 1st ACTIVATION AFTER DPE SWITCH-ON

At 2007.223.12.38.53Z

OEM APID 1536 ID 233 "JEM-X1 AUTO EVENT 3" FIX6=0 K9079=0 K9080=80
K5419=0 K5420=65535

was correctly received, when the DFEE was switched on and JEM-X1 autonomously transitioned to Safe mode. (As the DFEE has been switched off unconditionally via CRP_JEM1_9010, the Autorecovery Level, TM parameter K5458 AUTO RECOV INFO, was still DFEE CONTEXT, rather than being set to NO RECOVERY as during the nominal DFEE switch off procedure FCP_JEM1_9010.)

As part of this procedure, the following procedures were executed:

- 12:43Z FCP_JEM1_0025 JEMX1 DFEE SW PATCH SEQUENCE (ver 4.0 to 5.3)
- 13:07Z FCP_JEM1_0060 JEMX1 UPDATE ENERGY LINEARISATION TABLE

13:43Z FCP_JEM1_1010 JEMX1 CONFIGURATION SETTING FOR SCIENCE OPS. JEM-X1 was activated with the current nominal microstrip gas gain voltage (dV) of 73 RAW.

14:15Z FCP_JEM1_0044 JEMX1 DATA TAKING

JEM-X1 commanding from the automatic Timeline was then re-enabled at 14:16Z.

2007-08-12 (DOY 224, Rev 589) to 2007-08-17 (DOY 229, Rev 591)

JEM-X1 operations executed nominally.

8.3.5 OMC Operations

2007-08-11 (DoY 223, Rev 589) to 2007-08-14 (DoY 226, Rev 590)

Nothing to report.

2007-08-15 (DoY 227, Rev 590)

At 04:43:15, an IREM SEU (#52) caused OMC to switch to SAFE mode. A recovery was performed, and the unit returned to Stand-by at 05:19:09. The impact was that pointing 05900049 was cut short from a planned 3503 to 249 seconds (effectively lost).

2007-08-16 (DoY 228, Rev 591)

Nothing to report.

2007-08-17 (DoY 229, Rev 591)

At 21:48, imcs problems caused a suspension of the Timeline. The imcs was recovered at 22:10, and a recovery then performed. The Timeline was rejoined at 22:30. The impact was the loss of pointing 05910044. It was at this time the following OEMs were received:

2007.229.22.03.18.057	2007.229.22.03.27.383	1792	RealTime	131	TC	REJECT	
REJECTED TC1			0	0	65535	PR	N
E E							
2007.229.22.03.24.057	2007.229.22.03.35.407	1792	RealTime	131	TC	REJECT	
REJECTED TC1			0	0	65535	PR	N
E E							

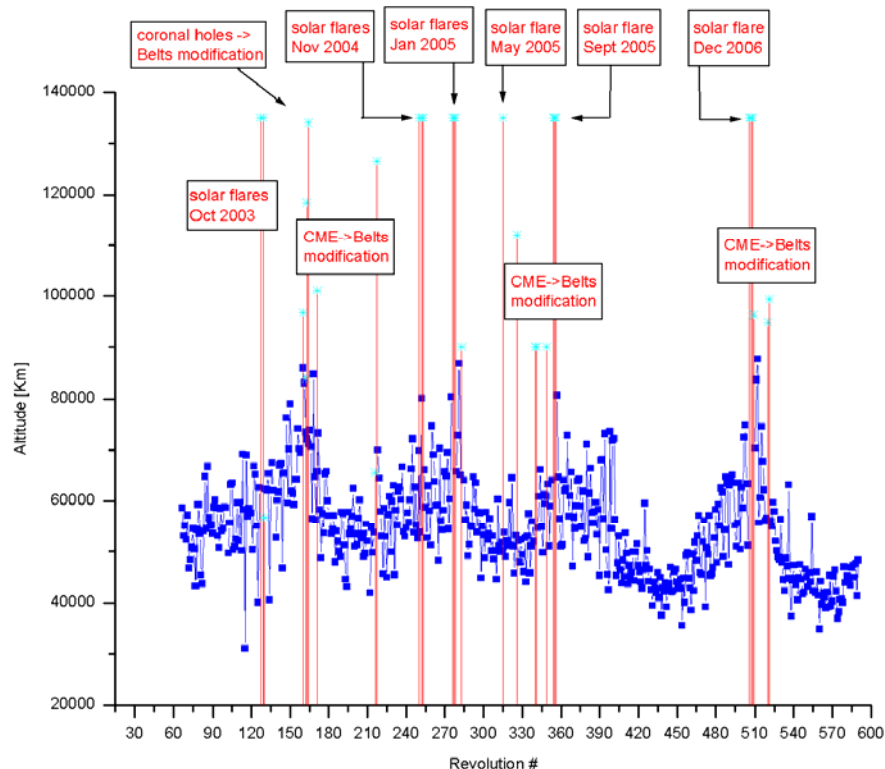
These correspond to the M1130 (RESET IM) and MU1310 (IMAGING-A) commands for that pointing.

On DoY 224 at 17:06:59, and DoY 227 at 16:52:59 OMC went to SAFE mode nominally, at the radiation belt entry time as set in the Broadcast Packet.

8.3.6 IREM Operations

Radiation Belts Entry

Evolution of Radiation Belt Entry 2003-2007



IREM daily report

DoY 2007.227 (15/08/2007):

At 04:43Z, a local reset of the IREM CSCI S/W (SEU #52) occurred. The status of the unit, before the local reset of the IREM CSCI S/W, was nominal, here is a summary:

- 1) The temperatures were nominal;
- 2) The LCL current was nominal;
- 3) The last HK before the anomaly showed HV, 5V and 6V voltages inside limits;
- 4) The anomaly occurred at 2007.227.04.43Z at 120708 km. The unit had performed an automatic transition to Standard Mode (ie. no block counter increasing, all the TM words= FFFF hex); just before the anomaly, radiation counters reported nominal values considering the position of the S/C along the orbit;
- 5) The recovery of the unit started at 05:11Z using procedure CRP_SYS_2570. The first dump of the status word after the anomaly reported a value of BCC0 HEX = 48320 DEC = 1011110011000000, i.e the Checksum Failure Flag ON. The unit was still reporting the status as if it was in Integral mode with counting ON and accumulation ON. This value of the status word is assumed to be an old one written by the S/W at the moment of the anomaly.
- 6) A dump of all the registers gave a status word BC80 HEX = 48256 DEC = 1011110010000000, ie. the unit was still reporting the status as if it was in Integral mode but the Checksum Failure flag was this time OFF and the checksum counter in the register number 3 incremented by 1 unit.
- 7) The patch was performed successfully with the correct re-starting of the S/W following procedure FCP_RM_0081. The operation was completed at 07:17Z.

The IREM automatic transition to Standard Mode affected the instruments by forcing them to automatically enter Safe configuration, except for SPI and JEM-X whose automatisms are disabled according to the PIs request. OMC was recovered at 05:19Z and IBIS at 05:52Z.

The cause of these S/W resets is apparently due to the unit's memory device that is sensitive to high energy radiation, as proved during test campaign on-ground.

Electron Belts

REV	S/C BCPKT (electron)	Electron CUT-OFF Observed Entry/Exit	Observed Entry/Exit Altitude [Km]	Electron CUT-OFF Predicted Entry/Exit	Predicted Entry/Exit + Altitude [Km]
589	RAD_ENTR R 2007-08- 12T17:06:53Z	12/08/2007 18:49:55	41337.3	12-Aug-2007 18:19:45	45707.17
590	RAD_EXIT R 2007-08- 13T03:16:26Z	13/08/2007 01:54:51	>> 29817.7	13-Aug-2007 02:09:45	43634.25
590	RAD_ENTR R 2007-08- 15T16:52:58Z	15/08/2007 17:44:19	48310.3	15-Aug-2007 18:08:23	45463.44
591	RAD_EXIT R 2007-08- 16T03:03:01Z	16/08/2007 01:26:27	>> 29813.6	16-Aug-2007 01:58:23	43809.77

Reference

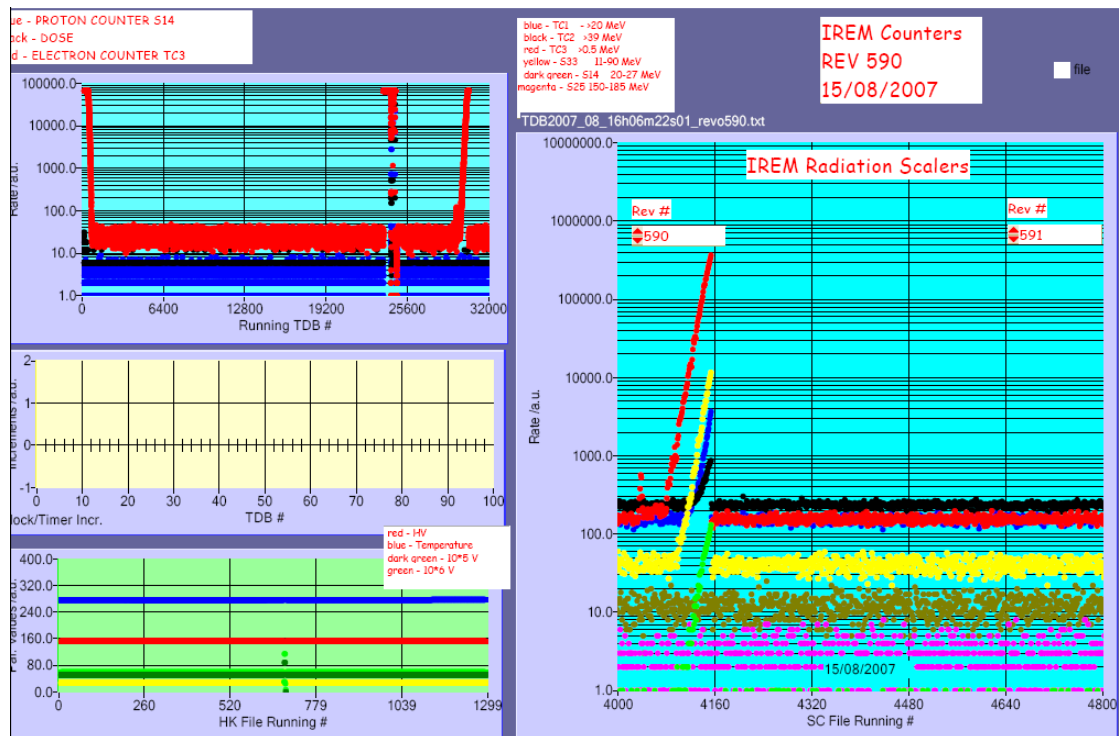
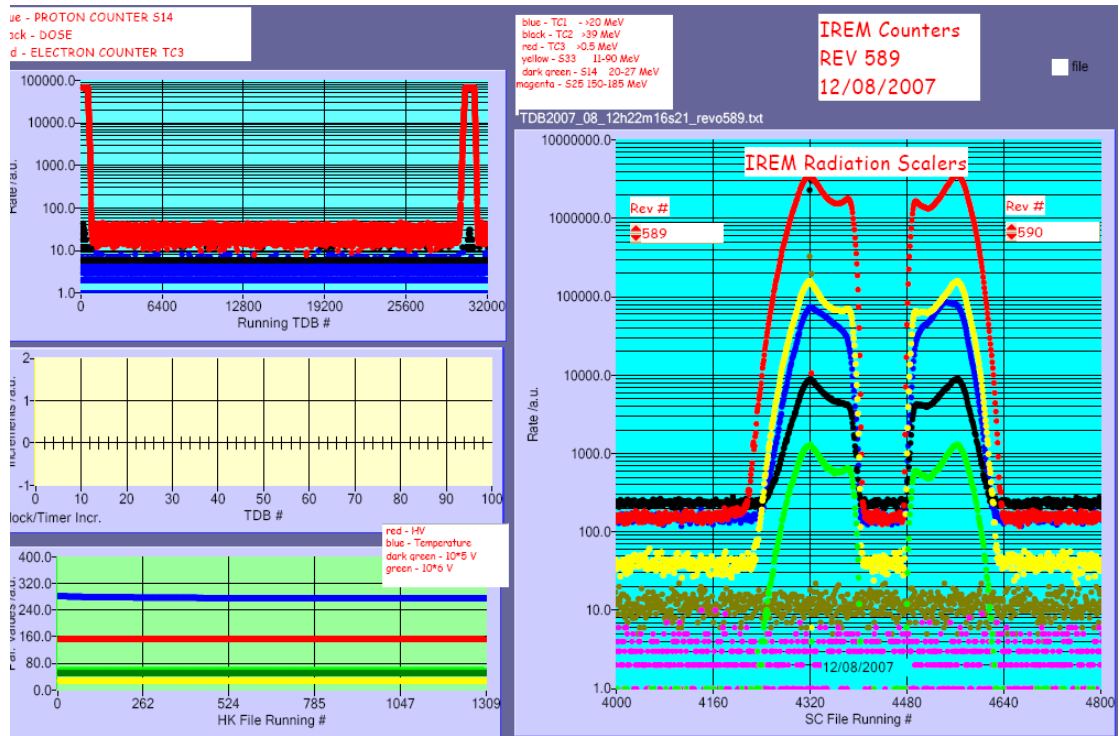
High radiation

Very small error vs reference (less than 10 minutes)

Small error vs reference (between 10 and 30 minutes)

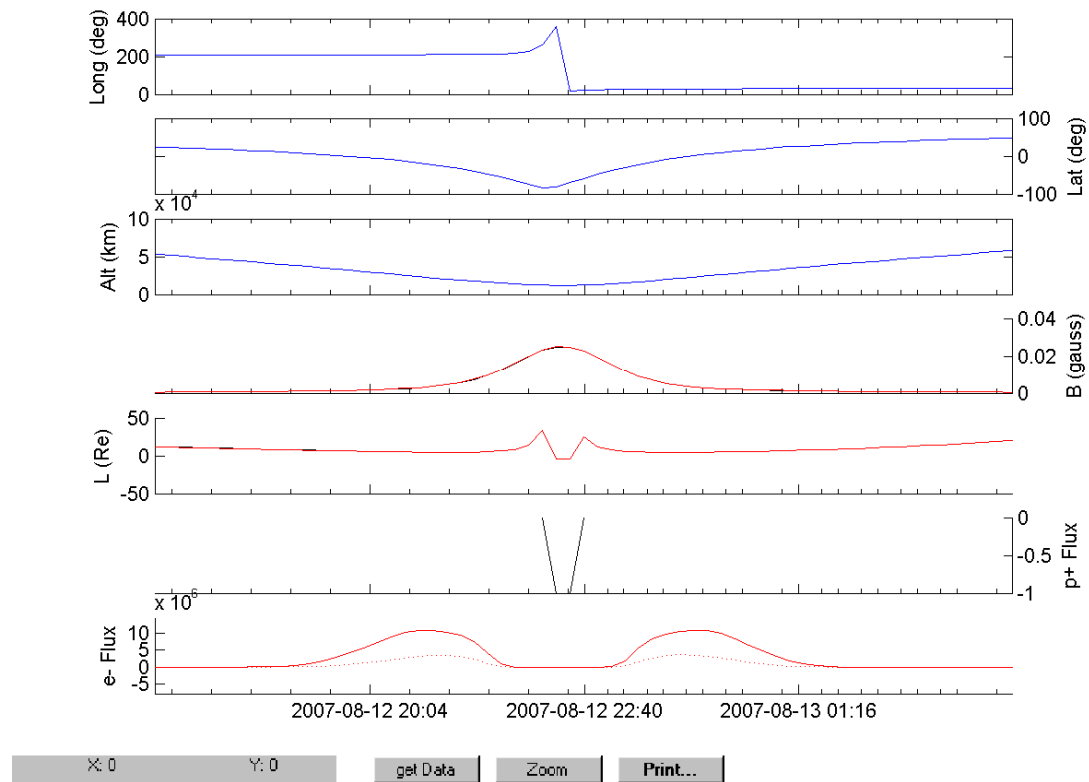
Large error vs reference (more than 30 minutes)

IREM radiation counters:

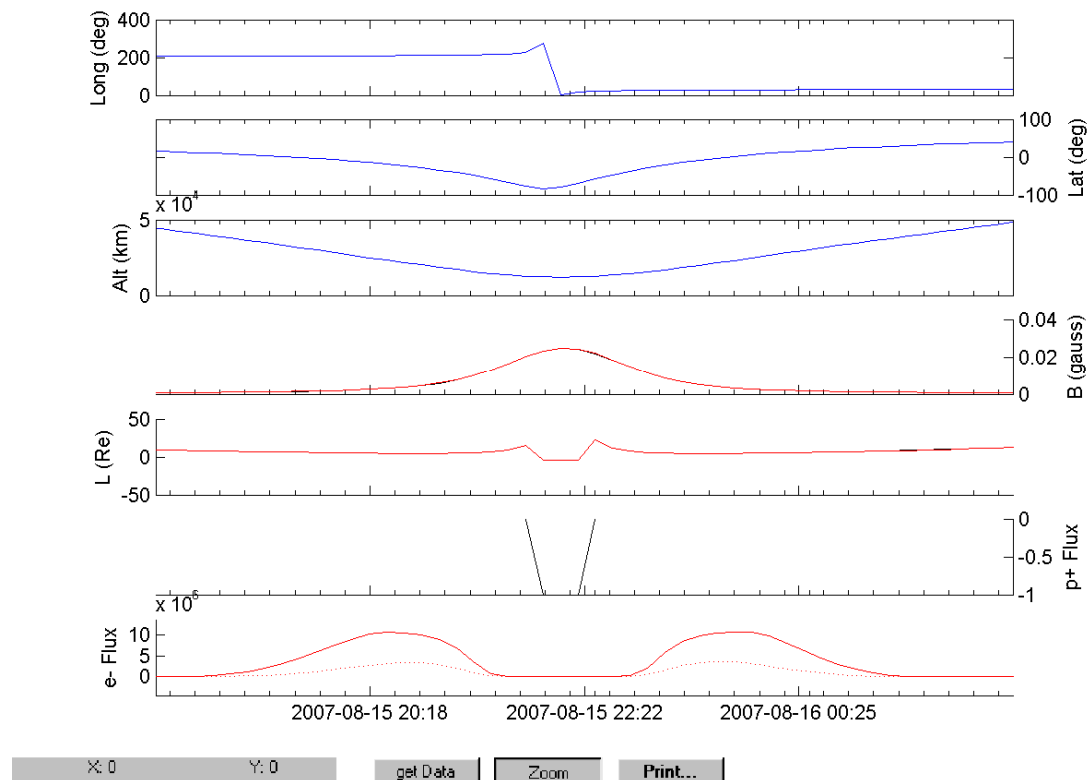


IREM Predicted Radiation Belt Passages

Rev 589



Rev 590



Doc. Title : INTEGRAL Mission Report #256
Doc. Ref. : INT-MOC-SYS-RP-1001-OPS-OAI
Date : 20/08/07

Issue : 1
Rev. : 0
Page : 37

SEC-GOES Observed Particles Fluxes (using SEIS/RAT tool):

Due to a problem on the SEISOP server, no data are available this week. However, the week was very quiet and no radiation was reported.