

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-TOS-OF
No. 071
Week 05
02.02.04
Routine Phase

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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 24.01.04 until 30.01.04 (both dates inclusive) and covers the revolutions 157 & 158.

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 were the galactic plane and SN1006 (RA 15:02:55.00; DEC -41:57:00.0). The activities consisted of GPS and raster dithering observations.

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.

There were four cases of release of the Guide Star due to False Events on the STR. In one case, a Close Loop Slew was performed on the wrong star, causing an error in the achieved attitude.

Several Slews/Pointings were missed during this time due to drops in the telemetry and the losses of the Guide Star.

There was a Roll Error at the end of an Open Loop Slew. This error was introduced by an attitude determination that was based on a mapping during which the SSL was enabled.

The fuel consumption over the period between 23/01/2003 and 30/01/2004 was 0.077 kg. The remaining propellant is in the order of 172.777 Kg on the 30th of January.

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

3.1.2 Power

The power subsystem is working as specified. The available power from the arrays is in the order of **2200W**.

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 was 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

The overall status of the instrument is nominal.

During the reporting period the instrument was in photon-by-photon mode with spectra TM enabled and an assigned TM bandwidth in the science windows of 98 pkts/cycle.

The cryo-cooler is working well maintaining the temperature within 85+/-1K.

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

3.2.2 IBIS

The status of the unit is Nominal.

The TM bandwidth assigned to IBIS was 134 pkts/cycle.

No occurrence of anomalous OEM generation (ID 183-184-179-180, Class 2) was reported after the VETO S/W patch.

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.

During this period JEM-X1 was dormant with a TM allocation of 1 packet/cycle. JEM-X2 operations were performed by the automatic Timeline, with a TM allocation of 8 packets/cycle during science observations.

JEM-X2 made autonomous transitions to Safe mode, triggered by high background radiation levels as reported by IREM, before it was due to be commanded to Safe mode by the Timeline before radiation belt entry of revolutions 156 and 157. In revolution 156 this occurred a few minutes before the planned transition to Safe mode and in revolution 157 this occurred approximately 37 minutes earlier than planned.

On DOY 029, at the start of revolution 158, the activation of JEM-X2 by the automatic Timeline failed due to some command verification conditions failing as a result of the IMCS wrongly flagging certain engineering values of TM parameters as invalid. JEM-X2 was activated manually and was in Data Taking mode by 10:24.

Further information on the JEM-X operations can be found in the Appendix Section 8.3.4.

3.2.4 OMC

The status of OMC is nominal.

During the reporting period OMC operations were performed by the automatic timeline, with the TM allocation to OMC of 5 packets/cycle during normal science operations.

There were 213 OMC pointings executed nominally, 6 were completely, and 1 partially lost.

Note: Some more information concerning the OMC operations is provided in the Appendix Section 8.3.5.

3.2.5 IREM

The overall status of the unit is Nominal.

The observation period was characterized by low solar activity.

The Electron Belts Entry/Exit for revs 156-->157, as defined by a cut-off flux of $3.76E+02$ e/cm²/sec ($E > 0.5$ MeV) and the predicted Proton Belts Entry/Exit, as defined by a cut-off flux of $1.25E+03$ p/cm²/sec ($E > 8$ MeV) are shown below:

Electron Belts

REV	S/C BCPKT (electron)	Electron CUT-OFF Observed Entry/Exit	Electron CUT-OFF Predicted Entry/Exit	ALT[Km] predicted
156	RAD_ENTR R 2004-01-25T19:13:30	Sun 25 Jan 04, 17:13:59	25-Jan-2004 19:52:41	54558.41
157	RAD_EXIT R 2004-01-26T04:15:20	Mon 26 Jan 04, 02:17:35	26-Jan-2004 02:52:41	26601.97
157	RAD_ENTR R 2004-01-28T19:04:56	Wed 28 Jan 04, 17:40:07	28-Jan-2004 19:38:40	55290.81
158	RAD_EXIT R 2004-01-29T04:06:49	Thu 29 Jan 04, 02:24:39	29-Jan-2004 02:48:40	27344.64

Reference

Small error vs reference

Large error vs reference

Proton Belts

REV	S/C BCPKT (electron)	Proton CUT-OFF Predicted Entry/Exit	ALT[Km] predicted
156	RAD_ENTR R 2004-01-25T19:13:30	26-Jan-2004 01:12:41	11548.35
157	RAD_EXIT R 2004-01-26T04:15:20	26-Jan-2004 01:42:41	14951.25
157	RAD_ENTR R 2004-01-28T19:04:56	29-Jan-2004 01:08:40	11962.67
158	RAD_EXIT R 2004-01-29T04:06:49	29-Jan-2004 01:28:40	14209.72

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

4 Ground Facilities

The performance of the Operational ground facilities was in general good in the reporting period. The main problems this week, are briefly described below.

4.1 Mission Operations Centre

The performance of the MOC was in general good in the reporting period, there were serious problems however with the NCTRS-A which caused delayed transmission of TCs, this in turn caused subsequent Interlocked commands to fail release.

The consolidation of the data that were erroneously deleted from the consolidator file is ongoing and should be finished by end of week 6.

The orbit did not evolve as desired after the start of the active orbit control using the Reaction Wheel Biases. A strategy to correct the orbit minimising the losses of

resources (fuel) and impacts on the science has been agreed with ISOC and is currently been implemented.

4.2 Ground Stations & Network

There were a few minor incidents concerning the ground stations this week, see below for details.

Redu is endeavouring to ensure all data currently held is backed-up, to avoid potential losses during the on-going consolidation.

4.3 Science Ground Segment

During the past week, there have been several incidents of hackers attempting to gain access to the PI computers located at the MOC. A fire-wall has been installed on the IREM lap-top to prevent this. Further measures are being looked into on other machines.

4.3.1 ISOC

1. Mission planning

PSF's: Received up to rev. 165

POS and POD generated: up to rev 162 (no change)

TSF: Up to rev 161

No re-planning performed the last two weeks. See also problems below.

2. Observation status

ECS's for up to rev's 148 except 140 received. Corresponding OCS's generated and sent to ISDC. No extra time credited to a proposal

3. ISOC science archive

Two tapes with archive data received from ISDC. Ingestion in ISOC archive is still pending.

4. ISOC system

ISOC system version 10.1 is still in operational use. System is stable. Two minor patches have been performed to fix detected problems. OMC pointing software and star catalogue received from OMC PI. It is being checked in ISOC before introduction in operational system. This is expected next week.

5. Problems

The received PSF's for rev's 163 to 165 from MOC were rejected by the ISOC system since they included new RWB windows in a place that could not be handled. Solution is in discussion with MOC.

The problem reported in the last ISOC report related to a slew too close to a RWB event is understood. The POS checker has been updated to detect also this case. Therefore no manual inspection for this problem is needed any more until the ISOC scheduling software is updated.

6. AO 3 preparation

Detailed planning for this AO in progress.

4.3.2 ISDC

On 02/02/2004, the status of ISDC observation processing is:

- Latest Standard Analysis completed: amalgamated observation 01201250001,01201980001,01297000013 (Cassiopeia A, Revolution 142-143) on 30/01/2004
- Latest products archived: observation 01100090008 (Vela region, Revolution 138) on 27/01/2004
- Latest observation products sent to the observer: 01202070003 (X1916-053, Revolution 131-134) on 09/01/2004.

5 Special Events

None

6 Anomalies

There were a number of problems related to the ground segment that impacted the operations:

- On DoY 024, between 00:00, and 01:11, there were brief drops in TM, due to the on-going playback.
- Later at 01:13, an AOCS command failed release, the AOCS commanding was disabled, and the star mapping at 01:28 failed. At 01:30, the link test failed, and at 01:31, the TMPs at Redu were switched from 1 to 2, at 01:40, the network had problems inserting the TC link. At 01:44, the carrier dropped due to the server at the ground station being rebooted. At 01:56 the links were back, and at 02:37, the Timeline was re-joined. The impact was that pointings 01560033, and 01560034 were lost, 01560035 was recovered, being performed manually and the nominal time.
- At 04:41, the applications on idda, were restarted due to a failure to store a TM packet.
- At 05:42, the TM link dropped at 05:45, the search/track command failed, the TM returned at 05:49, there were still problems recovering the VC7 link, which was eventually restored using the other TMP.
- At 06:15, the link between MADDS and ISDS was disconnected, at 06:20, the restart of ISDS and IFRD failed, due to illegal data coming from the Telemetry link. At 06:26, the tasks were successfully re-started, without having to reboot the machine.
- From 12:23, until 12:49, when the TCONmainRT task on idda was restarted, the error message 'Store of packet failed "TCONmainRT"' appeared every minute.

- On DoY 025, at 10:49, the TLM parameter G2098 was in the state: IOE-OVFWPXADD-M7 has SCC failure, (overflow), ISDC were informed.
- At 13:55 the message HFACTMrecord:store: Error writing TM record on archive appear every 30 seconds, and every 3 seconds the message 'Store of packet failed' appeared, the TCON_RT task on IDDA was restarted at 13:59, and the message ceased.
- At 23:10, sun128 was showing "yellow", due to the disk being full.
- On DoY 026, at 02:08, a packet failed to store on IDDA. The TCONmainRT task was restarted.
- At 09:18, the TC & TM were lost when the NCTRS-B was accidentally shut-down. The TLM was restored at 09:26, and the TC at 09:27. The impact was that pointing 01560011 was partially lost.
- From 16:50 to 16:56, there was a drop in VC0 TLM from Redu, and again for about 15 seconds at 17:24, no impact.
- At 22:32, the TMPs at Redu were stopped and started according to INT_OR_0067.
- On DoY 027 from 01:21 to 02:01, there were brief drops in VC0 TLM due to the ongoing playback from Redu. At 02:01, it was decided to terminate the playbacks due to the TM drops.
- On DoY 028, at 07:47, due to AOCS problems, pointings 01570081 and 01570082 were lost.
- At 16:40, ISDC reported that the OLF files 200402813, 200402814 and 200402815 were unusually small, this was due the operations being conducted on the B-chain during this time interval.
- On DoY 029, at 04:21 a JEM-X2 command failed completion, and the following command failed release. The instrument was put into SAFE mode, until 10:25.
- At 08:49, an AOCS command remained unverified, forcing the AOCS to be disabled in the Timeline. The impact was pointing 01580008 was lost. The problem was traced to an upgrade in the imcs software. At 13:30, the imcs was switched from the A-chain to the B-chain, after the S/W had been rolled back, the imcs was switched back to the A chain at 15:30.

The following new anomaly reports have been entered into the Anomaly Reporting and Tracking System. Repeats of existing anomalies are not shown in this table.

AR id	Date Occurrence	Subject	Segment	Status
INT-2551	26/01/2004	NCTRS-B application taken down by mistake		Pending
INT-2552	26/01/2004	On-line Long Term archive is corrupted.	IMCS	Open
INT-2553	26/01/2004	The consolidator archive on idda cannot be written to following reception...	IMCS	Open
INT-2554	26/01/2004	Telemetry not accessible from TM Desktop or TMP task	IMCS	Open

7 Future Milestones

Planned for the beginning of February is a Veto patch to rescale the counter factor.

There is also an upcoming JEMX patch to update the on-board background rejection criteria and the HV safety limits. The precise date for this change has yet to be set.

Both JEM-X units will be activated during the upcoming crab calibration. Afterwards JEM-X 1 will replace JEM-X 2.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 157

The observations in revolution 157 consisted of 16 pointings of a GPS lasting ~11 hours followed by a raster dithering observation of SN1006 (RA 15:02:55.00; DEC - 41:57:00.0), performed for the remaining ~50 hours of observation time.

Revolution 158

In revolution 158 a raster dithering observation of SN1006 (RA 15:02:55.00; DEC - 41:57:00.0) was performed throughout the available observation time (~61 hours).

During these revolutions, all instruments were in their nominal science modes, except for JEM-X1, which remained in Safe mode, and the TM allocation was 134 IBIS, 98 SPI, 1 JEM-X1, 8 JEM-X2, 5 OMC.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2004-01-08T03:43:54.000Z	173.1090	F	Automatic TM processing.
2004-01-11T03:32:41.000Z	173.0878	F	Automatic TM processing.
2004-01-14T03:23:53.000Z	173.0643	F	Automatic TM processing.
2004-01-15T05:43:08.000Z	173.0432	F	Automatic TM processing.
2004-01-16T15:33:35.000Z	173.0218	F	Automatic TM processing.
2004-01-17T03:11:20.000Z	173.0117	F	Automatic TM processing.
2004-01-17T12:07:45.000Z	173.0006	F	Automatic TM processing.
2004-01-17T15:54:33.000Z	172.9794	F	Automatic TM processing.
2004-01-18T13:31:40.000Z	172.9126	F	Automatic TM processing.
2004-01-20T02:55:03.000Z	172.8937	F	Automatic TM processing.
2004-01-21T13:16:11.000Z	172.8745	F	Automatic TM processing.
2004-01-23T02:47:03.000Z	172.8537	F	Automatic TM processing.
2004-01-26T02:41:50.000Z	172.8080	F	Automatic TM processing.
2004-01-26T11:16:07.000Z	172.7928	F	Automatic TM processing.
2004-01-29T02:32:06.000Z	172.7768	F	Automatic TM processing.

This report was generated Fri Jan 30 08:00:07 GMT 2004

8.3 Detailed Satellite Information

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

8.3.1 AOCS Operations

AOCS operations were executed from the Automatic Timeline.

During this period, 58 Open Loop Slews, 166 Closed Loop Slews and 3 Momentum Bias were executed. 10 slews were missed or executed manually. This is equivalent to a 4.5%.

24/01/04 (Day of Year 024, Revolution 156)

Slew/Pointing lost due to drops in Telemetry (Redu): TM gaps during playback of TM from the Redu Ground Station caused uplink failure of an AOCS command and stopping of the AOCS commanding from the timeline. Slew/Pointing 01560033 was lost. A manual Open Loop Slew was then performed to the attitude of PID 01560035. This attitude was reached before its planned time in the Timeline. The pointing was therefore not affected.

Slew/Pointing lost due to drops in Telemetry (Redu): At 05:45, another drop in TM caused the failure of an AOCS TC and stopping of the AOCS commanding. Slew/Pointing 01560040 was missed and the attitude of PID 01560041 was recovered by a manual Open Loop Slew. This attitude was reached before its planned time in the Timeline. The pointing was therefore not affected.

25/01/04 (Day of Year 025, Revolution 156)

Nothing to report.

26/01/04 (Day of Year 026, Revolution 156-157)

Guide Star released during perigee passage due to False Events: The Guide star was released at 01:42:05, when the number of detected False Events exceeded the STR SEU Filter Threshold of the ACC. At LOS the Guide star was at CCD coordinate [16292, 9451] with 6.65 Mi. At AOS the new Guide Star was at CCD location [11298, -10293] with 8.25 Mi. This was at an altitude of about 14500 km.

Roll Error at the end of Open Loop Slew 01570002: The roll error at the end of the 57° Open Loop Slew 01570001 was +112 arc-seconds (this error was not there at the beginning of the slew). For the update of the parameters of the next slew, the FDS took the mapping at the end of slew 1, during which the SSL was enabled. The jitters caused by enabling of the SSL introduced an error in the attitude determination, amounting to a roll error of 310 arc-seconds (from 0157_0002.attd_log). This, in turn, introduced a roll error of -144 arc-seconds in to the next slew in the form of the SSL assumed roll angle at the end of Open Loop Slew 01580002 with a slew angle of 8°. This error, which could also be seen at the start of the slew, was more than the OTF threshold for roll (120") and caused flickering of the Pointing Bit and generation of Roll Error OOL. This was not seen at OTF level.

Here, the roll error is defined as the difference between the FDS assumed roll angle (also commanded as SSL parameters) and the roll angle reading from the FSS.

Loss of Guide Star due to proximity to the edge of the STR FoV: At 15:18:54, the Guide was lost because it was too close to the edge of the STR FoV. This 8.6 Mi star was picked by the ACC after an Open Loop Slew and was at CCD location [29558, -298] when it was lost. A mapping was performed and a new Guide was picked: [8331, 5374], 6.4 Mi.

27/01/04 (Day of Year 027, Revolution 157)

Nothing to report.

28/01/04 (Day of Year 028, Revolution 157)

Guide Star released just before start of Close Loop Slew due to False Events: The Guide Star was released at 07:48:00 due to the STR SEU Filter of the ACC. In the first cycle after the change of Guide Star before Close Loop Slew 01570081, an undetected False Event caused a jump of [478, -566] CCD units in the apparent position of the Guide Star, which resulted in the generation of Pitch and Yaw Error messages. The magnitude of the Guide star was 7.45 and the reported magnitude of the undetected False Event was 7.35. In the next cycle, the real Guide Star was detected as False Event, its status was constantly reported as such, and it was finally released when the STR SEU Filter Threshold was exceeded. ACC commanded a mapping and a new guide star with CCD coordinates [-2426, -14582] and 7.95 Mi was picked. The Close Loop Slew was then performed on this wrong Guide Star and as a result PID 01570081 had the wrong attitude. AOCS commanding from the Timeline was stopped and a manual Open Loop Slew was performed to the attitude of PID 01570083. This attitude was reached before the planned time in the Timeline and therefore it was not affected. This happened at an altitude of about 120000 km.

29/01/04 (Day of Year 029, Revolution 157-158)

Guide Star released during perigee passage due to False Events: The Guide star was released at 01:47:04, when the number of detected False Events exceeded the STR SEU Filter Threshold of the ACC. At LOS the Guide star was at CCD coordinate [10484, -11854] with 6.15 Mi. At AOS the new Guide Star was at CCD location [1874, -12332] with 7.9 Mi. The altitude was about 16500 km.

Slew/Pointing lost due to missing TM packets: At 08:49, the AOCS command to report the loaded Guide Star failed completion verification due to loss of TM packets. This caused uplink failure of the next Interlocked command. AOCS subsystem was disabled on the Autostack and Slew/Pointing 01580008 was missed. A manual Open Loop Slew was then performed to the attitude of PID 01580009.

30/01/04 (Day of Year 030, Revolution 158)

Drop of the OTF and loss of Guide Star due to False Events on the STR: About six minutes before the end of Pointing 01580032, False Events on the STR caused drop of the Pointing Bit, release of the Guide Star and finally drop of the OTF:

- 00:53:25.567, an undetected False Event caused a jump of [-696, -218] CCD units in the apparent position of the Guide Star and drop of the Pointing Bit.
- 00:53:34.067, The Guide star was released when the number of detected False Events exceeded the STR SEU Filter Threshold of the ACC. The released star was located at [1364, 1502] and had a magnitude of 7.95.
- 00:53:44.068, A new Guide Star was picked after the ACC commanded Mapping: [15149, -13086], 7.35 Mi.
- 00:53:44.648, The OTF finally dropped to NOT REACHED.

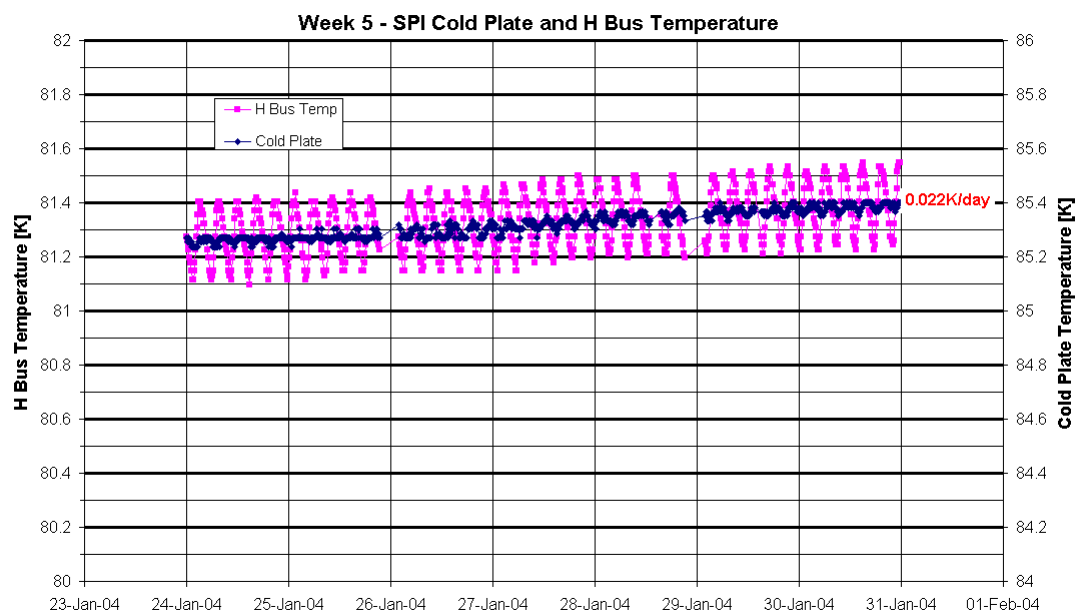
This was at an altitude of about 140100 km.

8.3.2 SPI Operations

Cryo-cooler / Detector Cold-Plate:

The cold-plate temperature is leveled at around 85.3K with a small positive drift of 0.022K/day, which is within the expected range. The performance of the cryo-cooler is nominal.

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



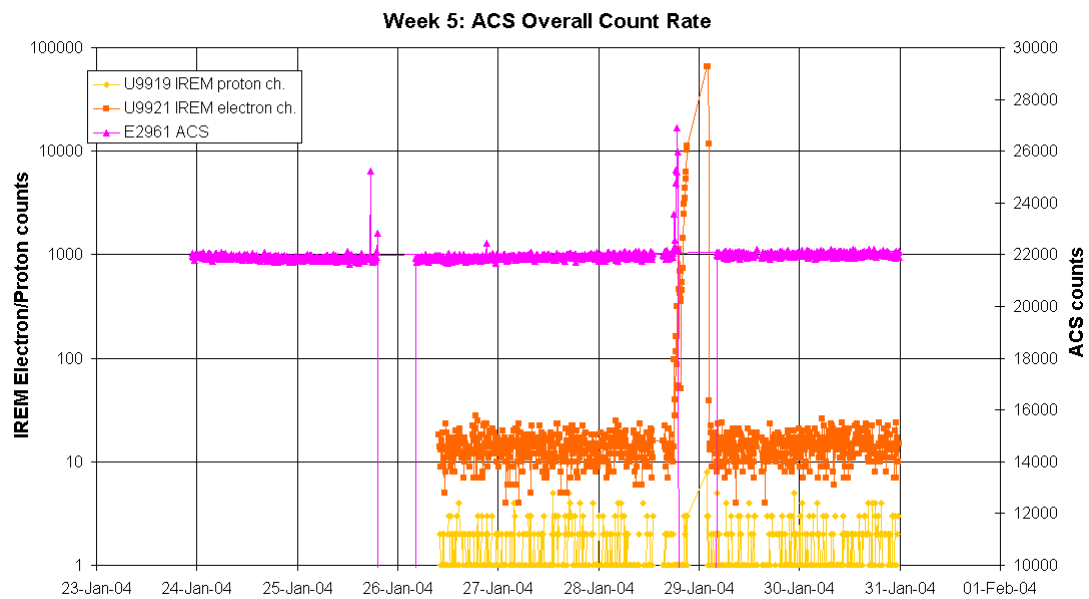
IASW/DPE:

Nothing to report.

ACS:

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

The performance of the ACS is nominal.

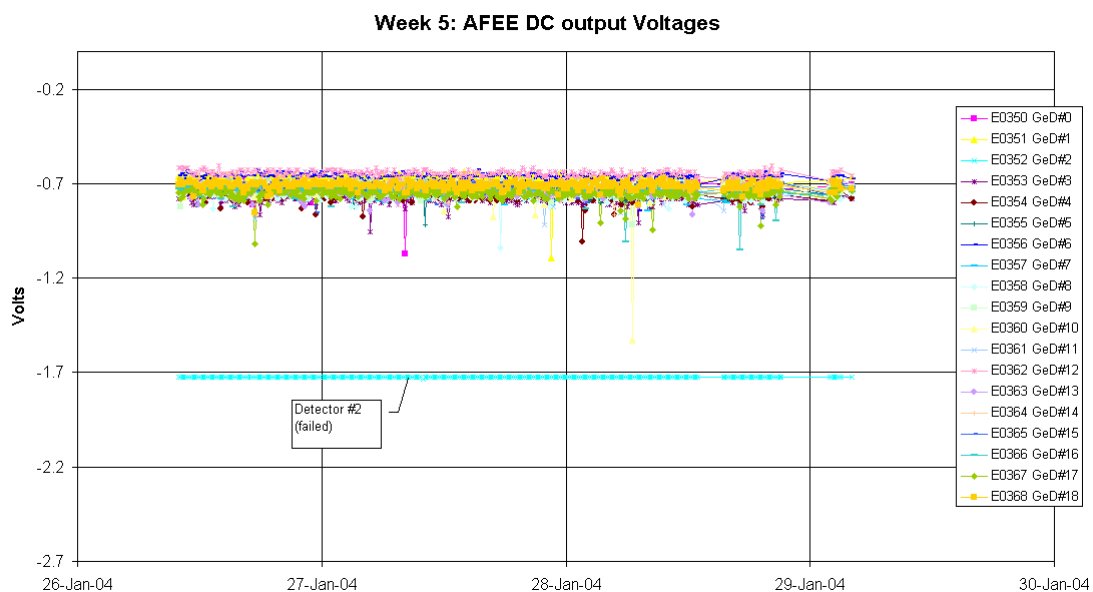


AFEE:

The AFEE dc output signals are here after plotted during the reporting period.

These signals represent the DC component of the current flowing through the Ge crystals polarised at 4kV; they provide a measure of the health status of both the detectors and the HV section.

The performance of the detectors is nominal except for the detector #2 (see anomaly report INT_SC-72).

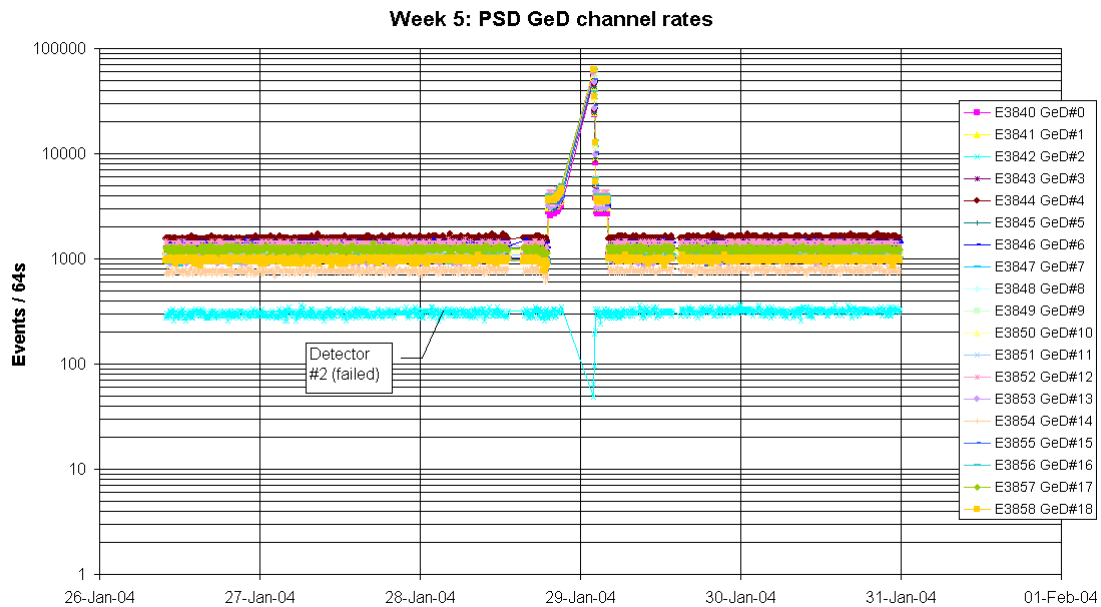


DFEE:

Nothing to report.

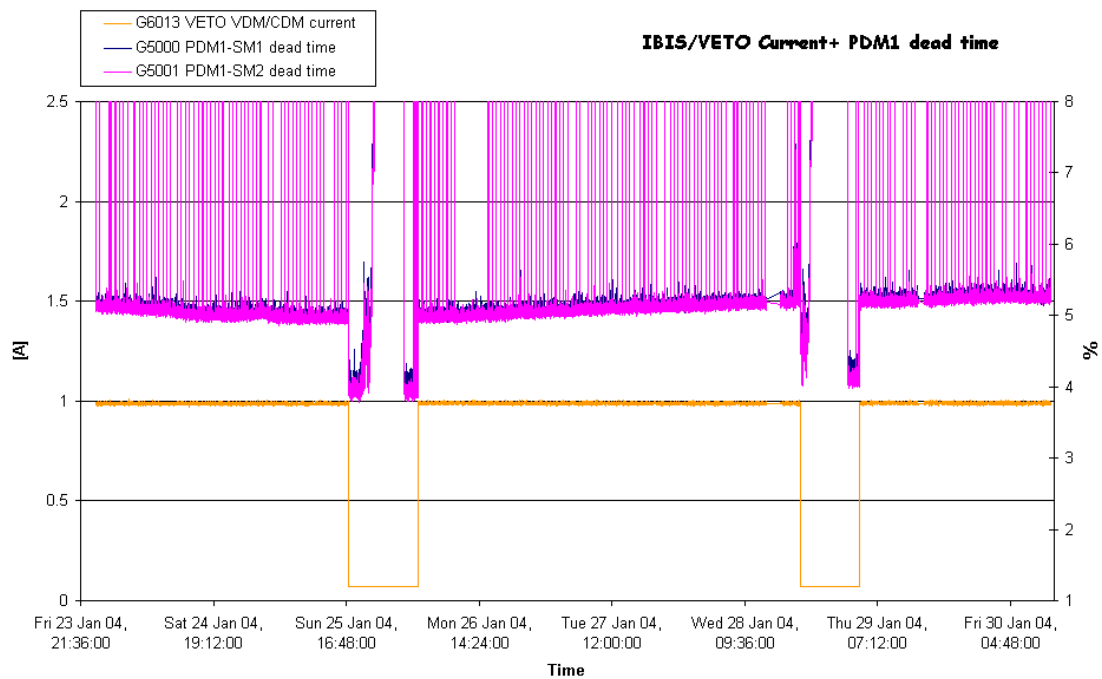
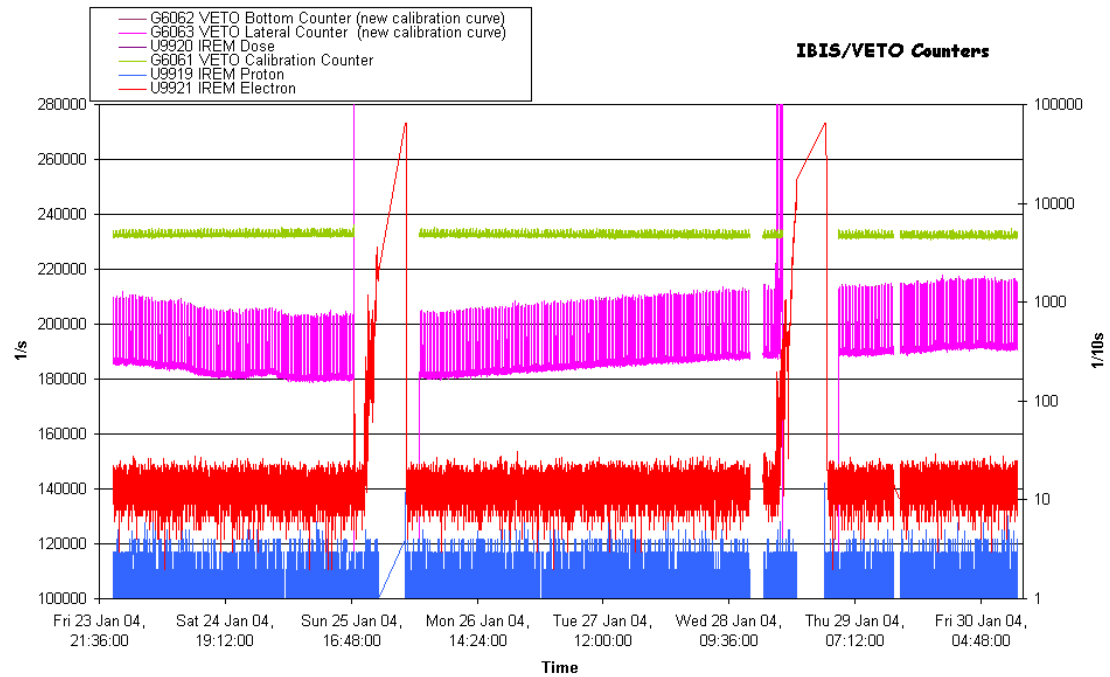
PSD:

The following plot shows the GeD channel rates detected by the PSD during the reporting period. The count rate of each detector is within the expected range, except for the failed detector #2, whose residual counts are triggered by noise.

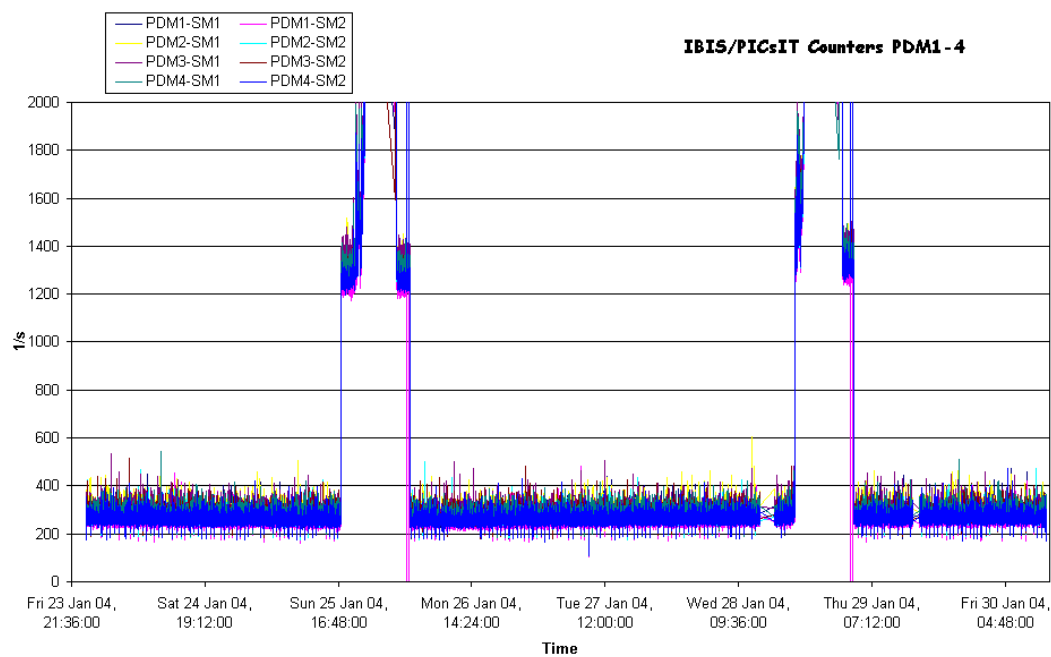
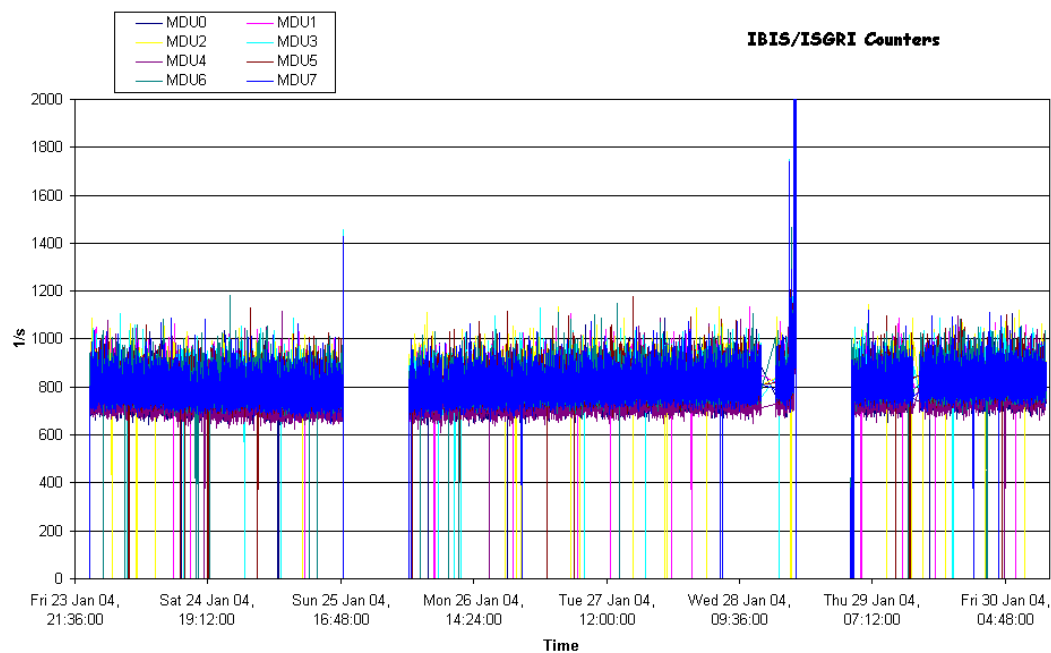


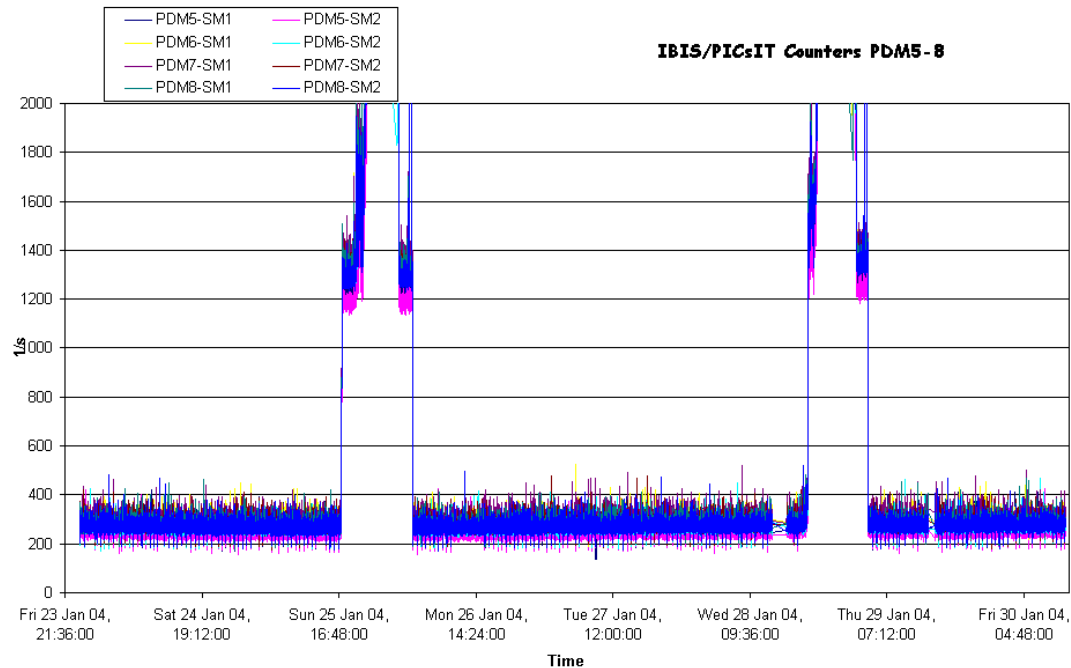
8.3.3 IBIS Operations

Plots of the VETO bottom and lateral counter with the PICsIT PDM#1 SM1-2 dead times, and the VETO VDM/CDM current during the observation period are shown below:



Plots of the ISGRI and PICsIT counters during the observation period are shown below:





DOY 2004.024 (24/01/04)

Nothing to report.

DOY 2004.025 (25/01/04)

At 10:49 the parameter G2098 (IOE-OVFWPXADD-M7) reported out of limits (Status Consistency Fail). After a few cycles the OOL disappeared. No action was taken as indicated in Payload FDIR doc.

At 17:14 the automatic transition to Safe configuration (IASW In Stand-By + HVs OFF) due to the high background radiation was reported ~120 minutes prior the S/C broadcasted Radiation Belts entry time.

The s/s SOE decided to not proceed to recover the instrument due to the high fluctuations of the IREM electron Counter. The Radiation Belt Entry, as distributed by the S/C Broadcast packet, occurred at 19:13.

DOY 2004.026 (26/01/04)

There were a few reported during the Belt passage of the OEM APID 1280 ID 167 Class 2 <<IBIS1 PICsIT NOISY SEMIMODULE SIGNALLING>> due to the PICsIT detectors being ON without the VETO anticoincidence system, as required by the PIs.

DOY 2004.027 (27/01/04)

At 02:16 the following OEM APID 1280 ID 133 CLASS 2

<< IBIS1 IASW LSL TRANSFER FAILED (LOW LEVEL)>>

together with OEM APID 1280 ID 131 CLASS 2

**<<IBIS1 IASW LSL TRANSFER FAIL REPORT FOR HIGH-LEVEL
MODULE RESET>>**

were reported. These two OEMs were followed after few seconds by OEM APID 1280 ID 238 CLASS 3

<< IBIS1 MCE5 TIME OUT>>.

This anomaly is similar to that which occurred on MCE3 on DoY 2004.017. IBIS incurred in a timing problem on the LSL that affected the communication with the peripherals. During this time a request for HK1 was sent to the MCE5 without any answer due to the black out in communication between the peripheral and DPE. The IASW flagged the non-generation of HK1 from the MCE5 as an on-board rejection (time out) of the internal TC identified in the OEM above by the CID. During this time no valid HK was collected from MCE5 therefore what was reported in the HK1 was simply the IASW default (i.e. all 000000...). This is confirmed by the reading of some TM_paras as the biases, operating modes and MDUs temperatures all reporting as value 0 raw. After few TM cycles the unit solved autonomously the internal conflict on the LSL and reported the valid HK1 for MCE5. As suggested by the Payload FDIR doc no action was requested, just a monitoring of the unit. The detailed description of the anomaly, for the MCE3, has been reported in WR #69.

At 9:23 the parameter family G5066 (PDM: Semimod 1 FIFO Half Full Flag) reported out of limits (Status Consistency Fail). At 09:23 the parameters returned within limits. No action was taken, as suggested by the Payload FDIR.

DOY 2004.028 (28/01/04)

At 18:19 the parameters G6062 and G6063 reported warning High for few TM cycles. After ~30 minutes, at 18:46, the automatic transition to Safe configuration (IASW In Stand-By + HVs OFF) due to high background radiation was reported, ~28 minutes prior the S/C broadcasted Radiation Belts entry time.

The s/s SOE decided to not proceed to recover the instrument due to the high fluctuations of the IREM electron Counter and the incoming Radiation belts Entry, as distributed by the S/C Broadcast packet, which occurred at 19:14.

DOY 2004.029 (29/01/04)

There were a few reports during the Belt passage of the OEM APID 1280 ID 167 Class 2 <<IBIS1 PICsIT NOISY SEMIMODULE SIGNALLING>> due to the PICsIT detectors being ON without the VETO anticoincidence system, as required by the PIs.

DOY 2004.030 (30/01/04)

Nothing to report.

8.3.4 JEM-X Operations

2004-01-24 (DOY 024, Rev 156)

Nothing to report

2004-01-25 (DOY 025, Rev 156)

At 17:14 the following radiation monitoring parameters from IREM went Out of Limits:

K5317 RAD MONITOR 3 (Electron Counter), value = 72

L5317 RAD MONITOR 3 (Electron Counter), value = 72,

causing JEM-X2 to transition to Safe mode autonomously (issuing OEM 231 JEM-X2 AUTO EVENT 1).

At 17:42 JEM-X2 performed an autonomous recovery to Setup mode (issuing OEM 233 JEM-X2 AUTO EVENT 3) after the IREM RMCR values had remained below the JEM-X2 thresholds for exiting from Safe mode for more than 10 minutes.

At 17:52:07 JEM-X2 was then commanded to Safe mode by the ED LESAFE01 scheduled in the automatic Timeline before radiation belt entry.

2004-01-26 (DOY 026, Rev 156-157)

Nothing to report

2004-01-27 (DOY 027, Rev 157)

Nothing to report

2004-01-28 (DOY 028, Rev 157)

At 17:39 the following radiation monitoring parameters from IREM went out of limits:

K5317 RAD MONITOR 3 (Electron Counter), value = 67

L5317 RAD MONITOR 3 (Electron Counter), value = 67,

and at 17:40Z JEM-X2 performed an autonomous transition to Safe mode (issuing OEM 231 JEM-X2 AUTO EVENT 1).

This was a few minutes before the ED LESAFE01 was scheduled in the Timeline, at 17:43:33, to put JEM-X2 in Safe mode before radiation belt entry.

2004-01-29 (DOY 029, Rev 157-158)

After radiation belt exit of revolution 158, the following command verification conditions failed, resulting in the failure of the JEM-X2 activation ED LEACT_02 scheduled in the automatic Timeline:

- At 04:21 the command L0002 HV ON failed Command Execution Verification (CEV). This did not cause a failure of subsequent commands in the ED LEACT_02 as this command was not interlocked.
- At 04:26 the TC LU0003A (SET dV NOM-3LSB) failed Pre-Transmission Validation (PTV) and was not released from the Autostack.

JEM-X2 commanding by the automatic Timeline was immediately disabled.

The cause of the PTV failure was not immediately evident and JEM-X2 was commanded to Safe mode at 05:30.

The PTV condition for TC LU0003A had been satisfied during the CEV for the previous TC (LU0004 SET Vc NOMINAL), and upon investigation it was found that this PTV failure was due to TM parameters' engineering values sometimes being erroneously flagged by the IMCS as invalid.

The recovery of JEM-X2 was started at 09:36 by first executing procedure FCP_JEM2_0041 to put JEM-X2 in SETUP mode, followed by procedure LEACT_02 to switch on the HV and configure JEM-X2 for science operations. The TCs of the sequence LEACT_02 were uplinked manually instead of sending the sequence in automatic mode. This allowed time for the execution verification of each TC to be done manually by checking the telemetry and for PTVs to be overridden and the interlock to be reset where required. The only exceptions to this were steps 2.1 and 2.2 of the procedure LEACT_02, i.e. TCs L0001 HV READY and L0002 HV ON, which were uplinked in automatic mode to maintain their required relative timing.

The recovery was completed at 10:24, when JEM-X2 was put in Data Taking mode with the observation parameters as planned in the Timeline for this observation.

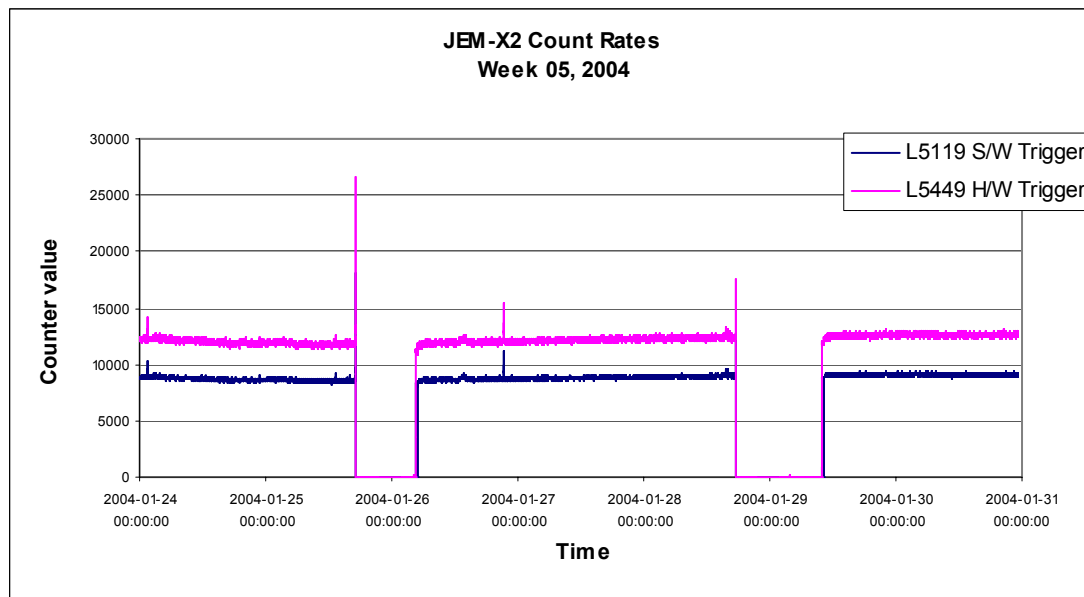
2004-01-30 (DOY 030, Rev 158)

Nothing to report

8.3.4.1 JEM-X2 Count Rates

JEM-X2 count rates over the reporting period are displayed in the following graph¹.

¹ Data sampled to smooth spikes in S/W Trigger due to flushing of buffer during slews.



8.3.5 OMC Operations

On DoY 024 between 01:13, and 02:37, ground stations problems caused the loss of pointings 01560033 and 01560034, pointing 01560035 was recovered, and executed nominally.

On DoY 024 due to the TM link dropping, pointing 01560040 was lost, pointing 01560041 was recovered, and executed nominally.

On DoY 026 from 09:18 to 09:26, due to the accidental shutting down of INCTRS-B, there was no TLM, this impacted pointing 01560011, which lost data telemetred in this interval.

On DoY 028 at 07:48, a false event in the star tracker caused the loss of a guide star. This caused the loss of pointings 01570081 and 01570082.

On DoY 029 at 08:49, commanding problems caused pointing 01580008 to be lost

Rejected Commands:

On DoY 024 at 01:57:33, 2 commands were rejected.

```
2004.024.01.57.33.599 2004.024.01.57.25.609 1792 Real Time
Rejection 131 REJECTED TC1
FIX2=0 M5010=6,NORMAL M9079=3 M9080=131 M5001=60,IM A M9068=1
FIX2=0 M9069=813
2004.024.01.57.33.474 2004.024.01.57.20.859 1792 Real Time
Rejection 131 REJECTED TC1
FIX2=0 M5010=6,NORMAL M9079=3 M9080=131 M5001=130,RESET IM
M9068=1 FIX2=0 M9069=812
```

On DoY 029 at 08:52:37, 2 commands were rejected.

```

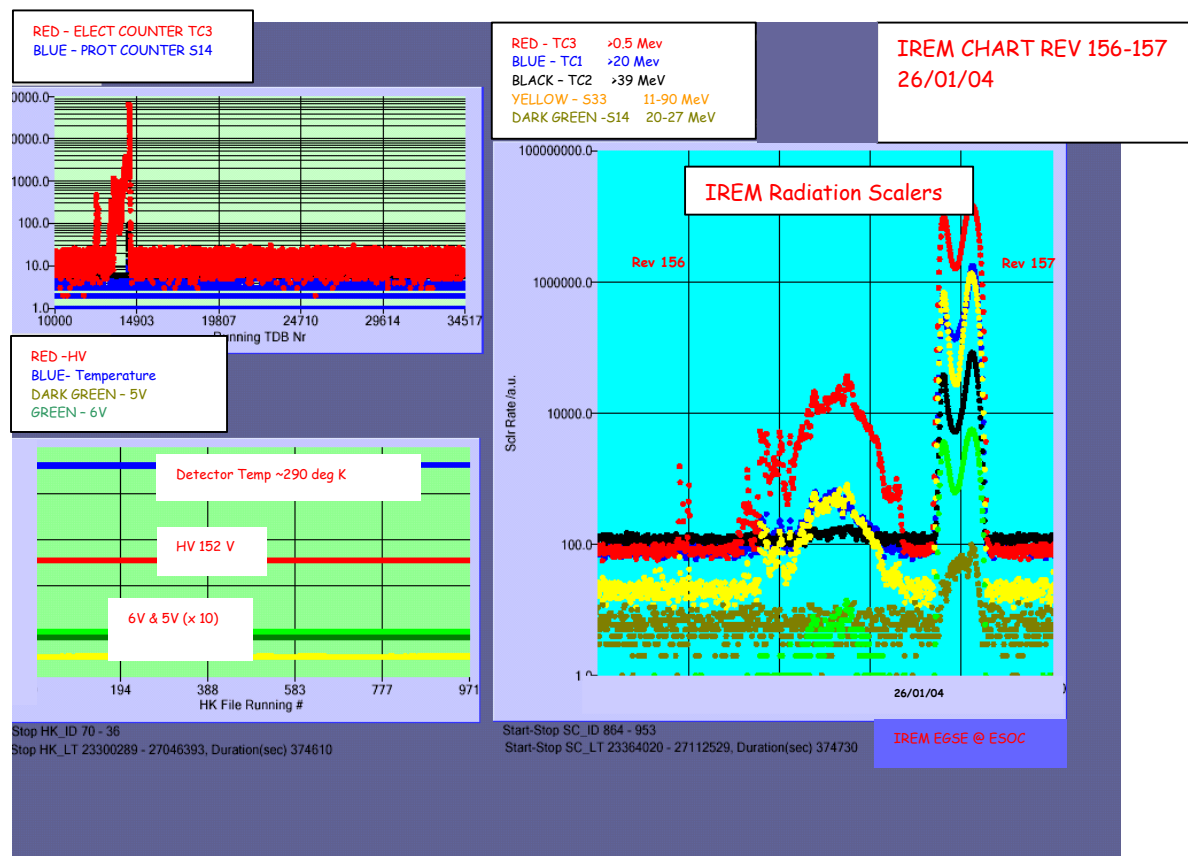
2004.029.08.52.37.189  2004.029.08.52.31.351      1792      Real   Time
Rejection 131          REJECTED TC1
      FIX2=0 M5010=6,NORMAL M9079=3 M9080=131 M5001=60,IM A M9068=1
FIX2=0 M9069=318
2004.029.08.52.37.099  2004.029.08.52.25.101      1792      Real   Time
Rejection 131          REJECTED TC1
      FIX2=0 M5010=6,NORMAL M9079=3 M9080=131 M5001=130,RESET IM
M9068=1 FIX2=0 M9069=317
  
```

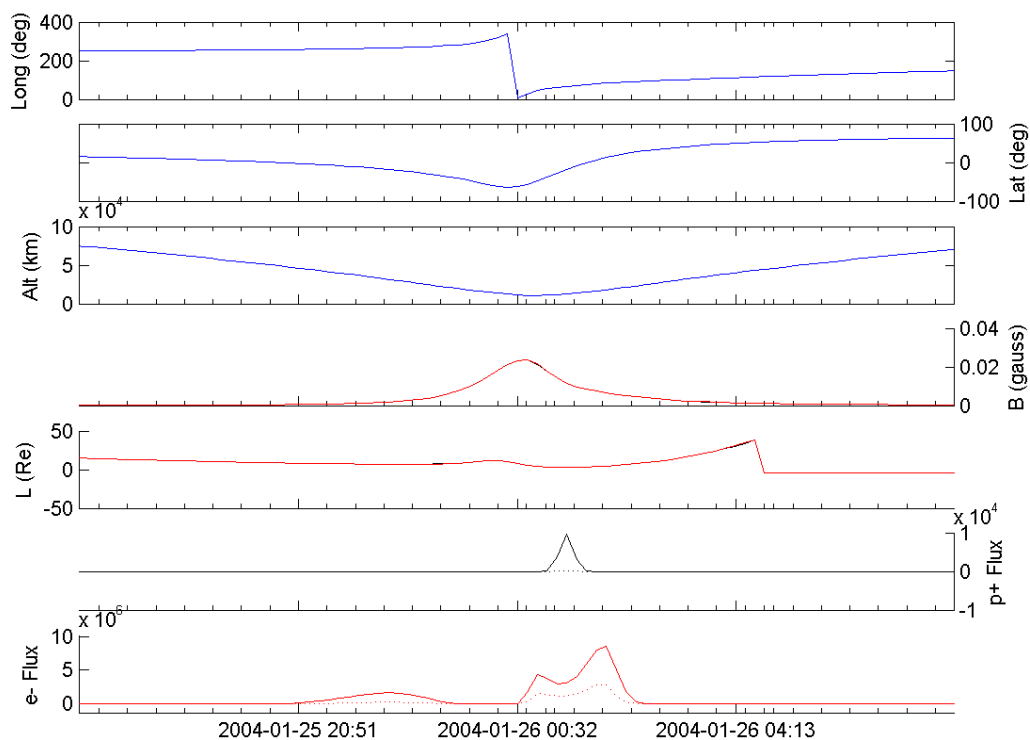
These correspond to the M1130 (Reset IM), and MU1310 (Imaging A) commands from the lost pointings of 01560034 and 01580008 respectively.

On DoY 025, at 19:13:48, and again on DoY 28, at 19:05:09, OMC was switched by the Timeline to SAFE mode, at the nominal time.

8.3.6 IREM Operations

Plots of the evolution of the IREM counters from revs 156-->158 and the predicted Belts passages (as calculated with AP8Max and AE8Max models by using the RADMON tool), are shown below:





X: 0 Y: 0 get Data Zoom Print...

