
EUROPEAN SPACE AGENCY
DIRECTORATE OF TECHNICAL & OPERATIONAL SUPPORT
MISSION OPERATIONS DEPARTMENT

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-TOS-OF
No. 065
Week 51
22.12.03
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 13.12.03 until 19.12.03 (both dates inclusive) and covers the revolutions 143 & 144.

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 Cassiopeia A (RA 23:51:43.00; DEC +62:03:55.0) and the OMC Flat Field target (RA 23:48:0.00; DEC +14:30:00.0). The activities consisted of raster dithering and staring observations. In addition, OMC Flat Field and Dark Current Calibrations were performed.

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.

The eclipse passages were nominal from an AOCS point of view, except for a loss of Guide Star due to False Events, which occurred at a time when ACC was in Eclipse.

There was another loss of Guide Star due to False Events during a perigee passage. In the second cycle after the loss, ACC generated an "IMU Yaw Threshold Exceeded" OEM. The reason for this OEM is still being investigated. There is no telemetry available from this time, except the stored OEMs.

A few slews were missed during this period. One of them was caused by a late AD verification of a telecommand. The other losses were caused by an operator error, which caused failure of start of the Sun Steering Law.

The fuel consumption over the period between 12/12/2003 and 19/12/2003 was 0.0759 kg. The remaining propellant is in the order of 173.512 Kg on the 19th of December.

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**.

15/12/2003 (DOY 349)

Eclipse passage:

Eclipse #2 of eclipse season #3.

Total Eclipse Duration: 37m 31s

Umbra Duration: 36m 02s

ECD measured DOD Battery 1 13.5% (3.25Ah)

ECD measured DOD Battery 2 13.4% (3.22Ah)

(Note DOD calculation assumes nominal battery capacity rating of 24Ah)

Recharge time battery 1 1h 56m

Recharge time battery 2 1h 55m

Both the eclipse passage and recharge executed nominally, a small increase in the battery internal temperatures towards the end of the recharge period indicates that both batteries were fully recharged.

15/12/2003 (DOY 349)

Update of MRU EOC timer.

The MRU EOC Timer threshold was updated to a raw value of 27 (corresponds to 128m 15s)

This value is suitable for eclipses #3 to #8

18/12/2003 (DOY 352)

Eclipse passage:

Eclipse #3 of eclipse season #3.

Total Eclipse Duration: 45m 38s

Umbra Duration: 44m 19s

ECD measured DOD Battery 1 17% (4.07Ah)

ECD measured DOD Battery 2 16.8% (4.03Ah)

(Note DOD calculation assumes nominal battery capacity rating of 24Ah)

Recharge time battery 1 2h 26m

Recharge time battery 2 2h 24m

Both the eclipse passage and recharge executed nominally, a small increase in the battery internal temperatures towards the end of the recharge period indicates that both batteries were fully recharged.

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

15/12/2003 (DOY 349)

Adjustment of CLCW ratio in VC-0 TM Frames.

During the previous weeks it was noted that commanding of several slews had been interrupted by TC verification timeout at CLCW level whilst using DSS-16 (See section 6 & 8.3.1 for details of an occurrence). Investigation showed that this was caused by a combination of variable delays in receiving TM frames from the Station and the irregular distribution of CLCWs in VC-0 TM.

To overcome this problem it was decided to adjust the ratio of CLCWs in VC-0 TM so that it was heavily in favour of VC-0 telecommand verification. The procedure to do this is basically to switch back and forth between low and high bit rate until a satisfactory CLCW ratio is achieved. The required proportion of VC-0 CLCWs is about 0.7. From the test with the FM, in 20 switchings this ratio was achieved 5 times. To maximise the available time window (SAT_ENG) the ISGRI CTX Table load was executed early, in parallel with the Reaction wheel Biasing operation at the start of the revolution.

On the 4th switching cycle a ratio of about 0.8 VC-0 CLCWs was achieved. Following the load of a Science PST, the maximum time between VC-0 CLCWs was 4 seconds (previously 8 seconds), the proportion of VC-0 CLCWs was 0.75.

The operation appears to have been successful, up to the time of writing (6/1/2004) no slews have been interrupted due to CLCW timeout.

Note that in this configuration VC-7 commanding channel cannot be used for nominal operations via Goldstone. If TC operations are to be moved to VC-7, the operations must be repeated to produce a CLCW ratio heavily in favour of VC-7 TCs.

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.

The investigation of the anomaly of GeD#2 is on-going by SPI Team: a few attempts to recover the detector #2 were performed during the observation period plus an evaluation of the camera performances after the detector anomaly. The TM bandwidth assigned to SPI was 98 pkts/cycle.

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

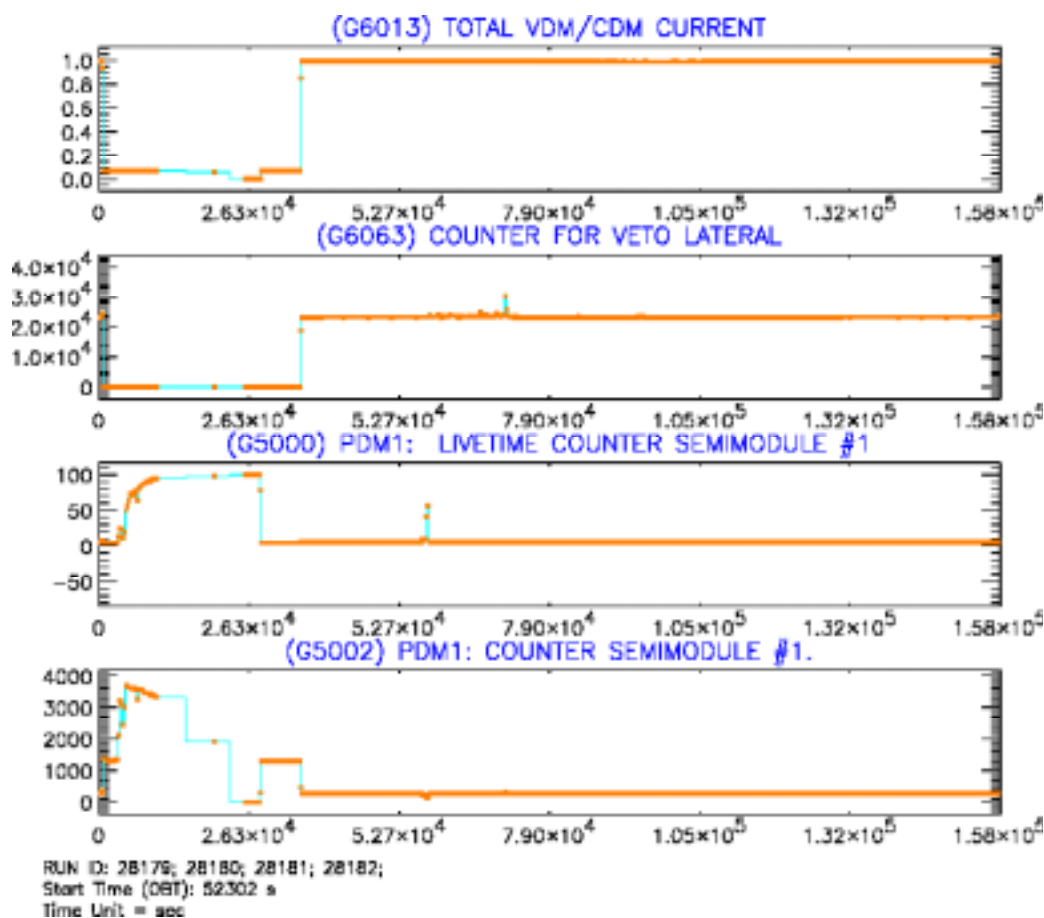
3.2.2 IBIS

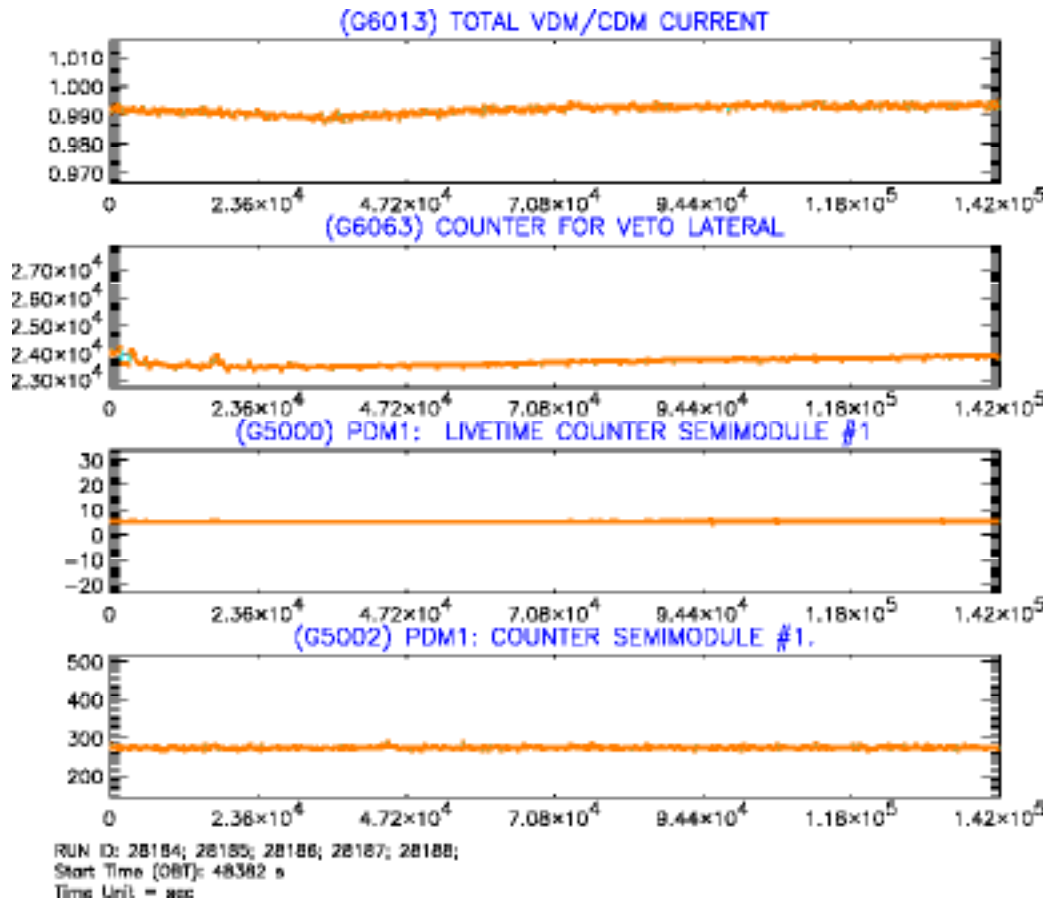
The status of the unit is Nominal.

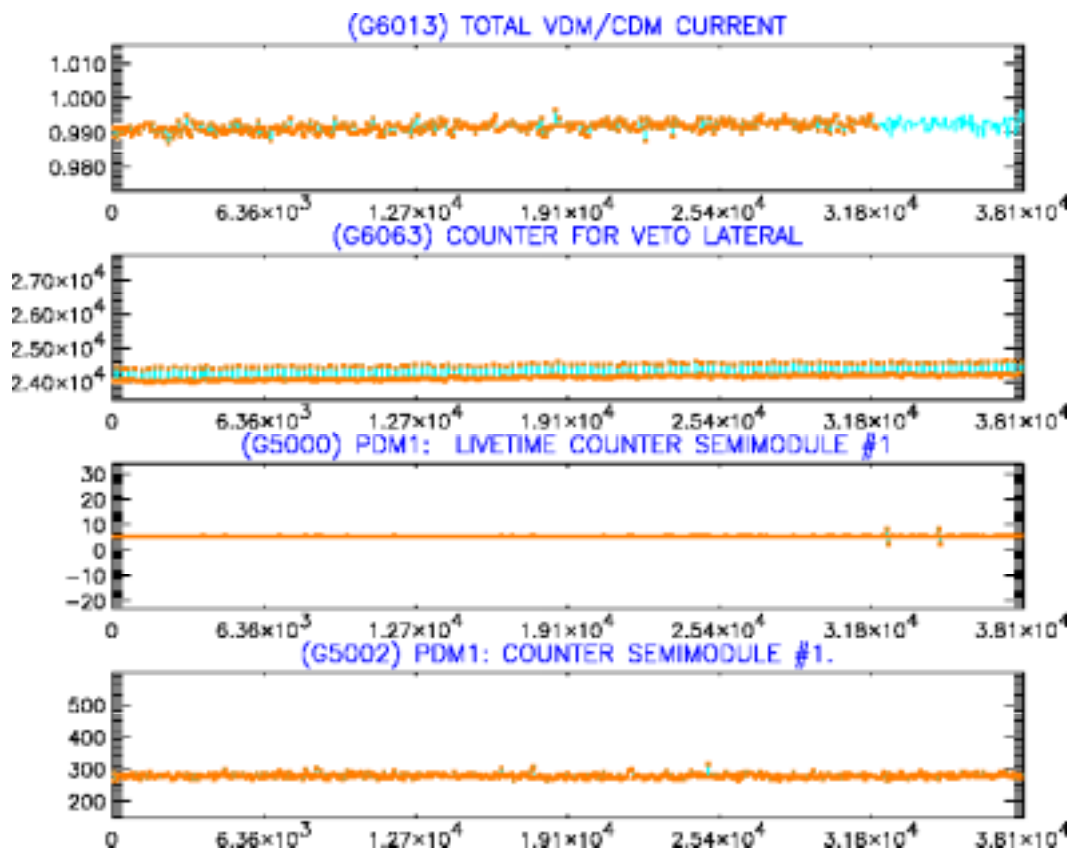
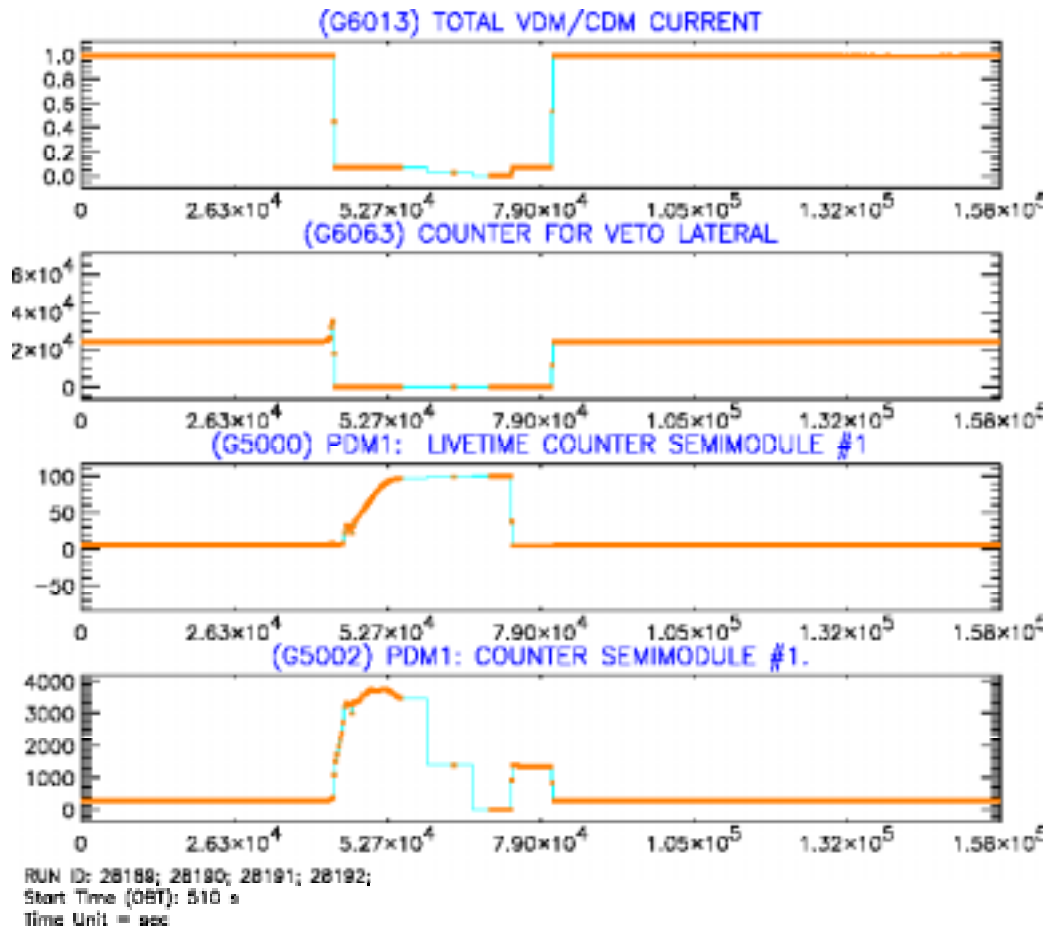
The TM bandwidth assigned to IBIS was 134 pkts/8sec. No occurrence of anomalous OEM generation (ID 183-184-179-180, Class 2) was reported after the VETO S/W patch. During revolution 142 and 143 the automatic transition to Stand-By and HVs switch OFF due to the high radiation background ~30 minutes prior the BCP Radiation Belts entry were reported

Plots of VETO VDM/CM current plus the VETO lateral counter during the observation period are 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.

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.

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 222 OMC pointings executed, with 4 missed.

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

3.2.5 IREM

The status of the unit is Nominal.

The observation period was characterized by low solar activity. The modification of the Radiation Belts Entry altitude determined in rev 142 and 143 the anticipated switch OFF, due to the on-board automatism, of OMC and IBIS units.

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 were caused by anomalies related to the ground stations and Mission Control System.

4.1 Mission Operations Centre

The performance of the MOC was generally good in the reporting period. However, there were a number of problems with disc and swap space this week, see section 6 for details.

4.2 Ground Stations & Network

As mentioned above there were several problems related to the ground stations. A number of incidences of RFI/ TM drops / bad frames / Reed-Solomon errors occurred.

Apart from this 3 problems had an impact on the executing timeline, these are detailed in section 6:

4.3 Science Ground Segment

4.3.1 ISOC

1. Mission planning

Short term PSF: Received up to rev. 153

Long term PSF: up to rev. 164 (no change)

POS and POD generated: up to rev 153

TSF: Up to rev 152.

REV.s 144 to 148 were re-planned to accommodate the Project Scientist request to re-point a target. Rev 150 was re-planned due to resubmitted PSF.

2. Observation status

No change

3. ISOC science archive

No archive data received from ISDC. Since processing of rev 81 is now done ISOC expects shortly a new partition of science archive data.

4. ISOC system

ISOC system version 10.1 in operational use. No change. System has been used without problems.

5. Problems

none

6. AO 2 preparation

AO 2 is operational since the start of rev 144, i.e. 18 December. ISOC proposal data base has been cleaned up. AO 1 observations not valid for AO 2 has been set to completed. AO 2 list of proposals and targets put on the ISOC web page.

4.3.2 ISDC

On 22/12/2003, the status of ISDC observation processing is:

- Latest Standard Analysis completed: observation 01202030001 (IC443, Revolution 123-125) on 19/12/2003
- Latest products archived: observation 01297000015 (SgrA*, Revolution 113-115) on 08/12/2003
- Latest observation products sent to the observer: observation 01297000015 (SgrA*, Revolution 113-115) on 10/12/2003

5 Special Events

6 Anomalies

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

- On DoY 347 at 07:22, the TPF for slew 01420042 failed to transfer, the IFTS was restarted in time, and the slew was not affected.
- On DoY 348, at 18:17, an AOCS command failed uplink due to a late AD confirmation from DSS-16, of the previous command. The impact was slew 01420093 was missed and 01420094 was manually recovered executing at approximately the nominal time.
- On DoY 348, at 21:51, the IMCA was showing yellow, with a high CPU usage of around 42%.
- At 22:05, the IDDA showed yellow, indicating low disc space on the consolidator.
- On DoY 349, at 04:23, the Out-of-Limit display crashed, probably due to the large number of status consistency checks during the eclipse.
- At 08:10 there was a 1 second drop in TM & TC from Redu.
- On DoY 350 at 04:36, the TC & TM dropped out due to a 'hit on the line', at 04:40 the links were back using the ISDN line, the BCPKT and STR mapping commands were resent in time to prevent any data or pointing loss.
- At 07:30, the IDDA was red, due to lack of CD production, this was recovered at 08:20, by clearing the disc of temporary files, and restarting the system.
- Between 23:45 and 00:40 the following day, there were a few packets lost from DSS-16 due to RFI. The corresponding DR number is G103844.
- On DoY 351, at 06:02, the IDDA went yellow, due to low swap space, no impact.
- On DoY 352 at 05:21, all time-tag command failed release, the problem was resolved at 14:27, when the OBQM tasks was stopped and restarted, and at 17:37, all the failed commands were resent, there was no impact.
- Later, at 07:03, TC A3084 (start sun steer) fails uplink. The AOCS was then disabled from the automatic stack. At 08:20, the attitude was manually recovered to the end of slew 01440004. The impact was, that this pointing was lost.
- At 13:11, there was a MADDS-B/AUX error, which stopped CD production, a clean-up of the temporary files was performed and the system was successfully restarted.
- On DoY 353, at 18:20, there was a brief drop in VC0 TLM from Redu, no impact, and at 19:14, there was a drop in the TM bad frame link from DSS-16, also, without impact.

There were no new anomalies entered into the ARTS system this week.

7 Future Milestones

- Eclipse season started on 12/12/2003, there will be a total of 9 eclipses, with a maximum duration of 55 min. on 27/12/2003.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 143

The observations in revolution 143 consisted of an amalgamated raster dithering observation of Cassiopeia A (RA 23:51:43.00; DEC +62:03:55.0) performed throughout the available observation time (~62 hours).

Throughout this observation 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.

Revolution 144

The observations in revolution 144 consisted of a raster dithering observation of Cassiopeia A (RA 23:51:43.00; DEC +62:03:55.0) lasting ~56 hours. This was followed by a 4-hour staring observation at the OMC Flat Field target (RA 23:48:00.0; DEC +14:30:00.0), during which OMC Flat Field and Dark Current Calibrations were performed.

Throughout these observations SPI, IBIS and JEM-X2 were in their nominal science modes and JEM-X1 remained in Safe mode. During the Cassiopeia A observation, OMC was in Normal Science mode and the TM allocation was 134 IBIS, 98 SPI, 1 JEM-X1, 8 JEM-X2, 5 OMC. During the OMC Flat Field observation, OMC was in FFCalibration and then DCCalibration modes and the TM allocation was 90 IBIS, 87 SPI, 1 JEM-X1, 8 JEM-X2, 60 OMC.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2003-12-03T05:32:21.000Z	173.7807	F	Automatic TM processing.
2003-12-03T08:53:42.000Z	173.7635	F	Automatic TM processing.
2003-12-03T12:45:00.000Z	173.7430	F	After thruster torque calibration
2003-12-03T14:11:42.000Z	173.7221	F	Automatic TM processing.
2003-12-04T15:43:21.000Z	173.7029	F	Automatic TM processing.
2003-12-06T05:26:29.000Z	173.6830	F	Automatic TM processing.
2003-12-07T15:55:28.000Z	173.6596	F	Automatic TM processing.
2003-12-09T05:33:40.000Z	173.6341	F	Automatic TM processing.
2003-12-10T15:44:24.000Z	173.6084	F	Automatic TM processing.
2003-12-12T05:44:04.000Z	173.5878	F	Automatic TM processing.
2003-12-12T14:31:01.000Z	173.5712	F	Automatic TM processing.
2003-12-13T15:44:47.000Z	173.5547	F	Automatic TM processing.
2003-12-15T05:40:28.000Z	173.5472	F	Automatic TM processing.
2003-12-16T15:04:48.000Z	173.5236	F	Automatic TM processing.
2003-12-18T05:37:16.000Z	173.5119	F	Automatic TM processing.

This report was generated Fri Dec 19 08:00:08 GMT 2003

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, 29 Open Loop Slews, 196 Closed Loop Slews and 5 Momentum Bias were executed. 5 slews were missed or executed manually. This is equivalent to a 2.2%.

The AOCS eclipse operations were completely nominal. The Eclipse Timers and the Time Tagged sequence to re-enable IMU Auto Switch-Off were loaded from the Timeline and the pre-eclipse IMU health checks were performed at the planned times. Some information regarding the eclipse times and IMU usage up to this stage of the eclipse season are provided below:

AOCS Eclipse Times													Winter 2003-2004	
Date	AOS	ACC Eclipse Imminent	Eclipse Start						Eclipse End					Eclipse Duration
			ACC	FDE	FCE	Penumbra	FSS Sun Out	Umbra	Umbra	FSS Sun In	Penumbra	FDE/FCE	ACC	
12/12/2003	04:32:34	03:36:07	04:18:10	04:29:09	04:29:53	04:35:47	04:37:05	04:37:29	04:59:59	05:00:15	05:02:01	05:08:13	05:11:46	0:26:14
15/12/2003	04:21:25	03:22:47	04:05:00	04:16:15	04:16:59	04:22:27	04:23:35	04:23:37	04:58:29	04:58:44	04:59:58	05:06:19	05:09:55	0:37:31
18/12/2003	04:10:48	03:11:37	03:53:43	04:03:59	04:04:43	04:11:17	04:12:14	04:12:18	04:55:35	04:55:47	04:56:55	05:02:07	05:06:42	0:45:38

IMU Usage during Eclipse Season						Winter 2003-2004	
IMU On	IMU Off	From Health Check		From Auto Calibration		On Time	Accumulated On Time
		Noise Roll [as/s]	Drift Roll [as/s]	Drift Roll [as/s]			
2003/12/11 21:23:04	2003/12/12 05:14:00	0.1884	0.2421	0.2052		7:50:56	7:50:56
2003/12/14 21:07:42	2003/12/15 05:12:07	0.2040	0.1719	0.2062		8:04:25	15:55:21
2003/12/17 21:05:17	2003/12/18 05:08:54	0.1822	0.0833	0.1584		8:03:37	23:58:58

13/12/03 (Day of Year 347, Revolution 142)

Nothing to report.

14/12/03 (Day of Year 348, Revolution 142)

Slew lost due to late TC verification: At 18:34 the command to report the current Guide Star of the Close Loop Slew sequence failed release because its Dynamic PTV was still in WAIT at the release time, pending AD verification of the previous TC. Slew 01420093 was missed. A manual Close Loop Slew was then performed to the attitude of Pointing 01420094. This attitude was reached before the planned start time of Pointing 01420094. This observation was therefore not affected.

As has been previously reported, this problem is caused by the distribution of VCO packets in the TM stream, from which the CLCW is extracted in the Goldstone

Ground Station. On 18/12/2003 a special operation will be performed to change the on-board CLCW ratio in favour of VC-0 CLCWs.

15/12/03 (Day of Year 349, Revolution 142-143)

Loss of Guide Star and generation of “IMU Yaw Threshold Exceeded” OEM during perigee passage: At 03:30:54, The Guide Star was released when the number of detected False Events on the STR exceeded the SEU Filter threshold. At LOS the magnitude 6 Guide star was located at CCD (21613, -329). This was after the ACC Eclipse Imminent Flag was set and before the start of the Automatic IMU Calibration. At 03:30:45.544 a new Mapping started, the Roll and Pitch control input were set to be taken from the FSS and the Yaw error was set to zero – no Yaw control (RGA = 11, DCA = 3). This is the normal case after loss of Guide Star until a new star is found or until the IMU is put in for Yaw control after the Gyro Delay Time is elapsed. In the next cycle, at 03:30:46:044, the ACC generated an “IMU YAW Threshold Exceed” OEM (ID 87). This OEM is generated when the difference between two successive readings from an IMU channel is larger than the maximum acceptable step for that channel, which is currently set to 0.00875 radians or 0.5 degrees for Yaw. It is not expected to have such a big jump in Yaw in one ACC cycle. Since this happened outside of the Ground Station coverage, it is not possible to further investigate the situation using telemetry. IMU-1 had been switched On at 2003-12-14T21:07:42 and selected in the ACC Configuration Word B for Roll as part of the pre-eclipse IMU health check. The IMU-1 Drift and Noise levels for Yaw calculated during the latest calibration (on 05/12/2003) were 0.1147 arc-sec/sec and 0.0479 arc-sec/sec respectively.

The STR SEU Filter threshold was exceeded six more times during the first mapping after the release of the Guide. In the second mapping a new Guide Star was picked. At AOS the Guide had CCD coordinates (190, -4021) and magnitude 8.45.

16/12/03 (Day of Year 350, Revolution 143)

Nothing to report.

17/12/03 (Day of Year 351, Revolution 143)

Update of the on-ground blemish pixel table: As part of the periodic AOCS calibrations, all the attitude determination logs (mapping data) of revolutions 139 to 142 were processed to determine possible bad (lit blemish) pixels. The determination is based on the total number of “Reduced Accuracy” readings of each pixel. A pixel that is systematically reporting “Reduced Accuracy” during mappings is likely to be a lit blemish pixel. From this analysis these candidates are identified: [110 29], [216 19], [226 202], [326 274] and [363 70]. The last pixel in the list has already been identified. The on-board ACC blemish table will not be updated. However, the Flight Dynamics System is updated with this data to prevent selection of Guide Stars on bad pixels.

Identification of dark blemish pixels requires a dump of a STR CCD window from the suspected area. Currently we have no indication of possible dark blemishes.

18/12/03 (Day of Year 352, Revolution 143-144)

Loss of Guide Star during Eclipse passage: At 04:08:51.965, the Guide Star was released when the STR SEU Filter threshold was exceeded. The ACC was in Eclipse at this time. All the controller errors were set to zero and the S/C remained without any control until 04:09:03.961 when a new Guide Star was found during the Mapping. At LOS the guide Star was at CCD (21494, -7849) with 7.4 Mi and at AOS the new Guide was at CCD (9814, 11667) with 7.45 Mi.

Slows lost because the start of Sun Steering Law failed: At 07:03:05 the command to start the Sun Steering Law failed uplink because of Static PTV No-Go condition. The Static PTV failure was because the difference between the actual Roll angle after Open Loop Slew 01440001 and the SSL assumed Roll angle was 9.895 arc minutes, which is greater than the 7 arc-minute PTV threshold. The reason for this error in Roll is as follows:

After the Reaction Wheel Bias, which started at 05:53:55, the FDS updated the parameters of Open Loop Slew 01440001. At 06:18, the Timeline was aborted, the Autostack task was restarted and the Timeline was reloaded on the Autostack. However, it was forgotten to update the next AOCS activity in the Timeline after the reload. This caused slew 01440001 to be executed with the default parameters, thus introducing an error in the actual attitude after the slew compared to the Timeline assumed attitude. This error was introduced by the Reaction Wheel Bias and probably with some contribution by the loss of Guide Star during the eclipse passage. To rejoin the Timeline, a manual Open Loop Slew was performed to the attitude of Pointing 01440004. This attitude was reached before the Planned time in the Timeline. Pointings 01440001 to 01440003 were affected.

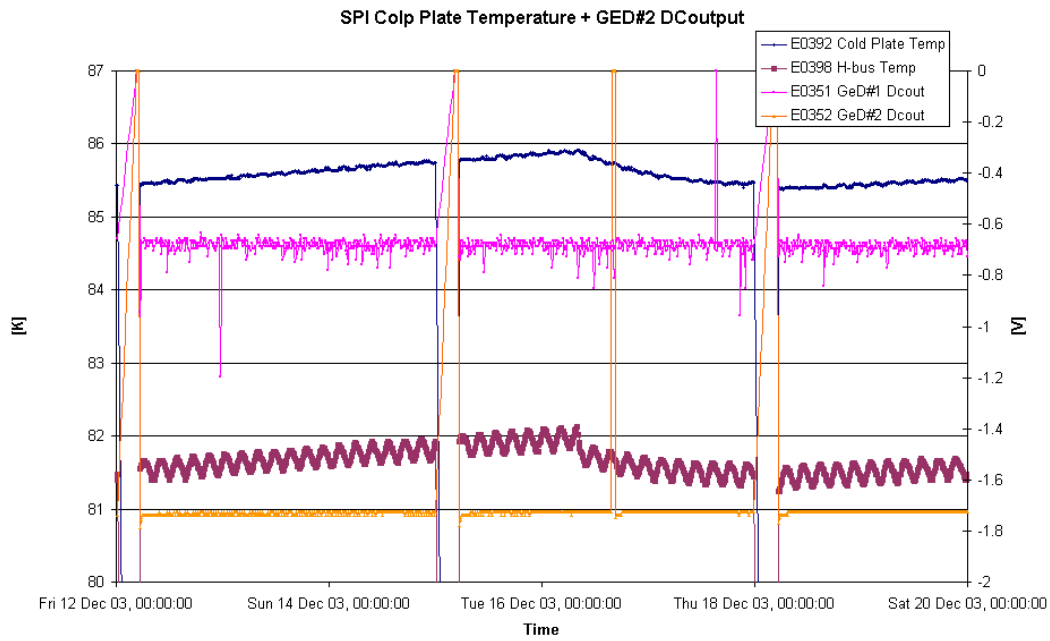
19/12/03 (Day of Year 353, Revolution 144)

Nothing to report.

8.3.2 SPI Operations

Cryo-cooler:

The observation period was characterized by the fine-tuning of the detectors camera temperature. In this phase the cryo-cooler was commanded to maintain 85 K within a band of ± 0.9 K. The plot below summarizes the information on the Cold Plate Temperatures and on the DC output voltages for GeD # 1 and #2. The estimated Cold Plate temperature drift was ~ 0.1 K/day before the setting of the strokes to 37.



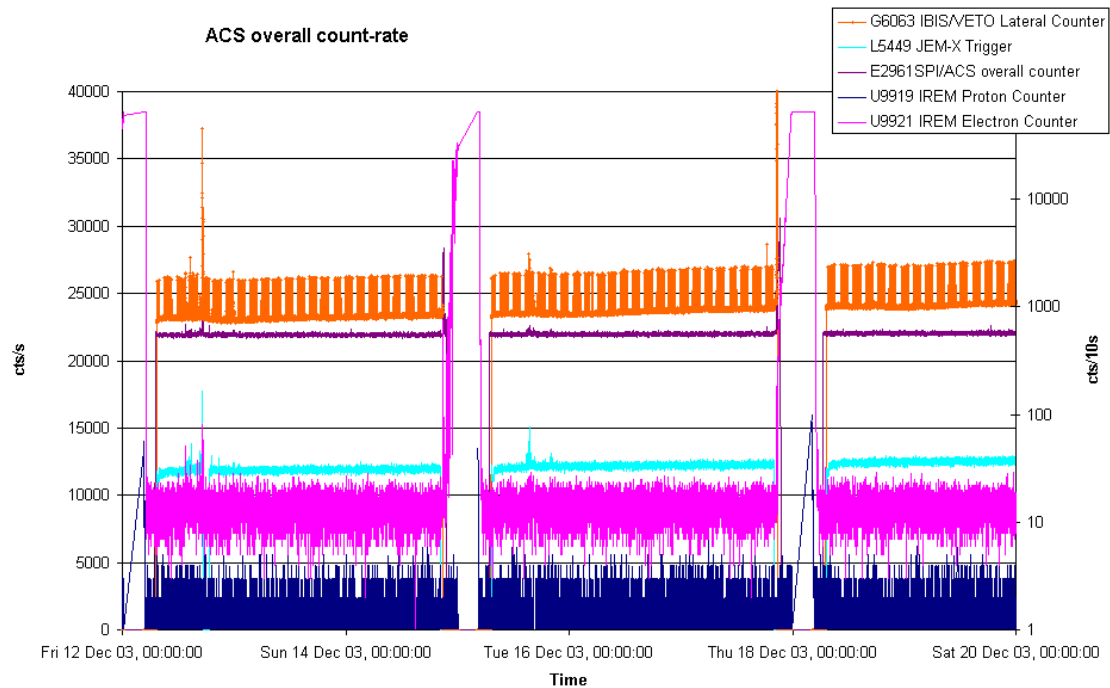
On DoY 2003.350 (16/12/03) at 08:06 the SPI compressor strokes for the CDE2 (sections C+D) were set to the value 37.

IASW/DPE:

Nothing to report.

ACS:

The following plots show the ACS overall count rate evolution during the observation period. The ACS count-rate is in qualitatively in agreement with that reported for the IBIS/VETO, JEM-X and IREM units.



AFEE:

DOY 2003.350 (16/12/03)

The investigation into the anomaly on the pre-amplifier of the SPI GeD #2 was continued. At 15:28 the SPI recovery #3 according to the OR-121 (attached) was performed: the recovery foresaw to set the high energy clamping ON when the detector HVPS & LVPS were OFF, to switch ON the detector (LVPS first and then HVPS) and to perform a transition to PHOTON with reduced HV values (1KV and 0.5 KV).

No count-rate was reported by the unit (GeD#2) during the recovery activity.

At 17:50 the SPI camera evaluation according to the OR-123 (attached) was performed, steps 10-40, setting all the detectors to 3.5 KV and leaving the #2 to 500 V.



INTEGRAL Operational Request Form.

SPI anomaly on GeD#2 recovery (3)

Date: 23/12/2003

Author: Federico Di Marco

Page 1 of 1

OR Number:

Originator.		
Name: J. P. Roque/R. Gonzales/ F. Di Marco	Date:	Signature:
Approval.		
SOM:	Date:	Signature:
Analyst:	Date:	Signature:
Read and Understood.		
Glenn Hurrell	Date:	Signature:
Rene Lemme	Date:	Signature:
Marino Zannoni	Date:	Signature:
Dominic Davison-Gair	Date:	Signature:
Atef Soliman	Date:	Signature:
Liviu Toma	Date:	Signature:
	Date:	Signature:
	Date:	Signature:

Details:

This OR describes the activities to be performed attempting a third SPI GeD#2 recovery. The Recovery is organized in two parts:

- The first part setting of the GeD#2 OFF (LVPS and HVPS) and performing the transition to PHOTON;

 10 : GOTO CONF using FCP-SPI1-0160

30 : SET HVPS OFF AND LVPS OFF for detector 2 using FCP-SPI1-1710
 load ES1710_AF-CH-00_fmconfig_XXXXX.TPF
 edit it manually and set E5172 =OFF AND E5192 =OFF

step 4.1 and 4.7 of the procedure should report 4KV for all dectectors except detector 2 which should be 0

90 : GOTO OPER (Photon/photon) using FCP-SPI1-0130

 During the first and second part the unit will perform an acquisition in the set configuration for time TBD by SPI Pis

- The second part setting the high energy clamping ON when the detector is OFF, switching ON the detector (LVPS first and then HVPS), performing a transition to PHOTON and setting the HV to reduced values (1KV and 0.5 KV).



INTEGRAL Operational Request Form.

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SPI anomaly on GeD#2: evaluation of camera performances

Date: 23/12/2003

Author: Federico Di Marco

OR Number:

Originator.		
Name: J. P. Roque/R. Gonzales/ F. Di Marco	Date:	Signature:
Approval.		
SOM:	Date:	Signature:
Analyst:	Date:	Signature:
Read and Understood.		
Glenn Hurrell	Date:	Signature:
Rene Lemme	Date:	Signature:
Marino Zannoni	Date:	Signature:
Dominic Davison-Gair	Date:	Signature:
Atef Soliman	Date:	Signature:
Liviu Toma	Date:	Signature:
	Date:	Signature:
	Date:	Signature:

Details:

The purpose of the OR is to assess the overall performances of the detector camera after the GeD#2 anomaly. This OR is in the context of the SPI 3rd attempt to recover. The OR will be executed during Rev 143 before the Radiation Belts Entry.

CAMERA PERFORMANCES FUNCTION OF HIGH VOLTAGE

10 : GOTO CONF using FCP-SPI1-0160

20 : SET HV to 3.5 KV with detector 2 at 0.5 KV V using FCP-SPI1-1713

load ES1713_AF_HVSET_3500V_xxxxx.TPF in /CMD/TPF/PI/SPI1/misc,
edit it manually and
set HV for detector 2 to 0.5 KV : E5012 = 0.5 KV

30 : REPORT DC OUTPUT VOLTAGES
EXECUTE FCP-SPI1-1813

40 : GOTO OPER (Photon/photon) using FCP-SPI1-0130
WAIT 8 HOURS

50 : GOTO CONF using FCP-SPI1-0160

60 : SET HV to 3.0 KV with detector 2 at 0.5 KV V using FCP-SPI1-1713

load ES1713_AF_HVSET_3000V_xxxxx.TPF in /CMD/TPF/PI/SPI1/misc,
edit it manually and
set HV for detector 2 to 0.5 KV : E5012 = 0.5 KV

At 00:20 the second part of OR-123 (steps 50-80) was done, setting all the detectors to 3.0 KV and leaving the #2 to 500 V.

DOY 2003.351 (17/12/03)

At 08:45 the third part of OR-123 (steps 90-120) was executed, setting all the detectors to 2.5 KV and leaving the #2 to 500 V.

At 15:13 the fourth part of OR-123 (steps 130-160) was carried out, setting all the detectors to 2.0 KV and leaving the #2 to 500 V.

At 20:41 the fifth part of OR-123 (steps 170-200) was performed, setting the camera to the Nominal configuration (HV for GeD#2 to 500 V and for all the others detectors set to 4 KV).

At 20:50 the camera performance evaluation was completed.

DFEE:

Nothing to report.

PSD:

Nothing to report.

8.3.3 IBIS Operations

DOY 2003.347 (13/12/03)

Nothing to report.

DOY 2003.348 (14/12/03)

At 20:47 the automatic transition in Safe configuration (IASW In Stand-By + HVs OFF) due to the high radiation background ~30 minutes prior the S/C broadcasted Radiation Belts entry time was reported.

DOY 2003.349 (15/12/03)

Nothing to report.

DOY 2003.350 (16/12/03)

Nothing to report.

DOY 2003.351 (17/12/03)

At 20:47 the automatic transition in Safe configuration (IASW In Stand-By + HVs OFF) due to the high radiation background ~30 minutes prior the S/C broadcasted Radiation Belts entry time was reported

DOY 2003.352 (18/12/03)

Nothing to report.

DOY 2003.353 (19/12/03)

Nothing to report.

8.3.4 JEM-X Operations

2003-12-13 to 2003-12-19, DOY 347 to 353 , Revs 142 to 144

Nothing to report

8.3.5 OMC Operations

On DoY 348, at 18:37, two commands were rejected with the following On-Event-Messages:

```
2003.348.18.37.37.349 2003.348.18.37.26.961 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=2609
2003.348.18.37.30.868 2003.348.18.37.20.461 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=2608
```

This corresponds to the time when pointing 01420093 was missed due to a failed AOCS command, leaving the OTF high. Pointing 01420094 was manually command in time for a nominal observation.

On DoY 348, at 21:41 OMC switched to SAFE mode nominally according to the timeline.

On DoY 351, at 21:30 OMC switched to SAFE mode nominally according to the timeline.

On DoY 352, at 08:28, the OMC was switched to Stand-by due to the on-going attitude recovery. At 09:11 the instrument went back into Science mode, the impact was that pointings 01440002, 01440003 & 01440004 were lost.

At 08:35 the OMC lens temperature went OOL soft low (-10.277°C). Again at 12:35 the lens was OOL, but at 12:40. it returned within the soft limits.

On DoY 353 at 19:07, the OMC lens temperature again went OOL.

8.3.6 IREM Operations

On DoY 352 at 23:42 the IREM TC U4921 (Ground Link OFF) failed the CEV due to a late update of the relevant TM parameter in the CMD verifier task. No further action was taken after positive verification of the status OFF of the Ground Link.

IREM counter evolution plots from rev 143->144 are shown below:

