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DIRECTORATE OF TECHNICAL & OPERATIONAL SUPPORT
MISSION OPERATIONS DEPARTMENT

INTEGRAL
Mission Report

INT-MOC-SYS-RP-1001-TOS-OF

No. 008
Week 46

15.11.02

Commissioning Phase

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1 General

This report comprises inputs from various teams involved in the Commissioning activities:
- Flight Control Team,
- Flight Dynamics Team (Fuel book-keeping).

This report addresses the activities from 09.11.02 until 15.11.02 (both dates inclusive). It covers the revolutions 9 and 10 and the beginning of revolution 11, which is the first revolution that considers planning inputs from the INTEGRAL Science Operations Centre.

2 Summary of Activities

The operations were performed according to the Commissioning Timeline that was produced by the Flight Control Team. The routine operations, such as slews or the activities related to the Perigee Passage have been performed from the automatic Timeline while most of the calibration activities were performed using manual commands.

The last S/C related commissioning activities were performed in this period. This included a "worst case slew", i.e. a long slew (about 163 deg) executed at low altitudes (below 40.000 Km), and the measurement of the RF characteristics considering the off-pointing of the ground antenna.

The main objective of this period concerned the commissioning of the various instruments:
- JEM-X: The performance of JEM-X was verified by pointing at complex field targets (LMC-X 1 & 3). The anomaly that was identified during revolution 7 was considered and the instruments were operated at low voltages.
- IBIS: The parameter optimization of IBIS was finalized.
- SPI: The threshold adjustment including the calibration of the Pulse Shape Discriminator (PSD) was performed.
- OMC: Some acquisitions were performed at various attitudes.

The following table provides an overview of the main operations. Some more details are provided in the Appendix, see section 8.2.

Date	Revolution	Activity
09.11	9	Worst Case Slew, i.e. long slew at low altitudes
09.11	9	JEM-X activation in Data Taking Mode with low voltage
09.11 – 11.11	9	IBIS commissioning, parameter optimization SPI commissioning, parameter and threshold calibration
12.11	10	Slew to LMC-X 1 & 3 attitudes
12.11 – 14.11	10	JEM-X activation and verification at low voltage on complex field targets (LMC-X) IBIS parameter optimization
12.11 – 13.11	10	SPI threshold adjustments
13.11	10	RF measurements incl. ground antenna off-pointing
14.11	10	Slew to empty field attitude
14.11	10	SPI PSD calibration
15.11	11	First planning input from ISOC
15.11	11	OMC Flat Field calibration Instruments in Normal Science Mode

The operations that are listed in the above table have been successfully performed according to the operational Timelines and flight procedures that were prepared by the Flight Control Team. In addition several change requests that were generated by the Payload Support Teams have been incorporated.

A significant step was the start of revolution 11 because the Operational Timeline includes for the first time planning inputs that were generated by ISOC. The revolution 11 to 13 will be a transition phase because from revolution 14 onwards the operations are to be derived mostly from the planning inputs as foreseen for the Routine Mission Phase.

While executing the Timeline for revolution 11 the Timeline for revolution 12 was prepared. During the process, it was identified that the attitude defined in the planning input for revolution 12 was not conflict free. ISOC has been informed and the replanning process has been performed, resulting in new Timelines for the revolutions 11 and 12.

3 Satellite Status

3.1 Platform

All functions of the platform are nominal. So far redundant units have not been switched on if they are not required for the operations. The performance of the various subsystem is as expected.

3.1.1 AOCS

The performance of the AOCS subsystem is good. All functions of the AOCS have been verified and the performance of the AOCS, e.g. the accuracy of slews, has been assessed. A "*worst case*" slew, i.e. a long open loop slew at low altitudes, has been performed to verify the slew accuracy in such a case. The final error of the long yaw slew of 162.7º was 1.4º, which corresponds to 0.86 % of the slew length.

The problem with the temperature in the fuel lines has been fixed. A special on-board monitoring function has been implemented.

The Guide Star has been lost during the Perigee Passage before revolution 9. The Guide Star was already lost at previous Perigee Passages and since such a loss impacts the operations this behaviour should be further analysed.

The phenomena of the star oscillation that was reported previously has been analysed by ALENIA. The change of position due to the activation of the heater loop that was observed on doy 294 was about 3 CCD units in y- and 5 CCD units in z- direction. In addition an oscillation of about 10 – 20 CCD units has been observed, which can happen if the barycenter of the tracked star falls between two pixels. The behaviour is explainable and is currently not considered as a problem. However, a further analysis to check the impact on the relative pointing error might be required.

The remaining fuel (incl. the pressurant of 4.24 Kg) was on 13 Nov, 185.35 Kg. The fuel consumption since 03.11 was 0.12 Kg.

Note: A detailed report concerning the AOCS operations and the fuel budget is provided in the Appendix, see sections 8.1 and 8.3.1.

3.1.2 Power

The power subsystem is working properly. The power consumption of the various units is as expected and the power margin is adequate. No degradation of the available power has been identified so that the available power from the solar arrays is still in the order of 2380 W.

3.1.3 Thermal

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

The RCS Heater configuration was changed, and a new On Board Monitoring (OBM) table was loaded.

The Propellant Heater B is now permanently OFF and Propellant Heater A only is enabled. The RCS subsystem is protected against under-temperature / Propellant Heater A failure by 14 new OBM entries and a new Recovery Action Command Packet (RACP) command. The 14 OBM entries check 14 Reaction Control System (RCS) Thermistors temperatures against a low temperature threshold, if any one of these entries falls below the check threshold the RACP is issued to switch on Propellant heater B.
To accommodate these 14 new entries the OBM tables for eclipse and Sunlight seasons must be updated - the Flight Operations Plan (FOP) and the Operational Database (ODB) will be updated once any necessary tuning of limits etc. has been completed.

3.1.4 OBDH

The functions of the On-board data handling subsystem is as expected. All Data Processing units have been switched on and the on-board communications flow is working properly.

3.1.5 RF

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.

Special RF measurement tests have been performed with the Villafranca station in revolution 10. One of the tests included an off-pointing of the antenna to identify when the signal is lost. The results are satisfying.

3.2 Payload

3.2.1 SPI

The SPI operations are progressing as foreseen in the Commissioning Timeline.

The temperature of the detector cold plate seems to stabilise at around 90 K.

A few special characteristics have been identified during the first few weeks in orbit, which have some implication on the foreseen operations.
Due to the high background the instrument requires a higher TM bandwidth than expected to perform the foreseen tests (about 90 TM packets). Specific tests will be introduced during the Performance Verification (PV) phase, in the revolutions 12 and 13, to identify the optimal TM occupation.
The detector 12 works at a lower voltage (2.5 KV instead of 4 KV) as the detector provides a better performance at this level.

A few anomalies of the S/W have been identified and are currently under investigation, e.g. a few TM packets are missed every cycle, On Event Messages are repeated at high rate.

3.2.2 IBIS

The parameter optimisation has been formally completed as foreseen in the Commissioning Timeline. However, some additional activities that have been requested by the IBIS PI to fine tune the instrument are still ongoing.

The interface to the ISDC for the regular upgrade of the ISGRI context tables has been successfully verified. This mechanism will be applied in the upcoming revolutions.

The PDMs are currently switched off at Perigee Belt entry on request of the IBIS Team. This is different to the Routine Science Phase when it is foreseen to keep the units on during the Perigee Passage. This has the consequence that the temperature drops by about 10ºC during the Perigee Passage.
Some pixels become noisy for a short period after the Perigee Passage and then recover. It is currently under investigation whether this is due to the thermal stress during the Perigee Passage.

The analysis of the scientific data has indicated that the cosmic rays interact with the atoms of the scintillators of the PICSIT detector plane. Though this causes some peculiar traces it is a clear indication of the good health status of the IBIS detectors & electronics because it demonstrates the imaging capability of the instrument.

Note: Some further information is provided in the Appendix, see section 8.3.2.

3.2.3 JEM-X

After the identification of the problems with the anodes the JEM-X 1 has been operated at lower voltages (80 V below nominal). This reduced the gain by a factor of 2.6. Apart from this the instrument is performing well.

The exposures were impacted by an increase of the solar activity on 09 Nov after about 8 hours of data taking and the JEM-X 1 was commanded to Safe Mode.

For safety reasons the instruments are currently put in Safe Mode 90 minutes before the altitude of 60.000 Km is reached.

Note: Some further details concerning the JEM-X operations are provided in the appendix, see section 8.3.3.

3.2.4 OMC

The OMC is operating nominally. One OMC image acquisition has been performed each day with a minimum duration of 45 minutes. Outside these periods OMC was in Stand-by mode.

3.2.5 IREM

The INTEGRAL Radiation Monitor (IREM) is working nominally.

The previous settings of the Belt entry at 60.000 Km and of the Belt exit at 40.000 Km have been maintained. These are the critical altitudes that are used for the relevant times in the Broadcast Packet.

Due to a synchronisation problem between the Science files and the Housekeeping (HK) data it was necessary to reset the unit by a transition of the modes: INTEGRAL → Standard → INTEGRAL. This operation was executed within 30 minutes, i.e. with minimum impact on the instruments.

Due to the size of the IREM buffer it was necessary to modify the setting for the download of HK data to 240 seconds. This is relevant for the ground station outage period around the Perigee.

4 Ground Facilities

4.1 Mission Operations Centre

The performance of the MOC was good.

The processing of the received data and the distribution to the PI workstations located at MOC and to the ISDC is functioning. There were a few minor problems, which however did not impact the execution of the operations.

The processing of the attitude and orbit data by the Flight Dynamics System (FDS) was OK. However, there were some problems in the transfer of the command inputs in form of Task Parameter Files (TPF) to the Mission Control System (IMCS), which impacted the execution of the Timeline.

The operations are performed partially using manual commanding and partially using the automated Timeline, which is occasionally stopped by a known S/W bug (see section 5).

The Timelines and procedures that were produced by the MOC are good. The operations could be performed following the timelines and procedures. Change requests issued by the Project Support Teams have been implemented to take into account the actual status of the satellite.

4.2 Ground Stations & Network

The performance of the operational network was good. There was no problem that impacted the operations.

The performance of the ground stations was in general good. The situation at Goldstone has significantly improved. However, there were still a few station passes at Redu and Goldstone, during which problems occurred that impacted the operations, see section 5.

4.3 Science Ground Segment

4.3.1 ISOC

No input was provided by ISOC.

The planning inputs for the upcoming revolutions have been provided as foreseen for the actual Routine Mission Phase. The relevant operational Timelines could be created and the Timeline for revolution 11 is currently being executed.

While processing the planning input for revolution 12 the MOC identified that there is a problem with the attitude at the beginning of revolution 12. ISOC has been informed about the conflict (violation of the Earth limb constraint) and provided new planning inputs for revolution 11 and 12, which have been implemented by the MOC.

4.3.2 ISDC

No input was provided by ISDC.

5 Special Events

The next Eclipse season will start on 30 December.

The satellite has undergone a flare, which was registered by the instrument. However, none of the functions of the satellite was impacted.

6 Anomalies

A list of the anomalies that were identified so far and are still pending is presented in the Appendix. The main anomalies that had an influence on the operations were as follows:

The main problems concerning the stations, which impacted the execution of the operations, were:

- One pass over Redu was impacted due to a missing input of pointing predictions. This impacted the proper pointing of the antenna at the beginning of the pass and the operations had to be delayed. This problem has been cured.
- The problem with the Telecommand Encoder reoccurred. Some equipment has been exchanged and the problem did not happen again.
- One of the Goldstone passes was impacted by strong winds.
- During two passes over Goldstone some TM data were repetitively sent, i.e. packets were duplicated. While this problem did not impact the operations the first time it impacted the attitude reconstruction by the Flight Dynamics System at the second occurrence. The reason of the duplication has been identified and the problem has been cured.

The automatic Timeline was stopped a few times due to a known S/W bug of the INTEGRAL Mission Control System (IMCS). The missed operations have been executed using manual commands and the operations were resumed within minutes. This failure is to be removed soon in order to allow a flawless execution of the operations. The investigation is ongoing.

The automatic Timeline was also impacted a few times by missing command inputs (TPFs) to be provided by the Flight Dynamics System to the IMCS. There were several reasons for the failed transfer. They have been understood and an investigation is ongoing to make this mechanism more robust.

During the reporting no significant new problems have been identified concerning the space segment. The main issues that require some attention are:

- The degradation of the JEM-X that was identified in week 45 is still under investigation. The two JEM-x instruments are currently operated at a lower voltage. This measure had a positive effect on the health of the instruments.

- The loss of the Guide Star around Perigee can delay the planned activities post Perigee, i.e. delay the execution of the Timeline.

7 Future Milestones

The Performance Verification Phase has been started for IBIS, JEM-X and OMC with revolution 11. The special commissioning activities related to SPI that require manual commanding will be finished in revolution 13.

The first execution of a dither pattern is planned for 16 November.

The satellite will be configured for the Leonides Passage on 19 November. Hence, the operations will be interrupted for about 12 hours during revolution 12.

8 Appendix

The appendix includes various detailed information.

8.1 Detailed Fuel Book-keeping

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2002-11-03T01:05:02Z     185.4658      F     Automatic TM processing.
2002-11-03T09:33:59Z     185.4360      F     Automatic TM processing.
2002-11-03T19:37:12Z     185.4010      F     Automatic TM processing.
2002-11-04T20:19:38Z     185.4002      F     Automatic TM processing.
2002-11-06T09:38:22Z     185.3939      F     Automatic TM processing.
2002-11-06T11:54:14Z     185.3800      F     AMD + 0008_22_M.RWB
2002-11-09T09:37:41Z     185.3604      F     Automatic TM processing.
2002-11-09T11:47:41Z     185.3582      F     Automatic TM processing.
2002-11-09T14:09:26Z     185.3562      F     Automatic TM processing.
2002-11-10T19:52:48Z     185.3493      F     Automatic TM processing.

This report was generated at  Wed Nov 13 08:00:06 GMT 2002


Note: fuel-book initial value included 4.24kg pressurant
      which will not be exhausted  -  thus when the fuel
      book reaches a value of 4.24kg this represents the
      ZERO PROPELLANT value.
```

8.2 Commissioning Timeline: Weekly Summary

End of rev.8 (2002-11-08 00:00:00 to 2002-11-09 07:41:07)

Attitude is Empty Field 1 Attitude
IBIS VETO-PICSIT Delay Anticoincidence Optimisation (IBIS-050)
IBIS VETO-ISGRI Delay Anticoincidence Optimisation (IBIS-051)
IBIS PICSIT-ISGRI Synchronisation - Compton Optimisation (IBIS-055)
Slew to perigee passage attitude

In addition:

- Specific OMC imaging ops at Empty field attitude
- JEMX1&2 were in Safe mode
- Update of IREM thresholds for IBIS (PI-OPS-118)

Rev.9 (2002-11-09 07:41:07 to 2002-11-12 07:28:12)

Worst case slew error test
Slew to attitude for worst case slew error test
Slew back to Empty Field 1
Activation of JEMX1detector at a reduced gain (PI-OPS-114)
SPI Camera performances for various High voltages at 90 K (SPI-230)

IBIS VETO Thresholds Optimisation (IBIS-060)
IBIS VETO Zoning Optimisation (IBIS-065)
Specific SPI Change Requests (PI-OPS-130/131/132) replacing the pre-planned activity SPI-240 : Investigation on the PSD dead time origin
PSD thresholds and AFEE energy thresholds calibration (SPI-250)

In addition:

- 1st tuning of the ISGRI calibration sequence (PI-OPS-119/129)
- Repetition of a part of IBIS PICSIT-ISGRI Synchronisation - Compton Optimisation (IBIS-055)
- IBIS ISGRI Noisy pixel parameter optimisation (PI-OPS-128)
- Repetition of SPI calibration SPI-080: Influence of the dead time of the saturating extension
- The SPI Crycooler stroke has been adjusted to 5.15mm for all the compressors
- Investigation on IBIS CDM01 (PI-OPS-137)
- SPI PSD with new ACS timing check (PI-OPS-134)
- JEMX1&2 commanded to Safe mode for increased Solar activity

Rev.10 (2002-11-12 07:25:53 to 2002-11-15 07:13:35)

Slew to LMC-X1 attitude (1st target for JEM-012)
Activation of JEMX1&2 detector at a reduced gain (PI-OPS-136)
1st part of JEMX Data Taking Format Verifications on Complex Field Targets (JEM-012)
Slew to LMC-X3 attitude (2nd target for JEM-012)
2nd part of JEMX Data Taking Format Verifications on Complex Field Targets (JEM-012)
SPI GeD High Voltages + (AFEE, PSD) thresholds update and check (SPI-260)
SPI PSD & AFEE TimeTag aligment and multiple window size optimisation (SPI-270)
SPI Veto pulse and AFEE Time Tag alignment (SPI-274)
SPI Veto pulse sent to PSD alignment (SPI-278)
Slew to Empty Field 1 (for SPI PSD calibration)
SPI First step of PSD calibration (SPI-280)

In addition :

- The ISGRI calibration sequence has been tuned and updated for periodic execution in each orbit (from rev.11 onward) (PI-OPS-140)
- Specific OMC imaging ops at LMC attitude
- 1st test to optimise SPI TM bandwidth occupation
- Diagnostic Data collection for JEMX anomaly investigation @ Empty field attitude (PI-OPS-0142)
- Additional test on size and delay of the SPI ACS veto gate (PI-OPS-159)
- Further IBIS Compton selection optimisation (PI-OPS-157)
- Further IBIS CDM HV optimisation (PI-OPS-155)
- Further ISGRI veto strobe optimisation (PI-OPS-151)
- IREM reset to recover timing anomaly (PI-OPS-139)
- Repetition of SPI test with GeD HV at 4.5kV (not enough data) (PI-OPS-138)

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 08/11/2002-14/11/1002

These are the main AOCS events in the reporting period:

08/11/2002 (Day of Year 312, Revolution 8)

Nominal AOCS operations performed from the Automatic Timeline.

Update of FSS Transfer Function

It was performed at 17:30. The new coefficients were the result of the STR/FSS Misalignment Calibration performed on revolution 6. Since the FSS was used in the attitude control loop for the roll axis, the update of the Transfer Function provoked a step change in the reference for this axis. This was expected, and the size of the jump evaluated before hand.
In this case the change in the roll reference was of 1.3 arcminutes. This is well below the safety limit (10 arcminutes), but above the On Target Flag limit (1 arcminute). Due to this the ACC Pointing Bit (OTF), was set to FALSE for 3 seconds, but this was not seen by the sampling used in the Broadcast Packet and consequently was not transmitted to the Payload.

09/11/2002 (Day of Year 313, Revolution 8-9)

Nominal AOCS operations performed from the Automatic Timeline.

Guide star released (SEU Filter Trigger)

At AOS it was observed that the guide star had been lost during the perigee passage, and a new one acquired. Due to this the AOCS subsystem was disabled from the Automatic Timeline. The dump of the ACC On Event Buffer shown the messages:

07:35:57 ACC YAW ERROR OOL (probably an undetected False Event in the STR CCD)
08:43:47 ACC YAW ERROR OOL (the same)
08:45:18 ACC STR THR EX (STR SEU Filter exceeded, ACC swaps control to FSS/IMU and starts a mapping).
08:45:18 ACC AIMU ON (ACC powers on the IMU (IMU-1) to use it in the control law)

plus other messages reporting the mapping and the control law reference changes due to the event. No detailed analysis could be done, since the problem occurred during LOS period, but from the OEM's it can be deduced that the STR CCD suffered radiation impacts that caused a high number of False Events. Two of the undetected ones caused the excessive yaw error messages, and a high rate of detected events finally caused the ACC to Trigger the SEU Filter. This filter is in place to prevent the usage of STR data in the control law in the presence of an excessive rate of SEU's in the CCD. The current values used are:

Every time the STR reports a False Event, counter is increased by 1.
Every ACC cycle (0.5 s) that the STR does not report False Event, counter is decreased by 1.
If the accumulated counter reaches 7, the SEU Filter triggers.

Since there was no TM, it is not possible to know if the problem was due to 7 SEU's in a row, or other type of temporal distribution. The TM after AOS shown a relatively high number of False Events still occurring (with a star of a similar magnitude to the lost one), but far from the rate that would trigger the SEU Filter.
The magnitude of the lost star was 7.5, and it was lost at a height in the orbit of 16000 Km.

Worst case slew error.

The purpose of this test was to get a good estimation of what could be the biggest error introduced by an open loop slew. The design of the slew for this test offered some problems, since on one hand it is known that the worst case in relation to the slew length corresponds to a combined yaw-pitch slew, but on the other hand due to the fact that open loop slews are rotations around an eigenaxis that is fixed during the slew, it is not possible to perform long yaw-pitch combined slews without violating the roll constraint. Finally Flight Dynamics decided to perform a long yaw slew of 162.7°, with the wheel momentum vector at the limit of the stability constraint. The final error of the slew was 1.4°, or a 0.86% of the slew length. While this is probably not a worst case, it should be representative of the error introduced by very long slews with unfavourable initial wheel speeds.
From the operational point of view, it was planned to perform this test from the automatic timeline. Due to the loss of guide star reported above, the activities could not be started on time, and they were performed manually. This did not impact the test.

10/11/2002 (Day of Year 314, Revolution 9)

Nominal AOCS operations executed from the Automatic Timeline.

On Target Flag set to False.

At 16:18:02.256 the ACC issued the OEM:

ACC YAW ERROR OOL

This message is issued when the threshold for the OTF in yaw is exceeded. The reason for the problem was an instantaneous change in the guide star detected position, for one cycle, which seems a case of undetected False Event in the STR CCD:

Time	Mag	CCDYCCDZ
16:18:01.561	7.70	187176467
16:18:02.061	7.55	187496548
16:18:02.561	7.65	187156472

The change of magnitude of 0.1 is below the False Event threshold in the STR (relative change in energy bigger than 0.22 with respect to the previous cycle), but the change in the STR Z coordinate was of 81 CCD units, or 19.8''. This is above the OTF threshold for Yaw (18'').
The event was not reflected in the controller. The ACC Pointing Bit (OTF), was set to FALSE for 0.5 seconds, but this was not seen by the sampling used in the Broadcast Packet and consequently was not transmitted to the Payload.
The height in the orbit at the moment of the event was 153000 Km.

11/11/2002 (Day of Year 315, Revolution 9)

Nominal AOCS operations executed from the Automatic Timeline.

12/11/2002 (Day of Year 316, Revolution 9-10)

Nominal AOCS operations executed from the Automatic Timeline.

Update of TPF file naming convention

Stating from revolution 10, the file naming convention for the TPF's (Task Parameter File) for AOCS has been modified to have a 4 digits version number. The previous convention of 2 digits was potentially not sufficient to cover all the TPF's of the same type needed for a full science revolution, due to the high number of slews expected.

Automatic Update of a TPF failed

The automatic update of the first slew of revolution 10 failed. The reason was a script problem in the Flight Dynamics System due to the transition to 4 digits version number for AOCS TPF's. After an inspection of the determined attitude, and since the attitude was almost error free, it was decided to let the slew go according to the timeline pre-planned parameter values, just disabling the commanded re-start of the SSL (Sun Steering Law) at the end of the slew.

13/11/2002 (Day of Year 317, Revolution 10)

Nominal AOCS operations executed from the Automatic Timeline.

Automatic Update of a TPF failed

At 23:34 the automatic update of an offset (closed loop slew) failed. The reason was that due to a Ground Station problem with Goldstone, all telemetry was being received twice. This duplicated TM caused the Flight Dynamics System to see two instances of each star in the STR mapping, and the attitude matching was not considered good in order to produce the updated TPF. Due to the timeline not been updated, the change of guide star that is part of the offset preparation failed, and the AOCS commanding was disabled from the timeline. The Flight Dynamics and engineer on call support was phoned, and the offset performed manually with one hour of delay.

14/11/2002 (Day of Year 318, Revolution 10)

Nominal AOCS operations executed from the Automatic Timeline.

8.3.2 IBIS Operations

Though the parameter optimisation has been in principle completed, e.g. the optimisation of the Compton angle, some fine tuning of the instrument is still ongoing, e.g. of the HV setting of the CDM 01 (calibration unit 1).

The LTA calibration has been executed in automatic mode during revolution 11 using Task Parameter Files (TPF) from ISDC. The IBIS team has confirmed the basic procedure. However, it is still to be clarified whether the LTA calibration at – 70 V is required in some special circumstances.

The interface between the MOC and the ISDC has been verified for the provision of the ISGRI context needed for the LTA calibration. The distribution of the 8 files from the IMCS server to the relevant IMCS client should be improved.
The interface between MOC and ISDC for the update of the ISGRI context table that is required each revolution after the calibration has been verified in revolution 11. Some minor updates in the ODB are needed.

The decision of the IBIS team to keep the PDMs on (as initially foreseen) or off during the Perigee Passage is ongoing. It is to be verified whether the thermal stress (change of temperature of about 10ºC) causes the pixels to become noisy.

Some paths in the PICSIT detector plane that have been caused by the interaction of cosmic rays with the atoms of the scintillators have been observed with a frequency of 1 every 5 minutes. Though the analysis is still ongoing this can be considered as a demonstration of the imaging capability of the instrument.

8.3.3 JEM-X Operations

On 9 November, JEM-X 1 was switched on at a lower voltage level (80 V below the nominal). The first analyses show that the gas gain was reduced by a factor of 2.6. Apart from this the detector apparently worked well. The exposure was interrupted by an increase in the solar activity after about 8 hours of data taking. For safety reasons the JEM-X 1 was commanded to Safe mode.

On 11 November (DOY 315) at 08:00:00 UTC JEMX-1 HV was switched on and set to a value of 82 Decimal (~ 820 V) by request from PI. JEMX-1 was then set in DATA TAKING mode for the rest of the revolution 9 until it was set to SAFE mode by time tag command at 90m minutes before 60000 km descend time. The PIs were closely monitoring the behaviour of the instrument during this time.

On 12 November, when the 40000 km altitude was reached, JEMX 1 and 2 High Voltages (HV) were set to values of 82 and 80 respectively. These are the new HV settings agreed by the JEMX PI, which are 8 steps (80 V) lower then the nominal settings. At 12:20:00 Z ,JEMX commissioning activity 012, Format Verification on Complex Field Targets, was started with the first set of format verification at LMC-X1 attitude and the second set at LMC-X3 attitude. This lasted until 19:33:00 and from that time both JEMX units were set to Data Taking mode until slew to Empty Field 1 attitude at 318:00:30:00 when a 12 hour diagnostic data dump operation was started on both units. Since 318:12:50:00 both JEMX units were in data taking mode until transition to Safe mode by Time Tag (TT) Telecommand at 319:00:12:00, 60000 km descend - 90 minutes.

The JEM-X PI has generated so far three anomaly reports, describing the problems observed on the anodes and the possible causes.

When in Diagnostic Data Dump mode, JEMX1 generates unexpected Anomaly and Exception On Event Messages (PEM) with IDs 5 and 6. The reason is still unclear. An Anomaly Report has been issued.

8.4 List of Anomalies since Launch

The following table presents the list of all identified anomalies that have been registered since Launch and that are still pending (Status: 14.11.02).

ARid	Date Occurrence	Subject	Segment	Element	Status
INT - 002003	19/10/2002	Command failure from TCE2 at Redu1.	Ground	ESA Sta.	Pending
INT - 002007	22/10/2002	Command sequence TENPE_00 is incorrect.	Space	Procedures	Pending
INT - 002010	22/10/2002	Time correlation not applied correctly to time parameters in TM type 8 reports.	Ground	IMCS	Pending
INT - 002018	22/10/2002	Loss of TM and TC with Goldstone.	Ground	NASA Sta.	Pending
INT - 002021	22/10/2002	JEM-X: Unexpected OEM during HV ramp up.	Space	JEM-X	Pending
INT - 002017	23/10/2002	INCTRB crashed.	Ground	NCTRS	Pending
INT - 002013	24/10/2002	VETO LSL error.	Space	IBIS	Pending
INT - 002015	24/10/2002	HSL error (loss of SYNCH).	Space	JEM-X	Pending
INT - 002023	27/10/2002	SPI: ACS status error.	Space	SPI	Pending
INT - 002025	28/10/2002	Telemetry and Telecommand outagesd due to Antenna Mispointing	Ground	NASA Sta.	Pending
INT - 002026	28/10/2002	Sun144 forced logout whilst SPACON was commanding!	Ground	IMCS	Pending
INT - 002036	03/11/2002	TM Desktop running very slow	Ground	IMCS	Pending
INT - 002037	03/11/2002	Telemetry loss from REDU	Ground	ESA Sta.	Pending
INT - 002041	06/11/2002	OBM Entries for Battery Voltage Monitoring Incorrect	Space	SDB	Pending
INT - 002042	06/11/2002	Timeline stopped due to PTV Failure	Ground	IMCS	Pending
INT - 002057	06/11/2002	Automatic command stack	Ground	IMCS	Pending

INT - 002058	06/11/2002	Telemetry Play Back Failed	Ground	NASA Sta.	Pending
INT - 002044	07/11/2002	SECL Table Entries in SDB must be Modified.	Space	SDB	Pending
INT - 002046	07/11/2002	Propellant Heater System Behaviour.	Space	Spacecraft	Pending
INT - 002047	07/11/2002	VPD Task Problem when Displaying OEMs.	Ground	IMCS	Pending
INT - 002049	07/11/2002	Beginning of a gradual erosion of the anodes on the microstrip plates	Space	JEM-X	Pending
INT - 002059	07/11/2002	Problems with handover to GoldStone	Ground	NASA Sta.	Pending
INT - 002048	08/11/2002	TM Data Retrieval Jobs not executed	Ground	IMCS	Pending
INT - 002051	09/11/2002	Loss of Guide Star	Space	Spacecraft	Pending
INT - 002052	09/11/2002	Failed Printer NBP531	Ground	IMCS	Pending
INT - 002054	09/11/2002	OEM on SPI Spectra Building.	Space	SPI	Pending
INT - 002055	09/11/2002	IBIS VETO anomalous count rates.	Space	IBIS	Pending
INT - 002053	12/11/2002	AD verification failed twice with Vilspa	Ground	ESA Sta.	Pending
INT - 002060	12/11/2002	The BCPKT Belts Exit Time in the EPOS for revolution 10 was incorrect.	Ground	FDS	Pending
INT - 002061	12/11/2002	TM Desktop perfomance collapses when de-selecting supercommutated procesing.	Ground	IMCS	Pending
INT - 002062	13/11/2002	Static PTV wrongly handled by IMCS when commands are copied	Ground	IMCS	Pending
INT - 002063	13/11/2002	Frames/Packets out of sequence by 7 seconds	Ground	NCTRS	Pending
INT - 002064	13/11/2002	Failed to handover to VIL-2	Ground	ESA Sta.	Pending
INT - 002066	13/11/2002	Data routing to ISDS	Ground	I/F to SGS	Pending
INT - 002070	14/11/2002	TDRS: data Rerievals cancelled	Ground	IMCS	Pending
INT - 002071	14/11/2002	Generation of OEM ID 5 and 6 by JEMX-1 in Diagnostic Dump Mode	Space	JEM-X	Pending
INT - 002072	15/11/2002	Times in EPOS not in line with Scheduling	Ground	FDS	Pending

INT - 002073	15/11/2002	Commanding too close to LOS	Ground	FDS	Pending
INT - 002074	15/11/2002	RMU calibration failed	Ground	FDS	Pending
INT - 002075	15/11/2002	Provision of TPF failed	Ground	FDS	Pending
INT - 002076	15/11/2002	TM share below the Belt	Science	ISOC	Pending
INT - 002077	15/11/2002	SPI Spectra at Belt Exit	Space	SPI	Pending