

INTEGRAL
Mission Report
INT-MOC-SYS-RP-1001-TOS-OF
No. 037
Week 23
10.06.03
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.

It addresses the activities from 31.05.03 until 06.06.03 (both dates inclusive) and covers the revolutions 77 to 79.

2 Summary of Activities

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

The targets of the observations in these revolutions were 1E1145.1-6141 (RA 11:47:28.60; DEC -61:57:14.0), 3C 279 (RA 12:56:11.17; DEC -05:47:21.5), the galactic plane and Cygnus X-1 (RA 19:58:21.68; DEC +35:12:05.8). The activities consisted of raster dithering and GPS 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.

3.1.1 AOCS

The main event of this week was another occurrence of the STR 1750 Processor Fault. The fault happened during a mapping, which was commanded after a Close Loop Slew, and when processing the ESW that contained the guide star and an extended celestial object. An automatic mapping was performed after the reset and a new guide star was found.

There was also a case of release of Guide Star when the ACC threshold of the STR SEU Filter was exceeded during the perigee passage.

A few slews were missed due to problems at the Goldstone ground station.

The fuel consumption over the period between 28/05/2003 and 06/06/2003 was 0.466 Kg. The remaining propellant is in the order of 176.764 Kg on the 6th of June. It was noted that the fuel consumption was higher than during previous weeks. Though this

is currently of no concern it will be checked whether the consumption will drop again.

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

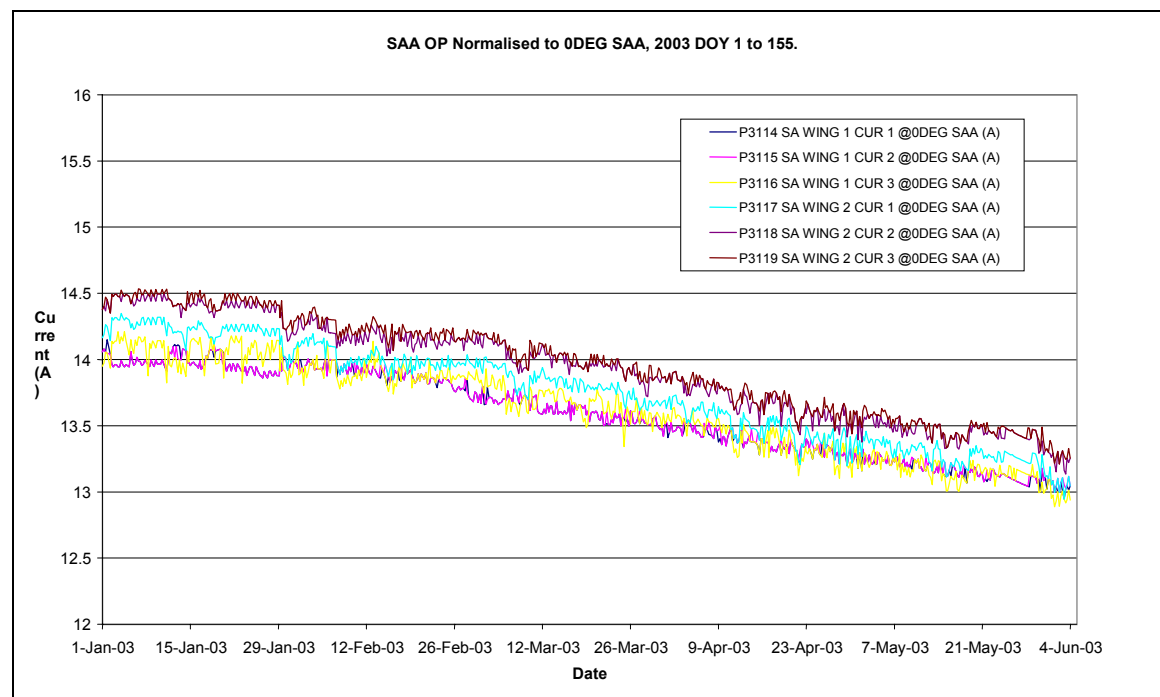
3.1.2 Power

The power subsystem is working as specified.

The available power from the arrays is in the order of 2230W, this compares with a figure of about 2380W in January, the reduction of about 9% is almost wholly due to seasonal variations, there is no evidence of significant degradation in array performance. A better estimate of any degradation can be made in October when Integral has been one year in Orbit.

The above figures correspond to a Solar Aspect Angle of 0DEG on pitch, the roll angle is not compensated, neither is the array temperature.

The plot below shows the evolution of the solar array currents since the beginning of 2003.



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 identified.

The problem concerning the ratio of VC0 and VC7 CLCW data that occurred after the load of the S/W patch regarding the TM data rate increase has not been solved. The analysis has shown that an on-board change might not be feasible without another modification of the data rate, e.g. slightly reduced data rate. For the time being commanding is performed using VC 0 commands only.

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. There is only one exception: After the increase of the TM data rate it seems that the link margin becomes marginal at low elevation over Redu for special azimuth angles. This is under investigation.

3.2 Payload

3.2.1 SPI

The status is nominal.

The instrument is operating in photon by photon mode with Spectra telemetry disabled. The TM bandwidth assigned to SPI was 91 pkts/cycle for the reported period.

The Cryocooler is working nominally maintaining 85K temperature in the detector cold plate.

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 has changed from 107 to 134 pkts/cycle, since the definition of the new PST used with the High Bit Rate mode. Reported during the end revolution 76 high radiation count rates for electron and proton counters: the new thresholds set for IBIS were not exceeded but the VETO counters were in OOLs.

On DoY 154 IBIS went in Stand-By due to an anomaly occurred on IREM.

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

3.2.3 JEM-X

During the reporting period, JEM-X2 operations were executed from the Automatic Timeline and JEM-X1 was dormant.

On 31st of May, high radiation levels (as seen by IREM), which were caused by high solar activities, caused transition of JEM-X2 mode to SAFE. The radiation levels did not settle before the Critical Instrument Descending Altitude. JEM-X2 stayed in SAFE mode during the final hours of revolution 76.

On the 3rd of June (DoY 154), a failure on-board IREM caused transition to SAFE mode. JEM-X2 remained in SAFE until the BCP Radiation Monitoring Flag was set to disregard to isolate IREM from the instruments and then the unit was recovered back to science mode. IREM was later recovered and the BCP RMF was set back to REGARD by the timeline at the BCP Radiation Belt End time of the next revolution. This caused another transition of JEM-X2 mode to SAFE due to a known problem of the IASW.

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

3.2.4 OMC

During this period, a considerable number of OMC pointings were missed due to different problems.

High radiation levels as read by IREM caused OMC SAFE mode for the second time during revolution 76. This time the radiation levels did not settle before the Critical Instrument Descending Altitude and OMC stayed in SAFE mode during the final hours of this revolution.

A ground station problem and loss of VC0 and TC interrupted the OMC operations for several hours on the 2nd of June (DoY 153).

On the 3rd of June (DoY 154), a failure on-board IREM caused transition to SAFE mode. OMC remained in SAFE until the BCP Radiation Monitoring Flag was set to disregard to isolate IREM from the instruments. A few more OMC pointings were missed because of this problem and the following late station handover.

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

3.2.5 IREM

Reported IREM high radiation count rates due to solar activity on DoY 151 at the end of rev 76: even if just few hours before the Radiation belt entry the event was genuine solar activity and not related to the belt entry. During revolution 77 an anomaly

affected the IREM CSCI sw: a reset of the sw triggered by an external event (SEU) forced the unit in Standard Mode. As consequence of the sw reset all the payloads went in Safe mode (with the exception of SPI). After the uplink of the patch and the reconfiguration, the status of the unit is Nominal.

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

4 Ground Facilities

The overall performance of the ground segment was relatively good in the reporting period. Though there were a couple of problems the required overall system performance was met.

The performance of the ground segment regarding the increased data rate is still being assessed. The two areas of concern that were already mentioned in the previous report are still existing:

- The performance of the control system regarding the archiving of data and the generation of the CD ROMs became marginal. Various options to increase the performance of the system to meet the increased system load have been assessed. Some options have been selected that require approval because they have some cost implications.
- The ratio of VC0 and VC7 CLCW information provided by the satellite has changed significantly after the S/W change regarding the increased data rate. It is currently not possible to execute the nominal Timeline using VC 7 commands because there is a high risk that the Timeline is aborted due to a time-out of the command verification. The problem has been analysed by various parties, including industry, and a straightforward solution has not been identified. A temporary solution is in place that allows to execute the Timeline.

4.1 Mission Operations Centre

The performance of the IMCS was good in the reporting period. There was no problem that impacted the execution of the Timeline. However, the performance of the control system regarding real-time TM processing, archiving of data, data consolidation, offline data retrieval, etc., is marginal under the load caused by the increased data rate. The parallel execution of several tasks could impact the real-time processing of data. The various activities have to be carefully scheduled, which leads to a delay of some activities, e.g. the generation of the CD ROMs.

4.2 Ground Stations & Network

There were a couple of problems related to the ground stations during the reporting period:

- During some passes over Redu some data were lost at the end of the pass at low elevations. This might indicate that the RF budget is limited after the increased data rate. This is still under investigation.
- There were several problems with the Goldstone (equipment failure and configuration problems). The problems have been analysed and discussed with JPL. JPL is currently checking which system improvements are required.

4.3 Science Ground Segment

4.3.1 ISOC

No ISOC Input has been provided

4.3.2 ISDC

No ISDC Input has been provided

5 Special Events

Nothing to report

6 Anomalies

The problems related to the ground segments are already mentioned in chapter 4.

A list of the pending anomalies since Launch is presented in the Appendix. New anomalies raised during the past week are listed below:

AR No.	Date	Subject	Segment	Element	Status
INT - 002334	30/05/2003	Bad telemetry from Goldstone - DSS-16	Ground	NASA Sta.	Pending
INT - 002336	02/06/2003	VC-0 telemetry not being received from Goldstone	Ground	NASA Sta.	Pending
INT - 002333	03/06/2003	TM acquisition from MRU-B no longer possible.	Ground	Simulator	Pending
INT - 002337	03/06/2003	Late handover to DSS-16 due to uplink bind problem	Ground	NCTRS	Pending
INT - 002338	03/06/2003	Error sending data to consolidator (VC-7)	Ground	IMCS	Pending
INT - 002339	05/06/2003	IREM anomaly: SEU (#3)	Space	IREM	Pending
INT - 002340	05/06/2003	IBIS anomaly: Histogram production stopped due to coincidence of GSHF=1 with the start of S5 process	Space	IBIS	Pending
INT - 002341	05/06/2003	IBIS anomaly: Histogram production stopped due to the combination of PDUR setting with IASW observation duration calculation during long staring	Space	IBIS	Pending

INT - 002342	05/06/2003	Telemetry Drops from GoldStone DR: AR109393	Ground	NASA Sta.	Pending
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7 Future Milestones

The next Eclipse Season will start on 24 June.

It is currently planned to operationally apply the increased TM data rate from mid June.

8 Appendix

The appendix includes various detailed information.

8.1 Overview of Revolutions

Revolution 77

The observations in revolution 77 began with a continuation of the raster dithering observation performed in revolution 76 of the binary pulsar 1E1145.1-6141 (RA 11:47:28.60; DEC -61:57:14.0) lasting ~11 hours. Following this, a raster dithering observation of the Blazar 3C 279 (RA 12:56:11.17; DEC -05:47:21.5) was performed for the remaining ~48 hours of observation time.

Revolution 78

The observations in revolution 78 consisted of a raster dithering observation of 3C 279 (RA 12:56:11.17; DEC -05:47:21.5) for about 41 hours. This was followed by 13 pointings of a GPS, and then a raster dithering observation of 1E1145.1-6141 (RA 11:47:28.60; DEC -61:57:14.0) was performed for the remaining ~9 hours of observation time.

Revolution 79

The observations in revolution 79 consisted of 13 pointings of a GPS followed by a raster dithering observation of Cygnus X-1 (RA 19:58:21.68; DEC +35:12:05.8), which was performed for the remaining ~52 hours of observation time.

Throughout the observations in these revolutions, all instruments were in their nominal science modes, except for JEM-X1, which was in Safe mode. The TM allocation commanded by the Timeline (and reported in the BCP) was 74 SPI, 107 IBIS, 1 JEM-X1, 8 JEM-X2, 5 OMC. However, a PST with a TM allocation of 98 SPI, 134 IBIS, 1 JEM-X1, 8 JEM-X2, 5 OMC was loaded manually.

8.2 Consumables

8.2.1 Detailed Fuel Book-keeping

2003-05-25T12:31:45.000Z	177.2748
2003-05-25T18:45:30.000Z	177.2647
2003-05-28T12:10:48.000Z	177.2305
2003-05-28T18:35:05.000Z	177.2082
2003-05-29T12:20:19.000Z	177.1413
2003-05-29T14:58:03.000Z	177.1080
2003-05-29T22:07:40.000Z	177.0621
2003-05-30T04:59:16.000Z	177.0223
2003-05-31T18:21:44.000Z	176.9850
2003-06-01T09:07:54.000Z	176.9620
2003-06-02T04:54:52.000Z	176.9016
2003-06-03T18:05:03.000Z	176.8824
2003-06-05T14:21:49.000Z	176.8319
2003-06-05T21:57:34.000Z	176.8005
2003-06-06T00:25:26.000Z	176.7640

This report was generated Fri Jun 6 08:00:16 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 SUMMARY OPERATIONS REPORT 31/05/2003-06/06/2003

AOCS operations were executed from the Automatic Timeline.

During this period, 112 Open Loop Slews, 49 Closed Loop Slews and 8 Momentum Bias were executed. 9 slews were lost or executed manually. This is equivalent to a 6%.

31/05/03 (Day of Year 151, Revolution 76-77)

Star Tracker 1750 Fault: A STR 1750 fault interrupted a mapping, which was commanded after a Close Loop Slew. The mapping started at 09:10:58.320 and stopped at 09:11:17.804. This fault was not seen in TM. The guide star had magnitude 5.55 and CCD coordinates (9283, 11777), located in ESW 11. The data from the STR tracker showed that the last ESW processed during the mapping was ESW 10. According to the mission star catalogue, an extended celestial object with magnitude 4.6 and CCD coordinates (6675, 8202) was in the field of view, located in ESW11. This ESW contained a region of sky with a cluster of several close by (in terms of angular separation) objects. The attitude was:

RA: 11:32:29.04 DEC: -61:03:22.7 POS: 267:41:35.7

And the altitude was 75500 km.

It should be noted that the STR 1750 fault, which happened on 30/05/2003 at 23:25:58, was caused by the same combination of this extended celestial object and cluster of close-by stars when INTEGRAL was pointing to the same attitude. In both cases the STR was tracking the same guide star, which was located in the ESW that contained the extended object.

After the fault, an automatic mapping was done and a new guide star was found: magnitude 7.9, CCD coordinates (8886, -4372). This event caused the OTF to go down at the beginning of pointing 00760063 and remain NOT REACHED for the rest of this pointing.

01/06/03 (Day of Year 152, Revolution 77)

Nothing to report.

02/06/03 (Day of Year 153, Revolution 77)

Slews missed due to Ground Station Problem (Goldstone DSS-16): At 08:04, after station handover to Goldstone DSS-16, a problem at the station, which seems to have been an incorrect configuration of the TCP, caused loss of VC0 telemetry and consequently commanding capability. This problem, which was not cured until 11:51, resulted in missing of slews 00770040 to 00770046. After VC0 TM and TC links were reestablished, a manual slew was done to the attitude of pointing 00770046 and parameters for slew 00770047 were manually updated using the FD timeline recovery tool.

03/06/03 (Day of Year 154, Revolution 77-78)

Slew missed due to late station handover: Due to a problem with the NCTRS, the station handover from REDU to Goldstone DSS-16 could not be done on time. The AOCS commanding was disabled on the Autostack and slew 00770064 was missed. After establishment of TM/TC link, a manual slew was performed to the attitude of pointing 00770065 and parameters for slew 00770066 were updated manually. The RMU calibration from the Automatic Timeline was also missed during this time. This calibration was later performed manually.

04/06/03 (Day of Year 155, Revolution 78)

Nothing to Report.

05/06/03 (Day of Year 156, Revolution 78)

FD system failed to update slew parameters: A 40 second drop in TM caused the loss of the "Mapping End" OEM. For this reason, the FD system failed to generate the TPF for slew 00780043. The timeline recovery tool was then used to manually generate this TPF and update the timeline.

06/06/03 (Day of Year 157, Revolution 78-79)

Pitch Error during perigee passage: At 16:27:39, the ACC generated a Pitch Error OEM. This OEM was received when the ACC OEM buffer was dumped after AOS in revolution 79. No further information is available on this event. However, the reason for this error could have been an undetected false event that had caused a change in

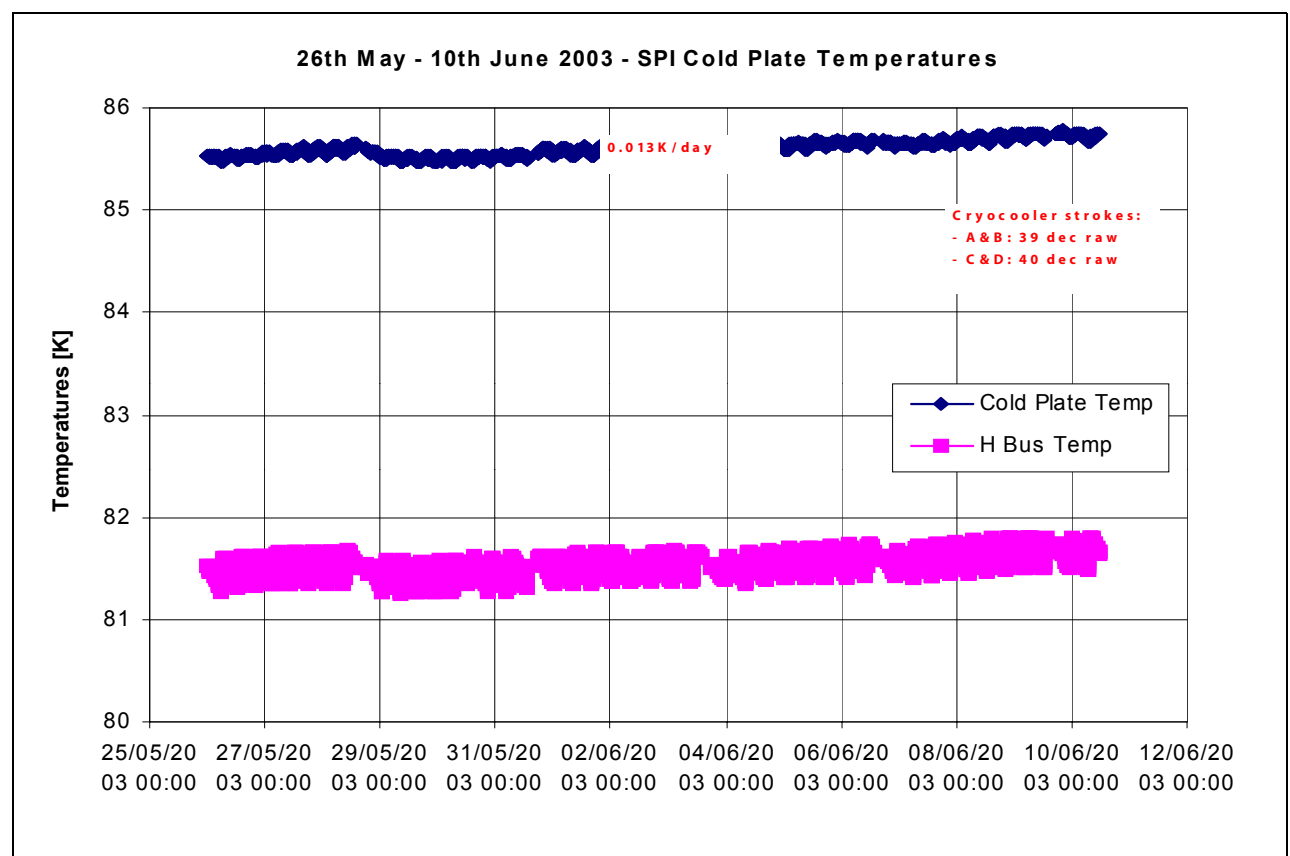
the position of the guide star (as seen by the STR) for one cycle, which in turn had caused the pitch error.

Guide Star released during perigee passage due to SEU Filter: At 16:27:43 the Guide Star was released when the ACC SEU STR Filter was exceeded. This happened during the perigee passage. At LOS the guide star had magnitude 6.95 and CCD coordinates (17417, -12266). An autonomous mapping was performed and the ACC found a new guide star. AT AOS the guide star had magnitude 8.45 and CCD coordinates (-8983, -5619).

8.3.2 SPI Operations

Cryocooler:

The performance of the 4 compressors is nominal and the cold plate temperature is maintained at around 85.6K. The drift phenomenon has been analyzed for the last 2 weeks and some fluctuations have been noticed: analysis of any relation with S/C attitude is on-going.



IASW/DPE:

1) From the outcome of the Change Request FCT-OPS-080 “Investigation on SPI TM drop: effects of mode transitions & DFEE spectra en/dis” the ED EEPM-02, which

makes the transition photon→conf→ photon, has been now fixedly inserted in the JX_HVON1 EPOS window (at PSF level), about 10 minutes after belts exit.

2) CNES reported that in one occasion the IASW-CSSW has generated additional HK packets filled with corrupted data. Retrieval of these packets is on-going. An anomaly report will be written if necessary.

ACS: FEE 91 count rate was reported out of limit by CNES on date 2 June, for a long period. Analysis on MOC side to verify the IMCS detection capability of this alert is on-going.

DFEE, PSD AFEE: Nothing to report.

8.3.3 IBIS Operations

Reported (few) during Belt passage the OEM ID 167 Class 2<<IBIS1 PICsIT NOISY SEMIMODULE>> due to the fact that the PICsIT detectors are ON without the VETO anticoincidence system, as it required by PIs.

DOY 2003. 151

At 02.21 Z reported the TM parameters G6062-63 going in/out limits many times. These OOLs were in coincidence with high radiation counting in the IREM counters.

At 03.30Z applied the recovery procedure OR 18 for VETO high count rate monitoring by sending the following TCs:

- G0125 IASW transition to Stand-By;
- G0601 VETO transition to Stand-By ;
- G0634 VETO transition to Maintenance;

The purpose of the recovery was to monitor the VDM counters during the OOLs condition, using the experience of the Commissioning phase. This recovery procedure will not be used anymore in the future, because it is referring to a different phase of the mission (when VETO was more instable in the count rates) and can create confusion in the operator. The Monitoring of VETO in Maintenance continued until the radiation Belt entry (~ 11:00Z). During that period the VETO counters were many times in OOLs with count rates oscillating from 30000-50000 counts. Being the OOL condition currently fixed at 35000 counts/sec, it is mandatory an update of the high limits considering that each VETO PMT can work fine with a count rate of 10000 counts/sec.

No impact on VETO s/s has been noticed after this high radiation event (for a plot of the radiation counter see the IREM section below).

At 04.50Z the IBIS s/s was disabled from the automatic timeline. The s/s was re-enabled at 09.32Z.

DOY 2003. 153

Reported at 17.49Z

the SCC failing for TM parameter G2000: this SCC flagged an overflow of the noisy pixel address in ISGRI module M0. As suggested in the FDIR doc the operator attempted to inform ISDC and no further action was taken.

DOY 2003. 154

At 03.46Z IBIS went in Safe mode (IASW Stand-By, VETO in Stand-By, ISGRI in Stand-By and biases OFF) triggered by an IREM anomaly (see detail in IREM section): the safe mode was activated by the internal automatism (due to the values 'FFFF' of the IREM counters). The reconfiguration of the instrument was completed before pointing 0770065 at 08.30Z.

At 10.28Z the VETO counters parameters G6062-63 started to go in/out limits, probably due to an earlier radiation belt entry. At 10.53 the operator, after having consulted the s/s SOE, manually perform a transition of the unit in safe mode following the action reported in the FDIR doc (IASW Stand-By, VETO in Stand-By, ISGRI in Stand-By and biases OFF) by using the FCP_IBIS1_0313, 203 and 265-273.

DOY 2003. 155

Reported at 00.56Z

the OEM ID 179 Class 2 <<IBIS1 VETO COUNTER BOTTOM EXCEEDS ALERT VALUE>>. The relevant TM_para G6062 reported values inside limits after few TM cycles and therefore the problem has been disregarded, as suggested by the nominal reaction to this OEM.

DOY 2003. 156

Reported at 01.41Z

the OEM ID 183 Class 2 <<IBIS1 VETO +5V VECU VOLTAGE OUT OF RANGE>>. The relevant TM_para G6106 reported a value inside limits and therefore the problem has been disregarded, as suggested by the nominal reaction to this OEM.

Reported at 04.27Z

the OEM ID 184 Class 2 <<IBIS1 VETO +28V VDM/CDM VOLTAGE OUT OF RANGE>>. The relevant TM_para G6107 reported values inside limits and therefore the problem has been disregarded, as suggested by the nominal reaction to this OEM.

8.3.4 JEM-X Operations

JEM-X SUMMARY OPERATIONS REPORT 31/05/2003-06/06/2003

31/05/2003, DOY 151, Revolution 76-77

- **JEM-X2 to SAFE mode because of high radiation level:** At 03:22, JEM-X2 went to SAFE mode when the RMC#3 from IREM reached the JEM-X SAFE threshold of 64. The radiation levels remained high throughout the rest of the revolution 77. JEM-X2 was therefore left in SAFE mode until the BCP Radiation Belt Start time at 11:18:44. On 28/05/03 we had received "Potential Satellite Anomaly Alert" for the period from 28 to 31 May due to high solar activity. A plot, showing the IREM readings throughout DoY151, can be found in the OMC report.

01/06/2003, DOY 152, Revolution 77

Nothing to report

02/06/2003, DOY 153, Revolution 77

Nothing to report

03/06/2003, DOY 154, Revolution 77-78

- **JEM_X2 transition to SAFE because of IREM failure:** At 03:46, a failure on-board IREM and broadcast of RMCRs with values of xFFFF caused transition of JEM-X2 mode to SAFE. This was at the beginning of pointing 00770061. At 06:07, the BCP Radiation Monitoring Flag was set to DISREGARD to isolate IREM from the instruments. Manual recovery of JEM-X2 started at 07:59 and at 08:29, the unit was commanded into DATA TAKING mode from ground. Later during the day IREM was recovered and the BCP RMF was left to be set to REGARD by the timeline in the next revolution.
- **JEM-X2 transition to SAFE because of IASW problem with respect to BCP RMF:** At 20:09, When the BCP RMF was set back to REGARD by the timeline (after the BCP Radiation Belt End time of revolution 78), JEM-X2 went to SAFE mode. This was during the uplink of ED KEHVON01 and caused PTV failure of the commands and stopping of JEM-X2 commands in the timeline. The reason for this transition to SAFE is a known software problem: After the BCP RMF is set to DISREGARD, the JEM-X IASW stops reading the BCP RMC values from IREM and keeps the latest values before the flag was set. When the BCP RMF is set back to REGARD, the IASW reacts to the RMC values that it had kept from the time of setting the flag to DISREGARD. Since the IREM readings were above the JEM-X SAFE thresholds when the RMF was disregarded, JEM-X2 went to SAFE mode immediately after the BCP RMF was set to REGARD. The manual recovery of the unit started at 20:53 and at 21:21 it was commanded to DATA TAKING from ground, with the same configuration as the timeline.

04/06/2003, DOY 155, Revolution 78

Nothing to report

05/06/2003, DOY 156, Revolution 78

Nothing to report

06/06/2003, DOY 157, Revolution 78-79

Nothing to report

8.3.5 OMC Operations

OMC SUMMARY OPERATIONS REPORT 31/05/2003-06/06/2003

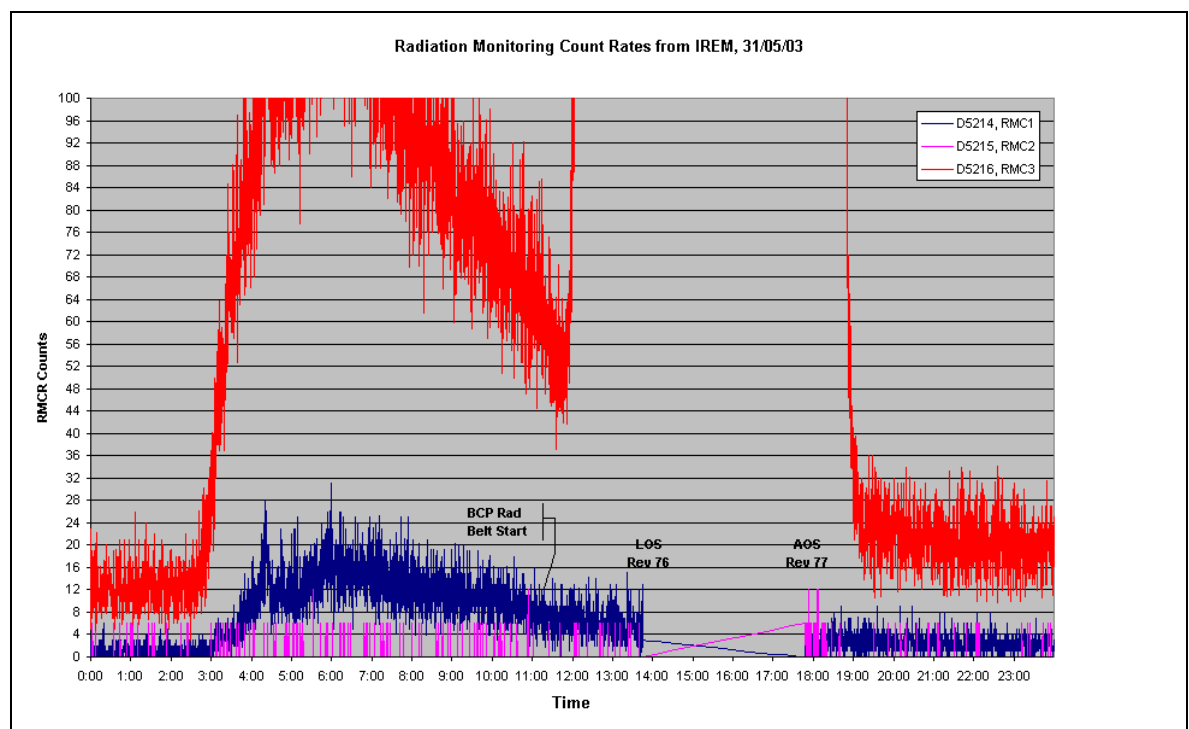
During this period 137 OMC image acquisitions were performed by the timeline. 19 OMC pointings were missed due to different problems.

31/05/2003, DOY 151, Revolution 76-77

- **OMC to SAFE mode because of high radiation:** At 04:00, OMC went to SAFE mode when the RMC#1 from IREM reached the OMC SAFE threshold (16). The radiation levels

remained high throughout the rest of the revolution 77. OMC was therefore left in SAFE mode until the BCP Radiation Belt Start time at 11:18:44. Just before this time, the SAFE OFF TC was sent to make the transition to STANDBY and make the instrument go to SAFE mode by the BCP Rad Belt Start time. Otherwise, the automatic transition from SAFE to STANDBY at BCP Rad Belt End, in the next revolution, would not be done. OMC was in SAFE mode throughout pointings 00760057 to 00760064.

On 28/05/03 we had received "Potential Satellite Anomaly Alert" for the period from 28 to 31 May due to high solar activity. The following plot shows the IREM readings during the 31st of May. See also the INTEGRAL Weekly Report Nr.36, for week 22.



01/06/2003, DOY 152, Revolution 77

Nothing to report

02/06/2003, DOY 153, Revolution 77

- **Pointings missed due to Ground Station Problem (Goldstone DSS-16):** After station handover to Goldstone DSS-16, a problem at the station, which seems to have been an incorrect configuration of the TCP, caused loss of VC0 telemetry and consequently commanding capability. This problem, which was not cured until 11:51, resulted in missing of slews/pointings 00770040 to 00770046. After VC0 TM and TC links were reestablished, a manual slew was done to the attitude of pointing 00770046. OMC timeline driven operations resumed from pointing 00770047.

03/06/2003, DOY 154, Revolution 77-78

- **OMC transition to SAFE because of IREM failure:** At 03:46, a failure on-board IREM and broadcast of RMCRs with values of xFFFF caused transition of OMC mode to SAFE. This was at the beginning of pointing 00770061. At 06:07, the BCP Radiation Monitoring Flag was set to DISREGARD to isolate IREM from the instruments. The SAFE OFF TC was sent at 06:21 and OMC went to STANDBY. This was during pointing 00770063. The

IREM problem was fixed and from revolution 78, the BCP RMF was set back to REGARD.

- **Pointing 00770064 missed because of late station handover:** Due to a problem with the NCTRS, the station handover from REDU to Goldstone DSS-16 could not be done on time. The AOCS commanding was disabled on the Autostack and slew 00770064 was missed. Since only AOCS commanding was disabled from the timeline, OMC commands and the BCP setting commands were uplinked. This caused transition of OMC mode to NORMAL (Science) at 06:40:53 with the imaging parameters of pointing 00770064, while INTEGRAL was still pointing to the attitude of pointing 00770063. Because of this mismatch, OMC kept generating "Science Window Rejected" OEMs throughout this pointing. After establishment of TM/TC link, a manual slew was performed to the attitude of pointing 00770065. At 07:38:38, OMC was commanded to STANDBY from ground and the imaging commands for pointing 00770065 were manually uplinked. At 07:41:57, OMC resumed the NORMAL science mode with the correct attitude and the correct imaging parameter setting. The start of pointing 65, as per timeline, was at 07:35:15.

04/06/2003, DOY 155, Revolution 78

Nothing to report

05/06/2003, DOY 156, Revolution 78

Nothing to report

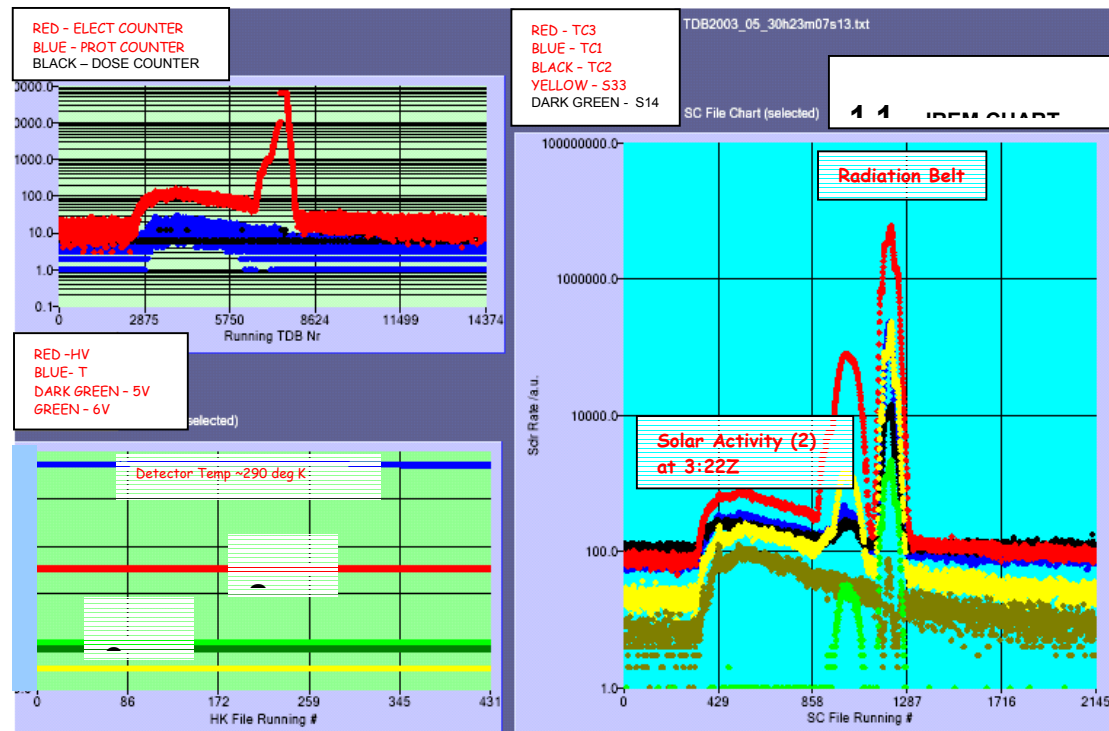
06/06/2003, DOY 157, Revolution 78-79

Nothing to Report

8.3.6 IREM Operations

DOY 2003. 151

At 02.21Z reported high radiation count rates, the values reached were out of the new thresholds set for JEM-X and OMC . The high radiation environment was mainly dominated by electrons with a clear presence of protons. The plots of the IREM counters plus the accumulated SCI files are reported below.



As effect of the high count rates JEM-X and OMC were forced in Safe Mode.
 No effects on the IREM unit have been noticed during high radiation condition.

DOY 2003. 154

At 03.42z the unit had a local reset of the IREM CSCI sw: as in the past (see problem on 16/12/2002 and 01/01/2003) the status of the unit was nominal, below is reported a brief summary:

- 1) temperatures nominal;
- 2) LCL current nominal;
- 3) last HK before the anomaly reported HV , 5V, 6V voltages inside limits;
- 4) the anomaly occurred at 03.46Z and the unit performed an automatic transition to Standard Mode (i.e. no block counter increasing, all the TM words= FFFF hex);
- 5) the first dump of the status word after the anomaly reported the value '48320' Dec = 'BCC0' hex =

```
'1    Ground Link On
0
1    Accumulation ON
1    Counting ON
1    Integral Mode
1
0
```

0
 1
 1
 0
 0
 0
 0
 0
 0'

HV ON

Checksum failure ON

i.e. the unit reported a status word as in Integral mode with counting ON, accumulation ON and the checksum failure flag ON.

We assumed , as it was in the past, that the value of the status word was that one written/requested by the sw at moment of anomaly;

6) the dump of the complete register bank reported, as in the past, a different value of the status word: '48256' Dec = ' BC80' hex=

'1
 0
 1
 1
 1
 1
 1
 0
 0
 1
 0
 0
 0
 0
 0
 0'

Checksum Failure OFF

i.e. still the unit reported the status word as in Integral mode BUT with the checksum failure flag OFF . The checksum failure counter in the register bank # 3 incremented of 1 unit (the past value was 2 due to the previous two SEUs).

The IREM automatic transition to Standard Mode (reset of the CSCI sw) affected the instruments status via BCP: at the same time of the IREM anomaly, OMC, JEM-X2 and IBIS went in safe mode activated by internal automatism (due to the values 'FFFF'of the counters). SPI did not react, because the internal automatism was not enabled, as requested by SPI Pis.

The cause of this sw reset was probably due to a SEU, as it was already in the past twice. An external event (probably an heavy ion/cosmic radiation) determined a bit flipping in the IREM memory detected by the checksum control logic that triggered the reset of the CSCI sw.

The recovery of the unit started around 7.00Z including the uplink of the IREM patch (counters rescaling factor). The DRMC flag disabled and the patch successfully uplinked; a dump of the memory patch has been executed and sent to IREM PIs for final confirmation.

After the patch, IREM was verified with different scalers and in the Ground Link ON/OFF function (see Transfer Data Block attached).

The final set of the unit was:

- accumulation time 60 sec
- HK files every 5 SCI files
- TC3 scaler for the electron counter
- S14 scaler for the proton counter

The unit was monitored during the Belt passage and the DRMC flag automatically re-enabled at the updating of the BCP group 1 parameters (at 20.08Z, at radiation belt exit). The status of the unit after the patch is Nominal.

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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. Though these Anomaly Reports still have a pending status most of the problems have been analysed and solutions or at least workarounds are already in place.

Note:

There is a big delay in closing AR's, which concerns mainly problems related to the stations.

ARid	Date Occurrence	Subject	Segment	Element	Status
INT - 002010	22/10/2002	Time correlation not applied correctly to time parameters in TM type 8 reports.	Ground	IMCS	Pending
INT - 002024	28/10/2002	OEM: SPI1 Fixed print overflow	Space	SPI	Pending
INT - 002061	12/11/2002	TM Desktop performance collapses when de-selecting supercommutated processing.	Ground	IMCS	Pending
INT - 002066	13/11/2002	Data routing to ISDS	Ground	I/F to SGS	Pending
INT - 002082	13/11/2002	TM packet production lower than allocation.	Space	SPI	Pending
INT - 002070	14/11/2002	TDRS: data Retrievals cancelled	Ground	IMCS	Pending
INT - 002094	19/11/2002	TDRS does not work with supercommutated parameters	Ground	IMCS	Pending
INT - 002142	11/12/2002	TDRS Time Interval Setting	Ground	IMCS	Pending
INT - 002145	15/12/2002	Commands failing PTV for no reason	Ground	IMCS	Pending
INT - 002199	17/01/2003	Incorrect handling of CLCW wraparound in CLTU mode	Ground	ESA Sta.	Pending
INT - 002212	29/01/2003	TDRS Interval-by-Interval TM Retrieval Problem	Ground	IMCS	Pending
INT - 002213	29/01/2003	SCOS 2000 Interval-by-Interval TM Retrieval Problem	Ground	IMCS	Pending
INT - 002214	29/01/2003	Drop in telemetry from REDU	Ground	ESA Sta.	Pending
INT - 002217	06/02/2003	TC link drop	Ground	NASA Sta.	Pending
INT - 002219	10/02/2003	IBIS: PICsIT PDMs counters SET to 0 (twice) during nominal operation	Space	IBIS	Pending
INT - 002220	10/02/2003	Wrong Scrolling Display definitions on IMCS following Import	Ground	IMCS	Pending
INT - 002221	10/02/2003	IBIS: SCI submode table loaded only if forcing the submode	Space	IBIS	Pending

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INT - 002233	24/02/2003	Time Calibration not Coherent among Ground Stations	Ground		Pending
INT - 002234	24/02/2003	S2K unable to access READ ONLY disk in IDDA.	Ground	IMCS	Pending
INT - 002235	25/02/2003	Too narrow window for RMU cal in PSF of rev 49	Ground	I/F to SGS	Pending
INT - 002242	02/03/2003	TM & TC Drop on DSS 16	Ground	NASA Sta.	Pending
INT - 002243	04/03/2003	CDS Failed to Lock at Redu - H/O Postponed	Ground	ESA Sta.	Pending
INT - 002246	05/03/2003	Loss of Telemetry from DSS16	Ground	NASA Sta.	Pending
INT - 002252	10/03/2003	CDS out of Lock at Redu - TM&TC Loss	Ground	ESA Sta.	Pending
INT - 002253	10/03/2003	RX1 and RX2 Locked at the same time	Ground	NASA Sta.	Pending
INT - 002255	10/03/2003	Late AOS at DSS-24	Ground	NASA Sta.	Pending
INT - 002256	14/03/2003	Late AOS at DSS-16	Ground	NASA Sta.	Pending
INT - 002257	17/03/2003	Late AOS at DSS-24	Ground	NASA Sta.	Pending
INT - 002258	20/03/2003	IBIS: stop downloading HIST during GCDE	Space	IBIS	Pending
INT - 002259	21/03/2003	TDRS: Retrieval log is Meaningless.	Ground	IMCS	Pending
INT - 002260	21/03/2003	Monitoring task Printout, sample time	Ground	IMCS	Pending
INT - 002262	21/03/2003	TDRS: FEN Retrievals containing status parameters always fail.	Ground	IMCS	Pending
INT - 002265	24/03/2003	Loss of TC & TM Link	Ground	ESA Sta.	Pending
INT - 002267	25/03/2003	Drop in link from ISDS to ISDC	Ground	I/F to SGS	Pending
INT - 002268	25/03/2003	No bit lock via DSS-16	Ground	NASA Sta.	Pending
INT - 002270	26/03/2003	Late uplink via DSS-16	Ground	NASA Sta.	Pending
INT - 002271	26/03/2003	Drops in telemetry from DSS-16	Ground	NASA Sta.	Pending
INT - 002272	26/03/2003	TC link via DSS-16 lost	Ground	NASA Sta.	Pending
INT - 002273	27/03/2003	Drop in VC7 via REDU	Ground	ESA Sta.	Pending
INT - 002279	29/03/2003	Telemetry lost from DSS-16. DR N109197	Ground	NASA Sta.	Pending
INT - 002280	30/03/2003	Telemetry lost from REDU	Ground	ESA Sta.	Pending
INT - 002281	31/03/2003	TC outage via REDU	Ground	ESA Sta.	Pending
INT - 002283	01/04/2003	ISDS-A and IDDA services stopped	Ground	IMCS	Pending
INT - 002284	01/04/2003	Reed Solomon alarms from REDU	Ground	ESA Sta.	Pending
INT - 002285	02/04/2003	Redu Antenna Uplink switch goes off bus	Ground	ESA Sta.	Pending
INT - 002286	02/04/2003	Reboot of ESOC Firewall	Ground	I/F to SGS	Pending
INT - 002288	03/04/2003	TM/TC lost via REDU	Ground	ESA Sta.	Pending

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INT - 002290	03/04/2003	Bad frames and TLM drop from DSS-16. Possible RFI	Ground	NASA Sta.	Pending
INT - 002291	08/04/2003	Archiving lost on A chain	Ground	IMCS	Pending
INT - 002292	09/04/2003	Telemetry Drops from GoldStone (DR 6102621)	Ground	NASA Sta.	Pending
INT - 002293	13/04/2003	Science data CDs produced with no TM inside.	Ground	IMCS	Pending
INT - 002295	15/04/2003	Telemetry Drops from GoldStone	Ground	NASA Sta.	Pending
INT - 002298	20/04/2003	ISDS - ISDC link outage	Ground	I/F to SGS	Pending
INT - 002299	21/04/2003	Telemetry loss from DSS-24	Ground	NASA Sta.	Pending
INT - 002302	24/04/2003	Telemetry loss via DSS-16 due to RFI	Ground	NASA Sta.	Pending
INT - 002305	04/05/2003	Telemetry Drops from GoldStone. DR G102720	Ground	NASA Sta.	Pending
INT - 002308	05/05/2003	Loss of TM/TC link due to hit on line	Ground	COMMS	Pending
INT - 002307	06/05/2003	Wrong sign applied in the S/C delay in the correlator.	Ground	IMCS	Pending
INT - 002309	06/05/2003	Command release delayed	Ground	ESA Sta.	Pending
INT - 002310	06/05/2003	TC-1 dropped off line at REDU	Ground	ESA Sta.	Pending
INT - 002311	06/05/2003	Drop in TM on MADDs-ISDSA link	Ground	ESA Sta.	Pending
INT - 002312	06/05/2003	Static PTV in "No Go" State for command A3189	Ground	IMCS	Pending
INT - 002315	09/05/2003	Late handover to DSS-16, DR G102733	Ground	NASA Sta.	Pending
INT - 002316	09/05/2003	Loss of TM and TC link via DSS-16. DR G102735	Ground	NASA Sta.	Pending
INT - 002317	09/05/2003	Late handover to REDU	Ground	ESA Sta.	Pending
INT - 002318	09/05/2003	SUN workstation 128 rebooted itself.	Ground	IMCS	Pending
INT - 002319	10/05/2003	TM drop via DSS-16 DR number: G102736	Ground	NASA Sta.	Pending
INT - 002314	12/05/2003	Wrong file displayed for Timeline Summary File	Ground	IMCS	Pending
INT - 002320	15/05/2003	Lost TC link to Goldstone. DR G102748	Ground	NASA Sta.	Pending
INT - 002321	18/05/2003	Drop in telemetry from REDU	Ground	ESA Sta.	Pending
INT - 002323	19/05/2003	Telemetry Drops from GoldStone (DR 109346)	Ground	NASA Sta.	Pending
INT - 002324	19/05/2003	Command A3084 not verified	Ground	IMCS	Pending
INT - 002325	21/05/2003	Telemetry drop from Redu	Ground	ESA Sta.	Pending
INT - 002326	21/05/2003	Hardware failue at DSS-16 during handover DR: G102772	Ground	NASA Sta.	Pending
INT - 002329	24/05/2003	Late handover to DSS-16. DR: G102803	Ground	NASA Sta.	Pending
INT - 002327	26/05/2003	CLCW: change in ratio of the number of VC-0 / VC-7 CLCWs in VC-0 TM Frames	Space	Platform	Pending

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INT - 002328	27/05/2003	TDRS queries for some SPI parameters fail before DOY 2003.034	Ground	IMCS	Pending
INT - 002330	27/05/2003	NCTRS CPU goes to 85% for a problem related with tracking data	Ground	NCTRS	Pending
INT - 002331	27/05/2003	Monitoring Task ASCII Printout, not in ASCII format	Ground	IMCS	Pending
INT - 002332	30/05/2003	Problems with tracking receiver at REDU	Ground	ESA Sta.	Pending
INT - 002334	30/05/2003	Bad telemetry from Goldstone - DSS-16	Ground	NASA Sta.	Pending
INT - 002336	02/06/2003	VC-0 telemetry not being received from Goldstone	Ground	NASA Sta.	Pending
INT - 002333	03/06/2003	TM acquisition from MRU-B no longer possible.	Ground	Simulator	Pending
INT - 002337	03/06/2003	Late handover to DSS-16 due to uplink bind problem	Ground	NCTRS	Pending
INT - 002338	03/06/2003	Error sending data to consolidator (VC-7)	Ground	IMCS	Pending
INT - 002339	05/06/2003	IREM anomaly: SEU (#3)	Space	IREM	Pending
INT - 002340	05/06/2003	IBIS anomaly: Histogram production stopped due to coincidence of GSHF=1 with the start of S5 process	Space	IBIS	Pending
INT - 002341	05/06/2003	IBIS anomaly: Histogram production stopped due to the combination of PDUR setting with IASW observation duration calculation during long staring	Space	IBIS	Pending
INT - 002342	05/06/2003	Telemetry Drops from GoldStone DR: AR109393	Ground	NASA Sta.	Pending