INTERNATIONAL GAMMA-RAY ASTROPHYSICS LABORATORY

(INTEGRAL)

Science Operations Centre

Facility Operations Manual

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Date	**Issue**	**Section**	**Description / Reason**
15 Dec 1999	First Draft	All	Produced to assist ISOC Software Integration & Testing.
26 May 2000	0 r1	All	Updated to reflect comments from ISOC team. Document.
14 July 2000	0 r2	All	Expanded pulling information from ISOC Ops Concept & Integral Design Report. Also includes Editorial Updates.
27 Oct 2000	0 r3	All	Updated & restructured following internal (ISOC) review
1 Nov 2000	1	-	Formal Issue for start of AO-1 Call
20 Nov 2000	1 r 1	See Change Bars	Procedures updated to reflect working experience. Some editorial corrections also made.
21 May 2002	1 r 2	All	PHS related procedures updated to bring them in line with the remodelled PHS Software. AO/TAC related activities updates to reflect 'as performed' AO 'lessons learnt' Information added to clarify ISOC ‘high level’ handling of external deliveries and more detailed handling of Event Designators.
7 Oct 2002	1 r 3	All	Procedures updated & added to reflect experience gained during Simulations & Training exercises. Procedures added to cover the reception of external deliveries and the importation of Event Designators. Concept of ISOC Science Team duty rotation included
20 Nov 2002	1 r 4	See Change Bars	Updated to reflect comments received from D. Texier & E. Kuulkers. Several other editorial corrections added.
30 Oct 2003	1 r 5	See Change Bars	Procedures for AO-2 support incorporated/updated along with several other minor procedural changes.
30 Jan 2004	1 r 6	All	Updated Post AO-2 & ISOC v10 release

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1. Introduction

1.1 Scope

This ISOC Facility Operations Manual (IFOM) has been produced in order to provide a single source of reference for all rules, protocols and procedures to be used by the Integral SOC Staff, from the 'initial' pre-launch AO Call (Launch –18 months) until the end of the nominal mission.

1.2 Structure of Document

The layout of this document is:

Chapter 1 - Introduction

This section includes the scope & structure of the document, along with the lists of Applicable Documents (AD), Reference Documents (RD) and Acronyms.

Chapter 2 - ISOC Team Structure

Within this section ISOC management & team structure is presented along with the breakdown of ISOC tasks between the various ISOC groups.

Chapter 3 - The ISOC System

A brief description of the ISOC System and its environment are provided in this chapter.

Chapter 4 - Overview of ISOC Activities

Detailed description of all activities performed by the ISOC.

Chapter 5 - ISOC (Internal) Procedures

This section contains the low level /detailed procedures on how the ISOC conduct/perform its day-to-day tasks.

Chapter 6 - External Interfaces

This section provides an overview of the nature of the various external groups/centres to which the ISOC interact.

Annex 1: Guidelines & Policy

A brief summary of the various guidelines & policy documents, defined by the Project Scientist, which have an influence on how the ISOC conduct specific activities.

1.3 Applicable Documents

AD.1	Integral Science Management Plan	ESA/SPC (94) 1 rev 1 (Annex)
AD.2	Integral Ground Segment Management Plan	INT-PL-23045
AD.3	Science Ground Segment Requirements Document	INT-SR-1594
AD.4	Science Ground Segment Implementation Plan	INT-PL-3197
AD.5	Integral Science Data Rights	INT-TN-14571
AD.6	Integral FOP Volume 3 (OGS-SGS Interactions)	INT-MOC-FOP-1001-TOS-OGI
AD.7	ISOC-ISDC Interactions Document	INT-SOC-DOC-007

1.4 Reference Documents

RD.1	Integral SOC Operations Concept	INT-SOC-DOC-001
RD.2	Definition of Science Observation Terms	INT-SOC-DOC-002
RD.3	ISOC URD	INT-SOC-REQ-001
RD.4	ISOC SRD	INT-SOC-SRD-002
RD.5	Integral SOC System Design & Performance Report	INT/SAG/98-0045/TN
RD.6	Integral Mission Operations Concept	INT-SYS-MIS-TN-0001-SMD
RD.7	Integral Mission Planning Concept	INT-SYS-MIS-TN-0002-SMD
RD.8	ISDC Operations Management Plan	ISDC/OMP
RD.9	Integral Ground Segment Design Report	INT-RP-22519
RD.10	OGS-SGS ICD	INT-SYS-ICD-0001-OGI
RD.11	ISOC-ISDC ICD	INT-SOC-ICD-001
RD.12	ISOC-OMC ICD	INT-SOC-ICD-002
RD.13	ISDC EID-A	EID-A for ISDC
RD.14	EID-B ISDC	ICD/EIDB
RD.15	Instrument EID-A	EID Part A
RD.16	EID-B SPI	SPI-SG-0/SAT-1111-CNES
RD.17	EID-B IBIS	IN.IB.IAS.EID.001/00
RD.18	EID-B JEM-X	JEMX/EID-B
RD.19	EID-B OMC	OMC/INT/20000/ICD/001
RD.20	Configuration Control Concept for the Integral Ground Segment	INT/SAG/00-0042/TN
RD.21	Data Distribution Policy	INT/SGS/96-0027/TN
RD.22	Integral Core Programme	INT-TN-22523
RD.23	Integral Community Support	INT/SAG/99-0002/TN
RD.24	Instrument Team - Ground Segment Delivery Document	INT-SOC-ICD-034
RD.25	ISOC Configuration Control Procedures	INT-SOC-DOC-008
RD.26	ISOC Uplink SUM	INT-SOC-SUM-030
RD.27	The Integral Help Desk	INT/SAG/00-0112/TN
RD.28	Target Visibility User Manual	INT-SOC-UM-031
RD.29	Observation Time Estimator User Manual	INT-SOC-UM-032
RD.30	Overview of PV & In-flight Calibration Plan	INT/SAG/01-0158/TN
RD.31	Project Scientists Guidelines for ISOC Mission Planning	INT/SDG/02-0164/TN
RD.32	Archive Software Joint Development Plan	INT/SAG/99-0013/TN
RD.33	Instrument Modes & Modes Transitions	INT/SAG/98-0042/TN
RD.34	Instrument Team / Ground Segment Interface Document	INT-SOC-ICD-034
RD.35	The Galactic Centre Deep Exposure (AO-2)	INT-SOC-TN-041

1.5 List of Acronyms

ADS	Archive & Distribution System
AO	Announcement of Opportunity
CCB	Configuration Control Board (ISOC)
CCS	Configuration Control System
CPWG	Core programme Working Group
DCOM	Data Centre Operation Manager (ISDC Operations Manager)
DBOB	Database of Observable Bins
DRB	Delivery Review Board
ECS	Exposure Completion Status
EPOS	Enhanced POS
fte	Full Time Equivalent
GCDE	Galactic Centre Radian Deep Exposure
GPS	Galactic Plane Scan
GRB	Gamma Ray Burst
ICD	Interface Control Document
I/F	Interface
IGSCCB	INTEGRAL Ground Segment Configuration Control Board
INTEGRAL	International Gamma Ray Astrophysics Laboratory
IPV	Instrument Parameter Validator
ISDC	INTEGRAL Science Data Centre
ISOC	INTEGRAL Science Operations Centre
ISWT	Integral Science Working Team
IWS	ISOC Web System
MOC	Mission Operations Centre (ESOC)
MPMF	Mission Planning Message Files
OCS	Observation Completion Status
OGS	Operational Ground Segment (MOC & Ground Stations)
OSS	Observation Scheduler System (ISOC Planning System)
OTE	Observation Time Estimator
PAD	Proposal Administrative Data
PCWG	Payload Calibration Working Group
PGT	Proposal Generation Tool
PHS	Proposal Handling System
POD	Planning & Observation Data
POS	Preferred Observation Sequence
PSF	Planning Skeleton File
R-Sci	(ISWT nominated) CP Research Scientist
SCOM	SCience Operations Manager (ISOC Operations Manager)
IFOM	Integral SOC Facility Operations Manual (This Document)
SGS	Science Ground Segment (ISOC & ISDC)
SGSM	Science Ground Segment Manager
SOM	Spacecraft Operations Manager
SPACON	Spacecraft Controller (@ESOC)
STP	Slew Time Predictor
S/W	Software
TAC	Time Allocation Committee
TBC	To Be Confirmed
TBD	To Be Determined
TBW	To be Written
TSF	Timeline Summary
TN	Technical Note
TOO	Target Of Opportunity
TVP	Target Visibility Predictor

2. ISOC Team Structure & Distribution of Tasks

Within the ISOC all activities will be conducted under the guidance of the Integral Project Scientist. The Project Scientist being responsible for ensuring that the Integral SGS endeavours to achieve the scientific objectives as laid down in the Science Management Plan (AD.1). The Project Scientist delegates the day-to-day operations of the ISOC to the Integral Science Operations Manager (SCOM).

The SCOM, in conjunction with the MOC appointed Spacecraft Operations Manager (SOM) and the ISDC appointed Data Centre Operations Manager (DCOM), ensures that operations of the Integral mission are conducted in-line with the scientific objectives, laid down in AD.1 or as amended by the Project Scientist. In addition to the task of the day-to-day management of the ISOC, the SCOM will represent the ISOC on the Integral Ground Segment Configuration Control Board (IGSCCB).

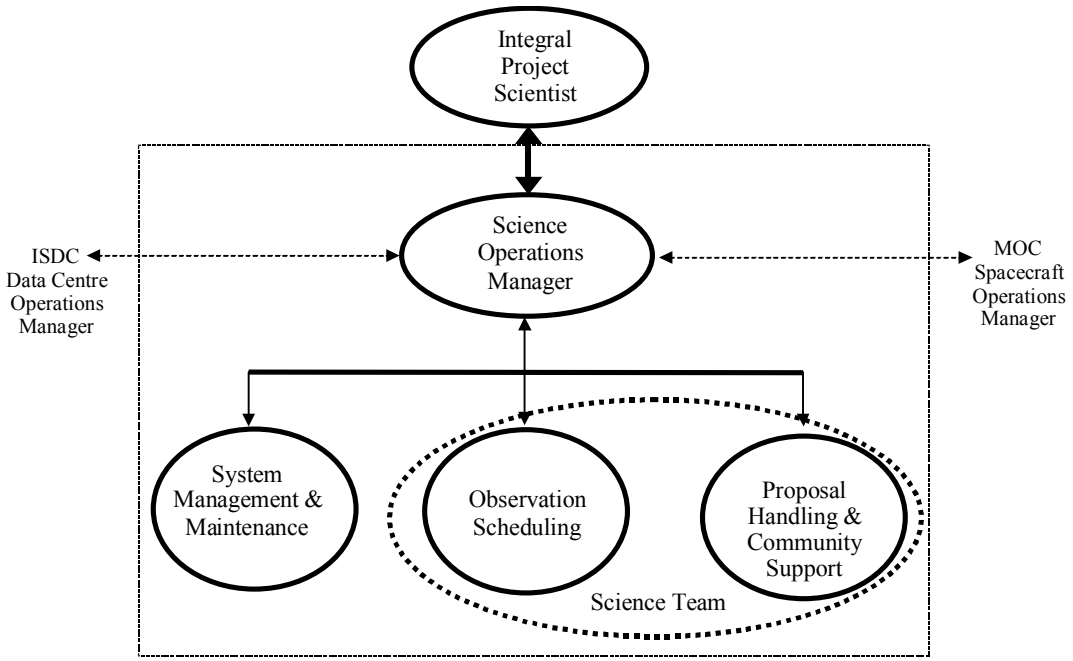


Figure 2-1 Integral Science Operations Team Structure

2.1 The ISOC Team

Within the ISOC the Science Operation Manager (SCOM) leads a small team of experienced Scientist/Astronomers and Engineers. For conceptual reasons the team has traditionally be divided into three functional 'operational elements' or groups. The three 'functional' groups are:

- Proposal Handling & Community Support Group (PHCS)
- Observation Scheduling Group (OS)
- System Management and Maintenance Group (SMM)

In reality however there are only two physical groups, as the tasks allocated to the PHCS & OS groups are shared, between the ISOC scientists.

2.2 Distribution of Tasks within the ISOC

2.2.1 The ISOC Science Team

The ISOC Science Team consists of 5 full-time equivalents (fte) astronomers/scientist[1]. A summary of the duties & tasks assigned to the Science team is contained in sections 2.2.1.1 to 2.2.1.3. For all key tasks identified, in sections 2.2.1.1 to 2.2.1.3, the Project Scientist will nominate a member of the Science Team as the 'responsible'. For example a different member of the team may be assigned overall responsibility for the HelpDesk Support, Instrument Calibrations, Observations Scheduling/Planning and Archive activities.

2.2.1.1 Proposal Handling & Community Support Tasks

The Tasks to be performed by the Science Team in support of Proposal Handling & Community Support are:

- Maintenance of AO related documentation
- Support to Community with respect to AO related queries
- Support to TAC with respect to AO General Programme proposals
- Support to ISWT with respect to Core Programme proposals
- Reviewing and maintenance of all accepted proposals to ensure that they remain compatible with the measured instrument performances.
- Utilisation of the Integral SOC Simulation facilities in support of:
    - proposal and TOO validation & analyse
    - analyse of instrument configured parameter modifications
    - investigations into instrument anomalies
- Supporting the submission (& scheduling) of Calibration and Engineering related proposals
- Support the definition, validation and scheduling of TOOs.
- Analyse & Import the various ISDC generated ‘Exposure Completion Status’ files in order to determine the execution status of all schedule exposures/observations.
- Preparation and distribution ‘Observation Completion Status’ files for/to ISDC.
- Regularly review the Standard Data Products release guidelines and make recommendations to the PS
- Maintenance of the Proposal Data Base and any associated data files
- Operate the ISOC Science Data Archive System

2.2.1.2 Observation Scheduling Tasks

The Tasks to be performed by the Science Team in support of Observation Scheduling are:

- Preparation of statistics / reports on the ‘long term’ utilisation of Integral Observation time.
- Operation of all orbit/prediction & visibility tools
- Importation, from MOC, of all operations related data/files, PSF, Planning Messages, Timeline Summary, DBOB etc.
- Using OSS create a revolution by revolution sequence of Preferred Observations (POS)
- Transferring of Preferred Observation Schedule (POS) details to MOC and ISDC.
- Liaison with MOC & ISDC in all matters concerning scheduled observations.

[1] The size of the Integral team will be reduced, when SOC activities are transferred from ESTEC to VILSPA.

- Support 'accelerated' re-planning in response to TOOs and Anomalies

2.2.1.3 General Support Tasks

- Support to the PS in the preparation of all necessary Proposal related reports & statistics
- Support to the PS in Public Relations Activities
- General support to proposers/observers via a Help Desk
- Maintain all appropriate 'Operational' procedures

Distribution of Procedures Between ISOC Team Members /Functional Tasks			
Function	Section	Title of Procedure	Comment
Mission Planner & On-call Duty Scientist	5.2.1 5.2.2 5.2.3 5.2.4 5.2.5 5.2.6 5.2.7 5.2.8	Routine Planning Activities Target of Opportunity Scheduling Soft TOO Scheduling Visual Checks on Generated Planning files Checking the Planning Messages Reception & Validation of Timeline Summary Handing of Contingencies Special Observation Related Procedures	
ISOC - ISDC Interface Scientist	5.3.1 5.3.2 5.3.3	Check for reception of new ECS files Processing ECS Preparation for ISOC-ISDC Teleconference	ECS-OCS Handling
Routine Help Desk Support	5.1.1.1 5.1.1.2 5.1.1.3	Help Desk Management Operation of the Help Desk S/W (JitterBug) Maintain & Publish a List of Frequently asked Questions	
ISOC Librarian & System Admin.	5.5.1.1 5.5.1.2 5.5.1.3 5.5.2.1 5.5.2.2 5.5.2.3 5.5.2.4	Flight Dynamics Packages IODB & ED Deliveries Deliveries from OMC Starting & Stopping of the PHS Receiver Task Status Check of the External Interface Machine Status Check of the Operational Server Monitoring of Operational Server	 AO AO
Additional Tasks & Procedures (Shared between Science Team)	5.1.2.1 5.1.2.2 5.1.2.3 5.1.2.4 5.1.2.5 5.1.2.6 5.1.3 5.1.4 5.1.5	Setting of the Correct AO number Monitoring of Proposal Status Proposal Analysis Proposal Updating (Post TAC Analyses) Returning a Proposal (PGT Compatible version) to a Proposer Creation of the CD with copy of Proposals for the TAC Core Programme Submission Calibration & Engineering Proposal Submission Observation Amalgamation	AO AO AO AO AO AO AO Monthly AO
Event Designator / IODB Maintenance	5.6.1 5.6.2 5.6.3	Installation of the new Event Designators Mode & ED Definition & (Re-) configuration Investigation into Problems with IODB/EDs!	
Archive Activities	5.4	Science Data Archive Management	

Table 1 - Distribution of Procedures

2.2.1.4 On-Call Strategy

In line with AD2 & RD.9, the ISOC has implemented an 'out-of-normal-office-hours' (On-Call) support service. This service enables the ISOC team to support TOOs and Instrument Anomalies, which occur at weekends or on public holidays. The baseline, defined in RD.9, is that a member of the Science Team will provide on-call cover, on Saturdays, Sundays & public holidays, during the hours of 9:00 and 17:00.

The person performing this task, rotated among the team members, is called the ISOC Duty Scientist. The nominal period of support provided by a specific Duty Scientist runs from Monday @ 09:00 until the following Monday @09:00.

2.2.2 System Management and Maintenance Group

The SMM Group is responsible for all non-'PHCS' and OS group specific activities and for the 'first-line' maintenance of ISOC hardware & software. This group consist of 3 fte engineers[2].

2.2.2.1 Configuration Controller & System Administrator

The persons(s) occupying this position is (are) expected to carry out the following duties:

- Maintain Configuration Control of all ISOC specific documentation & configurable elements
- Maintain a cross-reference-matrix of Configured Items used by ISOC, ISDC & MOC
- Co-ordinate the maintenance/updating of Systems & Tools shared between ISOC & the other Ground Segment centres
- Import appropriate external deliveries i.e. DBOB, Revno & Orbit files etc.
- Maintain SMM Group 'Operational' procedures

2.2.2.2 Software Maintenance Engineers

The two Software Engineers shall be responsible for the maintenance of the:

- Proposal Handling Software
- Observation Scheduling Software
- ISOC Archive System Software
- Simulator Facilities (running at ISOC)
- Operations related supporting software

Due to the fact that some PI/Instrument Team software will be installed and running within the ISOC, the PI/Instrument Teams are required to support the ISOC in maintaining it. For example the OMC Catalogue & it's associated extraction software. Similarly the MOC are required to maintain the software provided by them. i.e. Visibility Tools, Slew-Time Predictor etc.

[2] The size of the Integral team will be reduced, when SOC activities are transferred from ESTEC to VILSPA

2.3 Regular Meetings & Teleconferences

2.3.1 ISOC Weekly Operations Meeting

The ISOC Weekly Operations Meeting is normally expected to take place, every Wednesday @ 10:30. The standard agenda for these meetings is outlined in Table 2. The participants of the meeting shall include representatives of all ISOC groups. The Minutes of the meeting shall be distributed to all ISOC staff, Head SCI-SD, SGS Co-ordinator.

ISOC Weekly Operations Meeting Agenda
1) Previous minutes
2) Problem Areas
3) System Status
4) Observation Status & Statistics
5) Report on any Deviations/Re-plans performed, (Outside of weekly meeting, in support of unforeseen events.)
6) Short term schedule (for next 2 – 3 weeks)
7) Longer term planning (next couple of months)
8) Archive
9) AOB

Table 2 - ISOC Weekly Operations Meeting Agenda

2.3.2 ISOC Science Planning meetings

Throughout the mission the Project Scientist will organise & chair regular (bi-weekly or monthly) meeting of the ISOC Science team. The principle objective of these meetings is to review the status of the current schedule, with respect to the Long Term Plan (LTP), and amend the LTP accordingly. An integral element of any review of the LTP is feedback, from ISDC, on the status of the executed observations. The determination of the status of executed observations is the key purpose of the bi-weekly ISOC-ISDC telecons. (ref. Section 2.3.4.)

2.3.3 ISOC Configuration Control Board Meetings

These meetings will be held as required. The SCOM or his nominated deputy shall chair this meeting, which will be attended by representatives of ISOC groups. The objective of the meeting is to monitor & control the modifications to the ISOC S/W Systems and all it's configured elements.

2.3.4 Bi-Weekly 'Science' Teleconference with ISDC

These teleconferences are held with ISDC to discuss the status of the observations and the distribution of the science data. In preparation for these meeting the ISDC generated Exposure Completion Status (ECS) files will be imported, into the ISOC system and a new set of Observation Completion Status (OCS) files will generate and dispatched to ISDC. These OCS will reflect the planning, performed to-date.

2.3.5 Bi-Weekly Ground Segment Teleconference

Every 2 – 3 weeks a 3-centre teleconference (MOC, ISOC & ISDC) will take place. These teleconferences are coordinated & chaired by the SGS Co-ordinator. The actual day on which the meeting takes place is not important but it is beneficial it takes place towards the end of a week. i.e. After the weekly ISOC meeting.

2.4 Other Meetings

2.4.1 Integral Science Working Group Meeting

These meetings will be held on a schedule to be defined by the Project Scientist. The SCOM or his nominated deputy will represent the ISOC.

2.4.2 Ground Segment Configuration Control Board Meetings

These meetings will be held as required. The location of the meeting is expected to alternate between the 3 centres. The Mission Manager is expected to chair these meetings.

2.4.3 Ground Segment Co-ordination Meetings

These meetings, involving the three Ground Segment Centres and the four Instrument Teams, are held approximately every 3 months. Co-ordinated & chaired by the SGS Co-ordinator they provide the main forum for monitoring & reporting on the overall mission operations. ISOC participation is expected to depend heavily on the agenda of items to be discussed.

2.4.4 AO Co-ordination Meetings

These meetings will be held prior to & during each AO Call. They will be chaired by the Project Scientist or his nominated scientific deputy and will be attended by all member of the ISOC Science Team. The objective of these meetings is to co-ordinate & monitor the progress of an AO call and to identify & correct potential problems

2.5 ISOC Formal Contact Persons/points

2.5.1 Operational Requests & Overall Management

The official contact point, within the ISOC for all operational matters, is the Science Operations Manager (SCOM) or his/her nominated representative. The SCOM shall be provided with a mobile phone so that he/she can be contact at anytime. Refer to Table 3 & Table 4.

2.5.2 TOO Alerts

The ISOC will establish a dedicated ALERT email address (intalert@rsd.esa.int) to be used by all external parties, to notify the ISOC that they have identified a potential TOO. This email address is connected to the mobile phone SMS system in order to bring the alert to the attention of the Project Scientist, SCOM and Duty Scientist. The SCOM/PS will then co-ordinate the ISOC response to alert.

2.5.3 All other Queries

All non-time critical queries & question relating to Integral or submitted proposal should be routed to the Integral Help Desk. (inthelp@rssd.esa.int) These questions will then be reviewed by the Help Desk manager and routed to the appropriate person/centre for further action and follow-up.

2.5.4 List of Email Accounts

The Table 3 provides a summary of the 'formal' email accounts/aliases used within the ISOC for the various operational tasks.

Formal ISOC Email Addresses	
Email Address	**Description of Purpose**
inthelp@rssd.esa.int	Integral Help Desk
intalert@rssd.esa.int	Used to inform ISOC of a potential TOOs
isocprop@rssd.esa.int	Used by ISOC Proposal Handlers
isocsci@rssd.esa.int	Alias used contact whole ISOC Science Team
isoclib@rssd.esa.int	Use to send items/mail to ISOC Librarian & ISOC CCB Secretary
Arvind.Parmar@esa.int	Mission Manager (A. Parmar)
Christoph.Winkler@esa.int	Project Scientist (C. Winkler)
Lars.Hansson@esa.int	Science Operations Manager (L. Hansson)

Table 3 - List of Formal ISOC Email Addresses

2.5.5 List of Telephone points of Contact

The Table 4 provides a summary of the 'formal' telephone numbers used within the ISOC for the various operational tasks.

List of ISOC Telephone Numbers	
Telephone Number	**Description of Purpose**
+31 71 565 3551; 3567; 3568	Operations Room
+31 71 565 4219	Operations Room Fax machine
+31 71 565 6188	Meeting Room (Fl072) – Standard line
+31 71 565 5614	ISOC Meeting Room (Fl072) – Conference Box line
+31 71 565 3591	Project Scientist (C. Winkler)
+31 71 565 4532	Mission Manager (A. Parmar)
+31 71 565 3471	Science Operations Manager (L. Hansson)
+31 71 565 5434	ISOC Office Fax machine
+31 6 52062136	Mobile assigned to Mission Manager (A. Parmar)
+31 6 52062137	Mobile assigned to Deputy Project Scientist (R. Much)
+31 6 52062138	Mobile assigned to Science Operations Manager (L. Hansson)
+31 6 52062139	***Mobile assigned to ISOC Duty Scientist (Scientist on-call)***
+31 6 53775153	Private Mobile of Project Scientist (C. Winkler)

Table 4 - List of Key ISOC Telephone Numbers

3. The ISOC System

3.1 System Overview

The ISOC system will in the main support the uplink activities but in addition it will host a copy of the INTEGRAL archive (mirror of the ISDC INTEGRAL archive). Consequently the ISOC system (see RD.5) is split in two independent elements: the **ISOC core system** to support the uplink operations and the **Archive and Distribution System (ADS).**

3.2 The ISOC Core System

The **ISOC core system** consists of the following elements:

- **ISOC WWW System (IWS):** this system provides access to ISOC for the public. It will in particular gives access to the AO package and PGT, to the catalogues, access to the Proposal Public Data and handling of the Change Requests (access to the change requests is controlled by password). The astronomers will be able to access the Observation Time Estimator and the Target Visibility Tool.
- **Proposal Generation Tool (PGT):** PGT can be downloaded from the WWW on the user local machine. All astronomers are required to use the PGT, to prepare and submit their proposals.
- **Proposal Handling System (PHS):** This system is running at ISOC only and used by the ISOC Proposal Handlers to mainly maintain the ISOC Mission DataBase (containing the proposals and observations data).
- **Observation Scheduling System (OSS):** This system is running at ISOC only and used by the Mission Planners to schedule observations.
- **Configuration Control Subsystem (CCS)**: This system is only running at ISOC and used by the ISOC Configuration Controller to maintain and update the ISOC Configurable Parameters.
- **ISOC Simulations Facilities**: these include, the Observation Time Estimator (OTE), the Instrument Parameter Validator (IPV), Starmap and the Target Visibility Predictor (TVP). The scientific community in the preparation of their proposals will have access to the OTE & the TVP.

3.2.1 ISOC WWW System (IWS)

The IWS will provide the following functionality:

- on-line access to the Announcement of Opportunity documentation and information.
- access to the PGT software for download on the user local machine using FTP.
- access to the simulation tools (Target Visibility Predictor and Observation Time Estimator): the system will check the correctness and completeness of the user inputs, trigger the simulations and display back the simulations results to the user.
- access to the Change Request system: the IWS will check the correctness and completeness of the user inputs. Access to this tool will be restricted by a password. The system will automatically store the submitted Change Request in the CR database at ISOC.
- query the CR data base: the system will check the correctness and completeness of the user inputs then perform the submitted query on the CR database, and display back the query results to the user.
- display the Proposal Data Public Data: the system will provide access to the proposal public data. The PHS automatically updates these public data at regular interval.

3.2.2 Proposal Generation Tool (PGT)

The PGT functionality's are:

- support of the user in the preparation of the proposals via the GUI.
- checking the user entries for valid values at entry time.
- global checking at proposal level. This will check the syntax and completeness of the proposal.
- store and reload a proposal on the local disk.
- access to the TVP and OTE (tbc).
- interface with the ISOC: the PGT will send the submitted proposal to ISOC.

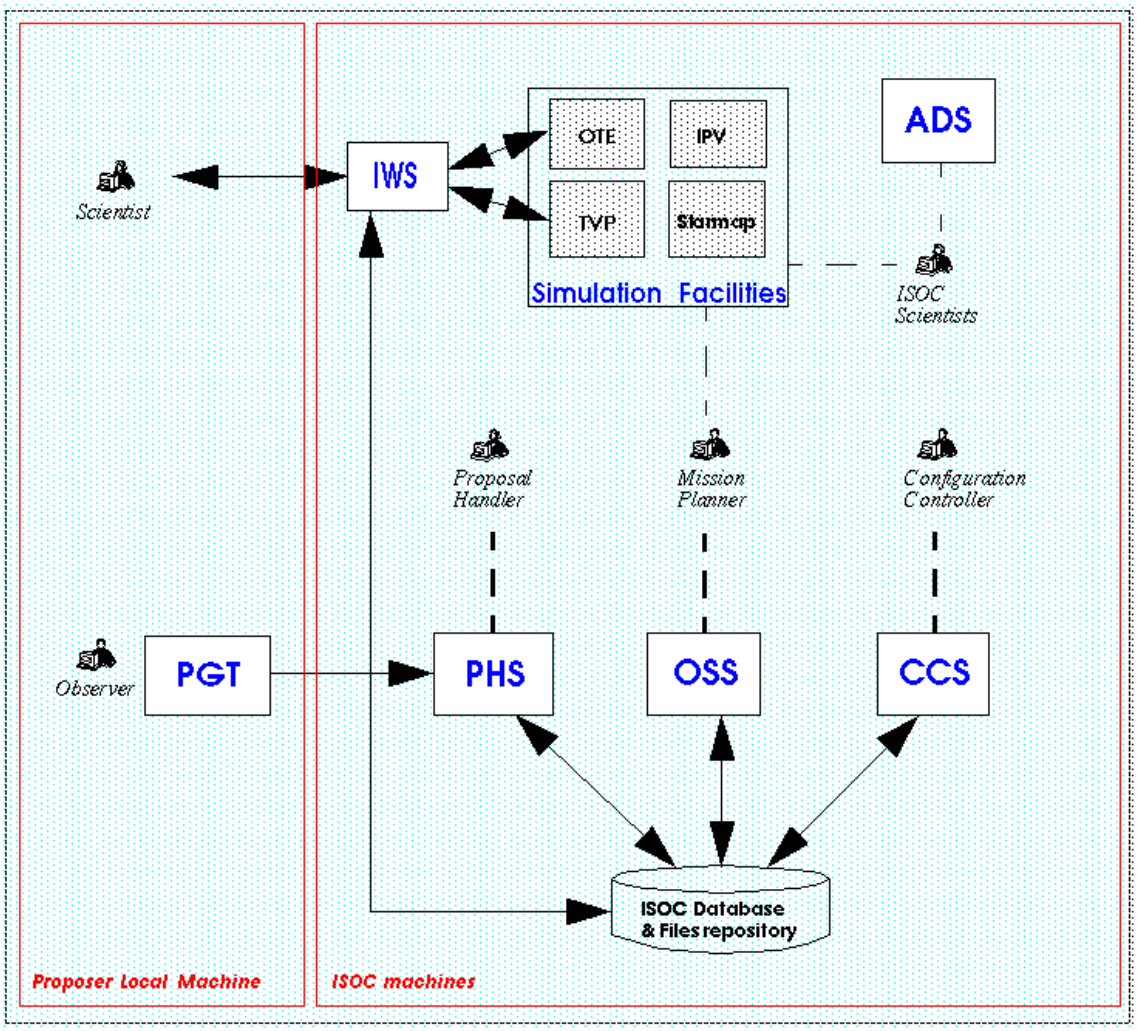


Figure 3-1 Schematic of the ISOC System

3.2.3 Proposal Handling System (PHS)

The PHS functionality's are:

- reception of the proposal sent by PGT. At reception, the PHS will further check the proposal. If the checks fail, the PHS will store the proposal in a dedicated directory and automatically inform by email the proposer. If the checks succeed, the PHS will store the proposal and observations in the ISOC Mission Database and further process the proposal and observations data (e.g setting the identifiers, setting the status etc...).

- processing of the Exposure Completion Status (ECS) received from the ISDC and to update the exposures data ISOC Mission data base consequently.
- generation of the Observations Completion Status (OCS) File. This involves processing the exposure data, update the observation data in the ISOC Mission Database, and write the output file (OCS).
- interface with the IFTS for getting and sending files to the external centres (MOC/ISDC)
- generation of statistics/ reports to support the operations (e.g. TAC)
- support the capability of amalgamating observations from different proposals

3.2.4 Observation Scheduling System (OSS)

The OSS functionality's are:

- interface with IFTS for sending and receiving the planning files.
- import of the PSF received from MOC into the ISOC system: this will set all the schedule constraints in the ISOC database.
- automatic scheduling of the GSHO windows and the RWB: the OSS will automatically put the GSHO windows inside the overlap windows according to a pre-defined strategy.
- automatic scheduling of the fixed time observations: the system will place them in the observations windows and create the necessary exposures. The system will reshuffle the GSHO and the RWB windows in order to optimise the exposure duration's and hence provide maximum utilisation of the observation time.
- extraction of the observations selected by the Mission Planner from the ISOC Mission Database.
- automatic schedule of the observations: the system will reshuffle the GSHO windows and the RWB in order to maximise the observation time. The system will automatically fill-in the gaps in the schedule by finding the gaps in the schedule, scanning the ISOC Mission data base, extracting an observation, scheduling it (creating the exposures)
- calculation of the slew time between exposures using the MOC provided software generation of the planning files POS/ICP/POD
- calculation of the OMC sub-windows using the OMC provided software, definition of the pointing identifiers, generation of the EDs necessary per exposure
- display of the schedule.

3.2.5 Configuration Control Subsystem (CCS)

The CCS functionality's are:

- Importation & Maintenance of the Event Designators (ED) and associated 'Instrument/ISOC Modes/Observation Configurations
- Maintenance of the ISOC configurable parameters (Some parameters are now maintained in sub-system configuration Scripts.)
- Maintenance of the List of Proposer Identifiers

3.2.6 ISOC Simulations Facilities

3.2.6.1 Starmap

The ISOC Star-map interfaces with the DBOB (received from MOC) and the ISOC Mission Database. Star-map will be used to create sky-bin plots in both equatorial and galactic co-ordinate reference systems on to which the ISOC Mission Planners can project the co-ordinates of the observations contained within the database.

3.2.6.2 Target Visibility Predictor (TVP)

The TVP will determine the visible sky-bins for a given celestial position.

3.2.6.3 Observation Time Estimator (OTE)

The OTE will calculate the estimated duration of an observation given the source characteristics and the operational mode.

3.2.6.4 Instrument Parameter Validator (IPV)

The IPV will simulate the instrument behaviour in particular the telemetry rate required for a given instrument mode and parameter setting.

3.3 ISOC Archive and Distribution System

For details of the ISOC **Archive and Distribution System (ADS)** refer to RD.32.

3.4 ISOC Network Configuration

During the operations the ISOC will communicate with ISDC and the MOC via Internet. The MOC system IFTS will be installed at the three centres. All the files transfer between the ISOC on one hand and MOC/ISDC on the other hand will be via IFTS (based on TCP/IP and FTP). Some other file transfers will be via FTP (e.g. OBSW). The ISOC will include two networks:

3.4.1 Operational Network

This network will host the machines to run the critical operational parts of the ISOC system. One machine will be used by a Mission Planner to access the Observation Scheduling System (OSS). Another will be used by a Proposal Handler to access the Proposal Handling System (PHS). The third machine will be used by the Configuration Controller to access the Configuration Control System in order to update the ISOC Configurable Parameters. This third machine will also act as backup to the nominal PHS & OSS machines.

The Operational Network is completely protected from external access: no access from outside to this network will be possible. All the machines on the operational network, and the network itself, are installed in a dedicated & secure area.

3.4.2 Development Network

This network will host the machines used as office and development machines. The machines where IFTS, PHS receiver and IWS are installed will be accessible from the outside world. The IFTS is used for the file transfer with MOC and ISDC. Some other transfer will be made using FTP. A local copy of the OSS with the ISOC Mission database will be installed on one of the scientist machines. This will be used by the Mission Planner to work on the Long Term Plan and to establish the long term planning strategy.

All other software packages will be installed on the server. The access to software and data will be controlled using user accounts, access rights, groups of the UNIX Operating System and user accounts and protections in Oracle. (See RD.5)

4. Overview of ISOC Activities

4.1 Support to the Announcement of Opportunity (AO) Process

4.1.1 Preparation & Maintenance of AO Documentation

The ISOC is responsible for the production and maintenance of all documentation associated with the Announcement of Opportunity (AO). This documentation contains detailed descriptions of all systems relevant for the observer and shall be updated, where necessary, prior to each AO.

The AO documentation is prepared by the ISOC Science team, based on inputs received from all INTEGRAL parties (Instrument teams, Mission Scientists, ISDC, MOC, Integral Project Team and the ISOC). Prior to each release of the documentation all parties are required to participate in its review. The latest version of the documentation will be made available to the public via the Integral SOC Web site. http://astro.esa.int/Integral/isoc/html/

The five main elements of the AO documentation are:

- Executive Summary
- Integral Manual
- Integral Guaranteed Time
- Instrument Observers Manuals
- Policies, Procedures & Forms

4.1.1.1 Executive Summary

This gives a short summary of the spacecraft and instrument capabilities, the core programme and general programme information (i.e. amount of available time), the proposal submission process, the time allocation process, data rights and a short overview of the call documentation.

4.1.1.2 INTEGRAL Manual

This document gives the overview of the mission aspects of INTEGRAL (orbit, viewing constraints, pointing etc.), and gives detailed information on the INTEGRAL ground segment, including proposal submission, proposal handling, mission planning, observation execution and changes in the schedule, TOO handling, calibration and data processing. It should give a brief overview of gamma-ray astronomy. Details on the different source types for INTEGRAL (e.g. transients, TOOs etc.) should be given, as well as all special observing modes available to the observer (dithering possibilities, fixed time observations, etc.).

4.1.1.3 INTEGRAL Guaranteed Time

This document gives a detailed description of the guaranteed time programme on INTEGRAL. Including the GPS, GCDE, and pointed observations, including TOO follow-up observations. It needs to include clear scientific goals of all parts of the GT, in order to allow observers to propose pointed observations on targets that may be in the GPS or GCDE. The document should give enough information for the observer and the TAC to decide whether open time observations are duplicating the GT or not.

4.1.1.4 Instrument Observer Manual's

For each of the four instruments this document describes in detail the instruments design, operations, observing modes, and data products that will be sent out to the observer. Each manual should contain details on the instrumental sensitivities (preferably measured, but if necessary estimated), and a description how the observer can do a rough estimate of an observing time (without using the simulator). Also a detailed example of an observing time estimate should be given in each manual.

4.1.1.5 Policies, Procedures and Forms

This document gives detailed information on the proposal sub-mission procedure, the types of proposals, TOO proposals, Proposal evaluation and selection (TAC), possible modifications to observations post-launch (due to big changes in instrument sensitivities etc.), future calls for proposals, data processing and products, data rights. It should give examples of filled in proposal forms.

4.1.2 Time Allocation Committee (TAC) Support

Refer to section 5.1.2.

4.2 Help Desk & Community Support

4.2.1 The INTEGRAL Help Desk

The purpose of the INTEGRAL help desk is to answer questions from observers on INTEGRAL (proposals, scheduling, data etc.) with a short turn around time. The target time between receiving a question and answering /responding to it being a few working days. It is however anticipated that most queries received will be minor and hence answered on a much shorter time scale. In order to make logging of questions and answers possible the helpdesk will only respond to questions submitted **electronically**.

The central helpdesk account for INTEGRAL, inthelp@rssd.esa.int, has been implemented by ISOC. Therefore although the INTEGRAL Science Ground Segment is split between two sites (ISOC and ISDC), it is intended that this will be kept transparent to the observer. An observer will therefore see only one helpdesk.

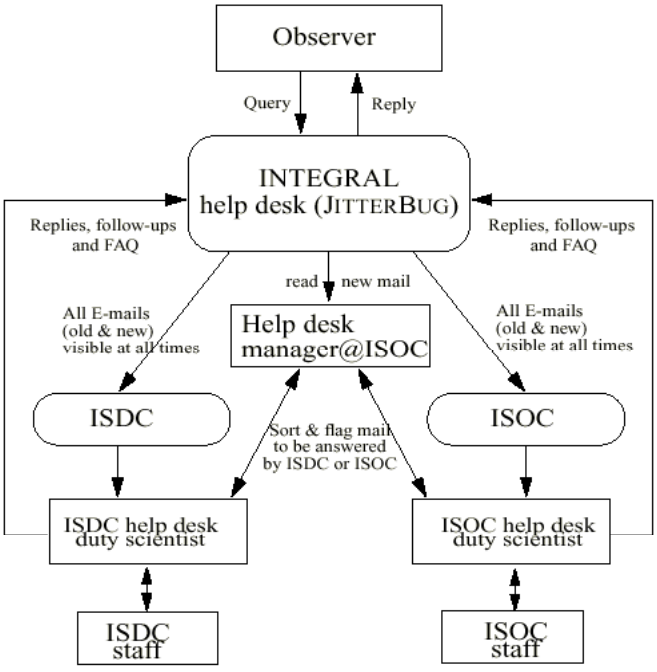


Figure 4-1 The Integral Help Desk

All submitted queries will be distributed/available to both ISOC & ISDC helpdesk staff with the Help Desk Manager at ISOC co-ordinating the responses. ISDC team will answer questions on INTEGRAL data product's instrument calibration results and data shipment. The ISOC team will answer questions on Proposals, observing modes, observation scheduling and general INTEGRAL questions.

The incoming Email will be logged, and each query received will be assigned a reference number. The person making the query will be automatically notified of the number assigned. In all future

correspondence the person who made the original query must quote this reference number. The answers that are sent back, from the ISOC or ISDC, to the observers will also be logged and tracked using this reference number

4.2.2 The ISOC Science & Helpdesk Web sites

The ISOC will maintain a web site dedicated to providing details of the Integral mission and its operations status.

4.2.3 Publication of the ISOC Newsletter

The Integral Science Operations Centre Newsletter will be an important medium to inform the community of news concerning INTEGRAL proposals, scheduling, data processing, calibration and science. The newsletter will be available in electronic (PDF) format from the ISOC External Web page http://astro.esa.int/Integral/isoc/html/. Registered users/proposers will be notified by email when a new or updated Newsletter is available on the web.

4.3 New Proposal Submission & Processing

4.3.1 The Proposal Reception System

Proposals can only be submitted to the ISOC when the Proposal Receiver S/W is enabled. At the start of each AO, or beginning of any period of the approved (re-) submission, the ISOC will Start/Enable the Proposal Receiver S/W. This S/W will then remain Enabled until the end of the AO submission period. The period during which the Receiver is enabled will be identified in the AO data package.

4.3.2 Open Time Proposals, submitted as part of the AO/TAC Process

The vast majority of proposal requests, for Integral Observing Time, will come in response to the Announcements of Opportunities (AO) to be made prior to and during the mission. A brief overview of how such proposals are handled by the ISOC is given below.

4.3.2.1 The Submission of an Open Time Proposal, as part of an AO

Before submitting a proposal a Proposer must first download and install the ISOC PGT software. This S/W is available from the ISOC Operational Web site. The Proposer is then free to create his/her proposals. Before submitting the proposal the proposer should attach his/her Scientific Justification in the format identified in the AO documentation. On a rare occasion, and only after approval from the Help Desk, a science justification may be submitted via ftp.

On reception of a proposal, the ISOC Proposal Handling System (PHS) checks its validity against several predefined criteria and:

If no errors are detected:

- The proposal is flagged as VALIDATED and placed in the Proposal Database with its status set to VALIDATED.
- An automatic task will send an Email to the Proposer advising him/her that the proposal has been successfully received & validated. The Email also contains the automatically generated Proposal ID. assigned to this proposal. This Proposal ID must be quoted in all future communications with the ISOC Help Desk, regarding this Proposal.
- A copy of the Email will be sent to a special ISOC Proposal Handler account (isocprop@rssd.esa.int) for internal ISOC records.

If found in error:

- The proposal is placed in the INVALID Proposals Directory within the PHS.
- An automatic task will send the proposal back to the Proposer indicating that the proposal failed the validation process. The Email will contain details of the error(s) detected.
- A copy of the Email will be sent to the special Proposal Handler account for internal ISOC records.

4.3.2.2 The Re-Submission of an Open Time Proposal, during the AO

At any time during the AO Call an observer is free to resubmit an already Validated Proposal. The procedure for re-submission is basically the same as for the first time submission with the only additional constraint, on the proposer, being that (s)he is required to use the “ReSUBMIT” option.

Any successfully validated re-submitted proposal will be stored in the database with a new/high version number. On the other hand any re-submitted proposal not containing a valid Proposal ID will be treated by PHS as a new proposal and, if successfully validated, will result in a new proposal in the database with a new Proposal ID.

4.3.2.3 Processing of Validated Proposals, by ISOC, prior to TAC Analysis

Once the period of an AO Call has elapsed, and the PHS Receiver Interface has been Stopped /Disabled the ISOC Proposal Handling team have the task of analysing all Validated Proposals, before their submission to the Time Allocation Committee (TAC). To examine the proposals in the database the Proposal Handlers utilise the Proposal Handling System (PHS). Using the PHS it will be possible to filter, sort and print a complete proposal and/or certain characteristics of the various observations contained within it.

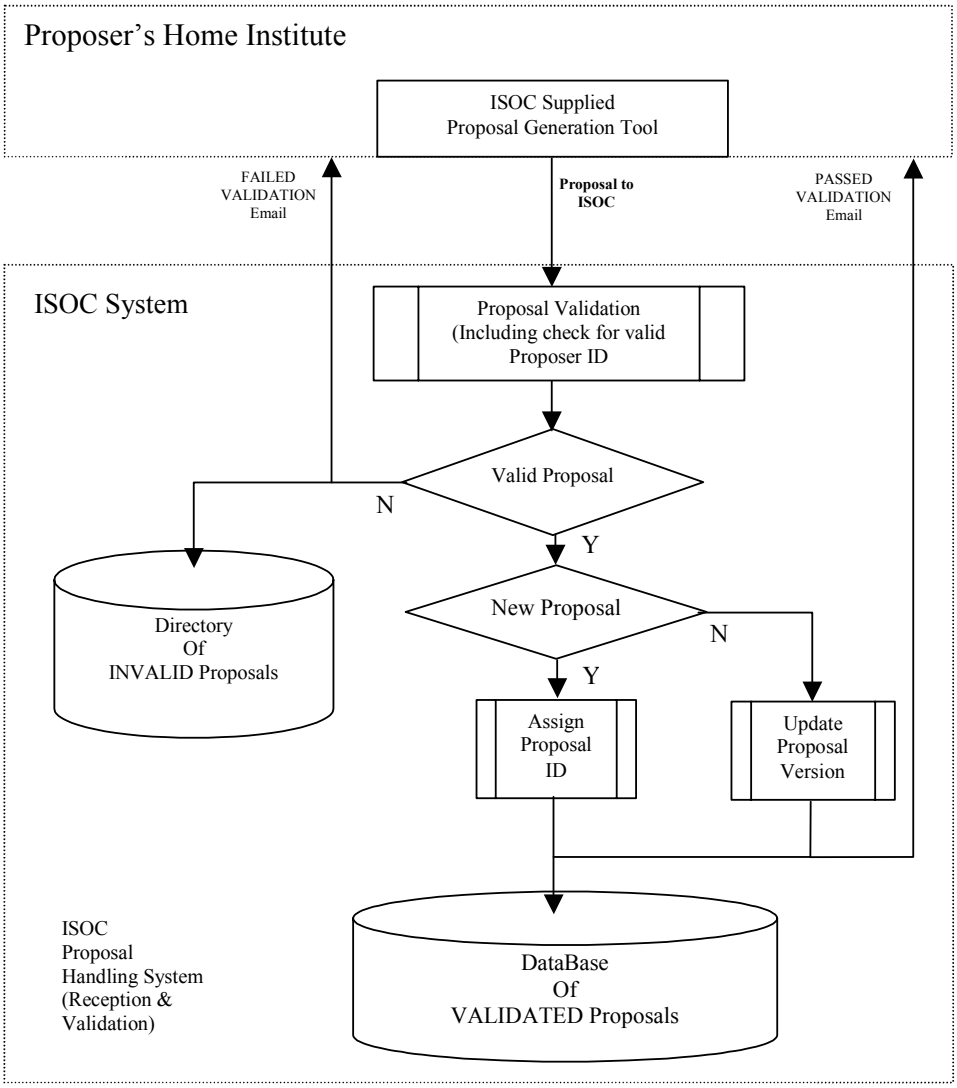


Figure 4-2 Proposal Reception & Validation

Depending on the nature of the requested observations, the ISOC staff may use of the Observation Time Estimator (OTE) and the Target Visibility Prediction (TVP) Software to aide their analysis into the feasibility of a specific proposal/observation. Following the completion of the analysis of the Validated Proposal, the ISOC Proposal Handling team will prepare (off line) a brief report (Technical Feasibility Assessment) on each proposal.

The staff of the ISOC will then sort the Proposals into their TAC Panel subjects. The full Proposal (including Scientific Justification) and the brief report, prepared by the ISOC, will then be sent to the appropriate members of the TAC.

4.3.2.4 Processing of Validated Proposals, by ISOC, post TAC Analysis

Following the completion of the TAC process the ISOC Staff will be required to update certain (specific) fields of the Validated Proposals held within the database. The fields which the ISOC must update, post TAC analysis, include TAC Status (APPROVED/REJECTED); TAC assigned Priority; Allocated Duration…. etc.

4.3.3 Core Programme Observations

Prior to each AO, the ISOC will enter the characteristics of all Core Programme observations, in line with instructions received from the Project Scientist/ISWT. The observations to be performed within the Core Programme are:

- Pointed Observations
- Galactic Plane Scans
- Galactic Centre Deep Exposure

4.3.3.1 Submission of Pointed Observations

The procedure for the submission of the Pointed Observations is basically identical to that used to submit Open Time Proposals. The only real differences are that the astronomers, within the ISOC, submit the proposals/observations, via PGT, and the proposal details are not sent to the TAC for approval. The ISOC Proposal Handlers will set the “APPROVED” flag, in the Proposal Database, after the Project Scientist has cross-checked what has been entered.

4.3.3.2 Submission of GPS

On a yearly basis the ISOC team, using a dedicated set of Tools/Software Scripts, will enter into the PHS all the observation required to perform the weekly GPS scans.

4.3.3.3 Submission of GCDE

On a yearly basis the ISOC team, using a dedicated set of Tools/Software Scripts, will enter into the PHS all the observation required to perform the GCDE scans.

4.3.4 Submission of Calibration proposals/Observations

In order to be scheduled by the ISOC, Instrument Calibrations will have to exist within the ISOC Proposal / Observation databases. All post launch instrument calibration requests/proposals will be entered directly into the ISOC database, using the PHS system.

Submission of a calibration proposal / observation will be performed by the ISOC Science team, using the PHS, in response to a request from a specific Instrument Team. The Payload Calibration Working Group must provide approval for the submission of a calibration proposal.

4.3.5 Submission of Engineering Proposals/Observations

Technically speaking, the ISOC planning system cannot be used to perform 'engineering' activities such as SPI Annealing, instrument memory loading and dumping etc. It has however been recognised that to perform these type of activities, system resources such as TM Allocation and special satellite attitudes etc., along with the ability to reserve (block) a period of instrument 'observing' time will be required.

Submission of engineering observation will be performed in-house by the ISOC Science Team in response to requests received from, & approved by, the Ground Segment Co-ordination meetings 2.4.3.

4.4 TOO Submission & Declaration

4.4.1 Submission of ToO Proposals, outside of AO/TAC & CP

Although it is expected that most 'potential' Target of Opportunity (ToO) proposals will be received and approved as part of the CP & AO process, it is expected that some additional proposals will be submitted, during the course of the mission, in response to observed transients. At any time, throughout the mission, therefore the ISOC may receive a request to interrupt the nominal planned sequence of observation and schedule a ToO.

The mechanism for the submission of a ToO request is via the dedicated web page http://astro.estec.esa.nl/Integral/isoc/html/too/my_too_alert.html. After entering & committing the required information, an email will be sent to a dedicated email alias (intalert@rssd.esa.int). All emails generated/received will be automatically forwarded to the ISOC Science Team. In addition an SMS will be sent to the ISOC Duty Scientist, advising him/her of the existence of the alert.

On reception of the request, the ISOC Duty Scientist will:

- Confirm the reception of the request with the Project Scientist.
- Perform a manual check, against a predefined set of catalogues, if the RA & DEC of the source corresponds to a know 'fast transient'
- Check the feasibility of scheduling the required observation (Source visibility, S/C attitude constraints etc.)
- Assess the implications, scientific & technical, of interrupting the present 'pre-planned' schedule.
- Cross-check the request against the list of already approved proposals
- Report back to the Project Scientist on his/her findings

4.4.2 Declaration of a ToO

If the Project Scientist declares the TOO to be valid, he will issue a TOO notification. This notification will be distributed to the ISWT and all elements in the ground segment. This notification will advise everyone that a TOO has been declared and, if necessary, a re-plan of the schedule has been approved.

The ISOC's response to the declaration of a TOO will be:

1. If an already approved proposal exists in the database, he will authorise the ISOC Planners to schedule the TOO and where in the ongoing schedule they should insert the TOO.
   If the approved observation does not belong to the person who has notified the ISOC of the TOO, the ISOC Help Desk will contact the original proposer and advise him/her that his proposal/observation is about to be scheduled.

   Or

2. If no approved proposal exists, within the database, the ISOC Duty Scientist will be instructed to assist the 'New TOO proposer' to submit one. The sequence events involved in do this are:
   - ISOC Help Desk contacts proposer advising him/her that the TOO request has been authorised and providing, if needed a Proposer ID.
   - If applicable ISOC Proposal Handler adds the new Proposer ID to the "List of Proposer Identifiers" contained within CCS.

- Using the data, provided by the proposer, the ISOC Proposal Handler then creates and submits to PHS, the new TOO proposal. (Note: In order to minimise the time required to generate a new Proposal/observation the ISOC will maintain some generic TOO templates. The proposal is assigned type 'TOO non-TAC' approved. Assuming the data has been entered correctly, the proposer of the TOO should receive, from PHS, notification that his proposal has been VALIDATED & placed in the proposal DataBase.
- Once the completed proposal has been checked, by the Project Scientist, its' status will be updated to APPROVED. At the same time the ISOC Proposal handler will insert the additional 'post TAC' field values. i.e. "Approved Duration", "Priority" etc..
- With the approved proposal now in the database the ISOC Mission Planner can initiate the appropriate 're-plan' of the ongoing schedule.

The process for scheduling an observation resulting from the declaration of a TOO is addressed in sections 4.6.4 and 5.2.2.

4.5 Proposal Maintenance

4.5.1 Amalgamation of Open Time Observations

As part of the AO process the ISOC will prepare for the TAC list of possible 'proposed' Observations that could be amalgamated. These lists, of potential amalgamated observations will then be forwarded to the TAC for their consideration/ approval.

Details of the amalgamation requirements/rules are provided in the ISOC URD (RD.2). It is possible for the ISOC to set a flag in PHS to INHIBIT the observations from a specific proposal from being considered for amalgamation, should such a need be justified.

After approval by the TAC, or additional recommendations by them, the ISOC staff will contact the proposers advising them of the TAC recommendation. Assuming the various proposers accept the TAC recommendation, the ISOC staff will then update the Proposal/Observation database accordingly.

4.5.2 Sending of Proposal & Observation Related Data to ISDC

Following the completion of the AO process the ISOC Proposal Handlers will generate and send to the ISDC the Proposal Administrative Data (PAD), Initial Observation Parameters (IOP) and the TOO Justification/Criteria.

The PAD & IOP can be sequentially generated and sent using the appropriate field/buttons on the Main Menu of Proposal Handling System (PHS). The justification associated with a TOO observation is not included within the PAD nor the IOP and must be separately generated by the ISOC Proposal Handler. In order to generate a file containing the TOO Justification therefore the ISOC Proposal Handler must perform a query of the database for all Observations of type TOO. He/she must then sort & save the justification by Observation ID in a file. After the file has been created it must be copied from the Operational Network on to the Office/development network from where it can be emailed to the ISDC. The format of the TOO Justification File and the destination email address are TBD. It is expected that these will be defined in the ISOC-ISDC Interactions Document (AD.7).

Due to the fact that Proposal/Observation Database will be updated between AOs, as TOO, Calibration & Engineering Observations etc. are added/modified, the ISOC are required (RD.11) to send new versions of the PAD, IOP and TOO Justifications to the ISDC whenever they are affected.

4.5.3 Modification of an Open Time Proposal, outside of the AO period

Once the AO Call has been deemed closed, by the Project Scientist, any observer wishing to update/modify a proposal must first contact the ISOC Help Desk. The observer will be required to provide his/her Proposer & Proposal Ids, the details of the changes to be made along with the justification as to why the changes are necessary. Only after analysing the request, including possible consultation with the observer, the Help Desk will refer the matter to the Project Scientist.

If the Project Scientist approves the request, a member of the ISOC Science team will then carry out the approved modifications to the proposal and send a copy of the modified proposal back to the

observer/proposer, for his/her confirmation. During the period between the requested update and the reception/acknowledgement, from/by the Proposers, indicating his acceptance of the changes implemented, the scheduling of the proposal/observation will be blocked.

4.5.4 Modification of the Core Programme

The ISOC team will only perform modification to any part of the Core Programme observations only at the request of the Project Scientist. The ISOC Proposal Handlers using dedicated version of PGT can carry out changes to the 'pointed observations'. Due to the nature of the implementation of the GPS & GCDE proposals/observation, within PHS, changes to their structure & observing strategies may require the support of the ISOC S/W maintenance team.

4.5.5 Updating of Calibration & Engineering Observations

It is expected that, throughout the mission, there will be the need to add new and modify existing Calibration & Engineering observations.

Changes to/& addition of Engineering observation will be performed in-house, by the ISOC team, in response to a request from MOC and where appropriate in consultation with the applicable Instrument Team.

Changes to/& addition of Calibration observation will also be carried out by the ISOC team but in their case it will be in response to /in conjunction with the appropriate Instrument Team(s) and ISDC. Details of the in-flight calibration concept are contained in the In-flight Calibration Plan, RD.30.

4.6 Observation Scheduling

4.6.1 Long Term & Short Term Plan

Following the completion of each AO Call and TAC processing, the ISOC Mission Planners will generate a set of 'long term' plans/observing scenarios, covering observation period (Year of Mission) to which the AO relates. This set of 'Long Term Plans' will be used by the Project Scientist, in consultation with the ISWT, to determine the final planning strategy to be used by the ISOC. The key elements of this strategy are summarised, by the Project Scientist, in the Mission Planning Guidelines (RD.31), provided to the ISOC planners. The overall outcome of the strategy is reflected in the long term & short term plans produced by the ISOC Science team.

Previous experience has shown that any long-term plan produced never fully reflects what will eventually be scheduled. This is especially the case where, as is the case with Integral, observation times are relatively large and hence subject to 'frequent' interruptions to support ToOs. The LTP can however be used to provide an accurate prediction on when /if it is possible to schedule specific (eg. Fixed Time and 'Co-ordinated') observation and to what degree there may be some over/under capacity with respect to predicted sky visibility. The LTP is published by ISOC on the web at http://astro.esa.int/Integral/isoc/html/. Throughout the mission, regular meetings are held, between the Project Scientist & ISOC Science team, to review the status of the LTP and update where appropriate.

A Short Term Plan (STP), derived from the LTP, is also published buy the ISOC on the WEB at http://astro.esa.int/Integral/isoc/html/ This STP, which typically cover a period of up to 3 weeks in the future, is a reflection of the actual planning status. The STP is derived / extracted dynamically from the ISOC database every time a web user refreshes the screen.

4.6.2 Overview of the Routine Planning Cycle

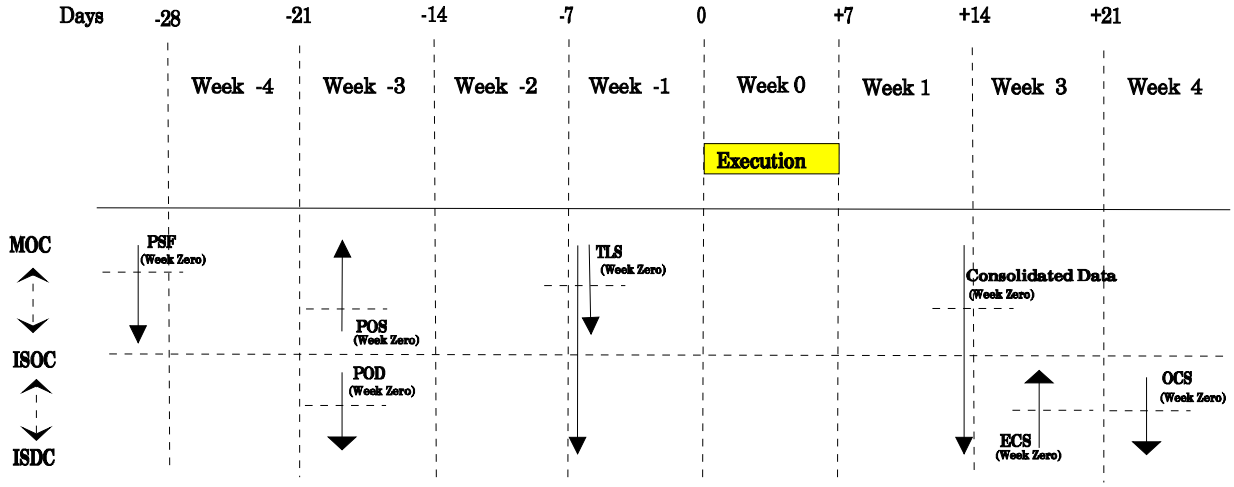
The high level planning cycle of RD.6, calls for the MOC to provide, the ISOC, the Planning Skeleton File (PSF) associated with a specific orbit approximately 28 to 35 days in advance of that actual revolution being executed. The ISOC is then required to return the corresponding Preferred Observation Sequence (POS) at least 14 days before their execution is due. Thus allowing the MOC sufficient time to generate and, the MOC to validate the corresponding Timeline. The planning files, PSF, POS, POD, TSF etc. always contain details of the operations to be performed for a complete Revolution.

MOC will send a summary of the Timeline (TSF) to the ISOC for formal approval and a copy to the ISDC. The process of Timeline generation normally takes place one week in advance of its scheduled execution time.

As part of the POS generation process, the ISOC, also generate a Planning and Observation Data (POD) file for subsequent transmission to the ISDC. This POD is used to provide the ISDC the observation details relating to the planned observations that its required to assist in the interpretation of the raw instrument data received from MOC.

Following the execution of each revolution the ISDC will make available to ISOC the appropriate Exposure Completion Status files. These files are generated by the ISDC on the consolidated data

received from MOC one - two weeks after the event. These ECS files provide the ISOC with the statistics it requires on the 'degree of completeness' of the executed/scheduled exposures. The ISOC Mission Planners, after reviewing the contents of these reports, will be able to import them into PHS. The result of such an import will be that the PHS will update the 'scheduled/to be scheduled' times of the applicable observations. At regular intervals, possibly, weekly, the ISOC Mission Planners will generate and send to the ISDC, also using the PHS, a set of Observation Completion Status files. OCSs are sent for all observations whose states have changed since they were last sent.



The Integral Planning Cycle

(For a revolutuion to be Executed in Week 0)

Figure 4-3 The Integral Planning Cycle

4.6.3 The Nominal Planning Process @ ISOC

4.6.3.1 Importation of New PSFs

On a regular basis, at least once per week, the Mission Planner will check to see if MOC have sent any new or updated Planning Skeleton Files (PSF). These files will normally refer to future 'as yet unscheduled' revolutions but may, on rare occasions, such as ground station availability change, relate to a previously scheduled (but not yet executed) one. If the PSFs sent are updates to existing one the MOC normal contact the planners via email. The planners then use the Observation Scheduling System (OSS), to import these PSFs.

4.6.3.2 Selection of the Observations to be scheduled

Based on the Long Term Plan, approved by the Project Scientist, the Duty Mission Planner will, using the Observation Scheduling System (OSS), select the areas of the sky (called Sky Bins) where it is possible to schedule observations. These Sky Bins being selected on user definable criteria such as:

- Sky Bin visible for greater than…
- Sky Bin visible in a specific revolution/week or month etc.

4.6.3.2.1 Identification of potential observations

Once the appropriate/available Sky Bins have been identified, the Mission Planner will search the Proposal/Observation Database, using one or more 'user definable' sets of search criteria, for suitable /potential observations to cover the period(s) defined in the Sky Bins.

The sort/selection criteria will cover things like:

- Scientific Priority,
- Observation Type (Fixed Time, Calibration etc.),
- Sky Bin Location,
- Instruments to be used,
- Whether part of an observation has already been observed? etc.

Normally much of this effort will not be required as the primary source for which observations are to schedule & when is the LTP.

4.6.3.2.2 GPS and GCDE observations

Due to the fact that it is expected that most TOO candidates will be detected as part of the GPS & GCDE data processing, the ISOC Mission Planner will, whenever possible, schedule the weekly GPS & GCDE observations to be performed near the beginning of a week. Thus ensuring that the observation related data should be available at the ISDC during the normal working week. In this way it is hoped to shorten the TOO Turnaround Time. The optimum time for scheduling such observations is believed to be late Sunday night or early Monday morning.

When it comes to scheduling the GPS & GCDE the ISOC Mission Planner will check his/her records, and the LTP, to determine which scan or part of the GCDE is due to be performed. After confirming this, using Starmap, the planner will select the appropriate observation and points within it. BPS & GCDE observations are then schedule as fixed time observations.

4.6.3.2.3 Insertion of Calibration & Engineering Observations

Calibration or engineering observation are stored in the proposal database as fixed time observations and as such require no special scheduling procedures. The mission planner will however check that they have the correct start time, duration and required mode settings. These observations are always scheduled as Fixed-Time observations and are handles as in the normal manner. Some calibration may however impose more some additional constraints than others.

4.6.3.2.4 Sorting of Observations

Having extracted a list of observations, the Mission Planner, will have the capability of sorting them further, using their database attributes. The outcome of these sorts will be displayable in both graphical and tabular format. The Mission Planner will be able to print and save the results of the sorts performed.

4.6.3.3 Generation of the POS & POD

With the preferred set & sequence of observations defined, the mission planner will use the Observation Scheduling (OSS) System to merge the selected observations with the MOC provided PSFs. The OSS will attempt to schedule the selected observations in order of their priority. The ISOC Mission Planner, as part of the selection process, defines these 'scheduling' priorities. The ISOC Mission Planner will normally give 'Fixed Time' observations and partially scheduled

observations. Where necessary the OSS will break up the observations into multiple exposures in order to schedule them.

Once the draft schedules are 'complete' the mission planner will be offered the opportunity to inspect them. If satisfied with the schedules, the Mission Planner will command the OSS to complete the POS making process. The OSS will then generate the required number of POSs, inserting where necessary the supplementary information required.

At present it is necessary for the Mission Planner to manually insert 'extra' RWBs, during the GPS & before ToOs. Refer to section 5.2.8.6.

4.6.3.4 Sending of POS & POD

"Exiting" from OSS scheduling window will force the generation of the planning files. During the generation process OSS will insert the OMC command parameter information. Once the files are created OSS perform an automatic check on the POS & ICP and advice if any problems are encountered. Assuming no errors are detected the final task of the Mission Planner is to transfer the POS/ICP to the MOC and the associated POD/OPP to the ISDC.

4.6.4 Re-planning

The term re-planning is however usually associated with the need to radically change the sequence of planned operations/observations in response to a contingency. The need for such contingencies re-planning of the schedule is foreseen in cases of:

- Instrument/Spacecraft Anomaly
- Declaration of a TOO
- Unforeseen (Planned) Ground Station Outage

The details of the re-plan process will be dependent on the reason the re-plan is being performed. For example if sufficient advanced warning is available about the change in ground stations then a complete new set of planning files could be required. i.e. from PSF through to Timeline. If the re-plan has to be performed in response to a spacecraft or instrument anomaly, the on-going schedule may well have to be stopped and a new set of planning files generated once the problem has been solved.

The scheduling of a TOO related observation will only be performed by the ISOC, when explicitly authorised by the Project Scientist. As part of this instruction/declaration the Project Scientist will make the final decision as to where the ongoing or pre-planned sequence of observations will be interrupted and subsequently resumed.

The nominal sequence of events, associated with a re-plan is:

- Importing of new PSFs, (If requested to do so by MOC)
- De-commit the appropriate observations/exposures from the existing schedules
- Generation of the new Revolution(s), containing the TOO observation
- Send new planning files to MOC & ISDC

Further details can be found in section 5.2.2.

4.7 Observation Tracking

The status of an observation can be tracked at each stage of the planning process. Prior to the execution of the schedule, it is possible, by examining the various planning messages, received from MOC, to monitor the process of Timeline generation. This stage ends with the reception, from MOC, of a Timeline Summary File (TSF), for each POS sent.
Each stage of this process is described in the following subsections.

4.7.1 Reception of Planning Messages

Following the submission of the POS & ICP, and prior to the reception of the Timeline Summary, the ISOC will receive four different types of Planning Messages, from MOC, indicating the progress of the Timeline Generation.

The following message types are received, via IFTS:

- EPOS Validation Message
- APF Validation Message
- Cross Validation Message
- Timeline Generation Message

Since the header of these messages contain an indication of whether that part of the Timeline generation process has been successful or not, the ISOC Mission Planner can easily monitor) the progress made by MOC in generating a Timeline.

The reception of a message indicating the failure of a specific part of the generation sequence, especially EPOS & APF generation, will provide the ISOC advanced warning that MOC may reject the POS that they refer to. These Planning Messages are expected accessible on both the ISOC operational and office networks.

4.7.2 Reception & Validation of Timeline Summary

At the end of the Timeline Generation Process the MOC will send to ISOC, via IFTS, the Timeline Summary for formal approval. Since the IFTS at ISOC, does not trigger any ‘alarms’ when a file is received the MOC will also send an email to the Mission Planner and SCOM advising them of the new Timeline Summary.

These Timeline Summary files are accessible on both the ISOC operational and office networks.

4.8 Exposure & Observation Completion Status management

At the beginning of each week/planning cycle the ISOC Scientist responsible for ECS-OCS handling, will check to see if there are any new Exposure Completions Status files from ISDC. These files are generated by the ISDC on the consolidated data hence the 3-week delay. These ECS files provide the ISOC with the statistics it requires on the ‘degree of completeness’ of the executed/scheduled exposures. (AD.5)

If after analyse of the ECS files, they are have been confirmed to be consistent with what the ISOC scheduled, and the amount of ‘Good Time’ is deemed valid, he/she will run ‘Import ECS’ option

available in the Proposal Handling System (PHS). By importing the ECS files from ISDC he/she automatically forces the system to update the status of the related observations. .

Towards the end of each planning week/cycle the same scientist, using PHS, will generate and send a new set of Observation Completion Status (OCS) files. He/she reports the status of all observations to at the ISOC Weekly Operations meeting and to the Project Scientist at the Science Planning meetings.

A bi-weekly telecom is held with ISDC to discuss the status of this interface and determine which observations can/should be considered as complete.

4.9 ISOC Configuration Control & Software Maintenance

The procedures & rules to be followed, to maintain the ISOC Configuration Control & Software are contained within the ISOC Configuration Control Procedures document, RD.25. As a supplement to RD.25, section 5.5 provides an overview of how ISOC will handle the reception of external deliveries.

4.10 Integral Science Data Archive

Background information on the ISOC Archive can be found in the following documents:

- Archive Software Joint Development Plan (RD.31)
- ISOC-ISDC Interactions Document (AD.7)
- ISOC-ISDC ICD (RD.11)

5. ISOC (Internal) Procedures

5.1 Proposal Handling & Community Support

5.1.1 Help Desk

5.1.1.1 Help Desk Management

The helpdesk manager / duty scientist tasks can be performed using machines on the normal office-LAN. Below is a list tasks to be performed:

- Check the helpdesk account several times per day (minimum once per day) for new messages.
- Allocate questions to either ISOC or ISDC for further investigation & response.
- Check the pending questions (ISOC & ISDC) and ensure that none are older than 2 days.
- Answer ISOC allocated questions using the FAQ lists, or passes messages to appropriate ISOC specialist for action/response.
- Update FAQ list where appropriate
- If request is for a Proposal ID move the message to the dedicated HelpDesk directory and advise the member of ISOC Science Team assigned to maintain/update the list.

5.1.1.2 Operation of the Help Desk S/W (JitterBug)

The Help Desk account can be access using a WEB Browser at the ISOC, internally restricted, URL http://astro.esa.int/inthelp_scripts/inthelp.manager. The user name is “inthelp” and the HelpDesk Manager maintains the password. The procedures for operating the Help Desk (JitterBug) are defined in RD.27.

5.1.1.3 Maintain & Publish a List of Frequently asked Questions

The ISOC Help Desk manager/ duty scientist based on inputs from The ISOC & ISDC Science teams will perform the generation of the list of FAQ. The list will be accessible from the ISOC web page and updated as needed.

5.1.2 AO Related Procedures

5.1.2.1 Setting of the Correct AO number

At the start of each AO Call, it essential the AO number used by the CCS & PHS is set to the correct value. The rational for this being that it will allow the ISOC & ISDC to differentiate between the different types of proposals using the AO number. Open Time (Per year); Core (per year); Calibration; Engineering & PV phase related. To this end the AO number forms part (AA field) of the Proposal Identifier. See RD.11.

AO Number	Use
00	Identifies proposals submitted for the PV phase
01; 02; 03… etc	Identifies the annual AO Call for Open time proposals and the annual submitted Core Programme proposals
88	Identifies proposals submitted for Calibration & Engineering activities
99	Identifies proposals submitted for internal ISOC testing

Table 5 - Agreed Allocation of AO Numbers

At the start of each AO call, the ISOC must ensure that the AO number used by PHS/CCS matches the AO number of the PGT version, issued to support a specific AO.

1. Logon to PHS & select CCS option “Maintain Domain Properties”
2. Scroll down the list of Properties until you get to “isoc AO.x”
   (Where x is a number between 0 & 9)
3. Change the “value” field of “isoc AO. 2” to the required AO number.
   (Remember to include the leading ZERO)
4. Save the Changes & exit the task.

5.1.2.2 Monitoring of Proposal Status

During the period of the AO call a member of the Science team is required to check (DAILY) the isocprop mail account in order to monitor the number and type (Accepted/Rejected/Mail Error) of responses being automatically sent to the proposers.

Access to the isocprop account is possible from the office network via the astro machine.

WARNING ONLY one person should access this account at any given time.

1. Configure the workstations for a telnet session to astro. (Type “xhost +astro”)
   {The need for this step will depend on the user’s workstation set-up.}
2. Telnet to “astro.esa.int”
3. Login as “isocprop”
4. Confirm/Configure Display settings (“echo $DISPLAY”)
5. Start Netscape mail application and check the various mail boxes (see Table 6)
   (If there are any errors (see section 5.1.2.2.1) and take appropriate recovery action.)
6. When finished exit both Netscape & the “isocprop” account on the astro machine.

5.1.2.2.1 Analysis of Mail Box messages:

Emails in the PASSES VALIDATED mailbox are of interest only for statistics whereas emails in the FAILED VALIDATION mailbox should be check to see if there are any consistent reasons as to why proposals are being rejected by PHS. One reason for proposals to be rejected could be misinterpretation, by the Proposer, of the AO supporting documentation. Another reason could be a discrepancy between the checks carried out by PGT and those performed by PHS.

Mail Box	Content
PASSED VALIDATED	Copy of all **Validated** Proposal Acknowledgements Emails
FAILED VALIDATION	Copy of all **Rejected** Proposal Acknowledgements Emails
ERROR	Copy of all Emails Return Address Errors

Table 6 - Mail Boxes used by "isocprop" account

Emails in the ERROR mailbox would indicate that the Mailer Task, running on the External Communications Machine (ECM) has detected errors in the return mail address contained in the original proposal. It should be noted that no checks are performed by PGT. Each email found in this mailbox needs to be manually checked to determine the source of the problem and then the Proposer ID, contained in the email and should be checked against the List of Proposer Ids. If a match can be found the email can then be forwarded to the correct address. A cover note should also be included advising the proposer that the email contained in the proposal contained errors and if the email in the ERROR mailbox contained an Acknowledgement of a Valid Proposal the proposer should be asked to resubmit the proposal with a corrected email address.

5.1.2.3 Proposal Analysis

5.1.2.3.1 Technical Feasibility Assessment

For each proposal submitted, as part of an AO Call, the PHCS group will assess technical feasibility of the observations contained within it. See section 4.3.2.3.

The checks will be systematically performed for all observations contained within a proposal. The source documents for the checks will be the paper copy of the proposals maintained in the Operations Room. For each proposal/observation the PHCS group will complete a Technical Feasibility Form. The layout of this Form is shown in Table 7.

5.1.2.3.2 Check of Target Visibility

The observer specified RA & DEC etc. of each observation must be entered, manually, into the Target Visibility Predictor (TVP) software. A check will then be made to determine the visibility periods available.

The TVP User Manual (RD.28) contains all the details required to use the TVP.

5.1.2.3.3 Check of Requested Observation Time

For each observation submitted, the ISOC Proposal Handling team will check whether the observer requested Observation Time is in agreement with the values predicted by the Observation Time Estimator (OTE).

The OTE User Manual (RD.29) contains all the details required to use the OTE.

Technical Feasibility Assessment Form	
Proposer ID	**Proposal Title**
Assessed By	

1. Does NOT Conflict with Core Programme?	Yes / No
2. Target visible at Required Time?	Yes / No

Instrument Details	
3. Energy Range Valid?	Yes / No
4. Spectral Resolution Valid?	Yes / No
5. Spatial Resolution Valid?	Yes / No
6. Field of View Requirement Valid?	Yes / No
7. Timing Requirements met?	Yes / No
8. Instrument Modes Valid?	Yes / No
9. Others (Specify)	

Observation Time Feasibility	
10. Sufficient Information to Derive Feasibility?	Yes / No
11. Feasibility validated by OTE?	n.a./Yes/No
12. Feasibility Validated by Observer Manual (511keV line)?	n.a./Yes/No
13. Feasibility Validated for Diffuse Emissions?	n.a./Yes/No
14. Others (Specify)	

15. Dither Pattern Consistent with requested use of Instruments?	Yes / No
16. Others (Specify)	

Scheduling Feasibility	
17. Fixed Time Requirements Feasibility	Yes / No
18. ToO Trigger Feasibility	Yes / No
19 Others (Specify)	

Other Comments

ISOC Feasibility Recommendation:	
	Yes (feasible)/ No (Infeasible)/ To be discussed

Table 7 - Technical Feasibility Assessment Form

5.1.2.4 Proposal Updating (Post TAC Analyses)

5.1.2.4.1 Background

In support of the TAC process members of the ISOC science team will participate in the various tack panel meetings. A key part of their role, during these meetings is to record the panel recommendations & conclusion for each observation with a proposal. In order to carry out this task the ISOC scientist, on each panel, will complete a TAC Panel Results Form/Spreadsheet An example of the information /fields contained within this form/spreadsheet are given in Table 8.

At the end of the TAC process, and once the TAC panel members have confirmed that the form/spreadsheet has been completed correctly, the ISOC Science team will merge the results of the various panels into a single spreadsheet. The ISOC Science team will use the data contained in this spreadsheet to update all proposals/observations, for that AO, in the proposal database.

Table for AO-1 TAC Panel Results Form	
Column Number	**Column Description**
1	Proposal ID
2	Observation ID
3	RA (J2000)
4	DEC (J2000)
5	Requested time (seconds)
6	Grade [A, B, C, TOO(A), GRB (B1, B2)]
7	Recommended target
8	Granted time [sec] (Note: TAC "0 sec" for C-hitchhiker converted here into "1 sec" for PHS compliance). "0 seconds" in this column means REJECTED
9	Recommendation on dither pattern
10	Comments on data rights and/or data requests from other observations (also if specifically requested in proposal)
11	Comments on fixed time and/or TOO
12	Reasons for rejection
13	Other comments

Table 8 - AO-1 TAC Panel Results Form

5.1.2.5 Returning a Proposal (PGT Compatible version) to a Proposer

This procedure describes the steps necessary to extract (section 5.1.2.5.1) a copy of the proposals, from PHS, in a format suitable for their subsequent re-submission via PGT. The procedure also includes details of how to transfer the extracted files to the development/office network.

5.1.2.5.1 Extracting Proposals from PHS

1) Log in to the Operations Room PC (or UNIX machine) as “phsuser1” and start the PHS application. Available as a desktop shortcut on PC.
   (The standard user login & password are sufficient.)
2) Select PHS option to "PHS to PGT Conversion"

3) Select the following 'sort criteria'.
   - AO number = xx *(Where xx stands for 01, 02, 03 etc.)*
   - Type = General Programme

4) Select all required proposals displayed by left-clicking the mouse on the first row and then (while holding down the "Shift" button) left-clicking the mouse and then select option "CONVERT"
5) The converted proposal will be stored in PC directory C:\isoc\data\Converted_Proposals\. On the UNIX these files will be stored in the equivalent directory. The proposals are stored with names in the format 'PI-Name_Proposal-Number.phs'
6) Log out of PHS.

5.1.2.5.2 Copy Proposals to the Development network

If only few proposals are to be transferred, to the development/office network, the best method of doing this is by using the "*cp2dev"* command. Refer to section 5.1.2.5.2.1. If a large quantity of files need to be transferred then it is best to burn them on to a CD or other form or removable media. Refer to section 5.1.2.5.2.2.

5.1.2.5.2.1 Copying the odd file directly from the UNIX machine.

If using the UNIX system entering the following command can transfer the files:

"*cp2dev* PI-Name_Proposal-Number.phs"

Files copied in this manner will appear in the office/development system in the directory:

~home/isocops/DATA/copy

5.1.2.5.2.2 Burning files on to a CD (using PC[3] in Ops area)

Before one can copy the proposals from the PC to a CD ROM it is first necessary to get a copy of the files on the PC. This can task can be performed by starting PHS on the PC and executing the procedure in section 5.1.2.5.1. With a copy of the files stored on the PC

In order to copy the files to a CD a blank CD should be inserted into the CD/DVD drive of the PC. The PC should detect the insertion of the CD and automatically start the application/program called NERO. *(If the application does not start automatically use NERO ICON on the desktop.)*

1) After the insertion of a blank CD into the PC CD/DVD burner the NERO program should open a "New Compilation" window.
   - Select the option "Open" and from list of files displayed select "CD for PHS2PGT"

   This should result in the opening of a window called "CD for PHS2PGT". The various folders highlighted in this window are linked to the 'File Browser' window directory:

   C:\isoc\data\Converted_Proposals

2) Under menu option "File" select the sub-option "Write CD".
3) Wait for confirmation that the Burning process is complete.
4) Eject CD and repeat from step 1) if additional CDs are to be created.

[3] This procedure needs to be revised so that it uses the CD rewriter on the new Ops Server

5) Log out of NERO program.

5.1.2.5.3 Send Proposal Back to a Proposer.

With the required proposal either copied on to a CD or transferred to a directory in the office/dev network, the file can be emailed back to the proposer. The file names are in the format: "PI-Name_Proposal-Number.phs".

1) On receipt of the request for an old proposal the help desk duty scientist should login as "inthelp" on the development LAN. (Contact Astrid for the Password.)
2) Startup Netscape7 and the Netscape email facility. The INBOX will contain a copy of the original Proposers request.
3) Select the "Proposal Return" template stored in the "Template" folder of Netscape mail tool. When you click on the template message it comes up, ready to be sent. All you need to do is attach the Proposal, stored on the CDROM, and enter the proposer e-mail address.
4) Reply to the message appending the converted proposal making a "bcc" to inthelp@rssd.esa.int.

5.1.2.6 Creation of the CD with copy of Proposals for the TAC

This procedure was written to support the TAC process associated with AO-2. The procedure will have to be revised, for AO-3, once the requirements for that AO are known[4]. For AO-2 the following information was required to be transferred to the CD:

A0-2 Proposals, including Science Justifications
A0-1 Proposals (with Grade A observations still to be completed.)
A0-2 Documentation (as maintained on the ISOC AO Website)

Table 9 provides details of where the various AO proposal details are stored on the CD ROM.

Category		Location
AO-1	Compact Objects	c:\ao2cd\ao1\compact\
AO-1	Extragalactic Objects	c:\ao2cd\ao1\extra\
AO-1	Nucleosynthesis	c:\ao2cd\ao1\nucleo\
AO-1	Others	c:\ao2cd\ao1\others\
AO-2	Compact Objects	c:\ao2cd\ao2\compact\
AO-2	Extragalactic Objects	c:\ao2cd\ao2\extra\
AO-2	Nucleosynthesis	c:\ao2cd\ao2\nucleo\
AO-2	Others	c:\ao2cd\ao2\others\

Table 9 - Location of Proposals on the CD

Access to the data has been made easy, via a single index.html file. The lower level html page, displayed the proposals by AO & category. The list, per category had two hyperlinks per proposal. "P" & "J". Selecting "P" will take you to the proposal details as stored within the ISOC Proposal database and the selection of "J" will open the associated Scientific Justification. The justification is "as submitted" by the proposer. All files were in PDF format and where a justification had been submitted in postscript it was converted to pdf before insertion on the CD. *(Note that for AO-3 it is*

[4] This procedure needs to be revised so that it uses the CD rewriter on the new Ops Server.

expected that the files science justifications will be stored on the CD in both postscript, if that was the original format, & pdf.)

5.1.2.6.1 Selection of AO-02 Proposals

5.1.2.6.1.1 Copy/Save AO-02 Proposal, as PDF files, for the TAC

This procedure describes the steps necessary to save a copy of the AO-02 proposals, in PDF format, for distribution to the TAC.

1) Log in to the Operations Room PC as "phsuser1" and start PHS, using the desktop shortcut. (Standard use logins & passwords are sufficient.)
2) Select PHS option to 'View the Proposals"
3) Select the following 'sort criteria'.
   - AO number = 02
   - Category = 'X'
   - Status = Validated
   - Type = General Programme

   Where 'X 'is one of the following:
   Compact Objects; Extragalactic Objects; Nucleosynthesis; Others

4) Select all proposals displayed by left clicking the mouse on the first row and then (while holding down the "Shift" button) right clicking the mouse.
5) Select the "Print" options with printer set to "Acrobat PDF Writer". Click OK
6) Select required directory & click "SAVE/Print". The full directory path is:
   C:\ao2cd\ao2\'X'\prop
   Where "X" is 'compact' ; 'extra' ; 'nucleo' ; 'other'
   (You will have to repeat/confirm this step for all proposals in the category.)
7) Repeat from step 3) for the next Category.
8) 'DISMISS' the window & exit PHS.

5.1.2.6.1.2 Convert Science Justifications into PDF

1) Login to Unix Station as PHSUSER1
2) Clean up the temporary Justification Directory by deleting all files contained in directory: **"/phsuser1/ao2cd/ao2/temp_psj"**
3) Open a window & go to the directory: **"/isoc/data/PSJ"**
4) Extract latest version of AO-2justification by typing:

   > justout 02 ../../../home/phsuser1/ao2cd/ao2/temp_psj

5.1.2.6.1.3 Sort Science Justifications by Category

1) Delete all files contained in the following directories:
   "/phsuser1/ao2cd/ao2/compact/just"
   "/phsuser1/ao2cd/ao2/extra/just"
   "/phsuser1/ao2cd/ao2/nucleo/just"
   "/phsuser1/ao2cd/ao2/other/just"

2) Open a window & go to the directory: **"/phsuser1/ao2cd/ao2/temp_psj"**
3) Execute sequentially each of the commands contained in Table 10:

Category	Command
Compact Objects	justsplit -a02 -ccompact -o/home/phsuser1/ao2cd/ao2 -sV
Extragalactic Objects	justsplit -a02 -cextra -o/home/phsuser1/ao2cd/ao2 -sV
Nucleosynthesis	justsplit -a02 -cnucleo -o/home/phsuser1/ao2cd/ao2 -sV
Others	justsplit -a02 -cother -o/home/phsuser1/ao2cd/ao2 -sV

Table 10 - Commands to Sort AO- 2 Science Justifications

Where "justsplit" is the name of the script to be run and the other fields are as defined in Table 11.

a	AO Number	Leading two digits of file name
c	Category	'compact' ; 'extra' ; 'nucleo' ; 'other'
o	Directory	Destination directory for the extracted files
s	Status (Optional)	V- Validated ; A – Approved ; S – Scheduled, M - Amalgamated
p	Priority (Optional)	Assigned Priority 1 = "A" ; 2 = "B" etc.

Table 11 - Definition of parameters in "justsplit" script

5.1.2.6.1.4 Copy/Save all Science Justification

1) Start WS_FTP_Pro (shortcut ICON is on desktop.)
2) Confirm that the Pop-up screen stipulates:
   HOST = isocopsv1
   USER Identifier = phsuser
3) Click the option "Connect"
4) In the left hand window (Local System) change the directory to point to:
   C:\ao2cd\ao2\'X'
   (Where "X" is 'compact' ; 'extra' ; 'nucleo' ; 'other'.)
5) In the right hand window (Remote System) change the directory to point to:
   ~/phsuser1/ao2cd/ao2/X/
6) Select and drag the 'just' folder on the Remote system to the local system.
7) Repeat for all four categories.
8) Log out of WS_FTP_Pro.

5.1.2.6.2 Selection of AO-01 Proposals

5.1.2.6.2.1 Copy/Save AO-01 Proposal, as PDF files, for the TAC

This procedure describes the steps necessary to save a copy of the AO-01 proposals, in PDF format, for distribution to the TAC.

1) Log in to the Operations Room PC as "phsuser1" and start PHS, using the desktop shortcut. (Standard use logins & passwords are sufficient.)
2) Select PHS option to 'View the Proposals"
3) Select the following 'sort criteria'.
   - AO number = 01

- Category = 'X'
- Status = Approved
- Type = General Programme

Where 'X 'is one of the following:

Compact Objects; Extragalactic Objects; Nucleosynthesis; Others

4) Select all proposals displayed by left clicking the mouse on the first row and then (while holding down the "Shift" button) right clicking the mouse.
5) Select the "Print" options with printer set to "Acrobat PDF Writer". Click OK
6) Select required directory & click "SAVE/Print". The full directory path is:

C:\ao2cd\ao1\'X'\prop

Where "X" is 'compact' ; 'extra' ; 'nucleo' ; 'other'

(You will have to repeat/confirm this step for all proposals in the category.)

7) Repeat from step 3) for the next Category.
8) 'DISMISS' the window & exit PHS.

5.1.2.6.2.2 Convert Science Justifications into PDF

1) Login to Unix Station as PHSUSER1
2) Clean up the temporary Justification Directory by deleting all files contained in directory:

"/phsuser1/ao2cd/ao1/temp_psj"

3) Open a window & go to the directory: "/isoc/data/PSJ"
4) Extract latest version of AO-1 justification by typing:

> justout 01 ../../../home/phsuser1/ao2cd/ao1/temp_psj

5.1.2.6.2.3 Sort Science Justifications by Category

4) Delete all files contained in the following directories:

"/phsuser1/ao2cd/ao1/compact/just"
"/phsuser1/ao2cd/ao1/extra/just"
"/phsuser1/ao2cd/ao1/nucleo/just"
"/phsuser1/ao2cd/ao1/other/just"

5) Open a window & go to the directory: "/**phsuser1/ao2cd/ao1/temp_psj"**
6) Execute sequentially each of the commands contained in Table 12:

Category	Command
Compact Objects	justsplit -a01 -ccompact -o/home/phsuser1/ao2cd/ao1 -p1 -sA,S,M
Extragalactic Objects	justsplit -a01 -cextra -o/home/phsuser1/ao2cd/ao1 -p1 -sA,S,M
Nucleosynthesis	justsplit -a01 -cnucleo -o/home/phsuser1/ao2cd/ao1 -p1 -sA,S,M
Others	justsplit -a01 -cother -o/home/phsuser1/ao2cd/ao1 -p1 -sA,S,M

Table 12 - Commands to Sort AO-1 Science Justifications

Where "justsplit" is the name of the script to be run and the other fields are as defined in Table 11.

5.1.2.6.2.4 Copy/Save all Science Justifications

1) Start WS_FTP_Pro (shortcut ICON is on desktop.)
2) Confirm that the Pop-up screen stipulates:
   HOST = **isocopsv1**
   USER Identifier = **phsuser**
3) Click the option "Connect"
4) In the left hand window (Local System) change the directory to point to:
   C:\ao2cd\ao1\'X'
   (Where "X" is 'compact' ; 'extra' ; 'nucleo' ; 'other'.)
5) In the right hand window (Remote System) change the directory to point to:
   ~/phsuser1/ao2cd/ao1/X/
6) Select and drag the 'just' folder on the Remote system to the local system.
7) Repeat for all four categories.
8) Log out of WS_FTP_Pro.

5.1.2.6.3 Creating an HTML List/Table of Proposals

1) Logon to PC as PHSUSER1
2) Select "Start" button & select "Run a Program"
3) Enter the following command to create AO-1 tables:
   "c:\ao2cd\ao_scripts\ao1\createindex isoc"
4) Enter the following command to create AO-2 tables:
   "c:\ao2cd\ao_scripts\ao2\createindex isoc"

The tables will be created and stored in the directories:
C:\ao2cd\ao1\ & C:\ao2cd\ao2

5.1.2.6.4 Burn Master CDROM of Proposals

In order to copy the files to a CD a blank CD should be inserted into the CD/DVD drive of the PC[5]. The PC should detect the insertion of the CD and automatically start the application/program called NERO. *(If the application does not start automatically use NERO ICON on the desktop.)*

1) After the insertion of a blank CD, into the PC CD/DVD burner, the NERO program should open a "New Compilation" window.
   - Select the option "Open" and from list of files displayed select "CD for AO-02"

   This should result in the opening of a window called "CD for AO-02". The various folders highlighted in this window are linked to the 'File Browser' window directory:
   C:\ao2cd
2) Under menu option "File" select the sub-option "Write CD".
3) Wait for confirmation that the burning process is complete.
4) Eject CD and repeat from step 1) if additional CDs are to be created.
5) Log out of NERO.

[5] This procedure needs to be revised so that it uses the CD rewriter on the new Ops Server.

5.1.3 Core Programme Submission

5.1.3.1 Pointed (Staring & Dither) Observations

The entering of the Core Programme pointed observations is formally that of the ISWT. Members of the ISOC enter these proposals, defined in RD.22, into the Proposal Database. After entering their submission the ISOC will send a copy to the Research Scientist (R-Sci), nominated by the ISWT, who will lead the scientific investigation of a specific observation. These scientists may request, the ISOC, to update that the observation characteristics, should they discover any error.

The Project Scientist maintains the up to-date list of ISWT appointed Research Scientists.

The actual Core Programme, pointed Observation/Proposal are entered directly into the PHS, by the ISOC Science Team.

5.1.3.2 GPS & GCDE

GPS & GCDE observations are generated and entered into the Proposal Database using software scripts built & maintained by the software team. To ensure compliance with the scientific requirements of the Core Programme (RD.22), the ISOC science team checks the contents of the scripts.

5.1.4 Calibration & Engineering Proposal Submission

Calibration /engineering proposals/observations can be entered directly into the Proposal database by any member of the ISOC Science team, normally this done by the team member with responsibility for calibration activities. The PHS functionality used is available under the option "Create Proposal" Once the new proposal has been created it can be edited, approved & scheduled just like any other set of observations/proposals.

5.1.5 Observation Amalgamation

Although the PHS software can select candidate observations for amalgamation the final stages of creating an amalgamated observation requires human analysis. The procedure here does not address this analysis, as it is scientific in nature & very much source/observation objective dependent.

The 'man-machine' interface part of the amalgamation process/procedure is:

1) Start PHS & login as normal
2) Under PHS option "Amalgamation" select sub option "Amalgamate"
   (In this window it is possible to specify the allowed distance, between the sources.)
3) Selecting the option "Prepare" will force PHS to start the query on the database.
   (The query will result in the production of lists of possible candidates.)
4) These candidate list need to be analysed (offline) to determine if the selected observations, within them, make scientific sense.
5) Once the candidate lists have been analysed, and updated if necessary the appropriate observations should be added to the core observations.
6) The list of observations, associated with each core can then be saved.

5.1.6 OMC Delta Catalogue Maintenance

5.1.6.1 Add an entry to the OMC Delta Catalogue

If a list of sources has been provided it is better (saves typing & errors) to copy the file onto the operational system. (Via a floppy disc is probably the easiest way.)

7) Start PHS & login as normal
8) Under PHS option "CCS" select sub option "Edit OMC Delta Catalogue"
9) In the new pop-up menu/window select the option "INSERT".
   The following Source Fields should be completed:
   a. ID – Value in this field is entered automatically
   b. RA
   c. DEC
   d. Std. Error in Alpha
   e. Std. Error in Delta
   f. Extension
   g. Priority – Value in this field is fixed to "1".
   h. In Corporation Date – Value is entered automatically
   i. Comments Field

Where the source characteristics are contained in a file, the details can be easily copied, field-by-field, using Copy & Paste. (i.e. Highlight the text to be copied, with Left Mouse button. Move curser it the appropriate PHS field and Right Click the mouse. The text can be copied/inserted by clicking the middle mouse button.)

10) Select "SAVE" and repeat from step 9) for each new source.
    The updated Extension Catalogue will be stored in the directory/file:
    ~ isoc/data/OMC/Catalogue/OMC_CAT_V0002_ext.ASCII

11) Print the new/updated list & select "DISMISS" to close the window.
12) Exit PHS
13) Record update in the Log Book
14) Send an email to ISOC CCB (isoclib@rssd.esa.int) with copy to isdc_shift@obs.unige.ch informing them that the updates have been made. A copy of the updated *OMC_CAT_V0002_ext.ASCII file* should be attached.

5.1.6.2 Delete an entry in the OMC Delta Catalogue.

1) Start PHS & login as normal
2) Under PHS option "CCS" select sub option "Edit OMC Delta Catalogue"
3) In the new pop-up menu/window select the row to be deleted.
4) Select "DELETE" from the list of options.
5) Select "SAVE" and repeat from step 3) for each source to be removed. The updated Extension Catalogue will be stored in the directory/file:
   ~ isoc/data/OMC/Catalogue/OMC_CAT_V0002_ext.ASCII

6) Print the new/updated list & select "DISMISS" to close the window.

7) Exit PHS
8) Record update in the Log Book
9) Send an email to the ISOC CCB (isoclib@rssd.esa.int) with copy to isdc_shift@obs.unige.ch informing them that the updates have been made. A copy of the updated *OMC_CAT_V0002_ext.ASCII file* should be attached.

5.2 Observation Scheduling

An overview of scheduling process, and the tasks to be performed are provided in section 4.6. In this section aim is to provide information to at least one level deeper. Due to the high degree of flexibility available to the Mission Planner it cannot provide a step-by-step guide on which observations will be scheduled at which time. The 'procedures' contained here also assume that the user/Mission Planner is familiar with the following software packages:

- Starmap
- Proposal Handling Subsystem
- Observation Scheduling System

5.2.1 Routine Planning Activities

The actual task of generating a set of observation schedules is relatively straightforward. The real task is to determine which observations and in which sequence the mission planner wishes them to be scheduled. The mission planner has full freedom in determining both the observation and the order they will be scheduled. Here it is however assumed that he will use the approved Long-term plan as his reference. Deviations to the long term plan, for example in response to a TOO etc. will be tracked by the Science team Member who has been nominated by the Project Scientist as Mission Planning Responsible. It is assumed, periodically therefore, that the Mission Planning Responsible scientist will produce updates to the long-term plan. The nominated 'Duty' Mission Planner is expected therefore to use the Long-term plan and any issued updates as the scientific input to the planning process. Other inputs will be the need to perform Calibration & or Engineering observations. The need for any of these two later items to be performed will be confirmed at the ISOC Weekly Operations Meeting. Refer to section 2.3 for details.

The main sequence of events is:

- Importation of any new planning files from MOC
- Selection of Observations to be scheduled
- Generation of the Physical Observation Schedules
-

Each of these activities is addressed in the following sub-sections.

5.2.1.1 Importation of any new planning files from MOC

Before commencing planning session the Duty Mission Planner should check to see if any new PSFs are available for import. The availability of new PSFs can be check, form within OSS by selecting the option "Process New PSFs", or by checking the content of the directory:

"~isoc/data/PSF/received"

In order to import, into OSS, new PSFs the Duty Mission Planner is required to start OSS select the option "Process New PSFs". The new PSFs (not yet imported) will be displayed in the corresponding OSS window. Highlighting the desired file and then clicking the "Accept PSF" option performs the actual import. The success or otherwise of the import is indicated in the messages bar at the bottom of List window.

Warning:

The importing of a new version of a PSF will result in the automatic unscheduling of all observations, GSHO & RWBs associated with that revolution. The ISOC therefore should never (unless first agreed with MOC) import a new version of a PSF, where the resulting POS would have to be sent as an RPOS. An RPOS being defined as the re-planning of the on-going revolution or any revolution starting within 8 hours[6] of the time at which ISOC would submit the files.

5.2.1.2 Selection of Observations to be scheduled

Based on the Long Term Plan, approved by the Project Scientist, and the GPS & GCDE table produced & maintained by the Mission Planning Responsible, the Duty Mission Planner will, using the Starmap select the areas of the sky (called Sky Bins) where it is possible to schedule observations. These Sky Bins being selected on user definable criteria such as:

- Sky Bin visible for greater than…
- Sky Bin visible in a specific revolution/week or month etc.

Once the appropriate/available Sky Bins have been identified, the Duty Mission Planner selects, from the database the Proposal/Observation he is interested in scheduling. In this way he can check their visibility. Once he is happy with his selection he can proceed to scheduling them. Section 5.2.1.3

5.2.1.3 Generation of the Physical Observation Schedules

Before scheduling any revolution the directory **"/isoc/data/PSF/accepted"** should be check, in order to confirm that the required PSFs have already been imported into OSS. (This information is

[6] The 8 hours is an agreed number, introduced to allow MOC time to respond to the RPOS. It is not a physical constraint. If MOC are prepared /forewarned a new timeline can be created & introduced in 2 - 3 hours. Although technically not an RPOS, re-plan files with a start time that is outside of the normal working week should also be submitted as an RPOS.

not available from within OSS.) If it is concluded that the required PSFs are not already 'accepted', the procedure in section 5.2.1.1 should be performed to 'import' them.

1) Start OSS
2) Enter the Start and End revolution number one intends to schedule, and click on "Schedule these revolutions"

Explanation of the top part of the session window (above "Selection statement")

3) "Start/End Revolution": The start and end revolution number is displayed.
4) "Display a Revolution": One can display a single particular revolution.
5) More windows can be opened to display the same or another revolution.
6) "Open a saved Set"/"Save this Set": One can open a saved set or save a set of SQL expressions that were entered in the "Selection statement" part of the session window.
7) "DBOB": One can choose between 10x10 (default) and 2x2. This is the width and height of a skybin used and is provided by Flight Dynamics. The default of 10 by 10 degrees is the one to use and is also used by Starmap. Using 2 by 2 degrees is more cpu intensive and does not necessarily improve the scheduling.
8) "Minimum visible duration": When scheduling observations ONLY skybins with the minimum visible duration value given (default is 30,000 seconds) can be scheduled. Values below typically 10,000 seconds (about 3 hours) are not recommendable. The values are PER revolution.

An Explanation of the Schedule Display Window

9) When the option "**Display a Revolution"** is selected the Schedule Display window pops up. A timetable is shown for the whole revolution for the following properties:
    - "Scheduled": this bar shows the actual schedule.
    - Colours are: white - target, green - handover window, pink - slew, yellow - RWB.
10) Right clicking with the mouse gives two options: "Details" and "Unschedule".
    - When selecting "Details" a window pops up with some more detailed info (start and end times, what kind of event, etc.) on the particular part of the observation where one clicked.
    - When selecting "Unschedule" ALL scheduled observations and slews after the point where one clicked upon are deleted.
11) When a RWB has been inserted manually (see below) one can also select "Delete RWB". This deletes the RWB selected. Note that only manually inserted RWBs can be deleted, and not the ones that are defined in the PSF.
12) "Instrument": this bar shows when the instruments are on and can be used for doing scientific observations.
13) "Slew": this bar shows when slew can be performed. By right clicking on this bar one can insert manually RWBs. If one is inserted one can delete it again by right clicking on the particular RWB window in the "Scheduled" bar, by selecting "Delete RWB").
14) "Overlap": this bar shows when both Redu and Goldstone can have contact with Integral.
15) "RWB": this bar shows the possible times for RWBs.
16) "RMU": this bar shows the possible times for RMUs.

Note:
One can zoom in or out by clicking on "+" or "-" (top left of the Schedule frame), respectively.

One can delete all scheduled observations and slews by clicking on "Unschedule" at the top of the Schedule frame.

Information on the history of how the observations were scheduled with OSS, as well as info on times, observations, slews, pointings, etc. can be viewed in a separate window by clicking on "History" at the top of the Schedule frame.

17) "Schedule Summary": shows a table of the scheduled observations.

Note that this summary can be printed to a file by selecting "Save Summary as Tab separated ..." from "File" at the top of the Schedule window, or simply type Ctrl-T. The file can be found in "Summary" data directory and is called "XXXX.SUM", where XXXX is the revolution number (add zero's [0] before the number if it is less than 1000).

18) Select & Deselect Observations
Within the "Selection statement" window one manually select or deselect observations based on the key properties from the proposal database. The (de)selection is done by using SQL queries. Basically, from ALL keys of ALL tables selections can be made.
An example is: "and RA>75 and dec>65 and priority<3".

Note: ALWAYS start the SQL query with "and"! (This is because internally in OSS some SQL queries are already made). Also note that SQL queries are not case sensitive. Clicking on "Save this Set" above the "Selection statement" window can save SQL queries. A previous saved query can opened by clicking on "Open a saved Set" above the "Selection statement"

19) Selection of Perigee Attitude
When the revolution has not been scheduled before the Duty Mission Planner should select the option to use the ***last pointing for perigee*** attitude. This avoids long slews before perigee entry and thus saves science time.

20) Schedule the revolution
When the planner has completed & check the schedules he/she should commit them by selecting the option "**Schedule selected Revolutions".**

OSS now reads in every observation from the database and accepts all targets, which are in a visible skybin. Then scheduling is done which takes into account the SQL queries and the few options. This may take a while (e.g. due to unscheduling or calculating dither patterns). Fixed Time observations are scheduled first, and then the Normal Time observations are filled taking into account the various queries. When scheduling is done, one can review the current schedule by clicking on "Display a Revolution", see above.

21) Check the schedule if there are any observations which are potentially `SPIBIS-ed'.
If a particular observation is `SPIBIS-ed', unschedule the revolution from that observation and start to re-plan from there.

22) Exit or Quit OSS
To quit and to NOT save the Schedule session, click the option
"Quit Scheduling Session"
To quit and save the whole session, click the option
"Exit Scheduling Session"

On **"Exit Scheduling Session"** OSS creates the POS and ICP files which have to be sent to MOC, and the POD and OPP files which have to be sent to the ISDC.

5.2.1.4 Manual Checking & Sending of the Observation Schedules/files

1) Check the POS produced for the revolutions scheduled. (Refer to section 5.2.4)
2) If POS are deemed 'OK', **Enter OSS** and send the POSs/ICP to MOC using the option:

"Send POS/ICP"

3) After sending the POSs/ICPs, the associated POD/OPPs should be sent to ISDC using the option:

"Send POD & OPP"

4) After approximately 3 minutes check the directories **/isoc/data/POS/sent/** and **/isoc/data/POD/sent/** to confirm that the POS/ICP & POD/OPP have been sent. i.e. check if the files appear in these directories.

(Note: Copies of all files sent via IFTS are copied by the system to a mirror set of directories on the office/development server. "~home/isocops/data/……")

5) Update ISOC Log Book identifying the POS/POD versions created, the time at which they were sent.

5.2.2 Target of Opportunity Scheduling

The decision to schedule a TOO shall be taken by the Project Scientist or his/her nominated deputy. TOO Management is addressed in sections 4.4 and 4.4.2. This section deals only with the activities required to schedule the observation, once it has been approved.

5.2.2.1 Check Existing Schedule

1) **Enter OSS**
2) Select the revolution(s), which is (are) going to be rescheduled.
3) Display the schedule of that (these) revolution(s).
4) Determine a suitable time for the start of the TOO [generally something like more than ~10 hrs from the time one starts this re-plan].
5) Check if there are any Fixed Time observations after that time.
6) Quit Scheduling Session [i.e. no change in schedule!].
7) Quit OSS

5.2.2.2 Notify MOC/ISDC that re-plan is about to commence

Before commencing a TOO re-plan the ISOC duty scientist should send an email &/or telephone the MOC & ISDC to inform them that the re-plan has been approved. In the email the ISOC duty scientist should indicated the proposed time, derived in section 5.2.2.1 bullet 4), at which the present schedule will be interrupted.

5.2.2.3 Enter TOO proposal/observation Start Time

1) **Enter PHS**
2) Select the (new) TOO proposal/observation [Click on "Details" and "Checkout"]. Note that it is assumed here that if a new Proposal was/is required to support the TOO, that the necessary observation(s) have already been entered, through either PGT or directly using PHS.
3) Enter the earliest and latest start times of the TOO observation
4) Earliest time is the suitable time selected in 5.2.2.1 bullet 4)
5) There should be sufficient time between the earliest and latest start time. This will some flexibility in scheduling and also accommodate overheads which may be required to perform 'long slews'. In general it is proposed to allow 12 hours between earliest and latest time. Note that the status of the proposal should be "approved"
6) Commit the proposal; the proposal database is now updated
7) If there were any Fixed Time observations after the earliest start time, they should be updated as well: select the corresponding proposal/exposure [Click on "Details" and "Checkout"], "reset" the fixed time intervals [the status of the observation /exposure now becomes unscheduled], and commit.
8) Quit PHS

5.2.2.4 De-commit Existing Schedule & Generate new one

1) **Enter OSS**
2) Enter the revolution that is going to be rescheduled.
3) Display the schedule of that revolution.
4) Un-schedule the revolution from earliest start time [see section 5.2.2.1 bullet 4) and 7); put cursor on "Scheduled"-bar, right-click and "unschedule"].

5) Go to "Session Window". Select "Use previous perigee attitude" [so it does not affect the next revolution].
6) Schedule selected revolution. Check the schedule; the TOO should be in now.
7) Follow the procedure in section 5.2.8.6 to insert the necessary manual RWBs.
8) Save schedule summary and save statistics [click on "File"].
9) Exit Scheduling Session [i.e. new schedule is now saved!]. POS, ICP, POD and OPP are created. Note that a new POS for the next revolution is created as well. Remove that POS.
10) Quit OSS

5.2.2.5 Manual Checked & Sending of planning files

1) Check the POS (Refer to section 5.2.4)
2) If POS is 'OK', send POS and ICP to MOC. Notify MOC (#integralogs@esa.int), with copy to ISDC (isdc-ops@obs.unige.ch & isdc-shift@obs.unige.ch), by e-mail and then telephone the SPACON (x62408) to inform him/her that the files have been sent. The email notification should clearly identify the point/time at which the RPOS deviates from the original schedule.
3) After approximately 3 minutes check the directory **/isoc/data/POS/sent/** to confirm that the files have been sent.
4) Wait until MOC verify that POS is OK. (Refer to section 5.2.5)
5) Once MOC have verified that the POS has been accepted the POD and OPP should be sent to ISDC.
6) Notify ISDC by e-mail (isdc-ops@obs.unige.ch with copy to isdc-shift@obs.unige.ch) and telephone (+41 22 950 91 **70, 71 or 73**) that the POS has been accepted by MOC and that the POD & IOP associated with it have been sent. (Refer to AD.7 for details)
7) After approximately 3 minutes check the directory **/isoc/data/POD/sent/** to confirm that the files have been sent.
8) Update ISOC Log Book identifying the POS version sent, the time it sent & the scheduled time of the TOO.

5.2.3 Soft TOO Scheduling

The Soft TOO capability is supported via the OMC Delta Catalogue tool. (Refer to section 5.1.5 for details.)

After insertion of the required 'new' OMC source, in the Delta Catalogue, the planner need only regenerate the appropriate output files (POS/ICP etc.) and send them to MOC. Normal TOO protocols should be followed. Regeneration here implies starting OSS, opening the applicable revolution file, for display and exiting again. The files should then be checked & sent as stipulated in section 5.2.2.5. At time of sending the planner has the option of specifying if the POS should be sent as an RPOS.

5.2.4 Visual Checks on Generated Planning files

5.2.4.1 Manual Running of the POS Checker

Following the creation of a POS/ICP OSS will automatically run the POS Check programme. This programme has been designed to check the POS for violation of any POS ICD constraints. Should any manual editing of a schedule (POS or ICP) have taken place, it is recommended that the mission planner manually re-run the POS Checker programme.

This can be carried out as follows:

1) Log on to the operational system as phsuser1 and select the directory:
   ~isoc/data/POS/generated

2) Enter the command:
   $ **runCheckPOS RRRR VV >** ***/isoc/data/Summary/POS_Check_RRRR_VV.txt***

   (Where RRRR VV is the revolution & version of the POS/ICP to be checked.)

5.2.4.2 Creating the POS Summary File

The POS summary programme can be used to create a very useful ASCII summary of a POS. To generate & save a POS Summary the user should enter the following UNIX instruction:

$ **genPOSSummary** ***/isoc/data/POS/generated/RRRR_VV.POS***
> /isoc/data/Summary/POS_Summary_RRRR_VV.txt

When a new POS has been created for an already existing revolution, for example a TOO, it is recommended that the new POS Summary be compared with the old one. This can be done by using the UNIX 'DIFF' command. When the 'diff' is performed on two version of the POS Summary the two files should be identical 'up to the point where the RWB & slew to the TOO have been scheduled. The files should also confirm that the GSHOs have not been moved. Both of these checks are critical, in the case of an RPOS, otherwise MOC may well reject the planning files. If differences are detected in the two files, these differences should be brought to the attention of the MOC, before their submission.

5.2.5 Checking the Planning Messages

Following the submission of the POS & ICP, and prior to the reception of the Timeline Summary, the ISOC expect to receive the following four different message types:

- EPOS Validation Message
- APF Validation Message
- Cross Validation Message
- Timeline Generation Message

The header of these messages, see RD.11, will contain an indication of whether that part of the Timeline generation process has been successful or not, the ISOC Mission Planner can there monitor the progressive generation of the Timeline by MOC.

The reception of a message indicating the failure of a specific part of the generation sequence, especially EPOS & APF generation, will provide the ISOC advanced warning that MOC may reject a POS. These Planning Messages are accessible, to the ISOC team, on both the office/development and operational networks. They are located in the directory ~ ***isoc/data/MPMF/received/***

5.2.6 Reception & Validation of Timeline Summary

At the end of the Timeline Generation Process the MOC will send to ISOC, via IFTS, the Timeline Summary for formal approval. Since the IFTS at ISOC, does not trigger any 'alarms' when a file is received the MOC will also send an email to the Mission Planner and SCOM advising them of the new Timeline Summary.

5.2.7 Handing of Contingencies

5.2.7.1 Network Problems @ISOC

Should the subnet, to which the ISOC ECS machine is connected, fail it will not be possible for the ISOC to send & receive any files via IFTS. The impact of a short (couple of days) failure of the subnet is negligible, unless the ISOC has to undertake a critical re-plan. Critical re-plans are basically re-plans in response to a ToO or ALL planning events during the PV phase.

In both the ToO & the PV cases it is important to get information into the ISOC operational system, so that the planning task can be initiated and eventually get the final planning files out to MOC (& ISDC).

5.2.7.1.1 Alternative method of getting data to the Operational System

All ToO alerts are received and stored on the Astro machine and assuming that machine is still functioning the data can be accessed from any the RSSD subnets. The proposal data can thus be printed off and manually entered in the PHS. If Astro is down and ISDC has detected a ToO the back up for them would be to send the ToO characteristics, to ISOC, by fax.

During PV phase the volume of data to be transferred, from ISDC to ISOC, could be quite large. Again, as a back up this information could be faxed to the ISOC but manually re-entering the data would be both time-consuming & prone to human error. I order to minimise the impact of such an event, should it occur during PV, a full copy of the baseline PV proposals would already reside in PHS on the ISOC2 system. Thus should it not be possible to receive the latest updates via the PLD task the ISOC planner would only have to update this baseline set of observations to reflect the changes requested via fax.

5.2.7.1.2 Alternative method of transferring planning files to MOC

In order to send the planning files to MOC, by passing the failed ISOC subnet, the files will have to be copied (DAT or Floppy) off of the operational system so that they can be emailed to MOC. Assuming the failure is restricted to ISOC subnet the files could be installed on any of the ‘astro’ machines. If ‘astro’ is also down any PC, with email capability will do.

The two files to be copied, & sent to MOC, are the POS & ICP. (RRRR_VV.POS & RRRR_VV.ICP) Both of these files are located in the directory ***/isoc/data /POS/generated/.***

The files should be emailed to the address #integralogs@esa.int. After sending the files the SPACON should be called (x62408) to let him/her know that they have been sent.

5.2.8 Special Observation Related Procedures

5.2.8.1 OMC FF & DC Calibrations

5.2.8.1.1 Structure of OMC FF & DC Calibrations

tbw

5.2.8.1.2 Creating & scheduling OMC FF & DC Calibrations

Following the execution of the OMC Flat Field or Dark Current Calibrations the OMC instrument will remain in the calibration mode until either of the following occurs:

- OMC is commanded by Ground back to STANDBY mode
- INTEGRAL enters the Radiation Belts and the on-board autonomy, on OMC, commands the transition to STANDBY.

If the OMC is left in a calibration mode (i.e. is NOT in STANDBY mode) and ISOC schedule a normal OMC observations (NOMINAL & FAST mode), the OMC instrument will generate an On-Event Message (OEM). The implication of this OEM will be that MOC will need to command a reset of the OMC IASW, before any observations can proceed.

In order to avoid this situation, it is necessary for the ISOC to schedule a short Engineering Observation after each FF or DC Calibration. This observation should be used both to command OMC to STANDBY Mode as well as force the TM allocation back to the nominal rates. The duration of the Engineering Observation being just large enough to comply with the minimum pointing duration agreed with MOC & maintained in the OSS Configuration script.

5.2.8.1.3 Running the OMC FFC POS/ICP Hack program

The POS Hacker program, to automate the 'manual editing of the POS/ICP in support of OMC FF observations, is located on the operational system. The executable is called "omcff".

1) To execute the program type "**omcff**".
2) Input the POS filename (e.g. 0099_99.POS) and off it goes.

   The original POS/ICP file is copied to e.g. 0099_99.POS_orig and 0099_99.ICP_orig (just in case), while the hacked POS/ICP is called 0099_99.POS_new and 0099_99.ICP_new.

3) Perform a cat –ve of the new ICP to check that the number of characters, per line is correct.
   "cat –ve 0099_99.ICP_new > check_0099_99.ICP_new"

4) Open file "check_0099_99.ICP_new" with normal text editor & visually check it.
5) If you're happy, copy manually the new POS/ICP files to the 'original' POS/ICP names/versions, i.e.
   "cp 0099_99.POS_new 0099_99.POS" &
   "cp 0099_99.ICP_new 0099_99.ICP"

6) Send the POS/ICP to MOC in the usually manner.

5.2.8.2 The Handling of GPS observations

Galactic Plane scans are to be scheduled every 2nd or 3rd revolution. i.e. roughly once per week. Thus there are in total 52 GPS scans in a year. The first scan, in the routine phase is currently planned for Revolution 26.

Due to the Sun, anti-Sun, moon and earth constraints there can be up to 3 arcs of the GPS pattern visible at a particular time. The Science Team Member, responsible for mission planning, has produced will maintain a table identifying, for each weekly scan, which parts of the GPS is visible. This table, to be placed on the web, also identifies which points in each scan should be scheduled. This information has been compiled using Starmap and TVP to determine the parts of the scans, which are visible, and then optimising these visibility periods against the total allocated time for the GPS.

In generally GPS scans are best scheduled at the beginning of a revolution. The reason for this being that long slew, to the first GPS pointing, may be unavoidable. By scheduling the GPS, as the first observation in a revolution means that any long slew, required to get to the start point, will take place before exiting the radiation belts.

Selecting a specific GPS scan & arc of scan for scheduling.
The proposal numbers for the GPS scans, in AO-02, start with 02998.

- From within PHS select "View Proposals" option
- Select "ISWT survey" under "Type" & make "Type" active as a selection criterion
- Select the ISWT GPS and view the proposal by clicking on "Details".

The GPS proposal has 3x52 records. They have numbered "0101", "0102", "0103", "0201", etc. The first 2 digits are for the pattern number, i.e. "01" is pattern 1. There are three records for pattern 1 (`sub records'), corresponding to 3 arcs which may be visible during a year..

- To activate a particular GPS scan for scheduling select the appropriate record(s) and click on "**Checkout**".
- Fill in the Earliest and Latest start times of that particular part of the scan. If the GPS is to be scheduled at the beginning of a revolution the Start time should be set to a value at least 1 hour after perigee. When the Start & End times are entering the revolution number is automatically calculated & displayed.
- Enter also the Start Point and End Point of the GPS (these values should be taken for the GPS table maintained & published by the Mission Planning Responsible.).
- The Approved time should be updated by clicking on "Update Approved time." under Start Point of GPS.
- When one has changed the necessary records **"COMMIT**" it and **"DISMISS**".
- Exit PHS
- The modified GPS scan can now be called up in OSS

5.2.8.3 The Handling of GCDE observations

As with the GPS the Mission Planning Responsible will identify from the long-term plan, covering the whole AO period, when specific parts of the GCDE are visible and hence should be scheduled.

The mission planners also maintain a list/table of pointing positions (RA & DEC) of each point with the GCDE, identified by Pattern ID & a Pointing number.

Selecting a specific GCDE scan for scheduling.
For AO-1 the proposal numbers started with 01999 & for AO-2 they start with 02999 etc.

- From within PHS select "View Proposals" option
- Select "ISWT survey" under "Type" & make "Type" active as a selection criterion
- Select the ISWT GCDE and view the proposal by clicking on "Details".

The GCDE, in AO-2, consists of seven different patterns. Each pattern defines two proposals. (For pattern 1 we have proposals 0299911 & 0299921; for pattern 2 we have proposals 0299912, & 0299922 etc.) An observation in each proposal consists of all the pointings within that pattern. Since a pattern is scanned more than once during the AO, there will be several "identical" observations within each proposal.

The structure of the GCDE & its patterns are explaining in RD. 35. The activation/selection of a specific pattern (Proposal) & column (Observation) is performed in a manner similar to that of GPS.

- To activate a particular GCDE scan for scheduling select the appropriate record(s) and click on "**Checkout**".
- Fill in the Earliest and Latest start times of that particular part of the scan. If the GCDE is to be scheduled at the beginning of a revolution the Start time should be set to a value at least 1 hour after perigee. When the Start & End times are entering the revolution number is automatically calculated & displayed. (Always check that the displayed revolution number is the correct one!)
- Enter also the Start Point and End Point of the GCDE (these values should be taken for the GCDE table maintained & published by the Mission Planning Responsible.).
- The Approved time should be updated by clicking on "Update Approved time." under Start Point of GCDE.
- When one has changed the necessary records **"COMMIT**" it and **"DISMISS**".
- Exit PHS
- The modified GCDE scan can now be called up in OSS

5.2.8.4 Managing the OBT Wrap Round

Approximately ever 193 days the On-board time, as transmitted in the Broadcast packet, will be observed by the instruments to wrap round. If this 'apparent' wrapping round of the OBT were to occur while IBIS is in either Standard or Polarimetry mode, the onboard Histograms process would 'freeze'. Autonomous 'unfreezing' will only take place when/if the instrument detects a valid slew pointing transition/sequence of events. In the case where INTEGRAL is dithering, and the wrap-round takes place during a pointing, any histogram's being generated will be corrupted. In the case of a long staring observation the corruption of the histograms process would lead to the loss of all histograms that would have been generated during the long pointing.

It is therefore important that ISOC avoid scheduling a long staring observation when wrap-round is expected to occur. To do this the ISOC should schedule a 'fixed time' Engineering Observation, with a duration of approximately 15 minutes centred on the predicted wrap-round time. The MOC are required to advice the ISOC, as part of the regular telecon/meeting, when the wrap-round will take place.

The engineering observation should configure ALL instruments back to the ISOC defaults specified in the Instrument Modes TN (RD.33).

5.2.8.5 Handling of SPI Annealing & associated PSD Calibration

SPI annealing & the PSD calibration operations are prepared offline and inserted into the PHS as a series of Fixed time Observations. Their scheduling is therefore performed in an identical manner to any other Fixed Time Observation. The sequence of events surround each SPI annealing are discussed in a dedicated meeting involving representatives of MOC, SPI Team & ISOC.

5.2.8.6 Manual Insertion of RWBs

RWBs windows should be inserted into a (R)POS, where a deviation in the schedule , being presently executed, is to be introduced. This is only expected to be necessary if a schedule has to be modified in response to a ToO or Ground Station contingency. The RWB should be inserted just before the slew to the to the new observation.

The next version of OSS will support the automatic insertion of RWBs, at exposure boundaries The insertion will is automatic in the sense that if the planner deletes & then replaces an exposure/observation, he/she will prompted to confirm insertion of the RWB.

Manual insertion of an RWB is performed, from within OSS, by right clicking the mouse whilst holding the cursor over the appropriate point in the Schedule visualisation window.

5.2.8.7 Switch the Operational JEMX unit

At the request of the JEMX PI, the ISOC, normally schedule observations using only one JEMX unit. The, not to be used, JEMX is always kept in SAFE_DORM mode. The one being used being normally in Data Taking mode. The SAFE_DORM mode has NO EDs associated with it.

The present implementation of the ISOC system means that the ISOC can schedule either or both JEMX units in a revolution and OSS will automatically insert (if scheduled mode = Data-Taking) the appropriate HV activation EDs. OSS cannot however determine the required minimum PST settings. This information is stored separately in the CCS Domain Properties[7] table.

PST defaults (minimum values) can only be changed in consultation with MOC.

Assuming a transition from JEMX2 to JEMX1, the typical sequence of events, to implement the necessary updates to CCS& Proposals, when switching JEMX units (& PST settings) is:

1. Using the CCS option “Mode Maintenance” modify the JEMX units entries such that the JEMX TM allocations are as given in Table 13:

JEMX Unit	Mode	Def.TM	Min.TM	Max.TM
JEMX 1 (Assuming PST optimised for JEMX1)	NOT_USED	5	5	124
	SETUP	8	5	124
	DATA_TAKING	8	5	124
	DIAG_DUMP	8	5	124
	SAFE_DORM	5	5	124
JEMX 2 (When PST optimized for JEMX1)	NOT_USED	1	1	120
	SETUP	1	1	120
	DATA_TAKING	1	1	120
	DIAG_DUMP	1	1	120
	SAFE_DORM	1	1	120

Table 13 - JEMX 1 & 2 TM Allocation (if PST optimised for JEMX1)

2. Modify CCS "Domain Properties" to use JEMX1 instead of JEMX2 in the GPS/GCDE and to set number of default HK packets to be used in defining BCP/PSF TM distribution.

Domain Properties	Value
Jemx1HKTM	5
Jemx2HKTM	1
gps.jemx1.mode	"DATA_TAKING"
gps.jemx2.mode	"SAFE_DORM"
gcde.jemx1.mode	"DATA_TAKING"
gcde.jemx2.mode	"SAFE_DORM"

Table 14 - CCS Domain Properties optimised for JEMX 1

[7] The editing of CCS properties is restricted to only a few members of the ISOC Team.

3. ISOC need to run a script to update all "Approved Observations" and set the JEMX1 modes & TM parameters to those of JEMX2. In all Approved observations JEMX 2 mode should then be set to "SAFE_DORM". The TM allocation should always be set to "Default"

4. All observations, which have only been partially scheduled, need to be closed down (set to “Completed”) and new observations created & "Approved". Only when this has been completed can scheduling be resumed.

5.2.8.7.1 Suppressing JEMX HV Activation EDs @ Belt Exit.

OSS determines whether it should insert the JEX HV ED, at the start of a revolution, by checking if a JEMX unit is operated in Data Taking mode. If the unit has been schedule to use JEMX in Data Taking, at any time in the revolution, the appropriate ED is extracted from CCS. These JEMX EDs are defined in the "CCS Domain Properties" table as:

instrumentStartup.J.ed = "KEACT_"
instrumentStartup.K.ed = "LEACT_"

If one wants to schedule the JEMX Data Taking mode, without OSS commanding the HV activation, @ belt exit, then one can either edit the POS & ICP to remove the ED (post scheduling) or set the value for "instrumentStartup...." to "NONE".

Editing the POS/ICP is the preferred & best when the suppression of the activation is only required for a couple of revolutions. The CCS capability, of suppressing the insertion of these activation EDs, was implemented to enable the ISOC to avoid systematically scheduling the instrument activations should it be requested by MOC &/or the JEMX PI.

5.3 Observation Status Monitoring

5.3.1 Check for reception of new ECS files

On a regularly (daily) basis, the responsible ISOC scientist is required to check for the reception of Exposure Completion Status (ECS) files, from ISDC. These files are received via IFTS and are stored, on the development/office network, in the directory:

~isocops/isoc/data /ECS/received/

The simplest way of checking for these files is by typing:

"ls -lrt ~isocops/data/ECS/received"

5.3.2 Processing ECS files

If any new files are present the Duty Proposal Handler should log into PHS, in the operations room. Normal user ID & Password are applicable.

- Select the PHS option "**Import/Export Files**"
- Select option "**ECS Process**"

One by one the user can process the ECS's by either double-clicking on the filename, or selecting the filename and clicking open.

After a few seconds you have an overview of the good times. Check the good time and compare it to the scheduled time. Normally they are either very close or caused by a low PICsIT good time. Normally one tends to ignore the low PICsIT good times, since it was not really possible to analyse the data anyway, but this might change in the future. If there are low good times, this should be flagged in kept in mind for the telecon (however, if there is a low good time for only one pointing of a long observation this can be disregarded).

Now click on print, select proper printer (i.e. pr-duplex-nb, to avoid banner page) and select landscape under "options". The printouts should be filed.

When finished one should generate the OCS'es. Take care to first select the proper AO (01,02,88) number, before generating & sending the OCS.

- From within the PHS option Import/Export Files select OCS option **"Generate ALL"**
- When the processing is complete select OCS option "**Send ALL**".

5.3.3 Preparation for ISOC-ISDC Teleconference

In order to prepare for the telecom, refer to section 2.3.4, one needs to produce/obtain an overview of the "Good Times". This can be done using the PC in the operations room.

- Log in to the PC using the same username and password as on the Solaris machine.
- Double click on "shortcut to observation_status.xls".

Go to the "query"-sheet, select "data" and click "refresh". Then go to the "observations"-sheet and print this one. This printout gives an overview of the total good time and good time per instrument for each observation.

When deciding on whether the data is good enough to be distributed one should generally ignore PICsIT good times and accept good times within 5% of the scheduled time. Also 10% deviations for short observations are accepted (since rescheduling e.g. 5 ks is a major overhead). However, these are only vague guidelines and should be looked at on a case-by-case basis. In general the good times are either very close to 100%, or something significant (e.g. annealing) has happened.

When deciding on distributing the data it should be kept in mind that data taken within 6 weeks should be processed as one set and distributed together, so a look at the executed revolutions (or in exceptional cases the short-term schedule) is needed.

Prior to the telecon ISDC (Katja) usually sends a list of observations to be discussed. From the printout obtained from the spreadsheet it is clear when an observation is "successful" (from an "instrument on" point of view) or not. If not (which is an exceptional case) extra time should be credited to the observation, and the observer should be informed through the helpdesk. However, since in practice there is always a large delay before the rescheduling will take place, also the dataset of the short observation should be distributed.

5.4 Science Data Archive Management

TBW. Background information can however be found in the following documents:

- Archive Software Joint Development Plan (RD.31)
- ISOC-ISDC Interactions Document (AD.7)
- ISOC-ISDC ICD (RD.11)

5.5 ISOC System Administration & Librarian Tasks

In line with RD.24 & RD.34, all external deliveries, or notifications that an external delivery is available, should be routed to the ISOC Librarian, for action. The email address of the ISOC Librarian is given in Table 3 and RD.24.

After received the delivery note/notification, the ISOC librarian will fetch (if appropriate) the applicable item(s) and place them in a dedicated software directory **(/isoclib/deliveries/xxxx)**. Details of the delivery note will also be circulated to all ISOC personnel. Depending on the nature of the delivery, software and or data item, a member of the Software and or Science team will be asked to inspect the new delivery and report their findings to the Delivery Review board, which will be triggered by the ISOC Librarian's email. In the case of the ISOC, due to the small size of the team, the Configuration Control Board (CCB) performs the tasks of the DRB.

During the CCB the decision as to how to proceed with the deliver will be take. That decision will depend, not just on the feedback received from the initial ISOC team members' analysis but also on any possible implications it may have for external ISOC parties. The CCB will also crosscheck the delivery against RD.20, in order to ensure that all applicable GS CCB requirements are complied with.

Generally speaking the external deliveries, to the ISOC will normally be received from MOC and occasionally OMC, ISDC and Southampton. Each of these deliveries can be divided in to software update, which will generally be infrequent and data or table updates. The latter are expected to be more frequent.

Once a file, or S/W packages has been approved by the DRB/CCB the ISOC Librarian will update the S/W development links to ensure that they now point to the newly approved file/software package.

Where appropriate, for example in the case of the OMC Catalogue, the ISOC Librarian will contact ISDC and advise them that a new catalogue has been approved. Refer to section 5.5.1.3 and RD.11 for further details on OMC Catalogue updating and RD.34 for details of all multi-site configured items.

RD.20 and RD.25 cover, in some detail the procedures used by the ISOC S/W team, to ensure that the system configuration is maintained. The following subsections therefore concentrates on configuration control activities relating to external deliveries.

5.5.1 ISOC Librarian Tasks

5.5.1.1 Flight Dynamics Packages

Table 15 contains a list of all Flight Dynamics files transferred to ISOC, from MOC. As can be seen they basically fall into categories. Software & associated data files.

All Software files will be sent to the ISOC, by surface mail, on CDs. The various data files, which are updated more frequently, are sent/received via the IFTS.

All Flight Dynamics deliveries, data or S/W, will be accompanied by a delivery note. It is assumed here that the delivery note, for those files transferred via IFTS, will take the form of an email to the ISOC Librarian. The email will then act as the trigger for the librarian to retrieve the files from the operational machine, where all IFTS files are sent/stored.

The files, software & data, will be stored in the appropriate **/isoclib/deliveries/FDS.xxxx** directory on the development network. The procedures relating to the installation of these software & data files are contained in RD.25.

Description	Method of Transfer	Format	Update Rate	Comment
Attitude Constraints Checker S/W	CD	Libraries	-	
Attitude Constraints Checker Data	IFTS	Binary	Biweekly	
DBOB S/W	CD	Libraries	-	
DBOB Data	CD/IFTS	Binary	Every 2 - 3 months	
Slew Time Predictor S/W	CD	Libraries	-	
Slew Time Predictor Data	IFTS	Binary	Biweekly	
Orbit Access File	IFTS	Libraries	Weekly	Orbita & Revno files (Sect.5.5.1.1.1)

Table 15 - List of Flight Dynamics deliveries

5.5.1.1.1 Updating of the Orbita & Revno files used by ISOC

New copies of Orbita & Revno files are received from MOC/FD, automatically every 3 - 7 days. It not operationally necessary for the ISOC to update/replace their copies of these files at this high frequency as files remain valid for several months. To ensure that any updates are not overlook, the Software Librarian will import the latest set of these files at the start of each week. The procedure to do this is given below.

1) Log in as ‘isocsys’, run PHS & select.
2) ***Confirm that no other user is using OSS & PHS before proceeding.***
3) Select CCS option “**FD Files & SPIBIS**”
4) Select button/option “**Install Data Files**”.
5) A series of Pop-up windows will appear, referring to first Orbit & then the Revno file. Click “OK” for each of these windows.

6) When the importing of the new files is completed select the option "**Recalculate All**". After this option has been selected PHS will begin to systematically recalculate the SPIBIS constraints for all observations. The process may take a few minutes.
7) When PHS has finished recalculating/regenerating the list of SPIBISed observations, print the new REVNO file.
8) Clicking the "Dismiss" button can close the window.
9) Log out of PHS & record in log book that the new set of Orbita & Revno files have been installed.

5.5.1.2 IODB & ED Deliveries

In addition to the Flight Dynamics files, transferred to ISOC from MOC, the ISOC also receive the Event Designator Browser. This browser is a subset of the much larger IODB and contains the details required by ISOC to command the correct instrument configuration. Table 16

Description	Method of Transfer	Format	Comment
Integral Operational Database (IODB)	FTP	MS-Access	Baseline is that this file is not sent to ISOC. Instead ISOC receive the smaller ED Browser - see below
Event Designator Browser	Email FTP	MS-Access	Placed on the MOC ftp server as a 'Zipped' MS Access file of ~ 6 M. Used by ISOC to extract ED details

Table 16 - Other MOC Deliveries

The IODB contains details of not just the required Event Designators but also all satellite TM parameters. At an estimated size of ~100 Mb this file is not very easy to manage/manipulate. The ED Browser on the other hand is much smaller ~30 Mb (~5Mb when compressed) and in addition it support easy visualisation of the EDs.

Following the reception of the delivery note/Email, from MOC, the Software Librarian will retrieve the file, via FTP, and place it in the appropriate 'new' ED Browser directory on the ISOC development system. **(Typical directory structure is /isoclib/deliveries/iodb_dd_mm_yy)**

The zipped & unzipped versions, of the MS Access have the formats:

Event Designator_2K_dd_mm_yy.zip or Event Designator.mdb

5.5.1.2.1 Burn Copy of ED Browser on to a CD or other Media device

A copy of the new ED browser also needs to be copied to the PC in the OPS room. The can be done in several ways but perhaps one of the easiest is to burn a copy of the browser onto a CD Rom.

1. Log on to Development server (actual Workstation)
2. Insert blank CD in to the CD Writer
3. Open the K3b or Gear CD copying programme
4. The software should guide you through the steps to format the blank CD.
5. Drag/copy the IODB/ED files **(Event Designator_2K_dd_mm_yy.zip and/or Event Designator.mdb)** from the library directory to the appropriate window in K3b or Gear.
6. Select the option/icon "Burn a Disc", or word "write" to start the burning.)
7. CD will be ejected when process has been completed.

5.5.1.3 Deliveries from OMC Team

Table 17 contains a list of the OMC files to be received by ISOC.

Description	Method of Transfer	Format	Update Rate	Comment
OMC Pointing Software	FTP	Libraries	-	
OMC Catalogue	FTP	Ascii	Every AO	
OMC Delta Catalogue input	Email	Ascii	-	Provided to ISOC every time a new 'temporary' addition to the catalogue is to be added.

Table 17 - List of OMC Software & Data File deliveries

It is not expect that the OMC delivered 'Pointing Software' will ever be changed, unless there is a problem detected with the onboard software or hardware. On the other hand, it is expected that the ISOC will receive the 'occasional' update to the OMC catalogue. Updated versions of the catalogue are to be expected, as a minimum, following every AO cycle. Other updates will be made available as & when it is deemed necessary by the OMC Instrument Team to incorporate new sources, or update the details of existing ones.

In line with RD.34, when a new copy of the OMC Catalogue, or Software, is ready the OMC Team will send an email (delivery note) to the ISOC Librarian, specifying the server & location of the new delivery. The ISOC Librarian will then copy the appropriate file(s) to the ISOC deliveries directory **/isoclib/deliveries/omc_dd_mm_yy** and inform the SCOM & ISOC CCB of its arrival.

The ISOC CCB procedure for the handling of a S/W deliver is slightly different from that of a new Catalogue. The reason for this being that the installation of a version of the OMC S/W is an internal ISOC concern, provided the external interfaces defined in RD.12 remain unchanged. OMC catalogue is however an identified multi-site configured item as it also used by ISDC. The updating of the OMC catalogue shall therefore be coordinated with the ISDC, via the GS CCB (see RD.34) and in line with AD.7.

Changes to the OMC Delta Catalogue are performed by the ISOC Science Team and are addressed in section 5.1.5. Copies of these updates are also copied to ISDC.

5.5.1.3.1 Procedure for transferring OMC Catalogue to ISDC

- The ISOC Librarian shall place a **'gzipped'** copy of the OMC Catalogue on the ISOC ftp server in the following directory:
  ftp://astro.esa.int/pub/integral/ISOC/download
- The ISOC Librarian shall then send an email to the ISDC using the email address:
  isdc-ops@obs.unige.ch with copy to isdc-shift@obs.unige.ch
- The email should include, as an attachment a copy of the delivery note, received from OMC, along with the following details:
  - Catalogue Version Number
  - The server location (See above)
  - Planned implementation date, Revolution number etc.

5.5.2 ISOC System Administration

5.5.2.1 Starting & Stopping of the PHS Receiver Task

For the duration of an AO Call the PHS Receiver Task must be up & running if proposers are to be able to submit a proposal. Just prior to the start of each AO the SCOM must request/authorise the System Administrator to START this task. Similarly at the end of an AO Call the SCOM will request the System Administrator to STOP this Task.

Requests to start & stop the task will also be made, out side of the AO periods, in order to allow the ISOC to run PGT from ISOC during the PV phase and for the odd occasion that a proposer is authorised to re-submit a proposal.

For details of how this should be done, the reader should ref to the ISOC Uplink SUM (RD.26).

5.5.2.2 Status Check of the External Interface Machine

External Communications Machine (ECM) - status to be checked (**daily**) by the ISOC Librarian.

At regular intervals during each day the "processCheckMonitor" task sends an email report, containing any message/alerts, to the Software Maintenance Team using the alias isocsmm@astro.esa.int.

The tasks checked on the ECM are:

- PRV - Proposal Receiver
- MLR – Mailer
- IFTS – ISOC-ISDC-MOC File transfer

If any of the tasks indicate a problem, or the emails are no longer being received, the ISOC Librarian will log the occurrence of the error and initiate an investigation/recover.

The ISOC Uplink SUM (RD.26) for full details of the applicable procedures.

5.5.2.3 Status Check of the Operational Server

On a daily basis, normal working days only, the ISOC Librarian is required to perform a detailed check on the status of the critical S/W tasks running on the operational server (ISOCOPSV1).

When the problem is identified the ISOC Librarian will record its details in the Log Book and conduct an investigation. This entry should contain details of any work-around implemented and where applicable the number of the SPR raised.

1) **LOGIN** to **ISOCOPWS1**.
2) Using the UNIX commad "ps' confirm:
   a) Process "pld" is running
   b) Process "ppd" is running
3) Examine the "/isoc/data/Submitted_Proposals" directory tree for anomalies.
4) Check the following log for errors:
   a) "pld" log

b) "ppd" log
5) Run "ccs' noting any changes
6) Run "phs' noting any changes

5.5.2.4 Monitoring of Operational Server

During the period of an AO Call, the System administrator is required to check the status of the Push – Pull Daemon and Proposal Loader tasks running on the operational server (ISOCOPSV1).

1. Logon on to **ISOCOPWS1**.

If the "processCheckMonitor" task is not already running in a window, a terminal should be created. Clicking the right mouse button anywhere on the desktop and selecting the option Terminal does this. At terminal window command line type the following:

~checker/bin/processCheckMonitor

2. **Check for Error Messages**

If there is a problem with any of the tasks an error entry similar to the one below show be present in the window.

"ERR:process [*name_of_process*] not running, please take action"

3. **Record & Report any Problems/Errors**

Check the Operational Logbook, kept next to the machine, to determine if this is a new or old entry. (Each entry in the "processCheckMonitor" task has a unique time stamp.)
If this is a new entry record the detection of it in the Logbook and contact Software Support, via email (isocsmm@rssd.esa.int) and phone, advising them that an error has been detected.

When the problem has been solved/rectified, the action taken should also be recorded in the Logbook. This entry should contain details of any work-around and where applicable the number of the SPR raised.

5.6 Instrument Mode & Event Designator Management

5.6.1 Installation of the new Event Designators

The installation of the new EDs requires that the users have access to several restricted CCS functions. The following steps assume that a new ED Browser has been received from MOC and copied to CDROM by the ISOC Librarian. Refer to section 5.5.1.2.

5.6.1.1 Install ED Browser on OPS PC & Extraction Files for CCS

This section & subsections can only be performed on the OPS room PC as they require the user to run MS Access.

5.6.1.1.1 Install a Copy of the New ED Browser on the OPS Room PC

1) Log on to the Ops PC as ***"phsuser1"*** and delete ALL '*.txt' files that you find in the local directory: "C:\data\access\iodb"
2) Insert the CD ROM, containing the new ED Browser, in the CD drive and copy the file "**Event Designator_2K_dd_mm_yy.zip"** or "**Event Designator_2K_dd_mm_yy.mdb**" file to the directory "**C:\data\access\iodb**"
3) If the CD contains the zipped version of the file the MS Access database (.mdb) files should be extracted from it. The ".mdb" should be placed in the directory ***{C:\data\access\iodb\}.*** The extracted MS Access file, should be called:

   Event Designator_2K_dd_mm_yy.mdb

5.6.1.1.2 Extract ED Characteristics from the ED Browser

1) Open the ED Browser/Database, by double clicking on:

   Event Designator_2K_dd_mm_yy.mdb
2) Verify that the IODB version, reference on the ED Browser/Viewer start-up screen/window, is in agreement with the release note sent by MOC.

   The file naming convention is: **IODB_XX_vvvv_dd_mm_yy**

```
Where:
      IODB     = Database name
      xx       = Relevant SDB version number
      vvvv     = IODB  running  version  number
                 (Increments with each IMCS propagation)
      dd_mm_yy = Release date
```

3) Export the files required by CCS
   - Set the Import/Export directory path to: "**C:\data\access\iodb**"
   - Select the Option "Export Database" & confirm Export.

4) When 'Job Complete' is indicated, confirm that the following 14 (.txt) files have been inserted in the directory "**C:\data\access\iodb**":
   - cca; ccf; ccs; cdf; cpc; csf; csp; css; paf; pas; prf; prv; sdf; vdf

5.6.1.2 Extract & Compare ED information from the new IODB Files

1) Start the PHS application and select the CCS option "**Import IODB**"
2) If a completely new ED is to be imported/added it is necessary for the user to add it to the list of EDs to be EXTRACTED. This is done by adding the mnemonic of the new ED to the list displayed on the left, of the CCS Start-up screen. The list should already include the mnemonics of all EDs already 'used' by the CCS/PHS.

(***The addition of any new EDs must be carried out before the 'extract' process is performed.)***

Remember to COMMIT the update!

Note: The need to add any new EDs to the system would have been discussed & agreed with MOC well in advance of the new delivery.

3) Select the "**Extract IODB**" button and then wait while CCS processes the files. When instructed to do so you may "**DISMISS**" the processing window.
4) Select the various options "**ED Differences**; **Parameter Alias Differences; Parameter Differences; Affected Observations & Range Differences** " to view print any differences detected. Differences due to calibration curves of the JEMX Data Taking parameters will always be detected. These 'differences can be removed by following the procedures in section 5.6.1.3.

Note: If differences were detected, which would impact an observation the button to "**Import IODB**" will be inhibited.

5.6.1.3 JEMX Event Designator "Modifications/Fixes"

The ISOC do not use the calibration curves & parameter limits present in some of the JEMX EDs, provided by MOC. Every time an IODB/ED Browser extract is imported into the ISOC system PHS compares the 'new' (MOC Values) with those used by ISOC. Table 18 - List of expected JEMX related ED differences, provides details of the known/expected JEMX related discrepancies which will be flagged. Before the importing of the latest/extracted ED set can be carried out it is necessary to remove the discrepancies. This is dome by modifying the new "extracted" JEMX ED characteristics to reflect the values used by the ISOC. Refer to Table 19.

1) Within the Import IODB option of CCS there is a button/option called "**Fix Jemx**". By clicking this button CCS will run a script, which will update the new JEMX EDs to match the setting given in Table 19.

2) After the updates have been made (& committed) the button "**Refresh Diffs**" should be pressed. Ideally this should confirm that all the necessary JEMX changes have been implemented. Unfortunately the newly implemented JEMX HV activation EDs, contain within them the same commands/parameters of the Data Taking ED. Pending implementation of the appropriate Software Change Request the KE & LEACT_ EDs will not be updated by the JEMX Fix Button.

3) ***If CCS flags no more differences proceed to section 5.6.1.4, otherwise proceed to section 5.6.2.***

List of expected JEMX related ED differences			
What	**ED Name**	**Param.ID**	**Change Description**
Changed	KEDATA	K0022F	VTYPE R -> E CATEG; N -> C
Changed	KEDATA	K0023F	VTYPE R -> E CATEG; N -> C
Changed	LEDATA	L0022F	VTYPE R -> E CATEG; N -> C
Changed	LEDATA	L0023F	VTYPE R -> E CATEG; N -> C
Changed	KEACT_	K0022F	VTYPE R -> E CATEG; N -> C
Changed	KEACT_	K0023F	VTYPE R -> E CATEG; N -> C
Changed	LEACT_	L0022F	VTYPE R -> E CATEG; N -> C
Changed	LEACT_	L0023F	VTYPE R -> E CATEG; N -> C

Table 18 - List of expected JEMX related ED differences

ED Name	FPNAME	Change to make
KEDATA	K0022F	Open VTYPE & change value from E to R Open CATEG & change value from C to N
		Open **PRF_ID 3886** and change the entry which has: PRV_MINVAL from 3.125 to 0 PRV_MAXVAL from 93.75 to 29
	K0023F	Open VTYPE & change value from E to R Open CATEG & change value from C to N
		Open **PRF_ID 3887** and change the entry which has: PRV_MINVAL from 6.25 to 1 PRV_MAXVAL from 96.875 to 30
KEACT_	K0022F	Open VTYPE & change value from E to R Open CATEG & change value from C to N
		Open **PRF_ID 4046** and change the entry which has: PRV_MINVAL from 3.125 to 0 PRV_MAXVAL from 93.75 to 29
	K0023F	Open VTYPE & change value from E to R Open CATEG & change value from C to N
		Open **PRF_ID 4047** and change the entry which has: PRV_MINVAL from 6.25 to 1 PRV_MAXVAL from 96.875 to 30
LEDATA[8] & LEACT_	L0022F	Open VTYPE & change value from E to R Open CATEG & change value from C to N
	L0023F	Open VTYPE & change value from E to R Open CATEG & change value from C to N

Table 19 - List of necessary JEMX ED Updates

[8] The KE/ LEDATA & KE/LEACT_ Event Designators each use the same PRF_ID the updating of the KEDATA & KEACT_ values for the PRF_ID also update the values for LEDATA & LEACT_.

5.6.1.4 Importing New Event Designators

Note: The final installation of the new EDs needs to be approved by the ISOC CCB.

1) Select the "**Refresh Diffs**" button and verify that all discrepancies are have gone.
2) Select the Options "**ED Differences**; **Parameter Differences**; **Parameter Alias Differences & Affected Observations**" and verify that there are now 'problems remaining.
3) Select the "**Import IODB"** button and CCS will initiate the final stages of the import process. *This will take several minutes*.
4) When import is complete exit by selecting "**Dismiss**"

Note: Approximately 10 minutes after the installation of the new set of EDS is complete it is possible to verify that the IODB version number has been updated.

5) Select 'Help/About' option on the PHS Switchboard and verify that the CCS-IODB Version number has been updated to agree with the latest MOC IODB. The format should look like something like

IODB_XX_vvvv_dd/mm/yy SIGNATURE dd_mm_yy_A

```
Where:
IODB_xx_vvvv_dd/mm/yy   - reflects the version of IODB imported &
SIGNATURE dd_mm_yy_A    - specifies the date at when PHS/CCS was updated.
```

6) Update the ISOC Log Book noting the ISOC system on which the update was carried out and the IODB version number as recorded/displayed by PHS.

7) If an ED was imported which contained a new ED parameter it will be necessary to define for that ED / parameter a set of ISOC default values. Refer to section 5.6.3.3.

8) In a new ED was imported, with or without parameters, it will be necessary to define a set of ISOC default values before it can be used. It will also require linking to an ED. Refer to section 5.6.2 .

9) That's it! The new Event Designators are now installed. You should now logout of PHS & record time, date & version number of new IODB in the Log Book

5.6.2 Mode & ED Definition & (Re-) configuration

The CCS allows an authorised ISOC user not only he capability of examining and modifying EDs already contained within the ISOC PHS.

This procedure address the following CCS Functionality's:

1. Maintain at ED level certain information
2. Maintain a list/set of Modes
   a) Maintain Mode Level Parameters
   b) Maintain Links between Mode & EDs
   (Allow sorting by either EDs or Modes)

By manipulation of EDs it is possible to change completely the characteristics of an observation. It is essential therefore that any updates that are to perform have the full approval of the ISOC CCB, and when appropriate (e.g. ED Timing) in consultation with MOC.

5.6.2.1 Maintenance of ED level information

The CCS option "**Current EDs**" allows the user to view, sort and modify the characteristics of all EDs installed on the PHS/CCS

The following characteristics are displayed can be changed on the opening window:

- Next ED Offset

By selecting a specific ED the ED characteristics can be set/changed by selecting "ED Parameters. The following parameters can be changed, in the pop-up window:

- ISOC Parameter Default Values
- ISOC Parameter Acronyms

Note:
The 'Next ED Offset' and the 'ISOC Parameter Acronym' must be entered for each ED. The Acronym is the parameter description displayed in PHS. An 'ISOC Parameter Default Value' must be entered if no MOC Default has been specified.

5.6.2.2 Maintenance of ISOC 'Instrument' Modes

The CCS option "**Mode Maintenance**" allows the user to build and maintain the list of 'ISOC supported Modes'. In order to do this option allows the user to create new modes and associated EDs with that mode. It is also possible for the user to completely remove a mode from the system. This option of CCs consists to two sub options:

1) At mode level the user must define/ can change the following:
   - ISOC Mode Description (Should use UPPER CASE)
   - Mode Start Offset (wrt PREQ)
   - TM Allocation Default/Min/Max
   - Minimum Exposure Time
   - ISDC KEY (The applicable 'mode number' as assigned/defined in RD.11.)

2) In order to assign an ED to a mode the user need only select the required ED from the list provided. The user can also change the order by which the EDs shall schedules when the mode is called/executed by OSS.
3) When a new ED, with observation specific parameters, is added to an already exiting **& USED** mode, it is necessary to deselect/select that mode (@observation level) before the new parameters can be seen/modified in an observation.

5.6.2.3 Maintenance of other ED Relationships

It should be noted that the ED Import & Maintenance functionality's of CCS only work on ED related information stored within PHS. It is possible for EDs to change, which may impact not only PHS but also OSS & PGT configuration scripts &/or code. If this happens it is necessary for the person responsible for the importing of the EDs to raise the necessary subsystem SPRs. The known subsystems & corresponding EDs where this is necessary are given in Table 20.

Sub-system	ED related info
OSS	- timing (& content) associated with updating the BCP (wrt Slews) - timing of the sending of the PST ED - Timing & content of OMC (IM_A & IM_B) EDs
PGT	- All mode definitions and ALL associated ED parameters

Table 20 - ED used, in PGT & OSS, whose characteristics are not taken from CCS

5.6.3 Investigation into Problems with IODB/EDs!

This section should only be followed if differences were detected during the importation process, other than those identified in section 5.6.1.3.

- Select the various options "**ED Differences**; **Parameter Alias Differences; Parameter Differences; Affected Observations & Range Differences** " and print any differences detected.

5.6.3.1 New EDs in the ED Difference window

The only new EDs which should appear in this window should be those added to the list of EDs to be extracted. New EDs can always be imported into PHS/CCS, without concern, as they are not associated with any ISOC Mode/Observation.

After the import process is complete the user should enter the required ISOC characteristics which are to be associated with it. See section 5.6.2.1.

5.6.3.2 ED has been deleted

The deletion of an ED, by MOC, is not expected to take place. Should this however happen the removal of an ED form the IODB will, on import, also remove the ED from CCS. Provided that is that the ED is not identified as being used in any observations. In order to avoid any inconsistencies it is recommended that MOC should never delete/remove an ED from the system. If necessary a new one should be made.

5.6.3.3 Parameters Added/Deleted to/from an ED

Adding a parameter to an ED is not a problem for CCS/PHS. Once the import is complete the ISOC CCS user must enter the ISOC characteristics of the new ED parameter. This is can be done by using CCS option 'Current EDs'.

5.6.3.3.1 Impact on existing Observations

What to do in this event is not a simple thing to define a procedure. If CCS indicates that any existing observations are impacted the differences should be printed, along with a list of the impacted observations and discussed offline with the ISOC Science Team.

5.6.3.3.2 Impact on PGT

Any change to an ED involving parameters may impact PGT. This is especially the case of CPGT. Changes to be looked for are:

- Number of ISOC selectable parameters
- Parameter range
- Parameter alias
- Parameter name (tbc)

5.6.3.4 Timing (Execution duration) of an ED has changed

In principle a change in the duration of an ED should be managed, by OSS, without any problem. Unfortunately no (or limited) test has been carried out to verify OSS will correctly handle such a change. It is not expect that there would be a problem if the duration were to be decreased. If the

duration of an ED were to be increased, it has to be confirmed whether OSS correctly delays, if necessary, the execution of the OTF Mask/unmask ED. See section 5.6.2.3

5.6.3.5 ED Controlled by OSS have been changed

5.6.3.5.1 OMC IM_A & IM_B have been highlighted

Refer to section 5.6.2.3

5.6.3.5.2 Broadcast Packet Mask/Unmask

Refer to section 5.6.2.3

5.6.3.6 Final Importation of new Event Designators

If the problems with the new IODB required that the previous import attempt be aborted the import procedure should be repeated from section 5.6.1.2. If a new or modified ED Browser has been delivered the procedure will have to be repeated from the beginning.

6. External Interfaces

6.1 Mission Operations Centre

Refer to the Integral Flight Operations Plan Volume 2, Book 1 & Volume 3 Book 1 (AD.6).

6.2 Integral Science Data Centre

Refer to the ISOC-ISDC Interactions Document (AD.7) and the ISOC-ISDC ICD (RD.11).

6.3 Southampton University

The ISOC will interface with Southampton University in connect with the maintenance of the Mass Model, Observation Time Estimator (OTE) and the Instrument Parameter Validator (IPV).

6.4 Instrument Teams

With the exception of OMC, for the deliver or the OMC Pointing S/W and the OMC catalogue, the interactions to the four instrument teams will normally be managed via meetings of the IGSCCB, ISWT and PCWG. Additional interactions are expected to take place via ISOC participation in the regular ISDC – Instrument Team meetings and the proposed GS – IT meetings. RD.24 contains details of all deliveries & associated interactions between the ISOC and the instrument teams.

The ISOC – OMC interface is also addressed in RD.12.

6.5 The Science Community

This interface is handled via the implementation of the Integral/ISOC Web based (http://astro.esa.int/Integral/isoc/html/) Help Desk. Refer to section 4.2.1.

7. Annex 1: Guidelines & Policy

7.1 New Source Naming Convention

Refer to the AO Documentation at http://astro.esa.int/Integral/isoc/html/

7.2 Data Release Guidelines

Refer to RD. 21

7.3 Project Scientist Guidelines for ISOC Mission Planning

Refer to RD. 31