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All members OPS-ONC
All members OPS-ONF
All members OPS-ONI
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All members OPS-ONV
All members OPS-CQ

GFCC
Scheduling Office
Operations Supervisor

Cebreros Ground facility Manager
Kiruna Ground facility Manager
Kourou Ground facility Manager
Maspalomas Ground facility Manager
New Norcia Ground facility Manager
Perth Ground facility Manager
Redu Ground facility Manager
Villafranca Ground facility Manager

Document List

Reference Documents

[RD 1] OCC Facilities Manual

[RD 2] ESTRACK Facilities Manual

[RD 3] OCC Testing and Maintenance Manual

[RD 4] ESTRACK Testing and Maintenance Manual (ETMM)

[RD 5] GFROMs (Ground Facilities Remote Operations Manuals)

[RD 6] NCDs (Network Configuration Documents)

[RD 7] OCC and ESTRACK User Manual (OEUM)

[RD 8] ESTRACK Operations Manual Volume 4, “Training and Simulations”

Applicable Documents

[AD 1] Control of Inspection, Measuring and Test Equipment QMS-ESOC-INFR-PR-2200-OPS

[AD 2] ESOC Quality Manual, QMS-ESOC-QMAN-MAN-0100-OPS

ABSTRACT

The OCC and ESTRACK Operation Manual (OEOM) presents the process, by which OCC and ESTRACK Operators provide a service to a user (customer) of OCC and ESTRACK. The OEOM is intended to be read in conjunction with [RD 7].

The Operational Support provided by the OCC and ESTRACK Operators includes:

- Scheduling of the OCC and ESTRACK facilities
- Execution of the service as scheduled
- Notification to the user:
    - that the service has been provided, including actual times of certain activities
    - of any failure to provide a requested service, and the reason for that failure
    - investigation together with the user of any anomalies encountered during provision of the service

The roles and responsibilities of the OCC and ESTRACK interfaces with the user are presented in [RD 7]. The OEOM presents the roles and responsibilities of operational entities, which do not interface with the user.

The OCC and ESTRACK Operation Manual was produced and is maintained by the Ground Facilities Services Section (OPS-ONF) of ESA's Directorate of Operations and Infrastructure (D/OPS). The document was produced by OPS-ONF in co-operation with other operational sections of D/OPS.

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TABLE OF CONTENTS

1 INTRODUCTION 1
1.1 Scope 1
1.2 Applicability 1

2 OPERATIONS POLICY 3
2.1 Operational Equipment - OCC 3
2.2 Operational Equipment – Ground Facilities 3
2.3 ESTRACK Ground facility Remote Operations 4

3 OPERATIONAL ROLES WITHIN OCC AND ESTRACK 6
3.1 Operational Roles within OCC 6
3.2 Operational Roles within ESTRACK 7

4 OPERATIONAL PROCEDURES 8
4.1 Local Operations 8
4.2 Remote Operations 13

5 SCHEDULING PROCEDURES 14
5.1 Introduction 14
5.2 Scheduling of Requested Services 14
5.3 Sources of MOIS Inputs 16

6 LOGISTICS PROCEDURES 29
6.1 Request for Technical Spares (Spare Request) 29
6.2 Requests for Repair of Defective Items (Repair Request) 33

7 OPERATIONAL MESSAGES AND REPORTING 37
7.1 Introduction 37
7.2 Status Change Report – OMS 26 37
7.3 Daily Incident Log 43
7.4 Events Recording Log Books 44

8 ESTRACK-SPECIFIC HEALTH, SAFETY AND SECURITY 48
8.1 Introduction 48
8.2 Full or Partial Evacuation of an ESTRACK Ground Facility 48

9 ACRONYMS AND ABBREVIATIONS 49

LIST OF FIGURES

5-1: Scheduling Process Inputs and Outputs
5-2: ESAF in graphical format (first page)
5-3: ESAF in tabular format (first page)
5-4: Integral SAF (excerpt)
5-5: Screenshot of MOIS Database, data overview in GANTT form, sorted by station
5-6: Screenshot of MOIS Database, data overview in GANTT form, sorted by mission
5-7: Screenshot of MOIS Database, data overview in tabular form, sorted chronologically
5-8: Screenshot of MOIS Database, data overview in tabular form, sorted by mission
5-9: Screenshot of MOIS Database, data overview in tabular form, sorted by station
5-10: Screenshot of MOIS Database, data overview in GANTT form, showing GUI for editing support times by Scheduling Officer
5-11: World Map with Station Predictions (Wimpy) – Front Page
5-12: Wimpy – Example World Map Printout

6-1: Spare Request
6-2: Flat List of Spare Requests for Kourou Ground Facility on ECDB
6-3: Repair Request
6-4: Flat List of Repair Requests for Kourou Ground Facility on ECDB

7-1: OMS 26 Status Change Report (Failure)
7-2: OMS 26 Status Change Report (Upgrade)
7-3: Screenshot of the ECDB OMS26 interface, displaying a flat list of OMS 26s raised for the Perth ground facility
7-4: OCC Log Book Format facing page
7-5: OCC Log Book Format reverse page

1 INTRODUCTION

1.1 Scope

The OCC and ESTRACK Operation Manual (OEOM) presents the processes whereby operators of the European Space Agency ground facilities provide support to users involved in spacecraft monitoring and control. The ground facilities covered by this document comprise:

- ESA's Operations Control Centre (OCC) located at the European Space Operations Centre (ESOC)
- the ESTRACK (European Space Tracking Network) network of ground facilities

1.2 Applicability

Together with [RD 7], this document supersedes the document "ESTRACK Operations Manual, Volume 2 Network Control Procedures (DTOS-ESTR-OPS-OM-1001-TOS-ONF) Issue 7, Revision 0". Other volumes of the EOM are not superseded by this document.

The ground facilities, whose operation is covered by this document, are the same as those presented in [RD 7].

The OEOM presents the interface between the various sections involved in providing a service to the user (customer) of the OCC and ESTRACK facilities. The OEOM provides neither a system description nor a reference for the ESTRACK network or any other tracking network used by ESA. Such information is presented in [RD 1], [RD 2] and [RD 6].

The OEOM does not cover details of OCC or ESTRACK maintenance; these are presented in [RD 4]. The OEOM also does not cover matters specific to training and simulations; these are covered in [RD 8].

The policies and procedures specified in the OEOM must be considered in the context of the documents that provide more specific operational information. These documents include:

- The Ground Facilities Remote Operations Manual (GFROM);
- Mission-specific Network Operations Procedures (NOP);
- Ground facility-specific Network Configuration Documents (NCD);
- Ground facility-specific Communication Configuration Station Dossiers (CCSD);
- OCC Facilities Manual (OFM);
- ESTRACK Facilities Manual (EFM).

The GFROM covers remote operations of the ESTRACK facilities involved in the support of the routine phase of ESA missions. It contains Global Operating Rules, Mission Specific Instructions, Routine Work Instructions, Checklists & Forms plus related administrative instructions, and Contingency & Recovery Activities. Short-term changes in operational procedures are temporarily covered by Operations Change Requests, until they are either incorporated into the GFROM or are declared no longer valid.

Operating guidelines and procedures for a given mission are detailed in that mission's Network Operations Procedures (NOP) document. In general the NOP will be the governing document for operations during LEOP and any subsequent Commissioning phase, constituting the set of rules to be adhered to by the Ground Operations Manager (GOM) and GFCC personnel on duty. Once the mission has formally entered its Routine phase the GOM position is not normally manned and the Shift Co-ordinator has responsibility for ground operations. In this phase the GFROM is the governing document, supplemented by the OCRs.

Note: In the event of conflict between the GFROM, the NOP and/or the OEOM during routine operations phase, precedence shall be given to statements given in documents in the following order:

1. GFROM, supplemented by OCRs
2. NOP
3. OEOM.

This order of precedence shall be applied until a definitive ruling is given by the Head of Ground Facilities Operations Section (H/OPS-ONF), or a nominated deputy.

For each ground facility in the ESTRACK network, the ESTRACK Network Configuration & Test Section (OPS-ONN) has responsibility to produce a Network Configuration Document (NCD). NCDs are also produced to cover the configuration of any equipment deployed to and/or operated at a non-ESA ground facility. The NCD prescribes the mission specific configuration of each equipment at the ground facility including the parameters to be set on the Station Computer (STC) to support the respective satellite pass. OPS-ONN is responsible for keeping NCDs current, and for any STC tailoring required to support a mission. The STC tailoring is agreed between OPS-ONN and OPS-ONF.

Logistics interfaces are defined in the OEOM, since this involves interaction between two different sections of OPS-ON.

As mentioned above, the ESTRACK Facilities Manual (EFM) provides information about the ESTRACK ground facilities. The procedures in the OEOM should be performed taking the capabilities and limitations of these facilities into account.

2 OPERATIONS POLICY

2.1 Operational Equipment - OCC

All technical equipment concerned with the handling of telemetry, telecommand and tracking data relating to spacecraft operations is defined as “Operational Equipment”. This includes equipment for voice, data, fax or other means of telecommunications, and associated test equipment, and may be classified under the following headings:

- Ground Facility Monitor and Control Systems:
  - Station Computers (STC or CSMC);
- Network Control and Telemetry Routing System (NCTRS);
- Operations Dedicated Ground Communications Network (OPSNET);
- Gateways, e.g. Svalbard NASDA Gateway, ESA SLE Gateway
- Auxiliary Systems:
  - Intercom;
  - Video Distribution;
  - Timing & Countdown;
  - Telemetry Processing and Recording;
- OCC Facilities:
  - Control Room Equipment;
  - Workstations.

Operational equipment may only be used by personnel who have received the appropriate training and have been authorized by the relevant technical supervisor.

Operating procedures for each item of equipment are provided in the appropriate user manuals. Details of particular parameter settings and equipment configurations for each mission are specified in the GFROM, the appropriate NOP, NCD or other system-specific configuration documents.

2.2 Operational Equipment – Ground Facilities

As with OCC Operational Equipment, Ground Facility Operational Equipment is concerned with the handling of telemetry, command and tracking data relating to spacecraft operations. This includes the locally located Ground Facility Monitor and Control Systems and any auxiliary systems.

The operational equipment may only be operated by personnel who have received the appropriate training and have been authorized by the local operations supervisor.

2.3 ESTRACK Ground facility Remote Operations

The ESTRACK ground facilities can be locally or remotely monitored and controlled. The Ground facility M&C System may be controlled either remotely, i.e. from the OCC, or locally, i.e. from the local ground facility. However, the M&C System can only be controlled from one location at a time. This is regulated by use of a token, which is transferred from one workstation to the other, when control is to be handed over. This concept is called Master Control Privilege (MCP) in the case of STC and Command Net in the case of CSMC. With the STC system it is also possible for the workstation which has MCP to refuse to transfer MCP to another workstation which has requested control. Both systems allow a number of other workstations to be connected in Monitor mode, i.e. without control.

Control of a ground facility also implies responsibility for adhering to International Telecommunication Union (ITU) and national regulations related to uplink power and minimum elevation for uplink.

Typically, each ground facility has mission specific configurations defined in the ground facility-specific NCD and programmed procedures, known as “JOBS”, that can be executed by the STC or CSMC. Depending upon the mission and ground facility equipment, this enables automatic or semi-automatic configuration of the ground facility for each spacecraft pass. In order to position the antenna for spacelink acquisition the latest Spacecraft Trajectory Data Messages (STDM) based on the most up-to-date orbit calculation need to be loaded on the Ground Facility M&C System and distributed to the Front End Controller (FEC), that steers the antenna (in co-operation with the tracking receiver).

During routine operations ESTRACK ground facilities shall be operated under full remote control from the GFCC at ESOC. Ground facility M&O contractors shall provide local maintenance during normal local working hours and in case of call-outs. The Shift Co-ordinator at the GFCC shall decide upon and justify the execution of call outs. During critical operational phases it is intended to have ground facility M&O contractors on site around the clock. Operations co-ordination between the ground facility M&O contractors and the GFCC operators at ESOC is achieved through voice conference circuits, known as “voice loops”.

Detailed procedures relating to operating Ground Facilities from the GFCC are presented in the relevant GFROM. This document presents both generic procedures and activities specific to a particular mission. Procedures presented in the GFROM provide more detail and therefore take precedence over any high-level procedures described in the OEOM.

A distinction is no longer made between ESTRACK ground facilities dedicated to LEOP, and those dedicated to routine mission support. Although some ground facilities support missions on a

routine basis, they are assumed to be available for future LEOPs, subject to the agreement of the routinely supported missions. Similarly, ground facilities which are not dedicated to routine support of a particular mission may support in cases of failure or maintenance of another ground facility, or if additional support is required by the mission during critical operations.

Routine mission support is currently provided by the following ground facilities:

- DSP: VILLAFRANCA-2
- ERS-2: KIRUNA-1 (KIRUNA-2 regular back-up)
- ENVISAT: KIRUNA-1 (KIRUNA-2 regular back-up)
- CLUSTER II: VILLAFRANCA-1, MASPALOMAS
- INTEGRAL: REDU-1
- MARS EXPRESS: NEW NORCIA
- ROSETTA: NEW NORCIA
- SMART-1: KOUROU, PERTH, MASPALOMAS, VILLAFRANCA-2 (though scheduled to minimise conflict with other missions support)
- XMM: KOUROU, PERTH
- VENUS EXPRESS: CEBREROS is planned to be prime for routine support

In depth knowledge of the ESTRACK ground facility design is a pre-requisite for remote ground facility operations, in particular in order to be able to reconfigure between redundant uplink and downlink chains, and to perform a first level investigation in case of problems of the spacelink, performance degradation or failure of equipment.

Of the current ground facilities, Kourou, Maspalomas, New Norcia, Cebreros, Perth, Redu-1, Villafranca-1 and Villafranca-2 have Mk II Station Computers (STC-2), the second-generation ESA station computer, operating on SUN workstations at the ground facility and in the GFCC. Monitoring and control of the NDIU at Santiago is also via STC-2.

The Kiruna and Malindi ground facilities use a PC-based “Central Station Monitor and Control” (CSMC). CSMC PC terminals in the GFCC provide the interface for remote ground facility operations, with functions comparable to those provided by STC-2, but with a different mimic and operator interface.

3 OPERATIONAL ROLES WITHIN OCC AND ESTRACK

3.1 Operational Roles within OCC

3.1.1 INTRODUCTION

In order to operate the various elements of the OCC facilities to provide a service to the user, roles have been identified with specific duties and responsibilities. These roles are:

- Ground Operations Manager (GOM);
- Operations Supervisor;
- Shift Co-ordinator;
- Ground Facilities Operator;
- Scheduling Officer;
- Computer and Communications Supervisor;
- Computer and Communications Operator;

All these roles are already presented in [RD 7].

In addition, a number of roles exist, which do not directly interface to the user:

- Network Evaluation Support (NETEVAL);
- Network Logistics Support (NETSUP).

3.1.2 NETWORK EVALUATION SUPPORT (NETEVAL)

NETEVAL receives OMS 20s providing details of Terminal Support activities, OMS 24s providing details of Failure to Support, and OMS 26s, which are Equipment Failures, which may or may not be associated with an OMS 24.

From these reports NETEVAL is able to provide a breakdown of ground facility support by spacecraft in hours per year, total number of hours the ground facility supported all requests, percentage of time ground facility equipment was available for support, etc. These statistics are used as the basis for the quarterly OPS-ON Reports “Facilities, Maintenance & Operations Performance Report” and “Performance Figures Operational Services Report”. The personnel responsible for NETEVAL shall report to H/OPS-ONF through a nominated deputy acting as the relevant Agency Domain Manager.

3.1.3 NETWORK LOGISTICS SUPPORT (NETSUP)

NETSUP receives requests for equipment spares or requests for repair to be authorised, information that equipment is being shipped to ESOC for repair etc, and is responsible for arranging the logistic support activities associated with these requests. The personnel responsible for NETSUP shall report to H/OPS-ONF through a nominated deputy acting as the relevant Agency Domain Manager.

3.2 Operational Roles within ESTRACK

3.2.1 INTRODUCTION

In order to operate the various elements of the ESTRACK facilities to provide a service to the user, roles have been identified with specific duties and responsibilities. These roles are:

- OPS-ONN Station Engineer
- ESTRACK Ground Facility M&O Contractors;

These roles are already presented in [RD 7].

4 OPERATIONAL PROCEDURES

4.1 Local Operations

4.1.1 PASS PROCEDURES – LOCAL GROUND FACILITY OPERATIONS

Introduction

Pass procedures will vary slightly for each mission but the following general rules shall apply to all supports. All such procedures shall be noted in the applicable mission NOP and/or GFROM.

These procedures are applicable to all ESTRACK ground facilities. Non-ESA ground facilities supporting an ESA mission shall follow the equivalent general procedures which are applicable to the facilities of that Agency.

Pass Procedures

Standard Generic Pass Procedures are presented in the following sections.

Pre-Pass Activities

Ground facility M&O contractors shall start preparing for a pass at the Start Support time specified in the relevant OMS 11. However, prior to this time the M&O contractors shall check that sufficient Spacecraft Trajectory Data Messages (STDM) are available to cover the complete pass.

A guideline for activities follows:

- NETWORK establishes voice contact.
  - Pre-pass briefing - confirmation of scheduled activities, whether the “Standard Pass” configuration shall be used or there is some non-standard requirement, e.g. Time Offset Value (TOV), Polarisation change, Transponder change, etc.
- Start configuration, initially for ranging calibration and DFTs (if required)
  - If applicable, assign antenna to the spacecraft to be supported
  - Ground facility M&O contractors advise NETWORK that they are ready to carry out a ranging calibration with the antenna pointing to a "safe" position.
  - Carry out ranging calibration, then remove ranging calibration setup
  - Configure ground facility for Long Loop Telemetry test.
  - Set up PSS simulated Telemetry as instructed by NETWORK for a Data Flow Test. If required, configure to receive test command(s) to the telecommand interface and if required to the PSS.
  - Pre-pass tasks completed. Test loops removed.

  - Ensure that the ground facility is configured as briefed.
- Start antenna tracking task. Prepare for AOS. Confirm antenna moves to position of expected AOS.
  - Ensure that Monitored Variables List (MVL) data is being retrieved by Network, if required.
  - Start AGC recording if required, using strip chart recorder and SATT or using IFMS if available.
  - Connect SATT Spectrum Analyser to monitor the Downlink or Uplink as required
  - Start Meteo measurements if required

Pass Activities

A guideline for activities follows:

Downlink Acquisition

- If no signal is received at the expected time on any polarisation, commence searching (using the predefined search pattern specified in the NOP) with the antenna once program track is above 3° and TRRX is set to Cross Correlation or Phase Locked Loop. The antenna masking profile should be taken into account.
  - Advise NETWORK if search is started.
- Report acquisition to NETWORK;
  - Ensure correct receiver lock on the carrier.
    Note: AOS time is the time of lock on the IFMS or telemetry receivers when the antenna is moving.
- Select Autotrack as soon as possible but only when above 3° and with a good downlink signal;
- Ensure TLM lock on prime and any redundant chains, and report lock to NETWORK;
- Apply Time Offset Value (TOV), if required.
- If necessary, in cases of poor signal/noise ratio, some loop bandwidths may be reduced at operator discretion after acquisition. Advise NETWORK of any changes.

Uplink Acquisition

Note: Ground facilities not scheduled for uplink must ensure that no RF is radiated. See also Section 4.1.2 for more details of uplink acquisition

- NETWORK shall advise the ground facility in the pre-pass briefing when their uplink can be started. This would normally be as soon as they have AOS and are above the ITU and national minimum elevation for uplink. However, in cases where ground facility coverage overlaps, ground facilities shall not commence uplink until instructed from NETWORK by voice, after the previous ground facility has stopped its uplink;

- When instructed by NETWORK by voice, start the uplink transmission and commence uplink sweep;
- Advise NETWORK when sweep is completed;
- If necessary, in case of no on-board lock, a resweep may be requested.

During The Pass

A guideline for activities follows:

- Monitor antenna pointing deviations in predictions. Apply TOV if required, and inform NETWORK of TOV applied;
- Monitor TLM quality;
- Monitor uplink performance;
- Monitor ranging performance;
- Monitor AGC levels and report values as requested;
- Log all local activities;
- Stop uplink when advised (or at minimum permitted elevation); Advise NETWORK that the antenna is approaching the uplink elevation limit with a 5-minute “heads up” warning.
- Advise NETWORK of LOS.

Note: The following shall not be performed during operations under local control:

- Never uplink without authorisation;
- Do not perform any equipment tests without authorisation;
- Do not leave the operational position unmanned;
- Never have simulated data on line without NETWORK instruction.

Post-Pass Activities

A guideline for activities follows:

- Stop antenna tracking task, if applicable de-assign antenna from spacecraft
- If applicable, set equipment to standby condition, but only when authorised by NETWORK;
- Compile a pass report (OMS 20) for the support, as described in [RD 7].

4.1.2 UPLINK ACTIVITIES

The following procedures will be used to control the uplink operations at a ground facility.

Starting Uplink

• NETWORK shall ensure that only one ground facility is active for uplink;
• Voice dialogue is as follows:
  • To start, NETWORK instructs the ground facility "START UPLINK";

  - The ground facility switches on uplink power to the antenna and initiates the frequency sweep;
  - Ground facility reports "UPLINK STARTED. SWEEP IN PROGRESS";
- When the sweep is completed, the ground facility reports "UPLINK SWEEP COMPLETED";
- SPACON checks that the spacecraft receivers are properly locked on to the uplink. If not, SPACON requests NETWORK to instruct the ground facility to perform a resweep and the above procedure is repeated.

Stopping Uplink

- NETWORK instructs the ground facility "STOP UPLINK";
- The ground facility stops the uplink and reports "UPLINK IS STOPPED".

Note: Various missions, especially Deep Space missions, require uplink to be routinely started and stopped several times during the support.

Polarisation Changes

The normal polarisation configuration is defined in the mission-specific part of the NCD and is configured during the pre-pass phase.

Any change of uplink polarisation requested by the spacecraft operations team at ESOC requires:
- Stopping the uplink;
- Changing the polarisation;
- Re-starting the uplink with sweep etc.

Contingency Actions

When a ground facility is active on uplink and communications are lost with the OCC, standard procedure requires that the ground facility must stop the uplink, if the data link is lost for over 1 minute, to enable any other ground facility with visibility to start their uplink.

Before any highly critical operation, SOM/SPACON may contact the prime ground facility by telephone and keep the line open until the operation has been completed satisfactorily.

Ranging Calibrations

Ranging calibrations shall nominally be made daily at each ground facility (one ranging calibration per mission to be supported). Exceptions to this are polar low earth orbit missions, e.g. ERS-2, Envisat where a ranging calibration at the nominal prime ground facility is required only every third day. In all cases, this must be done when the uplink is not required for operations. This has to be done when the ground facility is not active for spacecraft operations as the antenna must radiate to the test probe.

The calibration shall be co-ordinated by NETWORK at a pre-scheduled time or when agreed between NETWORK and the ground facility.

• NETWORK instructs the ground facility: "CONFIGURE FOR RANGING CALIBRATION FOR (spacecraft name)";
• The ground facility configures as appropriate for that ground facility;
• The antenna is pointed to a pre-programmed "safe" position, i.e. away from the spacecraft and away from geostationary satellite positions (generally northern hemisphere ground facilities point north and southern hemisphere ground facilities point south);
• The ground facility then reports "READY FOR CALIBRATION";
• NETWORK then starts the calibration task and progress shall be monitored by the ground facility;
• At the end of the calibration, NETWORK advises the ground facility: "CALIBRATION COMPLETED – CONFIGURE FOR REAL TIME SUPPORT (or other tasks)";
• The ground facility then stops the uplink, reconfigures as required and then reports "CALIBRATION OFF - READY FOR REAL TIME SUPPORT (or other tasks)".

4.2 Remote Operations

Introduction

With the transition to remote ground facility operations, the GFCC personnel have direct responsibility for supporting spacecraft passes during routine mission operations. Detailed procedures relating to operating Ground Stations from the GFCC are given in [RD 5].

In addition to the procedures presented in Section 4.1, the following applies to operations from the GFCC:

- The GFCC shall be staffed around the clock throughout the year (24h/7d service coverage). The GFCC shall never be left unmanned, except if evacuation is ordered, e.g. due to fire alarm;
- In addition to remote control of the ground facility M&C system, the GFCC operators are also responsible for control of the NCTRS during the scheduled support.

Operation of the Network Control and Telemetry Routing System (NCTRS)

The Network Control and Telemetry Routing System provides a facility to manage the logical links between the OCC and remote ground facilities or simulators. The NCTRS is also used to transfer orbital predictions (STDMs) to the Ground Facility M&C System, as well as retrieve Monitored Variable Lists (MVLs) from the STC and Radiometric datasets from the IFMSs or MPTSs.

For most ESA missions controlled from OCC, an NCTRS is tailored to meet the specific configuration requirements of that mission. The procedures detailing the operation and configuration of mission-specific NCTRS implementations are presented in the mission-specific GFROM. Where a mission-specific volume has not been produced or is not applicable (e.g. for equipment tests through an NDIU), the generic GFROM (Volume 1) provides procedures for use.

The procedures defined in the appropriate NCTRS manual shall be used for:

- Call set-up of communications channels between TM demultiplexers in the various ground facilities and a specific MCS
- Call set-up of communications channels between a specific MCS and Telecommand Encoders at the various ground facilities;
- Extraction of ranging measurement files from the ranging equipment (IFMS or MPTS) in the various ground facilities and delivery to the flight dynamics computers for further processing;
- Extraction of STDM files from flight dynamics computers and delivery to the ground facility M&C system for further processing by the FEC;
- Extraction of Monitored Variables List (MVLs) from the STC at the respective ground facility.

5 SCHEDULING PROCEDURES

5.1 Introduction

The methods by which a user may request scheduling of a service from OCC or ESTRACK is presented in [RD 7].

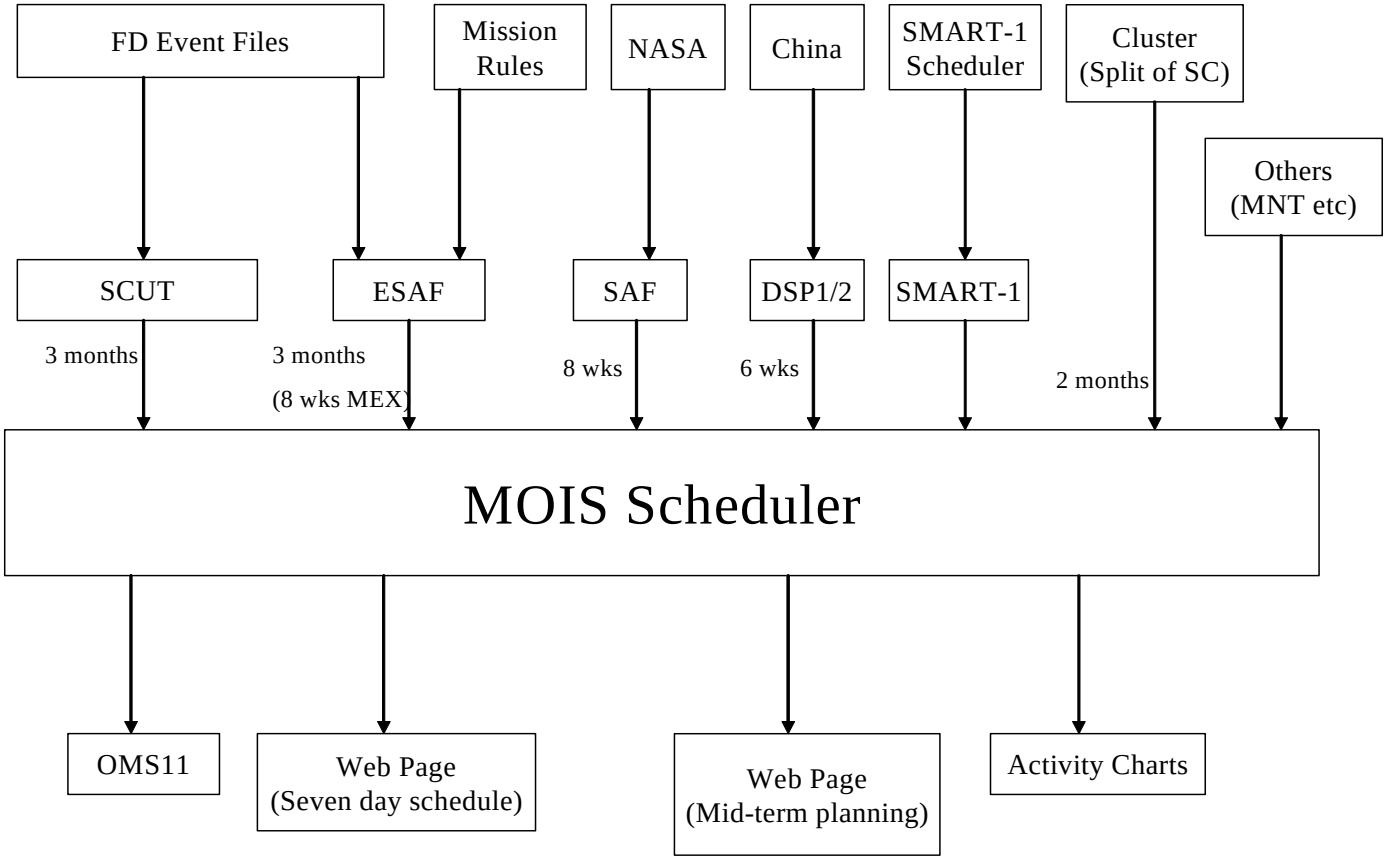
5.2 Scheduling of Requested Services

Upon receipt of a scheduling request, the information shall be entered into the MOIS database, and the request retained on file.

An Operational Scheduling Request will normally be accepted by SCHEDULING only prior to noon on the Thursday preceding the week during which the request is effective. In urgent or special cases however, an OSR may be accepted after this time. The request shall be recorded as a late input. The number of late inputs per month shall be recorded by the Scheduling Officer and reported to H\OPS-ONF on a monthly basis.

The Scheduling Office uses the MOIS database for scheduling. Inputs are in the form of ESAFs, SAFs, Flight Dynamics Files (via SCUT), Svalbard files (from the ERS-2 and Envisat Mission Planning Systems) as well as manual inputs of support requests for the DSP mission. Maintenance and other activities requested by the relevant OPS-ONN Station Engineers are also inputted to the database.

An overview of the Inputs and Outputs of the Scheduling Process is shown in Figure 5-1.



Scheduling Processes

Figure 5-1: Scheduling Process Inputs and Outputs

5.3 Sources of MOIS Inputs

ESAF (ESTRACK Station Allocation File):	Mission Planning Personnel of Deep Space Missions
SAF (Schedule and Allocation File):	DSN Scheduling Office
Svalbard Files:	ERS-2 and Envisat Mission Planning Personnel
DSP Inputs:	DOMC (DSP Operations and Management Centre - China National Space Agency)
SCUT:	Input from ESOC Flight Dynamics
Maintenance:	From OPS-ONN Station Engineer or Ground Facility Manager
Other:	Operations Scheduling Request Form

Figure 5-2 and 5-3 show the ESAF content in graphical and tabular format.
Figure 5-4 shows an example of a DSN SAF.
Figures 5-5 to 5-10 show screenshots from the MOIS Scheduling Tool

The MOIS System produces a graphical representation of the inputted information. By applying pre-determined rules, the Scheduling Officer refines the information and resolves conflicts so that OMS 11s can be produced for the supports identified at each station.

Orbital information and relevant documents are supplied to SCHEDULING by OPS-GFM. From these inputs the initial ESTRACK support schedule and any possible external agencies support requests are formulated.

In addition, a Wimpy is produced each period by Flight Dynamics Division (OPS-GFM) for each spacecraft supported. The Wimpy gives a tabular chart of the location of a spacecraft at any moment in time with reference to standard earth co-ordinates and to ground stations used for that mission. Examples are shown in Figure 5-11 and Figure 5-12.

The Wimpy listing is computer generated and provides the following information:
• Satellite name;
• Orbit parameters and derived elements;
• Epoch;
• Revolution number;
• Station name, number and co-ordinates;

• Month, day, time of appearance;
• Time of disappearance;
• Azimuth & elevation;
• Range;
• Optical horizon of the station;
• Eclipse data;
• Spacecraft occultation;
• Doppler frequency.

Note: Where necessary, specific requirements for retrieval of radiometric data, e.g. at specific times will be supplied to Scheduling by OPS-GFM.

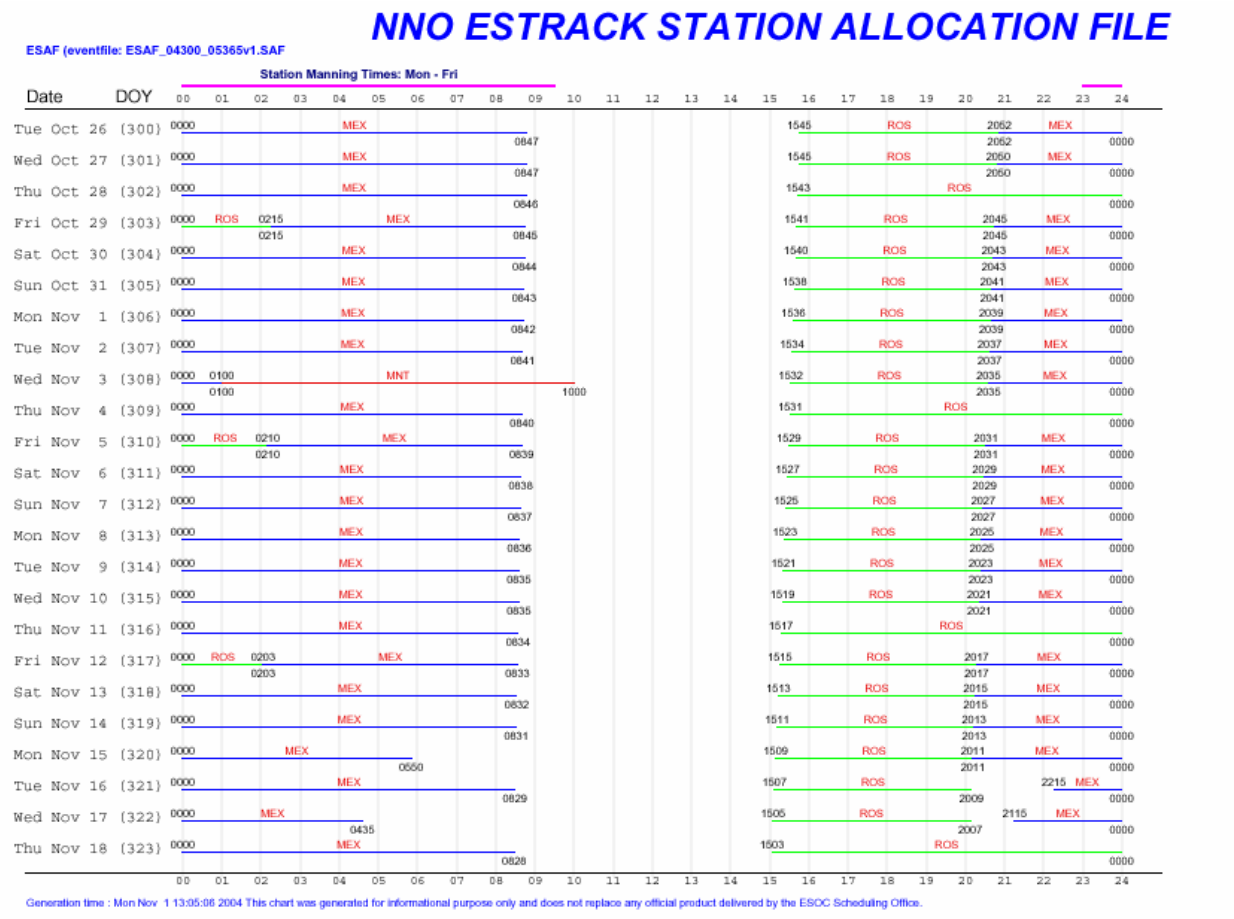


Figure 5-2: ESAF graphical format (first page)

```
BLANK LINE
GROUND_STATION_NAME = NNO
SPACECRAFT_NAME = MEX_ROS_VEX
DSN_STATION_NAME = DSS-74
DATA_SET_ID = ESAF_SCHEDULE
FILE_NAME = NNO_05231_05365V1.ESAF
PRODUCT_VERSION_ID = 1.0
APPLICABLE_START_TIME = 2005-231T15:39:00
APPLICABLE_STOP_TIME = 2005-36516:44:00
PRODUCT_CREATION_TIME = 2005-235T10:00:00
BLANK LINE
 05 231 1539 1624 0141 0151 NNO    MEX   TRK TECS_00121
 05 232 1637 1722 0139 0149 NNO    MEX   TRK TECS_00121
 05 233 1703 1748 0136 0146 NNO    MEX   TRK TECS_00121
 05 234 1534 1619 0034 0044 NNO    MEX   TRK TECS_00121
 05 235 1532 1617 0131 0141 NNO    MEX   TRK TECS_00121
 05 236 1530 1615 0128 0138 NNO    MEX   TRK TECS_00121
 05 237 0258 0358 1528 1528 NNO    ROS   TRK Monitor_Pass
 05 237 1528 1613 0126 0136 NNO    MEX   TRK TECS_00121
 05 238 1810 1855 0123 0133 NNO    MEX   TRK TECS_00121
 05 239 1645 1730 2349 2359 NNO    MEX   TRK TECS_00121
 05 240 1700 1745 2321 2331 NNO    MEX   TRK TECS_00121
 05 241 1521 1606 0116 0126 NNO    MEX   TRK TECS_00128
 05 242 1644 1729 0112 0122 NNO    MEX   TRK TECS_00128
 05 243 1516 1601 0109 0119 NNO    MEX   TRK TECS_00128
 05 244 0244 0344 1514 1514 NNO    ROS   TRK Monitor_Pass
 05 244 1514 1559 0106 0116 NNO    MEX   TRK TECS_00128
 05 245 1512 1557 0104 0114 NNO    MEX   TRK TECS_00128
 05 246 1510 1555 2023 2033 NNO    MEX   TRK TECS_00128
 05 247 1659 1744 2315 2325 NNO    MEX   TRK TECS_00128
 05 248 1606 1651 0055 0105 NNO    MEX   TRK TECS_00128
 05 249 1645 1730 0049 0059 NNO    MEX   TRK TECS_00128
 05 250 0100 0100 1000 1000 NNO    MNT   TRK MONTHLY STATION MAINT
 05 250 1500 1545 2219 2229 NNO    MEX   TRK TECS_00128
 05 251 0230 0330 1458 1458 NNO    ROS   TRK Monitor_Pass
 05 251 1458 1543 0046 0056 NNO    MEX   TRK TECS_00128
 05 252 1455 1540 0043 0053 NNO    MEX   TRK TECS_00128
 05 253 1453 1538 0040 0050 NNO    MEX   TRK TECS_00128
 05 254 1450 1535 2008 2018 NNO    MEX   TRK TECS_00128
 05 255 1448 1533 2300 2310 NNO    MEX   TRK TECS_00128
 05 256 1546 1631 0030 0040 NNO    MEX   TRK TECS_00128
 05 257 1442 1527 0027 0037 NNO    MEX   TRK TECS_00128
 05 258 0217 0317 1439 1439 NNO    ROS   TRK Monitor_Pass
 05 258 1549 1634 0024 0034 NNO    MEX   TRK TECS_00128
 05 259 1436 1521 2142 2152 NNO    MEX   TRK TECS_00128
 05 260 1455 1540 0017 0027 NNO    MEX   TRK TECS_00128
 05 261 1430 1515 0014 0024 NNO    MEX   TRK TECS_00128
 05 262 1427 1512 0010 0020 NNO    MEX   TRK TECS_00128
 05 263 1424 1509 2223 2233 NNO    MEX   TRK TECS_00128
 05 264 0206 0306 1421 1421 NNO    ROS   TRK Monitor_Pass
 05 264 1421 1506 2200 2210 NNO    MEX   TRK TECS_00128
```

Figure 5-3: ESAF in tabular format (first page)

```
*                      DSN 7-DAY OPERATIONS SCHEDULE
*                            ACTIVITIES LISTING
*                     WEEK NO. 41 *** 04 OCT 04 - 10 OCT 04
*-------------------------------------------------------------------------------
-
*DAY START BOT  EOT  END FACILITY USER   ACTIVITY         PASS  CONFIG/ WRK A C
*                                                        NO.   SOE     CAT R F
*-------------------------------------------------------------------------------
-
*----------
*MON 04 OCT
*----------
 278 2341 0026 0415 0430  DSS-24  INTG   TRK PASS         0723  N056    1A1
          NMC,RRPA,TLPA,STXL,SHMT,UPL,CCP;
*----------
*TUE 05 OCT
*----------
 279 2011 2036 0330 0340  DSS-16  INTG   TRK PASS         0724  NONE    3C1
          ;
*----------
*THU 07 OCT
*----------
 281 2351 0016 0358 0408  DSS-16  INTG   TRK PASS         0726  NONE    3C1
          ;
*----------
*FRI 08 OCT
*----------
 282 2000 2025 0318 0328  DSS-16  INTG   TRK PASS         0727  NONE    3C1
          ;
*----------
*SUN 10 OCT
*----------
 284 2340 0005 0345 0355  DSS-16  INTG   TRK PASS         0729  NONE    3C1
          ;
```

Figure 5-4: Integral SAF (excerpt)

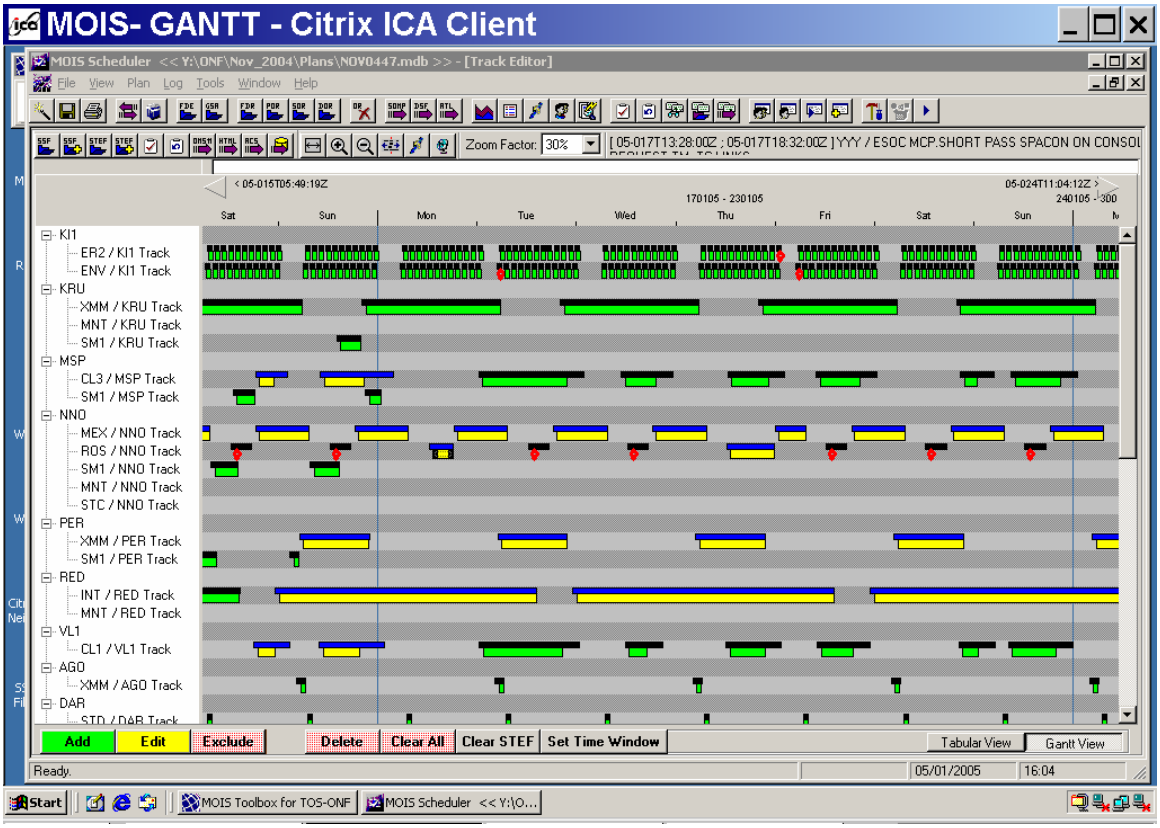


Figure 5-5: Screenshot of MOIS Database, data overview in GANTT form, sorted by station

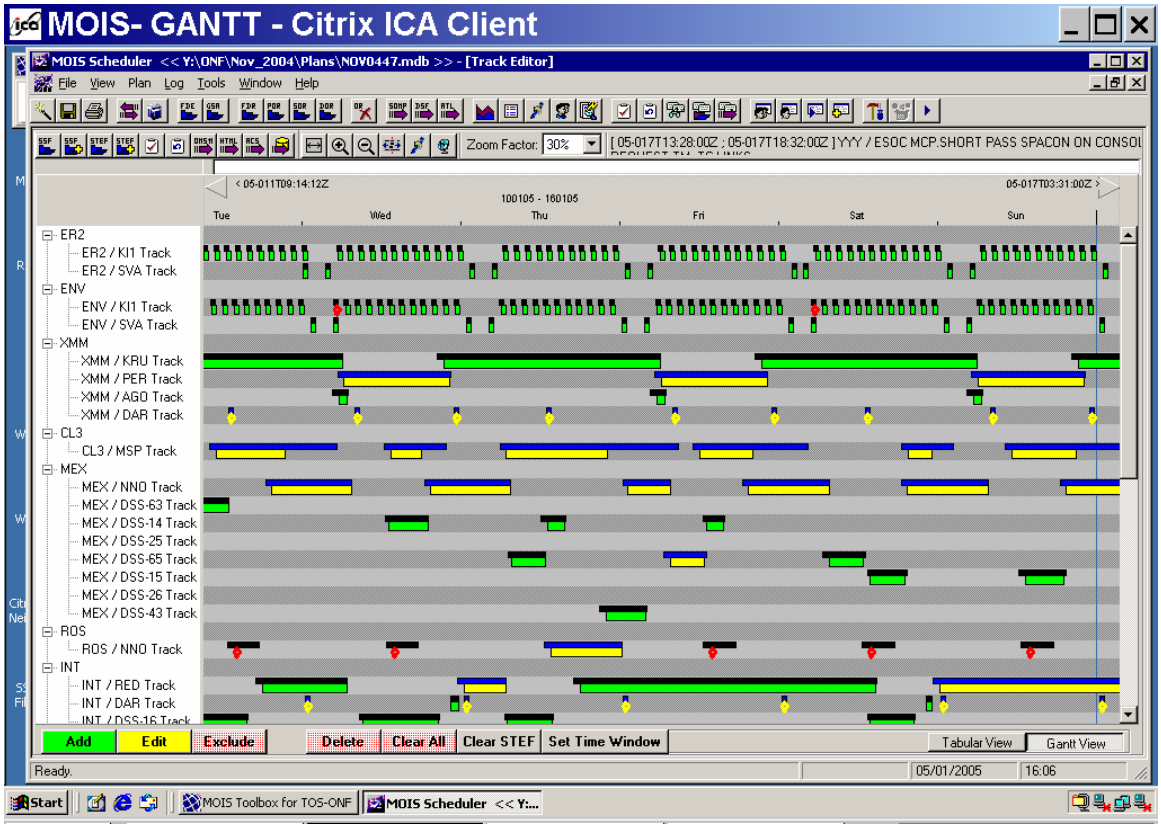


Figure 5-6: Screenshot of MOIS Database, data overview in GANTT form, sorted by mission

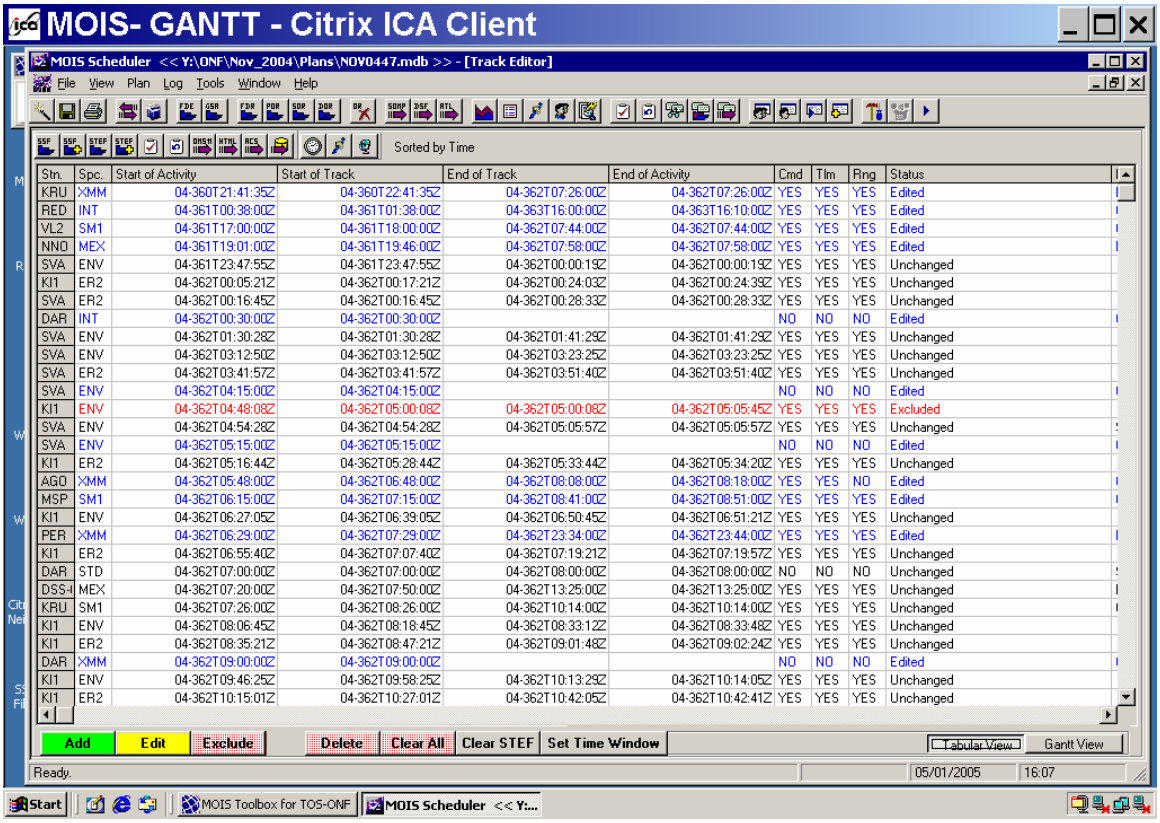


Figure 5-7: Screenshot of MOIS Database, data overview in tabular form, sorted chronologically

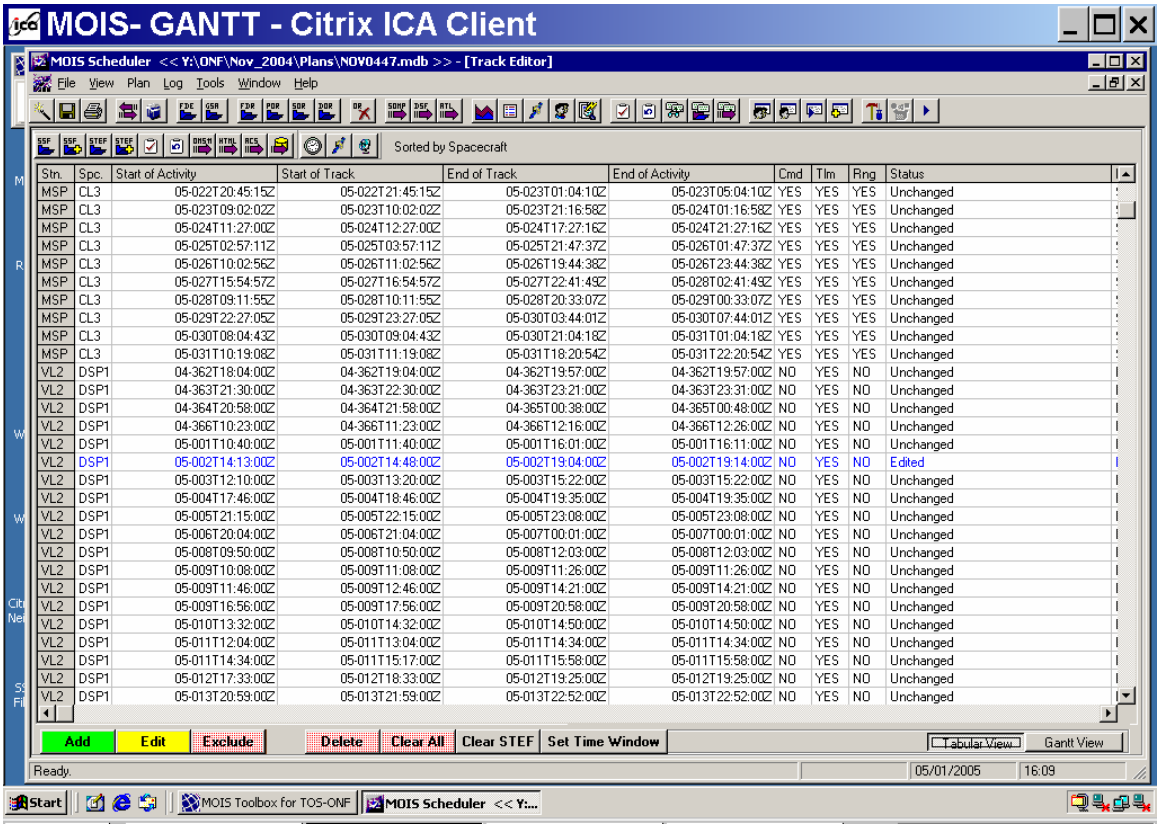
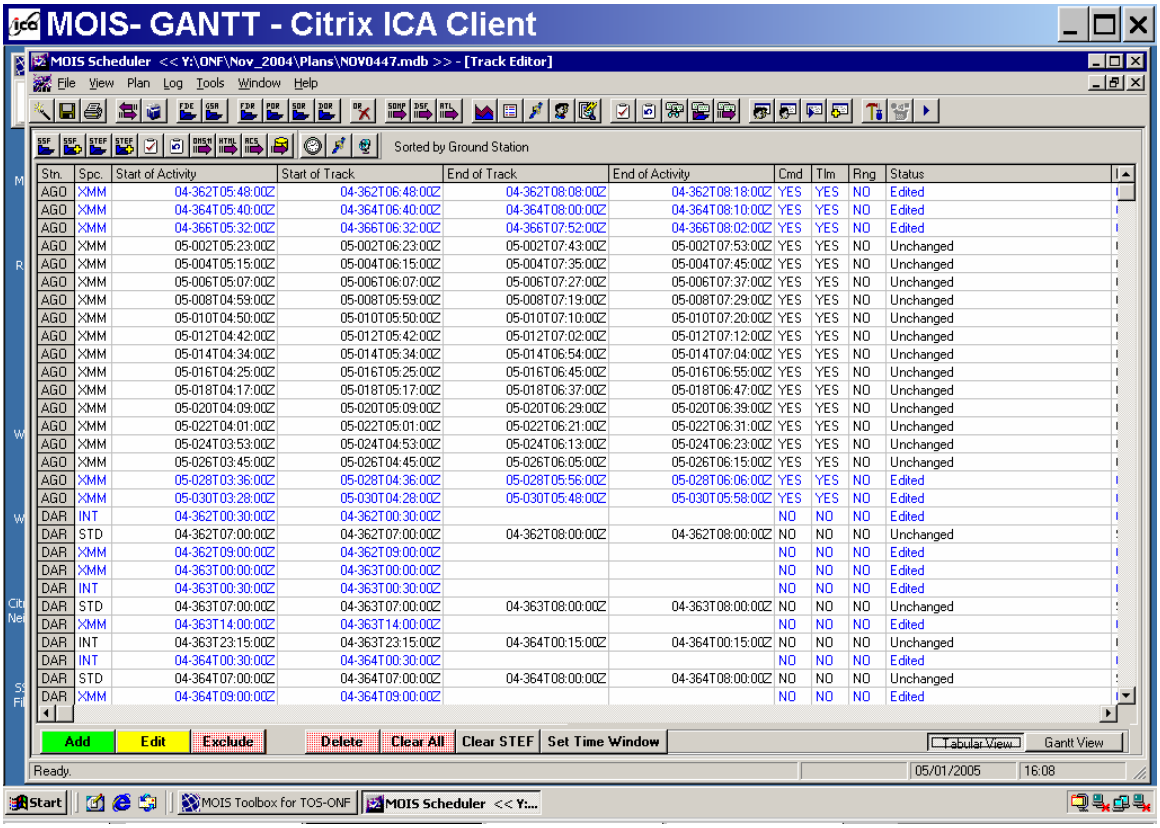


Figure 5-8: Screenshot of MOIS Database, data overview in tabular form, sorted by mission



Stn.	Spc.	Start of Activity	Start of Track	End of Track	End of Activity	Cmd	Tlm	Rng	Status
AGO	XMM	04-362T05:48:00Z	04-362T06:48:00Z	04-362T08:08:00Z	04-362T08:18:00Z	YES	YES	NO	Edited
AGO	XMM	04-364T05:40:00Z	04-364T06:40:00Z	04-364T08:00:00Z	04-364T08:10:00Z	YES	YES	NO	Edited
AGO	XMM	04-366T05:32:00Z	04-366T06:32:00Z	04-366T07:52:00Z	04-366T08:02:00Z	YES	YES	NO	Edited
AGO	XMM	05-002T05:23:00Z	05-002T06:23:00Z	05-002T07:43:00Z	05-002T07:53:00Z	YES	YES	NO	Unchanged
AGO	XMM	05-004T05:15:00Z	05-004T06:15:00Z	05-004T07:35:00Z	05-004T07:45:00Z	YES	YES	NO	Unchanged
AGO	XMM	05-006T05:07:00Z	05-006T06:07:00Z	05-006T07:27:00Z	05-006T07:37:00Z	YES	YES	NO	Unchanged
AGO	XMM	05-008T04:59:00Z	05-008T05:59:00Z	05-008T07:19:00Z	05-008T07:29:00Z	YES	YES	NO	Unchanged
AGO	XMM	05-010T04:50:00Z	05-010T05:50:00Z	05-010T07:10:00Z	05-010T07:20:00Z	YES	YES	NO	Unchanged
AGO	XMM	05-012T04:42:00Z	05-012T05:42:00Z	05-012T07:02:00Z	05-012T07:12:00Z	YES	YES	NO	Unchanged
AGO	XMM	05-014T04:34:00Z	05-014T05:34:00Z	05-014T06:54:00Z	05-014T07:04:00Z	YES	YES	NO	Unchanged
AGO	XMM	05-016T04:25:00Z	05-016T05:25:00Z	05-016T06:45:00Z	05-016T06:55:00Z	YES	YES	NO	Unchanged
AGO	XMM	05-018T04:17:00Z	05-018T05:17:00Z	05-018T06:37:00Z	05-018T06:47:00Z	YES	YES	NO	Unchanged
AGO	XMM	05-020T04:09:00Z	05-020T05:09:00Z	05-020T06:29:00Z	05-020T06:39:00Z	YES	YES	NO	Unchanged
AGO	XMM	05-022T04:01:00Z	05-022T05:01:00Z	05-022T06:21:00Z	05-022T06:31:00Z	YES	YES	NO	Unchanged
AGO	XMM	05-024T03:53:00Z	05-024T04:53:00Z	05-024T06:13:00Z	05-024T06:23:00Z	YES	YES	NO	Unchanged
AGO	XMM	05-026T03:45:00Z	05-026T04:45:00Z	05-026T06:05:00Z	05-026T06:15:00Z	YES	YES	NO	Unchanged
AGO	XMM	05-028T03:36:00Z	05-028T04:36:00Z	05-028T05:56:00Z	05-028T06:06:00Z	YES	YES	NO	Edited
AGO	XMM	05-030T03:28:00Z	05-030T04:28:00Z	05-030T05:48:00Z	05-030T05:58:00Z	YES	YES	NO	Edited
DAR	INT	04-362T00:30:00Z	04-362T00:30:00Z			NO	NO	NO	Edited
DAR	STD	04-362T07:00:00Z	04-362T07:00:00Z	04-362T08:00:00Z	04-362T08:00:00Z	NO	NO	NO	Unchanged
DAR	XMM	04-362T09:00:00Z	04-362T09:00:00Z			NO	NO	NO	Edited
DAR	XMM	04-363T00:00:00Z	04-363T00:00:00Z			NO	NO	NO	Edited
DAR	INT	04-363T00:30:00Z	04-363T00:30:00Z			NO	NO	NO	Edited
DAR	STD	04-363T07:00:00Z	04-363T07:00:00Z	04-363T08:00:00Z	04-363T08:00:00Z	NO	NO	NO	Unchanged
DAR	XMM	04-363T14:00:00Z	04-363T14:00:00Z			NO	NO	NO	Edited
DAR	INT	04-363T23:15:00Z	04-363T23:15:00Z	04-364T00:15:00Z	04-364T00:15:00Z	NO	NO	NO	Unchanged
DAR	INT	04-364T00:30:00Z	04-364T00:30:00Z			NO	NO	NO	Edited
DAR	STD	04-364T07:00:00Z	04-364T07:00:00Z	04-364T08:00:00Z	04-364T08:00:00Z	NO	NO	NO	Unchanged
DAR	XMM	04-364T09:00:00Z	04-364T09:00:00Z			NO	NO	NO	Edited

Figure 5-9: Screenshot of MOIS Database, data overview in tabular form, sorted by station

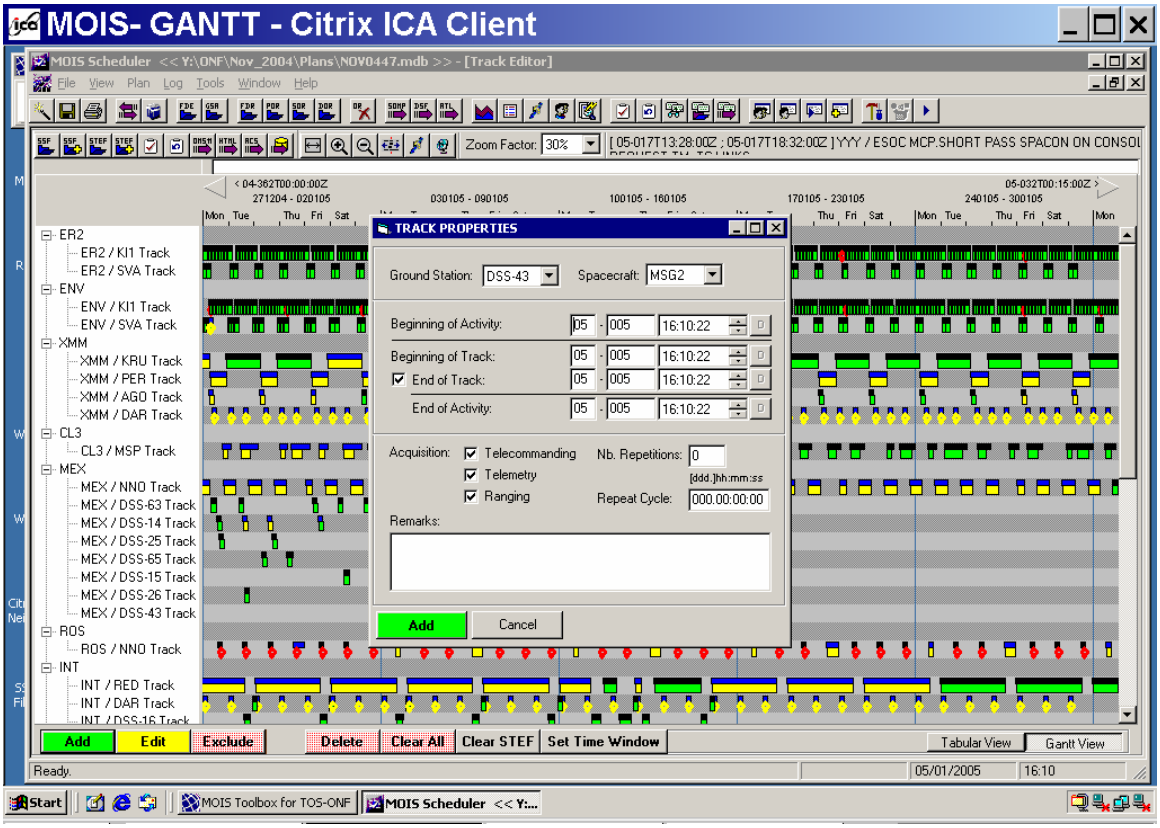
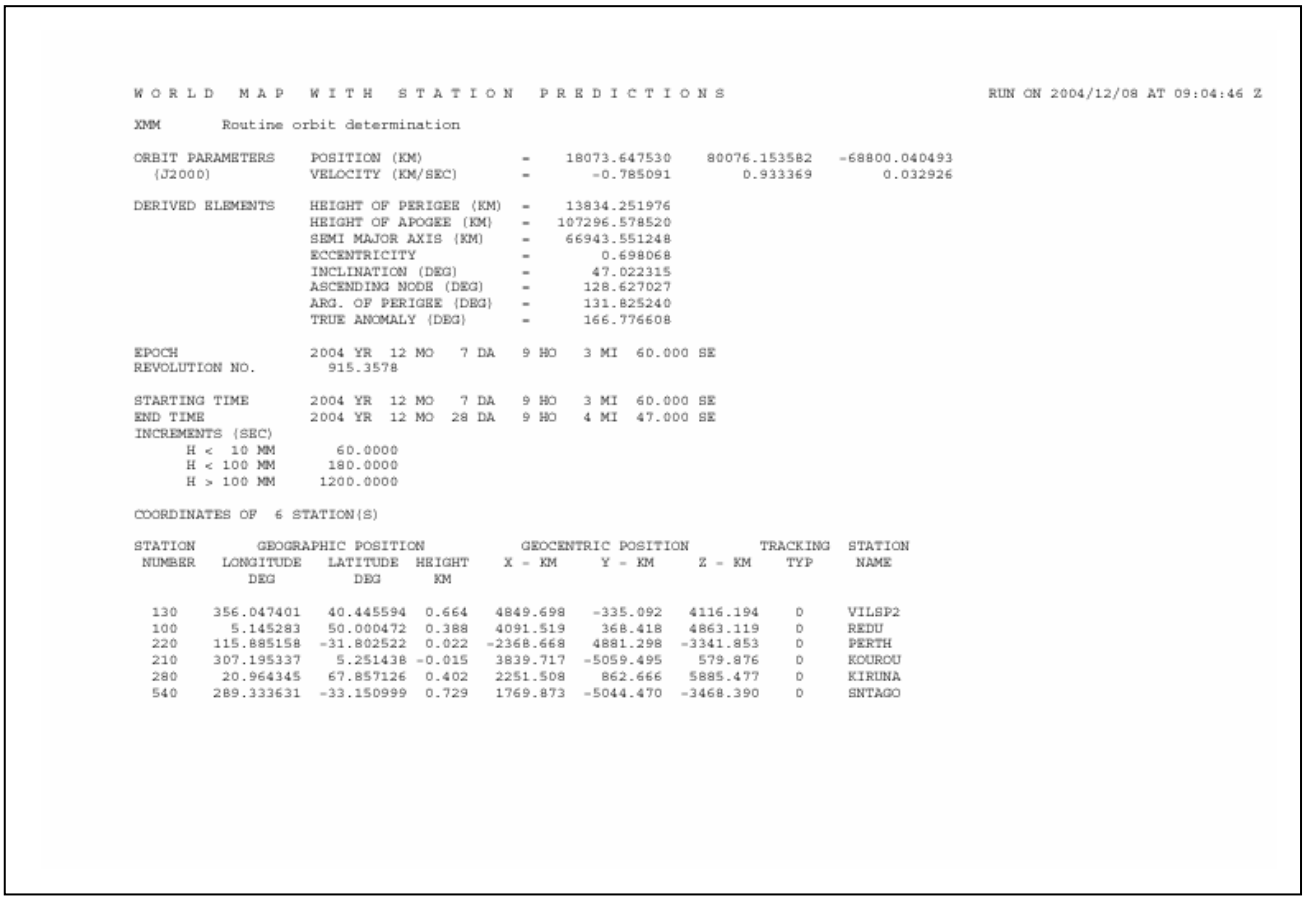
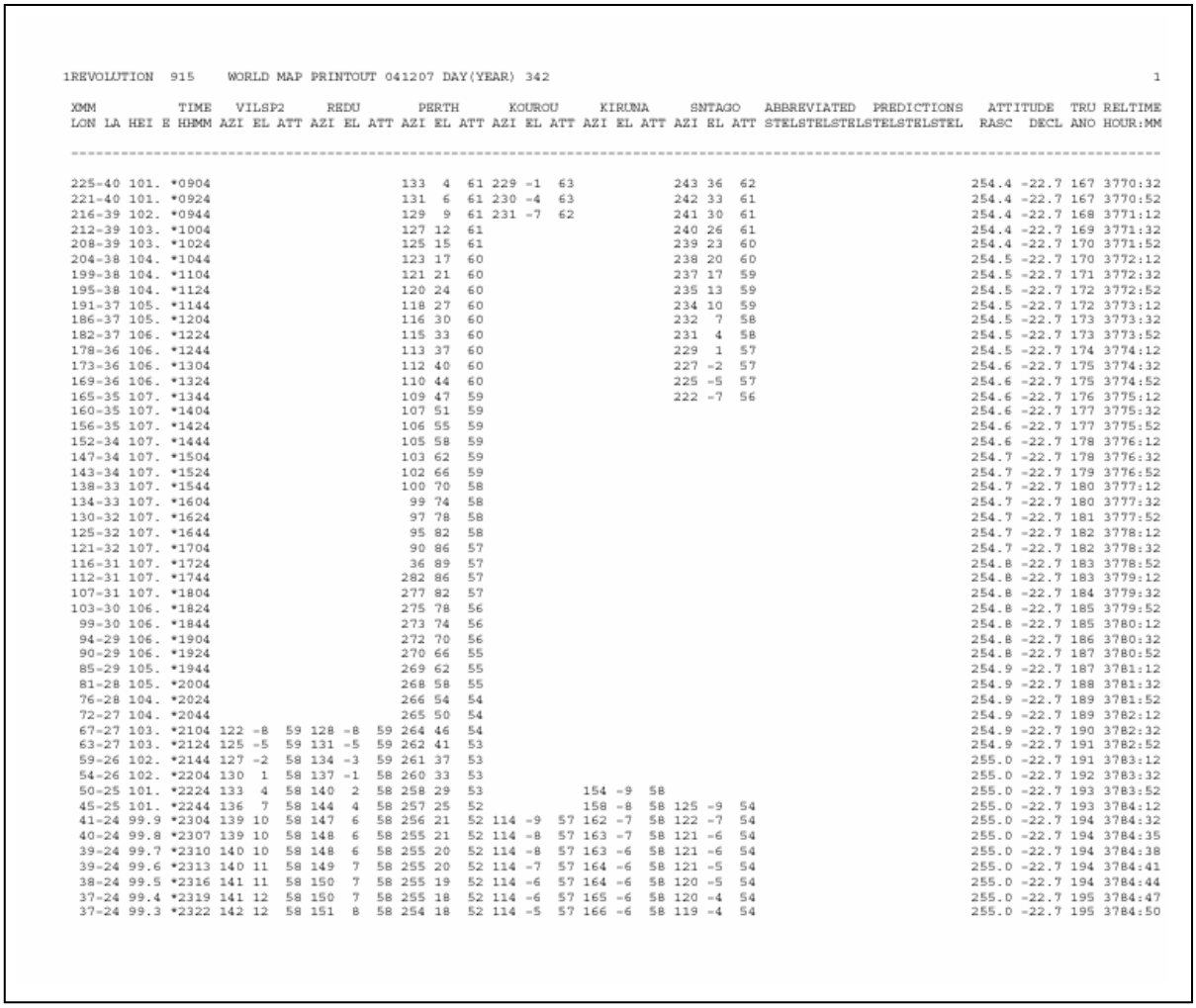


Figure 5-10: Screenshot of MOIS Database, data overview in GANTT form, showing GUI for editing support times by Scheduling Officer



```
W O R L D   M A P   W I T H   S T A T I O N   P R E D I C T I O N S                    RUN ON 2004/12/08 AT 09:04:46 Z

XMM       Routine orbit determination

ORBIT PARAMETERS    POSITION (KM)           =    18073.647530    80076.153582   -68800.040493
  (J2000)           VELOCITY (KM/SEC)       =       -0.785091        0.933369        0.032926

DERIVED ELEMENTS    HEIGHT OF PERIGEE (KM)  =    13834.251976
                    HEIGHT OF APOGEE (KM)   =   107296.578520
                    SEMI MAJOR AXIS (KM)    =    66943.551248
                    ECCENTRICITY            =        0.698068
                    INCLINATION (DEG)       =       47.022315
                    ASCENDING NODE (DEG)    =      128.627027
                    ARG. OF PERIGEE (DEG)   =      131.825240
                    TRUE ANOMALY (DEG)      =      166.776608

EPOCH               2004 YR  12 MO   7 DA   9 HO   3 MI  60.000 SE
REVOLUTION NO.        915.3578

STARTING TIME       2004 YR  12 MO   7 DA   9 HO   3 MI  60.000 SE
END TIME            2004 YR  12 MO  28 DA   9 HO   4 MI  47.000 SE
INCREMENTS (SEC)
      H <  10 MM       60.0000
      H < 100 MM      180.0000
      H > 100 MM     1200.0000

COORDINATES OF  6 STATION(S)

STATION       GEOGRAPHIC POSITION          GEOCENTRIC POSITION        TRACKING  STATION
 NUMBER    LONGITUDE    LATITUDE  HEIGHT    X - KM     Y - KM     Z - KM    TYP     NAME
             DEG          DEG      KM

  130    356.047401   40.445594  0.664   4849.698   -335.092   4116.194     0     VILSP2
  100      5.145283   50.000472  0.388   4091.519    368.418   4863.119     0     REDU
  220    115.885158  -31.802522  0.022  -2368.668   4881.298  -3341.853     0     PERTH
  210    307.195337    5.251438 -0.015   3839.717  -5059.495    579.876     0     KOUROU
  280     20.964345   67.857126  0.402   2251.508    862.666   5885.477     0     KIRUNA
  540    289.333631  -33.150999  0.729   1769.873  -5044.470  -3468.390     0     SNTAGO
```

Figure 5-11: World Map with Station Predictions (Wimpy) – Front Page



```
1REVOLUTION  915    WORLD MAP PRINTOUT 041207 DAY(YEAR) 342                                                                                                1

 XMM          TIME   VILSP2      REDU        PERTH       KOUROU      KIRUNA      SNTAGO   ABBREVIATED  PREDICTIONS   ATTITUDE  TRU RELTIME
 LON LA HEI E HHMM AZI EL ATT AZI EL ATT AZI EL ATT AZI EL ATT AZI EL ATT AZI EL ATT STELSTELSTELSTELSTELSTELSTEL  RASC  DECL ANO HOUR:MM
 ---------------------------------------------------------------------------------------------------------------------------------------------------

225-40 101. *0904                      133  4  61 229 -1  63            243 36  62                          254.4 -22.7 167 3770:32
221-40 101. *0924                      131  6  61 230 -4  63            242 33  61                          254.4 -22.7 167 3770:52
216-39 102. *0944                      129  9  61 231 -7  62            241 30  61                          254.4 -22.7 168 3771:12
212-39 103. *1004                      127 12  61                        240 26  61                          254.4 -22.7 169 3771:32
208-39 103. *1024                      125 15  61                        239 23  60                          254.4 -22.7 170 3771:52
204-38 104. *1044                      123 17  60                        238 20  60                          254.5 -22.7 170 3772:12
199-38 104. *1104                      121 21  60                        237 17  59                          254.5 -22.7 171 3772:32
195-38 104. *1124                      120 24  60                        235 13  59                          254.5 -22.7 172 3772:52
191-37 105. *1144                      118 27  60                        234 10  59                          254.5 -22.7 172 3773:12
186-37 105. *1204                      116 30  60                        232  7  58                          254.5 -22.7 173 3773:32
182-37 106. *1224                      115 33  60                        231  4  58                          254.5 -22.7 173 3773:52
178-36 106. *1244                      113 37  60                        229  1  57                          254.5 -22.7 174 3774:12
173-36 106. *1304                      112 40  60                        227 -2  57                          254.6 -22.7 175 3774:32
169-36 106. *1324                      110 44  60                        225 -5  57                          254.6 -22.7 175 3774:52
165-35 107. *1344                      109 47  59                        222 -7  56                          254.6 -22.7 176 3775:12
160-35 107. *1404                      107 51  59                                                            254.6 -22.7 177 3775:32
156-35 107. *1424                      106 55  59                                                            254.6 -22.7 177 3775:52
152-34 107. *1444                      105 58  59                                                            254.6 -22.7 178 3776:12
147-34 107. *1504                      103 62  59                                                            254.7 -22.7 178 3776:32
143-34 107. *1524                      102 66  59                                                            254.7 -22.7 179 3776:52
138-33 107. *1544                      100 70  58                                                            254.7 -22.7 180 3777:12
134-33 107. *1604                       99 74  58                                                            254.7 -22.7 180 3777:32
130-32 107. *1624                       97 78  58                                                            254.7 -22.7 181 3777:52
125-32 107. *1644                       95 82  58                                                            254.7 -22.7 182 3778:12
121-32 107. *1704                       90 86  57                                                            254.7 -22.7 182 3778:32
116-31 107. *1724                       36 89  57                                                            254.8 -22.7 183 3778:52
112-31 107. *1744                      282 86  57                                                            254.8 -22.7 183 3779:12
107-31 107. *1804                      277 82  57                                                            254.8 -22.7 184 3779:32
103-30 106. *1824                      275 78  56                                                            254.8 -22.7 185 3779:52
 99-30 106. *1844                      273 74  56                                                            254.8 -22.7 185 3780:12
 94-29 106. *1904                      272 70  56                                                            254.8 -22.7 186 3780:32
 90-29 106. *1924                      270 66  55                                                            254.8 -22.7 187 3780:52
 85-29 105. *1944                      269 62  55                                                            254.9 -22.7 187 3781:12
 81-28 105. *2004                      268 58  55                                                            254.9 -22.7 188 3781:32
 76-28 104. *2024                      266 54  54                                                            254.9 -22.7 189 3781:52
 72-27 104. *2044                      265 50  54                                                            254.9 -22.7 189 3782:12
 67-27 103. *2104 122 -8  59 128 -8  59 264 46  54                                                          254.9 -22.7 190 3782:32
 63-27 103. *2124 125 -5  59 131 -5  59 262 41  53                                                          254.9 -22.7 191 3782:52
 59-26 102. *2144 127 -2  58 134 -3  59 261 37  53                                                          255.0 -22.7 191 3783:12
 54-26 102. *2204 130  1  58 137 -1  58 260 33  53                                                          255.0 -22.7 192 3783:32
 50-25 101. *2224 133  4  58 140  2  58 258 29  53            154 -9  58                                    255.0 -22.7 193 3783:52
 45-25 101. *2244 136  7  58 144  4  58 257 25  52            158 -8  58 125 -9  54                         255.0 -22.7 193 3784:12
 41-24 99.9 *2304 139 10  58 147  6  58 256 21  52 114 -9  57 162 -7  58 122 -7  54                         255.0 -22.7 194 3784:32
 40-24 99.8 *2307 139 10  58 148  6  58 255 21  52 114 -8  57 163 -7  58 121 -6  54                         255.0 -22.7 194 3784:35
 39-24 99.7 *2310 140 10  58 148  6  58 255 20  52 114 -8  57 163 -6  58 121 -6  54                         255.0 -22.7 194 3784:38
 39-24 99.6 *2313 140 11  58 149  7  58 255 20  52 114 -7  57 164 -6  58 121 -5  54                         255.0 -22.7 194 3784:41
 38-24 99.5 *2316 141 11  58 150  7  58 255 19  52 114 -6  57 164 -6  58 120 -5  54                         255.0 -22.7 194 3784:44
 37-24 99.4 *2319 141 12  58 150  7  58 255 18  52 114 -6  57 165 -6  58 120 -4  54                         255.0 -22.7 195 3784:47
 37-24 99.3 *2322 142 12  58 151  8  58 254 18  52 114 -5  57 166 -6  58 119 -4  54                         255.0 -22.7 195 3784:50
```

Figure 5-12: Wimpy – Example World Map Printout

6 LOGISTICS PROCEDURES

6.1 Request for Technical Spares (Spare Request)

Introduction

Ground facility M&C contractors requiring spare parts for replacement or repair of equipment on site may submit a Spare Request to NETSUP at ESOC via the ECDB database. NETSUP then either sends the spare from stock or arranges procurement of the parts to be sent when available. This procedure applies only to requests for technical items.

Creation of Spares Requests

The steps involved for Spare Requests are as follows:

- Ground facility submits a Spare Requests via ECDB, copied to ESOC/NETSUP via e-mail or fax;
- NETSUP liaises with ESOC Purchase Office on action to take;
- NETSUP dispatches requested spares when available and advises ground facility M&C contractors;
- Ground facility M&C contractors acknowledge by email or fax receipt of spares to ESOC Transport Office, copied to ESOC/NETSUP;
- NETSUP monitors progress of all outstanding requests and closes the Spare Request when the requested spare has arrived at the ground facility.

Figure 6-1 shows an example of a Spare Request. Figure 6-2 shows a screenshot from the ECDB of the flat list of Spare Requests for Kourou ground facility.

Server >> ECDB OPER >> KOUROU >> OMS AND REPAIR SPARE REQUEST >> SPARE REQUEST Logout ECDB_ADMIN

SPARE REQUEST: Details

From: KOUROU **Opening Date:** 11-AUG-2005

To: NETSUP, ESOC **Priority:** URGENT
Info: ADM-GSG, ESOC DIERTER
AMEND

Subject: SPARE REQUEST 05/008 **Status:** OPEN

a. Item Description:	GREASE FOR ANTENNA BEARING
b. Manufacturer:	ESSO
c. Part Number:	BEACON EP 2
d. Quantity:	30 **Unit for required quantity:**
e. Main assembly in which fitted:	AZ GEAR BOX 1- HCNT: KRU.10.5.3
f. Last Spare Request:	05/007
g. Remarks:	STANDARD 400 GR CARTRIDGES. ALTERNATIVES: BP ENERGREASE LS-EP 2, SHELL CALITHIA EP FETT T 2
h. Station Technician:	PLT
	Closure Date:
	Cancellation Date: [If applicable]

Additional Information to be completed at ESOC:

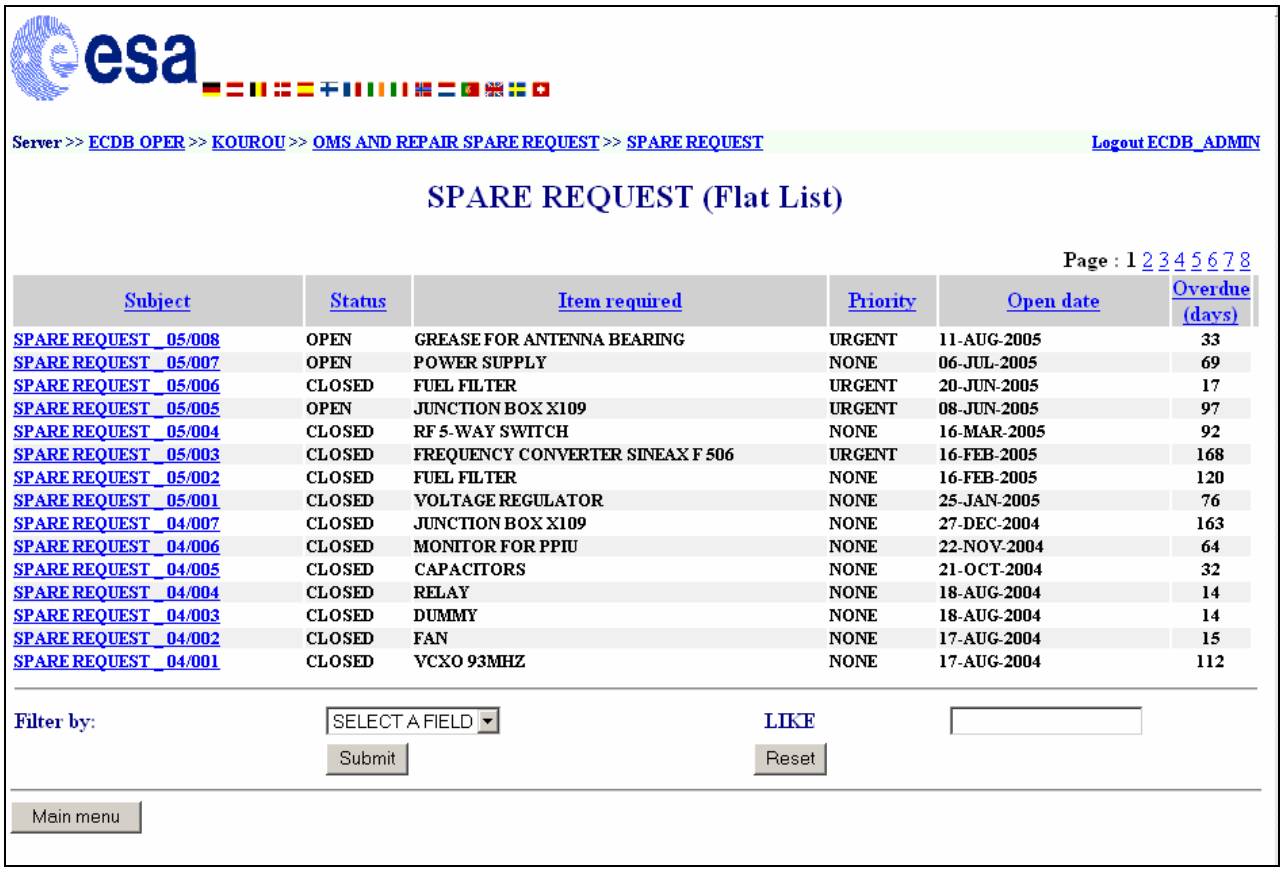
Request Type: ESOC

Additional informations:

Additional informations to be completed at ESOC

- CHANGE STATUS - **on Date:** day month year Submit Reset

Figure 6-1: Spare Request



esa

Server >> ECDB OPER >> KOUROU >> OMS AND REPAIR SPARE REQUEST >> SPARE REQUEST Logout ECDB_ADMIN

SPARE REQUEST (Flat List)

Page : 1 2 3 4 5 6 7 8

Subject	Status	Item required	Priority	Open date	Overdue (days)
SPARE REQUEST_05/008	OPEN	GREASE FOR ANTENNA BEARING	URGENT	11-AUG-2005	33
SPARE REQUEST_05/007	OPEN	POWER SUPPLY	NONE	06-JUL-2005	69
SPARE REQUEST_05/006	CLOSED	FUEL FILTER	URGENT	20-JUN-2005	17
SPARE REQUEST_05/005	OPEN	JUNCTION BOX X109	URGENT	08-JUN-2005	97
SPARE REQUEST_05/004	CLOSED	RF 5-WAY SWITCH	NONE	16-MAR-2005	92
SPARE REQUEST_05/003	CLOSED	FREQUENCY CONVERTER SINEAX F 506	URGENT	16-FEB-2005	168
SPARE REQUEST_05/002	CLOSED	FUEL FILTER	NONE	16-FEB-2005	120
SPARE REQUEST_05/001	CLOSED	VOLTAGE REGULATOR	NONE	25-JAN-2005	76
SPARE REQUEST_04/007	CLOSED	JUNCTION BOX X109	NONE	27-DEC-2004	163
SPARE REQUEST_04/006	CLOSED	MONITOR FOR PPIU	NONE	22-NOV-2004	64
SPARE REQUEST_04/005	CLOSED	CAPACITORS	NONE	21-OCT-2004	32
SPARE REQUEST_04/004	CLOSED	RELAY	NONE	18-AUG-2004	14
SPARE REQUEST_04/003	CLOSED	DUMMY	NONE	18-AUG-2004	14
SPARE REQUEST_04/002	CLOSED	FAN	NONE	17-AUG-2004	15
SPARE REQUEST_04/001	CLOSED	VCXO 93MHZ	NONE	17-AUG-2004	112

Filter by: SELECT A FIELD LIKE

Submit Reset

Main menu

Figure 6-2: Flat List of Spare Requests for Kourou Ground Facility on ECDB

Format of Requests

The Spare Request shall be submitted to ESOC/NETSUP via ECDB in the following format:

From: <GROUND FACILITY>
To: NETSUP – ESOC
Priority: <URGENT or NONE>
Subject: Spares Request XX/XXX (year/sequential number)

a) Item Description
b) Manufacturer
c) Part Number
d) Quantity, Unit for required quantity
e) Main assembly in which fitted
f) Last Spare Request
g) Relevant OMS 26 Equipment Failure Number (if applicable)
h) Remarks
i) Station Technician

Notes:

- Spare Requests are intended for replacement of existing spares and not for creating local spares stocks when a ground facility is first established or for when new equipment is introduced to a ground facility.
- Multiple orders of the same type may be made on one request where (a) is common for all (e.g. resistors of various values). However, if the items are of different types (e.g. lamps and relays) a separate request number should be completed.
- Urgent items shall be submitted as Priority “URGENT”. This priority should be used when the required item has an operational impact.
- If the item is related to a breakdown or for replacement of a defective part, the relevant OMS 26 Equipment Failure number must be provided.
- Routine requests would have a target delivery within 3 months if not available as a stock item.

6.2 Requests for Repair of Defective Items (Repair Request)

Introduction

Remote ground facilities having defective units, modules or cards beyond the capability of local repair may submit via the ECDB database a repair request to NETSUP, who then defines the action to be taken.

If a replacement spare is available and requested due to the time required to repair of a defective item being unacceptable, this action shall be arranged via NETSUP. The defective item would be repaired and then returned to OPS-ONF stores as a spare.

Creation of Repair Requests

The steps involved for repair request are as follows:

- Ground facility submits via ECDB a Repair Request, copied to ESOC/NETSUP via e-mail or fax;
- NETSUP specialist and the relevant OPS-ONN Station Engineer jointly decide on the action to be taken;
- NETSUP advises ground facility of details for dispatching the item;
- The ground facility advises NETSUP of dispatch details;
- NETSUP advises ground facility of receipt of item;
- NETSUP dispatches repaired or replacement item (if it is to be returned);
- Ground facilities M&C contractors inform NETSUP on receipt of item;
- The relevant OMS 26 Equipment Failure number must be provided, if applicable;
- NETSUP monitors progress of all outstanding repair requests and closes the Repair Request when the requested item has arrived at the ground facility.

Figure 6-3 shows an example of a Repair Request. Figure 6-4 shows a screenshot from the ECDB of the flat list of Repair Requests for Kourou ground facility.

Server >> ECDB OPER >> KOUROU >> OMS AND REPAIR SPARE REQUEST >> REPAIR REQUEST Logout ECDB_ADMIN

REPAIR REQUEST: Details

From: KOUROU **Opening Date:** 14-JUN-2005

To: NETSUP, ESOC **Priority:** NONE
Info: ADM-GSG, ESOC D
AMEND

Subject: REPAIR REQUEST 05/012 **Status:** CLOSED

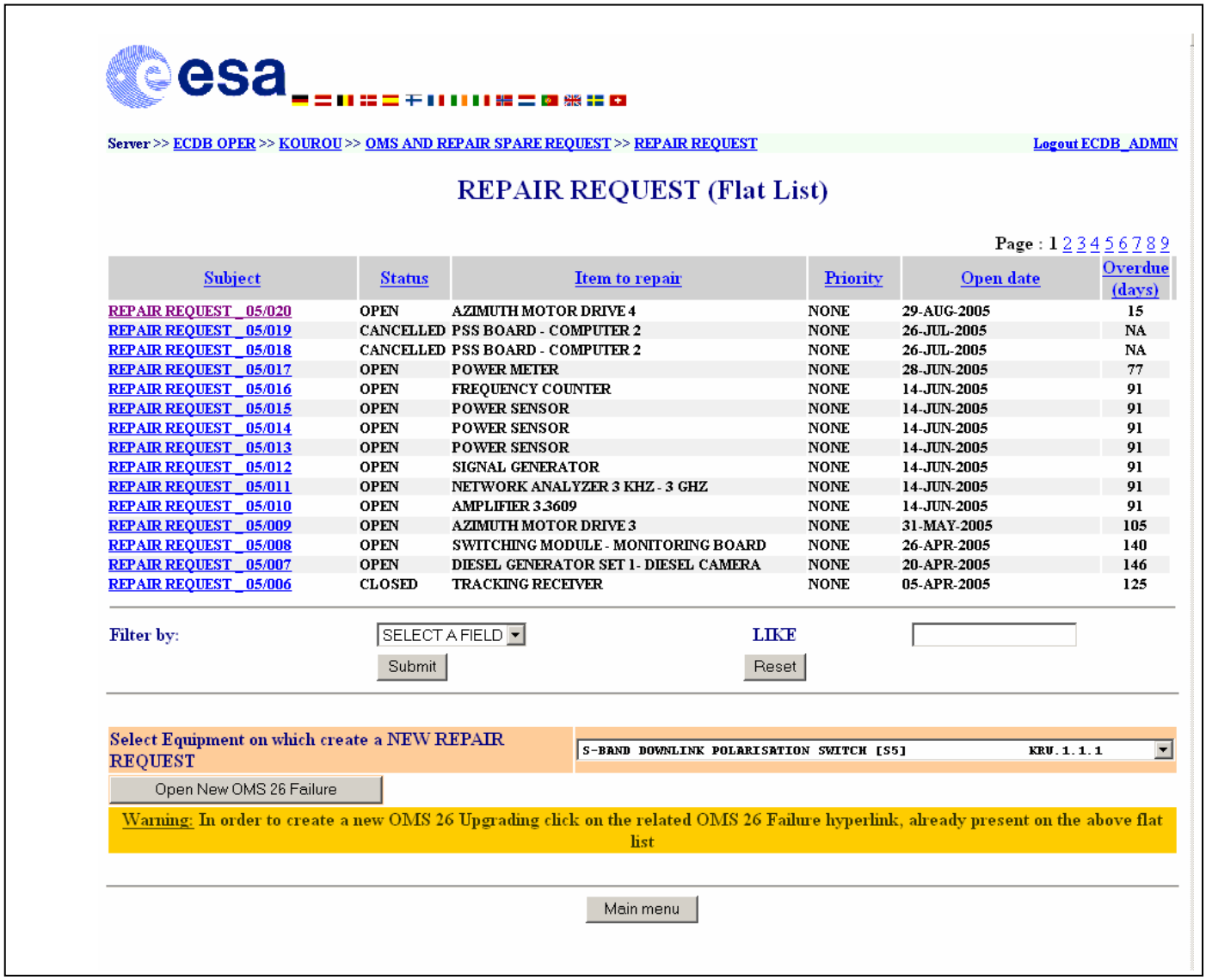
a. Item Description:	SIGNAL GENERATOR
b. Item Details	
Manufacturer:	HEWLETT PACKARD
Part Number:	8663A
Serial Number:	3423A02268
ESA Inventory Number:	26819
c. Symptom of fault:	OUT OF CALIBRATION
d. Main assembly in which fitted:	SIGNAL GENERATOR - KRU.14.5.9
e. Station Technician:	ADRIAN FOWLER
f. Remarks:	THIS IS A CAT B ITEM - BUT NEEDS TO BE CALIBRATED DUE TO LENGTH OF TIME THE CAT A EQUIPMENT IS AWAY FOR CALIBRATION.

Last repair Request: NULL **Closure Date:** 13-SEP-2005
Dispatched on: **Cancellation Date:** [If applicable]

Additional Information to be completed at ESOC:

Request Type: ESOC
Maintenance Nr:

Figure 6-3: Repair Request



esa

Server >> ECDB OPER >> KOUROU >> OMS AND REPAIR SPARE REQUEST >> REPAIR REQUEST Logout ECDB_ADMIN

REPAIR REQUEST (Flat List)

Page : 1 2 3 4 5 6 7 8 9

Subject	Status	Item to repair	Priority	Open date	Overdue (days)
REPAIR REQUEST_05/020	OPEN	AZIMUTH MOTOR DRIVE 4	NONE	29-AUG-2005	15
REPAIR REQUEST_05/019	CANCELLED	PSS BOARD - COMPUTER 2	NONE	26-JUL-2005	NA
REPAIR REQUEST_05/018	CANCELLED	PSS BOARD - COMPUTER 2	NONE	26-JUL-2005	NA
REPAIR REQUEST_05/017	OPEN	POWER METER	NONE	28-JUN-2005	77
REPAIR REQUEST_05/016	OPEN	FREQUENCY COUNTER	NONE	14-JUN-2005	91
REPAIR REQUEST_05/015	OPEN	POWER SENSOR	NONE	14-JUN-2005	91
REPAIR REQUEST_05/014	OPEN	POWER SENSOR	NONE	14-JUN-2005	91
REPAIR REQUEST_05/013	OPEN	POWER SENSOR	NONE	14-JUN-2005	91
REPAIR REQUEST_05/012	OPEN	SIGNAL GENERATOR	NONE	14-JUN-2005	91
REPAIR REQUEST_05/011	OPEN	NETWORK ANALYZER 3 KHZ - 3 GHZ	NONE	14-JUN-2005	91
REPAIR REQUEST_05/010	OPEN	AMPLIFIER 3.3609	NONE	14-JUN-2005	91
REPAIR REQUEST_05/009	OPEN	AZIMUTH MOTOR DRIVE 3	NONE	31-MAY-2005	105
REPAIR REQUEST_05/008	OPEN	SWITCHING MODULE - MONITORING BOARD	NONE	26-APR-2005	140
REPAIR REQUEST_05/007	OPEN	DIESEL GENERATOR SET 1- DIESEL CAMERA	NONE	20-APR-2005	146
REPAIR REQUEST_05/006	CLOSED	TRACKING RECEIVER	NONE	05-APR-2005	125

Filter by: SELECT A FIELD LIKE

Submit Reset

Select Equipment on which create a NEW REPAIR REQUEST

S-BAND DOWNLINK POLARISATION SWITCH [S5] KRU.1.1.1

Open New OMS 26 Failure

Warning: In order to create a new OMS 26 Upgrading click on the related OMS 26 Failure hyperlink, already present on the above flat list

Main menu

Figure 6-4: Flat List of Repair Requests for Kourou Ground Facility on ECDB

Format of Request

The Repair Request shall be submitted to ESOC/NETSUP via ECDB in the following format:

From: <GROUND FACILITY>
To: NETSUP, ESOC
Info: ADM-GSG, Relevant OPS-ONN Station Engineer
Priority <URGENT or NONE>
Subject: Repair Request XX/XXX (year/sequential number)

a) Item Description
b) Item Details:
Manufacturer
Part Number
Serial Number
ESA Inventory Number
c) Symptom of fault
d) Main assembly in which fitted
e) Station Technician
f) Relevant OMS 26 Equipment Failure Number (if applicable)
g) Remarks

Last Repair Request

Notes:

- Urgent items shall be submitted as Priority "URGENT". This priority should be used when the required item has an operational impact
- The ESA inventory number is mandatory

Repair Label

All defective items must be accompanied by a repair sheet, completed with details of the item and the fault description

7 OPERATIONAL MESSAGES AND REPORTING

7.1 Introduction

Operational reports, which are visible to the OCC/ESTRACK user, i.e. OMS 20s (Pass Reports), OMS 24s (Operations Failure Reports), OCC/ESTRACK Anomaly Reports (ARs) and the Weekly Operations Report are presented in [RD 7]. The operational reports presented here are intended only for distribution internally to OPS-ON.

7.2 Status Change Report – OMS 26

Introduction

An OMS 26 Status Change Report shall be generated whenever a change of status takes place in any item of the ground facility hardware. The message shall refer to the FAILURE or the UPGRADING of specific equipment.

An OMS 26 shall only be raised by ESTRACK Ground facility personnel. In the event of an anomaly identified at an unmanned ground facility, the GFCC Shift Co-ordinator shall decide, whether the ground facility can support the scheduled activity at a reduced capacity, i.e. without redundancy on some systems or subsystems, or whether the ground facility staff shall be requested to go to the ground facility to take remedial action. This decision shall be taken based on a matrix contained in the relevant GFROM as well as under consultation with any relevant available ESOC personnel, e.g. OPS-ONN Station Engineer or OPS-ONF Operations Engineer or Operations Supervisor. Contact details for initiating “Callouts” shall be available to the Shift Co-ordinator.

Status Definitions

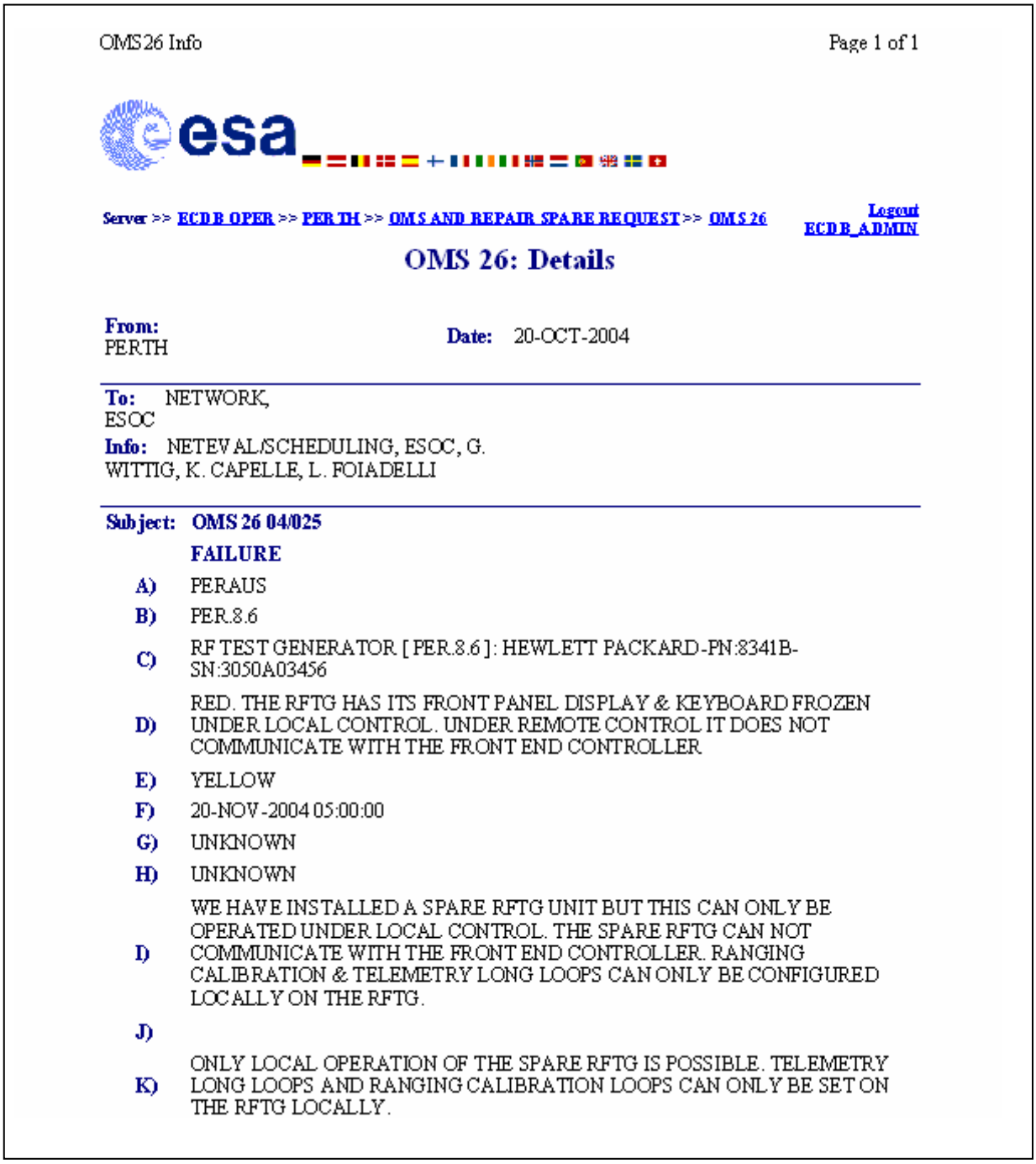
Status may refer to one particular piece of equipment or to a chain of equipment, e.g. if an amplifier on the uplink chain is red but redundancy exists, i.e. there is a second amplifier, which is green, the status of the uplink chain is yellow, i.e. able to support but with reduced redundancy.

STATUS	OPERATIONAL MEANING
Green	Equipment or chain is fully operational
Yellow	Equipment or chain is able to support but with reduced capability or reduced redundancy
Red	Equipment or chain is not operational

Creation of OMS 26s

An OMS 26 Status Change Report shall be generated whenever a change of status takes place in any item of the ground facility hardware. The message shall refer to the FAILURE or the UPGRADING of specific equipment.

An example OMS 26 message for equipment failure is shown in Figure 7-1. An OMS 26 may correspond to an OMS 24, if the equipment failure has led to a loss of scheduled service; however, this is not mandatory, since equipment failure can often be overcome by use of redundant equipment. A corresponding OMS 26 message for the subsequent upgrade is shown in Figure 7-2. Figure 7-3 shows a screenshot of the ECDB OMS 26 interface, displaying a flat list of OMS 26s raised for the Perth ground facility.



OMS 26 Info Page 1 of 1

esa

Server >> ECDB OPER >> PERTH >> OMS AND REPAIR SPARE REQUEST >> OMS 26 Logout ECDB_ADMIN

OMS 26: Details

From: PERTH **Date:** 20-OCT-2004

To: NETWORK, ESOC

Info: NETEVAL/SCHEDULING, ESOC, G. WITTIG, K. CAPELLE, L. FOIADELLI

Subject: **OMS 26 04/025**

FAILURE

A) PERAUS

B) PER.8.6

C) RF TEST GENERATOR [PER.8.6]: HEWLETT PACKARD-PN:8341B-SN:3050A03456

D) RED. THE RFTG HAS ITS FRONT PANEL DISPLAY & KEYBOARD FROZEN UNDER LOCAL CONTROL. UNDER REMOTE CONTROL IT DOES NOT COMMUNICATE WITH THE FRONT END CONTROLLER

E) YELLOW

F) 20-NOV-2004 05:00:00

G) UNKNOWN

H) UNKNOWN

I) WE HAVE INSTALLED A SPARE RFTG UNIT BUT THIS CAN ONLY BE OPERATED UNDER LOCAL CONTROL. THE SPARE RFTG CAN NOT COMMUNICATE WITH THE FRONT END CONTROLLER. RANGING CALIBRATION & TELEMETRY LONG LOOPS CAN ONLY BE CONFIGURED LOCALLY ON THE RFTG.

J)

K) ONLY LOCAL OPERATION OF THE SPARE RFTG IS POSSIBLE. TELEMETRY LONG LOOPS AND RANGING CALIBRATION LOOPS CAN ONLY BE SET ON THE RFTG LOCALLY.

Figure 7-1: OMS 26 Status Change Report (Failure)

OMS 26 Info Page 1 of 1

Server >> ECDB OPER >> PERTH >> OMS AND REPAIR SPARE REQUEST >> OMS 26 Logout ECDB_ADMIN

OMS 26: Details

From: PERTH **Date:** 02-DEC-2004

To: NETWORK, ESOC
Info: NETEVAL/SCHEDULING, ESOC

Subject: **OMS 26 04/025**

UPGRADING

A) PERAUS

B) PER.8.6

C) RF TEST GENERATOR [PER.8.6]: HEWLETT PACKARD-PN:8341B-SN:3050A03456

D) OMS 26 04/025

E) GREEN

F) 02-DEC-2004 11:00:00

G) RFTU REPLACED BY SPARE UNIT EX ESOC

H) FAULTY RFTU TO BE RETURNED TO ESOC FOR REPAIRS

Figure 7-2: OMS 26 Status Change Report (Upgrade)

Server >> ECDB OPER >> PERTH >> OMS AND REPAIR SPARE REQUEST >> OMS 26

Logout
ECDB_ADMIN

OMS 26: Status Change Reports (Flat List)

Page : 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Subject	Refert to	A) Station Code	B)Terminal & Equip.Code	C)Equip.Unit & Serial N.	OMS 26 date	Associated to	
OMS 26_04/027	FAILURE	PERAUS	PER.7.5.2.1	ANTENNA BORE SITE 8663A SYNT. SIGNAL GENERATOR, S/N:3423A02267, ESOC N0: 26958	13-DEC-2004		X
OMS 26_04/026	FAILURE	PERAUS	PER.1.3.2.12	1ST LOCAL OSCILLATOR DRAWER 2 [PER.1.3.2.12]: SNEC-PN:GSLOPF1416-SN:102	22-NOV-2004		X
OMS 26_04/026	UPGRADING	PERAUS	PER.1.3.2.12	1ST LOCAL OSCILLATOR DRAWER 2 [PER.1.3.2.12]: SNEC-PN:GSLOPF1416-SN:102	22-NOV-2004	OMS 26 04/026	X
OMS 26_04/025	FAILURE	PERAUS	PER.8.6	RF TEST GENERATOR [PER.8.6]: HEWLETT PACKARD-PN:8341B-SN:3050A03456	20-NOV-2004		X
OMS 26_04/025	UPGRADING	PERAUS	PER.8.6	RF TEST GENERATOR [PER.8.6]: HEWLETT PACKARD-PN:8341B-SN:3050A03456	02-DEC-2004	OMS 26 04/025	X
OMS 26_04/024	FAILURE	PERAUS	PER.12.8	CONNECTION MODULE 2 [PER.12.8]: NETRIX-PN:-SN:	10-NOV-2004		X
OMS 26_04/024	UPGRADING	PERAUS	PER.12.8	CONNECTION MODULE 2 [PER.12.8]: NETRIX-PN:-SN:	10-NOV-2004	OMS 26 04/024	X
OMS 26_04/023	FAILURE	PERAUS	PER.5.6.1	HIGH POWER AMPLIFIER [PER.5.6.1]PN: -22500:-SN: 06	08-NOV-2004		X
OMS 26_04/023	UPGRADING	PERAUS	PER.5.6.1	HIGH POWER AMPLIFIER [PER.5.6.1]PN: -22500:-SN: 06	16-NOV-2004	OMS 26 04/023	X
OMS 26_04/022	FAILURE	PERAUS	PER.7.5.2.1	BORESITE CALIBRATION TOWER	02-NOV-2004		X

Figure 7-3: Screenshot of the ECDB OMS26 interface, displaying a flat list of OMS 26s raised for the Perth ground facility

OMS 26 Format

The OMS 26 message shall consist of two parts:

- Message identification and reference number;
- Operational contents;

Message Identification and Reference Numbering

The message identification line shall include the message identification (OMS 26) followed by the reference number assigned by the ground facility.

OMS 26 messages for each ground facility shall be numbered sequentially, starting with the number 1 at the beginning of each calendar year.

Example: OMS 26 04/025 (The 25th OMS 26 generated in 2004)

Operational Contents

The contents of each category are as follows:

1. Failure

A) Ground facility six-letter code name;
B) Terminal (if applicable) and equipment code, as per the latest issue of the Network Equipment Availability Report;
C) Equipment unit and serial number of unit concerned;
D) Nature of unserviceability / status of unit affected (red or yellow – see definitions above);
E) Status of system affected (red or yellow);
F) Date/time unserviceable;
G) Can ground facility repair?
H) Estimated time back in operation;
I) Operational consequences;
J) Reference number of any associated operations failure reported (OMS 24);
K) Additional remarks.

2. Upgrading

A) Ground facility six-letter code name;
B) Terminal and equipment code (see associated OMS 26, failure);
C) Equipment unit and serial number of unit (see associated OMS 26, failure);
D) Reference number of associated OMS 26 failure;
E) Present status of upgraded system (yellow or green);
F) Date/time of change of status;
G) Detail of repairs carried out (where applicable);
H) Additional remarks.

7.3 Daily Incident Log

Introduction

A Daily Incident Log shall be generated and distributed by the Shift Co-ordinator on a daily basis. The Daily Incident Log shall list all non-nominal incidents which have occurred during operational activities under control or monitoring of the GFCC operators during a twenty-four hour period.

Creation of Daily Incident Logs

The Daily Incident Log is currently generated from a database, into which entries are made when GFCC operators notice non-nominal incidents during operational activities. The Daily Incident Log currently covers the period from 05:00 UTC of the previous DOY to 05:00 UTC of the current DOY. The format of the Log is a tabular form.

The method of creating the Daily Incident Log as well as the time frame covered by the Log and the format of the Log may be changed to adapt to operational requirements, in agreement with the OPS-ONF GFCC Domain Officer.

The Daily Incident Log shall be distributed by e-mail to the OPS-ONF Operations Engineers, the OPS-ONN Station Engineers and the Ground Facility M&O contractors.

7.4 Events Recording Log Books

Introduction

Log books are to be used in all operational areas within the OCC and ESTRACK. Event recording log books shall be used for routine mission operations, and for LEOP and simulation phases.

Log Book Format

The log books to be used in all operational areas shall be of fixed format as follows:

- Size: DIN A4
- Cover: Hard back
- Fixed binding
- Flat opening
- Pages: Numbered in upper right corner
- Face page printed as shown at Figure 6-4
- Reverse of page, line printed for notes as shown at Figure 6-5
- Title page of log book to carry instructions for use

Log Book Entries

Log book entries shall be completed in accordance with the following rules:

- All log books shall bear an opening date, and when complete, a closing date on the front cover and title page.
- The log book is an official document and the responsible supervisor in any operational area shall ensure it is maintained in a clean and orderly fashion.
- All entries shall be in black or blue ink.
- All entries shall be in English.
- All entries shall bear the time of entry (UTC) and initials of the person making the entry.
- Pages shall not be removed under any circumstances.
- The day number and date shall be entered at the top of each page at the time of the first entry on that page.
- At the end of each day (2400z), the next day number and date shall be entered on a new page.
- All operations personnel are responsible for keeping their logs updated and entering events as soon as possible after occurrence.
- Notes of all significant events shall also be entered on the left page of the log.
- The responsible supervisor in each area shall check the shift log books at the end of each day and make any pertinent remarks if necessary.

- The shift log books shall remain at the operational position, and special permission shall be required from the responsible supervisor to remove them.
- Entries which have been made shall not be altered or deleted. Changes shall be made by striking out the incorrect entry and making a new entry afterwards.
- Shift change times shall be clearly indicated with the initials of the incoming team member.

Figure 6-4: OCC Log Book Format facing page

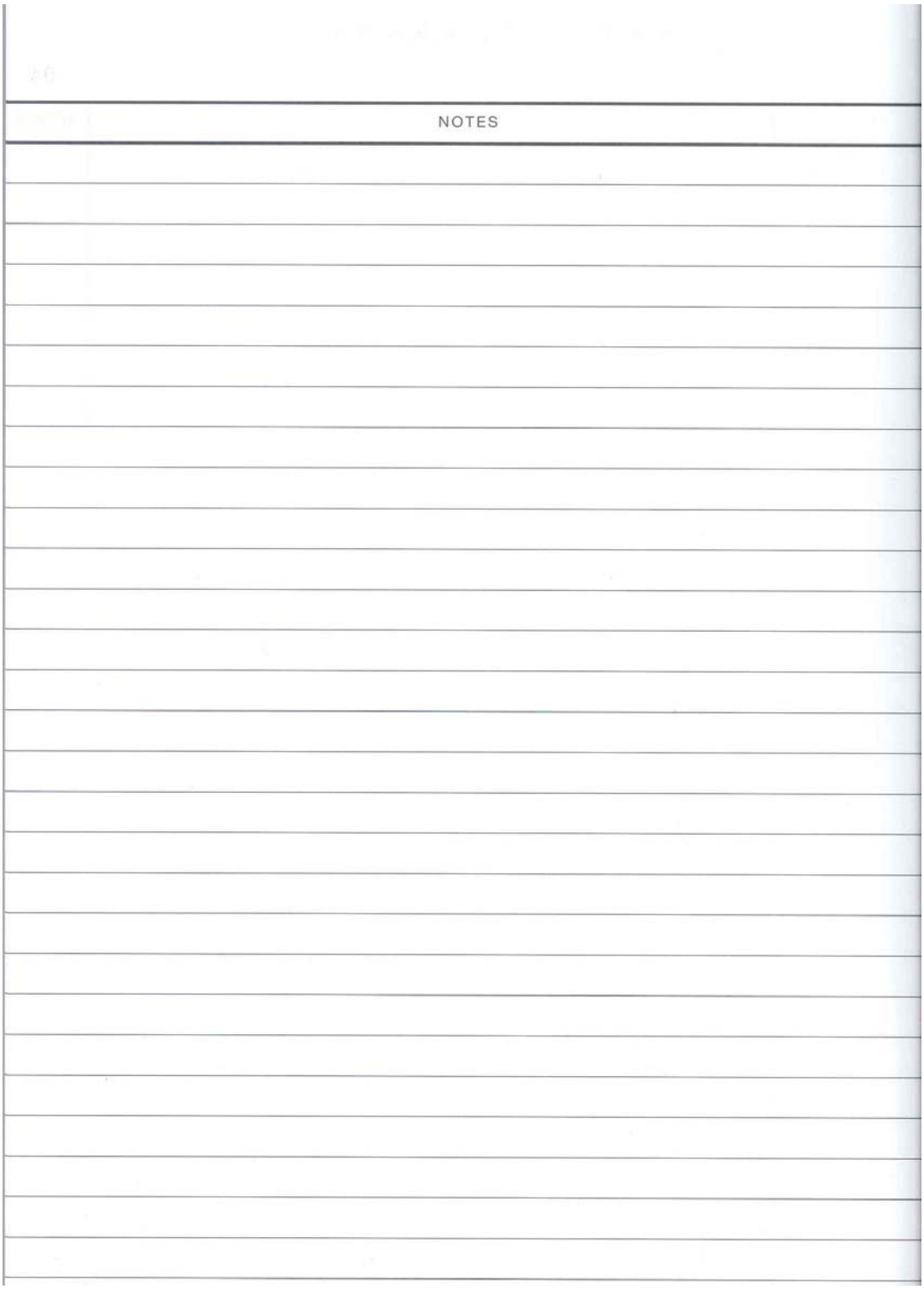


Figure 6-5: OCC Log Book Format reverse page

8 ESTRACK-SPECIFIC HEALTH, SAFETY AND SECURITY

8.1 Introduction

Normal ESTRACK and national health, safety and evacuation procedures shall be adhered to at all times.

8.2 Full or Partial Evacuation of an ESTRACK Ground Facility

In the event of a fire alarm or any other recognized call to evacuate part or all of the facility, the facility's standard evacuation procedures shall apply at all times. Safety of personnel shall always take precedence over mission operations.

For some mission phases it is vital that OCC personnel is informed immediately in the event of a ground facility evacuation, so that action can be taken to bring the spacecraft to a safe condition.

The responsibility for ensuring that all M&O contractors have been briefed in the actions to take in the event of an evacuation alarm during the final countdown to launch or other critical operation shall be defined locally. As a minimum, such a briefing shall include:

- the precise location to which M&O contractors should evacuate;
- who has responsibility for informing the GOM or the GFCC Shift Co-ordinator that the facility has been evacuated and whether the ground facility M&C system may still be operated remotely by the GFCC;
- telephone numbers to be used to contact the GOM or GFCC Shift Co-ordinator from outside the facility;
- the location of any documents that have been set aside from the facility for such an eventuality.

9 ACRONYMS AND ABBREVIATIONS

AD	Applicable Document
AR	Anomaly Report
ARTS	Anomaly Report Tracking System
CCC	Computer and Communications Centre
CCSD	Communications Configuration Station Dossier
CFS	Communications Facilities Support
DCA	Dedicated Control Area
DCR	Dedicated Control Room
DLK	Downlink
DSN	Deep Space Network (NASA)
D/OPS	ESA's Directorate of Operations
DOY	Day Of Year
ECDB	ESTRACK Configuration Database
EFM	ESTRACK Facilities Manual
EOM	ESTRACK Operations Manual
ESA	European Space Agency
ESAF	ESTRACK Station Allocation File
ESOC	European Space Operations Centre
ESTRACK	European Space Tracking Network
FCT	Flight Control Team
GFCC	Ground Facilities Control Centre
GFROM	Ground Facilities Remote Operations Manual
GFURD	Ground Facilities User Requirement Document
GOM	Ground Operations Manager
ICD	Interface Control Document
JAXA	Japan Aerospace Exploration Agency
JPL	Jet Propulsion Laboratory
KRU	Kourou ground facility
LEOP	Launch and Early Orbit Phase
M&O	Maintenance and Operations
MCP	Master Control Privilege (STC)
MCR	Main Control Room
MCS	Mission Control System
MIP	Mission Implementation Plan
MOIS	Manufacturing and Operations Information System
MMI	Man Machine Interface
MSG	Meteosat Second Generation
NASA	National Aeronautics and Space Administration
NCD	Network Configuration Document
NCTRS	Network Control and Telemetry Routing System
NDIU	Network Data Interface Unit
NNO	New Norcia ground facility
NOP	Network Operations Procedures
OCC	Operations Control Centre
OCR	Operations Change Request
OEOM	OCC & ESTRACK Operation Manual
OEUM	OCC & ESTRACK User Manual
OM	Operations Manager
OMS	Operational Message
OFM	OCC Facilities Manual
OPSNET	Operations Network
OPS-ON	Ground Facilities Operation Division of ESA's Directorate of Operations
OPS-ONC	Communications Section of ESA's Directorate of Operations
OPS-ONF	Ground Facilities Services Section of ESA's Directorate of Operations
OPS-ONN	Network Configuration and Test Section of ESA's Directorate of Operations
PER	Perth Ground facility
PSR	Project Support Room
RD	Reference Document
RDD	Reference Design Document
REQ	Reference Requirement Document (or SOW)
SAF	Station Allocation File
SCUT	Station Commitment & Utilisation Tool
SPC	Signal Processing Center
SSR	Software Support Room
STC	Station Computer
STDM	Spacecraft Trajectory Data Message
TBC	To Be Confirmed
TBD	To Be Defined
TM	Telemetry
TRK	Tracking
ULK	Uplink
URD	User Requirement Document
UTC	Universal Time Co-ordinated
Wimpy	World Map Predictions (Flight Dynamics)