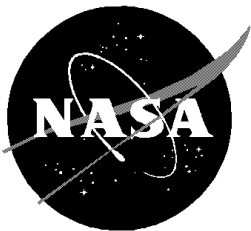


MOD International Liaison Console Handbook Generic and RIO Operations

Mission Operations Directorate
Operations Division

Basic
February 10, 2006



National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas

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MOD International Liaison Console Handbook Generic and RIO Operations

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<u>Page No.</u>	<u>Change No.</u>
Preface	Basic
i – viii	Basic
1-1 – 1-2	Basic
2-1 – 2-25	Basic
3-1 – 3-16	Basic
4-1 – 4-106	Basic
5-1 – 5-42	Basic
6-1 – 6-41	Basic
7-1	Basic
A-1 – A-13	Basic
B-1 – B-5	Basic
C-1 – C-6	Basic
D-1 – D-8	Basic
E-1 – E-2	Basic
F-1	Basic
G-1 – G-2	Basic
H-1	Basic

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PREFACE

This document was prepared for the International Liaison organization, Operations Division, Mission Operations Directorate (MOD), National Aeronautics and Space Administration (NASA), Lyndon B. Johnson Space Center, Houston, Texas. Technical Documentation Services (TDS) personnel provided the editorial support.

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CONTENTS

Section	Page
1.0 INTRODUCTION.....	1-1
1.1 PURPOSE.....	1-1
1.2 SCOPE.....	1-1
1.3 ORGANIZATION AND FUNCTION CHARTS	1-1
2.0 ROLES AND RESPONSIBILITIES.....	2-1
2.1 INTERNATIONAL LIAISON GENERAL DESCRIPTION.....	2-1
2.2 DO INTERNATIONAL OPERATIONS POSITIONS	2-1
2.2.1 Operations Lead.....	2-1
2.2.2 HSG System Specialists	2-3
2.2.3 HSG-Moscow	2-4
2.2.4 HSG Interpreters	2-4
2.2.5 Backup Control Center (BCC).....	2-7
2.2.6 HSG-Japan.....	2-7
2.2.7 HSG-ESA (Columbus).....	2-7
2.2.8 HSG-ATV	2-8
2.3 INTERNATIONAL PARTNER INTERFACES.....	2-8
2.3.1 RSA – MCC-M.....	2-8
2.3.2 ESA – ATV-CC.....	2-8
2.3.3 ESA – COL-CC	2-9
2.3.4 JAXA-JEM.....	2-9
2.3.5 JAXA-HTV	2-10
2.4 HOUSTON OPERATIONS POSITIONS	2-10
2.4.1 Remote Interface Officer	2-10
2.4.2 IP Support Groups.....	2-14
2.4.3 Office.....	2-18
2.4.4 Interpreters.....	2-19
2.5 MISSION PHASES AND RESPONSIBILITIES	2-23
2.5.1 ISS Steady State.....	2-24
2.5.2 ISS USOS EVA	2-24
2.5.3 Orlan RS EVA	2-24
2.5.4 Shuttle Operations.....	2-24
2.5.5 Soyuz Operations.....	2-25
2.5.6 Progress Operations	2-25
2.5.7 ATV Operations.....	2-25
2.5.8 HTV Operations.....	2-25

Section	Page
3.0 ADMINISTRATIVE.....	3-1
3.1 PRODUCTS	3-1
3.1.1 Operations Interface Procedures	3-1
3.1.2 Databooks	3-2
3.1.3 Display Reference Guide	3-2
3.1.4 Training Guide.....	3-2
3.1.5 Console Handbooks	3-3
3.2 CONSOLE DOCUMENTATION	3-3
3.2.1 Console Log	3-3
3.2.2 Handovers	3-4
3.2.3 RS Daily Status	3-4
3.2.4 Russian Segment Knowledge Base	3-5
3.3 CONSOLE ADMINISTRATIVE PROCEDURES	3-5
3.3.1 Delegation of Authority Memo	3-5
3.3.2 RIO Parking.....	3-6
3.3.3 Console Library Maintenance.....	3-9
3.3.4 HSG Insignia	3-11
3.3.5 How To Obtain Headsets	3-12
3.3.6 MCC Badging and Security Procedures.....	3-13
3.3.7 RIO Lockers	3-15
3.3.8 Archiving Files from the RIO Console	3-16
3.3.9 Obtaining a DEC-Alpha Account	3-16
4.0 TOOLS.....	4-1
4.1 DEC APPLICATIONS AND DISPLAYS.....	4-1
4.1.1 DEC-Alpha Workstation Initialization.....	4-1
4.1.2 Telemetry Displays.....	4-1
4.1.3 ODRC.....	4-20
4.1.4 How To Use RTPlot.....	4-29
4.1.5 How To Use ELOG.....	4-40
4.1.6 Other DEC-Alpha Procedures	4-50
4.2 VOICE LOOPS.....	4-51
4.2.1 Logging in and Startup	4-52
4.2.2 DVIS Basic Procedures.....	4-53
4.2.3 Common RIO Loops.....	4-54
4.2.4 RIO Virtual DVIS	4-55
4.2.5 Other Frequently Used Loops	4-55
4.3 PC-BASED APPLICATIONS.....	4-59
4.3.1 JSC-MAS Account.....	4-59
4.3.2 PC Application Quick Reference	4-60
4.3.3 MCC Web Applications	4-62
4.3.4 DO International Liaison Web Applications	4-92

Section	Page
4.4 OTHER TOOLS.....	4-106
4.4.1 RRCG X-Terms	4-106
5.0 GENERAL PROCESSES	5-1
5.1 SHIFT PREP	5-1
5.2 ALTERNATIVE FLIGHT DIRECTOR GUIDELINES.....	5-1
5.2.1 RIO AFD Guidelines.....	5-1
5.2.2 RRCG AFD Guidelines.....	5-2
5.2.3 AFD Content.....	5-2
5.3 CONSOLE POSITIONS AND LAYOUT	5-3
5.3.1 Shuttle White Flight Control Room Positions	5-3
5.3.2 ISS Blue Flight Control Room Positions	5-6
5.4 RIO STEPS IN REAL-TIME FLIGHT RULE DEVELOPMENT	5-10
5.5 RIO STEPS IN REAL-TIME STATION OPERATIONS DATA FILE PROCESS.....	5-10
5.6 RUSSIAN DETAILED DAILY PLAN DEVELOPMENT PROCESS..	5-10
5.6.1 Purpose of ДПП FN.....	5-10
5.6.2 DPP Process Overview	5-10
5.6.3 DPP FN Standards.....	5-11
5.6.4 DPP FN Content.....	5-11
5.6.5 DPP FN Example	5-12
5.7 OCA DOWNLINKED FILE TRANSFER TO MOSCOW	5-14
5.8 RIO/HSG E-MAIL ACCOUNT.....	5-15
5.8.1 Adding the RIO or HSG E-Mail Account.....	5-16
5.8.2 HSG/RIO E-Mail Account Guidelines	5-21
5.9 RIO AR PROCESS	5-21
5.10 VIDEO TRANSFER TO MOSCOW	5-21
5.11 RECORDED VIDEO REQUEST	5-22
5.12 LOOP RECORDING REQUEST	5-22
5.13 TRANSLATION REQUESTS	5-22
5.14 REQUESTING ADDITIONAL INTERPRETERS FOR CONSOLE SUPPORT	5-23
5.15 IMMT INTERNAL MINUTES AND EXECUTIVE OVERVIEW PROCEDURE	5-24
5.16 VOICE LOOP FLIGHT NOTE PROCESS.....	5-28
5.17 RIO ON-CALL UPDATES	5-29
5.18 HAZARDOUS MATERIALS REPORT.....	5-31
5.19 RUSSIAN SEGMENT DAILY STATUS REPORTS.....	5-32
5.20 VOICE COMMUNICATIONS STANDARDS.....	5-38
5.20.1 Voicing Letters and Numbers.....	5-38
5.20.2 Voicing Procedure Words	5-39
5.20.3 Standard Voice Checks.....	5-41

Section	Page
5.21 NOTIFYING S/G INTERPRETERS OF TRANSLATION ISSUES...	5-41
5.22 HOW TO INSTALL CORRECT RODF AND RADIOGRAM FONTS ON YOUR PC	5-41
6.0 RIO-SPECIFIC CONSOLE PROCESS AND PROCEDURES.....	6-1
6.1 STEADY STATE RIO	6-1
6.1.1 Steady State RIO Daily Tasks	6-1
6.1.2 Steady State RIO Weekly Tasks	6-6
6.1.3 Steady State RIO Increment Notebook	6-7
6.2 JOINT SHUTTLE MISSION RIO	6-8
6.2.1 Shuttle RIO Checklist	6-9
6.2.2 Shuttle Flight-Specific Notebook	6-11
6.3 SOYUZ OPERATIONS RIO	6-13
6.3.1 Soyuz Operations Checklist	6-13
6.3.2 RIO Soyuz Flight-Specific Notebook	6-19
6.4 SPECIAL OPERATIONS RIO	6-20
6.4.1 Progress Support	6-20
6.4.2 Soyuz Relocate	6-23
6.4.3 Reboost/Debris Avoidance Maneuver Support RIO	6-25
6.4.4 ATV Support RIO	6-25
6.4.5 Joint Airlock EVA Support RIO	6-26
6.4.6 Orlan EVA Support RIO	6-29
6.4.7 Russian Segment Software Transition Support RIO	6-32
6.4.8 H-IIA Transfer Vehicle RIO.....	6-34
6.5 SIMULATION RIO	6-35
6.5.1 Simulation Locations	6-35
6.5.2 Simulation RIO Checklist.....	6-35
6.5.3 RSET Tag-up	6-38
6.5.4 Interpreter Roles for Sims	6-38
6.5.5 Interpreter Evaluations	6-39
6.5.6 RS Systems Status for Simulations.....	6-40
7.0 GROUND NETWORK.....	7-1

Appendix	Page
A ENGLISH/RUSSIAN ACRONYMS AND ABBREVIATIONS	A-1
B PHONE NUMBERS	B-1
C MOA FOR SHARING THE RIO/EVA/VVO CONSOLE IN THE BFCR	C-1
D MSG WORK INSTRUCTIONS.....	D-1
E IP OPS CENTER ROOM CONFIGURATIONS.....	E-1
F TIME REFERENCES AND ZONES	F-1
G CONVERSIONS.....	G-1
H CHANGE CONTROL	H-1

TABLES

Table

3-1 RS daily status example.....	3-5
3-2 RIO console library audit example	3-9
4-1 Common RIO loops	4-54
4-2 RIO virtual loop assignments	4-55
4-3 Frequently used shuttle call signs/loops	4-56
4-4 Frequently used ISS call signs/loops	4-58
4-5 ISS uplink status colors.....	4-68
5-1 Shuttle WFCR position descriptions	5-3
5-2 ISS BFCR position descriptions	5-7
5-3 Russian detailed daily plan example – main body	5-12
5-4 Russian detailed program plan example – Molniya coverage.....	5-13
5-5 FGB/Soyuz/Progress telemetry.....	5-14
5-6 Translation request responsibilities.....	5-22
5-7 ISS RS system status and consumables report example	5-33

Table	Page
6-1 Meeting schedule	6-6
6-2 Integrated HSG/RIO/Interpreter Support Schedule Template.....	6-17
6-3 RS initial conditions for sims	6-40

FIGURES

Figure	
1-1 MOD organization chart	1-2
3-1 Microsoft Word print window	3-4
3-2 Delegation of authority memo example.....	3-6
3-3 Building 30 parking layout	3-7
3-4 RIO parking space identifier	3-8
3-5 HSG emblem	3-12
4-1 RIO DNAV menu.....	4-1
4-2 HSG Displays menu.....	4-2
4-3 DTE/MED/SCR menu	4-2
4-4 Tools menu	4-2
4-5 Data Control menu.....	4-3
4-6 Print menu.....	4-3
4-7 HSG overview display	4-4
4-8 VVO Russian vehicles MSK display.....	4-5
4-9 ECLSS CDDT display	4-7
4-10 Joint Airlock Mega MSK Display	4-8
4-11 ECLSS dP/dT MSK display.....	4-9
4-12 ISS EMU Data Page 1 MSK.....	4-10
4-13 EVA CDDT display for airlock systems	4-11
4-14 MEWS start screen	4-21
4-15 ODRC Interface application	4-21
4-16 Flight selection screen examples	4-22
4-17 Request Data window	4-23
4-18 MEWS plot window	4-25
4-19 More MEWS plot windows	4-26
4-20 MEWS plot file directory.....	4-27
4-21 Example of plot	4-28
4-22 Example of Tab data.....	4-29
4-23 RTPlot main window	4-30
4-24 RTPlot example	4-31
4-25 Commands menu.....	4-32

Figure	Page
4-26 Information mode	4-33
4-27 X, Y Information dialog.....	4-33
4-28 Set limits dialog	4-34
4-29 Scale-type dialog.....	4-35
4-30 Label dialog.....	4-36
4-31 Information mode	4-38
4-32 Line style dialog	4-38
4-33 Prediction line dialog.....	4-39
4-34 ELOG main window with class icons.....	4-41
4-35 Deiconified class window	4-42
4-36 Acknowledge event action	4-43
4-37 Commands menu.....	4-44
4-38 Information mode	4-44
4-39 Tag selection box.....	4-45
4-40 Update rate	4-46
4-41 Base time dialog	4-47
4-42 Class showing delta time	4-47
4-43 Information mode command menu	4-48
4-44 DVIS screen.....	4-52
4-45 MCC-H home page	4-63
4-46 ISS Tools menu	4-63
4-47 ISS Planning menu	4-64
4-48 ISS Systems menu	4-64
4-49 ISS Trajectory menu	4-65
4-50 ISS Engineering menu	4-65
4-51 ISS References menu.....	4-65
4-52 STS Tools menu	4-66
4-53 STS Planning menu	4-66
4-54 STS Systems menu	4-67
4-55 STS References menu.....	4-67
4-56 ChitS organization selection.....	4-71
4-57 ChitS main screen.....	4-72
4-58 Chit screen explanation.....	4-73
4-59 Electronic Flight Notes (EFN) login screen	4-76
4-60 EFN system main window.....	4-77
4-61 MCC Flight Note screen explanation	4-78
4-62 STS Tools menu	4-79
4-63 PPCR window	4-79
4-64 Accessing IFI	4-80
4-65 IFI link	4-80
4-66 Read Only access	4-81
4-67 Searching IFI list	4-81
4-68 Viewing IFI	4-82

Figure	Page
4-69 Starting IMG0	4-83
4-70 IMG0 application running	4-84
4-71 OSTPV window running	4-85
4-72 IPV open document dialog	4-87
4-73 Anomaly Log main page	4-89
4-74 Create Log Entry form.....	4-90
4-75 International Liaison home page	4-92
4-76 HSG Daily News	4-93
4-77 Russian Segment Knowledge Base.....	4-94
4-78 KB data flow (participant in italics)	4-101
4-79 Example of IP (Russia)-generated correspondence	4-103
4-80 HSG Mission Data page.....	4-105
5-1 White Flight Control Room.....	5-6
5-2 Blue Flight Control Room	5-9
5-3 RIO Inbox.....	5-16
5-4 Services window	5-17
5-5 Microsoft Exchange Server properties	5-17
5-6 Advanced properties popup window	5-18
5-7 Add Mailbox window	5-18
5-8 E-mail Accounts window number one	5-19
5-9 E-mail Accounts window number two	5-19
5-10 E-mail Accounts window number three.....	5-20
5-11 Advanced properties popup window	5-20
5-12 Add Mailbox window	5-21
5-13 IMMT notes example	5-25
5-14 IEO guidelines.....	5-27
5-15 On-Call information window	5-30
5-16 On-call edit window	5-31
5-17 RS Daily Status Report access	5-32
6-1 Red Flight Control Room layout.....	6-35
6-2 Interpreter evaluation form.....	6-39

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to define the roles and responsibilities of the various positions supported by the International Liaison organization of the Operations Division of the Mission Operations Directorate (MOD). This document also provides the procedures for the MOD International Liaison console functions performed in Houston (primarily for the Remote Interface Officer (RIO)), generic procedures that are common to multiple International Liaison console positions, as well as important reference information. The volumes described in Section 1.2 handle procedures that are either completely or predominantly performed at positions other than in Houston.

1.2 SCOPE

This generic volume provides an overview of all the various console positions and functions of the MOD International Liaison organization. It also covers any procedures and tools that are performed in Houston or used by more than one position within the International Liaison function.

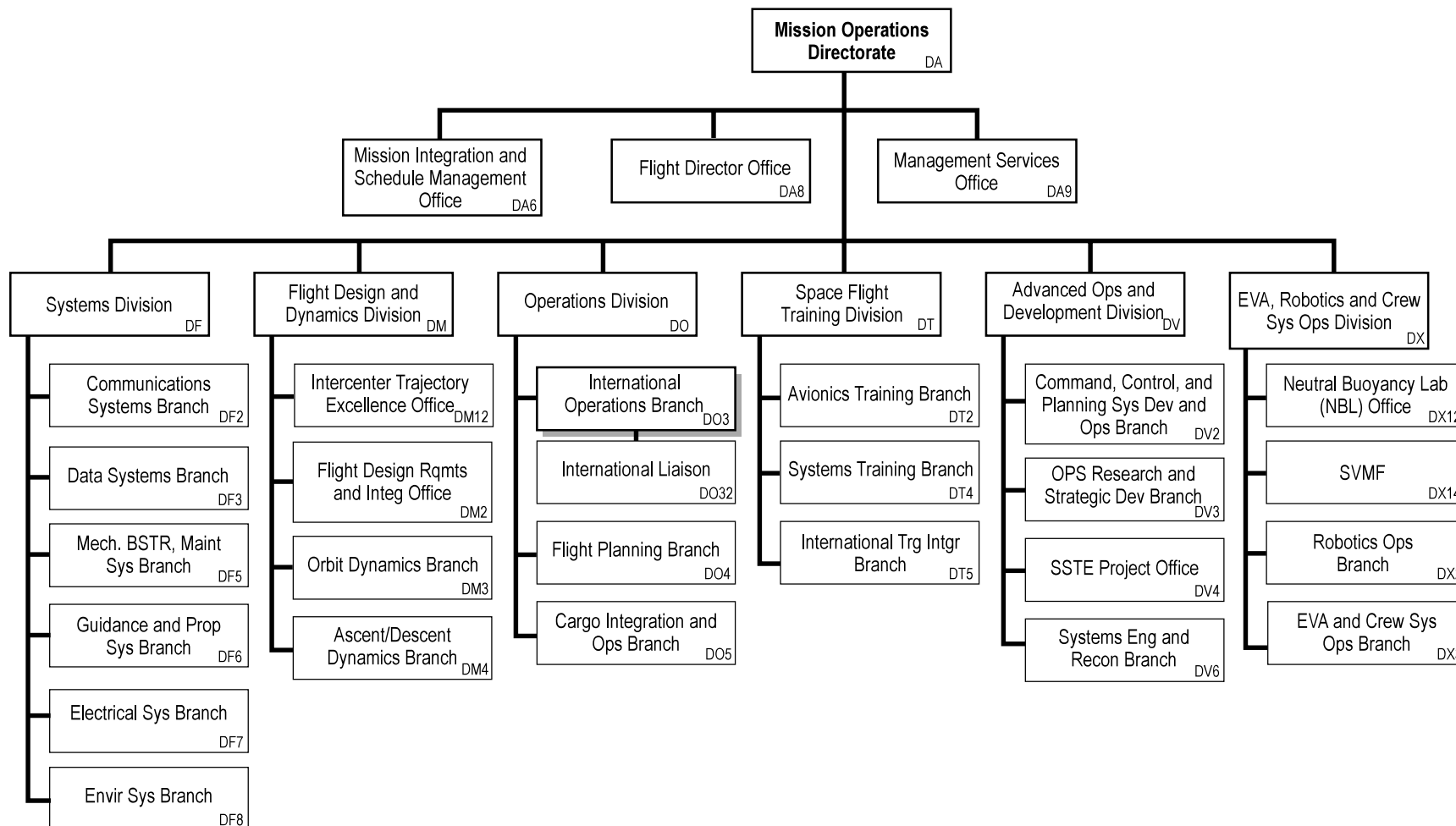
The details for a specific area, as well as any procedures or information unique to that area, are covered in the following separate volumes:

- Volume A Houston Support Group – Moscow (HSG-Moscow)
- Volume B Backup Command and Control (BCC)
- Volume C HSG – Japan
- Volume D HSG – European Space Agency (ESA)
- Volume E HSG – Automated Transfer Vehicle (ATV)
- Volume I International Partner (IP) Support Groups
- Volume N Ground Networks and Telemetry
- Volume O International Liaison Office Handbook
- Volume T Mission Control Center – Moscow (MCC-M) Interpreters

Volumes F through H, J through M, P through S, and U through Z are reserved for future use.

1.3 ORGANIZATION AND FUNCTION CHARTS

Figure 1-1 is the organization chart for the MOD, down to the branch level. It also includes the International Liaison Group (DO32), under the International Operations Branch (DO3).



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Figure 1-1. MOD organization chart

2.0 ROLES AND RESPONSIBILITIES

2.1 INTERNATIONAL LIAISON GENERAL DESCRIPTION

The Operations Division (DO) International Liaison organization performs the following functions:

- a. Provides operations consultants or liaisons in the control centers of the IPs
- b. Leads the overseas team of U.S. flight controllers, specialists, and interpreters to streamline and facilitate communications between the IP control centers and MCC-Houston (MCC-H) during real-time operations
- c. Works with IPs to develop operations concepts for support of future joint mission operations
- d. Serves as Mission Operations Directorate (MOD) Lead for operational integration of the IP segments of the International Space Station (ISS)
- e. Develops and maintains Operations Interface Procedures (OIPs) between National Aeronautics and Space Administration (NASA) and the other IPs
- f. Defines ground systems and network requirements necessary to support U.S. teams deployed in IP control centers

2.2 DO INTERNATIONAL OPERATIONS POSITIONS

DO supports several different flight control positions at various sites around the world that interface and support console operations in Houston through/with the Remote Interface Officer (RIO). The RIO is the prime interface for these positions, but they also interface with the Flight Director (FD) and many other Houston-based console positions.

2.2.1 Operations Lead

The Operations Lead is the leader of the Houston Support Group (HSG) at an IP control center and manages and coordinates all NASA-related activities at that location. The Operations Lead is the official Point of Contact (POC) to negotiate or provide status information to the MCC-H FD and the IP.

The Operations Lead is responsible for, but not limited to, the following duties:

- a. Consulting with IP Flight Control Teams (FCTs) daily, regarding current operations, joint procedures being performed, and potential contingencies that might occur
- b. Providing clarifications, consultations, and interpretations of flight operations conducted on IP and U.S. segments
- c. Maintaining operational knowledge of activities and systems on all segments of the ISS

- d. With MCC-H FD direction, coordinating and negotiating issues with IP control centers, as well as their Operations Management
- e. Participating in IP control center meetings on joint ISS operations and relaying pertinent information to their respective Mission Control center (MCC)
- f. Providing the MOD interface to IP Operations Management
- g. Interacting with MCC-H, as required, including daily FD conference support
- h. Reviewing Flight Notes (FNs) and responding appropriately
- i. Relaying pertinent information to IP FD, as required
- j. Coordinating with IP control center personnel to analyze IP segment telemetry data and monitoring IP command uplinks
- k. Interfacing with IP FCT to facilitate the following:
 - 1. Provide explanation/interpretation of ongoing operations, procedures, Flight Rules, and OIPs
 - 2. Expediting implementation of changes to the Short-Term Plan (STP) and daily timelines, as required
 - 3. Submitting emergency timeline changes, requiring execution within 38 hours
- l. Negotiating procedures, Flight Rules, and OIPs on behalf of MOD
- m. Training, certifying, and managing interpreter resources located in the IP control center
- n. Negotiating changes in the plans on behalf of the MCC-H FD and Ops Planner
- o. Interacting, as required, with the ISS Program Office representatives in the IP control center during real-time mission operations
- p. Serving as the interface to any Program Office representatives located in the IP control center, with regard to operations policies and agreements with the IP
- q. Maintaining rosters and emergency contact information for HSG members, dependents, and visitors/guests (both business and personal) in the host country, as required
- r. Reviewing the HSG facility and operations on a continuing basis for safety hazards and ensuring that appropriate steps are taken to prevent the occurrence of mishaps

- s. Approving plans regarding changes to the HSG facility configuration (both mission and administrative networks)
- t. Serving as the interface to TechTrans International (TTI) management on TTI performance evaluations and job descriptions and managing interpreter resources
- u. Coordinating issues regarding apartments and staffing in host country with DO management in Houston
- v. Working with Program Office representatives on chits and anomalies involving IP

Any Operations Lead functions or duties unique to a particular location are documented in the specific volume of the console handbook that covers that location.

2.2.2 HSG System Specialists

HSG Systems Specialists, such as the Russian Segment Specialist (RSS), are the experts on the systems of an IP segment.

Their responsibilities include, but are not limited to

- a. Meeting routinely with IP FCT to discuss IP systems performance and operation
- b. Discussing anomalies in accordance with the OIP between MCC-H and the IP
- c. Providing the lead on verification of U.S.-generated drawings and systems brief information by reviewing these products with the IP experts
- d. Serving as book manager for the IP Segment Databook (e.g., the Service Module (SM) Databook)
- e. Having knowledge of IP telemetry displays and serving as book manager of supporting documentation and display descriptions, for example:
 - 1. Principles of operation (commands and telemetry)
 - 2. Overview schematics (to the valve and box level)
 - 3. Coolant loop dependencies, if actively cooled
 - 4. Important IP parameters (e.g., liters of O₂ produced for given water and power input)
 - 5. Equipment power consumption in nominal operations
- f. Developing HSG inputs to the Weekly 0800 Status Report
- g. Maintaining operational knowledge of activities and systems on all segments of the ISS

- h. Relaying information from the MCC-H FD and FCT to the IP team
- i. Relaying information contained in procedures, Flight Rules, and OIPs
- j. Providing explanation of ongoing United States On-Orbit Segment (USOS) operations, procedures, flight rules, and OIPs to the IP FCT
- k. Reviewing FNs and providing recommendations to the Operations Lead on necessary actions and distributing to other members of the HSG, if needed
- l. Relaying information (e.g., Planning Product Change Requests (PPCRs)) regarding changes to crew plans
- m. Working with Program Office representatives on chits and anomalies involving IPs
- n. Reviewing IP procedures in the Operations Data File (ODF) and providing comments to the appropriate procedure coordinator
- o. Providing inputs to the Operations Lead on interpreter performance
- p. Developing inputs to Items for Investigation (IFI) on IP segment anomalies

The HSG Systems Specialist also supports design reviews on the IP hardware, as appropriate; meets routinely with the Program Office and IP personnel concerning progress and significant events on IP hardware; and relays the information to the appropriate FCT personnel in Houston.

2.2.3 HSG-Moscow

HSG-Moscow is located at Russia's Center for Control of Spaceflights (TsUP) in the city of Korolev, which is northeast of Moscow. The HSG-Moscow is responsible for the coordination of any work and information transfer regarding ISS systems and payloads between the FCT of MCC-M and MCC-H. HSG-Moscow primarily provides real-time flight support on console in the Houston Support Room (HSR). HSG-Moscow can also provide a Backup Control Center (BCC) function, if required.

For details and procedures regarding HSG-Moscow operations, refer to JSC-36340-A, Moscow Operations Console Handbook. The latest version can be found at the DO International Liaison Web site: <http://mod.jsc.nasa.gov/do13/>.

2.2.4 HSG Interpreters

2.2.4.1 HSG Interpreter General Roles and Responsibilities

MCC certified interpreter support at MCC-M is required 24 hours a day, 7 days a week, including holidays, for interpretation and translation. Space-to-Ground (S/G) certified

interpreter support is required on crew days off. Interpreter tasks are as follows:

- a. On crew working days – Provide concurrent support for up to two voice loop conversations, one face-to-face interpretation, and translation support as directed by the Ops Lead
- b. On crew days off – Provide for one voice loop conversation, S/G interpretation, and translation support

Voice loop (other than S/G) and face-to-face conversations are consecutive interpretations. S/G interpretation is done as simultaneous interpretation. Standard translation support consists of products such as weekly systems reports, planning change requests, and memos.

If the TTI Docs group in Houston is unavailable, additional translations (e.g., Technical Interchange Meeting (TIM) protocols) may be accommodated on a time-available basis and with Ops Lead approval. When all HSG interpreters are busy, other available MCC-M interpreters, as directed by the Ops Lead, may provide additional support.

- a. When the HSG is not present at MCC-M, the interpreters are required to facilitate discussions and answer phones and voice loop calls between MCC-H and MCC-M. Additional tasks, such as document retrieval, translation, and distribution to MCC-M are required.
- b. Interpreter support includes a peer Quality Assurance (QA) of all translations done at MCC-M.
- c. Interpreter provides results of the MCC-M post-pass briefings to the Russian Segment (RS) or Ops Lead. In addition, the Ops Lead may request real-time interpretation of the Russian Shift Flight Director (SRP) loop during important activities.
- d. On crew days off and for off-nominal situations (e.g., calls during crew sleep, MCC-H evacuation) when the S/G interpreters in Houston are not on console, the HSG interpreter provides the S/G interpretation.

2.2.4.2 HSG Interpreter Administrative Staff

Support is required at MCC-M Monday through Friday from 9 a.m. to 5 p.m., Moscow time. Additional support may be required outside these hours in the event of off-nominal activities and during certain dynamic stages of the flight. The administrative staff reports to the HSG Ops Lead and performs the following major functions:

- a. Provides coordination between HSG and MCC-M, Rocket Space Corporation-Energia (RSC-E), Rosaviakosmos, and Khrunichev
- b. Conducts document management and archival of all products (HSG, Moscow Technical Liaison Office (MTLO), Public Affairs Officer (PAO), and Extravehicular Activity (EVA) developed at MCC-M
- c. Updates Web postings, as required
- d. Coordinates HSR equipment maintenance, repair, cleaning, and supplies
- e. Coordinates MCC-M access documentation and visa assistance, as required
- f. Maintains daily log records of all interpreters (HSG, MTLO, EVA, Russian Operations Data File (RODF), and PAO) working at MCC-M
- g. Maintains MCC-M interpreter training library and training records
- h. Translates correspondence, agendas, and reports, as required

TTI is the contractor responsible for NASA/Russia translation and interpretation. TTI's main office in Moscow is located in the Volga at the following address:

Hotel Complex "Volga"
Suite 1-40
Bolshaya Spasskaya Ulitsa, 4
Moscow, Russia
107078
Phone: 011-7-095-929-6110
Fax: 011-7-095-929-6109

2.2.4.3 Interpreter Support for Russian Sites

Interpreters may be required to support NASA and NASA contractor personnel at various Russian sites (Star City, Rosaviakosmos, Khrunichev, Institute of Biomedical Problems (IBMP), RSC-E, etc.). No more than twice a year, a 1- or 2-week Baikonur trip may also be required.

Cross-training between the interpreter positions is strongly encouraged and highly desirable. Specifically, interpreters supporting the HSG should also be able to support

MTLO, and vice versa. EVA and PAO interpreters should be able to support HSG console operations, if needed.

2.2.5 Backup Control Center (BCC)

The Emergency Mission Control center (EMCC) is located in Russia and comprises MCC-M as the Lead Control center, coupled with the HSR at MCC-M acting as BCC. The HSG BCC facility provides a U.S. command and control capability from MCC-M, if the EMCC must be activated. The EMCC is used for situations that render MCC-H unable to provide telemetry, voice, and command capability for extended periods. EMCC is also used when the threat of severe weather results in the evacuation of MCC-H for extended periods. The HSG serves as the primary U.S. support to MCC-M and monitors essential vehicle systems in support of ISS on-orbit operations.

For details and procedures regarding BCC, refer to JSC-36340-B, Backup Command and Control Operations Handbook. The latest version can be found at the following DO International Liaison Web site: <http://mod.jsc.nasa.gov/do13/>.

2.2.6 HSG-Japan

The HSG-Japan will be created before the launch of the first piece of the Japanese segment of the ISS. HSG-Japan will be located at the Space Station Integration and Promotion Center (SSIPC), which is at the Japan Aerospace Exploration Agency's (JAXA's) Tsukuba Space Center (TKSC). It is in the city of Tsukuba in the Ibaraki prefecture of Japan and is about 50 km northeast of Tokyo.

The HSG-Japan will be responsible for the coordination of any work and information transfer regarding ISS systems between the FCTs of MCC-H and SSIPC. It will also be responsible for similar duties when the H-IIA Transfer Vehicle (HTV) is docked to the ISS. HSG-Japan will primarily provide real-time flight support on console.

Once it is created, the details and procedures for HSG-Japan operations will be in JSC-36340-C, Japan Operations Console Handbook.

2.2.7 HSG-ESA (Columbus)

The HSG-European Space Agency (ESA) (Columbus) will be created before the launch of the first piece of the European segment of the ISS. HSG-ESA will be located at the ESA's Columbus Control center (COL-CC), which is at the German Space Operations Center of the German Space Agency (DLR). It is in the city of Oberpfaffenhofen, Germany, and is south of Munich.

HSG-ESA will be responsible for the coordination of any work and information transfer regarding ISS systems between the FCTs of MCC-H and the COL-CC. HSG-ESA will primarily provide real-time flight support on console.

Once it is created, the details and procedures for HSG-ESA operations will be in JSC-36340-D, European Space Agency (ESA) Operations Console Handbook.

2.2.8 HSG-ATV

The HSG-Automated Transfer Vehicle (ATV) will be created before the first launch of the ATV. HSG-ATV will be located at the ESA's ATV Control Center (ATV-CC) that is at the facilities of the French Space Agency (CNES) in the city of Toulouse, France.

HSG-ATV will be responsible for the coordination of any work and information transfer regarding ISS and ATV systems between the FCTs of MCC-H and the ATV-CC. HSG-ATV will primarily provide real-time flight support on console.

Once it is created, the details and procedures for HSG-ATV operations will be in JSC-36340-E, Automated Transfer Vehicle (ATV) Operations Console Handbook.

2.3 INTERNATIONAL PARTNER INTERFACES

The ISS Mission Control Teams comprise flight controllers at several IP control centers. Each IP control team is individually organized, based on organizational considerations internal to that IP's program needs and heritage.

For more detailed information, please refer to the Operations Interface Procedures (OIP SSP-50643-Generic) at http://mod.jsc.nasa.gov/do13/OIP_Homepage.html.

2.3.1 RSA – MCC-M

The ISS Main Real-Time Operation Management Group (ΓΟΓΥ) is headed by the ISS RS Lead FD. The ΓΟΓΥ is located in the MCC-M (or ЦУП-μ) located in Korelev, Russia. Shift operations for the ΓΟΓΥ are headed by the Shift Flight Director (СРП). The primary interface for the RIO is the Shift Assistant Flight Director (ΠΡΠ). In addition, RIO interfaces with the Functional Cargo Block (FGB) SRP.

For more detailed information, please refer to the Operations Interface Procedures (OIP SSP-50643-A; NASA/Federal Cosmonautics Agency – ΦΚΑ) at http://mod.jsc.nasa.gov/do13/OIP_Homepage.html.

2.3.2 ESA – ATV-CC

The ESA has their ATV Flight Control Team (ATV-CC) located in the CNES in Toulouse, France.

Refer to SSP-50643-E, OIP, Volume E: NASA/ESA (ATV)/Rosaviakosmos, for detailed ATV-CC flight controller responsibilities at http://mod.jsc.nasa.gov/do13/OIP_Homepage.html.

ATV-CC hosts the operational teams in charge of conducting ATV operations during all phases of the mission. The different teams hosted at ATV-CC are

- a. The ESA Operations Management Team (OMT) (collocated at ATV-CC), which has responsibilities that include mission preparation for operations products, ATV-CC

modifications, and verification and validation of all operations products, ground facilities, and training.

- b. The FCT, including the Flight Dynamics Team, is led by the ATV Flight Director (ATV FLIGHT). The FCT is responsible for providing the real-time operations expertise of the ATV systems and elements. The ATV FCT prepares the ATV-CC for each mission and is the focal point for discussions between MCC-M and MCC-H regarding ATV operations.
- c. The Engineering Support Team (EST) supports operations during the active modes (ATV free flight, docking/undocking, loitering in the ISS vicinity, ISS propulsive support, and ISS refueling) and is on request by the FCT during passive modes (e.g., attached phase, for times when no refuel or propulsive support to ISS is scheduled). The Engineering Support Team Leader (ESTL) leads the EST.

2.3.3 ESA –COL-CC

The ESA has their Columbus Module (COL) FCT located in the COL-CC at Oberpfaffenhofen, Germany.

The Columbus FCT activities are directed and coordinated by the COL-CC FD. One FD (head of the FD Team) is the designated lead for the FCT and overall COL-CC operations.

The FCT is responsible for the overall safe COL operation (Systems and Payloads) as part of the ISS operation. In addition, the FCT is supplemented by several external operations support organizations, among them the EST, Columbus Operations Management Team Representatives, Crew Operations, Medical Operations Support personnel, and Payload Operations Team personnel.

The FCT composition and functional allocation is dependent upon the activities on the ISS and Columbus 1E Assembly Flight and Increment steady state operations.

COL-CC FD – The COL-CC FD on duty (call sign Columbus FLIGHT) is responsible for overseeing the conduct of safe and effective Columbus element system and payload operations. During increment preparation, the FD is responsible for ensuring (at a management level) that the resources of the COL-CC and the supporting operational ground segment are adequate to conduct mission operations. This includes ensuring adherence to mission rules and proper coordination of any necessary deviations. The FD position is manned on a continuous 24-hour/day basis.

Refer to SSP-50643-D, OIP, Volume D: NASA/ESA-Columbus, for detailed COL-CC flight controller responsibilities at http://mod.jsc.nasa.gov/do13/OIP_Homepage.html.

2.3.4 JAXA-JEM

The JAXA has their Japanese Experiment Module (JEM) FCT located in the SSIPC at Tsukuba, Japan.

Refer to SSP-50643-C, OIP, Volume C: NASA/JAXA, Section 2.3 for detailed Japanese Flight Control Team (JFCT) flight controller responsibilities at http://mod.jsc.nasa.gov/do13/OIP_Homepage.html.

Some flight control positions that RIO interfaces with are shown below.

Japan FD – The Japan FD (call sign J-FLIGHT) is responsible for the overall JEM system and JAXA payload real-time operations, health, safety, planning, and is the leader of the JFCT.

SSIPC Capsule Communicator (CAPCOM) – The SSIPC CAPCOM (call sign SSIPC CAPCOM) is responsible for SSIPC communication on the S/G voice loop with an ISS crewmember or a shuttle crewmember regarding JEM operations and JAXA Payload operations. SSIPC CAPCOM interfaces with the ISS CAPCOM to request and coordinate S/G discussions.

Note: Some JFCT flight controllers also have responsibilities with the HTV FCT.

2.3.5 JAXA-HTV

The JAXA has their HTV FCT located in the SSIPC at Tsukuba, Japan.

Refer to SSP-50643-C, OIP, Volume C: NASA/JAXA, Section 2.3 for detailed JFCT flight controller responsibilities at http://mod.jsc.nasa.gov/do13/OIP_Homepage.html.

2.4 HOUSTON OPERATIONS POSITIONS

2.4.1 Remote Interface Officer

The RIO is located in the front room of MCC-H and usually serves as the principal interface between MCC-H and all the IP control centers (MCC-M, ATV-CC, COL-CC, SSIPC) during high-activity periods, such as vehicle dockings/undockings, EVAs, reboosts, and other complex operations (e.g., software updates).

The RIO also supports ISS steady state operations, Monday to Friday during ISS orbit 2 (Houston business hours). Further, the RIO manages interpreter/translator resources to ensure that required communication is accomplished. The RIO is responsible for the following general functions:

- a. Communications (verbal and written) between MCC-H and IP control centers, including
 1. Relaying of major ISS USOS and shuttle events (e.g., launch, GO/NO-GO calls to the IP FCTs)
 2. Managing the cadre of MCC-H interpreters and translators, ensuring that sufficient resources are trained and available for mission support

3. Setting priorities when translator workload warrants
4. Coordinating efforts with other internationally distributed HSG teams
- b. Integration of U.S. and IP operations, including
 1. Informing the IP FCTs of ISS USOS and shuttle failures, troubleshooting, repair, and preventative maintenance that affect joint operations
 2. Informing the MCC-H FCT of IP segment failures, troubleshooting, repair, and preventative maintenance that affect joint operations
 3. Relaying requests for changes in timelines or procedures to and from IP control centers for evaluation
- c. Locating local expertise on IP segment systems and operations
- d. Locating local expertise on visiting vehicle capabilities during free flight (as backup to the Visiting Vehicle Officer (VVO)) and during docked operations
- e. Consultation on U.S. and IP operations with the respective control center
- f. Knowledge of U.S. and IP ground and orbital command and communications network capabilities, including
 1. Russian ground sites, Altair constraints, and availability
 2. Russian command constraints and U.S. backup availability
 3. U.S. ground sites and Tracking and Data Relay Satellite System (TDRSS) constraints and availability
 4. U.S. command capabilities and RS backup availability
 5. U.S. and Russian network interfaces
 6. U.S. and IP network interfaces and spacecraft command and communication
- g. Having specific knowledge of the joint documents and joint negotiations, including
 1. Knowledge of what has been agreed upon and the rationale for those agreements
 2. Maintaining and following procedures for real-time changes to joint documents and rules
- h. Knowledge of IP FCT organizational structures
- i. Maintenance of console tools and aids

- j. With MCC-H FD direction, coordinating and negotiating issues (using HSG resources) with IP control centers, as well as their Operations Management
- k. Participation in MOD, Program Office, and Mission Evaluation Room (MER) meetings on joint ISS operations and relaying pertinent information to the respective MCC
- l. Supporting and coordinating conferences between FDs
- m. Reviewing flight notes and responding appropriately
- n. Relaying pertinent information to IP FDs, as required
- o. Interfacing with IP FCT to facilitate the following
 1. Explanation/interpretation of ongoing operations, procedures, flight rules, and OIPs
 2. Implementation of changes to the Short-Term Plan (STP) and daily timelines, as required
 3. Submission of emergency timeline changes requiring execution within 38 hours
- p. Negotiating changes in plans on behalf of the MCC-H FD
- q. Serving as the interface to TTI management on TTI performance evaluations and job descriptions
- r. Working with the Program Office, MOD, and MER representatives on chits and anomalies involving IPs

RIO also provides assistance to the IP Support Groups (Moscow Support Group (MSG), European Support Group (ESG), Tsukuba Support Group (TSG)) in MCC-H and manages the interpreter/translator resources to ensure that required communication is accomplished.

Space flight operations are sufficiently challenging when an FCT speaks the same language; misunderstandings can and will occur. The difficulty of this task is multiplied when other IP control centers are involved. The RIO and interpreters have an absolutely critical job to ensure effective communication between the MCC-H and other IP control centers. The RIO must filter all that goes on in MCC-H and provide the IP FCTs with what they primarily need to know, without leaving out critical information needed to ensure safe and efficient operations.

2.4.1.1 RIO Schedule

The current RIO schedule can be found in the RIO inbox calendar and at the following: http://mod.jsc.nasa.gov/do13/admin/RIO_schedule.xls, which is off the DO International

Liaison home page. See JSC-36399 (Volume O, DO International Liaison Office Handbook) for further explanation of the International Liaison home page.

2.4.1.2 RIO Tag-Up

RIO tag-ups are conducted biweekly to discuss issues involving RIO console support, including (but not limited to) action items, console handbook Change Requests (CRs), mission support, rotation schedule changes, and upcoming activities. The agenda can be found at <http://mod.jsc.nasa.gov/do13/RIO>.

2.4.1.3 RIO Increment Lead

The RIO Increment Lead is a position designed to ease the workload of the on-console RIO, the RIO Lead (RIO Grande), and the HSG-Moscow Increment Lead. The HSG Increment Lead and the RIO Increment Lead switch places during the middle of the increment. During an increment, the RIO Increment Lead performs lead duties in Houston for half of the increment and then travels to Moscow to be the HSG Increment Lead. At the same time, the HSG Increment Lead travels back to Houston and assumes RIO Increment Lead duties.

Some of the RIO Increment Lead duties are to

- a. Attend ISS Mission Management Team (IMMT) and Ops Tag-up meetings, take notes, and distribute internally to DO International Liaison personnel and ISS FD
- b. Attend MER Fault Isolation Teams (FITs) and Anomaly Resolution Teams (ARTs)
- c. Coordinate Generic Joint Operations Panel (GJOP) support
- d. Act as lead for key mission activities and attend relevant meetings (EVAs, software uploads, reboots, Soyuz/Progress dockings)
- e. Coordinate mission-specific TTI translation and interpretation
- f. Coordinate with Spacecraft Planning and Analysis (SPAN) and DA8 on Mission Information System (MIS) (chit, IFI, Anomaly Report (AR)) issues
- g. Coordinate with EVA and VVO on console-sharing plans (according to console-sharing Memorandum of Agreement (MOA))
- h. Archive RIO data (RIO e-mail, SM Detailed Daily Plan (DPP), RIO handovers) at appropriate intervals
- i. Interact with the Russian Segment Support Team (RSST) on a regular basis to resolve issues and improve their effectiveness
- j. Support on-console RIO, as needed
- k. Support lead RIO (RIO Grande), as directed

2.4.1.4 Lead RIO (RIO Grande)

The lead RIO, informally referred to as the “RIO Grande,” coordinates all high-level RIO activities. The Lead RIO does not coordinate key mission-specific activities, which are the responsibility of the RIO Increment Lead.

In the absence of the RIO Increment Lead, the RIO Grande performs and/or delegates Increment Lead duties (described previously), as needed.

Responsibilities of the Lead RIO include

- a. Coordinating generic RIO/HSG with appropriate groups (DO, DF, DA8, ISS Program, ISS MER, etc.)
- b. Ensuring standardization of RIO processes and procedures
- c. Overseeing CR processing for Houston Operations Console Handbook
- d. Coordinating TTI translation and support plans
- e. Coordinating TTI interpreter certifications (requires a Civil Servant (CS) to perform actual evaluation)
- f. Monitoring RIO certification process to ensure that sufficient personnel are available for assignments and RIO rotations
- g. Maintaining RIO rotation schedule in Excel (weekly schedule) and Outlook (daily)
- h. Conducting biweekly RIO tag-ups
- i. Assigning joint Space Transportation System (STS) mission leads with DO International Liaison Manager
- j. Maintaining RIO tag-up Web site with meeting agenda, RIO assignments and rotations, and action items

2.4.2 IP Support Groups

Just as NASA has an HSG at each IP control center, each of the IPs has a support group of their own that is located in MCC-H and is composed of members of the IP FCT. These groups are basically a mirror image of the HSG and perform similar liaison functions.

DO International Liaison personnel in Houston interact with the members of these IP Support Groups. MOD provides these groups with consoles, computers, office space, and other resources. DO International Liaison is the primary interface between these groups and the rest of the NASA team.

The details and procedures for these groups are documented in JSC-36340-A, International Partner (IP) Support Group Console Handbook.

2.4.2.1 Russian Segment Support Team

A team of Russian specialists is located in Houston to fulfill the requirements in Section 4 of the NASA/TTI Russian Language and Logistics Services contract. This contract is designed to enhance operations between MCC-H and MCC-M by providing a consultant team (the Russian Regional Control Group (RRCG)) in MCC-H for real-time operations and a simulation team (the Russian Simulation Execution Team (RSET)) to role-play MCC-M in simulations at Johnson Space Center (JSC). Together, the RRCG and the RSET comprise the RSST.

The NASA Technical Lead for this contract is the DO International Liaison Manager. Questions regarding the work instructions should be addressed to the NASA Technical Lead or his designee. Reference Appendix D, MSG Work Instructions, for more detailed information. Also see SSP-50643-A, OIP NASA/Rosaviakosmos, Section 2.

2.4.2.2 Russian Regional Control Group (PPFY)

The RRCG performs the following tasks:

- a. Tracks execution of the ISS flight program
- b. Monitors the status of onboard systems via telemetry and crew reports
- c. Introduces changes in procedures for control of onboard systems in accordance with current onboard system status jointly with the MCC-M
- d. Monitors planning and command program control of ISS flight
- e. Conducts medical monitoring of the mission
- f. Monitors important operations on the ISS RS or USOS with the participation of ISS operation support groups
- g. Provides consultation on RS operations and systems
- h. Monitors functionality of systems and software in the PPFY data computer complex at MCC-H
- i. Serves as a Backup Control Center-Russia (BCC-R) for MCC-M

2.4.2.3 RRCG Positions

The RRCG usually comprises the following:

- a. One certified CPΠ
- b. Two planning specialists
- c. One Gagarin Cosmonaut Training Center (GCTC) medical specialist
- d. One IBMP medical specialist
- e. One ground system specialist
- f. Two integrated systems specialists from the following areas: motion control, onboard complex control system, ballistics, and math modeling
- g. One integrated systems specialist from the following areas: life support, electrical power, and thermal

2.4.2.4 RRCG Schedule

RRCG tours of duty are usually no shorter than 3 months. The rotation schedule usually accommodates a maximum of 1-week handover between RRCG teams and specialists.

The RRCG usually covers two shifts of ISS Increment real-time operations when the crew is awake. Each shift should include a representative from the CPΠ/ΠΠΠ group, a planner, and system support. Weekend support is required only when the weekend day is a crew workday or a shuttle docked day.

The shift support times for the GCTC and IBMP medical support specialists are determined by the U.S. and Russian medical teams.

The RSST covers 24 hours daily from shuttle launch to shuttle undocking for joint shuttle/ISS missions. This may require using RSET personnel to support the RRCG during joint shuttle/ISS flights.

2.4.2.5 RSET

The RSET is contracted (according to the MSG Work Instructions) to act as MCC-M only during ISS stage and joint ISS/shuttle simulations at MCC-H.

The support for any one simulation usually includes

- a. CPΠ or ΠΠΠ (Assistant Shift Flight Director), Glavni operator
- b. Specialist from one of the following areas: motion control, onboard complex control system, life support, electrical power, and thermal

The RSET usually provides a specialist to interface with the U.S. team in planning the simulations.

The RSET has the ability to cover up to five simulations per week.

RSET rotations are also no shorter than 3 months. Rotations accommodate a maximum of 1-week handover between RSET teams.

The RSET is collocated with HSG simulation personnel in JSC, building 30.

2.4.2.6 European Columbus Management Group

The main responsibility of the European Columbus Management Group (ECMG) is to provide consultation and represent the position of COL-CC in Houston. Nominally, the ECMG staffs the ESA Support Room (ESR) during normal Houston business hours and the majority of the crew workday (~0600 to 2200 Greenwich Mean Time (GMT)). However, onboard activities and the crew schedule may cause these times to be deviated. (See SSP-50643-D, OIP NASA/ESA (Columbus), Section 2). The ECMG, as a group, performs the following functions:

- a. Provides ISS Program Office and MOD support (including IMMT, Mission Management Team (MMT), Canadian Joint Operations Panel (C-JOP), and other technical meetings)
- b. Monitors onboard operations based on telemetry received from MCC-H, COL-CC, and crew reports
- c. Monitors and provides interface support during communication passes with ISS/Columbus
- d. Interfaces with telemetry analysis and engineering support experts at MCC-H and COL-CC
- e. Supports ISS planning with respect to Columbus requirements and constraints
- f. Interfaces with OPS PLAN (at MCC-H) and Columbus Ops Plan (COP) at COL-CC
- g. Supports flight-critical operations on ISS Columbus and USOS with the involvement of ISS operations support groups, in particular
 1. Columbus module assembly, activation, and checkout activities
 2. EVAs related to Columbus
- h. Monitors the status and operational conditions of the ESA Manned Space Mission (MSM) Ground Segment (GS) technical assets and software, including the ESA relays, COL-CC, and MSM GS Interconnected Ground Support (IGS)

- i. Carries operations documentation of the group
- j. Provides interfaces with ESA crew medical support personnel at the COL-CC and/or European Astronaut Center (EAC)
- k. Reviews NASA-provided Columbus databooks, Columbus display reference guides, and multisegment Station Operations Data File (SODF)

2.4.2.7 ECMG Positions

TBD

2.4.2.8 ECMG Schedule

TBD

2.4.2.9 ECMG Simulation Team

TBD

2.4.2.10 Tsukuba Support Group

The Japanese team in Houston is the TSG. The TSG, located in MCC-H, is responsible for supporting the JFCT by providing clarifications, consultations, and interpretations of ISS and JEM system operations and assisting in data exchange between the ISS FCT and the JFCT. The TSG is not authorized to make decisions regarding JEM operations.

The TSG participates in MCC-H discussions on joint ISS operations and relays information that may impact JEM operations to the JFCT. (See SSP-50643-C, OIP NASA/JAXA, Section 2.)

2.4.2.11 TSG Positions

TBD

2.4.2.12 TSG Schedule

TBD

2.4.2.13 TSG Simulation Team

TBD

2.4.3 Office

All DO International Liaison personnel also have many administrative duties outside the control center. The various procedures, POCs, forms, and protocols for the office environment are documented in JSC-36340-O, International Liaison Office Handbook. The latest version can be found at the DO International Liaison Web site, <http://mod.jsc.nasa.gov/do13/>. Badging, obtaining access to various computer systems,

office resources, time cards, and travel planning are just some of the topics covered in Volume O.

2.4.3.1 DO International Liaison Manager

The DO International Liaison Office Manager is responsible for managing International Liaison personnel, as well as the various personnel temporarily assigned to International Liaison functions at one of the remotely located HSGs in the IP control centers. The International Liaison Office Manager is responsible for overseeing several contracts for the MOD, including the work performed by United Space Alliance (USA)/Barrios employees under the Space Flight Operations Contract (SFOC), and work performed by Tech Trans International (TTI) employees under the International Mission Integration Contract. There are several other tasks and responsibilities that are covered in the DO International Liaison Office Handbook. The DO International Liaison Manager reports directly to the DO3 International Operations and Procedures Branch Chief.

2.4.4 Interpreters

The interpreters provide interpretation and translation services between English and the primary languages used at the IP control centers (predominantly Russian for now). They perform the following duties and are under the direction of the Operations Lead or RIO, depending on their location:

- a. Provide continuous around-the-clock interpretation on various voice loops
- b. Provide post-pass debriefs after Russian ground site passes
- c. When needed, interpret internal IP FD loop conversations
- d. When requested by an Operations Lead or RIO, provide oral or typed English translation of the communications
- e. If needed, transcribe summaries of foreign language Air-to-Ground (A/G) conversations into written English
- f. Perform interpretation for general and discipline-specific discussions, both in person and in teleconferences
- g. Cross-train to support any interpretation area, such as ODF translation, EVA, PAO, planning, systems, payloads, system administrator, and medical operations
- h. Be proficient in the use of Microsoft Word, with basic knowledge of other Microsoft Office products, including Outlook, PowerPoint, and Excel
- i. Perform translation of, but not limited to, the following: RODF, Flight Rules, OIP, PPCRs, databooks, timelines, consumable reports, radiograms, memos, faxes, and telecon material, including agenda and presentations

- j. Occasionally travel to other IP facilities outside the IP control center to support the HSG

The details and procedures for interpreter functions are documented in JSC-36340-T, MCC-M Interpreters Console Handbook.

2.4.4.1 TTI Houston Office and Onsite Specialists

TTI is the contractor responsible for Russian interpretation and translation. They also assist with Visa processing and accommodating visitors to Moscow. The TTI Houston office staff is composed of the DO International Liaison TTI Administrative Logistics Specialist. The TTI main office address and contact information is provided below for reference:

2200 Space Park
Suite 410
Houston, TX 77058
Phone: 281-335-8000
Fax: 281-333-4396
TechTrans@TTI-Corp.com
<http://www.tti-corp.com/>

2.4.4.2 RRCG Interpreter

MCC-certified interpreter support is required Monday through Friday, for two shifts/day and on weekends and holidays for one shift/day for normal operations. Additional support may be required outside these hours in the event of off-nominal activities. Interpretation for the RRCG is done as consecutive interpretation. Major tasks are supporting discussions between the RRCG and RIO, FD, Ops Plan, and other specialists; translating the RS Daily Status Report; and interpreting FCT handover.

For joint ISS/shuttle, MCC-certified interpreter support is required at Launch (L) – 2 hours and continues 24 hours a day (three shifts) until the shuttle final separation burn on undocking day. Interpretation for the RRCG is done as consecutive interpretation.

2.4.4.3 Space-to-Ground Interpreters

S/G certified interpreter support is required every day, except crew days off, for two shifts/days during crew wake hours for nominal operations. Interpretation of the S/G is done as simultaneous interpretation.

For joint ISS/shuttle missions, S/G certified interpreter support is required every day, including weekends and holidays, for two shifts/day (16 hours) during crew wake hours for normal operations. S/G certified interpreter support is required on the shuttle-docking day from the end of post-sleep until the combined S/G and A/G is configured. Interpretation of the A/G is done as simultaneous interpretation.

2.4.4.4 Execute Package Translation

MCC-certified interpreter support is required Monday through Friday, 9:30 a.m. to 5:30 p.m., and on weekends and holidays, 10 a.m. to 5:00 p.m., Houston time, for daily translation of the Execute Packages (i.e., radiograms). HSG interpreters or the International Execution Planning Conference (IEPC) interpreters provide additional Execute Package interpretation for surge periods, identified as follows:

- a. Russian EVA Ops: Depending upon projected workloads, No Later Than (NLT) 1 week before to the day of the EVA
- b. Soyuz Ops: From 1 week before launch to the day of undocking
- c. Progress Ops: Two days before launch to docking
- d. Shuttle Ops: From the day of launch to the day of undocking

HSG interpreters and TTI-Houston office handle occasional overflow.

2.4.4.5 Timeline Translation

MCC-certified interpreter support is required Monday through Friday, 8:30 a.m. to 5:30 p.m., Houston time, for translation of planning products and interpretation support of planning telecons in the Increment Execute Planning Team (IEPT) room. The Increment Execute Planning Center (IEPC) interpreter provides Exec Package translation Quality Check (QC) and is available for Executive Package translation surge support when no rush IEPT jobs are pending.

2.4.4.6 ISS Mission Management Team Teleconference Support

MCC-certified interpreter support is required before 1 hour IMMT and continues until the IMMT Chairman releases the interpreter. Additional United States (U.S.)/Russian tag-ups may be requested at the Chairman's discretion. These usually occur immediately before or after the IMMT. Interpretation of the IMMT is done as consecutive interpretation.

2.4.4.7 ISS EVA CAPCOM Support

MCC EVA-certified interpreter support is required to talk directly with cosmonaut EVA crewmembers during EVAs, as required by the FD. The interpreter sits at the CAPCOM console from the start of EVA prep through the end of post-EVA, as requested by the FD. Support on other flight days (e.g., Extravehicular Mobility Unit (EMU) checkout) may also be requested. The same interpreter(s) support crew training sessions in the Neutral Buoyancy Laboratory (NBL) and vacuum chamber, as well as simulations (sims) with the FCT in MCC.

2.4.4.8 RIO

For joint ISS/shuttle support, MCC-certified interpreter support is required for the docking and undocking shifts. This function should be staffed to provide voice loop support and peer QA. Interpretation for the RIO is done as consecutive interpretation.

2.4.4.9 Sims with RSET/Russian Segment Instructor (RSI) Participation

a. RIO support (for sims with RIO participation)

MCC basic-trained interpreter (for generic sim) or MCC-certified interpreter (for flight-specific sim) support is required at sim – 0.5 hour and continues until released by the RIO. For sims longer than one shift, interpreter support is required for each shift, because it may be required to support voice loop teleconferences with other specialists. Interpretation for the RIO is done as consecutive interpretation. For docking/undocking sims, the interpreter should sit at the RIO console. For all other sims, the interpreter should sit at the HSG console and also provide interpretation between HSG and the RSET.

b. FD support (for sims without RIO participation for interpretation between the SRP and the FD)

MCC basic-trained interpreter (for generic sim) or MCC-certified interpreter (for flight-specific sim) support is required at sim – 0.5 hour and continues until released by the FD. For sims longer than one shift, interpreter support is required for each shift, because it may be required to support voice loop teleconferences with other specialists. Interpretation for the FD is done as consecutive interpretation.

c. CAPCOM support (interpretation between CAPCOM and Glavni operator)

MCC basic-trained interpreter (for generic sim) or MCC-certified interpreter (for flight-specific sim) support is required at sim – 0.5 hour and continues until released by the CAPCOM. For sims longer than one shift, interpreter support is required for each shift. Interpretation for the CAPCOM is done as consecutive interpretation. This interpreter also provides interpretation between HSG and the RSET for dock/undock sims and sims without RIO.

d. Sim real-time interpretation of S/G

MCC basic-trained interpreter (for generic sim) or MCC-certified interpreter (for flight-specific sim) support is required at sim – 0.5 hour and continues until released by the FD or RIO. Interpretation is required for all operations during crew wake periods. Interpretation of the sim S/G is done as simultaneous interpretation.

2.4.4.10 Sims Without RSET/RSI Participation (Houston Support)

a. RIO support (for sims with RIO participation)

MCC basic-trained interpreter (for generic sim) or MCC-certified interpreter (for flight-specific sim) support is required at sim – 0.5 hour and continues until released by the RIO. For sims longer than one shift, interpreter support is required for each shift. Interpretation for the FD is done as consecutive interpretation.

b. FD support (for sims without RIO participation)

MCC basic-trained interpreter (for generic sim) or MCC-certified interpreter (for flight-specific sim) support is required at sim – 0.5 hour and continues until released by the FD. For sims longer than one shift, interpreter support is required for each shift. Interpretation for the FD is done as consecutive interpretation.

c. Assist NASA specialists in role playing of SRP, PRP, Glavni, or Russian specialists

MCC basic-trained interpreter support is required at sim – 0.5 hour and continues until released by the on-console HSG operator. For sims longer than one shift, interpreter support is required for each shift.

d. Real-time interpretation of S/G

MCC basic-trained interpreter (for generic sim) or MCC certified interpreter (for flight-specific sim) support is required at sim – 0.5 hour and continues until released by the FD or RIO. Interpretation is required only for crew wake periods. Interpretation of the S/G is done as simultaneous interpretation. A dedicated S/G interpreter may be requested only if the Russian crew is not proficient in English.

2.4.4.11 Document Translations

TTI-Houston office translation for real-time documentation (e.g., Flight Rules, OIPs, MCC faxes, etc.) should be provided per FD or RIO request. Requesting translations should be made during office hours at ttidoc-ems.jsc.nasa.gov (TTIDOC on the Global) account.

2.4.4.12 After-Hours Translation and Interpretation Requests

Call the TTI Logistics on-call number, 281-467-0731, for emergency translation and interpretation requests.

2.5 MISSION PHASES AND RESPONSIBILITIES

DO International Liaison personnel have various responsibilities during the various phases of a mission. This section describes those phases and the duties required at those times.

2.5.1 ISS Steady State

For ISS steady state operations, the HSG-Moscow is on console Monday through Friday for Moscow business hours and most of the crew workday. They hand over to the RIO a few hours before crew sleep. HSG-Moscow also works a short shift on the weekend, usually Sunday, to finalize the plan for Monday. RIO typically supports Monday through Friday, from 7:00 a.m. until 4:00 p.m.

In this phase, HSG-Moscow is the primary interface between the two control centers. During Houston hours, the RIO works any items in the handover notes that require resolution before the HSG returns the next morning. The RIO also ensures that the final plans for the next day are in sync.

Interpreters are on duty in Moscow every day of the week, 24 hours/day and provide all voice loop interpretations between the two control centers. They also support conferences between systems specialists and all face-to-face meetings in Moscow. Interpreters are also on duty in Houston to provide interpretation of S/G conversations during the crew day and to translate the Execute Package.

It is envisioned that in the future, when HSG-ESA and HSG-Japan are active, those teams will probably work during their respective business day plus part of the crew day. Each team would hand over to the next team located further west (HSG-Moscow/ESA to RIO to HSG-Japan and then back to HSG-Moscow). Thus, HSG operations would follow IP operations around the world during each day.

2.5.2 ISS USOS EVA

During an ISS USOS EVA, the RIO is the primary interface between Houston and the IP control centers. This applies for both steady state and most assembly flight EVAs. The HSG assists the RIO in performing all the various interface duties. If needed, additional interpreters are on duty in Houston to support voice loop and/or S/G interpretation.

2.5.3 Orlan RS EVA

For an Orlan EVA, the HSG-Moscow is the primary interface between MCC-H and MCC-M. The RIO supports the HSG in performing the interface duties. Additional interpreters who are specialized in Orlan terminology and Russian EVA operations are on duty in Moscow to support whatever interpretation is required during the EVA.

In the future, the RIO will also be the primary interface to ESA and JAXA during any Russian Orlan EVAs.

2.5.4 Shuttle Operations

During a shuttle flight, the RIO is the primary interface between Houston and Moscow. The RIO supports 24 hrs/day from L – 3 hours until the beginning of crew sleep after docking. During the docked phase, the RIO supports during the crew day. The RIO support ends after the undocking and separation burn. The HSG supports

24 hours/day, 7 days/week from launch until undocking and then resumes their normal support.

For Columbus and JEM assembly missions, the Assembly, and Checkout Officer (ACO) is the primary interface between MCC-H and the IP control center responsible for that particular module. The ACO is responsible for coordinating tasks related to assembly, activation, and checkout of that module. The RIO is the primary interface to all IP control centers for rendezvous, docking, and undocking. The RIO is also the primary interface to all the IP control centers, except the one responsible for the primary payload. The HSG supports the RIO and ACO during this phase.

2.5.5 Soyuz Operations

From launch to docking, the RIO is on duty during the entire crew day (two shifts). During the docked portion of the taxi flight, the RIO provides support similar to steady state. Both RIO and HSG support the undocking and landing.

There are also two ballistics specialists: the VVO and the Automated Rendezvous Officer (ARO), who support during this phase. They are from the Flight Design and Dynamics Division (DM) and are experts in the dynamic operations of launch, rendezvous, docking, undocking, and landing. They are also experts on the unique rendezvous and docking systems, such as Kurs and the Russian Manual Remote Docking System (TORU). The VVO works in MCC-H, and the ARO is a member of the HSG. They serve as a direct interface to the IP ballistics specialists for these dynamic operations.

2.5.6 Progress Operations

DO International Liaison support during Progress operations, including launch, rendezvous, docking, and undocking, is generally the same as steady state, but can support off-nominal times during key periods, such as launch and docking. RIO supports during their normal steady state shift, and they are on console for docking and undocking. The VVO and ARO also provide support during critical Progress operations.

2.5.7 ATV Operations

Although HSG and RIO support during this phase is not yet finalized, it may eventually be similar to that provided during Progress operations. During the first few ATV missions, support will likely be significant.

2.5.8 HTV Operations

Although HSG and RIO support during this phase is not yet finalized, it may eventually be similar to that provided during Progress operations. During the first few HTV missions, support will likely be significant.

3.0 ADMINISTRATIVE

This section describes the administrative procedures, products, documentation and other references that are necessary for the Russian Interface Officer (RIO) and other International Liaison personnel to accomplish their duties while on console.

Some International Liaison products are for use by the entire International Space Station (ISS) community. Other products are strictly for International Liaison personnel.

International Liaison console documentation is similar to other disciplines and consists of console logs and handovers, but it is unique in that handovers are passed between internationally distributed teams (RIO and the Houston Support Group (HSG)).

3.1 PRODUCTS

The following products are maintained by International Liaison personnel for console use, including (but not limited to):

- a. Operations Interface Procedures (OIPs)
- b. International Partner (IP) Segment Databooks
- c. Display Reference Guides
- d. Console Handbooks
- e. Training Guides

3.1.1 Operations Interface Procedures

The purpose of the OIP is to document real-time operational interfaces and standard procedures used to exchange information between the Mission Control Centers (MCCs) of the IPs. The document contains the OIPs used by all flight controllers, not just the RIO or HSG. The DO International Liaison organization is the book manager for the entire document.

The Generic OIP (SSP-50643-Generic) defines the procedures that are standard to and that affect the interests of all IPs.

Special procedures regarding MCC coordination with the individual IPs are covered in the IP-specific OIP bilateral documents, Volumes A through E.

- OIP Volume A: NASA/Russia
- OIP Volume B: NASA/Canada
- OIP Volume C: NASA/JAXA
- OIP Volume D: NASA/ESA (Columbus)
- OIP Volume E: NASA/ESA (ATV)/Russia

The latest version of all the OIP documents can be found at the following Web site.
http://mod.jsc.nasa.gov/do13/OIP_Homepage.html.

3.1.2 Databooks

The purpose of a Databook is to provide a systems reference document for flight operations personnel during ISS planning, training, and real-time mission operations. Each Databook typically covers one IP module or vehicle and includes overview and summary level systems information (including operationally pertinent safety data) that is directly applicable to the Mission Operations Directorate (MOD) role during assembly and steady state mission operations. They also contain detailed systems information in those areas that are deemed to be necessary.

The existing Databooks are as follows:

Service Module (SM)	JSC-36460
Functional Cargo Block (FGB)	SFOC-FL1884
Docking Compartment (DC)	JSC-36452
Soyuz/Progress	JSC-36468
Automated Transfer Vehicle (ATV)	JSC-36507

The Databooks for Columbus and the Japanese Experiment Module (JEM) will be produced approximately 1 year before their respective launch dates. The latest version of all the Databooks can be found at the following Web site:
<http://mod.jsc.nasa.gov/do13/>.

3.1.3 Display Reference Guide

The purpose of the Russian Segment Display Reference Guide (JSC-36472) is to provide a MCC-Moscow (MCC-M) display reference document for the National Aeronautics and Space Administration (NASA) flight operations personnel based in Moscow. The document is a guide to Russian Segment telemetry display data, otherwise referred to as "X Terms." The displays, or frames, are grouped by system or functional set and are supplied with line numbers and text explaining the various parameters.

The latest version of the Russian Segment Display Reference Guide can be found at the following Web site: <http://mod.jsc.nasa.gov/do13/>.

It is possible that display guides for the Columbus or the JEM will be required at some time in the future. If so, they will be available at the same Web site.

3.1.4 Training Guide

There are two training guides for International Liaison personnel. The HSG Certification Guide (JSC-36373) is for HSG and RIO personnel. The Interpreter Training and Certification Guide (JSC-36455) is for use by interpreters. Each guide serves three important functions. First, it introduces the training program. Second, it defines the

requirements leading to certification for each assigned position. Finally, it provides each flight controller with a personal record of their job-related training.

The latest version of the training guides can be found at the following Web site:
<http://mod.jsc.nasa.gov/do13/>.

3.1.5 Console Handbooks

Console Handbooks are described in Section 1 of this document.

3.2 CONSOLE DOCUMENTATION

During the course of an on-console shift (real time or sim), several different forms of documentation are used. The RIO uses a console log, a handover, and the RS Daily Status, and all these items must be archived.

3.2.1 Console Log

The RIO console uses an electronic log. This is a Word document with macros that allow for a Greenwich Mean Time (GMT), Simulated Greenwich Mean Time (SGMT), or Mission Elapsed Time (MET) stamp. This is very useful for tracking items that need to be placed in a handover or just for general mission awareness. The RIO console log template is kept on the S: drive at: \\Jsc-mod-fs3\world\Divisions\Do\Shared to World\DO13\Console Log Template. The running log is saved on the RIO V: drive. The procedures for maintaining a console log can be found in JSC-29229, ISS Flight Controllers Operational Handbook (FCOH) at http://mod.jsc.nasa.gov/DA8/FCOH/iss_fcoh/Section 02/iss_2_1.doc.

Per the ISS FCOH, the console log is to be archived electronically (unless handwritten on MCC console log paper), printed after each shift, and signed by the console operator. The printed version of the log is then filed in a binder on the RIO shelf. To print only the new items that have been entered for the day, highlight from the on console entry to the off console entry, click file, and print. When the Print window opens, click on the radio button next to Selection. See Figure 3-1 of a print window for an example.

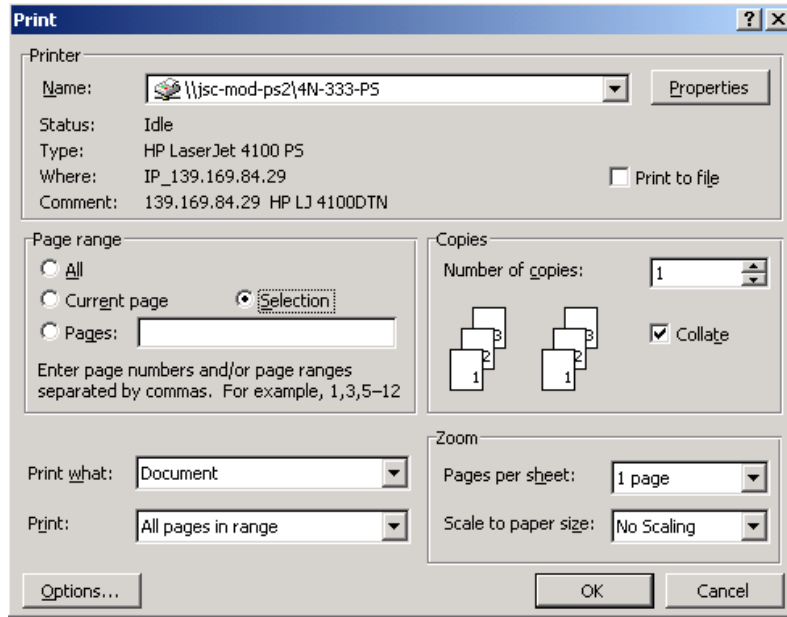


Figure 3-1. Microsoft Word print window

3.2.2 Handovers

RIO shares handovers with the HSG. Because the HSG is currently the primary user and beneficiary of the handover, the procedure for writing handovers is kept in the HSG Moscow Operations Console Handbook (JSC-36340). For all details, including how to make updates properly and submitting handovers to the HSG Daily News page, refer to this document. This procedure may be moved into the MOD International Liaison Console Handbook Generic and RIO Operations at a later date.

RIO stores a copy of the handover on the V: drive and archives it on disc media when necessary.

The general procedure for items that a flight controller should include in a shift handover is found in the ISS FCOH at http://mod.jsc.nasa.gov/da8/FCOH/iss_fcoh/Section 02/iss_2_2.doc.

3.2.3 RS Daily Status

At the end of each day, the Russian Regional Control Group (PPFY) submits to the RIO the Russian Segment (RS) Daily Status report. This is a translated version of a report that is sent from MCC-M to the Russian Regional Control Group (RRCG). This report is sent out via e-mail at the same time as the RIO handover. The report is in tabular format. The first column is the system/parameter. The second column is the status/value. The third column is for notes. An example of a subsection of the table is shown in Table 3-1.

Table 3-1. RS daily status example

System, parameter	Status, value	Notes
RS modes and operations		
RS mode	Standard	
Primary operations	Nominal attitude	
БИНС basis correction/alignment	Four periodic corrections (БОКЗ)	
Upper Tier (BY) issues	None	
Propellant consumption per Onboard Control System (БКУ) data		
GDOS	534.224 kg	
Delta GDOS	0 kg	
ГКДС	343.182 kg	
BROT	564.224 kg	

3.2.4 Russian Segment Knowledge Base

The RS Knowledge Base (KB) is a means of keeping a history of failures, maintenance, repair, and key operations performed on the RS. It is expected that this capability will be expanded to the other IP segments and visiting vehicles. All RIO and HSG personnel are required to keep the KB accurate and up to date.

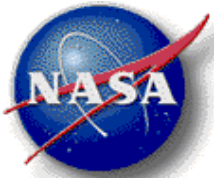
For details on how to use the RS KB, refer to Section 4 of this document.

3.3 CONSOLE ADMINISTRATIVE PROCEDURES

3.3.1 Delegation of Authority Memo

During the time when a RIO Increment lead is handing over to a new RIO lead, a delegation-of-authority letter must be written identifying the new RIO lead (refer to Figure 3-2). This is done formally by submitting a letter to the following (names used are examples only):

Lead Increment Flight Director	M. Abbott
DO Division Chief	L. Davis
DO International Liaison Office Manager	T. Baum



DATE: MM/DD/YY

TO: M. Abbott, Lead ISS Increment Flight Director
L. Davis, Operations Division Chief
T. Baum, International Liaison Office Manager

FROM: (name of RIO Increment lead)
Remote Interface Officer lead

SUBJECT: Delegation of Authority

Beginning DD MM YYYY, the RIO Increment lead operations responsibility will be performed by Mr(s). _____. I would like to thank you and your team for your outstanding support during my tour and look forward to working with you in the near future. Mr(s). _____ can be reached at _____.

Thank You,

(Signature)
Remote Interface Officer (RIO) lead

Figure 3-2. Delegation of authority memo example

3.3.2 RIO Parking

The RIO console position has two reserved parking spaces outside building 30. The space is located in the parking lot on the west side (toward JSC building 17). It is in the second row from the security building.

If someone is parked in the space, please call JSC security at x36458.

Figure 3-3 shows the parking layout. Building 30 is on the right-hand side of the page.



Figure 3-3. Building 30 parking layout

The on-shift mission operations RIO (not simulation RIO) has priority over other International Liaison personnel for the space. Building 30 (MCC) is on the right hand side of this page.

To signify that your car is allowed to park in the RIO space, print out the sign shown in Figure 3-4 (if one of the laminated versions cannot be attained) and place it in an obvious place where it can be seen from the outside (dashboard, hung from the rear view mirror, etc.).



Figure 3-4. RIO parking space identifier

3.3.3 Console Library Maintenance

There are numerous hard copy books for console at the RIO Red Flight Control Room (RFCR), RIO Blue Flight Control Room (BFCR), and HSG sim areas. When the ISS Flight Control Team (FCT) transfers to the White Flight Control Room (WFCR), the RIO must move the most important and useful documents and store them in the cabinets behind the MOD console (not on the console itself).

Periodically, preferably once a month, the lead RIO should audit the documentation in order to ensure that it is current. The audit should appear similar to what is shown in Table 3-2 (bold type shows those documents needing updates). This example shows the books that the RIO should have on console. When the audit is complete, the results should be e-mailed to the International Liaison Logistics manager.

Table 3-2. RIO console library audit example

Book	Version on console	Current published version
	SODF	
EMERGENCY	16 JUL 04	16 JUL 04
Warning	13 SEP 04	13 SEP 04
Caution	17 SEP 04	17 SEP 04
ISS/Shuttle Joint Ops	04 AUG 03	01 OCT 04
Assembly Ops		Not needed until LF-1.1
Robotics Flight Supplement (FS)	22 OCT 02	
EVA Checklist	10 JAN 03	10 JAN 03
ISS EVA Tasks		29 JUL 02
	FDF	
RNDZ		Not needed until LF-1.1
PDRS FS		Not needed until LF-1.1
EVA FS		Not needed until LF-1.1
	RODF	
FGB Systems Ops	01 OCT 98	30 MAR 04
FGB IFM	12 MAY 04	12 MAY 04
FGB IFM Appendix 1	MISSING	2 DEC 03
EVA from ПxO	15 SEP 00	15 SEP 00
EVA from DC1	15 JAN 04	01 JUL 04
Orlan Ops	10 FEB 04	25 AUG 04
Orlan Ops Appendix	01 JUN 02	01 JUN 02

Table 3-2. RIO console library audit example (continued)

Book	Version on console	Current published version
IRS Act/Deact	15 AUG 01	20 SEP 04
COGC	15 FEB 02	20 SEP 04
Auxiliary Computer Systems	20 OCT 00	23 JAN 03
PTK	28 FEB 02	12 MAR 04
SM Fire Protection (СППЗ)	MISSING	20 SEP 04
SM Pressure Control and Atmosphere Monitoring System (СКДС)	MISSING	20 SEP 04
SM IFM IVA General Guidelines and Standard Ops Ref Manual	25 APR 02	15 JUL 04
SM IFM IVA Installation Operations	MISSING	10 APR 04
SM IFM IVA – Removal and Replacement Tasks	MISSING	15 MAY 04
Laptop Formats	01 OCT 00	01 OCT 00
COЖ	05 FEB 02	12 JUL 04
Med Ops Book 1	14 NOV 01	30 JAN 04
Med Ops Book 2	15 JAN 02	30 JAN 04
СУДН	30 SEP 01	30 SEP 01
БВС	20 NOV 01	20 NOV 01
PCY	20 APR 02	01 SEP 04
COTP	30 MAR 04	30 MAR 04
Video and Audio	03 JUN 02	19 APR 04
SM Photo Equipment	MISSING	15 OCT 02
СЕР	20 JAN 01	20 MAR 03
DC-1 IFM IVA	MISSING	02 DEC 03
	Flight Rules	
Vol. A	Final, PCN-2, Errata 25 JUN 04	Final, PCN-2, Errata 2 5 JUN 04
Vol. B	Final, PCN-3 05 OCT 04	Final, PCN-3 05 OCT 04
Vol. C	Final, PCN-4, Errata 19 DEC 03	Final, PCN-4, Errata 19 DEC 03

Table 3-2. RIO console library audit example (concluded)

Book	Version on console	Current published version
Vol D	Final 09 OCT 01	Final 09 OCT 01
E10 FS Rules	MISSING	Final 29 OCT 04
	OIP	
Generic	June 2003	June 2003
Vol. A	June 2003	June 2003
Vol. B	MISSING	July 2004
Vol. E	Feb 2004	
	Data Books	
FGB	MISSING	01 OCT 01
SM	Final, CPN-3 24 FEB 04	Final, CPN-3 24 FEB 04
DC1	Basic, CPN-1 18 DEC 01	Basic, CPN-2 26 JUL 04
Soyuz/Progress	18 OCT 02	18 OCT 02
	Other	
BCC Handbook	23 MAY 03	30 MAR 04
SSSH	Rev. G, DCN-1 15 SEP 03	Rev. G, PCN-1 15 SEP 03
ISSSH	Basic, Rev C, PCN-1 16 JAN 04	Basic, Rev C, PCN-1 16 JAN 04

3.3.4 HSG Insignia

There is currently no designated patch for the International Liaison Office or RIO, but the HSG symbol is often used as the de facto insignia for all MOD International Liaison personnel.

HSG insignia description: The HSG emblem is elliptical, the true shape of the orbit of the ISS. The inner ellipse, which is touched by the silhouette of the ISS, represents the ISS on orbit. The orange symbols representing the two ISS primary control centers, Mission Control Center-Houston (MCC-H) and Центр Управления Полётам-Москва (ЦУП-М), are located at each focus of the orbital ellipse. These symbols, and their locations, represent the two control centers as the focal points for conducting ISS operations. The mathematical integral symbol represents the major function of the HSG, to provide operational integration between the two primary ISS control centers. The seven stars are a tribute to the invaluable experience gained by members of the HSG during the seven increments of the NASA-Mir program. The ribbons of the U.S.

and Russian national colors terminate into gold stars, which represent the FCTs of MCC-H and ЦУП-М. Each star is connected with both ribbons of national colors to symbolize the international cooperation between the two FCTs. The English and Russian titles “ISS HOUSTON SUPPORT GROUP” and “ХЬЮСТОНСКАЯ ГРУППА УПРАВЛЕНИЯ МКС” span across the upper and lower halves of the ellipse to symbolize the contribution of the HSG interpreters to our mission success. The HSG emblem is shown in Figure 3-5.



Figure 3-5. HSG emblem

3.3.5 How To Obtain Headsets

The United Space Alliance (USA) logistics management organization is responsible for the issue, receipt, maintenance, and inventory of headsets and other devices used by MOD and the USA organizations.

The Automated Logistics Management System (ALMS) maintains inventory management of these devices. This includes ensuring that adequate spares/parts are on hand to meet projected needs. Budgeting should be included in the USA logistics budget submittals.

The issuing of, turn-in, and maintenance for this equipment are at the substore in building 5 (room 1006). Emergency replacement of defective headsets is obtained through the Facility Operations Manager (FOM) in the MCC (room 111). The user shall give the defective unit to the FOM at the time of the replacement.

New issues must be approved by the requester's branch chief (NASA) or department manager (USA). Once issued, these devices become an accountability item for the receiver and must be turned in before terminating employment. Each device has an equipment identification number by which they are tracked.

3.3.5.1 Procedures

a. New issue

1. Requester obtains branch chief (NASA) or department manager (USA) concurrence on NASA Form 1348 or USA Form USA 3977-H and submits to the substore.
2. Substore personnel enter appropriate data into the ALMS.
3. Requester signs inventory transaction form and is issued headset.

b. Return

1. Submit headset to the substore.
2. Obtain turn-in receipt from substore personnel.
3. Substore personnel enter appropriate data into ALMS.

c. Maintenance

1. Headsets requiring maintenance are submitted to the substore.
2. Turn-in for maintenance results in issuance of another headset (if required). Inventory transaction forms must be completed, as is done for a new issue.
3. During support periods, emergency maintenance of a headset device may be obtained through Houston Voice.

3.3.6 MCC Badging and Security Procedures

Scope

The area of building 30 that contains the MCC is considered a Controlled Access Area (CAA). To have access to the building 30 MCC, all employees are required to accomplish certain tasks and follow stringent security procedures. This section gives employees a reference for understanding these tasks and procedures.

Access to Controlled Access Areas

Access to a CAA is restricted to personnel who have an official need for entry and possess a NASA or Johnson Space Center (JSC) badge that has been encoded for CAA access. Two types of CAA cards are issued at the badge office in building 30,

a permanent CAA card (greater than 1 year) and the temporary CAA card (less than 1 year). To obtain CAA access, all employees are subjected to a background investigation performed by the U.S. Government.

CAA Investigative Requirements

To obtain nonescorted permanent or nonescorted temporary access to the MCC, the employee's company must submit a JSC Form 234a (JSC Screening Request/Approval Form) to JSC Personnel Security in building 419. The employee does not complete the JSC Form 234a; his/her company Facility Security Officer (FSO) completes the form. This form initiates a National Agency Check (NAC) background investigation. This investigation must be completed before an employee is allowed permanent or temporary access to the MCC. However, while an employee is waiting for the completion of the NAC investigation, he/she can apply for an escort-required badge that allows them escorted access to the MCC. The NAC investigation typically takes between 90 and 180 days and has been known to take up to 1 year. Most employees are issued an escort-required badge during the investigation timeframe.

Requirements for CAA Card Types

An employee must have a permanent JSC badge and a completed or interim NAC investigation to receive permanent access to CAAs. Only U.S. citizens and foreign astronauts are issued permanent JSC badges; therefore, non-U.S. citizens, including those designated as foreign representatives or permanent resident aliens, are not allowed permanent access to CAAs. Any employee can be issued temporary CAA access, as long as they have a JSC badge and have completed an interim NAC investigation.

To obtain an escort-required badge, an employee needs only to possess a JSC badge.

Processing for a CAA Card

Once an employee is identified as one who requires MCC access, the employee's supervisor must notify the FSO. The FSO then initiates the NAC investigation and completes JSC Form 722 (Controlled Access Area Card Request). This card must be initialed and signed by the sponsor, approving official, and escorter (for escort-required access only). The sponsor, approving official, and escorter are all onsite JSC employees who have access to the MCC. The FSO is responsible for obtaining these signatures. This process is usually transparent to the employee.

When the signatures are obtained, the FSO contacts the employee to let him/her know that JSC Form 722 has been completed. The employee is directed to the security office in building 30 where his/her badge is encoded with permanent or temporary CAA access. Once encoded with permanent or temporary access, the employee can use the card reader to access the MCC. If the employee was processed for escort-required access, they will have to follow different procedures for accessing MCC.

Escort-Required Procedures

The FSO notifies employees when they have been granted escort-required access to the MCC. The employee is directed to the security office in building 30 to pick up the escort-required badge. The employee should treat the escort-required badge with the same safeguards as the JSC badge. The employee must contact his/her escort before entering the MCC. Once inside, the employee must properly display both the JSC badge and the escort-required badge. Also, while being escorted into the MCC, the employee must remain with the escort at all times until leaving the controlled area.

Security Rules

A person issued a JSC badge or CAA card is responsible for ensuring that reasonable protection is afforded to minimize the loss and/or false use of the badge/CAA card by taking the following actions:

- a. Immediately reporting the loss and/or false use of a badge/CAA card to the JSC Security Office and the employee's Security Manager.
- b. Promptly notifying the JSC Security Office of any name change or a major change in physical appearance.
- c. Properly displaying the badge/CAA card for official identification purposes and at all times while on site at JSC.
- d. Surrendering the badge/CAA card upon termination of employment or when no longer needed.
- e. If the JSC badge stops working in the card readers, report to the security office in building 30. They can properly identify the status of the badge.

3.3.7 RIO Lockers

RIO lockers are available in building 30 for the storing of RIO items, such as headsets. The lockers are located just outside the PPGY room.

Assignments should be as follows:

RIO locker assignments

Locker no. 61: Last name starts with A-J

Locker no. 62: Last name starts with K-P

Locker no. 63: Last name starts with Q-Z

RIO lockers are located to the left of the PPGY front door, on the top row.

Combinations

No. 61: see Lead RIO

No. 62: see Lead RIO

No. 63: see Lead RIO

3.3.8 Archiving Files from the RIO Console

Periodically, files must be archived, due to limited space on the V: drive and e-mail servers. Use the following method to place files in archive:

1. Write e-mail files, V: drive files (logs, handovers, etc.) to a CD.
2. Label the CD clearly.
3. Store the CD in the International Liaison Office Manager's cabinet in room 333B.

3.3.9 Obtaining a DEC-Alpha Account

A Digital Equipment Corporation (DEC)-Alpha account is obtained using a Computer Access Request (CAR) form (JSC Form 237). This form can be accessed from the International Liaison Web site, Group Administrator or IP Facility Coordinator.

When completing the form, do the following:

1. Complete the top portion of the form, items A1 through A4.
2. Under A5, enter "MCC-H/RIO, HSG, Houston Support Room (HSR)/HSG."
3. Under A6, enter "To perform duties as flight controllers in support of ISS."
4. Deliver the hard copy to the DO International Liaison IP Facility Coordinator, who will obtain signatures from the proper individuals.

4.0 TOOLS

4.1 DEC APPLICATIONS AND DISPLAYS

Digital Equipment Corporation (DEC)-Alpha is a term that refers to the computer workstations that are connected to the MCC Operations Local Area Network (LAN). They are used to view spacecraft telemetry and to send commands to spacecraft. Although the computers that are used to perform these tasks are no longer of the DEC-Alpha brand, the informal name is still commonly used.

4.1.1 DEC-Alpha Workstation Initialization

The International Space Station (ISS) Flight Controllers Operational Handbook (FCOH) defines the procedure for logging into the DEC Alpha client workstations. This procedure can be found at [http://mod.jsc.nasa.gov/da8/FCOH/iss_fcoh/Section 12/ISS 12 1.doc](http://mod.jsc.nasa.gov/da8/FCOH/iss_fcoh/Section%2012/ISS_12_1.doc).

4.1.2 Telemetry Displays

All telemetry displays used in the Mission Control Center (MCC) are called from the Display Navigation (DNAV) menu. The Russian Interface Officer (RIO) DNAV is shown in Figure 4-1.

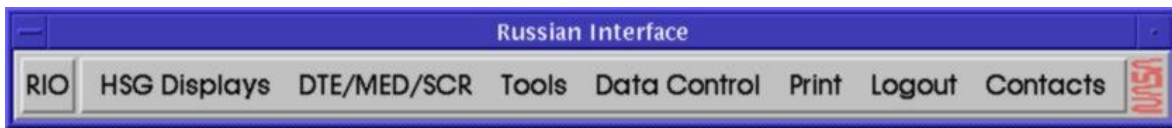


Figure 4-1. RIO DNAV menu

4.1.2.1 Common Displays

The **RIO** button is used to toggle between the Master and RIO DNAVs. The **HSG Displays** (Houston Support Group Displays) pulldown menu is shown in Figure 4-2, the Data Terminal Equipment/Manual Entry Device/Strip Chart Recorder (**DTE/MED/SCR**) pulldown in Figure 4-3, **Tools** in Figure 4-4, **Data Control** in Figure 4-5, and **Print** in Figure 4-6. These figures are shown only as examples. The menus are subject to change from time to time.

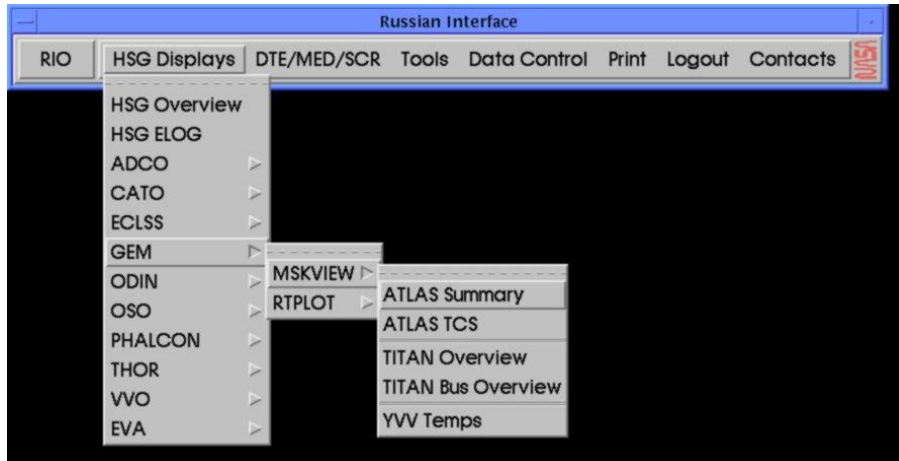


Figure 4-2. HSG Displays menu

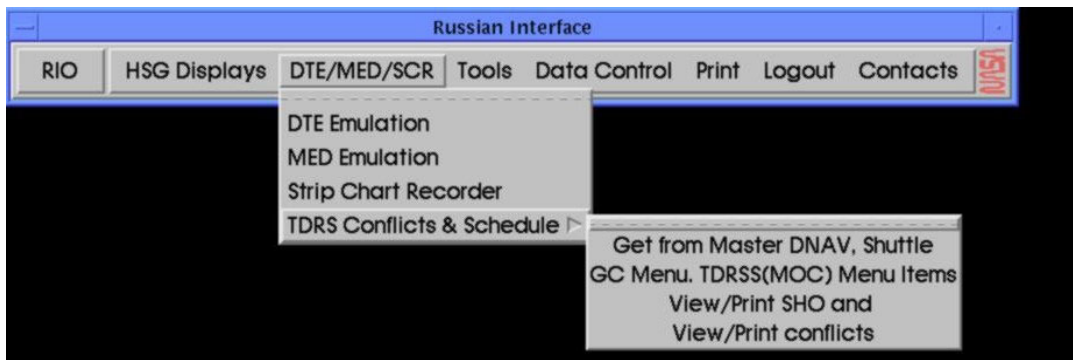


Figure 4-3. DTE/MED/SCR menu

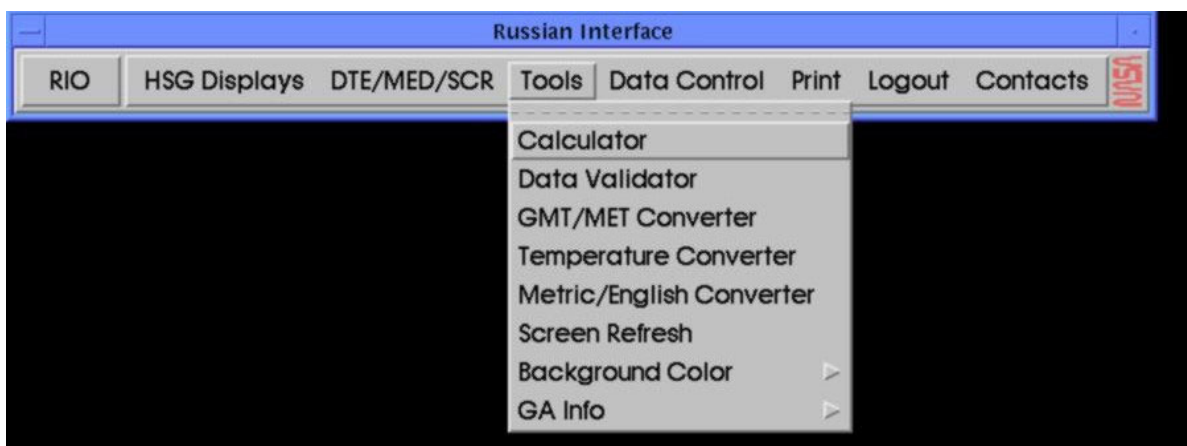


Figure 4-4. Tools menu

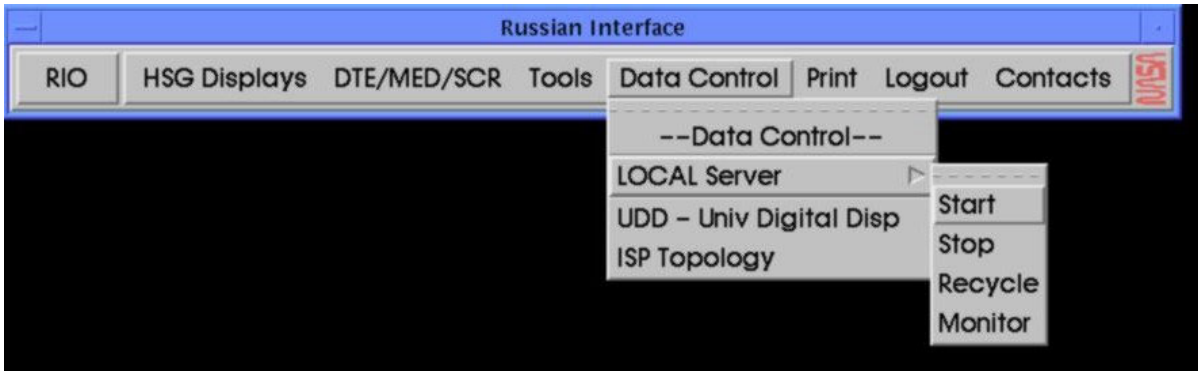


Figure 4-5. Data Control menu

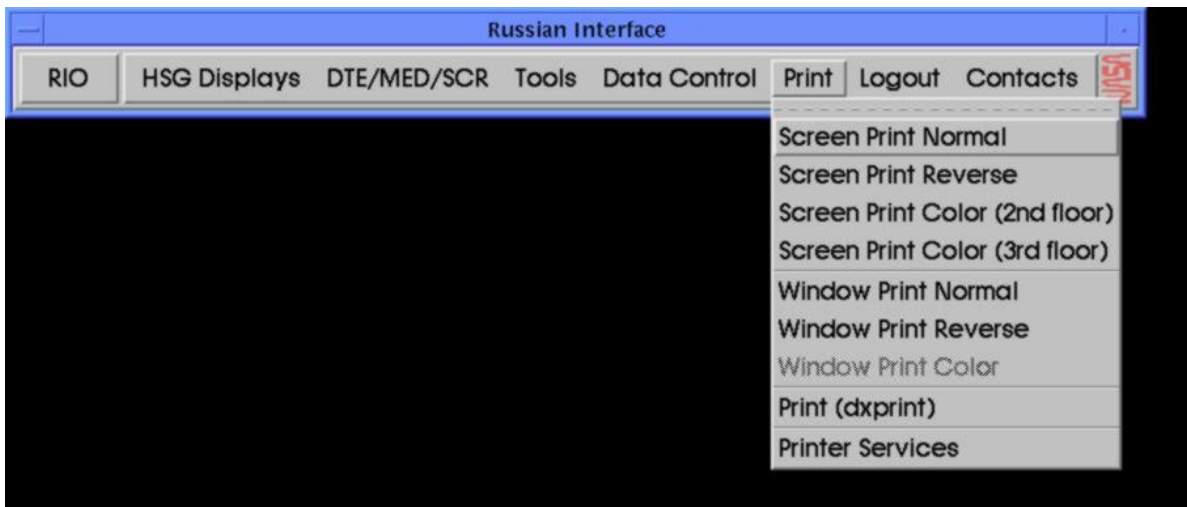


Figure 4-6. Print menu

4.1.2.2 Mission-Specific Displays

Displays Used During Steady State Operations

During steady state ISS operations, the RIO is the Mission Control Center-Houston (MCC-H) position that is responsible for the knowledge of the Russian Segment (RS) and associated operations. As such, the RIO uses the HSG overview display as the primary information source to the RS. This display is shown in Figure 4-7 as an example. The procedure for understanding this display can be found in JSC-36340, Vol. A, HSG-Moscow Operations Console Handbook.

CCS OBT 8576/14.31.33 Delta Coarse -000/00.00.01 ЦБМ OBT8576/14.31.31 Delta Fine 343026 SM Time Invalid				Master Time Unit SM Bus 6				ATMOSPHERE CONTROL PO P 742 / 14.35 dP/dt / RsvT 0.0 / 0.00 ПхО P 751 / 14.53 ПрК P 755 / 14.60 DC P 757 ПГО P 752 / 14.55 ГА P 764 / 14.85 PMA1 P1 788 / 748 / 14.49 PMA1 P2 848 / 755 / 14.60 ЭПК 1 CL ЭПК 2 OP КВД ГА - Node 1 CL КВД ГА - ТК CL КВД ПГО - ГА CL КВД ПГО - SM CL				ATMOS REVITALIZATION VOZDUKH Air Flowrate 24.0 Emer Vacuum Vlv OP CO2 Removal Fail -- Cycle Time 20.0 Failure -- Air Flow Mode MAN Cycles Mode MAN			
ЦБМ TBM ФTE Tm Sys Config Chan A Chan B Active Tm system Deact Deact Active Xmitter Main Main Storage Dev Mode Record Record Rec/Playback: Deact Deact Active Storage Dev Main Main VHF Off Regul Off				ECWA Lights Warning Caution Fire dP/dT Toxic ECWA Tones Warning Caution Fire dP/dT Toxic				State Status MCA OPERATE OPERATIONAL SM ppO2 166.8 US ppO2 171.5 SM ppCO2 4.6 US ppCO2 4.4 SM ppH2 0.1 US ppH2 0.0 SM ppCO 2.1 US ppH2 568.8 US ppCH4 0.0 SM ppH2O 7.6 US ppH2O 1.39 FGB ppH2O 18.2							
FGB MDM-1 Active Fault FGB MDM-2 Act -- КПП-1 -- -- КПП-2 Act -- TBM Act -- FGB YC -- -- SM YC-1 Act -- SM YC-2 -- -- SM YC-3 Act -- SM YC-4 -- -- SM YC-5 Act -- SM YC-6 -- --				ID ЦБМ-3 ЦБМ-1 -- Routing Inh RCT Bus GNC-2 ЦБМ-2 - Frm cnt 19 ЦБМ-3 - Tm Fmt 9SM ЦБМ -- ЦБМ Fail Ind ЦБМ Fail Cnt Busy bit adv - Sync Loss 0 TBM -- Frm Cnt adv - Busy bit 0 ЦБМ State ACT Busy bit fail - Frm Cnt Fail 0 Lane Chng ENA Frm Cnt fail - Lane Cng 12				Forward Link Yes S-Band AGC 25							
Batt 1 Batt 2 Batt 3 Batt 4 Batt 5 Batt 6 Batt 7 Batt 8 FGB Bat Cycl OFF OFF OFF OFF OFF OFF FGB ЗРУ ON ON OFF ON ON ON FGB Inc Chrg ON ON ON ON ON ON				SM Bat Cycl OFF OFF OFF OFF ON OFF OFF OFF SM ЗРУ ON ON ON ON OFF ON ON ON				WATER MANAGEMENT CPBK Power ON Check SRVK --				BMP Failure -- Fan Pwr ON Auto Mode YES AVK Emer Vac Vlv CL Vlv Grp 1 Purify YES Vlv Grp 1 Regen -- Vlv Grp 2 Regen YES Vlv Grp 2 Regen -- Abs Bed 1 Purify YES Abs Bed 1 Regen -- Abs Bed 2 Purify YES Abs Bed 2 Regen --			
SM CHT CHT21 CHT22 CHT23 CHT24 OFF ON ON OFF				FGB Solar Array Current 12.5 N Main Bus Current 50.0 -- Main Bus Volts 1 28.4 -- Main Bus Volts 2 28.6 -- Main Bus Power 0.00 ROM mode OFF RACU 5 RACU 6 Status OFF - ON - Total RACU Pwr Out 0.13				SM TEMP / HUMIDITY CONTROL AIR FANS CKB 1 Air Fan Mode ON CKB 1 Air Fan Out T 14.2 CKB 2 Air Fan Mode OFF CKB 2 Air Fan Out T 20.9 HTRS BH 1 Air Htr Pwr ON BH 2 Air Htr Pwr ON DUCT FANS ПхО Air Duct Fan Pwr ON ПрК Air Duct Fan Pwr ON CREW FANS BKY 1 Crew Fan Pwr OFF BKY 2 Crew Fan Pwr OFF				THERMAL Loop 1 Loop 2 SM Ext Press 700.0 732.0 SM Ext Opr OFF ON SM Int Press 857.0 886.0 SM Int Opr OFF ON SM Int Pump -- 4CPIH1			
SM Station Modes Cur Mode Standard Xtlon stat Success Cur Xtlon None Last Xtlon Valid US GNC Mode: CMG TA RS GNC Mode: CMG TA Attitude Mnvtr in Prog? No Mnvtr Complete? n/a Cntl Veh US Ref Frame LVLH Total Error: 0.75 RS GNC Kinematic Mode LVLH RS Master Slave Thrstr Ops Mode Thrstrs On				Sensor Stat Oper/Fail GIVUS 0 /- ORT - /- Star Snsr - /- Sun Snsr - /- Horizon Snsr - /F Magnet - /- GLONASS - /-				SM Battery Volts -- Power Balance -- Tot S.A. Current 0.0 Tot Load Current 154.0 Tot Battery Charge 295.0 Battery Charge Mode Automatic Battery Cycle Mode Selected Total Active ЗРУ 8 HSG Overview Display DO13/M. Atlyn/A30788 Version 1.2 (03/06/2003)				FGB Ext Pump -- -- FGB Int Pump -- -- 4H3			

Figure 4-7. HSG overview display

Other displays that are used are the Common Display Development Team (CDDT) displays. These are found under the **MASTER DNAV** → **Station** → **ISS FD** → **CDDT**. These are the digital click-through displays that emulate what the crew uses on the Portable Computer System (PCS) laptops on the ISS.

At different times, the RIO may be interested in seeing the telemetry for an individual system. These are found under the system-specific menus on the Master DNAV.

Displays for Visiting Vehicle Arrival/Departure (ATV/Progress/Soyuz)

The Visiting Vehicle Officer (VVO) has one display that is used for Soyuz and Progress dockings. This display is accessible from the DNAV:STATION:VVO menu and is shown in Figure 4-8.

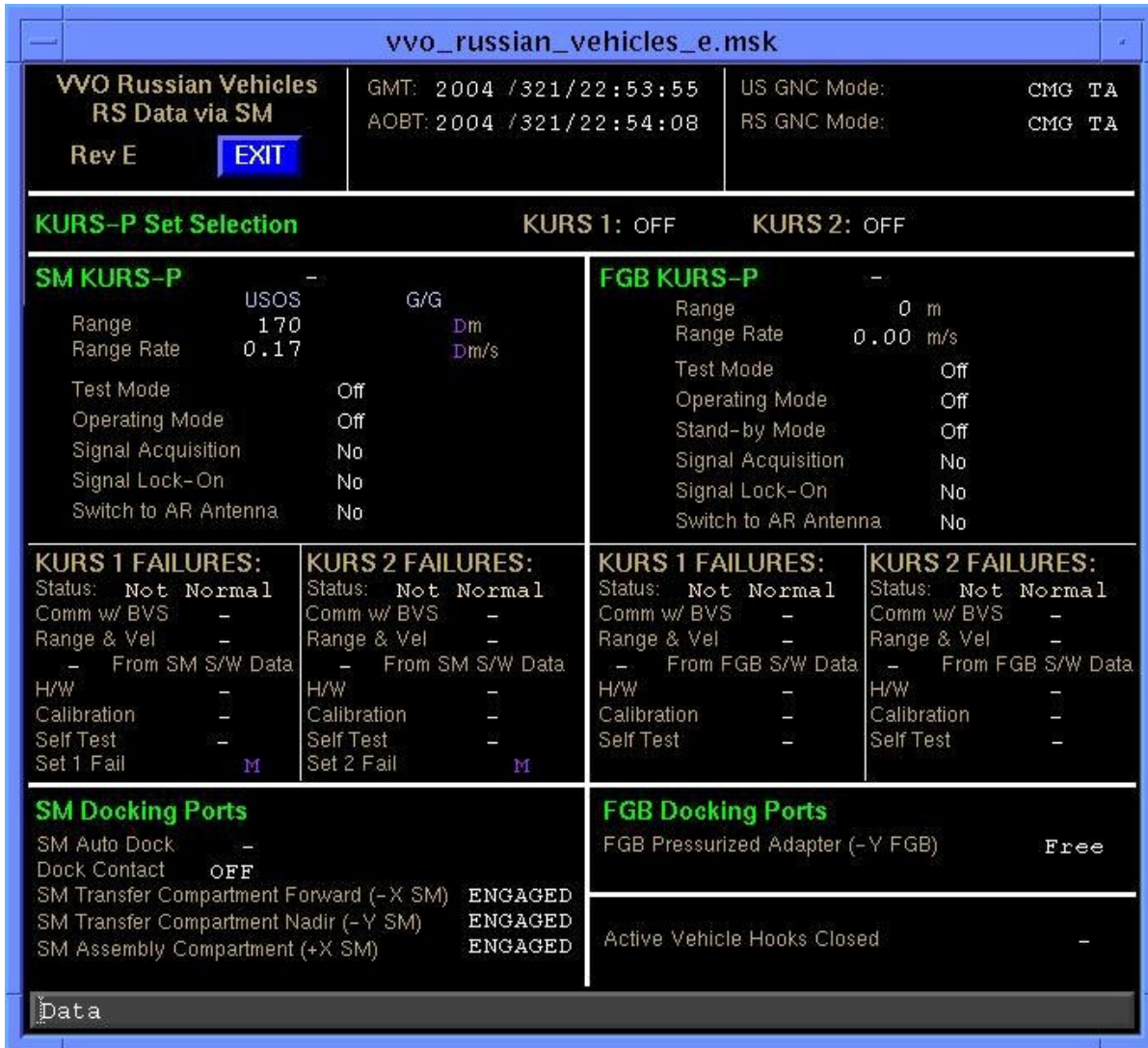


Figure 4-8. VVO Russian vehicles MSK display

Displays for Shuttle Rendezvous and Docking

During the rendezvous and docking of the shuttle, the RIO is responsible for informing the Russian Shift Flight Director (SRP)/Mission Control Center-Moscow (MCC-M) Assistant Shift Flight Director (PRP) of the range, rate, contact, and capture of the shuttle to the ISS. Multiple displays are used during this timeframe.

The rendezvous console has several displays that can be used. The major item about these displays is that you must first start a data server, which can be found under the Master DNAV. **MASTER → Shuttle → Rendezvous (RGPO) → Telemetry (Start First)**. Some of the common displays used are the Attitude (3-D), Relmo +.

Another good display is found under the prop console. The consumables are a good way to watch the burns. This is found at **MASTER → Shuttle → PROP → Consumables**.

Displays for Shuttle Undocking/Departure

During the undocking, flyaround, and departure of the shuttle, the RIO is responsible for informing the Russian Flight Directors of the separation, range, and range rate of the shuttle. Multiple displays are used during this timeframe.

The rendezvous console has several displays that can be used. The major item about these displays is that you must first start a data server, which can be found under the Master DNAV. **MASTER → Shuttle → Rendezvous (RGPO) → Telemetry (Start First)**. Some of the common displays used are the Attitude (3-D), Relmo +.

Displays for Extravehicular Activities

In addition to useful information contained on the HSG overview display, there are basically five displays that can provide useful information to the RIO during an ISS Extravehicular Activity (EVA). These displays provide much of the same information, but in a slightly different format.

The available ISS displays are

- a. The Environmental Control and Life Support System (ECLSS) CDDT display for the airlock
- b. The joint airlock mega Manual Select Keyboard (MSK) display
- c. The ECLSS dP/dT MSK display
- d. The ISS Extravehicular Mobility Unit (EMU) MSK data pages (three pages)
- e. The EVA CDDT display for airlock systems

The primary display, which provides all the parameters to be discussed in this section, is the Joint Airlock Mega Display. There are currently no displays available on the U.S. side that display data for EVAs using the Orlan suit.

CDDT: Airlock ECLSS

This display can be reached from the ISS home page by clicking the ECLSS symbol on the ISS home page, then clicking the button labeled **Airlock**.

This page presents a schematic (see Figure 4-9) of the ECLSS system present in the ISS airlock, which consists of an equipment lock and a crew lock.

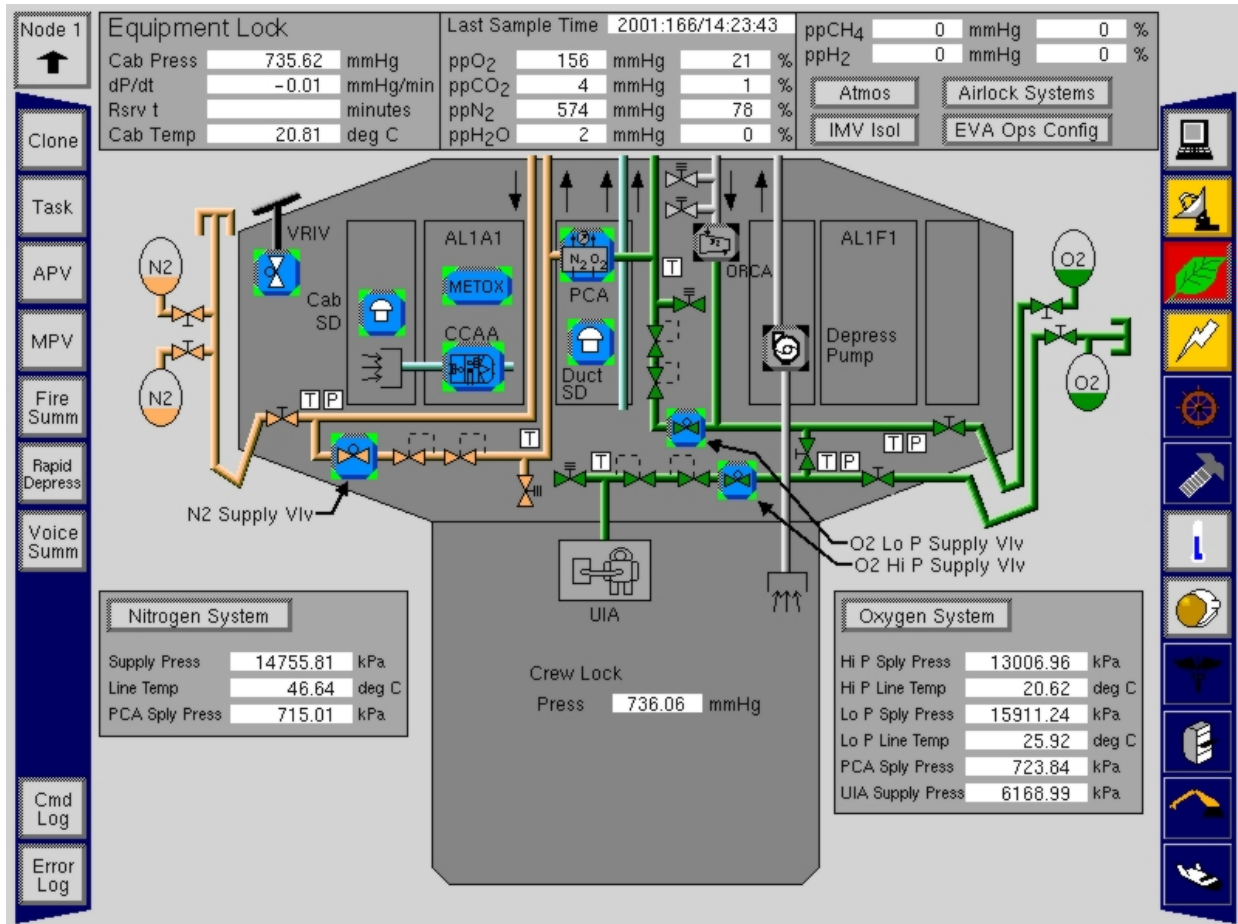


Figure 4-9. ECLSS CDDT display

The primary parameters of interest are the Crew Lock Pressure and the Depress Pump status.

The Crew Lock Pressure value (displayed in mmHg) displays the atmospheric pressure currently in the Crew Lock. Changes in this value signal the status of certain prebreathe activities, such as the beginning of depress, or the beginning of repress following an EVA.

Pressing the Depress Pump icon pops up the Depress Pump display. This display also shows the Crew Lock pressure, as well as the power state of the depress pump, the pump speed, and the electrical current flowing to the pump.

Joint Airlock Mega Display

This display provides an overall system state summary for the airlock. This page is found on the Master DNAV through the path **EVA → Displays from EVA server → Joint Airlock Display**.

This display provides a system status summary for the systems in the airlock. It is subdivided into five areas, ECLSS, Command and Data Handling (C&DH), EVA Systems, COMM, Electrical Power System (EPS), and Lab TCS (see Figure 4-10).

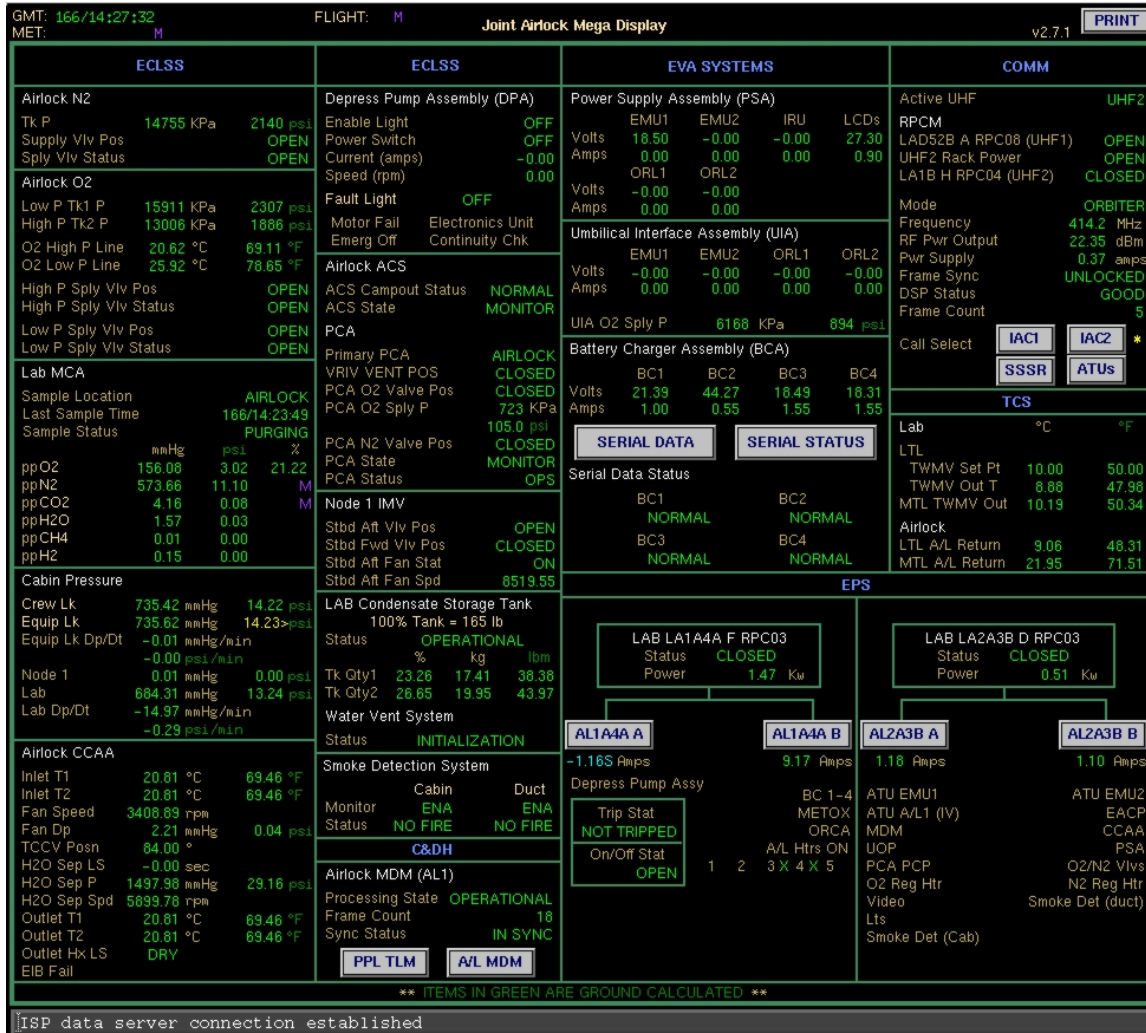


Figure 4-10. Joint Airlock Mega MSK Display

The ECLSS section contains data concerning the state of the N₂ and O₂ supply systems, atmospheric constituent data, crew lock and equipment lock pressure data, the airlock systems state, and the airlock depress pump state. The airlock pressure data and depress pump state can be used to track crew progress during an EVA prebreathe, depress, or repress.

The EVA Systems section shows the voltages and currents to various elements of the EMUs and the EMU umbilical. The voltages and currents displayed here give insight into the status of certain EVA-related crew activities.

MSK: ECLSS dP/dT Display

This display can be reached from the Master DNAV through the path **Station** → **ECLSS** → **Displays on ECLSS server** → **MSK-View Displays** → **ECLSS dP/dT**.

This page presents a schematic (see Figure 4-11) of the ISS. The pressure data for each of the elements is shown. The pressure change data for the Service Module (SM), the U.S. Lab, and the equipment lock is also shown. As with the other displays, this pressure data can be used to determine crew progress through prebreathe, depress, or repress activities.

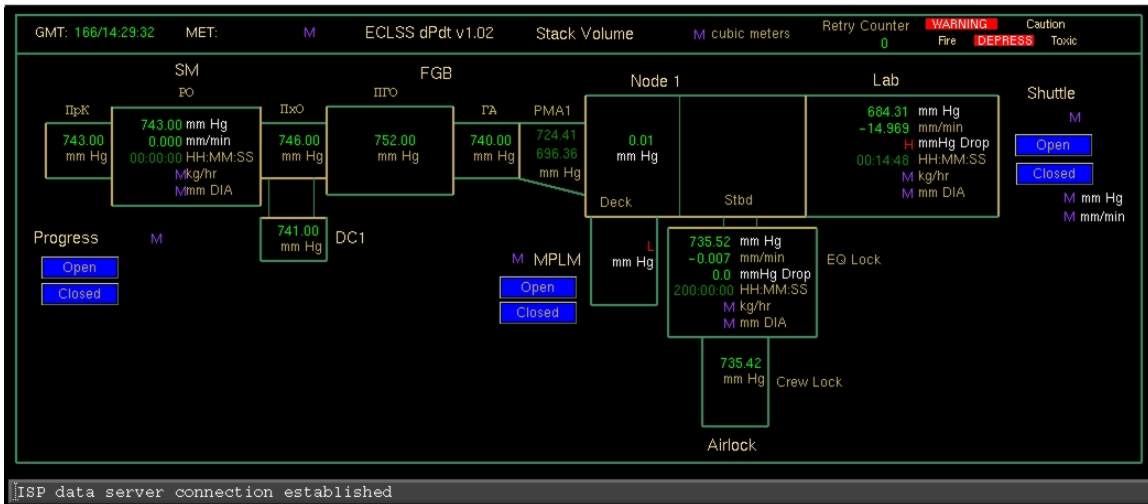


Figure 4-11. ECLSS dP/dT MSK display

ISS EMU Data Page (1 to 3)

This page is found on the Master DNAV through the path **Station** → **EVA** → **Displays from EVA server** → **ISS EMU Data Page 1 (2,3)** (see Figure 4-12).

GMT: 166/14:30:13		EMU DATA PAGE 1			
Downlisted Ch ID CH 1 0 CH 2 0 CH 3 0 CH 4 0		Channel 1 EMU 3003 (L) ID: 52 / 112	Channel 2 EMU 3015 (L) ID: 112 / 248	Channel 3 EMU 3005 (XL) ID: 51 / 163	Channel 4 ID: -1 / -1
O2 Actuator		S	S	S	S
Time EV	hr:min	00:00	00:00	00:00	00:00
O2 TM LF	hr:min	00:00	00:00	00:00	00:00
PWR TM LF	hr:min	00:00	00:00	00:00	00:00
(% PWR LF)	%	0.00S	0.00S	0.00S	0.00S
(%O2 LF)	%	0.00S	0.00S	0.00S	0.00S
SUIT P	PSId	0.00S	0.00S	0.00S	0.00S
O2 P	PSIa	0.00S	0.00S	0.00S	0.00S
(O2 Rate)	PSI/min	0.00S	0.00S	0.00S	0.00S
(Met. Rate)	BTU/hr	0.00S	0.00S	0.00S	0.00S
(Met. Rate)	KCal	0.00S	0.00S	0.00S	0.00S
SOP Rate	PSI/min	0S	0S	0S	0S
SOP	PSIa	0S	0S	0S	0S
SBLM P	PSIa	0.00S	0.00S	0.00S	0.00S
BAT VDC	volts	0.00S	0.00S	0.00S	0.00S
Bat Amps	amps	0.00S	0.00S	0.00S	0.00S
RPM	RPM	0	0S	0S	0S
CO2	mmHg	0.00S	0.00S	0.00S	0.00S
H2O Temp	Deg F	0.00S	0.00S	0.00S	0.00S
H2O G P	PSIa	0.00S	0.00S	0.00S	0.00S
H2O W P	PSIa	0.00S	0.00S	0.00S	0.00S
(H2O G P) Δ	PSId	0.00S	0.00S	0.00S	0.00S
(H2O W P) Δ	PSId	0.00S	0.00S	0.00S	0.00S
BITE Light		OFFS	OFFS	OFFS	OFFS
(Checksum)		NO ERRORS	NO ERRORS	NO ERRORS	NO ERRORS
(Daemon Stat)		No EMU Data	No EMU Data	No EMU Data	No EMU Data
Parameters in parenthesis not displayed in DCM status list					
LAST SCAN: -GMT-		000/00:00:00	000/00:00:00	000/00:00:00	000/00:00:00
EMU DAEMON: -GMT-		000/00:00:00	000/00:00:00	000/00:00:00	000/00:00:00
ISP data server connection established					

Figure 4-12. ISS EMU Data Page 1 MSK

These displays provide many EMU data parameters. There are three separate pages, each providing a separate set of data. In addition to many others, these pages contain the EMU parameters that are also shown on the Joint Airlock Mega Display.

CDDT: EVA Airlock

This display can be reached from the ISS home page by clicking the EVA symbol on the ISS home page, then clicking the button labeled Airlock Systems (see Figure 4-13).

As with the previous displays, this display shows many of the same parameters available on other displays. Which one is used is a matter of taste and convenience.

Airlock ATUs	
IAC1 Call Select	IAC1 Mode Backup
IAC2 Call Select	IAC2 Mode Active
Major Constituent Analyzer (MCA)	
LAB MCA	Sample Location
	ppO2 0.000 mmHg
	ppCO2 0.000 mmHg
Battery Charger Assembly (BCA)	
	BC1 BC2 BC3 BC4
BCA	Volts 21 44 18 18
	Amps 0 0 1 1
Airlock Pressure Summary	
A/L ACS	C-Lk Press 14.22 psi 735 mmHg
	E-Lk Press 14.22 psi 735 mmHg
	E-Lk dPdt -0.00 psi/min 0 mmHg/min
	E-Lk / C-Lk Delta F 0.00 psi 0.10 mmHg
Depress Pump	
	Fault Light OFF
RPCM_AL1A4A_A	Enable Light OFF Motor Fail
RPC_01	Power Switch OFF Electronics Unit
	Current, A 0 Emergency Off
	Speed, RPM 0 Continuity Check
A/L RPCMs	
	RPCM_AL2A3B_A RPCM_AL1A4A_A
	RPCM_AL2A3B_B RPCM_AL1A4A_B

Figure 4-13. EVA CDDT display for airlock systems

4.1.2.3 EVA Activities Reflected in the Displays

This section provides a short synopsis of what activities in a generic EVA are reflected in the display data presented in Section 4.1.2.2. All the discussed parameters can be viewed on the Joint Airlock Mega Display, but many are available on the other displays.

ISS EVA Prep

Early in the EVA day, most likely during the crew post-sleep timeframe, the ECLSS officer commands the High Pressure Supply Valve to the open position. This valve provides high-pressure oxygen to the EMU umbilical. Nominally, this valve would remain in the open position continuously, but due to a known leak in the EVA umbilical, this valve is closed when not using the umbilical to support EVA activities. This valve position status is available on the airlock ECLSS CDDT display and on the Joint Airlock Mega Display.

When this valve is commanded to open, the Umbilical Interface Assembly (UIA) O₂ supply pressure also rises to its nominal value of 850 to 950 Pounds per Square Inch Actual (PSIA). This parameter is also available on the Joint Airlock Mega Display (Figure 4-10).

The crew begins their prebreathe procedure using the EVA Prep Using ISS O₂, procedure 1.215 in JSC-48538, ISS EVA Systems ODF. While a shuttle is docked, the procedure used is titled EVA Prep Using Shuttle O₂. The content of these procedures is about the same, with the only difference being the source of the prebreathe oxygen.

The first activity in this procedure that is apparent in the display data is the EMU powerup. During the EMU powerup, the Power Supply Assembly (PSA) is powered up. This activity is reflected in nonzero voltage readings from the PSAs for the pertinent EMUs. The nominal voltage is between 18.0 and 19.0 volts. Liquid Crystal Display (LCD) voltages are also nonzero to indicate that the PSA display is functioning properly. Voltages are also nonzero at the UIA in preparation for the EMU switch to umbilical power. These parameters are available on the Joint Airlock Mega Display.

When the EMU is placed on umbilical power, the PSAs and the UIAs reflect the increased load with increased amp readings at the PSA and the UIA. Before suit donning, these values read about 0.5 amp for the pertinent EMUs. This value is also available on The Joint Airlock Mega Display.

At this point, the Intravehicular (IV) crewmember begins the ISS airlock 10.2 PSIA operations initiation. The first steps include configuring the depress pump assembly. The enable light for the depress pump assembly should indicate ON, and the power switch is taken to ON. Both of these are indicated on the Joint Airlock Mega Display and the EVA CDDT display for airlock systems. After the pump is activated, no pressure drop is apparent until the crew has opened the Depress Manual Pump Isolation Valve (this is a manual valve, so there is no insight into its position).

After the valve is opened, the pressure in the crew and equipment lock begins to drop. While the pressure is dropped to 10.2 PSIA, there is a pause at approximately 11.8 PSIA. During this time, the pressure in the airlock may be monitored on most of the aforementioned displays. A small pressure increase in the node may also be observable, as the air being removed from the airlock is being pumped into the node.

When 10.2 PSIA is reached, an EMU comm and data check may be observable on the ground displays. (One hour 40 minutes of biomed data are downlinked, followed by 15 minutes of suit data. This is standard for EMU downlink data.) When the crewmember has donned the suit and the suit helmet is locked, the Joint Airlock Mega Display reflects an increase of about 5 amps in the current flowing from the PSA and UIA to the appropriate EMU. At this point, the suit is pressurized and the EMU purge is initiated.

When the EMU purge is initiated, one may see the ppO₂ readings in the airlock rise due to the additional O₂ used to purge the suit. During this purge, the UIA O₂ supply pressure may also drop. At the same time, a repress of the crew and equipment lock back to 14.7 PSIA begins. This repress dilutes the increased O₂ presence in the airlock and gives the IV crewmember an opportunity to exit the airlock, before the final airlock depress. This repress is apparent on the ground displays, and a small drop in the ISS pressure may also be noticeable.

When the suit prebreathe is complete, a final depress to 0 PSIA begins. The airlock is depressed from 14.7 PSIA to approximately 5.0 PSIA using the depress pump. There is then a pause for approximately 15 minutes for suit leak checks. After this, the depress pump is reactivated until the airlock pressure reaches 2 PSIA, at which point the pump becomes ineffective and is deactivated. These pressure changes and pump activities are apparent in the ground displays.

The final ground display signatures that one sees before egress is the start of the flow of suit data and the switching of the suit to battery power, which is apparent in the decrease in PSA and UIA loads. This switch to battery power signals the official beginning of the EVA.

Post EVA

Following an EVA, the repress activities are roughly the opposite of the depress activities. While most of the activities involve manual valve configurations that are not visible in ground data, there are some steps that can be observed.

The loads on the PSA and the UIA increase to the levels that were seen before egress when the EMUs are taken off battery power. When the repress is intimated, there is a pause at 5 PSIA to verify hatch integrity. Upon completion of the repress, during suit doffing, the loads on the UIA and the PSA drop to 0.5 amp, which indicates that the suit fans are deactivated.

Following suit doffing, the In-flight Refill Unit (IRU) loads may also be observed at a higher level as the crew refills the suit with water before suit stowage. This parameter is available on the Joint Airlock Mega Display (Figure 4-10).

4.1.2.4 Console Application Certification Process for ELOG, RTPlot, and MSK-View

Overview

These guidelines define the process used by International Liaison Flight Controllers to correctly build and certify User Data Files for certified MCC applications Manual Select Keyboard Viewer (MSK-V), Event Logger (ELOG), and Real-Time Plot (RTPlot).

Difference between a user data file and a certified application:

- a. A user data file contains formatting and telemetry information to be used with certified MCC applications. Examples are
 1. xxxyyy.msk (MSK-View Data File)
 2. xxxyyy.plot (RTPlot Data File)
 3. xxxyyy.evet (ELOG Data File)

- b. A certified MCC application is a certified program that runs a user data file. The following examples are already certified and housed in the Maintenance, Mechanical, Arm, and Crew Systems (MMACS) directory:
 - 1. MSK-View Application
 - 2. RTPlot Application
 - 3. ELOG Application

Location and Types of Directories

User data files reside on the High Activity (HA) read-write server to support various MCC activities including mission, simulations, and testing. These files are found in three HSG directories on the server: **cert_apps**, **uncert_apps** and **DATA\cert_testing**. The **cert_apps** and **uncert_apps** directories are used for activities defined by the Facility Systems Manager (FSM) as using certified and uncertified activities, respectively. The **DATA\cert_testing** directory contains uncertified user data files still in development, as well as Source Independent Telemetry Format (SITF) files (used to test and certify the user data files). New user files or changes to them are developed in the **DATA\cert_testing** directory.

When development is complete, testing and certification of the user data file is performed. This requires use of the SITF server (playback DNAV), which accesses files in the **DATA\cert_testing**, **uncert_apps** and **cert_apps** directory.

Verification Methods

New user data files or changes to existing user data files **must** be verified before becoming available on a certified activity. It is desired, yet not mandatory, that two people confirm that the changes are made correctly. One of these could be the person who built the file or made the changes, and the other could be anyone else in the group.

There are several methods of verification for HSG, which certifies the user data files for a given application, including running an SITF file and manual verification of Parameter Unique Identifiers (PUIs) using desktop review/real-time test.

Each telemetry parameter and enumeration on the application driven by the user data file must be verified.

User Data File Certification

- a. HSG uses an SITF server matched with
 - 1. Certified version of a CDDT display
 - 2. Certified application with user data file loaded (example: using RTPlot application with an rtplot.plot user data file)

3. Systems Division (DF) discipline-specific certified data file (example: using ECLSS MSK-V to compare against HSG MSK-V)
 4. SITF file (SITF file required varies with mission/element changes)
- b. HSG can also use real-time verification while running the data file via command line.

Summary of SITF Verification Method

Step 1: Load the SITF server and load an SITF file (use the X-term window command line: hsgplayback).

Example: Load Yellow DNAV, start SITF server, and load xxxyyy.sitf from the **DATA/cert_testing/DATA/sitf/** file location.

Step 2: Open certified application with user data file loaded.

Example: Start HSG uncert rtplot.plot from the yellow DNAV (loads certified application RTPlot and user data file rtplot.plot).

Step 3: Open a certified CDDT version (i.e., verification methods must use certified applications whenever possible to verify PUIs).

Example: Open CDDT display from the yellow DNAV. (Version is stated because the CDDT display cannot actually be called up under **cert_apps**. The CDDT display is called up in **uncert_apps**, but the file size and date is used to verify that the uncert CDDT version matches the certified CDDT. If using a certified MSK-V, HSG Group Administrator (GA) in Houston links all uncertified MSKs to the Cert_apps directory. Therefore, file size/date comparison are not required with MSK.)

Step 4: Start the SITF file.

Example: Start the xxxyyy.sitf file to force data through both the certified CDDT version and the certified application with user data file loaded.

Step 5: Cross check each telemetry parameter and enumeration between certified CDDT version and certified application/user data file version.

Example: Each time PUI xxxxxxxxxx appears on one display, verify that the same appears on the other. Mark results on hardcopy printout of SITF file or display printout.

If errors are found, troubleshoot by checking PUIs, enums, SITF, and delta cert the fixed areas.

Recordkeeping Configuration Management

When the changes have been verified, the initiator and/or the flight lead for the appropriate mission update writes up a statement of certification. The statement must include

- a. Purpose and description of the new user data file of change
- b. Method for verifying the user data file
- c. Results of the verification
- d. Signatures of each verifier

The signed statement of certification, a hard copy of the new or changed user data file, the SITF files, and any other relevant hard copies from the testing (screen shots, etc.) are kept in the appropriate application notebook.

When the statement of certification is complete, the initiator and/or flight lead notifies the GA that the certification is complete. The GA then

1. Assumes ownership of the new or changed user data file and copies it into both the **cert_apps** and **uncert_apps** directories
2. Updates the HSG Information Sharing Protocol (ISP) Dictionary
3. Updates the DNAV scripts

The initiator and/or flight lead is then responsible for ensuring that the appropriate certified applications work properly and informing the other HSG Flight Control Team (FCT) members of the update.

Testing Deadlines

It is recommended that all display development for a given flight be accomplished before L – 45 days so that 2 weeks can be allotted to testing and certification of the user data files. L – 30 is typically the point at which the FSM locks down the **cert** directory. HSG only modifies the data files and, therefore, changes to the data files after the L – 30 day cutoff do not require a Joint Evaluation Team (JET) form.

How to Create an ISP SITF File

An SITF file is an American Standard Code for Information Exchange (ASCII) text file that is the data source for the ISP SITF server. This provides a means to test programs without the need for live telemetry data. The creator of the SITF file can give any value he desires for each symbol, PUI, or Measurement Stimulation Identifier (MSID) they choose to include in the file.

Below are two ways to create an SITF file. The first, manual SITF file creation, calls for entering everything manually, including a value for each MSID/PUI in each cycle. The second option is semiautomatic SITF file creation. MSIDs/PUIs are entered and a minimum and maximum value for each MSID/PUI. A script is then run to produce any number of cycles desired. A random value is generated automatically for each MSID/PUI (within the range specified for that MSID/PUI).

Manual SITF File Creation

Step 1: From the DNAV, select **Tools**, then select **Notepad**, which is a simple text editor.

Step 2: Beginning at the very top of the page, type in each MSID/PUI you wish to subscribe to, one MSID/PUI per line.

Or, you can open another instance of **Notepad**, open your dictionary file, and copy and paste each MSID/PUI from the dictionary file to the new file. Be sure to copy only the MSID/PUI itself. Do not include the colon or anything following the colon. Do not add any comment lines. Specify only the MSIDs/PUIs needed to support the display or program being tested. The entire dictionary content is not required.

Step 3: When you have finished adding all the input MSIDs/PUIs to your file, add the following line:

pause 1

At this point, the file should look something like this.

MSID001
MSID002
MSID003
MSID004
pause 1

You have just created one cycle of the SITF file.

Step 4: Use the mouse to copy all the MSIDs/PUIs and the pause statement. Now paste it at the end of the file, giving you two cycles. Repeat this paste until you have the desired number of cycles.

Step 5: For each MSID/PUI, type in a value. You can use space(s) or tab(s) separators between MSID/PUI and value.

Step 6: At the end of the file, change **pause 1** to **pause 5**. Then add this line

rewind

By placing a **rewind** statement at the end of the file, the SITF file will be read over and over again, until the SITF server is stopped. Now your file should look something like this.

```
MSID001  1.397
MSID002  .0079002
MSID003  100
MSID004  43.9997
pause 1
MSID001  1.50032
MSID002  .0079004
MSID003  98.3
MSID004  41.244
pause 1
:
:
MSID001  1.3999
MSID002  .0079010
MSID003  101.017
MSID004  42.932
pause 5
rewind
```

Optional Step

If you want to test your program for handling statuses, you will need to add another number to each line for which you want a status to be reported. (Please refer to the ISP Reference Manual for full details.) Following are the values of some of the status bit maps (in Octal):

missing:	STMISSING	80000000
dead:	STDEAD	40000000
off-scale high:	STOSH	20000000
off-scale low:	STOSL	10000000
static:	STSTATIC	08000000

For example, if you wanted to add an off-scale low status for **MSID002** for a particular cycle, it would look something like this.

```
MSID001    1.89
MSID002   -209.7  10000000
MSID003    93.2
MSID004    29.012
```

You can add a status specification to as many lines as you like. None are required.

Step 7: Check to ensure that there are no blank lines anywhere in the file. To ensure that there are no blank lines at the end of the file, go to the **rewind** line at the end of the file and press the down arrow key. Did the cursor move to the next line? If it did, you have at least one blank line at the end of the file, so do the following: Press the down arrow key until the cursor stops moving down. Next, press the Backspace key until the cursor backs up to the end of the **rewind** line.

Step 8: You have finished creating your SITF file. Save it as

myfile.sitf

You can name your SITF file anything you want. Using the .sitf extension is recommended.

Semiautomatic SITF File Creation

Step 1: Copy the script file **mksitf**, which is in OPS and the Common Desktop Environment (CDE), by typing

```
cp /users/eclss/rbreclss/bin/mksitf ./
```

Step 2: Change the permissions for **mksitf** so that you will be able to run it (Step 8) by typing

```
chmod 775 mksitf
```

Step 3: From the DNAV, select **Tools**, then select **Notepad**, which is a simple text editor. This is required to build an input file to a program that generates an SITF file.

Step 4: Beginning at the top of the page, type in each MSID/PUI you wish to subscribe to, one MSID/PUI per line. Or, you can copy and paste each MSID/PUI from another window containing your dictionary file. Be sure you copy only the MSID/PUI itself. Do not include the colon or anything following the colon. Do not include any comment lines.

Step 5: After each MSID/PUI, type in a minimum and maximum value for that MSID/PUI, using space(s) or tab(s) separators. The range of values should include more than your expected values for an MSID/PUI, since you will want to test your program for handling of unexpected values, as well. Your file should now look something like this.

MSID001	1.00	9.00
MSID002	-20	20
MSID003	90	102
MSID004	24.01	47.09

Step 6: Check to ensure that there are no blank lines anywhere in the file. To ensure that there are no blank lines at the end of the file, go the last line that has an MSID/PUI on it and press the down arrow key. Did the cursor move to the next line? If it did, there is at least one blank line at the end of the file, so do the following: Press the down arrow key until the cursor stops moving down. Next, press the Backspace key until the cursor backs up to the end of the line with your last MSID/PUI.

Step 7: Save your file as

myminmax.txt

This is not your SITF file; it is the input file for the mksitf script.

Step 8: Run the mksitf script that you copied to your directory by typing

mksitf myminmax.txt 100 > myfile.sitf

This will create a SITF file named myfile.sitf with 100 cycles. The choice for the name of the file and the number of cycles is up to you. The .sitf extension is recommended.

Step 9: Your SITF file, myfile.sitf, is ready to be used. If you want to change a few of the values in your SITF file, open the file using Notepad and make your changes. But REMEMBER, do not add any blank lines.

Optional Step

Same as above. See under Optional Step in the Manual SITF File Creation procedure.

4.1.3 ODRC

Use the Orbiter Data Reduction Center (ODRC) to obtain ISS data from the past, as far back as you would like to go.

4.1.3.1 Starting ODRC

To start the ODRC

1. From the MASTER DNAV, Select Global Apps\Mission Evaluation Workstation System (MEWS)/ODRC. Figure 4-14 shows the MEWS start screen.

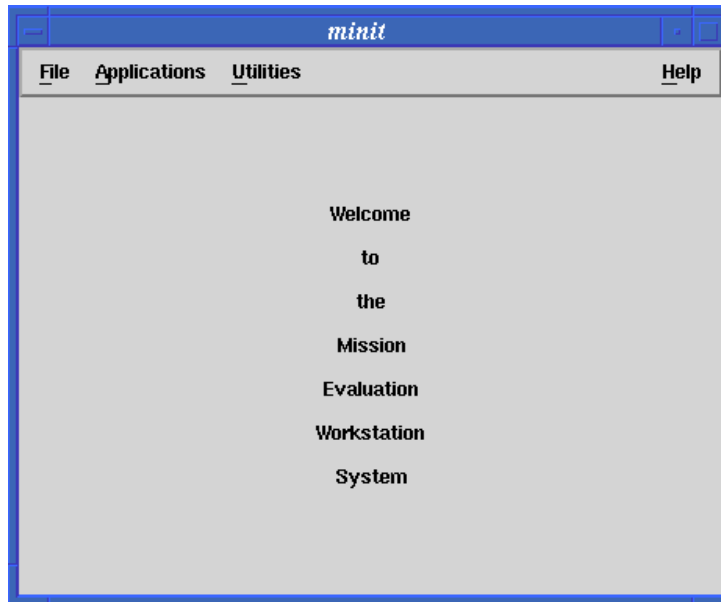


Figure 4-14. MEWS start screen

2. Left click on **Applications** to get to the ODRC Interface, Plot, Tab, and Verify applications. Select **ODRC Interface**. The ODRC Interface application is shown in Figure 4-15.

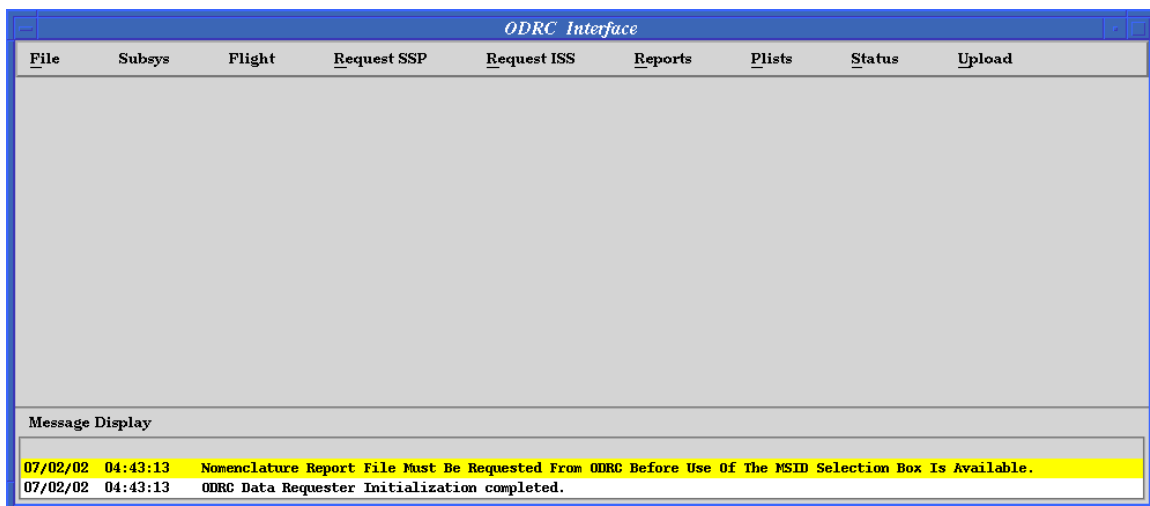


Figure 4-15. ODRC Interface application

3. Select **SUBSYS** (second item from left) and choose **HSG** (Figure 4-16). Click **OK**.
4. Next, select the proper flight ID by clicking **FLIGHT** from the ODRC Interface (third from left), scrolling to the proper ID, highlighting it, and clicking **OK**. If the flight ID is unknown, call ext. 3ODRC. See Figure 4-16 to see the flight selection screen.

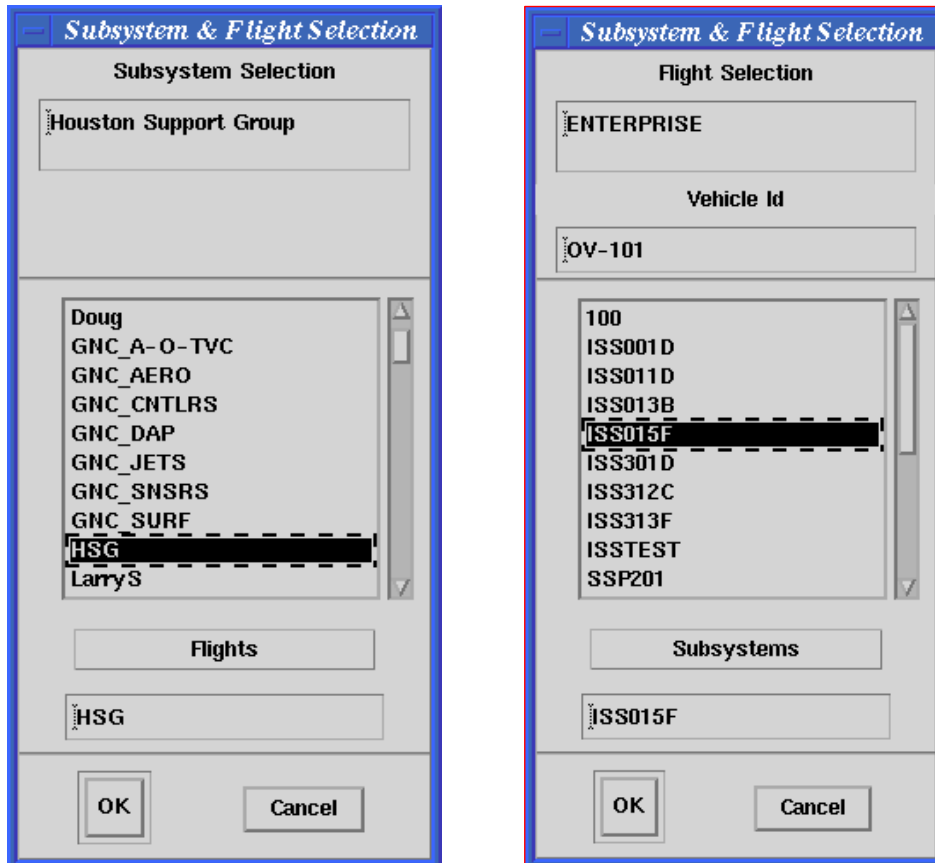


Figure 4-16. Flight selection screen examples

5. Notice that both the subsys and flight selections changed in the ODRC Interface screen (see Figure 4-16).

4.1.3.2 Requesting Data

1. From the ODRC Interface screen (Figure 4-15), click on **Request ISS/ISS Core** to bring up the Request Data screen (Figure 4-17). For nominal ISS Ops, change ODRC Alias listed under Options menu (top left of screen) to "odrc_ums1." When HSG is in Backup Control Center (BCC) mode, it must be listed as "odrc3."

Request ISS/CORE Data

Options

Build Request Items List

Add Item	Item Type	Items List	Type
	Plot Format	RREC00CT1005P	M
	Tab Format	RFPC00MD0028J	M
	Plot Family		
	Tab Family		
	Verif Format		
	MSID		
	Local Plist		
	DPS Format		

Data Request Times And Rate

Start: YYYY [2002] DDD [183] HH [00] MM [00] SS [00] Time Reference [GMT]

Stop: YYYY [2002] DDD [183] HH [02] MM [00] SS [00] Update Rate [0]

(secs between samples 0=full)

Select Product Options

Calibration: [MCC CALIBRATIONS] Data Type: [BEST] Product Type: [NCD]

Product Destination

Node Address: [svo82] Run Number: [] Filename: [SV085F-1465]

Select Action

[Request] [Validate List] [Cancel]

Figure 4-17. Request Data window

2. If a plot format already exists or was prebuilt, click on **List Files**, select the proper format name on the Lister_PopUP menu, and click **done**. The Format File name appears under the Items List. PUIs for existing formats can be checked on the Lister_PopUP menu by selecting **Details|List MSIDs** from Plot Formats. In the List MSIDs/Formats_Popup menu, select the **Format File** on the left-hand side. Relevant PUIs (MSIDs) appear on the right-hand side of the screen. Click **Finished** when done. If a new format is to be built, or if there is no format for the PUI(s) of interest, under Add Item, type in the desired PUI, click **MSID**, and the PUI should appear under the Items List. Repeat, as needed, to list all the PUIs of interest.
3. Enter the Start and Stop times for the period of time being evaluated. Number of PUIs and time of interest affect how long it takes to pull all the data. For BCC dry runs and checkouts, the Start and Stop times entered for retrieving American Contingency Telemetry (ACT) data should match the Start and Stop times on the BCC playback tape.

4. Enter 0 for the Update Rate. This provides the fullest data rate; however, if spurious bit flips are cluttering up the plot, come back and increase the Update Rate to get a cleaner slope. Update rate of 30 will give a data value every 30 seconds.
5. Enter a run number. This should be obtained from the HSG System Administrator (SA).
6. A file name can be entered (usually the Format File name), or the default file name for the data pull can be noted. Use a distinctive file name that can be easily identified within a large list of others.
7. Click **Request** to start the data run.
8. Request Status on ODRC Interface screen (Figure 4-15) changes from Submitting (being sent), Validated (request is in the queue), Running (data is being pulled), Transmitting (data coming to you), and Completed (it is now viewable on your machine).

Note: If Request Status is Aborted, it usually means that the PUI does not exist or Subsystem and/or Flight are wrong (see Steps 3 and 4 in Section 4.1.3.1). Be sure to note the Output File name on the request (same as in Step 6 in Section 4.1.3.2). Also, verify that there is no mismatch between the run number for retrieval and the run number for recording.

4.1.3.3 Building a Format

1. At the MEWS start screen (Figure 4-14), click **Applications|PLOT** to bring up the Plot window (Figure 4-18).

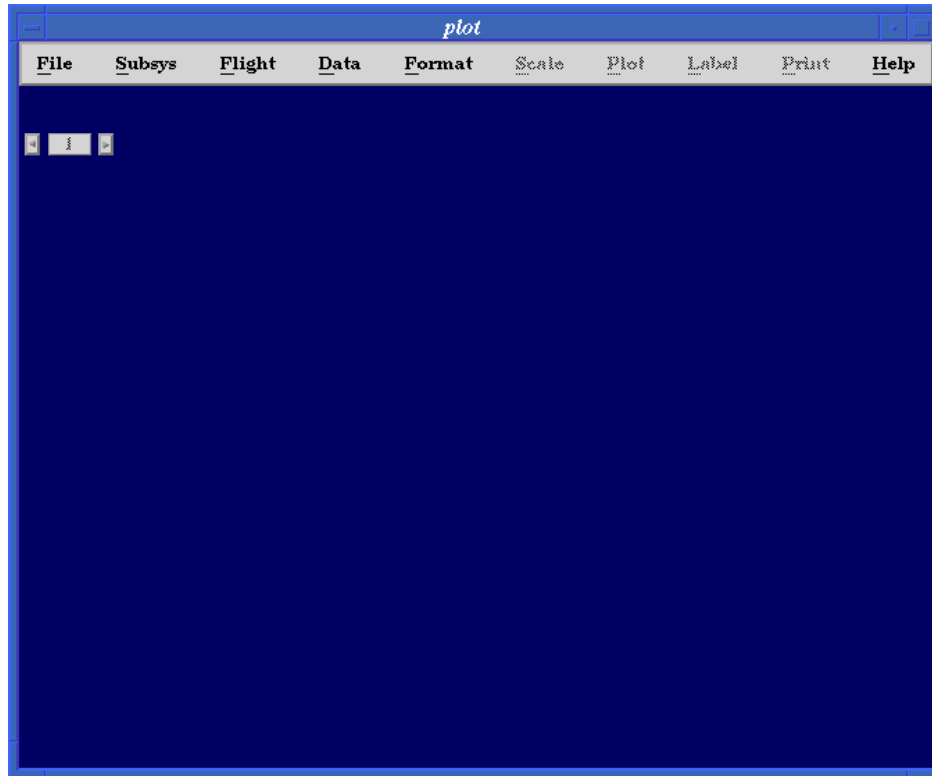


Figure 4-18. MEWS plot window

2. Update the Subsys and Flight items, as in Steps 3 and 4 in Section 4.1.3.1.

Note: Steps 3 and 4 are not necessary if format already exists. Existence of format should have been determined in Step 2, Section 4.1.3.2. If format already exists, go to View the Plot section.

3. Click on **Format**, then **Create Format File**. The Format Name is defined in the first window (Figure 4-19), Unix format. This should be something descriptive of the data to be plotted. Type in the name of the file and click on **Permanent** if this format is to be available for future reference (something you plan on regularly using) or **Temporary** if this is going to be used only for a day. Then click **Create**. This brings up the MEWS Format Editor.

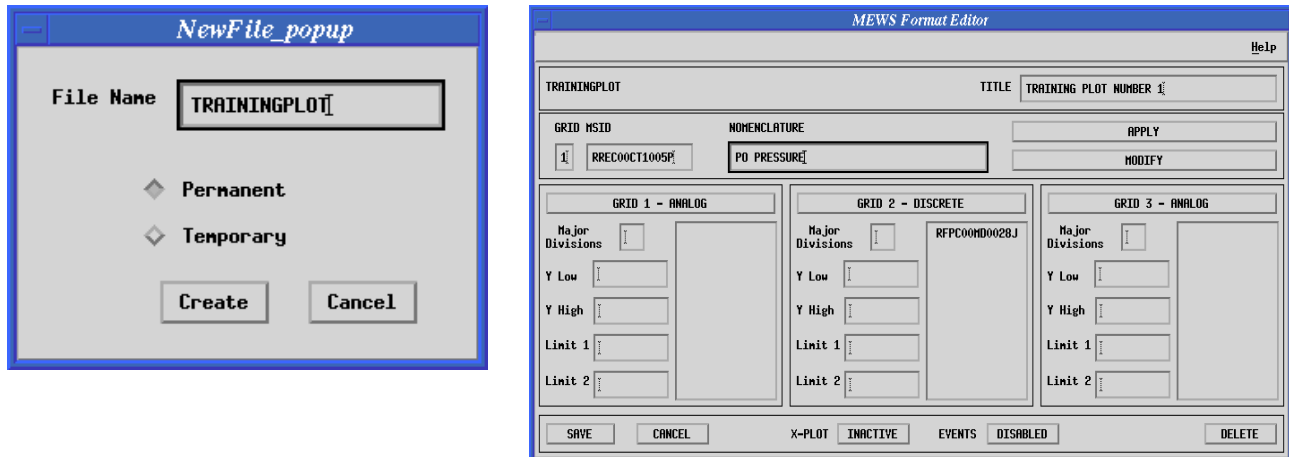


Figure 4-19. More MEWS plot windows

4. Enter the Title of the plot (spaces between words can be used on this screen). There are three grids that can be used. Enter the grid number. Under MSID, enter the MSID/PUI that is to be evaluated and under Nomenclature, type in an identifying name (spaces can be used here). Click **Apply**. Repeat, as necessary, to plot up to three grids at one time. When switching grids, a double click in that box is required. Click **Save** when all PUIs have been entered.

4.1.3.4 Viewing the Plot

1. When Request Status is complete, notice that on the Plot window the Scale, Plot, Label, and Print options are gray and cannot be selected.
2. Click on **Data** to bring up the plot file directory (Figure 4-20).

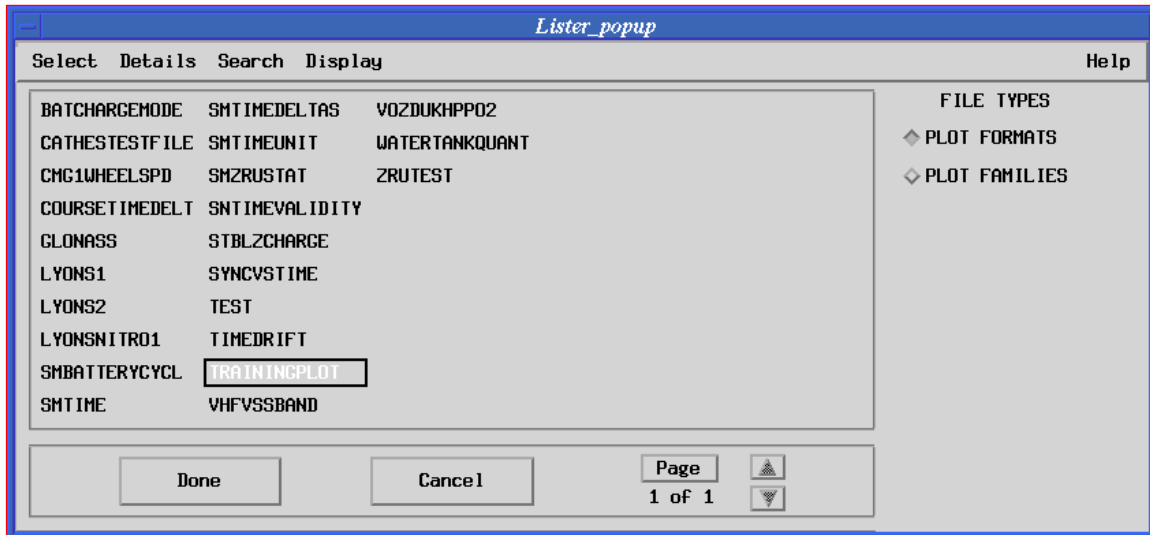


Figure 4-20. MEWS plot file directory

3. Highlight the data file. This is the one noted in Step 6 of Section 4.1.3.2. Click **Done**.
4. Select **Format**|**Select Format File**.
5. Highlight the Format file. Click **Done**.
6. The Plot selection is no longer gray and can be selected. Select **Plot** and **View Plot**.
7. Scale, Label, and Print selections are no longer grayed out and can be used, as required. Note that the Format and Data file names are in the upper right corner of the screen (see Figure 4-21).

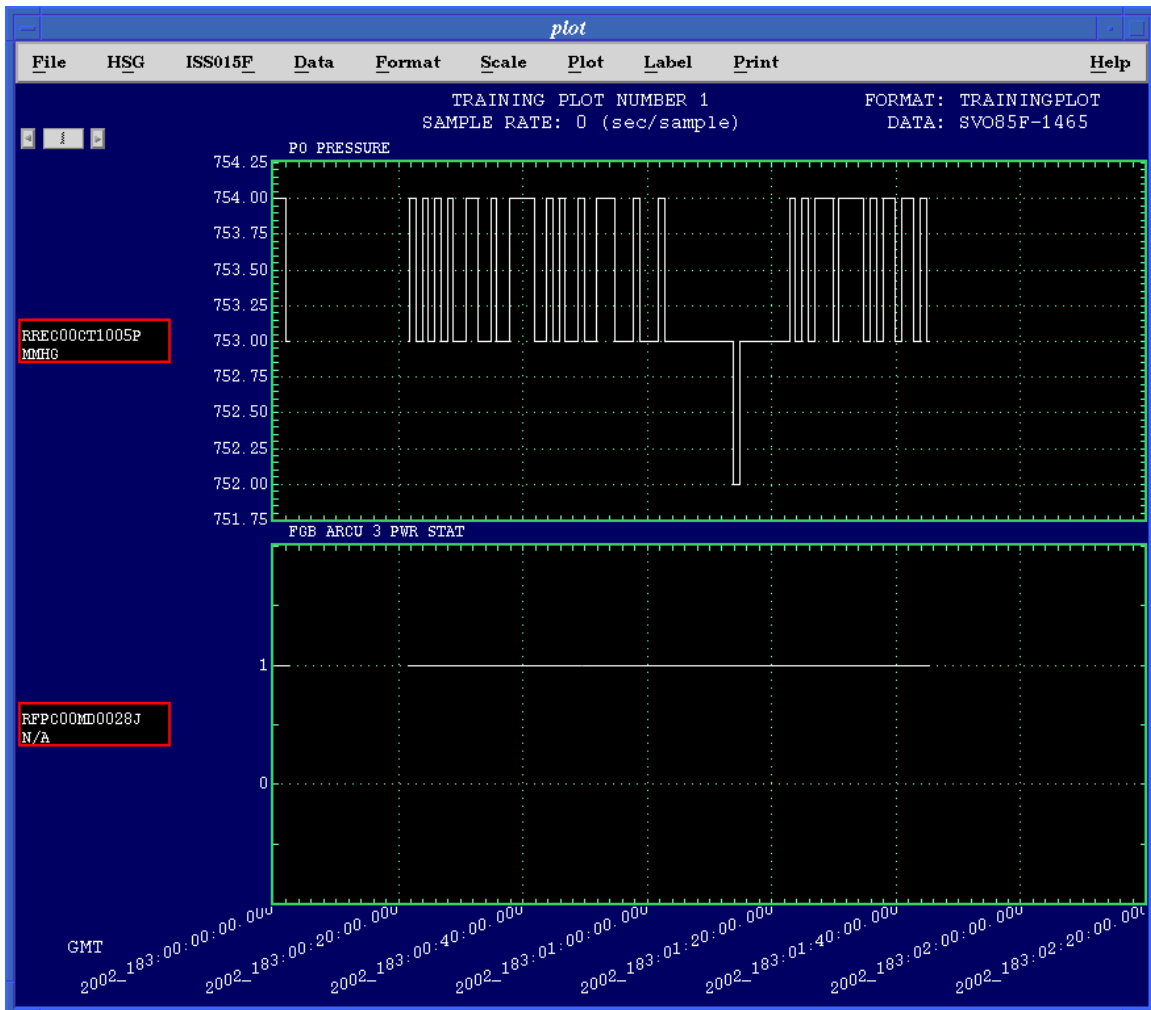


Figure 4-21. Example of plot

4.1.3.5 Viewing Tabular Data

1. From the MEWS start screen, click **Applications** and then **Tab**.
2. Define the Subsys and Flight.
3. Set up the format (same technique as in Section 4.1.3.4) for tabular data.
4. Request the data.
5. Select the **Data** file.
6. Select the **Format** file.
7. Click on the now available **Tab** button and click **To Screen** to view the table.

Note: **Be careful when printing the Tab option**, as this is a large amount of data and will use a lot of paper. There are 169 pages in the example shown in Figure 4-22.

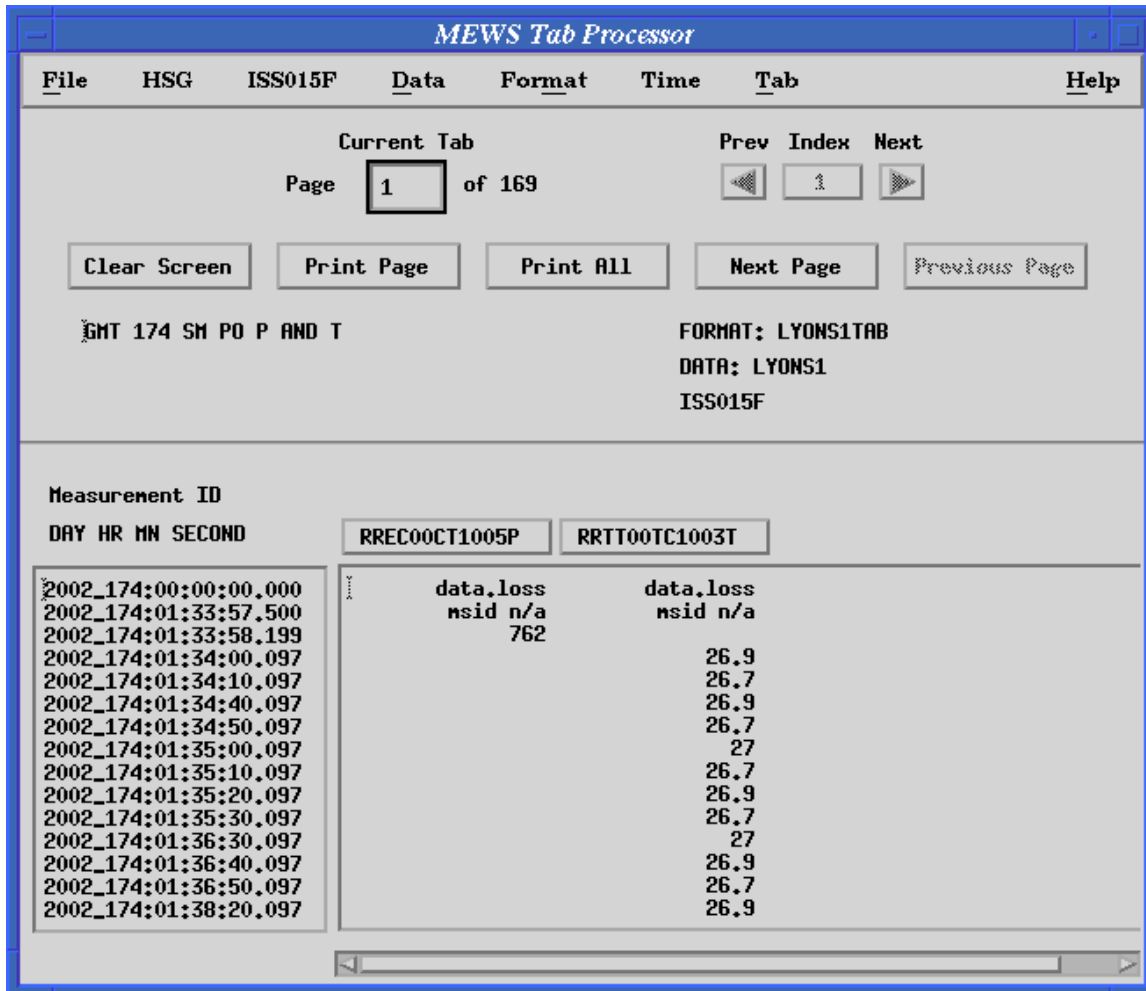


Figure 4-22. Example of Tab data

4.1.4 How To Use RTPlot

4.1.4.1 RTPlot Overview

RTPlot provides a means of plotting real-time or playback data PUI, MSID, or output from a workstation application. Each **plot** displays one or more Y-axis parameters against a single X-axis parameter. There is no constraint on the number of plots or the number of Y-axis parameters in a single plot. Plot data are stored in data files allowing the program to refresh the plot display and allowing RTPlot to be exited and restarted without losing previously plotted data. Three scaling options are allowed: continuous, windowed, and scrolled.

4.1.4.2 Program Operation

When the program is executed, a copyright dialog box, giving the program name, version, and author displays. This dialog disappears after ~5 seconds, or when a mouse button is pressed. The contents of the **plot** and **plot data** files are now loaded. Extensive error checking is performed on the plot file. If an error exists, a dialog explaining the problem displays and the program exits. Finally, the main window displays with plot icons, as shown in Figure 4-23.

The presence of a configuration file can modify the startup appearance; this lesson assumes that no configuration file is used.

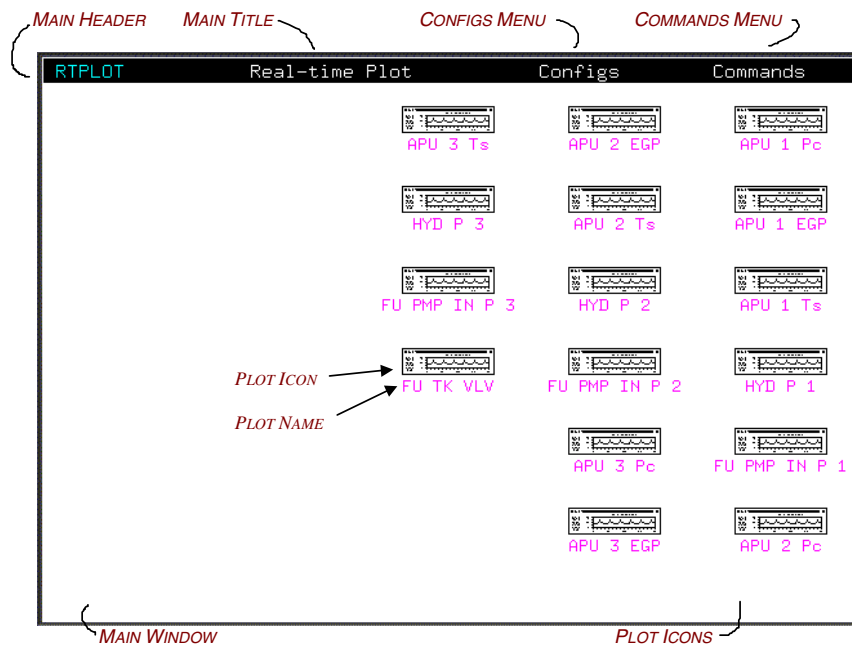


Figure 4-23. RTPlot main window

The main header is at the top. This header contains the program name (RTPlot), main title (user-definable), and the **Configs** and **Commands menus** (the presence of a Configs menu is user-definable). Below the header is the main window, which contains the plots and **plot icons**.

Note: The number and names of the plot icons varies depending on the user-supplied plot file.

Next, a dialog should appear indicating that a connection to the ISP server has been established. **If this dialog is not received, no new data will be plotted!** If the ISP connection is subsequently lost, a dialog is generated, and the program automatically attempts to reconnect. At this point, RTPlot is ready to start plotting data.

The icon consists of two parts, a representation of a plot and a **plot name**. The plot name is chosen by the user and should give an indication of what kind of data are contained within the plot. The name is usually **green**; if any of the data in the plot exceed user-defined limits, the name is shown in **red**. If the plot is disabled, the name is shown in white.

A **deiconified** plot is shown in Figure 4-24.

Movement is constrained to vertical or horizontal while the **Ctrl** key is held.

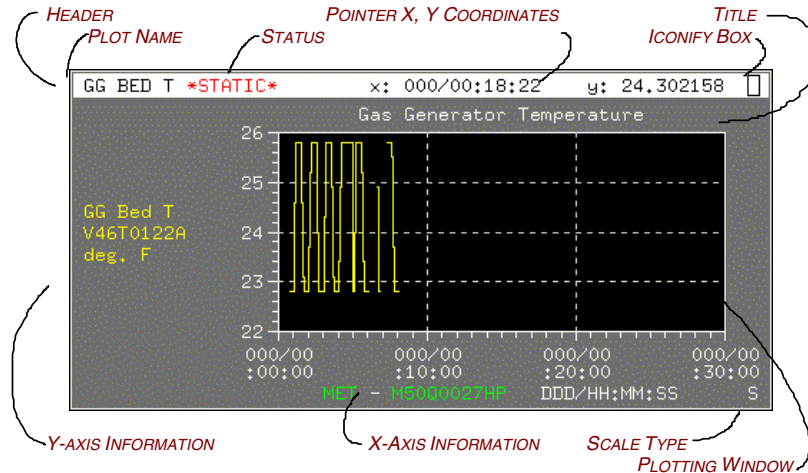


Figure 4-24. RTPlot example

The plot header contains the plot name, the status, and the iconify box.

The plot name is the same one that displays when the plot is iconified.

A status shows only when the ISP data needed by the plot (the X-axis parameter or **all** the Y-axis parameters) are static or otherwise unavailable (***STATIC***) or if the plot is disabled (***DISABLE***). The rectangular area where the data are plotted is the **Plotting Window**. Above it is the plot **title**. Below and to the left of the plotting window is the **X- and Y-axis Information** (MSID, name, and units).

The character in the lower right corner of the plot window indicates the **scale type** (**C** = Continuous, **W** = Window, and **S** = Scroll). The plot data and background colors are user-definable. This is described in detail in the Scale Type Command.

When the mouse pointer is in the plotting window (and if there is plotted data), the plot header also displays the **pointer X- and Y-coordinates**.

To display the **slope** of a line, place the pointer within the plotting window, press and hold the **left mouse button**, then move the pointer. A dashed line appears, passing through the point where the button was first pressed and the current pointer location.

The plot header now displays the **slope** of this line in place of the pointer X, Y coordinates.

Pressing and holding the **SHIFT key** while holding the **left mouse button** modifies the slope line behavior. The slope information is removed from the plot header and a **vertical cursor**, which moves in response to pointer movements, is drawn in place of the slope line. This cursor is reproduced on every other deiconified plot that has the same X-axis MSID (as long as the X-coordinate of the line falls within the plot's minimum and maximum X-axis values).

The X- and Y-axis minimum and/or maximum values can be changed (zoomed in) by pressing and holding the **middle mouse button** with the pointer within the plot (but not the header). The mouse pointer jumps to the upper left-hand corner of the plotting window, if outside the window. Moving the pointer causes a dashed rectangle to appear. When the mouse button is released, the plot rescales to display the selected **zoom** area.

4.1.4.3 Commands

The **Commands menu** from RTPlot is shown in Figure 4-25 and is discussed in Section 4.1.4.4.

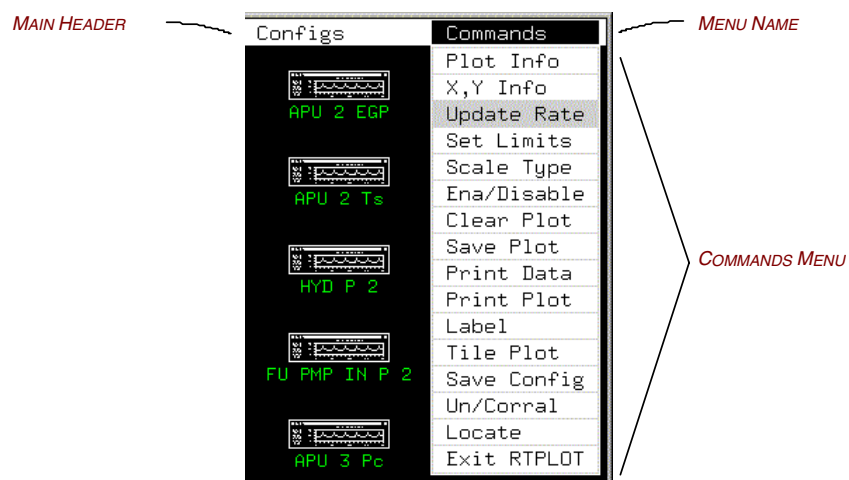


Figure 4-25. Commands menu

Plot Info

Plot info enters the **Information Mode** for the selected plot(s). The main window contents change, replacing the plots/icons with information on the selected plot (see Figure 4-26). The information header replaces the main **header**. Below this is the **RTPLOT Information** list, providing information on plot status, configuration, ISP parameters, and current values. The display is dynamic; showing changes to the parameter values and plot status in real time, while user-induced changes are made via

the **Commands** menu. The Y-axis parameter information color reflects the color of the data on the plot. If the plot information extends beyond the bottom of the main window, a **scroll bar** appears.

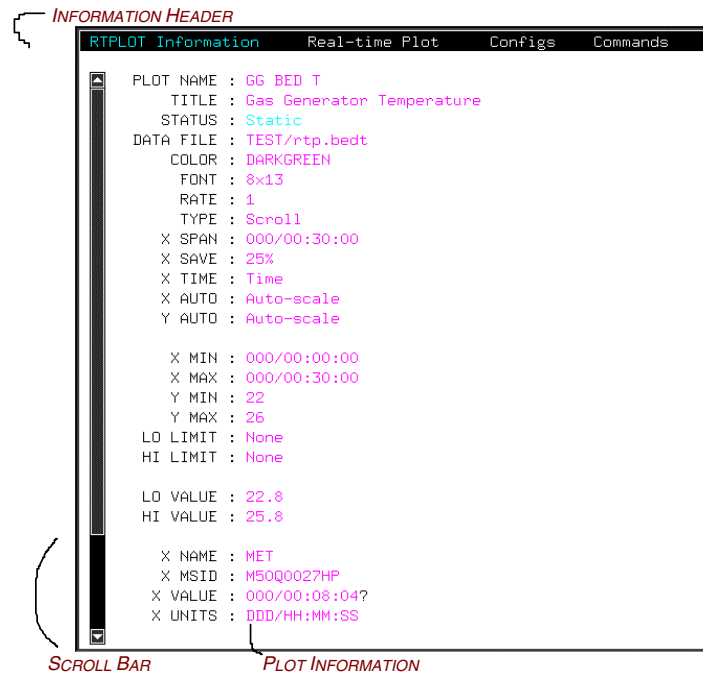


Figure 4-26. Information mode

X, Y Info

This command brings up the X, Y Information dialog box with mouse pointer **X- and Y-coordinates** when the pointer is in a plotting window with data plotted (duplicates the information shown in plot header). When a slope line is displayed (via the left mouse button, as described above) the dialog expands to show the **slope** and **difference** between the initial and current pointer locations (see Figure 4-27). To reposition the X, Y Information box, drag it to a new position using the **left** or **middle mouse buttons**. Select **X, Y Information** again or **right-click** on the dialog to remove it (see Figure 4-27).

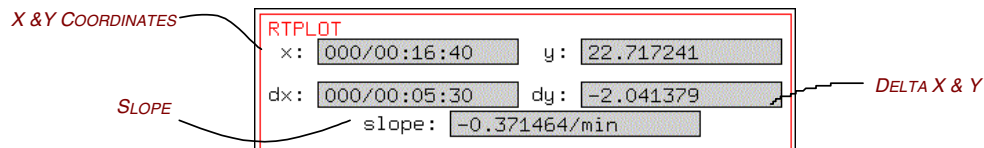


Figure 4-27. X, Y Information dialog

Update Rate

A dialog box appears where a new **update rate** can be entered. This rate is applied to all ISP parameters within the selected plot(s); only numeric values are valid. For example, if the rate input is 3, ISP parameters in the plot are plotted every 3 seconds (any data changes in between are ignored). Setting the rate to zero instructs the program to plot parameters at **full rate**.

Set Limits

The Set Limits command alters **boundaries (Bounds)** and **Limits** for the plot(s). The set limits dialog box is shown in Figure 4-28. The X- and Y-axis minimum and maximum scale values are set by entering new values in the respective **boundary boxes**. For **window** and **scroll** scale-type plots (described in the following paragraph), the difference between the maximum and minimum X-axis values determines the X-axis span. If the input box is empty, the program bases the minimum and maximum axis values on displayed data. When the **Auto-scaling box** is **green** (enabled) for an axis, RTPlot automatically adjusts the minimum and/or maximum axis values so that the data fit within the boundaries. With autoscaling off, the boundaries must be user defined.

An upper and/or lower **limit line** is displayed if a value is entered in the appropriate **Limits box**. The limit line is a **red** horizontal dashed line at the Y-axis value entered. If plotted data falls outside the upper or lower limit, the icon name is drawn in **red**. Erasing the input box value eliminates the limit line.

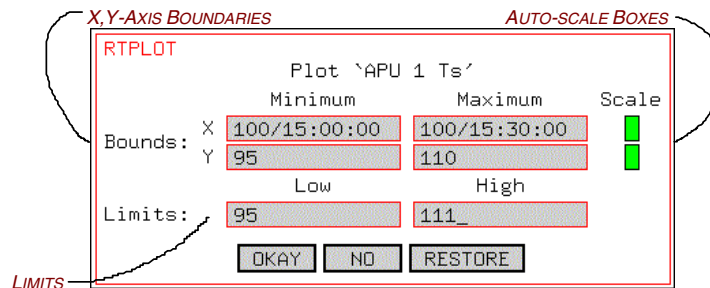


Figure 4-28. Set limits dialog

Scale Type

This command displays a dialog for one or more plots/icons, as shown in Figure 4-29.

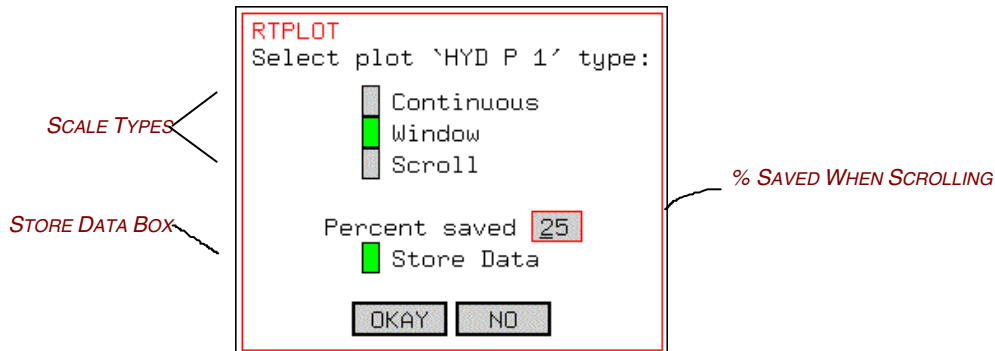


Figure 4-29. Scale-type dialog

Continuous

All plotted data are retained in the data file. If autoscaling is enabled, the X- and Y-axes automatically adjust to keep the plotted data visible.

Window

Only the user-defined time span of data is viewable. When the X-axis maximum time is exceeded, the scale shifts forward in time (the shift amount is user-definable using the store data box, as described below). The data no longer visible are still maintained in the data file.

Note: For the Window and Scroll scale types, the amount of data redisplayed on scrolling is adjustable by setting the **percent saved input box** value. For any scale type, by toggling the **store data box** off, all data storage for the plot is disabled. Plotting continues normally, but the selected plot clears if resized.

Scroll

Plot rescaling occurs as described for a Window plot. However, following scrolling, **only the visible data are retained in the data file.**

Ena/Disable

This command toggles the enable status for a chosen plot (or plots). When a plot is disabled, data are not plotted. The plot header indicates ***DISABLED***, and the icon name is in white. Execute the command again to reenable a plot.

Clear Plot

All plot data are deleted for the selected plot(s). The plot automatically begins plotting again when new data are received.

Save Plot

Following a confirmation, plot data are saved for the selected plot(s) to the file name indicated. The file name is the plot name with .sav extension.

Print Data

When executed, the program produces a listing, for each plot selected, of the plot X- and Y-axis parameter values and statuses in a tabular format. This information is output to the printer.

Label

This command allows a text label to be added to the plot. When the command is executed, the pointer changes to the crosshair shape. Click on the desired label position and a dialog appears, shown in Figure 4-30. Enter the desired **label text**. Select **ADD** to display the label on the plot. Click on an existing label to display the selected text in the input box. The text can be altered and then updated on the plot with the **ADD** box. Choosing **DELETE** removes the label from the plot.

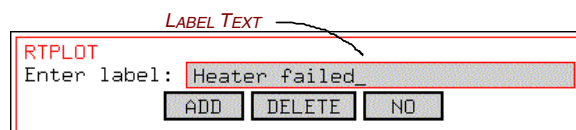


Figure 4-30. Label dialog

Tile Plot

This command provides a means of arranging a selected number of plots within a specified rectangular boundary. First, choose the plot(s) (or plot icons). Then, to determine the tiling area, click and hold on one corner of the desired area, and drag the pointer to the opposite corner, releasing the button at the opposite corner of the rectangular area. When the button is released, the selected plots are resized and repositioned to fit within the tiling area.

Save Config

This command stores the current configuration of the window size, class **iconification state, position, size, corral state, minimum and maximum X- and Y-axis values, limits, scale type, labels**, etc. for later use, providing for a quicker and easier setup. With the

use of the **Configs** menu, a user may switch between many saved configurations while RTPlot is operating.

Un/Corral

This command toggles the corral state. The matrices are normally **corralled** when the program is first started, so the deiconified matrices are constrained in position by the main program window. **Uncorralled** matrices may be moved freely.

Locate

This command brings up a list of all classes in alphabetical order for you to choose the one you are looking for.

Exit RTPlot

A dialog box appears asking for confirmation; if received, the ELOG main window is removed, the open files are closed, and the program terminates.

Configs Menu

A user-defined list of saved configurations, as described previously in the window operations portion of Section 4.1 of this document. These allow for quick setup of the ELOG program window with customized settings.

4.1.4.4 Information Mode

When the **information mode** is active, new items replace some of the **Commands** menu items, and others change function. These changes are described in the following paragraphs. Some of the commands require that a plot information parameter be selected, indicated by the mouse pointer changing to a crosshair-in-diamond. The information mode **Commands** menu is shown in Figure 4-31.

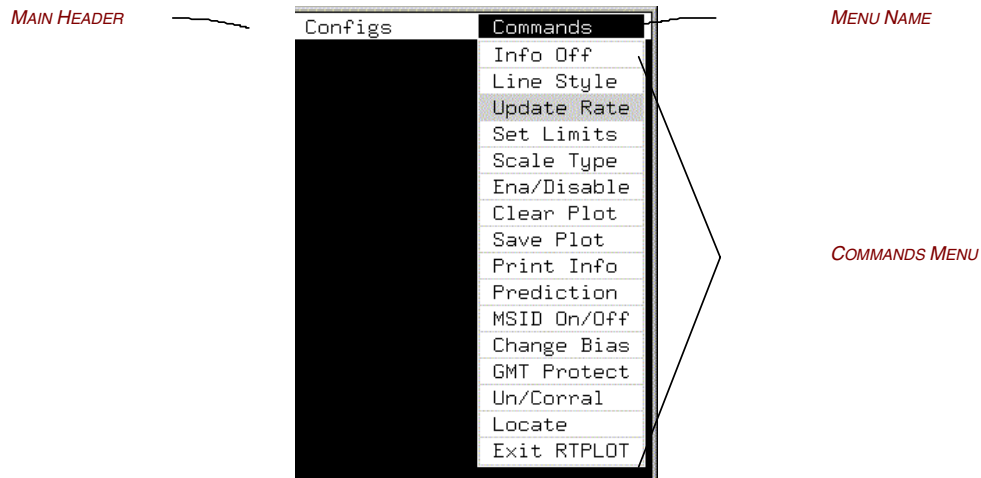


Figure 4-31. Information mode

Info Off

This command terminates information mode, restores the normal plot and icon view in the main program window, and returns the **Commands** menu to the original version.

Line Style

A Y-axis parameter must be selected for this command. A dialogue box then appears, as shown in Figure 4-32. Choose a **line style** by selecting the appropriate box. The line styles are **point** (only individual points are plotted), **direct** (a line is drawn between each point), **step** (a horizontal line is drawn from the left-most point to the X-coordinate of the next point, then a vertical line is drawn to the next point), and **endpoint** (only the last point is displayed on the plot). A text character can be drawn at each plotted point by typing the desired character in the **plot character** box. The information display updates to indicate the new line style.

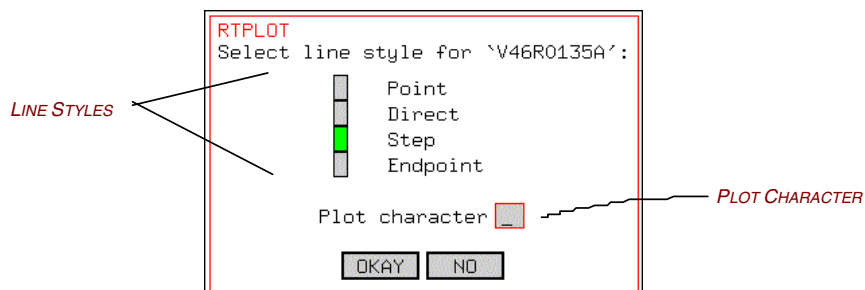


Figure 4-32. Line style dialog

Scale Type, Update Rate, Set Limits, Ena/Disable, Clear Plot

These commands operate in a manner similar to their noninformation mode counterparts, except that now only the information mode plot is affected.

Print Info

This command outputs event definitions for the currently selected class to the printer. The format of the output is similar to that shown in the main program window.

Prediction

This command can display a prediction line for each Y-axis parameter. Choose a parameter, and a dialog box is displayed, as shown in Figure 4-33.

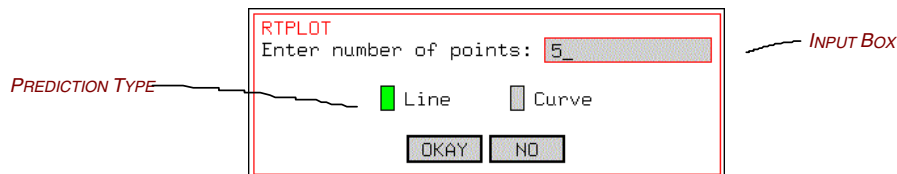


Figure 4-33. Prediction line dialog

Prediction Line Dialog

In the **input box**, a value is entered for the number of points on which to base the prediction. The **prediction type** is determined by selecting the appropriate box. A least squares method (straight line or parabolic curve) is used for the prediction calculation. The information display changes to reflect the prediction line. Entering zero for the number of points removes the prediction line.

MSID On/Off

This command requires selection of a Y-axis parameter. When selected, the enable status of the parameter is toggled. A parameter flagged as disabled has *****IGNORED***** displayed on the **Y MSID:** line and is no longer plotted. Selection of the parameter again reenables it.

Change Bias

After selecting the X-axis or a Y-axis parameter or a background line, a dialog box is displayed. Enter the bias value (\pm) and select **OKAY**. The bias value is displayed, along with the other parameter information.

GMT Protect

This command toggles the Greenwich Mean Time (GMT) jump protection flag. A confirmation dialog box first appears, indicating which action (activation or deactivation) will occur. When enabled, jump protection attempts to prevent bad ISP parameter time tags from corrupting the plotted data. If plotting playback data, this flag is turned off.

4.1.5 How To Use ELOG

4.1.5.1 ELOG Overview

The ELOG program provides a means to automatically log telemetry change events in real time. In ELOG, an **event** is a comparison between an ISP parameter and a constant. The comparison simply determines if one value is greater than, less than, or equal to the specified constant (number, text string, or parent word). The parameters used could be a PUI, MSID, or output from a workstation application. When the comparison is true, the event (tagged by GMT, Mission Elapsed Time (MET), and other user-defined parameters) is logged to a file and displayed in the program.

Note: ISP: The software that provides time-tagged, change-only telemetry and data from various sources to a workstation application.

Each event is assigned to one or more classes. A class is a user-defined group of related events created for easier event manipulation. Each class is represented by a separate window or icon in the ELOG main window. These windows can be manipulated in many ways. Changing class parameters can affect an entire set of events.

The program allows for acknowledging events. Acknowledging an event changes the colors in which it is displayed (the background turns black). This provides a means of visually checking off which events have been noted and dealt with. Counters are displayed showing the number of unacknowledged events and total events, by class, to aid in event tracking. There are numerous methods for acknowledging events singly or in groups.

ELOG has an **information mode** that provides the user with a means of examining and changing individual event parameters from within the program.

4.1.5.2 Program Operation

When the program is executed, a copyright dialog box, giving the program name, version, and author is displayed. This dialog disappears in ~5 seconds, or when a mouse button is pressed. The contents of the **event** file are now loaded. Extensive error checking is performed on this file. If an error exists, a dialog explaining the problem displays, and the program exits. Otherwise, if the **log** file already exists with logged events, a dialog box appears asking whether to keep the existing events or to

clear the file. If clearing the file is chosen, another dialog box appears that allows saving the existing log file. Finally, the main window is displayed, as shown.

At the top is the main header. This header contains the program name (ELOG), main title (user defined), and the **Configs** and **Commands** menus. Below the header is the main window, containing the classes and class icons. Note that the number and names of the class icons vary, depending on the user-supplied event file. If more than one class is defined, an All class is generated by the program that displays any logged event, regardless of class affiliation.

Next, a dialog should appear indicating that a connection to the ISP server is established. **If this dialog is not received, no new events will be logged!** If the ISP connection is subsequently lost, a dialog is generated and the program automatically attempts to reconnect. At this point, ELOG is ready to start logging events. When an event is logged, it is displayed in one or more classes. Classes and class icons are described below. A typical ELOG class icon is shown in Figure 4-34 of the main program window.

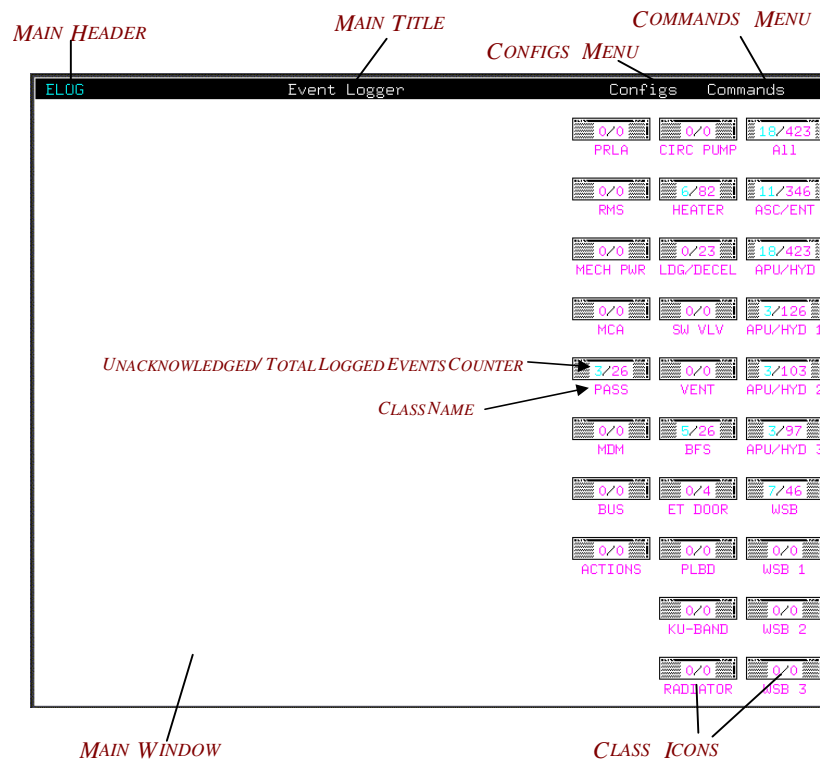


Figure 4-34. ELOG main window with class icons
(a negative image is used for ease of printing)

The icon consists of two parts, a pair of **counters** and a **class name**. The counters represent the number of unacknowledged logged events (in **red**; if this number is zero, it is **green**) and the total number of logged events for this class. The class name is

chosen by the user and should give an indication of what kind of events are contained within the class. The name is usually **green**; if all the events belonging to this class are **disabled**, the name is shown in **red**.

A deiconified **class** is a list of certain logged events, as shown in Figure 4-35.

The **class header** contains, from left to right, the **class name**, **status**, **event counters**, and the **iconify box**. The name is the same one that is displayed when the class is iconified. A status is shown only when **all** ISP data needed by the class are static or otherwise unavailable (***STATIC***), or if the class is disabled (***DISABLE***). The event counters are the same as when iconified: the number of unacknowledged events and the total number of logged events.

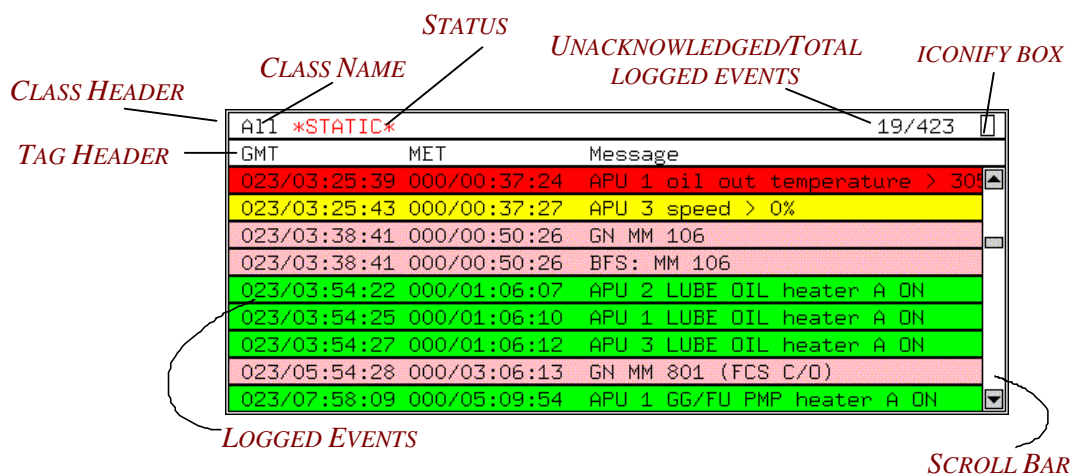


Figure 4-35. Deiconified class window

Below the class header is the **tag header**. The tag header contains the names for the individual columns in the events below it (the default is **GMT**, **MET**, and **Message**). Event tags are described in detail later. Tag events are time-stamped or tagged as they occur. Events can be tagged with other user-defined parameters as well.

The **logged events** are shown below the tag header. The tags and event text are aligned under the appropriate column in the tag header. The user in the event file determines the color used for the event text and background. **The event color scheme should reflect the nature of the event (information, malfunction, etc.)**. The event display area is empty (black) when no events have been logged.

By default, the latest logged event is shown below earlier events, but it is possible to reverse the display order (latest events on top). When the class event log is scrolled back (the latest log entry is not visible), subsequent logged events will not be seen. To notify the user of new events, the counters are incremented and the scroll area turns **red**. The scroll area turns white again if the log is scrolled.

Left click on a logged event, and the event is then **acknowledged**, as described above. An acknowledged event is shown in Figure 4-36. **Double-clicking the tag header acknowledges all the logged events in the class.**

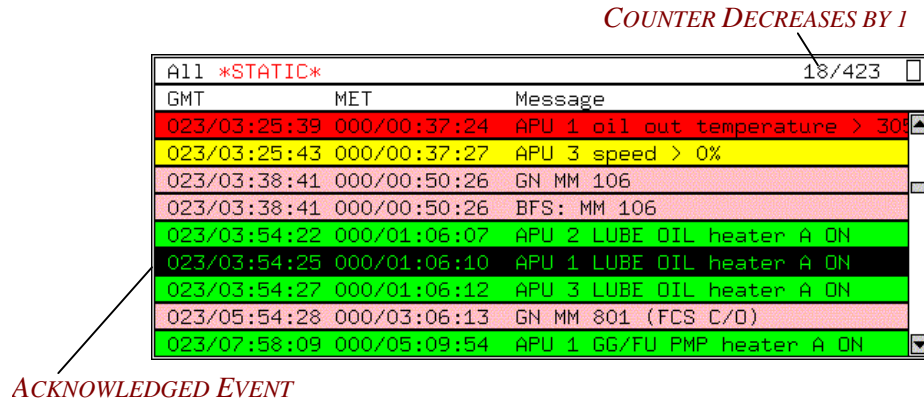


Figure 4-36. Acknowledge event action

Middle click on a log entry to view the **current value and status** of the parameter associated with the event. A dialog appears showing the parameter, status, and the last time (in GMT) that the parameter changed.

If a logged event is selected with both the **left** and **middle mouse buttons**, a dialog box appears allowing the logged event to be **deleted**. This should be used only to remove events that have been logged due to **bad data!** **Select and hold with the left button, and then press the middle button.**

4.1.5.3 Commands

Figure 4-37 shows the **Commands menu** for ELOG. The function of each command is described as follows. The menu appears above the Commands text if the main header is at the bottom.

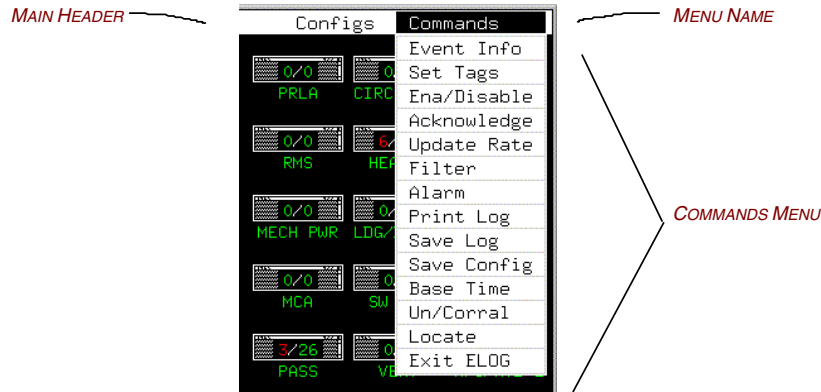


Figure 4-37. Commands menu

Event Info

When this command is executed (following the selection of a class), the program enters the **Information Mode**. The main window contents change, replacing the classes/icons with information on the events belonging to the selected class (see Figure 4-38). The **Commands** menu changes in Information mode; these changes are described later.

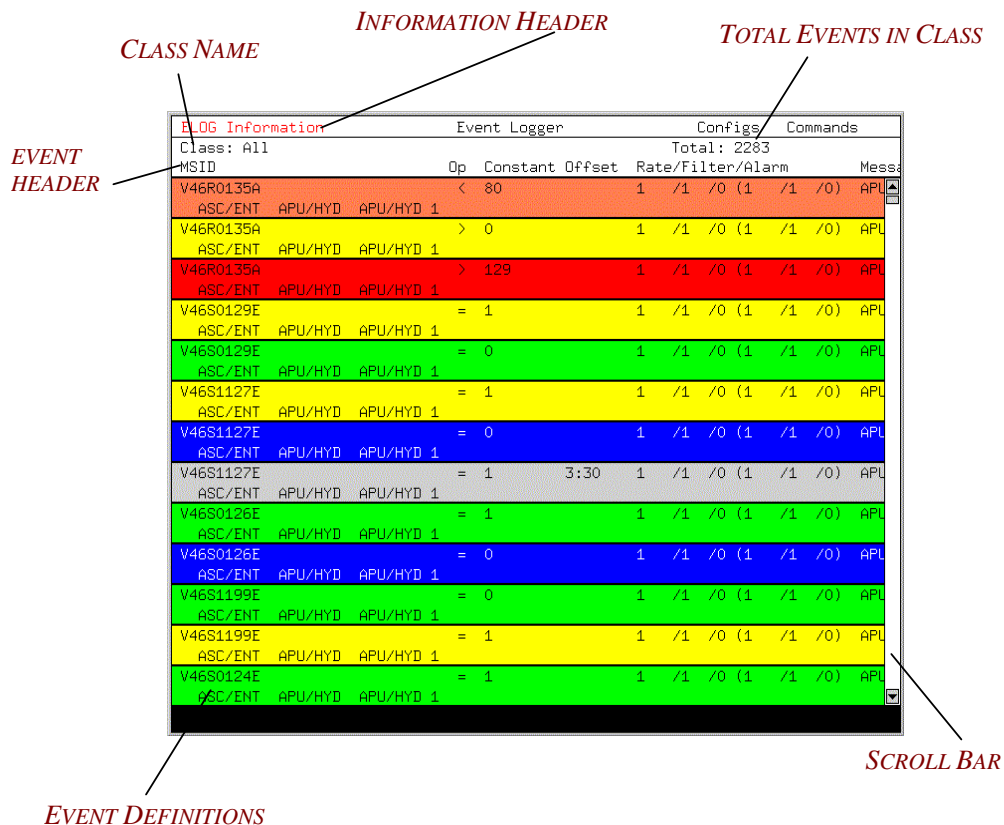


Figure 4-38. Information mode

The header is made up of the **information header** and the **event header** with the **class name**, the **total number of events** belonging to the selected class, and the column headers for the **event definitions**. The definitions describe the events in the selected class, including the event (**parameter**, **operator**, **constant**, and **offset**), the current and default **update rate**, **filter**, **alarm status**, and **text message**. The second row of the definition shows all the classes to which this event belongs. The **All** class does not appear in the list since, by default, all events belong to it.

Click on an event definition to display a dialog box containing the current value and status of the selected event's ISP parameter.

Each event appears in the event definition display color when it is logged. As a general practice, certain events are given color definitions that may be associated with the magnitude of the event and its effect on current operations.

Set Tags

Set Tags shows the available tags for the selected class (or classes). See Figure 4-39 for an example. Individual tags can be toggled on/off for display by selecting the adjoining **tag box** (tags are displayed when the box is **green**). **OKAY** removes the dialog, and the affected class(es) are redrawn to reflect any changes made. The default tags are GMT, MET, Event, Message. Up to 16 additional tags can be defined by the user.

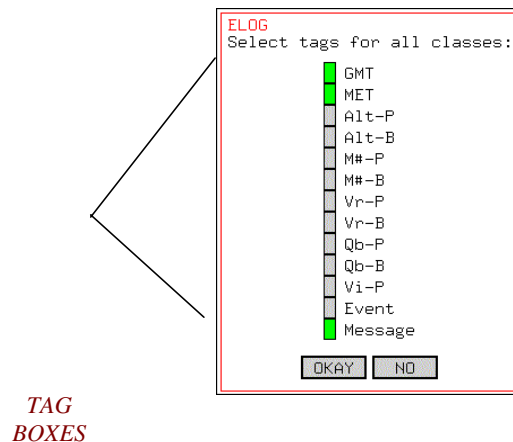


Figure 4-39. Tag selection box

Ena/Disable

This command toggles the enable status of the class (or classes) chosen. When disabled, all events belonging to the class will not be logged (even in the other classes to which the event belongs). The class header indicates ***DISABLED***, and the icon name is in **red**. Execute the command again to reenab a class.

Acknowledge

Logged events in the class(es) chosen become acknowledged. The class(es) are redrawn to reflect the acknowledged state, and the unacknowledged event counter in the class(es)/icon(s) is reset to zero.

Update Rate

A dialog box appears (see Figure 4-40) where a new update rate can be entered. This rate is applied to all events in the selected class(es), and only numeric values are valid. For example, if a rate of 3 is input, events in the class(es) selected are evaluated every 3 seconds (any data changes occurring in between are ignored). Setting the rate to zero instructs the program to process events at full rate. **DEFAULT** restores rates to values set in the event file.

Update rate: The delay, in seconds, between evaluations of an event's true/false status.

Full rate: The maximum rate at which a parameter is sampled and passed to ISP.

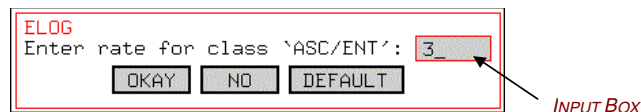


Figure 4-40. Update rate

Filter

Filter generates a dialog that operates similar to the update rate dialog described above. Only **filter values** greater than zero are valid. Example: If the filter value equals five, an event must be true for five consecutive checks before logging occurs. Recall that the time between evaluations is determined by the update rate. During periods of “ratty” data, events can be erroneously logged due to bad data values; setting the filter to a higher value can reduce or eliminate the spurious log entries.

Alarm

Alarm produces a dialog to set the alarm annunciation. Any nonzero value turns on the alarm, and zero turns off the alarm. If multiple events with alarms are logged simultaneously, only one tone sounds. Alarms should be limited to critical events.

Print Log

Any events logged to the class selected are printed. Only tags currently selected for viewing are printed. Other information (class name, flight number, and total logged events) is printed as a header.

Save Log

Following a confirmation dialog, the events logged for the selected class(es) are saved to the file name indicated. This file name is the class name with the .sav file extension.

Save Config

Save Config stores the current configuration of the window size, class **iconification state**, **position**, **size**, **corral state**, and displayed **tags** for later use, providing for a quicker, easier setup. With the use of the **Configs** menu, a user may switch between many saved configurations while ELOG is operating.

Base Time

When this command is selected, a dialog appears (shown in Figure 4-41). A time is entered into the input box in the **time format**. The time entered reflects a zero or base time from which all events will be temporarily referenced.

Time format: Time entered in the form DDD/HH:MM:SS (days, hours, minutes, seconds).

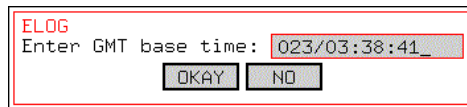


Figure 4-41. Base time dialog

OKAY changes the **MET** tag to **Delta Time**, and all times in this column now reflect the difference between **GMT** and the base time entered as shown in Figure 4-42.

Example: To find the difference in time between two events, set the base time to the GMT of the first event. The time of the first event is now 000/00:00:00, and the second event's **Delta Time** now shows the time elapsed since the first was logged. In the **Commands** menu, use **Restore MET** to restore the normal **MET** function.

HEADER CHANGES

GMT	Delta Time	Message
023/03:25:39	-00/00:13:02	APU 1 oil out temperature > 300
023/03:25:43	-00/00:12:58	APU 3 speed > 0%
023/03:38:41	000/00:00:00	GN MM 106
023/03:38:41	000/00:00:00	BFS: MM 106
023/03:54:22	000/00:15:41	APU 2 LUBE OIL heater A DN
023/03:54:25	000/00:15:44	APU 1 LUBE OIL heater A DN
023/03:54:27	000/00:15:46	APU 3 LUBE OIL heater A DN
023/05:54:28	000/02:15:47	GN MM 801 (FCS C/D)
023/07:58:09	000/04:19:28	APU 1 GG/FU PMP heater A DN

TIME TAGS CHANGE

Figure 4-42. Class showing delta time

Un/Corral

Un/corral toggles the corral state. The matrices are normally **corralled** when the program is first started, so the deiconified matrices are constrained in position by the main program window. **Uncorralled** matrices may be moved freely.

Locate

Locate brings up a list of all classes in alphabetical order for you to choose the one you are looking for.

Exit ELOG

A dialog box appears asking for confirmation; if received, the ELOG main window is removed, the open files are closed, and the program terminates.

Configs Menu

This is a user-defined list of saved configurations. These allow for quick setup of the ELOG program window with customized settings.

4.1.5.4 Information Mode

In **Information mode**, some of the **Commands** menu items are different and others change function, as described in the following paragraphs. Some commands require that an event definition be selected. The mouse pointer changing to a crosshair-in-diamond indicates these commands. The **Information mode commands** menu is shown in Figure 4-43.

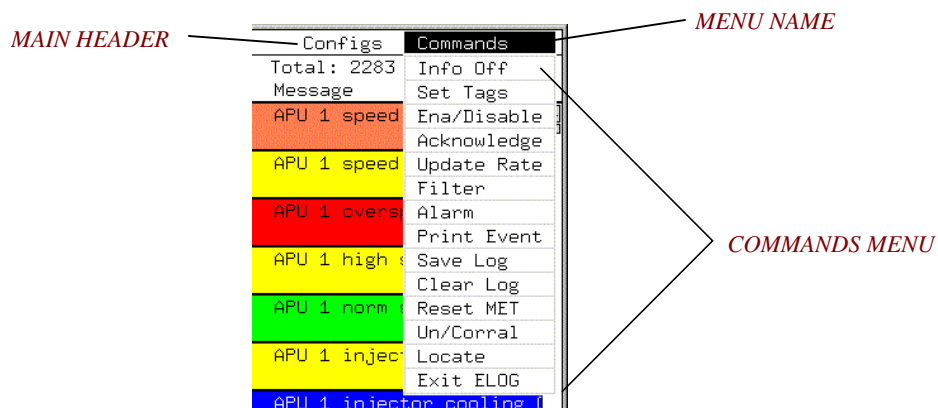


Figure 4-43. Information mode command menu

Info Off

Info off terminates information mode, restores the normal class and icon view in the main program window, and returns the **Commands** menu to the original version. Pressing a mouse button while holding the **Ctrl** key or another button also exits information mode.

Ena/Disable

Placing the mouse pointer over an event definition and pressing a button toggles the enable status of the event. When disabled, ***DISABLE*** appears at the right-hand side of the definition.

Acknowledge

When an event definition is selected, every logged occurrence in every class of the event chosen is acknowledged.

Update Rate, Filter, and Alarm

These commands operate in a manner similar to their noninformation mode counterparts, except that now only an individual event is affected. The event definition shows both the current and default values of these parameters (defaults are shown in parentheses). By using these commands, the current value for update rate, filter, and alarm status can be altered. Values changed by these commands are lost when the program is exited.

Print Event

This command outputs event definitions for the currently selected class to the printer. The output format is similar to the main program window.

Save Log

Following a confirmation dialog, the events logged for the current information mode class are saved to the file name indicated. This file name is the class name with .sav appended.

Clear Log

All log entries for the currently selected information mode classes are deleted from the log file. Even if a deleted event is a member of another class, it is still removed and can no longer be viewed in that other class.

Reset MET

When executed, ELOG attempts to recalculate the difference in time between the current GMT and MET. This difference is used to calculate the MET displayed as a tag in the classes.

Note: ELOG normally performs this calculation at startup. Once determined, this value is stored in the log file.

Remaining Commands

The remaining commands operate identically to the ones in the noninformation mode **Commands** menu.

4.1.6 Other DEC-Alpha Procedures

4.1.6.1 Moving Data Via FTP from OPS DEC Workstations to MAS PCs

- a. To File Transfer Protocol (FTP) from Operations (OPS) DEC workstations to Mission Activities Server (MAS) Personal Computers (PCs), you must have a MAS PC account.
 1. On the DEC, bring up a window (xterm), and enter **ftp mas-ftp**.
 2. When you are prompted for a user name, enter **jsc-mas<jsc mas username>** where <jsc mas username> is the user ID you use to log in to the MAS PC (probably the same that you use to log in to JSC PCs).
 3. When you are prompted for a password, enter your MAS PC password.
 4. Change to your group's directory. This is the one you have access to write to (e.g., > cd rio).
 5. You can now transfer files. Use "put" to copy files to the JSC-MAS server (e.g., > put filename).
- b. If the file is a bitmap, the FTP transfer mode must be changed to binary. Type in **binary** at the FTP prompt before transferring the file.
- c. You can also use XDIR or XFTP to make the above connection and transfer files.
- d. To access the files on a MAS PC
 1. Log in to the MAS PC.
 2. Bring up Windows Explorer and go to the directory V:\<Group>\<Group> OpsFTP. You should see the file(s) that you transferred.

3. You may wish to create a shortcut to the directory mentioned in the previous step. If you cannot find the above directory, it is also at [\\Jsc-mas-pf1\OpsFTP](#) \<Group>

4.1.6.2 Creating a .jpg Image of a DEC Window

1. Ensure that the window you want to make a .jpg of is open.
2. On the Master DNAV, go to “Global Apps → XV.”
3. Right click on the window that opens for the XV menu.
4. Click **Grab**.
5. Select the **Hide XV windows** button and click **Grab**.
6. Put the cursor on the title bar of the window you want to make a .jpg of and left click.
7. Select **Save** in the **xv controls** window (it reappears after Step 6).
8. Change the Format to JPEG.
9. Navigate to the folder where you want to save the file.
10. Give the file a name, but be sure to end it with .jpg and then click **OK**.
11. Select **OK** in the **xv jpeg** window.
12. The file is saved.

4.2 VOICE LOOPS

To the left and right of each console is a Digital Voice Intercommunications System (DVIS) panel. Each DVIS unit consists of a flat screen touch-activated panel (called a keyset) and headset jacks (below the console). The flat screen panel may be mounted in a computer console or freestanding on a desk or table. The headset is connected to the system by plugging it into a jack that is connected to the keyset.

The user controls the system by selecting various functions via the touch screen panel. The following section describes how to use the system.

Before using the system, the user must first activate and log in the keyset. When not in use, the touch screen goes blank. Touch the screen until a blank orange grid appears. At this point, use the following procedure to log in.

4.2.1 Logging in and Startup

1. Touch **SIGN ON**, and a numerical keypad appears.
2. Enter the four-digit ID number at the top of the DVIS panel or one of the RIO Generic IDs shown in Table 4-2.

You are now logged on to DVIS. You should see a screen that looks similar to Figure 4-44.

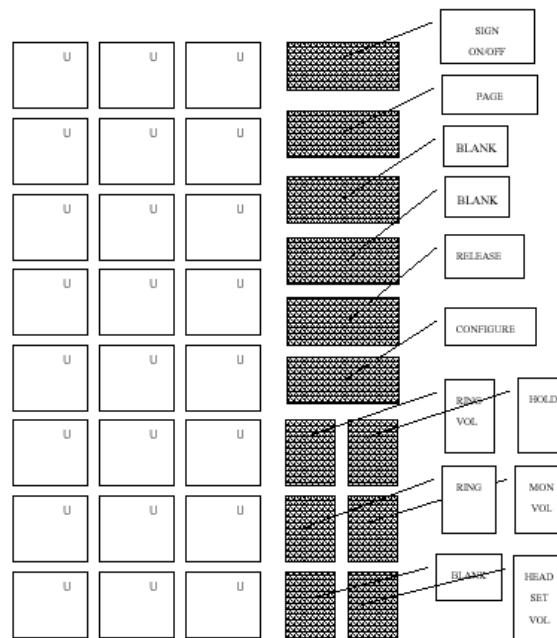


Figure 4-44. DVIS screen

Each keyset consists of 10 pages, and each page contains 24 configurable loops. Desired loops can be chosen from a universal list and configured by the operator.

The line keys on each page display loops available to the user. The first line is the supervision field that identifies the mode indicator. There are four mode indicators.

- M Monitor: configured for voice monitoring (listen only)
- HM High Monitor: configured for voice monitoring at full volume
- TL Talk/Listen: talk when push-to-talk is pressed (deselected when another loop is pressed)
- TLM Talk/Listen/Monitor: talk when push-to-talk is pressed

The bottom three lines of each key contain the loop name/description.

4.2.2 DVIS Basic Procedures

The following describes the most commonly used features of DVIS. For more information, refer to the Digital Voice Intercommunications Subsystem (DVIS) Keypad User's Guide (FAC-UG1432).

4.2.2.1 How to Activate a Loop

The example uses a loop with TLM capability.

1. Touch the desired TLM key once to activate monitor mode (supervision field highlighted). The user is connected to conference line to listen.
2. Touch selected TLM key again to activate Talk/Listen/Monitor mode (supervision field flashing). The user is connected to conference line to listen and talk. Press headset switch to talk.

Subsequent touches alternate between TL modes.

4.2.2.2 How to Configure a Loop

The example uses a loop with TLM capability.

1. Touch the desired location of the new loop.
2. Touch the **Configure** key.
3. Touch **<Select Partition>**.
4. For ISS, select **SSC** or for shuttle, select **MCC**.
5. Touch **<Alpha List>**.
6. Touch the letter of the alphabet that the loop starts with.
Note: You will have to cycle through a couple of times to get to the letter desired.
7. Highlight the desired loop by touching it or using the UP or DOWN arrows.
8. Select **TLM** from the right-hand side.
9. Select **Enter**.
10. Highlight the new loop to listen or touch again for talk.

4.2.2.3 How to Deactivate a Loop

In order to deactivate a loop, select the **Release** key, then the loop you wish to deactivate.

4.2.2.4 How to Sign Off from DVIS

In order to sign off the DVIS panel, hit the **SIGN IN/OUT** key and then hit **Enter**. The DVIS returns to the first screen.

4.2.3 Common RIO Loops

The panel at the RIO console is set up with the common RIO loops that must be monitored. They are listed in Table 4-1.

Table 4-1. Common RIO loops

Loop ID	Loop name	Loop use	Partition
S/G 1 and 2	Space to ground	MCC to Crew conversations on S-band	SSC
RS ISS VHF 1/2	Russian space to ground loops 1 and 2	Monitor Russian ground site voice to ISS	SSC
Trans R – E	Translate Russian to English (Loop 12)	Monitor Russian S/G calls	SSC
ISS AFD	ISS AFD	Prebrief/Debrief loop	SSC
ISS FD	FD loop	Communication with ISS Flight	SSC
ISS OPS	Loop 18	Talk to SRP/PRP, monitor SRP/PRP comm with Flight	SSC
FD	Shuttle Flight loop	Talk/listen to Shuttle Flight loop	MCC
HOUSTON SUPPORT	Loop 8	Discussion with HSG	SSC
HSG/RIO COORD	Loop 5	Used for more private conversation with HSG	SSC
RIO MOCR	RIO MOCR	Monitor this loop for calls from other FCT members	SSC
RIO INTRPTR	RIO Interpreter	Used for conversations between RIO and interpreters	SSC
RIO CONSULT	RIO consult	Additional Loop for RIO conversations	SSC
ASSY OPS	Assembly OPS	Talk/listen to the ACO loop	SSC
FCR SYS	Flight Control Room Systems	Talk to ISS front room systems personnel discussions	SSC
Simulation Loops			
RIO RUSSIAN TRANSLT	RIO Russian Translate	During sims, S/G1 and 2 comm translated to Russian for RSET	SSC
SIM ISS OPS	Sim ISS Operations	Simulated version of loop 18 ISS OPS	SSC
SIM HOUSTON SUPPT	Sim Houston Support	Simulated version of loop 8 HOUSTON SUPPT	SSC
SIM HSG INT	Sim HSG Internal	Simulated version of loop 5	SSC

4.2.4 RIO Virtual DVIS

The RIO has a set of virtual DVIS IDs assigned. These virtual DVIS IDs are used when DO International Liaison personnel have to support sims or real-time OPS at locations other than their normal console and need preconfigured DVIS pages. These virtual IDs are numbered 8001 to 8005 and 8021 to 8025. Some of these have been assigned to different individuals. The assignments are listed in Table 4-2.

Table 4-2. RIO virtual loop assignments

DVIS ID	Person	Pages	DVIS ID	Person	Restriction
8001	Fuller	1-5	8021-0001	Kabakov	Only one instance of these numbers at a time
			8021-0002	Buschow	
			8021-0003		
			8021-0004		
	Kaznica	6-10	8021-0005	Terp1	
8002	Zimmerman	1-5	8022-0001	Campion	Only one instance of these numbers at a time
			8022-0002	Landis	
			8022-0003		
			8022-0004		
	Boggs	6-10	8022-0005	Terp2	
8003	Harvey	1-5	8023-0001	Hayhurst	Only one instance of these numbers at a time
			8023-0002	Janda	
			8023-0003		
			8023-0004		
	Lloyd	6-10	8023-0005	Terp3	
8004	Lyons	1-5	8024-0001	Remko	Only one instance of these numbers at a time
			8024-0002	Zarechnak	
			8024-0003		
			8024-0004		
	Wester	6-10	8024-0005	Terp4	
8005	Baker	1-5	8025-0001	Shafa	Only one instance of these numbers at a time
			8025-0002	Eugene	
			8025-0003		
			8025-0004		
	Sverdlin	6-10	8025-0005	Terp5	

4.2.5 Other Frequently Used Loops

Table 4-3 and Table 4-4 list the frequently used loops for each console position for both shuttle and ISS, respectively. For a complete list of call signs and loops, reference

Space Station Program (SSP), FCOH Standard Operating Procedure (SOP) 1.4, and ISS FCOH SOP 1.2.1, JSC-29229.

Table 4-3. Frequently used shuttle call signs/loops

Call sign	Prime call loop	Console position
BOOSTER	MOCR SPEC	Booster Engineer
CAPCOM	FD	Capsule Communicator
DPS DPS SUPPORT CDMS	MOCR DPS/CDMS SSR-1	Data Processing System Engineer DPS Support Comm and Data Management System (SL)
EECOM LIFE SUPPORT THERMAL	MOCR SYS SSR-1 SSR-1	Electrical, Environmental, Consumables Manager Life Support Thermal
EGIL EPS	MOCR SYS SSR-1	Electrical, Generation, and Illumination Engineer Electrical Power System
EVA EVA TASK EMU SYSTEMS	MOCR SPEC EVA MPSR EVA MPSR	EVA Officer EVA Task Support Extravehicular Mobility Unit Systems
FAO MATS POINTING TIMELINE OCA	FAO REPLAN A/P COORD REPLAN OCA STS	Flight Activities Officer Message and Timeline Support Pointing Timeline Orbiter Communications Adapter Engineer
FDO	MOCR DYN	FLIGHT DYNAMICS OFFICER
FLIGHT	FD	FD
GC DFE COMMAND NIP SUP COMPUTER SUP HOUSTON VOICE HOUSTON TV WSS	GC CALL DFE COMMAND NIP SUPV SDPC SUPV-1 VOICE CNTRL HOUSTON TV WSS CALL	Ground Controller Data Flow Engineer Command Engineer Network Input Processor Supervisor Computer Supervisor Voice Engineer Television Engineer Workstation Support
GNC GNC SUPPORT	MOCR GNC/PROP SSR-1	Guidance, Navigation, and Controls Systems Engineer GNC Support (Orbit)
GPO	MOCR DYN	Guidance Procedures Officer
INCO INST COMM SUPRT	INCO INSTR COORD INCO SUPPORT	Integrated Communications Officer Instrumentation RF Com/Data Com

Table 4-3. Frequently used shuttle call signs/loops (concluded)

Call sign	Prime call loop	Console position
MMACS IFM MECHANICAL	MOCR SYS IFM COORD SSR-1	Maintenance, Mechanical, Arm, and Crew Systems In-Flight Maintenance Mechanical Systems Support
PAO	PAO	Public Affairs Officer
PAYCOM	POCC CMD	POCC Payload Commander
PAYLOADS SYS 1 DATA/SYS 2	PAYLOADS PL SYS/OPS ACTN PL DATA/OPS SPRT	Payload Officer Payload Systems Payload Data/Transfer
PDRS/RMS RMS SUPPORT RMS SYSTEMS	MOCR SPEC RMS COORD RMS COORD	Payload Deploy Retrieval RMS Support RMS Systems
PHASE-1 REP	PHASE 1 COORD	Phase-1 Representative
PL CUSTOMER	PRIME OPS/OPS ACT	POCC, Operations Directors
PL- SECONDARY	P/L CONF	POCC/CSR Secondary Payload Representatives
PROP	MOCR GNC/PROP	
RIO	RIO MOCR RIO CONSULT RIO INTRPRTR RUSSIAN CONSLT	Russian Interface Officer
RME-REP	RME COORD	
RNDZ	MOCR DYN	Rendezvous Guidance Procedures Officer
SURGEON BME	SURGEON MED OPS	Surgeon Biomedical Engineer
TRAJ	MOCR DYN	Trajectory Engineer

Table 4-4. Frequently used ISS call signs/loops

Call sign	Prime call loop	Console position
ACO ACO SYSTEMS ACO DATA	ASMBLY OPS ASMBLY COORD ASMBLY COORD	Assembly, Activation, and Checkout Officer ACO Systems ACO Data
ADCO HAWKI	ADCO HAWKI COORD	Attitude Determination and Control Officer – Motion Control Systems Momentum (H), Attitude (A), Angular Rate (W), Kinetic Energy (K), Moment of Inertia (I)
CATO STARCOM	CATO CATO MPSR	Communication and Tracking Officer Station RF Communication
CIO ISO PLUTO	CIO ISO ISS CIO COORD	Cargo and Integration Officer Inventory and Stowage Officer Plug-In and Utilization Officer
ECLS ACE	FCR SYS/ECLS SYS COORD/ ECLS MPSR	Environmental Control and Life Support Systems Officer Atmospheric Control Engineer
EVA EVA TASK EMU SYSTEMS	EVA EVA MPSR EVA MPSR	Extravehicular Activities Officer – ISS EVA Task Support EMU Systems
FLIGHT	ISS FD	FD
HSG	Houston Support MH08	Houston Support Group
ODIN RAVEN	ODIN ODIN MPSR/SYS COORD	Onboard Data and Information Network Officer – Command and Data Handling Resource Avionics Engineer
OPS PLANRPE RPE2 OCA	OPS PLAN OPS PLAN SUPT OPS PLAN SUPT OCA ISS/OPS PLAN SUPT	Operations Planning Officer Replanning Engineer (pronounced “rippy”) Replanning Engineer 2 Orbital Communications Adapter
OSO OSO SUPPORT	FCR SYS/OSO OSO MPSR	Operations Support Officer – Maintenance, Structural, and Mechanical OSO Support
PHALCON POWER	FCR SYS/ PHALCON SYS COORD/ PHALCON MPSR	Power, Heating, Articulation, Lighting, and Control Officer (Electrical Power System) Power
ROBO MSS SYSTEMS	ROBO ROBO Coord	Robotics Operations Systems Officer SSRMS Officer Real-Time Robotics Procedures Planner

Table 4-4. Frequently used ISS call signs/loops (concluded)

Call sign	Prime call loop	Console position
SURGEON BME	SURGEON ISS MED OPS	Flight Surgeon Biomedical Engineer
THOR TCON	FCR SYS/THOR SYS COORD/THOR MPSR	Thermal Operations and Resource Officer Thermal Control
TOPO TPS VVS	TOPO ISS TRAJ OPS ISS TRAJ OPS	Trajectory Operations Officer Trajectory Profile Support Visiting Vehicle Specialist

4.3 PC-BASED APPLICATIONS

4.3.1 JSC-MAS Account

This section includes information dealing with the PCs located in the Multipurpose Support Room (MPSR) and Flight Control Room (FCR) and their use associated with flights and sims. These PCs are used for flight support, such as the creation of an Anomaly Report (AR), a chit, or the review or creation of Flight Notes (FNs).

The PCs located in MCC-H are connected to the Johnson Space Center (JSC)-MAS server. This server is solely dedicated to Mission Operations Directorate (MOD) mission support and is inaccessible to the rest of the computer network. It holds information for the current activity, sim, or mission, such as FNs and Failure Impact Workarounds (FIWs).

To retrieve a forgotten password or to ask any other questions about the MAS domain (formerly the MODM server), call extension 26100 during office hours or 35665 during off-hours. The MCC PC enhanced support pager (281-467-0661) is also available for certain problems, such as those listed below.

- a. Occurrence or suspicion of virus activity
- b. JSC-MAS server unavailability (only JSC-MAS servers)
- c. Failure of MCC PC hardware (failure that makes the equipment nonfunctional, and no other PC may be easily used until Standard (STD)-hours)
- d. Inability to log in (account exists; already called 35665 to confirm password)

Note: The following **are not** covered by the 24-hour pager:

- a. Cannot receive e-mail
- b. Cannot see someone else's server (mail server, JSC-MOD-FSx, Flight Control Operations Division (FCOD), Boeing, etc.)
- c. Cannot print

4.3.2 PC Application Quick Reference

4.3.2.1 MCC-H Web Site Information

MCC-H real time – <https://ops1.jsc.nasa.gov/>

(Can also be accessed via Web site map → CONSOLE → MCC Real-time Gateway)

Joint Execute Package Development and Integration (JEDI)

Daily summary	(Tools → JEDI → Category filter → Daily summaries)
Radiograms (inc. Form 24)	(Tools → JEDI → Category filter → All Radiograms)
Orbiter Communications Adapter (OCA) messages	(Tools → JEDI → Category filter → All U.S. Items)
FNs	(Tools → EFN → Posn filter → RIO)
Planning Product Change Requests (PPCRs)	(Tools → PPCR)
Attitude timeline	(Systems → ATL)
Chits	(Tools → Chits)
ARs	(Tools → Anomalies)

OSTP Viewer (OSTPV)/IPV/RODF/Multiement Procedures Information

Onboard Short-Term Plan Viewer (OSTPV) (On MCC Gateway)
Activity info – right click
Procedure Manual Procedure Viewer (MPV) – double click
International Procedure Viewer (IPV) (On MCC Gateway)
U.S. procedures (English only)

Russian Operations Data File (RODF)	http://mod.jsc.nasa.gov/do3/ODF/RSA-ODF/index.html or at Web site map → CONSOLE → Procedures → RODF Bilingual
Multielement Procedures (MEPs)	http://mod.jsc.nasa.gov/do3/SODF/Products/MultiElement.cfm?IncludeEmer=false or at Web site map → CONSOLE → Procedures → SODF → SODF Procedures → Multielement procedures Bilingual. MEPs are part of Station Operations Data File (SODF)

4.3.2.2 DO International Liaison Web Information

(WWW: <http://mod.jsc.nasa.gov/do13/>)

Console

HSG daily news	https://mod2.jsc.nasa.gov/do13/HSGDaily/ HSG/RIO handover, RS Daily Status Report, RS Knowledge Base, NASA IP faxes
RS Knowledge Base (KB)	https://mod2.jsc.nasa.gov/do13/kb/
Flight rules	http://mod.jsc.nasa.gov/Da8/rules/
HSG mission data	http://mod.jsc.nasa.gov/do13/missions/index.cfm?id=11A Flight Rules, Flight Plan, Assembly Operations Handbook (AOH)

Console/Procedures

SODF	http://mod.jsc.nasa.gov/do3/SODF/
RODF	http://mod.jsc.nasa.gov/do3/ODF/RSA-ODF/
Ops Nom	http://mod.jsc.nasa.gov/do3/ODF/OpNom/ Must adhere <ol style="list-style-type: none">Two hundred Russian acronyms that do not translateAnnex D: RS terminology

Products/Databooks: All databooks: Check panels and labels.

Products/OIP

Information Exchange Rules Generic Operations Interface Procedure (OIP)
http://mod.jsc.nasa.gov/do13/OIP/SSP-50643_Gen_E.pdf
Must adhere
a. Loop protocol
b. Volume A (all)
http://mod.jsc.nasa.gov/do13/OIP/SSP_50643_A_E.pdf

Partners/Russia

ISS Lexicon <http://iss-www.jsc.nasa.gov/ss/issapt/lexicon/>

4.3.3 MCC Web Applications

The MCC-H Web site is intended to be the main “front door” to all Web-based information in the Control Center for both real time and sim for ISS and Space Transportation System (STS) operations. Contrary to popular belief, it is far more than just JEDI. It includes Web-based anomalies, chits, Electronic Flight Notes (EFNs), I am GO (IMGO), Information Management System (IMS) search, JEDI, PPCRs, ISS, and STS planning products and information, systems and trajectory data, reference documents, and more.

4.3.3.1 Gateway Login

The MCC-H gateway is located at <https://ops1.jsc.nasa.gov/gateway/> (see Figure 4-45). The gateway allows users to choose between Mission and Sim 1, Sim 2, or Sim 3. For all real-time work, the user should click on the appropriate Mission button (**ISS Users** or **STS Users**). For sims, the FD typically directs all users to the correct sim Web site. At the login prompt that appears, the JSC-MAS Domain login and password should be entered.

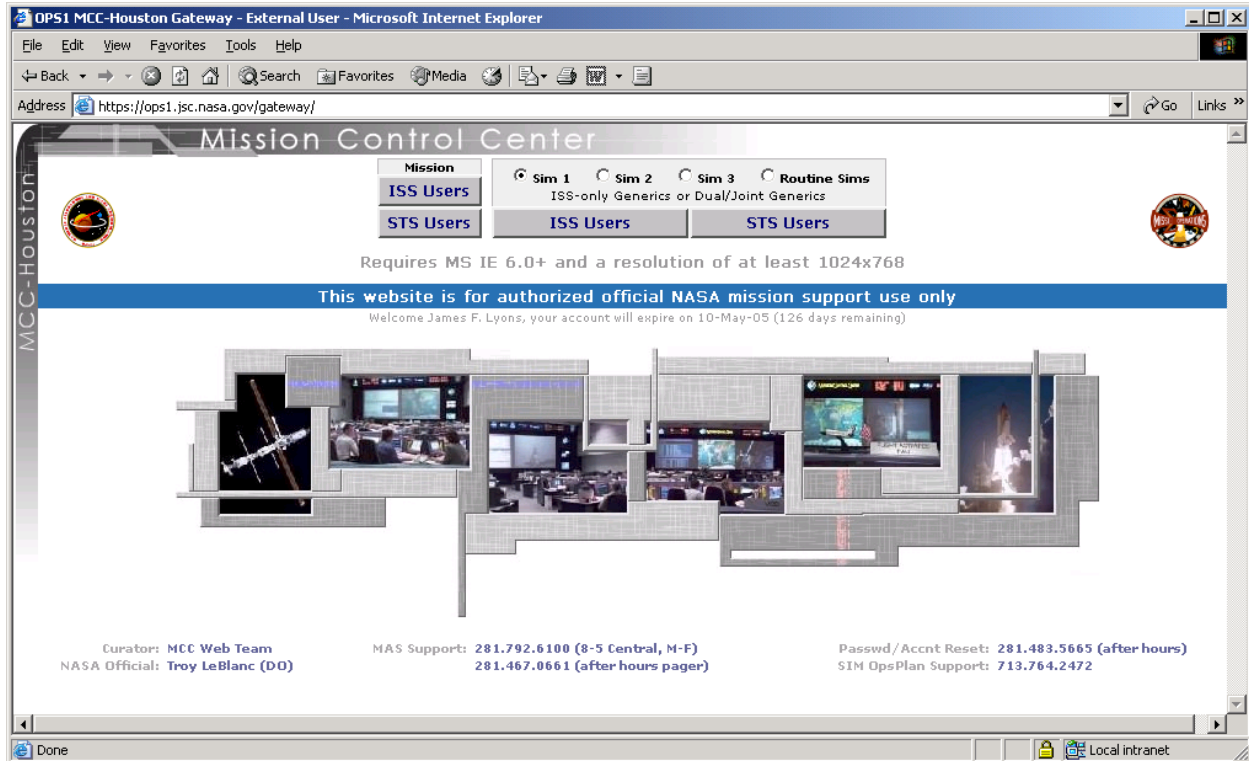


Figure 4-45. MCC-H home page

4.3.3.2 ISS Real Time

A menu bar at the top of the page provides several buttons to direct the user to different resources (see Figure 4-46).

Tools – The most often used is the Tools menu, which directs you to

- a. Anomalies
- b. Flight Notes
- c. IMGO
- d. IMS search
- e. ISS JEDI
- f. PPCRs



Figure 4-46. ISS Tools menu

The Tool Comments menu is a link to JEDI developers, and the **Tool Info** button links to a status sheet of tool updates (a JSC username and login may be required to access Tool Info).

Planning – The Planning menu (Figure 4-47) links to ISS Plans, the ISS Replan Policy, and other useful links.



Figure 4-47. ISS Planning menu

Systems – The Systems menu (Figure 4-48) links to the

- a. Status Report (formerly the ISS 0800 Report)
- b. Attitude Timeline (ATL)
- c. Caution and Warning (C&W) spreadsheet
- d. Command Error Tracking Web site
- e. Environmental Control and Life Support System (ECLSS) home page
- f. Power, Heating, Articulation, Lighting, and Control Officer (PHALCON) operational data
- g. PCS home page
- h. Plug-in-plan home page
- i. Stage Portable Operations Computer Control Board (S-POCCB) home page
- j. Multiplexer/Demultiplexer (MDM) software configuration spreadsheet



Figure 4-48. ISS Systems menu

Trajectory – The Trajectory menu (Figure 4-49) provides links to the ISS and STS Orbit Tracks, Reboost Profile, and Viewing Opportunities.



Figure 4-49. ISS Trajectory menu

Engineering – The Engineering menu (Figure 4-50) provides links to

- a. Items for Investigation (IFIs)
- b. Problem Reporting and Corrective Action (PRACA) System
- c. Professional Versioning Control System (PVCS) home page
- d. Vehicle Master Data Base (VMDB)



Figure 4-50. ISS Engineering menu

References – The References menu (Figure 4-51) provides links to

- a. Emergency Mission Control Center (EMCC) procedures
- b. FCOH
- c. FCT On-Call List
- d. Flight Rules
- e. ISS Imagery Web site (DIMS)
- f. MCC-H/Payload Operations Integration Center (POIC) Joint Operations Integration Plan (JOIP)
- g. International Partner (IP) information (electronic copies of faxes, OIPs, etc.)



Figure 4-51. ISS References menu

The menu bar also contains links to quickly redirect you to the STS real-time Web site or back to the MCC-H gateway.

4.3.3.3 STS Real Time

A menu bar at the top of the page provides buttons, similar to the ISS real-time options, to direct users to different resources.

Tools – The most often used is the Tools menu (Figure 4-52), which directs you to

- a. Anomalies
- b. Chits (Section 4.3.2), Joint FNs
- c. STS-only FNs
- d. STS JEDI

The Tool Comments menu is a link to JEDI developers, and the **Tool Info** button links to a status sheet of tool updates (a JSC username and password may be required to access Tool Info).

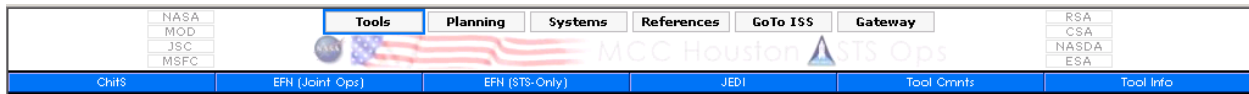


Figure 4-52. STS Tools menu

Planning – The Planning menu (Figure 4-53) provides links to the Flight Plans home page, Flight Data File (FDF) Status Sheets, and the Integrated Operations Plan (IOP) home page.



Figure 4-53. STS Planning menu

Systems – The Systems menu (Figure 4-54) provides a link to the Portable Onboard Computer Control Board (POCCB) home page, where users can find information about the Payload General Support Computers (PGSCs).



Figure 4-54. STS Systems menu

References – The References menu (Figure 4-55) provides links to

- a. EMCC Procedures
- b. FCOH, Flight Rules
- c. STS Imagery Web site



Figure 4-55. STS References menu

The menu bar also contains links to quickly redirect you to the ISS real-time Web site or back to the MCC-H gateway.

4.3.3.4 Use of JEDI

JEDI is a Web utility that provides an integrated capability to generate and manage ISS and shuttle crew messages and execute packages. JEDI is used to display messages for the crew and ground and can be searched by increment, category, and title.

Note: Although the crew does use JEDI to see its messages, they use a different format than the ground sees. Internet Explorer is the recommended Web browser for using JEDI, as certain features do not work with Netscape or other browsers.

Login

JEDI is accessed from the MCC-H Web page, found at <https://ops1.jsc.nasa.gov/>. A link to this page is available from the home page when a user opens Internet Explorer from a Mission Operations Computer (MOC) MCC server (JSC-MAS) personal computer. From the MCC-H page, click on the **Tools** button, then ISS JEDI or STS JEDI. The list shown is a numeric list of all messages for that increment or flight.

OCA Messages

a. Message numbers

Every note officially sent to the crew is given a message number. This number is the unique identifier for the message. ISS JEDI has developed a message number format of XX-YYYY, where XX is the increment and YYYY is the message number (e.g., the first message of Expedition 5 was 05-0001). The STS JEDI is slightly different, in that the increment (or flight) number is not displayed as part of the message number. Instead, the flight must be selected from the flights scroll-down menu. A straight numeric list directs the user to the desired message.

b. Creating messages

Messages are usually created from FNs or e-mails to the OPSPLAN inbox. Once a FN is approved by flight for uplink, OPSPLAN informs the Replanning Engineer (RPE) or RPE Support and asks them to turn it into a JEDI message. E-mails become JEDI messages as soon as they are received by the OPSPLAN. The OPSPLAN team assigns a message number and attaches the appropriate file.

c. Colors

JEDI uses different colors to identify the status of messages at a glance. Table 4-5 identifies several of the colors and their uses.

Table 4-5. ISS uplink status colors

Pink	Awaiting inputs
Purple	In work
Yellow	In review
Green	Approved
Light Grey	Uplinked
Dark Grey	On hold
Black	Cancelled
Brown	Deleted onboard
Blue	Confidential
White	Ground message (not uplinked to crew)

d. U.S. On-Orbit Segment (USOS) daily summary

The USOS daily summary is an ISS message that is uplinked every day. If a user has a very short message to convey to the crew, words may be submitted via an internal note to OPSPLAN to be incorporated into the daily summary.

e. Joint messages

During shuttle flights, messages are sometimes sent up to both the ISS and the shuttle. Instead of having to submit two separate messages, one message can be submitted to either the Flight Activities Officer (FAO) or OPSPLAN team as a joint message. The message will receive two message numbers, one for ISS (with the XX-YYYY format) and one for shuttle (with just the YYY format). The message must be approved by both Flight Directors (FDs) before it can be uplinked to either crew.

JEDI Use

- a. Select the **TOOLS** button on the MCC Web site main nav bar.
- b. Select **ISS JEDI** or **STS JEDI** from the light blue menu bar.
- c. Select **Update** to refresh the main message status list, bringing the 2-week calendar back to today, and clearing the Title Search field.
- d. On **ISS JEDI**, current increment messages are selected by a pulldown selection list next to the **Update** button. The current increment is the default. You may also view two increments worth of messages using the **Cur & Prv** selection option.

STS JEDI displays the current or most recent flight by default. To find previous flights, click on the down arrow next to the Flights field to select the desired flight.

- e. On ISS JEDI, message categories are selected via the following pulldown category selection list:
 1. All U.S. items (default – no radiograms)
 2. All radiograms (ground only)
 3. Daily summaries
 4. Actions
 5. Daily updates
 6. New procedures
 7. Refs

- 8. Future events
- 9. Uncategorized items

Selecting one will filter the Uplink Status display to show only those items that belong to each category.

Note: The All U.S. Items category ignores radiograms because of the huge list of messages it would otherwise have to display. Given the difference between U.S. and Russian message numbering systems, the U.S. messages would be buried many pages down beneath a mountain of radiograms.

- f. Title Search remains active across all category or Items/Pg settings. Click **Update** or **Clear** to end search.
- g. Items/Pg determines how many messages/uplink items are to be displayed on one page. The default is 50.
- h. Paging is controlled by the bar that looks like: <l < 1 2 3 4 5 6 7 8 9 10 > |>
<l = go to first page
|> = go to last page
= go to specific page
= page you are on
> = list next 10 pages and open middle page of that group
< = list prev 10 pages and open middle page of that group
- i. Russian and English translations are provided for each message. The colored cell indicates which version was specified for uplink. If a single message contains both language translations, a single block with one hyperlink will span both language columns.
- j. The 2-week calendar block along the bottom of the display provides links to lists of All Daily Mail for each day (analogous to Execute Packages). These lists are built automatically when an applicability date or range for a message is specified. You may scroll the calendar display to the right or left in 2-week steps using the arrows. The green box, which denotes today, rolls over at midnight, Houston time.

4.3.3.5 ChitS

Chit is another term for Mission Action Request (MAR). It is a formal request between real-time support groups. The chit is most often used between the FCT and the Mission Evaluation Room (MER) to request engineering and/or safety analysis, but is also used between the FCT to the Increment Management Center (IMC) (e.g., to request crew time for an activity) or for real-time coordination between IPs.

Chits are written to ensure that all decisions and procedure changes are documented in writing to prevent confusion during coordination or in later communications. Chits should be written in a clear and concise manner.

Chits are electronically created in Microsoft Word using Web-based JEDI on the JSC-MAS server. They are submitted to the Spacecraft Analysis (SPAN) console using Microsoft Word macros built for chits. The chit file is a Word file and can be revised accordingly. Users must have a JSC-MAS account and be assigned to an approved organization to have access to the Chit System (ChitS). The Web-based ChitS is used by both ISS and shuttle FCTs.

Procedure

a. Login

1. ChitS is accessible from both ISS and STS JEDI. To log in, go to <https://ops1.jsc.nasa.gov/>. See Section 4.2 for instructions on the MCC-H page.
2. Click **Tools** → **ChitS** from the menu bars at the top of the screen.
3. If the user is a member of multiple organizations, the user is given the choice to log in as a member of one of these organizations (Figure 4-56). The user selects the group for whom they would like to author and respond to chits and clicks **OK**.

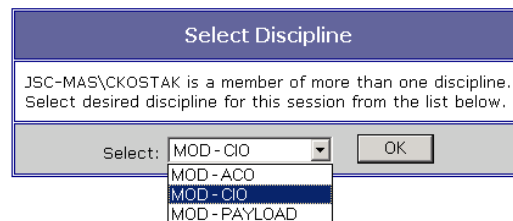


Figure 4-56. ChitS organization selection

4. The ChitS main screen appears (Figure 4-57). From this screen, users can read, author, and respond to chits. Also available from this screen are the search criteria filters.

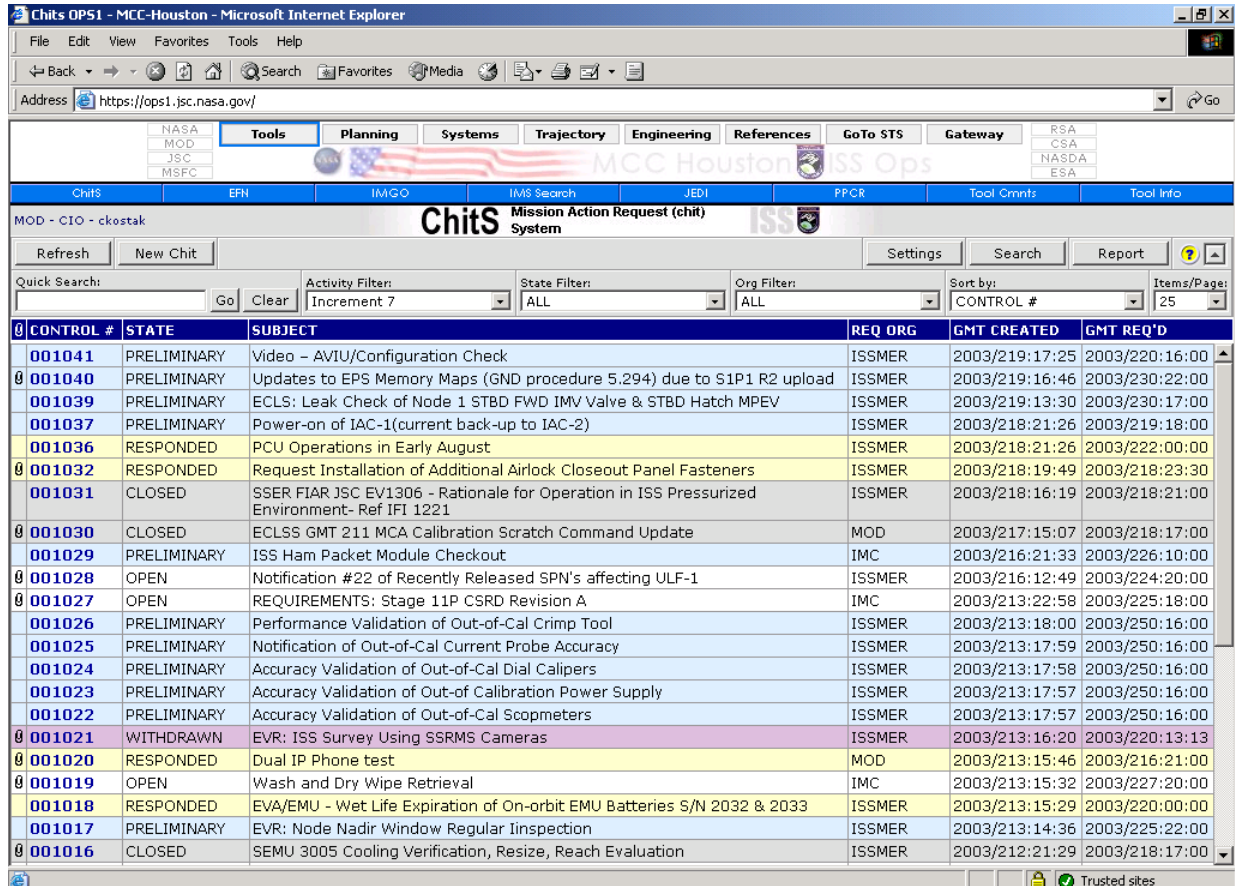
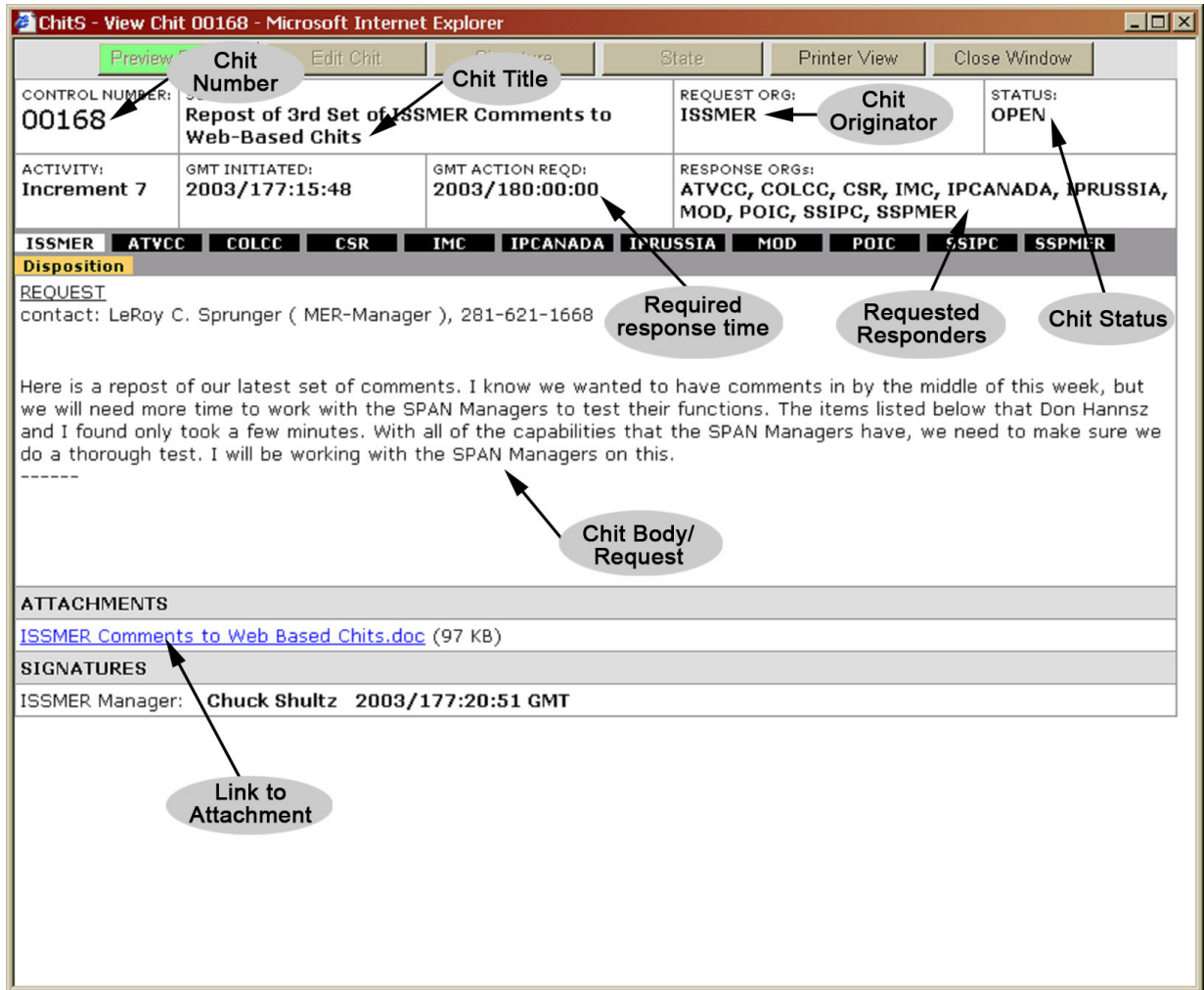


Figure 4-57. ChitS main screen

b. Reading a chit

To read a chit, click on the blue bold number in the Control # column. The chit opens as a separate Explorer browser window. Figure 4-58 provides an explanation of the chit screen.



jsc36496-t_016r1.tif

Figure 4-58. Chit screen explanation

Reference and Definitions

Chit States

There are six states of chits: Preliminary, Open, Responded, Disposition, Closed, and Withdrawn. Below is a description of each state and the criteria to be moved from one state to the next.

- a. Preliminary – Chits in this state are in work by the originator and not yet open for formal review by the responders. Prelim chits are submitted to Spacecraft Planning and Analysis (SPAN) when the originating organization is ready to open the chit for review by the responders.

To be opened by SPAN, preliminary chits must first be signed by the organization manager.

- b. Open – Chits in this state have been signed by the requesting organization’s manager and submitted to and opened by SPAN. These chits are available for review by responding organizations.
 - 1. Once a chit is opened by SPAN, there will be no changes to the originator’s request. If there are changes that need to be made, the chit must be withdrawn and resubmitted as a new chit.
 - 2. Chits cannot be transferred back to the Preliminary state from the Open state.
- c. Responded – Chits in this state have been responded to by all requested responding organizations, signed by responding organization managers, and are ready for originator disposition. In the Responded state, the originator and/or originating organization manager type in the disposition.
 - 1. Once in the Responded state, no changes can be made to the request or responses unless coordinated and approved through SPAN.
 - 2. With SPAN approval, a chit can be transferred from the Responded state to the Open state. SPAN, as the process owner, is the only discipline that can perform this function.
- d. Disposition – Chits in disposition state have had all responses integrated and dispositioned by the originating organization manager. In this disposition, the requesting manager states a forward plan, summary, and/or actions with accompanying estimated completion dates. The Disposition tab is editable only by the chit originator and/or SPAN while in the Responded state.
 - 1. SPAN transfers chits to the Disposition state when all responses have been integrated and dispositioned by the originating organization manager.
 - 2. Once in the Disposition state, the chit is not updated again until the Disposition actions are closed and the chit is ready to be transferred to the Closed state.
 - 3. Not all chits require a Disposition, but the tab is a default for all chits. SPAN manages moving a chit from Responded to Closed if a Disposition is not necessary.
- e. Closed – Chits in the closed state have been either responded to or dispositioned by the requesting organization manager and are ready to be archived. Only the chit process owner, SPAN, can place a chit into the Closed state upon confirmation from the originating organization that all disposition actions are complete.

No controllers should be operating from Closed chits. Any change in operations in a Closed chit should be covered by other execute documentation.

- f. Withdrawn – A chit in any state but Closed can be withdrawn. Information in a withdrawn chit should not be used for operational decisions. Originators can withdraw Preliminary chits; SPAN must withdraw chits in any other state.

Refresh

The ChitS main screen is updated automatically every 30 seconds. The main screen can also be updated by clicking the **Refresh** button in the top left of the ChitS field.

4.3.3.6 Electronic Flight Notes

EFNs are written to ensure that all decisions and procedure changes are documented in writing to prevent confusion during coordination or in later communications. FNs should be written in a clear and concise manner. An FN is required if

- a. There is a change to crew procedures (FDF/SODF) or timeline (Flight Plan, Rendezvous timeline, etc.)
- b. There is a change to ground operations procedures (e.g., JOIP) or timelines (e.g., OST or MST)
- c. There is a decision or coordination that must be approved by both ACO/PAYLOADS and payload representatives or other customers
- d. A message must be read to the crew
- e. Information must be provided to the entire FCT

If the action required is so time-critical that an FN cannot be written before action is taken, an FN is written after the action is complete.

During shuttle-only flights, payload customers can send FNs only to Payloads. However, for ISS operations, the Payload Operations Director (POD) can create their own FNs through the ISS JEDI program.

There are three types of FNs.

- a. Working note – These notes are viewable only by members of the same flight control discipline. They are often used to save an FN in work for review by the FCR or MPSR. They can also be used to document information for later internal review.
- b. Internal note – Messages sent to other controller disciplines are internal notes. An example would be a note sent from ACO to FAO requesting that an additional task be performed for a payload that is malfunctioning. Internal notes can also be used for interdiscipline coordination before submitting an FN.
- c. Flight Note – FNs can be seen by the entire FCT. They are used for information that must be reviewed by the whole team and need FD approval.

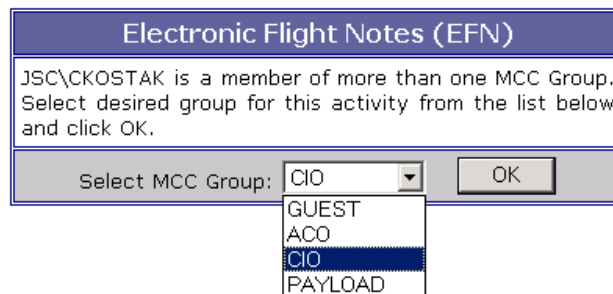
FNs can be written from the Control Center, the office, or anywhere else (remote Payload Operations Control Center (POCC)) that JEDI is available, provided the user has access to the JSC-MAS domain. The EFN system is the same for both ISS and shuttle.

The following procedure identifies how to write FNs and the process by which DO32 flight controllers develop FNs and review them on console.

Procedure

a. Log in

1. The EFN system is accessible only from the MCC-H page. To log in, open the real-time (or sim) MCC-H page (see Section 4.2 for more information on the MCC-H page).
2. Click **Tools** → **EFN** from the menu bars at the top of the screen.
3. Select the MCC group from which you would like to write and view FNs and click **OK** (see Figure 4-59).



**Figure 4-59. Electronic Flight Notes (EFN)
login screen**

4. The EFN main screen appears (see Figure 4-60). From this screen, you can read and write FNs, internal notes, and working notes, and sort or search by different fields.

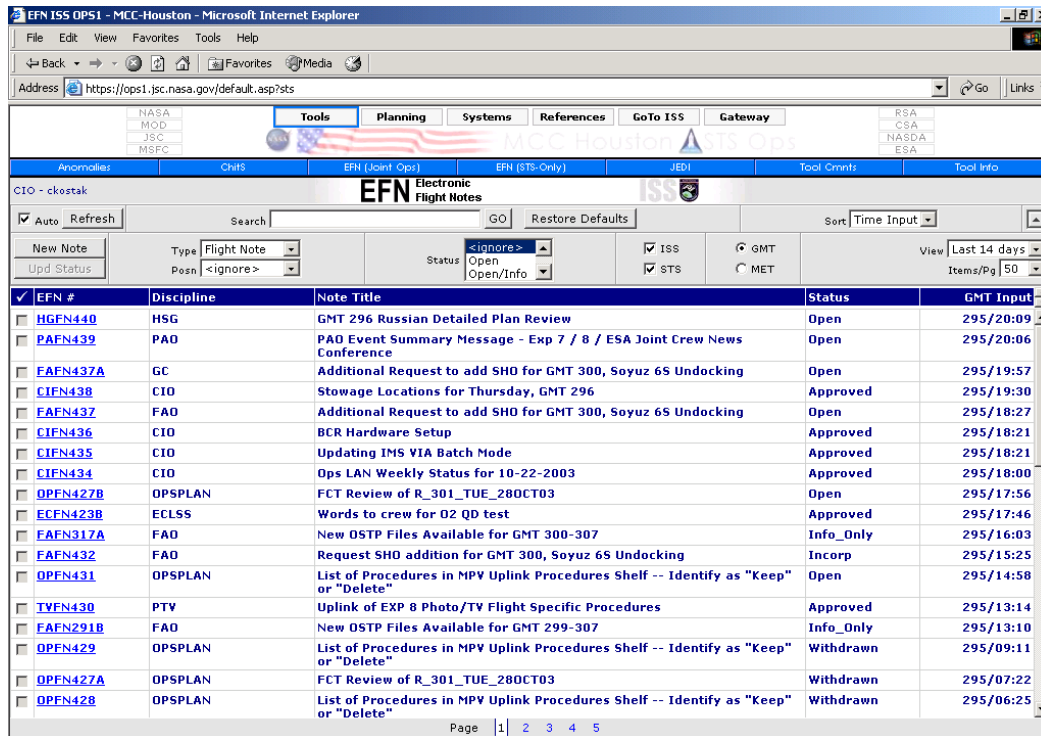


Figure 4-60. EFN system main window

b. Reading EFNs

To read an FN, click on the underlined FN number in the EFN # column. The FN opens as a separate Explorer browser window. See Figure 4-61 for an explanation of the Flight Note screen.

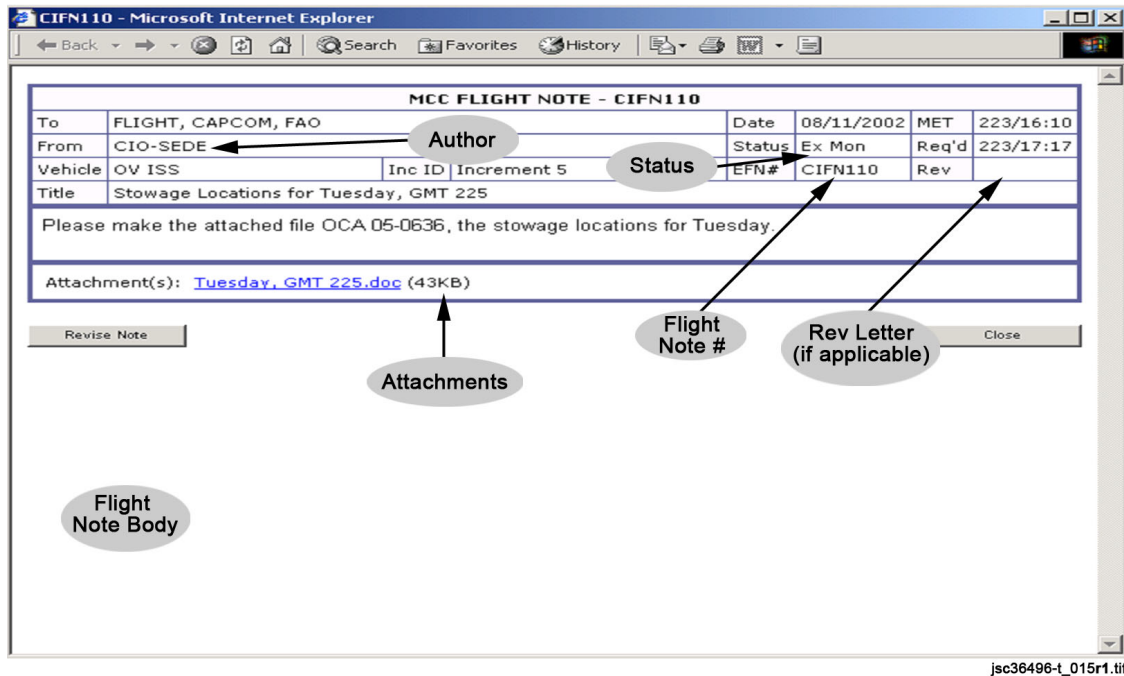


Figure 4-61. MCC Flight Note screen explanation

c. Other EFN system information

1. The MCC PC system can display FNs according to various criteria, including
 - (a) FN, inbox note, working note
 - (b) Position the note was created by
 - (c) Status (i.e., all notes, open notes only, closed notes only)
 - (d) ISS only, shuttle only, or both

2. MCC PC can also perform searches. To perform a search

Type the selected search string in the Search field and click **GO**.

The EFN system automatically refreshes its screen when the **Auto** button is selected. If the Auto refresh is not working, the user can select the **Refresh** button to the right of the Auto box and perform a manual refresh. If an expected note is still not visible, clicking the **Refresh** button at the top of the screen may help.

4.3.3.7 PPCR

PPCR is used to add, modify, or delete an activity in the Onboard Short-Term Plan (OSTP). This can be done for a crew or ground activity. A PPCR is used when a

change to a published timeline OSTP is to be made. Anyone with access to JSC-MAS can submit a PPCR. The only people who can edit any given PPCR are members of the discipline responsible for that PPCR or a member of the OPS PLAN team. Only members of the OPS PLAN team can update a PPCR status and approvals.

Access the PPCR tool by going to the MCC-H page, navigate to the **Tools** tab, then click on the **PPCR** tab (see Figure 4-62).

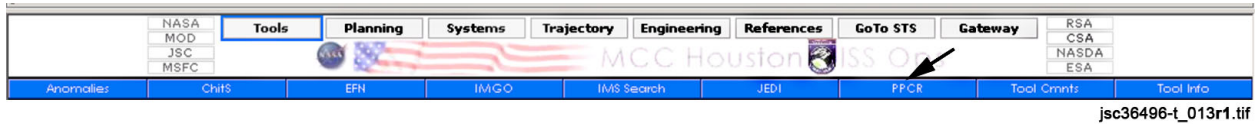


Figure 4-62. STS Tools menu

To read a PPCR, click on the link in the Title section. This opens the desired PPCR window (see Figure 4-63).

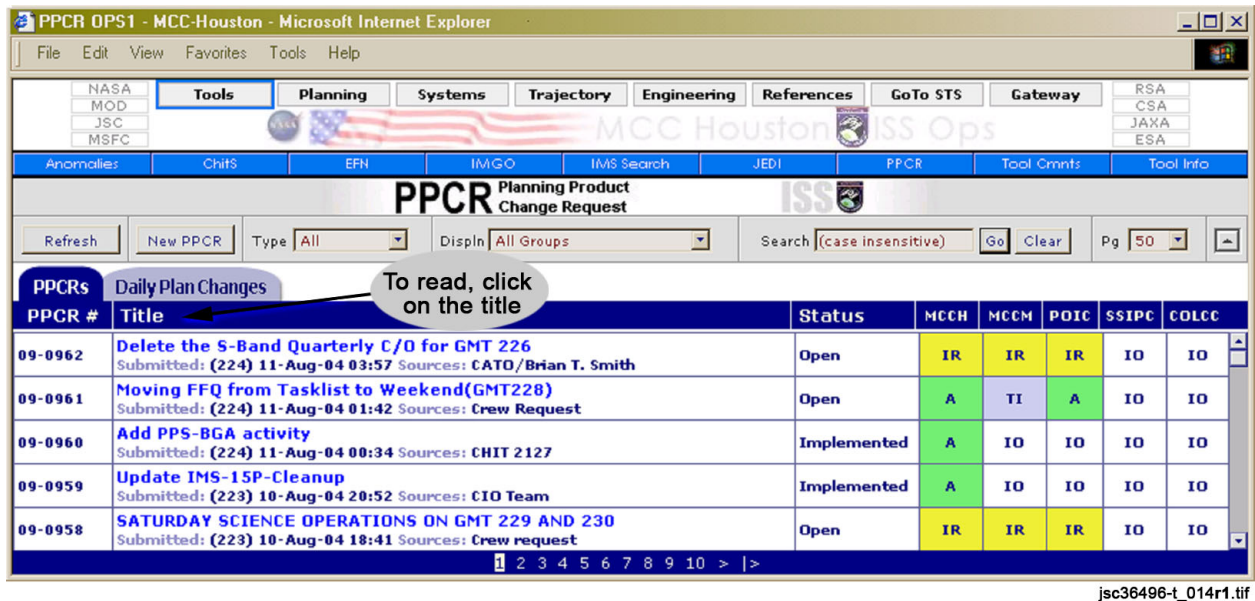


Figure 4-63. PPCR window

4.3.3.8 IFI

The purpose of IFIs is to document and investigate an unexpected status, operation, or behavior of onboard systems, software, or the vehicle in general.

1. To access the IFI tool, go to the MCC-H page, navigate to the **Engineering** tab, then click on the **IFI** tab (see Figure 4-64).

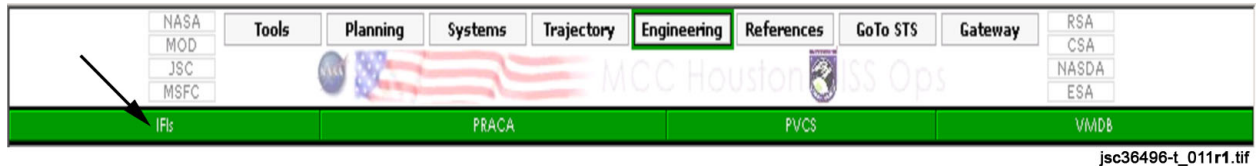


Figure 4-64. Accessing IFI

2. Click on the **Login to IFI** link (see Figure 4-65).



Figure 4-65. IFI link

3. Click on **Read Only** link (see Figure 4-66).

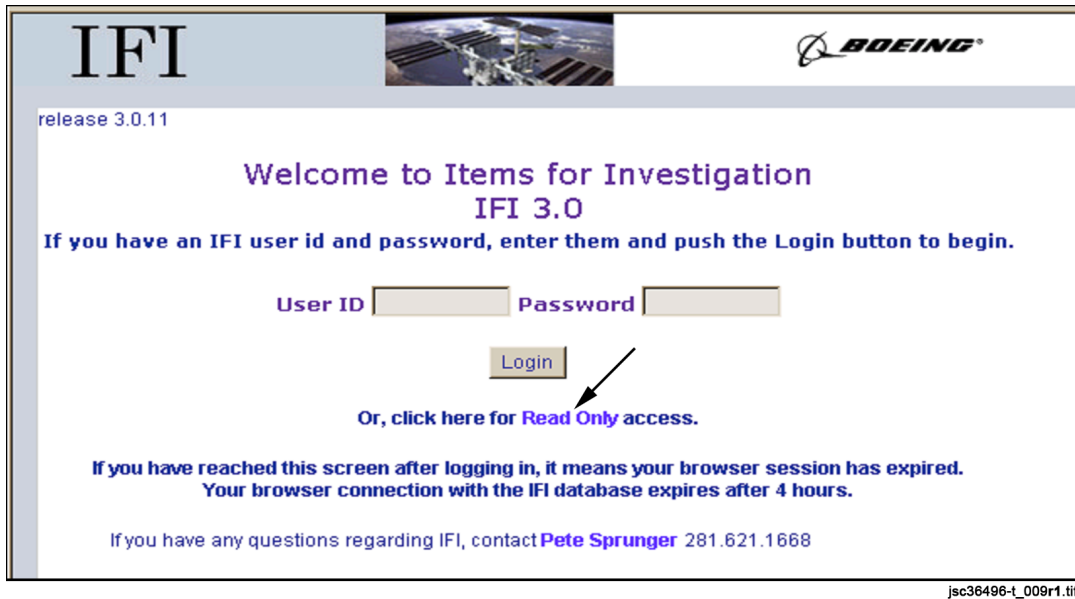


Figure 4-66. Read Only access

4. Highlight the desired IFI and click on **Search IFI List** (see Figure 4-67).

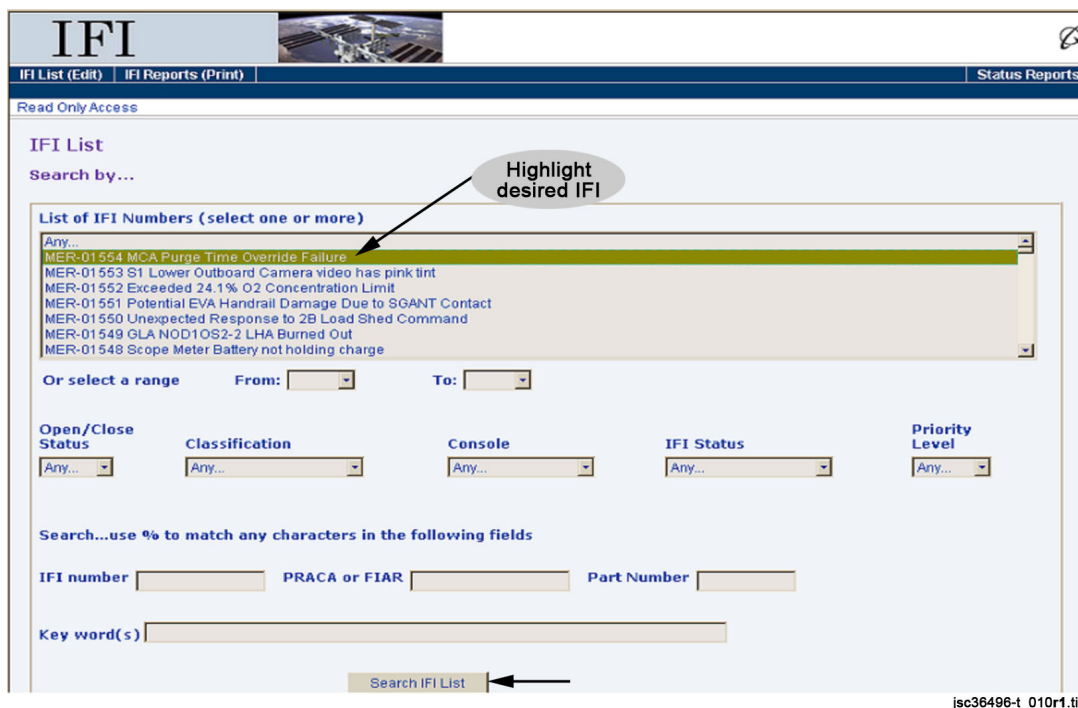


Figure 4-67. Searching IFI list

- Click on the **VIEW** (see Figure 4-68).

The screenshot shows the IFI List application interface. At the top, there is a header with the IFI logo and a small image of a space station. Below the header, there are links for 'IFI List (Edit)' and 'IFI Reports (Print)'. A 'Read Only Access' message is displayed. The main heading is 'IFI List' with a 'Search by...' link. A search box contains the text 'Any...'. Below the search box, a list of IFI numbers is shown, with the first one, 'MER-01554 MCA Purge Time Override Failure', highlighted. Below the list, there are filters for 'Or select a range' with 'From' and 'To' dropdowns, and four dropdowns for 'Open/Close Status', 'Classification', 'Console', and 'IFI Status', all set to 'Any...'. A search instruction says 'Search...use % to match any characters in the following fields'. Below this are input fields for 'IFI number', 'PRACA or FIAR', and 'PartNumber', and a 'Key word(s)' field. A 'Search IFI List' button is at the bottom of the search area. Below the search area, it says '1 record(s) matched search criteria'. At the bottom, there is a table with columns: 'Click to...', 'IFINbr', 'Title', 'Status', 'Classification', and 'Console'. The first row has a 'VIEW' button with an arrow pointing to it, the IFI number 'MER-01554', the title 'MCA Purge Time Override Failure', the status 'Open', the classification 'Under Investigation', and the console 'ECLSS'.

Click to...	IFINbr	Title	Status	Classification	Console
VIEW	MER-01554	MCA Purge Time Override Failure	Open	Under Investigation	ECLSS

jsc36496-t_008r1.tif

Figure 4-68. Viewing IFI

4.3.3.9 IMGO

IMGO is the application used by FDs to ensure that the FCT is prepared to receive key briefings, statuses, and readiness for the Alternate Flight Director (AFD), to name just a few examples. The following steps are necessary to use the IMGO application, which is based off the MCC Web page:

- Bring up the application by clicking on the **IMGO** button on the blue toolbar, as shown in Figure 4-69.

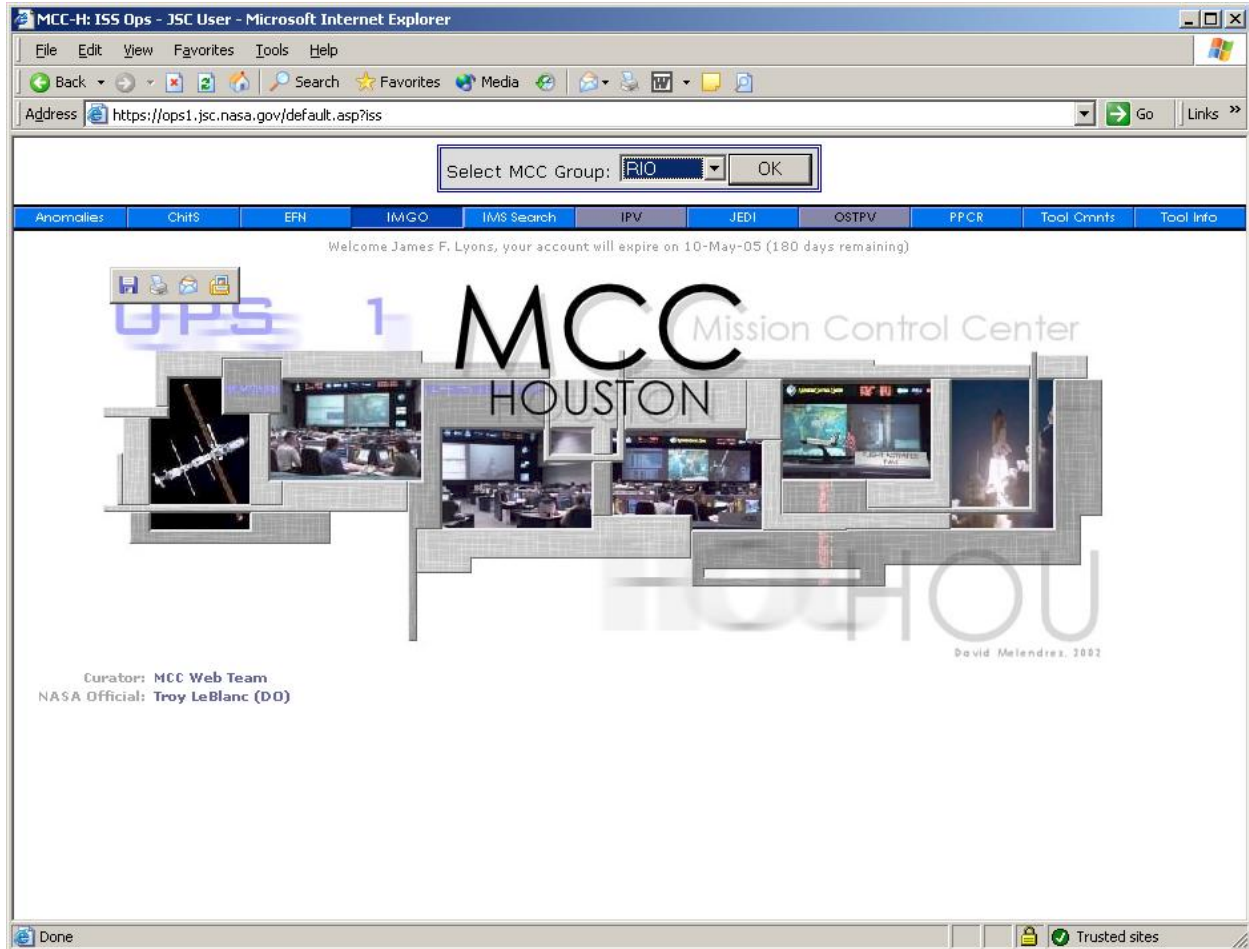


Figure 4-69. Starting IMGO

2. This brings up the **Select MCC** window (also shown in Figure 4-69). Click on the down arrow to choose which flight control position from which you want to issue IMGO color indications.

Note: DO NOT use the IMGO application if you are not performing on console under the positions indicated. By not following this rule, you run the risk of indicating that a flight controller is ready to receive key information when he/she may not be ready.

3. Click **OK**. This brings up the window shown in Figure 4-70.

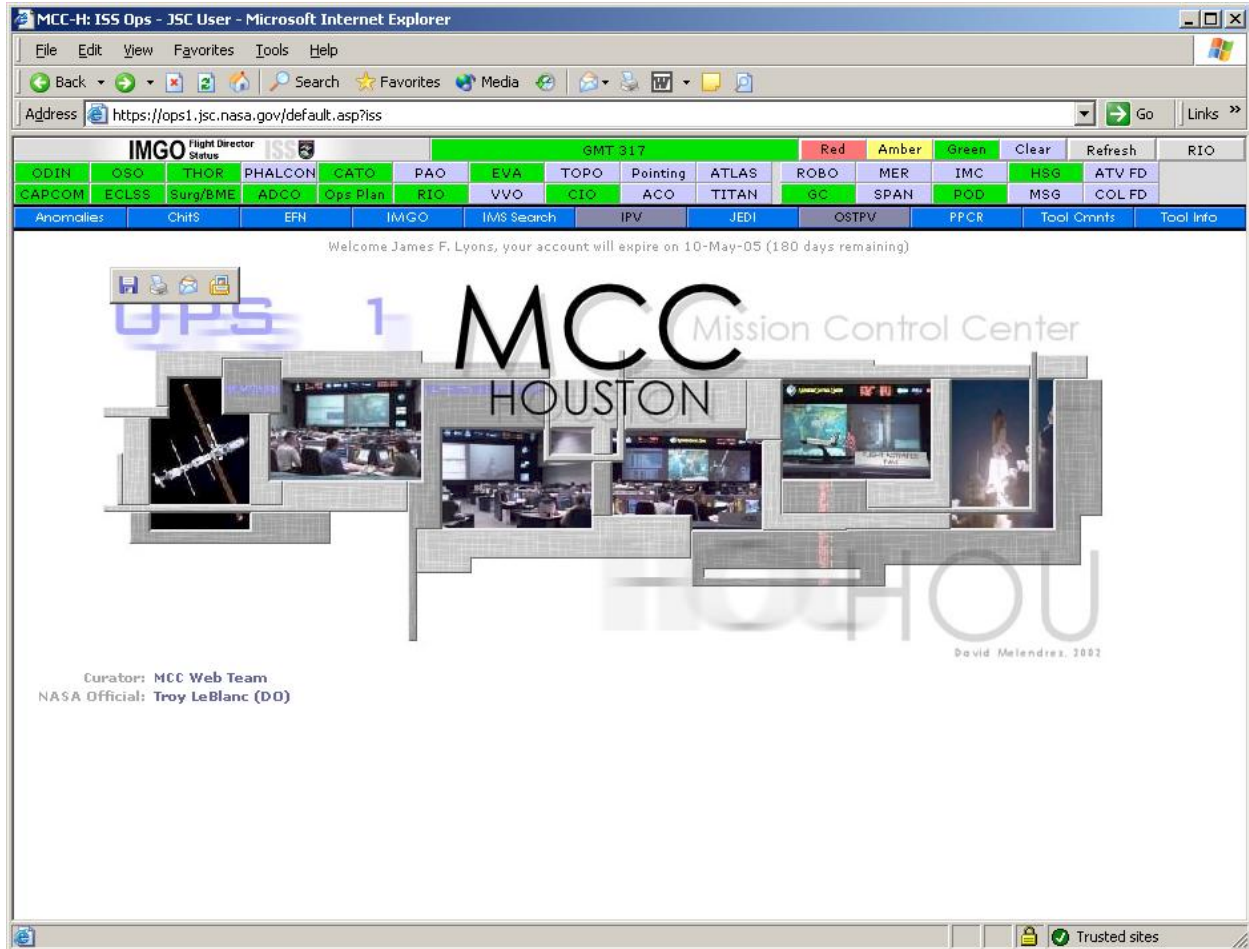


Figure 4-70. IMGO application running

4. You are now ready to use IMGO. When an FD indicates that he/she wants all flight controllers on AFD as a red, click on the **RED** button. The flight controller position under which you entered IMGO will have its respective button light up as red, yellow, or green (depending on which color the FD requested).

4.3.3.10 OSTPV//IPV

OSTPV

The OSTPV client is the application that is used by the entire FCT in MCC-H (and IP FCTs) to view the OSTP (Daily Plan). The OSTPV is a software tool that enables online access to planned ISS activities. The OSTPV provides the capability to view several days of planned activities. OSTPV also provides easy access to the IPV procedures associated with the activity. Users have the option of customizing the timeline views, and the color of the activity provides feedback on the status of an activity. Onboard ISS crewmembers and the OPS PLAN discipline are the only ones with editing authority for the OSTPV data sets.

Procedure

- a. From the MCC-H page, select the **Tools** tab, and then click on the **OSTPV** tab.
- b. When OSTPV starts, the Select Timeline window appears.
- c. The OSTPV main window is the primary window for the user to begin navigating for data about specific activities. Multiple days of activities are displayed in a scrollable timeline broken out into operator bands, as shown in Figure 4-71.

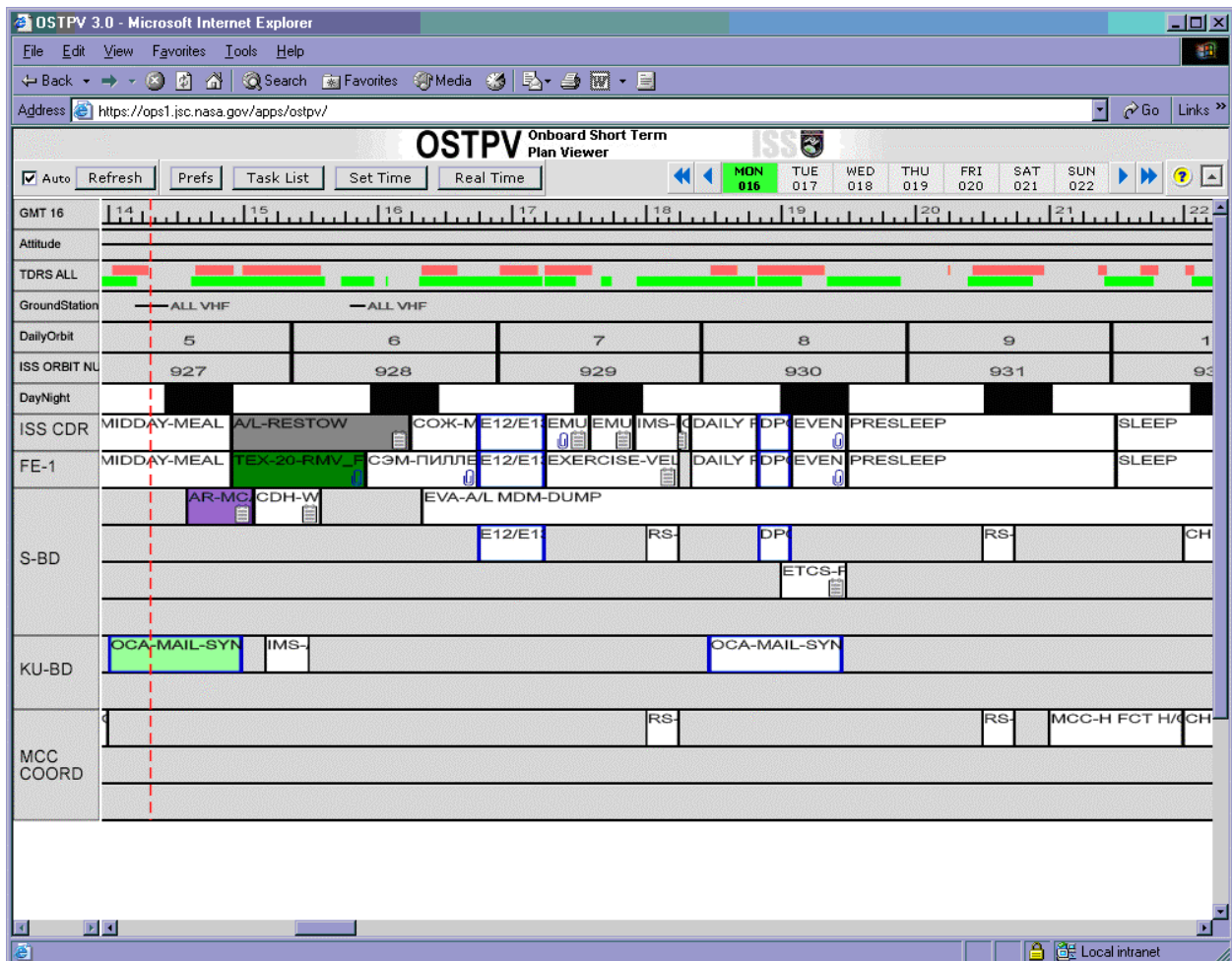


Figure 4-71. OSTPV window running

- d. User preferences allow the user to customize the graphical display. A graphical time indicator (thin vertical bar) moves with the current time. Time bands and condition bands are shown above the timeline and are also customizable via user preferences.

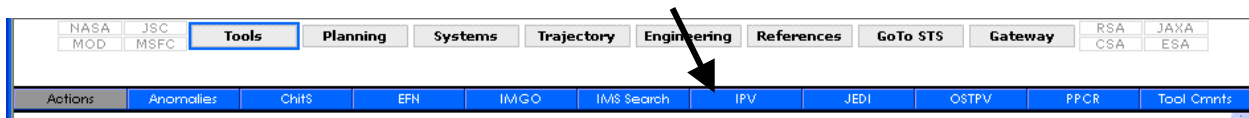
Generic OSTPV Capabilities and Usage

- a. Setting simulation time – Click on the **Set Time button in the upper left**. A dialog box appears allowing you to set the desired date and time of the sim you are working. Click **Set Time** to accept this time.
- b. Bubble help – This feature displays more information about the activity when the cursor is placed over the activity. Displayed information includes full Activity Name, Start Time, Location (in parentheses), and the first 56 characters of the execution note. Bubble help is the yellow highlighted text that appears when you drag your mouse cursor over an activity.
- c. Linking to procedures – Most activities are linked to a procedure that may be viewed in IPV. The cursor turns into a notepad when it passes over an activity that is linked to a procedure. Double left clicking on the activity launches IPV and takes you to the associated procedure.
- d. Detailed activity information – Right clicking on an activity opens the Activity Edit Dialog window. The various tabs in the window contain all information associated with the activity.
- e. Customizing the display – Each user may define any number of different display configurations. Click on the **Prefs** button in the upper left. The user can select, deselect, and reorder the available bands. Clicking **Apply** causes the current session of OSTPV to update to the new display. The user can go to the **Preferences File** field and save the new configuration to a file in order to have that configuration available the next time OSTPV is started. OSTPV starts in the display defined by the user's default preference file.

4.3.3.11 IPV

The IPV client is the application that is used by the entire FCT in MCC-H to view ISS crew procedures. The MPV is a software tool that enables online access to crew procedures. OSTPV also provides easy access to the manual procedures associated with the activity.

- a. From the MCC-H page, select the **Tools** tab, and then click on the **IPV** tab.



- b. When MPV is started, the Open Document dialog appears (shown in Figure 4-72).

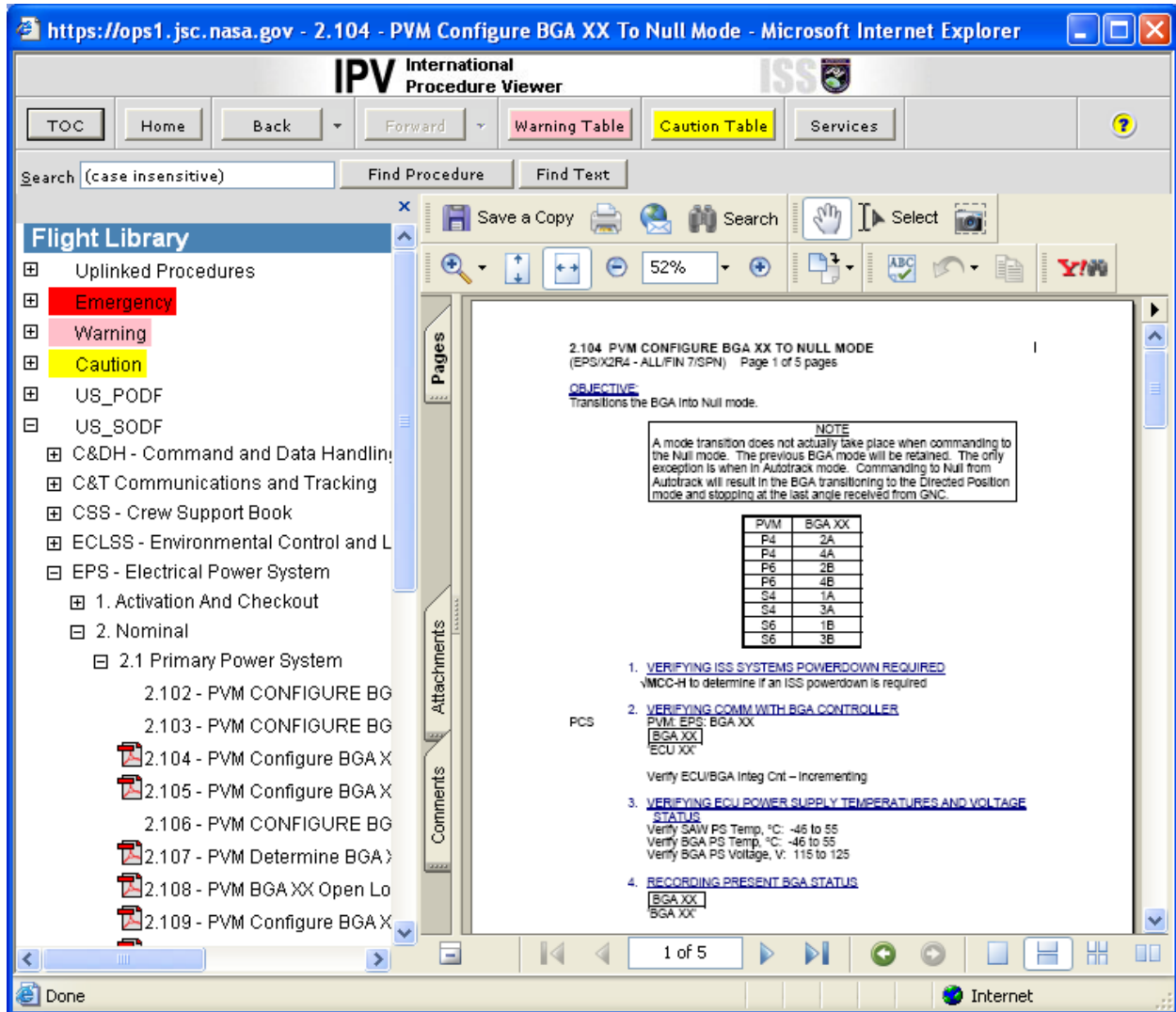


Figure 4-72. IPV open document dialog

The IPV window has three main sections (panes). The first section is the menu bar (see Figure 4-72). The second section contains the Library popdown selector and a set of buttons. The third section contains the opening IPV window with the ODF symbol or the procedure that you would like to view.

Menu Bar

The menu bar at the top of the IPV window contains several useful utility buttons. The buttons are explained below:

1. **TOC** – Allows the user to toggle to/from viewing the Table of Contents pane. This is useful for navigating to other procedures.
2. **Home** – Clicking on this button brings up the Procedures (ODF/FDF) home page.

3. **Back/Forward** – Clicking on these buttons navigates to the previously viewed window in the right-hand pane.
4. **Warning Table** – Opens the Warning Table. This table allows cross referencing of Warning messages with their associated event codes.
5. **Caution Table** – Opens the Caution Table. This table allows cross referencing of Warning messages with their associated event codes.
6. **Services** – Opens a fourth pane in the right side of the IPV window, containing useful search menus, records, and a detailed user manual.
7. **Search/Find Procedure/Find Text** – These items work in conjunction with each other. In the search field, enter the name of the procedure or word that you desire in case-sensitive text, and then click on either the **Find Procedure** or **Find Text**, depending on which of the two you need.

The third section displays the folders (shelves) and documents in the current library.

Navigating Folders (Shelves)

To display the documents in a folder (also referred to as a shelf), simply click on the shelf in the TOC pane. If the TOC pane is not visible, simply click on the **TOC Utility** button at the top left of the IPV window. The documents on that shelf are listed to the right in the Flight Library column. If the shelf has subshelves, a “+” is displayed to the left. Selecting the “+” displays the subshelves and changes the “+” to a “-”. Selecting the “-” causes the subshelves to be hidden again.

Opening Documents

To open a document, simply single click on its name in the TOC table. The documents are in Adobe Acrobat format, along with the normal utility buttons that appear with this particular application. These buttons are shown at the top of the procedure pane.

4.3.3.12 Anomaly Reporting Tool

The Anomaly Log tool can be accessed under the Tools toolbar of the ISS partition of the MCC gateway, as shown in Figure 4-73.

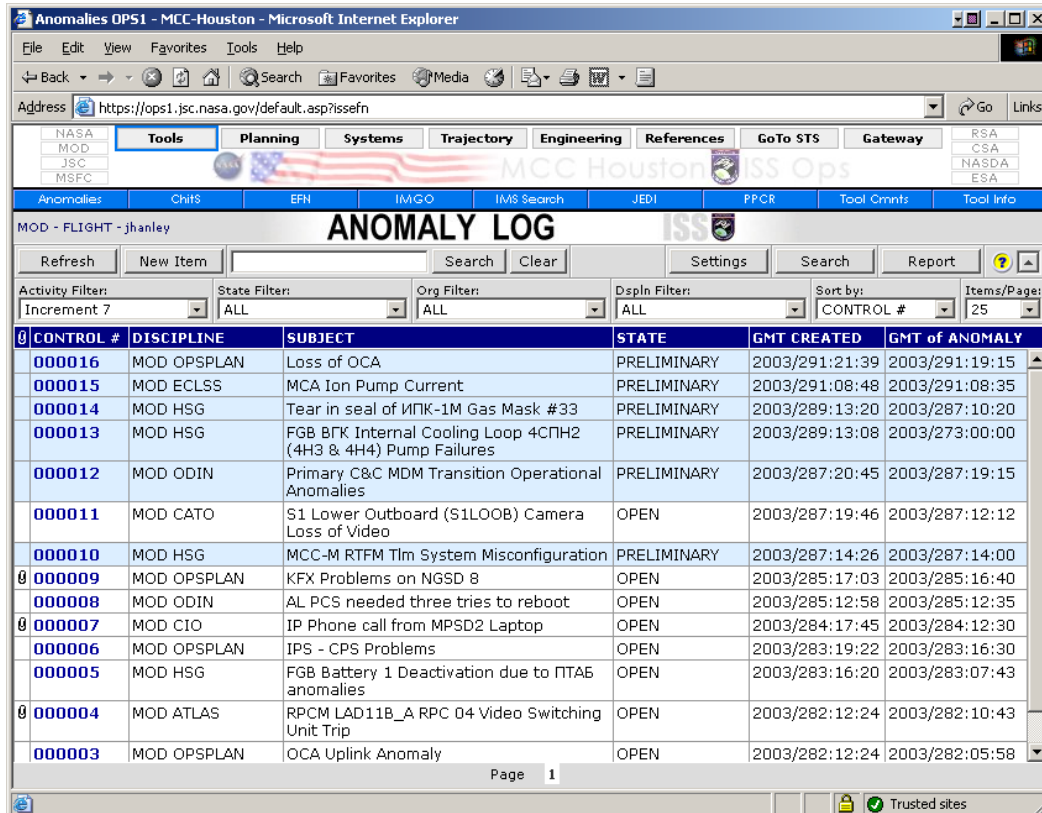


Figure 4-73. Anomaly Log main page

Selecting the **New Item** button on the Anomaly Log toolbar creates a new log entry. This opens the **Create Log Entry** form in a separate browser window, as shown in Figure 4-74.

The screenshot shows a web browser window titled "Anomaly Log - Create Log Entry - Microsoft Internet Explorer". The form contains the following fields and sections:

- Buttons: Save, Attachment Manager, Cancel
- CONTROL NUMBER: (empty)
- ORIGINATOR: MOD FLIGHT
- ACTIVITY: Increment 7 (dropdown)
- TIME NOW GMT: 2003/292:09:12
- STATUS: PRELIMINARY
- EFFECTED DISCIPLINE: [assign]
- RESPONSE ORG: [assign]
- MOD
- SUBJECT: (empty text area)
- CONTACT NAME: Jeff M. Hanley (FLIGHT)
- CONTACT INFO: (empty)
- GMT OF ANOMALY: (empty)
- HARDCOPY PAGES: 0
- PREVIEW: Enabled (green button)
- Rich text editor toolbar with options: Normal, Arial, 10, Bold, Italic, Underline, Strikethrough, Bulleted List, Numbered List, Indent, Outdent, Link, Unlink.
- Impact (empty text area)
- Resolution or Workaround (empty text area)
- Attach File #1 (empty) Browse... Attach File #2 (empty) Browse...

Figure 4-74. Create Log Entry form

The following describes the fields of the log entry input form:

- Control Number – Generated automatically by the Anomaly Log tool.
- Originator – Specifies the originating discipline, generated automatically based on the login ID of the originator.
- Activity – Generated automatically by the Anomaly Log tool.

- d. Time Now GMT (GMT created) – Generated automatically by the Anomaly Log tool.
- e. Status – Specifies the status of the log entry.
 - 1. **PRELIMINARY** indicates a draft, which is still being cooked. It is considered done when the originator signs it electronically.
 - 2. **OPEN** means that the first-hand account of what happened is complete.
 - 3. **DISPOSITIONED** indicates the following:
 - (a) MER has decided IFI/no IFI (for hardware/software issues).
 - (b) No further on-console work on the problem is expected.
 - (c) Still open action items to be worked off-console. Due date to be assigned by increment FD.
 - 4. **CLOSED** means that all on-console and off-console actions are complete.
- f. Affected Discipline – Named by the originator and selected by the SPAN, these are the other disciplines impacted by the anomaly. These disciplines are required to concur on the description, or impact and resolution entered by the originator, or may provide supplemental data of their own under their response tab and after the anomaly is opened.
- g. Responding Orgs – This entry selects the organizations (ISSMER, MOD, POIC, etc.) for which the system creates a response tab when the status transitions to OPEN.
- h. Subject – Specify a short, but descriptive title of the problem. Generally, this includes a noun and a verb. Acronyms and abbreviations in common usage are acceptable, if required to limit title size; however, the acronyms/abbreviations are to be explained in the text of the description.
- i. Contact Name – Generated automatically by the Anomaly Log tool based on the Login ID of the originator.
- j. Contact Info – Entered by the originator, typically the console phone number.
- k. GMT of Anomaly – Entered by the originator.
- l. Preview – Defaults to Enabled. This allows other organizations to view the anomaly while it is in a preliminary state. It is preferred to always leave the preview Enabled.
- m. Description – Entered by the originator, this is a detailed description of the anomaly, offering all relevant details surrounding the events.

- n. Impact – Entered by the originator, summarizes the capabilities lost or other ramifications of the problem described in the Description field.
- o. Resolution or Workaround – Entered by the originator, this is a detailed description of the immediate actions taken to resolve the problem, safe the system, or otherwise recover from the anomaly, including procedural steps executed and their results.
- p. Attach File – Allows the originator, affected disciplines, and responding organizations to attach supplementary information relevant to the anomaly. This can include .mp3 sound files of crew reports, presentation slides and summaries from anomaly resolution meetings, plots, photos, or tabular data files.

4.3.4 DO International Liaison Web Applications

The International Liaison Web applications can be accessed via its home page (see Figure 4-75), <http://mod.jsc.nasa.gov/do13/>. The most frequently used applications are the HSG Daily News and the RS KB.

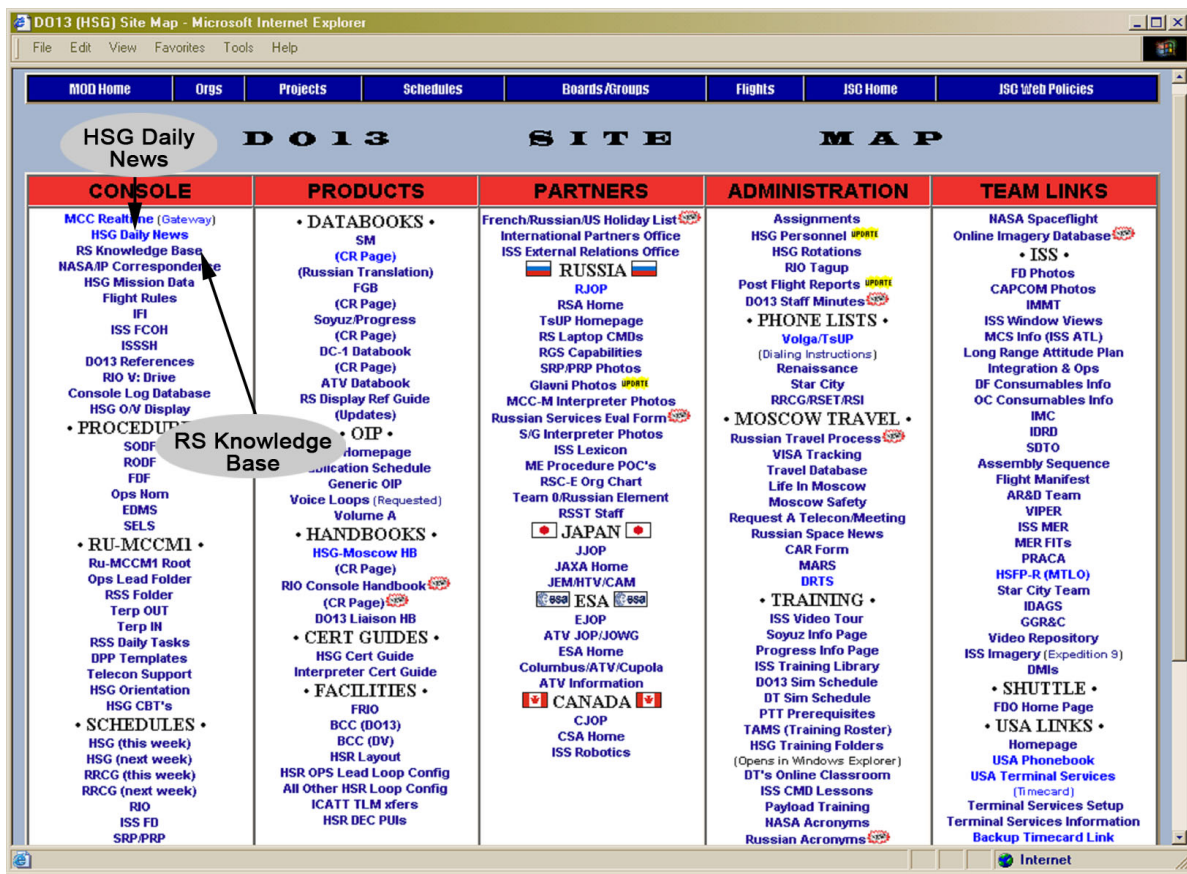


Figure 4-75. International Liaison home page

4.3.4.1 HSG Daily News

The HSG Daily News contains daily information regarding the status of the RS, the HSG/RIO console logs, and the RS Detailed Daily Plan (DPP). To access any information, click on the appropriate link (see Figure 4-76).

HSG Daily News

Date: Display:

◀ Aug-11 (Day 224) ▶ [RIO/HSG Console Logs](#)

Date	HSG/RIO Handover	RS Daily Status Report	RS Detailed Daily Plan (DPP)
Aug-11	Not Available	Not Available	F002634
Aug-10	08_10_04 RIO to HSG.doc	8_10_RS Stat_E.doc	FN2625
Aug-09	08_09_04 KZ to RIO.doc	8_09_RS Stat_E.doc	F002605

RS Knowledge Base

GMT	Subsystem	Event
22300:00	Reboost/DAM	Cancellation of E9 SM Main Engine Burn

NASA/IP Faxes

Fax GMT	Fax Title	Sender	Recipient
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*Curator and NASA Official: Greg Smith
File data uploaded at 8/10/04 21:49 by rhayhurs*

Figure 4-76. HSG Daily News

4.3.4.2 Russian Segment Knowledge Base

The RS KB provides the historical, as well as most recent, status of the RS. This site is updated daily by the HSG and RIO personnel as the onboard system configuration changes. Click on the link to obtain detailed information (see Figure 4-77).

Group	Subsystem*	Current Status	History
	BBC ▶	Nominal	04/203: SM SW v7.02 Upload 04/201: SM 7.02 SW Loading Prep - Installation of 07.02 on KЦПTs (GMT 170 and 201)
	FGB MDM ▶	FGB MDM 1 - Failed, unpowered FGB MDM 2 - Operating	02/325: FGB MDM 1 failed. Powered off on GMT 325. 02/324: FGB MDM-1 Comm Failure with SM TYM
	СУБА/СУБК ▶	none	04/084: СУБА Cable Installation for Future TBM Restart Capability 04/071: FGB УПЛУ-3 Block 23A827 Input/Output Adapter R&R
	TBM ▶	3 channels active (following SM 7.02 Uplink on GMT 203)	04/197: Failure to Upload SM7.02 to TBM Lane 3 03/330: DC/TBM Software Patch
	ЦВМ ▶	3 channels active	04/189: ЦВМ restart 04/184: ЦВМ Lane 1 Drop Out
	БИТС ▶	none	04/134: Primary Commutator ЛКТ2Д-3 Anomaly & Troubleshooting
	Komparus ▶	FGB commanding alternates between Regul/Komparus weekly, switch occurs on Sunday. Double activation/deactivation of УПЛУ indicates the switch is being performed. Note: If FGB Daily Program uplink appears in the ДПП, then Regul is being used for FGB commanding.	04/002: FGB Komparus/Regul commanding schedule philosophy
	MCC-M ▶	On Prime E3 Link	04/213: ACT and DBCL Test on GMT 213 04/211: TsUP Power Failure (Draft)

Figure 4-77. Russian Segment Knowledge Base

Operations Concept

The RS KB stores and manages RS systems information to provide continuity across HSG rotations, as well as long-term retention of corporate knowledge. The tool is used for real-time and near real-time documentation of notable RS events. The tool provides the following functionality:

- a. Event log for immediate recording of key nominal and off-nominal events
- b. Knowledge tool for adding and managing the followup systems details for events
- c. Search options for extracting reports based on subsystems or time

Overview

KB data can be viewed by any user who has access to the JSC, JSC-MAS, JSC-MOD, and a few trusted offsite domains; however, only DO International Liaison and a few other designated personnel have write access to the database. Security is controlled via the secure green mirror site (<https://mod2.jsc.nasa.gov/do13/kb/>) and at the application level by validation of the JSC or JSC-MAS user ID and password.

The KB home page consists of two frames. The top frame contains the menu options to change the configuration of the bottom frame or open another window with requested information; it is referred to as the KB menu. The bottom frame shows the current

status and a selectable number of historical events for each subsystem. This page is also synonymous with the KB home page.

a. KB menu features

1. Add generic event – Use this feature to add a new event for a subsystem that does not appear on the KB home page. This is the event “long form” where the group and subsystem have to be selected. If there are no events for a subsystem, this function is required to create the first event record.
2. View RS subsystems – A new window is opened to allow customized selection of the subsystems to display on the KB home page. Clicking the hyperlinked name opens an edit window. Caution: Changing the subsystem configuration affects every user, so only the Ops Lead or a designee should tinker with this option. New subsystems can also be added from this page by specifying the group, subsystem, and an English description. Deletions are not permitted via the Web page, but the curator can delete it from the database.
3. Display recent events – The KB home page displays the last two events for each subsystem. The page can be refreshed to show the 5 or 10 latest events.
4. Display recent updates – The KB home page displays all events that have been updated for the most recent 3 days (default), or the last 7, 14, or 30 days.
5. Create report – In order to search for a specific item in any group or subsystem, be sure to choose the **and** option, just to the left of Keyword, before pressing the **Create report** button. The database can be queried to show only events for any combination of increment/group/subsystem. The subsystem pulldown is dynamically populated, based on the selection made in the group pulldown menu.

b. KB home page

1. Two things have to be in place for a subsystem to appear on the KB home page. First, the subsystem has to exist in the database with the **Show in Log** box checked (see Manage Subsystems section). Second, the subsystem displays only if at least one event has been created.
2. The Current Status field is used only to store the latest system configuration, and new information overwrites the old. The History field permanently stores event records and must be entered separately from the Current Status (i.e., Current Status info does not get permanently stored in the History section). This frame also includes references to X-term frames where one can find the current status of system configuration via telemetry.
3. The KB is designed to augment the Ops Lead Handover report. Keeping information up to date in multiple places can result in errors, so the

recommended practice is to develop the event details in the Ops Lead Handover and transfer those details into the KB when it is time to retire the item from the handover.

4. Events are classified according to subsystem and group, per SSP-50254, Operations Nomenclature, Section 8.2, Functional Hierarchy.

Console Responsibilities

- a. The Russian Systems Specialist (RSS) is responsible each shift for updating the Current Status field.
- b. The RSS and the Ops Lead are jointly responsible for adding and updating events in the History field. If practical, whichever RSS or Ops Lead obtained the information from the specialist should enter the event. Events are entered throughout the day, as time allows. The Ops Lead also notes this in the handover.
- c. Each Friday, the RSS uses the Current Status fields from the KB to update the ISS Systems Weekly Status Report.
- d. The RSSs and Ops Leads will regularly review all events recently submitted (perhaps within the last week) for completeness.
- e. The Operations Lead uses the KB as a starting point for the weekly or monthly activity report.
- f. The Lead Ops Lead for the increment and Monday's RIO will perform a weekly audit and cleanup on Monday evening.
- g. Event details can and should be shared with other groups (e.g., FD, ECLSS, ADCO) when pertinent. Open the event details page and right click on the text of the KB entry and click **Properties**. The URL can be copied to e-mail for distribution.

Procedures

- a. Add New Event:
 1. Select the Utilities pulldown menu
 2. Select **Add Generic Event**
 3. Within the popup window, fill out the GMT time
 4. Within the Meta data pulldown, fill out all fields
 5. Within the Event Details pulldown, input the details of the event (see html hints below)

6. Within the Attachments pulldown, add attachments or links, as required
- b. Modify Event
 1. Double click on the Event Date for the entry that requires editing
 2. Edit fields identical to the procedure in the Add New Event section
- c. Search for Event
 1. Select the Search pulldown menu
 2. Populate all fields
 3. Use the **OR** button to include a keyword search in addition to the fields search
 4. Use the **AND** button to include a keyword search within the selected fields
- d. Add New Subsystems (Restricted Access)
 1. Select the Utilities pulldown menu
 2. Select **View RS Subsystems**
 3. Select **Add New Subsystem**
 4. Populate all fields

Note: Subsystem will not appear until a new event in that subsystem is created

- e. Hide/Show Subsystems (restricted access)
 1. Select the Utilities pulldown menu
 2. Select **View RS Subsystems**
 3. Select the **Show in Log** dialog box for the applicable subsystem

KB entries that are associated with an IFI shall remain DRAFT until the associated IFI is marked CLOSED. At that point, they can be marked FINAL, if no further information is expected from MCC-M. See HSG Moscow OPS Console Handbook (JSC-36496-A) Procedure 4.16, IFI Process for HSG/MCC-M, for more information.

Guidelines for Creating a New Event

- a. Do create a New Event for routine Repair and Replace (R&R) (e.g., "Replacement of BKO purification column unit," "SM GA CO₂ Filter R&R").

- b. Do not create a New Event for daily tasks, such as air flow sensor checks or POTOK activation.
- c. Do not create a New Event for periodic/routine/common reconfigurations of the system. These will be captured in the Status Field. For example, do not create events for routine battery cycling, routine pump cycling, or routine CKB cycling. On the other hand, if a pump is cycled due to a failure, it should be included in the relevant event. If in doubt, err on the side of caution and create an event.
- d. If there are significant system reconfigurations associated with a specific activity, this information should be captured in the event for the activity itself. For example, there are a number of activities and systems reconfigs prior to a Soyuz or Progress undocking or docking, such as YC-21 Matching Unit removal, ЛКТ removal, Docking unit assembly, represses from progress, urine transfer, etc. These should be captured in one event titled (e.g. "21P Undocking Prep").
- e. For crew activities, include a hyperlink to the relevant radiogram from within JEDI. Also, consider adding any applicable FNs, Word documents, images, or other valuable information. Do not upload a separate file when it already exists in another application (JEDI, EFN, DIMS, ChitS, IFI). Once imagery shows up in the Imagery database, it can be deleted from the KB entry.
- f. Each KB should be a single, readable report (as opposed to a console log entry from each day of troubleshooting). If information within an entry from a previous shift is out of date, it should be deleted entirely. If there is a long detailed list of information, a summary should be put at the top of the KB entry and clearly called out as a summary.
- g. When troubleshooting on a single subsystem spans days or even weeks, all pertinent information about troubleshooting should be kept in a single event entitled XXX Troubleshooting (GMT YYY – ZZZ). For extended troubleshooting, a summary at the beginning of the entry is required. The Event GMT should be updated with the latest date of troubleshooting so that it continues to show up in the HSG Daily News page as information is added.
- h. When practical, include details of failed component R&R within the same KB entry that describes the failure. At a minimum, the entry describing the failure should include the date of the R&R and a link to the relevant KB entry that describes the R&R.
- i. A draft KB entry can be a running log of information learned each day from MCC-M specialists (e.g., MCC-M will reattempt Elektron Activation tomorrow). However, a final KB entry should be a narrative of what actually happened (e.g., Elektron Activation was delayed until GMT XXX due to RSS recommendation). For example:

From:

As of GMT XXX, specialists are planning additional testing on GMT YYY

To:

MCC-M performed additional testing on GMT ZZZ...

- j. Do not enter the same event more than once to cover multiple systems.
- k. Use only English characters for uploaded file names.
- l. Time allowing, International Liaison personnel shall review old KB entries to see if they need to be updated based on newly received information. For example, after the crew disconnected the SM +X camera during EVA 10, a RIO updated the E7 and E8 entries that described the initial failure (added comments saying the camera was repaired on EVA 10).
- m. For recurring events, include all of the information in one entry. Each time the event reoccurs, update the Title and Date to indicate the recurrence.
- n. Save e-mail messages in .msg format, rather than .rtf.

In Order to Link to Chits and EFNs

- a. Open the relevant chit or EFN from Internet Explorer.
- b. Right mouse click on the chit or EFN from the new popup and select **Properties**.
- c. Copy and paste the URL from the **Address: (URL)** field into the relevant KB entry.

Tips for Avoiding Common Mistakes in the KB

- a. Write concisely and objectively.
- b. Do not write in first person, such as "I was thinking about ...," or "they would love to do ...," or "GS and SQ talked to ..." Simply refer to MCC-M specialists (e.g., SOZh/Zakharova reported that ...).
- c. Make all time references in GMT.
- d. Each event should be tagged with the time of the event, not the time you wrote the entry.
- e. If posting events in the future, tag the event with the planned time of the event. Flag it as a draft entry.
- f. Proofread entry before update.
 - 1. Check for completeness and continuity.

2. Typos and sloppy grammar reflect poorly on HSG. Copy to Word for spell checking, if necessary.
- g. Draft KB entries can refer to events that might happen in the future (e.g., MCC-M will R&R the failed component next week). However, final KB entries should always refer to when the event actually occurred (e.g., R&R was performed on GMT 114). The originator of the KB event is responsible for ensuring that the entry is complete before it is finalized.

Tips for Avoiding Common Mistakes in the KB

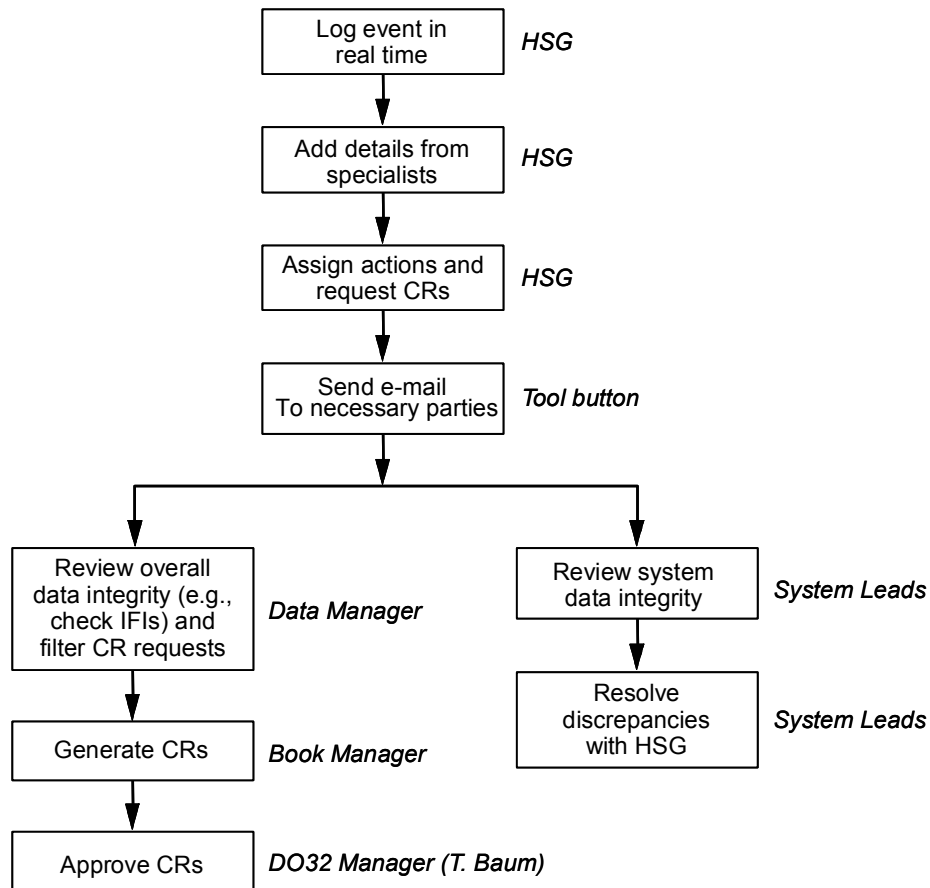
- a. To create a hyperlink: ` Your website title or other text to be linked`.
- b. Bold ` Text `; or Underline: `<u> Text </u>`
- c. To insert an image: ``

Creating a Backup of the KB

The process takes about 10 seconds, during which the program retrieves all events from the database for each subsystem (one at a time) and writes a set of files named subsystem.htm to the do13/kb/HTMLbackup/ directory on the jsc-mod-webops server, as well as displaying an integrated report for all subsystems on the PC monitor. The do13styles.css file must also exist in the directory to provide formatting. The entire set of files can be copied to the Moscow server, as required.

Procedure

1. Click on **Utilities** menu.
2. Click on **Gen HTML b/u** button.
3. Open the jsc-mod-webops\do13\kb\HTMLbackup folder.
4. Copy all contents, including the do13styles.css file, to the [\\rumccm1\hsg-data](http://rumccm1\hsg-data) server.



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Figure 4-78. KB data flow (participant in italics)

4.3.4.3 Fax/Correspondence Generation and Archiving Web Page

Written correspondence (faxes, memos, e-mails, etc.) between the IPs and MCC-H are managed by the HSG/RIO using a Web application (<http://mod.jsc.nasa.gov/do13/fax/>). The HSG/RIO or any other preapproved fax initiator can perform Web posting of information. Key correspondence personnel within MOD, Engineering, ISS Program Office, and Safety (and others who may be added later) are encouraged to directly post their data on the Web. The general concept is that DO International Liaison manages the process, while individual organizations manage their own content. Translations of correspondence between Houston and Russia will follow standard protocol and procedures, when required.

Historically, correspondence referred to the hard copy faxes that were sent between MCC-H and MCC-M, starting in the shuttle-Mir program. Today, correspondence is

conducted primarily via electronic means (e.g., e-mail), but the fax method is always available. The terms correspondence and faxes are used interchangeably.

Anyone with access to the JSC intranet can view information on the correspondence Web page. However, DO International Liaison maintains the list of people approved to initiate, modify, or delete faxes.

Type of Info for Posting

This fax tool is designed to integrate all ISS mission-related fax traffic between control centers at a single Web site. The concept is not to capture every fax, but only the ones that apply to the design, safety, and operations of the ISS. Examples of faxes that should not be posted are documents that already exist or are managed via some other process, personnel travel paperwork, and other admin items.

Web Layout/Features

- a. The Web site is divided into two sections. The top section (frame) contains the sort/display features, as well as links to **Upload a Fax**, view the **Pre-inc 3 Faxes**, and view the **Fax Help** file. By default, the fax data for the last 30 days are displayed.
- b. Use the various sort filters to find a desired subset of data and click on **Display**.
- c. Clicking **Refresh** restores the default data for the last 30 days.

Initiating a New Fax

To initiate a fax, an authorized user clicks on the **Upload a Fax** link on the Web site mentioned. First-time users should review the Fax Help link to learn how to use the Web features. The fax initiator can be the actual initiator or another person acting on his behalf, such as the recipient, an office fax manager, or HSG/RIO. Once the fax is posted, the initiator notifies the recipient per their protocol that the fax exists. Some fax participants may not have a JSC network connection, so e-mail, traditional faxing, and hand delivery may also be required.

A fax can be a simple exchange of data that can be added to the fax cover page (see Figure 4-79). The cover page has fields for English and Russian comments. The HSG/RIO usually coordinates the Russian translation for the cover page. For more complex issues, the fax tool also accommodates multiple English and Russian attachments, along with the cover page. The fax initiator usually supplies Russian attachments, but HSG can arrange for translation support, if required. It is acceptable to submit a fax in English only and later modify the fax by adding the Russian translation. The fax ID number can be either automatically assigned by the Web tool or can be specified by the user.

	<h2 style="text-align: center;">NASA/IP Correspondence Tracking Cover Sheet</h2> <p style="text-align: center;">View Update History for Fax Inc4-0084-Russia</p>						
<p>Date/Time of Fax in GMT Current Date/Time (GMT): 06/09/2002 16:27:32 Date (mm/dd/yyyy) 06/04/2002 Time (hh:mm) 12:00</p>	<table border="0"> <tr> <td>From Last Name Antoshechkin</td> <td>To Last Name Suffredini</td> </tr> <tr> <td>First Name Yuri</td> <td>First Name Mike</td> </tr> <tr> <td>IP Russia</td> <td>IP Houston</td> </tr> </table>	From Last Name Antoshechkin	To Last Name Suffredini	First Name Yuri	First Name Mike	IP Russia	IP Houston
From Last Name Antoshechkin	To Last Name Suffredini						
First Name Yuri	First Name Mike						
IP Russia	IP Houston						
<p>Fax Title (English) Potok Status Report Название (Русский)</p> <table border="0"> <tr> <td>Type Operations</td> <td>Control Number Inc4-0084-Russia</td> </tr> <tr> <td></td> <td>TTI Number 00000</td> </tr> </table>		Type Operations	Control Number Inc4-0084-Russia		TTI Number 00000		
Type Operations	Control Number Inc4-0084-Russia						
	TTI Number 00000						
<table border="0"> <tr> <td>Flight Inc4</td> <td>Message Content Содержание сообщения</td> </tr> </table>		Flight Inc4	Message Content Содержание сообщения				
Flight Inc4	Message Content Содержание сообщения						
<p>English File 1 Antoshechkin to Suffredini E.doc</p>							

Figure 4-79. Example of IP (Russia)-generated correspondence

Fax Cover Page Inputs

- a. Input the **Date/Time**. The GMT day is not currently used in favor of the calendar date and time at fax submission. Make sure to follow the correct format (mm/dd/yy). The current date/time is automatically displayed.
- b. Specify the appropriate **To, From, Inc/Flight, Title, and Message Content**. Up to four individuals can be specified as a recipient.
- c. **Title** and **Message Content** also have fields for Russian text, so the interpreters can edit the messages online.
- d. Message type should be easy to understand.
 1. Operations (MCC-H, TsUP, RJOP, FDs, Planning, etc.)
 2. Safety (Joint American/Russian Safety Working Group (JARSWG), Gary Johnson, et al.)
 3. Program Office (ISS Mission Management Team (IMMT), Team 0, IMC, MIOCB, Holloway, Suffredini, etc.)

4. Engineering (MER and IP MER personnel)
5. Payloads (Marshall Space Flight Center (MSFC) and IP payloads)
- e. **Control Number** allows user to define a preexisting reference number. For example, a letter from Holloway has a reference number similar to OC-02-025, whereas Safety appears as 02-03-074. If the control number is not provided, leave it blank and one will be assigned. If a duplicate control number is used, it will not upload the files or update the database.
- f. **TTI Doc Number** allows a cross-reference to the TechTrans International (TTI) translation source. If unknown, leave the default value of "00000."
- g. The **Browse** button allows the user to do a directory search for the attachment file(s) and upload the file(s) to the correct directory on the MOD Ops server.
- h. Click on **Upload Fax to Web**.

Modifying or Deleting a Fax

The fax initiator or the HSG/RIO can modify or delete any existing fax. The detailed instructions are in the online fax help. The modification form is very similar to the initiation form and any mission information can be updated, but certain field updates (e.g., fax ID) may be blocked for system integrity. The deletion function will remove the fax record from the database, as well as physically delete the file from the server.

Viewing a Fax

The fax index page is automatically updated when a new fax posts (the refresh button may be used). Faxes are listed in chronological order, with the most recent fax at the top. From the index page, the user can view the cover page or go directly to a specific attachment. As mentioned previously, only JSC intranet access is needed to view a fax. A number of options are available for sorting and displaying desired information (see Figure 4-79).

4.3.4.4 HSG/RIO Mission Data Page

This application provides a **single location** to manage mission specific and Flight Controller proficiency training materials used by HSG/RIO, Russian flight controllers, and interpreters. The site stores both English and Russian documents (see Figure 4-80).

The Web site is located at <https://mod2.jsc.nasa.gov/do13/missions/>.

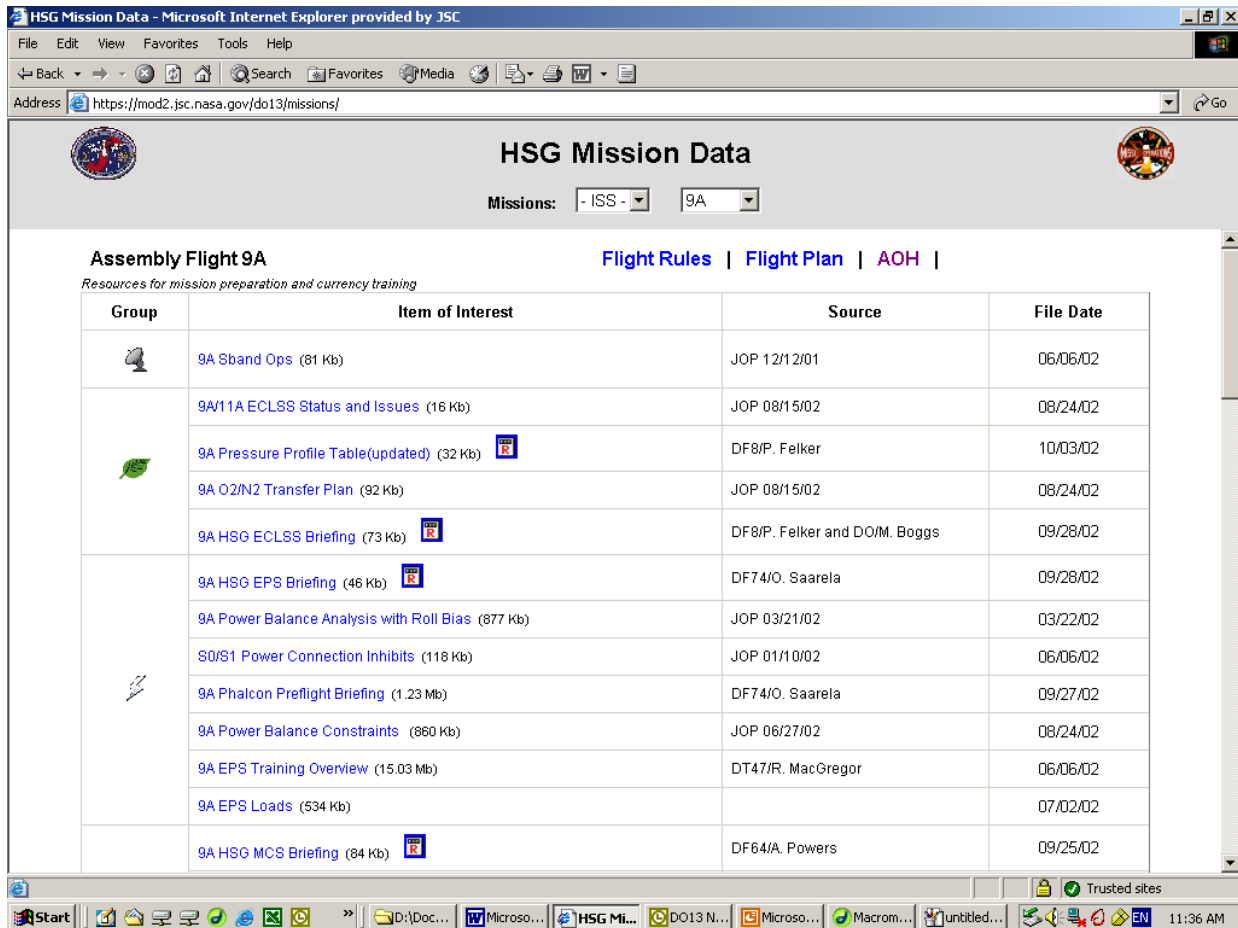


Figure 4-80. HSG Mission Data page

Mission Data Features

a. Auto page configuration

Program automatically sets the default page to the current ISS mission and identifies the Lead mission controller, who manages the content.

b. Dual language documentation

Russian documents are indicated with a boxed “R” next to the equivalent English documents. This is useful in tracking the educational materials delivered to MCC-M.

c. Displayed file properties

Files are displayed with their file sizes and file dates to inform users of the download effort and data currency, respectively. Links show “n/a” for the file date.

d. Edit mode

For users with write permissions, an event may be edited by double-clicking on the File Date field (either an actual date or the “n/a”).

4.3.4.5 DO International Liaison References

The DO International Liaison references page is a place for miscellaneous technical and administrative information, such as slide shows, how to use a presentation, new processes and techniques, etc.

The page is located on the following Web site at <http://mod.jsc.nasa.gov/do13/>.

4.4 OTHER TOOLS

4.4.1 RRCG X-Terms

The Russian Regional Control Group (RRCG) contains several X-Term computer workstations for viewing RS telemetry displays. Permission to view this display is required from the RRCG Shift Flight Director (СПП). To understand the content of these displays, please refer to the Russian Segment X-Term Display Reference Guide (JSC-36472).

5.0 GENERAL PROCESSES

5.1 SHIFT PREP

The following checklist should be performed as early as possible in order to maximize mission cognizance during a shift as Remote Interface Officer (RIO) (time required to perform these tasks is in parentheses):

- a. RIO handover (5 min) – Russian Segment (RS) plans, vehicle status, RS Knowledge Base (KB) (Web)
- b. RIO in box (5 min) – New topics in last 24 hours. Houston Support Group (HSG) in box (optional)
- c. Onboard Short-Term Plan Viewer (OSTPV) (5 min) – Glance at major activities, including RS Command (CMD) and S-bands
- d. Joint Execute Package Development and Integration (JEDI) (10 min) – United States On-Orbit Segment (USOS) daily summary, F24, radiograms
- e. Electronic Flight Note (EFN) (5 min) – Key topics in last 24 hours
- f. Fax (5 min) – New faxes in last 24 hours
- g. Planning Product Change Request (PPCR) (5 min) – New changes in last 24 hrs
- h. Attitude Timeline (ATL) (2 min) – Current attitude, sideslip angle, upcoming maneuvers/events
- i. RS daily status (2 min) – System configurations, measurements (e.g., Partial Pressure Oxygen (PPO₂))

Descriptions of the tools used to perform the above activities is given in Section 4.0 of this document.

5.2 ALTERNATIVE FLIGHT DIRECTOR GUIDELINES

At the start of each shift, the International Space Station (ISS) Flight Director (FD) conducts a briefing with his team and representatives of other ISS Flight Control Centers. This briefing, which is held on the Alternative Flight Director (AFD) DVIS loop (DVIS 4334), is commonly referred to by flight controllers as “AFD.”

5.2.1 RIO AFD Guidelines

During AFD, the RIO can give his/her briefing either before or after the HSG and/or Russian Regional Consultant Group (RRCG) (FDs often refer to the RRCG as the Moscow Support Group (MSG)). If the briefing is after the HSG and/or RRCG, the RIO can cover potentially missed items.

If the RIO is first, the following should be reported:

- a. Who the Russian Shift Flight Director (SRP) and PRP are
- b. Detailed Daily Plan (DPP) Flight Note (FN) number and significant activities involved
- c. Major RS anomalies, troubleshooting, and workarounds
- d. Major RS activities completed, in process, or coming up on the plan
- e. Major actions in work
- f. Answers to any/all questions the FD has that involve the RIO

5.2.2 RRCG AFD Guidelines

- a. The MSG SRP supports AFD conferences at 0700 and 1500 (Monday to Friday).
- b. The SRP supports AFD from his normal workstation in the MSR.
- c. The SRP monitors the ISS FD loop for the call that directs the oncoming team to the ISS AFD loop. SRP announces on the ISS AFD loop "Moscow Support Group is on AFD." An MSG light on the Personal Computer (PC)-based I am GO (IMGGO) tool may replace the verbal call.
- d. The MSG interpreter provides consecutive interpretation on the ISS AFD loop for only the SRP report. This is similar to the practice in simulation debriefs.
- e. After the SRP has given his report, the SRP and interpreter continue to monitor ISS AFD with no further interpretation on the ISS AFD loop. Interpretation is performed off the loops as either simultaneous or summary style.
- f. The RIO continues to support the 0700 and 1500 AFDs, respectively, and provides any additional information not covered by the MSG or HSG.
- g. Rocket Space Corporation-Energia (RSC-E) management has approved MSG participation in ISS AFD.

5.2.3 AFD Content

- a. At the 0700 AFD, the SRP reports on the following (as appropriate):
 1. Results of scheduled activities (crew and Mission Control Center-Moscow (MCC-M)) on the previous day
 2. Key events from the Service Module (SM) daily report, which is generated at the end of each team's 24-hr shift in Moscow
 3. Unique systems configurations or first-time activities

- b. At the 1500 AFD, the SRP reports on the following (as appropriate):
 - 1. Preliminary timeline status on current day
 - 2. Unique systems configurations or first-time activities
 - 3. Timeline activities planned for the next day
 - 4. New information related to future plans
- c. Mission Control Center-Houston (MCC-H) flight controllers can use the opportunity to ask questions of RS and to request tag-ups with MSG specialists during the SRP briefing.
- d. ISS FD should also mention any meetings (Mission Operations Directorate (MOD), Mission Evaluation Room (MER), or ISS Management Center (IMC)) of interest to the SRP. These are mission-related meetings, not the standard forums like ISS Mission Management Team (IMMT), Russian Joint Operations Panel (RJOP), etc.

5.3 CONSOLE POSITIONS AND LAYOUT

See Table 5-1 for White Flight Control Room (WFCR) position descriptions and Figure 5-1 for WFCR layout.

5.3.1 Shuttle White Flight Control Room Positions

Table 5-1. Shuttle WFCR position descriptions

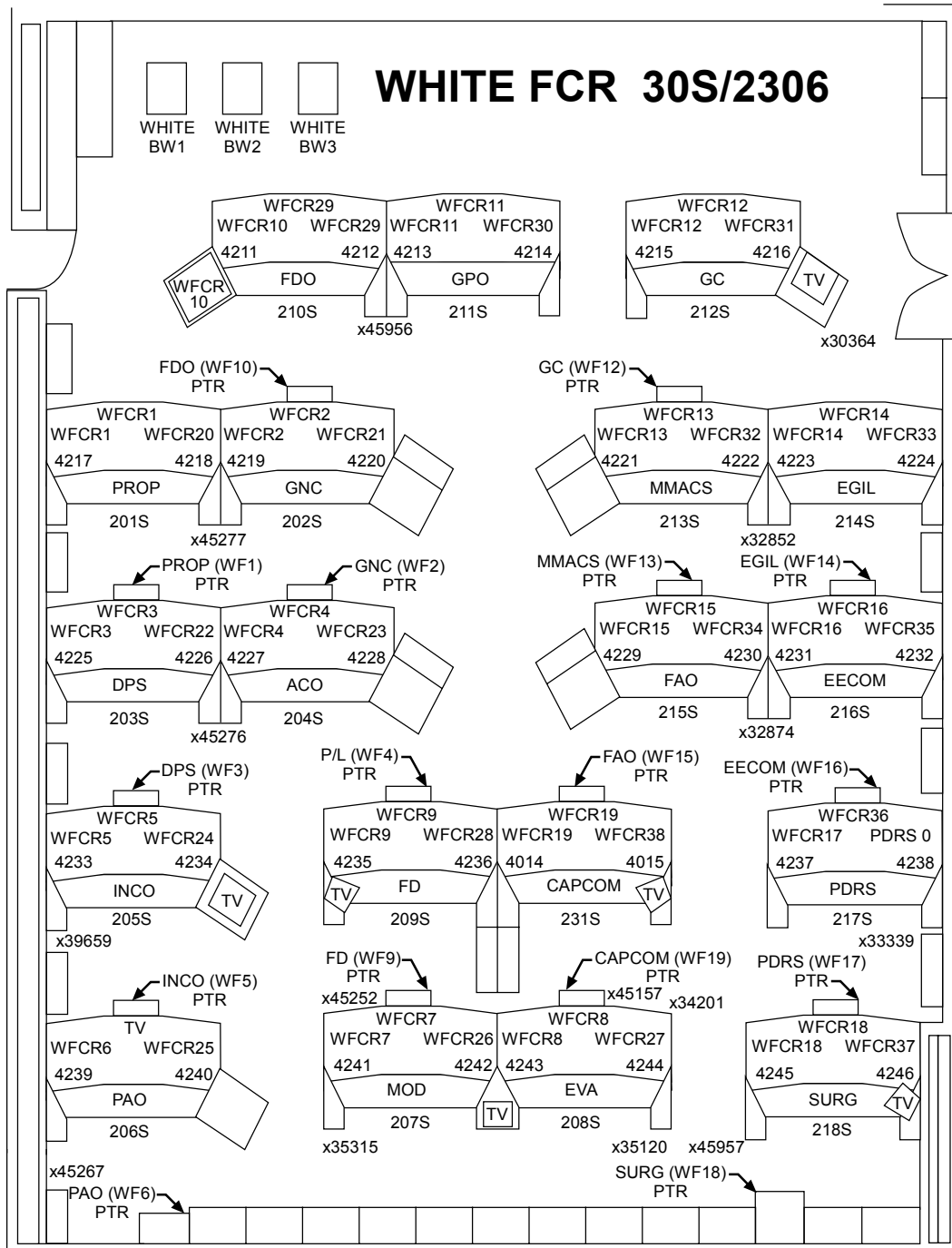
FLIGHT	Flight Director (FD)
<p>Leader of the Flight Control Team (FCT), responsible for overall shuttle mission and payload operations and all decisions regarding safe, successful flight conduct (Сменный руководитель полета)</p>	
CAPCOM	Capsule Communicator/Spacecraft Communicator
<p>Primary communicator between the FCT and crew (Главный оператор по связи с экипажем)</p>	
FIDO	Flight Dynamics Officer (FDO)
<p>Plans and monitors trajectory-related activities in conjunction with Guidance Officer (Ответственный за динамику полета; баллистик)</p>	
GUIDANCE	Guidance Procedures Officer (GPO)
<p>Monitors onboard navigation and onboard guidance computer software</p>	

Table 5-1. Shuttle WFCR position descriptions (continued)

DPS	Data Processing System Engineer
Determines status of data processing system, including the five onboard general purpose computers, flight-critical and launch data lines, malfunction display system, mass memories, and systems-level software	
SURGEON	Surgeon
Monitors crew activities, coordinates medical operations FCT, provides crew consultations, and advises FD of the crew's health status (Полетный врач)	
BOOSTER	Booster Engineer
Monitors and evaluates main engine, Solid Rocket Booster (SRB), and external tank performance during prelaunch and ascent phases of missions	
PDRS	Payload Deploy Retrieval System
Monitors operation of the Remote Manipulator System (RMS)	
PROP	Propulsion Engineer
Monitors and evaluates reaction control and orbital maneuvering propellants and other consumables available for maneuvers	
GNC	Guidance, Navigation, and Control (GNC) Systems Engineer
Monitors all vehicle GNC, notifies FD and crew of impending abort situations, and advises crew regarding guidance hardware malfunctions	
EECOM	Electrical, Environmental, Consumables Manager
Responsible for passive and active thermal control of the vehicle, cabin atmosphere control, avionics cooling, supply/waste water system management, and fire detection/suppression	
EGIL	Electrical Generation and Illumination Engineer
Monitors electrical systems, fuel cells and associated cryogenics, AC and DC power buses, vehicle pyrotechnics, and lighting and hardware Caution and Warning (C&W) systems	
INCO	Integrated Communications Officer
Plans and monitors in-flight communications and instrumentation systems configuration	

Table 5-1. Shuttle WFCR position descriptions (concluded)

GC	Ground Controller
Directs maintenance and operation activities affecting Mission Control hardware, software, and support facilities, coordinates the Ground Space Flight Tracking and Data Network (GSTDN) and the Tracking and Data Relay Satellite System (TDRSS) with Goddard Space Flight Center (GSFC) (Оператор наземной системы слежения)	
FAO	Flight Activities Officer
Plans and supports crew activities, checklists, procedures, and schedules, and plans/manages the attitude of the vehicle (Руководитель полетных работ)	
PAYLOAD	Payloads Officer
Coordinates onboard and ground system interfaces between the FCT and payload user and monitors Spacelab and upper-stage systems and their interfaces with the payload	
MMACS	Maintenance, Mechanical, Arm, and Crew Systems
Monitors operation of the orbiter structural and mechanical system and follows use of onboard crew hardware and in-flight equipment maintenance	
PAO	Public Affairs Officer
Provides mission commentary to supplement and explain air-to-ground transmissions and flight control operations to the news media and the public (Ответственный за связь с общественностью)	
MOD	Mission Operations Directorate Manager
Provides a link from the Flight Control Room (FCR) to top National Aeronautics and Space Administration (NASA) and Johnson Space Center (JSC) MOD management (Руководитель управления полетных операций)	



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Figure 5-1. White Flight Control Room

5.3.2 ISS Blue Flight Control Room Positions

See Table 5-2 for Blue Flight Control Room (BFCR) position descriptions and Figure 5-2 for layout.

Table 5-2. ISS BFCR position descriptions

<p style="text-align: center;">ADCO</p> <p style="text-align: center;">Attitude Determination and Control Officer (Ответственный за определение и управление ориентацией)</p>
<p style="text-align: center;">CATO</p> <p style="text-align: center;">Communication and Tracking Officer (Ответственный за системы связи и слежения)</p>
<p style="text-align: center;">ECLSS</p> <p style="text-align: center;">Environmental Control and Life Support System (Ответственный за системы обеспечения жизнедеятельности)</p>
<p style="text-align: center;">ODIN</p> <p style="text-align: center;">Onboard Data, Interfaces, and Networks (Ответственный за передачу данных, интерфейсы и бортовую компьютерную сеть)</p>
<p style="text-align: center;">OSO</p> <p style="text-align: center;">Operation Support Officer (Ответственный за обеспечении поддержки проведения операций – конструкции и механизмы)</p>
<p style="text-align: center;">PHALCON</p> <p style="text-align: center;">Power, Heating, Articulation, Lighting, and Control Officer (Ответственный за управление системой электропитания, нагревателями, освещением)</p>
<p style="text-align: center;">RIO</p> <p style="text-align: center;">Remote Interface Officer Primary interface between the U.S. to Russian and other IP FCTs</p>
<p style="text-align: center;">THOR</p> <p style="text-align: center;">Thermal Operations and Resources (Ответственный за операции по системе терморегулирования)</p>

Table 5-2. ISS BFCR position descriptions (concluded)

<p style="text-align: center;">ТОРО</p> <p style="text-align: center;">Trajectory Operations Officer (Ответственный за операции по траектории полета) – баллистик</p>
<p style="text-align: center;">EVA</p> <p style="text-align: center;">Extravehicular Activity (Специалист по ВКД)</p>
<p style="text-align: center;">ROBO</p> <p style="text-align: center;">Robotic Operations Officer (Специалист по манипулятору)</p>
<p style="text-align: center;">ACO</p> <p style="text-align: center;">Assembly and Checkout Officer (Ответственный за сборку и проверку систем)</p>
<p style="text-align: center;">OPS PLAN</p> <p style="text-align: center;">Operations Planner (Ответственный за планирование операций)</p>

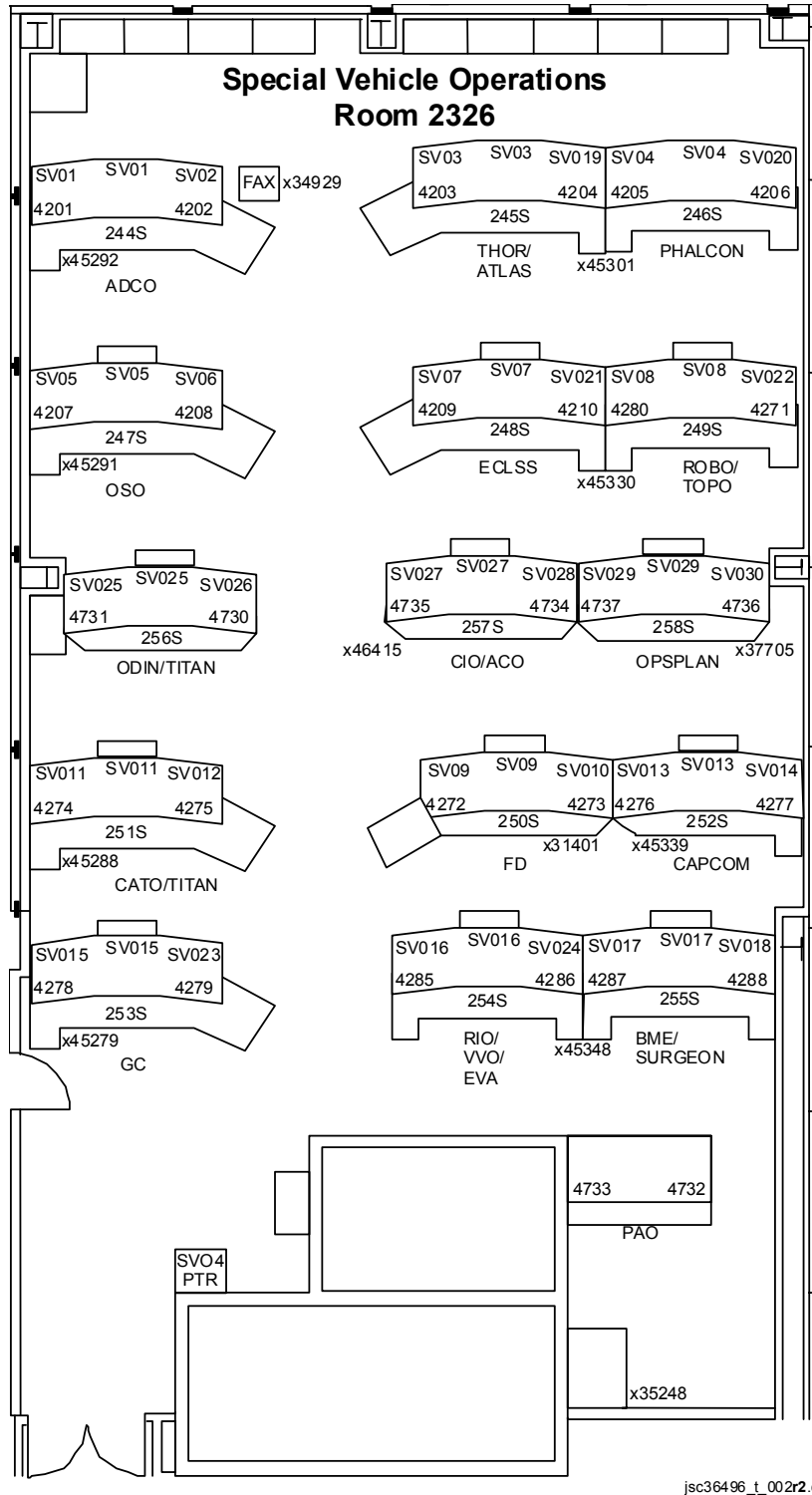


Figure 5-2. Blue Flight Control Room

Note: Red Flight Control Room (RFCR) layout is detailed in Section 6.5, Simulation RIO.

5.4 RIO STEPS IN REAL-TIME FLIGHT RULE DEVELOPMENT

Refer to JSC-29229, Flight Controllers Operational Handbook (FCOH) SOP 2.6.
http://mod.jsc.nasa.gov/da8/FCOH/iss_fcoh/Section%2002/iss_2_6.doc.

5.5 RIO STEPS IN REAL-TIME STATION OPERATIONS DATA FILE PROCESS

Refer to JSC-29229, FCOH SOP 2.7.
http://mod.jsc.nasa.gov/da8/FCOH/iss_fcoh/Section%2002/iss_2_7-new.doc.

5.6 RUSSIAN DETAILED DAILY PLAN DEVELOPMENT PROCESS

5.6.1 Purpose of ДПП FN

HSG/RIO generates a FN for each final ДПП to serve several functions.

- a. To give MCC-H and the HSG better insight into MCC-M ground activities
- b. To integrate key MCC-M activities into the Onboard Short-Term Plan (OSTP)
- c. To integrate key MCC-H activities into the ДПП
- d. To compare ДПП and the OSTP
- e. To identify potential activity and resource conflicts
- f. To provide HSG/RIO an opportunity to gather additional information on RS activities

5.6.2 DPP Process Overview

- a. On E – 2 days (where E = Execution day), HSG meets with the Russian Detailed Planner (ГДПП) to review the preliminary ДПП for day E – 2. HSG generates an internal FN using the standard format (see following example) and sends it to RIO and Ops Plan.
- b. On E – 1 day, RIO gives the internal FN to the RRCG (~1300 central time) for their review, and RRCG gives the RIO a copy of the final ДПП. RIO and RRCG approve the internal FN.
- c. On E – 1 day, RIO submits the FN, notifies the ISS FD, and verbally highlights any items of interest to the FCT over the ISS FD loop. In some cases, RIO should precoordinate an activity with a flight controller on their loop if a detailed discussion is anticipated on the ISS FD loop. RIO makes recommendations to ISS FD, if specific RS activities are desired in the OSTP.
- d. On Execution (E) day, HSG may review the ДПП for any overnight changes (e.g., RCT).

5.6.3 DPP FN Standards

- a. The emphasis of the FN is the MCC-M activities; however, it is useful to include references to crew activities or MCC-H activities, if they are related to a ДПП activity (deactivation of ВД-СУ mode for telemetry connector mates/demates is a prime example).
- b. The comments column should be used to list any rationale or additional clarification pertaining to an activity. When it is unclear, note if an activity is performed via S-band, Russian Ground Segment (RGS), or by onboard program (СПП, РСС, or БПП).
- c. HSG should annotate if an activity was Pen and Inked (P&I) to the final ДПП, so that RIO will know whether the RRCG is seeing the latest modifications. A simple P&I in the comments column is sufficient.
- d. The comments column is also used to identify any discrepancy with the OSTP.
- e. Key events may be bold faced.
- f. The standard FN title is "GMT XXX Russian Detailed Program Plan."

5.6.4 DPP FN Content

Include the following activities:

- a. Ground commanding or system-related activities.
- b. System crew activities, such as equipment maintenance, Repairs and Replacements (R&Rs), major configuration changes, etc. that might not be in the Russian DPP, but are listed in Form 24. This can help put the activity in the right context.
- c. Daily Smoke Detector Test (тест датч дыма).
- d. Daily State Vector [BC] uplink.
- e. All other nondaily equipment maintenance (e.g., Vozdukh Emergency Vacuum Valves [ABK] maintenance, fan cleanings, BMP ops).
- f. Daily ИП-1 Air Flow Sensors Test (Тест ИП-1).
- g. Daily Prop Limit [BRO] uplink.
- h. Uplink daily time settings (Установка БШВ "REGTIM").
- i. Daily Time synchronization (выд. Синхромил. На уст. БШВ).
- j. Daily [TBM] software masks data dumps (START and STOP RT).

- k. Daily ПОТОК (air ionizer) activation.
- l. Daily SM/DC-1 power bus checks (Контр. Шин. Пит).
- m. Daily Star Mapper (БОКЗ) Buffer Dumps (Сброс авар. Буфера БОКЗ).
- n. Daily СПП, РСС, БПП onboard programs uplink.

5.6.5 DPP FN Example

The FN contains three tables. A description of each section is provided in Table 5-3, Table 5-4, and Table 5-5.

In Table 5-3, the columns are the Daily Orbit (DO), the Greenwich Mean Time (GMT) of the activity, the event, and a comment section.

Table 5-3. Russian detailed daily plan example – main body

Daily orbit	GMT	Event	Comment
7	08:49-09:04	RCT	
9	11:12-11:27	RCT	
11	14:41-14:56	RCT	
15	20:41-20:56	RCT	No S-band available at this time. OSTP has RCT scheduled for 2120 – 2135 GMT (with S-band)
2		Uplink onboard daily program, prop limits, and state vectors	
		Deactivate СКВ-1	
3	01:05-01:45	RCT	
		Deactivate ВД-СУ mode	For БИТС backup database (ЦПЛГ) test
		Deactivate and activate Vozdukh, Elektron, БМП	For ВД-СУ deactivation
		Activate СКВ-1	
4	02:45-03:20	RCT	

Daily Orbit Column

If there is an activity for a given orbit, that orbit is added. If there are no activities, it is okay to omit the row for that particular DO.

GMT Column

Events are often hard-scheduled and have a time associated with them; the GMT column is then filled out with the specific time. As in the example, certain activities may take place at any time across the entire orbit or ground pass and have no set time at which they will be completed. In this case, it is acceptable to leave this column blank.

Event Column

Use standard nomenclature where possible and, if needed, be more descriptive in order to allow the reader to understand the event.

Comments Column

Describe the purpose of the event and, more importantly, note any P&I changes to the DPP. These are typically caught on the E-1 review. Note any other additional info of interest, if any. Specify method of uplink (if known).

Ensure that the following activities are also noted from the **Обмен информации в гогу** row at the bottom of the DPP:

Тренировка ГОГУ по зд. 11ф732А17 № 213 - СПУСК ТМА-2. ОТР – Indicates that simulation telemetry will be processed and displayed on MCC-M ground displays (X-Terms). If this appears, verify that this telemetry will not be shipped to Houston; if it is, ensure that Houston is aware that it will occur.

Отраdotка нобои берсии цмо кпы и цмо тмо пс мкс – This indicates that MCC-M ground facilities will be undergoing software upgrades. This may lead to bad telemetry being displayed on the X-Terms. Times should be given as to when this will occur.

Further down in the FN is a table that contains the Molniya satellite coverage for the day. An example of this is shown in Table 5-4.

Table 5-4. Russian detailed program plan example – Molniya coverage

Molniya satellite coverage		
GMT	Coverage	Comments
To 1427	None	
1427 – 1435	One satellite	Two strings available for command and telemetry
1435 to end	None	

GMT Column

The GMT times are found at the top of the DPP. These times are indicative of when the satellites are available and when they are not.

Coverage Column

This column shows whether one, two, or no satellites are available for usage. Sometimes only DOs are available (no specific start and end time is given).

Comments Column

Shows how many strings are available for telemetry and/or commanding.

The last table on the FN contains the DOs (left column) with Soyuz, Progress, and Functional Cargo Block (FGB) telemetry, and which of those telemetry streams is available (right column).

Table 5-5. FGB/Soyuz/Progress telemetry

Available Soyuz/Progress and FGB telemetry	
Daily orbit	Telemetry downlinked
DO12	FGB stream A Soyuz/Progress
DO14	FGB streams A and B
DO2	FGB streams A
DO4	FGB A Soyuz/Progress Reserve

Disclaimer

At the bottom of the DPP (in the footer) make sure the following statement is added:

NOTE: The DPP Review produced by HSG and RIO is intended to document the DPP as written. There may be small differences between the DPP and OSTPV. Official resolution of discrepancies should be directly worked through MCC-Hs counterparts or through SRP on Loop 18.

5.7 OCA DOWNLINKED FILE TRANSFER TO MOSCOW

RIO has access to the V:\OCAFDCC\ISS\Downlink\ForMoscow folder. If a large Orbital Communications Adapter (OCA) file has been downlinked, it often needs to be sent to Moscow (assuming that the MCC-H FD has approved). This procedure identifies the proper way of doing that.

- a. MCC-M instructs the crew to place the [ACH] files on the K: drive in K:/OCA-Down/ForMoscow/

Note: The file size must not exceed 70 Megabytes.

- b. The OCA Officer locates the files once placed in this directory. OCA downlinks the file per Ku availability and uplink/downlink traffic.

The OCA Officer transfers the files to the V:\OCAFDCC\ISS\Downlink\ForMoscow directory.

- c. The RIO opens Explorer and navigates to the above directory.
- d. The RIO invites the MSG SRP to visit the RIO workstation in the FCR with their "thumb drive."
- e. The RIO plugs the thumb drive into the RIO workstation and directly copies the file from the V: drive location to the thumb drive.
- f. MSG can then transfer the file back to Moscow using their dedicated network connection.

5.8 RIO/HSG E-MAIL ACCOUNT

The RIO HSG e-mail accounts are used for other personnel, flight controllers, FDs, and managers to communicate with the on-console RIO or HSG personnel. This is an indispensable tool for the RIO and HSG to conduct their work. The RIO e-mail inbox is shown in Figure 5-3, as an example.

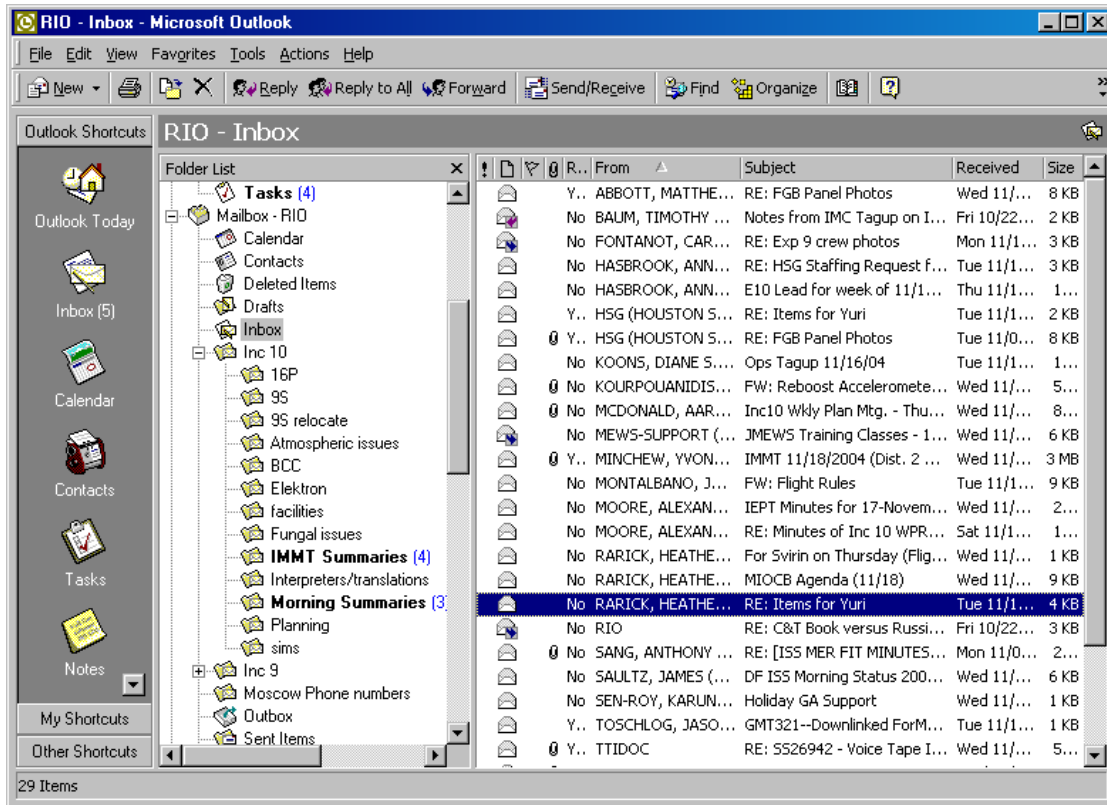


Figure 5-3. RIO Inbox

To be authorized to use the RIO or HSG e-mail account, contact the International Liaison Administrative Logistics Specialist.

5.8.1 Adding the RIO or HSG E-Mail Account

To add the RIO or HSG e-mail account to your personal e-mail account, use the following methods, depending on which operating system you are using.

5.8.1.1 Windows 2000

Assuming that you are authorized to use the RIO or HSG e-mail account, it can be added by performing the following steps in Windows 2000 (we will use the HSG e-mail account in this example):

1. Go to Tools: Services
2. The window shown in Figure 5-4 comes up.

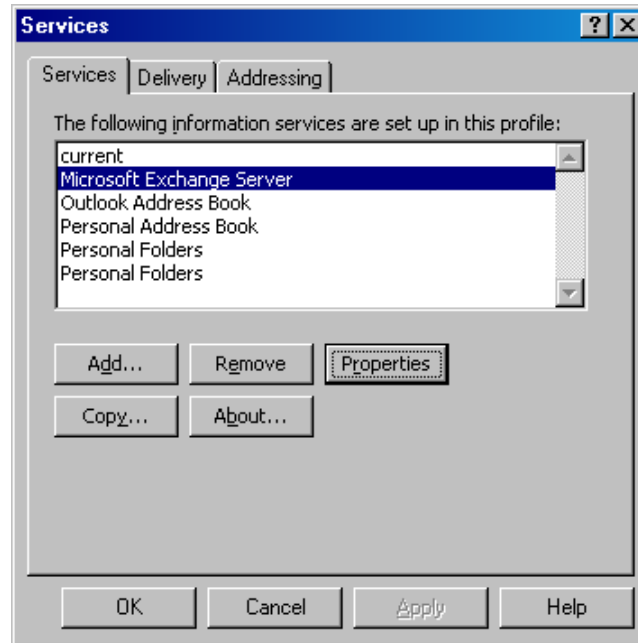


Figure 5-4. Services window

3. Move the blue highlight bar to **Microsoft Exchange Server** (as shown in Figure 5-4). Then click on the **Properties** button, and the window shown in Figure 5-5 comes up.

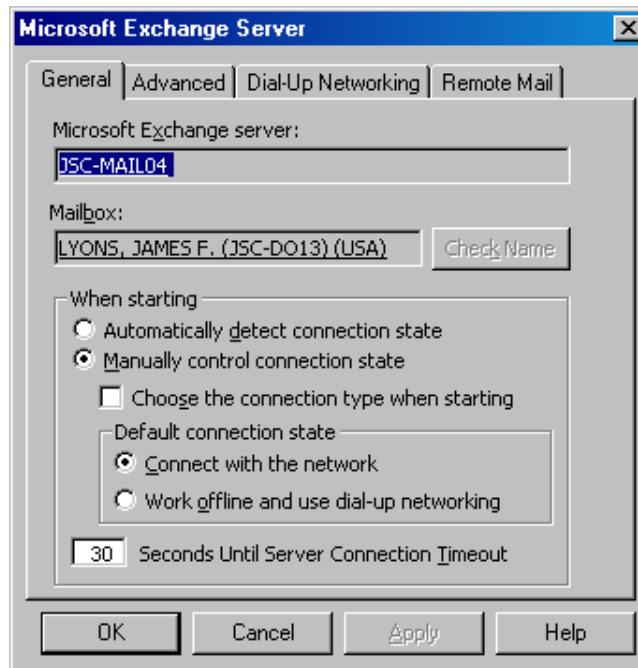


Figure 5-5. Microsoft Exchange Server properties

4. Click on the **Advanced** tab, and the window changes, as shown in Figure 5-6.

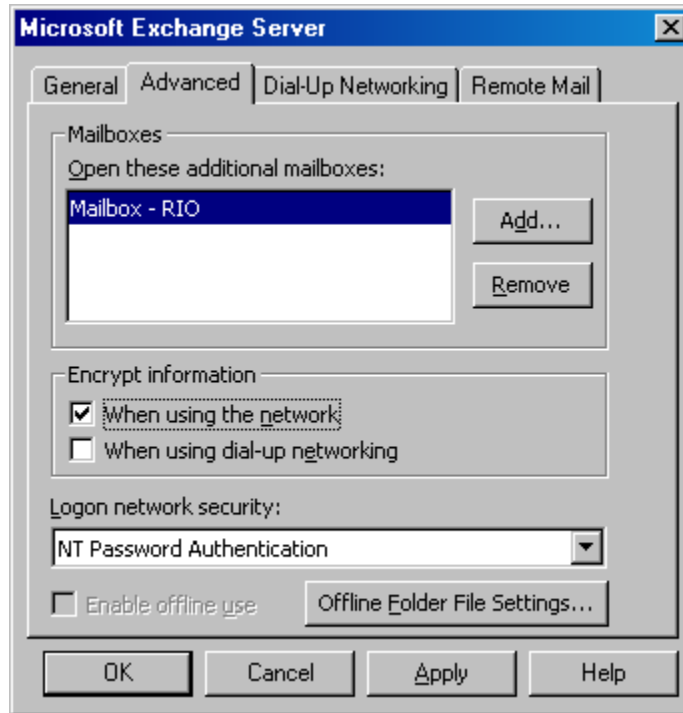


Figure 5-6. Advanced properties popup window

In this example, a RIO account already exists on this user's account, so add an HSG (or RIO if it has not been added yet).

5. Click on the **Add...** button. The popup window, shown in Figure 5-7, appears.

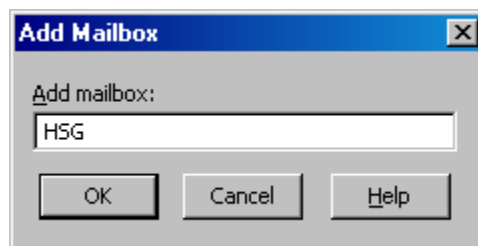


Figure 5-7. Add Mailbox window

6. You are done. You can begin to use the new account.

5.8.1.2 Windows XP

To add an HSG or RIO mailbox in Windows XP, the procedures are slightly different.

1. Click on the **Tools** menu and select **E-mail Account**. The window shown in Figure 5-8 appears.

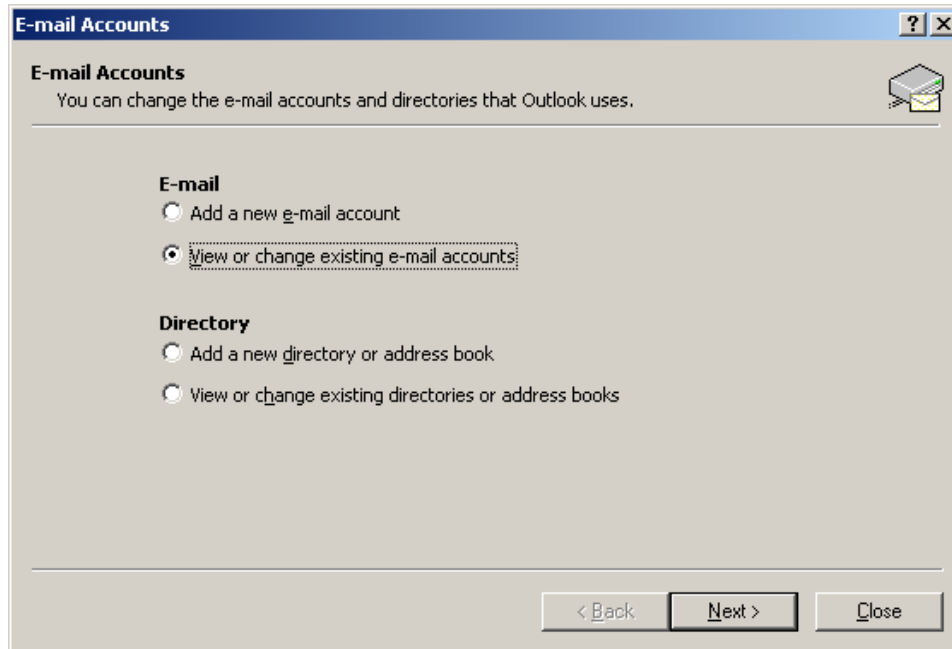


Figure 5-8. E-mail Accounts window number one

2. The default option of **View or change existing e-mail accounts** is what you need. Click on the **Next** button and the window shown in Figure 5-9 appears.

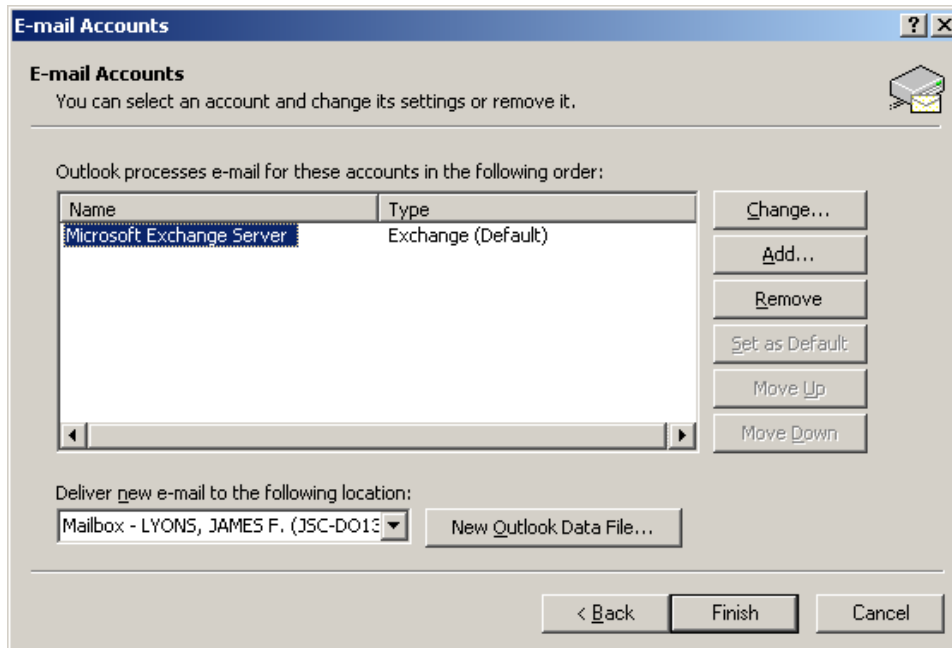


Figure 5-9. E-mail Accounts window number two

3. Click on the **Change** button. The window shown in Figure 5-10 appears.

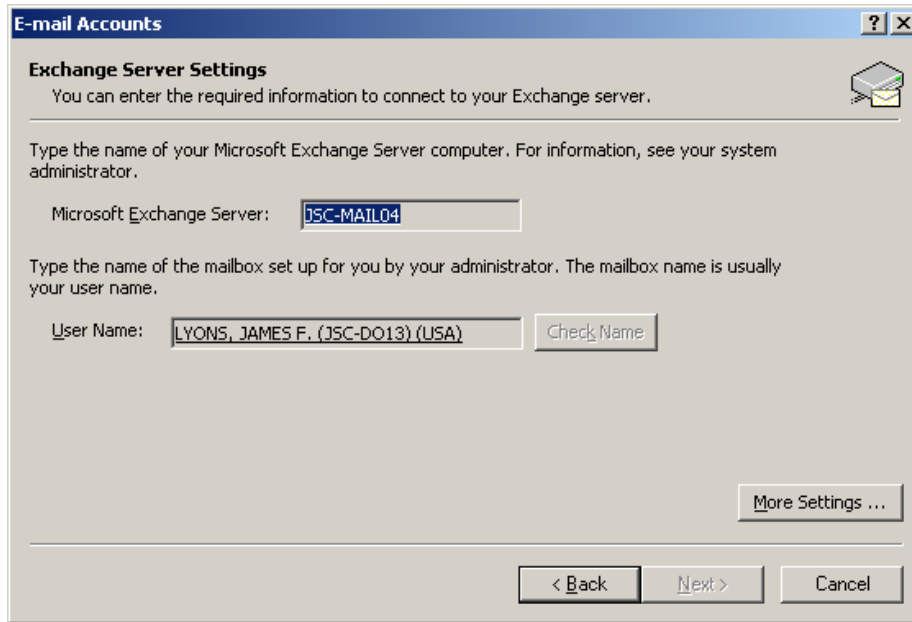


Figure 5-10. E-mail Accounts window number three

4. Click on the **More Settings...** button. The popup window shown in Figure 5-11 appears.

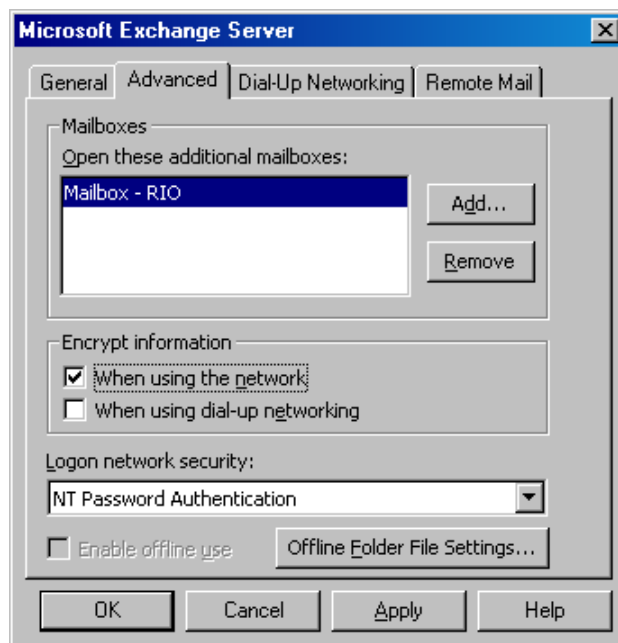


Figure 5-11. Advanced properties popup window

In this example, a RIO account already exists on this user's account, so add an HSG (or RIO if it hasn't been added yet).

5. Click on the **Add...** button. The popup window shown in Figure 5-12 appears.

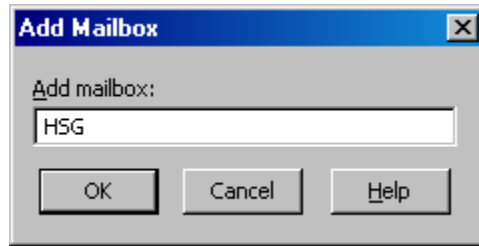


Figure 5-12. Add Mailbox window

6. You are done. You can begin to use the new account.

5.8.2 HSG/RIO E-Mail Account Guidelines

- a. Check RIO or HSG account frequently (at least a few times an hour).
- b. Store important files in a folder in the inbox. The folder should be labeled as Increment X (X being the number of the increment) with subfolders labeled as subtopics, such as "9S Relocate," "EVA 10," or "STS 151 – ISS 25A."
- c. Answer incoming e-mails as soon as reasonably possible.
- d. Check for actions in the e-mails and work them appropriately.
- e. Respond as RIO or HSG in the From field on the e-mail.
- f. Do not let the number of e-mails in the inbox become too large, but do not move them to a folder before it is reasonable to do so. If possible, try to keep the number of e-mails to less than one page.
- g. Archive the e-mails at the end of an increment or when there is no longer sufficient memory in the e-mail account.

5.9 RIO AR PROCESS

Refer to JSC-29229, FCOH SOP 9.2:

http://mod.jsc.nasa.gov/da8/FCOH/iss_fcoh/Section_09/iss_9_2.doc.

5.10 VIDEO TRANSFER TO MOSCOW

Video transfer is usually arranged well ahead of time, but if video is needed without much time notice, contact Ground Control (GC) on loop 8. GC will contact JSC Video Teleconferencing Services (ViTS) at (281) 483-7772.

Video support is available 24 hours per day during shuttle missions and from 2300 to 1700 Central Daylight Time (CDT) at all other times. For television requests during the unsupported time, arrange the request before 1700. The number at MSFC to call if the Volga connection drops is 5-4-1771.

5.11 RECORDED VIDEO REQUEST

Refer to JSC-29929, FCOH SOP 6.4.2.

[http://mod.jsc.nasa.gov/da8/FCOH/iss_fcoh/Section 06/iss 6 4 2.doc](http://mod.jsc.nasa.gov/da8/FCOH/iss_fcoh/Section%2006/iss_6_4_2.doc).

5.12 LOOP RECORDING REQUEST

Refer to JSC-29229, FCOH SOP 6.1.5.

[http://mod.jsc.nasa.gov/da8/FCOH/iss_fcoh/Section%2006/iss 6 1 5.doc](http://mod.jsc.nasa.gov/da8/FCOH/iss_fcoh/Section%2006/iss_6_1_5.doc).

5.13 TRANSLATION REQUESTS

If a translation is needed, every effort should be made to work through the RIO, HSG Ops Lead or RIO on call.

General guidelines:

- a. Submit the procedure as early as possible. Obviously, the sooner it is submitted, the better the quality of the translation will be. Submitting drafts of procedures that are still in work for early translation is helpful.
 - 1. Expect translations to be done about 250 words (per page) per day.
- b. Send translation to contact, as noted in table below. Include translation request information (previous translations, need date/time, distribution when completed). For translation to be done in Moscow, you can place in TERP Inbox (a link is on the DO13/32 Web page) instead of e-mail. Notify contact and provide translation request information via voice loop or phone call.
- c. For translations to be done by TechTrans International (TTI) Houston, use TTIDOC e-mail.
- d. DA8 concurrence can be provided by Ginger Kerrick or Heather Rarick.

Table 5-6. Translation request responsibilities

Interpreter type	Documents	Contact
Chits	MTLO Interpreters; for excess chit translation use HSG Interpreters	HSG Ops Lead/MTLO Lead
Crew messages: EVA (radiograms and US)	For Russian EVA or Russian tasks during US EVA: HSG EVA Interpreters For US EVA or US tasks during RS EVA: HSG Interpreters or TTI Houston with HSG EVA Interpreters for QC	HSG EVA (and RIO/HSG Ops Lead)

Table 5-6. Translation request responsibilities (concluded)

Interpreter type	Documents	Contact
Crew messages: radiograms	Execute Package Interpreters (Orbit 2: 9:00 am to 5:00 pm, Houston time) (Ops Plan MPSR)	Ops Plan
Crew messages: radiograms (overflow)	HSG Interpreters	RIO/HSG Ops Lead
Crew messages: US	For documents less than 10 pages: HSG Interpreter For documents greater than 10 pages (and DA8 concurrence): TTI Houston	RIO/HSG Ops Lead
Flight Notes (FNs)	Requires DA8 concurrence: HSG Interpreters	RIO/HSG Ops Lead
FNs: Real-time Flight Rules	TTI Houston (O. Giannetti)	Flight Notes automatically send e-mail to TTI Houston. Use RIO/HSG Ops Lead for pre-coordination of these changes
Flight Rules (Workflow)	TTI Houston (automatic)	Flight Rules Book Manager
Other	Requires DA8 concurrence: TTI Houston	Gloria Cybulski
PPCR	HSG Interpreters	RIO/HSG Ops Lead
RODF Procedures	RODF Interpreters (HSG)	HSG Ops Lead
SODF (Workflow)	TTI Houston (automatic)	n/a
SODF Procedures (multi-element and impact)	SODF Interpreters (MCC-H)	ODF Lead
ODF Procedures (multi-element and impact)	RODF Interpreters (HSG/HSG Inbox). For Emergency and Med Checklist Procedures Houston ODF Terps (Bldg 35) are prime, with HSG RODF Terps handling the overflow	ODF Console (x45152) (ODF Coord Loop) (after-hours work through Ops Plan or see MCC-H on-call list)

5.14 REQUESTING ADDITIONAL INTERPRETERS FOR CONSOLE SUPPORT

If a special on-console activity requires an additional interpreter(s), contact the TTI interpreters supervisor (Natasha Robarge) by e-mail and/or phone (281-335-8000) several days before the event. Include the date, times needed, and the type of the event when making the request.

5.15 IMMT INTERNAL MINUTES AND EXECUTIVE OVERVIEW PROCEDURE

This procedure identifies the guidelines for completing the IMMT internal minutes and the IMMT Executive Overview (IEO) on a twice weekly basis. The purpose of the IEO is to document major agreements between International Partners (IPs) at the IMMT in order to ensure that ISS upper management is aware of these agreements.

Following the IMMT (usually on Tuesday and Thursday), the RIO performs the following:

- a. RIO takes notes of the IMMT. The notes can be written in Microsoft Outlook or attached as a Word document. Figure 5-13 provides an example.

IMMT August 2, 2004

MOD (M. Abbott)

- Congratulations to MCC-M on the successful undock of 14P.
- EVA preparations are going smoothly.
- Additional comm at egress was obtained; however, there are two gaps that are still in work (11 and 7 minute gaps after egress).
- ACT test successful. Uplink of dump command via Russian assets also successful.
- Wednesday repress from US N2 tanks to 14.3 psi. Subsequent represses will be discussed post EVA.
- MCS planning and analysis for 15P docking, 06:35 GMT dock time (any other times will be a significant impact to MCC-H). V. Blagov concurred on the dock time with MCC-M reporting 09:33 ± 2 min DMT.
- Vibration test for Soyuz with IWIS, requested by MCC-M, is being assessed by MCC-H.
- Flight rule coordination complete. Work to publish and distribute is in work today.

RSCE-E (V. Blagov and A. Spirin)

- Elektron operations yesterday had a glitch. Acceptable state, technical documentation says the Elektron can behave this way, so crew fixed and it is operating nominally. This is considered a short-term glitch. It is possible to have short-term shutdowns of this system. Most probable reason is gas bubbles collecting in the lines and causing pump to shutdown. Crew removes bubbles and restarts.
- All other Russian systems are nominal.

MER (T. Ames)

- Crew reported a Node light failure over the weekend. This brings node light failures to 5 of 8 and for USOS 9 of 24. 15P has 4 new lights.
- New attitude which was implemented post-14P, has been doing well with average momentum ~10%.
- All Engineering inputs to Flight Rules have been submitted.

Safety (D. Koonz)

- Ops constraints on Restiniya and PCP (sp?) have been removed.
- 2 payload certifications for 15P are still open with ECDs of 8/5. Certs will be discussed at JARSWG.
- 3 open cargo certifications with ECDs of 7/30 – will get status.

Figure 5-13. IMMT notes example

IMC (M. Owens)

- CSRD chit 2071 still in work and requiring IPRUSSIA response.
- Chit 2121, crew wake time chit, is a repeat of chit 2040 used on EVA 9A and will be dispositioned with no issues.
- No planned IMMT for Thursday.

Payloads – nothing to report

CSA – nothing to report

ESA – no answer

Program Integration – nothing to report

Space & Life Sciences – nothing to report

EVA – no one there but MOD says “Ready”

Boeing – nothing to report

Avionics – Momentum has been low.

Crew – “crew ready”

Figure 5-13. IMMT notes example (concluded)

- b. RIO sends IMMT minutes to DL DO13 e-mail distribution, as well as the ISS Lead FD, the ISS Increment Lead FD, ISS FLIGHT, the RJOP Chair, and anyone else deemed necessary.
- c. The ISS IM also takes notes for the official minutes. The official notes may take several days to post. An official summary of the agreements is needed the same day of the IMMT. These agreements are summarized in the IEO. A template is shown in Figure 5-14.

Agreements:

* All parties agreed to decide by Thursday how and when a repress is to be performed

Actions:

* MOD ECLSS and Russian ECLSS to jointly recommend a repress plan by Thursday's MMT

Upcoming Meetings:

* Soyuz SORR September 24th

Highlights:

* All parties GO for GNC R4 upload

* Reboost on September 22nd

Figure 5-14. IEO guidelines

- d. The IMC obtains concurrence on the IEO from the IMMT chair before sending to RIO/HSG.
- e. After receiving concurrence from the IMMT Chair, the IM or designated representative (IMC) sends the notes to the RIO/HSG.
- f. RIO/HSG submits for translation. After translation, RIO/HSG or IMC sends to IEO distribution. The IEO distribution should be composed of the following, at a minimum (in parentheses are Increment 9 reps; these will change over time. RIO must be knowledgeable of who these reps are and change the distribution accordingly):
 1. ISS Program
 - (a) ISS Program Manager Deputy Mike Suffredeni
 - (b) IMMT Chairman (Geyer)
 - (c) IMMT Deputy Chairman (Gahring)
 - (d) IMC
 - (e) HSFP-R Director (Newman)

2. MOD

- (a) ISS Lead Flight Director (Hanley)
- (b) Current Lead Increment Flight Director
- (c) Current Backup Increment Flight Director
- (d) ISS FLIGHT
- (e) DL DO13
- (f) RJOP Chair (Rarick)
- (g) HSG
- (h) RIO
- (i) Current Increment Crew Support Astronauts (CSAs)
- (j) Current Lead Increment CAPCOM

3. MER

- (a) DL MER MOSCOW
- (b) ISS-MER-MGRS

- g. HSG places the IEO into translation for delivery to SRP, Blagov, and Antosheshchkin. If, by the time the IEO is submitted, the HSG is off console, RIO submits the IEO to the MCC-M translators for translation.

5.16 VOICE LOOP FLIGHT NOTE PROCESS

Purpose: To inform, with FD approval, GC and Houston Voice of the voice loop patch configuration required for a given phase of ISS Operations.

If the RIO receives an input from a member of an FCT (ISS, shuttle, or IP) to configure a voice loop, the RIO should

- a. Review the latest FN and verify with GC that it fully documents the current configuration.

If it is not the current configuration, the RIO works with GC to document the current configuration.

- b. Update the configuration with the requested change, highlighting the change.
- c. Update the applicability date at the top of the matrix.

- d. Save the matrix as **Voice Loop Configuration xx_xx_xx** to an easily located spot on the PC.
- e. Attach the matrix to a FN that spells out the changes.

Example: GC/Houston Voice: Remove Loop 42 and patch it to FD Coord 1 <DVIS #>. HSG SA: Using the ADAM system, secure MH 42 so that only the FD Voice Panel can talk on the loop.
- f. Request FD approval of the FN.
- g. Track the reconfiguration through to completion and notify the requesting party.
- h. Send a note containing the FN number and, if possible, the matrix to robert.l.harvey1@jsc.nasa.gov.
- i. Request that the FD mark the FN as Info Only.

If the RIO receives the input from the Voice Loop coordinator, the RIO should

- a. Save the Matrix as **Voice Loop Configuration xx_xx_xx** to an easily located spot on the PC.
- b. Attach the matrix to a FN that spells out the changes.

Example: GC/Houston Voice: Remove the Loop 42 and patch it to FD Coord 1 <DVIS #>. HSG SA: Using the ADAM system, secure MH 42 so that only the FD Voice Panel can talk on the loop.
- c. Request the FD to approve the FN.
- d. Track the reconfiguration through to completion.
- e. Send a note containing the FN number and, if possible, the matrix to robert.l.harvey1@jsc.nasa.gov.
- f. Request that the FD mark the FN as Info Only.

5.17 RIO ON-CALL UPDATES

If a RIO or HSG is not on console during the designated rotation, they must be reachable at all times. This status is referred to as being “on call.” Use the MCC-Web to make RIO or HSG on-call updates by

- a. Clicking on the **References** button in the top menu
- b. Clicking on the **FCT On-Call List**
- c. Clicking on the **RIO** in the left grey frame

These steps bring up the window shown in Figure 5-15.

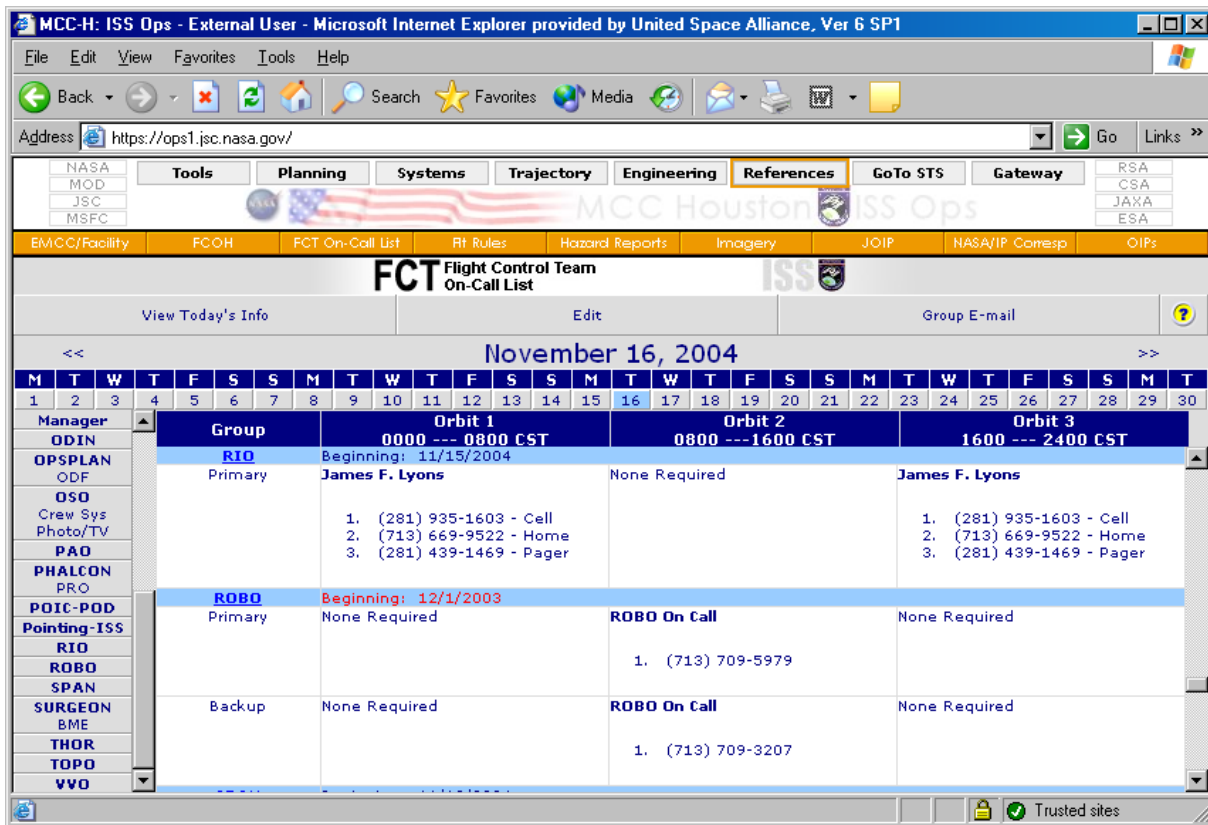


Figure 5-15. On-Call information window

This window shows who is on call for the RIO console by shift. To make changes, perform the following:

1. Click on the grey **Edit** button above the date and below the **FCT...** title.
2. Fill in either the **HSG** or **RIO** circle.
3. The window shown in Figure 5-16 comes up.
4. To make updates, click on the down arrow key to locate an individual to be on call.
5. To add, delete, or modify an individual, use the grey buttons on the left.

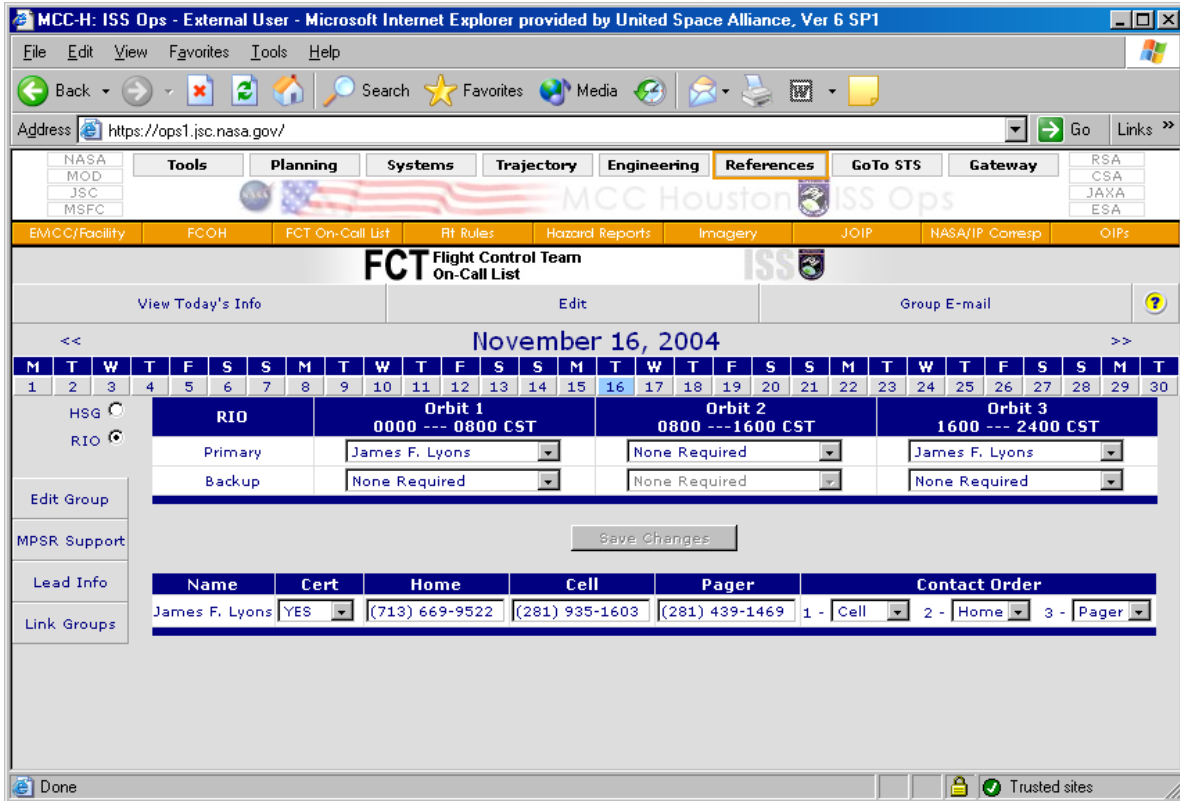


Figure 5-16. On-call edit window

5.18 HAZARDOUS MATERIALS REPORT

The HSG or RIO may be asked for assistance in ensuring that Hazardous Materials (HazMat) information is coordinated properly between MCC-H and MCC-M. The following information is provided for reference in case this coordination is needed.

The ISS HazMat database is part of the ISS Inventory Management System (IMS). The IMS is a large database that is designed to track hardware and consumables, in addition to chemicals onboard ISS. This database is available onboard, via PCs, as well as on the ground and via the Internet.

The JSC medical operations toxicologist obtains the data for HazMat from payloads or systems contacts. Initial HazMat data entry occurs before each launch to ISS. The crew, with the aid of a bar code reader, updates changes to the database as items arrive and are used, stored, relocated, discarded, or returned to Earth.

The HazMat database includes information on hazard rating, major exposure routes, acute toxicity symptoms, and contingency medical treatment protocols.

The IMS user also has the option to link to the Medical Operations Toxicology database. This database gives additional information on chemical and physical characteristics and compound class Spacecraft Maximum Allowable Concentration (SMAC) limits. This

database is a standalone system using the Advance Revelation database system on a microcomputer to provide flight surgeons with information on potentially toxic compounds, including utility and mission-specific payload compounds that are flown on a shuttle or ISS mission.

5.19 RUSSIAN SEGMENT DAILY STATUS REPORTS

The RRCG is under contract to deliver a status of Russian systems to the MCC-H team. The format under which this is completed is known as the RS Daily Status Report. It is available from the HSG Daily News Web page (see Section 4) shown in Figure 5-17.

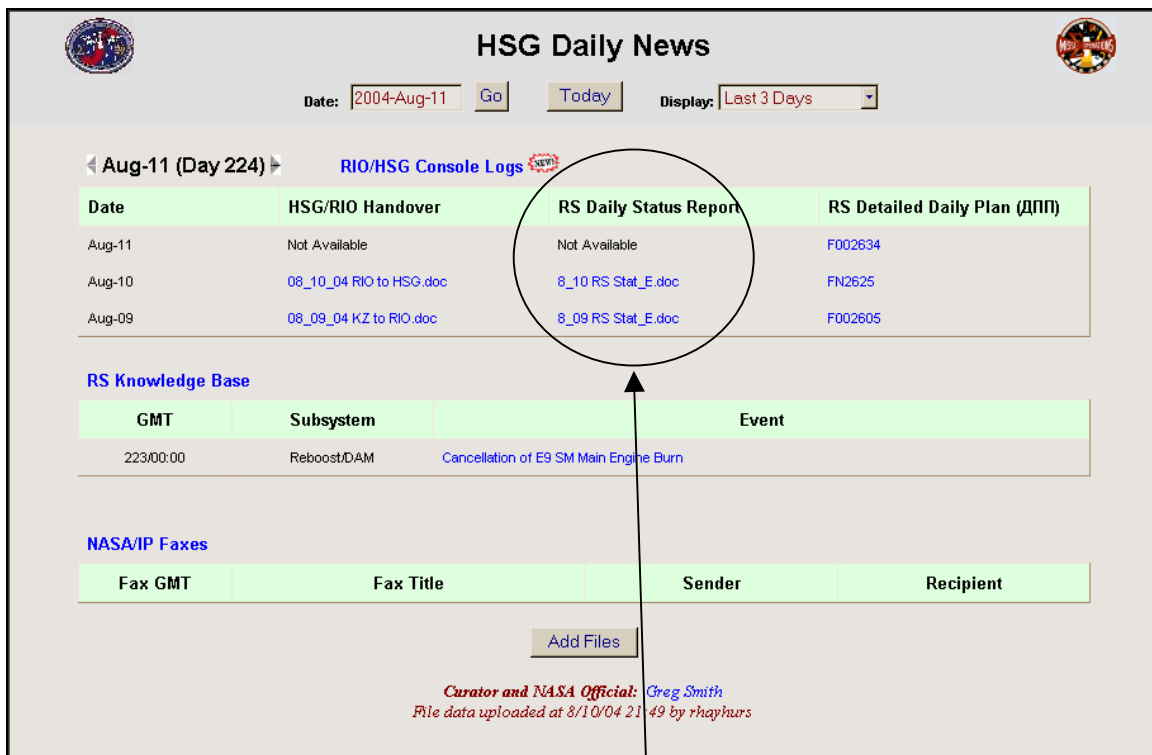


Figure 5-17. RS Daily Status Report access

How it is posted:

- The RS Daily Status Report is prepared by the MCC-M Russian FCT and sent to the RRCG in Houston.
- The RRCG interpreter translates the document and posts it to the daily news page.
- The Russian and English files are archived on the V: Interp folder.
- The RIO can also post the RS Daily Status Report, if necessary, using the HSG Daily News **Add Files** button.

An example of the RS Daily Status Report is shown in Table 5-7.

Table 5-7. ISS RS system status and consumables report example

System, parameter	Status, value	Notes
RS modes and operations		
RS mode	Standard	
Primary operations	Nominal attitude	XPOP + bias
БИНС basis correction/alignment	Periodic correction	БOK3 star mapper
Upper Tier (BY) issues	None	
Propellant consumption per Onboard Control System (БКУ) data		
GDOS	623.470 kg	
delta GDOS	0 kg	
ГКДС	461.752 kg	
BROT	703.470 kg	
Attitude Thrusters (ДО)		
Attitude/Translation Control System (СИО)	SM attitude thruster manifolds 1, 2	
Motion Control System (СУДН) issues	None	
Electrical Power System (СЭП)		
SM ЗПУ (Charge-Discharge Unit): number of activated units	7	Battery 1 ЗПУ charge-discharge unit deactivated
CHT activated	YES	CHT 4 is on
SM АБ (Storage Battery) capacity	370 Ah	
EPS (СЭП) issues	None	
Life Support System (СОЖ)		
Elektron	ON (24 A)	
Vozdukh	ON	
Micropurification Unit (БМП)	ON	
Harmful Contaminant Filter (ФВП)	off	
Condensate Water Processor CPB-K (SRV-K)	ON	
Сигнал (Signal)	ON	

Table 5-7. ISS RS system status and consumables report example (continued)

System, parameter	Status, value	Notes
TIK cassette (SFOG candle) supply	Qty – 106	
CO ₂ absorbent beds	Qty 20 Russian + 22 U.S.	
Water	337.8 liters	
Food	133 person-days	
O ₂ available in Progress	7.9 kg	
COЖ issues	None	
Section 1: Fuel Tank (БГ1)	136 kg	
Section 1: Oxidizer Tank (БО1)	258 kg	
Section 2: Fuel Tank (БГ2)	53 kg	
Section 2: Oxidizer Tank (БО2)	105 kg	
Mrap1 (available propellant in Section 1)	332 kg	
Mrap2 (available propellant in Section 2)	101 kg	
FGB Low Pressure Tank (БНД): Fuel Tanks (БГ1, 2, 3)	306 kg	
FGB Low Pressure Tank (БНД): Oxidizer Tanks (БО1, 2, 3)	345 kg	
FGB High Pressure Tank (БВД): Fuel Tank (БГ)	163 kg	
FGB High Pressure Tank (БВД): Oxidizer Tank (БО)	303 kg	
FGB Propellant Tank (ТБ): Fuel Tanks (БГ1, 2, 3, 4)	799 kg	
FGB Propellant Tank (ТБ): Oxidizer Tanks (БО1, 2, 3, 4)	1483 kg	
Soyuz TMA: Propellant in Combined Propulsion System (КДУ)	501 kg	
Progress: Propellant in Combined Propulsion System (КДУ), Equipment Compartment (АО)	205 kg	

Table 5-7. ISS RS system status and consumables report example (continued)

System, parameter	Status, value	Notes
Progress: Section 1: Propellant Resupply System (СД) Fuel Tank (БГ1, 3) Equipment Compartment (АО)	0 kg	
Progress: Section 1: Propellant Resupply System (СД) Oxidizer Tanks (БО1, 3), Equipment Compartment (АО)	0 kg	
Progress: Section 2: Propellant Resupply System (СД) Fuel Tanks (БГ2, 4) Equipment Compartment (АО)	0 kg	
Progress: Section 2: Propellant Resupply System (СД) Oxidizer Tanks (БО 2, 4) Equipment Compartment (АО)	0 kg	
Progress: Propellant in Combined Propulsion System (КДУ), (DC1)	0 kg	
Progress: Section 1: Propellant Resupply System (СД), Fuel Tank (БГ1, 3), (DC1)	0 kg	
Progress: Section 1: Propellant Resupply System (СД), Oxidizer Tank (БО1,3), (DC1)	0 kg	
Progress: Section 2: Propellant Resupply System (СД) Fuel Tank (БГ2,4), (DC1)	0 kg	
Progress: Section 2: Propellant Resupply System (СД) Oxidizer Tank (БО2,4), (DC1)	0 kg	
Integrated Propulsion System (ОДУ) Issues	None	
Atmospheric Parameters		
Рмв (Pressure, per pressure gauge) (last taken)	751 mmHg	
Рпо (Pressure in working compartment)	755 mmHg	Pressure monitored with Д ДДИ sensors
O ₂	163.7 mmHg	US CSA-CP

Table 5-7. ISS RS system status and consumables report example (continued)

System, parameter	Status, value	Notes
CO ₂	3.7 mmHg	ИК0501
CO	2.2/2.6 mg/m ³	Sensor/status telemetry
Тро	26.8° C	
Thermal Control System (СОТР)		
H ₂ O	7.6 mmHg	
КОБ1	On	
КОБ2	Off	
КОХ1	Off	
КОХ2	On	
СКБ1	Off	
СКБ2	On	
СОТР issues	Yes	SKV2 shut down due to БРПК tank overflow
Onboard Equipment Control System (СУБА)		
СУБА issues	None	
Onboard Computer System (БВС)		
SM CC (ЦВМ) Lane 1 status	Active	
SM CC (ЦВМ) Lane 2 status	Active	
SM CC (ЦВМ) Lane 3 status	Active	
SM TC (ТВМ) Lane 1 status	Active	
SM TC (ТВМ) Lane 2 status	Active	
SM TC (ТВМ) Lane 3 status	Active	
БВС issues	None	
Onboard Communication System (БРТК)		
БРТК issues	None	
Science experiments		
Payload Team (ГЦН) issues	None	
ТЕХ-25 (Скорпион)	SKORPION	
КНТ-2 (МРАС and SEED)	MPAC/SEED	

Table 5-7. ISS RS system status and consumables report example (concluded)

System, parameter	Status, value	Notes
ПКЭ-1В	KROMKA	
ТЕХ-5	METEOROID	
РБО-1	PROGNOZ	
БИО-2 (Биориск)	BIORISK	
ТЕХ-GTS		
КНТ-1 (GTS)	GTS	
ТМО-БСММ		
БСММ	BSMM	Activated for continuous operation GTS status check on orbits 2194/1 and 2197/4
ТЕСТ.ВКЛ. ТМО С БСММ		
ПЛАЗМА		
РБО-3-1 МАТРЕШКА		
ПУЛЬС		
ГОДЭ		
Crew Activity Support (ГОДЭ)		
Radiograms uplinked	All r/g uplinked	Via OCA: all forms for 11.15.04: f24-17 prel.
ODF issues	None	
Open issues	None	
Comments to the crew and crew questions for ГОГУ		
Comments to crew	None	
Crew feedback to ГОГУ	None	
Communication with MCC-H		
Open issues	None	
Comments to MCC-H	None	
Comments to ГОГУ Groups		
Comments to ГОГУ groups		

5.20 VOICE COMMUNICATIONS STANDARDS

Effective communications are directly dependent upon an understanding of network phraseology and the strict adherence to established procedures that, by their nature, ensure system discipline. During flight time, voice transmission, via Air-to-Ground (A/G) circuits, is restricted to that necessary for the application of flight control procedures contributing to the safety of space flight and the success of the mission.

The following procedures have been developed to ensure effective standardized voice communications.

5.20.1 Voicing Letters and Numbers

It is very important to use the accepted phonetic alphabet for letters and digits for all numbers. Through worldwide acceptance, certain abbreviations are given by the letters only, without using the phonetic alphabet (i.e., PCM (Pea-See-Em), GMT, IUS, SRB, OI, ET, VHF, UHF, RF, and JSC). Common usages of certain number sets allow unambiguous use of word groupings, rather than digits (i.e., Three Seventy, Seven Forty Seven, Building Thirty, and Six Forty Two B). Also, pay attention to the following:

- a. "Fifty microvolts" can be misunderstood for "fifteen microvolts," but "five zero microvolts" is unambiguous. "Test B" can be misunderstood for "Test D," but "Test Bravo" is unambiguous.
- b. When transmitting times in GMT, care must be exercised in the use of the letter Z since the phonetic pronunciation ("Zulu") could be mistaken for "Two Two." The following example prevents any ambiguity: "Lift-off occurred at one six hours, four zero minutes, zero zero seconds GMT."

5.20.1.1 Phonetic Alphabet

When use of the phonetic letter equivalent is required, due to poor receiving conditions or for other reasons, the phonetic alphabet, as given below, is used.

A – Alpha	H – Hotel	O – Oscar	V – Victor
B – Bravo	I – India	P – Papa	W – Whiskey
C – Charlie	J – Juliet	Q – Quebec	X – X-ray
D – Delta	K – Kilo	R – Romeo	Y – Yankee
E – Echo	L – Lima	S – Sierra	Z – Zulu
F – Foxtrot	M – Mike	T – Tango	
G – Golf	N – November	U – Uniform	

5.20.1.2 Phonetic Numerals

Numerals are pronounced as

1 – Wun	4 – Fower	8 – Ate
2 – Two	5 – Fi-yiv	9 – Niner
3 – Tha-ree	6 – Six	0 – Zero
	7 – Seven	

Examples

- a. 15 is pronounced as one five.
- b. 150 is pronounced as one five zero.
- c. 1500 is pronounced as one five zero zero.
- d. 1.5 is pronounced as one point five.
- e. 0.015 is pronounced as zero point zero one five.

5.20.2 Voicing Procedure Words

The following are established procedure words (prowords) and their meanings:

Proword	Meaning
Affirmative	Yes.
All after	I refer to all the transmission following XXX (i.e., “GC GOLDSTONE, say again all after XXX”).
Break break	I wish to interrupt a transmission in progress.
Note: This proword is only to interrupt with urgent traffic.	
Copy	Understand.
Disregard	Cancel my transmission in progress or cancel my last transmission (i.e., “Disregard my last transmission.”).
Figure	Numerals are to follow.
Note: This proword is not necessary in requesting or giving parameter readouts or when transmitting times.	
I spell	I will spell the following phonetically (i.e., “ACCU, I spell, Alpha Charlie Charlie Uniform ACCU.”).
Negative	No.

On my mark	An event is to take place. A countdown will be at 1-second intervals. The countdown may start with 10, 5, or 2, but the count should be at 1-second intervals toward zero and should end 1 second after “one” with the word “mark.”
Read back	Repeat all, or the specified portion of my last transmission (i.e., “MADRID, COMMAND. Carrier-on time, zero four two one five six. Read back all after time.” “COMMAND, MADRID. I read back, zero four two one five six.”).
Roger	I have received your transmission.

Never say “Roger” when you mean Affirmative or Negative.

Say again	Repeat all, or the following portion of your last transmission (i.e., “Say again all after XXX,” or “Say again word after XXX.”).
Speak slower	You are talking too fast.
Stand by	I must pause for a few seconds.

Note: Since “Stand by” requires that the called party ignore his other calls and wait for your transmission, this is used only if the waiting time is going to be less than the time it would take to break communications and reestablish them. “Roger, I will call you back” should be used if the waiting time is longer than this.

Unknown station or station calling	I do not know the identity of the station calling me (i.e., “Unknown station, HOUSTON, say again,” or “Station calling HOUSTON, say again.”).
Wilco	I have received your message; I understand it, and will comply (i.e., “COMMAND, MADRID, Wilco.”).

Note: “Roger” is never used with “Wilco.”

Word after	I refer to the word after XXX (i.e., “GOLDSTONE, COMMAND, say again word after XXX”; “COMMAND, GOLDSTONE, I say again XXX.”).
Word before	I refer to the word before XXX.
Words twice	Communications are difficult. Transmit, or I will transmit, each word or group twice.

5.20.3 Standard Voice Checks

When testing voice circuits, a standard short count (1, 2, 3, 4, 5, 5, 4, 3, 2, 1) should be spoken directly into the microphone at normal voice level. Voice checks provide the means to ensure that the circuit is operating, to check the intelligibility and quality of the speech on the circuit, and to verify that the speech is clearly understood and is of normal tonal quality for the type of circuit under test.

The degree signal strength and readability of the transmission are expressed in the following terms or combinations.

Signal strength	Readability
Loud	Clear
Good	With distortion
Weak	With background noise
Barely audible	With fading but readable
Inaudible	Unreadable

5.21 NOTIFYING S/G INTERPRETERS OF TRANSLATION ISSUES

On occasion, Space to Ground (S/G) interpretation may drop out or have some other problem due to headset issues or miscues. DO NOT call the S/G interpreters on the RIO INTRPTR loop to let them know of the problem. This is very distracting for the interpreters.

Instead, call the S/G interpreters on the phone to let them know of the problem, and then decide on what action to take (have them reinterpret from recording or fill us in on what they said, if they can remember). Someone will answer the phone and relay the message to them.

The S/G interpreter number is 3-1068 and is on the DO International Liaison badge cards.

5.22 HOW TO INSTALL CORRECT RODF AND RADIOGRAM FONTS ON YOUR PC

If your PC does not have the correct fonts installed, many RODF procedures and radiograms will display unusual icons (spiders, umbrellas, etc.) instead of the standardized icons.

To rectify this abnormality, perform the following:

1. Open the following RS KB entry:
https://mod2.jsc.nasa.gov/do13/kb/history_detail.cfm?HistoryID=1821.

2. Copy the two attached files (**RSSymbols.TTF** and **odfsymb.ttf**) to the following folder on your PC:

C:\Windows\Fonts

3. Reopen the file and the standard ODF icons should appear correctly.

6.0 RIO-SPECIFIC CONSOLE PROCESS AND PROCEDURES

6.1 STEADY STATE RIO

The Remote Interface Officer (RIO) supports the steady state operations of the International Space Station (ISS) during the orbit 2 shift or longer, as required. Also, the RIO supports steady state operations for any major activities, as required. These special periods are covered later in this section.

6.1.1 Steady State RIO Daily Tasks

The following sections detail the list of daily and weekly tasks the Steady State RIO should perform both off and on console.

6.1.1.1 Friday Before Shift

The following items are performed on the Friday before weekly rotations as Stage OPS RIO:

- a. Read the Russian Segment Knowledge Base (KB) for new entries.
- b. Read the handover thoroughly to maintain cognizance of the week's activities and upcoming activities.
- c. Tag up with current RIO for any additional information that is needed.

6.1.1.2 On Console (Monday to Friday)

The following items are completed during the week that a RIO is on console for ISS Steady State Operations:

- a. Beginning of shift (arrive at 0645)
 1. Announce arrival on ISS Flight Director (FD) loop.
 2. Tag up with the Houston Support Group (HSG) (OPS Lead) on loop 5 or 8 to determine any actions that need immediate attention.
 3. Log in to Digital Equipment Corporation (DEC) and launch HSG Overview and HSG Event Logging (ELOG).
 4. Log in to Personal Computer (PC) and start Onboard Short-Term Plan Viewer (OSTPV), RIO log, RIO handover, Electronic FN (EFN), e-mail (with RIO in box), and I am GO (IMGO).
 5. Activate Digital Voice Intercom System (DVIS) and select the following loops: Space-to-Ground (S/G) 1/2, ISS FD, ISS Alternate Flight Director (AFD), ISS OPS Moscow-Houston (MH) 18, HOUSTON SUPPORT MH 08, HSG/RIO COORD MH 05, RIO Mission Operations Control Room (MOCR), RIO

INTRPTR, Russian-to-English (R/E) TRANSLT, Russian Segment (RS) ISS Very High Frequency (VHF) 1/2, and Orbiter Communications Adapter (OCA) Blue Flight Control Room (BFCR).

6. Begin prep for AFD by reviewing the handover and any other sources deemed necessary.
 7. AFD starts NET at 0715. RIO is required to participate.
 8. Take notes in RIO log for AFD and highlight any actions.
 9. After AFD, and if the RIO increment Lead is unable to attend, go to ISS Mission Management Team (IMMT) (Mondays and Thursdays at 0800) or U.S. OPS Tag-up (Tuesdays and Fridays at 0800). Take notes and distribute to Distribution List (DL) DO13.
 10. Tag-ups between IMMT Chairs and Blagov sometimes occur. The RIO Increment Lead is prime for attending these, but the on-console RIO will go if the Lead cannot.
- b. Review the following to obtain mission cognizance for the current day:
1. RIO handover – Upcoming RS plans, vehicle status, open work
 2. RIO in box – Read and respond to RIO e-mails and HSG inbox (optional)
 3. OSTPV – Review major activities, including RS Command (CMD) and S-bands
 4. Joint Execute Package Development and Integration (JEDI) – United States On-Orbit Segment (USOS) daily summary, F24, OCA messages, radiograms
 5. EFN – Review open and approved Flight Notes (FNs), as well as new RIO internal notes
 6. RS KB – Events in last 3 days are bold-faced
 7. Fax – Read new faxes
 8. Planning Product Change Request (PPCR) – Review timeline changes that impact the RS
 9. Attitude Timeline (ATL) – Current attitude, sideslip angle, upcoming maneuvers/events
 10. RS daily status – System configurations, measurements (e.g., Partial Pressure Oxygen (PPO₂))
 11. Chit – Review items pertaining to the RS and update, as required

12. Item for Investigation (IFI) – Review new RS entries and check for consistency with RS KB
 13. RS Anomaly Reports (ARs)
- c. Core shift functions
1. Support meetings, per weekly schedule (details later in this section).
 2. Conduct voice communications on loop 18 with ППП/СРП to exchange information between Mission Control Center-Houston (MCC-H) and Mission Control Center-Moscow (MCC-M).
 3. Provide transition between offgoing HSG (orbit 2) and oncoming MCC-H (orbit 3) teams. Support orbit 2 to orbit 3 AFD briefing.
 4. Provide local expertise to MCC-H for RS systems operations.
 5. Facilitate Russian Regional Control Group (RRCG) participation in MCC-H operations (e.g., AFD, meetings, plan review, issue resolution).
- d. RS situational awareness
1. Monitor VHF passes and inform MCC-H on items of interest.
 2. Observe execution of current day's RS activities.
 3. Advise MCC-H of current and planned RS operations affecting their systems.
- e. HSG coordination (HSG duties are outlined in Operations Interface Procedure (OIP) A2.3.3)
1. Transfer the HSG/RIO handover to RIO control. Discuss topics to give the RIO a full understanding and determine which open work will be worked by the RIO.
 2. Assist HSG with Web postings of National Aeronautics and Space Administration (NASA)/International Partner (IP) fax correspondence.
 3. Assist OPS Plan and others with document translations via HSG (or TechTrans International (TTI)) interpreters.
 4. Review translation priorities with OPS Plan, if an important radiogram is needed at a certain time (e.g., S/G interpreter documentation for new or complex ops). Overflow work can be shifted to the HSG interpreters.

f. RRCG coordination

1. Review next day timeline, including explanations of unique activities and RS events affecting the USOS.
2. Discuss any RS or USOS (with RS impacts) anomalies.
3. Assist with any workstation or facility issues.
4. Provide assistance and training on use of PC and DEC applications.
5. Verify that the RRCG has current mission documents (Flight Rules, Operations Data File (ODF), Flight Data File (FDF) Flight-Specific Annexes, OIPs).
6. Facilitate any discussions between the Mission Control Center (MCC)/ Increment Management Center (IMC)/Mission Evaluation Room (MER) and the RRCG.
7. Clarify any questions regarding the RS Daily Status Report.
8. Inform RRCG of any important meetings during the week.
9. Report any significant findings to the FD and HSG.

g. ДПП FN generation

1. Provide RRCG with the internal ДПП note and receive the final ДПП early in the shift.
2. Perform comprehensive review of upcoming RS activities in Onboard Short-Term Plan (OSTP) (including ops and execution notes), ДПП, F24, radiograms, and Russian Operations Data File (RODF).
3. Collaborate with RRCG to resolve issues and understand unknown operations.
4. Submit the ДПП FN.
5. Report discrepancies and updates to OPS Plan and the ISS FD.

Note: MCC-M timeline info is electronically transferred to MCC-H at E – 6 days, so certain MCC-M ground activities may not be included. OSTP updates should meet the following criteria:

- (a) Activity affects the crew (e.g., CKB deactivation).
- (b) Activity affects the USOS (e.g., CHT activation).
- (c) Contains critical command activity, which should be marked with a blue box.

6. Advise MCC-H disciplines (and the ISS FD) of upcoming activities and documentation affecting their systems.

h. Logistics

1. Save RIO files (handovers, logs, meeting minutes) in V:/RIO/Steady State/folders.
2. Post the RIO handover to the [HSG Daily News](#) page.
3. RS daily status reports are saved in V:/INTERP/RS Daily Status Reports/, and RIO has access to this folder.
4. Several English/Russian glossaries are found in V:/INTERP/TTI_Glossaries. The main document is RS_systems.doc.
5. Maintain current documents in RIO bookshelf. Verify that ODF is up to date.
6. Update the Moscow/Houston voice loop configuration table as an FN to show temporary loop changes (e.g., loop assignments for Extravehicular Activity (EVA), visiting vehicle OPS, and failure workaround).
7. Inform Lead RIO of any crew circadian shifts. The Lead RIO will coordinate with TTI.

i. End-of-shift checklist

1. Save the RIO console log.
2. File ДПП in ДПП notebook.
3. Submit ДПП FN, explain new or complex OPS to MCC-H, and post the FN to the [HSG Daily News](#) page.
4. Update RIO/HSG handover and post it to the [HSG Daily News](#) page.
5. Review RS daily status report.
6. Update RS KB, Current Status and Event History, as required.
7. Manage RIO in box.
8. Obtain ISS FD approval for release.

6.1.2 Steady State RIO Weekly Tasks

Beginning of the Week

The stage RIO is on call for the entire week (Monday to Sunday), so update the ISS Flight Control Team (FCT) Contact List FN.

End of the Week

Tag up with the RIO who will be on console for the following week. Discuss open issues, key timeline events, and meeting support, as required. Ideally, the oncoming RIO should go to the RIO console on Friday to review the data in person.

See Table 6-1 for the weekly meeting schedule. The RIO Increment Lead is prime for attending these.

Table 6-1. Meeting schedule

Day	Time and place	Meeting	Info
Monday	0800 – 0900 Bldg 30, room 225A	IMMT	Mark Geyer (Chairperson) Heather Monahan (Contact) 281/244-8369 http://iss-www.jsc.nasa.gov/ss/issapt/issmmt/
Tuesday	0800 – 0900 Bldg 30, room 225A	JSC OPS tag-up	
Wednesday	0700 – 0900 Check Web for location	RJOP	Heather Rarick (Chairperson) 281/483-7622 http://mod.jsc.nasa.gov/da8/Jop/RJOP/
Thursday	0700 – 0900 Bldg 4S, room 4519	Team 0	Greg Dorth (Chairperson) Betsy Fleming (Contact) 281/244-7728 http://iss- www.jsc.nasa.gov/ss/issapt/rait/rait.html
	0800 – 0900 Bldg 30, room 225A	IMMT	Mike Suffredini (Chairperson) Heather Monahan (Contact) 281/244-8369 http://iss-www.jsc.nasa.gov/ss/issapt/issmmt/
	1030 – 1130 Bldg 30, room 225A	WLP Planning	Lead Inc. FD and Lead U.S. Planner
Friday	0800 – 0900 Bldg 30, room 225A	JSC OPS tag-up	

Meeting Support

- a. IMMT support is required. Write minutes and distribute to DL DO13, ISS FD, Lead/Backup FDs, and Moscow Support Group (MSG).
- b. Russian Joint Operations Panel (RJOP) support is required.
- c. RJOP splinter support is optional, based on topics.
- d. Johnson Space Center (JSC) OPS tag-up support is required.
- e. Team 0 support is recommended, based on topics.
- f. Weekly Look-Ahead Plan (WLP) planning support is recommended. Inform HSG of new activities or update the RS events schedule in the HSG/RIO handover.

Before a Shuttle Flight

Work with the Lead RIO and HSG OPS Lead to review the upcoming mission objectives with the RRCG.

6.1.3 Steady State RIO Increment Notebook

The lead RIO for the flight before a new increment is in charge of pulling together an Increment Notebook. This notebook contains the handovers, FNs, Detailed Daily Plans (DPPs), RS Daily Status, and any other relevant information. The notebook is used to store any and all key information generated by the RIO, HSG, or RRCG during the increment.

The following items should be in the notebook:

Objectives/Priorities

- a. Flight objective (Increment Definition and Requirements Document (IDRD), Section 1)
- b. Mission on-orbit task priorities and task overview (use Flight Rules or Mission Integration Plan (MIP), Section 4)

Planning

- a. Flight Plan notes
- b. Overview timeline (latest On-Orbit Operation Summary (OOS))

Increment MMT

- a. Last and next agendas
- b. Minutes or notes from previous meetings
- c. Milestone charts (if available)

RS and USOS Systems

- a. System configurations (unique and standard)
- b. U.S. and shuttle system configurations
- c. Relevant KB entries

Flight Rules

- a. Schedule of due dates and publication dates
- b. Status of Russian rules in work
- c. Flight Rules with issues

Chits, IFIs, ARs

For key Russian issues, malfunctions, and technical requests

DO International Liaison Actions

- a. DO International Liaison assignments for support, RIOs and HSG personnel (interpreters, when known).
- b. Items necessary for RIO and/or HSG to work. Include who assigned the action and when; to whom the response is required and by when; current status or closure.

Point-of-Contact List for all Flight Leads

6.2 JOINT SHUTTLE MISSION RIO

The joint mission RIO works during space shuttle flights to the ISS. The RIO support covers three shifts from launch until docking, at which point the orbit 3 RIO may be placed on call. The two remaining shifts remain on duty until undocking. The RIO is responsible for maintaining the IP's awareness of the mission and the mission objectives. This alleviates some of the work that the ISS FD must perform. The RIO is also often asked to monitor the Capsule Communicator (CAPCOM) coordination loop during times of high crew activity.

6.2.1 Shuttle RIO Checklist

6.2.1.1 Before the Mission

- a. Attend all mission-specific Joint Operations Panels (JOPs)
- b. Develop flight-specific notebook (see following procedure)
- c. Participate in joint simulations and implement lessons learned
- d. Ensure that premission planning information is transferred to the Russian side
- e. Oversee mission Flight Rules development process with the Russian side
- f. Coordinate with TTI on interpreter schedule
- g. Give mission briefing to RIO/interpreter team
- h. Develop/present HSG/RIO/interpreter briefing to the Flight Readiness Review (FRR)

6.2.1.2 During the Mission

- a. Launch
 - 1. Use Table 8-3 (Shuttle Prelaunch and Ascent Phase Interactions) in the OIP, Generic Volume, to coordinate MCC-H and MCC-M (and other IP FCTs) interactions.
 - 2. At L – 5 hours, begin console support and send final schedule for RIO and FD support to MCC-M.
 - 3. At L + 10 minutes, send fax of official time of launch to MCC-M.
- b. Before and after docking
 - 1. Follow Table 8-4 (Shuttle Docking and Information Exchange) in the OIP, Generic Volume, to coordinate MCC-H and MCC-M (and other IP FCTs) interactions.
 - 2. Reference Flight Rules C2-9; C2-101, C2-104; C2-107; C11-11; and ISS/Shuttle Joint Operations Book, ARRIVAL, 1.106 PMA2 Pre-Arrival Configuration.
 - 3. Report burns and mode transitions when appropriate and per table A4-3.
 - 4. At Terminal ignition (Ti) burn – 60 minutes, receive GO for Ti from MCC-M.
 - 5. Confirm that RS inhibits are in place before GO for docking.

6. At Dock – 1 hour (crew is told to approach within 400 feet).
 - (a) Tell MCC-M that USOS arrays are feathered and ISS/shuttle systems are GO.
 - (b) Request MCC-M solar array feathering plan.
 - (c) Confirm that Service Module (SM) lights are on.
 - (d) Report that shuttle tracking lights are on.
 - (e) Request GO for dock from MCC-M.
 7. At Dock – 32 minutes (shuttle arrives at V-bar and within 170 feet)
 - (a) Tell MCC-M that USOS arrays are feathered, and ISS/shuttle FCTs are GO for dock.
 - (b) Confirm MCC-M solar array feathering.
 - (c) MCC-M confirms that they are still GO for dock.
 8. At Dock
 - (a) RIO reports contact and capture.
 - (b) Confirm RS in indicator mode (if not, request MCC-M to send manual command to indicator mode).
 - (c) RIO reports ring retracting.
 - (d) RIO reports hooks driving.
 - (e) RIO reports hooks closed, hard mate achieved.
 - (f) RIO requests GO for shuttle maneuver, reports to MCC-M when complete.
- c. During joint timeframe
1. Use part of stage OPS RIO checklist, as stated in Procedure 6.1.
 2. For EVAs, use OIP, Generic Volume, Table 8-11 and 8-12 (Information Exchange, Initiation and Completion – Joint Airlock EVA) to coordinate interactions between MCC-M and MCC-H (and other IP FCTs).
 3. For element assembly, use OIP, Generic Volume, Table 8-5 (Assembly Information Exchange) to coordinate interactions between MCC-M and MCC-H (and other IP FCTs).

4. Review shuttle execute package daily, as well as key messages, FNs, and chits.
- d. Before and after undocking
1. For undockings, use OIP, Generic Volume, Table 8-7 to coordinate interactions between MCC-M and MCC-H (and other IP FCTs).
 2. Also use Flight Rules C-2 151, 153, and 155.
 3. Report to MCC-H that validity checks are inhibited.
 4. Monitor MCC-M transition to PROX OPS mode.
 5. At Undock – 1 hour, report to MCC-M that MCC-H is GO for undock.
 6. Report to MCC-M when in undocking attitude.
 7. Report U.S. solar array feathering and confirm Russian solar array feathering.
 8. At Undock – 3 minutes, report that ISS is in free drift.
 9. Report to MCC-M when hooks are driving open.
 10. Report to MCC-M when separation has started, and then periodically report range and range rate.
 11. At Undock + 100 seconds, report that ISS is in Local Vertical/Local Horizontal (LVLH) attitude hold. MCC-M confirms that stage OPS inhibits are in place.
 12. At R<170 feet, confirm RS arrays tracking.
 13. At R>400 feet, report when U.S. solar arrays are tracking.
 14. Coordinate and monitor transition to standard mode.
 15. Give periodic status of flyaround and separation burn.

6.2.1.3 Postmission

Compile a Lessons Learned.

6.2.2 Shuttle Flight-Specific Notebook

The flight-specific lead RIO should maintain a notebook for the other International Liaison personnel also supporting the flight (additional RIOs, OPS Leads, and Russian Systems Specialists (RSSs)). This notebook contains reference materials and notes/minutes, as specified below. It should be kept on the flight-specific lead RIO's desk, available for others to borrow and use or update while the lead RIO is unavailable.

When the lead RIO is unavailable to attend flight-specific JOPs, flight-specific sims, or other flight-specific forums, the lead OPS Lead (if in Houston) should provide updates to the notebook; otherwise, the lead RIO should find someone to support the event and maintain accurate information in the notebook.

The following items should be in the notebook:

Objectives/Priorities

- a. Flight objective (Flight Requirements Document (FRD), Section 1)
- b. Mission on-orbit task priorities and task overview (use Flight Rules or MIP, Section 4)

Planning

- a. Flight Plan notes
- b. Overview timeline (latest)
- c. Timeline walkthrough

JOP

- a. Last and next agendas
- b. Minutes or notes from previous meetings
- c. Milestone charts (if available)

Simulations

- a. Schedule
- b. Debrief notes

RS and USOS Systems

- a. System configurations (unique and standard)
- b. U.S. and shuttle system configurations

Flight Rules

- a. Schedule of due dates and publication dates
- b. Status of Russian rules in work
- c. Flight Rules with issues

DO International Liaison Actions

- a. DO International Liaison assignments for support, RIOs and HSG personnel (interpreters, when known).
- b. Items necessary for RIO and/or HSG to work. Include who assigned the action and when; to whom the response is required and by when; current status or closure.

Point-of-Contact List for all Flight Leads

6.3 SOYUZ OPERATIONS RIO

During the launch, rendezvous, docking, and undocking of the Soyuz vehicle, the RIO supports and ensures the success of the mission.

Typically, two RIOs support from launch until docking during Russian Ground Sites (RGS), and one RIO is scheduled for the joint mission. Two RIOs are scheduled for Undocking – 1 day through landing.

6.3.1 Soyuz Operations Checklist

6.3.1.1 Before the Mission

- a. Coordinate and develop the MH voice loop EFN with the DO International Liaison Voice Loop Systems Lead and Visiting Vehicle Officer/Automated Rendezvous Officer (VVO/ARO).
 - i) English interpretation of Soyuz SRP loop is performed by HSG interpreters. RIO will inform FCT onto which loop the translation is performed (typically MH38). The Soyuz SRP loop should be interpreted simultaneously in real time during launch, docking, undocking, and landing. All other times (RGS DO13 – DO5), a post-pass summary interpretation is sufficient.

HSG provides the HSG Interpreter with the Acquisition of Signal/Loss of Signal (AOS/LOS) times for the Soyuz RGS passes.
 - ii) English interpretation of Soyuz VHF (RS ISS VHF2) is performed by Soyuz S/G interpreters in MCC-H. RIO will inform FCT as to which loop the translation is performed on (typically RIO Russian Translate).
 - On docking day, once the Big Loop is established (VHF1 + VHF2 + S/G 2), the ISS S/G interpreter translates any Soyuz conversations on that loop.
 - On undocking day, the Soyuz S/G interpreters begin translation of the big loop as soon as the departing crew enters the Soyuz.
 - On flight days 1 to 3, and also landing day, RIO provides the Soyuz S/G Interpreter with the AOS/LOS times for the Soyuz RGS passes.

- iii) ISS S/G Interpreters provide nominal support per established priorities up until the big loop is established. They should announce “Soyuz VHF comm pass” on TRANS RUS/ENG MH12 when a Soyuz RGS pass is occurring. Big loop is established approximately 1 hour before docking. Once big loop is established, the ISS S/G interpreter will only interpret that loop.
- iv) RIO shall coordinate with Ground Control (GC) to ensure that the following loops are recorded: Soyuz SRP, Soyuz SRP Translation, and Soyuz VHF translation.

Note: The tapes are reused beginning one week beyond the end of mission. If a permanent recording is required, the RIO shall request a cassette tape (from GC via Mission Data Request Form (MDRF)) within that week.

- b. Ensure that S/G and VHF interpreter roles and loop configurations are well defined.
- c. Write and present the RIO/HSG/interpreter readiness at the division and Mission Operations Directorate (MOD) readiness review.
- d. Work with HSG operations Lead and TTI-Houston to develop an integrated RIO and interpreter shift schedule. Refer to Table 6-2 (below) for the preferred format. This schedule shall be distributed to all parties via e-mail.
- e. Attend any IMMTs, RJOPs, etc. related to the docking, undocking, taxi flight, or landing, both before and during the mission (or arrange for somebody else to cover them).
- f. Attend the program-level Stage Operations Readiness Review (SORR) in Bldg 1.
- g. Attend the various Docking – X days (D –) planning meetings in Houston.
- h. Create/update a Soyuz goody book and/or update the HSG Mission data page with key info.
- i. Review Soyuz Computer Based Training (CBT).
- j. Conduct a RIO/interpreter tag-up.
- k. Monitor ISSP MGMT COORD on a non-interference basis.

During dynamic phases of flight, IMC coordinates with the ISS Program via ISSP MGMT COORD and via the IMC Web site:
<https://mod2.jsc.nasa.gov/dt/imc/index.cfm>. RIO should monitor both on a non-interference basis. RIO/HSG and VVO report status directly to ISS Flight on ISS FD 1. IMC will monitor ISS FD 1 and log/report any status items on the IMC Web page and ISSP MGMT COORD.

NASA/Department of Defense (DOD) will be following the launch and landing phases in order to provide projected location data to Soyuz SRP for an abort or off-nominal landing case.

- I. Coordinate console requirements for VVO, EVA, and Soyuz S/G interpreters.

6.3.1.2 Launch to Docking (Two RIOs, O1 and O2)

- a. Follow Table 8-8 (Soyuz/Progress Rendezvous and Docking Information Exchange) in the OIP, Generic Volume, to coordinate MCC-H and MCC-M (and other IP FCTs) interactions.
- b. Review daily Soyuz plans on the DPP FN distributed by the VVO/ARO.
- c. Monitor the launch. At 10 minutes after launch, MCC-M sends a fax stating the official time of launch. The RIO shall post this to the NASA/IP Correspondence page.
- d. Monitor Delta Velocity (DV) burns as they occur and listen to post-pass reports by HSG/ARO and MCC-M.
- e. Docking
 - 1. Report to MCC-M when validity check inhibits are in place.
 - 2. Monitor and confirm transition to PROX OPS mode.
 - 3. Monitor and confirm RS solar array feathering and report to MCC-M USOS solar array feathering.
 - 4. Monitor and confirm with MCC-M capture, free drift (indicator mode), and hooks.
 - 5. After hooks are closed, monitor and report validity check inhibits to MCC-M.
 - 6. Monitor and confirm transition to standard mode.

6.3.1.3 Joint Mission

- a. Operations are reduced to one RIO per nominal operations.
- b. Use part of stage OPS RIO checklist, as stated in Procedure 6.1.
- c. Monitor crew handover and Soyuz packing progress.

6.3.1.4 Undock to Landing

- a. Follow Table 8-9 (Soyuz/Progress Undocking Information Exchange) in the OIP, Generic Volume, to coordinate MCC-H and MCC-M (and other IP FCTs) interactions.
- b. Before undocking
 1. Inform MCC-M when validity check inhibits are in place.
 2. Monitor and confirm transition to PROX OPS mode.
 3. Inform MCC-M when in the docking attitude.
 4. Monitor and confirm that RS solar arrays are feathered. Report to ISS FD.
 5. Inform MCC-M when USOS solar arrays are feathered.
 6. Monitor and confirm from MCC-M when in free drift (indicator mode). Report to ISS FD.
- c. Monitor and confirm from MCC-M when physical separation occurs.
- d. Coordinate ISS back in attitude control.
- e. Inform Moscow when validity check inhibits have occurred.
- f. Monitor and confirm proper transition to standard mode.
- g. Monitor and confirm from MCC-M successful landing of Soyuz, which is a few hours after undock.

Table 6-2. Integrated HSG/RIO/Interpreter Support Schedule Template

Date (GMT)	HSG (CDT)	RIO (CDT)	Soyuz SRP Terp (LMT)	S/G Terp (CDT)	Crew Awake			Notes			
					CDT	GMT	LMT	CDT	GMT	LMT	
Sat 10/1 (274)		Harvey	07:00 - 15:15 LMT	ISS (HSG terps) 0000 - 1730	ISS Crew			11S Launch			
		273/21:00 - 05:00									
				Soyuz (Hou) 273/22:00 - 06:30	0100 - 1630	0600 - 2130	1000 - 275/0030	273/22:54	03:54	07:54	
					DO5 LOS						
								06:01	11:01	15:01	
Sun 10/2 (275)		Zimmerman	02:30 - 14:15 LMT	ISS (Hou) 0000 - 1300	ISS Crew			11S Free Flight DO13 AOS – 274/22:50 GMT DO5 LOS – 09:53 GMT			
		274/17:15 - 03:30									
				Soyuz (Hou) 274/17:00 - 10:30 and	0100 - 1200	0600 - 1700	1000 - 2100				
		Harvey									
		16:00 - 01:30									
Mon 10/3 (276)		Zimmerman	01:20 LMT until hatch open	Soyuz (Hou) 275/16:00 until ~23:20	ISS Crew			DO13 AOS - 275/21:37 GMT 11S Docking			
		00:30 - 08:00									
		TBD									
		07:00 - 14:30			ISS (Hou) 275/1930 -1530	275/2030 - 1430	0130 - 1930	0530 - 2330	00:20	05:20	09:20
Tue 10/4 (277)	O1/ 23:00 - 07:30		N/A	0130 - 1900	11S/10S Docked OPS						
	O2/ 07:00 - 14:30	O2/Harvey 07:00 - 16:00			0230 - 1800	0730 - 2300	1130 - 278/0300				
Sat 10/8 (281)	O1/ 23:00 - 07:30		N/A	0130 - 1900 (Hou)	11S/10S Docked OPS						
	O2/ 07:00 - 14:30	O2/Baker 07:00 - 16:00			0230 - 1800	0730 - 2300	1130 - 282/0300				
		07:00 - 14:30			09:00 - 17:00						

Table 6-2. Integrated HSG/RIO/Interpreter Support Schedule Template (concluded)

Date (GMT)	HSG (CDT)	RIO (CDT)	Soyuz SRP Terp (LMT)	S/G Terp (CDT)	Crew Awake			Notes		
					CDT	GMT	LMT	CDT	GMT	LMT
Mon 10/10 (283)	O1/	Zimmerman	284/00:15 - 04:30 LMT (for landing)	ISS (Hou) 0300 - 2130	10S Undocking OPS			10S Undocking		
		04:00 - 11:30						16:44	21:44	284/01:44
	O2/	Baker		Soyuz (Hou) 1400 - 2000	10S Landing					
		10:30 - 19:30			0400 - 2030	0900 - 284/0130	1300 - 284/0530	19:14	284/00:14	284/04:14
Tue 10/11 (284)	On-call	Normal OPS	N/A	Normal OPS	N/A			N/A		
Wed 10/12 (285)	Normal OPS	Normal OPS	N/A	Normal OPS	N/A			N/A		

6.3.1.5 Post-Flight

Collect postflight lessons learned and submit to DO International Liaison Office Manager.

6.3.2 RIO Soyuz Flight-Specific Notebook

This document can be included with the increment notebook (at Increment Lead RIO's discretion).

Objectives/Priorities

Mission on-orbit task priorities and task overview (use Flight Rules or MIP, Section 4)

Planning

- a. Flight Plan notes
- b. Overview timeline (latest)
- c. Up-to-date ATL

RS and USOS Systems

- a. System configurations (unique and standard)
- b. U.S. and shuttle system configurations

Flight Rules

- a. Schedule of due dates and publication dates
- b. Status of Russian rules in work
- c. Flight rules with issues

DO International Liaison Actions

- a. DO International Liaison assignments for support, RIOs and HSG personnel (interpreters, when known).
- b. Items necessary for RIO and/or HSG to work. Include who assigned the action and when; to whom the response is required and by when; current status or closure.

Point-of-Contact List for all Flight Leads

6.4 SPECIAL OPERATIONS RIO

On occasion, the RIO is called upon to help cover some times of high activity on the ISS. These are for Soyuz/Progress, Automated Transfer Vehicles (ATV) rendezvous and departure, Soyuz relocation, ISS increment EVAs, and software transitions.

The following items should be handled by the lead increment RIO, and a specific lead is not needed. The increment RIO can appoint a lead for one of the items listed in Section 6.4.1, if it is deemed necessary.

6.4.1 Progress Support

Progress support does not necessarily require real-time support by the RIO. A VVO supports the launch to docking and undocking timeframes. RIO support is determined by the lead increment RIO.

6.4.1.1 Progress Operations Checklist

Before the Mission

- a. Coordinate and develop the MH voice loop EFN (if needed).
- b. Write and present the RIO/HSG/interpreter readiness at the division and MOD readiness reviews.
- c. Develop RIO and interpreter shift schedules and coordinate with TTI-Houston.
- d. Attend any IMMTs, RJOPs, etc. related to the docking, undocking, hazardous cargo (if any), both before and during the mission (or arrange for somebody else to cover them).
- e. Attend the program-level SORR in bldg 1.
- f. Attend the various Docking – X days (D –) planning meetings in Houston.
- g. Create/update a Progress section in the increment goody book.

Launch to Docking

- a. Follow Table 8-8 (Soyuz/Progress Rendezvous and Docking Information Exchange) in the OIP, Generic Volume, to coordinate MCC-H and MCC-M (and other IP FCTs) interactions.
- b. Review daily Soyuz plans on the DPP FN distributed by VVO/ARO.
- c. Monitor the launch. At 10 minutes after launch, MCC-M sends a fax stating the official time of launch.

- d. Monitor DV burns as they occur and listen to post-pass reports by HSG/ARO and MCC-M.
- e. Docking
 - 1. Report to MCC-M when validity check inhibits are in place.
 - 2. Monitor and confirm transition to PROX OPS mode.
 - 3. Monitor and confirm RS solar array feathering and report to MCC-M USOS solar array feathering.
 - 4. Monitor and confirm with MCC-M capture, free drift (indicator mode), and hooks.
 - 5. After hooks are closed, monitor and report validity check inhibits to MCC-M.
 - 6. Monitor and confirm transition to standard mode.

Docked Timeframe

- a. Monitor unpacking and packing operations, particularly for hazardous cargo.
- b. Monitor reboost operations.
- c. Monitor key equipment removals and reinstallations (commutators, matching unit).

Undock to Landing

- a. Follow Table 8-9 (Soyuz/Progress Undocking Information Exchange) in the OIP, Generic Volume, to coordinate MCC-H and MCC-M (and other IP FCTs) interactions.
- b. Before undocking
 - 1. Inform MCC-M when validity check inhibits are in place.
 - 2. Monitor and confirm transition to PROX OPS mode.
 - 3. Inform MCC-M when in the docking attitude.
 - 4. Monitor and confirm that RS solar arrays are feathered.
 - 5. Inform MCC-M when USOS solar arrays are feathered.
 - 6. Monitor and confirm from MCC-M when in free drift (indicator mode).
- c. Monitor and confirm from MCC-M when physical separation occurs.

- d. Coordinate ISS back in attitude control.
- e. Inform Moscow when validity check inhibits have occurred.
- f. Monitor and confirm proper transition to standard mode.
- g. Monitor and confirm from MCC-M successful deorbit of Progress, which could be a few hours to a few weeks after undock.

6.4.1.2 RIO Progress Flight-Specific Notebook Section

There is no specific notebook that should be maintained for Progress. However, a section of the increment notebook should be kept up to date. Include the following useful information:

Objectives/Priorities

Mission on-orbit task priorities and task overview (use Flight Rules or MIP, Section 4)

Planning

- a. Flight Plan notes
- b. Overview timeline (latest)
- c. Up-to-date ATL

RS and USOS Systems

- a. System configurations (unique and standard)
- b. U.S. and shuttle system configurations

Flight Rules

- a. Schedule of due dates and publication dates
- b. Status of Russian rules in work
- c. Flight Rules with issues

DO International Liaison Actions

- a. DO International Liaison assignments for support, RIOs and HSG personnel (interpreters, when known).
- b. Items necessary for RIO and/or HSG to work. Include who assigned the action and when; to whom the response is required and by when; current status or closure.

Point-of-Contact List for all Flight Leads

6.4.2 Soyuz Relocate

Soyuz docking port relocations support requires real-time support by the RIO. RIO shift support is determined by the lead increment RIO.

6.4.2.1 Soyuz Relocate Operations Checklist

Before Relocation

- a. Coordinate the development of the ISS unmanned operations FN.
- b. Coordinate and develop the MH voice loop EFN (if needed).
- c. Write and present the RIO/HSG/interpreter readiness at the division and MOD readiness review.
- d. Develop RIO and interpreter shift schedules and coordinate with TTI-Houston.
- e. Attend any IMMTs, RJOPs, etc. related to the docking, undocking, hazardous cargo (if any), both before and during the mission (or arrange for somebody else to cover them).
- f. Attend the various planning meetings in Houston.
- g. Create/update a Soyuz relocate section in the increment goody book.

Relocation Day

Important consideration: The day of relocation is usually very long. Take care to identify activities on the day of relocation that can be moved to another day.

- a. Follow Table 8-10 (Soyuz Port Relocation Information Exchange) in the OIP, Generic Volume, to coordinate MCC-H and MCC-M (and other IP FCTs) interactions.
- b. Review daily plan on the DPP FN distributed by HSG.
- c. Monitor movement of equipment, duct disassemblies, equipment deactivations, and hatch closings.
- d. Monitor Soyuz activation.
- e. Before undocking
 1. Report to MCC-M when validity check inhibits are in place.
 2. Monitor and confirm transition to PROX OPS mode.

3. Monitor and confirm RS solar array feathering and report to MCC-M USOS solar array feathering.
 4. Monitor and confirm with MCC-M capture, free drift (indicator mode), and hooks.
 5. After hooks are closed, monitor and report validity check inhibits to MCC-M.
 6. Monitor and confirm transition to standard mode.
- f. Monitor flyaround.
- g. Redocking
1. Report to MCC-M when validity check inhibits are in place.
 2. Monitor and confirm transition to PROX OPS mode.
 3. Monitor and confirm RS solar array feathering and report to MCC-M USOS solar array feathering.
 4. Monitor and confirm with MCC-M capture, free drift (indicator mode), and hooks.
 5. After hooks are closed, monitor and report validity check inhibits to MCC-M.
 6. Monitor and confirm transition to standard mode.
- h. After docking, monitor hatch openings, duct assemblies, and reactivation/relocation of equipment.

Post Relocation

Identify any lessons learned for final increment Lessons Learned report.

6.4.2.2 RIO Soyuz Relocate Flight-Specific Notebook Section

There is no specific notebook that should be maintained for Soyuz relocations. However, a section of the increment notebook should be kept up to date. Include the following useful items:

Objectives/Priorities

Mission on-orbit task priorities and task overview (use Flight Rules or MIP, Section 4)

Planning

- a. Flight Plan notes

- b. Overview timeline (latest)
- c. Up-to-date ATL

RS and USOS Systems

- a. System configurations (unique and standard)
- b. U.S. and shuttle system configurations

Flight Rules

- a. Schedule of due dates and publication dates
- b. ISS demanning FN
- c. Status of Russian rules in work
- d. Flight Rules with issues

DO International Liaison Actions

- a. DO International Liaison assignments for support, RIOs and HSG personnel (interpreters, when known).
- b. Items necessary for RIO and/or HSG to work. Include who assigned the action and when; to whom the response is required and by when; current status or closure.

Point-of-Contact List for all Flight Leads

6.4.3 Reboost/Debris Avoidance Maneuver Support RIO

The ISS often has a reboost performed. In addition to maintaining altitude, reboosts can actually save propellant. By increasing the altitude of the ISS, the atmospheric drag is decreased, thus reducing the number of Control Moment Gyroscope (CMG) desaturation burns required. While most of these are performed over the Russian ground passes, the RIO is there to support these activities, if required.

If it is determined that a debris avoidance maneuver is required to clear the orbital path of the ISS, the RIO facilitates and supports the U.S. and Russian teams in planning and executing the burn.

For reboosts, use OIP, Generic Volume, Table 8-6 to coordinate interactions between MCC-M and MCC-H (and other IP FCTs).

6.4.4 ATV Support RIO

TBD

6.4.5 Joint Airlock EVA Support RIO

EVA support by RIO is required for joint airlock EVAs during ISS Standalone Stage Operations. A lead RIO is not chosen for EVA operations. This task is performed by the Lead Increment RIO. The Lead Increment RIO does have the authority to appoint a lead, if desired.

Note: Russian EVAs start at hatch open. U.S. EVAs start at Extravehicular Mobility Unit (EMU) transition to battery power.

6.4.5.1 Joint Airlock EVA Checklist

Before Joint Airlock EVA

- a. Attend all mission-specific JOPs.
- b. Develop flight-specific notebook section (see the following procedure).
- c. Participate in joint simulations and implement lessons learned.
- d. Ensure that premission planning information is transferred to the Russian side.
- e. Assist DA8 mission Flight Rules development process with the Russian side.
 - Work with DA8 to develop Flight Rule package for MCC-M. Post on HSG Mission Data page in both English and Russian
- f. Request additional interpreter for CAPCOM console, in case communication with Russian crewmember is needed.
- g. Work with HSG, SRP Office, RRCG and RSC-E Procedures lead to ensure that appropriate procedures are translated into Russian.
- h. Work with HSG Operations Lead and TTI-Houston to develop integrated RIO, HSG and interpreter shift schedule. Schedule shall be distributed to all parties via e-mail.
- i. Coordinate RIO console manning requirements with EVA, VVO, and CIO.
- j. Coordinate EVA loop tie requirements with HSG EVA and DO32 Voice Loop Lead.
- k. Coordinate ISS FD and CAPCOM request for an additional interpreter for Capcom console in case communication with Russian EVA crew member is needed.
 - If a CAPCOM interpreter is deemed necessary, typically, two interpreters shall be scheduled to work both the actual EVA day and EMU don/doff testing.
 - A specific location should be scheduled for both interpreters. If possible, the prime interpreter will sit at the CAPCOM or ISS FD console. Otherwise, the prime interpreter will sit at the RIO console. The backup interpreter will sit at a

MPSR console. The prime interpreter should be able to talk on 1S/G1 and 1S/G2.

- If deemed necessary, based on a real-time call from ISS FD, the CAPCOM interpreters will perform translation directly on 1 S/G1 and/or 1 S/G2.

During the EVA Day

- a. For EVAs, use OIP, Generic Volume, Tables 8-11 and 8-12 to coordinate interactions between MCC-M and MCC-H (and other IP FCTs).
- b. Refer to Flight Rule C2-9 for EVA GO/NO GO checklist and Volume B and Flight-Specific Flight Rules.
- c. Request and confirm with MCC-M the EVA inhibit PAD on RS (see EVA Checklist).
- d. Confirm that dP/dT sensor algorithm is inhibited.
- e. Report to MCC-M when prebreathe/depress to 10.2 psi starts.
- f. Report to MCC-M when 10.2 psi is reached.
- g. Report to MCC-M when repress to 14.7 begins and completes.
- h. Request MCC-M GO for crew lock depress.
- i. Report to MCC-M when crew lock depress completes.
- j. Report to MCC-M when the Extravehicular (EV) hatch is open.
- k. For key assembly activities, refer to OIP, Generic Volume, Table 8-5 to coordinate and report key interactions and other events with MCC-M (and other IP FCTs).
- l. Report to MCC-M when EV hatch is closed.
- m. Report to MCC-M crew lock repress start and completion.
- n. Report joint airlock-Node 1 hatch opening.

After the EVA

- a. Put together a lessons learned summary for the postflight/increment Lessons Learned report.
- b. RIO shall provide an e-mail to PRP and the RRCG with the following information:
 1. List of EVA tasks completed/not completed
 2. Unofficial Hatch Open and Hatch Closed times

3. Official EVA Phase Elapsed Time (PET) based on Flight Rule B15-1 EVA TIME DEFINITION.

6.4.5.2 EVA Section for RIO Increment Lead Notebook

There is no specific notebook that should be maintained for EVAs, although for some very detailed EVAs, it may be a good idea. However, an EVA section should be in the increment notebook. The following items list useful information that should be included:

Objectives/Priorities

Mission on-orbit task priorities and task overview (use Flight Rules or MIP, Section 4)

Planning

- a. Flight Plan EVA notes
- b. EVA overview timeline (latest)
- c. Up-to-date ATL

RS and USOS Systems

- a. System configurations (unique and standard)
- b. U.S. and shuttle system configurations

Flight Rules

- a. Schedule of due dates and publication dates
- b. ISS demanning FN, if ISS is demanned during EVA
- c. Status of Russian rules in work
- d. Flight Rules with issues

DO International Liaison Actions

- a. DO International Liaison assignments for support, RIOs and HSG personnel (interpreters, when known).
- b. Items necessary for RIO and/or HSG to work. Include who assigned the action and when; to whom the response is required and by when; current status or closure.

Point-of-Contact List for all Flight Leads

6.4.6 Orlan EVA Support RIO

EVA support by RIO is required for Orlan EVAs during ISS Standalone Stage Operations. A lead RIO is not chosen for EVA operations. This task is performed by the Lead RIO. The Lead RIO does have the authority to appoint a lead, if desired.

Note: Russian EVAs start at hatch open. U.S. EVAs start at EMU transition to battery power.

6.4.6.1 Orlan EVA Checklist

Before Joint Airlock EVA

- a. Attend all mission-specific JOPs.
- b. Develop flight-specific notebook section (see the following procedure).
- c. Participate in joint simulations and implement lessons learned.
- d. Ensure that premission planning information is transferred to the Russian side.
- e. Oversee mission Flight Rules development process with the Russian side.
- f. Request additional interpreter for CAPCOM console in case communication with Russian crewmember is needed.

During the EVA Day

- a. For Orlan EVAs, use OIP, Generic Volume, Tables 8-13 and 14, to coordinate interactions between MCC-M and MCC-H (and other IP FCTs).
- b. Refer to Flight Rule TBD for EVA GO/NO GO checklist.
- c. Have proper RODF (EVA from DC-1 and EVA Orlan OPS), as well as any radiograms, at hand.
- d. Request and confirm with MCC-M the EVA inhibit PAD on RS (see EVA Checklist).
- e. Report to MCC-M that required U.S. systems deactivations have occurred.
- f. Confirm that dP/dT sensor algorithm is inhibited.
- g. If demanning ISS, monitor hatch closures and equipment relocations/deactivations.
- h. Monitor and confirm transition to external OPS mode.
- i. DC-1 depress
 1. Monitor and confirm attitude hold for depress.

2. Report MCC-H GO for depress.
 3. Monitor and confirm pressure change from MCC-M.
 4. Monitor and confirm depress complete from MCC-M.
- j. EV hatch open
1. Receive report from MCC-M that EV hatch is open.
 2. When hatch is open, GO to perform momentum management and manual desaturation (only when crew is working near SM thrusters).
 3. If required, report when transition to momentum management and manual desaturation is complete.
- k. During EVA
1. Monitor crew task list, as identified in radiograms.
 2. If crew is working near SM thrusters, monitor CMG momentum closely. A Loss of Attitude Control (LOAC) is possible during this timeframe and will result in powerdowns via load sheds and possible loss of communication. Be prepared to request Russian ground site commanding and voice. A preemptive request to move the crew to prevent LOAC by commanding a manual desaturation may occur.
- l. EV hatch close
1. MCC-M should inform that crew is returning to the hatch.
 2. If crew was working near thrusters, once they are outside the thruster Keep Out Zone (KOZ), monitor and confirm from MCC-M thruster reenable.
 3. Confirm and monitor EV hatch closure.
 4. After hatch closure, monitor and confirm from MCC-M DC-1 repress.
 5. Monitor and confirm from MCC-M completion of DC-1 repress.
- m. Monitor and confirm RS inhibit removals and configuration changes.

After the EVA

Compile a lessons learned summary for the postflight/increment Lessons Learned report.

6.4.6.2 EVA Section for RIO Increment Lead Notebook

There is no specific notebook that should be maintained for EVAs, although for some very detailed EVAs, it may be a good idea. However, an EVA section should be in the increment notebook. The following items list useful information that should be included:

Objectives/Priorities

Mission on-orbit task priorities and task overview (use Flight Rules or MIP, Section 4)

Planning

- a. Flight Plan EVA notes
- b. EVA overview timeline (latest)
- c. Up-to-date ATL

RS and USOS Systems

- a. System configurations (unique and standard)
- b. U.S. and shuttle system configurations

Flight Rules

- a. Schedule of due dates and publication dates
- b. ISS demanning FN, if ISS is demanned during EVA
- c. Status of Russian rules in work
- d. Understand the plan for thruster inhibits if the crew is working near the Russian thrusters (aft of SM)
- e. Flight Rules with issues

DO International Liaison Actions

- a. DO International Liaison assignments for support, RIOs and HSG personnel (interpreters, when known).
- b. Items necessary for RIO and/or HSG to work. Include who assigned the action and when; to whom the response is required and by when; current status or closure.

Point-of-Contact List for all Flight Leads

6.4.7 Russian Segment Software Transition Support RIO

RS designers implement RS software transitions periodically to respond to vehicle changes, growth in software requirements, responses to operational issues, and according to recommended updates. The RIO, with the HSG, the Onboard Data and Information Network (ODIN), and the Attitude Determination and Control Officer (ADCO), is a key player during this important event. Use the following checklist as a general guide for the RIO during the software transition process.

6.4.7.1 Software Transition Checklist

Before Software Transition Days

- a. Attend all mission-specific JOPs.
- b. Develop flight-specific notebook section (see the following procedure).
- c. Participate in joint simulations and review previous lessons learned.
- d. Oversee mission Flight Rules development process with the Russian side.
- e. The HSG composes a preliminary FN with the plan for the software transition. Make this into an FN. It will be updated frequently as more details come in. Review updates to stay on top of the process.
- f. Software is usually delivered on Compact Disks (CDs) and laptops loaded with the newest version.
- g. Attend the software readiness transition at the GJOP.
- h. Attend relevant MER meetings on the transition.

During the Software Transition Days

For software transitions, the following general plan is often employed.

- a. First day
 1. Crew replaces one or more RS laptops with new laptop already loaded with new software load (brought up on Progress). Laptop will be deactivated.
 2. Load КЦП-2 (1) central post computers.
 3. If required, load matching units.
 4. TBM and ЦБМ restart (to bring up all three lanes) with context data.

b. Second day

1. **TBM/ЦBM software upload** (done overnight Moscow time). Also, prepare COЖ, COTP, COCB, and DC1 for the upcoming software reload.
2. Isolate TBM 1 and 2.
3. Load TBM 3 with new software version from KЦП-2 (1).
4. Restart TBM 1 and 2 (lane 3 will be voted out and transitioned to standby mode).
5. Isolate ЦBM 1 and 2.
6. Load ЦBM 3 with new software version from KЦП-2.
7. Restart ЦBM 1 and 2 (lane 3 will be voted out and transitioned to standby mode).
8. Load TBM lanes 1 and 2 with new software version.
9. Load ЦBM lanes 1 and 2 with new software version.
10. Transition TBM and ЦBM lanes 3 to standby mode.
11. MCC-M loads new software version on ground (no command capability for ~ 1 hour).
12. Restart all three lanes ЦBM and TBM without context data.
 - (a) **No S-band commanding for 3 to 6 hours to TBM/ЦBM.**
 - (b) Russian Contingency Telemetry (RCT) will be activated during this time from CПП.
 - (c) Inhibit transition to survival mode.
13. Recover onboard systems (will require about three orbits to recover all systems).

c. Third day and/or fourth days

1. Load other laptops from hard drives or CDs
2. Load other central post computer
3. Load other ground systems

After the Software Transition

Compile a lessons learned summary for the postflight/increment Lessons Learned report.

6.4.7.2 RS Software Transition Section for RIO Increment Lead Notebook

There is no specific notebook that should be maintained for software transitions. However, a software transition section should be in the increment notebook. Include the following items that list useful information:

Objectives/Priorities

Mission on-orbit task priorities and task overview (use Flight Rules or MIP, Section 4)

Planning

- a. Flight Plan software transition notes
- b. Software transition overview timeline (latest)
- c. Up-to-date ATL

RS and USOS Systems

- a. System configurations (unique and standard)
- b. U.S. and shuttle system configurations

Flight Rules

- a. Schedule of due dates and publication dates
- b. Status of Russian rules in work
- c. Flight Rules with issues

DO International Liaison Actions

- a. DO International Liaison assignments for support, RIOs and HSG personnel (interpreters, when known).
- b. Items necessary for RIO and/or HSG to work. Include who assigned action and when; to whom the response is required and by when; current status or closure.

Point-of-Contact List for all Flight Leads

6.4.8 H-IIA Transfer Vehicle RIO

TBD

6.5 SIMULATION RIO

6.5.1 Simulation Locations

The RIO supports both ISS-only and joint ISS and shuttle simulations out of the Red Flight Control Room (RFCR), depicted in Figure 6-1. The RIO may have to make arrangements before the sim so that there is a console position available.

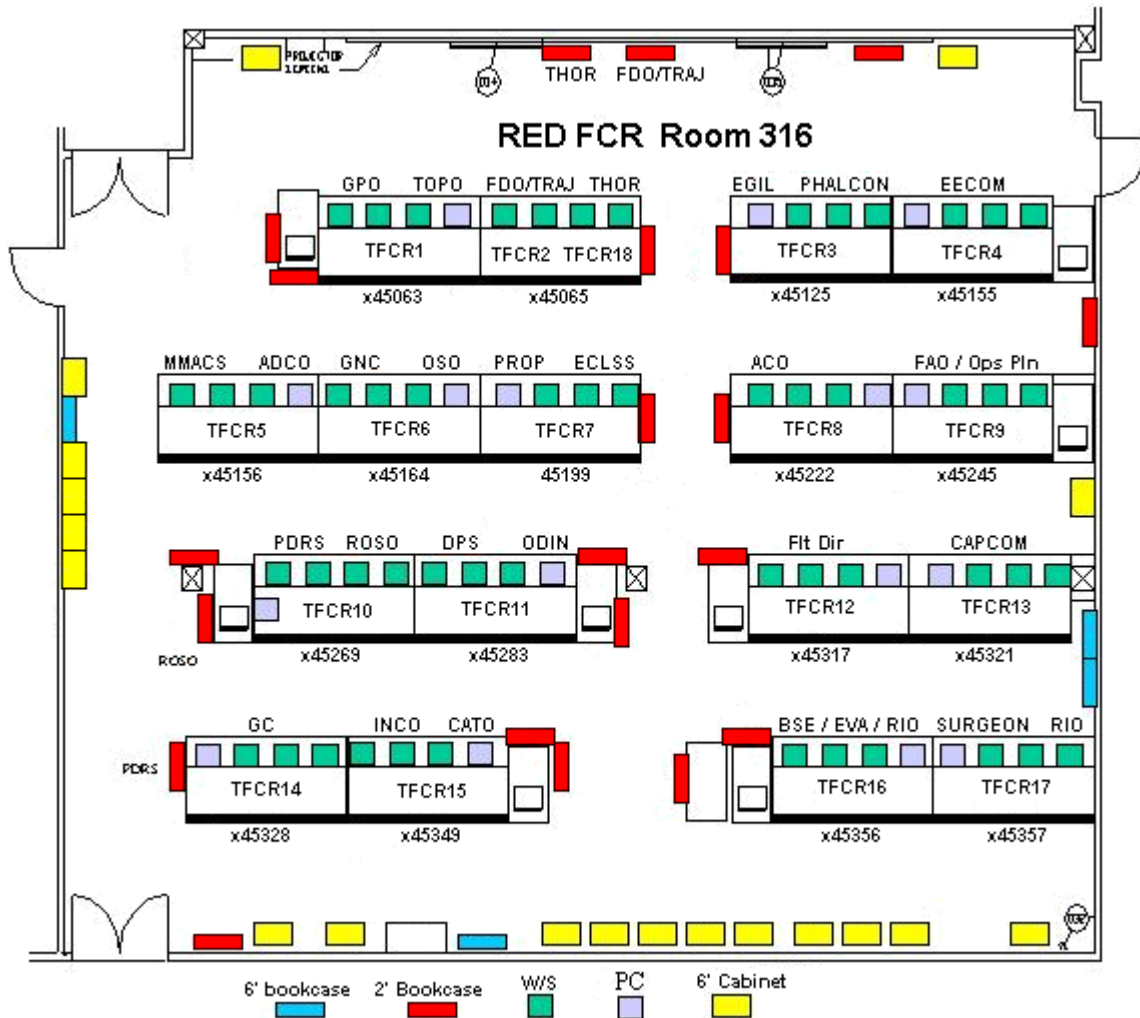


Figure 6-1. Red Flight Control Room layout

Note: When the RIO prime console is used by EVA, try the Assembly Checkout Officer (ACO)/OPS Plan/Trajectory Operations Officer (TOPO) consoles, if empty.

6.5.2 Simulation RIO Checklist

International Liaison simulation personnel support two positions: RIO and HSG. RIO sits in the RFCR, while the HSG sits in the Payload Operations Control Center (POCC) with the Russian Simulation Execution Team (RSET). The HSG position is supported

by an OPS Lead or RSS (or On-the-Job Trainees (OJTs)). RIOs take the lead role during a sim and communicate frequently with the RSET.

Sims require a great deal of hard work to be successful, but the rewards can be significant. In order to best prepare and perform for a sim, use the following guidelines.

General Guidelines

- a. If you are assigned to a mission, you should work the related simulations.
- b. The DO13 International Liaison Logistics Coordinator mails out the weekly sim schedule 1 week ahead of time.

Day Before the Sim

- a. Study the timeline, procedures, and relevant Flight Rules before the simulation. For flight-specific simulations, the OPS Lead should schedule a team tag-up in advance to review these items as a group.
- b. The RIO for each simulation is responsible for ensuring that the console documentation is correct.
- c. Arrange a meeting with the RSET to discuss the timeline for tomorrow's sim and scheduled interactions (documented in the OIP).

Day of the Sim, Before Start

- a. Arrive on console 1 hour before the scheduled start time. You must stay through the entire debriefing after the simulation ends.
- b. TTI arranges the interpreter support for simulations. The interpreters arrive 30 minutes before the scheduled start.
- c. The RIO is responsible for writing evaluations for all building 30 interpreters (except RIO's interpreter). The DO13 International Liaison Logistics Coordinator distributes the forms in advance, and you should complete them at the end of the simulation.
- d. The RSET arrives at about the same time as the interpreters. They pass on any initial conditions that need to be reported. Review the RS Systems Checklist (see procedure in this section).
- e. Log into DVIS using nominal procedures and use the ISS 2 loops. A page should be configured on DVIS to support this.
- f. On the JSC-Mission Activities Server (MAS) PC, bring up the sim version of JEDI and OSTPV with the correct timeline and the sim console log.

Sim AFD

- a. Report any RS initial conditions.
- b. Report U.S. segment initial conditions to the Russians.
- c. Report to the Russians when the sim has started (Go to Run) and later when all FCT members are GO for nominal OPS.

During the Sim

- a. For most FCTs and FDs, the RIO conducts almost all communications with the RSET. This is valuable training for the RIO in learning how to communicate effectively with the Russian team during periods of intense operations.
- b. Report the completion of all key events to the RSET.
- c. Use the OIP interactions tables (EVA, dockings, assembly) for key communications and requests for crucial GO/NO GO items.
- d. Report all ISS malfunctions that occur and any cautions, warnings, and emergencies.
- e. Relay the completion of key steps to U.S. and Russian sides for attitude handovers and thruster inhibits.
- f. Report important shuttle malfunctions to RSET that could affect the mission.
- g. Follow key crew and ground procedures.
- h. Request Russian ground sites immediately when communication is lost.
- i. If nothing is happening that affects HSG or RIO, use the time to learn about other parts of the vehicle. Listen to Flight Management Team (FMT) coord, call up various systems displays, run plots, and follow the systems activities. This is your chance to learn more about the U.S. side of the vehicle.
- j. Do not use this time to catch up on e-mail.

Sim Debrief

- a. Set up debrief arrangements between the RSET and the FD. The RSET may want to leave early. Try to encourage the RSET to participate in the debrief, if there were activities that required significant Russian activity.
- b. During debriefs, bring up key Russian and U.S. failures that affected your console and how you think you handled it. Flight and perhaps other FCT members may offer constructive criticism or help on how to handle the situations that were encountered.

After the Sim

- a. Follow up on any actions assigned during the debrief.
- b. Distribute sim lessons learned to DL DO32 e-mail list.

6.5.3 RSET Tag-up

Before any simulation, the HSG or the RIO for the simulation attempts to meet with the RSET to discuss the sim. During this time, the timeline for the simulation should be discussed and any questions that the HSG/RIO cannot answer should be logged and attempted to be answered before the simulation. Any known initial conditions can be discussed.

6.5.4 Interpreter Roles for Sims

Three interpreters nominally provide support for sims. Each interpreter has primary and backup roles, defined as follows:

Task Terp	RIO/SRP (loop 18)	S/G	Glavni (loop 2)	RSET/STL (see note 1)	RSET/HSG (no loop)	Debrief (ISS AFD2)
Loop 18 interpreter	Prime			Prime		Prime
S/G interpreter		Prime	Backup			
Glavni interpreter	Backup	Backup	Prime	Backup	Prime	

Notes

1. The RSET and the Station Training Lead (STL) use the RSET STL COORD and RSET INST COORD loops.
2. The loop 18 interpreter is located in the RFCR, next to RIO, during dock/undock sims. For other sims, the loop 18 interpreter locates with the RSET. Assignments are independent of the loop 18 interpreter location.
3. The RIO and the SRP should be cognizant that the one interpreter is supporting two major roles with the SRP as a common link between the two loops. Since loop 18 is the premier communication channel between MCC-H and MCC-M, the SRP should make this loop top priority and break out of noncritical STL loop discussions when RIO calls.
4. When a crewmember talks in Russian or a mixed language, the Glavni interpreter interprets into English on S/G or VHF loop consecutively.
5. When the English-speaking crew talks to Glavni, the Glavni interpreter interprets Russian into English on S/G or VHF loop consecutively.
6. RIO RUSSIAN TRANSLT loop is used by the S/G interpreter only for English to Russian interpretation.

6.5.5 Interpreter Evaluations

After every simulation, an evaluation form must be completed for each interpreter. The form to use can be accessed from the International Liaison home page or can be printed out from the following pages (see Figure 6-2).

Ratings require sufficient justification in the Comments field, especially any rating other than a Satisfactory.

Be conscientious when completing the form. The quality of interpretation is crucial in training interpreters to improve their job performance capabilities. This has direct implications on how MCC-H and MCC-M operate the ISS.

Date:	DATE
Event:	NAME OF SIM
WBS Number:	
Type of Work:	Continuous Support (Interpretation / Translation)
Document:	
MIC Representative:	NAME OF INTERPRETER AND LOOP HERE
Evaluator:	
Deliver to NASA COTR or Designee:	Lisa Munday (JSC-OX) & Michele Richards*

*If returning by FAX, send to Lisa Munday (FAX: 281-244-7619).

Excellent <input type="checkbox"/>	Very Good <input type="checkbox"/>	Good <input type="checkbox"/>	Satisfactory <input type="checkbox"/>	Unsatisfactory <input type="checkbox"/>
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Excellent –	Of exceptional merit; exemplary performance in a timely, efficient, and economical manner; very minor (if any) deficiencies with no adverse effect on overall performance.
Very Good –	Very effective performance, fully responsive to contract requirements accomplished in a timely, efficient, and economical manner for the most part. Only minor deficiencies.
Good –	Effective performance; fully responsive to contract requirements; reportable deficiencies, but with little identifiable effect on overall performance.
Satisfactory –	Meets or slightly exceeds minimum acceptable standards; adequate results. Reportable deficiencies with identifiable, but not substantial, effects on overall performance.
Unsatisfactory –	Does not meet minimum acceptable contract standards in one or more areas; remedial action required in one or more areas; deficiencies in one or more areas that adversely affect overall performance.

Comments:

Figure 6-2. Interpreter evaluation form

6.5.6 RS Systems Status for Simulations

Use Table 6-3 to determine the initial conditions for any given simulation. This table is completed during the RSET tag-up.

Table 6-3. RS initial conditions for sims

System/ Система	System Status/ Состояние системы	Notes/ Примечания
Pressure/Давление	PO = ПхО = Прк = ПГО = ГА =	
Partial Pressure/ Парциальное давление	SM: CO ₂ = O ₂ = H ₂ O = FGB: CO ₂ = O ₂ = H ₂ O =	
Vozdukh/«Воздух»	Mode:	
Elektron/«Электрон»	Mode:	
СКВ	СКВ1: СКВ2:	
БМП	Filter 1/Φ1: Filter 2/Φ2:	
АБ	SM: FGB:	
СНТ/ARCU	SM CHT 21 CHT 23: CHT 22 CHT 24: FGB ARCU 51: ARCU 53: ARCU 52: ARCU 54:	
RACU	RACU5: RACU6:	
СОСБ	SM: FGB:	

Table 6-3. RS initial conditions for sims (concluded)

System/ Система	System Status/ Состояние системы	Notes/ Примечания
Status of RS Hatches/Люки		
Health Status of Docked Soyuz/Союз		
Health Status of Docked Progress/Прогресс	Air = _____ kgs O ₂ = _____ kgs	

7.0 GROUND NETWORK

TBD

APPENDIX A ENGLISH/RUSSIAN ACRONYMS AND ABBREVIATIONS

A.1 ENGLISH ACRONYMS

For more complete lists of NASA and Russian acronyms (including the ISS Lexicon), consult the DO13 Web page at <http://mod.jsc.nasa.gov/do13/>.

A/G	Air-to-Ground
ACE	Atmospheric Control Engineer
ACO	Assembly and Checkout Officer
ACT	American Contingency Telemetry
ADCO	Attitude Determination and Control Officer
AFD	Alternative Flight Director
ALMS	Automated Logistics Management System
AOH	Assembly Operations Handbook
AOS	Acquisition of Signal
AR	Anomaly Report
AR&D	Automated Rendezvous and Docking
ARO	Automated Rendezvous Officer
ART	Anomaly Resolution Team
ASCII	American Standard Code for Information Exchange
ATL	Attitude Timeline
ATV	Automated Transfer Vehicle
ATV-CC	ATV Control Center
BCC	Backup Command and Control Backup Control Center
BCC-R	Backup Control Center-Russia
BFCR	Blue Flight Control Room
BME	Biomedical Engineer
C&DH	Command and Data Handling
C&W	Caution and Warning
C-JOP	Canadian Joint Operations Panel
CAA	Controlled Access Area
CAPCOM	Capsule Communicator
CAR	Computer Access Request
CATO	Communication and Tracking Officer
CBT	Computer Based Training
CC	Control Center
CD	Compact Disk
CDDT	Common Display Development Team
CDE	Common Desktop Environment
CDMS	Comm and Data Management System
CDT	Central Daylight Time
CIO	Cargo and Integration Officer

CMD	Command
CMG	Control Moment Gyroscope
CNES	French Space Agency
COL	Columbus Module
COL-CC	Columbus Control Center
CONUS	Continental U.S.
COORD	Coordination
COP	Columbus Ops Plan
CR	Change Request
CS	Civil Servant
CSA	Crew Support Astronaut
CSRD	Current Stage Requirements Document
CST	Central Standard Time
DC	Docking Compartment
DEC	Digital Equipment Corporation
DFE	Data Flow Engineer
DIMS	ISS Imagery Web Site
DL	Distribution List
DLR	German Space Agency
DM	Flight Design and Dynamics Division
DMT	Decreed Moscow Time
DNAV	Display Navigation
DO	Daily Orbit Operations Division
DPC	Daily Planning Conference
DPP	Detailed Daily Plan
DPS	Data Processing System
DTE	Data Terminal Equipment
DV	Delta Velocity
DVIS	Digital Voice Intercom System
EAC	European Astronaut Center
ECD	Estimated Completion Date
ECLS	Environmental Control and Life Support
ECLSS	Environmental Control and Life Support System
ECMG	European Columbus Management Group
EECOM	Electrical, Environmental, Consumables Manager
EFN	Electronic Flight Note
EGIL	Electrical, General Instrumentation, and Lighting Engineer
ELOG	Event Logger
EMCC	Emergency Mission Control Center
EMU	Extravehicular Mobility Unit
EPS	Electrical Power System
ESA	European Space Agency
ESG	European Support Group

ESR	ESA Support Room
EST	Engineering Support Team
ESTL	Engineering Support Team Leader
EV	Extravehicular
EVA	Extravehicular Activity
FAO	Flight Activities Officer
FCOD	Flight Control Operations Division
FCOH	Flight Controller Operations Handbook
FCR	Flight Control Room
FCT	Flight Control Team
FD	Flight Director
FDF	Flight Data File
FDO	Flight Dynamics Officer
FGB	Functional Cargo Block
FIT	Fault Isolation Team
FIW	Failure Impact Workaround
FMT	Flight Management Team
FN	Flight Note
FOM	Facility Operations Manager
FRD	Flight Requirements Document
FRR	Flight Readiness Review
FS	Flight Supplement
FSM	Facility Systems Manager
FSO	Facility Security Officer
FTP	File Transfer Protocol
GA	Group Administrator
GC	Ground Control
GCTC	Gagarin Cosmonaut Training Center
GJOP	Generic Joint Operations Panel
GMT	Greenwich Mean Time
GNC	Guidance, Navigation, and Control
GPO	Guidance Procedures Officer
GS	Ground Segment Ground Site Ground Station
GSFC	Goddard Space Flight Center
GSTDN	Ground Space Flight Tracking and Data Network
HA	High Availability
HawKI	Momentum (H), Attitude (a), Angular Rate (w), Kinetic Energy (K) Moment of Inertia (I)
HazMat	Hazardous Material
HM	High Monitor

HSG	Houston Support Group
HSR	Houston Support Room
HTV	H-IIA Transfer Vehicle
IBMP	Institute of Biomedical Problems
ID	Identification
IDRD	Increment Definition and Requirements Document
IEO	IMMT Executive Overview
IEPC	Increment Execute Planning Center International Execution Planning Conference
IEPT	Increment Execute Planning Team
IFI	Item for Investigation
IFM	In-Flight Maintenance
IGS	Interconnected Ground Subnet
IM	Increment Manager
IMC	Increment Management Center Information Management Center ISS Management Center
IMGO	I am GO
IMMT	ISS Mission Management Team
IMS	Information Management System Inventory Management System
INCO	Integrated Communications Officer
INST	Instrumentation
IOP	Integrated Operations Plan
IP	International Partner
IPV	International Procedure Viewer
IRS	Integrated Resource and Schedule
IRU	In-flight Refill Unit
ISO	Inventory and Stowage Officer
ISP	Information Sharing Protocol
ISS	International Space Station
ISSH	International Space Station Systems Handbook
IV	Intravehicular
IVA	Intravehicular Activity
IWIS	International Space Station Wireless Instrumentation System
JARSWG	Joint American/Russian Safety Working Group
JAXA	Japanese Aerospace Exploration Agency
JEDI	Joint Execute Package Development and Integration
JEM	Japanese Experiment Module
JET	Joint Evaluation Team
JFCT	Japanese Flight Control Team
JOIP	Joint Operations Integration Plan

JOP	Joint Operations Panel
JSC	Johnson Space Center
KB	Knowledge Base
KOZ	Keep Out Zone
KSC	Kennedy Space Center
L	Launch
LAN	Local Area Network
LCD	Liquid Crystal Display
LOAC	Loss of Attitude Control
LOS	Loss of Signal
LVLH	Local Vertical/Local Horizontal
M	Monitor
MAR	Mission Action Request
MAS	Mission Activities Server
MATS	Message and Timeline Support
MCC	Mission Control Center
MCC-H	MCC-Houston
MCC-M	MCC-Moscow
MCS	Motion Control System
MDM	Multiplexer/Demultiplexer
MDRF	Mission Data Request Form
MED	Manual Entry Device
MEP	Multielement Procedure
MER	Mission Evaluation Room
MET	Mission Elapsed Time
MEWS	Mission Evaluation Workstation System
MH	Moscow-Houston
MIOCB	Mission Integration and Operations Control Board
MIP	Mission Integration Plan
MIS	Mission Information System
MMACS	Maintenance, Mechanical, Arm, and Crew Systems
MMT	Mission Management Team
MOA	Memorandum of Agreement
MOC	Mission Operations Computer
MOCR	Mission Operations Control Room
MOD	Mission Operations Directorate
MODM	MOC MCC Server
MPSR	Multipurpose Support Room
MPV	Manual Procedure Viewer
MSFC	Marshall Space Flight Center
MSG	Moscow Support Group
MSID	Measurement Stimulation Identifier
MSK	Manual Select Keyboard

MSK-V	Manual Select Keyboard Viewer
MSM	Manned Space Mission
MSS	Mobile Servicing System
MTLO	Moscow Technical Liaison Office
NAC	National Agency Check
NASA	National Aeronautics and Space Administration
NBL	Neutral Buoyancy Laboratory
NET	No Earlier Than
NIP	Network Input Processor
NIP SUP	Network Input Processor Supervisor
NISN	NASA Integrated System Network
NLT	No Later Than
OCA	Orbiter Communications Adapter Overall Configuration Analysis
ODF	Operations Data File
ODIN	Onboard Data and Information Network
ODRC	Orbiter Data Reduction Center
OIP	Operations Interface Procedure
OJT	On-the-Job Training/Trainee
OMT	Operations Management Team
OOS	On-Orbit Operations Summary
OPS	Operations
OSO	Operations Support Officer
OSTP	Onboard Short-Term Plan
OSTPV	Onboard Short-Term Plan Viewer
P&I	Pen and Ink
P/L	Payload
PAO	Public Affairs Officer
PC	Personal Computer
PCS	Portable Computer System
PDRS	Payload Deploy Retrieval System
PET	Phase Elapsed Time
PGSC	Payload General Support Computer
PHALCON	Power, Heating, Articulation, Lighting, and Control Officer
PLUTO	Plug-in Plan Logistics and Utilization
POC	Point of Contact
POCC	Payload Operations Control Center
POCCB	Portable Onboard Computer Control Board
POD	Payload Operations Director
POIC	Payload Operations Integration Center
PPCR	Planning Product Change Request
PPO ₂	Partial Pressure Oxygen
PRACA	Problem Reporting and Corrective Action System

PROX	Proximity
PRP	MCC-M Assistant Shift Flight Director
PSA	Power Supply Assembly
PSIA	Pounds per Square Inch Actual
PUI	Parameter Unique Identifier
PVCS	Professional Versioning Control System
QA	Quality Assurance
QC	Quality Check
R&R	Repair and Replace
R/E	Russian-to-English
RAVEN	Resource Avionics Engineer
RCT	Russian Contingency Telemetry
RF	Radio Frequency
RFCR	Red Flight Control Room
RGS	Russian Ground Segment Russian Ground Site
RIO	Remote Interface Officer
RJOP	Russian Joint Operations Panel
RME	Responsible Maintainability Engineer
RMS	Remote Manipulator System
RNDZ	Rendezvous
ROBO	Robotics Operations Systems Officer
RODF	Russian Operations Data File
RPE	Replanning Engineer
RRCG	Russian Regional Control Group
RS	Russian Segment
RSC-E	Rocket Space Corporation-Energia
RSET	Russian Simulation Execution Team
RSI	Russian Segment Instructor
RSS	Russian Systems Specialist
RSST	Russian Segment Support Team
RT	Real Time
RTPlot	Real-Time Plot
S-POCCB	Stage Portable Operations Computer Control Board
S/G	Space-to-Ground
S/W	Software
SA	System Administrator
SCR	Strip Chart Recorder
SFOC	Space Flight Operations Contract
SGMT	Simulated Greenwich Mean Time
Sim	Simulation
SITF	Source Independent Telemetry Format
SM	Service Module

SMAC	Spacecraft Maximum Allowable Concentration
SODF	Station Operations Data File
SOP	Standard Operating Procedure
SORR	Stage Operations Readiness Review
SPAN	Spacecraft Planning and Analysis
SRB	Solid Rocket Booster
SRP	Russian Shift Flight Director
SSC	Space Station Computer
SSIPC	Space Station Integration and Promotion Center (Tsukuba, Japan)
SSP	Space Station Program
SSR	Staff Support Room
SSSH	Space Shuttle Systems Handbook
STARCOM	Station RF Communication
STD	Standard
STL	Station Training Lead
STP	Short-Term Plan
STS	Space Transportation System
SUP	Supervisor
TCON	Thermal Control
TCS	Thermal Control System
TDRSS	Tracking and Data Relay Satellite System
Terp	Interpreter
THOR	Thermal Operations and Resource Officer
Ti	Terminal Ignition (burn)
TIM	Technical Interchange Meeting
TKSC	Tsukuba Space Center
TL	Talk/Listen
TLM	Talk/Listen/Monitor
TOPO	Trajectory Operations Officer
TORU	Russian Manual Remote Docking System
TPS	Trajectory Profile Support
TRAJ	Trajectory
TSG	Tsukuba Support Group
TsUP	Russian phonetic acronym for MCC-Moscow
TTI	TechTrans International
TV	Television
U.S.	United States
UIA	Umbilical Interface Assembly
URL	Uniform Resource Locator
USA	United Space Alliance
USOS	U.S. On-Orbit Segment
VHF	Very High Frequency
ViTS	Video Teleconferencing Services

VMDB	Vehicle Master Data Base
VV	Visiting Vehicle
VVO	Visiting Vehicle Officer
VVS	Visiting Vehicle Specialist
WFCR	White Flight Control Room
WLP	Weekly Look-Ahead Plan
WSS	Workstation Support

A.2 RUSSIAN ACRONYMS

АБ	Storage Battery
АВК	Emergency Vacuum Valve
АСН	Satellite Navigation System
АО	Equipment Compartment
БВД	FGB High Pressure Tank
БВС	Onboard Computer System
БГ	Fuel Tank
БГ1	Fuel Tank 1
БГ2	Fuel Tank 2
БИНС	Functional Cargo Block High Pressure Tank
БИО	Biorisk Scientific Payload
БИТС	Service Module Radio Telemetry System
БКУ	Onboard Control System
БМП	Micropurification Unit
БНД	Functional Cargo Block Low Pressure Tank
БО	Oxidizer Tank
БО1	Oxidizer Tank 1
БО2	Oxidizer Tank 2
БОКЗ	Star Mapper
БПП	Onboard Daily Program Flight Cyclogram
БРПК	Condensate Separation and Pumping Unit
БРТК	Russian Segment Communications Complex
БСММ	Payload Matching Unit
ВД-СУ	БИТС Data Output Mode
ВКЛ	Activate
Воздух	Vozdukh
ВС	Velocity Vector
ВУ	Upper Tier
выд. Синхромил. На уст. БШВ	Daily Time Synchronization
ВРО	Allowable propellant consumption for attitude control (kg)
ВРОТ	Excessive prop consumed flag for attitude control (equals ГДОС + ВРО)
ГА	Gas Analyzer or Pressurized Adapter
ГДПР	Russian Detailed Planning Group
Главный оператор по связи с экипажем	Russian CAPCOM
ГОГУ	Main Real-Time Operation Management Group a.k.a MCC-Moscow Flight Control Team
ГОДЭ	Crew Activity Support Group
ГЦН	Payload Team

ДДИ	Russian Rapid Pressure Change Sensors
Давление	Pressure
ДПП	Detailed Flight Plan
ЗРУ	Battery Charge/Discharge Unit
ИК0501	O ₂ , CO ₂ , H ₂ O Gas Analyzer
ИП-1	Air Flow Sensors
КДУ	Combined Propulsion System
КНТ	Long Duration Exposure Russian scientific payload
КОБ1	Internal Thermal Control Loop 1
КОБ2	Internal Thermal Control Loop 2
Контр. Шин. Пит	Power Bus Check
КЦП	Central Post Computer
Люки	RS Hatches
ЛКТ	Local Commutator
МАТРЕШКА	Matrushka Scientific Payload
Обмен информации в гогу	Exchange Information with MCC-M Flight Control Team
ОДУ	Integrated Propulsion System
Парциальное давление	Partial Pressure
ПГО	FGB Working Compartment
ПКЭ	Kromka Russian Scientific Payload
ПЛАЗМА	Plasma Scientific Payload
Полетный врач	Flight Surgeon
Примечания	Notes
Прк	SM Pressurized Tunnel
Прогресс	Progress Cargo Spacecraft
ПРП	MCC-M Shift Assistant Flight Director
ПУЛЬС	Pulse Russian Scientific Payload
ПхО	Service Module Pressurized Adapter
РБО	Radiation Orbit
РОТОК	Air Ionizer for Filtering Microbiological Impurities
Рмв	Pressure Reading From Handheld Manometer
РРГУ	Russian Regional Control Group
Рро	Pressure in Working Compartment
РСС	Russian Communications Equipment Scheduling Daily Program

PCY	Russian Operations Data File Manual Controls Procedure Book
PTK	Russian Operations Data File Communications Procedure Book
Сброс авар. Буфера БОКЗ	Star Mappers Emergency Buffer Dump
СД	Propellant Resupply System (Progress) Solar Sensors
Сигнал	Signal
СИО	Actuators System Attitude/Translation Control System Data Display Device
СИО-С	Descent Control System Entry Actuators System
Система	System
СКВ	Service Module Air Conditioner
СКВ-1	Service Module Air Conditioner number 1
Скорпион	Scorpion Russian Scientific Payload
СКДС	SM Pressure Control and Atmosphere Monitoring System
СНТ	American to Russian Converter Unit
СОГС	Russian Segment Air Revitalization Subsystem
СОЖ	Russian Segment Life Support System
СОСБ	Solar Arrays
Состояние системы	System Status
СОТР	Russian Segment Thermal Control System
Союз	Soyuz Spacecraft
СПП	Onboard Daily Program
СППЗ	Fire Protection System
СПУСК	Descent
СРП	Shift Flight Director
СУБА	Onboard Equipment Control System
СУДН	Motion Control System
СЭП	Electrical Power Specialist Electrical Power System
ТБ	FGB Propellant Tank
ТВМ	Daily
ТЕСТ.ВКЛ. ТМО С	Television Exchange Module Activation With Payload
БСММ	Matching Unit
тест датч дыма	Smoke Detector Test
Тест ИП-1	Air Flow Sensors Test
ТИК	Solid Fuel Oxygen Generator Cassette
ТМО	Television Exchange Module
ТМО-БСММ	Television Exchange Module – Payload Matching Unit
Тренеровка	Training or Simulation

УС-21 Установка БШВ "REGTIM"	Matching Unit Load Daily Time Setting
ФВП ФКА	Harmful Contaminant Filter NASA/Federal Cosmonautics Agency
ХЬЮСТОНСКАЯ ГРУППА УПРАВЛЕНИЯ МКС	ISS Houston Support Group
ЦВМ Центер Управления Полётам-Москва ЦПЛГ ЦУП-М	Service Module Central Computer Mission Control Center-Moscow Local Group Central Instruments Subsystem Mission Control Center-Moscow
GDOS GKDS	Amount of propellant consumed for attitude control (kg) Amount of propellant consumed for reboost from large SM thrusters (kg)

**APPENDIX B
PHONE NUMBERS**

HOUSTON CONSOLE	PRIMARY NUMBER	SECONDARY NUMBER
BFCR Fax (near GC)	34788	
BFCR FD	31401	
BFCR PAO Console	37706	
BFCR RIO Console	46466	
BFCR ROBO	45330	
BFCR Surgeon Console	45348	
DO13 GA (Mike Sen-Roy)	42248	713-710-7931 (P)
GMO/Flight Surgeon Console (229A)	30981	
IMC Fax	45066	
ISS MER	39456	
ISS S/G Interpretation (30/225)	31068	31087, 31055
JSC-MAS Help		
POCC 3 – SRP	32410	41273
POCC 4 – HSG	41275	41276
POCC 6 – Glavni	41260	41259
POCC Fax	35301	
Residence Inn	281-486-2424	
RFCR FD	45317	
RFCR Ops Plan	45245	
RFCR RIO	45356	
RIO Increment Lead	38440	
RRCG Cell	281-450-5127	
RRCG Conference Room (229B)	38239	
RRCG Fax	45952	
RRCG Pager	281-505-5948	
RRCG RS Planner Console	30980	
RRCG SRP Console	38196	
RSET/RSI Cell	281-450-6381	
RSI Sim Support Bldg 5	46444	
Shuttle Mission Recorder	31077	
Sim Recorder	31076	
Station Recorder	32107	
WFCR Fax	32164	
WFCR FD	45252	
WFCR RIO/MOD console	35315	

HOUSTON OFFICE/OTHER	PRIMARY NUMBER	SECONDARY NUMBER
Bldg 30 Badging	39091	
DA8/RJOP Heather Rarick	41013	281-797-2477
DO13 Meet Me	877-930-9167	521684
DO3213 Manager/Baum	40267	281-728-4737 (C)
JSC Duty Status	33351	877-283-1947
JSC Emergency	33333	
JSC Info Line	36765	
JSC Operator	30123	
JSC Security Desk	34441	
JSC Security Dispatch	30280	
Medardo Munoz	38923	281-923-7182 (C)
RSET/RSI (4S/305)	40916	
TTI Logistics Fax	281-333-4396	
TTI Office	281-335-8000	
TTI Translation Fax	281-335-0893	
TTI/Cybulski	40281	713-306-9564 (C)
USA/Ernie Edge	40238	281-773-6540 (C)
USA/Jeanine Shofner	40250	

MOSCOW	PRIMARY NUMBER	SECONDARY NUMBER
GCTC Deputy DOR	21876	784-9166 (C)
GCTC Director of Operations	21802	768-2028 (C)
GCTC Profi Fax	21807	526-5011
HSG Conference/Break	21330 (polycom)	21329, 011-7095-586-8464
HSG EVA	21223	
HSG Fax	21231	
HSG Office	21221	
HSG OPS LEAD/PLAN	21221	
HSG Room 118	21218	21232 (F)
HSG RSS 1	21220	
HSG RSS 2	21222	
MTLO Office/Conference	21235 (polycom)	21233 (F)
Penta Office	21451-4	21457 (F)
Volga HSFP-R Lead	21395	922-2158 (C)
Volga MTLO Lead	21385	139-1433 (C)
Volga NISN Comm Center	21589 - 90, 211015	768-0734 (on call)
Volga Ops Lead	21393	139-1448 (C)
Volga Room 99 Conf	21540	
Volga Room 99 Fax	21387	
Volga TTI Office Fax	21538	
Volga TTI Office Manager	21531	
Volga TTI Supervisor	21384	
Volga TTI Transportation	21532	
Volga USA Lead	21548	8-910-423-2297 (C)

OTHER MOSCOW	PRIMARY NUMBER	SECONDARY NUMBER
Alexander Butovchenko – Bldg 100, Rm 425	6213	
Ballistic Coordination Group – Bldg 100, Rm 507	6250	
Boris Motsulev – Bldg100, Rm 203	6216	
CAPCOM SM ISS – Bldg 100, Rm 139	6247	
Equipment Room – Bldg 100, Rm 420	6200	
FGB Lead – Bldg 100, Rm 237	6202	
FGB Planners Facsimile – Bldg 100, Rm 239	6203	
HSG Loop Interpreter – Bldg 100, Rm 124B	6243	
HSG Loop Interpreter – Bldg 100, Rm 124B	6244	
ISS FD Facsimile – Bldg 100, Rm 141	6260	
ISS Technical Management – Bldg 22, Rm 314	6245	
Long-term Planning Team – Bldg 100, Rm 107	6246	
Math Modelling Group – Bldg 22, Rm 328	6248	
Mathematical Modeling Team – Bldg 100, Rm 205	6215	
Med OPS – Bldg 100, Rm 223	6258	
Med OPS Facsimile – Bldg 100, Rm 223	6259	
MTLO Facsimile – Bldg 100, Rm 151	6219	
Natasha Petrova – Bldg 100, Rm 122	6228	
PIMS – Bldg 100, Rm 121	6261	
S. Tareev – Bldg 100, Rm 430	6201	
Sergei Pouzanov PAO – Bldg 100, Rm 124A	6225	
Shift FD – Bldg 100, Rm 141	6207	
Tatiana Kopteva – Bldg 100, Rm 122	6227	
Video Conference Room – Bldg 22, Rm 114	6205	
Yury A. Skursky – Bldg 22, Rm 102A	6249	

ESA	NAME	NUMBER
Les Mureax	Steve Smith, work	33-1-53-69-80-73
	Steve Smith, after hours	33-6-82-24-20-96
Munich	TBD	
Toulouse	HSG-ATV	33-561-283-669
	AIO	33-561-283-668
	ATV Flight	33-561-283-673

JAXA	NAME	NUMBER
Tsukuba	NASA Liaison Office, phone	(81) 29-852-1511
	NASA Liaison Office, fax	(81) 29-852-1512

APPENDIX C
MOA FOR SHARING THE RIO/EVA/VVO CONSOLE IN THE BFCR

In June 2003, a Memorandum of Agreement (MOA) was signed between DM35 (Visiting Vehicle Officer (VVO)), DX32 (Extravehicular Activity (EVA) Tasks), DX35 (EVA Systems), and DO13 (Remote Interface Officer (RIO)) to document the guidelines for sharing a common console in the Blue Flight Control Room (BFCR). This MOA was the result of several months of work to equip the console with a second Personal Computer (PC) workstation and connect the second Digital Voice Intercom System (DVIS) panel to the Mission Control Center (MCC) voice recording trunk.

The MOA designates a prime operator for various operational phases and activities. Within these prime periods, it is specified whether the prime operator has exclusive rights to both workstations or if the second workstation can be shared to a nonprime operator. The MOA also defines the real-time communication process and guidelines for managing other console resources (e.g., DVIS, Digital Equipment Corporation (DEC), Television (TV)).

A copy of the MOA resides in each discipline's console handbook. The Flight Controller Operations Handbook (FCOH), Procedure 6.1.5 was also updated to show the new recording capability.

National Aeronautics and
Space Administration
Lyndon B. Johnson Space Center
2101 NASA Road 1
Houston, Texas 77058-3696



Reply to Attn of :

July 8, 2003

TO: Distribution

FROM: Tim Baum, Manager
International Liaison Office

SUBJECT: RIO/EVA/VVO Console Sharing MOA

In June 2003, a Memorandum of Agreement (MOA) was signed between DM35 (VVO), DX32 (EVA Tasks), DX35 (EVA Systems), and DO13 (RIO) to document the guidelines for sharing a common console in the BFCR. In the past, console resources were insufficient to support multi-discipline usage requirements and too often a Flight Controller would have to relocate. However, during the January – May 2003 timeframe DO13 worked with the CSOC, ISD, and the MCC PC Panel to equip the console with power, data, and hardware for a second PC workstation. Houston Voice also connected the second DVIS panel to the MCC voice recording trunk.

Essentially, the MOA designates a prime operator for various operational phases and activities. Within these prime periods, it is specified whether the prime operator has exclusive rights to both workstations or the second workstation can be shared to a non-prime operator. The MOA also defines the real-time communication process and guidelines for managing other console resources (e.g., DVIS, DEC, TV, etc).

Excellent support was provided by all parties in developing the MOA. A copy of the MOA will reside in each discipline's console handbook. FCOH procedure 6.1.5 was also updated to show the new recording capability.

Tim Baum
DO13/International Liaison Office

See Attachment

cc: DA8/Milt Helfin
DA8/Jeff Hanley
DA8/ISS FD
DM35/Scott Dunham
DX32/Randy McDaniel
DX35/Mary Fitts

C.1 MOA FOR SHARING THE RIO/EVA/VVO CONSOLE IN THE BFCR

C.1.1 Overview

The RIO, EVA, and VVO provide specialized International Space Station (ISS) support from a shared console in the BFCR, per FCOH 1.2.2 (Console/Call Sign/Loop Listing). This protocol defines the BFCR console requirements and designates a prime operator for a given activity. Console allocation for each position is based on general support activities and flight experience. If mission priorities call for an operator to support in the BFCR at a time when they are not prime, the nonprime operator must coordinate with the prime operator per the notification process given in Section C.2.1. With the second PC workstation installed, console sharing allows two operators to work simultaneously. As mission priorities and staffing requirements change in the future, this protocol may be amended.

C.2 PRIME OPERATOR DESIGNATIONS

VVO is prime at the BFCR console for all Visiting Vehicle (VV) traffic, excluding shuttle, per Table C-1. Additional docking/undocking preparation (e.g., Kurs tests, TORU tests) should be coordinated via the notification process given in Section C.2.1.

Note: The VVO does not have a Multipurpose Support Room (MPSR) console, except on docking day when they acquire a Trajectory (TRAJ) console for VV support position.

EVA is prime at the BFCR console for all ISS-based EVAs, as well as key EVA prep activities, per Table C-1. Additional EVA-related activities should be coordinated via the notification process provided in Section C.2.1. For nominal steady state support, the EVA MPSR is also available.

RIO is prime at the BFCR console for all shuttle missions to ISS, as well as ISS steady state support, which overlaps with Houston Support Group (HSG) orbit 2 and Mission Control Center-Houston (MCC-H) orbit 3, per Table C-1. Additional support of International Partner (IP) activities should be coordinated via the notification process in Section C.2.1.

Note: RIO does not have an MPSR console.

Table C-1. Prime operator designation

Prime operator	Activity	Prime period	
		Prime, but console sharing is permitted	Exclusive rights to the entire console
VVO*	Arriving vehicle	N/A	Launch – 1 week → dock/berth + 6 hrs
	Departing vehicle	N/A	Undock/release – 1 week → undock/release + 9 hrs
	Deorbiting vehicle	If not covered above: Deorbit – 1 day → Deorbit + 3 hours	N/A
	Soyuz relocation	None	Undock – 1 week → dock + 6 hrs
EVA	ISS stage EVA	EVA – 2 days → EVA + 24 hours	EVA – 1 day → post-EVA
	EVA preparation	EVA dry runs, EMU checkouts, S/G conferences, etc. (as required)	N/A
	Maintenance and/or trouble-shooting for EMU, US A/L, tools	Maintenance – 8 hrs → maintenance + 8 hrs	N/A
	Shuttle/ISS docked OPS	N/A	Dock + 8 hrs → final EVA + 8 hrs
RIO	Stage OPS	1200 – 1700 local (Monday – Friday)	N/A
	Complex RS events	Reboost, S/W transition, major RS IFM, etc.	N/A
	Shuttle docking	Launch – 24 hrs → dock + 8 hrs	Launch → post-dock (hardmate and attitude control established)
	Shuttle undocking	Undock – 12 hrs → undock + 6 hrs	Undock – 6 hrs → undock + 2 hrs
	Shuttle/ISS joint OPS	Prime for non-EVA flights	N/A

*VVO OJT time is allocated to train and certify new VVOs, since they receive no simulations. However, the VVO OJT will yield the console if another operator has a prime activity.

C.2.1 Communication and Notification Process

It is imperative that affected parties communicate their level of support to each other at a working level. Sharing of BFCR console changes for upcoming activities allows affected disciplines to find alternate console locations as the situation warrants. Staffing plans should be shared either in written form to the VVO, RIO, and DL MCC EVA e-mail accounts or verbally with the appropriate personnel identified in the “ISS Flight Control Team (FCT) Contact List” Flight Note (FN). Two days advance notice should be the minimum. It is the responsibility of a nonprime operator to contact the prime operator to ensure that adequate resources are available for console sharing. However, if a prime

operator has an activity that requires the entire console (e.g., On-the-Job Training (OJT) experience) outside the exclusive period, the prime operator should notify the other operators.

Off-nominal Russian Segment (RS) Visiting Vehicle (VV) operations or off-nominal EVA operations may require VVO or EVA to retain the BFCR console for additional time. The RIO may provide extended support during off-nominal IP events or when HSG is not on console (e.g., HSG console relief). In these cases, all parties should be informed, as soon as practical, so that any conflicts can be identified and resolved. Any staffing conflict is worked in advance between Lead Controllers. ISS FD approval of the console support plan will be required only if mission priorities need to be clarified.

C.2.2 Console Sharing Guidelines

Console resources include two DEC workstations (single monitor and dual monitor), two DVIS panels, two PC workstations, and one TV. When sharing the console, EVA is given preference to the left side, because it has two DEC monitors and the TV. Console sharing also implies the physical allocation of chairs, bookshelves, and console countertop space. Operators should precoordinate, if special configurations and seating are required (e.g., dual-monitor DEC, TV use). The DVIS Identifications (IDs) belong to the console; therefore, if a nonprime operator has to relocate to another console, he should use the DVIS ID at that console or his group's personal DVIS ID (8000 series). Both DVIS keysets are recorded per FCOH 6.1.5. Each operator "owns" two DVIS pages at the shared console, and the configuration should be changed only by the owner. DVIS pages are allocated as shown in Figure C-1.

FD: Pages 1 and 2

RIO: Pages 3 and 4

EVA: Pages 5, 6, and 7

VVO: Pages 8 and 9

Open: Page 10

Finally, if an operator needs to stay logged in for an extended period of time (e.g., plots), they should use an MPSR console.

Tim Baum,
RIO Group Lead

Randy McDaniel,
EVA Task Group Lead

Scott Dunham,
VVO Group Lead

Mary Fitts,
EVA Systems Group Lead

cc: DA8/Milt Helfin
DA8/Jeff Hanley
DA8/ISS FD

Figure C-1. DVIS page allocation

**APPENDIX D
MSG WORK INSTRUCTIONS**

**RUSSIAN SEGMENT SUPPORT TEAM
WORK INSTRUCTIONS**

December 18, 2002

Appendix D – Table of Contents

1. Purpose
2. Staffing and Shift Support
3. Coordination
4. Planning
5. Systems Monitoring
6. Product and Flight Documentation Support
7. Moscow Support Room Facilities
8. Medical Operations Support
9. Training and Simulation Support

Section 1: Purpose

The purpose of the following work instructions is to define the specific activities and support by Russian specialists necessary to fulfill the requirements in Section 4 of the National Aeronautics and Space Administration (NASA)/TechTrans International (TTI) Russian Language and Logistics Services contract. This contract is designed to enhance operations between MCC-Houston (MCC-H) and MCC-Moscow (MCC-M) by providing a consultant team (the Russian Regional Control Group (RRCG)) in MCC-H for real-time operations and a simulation team (the Russian Simulation Execution Team (RSET)) to role-play MCC-M in simulations at Johnson Space Center (JSC). Together, the RRCG and the RSET comprise the Russian Segment Support Team (RSST).

The NASA Technical Lead for this contract is the DO13 Manager. Questions regarding the work instructions should be addressed to the NASA Technical Lead or his designee.

Changes to these instructions may be made upon mutual agreement by NASA and the contractor.

Section 2: Staffing and Shift Support

Real-Time Operations (RRCG)

1. The support must include
 - (a) One certified CPП
 - (b) One certified ППП
 - (c) Two planning specialists
 - (d) One Gagarin Cosmonaut Training Center (GCTC) medical specialist
 - (e) One Institute of Biomedical Problems (IBMP) medical specialist
 - (f) One ground system specialist
 - (g) Two integrated systems specialists from the following areas: motion control, onboard complex control system, ballistics, math modeling, Automated Rendezvous and Docking (AR&D)
 - (h) One integrated systems specialist from the following areas: life support, electrical power, thermal
2. RRCG tours of duty should be no shorter than 3 months. The rotation schedule should accommodate a maximum of 1-week handover between RRCG teams.
3. The RRCG shall have the ability to cover two shifts of International Space Station (ISS) increment real-time operations when the crew is awake. Each shift should

include a representative from the CPΠ/ΠPΠ group, a planner, and system support. Weekend support is required only when the weekend day is a crew workday or a shuttle docked day.

4. The shift support times for the GCTC and IBMP medical support specialists are determined between the U.S. and Russian medical teams.
5. The RSST shall have the ability to cover 24 hours daily from shuttle launch to shuttle undocking for joint shuttle/ISS missions. This may require using RSET personnel to support the RRCG during joint shuttle/ISS flights.
6. The RRCG rotation ideally should include at least one English-speaking planning specialist and one English-speaking system specialist.
7. The RSST should comprise skills and expertise capable of supporting limited Backup Control Center (BCC) operations.

Simulation Team (RSET)

1. The support for any one simulation must include
 - (a) CPΠ/ΠPΠ; at a minimum, the contractor sends one certified CPΠ for this activity.
 - (b) Glavni operator.
 - (c) Specialist from one of the following areas: motion control, onboard complex control system, life support, electrical power, thermal.
2. The contractor also provides a specialist to interface with the U.S. team in planning the simulations.
3. The RSET shall have the ability to cover up to five simulations per week.
4. RSET rotations should be no shorter than 3 months. Rotations should accommodate a maximum of 1-week handover between RSETs.

RSST

Upon mutual agreement between the NASA Technical Lead and the RSST Lead, the RSST members may be temporarily detailed to the U.S. Flight Control Team (FCT) disciplines to gain a better mutual understanding of United States On-Orbit Segment (USOS) and joint operations.

Section 3: Coordination

1. The RRCG will consult USOS management, ISS Mission Management Team (IMMT), and other American specialists on the status of the ISS RS onboard systems as ISS RS activities are planned and executed.
2. The RRCG shall participate in a daily tag-up with the ISS Flight Director (FD) before the morning Daily Planning Conference (DPC) regarding upcoming Russian activities for the current day and the next 2 days. If the ISS FD is unavailable, this tag-up occurs with the RIO or another member of the MOD/DO13 International Liaison Group.
3. The RRCG shall tag up with U.S. specialists for any unique or first-time RS activities no later than 4 days (one planning cycle) in advance of the activity.
4. The RRCG shall interact with MCC-H telemetry analysis and sustaining engineering Mission Evaluation Room (MER) teams.
5. The RRCG shall review and support discussions between MCC-M and MCC-H specialists to help coordinate the implementation and uplink of Russian Operations Data File (RODF), Operations Data File (ODF), and multisegment procedure modifications.
6. The RRCG shall participate, if requested by the NASA Team Lead, in the NASA Readiness Review meetings (mission, software, etc.), Mission Management Team (MMT) meetings, and any other technical meetings requested.
7. The RRCG shall provide RS expertise and consultation to U.S. specialists on anomalous RS conditions.
8. The RRCG shall provide RS expertise to U.S. specialists in the development of responses to off-nominal situations on the ISS.
9. The RRCG shall coordinate between the Russian and U.S. FCTs to help resolve open chits.
10. The RRCG shall advise the U.S. experts on the actual operational characteristics of the ISS RS onboard service systems, including routine scheduled maintenance and replacement of items.
11. The RRCG shall provide consultations for the ISS RS and USOS onboard systems off-nominal situations analysis and its interdependence on the respective partner segment.
12. The RRCG Flight Surgeon shall coordinate with the U.S. Medical Operations Team to provide integrated crew medical support. This support may also include support at Kennedy Space Center (KSC) for shuttle launch and landing activities.
13. The RRCG shall support U.S. specialists in tracking and identifying RS anomalies in the U.S. maintained In-Flight Investigations (IFIs) database.

Section 4: Planning

1. The contractor shall provide daily delivery of the complete preliminary and final ДПП, as well as any real-time revisions to both the Houston FCT and the Houston Support Group (HSG). In coordination with MCC-M, the RRCG shall inform the U.S. FCT of any discrepancies in the final version of the ДПП in comparison with the final Onboard Short-Term Plan (OSTP).
2. The RRCG shall consult with MCC-H planning specialists on different types of flight plans (On-Orbit Operations Summary (OOS), Weekly Look-Ahead Plan (WLP), Short-Term Plan (STP), OSTP, and Shuttle Flight Plan) and identify discrepancies between Russian and U.S. plans.

Section 5: Systems Monitoring

1. The RRCG shall monitor RS systems telemetry via S-band and Russian Ground Stations to maintain cognizance of the RS systems status.
2. The RRCG shall monitor activities of the Russian FCT in order to provide insight to the MCC-H FCT.
3. The RRCG shall consult U.S. specialists and interpret real-time ISS RS telemetry parameters, as well as provide requested hard copies of Russian telemetry displays to U.S. specialists.
4. The RRCG shall request from MCC-M performance analysis and keep track of command and planning data packages (comm sessions schedule and content, daily program details, etc.).
5. The RRCG shall interpret ISS RS onboard systems telemetry parameters for U.S. specialists.

Section 6: Product and Flight Documentation Support

1. The contractor shall deliver the detailed RS Daily Status Report to both the Houston FCT and the HSG.
2. The contractor shall provide, each workday, to both the Houston FCT and the HSG a copy of the daily orbit command plan.
3. Upon request, the RRCG shall review Moscow-generated status reports with U.S. specialists as specified in the Operations Interface Procedures (OIP).
4. The contractor shall review and identify, to the NASA Technical Lead, the required changes (updates, error correction, etc.) in the RS databooks (Functional Cargo Block (FGB), Service Module (SM), Soyuz, Progress, Docking Compartment (DC), etc.), developed by American experts. This activity may take place either in Houston or in Moscow.

5. The RSST shall, based on NASA Technical Lead request, consult U.S. specialists and interpret generic ISS RS telemetry parameters in support of the NASA Display Reference Guide effort.
6. The RSST shall participate in development and updates of the OIP.
7. The RSST shall participate in the development of the Joint Flight Rules, as well as changes to the Joint Flight Rules.
8. The RSST shall participate in the development of the Emergency Philosophy documents and work to expedite joint agreement between U.S. and Russian specialists on the content of these documents.
9. The RRCG shall maintain a current set of Russian Ground Procedures in the Moscow Support Room. The RRCG will consult with the U.S. specialists on these procedures, when requested.
10. The RSST shall provide expert advice on the technical accuracy of the RS schematics issued by GCTC, including the list of discrepancies, along with recommendations on schematics updates.

Section 7: Moscow Support Room Facilities

1. The contractor shall maintain and upgrade the Russian hardware and software in the RRCG facility to keep it in synch with MCC-M. Additionally, displays in the RRCG facility should be updated no more than 48 hours after the MCC-M displays are updated.
2. The Backup Control Center-Russia (BCC-R) shall be tested biannually to ensure the following:
 - (a) The hardware and software are functional and compatible with U.S. ground system interfaces.
 - (b) RRCG BCC procedures are up to date.
 - (c) RRCG team readiness.
3. The RRCG shall support communication with the ISS Russian crewmembers via the U.S. communications resources, if requested by the ISS FD.

Section 8: Medical Operations Support

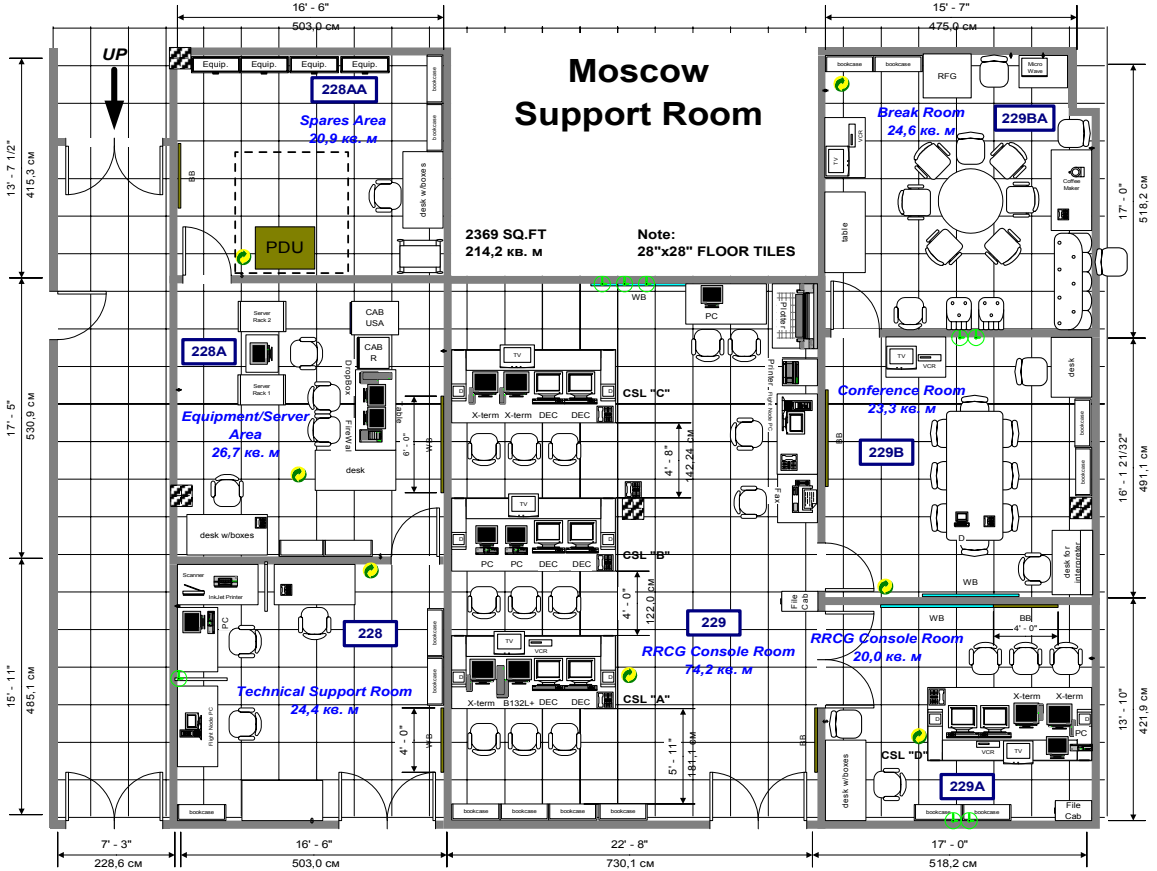
1. The contractor shall provide medical support to the crew under the supervision of the NASA ISS Crew Surgeon, including medical care and evaluation throughout all mission phases. The effort will require travel to and from launch and landing sites.
2. Coordinate medical issues with U.S. and Russian medical authorities. This includes, but is not limited to, resolving crew sleep shifting schedule no later than 1 week in advance.
3. Evaluate medical data and report findings to the NASA Crew Surgeon, Russian medical authorities, and Mission Control Center (MCC) control team members, as appropriate.
4. The contractor shall serve as a member of the MCC-H mission control team under the supervision of the NASA ISS Increment Crew Surgeon.
5. The contractor shall provide medical support for crewmember families, as appropriate.
6. The contractor shall provide behavioral and psychiatric support, as required.
7. The contractor shall coordinate issues related to Russian crew health care equipment and pharmacy, including maintenance and quality assurance.
8. The contractor shall develop schedules, as required.
9. The contractor shall assist in the development of medical information useful to ISS missions, including secure means of data exchange for private medical data.
10. The contractor shall participate in and complete training required to serve as ISS Crew Surgeon.
11. The contractor shall support medical and research training of crewmembers.
12. The contractor shall coordinate issues related to Russian research protocols and equipment, including data exchange and support of Institutional Review Board(s).

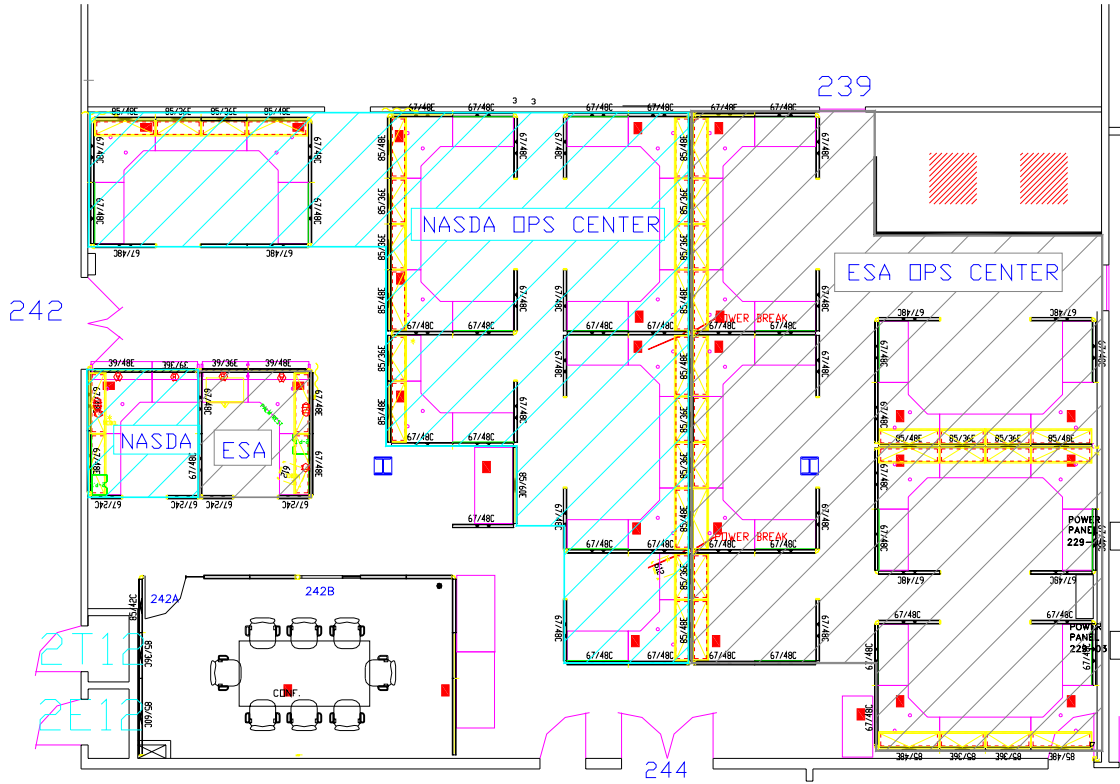
Section 9: Training and Simulation Support

1. The RSET shall participate in the planning and development of simulations.
2. The RSET shall actively participate in the simulation execution jointly with ISS USOS control team in the capacity analogous to the ISS RS control team.
3. The RSET shall provide consulting services at simulation debriefings and solve problems, identified during simulation jointly with MCC-H personnel.
4. The RSET shall analyze comments pertaining to the crew and ground support personnel performance during the simulation.
5. The Glavni shall support standalone training sessions with ISS crewmembers in the mockup facilities.

APPENDIX E IP OPS CENTER ROOM CONFIGURATIONS

Russian Regional Control Group Room (JSC Building 30M, Rooms 228, 229)





INTERNATIONAL PARTNERS
UTILIZING EXISTING CONFIGURATION

NASDA and ESA Ops Centers (JSC Building 30M, Room 244)

APPENDIX F TIME REFERENCES AND ZONES

Due to the international nature of the International Space Station (ISS), many time zones will be used. The ISS standard is Greenwich Mean Time (GMT), with the exception of joint operations (orbiter present) where Mission Elapsed Time (MET) is standard; however, the respective control centers may use their local time.

Controllers should be familiar with the following time references.

- a. GMT – The current time at the prime meridian (0° longitude); does not change for daylight saving time.
- b. Central Standard Time (CST) – The current time in Houston, Texas, and Huntsville, Alabama. CST is the time reference from the last Sunday in October to the first Sunday in April. $CST = GMT - 6$ hours.
- c. Central Daylight Saving Time (CDT) – The time reference from the first Sunday in April to the last Sunday in October. $CDT = GMT - 5$ hours.
- d. Local Moscow time – The time in Moscow, which varies for daylight saving time. At this point, there does not appear to be a standard of when the change to and from Moscow daylight saving time will occur. However, in recent history, Moscow has changed its clocks 1 week before the U.S. adjustment for CDT.
- e. Moscow standard time = $GMT + 3$ hours = Decreed Moscow Time (see Item g. below).
- f. Moscow daylight saving time = $GMT + 4$ hours.
- g. Decreed Moscow Time (DMT) – Moscow time not adjusted for daylight saving time. DMT is ALWAYS $GMT + 3$ hours. The Mir Space Station uses DMT as the time reference onboard. MCC-M uses DMT for local time.
- h. MET – Used only for space shuttle flights. MET is the elapsed time from Solid Rocket Booster (SRB) ignition and is denoted as DD/HH:MM:SS where DD is days, HH is hours, MM is minutes, and SS is seconds. The shuttle crew day and flight plan are based on MET.

APPENDIX G CONVERSIONS

Distance/Length

1 in. = 2.54 cm
1 ft = 30.48 cm = 0.3048 m
1 yd = 91.44 cm = 0.9144 m
1 mile = 5280 ft = 1609.344 m = 1.609344 km
1 nautical mile = 1.151 miles = 6076.1155 ft = 1852 m = 1.852 km

1 cm = 0.3937 in.
1 m = 1.0936 yds = 3.28 ft = 39.37 in.
1 km = 0.54 nautical miles = 0.62137 miles = 3280.84 ft

Mass

1 oz = 137.5 g
1 lb = 0.454545 kg
1 ton = 909.09 kg

1 g = 0.007273 oz
1 kg = 2.2 lb = 35.2 oz
1 metric ton = 2200 lb

Pressure

1 psi = 51.7 mmHg
1 mmHg = 0.01934 psi

14.7 psi = 760 mmHg
10.2 psi = 527.35 mmHg

1 psi/hr = 0.8617 mmHg/min
1 mmHg/min = 1.16 psi/hr

Velocity

1 ft/sec = 0.6818 miles/hr = 0.3048 m/sec = 1.09728 km/hr
1 mile/hr = 1.4667 ft/sec = 0.44704 m/sec = 1.609344 km/hr
1 mile/sec = 1609.344 m/sec = 5793.64 km/hr

1 m/sec = 3.6 km/hr = 3.28 ft/sec = 2.237 miles/hr
1 km/hr = 0.27778 m/sec = 0.91111 ft/sec = 0.62137 miles/hr
1 km/sec = 3280 ft/sec = 2237 miles/hr

Volume

$$1 \text{ cup} = 240 \text{ ml}$$

$$1 \text{ quart} = 960 \text{ ml}$$

$$1 \text{ gallon} = 3.840 \text{ liters}$$

$$1 \text{ ml} = 0.0333 \text{ oz}$$

$$1 \text{ liter} = 1.04167 \text{ quarts} = 33.3 \text{ oz}$$

$$1 \text{ cubic inch (in}^3\text{)} = 16.387 \text{ cm}^3$$

$$1 \text{ cubic foot (ft}^3\text{)} = 28317 \text{ cm}^3 = 0.028317 \text{ m}^3$$

$$1 \text{ cubic yard (yd}^3\text{)} = 0.7646 \text{ m}^3$$

$$1 \text{ cm}^3 \text{ (or cc)} = 1 \text{ ml}$$

$$1 \text{ cm}^3 = 0.061 \text{ in}^3$$

$$1 \text{ m}^3 = 1.308 \text{ yd}^3 = 35.31 \text{ ft}^3$$

**APPENDIX H
CHANGE CONTROL**

**DO32/International Liaison Group Product
CHANGE REQUEST (CR)**

<p>DOCUMENT</p> <p><input type="checkbox"/> RS Display Reference Guide</p> <p><input type="checkbox"/> FGB Databook</p> <p><input type="checkbox"/> SM Databook</p> <p><input type="checkbox"/> Soyuz/Progress Databook</p> <p><input type="checkbox"/> Docking Compartment Databook</p> <p><input type="checkbox"/> ATV Databook</p> <p><input type="checkbox"/> Columbus Databook</p> <p><input type="checkbox"/> MLM Databook</p> <p><input type="checkbox"/> JEM Databook</p> <p><input type="checkbox"/> HSG Moscow Operations Console Handbook</p> <p><input type="checkbox"/> Generic/RIO Console Handbook</p> <p><input type="checkbox"/> Interpreter Console Handbook</p> <p><input type="checkbox"/> ATV Operations Console Handbook</p> <p><input type="checkbox"/> DO32 Office Handbook</p> <p><input type="checkbox"/> DO32 Cert Guide</p> <p><input type="checkbox"/> Interpreter Cert Guide</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Initiator</td> <td style="width: 50%;">Date</td> </tr> <tr> <td colspan="2">Organization/Department/Name</td> </tr> <tr> <td colspan="2">Phone Number</td> </tr> <tr> <td colspan="2">Email Address</td> </tr> <tr> <td colspan="2">Assigned by Book Manager:</td> </tr> <tr> <td colspan="2">CR# _____</td> </tr> <tr> <td colspan="2">Date Accepted _____</td> </tr> </table>	Initiator	Date	Organization/Department/Name		Phone Number		Email Address		Assigned by Book Manager:		CR# _____		Date Accepted _____	
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Attachment

TITLE: International Liaison Office Houston Operations Console Handbook

NASA-JSC

DA8 Rarick, H.
*DA83 MOD Technical Data Center (3)
DO32 Baker, A.
Baum, T.
Boggs, M.
Buschow, M.
Campion, M.
* Cybulski, G. (10)
Harvey, R.
Hayhurst, R.
Janda, B.
Kabakov, A.
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