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Mission Integration, Real-Time Analysis and Graphical Editor (MIRAGE)

June 12, 1996

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Jet Propulsion Laboratory

California Institute of Technology

Pasadena, California

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MIRAGE USER'S GUIDE

Phase 2A

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INTRODUCTION

.1 Document Overview

This manual contains the User's Guide to the MIRAGE software. It consists of general information about the software, including technical information that you will need to get started.

The following sections will describe how to use MIRAGE. Details regarding what is needed at start up can be found in Section 2. An overview of the graphical display layout and command syntax is in Section 3. Section 4 introduces the modeling function in MIRAGE. Information on using MIRAGE during uplink planning is in Section 5 and detailed description of the menu is in Section 6. Section 7 contains the appendices.

1. Software Overview

MIRAGE (Mission Integration, Real Time Analysis and Graphical Editor) is a graphical sequence planning tool, used by the Galileo Science and Sequencing Office (SSO). MIRAGE is the Galileo Project adaptation of the PLAN-IT-II software, developed by the JPL Sequence Automation Research Group in Section 314. Plan-IT-II is a LISP-based multi-mission sequence planning tool that resides on a Sun Sparcstation/Unix network.

The MIRAGE software system provides a graphical timeline interface, and is used to expedite the integration of science activity requests by modeling the effects of the candidate sequence on the spacecraft resources and identifying conflicting or excessive claims on such resources. MIRAGE will be used primarily by the Sequence Integration Engineer (SIE), and the JPL science coordinators during the Orbit Activity Plan (OAP) and Orbit Profile (ORPRO) portions of the uplink planning process to input, edit and check the science activity requests. MIRAGE provides the following sequence checking/modeling functions:

1. Models the data flow on-board the spacecraft to approximate when data is played back, and when there is a risk of losing data (requiring proactive commanding of Buffer Dumps to Tape, Record Rate Change Coverage, etc). MIRAGE will:

    a. Model the use of the Multi-Use Buffer (MUB).
    b. Model the use of the Data Management System (DMS).
    c. Model the Playback process.
    d. Model the Telemetry process.
    e. Model the use of the Priority Buffer.

2. Provides summary totals by orbit phase (encounter and two cruise loads)/working group/teams for the following allocated resources:

    a. Bits to ground - measure of amount of data returned to the ground.
    b. Tracks - measure of amount of data recorded to the tape recorder.
    c. DMS start/stop cycles - number of times the tape recorder is started and stopped.
    d. CDS memory bytes - amount of CDS memory required by the sequence.

3. Identifies conflicting claims for scan platform, spacecraft attitude, record, and real-time modes.

4. Displays the results of model runs and resource usage by the means of line plots, histograms, or tabular output

MIRAGE is maintained by the following members of the Science System Engineering Group (SSEG).

Laura Barnard Software Quality Assurance

Brian Chafin	Cognizant Programmer/Cognizant Engineer
Valerie Henderson	System Engineer
Julio Osornia	System Administrator

1. System Hardware/Software Requirements

MIRAGE executes in a LISP environment on Sun SPARC machines running Solaris 1.0 (or older) and X-Windows, either under Motif or OpenWindows. It may also be run remotely from an IBM compatible or Macintosh. MIRAGE is currently hosted on the SSEG Sparc-20, hostname Donatello, IP address 137.149.127.3. MIRAGE may be run either at the console or remotely from a desktop PC. If running remotely, the user must have a computer equipped with an ethernet connection to the JPL-ILAN, either through the FDDI or the 5S channel, running TCP/IP protocol. Off-lab dial-in connections are not currently supported.

.3.1 SUN

The minimum requirements for running MIRAGE on a Sun-based system is as follows:

SPARC or equivalent
32MB of RAM
40 MB of hard disk
Optional color terminal
At least 60MB of swap space allocated for virtual memory.

1.3.2 Windows 3.1 or Macintosh

Running from a Windows 3.1 or MAC based PC requires a high resolution graphics terminal, and an X terminal server software, such as eXceed/W for Windows and MacX for the Mac. This software sets up the PC display to understand the X terminal display of the host Sun system.

IBM or Compatible

MS-DOS system capable of running Windows 3.1
14" or larger VGA color monitor; 17" or larger preferred.
X-Terminal server software. The SSEG currently supports eXceed/W versions 3.3.3 and 4.0 by Hummingbird Software.
TCP/IP software, such as the TCPIP.EXE that comes with LAN WORKPLACE for DOS.

MAC

System 6.x or 7.x.
14" or larger color monitor; 17" or larger preferred.
X-Terminal server software. The SSEG currently supports MacX.
MACTCP or other TCP enabling software.

1. Packaging

The MIRAGE system is made up of the executable, the Galileo specific adaptation files, and the Lisp environment files. In general, the user will not need to be concerned with the location of the Lisp environment files and adaptation files. A soft-link for all of these files will be setup for each user when their account is created.

.4.1 MIRAGE System Files

The MIRAGE system files are located in the /develop/mirage directory and subdirectories as follows:

The MIRAGE Executable "MIRAGE"

The MIRAGE executable is the 'core' PLAN-IT II program which has been altered for Galileo and is named /develop/mirage/mirage. This is where the basic user interface capabilities are (moving things, changing legends, editing activities, etc.).

The Project File "*.lisp"

This file loads the Galileo specific adaptation files, which add the capabilities that are specific to PAs, OAPels and modeling. This file has the '.lisp' extension and is located in the /sequence/configuration/systems subdirectory. Each user will be set up with a link to the central /sequence/configuration/systems directory that will be under the control of SSEG.

The Legend File "*.legend"

The legend file controls the appearance of the onscreen timeline legend and sets the plot key for each line. The user can change the appearance of the legend to suit their needs (see section 3.2.1).

The Time Systems File "*.time"

The time systems file contains the definitions of the Galilean time systems and epoch definitions. The time system file is usually loaded via a script file (see below).

The Script File "*.script"

The scripts files layout the legend and set up the time system. There will be a separate script file available for each sequence. It is very important that you use the appropriate script file for the sequence you are working on. These files will be under the control of the SIE for that sequence. A directory for each sequence will be created to contain the scripts, delivery area, and merge area. For example, G1 uses the following: /g1/scripts/g1.script

1.4. MIRAGE Data Files "*.data"

As you add or load activities into MIRAGE, they are saved in a MIRAGE internal data format. This file is a plain text file which holds information about all the activities for the sequence. A sequence file is made up of two types of activities: OAPEL-level and PA-level (Profile Activity). OAPEL (Orbit Activity Plan Element) activities, the initial input, will consist of an activity id, start and end times, requestor, team, Working Group (WG), and resource claims. With this level of information MIRAGE will be able to perform resource analysis and estimate CDS byte usage. As the sequence planning progresses, the user will add one or more PAs to each OAPEL activity. With the PA parameters added to the file, MIRAGE will be able to perform more detailed modeling, constraint checks, and resource usage summarizations. MIRAGE can also read/write files containing PAs in the SEQGEN standard SSDF format (*.ssdf).

1.4. Sequence Delivery Directories

Separate directories will be set up for each orbit that will contain the orbit specific configuration files, team delivery files, master data, and report files. These directories are under the control of the SIE for that orbit. As an example, the G1 directory structure is as follows:

/g1/script/	-	G1 script file, legend file, and time system file
/g1/oap/delivery	-	Individual team data files delivered to SIE
/g1/oap/master	-	Master data file, TOLs, and other reports

Examples of the above files may be found in the appendix.

1. Typographical Conventions

< > Indicates particular keys on your keyboard. For example <PgUp>, <Enter>, <Delete> refer to actual keys contained on most IBM keyboards. Because keyboards may vary, your keyboard may not have a particular key, but usually another key or combination of keys will perform the same function. Refer to section 3.3.3 for a listing of common key substitutions.

<LABEL> Indicates a screen control button.

[ ] Indicates where user specific data should be entered. Neither the '[]' symbols nor the actual text contained within should be entered. For example: [filename] means you should enter the actual name of a file where requested.

Menu Commands: EXTRAS/OAPEL COMMAND/CREATE OAPEL
The first entry (EXTRAS) is the menu name found on the main menu bar.
The slashes separate menu options that are found on the sub-menus.

Keyboard Commands: new project release
This indicated the command to be typed into the command pane. Note that most commands can be abbreviated to the first few letters followed by the space bar (command completion). See section 3.3 for more details.

load ssdf...g1oap.ssdf

Many commands require arguments. The ellipsis indicate that you will be prompted for additional information like a file name. In the command pane type the command (string in front of the ellipsis) followed by the <SPACEBAR>. You will then be prompted for the additional information (after the ellipsis).

Mouse Commands:

L-Mouse	- click the left mouse button
R-Mouse	- click the right mouse button
M-Mouse	- click the middle mouse button
<SHIFT> L-Mouse	- Hold the shift key and press the indicated button
<CNTRL> R-Mouse	- Hold the control key and press the button

SETTING UP TO RUN MIRAGE

2. Obtaining a Unix Account

Each user will need an account on Donatello (the SSEG Sun server) and a password. Contact the SSEG System Administrator (Julio Osornia, 393-1230) to obtain an account. When the account is established, the user will have an account in the /home directory and will be able to run MIRAGE from this account.

Each user should also have the following files:

.cshrc	-	This file sets up the environment
.clinit.cl	-	This file may be copied from /sequence/configuration/.clinit.cl.
Systems/	-	Systems subdirectory

2. Installing the X terminal Server

If you are running on a SUN workstation, you may skip this section. The X terminal server software for both PCs and MACs is located on the SSO Novell File Server. If you need access to this server, contact the SSEG System Administrator, Julio Osornia, 393-1230. You must install your TCP/IP software first (see section 2.2.3).

2.2. MacIntosh

MacX is located in the *public/apps-mac/MacX for MIRAGE* folder on the SSO Novell File Server. To install MacX, simply drag the folder to your hard disk.

.2.2 Windows 3.1

The eXceed/W software is located in \public\apps-pc\EXCEED. To install the software, select RUN from the Program Manger. When prompted, enter *\Exceed \ setup.exe*; or use the BROWSE button to point to this file. During installation, the setup routine will prompt you for the following:

Prompt:	**Select:**
Font File:	75DPI
Network Software:	LAN WORKPLACE FOR DOS
Install Local X client?:	This is optional. If you are low on disk space, say no.
Create Windows Group?:	Yes

Once the install routine is finished, you will have a new program group called eXceed 4. Within this group, there are two icons that you will use for running MIRAGE. The eXceed 4 icon actually starts the eXceed Software running in the background, and the TELNET icon will be used to establish a remote session to log onto Donatello.

2.2. What's your IP Address?

Before you can log onto MIRAGE, you must know the IP address of your machine. The IP address is a number in the form: 128.149.92.999, if you are on the 7th floor of building 264, and serves to uniquely identify your machine as a node on the internet. This number is obtained from the System Administrator of the network you are connected to, and entered as part of the installation of the TCP/IP software (MACTCP for MACs, LAN WORKPLACE FOR DOS for IBMs or compatibles). If you are unsure which software you are running, contact your System Administrator.

On a MAC, start the MACTCP software; the IP address will be listed on the first screen. If on an IBM and using LAN WORKPLACE FOR DOS, open the file NET.CFG, which should be located in the NWCLIENT directory. Near the bottom of the file, the IP address used by the machine will be listed.

2. Starting and Exiting MIRAGE

2.3. From Donatello

To start MIRAGE:

1. At the console, logon using your user id and password. Remember that Unix is case-sensitive, so use lowercase.

2. Type: **openwin** and press the <ENTER> key.

3. Click on the console window to make it active and type: **MIRAGE**

4. Load the project file: **new project release**

5. Load the script file: **load script /g1/scripts/g1.script**

To exit MIRAGE:

1. Click on the EXIT button, located at the upper right corner of the display.

2. When you are back at the console window, place the mouse cursor in the title bar of the window, press the right mouse key and select QUIT to quit the open windows.

3. Type: **logout** and press the <ENTER> key.

2.3. From a MAC

To start MIRAGE:

1. Open the MacX folder and double-click the MacX icon

2. Start a MacX session and logon to a SSEG MIRAGE server (donatello, dune, etc.)
using your name and password. (You may use Versaterm or Telnet for your login, but we re

3. Type the following:
   setenv DISPLAY your.ip.address.number:0.0
   e.g. setenv DISPLAY 128.149.92.999:0.0

4. It is a good idea at this point to open a second window that you can use for UNIX
level
   commands. At the donatello prompt type:
   xterm -sb &
   This opens a second window with scroll bars in the background.

5. Type: **mirage**

6. Load the project file: **new project release**

7. Load the script file: **load script /g1/scripts/g1.script**

To exit MIRAGE:

1. Click on the EXIT button, located at the upper right corner of the display.

2. If you have an xterm window, click on the close box in the upper left corner.

3. Type: **logout** and press the <ENTER> key.

2.3. From Windows

To start MIRAGE:

1. Open the eXceed folder and double-click the eXceed icon

2. Double click the TELNET icon. You should see the **login:** prompt

3. Logon to a SSEG MIRAGE server (donatello, dune, etc.) using your name and password.

4. The system may prompt you for a terminal type: enter **VT100**
5. Type the following:

   setenv DISPLAY your.ip.address.number:0.0
   e.g. setenv DISPLAY 128.149.92.999:0.0

6. It is a good idea at this point to open a second window that you can use for UNIX level
   commands. At the donatello prompt type:
   xterm -sb &
   This opens a second window with scroll bars in the background.

7. Type: **mirage**

8. Load the project file: **new project release**

9. Load the script file: **load script /g1/scripts/g1.script**

To exit MIRAGE:

1. Click on the EXIT button, located at the upper right corner of the display.

2. If you have an xterm window, click the close box in the upper left hand corner.

3. Type: **logout** and press the <ENTER> key.

4. Close the TELNET window, and exit the eXceed software by restoring and closing the eXceed window.

2.3. From a Sun Workstation (e.g. POINTER)
To start MIRAGE:

1. Log onto the Sun workstation using your name and password on that system.

2. Type the following: **xhost +**

3. Logon remotely to a SSEG MIRAGE server: **rlogin -l *yourname* donatello**

4. When prompted, enter your password.

5. Type the following:

   setenv DISPLAY your.ip.address.number:0.0
   e.g. setenv DISPLAY 128.149.92.999:0.0

6. Type: **mirage**

7. Load the project file: **new project release**

8. Load the script file: **load script /g1/scripts/g1.script**

To exit MIRAGE:

1. Click on the EXIT button, located at the upper right corner of the display.

2. Type: **logout** and press the <ENTER> key.

3. Logout of the Sun workstation.

MIRAGE INTERFACE BASICS

This section describes the MIRAGE display environment, and command basics.

3. The MIRAGE Display

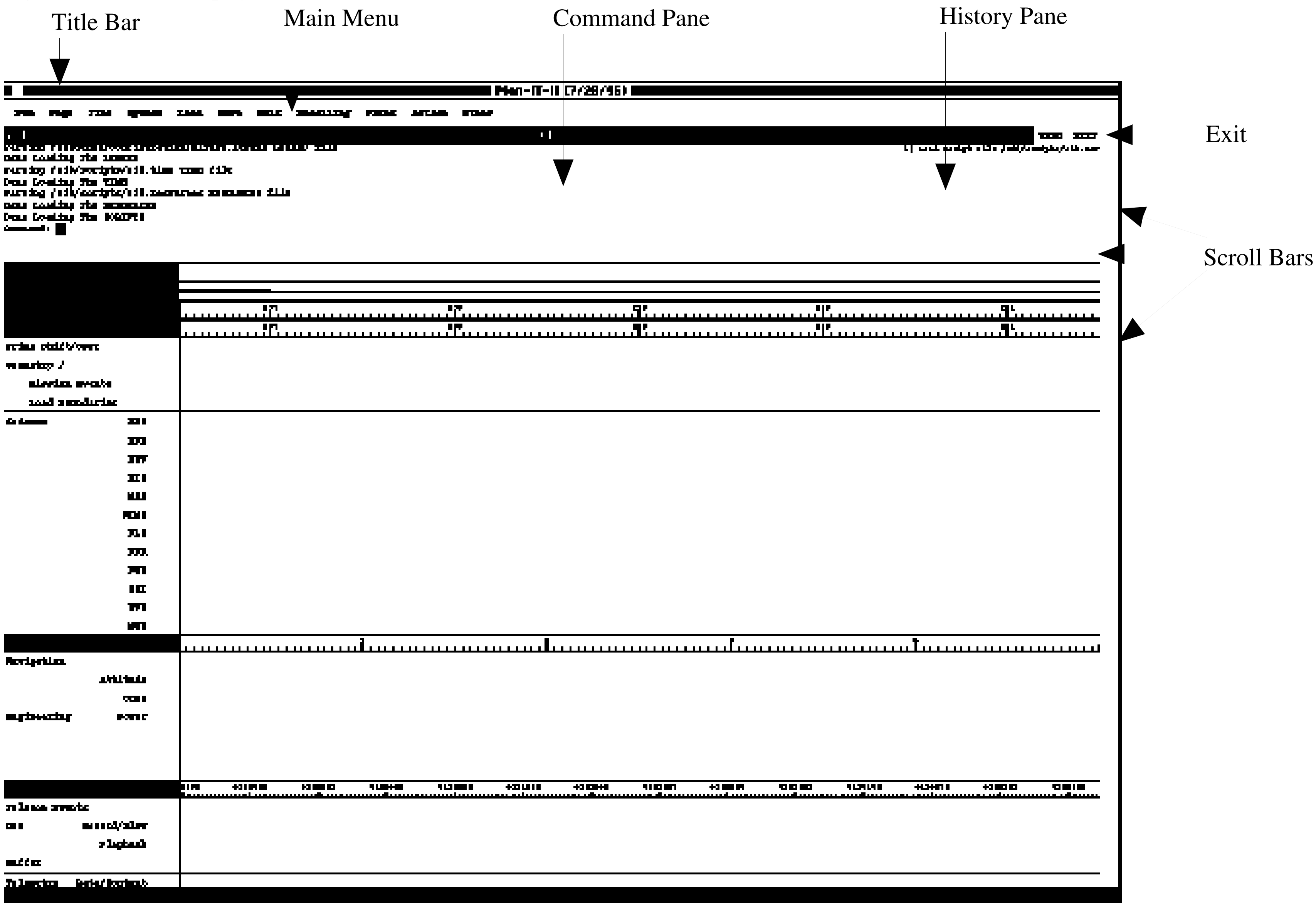
When you run MIRAGE, you will see that your screen is divided into sections or panes (Figure 1). At the top of the display is the main menu bar with 11 menus which will allow you to invoke the commands to manipulate what you will see in the graphical display. Just below the main menu bar, the Title bar contains the following information: The left-most string is the PROJECT TITLE LABEL. The second string shows the total duration of the sequence (e.g.,ALL 65/00:00:00 for 65 days). The fourth string (VIEW) is the amount of time the user is now seeing (e.g. 6/12:00:00 for 6 days 12 hours). The third string states the current time system you are working in (e.g., RELATIVE), and can be changed by clicking the left mouse button. Finally, the fifth string (END) is the end time of the sequence.

Below the title menu bar there are two panes. The larger left pane is the commanding window. The smaller right pane will show a commanding history as you work in the command window. The larger pane at the bottom is the sequence and modeling display area. After loading your data files (section 5.15), the display panes, which graphically represent the sequence you are working on, will appear in this area.

The display also contains two buttons at the top right. They are marked:

UNDO	*Use to "undo" the last thing done*
EXIT	exits MIRAGE

Figure 1 MIRAGE Display



3.1. Command Pane

The larger left pane at the top of the screen is the Command (or status) pane. It provides keyboard interaction with the user. All commands are echoed here. MIRAGE signals it is ready to accept a command by displaying the *Command:* prompt in this pane. You can type in commands, issue them from the pull down menus, or invoke them with the mouse buttons. You can re-submit a command from the Command pane by scrolling back through the command history, highlighting the desired command and pressing **<ENTER>.**

3.1. History Pane

The smaller pane to the right shows the command history as you work in the command window. It saves the history of all regular commands issued; commands are numbered as they are issued. The command history can be saved to a text file (script file) to be used again later for another sequence. Nothing will be listed in this pane if you invoke a command and abort it before completion.

You can re-submit a command from the History pane by scrolling back through the command history, highlighting the desired command, and pressing **<ENTER>.** The history pane is also used to report the results of some commands.

.1.3 Display Work Area

This is the largest pane in the display. Both the activities and resource constraints used for a sequence are represented here. The vertical scroll bar, located along the right side of the display, will allow you to view any vertical portion of the sequence timeline. Horizontal scrolling is accomplished by using the commands in the *PAN* menu in the command/status pane or using the scroll bar located on the line marked "Relative" in the pan pane display area (see Figure 1). The display in this pane may contain the OAPELs and PAs, epoch time markers, model plots, MUB data level, etc. (see 3.1.4).

As you move the mouse around the display, various objects in the display will be highlighted. The default highlight is two horizontal bars above and below the cursor. This helps to identify the legend line you are on. If the mouse is placed over an object, e.g. an OAPEL or PA, the highlight area changes to a box surrounding the object.

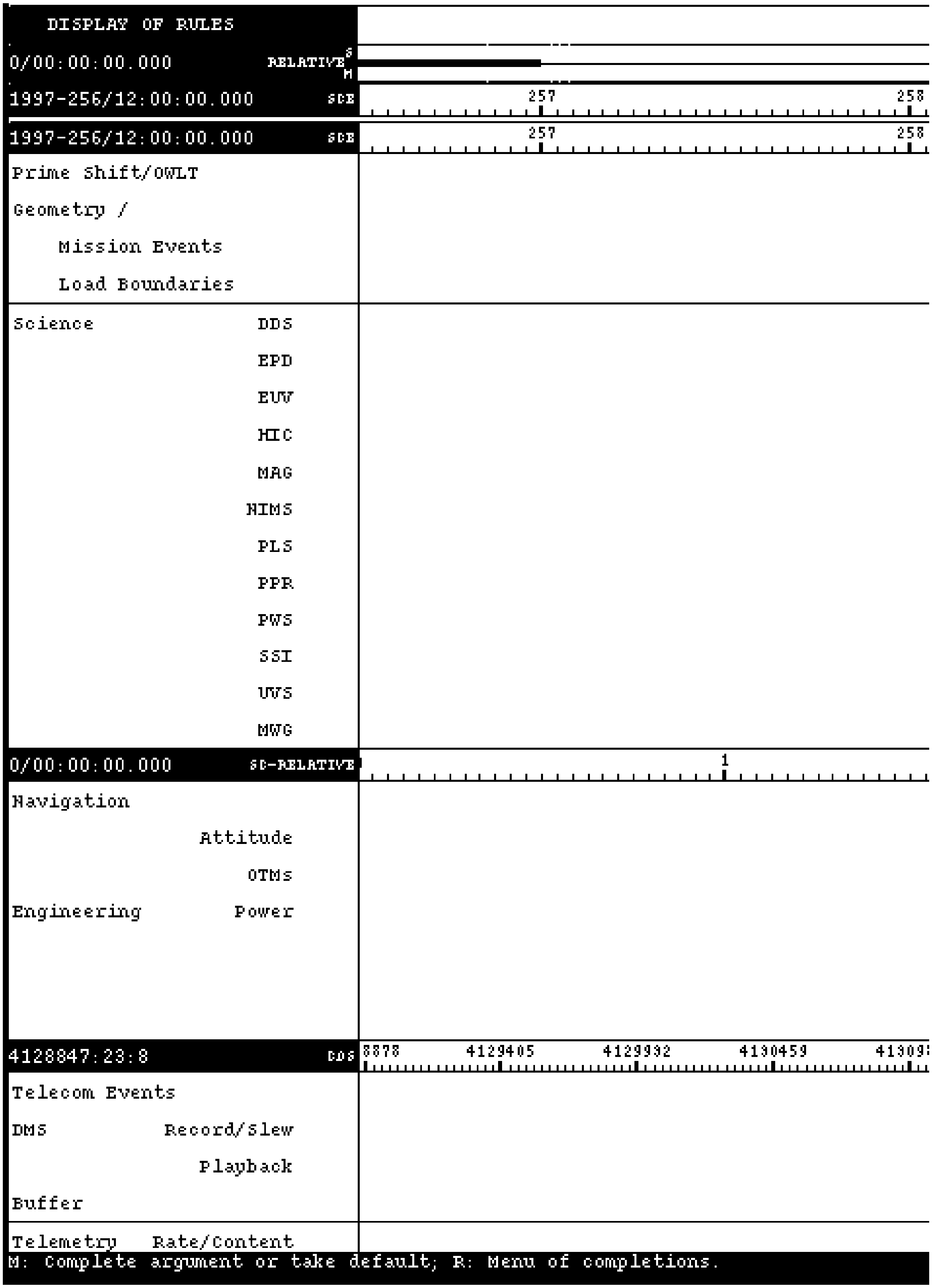
Any items that are highlighted in the display pane are items that can be changed when using mouse invoked commands. A mouse invoked command is one that was called using one of the buttons on the mouse, either alone or with the help of the <ctrl> or <shift> keys. Read through section 3.3.3 for more details.

3.1. The Legend

Along the left side of the sequence display area is the legend. The legend consists of a label, which is displayed on the screen and a plot key, which is an up-to-six character string that tells MIRAGE where to place an activity. The Galileo legend is shown in Figure 2.

Some of the basic categories are: Geometric and Mission Events, Science Instrument, NAV/ENG & Probe, DMS/Downlink/Data Rates, DSN allocations, Buffer Levels/RTE/RTS Formats and Rates, Instrument Select States, Tape State, and Buffer Hi and Lo Watermarks.

Figure 2 MIRAGE Legend



3. Configuring MIRAGE

The MIRAGE software, like its parent software Plan-It II, facilitates manipulation and graphical viewing of various sequence scenarios. One of this software's features is that you can choose to change any number of the display features to suit your needs.

3.2. Changing Legends

To change the existing legend go to **EDIT/LEGEND.** At this menu you can change the width, height, toggle the legend on/off, or reorder the lines in the legend. After makeing the changes you can save the legend that you have created for reuse in a later session by using the **SAVE/LEGEND** command.

To load a previously saved legend use: **Load Legend**
MIRAGE will then prompt you for a file name.

3.2. Zooming and Scaling

By changing the scale, you can change what you see on the screen. To change the scale go to: **TIME MENU/SCALE/SELECT**... If you chose Left scale, the left side of the screen will remain the same, and the rest of the screen will scale itself to what you chose. For example, if you typed in "1/" the scale would change to one day. If you type "12::" it will show 12 hours.

To zoom in or out by a factor of two select **TIME MENU/SCALE/ZOOM In or Out.** To use a different zoom factor select **TIME MENU/SCALE/ZOOM FACTOR** and input your own number.

3.2. Vertical Ruler

An optional vertical ruler may be displayed. The vertical ruler follows the cursor as it is moved around the display. The corresponding time at the ruler's location is shown in the upper right of the title bar. To set a vertical ruler, issue the following command in the Command Pane: **ruler on**. Left click to turn the ruler off and enable further commands.

3. MIRAGE Commands

Commands allow you to interact with the program. You can issue commands to MIRAGE with the mouse, from the keyboard, or from a menu. All commands are echoed to the command pane. As an aid in typing, MIRAGE provides a "command completion" capability, that allows you to type in an abbreviated form of a command. By pressing <SPACEBAR> after the first couple of letters in a word MIRAGE will usually complete the word correctly. E.g., you could type in the command: **New Project**, or you could abbreviate it to: **N <SPACE> P <SPACE>** or **New <SPACE> P <SPACE>**, or anything else that would uniquely identify the command.

MIRAGE also maintains command histories, held in both the command (status) pane and history (action) pane. Each pane holds an aspect of the command history, and you can scroll through the past commands to see what you have done or what you may wish to re-invoke with its arguments.

To type in the command from the keyboard, you must first activate the command pane by clicking on it with the mouse or by being in the MIRAGE window. It is generally safer to use all lowercase as some commands are passed through to the UNIX operating system (which enables flexiability by being case sensitive).

3.3. Aborting Commands

You may abort any partially completed command by typing <*ctrl-z*>. Or, if you haven't hit the <RETURN> key, you may use the <DELETE> key to backspace all the way back to the Command: prompt.

If you need to abort a command already executed (dive dive dive!), hit <*ctrl-meta-z*>. The "meta" key is the diamond key on the SPARC station. On a MAC, try using <*esc*> *and* <*ctrl-z*>, or the <*meta*> key defined by the user in MacX and on the PC use <*ctrl-alt-z*>.

3.3. Command Help

There is a "help" function for commands. Pressing <CTRL><SHIFT>? or the Right Mouse Button will bring up a help screen listing all possible completions to the command and/or its argument(s). Pressing <CTRL><SHIFT>? when prompted for a filename will bring up a file chooser.

3.3. Mouse Command Sets

Along the bottom of the display is the mouse action line (see Figure 1). This line tells you what actions are available to you via the separate mouse buttons: L = left button, M = Middle button, R = right button. In addition, different sets of mouse commands are available by pressing the <SHIFT> or <CTRL> keys and the mouse buttons. The mouse commands are context sensitive, that is, the mouse commands change as you move the mouse around the display.

The following shows the mapping of the UNIX three button mouse/keyboards to other systems.

Button Substitution			
3-button (UNIX)	Left	Middle	Right
2-button (Windows)	Left	Both	Right
1-button (MAC)	Button	Left-Arrow	Right-Arrow

Auxiliary Key			
UNIX	<Shift>	<Control>	Meta ("diamond" key)
Windows	<Shift>	<Control>	<ALT>
MAC	<Shift>	<Control>	Up-Arrow or <ALT><Up-Arrow>

The following table shows the Mouse commands available when the cursor is positioned over the indicated screen objects.

OAPEL/PA Activity Mouse Commands

Left	Redisplay Region
Middle	Show
Right	Edit Activity
Shift-Left	Reposition
Shift-Right	Stretch by Stop
Control-Left	Drag by Start
Control-Middle	Change Color
Control-Right	Drag by Stop
Meta-Left	Reposition
Meta-Middle	Edit Activity
Meta-Right	Change Color

Time Marker Mouse Commands

Middle	Show Epoch
Right	Menu
Control-Middle	Color Change

Scroll Region Mouse Commands

Left	Pan left 1 screen
Middle	Pan to Cursor
Right	Pan right 1 screen
Shift-Left	Pan left 1/2 screen
Shift-Middle	Pan to Time
Shift-Right	Pan right 1/2 screen
Control-Middle	Color Change

Region/Legend Mouse Commands

Left	Redisplay region
Middle	Show Object
Right	Menu
Control-Left	Move Screen top to region
Control-Middle	Move Screen middle to region
Control-Right	Move Screen bottom to region

3. The MIRAGE Menus

There are 11 pull down menus representing a particular category of commands you can access via its menu. To access the menus, click on the menu title in the main title bar. To execute a command, click on that particular command. You will see the command appear in the command pane and if it does not need any further arguments to complete it, it will begin executing once you hit <ENTER>. If it requires argument(s), supply it/them in the command pane and follow by a <ENTER> to start execution. To deactivate a menu, click outside the menu or hit the <ESC> key. Listed below is a brief description of each of the 11 menus. See section 6 for a more complete description.

Pan Contains all commands that horizontally pans the display working area. Allows view to shift in time.

Page Contains all commands that vertically scroll the display working area.

Time Contains all the timing commands allowing for generic time modification. You may change the time scale of the display work area to view more or less of the sequence. You can also add or remove time markers, or select a new time system to work in.

System Contains the MIRAGE configuration commands that allow you to influence the operation

Load Contains all commands to load various file types.

Save Contains all commands for saving file types.

Edit Contains all editing commands.

Modeling Contains all modeling commands.

Print Contains commands that generate various forms of hardcopy (including graphical plots).

Action Contains various advanced activity action commands.

Other Contains miscellaneous strategy, rules, etc commands.

MODELING IN MIRAGE

4. Multi Use Buffer

Modeling the Multi Use Buffer (MUB) is among the most complicated and critical functions of MIRAGE. The MUB is an area reserved in CDS memory which is used as a temporary staging area for the flow of data between the instruments, the DMS and the downlink systems on-board the spacecraft. The multi-use buffer stores raw DMS tape data and RRCC data prior to processing, processed DMS tape, RRCC data prior to downlink, and real time science data (in the form of VCDUs) prior to downlink. Both raw data and processed VCDUs may occupy the buffer at any given time.

4.1. Buffer High and Low Water Marks

The High and Low Water Marks are user selectable buffer fill levels which influence the control of the playback process. When playback is active, the Low Water mark is the level at which the playback process will start bringing in raw data from the tape recorder to the MUB to be sent to be packetized. The High Water Mark is the level at which the playback process will stop transferring data from the tape recorder to the MUB. When High and Low Water Marks are the same, playback is paused. Both the High and Low Water marks are set by the user via the BFRHILO PA. The difference between the High and Low Water marks thus determines how much data is retrieved from the tape in a single gulp.

4.1. Filling the Buffer

Data is sent to the MUB under the following conditions:

1. Data coming from a real-time activity is sent to the MUB after coming from the packetizers (and the VCDU builder) and before being sent to the telemetry output buffer.
2. Raw data from a recorded activity is read off the tape recorder and put in the MUB before being sent to the packetizers for compression (a 'gulp').
3. Processed recorded data (VCDUs) taken from the packetizers is sent to the MUB before being downlinked as playback.
4. When Record Rate Change Coverage is enabled, data in the LPW stream is collected by the CDS and sent to the MUB for downlink.

4.1. Draining the Buffer

Data is taken out (drained) from the MUB under the following conditions:

1. As processed VCDUs are being sent to the telemetry output buffer.
2. When a Buffer Dump to Tape (BFRDUMP) PA is commanded.
3. When raw playback data is sent from the MUB to the packetizers.

4.1. Modeling the Effect of Real Time Activities on the Multi Use Buffer

Real Time data are sent to the instrument-specific reducers, then are processed into VCDUs and placed in the MUB to await downlink. Real Time science activities either issue an RTSFMT PA, or depend upon a previously issued RTSFMT to set the format.

Data is also sent to the MUB via the Record Rate Change Coverage (RRCC) PA. The RRCC is used around encounters to achieve continuous low rate science data. Without this capability data would be lost at each DMS rate change because of runup and rundown on the tape between recorded observations. RRCC is enabled by a pair of RRCC PAs, the first sets RRCC on, the second turns off, or clears the RRCC. If a rate change is commanded when RRCC is enabled, data in the LPW stream will be captured by the CDS into the multi-use buffer for a maximum of 32 minor frames. These data are placed in the RTS data stream, processed, packetized, and placed into VCDUs to await downlink.

4.1. Modeling the Effect of Buffer Dump to Tape on the Multi Use Buffer

During periods where the capacity of the multi-use buffer is exceeded by real-time science data or when the collection rate is higher than the telemetry rate, the MUB may overflow. When overflow is imminent, the contents of the MUB (completed VCDUs only) may be dumped to the tape recorder via the BFRDUMP PA.

4.1. Modeling the Effect of Playback on the MUB

The Playback process is activated by the SCITLM PA (REC_FMT = IPB or RPB). After playback is activated, the CDS autonomously starts reading playback data off the DMS into the MUB when the buffer fill level reaches the low-water mark. This action continues until the buffer fill level reaches the high-water mark. Then the playback of the DMS is stopped, the DMS is rolled back by an amount greater than the amount of tape covered during run-down, and the raw data in the buffer is processed into VCDUs. When the high water mark is set equal to the low water mark (or vice versa) the playback process is paused.

In MIRAGE, the playback function queries the tape map and calculates the amount of data to be played back ('gulp'), determines how long it takes to process and downlink that data, and updates the tape position and MUB contents based on the gulp sizes and contents.

4.1. Modeling the Effect of Telemetry on the MUB

Telemetry activities send data from the on-board buffers into the downlink stream. Telemetry PAs (TLMPLAN) set the telemetry rate and indicate whether fill data is provided.

4.1. User Control of the MUB Level

The user may control the buffer level through the use of a special MIRAGE activity called a MUB_LEVEL activity. This activity, which may be created like a PA (see section 5.4 for details) contains a single parameter, MUB_CHANGE, which allows the user to specify an amount in the range of -100 to 100, reflecting a percentage of the maximum MUB level.

MIRAGE will add (or subtract) the number of bits represented by the value in MUB_CHANGE from the modeled MUB level at the start of the MUB_LEVEL activity. Note that this change is a relative change; adding 50 percent would add 50 percent of the MUB maximum to the modeled level. It would not put the MUB at 50 percent full (unless the MUB started out empty). If the change would drive the MUB level beyond the maximum or minimum MUB levels, MIRAGE will change the level to the corresponding maximum or minimum.

4. Priority Buffer

The Priority Buffer is a 9 VCDU area in CDS memory used for the collection and priority return of real time engineering and OPNAV real time data. Completed VCDUs in the buffer take priority over all other completed VCDUs for downlink.

4. DMS

The majority of science data during the encounter load will be recorded to tape and played back during the two cruise loads. A few observations which are geometry driven and occur outside the encounter phase will also be recorded. For each DMS PA, MIRAGE calculates BTG, DMS start/stop cycles, all track changes, updates DMS state variables, and writes entries in the DMS Map and the Tape Map.

4. Running the Models

Performing all non-playback modeling is a one step process: Run the models by issuing the EXECUTE MODELS command from the menu or from the keyboard. Other commands perform more specific modeling or perform playback modeling. Please see 5.13 for details.

4. How Modeling Results are Displayed

The results of a MUB model run are displayed along the MUB data level plot line, Priority Buffer Level plot lines, RTS RATE, Downlink Rate, and RTE Rate plot lines. Color is used to indicate the percentage of the maximum value of the limit for each line as follows:

Shades of Blue	=	< 25% usage
Green	=	< 50% usage
Yellow, Orange & Brown	=	<100% usage
Red	=	oversubscription

Modeling and status information is displayed in MIRAGE on the legend lines near the bottom of the screen. Appendix 8.1 lists the legend lines and what they measure.

For the status lines displaying states (rather than values), a color bar under the text display is used in the following way to indicate the last state claimed by an OAPEL:

- Green bar - One or more OAPELs are claiming that state

- Red Bar - Two or more OAPELs are claiming conflicting states (Hint: Middle click on the red bar to show the activity ids of the OAPELs in conflict)

4. OAPEL-level Resource Conflict Checking

During periods when two or more activities claim the same resource, a conflict occurs. In order to understand where such conflicts arise in the early planning stages (i.e. before the detailed planning of PAs has been done), MIRAGE will perform OAPEL-level conflict checks for the following spacecraft resources:

- Use of Record
- Use of Scan Platform
- Spin Status

These resource claim fields are part of the OAPEL input form, described in section 5.2.

4. How OAPEL-level Conflict Checking Results are Displayed

The results of the conflict checking for the realtime, record, and scan platform resources are displayed along plot lines which are located towards the bottom of the legend, although they may be moved in the same manner as any other legend lines.These lines are titled:

- OAPEL DMS Use
- OAPEL Platform Use
- OAPEL Spin State

Color is used to indicate the state of the resource for each line as follows (not applicable to Spin State):

White	=	No OAPELs exist during that time period
Blue/gray	=	OAPELs exist, but aren't using the resource
Orange	=	One OAPEL is using the resource
Red	=	Conflict: two or more OAPELs are using the resource

The results of the conflict checking for the spin state resource are displayed along the OAPEL Spin State legend line. A color bar under the text display is used in the following way to indicate the last state claimed by an OAPEL:

Green bar - One OAPEL is claiming that spin state
Red Bar - Conflict: Two or more OAPELs are claiming that spin state (Hint: Middle click on the red bar to show the activity ids of the OAPELs in conflict)

USING MIRAGE

This section describes basic operations with MIRAGE. It is organized in the order that a user may want to perform operations in MIRAGE. Note that in general, MIRAGE has completion capabilities, so pressing <Space> after the first couple of letters in a word will usually complete the word correctly. (E.g., type: N <space> P <space> rel). Pressing <space> will also accept an offered default. Also note that if the you mis-type something and MIRAGE asks you to edit your commands, aborting the command with <Ctrl-z> and retyping it is usually easier than trying to edit it.

5. Starting MIRAGE

1. Start your X terminal Software
2. Log onto Donatello via TELNET, Versaterm, MacX, etc.
3. Windows: Term = **vt100**
4. If running from a PC: **setenv DISPLAY ipaddress: 0.0**
5. Start MIRAGE: **mirage**
6. Load the project file: **new project release**
7. Load the script file: **load script /g1/scripts/g1.script** (g1 only)

At this point you have initialized MIRAGE with the appropriate project, legend, and time systems files, and you should see the MIRAGE display (see also section 3.1).

5.1. Miscellaneous (But Useful) Commands

- If you can not see all of the legend use: **Edit/legend/change width**
  The default width is 179 but 225 works well with certain fonts.

- Set vertical ruler on: **ruler on**
  (Note that the ruler must be turned off by clicking the left mouse button before any other commands can be used)

- Use SYSTEM/CONFIGURATION/TIME and DURATION SNAP to set an invisible time grid tha will control the movement of the vertical ruler, and the placement of activities via a copy or move command.

- Change scale: **left scale** /12:00:00 This sets the display to 12 hours, or
  Time/scale/zoom in (or out). This zooms by a factor of two.

- Use <Control> <Shift> ? to give help information on valid commands and arguments.

- You can also use the command pane by highlighting a past command and clicking. This will re-issue that command.

- Whenever you are asked to supply a file name, you can access the UNIX file chooser by pressing: <Control> <Shift> ?

- Clicking the middle mouse button while the mouse is on an object will show information about that object in the command pane. Clicking the right button will edit the object.

- Set up to be able to find activities by their PSID: **unique id**..id <ENTER>

- To refresh the screen, you can use System/Redisplay.

- If you need to start over, issue the INITIALIZE SYSTEM command. This will re-initialize the system, deleting the data files et al. A pop-up window will appear stating "Leave definitions for this problem domain in Plan-IT-II?", and you should click yes. You will then need to reload the script.

- To quickly edit a field in an activity, use the EDIT/ACTIVITY/EDIT SLOT command. After selecting the OAPEL or PA with the mouse, you can type in the name of the specific field to edit, and a single window will popup for just that field.

- To kill a process in UNIX, type **ps -aux** in the UNIX command line to get the process number.

5.1. Moving around the screen

- Highlight the "Relative" bar and then hit the left mouse button and you will move the viewing screen in increments to the left. Hitting the right mouse will move in increments to the right. The increments are defined by the view scale that you have chosen (i.e. 12 hour view will move in 12 hour increments, etc.). Highlighting the "Relative" bar and clicking the middle mouse will move the scroll bar to the cursor's position.

- The "Pan" command will move you later in time or durations (Menu to choose from).

- System/Redisplay will refresh your screen after several changes.

- To find an activity use PAN/TO SOMETHING/UNIQUE ID, and enter the activity id or PSID of the desired object. Make sure you have entered the command: unique id..id <ENTER>.

5. Create OAPEL

The Create OAPEL command will add a new OAPEL to the data file. When you issue this command, you will first be prompted for the legend line to place the new activity, then the OAPEL input form will be displayed, allowing you to enter the OAPEL fields. This command is found on the EXTRAS menu, under CREATE OAPEL. Note: in order to see both OAPELs and PAs on the screen, you need to issue the following command: System/Show Hide/Display composite activities - <ENTER>.

1. **Menu:** EDIT/CREATE OAPEL
   Keyboard: Create OAPEL

2. *Where do you want it plotted?*
   Click the mouse on the desired legend line.

3. Hit the R-mouse or <RETURN> key to input command.

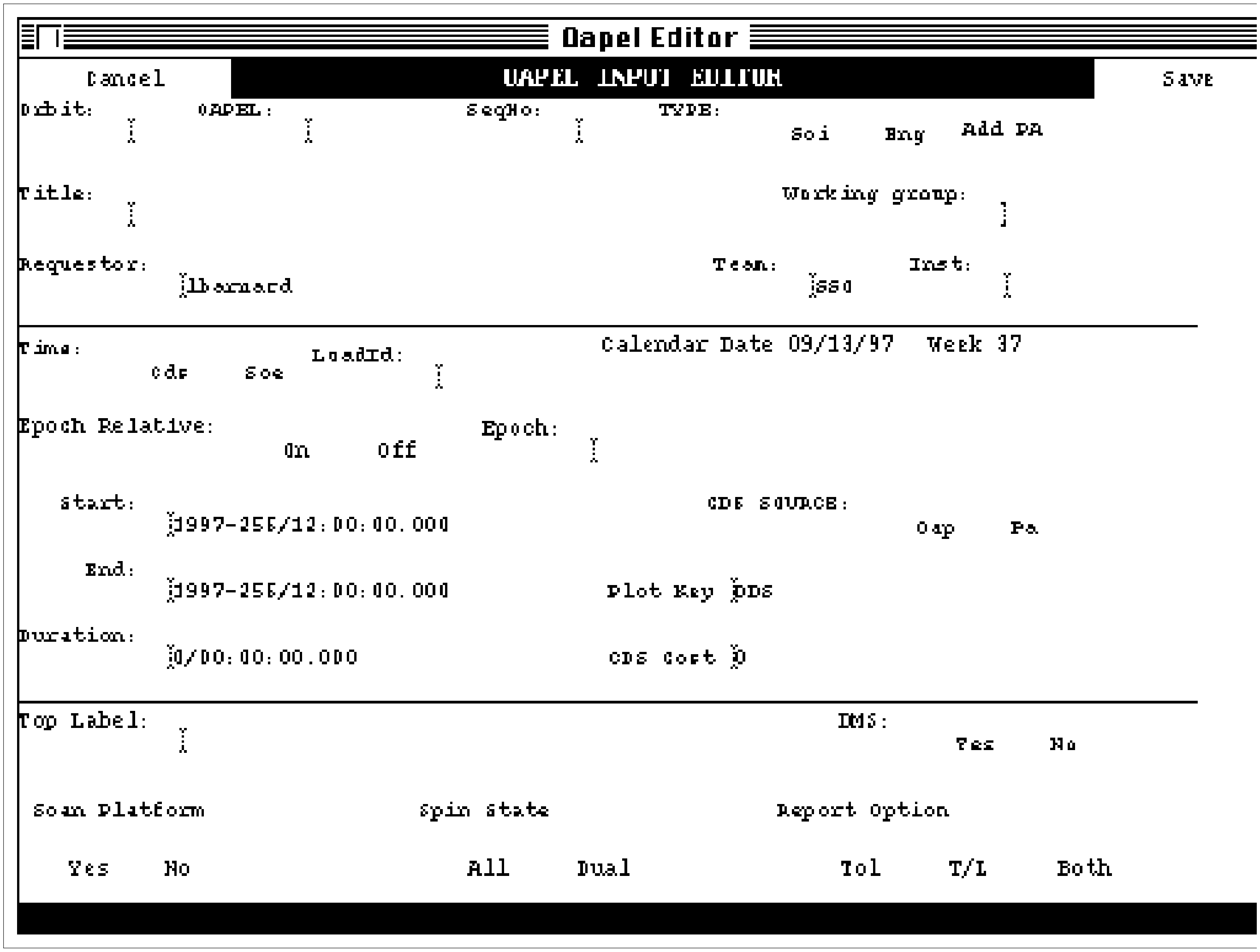
4. The OAPEL input form will be displayed (see Figure 3). Immediately hit <TAB> to position the cursor in the first input field (orbit) and start typing.

   Use <TAB> to move from field to field, except in the Observation and Design Detail, where you must click the mouse to get to another field.

You can resize the window by dragging the lower right corner to show more of the form.

5. The CANCEL and SAVE buttons are located on the upper left and upper right corners. You must SAVE the OAPEL when you are done.

Figure 3 OAPEL Editor



5.2.1 Activity ID Usage

The activity id is a 13 character string that is used as the unique key for each activity (the term activity and OAPEL are used interchangeably). There are two types of activities: Science and Engineering. They are distinguishable by how the activity id is parsed, and the value in the TYPE field (SCI or ENG).

A Science activity id has the following sub-parts:

Activity ID: Science - 13 characters

Orbit	-	2 Char
Target	-	1 Char
Instrument	-	1 Char
OAPEL	-	6 Char
SEQuence No	-	2 Char
Multi Flag	-	1 Char

An Engineering activity id has the following sub-parts:

Activity ID: Engineering - 13 characters

Orbit	-	2 Char
OAPEL	-	8 Char
SEQuence No	-	3 Char

MIRAGE determines whether an activity is of science or engineering type based on the name of the team input at the OAPEL Editor screen as follows:

Science (TYPE = SCI')
RSSG, FPSG, MWG, SSI, NIMS, UVS, EUV, PPR, PLS, EPD, HIC, DDS, MAG, RS, NAV

Engineering (TYPE = ENG')
All other choices

This distinction is important when printing a Sequence Time-Ordered Listing (see appendix). MIRAGE lists the Activity ID under the Activity Column for Science records, but lists the TOPLABEL for ENG records.

5.2.2 Adding PAs to an OAPEL

You can add one or more PAs to an OAPEL while you are editing the form by clicking the ADD PA near the middle of the form. When you click this button you will be presented with a list of PAs from which you can choose. Please note that this method only adds the name of the PA, not any of its' attributes. We recommend that you keep the "Show PA Editor" toggle in the ON position, (EDIT/SHOW PA EDITOR AFTER ADD) because then the "Activity Editor" for the PAs come up with each addition. You can tell that the toggle is on by the presence of asterisks in front of the ADD PA button, and around the Project Title in the upper left of the screen.

To Add PAs to an OAPEL:

1. Click on the ADD PA button on the OAPEL Form.
2. Select the desired PA from the list by highlighting and clicking on the name.
3. Repeat until all PAs have been selected.
4. Select <SAVE> on the OAPEL form.
5. Put in the relative offset of the OAPEL. The default is to start the PAs at the same time as the OAPI
6. If the Toggle Editor is on, there will be an input screen after each addition. You fill in the fields by tabbing, and you "Accept" when you are done. The next PA will pop up asking for "relative offset", and steps 5 and 6 will be repeated until all of the PAs selected are attached.

Adding PAs to an OAPEL will create a graph that is difficult to see because all of the PAs plot on top of the selected OAPEL. To change this you need to complete two different steps that will spread out the text so that it is readable. These two steps are:

1. **Edit/Legend/Change Region Height/Select Region**
   The default pixel is 18 and you should change the pixels to 40 or greater in value.

2. **Edit/Activity/Region Plot/Select Region**
   The default is "sinewave" hit <RETURN>.

5. Edit OAPEL

1. EDIT/OAPEL EDITOR Keyboard: EDIT OAPEL
2. Click on the desired OAPEL and press the right mouse button, or <ENTER>.
   (For a Mac, highlight the OAPEL with the cursor and then click the L-mouse button).
3. Edit the information in the OAPEL Form and press SAVE or CANCEL button.
4. If the times were edited, you may need to scroll the display to see the changed duration.

5. Create PA

This command adds a single PA to the file without attaching it to an OAPEL.

1. EDIT/CREATE PA
   Keyboard: Create PA [PA_NAME]
2. Fill in the desired information into the fields (Name, PA, give a start time, a duration, and select a legend line while creating it before editing).
3. Click on ACCEPT or ABORT when done.

5. Edit PA

1. EDIT/PA EDITOR Keyboard: PA EDITOR
2. Click on the desired PA and press the right mouse button, or <ENTER>.
   (Mac = L-mouse)
3. Edit the information in the PA Form and press ACCEPT or ABORT button.
4. If the times were edited, you may need to scroll the display to see the changed duration.

5. Lengthen/Shorten Activity with Mouse

1. EDIT/ACTIVITY/ STRETCH START (or STOP) Keyboard: "Stretch by start " or "stretch by stop".
2. Click on activity.
3. Press <ENTER> or click right mouse button.(Mac = L-mouse)
4. A vertical ruler line will appear; position the ruler with the mouse to the desired time using the time display as a guide.
5. Click the mouse. The Start/End time of the activity will be immediately changed.

5. Move Activity with Mouse

1. EDIT/ACTIVITY/DRAG BY START (or STOP)
   Keyboard: "Drag by Start" or "Drag by Stop" or <SHIFT> Right Mouse Button.
2. Click on activity
3. <ENTER> or Right Mouse.(Mac = L-mouse)
4. A vertical ruler line will appear; position the ruler with the mouse to the desired time using the time display as a guide.
5. Click the mouse. The Start/End time of the activity will be immediately changed.

5. Finding Activities

1. In the command window type: unique id..id <ENTER>.
2. Menu command: PAN/TO SOMETHING/UNIQUE ID
3. Enter the Activity ID or PA name of the desired activity, or:
   PAN/PAN TO NEXT ACTIVITY or,
   PAN/PAN TO NEXT TYPE...OAPEL (or PA name)

MIRAGE will scroll the display to the start time of the activity, if found.

5. Deleting Activities

Deleting an Activity: **EDIT/REMOVE ACTIVITY**
*Activity?*Click on the OAPEL or PA you wish to delete.
Delete?<RETURN> or R-mouse button.

5. Showing Activities

Highlight the activity with the mouse and press the middle button. Information about the activity will be scrolled in the command pane. You can use this technique to show information about any activity on the screen, epoch markers, conflict bars, etc.

5. Copying Activities

1. Coping an activity: **EDIT/COPY ACTIVITY**

2. *Connatation?* (Later/Earlier/Every/) Use the R-mouse to bring up your options and hit <RETURN>. MIRAGE will ask you for the default start, relative to the start time of the original OAPEL (or end time if that is what you chose).
   Start Offset? Enter number of hours or minutes.
   Input OAPEL Name: Enter the name of the new OAPEL. <RETURN>.

5. Browsing/Quick Editing Activities

The MIRAGE Browser allows the user access to the data fields in a spreadsheet like format. In this format the user may click on and edit any field visible in the Browser window (Figure 3). Once set up, the Browser window is a separate window which may be closed or minimized like any other X-Window. Setting up the Browser window requires you to select the activities to browse (FILTER), then arrange the columns, and finally to show the Browse window as follows:

1. EDIT/BROWSER/FILTER ACTIVITIES

2. At the prompt type: **none**

3. Next a selection option popup will appear which will allow you to specify the activity type, timespan and/or plotkeys to browse.

   Activity types may be either OAPEL, or the name(s) of the PAs, separated by commas if entering more than one.

   Timespan is the time interval to browse. This is defaulted to the start and end of the display.

   Plotkey may be any valid legend plotkey, separated by commas if entering more than one.

   For example, to view all OAPELs in the sequence, keep the time interval as listed, and type **OAPEL** in the TYPE field. Once this step is done, go to #4.

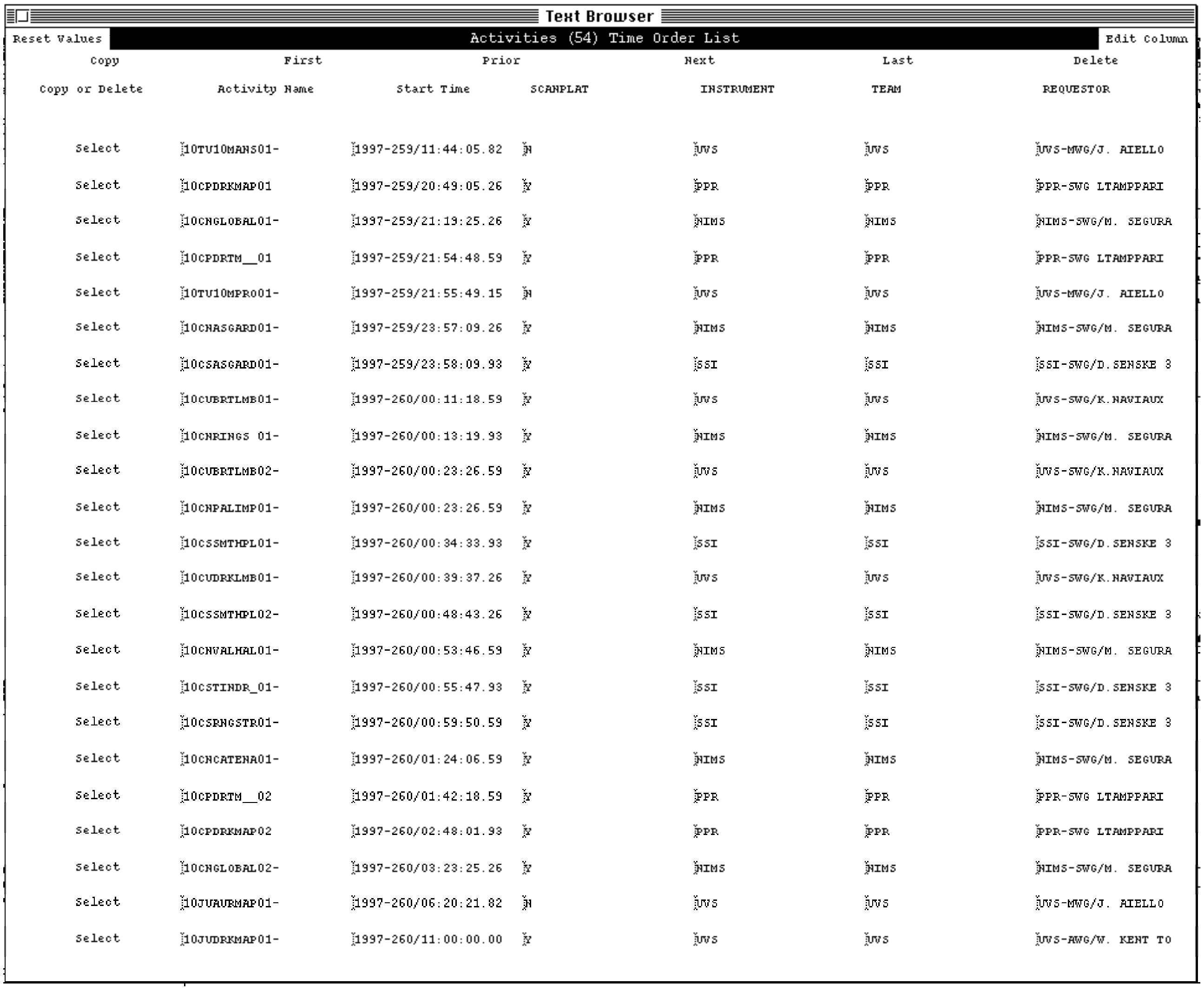
4. EDIT/BROWSER/ARRANGE COLUMNS

5. Next a field selection option popup will appear allowing you to select the individual fields to browse. Clicking on several fields performs multiple selects.

6. Finally, show the Browser by selecting EDIT/BROWSER/BROWSE ACTIVITIES. This step may take several seconds to minutes while MIRAGE is gathering the activities to be shown.

   The Browser Window offers both horizontal and vertical scroll bars. The user may click on any fields and type to edit. At the upper left corner is the RESET VALUES button which acts as an UNDO (one level). At the upper right corner a EDIT COL button allows to to select a field for a global replace. Note that your edits are not saved until you return to the EDIT menu and select **ACCEPT TOL EDITS.** To close the BROWSER, right button click on the title bar and select CLOSE.

Figure 5 Browser screen



Text Browser

Reset Values | Activities (54) Time Order List | Edit Column

Copy | First | Prior | Next | Last | Delete

Copy or Delete	Activity Name	Start Time	SCANPLAT	INSTRUMENT	TEAM	REQUESTOR
Select	10TU10MANS01-	1997-259/11:44:05.82	N	UVS	UVS	UVS-MWG/J. AIELLO
Select	10CPDRKMAP01	1997-259/20:49:05.26	Y	PPR	PPR	PPR-SWG LTAMPPARI
Select	10CNGLOBAL01-	1997-259/21:19:25.26	Y	NIMS	NIMS	NIMS-SWG/M. SEGURA
Select	10CPDRTM__01	1997-259/21:54:48.59	Y	PPR	PPR	PPR-SWG LTAMPPARI
Select	10TU10MPRO01-	1997-259/21:55:49.15	N	UVS	UVS	UVS-MWG/J. AIELLO
Select	10CNASGARD01-	1997-259/23:57:09.26	Y	NIMS	NIMS	NIMS-SWG/M. SEGURA
Select	10CSASGARD01-	1997-259/23:58:09.93	Y	SSI	SSI	SSI-SWG/D.SENSKE 3
Select	10CUBRTLMB01-	1997-260/00:11:18.59	Y	UVS	UVS	UVS-SWG/K.NAVIAUX
Select	10CNRINGS 01-	1997-260/00:13:19.93	Y	NIMS	NIMS	NIMS-SWG/M. SEGURA
Select	10CUBRTLMB02-	1997-260/00:23:26.59	Y	UVS	UVS	UVS-SWG/K.NAVIAUX
Select	10CNPALIMP01-	1997-260/00:23:26.59	Y	NIMS	NIMS	NIMS-SWG/M. SEGURA
Select	10CSSMTHPL01-	1997-260/00:34:33.93	Y	SSI	SSI	SSI-SWG/D.SENSKE 3
Select	10CUDRKLMB01-	1997-260/00:39:37.26	Y	UVS	UVS	UVS-SWG/K.NAVIAUX
Select	10CSSMTHPL02-	1997-260/00:48:43.26	Y	SSI	SSI	SSI-SWG/D.SENSKE 3
Select	10CNVALHAL01-	1997-260/00:53:46.59	Y	NIMS	NIMS	NIMS-SWG/M. SEGURA
Select	10CSTINDR_01-	1997-260/00:55:47.93	Y	SSI	SSI	SSI-SWG/D.SENSKE 3
Select	10CSRNGSTR01-	1997-260/00:59:50.59	Y	SSI	SSI	SSI-SWG/D.SENSKE 3
Select	10CNCATENA01-	1997-260/01:24:06.59	Y	NIMS	NIMS	NIMS-SWG/M. SEGURA
Select	10CPDRTM__02	1997-260/01:42:18.59	Y	PPR	PPR	PPR-SWG LTAMPPARI
Select	10CPDRKMAP02	1997-260/02:48:01.93	Y	PPR	PPR	PPR-SWG LTAMPPARI
Select	10CNGLOBAL02-	1997-260/03:23:25.26	Y	NIMS	NIMS	NIMS-SWG/M. SEGURA
Select	10JUAURMAP01-	1997-260/06:20:21.82	N	UVS	UVS	UVS-MWG/J. AIELLO
Select	10JUDRKMAP01-	1997-260/11:00:00.00	Y	UVS	UVS	UVS-AWG/W. KENT TO

5. Running the Models

Run the models from the following menu command: MODELING/EXECUTE MODELING RUN or in the command window type: **execute models.** Scroll down the display to see the results. Below is a brief description of each of the types of models that can be run after the first model command.

5.13.1 Execute Models

This command performs all non-playback modeling. Any MUB, RTS, or DMS related report can be printed after the command is executed. The "Quick MUB Update" and "Quick DMS Model" commands perform subsets of this model.

5.13.2 Quick MUB Update

This command performs a subset of MUB and RTS calculations. “Execute models” must have been run at least once before this command is run. Only changes, additions, or deletions in OPTRTM (and the real-time calls by OPTREC), RTSFMT, RTEFMT, NIMSRTS, and UVFLUSH are modeled by this command.

5.13.3 Quick DMS Model

This command allows for complete non-playback modeling of the DMS without running the "Execute Models" command. To get any real-time modeling,"Execute Models" must be run. After "Quick DMS Model" is run, any DMS related report can be printed.

5.13.4 Model Playback Data Select

This command models all of the data selected by the instrument teams for playback. “Execute Models” must be run before this command. The reports "PBT Report", "Playback Plan", and "Playback by Activity" can be run after this command is executed.

5.13.5 Generate PBINFO Data/Load PBINFO File

The “Generate PBINFO Data” command determines the amount of downlink available for playback for each TLMPLAN in a period of active playback. The “Load PBINFO FILE” command creates the same information by loading it in from a file which had been previously saved out with the "Save PBINFO File" command. This data is only necessary for modeling playback schedules. Since this command can take a long time (up to several hours) to execute, it is recommended, when possible, to use a saved file. A saved file is valid when no RTS, RTE, OPNAV, or TLMPLAN has changed during a period of active playback since the PBINFO file was created. For instance, a PBINFO file created during a SEQ merge can be used by the playback coordinator until the next merge.

5.13.6 Model Playback Schedule

This command models when all the playback data comes down. "Execute Models" and "Model Playback Data Select" must have been run first. In addition, the PBINFO data must have been created in some manner, either by generating or loading the file (See 5.13.5). After this command is executed, the"Playback Schedule by Activity", "Playback Schedule by Single", "Playback MBTG Summary", and "Autonomous Fill Report" can be run, and the Playback and Autonomous Fill sections of the "MBTG Overview" report will be accurate. This command seems to take 20 - 30 minutes to run on Donatello with no other significant processes running. This command also creates the gulps saved by "Save Gulp List".

5.13.7 Create RECFMT SINGLEs

This command creates a RECFMT single for every record for each pass in the PBT. It also deletes any existing RECFMT SINGLEs. Model Playback Data Select should be run again if you choose to create RECFMT singles.

5.13.8 SEGMENT

This command creates soft BEGSEG and ENDSEG singles to segment the Playback Table (PBT) appropriately.

5. Save Files

Save Files allows you to save data in various file formats, including a MIRAGE data file (“SAVE DATA” command), or in an SSDF format (“SAVE SSDF” commands) that can be read into SEQGEN. In addition, MIRAGE has the capability to save subsets of the data depending on the user's name, working group or team affiliation (“SAVE PERMITTED SUBSET’ command), as well as saving all subsets by using the “SAVE ALL SUBSETS” command. This capability allows team members to load a merged sequence file, perform modeling and conflict checks with the entire file, play what-if games with all activities in the file to develop a strategy for resolving conflicts or generating activities and then save only those activities accessible to the user in a file which can be re-delivered. This is accomplished through the use of the SAVE/SUBSET command, a system level permissions file (under the control of the Sequence Team) and the Requestor field in the OAPEL and

PA parameters. In addition to this, the “SAVE PBT SSDF” saves only playback singles and sorts them in pass-time order.

5.14. Permission File

Access to activities (for saving data) is controlled by a system permissions file. This file contains the following information:

login name, list of teams, list of working groups, requestor name;

For example:

```
ebarbini,NIMS,RSSG,E. BARBINIS;
knaviaux,EUV UVS,AWG MWG SWG RSSG,K.Naviaux;
cpolansk,DDS MAG,MWG FPSG,C POLANSKEY;
jhui,NIMS,AWG SWG RSSG,J. Hui;
jkaufman,SSI,AWG SWG RSSG,JKAUFMAN;
```

In the first example, ebarbini can save any activity that contains NIMS and RSSG in the Requestor field. The permissions file is under the control of the Sequence Team. Requests for changes must be made through them.

5.14. Requestor Field

The requestor field should contain the following information: TEAM WG NAME

TEAM	-	Science team, SEQ, or NAV
WG	-	AWG, MWG, SWG, FPSG, RSSG, or SEQ team subgroup
NAME	-	First initial and last name of the requestor

This information is used by the SAVE SUBSET command to determine what activities can be saved by the user, as well as modeling resource usage.

5.14. Saving Subsets

1. SAVE/SAVE PERMITTED SUBSET

2. You will be prompted for TEAM, WG, and PERSON. You may enter a value for one, two or all three of these parameters. The combination of these three taken together determine which data will be saved, and how the resultant data file will be named.

   Enter the Team whose data you wish to save. You must enter a team that is listed in the permissions file for your name, or blank to ignore team. The team parameter can be any science team, SEQ, or NONE.

   Enter the WG to use as part of the filtering criteria, or blank to ignore WG. The WG parameter can be AWG, MWG, SWG, FPSG, RSSG, or NONE.

   Enter the PERSON parameter to select all the data belonging to the user. The person parameter can be Y, Yes, N, or NO. Enter Y to use the name as part of the filtering criteria, or N to ignore name. The name is pulled from the last field of the permissions file and must match at least part of the REQUESTOR field.

3. The data which meets all of the above selection criteria (i.e. the selected team, WG, and name appear in not, will not be saved.

File names are generated according to the following rules.

orbit# team wg.date.data

g2.941110.data	No team or WG specified
g2uvs.941110.data	No WG specified
g2uvsawg.941110.data	Team, WG both specified
g2awg.941110.data	Only WG specified

If the PERSON parameter is Y, the file is saved to the user's home directory. If the PERSON parameter is N and the team is given, the file is saved in the /work/team (e.g. /work/uvs) directory. If the PERSON parameter is N and no team is given, the file is saved in the /work/wg (e.g. /work/swg) directory.

5. Load Files

5.15. MIRAGE Data file (.data)

1. Menu Command: Load/Data

2. *Filename?* Type in complete file name **OR** you can access the UNIX file chooser by pressing: <Control> <Shift> ?

3. Hit Return to complete the command.

5.15. SSDF (Sequence Data Files)

This command loads in PAs, and attaches them to the existing OAPEL if available. Be sure you have loaded the OAPEL files in first before loading an SSDF.

1. LOAD/LOAD SSDF Keyboard: Load SSDF

2. *Replace?* Yes/No
   If "Yes", PAs attaching to an OAPEL will replace any PAs already attached to that OAPEL with the same PSID.

3. *Filename?* Type in complete path and file name and hit the spacebar; Mirage will then request a path name for the error file {error file}. PSIDs of PAs that cannot be loaded from the ssdf will then be placed in the error file. You must have read/write capability for the directory that you choose for the error file or you will get a command error.

4. *Error file?* Type in complete path and file name for the error file {error file}.

5. Printing

The MIRAGE Print Menu prints Time Ordered Listings, CDS Reports, Tape Maps, Model Plots, and a variety of other reports (See Section 6.1 for additional options). In general, MIRAGE sends the output to an electronic file. The user must then go to a UNIX command window and type: **lpr..name of file** or **Enscript-r...name of file**. Lpr should be used for postscript files and portrait text files. Enscript should be used for landscape text files. This will then print your file to the Donatello printer. Hint: Several reports now have the capability to be viewed on-screen before printing {*echo-to-screen?* "Yes"} or printed directly to the printer {*echo-to-printer?* "Yes"}.

- **OAPEL Form** Sends a single OAPEL or multiple OAPELS to poscript file.
  Option? (Single/Team;/Working Group/From Browser/All)
  Echo-to-printer? (Yes/No)
  filename? This makes the poscript file. MIRAGE will attach the actid of the OAPEL at the end.
  Select an OAPEL Select the OAPEL you wish to print.

- **Science TOL** Sends the Science Time Ordered Listing to a postscript file.
  From Browser (Yes/No) Default is No.
  filename? This makes the portrait text file.

- **Sequence TOL** Sends the Sequence Time Ordered Listing to a postscript file.
  From Browser (Yes/No) Default is No.
  filename? This makes the landscape text file.

- **Screendump** Screen prints directly to the printer. Please note that the cursor will change to a crosshair (+), but you just hit <RETURN>.

- **Single Model Plot** Sends a single page of modeling runs to postscript files.

- **Multiple Model Plots** Prints multiple postscript modeling files.

- **Save/Summary** MIRAGE creates a summary that you can select which activities you wish to review.
  Filename? This makes the landscape text file.
  Choose type Type of activity you wish to review.(Troubled Activities,

- **Single Page Timeline** One page of timeline is saved as a postscript file.
  Orientation? (Landscape/Portrait)
  Where do you want the legend? (Left/Right)
  Default Time? Hit <Return> for the whole page.
  File Path Name? This makes the poscript file.

- **Several Page Timelines** This saves a whole sequence in a series of one page plots in multiple postscript files.
  Orientation? (Landscape/Portrait)
  Where do you want the legend? (Left/Right)
  Default Time? Hit <Return> for the whole page.
  File Path Name? This makes the poscript file.

- **Text Reports** (See section 8.4).

MIRAGE MENUS

6.1 PAN Menu

Pan Left	Pan one screen to the left
Pan Half Left	Pan one half screen to the left
Pan Back By	Pan left by a specified duration amount

Pan To Prior Activity	Pan to start with first prior activity
Pan to Prior Type	Pan to start with first prior activityif specified type
Pan to Prior Conflict	Pan to start with first prior activity conflict
Pan Right	Pan right by one viewscreen
Pan Half Right	Pan right by one half viewscreen
Pan Forward By	Pan right by a specified duration amount
Pan to Next Activity	Pan to start of the next activity
Pan to Next Type	Pan to start of the next activity of specific type
Pan to Next Conflict	Pan to start of the next activity conflict
To Time	Pan to specified time
Center at Time	Pan so as to center the specific time
Unique ID	Pan to start with activity of specific unique id
Object	Pan to start with specified object

6.2 PAGE Menu

Scroll Up	**Vertically position one view screen**
Scroll Up by Half	**Vertically position one half view screen**
Scroll to Top	**Move to top of view screen**
Scroll Down	**Vertically position one view screen down**
Scroll Down by Half	**Vertically position one half view screen down**
Scroll to Bottom	**Move to bottom of view screen**
Y-Coordinate	**Position view screen at specified coordinate**
Top Position	**Move to the top of view screen**
Center About Position	**Position view screen centering at specified coordinates**
Bottom Position	**Position view screen to end at specified coordinate**
Region to Top	**Position view screen to start at region**
Center Region	**Position view screen centering on region**
Region to Region	**Position view screen to end at region**

6.3 TIME Menu

Left Scale	Change view screen's time span,keeping the start the same
Center Scale	Change view screen's time span,about the mid-point
Right Scale	Change view screen's time span,keeping the end time the same
Scale	Change view screen's time span and position
Zoom In	Decrease the viewscreen's timespan bya factor of two
Zoom Out	Increase the viewscreen's timespan by a factor of two
Zoom Factor	Change view screen's timespan by a specified factor
Select Time System	Pick new default time system
New Resolution	Change the resolution of Plan-IT-II
Ruler On	Make a vertical ruler to follow the mouse temporarily
Add Time Marker	Add a new time epoch
Remove Time Marker	Remove a time epoch

6.4 System Menu

Redisplay		Refresh the view screen
Toggle Pan Display View		
Clear Interaction Pane		Remove visible history of interacti
Initialize System		Clear data out and start over
New Project		Load in problem domain adaption
Project Title		Change the title of the Plan-IT-II r
Show/Hide	Display Composite Activites	Always display composite activitie
	Display Parent Activites	Always display "parent" activities
	Display Children Activites	Always display "children" activiti
	Display Deleted Activities	Display deleted activities as plots t
	Show Object	Textually show any Plan-IT-II obj
	Show Parent	Textually show the parent of an ac
	Show varying Slot	Show slot that varies over time
Display/Color	Color Capability	Turn color on/off for a whole disp
	Change Color	Change color of something
	Invert Video	Invert video display
	Foreground Color	Changes text color
	Background Color	Changes background color
	Text Size	Change text size
	Assign Constraint	Define color coding of constraints
Activity	Unique Identifier Slot	
	Alternate Name	
	Display Attributes	
	Maximum Detail Spread	
	Intelligent Detailing	
	Kind of Search	
Configuration	Toggle Command Beep Confirmation	Command completion beeping
	Edit Mode	Change editability of slots within t
	Show Mode	Change how the slots are shown wi activities
	Unit Show	Change order of showing how acti impact consuming type of constra
	Display Follows Plan-It Moves	Have display follow Plan-IT as it p scheduling
	Time and Duration Snap	Make mouse and time/duration inp grid
	Remove Time and Duration snap	Remove time/duration grid
Garbage Collection	Turn Garbage Collector Off	Allow memory fragmentation
	Turn Garbage Collector On	Prevent memory fragmentation
	Force Garbage Collection	Remove memory fragmentation...N

6.5 LOAD Menu

Data File	Load in a Plan-IT-II data file
Load SSDF	Load a file in SSDF format
Load OAPLINK	Load an OAPLINK file
Load Tape Map	Load a tape map file
Load PBINFO File	Load a PBINFO file
Load Permissions File	Load a permissions file
Load TOL PAs	Load last of PA types to include inTOL
Merge File	Load in a data file

Script	Load in a script/batch file
Legend	Load or swap in a legend file
Time	Load in a time system specification file
OWLT	Load in the one-way light time file
SCLK/SCET	Load the SCLK/SCET coefficient file
Resources	Load in the resource constraint file
Rules	Load in a rule file
New PBT	Delete all current singles and load in a new data file

6.6 SAVE Menu

Data File	Save one or more Plan-IT-II data files
Save OAPLINK	Save OAPLINK readable file
Save Tape Map	Save MIRAGE tape map for reading into MIRAGE or PBT Editor
Save PBINFO File	Save a playback information file
Save OAPELs	Save a data file containing only OAPELs
Save permitted subset of data	Save all data for team/wg/user id that a particular person is allowed to save
Save all subsets of data	Save all data into separate team and wg files
Save MUB in delimited file	Save the MUB level into a comma delimited file
Save Priority Buffer	Save the Priority Buffer data in a file
Save Downlink in delimited file	Save theDownlink (D/L) data into a comma delimited file
Save RTS in delimited file	Save RTS rates into comma delimited file
Save TapeTIC in delimited file	Save the tape TIC position into a comma delimited file
Save TapeTRACK in delimited file	Save the tape TRACK position into a comma delimited file
Save PAs to an SSDF	Save all PAs to a SSDF formatted file
Save DMS PAs to an SSDF	Save all DMS only PAs to a SSDF formatted file
Save Non-DMS PAs to an SSDF	Save all Non-DMS only PAs to a SSDF formatted file
Save RTMRF	Save the Real-Time Mode Request File
Script	Save a script file
Legend	Save out a legend file
Time	Save out a time system specification file
Resources	Save out the resource constraint's conditions
Rules	Save out a rule file
Summary	Save a Plan-IT-II summary
Save PBT singles to an SSDF	Save Playback Table singles to an SSDF formatted file
Save Gulp List	Saves the details of each gulp modeled by the playback schedule model to a comma-delimited file
Save AQQC-SEF-File	Saves an SEF file for input into the AQQC system

6.7 EDIT Menu

Create an OAPEL	Create and edit an OAPEL
OAPEL Editor	Edit an OAPEL
Check/Change OAPEL times vs PA Times	Make sure OAPEL time frame contains all PAs
Edit Oapel timing without impacting its PA components	Change OAPEL timing without moving PAs
View/Edit Objective or Design Fields	
Toggle OAPLINK file warnings On/Of	
Activity	
Edit Activity	Edit an activity
Reposition Vertically	Move activity vertically within the display
Region Plot	Reposition activities within a region
Stretch Start	Change the activity's start time via the mouse
Stretch Stop	Change the activity's stop time via the mouse
Drag Start	Move the activity's start time via the mouse
Drag Stop	Move the activity's stop time via the mouse
Edit Slot	Edit an activity's slot
Edit Parameter list or array element	Edit an activity's table element
Change Table Size in use	Change an activity's table allocation
Browser	
Browse Activities	Show time ordered list
Filter Activities	Collect activities for TOL/Editing
Arrange Columns	Influence what is displayed in TOL
Accept TOL Edits	Take acceptable changes from TOL Browser
Group	
Build Group	Construct a group of activities
Dissolve Group	Disband a group of activities
Restore Group	Re-unite all activities into their old group
Show Group	Highlight all activities that are a member of this group
Composite	
Build Composite	Unite activities under a composite activity
Add Components	Add independent activities as components to a componer
Free a Component	Make one child component independent of its componer
Free All Components	Make children components independent of its componen
Legend	
Substitute Activity	Convert regions into activity plotting regions
Toggle Legend (on/off)	Turn the legend on or off from the display
Change Width of Legend	Change the width of the legend
Add Region	Add a new region after another region
Remove Region	Remove a plotting region from the legend
Change Region Height	Change the height of a plotting region
Place Region in New Location	Move region to follow another region
Exchange Two Regions Position	Exchange two display region's location
Name	Change the label of a region
Plot Key	Change the plot key of a region
Create a PA	Same as "Instantiate Type"
PA Editor	Invoke the activity editor

Show PA Editor after Add (On/Off)	On/Off Toggle; On = editor pops up after creating a PA
Copy Activity	Make a copy of any activity
Remove Activity	Delete an activity

6.8 Modeling Menu

Execute Modeling Run	Run models
Quick MUB Update	Update MUB model after changes
Quick DMS Model	Models the DMS without modeling playback or MUB activ after PAs have been changed
Histogram View	Histogram display of consumable / non-consumable constraints
Gauge View	Fuel gauge display of consumable constraints
Interpolate Consummables	Interpolate between changes of consumable constraints
Label Consumption Constraints	Label usage of consumable / non-consumable constraints
Link Resource Plots	Allows multiple plots to be displayed on one line
Unlink Resource Plots	Resets resource plots
Calculate Total BTG	Calculates the total BTG available for an orbit
Calculate Total RTE	Calculates the total RTE sent to ground
Generate PBINFO Data	Calculates all of the playback information
Create RECFMT Singles	Deletes all RECFMT singles and creates new ones
Model Playback Data Select	Models the data selected by the current set of playback sing
Model Playback Schedule	Models when and if selected playback data comes down

6.9 Print Menu

OAPEL Form	Print one or more OAPEL forms to a file(s)
Science TOL	Print a Science TOL to a file
Sequence TOL	Print a Sequence TOL to file
Screendump	Perform a screendump of the screen
Single Model Plot	Generate single plot of a consumption-based constraint
Multiple Model Plots	Generate multiple plots of a consumption-based constrain
Single Page Timeline	Generate a single page timeline plot
Several Page Timelines	Generate multiple page activity timeline plots
Print Extended Byte Report	Print report of all PAs and associated CDS bytes to a file, printer, or screen.
Print DMS Map	Print detailed report of all record activities to a file, printe screen.
Print Byte Report	Print bytes by team, wg, and load to a file, printer, or scree
Print Tape Map	Print report of all record activities to a file, printer, or scre
Print Tape Usage Summary	Print summary of team/wg data on tape to a file, printer, screen.
Print RTS MBTG	Print summary by team/wg of RTS MBTG to a file, printe screen.
Print Resources by Activity	Print resource usage for each OAPEL to a file, printer, or screen.
Print MBTG Overview	Print summary of telemetry usage to a file, printer, or scre
Print Autonomous Fill Report	Print report of all cases of autonomous fill to a file, printe screen.
Print Tape Accounting Summary	Print summary by team/wg tape charges to a file, printer, screen.
Print Playback MBTG Summary	Printsummary by team/wg of MBTG for playback to a file printer, or screen.
Print PBT Report	Print summary of PBT singles to a file, printer, or screen.
Print Playback Plan	Print summary by record activity of the requested playbac file, printer, or screen.
Print Playback by Activity	Print summary by team/wg activity to a file, printer, or scr
Print Playback Schedule by Single	Print schedule for downlinking each single to a file, printe screen.
Print Playback Schedule by Activity	Print schedule for downlinking each activity to a file, prin screen.

6.10 Action Menu

Create	Unstantiate
Activity Action	Invoke a scheduling action on an activity
Parent Action	Invoke a scheduling
Monitor	Track an activity's impact on the constraints
Unmonitor	Remove an activity's impact on the constraints
Delete	Remove an activity from a sequence
Undelete	Restore a deleted activity back into the sequence
Freeze	Don't allow Plan-IT to modify an activity on its own
Thaw	Give Plan-IT permission to modify an activity on its own
Adjust	Adjust the slot values within an activity
Consider	Change activity's impact to its constraints
Scouting	Search for a better spot in the sequence for an activity
Change	Change various attributes of an activity
Duplicate	Duplicate an activity
Illustrate children	Highlight all components of an activity
Detail	Go to finer amount of detail within an activity
Abstract	Reduce to a finer amount of detail within an activity
Move	Move an activity around within its temporal specifications
Shift	Move an activity around within its local temporal specifications
Shrink	Reduce the duration of an activity
Expand	Increase the duration of an activity
Decrease Cyclic Scope	
Increase Cyclic Scope	
Create Looper	Not applicable.

6.11 OTHER Menu

Mouse Edits	Stretch About Center	Change the activity's start and stop time via the mou
	Drag Center	Move the activity's center time via the mouse
Rules	Number of Rule Violations	Count of rule violations
	Change Rule Violation Status	Change the waivered status of a rule violation
	Run Rules	Check for rule violation
More	Comment to Script	Insert a comment within the script
	Generate Mediators	Merge temporally contiguous conflicts and classify
	Kill Mediators	Remove conflict classifications structure
Strategy	Run Strategy from strategy string	Execute a new strategy
	New Strategy	Create a new strategy
	Execute Strategy by Name	Execute an existing strategy
	Group Strategies	Build a serial group of strategy
Constraint	Defer	Turn off selected constraints
	Activate	Turn on selected constraints
	All Constraints	Turn off/on selected constraints
	Conflict Consideration	Influence which constraints to consider in conflicts
	Search Considerations	Influence which constraints to consider during searc
	Masking	Filter how constraints display their information
	Display Operation	Change how constraints update their display increm
	Display Mode	Change the display of consummables / non-consum constraints
	Normal View	Most basic display of consummables / non-consuma constraints
	Fix Limits	Fix the plotting usage / height of consummables / n consummables constraint
Scope	Search (global restriction)	Influence search globally
	Segment Sequence (strategy)	Influence strategy execution by segmenting sequen temporally
	Sequence Splicing	Influence strategy execution by splicing sequence t
Dangerous	Slot Dependencies	Break slot dependencies
	Step Temporal Relationships	Break step timing

7. TIPS, TRICKS & TROUBLESHOOTING

7.1 Open Two Windows

Whenever you logon to donatello and start MIRAGE from a MAC or PC, the MIRAGE process takes over the window; once MIRAGE has started, you cannot get back to the command window until you exit MIRAGE (if you are on a Sun workstation, you just need to click on the backround with the mouse button to bring up another command window). Therefore it is always a good idea to give yourself a second command window (called xterm window) from which you can run MIRAGE, and use the first window to issue UNIX commands such as print, ls, as well as to kill processes if you need to (see section 7.2).

You must start the xterm window BEFORE you start Mirage, but after you type the setenv DISPLAY. At the UNIX command line, type the following:

xterm &

This will bring up a second window that runs in the background (i.e. only becomes active when you click on it).

To bring up an xterm window with scroll bars type:
xterm -sb &

You may also set up Mirage MacX or eXceed with the capability to run an xterm. Check the documentation for details.

To close the xterm window, click on the close box at the upper left hand corner.

7.2 Killing a process

If Mirage gets stuck for some reason, and you cannot get the prompt back, or you lose the network connection and you have a Mirage session still running, you will have to end the Mirage process with the ‘kill’ command. Type the following at a Unix prompt (if you did not open an xterm window as suggested in the above section, you will have to log on on another machine, or through a separate telnet session):

ps -aux

This will give you a listing of all processes running (see figure below).

```
donatello {21} ps -aux
USER       PID %CPU %MEM   SZ  RSS TT STAT START  TIME COMMAND
aallbaug  5850 90.7 23.83355632916 pd R    12:06  45:22 /develop/mirage/release/
bchafin   4633 19.7  4.139324 5608 p5 S    08:43 105:57 /develop/mirage/mirage -
bchafin   4495  0.0  0.8 4160 1052 p3 S    07:37   1:07 /develop/mirage/emacs/bi
kspelts   5115  0.0  0.032616    0 p9 IW   10:14  20:01 mirage
vhenders  6405  0.0  0.1   32  196 q0 S    14:02   0:00 mirage
```

The second column is the process id. Find the one with your user name and ‘mirage’ in the command column.

Type: **kill -9 pid**

This will kill the process. For example, to kill vhenders mirage process, I would type: kill -9 6405
To shorten the list, you may want to print just the jobs that have the string ‘mirage’ embedded in it, or your userid, as follows (the vertical bar is the ‘pipe’ character, usually found on the ‘\’ key):

ps -aux | grep mirage

ps -aux | grep vhenders

7.3 Where are my printouts?

When you log onto donatello, the default print device ('lp') is the printer in the SIWR that is physically connected to donatello. These printer defaults are environment variable and are set in your .login file. The following is an excerpt of a .login file:

```
#
# set environment variables
#
setenv XAPPLRESDIR /local/app-defaults
setenv LASERPRINTER lp
setenv PS_PRINTER lp
setenv PRINTER lp
```

'lp' is the name for the default printer on donatello, which is the printer directly connected to donatello. Other printer queues have been set up on donatello that direct print jobs to printers on the 7th or 5th floor.

To redirect printout to printers on the 7th floor, you need to change 'lp' to 'lp723'.

```
setenv LASERPRINTER lp723
setenv PS_PRINTER lp723
setenv PRINTER lp723
```

To redirect printout to the 570 printer on the 5th floor, you need to change 'lp' to 'lp570'.

```
donatello /home/vhenders {40}cat /home/jmorris/570
setenv LASERPRINTER lp570
setenv PS_PRINTER lp570
setenv PRINTER lp570
```

You may either type these commands in at the prompt, or you may put these commands in a file and execute them, or you may change your .login to make them permanent.

There are 3 files in /sequence/scripts that contain the above commands: 723, 570 and 570j. If you want to redirect the printer to one of these printers, copy the appropriate file to your home directory. To execute the file, use the *source* command:

```
source 723
```

This resets the environment variables as noted above.

To make this change permanent, you will need to edit your .login script. Note that if you change your .login file, you must either log out and log back in, or source .login to effect the changes.

7.4 Exiting from the LISP Compiler

In case you ever find yourself at the LISP compiler, here is how you exit:

?exit

You will then be prompted to exit Lisp, type 'Y'.

7.5 New Phase 2A Common Problems

- A common human error that has been seen is adding a track parameter to the PAs. Please do not put a number in unless it is needed, and never put in a zero.

- Please be extremely cautious when text editing your data files by hand. This is the most common human error that delays the planning process.

- Do not set the PREV_RATE or NEXT_RATE in your PA unless you are sure that the previous or next file is set as well.

- You must have at least 1 SEGBNDRY PA to get any accounting reports. If you do not all of the reports will be zero.

- The following rules for avoiding playback problems have been compiled by ad hoc groups. Please see the SSO Rules Document to further research playback issues of this kind.

3.7 Continuous Search Avoidance / Flight Rule 06C90 shall be implemented as follows:

(1) For DMS start-ups or speed changes
- *Always use SCITREC/SCITLM PAs (except for BDT)*
- *Always put RECFMT in same minor frame as RECORD START TIME*
- *Exceptions:*
- *one minor frame later for BDT (and maybe for LNR, LPU, LPW)*
    - *at previous PBT entry time for BPT*

(2) For format changes with no DMS speed change
- *Always use SCITLM*
- *Put RECFMT in same minor frame as 6TMREC*

(3) For DMS stops or speed changes
- *Entries are allowed in same minor frame as RECORD STOP TIME*
- *No entries after RECORD STOP TIME*
- *No entries in the 2 minor frames preceeding RECORD STOP TIME*

(4) No entries between RECORD STOP TIME and next RECFMT

(5) During a BPT, no entries earlier than TBD (RECORD START TIME +3mf)

Rationale: This implementation is designed so that knowledge of previous entries will not be required when making PBT entries for a particular observation (except for BPT entries) and so that deselects can be entered after the last minor frame of valid data.

5.10 Gaps Between Images

When two images are adjacent to each other on the tape, there must be a gap of at least one tic between the recorded data for the two images that contain data that cannot be confused with data from either image. (Prepare cycle data or data from a previous orbit are OK).

To implement this:

(1) When CAMEL moves the tape after an observation, it shall leave the tape at the same place it would have been following a normal rundown from the observation.

(2) When the record plan calls for cutoff of data flow to the DMS in the middle of an SSI readout cycle, a deselect shall be placed in the PBT at this point.

Rationale: If this rule is not followed, one or both images could be lost in playback. Item (2) uses a deselect to deal with a situation in which there is no easy way to provide the "gap".

8 APPENDIX

8.1 Modeling and Status Legend Lines

Modeling and status information is displayed on the following legend lines:

Sequence Load	-	Load A, Load B, or Load C.
MUB Data Level	-	Fill level of the MUB in bits
UV Bursts	-	Average EUV/UVS MUB input rate between bursts.
RRCC Rate	-	RRCC MUB input rate.
PRI Buffer Level	-	Fill level of the Priority Buffer in bits
Down Link Rate	-	Downlink rate from the TLMPLAN PA in bps
Fill Status	-	Whether fill is set to NORM or FILL.
RTS Data Rate	-	Rate from the RTSFMT and OPTRTM PAs in bps
RTS Format	-	Format requested in the RTSFMT PA
RTE Data Rate	-	Rate from the RTEFMT and OPTRTM PA in bps
RTE Format	-	Format requested in the RTSFMT PA
AACS RTS Select State	-	Whether instrument is selected for RTS or deselected
DDS RTS Select State	-	Whether instrument is selected for RTS or deselected
ENG RTE Select State	-	Whether instrument is selected for RTE or deselected
EPD RTS Select State	-	Whether instrument is selected for RTS or deselected
EUV RTS Select State	-	Whether instrument is selected for RTS or deselected
HIC RTS Select State	-	Whether instrument is selected for RTS or deselected
MAG RTS Select State	-	Whether instrument is selected for RTS or deselected
NIMS RTS Select State	-	Whether instrument is selected for RTS or deselected
PLS RTS Select State	-	Whether instrument is selected for RTS or deselected
PWS RTS Select State	-	Whether instrument is selected for RTS or deselected
UVS RTS Select State	-	Whether instrument is selected for RTS/RTE or deselected
AACS Record Select State	-	Whether instrument is selected for record or deselected
BDT Record Select State	-	Whether instrument is selected for record or deselected
DDS Record Select State	-	Whether instrument is selected for record or deselected
ENG Record Select State	-	Whether instrument is selected for record or deselected
EPD Record Select State	-	Whether instrument is selected for record or deselected
EUV Record Select State	-	Whether instrument is selected for record or deselected
HIC Record Select State	-	Whether instrument is selected for record or deselected
MAG Record Select State	-	Whether instrument is selected for record or deselected
NIMS Record Select State	-	Whether instrument is selected for record or deselected
PLS Record Select State	-	Whether instrument is selected for record or deselected
PPR1 Record Select State	-	Whether instrument is selected for record or deselected
PPR3 Record Select State	-	Whether instrument is selected for record or deselected
PWS Record Select State	-	Whether instrument is selected for record or deselected
SSI Record Select State	-	Whether instrument is selected for record or deselected
UVS Record Select State	-	Whether instrument is selected for record or deselected
Record Format	-	Current format from the SCIREC/SCITLM PA
Tape State	-	Record, ready, slew, playback, runup, etc
Tic Position	-	Tic position of tape.
Track Position	-	Track position of tape.
Tape Rate	-	Tape rate in bps.
High Water Mark	-	High water level from the BUFHILO PA in bits
Low Water Mark	-	Low water level from the BUFHILO PA in bits
OAPEL DMS Use	-	Whether an OAPEL claims the DMS
OAPEL Platform Use	-	Whether an OAPEL claims the scan platform
OAPEL Spin State	-	What spin state the OAPEL desires

8.2 Required PA Parameters

The MIRAGE internal file structure will mimic a SEQGEN Standard Sequence Data File (SSDF) containing Profile Activities (PAs). Each PA is comprised of a set of lists and sublists of parameter values. Certain parameters must be filled in for certain modeling functions; however, MIRAGE will not require that all parameters are filled in. MIRAGE will base its modeling on what is present in the sequence file and will model to the best of its ability given the level of detail in the file. The following is a list of all PAs and the fields which are required by MIRAGE for modeling. This list does not include fields required for CDS byte counting or start time determination.

PA	PARAMETERS	MODEL
AACSMODE	TRAN_OPT	Spin State
ALSPINSP		No modeling
ARRAY		No modeling
BFRDUMP	PAUSE_PB	Playback modeling
	SLEW_DMS	Tape position modeling
	GOTO_TRACK	If SLEW_DMS = TRUE
	GOTO_TIC	If SLEW_DMS = TRUE
	RESUME_PB	Playback modeling
	SET_RECFMT	Optional, DMS Format modeling
BFRHILO	HIGH_LVL	Playback modeling
	LOW_LVL	Playback modeling
CALLOC	NONE	No modeling
CANVU	NONE	No modeling
CDUSNR	NONE	No modeling
CLKSYSID	DATA_RATE	RTE modeling
	RECORD	Tape Map modeling
	REWIND	Tape position modeling
CMDMRO	DATA_RATE	RTE modeling
CMDRS	NONE	No modeling
CMDSP	NONE	No modeling
COMMENT	NONE	No modeling
CSMOS	NONE	No modeling
DELTDOR	NONE	No modeling
DIPLEX	NONE	No modeling
DLKCAP	BIT_RATE	Downlink capability modeling
DLMODI	NONE	No modeling
DMSCNTRL	FUNCTIONS	DMS modeling
	TRACK	If FUNCTION = SLWDUR, DMS position modeling
	FINAL_TIC	If FUNCTION = SLWTIC, DMS position modeling
	REWIND	If FUNCTION = SLWTIC,DMS position modeling
DMSMRO	TRACK	DMS position modeling
	TAPE_REPOS	DMS position modeling
	DELTA_TICS	DMS position modeling
EPDCNTR	NONE	No modeling
EPDLOAD	NONE	No modeling
EPDMODE	NONE	No modeling
EPDSAFE	NONE	No modeling
EUVCLR	NONE	No modeling
EUVCMD	NONE	No modeling
FAPEVENT	NONE	No modeling

PA	PARAMETERS	MODEL
GALLOC	NONE	No modeling
GEOEVENT	NONE	No modeling
GLDVU	NONE	No modeling
GREVNT	NONE	No modeling
HICCMD	HIC_TLM_ST	HIC/EUV modeling
INITRS	NONE	No modeling

LOOPER	NONE	No modeling
MADVU	NONE	No modeling
MAGCNFG	NONE	No modeling
MAGSLEW	NONE	No modeling
MAGSNAP	NONE	No modeling
MALLOC	NONE	No modeling
MEMLOAD	NONE	No modeling
MORTOR	NONE	No modeling
NGLLEVT	NONE	No modeling
NIMSINIT	NONE	No modeling
NIMSRTS	WL_PER_CYC	RTS Modeling
	INST_MODE	RTS Modeling
	MIR_BLK1	RTS Modeling
	MIR_BLK2	RTS Modeling
	CXCPRIM	If INST_MODE = “RC”, RTS modeling
NIMSTAB	NONE	No modeling
NOAH	NONE	No modeling
OBSRV	NONE	No modeling
OPTREC	DDS_STATUS	Tape Map modeling
	EPD_STATUS	Tape Map modeling
	EUV_STATUS	Tape Map modeling
	HIC_STATUS	Tape Map modeling
	PLS_STATUS	Tape Map modeling
OPTRTM	AACS_STATUS	RTS modeling
	ENGR_STATUS	RTE modeling
	DDS_STATUS	RTS modeling
	EPD_STATUS	RTS modeling
	EUV_STATUS	RTS modeling
	HIC_STATUS	RTS modeling
	MAG_STATUS	RTS modeling
	NIMS_STATUS	RTS modeling
	PLS_STATUS	RTS modeling
	PWS_STATUS	RTS modeling
	UVS_STATUS	RTS modeling
OWLT	NONE	No modeling
PCINIT	NONE	Spin state modeling
PCREST	NONE	Spin state modeling
PLSCMD	NONE	No modeling
PLSLOAD	NONE	No modeling
PLSMODE	NONE	No modeling
PLSTBUP	NONE	No modeling
PWSCMD	NONE	No modeling
PWSICT	NONE	No modeling
QT	NONE	No modeling
RADHTR	NONE	No modeling

PA	PARAMETERS	MODEL
RECORD	REWIND	Tape position modeling
	REC_DUR	Tape state modeling
	MODE_RATE	Tape Map modeling
RFSCHG	NONE	No modeling
RRCC	SET_OR_CLR	RRCC modeling
	RRCC_DUR	RRCC modeling
RSCIENCE1	NONE	No modeling
RTEFMT	ENG_FMT	RTE modeling
RTSFMT	SCI_FMT	RTS modeling
SCIMRO	DATA_RATE	RTE modeling
SCIREC	MODE_RATE	Tape Map modeling
SCITLM	REC_FMT	Tape Map modeling
	BPT_RATE / If REC_FMT=BPT,	Tape Map modeling
SEGBNDRY	NONE	Mission Phase modeling
SITURN	DATA_RATE	RTE modeling
SLRCON	NONE	No modeling
SMOS	NONE	No modeling
SSI	NONE	No modeling
STHAND	NONE	No modeling
SWANT	NONE	No modeling
SWRCVR	NONE	No modeling
SWRNG	NONE	No modeling
SWTLMS	NONE	No modeling
SWTLMX	NONE	No modeling
SWTXR	NONE	No modeling
SXDOP	NONE	No modeling
TARGET	NONE	No modeling
TCMWNDW	DATA_RATE	RTE modeling
THRSFLUSH	NONE	No modeling
THRWNDW	NONE	No modeling
TLMCNTRL	NONE	No modeling
TLMFILL	NONE	No modeling
TLMGEN	NONE	No modeling
TLMPLAN	TLM_FILL	Downlink modeling
	TLM_RATE	Downlink modeling
TRANSIT	NONE	No modeling
UCLAIM	NONE	No modeling
UTILITY	NONE	No modeling
VCOCAL	NONE	No modeling
VECTSTR	NONE	No modeling
BEGSEG	PASS	Playback modeling
DESELC	PASS	Playback modeling
ENDSEG	PASS	Playback modeling
NIMPBK	WRK_GRP	Playback modeling
	CMPR_DVSR	Playback modeling
	PASS	Playback modeling

PA	PARAMETERS	MODEL
PWSPBK	WRK_GRP	Playback modeling
	CMPR_DVSR	Playback modeling
	PASS	Playback modeling
RECFMT	REC_FMT	Playback modeling
	PASS	Playback modeling
SELECT	WRK_GRP	Playback modeling
	CMPR_DVSR	Playback modeling
	PASS	Playback modeling
SSIBRC	WRK_GRP	Playback modeling
	CMPR_DVSR	Playback modeling
	PASS	Playback modeling
SSIHUF	WRK_GRP	Playback modeling
	CMPR_DVSR	Playback modeling
	PASS	Playback modeling
SSIICT	WRK_GRP	Playback modeling
	CMPR_DVSR	Playback modeling
	PASS	Playback modeling

8.3 MIRAGE System Files

The following are examples of the MIRAGE System/Configuration files. These examples are taken from the /g2/scripts directory on Donatello. These are plain text files, which may be editied by the knowledgeable user to customize the MIRAGE environment and behaviour. Note that the system versions of these files that are in the /nn/scripts directory is under the control of the SIE for that sequence. However, users may copy these files to their own areas for their own use (;;; is the comment character).

8.3.1 Script File

This script file loads in the G2 sequence legend, time systems and resources file. The file also contains the modeling-related commands (interpolate/histogram-view) that set up the legend lines to show the modeling results. Note that these commands refer to the MIRAGE internal ID number for the legend line (all MIRAGE objects from activities to legend lines have an internal ID number). Whenever a new binary is created for MIRAGE (as a result of compilation) the ID numbers of the legend line may change.

```
;;; -*- Mode: Common-Lisp; Package: Apgen -*-
;;This is a script file of the actions done in Apgen
(COM-LOAD-LEGEND #p"/sequence/configuration/mirage.legend")
(COM-LOAD-TIME #p"/g2/scripts/g2.time")
(com-select-time-system sce)
(setf *sequence* 'G2)
(setf *pbcap_list* nil)
(setf *start_tic* 200.0)
(setf *start_track* 1)
(COM-LOAD-RESOURCES #p"/sequence/configuration/mirage.resources")
(COM-INTERPOLATE-CONSUMMABLES ( "MUB_LEVEL" "PRI_LEVEL" "TAPE_TIC" ))
(COM-HISTOGRAM-VIEW ( "LOW_WATER_MARK" "HIGH_WATER_MARK" "TAPE_RATE"
"RTE_RATE" "RTS_RATE" "DOWNLINK_RATE" "UV_BURST" "TAPE_TRACK"))
(COM-LOAD-PERMISSIONS #p"/sequence/configuration/mirage.permissions")
(COM-LOAD-TOL-PAS #p"/g2/scripts/g2.tol.pas")
(COM-LOAD-SCLK/SCET #p"/g2/scripts/g2-2.sclk")
```

8.3.2 Time Systems File

The time system file defines the internal resolution, and Galileo specific epoch times and time systems. This file may be edited to modify, add or delete epochs, or change sequence duration.

```
;;; -*- Mode: Common-Lisp; Package: Apgen -*-
;;This is the Time Systems Information File that Apgen uses
;;Generation Time and Date 10:30:00 on 12/15/1994

(Time-Systems
     (Resolution MILLISECONDS)
     (Sequence-Duration "45/00:00:00.000")
     (Time-Points
       ("JEE" "SCE 1997-051/20:53:54.088")
       ("JTE" "SCE 1997-051/20:53:54.088")
       ("IEE" "SCE 1997-051/12:04:04.775")
       ("EEE" "SCE 1997-051/17:02:21.430")
       ("GEE" "SCE 1997-052/16:26:47.377")
       ("CEE" "SCE 1997-053/22:55:53.306")
       ("ETE" "SCE 1997-051/17:02:21.430"))

     (SCE
          (Format Code "sce")
          (The highest resolution in MILLISECONDS)
          (The lowest resolution in YEARS)
          (Uses a printing function called YDHMS-PRINT)
          (Start Time "SCE 1997-045/12:00:00.000  "))
     (SC-RELATIVE
          (Format Code "sc-relative")
          (The highest resolution in MILLISECONDS)
          (The lowest resolution in DAYS)
          (Uses a printing function called DHMS-PRINT)
          (Start Time "SC-RELATIVE 0/00:00:00.000"))
     (CDS
          (Format Code "gll-cds")
          (The highest resolution in RTI)
          (The lowest resolution in MAJOR-FRAMES)
          (Uses a printing function called GLL-CDS-PRINT)
          (Start Time "CDS 3828345:88:3"))
     (ERT
          (Format Code "ert")
          (The highest resolution in MILLISECONDS)
          (The lowest resolution in YEARS)
          (Uses a printing function called YDHMS-PRINT)
          (Start Time "ERT 1997-045/12:50:17.761")))
```

8.3.3 Legend File

The legend file defines the on-screen legend and set the heigth (in pixels: default = 18) for each legend line region. The user may directly modify this file to change the appearance of the legend.

```
;;; -*- Mode: Common-Lisp; Package: Apgen -*-
(Time-Frame "Time-1")
("Prime Shift/OWLT" "PRIME" 18)
("Geometry /" "INFO" 18)
("    Mission Events" "MSNEV1" 18)
("    Load Boundaries" "LDBDY" 18)
```

```
(Border "Border-1")
("Science              DDS" "DDS" 18)
("                     EPD" "EPD" 18)
("                     EUV" "EUV" 18)
("                     HIC" "HIC" 18)
("                     MAG" "MAG" 18)
("                    NIMS" "NIMS" 18)
("                     PLS" "PLS" 18)
("                     PPR" "PPR" 18)
("                     PWS" "PWS" 18)
("                     SSI" "SSI" 18)
("                     UVS" "UVS" 18)
("                     MWG" "MWG" 18)
(Time-Frame "Time-2")
("Navigation" "NAV" 18)
("                Attitude" "HGA" 18)
("                    OTMs" "MNVR" 18)
("Engineering        Power" "POWER" 18)
("                        " "ENGR1" 18)
("                        " "ENGR2" 18)
("                        " "ENGR3" 18)
(Time-Frame "Time-3")
("Telecom Events          " "TELCOM" 18)
("DMS          Record/Slew" "RECSLW" 18)
("                Playback" "PB" 18)
("Buffer                  " "BUFFER" 18)
(Border "Border-3")
("Telemetry   Rate/Content" "TLMCTL" 18)
("              RTS Format" "RTSFMT" 18)
("              RTE Format" "RTEFMT" 18)
("      Downlink Data Rate" "DLRATE" 18)
("Uplink" "U/L" 18)
("Radio Science" "RADSCI" 18)
(Border "Border-2")
("DMS CNFG" "DSN" 18)
("DSN Allocations        G" "GALLOC" 18)
("                       C" "CALLOC" 18)
("                       M" "MALLOC" 18)
("                  DIPLEX" "DIPLEX" 18)
("SUBLISTs/CMDs           " "SUBLIST" 18)
(Time-Frame "Time-4")
;;;(non-depletable "Downlink_Capability")
;;;(non-depletable "Total_Downlink")
;;;(non-depletable "RTE_Rate")
(state "Mission_Phase")
(non-depletable "MUB_Level" 40)
(non-depletable "UV_Burst" 20)
(non-depletable "RRCC_BURST" 20)
(non-depletable "PRI_Level" 40)
(non-depletable "DOWNLINK_RATE" 20)
(state "FILL_STATE")
(non-depletable "RTS_Rate" 40)
(state "SCI_FMT")
(non-depletable "RTE_Rate" 40)
(state "ENG_FMT")
(state "AACS_RTS_SELECT_STATE")
(state "DDS_RTS_SELECT_STATE")
(state "ENG_RTE_SELECT_STATE")
```

```
(state "EPD_RTS_SELECT_STATE")
(state "EUV_RTS_SELECT_STATE")
(state "HIC_RTS_SELECT_STATE")
(state "MAG_RTS_SELECT_STATE")
(state "NIMS_RTS_SELECT_STATE")
(state "PLS_RTS_SELECT_STATE")
(state "PWS_RTS_SELECT_STATE")
(state "UVS_RTS_SELECT_STATE")
(state "AACS_Rec_SELECT")
(state "BDT_Rec_SELECT")
(state "DDS_Rec_Select")
(state "ENG_Rec_Select")
(state "EPD_Rec_Select")
(state "EUV_Rec_Select")
(state "HIC_Rec_Select")
(state "MAG_Rec_Select")
(state "NIMS_Rec_Select")
(state "PLS_Rec_Select")
(state "PPR1_Rec_Select")
(state "PPR3_Rec_Select")
(state "PWS_Rec_Select")
(state "SSI_Rec_Select")
(state "UVS_Rec_Select")
;;;(state "AACS_Playback_Select")
;;;(state "DDS_Playback_Select")
;;;(state "ENG_Playback_Select")
;;;(state "EPD_Playback_Select")
;;;(state "EUV_Playback_Select")
;;;(state "HIC_Playback_Select")
;;;(state "MAG_Playback_Select")
;;;(state "NIMS_Playback_Select")
;;;(state "PLS_Playback_Select")
;;;(state "PPR_Playback_Select")
;;;(state "PWS_Playback_Select")
;;;(state "SSI_Playback_Select")
;;;(state "UVS_Playback_Select")
;;;(state "BDT_Playback_Select")
;;;(non-depletable "High_Water_Mark")
;;;(non-depletable "Low_Water_Mark")
(state "REC_FMT")
(state "Tape_State")
(non-depletable "Tape_Tic" 40)
(non-depletable "Tape_Track")
(non-depletable "Tape_Rate")
(non-depletable "High_Water_Mark")
(non-depletable "Low_Water_Mark")
(non-depletable "USEREC")
(non-depletable "USERTS")
(non-depletable "USESCAN")
(state "spinstat")
("MUB Manager" "MUBMAN" 18)
("RTS Manager" "RTSMAN" 18)
("RTE Manager" "RTEMAN" 18)
("PRI Manager" "PRIMAN" 18)
("DMS Manager" "DMSMAN" 18)
;;;(depletable "MUB_RTS_Level")
("BAD PLOT KEYS" "undefined" 30 red)
```

8.3.4 Resources File

The resource file contains information on the status of resources recognized by MIRAGE and may be used to set initial conditions for a sequence in advance of a modeling run. This file may be edited to set/reset an instrument state (select/deselect), tape state (ready, etc), size of the MUB, high and low water marks, downlink and DMS rates, etc.

```
;;; -*- Mode: Common-Lisp; Package: Apgen -*-

(Resource Constraints
         (Mission_Phase "Mission_Phase" (initial-state "None")
                       (plot-namestring "Sequence Load"))
         (MUB_Level "MUB_Level"
                    (plot-namestring "MUB Data Level"))
         (UV_Burst "UV_BURST"
                   (plot-namestring "UV Bursts"))
         (RRCC_Burst "RRCC_BURST"
                   (plot-namestring "RRCC Rate"))
         (FILL_STATE "Fill_State" (initial-state "NORM")
                     (plot-namestring "Fill State"))
         (PRI_Level "PRI_Level"
                    (initial-state 0)
                    (plot-namestring "PRI Buffer Level"))
         (RTS_Rate "RTS_Rate"
                   (initial-state 0)
                   (plot-namestring "RTS Data Rate"))
         (SCI_FMT "SCI_FMT"
                  (initial_state Z)
                  (plot-namestring "RTS Format"))
         (RTE_Rate "RTE_Rate"
                   (initial-state 0)
                   (plot-namestring "RTE Data Rate"))
         (ENG_FMT "ENG_FMT"
                  (initial_state L)
                  (plot-namestring "RTE Format"))
         (AACS_RTS_SELECT_STATE "AACS_RTS_SELECT_STATE"
                               (initial-state SELECT)
                               (plot-namestring "AACS RTS Select State"))
         (DDS_RTS_SELECT_STATE "DDS_RTS_SELECT_STATE"
                               (initial-state SELECT)
                               (plot-namestring "DDS RTS Select State"))
         (ENG_RTE_SELECT_STATE "ENG_RTE_SELECT_STATE"
                               (initial-state SELECT)
                               (plot-namestring "ENG RTE Select State"))
         (EPD_RTS_SELECT_STATE "EPD_RTS_SELECT_STATE"
                               (initial-state SELECT)
                               (plot-namestring "EPD RTS Select State"))
         (EUV_RTS_SELECT_STATE "EUV_RTS_SELECT_STATE"
                               (initial-state SELECT)
                               (plot-namestring "EUV RTS Select State"))
         (HIC_RTS_SELECT_STATE "HIC_RTS_SELECT_STATE"
                               (initial-state SELECT)
                               (plot-namestring "HIC RTS Select State"))
         (MAG_RTS_SELECT_STATE "MAG_RTS_SELECT_STATE"
                               (initial-state SELECT)
                               (plot-namestring "MAG RTS Select State"))
         (NIMS_RTS_SELECT_STATE "NIMS_RTS_SELECT_STATE"
                               (initial-state SELECT)
```

```
                    (plot-namestring "NIMS RTS Select State"))
    (PLS_RTS_SELECT_STATE "PLS_RTS_SELECT_STATE"
                    (initial-state SELECT)
                    (plot-namestring "PLS RTS Select State"))
    (PWS_RTS_SELECT_STATE "PWS_RTS_SELECT_STATE"
                    (initial-state SELECT)
                    (plot-namestring "PWS RTS Select State"))
    (UVS_RTS_SELECT_STATE "UVS_RTS_SELECT_STATE"
                    (initial-state SELECT)
                    (plot-namestring "UVS RTS Select State"))
    (AACS_Rec_Select "AACS_Rec_Select"
                (initial-state SELECT)
                (plot-namestring "AACS Record Select State"))
    (BDT_Rec_Select "BDT_Rec_Select"
               (initial-state SELECT)
               (plot-namestring "BDT Record Select State"))
    (DDS_Rec_Select "DDS_Rec_Select"
               (initial-state SELECT)
               (plot-namestring "DDS Record Select State"))
    (ENG_Rec_Select "ENG_Rec_Select"
               (initial-state SELECT)
               (plot-namestring "ENG Record Select State"))
    (EPD_Rec_Select "EPD_Rec_Select"
               (initial-state SELECT)
               (plot-namestring "EPD Record Select State"))
    (EUV_Rec_Select "EUV_Rec_Select"
               (initial-state SELECT)
               (plot-namestring "EUV Record Select State"))
    (HIC_Rec_Select "HIC_Rec_Select"
               (initial-state SELECT)
               (plot-namestring "HIC Record Select State"))
    (MAG_Rec_Select "MAG_Rec_Select"
               (initial-state SELECT)
               (plot-namestring "MAG Record Select State"))
    (PLS_Rec_Select "PLS_Rec_Select"
               (initial-state SELECT)
               (plot-namestring "PLS Record Select State"))
    (PPR1_Rec_Select "PPR1_Rec_Select"
               (initial-state SELECT)
               (plot-namestring "PPR1 Record Select State"))
    (PPR3_Rec_Select "PPR3_Rec_Select"
               (initial-state SELECT)
               (plot-namestring "PPR3 Record Select State"))
    (PWS_Rec_Select "PWS_Rec_Select"
               (initial-state SELECT)
               (plot-namestring "PWS Record Select State"))
    (SSI_Rec_Select "SSI_Rec_Select"
               (initial-state SELECT)
               (plot-namestring "SSI Record Select State"))
    (UVS_Rec_Select "UVS_Rec_Select"
               (initial-state SELECT)
               (plot-namestring "UVS Record Select State"))
;;;    (AACS_Playback_Select "AACS_Playback_Select" (initial-state "DESELECT"))
;;;    (DDS_Playback_Select "DDS_Playback_Select" (initial-state "DESELECT"))
;;;    (EPD_Playback_Select "EPD_Playback_Select" (initial-state "DESELECT"))
;;;    (EUV_Playback_Select "EUV_Playback_Select" (initial-state "DESELECT"))
;;;    (HIC_Playback_Select "HIC_Playback_Select" (initial-state"DESELECT"))
;;;    (MAG_Playback_Select "MAG_Playback_Select" (initial-state "DESELECT"))
```

```
;;;     (NIMS_Playback_Select "NIMS_Playback_Select" (initial-state "DESELECT"))
;;;     (PLS_Playback_Select "PLS_Playback_Select" (initial-state "DESELECT"))
;;;     (PPR_Playback_Select "PPR_Playback_Select" (initial-state "DESELECT"))
;;;     (PWS_Playback_Select "PWS_Playback_Select" (initial-state "DESELECT"))
;;;     (SSI_Playback_Select "SSI_Playback_Select" (initial-state "DESELECT"))
;;;     (UVS_Playback_Select "UVS_Playback_Select" (initial-state "DESELECT"))
;;;     (ENG_Playback_Select "ENG_Playback_Select" (initial-state "DESELECT"))
;;;     (BDT_Playback_Select "BDT_Playback_Select" (initial-state "DESELECT"))
 (High_Water_Mark "High_Water_Mark"
                       (initial-state 516096)
                       (plot-namestring "High Water Mark"))
        (Low_Water_Mark "Low_Water_Mark"
                      (initial-state 57344)
                      (plot-namestring "Low Water Mark"))
        (Tape_State "Tape_State"
                   (initial-state "READY")
                   (plot-namestring "Tape State"))
        (REC_FMT "REC_FMT"
                (initial-state "LPW")
                (plot-namestring "Record Format"))
;;;     (MUB_RTS_Level "MUB_RTS_Level" (initial-state 0))
        (Tape_Pos "Tape_Pos"
                 (initial-state 0)
                 (plot-namestring "Tape Position"))
        (Tape_Rate "Tape_Rate"
                  (initial-state 0)
                  (plot-namestring "Tape Rate"))
;;;     (High_Water_Mark "High_Water_Mark" (initial-state 0))
;;;     (Low_Water_Mark "Low_Water_Mark" (initial-state 0))
        (DOWNLINK_RATE "DOWNLINK_RATE"
                     (initial-state 0)
                     (plot-namestring "Downlink Rate"))
        (USESCAN "USESCAN"
                (initial-state 0)
                (plot-namestring "OAPEL Platform Use"))
        (USEREC "USEREC"
               (initial-state 0)
               (plot-namestring "OAPEL DMS Use"))
        (USERTS "USERTS"
               (initial-state 0)
               (plot-namestring "OAPEL RTS Use"))
        (SPINSTAT "SPINSTAT"
                 (initial-state 0)
                 (plot-namestring "OAPEL Spin State")))
```

8.3.5 Data File

The following is the MIRAGE internal data file format. This format may also be produced by OAPLINK from a database file for loading into MIRAGE. Additionally, this file may also be read by OAPLINK into an OAPEL database (PAs are ignored).

```
("G2GUBRTLMB02-" DESELC "SINGLES"
      (Time SCE "1996-245/00:00:00" "1996-245/00:00:00" (Duration
"0/00:00:00"))
      (LEVEL "SINGLE")
      (ALG_NAME "DESELC")
      (ID "300CA")
```

```
      (PRCS PRI)
      (TEAM_ID RSST)
      (REQUESTOR "UVS-SWG/K.NAVIAUX 37740")
      (ACT_NAME "G2GUBRTLMB02-")
      (DESCRIPT "UVS OH BRTLMB PB DESELECT")
      (REC_TIME "GTE-CDS 09:06:0")
      (DESCRIPTB "")
      (DESCRIPTC "")
      (DESCRIPTD "")
      (DESCRIPTE "")
      (DESCRIPTF "")
      (DESCRIPTG "")
      (DESCRIPTH "")
      (PB_INSTRUMENT UVS2))
("G2EUPHAS7901-" OAPEL "UVS"
      (Time "GEE-CDS 4153:90:0" "GEE-CDS 4090:00:0" (Duration "63:90:0"))
      (ID "G2EUPHAS7901-")
      (REQUESTOR "UVS-SWG/K.NAVIAUX 37740")
      (TEAM "UVS")
      (INSTRUMENT "UVS")
      (LOAD "G2A")
      (WORKGROUP "SWG")
      (PLOTKEY "UVS")
      (RIDING "")
      (TITLE "UVS EUROPA PHASE (~79 deg)")
      (OBJECTIVE "Observe Europa in the 1600ü to 3200ü wavelength regions at
phase
angles not obtainable from the Earth to supplement and complement the
NIMS surface property measurements.

~1 hour real-time Europa Phase observation at ~79í phase (~353-356
longitude).")
      (DESIGN "UVS 10bps RTS Rate (RTSFMT = D, E, F, H, or I).

#      PA
-      --
2      OPTRTM (Select UVS/AACS at start, Deselect UVS at end)
1      BFRDMP (Clear/Discard UVS buffer at start)
2      TARGET
1      CMDRS  (HV  On = 34UVS,07,S,N,N,N,S,0, ON,OFF,OFF,
ON,OFF,NOOVR,1,00,00,00,00)
               (HV Off = 34UVS,01,F,N,N,N,S,0,OFF,OFF,
ON,OFF,OFF,NOOVR,1,2C,01,00,00)

Total Bytes = (28+19)+(1*20)+(2*36)+(10+(4*14)) = 205")
      (CDSCOST 205)
      (TOPLABEL "G2EUPHAS7901-")
      (BOTLABEL "(real-time)")
      (CHGDATE "")
      (PS "")
      (TYPE SCI)
      (RPT BOTH)
      (CON YES)
      (CHANGEDBY "")
      (TIMESYS CDS)
      (ALIAS "")
      (SPINSTAT NIL)
      (SPINUSE NIL)
```

```
      (SCANPLAT )
      (DMS )
      (REALTIME YES)
      (CDS_SOURCE )
      (USESCAN 0)
      (USEREC 0)
      (USERTS 0)
      (Component-List
         ("G2EUPHAS7901-" OPTRTM "RTFMT"
              (Time SCE "1996-247/21:02:01" "1996-247/21:03:02" (Duration
"0/00:01:01"))
              (LEVEL "PA2")
              (NAME "OPTRTM")
              (ID "432CA")
              (PRCS PRI)
              (START_PA "GEE-CDS 4152:00:0")
              (PLAN_DUR "+CDS 01:00:0")
              (ACTUAL_DUR "")
              (TEAM_ID RSST)
              (REQUESTOR "UVS-SWG/K.NAVIAUX 37740")
              (ACT_NAME "G2EUPHAS7901-")
              (DESCRIPT "UVS/AACS SELECT AT START")
              (AACS_STATUS INCLUDE)
              (ENGR_STATUS NCG)
              (DDS_STATUS NCG)
              (EPD_STATUS NCG)
              (EUV_STATUS NCG)
              (HIC_STATUS NCG)
              (MAG_STATUS NCG)
              (NIMS_STATUS NCG)
              (PLS_STATUS NCG)
              (PWS_STATUS NCG)
              (UVS_STATUS INCLUDE)
              (AACS_RTS_SELECT_STATE SELECT)
              (DDS_RTS_SELECT_STATE NIL)
              (ENG_RTE_SELECT_STATE NIL)
              (EPD_RTS_SELECT_STATE NIL)
              (EUV_RTS_SELECT_STATE NIL)
              (HIC_RTS_SELECT_STATE NIL)
              (MAG_RTS_SELECT_STATE NIL)
              (NIMS_RTS_SELECT_STATE NIL)
              (PLS_RTS_SELECT_STATE NIL)
              (PWS_RTS_SELECT_STATE NIL)
              (UVS_RTS_SELECT_STATE SELECT)
              (Display-Y 1))
```

8.4 Available Report Formats

8.4.1 OAPEL Form

ACTIVITY ID: 10CNCATENA01-
START TIME: 1997-260/01:24:06.599

Activity ID: Orbit 10 OAPEL CNCATENA SeqNo 01-

Title GIPUL Catena Coverage Instrument NIMS

Requestor NIMS-SWG/M. SEGURA Team NIMS Working Group SWG

Time System CDS Load ID Calendar Date 09/17/97 Week 38

Start	CEE+CDS 62:00:0	1997-260/01:24:06.599	CEE+SCE 0/01:02:41.333
End	CEE+CDS 84:00:0	1997-260/01:46:21.266	CEE+SCE 0/01:24:56.000
Duration	22:00:0	0/00:22:14.667	0/00:22:14.667

Top Label 10CNCATENA01-
Bottom Label
Plot Key NIMS Type SCI Scan Platform Y
CDS Bytes 0 Report Options BOTH
CDS Source OAP Spin State Y DMS Y

Observation Objective

To determine the composition of Callisto's longest crater
chain,
investigate compositional differences with surrounding surface
look for minor constituents.

Design Detail

Instrument mode: LM Spatial resolution: 13.25
km/nimsel
Instrument gain state: 2 Spectral resolution: 204 wavelengths
Phase angle: 81. 89 Coverage in nimsels:
Bits-to-Ground 2.62 mbits

Target to specified longitude and latitude to scan in 4 swaths
across GIPUL CATENA. NYQUIST SAMPLING, 20% overlap between scans.

Galileo Activity Plan Form 10:02:46 on 10/12/1995 (Thursday)

8.4.2 OAP Science Time Ordered Listing

ORBIT ACTIVITY PLAN TIME ORDERED LISTING

10:04:22 on 10/12/1995 (Thursday) Page No. 1

Activity ID	Start Time	End Time	Duration	Team	CDS
10TU10MANS01-	JEE-CDS 3529:00:0	JEE-CDS 2924:00:0	605:00:0	UVS	0
	97-259/11:44:05.825	97-259/21:55:49.159	0/10:11:43.334		
	JEE-2/11:28:12.667	JEE-2/01:16:29.333	0/10:11:43.334		

10CPDRKMAP01	CEE-CDS 210:00:0	CEE-CDS 145:00:0	65:00:0	PPR	134
	97-259/20:49:05.266	97-259/21:54:48.599	0/01:05:43.333		
	CEE-0/03:32:20.000	CEE-0/02:26:36.667	0/01:05:43.333		
10CNGLOBAL01-	CEE-CDS 180:00:0	CEE-CDS 120:00:0	60:00:0	NIMS	0
	97-259/21:19:25.266	97-259/22:20:05.266	0/01:00:40.000		
	CEE-0/03:02:00.000	CEE-0/02:01:20.000	0/01:00:40.000		
10CPDRTM__01	CEE-CDS 145:00:0	CEE-CDS 80:00:0	65:00:0	PPR	134
	97-259/21:54:48.599	97-259/23:00:31.933	0/01:05:43.334		
	CEE-0/02:26:36.667	CEE-0/01:20:53.333	0/01:05:43.334		
10TU10MPRO01-	JEE-CDS 2924:00:0	JEE-CDS 2439:00:0	485:00:0	UVS	0
	97-259/21:55:49.159	97-260/06:06:12.492	0/08:10:23.333		
	JEE-2/01:16:29.333	JEE-1/17:06:06.000	0/08:10:23.333		
10CNASGARD01-	CEE-CDS 24:00:0	CEE-CDS 8:00:0	16:00:0	NIMS	0
	97-259/23:57:09.266	97-260/00:13:19.933	0/00:16:10.667		
	CEE-0/00:24:16.000	CEE-0/00:08:05.333	0/00:16:10.667		
10CSASGARD01-	CTE-CDS 23:00:0	CTE-CDS 18:00:0	5:00:0	SSI	334
	97-259/23:58:09.933	97-260/00:03:13.266	0/00:05:03.333		
	CTE-0/00:23:15.333	CTE-0/00:18:12.000	0/00:05:03.333		
10CUBRTLMB01-	CTE-CDS 10:00:0	CTE+CDS 2:00:0	12:00:0	UVS	146
	97-260/00:11:18.599	97-260/00:23:26.599	0/00:12:08.000		
	CTE-0/00:10:06.667	CTE+0/00:02:01.333	0/00:12:08.000		
10CNRINGS 01-	CEE-CDS 8:00:0	CEE+CDS 2:00:0	10:00:0	NIMS	0
	97-260/00:13:19.933	97-260/00:23:26.599	0/00:10:06.666		
	CEE-0/00:08:05.333	CEE+0/00:02:01.333	0/00:10:06.666		
10CUBRTLMB02-	CTE+CDS 2:00:0	CTE+CDS 9:00:0	7:00:0	UVS	122
	97-260/00:23:26.599	97-260/00:30:31.266	0/00:07:04.667		
	CTE+0/00:02:01.333	CTE+0/00:09:06.000	0/00:07:04.667		
10CNPALIMP01-	CEE+CDS 2:00:0	CEE+CDS 32:00:0	30:00:0	NIMS	0
	97-260/00:23:26.599	97-260/00:53:46.599	0/00:30:20.000		
	CEE+0/00:02:01.333	CEE+0/00:32:21.333	0/00:30:20.000		

Additional pages...

TOTAL OAPEL CDS BYTES = 19650

TIME ORDERED LISTING

Week	Date	Start Time	End Time	Duration	Activity	Team	Group	Actid	Plotkey	CDS
38	09/16/97	97-259/11:44:05.825	97-259/21:55:49.159	0/10:11:43.334	10TU10MANS01	UVS	MWG	10TU10MANS01-	UVS	0
38	09/16/97	97-259/20:49:05.266	97-259/21:54:48.599	0/01:05:43.333	Callisto Darkmap 01	PPR	SWG	10CPDRKMAP01	PPR	134
38	09/16/97	97-259/21:19:25.266	97-259/22:20:05.266	0/01:00:40.000	Callisto Global Coverage	NIMS	SWG	10CNGLOBAL01-	NIMS	0
38	09/16/97	97-259/21:54:48.599	97-259/23:00:31.933	0/01:05:43.334	Callisto Dayside Regional Thermal Map 01	PPR	SWG	10CPDRTM__01	PPR	134
38	09/16/97	97-259/21:55:49.159	97-260/06:06:12.492	0/08:10:23.333	10TU10MPRO01-	UVS	MWG	10TU10MPRO01-	UVS	0
38	09/16/97	97-259/23:57:09.266	97-260/00:13:19.933	0/00:16:10.667	ASGARD Basin observation	NIMS	SWG	10CNASGARD01-	NIMS	0
38	09/16/97	97-259/23:58:09.933	97-260/00:03:13.266	0/00:05:03.333	Callisto 1x14 Asgard transect	SSI	SWG	10CSASGARD01-	SSI	334
38	09/17/97	97-260/00:11:18.599	97-260/00:23:26.599	0/00:12:08.000	UVS CALLISTO BRIGHT LIMB SCAN (O & H)	UVS	SWG	10CUBRTLMB01-	UVS	146
38	09/17/97	97-260/00:13:19.933	97-260/00:23:26.599	0/00:10:06.666	ASGARD Multi-Ring Structure Observation	NIMS	SWG	10CNRINGS 01-	NIMS	0
38	09/17/97	97-260/00:23:26.599	97-260/00:30:31.266	0/00:07:04.667	UVS CALLISTO BRIGHT LIMB (OH)	UVS	SWG	10CUBRTLMB02-	UVS	122
38	09/17/97	97-260/00:23:26.599	97-260/00:53:46.599	0/00:30:20.000	Valhalla Palimpsest Spectroscopy	NIMS	SWG	10CNPALIMP01-	NIMS	0
38	09/17/97	97-260/00:34:33.933	97-260/00:38:36.599	0/00:04:02.666	Callisto 2x1 smooth plains	SSI	SWG	10CSSMTHPL01-	SSI	165
38	09/17/97	97-260/00:39:37.266	97-260/00:56:48.599	0/00:17:11.333	UVS CALLISTO DARK LIMB DRIFT	UVS	SWG	10CUDRKLMB01-	UVS	107
38	09/17/97	97-260/00:48:43.266	97-260/00:53:46.599	0/00:05:03.333	Callisto 2x3+1 smooth plains	SSI	SWG	10CSSMTHPL02-	SSI	264
38	09/17/97	97-260/00:53:46.599	97-260/01:24:06.599	0/00:30:20.000	Valhalla Basin/Rings Observation	NIMS	SWG	10CNVALHALL01-	NIMS	0
38	09/17/97	97-260/00:55:47.933	97-260/00:58:49.933	0/00:03:02.000	Callisto 1x1 of dome crater Tindr	SSI	SWG	10CSTINDR_01-	SSI	111
38	09/17/97	97-260/00:59:50.599	97-260/01:02:52.599	0/00:03:02.000	Callisto 2x2 small ring structure	SSI	SWG	10CSRNGSTR01-	SSI	165
38	09/17/97	97-260/01:24:06.599	97-260/01:46:21.266	0/00:22:14.667	GIPUL Catena Coverage	NIMS	SWG	10CNCATENA01-	NIMS	0
38	09/17/97	97-260/01:42:18.599	97-260/02:48:01.933	0/01:05:43.334	Callisto Dayside Regional Thermal Map 02	PPR	SWG	10CPDRTM__02	PPR	134
38	09/17/97	97-260/02:48:01.933	97-260/03:53:45.266	0/01:05:43.333	Callisto Darkmap 02	PPR	SWG	10CPDRKMAP02	PPR	134
38	09/17/97	97-260/03:23:25.266	97-260/04:24:05.266	0/01:00:40.000	Callisto Global Coverage	NIMS	SWG	10CNGLOBAL02-	NIMS	0
38	09/17/97	97-260/06:20:21.825	97-260/14:30:45.159	0/08:10:23.334	10JUAURMAP01-	UVS	MWG	10JUAURMAP01-	UVS	0
38	09/17/97	97-260/11:00:00.000	97-260/12:35:00.000	0/01:35:00.000	Darkside Map	UVS	AWG	10JUDRKMAP01-	UVS	286
38	09/17/97	97-260/12:35:00.000	97-260/14:10:00.000	0/01:35:00.000	Fixed local time map	UVS	AWG	10JUFIXTMD01-	UVS	0
38	09/17/97	97-260/14:10:00.000	97-260/15:45:00.000	0/01:35:00.000	Auroral asymmetry map	UVS	AWG	10JUAURMAP01-	UVS	269
38	09/17/97	97-260/14:30:45.159	97-260/22:41:08.492	0/08:10:23.333	10TU10MPRO02-	UVS	MWG	10TU10MPRO02-	UVS	0
38	09/17/97	97-260/15:57:00.000	97-260/16:00:00.000	0/00:03:00.000	UVS AWG Buffer Dump	UVS	AWG	10JUBFRDMP01-	UVS	28
38	09/17/97	97-260/15:58:43.159	97-260/16:12:52.492	0/00:14:09.333	Jupiter N pole aurora rot 1 emission 1	SSI	AWG	10JSNPAURO01-	SSI	545
38	09/17/97	97-260/16:00:00.000	97-260/16:20:00.000	0/00:20:00.000	Northern region Feature Track	UVS	AWG	10JUFTKR1E11+	UVS	374
38	09/17/97	97-260/16:20:00.000	97-260/17:00:00.000	0/00:40:00.000	Northern region Feature Track	UVS	AWG	10JUFTKR1E12-	UVS	262
38	09/17/97	97-260/16:57:00.000	97-260/17:00:00.000	0/00:03:00.000	UVS AWG Buffer Dump	UVS	AWG	10JUBFRDMP02-	UVS	28
38	09/17/97	97-260/16:59:23.159	97-260/17:13:32.492	0/00:14:09.333	Jupiter N pole aurora rot 1 emission 2	SSI	AWG	10JSNPAURO02-	SSI	545
38	09/17/97	97-260/17:00:00.000	97-260/17:20:00.000	0/00:20:00.000	Northern region Feature Track	UVS	AWG	10JUFTKR1E21+	UVS	374
38	09/17/97	97-260/17:20:00.000	97-260/18:00:00.000	0/00:40:00.000	Northern region Feature Track	UVS	AWG	10JUFTKR1E22-	UVS	262
38	09/17/97	97-260/17:55:00.000	97-260/17:58:00.000	0/00:03:00.000	Feature Track Buffer Dump	UVS	AWG	10JUBFRDMP03-	UVS	28
38	09/17/97	97-260/18:00:00.000	97-260/19:00:00.000	0/01:00:00.000	North-East-West-South Map	UVS	AWG	10JUNEWSMP01-	UVS	116
38	09/17/97	97-260/19:00:00.000	97-260/21:35:00.000	0/02:35:00.000	Brightside map	UVS	AWG	10JUBRTMAP01-	UVS	423
38	09/17/97	97-260/20:39:57.146	97-260/20:44:57.146	0/00:05:00.000	MONITORING OF IO'S DAYSIDE	NIMS	SWG	10INCHEMIS01-	NIMS	0
38	09/17/97	97-260/20:45:57.146	97-260/20:50:47.146	0/00:04:50.000	MONITORING OF IO'S NIGHTSIDE	NIMS	SWG	10INTHRMAL01-	NIMS	0
38	09/17/97	97-260/21:35:00.000	97-261/02:15:00.000	0/04:40:00.000	Fixed longitude map	UVS	AWG	10JUFIXLON01-	UVS	247

Additional Pages...

TOTAL OAPEL CDS BYTES = 19650