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Spectra

Features and Functions Guide



SPECTRA



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About the Features and Functions Guide

WHAT IS IN THIS GUIDE

This guide provides the information and procedures for function keys F1 through F9. Features discussed in this guide include Capture Parameters, Batch Mode Builder, and Monitor mode. The following topics are covered:

- Setting up pre-capture filters for the Spectra system
- Using Real Time Call Trace to troubleshoot call completion problems
- Setting up message filters for each protocol so specific messages can be omitted from the data capture
- Setting up automatic responses to specific incoming SS7, ISDN, and X.25 messages

- Setting up the Spectra system for various capture parameters, including logging in to a secondary drive (if available), using a filtering subsystem, assigning a stop time for data capture, and setting the Spectra system to either overwrite data or stop data capture when the disk is full
- Creating and editing messages
- Monitoring SS7, ISDN, and X.25 links non-intrusively by setting start and stop triggers to start and stop data capture
- Using the F2 Run and the F9 Xamine features to run and examine tests
- Setting up the Spectra system to run batch sets (scripts)
- Using the F3 Stats function to view basic SS7, ISDN, and X.25 statistics (Information about Spectra system generator statistics screens can be found in the ***Spectra Generators and Emulators Guide***.)
- Using the F4 Alarms function, including setting alarms to trigger when specific conditions are detected, editing alarm traits for error trapping and message generation, setting the system alarm threshold levels, viewing alarm reports, and controlling the automatic deletion of alarm files
- Printing expanded or compressed messages to a file or a connected printer
- Setting up the Spectra system to communicate with remote or central facilities through serial ports connected directly or using a modem
- Using the F8 Tools menu
- Year 2000 Compliance
- Menu Hierarchy
- Directory Structure

TYPOGRAPHIC CONVENTIONS

This section illustrates and describes the typographic conventions used throughout this guide.

Typeface or Style	Description
Step Action  1. Click the **Inet** icon from the SpImain window.	Procedures begin with a feature description and are followed by step-by-step instructions. Specific items you are to select are displayed in bold text. An icon to the side of the procedure indicates the feature you are activating.

`# cd /inet/opt`
`<file_server_hostname>: 'pwd'`
`FORMAT [CSV/INET]`
	When a procedure consists of entering DOS or UNIX commands and scripts, the command or script is presented in bold Courier text.

✍ *Linksets can be dragged and dropped from the Status map.*	A note emphasizes supplemental information such as tips about options, functions, and procedures.
 *Avoid rebooting the system controller. If packages need updating, see directions for stopping and restarting packages. If the system is rebooted improperly, there is a chance the disk will be corrupted beyond the ability of the fsck to repair it.*	A caution message indicates you should proceed with caution when attempting the described process, as there are risks involved.

1 Spectra System Overview

OVERVIEW

This chapter provides an overview of the Spectra system, including how to launch the Spectra software, an explanation of the Main Function Selection screen and its options, and how to navigate in the Spectra system.

ACCESSING PROGRAM COMMAND LINE SWITCHES

Prior to launching the Spectra system, program command line switches can be accessed in DOS. These switches provide many different options, effective when the Spectra system is launched.

From a DOS prompt, enter `SPECTRA <-h>` and press the Enter (↵) key. The command line switches are displayed as pictured in **Figure 1.1**.

```
C:\SPECTRA>spectra -h
Usage: C:\SPECTRA\BIN\SPECTRA.EXE [-b][-h][-q][-r][-u][-v]
       -b  Enable remote batch mode
       -h  Show usage
       -q  Quiet.  No beeps
       -r  Reboot enable (on activity timeout)
       -u  MSU Forwarding
       -v  Show version
```

Figure 1.1 - Spectra System Command Line Switches

Table 1.1 lists the available command line switch functions.

Table 1.1 - Command Line Switch Functions

Command Line Switch	Function
-b	Enables remote batch mode operation: The -b command line switch is required to remotely enable the Batch Mode Builder so that the user may configure the Spectra system and start tests from a remote host.
-h	Show usage: Activating this function displays the available command line switches.
-q	Quiet: When this function is activated, the Spectra system operates in a quiet mode (no beeps).
-r	Reboot enable (on activity timeout): If the Spectra system stops processing events and timers for approximately 10 seconds while the Spectra system interrupt is still running, the Spectra system automatically reboots. If the AUTOEXEC.BAT file is configured properly, the Spectra system restarts after the reboot timeout.
-u	MSU Forwarding: When this function is activated, the MSU Forwarding feature on the system is automatically restarted without executing the Alt_F command under the F2 Run menu.
-v	Show version: When this function is activated, the current version of the Spectra system is displayed without starting the Spectra program.

LAUNCHING THE SPECTRA PROGRAM

From a DOS prompt, enter `SPECTRA <-n>` (where n equals any desired command line switch listed in **Table 1.1**), and press the Enter (↵) key. The System Login screen displays the Password Entry dialog box.

✍ *To force the Spectra system to launch using a particular command line switch, edit the AUTOEXEC.BAT file to include the desired command line switch.*

SYSTEM LOGIN SCREEN

If passwords are enabled by the System Administrator, each user must log in before the Spectra system can be accessed. To log in, a pre-defined user ID and password must be entered. User IDs and passwords are assigned by the System Administrator.

✍ *If passwords are disabled, users are not required to log in to access Spectra system functions.*

The User ID and Password fields are case sensitive. Enter the user ID and password in the Password Entry dialog box exactly as the System Administrator assigned them.

The Password Entry dialog box is pictured in **Figure 1.2**.

```
Please Enter User ID:
Please Enter Password:
```

Figure 1.2 - Password Entry Dialog Box

Follow these steps to log in to the Spectra system.

Step	Action
1.	Enter a user identification name in the User ID field of the Password Entry dialog box and press the **Enter** (↵) key.
2.	Enter the corresponding password in the Password field, and press the **Enter** (↵) key.

✍ *Password entries are case sensitive. Be sure to enter the password letters in the proper case format.*

Once the user is logged in, the Main Function Selection screen displays the main program functions of the Spectra system.

If you are unable to log in to the Spectra system, contact the System Administrator to verify your user ID and password.

NAVIGATING THE SPECTRA SYSTEM

All Spectra system screens display the menus and the keystrokes necessary to maneuver through the program. The following information applies to all Spectra system screens (see **Figure 1.3**).

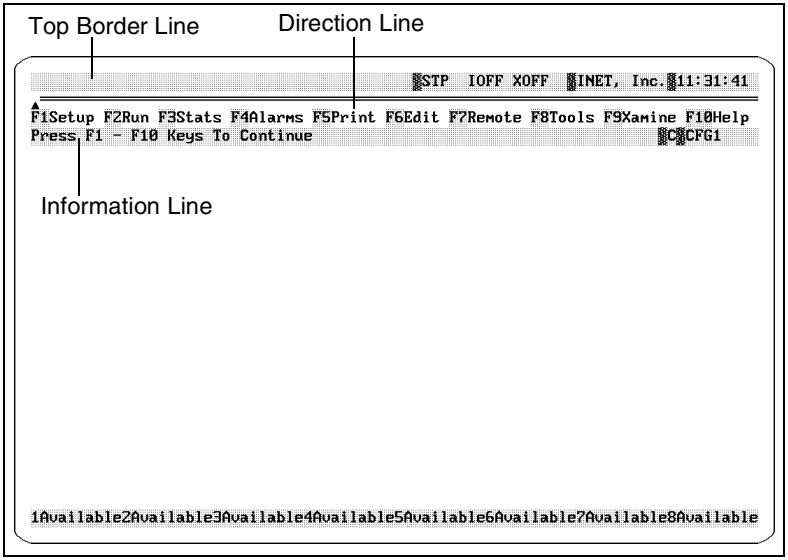


Figure 1.3 - Sample Spectra Screen

Top Border Line
The top border line displays error messages and information about file access.

Information Line
The information line displays information about procedures that can be performed from the current screen.

Direction Line
The direction line displays a list of options available from the current screen.

Moving the Cursor
Press the ↑↓ keys to move the cursor up or down. Press the ←→ keys to move the cursor left or right.

Selecting an Option
Press the Enter (↵) key to select the highlighted option.

Returning To the Previous Menu
Press the Esc key to return to the previous menu.

Accessing a Spectra Feature
Press a function key (F1, F2,..., F10) at any time to access various features.

Printing a Screen
Press the F5 key to print the current screen to a connected printer.

Movable and Hidden Menus
Press and hold the Alt key and use the ↑↓,←→, Home, End, PgUp, or PgDn keys to move the menu. If a menu can be hidden, Alt-H is displayed on the screen. Press the Alt key and the H key to hide the menu. Press any key to display hidden menus.

Accessing Help Screens
Press the F10 key to access help for the feature or screen currently in use.

MAIN FUNCTION SELECTION SCREEN

When the Spectra system program is launched, the System Login screen displays the Password Entry dialog box. Once the user is logged in, the Main Function Selection screen displays the main program functions of the Spectra system.

✍ *From this screen, press the Esc key to log out of the Spectra system (if the password feature is enabled). When the Esc key is pressed, the message "Do You Want To Logout (Y/N):" is displayed. Press the Y key to log out and return to the System Login screen. For more information, see "System Login Screen" on page 4 of this guide.*

Program functions are accessed from this screen (see **Figure 1.4**), but you do not have to return to this screen to change program functions. You can access a function from any screen in the program by pressing the corresponding function key. The mode, station ID, time, and status display line appear on all Spectra system screens.

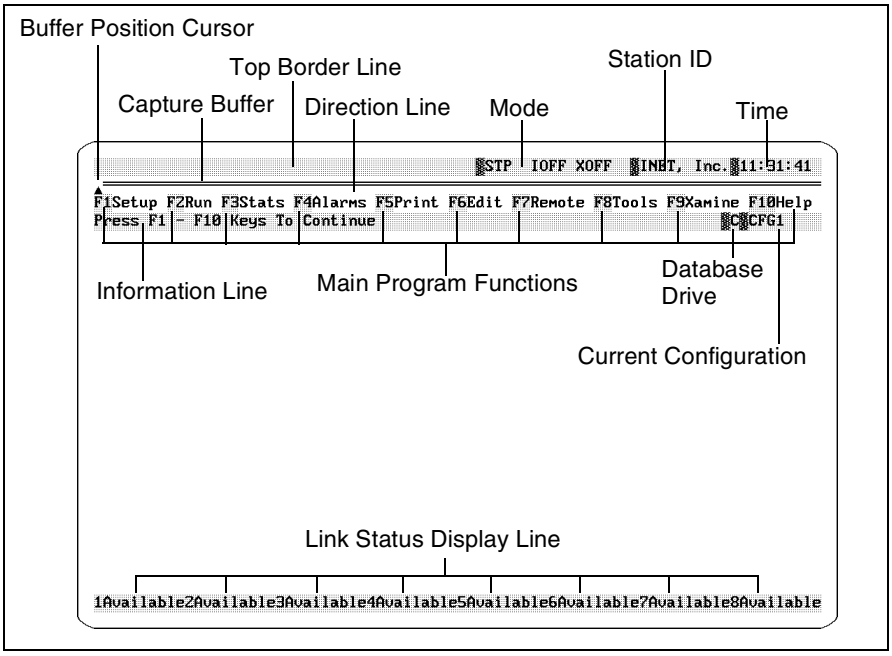


Figure 1.4 - Main Function Selection Screen

Main Function Selection Screen Definitions

Top Border Line
The top border line displays error messages and information about file access.

Mode
The Mode display indicates the current operating mode of each protocol. This area lists SS7, ISDN, and X.25 modes respectively. For example, if you are running SS7 Level 2 Tester, ISDN Call Generator, and X.25 Monitor, the following abbreviations appear in the Mode display:

LVL2 CGEN XMON

The Mode display changes every time a mode starts or stops running. If a protocol is not running a mode, the word OFF is displayed.

Station ID
The station ID identifies the name of the station using the Spectra system.

Time
The time indicates the time according to the computer's system clock.

Buffer Position Cursor
The Buffer Position cursor is a small solid triangle indicating the portion of the capture currently in view. The position of the cursor shifts right to left when paging up or left to right when paging down through the capture buffer.

Capture Buffer
A change in the shading of the capture buffer line indicates the utilization status of the capture buffer. Each position is equal to 1/80th of the capture buffer's size. For example, for a 5 MB capture buffer, each position is equal to 5,000,000/80 (62,500 B).

Direction Line
The direction line displays a list of options available from the current screen.

Information Line
The information line displays information about procedures that can be performed from the current screen.

Database Drive
The database drive indicates where the database of configuration files, signal unit files, test script files, etc. is stored.

Current Configuration
The current configuration indicates the name of the configuration the Spectra system is using. Configurations can be saved and recalled from the F1 Setup menu.

Link Status Display Line

The link status display line indicates the status of each board that is physically in the system (see **Figure 1.5**). For example, if four boards are in the system, four link status fields are displayed at the bottom of the screen. A maximum of 16 status fields can be displayed at a time. Each mode has different link status displays.

```
1InSv2InSv3InSv4InSv5InSv6InSv7InSv8InSv9InSv0InSv1InSv2InSv3InSv4InSv5InSv6InSv
```

Figure 1.5 - Link Status Display Line with 16 Links

✍ *When using the Spectra Trunk Tester, the maximum number of links displayed on the link status display line is 14.*

Table 1.2 describes the link status displays that may appear on the link status display line of the Main Function Selection screen.

Table 1.2 - Link Status Displays

Mode(s)	Status Display (8 Links)	Status Display (16 Links)	Description
Monitor Mode	NA	NA	Indicates the link is not present or has been turned OFF
	InService	InSv	Indicates the link is in service
	OutOfService	OOS	Indicates the link is in the initial alignment stage or is not operational
	NoCarrier	NoCa	Indicates no carrier is present
	NoSync	NoSync	Indicates the T1/E1/BRI link has not established synchronization with the opposite end
	NoSignal	NoSig	Indicates the T1/E1 link does not detect a valid signal
	AISAlarm	AISAlm	Indicates the T1/E1 link is receiving an Alarm Indication Signal (AIS) (also called a Blue Alarm)
	RemAlarm	RemAlm	Indicates the T1/E1 link is receiving a Yellow Alarm signal

Table 1.2 - Link Status Displays (Continued)

Mode(s)	Status Display (8 Links)	Status Display (16 Links)	Description
Level 2, 3, and 4 Testers, Intrusive Mode	T1Expired	T1Ex	Indicates the Level 1 timer T1 has expired
	T2Expired	T2Ex	Indicates the Level 2 timer T2 has expired
	T3Expired	T3Ex	Indicates the Level 2 timer T3 has expired
	T6Expired	T6Ex	Indicates the Level 2 timer T6 has expired
	T7Expired	T7Ex	Indicates the Level 2 timer T7 has expired
	SUERM	SUEM	Indicates the Signal Unit Error Rate Monitor (SUERM) threshold was exceeded

Table 1.2 - Link Status Displays (Continued)

Mode(s)	Status Display (8 Links)	Status Display (16 Links)	Description
Level 2, 3, and 4 Testers, Intrusive Mode (Continued)	AERM	AERM	Indicates the Alignment Error Rate Monitor (AERM) threshold was exceeded
	BSNrml	BSNa	Indicates an abnormal Backward Sequence Number (BSN) was detected
	FIBabnrml	FIBa	Indicates an abnormal Forward Indicator Bit (FIB) was detected
	Remote	Rem	Indicates the adjacent signalling point sent an SIOS, SIO, SIE, or SIN message
	L3 Stop	Stop	Indicates Level 3 put the link out of service
	No Carrier	NoCa	Indicates no data/clock is detected on the link
	InService	InSv	Indicates the link is in service
	OutOfService	OOS	Indicates the link is in the initial alignment stage or is not operational
	NoSync	NoSync	Indicates the T1/E1/BRI link has not established synchronization with the opposite end
	NoSignal	NoSig	Indicates the T1/E1 link does not detect a valid signal
	AISAlarm	AISAlm	Indicates the T1/E1 link is receiving an AIS (Blue Alarm)
	RemAlarm	RemAlm	Indicates the T1/E1 link is receiving a Yellow Alarm signal

Table 1.2 - Link Status Displays (Continued)

Mode(s)	Status Display (8 Links)	Status Display (16 Links)	Description
TCAP Generation, TUP/ISUP Generation, STP and SCP Emulation	Available	Avlb	Indicates the link is in service and is ready to transmit/receive messages
	SLTAError	SLTA	Indicates there was not a response to the transmitted Signalling Link Test Message (SLTM)
	OutOfService	OOS	Indicates the link is in the initial alignment stage or is not operational
	NoCarrier	NoCa	Indicates no data/clock is detected on the link
	RemInhibt	RemI	Indicates the link was inhibited remotely
	LocInhibt	LocI	Indicates the link was inhibited locally
	Local PO	LPO	Indicates the link is experiencing a local processor outage
	Remote PO	RPO	Indicates the link is experiencing a remote processor outage
	Congest 1	Cng1	Indicates the link is experiencing Level 1 congestion
	Congest 2	Cng2	Indicates the link is experiencing Level 2 congestion
	Congest 3	Cng3	Indicates the link is experiencing Level 3 congestion
	HW Failure	HW	Indicates the Data Link Processor (DLP) board has failed
	NoSync	NoSync	Indicates the T1/E1/BRI link has not established synchronization with the opposite end
	NoSignal	NoSig	Indicates the T1/E1 link does not detect a valid signal

Table 1.2 - Link Status Displays (Continued)

Mode(s)	Status Display (8 Links)	Status Display (16 Links)	Description
TCAP Generation, TUP/ISUP Generation, STP & SCP Emulation (Continued)	AISAlarm	AISAlm	Indicates the T1/E1 link is receiving an AIS (Blue Alarm)
	RemAlarm	RemAlm	Indicates the T1/E1 link is receiving a Yellow Alarm signal
ISDN Modes	InService	InSv	Indicates the link is in service
	OutOfService	OOS	Indicates the link is in the initial alignment stage or is not operational
	NoSync	NoSync	Indicates the T1/E1/BRI link has not established synchronization with the opposite end
	NoSignal	NoSig	Indicates the T1/E1 link does not detect a valid signal
	AISAlarm	AISAlm	Indicates the T1/E1 link is receiving an AIS (Blue Alarm)
	RemAlarm	RemAlm	Indicates the T1/E1 link is receiving a Yellow Alarm signal

Table 1.2 - Link Status Displays (Continued)

Mode(s)	Status Display (8 Links)	Status Display (16 Links)	Description
X.25 Modes	InService	InSv	Indicates the link is in service
	OutOfService	OOS	Indicates the link is in the initial alignment stage or is not operational
	T1Expire	T1Exp	Indicates the Level 1 timer T1 has expired
	AwtDisest	AwtEst	Indicates the link is awaiting disestablishment
	AwtEst	AwtEst	Indicates the link is awaiting establishment
	NoSync	NoSync	Indicates the T1/E1/BRI link has not established synchronization with the opposite end
	NoSignal	NoSig	Indicates the T1/E1 link does not detect a valid signal
	AISAlarm	AISAlm	Indicates the T1/E1 link is receiving an AIS (Blue Alarm)
	RemAlarm	RemAlm	Indicates the T1/E1 link is receiving a Yellow Alarm signal

MAIN PROGRAM FUNCTIONS

Access each program function by pressing the associated function key. Program functions can be changed without returning to the Main Function Selection screen by pressing the desired function key. The main program functions are as follows.

F1 Setup
The F1 Setup function is where the parameters required for the Spectra system are defined. Use the F1 Setup function to establish Level 1, Level 2, and Level 3 parameters and to customize test modes, filters, capture parameters, menu colors, the date and time, and Spectra system exit features.

F2 Run
The F2 Run function activates the current test mode automatically. Any test scripts established using the F1 Setup function are launched by pressing the F2 key. The Spectra system then provides the option to restart the test. While the Spectra system executes scripts and logs data, it performs search and analysis functions in real time.

F3 Stats
The F3 Stats function provides screens that display the vital statistics for Level 1 through Level 4 messages sent, received, or monitored by the Spectra system. Each statistics screen displays the statistics for each linkset and/or individual links.

F4 Alarms
The F4 Alarms function offers several options for generating alarms and statistics. Enabled alarms are generated automatically by the Spectra system to alert the user to specific testing conditions.

F5 Print
The F5 Print function prints expanded or compressed single-line messages to a file or to a connected printer. You can print the entire log buffer or only certain messages tagged in the F2 Run or F9 Xamine functions.

F6 Edit
The F6 Edit function creates and saves messages into a protocol catalog. Defined messages are used for triggering, filtering, and transmitting messages.

F7 Remote
The F7 Remote function accesses communication software (such as iRemote) that allows the host/remote relationship to take place. Complete Spectra system emulation is possible from a remote terminal running the communication program.

F8 Tools

Link management tools that help create the link state necessary to run specific tests when the Spectra system is in terminated modes are provided in the F8 Tools function. This function also provides transmit-on-demand capability and can be used for simultaneous deactivation of multiple links to simulate linkset failure conditions. Additionally, DOS commands for file management, hardware interface resets, and audio testing capabilities are included in this function.

F9 Xamine

Captured messages can be viewed in a number of ways using the F9 Xamine function. Pressing the F9 key halts all data capture (except when in Batch Test mode) until the F2 key is pressed again.

F10 Help

Help screens are accessed through the F10 Help function. Press the F10 key to access help information about the current screen. For example, pressing the F10 key from the Main Function Selection screen displays the function key definitions. Press the F10 key from any screen to view the related help file.

CHECKING SYSTEM COMPONENTS

Essential system component information for the Spectra system is located in the Component Versions screen, the DOS Information screen, and the Decode screen.

These screens identify the current Spectra software version, system serial numbers, DOS version, available capture memory, disk size, current disk usage, the current decode file, a list of installed decodes, and the decode version number.

This system information can be used as a reference when troubleshooting or documenting program problems.

COMPONENT VERSIONS SCREEN

The Component Versions screen displays the current Spectra system information. Spectra software version, DLP firmware version, the current decode template, and system serial number.

Press the F1 key, select Component Versions, and press the Enter (↵) key to view the Component Versions screen (see **Figure 1.6**).

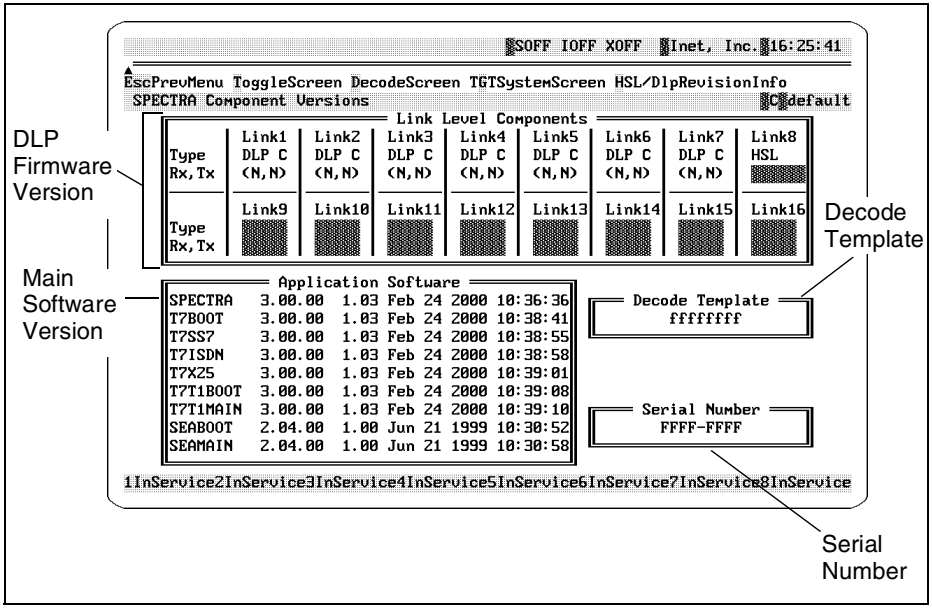


Figure 1.6 - Component Versions Screen

Component Versions Screen Definitions

ToggleScreen
Press the T key to toggle between the Component Versions screen and the DOS Information screen.

DecodeScreen
Press the D key to display the Decode screen.

HSL/DLPRevisionInfo
Press the H key to toggle the Application Software field to HSL Software Versions information. This option is only valid if you have purchased Spectra High Speed Links (HSL). For more information about Spectra High Speed Links, refer to the ***Spectra High Speed Links Guide***.

TGTSystemScreen
Press the G key to view the TGT System Component screen. This option is only valid if you have purchased Spectra Trunk Tester. For more information about Spectra Trunk Tester, refer to the ***Spectra Trunk Tester Guide***.

Link Level Components
This section displays the current firmware version and board type being used by the Spectra system.

Application Software
This section displays the current software files and their respective version numbers.

Decode Template
This section displays the current decode template. All decode functions in the Spectra system are derived from a single file named TEMPLATE.SS7. This file resides in the C:\SPECTRA\DECODE directory and is the engine that drives data interpretation and presentation within the Spectra system. The TEMPLATE.SS7 file defines which standard and/or variant protocols are decoded in the Spectra system. This file is installed and shipped with the Spectra system.

Proprietary messages and parameters can be added to existing protocol decode sets through the use of the Protocol Decode Definition Module (PDDM). This is an optional package that can be ordered from Inet. The PDDM allows you to generate a customized TEMPLATE.SS7 file. For information about creating a customized decode template, refer to the ***Spectra Protocol Decode Definition Module Guide***.

The Spectra system always retrieves the decode information from the TEMPLATE.SS7 file. Therefore, the version of the decode template used must be named TEMPLATE.SS7. If a new TEMPLATE.SS7 is to be used, rename the current TEMPLATE.SS7 file (for example, change the name to TEMPLATE.OLD) before copying the new file to the C:\SPECTRA\DECODE directory. This prevents overwriting of the previous version of the decode template. Restart the Spectra system to invoke the new decode file.

Revert to previous decode versions at any time by renaming the file TEMPLATE.SS7 and restarting the Spectra system. (Remember to rename the current TEMPLATE.SS7 template to avoid overwriting it.)

Serial Number
This section displays the current system serial number.

DOS INFORMATION SCREEN

The DOS Information screen displays the Spectra system DOS version, the current available capture memory, the primary and secondary disk size, and the current disk usage. Currently, secondary disk usage is not available. Press the T key on the Component Versions screen to access this screen. The DOS Information screen is pictured in **Figure 1.7**.

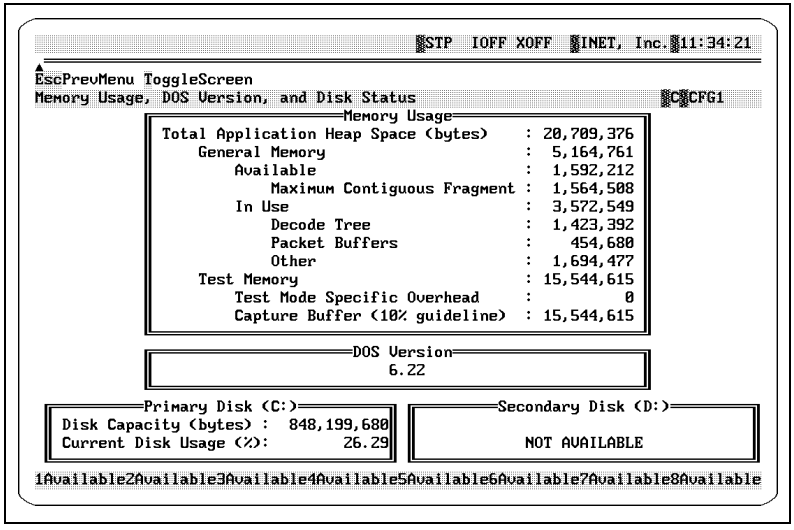


Figure 1.7 - DOS Information Screen (Example)

DECODE SCREEN

The Decode screen displays the name and file size of the current decode file, a list of installed decodes, the decode version number, and the directories from which the decode was created or installed. Press the D key on the Component Versions screen to access this screen. The Decode screen is pictured in **Figure 1.8**.

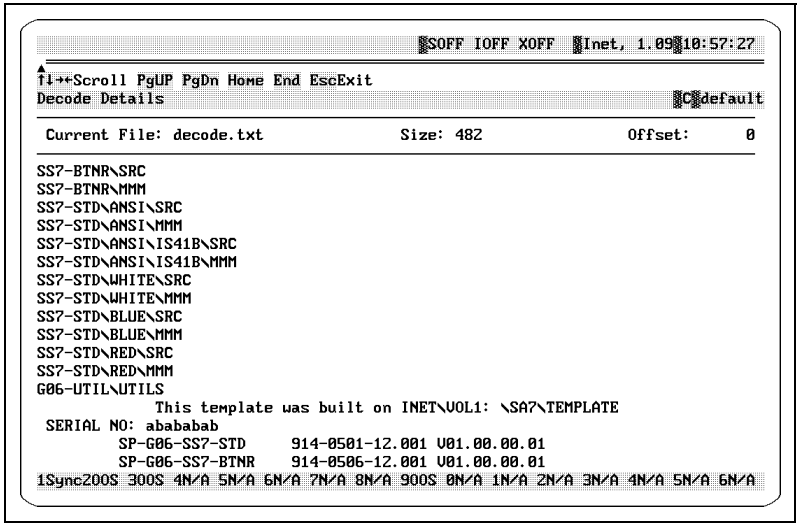


Figure 1.8 - Decode Screen (Example)

POWERING DOWN THE SPECTRA

Exit the Spectra system program and return to DOS before turning the system off.

To exit to DOS, press the F1 key, select EXIT TO DOS, and press the Enter (↵) key. The Exit to DOS dialog box is displayed (see **Figure 1.9**). If the password feature is enabled, only users with a System Administrator access level are allowed to exit to DOS. If the password feature is disabled, access levels do not apply, and any Spectra user can exit to DOS.

```
Exit to DOS? (Y/N)
```

Figure 1.9 - Exit to DOS Dialog Box

✍ *When exiting the Spectra system program, all boards are automatically set to Bridged mode. Board modes can be adjusted in the Level 1 Parameters screen.*

To return to the Spectra system program from DOS, type `SPECTRA` from the DOS prompt and press the Enter (↵) key, or reboot the computer.

✍ *You can type `SPECTRA` from the DOS prompt to return to the Spectra system only if `C:\spectra\bin` is part of the path statement in the AUTOEXEC.BAT file. If `C:\spectra\bin` is not part of the path statement in the AUTOEXEC.BAT file, you must type `SPECTRA` from the `C:\spectra\bin` directory to return to the Spectra system.*

After exiting to DOS, power down the Spectra system by turning the ON/OFF switch to OFF.

2 Filters

OVERVIEW

The Spectra system Filters option allows you to set up filters that capture only the messages you wish to view. Filtering prevents unnecessary information from taking up capture memory. The Filters option also allows Real Time Call Trace functions to be performed on specific phone numbers so you can troubleshoot call completion problems.

Follow these steps to access the Filters option.

Step	Action

1. Press the **F1** key to access the F1 Setup menu (see **Figure 2.1**).

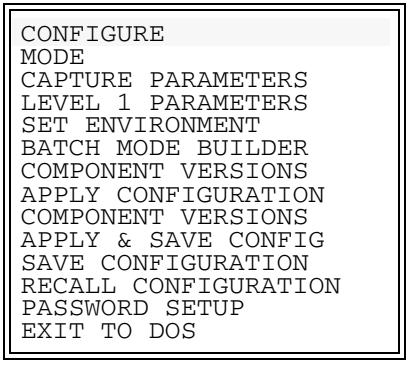


Figure 2.1 - F1 Setup Menu

2. Use the ↑↓ keys to select the **Configure** option, and press the **Enter (↵)** key. The Protocol options menu is displayed (see **Figure 2.2**).



Figure 2.2 - Protocol Options Menu

✍ *The Spectra system provides three protocol options—SS7, ISDN, and X.25. Since these protocols are available as separate options, your system may have any combination of the three protocols. If you requested only one protocol, no protocol choices are available. If you requested two protocols, only the protocol you chose are listed.*

SS7 Filters

To set up filters for use with SS7, select the SS7 option, and press the Enter (↵) key to access the SS7 Configure options menu (see **Figure 2.3**).



Figure 2.3 - SS7 Configure Options Menu

ISDN Filters

To set up filters for use with ISDN, select the ISDN option, and press the Enter (↵) key to access the ISDN Configure options menu (see **Figure 2.4**).



Figure 2.4 - ISDN Configure Options Menu

X.25 Filters

To set up filters for use with X.25, select the X.25 option, and press the Enter (↵) key to access the X.25 Configure options menu (see **Figure 2.5**).



Figure 2.5 - X.25 Configure Options Menu

The filter setup procedure for each protocol is explained in the following sections.

SS7 FILTERS

The Filters option allows the pre-capture filtering of messages so you capture only messages of interest. Filtering prevents unnecessary information from taking up capture memory. This option also allows the Real Time Call Trace option to be performed on specific phone numbers.

Follow these steps to access the SS7 filters.

Step	Action

1. From the SS7 Configure options menu (see **Figure 2.6**), press the ↑↓ keys to select **FILTERS**.



Figure 2.6 - SS7 Configure Options Menu

2. Press the **Enter** (↵) key to access the Filters menu (see **Figure 2.7**).



Figure 2.7 - Filters Menu

3. Only one of the filters options can be turned ON at a time. To turn the filters ON, highlight the desired field by pressing the →← keys, and press the **Enter** (↵) key.

When the SS7 Message Filter option is turned ON, an additional direction line option is displayed. The Pre/PostFilterStats option allows you to filter the statistics collected by the Spectra system by filtering the messages used to calculate the statistics. Hit the P key to toggle between Pre Filter and Post Filter in the Stats Log option in the display line. The default is set to the Pre Filter option. If the Pre Filter option is selected, the Spectra system will collect statistics for all incoming messages and will ignore the message filters. If the Post Filter option is selected, the Spectra system will not collect statistics for the messages defined in the Message Filters screen.

4. To set up parameters for either of the filters options, highlight the desired option, and press the **Enter** (↵) key.

SS7 REAL TIME CALL TRACE

When numbers are assigned in the SS7 Real Time Call Trace screen, only messages associated with a particular call or transaction to or from the assigned numbers are captured and displayed. Calls are traced using the Circuit Identification Code (CIC). Transactions are traced using the Transaction ID number. The Real Time Call Trace option also allows you to trace by Global System for Mobile Communication (GSM) Mobile Identity (IMSI/TMSI).

The Spectra system SS7 Real Time Call Trace option supports features that provide Local Number Portability (LNP) testing. The Real Time Call Trace option searches the Generic Address Parameter (GAP) in the Optional Parameters section of a message for phone numbers to support LNP testing.

The Spectra system allows each trace to be assigned a color for easier viewing when using F2 Run or F9 Capture functions.

The Real Time Call Trace screen is pictured in **Figure 2.8**.

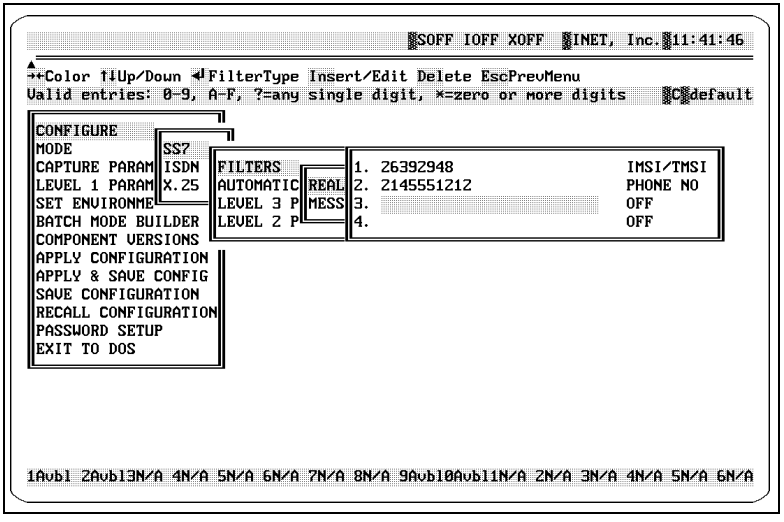


Figure 2.8 - SS7 Real Time Call Trace Screen

The following list describes valid entries for the SS7 Real Time Call Trace screen:

- The digits 0 through 9 represent numeric values.
- A question mark (?) is used to represent any single digit. For example, an entry of 80074399?? represents all 800 numbers between 7439900 and 7439999.
- An asterisk (*) is used to represent a zero or more digits. For example, an entry of *800* represents all numbers containing 800; numbers such as 8006809400, 9008008989, and 9724568000 are included. A maximum of two asterisks can be used in any single entry.

Real Time Call Trace Screen Definitions

→← Color
Press the →← keys to cycle through the color options for the phone number option. Stop when the color to be associated with the messages containing the phone number is displayed.

↑↓ Up/Down
Press the ↑↓ keys to move between the four call trace fields.

↵ On/Off
Press the Enter (↵) key to toggle between ON or OFF to allow or prohibit the capture of messages related to a phone number.

Insert/Edit
Press the Insert key to change or enter a phone number. This option accesses the entry field of a call trace option to change or enter a phone number in the field.

Delete
Press the Delete key to delete an entry.

EscPreviousMenu
Press the Esc key to return to the previous menu.

Using Real Time Call Trace

The Real Time Call Trace feature can be used to perform real-time call tracing to troubleshoot call completion problems. This feature identifies calls that are unable to perform the following standard call procedures:

- 800 number translation
- Custom Local Area Signaling Services (CLASS) procedural
- Line-In Database (LIDB) response
- Call forwarding
- Call re-routing

Problems with call setup procedures can also be identified.

✍ *The Real Time Call Trace option does not reassemble phone numbers that are segmented in multiple messages.*

This procedure explains how to trace a call.

Step	Action
1.	In the Real Time Call Trace screen, select the **1.** field.
2.	Press the **Insert** key to access the entry field. Enter the phone number or the International Mobile Subscriber Identity/Temporary Mobile Subscriber Identity (IMSI/TMSI) number to be traced (maximum of ten digits).
3.	Press the **Enter (↵)** key to assign the number.
4.	Press the **Enter (↵)** key again to cycle through the trace options—OFF, PHONE NO, and IMSI/TMSI. Use the **IMSI/TMSI** option if you want to perform call trace on the IMSI/TMSI field of a GSM network message. Otherwise, select the **PHONE NO** option for call tracing. When one of these options is selected, the Call Trace feature uses the entered number to perform the trace.
5.	Press the →← keys to cycle through the various color options. Stop when the color to be associated with the messages containing the phone number is displayed.

6. Repeat **Step 1** through **Step 5** for all four call trace fields (if necessary).

7. Press the **Esc** key to return to the Filters options menu.

8. Press the →← keys to toggle the **Trace** option to **ON**.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the* ***Spectra Setup and Configuration Guide****.*

9. To use call trace on the entered phone numbers, press the **F2** key. This prompts the Spectra system to run the call trace while in Monitor mode. An example of a Real Time Call Trace display is pictured in **Figure 2.9**.

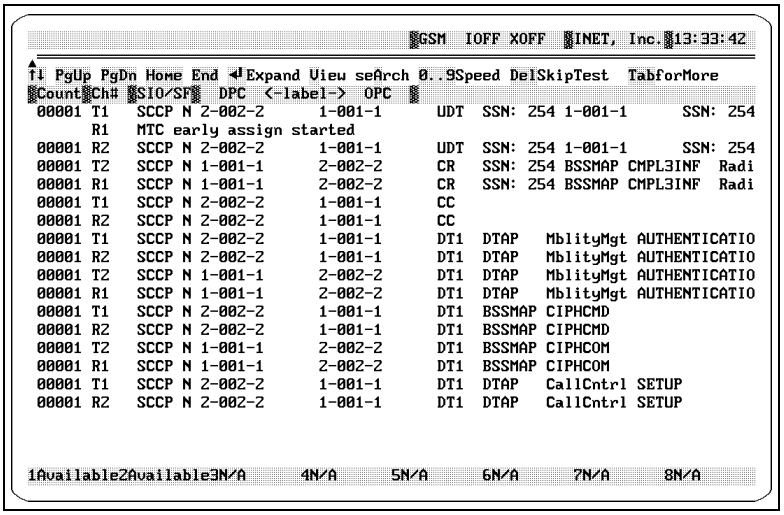


Figure 2.9 - Real Time Call Trace (Example)

Once the monitoring process begins, the Spectra system traces all messages pertaining to that call. When a message with a user-defined phone number is detected in a given signal unit, the Spectra system displays all Transaction Capabilities Application Part (TCAP), Telephone User Part (TUP), or Integrated Services Digital Network User Part (ISUP) messages pertaining to that call/transaction until the user stops the process.

✍ *When using a wildcard number, such as 417-623-????, in the first entry of the trace, the Spectra system captures the relevant ISUP messages. Any TCAP or TUP messages that satisfy the wildcard entry will not be captured unless another 417-623-???? entry is made in the Real Time Call Trace window.*

MESSAGE FILTERS

The Message Filters screen allows you to configure the filters settings for messages received by the Spectra system. Messages received by the Spectra system pass through the selected filters settings before they are captured and stored in the buffer. The Pre/Post Filter Stats option allows you to filter messages before statistics are collected (see "SS7 Filters" on page 26 of this guide). Up to 16 sets of filters, one set for each link, can be established in the Message Filters screen. The Message Filters screens for SS7, ISDN, and X.25 are very similar in appearance and setup but use protocol-specific information for filtering. The SS7 Message Filters screen is pictured in **Figure 2.10**.

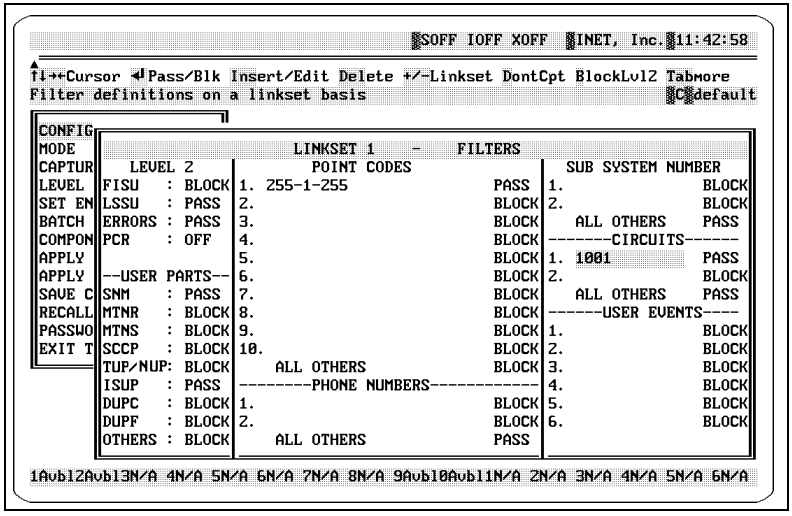


Figure 2.10 - SS7 Message Filters Screen

The SS7 Message Filters screen contains the following three sections.

LEVEL 2
Level 2 filters can be used to block or pass Fill In Signal Units (FISUs), Link Status Signal Units (LSSUs), and errored signal units. Preventative Cyclic Retransmission (PCR) can also be toggled ON or OFF. Level 2 filter fields appear red on color screens.

USER PARTS, POINT CODES, PHONE NUMBERS, SUB SYSTEM NUMBER, and CIRCUITS (CICS)
These filters are AND filters. A signal unit must pass all fields set to PASS in order to be placed in capture memory. Upon encountering a blocked field, the system stops checking for additional filters, and the signal unit is filtered out. These filter fields appear yellow on color screens.

USER EVENTS
If a Message Signal Unit (MSU) did not pass the yellow division of filters (**User Parts, Point Codes, Phone Numbers, Sub System Number, and CICs**), these filters are applied. If the MSU matches any of the designated user messages, it is blocked or passed depending on the entry. User events are protocol-dependent and are defined using the F6 Edit function. (For information about the F6 Edit function, see **Chapter 5** of this guide.) User Event Filter fields appear blue on color screens.

User-defined event message filtering provides you with a degree of additional qualification for the messages to be captured. Any message from the protocol's message catalog can be used as a user-defined event filter. This filter is applicable to all protocols.

In order to be placed in capture memory, any message must match a PASS entry in the filter section without encountering a BLOCK entry because BLOCK takes precedence over PASS. If a message is not tagged with a PASS indicator after passing through all filters, it is blocked.

Any filter defined in this screen takes effect only after the configuration is applied. If changes are made to the Filters screen while data capture is in progress, the changes only take effect after you have applied the configuration.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. Press the F2 key to restart the test. For more information about the Apply Configuration option, refer to "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

Message Filters Screen Definitions

↑↓↔Cursor
Press the ↑↓↔ keys to move the cursor to a particular field.

↵ Pass/Blk
Press the Enter (↵) key to toggle between PASS or BLOCK. This allows or prohibits the capture of a message, point code, user event, etc.

Insert/Edit
Press Insert key to access the dialog box or events catalog for the selected field.

Delete
Press the Delete key to delete the selected filter. For example, if Event filters are entered in the 1. and 2. fields, the 1. field can be selected and deleted to make the 2. field the only event filter.

+/-Linkset
Press the + or - keys to cycle through the filter screen for each linkset.

DontCpt
Press the D key to prevent data from being logged on the current linkset.

BlockLvl2
Press the B key to block Level 2 messages.

Tabmore
Press the Tab key to display other screen options.

Copy
Press the C key to access the Copy options menu (see **Figure 2.11**). The Copy options allows other linksets to be assigned the same filter settings as the displayed linkset. When the Copy option menu is displayed, all links are automatically marked. Select the linksets to which you do not want to assign the current filter settings, and press the Enter (↵) key to unmark them. When the assignments are made, press the I key. The message "Filter copied to specified linksets" is displayed in the information line at the top of the screen when the filter information is copied.

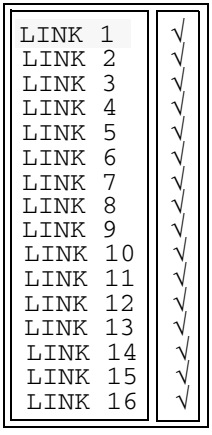


Figure 2.11 - Message Filters Screen Copy Options Menu

Save
Press the S key to save the current filters. A Save dialog box appears. Enter a file name (a maximum of eight characters) for the current filters in the dialog box and press the Enter (↵) key.

Recall
Press the R key to recall any previously saved filters. A catalog of saved filters is displayed. Use the ↑↓ keys to select the a filter and press the Enter (↵) key to display the file. Filters can be recalled and applied to numerous configurations.

LinkStatus
Press the L key to toggle the link status ON or OFF.

FISU
This option filters Fill-In Signal Units (FISUs) by allowing them to be passed or blocked.

LSSU
This option filters Link Status Signal Units (LSSUs) by allowing them to be passed or blocked.

Errors
This option filters signal unit errors by allowing them to be passed or blocked.

PCR
This option turns PCR filtering ON or OFF. This option is used only when the PCR method of error correction is specified under Level 2 Setup Parameters. Unexpected results may occur if this filter is used on a non-PCR linkset. PCR is used on international and satellite connections when standard error correction methods are not correcting transmission delays.

SNM
This option filters Signalling Network Management (SNM) MTP Level 3 messages, such as Transfer Prohibit (TFP) and Changeover Order (COO) messages, by allowing them to be passed or blocked.

MTNR (ITU-T and CHINA)
This option filters regular Signalling Network Test/Maintenance messages (MTNR), such as Signalling Link Test Messages (SLTMs) and Signalling Link Test Acknowledgments (SLTAs), by allowing them to be passed or blocked.

MTNS (ANSI)
This option filters special Signalling Network Test/Maintenance messages (MNTS), such as SLTMs and SLTAs, by allowing them to be passed or blocked.

SCCP
This option filters Signalling Connection Control Part (SCCP) messages, such as TCAP, LIDB, Private Virtual Network (PVN), CLASS, Interim Standard number 41 (IS41), and 800 number translation messages, by allowing them to be passed or blocked.

TUP/NUP
This option filters TUP messages, such as Initial Address Messages (IAMs) and Release Complete (RLC) messages for ITU, by allowing them to be passed or blocked. The TUP/NUP option also filters National User Part (NUP) messages for the British Telecom Network Requirement (BTNR) protocol by allowing them to be passed or blocked.

ISUP
This option filters ISUP messages, such as IAMs and Answer Messages (ANMs), by allowing them to be passed or blocked.

DUPC
This option filters Data User Part Circuit (DUPC) related messages by allowing them to be passed or blocked.

DUPF
This option filters Data User Part Facilities (DUPF) related messages by allowing them to be passed or blocked.

OTHERS
This option filters all other user part messages for User Part 9 through User Part 15. Some custom applications with these undefined user parts must set the Others field to PASS to capture data.

ALL OTHERS
This option allows you to pass or block all signal units not defined in the filter fields above it.

Assigning Level 2 Filters

Follow these steps to assign Level 2 filters.

Step	Action
1.	From the SS7 Configure options menus, use the ↑↓ keys to select **FILTERS,** and press the **Enter (↵)** key.
2.	Use the↑↓ keys to select **MESSAGE FILTER** and press the **Enter (↵)** key. When the Message Filters screen is displayed, the cursor appears in the FISU field in the Level 2 section.
3.	Press the **Enter (↵)** key to set the option to either BLOCK or PASS Level 2 FISU messages, or press the **B** key to BLOCK all Level 2 messages. If you choose to block all Level 2 messages, you can skip **Step 4** through **Step 6**.
4.	Press the ↓ key to move to the LSSU field. Press the **Enter (↵)** key to BLOCK or PASS Level 2 LSSU messages.
5.	Press the ↓ key to move to the Errors field. Press the **Enter (↵)** key to BLOCK or PASS Level 2 errored messages.
6.	Press the ↓ key to move to the PCR field. Press the **Enter (↵)** key to toggle the PCR filter ON or OFF.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the* ***Spectra Setup and Configuration Guide****.*

Assigning User Parts as Filters

The setting of each entry in the User Parts section is determined by the type of data being captured or the test being run. The most common user parts are SNM, MTNS, SCCP, TUP, and ISUP. **Table 2.1** provides a list of the types of messages captured when the User Part Filters are ON.

Table 2.1 - User Part Filters

User Part Filter	Message Types Captured When Filter is ON
SNM	MTP Level 3 Management Messages
MTNS/MTNR	Signalling Link Test Messages (SLTM, SLTA)
TUP	Telephone User Part Messages
ISUP	ISDN User Part Messages
SCCP	SCCP and TCAP Messages (CLASS, PVN, LIDB, 800 number translation, IS41 messages)

If all fields under the User Part section are set to BLOCK, no messages are captured, regardless of how the other fields are set in the yellow section of the filter screen. Follow these steps to assign User Parts as filters.

Step	Action
1.	In the SS7 Message Filters screen, press the ↑↓↔ keys to move the cursor to the SNM field in the User Parts section of the Message Filter screen.
2.	Press the **Enter** (↵) key to set the option to either BLOCK or PASS a message.
3.	Repeat this procedure for the other fields in the USER PARTS section.

*You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

If a user part is not displayed, use the OTHERS field for the filter assignment. The following sections explain how to discriminate between user part messages.

Assigning Point Codes as Filters

The point code filters qualify messages that passed the user part filtering. An entry in this field allows you to pass or block messages based on their origin or destination. Entries in this field resemble to the Destination Point Code (DPC), Origination Point Code (OPC), and Call Termination Point Code (CTPC) in the routing label of a message.

In order to be placed in capture memory, an MSU's point code must match a passed entry in this filter section without encountering a blocked entry with the same point code. For example, if you enter 1-1-5 - PASS in the 1. field and 1-1-5 - BLOCK in the 2. field, any MSU containing a point code of 1-1-5 is blocked because BLOCK takes precedence over PASS.

Follow these steps to assign point codes as filters.

Step	Action
1.	Press the ↑↓↔ keys to move the cursor to the 1. field of the Point Codes section.
2.	Press the **Insert** key. Enter the point code, and press the **Enter** (↵) key to assign the point code to the field. For valid point code ranges, refer to "Setting Valid Point Code Ranges" on page 115 of the ***Spectra Setup and Configuration Guide***.
3.	Press the **Enter** (↵) key again to BLOCK or PASS messages containing the specified point code. Repeat this step to assign up to ten point code filters. After the point codes are assigned, the All Others field of the Point Codes section automatically displays BLOCK or PASS. This field blocks or passes all point codes not entered in the previous ten fields. This field is for information purposes only and cannot be changed.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the* ***Spectra Setup and Configuration Guide***.

Assigning Phone Numbers as Filters

This entry qualifies messages based on the phone number (address signal) of a message with address parameters. Partial phone numbers are allowed.

In order to be placed in capture memory, an MSU containing a phone number as a parameter must match a passed entry in this filter section without encountering a blocked entry with the same phone number. For example, if you enter 2146809400 - PASS in the 1. field and 2146809400 - BLOCK in the 2. field, any MSU containing a phone number of 2146809400 is blocked because BLOCK takes precedence over PASS.

Follow these steps to assign phone numbers as filters.

Step	Action
1.	Press the ↑↓↔ keys to advance to the 1. field of the Phone Numbers section.
2.	Press the **Insert** key. Enter the phone number (wildcards available), and press the **Enter** (↵) key. The phone number is displayed in the field.
3.	Press the **Enter** (↵) key again to BLOCK or PASS messages containing the phone number. Repeat this step to assign a maximum of two phone number filters. After the phone numbers are assigned, the All Others field automatically displays BLOCK or PASS. This field blocks or passes all phone numbers not entered in the previous two fields. This field is for information purposes only and cannot be changed.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

Assigning Subsystem Numbers as Filters

The subsystem number filter applies only to SCCP messages. If the SCCP field in the User Part section is set to PASS, this field is used for qualifying messages.

In order to be placed in capture memory, the SCCP MSU's subsystem number must match a passed entry in this filter section without encountering a blocked entry with the same subsystem number. For example, if you enter 253 - PASS in the 1. field and 253 - BLOCK in the 2. field, any MSU containing a subsystem number of 253 is blocked because BLOCK takes precedence over PASS.

Follow these steps to assign subsystem numbers as filters.

Step	Action
1.	Press the ↑↓↔ keys to move the cursor to the 1. field of the Subsystem Numbers section. Subsystem Numbers are used in SCCP messages to define an application, such as LIDB or IS41.
2.	Press the **Insert** key. Enter the subsystem number (0 to 255), and press the **Enter (**↵) key. The subsystem number is displayed in the field.
3.	Press the **Enter (**↵) key again to BLOCK or PASS messages containing the subsystem number. Repeat this step to assign a maximum of two subsystem number filters. After the subsystem numbers are assigned, the All Others field automatically displays BLOCK or PASS. This field blocks or passes all subsystem numbers not entered in the previous two fields. This field is for information purposes only and cannot be changed.

The settings in the Subsystem Numbers section are based on the application being captured. The recommended settings are provided in **Table 2.2**.

Table 2.2 - Recommended Settings for Subsystem Numbers

SSN	ANSI Subsystem Description	ITU-T and CHINA Subsystem Description
00	SSN not known/not used	SSN not known/not used
01	SCCP Management	SCCP Management
02	Telephone User Part	(Reserved for ITU-T allocation)
03	ISDN User Part	ISDN User Part
04	Operation, Admin. and Maintenance Part	Operation, Admin. and Maintenance Part
05	MAP-IS41 Mobile Application Part	MAP - Mobile Application Part
06	HLR-IS41 Home Location Register	HLR - Home Location Register
07	VLR-IS41 Visitor Location Register	VLR - Visitor Location Register
08	MSC-IS41 Mobile Switching Center	MSC - Mobile Switching Center
09	EIR-IS41 Equipment Identification Register	EIR - Equipment Identity Register
10	AC-IS41 Authentication Center	AC - possible Authentication Center
11-250	(spare)	(spare)
251	CLASS	(spare)
252	PVN Private Virtual Network	(spare)
253	LIDB Query	BSS - OperationsAndMaintenance
254	800 Number Translation	BSS - RadioSubsystemApplicationPart
255	(Reserved for expansion)	(Reserved for expansion)

Table 2.2 is not intended to be a comprehensive listing of subsystem numbers. For more information about subsystem numbers, refer to the appropriate protocol specifications.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

Assigning Circuits as Filters

This entry is specific to TUP and ISUP messages. If the TUP and ISUP fields in the User Part section are set to PASS, this field can be used to qualify messages.

In order to be placed in capture memory, an MSU's circuit must match a passed entry in this filter section without encountering a blocked entry with the same circuit. For example, if you enter 496 - PASS in the 1. field and 496 - BLOCK in the 2. field, any MSU containing a circuit of 496 is blocked because BLOCK takes precedence over PASS.

Follow these steps to assign circuits as filters.

Step	Action
1.	Press the ↑↓↔ keys to move the cursor to the 1. field of the Circuits section. Circuits are used in ISUP and TUP messages to define speech path trunk selection.
2.	Press the **Insert** key. Enter a circuit, and press the **Enter (**↵) key. The assigned circuit is displayed in the field.
3.	Press the **Enter (**↵) key again to BLOCK or PASS messages containing the circuit. Repeat this step to assign up to two circuit filters. A range of circuits can be specified using a tilde (~) to separate the lower and upper limits of the range, such as 1~24, 1~32, 100~296, 0~4095 (ITU-T or ITU), or 0~16383 (ANSI). After the circuits are assigned, the All Others field automatically displays BLOCK or PASS. This field blocks or passes all circuits not entered in the previous two fields. This field is for information purposes only and cannot be changed.

The settings in this section can be used to capture messages related to a CIC or to a range of CICs.

Assigning User-Defined Events as Filters

The USER EVENTS section of the Message Filters screen allows you to specify which messages will be captured based on user-defined events.

In order to be placed in capture memory, an MSU must match a passed entry in this filter section without encountering a blocked entry. For example, if you enter COT_FAIL - PASS in the 1. field and COT_FAIL - BLOCK in the 2. field, the COT_FAIL MSU is blocked because BLOCK takes precedence over PASS.

Follow these steps to assign user-defined events as filters.

Step	Action
1.	Press the ↑↓↔ keys to move the cursor to the 1. field of the USER EVENTS section of the Message Filters screen.
2.	Press the **Insert** key to access the SUs Event catalog for that linkset's protocol. When the catalog is displayed, use the **A…Z Search** option to search for events alphabetically by pressing the corresponding key.
3.	Press the **Delete** key to delete the selected file name/event from the catalog.

✍ *If you press the **Delete** key, the selected file in the corresponding protocol's directory (for example, ANSI/SIGUNIT) is also deleted.*

4.	Select an event, and press the **Enter** (↵) key to assign that message as a filter.
5.	Press the **Enter** (↵) key again to BLOCK or PASS the assigned message.
6.	Repeat the filter assignment procedure for a maximum of six fields. These fields can capture any user-defined signal unit, including Continuity Test (COT) Failure messages, Abnormal Releases, TFPs to/from suspected point codes, and other messages indicating potential problems in the network.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

ISDN FILTERS

As with the SS7 filters, the ISDN filters allow for the pre-capture filtering of messages so you capture only messages of interest. Filtering prevents unnecessary information from taking up capture memory. The Filters option also allows the Real Time Call Trace option to be performed on specific phone numbers. This option is available to all ISDN data link layer protocols.

Follow these steps to access the ISDN filters.

Step	Action
1.	From the ISDN Configure options menu (see **Figure 2.12**), press the ↑↓ keys to highlight **FILTERS**.

```
FILTERS
AUTOMATIC RESPONSES
LEVEL 2 PARAMETERS
```

Figure 2.12 - ISDN Configure Options Menu

2.	Press the **Enter** (↵) key to access the Filters menu (see **Figure 2.13**).

REAL TIME CALL TRACE	OFF
MESSAGE FILTER	OFF
SHOW EACH DUPLICATE	OFF

Figure 2.13 - Filters Menu

3. You can activate either the Real Time Call Trace option or the Message Filter option; only one of these options can be ON at a given time. The Show Each Duplicate option works independently of the other two options and can be activated at any time.

   To turn ON the Real Time Call Trace option, highlight the desired field, and press the →← keys.

   To turn ON the Message Filter option, highlight the desired field, and press the →← keys.

✍ *When the ISDN Message Filter option is turned ON, an additional direction line option is displayed. The Pre/PostFilterStats option allows you to filter the statistics collected by the Spectra system by filtering the messages used to calculate the statistics. Hit the P key to toggle between Pre Filter and Post Filter in the Stats Log option in the display line. The default is set to the Pre Filter option. If the Pre Filter option is selected, the Spectra system will collect statistics for all incoming messages and will ignore the message filters. If the Post Filter option is selected, the Spectra system will not collect statistics for the messages defined in the Message Filters screen.*

   To turn ON the Show Each Duplicate option, highlight the desired field, and press the →← keys.

4. To set up parameters for either of the filters options, highlight the desired option, and press the **Enter (↵)** key. To activate the Show Each Duplicate option, highlight the desired field, and press the **Enter (↵)** key. For more information about the Show Each Duplicate option, refer to "Show Each Duplicate" on page 61 of this guide.

ISDN REAL TIME CALL TRACE

When numbers are assigned in the ISDN Real Time Call Trace screen, only messages associated with a particular calling party number or called party number are captured and displayed.

The Spectra system allows for each trace to be assigned a color for easier viewing when using the F2 Run or F9 Capture functions.

Other call setup procedures can also be identified. The Real Time Call Trace screen is pictured in **Figure 2.14**.

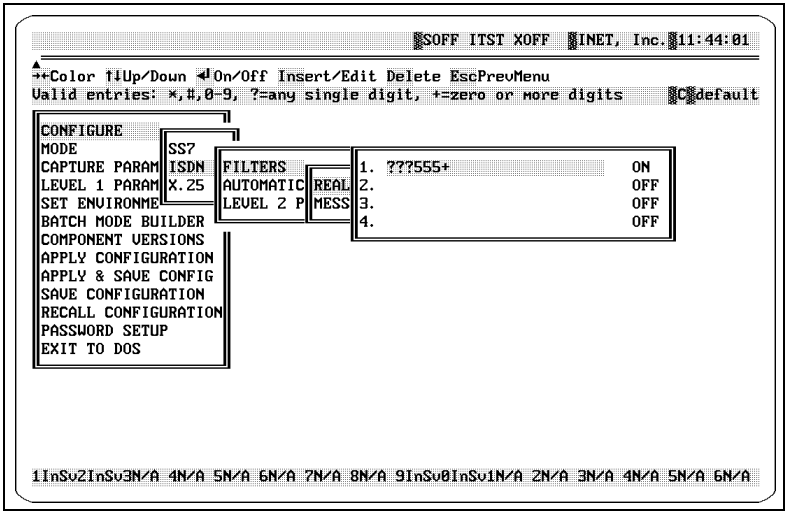


Figure 2.14 - ISDN Real Time Call Trace Screen

The following list explains valid entries for the ISDN Real Time Call Trace screen.

- An asterisk (*), a pound sign (#), and the digits 0 through 9 are valid ISDN phone number digits.
- A question mark (?) is used to represent any single digit. For example, an entry of 80074399?? represents all 800 numbers between 7439900 and 7439999.
- A plus sign (+) is used to represent zero or more digits. For example, an entry of +800+ represents all numbers containing 800; numbers such as 8006809400, 9008008989, and 9724568000 are included. A maximum of two plus signs can be used in any single entry.

Real Time Call Trace Screen Definitions

→← Color
Press the →← keys to cycle through the color options. This option cycles through the various color options and stops when the desired color to be associated with the messages containing the phone number is displayed.

↑↓ Up/Down
Press the ↑↓ keys to move between the four call trace fields.

↵ On/Off
Press the Enter (↵) key to prohibit (OFF) or allow (ON) the capture of messages related to a phone number.

Insert
Press the Insert key to access the entry field for the selected call trace option, or simply begin typing the phone number to enter it into the field.

Using Real Time Call Trace

Follow these steps to trace a call.

Step	Action
1.	In the ISDN Real Time Call Trace screen, select the **1**. field.
2.	Press the **Insert** key to access the entry field, and enter the phone number to be traced (maximum of 24 digits).
3.	Press the **Enter (↵)** key to assign the number.
4.	Press the **Enter (↵)** key again to toggle the trace option to the ON position. When the option is turned ON, call trace is performed using the entered phone number.
5.	Press the →← keys to cycle through the various color options for the option. Stop when the desired color to be associated with the messages containing the phone number is displayed.
6.	Repeat **Step 1** through **Step 5** for the other call trace fields (if necessary).
7.	Press the **Esc** key to return to the Filters options menu.

8. Press the →← keys to toggle the **Trace** option to ON.

9. To perform call trace using the entered phone numbers, press the **F2** key to run the Spectra system while in Monitor mode. An example Real Time Call Trace display is shown in **Figure 2.15**.

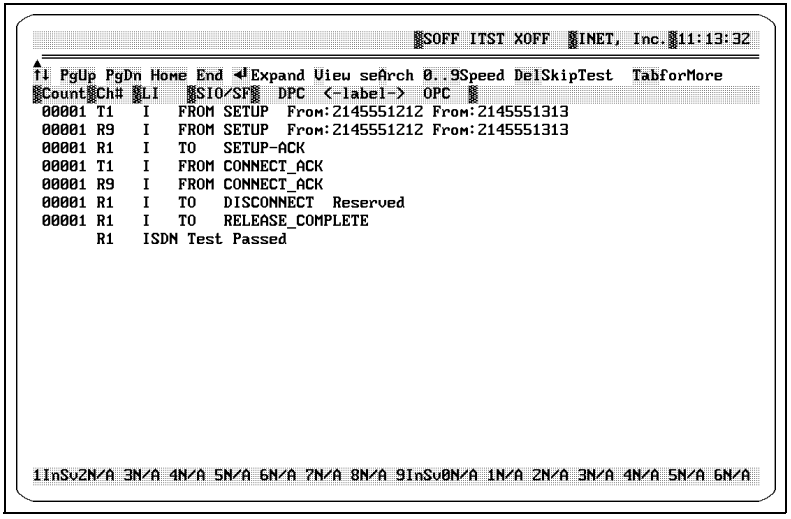


Figure 2.15 - Real Time Call Trace Display (Example)

Once the monitoring process is started, the Spectra system traces all messages until a message containing a user-specified phone number is detected. When a specified number is detected in a given signal unit, the Spectra system displays all messages pertaining to that call until the process is stopped by the user.

MESSAGE FILTERS

The Message Filters option filters messages before they are captured and stored in the buffer. The Pre/Post Filter Stats option filters messages before statistics are collected (see "ISDN Filters" on page 44 of this guide). Up to 16 sets of filters, one set for each link, can be established by using the functions of the Message Filters screen. The Message Filters screens for SS7, ISDN, and X.25 are very similar in appearance and setup but use protocol-specific information for filtering. The ISDN Message Filters screen is pictured in **Figure 2.16**.

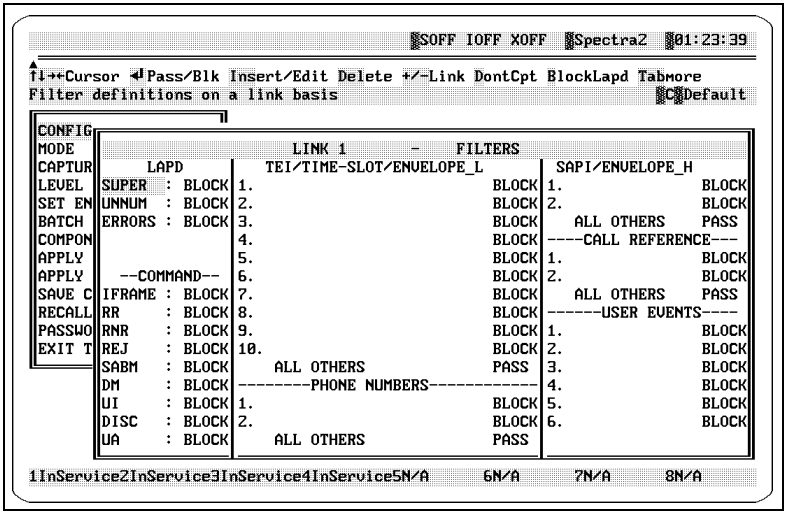


Figure 2.16 - ISDN Message Filters Screen

The Message Filters screen is divided into the following sections.

LAPD, Command
Filters for Link Access Procedures on the D-channel (LAPD) can be used to block or pass supervisory, unnumbered, and errored frames. LAPD and COMMAND filter fields appear red on colored screens.

Command filters can be used to block or pass Command frames. If all fields under the COMMAND section are set to BLOCK, no messages are captured, regardless of the other settings in the yellow sections found in the center and top right portions of the Filters screen.

All listed COMMAND filters may be used for the Consultative Committee for International Telephone and Telegraph (CCITT) protocol, European Telecommunications Standards Institute (ETSI) protocol, Application Binary Interface Standard (ABIS) protocol, and the V5.1 and V5.2 interfaces. However, only the UA, UI, and SABM commands can be used as filters for the Digital Access Signalling System (DASS) protocol and Digital Private Network Signalling System (DPNSS) protocol.

TEI\TIME-SLOT\ENVELOPE_L, PHONE NUMBERS, SAPI\ENVELOPE_H, and CALL REFERENCE
These filters are AND filters, which means a signal unit must pass fields set to PASS in order to be placed in capture memory. Once a blocked field is encountered, the system stops checking for additional filters and the signal unit is filtered out. These filter fields appear yellow on color screens.

USER EVENTS
If a a message did not pass the yellow division of filters (TEI\TIME-SLOT\ENVELOPE_L, PHONE NUMBERS, SAPI\ENVELOPE_H, and CALL REFERENCE), the USER EVENTS filters are applied. If the message matches any of the user messages, it is blocked or passed, depending on the entry. User events are messages defined by the user under the F6 Edit function. (For information about the F6 Edit function, see **Chapter 5** of this guide.) USER EVENT filter fields appear blue on colored screens.

User-defined event message filtering provides you with a degree of additional qualification for the messages to be captured. Any message from the protocol's message catalog can be used as a user-defined event filter. This filter is applicable to all protocols.

In order to be placed in capture memory, any message must match a PASS entry in the filter section without encountering a BLOCK entry because BLOCK takes precedence over PASS. If a message is not tagged with a PASS indicator after passing through all filters, it is blocked.

Any filter defined in this screen takes effect only after the configuration is applied. If changes are made to the Filters screen while data capture is in progress, the changes only take effect after you have applied the configuration.



*You must use the Apply Configuration option before any changes to the settings take effect. Press the F2 Run key to restart the test. For more information about the Apply Configuration option, refer to "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

Message Filters Screen Definitions

↑↓↔Cursor
Press the ↑↓↔ keys to move the cursor to a particular field.

↵ Pass/Blk
Press the Enter (↵) key to toggle between PASS or BLOCK. This allows or prohibits the capture of a message, point code, user event, etc.

Insert/Edit
Press the Insert key to access the dialog box or events catalog for the selected field.

Delete
Press the Delete key to delete the selected filter. For example, if Terminal Endpoint Identifier (TEI) filters are entered in fields 1. and 2., the first field can be highlighted and deleted to make the second field the only TEI filter.

+/- Link
Press the + or - keys to cycle through the filter screen for each linkset.

DontCpt
Press the D key to prevent data from being logged on the current linkset.

Block Lapd
Press the B key to block LAPD signal units.

Tabmore
Press the Tab key to display other screen options.

Copy
Press the C key to access the Copy options menu (see **Figure 2.17**). The Copy options allows other linksets to be assigned the same filter settings as the displayed linkset. When the Copy option menu is displayed, all links are automatically marked. Select the linksets to which you do not want to assign the current filter settings, and press the Enter (↵) key to unmark them. When the assignments are made, press the I key. The message "Copied to specified links" is displayed in the information line at the top of the screen when the filter information is copied.

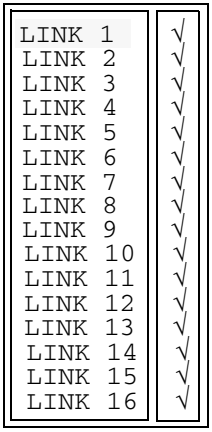


Figure 2.17 - Message Filters Screen Copy Options Menu

LinkStatus
Press the L key to toggle the link status ON or OFF.

SUPER
Supervisory frames are used for link control functions, such as acknowledging and requesting retransmission of information frames.

UNNUM
Unnumbered frames are used for link control or information transfer that does not require acknowledgment.

ERRORS
This option filters errored signal units by allowing them to be passed or blocked.

IFRAME
Information frames are used to transfer Level 3 information in sequentially numbered frames. They require acknowledgment. This command does not apply to the DASS or DPNSS protocols. Instead, the Unnumbered Information (UI) command is used.

RR
The Receive Ready (RR) command is used either to indicate that a network device is available to receive an information frame or to acknowledge previously received information frames. This command does not apply to the DASS or DPNSS protocols.

RNR
The Receive Not Ready (RNR) command is used to indicate that a network device is busy and unable to accept incoming information frames. This command does not apply to the DASS or DPNSS protocols.

REJ
The Reject (REJ) command is used to request the retransmission of information frames beginning from a specified frame sequence number. This command does not apply to the DASS or DPNSS protocols.

SABM
This filter field represents two commands: Set Asynchronous Balanced Mode Enhanced (SABME) or Set Asynchronous Balanced Mode Restricted (SABMR). The SABME command is used to initiate multiple-frame operation (modulo-128). The SABMR command is used to initiate multiple-frame operation (modulo-128) for DASS and DPNSS protocols.

DM
The Disconnected Mode (DM) command is used to indicate that a network device is unable to process sequential multiple information frames. This command does not apply to the DASS or DPNSS protocols.

UI
The Unnumbered Information (UI) command is used to send information that does not require acknowledgment. The UI command is used instead of an I-Frame command for the DASS and DPNSS protocols.

DISC
The Disconnect (DISC) command is used to terminate the link's multiple-frame operation. This command does not apply to the DASS or DPNSS protocols.

UA
The Unnumbered Acknowledgment (UA) command is used to acknowledge SABME and DISC commands. The DASS and DPNSS protocols both use this command.

TEI/TIME-SLOT/ENVELOPE_L
For the CCITT, ETSI, ABIS, V5.1 and V5.2 protocols, the TEI identifies a particular ISDN device or application within the main ISDN setup at the user end. This field can also be used to designate a timeslot for the DASS protocol. This field represents Channel in the DPNSS protocol.

SAPI/ENVELOPE_H
For the CCITT, ETSI, ABIS, V5.1 and V5.2 protocols, the Service Access Point Identifiers (SAPIs) specify the network application or entity that processes data link layer frames. This field does not apply to the DASS or DPNSS protocols.

CALL REFERENCE
The call reference numbers are used to identify messages associated with a particular call. The DASS protocol uses Link Access Protocol (LAP) numbers instead of call reference numbers, and the DPNSS protocol uses Data Link Connection (DLC) numbers instead of call reference numbers. Therefore, this filter does not apply to these protocols.

ALL OTHERS
The ALL OTHERS field allows you to pass or block all signal units not defined in the filter fields above it.

Assigning LAPD Filters

Follow these steps to assign the LAPD Filters option.

Step	Action
1.	From the ISDN Configure options menus, use the ↑↓ keys to select **FILTERS,** and press the **Enter (↵)** key.
2.	Use the ↑↓ keys to select **MESSAGE FILTER** and press the **Enter (↵)** key. When the Message Filters screen appears, the cursor is automatically placed in the SUPER field under the LAPD section.
3.	Press the **B** key to block or unblock all LAPD messages, or follow these steps to BLOCK or PASS individual message types.

4. With the cursor on the SUPER field, press the **Enter** (↵) key to either BLOCK or PASS LAPD Supervisory messages.

5. Press the ↓ key one time to move to the UNNUM field. Press the **Enter** (↵) key to either BLOCK or PASS LAPD Unnumbered Information messages.

6. Press the ↓ key one time to move to the ERRORS field. Press the **Enter** (↵) key to either BLOCK or PASS LAPD Errored messages.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

Assigning Commands as Filters

If all fields under the Commands section are set to BLOCK, no messages are captured, regardless of the settings in the yellow sections of the Filters screen. Follow these steps to assign commands as filters.

Step	Action
1.	In the ISDN Message Filters screen, use the ↑↓ keys to advance to the desired field of the Commands section of the Filters screen.
2.	Press the **Enter** (↵) key to either BLOCK or PASS the desired messages.
3.	Repeat **Step 1** and **Step 2** for all other fields in the Commands section.

The following sections show how to further discriminate between messages of given commands.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

Assigning TEI/Time-Slot/EnVelope_L Values as Filters

This entry further qualifies messages based on TEI or timeslot values. This filter represents Channel in the DPNSS protocol.

Follow these steps to assign TEI or timeslot values as filters.

Step	Action
1.	In the ISDN Message Filters screen, use the ↑↓ keys to advance to the desired field of the TEI/TIME-SLOT/ENVELOPE_L section of the Filters screen.
2.	Press the **Insert** key. Enter the desired TEI or timeslot value, and press the **Enter** (↵) key.
3.	Press the **Enter** (↵) key again to either BLOCK or PASS messages that contain the specified TEI or timeslot value.
4.	Repeat **Step 1** through **Step 3** to assign up to ten filters. After assigning the desired values, notice that the ALL OTHERS field automatically displays a BLOCK or PASS option. This field blocks or passes all values not entered in the previous ten fields. This field is for information purposes only and cannot be changed.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the* ***Spectra Setup and Configuration Guide****.*

Assigning Phone Numbers as Filters

This entry further qualifies messages based on the phone number (address signal) of a message with address parameters. Partial phone numbers are allowed. In order to be placed in capture memory, any message that has a phone number as a parameter must match a PASS entry in this filter section without encountering a BLOCK entry with the same phone number. This filter can be used with all protocols.

For example, if an entry of 2146809400 - PASS is made in the 1. field and an entry of 2146809400 - BLOCK is made in the 2. field, any message that contains a phone number of 2146809400 is blocked because BLOCK takes precedence over PASS.

Follow these steps to assign phone numbers as filters.

Step	Action
1.	Use the ↑↓ keys to advance to the 1. field of the Phone Numbers section.
2.	Press the **Insert** key. Enter the desired phone number (use a * for every wildcard digit entry), and press the **Enter (↵)** key. The phone number appears in the field.
3.	Press the **Enter (↵)** key to either BLOCK or PASS messages that contain the phone number.
4.	Repeat **Step 1** through **Step 3** to assign up to two phone number filters. After assigning the desired phone numbers, notice that the All Others field automatically displays a BLOCK or PASS option. This field blocks or passes all phone numbers not entered in the previous two fields. This field is for information purposes only and cannot be changed.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the* ***Spectra Setup and Configuration Guide****.*

Assigning SAPI/EnVelope_H Values as Filters

In order to be placed in capture memory, a message's SAPI value must match a PASS entry in this filter section without encountering a BLOCK entry with the same SAPI value. For example, if an entry of 63 - PASS is made in the first filter field and an entry of 63 - BLOCK is made in the second filter field, any message that contains a SAPI value of 63 is blocked, because BLOCK takes precedence over PASS.

SAPI index value filters are used for the CCITT, ETSI, ABIS, V5.1, and V52 protocols; they do not apply to the DASS and DPNSS protocols.

Follow these steps to assign SAPI values as filters.

Step	Action
1.	Use the ↑↓↔ keys to advance to 1. field of the SAPI/ENVELOPE_H section of the ISDN Filters screen. SAPI values specify the network application or entity that processes data link layer frames.
2.	Press the **Insert** key. Enter the desired SAPI value, and press the **Enter (↵)** key.
3.	Press the **Enter (↵)** key to either BLOCK or PASS messages that contain the specified SAPI value.
4.	Repeat **Step 3** to assign up to one more filter. After assigning the desired filters, notice that the ALL OTHERS field automatically displays a BLOCK or PASS option. This field blocks or passes all values not entered in the previous two fields. This field is for information purposes only and cannot be changed.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the* ***Spectra Setup and Configuration Guide****.*

Assigning Call Reference Numbers as Filters

In order to be placed in capture memory, a message's call reference number must match a PASS entry in this filter section without encountering a BLOCK entry with the same call reference number. For example, if an entry of 496 - PASS is made in the 1. field and an entry of 496 - BLOCK is made in the 2. field, any message that contains a call reference of 496 is blocked, because BLOCK takes precedence over PASS.

Call reference filters are used with CCITT, ETSI, ABIS, V5.1, and V5.2 protocols. They do not apply to the DASS and DPNSS protocols.

Follow these steps to assign call reference numbers as filters.

Step	Action
1.	Use the ↑↓↔ keys to advance to the 1. field of the CALL REFERENCE section. Call reference numbers are used to identify messages associated with a particular call.
2.	Press the **Insert** key. Enter the desired call reference number, and press the **Enter** (↵) key.
3.	Press the **Enter** (↵) key to either BLOCK or PASS messages that contain the specified call reference number.
4.	Repeat **Step 3** to assign up to two call reference filters. After assigning the desired call reference filters, notice the ALL OTHERS field automatically displays a BLOCK or PASS option. This field blocks or passes all call reference numbers not entered in the previous two fields. This field is for information purposes only and cannot be changed.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

Assigning User Events as Filters

The USER EVENTS section of the Message Filters screen allows you to specify which messages will be captured based on user-defined events.

In order to be placed in capture memory, a message must match a PASS entry in this filter section without encountering a BLOCK entry. For example, if an entry of CONNECT - PASS is made in the 1. field and an entry of CONNECT - BLOCK is made in the 2. field, any CONNECT message is blocked because BLOCK takes precedence over PASS.

Follow these steps to assign user-defined events as filters.

Step	Action
1.	Use the ↑↓↔ keys to advance to the 1. field of the USER EVENTS section of the Message Filters screen.
2.	Press the **Insert** key to access the Event catalog. The A…Z Search function can be used to search for events alphabetically when the corresponding letter is pressed. Instead of using the arrow keys to search for a file, simply type in the file name to highlight it.

✍ *Press the Delete key to delete the selected event from the catalog.*

3.	Select the desired event, and press the **Enter (↵)** key to assign that message as a filter.
4.	Press the **Enter (↵)** key to either BLOCK or PASS the assigned message.

5. Repeat **Step 1** through **Step 4** for up to six fields.

These fields can be used for capturing certain types of messages that may represent potential trouble in the network.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

SHOW EACH DUPLICATE

The Show Each Duplicate option controls the messages displayed on the F2 Run screen and gives the user the option of saving messages to the secondary hard drive. The Show Each Duplicate option is only available for ISDN and X.25 protocols.

When the Show Each Duplicate option is ON, the F2 Run screen displays every message, even if identical messages (for example, Receive Ready) are being sent. The Count field for all messages is always one, since each message is displayed. The Spectra system will display the messages on separate lines of the secondary capture and saves them to the secondary hard drive (see **Figure 2.18**).

✍ *This option has no effect on Error SUs.*

When the Show Each Duplicate option is OFF, the F2 Run screen displays messages only once and indicates the number of duplicate messages in the Count field of a particular message (see **Figure 2.19**). The duplicate messages are not saved to the secondary hard drive.

Figure 2.18 and **Figure 2.19** illustrate the difference between the Show Each Duplicate settings.

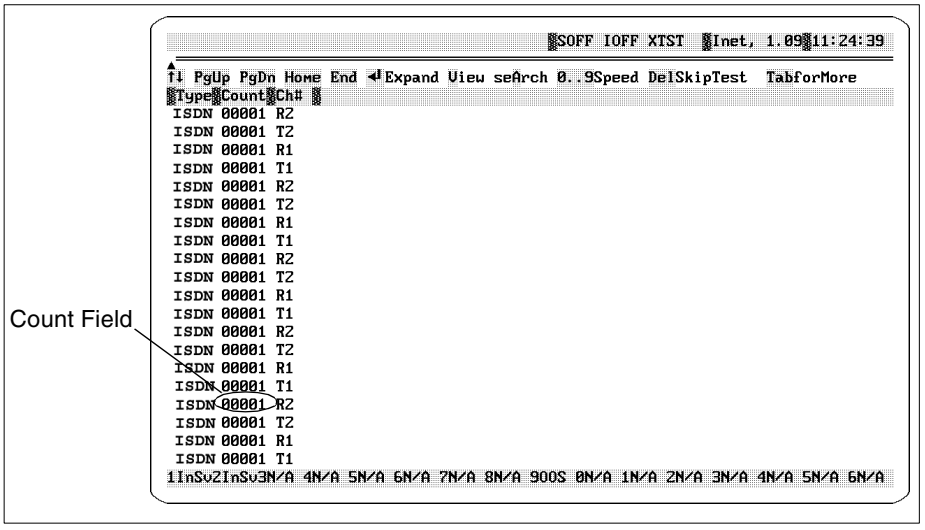


Figure 2.18 - F2 Run Screen - Show Each Duplicate Option ON

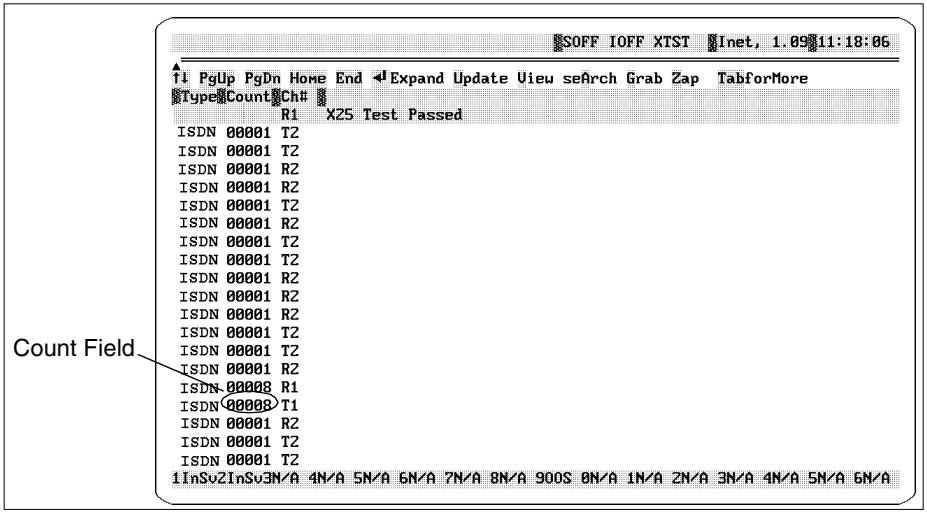


Figure 2.19 - F2 Run Screen - Show Each Duplicate Option OFF

X.25 FILTERS

As with the SS7 and ISDN filters, the X.25 filters allow for the pre-capture filtering of messages so you capture only messages of interest. Filtering prevents unnecessary information from taking up capture memory.

Follow these steps to access the X.25 filters.

Step	Action

1. From the X.25 Configure options menu (see **Figure 2.20**), press the ↑↓ keys to highlight **FILTERS**.

```
FILTERS
AUTOMATIC RESPONSES
LEVEL 3 PARAMETERS
LEVEL 2 PARAMETERS
```

Figure 2.20 - X.25 Configure Options Menu

2. Press the **Enter** (↵) key to access the Filters menu (see **Figure 2.21**).

MESSAGE FILTER	OFF
SHOW EACH DUPLICATE	OFF

Figure 2.21 - Filters Menu

3. To turn ON the Message Filter option, highlight the desired field, and press the →← keys. To turn ON the Show Each Duplicate option, highlight the desired field, and press the →← keys.

When the SS7 Message Filter option is turned ON, an additional direction line option is displayed. The Pre/PostFilterStats option allows you to filter the statistics collected by the Spectra system by filtering the messages used to calculate the statistics. Hit the P key to toggle between Pre Filter and Post Filter in the Stats Log option in the display line. The default is set to the Pre Filter option.If the Pre Filter option is selected, the Spectra system will collect statistics for all incoming messages and will ignore the message filters. If the Post Filter option is selected, the Spectra system will not collect statistics for the messages defined in the Message Filters screen.

4. To set up parameters for the Message Filters option, highlight the option, and press the **Enter** (↵) key. To activate the Show Each Duplicate option, highlight the option, and press the **Enter** (↵) key. For more information about the Show Each Duplicate option, refer to "Show Each Duplicate" on page 77 of this guide.

MESSAGE FILTERS

The Message Filters option filters messages before they are captured and stored in the buffer. The Pre/Post Filter Stats option filters messages before statistics are collected (see "X.25 Filters" on page 63 of this guide). Up to 16 sets of filters, one set for each link, can be established in the Message Filters screen. The Message Filters screens for SS7, ISDN, and X.25 are similar in appearance and setup but use protocol-specific information for filtering. The X.25 Message Filters screen is pictured in **Figure 2.22**.

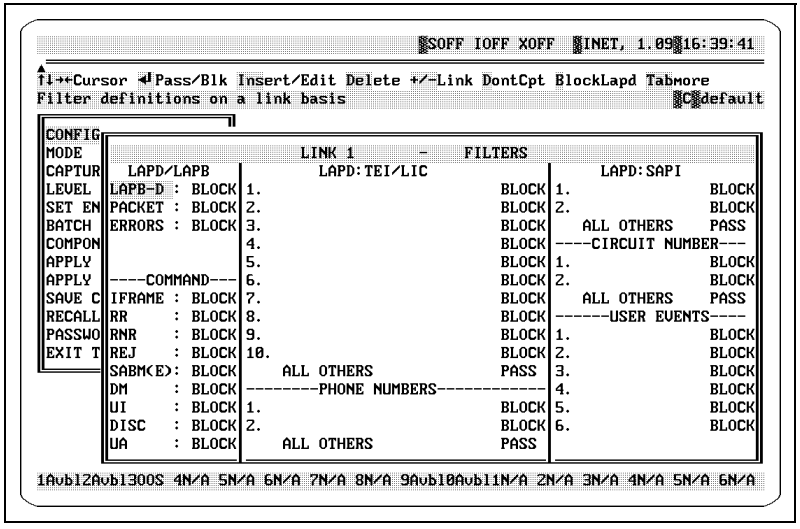


Figure 2.22 - X.25 Message Filters Screen

The Message Filters screen is divided into the following five separate sections. During the filtering procedure, messages must pass each division of filters before advancing to the next division.

LAPD/LAPB, COMMANDS
Layer filters can be used to BLOCK or PASS Link Access Protocol Balanced/ Link Access Procedure on the D-Channel (LAPB/LAPD) messages, packet layer messages, and errored messages. Command filters can be used to block or pass command frames. Layer filters appear red on color screens.

LAPD: TEI/LIC, LAPD: SAPI
The TEI/Link Identification Code (LIC) and SAPI filters are AND filters, which means a signal unit must pass all fields set to PASS in order to be placed in the capture memory. Once a blocked field is encountered, the system stops checking for additional filters and the signal unit is filtered out. These filter fields appear yellow on color screens.

✍ *The TEI/LIC and SAPI parameters can only be configured for LAPD messages.*

PHONE NUMBERS
These filters can be used to block or pass certain phone numbers and are also AND filters. These filters appear green on color screens.

CIRCUITS
These filters can be used to block or pass certain circuit numbers. These are AND filters, which means a message must pass each field set to PASS in order to be placed in capture memory. Once a blocked field is encountered, the system stops checking for additional filters. These filters appear white on color screens.

USER EVENTS
If the message matches any of the user messages, it is blocked or passed depending on the entry. User events are messages defined using the F6 Edit function. (For information about the F6 Edit function, see **Chapter 5** of this guide.) User events filters appear blue on color screens.

Any filter defined in this screen takes effect only after the configuration is applied. Therefore, if changes are made to the Filter screen while data capture is in progress, the changes only take effect after you have applied the configuration. Use the Apply Configuration option under the F1 Setup menu to apply the changes you have made. Then press the F2 Run key to restart the test.

Message Filters Screen Definitions

The following options are displayed in the direction line across the top of the screen.

↑↓↔Cursor
Press the ↑↓↔ keys to move the cursor to a particular field.

↵ Pass/Blk
Press the Enter (↵) key to toggle between PASS or BLOCK. This allows or prohibits the capture of a message, point code, user event, etc.

Insert/Edit
Press the Insert key to access the dialog box or events catalog for the selected field.

Delete
Press the Delete key to delete the selected User Defined Event filter. For example, if event filters are entered in fields 1. and 2., the first field can be highlighted and deleted to make the second field the only event filter.

+/- Link
Press the + or - keys to cycle through the filter screen for each linkset.

DontCpt
Press the D key to prevent data from being logged on the current linkset.

Block Lapd
Press the B key to block LAPD signal units.

Tabmore
Press the Tab key to display other screen options.

Copy
Press the C key to access the Copy options menu (see **Figure 2.23**). The Copy options allows other linksets to be assigned the same filter settings as the displayed linkset. When the Copy option menu is displayed, all links are automatically marked. Select the linksets to which you do not want to assign the current filter settings, and press the Enter (↵) key to unmark them. When the assignments are made, press the I key. The message "Copied to specified links" is displayed in the information line at the top of the screen when the filter information is copied.

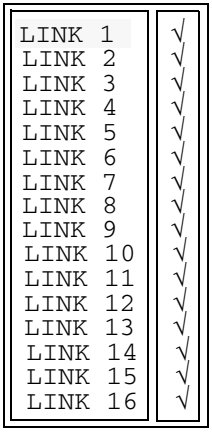


Figure 2.23 - Message Filters Screen Copy Options Menu

LinkStatus
Press the L key to toggle the link status ON or OFF.

LAPB/D
The LAPB/D filter filters LAPB/D layer messages by allowing them to be passed or blocked.

PACKET
This filter filters PACKET layer messages by allowing them to be passed or blocked.

ERRORS
This filter filters errored messages by allowing them to be passed or blocked.

IFRAME
The Information Frames are used to transfer Level 3 information in sequentially numbered frames and require acknowledgment. Information Frames are used for messages of all application type.

RR
The RR command is used to either indicate that a network device is available to receive an Information Frame or to acknowledge previously received Information Frames.

RNR
The RNR command is used to indicate that a network device is busy and unable to accept incoming Information Frames.

REJ
The REJ command is used to request the retransmission of Information Frames beginning from a specified frame sequence number.

SABM(E)
The SABME command is used to initiate multiple-frame operation (modulo-128).

DM
The DM command is used to indicate that a network device is unable to process sequential multiple Information Frames.

UI
The UI command is used to send information that does not require acknowledgment.

DISC
The DISC command is used to terminate the link's multiple-frame operation.

UA
The UA command is used to acknowledge SABME and DISC commands.

TEI/LIC

The TEI identifies a specific piece of terminal equipment on the X.25 interface. TEIs have a maximum value of 127. Any TEI entry in this field that is greater than 127 is translated by the Spectra system into a corresponding LIC format. The Spectra system notifies you of the translation from a TEI value to a LIC value with a message in the upper-left corner of the filters screen. The Spectra system then inserts the corresponding LIC value into the field you are editing. In the following example, a TEI value of 128, which exceeds the maximum value of 127, has been inserted into the LAPD:TEI/LIC section of the Filters screen (see **Figure 2.24**).

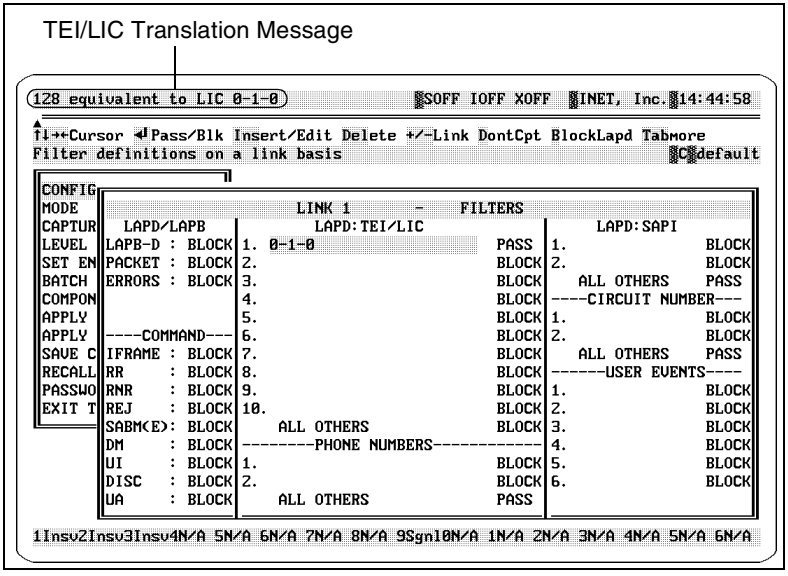


Figure 2.24 - X.25 Filters Screen - TEI/LIC Translation Message Displayed

The LIC identifies a specific link connection on the B-channel of the X.25 interface. The LIC parameter is displayed in a decimal format, (xxx-xxx-xxx) with the maximum value of each sub-field being 127 (for example, 120-115-110).

SAPI

The SAPI specifies the Layer 3 network application or entity that processes data link layer frames.

CIRCUITS
The circuits are used in messages to define the logical circuit that carries the message.

ALL OTHERS
The ALL OTHERS field allows you to pass or block all signal units not defined in the filter fields above it.

Assigning LAPD/LAPB Filters

Follow these steps to assign layer filters.

Step	Action
1.	When the Message Filters screen appears, the cursor is automatically placed in the LAPB field under the Layer section. Press the **Enter** (↵) key to either BLOCK or PASS the LAPB Layer messages.
2.	Press the ↓ key one time to move to the Packet field. Press the **Enter** (↵) key to either BLOCK or PASS the Packet Layer messages.
3.	Press the ↓ key one time to move to the Errors field. Press the **Enter** (↵) key to either BLOCK or PASS errored messages.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

Assigning Commands as Filters

If all fields under the Commands section are set to BLOCK, no messages are captured, regardless of other settings in the COLOR section of the Filters screen. Follow these steps to assign commands as filters.

Step	Action
1.	Use the ↑↓↔ keys to advance to the desired field of the Commands section of the Filters screen.

2. Press the **Enter** (↵) key to either BLOCK or PASS the desired messages.

3. Repeat **Step 1** and **Step 2** for all other fields in the Commands section.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the* ***Spectra Setup and Configuration Guide****.*

The following sections show how to further discriminate between messages of given commands.

Assigning TEIs as Filters

This entry further qualifies LAPD messages based on TEI values. Follow these steps to assign TEIs as filters.

Step	Action

1. Use the ↑↓↔ keys to advance to the desired field of the LAPD:TEI/LIC section of the Filters screen.

2. Press the **Insert** key. Enter the desired TEI value, and press the **Enter** (↵) key.

✍ *The Spectra system internally recognizes any single entry in this field greater than 127 and translates the entry into the proper LIC format. TEI entries cannot be greater than 127. For more information about LIC and TEI formats, see "TEI/LIC" on page 69 of this guide.*

3. Press the **Enter** (↵) key to either BLOCK or PASS messages that contain the specified TEI value.

4. Repeat **Step 1** through **Step 3** to assign up to ten TEI filters.

   After assigning the desired TEI values, notice that the ALL OTHERS field automatically displays a BLOCK or PASS option. This field is for information purposes only and cannot be modified.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the*

mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the ***Spectra Setup and Configuration Guide****.*

Assigning LICs as Filters

This entry further qualifies LAPD messages based on LIC values. Follow these steps to assign LICs as filters.

Step	Action
1.	Use the ↑↓↔ keys to advance to the desired field of the LAPD:TEI/LIC section of the Filters screen.
2.	Press the **Insert** key. Enter the desired LIC value, and press the **Enter** (↵) key.

✍ *The Spectra system internally recognize any single entry in this field greater than 127 and translates the entry into the proper LIC format. For more information about LIC and TEI formats, see "TEI/LIC" on page 69 of this guide.*

3.	Press the **Enter** (↵) key to either BLOCK or PASS messages that contain the specified LIC value.
4.	Repeat **Step 1** through **Step 3** to assign up to ten LIC filters. After assigning the desired LIC values, notice that the ALL OTHERS field automatically displays a BLOCK or PASS option. This field is for information purposes only and cannot be modified.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the* ***Spectra Setup and Configuration Guide****.*

Assigning Phone Numbers as Filters

In order to be placed in capture memory, a message's phone number must match a PASS entry in this filter section without encountering a BLOCK entry with the same phone number. For example, if an entry of 2146809400 - PASS is made in the 1. field and an entry of 2146809400 - BLOCK is made in the 2. field, any message that contains a phone number of 2146809400 is blocked because BLOCK takes precedence over PASS.

Follow these steps to assign phone numbers as filters.

Step	Action
1.	Use the ↑↓↔ keys to advance to the 1. field of the PHONE NUMBERS section.
2.	Press the **Insert** key to access the Enter Phone Number dialog box. Enter the desired phone number (maximum of 14 digits), and press the **Enter** (↵) key. The phone number appears in the field.
3.	Press the **Enter** (↵) key to either BLOCK or PASS messages that contain the phone number.
4.	Repeat **Step 1** through **Step 3** to assign up to two phone number filters. After assigning the desired phone numbers, notice that the ALL OTHERS field automatically displays a BLOCK or PASS option. This field blocks or passes all phone numbers not entered in the previous two fields.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

Assigning SAPIs as Filters

In order to be placed in capture memory, an LAPD message's SAPI must match a PASS entry in this filter section without encountering a BLOCK entry with the same SAPI. For example, if an entry of 63 - PASS is made in the 1. field and entry of 63 - BLOCK is made in the 2. field, any message that contains a SAPI value of 63 is blocked because BLOCK takes precedence over PASS.

Follow these steps to assign SAPIs as filters.

Step	Action
1.	Use the ↑↓↔ keys to advance to the 1. field of the SAPI section. SAPIs specify the network application or entity that processes data link layer frames.
2.	Press the **Insert** key. Enter the desired SAPI value, and press the **Enter** (↵) key.
3.	Press the **Enter** (↵) key to either BLOCK or PASS messages that contain the specified SAPI.
4.	Repeat **Step 3** to assign up to two SAPI filters. After assigning the desired SAPI filters, notice that the ALL OTHERS field automatically displays a BLOCK or PASS option. This field blocks or passes all SAPI values not entered in the previous two fields. This field is for information purposes only and cannot be modified.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

Assigning Circuits as Filters

In order to be placed in capture memory, a message's circuit must match a PASS entry in this filter section without encountering a BLOCK entry with the same circuit. For example, if an entry of 200 - PASS is made in the 1. field and an entry of 200 - BLOCK is made in the 2. field, any message that contains a circuit of 200 is blocked because BLOCK takes precedence over PASS.

Follow these steps to assign circuits as filters.

Step	Action
1.	Use the ↑↓↔ keys to advance to the 1. field of the CIRCUITS section. Circuits are used in messages to define the physical circuit that carries the message.
2.	Press the **Insert** key to access the Enter Circuit dialog box. Enter the desired circuit (0 to 255), and press the **Enter (↵)** key. The assigned circuit appears in the field.
3.	Press the **Enter (↵)** key to either BLOCK or PASS messages that contain the circuit. Repeat this step to assign up to two circuit filters. After assigning the desired circuits, notice that the ALL OTHERS field automatically displays a BLOCK or PASS option. This field blocks or passes all circuits not entered in the previous two fields.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

Assigning User Events as Filters

The USER EVENTS section of the Message Filters screen allows you to specify which messages will be captured based on user-defined events.

In order to be placed in capture memory, a message must match a PASS entry in this filter section without encountering a BLOCK entry. Follow these steps to assign user-defined events as filters.

Step	Action
1.	Use the ↑↓↔ keys to advance to the 1. field of the USER EVENTS section of the Message Filters screen.
2.	Press the **Insert** key to access the Event catalog. The A...Z Search function searches for events alphabetically when the corresponding letter is pressed. Instead of using the arrow keys to search for a file, you can simply type in the file name to highlight it.

✍ *Press the Delete key to delete the selected event from the catalog.*

3.	Select the desired event, and press the **Enter (↵)** key to assign that message as a filter.
4.	Press the **Enter (↵)** key to either BLOCK or PASS the assigned message.
5.	Repeat **Step 1** through **Step 4** for up to six fields.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

SHOW EACH DUPLICATE

The Show Each Duplicate option controls the messages displayed on the F2 Run screen and allows the user the option of saving messages to the secondary hard drive. The Show Each Duplicate option is only available for the ISDN and X.25 protocols.

When the Show Each Duplicate option is ON, the F2 Run screen displays every message, even if identical messages (for example, Receive Ready) are being sent. The Count field for all messages is always one, since each message is displayed. The Spectra system displays the messages on separate lines of the secondary capture and saves them to the secondary hard drive (see **Figure 2.25**).

✍ *This option has no effect on Error SUs.*

When the Show Each Duplicate option is OFF, the F2 Run screen displays messages only once and indicates the number of duplicate messages in the Count field of a particular message (see **Figure 2.26**). The duplicate messages are not saved to the secondary hard drive.

Figure 2.25 and **Figure 2.26** illustrate the difference between the Show Each Duplicate settings.

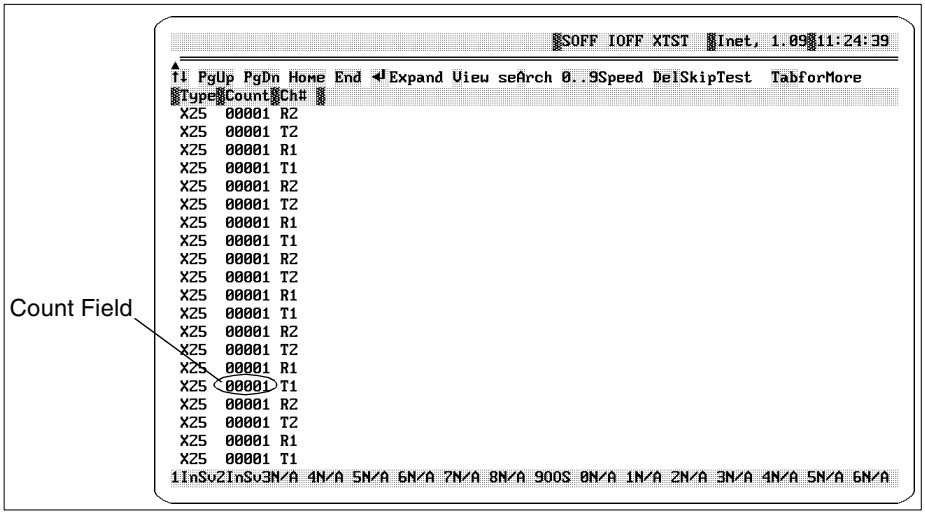


Figure 2.25 - F2 Run Screen - Show Each Duplicate Option ON

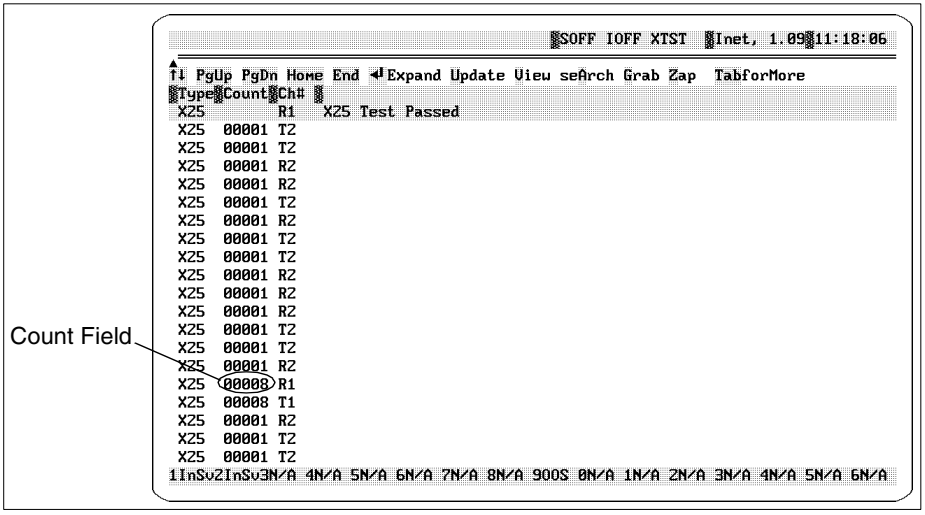


Figure 2.26 - F2 Run Screen - Show Each Duplicate Option OFF

3 Automatic Responses

OVERVIEW

The Spectra system automatically responds to user-defined messages specified in the Automatic Responses screen. In termination modes, the Spectra system responds only to those messages that are set to ON (Y) in the event/response tables provided.

Automatic responses for Signalling Link Test Message/Signalling Link Test Acknowledgment (SLTM/SLTA) are not provided in this screen because SLTM/SLTA processing is active at all times when the Spectra system is in any of the non-monitor modes.

The Automatic Responses screen is used for the following actions:

- Simplifying test scripts
- Processing multiple protocol scripts
- Generating calls [Telephone User Part (TUP), Integrated Services Digital Network User Part (ISUP), etc.]

Messages are processed by the Spectra system in the following order:

1. Test script trigger responses
2. User-defined auto responses (ITU-T and ANSI)
3. TUP/ISUP auto responses

SS7 AUTOMATIC RESPONSES

Follow these steps to access the SS7 Automatic Responses options menu.

Step	Action
1.	Press the **F1** key to access the F1 Setup menu (see **Figure 3.1**).

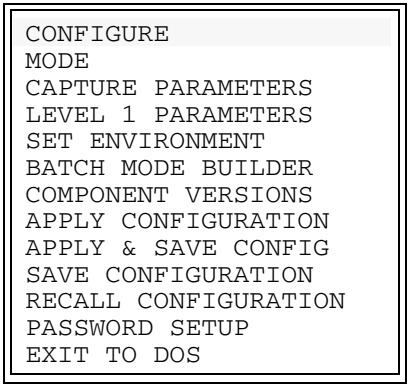


Figure 3.1 - F1 Setup Menu

2. Use the ↑↓ keys to highlight the **Configure** option, and press the **Enter** (↵) key. The Protocol options menu opens (see **Figure 3.2**).



Figure 3.2 - Protocol Options Menu

✍ *The Spectra system provides three protocol options—SS7, ISDN, and X.25. Since these protocols are available as separate options on the Spectra system, your system may have any combination of the three. If you requested only one protocol, no protocol choices are available.*

3. Use the ↑↓ keys to highlight the **SS7** option, and press the **Enter** (↵) key. The SS7 Configure options menu is displayed (see **Figure 3.3**).

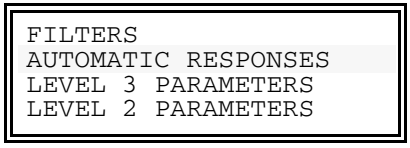


Figure 3.3 - SS7 Configure Options Menu

4. Use the ↑↓ keys to highlight the **Automatic Responses** option, and press the **Enter** (↵) key. The SS7 Automatic Responses options menu is displayed (see **Figure 3.4**).

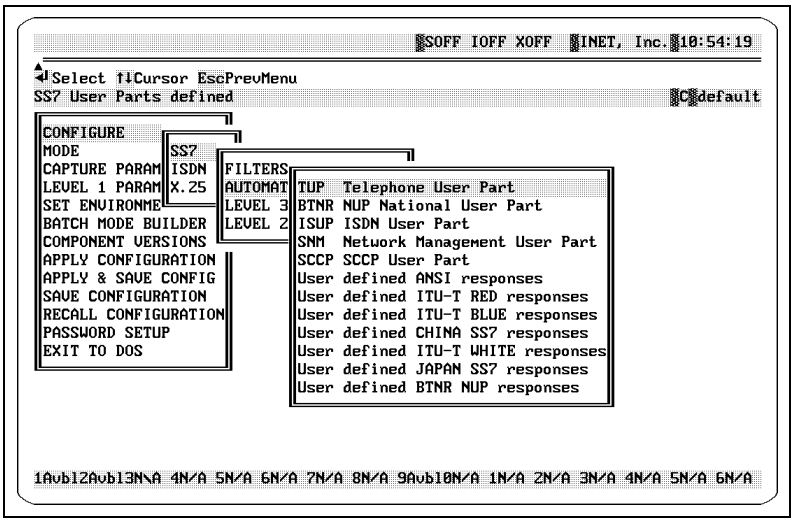


Figure 3.4 - SS7 Automatic Responses Options Menu

SS7 AUTOMATIC RESPONSES MENU OPTIONS

The following section defines the SS7 Automatic Responses menu options.

TUP - Telephone User Part (ITU-T RED and ITU-T BLUE)

This feature lets you control automatic responses to certain TUP messages listed in the Automatic Response options menu. This capability simplifies TUP test scripts by eliminating the need for IF THEN ELSE statements and allowing for the creation of test scripts that focus on the stimuli and responses relevant to the test at hand.

To access the TUP Automatic Responses options menu, select the TUP Telephone User Part option from the SS7 Automatic Responses options menu, and press the Enter (↵) key (see **Figure 3.5**).

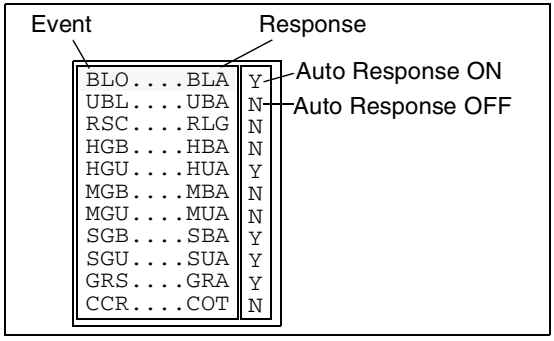


Figure 3.5 - TUP Automatic Responses Options Menu

The TUP Automatic Responses options menu allows user control over automatic responses to certain TUP messages. For example, if the BLO...BLA option is enabled, a Blocking Acknowledgment (BLA) message is automatically sent in response to any Blocking (BLO) message received in the communications process. The Spectra system sends the response message to the point code from which the incoming message originated.

The following information is also included in TUP automatic response messages:

- The Message Priority and Network Indicator fields from the Level 3 Network Configuration screen are stamped on the outgoing message. The Destination Point Code (DPC) is set to the incoming message Origination Point Code (OPC). The OPC is set to the incoming message DPC.

- The Circuit Identification Code (CIC) and Signalling Link Selection (SLS) fields of the outgoing message are set to that of the incoming message.

To activate auto response messages, press the ↑↓ keys to select a message pair, and press the Enter (↵) key to toggle the option ON (Y) or OFF (N).

BTNR NUP National User Part

This feature lets you control automatic responses to the British Telecom Network Requirement (BTNR) Network User Part (NUP) messages listed in this menu. This capability simplifies BTNR NUP test scripts by eliminating the need for IF THEN ELSE statements and allowing the creation of test scripts that focus on the stimuli and responses relevant to the test at hand.

To access the BTNR NUP Automatic Responses options menu, select the BTNR NUP National User Part option from the SS7 Automatic Responses options menu, and press the Enter (↵) key (see **Figure 3.6**).

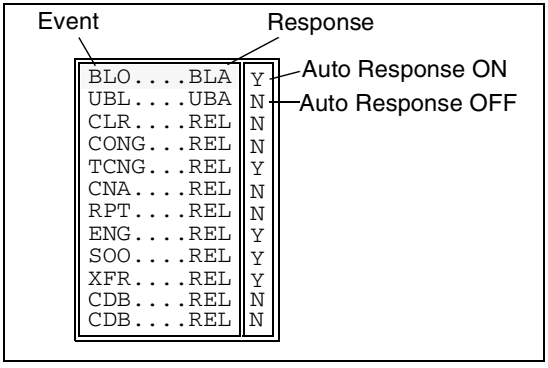


Figure 3.6 - BTNR NUP Automatic Responses Options Menu

The BTNR NUP Automatic Responses options menu allows user control over automatic responses to certain TUP messages. For example, if the BLO...BLA option is enabled, a BLA message is automatically sent in response to any BLO message received in the communications process. The Spectra system sends the message to the point code from which the message originated.

The following information is also included in BTNR NUP automatic response messages:

- The Message Priority and Network Indicator fields from the Level 3 Network Configuration screen are stamped on the outgoing message. The DPC is set to the incoming message OPC. The OPC is set to the incoming message DPC.

- The CIC and SLS fields of the outgoing message are set to that of the incoming message.

To activate auto response messages, press the ↑↓ keys to select a message pair, and press the Enter (↵) key to toggle the option ON (Y) or OFF (N).

ISUP ISDN User Part (ANSI and ITU-T)

The ISUP ISDN User Part allows user control over automatic responses to certain ISUP messages. This capability simplifies ISUP test scripts by eliminating the need for IF THEN ELSE statements and allowing for the creation of test scripts that focus on the stimuli and responses relevant to the test at hand.

To access the ISUP ISDN Automatic Responses options menu, select the ISUP ISDN User Part option from the SS7 Automatic Responses options menu, and press the Enter (↵) key (see **Figure 3.7**).

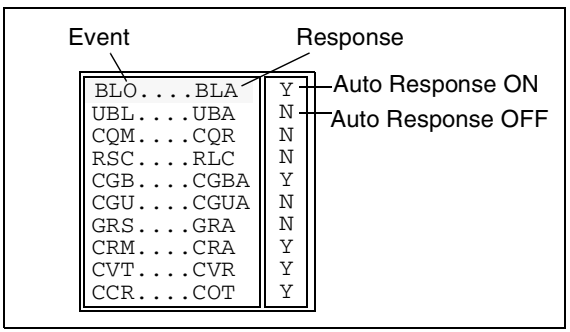


Figure 3.7 - ISUP ISDN Automatic Responses Options Menu

The following information is also included in ISUP ISDN automatic response messages:

- The Message Priority field and Network Indicator field in the Level 3 Network Configuration screen provide additional information for the message (discussed in "Network Configurations" on page 160 of the ***Spectra Setup and Configuration Guide***). The DPC is set to the incoming message OPC. The OPC is set to the incoming message DPC.

- The CIC and SLS fields of the outgoing message are set to that of the incoming message.

To activate auto response messages, press the ↑↓ keys to select a message pair, and press the Enter (↵) key to toggle the option ON (Y) or OFF (N).

SNM Network Management User Part

This feature lets you control automatic responses to certain Signalling Network Management (SNM) messages. (This feature is not active when the Spectra system is in Emulator and Generator mode.)

To access the SNM Automatic Responses options menu, select the SNM Network Management User Part option from the SS7 Automatic Responses options menu, and press the Enter (↵) key (see **Figure 3.8**).

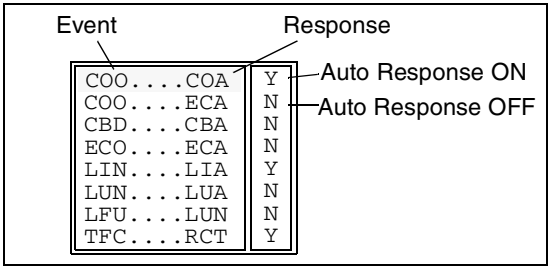


Figure 3.8 - SNM Automatic Responses Options Menu

To activate an auto response message, press the ↑↓ keys to select the message pair, and press the Enter (↵) key to turn the option ON (Y) or OFF (N).

✍ *The COO....COA and COO....ECA message pairs cannot be set to ON at the same time. When one pair is set to ON, the other pair is automatically set to OFF.*

The TFC...RCT message pair involves the T15 Timer. If this message pair is set to ON (Y) and the system receives a Transfer Controlled (TFC) message, the T15 Timer is triggered. When the assigned time elapses, an Route Set Congestion Test (RCT) message is sent. (A maximum of 16 simultaneous timers are possible.)

SCCP User Part

This feature lets you control automatic responses to Signalling Connection Control Part (SCCP) messages. The SCCP automatic response messages are Subsystem Status Test (SST) and Subsystem Allowed (SSA). An SST message is sent to verify the status of a subsystem marked “prohibited”. An SSA message is sent to concerned destinations to inform those destinations that a subsystem that was formerly prohibited is now allowed. (This option is not active under TCAP Generator or SCP Emulator mode.)

To access the SCCP Automatic Responses options menu, select the SCCP User Part option from the SS7 Automatic Responses options menu, and press the Enter (↵) key (see **Figure 3.9**).

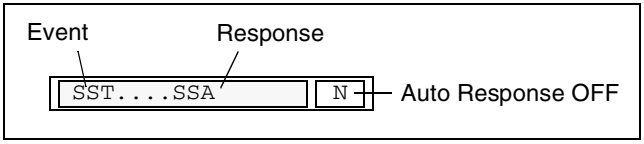


Figure 3.9 - SCCP Automatic Responses Options Menu

To activate the SCCP User Part auto response message, select the message pair, and press the Enter (↵) key to set the option to ON (Y) or OFF (N). When this option is ON, SCCP functionality works with ISUP and TUP simultaneously.

User-Defined Responses

The following protocol-specific selections are available from the SS7 Automatic Responses options menu:

- User defined ANSI responses
- User defined ITU-T RED responses
- User defined ITU-T BLUE responses
- User defined ITU-T WHITE responses
- User defined CHINA SS7 responses
- User defined JAPAN SS7 responses
- User defined BTNR NUP responses

User-defined responses allow you to establish automatic response messages for specific protocols. Each user-defined option provides four sets of Event/Response choices. An Event/Response message pair is defined using the message catalog. If the chosen response message has no masked fields, it is transmitted as is. Any masked field in the response message is replaced by the contents of the same field in the event message encountered.

This feature can be used in conjunction with test scripts to create TUP or ISUP call generator applications. The field value reflection mechanism is a bit-by-bit reflection. For example, if bits 0 and 1 of octet 16 are masked in the response message, then the values of bits 0 and 1 of octet 16 of the event message are put into bits 0 and 1 of octet 16 in the response message.

The Event menu and Response message catalogs present all messages built and saved from the Create/Edit Message screen accessed through the F6 Edit function. For more information, refer to "Create/Edit Message" on page 119 of this guide.

The following procedure explains how to assign user-defined events and responses.

Step	Action
1.	Select the **User defined responses** option for the desired protocol from the SS7 Automatic Responses options menu, and press the **Enter** (↵) key. The Event...Response options menu is displayed.
2.	Select the **Event1…Respons1** option, and press the **Insert** key to access the Event message catalog (see **Figure 3.10**). The Event message catalog displays messages from the selected protocol that can be assigned as the Trigger message that automatically causes the Spectra system to send a Response message.

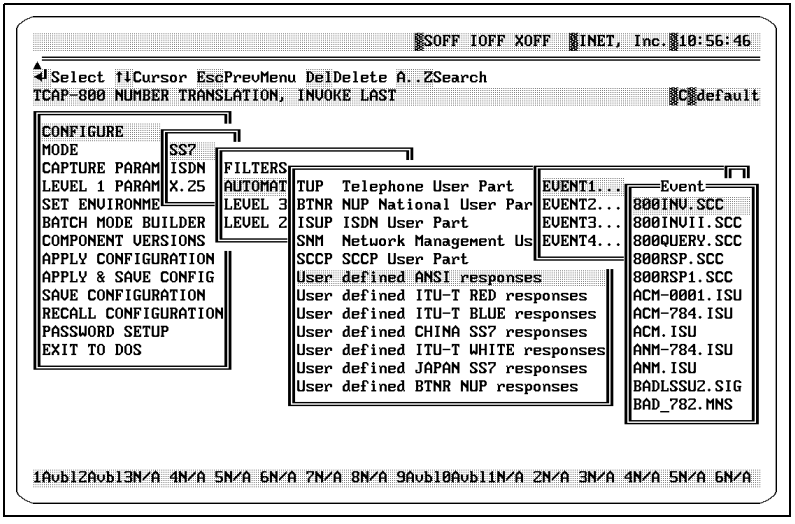


Figure 3.10 - SS7 Event...Response Options Menu - Event Message Catalog Displayed

3. Select a message, and press the **Enter** (↵) key to assign it. The Response message catalog is displayed. The Response message catalog displays messages from the selected protocol that can be assigned as the Response message that is automatically sent by the Spectra system when the assigned Event message is received.

4. Select a message, and press the **Enter** (↵) key to assign it.

5. The assigned Event and Response messages appear in the menu. Press the **Enter** (↵) key to turn the Event...Response ON or OFF.

6. Repeat **Step 1** through **Step 5** for up to four Event...Response assignments.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

ISDN AUTOMATIC RESPONSES

The ISDN Automatic Responses feature allows you to establish automatic message responses to received messages for specific ISDN data link layer protocols. Each of the options available under the Automatic Response options menu provides four sets of Event/Response choices. An Event/Response message pair is defined from the message catalog. If the chosen Response message has no masked fields, it is transmitted as is. Any masked field in the Response message is replaced by the contents of the same field in the Event message encountered. The Spectra system responds only to those messages that are set to ON (Y) in the Event/Response tables provided.

The Event and Response menus present all messages built and saved from the Create/Edit Message screen using the F6 Edit function. For more information about the Create/Edit Message screen, refer to "Create/Edit Message" on page 119 of this guide.

The ISDN Automatic Responses feature allows you to define protocol-specific Event and Response messages. The following protocols are available:

- CCITT
- ETSI
- ABIS
- V5.1
- V5.2
- DASS
- DPNSS

Follow these steps to access the ISDN Automatic Responses options menu.

Step	Action

1. Press the **F1** key to access the F1 Setup menu (see **Figure 3.11**).

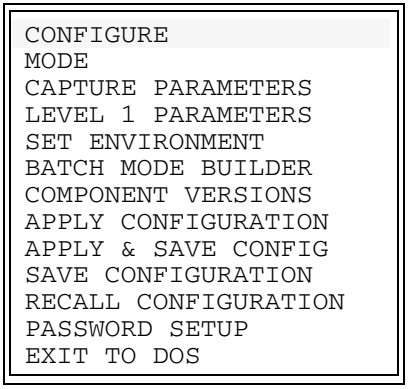


Figure 3.11 - F1 Setup Menu

2. Use the ↑↓ keys to highlight the **Configure** option, and press the **Enter** (↵) key. The Protocol options menu is displayed (see **Figure 3.12**).



Figure 3.12 - Protocol Options Menu

✍ *The Spectra system provides three protocol options—SS7, ISDN, and X.25. Since these protocols are available as separate options on the Spectra system, your system may have any combination of the three. If you requested only one protocol, no protocol choices are available.*

3. Use the ↑↓ keys to highlight the **ISDN** option, and press the **Enter (↵)** key. The ISDN Configure options menu is displayed (see **Figure 3.13**).



Figure 3.13 - ISDN Configure Options Menu

4. Use the ↑↓ keys to highlight the Automatic Responses option, and press the **Enter (↵)** key to access the ISDN Automatic Responses options menu (see **Figure 3.14**).

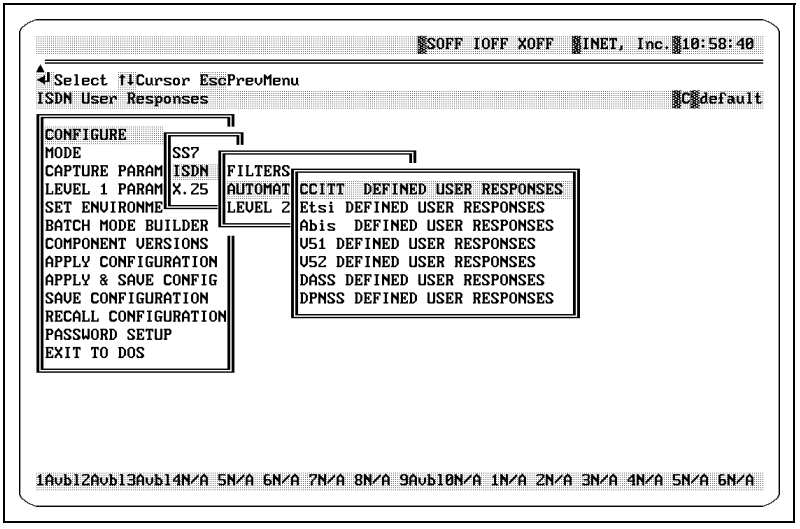


Figure 3.14 - ISDN Automatic Responses Options Menu

5. From the Automatic Responses options menu, select the desired protocol option, and press the **Enter** (↵) key. The Event...Response options menu is displayed (see **Figure 3.15**).

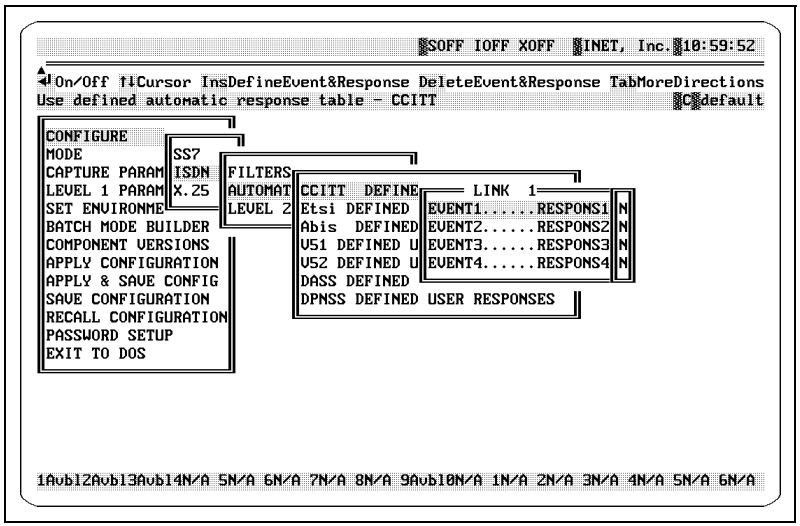


Figure 3.15 - ISDN Event...Response Options Menu

ISDN EVENT...RESPONSE OPTIONS MENU DEFINITIONS

↵On/Off
Press the Enter (↵) key to toggle the selected Event...Response option ON (Y) or OFF (N).

↑↓Cursor
Press the ↑↓ keys to move the cursor.

InsDefineEvent&Response
Press the Insert key to select a defined event and response from the Event and Response message catalogs.

DeleteEvent &Response
Press the Delete key to delete the selected Event...Response trigger.

TabMoreDirections
Press the Tab key to display additional commands across the top of the screen.

+NextLink
Press the + key to cycle through the 16 Event...Response screens (one for each link) in ascending order.

-PrevLink
Press the - key to cycle through the 16 Event...Response screens (one for each link) in descending order.

>CopyLink
Press the > key to access the Copy options menu (see **Figure 3.16**). The Copy options menu allows other linksets to be assigned the same Event...Response settings as the current link. When the Copy options menu is displayed, all links are automatically marked. Select the links to which you do not want to assign the current filter settings, and press the Enter (↵) key to unmark them. When the assignments are made, press the I key. An "Automatic Responses Copied" message is displayed in the information line at the top of the screen when the Event...Response information is copied.

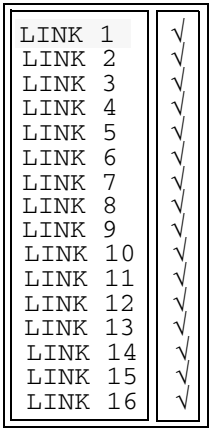


Figure 3.16 - ISDN Event...Response Copy Options Menu

ASSIGNING USER-DEFINED ISDN EVENTS AND RESPONSES

Follow these steps to assign user-defined ISDN Events and Responses.

Step	Action
1.	From the ISDN Event...Responses options menu, use the **+** key or **-** key to select the desired link.
2.	Highlight the **Event 1...Respons1** option, and press the **Insert** key to access the Event message catalog. The Event message catalog displays the protocol messages that can be assigned as the Trigger message that automatically causes the Spectra system to send a Response message. Select the desired message, and press the **Enter (↵)** key to assign it.
3.	The Response message catalog menu appears, displaying the protocol messages that can be assigned as the Response message that is automatically sent by the Spectra system when the assigned Event message is received. Select the desired message, and press the **Enter (↵)** key to assign it.
4.	The assigned Event and Response messages are displayed in the menu. Press the **Enter (↵)** key to turn the Event...Response ON or OFF.
5.	Repeat **Step 1** through **Step 4** for up to four Event...Response assignments.
6.	Use the **>** key to copy the Event...Response assignments to the desired links.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the **Spectra Setup and Configuration Guide**.*

X.25 AUTOMATIC RESPONSES

This option allows you to establish automatic message responses to received messages for specific X.25 data link layer protocols. Each of the user-defined options provides four sets of Event/Response choices. An Event/Response message pair is defined from the message catalog. If the chosen Response message has no masked fields, it is transmitted as is. Any masked field in the Response message is replaced by the contents of the same field in the Event message encountered. The Spectra system responds only to those messages that are set to ON (Y) in the Event/Response tables provided.

The Event and Response menus present all messages built and saved from the Create/Edit Message screen using the F6 Edit function. For more information about the Create/Edit Message function, refer to "Create/Edit Message" on page 119 of this guide.

The X.25 Automatic Responses feature allows you to define protocol-specific Event and Response messages. The following options are available:

- USER DATA DEFINED USER RESPONSES
- IS41 DEFINED USER RESPONSES
- ASCII DEFINED USER RESPONSES
- DMX DEFINED USER RESPONSES

Follow these steps to access the X.25 Automatic Responses options menu.

Step	Action

1. Press the **F1** key to access the F1 Setup menu (see **Figure 3.17**).

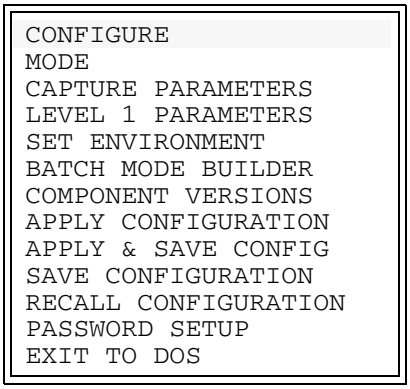


Figure 3.17 - F1 Setup Menu

2. Use the ↑↓ keys to highlight the **Configure** option, and press the **Enter (↵)** key. The Protocol options menu is displayed (see **Figure 3.18**).



Figure 3.18 - Protocol Options Menu

✍ *The Spectra system provides three protocol options—SS7, ISDN, and X.25. Since these protocols are available as separate options on the Spectra system, your system may have any combination of the three. If you requested only one protocol, no protocol choices are available.*

3. Use the ↑↓ keys to highlight the **X.25** option, and press the **Enter** (↵) key. The X.25 Configure options menu is displayed (see **Figure 3.19**).

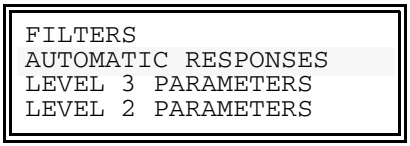


Figure 3.19 - X.25 Configure Options Menu

4. Use the ↑↓ keys to highlight the Automatic Responses option, and press the **Enter** (↵) key to access the Automatic Responses options menu (see **Figure 3.20**).

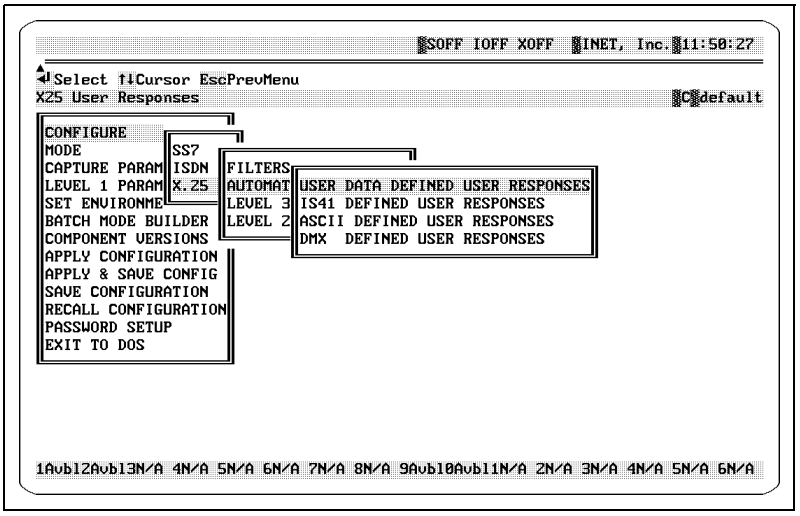


Figure 3.20 - X.25 Automatic Responses Options Menu

5. From the Automatic Responses options menu, select the desired protocol option, and press the **Enter** (↵) key. The Event...Response options menu is displayed (see **Figure 3.21**).

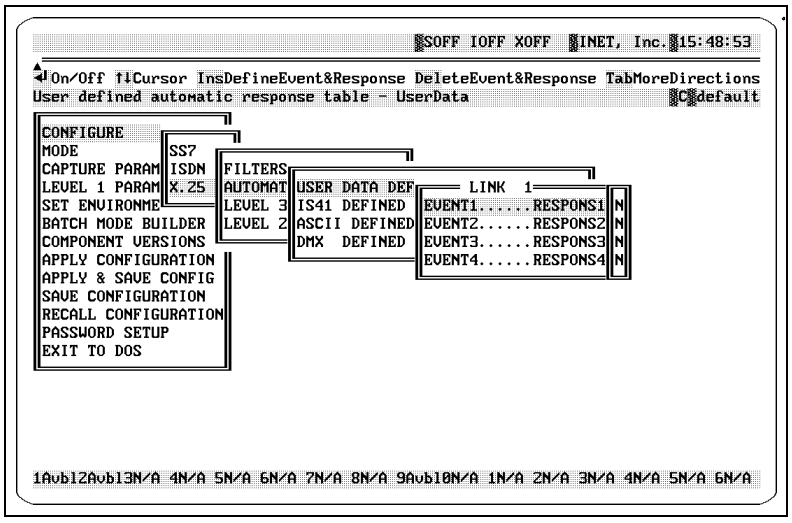


Figure 3.21 - X.25 Event...Response Options Menu

X.25 EVENT...RESPONSE OPTIONS MENU DEFINITIONS

↵On/Off
Press the Enter (↵) key to toggle the selected Event...Response option ON (Y) or OFF (N).

↑↓Cursor
Press the ↑↓ keys to move the cursor.

InsDefineEvent&Response
Press the Insert key to select a defined event and response from the Event and message catalogs.

DeleteEvent & Response
Press the Delete key to delete the selected Event...Response trigger.

TabMoreDirections
Press the Tab key to display additional commands at the top of the screen.

+NextLink
Press the + key to cycle through the 16 Event...Response screens (one for each link) in ascending order.

-PrevLink
Press the - key to cycle through the 16 Event...Response screens (one for each link) in descending order.

>CopyLink
Press the > key to access the Copy options (see **Figure 3.22**). The Copy options menu allows other linksets to be assigned the same Event...Response settings as the current link. When the Copy options menu is displayed, all links are automatically marked. Select the links to which you do not want to assign the current filter settings, and press the Enter (↵) key to unmark them. When the assignments are made, press the I key. An "Automatic Responses Copied" message is displayed in the information line at the top of the screen when the Event...Response information is copied.

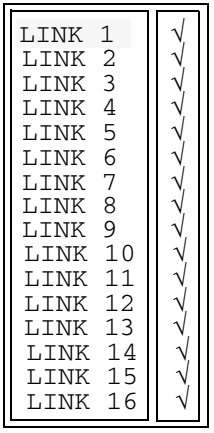


Figure 3.22 - X.25 Event...Response Copy Options Menu

ASSIGNING USER-DEFINED X.25 EVENTS AND RESPONSES

Follow these steps to assign user-defined X.25 events and responses.

Step	Action

1. In the X.25 Event...Response screen (see **Figure 3.23**), use the **+** or **-** keys to select the desired link.

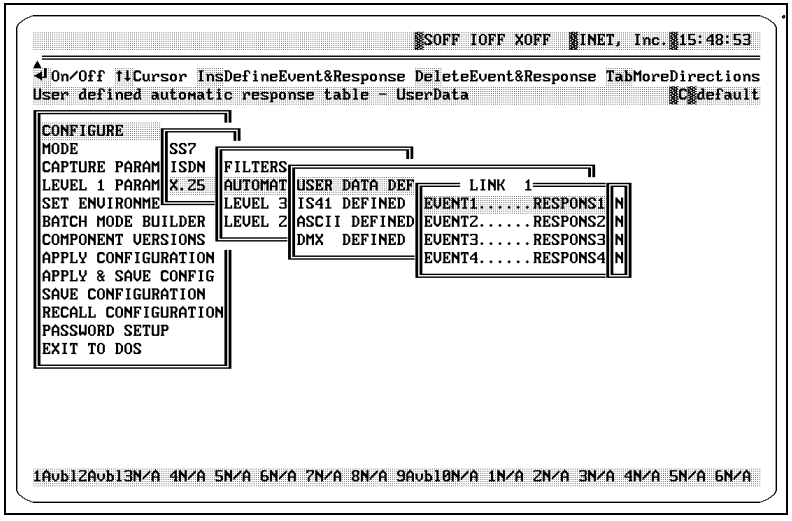


Figure 3.23 - X.25 Event...Response Options Menu

2. Select the **Event 1...Respons1** option and press the **Insert** key to access the Event message catalog. The Event message catalog displays the protocol messages that can be assigned as the Trigger message that automatically causes the Spectra system to send a Response message. Select the desired message, and press the **Enter** (↵) key to assign it.

3. The Response message catalog appears, displaying the protocol messages that can be assigned as the Response message that is automatically sent by the Spectra system when the assigned Event message is received. Select the desired message, and press the **Enter** (↵) key to assign it.

4. The assigned Event and Response messages are displayed in the menu. Press the **Enter** (↵) key to turn the Event...Response ON or OFF.

5. Repeat **Step 1** through **Step 4** for up to four Event...Response assignments.

6. Use the **>** key to copy the Event...Response assignments to the desired links.

✍ *You must use the Apply Configuration option before any changes to the settings take effect. After applying the configuration, press the F2 key to (re)start the mode that you are running. For more information about the Apply Configuration option, see "Apply Configuration" on page 258 of the* ***Spectra Setup and Configuration Guide****.*

4 Capture Parameters

OVERVIEW

The Spectra system allows you to capture data to the Primary Capture buffer by restarting the test in the F2 Run function. The Random Access Memory (RAM) installed in the Spectra system determines the capture buffer's capacity. Data is captured in a First In First Out (FIFO) manner. If the Spectra system has a secondary hard drive, data is captured to both the secondary hard drive and the RAM capture buffer. If a secondary hard drive is not installed, the message "Secondary Disk Not Available" is displayed in the top border line.

✍ *The Spectra system performs data capture when you press the F2 key to begin a test.*

ACCESSING THE CAPTURE PARAMETERS SCREEN

The capture settings are created using the Capture Parameters option under the F1 Setup menu. Follow these steps to access the Capture Parameters screen.

Step	Action
1.	Press the **F1** key to access the F1 Setup menu. This menu is pictured in **Figure 4.1**.

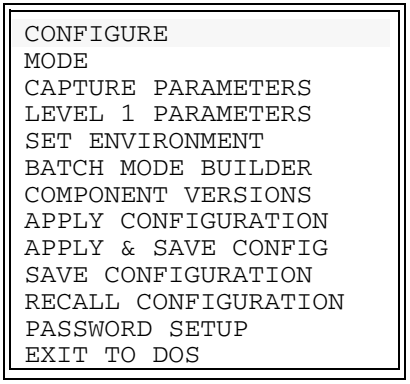


Figure 4.1 - F1 Setup Menu

2. Press the ↑↓ keys to select **Capture Parameters**, and press the **Enter (↵)** key. The Capture Parameters screen is displayed (see **Figure 4.2**).

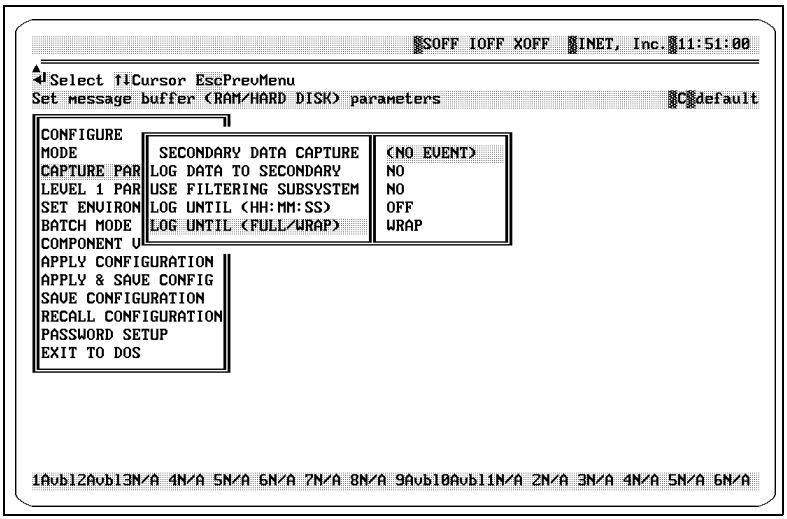


Figure 4.2 - Capture Parameters Screen

CAPTURE PARAMETERS SCREEN DEFINITIONS

SECONDARY DATA CAPTURE

This feature is optional under all modes. It allows continuous writing of data to the secondary hard drive in a FIFO manner and stops when an assigned condition is encountered.

LOG DATA TO SECONDARY

This option allows recent data to be tracked and logged to a hard disk for later reference. This provides a recent snapshot of all messages so information that preceded a link failure or a certain trigger response can be analyzed.

To activate this option, select it and press the Enter (↵) key to toggle between YES (on) and NO (off). Once activated, data is logged to the hard disk until the option is switched to NO or with one of the other assigned parameters is encountered. The data stored on the secondary drive is independent of the data sent to the buffer, although page 1 in Hard Drive Disk 2 is the same as the screen capture buffer if pre-capture filters are not enabled for the screen capture buffer.

By default, the Spectra system blocks FISUs (SS7), RRs (ISDN), and Frame Layer RRs (X.25). In order to capture these messages, you must set the message filters for these to PASS and turn the Log FISUs to Secondary option on this screen to YES. See **Chapter 2** of this guide for more information.

✍ *All X.25 and ISDN data is logged to the secondary disk drive if the Log Data to Secondary option is set to ON and the Use Filtering Subsystem option is set to OFF.*

The more hard disk space available for logged data, the more history of testing is retained for review. For example, a 100 MB hard disk can store approximately 10 minutes of test data (using 16 links at 80 percent bandwidth), a 200 MB hard disk can store 20 minutes of test data, and so on.

An alarm is triggered when the disk capacity reaches 70 percent, 80 percent, 90 percent, and 100 percent or when a hard disk failure is detected. The alarm stops disk capture when the appropriate conditions are met. These conditions are based on the parameters defined in the Alarm Groups option under the F4 Alarms function or in the Log Until Full (Full/Wrap) or Log Until Alarm Event options under the F4 Alarms menu.

The secondary hard drive (D:\ unless otherwise designated) must be partitioned and formatted for DOS.

✍ *For the Rackmount PCs, the HDD2 must be in the locked position (located in front of the Rackmount PC) for the PC to boot (see **Figure 4.3**). The portable unit does not have a secondary hard disk lock.*

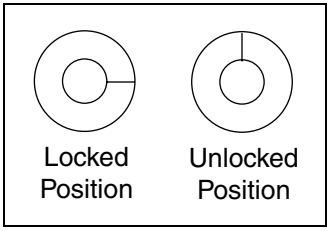


Figure 4.3 - Secondary Hard Disk Lock

USE FILTERING SUBSYSTEM

This option allows the user to use pre-capture filtering to eliminate unwanted messages before they are captured to the hard drive. To activate this option, select it and press the Enter (↵) key to toggle between ON (yes) and OFF (no).

LOG UNTIL (HH:MM:SS)
This option halts data logging at an assigned time if no other event has caused the HDD2 to stop capture. To activate this option, select it and press the Enter (↵) key. Enter the time in Hours:Minutes:Seconds. Press the Enter (↵) key to assign the time.

LOG UNTIL (FULL/WRAP)
This option allows the user to designate what the capture does when the disk reaches maximum capacity. When this option displays the word FULL, the capture ceases to log data as soon as the disk is full. When WRAP is displayed, the capture begins to overwrite previously captured data as soon as the disk is full.

5 Editing a Message

OVERVIEW

The F6 Edit function is used to create or edit messages and store them in the message catalogs. Defined messages from the message catalogs can be used for triggering, filtering, transmission, test scripts, and user-defined automatic responses. Standard message catalogs come with the Spectra system software (based on your configuration packages).

Various types of messages or partial messages can be defined in the F6 Edit function. This function allows you to display and edit the contents of messages in either plain-English or hexadecimal format. It also allows you masks portions of a message used to define a trigger. Any masked portions will be ignored when considering whether an incoming message satisfies the trigger definition.



The Grab function is another way to create messages (see "Grab" on page 194 of this guide). The Spectra system can grab messages by capturing the data, grabbing each message individually, and placing it in a message catalog. The cataloged messages can be accessed using the F6 Edit function and can be edited and resaved.

To access the F6 Edit function, press the F6 key. The F6 Edit menu is displayed (see **Figure 5.1**).

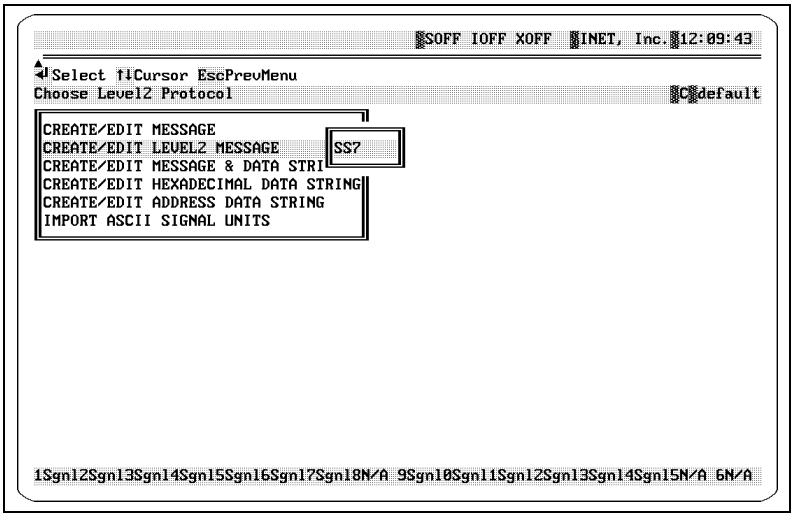


Figure 5.1 - F6 Edit Menu

✍ *A Create/Edit Level2 Message option for SS7 appears in this screen. If you have purchased Spectra High Speed Links, additional protocol options are available. For information about the use of the F6 Edit function in conjunction with HSL, refer to the* ***Spectra High Speed Links Guide****.*

Because there are so many possible message types, it would be impossible to document the procedures for constructing every kind of message. This chapter discusses basic rules for message construction.

MESSAGE EDITORS

The information elements (message components) available for editing vary according to the message type, the protocol selected, and the information in preceding portions of the message. For descriptions of the information elements for the various message types, refer to the original specifications for the corresponding protocol. The following section contains some general rules about editing information elements.

SS7 MESSAGE EDITOR

SU Type/Length
The information for this field can be entered manually or can be automatically assigned based on the message type and parameters chosen.

Service Indicator
This field defines the user part. If the selected user part of a given protocol is not defined, the message definition is terminated at the Network Indicator field.

Headers H1/H0
This field defines the actual message type.

Pointer User Info, Pointer Called #, and Pointer Optional
Pointer values must be entered manually. The value assigned to a pointer can be calculated by subtracting the octet number of the Pointer field from the octet number of the indicated information element. Use the octet numbers provided in the Header Lines to simplify the calculation of pointers. The octet number of the current field is displayed on the information line. Some fields have more than one octet.

Parameter Length
Parameter Length values must be entered manually. They can be assigned by calculating the difference between the octet number of the last element in the section and the octet number of the Parameter Length element. The octet number of the current field is displayed on the information line. Some fields have more than one octet.

User Data Length
User Data Length values must be entered manually. They can be assigned by calculating the difference between the octet number of the last element in the message and the octet number of the parameter length element. The octet number of the current field is displayed on the information line. Some fields have more than one octet.

To make assignments in each field of a message, highlight the field, and press the Enter (↵) key. For some fields, an options menu appears. Highlight the desired option, and press the Enter (↵) key to assign it. Other fields access the corresponding field directly. Select the desired entry, and press the Enter (↵) key to assign it.

Editing Existing Messages

When editing grabbed messages or other messages from the catalog, be sure to adjust the entries in the Pointer fields to correspond to changes made in other message fields (see the "Pointer User Info, Pointer Called #, and Pointer Optional" on page 111 of this guide for calculation rules). Also verify that Parameter Length fields have been defined correctly (see "Parameter Length" on page 111 of this guide for calculation rules). By adjusting these fields before saving or using the message, proper message structure is assured.

Address Signals

When entering address signals that have a combination of digits (1, 2, 3) and letters/symbols (ST, *, C11), use the hexadecimal mode to enter letters or symbols. When the cursor is in the proper location within the address signal, press the T key to switch between hexadecimal mode and plain-English mode.

```
Ch# T1     ANSI SS7            Flags:1       Count:1      Time:17:10:41.681
00000010   BIB/BSN..........   0/2
00000011   FIB/FSN..........   0/3
..100111   SU type/length....  MSU39
00......   Spare............   0
           Service information octet
....0101   Service indicator.  ISUP ISDN User Part
..00....   Message priority..  0
10......   Network indicator.  National Network
           Routing label
........   DPC: Net-Clstr-Mbr  238-245-020
........   OPC: Net-Clstr-Mbr  238-001-000
...00000   SLS..............   0
000.....   spare............   0
........   CIC..............   0
00......   spare............   0
           Message type
00000001   Headers H1/H0.....  IAM Initial Address
           ISUP Nature of connection indicators parameter
......00   Satellite.........  No satellite circuit in connection
....00..   Continuity check..  Continuity check not required
...0....   Echo suppressor...  Outgoing half echo suppressor not included
000.....   spare............   0
           ISUP Forward call indicators parameter
.......0   Nat'l/Int'l         Incoming national call
.....00.   End-to-end method.  No end-to-end method available
....0...   Interworking......  No interworking encountered, No7 all the way
...0....   End-to-end info...  No end-to-end information available
..0.....   ISUP indicator....  ISDN user part not used all the way
10......   ISUP preference...  ISDN user part required all the way
.......0   ISDN access.......  Originating access non-ISDN
....000.   spare............   0
0000....   reserved for nat'l  0
           ISUP Calling party's category parameter
00000000   Clg party category  Calling party's category unknown
00000011   Pointer - User info 3
00000101   Pointer - Called #  5
00001100   Pointer - Optional  12
           ISUP User service information parameter
00000010   Parameter length..  2
...00000   Info capability...  Speech
.00.....   Coding standard...  CCITT standard
1.......   Extension bit.....  1
...00000   Information rate..  Channel size
.00.....   Transfer mode.....  Circuit mode
1.......   Extension bit.....  1
           ISUP Called party number parameter
00000111   Parameter length..  7
.0000001   Nature of address.  Subscriber number
0.......   Odd/even..........  Even number of address signals
....0011   reserved..........  3
.100....   Numbering plan....  Reserved, unknown
0.......   spare............   0
........   Address signal....  2146809400
           ISUP Optional parameter
00001010   Parameter name....  Calling party number
00000111   Parameter length..  7
.0000001   Nature of address.  Unique Subscriber
0.......   Odd/even..........  Even number of address signals
......00   spare............   0
....00..   Addr. presentation  Presentation Allowed
.001....   Numbering plan....  ISDN numbering plan (CCITT Rec. E.164)
0.......   spare............   0
........   Address signals...  2146809413
           ISUP Parameter
00000000   Parameter name      End of optional parameters fields indicator
```

Pointer and Information Elements

Figure 5.2 - Sample IAM Message

ISDN MESSAGE EDITOR

This section contains information about editing ISDN messages. Because there are so many possible message types, it would be impossible to document the procedures for constructing every type of message. Information element options vary according to the message type, the protocol selected, and the information in preceding portions of the message. For descriptions of the information elements for various messages, refer to the original specifications for the corresponding protocol.

The following basic rules apply to CCITT, ETSI, ABIS, V5.1,and V5.2 interfaces. However, messages for the DASS and DPNSS protocols are unique in their construction and usage, so additional rules apply. This section contains general rules about editing ISDN information elements and specific information about DASS and DPNSS message construction.

Configuration Bit Field (C/R Bit)
All ISDN messages contain a Configuration Bit (C/R Bit) field. Default settings for this field vary depending on the message.

There are two catalogs of messages for the DASS protocol. One catalog is used when the C/R Bit is set to 0. Another catalog is used when the C/R Bit is set to 1.

1 = Network to User (PBX to ET message catalog)

0 = User to Network (ET to PBX message catalog)

The Functional Interface option in the Level 2 Link Layer Parameters options menu dictates which message catalog is available for use in test scripts.

The DPNSS protocol uses the same catalog of messages for C/R Bit 00 or 01.

SAPI/EnVelope_H Field
The Service Access Point Identifier (SAPI) can be assigned as one of the following: the CCP Call Control Procedures, the Q.931 Call Control Procedures, the X.25 Level 3 Conforming Packet Procedures, or the L2MGMT Layer 2 Management Procedures. The octet number of the current field is displayed on the information line. Some fields have more than one octet.

The CCITT, ETSI, ABIS, V5.1, and V5.2 protocols utilize SAPIs. SAPIs do not apply to the DASS and DPNSS protocols.

TEI/EnVelope_L Field
The Terminal Endpoint Identifier (TEI) designates the terminal from which the message is being sent. The octet number of the current field is displayed on the information line. Some fields have more than one octet.

The CCITT, ETSI, ABIS, V5.1, and V5.2 protocols utilize TEIs. TEIs do not apply to the DASS and DPNSS protocols.

FrameIdentifier Field
The FrameIdentifier field designates the kind of data the message contains—either an information frame or a supervisory information or unnumbered information frame. The octet number of the current field is displayed on the information line. Some fields have more than one octet. All protocols have this field, with the exception of the DASS and DPNSS protocols, which always use unnumbered information frames.

Information Frame Contents Field
The Information Frame Contents field indicates the type of information that is transmitted. The octet number of the current field is displayed on the information line. Some fields have more than one octet. All protocols have this field with two exceptions. CCITT designates this field as a Protocol Discriminator Contents field, and the DASS and DPNSS protocols list only the frame type.

Message Type Field
All ISDN messages contain a Message Type field that identifies the type of standard ISDN message. The Message Type octet defines the purpose of the message. For example, an ISDN message could be a Setup, Connect, or Release message. The octet number of the current field is displayed on the information line. Some fields have more than one octet.

Supervisory Bits
The Supervisory Bits give supervisory information such as Receive Ready commands, Receive Not Ready commands, or Reject commands. The octet number of the current field is displayed on the information line. Some fields have more than one octet.

Selection, Indication, and Supplementary Information String Fields (DASS and DPNSS protocols only)

Messages for the DASS and DPNSS protocols generally comprise a one-octet header followed by a variable length information field containing a string of 8-bit characters, which are coded in accordance with International Alphabet Number 5 (IA5) or ASCII. Certain messages may also contain binary coded octets immediately following the headers.

✍ *Spectra decodes do not allow catalogs to be displayed for fields using multiple octets or variable length fields. Consequently, new or edited messages for these fields must be entered character by character.*

Selection and Indication Fields (DASS only)

In some DASS protocol messages, a Selection/Indication field is included for conveying specific network or user information. If no such information is appropriate, the Selection/Indication field will not be present.

Information is carried in Selection and Indication fields in the form of IA5 characters which, with the exception of the Destination Address (DA), are structured into Supplementary Information (SI) strings.

A Selection Block contains complete selection information and may be a chain of related Selection fields, such as those from an Initial Service Request incomplete message [ISRM (I)] followed by a sequence of Subsequent Service Request messages (SSRMs). The Selection Block may contain one or more SI strings and/or a DA. An Indication field contains one or more SI strings. The DPNSS protocol messages do not use Selection Blocks, Selection, or Indication fields; instead, SI strings are used.

Supplementary Information (SI) String Fields (DASS and DPNSS)

The Supplementary Information (SI) string is a variable length information field. It uses a string identification list containing of a copy of the IA5 numerals and suffix letter of one or more SI string identifiers.

The string identification list and all the other data is a string of IA5 characters. Text in the header lines indicates parameters and text messages. Invalid data may confuse the editor. (For a listing of SI string identifiers, refer to **Appendix B** of this guide.) The Frame Type octet does not control the decode, so any message can be used with any frame type.

The SI string description only appears after all the required characters are entered for the SI code and the code value is followed by a * (2A Hex) or by a # (23 Hex) character.

SI strings, along with associated parameters, include information in addition to the DA or fixed information octets to be communicated from one PBX to another on a call. When more than one parameter is included in the string, they are separated by a space, or 20 Hex (see **Figure 5.3**).

DAs comprise one or more IA5 numerals zero through nine, have no identifier code and are not prefixed by a * or terminated by a #. The digits are always the last characters in the string. The first DA digit immediately follows the # of the last SI string.

SI identifiers may be followed by one or more parameters. Parameters are separated from the identifier and each other by a *. Strings must begin with a * and end with a #. The parameters are selected by identifier code, not by mnemonic. The mnemonic appears when the proper code is entered. **Figure 5.3** is a example of an SI string.

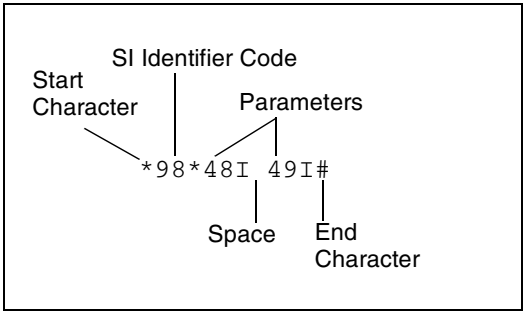


Figure 5.3 - Supplementary Information String (Example)

This string, `*98*48I 49I#`, represents the following message: The requests for Bearer Service Selection (Preferred) and Bearer Service (Notification) were not understood.

The SI identifier code of 98 is an Ignored-Signal Not Understood (mnemonic IG-SNU). The SI identifier code of 48I is a Bearer Service Selection - Preferred (mnemonic BSS-P). The SI identifier code of 49I is a Bearer Service Selection - Notification (mnemonic BSS-N).

To create a Called/Calling Line Category - Ordinary (CLC-ORD) information string, enter the code (31 Hex) as *1# starting in the SI identifier octet. The string continues until a # character is encountered. If optional parameters are desired, replace the ending # character with a * and continue adding parameters.

X.25 MESSAGE EDITOR

Frame Layer and Packet Layer
The Frame Layer and the Packet Layer fields cannot be edited in the Message Editor. These are assigned in the Configure option under the F1 Setup menu. For more information about setting the Link Access Procedure Balanced/Link Access Procedure on the D-Channel (LAPB/LAPD) Basic and Extended portions of the messages, see "Level 2 Parameters" on page 233 of the ***Spectra Setup and Configuration Guide***.

Data Portion
Parameter length fields must be entered manually. Parameter length values can be assigned by calculating the difference between the octet number of the last element in the section and the octet number of the parameter length element. The octet number of the current field is displayed on the information line. Some fields have more than one octet.

Parameter Lengths (for IS41)
Parameter Length fields must be entered manually. Parameter length values can be assigned by calculating the difference between the octet number of the last element in the section and the octet number of the parameter length element. The octet number of the current field is displayed on the information line. Some fields have more than one octet.

Component Lengths (for IS41)
The Component Length fields designate the lengths of the individual message components within the IS41 messages. The octet number of the current field is displayed on the information line. Some fields have more than one octet.

Component Identifier (for IS41)
The Component Identifier fields designate the IS41 component type. The octet number of the current field is displayed on the information line. Some fields have more than one octet.

F6 EDIT MENU DEFINITIONS

The following sections explain the options available from the F6 Edit menu (see **Figure 5.4**).

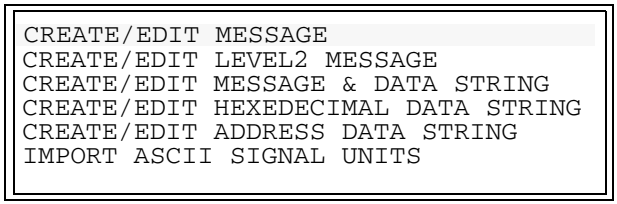


Figure 5.4 - F6 Edit Menu

CREATE/EDIT MESSAGE

The Create/Edit Message option defines a message in its entirety. This option is used to construct or modify messages used as filters, trigger messages, and transmit messages.

Follow these steps to access the Create/Edit Message screen.

Step	Action
1.	In the Editor options menu, place the cursor on the **CREATE/EDIT MESSAGE** option, and press the **Enter** (↵) key. The Protocol options menu is displayed, containing the available protocol options—SS7, ISDN, and X.25.

✍ *The protocol options available depend on the package purchased.*

2. Select the desired protocol, and press the **Enter** (↵) key to assign the protocol option. The available options are as follows:

   - **SS7**
     ANSI, ITU-T RED, ITU-T BLUE, ITU-T WHITE, CHINA, BTNR, JAPAN, and VARIANT

- **ISDN**
  CCITT, ETSI, ABIS, V5.1, V5.2, DASS, and DPNSS

✍ *If the current* `TEMPLATE.SS7` *file contains variant protocols for SS7 or ISDN, you have variant options to choose from.*

- **X.25**
  USER, IS41, and ASCII

3. Select the desired protocol, and press the **Enter** (↵) key to assign the protocol option.

4. The Create/Edit Message screen is displayed (see **Figure 5.5**).The information elements used for creating and editing messages vary depending on which protocol selection was made.

✍ *The entire message can be created in hexadecimal format by pressing the T key to toggle the editor to hexadecimal mode.*

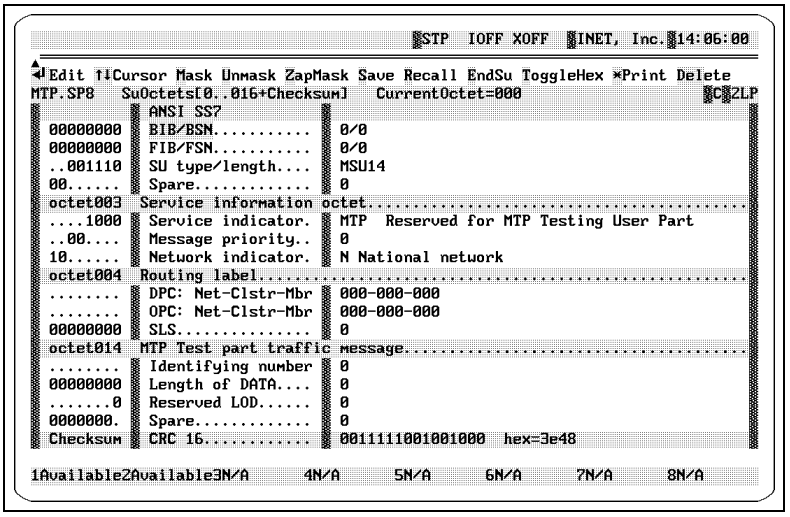


Figure 5.5 - Create/Edit Message Screen (Example)

Create/Edit Message Screen Definitions

↵ Edit
Press the Enter (↵) key to access either the numeric field or the options menu associated with the highlighted information element. After the selection is edited, press the Enter (↵) key to assign the changes.

↑↓ Cursor
Press the ↑↓, Home, and End keys to scroll through the elements in the information message.

Mask
Highlight the desired information element, and press the M key to assign the mask to the information element. When this function is applied to an information element in the message, that specific element becomes a Don't Care condition for all trigger and filter definitions.

Unmask
Highlight the desired information element, and press the U key to unmask it. This function removes the mask placed on an information element in the message.

ZapMask
Press the Z key to mask all information elements in the message.

Save
Press the S key to save the created or edited message. Enter a file name (maximum of eight characters) in the Save dialog box. Press the Enter (↵) key. The Notes dialog box appears, displaying a description of the modified message. Edit the notes (maximum of 47 characters) or leave the notes as displayed, and press the Enter (↵) key to save the file to the message catalog for the current protocol. Notes are displayed if the cursor is placed on the message when scrolling through the message catalog.

✍ *For the ISDN protocol, variants are saved in the appropriate variant directory. Saved files can be accessed using the Recall option.*

Recall
Press the R key to recall the message catalog that corresponds to the current protocol. Messages can be recalled for editing purposes. The A…Z Search function can be used to alphabetically locate the desired file. Press the corresponding letter key to move to the desired position. Select the desired message, and press the Enter (↵) key to recall it. The Delete function can also be used to delete the selected message.

```
800IAM.ISU
800INV.SCC
800INVII.SCC
800RSP.SCC
ACM-0001.ISU
ACM-784.ISU
ANM-784.ISU
BADLSSU2.SIG
BAD_782.SNM
BAD_LSSU.SIG
BAD_SSA.SCC
```

Figure 5.6 - Sample Message Catalog

EndSu
Press the E key to cut off a signal unit from the cursor position down.

ToggleHex
Press the T key to switch between hexadecimal and mnemonic, plain- English format to edit messages.

Print
Press the Shift key and the 8 key (*) to print the displayed message.

Delete
Press the Delete key to delete values in a message field.

When editing a message, the following information about the message is displayed on the information line and the screen (see **Figure 5.7**).

File Name
This function displays the file name of the current message if it was recalled for editing.

Current Octet
This function displays the octet number of the highlighted information element within the message. If a field spans more than 1 octet, the number shown is that of the least significant octet.

Signal Unit Length
This field specifies signal unit lengths in terms of octets plus checksum.

Bit Field
This function displays the entire message in binary representation. The most significant bits are displayed at the beginning of the field (0.....), and the least significant bits are displayed at the end of the field (...00000).

Header Lines
The header lines divide the screen display for convenient viewing of different sections of information elements and identify the starting octet of each element (see **Figure 5.7**). Use the starting octet displayed in the header lines to simplify the calculation of pointer values.

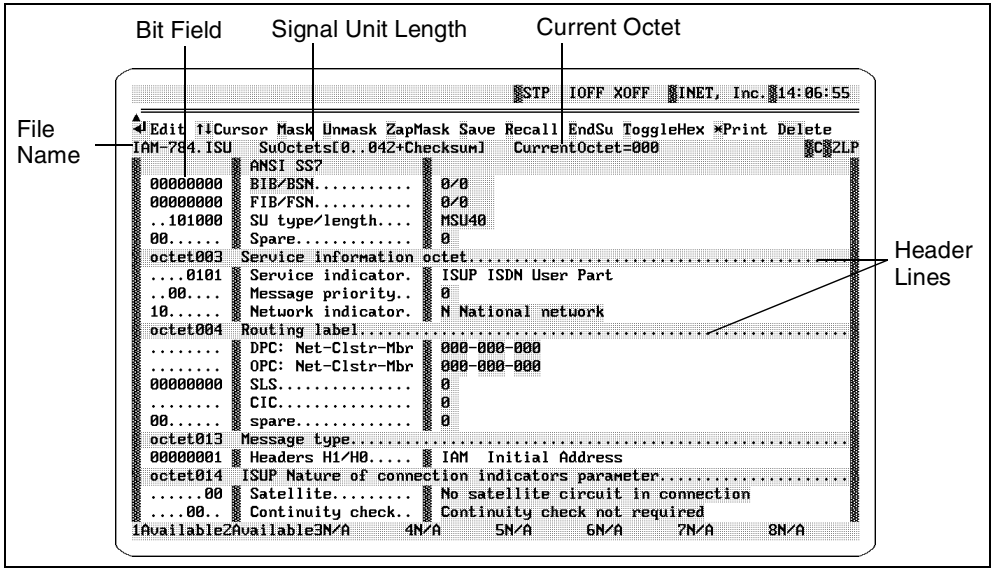


Figure 5.7 - Header Lines (Example)

Create/Edit Message Procedures

SS7, ISDN, and X.25 messages can be created using the Create/Edit Message feature under the F6 Edit function.

Creating SS7 Messages

From this screen, you can define Fill In Signal Unit (FISU), Link Status Signal Units (LSSUs) and Message Signal Units (MSUs) of any user part within the chosen protocol. Level 2 messages (LSSUs) can also be created and edited in the Create/Edit Level 2 Message screen. Refer to "Create/Edit Level 2 Message" on page 132 of this guide.

Follow these steps to define an SS7 message.

Step	Action

1. In the Create/Edit Message screen, press the **Enter** (↵) key twice to begin a new message.

2. Use the ↑↓ keys to select the **SU type/length** field, and press the **Enter** (↵) key. A menu of signal unit lengths appears.

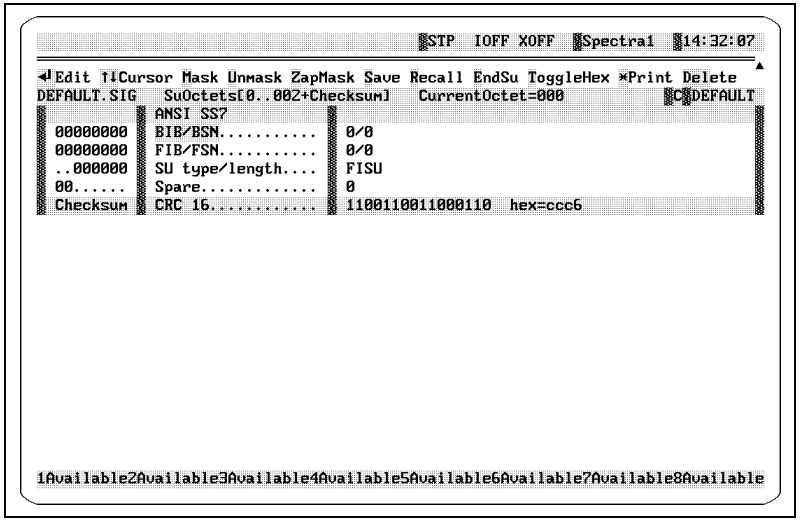


Figure 5.8 - Create/Edit Message Screen for SS7 ANSI Option

3. To define an LSSU, select either **LSSU1** or **LSSU2**, and press the **Enter** (↵) key. To define an MSU, highlight any of the **MSU** fields (MSU3-MSU63), and press the **Enter** (↵) key.

Selecting a specific MSU does not define the message length. The message length is defined within the message itself.

4. Continue to modify the fields within the message until you have completed editing the message.

✍ *The entire message can be created in hexadecimal format by pressing the T key to toggle the Create/Edit Message screen to hexadecimal mode.*

5. Press the **S** key to save the message. Enter a file name (up to eight characters) for the modified message, and press the **Enter (↵)** key. A three letter file extension identifying the associated protocol is added to the file name by the Spectra system. Saved messages can be accessed again by using the Recall option.

   The Notes dialog box appears, displaying a description of the modified message. Edit the notes (maximum of 47 characters) or leave the notes as displayed, and press the **Enter (↵)** key.



✍ *If a message is modified but not renamed, a dialog box with the following message "MessageName.XXX already exists, replace? (Y/N)" is displayed. If Y is selected, the existing message in the message catalog will be overwritten. If N is selected, the message "MessageName.XXX was not saved" appears in the information line, and the Save option is exited.*

Creating ISDN Messages

When the screen is first accessed, the default signal unit type presented is an Information frame. From this screen, you can also define any Supervisory and Unnumbered frames within the chosen protocol.

Follow these steps to define an ISDN message.

Step	Action
1.	In the Create/Edit Message screen, press the **Enter (↵)** key twice to begin a new message.
2.	Use the ↑↓ keys to select the desired field, and press the **Enter (↵)** key. A menu of available options appears. Select the option you want, and press the **Enter (↵)** key.

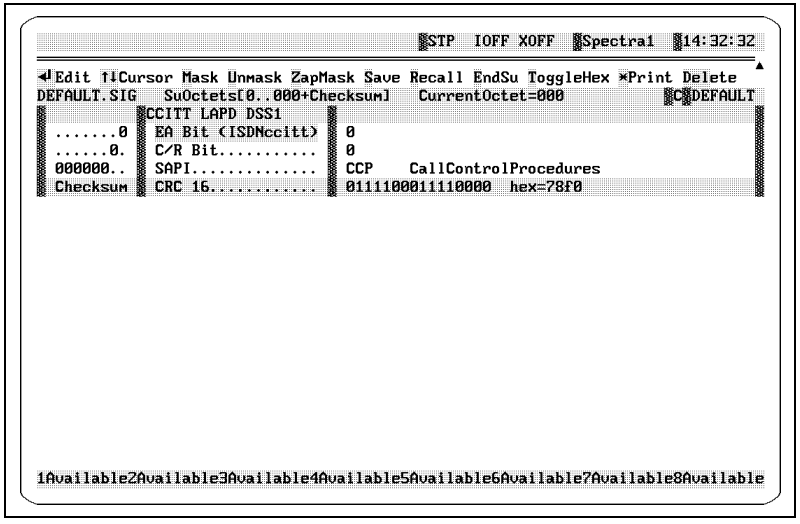


Figure 5.9 - Create/Edit Message Screen for ISDN CCITT Option

✍ *Spectra decodes do not allow catalogs to be displayed for fields using multiple octets or variable length fields. Consequently, new or edited messages for these fields must be entered character by character. This applies only to the DPNSS protocol.*

The message length is defined within the message itself. DPNSS messages with SI strings and additional parameters can vary in octet

length. There are standard DPNSS messages available in the message catalog, but some DPNSS messages must be built character by character for the SI string information and additional parameters.

For more information about SI strings, refer to "Selection, Indication, and Supplementary Information String Fields (DASS and DPNSS protocols only)" on page 116 of this guide. For the mnemonic coding of the SI string identifiers, refer to **Table B.1** in **Appendix B** of this guide.

✍ *The entire message can be created in hexadecimal format by pressing the T key to toggle the Create/Edit Message screen to hexadecimal mode.*

3. Continue to modify the fields within the message until you have completed editing the message.

4. Press the **S** key to save. Enter a file name (up to eight characters) for the modified message, and press the **Enter (↵)** key. A three letter file extension identifying the associated protocol is added by the Spectra system. Saved messages can be accessed again by using the Recall option.

   The Notes dialog box appears, displaying a description of the modified message. Edit the notes (maximum of 47 characters) or leave the notes as displayed, and press the **Enter (↵)** key.



✍ *If a message is modified but not renamed, a dialog box with the following message "MessageName.XXX already exists, replace? (Y/N)" is displayed. If Y is selected, the existing message in the message catalog will be overwritten. If N is selected, the message "MessageName.XXX was not saved" appears in the information line, and the Save option is exited.*

Creating X.25 Messages

When the screen is first accessed, the default is the data portion of an X.25 message. From this screen, you can define the data portion of the X.25 message in hexadecimal, ASCII text, or IS41 format.

User Data Messages
Hexadecimal information in User Data messages can be edited to refine predefined messages or to create new messages.

Follow these steps to create X.25 messages.

Step	Action

1. Select the **USER** option from the Editor options menu to access the Create/Edit Message screen for X.25 USER option (see **Figure 5.10**).

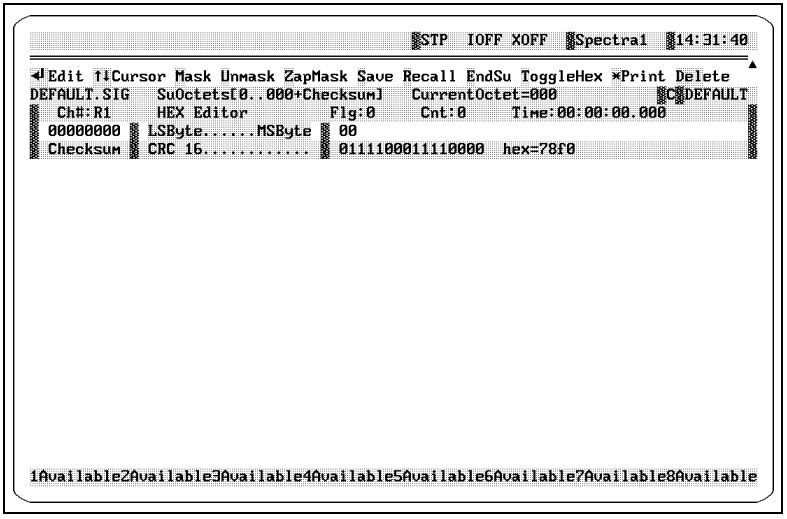


Figure 5.10 - Create/Edit Message Screen for X.25 USER Option

2. When the screen appears, the first byte of the message is automatically selected. Press the ↑↓↔ keys to highlight the desired byte in the message (that is, e2, ea., etc.), or press the **Insert** key to insert a new byte into the message.

3. Once the byte to be edited is highlighted, press the **Enter** (↵) key to access the Byte field.

4. Type in the characters for the byte, and press the **Enter** (↵) key. The cursor moves to the next byte in the message.

5. Repeat **Step 2** through **Step 4** for each byte that requires editing.

6. Press the **S** key to save the edited message. Follow the save procedures, entering a file name and description for the message.

IS41 Messages

Follow these steps to define an IS41 message.

Step	Action

1. Select the **IS41** option from the Editor options menu to access the Create/Edit Message screen for X.25 IS41 option (see **Figure 5.11**).

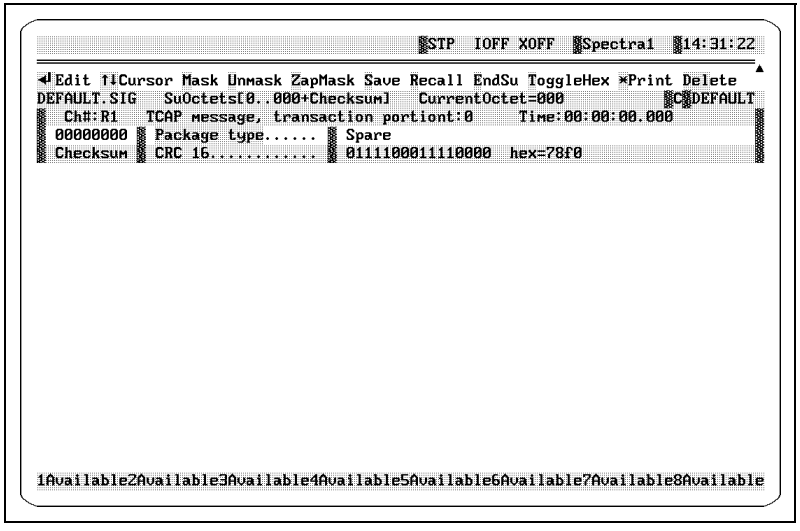


Figure 5.11 - Create/Edit Message Screen for X.25 IS41 Option

2. Select the **Package Type** field, and press the **Enter** (↵) key. Select the correct Package Type, and press the **Enter** (↵) key.

3. Select the **Component Identifier** field, and press the **Enter** (↵) key. The Component Identifier options menu is

displayed. Select the option you want, and press the **Enter** (↵) key. For more information about Computer Identifiers, see "X.25 Message Editor" on page 118 of this guide.

4. Select the **Component Type** field, and press the **Enter** (↵) key. Select the correct Component Type, and press the **Enter** (↵) key.

5. Select the **Component Length** field, and press the **Enter** (↵) key. Enter the component length, and press the **Enter** (↵) key. See "X.25 Message Editor" on page 118 of this guide for more information about determining parameter lengths.

6. Continue to modify the fields within the message until you have completed editing the message.

✍ *The entire message can be created in hexadecimal format by pressing the T key to toggle the Create/Edit Message screen to hexadecimal mode.*

7. Press the **S** key to save the edited message. Follow the save procedures, entering a file name and description for the message.

ASCII Messages

ASCII text characters in ASCII messages can be edited to refine pre-defined messages or create new messages.

Follow these steps to create new ASCII messages.

Step	Action
1.	Select the **ASCII** option from the Editor options menu to access the Create/Edit Message screen for ASCII option (see **Figure 5.12**).

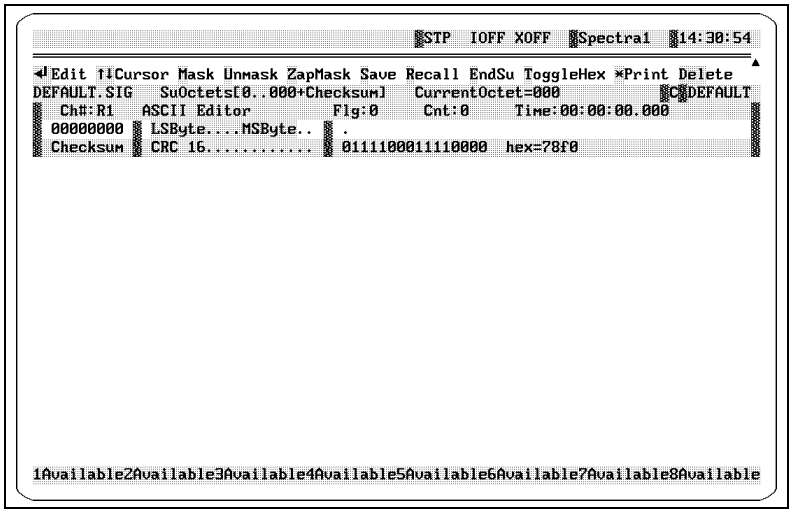


Figure 5.12 - Create/Edit Message Screen for X.25 ASCII Option

2. When the screen appears, the first byte of the message is automatically highlighted. Press the ↑↓↔ keys to highlight the desired byte in the message (that is, ... for ASCII), or press the **Insert** key to insert a new byte into the message.

3. Once the byte to be edited is highlighted, press the **Enter** (↵) key to access the Byte options menu.

4. When the menu appears, use the **A...Z Search** option to locate the desired byte. Once the desired byte replacement is highlighted in the menu, press the **Enter** (↵) key to assign it to the message. The cursor then moves to the next byte. In this manner, a new message can be created by building the desired message comprised of Byte menu options.

5. Repeat **Step 2** through **Step 4** for all information that requires editing.

6. Press the **S** key to save the edited message. Follow the save procedures, entering a file name and description for the message.

CREATE/EDIT LEVEL 2 MESSAGE

Level 2 messages are used to indicate the status of links. LSSUs are used for Alignment Procedures, Processor Outages, and Flow Control. The Create/Edit Level 2 Message option allows you to view or edit the Level 2 portion of an SS7 message.

Level 2 messages received by the Spectra system can be grabbed from the capture buffer and saved. Level 2 signal units are saved with an `.SIG` extension in a protocol specific directory locating inside the `C:\SPECTRA\PROTOCOL\PROTOCOL NAME\SIGUNITS\` directory. These messages can be recalled for viewing or editing purposes.

Follow these steps to create/edit the Level 2 portion of an SS7 message.

Step	Action
1.	Press the **F6** key to display the F6 Edit Function menu.
2.	Use the ↓↑ keys to select **Create/Edit Level 2 Message** and press the **Enter (↵)** key.

The Protocol options menu is displayed, containing the available protocol options (see **Figure 5.13**).

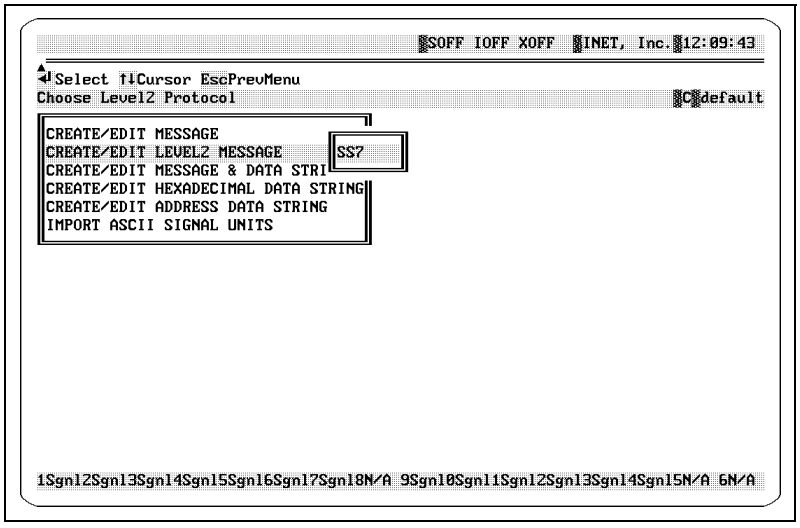


Figure 5.13 - F6 Edit Function Menu

✍ *Additional protocol options are available if you have purchased the Spectra High Speed Links (HSL) package. For information about the use of the Create/ Edit Level 2 Message feature in conjunction with Spectra High Speed Links, refer to the* ***Spectra High Speed Links Guide****.*

3. Select **SS7** from the appearing menu and press the **Enter** (↵) key. A protocol options menu appears.

4. Select the desired protocol, and press the **Enter** (↵) key to assign the protocol option. The available options are as follows:

   - **SS7**
     ANSI, ITU-T RED, ITU-T BLUE, ITU-T WHITE, CHINA, BTNR, JAPAN, and VARIANT

5. The Level 2 portion of the default signal unit for SS7 messages is displayed (see **Figure 5.14**).

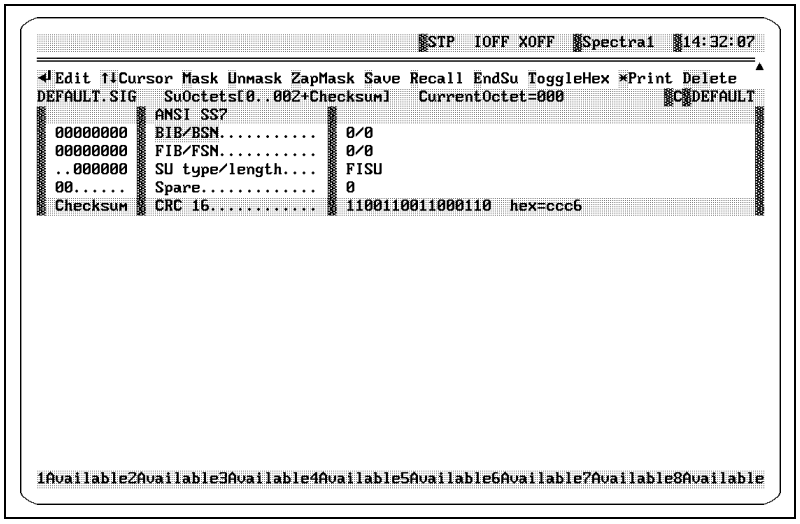


Figure 5.14 - Create/Edit Level 2 Message Screen - SS7 Message Displayed

6. Use the ↑↓ keys to select the **SU type/length** field, and press the **Enter (↵)** key. A menu of signal unit lengths appears.

7. Select either **LSSU1** (one octet) or **LSSU2** (two octets), and press the **Enter (↵)** key.

✍ *The entire message can be created in hexadecimal format by pressing the T key to toggle the Create/Edit Message screen to hexadecimal mode.*

8. Use the ↑↓ keys to select the **Link Status** field, and press the **Enter (↵)** key. A catalog of LSSU messages appears. Select from one of the following and press the **Enter (↵)** key:

   - Status Indicator-Out of Service (SIOS)
   - Status Indicator-Out of Alignment (SIO)
   - Status Indicator-Normal (SIN)
   - Status Indicator-Emergency (SIE)

- Status Indicator-Busy (SIB)
- Status Indicator-Processor Outage (SIPO)

✍ *For more information about Level 2 messages and their related timers, refer to "MTP Level 2 Procedures" on page 273 of the* ***Spectra Setup and Configuration Guide***.

9. Continue to modify any other fields within the message until you have completed editing the message.

10. Press the **S** key to save the message. Enter a file name (up to eight characters) for the modified message, and press the **Enter** (↵) key. A three letter file extension identifying the associated protocol is added to the file name by the Spectra system. Saved messages can be accessed again by using the Recall option.

    The Notes dialog box appears, displaying a description of the modified message. Edit the notes (maximum of 47 characters) or leave the notes as displayed, and press the **Enter** (↵) key.



✍ *If a message is modified but not renamed, a dialog box with the following message "MessageName.XXX already exists, replace? (Y/N)" is displayed. If Y is selected, the existing message in the message catalog will be overwritten. If N is selected, the message "MessageName.XXX was not saved" appears in the information line, and the Save option is exited.*

11. To recall a saved SS7 Level 2 Message, press the **R** key to access the saved message catalog. Use the ↑↓ keys to highlight the desired message and press the **Enter** (↵) key to view/edit the message.

CREATE/EDIT MESSAGE/DATA STRING

This option defines a partial message up to and including the Message Type field. It also defines up to 16 octets of the sliding data string portion of a message. This option is used for triggering, filtering, and also for replacing/altering messages.

✍ *This option is available only for SS7.*

The Create/Edit Message/Data String screen works just like the Create/Edit Message screen. In addition, it offers the ability to further qualify a message with a sliding phone number.

A message/data string is a signal unit that contains an optional data string with masks (Don't Care fields) in any position of the partially defined signal unit of the data string. The matching of the data string is position-independent but usually starts at the Message Type (H1H0) field (see **Figure 5.15**).

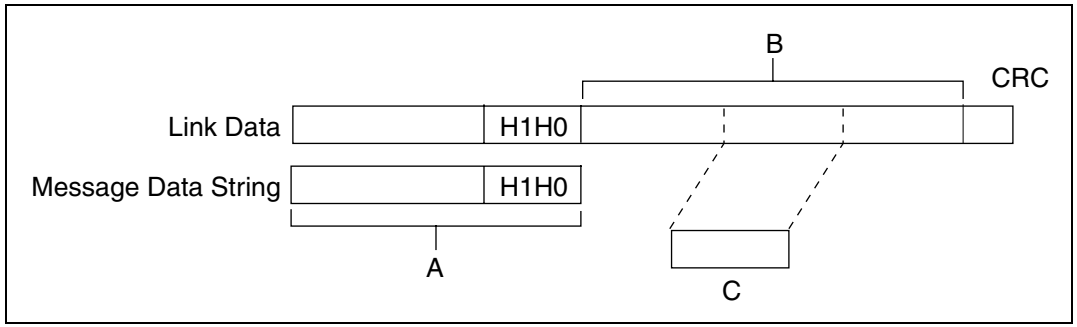


Figure 5.15 - Message/Data String

The Spectra system first matches portion A of the trigger to portion A of the link message. Then, data string C is compared to the remainder (section B) of the link message. This comparison starts immediately after the H1H0 field and continues shifting one nibble each time until a matching string within B is found.

A message/data string can have a null data string portion. For the Spectra system to declare a match between a captured message and a defined message/data string, the following equation must be satisfied:

$$Captured\ length \geq Message\ length + Data\ String\ length$$

The length of the captured message must be greater than or equal to the sum of the two portions of the message/data string.

Follow these steps to access the Create/Edit Message/Data String screen.

Step	Action
1.	In the F6 Edit menu, place the cursor on the **Create/Edit Message/Data String** option, and press the **Enter** (↵) key.
2.	The Protocol options menu is displayed, containing the available options. The protocol options available depend on the package purchased. The following options are available.

SS7
ANSI, ITU-T RED, ITU-T BLUE, ITU-T WHITE, CHINA, BTNR, JAPAN, and VARIANT

3. Select the desired protocol, and press the **Enter** (↵) key to assign the protocol option. The Create/Edit Message/Data String screen appears (see **Figure 5.16**).

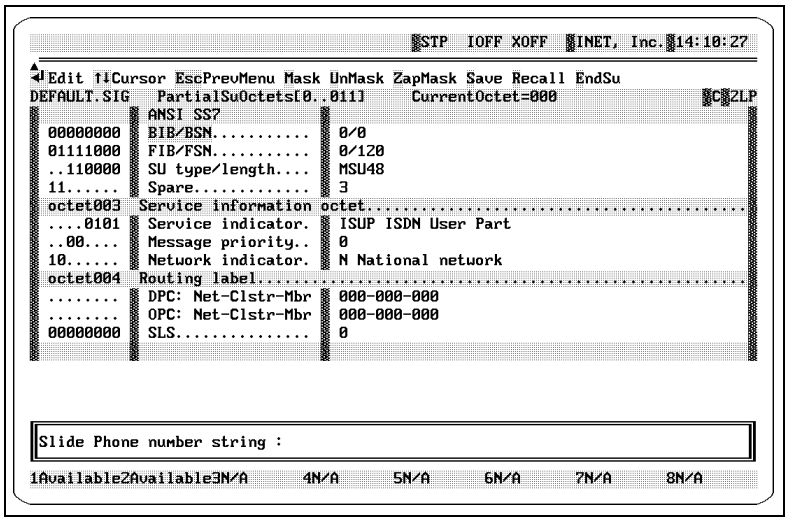


Figure 5.16 - Create/Edit Message/Data String Screen

✍ *This option allows a full or partial phone number to be entered into the slide string to further qualify messages. This option can only be accessed when creating MSUs.*

4. Press the **End** key to move to the end of the message, and press the ↓ key to access the Slide Phone Number String dialog box.



Figure 5.17 - Slide Phone Number String Dialog Box

5. Enter the desired phone number (do not use a hyphen). Press the **Shift** key and the **8** key (*) to enter a Don't Care Digit into the data string.

   To enter a hexadecimal data string, press the **H** key to change the option to Slide Hex data string. Enter the desired hexadecimal number. (The Spectra system program automatically enters digits in groups of two).

Use any digit or letter from A - F. Press the **Shift** key and the **8** key (*) to enter a Don't Care Digit character into the data string.

6. After the phone number or hexadecimal data string has been entered, press the ↑ key to move back to the message portion.

7. Press the **S** key, and enter a file name (maximum of eight characters) for the string in the Save dialog box. Press the **Enter (↵)** key.

8. The Notes dialog box appears, displaying a description of the data string. Edit the notes (maximum of 47 characters) or leave the notes as displayed, and press the **Enter (↵)** key to save the string and the current message to the message catalog for the current protocol. Notes are displayed if the cursor is placed on the message when scrolling through the message catalog. Saved messages can be re-accessed using the Recall option.

CREATE/EDIT HEXADECIMAL DATA STRING

The Create/Edit Hexadecimal Data String option defines specific hexadecimal data strings. This option is used for triggering and filtering messages in any mode. Data strings can be used to define up to 20 octets and provide the ability to mask down to the bit level.

✍ *This option is available only for SS7.*

Follow the steps below to assign a hexadecimal data string.

Step	Action
1.	In the Editor options menu, place the cursor on the **Create/Edit Hexadecimal Data String** option, and press the **Enter (↵)** key.
2.	The Hexadecimal Data String dialog box is displayed (see **Figure 5.18**).



Figure 5.18 - Hex Data String Dialog Box (Example)

✍ *Enter hexadecimal digits backwards when using them for triggering or viewing.*

3. Enter the desired hexadecimal number (the Spectra system program automatically enters digits in groups of two). Use any digit or letter from A through F. Press the **Shift** key and the **8** key (*) to enter a Don't Care Nibble character into the data string.

4. Press the **S** key, and enter a file name (maximum of eight characters) for the hexadecimal string in the Save dialog box. Press the **Enter (↵)** key.

5. The Notes dialog box appears, displaying a description of the hexadecimal string. Edit the notes (maximum of 47 characters) or leave the notes as displayed, and press the **Enter (↵)** key to save the hexadecimal string to the message catalog for the current protocol. Notes are displayed if the cursor is placed on the message when scrolling through the message catalog. Saved messages can be re-accessed using the Recall option.

CREATE/EDIT ADDRESS DATA STRING

This option defines messages by a specific phone number and can be used to trigger and filter messages in any mode.

✍ *This option is available only for SS7.*

Follow these steps to assign an address data string.

Step	Action

1. In the F6 Edit options menu, place the cursor on the **Create/Edit Address Data String** option, and press the **Enter (↵)** key. The Address Digits dialog box appears (see **Figure 5.19**).

```
Address Digits: 6809400
```

Figure 5.19 - Address Digits Dialog Box

2. Enter the desired phone number (do not enter a hyphen). Press the **Shift** key and the **8** key (*) to enter a Don't Care Digit character into the number.

3. Press the **S** key, and enter a file name (maximum of eight characters) for the address string in the Save dialog box. Press the **Enter (↵)** key.

4. The Notes dialog box appears, displaying a description of the address string. Edit the notes (maximum of 47 characters) or leave the notes as displayed, and press the **Enter** (↵) key to save the address string to the message catalog for the current protocol. Notes are displayed if the cursor is placed on the message when scrolling through the message catalog. Saved messages can be re-accessed using the Recall option.

IMPORT ASCII SIGNAL UNITS

Messages can also be imported from ASCII files containing the messages in a special hexadecimal format (see "ASCII Signal Unit File Format" on page 141 of this guide). Multiple messages, including masks, can be contained in one ASCII file. When the messages are imported, the Spectra system creates an entry in the appropriate message catalog for each signal unit and uses file names specified in the ASCII file.

Follow these steps to import ASCII messages.

Step	Action

1. Press the **F6** key, and select the **IMPORT ASCII SIGNAL UNITS** option in the F6 Edit menu. The Import ASCII Signal Units screen is displayed (see **Figure 5.20**).

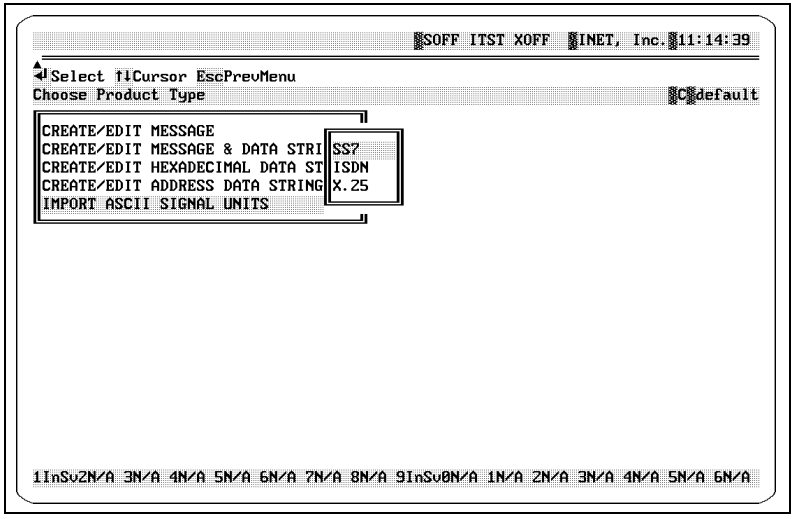


Figure 5.20 - Import ASCII Signal Units Screen

2. The Protocol options menu is displayed, containing the available protocol options. Select the desired protocol, and press the **Enter** (↵) key to assign the protocol option. The available protocol options depend on the package purchased.

✍ *ISDN is not available for the Import ASCII Signal Units option.*

The following options are available:

- **SS7**
  ANSI, ITU-T RED, ITU-T BLUE, ITU-T WHITE, CHINA, BTNR, JAPAN, and VARIANT
- **X.25**
  USER, ASCII

3. Select the desired protocol, and press the **Enter** (↵) key to assign the protocol option.

✍ *ASCII text files to be imported must be smaller than 256 B.*

4. The Enter ASCII File dialog box appears. Enter the path and file name for the ASCII file, and press the **Enter** (↵) key. The file is imported, and each signal unit in the file is added to the appropriate message catalog.

ASCII Signal Unit File Format

In order for the Spectra system to import messages from an ASCII file, the file must be in a certain format. Guidelines for importing ASCII signal unit files follow.

SS7 ASCII Signal Unit Guidelines

The following list contain guidelines for SS7 ASCII Signal Unit Formatting:

- Each signal unit is composed of signal unit data, the signal unit file name, and the signal unit data mask.
- Signal unit data is preceded and terminated by a pound sign (#) and is represented in unspaced, uppercase hexadecimal characters.
- The signal unit file name immediately follows the signal unit data.

- Signal unit mask data follows the signal unit file name. The mask data is preceded and terminated by a dollar sign ($) and is represented in unspaced, uppercase hexadecimal characters. Enabled bits mask the signal unit data bits (hexadecimal “F” masks an entire nibble; hexadecimal “0” leaves the nibble unmasked).

- Multiple messages can be contained within a single ASCII file. The ASCII signal unit file must be terminated by a carat (^).

✍ *If the Text Editor under the DOS Commands option in the F8 Tools menu is being used to enter or edit ASCII Signal Unit Data, the terminating carat character must be entered by pressing ALT-V, not Shift-6. The Shift-6 keystroke is used by the Spectra system to send a copy of the current screen to the printer.*

A sample SS7 ASCII Signal Unit File is pictured in **Figure 5.21**.

```
#02A3EF45126798AB9C2386097039586828586709797000AC#IAM_784
$FF000FFF0000000000000000000FF00F0000000000000000$
#9843624362406438956329857622563245634 5ACE9836598#ACM_NEW
$FFFFFFFFFFFFFF000FF0000000FFFFF0000F000FFF000000$
#2437652876435872 3645#SNM_OLD
$FFF00000000000000000$
^
```

Figure 5.21 - Sample SS7 ASCII Signal Unit File

X.25 ASCII Signal Unit Guidelines

Guidelines for X.25 ASCII Signal Unit Formatting follow:

- Each signal unit is composed of signal unit data, the signal unit file name, and the signal unit data mask.

- X.25 messages default to masked signal units.

✍ *If the Text Editor under the DOS Commands option in the F8 Tools function is being used to enter or edit ASCII Signal Unit Data, the terminating carat character must be entered by pressing ALT-V, not Shift-6. The Shift-6 keystroke is used by the Spectra system to send a copy of the current screen to the printer.*

6 Monitoring

OVERVIEW

The Spectra system monitors up to 16 signalling links in Bridged mode. In Monitor mode, there is data between multiple signalling points. Monitor mode allows you to capture and analyze link data, performing real-time and post-capture call tracing. You can view data based on specific criteria, such as phone numbers, errored messages and link status. You can also collect data from specialized tests that you create.

✍ *For information about the use of the Monitor mode in conjunction with Spectra High Speed Links, refer to the* ***Spectra High Speed Links Guide****.*

Follow these steps to access Monitor mode.

Step	Action
1.	Press the **F1** key to access the F1 Setup menu (see **Figure 6.1**).

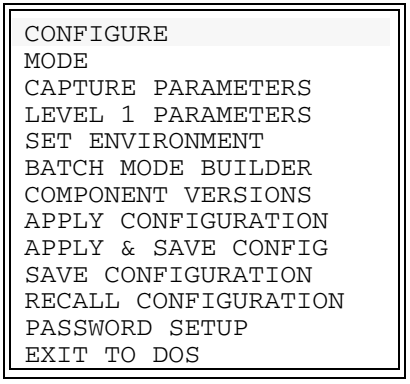


Figure 6.1 - F1 Setup Menu

2. Press the ↑↓ keys to select **Mode**, and press the **Enter** (↵) key. The Protocol options menu is displayed (see **Figure 6.2**).

3. Select the protocol you want to monitor, and press the **Enter** (↵) key.



Figure 6.2 - Protocol Options Menu

✍ *The Spectra system provides three protocol options—SS7, ISDN, and X.25. Since these protocols are available as separate options on the Spectra system, your system may have any combination of the three. If you requested only one protocol, no protocol choice is available. If you requested two protocols, only these choices are listed.*

SS7 Monitor Mode

If you select SS7, the SS7 Mode options menu is displayed (see **Figure 6.3**). To access the Monitor Mode, select Monitor, and press the Enter (↵) key.

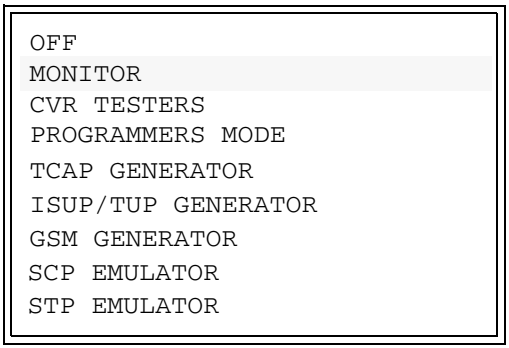


Figure 6.3 - SS7 Mode Options Menu

ISDN Monitor Mode

If you select ISDN, the ISDN Mode options menu is displayed (see **Figure 6.4**). To access the Monitor mode, select Monitor, and press the Enter (↵) key.

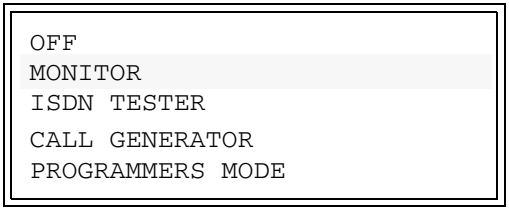


Figure 6.4 - ISDN Mode Options Menu

X.25 Monitor Mode

If you select X.25, the X.25 Mode options menu is displayed (see **Figure 6.5**). To access the Monitor mode, select Monitor, and press the Enter (↵) key.

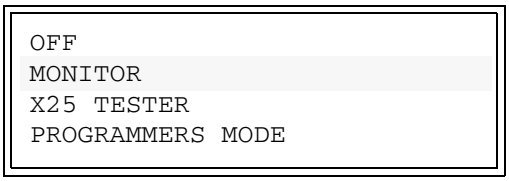


Figure 6.5 - X.25 Mode Options Menu

The following sections explain how to monitor SS7, ISDN and X.25 messages using the Monitor mode.

SS7 MONITOR MODE

When you access the SS7 Monitor mode, the Monitor Mode Trigger screen is displayed (see **Figure 6.6**).

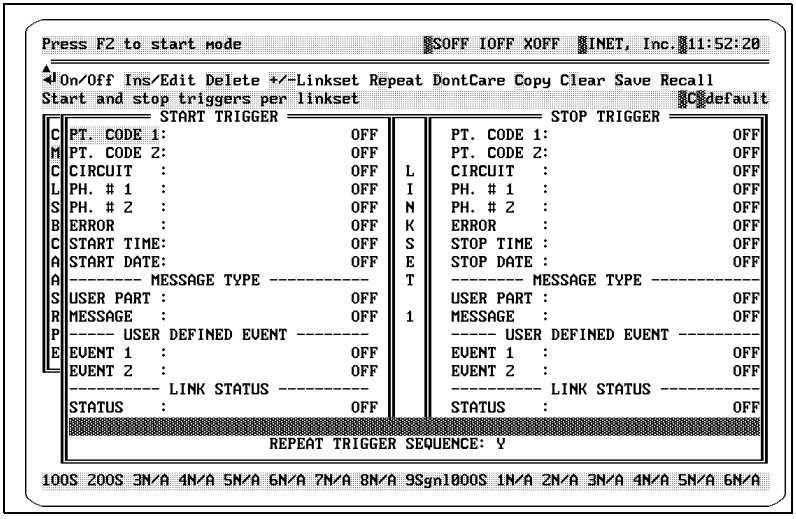


Figure 6.6 - SS7 Monitor Mode Trigger Screen

The Monitor Mode Trigger screen allows start and stop triggers to be assigned to define the conditions for data capture. A start trigger initiates data capture, and a stop trigger ends the data capture.

The START/STOP TIME and START/STOP DATE triggers take priority over all other triggers. For example, if the START/STOP TIME field has been set to 12:00:00, no other setting triggers data capture until 12:00:00.

The ERROR trigger, the USER DEFINED EVENT triggers, and the STATUS trigger are OR triggers. All other triggers are AND triggers without priority.

For example, if a point code is assigned as a trigger and a phone number is assigned as a trigger, both the point code and the phone number must be detected to trigger data capture (because these are AND triggers).

However, if a point code is assigned as a trigger and a user-defined event is assigned as a trigger, either the point code or the user-defined event must be detected to trigger data capture (because user-defined events are OR triggers).

Triggers can be assigned to each link. Use the + or - keys to cycle through the trigger screens for the 16 available links. The entire link is activated if any trigger on the link is matched.

The Spectra system takes the appropriate action based on the trigger settings listed in **Table 6.1**.

Table 6.1 - Possible Trigger Settings

Trigger Setting	Action Taken by Spectra
Start and Stop triggers set to OFF	The DontCare trigger is activated.
Start trigger set to OFF	Data capture begins upon receipt of the first message, whether it is a valid signal unit or an errored signal unit.
Stop trigger set to OFF	Data capture continues until the buffer is full.

✍ *If a start trigger is defined with a DontCare stop trigger, a second signal unit matching the start trigger does not reset the buffer (empty the current buffer and begin capturing new data). Instead, the start trigger signal unit is color-coded as a trigger (for easier viewing), and data capture continues until the buffer is full.*

SS7 Monitor Mode Trigger Screen Definitions

The following options are displayed in the direction line across the top of the screen.

↵ On/Off
Press the Enter (↵) key to turn the selected trigger ON or OFF.

Ins/Edit
Press the Insert key to access the entry field or message catalog for the selected trigger option.

Delete
Press the Delete key to delete the selected trigger. For example, if EVENT triggers are entered in fields one and two, the first field can be selected and deleted to make the second field the only event trigger.

+/-Linkset
Press the + or - keys to change the linkset displayed.

Repeat
Press the E key to enable or disable the Repeat Trigger Sequence feature. The REPEAT TRIGGER SEQUENCE field toggles to Y (yes) when enabled and N (no) when disabled. If the REPEAT TRIGGER SEQUENCE feature is enabled, the trigger is re-armed every time the start/stop sequence is completed. As a result, the Spectra system continuously re-arms for the next start/stop sequence until the capture buffer fills up.

DontCare
Press the D key to turn all trigger fields for the link to OFF (DontCare).

Copy
Press the C key to allow other linksets to be assigned the same trigger settings as the current displayed linkset. When the Copy options menu is displayed, all linksets are automatically marked, and additional direction line options are also displayed (see **Figure 6.7**). Select the linksets to which you do not want to assign the current trigger settings, and press the Enter (↵) key to unmark them. When the assignments are made, press the I key to initiate copying. The message "Copied to specified linksets (x to xx)" is displayed in the information line at the top of the screen when the trigger information is copied.

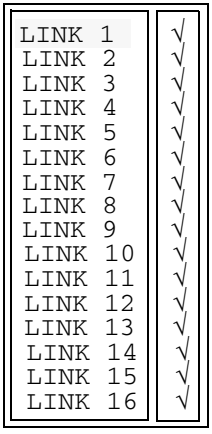


Figure 6.7 - Copy Options Menu

Clear
Press the L key to clear all the current triggers displayed. A Clear Link Triggers dialog box is displayed. Press the Y key to clear all displayed triggers.

Save
Press the S key to save the current triggers. A Save dialog box appears. Enter a file name (a maximum of eight characters) for the current filters in the dialog box and press the Enter (↵) key.

A File Description dialog box appears. Enter a description of the file in the dialog box. The file description allows a lengthy description (maximum of 55 characters) to be entered to include specifics of the file's contents. Press the Enter (↵) key.

Recall
Press the R key to recall any saved triggers. A catalog of saved triggers is displayed. Use the ↑↓ keys to select the a set of triggers and press the Enter (↵) key.

SS7 START/STOP TRIGGER FIELDS

This section documents the use of the various START/STOP TRIGGER fields used in the SS7 Monitor mode.

PT. CODE 1 AND PT. CODE 2
Any point code can be entered as a trigger in the PT. CODE 1 and PT. CODE 2 fields. When the field is ON, data capturing starts/stops when any message containing either of the assigned point codes in the routing label is encountered during transmission. Any Origination Point Code (OPC) or Destination Point Code (DPC) matching the entered point code causes a trigger.

CIRCUIT
Circuits refer to Telephone User Part (TUP) and Integrated Services Digital Network User Parts (ISUP) messages. If the CIRCUIT field is ON, data capturing starts/stops if a TUP or ISUP message containing the assigned circuit number is encountered during transmission.

PH. #1 AND #2
Any phone number can be entered as a trigger in the PH. #1 or PH. #2 fields. If the PH. #1 or PH. #2 field is ON, data capturing starts/stops when any message containing the entered phone numbers is encountered during transmission. Partial phone numbers may be entered as triggers.

ERROR
The ERROR field allows a particular error message to be assigned as a start/stop trigger. If the ERROR field is ON, data capturing starts/stops when any transmission containing the specified error type is encountered. When the ERROR field is selected and the Insert key is pressed, the Error Triggers options menu is displayed (see **Figure 6.8**).

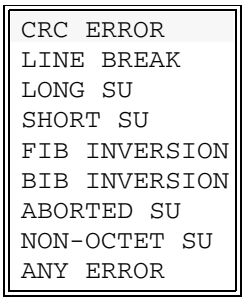


Figure 6.8 - Error Triggers Options Menu

CRC ERROR
This is an error signifying signal unit with a corrupt checksum.

LINE BREAK
This error is displayed when the system receives at least 7 consecutive 1s after receiving a flag (01111110).

LONG SU
This error is displayed when the system receives a signal unit that exceeds the maximum octet size (specified in Level 2 parameters).

SHORT SU
This error is displayed when the system receives a signal unit less than 5 octets in length.

FIB INVERSION
This error is displayed when the system receives a signal unit with an Inverted Forward Indicator Bit.

BIB INVERSION
This error is displayed when the system receives a signal unit with an Inverted Backward Indicator Bit.

ABORTED SU
This error is displayed when the system receives an aborted signal unit (an signal unit terminated prematurely with 7 consecutive 1s).

NON-OCTET SU
This error is displayed when the system receives a signal unit delimited with a flag (01111110) on a non-octet boundary.

ANY ERROR
This error is displayed when the system receives any of the conditions listed in the Error Triggers options menu.

START TIME/STOP TIME
The START TIME/STOP TIME fields take priority over other triggers. If a time is assigned in these fields, data capturing starts/stops at that time regardless of other trigger assignments.

START DATE/STOP DATE
The START DATE/STOP DATE fields take priority over other triggers. If a date is assigned in these fields, data capturing starts/stops at that date regardless of other trigger assignments.

USER PART
The USER PART field allows a particular user part message to be assigned as a start/stop trigger. If the USER PART field is ON, data capturing starts/stops when any transmission containing the assigned user part is encountered. This field provides a list of the 16 user part types.

MESSAGE
The MESSAGE field allows a particular message type to be assigned as a start/stop trigger. If the MESSAGE field is ON, data capturing starts/stops when any transmission containing the assigned message type is encountered. This option provides a catalog of message types for the user part selected in the previous field. The USER PART field must be turned ON before the MESSAGE field can be enabled.

USER DEFINED EVENT 1 AND 2
User-defined events are messages defined using the F6 Edit function. These messages are displayed in a catalog when the field is accessed by pressing the Insert key. The message can then be assigned as a trigger. If an event field is ON, data capturing starts/stops when any transmission containing the assigned event message is encountered. This option allows the Spectra system to trigger on a specific message. Any portion of the message can be masked when the message is built using the F6 Edit function. Creating and editing messages is explained in **Chapter 5** of this guide.

STATUS
The STATUS field allows a particular link status to be assigned as a start/stop trigger. If the STATUS field is ON, data capturing starts/stops when any transmission containing the assigned link status is encountered. This option provides a catalog of the following link status options: InService, Available, and Other.

ASSIGNING TRIGGERS TO SS7 LINKS

This procedure outlines how to set up the Monitor mode for all available trigger fields. All fields in this procedure are optional. Individual fields can be turned ON or OFF by selecting a field and pressing the Enter (↵) key. Turn ON each of the fields you want to use as a trigger before running Monitor Mode.

Follow these steps to set up the Monitor mode trigger fields.

Step	Action
1.	When the Monitor Mode Trigger screen is displayed, the cursor is automatically placed on the POINT CODE 1 field under the START TRIGGER column for LINK 1. Press the **Insert** key to access the numeric entry field.
2.	Enter the point code and press the **Enter (↵)** key to assign the point code as a trigger. For more information about point code formats and ranges, see "Set Point Code Format" on page 114 of the ***Spectra Setup and Configuration Guide***.
3.	Press the ↓ key one time to select the **POINT CODE 2** field. Repeat **Step 1** and **Step 2** for this field.

4. Press the ↓ key to select the **CIRCUIT** field. Press the **Insert** key to access the numeric entry field. Enter the physical circuit number, and press the **Enter** (↵) key to assign the circuit number as a trigger.

5. Press the ↓ key to select the **PH. #1** field. Press the **Insert** key to access the numeric entry field. Enter the phone number, and press the **Enter** (↵) key to assign the phone number as a trigger.

✍ *Partial phone numbers without leading DontCare or wildcard digits can be used as triggers.*

6. Press the ↓ key to select the **PH. #2** field. Repeat **Step 5** for this field.

7. Press the ↓ key to select the **ERROR** field. Press the **Insert** key to access the message catalog. Press the ↑↓ keys to select an error message, and press the **Enter** (↵) key to assign the error message as a trigger.

8. Press the ↓ key to select the **START TIME** field. Press the **Insert** key to access the numeric entry field. Enter the time (HH:MM:SS), and press the **Enter** (↵) key to assign the time as a trigger.

✍ *When this field is defined and turned ON, it replaces all other triggers.*

9. Press the ↓ key to select the **START DATE** field. Press the **Insert** key to access the numeric entry field. Enter the time (MM/DD/YY), and press the **Enter** (↵) key to assign the time as a trigger.

✍ *When this field is defined and turned ON, it replaces all other triggers.*

10. Press the ↓ key one time to select the **USER PART** field. Press the **Insert** key to access the user part message catalog. Press the ↑↓ keys to select a user part message, and press the **Enter** (↵) key to assign the message as a trigger.

11. Press the ↓ key one time to select the **MESSAGE** field. Press the **Insert** key to access the message catalog. Press the ↑↓ keys to select a message, and press the **Enter** (↵) key to assign the message as a trigger. A message cannot be entered if a user part was not entered.

12. Press the ↓ key one time to select the **EVENT 1** field. Press the **Insert** key to access the User Defined Event message catalog. Press the↑↓ keys to select a user-defined event message, and press the **Enter** (↵) key to assign the message as a trigger. Any field of the message that is masked is treated as a DontCare field.

13. Press the ↓ key one time to select the **EVENT 2** field. Repeat **Step 12** for this field.

14. Press the ↓ key one time to select the **STATUS** field. Press the **Insert** key to access the Status option catalog. Press the ↑↓ keys to select a status option, and press the **Enter (↵)** key to assign the status option as a trigger.

15. Press the ↑↓↔ keys to move to the STOP TRIGGER column and repeat the procedures described above for all fields requiring stop triggers.

16. Press the **E** key to assign the REPEAT TRIGGER SEQUENCE option. Pressing the **E** key toggles the option between Y (yes) and N (no).

17. After all start/stop triggers are assigned to Linkset 1, press the **+** key or the **-** key to advance to the other linksets. Repeat the entire procedure for all linksets requiring triggers.

✍ *Each linkset screen functions independently of the other linkset screens, with the exception of the REPEAT TRIGGER SEQUENCE command. This option remains constant in all linkset screens.*

18. Press the **S** key, and enter a file name (a maximum of eight characters) for the trigger string in the Save dialog box. Press the **Enter (↵)** key.

RUNNING SS7 MONITOR MODE

Follow these steps to run SS7 Monitor mode.

Step	Action

1. After setting all start/stop triggers, press the **F2** key. The Monitor mode begins data capture, and the F2 Run screen is displayed (see **Figure 6.9**). For more information about the F2 Run screen, see "Running a Test" on page 180 of this guide.

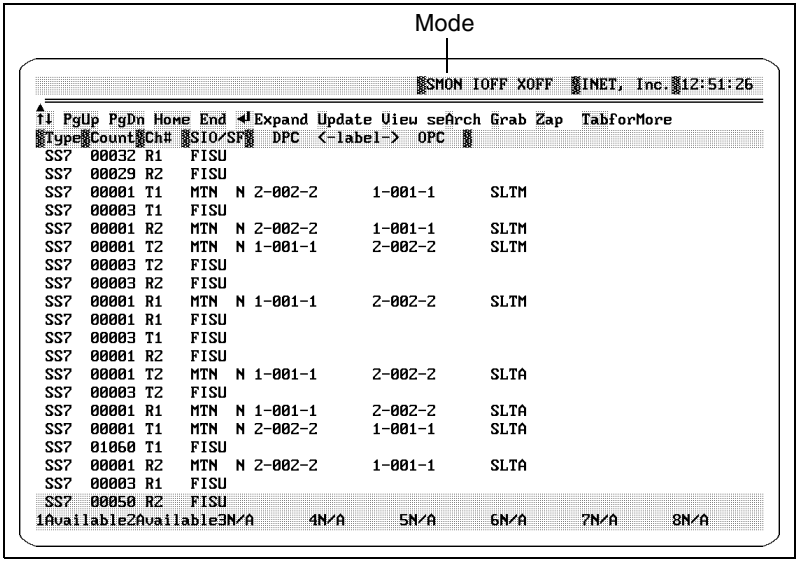


Figure 6.9 - F2 Run Screen

The Mode display at the top of the screen indicates that you are running SS7 Monitor mode. For more information about the Mode display, see "Main Function Selection Screen Definitions" on page 7 of this guide.

2. When you finish monitoring, complete one of the following steps:

   - To stop data capture and perform post-capture analysis, press the **F9** key. The F9 Xamine screen is displayed. For more information about the F9 Xamine screen, see "Post-Capture Traffic Analysis" on page 239 of this guide.

- To turn the SS7 Monitor mode OFF, access the **F1 Setup/Mode/ SS7** options menu, select **OFF**, and press the **Enter** (↵) key.

ISDN MONITOR MODE

When you access the ISDN Monitor mode, the Monitor Mode Trigger screen is displayed.

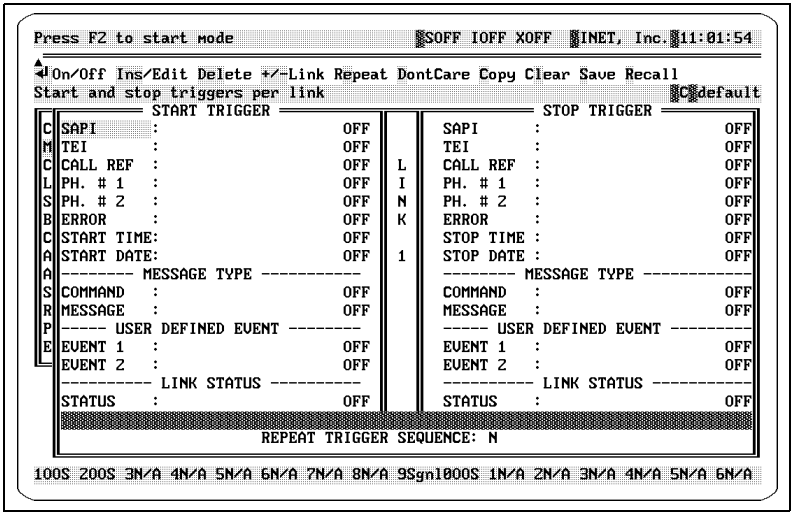


Figure 6.10 - ISDN Monitor Mode Trigger Screen

The ISDN Monitor mode unobtrusively observes, captures, and analyzes the data on the D-Channel of all ISDN links. The Monitor Mode Trigger screen allows start and stop triggers to be assigned to define the conditions for data capture. A start trigger initiates data capture on a given link, and a stop trigger ends the data capture.

The START/STOP TIME and START/STOP DATE triggers take priority over all other triggers. For example, if the START/STOP TIME field has been set to 12:00:00, no other setting triggers data capture until 12:00:00.

The ERROR trigger, the USER DEFINED EVENT triggers, and the STATUS trigger are OR triggers. All other triggers are AND triggers without priority.

For example, if a Service Access Point Identifier (SAPI) is assigned as a trigger and a phone number is assigned as a trigger, both the SAPI and the phone number must be detected to trigger data capture (because these are AND triggers).

However, if a SAPI is assigned as a trigger and a user-defined event is assigned as a trigger, either the SAPI or the user-defined event must be detected to trigger data capture (because user-defined events are OR triggers).

Triggers can be assigned to each link. Use the + or - keys to cycle through the trigger screens for the 16 available links, assigning triggers to each screen. The entire link is activated if any trigger on the link is matched.

The Spectra system takes the appropriate action based on the trigger settings listed in the **Table 6.2**.

Table 6.2 - Possible Trigger Settings

Trigger Setting	Action Taken by Spectra
Start and Stop triggers set to OFF	The DontCare trigger is activated.
Start trigger set to OFF	Data capture begins upon receipt of the first message, whether it is a valid signal unit or an errored signal unit.
Stop trigger set to OFF	Data capture continues until the buffer is full.

✍ *If a start trigger is defined with a DontCare stop trigger, a second signal unit matching the START trigger does not reset the buffer (empty the current buffer and begin capturing new data). Instead, the start trigger signal unit is color-coded as a trigger (for easier viewing), and data capture continues until the buffer is full.*

ISDN MONITOR MODE TRIGGER SCREEN DEFINITIONS

The following options are displayed in the direction line across the top of the screen.

↵ On/Off
Press the Enter (↵) key to turn the selected trigger ON or OFF.

Ins/Edit
Press the Insert key to access the entry field or message catalog for the selected trigger option.

Delete
Press the Delete key to delete the selected trigger. For example, if EVENT triggers are entered in fields one and two, the first field can be selected and deleted to make the second field the only event trigger.

+/-Link
Press the + or - keys to display the trigger assignments for the next for previous link.

Repeat
Press the E key to enable or disable the Repeat Trigger Sequence feature. The REPEAT TRIGGER SEQUENCE field toggles to Y (yes) when enabled and N (no) when disabled. If the REPEAT TRIGGER SEQUENCE feature is enabled, the trigger is re-armed every time the start/stop sequence is completed. As a result, the Spectra system continuously re-arms for the next start/stop sequence until the capture buffer fills up.

DontCare
Press the D key to change all trigger fields for the link to OFF (DontCare). This option sets all trigger fields in the current link to OFF.

Copy
Press the C key to allow other linksets to be assigned the same trigger settings as the current displayed linkset. When the Copy options menu is displayed, all linksets are automatically marked, and additional direction line options are also displayed (see **Figure 6.11**). Select the linksets to which you do not want to assign the current trigger settings, and press the Enter (↵) key to unmark them. When the assignments are made, press the I key to initiate copying. The message "Copied to specified linksets (x to xx)" is displayed in the information line at the top of the screen when the trigger information is copied.

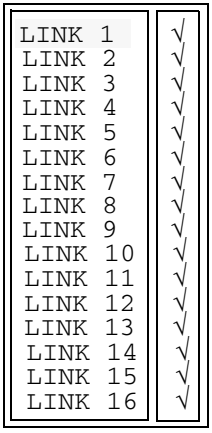


Figure 6.11 - Copy Options Menu

Clear
Press the L key to clear all the current triggers displayed. A Clear Link Triggers dialog box is displayed. Press the Y key to clear all triggers displayed.

Save
Press the S key to save the current triggers. A Save dialog box appears. Enter a file name (a maximum of eight characters) for the current filters in the dialog box and press the Enter (↵) key.

A File Description dialog box appears. Enter a description of the file in the dialog box. The file description allows a lengthy description (maximum of 55 characters) to be entered to include specifics of the file's contents. Press the Enter (↵) key.

Recall
Press the R key to recall any saved triggers. A catalog of saved triggers is displayed. Use the ↑↓ keys to select the a set of triggers and press the Enter (↵) key.

ISDN START/STOP TRIGGER FIELDS

This section documents the use of the various START/STOP TRIGGER fields used in the ISDN Monitor mode.

SAPI
The SAPI field allows a particular SAPI to be assigned as a start/stop trigger. If the SAPI option is turned ON, data capturing starts/stops when any message containing the specified SAPI is encountered during transmission.

TEI
The Terminal Endpoint Identifier (TEI) field allows a particular TEI to be assigned as a start/stop trigger. If the TEI option is turned ON, data capturing starts/stops when any message containing the specified TEI is encountered during transmission.

CALL REF
The CALL REF field allows a particular Call Reference number to be assigned as a start/stop trigger. If the CALL REF option is turned ON, data capturing starts/stops when any message containing the specified call reference number is encountered during transmission.

PH. #1 AND #2
Any phone number can be entered as a trigger in the PH. #1 or PH. #2 fields. If the PH. #1 or PH. #2 option is turned ON, data capturing starts/stops when any message containing the specified phone numbers is encountered during transmission. Partial phone numbers may be entered as triggers.

ERROR
The ERROR field allows a particular error message to be assigned as a start/stop trigger. If the ERROR option is turned ON, data capturing starts/stops when any transmission containing the specified error type is encountered. When the ERROR field is selected and the Insert key is pressed, the Error Triggers options menu is displayed (see **Figure 6.12**).

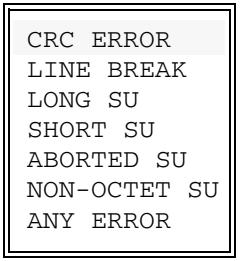


Figure 6.12 - Error Triggers Options Menu

CRC ERROR
This error is displayed when a signal unit receives a corrupt checksum.

LINE BREAK
This indicates receipt of at least 7 consecutive 1s after reception of a flag (01111110).

LONG SU
This error is displayed when the system receives a signal unit that exceeds the maximum octet size (specified in Level 2 parameters).

SHORT SU
This error is displayed when the system receives a signal unit less than five octets in length.

ABORTED SU
This error is displayed when the system receives an aborted signal unit (a signal unit terminated prematurely with 7 consecutive 1s).

NON-OCTET SU
This error is displayed when the system receives a signal unit delimited with a flag (01111110) on a non-octet boundary.

ANY ERROR
This error is displayed when the system receives any of the conditions listed in the Error Triggers options menu.

START TIME/STOP TIME
The START TIME/STOP TIME fields take first priority over any other triggers. If a time is assigned in these fields, data capturing starts/stops at the specified time regardless of any other trigger assignments.

START DATE/STOP DATE
The START DATE/STOP DATE fields take priority over other triggers. If a date is assigned in these fields, data capturing starts/stops at that date regardless of other trigger assignments.

COMMAND
The COMMAND field allows a particular command to be assigned as a start/stop trigger. If the COMMAND option is turned ON, data capturing starts/stops when any transmission containing the assigned command is encountered. The field offers the following command options (see **Figure 6.13**).

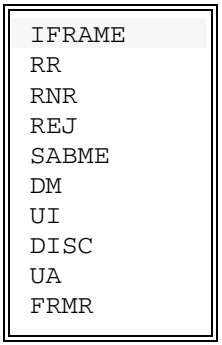


Figure 6.13 - Command Trigger Options Menu

IFRAME
Information Frames are used to transfer Level 3 information in sequentially numbered frames and require acknowledgment.

RR
The Receive Ready (RR) command is used to indicate that a network device is available to receive an Information Frame or to acknowledge previously received Information Frames.

RNR
The Receive Not Ready (RNR) command is used to indicate that a network device is busy and unable to accept incoming Information Frames.

REJ
The Reject (REJ) command is used to request retransmission of Information Frames, beginning from a specified frame sequence number.

SABME
The Set Asynchronous Balanced Mode Extended (SABME) command is used to initiate multiple-frame operation (modulo-128).

DM
The Disconnected Mode (DM) command is used to indicate that a network device is unable to process sequential multiple Information Frames.

UI
The Unnumbered Information (UI) command is used to send information that does not require acknowledgment.

DISC
The Disconnect (DISC) command is used to terminate the link's multiple-frame operation.

UA
The Unnumbered Acknowledgment (UA) command is used to acknowledge SABME and DISC commands.

FRMR
The Frame Reject (FRMR) command is used to reject a frame containing an unidentified command or response control field.

MESSAGE
The MESSAGE field allows a particular IFrame command message type to be assigned as a start/stop trigger. If the MESSAGE option is turned ON, data capturing starts/stops when any transmission containing the assigned message type is encountered.

✍ *The MESSAGE field is only valid if the Command field is set to IFRAME.*

USER DEFINED EVENT 1 AND 2
User-defined events are messages defined using the F6 Edit function. These messages are displayed in a catalog when the field is accessed by pressing the Insert key. The message can then be assigned as a trigger. If an event field is ON, data capturing starts/stops when any transmission containing the assigned event message is encountered. This option allows the Spectra system to trigger on a specific message. Any portion of the message can be masked when the message is built using the F6 Edit function. Creating and editing messages is explained in **Chapter 5** of this guide.

STATUS
The STATUS field allows a particular link status to be assigned as a start/stop trigger. If the STATUS field is ON, data capturing starts/stops when any transmission containing the assigned link status is encountered. This option provides a catalog of the two link status options: InService and Other.

ASSIGNING TRIGGERS TO ISDN LINKS

This procedure outlines how to set up the Monitor mode for all available trigger fields. All fields in this procedure are optional. Individual fields can be turned ON or OFF by selecting a field and pressing the Enter (↵) key. Toggle each of the fields you want to use as a trigger to ON before running Monitor mode.

Follow these steps to assign triggers to ISDN links.

Step	Action
1.	When the Monitor Mode Trigger screen appears, the cursor is automatically placed on the SAPI field under the START TRIGGER column for LINK 1. Press the **Insert** key to access the numeric entry field.
2.	Enter the desired SAPI value, and press the **Enter** (↵) key to assign the SAPI as a trigger.
3.	Press the ↓ key one time to select the **TEI** field. Press the **Insert** key to access the numeric entry field. Enter the desired TEI value, and press the **Enter** (↵) key to assign the TEI as a trigger.
4.	Press the ↓ key one time to select the **CALL REF** field. Press the **Insert** key to access the numeric entry field. Enter the desired call reference number, and press the **Enter** (↵) key to assign the call reference number as a trigger.

5. Press the ↓ key one time to select the **PH. #1** field. Press the **Insert** key to access the numeric entry field. Enter the desired phone number, and press the **Enter (↵)** key to assign the phone number as a trigger.

✍ *Partial phone numbers without leading DontCare or wildcard digits can be used as triggers.*

6. Press the ↓ key one time to select the **PH. #2** field. Repeat **Step 5** for this field.

7. Press the ↓ key one time to select the **ERROR** field. Press the **Insert** key to access the message catalog. Use the ↑↓ keys to select the desired error message, and press the **Enter (↵)** key to assign the error message as a trigger.

8. Press the ↓ key to select the **START TIME** field. Press the **Insert** key to access the numeric entry field. Enter the time (HH:MM:SS), and press the **Enter (↵)** key to assign the time as a trigger.

✍ *When this field is defined and turned ON, it replaces all other triggers.*

9. Press the ↓ key to select the **START DATE** field. Press the **Insert** key to access the numeric entry field. Enter the time (MM/DD/YY), and press the **Enter (↵)** key to assign the time as a trigger.

✍ *When this field is defined and turned ON, it replaces all other triggers.*

10. Press the ↓ key one time to select the **COMMAND** field. Press the **Insert** key to access the command catalog. Use the ↑↓ keys to select the desired message, and press the **Enter (↵)** key to assign the command as a trigger.

11. Press the ↓ key one time to select the **MESSAGE** field. Press the **Insert** key to access the Message catalog. Use the ↑↓ keys to select the desired message, and press the **Enter (↵)** key to assign the message as a trigger.

12. Press the ↓ key one time to select the **EVENT 1** field. Press the **Insert** key to access the user defined event message catalog. Use the↑↓ keys to select the desired user defined event message, and press the **Enter (↵)** key to assign the message as a trigger. Any field of the message that is masked is treated as a DontCare field.

13. Press the ↓ key one time to select the **EVENT 2** field. Repeat **Step 12** for this field.

14. Press the ↓ key one time to select the **STATUS** field. Press the **Insert** key to access the status option catalog. Press the ↑↓ keys to select a status option, and press the **Enter (↵)** key to assign the status option as a trigger.

15. Use the ↑↓↔ keys to move to the STOP TRIGGER column, and repeat the procedures described above for all fields that require stop triggers.

16. Press the **E** key to assign the REPEAT TRIGGER SEQUENCE option. Pressing the E key toggles the option between Y (yes) and N (no).

17. After all start/stop triggers have been assigned to Link 1, use the **+** key or the **-** key to advance to the other links. Repeat the entire procedure for all links that require triggers.

✍ *Each link screen functions independently of the other link screens, with the exception of the REPEAT TRIGGER SEQUENCE option, which remains constant between all link screens.*

18. Press the **S** key, and enter a file name (a maximum of eight characters) for the trigger string in the Save dialog box. Press the **Enter (↵)** key.

RUNNING ISDN MONITOR MODE

Follow these steps to run the ISDN Monitor mode.

Step	Action

1. After setting all start/stop triggers, press the **F2** key. Monitor mode begins data capture, and the F2 Run screen is displayed (see **Figure 6.14**). For more information about the F2 Run screen, see "Running a Test" on page 180 of this guide.

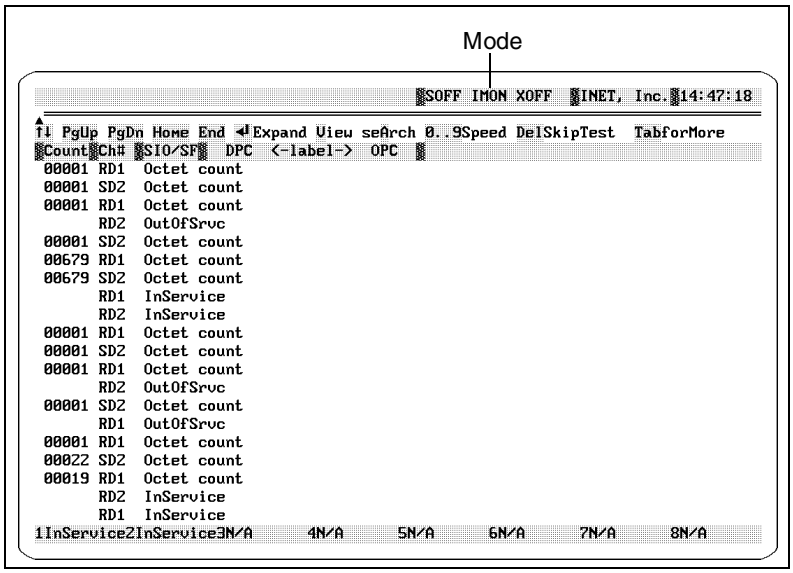


Figure 6.14 - F2 Run Screen

The Mode display at the top of the screen indicates that you are running ISDN Monitor mode. For more information about the Mode display, see "Main Function Selection Screen Definitions" on page 7 of this guide.

2. When you finish monitoring, complete one of the following actions:

   - To stop data capture and perform post-capture analysis, press the **F9** key. The F9 Xamine screen is displayed. For more information about the F9 Xamine screen, see "Continuous Traffic Analysis" on page 185 of this guide.

- To turn the ISDN Monitor mode OFF, access the **F1 Setup/ Mode/ISDN** options menu, select **OFF**, and press the **Enter (↵)** key.

X.25 MONITOR MODE

When you access the X.25 Monitor mode, the Monitor Mode Trigger screen is displayed.

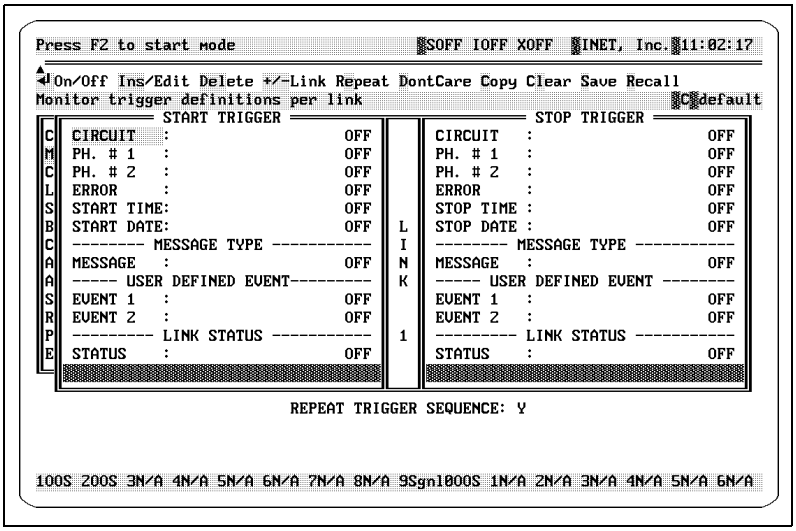


Figure 6.15 - X.25 Monitor Mode Trigger Screen

The Monitor Mode Trigger screen allows start and stop triggers to be assigned to define the conditions for data capture. A start trigger initiates data capture, and a stop trigger ends data capture.

The START/STOP TIME and START/STOP DATe triggers take priority over all other triggers. For example, if the START/STOP TIME field has been set to 12:00:00, no other setting triggers data capture until 12:00:00.

The ERROR trigger, the USER DEFINED EVENT triggers, and the STATUS trigger are OR triggers. All other triggers are AND triggers without priority.

For example, if a circuit is assigned as a trigger and a phone number is assigned as a trigger, both the circuit and the phone number must be detected to trigger data capture (because these are AND triggers).

However, if a circuit is assigned as a trigger and a user-defined event is assigned as a trigger, either the circuit or the user-defined event must be detected to trigger data capture (because user-defined events are OR triggers).

Triggers can be assigned to each link. Use the + key or the - key to cycle through the trigger screens for the 16 available links assigning triggers to each screen. The entire link is activated if any trigger on the link is matched.

The Spectra system takes the appropriate action based on the trigger settings listed in **Table 6.3**.

Table 6.3 - Possible Trigger Settings

Trigger Setting	Action Taken by Spectra
Start and Stop triggers set to OFF	The DontCare trigger is activated.
Start trigger set to OFF	Data capture begins upon receipt of the first message, whether it is a valid signal unit or an errored signal unit.
Stop trigger set to OFF	Data capture continues until the buffer is full.

If a start trigger is defined with a DontCare stop trigger, a second signal unit matching the start trigger does not reset the buffer (empty the current buffer and begin capturing new data). Instead, the start trigger signal unit is color-coded as a trigger (for easier viewing), and data capture continues until the buffer is full.

X.25 Monitor Mode Trigger Screen Definitions

The following options are displayed in the direction line across the top of the screen.

↵ On/Off
Press the Enter (↵) key to turn the selected trigger ON or OFF.

Ins/Edit
Press the Insert key to access the entry field or message catalog for the selected trigger option.

Delete
Press the Delete key to delete the selected trigger. For example, if Event triggers are entered in both fields one and two, the first field can be selected and deleted to make the second field the only event trigger.

+/-Link
Press the + or - keys to display trigger assignments for the next or previous link.

Repeat
Press the E key to enable or disable the REPEAT TRIGGER SEQUENCE feature. The REPEAT TRIGGER SEQUENCE field toggles to Y (yes) when enabled and N (no) when disabled. If the REPEAT TRIGGER SEQUENCE feature is enabled, the trigger is re-armed every time the start/stop sequence is completed. As a result, the Spectra system continuously re-arms for the next start/stop sequence until the capture buffer fills up.

DontCare
Press the D key to change all trigger fields for the link to OFF (DontCare). This option sets all trigger fields in the current link to OFF.

Copy
Press the C key allow other linksets to be assigned the same trigger settings as the current displayed linkset. When the Copy options menu is displayed, all linksets are automatically marked, and additional direction line options are also displayed (see **Figure 6.16**). Select the linksets to which you do not want to assign the current trigger settings, and press the Enter (↵) key to unmark them. When the assignments are made, press the I key to initiate copying. The message "Copied to specified linksets (x to xx)" is displayed in the information line at the top of the screen when the trigger information is copied.

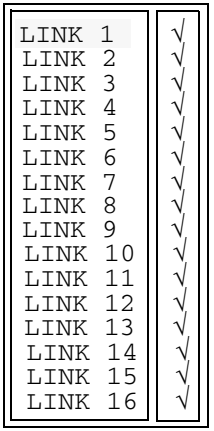


Figure 6.16 - Copy Options Menu

Clear
Press the L key to clear all the current triggers displayed. A Clear Link Triggers dialog box is displayed. Press the Y key to clear all triggers displayed.

Save
Press the S key to save the current triggers. A Save dialog box appears. Enter a file name (a maximum of eight characters) for the current filters in the dialog box and press the Enter (↵) key.

A File Description dialog box appears. Enter a description of the file in the dialog box. The file description allows a lengthy description (maximum of 55 characters) to be entered to include specifics of the file's contents. Press the Enter (↵) key.

Recall
Press the R key to recall any saved triggers. A catalog of saved triggers is displayed. Use the ↑↓ keys to select the a set of triggers and press the Enter (↵) key.

X.25 START/STOP TRIGGER FIELDS

This section documents the use of the various START/STOP TRIGGER fields used in the X.25 Monitor mode.

CIRCUIT
This field refers to X.25 circuits. When the field is ON, data capturing starts/stops if any messages containing the assigned circuit number are encountered during transmission.

PH. #1 & #2
Any phone number can be entered as a trigger in the PH. #1 or PH. #2 fields. If the PH. #1 or PH. #2 field is ON, data capturing starts/stops when any message containing the entered phone numbers is encountered during transmission. Partial phone numbers may be entered as triggers.

ERROR
The ERROR field allows a particular error message to be assigned as a start/stop trigger. When the field is ON, data capturing starts/stops if any transmission containing the assigned error message is encountered. When the ERROR field is selected and the Insert key is pressed, the Error Triggers options menu is displayed (see **Figure 6.17**).

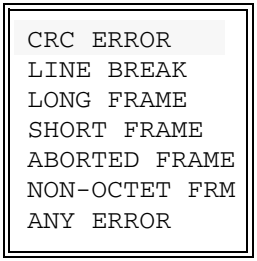


Figure 6.17 - Error Triggers Options Menu

CRC ERROR
This error indicates the receipt of a message with a corrupt checksum.

LINE BREAK
This error indicates the receipt of at least 7 consecutive 1s after reception of a flag (01111110).

LONG FRAME
This error indicates the receipt of a frame that exceeds the maximum octet size (specified in level parameters).

SHORT FRAME
This error indicates the receipt of a frame less than four octets in length.

ABORTED FRAME
This error indicates the receipt of an aborted frame (a frame terminated prematurely with 7 consecutive 1s).

NON-OCTET FRAME
This error indicates the receipt of a frame delimited with a flag (01111110) on a non-octet boundary.

ANY ERROR
This error indicates the receipt of any of the conditions listed in the Error Triggers options menu.

START TIME/STOP TIME
The START TIME/STOP TIME fields take first priority over any other triggers. If a time is assigned in this field and the field is ON, data capturing starts/stops at the specified time regardless of any other trigger assignments.

START DATE/STOP DATE
The START DATE/DATE TIME fields take priority over other triggers. If a date is assigned in this field and the field is ON, data capturing starts/stops at that date regardless of other trigger assignments.

MESSAGE
The MESSAGE field gives you the ability to trigger on a particular packet message type. When the field is ON, data capturing starts/stops if any transmission containing the assigned packet message type is encountered. When the MESSAGE field is selected and the Insert key is pressed, the Message Type options menu appears (see **Figure 6.18**).

```
don't care
RR P(R)=0              Receive Ready
1 Unknown Packet
RNR P(R)=0             Receive Not Ready
3 Unknown Packet
REJ P(R)=0             Reject
CALL_REQUEST
6 Unknown Packet
CALL_ACCEPT
8 Unknown Packet
CLEAR_REQUEST
A Unknown Packet
CLEAR_INFORMATION
C Unknown Packet
RESET_REQUEST
```

Figure 6.18 - Message Type Options Menu - (beginning of menu)

USER DEFINED EVENT 1 AND 2
User-defined Events are messages defined using the F6 Edit function. These messages are displayed in a catalog when the field is accessed by pressing the Insert key. The message can then be assigned as a trigger. If an event field is ON, data capturing starts/stops when any transmission containing the assigned event message is encountered. This option allows the Spectra system to trigger on a specific message. Any portion of the message can be masked when the message is built using the F6 Edit function. Creating and editing messages is explained in **Chapter 5** of this guide.

STATUS
The STATUS field allows a particular link status to be assigned as a start/stop trigger. If the STATUS field is ON, data capturing starts/stops when any transmission containing the assigned link status is encountered. This option provides a catalog of the two link status options: InService and Other.

ASSIGNING TRIGGERS TO X.25 LINKS

This procedure outlines to set up the Monitor mode for all available trigger fields. All fields in this procedure are optional. Individual fields can be turned ON or OFF by selecting a field and pressing the Enter (↵) key. Toggle each of the fields you want to use as a trigger to ON before running the Monitor mode.

Follow these steps to set up the Monitor Mode trigger fields.

Step	Action
1.	When the Monitor Mode Trigger screen appears, the cursor is automatically placed on the CIRCUIT field. Press the **Insert** key to access the numeric entry field. Enter the desired physical circuit number, and press **Enter** (↵) key to assign the circuit number as a trigger.
2.	Press the ↓ key one time to select the **PH. #1** field. Press the **Insert** key to access the numeric entry field. Enter the desired phone number, and press **Enter** (↵) key to assign the phone number as a trigger.

✍ *Partial phone numbers without leading DontCare or wildcard digits can be used as triggers.*

3.	Press the ↓ key one time to select the **PH. #2** field. Repeat **Step 2** for this field.

4. Press the ↓ key one time to select the **ERROR** field. Press the **Insert** key to access the message catalog. Use the ↑↓ keys to select the desired error message, and press **Enter** (↵) key to assign the error message as a trigger.

5. Press the ↓ key to select the **START TIME** field. Press the **Insert** key to access the numeric entry field. Enter the time (HH:MM:SS), and press the **Enter** (↵) key to assign the time as a trigger.

✍ *When this field is defined and turned ON, it replaces all other triggers.*

6. Press the ↓ key to select the **START DATE** field. Press the **Insert** key to access the numeric entry field. Enter the time (MM/DD/YY), and press the **Enter** (↵) key to assign the time as a trigger.

✍ *When this field is defined and turned ON, it replaces all other triggers.*

7. Press the ↓ key one time to select the **MESSAGE** field. Press the **Insert** key to access the message catalog. Use the ↑↓ keys to select the desired message, and press the **Enter** (↵) key to assign the message as a trigger.

8. Press the ↓ key one time to select the **EVENT 1** field. Press the **Insert** key to access the user defined event message catalog. Use the ↑↓ keys to select the desired user defined event message, and press the **Enter** (↵) key to assign the message as a trigger.

9. Press the ↓ key one time to select the **EVENT 2** field. Repeat **Step 8** for this field.

10. Press the ↓ key one time to select the **STATUS** field. Press the **Insert** key to access the status option catalog. Press the ↑↓ keys to select a status option, and press the **Enter** (↵) key to assign the status option as a trigger.

11. Use the ↑↓↔ keys to move to the STOP TRIGGER column, and repeat the procedures described above for all fields that require stop triggers.

12. Press the **E** key to assign the Repeat Trigger Sequence option. Pressing the E key toggles the option between Y (yes) and N (no).

13. After all start/stop triggers have been assigned to Link 1, use the **+** key or the **-** key to advance to the other links. Repeat **Step 1** through **Step 11** for all links that require triggers.

✍ *Each link screen functions independently of the other link screens with the exception of the REPEAT TRIGGER SEQUENCE option, which remains constant between all link screens.*

14. Press the **S** key, and enter a file name (a maximum of eight characters) for the trigger string in the Save dialog box. Press the **Enter (↵)** key.

RUNNING X.25 MONITOR MODE

Follow these steps to run the X.25 Monitor mode.

Step	Action

1. After setting all start/stop triggers, press the **F2** key. Monitor mode begins data capture, and the F2 Run screen is displayed (see **Figure 6.19**). For more information about the F2 Run screen, see "Running a Test" on page 180 of this guide.

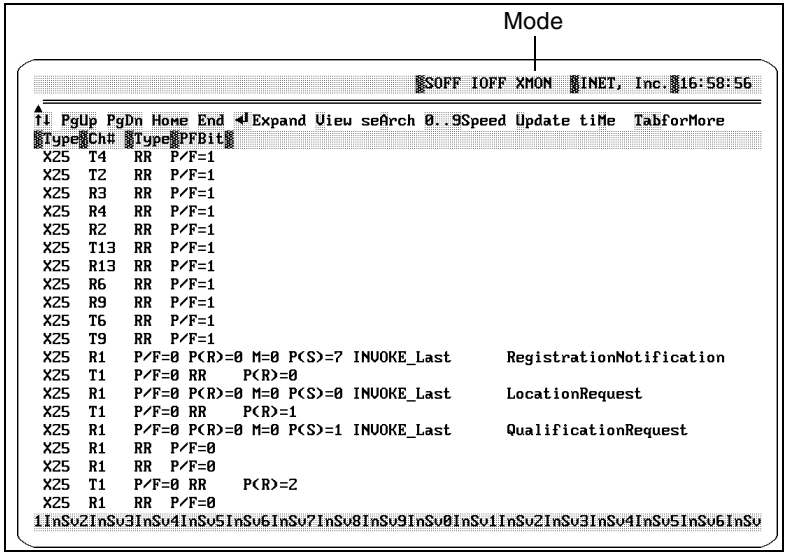


Figure 6.19 - F2 Run Screen

The Mode display at the top of the screen indicates that you are running X.25 Monitor mode. For more information about the Mode display, see "Main Function Selection Screen Definitions" on page 7 of this guide.

2. When you finish monitoring, complete one of the following actions:

   - To stop data capture and perform post-capture analysis, press the **F9** key. The F9 Xamine screen is displayed. For more information about the F9 Xamine screen, see "Continuous Traffic Analysis" on page 185 of this guide.

   - To turn the X.25 Monitor mode OFF, access the **F1 Setup/Mode/ X.25** options menu, select **OFF**, and press the **Enter** (↵) key.

7 Testing

OVERVIEW

The Spectra system gives users several options for performing a test. In all emulation modes, any desired test scenario can be constructed using the Spectra system's menu-driven test-building capability. You may also use the pre-scripted tests that are included with the software (based on packages in your configuration). These tests can easily be edited to meet any specific testing needs. For information regarding the constructing or editing of tests, see the guide for the mode of the test script you want to create or edit. For example, if you want to create a test script for the TCAP Tester mode, consult **Chapter 5** of the ***Spectra Testers Guide***.

Use the F2 Run function to run a test and observe the test in real time. The F2 Run function also allows users to expand messages for a more detailed look at values coded into the message.

The F9 Xamine function halts the test and provides a post-capture look at the test. The F9 Xamine function allows captured messages to be viewed in a number of ways. Using the F9 Xamine function halts all data capture until another test is started. This function provides similar options to the F2 Run function, with added capabilities allowing a user to save and recall test files, batch test files together, and perform call tracing.

The F2 Run and F9 Xamine functions also provide a way to create messages. The user can run a test, capture the data, grab an individual message, and place it in the message catalog. The grabbed messages in the message catalog can then be accessed using the F6 Edit function, and individual fields within the message can be edited.

The F2 Run and F9 Xamine functions include message searches, intermessage time interval analysis, and the plain-text decoding of messages. Even while the Spectra system executes scripts and continues to log data, it can perform all other Spectra system functions, including the editing of messages.

The F2 Run function's main screen, the Compressed Run screen, displays messages in chronological order.

The main F9 Xamine screen is similar to the main F2 Run screen. However, the main F9 Xamine screen offers additional features, including saving and recalling test files, batching test files, and performing call tracing.

From either of these two options, you can access the Expanded Message screen, which displays individual messages in a detailed format.

RUNNING A TEST

The F2 Run function activates the test mode automatically. Test scripts established in the F1 Setup function are launched when a mode is designated and the F2 key is pressed.

Follow these steps to run a test.

Step	Action
1.	Press **F1** to access the F1 Setup menu.
2.	Select the Mode option, and press the **Enter (↵)** key.
3.	Select the protocol of the mode you want to run, and press the **Enter (↵)** key.
4.	Select the Mode of the test you want to run, and press the **Enter (↵)** key.

5. After designating the mode, the Linkset Assignment options menu is displayed (see **Figure 7.1**).

LINK 1	MONITOR
LINK 2	MONITOR
LINK 3	MONITOR
LINK 4	MONITOR
LINK 5	MONITOR
LINK 6	MONITOR
LINK 7	MONITOR
LINK 8	MONITOR
LINK 9	TERMINATED
LINK 10	TERMINATED
LINK 11	TERMINATED
LINK 12	TERMINATED
LINK 13	TERMINATED
LINK 14	TERMINATED
LINK 15	TERMINATED
LINK 16	TERMINATED

Figure 7.1 - Linkset Assignment Options Menu

This option allows each linkset to be assigned a **MONITOR** or a **TERMINATED** option. A Monitor assignment allows the linkset to observe communications activity with no send/receive capabilities. A Terminated assignment allows the linkset to function with the send/receive capabilities intact. Select each linkset, and press the ←→ keys to toggle between the two settings.

6. After making the linkset assignments, press the **Enter** (↵) key.

7. The Tester screen for that mode is displayed. From this screen, select a test option. You can run a blank-script test, create a new test script, or

recall a test script. Initially, the Tester screen is displayed without a script (see **Figure 7.2**).

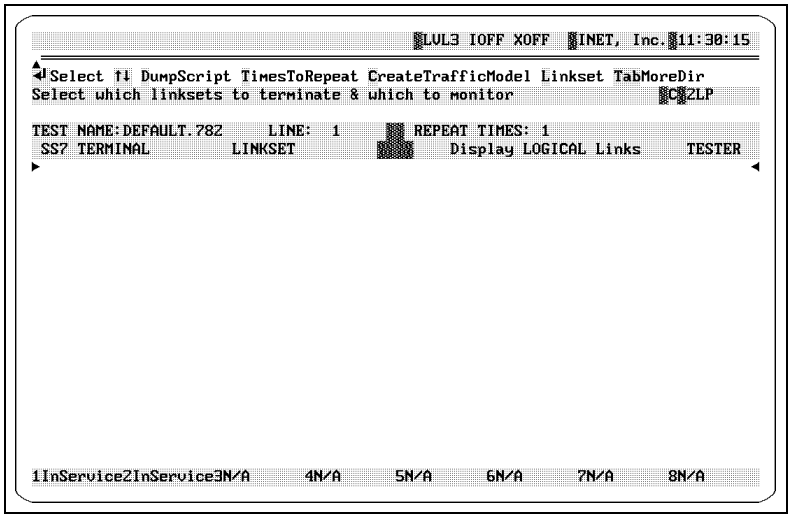


Figure 7.2 - Blank-Script Test Screen (Example)

Running a Blank-Script Test

If you want to run a blank-script test, you do not need to change any settings in this screen. Skip to **Step 8**.

Creating a Test Script

If you want to create a test script, you need to set up the new test script in this screen. See the appropriate Spectra system guide for information about creating test scripts for a particular mode. After creating the test script, continue with **Step 8**.

Recalling a Test Script

If you want to recall a previously created test script, press the **R** key to bring up the list of available test scripts, and select the script you wish to run. For more information about the mode-specific Tester screens, see the appropriate Spectra system guide. After recalling the test script, continue with **Step 8**.

8. Press the **F2** key. If a test is not already running, the Spectra system automatically runs the test. If another test is in progress, a Restart Test dialog box appears (see **Figure 7.3**).

✍ *Prior to running a test, configure applicable Level 1, 2, and 3 parameters. Refer to the **Spectra Setup and Configuration Guide** for details about system configuration.*

9. The Restart Test dialog box displays the current mode and the status of Call Trace and View. Press the **Y** key to run whatever test is currently displayed. Press the **N** key to allow the current test to continue. Either answer takes you to the Compressed Run screen where the functions and options available in this mode are displayed.

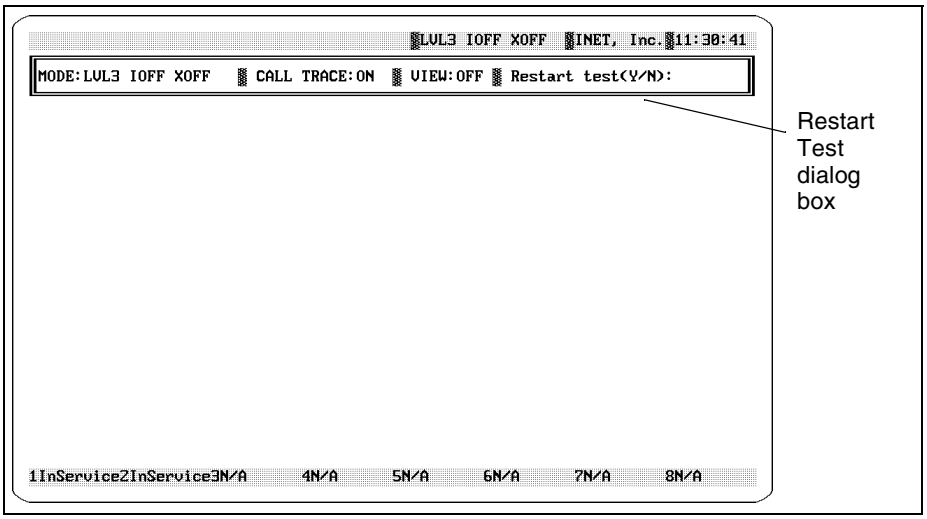


Figure 7.3 - Restart Test Dialog Box

The Compressed Run screen appears, the new test begins executing, and the transmitted/received messages begin scrolling across the screen (see **Figure 7.4**).

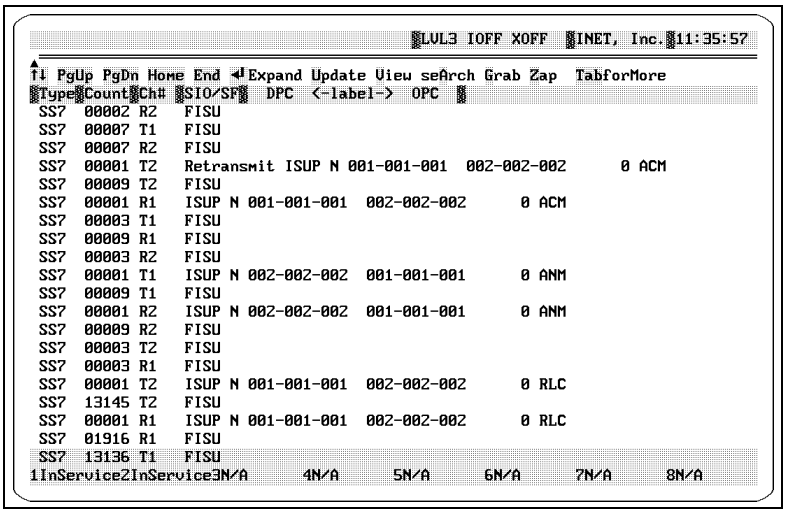


Figure 7.4 - Compressed Run Screen (Example)

✍ *Any comments placed in a test script can be viewed from the F2 Run screen by pressing the Enter (↵) key.*

10. Press ↑↓, **PgUp**, **PgDn**, or **Home** to freeze the screen. Using any of these keys does not stop the data capture process or test execution. At this point, the additional options Grab and Zap appear on the direction line. These options are explained in "Message-Related F2 Run Screen Options" on page 194 of this guide.

11. Press the **U** key to continue scrolling messages beginning with the last message currently in the capture buffer.

CONTINUOUS TRAFFIC ANALYSIS

The F2 Run function's main screen, the Compressed Run screen, allows users to perform data capture and real-time traffic analysis for the test that is running. Even while the Spectra system executes scripts and continues to log data, it can perform all other Spectra system functions, including the editing of messages.

The Compressed Run screen includes message searches, view filters, intermessage time interval analysis, and the plain-text decoding of messages. This screen displays messages in chronological order. From this screen, you can also access the Expanded Message screen, which displays values coded into individual messages in a detailed format.

The Compressed Run screen also provide a way to create messages. The user can run a test, capture the data, grab an individual message, and place it in the message catalog. The grabbed messages in the message catalog can then be accessed using the F6 Edit function, and individual fields within the message can be edited.

The following sections explain the use of the Compressed Run screen to analyze test traffic. Press the F2 key to access the Compressed Run screen (see **Figure 7.5**).

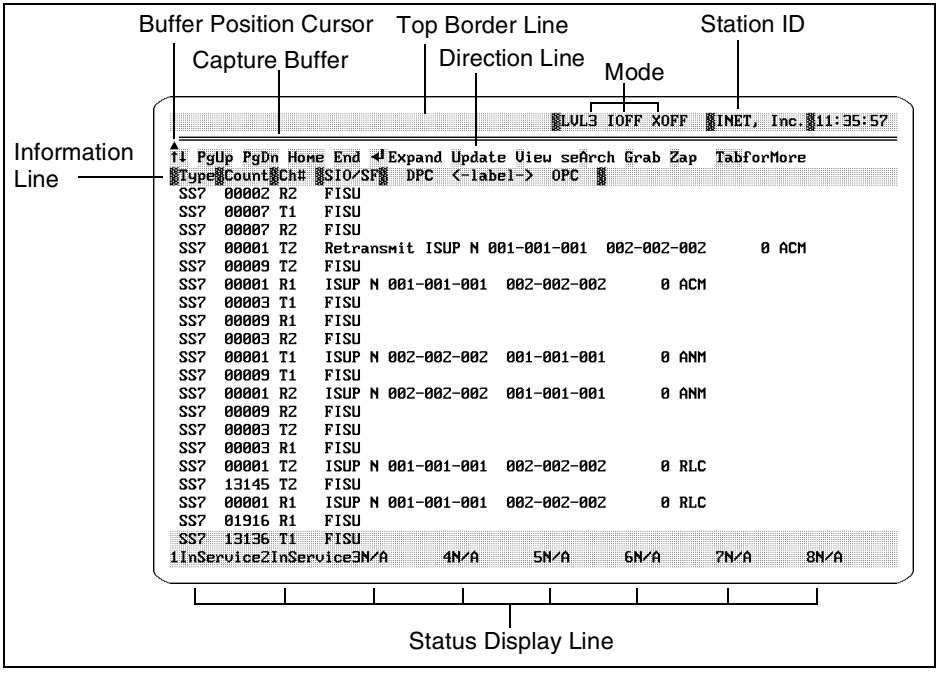


Figure 7.5 - Compressed Run Screen (Example)

COMPRESSED RUN SCREEN DEFINITIONS

↑↓, PgUp, PgDn, Home, End
These keys can be used to move easily through the Compressed Run screen. Pressing any of these keys stops the scrolling of captured messages for viewing, searching, and analysis. Using any of these keys does not stop the data capture process or test execution. To continue scrolling, press U for Update. Pressing U resumes the message scrolling beginning with the last signal unit currently in the capture buffer.

↵ Expand
Press the Enter (↵) key to expand the highlighted message for viewing in an easy-to-understand format in the Expanded Message screen (see "Individual Message Analysis" on page 254 of this guide for more details).

Update
Press the U key to update the screen display to reflect the latest data as it is captured. The Status Line cursor scrolls rapidly down the screen as it catches up to the new data.

seArch
Press the A key to allow field searches to be qualified by file name, message type, phone number, and other options. This option only appears in the F2 Run function direction line when the cursor is placed on a message. See "Search and View Options" on page 198 of this guide for more details. The capture buffer can also be searched for multiple messages (files) and multiple comments. See "Multiple Comments View and Multiple File View Windows" on page 225 of this guide for more details.

View
Press the V key to display only the messages that match user-specified criteria. See "Search and View Options" on page 198 of this guide for more details. The capture buffer can also be searched for multiple messages (files) and multiple comments. See "Multiple Comments View and Multiple File View Windows" on page 225 of this guide for more details.

0…9Speed
Press any number between 0 and 9 to adjust the speed of the scrolling messages. The number 9 is the fastest, and 0 is the slowest.

TabforMore
Press the Tab key to display additional direction line options available under this screen.

Alt_FMSUForward (Optional)
Press the Alt key and the F key simultaneously to toggle the MSU Forwarding feature ON or OFF. When the MSU Forwarding feature is toggled to ON or OFF, a corresponding message is displayed in the top border line.

The Alt_FMSUForward option controls the forwarding of Message Signal Units (MSUs) to an external system via TCP/IP. This option starts MSU Forwarding for all three protocol options—SS7, ISDN, and X.25. When the feature is turned ON, all of the messages that are captured to the buffer are forwarded to the configured external system through TCP/IP.

✍ *Alternatively, the Spectra system can be started with the -u command line switch which automatically enables the MSU Forwarding feature on the system restart without having to execute the Alt_F command. For more information, see "Accessing Program Command Line Switches" on page 2 of this guide.*

You must configure the MSU Forwarding feature before using this feature. Configuring the Spectra system for MSU Forwarding is described in **Chapter 12** of this guide.

✍ *Because all messages that are captured to the buffer are forwarded, use the Message Filters to filter out unwanted messages before they are forwarded. Refer to* **Chapter 2** *of this guide for information about setting up the Message Filters for the different protocol options.*

Buffer Position Cursor
The Buffer Position cursor is a small solid triangle indicating the portion of the capture currently in view. The position of the cursor shifts right to left when paging up or left to right when paging down through the capture buffer.

Capture Buffer
A change in the shading of the capture buffer line indicates the utilization status of the capture buffer. Each position is equal to 1/80th of the capture buffer's size. For example, for a 5 MB capture buffer, each position is equal to 5,000,000/80 (62,500 B).

PROTOCOL-SPECIFIC F2 RUN SCREEN OPTIONS

The next set of functions displayed in the Compressed Run screen provide several options for formatting the real-time screen update. The screen can be set to display SS7 traffic, ISDN traffic, or X.25 traffic.

SPACEBAR:SS7/ISDN/X.25
Press the spacebar to cycle through the screen display options—SS7 format, ISDN format, or X.25 format. The default is SS7 format.

The information line contains a SPACEBAR f ield that contains the name of the option you are viewing. For example, if you are viewing ISDN traffic, the message "SPACEBAR: ISDN" appears in the information line.

For each of the protocol options, a different set of options appear. These options are described in the following sections.

SS7 Screen Options

The SS7 F2 Run screen options appear in the information line when the screen is formatted for SS7. Press the spacebar to cycle through the protocol options—SS7, ISDN and X.25—until SS7 is displayed. The SS7 information line options are described in the following paragraphs.

DelSkipTest
Press the Delete key to skip the current test and advance to the next one. This option only affects the Batch Test Builder mode.

tiMe
Press the M key to turn ON or OFF the display of the time (in 1 ms resolution) the signal unit was received/transmitted. In the case of repetitive messages (count column >1), the time reflects the time of the first occurrence of that message. Receive channels are time-stamped when the last bit of the Cyclic Redundancy Check (CRC) is received. Transmit channels are time-stamped when the last bit of the CRC is transmitted.

✍ *From the start of the capture, each message is stamped with the time, including millisecond resolution. This allows approximately 49 days of capture before a wrap occurs and the time stamp starts over. Running continuous time-stamped data capture for longer than 49 days results in an incorrect time stamp after the 49-day period has expired.*

ALT_MDateAndTime
Press the Alt key and the M key to turn ON or OFF the display of the date and time the signal unit was received/transmitted. In the case of repetitive messages (count column >1), the date reflects the date of the first occurrence of that message.

Flag
Press the F key to turn ON or OFF the display of the inter-signal unit flag (01111110) count. The number displayed in this column represents the maximum number of flags between the preceding signal unit and the current signal unit. If the count of the current signal unit is greater than 1, the flag count reflects the maximum number of flags encountered between any two repetitions of the signal unit.

Li
Press the L key to display the Length Indicator column. The Length Indicator column displays the contents of the length indicator field of the signal unit in a mnemonic format.

BBsn/i/Fsn
Press the B key to turn ON or OFF the display of the Backward Sequence Number (BSN), the Forward Sequence Number (FSN), the Backward Indicator Bit (BIB), and the Forward Indicator Bit (FIB).

Osio/Sf
Press the O key to turn ON or OFF the display of the Signalling Information Octet, the Label field for MSUs, and the Status field for LSSUs.

Pointcode
Press the P key to toggle the display of the Destination Point Codes (DPCs) and the Origination Point Codes (OPCs) between names and codes. Names are assigned to point codes in the Point Code Names screen under Level 3 Parameters (see "Point Code Names" on page 184 of the ***Spectra Setup and Configuration Guide***). If no point code names have been assigned, only point codes are available.

Wsequence
Press the W key to access the Sequence option. The Sequence option allows a user to determine whether specific messages are in sequence. The Sequence option is described in "Wsequence" on page 196 of this guide.

Count
Press the C key to turn the Count display ON or OFF. This option turns ON or OFF the display of the count of identical messages consecutively transmitted/ received (down to the FSN/FIB and BSN/BIB fields). This feature avoids the unnecessary capture and display of identical messages. The Count field rolls over after 65,535, which usually signifies Fill-In Signal Units (FISUs) are being encountered repetitively.

lnktYpe
Press the Y key to display the link type (as defined in the Level 1 Parameters screen) for monitored messages.

Dualscreen
Press the D key to turn the dual screen mode ON or OFF. In this mode, the transmitted messages are displayed on one half of the screen, and the received messages are displayed on the other half.

Qcolor
Press the Q key to display messages that change between the assigned Message Type and Channel Type colors.

SPACEBAR:SS7
Press the spacebar to toggle the screen to display messages in SS7 format, ISDN format or X.25 format. The default is SS7 format.

Ch#
This option identifies the channel number of the captured message. SDn/RDn phrasing is used in the Monitor modes and Tn/Rn is used in the Emulation modes (where n is the link number).

ISDN Screen Options

The ISDN F2 Run screen options appear in the information line when the screen is formatted for ISDN. Press the spacebar to cycle through the protocol options—SS7, ISDN, and X.25—until ISDN is displayed. The ISDN information line options are described in the following paragraphs.

tiMe
Press the M key to turn ON or OFF the display of the time (in 1 ms resolution) the signal unit was received/transmitted. In the case of repetitive messages (count column >1), the time reflects the time of the first occurrence of that message. Receive channels are time-stamped when the last bit of the CRC is received. Transmit channels are time-stamped when the last bit of the CRC is transmitted.

✍ *From the start of the capture, each message is stamped with the time, including millisecond resolution. This allows approximately 49 days of capture before a wrap occurs and the time stamp starts over. Running continuous time-stamped data capture for longer than 49 days results in an incorrect time stamp after the 49-day period has expired.*

ALT_MDateAndTime
Press the Alt key and the M key to turn ON or OFF the display of the date and time the signal unit was received/transmitted. In the case of repetitive messages (count column >1), the date reflects the date of the first occurrence of that message.

Flag
The F key turns ON or OFF the display of the inter-signal unit flag (01111110) count. The number displayed in this column represents the maximum number of flags between the preceding signal unit and the current signal unit. If the count of the current signal unit is greater than 1, the flag count reflects the maximum number of flags encountered between any two repetitions of the signal unit.

LCommand
Press the L key to display the Command column. The ISDN Commands display the Link Access Procedure on the D-Channel (LAPD) frame format identifier values (Supervisory/Unnumbered or Information frames) and the message type.

BSapi/i/Tei
Press the B key to turn the display of the Service Access Point Identifier (SAPI) and the Terminal Endpoint Identifier (TEI) ON or OFF.

OCall
Press the O key to turn the display of the Call Reference Information Element (Call) ON or OFF.

Count
Press the C key to turn the display of the count of identical messages consecutively transmitted/received ON or OFF. This feature avoids the unnecessary capture and display of identical messages. The Count field rolls over after 65,535, which usually signifies messages are being encountered repetitively.

lnktYpe
Press the Y key to display the link type (as defined in the Level 1 Parameters screen) for monitored messages.

Dualscreen
Press the D key to turn the dual screen mode ON or OFF. In this mode, the transmitted messages are displayed on one half of the screen, and the received messages are displayed on the other.

Qcolor
Press the Q key to display messages that change between the assigned Message Type and Channel Type colors.

SPACEBAR:ISDN
Press the spacebar to toggle the screen to display messages in ISDN format, X.25 format, or SS7 format. The initial default is SS7 format.

Ch#
This option identifies the channel number of the captured message. SDn/RDn phrasing is used in the Monitor modes and Tn/Rn is used in the Emulation modes (where n is the link number).

X.25 Screen Options

The X.25 screen display options appear in the information line when the screen is formatted for X.25. Press the spacebar to cycle through the protocol options—SS7, ISDN, and X.25—until X.25 is displayed. The X.25 display options are described in the following paragraphs.

tiMe
Press the M key to turn ON or OFF the display of the time (in 1 ms resolution) the signal unit was received/transmitted. In the case of repetitive messages (count column >1), the time reflects the time of the first occurrence of that message. Receive channels are time-stamped when the last bit of the CRC is received. Transmit channels are time-stamped when the last bit of the CRC is transmitted.

✍ *From the start of the capture, each message is stamped with the time, including millisecond resolution. This allows approximately 49 days of capture before a wrap occurs and the time stamp starts over. Running continuous time-stamped data capture for longer than 49 days results in an incorrect time stamp after the 49-day period has expired.*

ALT_MDateAndTime
Press the Alt key and the M key to turn ON or OFF the display of the date and time the signal unit was received/transmitted. In case of repetitive messages (count column >1), the date reflects the time of the first occurrence of that message.

Flag
Press the F key to turn ON or OFF the display of the inter-signal unit flag (01111110) count. The number displayed in this column represents the maximum number of flags between the preceding signal unit and the current signal unit. If the count of the current signal unit is greater than 1, the flag count reflects the maximum number of flags encountered between any two repetitions of the signal unit.

LType
The L key displays the message type of monitored messages.

BAddr
Press the B key to turn ON or OFF the display of the Link Access Procedure Balanced (LAPB) Command and Response Addresses.

OPoll
Press the O key to turn ON or OFF the display of the Poll/Final Bit. The Poll/Final Bit displays either P/F=0 or P/F=1.

Count
Press the C key turns ON or OFF the display of the count of identical messages consecutively transmitted/received. This feature avoids the unnecessary, repetitive capture and display of identical messages. The Count field rolls over after 65,535, which usually signifies messages are being encountered repetitively.

lnktYpe
Press the Y key to display the link type (as defined in the Level 1 Parameters screen) for monitored messages.

Dualscreen
Press the D key to turn the dual screen mode ON or OFF. In this mode, the transmitted messages are displayed on one half of the screen, and the received messages are displayed on the other half.

Qcolor
Press the Q key to change the messages displayed on the screen between the assigned Message Type and Channel Type colors.

SPACEBAR:X.25
Press the spacebar to toggle the screen to display messages in SS7 format, ISDN format, or X.25 format. The default is SS7 format.

Ch#
This option identifies the channel number of the captured message. SDn/RDn phrasing is used in the Monitor modes and Tn/Rn is used in the Emulation modes (where n is the link number).

MESSAGE-RELATED F2 RUN SCREEN OPTIONS

The following options appear on the Compressed Run screen command line only when a message in the F2 Run screen is highlighted.

Grab
Press the G key to grab the selected message. This option saves the selected message to the message catalog. Grabbed messages are cataloged based on protocol and user part. They can be recalled using the F6 Edit function. They are also accessible for triggering, filtering, and transmission purposes. The file name extensions are automatically assigned by the Spectra system based on the user parts. This feature allows the Spectra system to present only relevant user part messages in certain emulation modes and allows identical file names to be used for different user parts (that is, IAM in both TUP and ISUP).

Press the G key to grab the selected message. The Save dialog box is displayed. Enter a name for the file (eight or fewer characters), and press the Enter (↵) key. The File Description dialog box is displayed. Enter a description of the grabbed message (maximum of 58 characters), and press the Enter (↵) key. A message displaying the status of the file appears on the top border line.

The Spectra system automatically adds a `.SIG` ending to the file name provided. The message is saved with the current configuration under the `C:\SPECTRA\PROTOCOL` directory.

✍ *For ISDN, if a variant option other than NONE is selected in the Link Layer Parameter screen, signal units grabbed from capture are saved in the appropriate variant protocol directory.*

The messages in the catalogs can be edited (using the F6 Edit function), assigned as triggers or transmit options in test scripts, or used as pre- or post-capture filters.

Zap
Press the Z key to mark or unmark every message in the buffer. If the Spectra system is still capturing data, subsequent messages are not marked.

tImereference
Press the I key to set the highlighted message as the time reference point, and move the cursor to any other message to view the elapsed time (to the closest ms) in the upper-left portion of the screen. This option provides the capability to automatically calculate the time that elapses between messages. The original message blinks to provide a point of reference.

marK
Press the K key to mark a single message to be printed to a hard disk or to a printer. Press the K key again to release the Selective Zap mode. A diamond (♦) appears in the first column, indicating the corresponding message is marked.

To mark a group of messages, highlight the first message and press the K key. Use the ↑↓ keys to move the cursor to the last message of the group, and press the K key again.

+/- SearchNextPrev
Press the + or - keys to advance to the next or previous occurrence of a defined search parameter.

fiNdtime
Press the N key to allow a certain time to be located within a test. When the N key is pressed, an Enter Time dialog box is displayed. Enter the desired time in MM/DD/YY HH:MM:SS:mmm format, and press the Enter (↵) key to search for the time entry within the current test.

ALT_NFindDateTime
Press the Alt key and press the N key simultaneously. An Enter Time dialog box is displayed. This option allows a certain date and time to be located within a test. Enter the desired date and time in MM/DD/YY HH:MM:SS:mmm format, and press the Enter (↵) key to search for the date/time entry within the current test.

JumpPage
Press the J key to jump to a desired page. This option allows different pages of information to be displayed. In the appearing dialog box, enter the desired page number (maximum number is dependent on the amount of pages captured), and press the Enter (↵) key. The screen then displays the messages associated with that particular page of data. A page of information is equivalent to one complete buffer of captured data. When several pages of captured data are stored on the hard disk, this option can be used to quickly move through them.

XPageTime
Press the X key to locate a certain time within a page of data. An Enter Time dialog box appears. Enter the desired time in HH:MM:SS:mmm format, and press the Enter (↵) key to search for the time entry within the current page. If the time is found, the cursor is placed on the associated message.

Wsequence
Press the W key to access the Sequence options menu. The Sequence feature allows a user to determine whether specific messages are in sequence.

✍ *This option is only available for SS7.*

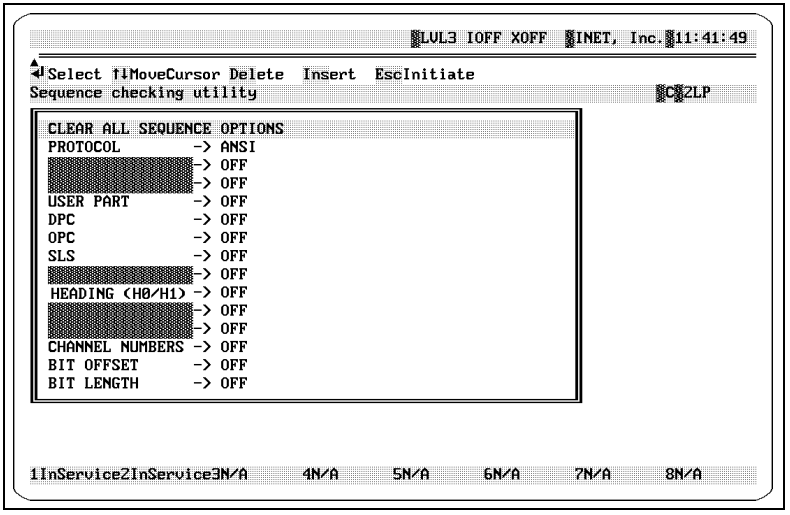


Figure 7.6 - Sequence Options Menu

Sequence Options Menu Definitions

↵ Select
Press the Enter (↵) key to enter or change information in a field.

↑↓ MoveCursor
Press the ↑↓ keys to move the cursor to a particular option.

Delete
Press the Delete key to turn OFF the highlighted option.

Insert
Press the Insert key to type information in the fields associated with each option.

EscInitiate
Press the Esc key to initiate the Sequence option as it is defined on the screen.

CLEAR ALL SEQUENCE OPTIONS
Press the Enter (↵) key to reset all menu options (except for the PROTOCOL option) to OFF.

PROTOCOL
This option allows a user to qualify parameters by protocol. Press the Enter (↵) key to access the protocol options. Select the desired protocol option, and press the Enter (↵) key to assign the protocol. The protocol options for SS7 are ANSI, ITU-T RED, ITU-T BLUE, ITU-T WHITE, CHINA, BTNR, and JAPAN.

USER PART
This option searches or views messages by any of the user parts available in the User Part options menu. Press the Enter (↵) key to access the User Part options menu. The options available depend on the protocol chosen. For more information about the User Part options menu, see "USER PART" on page 203 of this guide.

DPC
This option searches by DPC. Press the Enter (↵) key to edit the field, and enter the desired DPC. Press the Enter (↵) key again to assign the point code. Valid entries are three numerical entries separated by dashes (-). Valid point codes are 0 to 255, 0 to 255, and 0 to 255 for ANSI and CHINA; 0 to 7, 0 to 255, and 0 to 7 for ITU-T; or any corresponding number in decimal format.

OPC
Searches by OPC. Press the Enter (↵) key to edit the field, and enter the desired OPC. Press the Enter (↵) key again to assign the point code. Valid entries are three numerical entries separated by dashes (-). Valid point codes are 0 to 255, 0 to 255, and 0 to 255 for ANSI and CHINA; 0 to 7, 0 to 255, and 0 to 7 for ITU-T; or any corresponding number in decimal format.

SLS
This option searches by Signalling Link Selection (SLS). Press the Enter (↵) key to edit the field, and enter the desired SLS number. Press the Enter (↵) key again to assign the number. The range depends on the protocol and user part selected. The Spectra system does not allow out-of-range entries. An entry must be made in the User Part field before making an entry in this field.

HEADING (H0/H1)
This option searches by any of the message types available in the Headers (H0/H1) field of the message. Press the Enter (↵) key to access the Heading Type menu. Messages vary depending on the protocol and user part selected. Highlight the desired message type, and press the Enter (↵) key to assign the message type. An entry must be made in the User Part field before making an entry in this field.

CHANNEL NUMBERS
This option allows a user to view messages that are transmitted or received on a particular channel number, several channel numbers, or all channel numbers. For more information about the CHANNEL NUMBERS option, see "CHANNEL NUMBERS" on page 205 of this guide.

BIT OFFSET
This option allows you to enter the bit at which you wish to begin sequence checking. The range for the BIT OFFSET field is from 1 to the maximum bit length of the signal unit. The default BIT OFFSET is 1.

BIT LENGTH
This option allows you to set the number of bits that you want to sequence, beginning at the Bit Offset setting. The BIT LENGTH range is 1 to 32. The default BIT LENGTH is 7.

SEARCH AND VIEW OPTIONS

Search and View options are available from the F2 Run screen and the F9 Xamine screen for SS7, ISDN, and X.25.

Both options have protocol-specific options menus. When these options are accessed, the user selects the desired protocol and then options menus appear, providing specific choices based on protocol selection.

The options menus are the same for all SS7 protocols. In the ISDN protocol, the options menus are the same for the CCITT, ETSI, ABIS, V5.1, and V5.2 protocols. The options menus for DASS and DPNSS protocols are different. The X.25 layers all use different options menus.

The Search options menu contains the same options as the View options menu, with the exception of the LINK ERRORS option, which is not available under the View options menu. The only fields that are unique to the View options menu are the CHANNEL NUMBERS option and the VIEW option.

Accessing the Search or View Options

The Search option operates in conjunction with the View option and allows searches to be performed on messages that pass the assigned criteria. This option allows field searches to be qualified by file name, message type, phone number, etc.

The View options menu offers the additional option that turns the View option ON or OFF. When the View option is turned OFF, the individual view settings remain intact. This provides an easy way to view information without resetting viewing options.

Follow these steps to access the Search options menu or View options menu from the F2 Run screen or the F9 Xamine screen.

Step	Action
1.	If you are accessing the Search option, press the **A** key. The Protocol options menu is displayed (see **Figure 7.7**).

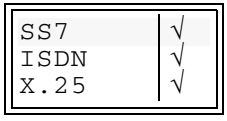


Figure 7.7 - Protocol Options Menu

✍ *Press the **O** key to turn a protocol ON or OFF. If a checkmark appears next to the protocol option, the option is ON.*

If you are accessing the View option, press the **V** key. The Protocol options menu is displayed (see **Figure 7.7**).

✍ *The Spectra system provides three protocol options—SS7, ISDN, and X.25. Since these protocols are available as separate options on the Spectra system, your system may have any combination of the three listed. The Search and View options menus for SS7, ISDN, and X.25 are very similar in appearance and setup but have protocol-specific options menus.*

2. Select a protocol option and press the **Enter (↵)** key. The appropriate Search options menu (see **Figure 7.8**) or View options menu (see **Figure 7.9**) is displayed.

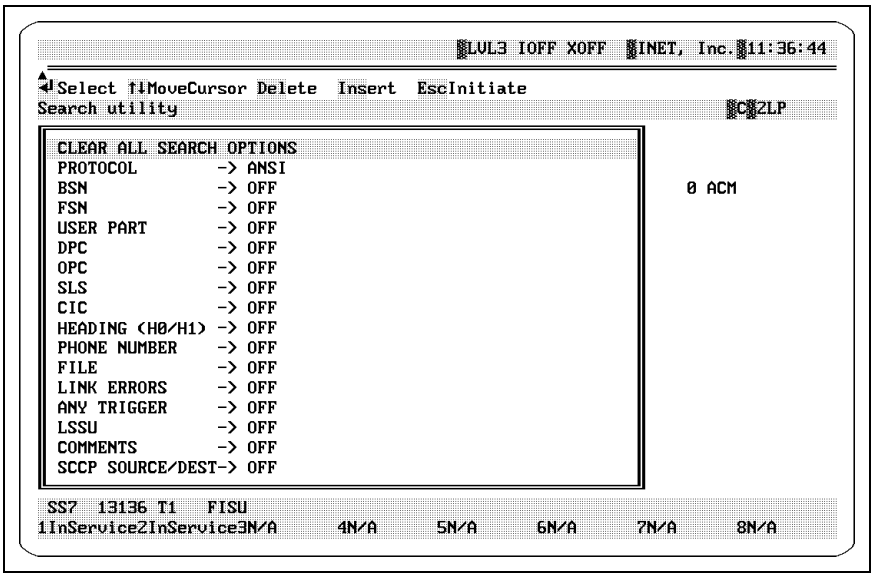


Figure 7.8 - Search Options Menu (SS7)

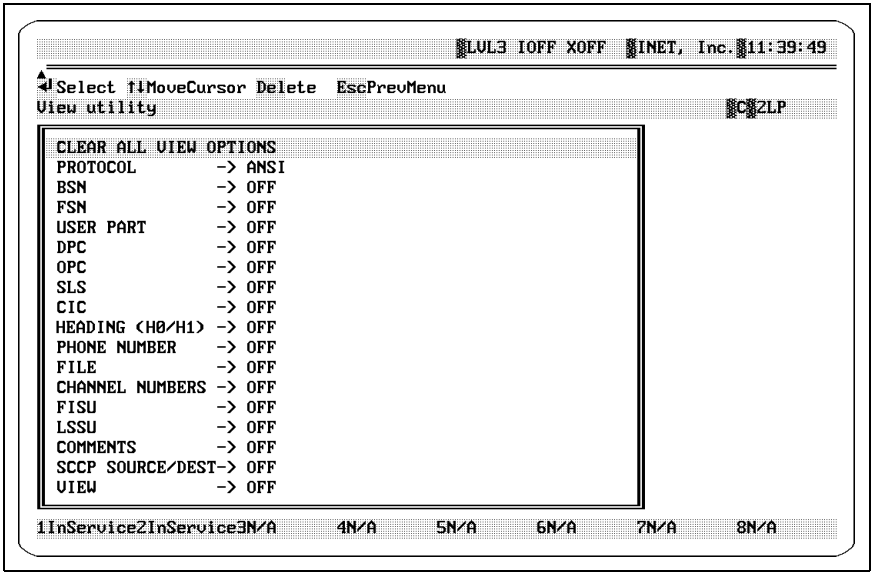


Figure 7.9 - View Options Menu (SS7)

3. Use the ↑↓ keys to move the cursor to the **PROTOCOL** field, and press the **Enter** (↵) key. A Protocol options menu displays the available protocols:

   - **SS7**
     ANSI, ITU-T RED, ITU-T BLUE, ITU-T WHITE, CHINA, BTNR, and JAPAN
   - **ISDN**
     CCITT, ETSI, ABIS, V5.1, V5.2, DASS, and DPNSS
   - **X.25 (Layer options)**
     LAPB/D, PACKET, I FRAME, and DON'T CARE

4. Use the ↑↓ keys to select the protocol you want to filter, and press the **Enter** (↵) key. The Search or View parameters vary according to the selected protocol.

   The sections that follow describe the Search and View parameters.

SS7 Search and View Options Menus

The SS7 Search options menu (see **Figure 7.8**) contains the same options as the SS7 View options menu, with the exception of the LINK ERRORS option, which is not available under the View options menu. The only fields that are unique to the View options menu are the CHANNEL NUMBERS option and the VIEW option (see **Figure 7.9**).

SS7 Search and View Options Menu Definitions

↵ Select
Press the Enter (↵) key to enter or change information in a field.

↑↓ MoveCursor
Press the ↑↓ keys to move the cursor to a particular option.

EscInitiate
In the Search options menu, press the Esc key to initiate the Search option as it is defined on the screen. If no matches are found, a "Not found searching down message" appears in the top border line.

In the View options menu, press the Esc key to initiate the View option as it is defined on the screen. The EscInitiate option appears in the direction line across the top of the View options menu only when the VIEW option is toggled to ON.

Delete
Press the Delete key to turn OFF the highlighted option.

+/-
Press the + or - keys to advance to the next or previous occurrence of a defined search parameter.

CLEAR ALL OPTIONS
Press the Enter (↵) key to reset all menu options to OFF.

PROTOCOL
This option allows a user to qualify parameters by protocol. Press the Enter (↵) key to access the protocol options. Select the desired protocol option, and press the Enter (↵) key to assign the protocol. The protocol options for SS7 are ANSI, ITU-T RED, ITU-T BLUE, ITU-T WHITE, CHINA, BTNR, and JAPAN.

BSN
This option allows a user to search or view messages by Backward Sequence Number (BSN). Press the Enter (↵) key to edit the field, and enter the desired BSN. Press the Enter (↵) key again to assign the number. The range for the BSN is 0 to 127.

FSN
This option allows a user to search or view messages by Forward Sequence Number (FSN). Press the Enter (↵) key to edit this field, and enter the desired FSN. Press the Enter (↵) key again to assign the number. The range for the FSN is 0 to 127.

USER PART
This option allows a user to search or view messages by any of the user parts available in the User Part options menu. Press the Enter (↵) key to access the User Part options menu. The options available depend on the protocol chosen. **Figure 7.10** shows the User Part options menu for the ANSI protocol.

```
don't care
00 SNM  Signalling Network Management Message
01 MTNR Signalling Network Test/Maint. Regular
02 MTNS Signalling Network Test/Maint. Special
03 SCCP Signalling Connection Control Point
04 TUP  Telephone User Part
05 ISUP ISDN User Part
06 DUPC Data User Part (Call/Circuit related)
07 DUPF Data User Part (Facility Reg./Cancel.)
08 MTP  Reserved for MTP Testing User Part
09 B-ISUP Broadband ISDN User Part
0A S-ISUP Broadband ISDN User Part
0B SI11 User Part 11--Spare
0C SI12 User Part 12--Spare
0D SI13 User Part 13--Rsvd for Ind Netwk Use
```

Figure 7.10 - User Part Options Menu (ANSI Protocol)

When the User Part options menu is displayed, the following two options appear in the direction line.

A…Z Search
The A…Z Search function can be used to alphabetically search for User Part options by pressing the corresponding letter key. Highlight the desired user part, and press Enter (↵) key to assign the user part.

+SearchToggle
The +SearchToggle function can be used to toggle the A...Z Search to a 0...F HexSearch to search for the hexadecimal User Part Code.

DPC
This option allows a user to search by DPC. Press the Enter (↵) key to edit the field, and enter the desired DPC. Press the Enter (↵) key again to assign the point code. Valid entries are three numerical entries separated by dashes (-). Valid point codes are 0 to 255, 0 to 255, and 0 to 255 for ANSI and CHINA; 0 to 7, 0 to 255, and 0 to 7 for ITU-T; or any corresponding number in decimal format.

OPC
This option allows a user to searches by OPC. Press the Enter (↵) key to edit the field, and enter the desired OPC. Press the Enter (↵) key again to assign the point code. Valid entries are three numerical entries separated by dashes (-). Valid point codes are 0 to 255, 0 to 255, and 0 to 255 for ANSI and CHINA; 0 to 7, 0 to 255, and 0 to 7 for ITU-T; or any corresponding number in decimal format.

SLS
This option allows a user to search by Signalling Link Selection (SLS). Press the Enter (↵) key to edit the field, and enter the desired SLS number. Press the Enter (↵) key again to assign the number. The range depends on the protocol and user part selected. The Spectra system does not allow out-of-range entries. An entry must be made in the User Part field before making an entry in this field.

CIC
This option allows a user to search by Circuit Identification Code (CIC). Press the Enter (↵) key to edit the field, and enter the desired CIC number. Press the Enter (↵) key again to assign the number. The range depends on the protocol and user part selected. The Spectra system does not allow out-of-range entries. An entry must be made in the User Part field before making an entry in this field.

HEADING (H0/H1)
This option allows a user to search by any of the message types available in the Headers (H0/H1) field of the message. Press the Enter (↵) key to access the Heading Type menu. Messages vary depending on the protocol and user part selected. Highlight the desired message type, and press the Enter (↵) key to assign the message type. An entry must be made in the User Part field before making an entry in this field.

PHONE NUMBER

This option allows a user to search by full or partial phone numbers. Press the Enter (↵) key to access the numeric field, and enter the desired digits. Press the Enter (↵) key again to assign the phone number. The Spectra system can match any string of digits within a given phone number in a message.

✍ *A question mark (?) is used to represent a wildcard for a single character. This wildcard character saves time when entering numbers. For example, an entry of 80074399?? represents all 800 numbers between 7439900 and 7439999. Any or all of the numbers may be wildcard characters. Since an asterisk (*), a pound sign (#), and digits 0 to 9 are valid ISDN phone number digits, a plus sign (+) is used in ISDN to represent a zero or more digits. For example, an entry of +800+ represents all numbers containing 800; numbers such as 8006809400, 9008008989, and 9724568000 are included. A maximum of two plus signs can be used in any single entry. A search can also be performed on partial numbers.*

FILE

In the Search options menu, the File option allows a user to search for a particular message built using the F6 Edit function. Press the Enter (↵) key to access the MESSAGE/DATA STRING options menu. Select the desired option, and press the Enter (↵) key again to access the catalog of available messages. Select the desired file, and press the Enter (↵) key to assign it. This option is useful in searching for messages with particular values in mandatory variable or optional fields—for example, a Release (REL) message with a certain cause value.

In the View options menu, the File option allows a user to view messages stored in the capture buffer. For more information about viewing stored files, see "Multiple File View Window" on page 230 of this guide.

CHANNEL NUMBERS

This View menu option allows a user to view messages that are transmitted or received on a particular channel number, several channel numbers, or all channel numbers. This option is available only from View options menu.

Follow these steps to view messages by channel numbers.

Step	Action

1. Highlight the **CHANNEL NUMBERS** option, and press the **Enter** (↵) key to access the CHANNEL NUMBERS options menu.

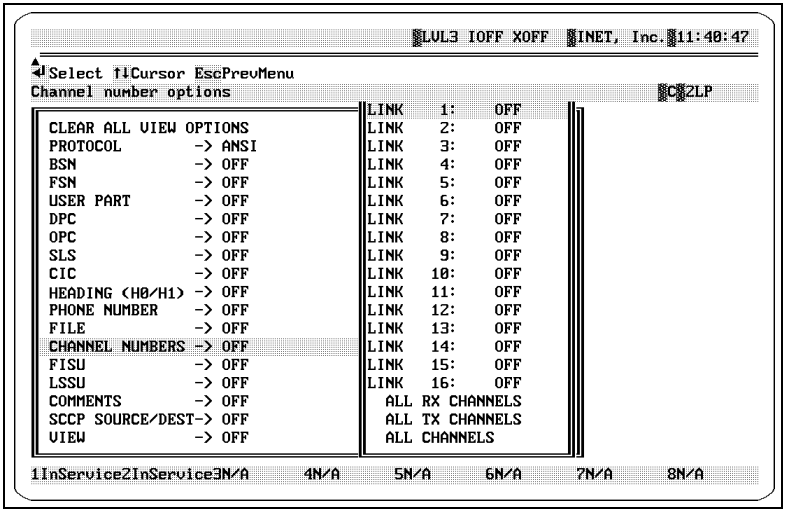


Figure 7.11 - View Options Menu - Channel Number Options Menu Displayed

2. Highlight the desired link number, and press the **Enter** (↵) key to turn the option to OFF, RX, TX or RX/TX. ALL RX CHANNELS, ALL TX CHANNELS, and ALL CHANNELS can also be selected to assign the designated entry for all links. The function of each option is shown in **Table 7.1**.

Table 7.1 - Channel Number Options

Option	View Received Messages On Link	View Transmitted Messages On Link
OFF	No	No
RX	Yes	No
TX	No	Yes
RX/TX	Yes	Yes
ALL RX CHANNELS	Toggles all links between RX and OFF	
ALL TX CHANNELS	Toggles all links between TX and OFF	

Table 7.1 - Channel Number Options (Continued)

Option	View Received Messages On Link	View Transmitted Messages On Link
ALL CHANNELS	Toggles all links between RX/TX and OFF	

3. Repeat **Step 1** and **Step 2** with all links to adjust their settings. After all channel number assignments have been made, press the **Esc** key. The word ON appears in the Channel Numbers field when channel numbers have been selected as view parameters.

4. After all other View assignments have been made, ensure the View option at the bottom of the menu is **ON**. The EscPrevious direction line option at the top of the screen then changes to EscInitiate. Press the **Esc** key to start the viewing process.

VIEW

The View option allows a user to turn the View option ON or OFF. The settings displayed in the View options menu when the option is turned ON or OFF are maintained.

LINK ERRORS

This Search option allows a user to search by a particular error (see **Table 7.2**). Press the Enter (↵) key to access the Error options menu. Highlight the desired error, and press the Enter (↵) key again to assign the error. The Link Errors option resets all other search options to OFF. To turn the Link Errors option OFF, press the Delete key.

Table 7.2 - SS7 Search by LINK ERROR Options

Error Type	Searches For
CRC Error	Messages with an incorrect checksum
Line Break	Line break occurrences (a series of more than seven 1s)
Long SU	Messages exceeding the maximum signal unit octet size
Short SU	Messages shorter than five octets in length

Table 7.2 - SS7 Search by LINK ERROR Options (Continued)

Error Type	Searches For
FIB Inversion	Message with the Forward Indicator Bit (FIB) set opposite to the previous signal unit captured
BIB Inversion	Messages with the Backward Indicator Bit (BIB) opposite to the previous signal unit captured
Aborted SU	Messages terminated by seven consecutive 1s
Non-Octet SU	Messages with a non-module 8 count; this condition is detected when a flag is encountered on non-octet boundaries
Any Error	Any errored signal unit

ANY TRIGGER
This option allows a user to search by any trigger. Press the Enter (↵) key to turn this option ON. This option resets all other options to OFF. To turn the option OFF, press the Del key.

LSSU
This option allows a user to search by any Link Status Signal Unit (LSSU). Press the Enter (↵) key to toggle this option ON or OFF.

COMMENTS
In the Search options menu, this option allows a user to search all comments that are placed in tests that appear in the capture buffer. Press the Enter (↵) key to toggle this option ON or OFF.

In the View options menu, multiple comments, combinations of comments, or text strings in the capture buffer can be viewed using the Multiple Comments View window found under the COMMENTS option. When accessing the COMMENTS option, a VIEW ALL or FILTER options menu appears. If the VIEW ALL option is selected, all comments found in the capture buffer are viewed. Selecting the FILTER option accesses the Multiple Comments View window. For more information about viewing multiple comments, refer to "Multiple Comments View Window" on page 225 of this guide.

SCCP SOURCE/DEST
This option allows the user to search for Signalling Connection Control Part (SCCP) connection-oriented messages. The SCCP Source/Dest option consists of two parts separated by a delimiter. The first part is the source reference number found in some SCCP connection-oriented messages. The second part is the destination reference number found in some SCCP connection-oriented messages. The two parts are separated by a forward slash. Each reference number must be entered in a Hexadecimal format with no more than six characters.

ISDN Search and View Options Menus

The ISDN Search options menu (see **Figure 7.12**) contains the same options as the ISDN View options menu, with the exception of the LINK ERRORS option, which is not available under the View options menu. The only fields that are unique to the View options menu are the CHANNEL NUMBERS option and the VIEW option.

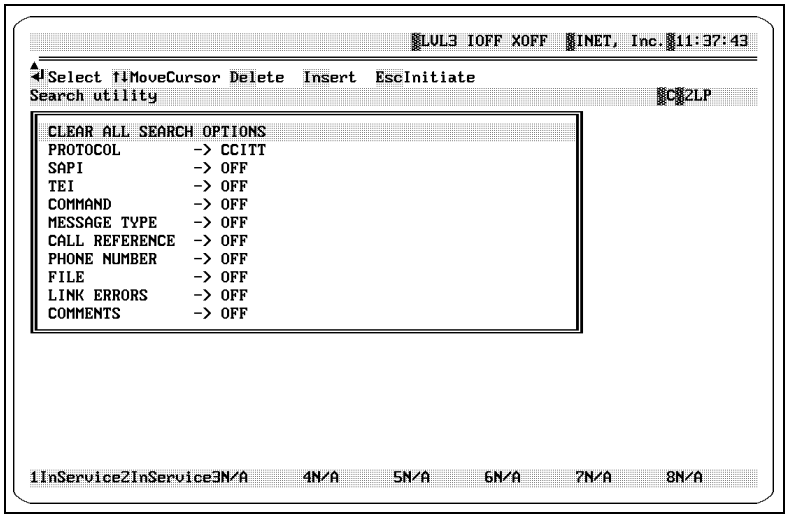


Figure 7.12 - ISDN Search Options Menu

ISDN Protocol-Specific Options Menus

Search and View options have protocol-specific options menus for ISDN. When these options are accessed, the user selects the desired protocol. Options menus then appear, providing specific options based on protocol selection. The options menus are the same for the CCITT, ETSI, ABIS, V5.1, and V5.2 protocols. The options menus for DASS and DPNSS protocols are different.

The Search and View options menus for CCITT, ETSI, ABIS, V5.1, and V5.2 protocols appear as shown in **Figure 7.13**.

```
CLEAR ALL SEARCH OPTIONS
PROTOCOL            -> CCITT
SAPI                -> OFF
TEI                 -> OFF
COMMAND             -> OFF
MESSAGE TYPE        -> OFF
CALL REFERENCE      -> OFF
PHONE NUMBER        -> OFF
FILE                -> OFF
LINK ERRORS         -> OFF
```

Figure 7.13 - ISDN Search Options Menus for CCITT, ETSI, ABIS, V5.1, and V5.2 Protocols

✍ *The LINK ERRORS option appears only in the Search options menu. Additionally, the CHANNEL NUMBERS and VIEW options appear only in the View options menu.*

The Search and View options menus for the DASS protocol appear as shown in **Figure 7.14**.

```
CLEAR ALL SEARCH OPTIONS
PROTOCOL            -> DASS
ET->PBX             -> OFF
PBX->ET             -> OFF
COMMAND             -> OFF
MESSAGE TYPE        -> OFF
LAP/DLC             -> OFF
PHONE NUMBER        -> OFF
FILE                -> OFF
LINK ERRORS         -> OFF
```

Figure 7.14 - ISDN Search Options Menus for DASS Protocol

✍ *The LINK ERRORS option appears only in the Search options menu. Additionally, the CHANNEL NUMBERS and VIEW options appear only in the View options menu.*

The Search and View options menus for the DPNSS protocol appear as shown in **Figure 7.15**.

```
CLEAR ALL SEARCH OPTIONS
PROTOCOL            -> DPNSS
MESSAGEGROUP        -> OFF
                    -> OFF
COMMAND             -> OFF
MESSAGE TYPE        -> OFF
LAP/DLC             -> OFF
PHONE NUMBER        -> OFF
FILE                -> OFF
LINK ERRORS         -> OFF
```

Figure 7.15 - ISDN Search Options Menus for DPNSS Protocol

✍ *The LINK ERRORS option appears only in the Search options menu. Additionally, the CHANNEL NUMBERS and VIEW options appear only in the View options menu.*

ISDN Search and View Options Menu Definitions

↵ Select
Press the Enter (↵) key to enter or change information in a field.

↑↓ MoveCursor
Press the ↑↓ keys to move the cursor to a particular option.

EscInitiate
Press the Esc key to initiate the Search or View option as it is defined on the screen. If no matches are found, a “Not found searching down” message appears in the top border line.

Delete
Press the Delete key to turn OFF the highlighted option.

+/-
Press the + or - keys to advance to the next or previous occurrence of a defined Search or View parameter.

CLEAR ALL OPTIONS
Press the Enter (↵) key to reset all menu options to OFF.

PROTOCOL
This option allows a user to qualify parameters by protocol. Press the Enter (↵) key to access the protocol options. Select the desired protocol option, and press the Enter (↵) key to assign the protocol. The protocol options for ISDN are CCITT, ETSI, ABIS, V5.1, V5.2, DASS, and DPNSS.

SAPI (CCITT, ETSI, ABIS, V5.1, and V5.2 protocols)
This option searches by SAPI. Press the Enter (↵) key to edit the field, and then enter the SAPI. Valid entries for SAPIs range from 0 to 63. Press the Enter (↵) key again to assign the number.

ET->PBX (DASS protocol)
This option searches for messages sent to the Private Branch Exchange (PBX) by the Exchange Termination (ET). Press the Enter (↵) key to toggle this field ON or OFF. The default setting is OFF.

MESSAGEGROUP (DPNSS protocol)
This option searches by message group. Press the Enter (↵) key to access the message group catalog, and select an option from the menu. Options for DPNSS message groups are Call Control message group, End-to-End message group, and Link-to-Link message group. Press the Enter (↵) key again to assign the desired selection.

TEI (CCITT, ETSI, ABIS, V5.1, and V5.2 protocols)
This option searches by TEI. Press the Enter (↵) key to edit the field, and then enter the TEI. Valid entries for TEIs range from 0 to 127. Press the Enter (↵) key again to assign the number.

PBX->ET (DASS protocol)
This option searches for messages sent to the ET by the PBX. Press the Enter (↵) key to toggle this field ON or OFF. The default setting is OFF.

COMMAND

This option searches by commands. Press the Enter (↵) key to access the Commands options menu. Select a command for the search, and press the Enter (↵) key. The available commands are listed in **Table 7.3**.

Table 7.3 - Command Menu Descriptions

Command	Description	Protocol
IFRAME	Information frames are used to transfer Level 3 information in sequentially numbered frames and require acknowledgment.	CCITT, ETSI, ABIS, V5.1, and V5.2
RR	The Receive Ready (RR) command is used either to indicate that a network device is available to receive an Information frame or to acknowledge previously received Information frames.	CCITT, ETSI, ABIS, V5.1, and V5.2
RNR	The Receive Not Ready (RNR) command is used to indicate that a network device is busy and unable to accept incoming Information frames.	CCITT, ETSI, ABIS, V5.1, and V5.2
REJ	The Reject (REJ) command is used to request the retransmission of Information frames, beginning with a specified frame sequence number.	CCITT, ETSI, ABIS, V5.1, and V5.2
SABME	The Set Asynchronous Balanced Mode Extended (SABME) command is used to initiate multiple-frame operation (modulo-128).	CCITT, ETSI, ABIS, V5.1, and V5.2
SABMR	The Set Asynchronous Balanced Mode Restricted (SABMR) command is used to initiate multiple-frame operation (modulo-128) for DASS and DPNSS protocols.	DASS and DPNSS
DM	The Disconnected Mode (DM) command is used to indicate that a network device is unable to process sequential multiple Information frames.	CCITT, ETSI, ABIS, V5.1, and V5.2
UI	The Unnumbered Information (UI) command is used to send information that does not require acknowledgment.	CCITT, ETSI, ABIS, V5.1, V5.2, DASS, and DPNSS
DISC	The Disconnect (DISC) command is used to terminate the link's multiple-frame operation.	CCITT, ETSI, ABIS, V5.1, and V5.2
UA	The Unnumbered Acknowledgment (UA) command is used to acknowledge SABME and DISC commands.	CCITT, ETSI, ABIS, V5.1, V5.2, DASS, and DPNSS
FRMR	The Frame Reject (FRMR) command is used to report an error condition that cannot be cleared by the retransmission of a frame identical to the frame that caused the error.	CCITT, ETSI, ABIS, V5.1, and V5.2

MESSAGE TYPE (IFRAME only)
This option is only available if IFRAME is the selected command. This option searches by the message types listed in the Message Type options menu. Press the Enter (↵) key to access the Message Type options menu, shown in **Figure 7.16**. Select the message type, and press the Enter (↵) key to assign the message type.

When the Message Type options menu is displayed, additional functions appear in the direction line. The A…Z Search option allows you to search alphabetically for message types by pressing the corresponding letter key. Select the message type, and press the Enter (↵) key to assign the message type. (Press the **+** key to toggle between alphanumeric and hexadecimal.)

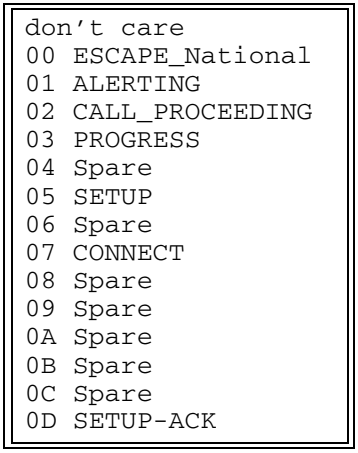


Figure 7.16 - Message Type Options Menu - IFRAME Only

CALL REFERENCE
This option is available only if IFRAME is the selected command. This option searches by a particular Call Reference value. Press the Enter (↵) key to access the numeric field, and enter the value. Valid entries for Call Reference values range from 0 to 32767. Press the Enter (↵) key again to assign the number.

LAP/DLC (DASS and DPNSS protocols)
This option searches by a particular LAP for the DASS protocol. It also searches by a particular DLC for the DPNSS protocol. Press the Enter (↵) key to access the numeric field, and then enter the value. Valid entries for LAP/DLC values range from 1 to 15 and 17 to 31. Press the Enter (↵) key again to assign the number.

PHONE NUMBER

This option searches by full or partial phone numbers. Press the Enter (↵) key to access the numeric field, and enter the desired digits. Press the Enter (↵) key again to assign the phone number. The Spectra system can match any string of digits within a given phone number in a message. This option is available for all protocols.

✍ *A question mark (?) is used to represent a wildcard for a single character. This wildcard character saves time when entering numbers. For example, an entry of 80074399?? represents all 800 numbers between 7439900 and 7439999. Any or all of the numbers may be wildcard characters. Since an asterisk (*), a pound sign (#), and digits 0 to 9 are valid ISDN phone number digits, a plus sign (+) is used in ISDN to represent a zero or more digits. For example, an entry of +800+ represents all numbers containing 800; numbers such as 8006809400, 9008008989, and 9724568000 are included. A maximum of two plus signs can be used in any single entry. A search can also be performed on partial numbers.*

FILE

In the Search options menu, this option allows a search for a particular message built using the F6 Edit function. Press the Enter (↵) key to access the MESSAGE/DATA STRING options menu. Select the desired option, and press the Enter (↵) key again to access the catalog of available messages. Select the desired file, and press the Enter (↵) key to assign it. This option is useful in searching for messages with particular values in mandatory variable or optional fields—for example, a Release (REL) message with a certain cause value.

In the View options menu, multiple messages in the capture buffer can be viewed using the Multiple File View window found under the FILE option. This window allows up to eight different messages to be viewed using boolean logic and operators that act as filters. Since the View option displays only the messages that match the user-specified criteria, users can create templates using the F6 Edit function to mask or unmask particular fields in a message that can then be used with the FILE option.

For more information about viewing multiple files, refer to "Multiple File View Window" on page 230 of this guide.

LINK ERRORS (Search only)
This option searches by a particular error (see **Table 7.4**). Press the Enter (↵) key to access the Error options menu. Highlight the desired error, and press the Enter (↵) key again to assign the error. The LINK ERRORS option resets all other search options to OFF. To turn the LINK ERRORS option OFF, press the Delete key.

Table 7.4 - ISDN Search by LINK ERROR Options

Error Type	Searches For
CRC Error	Messages with an incorrect checksum
Line Break	Line break occurrences (a series of more than seven 1s)
Long SU	Messages exceeding the maximum signal unit octet size
Short SU	Messages shorter than five octets in length
Aborted SU	Messages terminated by seven consecutive 1s
Non-Octet SU	Messages with a non-module 8-b count; this condition is detected when a flag is encountered on non-octet boundaries
Any Error	Any errored signal unit

CHANNEL NUMBERS (View only)
This option views messages that are transmitted/received on a particular channel number, several channel numbers, or all channel numbers. For more information about viewing channel numbers, refer to "CHANNEL NUMBERS" on page 205 of this guide.

COMMENTS
In the Search options menu, this option allows searches to be done on all comments that are placed in tests that appear in the capture buffer. Press the Enter (↵) key to toggle this option ON or OFF.

In the View options menu, multiple comments, combinations of comments, or text strings in the capture buffer can be viewed using the Multiple Comments View window found under the COMMENTS option. When accessing the COMMENTS option, a VIEW ALL or FILTER options menu appears. If the VIEW ALL option is selected, all comments found in the capture buffer are viewed. Selecting the FILTER option accesses a Multiple Comments View window. This window allows up to eight different comments to be viewed using boolean logic and operators that act as filters. Comments can be user-defined or a standard part of a message. Text strings can contain any printable characters and spaces.

For more information about viewing multiple comments, refer to "Multiple Comments View Window" on page 225 of this guide.

VIEW (View only)
Press the Enter (↵) key to turn the VIEW option ON or OFF. When the VIEW option is turned OFF, the individual View settings remain intact. This provides an easy way to view information without resetting viewing options.

X.25 Search and View Options Menus

The X.25 Search options menu (see **Figure 7.17**) contains the same options as the X.25 View options menu, with the exception of the LINK ERRORS option, which is not available under the View options menu. The only fields unique to the View options menu are the CHANNEL NUMBERS option and the VIEW option.

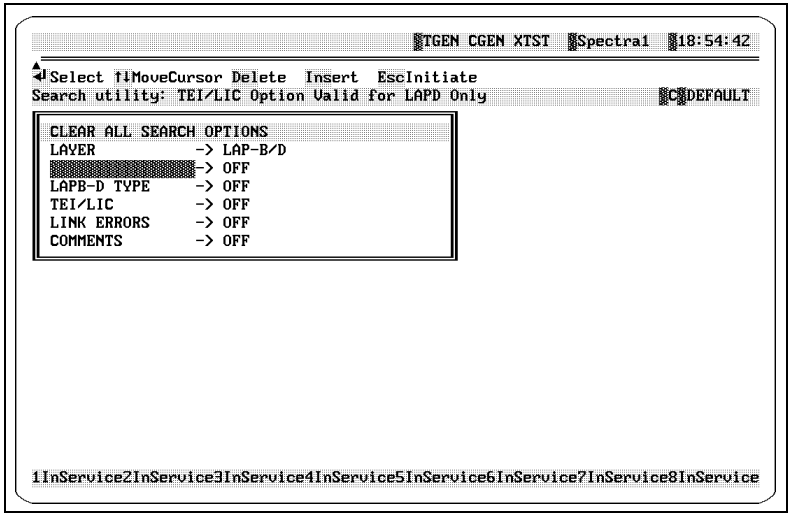


Figure 7.17 - X.25 Search Screen

Link Layer-Specific Options Menus

Search and View options have data link layer-specific options menus for X.25. When these options are accessed, the user selects the desired data link layer. Options menus appear providing specific options based on the selection. The options menus are different for all of the X.25 data link layers.

The Search options menu for the LAPB/D layer appears as shown in **Figure 7.18**.

```
CLEAR ALL SEARCH OPTIONS
LAYER                -> LAP-B/D
                     -> OFF
LAPB-D TYPE          -> OFF
TEI/LIC              -> OFF
FILE                 -> OFF
LINK ERRORS          -> OFF
COMMENTS             -> OFF
```

Figure 7.18 - X.25 Search Options Menu for the LAPB/D Layer

✍ *The View options menu is similar to **Figure 7.18***. However, it does not contain the *LINK ERRORS option. Additionally, the CHANNEL NUMBERS and VIEW options appear only in the View options menu but not in the Search options menu.*

The Search options menu for the PACKET layer appears as shown in **Figure 7.19**.

```
CLEAR ALL SEARCH OPTIONS
LAYER                -> PACKET
CIRCUIT NUMBER       -> OFF
PACKET TYPE          -> OFF
TEI/LIC              -> OFF
LINK ERRORS          -> OFF
COMMENTS             -> OFF
```

Figure 7.19 - X.25 Search Options Menu for the PACKET Layer

✍ *The View options menu is similar to **Figure 7.19***. However, it does not contain the *LINK ERRORS option. Additionally, the CHANNEL NUMBERS and VIEW options appear only in the View options menu but not in the Search options menu.*

The Search options menu for the I FRAME layer appears as shown in **Figure 7.20**.

```
CLEAR ALL SEARCH OPTIONS
LAYER              -> I FRAME
CIRCUIT NUMBER     -> OFF
USER-DATA FILE     -> OFF
TEI/LIC            -> OFF
LINK ERRORS        -> OFF
ANY TRIGGER        -> OFF
COMMENTS           -> OFF
```

Figure 7.20 - X.25 Search Options Menu for the I FRAME Layer

✍ *The View options menu is similar to* **Figure 7.20**. However, it does not contain the *LINK ERRORS option. Additionally, the CHANNEL NUMBERS and VIEW options appear only in the View options menu but not in the Search options menu.*

The Search and View options menu also provide a DON'T CARE layer, as shown in **Figure 7.21**, which includes the options available for all layers except for the USER DATA FILE option in the X.25 View and Search options menus and the ANY TRIGGER option in X.25 Search options menu.

```
CLEAR ALL SEARCH OPTIONS
LAYER              -> DON'T CARE
CIRCUIT NUMBER     -> OFF
PACKET TYPE        -> OFF
TEI/LIC            -> OFF
LINK ERRORS        -> OFF
COMMENTS           -> OFF
```

Figure 7.21 - X.25 Search Options Menu for the DON'T CARE Layer

✍ *The X.25 View options menu is similar to* **Figure 7.18**. However, it does not contain the *LINK ERRORS option. Additionally, the CHANNEL NUMBERS and VIEW options appear only in the View options menu but not in the Search options menu.*

X.25 Search and View Options Menu Definitions

↵ Select
Press the Enter (↵) key to enter or change information in a field.

↑↓ MoveCursor
Press the ↑↓ keys to move the cursor to a particular option.

Delete
Press the Del key to turn OFF the highlighted option.

EscInitiate
Press the Esc key to initiate the Search function as it is defined on the screen. If no matches are found, a "Not found searching down" message appears in the top border line.

+/-
Press the + or - keys to advance to the next or previous occurrence of a defined search parameter.

CLEAR ALL OPTIONS
Press the Enter (↵) key to reset all menu options to OFF.

LAYER
This option qualifies the search parameter by layer. Press the Enter (↵) key to access the layer options. Select the desired layer option, and press the Enter (↵) key to assign it. The layer options for X.25 are LAPB/D, PACKET, I FRAME, and DON'T CARE.

✍ *If DON'T CARE is selected, the search parameters will include all of the other layer options LAPB/D, PACKET, and I FRAME, except the USER DATA FILE option and the ANY TRIGGER option in the I FRAME layer.*

LAPB-D Type (LAPB/D layer only)
This option allows a user to search for a particular LAPB or LAPD supervisory message. Press the Enter (↵) key to access a catalog of available messages. Select the desired message and press the Enter (↵) key to assign it.

CIRCUIT NUMBER (PACKET, I FRAME, DON'T CARE layers only)
This option searches by circuit number. This number represents the physical circuit on which the speech path is established for TUP and ISUP. The number can be either a Permanent Virtual Circuit (PVC) or a Switch Virtual Circuit (SVC) value. Press the Enter (↵) key to edit the field, and enter the desired Circuit Number. Press the Enter (↵) key again to assign the number. The range depends on the protocol and user part selected. If an entry is outside the valid range, a NUMBER OUT OF RANGE message is displayed on the top border line.

USER DATA FILE (I FRAME only)
The User Data File is composed of three parts: Message, Message Slide, and Data String.

MESSAGE
This option searches by a specific message. Press the Enter (↵) key to choose a Message Type from the appearing options menu. The Message Type options are USER, IS41, and ASCII. Press the Enter (↵) key again to select a specific message from the appearing options menu (for example, LINKIN.X25).

MESSAGE SLIDE
This option searches by a specific phone number. Press the Enter (↵) key to choose a Message Slide Type from the appearing options menu. The Message Slide Type options are USER, IS41, and ASCII. Press the Enter (↵) key again to select a specific message slide (phone number) from the appearing options menu.

DATA STRING
This option searches by a specific phone number or any digital string. Press the Enter (↵) key to choose a data string from the appearing options menu.

TEI/LIC (LAPD only)
This option searches by Terminal Endpoint Identifier (TEI)/Link Identification Code (LIC). Press the Enter (↵) key to edit the field, and enter the TEI/LIC. Valid entries for TEIs range from 0 to 127. Any TEI value greater than 127 is converted by the Spectra system to a corresponding LIC format. Valid entries for LICs range from 0 to 127, in the following decimal format: xxx-xxx-xxx (for example, 115-120-125). Press the Enter (↵) key again to assign the numbers.

LINK ERRORS
This option searches by a particular error, as shown in **Table 7.5**. Press the Enter (↵) key to access the Error options menu. Highlight the desired error, and press the Enter (↵) key again to assign the error. The Link Errors option resets all other search options to OFF. To turn the Link Errors option OFF, press the Delete key.

Table 7.5 - X.25 Search by LINK ERROR Options

Error Type	Searches For
CRC Error	Frames with an incorrect checksum
Line Break	Line break occurrences (a series of more than seven 1s)
Long Frame	Frames exceeding the maximum octet size
Short Frame	Frames shorter than five octets in length
Aborted Frame	Frames terminated by seven consecutive 1s
Non-Octet Frame	Frames with a non-module 8-b count; this condition is detected when a flag is encountered on non-octet boundaries
Any Error	Any errored Frame

ANY TRIGGER (I FRAME layer only)
This option searches trigger messages that are specific to a user-defined script, typically either a tester script or a generator script. Press the Enter (↵) key to toggle this option to ON. The Spectra system searches for any triggers defined in an existing script.

CHANNEL NUMBERS (View only)
This option views messages that are transmitted/received on a particular channel number, several channel numbers, or all channel numbers. For more information about viewing channel numbers, refer to "CHANNEL NUMBERS" on page 205 of this guide.

COMMENTS
In the Search options menu, this option allows searches to be done on all comments that are placed in tests that appear in the capture buffer. Press the Enter (↵) key to toggle this option ON or OFF.

In the View options menu, multiple comments, combinations of comments, or text strings in the capture buffer can be viewed using the Multiple Comments View window found under the COMMENTS option. When accessing the COMMENTS option, a VIEW ALL or FILTER options menu appears. If the VIEW ALL option is selected, all comments found in the capture buffer are viewed. Selecting the FILTER option accesses a Multiple Comments View window. This window allows up to eight different comments to be viewed using boolean logic and operators that act as filters. Comments can be user-defined or a standard part of a message. Text strings can contain any printable characters and spaces.

For more information about viewing multiple comments, refer to "Multiple Comments View Window" on page 225 of this guide.

VIEW (View only)
Press the Enter (↵) key to turn the VIEW option ON or OFF. When the VIEW option is turned OFF, the individual View settings remain intact. This provides an easy way to view information without resetting viewing options.

Using the Search and View options

Follow these steps to use the Search or View options.

Step	Action
1.	From the F2 Run screen or the F9 Xamine screen, press the **V** key. The Protocol options menu appears (see **Figure 7.22**).

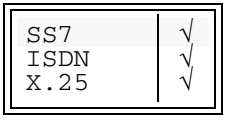


Figure 7.22 - Protocol Options Menu

2.	Press the **O** key to turn a protocol ON or OFF. If a checkmark (√) appears next to the protocol option, the option is ON.
3.	After selecting the protocols you wish to view, highlight the protocol you wish to clarify, and press the **Enter** (↵) key. A Protocol options menu appears, containing one or more of the following options:

- **SS7**
  ANSI, ITU-T RED, ITU-T BLUE, ITU-T WHITE, CHINA, BTNR, and JAPAN

- **ISDN**
  CCITT, ETSI, ABIS, V5.1, V5.2, DASS, and DPNSS

- **X.25**
  LAP B/D, PACKET, I-FRAME, and DON'T CARE

4. Highlight the protocol you wish to view, and press the **Enter** (↵) key. The View options menu is displayed (see **Figure 7.23**).

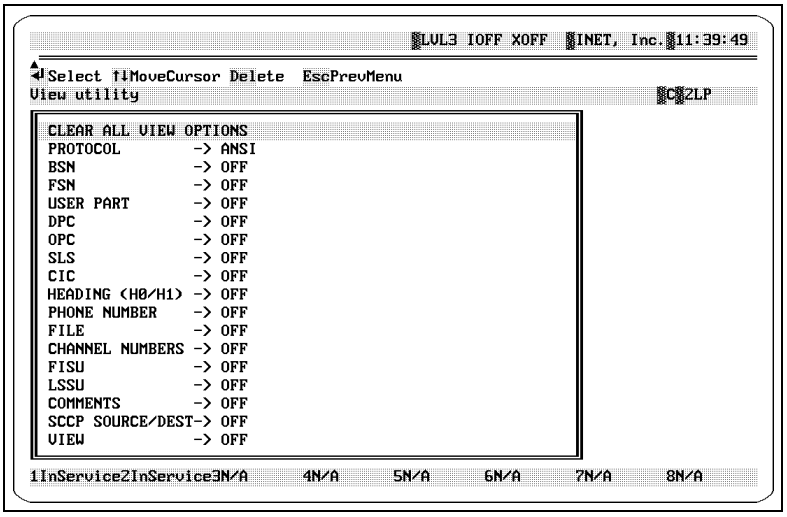


Figure 7.23 - Compressed Run Screen - View Options Menu Displayed

5. Once the menu appears, you can either use a message from the F6 message catalog through the File option, or enter the appropriate settings in the View options menu fields to establish the view criteria.

6. After establishing the view criteria, move the cursor to the View option at the bottom line of the View options menu, and press the **Enter** (↵) key. This turns the View filter ON.

7. To activate the View filter, press the **Esc** key.

When the compressed messages return to the screen, only messages with the assigned criteria are shown. A flashing message at the top-left side of the screen displays how many of the total messages actually passed the View filter. For example, if 25 messages out of 40 passed the view parameters and are displayed, the following message appears:

```
SU Pass View: 25 Out Of 40
```

MULTIPLE COMMENTS VIEW AND MULTIPLE FILE VIEW WINDOWS

Both the COMMENTS option and the FILE option found under the Search and View options menus have additional windows with multiple filtering capabilities that can be used to limit the search results or view results.

The options use similar windows, each of which allows up to eight different files or comments to be viewed using boolean logic and operators that act as filters. The FILE option is available for SS7 and ISDN modes only. The COMMENTS option is available in SS7, ISDN, and X.25 modes.

Multiple Comments View Window

Multiple comments, combinations of comments, or text strings in the capture buffer can be viewed using the Multiple Comments View window found under the COMMENTS option. When accessing the COMMENTS option, a VIEW ALL or FILTER options menu appears. If the VIEW ALL option is selected, all comments found in the capture buffer are viewed. Selecting the FILTER option accesses a Multiple Comments View window. This option is available in SS7, ISDN, and X.25 modes.

Comments can be user-defined or a standard part of a message. Text strings can contain printable characters and spaces. Remaining spaces at the end of the string, however, will be removed when the text string is processed.

Accessing the Multiple Comments View Window

Follow these steps to access the Multiple Comments View window.

Step	Action
1.	From the F2 Run screen or the F9 Xamine screen, press the **V** key. A Protocol options menu appears.
2.	Select the desired protocol to access the View options menu.
3.	From the View options menu, select the **COMMENTS** option and press **Enter** (↵) key. The COMMENTS options menu appears (see **Figure 7.24**).



Figure 7.24 - COMMENTS Options Menu

Step	Action
4.	Select the **FILTER** option. The Multiple Comments View window is displayed (see **Figure 7.25**).

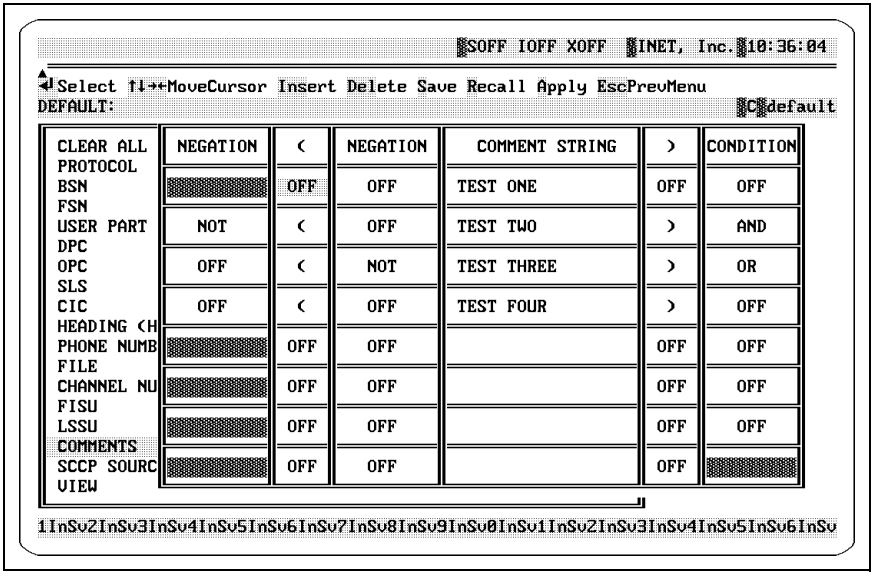


Figure 7.25 - Multiple Comments View Window

Users can edit the logical relationships between the criteria using the six columns in this window. The columns comprise the elements that compose the logical expression. The available logical operators are AND, OR, and NOT, as well as parentheses to use in conjunction with the expressions. Some elements can also be toggled ON or OFF in this window.

Multiple Comments View Window Definitions

↵Select
Press the Enter (↵) key to enter or change information in a field.

↑↓↔MoveCursor
Press the ↑↓ keys to move the cursor to a particular option.

✍ *The location of either window can be changed by pressing the ALT key and any arrow key.*

Delete
Press the Del key to turn OFF the highlighted option. Pressing the Delete key while the cursor is on an existing row removes the row from the window and draws the next row in sequence up one row.

✍ *Once an expression has been applied to the View options menu, it can be cleared by pressing the Delete key.*

Insert
Press the Insert key to insert a blank row in the window below the location of the cursor. Pressing the Insert key while the cursor is on an existing row will not overwrite the existing parameters unless all rows are already in use.

Save
Press the S key to save a Multiple Comments View expression to a file in the `SPECTRA\LINK-TYPE (SS7, ISDN, or X.25)\CVWFILES` directory. Enter a file name (maximum of eight characters) in the Save dialog box. Press the Enter (↵) key. A `.CVW` extension is automatically added to the file name. Enter a description (maximum of 59 characters) in the File Description dialog box, and press the Enter (↵) key. Saved files can be accessed using the Recall option.

Recall
Press the R key to access a catalog of saved files to recall an expression that has been saved. The A…Z Search function can be used to alphabetically locate the desired file. Press the corresponding letter key to move to the desired file name.

✍ *The Delete key can be used to delete a highlighted file. After pressing the Delete key, a Delete Filename dialog box appears with the message "Delete file name .CVW?". Press the Y key to delete the file, or press the N key to cancel.*

Place the cursor on the expression you wish to use or review, and press the Enter (↵) key. An expression can be edited while a different expression is in use, or the current expression can be edited and the changes immediately reapplied.

✍ *After recalling an expression, you must apply it by pressing the A key. When you return to the View options menu, the VIEW option must be toggled to ON before you can press the Esc key again to initiate changes to the capture buffer display.*

If a recalled file is modified and the changes are not saved, an Unsaved Changes dialog box appears with the message "Unsaved changes will be lost. Continue?". Press the Y key to continue without saving the changes. Press the N key to return to the window. A "Press S to save the changes" message appears in the top border line. If changes are not saved, the data is lost.

Apply
Press the A key to apply all current settings to the capture buffer. A Save dialog box appears. Press the Y key to apply the new expression. Press the N key to apply the new expression without saving it and to return to the View options menu. An expression can be applied without being saved. Once an expression has been applied, it can be cleared by pressing the Delete key while in the View options menu. If you go to the F2 Run screen or F9 Xamine screen and then return to the window, the last expression used is displayed. The user can edit the current expression or recall a different expression.

After applying an expression, a summary is displayed in the FILE field of the View options menu. The COMMENT field will only display FILTER, not a summary. The summary consists of the expression file name, the first three letters of the files (up to 37 characters), logical operators, and parentheses.

Logical operators displayed in the summary are represented by the following characters:

- AND is represented by the & character
- NOT is represented by the ! character
- OR is represented by the ¦ character

If the summary is longer than 39 characters, the 37th character and after will be represented by an ellipsis (…).

EscPrevMenu
Press the Esc key to return to the previous menu. If changes have been made to an expression, an Unsaved Changes dialog box appears with the message "Unsaved changes will be lost. Continue?". Press the Y key to continue. (If the expression is a recalled file, a dialog box appears with the message "Apply expression?".) From the Unsaved Changes dialog box, press the N key to return to the window. A "Press S to save the changes?" message appears in the top border line. If changes are not saved, the data is lost. The user also can apply the new expression by selecting Y when prompted to save changes to a new view file.

NEGATION
The NEGATION field allows a user to negate the value of the expression in parentheses. The negation spans the same amount of rows that the parentheses span; therefore, multiple files can be negated from the expression. The left parenthesis field must be toggled to ON (represented by a left parenthesis [(]), before you can access this field. After the left parenthesis field is toggled ON, use the ← key to return to the NEGATION field, and press the Enter (↵) key to toggle this field to OFF or NOT.

(
The left parenthesis field allows you to enclose the expression within parentheses, enabling additional operations to occur in the fields before the COMMENT STRING field. Press the Enter (↵) key to toggle this field ON (represented by a left parenthesis [(]) or OFF.

NEGATION
The second NEGATION field allows a user to add a negative indicator to the expression. The negation applies to the item on the same row and does not affect the logical operator. Press the Enter (↵) key to toggle this field to OFF or NOT.

COMMENT STRING
The COMMENT STRING field allows a user to enter a comment string to use in conjunction with the logical expression in the Multiple Comments View window. Press the Enter (↵) key to access the COMMENT STRING field, enter in the desired text string, and press the Enter (↵) key again to accept it.

)
The right parenthesis field allows a user to enclose the expression within parentheses, enabling additional operations to occur in the fields after the COMMENT STRING field. Press the Enter (↵) key to toggle this field ON (represented by a right parenthesis [)]) or OFF.

CONDITION
The CONDITION field allows a user to insert an operator that places a condition on that line of the expression. Press the Enter (↵) key to toggle between AND, OR, and OFF.

Multiple File View Window

Multiple messages in the capture buffer can be viewed using the Multiple File View window found under the FILE option. This window allows up to eight different messages to be viewed using boolean logic and operators that act as filters. This option is available for SS7 and ISDN modes only.

Since the View option displays only the messages that match the user-specified criteria, users can create templates using the F6 Edit function to mask or unmask particular fields in a message that can then be used with the FILE option. The combination of these user-defined templates, along with logical operators, provides a powerful and flexible way to locate desired message signal units or frames based on a logical combination of different fields working from multiple messages. This option can also be used as a simplified form of call trace.

Accessing the Multiple File View Window

Follow these steps to access the Multiple File View window.

Step	Action
1.	From the F2 Run screen or the F9 Xamine screen, press the **V** key to access the View options menu.
2.	Select the **FILE** option and press the **Enter** (↵) key. The Multiple Comments View window is displayed (see **Figure 7.9**).

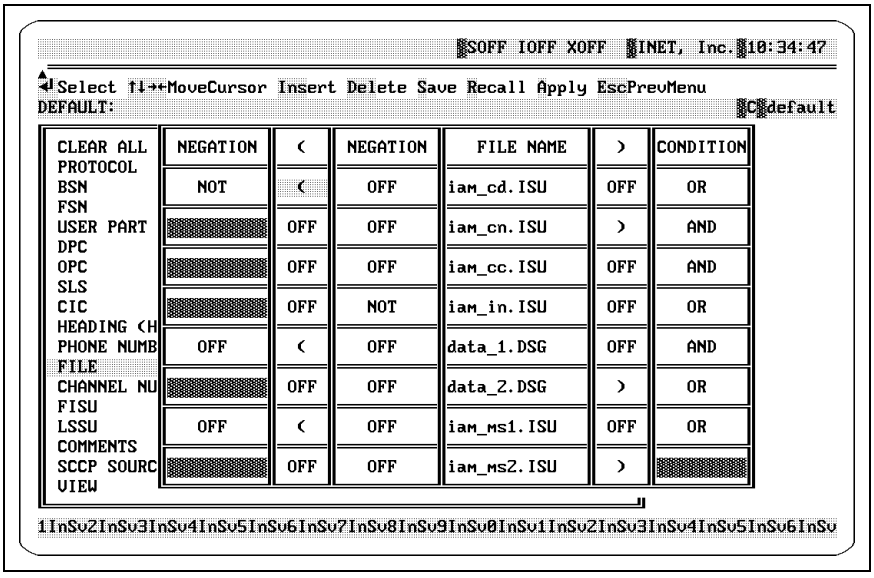


Figure 7.26 - Multiple File View Window

✍ *The Multiple File View window is identical to the Multiple Comments View window with the exception that FILE NAME appears in the COMMENT STRING field.*

Users can edit the logical relationships between the criteria using the six columns in this window. The columns comprise the elements that compose the logical expression. The available logical operators are AND, OR, and NOT, as well as parentheses, which can be used in conjunction with the expressions. Some elements can also be toggled ON or OFF in this window.

Multiple File View Window Definitions

↵Select
Press the Enter (↵) key to enter or change information in a field.

↑↓↔MoveCursor
Press the ↑↓ keys to move the cursor to a particular option.

✍ *The location of either window can be changed by pressing the ALT key and any arrow key.*

Delete
Press the Del key to turn OFF the highlighted option. Pressing the Delete key while the cursor is on an existing row removes the row from the window and draws the next row in sequence up one row.

✍ *Once an expression has been applied to the View options menu, it can be cleared by pressing the Delete key.*

Insert
Press the Insert key to insert a blank row in the window below the location of the cursor. Pressing the Insert key while the cursor is on an existing row will not overwrite the existing parameters unless all rows are already in use.

Save
Press the S key to save a Multiple Comments View expression to a file in the `SPECTRA\PROTOCOL (ANSI, BTNR, CHINA, etc.)\PROTOCOL NAME\VIEWS` directory. Enter a file name (maximum of eight characters) in the Save dialog box. Press the Enter (↵) key. A `.MVF` extension is automatically added to the file name. Enter a description (maximum of 59 characters) in the File Description dialog box, and press the Enter (↵) key. Saved files can be accessed using the Recall option.

Recall
Press the R key to recall an expression that has been saved. Press the R key to access a catalog of saved files. The A…Z Search function can be used to alphabetically locate the desired file. Press the corresponding letter key to move to the desired file name.

✍ *The Delete key can be used to delete a highlighted file. After pressing the Delete key, a Delete Filename dialog box appears with the message "Delete file name.MVF?". Press the Y key to delete the file, or press the N key to cancel.*

Place the cursor on the expression you wish to use or review, and press the Enter (↵) key. An expression can be edited while a different expression is in use, or the current expression can be edited and the changes immediately reapplied.

✍ *After recalling an expression, you must apply it by pressing the A key. When you return to the View options menu, the VIEW option must be toggled to ON before you can press the Esc key again to initiate changes to the capture buffer display.*

If a recalled file is modified and the changes are not saved, an Unsaved Changes dialog box appears with the message "Unsaved changes will be lost. Continue?". Press the Y key to continue without saving the changes. Press the N key to return to the window. A "Press S to save the changes" message appears in the top border line. If changes are not saved, the data is lost.

Apply
Press the A key to apply all current settings to the capture buffer. A Save dialog box appears. Press the Y key to apply the new expression. Press the N key to apply the new expression without saving it and to return to the View options menu. An expression can be applied without being saved. Once an expression has been applied, it can be cleared by pressing the Delete key while in the View options menu. If you go to the F2 Run screen or F9 Xamine screen and then return to the window, the last expression used is displayed. The user can edit the current expression or recall a different expression.

After applying an expression, a summary is displayed in the FILE field of the View options menu. The COMMENT field will only display FILTER, not a summary. The summary consists of the expression file name, the first three letters of the files (up to 37 characters), logical operators, and parentheses.

Logical operators displayed in the summary are represented by the following characters:

- AND is represented by the & character
- NOT is represented by the ! character
- OR is represented by the ¦ character

If the summary is longer than 39 characters, the 37th character and after will be represented by an ellipsis (…).

EscPrevMenu
Press the Esc key to return to the previous menu. If changes have been made to an expression, an Unsaved Changes dialog box appears with the message "Unsaved changes will be lost. Continue?". Press the Y key to continue. (If the expression is a recalled file, a dialog box appears with the message "Apply expression?".) From the Unsaved Changes dialog box, press the N key to return to the window. A "Press S to save the changes?" message appears in the top border line. If changes are not saved, the data is lost. The user also can apply the new expression by selecting Y when prompted to save changes to a new view file.

NEGATION
The NEGATION field allows a user to negate the value of the expression in parentheses. The negation spans the same amount of rows that the parentheses span; therefore, multiple files can be negated from the expression. The left parenthesis field must be toggled to ON (represented by a left parenthesis [(]), before you can access this field. After the left parenthesis field is toggled ON, use the ← key to return to the NEGATION field, and press the Enter (↵) key to toggle this field to OFF or NOT.

(
The left parenthesis field allows you to enclose the expression within parentheses, enabling additional operations to occur in the fields before the FILE NAME field. Press the Enter (↵) key to toggle this field ON (represented by a left parenthesis [(]) or OFF.

NEGATION
The second NEGATION field allows a user to add a negative indicator to the expression. The negation applies to the item on the same row and does not affect the logical operator. Press the Enter (↵) key to toggle this field to OFF or NOT.

COMMENT STRING
The COMMENT STRING field allows a user to enter a comment string to use in conjunction with the logical expression in the Multiple File View window. Press the Enter (↵) key to access the COMMENT STRING field, enter in the desired text string, and press the Enter (↵) key again to accept it.

FILE NAME
The FILE NAME field allows a user to select the template to use in conjunction with the logical expression in the Multiple File View window. Up to eight files can be selected.

From the Multiple File View window, use the ↑↓ keys to select a row of the expression, and press the Enter (↵) key. From the File Name options menu, select the desired file type and press the Enter (↵) key. A corresponding catalog is displayed.

Use the ↑↓ keys to locate the desired file and press the Enter (↵) key to assign it. The selected file defines the parameters of the files that are displayed when the expression is applied to the capture buffer.

)
The right parenthesis field allows a user to enclose the expression within parentheses, enabling additional operations to occur in the fields after the FILE NAME field. Press the Enter (↵) key to toggle this field ON (represented by a right parenthesis [(]) or OFF.

CONDITION
The CONDITION field allows a user to insert an operator that places a condition on that line of the expression. Press the Enter (↵) key to toggle between AND, OR, and OFF.

Creating an Expression

Follow these steps to create a new expression.

Step	Action
1.	From the Multiple Comments View window or the Multiple File View window, use the ←→ keys to place the cursor in the left parenthesis field.
2.	If you choose to use a parenthesis to enclose the expression, press the **Enter (**↵) key to toggle the left parenthesis ON (represented by a left parenthesis [(]). Use the ←→ keys to move the cursor to the next desired field.

✍ *If the left parenthesis field is not toggled to the ON position, the NEGATION field in the left column is not accessible.*

3. If you choose to negate the value of the expression enclosed in parentheses, select the left NEGATION field. The negation spans the same amount of rows that the parentheses span; therefore, multiple files can be negated from the expression. Press the **Enter (↵)** key to toggle this field between OFF and NOT. Use the ←→ keys to move the cursor to the next desired field.

4. If you choose to negate only one file or comment on one row without affecting the logical operator, select the right NEGATION field. Press the **Enter (↵)** key to toggle this field between OFF and NOT. Use the ←→ keys to move the cursor to the next desired field.

5. To select a comment string to view, go to **Step 6**. To select a file to view, go to **Step 7**.

6. To select a comment string to view, use the ←→ keys to move the cursor to the **COMMENT STRING** field, and press the **Enter (↵)** key to access this field. Enter in a comment string (up to 19 characters), and press the **Enter (↵)** key. Use the ←→ keys to move the cursor to the next desired field. Go to **Step 8**.

7. To select a file to view, use the ←→ keys to move the cursor to the **FILE** field, and press the **Enter (↵)** key to access this field. A File View options menu appears (see **Figure 7.27**).

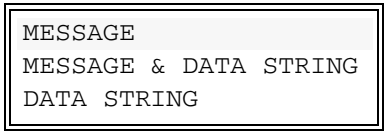


Figure 7.27 - File View Options Menu

Select any of the choices and press the **Enter (↵)** key. A corresponding message catalog is displayed. Select the desired message/data string, and press the **Enter (↵)** key. Use the ←→ keys to move the cursor to the next desired field.

8. If you choose to use a parentheses to enclose the expression, use the ←→ keys to move the cursor to the right parenthesis field, and press the **Enter (↵)** key to toggle the right parenthesis ON (represented by a right parenthesis [)]). Use the ←→ keys to move the cursor to the next desired field.

9. If you choose to use an operator to place a condition on the expression, use the ←→ keys to move the cursor to the CONDITION field, and press the **Enter** (↵) key to toggle between AND and OR. Use the ↓ key to move the cursor to next row.

10. Repeat **Step 1** through **Step 9** for up to eight rows. Press the **Insert** key to insert a new entry above a highlighted row.

✍ *After creating an expression, you must apply it by pressing the A key. When you return to the View options menu, the VIEW option must be toggled to ON before you can press the Esc key again to initiate changes to the capture buffer display.*

Creating File View Templates

Follow these steps to create two message templates that can be used to view all calls to or from a phone number.

Step	Action
1.	From anywhere is the Spectra system, press the **F6** key to access the F6 Edit options menu. Select the CREATE/EDI message option, and press the **Enter** (↵) key. A Protocol options menu is displayed.
2.	Select a protocol (SS7, ISDN, or X.25), and press the **Enter** (↵) key. Another Protocol options menu is displayed.
3.	Select the desired protocol, and press the **Enter** (↵) key.
4.	Press the **R** key to recall a message. A message catalog is displayed. Use the ↑↓ keys to select the desired message to use for the first template. Place the cursor on the desired message, and press the **Enter** (↵) key to open the message. The A…Z Search function can be used to alphabetically locate the desired file. Press the corresponding letter key to move to the desired position.
5.	Use the ↑↓ keys to locate the Called Party number parameters address signals field. Press the **U** key and the → key repeatedly until all octets in this field are unmasked.
6.	Press the **S** key to save the modified message. Enter a file name for the message in the Save dialog box. Press the **Enter** (↵) key. A File

Description dialog box appears. Enter an appropriate description, and press the **Enter (↵)** key.

7. Repeat **Step 4** through **Step 6** to unmask the Calling Party number parameters address signals field in the second message template.

8. Press the **F2** key or the **F9** key to return to traffic analysis or post-capture traffic analysis. A Restart Test dialog box appears. Press the **N** key.

9. Press the **V** key to access the View options menu. Select the **FILE** option. The Multiple File View window is displayed.

10. Press the **R** key to recall a message. Use the ↑↓ keys to locate the first template. Press the **Enter (↵)** key to assign it to the first row of the expression.

11. Use the → key to move the cursor to the CONDITION field. Press the **Enter (↵)** key to toggle this field to **OR**. Use the → key to move the cursor to the next line of the expression.

12. Press the **R** key to recall a message. Use the ↑↓ keys to locate the second template. Press the **Enter (↵)** key to assign it to the second row of the expression.

13. Press the **A** key to apply the expression.

All initiating messages containing the phone number are now displayed on the F9 Xamine screen. Multiple phone numbers can be viewed in the same way. The message template dictating the view parameters can also be based on the Originating Point Code (OPC), Destination Point Code (DPC), Circuit Identification Code (CIC), or other data fields such as international call or release cause values.

POST-CAPTURE TRAFFIC ANALYSIS

The F9 Xamine function allows captured messages to be viewed in a number of ways. Pressing the F9 key halts all data capture until another test is started by pressing the F2 key.

In addition to the Search, View, and screen formatting options found in the F2 Run function, the F9 Xamine function contains the following unique features:

- A Save command to save the capture buffer
- An Alt_Save command to save all marked messages to a `.DAT` file
- A Recall command to retrieve data that has been captured
- A Trace command to provide call-tracing capabilities
- A Filename command to display the file name and description for the current file once it has been saved
- A Batch command to recall batches of tests built using the Batch Test Builder option

To access the F9 Xamine screen, press the F9 key.

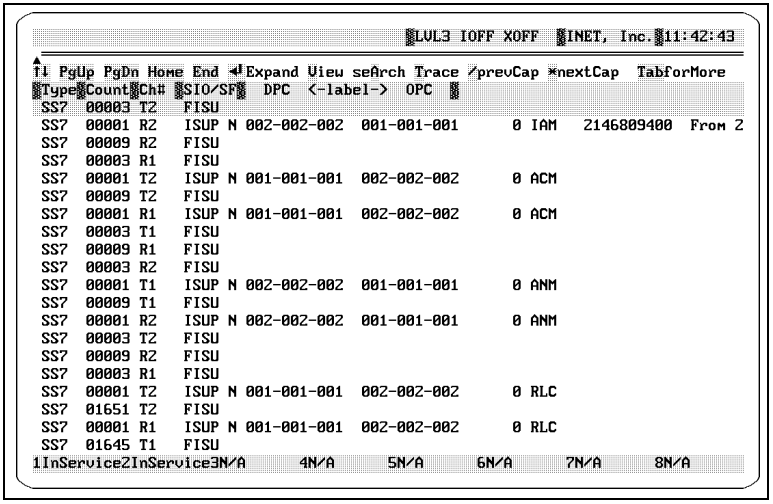


Figure 7.28 - F9 Xamine Screen (Example)

Any comments placed in a test script can be viewed from the F9 Xamine screen by pressing the Enter (↵) key.

F9 XAMINE SCREEN DEFINITIONS

The direction line options, as well as the screen formatting options found in the F2 Run function, are duplicated in the F9 Xamine screen. Refer to "Continuous Traffic Analysis" on page 185 of this guide for detailed descriptions of these options. Some direction line options only appear when the cursor is placed on a message. Refer to "Message-Related F2 Run Screen Options" on page 194 of this guide for detailed descriptions of these options.

The following features are only available in the F9 Xamine screen.

EFileName
The Filename command displays the file name and description for the current capture buffer, if this information has been saved to disk. Press the E key to access a dialog box containing the file name and description of the capture buffer file. Press the Esc key to return to the test screen.

Trace

Press the T key to provide call tracing with a variety of options. Trace works with ISUP, TUP, and SCCP messages. Trace is different from Search or View because it displays all messages associated with a particular call. See "Trace" on page 245 of this guide for more details.

/prevCap

Press the / key to display data that has been captured on a secondary hard disk (most recent information first). The Capture X of X message at the top of the screen reflects the segment of captured information currently displayed (determined by RAM memory available for capture data display). To advance to the next 4 MB of information, press the / key again. Repeat this process until all desired information is viewed.

✍ *Before this option can be used, the Log Secondary Data Capture To Disk option must be turned ON in the Capture Parameters screen. These options do not perform any function without a secondary disk. If no secondary disk is in operation, use the Recall option. See "Capture Parameters Screen Definitions" on page 105 of this guide for more information.*

***nextCap**

Press the ? key to access the beginning of the captured data first. This option works in the same manner as the /prevCapture option.

✍ *Before this option can be used, the Log Secondary Data Capture To Disk option must be turned ON in the Capture Parameters screen. These options do not perform any function without a secondary disk. If no secondary disk is in operation, use the Recall option. See "Capture Parameters Screen Definitions" on page 105 of this guide for more information.*

Save

Press the S key to save all the data in the capture buffer. A Save dialog box appears. Enter a file name for the captured data in the dialog box. Any standard DOS-type file name can be used. Press the Enter (↵) key.

A File Description dialog box appears. Enter a description of the file in the dialog box. The file description allows a lengthy description (maximum of 58 characters) to be entered to include specifics of the file's contents. Press the Enter (↵) key.

A message displaying the status of the file appears on the top border line. This saves the data to the hard disk. Saved data is placed in a file with a `.DAT` extension in the `C:\SPECTRA\SIGNALOG` directory. These saved files can only be recalled by using the Recall function. Data is saved in an Inet-specific format. To save information in ASCII format, use the tag and print options discussed in **Chapter 11** of this guide.

✍ *Press Esc to abort the Save procedure.*

When the capture buffer is saved, the Spectra system saves the test environment along with it. The following list gives the parameters saved with the capture buffer:

- Point Code List and Names
- Number of links
- Data Communications Equipment/Data Terminal Equipment (DCE/DTE) designation
- Monitor or terminated settings

Saved files can then be viewed at a later time by using the F9 Recall (Primary Capture) option.

Alt_Save
Press the Alt key and the S key to save all of the marked messages contained in the capture buffer to a `.DAT` file. This option works in the same manner as the Save option.

Recall
Press the R key to recall a specific test or data block that has been saved. You can recall data in the captured environment (default) or in the current user environment (ALT_B option). A catalog of saved `.DAT` files and `.ANL` files are displayed. The last file accessed is displayed at the top of the menu. When the cursor is placed on a file, a description of the selected file appears on the information line. The A…Z Search function can be used to alphabetically locate a file. Press the corresponding letter key to move to that position.

✍ *The Delete key can be used to delete the selected file.*

The Spectra system recalls data in its captured environment. While pressing the Alt key, press the B key to recall the data in your current environment. Place the cursor on the desired file, and press the Enter (↵) key to display the file. A message displaying the retrieval status of the file appears in the top border line. Press the Esc key to abort the Recall procedure at anytime.

When a user recalls data, the name of the recalled capture buffer is displayed on the screen. Recalling a test in the captured environment restores the following parameters:

- Point Code List and Names
- Number of links
- DCE/DTE designation
- Monitor or terminated settings

✍ *If an optional secondary hard drive is installed, additional capture options menu items appear refer to "Recall (with optional secondary hard drive)" on page 243 of this guide.*

Recall (with optional secondary hard drive)
Press the R key to recall a specific test or data block that has been saved. If your Spectra system has a secondary hard drive installed, the Recall option allows you to choose the PRIMARY CAPTURE or SECONDARY CAPTURE.

The PRIMARY CAPTURE option allows you to recall data that was saved to files using the Save option or the Alt_Save option. The SECONDARY CAPTURE option recalls data saved to an optional secondary disk. Data saved to this secondary disk is saved in a continuous flow in a First-In First-Out (FIFO) manner. Therefore, the Recall function for the SECONDARY CAPTURE recalls the entire data flow. For more information about the SECONDARY CAPTURE option, refer to **Chapter 4** of this guide.

PRIMARY CAPTURE

Press the R key to access the Capture options menu. Select the PRIMARY CAPTURE option, and press the Enter (↵) key. The appearing catalog displays `.DAT` files (saved captured data files). The last file accessed is displayed at the top of the menu. A description of the highlighted file is presented on the information line. The A…Z Search function can be used to alphabetically locate a file. Press the corresponding letter key to move to that position.

✍ *The Delete key can be used to delete the selected file.*

Place the cursor on the desired file, and press the Enter (↵) key to display the file. A message displaying the retrieval status of the file appears in the top border line. Press the Esc key to abort the Recall procedure at anytime

The PRIMARY CAPTURE option recalls data saved as files using the Save option or the Alt_Save option. The user has an option to recall data in the captured environment (default) or in the current user environment (ALT_B option). Recalling a test in the captured environment restores the following parameters:

- Point Code List and Names
- Number of links
- DCE/DTE designation
- Monitor or terminated settings

SECONDARY CAPTURE

Press the R key to access the Capture options menu. Select the SECONDARY CAPTURE option, and press the Enter (↵) key. The first page of the latest Hard Disk Drive 2 (HDD2) data is displayed. Use the /prevCapture, *nextCapture, or JumpPage options to display the desired information. For more information about the /prevCapture, *nextCapture, or JumpPage options refer to "/prevCap" on page 241 of this guide.

The SECONDARY CAPTURE option recalls data saved to an optional secondary disk. Data saved to this secondary disk is saved in a continuous flow in a First-In First-Out (FIFO) manner. Therefore, the Recall function for the SECONDARY CAPTURE recalls the entire data flow.

✍ *To perform a secondary capture, the LOG DATA TO SECONDARY function in the F1 Capture Parameters function must be disabled (set to 0) before data can be recalled from the secondary disk. Refer to* ***Chapter 4*** *of this guide for more information about secondary captures.*

ALT_NFindDateTime
While pressing the Alt key, press the N key to allow a certain date and time to be located within a test. An Enter Date dialog box is displayed. Enter the desired date and time in MM/DD/YY HH:MM:SS:mmm format, and press the Enter (↵) key to search for the date/time entry within the current test.

Trace

The trace option provides call tracing with a variety of options. Trace works with ISUP, TUP and SCCP messages. Trace is different from Search or View because it displays all messages associated with a particular call. This option is available only in the F9 Xamine screen and only for SS7 and ISDN. The Trace menu options vary based on protocol.

The Spectra system Trace option supports features that provide Local Number Portability (LNP) testing. Trace searches the Generic Address Parameter (GAP) in the Optional Parameters section of a message for phone numbers and provides TCAP ISUP correlation to support LNP testing. For more information about the TCAP Correlation option, refer to "TCAP CORRELATION" on page 250 this guide.

✍ *This option is not available for X.25.*

Follow these steps to access the Trace options menu.

Step	Action

1. From the F9 Xamine screen, press the **T** key. A Protocol options menu is displayed (see **Figure 7.29**).



Figure 7.29 - Protocol Options Menu

2. Select the protocol you want to further trace, and press the **Enter (↵)** key. Another Protocol options menu appears, containing the options that correspond to the selected protocol. The following options are available:

   - **SS7**
     ANSI, ITU-T RED, ITU-T BLUE, ITU-T WHITE, CHINA, BTNR, and JAPAN

   - **ISDN**
     CCITT, ETSI, ABIS, V5.1, V5.2, DASS, and DPNSS

3. Select the protocol you want to trace, and press the **Enter** (↵) key. The Trace options menu is displayed. The Trace options menus for SS7 and ISDN are shown in **Figure 7.30** and **Figure 7.31**.

```
CLEAR CALL TRACE OPTION
PROTOCOL          -> ANSI
PHONE NUMBER      -> OFF
CURRENT MESSAGE   -> OFF
USER PART         -> OFF
CIC               -> OFF
SCCP OPTIONS      -> OFF
TCAP CORRELATION  -> OFF
IMSI/TMSI         -> OFF
CALL TRACE        -> OFF
```

Figure 7.30 - SS7 Trace Options Menu

```
CLEAR CALL TRACE OPTION
PROTOCOL          -> CCITT
LINK              -> OFF
PHONE NUMBER      -> OFF
CURRENT MESSAGE   -> OFF
CALL REFERENCE    -> OFF
CALL TRACE        -> OFF
```

Figure 7.31 - ISDN Trace Options Menu

SS7 Trace Options Menu Definitions

The following functions appear in the direction line across the top of the SS7 Trace options menu, depending on which options are toggled: Delete, Insert, A...Z Search, and EscInitiate. The Delete key turns off the highlighted option. The Insert key allows you to insert data. The A…Z Search function can be used to alphabetically search for user part options by pressing the corresponding letter key. The EscInitiate function implements all the search options chosen. If no matches are found, a Not Found message appears in the top border line. The + and - keys can also be used to advance to the next occurrence of a defined message.

When the Call Trace options menu is displayed, the direction line options appear. Press the Enter (↵) key to select an option. Press the Delete key to turn OFF a selected option if there is an existing entry. Otherwise, press the Esc key to exit an option. The + and - keys can also be used to advance to the next occurrence of a defined message.

CLEAR CALL TRACE OPTION
This option allows a user to reset all Trace options to OFF by pressing the Enter (↵) key.

PROTOCOL
This option allows a user to qualify parameters by protocol. Press the Enter (↵) key to access the protocol options. Select the desired protocol option, and press the Enter (↵) key to assign the protocol. The protocol options for SS7 are ANSI, ITU-T RED, ITU-T BLUE, ITU-T WHITE, CHINA, BTNR, and JAPAN.

PHONE NUMBER
This option traces by full or partial phone numbers. Press the Enter (↵) key to access the numeric field, and enter the desired digits. Press the Enter (↵) key again to assign the phone number. The Spectra system can match any string of digits within a given phone number in a message. Trace also allows the use of wildcards in the phone number.

✍ *A question mark (?) is used to represent a wildcard for a single character. This wildcard character saves time when entering numbers. For example, an entry of 80074399?? represents all 800 numbers between 7439900 and 7439999. Any or all of the numbers may be wildcard characters. Since an asterisk (*), a pound sign (#), and digits 0 to 9 are valid ISDN phone number digits, a plus sign (+) is used in ISDN to represent a zero or more digits. For example, an entry of +800+ represents all numbers containing 800; numbers such as 8006809400, 9008008989, and 9724568000 are included. A maximum of two plus signs can be used in any single entry. A trace can also be performed on partial numbers.*

CURRENT MESSAGE
This option traces and displays all messages associated with the call that contains the current highlighted message. Press the Enter (↵) key to turn the option ON or OFF.

USER PART
This option qualifies the Trace parameters further by including a user part trace. Press the Enter (↵) key to access the User Part options menu. The options available depend on the protocol chosen.

✍ *The user cannot perform simultaneous tracing by phone number and user part.*

```
don't care
00 SNM  Signalling Network Management Message
01 MTNR Signalling Network Test/Maint. Regular
02 MTNS Signalling Network Test/Maint. Special
03 SCCP Signalling Connection Control Point
04 TUP  Telephone User Part
05 ISUP ISDN User Part
06 DUPC Data User Part (Call/Circuit related)
07 DUPF Data User Part (Facility Reg./Cancel.)
08 MTP  Reserved for MTP Testing User Part
09 SI09 User Part 09
0A SI10 User Part 10
0B SI11 User Part 11
0C SI12 User Part 12
0D SI13 User Part 13
```

Figure 7.32 - User Part Options Menu (ANSI protocol)

When the User Part options menu is displayed, additional functions appear in the direction line. The A…Z Search function can be used to alphabetically search for user part options by typing the name of the user part. Highlight the desired user part, and press the Enter (↵) key to assign the part.

CIC/TID
This option traces by Circuit Identification Code (CIC) or Transaction ID (TID). The CIC code represents the physical circuit on which the speech path is established for TUP and ISUP applications, while the TID represents the circuit established for SCCP applications. Press the Enter (↵) key to edit the field, and enter the desired CIC number. Press the Enter (↵) key again to assign the number. The range depends on the protocol and user part selected. An entry must be made in the User Part field before making an entry in this field.

SCCP OPTIONS
This option traces by one of two SCCP options—Connectionless (TCAP/UDT BSSMAP) and Connection oriented (DTAP/BSSMAP).

TCAP CORRELATION
This option provides TCAP ISUP correlation. This feature enables the Spectra system to successfully monitor and trace calls (TCAP query and TCAP responses) through the TID number, regardless of changing calling and called numbers and changing CIC codes. TCAP Correlation also correlates the Advanced Intelligent Network (AIN) TCAP query with the ISUP circuit related portion of the message.

IMSI/TMSI
This option traces by the GSM Mobile Identity—IMSI/TMSI. The International Mobile Subscriber Identifier (IMSI) consists of a string of 15 or fewer digits which are used to identify a subscriber on a GSM network. The Temporary Mobile Subscriber Identifier (TMSI) is a four-octet value assigned by the current Mobile Switching Center (MSC) to a mobile subscriber.

CALL TRACE
Press the Enter (↵) key to turn the Call Trace option ON or OFF. When the Trace option is turned ON, the EscInitiate function is displayed as a direction line option. EscInitiate implements all the search options chosen. If no matches are found, a Not Found message appears in the top border line. When the Trace option is turned OFF, all other settings remain intact. This provides an easy way to trace calls without resetting trace options.

ISDN Trace Screen Definitions

The following functions appear in the direction line across the top of the ISDN Trace screen, depending on which options are toggled: Delete, Insert, A...Z Search, and EscInitiate. The Delete key turns off the highlighted option. The Insert key allows a user to insert data. The A…Z Search function can be used to alphabetically search for user part options by pressing the corresponding letter key. The EscInitiate function implements all the search options chosen. If no matches are found, a Not Found message appears in the top border line. The + and - keys can also be used to advance to the next occurrence of a defined message.

When the Call Trace options menu is displayed, the direction line options appear. Press the Enter (↵) key to select an option. Press the Delete key to turn OFF a selected option if there is an existing entry. Otherwise, press the Esc key to exit an option. The + and - keys can also be used to advance to the next occurrence of a defined message.

CLEAR CALL TRACE OPTION
This option allows a user to reset all trace options to OFF by pressing the Enter (↵) key.

PROTOCOL
This option allows a user to qualify parameters by protocol. Press the Enter (↵) key to access the protocol options. Select the desired protocol option, and press the Enter (↵) key to assign the protocol. The protocol options for ISDN are CCITT, ETSI, ABIS, V5.1, V5.2, DASS, and DPNSS.

LINK
This option traces all calls on the designated link.

PHONE NUMBER
This option traces by full or partial phone numbers. Press the Enter (↵) key to access the numeric field, and enter the desired digits. Press the Enter (↵) key again to assign the phone number. The Spectra system can match any string of digits within a given phone number in a message. Trace also allows the use of wildcards in the phone number.

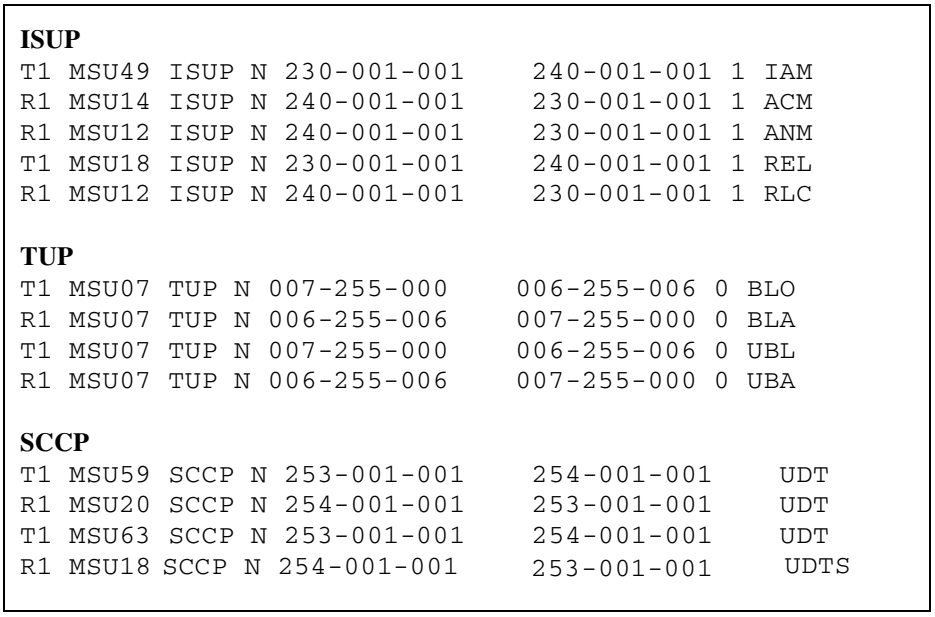
✍ *A question mark (?) is used to represent a wildcard for a single character. This wildcard character saves time when entering numbers. For example, an entry of 80074399?? represents all 800 numbers between 7439900 and 7439999. Any or all of the numbers may be wildcard characters. Since an asterisk (*), a pound sign (#), and digits 0 to 9 are valid ISDN phone number digits, a plus sign (+) is used in ISDN to represent a zero or more digits. For example, an entry of +800+ represents all numbers containing 800; numbers such as 8006809400, 9008008989, and 9724568000 are included. A maximum of two plus signs can be used in any single entry. A search can also be performed on partial numbers.*

CURRENT MESSAGE
This option traces and displays all messages associated with the call that contains the current highlighted message. Press the Enter (↵) key to turn the option ON or OFF.

CALL REFERENCE
This option traces by the designated Call Reference Information Element.

CALL TRACE

Press the Enter (↵) key to turn the Call Trace option ON or OFF. When the Trace option is turned ON, the EscInitiate function is displayed as a direction line option. EscInitiate implements all the search options chosen. If no matches are found, a Not Found message appears in the top border line. When the Trace option is turned OFF, all other settings remain intact. This provides an easy way to trace calls without resetting trace options. **Figure 7.33** shows examples of trace displays.



ISUP

```
T1 MSU49 ISUP N 230-001-001    240-001-001 1 IAM
R1 MSU14 ISUP N 240-001-001    230-001-001 1 ACM
R1 MSU12 ISUP N 240-001-001    230-001-001 1 ANM
T1 MSU18 ISUP N 230-001-001    240-001-001 1 REL
R1 MSU12 ISUP N 240-001-001    230-001-001 1 RLC
```

TUP

```
T1 MSU07 TUP N 007-255-000    006-255-006 0 BLO
R1 MSU07 TUP N 006-255-006    007-255-000 0 BLA
T1 MSU07 TUP N 007-255-000    006-255-006 0 UBL
R1 MSU07 TUP N 006-255-006    007-255-000 0 UBA
```

SCCP

```
T1 MSU59 SCCP N 253-001-001    254-001-001    UDT
R1 MSU20 SCCP N 254-001-001    253-001-001    UDT
T1 MSU63 SCCP N 253-001-001    254-001-001    UDT
R1 MSU18 SCCP N 254-001-001    253-001-001    UDTS
```

Figure 7.33 - Trace Display Examples

Using the Trace Option

Follow these steps to use the Trace option for post-capture filtering.

Step	Action

1. From the F9 Xamine screen, Press the **T** key. A Protocol options menu is displayed (see **Figure 7.34**).

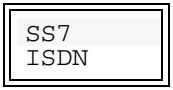


Figure 7.34 - Protocol Options Menu

2. Select the protocol you want to trace, and press the **Enter** (↵) key. Another Protocol options menu appears, containing the options available for the selected protocol. The following options are available:

   - **SS7**
     ANSI, ITU-T RED, ITU-T BLUE, ITU-T WHITE, CHINA, BTNR, and JAPAN

   - **ISDN**
     CCITT, ETSI, ABIS, V5.1, V5.2, DASS, and DPNSS

3. Select the protocol you want to trace, and press the **Enter** (↵) key. The Trace options menu is displayed.

4. Enter the appropriate settings in the Trace options menu fields to establish the trace criteria.

✍ *The SS7 Trace option does not reassemble phone numbers that are segmented in multiple messages.*

5. After assigning the trace criteria, move the cursor to the Call Trace option at the bottom line of the Trace options menu, and press the **Enter** (↵) key. This turns the Call Trace filter ON.

6. To activate the Trace filter, press the **Esc** key. Only messages with the assigned trace criteria are shown.

POST-CAPTURE FILTERING

Post-capture filtering provides a way to display certain messages from data after it has been captured. There are two types of post-capture filtering available—View and Trace.

View
This option displays only the messages that match user-specified criteria. The View option is available from the F2 Run screen. For information and procedures to access and use the View option, see "Search and View Options" on page 198 of this guide.

Trace
An alternative to the View option is the Trace option. Trace works with ISUP, TUP and SCCP messages. Trace is different from the View option because it displays all messages associated with a particular call. The Trace option is available only from the F9 Xamine screen.Therefore, it can only be used for post-capture filtering. For information and procedures to access and use the Trace option, see "Trace" on page 245 of this guide.

INDIVIDUAL MESSAGE ANALYSIS

Use the Expanded Message screen to analyze individual messages from your test. The Expanded Message screen is useful in identifying the values coded into the specific fields of a given message. Instead of searching for meanings hidden in hexadecimal data strings, you can immediately pinpoint a given field and obtain, in text description, the value coded into the field. Additional information about editing the fields within a message is provided in **Chapter 5** of this guide.

To access the Expanded Message screen, place the cursor on the desired message in either the F2 Run screen or the F9 Xamine screen, and press the Enter (↵) key. The highlighted message is displayed in the Expanded Message screen. An example of a message in plain-English format as it would appear in the Expanded Message screen is pictured in **Figure 7.35**.

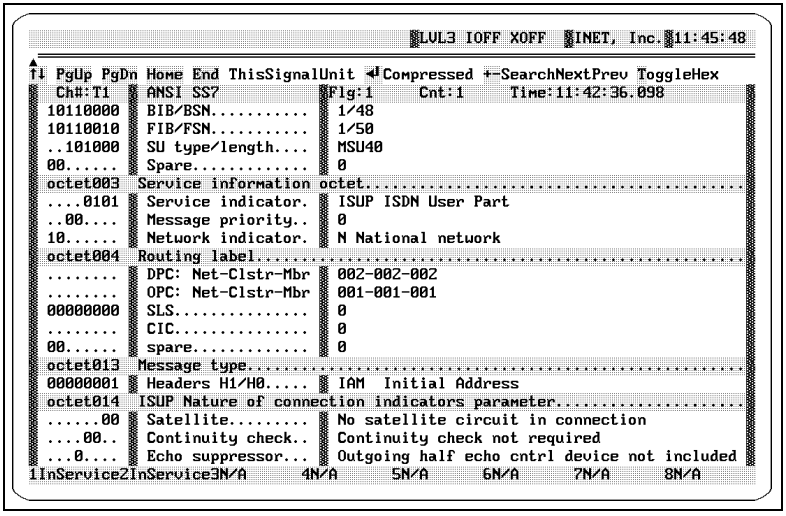


Figure 7.35 - Expanded Message Screen - Message in Plain-English Format

EXPANDED MESSAGE SCREEN DEFINITIONS

↑↓, PgUp, PgDn, Home, End ThisSignalUnit
Press the ↑↓, PgUp, or PgDn keys to keys to scroll the currently expanded signal unit up or down. Press the Home and End keys to move the cursor to the top or the bottom of this signal unit only.

↵ Compressed
Press the Enter (↵) key to return to the Compressed Run screen or Compressed Xamine screen.

+/- SearchNextPrev
Press the + or - keys to advance to the next or previous message from the capture buffer.

ToggleHex
Press the T key to toggle expanded messages between hexadecimal and plain-English format.

8 Building Batch Scripts

OVERVIEW

The Spectra system Batch Mode Builder provides for the grouping of up to 16 different test sets into a batch group. This batch group allows you to schedule the Spectra system to run multiple modes, multiple configurations, and multiple test scenarios one after the another. The batch set can be programmed to begin at any time or be executed upon the completion of a previous batch set.

The Batch Mode Builder also generates a batch print log file that retains the status of each batch set executed. This print log can be viewed as an output file or directed to a printer within the Spectra system.

BATCH MODE BUILDER

Follow these steps to access the Batch Mode Builder.

Step	Action

1. From the Spectra system Main Function screen, press the **F1** key to access the F1 Setup menu (see **Figure 8.1**).

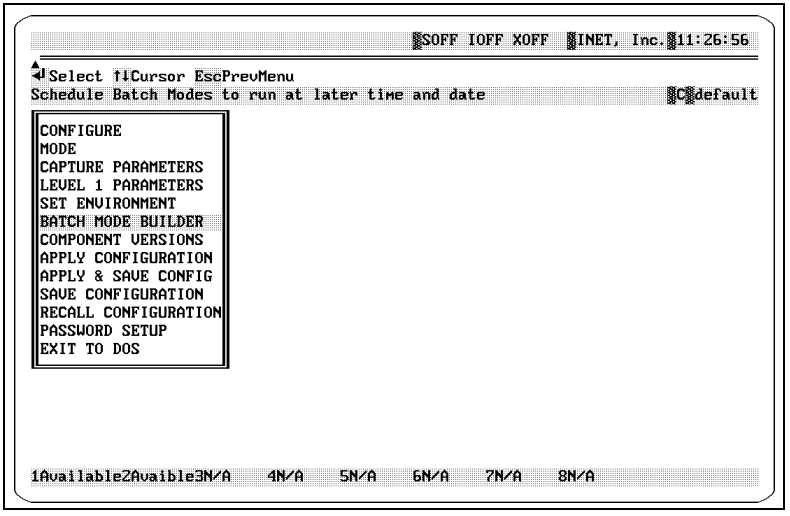


Figure 8.1 - F1 Setup Menu

2. Use the ↑↓ keys to highlight the **Batch Mode Builder** option, and press the **Enter (↵)** key to select it.

3. When you enter the Batch Mode Builder option, the Batch Mode screen is displayed (see **Figure 8.2**).

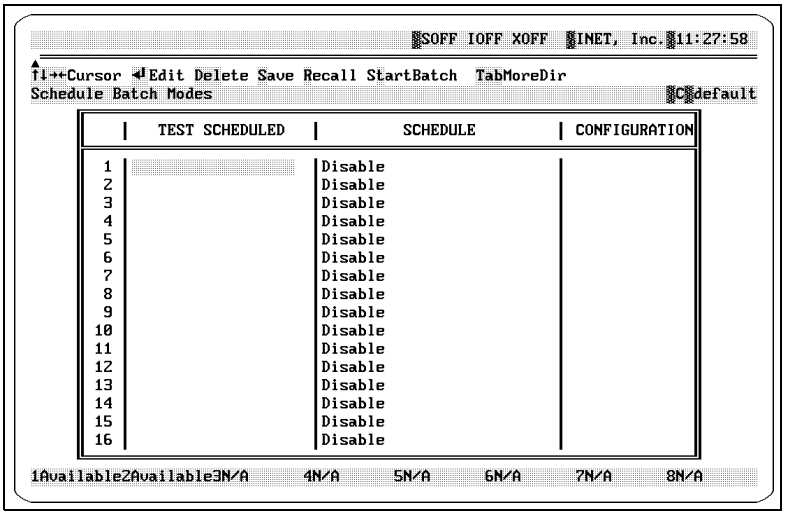


Figure 8.2 - Batch Mode Screen

The Batch Mode screen allows for the generation of up to 16 different batch sets. These batch sets can be programmed to run in order (upon the completion of a previous set) or independently according to a set time and date.

BATCH MODE SCREEN DEFINITIONS

↑↓↔, Cursor
Press the ↑↓↔ keys to move the cursor.

(↵) Edit
Press the Enter (↵) key to access the entry field for the selected option.

Delete
Press the Delete key to delete an entry in an option field that has been marked in the Batch Mode screen. Use the ↑↓↔ keys to highlight the desired field, and press the Delete key to delete it.

Save
Press the S key to save the current version of the batch mode script(s) built. A Save dialog box appears. Enter a file name (maximum of eight characters) for the current file in the dialog box and press the Enter (↵) key.

A File Description dialog box appears. Enter a description of the file in the dialog box and press the Enter (↵) key. The file description allows a lengthy description (maximum of 55 characters) to be entered about the file. When using the Recall option to recall a file, this description is displayed in the information line if the cursor is placed on the file. Saved files can be loaded in the Batch Mode Builder at a later date using the Recall option.

Recall
Press the R key to access the file catalog. The A…Z Search function can be used to alphabetically locate the desired file. Press the corresponding letter key to move to the desired position. Using the ↑↓ keys to select the desired file. Press the Enter (↵) key to display the file on the Batch Mode screen. The Delete function can also be used to delete the selected message.

StartBatch
Press the T key to start the batch test.

TabMoreDir
Press the Tab key to display additional commands in the direction line.

EscPrevmenu
Press the Esc key to return to the previous menu.

Test Scheduled
The Test Scheduled field displays the protocol and mode of the individual batch set test scripts.

Schedule
The Schedule field displays the conditions upon which each of the batch sets are executed.

Configuration
The Configuration field displays the working configuration of each batch set.

BUILDING BATCH SCRIPTS

The Batch Mode Builder allows for up to 16 different batch script sets to be chained together and executed as a group. These batch groups are built in the Batch Mode screen by entering the individual protocols, selecting different tests, setting the run times and conditions, and selecting the desired configuration for each batch set.

The grouped batch script sets can be saved as a file and recalled later to be executed or edited. As the Batch Mode executes the batch group, it generates a batch log print file. This file is updated upon the completion of each individual batch set with the status of each set. The batch log print file can be directed to a printer or sent to the screen to be viewed.

Batch set test scripts are constructed in the Batch Mode screen using the Edit command.

SETTING UP INDIVIDUAL TEST SCRIPTS

Follow these steps to set batch test protocols and modes.

Step	Action
1.	In the Batch Mode screen, use the ↑↓ keys to select one of the 16 batch sets available within the Test Scheduled field.
2.	Press the **Enter** (↵) key to access the Test Script window (see **Figure 8.3**).

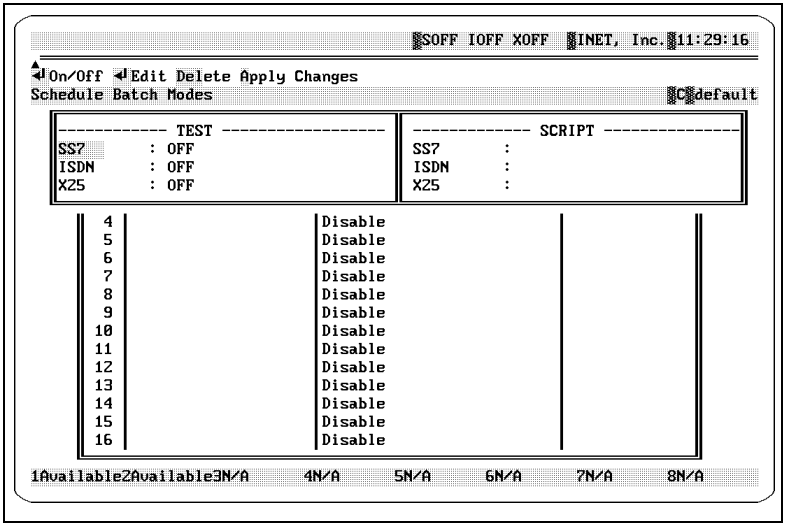


Figure 8.3 - Test Script Window

3. Using the ↑↓ keys, select the desired protocol option on the Test side of the Test Script window, and press the **Enter** (↵) key. The Mode options menu is displayed (see **Figure 8.4**).

✍ *Options vary with selected protocol and the individual packages purchased.*

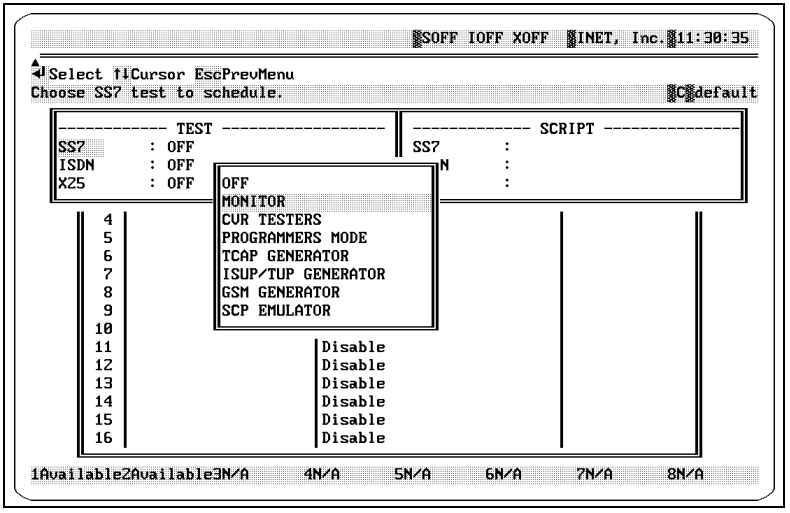


Figure 8.4 - Mode Options Menu

4. From the Mode options menu, select the mode you want to run for this script, and press the **Enter** (↵) key.

✍ *For more information about the specific mode options and their role in constructing test scripts, refer to the appropriate section in the Spectra system documentation.*

5. Use the →← keys to move from the Test side to the Script side of the Test Script window.

6. Press the **Enter** (↵) key to access the Script options menu for that mode.

7. Use the ↑↓ keys to select the desired script, and press the **Enter** (↵) key to load the script onto the Batch Mode screen.

8. Repeat **Step 1** through **Step 7** for all protocol and mode options you wish to add to this batch set entry.

9. When all the test options and scripts are loaded onto the Batch Mode screen, press the **A** key to apply the changes.

The Batch Mode Builder loads the test options and script sets onto the Test Scheduled field of the Batch Mode screen.

SETTING BATCH TIMES AND CONDITIONS

The Batch Mode Builder allows scripts to be executed at either a desired start time or immediately following the completion of the previous test.

✍ *The start time entered for batch scripts is the time the Batch Mode Builder initiates the recall of the test configuration. This recall time is approximately 30 seconds for a 16-link configuration. Configurations of less than 16 links require less recall time. The actual time the test starts is recorded in the* `BATCHLOG.TXT` *report. If an exact start time is needed, configure a batch test and run the test. Check the start time as recorded in the* `BATCHLOG.TXT` *file, and adjust the start time of your batch script accordingly.*

Follow these steps to set the desired time or condition to execute the batch set created.

Step	Action
1.	After constructing the protocol tests and scripts in the Test Script window as described in "Setting Up Individual Test Scripts" on page 261 of this guide, use the → key to highlight the corresponding Schedule field.
2.	The Schedule field displays a Disable status. To enable the Schedule field, press the **Enter** (↵) key to access the Schedule options menu for that entry.

3. Select the Set Time option using the ↓ key, and press the **Enter** (↵) key to access the Start Time/Stop Time window (see **Figure 8.5**).

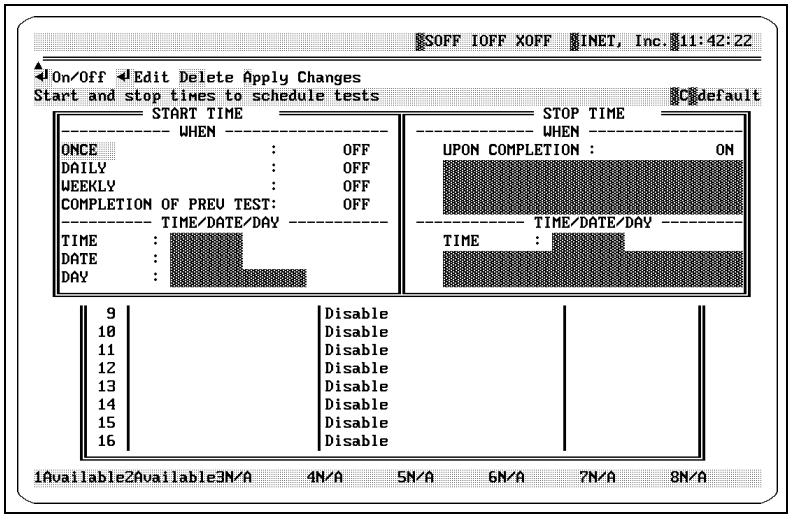


Figure 8.5 - Start Time/Stop Time Window

4. Set a start time for the script by selecting one of the options in the WHEN section. Use the ↑↓↔ keys to select the desired option—ONCE, DAILY, WEEKLY, or COMPLETION OF PREV TEST. Press the **Enter** (↵) key to toggle the option ON.

✍ *The first set in a Batch Mode script must be given a start time. All other batch sets in test script depend upon a valid start time for the first batch set.*

5. Depending on the option selected in the When field, select the desired Time/Date/Day field using the ↑↓ keys. Use the **Enter** (↵) key to access the selected field. Enter the desired time, date, and day (if applicable).

✍ *The start time entered for the batch scripts is the time the Batch Mode Builder initiates the recall of the test configuration. This recall time is approximately 30 seconds for a 16-link configuration. Less recall time is needed for configurations of less than 16 links. The actual time the test starts is recorded in the* `BATCHLOG.TXT` *report.*

The Batch Mode Builder also allows a script set to be terminated at a set time and then restarted according to the start time set on another day. This feature is set using the STOP TIME WHEN options menu. If a set stop time is desired, the UPON COMPLETION option must be toggled OFF and a valid stop time must be entered. Follow these steps to enter instructions into the STOP TIME fields.

Step	Action
1.	If a set stop time is desired for specific batch set, use the → key to enter the STOP TIME WHEN field.
2.	Use the ↑↓↔ keys to select the desired STOP TIME option. Choose either the UPON COMPLETION or TIME fields.
3.	If you chose the UPON COMPLETEION field, use the **Enter** (↵) key to toggle the field to ON. If you chose the TIME field, use the **Enter** (↵) key to access the field and enter the desired stop time of the specific batch set.

✍ *The current time of the Spectra system clock is given as a default in the TIME field. To adjust the time, enter in the desired time using the keyboard or press the →← keys.*

4.	When all the options are entered, press the **A** key to apply the changes. The Batch Mode Builder loads the scheduling parameters into the Schedule field of the Batch Mode screen.

SELECTING BATCH SET CONFIGURATIONS

The Batch Mode Builder allows specific network configurations that were previously saved to be recalled for use with your individual test scripts. For information about setting up network configurations, refer to **Chapter 7** of the ***Spectra Setup and Configuration Guide***.

Follow these steps to set the desired configuration for an individual test set.

Step	Action

1. After setting the protocol, mode, and start time for the test script entry (see "Setting Up Individual Test Scripts" on page 261 of this guide and "Setting Batch Times and Conditions" on page 263 of this guide), use the → key to highlight the corresponding CONFIGURATION field.

2. Press the **Enter** (↵) key to access a list of saved configurations. Use the ↑↓ keys to highlight the desired configuration.

   The A…Z Search function can be used to alphabetically locate the desired file. Press the corresponding letter key to move to the desired position.

3. After selecting the desired file, press the **Enter** (↵) key to load the file into the CONFIGURATION field.

4. Repeat the steps in "Setting Up Individual Test Scripts" on page 261 of this guide, "Setting Batch Times and Conditions" on page 263 of this guide, and "Selecting Batch Set Configurations" on page 265 of this guide for each batch set you want to add to the batch mode group. The screen pictured in **Figure 8.6** shows a completed Batch Mode screen with four batch set entries.

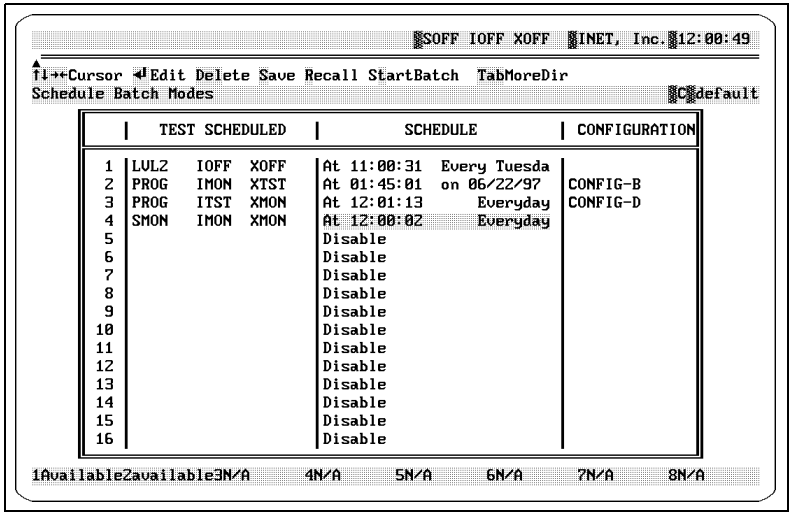


Figure 8.6 - Batch Mode Screen (Example)

SAVING BATCH SCRIPTS

The Batch Mode Builder allows for batch mode script sets to be saved as a group to a file. The batch file can then be recalled using the Recall function in the Batch Mode screen.

Follow these steps to save the current batch sets as a file.

Step	Action
1.	After setting up all the parameters for the Batch Mode script, press the **S** key to access the Enter Schedule File Name dialog box.
2.	Enter in a file name (maximum of eight characters) for the current file and press the **Enter (↵)** key.
3.	A File Description dialog box appears. Enter a description (maximum of 55 characters) of the file in the dialog box and press the **Enter (↵)** key. Saved files can be loaded in the Batch Mode Builder at a later date using the Recall option.

RECALLING BATCH SCRIPTS

The Batch Mode Builder allows you to recall Batch Mode Scripts and load them in the Batch Mode screen to be edited or executed.

Follow these steps to recall a Batch Mode file.

Step	Action
1.	In the Batch Mode screen, and press the **R** key.
2.	A list of previously saved batch group files is displayed. Use the ↑↓ keys to select the desired batch group file. The A…Z Search function is used to alphabetically locate the desired file. Press the corresponding letter key to move to the desired position.
3.	Press the **Enter (↵)** key to display the desired batch file on the Batch Mode screen.

EXECUTING BATCH MODE SCRIPTS

The Batch Mode Builder allows only Batch Mode scripts to be executed from the Batch Mode screen.

After recalling a Batch Mode script, press the T key to start the script.The message "Starting Batch Mode" appears in the top border line of the screen to alert you that the script has been started.

The message "View \SPECTRA\API\BATCHLOG.TXT" appears in the top border line of the screen to inform you that the `BATCHLOG.TXT` report file has been written.

HALTING THE EXECUTION OF BATCH SETS

The Batch Mode Builder allows batch mode sets to be halted immediately. To stop the execution of a batch set, press the F9 key.

✍ *The F9 key halts all batch sets.*

BATCH MODE REPORTS

The Batch Mode Builder generates a batch log print file for every batch script file that is executed. This report is updated as every batch set is completed. This file is called `BATCHLOG.TXT`. The file is written to `C:\SPECTRA\API\BATCHLOG.TXT`.

✍ *The batch log print file is overwritten for every new batch file that is loaded and executed within the Spectra system.*

VIEWING THE BATCH MODE REPORTS

To view the `BATCHMODE.TXT` file, access the F8 Tools function and select the DOS Commands option. The `BATCHLOG.TXT` file is located in `C:\SPECTRA\API\BATCHMODE.TXT`.

To direct the `BATCHLOG.TXT` output file, refer to **Chapter 11** of this guide.

An example of a `BATCHLOG.TXT` file is shown in **Figure 8.7**.

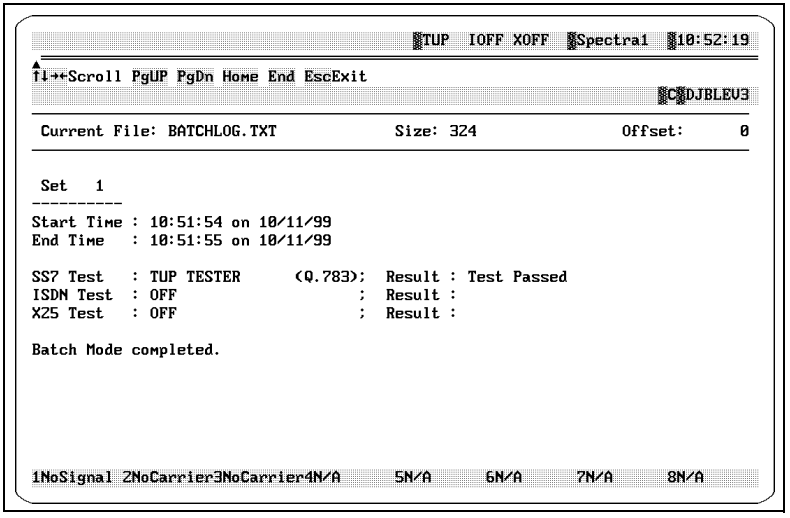


Figure 8.7 - BATCHLOG.TXT File (Example)

9 Viewing Basic Statistics

OVERVIEW

The Statistics function provides screens that display the vital statistics for all levels of messages sent or received by the Spectra system. Different statistics may be displayed, depending on the current operating protocol and mode of the Spectra system.

Statistics screens are strictly for viewing information—no changes can be made to the data from this function. All the statistics screens offer the same operating functions.

✍ *Two additional statistics options are available if you purchased Spectra High Speed Links (HSL) or Spectra Trunk Tester (TGT): TALI Basic Statistics and TGT Basic Statistics. For more information about TALI Basic Statistics, refer to the* ***Spectra High Speed Links Guide****. For more information about TGT Basic Statistics, refer to the* ***Spectra Trunk Tester Guide****.*

The Spectra system provides up to seven different groups of statistics screens. These groups are listed in **Figure 9.1**.

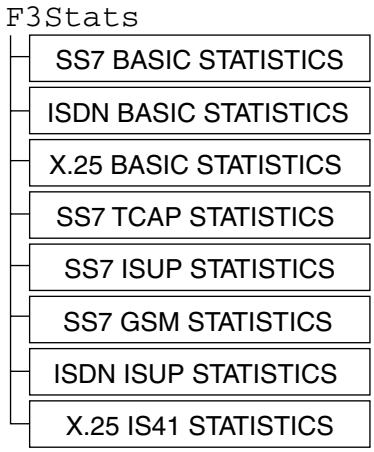


Figure 9.1 - Statistics Menu Hierarchy

✍ *Only statistics that are associated with the configuration currently running appear on the F3 Statistics menu.*

SS7 Basic Statistics, ISDN Basic Statistics, and X.25 Basic Statistics are explained in this chapter. The other statistics screens can be located using **Table 9.1** as they are described in the chapters for the specific mode they represent.

Table 9.1 - Statistic Screens for Other Modes

Statistic Screen	Guide Reference	Heading and Page
SS7 TCAP Statistics	***Spectra Generators and Emulators Guide***	See "Viewing SS7 TCAP Generator Statistics" on page 112.
SS7 ISUP Statistics	***Spectra Generators and Emulators Guide***	See "Viewing SS7 ISUP Statistics" on page 195.
SS7 GSM Statistics	***Spectra Generators and Emulators Guide***	See "Viewing SS7 GSM Statistics" on page 287.
ISDN ISUP Statistics	***Spectra Generators and Emulators Guide***	See "Viewing ISDN ISUP Statistics" on page 345.
X.25 IS41 Statistics	***Spectra Testers Guide***	See "Viewing X.25 IS41 Statistics" on page 411.

Follow these steps to access the Statistics screens.

Step	Action
1.	Press the **F3** key to access the F3 Stats menu.
2.	Select the group of statistics screens you wish to view, and press the **Enter (↵)** key.
3.	Use the ↑↓ keys to cycle through the available statistics screens for that mode.

The following sections describe the basic statistics screens.

SS7 BASIC STATISTICS

The SS7 Basic Statistics screens display the results of communication transactions from the tests run under the F2 Run function. The SS7 Basic Statistics screens include the following items:

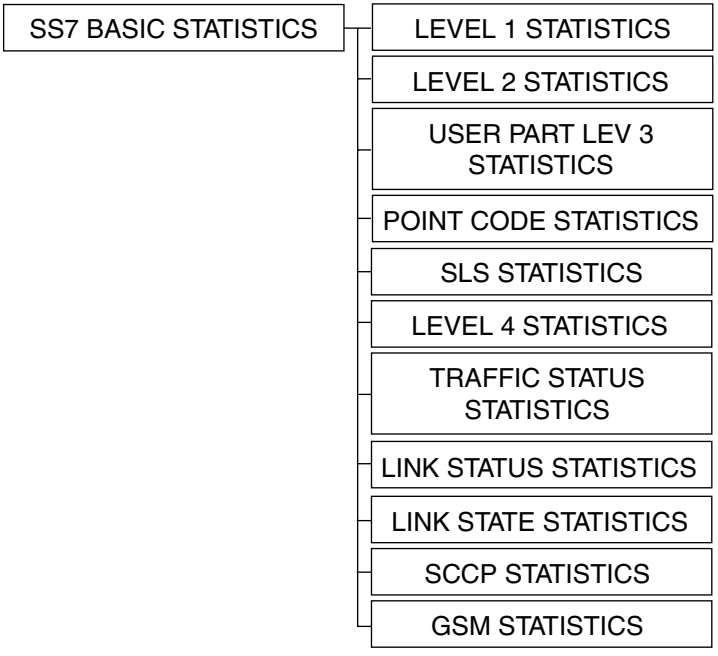


Figure 9.2 - SS7 Basic Statistics Screens

LEVEL 1 STATISTICS SCREEN

The Level 1 Statistics screen displays detailed statistics of Level 1 information. Level 1 statistics are valid only with DS1 (T1), E1 (CEPT) and Basic Rate Interface (BRI) interfaces. If no DS1, E1, or BRI interface is in use on the displayed link when the screen is accessed, a "Link is not DS1/E1" message is displayed.

In the Monitor modes, this screen provides the DS1/E1 status and statistical information for both DS1/E1 monitor inputs (the R and T channels). If the link is configured in a terminated emulation mode, only one DS1/E1 interface per link is active (see **Figure 9.3**). The statistical and status information provided reflect this information.

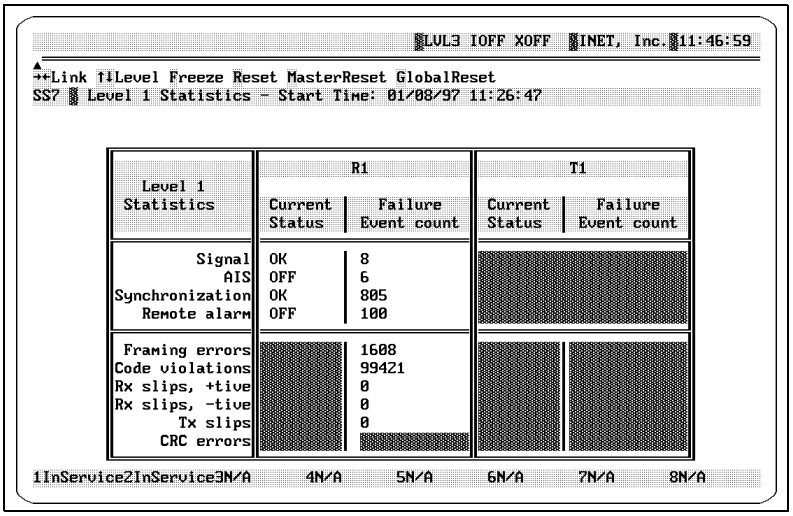


Figure 9.3 - Level 1 Statistics Screen

Level 1 Statistics Screen Definitions

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

RD1 (Monitor mode)
This column displays Level 1 Parameters received on the current link. Press the →← keys to toggle through the available links.

SD1 (Monitor mode)
This column displays Level 1 Parameters transmitted on the current link. Press the →← keys to toggle through the available links.

R1 (Tester mode)
This column displays Level 1 Parameters received on the current link. Press the →← keys to toggle through the available links.

T1 (Tester mode)
This column displays Level 1 Parameters transmitted on the current link. Press the →← keys to toggle through the available links.

Current Status
The current status column provides information on the status of the following fields.

Signal
This field indicates the current status of an incoming signal. Possible states are OK (normal) and Loss of Signal (fail).

AIS
This field indicates the current status of the Alarm Indication Status (AIS). Possible states are OFF (normal) and ON (fail).

Synchronization
This field indicates the current status of the frame synchronization. Possible states are OK (normal) and Loss of Sync (fail).

Remote Alarm
This field indicates the current status of the remote alarm. Possible states are OFF (normal) and ON (fail).

Failure Event Count
This column indicates the total number of failures experienced by the following Level 1 parameters.

Signal
This field indicates the number of times a loss of signal condition was detected.

AIS
This field indicates the number of times an incoming AIS (or Blue Alarm) was detected.

Synchronization
This field indicates the number of times frame synchronization loss was detected.

Remote Alarm
This field indicates the number of times a remote alarm signal (or Yellow Alarm) was detected.

Framing Errors
This field displays the number of detected framing errors.

Code Violations
This field displays the number of detected line code violations.

Rx Slips, +tive
This field displays the number of positive receive timing slips detected.

Rx Slips, -tive
This field displays the number of negative receive timing slips detected.

Tx Slips
This field displays the number of transmit timing slips detected. This is valid only when the DS1 link is used in emulation modes.

CRC Errors
This field displays the number of checksum errors detected. This is valid only for Extended Super Frame (ESF) DS1 applications.

LEVEL 2 STATISTICS SCREEN

The Level 2 Statistics screen displays detailed statistics about Level 2 information. The screen provides information about messages, flags, zero insertions/deletions, the Signal Unit Error Rate Monitor (SUERM), Forward Indicator Bit (FIB) inversions, and Backward Indicator Bit (BIB) inversions. The Level 2 Statistics screen is valid for all SS7 protocols (see **Figure 9.4**). All statistical data is accumulated regardless of any capture filters that may be in place, unless the Post Filter Stats option is selected. The Post Filter Stats option filters messages before statistics are collected (see "SS7 Filters" on page 26 of this guide).

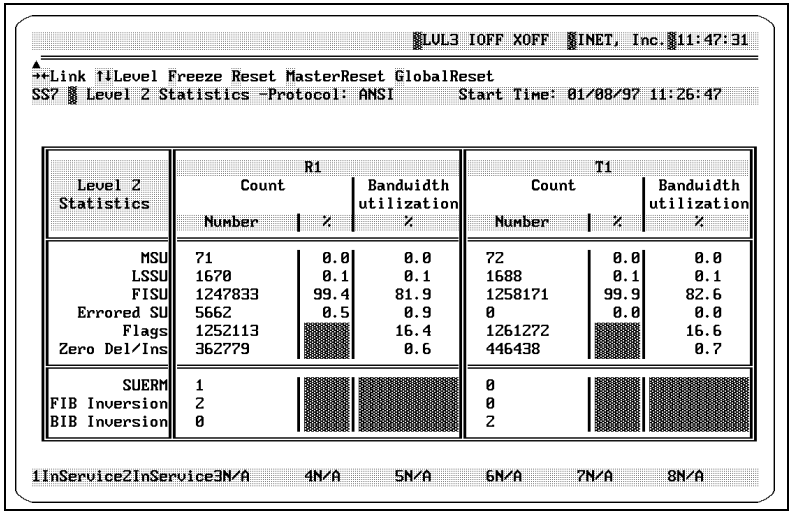


Figure 9.4 - Level 2 Statistics Screen

Level 2 Statistics Screen Definitions

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Protocol
This field displays the current protocol for the displayed statistics.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

RD1 (Monitor mode)
This column displays MSUs received on the current link. Press the →← keys to toggle through the available links.

SD1 (Monitor mode)
This column displays MSUs transmitted on the current link. Press the →← keys to toggle through the available links.

R1 (Tester mode)
This column displays MSUs received on the current link. Press the →← keys to toggle through the available links.

T1 (Tester mode)
This column displays MSUs transmitted on the current link. Press the →← keys to toggle through the available links

Count
This column tracks the occurrences of each parameter by number and percentage. There are two Count columns: received and sent (transmitted).

Number
This field displays the number of occurrences of each parameter in the current statistics tracking period.

%
This field provides a view of the overall percentage of messages or errors that have occurred. This percentage is based on the total number of messages. It is calculated using the following formula:

Total SU Count = MSU + LSSU + FISU + Errored SU

As an example, the percentage of Link Status Signal Units (LSSUs) is calculated as (LSSU/Total SU Count) x 100.

Bandwidth Utilization %
This column displays the total percentage of bandwidth used by the various messages, flags, and zero insertions received and sent (transmitted).

MSU
This field displays the number of Message Signal Units (MSUs) transmitted and received. (MSUs such as TCAP query messages, TUP request messages, etc.)

LSSU
This field displays the number of LSSUs (such as SIOSs, SIOs, SIEs, SINs, etc.) transmitted and received.

FISU
This field displays the number of Fill-In Signal Units (FISUs) transmitted and received.

Errored SU
This field displays the number of errored messages transmitted and received. Errored SUs are not included in the MSU, FISU or LSSU count. (Errored SUs are messages that contain long SUs, short SUs, aborted SUs, etc.)

Flags
This field displays the number of flag delimiters transmitted and received.

Zero Del/Ins
This field displays the total number of zeros inserted or deleted at the High Level Data Link Control (HDLC) level.

SUERM
This field displays the current level of the SUERM. The ideal value for this parameter is 0.

FIB Inversion
This field displays the number of times the FIB was toggled during transmission and receipt. For more information about FIB Inversion, see **Appendix A** of the ***Spectra Setup and Configuration Guide***.

BIB Inversion
This field displays the number of times the BIB was toggled during transmission and receipt. For more information about BIB Inversion, see **Appendix A** of the ***Spectra Setup and Configuration Guide***.

LEVEL 3 STATISTICS

The Level 3 Statistics screens display detailed statistics about Level 3 information. There are three Level 3 statistics screens: Level 3 User Part Statistics, Point Code Statistics, and Signalling Link Selection (SLS) and Network Indicator Statistics.

Level 3 User Part Statistics Screen

The Level 3 User Part Statistics screen provides information about various user parts. The statistics displayed on this screen may vary based on the current protocol (see **Figure 9.5**). All statistical data is accumulated regardless of any capture filters that may be in place, unless the Post Filter option is selected. The Post Filter Stats option filters messages before statistics are collected (see "SS7 Filters" on page 26 of this guide).

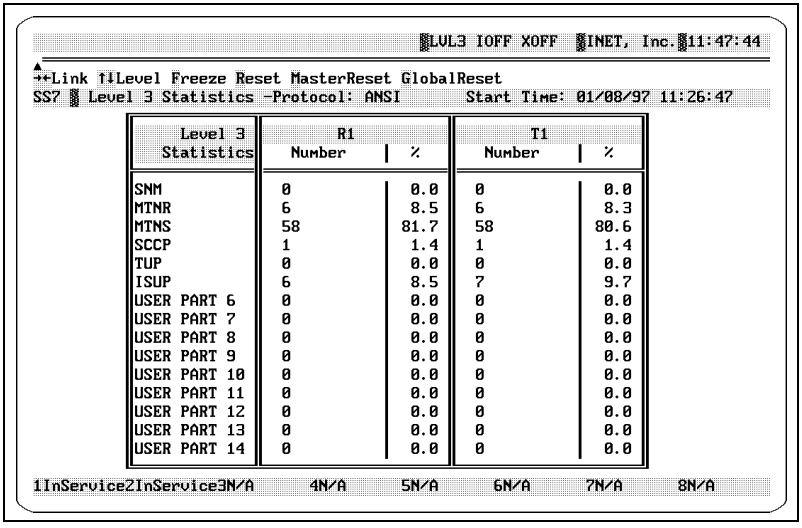


Figure 9.5 - Level 3 User Part Statistics Screen

Level 3 User Part Statistics Screen Definitions

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Protocol
This field displays the current protocol for the displayed statistics.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

RD1 (Monitor mode)
This column displays MSUs received on the current link. Press the →← keys to toggle through the available links.

SD1 (Monitor mode)
This column displays MSUs transmitted on the current link. Press the →← keys to toggle through the available links.

R1 (Tester mode)
This column displays MSUs received on the current link. Press the →← keys to toggle through the available links.

T1 (Tester mode)
This column displays MSUs transmitted on the current link. Press the →← keys to toggle through the available links.

Number
This field displays the number of particular User Part messages encountered during the current statistics tracking period.

%
This field displays the percentage of particular User Part messages in relation to the total message count for all user parts.

SNM
This field displays the number and percentage of Signalling Network Management (SNM) messages transmitted and received.

MTNR
This field displays the number and percentage of Signalling Network Test/ Maintenance Messages (regular) (MTNR) transmitted and received.

MTNS
This field displays the number and percentage of Signalling Network Test/ Maintenance Messages (special) (MNTS) transmitted and received.

MTN (ITU-T RED, ITU-T BLUE, and ITU-T WHITE protocols only)
This field displays the number and percentage of Signalling Network Test/ Maintenance messages transmitted and received.

SCCP
This field displays the number and percentage of Signalling Connection Control Part (SCCP) messages transmitted and received.

TUP
This field displays the number and percentage of Telephone User Part (TUP) messages transmitted and received.

NUP (BTNR protocol only)
This field displays the number and percentage of Network User Part (NUP) messages transmitted and received.

ISUP
This field displays the number and percentage of Integrated Services Digital Network User Part (ISUP) messages transmitted and received.

USER PART 6-14
The user parts 6-14 are not defined in ANSI; however, statistics are provided.

USER PART 2 (ITU-T RED, ITU-T BLUE, ITU-T WHITE, CHINA, JAPAN, BTNR protocols only)
This user part is not defined by ITU-T.

Point Code Statistics Screen

The Point Code Statistics screen displays a percentage graph and message count of point codes involved in the transmission/reception of messages. The screen also provides a total count of the specific point codes encountered. Up to 240 point codes can be viewed in this screen, depending on the number of point codes/names assigned in the Level 3 parameters (see **Figure 9.6**). All statistical data is accumulated regardless of any capture filters that may be in place, unless the Post Filter stats option is selected. The Post Filter Stats option filters messages before statistics are collected (see "SS7 Filters" on page 26 of this guide).

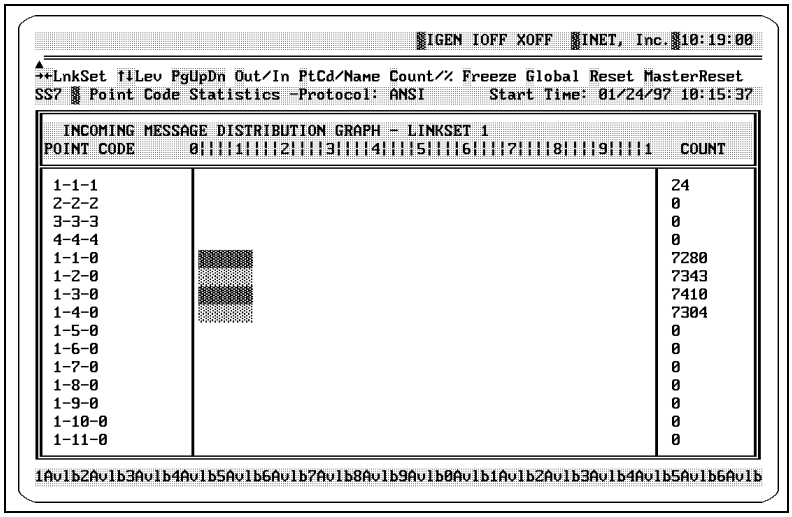


Figure 9.6 - Point Code Statistics Screen

Point Code Statistics Screen Definitions

→← LnkSet
Press the →← keys to move between possible links.

↑↓ Lev
Press the ↑↓ keys to cycle through the various levels of statistics screens.

PgUpDn
Press the PgUp or PgDn keys to move the screen display up or down.

Out/In
Press the O key to change the orientation of the screen from Outgoing (transmitted) information to Incoming (received) information.

PtCd/Name
Press the P key to toggle the display between the actual point code and the associated name.

Count/%
Press the C key toggle the display between the total message count and the percentage of messages.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

Protocol
This field displays the current protocol for the displayed statistics.

LINKSET
This field displays the number of the current linkset.

POINT CODE
This field displays all point codes related to incoming or outgoing messages.

COUNT or PERCENT%
This field displays the total message count or percentage messages related to each point code. Press the C key to toggle this field between COUNT and PERCENT%.

SLS, Network Indicator, and MSU Priority Statistics Screen

The SLS, Network Indicator, and MSU Priority Statistics screen displays load sharing statistics for Signalling Link Selection (SLS), Network Indicator, and MSU Priority fields related to Level 3 statistics (see **Figure 9.7**). The 32 fields in the SLS section represent the SLS divisions and reflect which SLS values are being used. The Network Indicator section displays the count and percentage of messages received or transmitted with a given Network Indicator code. The MSU Priority section provides information about the count and percentage of messages coded with different priority levels.

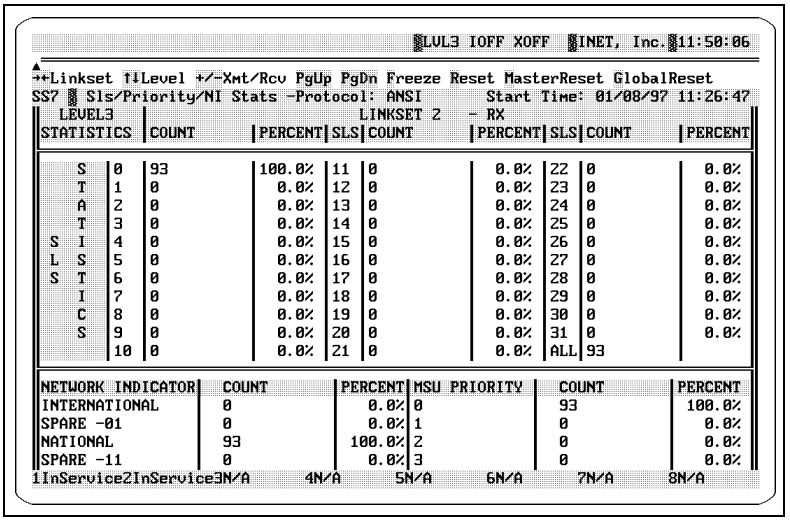


Figure 9.7 - SLS, Network Indicator, and MSU Priority Statistics Screen

SLS, Network Indicator, and MSU Priority Statistics Screen Definitions

→← Linkset
Press the →← keys to move between possible linksets.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

+/-Xmt/Rcv
Press the + key or - key to toggle the screen display between transmitted data (TX) and received data (RX).

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Protocol
This field displays the current protocol for the displayed statistics.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).



If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.

LINKSET
This field displays the number of the current linkset.

COUNT
This field tracks the occurrences of each SLS by number.

PERCENT
This field provides the percentage of messages transmitted or received for each SLS.

SLS
The 32 fields in the SLS section represent the SLS divisions and reflect which SLS values are in use.

NETWORK INDICATOR
This section displays the count and percentage of messages received or transmitted with a given Network Indicator code. The four possible network indicators are:

- INTERNATIONAL
- NATIONAL
- SPARE -01 (reserved for international use)
- SPARE -11 (reserved for national use).

✍ *The spare codes are represented in binary format. Their equivalents in numerical format are SPARE 1 and SPARE 3, respectively.*

MSU PRIORITY
This section displays the count and percentage of messages coded with different priority levels.

PSEUDO MODE STATISTICS SCREEN

The Spectra system provides a special Level 3 (Pseudo mode) statistics such as minimum, maximum, and average response times between transmitted and received messages. Messages reviewed are defined by the service indicator bit and can be grouped by either Linkset (Usergroup) or point codes. The Pseudo Mode Statistics screen with service indicator bit selection option is shown in **Figure 9.8**. This screen only appears in the SS7 Basic Statistics if the Level 3 Tester is running.

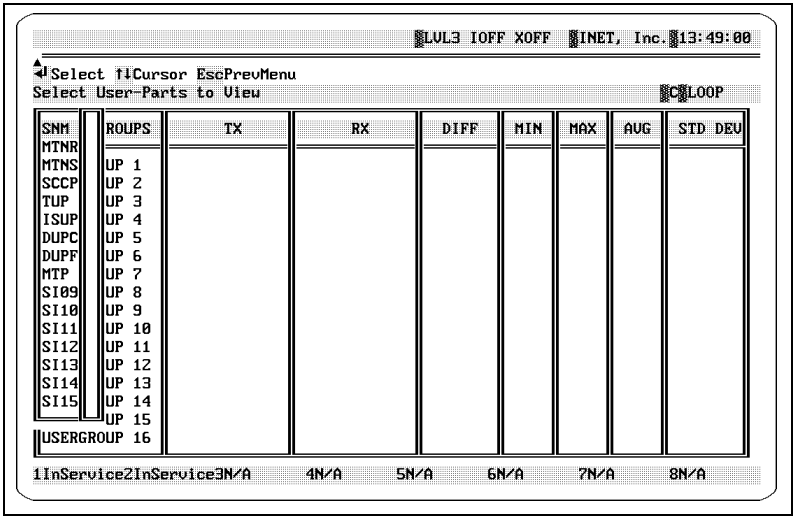


Figure 9.8 - Pseudo Mode Statistics Screen - Service Indicator Bit Selection Option

For screen definitions and more information about the Pseudo Mode Statistics screen, see "Pseudo Mode Statistics Screen" on page 170 of the ***Spectra Testers Guide***.

LEVEL 4 STATISTICS

The Level 4 statistics screens display detailed statistics about Level 4 information. There are five Level 4 statistics screens: Level 4 User Part Statistics, Traffic Status Statistics, Link Status Statistics, SCCP Statistics, and Link State Statistics.

Level 4 User Part Statistics Screen

The Level 4 User Part Statistics screen includes information about messages contained within various user parts (see **Figure 9.9**). The statistics displayed on this screen vary based on the current protocol. Message types not defined by the current protocol are displayed with their hexadecimal equivalent. All statistical data is accumulated regardless of any capture filters that may be in place, unless the Post Filter Stats option is selected. The Post Filter Stats option filters messages before statistics are collected (see "SS7 Filters" on page 26 of this guide).

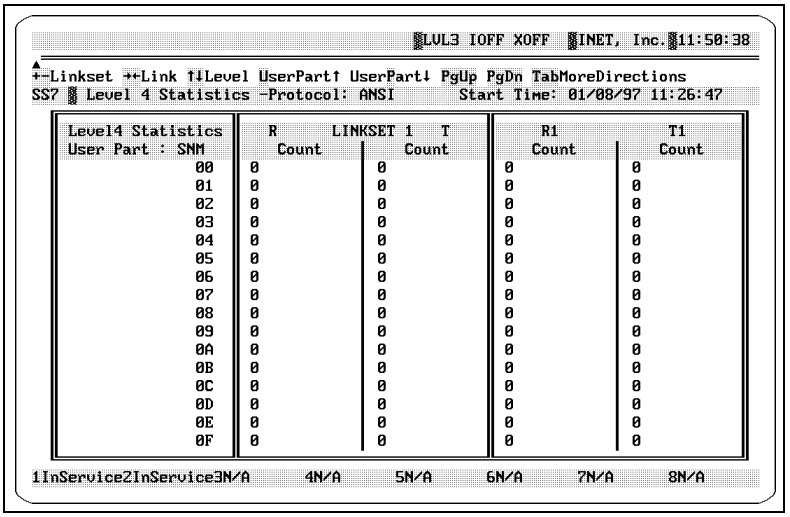


Figure 9.9 - Level 4 User Part Statistics Screen

Level 4 User Part Statistics Screen Definitions

+- Linkset
Press the + key or - key to move between possible linksets.

→←Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

User Part↑↓
Press the U key to cycle up or P key to cycle down through the available user parts. This option displays the current user part. There are 16 available user parts. This field also appears on the screen indicating the selected user part.

✍ *User Part statistics are protocol specific.*

PgUp, PgDn
Press the PgUp or PgDn keys to advance through the user part message display. When this option is used, the next or previous 16 messages of a possible 256 messages are displayed.

TabMoreDirections
Press the Tab key to display additional direction line options.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Protocol
This field displays the current protocol for the displayed statistics.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

LINKSET
This field displays the number of the current linkset.

RD Count and SD Count (Monitor mode)
These two columns display MSUs received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

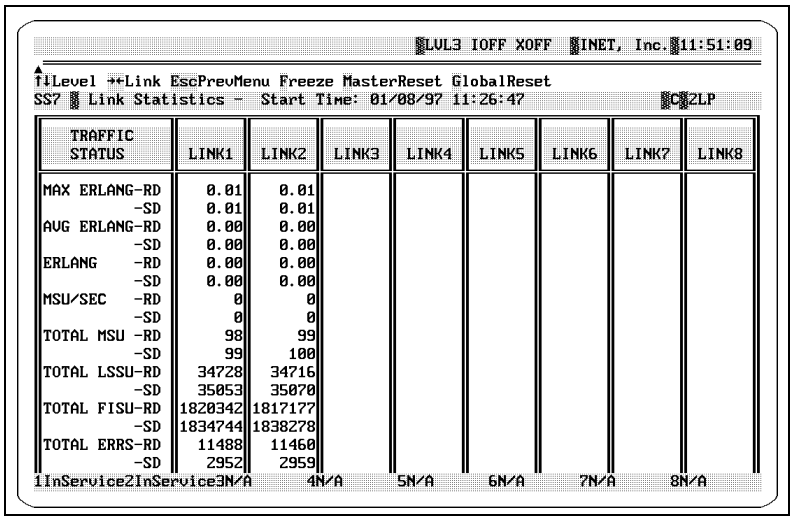
R Count and T Count (Tester mode)
These two columns display MSUs received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

RD1 Count and TD1 Count (Monitor mode)
These two columns display MSUs received on the indicated link. The numbers next to R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

R1 Count and T1 Count (Tester mode)
These two columns display MSUs received on the indicated link. The numbers following R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

Traffic Status Statistics Screen

The Traffic Status screen displays traffic information for both the receive and send channels of individual links (maximum of 16 links). The traffic information includes Erlang and signalling unit statistics (see **Figure 9.10**).



LVL3 IOFF XOFF INET, Inc. 11:51:09

↑↓Level →←Link EscPrevMenu Freeze MasterReset GlobalReset

SS7 Link Statistics - Start Time: 01/08/97 11:26:47 C2LP

TRAFFIC STATUS	LINK1	LINK2	LINK3	LINK4	LINK5	LINK6	LINK7	LINK8
MAX ERLANG-RD	0.01	0.01						
-SD	0.01	0.01						
AVG ERLANG-RD	0.00	0.00						
-SD	0.00	0.00						
ERLANG -RD	0.00	0.00						
-SD	0.00	0.00						
MSU/SEC -RD	0	0						
-SD	0	0						
TOTAL MSU -RD	98	99						
-SD	99	100						
TOTAL LSSU-RD	34728	34716						
-SD	35053	35070						
TOTAL FISU-RD	1820342	1817177						
-SD	1834744	1838278						
TOTAL ERRS-RD	11488	11460						
-SD	2952	2959						

1InService 2InService 3N/A 4N/A 5N/A 6N/A 7N/A 8N/A

Figure 9.10 - Traffic Status Statistics Screen

Traffic Status Statistics Screen Definitions

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

→← Link
Press the →← keys to move between possible links.

EscPrevMenu
Press the Esc key to return to the previous menu.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a “Display frozen. Press F again to update.” message appears in the top border line. Press the F key again to unfreeze and update the screen.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

Each of the following screen definitions has two fields for each link: an RD field and an SD field. The RD field represents information received. The SD field represents information sent (transmitted).

✍ *Erlang is a measurement of message traffic defined as*
MSU octets / (MSU octets + LSSU octets + FISU octets + Error octets).

MAX ERLANG
This field displays the maximum Erlang percentage used in receiving and sending messages on each individual link.

AVG ERLANG
This field displays the average Erlang percentage used in receiving and sending messages on each individual link.

ERLANG
This field displays the current Erlang percentage used in receiving and sending messages on each individual link. 1 Erlang represents maximum loading.

MSU/SEC
This field displays the total number of messages transmitted and received per second on each individual link.

TOTAL MSU
This field displays the total number of messages transmitted and received on each individual link.

TOTAL LSSU
This field displays the total number of Link Status messages transmitted and received on each individual link.

TOTAL FISU
This field displays the total number of Fill-In messages transmitted and received on each individual link.

TOTAL ERRS
This field displays the total number of Errored messages transmitted and received on each individual link.

Link Status Statistics Screen

The Link Status Statistics screen displays octet information for both the receive and send channels of individual links (maximum of 16 links). Statistics about network management, inhibited messages, and changeovers are also included (see **Figure 9.11**).

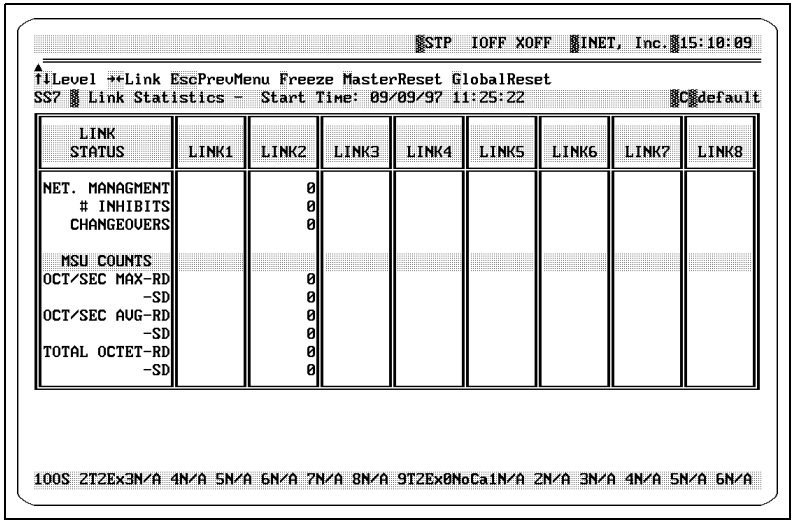


Figure 9.11 - Link Status Statistics Screen

Link Status Statistics Screen Definitions

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

→← Link
Press the →← keys to move between possible links.

EscPrevMenu
Press the Esc key to return to the previous menu.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

NET. MANAGEMENT
This field displays the total number of SNM messages encountered by each link.

 # INHIBITS
This field displays the total number of times a link inhibit message has been detected on the link.

CHANGEOVERS
This field displays the number of changeover messages on a particular link.

MSU COUNTS
Each of the following screen definitions, related to MSU counts for each link, has two fields for each link: an RD field and an SD field. The RD field represents information received. The SD field represents information sent (transmitted).

OCTETS/SEC MAX
This field displays the maximum MSU octets per second transmitted and received on each individual link.

OCTETS/SEC AVG
This field displays the average MSU octets per second transmitted and received on each individual link.

TOTAL OCTET
This field displays the total MSU octets transmitted and received on each individual link.

Link State Statistics Screen

The Link State Statistics screen displays the percentage of time each link spends in a particular link status mode, thus reflecting the Level 2 state of the link (see **Figure 9.12**). The natural progression of a link's state is Idle, Out Of Service, Initial Aligned, Align Ready, to InService.

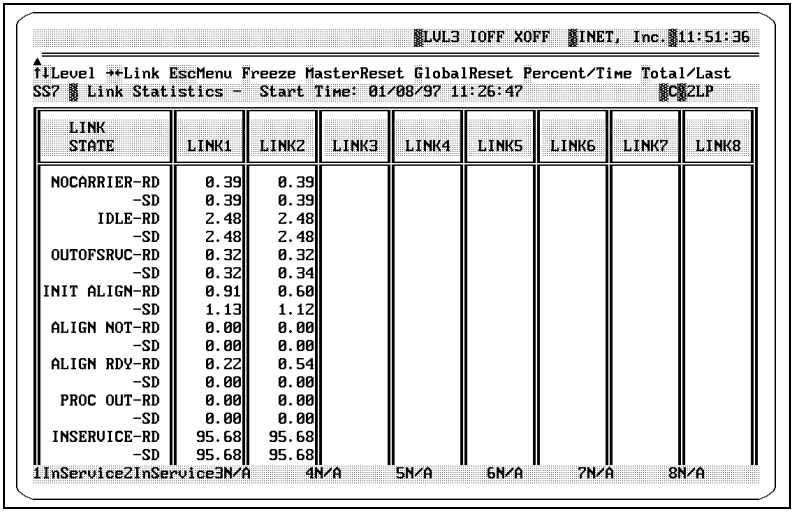


Figure 9.12 - Link State Statistics Screen

Link State Statistics Screen Definitions

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

→← Link
Press the →← keys to move between possible links.

EscMenu
Press the Esc key to return to the previous menu.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Percent/Time
Press the P key to toggle the display between percent and time. The percentage reflects the percentage of time the system has spent in each state. The time reflects the amount of time (in hours and minutes) the system has spent in each state.

Total/Last
Press the T key to toggle the display between the percentage or time totals for all links and the percentage or time that has occurred since each link was last in the idle state.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

Each of the following screen definitions, related to link states, has two fields for each link: an RD field and an SD field. The RD field represents information received. The SD field represents information sent (transmitted).

NO CARRIER
This field indicates the amount or percentage of time the data or clock was not detected on the link.

IDLE
This field indicates the amount or percentage of time the link was receiving bits of data and had a clock, but required a Status Indicator-Out of Service (SIOS) message to leave the IDLE state.

OUTOFSRVC
This field indicates the amount or percentage of time the link was either attempting to advance to the initial alignment stage or was not operational.

INIT ALIGN
This field indicates the amount or percentage of time the link was proving its ability to carry data by running tests. When the proving period is finished and the link receives a FISU, the state advances to ALIGN READY (if the link is ready) or ALIGN NOT (if link failed the proving period).

ALIGN NOT
This field indicates the amount or percentage of time the link did not prove its ability to carry data in the INITIAL ALIGN process.

ALIGN RDY
This field indicates the amount or percentage of time the link proved its ability to carry data in the INITIAL ALIGN process and the link was ready to test Level 2 and the higher ability of the system.

PROC OUT
This field indicates the amount or percentage of time the link's use was precluded due to the system's inability to handle Level 2 and higher information.

INSERVICE
This field indicates the amount or percentage of time the link was available for use.

SCCP STATISTICS

The SCCP Statistics screens display counts of specific messages containing SCCP causes. There are screens for each of the following types of causes:

- Return Causes
- Reset Causes
- Error Causes
- Refusal Causes
- Release Causes

These screens are displayed for ITU-T BLUE, ITU-T WHITE, and CHINA protocols, while the ANSI protocol contains a Diagnostic Statistics screen listing only Return Causes.

✍ *The SCCP Statistics screens do not apply to JAPAN and BTNR protocols.*

Diagnostic and Return Cause Statistics Screens

The Return Cause Statistics screens display a listing of Return Causes defining reasons why a message was returned. The Spectra system counts the number of received and transmitted Unit Data Service (UDTS) and Extended Unit Data Service (XUDTS) messages that contain each Return Cause listed. Counts are specified by linkset and link.

Two separate Return Cause screens are available, one screen for ANSI, ITU-T BLUE or CHINA, and one screen for ITU-T WHITE.

If ANSI is the selected protocol, the SCCP Statistics column indicates DIAGNOSTIC. If ITU-T BLUE or CHINA is the selected protocol, the SCCP Statistics column indicates RETURN CAUSE and the additional direction line options of ApplUp and APplDown are available (see **Figure 9.13**).

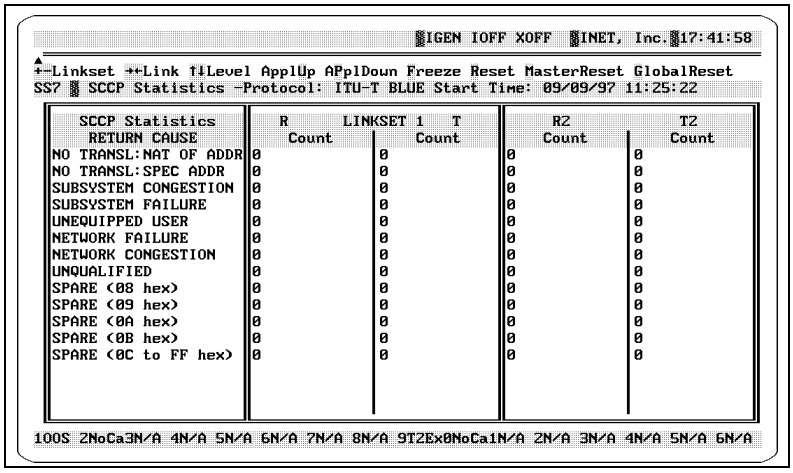


Figure 9.13 - ANSI Diagnostic Screen and ITU-T BLUE and CHINA Return Cause Statistics Screen

If ITU-T WHITE is the selected protocol, the following screen is displayed (see **Figure 9.14**).

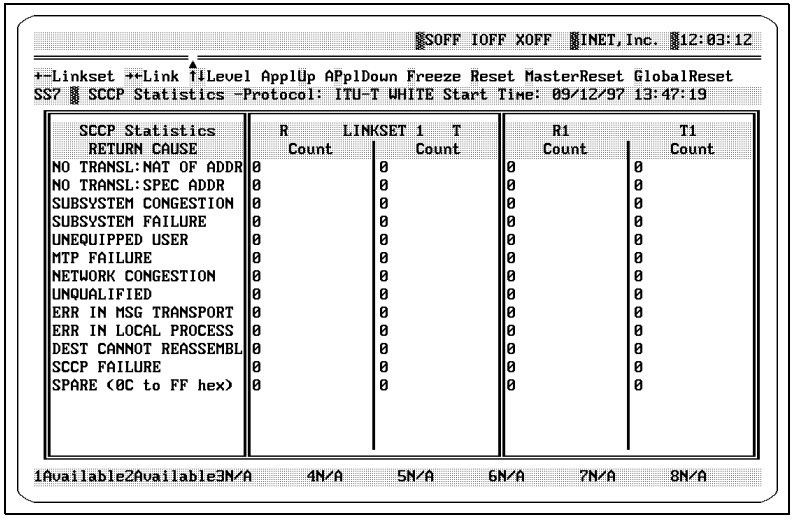


Figure 9.14 - ITU-T WHITE Return Cause Statistics Screen

Return Cause Statistics Screen Definitions

+- Linkset
Press the + key or - key to move between possible linksets.

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

ApplUp (ITU-T BLUE, ITU-T WHITE, and CHINA protocols only)
Press the U key to cycle forward through other SCCP Statistics screens for Return Causes, Reset Causes, Error Causes, Refusal Causes, and Release Causes.

APplDown (ITU-T BLUE, ITU-T WHITE, and CHINA protocols only)
Press the P key to cycle backward through other SCCP Statistics screens: Release Causes, Refusal Causes, Error Causes, Reset Causes, and Return Causes.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Protocol
This field displays the current protocol for the displayed statistics.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

LINKSET
This field displays the number of the current linkset.

RD Count and SD Count (Monitor mode)
These two columns display MSUs with Return Causes received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

R Count and T Count (Tester mode)
These two columns display MSUs with Return Causes received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

RD1 Count and SD1 Count (Monitor mode)
These two columns display MSUs with Return Causes received on the indicated link. The numbers next to R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

R1 Count and T1 Count (Tester mode)
These two columns display MSUs with Return Causes received on the indicated link. The numbers following R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

DIAGNOSTIC or RETURN CAUSES
This field indicates the number of transmitted/received UDTS and XUDTS messages containing Return Causes. ANSI, ITU-T BLUE, and CHINA Return Causes include the following messages:

- No translation for an address of such nature
- No translation for this specific address
- Subsystem congestion
- Subsystem failure
- Unequipped user

- Network failure
- Network congestion
- Unqualified
- Spare (08 hex)
- Spare (09 hex)
- Spare (0A hex)
- Spare (0B hex)
- Spare (0C to FF hex)

ITU-T WHITE Return Causes include the following messages:

- No translation for an address of such nature
- No translation for this specific address
- Subsystem congestion
- Subsystem failure
- Unequipped user
- MTP failure
- Network congestion
- Unqualified
- Error in message transport
- Error in local processing
- Destination cannot perform reassembly
- SCCP failure
- Spare (0C to FF hex)

Reset Cause Statistics Screen

The Reset Cause Statistics screen displays a list of Reset Causes defining reasons why a link connection was reset. The Spectra system counts the number of received and transmitted Reset Request (RSR) messages that contain each Reset Cause listed. Counts are specified by linkset and link. This screen is applicable only to the ITU-T BLUE, ITU-T WHITE, and CHINA protocols (see **Figure 9.15**).

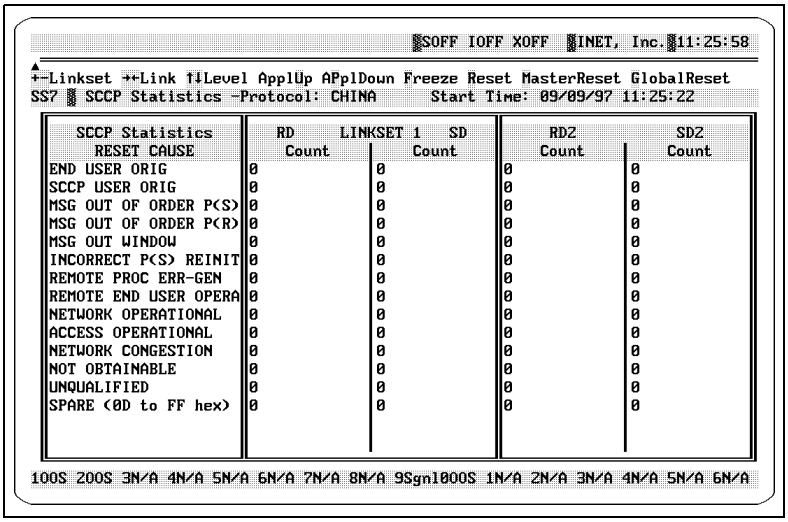


Figure 9.15 - Reset Cause Statistics Screen

Reset Cause Statistics Screen Definitions

+- Linkset
Press the + key or - key to move between possible linksets.

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

ApplUp (ITU-T BLUE, ITU-T WHITE, and CHINA protocols only)
Press the U key to cycle forward through other SCCP Statistics screens for Return Causes, Reset Causes, Error Causes, Refusal Causes, and Release Causes.

APplDown (ITU-T BLUE, ITU-T WHITE, and CHINA protocols only)
Press the P key to cycle backward through other SCCP Statistics screens: Release Causes, Refusal Causes, Error Causes, Reset Causes, and Return Causes.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Protocol
This field displays the current protocol for the displayed statistics.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

LINKSET
This field displays the number of the current linkset.

RD Count and SD Count (Monitor mode)
These two columns display MSUs with Reset Causes received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

R Count and T Count (Tester mode)
These two columns display MSUs with Reset Causes received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

RD1 Count and SD1 Count (Monitor mode)
These two columns display MSUs with Reset Causes received on the indicated link. The numbers next to R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

R1 Count and T1 Count (Tester mode)
These two columns display MSUs with Reset Causes received on the indicated link. The numbers following R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

RESET CAUSES
This field indicates the number of transmitted or received Reset Request (RSR) messages containing Reset Causes.

ITU-T BLUE, ITU-T WHITE, and CHINA Reset Causes include the following messages:

- End user originated
- SCCP user originated
- Message out of order - Incorrect P(S)
- Message out of order - Incorrect P(R)
- Remote procedure error - Message out of window
- Remote procedure error - Incorrect P(S) after (re)initialization
- Remote procedure error - General
- Network operational
- Access operational

- Network Congestion
- Not obtainable
- Unqualified
- Spare (0D to FF hex)

Error Cause Statistics Screen

The Error Cause Statistics screen displays a list of Error Causes describing exact protocol errors. The Spectra system counts the number of received and transmitted Protocol Data Unit Error (ERR) messages that contain each Error Cause listed. Counts are specified by linkset and link. This screen is applicable only to the ITU-T BLUE, ITU-T WHITE, and CHINA protocols (see **Figure 9.16**).

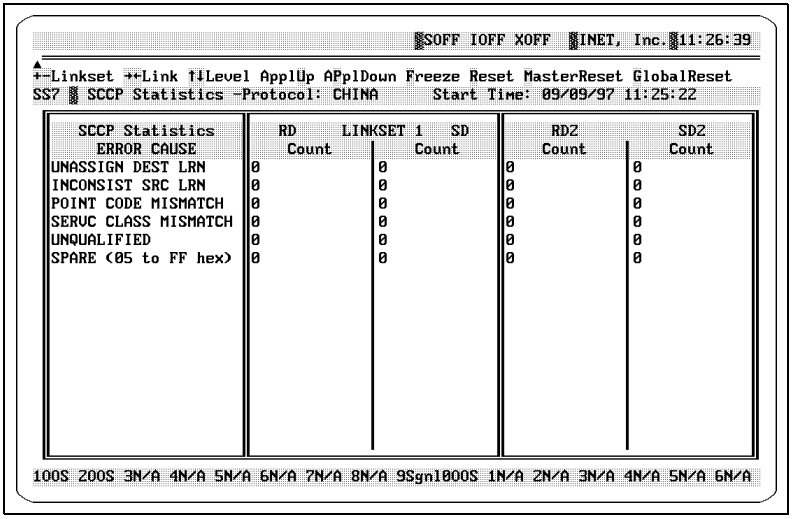


Figure 9.16 - Error Cause Statistics Screen

Error Cause Statistics Screen Definitions

+- Linkset
Press the + key or - key to move between possible linksets.

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

ApplUp (ITU-T BLUE, ITU-T WHITE, and CHINA protocols only)
Press the U key to cycle forward through other SCCP Statistics screens for Return Causes, Reset Causes, Error Causes, Refusal Causes, and Release Causes.

APplDown (ITU-T BLUE, ITU-T WHITE, and CHINA protocols only)
Press the P key to cycle backward through other SCCP Statistics screens: Release Causes, Refusal Causes, Error Causes, Reset Causes, and Return Causes.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Protocol
This field displays the current protocol for the displayed statistics.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

LINKSET
This field displays the number of the current linkset.

RD Count and SD Count (Monitor mode)
These two columns display MSUs with Error Causes received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

R Count and T Count (Tester mode)
These two columns display MSUs with Error Causes received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

RD1 Count and SD1 Count (Monitor mode)
These two columns display MSUs with Error Causes received on the indicated link. The numbers next to R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

R1 Count and T1 Count (Tester mode)
These two columns display MSUs with Error Causes received on the indicated link. The numbers following R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

ERROR CAUSES
This field indicates the number of transmitted or received Protocol Data Unit Error (ERR) messages containing Error Causes.

ITU-T WHITE, ITU-T BLUE, and CHINA Error Causes include the following messages:

- Local Reference Number (LRN) mismatch - Unassigned destination LRN
- Local Reference Number (LRN) mismatch - Inconsistent source LRN
- Point code mismatch
- Service class mismatch
- Unqualified
- Spare (05 to FF hex)

Refusal Cause Statistics Screen

The Refusal Cause Statistics screen displays a list of Refusal Causes defining the reason a connection was refused. The Spectra system counts the number of received and transmitted Connection Refused (CREF) messages that contain each Refusal Cause listed. Counts are specified by linkset and link. This screen is applicable only to the ITU-T BLUE, ITU-T WHITE, and CHINA protocols (see **Figure 9.17**).

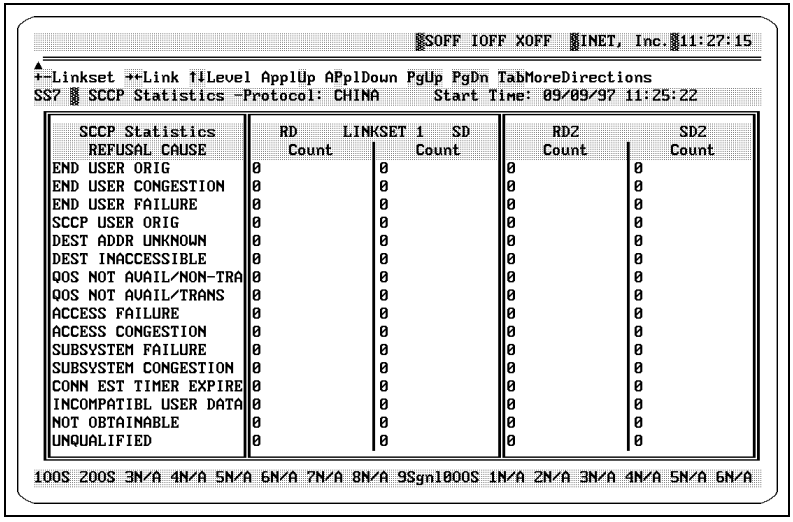


Figure 9.17 - Refusal Statistics Screen

Refusal Statistics Screen Definitions

+- Linkset
Press the + key or - key to move between possible linksets.

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

ApplUp (ITU-T BLUE, ITU-T WHITE, and CHINA protocols only)
Press the U key to cycle forward through other SCCP Statistics screens for Return Causes, Reset Causes, Error Causes, Refusal Causes, and Release Causes.

APplDown (ITU-T BLUE, ITU-T WHITE, and CHINA protocols only)
Press the P key to cycle backward through other SCCP Statistics screens: Release Causes, Refusal Causes, Error Causes, Reset Causes, and Return Causes.

PgUp, PgDn
Press the PageUp and PageDown keys to page through Refusal Causes.

TabMoreDirections
Press the Tab key to display additional direction line options.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Protocol
This field displays the current protocol for the displayed statistics.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

LINKSET
This field displays the number of the current linkset.

RD Count and SD Count (Monitor mode)
These two columns display MSUs with Refusal Causes received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

R Count and T Count (Tester mode)
These two columns display MSUs with Refusal Causes received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

RD1 Count and SD1 Count (Monitor mode)
These two columns display MSUs with Refusal Causes received on the indicated link. The numbers next to R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

R1 Count and T1 Count (Tester mode)
These two columns display MSUs with Refusal Causes received on the indicated link. The numbers following R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

REFUSAL CAUSES
This field indicates the number of transmitted/received CREF messages containing Refusal Causes.

ITU-T WHITE, ITU-T BLUE, and CHINA Refusal Causes include the following messages:

- End user originated
- End user congestion
- End user failure
- SCCP user originated
- Destination address unknown
- Destination inaccessible
- Network resource - Quality of Service (QOS) not available/non-transient
- Network resource - QOS not available/transient
- Access failure
- Access congestion
- Subsystem failure
- Subsystem congestion
- Expiration of the connection establishment timer
- Incompatible user data
- Not obtainable
- Unqualified

Release Cause Statistics Screen

The Release Cause Statistics screen displays a list of Release Causes defining the reason a connection was released. The Spectra system counts the number of received and transmitted Release (REL) messages that contain each Release Cause listed. Counts are specified by linkset and link.

If ITU-T BLUE or CHINA is the selected protocol, the following screen is displayed (see **Figure 9.18**).

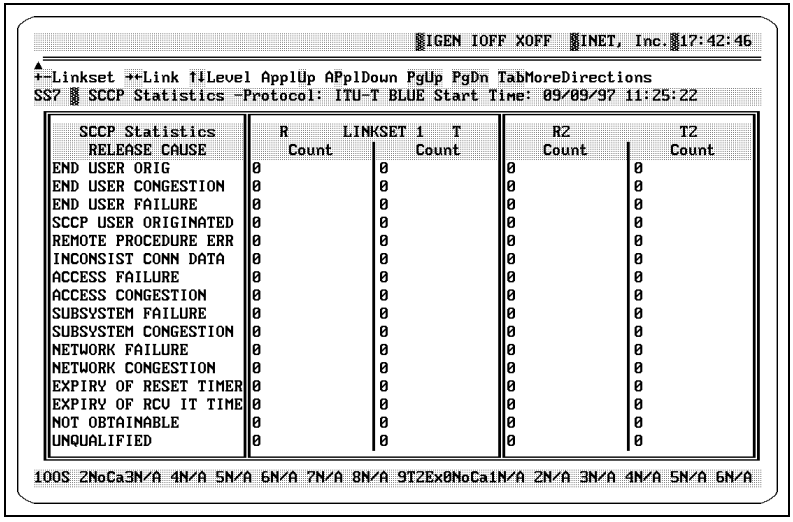


Figure 9.18 - ITU-T BLUE and CHINA Release Statistics Screen

If ITU-T WHITE is the selected protocol, the following screen is displayed (see **Figure 9.19**).

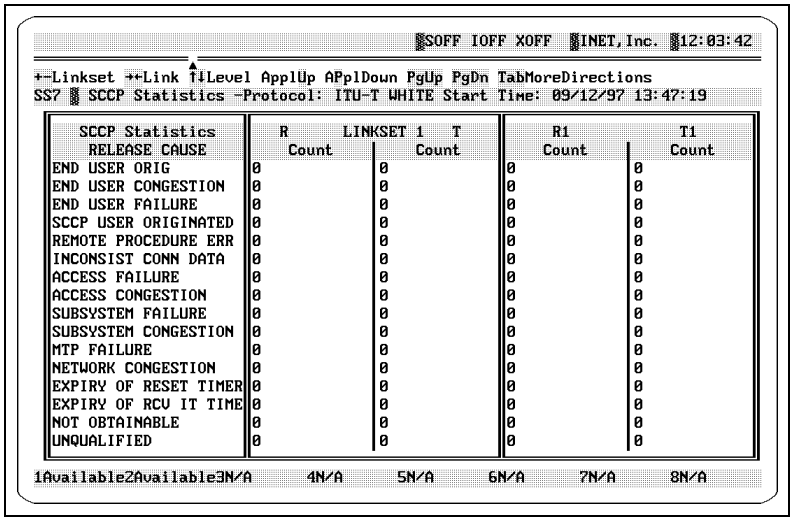


Figure 9.19 - ITU-T WHITE Release Cause Statistics Screen

Release Cause Statistics Screen Definitions

+- Linkset
Press the + key or - key to move between possible linksets.

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

ApplUp (ITU-T BLUE, ITU-T WHITE, and CHINA protocols only)
Press the U key to cycle forward through other SCCP Statistics screens for Return Causes, Reset Causes, Error Causes, Refusal Causes, and Release Causes.

APplDown (ITU-T BLUE, ITU-T WHITE, and CHINA protocols only)
Press the P key to cycle backward through other SCCP Statistics screens: Release Causes, Refusal Causes, Error Causes, Reset Causes, and Return Causes.

PgUp, PgDn
Press the PageUp and PageDown keys to page through Release Causes.

TabMoreDirections
Press the Tab key to display additional direction line options.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Protocol
This field displays the current protocol for the displayed statistics.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

LINKSET
This field displays the number of the current linkset.

RD Count and SD Count (Monitor mode)
These two columns display MSUs with Release Causes received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

R Count and T Count (Tester mode)
These two columns display MSUs with Release Causes received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

RD1 Count and SD1 Count (Monitor mode)
These two columns display MSUs with Release Causes received on the indicated link. The numbers next to R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

R1 Count and T1 Count (Tester mode)
These two columns display MSUs with Release Causes received on the indicated link. The numbers following R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

RELEASE CAUSES
This field indicates the number of transmitted/received Released (REL) messages containing Release Causes.

ITU-T BLUE and CHINA Release Causes include the following messages:

- End user origination
- End user congestion
- End user failure
- SCCP user originated
- Remote procedure error
- Inconsistent connection data
- Access failure
- Access congestion
- Subsystem failure
- Subsystem congestion

- Network failure
- Network congestion
- Expiration of reset timer
- Expiration of receive inactivity timer
- Not obtainable
- Unqualified

ITU-T WHITE Release Causes include the following messages:

- End user origination
- End user congestion
- End user failure
- SCCP user originated
- Remote procedure error
- Inconsistent connection data
- Access failure
- Access congestion
- MTP failure
- Network congestion
- Expiration of reset timer
- Expiration of receive inactivity timer
- Not obtainable
- Unqualified
- SCCP failure

GSM/PCS STATISTICS

The Global System for Mobile Communications (GSM)/Personal Communications Service (PCS) Statistics screens display statistics for different message types for all SS7-based protocols, including MAP, BSSAP, and DTAP. There are four Global System for Mobile Communication (GSM) Statistics screens: DTAP-MM Statistics, DTAP-CC Statistics, BSSMAP Statistics, and MAP Statistics. These statistics screens only contain data when the GSM Generator is running.

DTAP-MM Statistics Screen

The DTAP-MM Statistics screen displays statistics for different message types for the DTAP-MM protocol (see **Figure 9.20**).

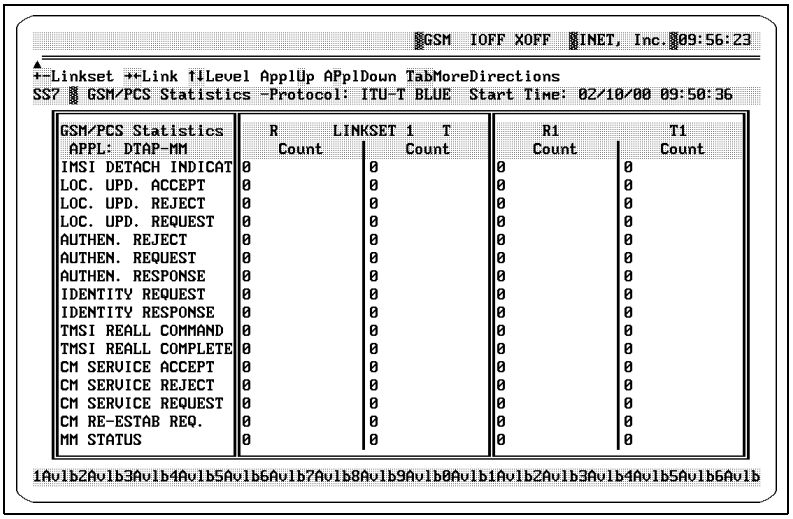


Figure 9.20 - DTAP-MM Statistics Screen

DTAP-MM Statistics Screen Definitions

+- Linkset
Press the + key or - key to move between possible linksets.

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

ApplUp
Press the U key to cycle forward through other GSM Statistics screens: DTAP-MM, DTAP-CC, BSSMAP, and MAP.

APplDown
Press the P key to cycle backward through other GSM Statistics screens: MAP, BSSAP, DTAP-CC, and DTAP-MM.

TabMoreDirections
Press the Tab key to display additional direction line options.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

LINKSET
This field displays the number of the current linkset.

RD Count and SD Count (Monitor mode)
These two columns display MSUs by message type received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

R Count and T Count (Generator mode)
These two columns display MSUs by message type received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

RD1 Count and SD1 Count (Monitor mode)
These two columns display MSUs by message type received on the indicated link. The numbers next to R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

R1 Count and T1 Count (Generator mode)
These two columns display MSUs by message type received on the indicated link. The numbers following R and T are the link(s) assigned to the linkset. Press the →←keys to toggle through the available links.

DTAP-MM Messages

IMSI Detach Indication
This message sets a deactivation indication in the network;
MS -> NETWORK.

Location Updating Accept
This message indicates that updating or International Mobile Subscriber Identity (IMSI) attach in the network has been completed; NETWORK -> MS.

Location Updating Reject
This message indicates that updating or IMSI attach has failed;
NETWORK -> MS.

Location Updating Request
This message either requests update of MS location or IMSI attach;
MS -> NETWORK.

Authentication Reject
This message indicates that authentication has failed and that the receiving mobile station will abort all activities; NETWORK -> MS.

Authentication Request
This message initiates authentication of the mobile station identity; NETWORK -> MS.

Authentication Response
This message delivers calculated response to network; MS -> NETWORK.

Identity Request
This message requests an MS to submit the specified identity to the network; NETWORK -> MS.

Identity Response
This message is sent in response to Identity Request message; provides the requested identity; MS -> NETWORK.

TMSI-reallocation Command
This message reallocates a new Temporary Mobile Subscriber Identity (TMSI); NETWORK -> MS.

TMSI-reallocation Complete
This message indicates that reallocation of a new TMSI has taken place; MS -> NETWORK.

CM Service Accept
This message indicates the requested service has been accepted; NETWORK -> MS.

CM Service Reject
This message indicates that the requested service cannot be provided; NETWORK -> MS.

CM Service Request
This message requests a service for connection management sub-layer entities; MS -> NETWORK.

CM Reestablishment Request
This message requests re-establishment of a connection if the previous one has failed; MS -> NETWORK.

MM Status
This message is sent to report certain error conditions; MS -> NETWORK.

DTAP-CC Statistics Screen

The DTAP-CC Statistics screen displays statistics for different message types for the DTAP-CC protocol (see **Figure 9.21**).

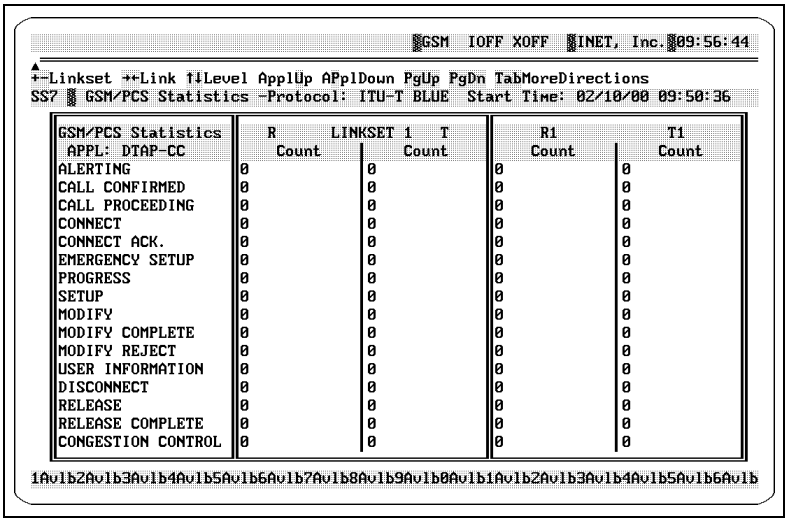


Figure 9.21 - DTAP-CC Statistics Screen

DTAP-CC Statistics Screen Definitions

+- Linkset
Press the + key or - key to move between possible linksets.

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

ApplyUp
Press the U key to cycle forward through other GSM Statistics screens: DTAP-MM, DTAP-CC, BSSMAP, and MAP.

APplDown
Press the P key to cycle backward through other GSM Statistics screens: MAP, BSSAP, DTAP-CC, and DTAP-MM.

PgUp, PgDn
Press the PageUp and PageDown keys to page through message types.

TabMoreDirections
Press the Tab key to display additional direction line options.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

LINKSET
This field displays the number of the current linkset.

RD Count and SD Count (Monitor mode)
These two columns display MSUs by message type received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →←keys to toggle through the available links for the linkset.

R Count and T Count (Generator mode)
These two columns display MSUs by message type received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

RD1 Count and SD1 Count (Monitor mode)
These two columns display MSUs by message type received on the indicated link. The numbers next to R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

R1 Count and T1 Count (Generator mode)
These two columns display MSUs by message type received on the indicated link. The numbers following R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

DTAP-CC Messages

Alerting
This message indicates that called user alerting has been initiated; MS -> NETWORK.

Call Confirmed
This message is sent to confirm an incoming call request; MS -> NETWORK.

Call Proceeding
This message indicates that the requested call establishment information has been received and no more call establishment information is accepted; NETWORK -> MS.

Connect
This message indicates call acceptance by the called user; MS -> NETWORK.

Connect Acknowledge
This message indicates that the mobile station has been awarded the call; NETWORK -> MS. This message may be sent to allow symmetrical call control procedures; MS -> NETWORK.

Emergency Setup
This message initiates emergency call establishment; MS -> NETWORK.

Progress
This message indicates the progress of a call in the event of interworking or in connection with the provision of in-band information/patterns; NETWORK -> MS.

Setup
This message initiates call establishment; MS -> NETWORK.

Modify
This message requests a change to bearer capability for a call; MS -> NETWORK.

Modify Complete
This message indicates completion of a request to change bearer capability for a call; NETWORK -> MS.

Modify Reject
This message indicates failure of a request to change the bearer capability for a call; MS -> NETWORK.

User Information
This message transfers information to the remote user; MS ->NETWORK. It delivers information transferred from the remote user; NETWORK -> MS.

Disconnect
This message requests the network to clear an end-to-end connection; MS-> NETWORK. It indicates that the end-to-end connection is cleared; NETWORK -> MS.

Release
This message indicates that the equipment sending the message intends to release the transaction identifier, and that the receiving equipment should release the transaction identifier after sending a Release Complete message; MS -> NETWORK.

Release Complete
This message indicates that the equipment sending the message has released the transaction identifier and the receiving equipment will release the transaction identifier; NETWORK -> MS.

Congestion Control
This message indicates the establishment or termination of flow control on the transmission of User Information messages; MS -> NETWORK.

Notify
This message indicates information pertaining to a call, such as user suspended; NETWORK -> MS.

Status
This message is sent at any time during a call to report certain error conditions; MS -> NETWORK.

Status Enquiry
This message is sent at any time to solicit a Status message;
MS -> NETWORK.

Start DTMF
This message contains the digit the network should reconvert back into a Dial Tone Multi Frequency (DTMF) tone which is then applied towards the remote user; MS -> NETWORK.

Stop DTMF
This message is used to stop the DTMF tone sent towards the remote user;
MS -> NETWORK.

Stop DTMF Acknowledge
This message indicates that the DTMF tone is no longer being sent;
NETWORK -> MS.

Start DTMF Acknowledge
This message indicates the successful initiation of the action requested by the Start DTMF message; NETWORK -> MS.

Start DTMF Reject
This message is sent if the network cannot accept the Start DTMF message;
NETWORK -> MS.

BSSMAP Statistics Screen

The BSSMAP Statistics screen displays statistics for different message types for the BSSMAP protocol (see **Figure 9.22**).

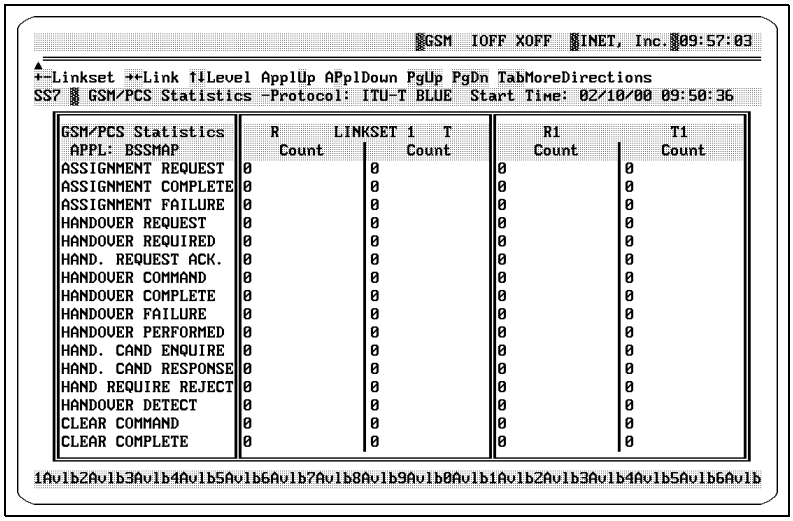


Figure 9.22 - BSSMAP Statistics Screen

BSSMAP Statistics Screen Definitions

+- Linkset
Press the + key or - key to move between possible linksets.

→← Link
Press the →← keys to move between possible links.

↑↓Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

ApplyUp
Press the U key to cycle forward through other GSM Statistics screens: DTAP-MM, DTAP-CC, BSSMAP, and MAP.

APplDown
Press the P key to cycle backward through other GSM Statistics screens: MAP, BSSAP, DTAP-CC, and DTAP-MM.

PgUp, PgDn
Press the PageUp and PageDown keys to page through message types.

TabMoreDirections
Press the Tab key to display additional direction line options.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

LINKSET
This field displays the number of the current linkset.

RD Count and SD Count (Monitor mode)
These two columns display MSUs by message type received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

R Count and T Count (Generator mode)
These two columns display MSUs by message type received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →←keys to toggle through the available links for the linkset.

RD1 Count and SD1 Count (Monitor mode)
These two columns display MSUs by message type received on the indicated link. The numbers next to R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

R1 Count and T1 Count (Generator mode)
These two columns display MSUs by message type received on the indicated link. The numbers following R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

BSSMAP Messages

✍ *All messages in this section are connection-oriented messages unless otherwise indicated.*

Assignment Request
This message requests the Base Station Controller (BSC) to assign radio resources; MSC -> BSC.

Assignment Complete
This message indicates that the requested assignment has been completed correctly; BSC -> MSC.

Assignment Failure
This message indicates that there has been a failure in the assignment process at the Base Station System (BSS) and that the assignment procedure has been aborted; BSC -> MSC.

Handover Request
This message indicates that the mobile is to be handed over to the target BSC; MSC -> BSC.

Handover Required
This message indicates that for a given MS that already has a dedicated radio resource assigned, a handover is required for the reason given; BSC -> MSC.

Handover Request Acknowledge
This message indicates that the request to support a handover at the target BSS can be supported; the message indicates to which radio channel the MS should be directed; BSC -> MSC.

Handover Command
This message contains the target channel to which the MS should return; MSC -> BSC.

Handover Complete
This message indicates that the correct MS has successfully accessed the target cell; BSC -> MSC.

Handover Failure
This message indicates to the Mobile Switching Center (MSC) that there has been a failure in the resource allocation process on handover and that the handover has been aborted; BSC -> MSC.

Handover Performed
This message indicates that the BSS has performed an internal handover; BSC -> MSC.

Handover Candidate Enquire
This message is a connectionless message, and indicates to BSC that it should perform handover for a given number of connections from one cell to other cells in the given list; MSC -> BSC.

Handover Candidate Response
This message is a connectionless message and is sent in response to receipt of Handover Candidate Enquire; contains the number of mobiles for which Handover Required messages have been sent; BSC -> MSC.

Handover Required Reject
This message indicates to the BSS that the Handover Required message has not resulted in handover; MSC -> BSC.

Handover Detect
This message indicates that the correct MS has successfully accessed the target cell; BSC -> MSC.

Clear Command
This message instructs BSS to release the associated dedicated resource; MSC -> BSC.

Clear Complete
This message informs the MSC that the associated dedicated resource has been successfully cleared; BSC -> MSC.

Clear Request
This message indicates to the MSC that the BSS wishes to release the associated dedicated resources; BSC -> MSC.

SAPI "n" Clear Command
This message instructs the receiving entity to release resources concerned with Service Access Point Identifier (SAPI) "N"; BSC -> MSC.

SAPI "n" Clear Complete
This message indicates that the transmitting entity has released all resources concerned with SAPI "N"; BSC -> MSC.

SAPI "n" Reject
This message indicates that a message with a SAPI value other than 0 has been rejected; BSC -> MSC.

Reset
This message is a connectionless message and indicates to the receiving entity that the transmitting entity has suffered a failure and has lost memory of the calls in progress, calls set up, and associated references; BSC -> MSC.

Reset Acknowledge
This message is a connectionless message and indicates to the receiving entity that the transmitting entity has cleared all calls and reset all references and is ready to resume service; BSC -> MSC.

Overload
This message is a connectionless message; MSC -> BSC: indicates an overload; BSC -> MSC: indicates either processor overload of the whole BSS or overload of a CCCH downlink.

Trace Invocation
This message starts production of a trace record at receiving entity; BSC -> MSC.

Reset Circuit
This message is a connectionless message and indicates to the receiving entity that the state of the circuit indicated in the message is unknown due to a failure; MSC -> BSC.

Reset Circuit Acknowledge
This message is a connectionless message and indicates to the receiving entity that the transmitting entity has cleared a possible call using the circuit and is ready to resume service; MSC -> BSC.

Block
This message is a connectionless message and indicates that a particular terrestrial resource must be blocked at the MSC and cannot therefore be used for traffic; BSC -> MSC.

Blocking Acknowledge
This message is a connectionless message and acknowledges receipt of a Block message, and indicates that the circuit concerned has been removed from service; MSC -> BSC.

Unblock
This message is a connectionless message and indicates that a particular terrestrial resource may be returned to service at the MSC and can therefore be used for traffic; BSC -> MSC.

Unblocking Acknowledge
This message is a connectionless message and acknowledges receipt of an Unblock message; it indicates that the circuit concerned has been returned to service; MSC -> BSC.

Resource Request
This message is a connectionless message and requests the current spare resource; MSC -> BSC.

Resource Indication
This message is a connectionless message and is sent in response to Resource Request message; BSC -> MSC.

Paging
This message is a connectionless message and contains sufficient information to allow the paging message to be transmitted by the correct cells at the correct time; it is only used when MS has an incoming call; MSC -> BSC.

Cipher Mode Command
This message updates the encryption parameters for the concerned MS; MSC -> BSC.

Classmark Update
This message updates the classmark parameters for the concerned MS; BSC -> MSC.

Cipher Mode Complete
This message indicates that a successful cipher synchronization has been achieved across the air interface; BSC -> MSC.

Queuing Indication
This message indicates a delay in the assignment of the required TCH; BSC -> MSC.

Complete Layer 3 Information
This message is sent upon receipt of an initial Layer 3 message (Page Response, Location Update Request, Re-Establish Request, CM Service Request); BSC -> MSC.

MAP Statistics Screen

The MAP Statistics screen displays statistics for different message types for the Mobile Application Part (MAP) protocol (see **Figure 9.23**).

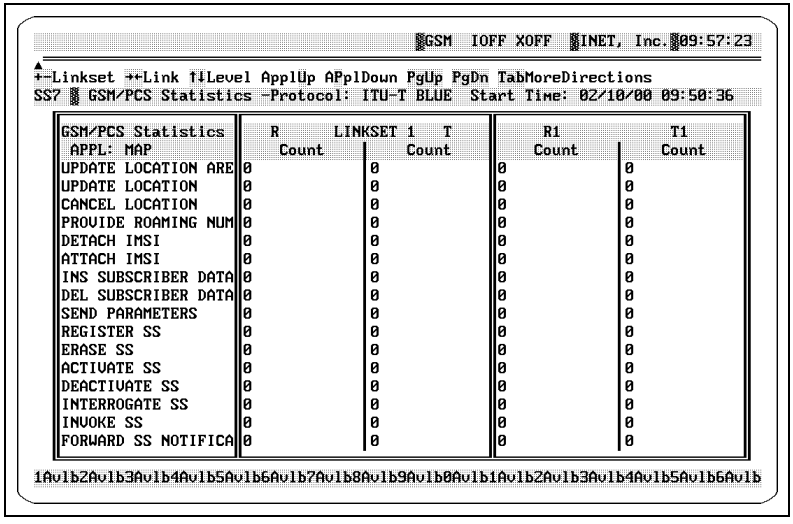


Figure 9.23 - MAP Statistics Screen

Map Statistics Screen Definitions

+- Linkset
Press the + key or - key to move between possible linksets.

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

ApplUp
Press the U key to cycle forward through other GSM Statistics screens: DTAP-MM, DTAP-CC, BSSMAP, and MAP.

APplDown
Press the P key to cycle backward through other GSM Statistics screens: MAP, BSSAP, DTAP-CC, and DTAP-MM.

PgUp, PgDn
Press the PageUp and PageDown keys to page through message types.

TabMoreDirections
Press the Tab key to display additional direction line options.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a “Display frozen. Press F again to update.” message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

MasterReset
Press the M key to reset all current link statistics for the current level screen (Level 1 Statistics, Level 2 Statistics, Level 3 Statistics, etc.). The Start Time field located in the information line near the top of the screen is also reset to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

LINKSET
This field displays the number of the current linkset.

RD Count and SD Count (Monitor mode)
These two columns display MSUs by message type received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

R Count and T Count (Generator mode)
These two columns display MSUs by message type received on the indicated linkset. Press the + key or - key to toggle through linksets. Press the →← keys to toggle through the available links for the linkset.

RD1 Count and SD1 Count (Monitor mode)
These two columns display MSUs by message type received on the indicated link. The numbers next to R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

R1 Count and T1 Count (Generator mode)
These two columns display MSUs by message type received on the indicated link. The numbers following R and T are the link(s) assigned to the linkset. Press the →← keys to toggle through the available links.

MAP Messages

Update Location Area
This message is invoked by an MSC to request its associated Visitors Location Register (VLR) for location area updating; MSC -> VLR.

Update Location
This message updates location information in the Home Location Register (HLR) of an MS; VLR -> HLR.

Cancel Location
This message requests a VLR to delete an MS from the list of visitors; HLR -> VLR.

Provide Roaming Number
This message requests a VLR to send back a roaming number in order to route a call to an MS; HLR -> VLR.

Detach IMSI
This message is invoked by an MSC to request its associated VLR to set an IMSI detach flag for a given MS; MSC -> VLR.

Attach IMSI
This message is invoked by an MSC to request its associated VLR to remove the IMSI detach flag for a given MS; MSC ->VLR.

Insert Subscriber Data
This message transfers to the VLR various data related to a visitor subscriber; HLR -> VLR.

Delete Subscriber Data
This message deletes information from a subscriber record in a VLR; HLR -> VLR.

Send Parameters
This message is invoked by a VLR to request a location register for one or several parameters related to a subscriber; VLR -> HLR or VLR -> VLR.

Register SS
This message registers data related to a supplementary service; MSC -> VLR or VLR -> HLR.

Erase SS
This message erases data related to a supplementary service; MSC -> VLR or VLR -> HLR.

Activate SS
This message activates data related to a supplementary service; MSC -> VLR or VLR -> HLR.

Deactivate SS
This message deactivates data related to a supplementary service; MSC -> VLR or VLR -> HLR.

Interrogate SS
This message retrieves information related to a supplementary service; MSC -> VLR or VLR -> HLR.

Invoke SS
This message invoked by an MSC to request its associated VLR for supplementary service invocation; MSC -> VLR.

Forward SS Notification
This message requests the forwarding of a supplementary service notification towards an MS; HLR -> VLR or VLR -> MSC.

Register Password
This message is invoked by an MS (by the subscriber himself) to register a new password related to the management of subscription data in the HLR; it is successful if subscriber can provide old password and new password twice in subsequent Get Password messages; MSC -> VLR or VLR -> HLR.

Get Password
This message is invoked by network to request a password from the MS; HLR -> VLR or VLR -> MSC.

Process Unstructured SS Data
This message is invoked by an MSC or VLR to relay unstructured information in order to allow end to end SS operation type between the MS and the HLR following specific rules; MSC -> VLR or VLR -> HLR.

Send Info For Incoming Call
This message is invoked by an MSC receiving an incoming call to request guidance from the VLR; MSC -> VLR.

Send Info For Outgoing Call
This message invoked by an MSC which has to handle an outgoing call set-up request to retrieve the required information from the VLR; MSC -> VLR.

Send Routing Information
This message is invoked by a gateway MSC to perform interrogation of the HLR in order to route a call towards an MS; GMSC -> HLR.

Complete Call
This message requests the MSC to set up a call to/from an MS; VLR -> MSC.

Connect To Following Address
This message requests MSC to connect a call to the indicated address; VLR -> MSC.

Process Call Waiting
This message requests the MSC to perform a call waiting procedure; VLR -> MSC.

Page
This message requests the MSC to page an MS, in the indicated location area; VLR -> MSC.

Search For Mobile Subscriber
This message requests an MSC to search for a mobile subscriber; VLR -> MSC.

Perform Handover
This message is invoked by one MSC to request the target MSC to trigger a handover procedure; MSC -> MSC.

Send End Signal
This message is invoked by one MSC to request another MSC to send the end signal when their association can be released; MSC -> MSC.

Perform Subsequent Handover
This message is invoked by serving MSC to request the call controlling MSC to trigger a subsequent handover procedure with a third MSC; MSC -> MSC.

Allocate Handover Number
This message is invoked by an MSC where a call has to handed over to request its associated VLR for a handover number; MSC -> VLR.

Send Handover Report
This message is invoked by a VLR, after receiving a handover number request, to request an MSC to send a handover report (in order to remove the handover number); VLR -> MSC.

Process Access Signalling
This message is invoked by one MSC, after a handover procedure, to request another MSC to forward signalling information to the MS; MSC -> MSC.

Forward Access Signalling
This message is invoked by one MSC, after a handover procedure, to request another MSC to forward signalling information to the MS; MSC -> MSC.

Note Internal Handover
This message is invoked by one MSC to inform another MSC that a handover has been performed within the area controlled by transmitting MSC; MSC -> MSC.

Register Charging Information
This message transmits the charging information to the HLR; MSC -> HLR.

Reset
This message is invoked by a location register, after a restart, to indicate to other location registers that a failure occurred; HLR -> VLRs or VLR -> HLRs.

Forward Check SS Indication
This message requests a VLR or an MSC to forward a check supplementary service indication to an MS; HLR -> VLR or VLR -> MSC.

Authenticate
This message requests a VLR to request a subscriber for authentication; VLR -> MSC.

Provide Imsi
This message requests an MS to identify itself by the IMSI; VLR -> MSC.

Forward New Tmsi
This message is invoked by VLR to reallocate the TMSI of an MS using the MSC; VLR -> MSC.

Set Ciphering Mode
This message is invoked by a VLR to request that an MSC set the ciphering mode and start the ciphering procedure if applicable; VLR -> MSC.

Check Imei
This message requests the Equipment Identity Register (EIR) to check the equipment identity used by an MS; MSC -> EIR.

Send Routing Info For Sm
This message is invoked by gateway MSC to perform the interrogation of the HLR in order to get routing information related to a mobile subscriber; GMSC -> HLR.

Forward Short Message
Invoked by one MSC to request another MSC to forward a mobile short message; MSC -> MSC.

SM Delivery Status
This message is invoked by a gateway MSC to set the Message Waiting Data into an HLR, or to inform an HLR of successful SM transfer after polling. GMSC -> HLR.

Note Ms Present
This message is invoked by a VLR to inform an HLR that an MS becomes reachable; VLR -> HLR.

Alert Service Centre
This message is used by an HLR to request an Interworking Message Switching Center (IWMSC) to inform a service center that a mobile subscriber becomes available; HLR -> IWMSC.

Activate Trace Mode
This message is invoked by an HLR entity in order to indicate to a VLR that the activities related to a subscriber have to be traced; HLR -> VLR.

Deactivate Trace Mode
This message requests a VLR to stop tracing a subscriber; HLR -> VLR.

Trace Subscriber Activity
This message is invoked by a VLR or an MSC to request a MSC trace the current subscriber related activity and to report the recorded information to the Operation and Maintenance Center (OMC); MSC -> MSC or VLR -> MSC.

Process Access Request
This message is invoked by an MSC to request its associated VLR to initiate the possible security procedures required before handling an access request from an MS; MSC -> VLR.

Begin Subscriber Activity
This message indicates to an HLR that one or several operations invoked by a subscriber will be forwarded during the associated ongoing dialogue; VLR -> HLR.

Send Identification
This message is used between an VLR and a previous VLR to retrieve IMSI and authentication sets for a subscriber registering afresh in that VLR; VLR -> VLR.

Send Authentication Info
This message is invoked by an VLR to retrieve authentication information from an HLR; VLR -> HLR.

Restore Data
This message is invoked by an VLR on receipt of a Provide Roaming Number indication for an unknown IMSI or an uncontinued IMSI. This message requests an HLR to send all data to the VLR that is to be stored in the subscriber's IMSI record; VLR -> HLR.

Send IMSI
This message is invoked by an VLR in order to retrieve the IMSI of a subscriber; VLR -> HLR.

Process Unstrss Request
This message is used between an VLR and an MSC and between an VLR and an HLR to relay information in order to allow unstructured supplementary service operation; VLR -> MSC; VLR -> HLR.

Unstructured SS Request
This message is used between an VLR and HLR and between an VLR and an MSC when the invoking entity requires information from the mobile user, in connection with unstructured supplementary service handling; VLR -> HLR; VLR -> MSC.

Unstructured SS Notify
This message is used between an VLR and HLR and between an VLR and an MSC when the invoking entity requires notification to be sent to the mobile user, in connection with unstructured supplementary service handling; VLR -> HLR; VLR -> MSC.

Inform Service Centre
This message indicates to the Service Centre which MSISDN number is stored in the Message Waiting Data File; HLR -> MSC.

Ready for SM
This message is used between an MSC and an VLR and between an VLR and an HLR. An MSC indicates this message if a subscriber indicates a memory available situation; an VLR uses this service to indicate this to an HLR; MSC -> VLR; VLR -> HLR.

Purge MS
This message instructs an HLR to mark its data for an MS so that any request for routing information for a mobile terminated call or a mobile terminated short message will be treated as if the MS is not reachable; VLR -> HLR.

Prepare Handover
This message indicates to an MSC-B (E-interface) that a call is to be handed over from MSC-A to MSC-B; MSC-A -> MSC-B.

Prepare Subsequent Handover
This message indicates to the MSC-A (E-interface) that it has been decided that a handover to either MSC-A or a third MSC is required; MSC-B -> MSC-A.

ISDN BASIC STATISTICS

The ISDN Basic Statistics screens display the results of communication transactions from the tests run under the F2 Run function. A list of the ISDN Basic Statistics screens is shown in **Figure 9.24**.

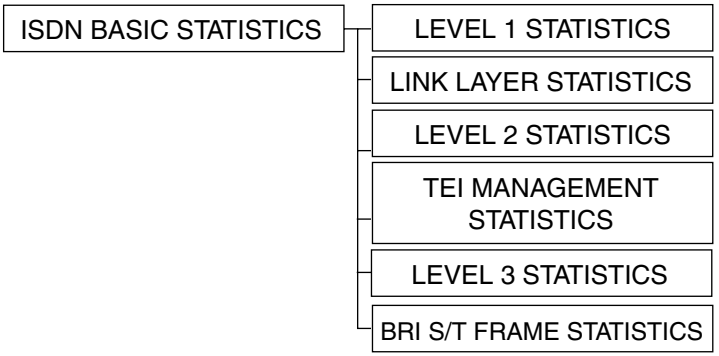


Figure 9.24 - ISDN Basic Statistics Screens

LEVEL 1 STATISTICS SCREEN

The Level 1 Statistics screen displays detailed statistics about Level 1 information. Level 1 statistics are only valid with DS1 (T1), E1 (CEPT), and BRI interfaces. If no DS1, E1, or BRI interface is in use on the displayed link when the screen is accessed, the message “Link is not DS1/E1/BRI” is displayed.

In the Monitor modes, this screen provides the DS1/E1/BRI status and statistical information for both DS1/E1/BRI monitor inputs (R and T channels). If the link is configured in a terminated emulation mode, only one DS1/E1/BRI interface is active per link (see **Figure 9.25**). The statistical and status information provided reflects this information.

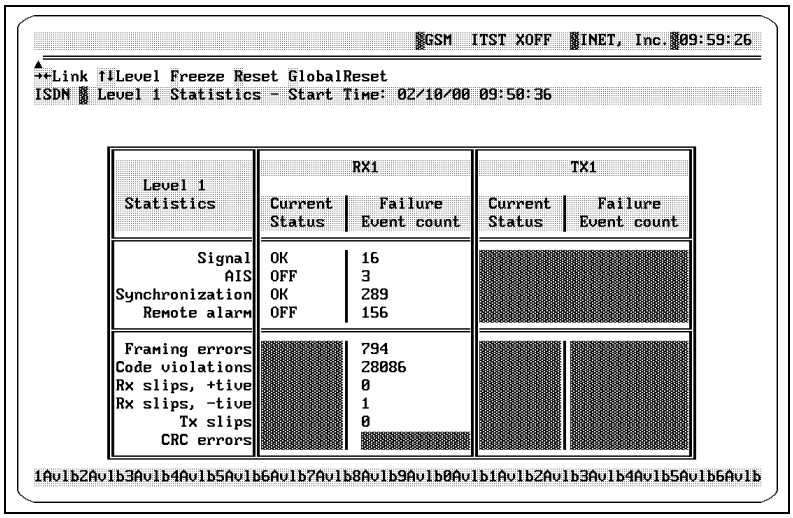


Figure 9.25 - ISDN Level 1 Statistics Screen

Level 1 Statistics Screen Definitions

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

RX1
This column displays Level 1 Parameters received on the current link. Press the →← keys to toggle through the available links.

TX1
This column displays Level 1 Parameters transmitted on the current link. Press the →← keys to toggle through the available links.

Current Status
The current status column provides information on the status of the following fields.

Signal
This field indicates the current status of an incoming signal. Possible states are OK (normal) and Loss of Signal (fail).

AIS
This field indicates the current status of the AIS. Possible states are OFF (normal) and ON (fail).

Synchronization
This field indicates the current status of the frame synchronization. Possible states are OK (normal) and Loss of Sync (fail).

Remote Alarm
This field indicates the current status of the remote alarm. Possible states are OFF (normal) and ON (fail).

Failure Event Count
This column indicates the total number of failures experienced by the following Level 1 parameters.

Signal
This field indicates the number of times a loss of signal condition was detected.

AIS
This field indicates the number of times an incoming AIS (or Blue Alarm) was detected.

Synchronization
This field indicates the number of times frame synchronization loss was detected.

Remote Alarm
This field indicates the number of times a remote alarm signal (or Yellow Alarm) was detected.

Framing Errors
This field displays the number of detected framing errors.

Code Violations
This field displays the number of detected line code violations.

Rx Slips, +tive
This field displays the number of positive receive timing slips detected.

Rx Slips, -tive
This field displays the number of negative receive timing slips detected.

Tx Slips
This field displays the number of transmit timing slips detected. This is valid only when the DS1 link is used in emulation modes.

CRC Errors
This field displays the number of checksum errors detected. This is valid only for ESF DS1 applications.

LINK LAYER STATISTICS SCREEN

The Link Layer Statistics screen displays detailed statistics about Link Access Procedure on the D-Channel (LAPD) information. The screen includes summary information about LAPD messages and zero insertions/deletions (see **Figure 9.26**). All statistical data is accumulated regardless of any capture filters that may be in place, unless the Post Filter Stats option is selected. The Post Filter Stats option filters messages before statistics are collected (see "ISDN Filters" on page 44 of this guide).

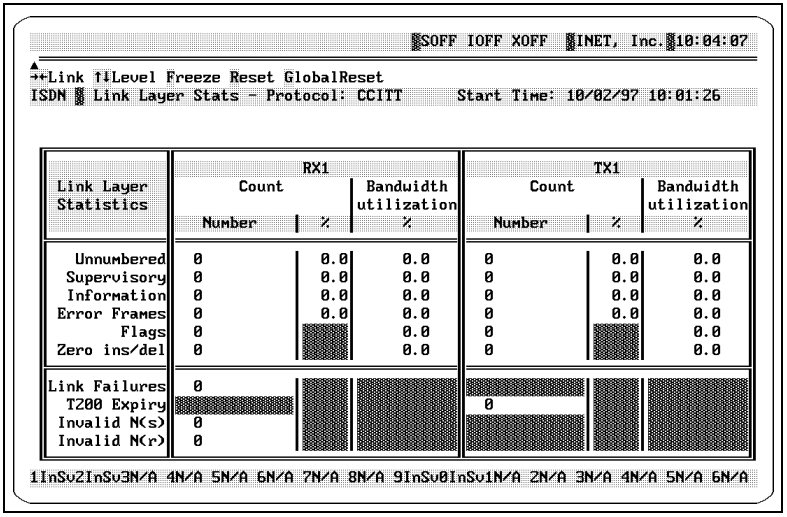


Figure 9.26 - Link Layer Statistics Screen

✍ *Link Layer statistics are displayed only for the Service Access Points and Terminal Endpoints defined on the current link. For information about the SAPI assignment screen, see "SAPI Assignments Screen" on page 216 of the **Spectra Setup and Configuration Guide**. For information about the TEI assignment screen, see"TEI Assignments Screen" on page 220 of the **Spectra Setup and Configuration Guide**.*

Link Layer Statistics Screen Definitions

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Protocol
This field displays the current protocol for the displayed statistics.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

RX1
This column displays frames received on the current link. Press the →← keys to toggle through the available links.

TX1
This column displays frames transmitted on the current link. Press the →← keys to toggle through the available links.

Count
This column tracks the occurrences of each parameter by number and percentage. There are two Count columns: received and sent (transmitted).

Number
This field displays the number of occurrences of each parameter in the current statistics tracking period.

%
This field provides a view of the overall percentage of messages or errors that have occurred. The percentage is based on the total number of messages processed in the current statistics tracking period.

Bandwidth Utilization %
This column displays the total percentage of bandwidth used by the various messages, flags, and zero insertions received and sent (transmitted).

Unnumbered
This field displays the number of Unnumbered messages transmitted and received. Unnumbered messages are LAPD link establishment commands and responses (UA, SABM, SABME, etc.).

Supervisory
This field displays the number of Supervisory messages transmitted and received. Supervisory messages are LAPD link control commands and responses (RR, RNR, REJ, etc.).

Information
This field displays the number of information messages transmitted and received. Information messages contain packet layer commands, responses, or user data.

Error Frames
This field displays the number of Error Messages transmitted and received. Error messages include Short Frame errors, Aborted Frame errors, CRC errors, etc.

Flags
This field displays the number of flag delimiters transmitted and received.

Zero Ins/Del
This field displays the total number of zeros inserted or deleted at the HDLC level.

Link Failures
This field displays the count of LAPD link failures encountered during the communication process. For example, a Link Failure message may occur when the transmitting signalling device does not receive acknowledgment for a transmitted message within an assigned amount of time.

T200 Expiry
This field displays the number of T200 timer expirations encountered during the communication process. The T200 timer is a link establishment timeout value assigned in the Level 2 Link Layer Parameters screen.

Invalid N(s)
This field displays the number of invalid Send Sequence Numbers encountered during the communication process.

Invalid N(r)
This field displays the number of invalid Received Sequence Numbers encountered during the communication process.

LEVEL 2 STATISTICS SCREEN

The Level 2 Statistics screen displays detailed information about Information frame types, specifically, Unnumbered, Supervisory, and Error frame statistics from the Link Layer Statistics screen (see **Figure 9.27**). All statistical data is accumulated regardless of any capture filters that may be in place, unless the Post Filter Stats option is selected. The Post Filter Stats option filters messages before statistics are collected (see "ISDN Filters" on page 44 of this guide).

The Link Layer Statistics screen is described in "Link Layer Statistics Screen" on page 348 of this guide.

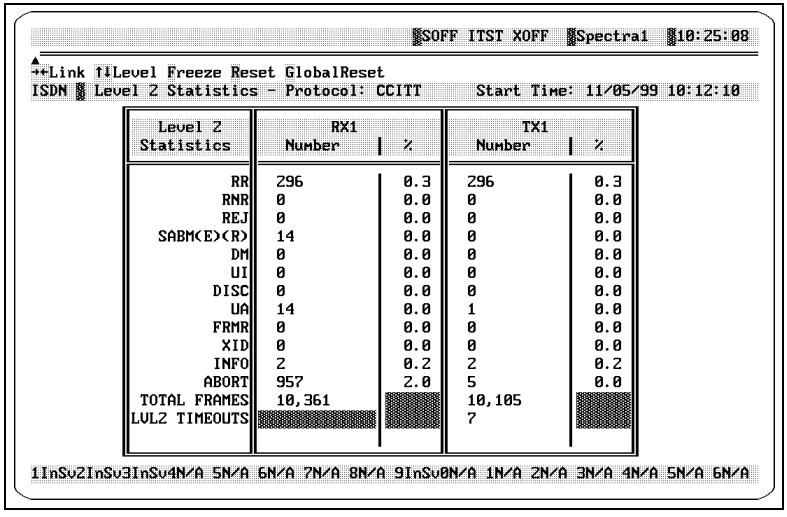


Figure 9.27 - Level 2 Statistics Screen

Level 2 Statistics Screen Definitions

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Protocol
This field displays the current protocol for the displayed statistics.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

Number
This field displays the number of frames by type in the current statistics tracking period.

%
This field provides the overall percentage of messages by type. The percentage is based on the total number of messages processed in the current statistics tracking period.

RX1
This column displays frames received on the current link. Press the →← keys to toggle through the available links.

TX1
This column displays frames transmitted on the current link. Press the →← keys to toggle through the available links.

RR
This field displays the number of Receive/Ready (RR) command/response messages transmitted and received on that link as well as the percentage of each.

RNR
This field displays the number of Receive Not Ready (RNR) command/response messages transmitted and received on that link as well as the percentage of each.

REJ
This field displays the number of Reject command/response messages transmitted and received on that link as well as the percentage of each.

SABM(E)(R)
This field displays the number of Set Asynchronous Balance Mode Extended (SABME) or Set Asynchronous Balance Mode Restricted (SABMR) command messages transmitted and received on that link as well as the percentage of each.

DM
This field displays the number of Disconnected Mode (DM) response messages transmitted and received on that link as well as the percentage of each.

UI
This field displays the number of Unnumbered Information (UI) command messages transmitted and received on that link as well as the percentage of each.

DISC
This field displays the number of Disconnect (DISC) command messages transmitted and received on that link as well as the percentage of each.

UA
This field displays the number of Unnumbered Acknowledgment (UA) response messages transmitted and received on that link as well as the percentage of each.

FRMR
This field displays the number of Frame Reject (FRMR) response messages transmitted and received on that link as well as the percentage of each.

XID
This field displays the number of Exchange Identification (XID) command/ response messages transmitted and received on that link as well as the percentage of each.

INFO
This field displays the number of Information command messages transmitted and received.

ABORT
This field displays the number of Abort messages transmitted and received.

TOTAL FRAMES
This field displays the summary of all above messages for the indicated link.

LEVEL 2 TIMEOUTS
This field displays the number of times timer T200 has expired.

TEI MANAGEMENT STATISTICS SCREEN

The TEI Management Statistics screen displays the Terminal Endpoint Identifier (TEI) Management messages that have been received and transmitted for each link (see **Figure 9.28**).

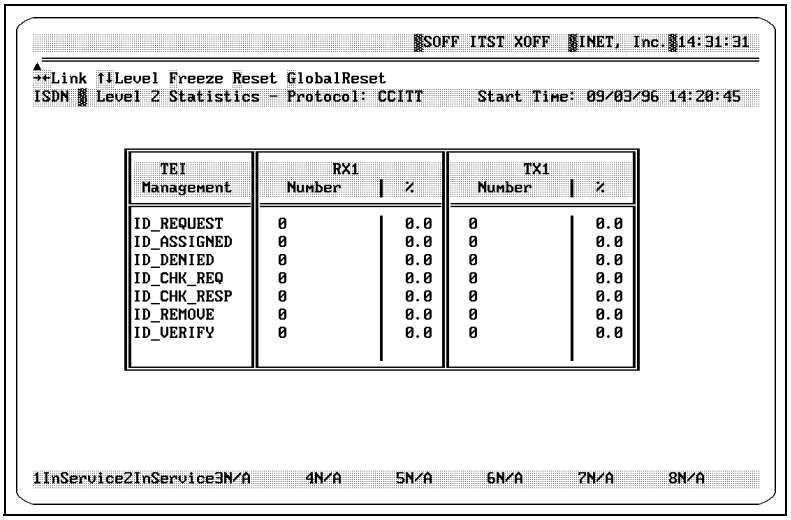


Figure 9.28 - TEI Management Statistics Screen

TEI Management Statistics Screen Definitions

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a “Display frozen. Press F again to update.” message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Protocol
This field displays the current protocol for the displayed statistics.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

Number
This field displays the number of frames by type in the current statistics tracking period.

%
This field provides the overall percentage of messages by type. The percentage is based on the total number of messages processed in the current statistics tracking period.

RX1
This column displays messages received on the current link. Press the →← keys to toggle through the available links.

TX1
This column displays messages transmitted on the current link. Press the →← keys to toggle through the available links.

ID_REQUEST
This field displays the number and percentage of ID_REQUEST messages encountered on a link.

ID_ASSIGNED
This field displays the number and percentage of ID_ASSIGNED messages encountered on a link.

ID_DENIED
This field displays the number and percentage of ID_DENIED messages encountered on a link.

ID_CHK_REQ
This field displays the number and percentage of ID_CHK_REQ messages encountered on a link.

ID_CHK_RESP
This field displays the number and percentage of ID_CHK_RESP messages encountered on a link.

ID_REMOVE
This field displays the number and percentage of ID_REMOVE messages encountered on a link.

ID_VERIFY
This field displays the number and percentage of ID_VERIFY messages encountered on a link.

LEVEL 3 APPLICATION STATISTICS SCREEN

The Level 3 Application statistics screen displays messages contained in the information count of the Level 2 Statistics screen (see **Figure 9.29**). Message types not defined by the current protocol are displayed with their hexadecimal equivalent. Message types vary depending on the selected protocol. All statistical data is accumulated regardless of any capture filters that may be in place, unless the Post Filter Stats option is selected. The Post Filter Stats option filters messages before statistics are collected (see "ISDN Filters" on page 44 of this guide).

✍ *The Level 2 Statistics screen is described in "Level 2 Statistics Screen" on page 351 of this guide.*

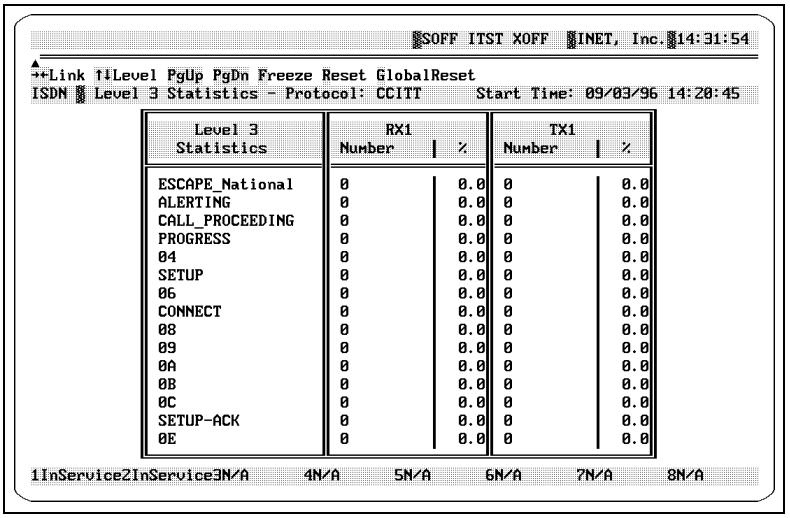


Figure 9.29 - Level 3 Application Statistics Screen

Level 3 Application Statistics Screen Definitions

→← Link
Press the →← keys to move between possible links.

↑↓Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

PgUp, PgDn
Press the PageUp and PageDown keys to advance through the user part message display.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Protocol (V5.1 protocol only)
Press the P key to cycle through message statistics for a subprotocol. Options for subprotocols are ISDN, Public Switched Telecom Network (PSTN), and Control.

Protocol (V5.2 protocol only)
Press the P key to cycle through message statistics for a subprotocol. Options for subprotocols are ISDN, Bearer Channel Connection (BCC), Protection, and Link Control.

PBX<->ET (DASS protocol only)
Press the P key to cycle through statistics for messages sent from either the Private Branch Exchange (PBX) or messages sent from the Exchange Termination (ET); PBX->ET (Network to User) or ET->PBX (User to Network).

Message Group (DPNSS protocol only)
Press the M key to cycle through statistics for messages from a Message Group. Options for DPNSS message groups are Call Control message group, End-to-End message group, and Link-by-Link message group.

Protocol
This field displays the current protocol for the displayed statistics.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

Number
This field displays the number of messages by type in the current statistics tracking period.

%
This field provides the overall percentage of messages by type. The percentage is based on the total number of messages processed in the current statistics tracking period.

RX1
This column displays messages received on the current link. Press the →← keys to toggle through the available links.

TX1
This column displays messages transmitted on the current link. Press the →←keys to toggle through the available links.

Message Types
Message types vary depending on the selected protocol. Message types not defined by the current protocol are displayed with their hexadecimal equivalent. Refer to the Q.931 Specification for more information on the individual message types for which statistics are provided.

BRI S/T FRAME STATISTICS SCREEN

The BRI S/T Frame Statistics screen displays detailed frame processing of Level 1 information by link. It is valid only when using a BRI interface.

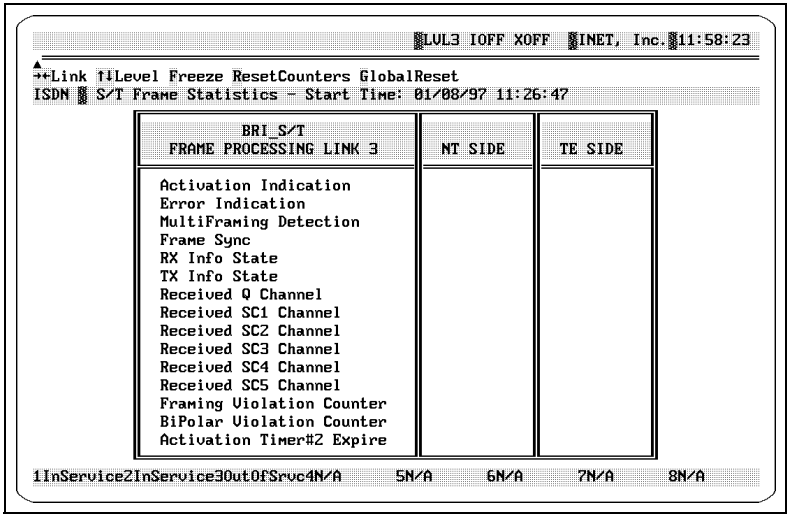


Figure 9.30 - BRI S/T Frame Statistics Screen

Press the ↑ key once to scroll down the BRI S/T Frame Statistics screen to view the remaining statistics available for this screen. Press the ↓ key once to return to the first page of this screen.

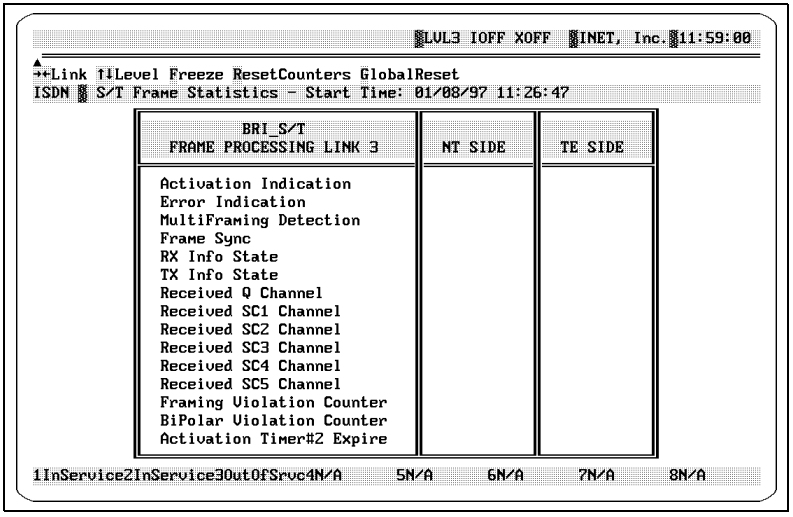


Figure 9.31 - BRI S/T Frame Statistics Screen

✍ *If no BRI interface is in use on the displayed link when the screen is accessed, the message "Link is not a BRI S/T" is displayed.*

BRI S/T Frame Statistics Screen Definitions

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

ResetCounters
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date. This option only appears in the direction line for the second portion of the BRI/ST Statistics screen (press the ↓ key once).

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

NT SIDE
This column displays occurrences of each parameter by number for the network (NT).

TE SIDE
This column displays occurrences of each parameter by number for the terminal equipment (TE).

The following are the Level 1 Statistics displayed for BRI S/T interfaces. Statistics are displayed for both the NT and the TE.

Activation Indication
This field indicates that the BRI NT/TE is fully activated in Level 1.The values displayed for this field are True or False. For the correct mode of operation, the activation indication is True for both the NT and the TE.

Error Indication
This field indicates an error by the activation state machine of the transceiver. The values displayed for this field are True or False.

Multiframing Detection
This field indicates that multiframing has been detected from the NT. This function applies to the TE only. The values displayed for this field are True or False.

Frame Synch
This field indicates whether frame synchronization is achieved. The values displayed for this field are True or False. For the correct mode of operation, frame sync is True for both the NT and the TE.

RX Info State
This field indicates the status of the received signal. The values displayed for this field are INFO0, INFO1, INFO2, INFO3, INFO4, or INFOX (where X is none of the above).

TX Info State
This field indicates the status of the transmitted signal. The values displayed for this field are INFO0, INFO1, INFO2, INFO3, INFO4, or INFOX (where X is none of the above).

Received Q Channel
When the device is configured as a NT, and multiframing has been enabled, this numeric value indicates the receipt of a Q channel nibble from the TE(s). This function is applicable to the NT only.

Received SC1 Channel
In the NT mode of operation, this bit corresponds to Subchannel 1 for transmission to the TE(s).

Received SC2 Channel
In the NT mode of operation, this bit corresponds to Subchannel 2 for transmission to the TE(s).

Received SC3 Channel
In the NT mode of operation, this bit corresponds to Subchannel 3 for transmission to the TE(s).

Received SC4 Channel
In the NT mode of operation, this bit corresponds to Subchannel 4 for transmission to the TE(s).

Frame Violation Counter
This field counts the number of frames not containing the correct number of Alternate Mark Inversion (AMI) violations.

Bipolar Violation Counter
This field counts the number of Unbalanced frames—frames in which the total number of +VE pulses is not equal to the number of -VE pulses.

Activation Timer #2
The NT configured S/T transceiver uses a value of 50 ms or 100 ms for Timer #2.

Activation Request
When this field displays Enabled, a request to activate is passed to the activation state machine within the S/T transceiver.

Deactivation Request
When this field displays Disabled, a request to deactivate is passed to the activation state machine within the S/T transceiver. This function is applicable to the NT only.

Enable B1 Channel
When this field displays Disabled, data that is received in the B1 channel timeslot is modulated onto the S/T interface in the B1 channel timeslot. This function is applicable to the TE only.

Enable B2 Channel
When this field displays Disabled, data that is received in the B2 channel timeslot is modulated onto the S/T interface in the B2 channel timeslot. This function is applicable to the TE only.

Invert B1 Channel
When this field displays Disabled, data that is received in the B1 channel timeslot is transmitted normally. When this field displays Disabled, data is inverted prior to transmission on the S/T loop in the B1 timeslot.

Invert B2 Channel
When this field displays Disabled, data that is received in the B2 channel timeslot is transmitted normally. When this field displays Enabled, data is inverted prior to transmission on the S/T loop in the B2 timeslot.

B1 Loopback
When this field displays Disabled, the device functions normally. When this field displays Enabled the device enters a B1 S/T loopback transparent mode.

B2 Loopback
When this field displays Disabled, the device functions normally. When this field displays Enabled, the device enters a B2 S/T loopback transparent mode.

Activation Proc Ignored
When this field displays Disabled, the transceiver functions normally. When this field displays Enabled, the transmit section of the transceiver is forced into the highest information state.

D-Channel Proc Ignored
When this field displays Disabled, the device adheres to D-Channel procedures. When this field displays Enabled, the device does not adhere to D-Channel procedures. This function is applicable to the TE only.

Enable Multiframing
When this field displays Disabled, multiframing is disabled. When this field displays Enabled, multiframing is enabled. This function is applicable to the NT only.

Invert E channel
This field is used to determine the polarity of the transmitted E echo channel from the NT to the TE. When this field displays Disabled, the polarity of the transmitted E echo channel from the NT to the TE is the same as the previously demodulated D bit from TE(s). When this field displays Enabled, these are logical inverses of one another. This function is applicable to the NT only.

Receive E Channel
When this field displays Disabled, the TE outputs the demodulated D-Channel data in the D timeslot on the IDL Tx. When this field displays Enabled, the TE outputs the demodulated E channel data in the D timeslot on the IDL Tx. This function is applicable to the TE only.

Ignore INFO1
When this field displays Disabled, the NT functions normally. When this field displays Enabled, the NT does not react to INFO1 from the TE. This function is applicable to the NT only.

Ignore INFO3
When this field displays Disabled, the NT functions normally. When this field displays Enabled, the NT does not react to INFO3 from the TE. This function is applicable to the NT only.

X.25 BASIC STATISTICS

The X.25 Basic Statistics screens display the results of communication transactions during tests run under the F2 Run function. The X.25 Basic Statistics screens are shown in **Figure 9.32**.

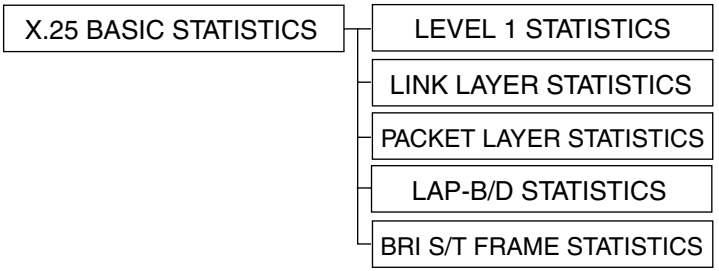


Figure 9.32 - X.25 Basic Statistics Screens

LEVEL 1 STATISTICS SCREEN

The Level 1 Statistics screen displays detailed statistics of hardware-related information. Level 1 statistics are only valid with DS1 (T1), E1 (CEPT), and BRI interfaces. If no DS1, E1, or BRI interface is in use on the displayed link when the screen is accessed, a “Link is not DS1/CEPT/BRI” message is displayed.

In the Monitor mode, this screen provides the DS1/E1 status and statistical information for both DS1/E1 monitor inputs (R and T channels). If the link is configured in the Emulation mode, only one DS1/E1 interface is active per link (see **Figure 9.33**). The statistical and status information provided reflect this information.

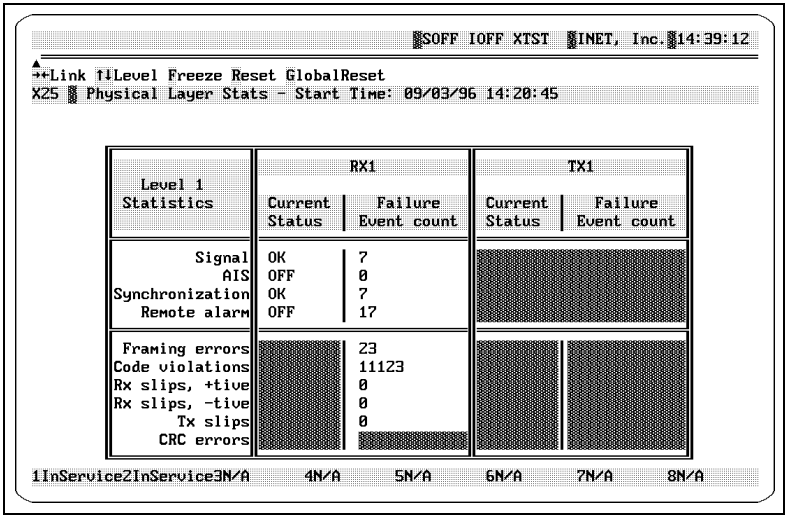


Figure 9.33 - Level 1 Statistics Screen

Level 1 Statistics Screen Definitions

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

RX1
This column displays Level 1 Parameters received on the current link. Press the →← keys to toggle through the available links.

TX1
This column displays Level 1 Parameters transmitted on the current link. Press the →← keys to toggle through the available links.

Current Status
The current status column provides information on the status of the following fields.

Signal
This field indicates the current status of an incoming signal. Possible states are OK (normal) and Loss of Signal (fail).

AIS
This field indicates the current status of the AIS. Possible states are OFF (normal) and ON (fail).

Synchronization
This field indicates the current status of the frame synchronization. Possible states are OK (normal) and Loss of Sync (fail).

Remote Alarm
This field indicates the current status of the remote alarm. Possible states are OFF (normal) and ON (fail).

Failure Event Count
This field indicates the total number of failures experienced by a particular Level 1 parameter.

Signal
This field indicates the number of times a loss of signal condition was detected.

AIS
This field indicates the number of times an incoming AIS (or Blue Alarm) was detected.

Synchronization
This field indicates the number of times frame synchronization loss was detected.

Remote Alarm
This field indicates the number of times a remote alarm signal (or Yellow Alarm) was detected.

Framing Errors
This field displays the number of detected framing errors.

Code Violations
This field displays the number of detected line code violations.

Rx Slips, +tive
This field displays the number of positive receive timing slips detected.

Rx Slips, -tive
This field displays the number of negative receive timing slips detected.

Tx Slips
This field displays the number of transmit timing slips detected. This is valid only when the DS1 link is used in emulation modes.

CRC Errors
This field displays the number of checksum errors detected. This is valid only for ESF DS1 applications.

LINK LAYER STATISTICS SCREEN

The Link Layer Statistics screen displays detailed statistics about LAPB/LAPD information. The screen includes information about messages and zero insertions/deletions (see **Figure 9.34**). All statistical data is accumulated regardless of any capture filters that may be in place, unless the Post Filter Stats option is selected. The Post Filter Stats option filters messages before statistics are collected (see "X.25 Filters" on page 63 of this guide).

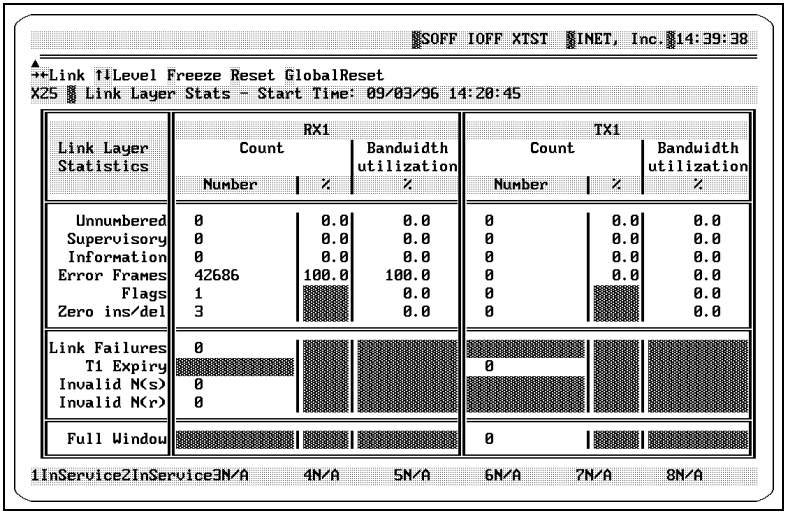


Figure 9.34 - Link Layer Statistics Screen

Link Layer Statistics Screen Definitions

→←Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

RX1
This column displays frames received on the current link. Press the →← keys to toggle through the available links.

TX1
This column displays frames transmitted on the current link. Press the →← keys to toggle through the available links.

Count
This column tracks the occurrences of each parameter by number and percentage. There are two Count columns: received and sent (transmitted).

Number
This field displays the number of occurrences of each parameter in the current statistics tracking period.

%
This field provides a view of the overall percentage of messages or errors that have occurred. The percentage is based on the total number of messages processed in the current statistics tracking period.

Bandwidth Utilization %
This column displays the total percentage of bandwidth used by the various messages, flags, and zero insertions received and sent (transmitted).

Unnumbered
This field displays the number of Unnumbered frames encountered during the current statistics tracking period. An unnumbered frame is used to provide additional data link control functions.

Supervisory
This field displays the number of Supervisory frames encountered during the current statistics tracking period. A supervisory frame is used to perform data link supervisory control functions such as acknowledge I frames, request retransmission of I frames, and to request a temporary suspension of transmission of I frames.

Information
This field displays the number of Information frames encountered during the current statistics tracking period. An I frame is used to perform an information transfer.

Error Frames
This field displays the number of Errored frames encountered during the current statistics tracking period. (Errored frames are frames that contain Long frames, Short frames, Errored CRC frames, etc.)

Flags
This field displays the number of flag delimiters encountered during the current statistics tracking period.

Zero ins/del
This field displays the total number of zeros inserted and deleted.

Link failures
This field is not currently in use.

T1 Expiry
This field displays the number of times that the T1 timer expires. The T1 timer can be set in the Level 2 Parameters under the X.25 Configure option (as discussed in the "Level 2 Parameters" on page 233 of the ***Spectra Setup and Configuration Guide***).

Invalid N(s)
This field displays the number of Invalid N(S) encountered during the current statistics tracking period. Invalid N(S) occurs when an I frame received contains an N(S) that is not equal to the receive state variable V(R) at the receiver. V(R) denotes the sequence number of the next in-sequence I frame to be transmitted.

Invalid N(r)
This field displays the number of Invalid N(R) encountered during the current statistics tracking period. Invalid N(R) occurs when an I frame received contains an N(R) that is not equal to the send state variable V(S) at the receiver. V(S) denotes the sequence number of the next in-sequence I frame to be transmitted.

Full Window
This field displays the number of times that a link layer window is full. The size of the window refers to the maximum number of outstanding I frames. Window size is set to 7 for basic and 127 for extended.

PACKET LAYER STATISTICS SCREEN

The Packet Layer Statistics screen displays detailed statistics about resets, restarts, and interrupts that have occurred on Spectra system links.

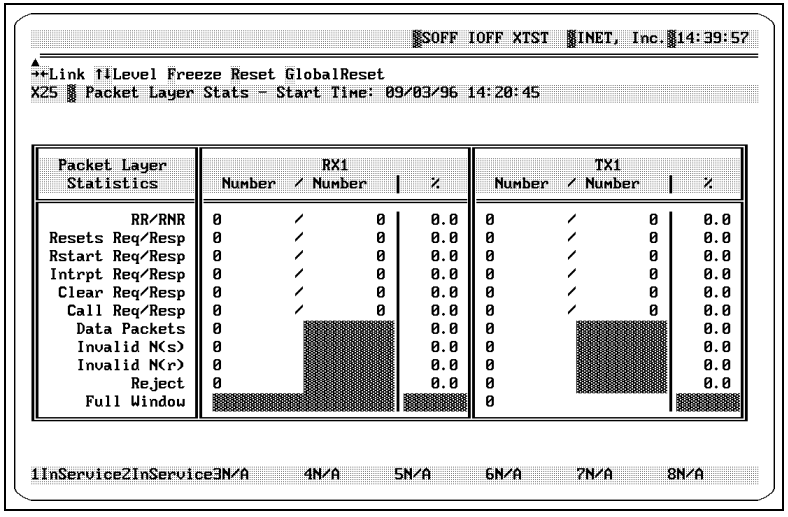


Figure 9.35 - Packet Layer Statistics Screen

Packet Layer Statistics Screen Definitions

→←Link
Press the →← keys to move between possible links.

↑↓Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Start Time
This field, located in the information line, displays the time and date the Spectra system began the current statistics tracking period. The Start Time is reset using the Reset option (press the R key).

✍ *If the Start Time field is reset, the statistics counters for the link that appears on the screen are also reset to zero.*

RX1
This column displays packets received on the current link. Press the →← keys to toggle through the available links.

TX1
This column displays packets transmitted on the current link. Press the →← keys to toggle through the available links.

Number
These two columns display the total number of packets by parameter encountered during the current statistics tracking period with the exception of the Full Window line. For information about the Full Window line, refer to "Full Window" on page 373 of this guide. There are two sets of columns: one for packets received and one for packets transmitted (sent).

%
This field displays the percentage of packets in relation to the total number of packets encountered during the current statistics tracking period.

RR/RNR
This field displays the number and percentage of RR and RNR packets encountered during the communication process. RR packets are used by the peer side to indicate that it is ready to receive data packets. RNR packets are sent by the peer side to indicate that it is temporarily not ready to receive any data packets.

Reset Req/Resp
This field displays the number and percentage of packet level circuit reset packets encountered during the communication process. Individual circuits are reset automatically when, for example, errors occur on a circuit. Circuits can also be reset manually under the PVC Reset option in the F8 Tools menu.

Restart Req/Resp
This field displays the number and percentage of packet layer restart packets encountered during the communication process. All circuits are restarted automatically when, for example, a link is taken out of service. Circuits can also be reset manually under the PVC Restart option or the PVC Reset option in the F8 Tools menu.

Interrupt Req/Resp
This field displays the number and percentage of Interrupt packets encountered during the communication process. Interrupt packets are messages that are sent immediately without going through the standard sequencing procedures. Interrupt packets can only be received by the Spectra system.

Clear Req/Resp
This field displays the number and percentage of Clear Req/Resp packets encountered during the communication process. Clear Req includes Clear Request and Clear Indication packets. Clear Resp includes Clear Confirmation packets. These packets are used to clear a particular Switched Virtual Circuit (SVC). This virtual circuit is in the ready state after it has been cleared. A SVC circuit can be cleared manually under the Clear A SVC Call option in the F8 Tools menu.

Call Req/Resp
This field displays the number and percentage of Call Req/Resp packets encountered during the communication process. Call Req includes Call Request and Incoming Call packets. Call Resp includes Call Accepted and Call Connected packets. These packets are used to establish a SVC. This virtual circuit can be cleared by sending Clear packets. A SVC circuit can be established manually under the Establish A SVC Call option in the F8 Tools menu.

Data Packets/bps
This field displays the number and percentage of Data Packets encountered during the communication process as well as the rate of transmission (in bits per second) of the data portion of the message. The rate of transmission displays the number of bits transmitted in the last one second interval. It does not display the average bits per second. Data Packets are information packets that contain user data.

Invalid P(s)
This field displays the number and percentage of Invalid Send Sequence Number packets encountered in the packet layer.

Invalid P(r)
This field displays the number and percentage of Invalid Receive Sequence Number packets encountered in the packet layer.

Reject
This field displays the number and percentage of Reject packets encountered during the communication process. Reject packets are sent by the Data Terminal Equipment (DTE) to request retransmission of one or several consecutive Data Communication Equipment (DCE) data packets.

Full Window
This field displays the number of times that the packet layer window is full. Window size is defined by the user in the Packet Layer Parameters under the X.25 Configuration. Because it is not a packet, Full Window does not have an entry in the percentage column.

LAP-B/D STATISTICS SCREEN

The LAP-B/D Statistics screen displays detailed statistics of the LAPB and LAPD information received and transmitted on each link. All statistical data is accumulated regardless of any capture filters that may be in place, unless the Post Filter option is selected. The Post Filter Stats option filters messages before statistics are collected (see "X.25 Filters" on page 63 of this guide). The LAP-B/D Statistics screen is pictured in **Figure 9.36**.

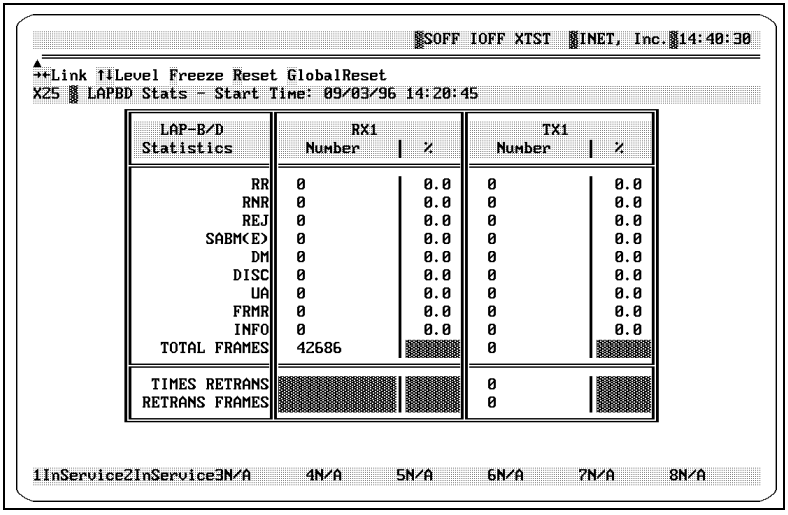


Figure 9.36 - LAP-B/D Statistics Screen

LAP-B/D Statistics Screen Definitions

→←Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

Freeze
Press the F key to freeze and unfreeze the screen. This option freezes the screen display but continues to update internal system statistics counters. When you press the F key, a "Display frozen. Press F again to update." message appears in the top border line. Press the F key again to unfreeze and update the screen.

Reset
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date.

GlobalReset
Press the G key to reset system statistics at all levels for all the links in the system.

Number
This field displays the total number of frames encountered during the current statistics tracking period.

%
This field displays the percentage of frames utilized in relation to the total number of frames encountered during the current statistics tracking period.

RR
This field displays the number and percentage of the LAP-B/D RR command and response messages encountered during the communication process. The RR supervisory frame is sent by the DCE or the DTE to indicate that it is ready to receive I frames and ready to acknowledge previously received I frames.

RNR
This field displays the number and percentage of the LAP-B/D RNR command and response messages encountered during the communication process. The RNR supervisory frame is used by the DCE or the DTE to indicate a busy connection. This means that the DCE or DTE is temporarily unable to accept any I frames. The RNR supervisory frame also acknowledges previously received I frames.

REJ
This field displays the number and percentage of the LAP-B/D REJ command and response messages encountered during the communication process. The REJ supervisory frame is used by the DCE or the DTE to retransmit any I frame numbered N(R) and above. All I frames numbered N(R)-1 and below are acknowledged.

SABM(E)
This field displays the number and percentage of the LAP-B/D Set Asynchronous Balanced Mode (SABM) command and Set Asynchronous Balanced Mode Extended (SABME) command messages. The SABM and SABME unnumbered command is used by the DCE or the DTE to begin link initialization. It also indicates the clearance of the busy condition reported by the previous RNR supervisory frame sent by the same DTE or DCE.

DM
This field displays the number and percentage of the LAP-B/D DM response messages encountered during the communication process. The DM unnumbered response is used to indicate that the DCE or the DTE is disconnected from the data link and is in the disconnected phase.

DISC
This field displays the number and percentage of the LAP-B/D DISC command messages encountered during the communication process. The DISC unnumbered response is used to terminate the mode that was previously set.

UA
This field displays the number and percentage of the LAP-B/D UA response messages encountered during the communication process. The UA unnumbered response is used by the DCE or the DTE to acknowledge the receipt of a mode-setting command (such as a SABM command).

FRMR
This field displays the number and percentage of the LAP-B/D Unnumbered Frame Reject (FRMR) response messages encountered during the communication process. The FRMR unnumbered response is used by the DCE or the DTE to indicate an error condition which cannot be recovered by the retransmission of the same frames.

INFO
This field displays the number and percentage of the LAP-B/D Information frames (I frames) encountered during the communication process. The I frame is used for information transfer. Each I frame has an N(S) and an N(R).

TOTAL FRAMES
This field displays the total number of frames encountered during the current statistics tracking period.

TIMES RETRANS
This field displays the total number of times a retransmission of frames has occurred during the current statistics tracking period. A retransmission occurs when a REJ frame is received.

RETRANS FRAMES
This field displays the total number of frames that have been retransmitted. A retransmission occurs when a REJ frame is received.

BRI S/T FRAME STATISTICS SCREEN

The BRI S/T Frame Statistics screen displays detailed frame processing of Level 1 information by link. It is valid only in the BRI interface.

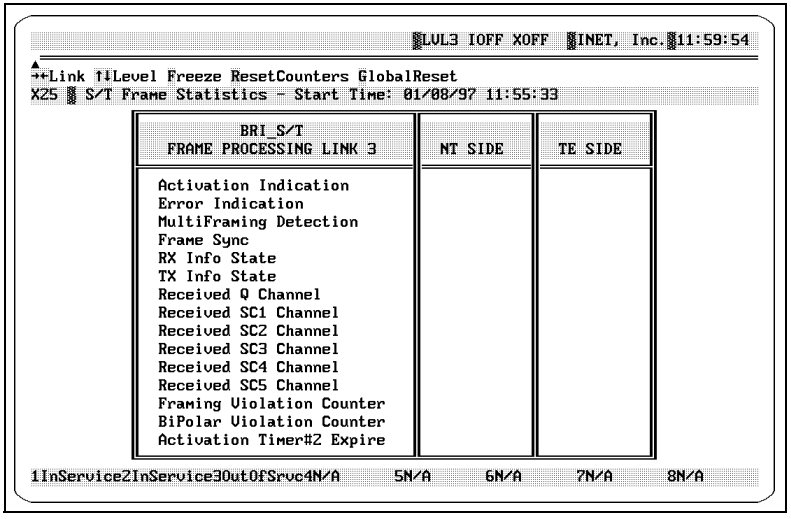


Figure 9.37 - BRI S/T Frame Statistics Screen

Press the ↑ key once to scroll down the BRI S/T Frame Statistics screen to view the remaining statistics available for this screen. Press the ↓ key once to return to the first page of this screen.

✍ *If no BRI interface is in use on the displayed link when the screen is accessed, the message "Link is not a BRI S/T" is displayed.*

BRI S/T Frame Statistics Screen Definitions

→← Link
Press the →← keys to move between possible links.

↑↓ Level
Press the ↑↓ keys to cycle through the various levels of statistics screens.

ResetCounters
Press the R key to reset the statistics counters to zero for the link that appears on the screen. This option also resets the Start Time, located in the information line near the top of the screen, to the current time and date. This option only appears in the direction line for the second portion of the BRI/ST Statistics screen (press the ↓ key once).

NT SIDE
This column displays occurrences of each parameter by number for the network (NT).

TE SIDE
This column displays occurrences of each parameter by number for the terminal equipment (TE).

The following are the Level 1 Statistics displayed for BRI S/T interfaces. Statistics are displayed for both the NT and the TE.

Activation Indication
This field indicates that the BRI NT/TE is fully activated in a Level 1 sense. The values displayed for this field are True or False. For the correct mode of operation, the activation indication is True for both the NT and the TE.

Error Indication
This field indicates an error by the activation state machine of the transceiver. The values displayed for this field are True or False.

Multiframing Detection
This field indicates that multiframing has been detected from the NT. This function applies to the TE only. The values displayed for this field are True or False.

Frame Sync
This field indicates whether frame synchronization is achieved. The values displayed for this field are True or False. For the correct mode of operation, frame sync should be True for both the NT and the TE.

Rx Info State
This field indicates the status of the received signal. The values displayed for this field are INFO0, INFO1, INFO2, INFO3, INFO4, or INFOX (where X is none of the above).

Tx Info State
This field indicates the status of the transmitted signal. The values displayed for this field will be INFO0, INFO1, INFO2, INFO3, INFO4, or INFOX where X is none of the above.

Received Q Channel
When the device is configured as an NT and when multiframing has been enabled, this numerical value indicates the receipt of a Q channel nibble from the TE(s). This function is applicable to the NT only.

Received SC1 Channel
In NT mode of operation, this bit corresponds to Subchannel 1 for transmission to the TE(s).

Received SC2 Channel
In the NT mode of operation, this bit corresponds to Subchannel 2 for transmission to the TE(s).

Received SC3 Channel
In the NT mode of operation, this bit corresponds to Subchannel 3 for transmission to the TE(s).

Received SC4 Channel
In the NT mode of operation, this bit corresponds to Subchannel 4 for transmission to the TE(s).

Received SC5 Channel
In the NT mode of operation, this bit corresponds to Subchannel 5 for transmission to the TE(s).

Frame Violation Counter
This field counts the number of frames not containing the correct number of AMI violations.

Bipolar Violation Counter
This field counts the number of unbalanced frames—frames in which the total number of +VE pulses is not equal to the number of -VE pulses.

Activation Timer #2
The NT configured S/T transceiver uses a value of 50 ms or 100 ms for Timer #2.

Activation Request
When this field displays Enabled, a request to activate is passed to the activation state machine within the S/T transceiver.

Deactivation Request
When this field displays Disabled, a request to deactivate is passed to the activation state machine within the S/T transceiver. This function is applicable to the NT only.

Enable B1 Channel
When this field displays Disabled, data that is received in the B1 channel timeslot is modulated onto the S/T interface in the B1 channel timeslot. This function is applicable to the TE only.

Enable B2 Channel
When this field displays Disabled, data that is received in the B2 channel timeslot is modulated onto the S/T interface in the B2 channel timeslot. This function is applicable to TE only.

Invert B1 Channel
When this field displays Disabled, data that is received in the B1 channel timeslot is transmitted normally. When this field displays Enabled, data is inverted prior to transmission on the S/T loop in the B1 timeslot.

Invert B2 Channel
When this field displays Disabled, data that is received in the B2 channel timeslot is transmitted normally. When this field displays Enabled, data is inverted prior to transmission on the S/T loop in the B2 timeslot.

B1 Loopback
When this field displays Disabled, the device functions normally. When this field displays Enabled, the device enters a B1 S/T loopback transparent mode.

B2 Loopback
When this field displays Disabled, the device functions normally. When this field displays Enabled, the device enters a B2 S/T loopback transparent mode.

Activation Proc Ignored
When this field displays Disabled, the transceiver functions normally. When this field displays Enabled, the transmit section of the transceiver is forced into the highest information state.

D-Channel Proc Ignored
When this field displays Disabled, the device adheres to D-Channel procedures. When this field displays Enabled, the device does not adhere to D-Channel procedures. This function is applicable to the TE only.

Enable Multiframing
When this field displays Disabled, multiframing is disabled. When this field displays Enabled, multiframing is enabled. This function is applicable to the NT only.

Invert E-channel
This field is used to determine the polarity of transmitted E echo channel from the NT to the TE. When this field displays Disabled, the polarity of the transmitted E echo channel from the NT to the TE is the same as the previously demodulated D bit from the TE(s). When this field displays Enabled, these are logical inverses of one another. This function is applicable to the NT only.

Receive E-Channel
When this field displays Disabled, the TE outputs the demodulated D-Channel data in the D timeslot on the IDL Tx. When this field displays Enabled, the TE outputs the demodulated E channel data in the D timeslot on the IDL Tx. This function is applicable to the TE only.

Ignore INFO1
When this field displays Disabled, the NT functions normally. When this field displays Enabled, the NT does not react to INFO1 from TE. This function is applicable to the NT only.

Ignore INFO3
When this field displays Disabled, the NT functions normally. When this field displays Enabled, the NT does not react to INFO3 from TE. This function is applicable to the NT only.

10 Alarms

OVERVIEW

The Spectra system provides real-time reporting by triggering alarms when specific conditions are detected. These alarms can help pinpoint the source of a problem so that it may be resolved before it spreads throughout the network.

Additionally, through its self-monitoring capability, the Spectra system can trigger alarms to report database changes, user logins and logouts, and other operational conditions. These informational tools are invaluable for identifying and pinpointing potential problems and for analyzing link, linkset, and node performance.

When an alarm is triggered according to the occurrence parameters established in its Alarm Traits screen, the alarm's individual alarm weight may be added to or subtracted from the total system alarm weight, depending on the user-defined severity of the alarm. Alarm weights for alarms with Minor, Major, or Critical severity are added to the system alarm level; alarm weights for alarms with Clear severity are subtracted from the alarm level. Informational alarm weights are neither added to nor subtracted from the system alarm level.

Alarms may also generate alarm messages when triggered. Alarm messages may be sent to printer or to disk. Alarm destination and occurrence traits are user-definable and can be modified while a test is running. Traits may be set independently for individual alarms to allow maximum flexibility in alarm message routing and triggering conditions.To access the Alarms menu, press the F4 key.

A Maintenance option is included so that you can view alarm reports. The Maintenance option automatically deletes alarm files according to a user-defined schedule to allow custom archiving of data.

ALARM MESSAGE FORMAT

When an alarm is triggered, its individual alarm weight is added to the system weight. Additionally, the alarm may generate an alarm message to be sent to disk, printer, or a remote station, as defined in the alarm's Alarm Traits screen. If sent to disk, alarm messages are appended to the daily alarm report in the `C:\SPECTRA\REPORTS\ALARMS` directory. Daily alarm reports are stored using the date they were generated (in YY/MM/DD format) as for the file name. Alarm message report files can be viewed using the View Alarms option under the Maintenance options menu (press the F4 key), or the View File option under the DOS Commands option (press the F8 key).

Alarm messages display information about an alarm in a certain format (see **Figure 10.1**). All fields are separated by a single space, with the exception of Message Length and Record Type. The example messages in this guide have been split into two lines for easier reading. Actual alarm messages appear on a single line. A sample alarm message for each alarm is provided in "System Alarms" on page 388 of this guide.

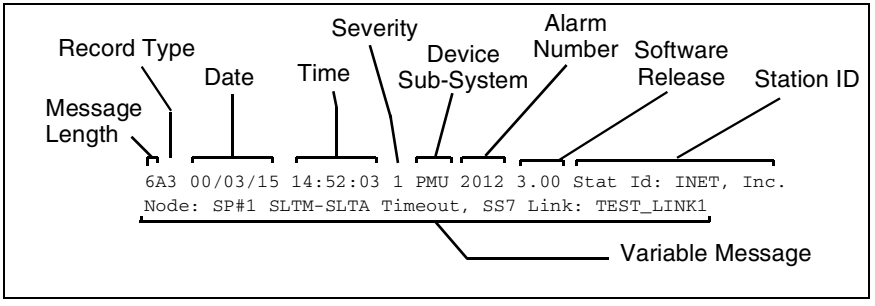


Figure 10.1 - Alarm Message Format

DEFINITIONS OF ALARM MESSAGE FIELDS

Message Length
This field displays the total message byte length in hexadecimal Least Significant Bit (LSB) Most Significant Bit (MSB) format.

Record Type
This field displays a "1" for a heartbeat record and a "3" for alarm messages.

Date
This field displays the date the alarm message was generated (in YY/MM/DD format).

Time
This field displays the time the alarm message was generated (in HH:MM:SS format).

Severity
This field displays the severity code of the alarm message as it was established in the Alarm Trait Parameter screen. The following list describes the available severity codes:

0	CLEAR
1	CRITICAL
2	MAJOR
3	MINOR
4	INFORMATIONAL

Device Sub-System
This field always displays the Protocol Monitoring Unit (PMU) as the device that detected the alarm condition.

Message Number
This field displays the number of the alarm that generated the alarm message.

Software Release
This field displays the current version of the Spectra system software.

Station ID
This field displays the Station ID of the station that generated the alarm message.

Variable Message
This field displays a description of the alarm and details about the conditions of the alarm. Refer to "System Alarms" on page 388 of this guide for an example of each alarm message.

SYSTEM ALARMS

System alarms are triggered by events occurring within the Spectra system itself, such as exceeding disk capacity, board failures/recoveries, logins, logouts, and database changes. Spectra system alarms are active in all modes.

The Spectra system alarms, listed by alarm number, are described in the following pages. An example of an alarm message generated by each alarm is also provided.

2250 Heartbeat Delta Time
A heartbeat alarm has been sent by the Spectra system, indicating that the Spectra system is still active. Heartbeat alarms are typically sent to a remote port so other facilities can detect a failure of the Spectra system if the heartbeat alarm is not received. The time interval between heartbeat alarms is specified by the user in the Alarm Trait screen.

```
481 00/04/13 14:52:03 1 PMU 2250 3.00
StatId: INET, Inc. Heartbeat
```

2251 User Logged In
A Spectra system user has logged in.

```
783 00/04/13 14:52:03 1 PMU 2251 3.00
StatId: INET, Inc. User Logged In Date:
00/04/13 Time: 14:52:03 UserId: User111
```

2252 User Logged Out
A Spectra system user has logged out intentionally or has been logged out automatically by the Spectra system after a period of inactivity. The automatic logout time for each user is defined by the System Administrator in the Password Setup screen.

```
796 00/04/13 14:52:03 1 PMU 2252 3.00
StatId: INET, Inc. User Logged Out Date:
00/04/13 Time: 14:52:03 UserId: User111
```

2253 Board Failure
A Data Link Processor board in the Spectra system has failed or has become unavailable while being reset by the Reset I/O Interface option in the F8 Tools menu.

```
63D 00/04/13 14:52:03 1 PMU 2253 3.00
StatId: INET, Inc. Board Failure Board
Number: 3
```

2254 Primary Disk 70 Percent Full
The primary data capture disk drive is greater than or equal to 70 percent full.

```
633 00/04/13 14:52:03 1 PMU 2254 3.00
StatId: INET, Inc. Primary Disk 70% Full
```

2255 Primary Disk 80 Percent Full
The primary data capture disk drive is greater than or equal to 80 percent full.

```
633 00/04/13 14:52:03 1 PMU 2255 3.00
StatId: INET, Inc. Primary Disk 80% Full
```

2256 Primary Disk 90 Percent Full
The primary data capture disk drive is greater than or equal to 90 percent full.

```
633 00/04/13 14:52:03 1 PMU 2256 3.00
StatId: INET, Inc. Primary Disk 90% Full
```

2257 Primary Disk 100 Percent Full
The primary data capture disk drive is 100 percent full.

```
643 00/04/13 14:52:03 1 PMU 2257 3.00
StatId: INET, Inc. Primary Disk 100% Full
```

2258 Secondary Disk 70 Percent Full
The secondary data capture disk drive is greater than or equal to 70 percent full.

```
653 00/04/13 14:52:03 1 PMU 2258 3.00
StatId: INET, Inc. Secondary Disk 70% Full
```

2259 **Secondary Disk 80 Percent Full**
The secondary data capture disk drive is greater than or equal to 80 percent full.

```
653 00/04/13 14:52:03 1 PMU 2259 3.00
StatId: INET, Inc. Secondary Disk 80% Full
```

2260 **Secondary Disk 90 Percent Full**
The secondary data capture disk drive is greater than or equal to 90 percent full.

```
653 00/04/13 14:52:03 1 PMU 2260 3.00
StatId: INET, Inc. Secondary Disk 90% Full
```

2261 **Secondary Disk 100 Percent Full**
The secondary data capture disk drive is 100 percent full.

```
763 00/04/13 14:52:03 1 PMU 2261 3.00
StatId: INET, Inc. Secondary Disk 100% Full
Overwriting Previous Data
```

2262 **Capture Memory 70 Percent Full**
The internal capture buffer is 70 percent full.

```
4F3 00/04/13 14:52:03 1 PMU 2262 3.00
StatId: INET, Inc. Capture RAM 70% Full
```

2263 **Capture Memory 80 Percent Full**
The internal capture buffer is 80 percent full.

```
4F3 00/04/13 14:52:03 1 PMU 2263 3.00
StatId: INET, Inc. Capture RAM 80% Full
```

2264 **Capture Memory 90 Percent Full**
The internal capture buffer is 90 percent full.

```
4F3 00/04/13 14:52:03 1 PMU 2264 3.00
StatId: INET, Inc. Capture RAM 90% Full
```

2265 **Capture Memory 100 Percent Full**
The internal capture buffer is 100 percent full.

```
503 00/04/13 14:52:03 1 PMU 2265 3.00
StatId: INET, Inc. Capture RAM 100% Full
```

2266 Database File Change
The user has changed the configuration database by selecting either Apply & Save Config or Save Configuration from the F1 Setup menu.

```
663 00/04/13 14:52:03 1 PMU 2266 3.00
StatId: INET, Inc. Database Has Changed
Date 00/04/13 Time: 14:52:03 UserId: USER1
Table: F8 Tools Option menu
```

2267 Remote User Log In
A remote user has logged in to the Spectra system.

```
683 00/04/13 14:52:03 1 PMU 2267 3.00
StatId: INET, Inc. Remote User Logged In
Date: 00/04/13 Time: 14:52:03 UserId: USER2
```

2268 Remote User Log Out
A remote user has logged out of the Spectra system intentionally or has been logged out automatically by the Spectra system after a period of inactivity. The automatic logout time for each user is defined by the System Administrator in the Password Setup screen.

```
693 00/04/13 14:52:03 1 PMU 2268 3.00
StatId: INET, Inc. Remote User Logged Out
Date: 00/04/13 Time: 14:52:03 UserId: USER2
```

2269 Secondary Disk Failure
The secondary disk has failed due to a hardware problem.

```
593 00/04/13 14:52:03 1 PMU 2269 3.00
StatId: INET, Inc. Secondary Disk Failure
```

2270 Primary Disk Failure
The primary disk has failed due to a hardware problem.

```
573 00/04/13 14:52:03 1 PMU 2270 3.00
StatId: INET, Inc. Primary Disk Failure
```

2273 Board Recovered
A failed Data Link Processor board in the Spectra system has recovered.

```
643 00/04/13 14:52:03 1 PMU 2274 3.00
StatId: INET, Inc. Board Recovered Board
Number: 12
```

2274 **Exit To DOS**
The user has exited to DOS.

```
643 00/04/13 14:52:03 1 PMU 2275 3.00
StatId: INET, Inc. Exit To DOS UserId:
USER1
```

2275 **Alarm Message Overflow**
Alarm messages have overflowed the buffer for the X.25 Remote Alarm Port, indicating that the X.25 link may have gone down. Alarm messages are temporarily sent to disk until buffer space becomes available.

```
693 00/04/13 14:52:03 1 PMU 2276 3.00
StatId: INET, Inc. Alarm Overflow Generated
To Disk Only
```

2276 **Alarm Message Overflow Abated**
Buffer space for alarm messages sent to the X.25 Remote Alarm Port has become available after an Alarm Message Overflow occurred.

```
593 00/04/13 14:52:03 1 PMU 2277 3.00
StatId: INET, Inc. Alarm Overflow Abated
```

2277 **Test Status Start**
A Level 2, Level 3, TUP, ISUP, or TCAP test has been started, either by the user pressing the F2 key or as designated in Batch Test mode. The time at which the test was started appears in the alarm message.

```
603 00/04/13 14:52:03 1 PMU 2279 3.00
StatId: INET, Inc. Test Started
14:52:02.250
```

2278 **Test Status Stop**
A Level 2, Level 3, TUP, ISUP, or TCAP test has been stopped. The time at which the test was stopped and the results of the test appear in the alarm message.

```
BF3 00/04/17 14:52:03 1 PMU 2280 3.00
StatId: INET, Inc. Test Stopped
14:52:23.926 test=FAILED
```

2279 Test Status Description

When a Level 2, Level 3, TUP, ISUP, or TCAP test is run, the Test Status Description alarm is triggered to report the test name and description. The Test Status Description alarm is triggered before the associated Test Status Start alarm.

```
9C3 00/04/13 14:52:03 1 PMU 2281 3.00
StatId: INET, Inc. Test Desc:
Name=DEFAULT.782, Default file
```

2280 Test Status User Timer

A user timer has been detected in a Level 2, Level 3, TUP, ISUP, or TCAP test script. The timer value appears in the alarm message.

```
643 00/04/13 14:52:03 1 PMU 2282 3.00
StatId: INET, Inc. Test User
Timer=00:00:00.040
```

2281 User Log In Failed

A Spectra system user attempted to log in and failed due to entering an incorrect user ID or password as defined in the Password Setup screen.

```
853 00/04/13 14:52:03 1 PMU 2283 3.00
StatId: INET, Inc. User Logged In
Unsuccessful Date: 00/04/13 Time: 14:52:03
UserId: USER6
```

2282 Remote User Log In Failed

A remote Spectra system user attempted to log in and failed due to entering an incorrect remote user ID or password as defined in the Remote Password screen.

```
8C3 00/04/13 14:52:03 1 PMU 2284 3.00
StatId: INET, Inc. Remote User Logged In
Unsuccessful Date: 00/04/13 Time: 14:52:03
UserId: USER8
```

2283 File Transfer Update

A file has been transferred during a remote session via the File Transfer option, which is accessed from the Port Setup screen under the F7 Remote menu.

```
843 00/04/13 14:52:03 1 PMU 2285 3.00
StatId: INET, Inc. File Update Date:
00/04/13 Time: 14:52:03 UserId: USER8 File:
SS7ACM.DAT
```

2284 **Internal Congestion Started**
The Spectra system's internal buffers are experiencing congestion.

```
943 00/04/13 14:52:03 1 PMU 2286 3.00
StatId: INET, Inc. Internal Congestion
Started Desc:
```

2285 **Internal Congestion Stopped**
The Spectra system's internal buffers are no longer experiencing congestion.

```
943 00/04/13 14:52:03 1 PMU 2287 3.00
StatId: INET, Inc. Internal Congestion
Stopped Desc:
```

2286 **Primary Disk Recovered**
The primary disk has recovered after an error or tested OK when the Spectra system software booted.

```
503 00/11/08 13:52:31 4 PMU 2288 3.00
StatId: INET, Inc. Primary Disk Recovered
```

2287 **Secondary Disk Recovered**
The secondary disk has recovered after an error or tested OK when the Spectra system software booted.

```
505 00/11/08 13:52:31 4 PMU 2289 3.00
StatId: INET, Inc. Secondary Disk Recovered
```

2288 **Secondary Disk Started**
Data capture to the secondary disk has begun. Data capture to the secondary disk is enabled in the Capture Parameters options menu.

```
883 00/11/08 13:52:31 4 PMU 2290 3.00
StatId: INET, Inc. Secondary Disk Capture
Started Date: 00/11/08 Time: 13:52:31
UserId: USER8
```

2289 Capture Memory Started

Data capture to the capture buffer in memory has begun. Data capture to the capture buffer is started by pressing the F2 key and starting a new test.

```
803 00/04/13 14:52:03 1 PMU 2291 3.00
StatId: INET, Inc. Capture Memory Stared
Date: 00/04/13 Time: 14:52:03 UserId: USER8
```

2290 Primary Disk < 70 Percent Full

The primary disk is less than 70 percent full after having been more than 70 percent full.

```
5D3 00/04/13 14:52:03 1 PMU 2292 3.00
StatId: INET, Inc. Primary Hard Disk Less
Than 70% Full
```

2291 System Power-Up

The system has been powered up or rebooted.

```
5D3 00/04/13 14:52:03 1 PMU 2292 3.00
StatId: INET, Inc. System Power-Up
```

2292 Link Status

The state of a link has changed. The new state is described in the alarm message.

```
893 00/05/22 00:02:07 4 PMU 2292 3.00
StatId: INET, Inc. Link Status Desc: State:
No Carrier SS7 Link No. 8
```

2293 Spectra Batch Mode Start

A group of test sets has been started using the Batch Mode Builder. The time at which the mode was started appears in the alarm message. The results of the individual tests, indicating mode and test name, appear in subsequent alarm messages.

```
743 00/05/22 10:22:17 4 PMU 2293 3.00
StatId: INET, Inc. Spectra Batch Mode
Started: Date: 00/05/22 Time: 10:22:18
```

2294 **Spectra Batch Mode Stop**
A group of test sets has been stopped using the Batch Test mode. The time at which the mode was stopped appears in the alarm message.

```
743 00/05/22 10:26:03 4 PMU 2294 3.00
StatId: INET, Inc. Spectra Batch Mode
Stopped: Date: 00/05/22 Time: 10:26:04
```

2295 **Spectra API Status**
An API command has failed. The failure is described in the alarm message.

```
863 00/10/21 10:39:27 4 PMU 2295 3.00
StatId: INET, Inc. API Failed to create:
GSM-GEN Stats: GSGESW SS7 Date: 00/10/21
Time: 10:39:28
```

EDITING ALARM TRAITS

Each alarm has a number of traits you can modify to control the Spectra system's alarm reporting and message generation. These traits may be altered while a test is running without affecting the test. The Spectra system continues to use the old trait values until the changes have been applied. Changes may be applied from the Alarm Groups screen, the Alarm Levels screen, the Alarm Traits screens, or the Set Auto Delete screen.

Follow these steps to view or edit alarm traits.

Step	Action
1.	Press the **F4** key to access the F4 Alarms menu.
2.	Highlight the **Alarms** option, and press the **Enter (↵)** key to access the Alarms options menu.
3.	Highlight the **Alarm Groups** option, and press the **Enter (↵)** key. The Alarm Groups options menu is displayed. All changes to alarm traits in an alarm group may be applied at one time from the Alarm Groups options menu by highlighting the appropriate group and pressing the Shift key and the 8 key (*).

4. To view the alarms available in an alarm group, highlight the desired alarm group, and press the **Enter** (↵) key. A catalog of that group's available alarms is displayed (see **Figure 10.2**).

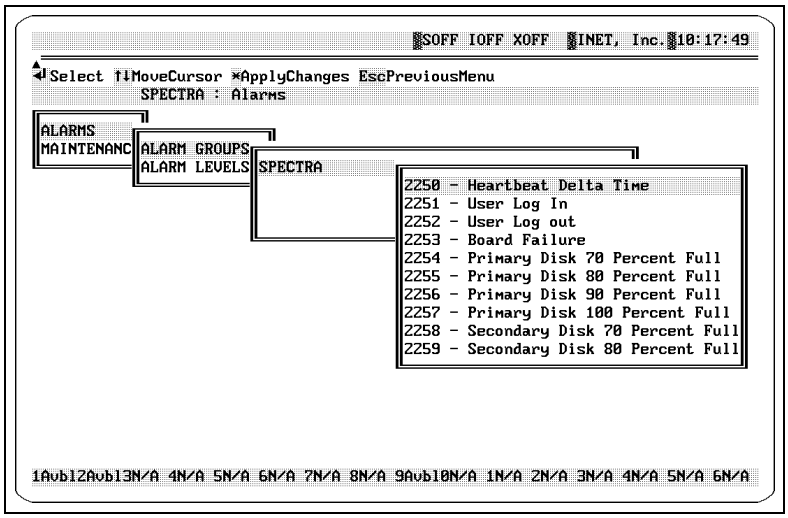


Figure 10.2 - Alarm Group Catalog of Available Alarms

5. To view or edit an alarm's traits, highlight the desired alarm, and press the **Enter** (↵) key. The Alarm Traits screen describing the selected alarm is displayed (see **Figure 10.3**).

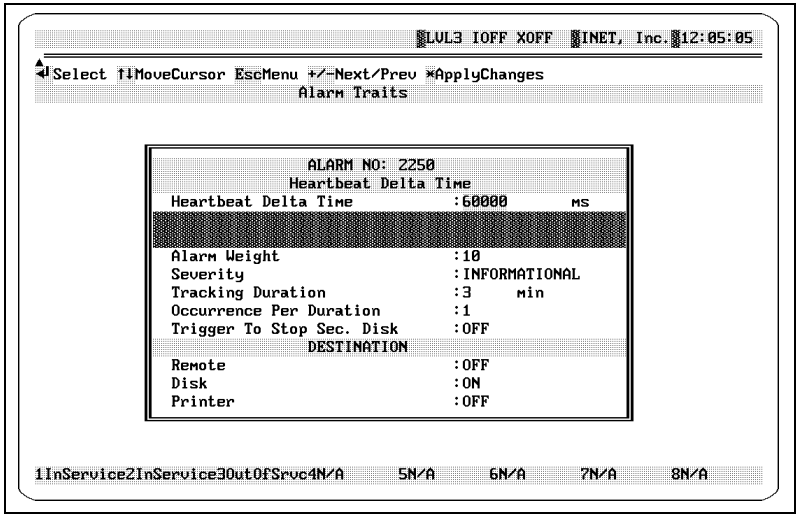


Figure 10.3 - Alarm Traits Screen (Example)

ALARM TRAITS SCREEN DEFINITIONS

↵ Select
Press the Enter (↵) key to access the current selected.

↑↓ MoveCursor
Press the ↑↓ keys to move between the alarm trait fields.

+/- Next/Prev
Press the + key to advance to the next alarm in the current alarm group. Press the - key to go to the previous alarm in the current alarm group.

*** ApplyChanges**
Press the Shift key and the 8 key (*) to apply the changes to the current alarm's traits. Changes to alarm traits do not take effect until the changes have been applied. Changes may also be applied from the Alarm Groups or Alarms options menus.

✍ *Alarms continue to be reported according to the previous alarm trait settings until any new changes are applied.*

ALARM NO.
Each alarm trait has an unique alarm number. This alarm number appears in alarm messages when an alarm is generated. Alarms are listed and described by number in "System Alarms" on page 388 of this guide.

Alarm Is Reported (0 Once)
This field is only displayed on alarms related to primary disk or secondary disk capacity (alarms 2254 through 2261). An alarm event is reported a certain number of times within a certain time period. The Alarm is reported field establishes the length of time during which the Spectra system should report occurrences of primary disk or secondary disk capacity alarms. If the value of 0 is entered in this field, the alarm will be reported only once.

To assign the length of time, select the Alarm is reported field, and press the Enter (↵) key. Enter the desired number of minutes (1-1440), and press the Enter (↵) key.

Alarm Weight
Alarm weights assign varying degrees of importance to different alarm conditions. Weights can range from 0 to 1000, with 1000 being the most important. When an alarm is triggered, its alarm weight is added to the total system alarm weight. A setting of 0 turns the alarm weight OFF for that alarm.

When an alarm level change is detected, the background color of the Statistics screens changes. This provides a quick visual indication of the alarm state of a given link. **Table 10.1** shows how alarm weights affect the alarm state of the link and the subsequent background color displayed in the Statistics screens.

Table 10.1 - Default Alarm Levels and Colors

Alarm State	System Weight	Color
Critical	1000+	Red
Major	500-999	Purple
Minor	250-499	Lt. Blue
No Alarm	0-249	Green
Link Not Present		Yellow

Alarm thresholds and colors can be adjusted in the Alarm Level Parameters screen (see "Setting System Alarm Levels" on page 403 of this guide).

To assign an alarm's weight, select the Alarm Weight field, and press the Enter (↵) key. Enter the desired weight (0 to 1000), and press the Enter (↵) key again to assign the weight.

Severity
If an alarm is generated, a value representing the severity of the alarm appears in the alarm message. Alarm severity may be INFORMATIONAL, CLEAR, MINOR, MAJOR, or CRITICAL. Press the Enter (↵) key to cycle through the options until the desired severity level appears in the field.

Tracking Duration
An alarm event must occur a certain number of times within a certain time period to trigger an alarm. The Tracking Duration field establishes the length of time during which the Spectra System counts successive occurrences towards an alarm.

To assign the length of time, highlight the Tracking Duration field, and press the Enter (↵) key. Enter the desired number of minutes (1-1440), and press the Enter (↵) key.

The Tracking Duration trait functions like a sliding window of time and works in conjunction with the Occurrence Per Duration trait. In the example displayed in **Figure 10.4**, if the traits specify that five alarm events must occur within one minute to trigger an alarm, an alarm is not triggered when occurrence "E" is detected (in the top example) because the five events did not occur within one minute. However, an alarm is triggered by alarm event "F" (in the lower example) because it occurs less than a minute after the four previous events.

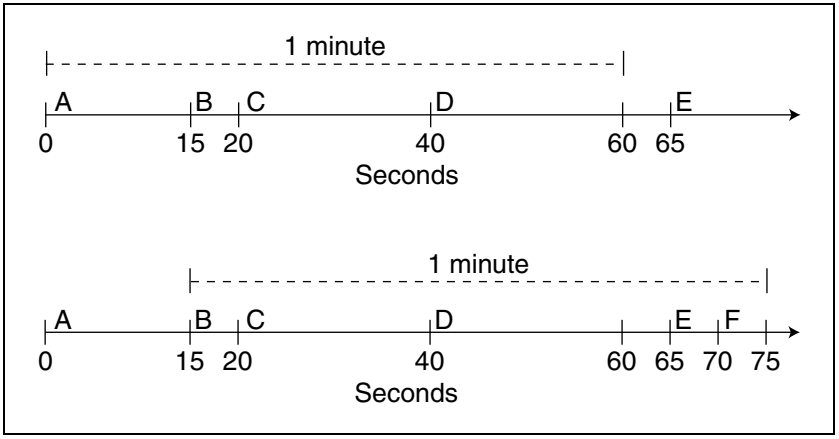


Figure 10.4 - Tracking Duration Example

Occurrence Per Duration
The Occurrence Per Duration value assigns the number of times a particular alarm event must occur within a specified Tracking Duration. When this condition is met, the alarm is triggered and the alarm weight is added to the system weight. If a destination has been enabled, an alarm message is generated. A setting of 1 generates an alarm for every occurrence, regardless of the value in the Tracking Duration field.

Trigger To Stop Sec. Disk
The Trigger To Stop Sec. Disk option stops secondary disk capture after an alarm. If the option is turned OFF, secondary disk capture is not affected. If the option is turned ON, secondary disk capture is stopped by the alarm. For example, this option can be used to stop secondary disk capture when the Secondary Disk 100% Full alarm is generated. To toggle the option ON or OFF, highlight the field, and press the Enter (↵) key.

Destination
Alarm messages for each alarm may be individually sent to disk, printer, or a remote station. To enable an alarm message to be sent, highlight the desired destination field, and press the Enter (↵) key to toggle the destination ON or OFF.

Remote
The alarm message is appended to a report file in the `C:\SPECTRA\REPORTS\ALARMS` directory and is stored until deleted by the system according to the Auto Delete settings (accessed by selecting the Maintenance option under the F4 Alarms menu). Alarm report file names appear in YY/MM/DD format.

Alarm reports may be viewed by selecting the View Alarms option from the Maintenance options menu, which is accessed by pressing the F4 key.

Disk
The alarm message is appended to a report file in the `C:\SPECTRA\REPORTS\ALARMS` directory and is stored until deleted by the system according to the Auto Delete settings (accessed by selecting the Maintenance option under the F4 Alarms menu). Alarm report file names appear in YY/MM/DD format.

Alarm reports may be viewed by selecting the View Alarms option from the Maintenance options menu, which is accessed by pressing the F4 key.

Printer
The alarm message is sent to a connected printer.

In addition to the alarm traits described above, certain alarms have special traits to specify alarm occurrences. Special Spectra system alarm traits are described in "Additional Spectra System Alarm Traits" on page 402 of this guide.

ADDITIONAL SPECTRA SYSTEM ALARM TRAITS

Certain Spectra system alarms have additional alarm traits to further specify alarm conditions. Spectra system alarms with additional traits are listed in the following paragraphs.

2250 **Heartbeat Delta Time**

The Spectra system alarm 2250 contains a Heartbeat Delta Time trait to specify a time interval in milliseconds between heartbeat alarms. Heartbeat alarms occur at user-defined time intervals to indicate that the Spectra system is active and functioning. Typically, heartbeat alarms are sent to the Remote Alarm Port so that a remote facility can monitor the status of the Spectra system.

To assign the time interval between heartbeat alarms, highlight the Heartbeat Delta Time field, and press the Enter (↵) key to access the field. Enter the desired time in milliseconds, from 1 second to 30 minutes (1000 milliseconds to 1800000 milliseconds), and press the Enter (↵) key again to assign the value.

2254-2261 **Report Frequency**

The Spectra system alarms 2254 through 2261 contain a trait to set the disk alarm reporting frequency. Disk alarms can be reported once a minute or once every 1 to 1440 minutes. To specify the alarm's report frequency, highlight the alarm's Alarm Is Reported (0 Once) field, and press the Enter (↵) key to access the field. Enter the delay between reported disk alarms in minutes, from 1 to 1440,or enter "0" to report the alarm only once. Press the Enter (↵) key again to assign the report frequency.

When an alarm is triggered, its individual alarm weight is added to the system weight. Additionally, the alarm may generate an alarm message to be sent to disk, printer, or a remote station, as defined in the Alarm Traits screen. If sent to disk, alarm messages are appended to the daily alarm report in the `C:\SPECTRA\REPORTS\ALARMS` directory. Alarm message report files can be viewed by selecting the View Alarms option from the Maintenance menu, which is found by pressing the F4 key.

The alarms that contain a trait to set the disk alarm reporting frequency include:

- 2254 Primary Disk 70% Full (report frequency)
- 2255 Primary Disk 80% Full (report frequency)
- 2256 Primary Disk 90% Full (report frequency)
- 2257 Primary Disk 100% Full (report frequency)
- 2258 Secondary Disk 70% Full (report frequency)
- 2259 Secondary Disk 80% Full (report frequency)
- 2260 Secondary Disk 90% Full (report frequency)
- 2261 Secondary Disk 100% Full (report frequency)

SETTING SYSTEM ALARM LEVELS

The Alarm Level Parameters screen is used to assign system alarm level parameters. Critical, Major, and Minor alarm weights and their associated colors for the statistics screen backgrounds are all established in this screen.

Follow these steps to access the Alarm Level Parameters screen.

Step	Action
1.	Press the **F4** key.
2.	Highlight the **Alarms** option from the F4 Alarms menu, and press the **Enter (↵)** key.

3. Highlight the **Alarm Levels** option, and press the Enter (↵) key. The Alarm Level Parameters screen is displayed (see **Figure 10.5**).

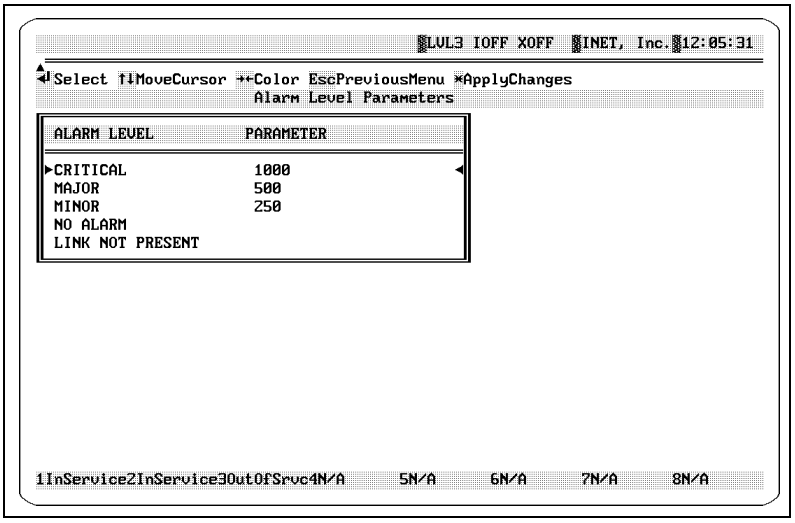


Figure 10.5 - Alarm Level Parameters Screen

ALARM LEVEL PARAMETERS SCREEN DEFINITIONS

↵ Select
Press the Enter (↵) key to select the highlighted parameter field.

↑↓ MoveCursor
Press the ↑↓ keys to move the cursor from field to field.

→← Color
Press the →← keys to cycle through the available colors for the highlighted field.

Esc Prevmenu
Press the Esc key to return to the previous menu.

***ApplyChanges**
Press the Shift key and the 8 key (*) to apply any changes made to alarm level parameters. Changes do not take effect until they have been applied.

Critical
This field assigns the total system alarm weight that must be reached before the system is placed into the Critical alarm state. To adjust the weight size, highlight the field and press the Enter (↵) key. Enter the desired weight size (maximum 9999), and press the Enter (↵) key.

Major
This field assigns the total system alarm weight that must be reached before the system is placed into the Major alarm state. To adjust the weight size, highlight the field and press the Enter (↵) key. Enter the desired weight size (maximum 9999), and press the Enter (↵) key.

Minor
This field assigns the total system alarm weight that must be reached before the system is placed into the Minor alarm state. To adjust the weight size, highlight the field and press the Enter (↵) key. Enter the desired weight size (maximum 9999), and press the Enter (↵) key.

No Alarm
This field does not assign a weight—just the background color of the statistics screens when the total system alarm weight is below the value assigned in the Minor alarm level.

Link Not Present
This field does not assign a weight—just the background color of the statistics screens when the currently displayed link is not detected by the system.

✍ *Changes to colors and alarm level settings do not take effect until they have been applied.*

MAINTENANCE

The Maintenance option is used to view current alarm logs and to set schedules for the automatic deletion of the alarm database files.

Follow these steps to access the Maintenance options menu.

Step	Action
1.	Press the **F4** key to access the F4 Alarms menu.
2.	Highlight the **Maintenance** option, and press the **Enter** (↵) key. The Maintenance options menu is displayed (see **Figure 10.6**).

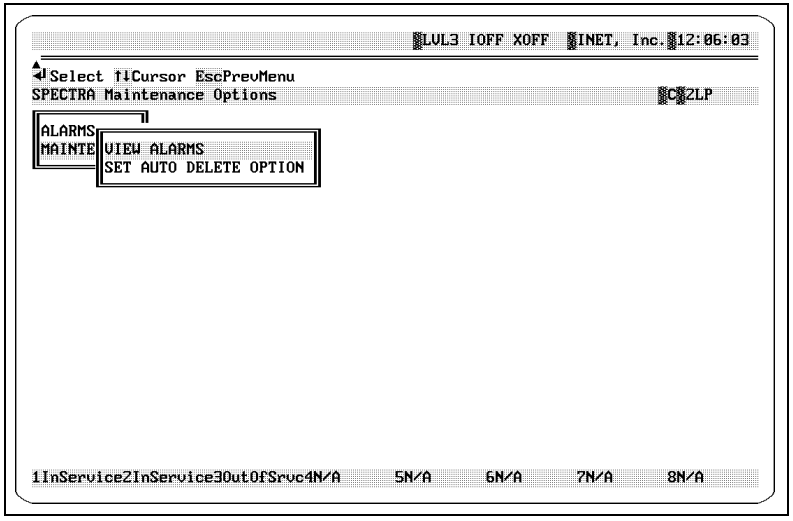


Figure 10.6 - Maintenance Options Menu

3.	Highlight either the **View Alarms** option or **Set Auto Delete** option and press the **Enter** (↵) key.

VIEW ALARMS

The View Alarms option is used to display the alarm log file for a specific date.

Follow these steps to view an alarm file.

Step	Action
1.	Highlight the **Maintenance** option in the F4 Alarms menu, and press the **Enter (↵)** key. The Maintenance options menu is displayed.
2.	Highlight the **View Alarms** option in the Maintenance options menu, and press the **Enter (↵)** key. A catalog of the current alarm files is displayed (see **Figure 10.7**).

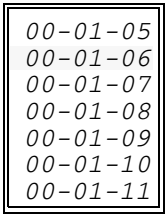


Figure 10.7 - Alarms Catalog (Example)

3. Highlight the desired date and press the **Enter** (↵) key to display the alarms for that day (see **Figure 10.8**). Use the ↑↓↔, **PgUp**, **PgDn**, **Home** and **End** keys to scroll through the display.

4. Press the **Esc** key to exit.

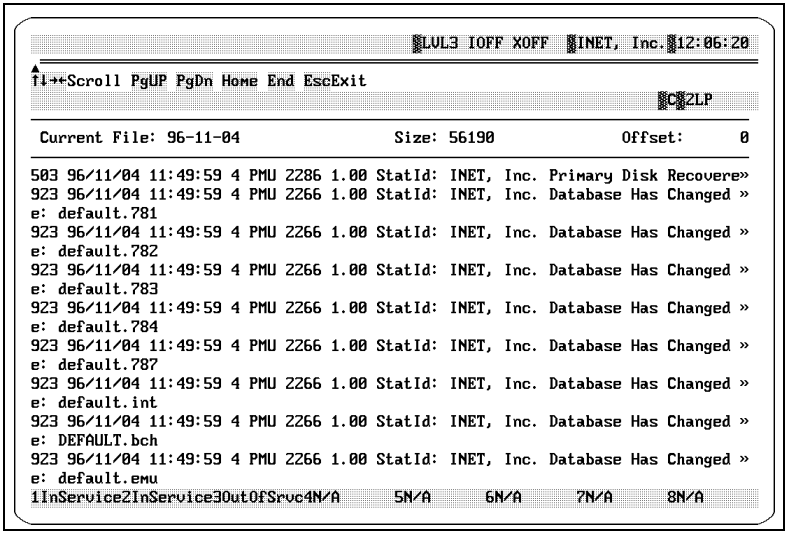


Figure 10.8 - View Alarms Screen

SET AUTO DELETE

The Set Auto Delete option controls the automatic deletion of alarm files. Daily alarms sent to disk are retained from 1 to 31 days as specified by the user. Every night at midnight, files in the directory `C:\SPECTRA\REPORTS\ALARMS` with creation dates older than the user-specified cutoff are automatically deleted.

Follow these steps to set the number of days to retain alarm files.

Step	Action

1. Highlight the **Maintenance** option in the F4 Alarms menu, and press the **Enter (↵)** key. The Maintenance options menu is displayed.

2. Highlight the **Set Auto Delete** option in the Maintenance options menu, and press the **Enter (↵)** key. The Auto Delete screen is displayed (see **Figure 10.9**).

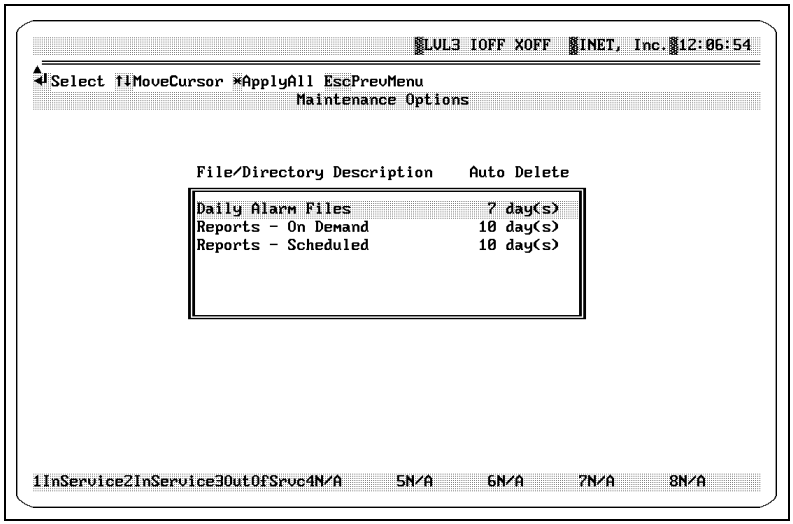


Figure 10.9 - Auto Delete Screen

3. Highlight the **Daily Alarm Files** option, and press the **Enter (↵)** key to access the field. A Days Before Deletion of Daily Alarm Files dialog box is displayed.

4. Enter the number of days to retain the daily alarms sent to disk (from 1 to 31), and press the **Enter (↵)** key to assign the value.

5. Press the **Shift** key and the **8** key (*) to apply all of the database changes to the file.

11 Printing

OVERVIEW

The F5 Print function prints expanded or compressed messages to a file or to a connected printer. When you run a test, the F2 Run and the F9 Xamine functions allow you to Mark or Zap messages. The Print function prints all messages that have been marked in the Run or Xamine modes with the Mark and Zap commands. For information about using the Mark or Zap commands, refer to "Running a Test" on page 180 of this guide.

When messages are printed to a file, they can be accessed by any word processing program that reads ASCII text files. Messages are stored with a `.PRT` file extension. Printed files appear just as they do on the screen of the Spectra system program.

You can queue as many print jobs as desired. Printing can be accomplished simultaneously with other test functions. Once a print job is queued, you can proceed with other tasks while the Spectra system handles the queued print job as a background task.

Press the F5 key to access the F5 Print menu (see **Figure 11.1**).

```
PRINT TAGGED MESSAGES (EXPANDED)    TO PORT
PRINT TAGGED MESSAGES (EXPANDED)    TO FILE
PRINT TAGGED MESSAGES (COMPRESSED) TO PORT
PRINT TAGGED MESSAGES (COMPRESSED) TO FILE
ABORT ACTIVE PRINT JOBS
VIEW A PRINT FILE
CONFIGURE PRINTER
```

Figure 11.1 - F5 Print Menu

✍ *Any screen can be printed at any time by pressing the Shift key and the 6 key (^) while the screen is displayed.*

F5 PRINT MENU DEFINITIONS

Print Tagged Messages (Expanded) To Port
This option prints all tagged messages to the printer in an expanded, detailed format. Each signal unit starts on a new page when printing. To print, highlight the option in the menu, and press the Enter (↵) key. A Description dialog box appears. Enter any information to be associated with the printed messages, and press the Enter (↵) key.

Print Tagged Messages (Expanded) To File
This option prints all tagged messages to a file on the hard disk in an expanded ASCII format. To print, highlight the option in the menu and press the Enter (↵) key. An Enter File Name to Transfer Data dialog box is displayed. Enter the desired file name, and press the Enter (↵) key. A Description dialog box is displayed. Enter any information to be associated with the printed messages, and press the Enter (↵) key. The file is saved to the `C:\SPECTRA\PRINTLOG` directory with a `.PRT` extension.

✍ *This is not a save function. This option is extremely important in speeding up the test result documentation process because it allows hard copies to be printed at a later date.*

Print Tagged Messages (Compressed) To Port
This option prints all tagged messages to the printer in a compressed format. To print, highlight the option in the menu and press the Enter (↵) key. A Description dialog box is displayed. Enter any information to be associated with the printed messages, and press the Enter (↵) key.

Print Tagged Messages (Compressed) To File
This option prints all tagged messages to a file on the hard disk in a compressed format. To print, highlight the option in the menu, and press the Enter (↵) key. Enter the desired file name, and press the Enter (↵) key. A Description dialog box appears. Enter any information to be associated with the printed messages, and press the Enter (↵) key. The file is saved to the `C:\SPECTRA\PRINTLOG` directory with a `.PRT` extension.

✍ *Print files that have been saved to a file can be copied to a floppy disk or printed directly from DOS.*

Follow these steps to print saved files from DOS

Step	Action
1.	To copy a file to a floppy disk, insert a floppy disk in the personal computer's A: drive. Go to the `C:\SPECTRA\PRINTLOG` directory on the hard disk, type **`COPY <FILENAME> A:`** at the DOS prompt, and press the **Enter** (↵) key.
2.	To print the file to a printer, go to the `C:\SPECTRA\PRINTLOG` directory on the hard disk, type **`PRINT <FILENAME>`** at the DOS prompt, and press the **Enter** (↵) key.

Abort Active Print Jobs
This option cancels all current print jobs. Highlight the option in the menu, and press the Enter (↵) key. A Delete Current Jobs dialog box prompts you to select Y or N. Enter Y and press the Enter (↵) key to cancel the print jobs.

View A Print File
This option allows files that have been printed to file (on the hard disk) to be viewed on the screen. Highlight the option in the menu, and press the Enter (↵) key. A file menu appears displaying available files. Highlight the desired file, and press the Enter (↵) key to view it. To print the viewed file, press the Shift key and the 6 key (*).

Configure Printer
Specific parameters can be assigned so that printed reports can conform to various printers. To access the Configure Printer dialog box, highlight the Configure Printer option, and press the Enter (↵) key. The Configure Printer dialog box is pictured in **Figure 11.2**.

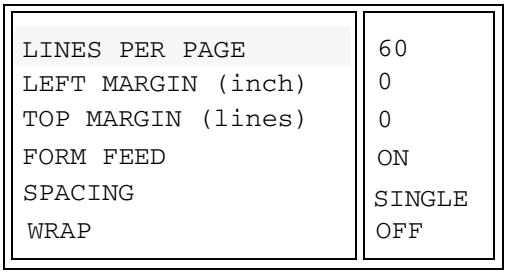


Figure 11.2 - Configure Printer Dialog Box

Lines Per Page
Press the Enter (↵) key to access the numeric entry field, and enter the desired number (maximum of 60) of lines to be printed per page

Left Margin (inch)
Press the Enter (↵) key to access the numeric entry field for the left margin for printed reports, and enter the desired number in inches (increments in whole inches only).

Top Margin (lines)
Press the Enter (↵) key to access the numeric entry field for the top margin for printed reports, and enter the desired number of lines.

Form Feed
Press the Enter (↵) key to toggle the form feed for the printer ON or OFF.

Spacing
Press the Enter (↵) key to toggle the line spacing to SINGLE or DOUBLE.

Wrap
Press the Enter (↵) key to toggle the Carriage Return/Line Feed (CR/LF) for the printer to OFF, 80, or 132. If 80 or 132 is selected, alarms sent to the printer will have a CR/LF on the 80th or 132nd character of each line.

12 Remote Operation

OVERVIEW

The Spectra system can communicate to remote or central facilities through serial ports. These remote ports can be used to connect a remote personal computer to the Spectra system either directly or using a modem to allow for file transfers between personal computers. Additionally, remote ports can be used to send generated alarm messages and reports to a remote personal computer. This data may be sent automatically or by request from a remote or central facility. The Spectra system remote control interface allows the remote user connecting to the Spectra system through a serial port to issue commands to the Spectra system to load configurations and run certain test scripts.

In addition to serial ports, the Spectra system can also be accessed by personal computers or UNIX workstations using Transmission Control Protocol/Internet Protocol (TCP/IP) through the optional Smart Ethernet Adapter (SEA) card and iRemote software.

The Spectra system offers an optional Message Application Programming Interface (API) feature that allows Message Signal Units (MSUs) to be generated remotely and transferred to the Spectra system. The Spectra system can then transmit these remotely generated

messages to the network, and responses can be forwarded using MSU Forwarding back to the remote workstation. MSU Forwarding can also send messages that pass your filters to a remote workstation.

Use the F7 Remote function to configure remote ports, COM ports, TCP/IP setup, MSU Forwarding, and Message API for the Spectra system. To access the Remote function, press the F7 key. The Remote Operations screen is displayed (see **Figure 12.1**).

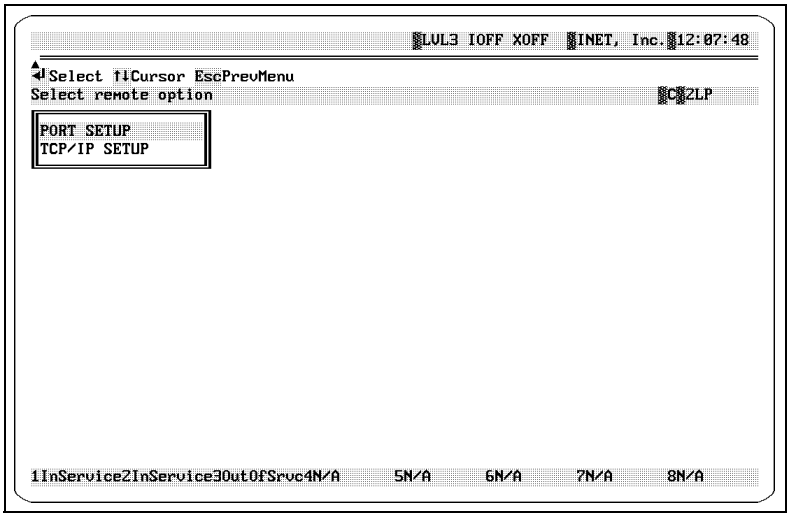


Figure 12.1 - Remote Operations Screen

PORT SETUP SCREEN

Remote ports are assigned for use as reach-through ports in the Port Setup screen. Select the PORT SETUP option in the F7 Remote menu, and press the Enter (↵) key. The Port Setup screen is displayed (see **Figure 12.2**).

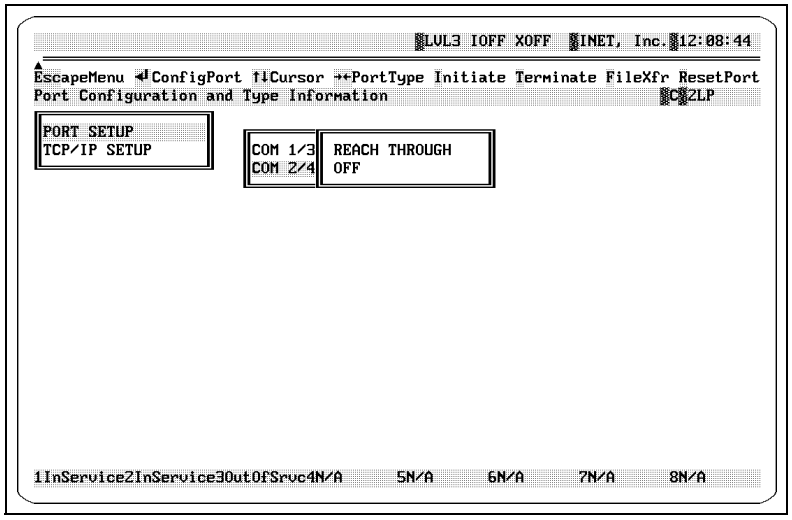


Figure 12.2 - Port Setup Screen

PORT SETUP SCREEN DEFINITIONS

EscapeMenu
Press the Esc key to return to the previous menu.

↵ ConfigPort
Assign a COM port and then press the Enter (↵) key. The COM Port Setup options menu displays. Refer to "COM Port Setup Options Menu" on page 419 of this guide for a description of the COM Port Setup options menu.

↑↓ Cursor
Press the ↑↓ keys to move the cursor through the information elements. The PageUp, PageDn, Home, and End keys can also be used to scroll through the elements in the information message.

→← Port Type
Press the →← keys to assign a Spectra system application to the selected port. Available port types are described in the following paragraphs.

OFF
The port is disabled.

REACH THROUGH
The port can be used to communicate with a remote personal computer or UNIX workstation using the iREMOTE software.

Initiate
Assign a COM port, and then press the I key to initiate a session between the host and a remote personal computer. Refer to "Host Station Calling Remote Station" on page 441 of this guide for a description of how to initiate a session from the host.

Terminate
Assign a COM port, and then press the T key to terminate a session between the host and a remote personal computer. Refer to "Terminating the Session" on page 445 of this guide for a description on how to terminate a session from the host.

FileXfr
Assign a COM port, and then press the F key to transfer files between the host and a remote personal computer after a session has been initiated. Refer to "Transferring Files" on page 443 of this guide for a description of the File Transfer screen. Files can also be transferred over X.25 reach-through ports.

ResetPort
Press the R key to reset the selected port. Changes made to port configurations do not take effect until the port has been reset. Once changes are made, if the ports have not been reset a Ports Have Not Been Reset message appears at the bottom of the screen.

COM 1/3 and COM 2/4
Press the ↓↑ keys to select either COM ports 1/3 or COM ports 2/4.

COM PORT SETUP OPTIONS MENU

COM ports are assigned in the COM Setup options menu. From the Port Setup options menu, select a port and press the Enter (↵) key. The COM Port Setup options menu is displayed (see **Figure 12.3**).

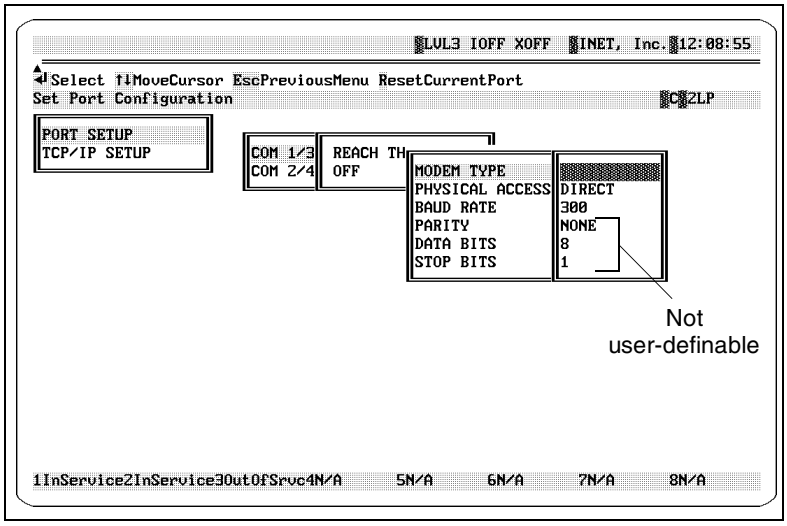


Figure 12.3 - COM Port Setup Options Menu

COM Port Setup Options Menu Definitions

EscapeMenu
Press the Esc key to return to the previous menu.

↵ Select
Assign a COM port, and then press the Enter (↵) key. The COM Port Setup options menu displays.

↑↓ MoveCursor
Press the ↑↓ keys to move the cursor through the information elements. The PageUp, PageDn, Home, and End keys can also be used to scroll through the elements in the information message.

ResetCurrentPort
Press the R key to reset the port parameters to the current settings. Changes made to port configurations do not take effect until the port has been reset. Once changes are made, if the ports have not been reset a Ports Have Not Been Reset message appears at the bottom of the screen.

PHYSICAL ACCESS
Press the Enter (↵) key to assign a DIRECT connection or a MODEM connection. Assign DIRECT if personal computers are connected using a serial cable; assign MODEM if the connection is made using a modem.

MODEM TYPE
Press the Enter (↵) key if the PHYSICAL ACCESS option is set to MODEM to cycle through the types of modem for use on the Spectra system. The modem type selected for the host does not have to be the same as the type selected for the remote personal computer. Some modems may behave differently with the program. Select from Hayes 2400, Hayes 9600, Codex 9600, and Multitech 9600.

✍ *If a new modem type is added, restart the Spectra system.*

The following additional direction line options appear when the PHYSICAL ACCESS option is set to MODEM.

EditModemConf
Press the E key to edit the configuration for a modem. The Modem Configuration window is displayed. See "Modem Configuration Window" on page 422 of this guide.

TabMore
Press the Tab key to display additional direction line options.

SaveModemConf
Press the S key to save the changes to a configuration for a modem.

InsertModemType
Press the Insert key to insert a new modem type. Enter a modem name (maximum of 14 characters) and press the Enter (↵) key. The configuration settings in the Modem Configuration window for the added modem must be edited to match manufacturer's specifications. Press the E key to access the Modem Configuration window (see "Modem Configuration Window" on page 422) of this guide.

Edit the configuration settings and press the Esc key to return to the previous screen. Press the S key to save the modem configuration settings.

DeleteModemType
Press the Delete key to delete a modem type.

SearchModemType
Press the A key to search for a modem type.

BAUD RATE
Press the Enter (↵) key to assign to cycle through the options for the communication speed of transmitted information in kilobits per second. Available options are 300, 1200, 2400, 4800, 9600, 19.2, 38.4, 56, 56.7 and 115.2 Kb/s. It is recommended that both modems be set at the same baud rates. Most modems communicate at the lower of the two designated baud rates.

✍ *The highest baud rate for Spectra units using a 486 processor is 19.2 Kb/s. Spectra units using the Pentium processor can select from all available baud rates.*

PARITY
This field displays the type of parity check. The default setting is NONE. This field cannot be modified.

DATA BITS
This field displays the number of bits used to represent data. The default setting is 8. This field cannot be modified.

STOP BITS
This field displays the number of stop bits. The default setting is 1. This field cannot be modified.

Modem Configuration Window

The Modem Configuration window contains the configuration settings for the specified modem. Call preferences, command structure, initial configuration, and other settings are created or modified in this window.

The commands may vary depending upon the modem in use. Refer to the manufacturer's specifications for a list of commands or command sets for the modem in use.

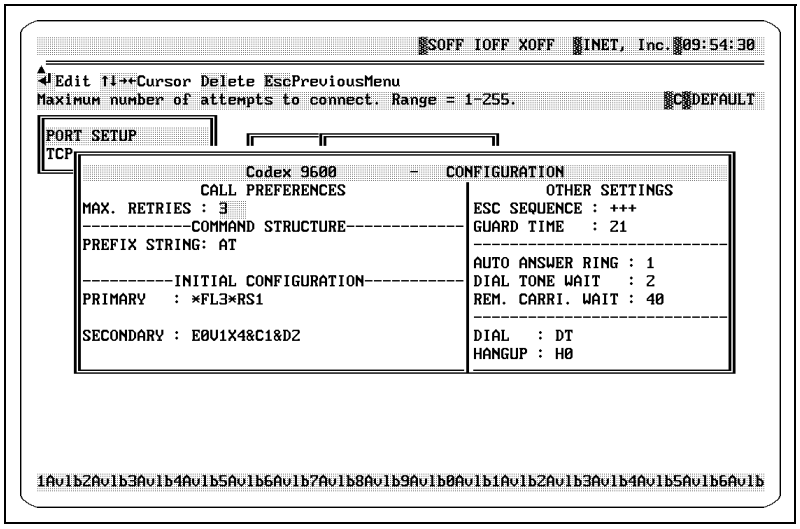


Figure 12.4 - Modem Configuration Window

✍ *If a modem other than the Hayes 2400, Hayes 9600, Codex 9600, or Multitech 9600 is in use or a new modem type has been inserted, the commands may differ from the Modem Configuration window settings. Refer to the manufacturer's specifications for a list of commands or command sets for the modem in use.*

Modem Configuration Window Definitions

MAX RETRIES
Press the Enter (↵) key to edit the maximum number of attempts to connect. The valid range for maximum entries is 1 to 255. The default setting is 3.

PREFIX STRING
Press the Enter (↵) key to edit the characters placed at the beginning of every command string. The default setting is the Attention Command (AT).

PRIMARY
Press the Enter (↵) key to edit the primary configuration string. Configuration strings vary depending upon the modem in use. Refer to the manufacturer's specifications for the modem in use.

SECONDARY
Press the Enter (↵) key to edit the secondary configuration string which is sent after the primary string and overrides it. Configuration strings vary depending upon the modem in use. Refer to the manufacturer's specifications for the modem in use.

✍ *The PRIMARY and SECONDARY configuration string fields are only applicable to the Hayes 2400, Hayes 9600, Codex 9600, and Multitech 9600 modems. If a new modem type has been inserted, refer to the manufacturer's specifications for primary and secondary configuration strings for the modem in use. If information regarding the strings is unavailable for the modem, the PRIMARY and SECONDARY configuration string fields should be cleared of data.*

ESC SEQUENCE
Press the Enter (↵) key to edit the escape sequence to switch from data mode to command mode. The default setting is +++.

GUARD TIME
Press the Enter (↵) key to edit the escape character detect time (the <S12> command). The unit in use is 0.02 seconds and the valid range is 0 to 255. The default setting is 21.

AUTO ANSWER RING
Press the Enter (↵) key to edit the number of rings before answering (the <S0> command). The unit in use is rings and the valid range is 0 to 255. The default setting is 1.

DIAL TONE WAIT
Press the Enter (↵) key to edit the dial tone wait time (the <S6> command). The unit in use is seconds and the valid range is 0 to 255. The default setting is 2.

REM. CARRI. WAIT
Press the Enter (↵) key to edit the remote carrier wait time (the <S7> command). The unit in use is seconds and the valid range is 1 to 255. The default setting is 40.

DIAL
Press the Enter (↵) key to edit the dial (touch-tone or pulse) command. If the commands for the modem in use differ from the Modem Configuration window settings, refer to the manufacturers specifications for the modem.

HANGUP
Press the Enter (↵) key to edit the force modem on-hook (hang-up) command. If the commands for the modem in use differ from the Modem Configuration window settings, refer to the manufacturers specifications for the modem.

CONFIGURING PORTS

Follow these steps to configure ports.

Step	Action

1. Use the ↑↓ keys to select the **Port Setup** option in the F7 Remote menu, and press the **Enter (↵)** key. The Port Setup options menu is displayed (see **Figure 12.5**).

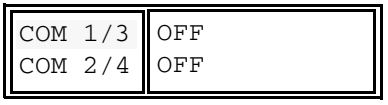


Figure 12.5 - Port Setup Options Menu

2. To assign a COM port for use as a remote port, use the ↑↓ keys to select one of the COM port options, COM 1/3 or COM 2/4 and press the

Enter (↵) key. The COM Port Setup options menu is displayed (see **Figure 12.6**).

MODEM TYPE	
PHYSICAL ACCESS	DIRECT
BAUD RATE	56.0
PARITY	NONE
DATA BITS	8
STOPBITS	1

Figure 12.6 - COM Port Setup Options Menu

3. Use the ↑↓ keys to select the PHYSICAL ACCESS field. Press the **Enter** (↵) key to toggle between DIRECT and MODEM.

   If MODEM was selected, continue to **Step 4**. If DIRECT was selected, skip to **Step 5**.

4. If MODEM was selected, use the ↑ key to move the cursor to the MODEM TYPE field and press the **Enter** (↵) key to cycle through the available modem types: Hayes 2400, Hayes 9600, Codex 9600, and Multitech 9600.

   If the configuration for the modem needs to be edited, press the **E** key (see "Modem Configuration Window" on page 422 of this guide).

5. Press the ↓ key to move the cursor to the BAUD RATE field and press the **Enter** (↵) key to cycle through the available choices: 300, 1200, 2400, 4800, 9600, 19.2, 38.4, 56, 56.7 and 115.2 Kb/s.

✍ *The highest baud rate for Spectra units using a 486 processor is 19.2 Kb/s. Spectra units using the Pentium processor can select from all available baud rates.*

6. Press the **Esc** key to return to the Port Setup options menu, this saves the changes to the COM Port Setup options menu.

7. Press the →← keys to select the port type for the COM ports to be assigned. A **REACH THROUGH** port can be used to communicate with a remote personal computer or UNIX workstations using the iRemote software. If **OFF** is selected, the port is disabled.

8. Press the **R** key to reset the port assignment.

9. Repeat **Step 2** through **Step 8** until all desired remote port assignments have been made.

TCP/IP SETUP

In addition to serial ports, the Spectra system can also be accessed by a personal computer or UNIX workstation using TCP/IP through Inet's optional Smart Ethernet Adapter (SEA) card and iRemote software. For information about installing an SEA card, refer to "Installing SEA Card(s)" on page 40 of the ***Spectra Setup and Configuration Guide***. For more information about setting SEA applications, refer to "Message API" on page 451 of this guide.

After installing the SEA card in the Spectra system and defining any route or gateway addresses, the IP address of the Spectra system is specified in the TCP/IP Setup screen. For more information about defining routes or gateway addresses, see "Default Gateway Setup and Routes" on page 430 of this guide.

Specifying an IP address for the Spectra system allows the system to be accessed through TCP/IP by a workstation running iRemote software for DOS, UNIX, or Windows. Refer to the ***iRemote for UNIX User Guide*** or the ***iRemote for Windows User's Guide*** for information about establishing connections between the workstation and the Spectra system. For information about iRemote for DOS, see "Using iRemote for DOS" on page 432 of this guide.

TCP/IP SETUP SCREEN

The IP address for the Spectra system is defined in the TCI/IP Setup screen. Prior to establishing the IP address, an SEA card (ethernet board) must be installed in the Spectra system. For information about installing an SEA card, refer to "Installing SEA Card(s)" on page 40 of the ***Spectra Setup and Configuration Guide***. A default gateway for the system can also be configured.

Select the TCP/IP SETUP option in the F7 Remote menu, and press the Enter (↵) key. The TCP/IP Setup screen is displayed (see **Figure 12.7**).

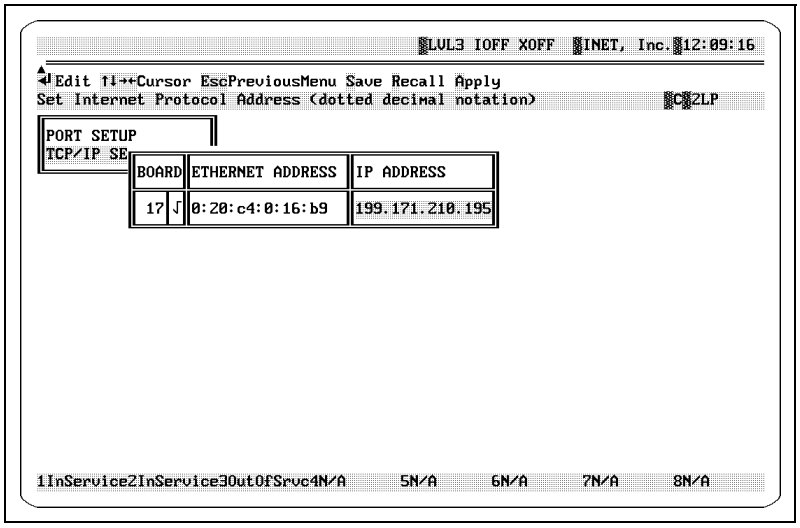


Figure 12.7 - TCP/IP Setup Screen

TCP/IP Setup Screen Definitions

↵ Edit
Press the Enter (↵) key to edit the IP ADDRESS field. After the selection is edited, press the Enter (↵) key to assign the changes. You must save or apply IP address changes before they take effect.

↑↓↔ Cursor
Press the↑↓↔ keys to move the cursor to the IP ADDRESS field.

EscPreviousMenu
Press the Esc key to return to the previous menu.

Save
Press the S key to save the current setup for all SEA cards (ethernet boards). A Save Setup for all ethernet boards (Y/N) dialog box is displayed. Press the Y key to save the setup. A Setup is saved for all ethernet boards message is displayed in the top border line. Press the N key or the Esc key to cancel.

Recall
Press the R key to recall any a setup for all SEA cards (ethernet boards). A Recall Setup for all ethernet boards (Y/N) dialog box is displayed. Press the Y key to recall the setup. A Setup recalled for all ethernet boards message is displayed in the top border line. Press the N key or the Esc key to cancel.

Apply
Press the A key to apply changes to the IP ADDRESS field. An Apply setup to ethernet board 17 (this resets the board) (Y/N) dialog box is displayed. Press the Y key to apply the changes. An Initializing Hardware, Board 17 message appears briefly in the top border line. Press the N key or the Esc key to cancel.

BOARD
This field indicates the board number assigned to the SEA card (ethernet board) by the dip switches.

ETHERNET ADDRESS (MAC Address)
This field displays the ethernet address or Media Access Control (MAC) address for the Spectra system. Ethernet addresses for SEA cards range from 00:20:C4:00:10:00 to 00:20:C4:00:1F:FF. This address is set automatically for Inet installed SEA cards. For SEA cards that will be installed by the user, Inet provides a batch file with the SEA card that will automatically set the MAC address (refer to "Installing SEA Card(s)" on page 40 of the ***Spectra Setup and Configuration Guide*** for more details). The ethernet/MAC address is specified in the `C:\SPECTRA\BIN\CONFIG.SEA` text file. Should the ethernet/MAC address need to be manually edited, save a backup of the existing `CONFIG.SEA` file before modifying (for example, save a copy of the file as `CONFIG.OLD` before editing the address). The text editor found under the DOS COMMANDS option in the F8 Tools menu can be used for modifying the file.

IP ADDRESS
Press the Enter (↵) key to edit the IP address for the system. Enter a new IP address in dotted decimal notation (for example XXX.XXX.XXX.XX). After the selection is edited, press the Enter (↵) key to assign the changes. You must save or apply IP address changes before they take effect.

IP Address Setup

Follow these steps to specify an IP address for the Spectra system.

Step	Action

1. From anywhere in the Spectra system, press the **F7** key to access the Remote Function.

2. Select the **TCP/IP SETUP** option in the appearing menu and press the **Enter (↵)** key. The TCP/IP Setup options menu is displayed (see **Figure 12.8**). A checkmark (√) appears next to the board number to indicate that an ethernet board is present and is recognized by the Spectra system.

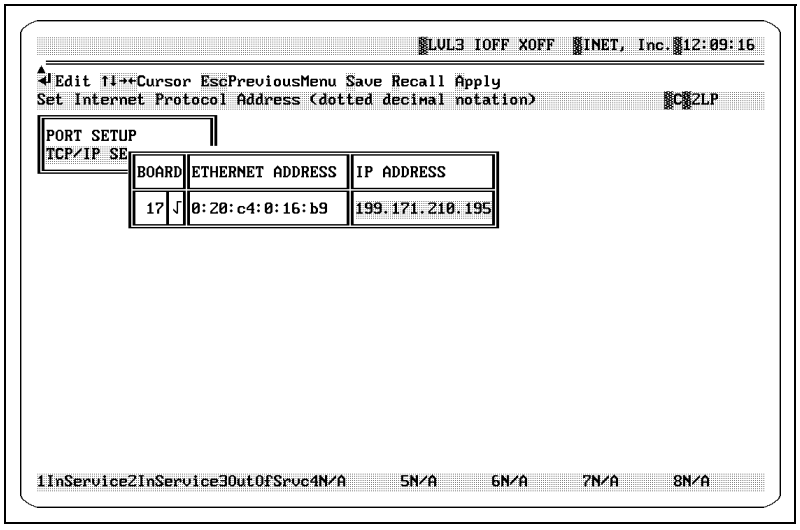


Figure 12.8 - TCP/IP Setup Options Menu

3. Select the **IP ADDRESS** field of the appropriate Ethernet board, and press the **Enter (↵)** key to access the field. Enter the IP address to be used by the Spectra system in dotted decimal notation (for example XXX.XXX.XXX.XX), and press the **Enter (↵)** key to assign it.

4. Press the **S** key to save the information. A Save Setup for All Ethernet Boards dialog box is displayed. Press the **Y** key to save the address information or press the N key to cancel.

5. Press the **A** key to apply the IP address change. An Apply Setup to Ethernet Board dialog box is displayed. Press the **Y** key to apply the setup and reset the board. The checkmark (√) next to the board number disappears while the ethernet board resets, and the checkmark (√) reappears when the board is restored.

   The system can now be accessed through TCP/IP.

Default Gateway Setup and Routes

If the Spectra system is accessed by a workstation that is not on the Local Area Network (LAN), it is necessary to specify a gateway through which the Spectra system can be reached. If the Spectra system is accessed by a workstation using a different router and different subnet on the LAN, it is also necessary to add the routes through which the Spectra system and the workstation communicate.

✍ *If your Spectra system is only accessed by UNIX workstations on the LAN, it is not necessary to configure a default gateway.*

The default gateway is specified in the `C:\SPECTRA\BIN\SCRIPT.SEA` text file. This file must be edited using the text editor found under the DOS COMMANDS option in the F8 Tools menu. The `SCRIPT.SEA` file is only loaded when the SEA card is rebooted, therefore, the system must be restarted for new routes to take effect.

For more information about how to access and use DOS commands, refer to **Chapter 13** of this guide. To view an example of a `SCRIPT.SEA` file, see "SEA Card" on page 452 of the this guide.

Follow these steps to add a default gateway and additional routes.

Step	Action

1. From anywhere in the Spectra system, press the **F8** key.

2. Select the **DOS COMMANDS** option in the appearing menu. Press the **Enter (↵)** key to access the DOS Commands screen (see **Figure 12.9**).

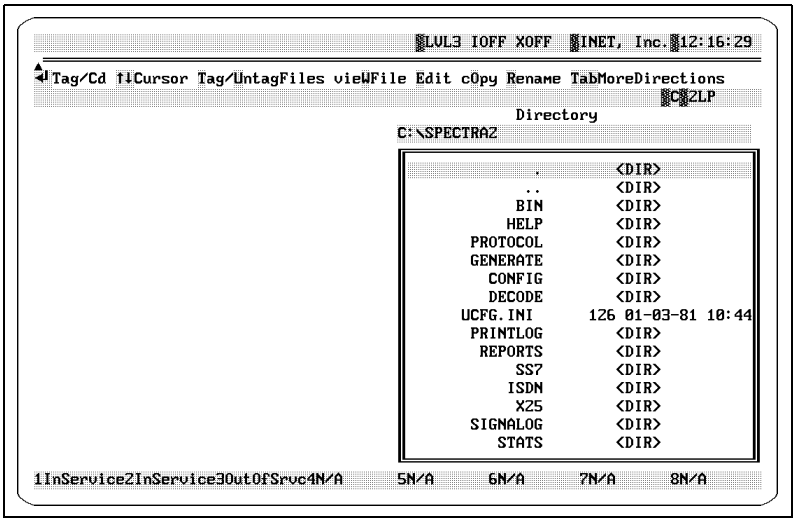


Figure 12.9 - DOS Commands Screen

3. Use the ↑↓ keys to place the cursor on the `SCRIPT.SEA` file. Press the **E** key to open the file for editing.

✍ *The DOS Commands screen displays the last directory used. The* `SCRIPT.SEA` *file is located in the* `C:\SPECTRA\BIN` *directory.*

4. Use the ↓ key to place the cursor on the last blank line immediately following the text that reads "`Define the default route (and any others)`" and the usage example that follows. Press the **Enter (↵)** key to create a new line. Place the cursor on this new line.

✍ *Lines in the* `SCRIPT.SEA` *file preceded with the # character are comments.*

5. Enter the following text and insert the IP address in the indicated area:
   `route add default <ip address> 1 1`

   If you are adding an additional route, particularly from a different LAN router, enter it in the following format:
   `route add <IP address> <IP subnet mask> <Spectra IP address> 1 1`

6. Press the **Alt** key and the **S** key simultaneously to save the file.

7. Restart the system.

✍ *The* `SCRIPT.SEA` *file is only loaded when the system is started, therefore, the system must be restarted for new routes to take effect.*

USING IREMOTE FOR DOS

The Spectra system can be connected to a remote personal computer with a reach-through port to allow file transfers and remote access to the Spectra system using iRemote for DOS. Once the ports have been defined, a session can be initiated by the remote personal computer over COM ports or by the host over a COM port to allow the remote user to access the host.

The following procedures cover remote access using only iRemote for DOS. If you are using a UNIX workstation or a Windows-based personal computer, refer to the ***iRemote for UNIX User Guide*** or the ***iRemote for Windows User's Guide*** for information about establishing connections between the workstation and the Spectra system.

CONFIGURING THE HOST STATION

Follow these steps to configure the host station for a connection using iRemote for DOS.

Step	Action

1. Use the ↑↓ keys to select the **Port Setup** option in the F7 Remote menu, and press the **Enter (↵)** key. The Port Setup Screen is displayed (see **Figure 12.10**).

COM 1/3	OFF
COM 2/4	OFF

Figure 12.10 - Port Setup Screen (Partial)

2. To assign a COM port for use as a remote port, use the ↑↓ keys to select COM 1/3 and press the **Enter (↵)** key. The COM Port Setup options menu is displayed (see **Figure 12.11**).

MODEM TYPE	
PHYSICAL ACCESS	DIRECT
BAUD RATE	56.0
PARITY	NONE
DATA BITS	8
STOPBITS	1

Figure 12.11 - COM Port Setup Options Menu

3. Use the ↑↓ keys to select the PHYSICAL ACCESS field. Press the **Enter (↵)** key to toggle between DIRECT and MODEM.

   If MODEM was selected, continue to **Step 4**. If DIRECT was selected, skip to **Step 5**.

4. If MODEM was selected, use the ↑ key to move the cursor to the MODEM TYPE field and press the **Enter** (↵) key to cycle through the available modem types: Hayes 2400, Hayes 9600, Codex 9600, and Multitech 9600.

   If the configuration for the modem needs to be edited, press the E key (see "Modem Configuration Window" on page 422 of this guide).

5. Press the ↓ key to move the cursor to the BAUD RATE field and press the **Enter** (↵) key to cycle through the available choices: 300, 1200, 2400, 4800, 9600, 19.2, 38.4, 56, 56.7 and 115.2 Kb/s.

✍ *The highest baud rate for Spectra units using a 486 processor is 19.2 Kb/s. Spectra units using the Pentium processor can select from all available baud rates.*

6. Press the **Esc** key to return to the Port Setup screen, this saves the changes to the COM Port Setup options menu.

7. Press the →← keys to set the port type to **REACH THROUGH.**

8. Press the **R** key to reset the port assignment.

9. Resetting the port breaks communications between the host and remote personal computers if they are already connected. A This will log the Remote Server OFF and update the port parameters (Y/N)? dialog box appears. Press the **Y** key to reset the port.

CONFIGURING THE REMOTE STATION

Follow these steps to configure the remote station for a connection using iRemote for DOS.

Step	Action
1.	If the iRemote program is not installed on the remote system, insert the INET-REMOTE diskette provided with your system into the personal computer. At the `DOS A:\` prompt, type **`INSTALL`** and press the **Enter (↵)** key. An INET REMOTE INSTALLED message appears on the screen when the installation is complete.
2.	Change the directory to the **`C:\IREMOTE`** directory. From the DOS prompt type **`IREMOTE`** and press the **Enter (↵)** key. The INET-REMOTE main menu is displayed (see **Figure 12.12**).

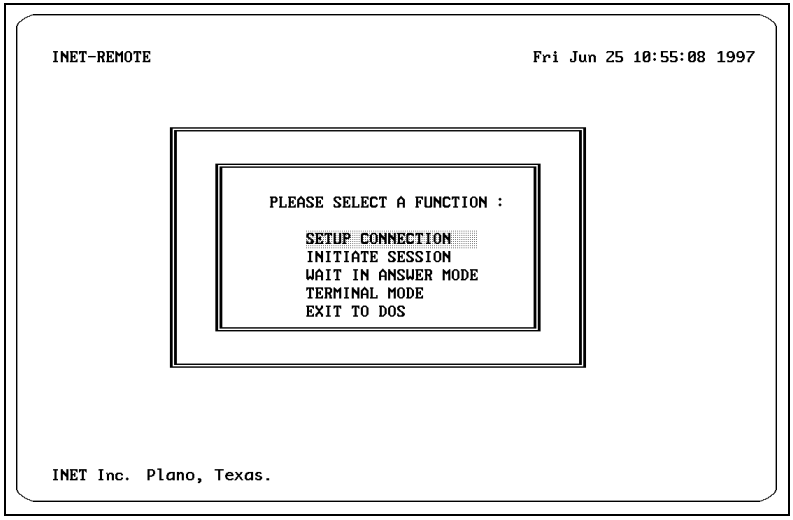


Figure 12.12 - INET-REMOTE Main Menu

3.	Use the ↑↓ keys to move the cursor to the SETUP CONNECTION option, and press the **Enter (↵)** key.

✍ *The TERMINAL MODE option can be used to send AT attention command lines directly to the modem. Press the ALT key and the C key to clear the terminal screen. Press the Esc key to return to the main menu.*

The Hardware Configuration menu appears displaying the current hardware configurations (see **Figure 12.13**).

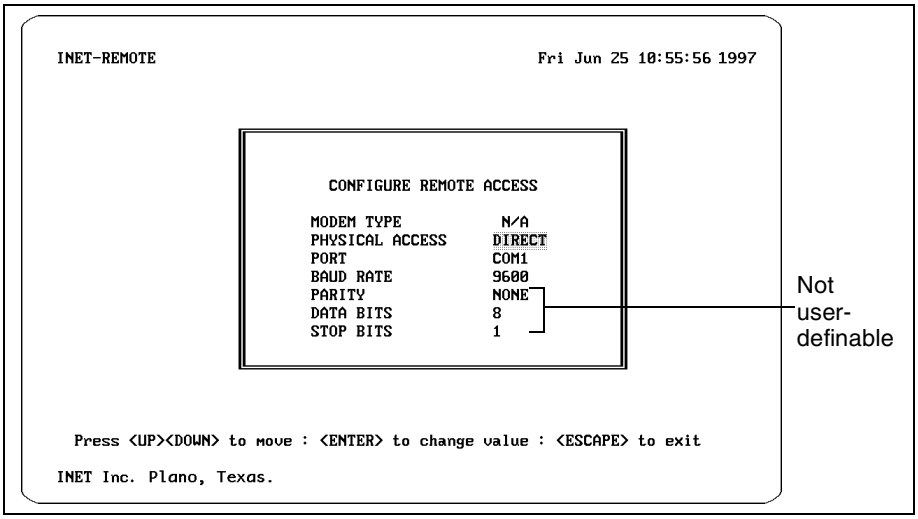


Figure 12.13 - INET-REMOTE Hardware Configurations Menu

The MODEM TYPE selected for the remote personal computer does not have match the type selected for the host. The PHYSICAL ACCESS and BAUD RATE fields must be set to match the host configuration.

4. To change remote configurations, use the ↑↓ keys select a field, and press the **Enter** (↵) key to cycle through the available options. Screen definitions for remote hardware configuration fields are the same as the fields found under the "COM Port Setup Options Menu" on page 419 of this guide.

5. After the remote port has been configured, press the **Esc** key to return to the INET-REMOTE main menu.

ESTABLISHING CONNECTIONS

Once the remote and host ports have been configured, a session can be initiated to establish connections. Sessions may be initiated by either the host or the remote station.

Remote Station Calling Host Station

Follow these steps to initiate a connection with the host station using iRemote for DOS.

Step	Action
1.	From the INET-REMOTE main menu, use the ↑↓ keys to select the **INITIATE SESSION** option, and press the **Enter (↵)** key. When the personal computers are linked directly by a serial cable, the remote station immediately tries to connect to the host station. When the personal computers are connected by a modem, the Initiate Session Phone Number screen is displayed (see **Figure 12.14**). This screen allows the user to select the phone number to be dialed from a list of numbers with associated names for rapid dialing.

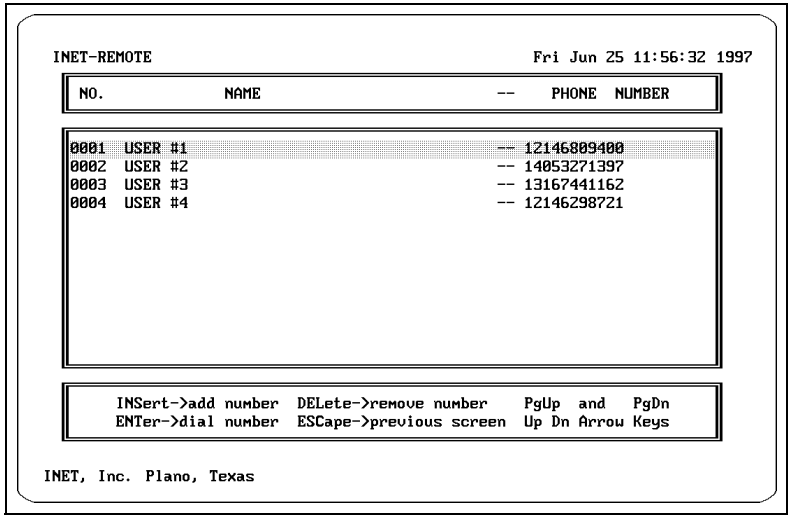


Figure 12.14 - INET-REMOTE Initiate Session Phone Number Screen

2. To add a name and phone number to the list, press the **Insert** key. Enter a name of up to 40 characters in the appearing dialog box, and press the **Enter (↵)** key. Enter a phone number of up to 20 digits and commas in the appearing dialog box, and press the **Enter (↵)** key. Each comma creates a 1 second delay between dialed digits, which is helpful for situations such as dialing a 9 to reach an outside line. An example entry may appear like this: `9,12146809400`.

3. To dial a number from the list, select it, and press the **Enter (↵)** key. When the connection has been made successfully, a `USER>` prompt is displayed at the top of the screen. Enter a valid user ID, as established in the host Spectra system's Password Setup screen, and press the **Enter (↵)** key.

✍ *The user ID is case sensitive and must match the name specified in the Spectra system's Password Setup screen.*

If successful communication is not established and no prompts appear, verify that hardware configurations and cable and modem connections between the host and remote personal computer are correct and try again.

4. A `PASSWORD>` prompt is displayed at the top of the screen. Enter the password, and press the **Enter (↵)** key. If the password is correct, the connection is completed, and the host screen is displayed on the remote personal computer.

✍ *The password is case sensitive and must match the name specified in the Spectra system's Password Setup screen.*

INET-REMOTE Session Commands

To access session commands in the INET-REMOTE program after connections have been established, press the Alt key and the X key while connected to the host. The Session Commands screen is displayed (see **Figure 12.15**).

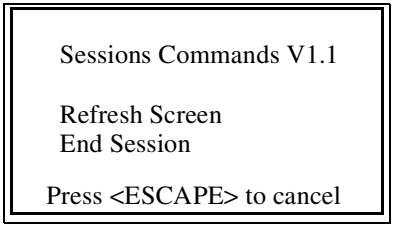


Figure 12.15 - Session Commands Screen

Refresh/Resync Screen
The F7 Remote screen is updated in synchronization with the host screen. Occasionally, however, the screen refresh process gets out of synchronization during communications. Select the Refresh screen option in the Session Commands screen. Press the Enter (↵) key and the spacebar to correct the problem. While the screen is refreshing itself, a Resyncing… message is displayed at the top of the screen.

End Session
Select this option, and press the Enter (↵) key to disconnect from the host.

Escape
Press the Esc key to return to the current session.

✍ *When the host breaks the connection or a modem goes down, a session screen is displayed to inform the user that the session has been broken. Press the Esc key to return to the previous screen.*

Remote Station Waiting to be Called

Follow these steps to initiate the Wait in Answer in iRemote for DOS.

Step	Action

1. From the INET-REMOTE main menu, use the ↑↓ keys to select the **WAIT IN ANSWER MODE** option, and press the **Enter** (↵) key. The remote station is placed in Answer mode, and the message WAITING FOR INCOMING CALL is displayed at the top of the screen (see **Figure 12.16**).

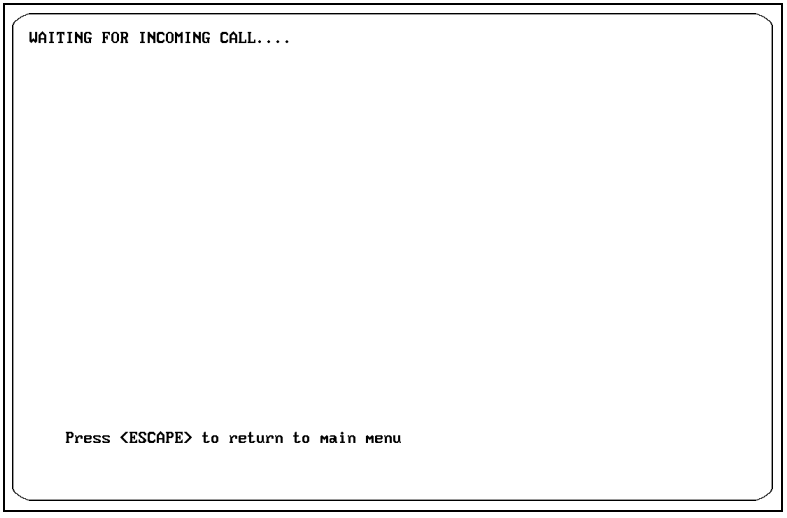


Figure 12.16 - INET-REMOTE Waiting in Answer Mode Screen

2. When the host station calls the remote station and a successful connection is made, the message HOST CONNECTION IS ESTABLISHED is displayed on the screen, and the host screen is displayed on the remote personal computer.

Host Station Calling Remote Station

Follow these steps to initiate a connection from the host to a remote station.

Step	Action

1. Use the ↑↓ keys to select the **Port Setup** option in the F7 Remote menu, and press the **Enter (↵)** key.

2. Select the **COM 1/3** port in the Port Setup screen (see **Figure 12.17**), and press the **I** key to initiate a session.

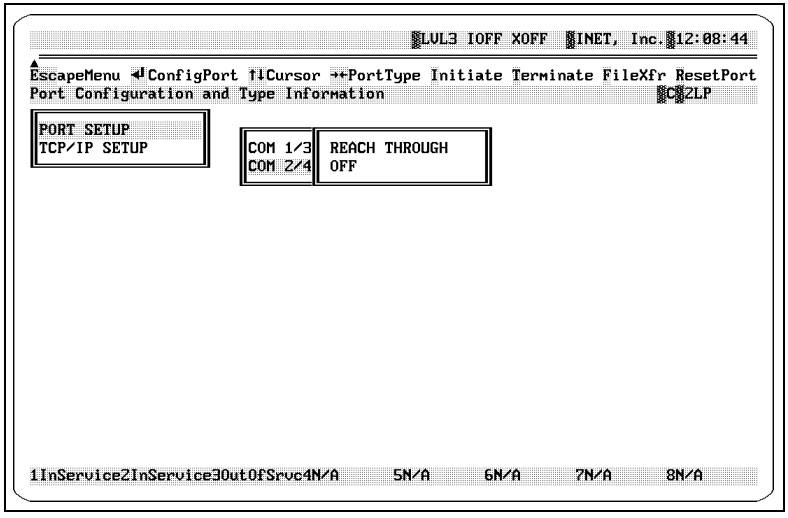


Figure 12.17 - Port Setup Screen

3. If the PHYSICAL ACCESS field in the COM 1/3 Port Setup screen has been set to MODEM, the Initiate Session Phone Number screen is displayed (see **Figure 12.18**). This screen allows the user to select the phone number to be dialed from a list of numbers with associated names for rapid dialing.

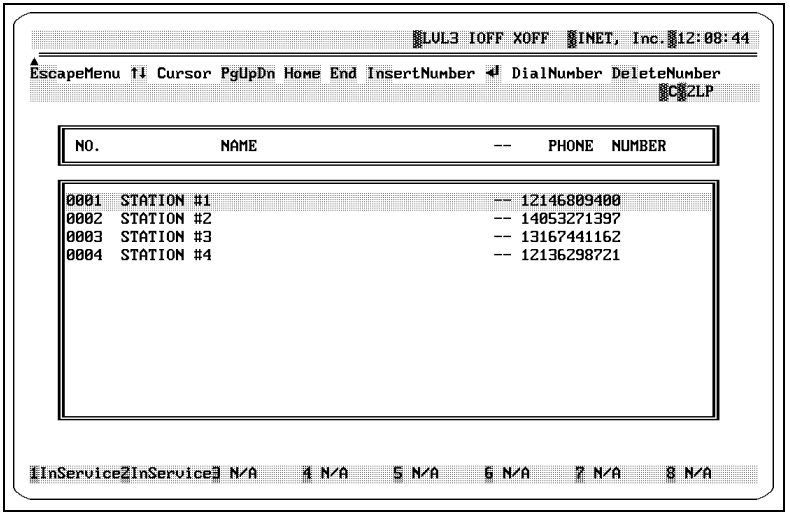


Figure 12.18 - Initiate Session Phone Number Screen

4. To add a name and phone number to the list, press the **Insert** key. Enter a name of up to 40 characters in the appearing dialog box, and press the **Enter (↵)** key. Enter a phone number of up to 20 digits and commas in the appearing dialog box, and press the **Enter (↵)** key. Each comma creates a 1 second delay between dialed digits, which is helpful for situations such as dialing 9 to get an outside line. An example entry may appear like this: `9,12146809400`.

5. To dial a number from the list, select it, and press the **Enter (↵)** key.

6. When the connection has been successfully made, the message REMOTE CONNECTION ESTABLISHED is displayed at the top of the screen.

✍ *The remote personal computer must be in WAIT IN ANSWER mode when the host attempts to establish a connection.*

TRANSFERRING FILES

Files can be transferred between the host and remote stations from the File Transfer screen. Files can be transferred over serial ports.

Follow these steps to transfer files between host and remote stations.

Step	Action

1. After establishing connections between the host and the remote station, from the host station select the desired port in the Port Setup screen, and press the **F** key. The File Transfer screen displays the file directories of the host and remote station hard drives (see **Figure 12.19**).

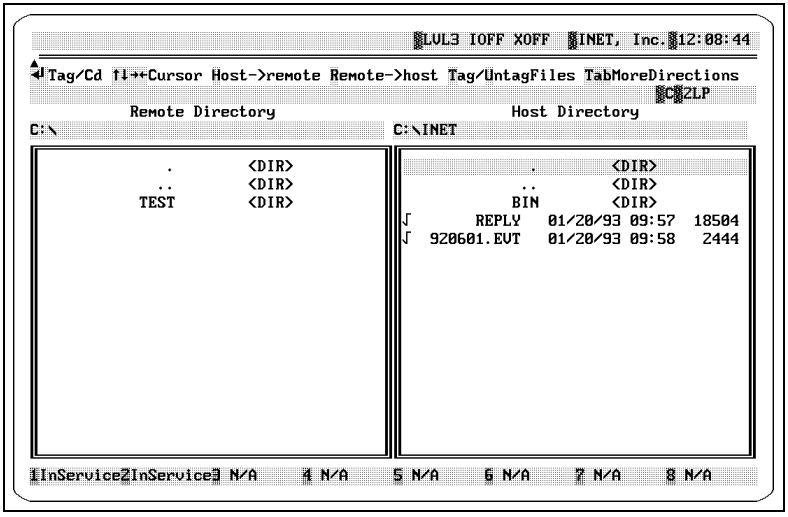


Figure 12.19 - File Transfer Screen

2. Use the ↑↓↔ keys to select the desired file. Press the **Enter** (↵) key to tag the file for transfer. A checkmark (√) is displayed next to tagged files.

3. To initiate the transfer process, press the **H** key to transfer files tagged under the remote directory to the displayed host directory, or press the **R** key to transfer files tagged under the host directory to the displayed remote directory. As files are transferred, the number of files and the percentage of transfer is displayed at the top of the screen. During file transfer, all other Spectra system functions are active.

✍ *Files can only be transferred in one direction at a time.*

File Transfer Screen Definitions

↵ Tag/Cd
Press the Enter (↵) key to tag files for uploading or downloading. The Enter (↵) key can also be pressed when a directory is selected to display the directory.

↑↓↔ Cursor
Press the↑↓↔ keys to move the cursor to the IP ADDRESS field.

Host ->remote
Press the H key to transfer tagged files to the displayed directory at the remote station. Files are always downloaded into the current displayed remote directory. If files with the same name exist in the remote directory, the files are not transferred to avoid overwriting existing files.

Remote -> host
Press the R key to transfer tagged files to the displayed directory at the host station. Files are always uploaded into the current displayed host directory. If files with the same name exist in the host directory, the files are not transferred to avoid overwriting existing files.

Tag/UntagFiles
Press the T key to tag all files. Press the U key to untag all files.

TabMoreDirections
Press the Tab key to display additional direction line options.

MakeDir
Press the M key while the cursor is in the host directory to create a new directory. An Enter New Host Directory dialog box is displayed. Enter the desired name (maximum of eight characters), and press the Enter (↵) key. The new directory is created on the host and is displayed in the host directory side of the screen.

ChangeDir
Press the C key while the cursor is in the host directory to change the displayed directory. An Enter Host Directory dialog box is displayed. Enter the desired name of the directory to be displayed, and press the Enter (↵) key. The specified directory then becomes the current displayed directory.

Directories are changed using the same syntax as in DOS. For example, if you want to change from the `C:\SPECTRA\BIN` directory to the root C: drive, simply enter `\` in the Enter Host Directory dialog box, and press the Enter (↵) key.

remoVeDir
Press the V key while the cursor is in the host directory to delete a directory. An Enter Host Directory to Remove dialog box is displayed. Enter the name of the existing directory to be removed, and press the Enter (↵) key.

Delete
Press the D key to delete the selected file.

Abort
Press the A key to stop the file transfer process. Files transferred before issuing the Abort command are not affected. Only a file in the process of transfer at the time that the Abort command is given does not transfer.

TERMINATING THE SESSION

The current session may be terminated at any time by either the host or the remote station.

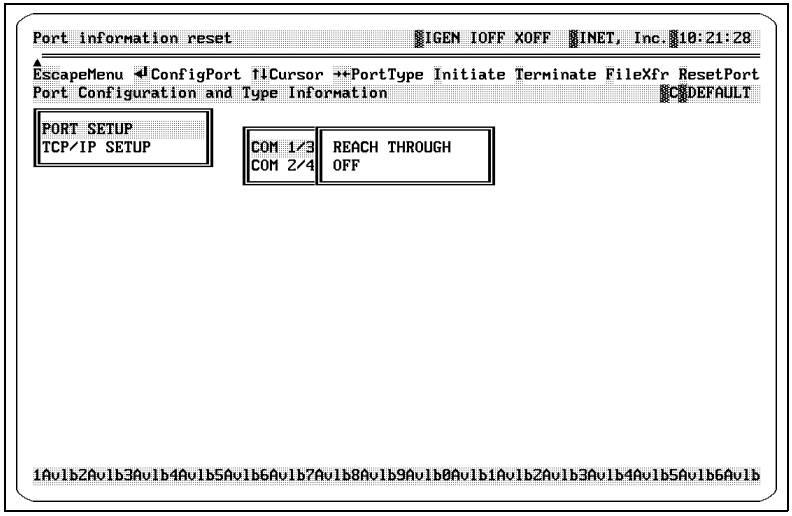


Figure 12.20 - Port Setup Screen

To terminate a session from the host, select the COM 1/3 port in the Port Setup screen, and press the T key. A Remote Disconnect message is displayed at the top of the screen.

To terminate a session from the remote station, press the ALT key press the S key simultaneously. Select the END SESSION option in the appearing menu, and press the Enter (↵) key.

MSU FORWARDING

The MSU Forwarding feature gives you the option to forward the MSUs that pass your message filter criteria to an external system through TCP/IP. When initiated in the F2 Run screen, all MSUs that are captured to the buffer are forwarded to the external server. You can configure the IP address and port number of the external server to which you want to forward the MSUs.

While the definition of an MSU differs between the protocols, MSU Forwarding is available for SS7, ISDN, and X.25. The following describes the definition of an MSU for each protocol:

- SS7 protocol, MSUs are defined as any signal unit with a Length Indicator (LI) greater than 2. Therefore, FISUs, Errors, and LSSUs are excluded.
- ISDN protocol, MSUs are defined as any I-Frame message, with the exception of LAPB, LAPD, UnNumbered, Flags, etc. For the data link layer protocols DASS and DPNSS, MSUs are defined as any UI message. For more information about MSU forwarding, refer to "MSU Forwarding" on page 446 of this guide.
- X.25 protocol, MSUs are defined as any IFrame message with the exception of LAPB, LAPD, UnNumbered, Flags, etc.

✍ *To filter the MSUs that are captured to the buffer, make sure the Message Filters option is turned ON. If the messages filters option is turned OFF, the MSU Forwarding feature forwards all captured signal units. For more information about setting up message filters, refer to "Message Filters" on page 31 of this guide.*

The Spectra system forwards MSUs to an external processor. In addition to the MSU, the Spectra system also forwards information about the link, the time the data was captured, and the length of the MSU. **Table 12.1** lists the components of the MSU record that is forwarded to an external processor as part of the MSU Forwarding feature.

Table 12.1 - MSU Record Components

Component Header	Size	Description
Timestamp	4 B	GMT
Tick	2 B	Millisecond resolution
LinkNo	1 B	Spectra link number
RecordLength	2 B	Length of the remainder of the record (not including these two bytes)
MSU1	X B	Forwarded message

The Spectra system uses an ASCII text file, named `SCRIPT.SEA` (see **Figure 12.21** on page 449), to define TCP/IP parameters for forwarding purposes. The `SCRIPT.SEA` file is located in the `C:\SPECTRA\BIN` directory. Use the DOS COMMANDS option found under the F8 Tools menu to access and edit the `SCRIPT.SEA` file.

Refer to "DOS Commands" on page 482 of this guide for information about accessing Spectra system directories.

The `SCRIPT.SEA` file is used to define netmasks, routes, hosts, and services for your network. The following parameters are included in the `SCRIPT.SEA` file.

Netmask
The netmask determines the portions of an IP address that specify the network and the host. Modify the netmask only if you are using subnetting.

IP Routing
IP Routing must be defined if you want to access the Spectra system from another IP network or if you want the Spectra system to reach another IP network. Routes must also be defined if you want to access the Spectra system through a different router on the same LAN.

IP Address
Host name entries allow you to assign names and aliases to IP addresses. The IP address number is required (msuhost must be defined), if you are using the MSU Forwarding option.

TCP Port Number
Service entries allow you to determine the TCP port number an application uses. The default values do not need to be modified, unless a TCP port number conflict occurs in your network.

You may need to contact your TCP/IP network administrator to verify that this file is configured properly for your network. If you edit the `SCRIPT.SEA` file, you must reboot the SEA card to apply the changes.

An example of an `SCRIPT.SEA` file is shown in **Figure 12.21** on page 449. Notice that the fields previously described are labeled on the example file. This demonstrates the lines in the `SCRIPT.SEA` file that you may need to modify in order to configure your Spectra system for MSU forwarding to your network.

```
# FILE    : \spectra\bin\script.sea
# FUNCTION: Script file for the Smart Ethernet Adaptor (SEA) board.
# NOTES   : Lines starting with '#' are comments.
#
echo
echo Executing MS-DOS script file: \spectra\bin\script.sea
#-----------------------------------------------------------------
# Define the IP net mask.
# usage:ip setmask ipInterface dottedDecimalMask
ip setmask 1 255.255.128.0 ———————————————————— Netmask
#-----------------------------------------------------------------
# Define the default route (and any others)
# usage:   route add default <ip address of gateway> <metric> <ttl>
route add default 198.4.15.1  1  1 ———————————————— IP routing
#-----------------------------------------------------------------
# Define service port numbers.
#
# usage:   service add <name> <port/protocol>
# example: service add iremote 8060/tcp
#
#  iRemote server port for access into local user interface
service add iremote            8060/tcp
#
# spectra server port for ASCII alarm forwarding
service add t7Alarms           8061/tcp
#
# spectra client port for ASCII alarm forwarding
service add spinetAlarms       8067/tcp # "alarmhost" must be defined below
#|
# spectra client port for MSU forwarding # "msuhost" must be defined below
service add spimsuForward      8075/tcp ——————————— User-defined
#                                                   TCP port number
#-----------------------------------------------------------------
# Define various host names/aliases.
#
#  The following names/aliases have specific meanings
#                       alarmhost - will attempt to connect to spinetAlarms  if
defined
#                       msuhost                - will attempt to connect to
spimsuForward if defined
#
#                       For INET internal use only
#                                rfshost      - RFS file server
#                                timehost - slave TIME from here
#
# usage:   host add <ip address> <name> [aliases...]
#
#host add 198.4.15.21 cliff rfshost msuhost———————————— User-defined IP address
```

Figure 12.21 - SCRIPT.SEA File (Example)

Configuring Spectra for MSU Forwarding

To configure your Spectra system for the MSU Forwarding feature, complete the following steps.

Step	Action
1.	Setup the Message Filters as described in "Message Filters" on page 31 of this guide.

✍ *Make sure the Message Filters option in the Filters options menu is set to ON.*

2.	Press the **F8** key to access the F8 Tools menu.
3.	Use the ↑↓ keys to select the DOS COMMANDS option, and press the **Enter (↵)** key.
4.	Use the ↑↓ keys to highlight the `SCRIPT.SEA` file in the `C:\SPECTRA\BIN` directory.
5.	Press the **E** key to access the `SCRIPT.SEA` file with the Edit option. The SCRIPT.SEA file appears on your screen in ASCII text format.
6.	Input adjustments to the text file for your network by modifying or adding appropriate lines in the `SCRIPT.SEA` file.
7.	After all modifications have been made, press the **Alt** key and the **S** key to save the file. A Save file (include extension if needed) dialog box appears.
8.	Press the **Enter (↵)** key to save the file under the same name (`SCRIPT.SEA`). A File exist, overwrite? (Y/N) dialog box appears. Press the **Y** key to overwrite the old `SCRIPT.SEA` file.
9.	Restart the system.

✍ *The* `SCRIPT.SEA` *file is only loaded when the system is started, therefore, the system must be restarted before changes to this file take effect.*

Your Spectra system should now be configured to use the MSU Forwarding feature. To initiate message forwarding, you must begin running a mode using the F2 Run option. After initializing a mode by pressing the F2 key, you can press the Alt key and the F key while in the F2 Run screen to begin forwarding all MSUs that pass your filters to the destination you indicated in the `SCRIPT.SEA` file.

Initiating MSU forwarding from the F2 Run screen is explained in "Alt_FMSUForward (Optional)" on page 187 of this guide. Alternatively, the -u Spectra system command line switch automatically enables the MSU Forwarding feature on the system restart without having to execute the Alt_F command. For more information, see "Accessing Program Command Line Switches" on page 2 of this guide.

MESSAGE API

The Spectra system has an optional Message API feature that enables a remote workstation to generate and transmit MSUs to the Spectra system through TCP/IP or a User Data Protocol (UDP) port (see **Figure 12.22**). These MSUs can then be transmitted over the network under test, and responses are received and forwarded to the remote workstation through MSU Forwarding. For information on the MSU Forwarding feature, refer to the proper protocol-specific section of MSU Forwarding in **Chapter 2** of this guide.

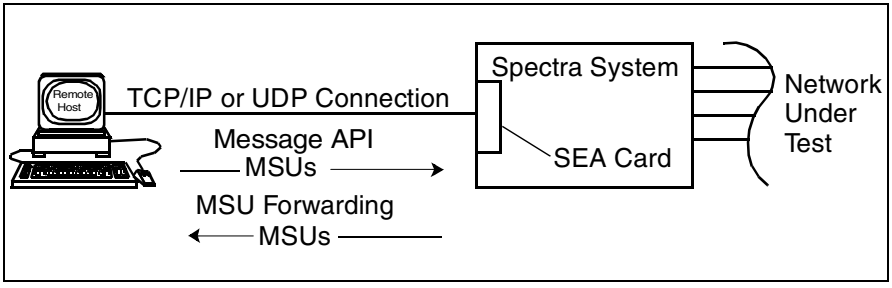
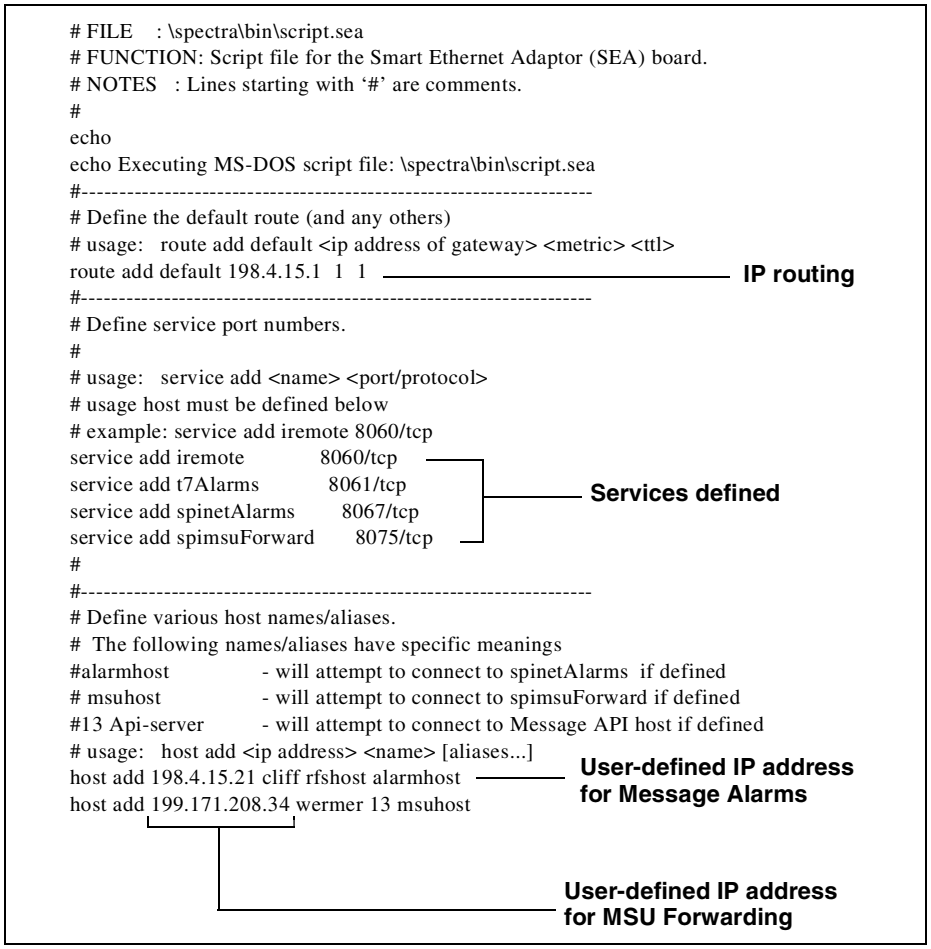


Figure 12.22 - Remote Test Manager

The Spectra system's Message API utilizes the SEA card, special SEA services, and the MSU Forwarding feature.

SEA CARD

The SEA card functions as a TCP/IP or UDP interface to the Spectra Host processor. The Spectra system uses special services to set the operation of the SEA card. These services are loaded by the `SCRIPT.SEA` text file (see **Figure 12.23**).




```
# FILE    : \spectra\bin\script.sea
# FUNCTION: Script file for the Smart Ethernet Adaptor (SEA) board.
# NOTES   : Lines starting with '#' are comments.
#
echo
echo Executing MS-DOS script file: \spectra\bin\script.sea
#-------------------------------------------------------------------
# Define the default route (and any others)
# usage:   route add default <ip address of gateway> <metric> <ttl>
route add default 198.4.15.1  1  1
#-------------------------------------------------------------------
# Define service port numbers.
#
# usage:   service add <name> <port/protocol>
# usage host must be defined below
# example: service add iremote 8060/tcp
service add iremote            8060/tcp
service add t7Alarms           8061/tcp
service add spinetAlarms       8067/tcp
service add spimsuForward      8075/tcp
#
#-------------------------------------------------------------------
# Define various host names/aliases.
#  The following names/aliases have specific meanings
#alarmhost              - will attempt to connect to spinetAlarms  if defined
# msuhost               - will attempt to connect to spimsuForward if defined
#13 Api-server          - will attempt to connect to Message API host if defined
# usage:   host add <ip address> <name> [aliases...]
host add 198.4.15.21 cliff rfshost alarmhost
host add 199.171.208.34 wermer 13 msuhost
```

Figure 12.23 - SCRIPT.SEA File (Example)

The `SCRIPT.SEA` file is edited using the Spectra system DOS commands found under the F8 Tools menu. For more information about editing files, refer to "DOS Commands" on page 482 of this guide.

SEA SERVICES

SEA services set the operation of the SEA card. All SEA services are defined as clients, except for the MSU Forwarding feature, which operates as a host. All clients are referenced by the port number, which is user definable. The MSU Forwarding host service is defined by the host name and must be defined as msuhost. Port numbers for the services defined must be programmed into the remote host. SEA services used for Message API are listed in the following paragraphs.

MSU Forwarding (spimsuForward)
The MSU Forwarding service establishes a single connection (a TCP/IP client) to a remote host through TCP/IP. The MSU Forwarding host service is defined by the host name and must be defined as msuhost.

Message API (13Api-server)
The Message API service enables the Spectra system to receive messages from remote hosts. The Message API service uses specific header structures for SS7, ISDN, and X.25 protocols. For more information about message headers, refer to "Header Information" on page 454 of this guide.

MESSAGE API HEADER STRUCTURE

Message API allows a remote workstation to generate and transmit MSUs to the Spectra system, which will then transmit the MSUs to the network. MSUs can be associated with either SS7, ISDN, or X.25 protocols supported by the Spectra system.

✍ *To run Message API, the Spectra system must be started with the -u command line switch enabled. To enable Message API and MSU Forwarding using a command line switch, see "Enabling Message API and MSU Forwarding using a Command Line Switch" on page 459 of this guide. For more information about command line switches, refer to "Accessing Program Command Line Switches" on page 2 of this guide.*

Data presented to the Spectra system for transmission as an MSU must consist of the MSU plus a message header.

Header Information

Messages transmitted to the Spectra system using Message API must contain a 10 B header needed to process the message (see **Figure 12.24**).

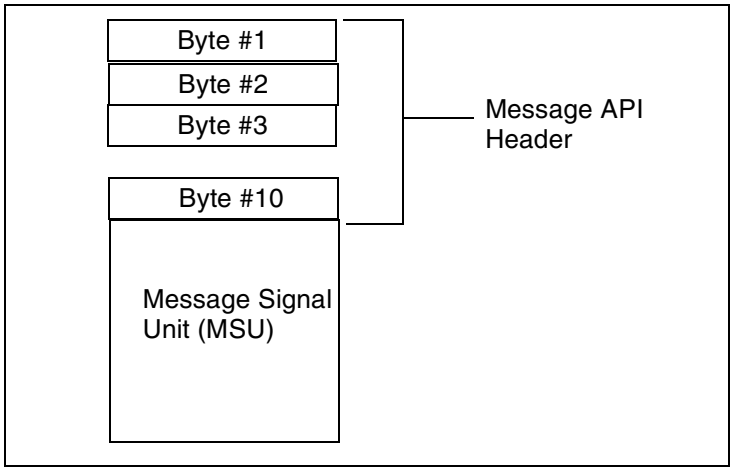


Figure 12.24 - Message API Header Format

The 10 B of header data contain the following information: message length, protocol, protocol parameters, and link characteristics. The Message API header information is different for SS7, ISDN, and X.25 protocols. Header formats for SS7, ISDN, and X.25 are shown in **Table 12.2**, **Table 12.3**, and **Table 12.4**, respectively.

Table 12.2 - SS7 Header Data

Byte Name	Byte Number	Parameter Length	Parameter Characteristics	Byte Contents (Shown in Hex)
Total length	1	1 B	MSU Length (in bytes) + 9 (in bytes)	See Parameter Characteristics
Reserved	2	1 B	Fixed	00
Reserved	3	1 B	Fixed	A5
Reserved	4	1 B	Fixed	DB
Protocol	5	1 B	Fixed	00
Destination	6	1 B	Fixed	00
Origination	7	1 B	Fixed	00
CIC #1	8	1 B	CIC	Value of low byte of CIC
CIC #2	9	1 B	CIC	Value of high byte of CIC
Reserved	10	1 B	Fixed	00

Table 12.3 - ISDN Header Data

Byte Name	Byte Number	Parameter Length	Parameter Characteristics	Byte Contents (Shown in Hex)
Total length	1	1 B	MSU Length (in bytes) + 9 (in bytes)	See Parameter Characteristics
Reserved	2	1 B	Fixed	00
Reserved	3	1 B	Fixed	A5
Reserved	4	1 B	Fixed	DB
Protocol	5	1 B	Fixed	01
SAPI	6	1 B	SAPI	SAPI
TEI	7	1 B	TEI	TEI
Reserved	8	1 B	Fixed	00
Reserved	9	1 B	Fixed	00
Link Number	10	1 B	Link Number	01 - 10

Table 12.4 - X.25 Header Data

Byte Name	Byte Number	Parameter Length	Parameter Characteristics	Byte Contents (Shown in Hex)
Total length	1	1 B	MSU Length (in bytes) + 9 (in bytes)	See Parameter Characteristics
Reserved	2	1 B	Fixed	00
Reserved	3	1 B	Fixed	A5
Reserved	4	1 B	Fixed	DB
Protocol	5	1 B	Fixed	02
LIC	6	1 B	Fixed	1X: LIC 0X: Not LIC Where X = don't care
LAPD-D Basic or Extended				X0: LAPD-D Basic X1:LAPD-D Extended Where X = don't care
Packet Basic or Extended	7	1 B	Fixed	01: Extended 00: Basic
Circuit No. 1	8	1 B		Value of low byte of circuit number
Circuit No. 2	9	1 B		Value of high byte of circuit number
Link Number	10	1 B	Link Number	01 - 10

✍ *The MSU transmitted with the header is not modified by the Spectra system. Therefore, all mandatory and optional parameters must be configured at the workstation prior to transmitting the header/MSU package to the Spectra system.*

Message API Setup

Before configuring the Spectra system to receive messages from the Message API feature, you must complete the following actions:

- Configure the `SCRIPT.SEA` file by defining ports numbers for Message API and MSU Forwarding.
- Enable Message API and automatic MSU Forwarding using the -u command line switch.

To configure the Spectra system for Message API, complete the following procedures.

Configuring the SCRIPT.SEA file for Message API

Follow these steps to configure the `SCRIPT.SEA` file.

Step	Action
1.	Press the **F8** key to access the F8 Tools menu.
2.	Use the ↑↓ keys to select the DOS COMMANDS option, and press the **Enter (↵)** key.
3.	Use the ↑↓ keys to select the `SCRIPT.SEA` file in the `C:\SPECTRA\BIN` directory.
4.	Press the **E** key to access the `SCRIPT.SEA` file with the Edit option. The SCRIPT.SEA file appears on your screen in ASCII text format.
5.	Input adjustments to the text file for your network by modifying the appropriate lines in the `SCRIPT.SEA` file for MSU Forwarding and Message API. For more information about adding MSU Forwarding and Message API services to the `SCRIPT.SEA` file, refer to "SEA Services" on page 453 of this guide.
6.	After all modifications have been made, press the **Alt** key and the **S** key to save the file. A Save file (include extension if needed) dialog box appears.
7.	Press the **Enter (↵)** key to save the file under the same name (`SCRIPT.SEA`). A File exist, overwrite? (Y/N) dialog box appears. Press the **Y** key to overwrite the old `SCRIPT.SEA` file.

✍ *After editing the* `SCRIPT.SEA` *file, you must reboot the SEA card to apply the changes. The following steps explain this process.*

8. Press the **Esc** key twice to return to the F8 Tools menu.

9. Use the ↑↓ keys to select the RESET I/O INTERFACE option, and press the **Enter (↵)** key. An Enter Board Number dialog box appears. Enter the board number and press the **Enter (↵)** key to reset it.

Enabling Message API and MSU Forwarding using a Command Line Switch

To run Message API, the Spectra System must be started with the -u command line switch enabled. This command line switch automatically enables the MSU Forwarding feature on the system.

✍ *Only users with a System Administrator level of clearance are allowed to exit to DOS and perform this procedure.*

Follow these steps to set the command line switch.

Step	Action

1. Press the **F1** key, select **EXIT TO DOS**, and press the **Enter (↵)** key to exit the Spectra system program and return to DOS.

✍ *Only users with a System Administrator level of clearance are allowed to exit to DOS.*

2. Press the **Y** key to exit to DOS.

3. Type **`SPECTRA -U`** from the DOS prompt, and press the **Enter (↵)** key. For more information about the command line switches, refer to "Accessing Program Command Line Switches" on page 2 of this guide.

The Spectra system can be configured for MSU Forwarding locally. For information about configuring the Spectra system for MSU Forwarding, refer to the proper protocol-specific section of MSU Forwarding in this chapter.

✍ *Messages generated remotely and transmitted to the Spectra system must have the proper message header. For more information about message headers for the Message API feature, refer to "Header Information" on page 454 of this guide.*

SILICON VALLEY NETWORK INTEGRATION

The Spectra system has an optional Silicon Valley Network (SVN) Integration feature, which works in conjunction with Silicon Valley test systems software. The SVN Integration feature provides users the ability to schedule and execute automated tests, collect the tests results, and provide detailed test results either locally on the Spectra system or remotely at a workstation through iRemote.

For more information about this option or for purchasing information, please contact your Inet Sales Representative.

13 Using the Tools

OVERVIEW

The F8 Tools function provides link-management tools that create the link state necessary to run specific tests. Different tool options are available for three different categories of program modes in the Spectra system. The F8 Tools function is used primarily in lab and testbed environments to simulate different test scenarios. It provides an easy way to manipulate links without creating entire test scripts. It can also be used for simultaneous deactivation of multiple links to simulate linkset failure conditions. Use the link manipulation options with caution to avoid unnecessary service outages.

The F8 Tools function allows the user to access DOS commands to create, edit, and view text files and perform file management. DOS commands are used primarily for Spectra system disk file management. Files can be copied, deleted, or renamed. Additional directories can be created or deleted to better organize disk files. The DOS Commands feature provides an ASCII text editor for editing or viewing text files.

The F8 Tools function can be used to reset hardware devices such as the Input/Output (I/O) Interface and the Basic Rate Interface (BRI) pod.

The Spectra system provides tools for testing audio quality. The Audio Controller allows you to plug a headset into a BRI pod in order to communicate audibly. The Tone Generator allows you to enter a string of digits in order to generate analog test tones.

The F8 Tools function also provides a Manage Mapping Table feature that allows you to adjust an input value based on various ranges. Through the use of various mathematical functions, an output value is returned.

Follow these steps to access the F8 Tools function.

Step	Action
1.	From anywhere in the Spectra system, press the **F8** key. The F8 Tools menu appears (see **Figure 13.1**).

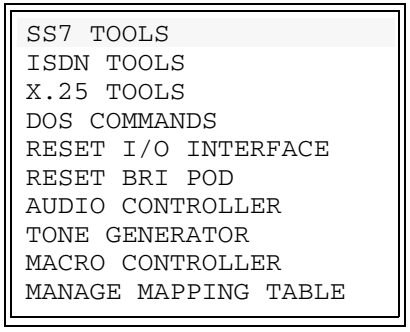


Figure 13.1 - F8 Tools Menu

2.	Use the ↑↓ keys to select the desired option, and press the **Enter** (↵) key.

SS7 TOOLS

The list of options in the SS7 Tools options menu varies, depending on the mode you are running.

The SS7 Tools options menu seen in **Figure 13.2** appears in the following modes:

- STP Emulation
- SCP Emulation
- TUP Tester
- ISUP Tester
- TCAP Tester
- ISUP/TUP Generator
- TCAP Generator
- GSM Generator

```
TRANSMIT MSU THROUGH LEVEL 3
TRANSMIT SU OUT SPECIFIED LINK
LINK ACTIVATE
LINK ACTIVATE (EMERGENCY ALIGNMENT)
LINK DEACTIVATE
LINK INHIBIT
LINK UNINHIBIT
LINKSET ACTIVATE
LINKSET DEACTIVATE
SET LOCAL PROCESSOR OUTAGE
CLEAR LOCAL PROCESSOR OUTAGE
CONNECT VSP TO STP
DISCONNECT VSP FROM STP
CONNECT C-LINK
DISCONNECT C-LINK
AUTO LEVEL3 STOP
AUTO LEVEL3 START
```

Figure 13.2 - SS7 Tools Options Menu

The SS7 Tools options menu seen in **Figure 13.3** appears in the Level 2 Tester, Level 3 Tester, and Manipulator modes.

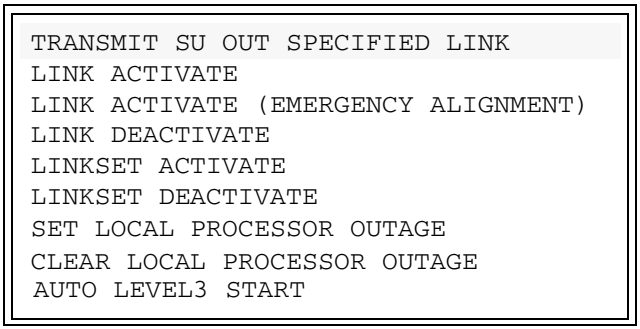


Figure 13.3 - SS7 Tools Options Menu

For most options, a Link Number dialog box appears (see **Figure 13.4**). Enter the desired link number, and press the Enter (↵) key to perform the operation. If the chosen link is not present, a message appears in the top border line.

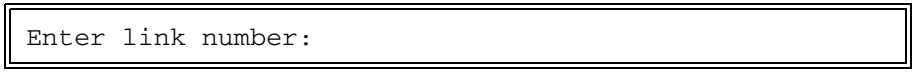


Figure 13.4 - Link Number Dialog Box

SS7 TOOLS OPTIONS MENU DEFINITIONS

Transmit MSU Through Level 3
This option provides true emulation by allowing an MSU message to be sent through the Spectra system's Level 3 processing.

Origination Point Codes (OPCs) and Destination Point Codes (DPCs) must be established during network configuration. For more information about the Network Configuration screen and the Level 3 Parameters option, see "Setting Up Your Network Configuration" on page 166 of the ***Spectra Setup and Configuration Guide***.

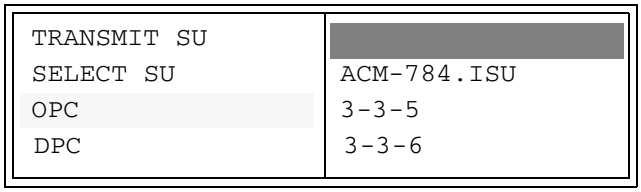


Figure 13.5 - Transmit MSU Through Level 3 Options Menu

Follow these steps to assign the transmit options.

Step	Action
1.	When the Transmit MSU Through Level 3 options menu appears, select the **OPC** field, and press the **Enter** (↵) key to access the available point codes. A menu appears displaying OPCs that have been established in the Network Configuration screen under the Level 3 Parameters option. Select the desired OPC, and press the **Enter** (↵) key.
2.	Select the **DPC** field and press the **Enter** (↵) key to access the available point codes. A menu appears displaying DPCs that have been established in the Network Configuration screen under the Level 3 Parameters option. Select the desired DPC, and press the **Enter** (↵) key.
3.	Select the **Select SU** field and press the **Enter** (↵) key to access the SU message catalog. Select the desired message, and press the **Enter** (↵) key.
4.	To transmit the message, select the **Transmit SU** field, and press the **Enter** (↵) key.

Transmit SU Out Specified Link
When this option is accessed, an options menu appears providing specific transmission options for sending a particular signal unit (see **Figure 13.6**).

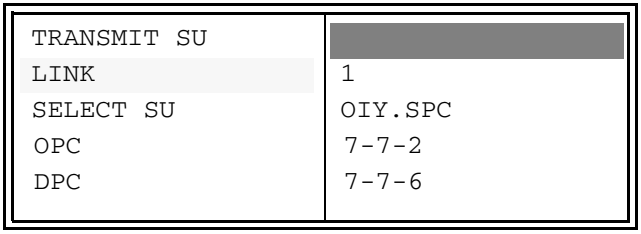


Figure 13.6 - Transmit SU Out Specified Link Options Menu

Follow these steps to assign the transmit options.

Step	Action
1.	When the Transmit SU Out Specified Link options menu appears, select the **Link** field and press the **Enter** (↵) key to access the numeric entry field. Enter the link number that the signal unit is to be transmitted on.
2.	Select the **Select SU** field, and press the **Enter** (↵) key to access the SU message catalog. Select the desired message, and press the **Enter** (↵) key.
3.	Select the **OPC** field, and press the **Enter** (↵) key to access the numeric entry field. Enter the desired OPC (0-255, 0-255, and 0-255 for ANSI; 0-7, 0-255, and 0-7 for ITU-T; or any corresponding number in decimal format), and press the **Enter** (↵) key.
4.	Select the **DPC** field, and press the **Enter** (↵) key to access the numeric entry field. Enter the desired DPC (0-255, 0-255, and 0-255 for ANSI; 0-7, 0-255, and 0-7 for ITU-T; or any corresponding number in decimal format), and press the **Enter** (↵) key.
5.	To transmit the message, select the **Transmit SU** field, and press the **Enter** (↵) key.

LINK ACTIVATE
Press the Enter (↵) key to align a link during a normal proving period. A Link Number dialog box appears. Type in the desired link number and press the Enter (↵) key.

LINK ACTIVATE (EMERGENCY ALIGNMENT)
Press the Enter (↵) key to align a link during an emergency proving period. A Link Number dialog box appears. Type in the desired link number and press the Enter (↵) key.

LINK DEACTIVATE
Press the Enter (↵) key to take a link out of service. A Link Number dialog box appears. Type in the desired link number and press the Enter (↵) key. The link will remain inoperable until it is reactivated using the LINK ACTIVATE option.

LINK INHIBIT
Press the Enter (↵) key to send a Link Inhibit Message (LIN) to the adjacent terminal. A Link Number dialog box appears. Type in the desired link number and press the Enter (↵) key.

LINK UNINHIBIT
Press the Enter (↵) key to send a Link Uninhibit Message (LUN) to the adjacent terminal. A Link Number dialog box appears. Type in the desired link number and press the Enter (↵) key.

LINKSET ACTIVATE
Press the Enter (↵) key to bring an entire linkset into service to recover a link under normal conditions using emergency alignment procedures. A Link Number dialog box appears. Type in the desired link number and press the Enter (↵) key.

LINKSET DEACTIVATE
Press the Enter (↵) key to take an entire linkset out of service. A Link Number dialog box appears. Type in the desired link number and press the Enter (↵) key. The linkset will remain inoperable until it is reactivated using the LINKSET ACTIVATE command,.

The following figures demonstrate how the Linkset Deactivate feature can be used to simulate sudden route unavailability scenarios.

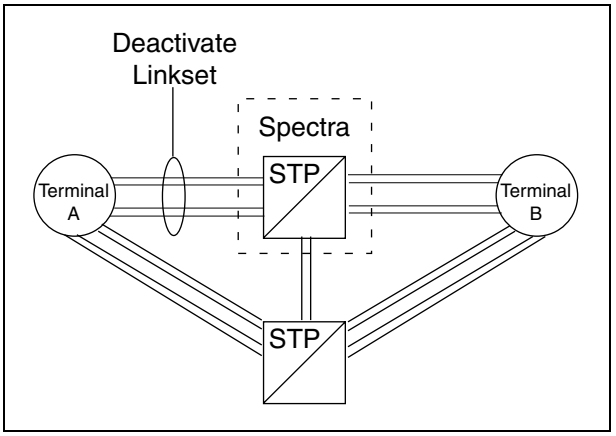


Figure 13.7 - Simultaneous Loss of All Links within a Linkset (Example 1)

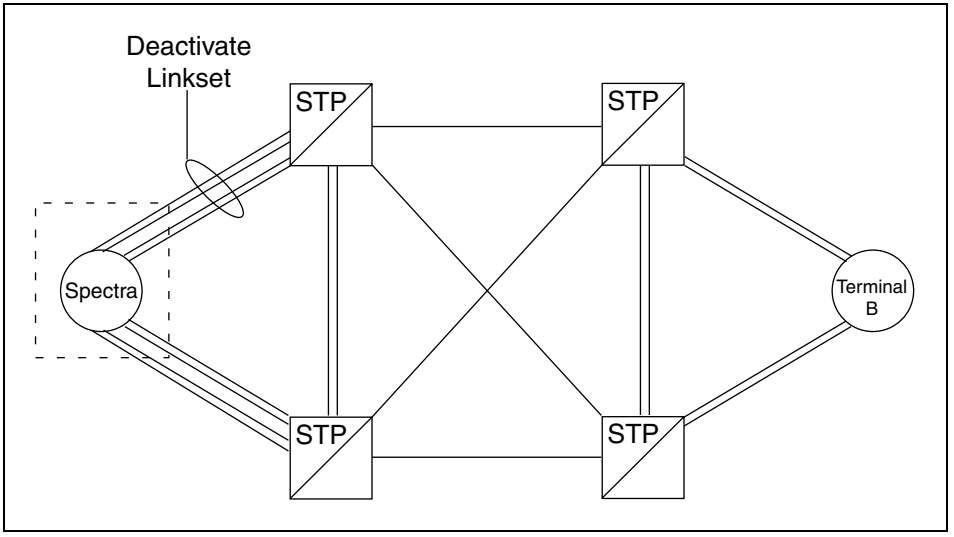


Figure 13.8 - Simultaneous Loss of All Links within a Linkset (Example 2)

SET LOCAL PROCESSOR OUTAGE
Press the Enter (↵) key to place a link in a local processor outage state and alert the adjacent terminal by transmitting a Status Indicator-Processor Outage (SIPO) signal unit. A Link Number dialog box appears. Type in the desired link number and press the Enter (↵) key

CLEAR LOCAL PROCESSOR OUTAGE
Press the Enter (↵) key to free a link from a local processor outage state and resumes normal operation on the specified link. A Link Number dialog box appears. Type in the desired link number and press the Enter (↵) key

CONNECT VSP TO STP
Press the Enter (↵) key to allows links from Virtual Signalling Points (VSPs) to be connected to particular Signalling Transfer Points (STPs). VSPs and STPs can be connected and disconnected to test the reaction of downed links on the network. Since this option deals with VSPs, the links are simulated and are not actual physical links.

VSPs are assigned in the Virtual SP screen. For more information, see "Assigning Virtual Signalling Points" on page 173 of the ***Spectra Setup and Configuration Guide***.

STPs are emulated by the Spectra system and assigned in the Network Configuration screen. For more information, see "Setting Up Your Network Configuration" on page 166 of the ***Spectra Setup and Configuration Guide***.

When this option is accessed, the Connect VSP to STP options menu appears (see **Figure 13.9**).

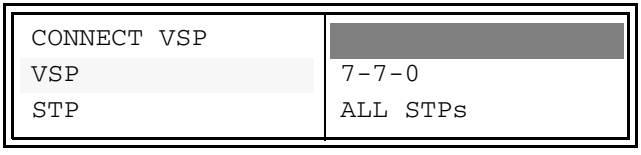


Figure 13.9 - Connect VSP to STP Options Menu

Follow these steps to connect VSPs to STPs.

Step	Action
1.	When the Connect VSP to STP options menu appears, select the **VSP** field, and press the **Enter** (↵) key to access the VSP point

code catalog. The catalog displays all point codes that have been entered in the Virtual SP screen for the current Network Configuration (see "Setting Up Your Network Configuration" on page 166 of the ***Spectra Setup and Configuration Guide***).

2. Select the desired VSP point code, and press the **Enter** (↵) key.

3. Select the **STP** field, and press the **Enter** (↵) key to access the STP Point Code catalog. All STP point codes currently emulated by the Spectra system are displayed. If an STP is available for connection, Available appears beside the point code. If it is not available, N/A appears. The All STPs can be chosen to connect the VSP to all available STPs.

DISCONNECT VSP FROM STP

This option allows links from VSPs to be disconnected from particular STPs.

When this option is accessed, a Disconnect VSP fro STP options menu appears (see **Figure 13.10**).

DISCONNECT VSP	
VSP	7-7-0
STP	ALL STPs

Figure 13.10 - Disconnect VSP From STP Options Menu

Follow these steps to disconnect VSPs from STPs.

Step	Action

1. When the Disconnect VSP from STP options menu appears, select the **VSP** field, and press the **Enter** (↵) key to access the VSP point code catalog. The catalog displays all point codes that have been entered in the Virtual SP screen for the current Network Configuration (see "Setting Up Your Network Configuration" on page 166 of the ***Spectra Setup and Configuration Guide***).

2. Select the desired VSP point code, and press the **Enter** (↵) key.

3. Select the **STP** field, and press the **Enter** (↵) key to access the STP point code catalog. All STP point codes currently emulated by the

Spectra system are displayed. If an STP is available for connection, Available appears beside the point code. If it is not available, N/A appears. The All STPs option can be chosen to connect the VSP to all available STPs.

CONNECT C-LINK
This option allows virtual C-Links to be connected to STPs.

DISCONNECT C-LINK
This option allows virtual C-Links to be disconnected from STPs.

AUTO LEVEL3 Stop/Start Options
The Auto Level 3 Stop/Start options are used to enable or disable automatic network management of nodes emulated by the Spectra system. By default, the Spectra system does not perform automatic network management. If Auto Level 3 is ON during a test, the Spectra system may interfere with the actual test and cause invalid conditions to occur. It is necessary to start Auto Level 3 functions when establishing pretest conditions, since the appropriate network management messages need to be exchanged with the system under test to establish appropriate conditions prior to executing a test. When a test is run, Auto Level 3 should be stopped so the terminal under test can perform network management functions. After a test is executed, Auto Level 3 functions can be started.

✍ *When Auto Level 3 is ON, the status display line on the bottom border of the screen reflects that the link is available (Avlb). When Auto Level 3 is disabled, the Link State reflects that the link is in service (InSv).*

Auto Level3 Stop
The Auto Level 3 Stop disables automatic network management of nodes emulated by the Spectra system.

Auto Level3 Start
The Auto Level 3 Start enables automatic network management of nodes emulated by the Spectra system.

ISDN TOOLS

The ISDN Tools option contains features for establishing and disconnecting ISDN links and Terminal Endpoint Identifiers (TEIs), manually transmitting ISDN messages, and sending BRI commands. The ISDN Tools options menu is pictured in **Figure 13.11**.



Figure 13.11 - ISDN Tools Options Menu

ISDN TOOLS OPTIONS MENU DEFINITIONS

Transmit SU Out Specified Link
When this option is accessed, an options menu appears providing specific transmission options for sending a particular signal unit. Different ISDN protocol selections in the Level 2 Link Layer Parameters screen alter the options in the Transmit SU Out Specified Link options menu. For more information about Level 2 Parameters, refer to "Level 2 Parameters" on page 209 of the ***Spectra Setup and Configuration Guide***.

The options menu for CCITT, ETSI, and ABIS appears as shown in **Figure 13.12**.

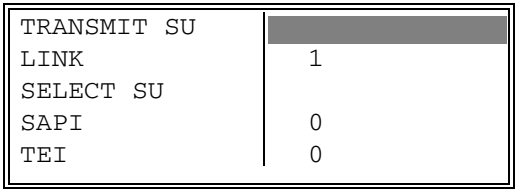


Figure 13.12 - Transmit SU Out Specified Link Options Menu

The options menu for V5.1 and V5.2 appears as shown in **Figure 13.13**.

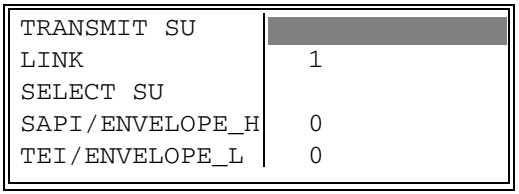


Figure 13.13 - Transmit SU Out Specified Link Options Menu

The options menu for DASS appears as shown in **Figure 13.14**.

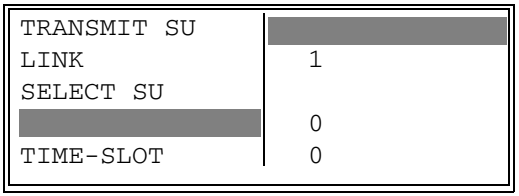


Figure 13.14 - Transmit SU Out Specified Link Options Menu

The options menu for DPNSS appears as shown in **Figure 13.15**.

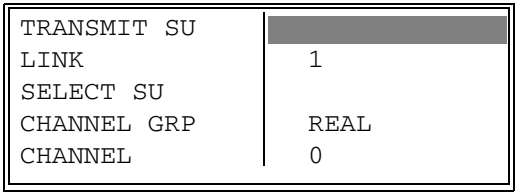


Figure 13.15 - Transmit SU Out Specified Link Options Menu

Follow these steps to assign the transmit options.

Step	Action
1.	Select the **Link** field, and press the **Enter** (↵) key to access the numeric entry field. Enter the link number for the link on which the signal unit is to be transmitted. Press the ↓ key to advance to the next field.
2.	Select the **Select SU** field, and press the **Enter** (↵) key to access the SU message catalog. Select the desired message, and press the **Enter** (↵) key. Press the ↓ key to advance to the next field.
3.	This step is for CCITT, ETSI, ABIS, V5.1, V5.2, and DPNSS protocols only. When using the DASS protocol, skip to **Step 4**. For CCITT, ETSI, ABIS, V5.,1 and V5.2 protocols, this is a numeric field. Select the **SAPI** or **SAPI/EnVelope_H** field, and press the **Enter** (↵) key to access the numeric field. Enter the desired value, and press the **Enter** (↵) key. Press the ↓ key to advance to the next field. For DPNSS, this field is a channel group toggle for real or virtual timeslots. Select the **Channel Grp** field, and press the **Enter** (↵) key to toggle between Real and Virtual. Press the ↓ key to advance to the next field.
4.	Select the **TEI**, **TEI/EnVelope_L**, **Time-Slot**, or **Channel** field and press the **Enter** (↵) key to access the numeric field. Enter the desired value, and press the **Enter** (↵) key.
5.	Press the ↑ key to advance to the **Transmit SU** field, and press the **Enter** (↵) key to transmit the message.

Terminal Link Control

When this option is accessed, an options menu appears providing specific options for sending a link control command message. Different ISDN protocol selections in the Level 2 Link Layer Parameters screen alter the options in the Terminal Link Control options menu. For more information about Level 2 Parameters, refer to "Level 2 Parameters" on page 209 of the ***Spectra Setup and Configuration Guide***.

The options menu for CCITT, ETSI, ABIS, V5.1, and V5.2 appears as shown in **Figure 13.16**.

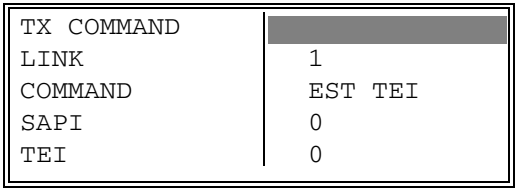


Figure 13.16 - Terminal Link Control Options Menu

The options menu for DASS appears as shown in **Figure 13.17**.

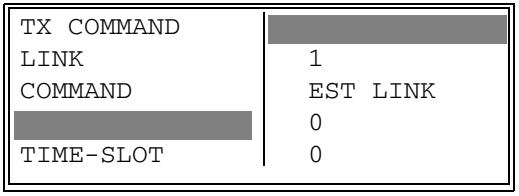


Figure 13.17 - Terminal Link Control Options Menu

The options menu for DPNSS appears as shown in **Figure 13.18**.

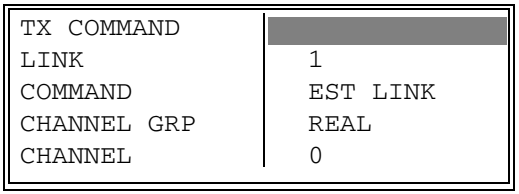


Figure 13.18 - Terminal Link Control Options Menu

Follow these steps to assign the link control options.

Step	Action
1.	Select the **Link** field, and press the **Enter** (↵) key to access the numeric entry field. Enter the link number that the signal unit is to be transmitted on. Press the ↓ key to advance to the next field.
2.	Select the **Command** field, and press the **Enter** (↵) key to toggle between the available link command options. As shown in the following list, based on the link protocol.

- **CCITT, ETSI, ABIS, V5.1, and V5.2 protocols:**
  - EST TEI - Resets all automatic TEIs.
  - TEI STATUS - Displays the status of the TEI for the specified link in the top border line as either TEI CONNECTED or TEI DISCONNECTED.
  - DISC TEI - Disables all TEIs for the specified link.
  - EST LINK - Resets all timeslots for the specified link.
  - DISC LINK - Disables the specified link.

- **DASS protocol:**
  - EST LINK - Resets all timeslots for the specified link.
  - DISC TIMESLOT - Disables the specified timeslot of the specified link.
  - EST TIMESLOT - Enables the specified timeslot of the specified link.
- **DPNSS protocol:**
  - EST LINK - Resets all valid real and virtual channels for the specified link.
  - EST CHANNEL - Enables the specified real or virtual channel of the specified link.
  - DISC CHANNEL - Disables specified real or virtual channels for the specified link.

Select the desired command, and press the **Enter** (↵) key. Press the ↓ key to advance to the next field.

3. This step is for CCITT, ETSI, ABIS, V5.1, V5.2, and DPNSS protocols only. When using the DASS protocol, skip to **Step 4**.

   For CCITT, ETSI, ABIS, V5.1, and V5.2 protocols, this is a numeric field. Select the **SAPI** field, and press the **Enter** (↵) key to access the numeric field. Enter the desired value, and press the **Enter** (↵) key. Press the ↓ key to advance to the next field.

   For DPNSS, this field is a channel group toggle for real or virtual timeslots. Select the **Channel Grp** field, and press the **Enter** (↵) key to toggle between Real and Virtual. Press the ↓ key to advance to the next field.

4. Select the **TEI**, **Time-Slot**, or **Channel** field, and press the **Enter** (↵) key to access the numeric field. Enter the desired value, and press the **Enter** (↵) key.

5. Press the ↑ key to advance to the TX Command field, and press the **Enter** (↵) key to transmit the message.

Basic Rate Interface Commands
When this option is accessed, an options menu appears providing specific options for sending a Basic Rate Interface (BRI) command message to set the Information State for the Network Termination (NT) side (see **Figure 13.19**).

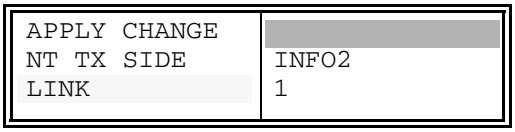


Figure 13.19 - Basic Rate Interface Commands Options Menu

The following items describe the NT TX SIDE options:

- INFO0: No line signal
- INFO2: Continue BRI activation (NT-to-TE)
- INFO4: Activation BRI (NT-to-TE)
- INFOX: Take link out of sync
- DON'T CARE: Bring link back into sync

Follow these steps to send an ISDN BRI command message, setting the link state for the ISDN NT interface.

Step	Action
1.	Select the **NT TX Side** field, and press the **Enter (↵)** key to rotate between the available interface command message options—INFO0, INFO2, INFO4, and INFOX.
2.	Select the **Link** field, and press the **Enter (↵)** key. Enter the desired link number, and select the **Apply Change** field, Press the **Enter (↵)** key to establish the desired information state.

X.25 TOOLS

The X.25 Tools options menu lists the tools that are used with the X.25 protocol. The X.25 Tools options menu is pictured in **Figure 13.20**.

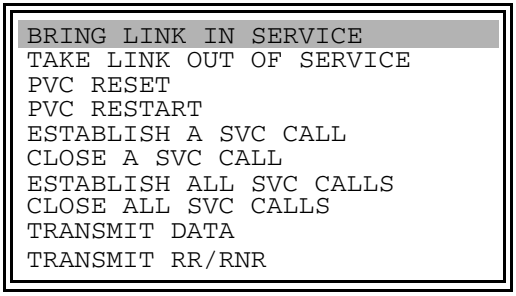


Figure 13.20 - X.25 Tools Options Menu

For all options, a Link Number options menu appears. Enter the desired link number, and press the Enter (↵) key to perform the operation. If the chosen link is not present, a message appears in the top border line.



Figure 13.21 - Link Number Dialog Box

X.25 TOOLS OPTIONS MENU DEFINITIONS

Bring Link In Service
This option brings a link into service. This option is used to align a link using a normal proving period. Select the option, and press the Enter (↵) key to access the Link Number options menu. Enter the desired link number, and press the Enter (↵) key to bring the link in service.

Take Link Out of Service
This option takes a link out of service and keeps it inoperable until it is reinstated by another option. Select the option, and press the Enter (↵) key to access the Link Number options menu. Enter the desired link number, and press the Enter (↵) key to take the link out of service.

PVC Reset
This option resets a specific Permanent Virtual Circuit (PVC) for a specified link. Select the option, and press the Enter (↵) key to access the Link Number dialog box. Enter the desired link number and the specific PVC to be reset (0 to 255), and press the Enter (↵) key.

PVC Restart
This option restarts all PVCs and Switching Virtual Circuits (SVCs) on a specified link. All PVCs and SVCs can be completely reinitialized for specific testing purposes (that is, returning links to original settings, recreating test scenarios, etc.). Select the option, and press the Enter (↵) key to access the Link Number dialog box. Enter the desired link number, and press the Enter (↵) key to restart the link.

SVC Call Options
Before using the SVC Call options, you must set up the X.25 Level 2 and Level 3 Parameters under the Configure option of the F1 Setup menu. For more information about setting Level 2 parameters, see "Level 2 Parameters" on page 233 of the ***Spectra Setup and Configuration Guide***. For more information about setting Level 3 parameters, see "Level 3 Parameters" on page 242 of the ***Spectra Setup and Configuration Guide***. SVC call numbers are defined in "Switch Virtual Circuit Mapping Screen" on page 252 of the ***Spectra Setup and Configuration Guide***.

Establish a SVC Call
This option tries to establish an SVC call on a specified link. Select the option, and press the Enter (↵) key to access the Link Number dialog box. Enter the desired link number and a valid SVC call number, and press the Enter (↵) key.

Close a SVC Call
This option closes a specific call on a specified link. Select the option, and press the Enter (↵) key to access the Link Number dialog box. Enter the desired link number and a valid SVC call number, and press the Enter (↵) key to close the call.

Establish All SVC Calls
This option tries to establish all SVC calls on a specified link. Select the option, and press the Enter (↵) key to access the Link Number dialog box. Enter the desired link number, and press the Enter (↵) key to try to establish the calls.

Close All SVC Calls
This option closes all SVC calls on a specified link. Select the option, and press the Enter (↵) key to access the Link Number dialog box. Enter the desired link number, and press the Enter (↵) key to close all calls on that link.

Transmit Data
The option transmits messages on demand that are located in the message catalog. These messages are stored in a catalog on the hard disk. Any message grabbed (captured) under the F9 Xamine function or created using the F6 Edit function is available for transmission. By sending out individual messages on demand, you can solicit various responses from the terminal being tested.

Transmit RR/RNR
This option allows you to transmit a Receive Ready (RR) message or a Receive Not Ready (RNR) message to the adjacent terminal. When this option is accessed, an editor box appears providing specific transmission options.

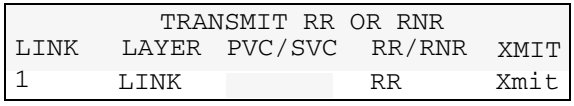


Figure 13.22 - Transmit RR/RNR Editor Box

Follow these steps to assign the transmit options.

Step	Action
1.	When the Transmit RR/RNR editor box appears, select the **LINK** field. Enter the link number that the RR/RNR is to be transmitted on.
2.	Select the **LAYER** field and press the **Enter** (↵) key to toggle between PACKET and LINK. Press the **Tab** key to move the cursor to the next field.
3.	If you selected: **PACKET** The cursor moves to the **PVC/SVC** field. Enter a valid PVC or SVC number, and press the **Tab** key to move the cursor to the next field.

LINK
The cursor moves to the **RR/RNR** field. Continue with **Step 4**.

4. Press the **Enter** (↵) key to toggle between RR and RNR.

5. To transmit the message, select the **XMIT** field, and press the **Enter** (↵) key.

DOS COMMANDS

The DOS Commands screen allows the user to manage disk files on the Spectra system's internal hard drive and the optional HDD2 drive. Select the DOS Commands option, and press the Enter (↵) key. The DOS Commands screen is displayed.

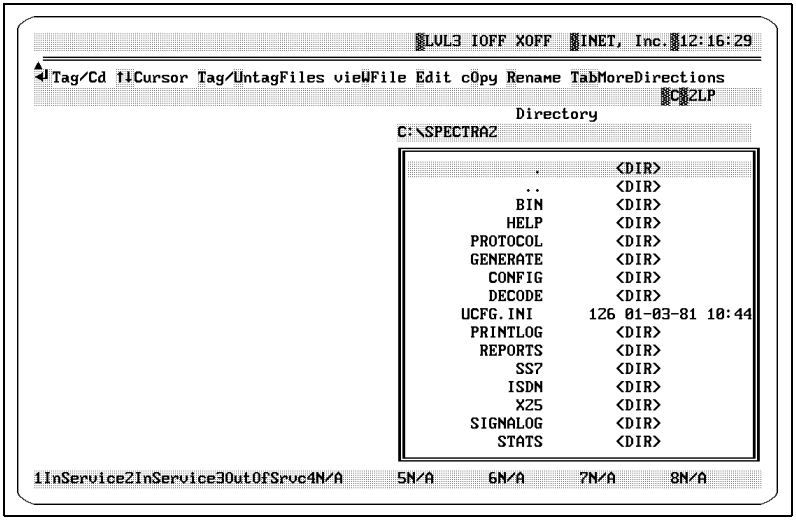


Figure 13.23 - DOS Commands Screen

DOS COMMANDS SCREEN DEFINITIONS

↵ Tag/Cd
Press the Enter (↵) key to tag the highlighted file for deletion. Press the Enter (↵) key again to untag the file. The Enter (↵) key can also be pressed when a directory is highlighted to display the directory.

✍ *Hidden files are not displayed in the directory window.*

↑↓ Cursor
Press the ↑↓ keys to move the cursor up or down in the directory window.

Tag/Untag Files
Press the T key to tag all files in the current directory. Press the U key to untag all files in the current directory.

Viewfile
Press the W key to view the highlighted file on screen. The file may be scrolled while viewing by pressing the ↑↓↔, PgUp, PgDn, Home or End keys. Press the Esc key to return to the DOS Commands screen.

✍ *Files longer than 32,500 lines are not loaded for viewing or editing.*

Edit
Press the E key to load the highlighted file for editing with the Text Editor. See "DOS Text Editor" on page 485 of this guide.

Copy
Press the O key to copy the highlighted file. A Copy Selected File dialog box appears.

- To copy the file to a new directory, type the name of the directory preceded by a backward slash (\), and press the Enter (↵) key.
- To copy the file to the same directory, type a new file name for the copy, and press the Enter (↵) key.
- To abort a copy, press the Esc key.

Rename
Press the R key to rename the highlighted file. A Rename Selected File dialog box appears. Enter the file name (maximum of eight characters) and optional extension (maximum of three characters), and press the Enter (↵) key.

CreateFile
Press the C key to create a new text file using the Text Editor. See "DOS Text Editor" on page 485 of this guide.

DeleteFile
Press the Delete key to delete tagged files. An Are you SURE you wish to DELETE file(s)? Y/N dialog box appears. Press the Y key to delete the files. If no files have been tagged, the selected file is deleted.

✍ *System files cannot be deleted using the DeleteFile function.*

ChangeDir
Press the D key to change the displayed directory. An Enter Directory dialog box appears. Enter the desired name of the directory to be displayed, and press the Enter (↵) key. The directory then becomes the current displayed directory.

Changing directories works in the same manner as it does from the DOS prompt. For example, to change from the `C:\SPECTRA\BIN` directory to the root C:\ directory, simply enter a backward slash (\) as the directory name, and press the Enter (↵) key.

MakeDir
Press the M key to make a new directory. An Enter New Directory dialog box appears. Enter the desired name of the new directory (maximum of eight characters), and press the Enter (↵) key. The new directory is created in the current displayed directory.

RemoveDir
Press the V key to delete a directory. An Enter Directory to Remove dialog box appears. Enter the name of the existing directory to be removed, and press the Enter (↵) key. Directories containing files cannot be removed until the files have been deleted.

DOS TEXT EDITOR

The DOS Text Editor can be used to create and edit ASCII text files.

Follow these steps to access the DOS Text Editor.

Step	Action

1. From the F8 Tools menu, use the ↑↓ keys to select the **DOS COMMANDS** option, and press the **Enter (↵)** key.

2. To edit an existing text file, select the desired file, and press the **E** key. To create a new text file, press the **C** key. The Text Editor screen appears.

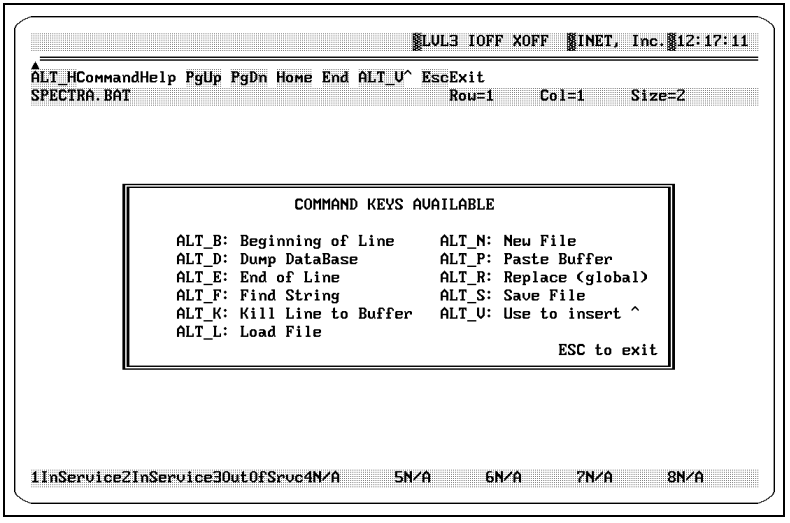


Figure 13.24 - Text Editor Screen - Command Help Displayed

3. Enter or edit text using the keyboard. Press the ↑↓↔ keys to move the cursor on the screen. Text is inserted to the left of the current cursor position.

4. Press the **Backspace** and **Delete** keys to correct typing mistakes or to make changes to an individual line.

5. While pressing the **Alt** key, press the **S** key to save the text. Enter a file name for the text, and press the **Enter (↵)** key.

6. Press the **Esc** key to return to the DOS Commands screen.

Text Editor Commands

PgUp
Press the PgUp key to scroll the text up one screen.

PgDn
Press the PgDn key to scroll the text down one screen.

Home
Press the Home key to move the cursor to the first line of text.

End
Press the End key to move the cursor to the last line of text.

ALT_HCommand Help
Press the Alt key and the H key to display the Text Editor Command Help window. Press the Esc key to return to the Text Editor. The following commands appear in the Text Editor Command Help window.

Beginning of Line
Press the Alt key and the B key to move the cursor to the beginning of the current line.

End of Line
Press the Alt key and the E key to move the cursor to the end of the current line.

Find String
Press the Alt key and the F key to find a text string. A Find String dialog box appears. Enter the text string to search for, and press the Enter (↵) key. The Text Editor searches from the current cursor position to the end of the text. If the string is found, the cursor moves to the position of the string in the text file.

Kill Line to Buffer
Press the Alt key and the K key to delete text from the cursor position to the end of the current line and store it in a paste buffer. The previous contents of the paste buffer are overwritten by the deleted text.

Load File
Press the Alt key and the L key to load an ASCII text file into the Text Editor. A Load File dialog box appears. Enter the name of the text file to load, and press the Enter (↵) key.

New File
Press the Alt key and the N key to delete all current text and begin a new text file.

Paste Buffer
Press the Alt key and the P key to insert the contents of the paste buffer at the current cursor position.

Replace (global)
Press the Alt key and the R key to replace a string in the text file with a new string, starting at the current cursor position. A Find String dialog box appears. Enter the string to be replaced, and press the Enter (↵) key. A Replace With dialog box appears. Enter the replacement string, and press the Enter (↵) key.

Save File
Press the Alt key and the S key to save the text file. A Save File dialog box appears. Enter the file name to be saved, and press the Enter (↵) key.

Carat Character
Press the Alt key and the V key to enter the terminating carat character when entering or editing ASCII signal unit data.

EscExit
Press the Esc key to exit the Text Editor and return to the DOS Commands screen. A dialog box appears with the following message "The Changes will be lost, do you want to Exit? (Y/N)". Press the Y to exit without saving the changes. Press the N key to return to editing.



Exiting from the Text Editor erases all unsaved text. Use caution when typing to avoid hitting the Esc key or the F1…F9 keys unintentionally.

RESET I/O INTERFACE

This option resets the I/O Interface—either the Data Link Processor (DLP) board or the Smart Ethernet Adapter (SEA) card.

Follow these steps to reset an I/O interface.

Step	Action
1.	From the F8 Tools menu, use the ↑↓ keys to select the **RESET I/O INTERFACES** option, and press the **Enter** (↵) key. An Enter Board Number dialog box appears (see **Figure 13.25**).

```
Enter board number:
```

Figure 13.25 - Enter Board Number Dialog Box

2.	Enter the number of the board to be reset, and press the **Enter** (↵) key.
3.	Repeat **Step 1** and **Step 2** for the desired number of boards.

RESET BRI POD

This option resets the BRI Pod. Follow these steps to reset a BRI interface.

Step	Action
1.	From the F8 Tools menu, use the ↑↓ keys to select the **RESET BRI POD** option, and press the **Enter** (↵) key. An Enter Pod Number dialog box appears (see **Figure 13.26**).

```
Enter pod number:
```

Figure 13.26 - Enter Pod Number Dialog Box

2.	Enter the number of the pod to be reset, and press the **Enter** (↵) key.
3.	Repeat **Step 1** and **Step 2** for the desired number of pods.

AUDIO CONTROLLER

The Audio Controller allows you to plug a headset into a BRI Pod in order to communicate audibly, listen in to calls you are monitoring, or even talk through the headset as a terminal device. You can connect/disconnect the headset on a link, as well as set the volume, side tone, PCM companding scheme, and power control for the analog communication.

To access the Audio Controller, select the Audio Controller option in the F8 Tools menu, and press the Enter (↵) key. The Audio Controller Settings screen appears (see **Figure 13.27**).

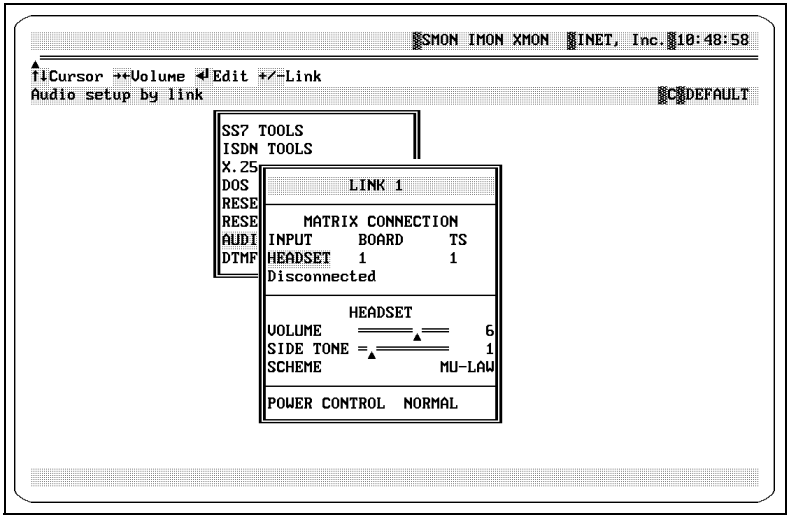


Figure 13.27 - Audio Controller Settings Screen

✍ *This feature requires that you have a T1 daughter board, a BRI pod, and a headset. The headset connects to the BRI pod.*

AUDIO CONTROLLER SETTINGS SCREEN DEFINITIONS

↑↓ Cursor
Press the ↑↓ keys to move the cursor up or down in the settings screen.

→←Volume
Press the →← keys to adjust the volume of the audio you hear on the headset.

↵Edit
Press the Enter (↵) key to access a field for editing.

+/- Link
Press the + or - keys to designate the link to which your headset is connected.

HEADSET
This section allows you to access the board and timeslot fields in order to input the necessary settings.

BOARD and TS fields
Press the → key to designate the board to which you want to listen. A Link Number dialog box appears. Type in the desired link number and press the Enter (↵) key. An Enter Time-Slot (1-31) dialog box appears. Designate the timeslot (TS) to which you want to listen and press the Enter (↵) key.

For a T1 board, you can enter any non-terminated timeslot from 1 to 24. For an E1 board, you can enter any non-terminated timeslot from 1 to 31. For a BRI, you can enter either B1 or B2 in the TS field.

Connected/Disconnected/Scan
Press the Enter (↵) key to cycle through the options for channels. Select form Scan for a channel, Connect to a channel, or Disconnect from a channel to which you want to listen.

Volume
Press the Enter (↵) key to adjust the volume of the audio you hear on the headset by entering a numeric value. Type in a value from 0 to 9 and press the Enter (↵) key to assign it.

Side Tone
Press the Enter (↵) key to adjust the volume of the audio you hear from your own voice by entering a numeric value. Type in a value from 0 to 9 and press the Enter (↵) key to assign it.

Scheme
Press the Enter (↵) key to toggle and set the PCM companding scheme—either A-LAW or MU-LAW—that is used.

Power Control
Press the Enter (↵) key to set the power control supplied to the phone by the computer to either NORMAL or RESTRICTED. Changing the setting reverses the polarity of the power signal.

USING THE AUDIO CONTROLLER

Follow these steps to use the Audio Controller.

Step	Action

1. Make sure your headset is properly plugged into the BRI pod.

*The BRI Pod can listen or talk on any other T1/E1 board that is in its bank (Boards 1 to 8 or Boards 9 to 16) as long as the BRI is the bank controller (Board 1 or Board 9). The Timing option of the Level 1 Parameters must be set to System for the bank in which the BRI is located. For more information about the Timing option, refer to "Timing" on page 122 of the **Spectra Setup and Configuration Guide**. Regardless of slot position, the BRI can always talk or listen to itself.*

2. From the F8 Tools menu, select the Audio Controller option, and press the **Enter (↵)** key. The Audio Controller Settings editor box appears (see **Figure 13.28**).

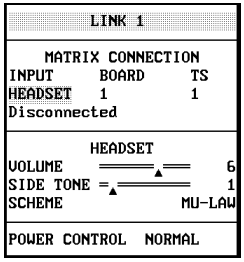


Figure 13.28 - Audio Controller Settings Editor Box

3. Press the **+** or **-** keys to designate the link in to which you plugged the headset.

4. Use the ↑↓ keys to select **SCHEME**. Press the **Enter (↵)** key to toggle between the MU-LAW and A-LAW PCM companding schemes.

5. Use the ↑↓ keys to select **POWER CONTROL**. Press the **Enter (↵)** key to toggle between the NORMAL and RESTRICTED power supply options.

6. Use the ↑↓ keys to select **HEADSET**, and Press the **Enter (↵)** key.

7. An Enter Board Number dialog box appears. Enter the number of the board, and press the **Enter (↵)** key.

8. An Enter TS Number dialog box appears. Enter the number of the timeslot to which you wish to listen (1 to 24 for T1; 1 to 31 for E1; or B1 or B2 for BRI), and press the **Enter (↵)** key.

9. Use the ↑↓ keys to select the **SCAN/CONNECTED/ DISCONNECTED** field. Press the **Enter (↵)** key to cycle through these options.

   If you are unsure of the timeslot to which you want to listen, select the **SCAN** option. The SCAN option cycles through the available timeslots beginning with the timeslot you designated in the TS field. The Scan option moves up one timeslot every 5 seconds.

   If you are certain that you want to listen to the timeslot you designated in the TS field, select the **CONNECTED** option. The CONNECTED option connects directly to the timeslot designated in the TS field.

10. When scanning, if you come to a timeslot to which you want to listen, press the **Enter (↵)** key to move from SCAN to CONNECTED.

11. To disconnect from a timeslot, press the **Enter (↵)** key until DISCONNECTED is displayed in the SCAN/CONNECTED/ DISCONNECTED field.

✍ *Whenever you start a new test under the F2 Run function, the Spectra system automatically disconnects you from the timeslot.*

TONE GENERATOR

The Tone Generator allows you to generate digital tones for testing. The Tone Generator comes with pre-programmed test tones as well as Dual Tone Multi Frequency (DTMF) tone generation capability. The Spectra system comes with three `.IMG` files that control the DTMF Generator. The three files are displayed in the following list.

- `TONETBL.IMG`
- `TONENATL.IMG`
- `TONEINTL.IMG`

✍ *Each file size is 15,200 B.*

The default file is national MU-LAW (`TONENATL.IMG`). If you need to generate A-LAW DTMF, you must exit to DOS and copy `TONEINTL.IMG` and `TONETBL.IMG`. This table file covers all sixteen tones plus the test tones. These files are located in the `C:\SPECTRA\BIN` directory.

✍ *In order for the Tone Generator to work, you must be set to a Terminated Test Mode under the F1 Setup/Mode options menu; you cannot be set to OFF or MONITOR in the Mode menu.*

To access the Tone Generator, select the Tone Generator option in the F8 Tools menu, and press the Enter (↵) key. The Tone Generator Settings screen appears (see **Figure 13.29**).

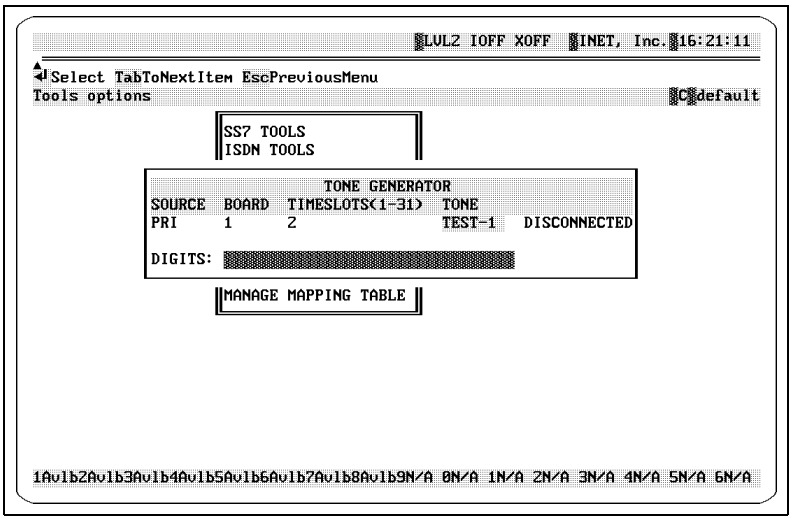


Figure 13.29 - Tone Generator Settings Screen

TONE GENERATOR SCREEN DEFINITIONS

↵Select
Press the Enter (↵) key to access a field for editing.

TabNextItem
Press the Tab key to move the cursor to the next field.

EscPreviousMenu
Press the Esc key to return to the previous menu.

SOURCE
Press the Enter (↵) key to toggle between the available source options. Designate the source of generated tones, as either PRI or DSP. The PRI option uses the Spectra's PRI to generate DTMF or test tones. The DSP option uses the DSP board(s) to generate DTMF or Single Frequency (SF) tones.

✍ *The DSP board SOURCE option is available only if you have purchased the Trunk Tester Network (TTN) or Trunk Tester Switch (TTS) options for the Spectra system.*

BOARD
Press the Enter (↵) key to designate the board to which you want to generate tones.

Timeslots (1-31)
Press the Enter (↵) key to designate the timeslot to which you want to generate tones. For a T1 board, you can enter any timeslot from 1 to 24. For an E1 board, you can enter any timeslot from 1 to 31. For a BRI, you can enter either B1 or B2 in the Timeslots (1-31) field.

Tone
Press the Enter (↵) key to designate the type of tone used in the test. The Spectra system provides three pre-programmed test tones—TEST TONE 1, TEST TONE 2, and TEST TONE 3—as well as DTMF Tone generation capability for the PRI Source option. The Spectra system provides eight pre-programmed SF tones as well as DTMF tone generation capability for the DSP Source option. These tones are described in the following paragraphs.

Pre-programmed Test Tones
When running a pre-programmed test tone, the Spectra system continuously generates the selected tone until the tone generator is disconnected. The pre-programmed test tones are displayed in **Table 13.1**.

Table 13.1 - Pre-Programmed Test Tones

MU-LAW	A-LAW
TEST TONE 1 - 1000 Hz	TEST TONE 1 - 400 Hz
TEST TONE 2 - 2600 Hz	TEST TONE 2 - 1000 Hz
TEST TONE 3 - 3300 Hz	TEST TONE 3 - 3300 Hz

Pre-programmed SF Tones
The SF tones are for use with the DSP Source option only. When running a pre-programmed SF tone, the Spectra system will continuously generate the selected tone until the tone generator is disconnected. The pre-programmed SF tones are:

- 400 Hz
- 1004 Hz
- 2010 Hz
- 2600 Hz

- 3100 Hz
- 3300 Hz
- 980 Hz
- 1780 Hz

DTMF Test Tones
When using DTMF test tones, the Spectra system allows you to select the tones to generate by using your keyboard (32 digits maximum). The Spectra system provides full 4 x 4 DTMF capability, including the digits 0 to 9 as well as #, *, A, B, C, and D to generate test tones.

For each key entered to generate a tone, the Spectra system generates the tone for 100 ms. This is immediately followed by 100 ms of silence before continuing with the next tone in the sequence. So, after you enter string of digits, the Spectra system generates the tones one after another in a 100 ms ON, 100 ms OFF manner.

You also have the option of entering a comma in the sequence. The comma represents 1 second of silence.

Transmit/Connected/Disconnected
When DTMF is the selected tone type, this field displays TRANSMIT, and the cursor moves to the DIGITS field, allowing you to enter DTMF digits to generate tones. Press the Enter (↵) key to move the cursor to the TRANSMIT field. Then the specified tones are generated.

When the tone type is one of the pre-programmed test tones (TEST-1, TEST-2, or TEST-3) or one of the pre-programmed SF tones, pressing the Enter (↵) key displays CONNECTED or DISCONNECTED. Select CONNECTED to start generating the test tones, and select DISCONNECTED to stop test tone generation.

USING TONE GENERATOR

Follow these steps to run the Tone Generator.

Step	Action

1. From the F8 Tools menu, select the **Tone Generator** option, and press the **Enter (↵)** key. The Tone Generator Settings screen appears (see **Figure 13.30**).

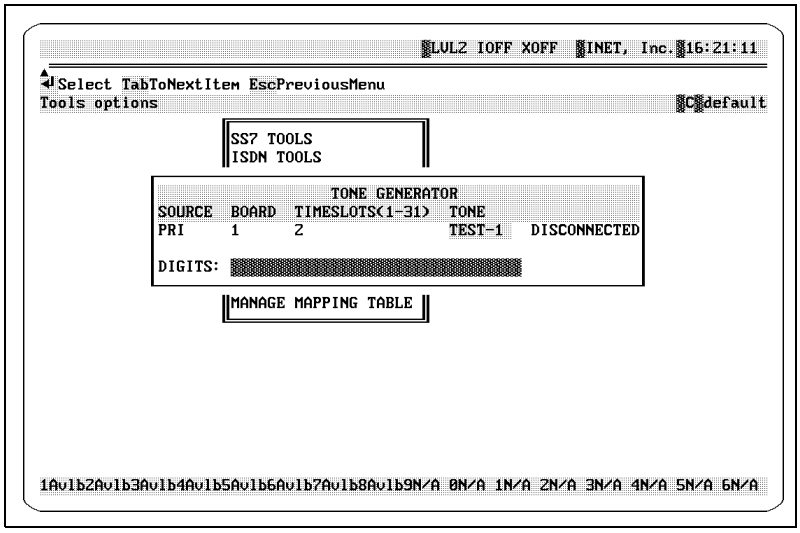


Figure 13.30 - Tone Generator Settings Screen

✍ *The DSP board SOURCE option is available only if you have purchased the Trunk Tester Network (TTN) or Trunk Tester Switch (TTS) options for the Spectra system.*

2. The cursor appears in the TRANSMIT/DISCONNECTED field. Press the **Tab** key to move the cursor to the Source field. Press the **Enter (↵)** key to toggle between PRI and DSP (if available). When you have selected the desired Source option, press the **Tab** key.

3. The cursor will then move to the BOARD field. Enter the number of the board on which you want to generate tones, and press the **Enter (↵)** key.

4. The cursor then moves to the TIMESLOTS field. Enter the number of the timeslot (1 to 24 for T1; 1 to 31 for E1; and B1 or B2 for BRI) on which you want to generate tones, and press the **Enter** (↵) key.

5. The cursor appears in the TONE field. Press the **Enter** (↵) key to cycle through the available tone options—DTMF, SF, TEST TONE - 1, TEST TONE - 2, and TEST TONE - 3. These tones are described in "Tone" on page 495 of this guide. When you have selected the type of tone to generate, press the **Tab** key.

6. If you selected:

   DTMF
   The cursor moves to the DIGITS field. Enter a string of digits to generate tones (maximum of 32 characters), and press the **Enter** (↵) key. The cursor moves to the TRANSMIT field, and the tones are generated.

   Test Tones / SF Tones
   The cursor moves to the TRANSMIT/CONNECTED/DISCONNECTED field. Press the **Enter** (↵) key until CONNECTED is displayed. The specified test tone generates continuously until you select DISCONNECTED.

MACRO CONTROLLER

The Macro Controller allows you to record a series of commands that can be performed on demand by a single keystroke. The Spectra system allows up to ten running macros at any given time. These macros can be stored as part of the system configuration and/or saved to a file and recalled along with the corresponding configuration for later use. Additionally, the Spectra system allows you to view a saved macro file in the Macro Controller screen. Each macro assignment is limited to 100 keystrokes.

To access the Macro Controller screen, select the Macro Controller option under the F8 Tools menu, and press the Enter (↵) key. The Macro Controller screen appears (see **Figure 13.31**).

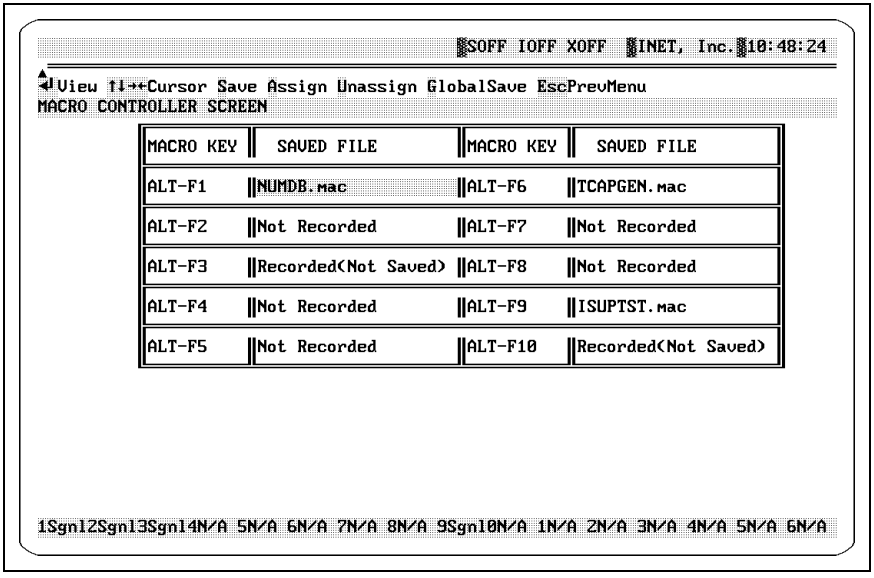


Figure 13.31 - Macro Controller Screen

All macro assignments are specific to the current configuration. Any errors encountered while recalling a configuration are written to a CFGERROR.PRT file, which can be viewed using the F5 Print function.

MACRO CONTROLLER SCREEN DEFINITIONS

The following options are displayed in the direction line across the top of the screen.

↵View
Press the ↑↓↔ keys to select the desired file, and press the Enter (↵) key to view the macro assignments for a specific file.

↑↓↔Cursor
Press the ↑↓↔ keys to move the cursor on the screen.

✍ *The left (←) arrow key moves the cursor to the previous existing HSL board or board 1, whichever comes first. The right (→) arrow key moves the cursor to next existing HSL board or board 16, whichever comes first. This is a new feature of the current release of the Spectra system and consequently may affect some recorded macros.*

Save
Press the ↑↓↔ keys to select the desired Saved File field, Press the S key to save the selected recorded macro assignments to a function key (F1, F2, F3, . . . F10), along with the current configuration, to a file. Saved macro files can be accessed later by using the Assign option when you have applied the corresponding configuration. Saved macro files are stored in the `C:\SPECTRA\CONFIG\CURRENT CONFIGURATION NAME\MACROS` directory with a .MAC extension. (For example, if you have the default configuration applied when you save a macro to file, the `.MAC` files are written to `C:\SPECTRA\CONFIG\DEFAULT\MACROS`).

✍ *All saved macro files are specific to the current configuration and may not be accessed under a different configuration.*

Assign
Press the ↑↓↔ keys to select the desired Saved File field, and press the A key to access a catalog of previously saved macro assignment files that were saved along with the current configuration and to assign a file to a specific function key. Press the ↑↓ keys to select the desired file, and press the Enter (↵) key to assign the file to the corresponding function key.

Unassign
Use the ↑↓↔ keys to select the desired Saved File field, and press the U key to unassign a macro file from a specific function key. A Proceed with Unassignment dialog box appears. Press the Y key to unassign the file from its corresponding function key.

GlobalSave
Press the G key to save all macro assignments along with the current Spectra configuration. When you recall and apply the specified configuration, the macro assignments will also be recalled.

✍ *You may use the Apply and Save Configuration option from the F1 Setup menu to save all macro assignments along with the current configuration. The Save Configuration option under the F1Setup menu also allows you to save all the current settings, including macro assignments, to a configuration file name of your choice.*

EscPrevMenu
Press the Esc key to return to the previous menu.

CREATING A MACRO

Follow these steps to create a new macro.

Step	Action
1.	From anywhere in the Spectra system, press the **Alt** key and the **F12** key simultaneously. The phrase Select Key (ALT_F1 - ALT_F10) appears in the top border line of your screen.
2.	Designate the function key you want to assign a macro to by pressing the **Alt** key and the **Fx** key simultaneously, where Fx is the function key of your choice (F1, F2, F3, . . . F10).
3.	A new message appears in the top border line stating Recording Fx, where Fx is the function key you designated in the previous step. Perform the sequence of steps that you want to record as a macro. The Spectra system records each keystroke you perform, up to a maximum of 100 keystrokes.
4.	When you have completed the sequence of steps, press the **Alt** key and the **F12** key simultaneously to stop programming the macro. A new message appears in the top border line stating Key Recorded Alt_Fx, where Fx is the function key you designated in **Step 2**. You can now use the function key you designated to execute the macro.

✍ *You may press the Ctrl key and the X key simultaneously at any time during the recording of a macro to exit the process and cancel your macro assignments.*

The Spectra system automatically recalls macro key assignments if the macros were saved as part of the system configuration the previous time the configuration was used. In order to save the macro as a macro file, see "Saving a Macro to File" on page 502 of this guide.

SAVING A MACRO TO FILE

Follow these steps to save a macro to a file.

Step	Action
1.	From the F8 Tools menu, select **MACRO CONTROLLER**, and press the **Enter (↵)** key. The Macro Controller screen appears.
2.	Use the ↑↓↔ keys to select the Saved File field corresponding to the function key that currently represents the macro you want to save to file. If you are saving a file that has only been recorded, the field will display Recorded (Not Saved). If you are renaming an existing file, the Saved File field will display the existing file name. For example, if you previously created a macro represented by the F4 key and you want to save that macro, you would select the Saved File field corresponding to the F4 key. After selecting the desired Saved File field, press the **S** key. The File Name dialog box appears (see **Figure 13.32**).



Figure 13.32 - File Name Dialog Box

3.	Enter a name for the file (in standard DOS format—eight or fewer characters), and press the **Enter (↵)** key. A .MAC extension is automatically added to the file name. The File Description dialog box appears (see **Figure 13.33**).



Figure 13.33 - File Description Dialog Box

4. Enter a description of the macro (maximum of 59 characters), and press the **Enter (↵)** key. When recalling saved macros, this description appears in the information line to help you locate files.

ASSIGNING A MACRO FROM A FILE

Follow these steps to assign a macro from a file.

Step	Action

1. From the F8 Tools menu, select **MACRO CONTROLLER**, and press the **Enter (↵)** key. The Macro Controller screen appears.

2. Use the ↑↓↔ keys to select the Saved File field that corresponds to the function key (F1, F2, F3, . . . F10) that you want to represent the macro you are recalling. Macro files can be assigned to any of the function keys. Press the **A** key to access the macro assignments catalog.

3. When the catalog is displayed, use the **A…Z Search** option to search for macros alphabetically by pressing the corresponding key. Select the file name of the macro you want to recall, and press the **Enter (↵)** key.

✍ *When the macro catalog is displayed, a description of the highlighted macro appears in the information line to help you locate files.*

You can now use the function key you designated to execute the macro.

MANAGE MAPPING TABLE

The Manage Mapping Table allows you to adjust an input value through the use of various mathematical functions. For example, the Manage Mapping Table is useful when adjusting timeslot values in the Play Tone feature of the ISUP/TUP, TCAP, or ISDN Testers.

Low and high values are entered into the mapping table to create ranges of values. An input value is then compared to the list of ranges in a selected Mapping Table file. When a range is matched, the value is adjusted according to the designated math function and constant, which results in an output value.

To access the Manage Mapping Table feature, select Manage Mapping Table in the F8 Tools menu, and press the Enter (↵) key. The Manage Mapping Table screen is displayed (see **Figure 13.34**).

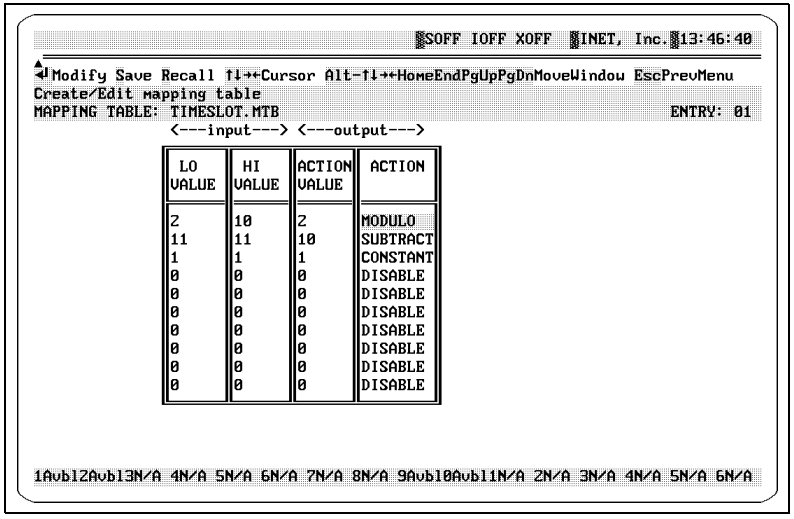


Figure 13.34 - Manage Mapping Table Screen (Example)

MANAGE MAPPING TABLE SCREEN DEFINITIONS

↵Modify
Press the Enter (↵) key to access a field for editing.

Save
Press the S key to save the current displayed mapping table to a file in the C:\SPECTRA\COMMON\MAPTABLE directory with a .MTB extension. An Enter mapping table name dialog box appears. Enter a file name (maximum of eight characters) and press the Enter (↵) key. A File Description dialog box appears. The File Description dialog box allows a lengthy description (maximum of 59 characters) to be entered to include specific information about the file's contents. Enter a description and press the Enter (↵) key.

Recall
Press the R key to recall a specific mapping table that has been previously saved. A catalog of saved map tables appears. Place the cursor on the desired mapping table file, and press the Enter (↵) key to display the mapping table. The A . . Z Search function can be used to alphabetically locate the desired file. Press the corresponding letter key to move to the desired position. The Delete key can be used to delete a selected file from the catalog. This also deletes the file from the hard drive.

Alt-HideMenu(s)
Press the Alt key and the H key simultaneously to hide the catalog of saved map tables. A Hit any key to display hidden menu(s) message appears in the top border line.

↑↓↔Cursor
Press the ↑↓↔ keys to move the cursor.

Alt-↑↓↔HomeEndPgUpPgDnMoveWindow
Press the Alt key and one of the following keys (↑↓, ←→, Home, End, PgUp, PgDn) to change the position of the mapping table on the screen.

Esc
Press the Esc key to return to the previous menu.

MAPPING TABLE:
This field displays the file name of the displayed mapping table.

ENTRY:
This field displays the row number of the current cursor position.

LO VALUE / HI VALUE
This column allows you to enter low and high values in which to compare an input value. For example, setting a LO VALUE of 12 and a HI VALUE of 400 matches any input value between and including 12 and 400.

✍ *If there are duplicate values in separate ranges, the input value matches the first entry with the agreeing value. For example, if one range is set to LO=100 and HIGH=400 and another range is set to LO=400 and HIGH=600, an input value of 400 matches the first range and can be adjusted as designated for that range.*

ACTION VALUE
This column allows you to enter a value in which to adjust the input value, using the designated ACTION, which results in an output value.

ACTION
This column allows you to toggle between various mathematical functions in which to adjust the input value, using the ACTION VALUE. The following list explains the possible actions.

DISABLE
This function allows you to disable any adjustment to the input value for the designated range.

CONSTANT
This function returns the Action value as the new output value. For example, an Action value of 5 returns an output value of 5.

ADD
This function adds the Action value to the input value and returns the result value. For example, given an input value of 12 and an Action value of 7, the mapping table returns an output value of 19.

SUBTRACT
This function subtracts the Action value from the input value and returns the difference. For example, given an input value of 12, and an Action value of 7, the mapping table returns an output value of 5.

MULTIPLY
This function multiplies the input value by the Action value, and returns the result value. For example, given an input value of 2 and an Action value of 3, the mapping table returns an output value of 6.

DIVIDE
This function divides the input value by the Action value and returns the result value. For example, given an input value of 2 and an Action value of 2, the mapping table returns an output value of 1.

MODULO
This function returns the remainder of the input value divided by the Action value. For example, given an input value of 7 and an Action value of 2, the mapping table returns an output value of 1.

The Modulo function is useful when adjusting timeslot values in the Play Tone feature of the ISUP/TUP, TCAP, or ISDN Testers. For example, if you want to vary the tone generation in the ISDN Tester between timeslots 0 and 1 (B1 and B2), you could set a timeslot LO-HI range of 2 to 10. With an Action value of 2, any even number results in a timeslot value of 0 (B1), and any odd number results in a timeslot value of 1 (B2).

SETTING UP THE MANAGE MAPPING TABLE

Perform the following steps to define settings for the Manage Mapping Table (refer to "Manage Mapping Table Screen Definitions" on page 504 of this guide for field definitions).

Step	Action

1. From the F8 Tools menu, select the **Manage Mapping Table** option, and press the **Enter (↵)** key. The Manage Mapping Table screen is displayed (see **Figure 13.35**).

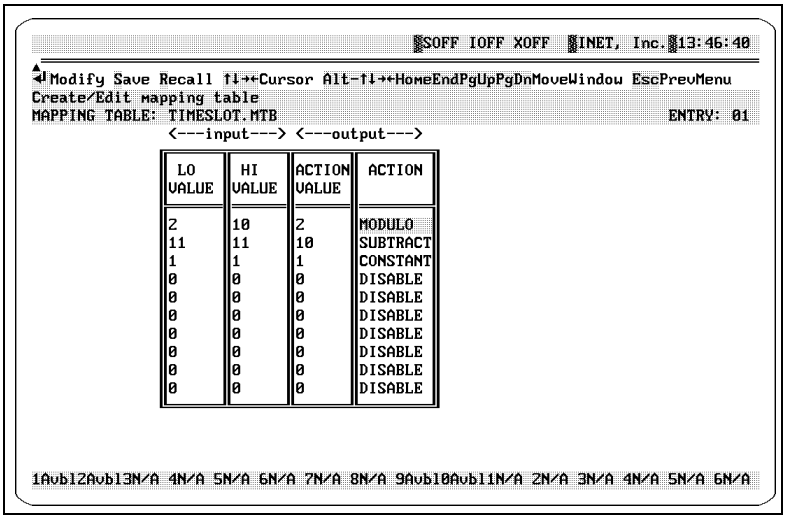


Figure 13.35 - Manage Mapping Table Screen (Example)

2. The cursor is displayed in the first **LO VALUE** input field. Press the **Enter (↵)** key to edit the field. Enter a value indicating the low end of a range in which to compare input values, and press the **Enter (↵)** key.

3. Press the → key to move the cursor to the **HI VALUE** input field. Press the **Enter (↵)** key to edit the field. Enter a value indicating the high end of a range in which to compare input values, and press the **Enter (↵)** key.

4. Press the → key to move the cursor to the **ACTION VALUE** field. Press the **Enter (↵)** key to edit the field. Enter a value in which to adjust the input value, and press the **Enter (↵)** key.

5. Press the → key to move the cursor to the **ACTION** field. Press the **Enter** (↵) key to toggle between the mathematical functions. The Action options are described in "ACTION" on page 506 of this guide.

6. Repeat **Step 2** through **Step 5** for additional entries in the Manage Mapping Table.

7. Once you have completed your entries, press the **S** key to save the table. Enter a file name and description, and press the **Enter** (↵) key.

14 Help

OVERVIEW

Help in the Spectra system is accessed using the F10 Help function. Pressing the F10 key from any screen overlays the help file related to the currently displayed screen.

Help contains key definitions, basic information, step procedures, and screen definitions for the related screen. Only main screens, sub-menus, or windows have links to Help.

Press the F10 key to access Help for the current screen, sub-menu, or window. **Figure 14.1** shows the help file for the F1 Setup screen.

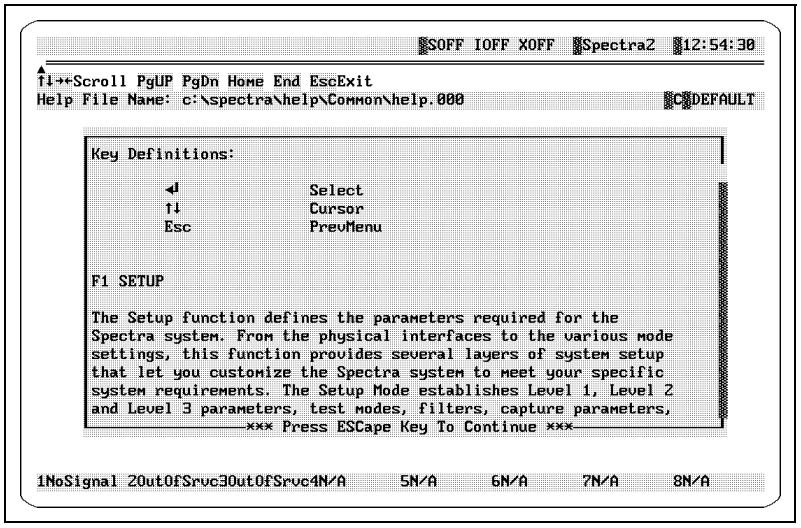


Figure 14.1 - F1 Setup Screen - Help Window

F10 HELP WINDOW DEFINITIONS

↑↓↔Scroll
Press the ↑↓↔ keys to move the cursor around the screen display.

PgUp PgDn
Press the PgUp or PgDn keys to move the screen display up or down.

Home
Press the Home key to return to the beginning of the screen display.

End
Press the End key to go to the end of the screen display.

EscExit
Press the Esc key to exit help and return to the current screen.

A Year 2000 Compliance

All modes, features, and functions of the Spectra system support Year 2000 functions and operations. All results listed below passed the software testing and comply with Year 2000 specifications.

- The Spectra system handles transactions that began in 1999 and end in 2000 with no errors.
- The Spectra system allows triggers in the Monitor Mode to be set to dates past 12/31/99.
- The Spectra system works when a start trigger in Monitor Mode is 1999 and an end trigger is 2000 (3 seconds after stop trigger).
- The Spectra system works when a start trigger and a stop trigger in Monitor Mode are 2000 (3 seconds after stop trigger).
- The Spectra links come up into service if the date is 2000.
- The Spectra end triggers in Monitor Mode work if the date is 2000.
- The Spectra time reference function works properly when marking a message in 1999 and ending in 2000.

- The Spectra system statistics still function properly when the date is 2000.
- The Spectra Batch Mode functions properly.
- The date in the Spectra system can be set from the application.
- The Spectra system alarm logs purge past 12/31/99.

✍ *A software patch for DOS may be required on Spectra units using a 486 processor in order to make the unit Year 2000 compliant. Spectra units using the Pentium processor should not need the patch.*

B Supplementary String Identifiers

The Supplementary Information (SI) string is a variable length information field found in DPNSS messages. It utilizes a string identification list comprising a copy of the IA5 numerals and the suffix letter of one or more SI string identifiers. When editing an message in the F6 Edit function, the SI string description appears only after all the required characters are entered for the SI code and when the code value is followed by a * (2A hex) or by a # (23 hex) character.

SI strings, along with associated parameters, include information in addition to the Destination Address (DA) or fixed information octets to be communicated from one PBX to another on a call. When more than one parameter is included in the string, they are separated by a space, or 20 hex.

SI identifiers may be followed by one or more parameters. Parameters are separated from the identifier and each other by a *. Strings must begin with a * and end with a #. The parameters are selected by identifier code, not by mnemonic. The mnemonic appears when the proper code is entered.

Table B.1 details the SI string identifiers used in DPNSS, sorted alphabetically by mnemonic. Refer to the protocol specifications for the parameters associated with the SI string identifiers.

Table B.2 details the SI string identifiers used in DPNSS messages, sorted by numerical identifier code. Refer to the protocol specifications for the parameters associated with the SI string identifiers.

Table B.1 - Mnemonic Coding of Supplementary Information String Identifiers

Mnemonic	Identifier Code	Supplementary Information String Name
A10	145	SSMF5 SIGNAL ‘A-10’
A13	147	SSMF5 SIGNAL ‘A-13’
A14	148	SSMF5 SIGNAL ‘A-14’
A15	149	SSMF5 SIGNAL ‘A-15’
A2	140	SSMF5 SIGNAL ‘A-2’
A5	142	SSMF5 SIGNAL ‘A-5’
A7	150	SSMF5 SIGNAL ‘A-7’
A8	144	SSMF5 SIGNAL ‘A-8’
AC-CBI	181	ADD-ON CONFERENCE - CONFERENCE BRIDGE IDENTITY
AC-CDC	176B	ADD-ON CONFERENCE - CLEAR - DOWN CONFERENCE
AC-DR	179B	ADD-ON CONFERENCE - DETAILS ADDRESS
AC-NAO	170	ADD-ON CONFERENCE - NO ADD ON CURRENTLY AVAILABLE
AC-PD	180	ADD-ON CONFERENCE - PARTY DETAILS
AC-PI	177	ADD-ON CONFERENCE - PARTY INDEX
ACK	55	ACKNOWLEDGE
ACT	102B	ACTIVATE
AD-O	90	ADDED-ON
AD-RQ	88H	ADD-ON REQUEST
AD-V	89B	ADD-ON VALIDATION
AS	161B	ALARM STATUS
AS-R	162B	ALARM STATUS - REQUEST

Table B.1 - Mnemonic Coding of Supplementary Information String Identifiers (Continued)

Mnemonic	Identifier Code	Supplementary Information String Name
AUTO-A	199	AUTOANSWER
BAS	92	BASIC SSMF5
BSS-M	47R	BEARER SERVICE SELECTION - Mandatory
BSS-N	49I	BEARER SERVICE SELECTION - Notification
BSS-P	48I	BEARER SERVICE SELECTION - Preferred
CBC	15B	CALL BACK COMPLETE
CBM-C	172B	CALL BACK MESSAGING - CANCEL
CBM-R	171B	CALL BACK MESSAGING - REQUEST
CBWF-C	13B	CALL BACK WHEN FREE - CANCEL
CBWF-CB	156B	CALL BACK WHEN FREE - CALL BACK REQUEST
CBWF-CLB	151B	CALL BACK WHEN FREE - CALL BACK
CBWF-CSUD	16B	CALL BACK WHEN FREE - CALL SET-UP (DELAYED)
CBWF-CSUI	12B	CALL BACK WHEN FREE - CALL SET-UP (IMMEDIATE)
CBWF-FN	11B	CALL BACK WHEN FREE - FREE NOTIFICATION
CBWF-R	10B	CALL BACK WHEN FREE - REQUEST
CBWNU-R	17B	CALL BACK WHEN NEXT USED - REQUEST
CD-CSU	97B	CALL DISTRIBUTION - CALL SET UP
CD-DNQ	67B	CALL DISTRIBUTION DO NOT QUEUE
CD-FN	86B	CALL DISTRIBUTION - FREE NOTIFY
CD-LINK	69B	CALL DISTRIBUTION - LINKED
CD-Q	63	CALL DISTRIBUTION - QUEUE
CD-UNLINK	93B	CALL DISTRIBUTION - UNLINKED
CDIV	119	CONTROLLED DIVERSION
CH-AC	182	CHARGE REPORTING - ACCOUNT CODE
CH-ACR	183B	CHARGE REPORTING - ACCOUNT CODE REQUEST‘
CH-ACT	184	CHARGE REPORTING - ACTIVE

Table B.1 - Mnemonic Coding of Supplementary Information String Identifiers (Continued)

Mnemonic	Identifier Code	Supplementary Information String Name
CH-CLR	185B	CHARGE REPORTING - CLEAR
CH-CR	186B	CHARGE REPORTING - COST REQUEST
CH-CST	187	CHARGE REPORTING - COST
CH-TR	188	CHARGE REPORTING - TIME RATE
CH-UR	189	CHARGE REPORTING - UNIT RATE
CH-UU	190	CHARGE REPORTING - UNITS USED
CHID	105B	CHANNEL IDENTITY
CLC-CONF	8	CALLING/CALLED LINE CATEGORY - CONFERENCE
CLC-DASS2	3	CALLING/CALLED LINE CATEGORY - DASS 2
CLC-DEC	2	CALLING/CALLED LINE CATEGORY - 10 pps
CLC-MF5	5	CALLING/CALLED LINE CATEGORY - SSMF5
CLC-NET	7	CALLING/CALLED LINE CATEGORY - NETWORK
CLC-OP	6	CALLING/CALLED LINE CATEGORY - OPERATOR
CLC-ORD	1	CALLING/CALLED LINE CATEGORY - ORDINARY
CLC-PSTN	4	CALLING/CALLED LINE CATEGORY - PSTN
CO	27	CALL OFFER
COC	84H	CONNECTED CALL
COS	18	CLASS OF SERVICE
CW	26	CALL WAITING
D-SIC	57A	DASS 2 - SERVICE INDICATOR CODE
DEACT	103B	DEACTIVATE
DI	109	DEVICE IDENTITY
DIV-BY	32	DIVERSION - BY PASS
DIV-CA	36B	DIVERSION CANCEL - ALL
DIV-CB	35B	DIVERSION CANCEL - ON BUSY
DIV-CI	33B	DIVERSION CANCEL - IMMEDIATE

Table B.1 - Mnemonic Coding of Supplementary Information String Identifiers (Continued)

Mnemonic	Identifier Code	Supplementary Information String Name
DIV-CR	34B	DIVERSION CANCEL - ON NO REPLY
DIV-FM	31B	DIVERSION - FOLLOW ME
DIV-RCA	76B	DIVERSION - REMOTE CANCEL ALL
DIV-RCB	74B	DIVERSION - REMOTE CANCEL ON BUSY
DIV-RCI	73B	DIVERSION - REMOTE CANCEL IMMEDIATE
DIV-RCR	75B	DIVERSION - REMOTE CANCEL ON NO REPLY
DIV-RSB	71B	DIVERSION - REMOTE SET ON BUSY
DIV-RSI	70B	DIVERSION - REMOTE SET IMMEDIATE
DIV-RSR	72B	DIVERSION - REMOTE SET ON NO REPLY
DIV-V	30B	DIVERSION - VALIDATION
DND	113	DO NOT DISTURB
DND-C	116B	DO NOT DISTURB - CLEAR
DND-O	114	DO NOT DISTURB - OVERRIDE
DND-S	115B	DO NOT DISTURB - SET
DRS	160	DIRECT ROUTE SELECT
DVD-B	43	DIVERTED ON BUSY
DVD-E	53	DIVERTED - EXTERNALLY
DVD-I	42	DIVERTED IMMEDIATE
DVD-R	44	DIVERTED ON NO REPLY
DVG	154	DIVERTING
DVG-B	38F	DIVERTING ON BUSY
DVG-I	37F	DIVERTING IMMEDIATE
DVG-R	39F	DIVERTING ON NO REPLY
DVT	152B	DIVERT
DVT-B	41B	DIVERT ON BUSY
DVT-I	40B	DIVERT IMMEDIATE

Table B.1 - Mnemonic Coding of Supplementary Information String Identifiers (Continued)

Mnemonic	Identifier Code	Supplementary Information String Name
DVT-R	45	DIVERT ON NO REPLY
EI-C	24B	EXECUTIVE INTRUSION - CONVERT
EI-I	25	INTRUDED
EI-PVR	20	EXECUTIVE INTRUSION - PRIOR VALIDATION
EI-R	21	EXECUTIVE INTRUSION - REQUEST
EI-W	202B	EXECUTIVE INTRUSION - WITHDRAW
ENH	91B	ENHANCED SSMF5
ENQ	80	ENQUIRY CALL
ERD	194	EXTERNAL REROUTING DISABLED
EST	118B	EXTENSION STATUS CALL
FR-R	106B	FORCED RELEASE - REQUEST
HDG	62	HOLDING
HF-A	200	HANDS-FREE - ACTIVATED
HF-D	201	HANDS-FREE - DEACTIVATED
HGF	29	HUNT GROUP FORWARDED
HOLD-REQ	60B	HOLD REQUEST
ICC	87	INTERCOM CALL
ID-SNU	98	IGNORED - SIGNAL NOT UNDERSTOOD
ID-SU	99	IGNORED - SERVICE UNAVAILABLE
IPL	23	IPL RESPONSE
IPL-R	22B	INTRUSION PROTECTION LEVEL -REQUEST
IRD	193	INTERNAL REROUTING DISABLED
LA	19	LOOP AVOIDANCE
NAE-CC	173	NETWORK ADDRESS EXTENSION - CALLING/CALLED IDENTITY COMPLETE
NAE-CI	174	NETWORK ADDRES EXTENSION - CALLING/CALED IDENTITY INCOMPLETE

Table B.1 - Mnemonic Coding of Supplementary Information String Identifiers (Continued)

Mnemonic	Identifier Code	Supplementary Information String Name
NAE-DC	157A	NETWORK ADDRESS EXTENSION - DESTINATION COMPLETE
NAE-DI	159A	NETWORK ADDRESS EXTENSION - DESTINATION INCOMPLETE
NLT-PT	195B	NON-LOOPED BACK TEST - PERFORM TEST
NLT-RES	198B	NON-LOOPED BACK TEST - RESULT
NLT-RQ	196B	NON-LOOPED BACK TEST - TEST REQUEST
NLT-SC	197B	NON-LOOPED BACK TEST - SEQUENCE COMPLETE
NS-DA	134	NIGHT SERVICE - DEACTIVATED
NS-DVD	130	NIGHT SERVICE - DIVERTED
NS-DVG	129	NIGHT SERVICE - DIVERTING
NS-DVT	128A	NIGHT SERVICE - DIVERT
NS-N	127B	NIGHT SERVICE - NOTIFICATION
NS-RDVD	133	NIGHT SERVICE - REDIVERTED
NS-RDVG	132	NIGHT SERVICE - REDIVERTING
NS-RDVT	131	NIGHT SERVICE - REDIVERT
NSI	58	NON-SPECIFIED INFORMATION*
OLI/CLI	50	ORIGINATING LINE IDENTITY/CALLED LINE IDENTITY
OPD	191	OUTPUT DIGITS
OPD-R	192B	OUTPUT DIGITS - REQUEST
PARK	168B	PARK REQUEST
PASSW	77B	PASSWORD
PB-P	107J	PRIORITY BREAKDOWN - PROTECTION
PB-R	108	PRIORITY BREAKDOWN - REQUEST
PKD	169	PARKED
Q-INFO	135	QUEUE INFORMATION
Q-PRIO	136	QUEUE PRIORITY
RCF	121	REDIRECTING ON CALL FAILURE

Table B.1 - Mnemonic Coding of Supplementary Information String Identifiers (Continued)

Mnemonic	Identifier Code	Supplementary Information String Name
RDG	120	REDIRECTING
RECON	61	RECONNECTED
REJ	54	REJECT
RO	14B	RING OUT
ROP-CON	112B	ROUTE OPTIMISATION - CONNECTED
ROP-CSU	111H	ROUTE OPTIMISATION - CALL SET UP
ROP-R	110B	ROUTE OPTIMISATION - REQUEST
RR-SNU	96	RECALL REJECTED SIGNAL NOT UNDERSTOOD
RTI	51	ROUTING INFORMATION
SATB	165	SATELLITE BARRED
SCE	81F	SINGLE CHANNEL ENQUIRY
SER-C	125	SERIES CALL - CANCEL
SER-E	126	SERIES CALL - ESTABLISHMENT
SER-R	124B	SERIES CALL REQUEST
SERV	166	SERVICE INFORMATION
SFI	158	SUPPLEMENTARY FACILITIES INHIBITED
SHTL	83F	SHUTTLE
SIC	46	SERVICE INDICATOR CODE
SIM-A	101	SIMULATED ANSWER
SN	56	SEND NEXT
SN-REQ	28T	SEND NEXT - REQUEST
SNU	94	SIGNAL NOT UNDERSTOOD
SOD-B	65	STATE OF DESTINATION - BUSY
SOD-F	66	STATE OF DESTINATION - FREE
SOD-I	153	STATE OF DESTINATION - INDETERMINABLE
SOD-REQ	155B	REQUEST STATE OF DETERMINATION

Table B.1 - Mnemonic Coding of Supplementary Information String Identifiers (Continued)

Mnemonic	Identifier Code	Supplementary Information String Name
SPL	78B	SPLIT
SU	95	SERVICE UNAVAILABLE
SW-R	1378	SWAP - REJECTED
SW-V	137T	SWAP - VALIDATION
TAD	164B	TIME AND DATE
TAD-R	163B	TIME AND DATE - REQUEST
TCS	104B	TRAFFIC - CHANNEL STATUS
TEXT	100	TEXTUAL DISPLAY
TEXT-M	64B	TEXT MESSAGE
TID	167	TRUNK IDENTITY
TOV-R	122H	TAKEOVER REQUEST
TOV-V	123B	TAKEOVER VALIDATION
TRFD	82	TRANSFERRED
TRFR	85	TRANSFER
TWP	79	TWO PARTY
	9	Reserved
	52	Reserved
	59	Reserved
	68	Reserved
	117	Reserved
	139	Reserved
	141	Reserved
	143	Reserved
	146	Reserved
	175	Reserved
	178	Reserved

Table B.1 - Mnemonic Coding of Supplementary Information String Identifiers (Continued)

Mnemonic	Identifier Code	Supplementary Information String Name
	203	Reserved
	204	Reserved
	205	Reserved
	206	Reserved
	207	Reserved

Table B.2 details the SI string identifiers used in DPNSS messages, sorted by numerical identifier code. Refer to the protocol specifications for the parameters associated with the SI string identifiers.

Table B.2 - Numerical Coding of Supplementary Information String Identifiers

Identifier Code	Mnemonic	Supplementary Information String Name
1	CLC-ORD	CALLING/CALLED LINE CATEGORY - ORDINARY
2	CLC-DEC	CALLING/CALLED LINE CATEGORY - 10 pps
3	CLC-DASS2	CALLING/CALLED LINE CATEGORY - DASS 2
4	CLC-PSTN	CALLING/CALLED LINE CATEGORY - PSTN
5	CLC-MF5	CALLING/CALLED LINE CATEGORY - SSMF5
6	CLC-OP	CALLING/CALLED LINE CATEGORY - OPERATOR
7	CLC-NET	CALLING/CALLED LINE CATEGORY - NETWORK
8	CLC-CONF	CALLING/CALLED LINE CATEGORY - CONFERENCE
9		Reserved
10B	CBWF-R	CALL BACK WHEN FREE - REQUEST
11B	CBWF-FN	CALL BACK WHEN FREE - FREE NOTIFICATION
12B	CBWF-CSUI	CALL BACK WHEN FREE - CALL SET-UP (IMMEDIATE)
13B	CBWF-C	CALL BACK WHEN FREE - CANCEL
14B	RO	RING OUT
15B	CBC	CALL BACK COMPLETE

Table B.2 - Numerical Coding of Supplementary Information String Identifiers (Continued)

Identifier Code	Mnemonic	Supplementary Information String Name
16B	CBWF-CSUD	CALL BACK WHEN FREE - CALL SET-UP (DELAYED)
17B	CBWNU-R	CALL BACK WHEN NEXT USED - REQUEST
18	COS	CLASS OF SERVICE
19	LA	LOOP AVOIDANCE
20	EI-PVR	EXECUTIVE INTRUSION - PRIOR VALIDATION
21	EI-R	EXECUTIVE INTRUSION - REQUEST
22B	IPL-R	INTRUSION PROTECTION LEVEL -REQUEST
23	IPL	IPL RESPONSE
24B	EI-C	EXECUTIVE INTRUSION - CONVERT
25	EI-I	INTRUDED
26	CW	CALL WAITING
27	CO	CALL OFFER
28T	SN-REQ	SEND NEXT - REQUEST
29	HGF	HUNT GROUP FORWARDED
30B	DIV-V	DIVERSION - VALIDATION
31B	DIV-FM	DIVERSION - FOLLOW ME
32	DIV-BY	DIVERSION - BY PASS
33B	DIV-CI	DIVERSION CANCEL - IMMEDIATE
34B	DIV-CR	DIVERSION CANCEL - ON NO REPLY
35B	DIV-CB	DIVERSION CANCEL - ON BUSY
36B	DIV-CA	DIVERSION CANCEL - ALL
37F	DVG-I	DIVERTING IMMEDIATE
38F	DVG-B	DIVERTING ON BUSY
39F	DVG-R	DIVERTING ON NO REPLY
40B	DVT-I	DIVERT IMMEDIATE
41B	DVT-B	DIVERT ON BUSY

Table B.2 - Numerical Coding of Supplementary Information String Identifiers (Continued)

Identifier Code	Mnemonic	Supplementary Information String Name
42	DVD-I	DIVERTED IMMEDIATE
43	DVD-B	DIVERTED ON BUSY
44	DVD-R	DIVERTED ON NO REPLY
45	DVT-R	DIVERT ON NO REPLY
46	SIC	SERVICE INDICATOR CODE
47R	BSS-M	BEARER SERVICE SELECTION - Mandatory
48I	BSS-P	BEARER SERVICE SELECTION - Preferred
49I	BSS-N	BEARER SERVICE SELECTION - Notification
50	OLI/CLI	ORIGINATING LINE IDENTITY/CALLED LINE IDENTITY
51	RTI	ROUTING INFORMATION
52		Reserved
53	DVD-E	DIVERTED - EXTERNALLY
54	REJ	REJECT
55	ACK	ACKNOWLEDGE
56	SN	SEND NEXT
57A	D-SIC	DASS 2 - SERVICE INDICATOR CODE
58	NSI	NON-SPECIFIED INFORMATION*
59		Reserved
60B	HOLD-REQ	HOLD REQUEST
61	RECON	RECONNECTED
62	HDG	HOLDING
63	CD-Q	CALL DISTRIBUTION - QUEUE
64B	TEXT-M	TEXT MESSAGE
65	SOD-B	STATE OF DESTINATION - BUSY
66	SOD-F	STATE OF DESTINATION - FREE
67B	CD-DNQ	CALL DISTRIBUTION DO NOT QUEUE

Table B.2 - Numerical Coding of Supplementary Information String Identifiers (Continued)

Identifier Code	Mnemonic	Supplementary Information String Name
68		Reserved
69B	CD-LINK	CALL DISTRIBUTION - LINKED
70B	DIV-RSI	DIVERSION - REMOTE SET IMMEDIATE
71B	DIV-RSB	DIVERSION - REMOTE SET ON BUSY
72B	DIV-RSR	DIVERSION - REMOTE SET ON NO REPLY
73B	DIV-RCI	DIVERSION - REMOTE CANCEL IMMEDIATE
74B	DIV-RCB	DIVERSION - REMOTE CANCEL ON BUSY
75B	DIV-RCR	DIVERSION - REMOTE CANCEL ON NO REPLY
76B	DIV-RCA	DIVERSION - REMOTE CANCEL ALL
77B	PASSW	PASSWORD
78B	SPL	SPLIT
79	TWP	TWO PARTY
80	ENQ	ENQUIRY CALL
81F	SCE	SINGLE CHANNEL ENQUIRY
82	TRFD	TRANSFERRED
83F	SHTL	SHUTTLE
84H	COC	CONNECTED CALL
85	TRFR	TRANSFER
86B	CD-FN	CALL DISTRIBUTION - FREE NOTIFY
87	ICC	INTERCOM CALL
88H	AD-RQ	ADD-ON REQUEST
89B	AD-V	ADD-ON VALIDATION
90	AD-O	ADDED-ON
91B	ENH	ENHANCED SSMF5
92	BAS	BASIC SSMF5
93B	CD-UNLINK	CALL DISTRIBUTION - UNLINKED

Table B.2 - Numerical Coding of Supplementary Information String Identifiers (Continued)

Identifier Code	Mnemonic	Supplementary Information String Name
94	SNU	SIGNAL NOT UNDERSTOOD
95	SU	SERVICE UNAVAILABLE
96	RR-SNU	RECALL REJECTED SIGNAL NOT UNDERSTOOD
97B	CD-CSU	CALL DISTRIBUTION - CALL SET UP
98	ID-SNU	IGNORED - SIGNAL NOT UNDERSTOOD
99	ID-SU	IGNORED - SERVICE UNAVAILABLE
100	TEXT	TEXTUAL DISPLAY
101	SIM-A	SIMULATED ANSWER
102B	ACT	ACTIVATE
103B	DEACT	DEACTIVATE
104B	TCS	TRAFFIC - CHANNEL STATUS
105B	CHID	CHANNEL IDENTITY
106B	FR-R	FORCED RELEASE - REQUEST
107J	PB-P	PRIORITY BREAKDOWN - PROTECTION
108	PB-R	PRIORITY BREAKDOWN - REQUEST
109	DI	DEVICE IDENTITY
110B	ROP-R	ROUTE OPTIMISATION - REQUEST
111H	ROP-CSU	ROUTE OPTIMISATION - CALL SET UP
112B	ROP-CON	ROUTE OPTIMISATION - CONNECTED
113	DND	DO NOT DISTURB
114	DND-O	DO NOT DISTURB - OVERRIDE
115B	DND-S	DO NOT DISTURB - SET
116B	DND-C	DO NOT DISTURB - CLEAR
117		Reserved
118B	EST	EXTENSION STATUS CALL
119	CDIV	CONTROLLED DIVERSION

Table B.2 - Numerical Coding of Supplementary Information String Identifiers (Continued)

Identifier Code	Mnemonic	Supplementary Information String Name
120	RDG	REDIRECTING
121	RCF	REDIRECTING ON CALL FAILURE
122H	TOV-R	TAKEOVER REQUEST
123B	TOV-V	TAKEOVER VALIDATION
124B	SER-R	SERIES CALL REQUEST
125	SER-C	SERIES CALL - CANCEL
126	SER-E	SERIES CALL - ESTABLISHMENT
127B	NS-N	NIGHT SERVICE - NOTIFICATION
128A	NS-DVT	NIGHT SERVICE - DIVERT
129	NS-DVG	NIGHT SERVICE - DIVERTING
130	NS-DVD	NIGHT SERVICE - DIVERTED
131	NS-RDVT	NIGHT SERVICE - REDIVERT
132	NS-RDVG	NIGHT SERVICE - REDIVERTING
133	NS-RDVD	NIGHT SERVICE - REDIVERTED
134	NS-DA	NIGHT SERVICE - DEACTIVATED
135	Q-INFO	QUEUE INFORMATION
136	Q-PRIO	QUEUE PRIORITY
137T	SW-V	SWAP - VALIDATION
1378	SW-R	SWAP - REJECTED
139		Reserved
140	A2	SSMF5 SIGNAL ‘A-2’
141		Reserved
142	A5	SSMF5 SIGNAL ‘A-5’
143		Reserved
144	A8	SSMF5 SIGNAL ‘A-8’
145	A10	SSMF5 SIGNAL ‘A-10’

Table B.2 - Numerical Coding of Supplementary Information String Identifiers (Continued)

Identifier Code	Mnemonic	Supplementary Information String Name
146		Reserved
147	A13	SSMF5 SIGNAL ‘A-13’
148	A14	SSMF5 SIGNAL ‘A-14’
149	A15	SSMF5 SIGNAL ‘A-15’
150	A7	SSMF5 SIGNAL ‘A-7’
151B	CBWF-CLB	CALL BACK WHEN FREE - CALL BACK
152B	DVT	DIVERT
153	SOD-I	STATE OF DESTINATION - INDETERMINABLE
154	DVG	DIVERTING
155B	SOD-REQ	REQUEST STATE OF DETERMINATION
156B	CBWF-CB	CALL BACK WHEN FREE - CALL BACK REQUEST
157A	NAE-DC	NETWORK ADDRESS EXTENSION - DESTINATION COMPLETE
158	SFI	SUPPLEMENTARY FACILITIES INHIBITED
159A	NAE-DI	NETWORK ADDRESS EXTENSION - DESTINATION INCOMPLETE
160	DRS	DIRECT ROUTE SELECT
161B	AS	ALARM STATUS
162B	AS-R	ALARM STATUS - REQUEST
163B	TAD-R	TIME AND DATE - REQUEST
164B	TAD	TIME AND DATE
165	SATB	SATELLITE BARRED
166	SERV	SERVICE INFORMATION
167	TID	TRUNK IDENTITY
168B	PARK	PARK REQUEST
169	PKD	PARKED
170	AC-NAO	ADD-ON CONFERENCE - NO ADD ON CURRENTLY AVAILABLE
171B	CBM-R	CALL BACK MESSAGING - REQUEST

Table B.2 - Numerical Coding of Supplementary Information String Identifiers (Continued)

Identifier Code	Mnemonic	Supplementary Information String Name
172B	CBM-C	CALL BACK MESSAGING - CANCEL
173	NAE-CC	NETWORK ADDRESS EXTENSION - CALLING/CALLED IDENTITY COMPLETE
174	NAE-CI	NETWORK ADDRES EXTENSION - CALLING/CALED IDENTITY INCOMPLETE
175		Reserved
176B	AC-CDC	ADD-ON CONFERENCE - CLEAR - DOWN CONFERENCE
177	AC-PI	ADD-ON CONFERENCE - PARTY INDEX
178		Reserved
179B	AC-DR	ADD-ON CONFERENCE - DETAILS ADDRESS
180	AC-PD	ADD-ON CONFERENCE - PARTY DETAILS
181	AC-CBI	ADD-ON CONFERENCE - CONFERENCE BRIDGE IDENTITY
182	CH-AC	CHARGE REPORTING - ACCOUNT CODE
183B	CH-ACR	CHARGE REPORTING - ACCOUNT CODE REQUEST‘
184	CH-ACT	CHARGE REPORTING - ACTIVE
185B	CH-CLR	CHARGE REPORTING - CLEAR
186B	CH-CR	CHARGE REPORTING - COST REQUEST
187	CH-CST	CHARGE REPORTING - COST
188	CH-TR	CHARGE REPORTING - TIME RATE
189	CH-UR	CHARGE REPORTING - UNIT RATE
190	CH-UU	CHARGE REPORTING - UNITS USED
191	OPD	OUTPUT DIGITS
192B	OPD-R	OUTPUT DIGITS - REQUEST
193	IRD	INTERNAL REROUTING DISABLED
194	ERD	EXTERNAL REROUTING DISABLED
195B	NLT-PT	NON-LOOPED BACK TEST - PERFORM TEST
196B	NLT-RQ	NON-LOOPED BACK TEST - TEST REQUEST

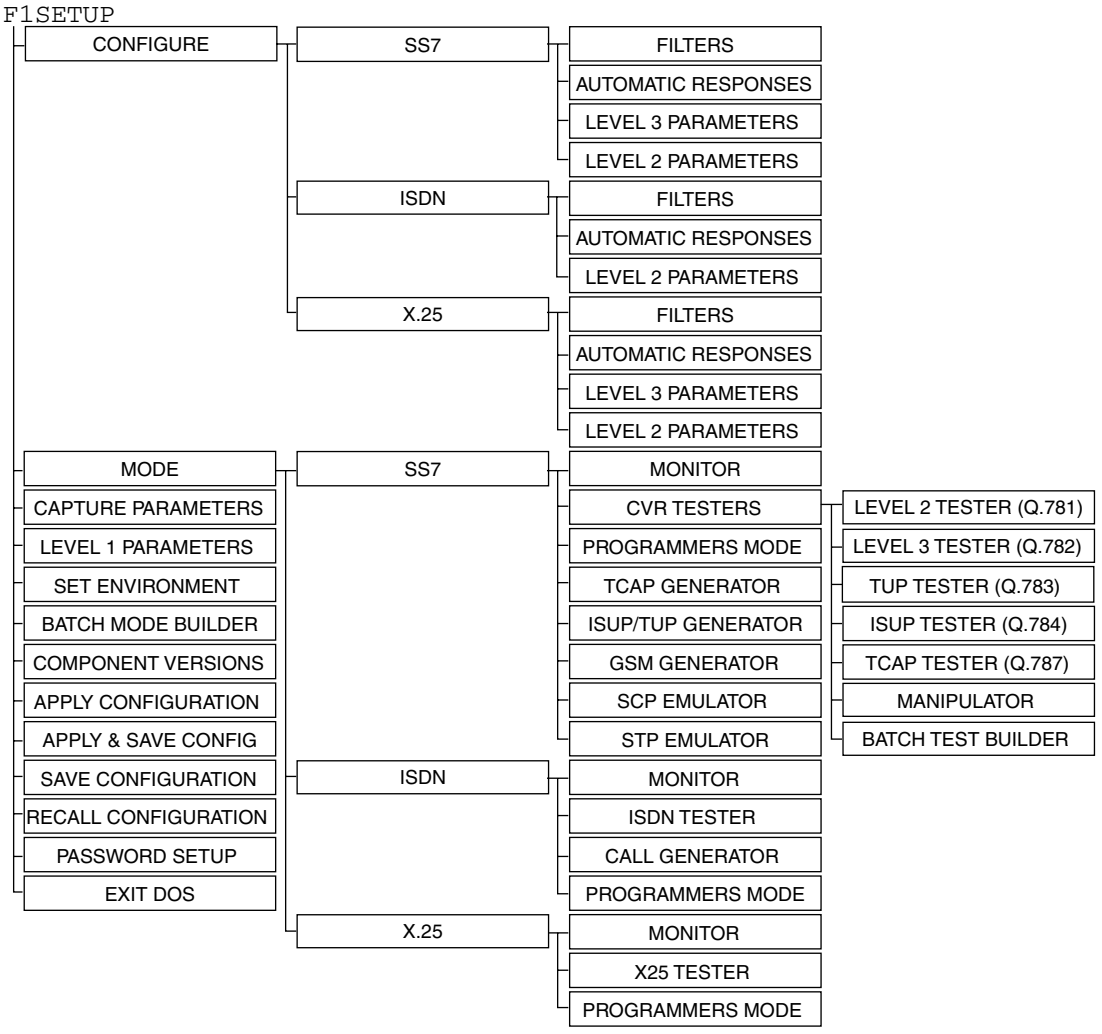
Table B.2 - Numerical Coding of Supplementary Information String Identifiers (Continued)

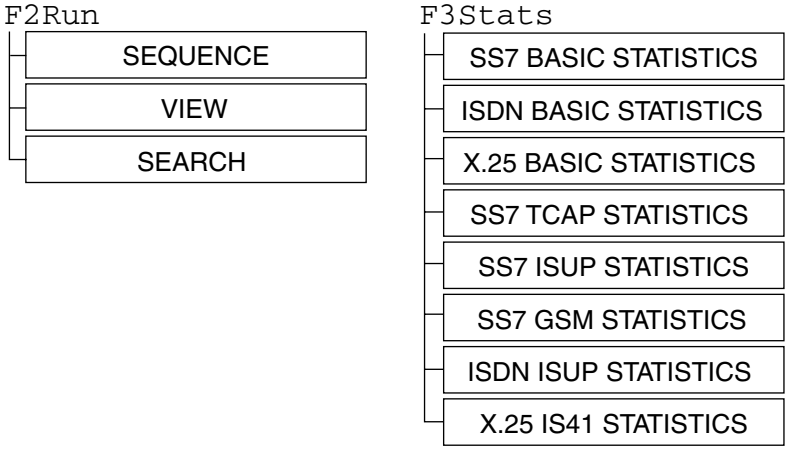
Identifier Code	Mnemonic	Supplementary Information String Name
197B	NLT-SC	NON-LOOPED BACK TEST - SEQUENCE COMPLETE
198B	NLT-RES	NON-LOOPED BACK TEST - RESULT
199	AUTO-A	AUTOANSWER
200	HF-A	HANDS-FREE - ACTIVATED
201	HF-D	HANDS-FREE - DEACTIVATED
202B	EI-W	EXECUTIVE INTRUSION - WITHDRAW
203		Reserved
204		Reserved
205		Reserved
206		Reserved
207		Reserved

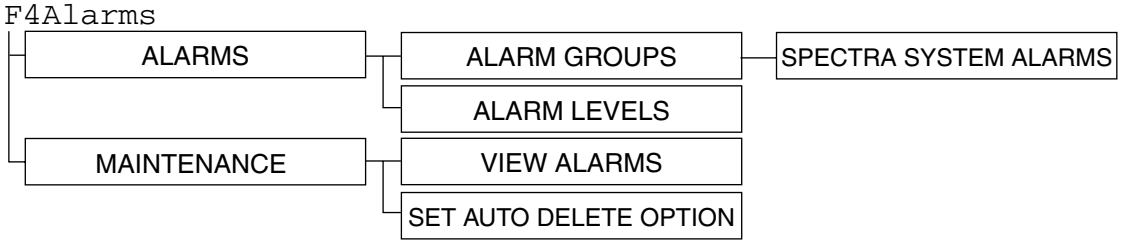
C Menu Hierarchy

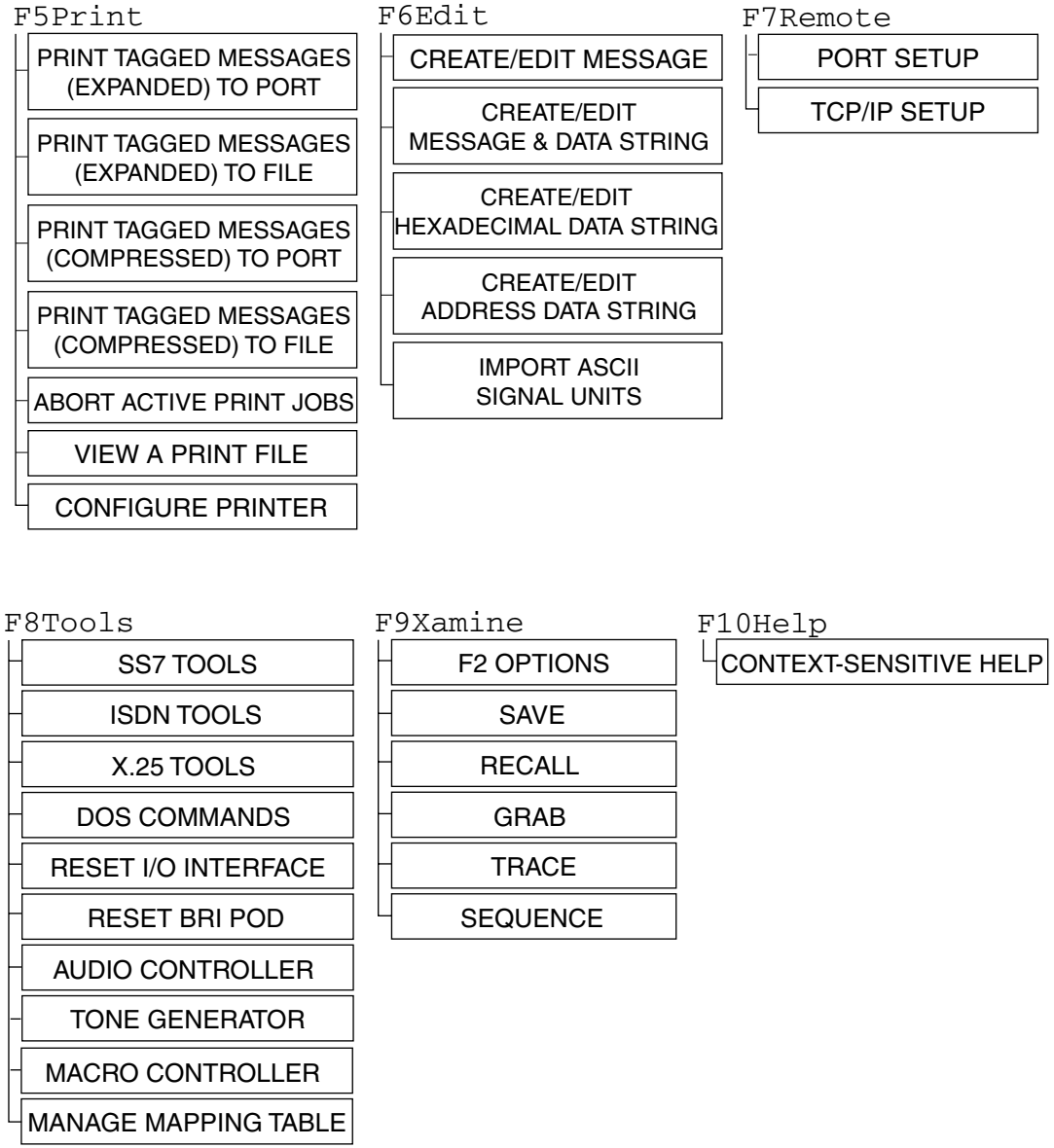
The Spectra system operates through a menu hierarchy that can be accessed through the function keys F1 through F9 from the main screen. Each function key opens an option menu that allows you to control the various functions of the Spectra system.

This appendix illustrates the menu hierarchy of each function key in a tree structure, providing a quick reference to the option menus for each of the nine function keys.




F2Run
SEQUENCE
VIEW
SEARCH
F3Stats
SS7 BASIC STATISTICS
ISDN BASIC STATISTICS
X.25 BASIC STATISTICS
SS7 TCAP STATISTICS
SS7 ISUP STATISTICS
SS7 GSM STATISTICS
ISDN ISUP STATISTICS
X.25 IS41 STATISTICS


F4Alarms
ALARMS
ALARM GROUPS
SPECTRA SYSTEM ALARMS
ALARM LEVELS
MAINTENANCE
VIEW ALARMS
SET AUTO DELETE OPTION


F5Print
PRINT TAGGED MESSAGES (EXPANDED) TO PORT
PRINT TAGGED MESSAGES (EXPANDED) TO FILE
PRINT TAGGED MESSAGES (COMPRESSED) TO PORT
PRINT TAGGED MESSAGES (COMPRESSED) TO FILE
ABORT ACTIVE PRINT JOBS
VIEW A PRINT FILE
CONFIGURE PRINTER
F6Edit
CREATE/EDIT MESSAGE
CREATE/EDIT MESSAGE & DATA STRING
CREATE/EDIT HEXADECIMAL DATA STRING
CREATE/EDIT ADDRESS DATA STRING
IMPORT ASCII SIGNAL UNITS
F7Remote
PORT SETUP
TCP/IP SETUP
F8Tools
SS7 TOOLS
ISDN TOOLS
X.25 TOOLS
DOS COMMANDS
RESET I/O INTERFACE
RESET BRI POD
AUDIO CONTROLLER
TONE GENERATOR
MACRO CONTROLLER
MANAGE MAPPING TABLE
F9Xamine
F2 OPTIONS
SAVE
RECALL
GRAB
TRACE
SEQUENCE
F10Help
CONTEXT-SENSITIVE HELP

D Directory Structure

The installation program places the Spectra system files into a directory named `C:\SPECTRA`. This directory contains all the preset test script files and the Spectra system subdirectories. A list of included test scripts is provided in **Appendix A** of the ***Spectra Testers Guide***.

Any saved files are placed within subdirectories in the main directory unless the system is otherwise directed by the user to save to a different location. Some subdirectories are created by the Spectra system the first time a file is saved using a feature.

Configuration file locations are name specific. A sub-directory is created for each saved configuration. For example, if the saved configuration filename is TEST ONE, all files required for that configuration can be found in the `C:\SPECTRA\CONFIG\TEST ONE` subdirectory under the corresponding protocol (SS7, ISDN, or X.25) subdirectory.

Some files are protocol specific and are saved in corresponding directories. For example, ISUP/TUP Generator file locations for model scripts are protocol specific. If the protocol setting is ANSI, the script file (with an `.SCR` file extension) is saved to the `C:\GENERATE\ISUP\ANSI` subdirectory.

Saved files can be copied to diskettes through the F8 Tools menu and DOS Commands sub-menu. For more information about using the DOS Commands submenu to copy files, refer to "DOS Commands" on page 482 of the ***Spectra Features and Functions Guide***.

The Spectra system subdirectories are described in the following sections. The following table details the subdirectories, file extensions, and sources of files in the Spectra system.

Table D.1 - Spectra Directory Structure

Subdirectory and Description (C:\SPECTRA\...)	**File Extension(s)**	**Source**
API This subdirectory contains the API script execution results text files.	.CSV .PRT	API execution of scripts
APISCHED This subdirectory contains the API Scheduler files and test scripts created or edited using API.	.SCH .API	API Scheduler API Script Editor screen
BIN This subdirectory contains system files.	.BIN .T7 .IMG .EXP .EXE	Spectra software
COMMON\MAPTABLE This subdirectory contains map table files used with Level 4 Tester's Play Tone script option. These tables are created under the F8 Tools Manage Mapping Table.	.MTB	Manage Mapping Table screen
CONFIG\CONFIGNAME\ This subdirectory contains saved configuration files listed by the file name.	N/A	Configuration files
CONFIG\CONFIGNAME\MACROS This subdirectory contains macros saved with configuration files.	.MCF .MCK	Macro Controller screen
DECODE This subdirectory contains the decode file, TEMPLATE.SS7, purchased with the Spectra system.	.SS7	Decode Template

Table D.1 - Spectra Directory Structure (Continued)

Subdirectory and Description (C:\SPECTRA\...)	File Extension(s)	Source
GENERATE This subdirectory contains all number databases, as well as the other subdirectories that contain protocol-specific files from the generation modes of Spectra system, such as traffic models created in ISUP Generator, database files recorded in TCAP Generator, etc. For example, a traffic model created in the TCAP Generator is stored with a .MOD extension.	.NUM .MOD	CreateCICDb screen Traffic Model screens for each generator
GENERATE\GSM This subdirectory contains the files used by the GSM Generator.	.TMD .BSR .MOD .TAM .MSR	Traffic Model Parameters, BSSAP scripts, Trigger action models, Map scripts
GENERATE\ISDN This subdirectory contains the files used by the ISDN Generator, as well as protocol specific subdirectories based on the decode template in use.	.LMD	IDSN Layer 3 Parameters Screen, Model Creation screen, Traffic Model Parameters
GENERATE\ISDN\PROTOCOL NAME (CCITT, ETSI, ABIS, V5.1, V5.2, DASS, DPNSS, VARIANT, etc.)\ Each protocol specific subdirectory contains protocol specific files related to the ISDN Generator. Therefore, subdirectories are based on the decode template in use, so variant protocols are also included.	.SCR .MDL	IDSN Layer 3 Parameters Screen, Model Creation screen, Traffic Model Parameters
GENERATE\ISUP This subdirectory contains ISUP/TUP Generator traffic models, as well as subdirectories for the protocols that contain protocol specific files used by each generator.	.LMD PTC .LMD .SCR .MDL .SCR	ISUP\TUP Generator Traffic Models, ISUP Generator Model Scripts screen Point Code Database, Generations Specifications screen, Model Creation screen, Traffic Model Parameters
GENERATE\ISUP\PROTOCOL NAME (ANSI, BTNR, C7-BLUE, C7-BTUP, C7-RED, C7-WHITE, C7-WTUP, JAPAN7, CHINA, and VARIANT, etc.)\ Each protocol specific subdirectory contains protocol specific files related to the ISDN Generator. Therefore, subdirectories are based on the decode template in use, so variant protocols are also included.	.SCR .MDL	IDSN Layer 3 Parameters Screen, Model Creation screen, Traffic Model Parameters

Table D.1 - Spectra Directory Structure (Continued)

Subdirectory and Description (C:\SPECTRA\...)	File Extension(s)	Source
GENERATE\TCAP This subdirectory contains TCAP Generator traffic models, as well as subdirectories for the protocols that contain protocol specific files used by each generator.	.LMD	Traffic Model Parameters
GENERATE\TCAP\PROTOCOL NAME (ANSI, BTNR, C7-BLUE, C7-RED, C7-WHITE, JAPAN7, CHINA, and VARIANT, etc.)\ Each protocol specific subdirectory contains protocol specific files related to the ISDN Generator. Therefore, subdirectories are based on the decode template in use, so variant protocols are also included.	.SCR .MDL	IDSN Layer 3 Parameters Screen, Model Creation screen, Traffic Model Parameters
HELP This subdirectory contains the help files (HELP.###) that display when the F10 key is pressed in the correlating screen.	.###	Spectra software
ISDN This subdirectory contains the ISDN emulator scripts.	.EMU	ISDN Emulator screen
ISDN\CVWFILES This subdirectory contains saved Multiple Comment views.	.CVW	F9 Examine screen (Multiple Comment View option)
ISDN\TGT This subdirectory contains the ISDN Database Settings files.	.CSM .ILM .TGT	TGT Channel-Scheme Mapping screen; TGT Interface ID Mapping screen; TGT Link-Database Mapping screen
LVL2SIGS\ATM This subdirectory contains grabbed ATM PDUs or edited and/or created ATM PDUs using the Create/ Edit Level 2 Message screen.	.AAL	Create/Edit Level 2 Message screen for ATM
LVL2SIGS\HDLC This subdirectory contains grabbed HDLC MSUs or edited and/or created HDLC MSUs using the Create/ Edit Level 2 Message screen.	.HDL	Create/Edit Level 2 Message screen for HDLC

Table D.1 - Spectra Directory Structure (Continued)

Subdirectory and Description (C:\SPECTRA\...)	File Extension(s)	Source
LVL2SIGS\TALI This subdirectory contains grabbed TALI OPCODEs or edited and/or created TALI OPCODEs using the Create/Edit Level 2 Message screen.	.TAL	Create/Edit Level 2 Message screen for TALI
PRINTLOG This subdirectory contains the print log files created using the F5 function or by the system.	.PRT	F5 Print function screen
PROTOCOL This subdirectory contains a subdirectory for each protocol. Subdirectories are based on the decode template in use, therefore, variant protocols are also included.	N/A	TEMPLATE.SS7
PROTOCOL\PROTOCOL NAME (ANSI, CCITT, JAPAN, ETC.)\ Each protocol specIfic subdirectory contains three additional subdirectories that contain all messages (signal units), mnemonics with slide files (the F6 Edit function), and views saved for multiple files or multiple comments.	N/A	TEMPLATE.SS7
PROTOCOL\PROTOCOL NAME\MNEMONICS This subdirectory contains mnemonics with slide files from the F6 Edit function.	Mnemonics vary based on protocol	Create/Edit Message screen
PROTOCOL\PROTOCOL NAME\SIGUNITS Messages are also saved with a unique extension based on the user part. For example, an ANSI ISUP signal unit named IAM.ISU is stored in the PROTOCOL\ANSI\SIGUNITS directory.	Extensions vary based on protocol	Create/Edit Message screen
PROTOCOL\PROTOCOL NAME\VIEWS This subdirectory contains saved protocol specific Multiple File views.	.MVF	F9 Examine screen (Multiple File View option)
REPORTS This subdirectory contains alarm files generated by the Spectra system. These include alarms created under the F4 Alarms function.	.RTX	Spectra system alarms
SCRIPTS This subdirectory contains the Programmer's Mode scripts.	.SDL	Programmer's Mode script screens

Table D.1 - Spectra Directory Structure (Continued)

Subdirectory and Description (C:\SPECTRA\...)	File Extension(s)	Source
SIGNALOG This subdirectory contains the reports for data captured and saved under the F9 Xamine function.	.DAT	F9 Xamine function screen
SS7 This subdirectory contains tester scripts for all the CVR testers (Level 2, Level 3, TUP, ISUP, and TCAP).	.781 .782 .783 .784 .787	Level 2 Tester screen Level 3 Tester screen TUP Tester screen ISUP Tester screen TCAP Tester screen
SS7\CVWFILES This subdirectory contains saved Multiple Comment views.	.CVW	F9 Examine screen (Multiple Comment View option)
SS7\GTTFILES This subdirectory contains the test scripts to be run with the Spectra system including the Global Title Translation files.	.GTT	Global Title Translation screen
SS7\TGT This subdirectory contains the CIC-TS Mapping tables and the TGT System Mapping tables.	CTS .TGT	TGT CIC-TS Mapping Table screen TGT System Mapping Table screen
STATS This subdirectory contains the statistics files generated by the Spectra system.		Statistics screens
X25 This subdirectory contains the X.25 emulator scripts.	.EMU	X.25 Emulator screen
X.25\CVWFILES This subdirectory contains saved Multiple Comment views.	.CVW	F9 Examine screen (Multiple Comment View option)

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