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ASA 312® Network Information Computer (NIC)™ and Remote Access Manager (RAM)

USER'S GUIDE

April 2002

Document No. CO 003202C

Software Release 3.14 and 4.14

Digital Lightwave®

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Return Shipping Instructions

If it is necessary to return the unit, obtain a **Return Material Authorization (RMA) number** and **Return Shipping Address** by contacting Technical Support between 8:30 a.m. and 6:30 p.m. EST, Monday through Friday.

Please enclose a letter that briefly describes the reason for returning the unit and include the following information:

- Unit Serial Number
- Customer Name and Shipping Address
- Customer Contact Name and Telephone Number
- Secondary Customer Contact Name and Telephone Number
- Customer Supplied Purchase Order Number (if applicable)

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If the original shipping container (box) is available, place the unit (and letter that describes the reason for the return) into the canvas carry bag, and pack it into the original Digital Lightwave, Inc. shipping container. **Do not include personal items such as jumper cords or connectors. Digital Lightwave, Inc. will not be responsible for these items.** Use the original foam inserts to protect all six sides of the unit.

Securely seal the shipping container, and mark **FRAGILE** on the container to ensure careful handling.

Include the **RMA number** on the outside of the shipping container.

If the original shipping container is not available, (a) an ASA 312 shipping container (Part Number **ASA-BOX**) can be purchased from Digital Lightwave, or **(b)** pack the unit (and letter that describes the reason for the return) into the canvas carry bag, and use the following general instructions to repack the unit using commercially available materials:

- Use a strong shipping container, similar to the original ASA 312 shipping box. Verify that the substitute container is rated at **350 lbs. per square inch** pressure durable.
- Make sure that the unit is satisfactorily protected by using a layer of ESD Protected short absorbing foam material. The foam padding must be 3- to 4-inches in thickness (70- to 100-mm) and applied to all six sides of the unit to provide adequate protection. Make sure that the canvas bag and unit cannot move or shift within the container.
- Securely seal the shipping container, and mark **FRAGILE** on the container to ensure careful handling.
- Include the **RMA number** on the outside of the shipping container.

Contact Technical Support for the Repair Department's Return Shipping Address.

When service is complete, your unit will be returned to you postage paid if the shipment is within the United States. You are responsible for paying all shipping charges, duties, taxes, and other charges for products returned to Digital Lightwave, Inc. from any location within or outside of the United States.

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GENERAL SAFETY GUIDELINES

The following safety precautions are provided to avoid injury and prevent damage to this product or any products connected to it during normal operation. Only qualified maintenance personnel should perform service procedures.

Use Proper Power Cord

To avoid fire hazard, use only the power cord specified for this instrument.

Avoid Electric Overload

This unit is designed to be powered from 90–132 and 180–260 VAC, 47-63 Hz, 60 watts. To avoid electric shock, fire hazard, or damage to the instrument, do not apply a higher voltage.

Ground the Instrument

The ASA 312 is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the instrument, ensure that the product is properly grounded.

Do Not Operate in Hazardous Conditions

To avoid injury or fire hazard, do not operate this instrument in wet, damp, or other hazardous condition. Do not operate this instrument in an explosive atmosphere.

Eye Protection

Users should never stare into unterminated connectors or broken fibers. In addition, fiber cables and interfaces should always be handled as if they were emitting laser light. Always leave protective covers on optical connectors to prevent damage and prevent laser emissions.

CAUTION

Use of controls or adjustments or procedures other than those specified herein may result in hazardous radiation exposure. ◄

Replacing the Battery

The ASA 312 uses a lithium battery located in the service access area not accessible to customers. To avoid damaging the unit, do not under any circumstances attempt to replace the lithium battery. Return the unit to Digital Lightwave, Inc. for battery replacement.

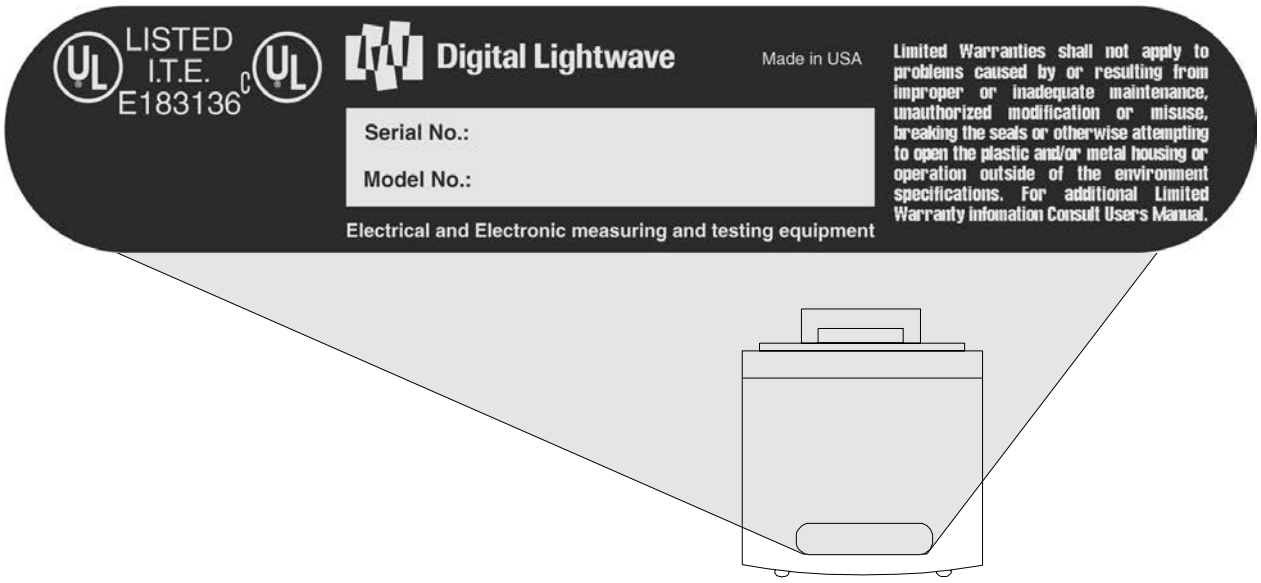
WARNING

Danger of explosion exists if the battery is replaced incorrectly. Do not, under any circumstances, attempt to replace the lithium battery. ◄

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Serial No. / Model No. Label

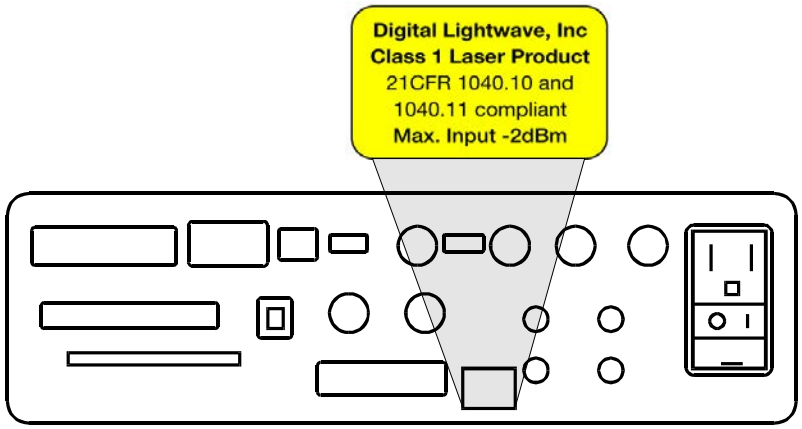
The following label is located on the rear of the ASA 312.



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Class 1 Laser Label

The following label is located on the ASA 312's Connector Panel.



ASA 312 Lasers

Laser	Wavelength	Class	Typical Normal Operation Output Power*
OC-1/12	1310 nm	Class 1	30 µW
OC-1/12	1550 nm	Class 1	29 µW
OC-48	1310 nm	Class 1	25 µW
OC-48	1550 nm	Class 1	22 µW

*** Laser output power measurements are measured during normal operation at 20 cm from meter probe to laser objective lens.**

The CDRH report accession number for the ASA 312 is 9612361.

The CDRH report accession number for the NAA I is 9922616.

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Preface

About This Guide

This guide describes the ASA 312 Network Information Computer (NIC), the Network Access Agent I (NAA 1), and their features.

Use this guide to:

- Obtain a basic understanding of the ASA 312/NAA I and their operation
- Configure the ASA 312/NAA I SONET, DS1, E1, DS3, or ATM protocol processors
- Monitor and record error and alarm results
- Inject and generate errors and alarms

This guide is intended for technicians responsible for maintaining and troubleshooting high-speed network facilities. It is assumed that you have a basic understanding of the following:

- T-Carrier operation
- SONET operation
- ATM operation

Organization of This Guide

This guide is organized as follows:

Chapter	Description
Chapter 1	*Getting Started with the ASA 312*. Provides a basic overview of how to operate and configure the ASA 312 hardware.
Chapter 2	*Getting Started with the Remote Access Manager.* Provides a basic overview of how to install and configure the RAM software.
Chapter 3	*User Interface Screen Components.* Provides a brief overview of the components of the ASA 312 and NAA I user interface screens.
Chapter 4	*SONET Protocol Processor.* Provides an overview of the SONET user interface, the LEDs, and basic configuration. The remainder of the chapter describes the commands, options, and functions available for the SONET protocol processor.

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Chapter	Description
Chapter 5	*DS1 Protocol Processor.* Provides an overview of the DS1 user interface, the LEDs, and basic configuration. The remainder of the chapter describes the commands, options, and functions available for the DS1 protocol processor.
Chapter 6	*DS3 Protocol Processor.* Provides an overview of the DS3 user interface, the LEDs, and basic configuration. The remainder of the chapter describes the commands, options, and functions available for the DS3 protocol processor.
Chapter 7	*ATM Protocol Processor.* Provides an overview of the ATM user interface, the LEDs, and basic configuration. The remainder of the chapter describes the commands, options, and functions available for the ATM protocol processor.
Chapter 8	*E1 Protocol Processor.* Provides an overview of the E1 user interface, the LEDs, and basic configuration. The remainder of the chapter describes the commands, options, and functions available for the E1protocol processor.
Chapter 9	*Tests & Setups.* Describes the functionality of the Tests & Setups Function Group button. This button is common to the SONET, DS1, E1, and DS3 protocol processors.
Chapter 10	*Settings, Presets, and Switch Matrix*. Describes the Settings, Presets, and Switch Matrix Function Group buttons that are common to all five protocol processors.
Chapter 11	*Action Button Row.* Describes the functions associated with the Action buttons.
Appendix A	*ASA 312 and NAA I Specifications.* Lists the technical specifications and features of the ASA 312 and NAA I.
Appendix B	*Using the ASA 312 Connector Panel*. Describes the configuration and setup required to use various ASA 312 connectors.
Appendix C	*Warranty and Registration*. Describes the ASA 312 and NAA I warranty.
Appendix D	*OC-48 Mode*. Provides a basic overview of the optional OC-48 feature.
Appendix E	*Jitter Measurements*. Provides an overview of the optional Jitter feature.
Glossary	Defines acronyms and terms used in this guide.
Index	Lists acronyms, terms, concepts, and sections for easy cross reference.

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Illustrations

The main user interface screen that appear in this document may vary from what appears on your ASA 312 and/or NAA I screens based on the hardware and software configuration of your unit.

Related Documents

The following is a list of related documents:

- *ASA 312 Network Information Computer Calibration Manual*, Document No. RF 002331
- *Network Access Agent I Installation Guide*, Document No. CO 000758
- *Network Access Agent I TL1 Command Reference Guide*, Document No. CO 001195

Periodically, software update notices are issued that describe new features that are not yet described in the user's guide.

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1 Getting Started with the ASA 312

Overview

This chapter describes the following basic tasks that are required to set up and use the ASA 312:

- Opening the unit and attaching optical and electrical cables
- Powering on the unit
- Configuring and restoring default settings
- Turning off the unit

Opening the ASA 312

To properly set up the ASA 312, perform the following:

1. Be sure the operating environment is within unit specifications. . For temperature, relative humidity, altitude, vibrations, and emissions specifications, refer to appendix A, *ASA 312 Specifications.*
2. Make sure that there is adequate ventilation space around the unit for cooling. Verify that the air intake and exhaust holes on the sides of the unit are free of any airflow obstructions.
3. Place the ASA 312 on a firm surface. . Set the unit so that it is standing upright and facing you as illustrated in the following figure.

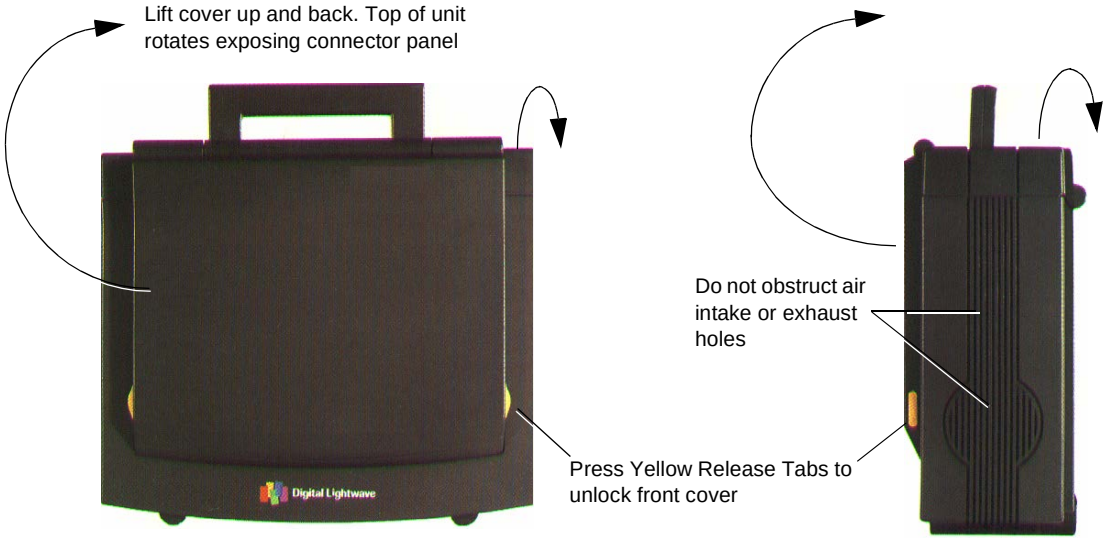


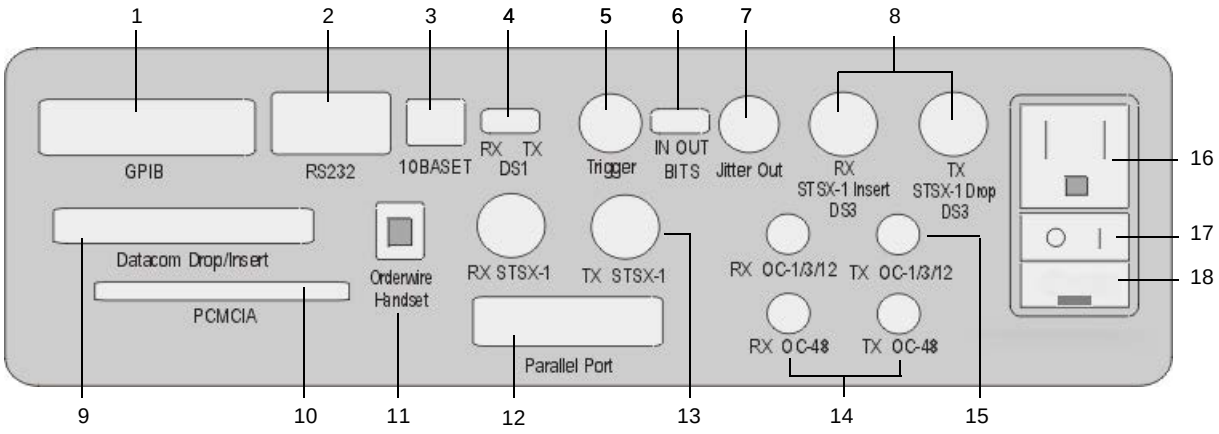
Figure 1-1. Opening the ASA 312

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4. Locate the yellow release catches on each side of the unit's front cover. While pressing the release catches, gently lift the front cover and extend it completely to the back of the unit until you hear a click. This indicates that the unit is locked into position.

Connector Panel Overview

The ASA 312 connector panel contains a wide variety of auxiliary interfaces. The interfaces are illustrated in the following figures.



1. **GPIB:** Interface used to connect a GPIB cable for SCPI command operation
2. **RS232:** 9-pin male connector for mouse, modem, direct connect or printer
3. **10BaseT:** 8-pin modular jack for Ethernet connection
4. **DS1 RX TX:** Bantam connectors for DS1 Transmit and Receive electrical signals
5. **Trigger:** BNC connector for future use
6. **IN OUT Bits:** Bantam jacks for external timing equipment (unframed 1.544 timing source)
7. **Jitter Out:** BNC connector for future use
8. **DS3 RX TX:** BNC connectors for DS3 Transmit and Receive electrical signals; or **STSX-1 Insert Drop:** For SONET electrical signals
9. **DataCom Drop/Insert:** 37-pin female, RS449 connector for D1 through D12 Overhead bytes
10. **PCMCIA:** Type II PC Card slot for PC Card modem or SRAM Flash card
11. **Orderwire Handset:** 4-pin modular jack. Not intended for direct connection to telecommunications circuits
12. **Parallel Port:** 25-pin female connector for parallel printer
13. **STSX-1 RX TX:** BNC connectors for SONET Transmit and Receive electrical signals
14. **OC-48 RX TX:** FC-PC, ST-PC, or SC-FC type connectors for SONET OC-48 optical signals
15. **OC-1/3/12 RX TX:** FC-PC, ST-PC, or SC-FC type connectors for SONET optical signals
16. **Power Cord Connector**
17. **On/Off Power Switch**
18. **Fuse Compartment**

NOTE: Connectors will vary based on your hardware configuration.

Figure 1-2. ASA 312 Connector Panel (Non E1 Configuration)

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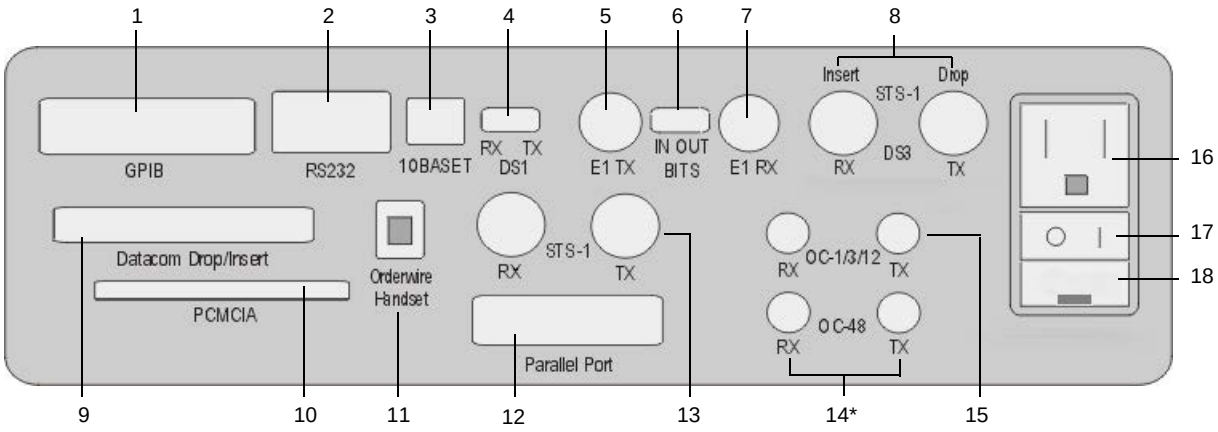


Figure 1-3. ASA 312 Connector Panel with E1 Configuration

1. GPIB: Interface used to connect a GPIB cable for SCPI command operation	**7. E1 RX:** BNC connectors for E1 Receive electrical signals.	**13. STSX-1 RX TX:** BNC connectors for SONET Transmit and Receive electrical signals
2. RS232: 9-pin male connector for mouse, modem, direct connect or printer	**8. STS-1/DS3 RX TX :** BNC connectors for DS3 Transmit and Receive electrical signals; or **STSX-1 Insert Drop:** For SONET electrical signals	**14. OC-48 RX TX:** FC-PC, ST-PC, or SC-FC type connectors for SONET OC-48 optical signals; or **Jitter Out:** BNC connector for Jitter output.
3. 10BaseT: 8-pin modular jack for Ethernet connection	**9. DataCom Drop/Insert:** 37-pin female, RS449 connector for D1 through D12 overhead bytes	**15. OC-1/3/12 RX TX:** FC-PC, ST-PC, or SC-FC type connectors for SONET optical signals
4. DS1 RX TX: Bantam connectors for DS1 Transmit and Receive electrical signals	**10. PCMCIA:** Type II PC Card slot for PC Card modem or SRAM Flash card	**16. Power Cord Connector**
5. E1 TX: BNC connectors for E1 Transmit electrical signals.	**11. Orderwire Handset:** 4-pin modular jack. Not intended for direct connection to telecommunications circuits	**17. On / Off Power Switch**
6. IN OUT Bits: Bantam jacks for external timing equipment (unframed 1.544 timing source)	**12. Parallel Port:** 25-pin female connector for parallel printer	**18. Fuse Compartment**

NOTE: Connectors will vary based on your hardware configuration.

* If the unit is configured for Jitter operation, the OC-48 RX and OC-48 TX connectors are not installed. Instead, the Jitter Out connector will appear in place of the OC-48 RX connector.

Figure 1-4. Hardware Setup

The following sections describe procedures for connecting optical and electrical cables and powering on the ASA 312. For configuration procedures, refer to the specific protocol processor chapter. For information about other connector panel connectors, refer to appendix B, *Using the ASA 312 Connector Panel.*

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Connecting Optical Signals

The optical connectors on the ASA 312 are labeled:

- RX OC-1/3/12
- TX OC-1/3/12
- RX OC-48
- TX OC-48

The ASA 312 can be configured with FC-PC, ST-PC, or SC-FC-type optical connectors and accepts both single-mode and multimode fiber.

WARNING
The ASA 312's optical Transmit output is produced by a Class 1 laser device. You should never, under any circumstances, look into an unterminated fiber. ◄

To connect optical signals to the ASA 312:

1. Unscrew the dustcaps that cover the optical ports on the ASA 312.

   These ports are labeled RX OC-1/3/12 and TX OC-1/3/12 (for OC-1, OC-3, or OC-12 optical rates) or RX OC-48 and TX OC-48 (for OC-48 optical rates).

2. Carefully insert the Transmit end of the optical fiber into the Receive port on the ASA 312.
   - For OC-1, OC-3, or OC-12 optical rates, this port is labeled RX OC-1/3/12.
   - For OC-48 optical rates, this port is labeled RX OC-48.
3. Line up the key on the optical fiber connector with the cutout on the optical port connector. Make sure that the optical fiber connector is fully inserted into the optical port.
4. Tighten the optical connector barrel clockwise until finger-tight. Do not overtighten.
5. Carefully insert the Receive end of the optical fiber into the Transmit port on the ASA 312.
   - For OC-1, OC-3, or OC-12 optical rates, this port is labeled TX OC-1/3/12.
   - For OC-48 optical rates, this port is labeled TX OC-48.

   Line up the key on the optical fiber connector with the cutout on the optical port connector. Make sure the optical fiber connector is fully inserted into the optical port.
6. Turn the optical connector barrel clockwise until finger-tight. Do not overtighten.

CAUTION
To prevent damage and keep the optical port connectors clean, always replace dustcaps on the optical port connectors when not in use. ◄

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Connecting Electrical Signals

The ASA 312 has a number of electrical connectors to accommodate various test sets.

For SONET, the ASA 312 uses BNC connectors that accept 75-ohm coaxial cable. . These connectors are labeled:

- RX STSX-1
- TX STSX-1

For DS1, the ASA 312 uses bantam connectors. These connectors are labeled:

- RX DS1
- TX DS1

For DS3, the ASA 312 uses BNC connectors that accept 75-ohm coaxial cable. These connectors are labeled:

- RX STSX-1 Insert DS3
- TX STSX-1 Drop DS3

For E1, the ASA 312 uses BNC connectors that accept 75-ohm coaxial cable. These connectors are labeled:

- E1 TX
- E1 RX

75-to-120 Ohm Adapter Interface Connection to E1

You will need the following components for E1 75-to-120 Ohm adapter interface operation:

- 75-ohm to 120-ohm adapter interface for ASA 312 conversion of balanced input to unbalanced input using E1 applications
- RJ-45 or RJ-48/Dual Bantam "Y" cable
- Balun cable or equivalent
- Two one-inch BNC-to-BNC cables with connectors at both ends

Connect the components as follows:

1. Connect one side of the BNC-to-BNC cables to the E1 TX and E1 RX ports located on the ASA 312 connector panel.
2. Connect the other side of the BNC to BNC cables to the RX In and TX Out ports located on the adapter interface. Ensure that each BNC connector is matched to its corresponding RX and TX port.
3. Connect the adapter interface to the RJ-45 or RJ-48/Dual Bantam "Y" cable.
4. Connect the RX In .and TX Out Bantam connectors to the E1 facility.
5. Once all cables are connected, turn on the ASA 312. When the main screen appears, select the DS1 protocol processor.
6. From the DS1 protocol processor TX or RX Settings screen, press the E1 button located in the top right corner of the screen.

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The E1 protocol processor main screen appears, and the ASA 312 is in E1 mode.

Use the following figure as a guide to connecting the E1 cables.

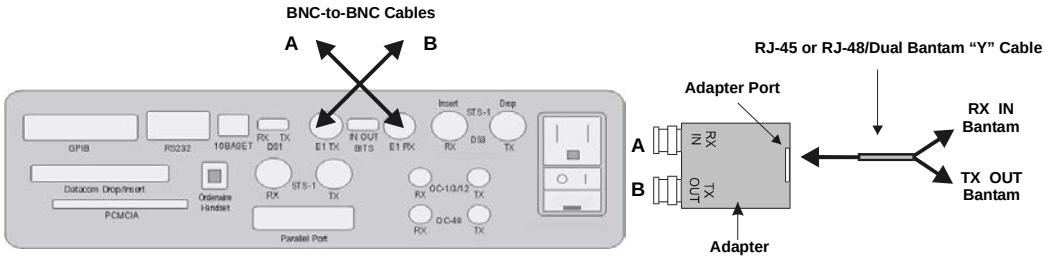


Figure 1-5. 75-to-120 Ohm Adapter Interface Connection to E1

Connecting electrical signals to the ASA 312:

1. Connect the transmit end of the signal cable to the appropriate Receive connector on the ASA 312.
2. Connect the receive end of the signal cable to the appropriate Transmit connector on the ASA 312.

ASA 312 Basic Operation

The following section is a quick reference for configuring and using the ASA 312. For information about specific protocol processor commands, refer to the protocol processor chapter.

Configuring the ASA 312 for Operation

Transmit commands appear on the ASA 312's touch screen when the unit is first turned on.

NOTE ➤
The Transmit commands that appear will vary depending on the features licensed in your unit. In this example, it is assumed that the unit is licensed for SONET operation. As a result, the SONET Transmit commands appear in the Function Menu area. ➤

The ASA 312 also retains its previous protocol and mapping configuration for all five protocol processors before being turned off. Since this configuration may not apply to your application, you can use the Presets function to quickly configure the ASA 312.

Use the following as a guideline to configure the ASA 312 with the Presets Function Button:

1. Turn on the ASA 312 and wait for the unit to boot.

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The ASA 312 performs a series of internal diagnostics while booting. After booting, the SONET protocol processor's Transmit commands appear in the Function Menu area.

2. Make sure that the appropriate cables are attached to the ASA 312.
3. Press the Presets button located in the Function Group button row.

   The Presets command box appears.
4. Press the Preset command that is appropriate for your application.
5. The message Processing...Please wait displays. The ASA 312 reconfigures to the selected configuration.
6. The Function Menu appears, containing the SONET Transmit Settings commands. If necessary, make any command changes to the SONET protocol processor required for your application.

   If necessary, select another protocol processor and make any changes necessary for the Transmit and Receive commands.
7. Turn the laser on (if required for your application).

   If the laser is not on, then press the Laser button. The Laser status displays as ON.
8. Verify that the protocol processor's LEDs are green.

   If LEDs are red, press the Results Function button for the specific protocol processor and view details of any active errors or alarms.
9. Press the Run Stop Action button.

   The Run/Stop Menu displays.
10. Press the Restart button for the appropriate protocol processor.

    All counters are cleared and the LEDs and Status Indicators are updated for that particular processor.

The ASA 312 is now configured for the appropriate mapping. If your application requires customized configuration, use the Switch Matrix to create specific mapping and configuration settings. The Switch Matrix is discussed in chapter 7, *Settings, Presets, and Switch Matrix*.

Restoring Default Settings

If it is necessary to restore ASA 312 default settings, perform the following procedures:

1. From any protocol processor, press the Settings Function Group button.

   The Settings Function Group commands appear in the Function Menu area.
2. Press the Misc button.

   The Miscellaneous commands appear.
3. Press the Reset command button.

   A dialog box appears displaying the following options:

   – Reset to Defaults

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- Reset to Factory Defaults and Reboot
- Reboot without Reset

4. Press one of the options.

   If a reboot option is selected, the ASA 312 reboots. If the Reset to Defaults option is selected, then the message Processing...Please wait appears while the default settings are restored.

Turning On and Off the ASA 312

To turn on the ASA 312:

1. Connect the proper power cord to the AC receptacle in the unit connector panel and then plug into an AC power source.
2. Locate the 1/0 power toggle switch on the connector panel and press to the "1" position.
3. After powering on the unit, make sure that the cooling fan is operating properly by listening to the fan rotation.
4. After turning on the ASA 312, it performs an internal diagnostic and boot procedure.

   When this is complete, a colorful user interface appears on the touch screen.

   Verify that the touch screen is operational. (For example, press the Help button located in the Action button row.)
5. If your application requires the use of the ASA 312's laser, turn the laser on by pressing the Laser button in the upper left corner of the ASA 312 touch screen.

To turn off the ASA 312:

1. Locate the 1/0 power toggle switch on the connector panel and press the switch to the "0" position.

   NOTE ➤
   After turning off the unit, wait approximately 5–10 seconds before turning the unit on again. ◄

When the unit is powered off, it retains the existing test set configurations. If you want to restore default settings, refer to the *Restoring Default Settings* section discussed earlier in this chapter.

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2 Getting Started with the Remote Access Manager

Overview

This chapter describes how to install, configure, and start the Remote Access Manager software.

What is the Remote Access Manager Software?

The Network Access Agent I (NAA I) Broadband System is a device that allows you to monitor and test your SONET, ATM, and T-Carrier facilities. Communication and control of this device occurs using the Remote Access Manager software over an Ethernet, serial direct, or serial dial connection.

The Remote Access Manager software is an application that runs on Windows NT® 4.0 and Windows® 98 operating systems and offers the following features:

- A graphical user interface (GUI) that allows quick and easy selection of numerous test functions for any of the protocol processors configured in your NAA I Broadband System
- Simultaneous command and control of multiple SONET, ATM, DS1, and DS3 protocol processors installed in an NAA I Broadband System nest
- Initiation of a series of alarm and error events to monitor your broadband facilities
- Event history statistics recorded in both report and graph formats
- Remote control of a portable ASA 312 unit

As a result of the NAA I's capabilities, you can reduce the cost to service and maintain your broadband networks by providing predispatch analysis of network problems.

Supported Versions

The RAM software is supported in the following software release versions:

- 4.7.11
- 4.8.4, 4.8.9, 4.8.10, 4.8.12
- 4.9.13, 4.9.15
- 4.10.15, 4.10.18
- 4.11.15
- 4.12.6, 4.12.9
- 4.13.7, 4.13.9

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- 4.14.x

Before You Begin

This section describes the hardware, software, and communications requirements for operating the Remote Access Manager software.

Perform the following tasks before using the Remote Access Manager:

- Obtain the Remote Access Manager CD or diskette from your Digital Lightwave Sales or Technical Support representative.
- Determine how you will connect to the ASA 312 or NAA I (for example, a direct serial connection, a modem connection, or an Ethernet connection).

  For a **direct serial** connection, you must use a Null modem cable.

NOTE ➤
For the ASA 312, the Remote Control Port command must be set to **RS-232 Direct**. If you have trouble connecting to the ASA 312, verify this command's setting by pressing the following buttons: Settings Function Group, User, Remote Control Port. ◄

  For a **modem** connection, you must have:

  – The telephone number of the modem connected to the remote ASA 312 or NAA I

  – An external modem attached to the remote ASA 312 or NAA I using a serial modem cable, or

  – A PCMCIA modem installed in the PCMCIA slot of the remote ASA 312, or a PC Card modem installed in the PCMCIA slot of the NAA I.

  – For the ASA 312, the Remote Control Port command must be set to **RS-232 Modem**.

NOTE ➤
If you have trouble connecting to the ASA 312, verify this command's setting by pressing the following buttons: Settings Function Group, User, Remote Control Port. ◄

  For an **Ethernet** connection, you must have the **IP Address, Subnet Mask,** and **Router** addresses entered into the remote ASA 312 or NAA I.

NOTE ➤
For the ASA 312, the SCPI Port command must be set to **Ethernet**. If you have trouble connecting to the ASA 312, verify these settings by pressing the following buttons: Settings Function Group, I/O Port, Ethernet, IP Address / Subnet Mask / and Settings Function Group, User, SCPI Port. ◄

NOTE ➤
When the NAA I Broadband System is first installed in your network, you must manually enter the IP address into each east and west device. This task must be completed before you can communicate to the NAA I Broadband System using an Ethernet connection.

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If it is necessary to manually enter the IP address, then refer to appendix A for instructions. ◄

NOTE ►
When attempting to make multiple connections to an NAA I via an RS-232, you must wait approximately one minute before attempting to establish another connection. ◄

Software and Hardware Requirements

The following lists the minimum requirements for the Remote Access Manager:

- Windows 98, Windows 95, or Windows NT 4.0 operating system. (If you are using Windows NT 4.0, your system must have Service Pack 3 or greater installed.)
- IP address for LAN access
- A desktop personal computer with a 200-Mhz Pentium® processor or faster
- 64 Mb RAM
- 2 Mb of free hard disk space
- An SVGA monitor with a minimum screen resolution of 640 by 480 pixels and 256 colors
- A CD-ROM drive for software installation
- A mouse to control and operate the Remote Access Manager software
- A modem if dialing into a NAA I Broadband System (a modem is required at each end of the connection)

Communications Requirements

Use one of the following connection methods to communicate to the NAA I Broadband System:

- LAN
  - Ethernet: Obtain the IP address and Nest name for each east and west device installed.
- Dial
  - RS-232 (Dial): Requires dial modems on both ends of the communications link. Obtain the telephone number for the NAA I Broadband System.
- Direct Connect
  - RS-232 (Serial): Requires a Null modem cable attached directly between a laptop or desktop PC and the NAA I Broadband System.

ASA 312 Recommended Modems

The following modems have been tested successfully for use with the ASA 312:

Modem	Model Number
Viking PC Card Modem 56K	FM56KP

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Modem	Model Number
Viking PC Card Modem 33.6K	FM336P
US Robotics 33.6K Sportster	SP1336
3COM 56K Cellular	3CXM556

Installing the Remote Access Manager

The Remote Access Manager is supplied on a CD- ROM. To install the remote operations software on a remote PC, perform the following:

1. If installing the software from a **CD-ROM**:
   - Insert the Remote Access Manager CD into the PC's CD-ROM drive.
   - The Auto-Run feature starts and displays the Remote Access Manager Welcome dialog window.
   - Proceed to step 2.

   NOTE ➤
   If the Auto-Run feature is disabled on your system, perform the following:
   - Open Windows Explorer.
   - Select the CD-ROM drive.
   - Select the **Setup.exe** file.
     The Remote Access Manager Welcome dialog window appears. ◄

Starting the Remote Access Manager

The following describes how to start the Remote Access Manager.

1. To start the Remote Access Manager, do one of the following:
   - Click the Start button, and then click the Remote Access Manager item, or
   - Double-click the Remote Access Manager shortcut icon located on the desktop.

   The Remote Connect window appears.

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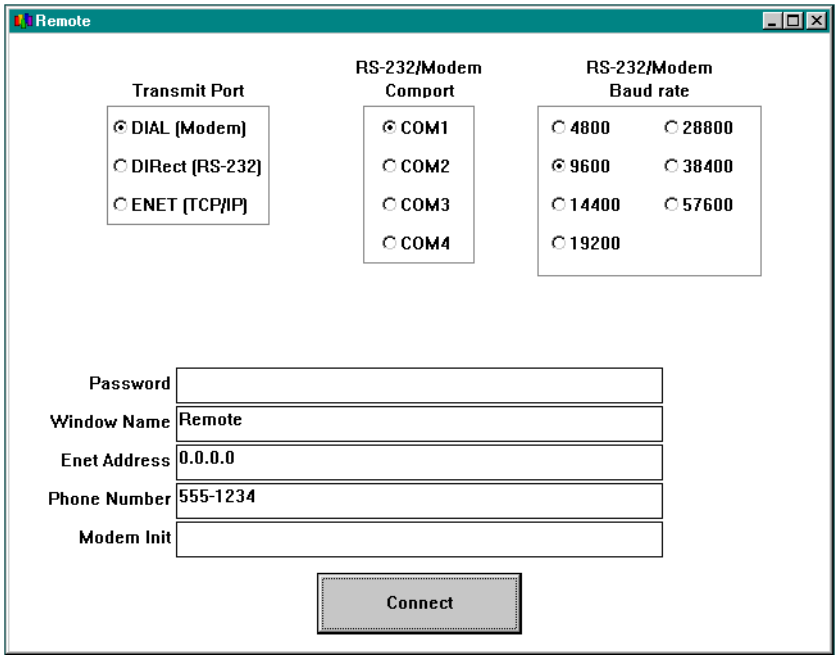


Figure 2-1. Remote Connect Window

The default settings are Dial (Modem), COM 1, and 9600 bps.

2. Select the Transmit Port, COM Port, and Baud rate appropriate for your remote connection.

   For an Ethernet connection:

   – Click ENET (TCP/IP).

   – If required, enter your password.

   – (Optional: Enter a unique Window Name or use the default name, Remote.)

   – Enter the NAA I's IP address into the Enet Address field.

   – Click Connect.

   For a modem connection:

   – Click Dial (Modem).

   – Click your PC's COM port.

   – Click a Modem Baud rate. (Do not select 14400 bps or 28800 bps.)

   – If required, enter your password.

   – (Optional: Enter a unique Window Name or use the default name, Remote.)

   – Enter the Phone Number for the modem attached to the NAA I

   – Enter AT&F into the Modem Init field. If you are using a US Robotics Sportster modem, enter AT&F1&B1 as the initialization string.

   – Click Connect.

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For a Direct serial connection using a Null modem cable:

- Click DIRect (RS-232).
- Click your PC's COM Port.
- Click a Modem Baud rate.

  NOTE ➤
  Use 9600 bps for the initial serial connection. After connecting, the serial port speed can be changed using the Baud Rate command by clicking the following buttons: Settings Function Group button, I/O Port button, Serial button. Use the new Modem Baud rate the next time a connection is made. ◄

- If required, enter your password.
- (Optional: Enter a unique Window Name or use the default name, Remote.)
- Click Connect.

A brief status message appears (displaying the version numbers of the NAA I software and the Remote Control Software), and then the NAA I initialization screen appears.

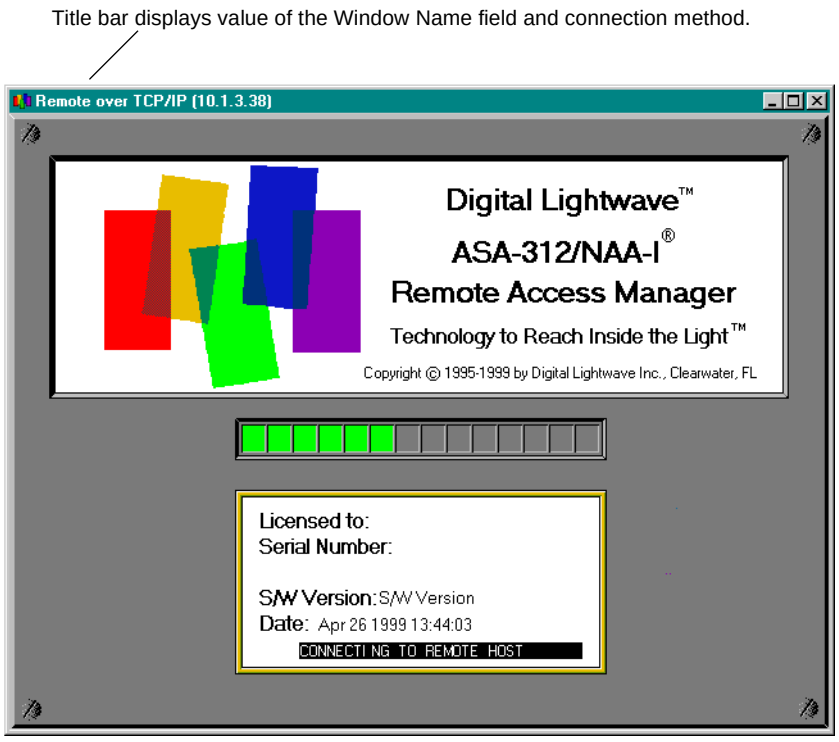


Figure B-2. Initialization Screen

After the connection is made, the NAA I Remote Access Manager window appears as a 640 X 480 pixel window on your PC's desktop.

NOTE ➤
If your desktop area is set to 1280 X 1024 pixels or greater, you can click the Maximize button to increase the Remote Access Manager window's size. ◄

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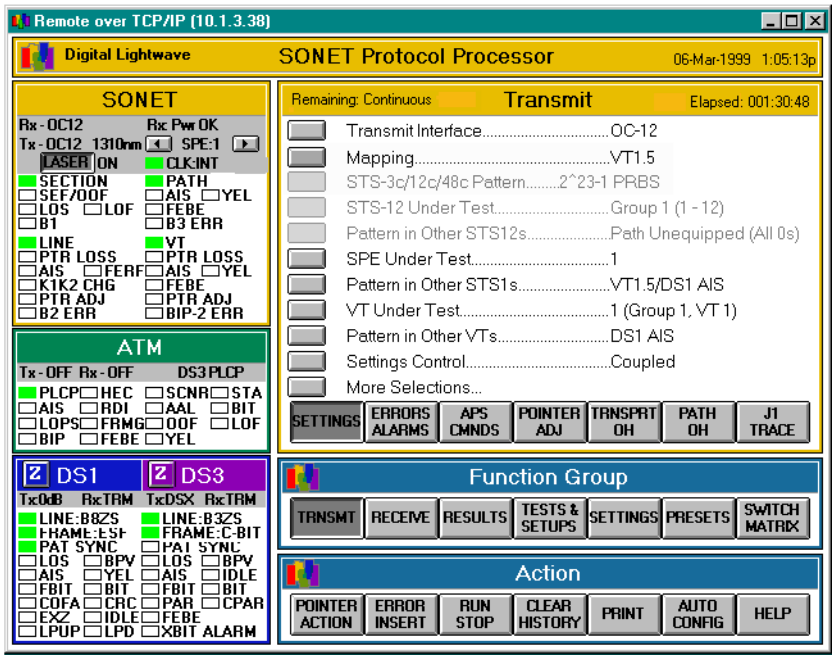


Figure 2-3. Remote Access Manager Window

Use your mouse to point and click on NAA I commands and functions to remotely control the unit.

NOTE ➤
The Remote Access Manager window can be resized (by adjusting the window's frame) so that only the LEDs and status indicators are visible. This is useful when multiple NAA I sessions are running. ➤

Password Security

Password security can be used to restrict access to a remote NAA I when using the Remote Access Manager. No passwords exist when the Remote Access Manager is first installed. This allows you to connect to a unit, and then create a password database. Two levels of password security exist:

- Administrator: Allows you to connect to a remote NAA I and create and edit the password list.
- Normal: Allows you to connect to a remote NAA I using the Remote Access Manager Software.

To create a Remote Access Password:

1. Start the Remote Access Manager.

   The Remote Connect window appears. (When you initially install the software, no passwords exist. Do not enter a value in the Password field when using the software for the first time.)

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After a connection is made, the NAA I Remote Access Manager window appears on your PC's desktop.

2. Open the Password Utility by clicking the following buttons:
   - Settings Function Group button
   - Utility button
   - Password button

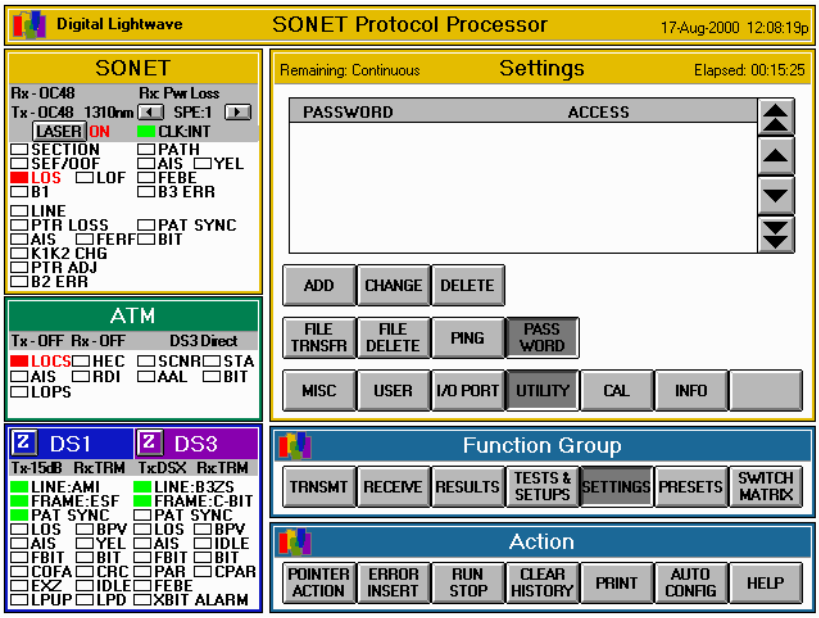


Figure 2-4. Password Window

3. Click Add.

   A message appears stating that you are creating a new user password and that you must use the soft keypad to enter the password.

4. Click OK, and then enter a password using your mouse and the soft keypad.

   Passwords can be any combination of one to eight letters, digits, or symbols. Passwords are not case sensitive.

5. Click the keypad's Enter key to accept the new password.

6. Click Normal User or Administrator to set a security access level.

   The password and access level appear in the Password List table.

   NOTE ➤
   If you have Administrator access, you can edit existing passwords, add new passwords, and delete passwords.

   If no Administrator level passwords are entered in the Password List table, then a user with Normal User access can perform the same tasks. ◄

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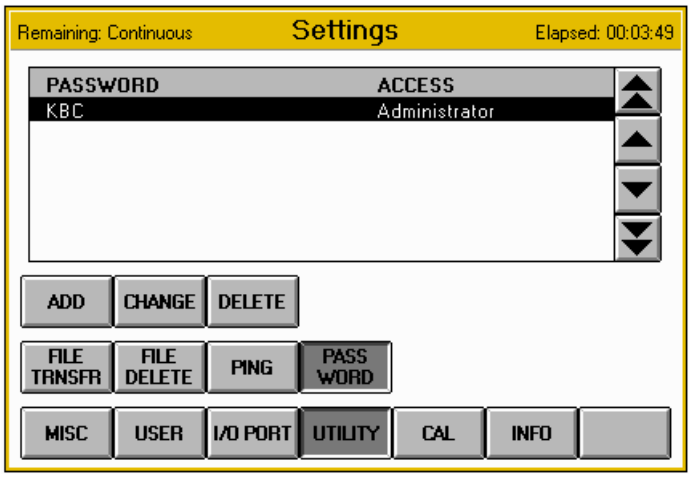


Figure 2-5. Password Window

To change a password's security access level:

1. Use the Password List table's scroll buttons to highlight a password.
2. Click Change.

   The Normal User and Administrator security access levels appear.
3. Click one of the access levels. The new access level appears in the Password List table.

To delete a Remote Access Password:

1. Use the Password List table's scroll buttons to highlight a password.
2. Click Delete.

   A message appears stating that the selected password will be deleted.
3. Click OK.

   The password is deleted from the Password List table.

Terminating a Remote Access Manager Session

To terminate the connection and close the Remote Control application:

1. Click CTRL + X from the remote PC's keyboard, or click the Close button located in the upper right corner of the Remote Access Manager window.

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Troubleshooting Remote Operations

The following lists solutions to possible remote problems.

Problem	Solution
Remote PC does not dial out	1. Make sure modem is configured properly. 2. Test modem with other software to be sure modem and connections are working.
Remote PC screen freezes white	Is interlnk.exe installed in config.sys on your PC? It can interfere with remote in Windows 95. The interlnk drivers poll the serial ports periodically, wiping out the drivers used by remote. If you run remote on one serial port and interlnk on another, then specify the port used for interlnk in config.sys (/com:1, /com:2, or /lpt:1). Otherwise, remove interlnk from config.sys and reboot.
Session is too slow when using a direct or modem connection	Disconnect the session. Set the baud rate between 9600 bps and 57600 bps and reconnect.

NAA I Basic Operation

The following section is a quick reference for configuring and using the NAA I. For information about specific protocol processor commands, refer to the protocol processor chapter.

Configuring an NAA I Device for Operation

Transmit commands appear in the Function menu of the Remote Access Manager's window when a session is first started.

NOTE ➤
The Transmit commands that appear will vary depending on the features licensed in your unit. In this example, it is assumed that the unit is licensed for SONET operation. As a result, the SONET Transmit commands appear in the Function Menu area ◄

The NAA I also retains its previous protocol and mapping configuration for all four protocol processors before being turned off. Since this configuration may not apply to your application, you can use the Presets function to quickly configure the NAA I.

Use the following as a guideline to configure the NAA I with the Presets Function Button:

1. Connect to either the east or west of the NAA I Broadband System as described earlier in this chapter. After connecting, the SONET protocol processor's Transmit commands appear in the Function Menu area.
2. Click the Presets button located in the Function Group button row.

   The Presets command box appears.

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3. Click the Preset command that is appropriate for your application.
4. The message Processing...Please wait displays. The NAA I reconfigures to the selected configuration.
5. The Function Menu appears, containing the SONET Transmit Settings commands. If it is necessary, make any command changes to the SONET protocol processor required for your application.

   If necessary, select another protocol processor and make any changes necessary for the Transmit and Receive commands.
6. Turn the laser on (if required for your application).

   If the laser is not on, then click the Laser button. The Laser status displays as ON.
7. Verify that the protocol processor's LEDs are green.

   If LEDs are red, click the Results Function Button for the specific protocol processor and view details of any active errors or alarms.
8. Click the Run Stop Action button.

   The Run/Stop Menu displays.
9. Click the Restart button for the appropriate protocol processor.

   All counters are cleared, and the LEDs and Status Indicators are updated for that particular processor.

The NAA I is now configured for the appropriate mapping. If your application requires customized configuration, use the Switch Matrix to create specific mapping and configuration settings. The Switch Matrix is discussed in chapter 10, *Settings, Presets, and Switch Matrix*.

Restoring Default Settings

If it is necessary to restore NAA I default settings, perform the following procedures:

1. From any protocol processor, click the Settings Function Group button.

   The Settings Function Group commands appear in the Function Menu area.
2. Click the Misc button.

   The Miscellaneous commands appear.
3. Click the Reset command button.

   A dialog window appears displaying the following options:

   – Reset to Defaults
   – Reset to Factory Defaults and Reboot
   – Reboot without Reset
4. Click one of the options.

   If a reboot option is selected, the Remote Access Manager session closes and the NAA I device reboots. (It may take several minutes to reconnect to the NAA I device.)

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If the Reset to Defaults option is selected, then the message Processing...Please wait appears while the default settings are restored.

Injecting Errors and Viewing Error Counts for the SONET, DS1, and DS3 Protocol Processors

The following procedures describe how to inject errors onto a SONET, DS1, E1, and DS3 protocol processor.

1. Select a protocol processor.

   Click either the protocol processor title bar or the processor button from the protocol processor button row.

2. Click the Trnsmt Function Group button, and then click the Errors Alarms button.

   The Errors and Alarms commands display in the Function Menu area.

3. Click the Type of Error Added command button, and select an error to transmit.

4. Click the Error Insertion Rate command button, and select an insertion rate.

   This allows you to enter the insertion rate at which errors are transmitted. Once you select an error rate, errors insertion begins. The status can be observed through the LEDs for the specific protocol processor. The Error icon appears in the protocol processor's title bar indicating that errors are currently being transmitted.

   NOTE ➤
   To inject single errors, click the Error Insert button located in the Action button row. ◄

5. Click the Results Function Group button to observe the error count.

   While errors are continuously inserted at the selected rate, you can view error analysis using the Trouble Scan, Main Results, Error Analysis, or Graphs functions.

   To clear the error count, click the Run Stop Action button and click the Restart button for the specific protocol processor.

6. To stop error transmission, set the Error Insertion Rate command to Off.

   Error transmission stops and the Error Icon no longer appears in the protocol processor title bar.

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Injecting Errors and Viewing Error Counts for the ATM Protocol Processor

The following procedures describe how to inject errors onto the ATM protocol processor.

1. Select the ATM protocol processor.

   Click either the ATM protocol processor title bar or the ATM processor button from the protocol processor button row.

2. Click the Functns Function Group button, and then click the Trnsmt button.

   The Errors commands appear in the Function Menu area.

3. Click the Type of ATM Error Added command button, and select an error to transmit.

4. Click the Error Insertion Rate command button, and select an insertion rate.

5. Click the Error Burst Count command button (if available), and select a burst count.

   NOTE ➤
   The Error Burst Count command is not available if the NAA I is configured to generate Bit errors or if it is configured for ATM/DS1 or ATM/DS3 mapping. ◄

6. Click the Duration of Error Insertion command and select how long the error is transmitted.

   After setting the error parameters, errors are continuously inserted at the selected rate for the selected duration. The status can be observed through the LEDs for the specific protocol processor. The Error Icon appears in the protocol processor's title bar indicating that errors are currently being transmitted.

   NOTE ➤
   If you want to inject single errors, click the Error Insert button located in the Action button row. For DS1, ATM, and DS3 ATM mapping, the Error Insert button is available only for Bit errors. ◄

7. Click the Results Function Group button to observe the error count.

   While errors are inserted at the selected rate, you can view error analysis using the Trouble Scan, Main Results, Error Analysis, or Graphs functions.

   To clear error counts, select the Run Stop Action button and click the Restart button for the ATM protocol processor.

8. To stop error transmission, set the Error Insertion Rate command to Off, or set the Duration of Error Insertion command to Off.

   Error transmission stops and the Error Icon no longer appears in the protocol processor title bar.

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3 User Interface Screen Components

User Interface Screens

Both the ASA 312 and NAA I have main user interface screens from which you can view the status of various test sets, view and change the configuration of any test set, start and stop numerous tests, and collect a variety of statistics about test set performance. The difference between the two user interfaces is:

- The ASA 312 has a “touch” screen, and
- The RAM has a “point-and-click” screen.

These are discussed below.

Using the ASA 312 Touch Screen

The ASA 312 touch screen is an all-glass touch screen with a transparent, thin-film conductive coating fused to its surface. An overcoat is applied to this conductive coating that protects and seals the entire sensor. The edges contain an electrode pattern that distributes a low-voltage, AC field over the entire conductive layer. When a finger makes contact with the screen’s surface, it “capacitively couples” with a voltage field flowing in the conductive layer. The touch screen detects and reports the presence and exact position of your finger.

To use the ASA 312 touch screen, place your finger directly onto the screen to select or perform the intended task.

NOTE ➤
Using any objects other than your finger, such as a pencil, pen, or fingernail will not activate the touch screen display. ◄

For example, to view the Switch Matrix, using your finger, press the Switch Matrix button located in the Function Group button row. The Switch Matrix menu appears. To clear the Switch Matrix, press Exit.

Cleaning the Touch Screen

The ASA 312 touch screen has a protective glass coating that is resistant to scratching. To clean the touch screen, use a lightly dampened cloth and isopropyl alcohol or a non-ammonia glass cleaner. Gently wipe the screen to remove residue. To avoid equipment damage, do not allow any liquids to drip down the touch screen where they could gather at the bottom of the display.

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Using the RAM Point-and-Click Window

The Remote Access Manager window is the user interface to the NAA I. Through this display, you can view the status of various test sets, view and change the configuration of any test set, start and stop numerous tests, and collect a variety of statistics about test set performance.

Navigating through the RAM screen is very similar to operating in a Windows environment, as you activate functions by pointing and clicking with the mouse.

To use the RAM point-and-click screen, utilizing the mouse, click once on the function you want to access.

IMPORTANT ➤
Some functions available on the ASA 312 are not available through the NAA I. Functions that are not available are either not included or grayed out on the RAM user interface screen. ◄

Screen Components

The main screen display is divided into several major areas called regions. Each region provides different information depending on the protocol processor in use. Each of the five protocol processors integrated into the ASA 312 and NAA I use the same operating interface and menu formats.

To differentiate the protocol processors, each protocol processor has a unique color associated with its menus:

- SONET (Gold)
- ATM (Green)
- DS1 (Dark Blue)
- DS3 (Purple)
- E1 (Gray)
- Medium blue is used for areas that are common to each of the protocol processors.

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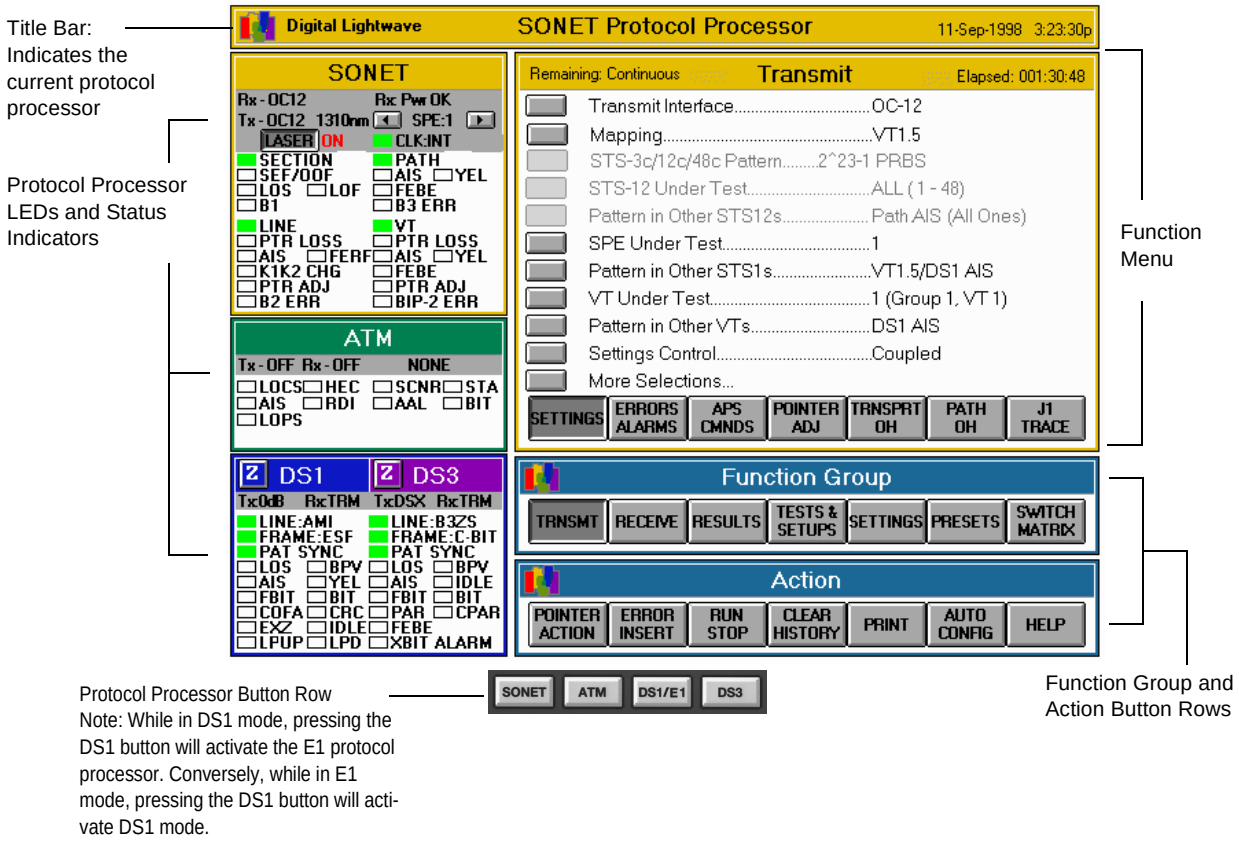


Figure 3-1. Touch Screen Components

Protocol Processor Title Bar

The protocol processor title bar is a horizontal bar located at the top row of the screen. The title bar contains the name of the protocol processor in use, the current date, and the current time. The protocol processor name appears in gold, green, blue, gray, or purple to give a quick visual indication of which protocol processor is currently in use.



Figure 3-2. SONET Protocol Processor Title Bar Shown

SONET LEDs and Status Indicators

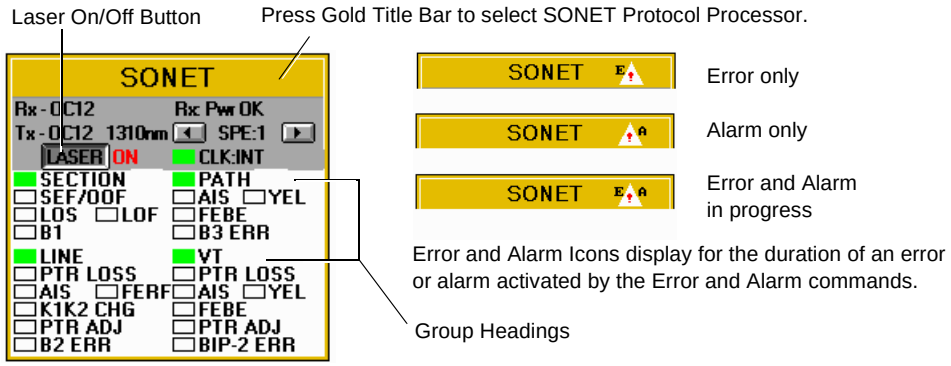
The SONET LEDs and Status Indicators are located in the upper left section of the screen.

The SONET title bar is gold. The gray area below it displays the current settings for various SONET and laser functions. The LEDs and Status Indicators are divided into five groups that designate errors and alarms for the Section, Line, Path, and Virtual Tributary (when configured for VT1.5 mapping), and Payload (when configured for STS-3c/Pattern or STS-12c/Pattern mapping).

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When an error or alarm occurs, one of these group headings will change color from green to red. The LED and Status Indicator text will stay red for the duration of the error or alarm. Once the error or alarm is cleared, using the Clear History action button, the Status Indicator returns to black text.

The LEDs and text change colors are listed in the following illustration. In addition to the LED status, an Error and Alarm icon also appears in the SONET title bar to indicate that error or alarm activity is active.



Green LED – Status Indicator; normal operating condition.
Clear LED and Black Text – Error/Alarm Indicator; normal operations, no errors or alarms.
Red LED and Red Text – Error or alarm is occurring.
Clear LED and Red Text – Error or alarm was detected, but is now cleared.
Error and/or Alarm Icon – Indicates that a generated error or alarm is currently in progress.

Figure 3-3. SONET LEDs and Status Indicators

The grayed section above the SONET LEDs and Status Indicators shows:

- The current settings for the SONET transmit and receive signals
- The current clock reference setting
- The laser status
- The current Synchronous Payload Envelope (SPE) selected for testing and monitoring

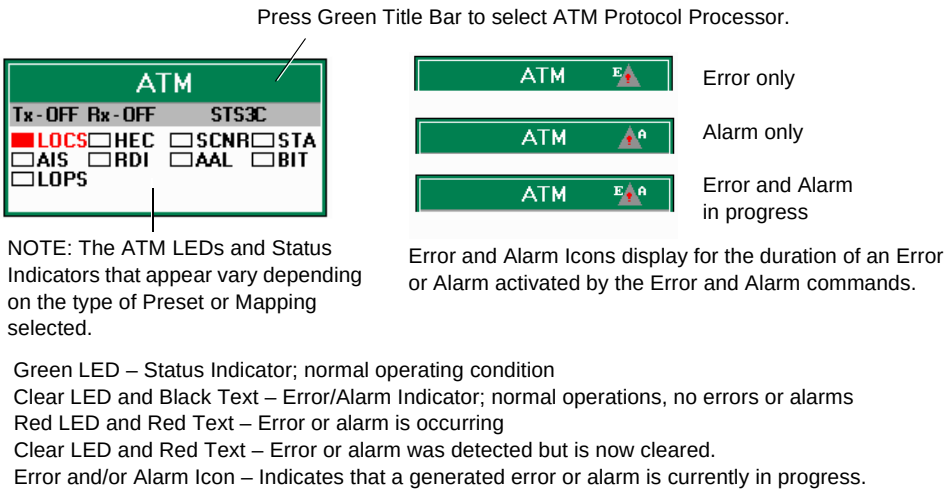
For more information about the SONET LEDs and Status Indicators, refer to chapter 4, *SONET Protocol Processor*.

ATM LEDs and Status Indicators

The ATM LEDs and Status Indicators appear below the SONET LEDs on the screen. The ATM title bar is green and the gray area below shows the current ATM transmit and receive status and the current ATM mapping.

If your unit is not licensed for ATM, then the ATM LEDs and Status Indicators do not appear.

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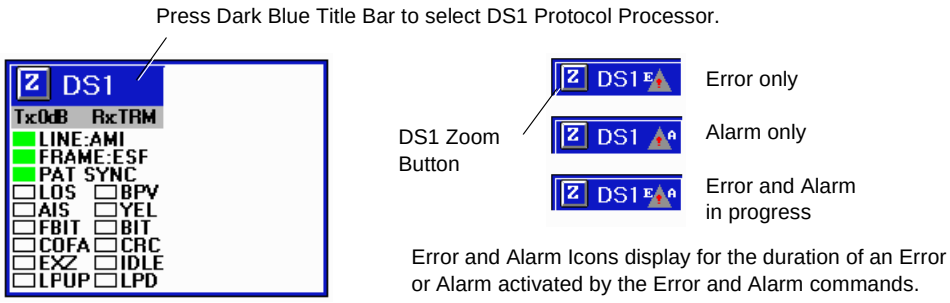
Green LED – Status Indicator; normal operating condition
Clear LED and Black Text – Error/Alarm Indicator; normal operations, no errors or alarms
Red LED and Red Text – Error or alarm is occurring
Clear LED and Red Text – Error or alarm was detected but is now cleared.
Error and/or Alarm Icon – Indicates that a generated error or alarm is currently in progress.

Figure 3-4. ATM Protocol Processor LEDs and Status Indicators

For more information about the ATM LEDs and Status Indicators, refer to chapter 7, *ATM Protocol Processor*.

DS1 LEDs and Status Indicators

The DS1 LEDs and Status Indicators are located in the lower left corner of the screen. The DS1 title bar is blue, and the gray area displays current settings for the DS1 transmit and receive signals.



Green LED – Status Indicator; normal operating condition
Clear LED and Black Text – Error/Alarm Indicator; normal operations, no errors or alarms
Red LED and Red Text – Error or alarm is occurring
Clear LED and Red Text – Error or alarm was detected but is now cleared.
Error and/or Alarm Icon – Indicates that a generated error or alarm is currently in progress.
DS1 Zoom Button – Activates the DS1 Zoom function.

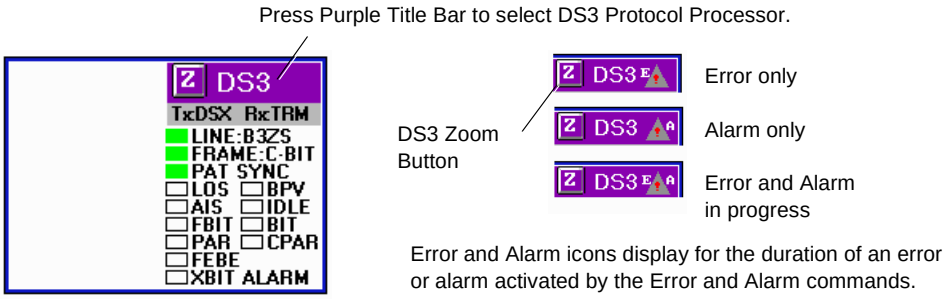
Figure 3-5. DS1 Protocol Processor LEDs and Status Indicators

For more information about the DS1 LEDs and Status Indicators, refer to chapter 5, *DS1 Protocol Processor*.

DS3 LEDs and Status Indicators

The DS3 LEDs and Status Indicators are located in the lower left corner of the screen. The DS3 title bar is purple and the gray area displays current settings for the DS3 transmit and receive signals.

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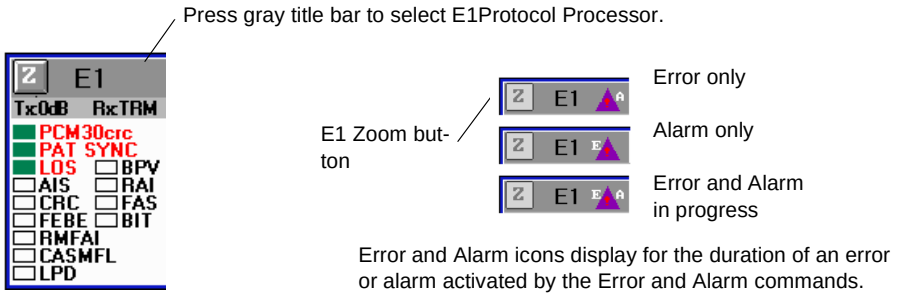
Green LED – Status Indicator; normal operating condition.
Clear LED and Black Text – Error/Alarm Indicator; normal operations, no errors or alarms.
Red LED and Red Text – Error or alarm is occurring.
Clear LED and Red Text – Error or alarm was detected, but is now cleared.
Error and/or Alarm Icon – Indicates that a generated error or alarm is currently in progress.
DS3 Zoom Button – Activates the DS3 Zoom function.

Figure 3-6. DS3 Protocol Processor LEDs and Status Indicators

For more information about the DS3 LEDs and Status Indicators, refer to chapter 6, *DS3 Protocol Processor*.

E1 LEDs and Status Indicators

The E1 LEDs and Status Indicators are located in the lower left corner of the screen. The E1 title bar is gray and the area below displays current settings for the E1 transmit and receive signals.



Green LED – Status Indicator; normal operating condition
Clear LED and Black Text – Error/Alarm Indicator; normal operations, no errors or alarms
Red LED and Red Text – Error or alarm is occurring
Clear LED and Red Text – Error or alarm was detected but is now cleared.
Error and/or Alarm Icon – Indicates that a generated error or alarm is currently in progress.
E1 Zoom Button – Activates the E1 Zoom function.

Figure 3-7. E1 Protocol Processor LEDs and Status Indicators

For more information about the E1 LEDs and Status Indicators, refer to chapter 8, *E1 Protocol Processor*.

Function Menu

The Function menu is located above the Function Group button row. The Function menu is viewed by selecting any of the Function Group buttons. This area displays the functions or commands associated with the currently selected protocol processor and Function Group button.

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The Function menu contains a title bar displaying the Function Group button that you selected. The title bar appears as gold, green, dark blue, gray, or purple depending on the protocol processor selected.

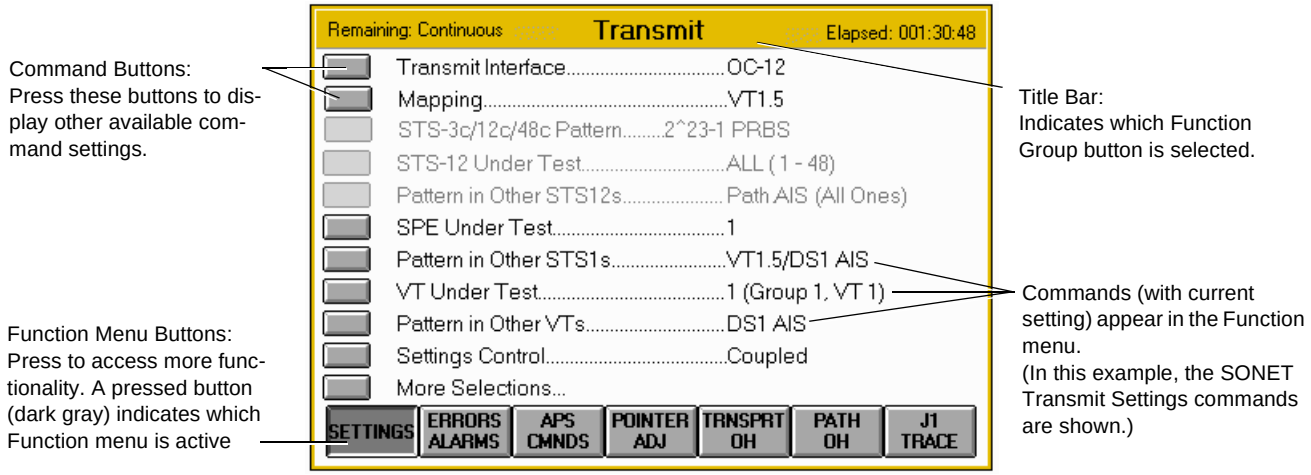


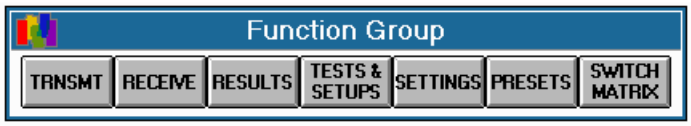
Figure 3-8. Function Menu with SONET Transmit Commands Shown

Function Group Button Row

The Function Group button row is located above the Action button row. The title bar is medium blue, indicating that it is applicable to all five protocol processors.

This row provides access to seven different functions and operations used by any five protocol processors. Pressing one of the first six buttons causes a Function menu to appear. Pressing the Switch Matrix button causes the Switch Matrix to appear. Due to the size of the Switch Matrix, the entire screen is used to display it.

The functionality of these buttons is described in more detail later in each protocol processor chapter.



SONET, DS1, and DS3 Function Group Button Row



ATM Function Group Button Row

Figure 3-9. Function Group Button Rows

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Action Button Row

The Action button row is located in the lower right section of the screen. The title bar and border are medium blue, indicating that these functions are applicable to all five protocol processors.



Figure 3-10. Action Button Row

The Action button row provides selections for seven actions that can be utilized during protocol processor operations. The following briefly describes these buttons:

Action Button	Description
Pointer Action	This button is only applicable for the SONET protocol processor. The Pointer Action button allows you to activate the pointer and increment or decrement its movement. Pointer parameters are configured using the Pointer Adj button located under the SONET Trnsmt Function Group button.
Error Insert	Generates an error for the selected protocol processor. The type of error inserted is determined by the Type of Error Added command located under the Errors Alarms button (for SONET, DS1, E1, and DS3) or the Errors button for ATM.
Run Stop	Turns ON or Off any protocol processor and stops and restarts any error or alarm test running on any protocol processors.
Clear History	Clears the status indicators on all protocol processors.
Print	Prints the current screen, event logs, and test results. Commands that control Printer operation are located under the Settings Function Group button.
Auto Config	Analyzes the signal received at the selected protocol processor and sets the receive parameters accordingly. If the Transmit and Receive are coupled, then the transmit parameters are set to match the received signal. If a test is being performed when the Auto Config option is selected, the test is stopped and all results are zeroed. A new test is then started.
Help	Displays the ASA 312 online help menu.

Refer to chapter 9, *Action Button Row* for more information on these buttons.

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Protocol Processor Button Row

The protocol processor button row is located in the lower center of the screen below the Action button row.

NOTE ➤
The protocol processor button row is not available for use with the NAA I. ◄

These buttons provide quick access to the SONET, ATM, DS1, E1, and DS3 protocol processors.



Figure 3-11. Protocol Processor Button Row

NOTE ➤
To begin operating any or all of the ASA 312 protocol processors simultaneously, you can either select one of the four test buttons from the Function Group button row or touch any of the four colored protocol processor title buttons. ◄

NOTE ➤
While in DS1 mode, you can activate the E1 protocol processor by selecting the DS1 button. Conversely, while in E1 mode, you can select the DS1 button to switch to DS1 mode. ◄

Injecting Errors and Viewing Error Counts for the SONET, DS1, E1, and DS3 Protocol Processors

The following procedures describe how to inject errors onto a SONET, DS1, E1, and DS3 protocol processor.

1. Select a protocol processor.

   Press either the protocol processor title bar or the Processor button from the protocol processor button row.

2. Press the Trnsmt Function Group button, and then press the Errors Alarms button.

   The Errors and Alarms commands display in the Function menu area.

3. Press the Type of Error Added command button, and select an error to transmit.

4. Press the Error Insertion Rate command button, and select an insertion rate.

   This allows you to enter the insertion rate that errors are transmitted. Once you select an error rate, errors insertion begins. The status can be observed with the LEDs for the specific protocol processor. The Error icon appears in the protocol processor's title bar indicating that errors are currently being transmitted.

   NOTE ➤
   To inject single errors, press the Error Insert button located in the Action button row. ◄

5. Press the Results Function Group button to observe the error count.

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While errors are continuously inserted at the selected rate, you can view error analysis using the Trouble Scan, Main Results, Error Analysis, or Graphs functions.

To clear the error count, press the Run Stop Action button and press the Restart button for the specific protocol processor.

6. To stop error transmission, set the Error Insertion Rate command to Off.

   Error transmission stops and the Error icon no longer appears in the protocol processor title bar.

Injecting Errors and Viewing Error Counts for the ATM Protocol Processor

The following procedures describe how to inject errors onto the ATM protocol processor.

1. Select the ATM protocol processor.

   Press either the ATM protocol processor title bar or the ATM processor button from the protocol processor button row.

2. Press the Functns button, and then press the Trnsmt button.

   The Errors commands appear in the Function Menu area.

3. Press the Type of ATM Error Added command button, and select an error to transmit.

4. Press the Error Insertion Rate command button, and select an insertion rate.

5. Press the Error Burst Count command button (if available), and select a burst count.

   NOTE ➤
   The Error Burst Count command is not available if the ASA 312 is configured to generate Bit errors or if it is configured for ATM/DS1 or ATM/DS3 mapping. ◄

6. Press the Duration of Error Insertion command and select how long the error is transmitted.

   After setting the error parameters, errors are continuously inserted at the selected rate for the selected duration. The status can be observed with the LEDs for the specific protocol processor. The Error Icon appears in the protocol processor's title bar indicating that errors are currently being transmitted.

   NOTE ➤
   If you want to inject single errors, press the Error Insert button located in the Action button row. For DS1 ATM and DS3 ATM mapping, the Error Insert button is available only for Bit Errors. ◄

7. Press the Results Function Group button to observe the error count.

   While errors are inserted at the selected rate, you can view error analysis using the Trouble Scan, Main Results, Error Analysis, or Graphs functions.

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To clear error counts, select the Run Stop Action button and press the Restart button for the ATM protocol processor.

8. To stop error transmission, set the Error Insertion Rate command to Off, or set the Duration of Error Insertion command to Off.

   Error transmission stops and the Error Icon no longer appears in the protocol processor title bar.

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4 SONET Protocol Processor

Overview

This chapter describes the LEDs that report activity and the user interface and commands that control the SONET protocol processor.

Introducing the SONET User Interface

The SONET User Interface presents the commands, buttons, and LEDs that you use to control the SONET protocol processor. The SONET user interface consists of the following elements:

- SONET LEDs and Status Indicators
- SONET Function Menu
- Function Group and Action button rows

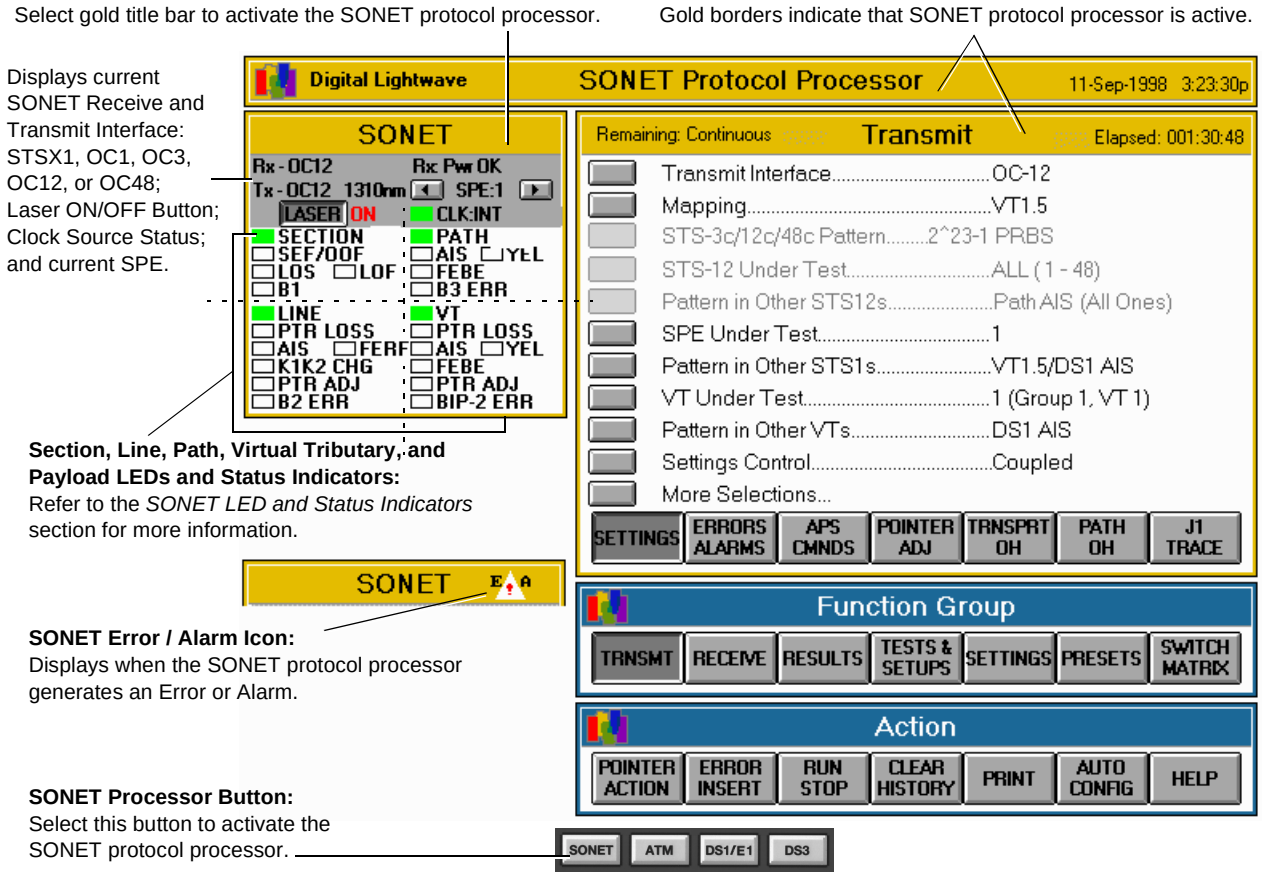


Figure 4-1. Typical SONET Protocol Processor Screen

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SONET LEDs and Status Indicators

The SONET Processor Alarm and Status Indicators area serves the following purposes:

- Powers on and off the laser using the Laser button
- Provides a visual status of the SONET activity on the Section layer, Line layer, Path layer, and Virtual Tributary
- Displays the settings of the SONET Transmit and Receive interfaces
- Provides access to the SONET protocol processor by selecting the gold border of this area.

The SONET Processor Alarm and Status Indicators are described in the following table.

SONET Interface and Laser Indicators

The following describes the SONET interface and laser control indicators.

Indicator	Description
Rx	Displays the value of the SONET Receive Interface Signal. This appears as OC-48, OC-12, OC-3, OC-1 or STSX-1. The Receive Interface command is located under the Settings Function of the Receive Function Group button.
Tx	Displays the value of the SONET Transmit Interface Signal. This appears as OC-48, OC-12, OC-3, OC-1 or STSX-1. The Transmit Interface command is located under the Settings function of the Trnsmt Function Group button.
Laser	Indicates laser status. Select the Laser button to power the laser on or off. The current Laser type appears as 1310 nm or 1550 nm. If your unit is configured for dual lasers, use the Laser Type command, located under the Misc function of the Settings Function Group button, to change laser settings.
Rx: Pwr	Indicates the laser's receive power status. The following values appear: Pwr OK or Pwr Loss
◀ SPE: ▶	SPE Under Test Scroll Buttons: Provides a shortcut to the SPE Under Test command and also indicates the current SPE selected for testing and monitoring. Use ◀ and ▶ to scroll through the SPE range. The SPE Scroll buttons are disabled for OC-1, STSX-1, and the following concatenated mappings: STS-12c, ATM/STS-3c, ATM/STS-12c, and STS-3c mapped OC-3.

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Indicator	Description
CLK:	Displays the Clock Reference setting. The following values can appear: Int (Internal), BITS, BITS (Int), Loop, or Loop (Int). The Clock Reference command is located under the Settings function of the Trnsmt Function Group button.

SONET Section Alarm and Status Indicators

The following describes the SONET Section Alarm and Status Indicators.

Indicator	Description
Section	Indicates the condition of the Section Alarm and Status Indicators
SEF / OOF	Severely Errored Framing/Out of Frame: Indicates that a Section SEF/OOF event occurred.
LOS	Loss of Signal: Indicates that an alarm signal was generated due to a lack of signal.
LOF	Loss of Frame: Indicates that an alarm signal was generated due to a frame alignment problem.
B1	Section B1 Errors
BPV	Bipolar Violation: Indicates a bipolar violation error was received. This indicator appears only when the SONET Receive Interface is set to STSX-1.

SONET Line Alarm and Status Indicators

The following describes the Line LEDs

Indicator	Description
LINE	Indicates the condition of the Line Alarm and Status Indicators.
PTR Loss	Loss of Pointer Alarm
AIS	Alarm Indication Signal: Indicates an Alarm Indication Signal occurred on the Line layer.
FERF	Far-end Receive Failure: Indicates that a FERF occurred on the Line layer. This is also known as a Remote Defect Indicator (RDI).
K1K2 CHG	Indicates a change in the received K1 or K2 bytes.
PTR ADJ	Indicates an increase or decrease in the Pointer value.
B2 ERR	Line B2 Error

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SONET Path Alarm and Status Indicators

The following describes the Path LEDs.

Indicator	Description
Path	Indicates the condition of the Path Alarm and Status Indicators.
AIS	Alarm Indication Signal: Indicates an Alarm Indication Signal occurred on the Path Layer.
YEL	Yellow Alarm: This is also known as a Remote Alarm Indicator (RAI).
FEBE	Far-end Block Error: A FEBE occurred on the VT layer.
B3 ERR	Path B3 Error

Virtual Tributary Alarm and Status Indicators

The following describes the VT LEDs. These LEDs appear only when the unit is configured for VT1.5 mapping:

Indicator	Description
VT	Virtual Tributary status
PTR LOSS	Loss of Pointer alarm on Virtual Tributary
AIS	Alarm Indication Signal: Indicates an AIS occurred on the Virtual Tributary.
FEBE	Far-end Block Error: FEBE occurred on the Path layer.
PTR ADJ	Indicates an increase or decrease in the Pointer value.
BIP-2 ERR	Virtual Tributary BIP-2 errors

Payload Alarm and Status Indicators

The following describes the Payload LEDs. These LEDs appear only when the unit is configured for STS-3c/Pattern or STS-12c/Pattern mapping:

Indicator	Description
PAT SYNC	Indicates a loss of pattern synchronization.
BIT	Indicates a Bit error was in the payload

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Configuring the ASA 312 and NAA I for SONET Operation

The ASA 312 and NAA I can be quickly configured for SONET operation using the Presets Function Group button.There are several SONET preset configurations available.

The following example describes how to configure the ASA 312 and NAA I for SONET with DS3 Drop and Insert mapping. It is assumed that the unit is looped (its transmit and receive ports are connected using a single cable) and configured for OC-12 operation.

1. Select the Presets button located in the Function Group button row.

   The Presets command box appears.

2. Select the SON DS3 D/I command button. (This drops a DS3 into a SONET data stream.)

   The message Processing...Please wait appears.

3. If the SONET protocol processor is not displayed in the function menu area, press the SONET protocol processor title bar.

   The SONET Function menu appears. Select the Trnsmt Function Group button, and if necessary, make any changes to the Settings commands required for your application.

   Select the Receive Function Group Button and make any changes necessary to the SONET Receive Settings commands.

4. Select the DS3 protocol processor.

5. If necessary, press the Trnsmt Function group button and make the appropriate changes to the DS3 protocol processor.

6. If necessary, press the Receive Function Group button and make the appropriate changes to the DS3 protocol processor.

7. Turn the Laser ON.

   If the Laser is not ON, then press the Laser button. The button is pushed in, and the Laser status displays as ON.

8. Verify that the SONET and DS3 LEDs are green or clear.

   If LEDs are red, press the Results Function Group button to view details of any active errors or alarms. If necessary, make the appropriate changes to either the SONET or DS3 protocol processor commands.

9. Select the Run Stop Action button.

   The Run/Stop Menu appears.

10. Select the Restart button under the SONET group.

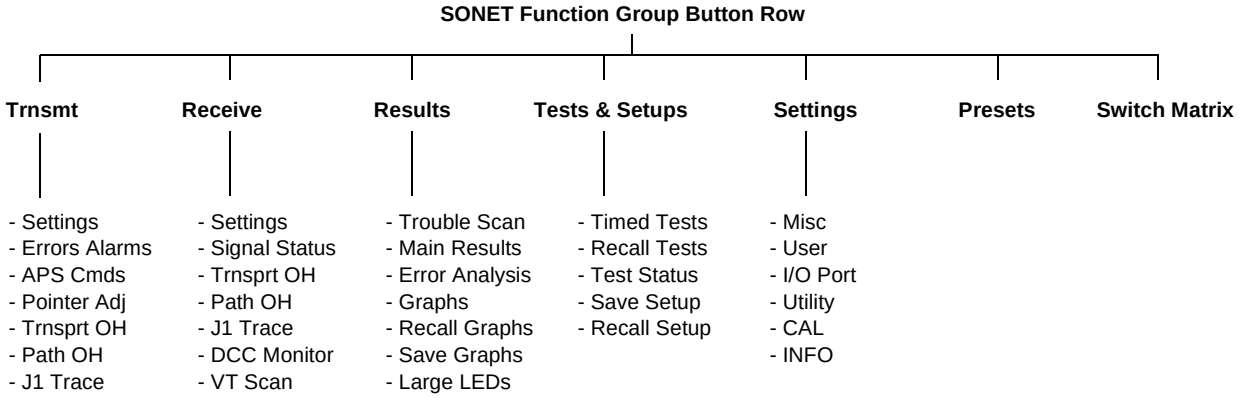
    All counters are cleared and the LED and Status Indicators are updated for the SONET and DS3 protocol processors.

The ASA 312 and NAA I are configured for SONET DS3 Drop and Insert mapping. If your application requires customized configuration, then use the Switch Matrix to create specific mapping and configuration settings.

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SONET Protocol Processor Function Group Buttons

The functionality available for the SONET protocol processor appears by selecting any of the following buttons from the Function Group button row:



The remainder of this chapter describes the functions, commands, and options associated with these Function Group buttons illustrated above.

Trnsmt Function Group

The Trnsmt (Transmit) Function Group button contains a variety of commands and options that allow you to control the transmit parameters for a SONET signal. The functionality allows you to control (adjust) specific overhead bytes and to verify if your SONET facility can detect problems and adjust accordingly. In addition, it allows you to inject errors and alarms to verify if your SONET facility is capable of detecting and responding to these conditions.

The following buttons make up the Transmit Function Group:

- **Settings:** Configures the unit's transmit parameters for your SONET test environment.
- **Errors and Alarms:** Generates errors and alarms on your SONET facility.
- **APS Commands:** Allows you to alter the K1 and K2 bytes so that the SONET facility is forced to Automatic Protection Switching.
- **Pointer Adjustment:** Allows you to manipulate the SONET pointer to stress your SONET facility to verify if it can detect pointer variance.
- **Transport Overhead:** Allows the Section and Line Overhead bytes to be manipulated to determine if the SONET facility can detect problems due to Section and Line Overhead byte errors.
- **Path Overhead:** Allows Path Overhead bytes to be configured to determine if the SONET facility can detect tolerance errors.
- **J1 Trace:** Allows you to edit and select a trace message to verify if various pieces of equipment can transmit and can receive the programmed message.

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Settings

The Settings button configures the transmit parameters of the ASA 312 and NAA I to match the SONET signal used in your test environment.

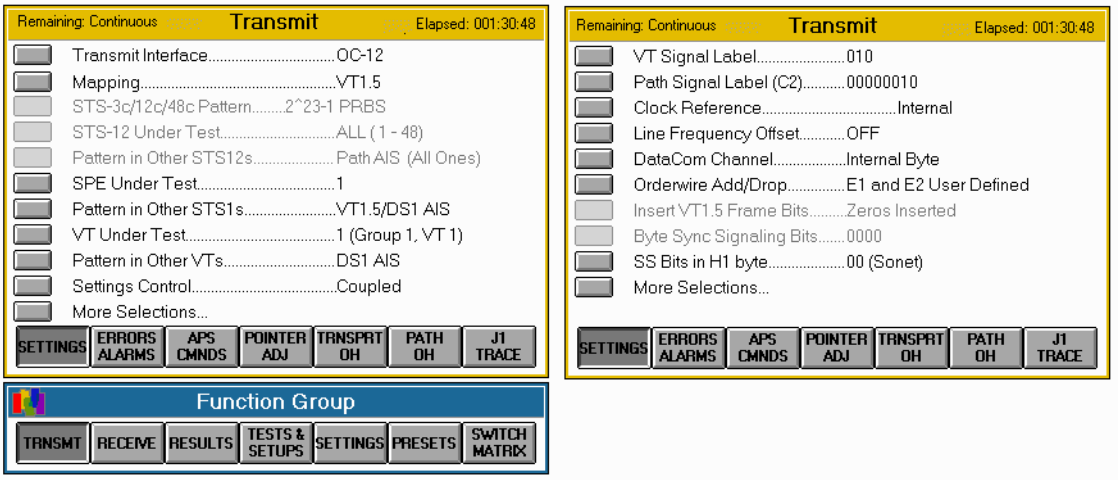


Figure 4-2. Transmit Settings Commands

The following section describes the Transmit Settings commands.

Transmit Interface

Selects a SONET transmit interface.

NOTE ➤
The Transmit Interface can be coupled to the Receive Interface or set independently of the Receive Interface. If coupled, any changes made to the Transmit Interface command are automatically made to the Receive Interface command. The current Transmit and Receive settings display as the Tx and Rx values in the SONET Alarm and Status Indicator area. ◄

The following options are available for this command:

Option	Description
OC-48	Configures the Transmit Interface for OC-48 operation. This option is available only if the OC-48 option is installed in the ASA 312 or NAA I. For OC-48 mode, the Transmit Interface and Receive Interface commands are automatically coupled.
OC-12	Configures the Transmit Interface for OC-12 operation.
OC-3	Configures the Transmit Interface for OC-3 operation.
OC-1	Configures the Transmit Interface for OC-1 operation.
STSX-1	Configures the Transmit Interface for the electrical equivalent of OC-1 rates.

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NOTE ➤
If your ASA 312 is an OC-48E model (ASA-PKG-OC48E), then the OC-12, OC-3, and OC-1 options are disabled (appear as gray text). The options available are OC-48 and STSX-1. ◄

Configuring the SONET Signal.
To configure the SONET signal:

1. Select the Transmit Interface command.
2. Select a Transmit Interface value. After selecting a value, the system immediately reconfigures the SONET protocol processor for the new interface.

Mapping

Selects the type of SONET mapping used by the SONET protocol processor. Use this command, in conjuction with the Transmit Interface and Receive Interface commands, to configure SONET Mapping.

The Mapping command is automatically coupled between the Transmit and Receive settings. Any changes made to this command are also made to the Receive Transmit Mapping command regardless of the value of the Settings Control command discussed later in this section.

The following options are available:

Option	Description
VT1.5	Configures SONET for Async VT1.5 mapping.
Byte Sync	Configures SONET for Byte Sync VT1.5 mapping. Byte sync mapping allows direct access to the 24 DS0 channels of a DS1 that is mapped into a VT1.5.
DS3	Configures SONET for DS3 mapping.
STSX-1 Drop/Insert	Connects the STSX-1 Drop and Insert line interface to the SONET protocol processor.
STS-3c/Pattern	Maps an STS-3c pattern into an OC-3 interface. The Transmit Interface command must be set to OC-3, OC-12, or OC-48 for this option to be available.
STS-12c/Pattern	Maps an STS-12c pattern into an OC-12 interface. The Transmit Interface command must be set to OC-12 or OC-48 for this option to be available.
STS-48c/Pattern	Maps an STS-48c pattern into an OC-48 interface. The Transmit Interface command must be set to OC-48 for this option to be available.
ATM	Configures SONET for ATM mapping.

Configuring SONET Mapping and Signals.
To configure SONET mapping and signaling:

1. Select the Mapping command.
2. Select a Mapping value.
3. Select the Transmit Interface command.
4. Select an Interface value.

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STS-3c/12c/48cPattern Selects the type of test pattern to send over an STS-3c, STS-12c, or STS-48c.

NOTE ➤
This command is available only if the Mapping command is set to STS-3c/Pattern, STS-12c/Pattern, or STS-48c/Pattern. ◄

The following options are available for this command.

NOTE ➤
If a PRBS pattern is selected when mapped for OC-48c operation, then the Intrusive Thru Mode option, for the STS-12 Under Test command, is not available. ◄

Option	Description
2^15-1 PRBS	Transmits a 2^15-1 PRBS pattern. This option is available only when the Mapping command is set to STS-48c/Pattern.
2^15-1 Inverted	Transmits an inverted 2^15-1 PRBS pattern. This option is available only when the Mapping command is set to STS-48c/Pattern.
2^23-1 PRBS	Transmits a 2^23-1 PRBS pattern.
2^23-1 Inverted	Transmits an inverted 2^23-1 PRBS pattern.
2^31-1 PRBS	Transmits a 2^31-1 PRBS pattern. This option is available only when the Mapping command is set to STS-48c/Pattern.
2^31-1 Inverted	Transmits an inverted 2^31-1 PRBS pattern. This option is available only when the Mapping command is set to STS-48c/Pattern.
All Zeros	Transmits an All Zeros pattern.
All Ones	Transmits an All Ones pattern.
8-Bit User	Continuously transmits an 8-bit user defined pattern. The pattern is entered using the keypad. This option is available only when the Mapping command is set to STS-48c/Pattern.

STS-12 Under Test Selects a specific STS-12 signal as the foreground (or source) channel in the STS-48 signal.

NOTE ➤
This command is available if the OC-48 hardware option is installed and the unit is configured for OC-48 operation. ◄

On the Transmit side, the unit multiplexes four STS-12 signals into a single STS-48 signal. Using this command, you have the option of:

– Selecting one of the four STS-12 signals to transmit alarms, errors, and patterns based on the type of mapping used, or

– Broadcasting the foreground channel's parameters across all four STS-12 signals.

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The following options are available for this command:

Option	Description
None	No specific STS-12 is selected. Instead, the pattern chosen by the Pattern in Other STS12s command is sent across all four STS-12s.
Group 1 (1-12)	Selects STS-12 #1 (SPEs 1–12) to transmit as the foreground, or source, channel.
Group 2 (13-24)	Selects STS-12 #2 (SPEs 13–24) as the source channel for transmission.
Group 3 (25-36)	Selects STS-12 #3 (SPEs 25–36) as the source channel for transmission.
Group 4 (37-48)	Selects STS-12 #4 (SPEs 37–48) as the source channel for transmission.
All (1-48)	Transmits the foreground channel across all four STS-12.
Intrusive Thru Mode	Allows an incoming OC-48 signal to pass through the unit without altering the data. The Transport Overhead bytes can be overwritten when using the APS Cmds and Trnsprt OH buttons in conjunction with the Transport Overhead byte buttons that appear in the Errors Alarms Function Menu. Refer to the Errors and Alarms section for more information. NOTE: This option is not available if: – the unit is configured for OC-48c operation, and – a PRBS pattern is selected using the STS-3c/12c/48c Pattern command.
Generated STS-48c	Transmits a single STS-48c signal. This option appears only when the Mapping command is set to STS-48c/Pattern.

Pattern In Other STS12s Selects the pattern used by the three STS-12 background channels.

NOTE ➤
This command is available if the OC-48 hardware option is installed and the unit is configured for OC-48 operation.

In addition, this command is not available if the STS-12 Under Test command is configured for All (1-48). ◄

Option	Description
Path AIS (All Ones)	STS Path Alarm Indication Signal. Inserts an All Ones pattern over the Path layer. This causes a Loss of Pointer alarm for the Virtual Tributary.
Path Unequipped (All Zeros)	Path Unequipped Alarm. Inserts an All Zeros pattern over the Path layer and sets the C2 byte to 00000000.

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SPE Under Test

The Synchronous Payload Envelope (SPE) is a significant part of a SONET frame. (A SONET frame consists of the Transport Overhead and the SPE.)

This command selects a specific frame from an OC-3 or OC-12 signal for monitoring and testing. This allows you to view and monitor errors and alarms that occur in this frame. The following options are available for this command.

NOTE ➤
For STSX-1 or OC-1 interface, this command is not available. ◄

Option	Description
SPEs 1-3	For OC-3 interface, SPEs 1 through 3 can be individually selected.
SPE 1-4	SPEs 1-4 can be selected if the Transmit Interface command is set to OC-12 and the Mapping command is set to STS-3c/Pattern.
SPEs 1-12	For OC-12 interface, SPEs 1 through 12 can be individually selected.
ALL	Selects all available SPEs.

An alternative to using this command to select an SPE using the SPE scroll buttons. The SPE scroll buttons appear in the SONET Alarm and Status area.

Using the SPE Scroll Buttons.
To use the SPE Scroll buttons:

1. Configure the SONET Receive Interface for OC-3 or OC-12.

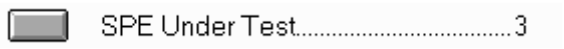
   NOTE ➤
   The SPE Scroll buttons are disabled for OC-1, STSX-1, and the following concatenated mappings: STS-12c, ATM/STS-3c, ATM/STS-12c, and STS-3c mapped OC-3. ◄

2. Select ◄ to scroll down the SPE list or ► to scroll up the SPE list.

   NOTE ➤
   For OC-3, the scroll range is SPEs 1–3.
   For OC-12, the scroll range is SPEs 1–12.
   For STS-3c mapped OC-12, the scroll range is SPEs 1–4. ◄



As the SPE changes in the SONET LED area, the value for the SONET SPE Under Test command changes, and the SONET Elapsed Time counter resets to 0.



NOTE ➤
When the SONET Transmit Interface and Receive Interface commands match (for example, Tx = OC12 and Rx = OC12), the SPE scroll range value also indicates the setting of the SPE Under Test commands.

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However, if the Transmit Interface and Receive Interface commands are different:

- The SPE scroll value indicates the Receive SPE Under Test command's value.
- The Transmit SPE Under Test command's value does not change when the scroll buttons are pressed. ◄

Pattern in Other STS1s

Configures the pattern used for an STS-1 on OC-3 and OC-12 interfaces. (This pattern is transmitted in other STS-1s besides the STS-1 that is selected by the SPE Under Test command.) The following options are available for this command:

Option	Description
VT1.5/DS1AIS	Sends a DS1 AIS alarm over all 28 VT1.5s in each STS-1.
DS3 Mapped Idle	Sends an Idle alarm over a DS3 signal.

VT Under Test

A VT1.5 contains 28 virtual tributaries. This command selects an individual virtual tributary (1–28) or all 28 virtual tributaries for testing and monitoring. The following options are available.

NOTE ➤
This command is available only for VT1.5 Mapping.◄

Option	Description
1 (Group 1, VT1) through 28 (Group 7, VT4)	Selects a specific virtual tributary for testing and monitoring.
All	Selects all 28 virtual tributaries
None	No virtual tributaries are selected.

Pattern in Other VTs

Determines what other patterns can be transmitted or received for other virtual tributaries besides the virtual tributary selected by the Selected VT command. The following options are available:

NOTE ➤
This command is not available (appears gray) if the Selected VT command is set to ALL. ◄

Option	Description
DS1 AIS	Sends an AIS alarm over a DS1 signal.
Numbered	Sends a number pattern over a DS1 signal.

Settings Control

Combines the Transmit Settings and Receive Settings so that any changes made to the Transmit Interface are copied to the equivalent Receive interface command. The following options are available:

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Option	Description
Coupled	Combines the Transmit and Receive settings so that command changes made on the Transmit side are automatically copied on the Receive side. For example, if the Transmit Interface command is changed to OC-12, then the Receive Interface is changed to OC-12.
Independent	Changes made to Transmit commands are not copied to the equivalent Receive commands.

More Selections

This command displays a second page that contains additional Transmit Settings commands.

VT Signal Label

The VT Signal Label is part of the virtual path overhead and is used to describe the content of the virtual tributary. It selects the Overhead payload for the selected VT. The following options are available for this command.

NOTE ➤
This command is available only for VT1.5 Mapping. ◄

This command selects the overhead payload for the Selected VT. The following options are available:

Option	Description
000	Unequipped
001	Equipped
010	Async mapping for DS1
011	Bit-synchronous mapping for DS1
100	Byte-synchronous mapping for DS1
101	Undefined
110	Payload Defect Indication
111	Undefined

Path Signal Label (C2)

The Path Signal Label is part of the STS Path Overhead and identifies the type of traffic contained in the SPE. The following options are available for this command.

NOTE ➤
This command defaults to the setting used by the User Defined option. When SONET mapping changes, the User Defined value also changes to a setting that is appropriate for that particular mapping. ◄

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Option	Description
Equipped (00000001)	The C2 byte is set to 00000001.
Unequipped (00000000)	The C2 byte is set to 00000000.
User Defined	Allows you to enter an 8-bit Path Signal label. The default value of this option varies depending on the current SONET mapping. For example, the SONET DS3 D/I Preset sets the C2 byte to 00000100.

Clock Reference

Determines the timing source for the SONET Transmit signal. The following options are available:

Option	Description
Internal	Derives the transmit data's timing source from the system's internal clock. The Clock value appears as CLK:INT.
BITS	Synchronizes the transmitted signal to the BITS (Building Integrated Timing Supply) clock input. If this option is selected, but BITS clocking is not available, then this command defaults to Internal. When this occurs, the Clock Value displays as CLK:BITS(INT).
Looped (Rx SONET)	Derives the transmit timing source from the clock signal on the SONET Receive interface. If this option is selected, but a signal is not available, then this command defaults to Internal. When this occurs, the Clock Value displays as CLK:LOOP(INT).

Line Frequency Offset

Adjusts the offset of the signal frequency of the transmitted SONET signal. The frequency can be adjusted in pulses per million (PPM). The following options are available for this command:

Option	Description
Off	The frequency cannot be adjusted.
Edit	Adjusts the signal frequency in pulses per million (PPM) using the + and - arrow keys to the 00.0 decimal place. The frequency offset ranges from -99.9 to 99.9. (For OC-48, the range is from -40.0 to 40.0.) The default value is 00.0. Once you have entered an offset value, you must press the Confirm button for it to be accepted.

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DataCom Channel

The DataCom Channel (DCC) defines specific bytes in both the Line layer (bytes D4 through D12) and the Section layer (bytes D1 through D3) overhead that is used for sending Operations and Maintenance (OAM) information between the attached Line and Section equipment. This command allows you to select which bytes transmit OAM information.

NOTE ➤
DataCom Channel activity can be viewed using the DCC Monitor function located under the SONET Receive Function Group button.

In addition, this command is automatically coupled. Any changes made to the Transmit settings are automatically made to the Receive settings. The value of the Settings Control command is ignored. ◄

The following options are available for this command:

Option	Description
Section Drop/Insert	Transmits and loops Section layer bytes (D1, D2, and D3). Bytes are dropped and inserted via the DataCom Connector.
Section PRBS Test	Transmits and loops a Pseudorandom Bit Sequence pattern.
Line Drop/Insert	Transmits and loops Line layer bytes (D4 through D12). Bytes are dropped and inserted via the DataCom Connector.
Line PRBS Test	Transmits and loops a PRBS pattern.
Internal Byte	Transmits and loops internally generated bytes which can be changed using the Transport Overhead function.

Orderwire Add/Drop

In ASA 312, this command allows you to add or drop an orderwire circuit. (The E1 and E2 bytes can be changed using the Transport Overhead function described later in this chapter.) The following options are available for this command:

Option	Description
E1 Handset, E2 User Defined	The E2 byte is user configured.
E1 User Defined, E2 Handset	The E1 byte is user configured.
E1 and E2 User Defined	Both the E1 and E2 bytes are user configured.

NOTE ➤
This function is not available for use with the NAA I.◄

Insert VT1.5 Frame Bits

In the ASA 312, this command determines if the current value of the DS1 Frame bit is used or if the DS1 Frame bit is set to zero. It is available only for Byte Sync mapping.

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A VT1.5 contains the V5, J2, Z6, and Z7 VT Path Overhead bytes. The byte that immediately follows the VT Path OH byte is the Phase byte. It contains Phase Indicator bits, Signaling bits, a DS1 Frame bit, and a Fixed Stuff bit. These bits are specific to byte sync operation.

The following options are available for this command:

Option	Description
Insert Signal Framing Bits	The Phase byte uses the DS1 Frame bit. When this option is selected, the command value appears as **FBIT Inserted**. The Insert Signal Framing Bits option is the default setting for Byte Sync mapping.
Insert Zeros	The Phase byte inserts a zero as the DS1 Frame bit. Some byte sync applications require that the Frame bit be set to zero. When this option is selected, the command value appears as **Zeros Inserted**.

NOTE ➤
This function is not available for use with the NAA I.◄

Byte Sync Signaling Bits Configures the Channel Signaling Bits (A, B, C, and D) of the DS1 frame that is mapped into a VT1.5. It is available only for Byte Sync mapping.

NOTE ➤
When using an ASA 312 to transmit a VT1.5 payload, this command allows you to enter a known value for the DS1 signaling bits.◄

When using an ASA 312 to receive a VT1.5 payload, you can view the incoming signaling bits to verify if they match the transmitted signaling bits. To view the incoming signaling bits, use the DS0 button which is located under the DS1 Receive Function Group.◄

The following signaling bits are available for this command:

0000	1000
0001	1001
0010	1010
0011	1011
0100	1100
0101	1101
0110	1110
0111	1111

NOTE ➤
This function is not available for use with the NAA I.◄

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SS Bits in H1 Byte

This command allows bits 5 and 6 (the SS bits) of the H1 Pointer Byte to be set to support a SONET or SDH Transport Overhead. Manipulation of the Transport Overhead allows you to stress a SONET network by simulating errors, alarms, and other stress conditions.

The following options are available for this command.

NOTE ➤
Use the Trnsprt OH button to view changes made to the SS bits. ◄

Option	Description
00 (SONET)	Sets bits 5 and 6 of the H1 Pointer byte to 0 (****00**). This indicates that the H1 byte is configured for SONET operation. This option is the default setting.
01 (Undefined)	Sets bit 5 to 0 and bit 6 to 1 (****01**).
10 (SDH)	Sets bit 5 to 1 and bit 6 to 0 (****10**). This indicates that the H1 byte is configured for SDH operation.
11 (Undefined)	Sets bits 5 and 6 of the H1 Pointer byte to 1 (****11**).

Errors and Alarms

The Errors and Alarms button allows you to select and generate errors and alarms transmitted by the SONET protocol processor. With this functionality, you can specify whether errors or alarms are sent over the SONET Section layer, Line layer, Path layer or Virtual Tributary.

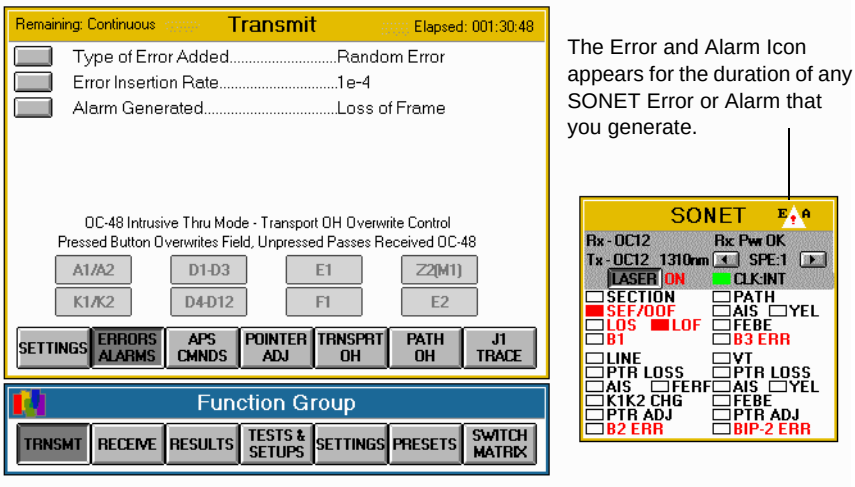


Figure 4-3. Errors Alarms Function Menu

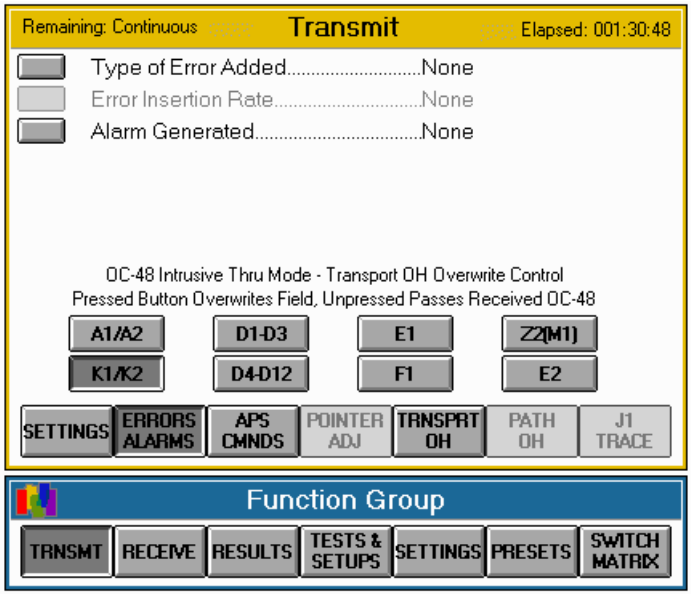
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Using the Errors and Alarms Button.
To insert an error:

1. Select an error from the Type of Error Added command.
2. Select an insertion rate with the Error Insertion Rate command.

Using the Errors and Alarms Button for Intrusive Thru Mode.
Intrusive Thru Mode is an option available for OC-48 operation. It allows an OC-48 signal to pass through the system. The data within the signal is unaltered; however, the Transport Overhead bytes (A1/A2, K1/K2, D1–D3, D4–D12, E1, F1, M1, and E2) can be changed to simulate errors, alarms, and other stress conditions such as Pointer Adjustments. This allows you to verify if equipment in the SONET network detects changed Transport Overhead bytes.

When configured for Intrusive Thru Mode, the Errors Alarms Function menu provides access to the Transport Overhead bytes. In addition, the Pointer Adj, Path OH, and J1 Trace buttons are disabled as illustrated in the following figure.



Overhead bytes are enabled for Intrusive Thru Mode.

Figure 4-4. Errors Alarms Function Menu with Intrusive Thru Mode

To change Transport Overhead bytes:

1. Select the Trnsprt OH button. The Transport Overhead bytes appear.
2. Select a byte and edit its 8-bit pattern.
3. Select the Errors Alarms button.
4. Select the Transport Overhead byte to transmit the new byte pattern.

   For more information about Transport Overhead bytes, refer to the *Trnsprt OH* section discussed later in this chapter.

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To change K1 and K2 bytes using the APS Cmds button: 1.

1. Select the APS Cmds button. The K1 and K2 bytes appear.
2. Edit the K1 and K2 bytes.
3. Select the Errors Alarms button.
4. Select the K1/K2 button to transmit the new bytes.
5. For more information about K1 and K2 bytes, refer to the *APS Commands* section discussed later in this chapter.

The following describes the commands and options associated with the Errors Alarms button.

Type of Error Added

Determines the type of error that is transmitted by the SONET protocol processor. Often these errors are used by the receiving equipment to determine if a transmission error has occurred.

The following options are available:

NOTE ➤
Use the Error Insert Action button to inject single errors into the SONET transmit signal. When this occurs, the appropriate error LED flashes red, and the error is recorded by various functions in the Results Function Group button. ◄

Option	Description
None	No Errors are selected. (Default)
Random Error	Generates random errors over the Section, Line, and Path layers and Virtual Tributaries. This type of error is available only when the SONET Transmit Interface is configured for OC-3 or OC-12. It is not available for Intrusive Thru Mode.
Section B1	Generates a B1 error over the Section layer. A B1 error is a BIP-8 (Bit Interleaved Parity-8 bit) error. It performs error monitoring by running an even parity check on the previous SONET frame. NOTE: When an ASA 312 is configured for Intrusive Thru Mode, received B1 errors are recorded by the Results function, but are not retransmitted out of the unit.
Line B2	Generates a B2 error over the Line layer. A B2 error is a BIP-8 error (times N, where N is the number of SPEs) over all of the previous SONET frames, but excluding the Section Overhead bytes. NOTE: When an ASA 312 is configured for Intrusive Thru Mode, received B2 errors are recorded by the Results function, but are not retransmitted out of the unit.

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Option	Description
Line FEBE	Generates a Far End Block Error over the Line layer. This error is also known as a Remote Error Indication (REI). This type of error is available only when the SONET Transmit Interface is configured for OC-3, OC-12, or OC-48.
STS-Path B3	Generates a B3 error over the Path layer. This option is not available for Intrusive Thru Mode.
STS-Path FEBE	Generates a FEBE error over the Path layer.This option is not available for Intrusive Thru Mode.
VT Random	Generates random errors over a Virtual Tributary.This option is not available for Intrusive Thru Mode.
VT BIP-2	Generates a BIP-2 error over a Virtual Tributary.This option is not available for Intrusive Thru Mode.
VT Path FEBE	Generates a FEBE error over a Virtual Tributary.This option is not available for Intrusive Thru Mode.
Payload	Generates a BIT error in the payload. This option is available for STS-3c/Pattern and STS-12c/Pattern mapping.This option is not available for Intrusive Thru Mode.

Error Insertion Rate

Sets the insertion rate for SONET transmit errors. This command is only available when an error type is selected using the Type of Error Added command.

The following options are available for this command:

Options	Description
Off	No errors are inserted for transmission. (The value displayed for this command is None.)
1e-*X*, where *X* is a value from 4 through 9	For VT Random, VT BIP-2, and VT Path Errors, error rates range from 1e-3 through 1e-9.
User Defined	Allows you to enter an error insertion rate.

The following table lists the range of valid User Defined error rates for OC-3, OC-12, and OC-48 SONET interfaces. The User Defined error rates for OC-1 and STS-1 SONET interfaces are identical to the error rates available for that specific error.

Table 4-1. User Defined Error Rates for OC-3, OC-12, and OC-48 SONET Interfaces

If this error is inserted...	Then this range of User Defined rates is available for an OC-3 SONET interface.	Then this range of User Defined rates is available for an OC-12 SONET interface.	Then this range of User Defined rates is available for an OC-48 SONET interface.
Random Errors	1e-3 to 1e-9	1e-4 to 1e-9	1e-4 to 1e-9
Section B1	4e-4 to 1e-9	1e-4 to 1e-10	1e-5 to 1e-10
Line B2 (for ATM mapping)	3e-4 to 1e-8	8e-5 to 1e-8	1e-3 to 1e-10
Line B2 (for non-ATM mapping)	1.2e-3 to 1e-9	1.2e-3 to 1e-10	1e-3 to 1e-10
Line FEBE	1.2e-3 to 1e-9	1.2e-3 to 1e-10	1e-4 to 1e-10

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If this error is inserted...	Then this range of User Defined rates is available for an OC-3 SONET interface.	Then this range of User Defined rates is available for an OC-12 SONET interface.	Then this range of User Defined rates is available for an OC-48 SONET interface.
STS-Path B3 and STS-Path FEBE (for ATM mapping)	1e-5 to 1e-8 1e-5 to 1e-8	1e-6 to 1e-9 1e-6 to 1e-9	1e-6 to 1e-9 1e-6 to 1e-9
STS Path B3 (for concatenated mappings: STS-3c, STS-12c, and STS-48c)	4e-4 to 1e-9	4e-4 to 1e-9 1e-4 to 1e-9	4e-4 to 1e-9 1e-4 to 1e-10 1e-5 to 1e-10
STS Path FEBE (for concatenated mappings: STS-3c, STS-12c, and STS-48c)	1e-4 to 1e-9	5e-5 to 1e-9 1e-5 to 1e-9	5e-5 to 1e-9 1e-5 to 1e-9 2e-6 to 1e-9
STS Path B3 and STS-Path FEBE (for remaining mappings)	1e-4 to 1e-9	1e-4 to 1e-9 1e-4 to 1e-9	1e-4 to 1e-9 1e-4 to 1e-9
VT Random, VT BIP-2, and VT Path FEBE	1e-3 to 1e-9 1e-5 to le-9 1e-5 to le-9	1e-3 to 1e-9 1e-5 to le-9 1e-5 to le-9	1e-3 to 1e-9 1e-5 to le-9 1e-5 to le-9

Alarm Generated

Generates an alarm over the physical line, Section layer, Line layer, Path layer, or Virtual Tributary.

NOTE ➤

After selecting an alarm, the alarm continues until one of the following occurs:

- The alarm is turned off by using the Off option
- The Reset to Defaults command is selected
- A Preset configuration is selected
- An Auto-Configuration is performed
- A Mapping change occurs ◄

The following alarms are available for this command:

Option	Description
Off	No alarms are generated (The value displayed for this command is None.)
Loss of Frame	Generates a Loss of Frame (LOF) alarm for the Section layer, Line layer, and Virtual Tributary. An LOF condition occurs if a valid framing pattern is missing for 3 milliseconds or greater. This alarm condition ends when two consecutive A1 and A2 framing bytes are received.
Loss of Signal	Generates a Loss of electrical or optical Signal (LOS) over the Section layer. An LOS alarm generates an All-Zeros pattern for 10 msec or greater. This option is available for Intrusive Thru Mode.

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Option	Description
Loss of Pointer	Generates a Loss of STS Pointer (LOP) over the Line layer. The STS Pointer resides in the H1 and H2 bytes which specify the location of the start of the Path Overhead within the SPE envelope capacity. This alarm simulates an LOP condition and allows you to verify if your equipment can detect and report an LOP condition. This option is available for Intrusive Thru Mode.
VT Path AIS	Generates an Alarm Indication Signal (AIS) for the Virtual Tributary. This type of alarm sets the VT payload to all ones. An AIS signal is also known as a Blue alarm.
VT Loss of Pointer	Generates a Loss of VT Pointer condition. The VT Pointer resides in the V1 and V2 bytes inside the VT Path Overhead.
VT Path Unequipped	Generates an Unequipped alarm for the Path layer. Bits 5, 6, and 7 of the V5 byte are set to 0.
VT Path Yellow	Generates a Yellow alarm for the Virtual Channel. A Yellow alarm is also known as a Remote Alarm Indication (RAI) signal.
Line AIS	Generates an AIS signal for the SONET Line layer (AIS-L). This option is available for Intrusive Thru Mode.
Line FERF	Generates a Far-End Receive Failure alarm over the Line layer. This type of alarm is also known as Line Remote Defect Indicator (RDI-L). This option is available for Intrusive Thru Mode.
Path AIS	Generates an AIS alarm over the Path layer and causes a Loss of Pointer alarm for the Virtual Tributary.
Path Yellow	Generates a Yellow alarm (RAI) over the Path layer.
Path Unequipped	Generates an Unequipped alarm for the Path layer. The C2 byte is set to 00000000.

APS Commands

Automatic Protection Switching (APS) is a feature that allows Line Terminating Equipment (LTE) to switch to a backup line in case of errors or failures on the main line. APS commands can be configured for either Linear- or Ring-based networks and are transmitted using bytes K1 and K2 of the Line overhead.

With the ASA 312 and NAA I, you can test the network's APS response by generating a condition likely to cause APS switching. You also have the capability to generate specific APS messages and monitor the response. The following illustrates an APS screen for both Linear- and Ring-based networks.

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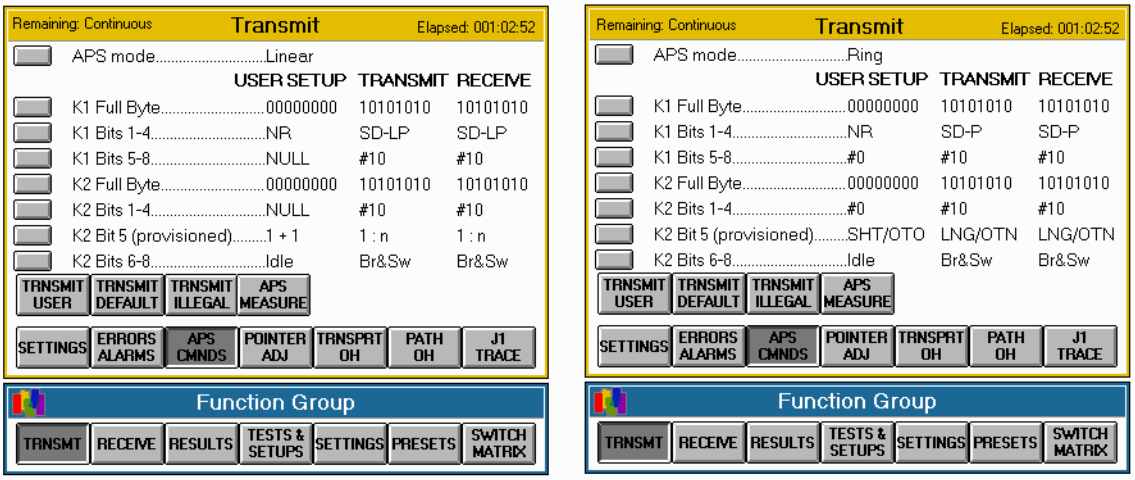


Figure 4-5. APS Commands Function Menu (Linear and Ring)

To make this testing easier and more efficient, the system uses menus dedicated to transmitting and receiving APS messages. These menus shows the individual bits within the transmitted and received APS bytes (K1 and K2). The bits are also translated into APS mnemonics for easy recognition.

NOTE ➤
Although you can edit the APS Commands using the commands described in the following section, you can also edit the transmitted K1 and K2 bytes directly from the Transport Overhead function menu as described later in this chapter. ➤

The following commands are associated with this function.

APS Mode

Determines whether the APS commands are configured for a Linear protection switching or Ring APS signaling mode.

The following options are available for this command:

Option	Description
Linear	Configures the ASA 312 and NAA I to transmit APS commands for a Linear (span) network.
Ring	Configures the ASA 312 and NAA I to transmit APS commands for a Ring network.

Editing the K1 Byte.
The K1 byte is a request for switch action. There are three commands that allow you to edit the bits of the K1 byte. To edit the K1 byte:

- Use the K1 Full Byte command to set all eight bits of the K1 byte at once.

  or

- Use the K1 Bits 1-4 command to set the first four bits of the K1 byte.

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- Use the K1 Bits 5-8 command to set the last four bits of the K1 byte.

The following describes the options available for these three commands.

K1 Full Byte

Allows you to configure the bit pattern of the K1 byte using either predefined or user defined settings by individually setting the eight bits of the K2 byte using the User Defined keypad.

The following options are available for this command and apply to both Linear and Ring modes:

Option	Description
Set to 00000000	Configures the K1 byte to 00000000 bit pattern.
Default (10101010)	Configures the K1 byte to 10101010 bit pattern.
Illegal (11111111)	Configures the K1 byte to 11111111 bit pattern.
User Defined	Allows you to configure the bit pattern one bit at a time using the User Defined keypad.

K1 Bits 1-4

Allows you to edit the first four bits of the K1 byte. The options for this command are predefined and use mnemonics to identify bit patterns. The mnemonics differ between Linear mode and Ring mode.

Linear Mode. If the APS Mode command is configured for Linear, then the following options are available for Byte K1, Bits 1–4:

Option	Description
(0000) NR	No Request, Bit Pattern 0000
(0001) Non Rev	Do not revert, Bit Pattern 0001
(0010) RR	Reverse Request (Ring), Bit Pattern 0010
(0011) Unused	Not Used, Bit Pattern 0011
(0100) EXER	Exerciser (Ring), Bit Pattern 0100
(0101) Unused	Not Used, Bit Pattern 0101
(0110) WTR	Wait-To-Restore, Bit Pattern 0110
(0111) Unused	Not Used, Bit Pattern 0111
(1000) MS	Manual Switch, Bit Pattern 1000
(1001) Unused	Not Used, Bit Pattern 1001
(1010) SD-LP	Signal Degrade Low Priority, Bit Pattern 1010 (This is the Transmit Default button setting.)
(1011) SD-HP	Signal Degrade High Priority, Bit Pattern 1011
(1100) SF-LP	Signal Fail Low Priority, Bit Pattern 1100
(1101) SF-HP	Signal Fail High Priority, Bit Pattern 1101
(1110) FS	Forced Switch, Bit Pattern 1110
(1111) LP	Lockout of Protection, Bit Pattern 1111 (This is the Transmit Illegal button setting.)

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Ring Mode. If the APS Mode command is configured for Ring, then the following options are available for Byte K1, Bits 1–4:

Option	Description
(0000) NR	No Request, Bit Pattern 0000
(0001) RR-R	Reverse Request (Ring), Bit Pattern 0001
(0010) RR-S	Reverse Request (Span), Bit Pattern 0010
(0011) EXER-R	Exerciser (Ring), Bit Pattern 0011
(0100) EXER-S	Exerciser (Span), Bit Pattern 0100
(0101) WTR	Wait-To-Restore, Bit Pattern 0101
(0110) MS-R	Manual Switch (Ring), Bit Pattern 0110
(0111) MS-S	Manual Switch (Span), Bit Pattern 0111
(1000) SD-R	Signal Degrade (Ring), Bit Pattern 1000
(1001) SD-S	Signal Degrade (Span), Bit Pattern 1001
(1010) SD-P	Signal Degrade (Path), Bit Pattern 1010 (This is the Transmit Default button setting.)
(1011) SF-R	Signal Fail (Ring), Bit Pattern 1011
(1100) SF-S	Signal Fail (Span), Bit Pattern 1100
(1101) FS-R	Forced Switch (Ring), Bit Pattern 1101
(1110) FS-S	Forced Switch (Span), Bit Pattern 1110
(1111) LP-S	Lockout of Protection (Span), Bit Pattern 1111 (This is the Transmit Illegal button setting.)

K1 Bits 5-8

Edits the last four bits of the K1 byte. When APS commands are configured for Linear mode, these bits indicate the channel number. (For example, Code 0 is the Null Channel, Codes 1-14 are the working channels, and Code 15 is an extra traffic channel.)

When APS commands are configured for Ring mode, these bits contain the Destination Code Identification.

The following is a list of options available for Byte K1, Bits 5 through 8:

Option	Description
Null	Protection channel requesting switch action. (The protection channel is supplied with a signal containing valid Transport Overhead for carriage of the APS bytes and Line BIP-8. Bit Pattern 0000.)
#1	Channel 1 requests switch action, Bit Pattern 0001
#2	Channel 2 requests switch action, Bit Pattern 0010
#3	Channel 3 requests switch action, Bit Pattern 0011
#4	Channel 4 requests switch action, Bit Pattern 0100
#5	Channel 5 requests switch action, Bit Pattern 0101
#6	Channel 6 requests switch action, Bit Pattern 0110
#7	Channel 7 requests switch action, Bit Pattern 0111

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Option	Description
#8	Channel 8 requests switch action, Bit Pattern 1000
#9	Channel 9 requests switch action, Bit Pattern 1001
#10	Channel 10 requests switch action, Bit Pattern 1010 (This is the Transmit Default button setting.)
#11	Channel 11 requests switch action, Bit Pattern 1011
#12	Channel 12 requests switch action, Bit Pattern 1100
#13	Channel 13 requests switch action, Bit Pattern 1101
#14	Channel 14 requests switch action, Bit Pattern 1110
#15 (EXTRA)	Extra traffic channel requesting switch, Bit Pattern 1111 (This is the Transmit Illegal button setting.)

Editing the K2 Byte.
The K2 byte provides additional information about network architecture and alarm conditions. There are four commands that allow you to edit the eight bits of the K2 Byte. To edit the K2 byte:

- Use the K2 Full Byte command to set all eight bits of the K2 Byte at once.

  or

- Use the K2 Bits 1-4 command to set the first four bits of the K2 byte
- Use the K2 Bit 5 (provisioned) command to set the fifth bit of the K2 byte.
- Use the K2 Bits 6-8 command to set the last three bits of the K2 byte.

The following describes the options available for these four commands.

K2 Full Byte

Configures the bit pattern of the K2 byte using either predefined or user defined settings or by individually setting the eight bits of the K2 byte using the User Defined keypad.

The following options are available for this command and apply to both Linear and Ring modes.

Option	Description
Set to 00000000	Configures the K1 byte to 00000000 bit pattern.
Default (10101010)	Configures the K1 byte to 10101010 bit pattern.
Illegal (11111111)	Configures the K1 byte to 11111111 bit pattern.
User Defined	Allows you to configure the bit pattern one bit at a time using the User Defined keypad.

NOTE ➤
Changes to these bits are automatically updated in the User Setup column. To Transmit these changes, you must press the Trnsmit User button. These changes will then appear in the Transmit column. ➤

K2 Bits 1-4

Configures the first four bits of the K2 byte.

Linear Mode. The first four bits indicate which working channel is bridged onto the protection channel during a traffic switching event.

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NOTE ➤
If NULL (Channel 0) is received on bits 5-8 of the K1 byte, then all four bits are set to 0.◄

The following options are available for this command.

Option	Description
NULL (# 0)	Protection channel requesting switch action. (The protection channel is supplied with a signal containing valid Transport Overhead for carriage of the APS bytes and Line BIP-8. Bit Pattern 0000.) (Default)
# 1	Channel 1 requests switch action, Bit Pattern 0001
# 2	Channel 2 requests switch action, Bit Pattern 0010
# 3	Channel 3 requests switch action, Bit Pattern 0011
# 4	Channel 4 requests switch action, Bit Pattern 0100
# 5	Channel 5 requests switch action, Bit Pattern 0101
# 6	Channel 6 requests switch action, Bit Pattern 0110
# 7	Channel 7 requests switch action, Bit Pattern 0111
# 8	Channel 8 requests switch action, Bit Pattern 1000
# 9	Channel 9 requests switch action, Bit Pattern 1001
# 10	Channel 10 requests switch action, Bit Pattern 1010 (This is the Transmit Default button setting.)
# 11	Channel 11 requests switch action, Bit Pattern 1011
# 12	Channel 12 requests switch action, Bit Pattern 1100
# 13	Channel 13 requests switch action, Bit Pattern 1101
# 14	Channel 14 requests switch action, Bit Pattern 1110
EXTRA (# 15)	Extra traffic channel requesting switch, Bit Pattern 1111 (This is the Transmit Illegal button setting.)

Ring Mode. Bits 1-4 are the Source Node Identification. (The Source Node ID is set to the Node's own ID.)

Option	Description
# 0	Protection channel requesting switch action. (The protection channel is supplied with a signal containing valid Transport Overhead for carriage of the APS bytes and Line BIP-8. Bit Pattern 0000.)
# 1	Channel 1 requests switch action, Bit Pattern 0001
# 2	Channel 2 requests switch action, Bit Pattern 0010
# 3	Channel 3 requests switch action, Bit Pattern 0011
# 4	Channel 4 requests switch action, Bit Pattern 0100
# 5	Channel 5 requests switch action, Bit Pattern 0101
# 6	Channel 6 requests switch action, Bit Pattern 0110
# 7	Channel 7 requests switch action, Bit Pattern 0111

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Option	Description
# 8	Channel 8 requests switch action, Bit Pattern 1000
# 9	Channel 9 requests switch action, Bit Pattern 1001
# 10	Channel 10 requests switch action, Bit Pattern 1010 (This is the Transmit Default button setting)
# 11	Channel 11 requests switch action, Bit Pattern 1011
# 12	Channel 12 requests switch action, Bit Pattern 1100
# 13	Channel 13 requests switch action, Bit Pattern 1101
# 14	Channel 14 requests switch action, Bit Pattern 1110
# 15	Extra traffic channel requesting switch, Bit Pattern 1111 (This is the Transmit Illegal button setting)

K2 Bit 5 (provisioned)

Edits the fifth bit of the K2 byte.

NOTE ➤
Changes to this bit are automatically updated in the User Setup column. To Transmit changes, you must press the Trnsmit User button. The new value will then appear in the Transmit column. ◄

Linear Mode. In Linear mode, this bit controls the type of protection switching architecture used. The following options are available.

Option	Description
1+1	Provisioned for 1+1 mode; Bit 5 = 0.
1:n	Provisioned for 1:n mode; Bit 5 = 1.

Ring Mode. In Ring mode, this bit controls the type of path code used. The following options are available:

Option	Description
SHT / OTO	Short Path Code (Default). Bit 5 = 0.
LNG / OTN	Long Path Code. (The Transmit Default and Transmit Illegal button settings are LNG / OTN). Bit 5 =1.

K2 Bits 6-8

Edits the sixth, seventh, and eighth bits of the K2 byte. These bits indicate if a FERF or FEBE occurs at the line level. The current value displays in the User Setup column of the APS Commands function menu.

NOTE ➤
Changes to these bits are automatically updated in the User Setup column. To Transmit these changes, you must press the Trnsmit User button. These changes will then appear in the Transmit column. ◄

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Linear Mode. If the APS Mode command is configured for Linear, then the following options are available for Byte K2, Bits 6–8:

Option	Description
(000) Unused	Not Used, Bit Pattern 000
(001) Unused	Not Used, Bit Pattern 001
(010) Unused	Not Used, Bit Pattern 010
(011) Unused	Not Used, Bit Pattern 011
(100) Uni-direct	Provisioned for Unidirectional Switching, Bit Pattern 100
(101) Bi-direct	Provisioned for Bidirectional Switching, Bit Pattern 101
(110) RDI-L	Line Remote Defect Indicator, Bit Pattern 110
(111) AIS-L	Line Alarm Indication Signal, Bit Pattern 111 (This is the Transmit Illegal button setting)

Ring Mode. If the APS Mode command is configured for Ring, then the following options are available for Byte K2, Bits 6–8:

Option	Description
(000) Idle	Idle, Bit Pattern 000
(001) Br	Bridged, Bit Pattern 001
(010) Br&Sw	Bridged and Switched, Bit Pattern 010 (This is the Transmit Default button setting)
(011) Ex Tr	Extra Traffic on Protection Channel, Bit Pattern 011
(100) Unused	Not Used, Bit Pattern 100
(101) Unused	Not Used, Bit Pattern 101
(110) RDI-L	Line Remote Defect Indicator, Bit Pattern 110
(111) AIS-L	Line Alarm Indication Signal, Bit Pattern 111 (This is the Transmit Illegal button setting)

User Setup, Transmit, and Receive Columns

These three columns display the current bit value for the K1 and K2 bytes. Any changes made to the K1 and K2 bytes are automatically updated in the User Setup column.

The Transmit column displays the bit values transmitted when you press either the Trnsmit User button, the Trnsmit Default button, or the Trnsmit Illegal button.

The Receive Column displays the bit values received for the K1 and K2 bytes.

Trnsmit User Button

This button transmits the bit values that appear in the User Setup column. When pressed, the User Setup values are transmitted and appear in the Transmit column.

NOTE ➤
You can edit the transmitted K1 and K2 bytes directly from the Transport Overhead function menu. ➤

Trnsmit Default Button

This button transmits the default bit values (10101010) for the K1 and K2 bytes.

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When pressed, the default bit values appear in the Transmit column:

Command	Linear Mode Bit Value	Ring Mode Bit Value
K1 Full Byte	10101010	10101010
K1 Bits 1-4	SD-LP	SD-P
K1 Bits 5-8	#10	#10
K2 Full Byte	10101010	10101010
K2 Bits 1-4	#10	#10
K2 Bit 5 (provisioned)	1:*n*	LNG/OTN
K2 Bits 6-8	(010)	Br & Sw

Trnsmit Illegal Button

This button transmits the illegal bit values (11111111) for the K1 and K2 bytes. When pressed, the illegal bit values appear in the Transmit column:

Command	Linear Mode Bit Value	Ring Mode Bit Value
K1 Full Byte	11111111	11111111
K1 bits 1-4	LP	LP-S
K1 Bits 5-8	EXTRA	#15
K2 Full Byte	11111111	11111111
K2 Bits 1-4	EXTRA	#15
K2 Bit 5 (provisioned)	1:*n*	LNG/OTN
K2 Bits 6-8	AIS-L	AIS-L

OC-48 APS Measure Function

The OC-48 Automatic Protection Switch (APS) Measure function allows you to measure the time it takes for your Line Terminating Equipment to switch to a backup line when errors or failures occur on the main line. APS measurement is .5 milliseconds accurate.

NOTE ➤
While the APS Measure function is active, all SONET and mapped tributaries will stop processing. Processing will begin again when you exit the APS Measuring function. ➤

To access the APS Measure function:

1. While in OC-48 mode, select **TRNSMT**.
2. Select **APS CMNDS**.
3. Select **APS MEASURE**. The following warning message appears:

```
Functionality will be limited to the APS measure-
ments only.
```

4. To *proceed*, select **OK**. To *cancel*, select **CANCEL**. If you selected OK, the Protection Switch Criteria and Arm/Reset Timer functions are displayed on the touch screen. The Protection Switch Criteria displays an Inactive status.
5. Select **Protection Switch Criteria**. The Protection Switch Criteria window appears.

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6. Select one of the following criteria to use as a trigger for an APS event:
   - B1 Error
   - SEF Alarm
7. To start APS measuring, select **Arm/Reset Timer**. The screen displays **ARMED**.

   APS measurement results appear on the screen. The results of this function are only valid while you are in the APS Measure screen.

   NOTE ➤
   Only one APS measurement can be taken at a time. To restart a test, select **Arm/Reset Time** again. ◄
8. To disable APS Measurement mode, select **EXIT**.

To measure the APS with a different setting criteria:

1. Select **Protection Switch Criteria**. A warning appears:

   ```
   APS time is active. Reset with new setting?
   ```
2. To proceed, select **OK**. To cancel, select **CANCEL**. If you selected OK, the Protection Switch Criteria window appears.
3. Select a new setting criteria.
4. To start the APS Measure test with your new settings, select **ARM/RESET TIMER**. A warning message appears:

   ```
   APS time is active Reset with new setting?
   ```
5. To proceed, select **OK**. To cancel, select **CANCEL**. If you selected OK, the new test is enabled, and measure results appear on the screen.
6. To disable APS Measurement mode, select **EXIT**.

Pointer Adjustment

The beginning of a SONET payload is identified by a Pointer. It consists of the H1 and H2 Pointer bytes. Using the ASA 312 or NAA I, you can stress a SONET network by manually adjusting the Pointer using the Pointer Action button located in the Action Button Row. By performing this task, you can stress your SONET equipment and verify if it can tolerate Pointer adjustments and also verify how your equipment reacts and reports these adjustments.

The parameters that control the Pointer Action button are configured using the Pointer Adjustment button. This button generates and controls pointer movements within the transmitted signal. The system allows you to stress test a network by changing pointers or introducing an SPE offset that continuously adjusts the STS pointer.

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Pointer Adjustment Sequence
To adjust the Pointer:

- Select the Pointer Adj button from the SONET Transmit Function Group as illustrated in the following figure.
- Make necessary changes to the Pointer Adjustment commands to increment or decrement the Pointer.
- Select the Pointer Action button. The Pointer changes.

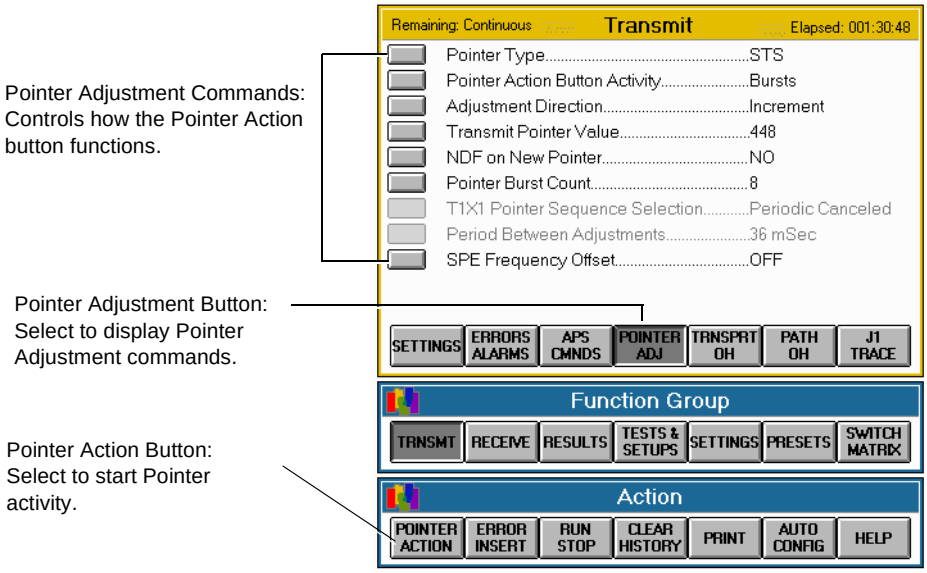


Figure 4-6. Pointer Buttons

The commands associated with this function button are described in the following section.

NOTE ➤
Pointer Adjustment is not available when the unit is configured for OC-48 Intrusive Thru Mode. ◄

Pointer Type

Selects the type of payload pointer used. The following options are available for this command:

Option	Description
STS	Configures the Pointer as a Synchronous Payload Envelope (SPE) pointer
VT	Configures the Pointer as a Virtual Tributary pointer. If configured for Byte Sync mode, refer to *VT Pointer Operation in Byte Sync Mode* at the end of the Pointer Adjustment section.

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Pointer Action Button Activity

Determines the type of Pointer activity that occurs when the Pointer Action button is pressed. The following options are available for this command:

Option	Description
Single	Inserts a single pointer movement with each press of the Pointer Action button.
New (VT Pointer type only)	Forces two new pointer values with or without a new data flag. The new pointer values are fixed at 78 and 81. If the current pointer is at 79, 80, or 81 when a new pointer action is initiated, then the new point value is set to 78. If the current pointer value is 78, the new point action resets the pointer to 81. Subsequent new pointer actions toggle this value between 78 and 81. **The New option appears only if the Pointer Type command is configured for VT pointer mode.**
Bursts	Inserts a burst of pointer movements with each press of the Pointer Action button. Each pointer burst consists of a series of one-location pointer movements spaced four frames apart (maximum legal rate). The burst count is determined by the Pointer Burst Count command described later in this section. **The Bursts option is available only for STS Pointer mode.**
T1X1 Sequence	This option enables the T1X1 Pointer Sequence Selection command and the Period Between Adjustment command. Both commands are described later in this section. **This option is available only for STS Pointer mode.**
Incr-Decr	Alternates the pointer insertion from increment to decrement with a 200 msec delay in-between. **This option is available only for STS Pointer mode.**
Decr-Incr	Selecting the Decr-Incr activity alternates the pointer insertion from decrement to increment with a 200 msec delay in-between. **This option is available only for STS Pointer mode.**

Adjustment Direction

Determines if the Transmit Pointer Value increments (Positive Stuffing) or decrements (Negative Stuffing) during Pointer activity. **This command is available only when the Pointer Type command is configured for STS mode.**

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Transmit Pointer Value

Sets the Pointer location for the STS Pointer only. The following options are available:

Option	Description
0	Sets the pointer to location zero (points to the byte immediately following the H3 transport overhead byte). The pointer is moved automatically when this selection is chosen, there is no need to press the Pointer Action button.
392	Sets the pointer to location 392. The pointer is moved automatically when this selection is chosen, there is no need to press the Pointer Action button.
Edit	Allows you to enter a Transmit Pointer value up to 1023. Using the Pointer Action button, you can manually insert pointers and verify the transmission and receiving of these pointers by observing the H1 and H2 bytes.

NDF on New Pointer

Allows you to suppress the New Data Flag (NDF) for new Pointer values. Options for this command are Yes or No. This command is available for both STS mode and VT mode Pointer Types.

Pointer Burst Count

Indicates the value that you increment or decrement the Pointer when the Pointer Action button is pressed. The Pointer Burst Count ranges from **2** through **8**.

NOTE ➤
This command is only available when the Pointer Action Button Activity command is configured for Burst mode. ◄

T1X1 Pointer Sequence Selection

Defines how the Pointer value increments or decrements during a T1X1 Pointer Sequence. It is only available when the Pointer Action Button Activity command is configured for T1X1 Pointer Sequence mode.

The T1X1 Pointer Sequence is a 360 second process that is based on:

- A 60 second initialization period
- Followed by ten 30-second periods

During these periods, the T1X1 Pointer increments or decrements based on the setting of the T1X1 Pointer Sequence Selection command.

For example, if the Pointer Action has the following configuration:

Pointer Action Button Activity	T1X1 Sequence
Adjustment Direction	Increment
Transmit Pointer Value	100
T1X1 Pointer Sequence Selection	Periodic Bursts of 3

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Then the following events occur:

- After the 60 second initialization period, the Transmit Pointer increments from 100 to 103.
- After the first 30-second period, the Transmit Pointer increments from 103 to 106.
- After the second 30-second period, the Transmit Pointer increments from 106 to 109.
- This process continues until the tenth 30-second period is reached. At this time, the Pointer Action process concludes, and the Transmit Pointer increments to a total of 133.

The following options are available for this command.

Option	Description
Periodic Bursts of 3	Increments/decrements the Pointer Value by a burst of 3 after a 60 second initialization period, and then increments/decrements the Pointer Value by a burst of 3 (0.5 msec apart) for the next ten 30-second periods. (When this option is set, the Period Between Adjustments command is not available.)
Periodic Added	This option is used in conjunction with the Period Between Adjustments command. During the initialization period (60 seconds), the Pointer Value is incremented/decremented once for each time period specified by the Period Between Adjustments command. After the initialization period, the pointer burst is incremented/decremented twice and continues to increment/decrement once for each specified time period. This sequence continues, except at every 30-second period, the pointer is incremented/decremented twice.
Periodic Canceled	This option is used in conjunction with the Period Between Adjustments command. During the initialization period (60 seconds), the Pointer Value is incremented/decremented once during each time period specified by the Period Between Adjustments command. After the initialization period, the pointer burst skips the increment/decrement, and continues to increment/decrement the Pointer Value once for the specified period between adjustments. This sequence continues; however, at every 30-second period, the pointer increment/decrement value is skipped.

Period Between Adjustments

Determines the time period that elapses between Pointer activity. This command is only available when the T1X1 Pointer Sequence Selection command is set to either Periodic Added or Periodic Canceled.

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SPE Frequency Offset

Sets the frequency offset for a Synchronous Payload Envelope. The following options are available for this command.

Option	Description
Off	Stops the SPE Frequency Offset
Edit	Allows you to adjust the Parts Per Million (PPM) to the 00.0 place. The SPE frequency offset is ± 100. Use the Off option to stop the SPE Frequency Offset.

VT Pointer Operation in Byte Sync Mode.

The following describes how the VT Pointer functions when the ASA 312 is configured for Byte Sync mode.

When these commands...	Are configured for...	Then the Transmit Pointer Value command...
Pointer Type	VT	Has a fixed Pointer Value that starts at 0 and has a range of 24 positions. (The initial range is from 103 to 93 and 0 to 12. Refer to the following example.) When the Pointer Action button is pressed, the Pointer decrements and increments through this range.
Pointer Action Button Activity	Single	For example, when the unit is first powered on and configured for Byte Sync mode, the VT Pointer Type defaults to Position 0. When the Pointer Action button is pressed, the Transmit Pointer Value sets to Position 103. Subsequent Pointer Actions cause the Pointer Value to decrement to Position 93. Once 93 is reached, the Adjustment Direction reverses and subsequent Pointer Actions increment the Pointer Value to Position 103 and then Positions 0 through 12. If it is necessary to gain more Pointer Positions in an increment or decrement direction, then reset the Pointer position using the New option as described below.
Pointer Type	VT	Sets the current Pointer Position to Position 0. (This assumes that the Pointer Position has been changed using the Pointer Action button.)
Pointer Action Button Activity	New	For example, if the Pointer Position starts at Position 0, is decremented two positions, and is then reset to Position 0 (by setting the Pointer Action Button Activity command to New), the Pointer can now decrement nine Pointer Positions (from Position 103 to Position 95) and increment 14 Pointer Positions (from Position 0 to Position 14). The Pointer Value still maintains a range of 24 positions; however, the Pointer Value now operates from Position 95 to Position 14. NOTE: After the Pointer Value has been reset to Position 0, make sure that the Pointer Action Button Activity command is set to Single. Otherwise, the Pointer Value remains at 0. In addition, if the Pointer Value and range are adjusted while in Byte Sync mode, and the ASA 312's mapping is changed from Byte Sync, then the Pointer Value resets to 0 and uses a range from 103 to 93 and 0 to 12 the next time Byte Sync mode is selected.

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NOTE ➤
This function is not available for use with NAA I.◄

Trnsprt OH

The Transport Overhead button allows you to stress a SONET network by directly editing Transport Overhead bytes to simulate errors, alarms, and other stress conditions.

The Transport Overhead functionality allows you to select an individual slot of the STS-1 signal, and then manipulate specific bytes.

NOTE ➤
For OC-48 Intrusive Thru Mode operation, edit a specific Transport Overhead byte using the Transport Overhead button, and then select that byte using the Errors Alarms button.◄

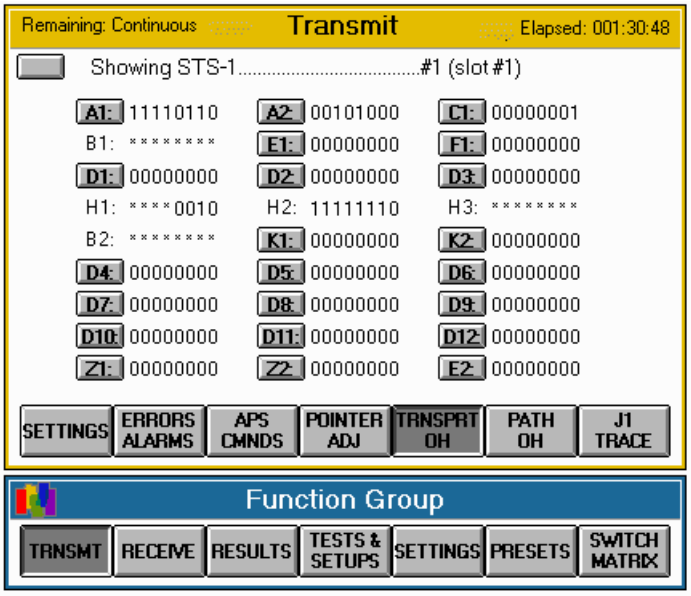


Figure 4-7. Transport Overhead Function Menu

The following commands are available.

Showing STS-1

Selects any slot within the OC-3 , OC-12, or OC-48 signal.

Options	Description
#1 (slot #1) through #3 (slot #3)	If the Transmit Interface command is set to OC-3, then the following slots are available: 1 (slot 1), 2 (slot 2) and 3 (slot3).
#1 (slot #1) through #12 (slot #12)	If the Transmit Interface command is set to OC-12, then the following slots are available: 1 (slot 1), 2 (slot 5), 3 (slot 9), 4 (slot 2), 5 (slot 6), 6 (slot 10), 7 (slot 3), 8 (slot 7), 9 (slot 11), 10 (slot 4), 11 (slot 8), and 12 (slot 12).

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Options	Description
#1 (slot #1) through #48 (slot #48)	If the Transmit Interface command is set to OC-48, then the following slots are available: 1 (slot 1), 2 (slot 17), 3 (slot 33), 4 (slot 2), 5 (slot 18), 6 (slot 34), 7 (slot 3), 8 (slot 19), 9 (slot 35), 10 (slot 4), 11 (slot 20), 12 (slot 36), 13 (slot 5), 14 (slot 21), 15 (slot 37), 16 (slot 6), 17 (slot 22), 18 (slot 38), 19 (slot 7), 20 (slot 23), 21 (slot 38), 22 (slot 8), 23 (slot 24), 24 (slot 40), 25 (slot 9), 26 (slot 25), 27 (slot 41), 28 (slot 10), 29 (slot 26), 30 (slot 42), 31 (slot 11), 32 (slot 27), 33 (slot 43), 34 (slot 12), 35 (slot 28), 36 (slot 44), 37 (slot 13), 38 (slot 29), 39 (slot 45), 40 (slot 14), 41 (slot 30), 42 (slot 46), 43 (slot 15), 44 (slot 31), 45 (slot 47), 46 (slot 16) 47 (slot 32), and 48 (slot 48).

Transport Overhead Bytes

Displays the Transport Overhead bytes that can be configured for each slot in the STS-1. By selecting an available byte (press the byte's command button), you can edit the 8-bit pattern using the ASA touch screen's binary keypad or, if working with NAA I, your PC keyboard.

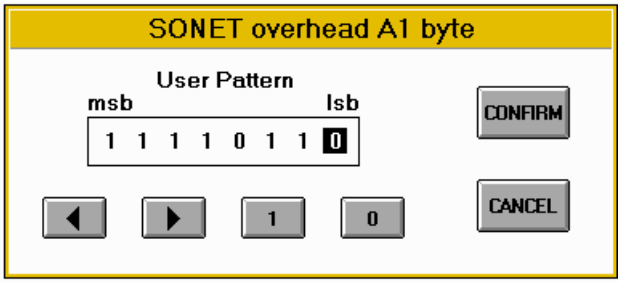


Figure 4-8. Touch Screen Keypad for Editing Transport Overhead Bytes

Path OH

NOTE ➤
This command is associated with the SPE Under Test command which appears under the Settings Function button. ◄

The Path Overhead button allows you to stress a SONET network by directly editing STS Path and VT Path Overhead bytes to simulate errors, alarms, and other stress conditions. (This method of stressing the network is an alternative to using the Errors and Alarms button.) The STS-1 SPE Under Test value indicates which Path Overhead bytes appear.

NOTE ➤
The Path Overhead button is not available for OC-48 Intrusive Thru Mode. ◄

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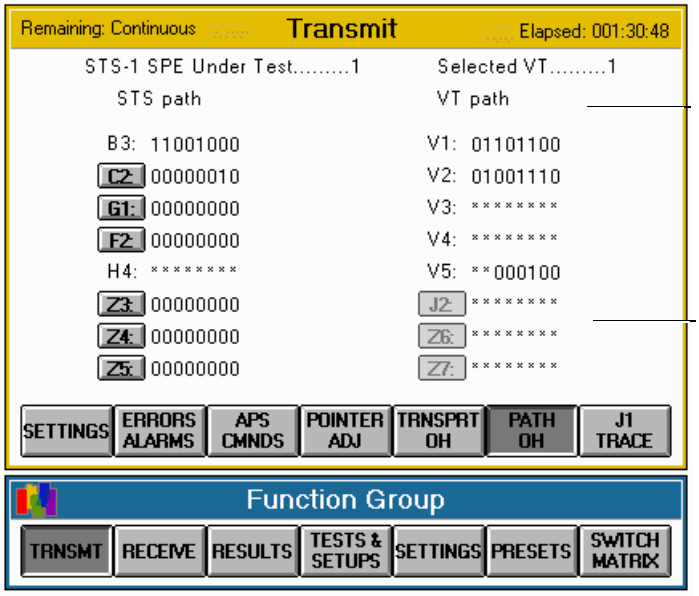


Figure 4-9. Path Overhead Function Menu

The following STS Path Overhead bytes can be edited:

STS Path OH Byte	Description
C2	STS Path Signal Label
G1	Path Status (This byte cannot be edited if the SONET protocol processor is mapped for ATM.)
F2	Path User Channel
Z3	Path Growth
Z4	Path Growth
Z5	Tandem Connection

The following STS Path Overhead bytes can be viewed:

STS Path OH Byte	Description
B3	STS Path BIP-8
H4	Indicator

The VT Payload Pointer and VT Path Overhead bytes appear only when the unit is configured for VT1.5 or Byte Sync mapping. The following bytes can be viewed:

VT Path Overhead Byte	Description
V1	VT Payload Pointer, Byte 1
V2	VT Payload Pointer, Byte 2
V3	VT Payload Pointer, Byte 3
V4	VT Payload Pointer, Byte 4

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VT Path Overhead Byte	Description
V5	VT Path Status, Signal Label, and Error Checking
J2	VT Path Trace (Available in Byte Sync mode)
Z6	VT Path Growth (Available in Byte Sync mode)
Z7	VT Path Growth (Available in Byte Sync mode)

J1 Trace

The J1 Trace allows you to enter a 64-byte pattern for repeated transmission. The pattern is a string of ASCII characters. You can create your own pattern or use the system's default pattern or null pattern. The pattern is sent on the same STS-1 that is selected using the SPE Under Test command. (This command is located under the Settings button.)

Three commands associated with this function button allow you to select a Trace pattern, create and edit a Trace pattern, and save a Trace pattern as a user-defined pattern.

NOTE ➤
The Path Overhead button is not available for OC-48 Intrusive Thru Mode. ◄

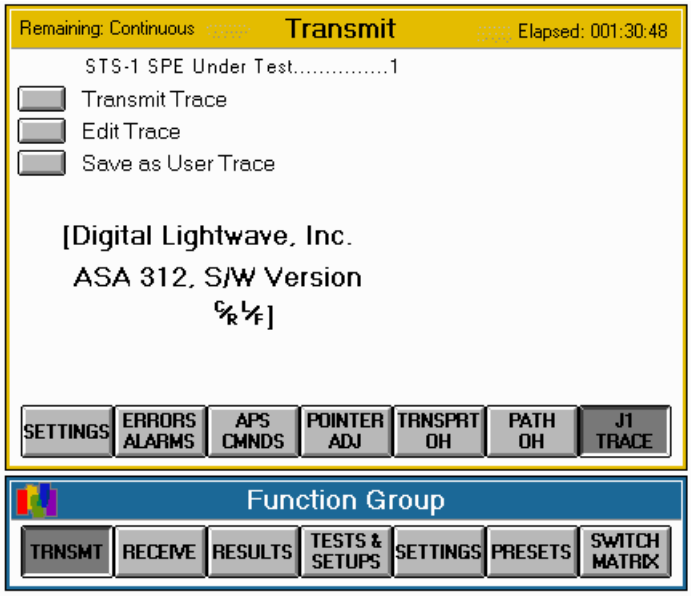


Figure 4-10. J1 Trace Function Menu

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Transmit Trace Selects one of three patterns as the J1 Trace pattern. The following options are available:

Option	Description
Default Trace	Selects the Digital Lightwave ASCII message as the J1 Trace pattern.
User Trace	Selects a user-defined ASCII message as the J1 Trace pattern. A user defined message is entered using the Edit Trace command.
Null Trace	Selects a null character pattern as the J1 Trace pattern.

Edit Trace Displays a keypad so that you can enter a trace message to send. This trace can then be saved as the User Trace. The trace can be up to 62 characters long.

Save as User Trace Saves the selected trace as the User Trace.

Receive Function Group

The Receive Function Group button contains functions, commands, and options that determine how the SONET protocol processor's receive interface is configured.

The following buttons make up the Receive Function Group:

- **Settings:** Configures the unit's receive parameters for your SONET test environment.
- **Signal Status:** Displays the optical or electrical power and frequency of the incoming signal.
- **Transport Overhead:** Displays the Transmit Overhead bytes.
- **Path Overhead:** Displays the Path Overhead bytes.
- **J1 Trace:** Displays the received J1 Trace.
- **VT Scan:** Continuously scans and reports activity for the DS1 channels that are multiplexed into a VT1.5 signal.

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Settings

The Settings Function Group button controls the signal parameters for the SONET receive interface.

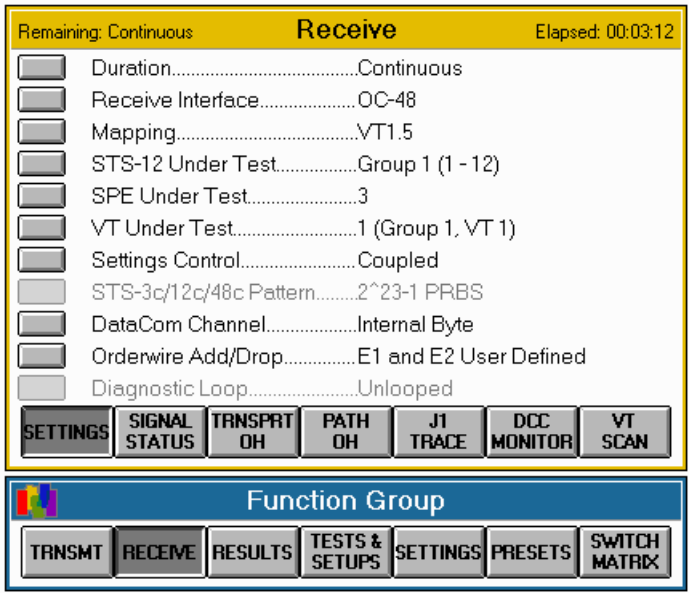


Figure 4-11. Receive Settings Commands

Duration

Sets the duration of the SONET Receive test to Continuous, 5 Minutes, 15 Minutes, 1 hour, 2 hours, 24 hours, 72 hours, or to a User Defined amount of time.

Receive Interface

Selects the SONET receive interface. The following options are available for this command.

NOTE ➤
The Receive Interface can be coupled to the Transmit Interface or set independently of the Transmit Interface. If coupled, any changes made to the Receive Interface are automatically copied to the Transmit Interface. The current Transmit and Receive settings display as the Tx and Rx values in the SONET Alarm and Status Indicator area. ➤

Option	Description
OC-48	Configures the Receive Interface for OC-48 operation. This option is available if the unit has the OC-48 hardware and licensing.
OC-12	Configures the Receive Interface for OC-12 operation.
OC-3	Configures the Receive Interface for OC-3 operation.
OC-1	Configures the Receive Interface for OC-1 operation.
STSX-1	Configures the Receive Interface for the electrical equivalent of OC-1 rates.

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NOTE ➤
If your system is an OC-48E model (ASA-PKG-OC48E), then the OC-12, OC-3, and OC-1 options are disabled (appear as gray text). The options available are OC-48 and STSX-1. ◄

Mapping

Selects the type of SONET mapping used by the SONET protocol processor. The following options are available.

NOTE ➤
The Mapping command is automatically coupled between the Transmit and Receive settings. Any changes made to this command are also made to the Receive Transmit Mapping command regardless of the value of the Settings Control command discussed later in this section. ◄

Option	Description
VT1.5	Configures SONET for Async VT1.5 mapping.
Byte Sync	Configures SONET for Byte Sync VT1.5 mapping. Byte sync mapping allows direct access to the 24 DS0 channels of a DS1 that is mapped into a VT1.5. This function is not available for use with the NAA I.
DS3	Configures SONET for DS3 mapping.
STSX-1 Drop/Insert	Connects the STSX-1 Drop and Insert line interface to the SONET protocol processor. This function is not available for use with the NAA I.
STS-3c/Pattern	Maps an STS-3c pattern into an OC-3 interface. The Receive Interface command must be set to OC-3, OC-12, or OC-48 for this option to be available.
STS-12c/Pattern	Maps an STS-12c pattern into an OC-12 interface. The Receive Interface command must be set to OC-12 or OC-48 for this option to be available.
STS-48c/Pattern	Maps an STS-48c pattern into an OC-48 interface. The Receive Interface command must be set to OC-48 for this option to be available.
ATM	Maps an ATM signal into the current SONET interface.

STS-12 Under Test

Selects a specific STS-12 signal to monitor.

When configured for OC-48 operation, the system receives an STS-48 signal that is demuxed into four STS-12 signals and then processed by the system.

NOTE ➤
This command is available if the OC-48 hardware option is installed and the unit is configured for OC-48 operation. ◄

You can select one of four STS-12 signals to monitor:

Option	Description
Group 1 (1-12)	Selects STS-12 #1 (SPEs 1–12) as the dropped and monitored channel.

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Option	Description
Group 2 (13-24)	Selects STS-12 #2 (SPEs 13–24) as the dropped and monitored channel.
Group 3 (25-36)	Selects STS-12 #3 (SPEs 25–36) as the dropped and monitored channel.
Group 4 (37-48)	Selects STS-12 #4 (SPEs 37–48) as the dropped and monitored channel.

After selecting an STS-12, use the SPE Under Test command to select a specific SPE to monitor.

SPE Under Test

Selects which Synchronous Payload Envelope (SPE) is used during a test. The options available for this command vary depending on the setting of the Receive Interface. The following options are available for this command.

NOTE ➤
This command is not available for STSX-1 interface, OC-1 interface, or OC-48 Intrusive Thru Mode. ◄

Option	Description
SPEs 1-3	For OC-3 interface, SPEs 1 through 3 can be individually selected.
SPEs 1-4	SPEs 1 through 4 can be selected if the Receive Interface command is set to OC-12 and the Mapping command is set to STS-3c/Pattern.
SPEs 1-12	For OC-12 interface, SPEs 1 through 12 can be individually selected.

An alternative to using this command to select an SPE using the SPE scroll buttons. The SPE scroll buttons appear in the SONET Alarm and Status area.

Using the SPE Scroll Buttons.
To use the SPE Scroll buttons:

1. Configure the SONET Receive Interface for OC-3 or OC-12.

   NOTE ➤
   The SPE Scroll buttons are disabled for OC-1, STSX-1, and the following concatenated mappings: STS-12c, ATM/STS-3c, ATM/STS-12c, and STS-3c mapped OC-3. ◄

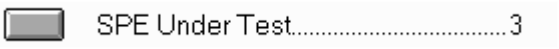
2. Select ▶ to scroll down the SPE list or ◀ to scroll up the SPE list.

   NOTE ➤
   For OC-3, the scroll range is SPEs 1–3.
   For OC-12, the scroll range is SPEs 1–12.
   For STS-3c mapped OC-12, the scroll range is SPEs 1–4. ◄



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As the SPE changes in the SONET LED area, the value for the SONET SPE Under Test command changes, and the SONET Elapsed Time counter resets to 0.



NOTE ➤
When the SONET Transmit Interface and Receive Interface commands match (for example, Tx = OC12 and Rx = OC12), the SPE scroll range value also indicates the setting of the SPE Under Test commands.

However, if the Transmit Interface and Receive Interface commands are different:

– The SPE scroll value indicates the Receive SPE Under Test command's value.

– The Transmit SPE Under Test command's value does not change when the scroll buttons are pressed. ◄

VT Under Test

VT1.5 contains 28 virtual tributaries. This command allows you to choose an individual virtual tributary (1-28) or all 28 virtual tributaries for testing and monitoring received signals. The following options are available for this command.

NOTE ➤
This command is only available for VT1.5 Mapping.◄

Option	Description
1 (Group 1, VT1) through 28 (Group 7, VT4)	Selects a specific virtual tributary for testing and monitoring.

Settings Control

Enables the combining of the Transmit Settings and Receive Settings so that any changes made to the Transmit Interface are duplicated on the Receive Interface.

The following options are available:

Option	Description
Coupled	Combines the Transmit and Receive settings so that command changes made on the Transmit side are automatically copied on the Receive side. For example, if the Receive Interface command is changed to OC-12, then the Transmit Interface is changed to OC-12.
Independent	Changes made to Receive commands are not copied to the equivalent Transmit commands.

STS-3c/12c/48c Pattern

NOTE ➤
This command is available only if the Mapping command is set to STS-3c/Pattern, STS-12c/Pattern, or STS-48c/Pattern. ◄

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This command selects the type of test pattern the SONET protocol processor expects to receive over an STS-3c, STS-12c, or STS-48c. The STS-3c/12c/48c Pattern command is automatically coupled to the Transmit STS-3c/12c/48c Pattern command described earlier in this chapter. Therefore, any changes made to this command using the Receive Function Group button are copied to the STS-3c/12c/48c Pattern command found under the Transmit Functions Group button.

For a description of this command, refer to the STS-3c/12c/48c Pattern command described earlier in this chapter.

Option	Description
2^15-1 PRBS	Configured to receive a 2^15-1 PRBS pattern. This option is available only when the Mapping command is set to STS-48c/Pattern.
2^15-1 Inverted	Configured to receive an inverted 2^15-1 PRBS pattern. This option is available only when the Mapping command is set to STS-48c/Pattern.
2^23-1 PRBS	Configured to receive a 2^23-1 PRBS pattern.
2^23-1 Inverted	Configured to receive an inverted 2^23-1 PRBS pattern.
2^31-1 PRBS	Configured to receive a 2^31-1 PRBS pattern. This option is available only when the Mapping command is set to STS-48c/Pattern.
2^31-1 Inverted	Configured to receive an inverted 2^31-1 PRBS pattern. This option is available only when the Mapping command is set to STS-48c/Pattern.
All Zeros	Configured to receive an All Zeros pattern.
All Ones	Configured to receive an All Ones pattern.
Live	User data is received; no pattern is used.
8-Bit User	Configured to receive an 8-bit user defined pattern. The pattern is entered using a touch screen binary keypad. This option is available only when the Mapping command is set to STS-48c/Pattern.

DataCom Channel

The DataCom Channel (DCC) defines specific bytes in both the Line layer (bytes D4 through D12) and the Section layer (bytes D1 through D3) overhead that is used for sending Operations and Maintenance (OAM) information between the attached Line and Section equipment. This command allows you to select which bytes transmit OAM information.

The Receive DataCom Channel command is automatically coupled to the Transmit DataCom Channel command described earlier in this chapter. Therefore, any changes made to this command using the Receive Function Group button are replicated to the DataCom Channel command found under the Transmit Functions Group button.

For a description of this command, refer to the DataCom Channel command described earlier in this chapter.

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NOTE ➤
DataCom Channel activity can be viewed using the DCC Monitor function located under the SONET Receive Function Group Button. ◄

Orderwire Add/Drop

Allows you to add or drop an orderwire circuit. The Receive Orderwire Add/Drop command is automatically coupled to the Transmit DataCom Channel command described earlier in this chapter. Therefore, any changes made to this command using the Receive Function Group button are copied to the Orderwire Add/Drop command found under the Transmit Functions Group button.

NOTE ➤
This function is not available for use with the NAA I. ◄

For a description of this command, refer to the Orderwire Add/Drop command described earlier in this chapter.

Diagnostic Loop

The Transmit signal is both internally looped to the Receive interface and transmitted out of the Transmit interface. If a questionable network event is reported, then this type of loopback can help verify that the test unit (NAA I) is operating correctly.

The following options are available:

- Looped: Enables the diagnostic loopback.
- Unlooped: Disables the diagnostic loopback.

NOTE ➤
This function is available for use only with the NAA I. ◄

Signal Status

Displays the optical (dBm) or electrical (voltage) power and line frequency received by the system. When optically connected, the following measurements appear:

- Received Optical Power (in dBm)
- Line Frequency (in MHz)
- Frequency Offset (in kHz and ppm)

When electrically connected, the following measurements appear:

- Peak Positive and Peak Negative Pulse Voltage (in volts)
- Power (in dBm and dBdsx)
- Line Frequency (in MHz)
- Frequency Offset (in kHz and ppm)

When initially selected, the Signal Status may take several seconds to update and will display the message Measuring... .

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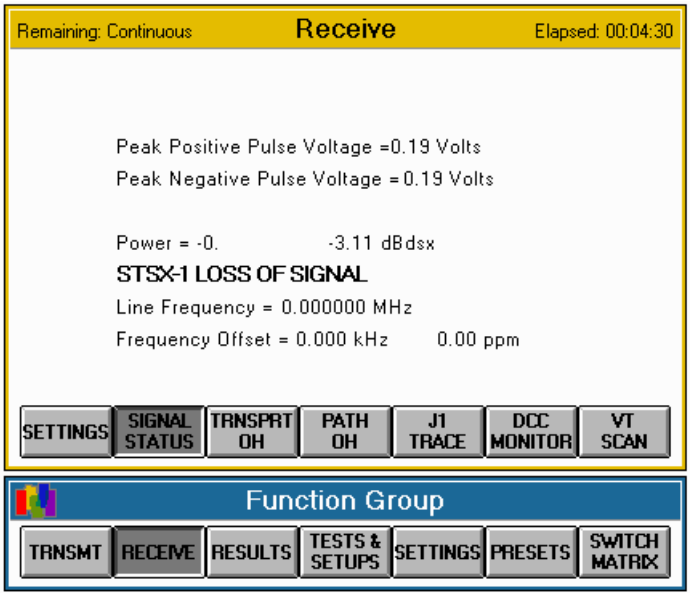


Figure 4-12. Receive Signal Status Function Menu with Optical Measurements Shown

Trnsprt OH

The Transport Overhead button (for the receive side of the protocol processor) lets you view all 27 bytes of a specific STS-1. For an OC-12 signal, Slots 1–12 can be viewed. For an OC-3, Slots 1–3 can be viewed. This function is independent of the Transmit Transport Overhead button.

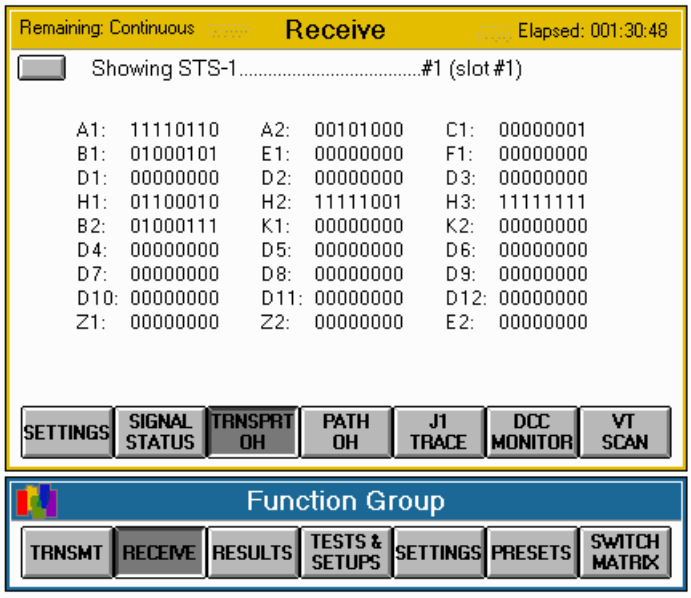


Figure 4-13. Receive Transmit OH Function Menu

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Path OH

The Path Overhead button lets you view the path overhead bytes for the selected SPE. (The current SPE is determined by the SPE Under Test command setting.)

The function can be independent of the Transmit-side. (The Settings Control command is set to Independent.) If so, then you are viewing the SPE selected under the Receive settings. If the Transmit and Receive functions are coupled, then your are viewing the same SPE that is selected on the Transmit-side.

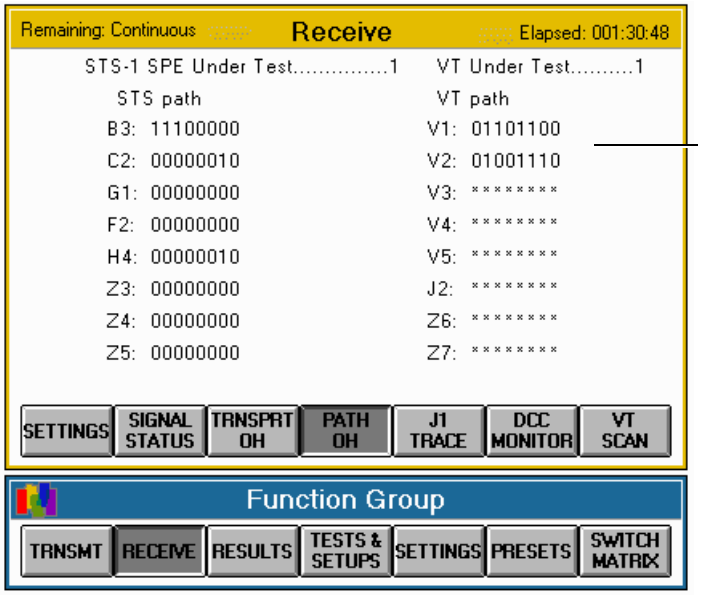


Figure 4-14. Path Overhead Function Menu

J1 Trace

The J1 byte from the Path Overhead is used to repetitively transmit a 64-byte, fixed length string so that continued connection to the source of the path signal can be verified at any receiving terminal along the path. In receive operations, you can view the 64-byte J1 pattern in the path overhead section of the results function.

The function can be independent of the Transmit-side. (The Settings Control command is set to Independent.) If so, then you are viewing the SPE selected under the Receive settings. If the Transmit and Receive functions are coupled, then your are viewing the same SPE that is selected on the Transmit side.

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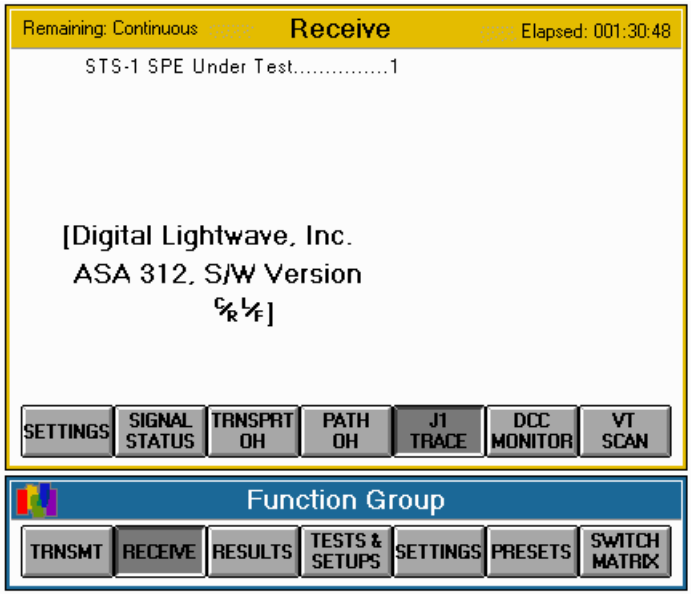


Figure 4-15. J1 Trace Function Menu

DCC Monitor

The DCC Monitor button lets you edit the datacom channel section and line transport overhead data for testing.

The following options are available for this command.

Option	Description
Section Drop/Insert	Allows you to drop and insert the Section DCC and edit the Line DCC bytes.
Section PRBS Test	Allows you to edit the Line DCC bytes and transmit an inserted PRBS pattern in the D1–D3 Section DCC bytes. The received pattern and Bit are monitored for both the DCC drop from SONET and the DCC Input from Connector. If either fails, then the PAT SYNC or BIT indicators turn red. The BIT Error count, Ratio and Seconds appear below the indicators in a table format.
Internal Byte	Allows you to edit the DCC bytes for Section (D1–D3) and Line (D4–D12) of the Transport Overhead. You must initialize the Transmit function and access the Transport Overhead selector to edit these DCC bytes.
Line Drop/Insert	Allows you to drop and insert the Line DCC and edit the Section DCC bytes.

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Option	Description
Line PRBS Test	Allows you to edit the Section DCC bytes and transmit an inserted PRBS pattern in the D4–D12 Line DCC bytes. The pattern and BIT monitoring are the same as described above in the Section PRBS Test option

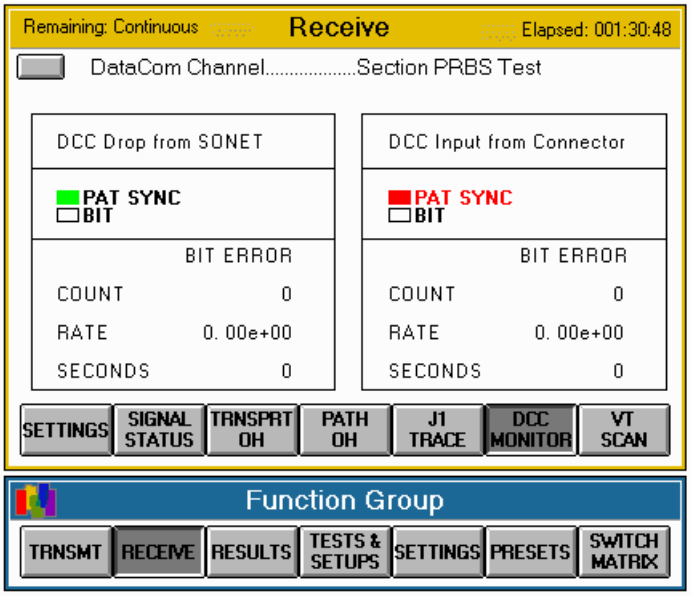


Figure 4-16. DCC Monitor Function Menu

VT Scan

The VT Scan button inspects and then reports the contents of the twenty-eight DS1 channels that are contained within a multiplexed VT1.5 signal. The information reported consists of such items as the framing and pattern activity detected on each DS1 channel.

The SONET protocol processor must be receiving a valid signal, otherwise, the VT Scan aborts. While a scan is in progress, you cannot access other functions. Select the Cancel button to stop the VT Scan.

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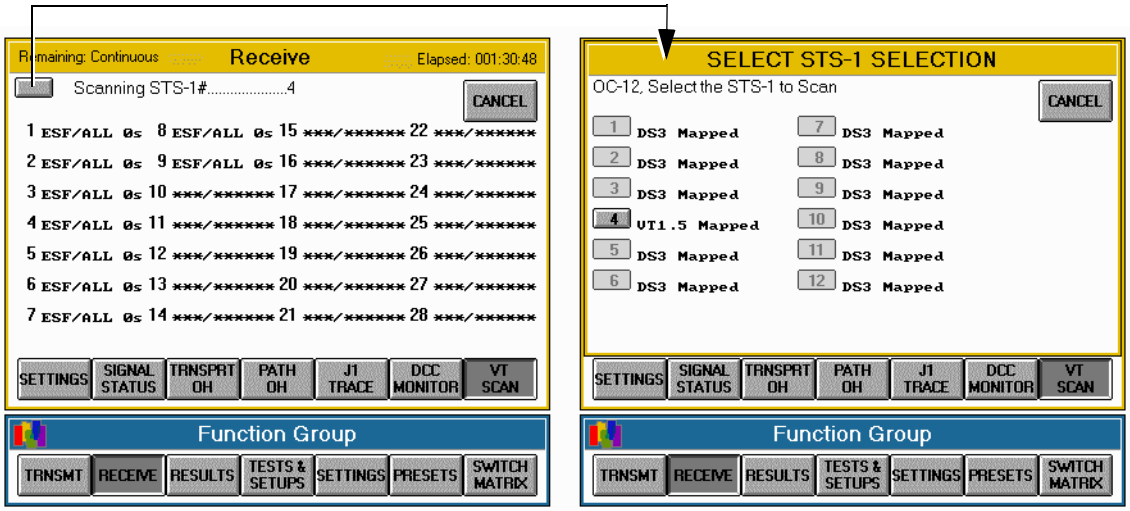


Figure 4-17. VT Scan Function Menu

Results Function Group

The ASA 312 and NAA I provide you with the ability to view results as a summary or as a history. The summary test results are displayed in a table format identifying errors, alarms, errored seconds and other parameters. The history results are displayed in a graphical format.

The Results Function Group button provides access to an overview of results, detailed main results, error analysis of the main results, graphed results, recall and save graph functions, and the ability to print the graphed results.

The following buttons make up the Results Function Group:

- **Trouble Scan:** Provides a quick report of detected errors and alarms and lists the duration of these events.
- **Main Results:** Provides detailed results for errors and alarms detected by the Trouble Scan function.
- **Error Analysis:** Reports percentage and error count values.
- **Graphs:** Displays alarm and error results as graphs
- **Recall Graphs:** Retrieves previously saved graphed data.
- **Save Graphs:** Saves graphed data.
- **Large LEDs:** Displays LED errors and alarms in a large format on the screen.

The following section describes these functions and their associated commands.

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Trouble Scan

The Trouble Scan function provides a list of received errors and alarms for the SONET protocol processor. The duration or count of each event also appears. This function is effective in identifying a general area to investigate when an error or alarm is detected.

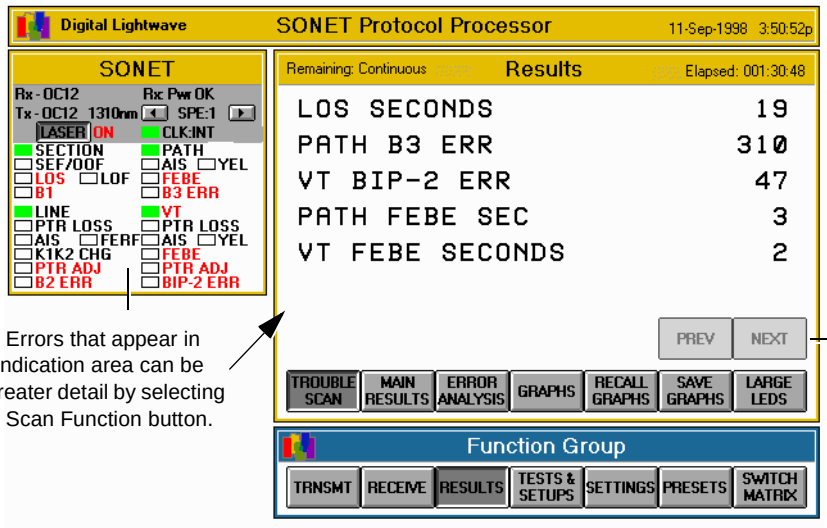


Figure 4-18. Trouble Scan Function Menu

The following is a list of the SONET Trouble Scan Errors and Alarms:

Event	Description
No Trouble	No error or alarms are detected.
Out of Frame Seconds	Reports the number of seconds an Out of Frame event occurred over a Section layer.
Loss of Frame Seconds	Reports the number of seconds a Loss of Frame event occurred over a Section layer.
Loss of Signal Seconds	Reports the number of seconds a Loss of Sync event occurred over a Section layer.
B1 Errors	Reports the number of B1 errors over a Section layer.
BPV	Reports Bi-polar violations that occur when the unit is configured for STSX1 mode.
BIT Errors	Reports the number of payload bit errors when the unit is in concatenated mapping (STS-3c, STS-12c, or STS-48c).
Loss of Pointer Seconds	Reports the number of seconds of Pointer Loss over a Line layer.
AIS Seconds	Reports the duration of an AIS condition
Line FEBE	Reports the number of Line FEBE errors.
K1K2 Change	Reports changes in the K1 and K2 Line Overhead bytes
Loss of Pattern Seconds	Reports the number of seconds a valid Pattern is not detected.

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Event	Description
Line B2 BIP Errors	Reports the number of B2 errors over the Line layer.
Path AIS	Reports the number of seconds a PATH AIS error.
Path Yellow Seconds	Reports the Yellow alarm duration over a Path layer.
Path FEBE Seconds	Reports the duration of a FEBE over a Path layer
Path B3 BIP Errors	Reports the number of B3 errors over the Path layer.
VT BIP-2 Errors	Reports the number of BIP-2 errors over a Virtual Tributary layer.
VT Loss of Pointer Seconds	Reports the duration of a Loss of Pointer event over a Virtual Tributary layer.
VT Path Yellow Seconds	Reports the Yellow alarm duration over a Virtual Tributary layer.
VT FEBE Seconds	Reports the duration of a FEBE errors over a Virtual Tributary layer.

Main Results

The Main Results button displays detailed results for SONET errors and alarms identified by the Trouble Scan function. An error and alarm results report can be created and printed by selecting the Print action button and then selecting the Results print option. For more information, refer to the Print section of chapter 11.

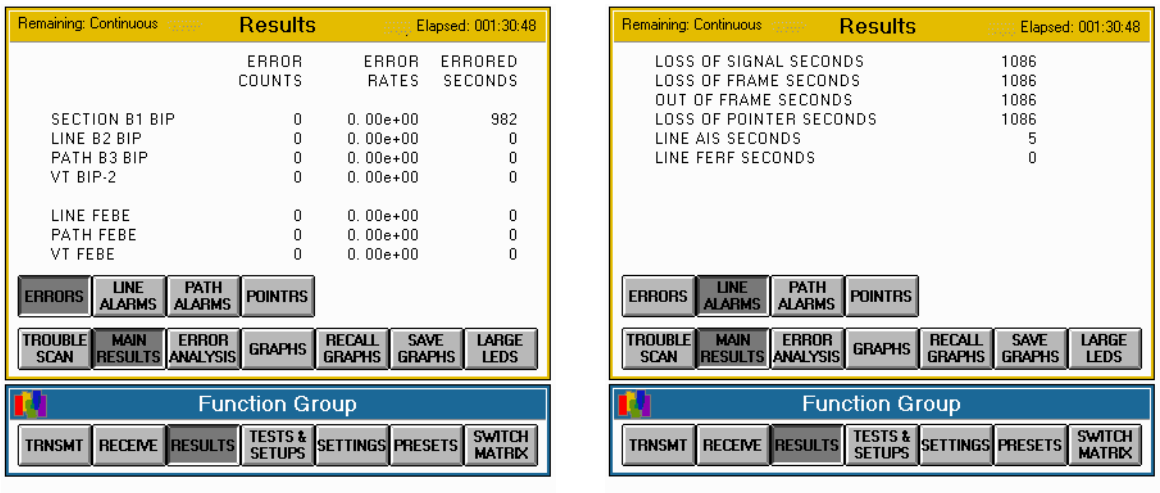


Figure 4-19. SONET Errors and SONET Line Alarms

Errors

Displays the number of errors detected, the error rate measurement, and the total number of seconds that the errors were transmitted.

The errors reported are generated by the SONET network or intentionally by the system using the Error Insert Action button.

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The following SONET errors are reported.

- Section B1 BIP
- Line B2 BIP
- Path B3 BIP
- VT BIP-2
- Line FEBE
- Path FEBE
- VT FEBE
- STSX-1 BPV (if configured for STSX-1 mode).
- Payload Bit

Line Alarms

Displays the duration of alarms detected over the Line layer. Results (in seconds) for the following alarms appear.

- Loss of Signal Seconds
- Out of Frame Seconds
- Loss of Pointer Seconds
- Line AIS Seconds
- Line FERF Seconds
- Loss of Frame Seconds

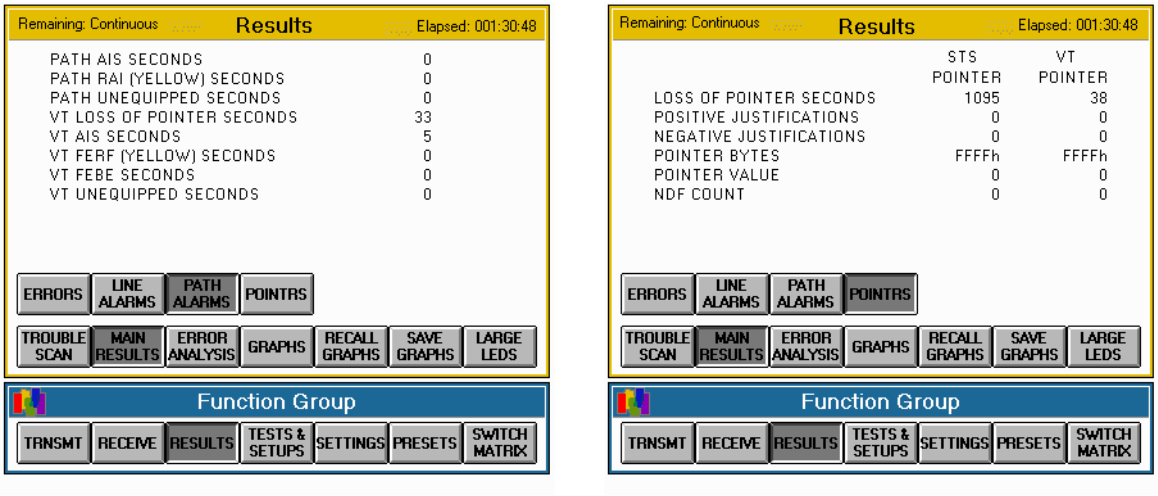


Figure 4-20. SONET Path Alarms and SONET Pointer Results

Path Alarms

Displays the duration of the SONET Path alarms. Results for the following alarms appear:

- Path AIS Seconds
- Path RAI (yellow) Seconds
- Path Unequipped Seconds
- VT Loss of Pointer Seconds
- VT AIS Seconds
- VT FERF (yellow) Seconds
- VT FEBE Seconds
- VT Unequipped Seconds

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Pointers

Displays the duration and values recorded for the STS Pointer and VT Pointer. The following results appear:

- Loss of Pointer Seconds
- Positive Justifications
- Pointer Bytes
- NDF (New Data Flag) Counts
- Negative Justifications
- Pointer Value

Error Analysis

This button provides greater detail of detected and logged SONET errors using percentage and count values.

Section Analysis

Provides a detailed breakdown for Section errors (B1 BIP) detected and logged by the SONET protocol processor.

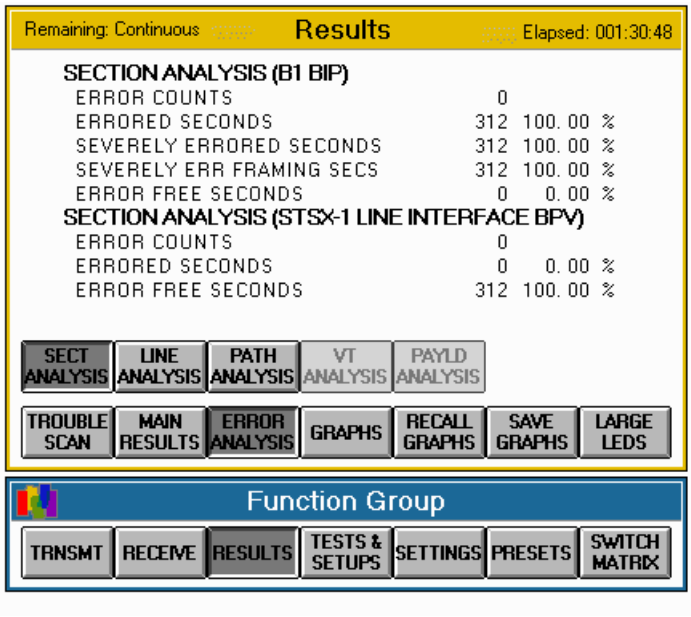


Figure 4-21. Error Analysis Section Analysis Display

Line Analysis

Provides a detailed breakdown for Line errors for both B2 BIP and FEBE error conditions logged by the SONET protocol processor.

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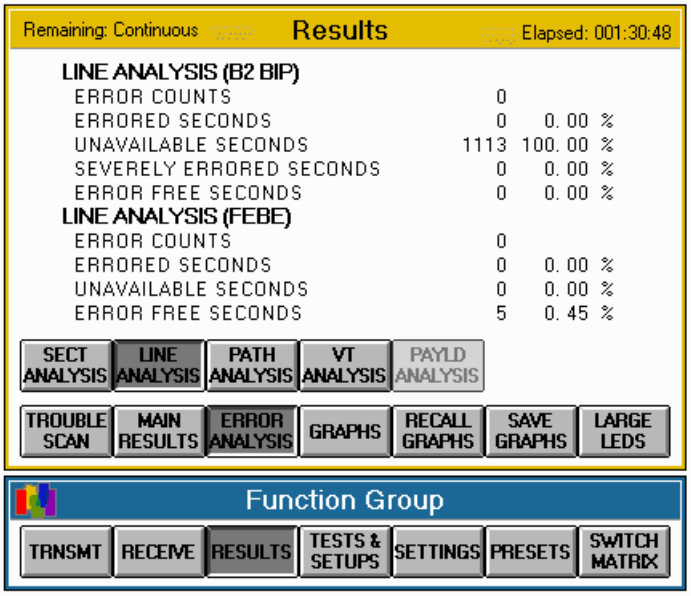


Figure 4-22. Error Analysis Line Analysis Display

Path Analysis

Provides a detailed breakdown for Path errors for both B3 BIP and FEBE error conditions logged by the SONET protocol processor.

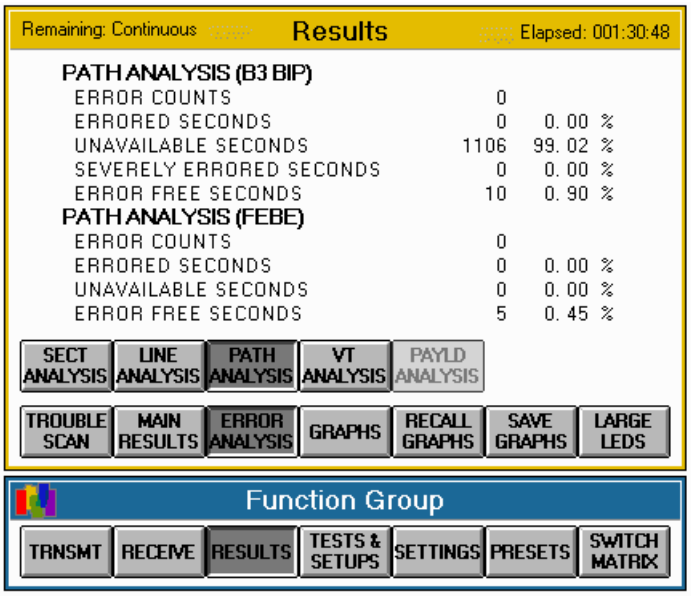


Figure 4-23. Error Analysis Path Analysis Display

VT Analysis

Provides a detailed breakdown for Virtual Tributary errors for both VT BIP-2 and VT FEBE error conditions logged by the SONET protocol processor.

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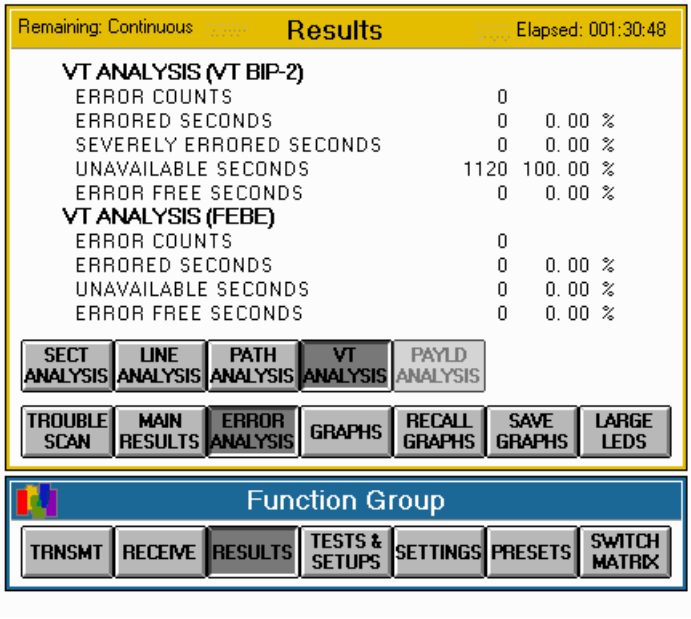


Figure 4-24. Error Analysis VT Analysis Display

Payload Analysis

Provides a detailed breakdown of the SONET Payload bit errors. This reporting is available for the STS-12c/Pattern and STS-3c/Pattern mappings and the DS1 Drop/Insert and DS3 Drop/Insert Preset commands.

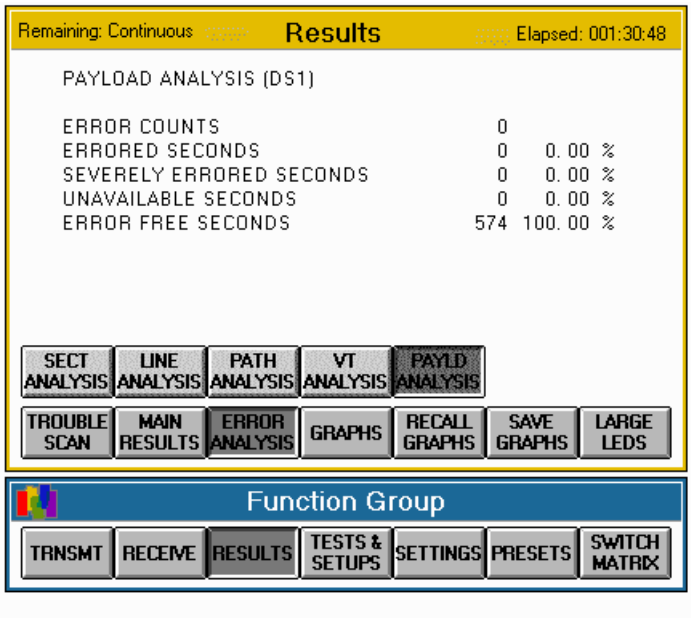


Figure 4-25. Error Analysis Payload Analysis Display

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Graphs

Use the Graphs button to view error and alarm results for the SONET protocol processor. These graphs show the test history for either the current test or the previous test. You can configure the graph function to display any combination of SONET Alarms and Errors.

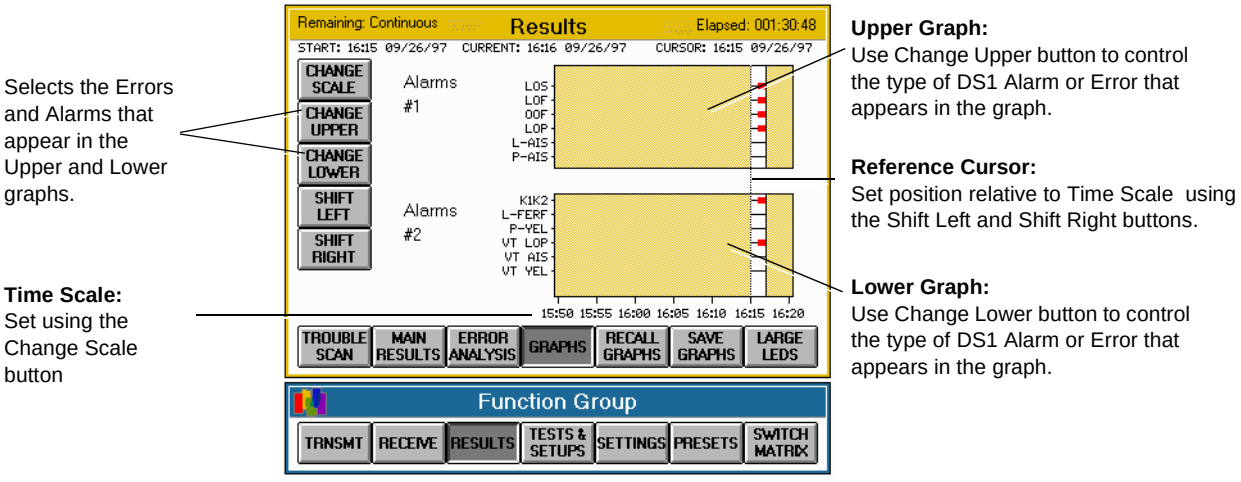


Figure 4-26. SONET Graphs

Graphed Alarms

The following items are graphed for Alarm #1:

- LOS (Loss of Signal)
- LOF (Loss of Frame)
- OOF (Out of Frame)
- LOP (Loss of Pointer)
- L-AIS (Line Alarm Indication Signal)
- P-AIS (Path Alarm Indication Signal)

The following items are graphed for Alarm #2:

- K1K2 (K1 and K2 Byte Change)
- L-FERF (Line Far-end Receive Failure)
- P-YEL (Path Yellow Alarm)
- VT LOP (Virtual Tributary Loss of Pointer)
- VT AIS (Virtual Tributary Alarm Indication Signal)
- VT YEL (Virtual Tributary Yellow Alarm)
- Payld (appears when using concatenated payloads in STS mapping.)

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Graphed Errors

The error count (1E-8 through 1E-0) is graphed for SONET Errors. The following SONET Errors can be graphed using this function:

- Section B1 Count
- Line B2 Count
- Path B3 Count
- Path FEBE Count
- Positive Pointer Adjustment
- Negative Pointer Adjustment
- VT BIP-2 Count
- VT FEBE Count
- VT Positive Pointer Adjustment
- VT Negative Pointer Adjustment
- Payload Errors

Change Scale

Compresses or expands the displayed time scale for the graphed errors and/or alarms.

The following values are available for this function:

Option	Description
30 minute	Sets the graph's time scale to 30-minute increments.
90 minute	Sets the graph's time scale to 90-minute increments.
3 hour	Sets the graph's time scale to 3-hour increments.
6 hour	Sets the graph's time scale to 6-hour increments.
12 hour	Sets the graph's time scale to 12-hour increments.
24 hour	Sets the graph's time scale to 24-hour increments.
72 hour	Sets the graph's time scale to 72-hour increments.

Change Upper and Change Lower

These buttons determine what type of alarms and errors display in the two graphs.

Shift Left and Shift Right

The Upper and Lower graphs use a dotted line as a Reference Cursor to identify exact error and alarm conditions for a specific time. Use these buttons to adjust the time scale to an earlier or later time by moving the cursor to the left or right on the Upper and Lower graphs.

The Reference Cursor can also be moved to a specific time by touching the screen and dragging the cursor either to the right or left in the graphed display. The position of the cursor corresponds to a time and date which is displayed above the graphs in text for easy viewing.

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Save Graphs

Use this button to save the current or previously graphed results to a file for later retrieval and viewing. The filename and a file description are entered using a keypad that automatically appears when these buttons are selected.

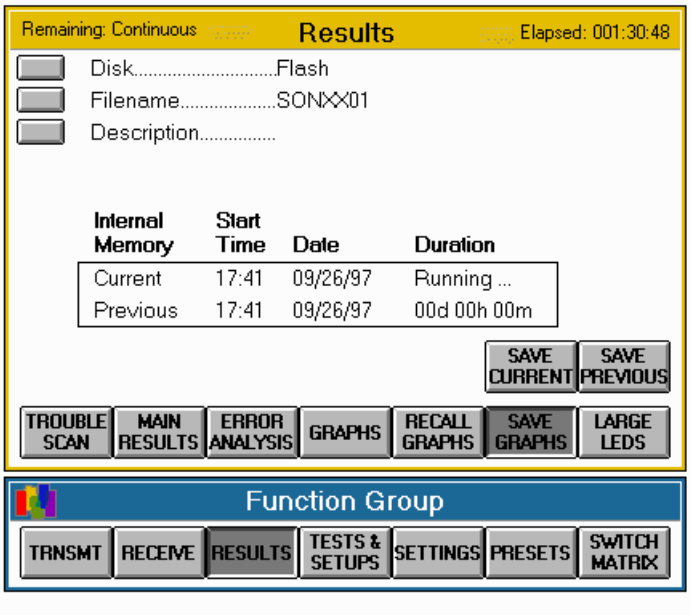


Figure 4-27. SONET Save Graphs Commands

The following information appears when Save Graphs button is selected.

Disk

Saves the graph to either Flash memory, the SRAM memory PC Card (only appears if a memory card is inserted in the PCMCIA slot), or RAM drive. The following options are available for this command.

Option	Description
Flash	This is nonvolatile memory. The Graph is stored on the system or until it is removed using the Delete command.
RamDrive	This is volatile memory. If the Graph is saved to RAM, then it is deleted when the system is Powered Off.
PCMCIA	Allows the Results Graph to be saved to an SRAM PC Card. **This option appears only if a PC Card is inserted into the PCMCIA slot.**

Filename

Allows you to save the Results Graph with an eight-character internal filename. Enter a filename. Filenames can be from one to eight characters in length. SONET Result Graphs have the .RS extension automatically appended.

Description

Allows you to enter a 25-character description for the file.

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Current and Previous Internal Memory

For easy reference, and to ensure that the file data is accurate, there is a table identifying data for both the current and previous system memory locations. This table contains the following information:

- Internal memory
- Start time of the graphed result
- Date of the graphed result
- Duration of the graphed result

Using two function buttons, Save Current and Save Previous, choose which graphed results to save. No graphed data file can be saved unless the protocol processor has been stopped and no test is currently running.

Save Current

Saves the graphed test data that is currently stored in the current system memory location.

To ensure accuracy, the system stores data in both a current and previous system memory location. These memory locations contain start time, date, and duration of the graphed results.

NOTE ➤
The message Protocol processor must be stopped before results can be saved appears if you try to save a file while a test is in progress. This warning applies only to the protocol processor currently in use; other protocol processors (for example, ATM, DS1, E1 or DS3) may be running due to the simultaneous operations capability.

No graphed data file can be saved unless the protocol processor and currently active test is stopped. ◄

Save Previous

Saves the graphed test data that is currently stored in the previous memory location.

To ensure accuracy, the system stores data in both a current and previous system memory location. These memory locations contain start time, date, and duration of the graphed results.

NOTE ➤
The message Protocol processor must be stopped before results can be saved appears if you try to save a file while a test is in progress. This warning applies only to the protocol processor currently in use; other protocol processors (for example, ATM, DS1, E1, or DS3) may be running due to the simultaneous operations capability.

No graphed data file can be saved unless the protocol processor and currently active test is stopped. ◄

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Recall Graphs

Use the Recall Graphs button to open any previously saved graph that is stored either on the Flash drive, SRAM PC Card (appears only if a memory card is inserted in the PCMCIA slot), or RAM drive.

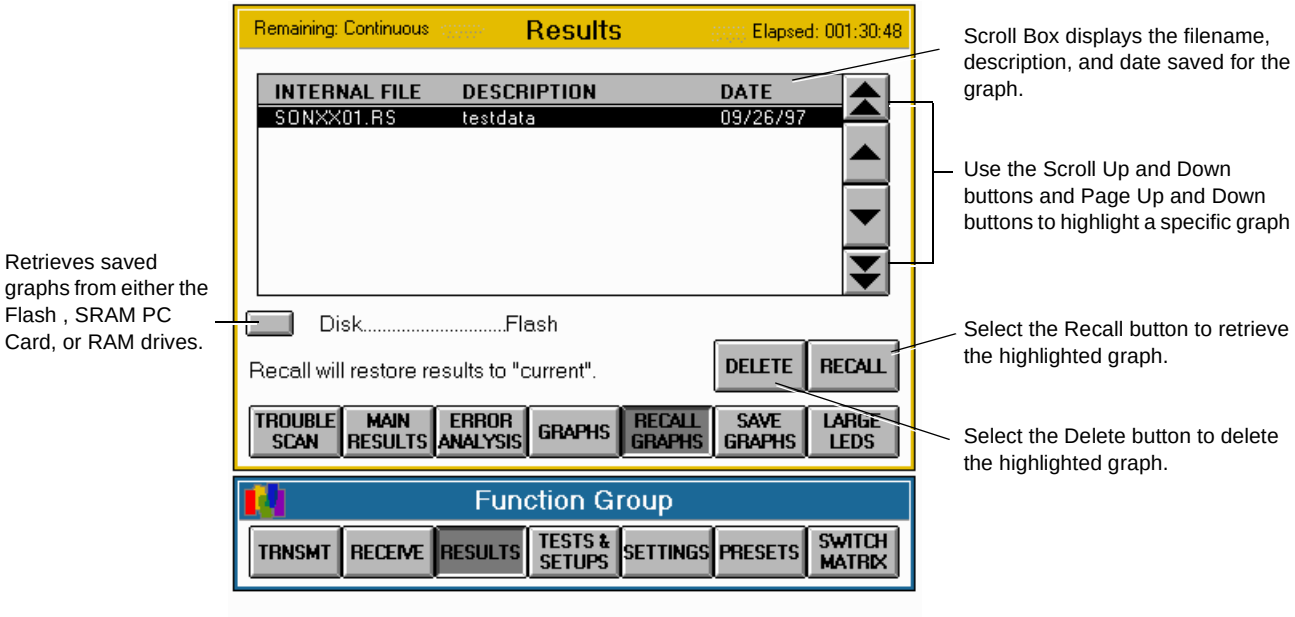


Figure 4-28. SONET Recall Graphs Commands

While the unit is performing test operations, protocol processor results are viewed and saved. Using the Save Graphs function described earlier in this section, these graphed results are automatically loaded into the instrument system memory and the data is always saved in what is called a "current" results location. When using the Run Stop function to stop the test and re-start another one, the "current" test results are moved to what is referred to as the "previous" test results location and the current test results are initiated again.

The Recall Graphs function menu field selector recalls graphs and either deletes the graphed results or restores the graphed results to the current location in the instrument system memory. These recalled results are derived from the list of graphs saved using the Save Graphs function. These saved graphs are listed in the Recall Graphs display and identified using a table.

The table lists the internal file name, a description of the file and the date the file was saved. Arrow keypads are provided for easy viewing up and down the list of saved graph files. Once a file is selected, it can either be recalled which restores these results to the current results location and now can be viewed, or deletes the graphed data using the Delete function.

NOTE ➤
The instrument is currently capable of saving only graphed results data obtained using the protocol processor Run Stop function. All other protocol processor results data are deleted automatically when the unit is turned off unless graphed results are saved using the Save Graph function. ◄

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Large LEDs Button

This function displays the SONET LED Error and Alarm Indicators in a large, easy to read format that covers the entire screen area. This is especially useful for viewing any errors or alarms from a long distance, such as across the room from a test bay.

You have the option of viewing errors and alarms for all protocol processors (DS1 or E1, DS3, ATM, and SONET) or just the SONET protocol processor errors and alarms.

The following describes the LED colors:

If the LED is this color...	Then the LED indicates this activity...
Green	The specific function is active and OK.
Red	An error or alarm event is in progress.
Yellow	Indicates that this function experienced an error or alarm event. This event is cleared by selecting the Clear History button.
Black (Clear)	No activity from this specific function.

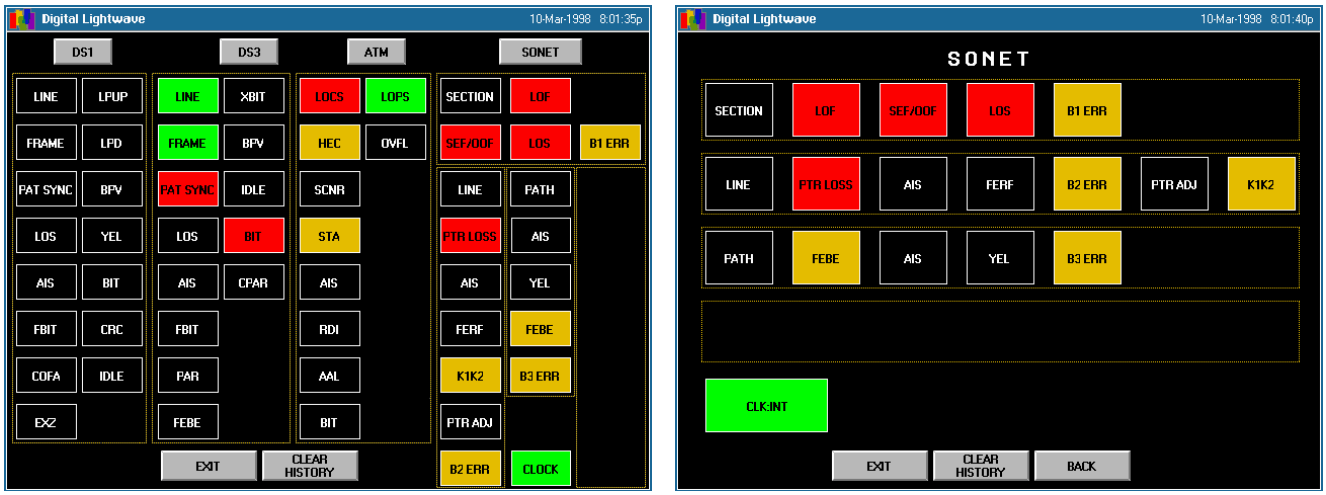


Figure 4-29. Large SONET LEDs and Large SONET Only LEDs

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Tests & Setups Function Group

The Tests & Setups Function Group button is described in detail in chapter 9, *Tests & Setups*. The commands and functions associated with this Function Group button are similar for the SONET, DS1, E1, and DS3 protocol processors.

Settings Function Group

The Settings Function Group button is described in chapter 10, *Settings, Presets, and Switch Matrix*. The commands and functions associated with this Function Group button are common to all five protocol processors.

Presets Function Group

The Presets Function Group button is described in chapter 11, *Settings, Presets, and Switch Matrix*. The commands and functions associated with this Function Group button are common to all five protocol processors.

Switch Matrix Function Group

The Switch Matrix Function Group button is described in chapter 11, *Settings, Presets, and Switch Matrix*. The commands and functions associated with this Function Group button are common to all five protocol processors.

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5 DS1 Protocol Processor

Overview

This chapter describes the user interface and commands that control the DS1 protocol processor. The DS1 protocol processor allows you to test and monitor DS1 signals. This can be performed independently or simultaneously with other protocol processors.

Introducing the DS1 User Interface

The DS1 user interface presents the commands, buttons, and LEDs that you use to control the DS1 protocol processor. The interface consists of the following elements:

- DS1 LEDs and Status Indicators
- DS1 Function Menu
- Function Group and Action button rows

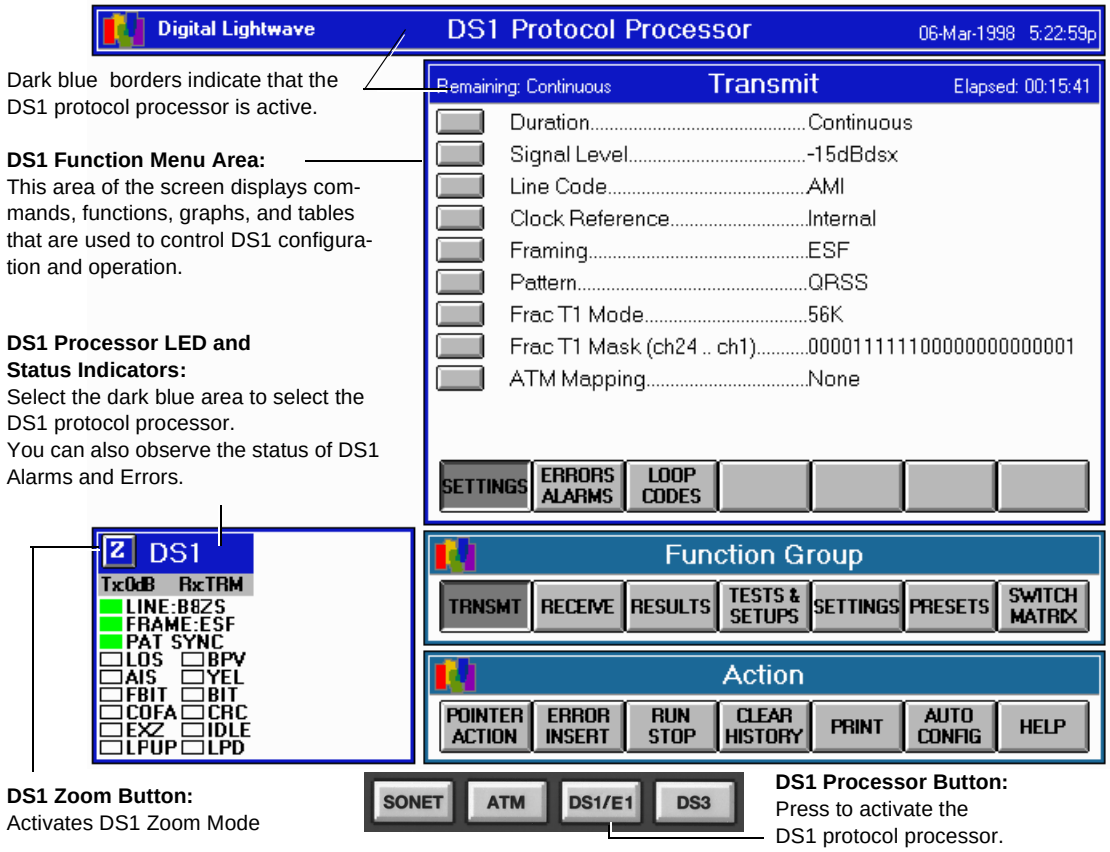


Figure 5-1. Typical DS1 Protocol Processor Touch Screen

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DS1 LEDs and Status Indicators

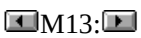
The DS1 Processor LED and Status Indicators area serves the following purposes:

- To provide access to the DS1 protocol processor functions, which is achieved by selecting the blue DS1 title bar on the screen.
- To provide a visual status of DS1 activity such as the line interface transmit and receive settings and DS1 alarm and error conditions.

The following describes the DS1 Processor Alarm and Status Indicators area.

DS1 Processor Alarm and Status Indicators

The DS1 Status Indicators report the condition of the DS1 alarms, errors, and signals.

Indicator	Description
	DS1 Zoom Button: Activates DS1 Zoom mode. This provides quick access to several DS1 Transmit and Receive commands, alarms, and errors. When selected, the entire screen is dedicated to the DS1 Zoom functions.
Tx	Indicates the current transmit DS1 Line Interface Signal Level (0dBdsx, -7.5dBdsx, or -15dBdsx). Refer to the DS1 Signal Level command for more information.
Rx	Indicates the current value of the DS1 Line Interface Input Termination (TRM, MON, or BRG). Refer to the DS1 Input Termination command for more information.
	VT Under Test Scroll Buttons and Counter: Indicates the Virtual Tributary (VT1–VT28) that is dropped or added to the DS1 protocol processor. This also indicates the value of the SONET VT Under Test command and allows you to change the VT. This counter appears only when a VT1.5 Async signal is dropped into the DS1 protocol processor. Use the Previous and Next scroll buttons to select a Virtual Tributary.
	M13 DS1 Scroll Buttons and Counter: Indicates the DS1 channel (DS1 #1–DS1 #28) that is dropped or added to the M13 MUX. This also indicates the value of the M13 DS1 Channel Inserted command and the M13 DS1 Channel Dropped command. This counter appears only when a signal is dropped from the M13 MUX into the DS1 protocol processor. Use the Previous and Next scroll buttons to select a DS1 Channel.

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Indicator	Description
Line	Line Code: Indicates the type of line coding selected for the DS1 line interface—AMI or B8ZS. Line Code does not appear if the VT Under Test Scroll buttons or M13 DS1 Scroll buttons appear.
Frame	Framing: Indicates the type of DS1 framing selected
Pat Sync	Pattern Synchronization: Indicates cell synchronization condition
LOS	Loss of Signal: Indicates a Loss of Signal status was detected.
BPV	Bipolar Violation Error: Indicates the presence of a Bipolar Violation error. This happens when two consecutive pulses of the same polarity occur in the same digital bit stream.
AIS	Alarm Indication Signal: Indicates, to downstream equipment, that an upstream failure has occurred on the DS1 signal. This is also known as a Blue Alarm.
YEL	Yellow Alarm: Also known as a Remote Alarm Indication (RAI) signal. Indicates to the far end that a failure was detected.
FBIT	Frame Bit Error: Indicates a frame bit error in the received frame bit pattern. This applies to both SF and ESF framing.
BIT	Indicates that a Bit error was received.
COFA	Change of Frame Alignment.
CRC	Cyclic Redundancy Check: Indicates that a CRC error has occurred. This applies to ESF framing only.
EXZ	Excess Zeros: Indicates that more than the permitted number of consecutive zeros were received. For AMI Line Coding, 16 or more zeros are excessive; for B8ZS Line Coding, 8 or more zeros are excessive.
Idle	Indicates a DS1 Idle alarm was received.
LPUP or LPDN	Loop Up or Loop Down: Indicates the transmission of a Loop Up or Loop Down code.
LPD	Looped: Indicates that a loopback test occurred.

Configuring the ASA 312 and NAA I for DS1 Operation

The ASA 312 and NAA I can be quickly configured for DS1 operation using the Presets Function group button.

The following procedures describe how to setup the system for basic DS1 operation using the DS1 Processor Preset command. It is assumed that the unit is looped (the transmit and receive ports are connected using a single cable).

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1. Select the Presets button located in the Function group button row. The Presets button is also accessible from the Switch Matrix screen.)

   The Presets command box appears.

   NOTE ➤
   If your system is not licensed for ATM operation, then the ATM options do not appear. ◄

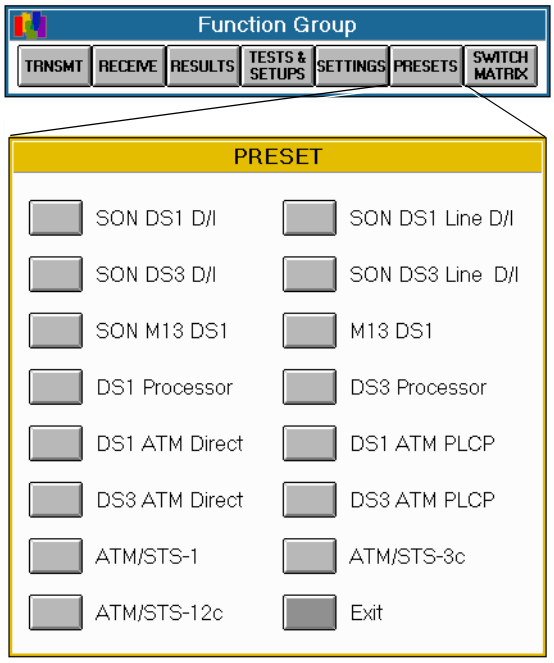


Figure 5-2. Displaying Preset Commands for DS1

2. Select the DS1 Processor command button.

   The message Processing...Please wait displays.

3. Select the DS1 protocol processor.

   The DS1 protocol processor is selected by selecting either the DS1 Title Bar (the dark blue area of the DS1 Alarm and Status Indicator area) or by selecting the DS1 Processor Button.

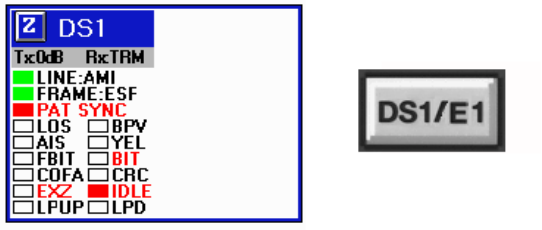


Figure 5-3. Selecting the DS1 Protocol Processor

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The Transmit Settings commands appear on the screen.

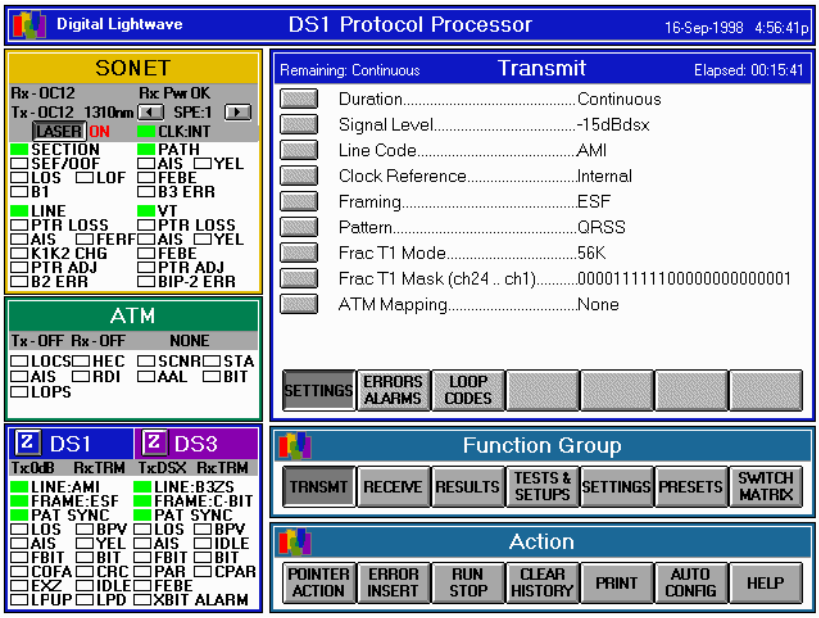


Figure 5-4. DS1 Protocol Processor with Transmit Function Menu

4. If necessary, make the appropriate changes to the Transmit DS1 Line Interface and DS1 protocol processor functions
5. Select the Receive Function group button.

   The Settings commands (from the Receive Function group button) display on the screen.

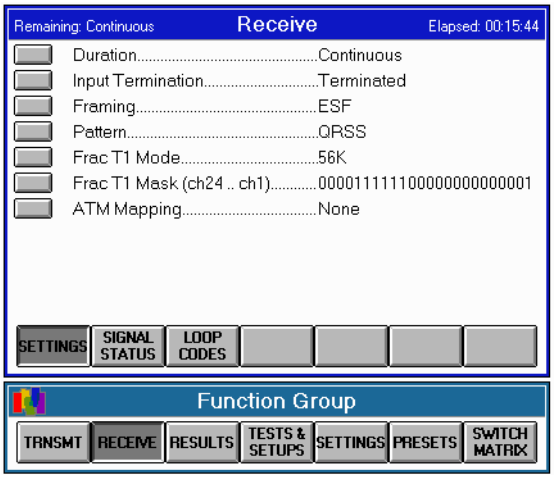


Figure 5-5. DS1 Protocol Processor with Receive Function Menu

6. If necessary, make the appropriate changes to the Receive DS1 Line Interface and DS1 protocol processor functions.

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7. Verify that the DS1 LEDs are green and clear.
8. Select the Run Stop button located in the Action button row.

   The Run/Stop Menu displays.

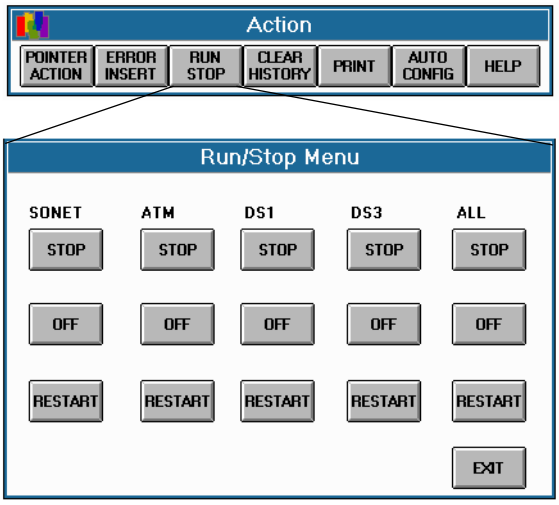


Figure 5-6. Restarting the DS1 Protocol Processor

9. Select the DS1 Restart button.

   The DS1 protocol processor is now running.

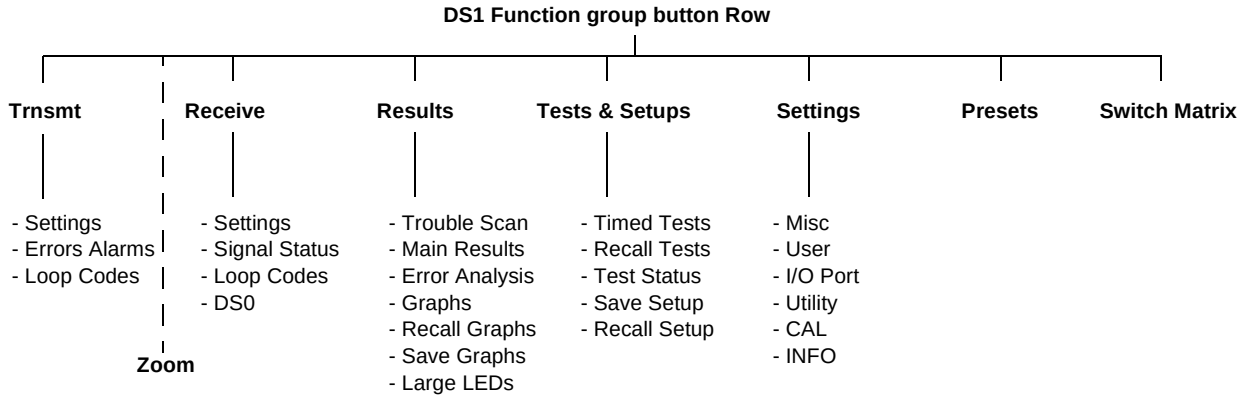
The system is configured for basic DS1 testing and monitoring. At this point, you can view results by selecting the Results Function group button or initiate tests by selecting the Tests & Setup Function group button.

If your application requires customized configuration, then use the Switch Matrix to create specific mapping and configuration settings.

DS1 Protocol Processor Function group buttons

The functionality available for the DS1 protocol processor appears by selecting any of the following buttons from the Function group button row:

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The remainder of this chapter describes the functions, commands, and options associated with the previously illustrated Function group buttons.

Trnsmt Function Group

The Trnsmt (Transmit) Function group button provides a menu for defining the signal parameters used in DS1 transmit operations.

The following buttons make up the Transmit Function Group:

- **Settings:** Configures the unit's transmit parameters for your DS1 test environment.
- **Errors and Alarms:** Generates errors and alarms on your DS1 facility.
- **Loop Codes:** Places a DS1 facility into loopback test.

The **Zoom** button activates the DS1 Zoom touch screen function which provides quick access to specific DS1 commands, alarms, and errors. It is described at the end of the Transmit Function Group section.

Settings

The Settings button configures the transmit signal parameters for the DS1 Line Interface and the DS1 protocol processor to match the DS1 signal used in your test environment.

NOTE ➤
The Framing and Pattern commands are automatically coupled between the Transmit and Receive Function group buttons. Therefore, any changes made to DS1 Framing and Pattern commands from the Transmit Function Group are automatically replicated for the Receive Function Group. ◄

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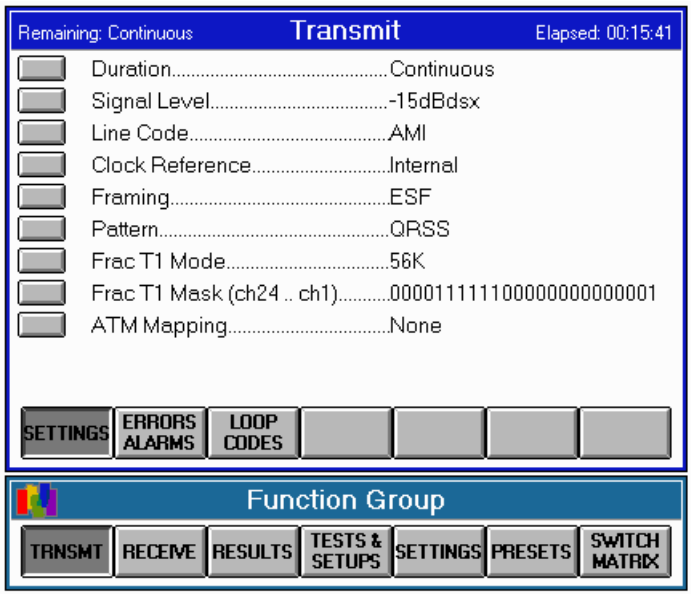


Figure 5-7. Transmit Settings Commands

Duration

Sets the duration of the Transmit test to Continuous, 5 Minutes, 15 Minutes, 1 hour, 2 hours, 24 hours, 72 hours, or a User-Defined amount.

Signal Level

Sets the strength of the DS1 transmit signal. The signal level values are relative to a normal DSX1 signal level. The following options are available:

Option	Description
0 dBdsx	Signal level is at the DSX1 signal level
-7.5 dBdsx	Signal level is -7.5 dB below the normal DSX1 signal level
-15 dBdsx	Signal level is -15 dB below the normal DSX1 signal level

Line Code

Selects the type of signal coding transmitted by the DS1 protocol processor. The following options are available.

Option	Description
AMI	Alternate Mark Inversion coding (Default)
B8ZS	Binary 8 Zero Substitution coding

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Clock Reference

Determines the timing source for the DS1 transmit signal. The following options are available:

Option	Description
Internal	Derives the transmit data's timing source from the system's internal clock.
BITS	Synchronizes the transmitted signal to the BITS (Building Integrated Timing Supply) clock input.
Looped	Takes the transmit timing source from the clock signal recovered from the received data.

Framing

Configures the framing format used for the DS1 transmit signal.

NOTE ➤
The DS1 Transmit and Receive functions are coupled. Any changes made to this command are replicated to the DS1 receive signal. The Receive Frame command is mentioned later in this chapter. ➤

The following options are available:

Option	Description
Unframed	Configures the system to transmit a DS1 signal using an unframed format.
ESF	Configures the system to transmit a DS1 signal using Extended Super Frame format.
SF/D4	Configures the system to transmit a DS1 signal using D4 super frame format.
SLC-96	Configures the system to transmit a DS1 signal using SLC-96 format (Subscriber Loop Carrier).

Pattern

Selects the type of DS1 signal pattern that is transmitted by the system.

NOTE ➤
The following information assumes that your system contains the latest hardware and software revisions. If a DS1 pattern behaves differently due to older hardware, then the difference is noted in the Description column.

Consult your Digital Lightwave Sales or Technical Support representative to obtain information about hardware and software revisions. ➤

The following patterns are available for the DS1 transmit signal:

DS1 Pattern	Description	Available for...
QRSS	Quasi-Random Signal Source. Transmits a modified 2^20-1 pseudorandom pattern which allows a maximum of 14 sequential zeros and 20 sequential ones. This pattern simulates live data.	All DS1 modes

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DS1 Pattern	Description	Available for...
2^6-1 (63) PRBS	Transmits a maximum of 5 consecutive zeros and 6 consecutive ones. This pattern is also known as a 63-bit PRBS pattern. **Note**: If your system contains older hardware, then this pattern appears only when the DS1 protocol processor is configured for 56K or 64K Fractional T1 mode.	All DS1 modes **Note:** This function is not available for use with the NAA I.
2^9-1 (511) PRBS	Transmits a maximum of 8 consecutive zeros and 9 consecutive ones. This is also known as a 511-bit PRBS pattern. **Note**: If your system contains older hardware, then this pattern appears only when the DS1 protocol processor is configured for 56K or 64K Fractional T1 mode.	All DS1 modes **Note:** This function is not available for use with the NAA I.
2^11-1 (2047) PRBS	Transmits a maximum of 10 consecutive zeros and 11 consecutive ones. This is also known as a 2047-bit PRBS pattern. **Note**: If your system contains older hardware, then this pattern appears only when the DS1 protocol processor is configured for 56K or 64K Fractional T1 mode.	All DS1 modes
2^15-1 PRBS	Transmits a 32,767-bit pseudorandom pattern on a DS1 which generates a maximum of 14 sequential zeros and 15 sequential ones. It provides a maximum number of zeros allowed for framed, non-B8ZS testing. The pattern does not meet the minimum ones-density requirement.	All DS1 modes
2^20-1 PRBS	Transmits a 1,048,575-bit pseudorandom pattern which generates a maximum of 19 sequential zeros and 20 sequential ones.	All DS1 modes
2^23-1 PRBS	Transmits a 8,388,607-bit pseudorandom pattern which generates a maximum of 22 sequential zeros and 23 sequential ones.	All DS1 modes
All Ones	Transmits a fixed test pattern of only pulses (marks). This pattern is generally used to stress span repeater current regulator circuits. It can be used as an Alarm Indication Signal (AIS) in unframed circuits, or a keep alive signal, idle code, or red alarm in other circuits.	All DS1 modes
All Zeros	Transmits a fixed all zeros pattern. Used to stress circuits for B8ZS coding errors.	All DS1 modes
3 in 24	Transmits a fixed test pattern of F0100 0100 0000 0000 0000 0100. The pattern is aligned with the F-bits as indicated. 3 in 24 provides the minimum ones density and the maximum excess zeros requirements to stress T1 circuits. When the pattern is framed, it violates the minimum ones density requirements.	All DS1 modes

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DS1 Pattern	Description	Available for...
1 in 8 (1:7)	Transmits a fixed pattern of F01000000. This pattern stresses the minimum ones density requirement for B8ZS encoded T1 circuits if sent unframed.	All DS1 modes
1010 Pattern	A fixed test pattern of alternating marks (1) and spaces (0). This pattern is generally used to perform a minimum level stress test on clock recovery circuits.	All DS1 modes
User Defined	Allows you to create a unique pattern for transmission. The pattern can range from 3-bits to 24-bits and is entered using a touch screen keypad. In addition, you can use this option to send a User Defined pattern created using the Maintenance Control Codes command. This command is located under the Loop Codes button.	All DS1 modes
VF Tones	Enables VF Tone generation. The following µ-law encoded tones can be generated over a DS0 channel: 404 Hz, 1000 Hz, 1004 Hz, 1013.8 Hz, and 2804 Hz. For more information regarding this pattern, refer to the *Using VF Tones Pattern* section discussed later in this chapter. Note: This pattern is available only for system's containing the latest hardware revision.	64K Fractional T1 mode only **Note:** This function is not available for use with the NAA I.
55DLY	Transmits a 55 octet Daly pattern.	Non-Fractional T1 mode
T1-2	Transmits a 96 octet pattern.	Non-Fractional T1 mode
T1-3	Transmits a 54 octet pattern.	Non-Fractional T1 mode
T1-4	Transmits a 120 octet pattern.	Non-Fractional T1 mode
T1-5	Transmits a 53 octet pattern.	Non-Fractional T1 mode
55-OCTET	Transmits a 55 octet pattern.	Non-Fractional T1 mode
DDS-1	An octet of 11111111 (repeated 100 times) followed by an octet of 00000000 (repeated 100 times) transmitted continuously. Note: If your system contains older hardware, then this pattern does not appear when the DS1 protocol processor is configured for Fractional T1 mode. In addition, this pattern is unavailable if the Framing command is set to Unframed or SLC-96.	All DS1 modes **Note:** This function is not available for use with the NAA I.

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DS1 Pattern	Description	Available for...
DDS-2	An octet of 01111110 (repeated 100 times) followed by an octet of 00000000 (repeated 100 times) transmitted continuously. Note: If your system contains older hardware, then this pattern does not appear when the DS1 protocol processor is configured for Fractional T1 mode. In addition, this pattern is unavailable if the Framing command is set to Unframed or SLC-96.	All DS1 modes **Note:** This function is not available for use with the NAA I.
DDS-3	An octet of 01001100 transmitted continuously. Note: If your system contains older hardware, then this pattern does not appear when the DS1 protocol processor is configured for Fractional T1 mode. In addition, this pattern is unavailable if the Framing command is set to Unframed or SLC-96.	All DS1 modes **Note:** This function is not available for use with the NAA I.
DDS-4	An octet of 00000010 transmitted continuously. A Yellow Alarm (Remote Alarm Indicator) occurs if the Framing command is configured for SF/D4 framing. This is normal because of the octet's bit pattern. Note: If your system contains older hardware, then this pattern does not appear when the DS1 protocol processor is configured for Fractional T1 mode. In addition, this pattern is unavailable if the Framing command is set to Unframed or SLC-96.	All DS1 modes **Note:** This function is not available for use with the NAA I.
DDS-5	DDS-1 pattern (repeated 4 times); DDS-2 (repeated 4 times); DDS-3 (once); DDS-4 (once) transmitted continuously. Note: If your system contains older hardware, then this pattern does not appear when the DS1 protocol processor is configured for Fractional T1 mode. In addition, this pattern is unavailable if the Framing command is set to Unframed or SLC-96.	All DS1 modes **Note:** This function is not available for use with the NAA I.
DDS-6	An octet of 11111110 (repeated 7 times) followed by an octet of 11111111 (once) transmitted continuously. Note: If your system contains older hardware, then this pattern does not appear when the DS1 protocol processor is configured for Fractional T1 mode. In addition, this pattern is unavailable if the Framing command is set to Unframed or SLC-96.	All DS1 modes **Note:** This function is not available for use with the NAA I.
Bridge Tap	Transmits twenty-one different patterns to detect bridge taps on a DS1. The following patterns are performed in 30 second increments: All Ones, 1-in-2, 1-in-4, 1-in-6, 1-in-7, 1-in-8, 2-in-9, 2-in-10, 2-in-11, 2-in-12, 2-in-13, 2-in-14, 2-in-15, 3-in-18, 3-in-19, 3-in-20, 3-in-21, 3-in-22, 3-in-23, 3-in-24, and QRSS. Test results can be viewed by selecting the Main Results button located in the Results Function Group. (This is a continuous test and can be stopped or restarted using the Run Stop Action button.)	Non-Fractional T1 mode

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DS1 Pattern	Description	Available for...
Multi-Pattern	Transmits five different patterns to stress a DS1. The following patterns are performed in 5 minute increments: All Ones, 1-in-8, 2-in-8, 3-in-24, and QRSS. Test results can be viewed by selecting the Main Results button located in the Results Function Group. (This is a continuous test and can be stopped or restarted using the Run Stop Action button.)	Non-Fractional T1 mode

Using VF Tone Patterns.
The ASA 312 supports VF tone generation.

NOTE ➤
This function is not available for use with the NAA I.◄

Using an system on the transmit-side, you can insert a com by selecting VF tone (μ-law encoded tone) into a single DS0 signal. The DS0 signal is multiplexed into a DS1 signal.

Using an ASA 312 on the receive-side, the DS1 signal is demultiplexed into a DS0 signal. The VF tone is dropped to the speaker for audible monitoring.

NOTE ➤
If your ASA 312 does not have the required supporting hardware, then **VF Tone** does not appear as an option for DS1 Patterns. ◄

To enable the system for VF Tone patterns:

1. Select the DS1 protocol processor.
2. Select the **Trnsmt** Function group button and then select the **Settings** button.
3. Configure the **Frac T1 Mode** command for **64K** channel rate.
4. Use the **Frac T1 Mask** command to set one DS0 channel to an Active (1) state.

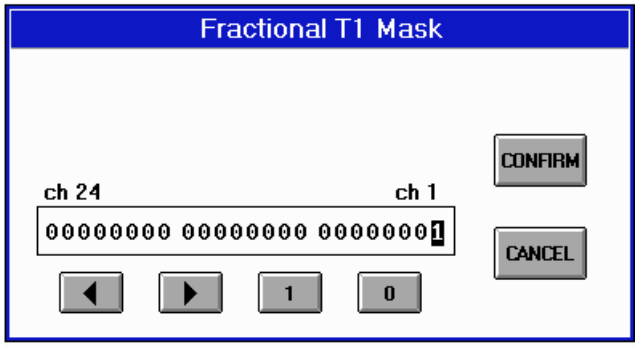


Figure 5-8. Setting a DS0 Channel to Active

5. Select the **Confirm** button.
6. Select the **Pattern** command and select the **VF Tone** option.

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The **Frequency** options appear. Select one of the following µ-law encoded tones:

Option	Description
404 Hz	Selects 404 Hz as the low voice frequency tone
1000 Hz	Selects 1000 Hz (a digital milliwatt) as the voice frequency tone (Use ESF framing for the DS1 signal to avoid false framing errors.)
1004 Hz	Selects 1004 Hz as the mid voice frequency tone
1013.8 Hz	Selects 1013.8 Hz (the Digital Reference Sequence) as the voice frequency tone
2804 Hz	Selects 2804 Hz as the high voice frequency tone

After selecting a VF Tone, the Output Level keypad appears.

5. Use the touch screen's keypad to enter an output level from -40.0 dBm to +3.0 dBm. The power can be set in 0.1 dBm increments.

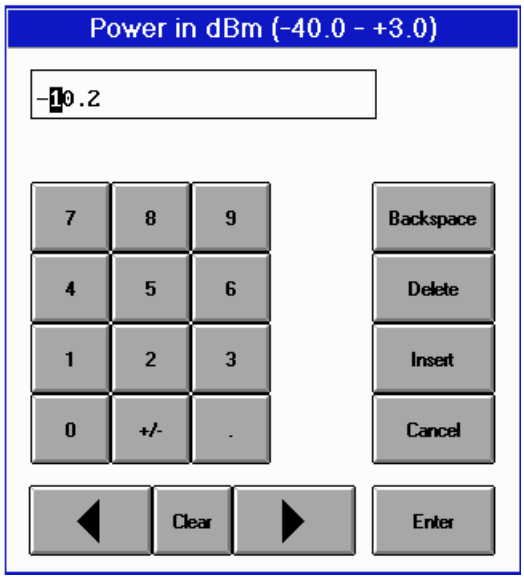


Figure 5-9. VF Tone Output Level Keypad

6. Select **Enter** on the keypad to generate the VF Tone pattern.

Frac T1 Mode

Configures the system for Fractional T1 testing using either 56K or 64K channel rates.

NOTE ➤
This function is not available for use with the NAA I.◄

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The following options are available:

Option	Description
OFF	Disables Fractional T1 mode.
56K	Configures the system for 56K channel rates. In addition, this option makes other Fractional T1 commands available for use.
64K	Configures the system for 64K channel rates. In addition, this option makes other Fractional T1 commands available for use.

The Frac T1 Mode command is automatically coupled between the Transmit and Receive Function group buttons. Any changes made to this command from the Transmit Function Group are automatically made to the Receive Function Group.

Selecting Fractional T1 Mode.
To select a Fractional T1 channel rate:

1. Make sure that the Framing command is set to ESF or SF/D4 framing.
2. Select Frac T1 Mode command.
3. Select a channel rate.

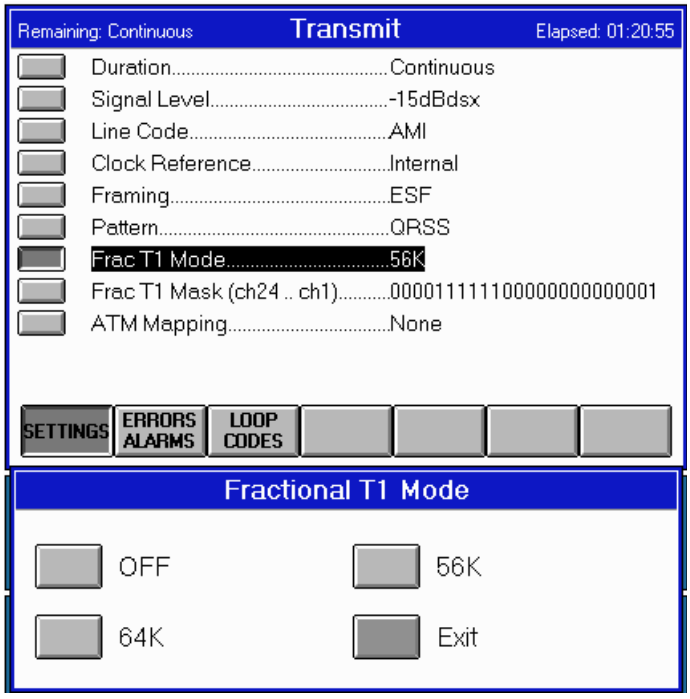


Figure 5-10. Fractional T1 Channel Rates

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Frac T1 Mask

Sets individual DS0 channels to an Active (1) or Idle (0) state. When Active, the DS0 transmits and receives the Fractional T1 test pattern across the span of selected Active channels. (The test pattern is set using the Pattern command.) When Idle, the DS0 ignores the selected test pattern and instead transmits an Idle pattern.

The DS0 channel state is configured using the Fractional T1 Mask keypad . The keypad displays all 24-DS0 channels. DS0 channels appear from left to right starting with Channel 24 and ending with Channel 1.

NOTE ➤
This function is not available for use with the NAA I.◄

The following options are available for this command:

If you set the DS0 to...	Then the channel is...
1	Active and transmits the Pattern command value over the span of selected DS0 channels.
0	Idle and transmits a 11111111 pattern (FF_{HEX} for 56K channel rates) or 01111111 ($7F_{HEX}$ for 64K channel rates). This idle pattern is transmitted instead of the selected Pattern value.

Selecting DS0 Channels.

To select DS0 channels:

1. Select the Frac T1 Mask command.
2. Select left- or right-arrow buttons to scroll through the DS0 Channel List.

   (Channels appear from left to right in descending order from Channel 24 to Channel 1.)
3. Do one of the following:
   - Select 1 to make the DS0 channel active. It will transmit or receive the selected test pattern.
   - Select 0 to 'mask' the channel. A masked channel transmits an idle pattern and not the selected test pattern.
4. Select Confirm to load the new Fractional T1 Mask settings.

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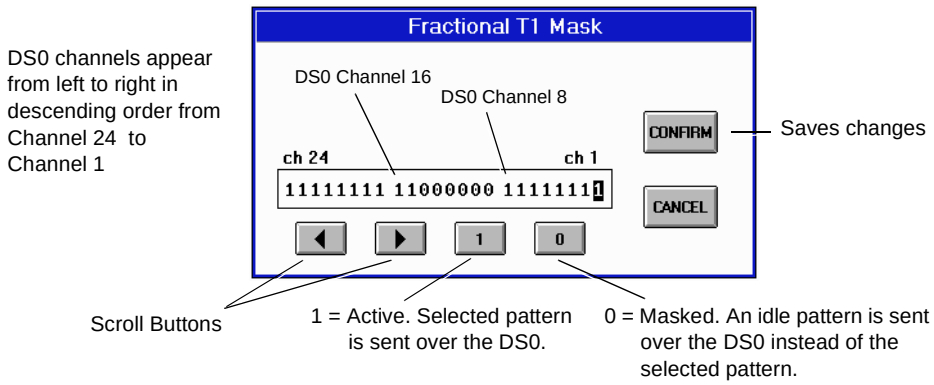


Figure 5-11. Masking DS0 Channels

ATM Mapping

Configures the DS1 protocol processor for ATM mode. This makes an automatic connection between the DS1 protocol processor and the ATM protocol processor. The following options are available for this command:

Option	Description
None	ATM Mapping is disabled for the DS1 protocol processor. The Pattern command defaults to QRSS.
Direct	Uses HEC-based cell delineation. By using less overhead, the maximum ATM Cell throughput is 1.536 Mbps.
PLCP	Physical Layer Convergence Protocol is used. ATM cells are enclosed in a frame defined by PLCP which adds more overhead. Because of the extra overhead, the maximum ATM Cell throughput is 1.413 Mbps.

The ATM Mapping command is automatically coupled between the Transmit and Receive Function group buttons. (For example, any changes made to this command from the Transmit Function Group are automatically made for the Receive Function Group.)

Errors and Alarms

The Errors and Alarms button allows you to select the type of errors and alarms transmitted by the DS1 protocol processor.

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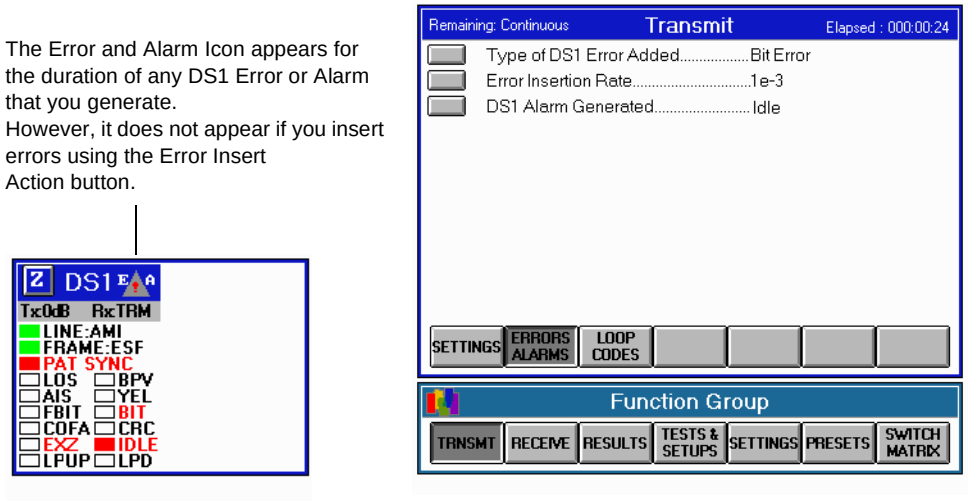


Figure 5-12. DS1 Transmit Errors and Alarms Commands

The following describes the commands and options associated with this button.

Type of DS1 Error Added

Determines the type of error that is transmitted by the DS1 protocol processor. Often, these errors are used by the receiving equipment to determine if a transmission error has occurred.

The following options are available:

NOTE ➤
Use the Error Insert Action button to inject single errors into the DS1 transmit signal. When this occurs, the appropriate error LED flashes red, and the error is recorded by various functions in the Results Function group button. ◄

Option	Description
None	Turns off DS1 error insertion.
Bit Error	Transmits a bit error which results in a frame-synchronization-bit error event. This also inserts a frame-bit error in the received frame-bit pattern. The bit error is not available for DS1/ATM mapping.
BPV Error	Transmits Bipolar Violation errors which result in a line code violation event for an AMI-coded signal, the occurrence of received excessive zeros, or a bipolar violation. A line code violation event for a B8ZS-coded signal is the occurrence of a received excessive zeros or a bipolar violation that is not part of a zero substitution code.
Frame Error	Results in a severely-errored-framing event; the occurrence of two or more framing-bit-pattern errors within a 3-ms period. This type of error is not available if the DS1 protocol processor is configured for Unframed framing format.

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Option	Description
CRC Error	Results in a CRC error event; the occurrence of a received CRC code that is not identical to the corresponding locally-calculated code. This option is available only when the DS1 protocol processor is configured for ESF framing format.

Error Insertion Rate

Sets the insertion rate for DS1 transmit errors.

NOTE ➤
This command is not available if the Type of DS1 Error Added command is set to None. ◄

The following options are available for this command.

Option	Description
Off	No errors are inserted for transmission. (The value displayed for this command is None.) This command effectively disables the Error Insert Action button.
1e-*X*, where *X* is a value from 1 through 7.	For BIT and BPV Errors, error rates range from 1e-2 (one bit error in every 100 bits transmitted) through 1e-7 (one bit error in every 10 million bits transmitted). For Frame errors, error rates range from 1e-1(one bit error in every 10 bits transmitted) through 1e-6 (one bit error in every 1 million transmitted). For CRC errors, error rates range from 1e-1 through 1e-5 (one bit error in every 100,000 bits transmitted).
1-in-*X*, where *X* is a value from 2 through 5.	This option defines the total number of zeros that appear in a pattern that uses a 1's-bit in a pattern that is *X*-bits long (for example a 1-in-3 pattern is 0100....). This type of error insertion rate is available only for Frame and CRC errors.
User Defined	Allows you to enter and save a customized error insertion rate. The following ranges are available: Bit Error: 1e-2 to 1e-7 BPV Error: 1e-3 to 1e-7 Frame Error: 1e-1 to 1e-6 CRC Error: 1e-1 to 1e-5

DS1 Alarm Generated

Generates a specific type of alarm on the transmit side of the DS1 protocol processor.

Option	Description
Off	No alarms generated. (The value displayed for this command is None.)

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Option	Description
Yellow	Generates a Yellow alarm for the transmit DS1 signal.
AIS	Generates an AIS (Alarm Indication Signal - also known as a Blue Alarm) signal for the transmit DS1 Signal.
Idle	Generates an Idle alarm for the transmit DS1 signal.

Loop Codes

The Loop Codes function allows you to isolate the connection between the system and the DS1 switch for loopback testing. With this segment isolated, you can configure the system to generate loopbacks in either direction. This allows the system to simulate a DS1 switch so that it can generate or receive loopback codes or place other DS1 facilities into or release from loopback.

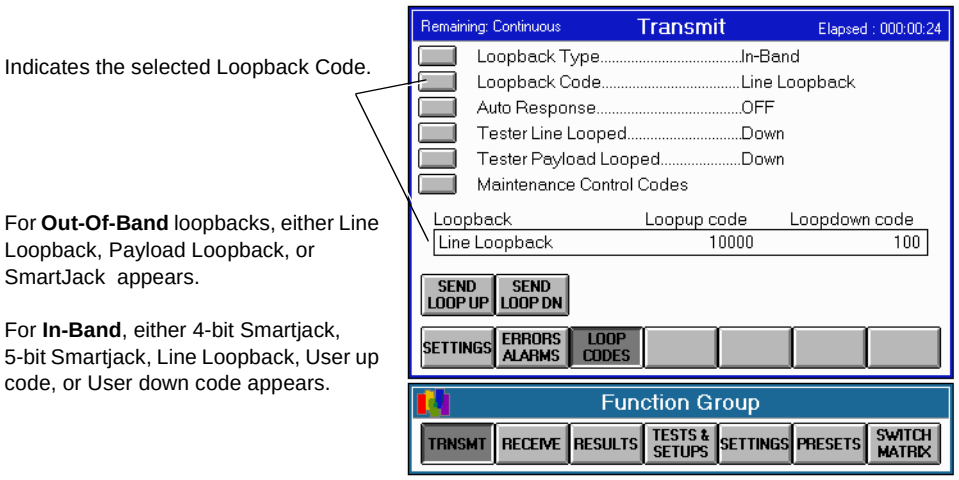


Figure 5-13. DS1 Loop Code Function Menu

The following commands are associated with this function button.

Loopback Type

Determines if the Loop Codes are sent as in-band signal or out-of-band signals. The following options are available:

Option	Description
In-Band	Available for all framing formats (Unframed, D4, ESF, and SLC-96).
Out-of-Band	Available only for ESF framing.
DDS Latching	Typically used for 64K channels. Sends a specific loopback signal for a set number of bytes. This option is available only if the unit is configured for Fractional T1 mode. Refer to the Frac T1 Mode command for more information.

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Option	Description
DDS Non-Latching	Also known as Alternating Loopback. Used for 56K channels only. The Non-Latching loopback sends the selected loopback signal as every other byte in the loopback pattern. This option is available only if the unit is configured for Fractional T1 mode. Refer to the Frac T1 Mode command for more information.

Loopback Code

Selects the type of loopback code transmitted. The options available vary based on the whether Loopback Type is configured for in-band or out-of-band signaling.

Option	Description
4-Bit Smartjack (Facility 1)	A loop-up code "1100", with the framing bits (D4, SF) over writing the pattern, is transmitted indicating to a compatible facility interface to establish a loop back. A loop-down code "1110" is transmitted to terminate the loop back. This option is only available when the Loopback Type command is configured for In-Band.
5-Bit Smartjack (Facility 2)	A loop-up code "11000", with the framing bits (D4, SF) over writing the pattern, is transmitted indicating to a compatible facility interface to establish a loop back. A loop-down code "11100" is transmitted to terminate the loop back. This option is only available when the Loopback Type command is configured for In-Band.
SmartJack (Network)	The codes are: Loop-up code 0001 0010 1111 1111 and Loop-down code 0010 0100 1111 1111. The bits are sent in the order from right to left. These codes are sent in the data link bit in the ESF. The payload of the signal, the 192 information bits, is returned to the sending side. The framing bits are still generated from the far end. This option is only available when the Loopback Type command is configured for Out-of-Band.

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Option	Description
Line Loopback (CSU)	For In-Band signaling, the Line Loopback should only be responded to by CSU or CI. A loop-up code “10000”, with the framing bits (D4, SF) over writing the pattern, is transmitted indicating to a compatible CSU or CI interface to establish a loop back. A loop-down code “100” is transmitted to terminate the loop back. The pattern should last for at least 5 seconds. The entire signal is looped back at the other end, no change in framing or BPV. For Out-of-Band signaling, the Line Loopback codes are: Loop-up code 0000 1110 1111 1111 and the Loop-down code is 0011 1000 1111 1111. The bits are sent in the order from right to left. These codes are sent in the data link bit in the ESF. The entire signal is looped back at the other end, no change in framing or BPV.
User Up Code	Allows you to create an 8-bit loopback pattern for the Loop Up Code. This option is only available for In-Band signaling.
User Down Code	Allows you to create an 8-bit loopback pattern for the Loop Down Code. This option is only available for In-Band signaling.
Payload Loopback	Payload Loopback codes are: Loop-up code 0001 0100 1111 1111 and Loop-down code 0011 0010 1111 1111. The bits are sent in the order from right to left. These codes are sent in the data link bit in the ESF. The payload of the signal, the 192 information bits are returned to sending side. The framing bits are still generated from the far end. This option is only available for Out-of-Band signaling.
OCU Loopback	Test is looped at the Office Channel Unit. This option is available only if the unit is configured for Fractional T1 mode. Refer to the Frac T1 Mode command for more information.
DSU Loopback	Test is looped at the Data Service Unit. This option is available only if the unit is configured for Fractional T1 mode. Refer to the Frac T1 Mode command for more information.
CSU Loopback	Test is looped at the Channel Service Unit. This option is available only if the unit is configured for Fractional T1 mode. Refer to the Frac T1 Mode command for more information.

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The following describes the Loopback Code transmitted for DDS Latching and DDS Non-Latching. **This applies only to Fractional T1 mode.**

For...	If you select...	Then this loopback code is transmitted...
DDS Latching	OCU Loopback	01010101
	CSU Loopback	00110001
	DSU Loopback	01110111
DDS Non-Latching	OCU Loopback	00101010
	CSU Loopback	00101000
	DSU Loopback	00101100

Auto Response

Determines how the DS1 protocol processor responds to Loop Up and Loop Down codes.

Option	Description
On	The DS1 protocol processor automatically responds to Loop Up and Loop Down codes. The system responds only to the type of loopback code that is selected by the Loopback Code command.
Off	The DS1 protocol processor does not automatically respond to Loop Up and Loop Down codes.

Tester Line Looped

Controls whether or not the system loops back the entire loop code signal it receives from a DS1 switch. (The entire loop code signal consists of the payload and framing bits.)

The following options are available:

Option	Description
Down	This is the normal operating mode for this command.
Up	This allows a received loop code to be immediately looped at the DS1 Line Interface. The entire loop code signal (payload and framing bits) is looped.

Tester Payload Looped

Determines whether or not the system loops back just the payload of a loop code received from a DS1 switch. This command allows the loop code signal to enter the system. The signal's framing bits are stripped, new framing bits are added, and then the signal is returned to the DS1 switch.

The following options are available:

Option	Description
Down	This is normal operating mode for this command.

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Option	Description
Up	The received loop code is stripped of its original framing bits, but the payload remains intact. The system inserts new framing bits and returns the loop code signal to the DS1 switch.

Maintenance Control Codes

Maintenance codes allow you to create and save up to four user defined test patterns. Once a pattern is saved, it is selected and transmitted using the Pattern command located under the Settings button. Refer to the Pattern command described earlier in this chapter.

Zoom

The DS1 Zoom function provides quick access to specific DS1 commands, errors, alarms, and LEDs. When the DS1 Zoom function is activated, the screen changes as illustrated in the following figure.

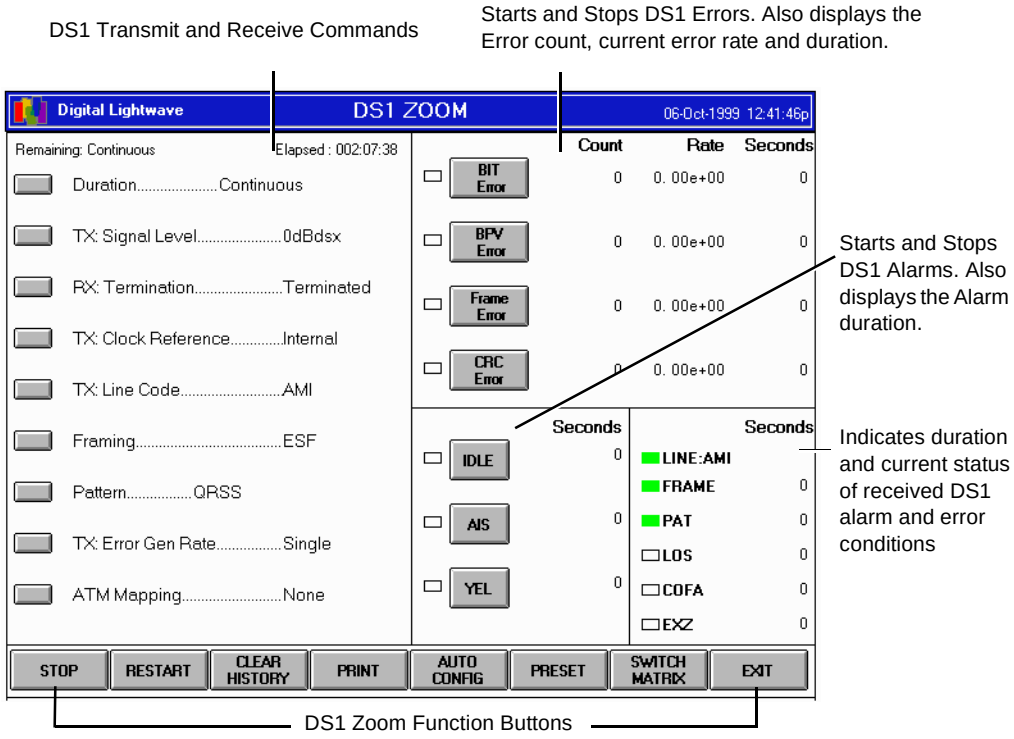


Figure 5-14. DS1 Zoom Touch Screen Display

The following describes the sections of the DS1 Zoom touch screen's display.

Zoom Transmit and Receive Commands

The Zoom Transmit and Receive commands provide fast access to key DS1 commands for configuration and setup of the DS1 protocol processor.

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Function	Description
Time Remaining	Indicates how much time remains in a timed test. If a test is untimed and running, displays "Continuous." If a test is stopped, displays "Stopped."
Elapsed Time	Indicates how long the DS1 protocol processor has been running. The timer is stopped by selecting the Stop function button. It resets to 00:00:00 and restarts when the Restart button is selected.
Duration	Functions as a timer and determines how long a DS1 error or alarm runs before it is terminated. Available options are: Continuous (if the test is untimed), 5 minutes, 15 minutes, 1 hour, 2 hours, 24 hours, 72 hours, User Defined.
TX: Signal Level	Sets the strength of the DS1 transmit signal. Available options are: 0 dBdsx, -7.5 dBdsx, -15 dBdsx.
RX: Termination	Sets the termination point of the DS1 receive signal. Available options are: Monitor, Terminated, Bridged
TX: Clock Reference	Sets the timing source for the DS1 transmit signal. Available options are: Internal, BITS, Looped
TX: Line Code	Sets the signal coding transmitted by the DS1 protocol processor. Available options are: AMI, B8ZS
Framing	Sets the framing format for the DS1 signal. Available options are: Unframed, SF/D4, ESF, SLC-96
Pattern	Sets the pattern for the DS1 transmit and receive signals. Available options are: QRSS, 2^15-1 PRBS, 2^20-PRBS, 2^23-1 PRBS, User Defined, LIVE, All Ones, All Zeros, 3 in 24, 1 in 8 (1:7), 1010 Pattern, 55DLY, T1-2, T1-3, T1-4, T1-5, 55-Octet, DDS-1, DDS-2, DDS-3, DDS-4, DDS-5, DDS-6, Bridge Tap, Multi-Pattern.
TX: Error Gen Rate	Sets the insertion rate of the DS1 transmit errors. Available options are: Single, 1 in 2 (2 in 4), 1 in 3, 1 in 4, 1 in 5, 1e-1, 1e-2, 1e-3, 1e-4, 1e-5, 1e-6, User Defined.
ATM Mapping	Configures the DS1 protocol processor for ATM mode. Available options are: None, PLCP, Direct

Zoom DS1 Errors

This section of the DS1 Zoom touch screen allows you to start and stop the transmission of DS1 errors. In addition, it also displays statistics such as the number of errors (Counts), the current error insertion rate (Rate), and the duration of the error (Seconds). These statistics typically appear on the screen when using functions located under the Results Function group button.

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When errors are transmitted using the DS1 Zoom touch screen, the following occurs:

- The selected error button is selected (dark gray)
- The associated LED flashes to indicate that errors are being received. The LED's frequency is dependent on the Error Generation Rate value.
- The Count column indicates the number of errors received
- The Rate column indicates the insertion rate of errors received
- The Seconds column indicates the duration of received errors

The following DS1 errors are available from the DS1 Zoom touch screen: .

Function	Description
BIT Error	Starts and stops the transmission of bit errors when the TX:Error Gen Rate command is set to a value other than Single. This type of error is disabled if the DS1 protocol processor is configured for ATM mode.
BPV Error	Starts and stops the transmission of Bipolar Violation errors when the TX:Error Gen Rate command is set to a value other than Single.
Frame Error	Starts and stops the transmission of Severely Errored Frames when the TX:Error Gen Rate command is set to a value other than Single. This type of error is disabled if the Framing command is set to Unframed.
CRC Error	Starts and stops the transmission of CRC errors when the TX:Error Gen Rate command is set to a value other than Single. This command is disabled if the Framing command is set to Unframed, SF/D4, or SLC-96.

Zoom DS1 Alarms

This section of the DS1 Zoom touch screen starts and stops the transmission of DS1 alarms.

When alarms are transmitted using the DS1 Zoom touch screen, the following occurs:

- The selected alarm button is selected (dark gray)
- The associated LED flashes to indicate that alarms are being received
- The Seconds column indicates the duration of received alarms

The following DS1 alarms are available from the DS1 Zoom touch screen:

NOTE ➤
If the TX:Error Gen Rate command is set to Single, then errors are inserted when the Zoom DS1 Error button is selected. ◄

Function	Description
Idle	Starts and stops an Idle alarm on the transmitted DS1 signal.

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Function	Description
AIS	Starts and stops an AIS alarm (Alarm Indication Signal – also known as a Blue alarm) on the transmitted DS1 signal.
YEL	Starts and stops a Yellow alarm on the transmitted DS1 signal.

This section of the DS1 Zoom touch screen provides a visual status of transmit and receive DS1 activity and DS1 errors and alarms. DS1 activity cannot be generated from this section of the touch screen.

Use the following to determine the type of activity and behavior represented by the DS1 LEDs and Indicators:

If a DS1 LED and Indicator is ...	Then it indicates.
Green (LED only)	Normal operation (The LED is acting as a status indicator.)
Clear LED with black text	Normal operation; there is no history of an error or alarm. (The LED and text are acting as an Error/Alarm indicator.)
Red LED with red text	An error or alarm is in progress
Clear LED with red text	An error or alarm was detected, but is no longer in progress

The Seconds column reports the duration of the associated LED activity.

The following DS1 LEDs appear on the DS1 Zoom touch screen:

Indicator	Description
LINE:	Indicates if AMI or B8ZS line coding is selected for the DS1 Line Interface. The Line LED is clear if the DS1 protocol processor cannot detect the type of line coding. If Line Coding is detected, Line LED is green.
FRAME	Indicates if the DS1 protocol processor has received Framing errors. If Framing errors occur, the duration appears in the Seconds column.
PAT	Indicates DS1 Pattern synchronization
LOS	Indicates a Loss of Signal condition.
COFA	Indicates a Change of Frame Alignment condition
EXZ	Indicates that more than the permitted number of consecutive zeros were received by the DS1 protocol processor. For AMI Line Coding, 16 or more zeros are considered excessive. For B8ZS Line Coding, 8 or more zeros are considered excessive.

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DS1 Zoom Function Buttons

The DS1 Zoom touch screen contains several Function Buttons that control DS1 protocol processor activity.

The following describes these buttons:

Function Button	Description
Stop	Stops all DS1 Zoom activity. All error, alarm, and elapsed time counters stop and indicate the current count.
Restart	Clears all alarms and errors; resets all counters to 0. If error or alarm activity is present, then the transmission and reception of these events continues.
Clear History	Resets recorded history of the DS1 Zoom LEDs and Indicators.
Print	The Print button allows a variety of DS1 alarm and error results, reports, and logs to be printed to the attached printer.
Auto Config	Configures the DS1 protocol processor to match the parameters of the incoming DS1 signal.
Presets	Allows the DS1 protocol processor to be quickly configured for DS1 specific mappings and operation. The following Presets are available: SON DS1 D/I. SON DS1 Line D/I, SON M13 DS1, M13 DS1, DS1 Processor, DS1 ATM Direct, DS1 ATM PLCP.
Switch Matrix	Displays a graphical interface of the system's current mappings and connections.
Exit	Closes the DS1 Zoom function and returns the screen to normal operation.

Receive Function Group

The Receive Function group button provides settings for the signal parameters used in the DS1 protocol processor receive operations. These commands configure the system for the expected receive signal.

NOTE ➤
For the DS1 protocol processor, many of the settings are replicated from the Transmit settings since the Transmit and Receive DS1 functions are automatically coupled. ◄

The following buttons make up the Receive Function Group:

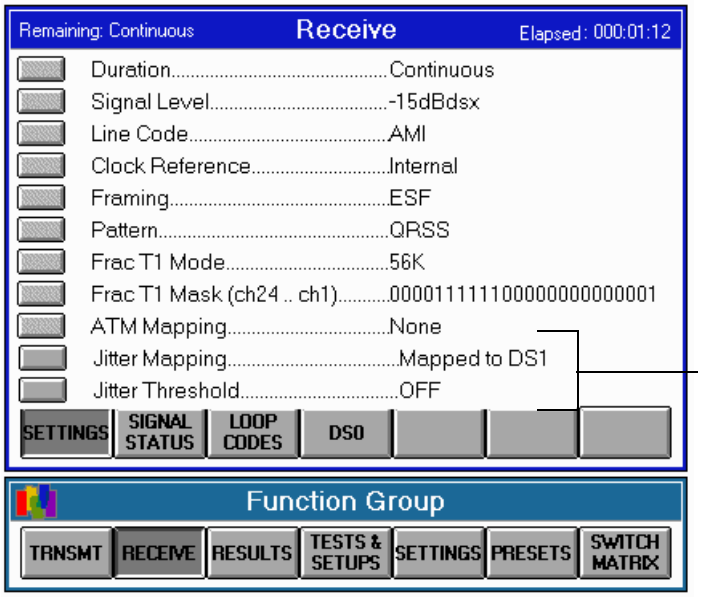
- **Settings:** Configures the unit's receive parameters for your DS1 test environment.
- **Signal Status:** Reports the strength of the incoming DS1 signal.
- **Loop Codes:** Places a DS1 facility into loopback test.
- **DS0:** Selects a specific DS0 signal from a DS1 signal.

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The following describes these functions and their associated commands.

Settings

The Settings button determines how the DS1 interface and processor parameters are configured.



The Jitter commands appear only if your unit has the optional Jitter card installed.

Due to space limitations, the Jitter card cannot be installed into a unit that has the OC-48 option installed.

Figure 5-15. DS1 Receive Settings Commands

Duration

Functions as a timer and determines how long a DS1 error or alarm runs before it is terminated. Available options are: Continuous (if the test is untimed), 5 minutes, 15 minutes, 1 hour, 2 hours, 24 hours, 72 hours, or User Defined.

Input Termination

Sets the termination point of the DS1 receive signal.

Option	Description
Monitor	Sets the receive sensitivity of the DS1 Line interface. Use this setting if the DS1 line connects to a monitor jack.
Terminated	Sets the receive sensitivity of the DS1 Line interface. Use this setting if the DS1 line terminates at the system's Line Interface.
Bridged	Allows the DS1 receive signal to be connected to both the DS1 interface and the DS1 protocol processor. **Note**: This function is not available for use with the NAA I.

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Option	Description
Looped (Diag)	The Transmit signal is both internally looped to the receive interface and transmitted out of the Transmit interface. If a questionable network event is reported, then this type of loopback can help verify that the test unit (NAA I) is operating correctly. **Note**: This function is not available for use with the ASA 312.

Framing

The Receive Framing command is automatically coupled to the Transmit Framing command described earlier in this chapter. Therefore, any changes made to the Framing command using the Receive Function group button are copied to the Framing command found under the Transmit Functions group button.

For a description of Framing command options, refer to the Framing command section described earlier in this chapter.

Pattern

Selects the type of DS1 receive signal pattern. The Receive Pattern command is automatically coupled to the Transmit Pattern command described earlier in this chapter. Therefore any changes made to the Pattern command using the Receive Function group button are replicated to the Pattern command found under the Transmit Functions group button.

The only exception is the Live option which uses live data traffic instead of a pattern. For a description of the other Pattern options available, refer to the Pattern command section described earlier in this chapter.

Option	Description
Live	Uses live data traffic; no pattern. This is used primarily for monitoring errors and alarms within a live data stream. When selected, the Pattern Sync LED becomes non-functional.

Frac T1 Mode

The Receive Frac T1 Mode command is automatically coupled to the Transmit Frac T1 Mode command described earlier in this chapter. Any changes made to this command using the Receive Function group button are copied to Frac T1 Mode command found under the Transmit Functions group button.

NOTE ➤
This function is not available for use with the NAA I.◄

For a description of Frac T1 Mode command options, refer to the Frac T1 Mode command section described earlier in this chapter.

Frac T1 Mask

The Receive Frac T1 Mask command is automatically coupled to the Transmit Frac T1 Mask command described earlier in this chapter. Any changes made to this command using the Receive Function group button are copied to Frac T1 Mask command found under the Transmit Functions group button.

NOTE ➤
This function is not available for use with the NAA I.◄

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For a description of Frac T1 Mask command options, refer to the Frac T1 Mask command section described earlier in this chapter.

ATM Mapping

The Receive ATM Mapping command is automatically coupled to the Transmit ATM Mapping command described earlier in this chapter. Any changes made to this command using the Receive Function group button are copied to ATM Mapping command found under the Transmit Functions group button.

For a description of ATM Mapping command options, refer to the ATM Mapping command section described earlier in this chapter.

Jitter Mapping

Configures the DS1 protocol processor for Jitter operation.

NOTE ➤
This command appears only if the system has the optional Jitter feature installed. Due to space limitations, the Jitter feature cannot be installed into units that have the optional OC-48 feature installed. ◄

NOTE ➤
This function is not available for use with the NAA I.◄

The following options are available:

Option	Description
None	Disables Jitter operation.
Mapped to DS1	Enables Jitter operation using the DS1 protocol processor.
Mapped to DS3	Enables Jitter operation using the DS3 protocol processor.

Jitter Threshold

Sets a unit interval (UI) value for Jitter measurements. For DS1 operation, the threshold ranges from 0 to 10 UI in increments of 0.1.

Jitter is measured in unit intervals (UIs), where one UI is the variation during one clock cycle (from the beginning of one clock pulse to the beginning of the next clock pulse).

If a positive or negative Jitter peak value equals or exceeds the Jitter Threshold, then the Jitter Hits Counter is incremented. This count can be viewed using the Jitter function that appears by selecting the Main Results button from the Results Function group button.

NOTE ➤
This command is available only if the Jitter Mapping command is set to Mapped to DS1. ◄

NOTE ➤
This function is not available for use with the NAA I.◄

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Signal Status

The Signal Status button displays the measured voltage, strength, line frequency, and frequency offset of the DS1 Receive signal as it enters the system.

The voltage displays as the Peak Positive and Peak Negative pulse voltage. The receive signal strength (power) displays in dBm and dBdsx. The signal frequency displays in Megahertz.

When initially selected, the Signal Status may take several seconds to update and will display the message Measuring... . If the DS1 signal is not detected, the message DS1 Loss of Signal appears.

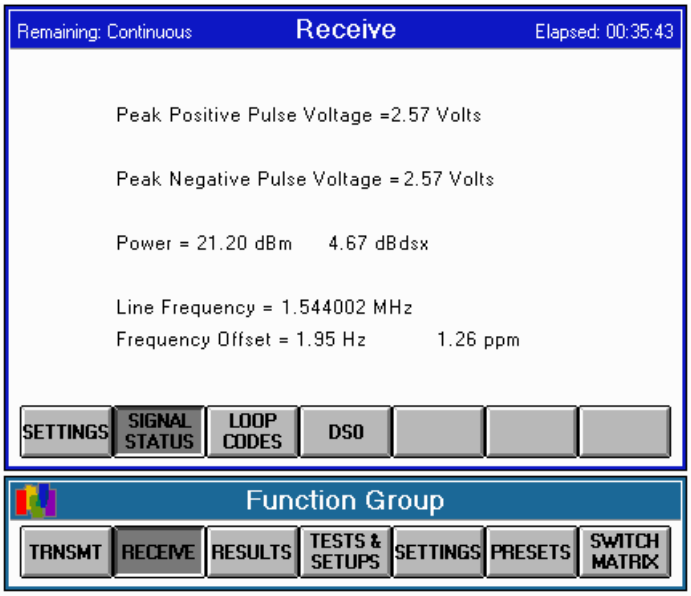


Figure 5-16. DS1 Signal Status Values

Loop Codes

The Receive Loop Codes are automatically coupled to the Transmit Loop Codes described earlier in this chapter. Therefore, any changes made to the Loop Codes commands and options using the Receive Function group button are replicated to the Loop Codes functions found under the Transmit Functions group button. For a description of Loop Codes operation, refer to the Loop Codes section described earlier in this chapter.

DS0

If your system is licensed for the DS0 feature, you can test and analyze T-Carrier transmission systems at the DS1 and DS0 levels from the DS1 access point.

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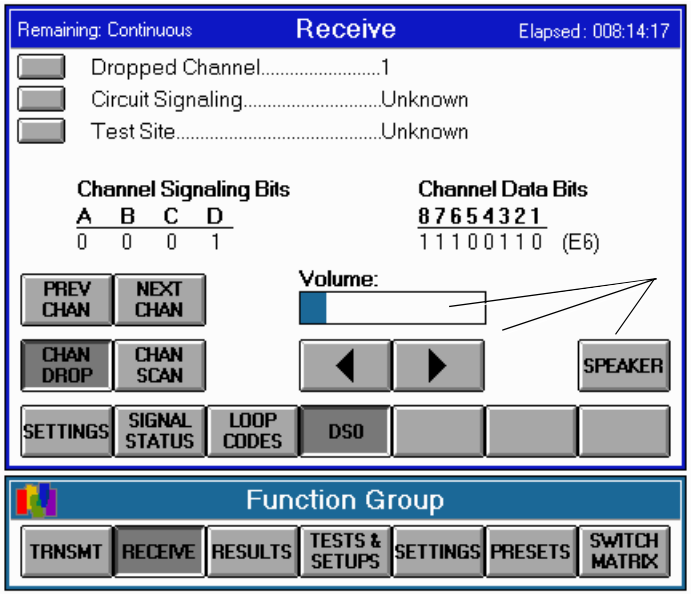
The DS0 function selects individual DS0 channels allowing data bits for D4 and ESF signaling bits (A, B, C, and D) to be monitored. A speaker provides audible VF outputs for the selected DS0 channel.

The DS0 function provides analysis of individual circuits using the Chan Drop button or analysis of all 24 DS0 channels using the Chan Scan button.The following describes the commands and functions associated with each button.

Channel Drop Button

The DS0 Channel Drop commands:

- Select the DS0 channel that is dropped from the DS1 signal
- Select the channel circuit signaling status of the selected DS0 channel
- Select the test site options



Speaker and Volume Control Functions (only available for use with the ASA312).

Figure 5-17. DS0 Channel Drop Commands

The following commands and functions are available for DS0 Channel Drop.

Dropped Channel

Selects a DS0 channel (Channels 1 through 24) to drop from the DS1 signal.

For ESF channel signaling, the four Channel Signaling Bits, labeled A, B, C, and D, indicate the status of the selected DS0 channel.

For D4 or SLC-96, the two Channel Signaling Bits, labeled A and B, indicate the status of the selected DS0 channel.

Circuit Signaling

Selects the specific type of signaling bits that are monitored and displayed within the DS0 Function Menu area.

The DS1 application uses robbed-bit signaling to provide DS0 per-channel circuit signaling data. Eight bits are available for the payload in each channel during 5 out of 6 frames. Every 6th frame, however, the least significant bit (8th) of each time slot is used (robbed) to provide per-channel circuit signaling.

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In the D4 format, bits are robbed in the 6th and 12th frame to derive the signaling channel. This bit is called the A bit and the bit from the 12th frame is called the B bit.

In the ESF format, bits are robbed in the 6th, 12th, 18th, and 24th frames to derive the signaling channel. These make up the A, B, C, and D bits respectively.

The contents and meaning of the signaling bits depend on the type of signaling selected using the Circuit Signaling command. The robbed-bit signaling states for six types of D4 and ESF circuit signaling are provided in the following tables.

The following table describes D4 and SLC-96 circuit signaling and bit formats.

Table 5-1. D4 and SLC-96 Circuit Signaling and Bit Formats

Circuit Signaling	Circuit	Signaling states	A	B
Loop Start	Network to CI	LCF	0	1
		Ringing	0	0
	CI to Network	LO (on-hook)	0	1
		LC (off-hook)	1	1
Ground-Start	Network to CI	LCF	0	1
		LCFO	1	1
		Ringing	0	0
	CI to Network	LO (on-hook)	0	1
		LC (off-hook)	1	1
		RG (service-request)	0	0
Loop-Reverse Battery	Network to CI	LO (on-hook)	0	0
		LC (off-hook)	1	1
	CI to Network	LO (on-hook)	0	0
		LC (off-hook)	1	1
Network-Provided Reverse Battery	Network to CI	LCF (on-hook)	0	0
		RLCF (off-hook)	1	1
	CI to Network	LO (on-hook)	0	0
		LC (off-hook)	1	1
E&M Signaling	Network to CI	On-hook	0	0
		Off-hook	1	1
	CI to Network	On-hook	0	0
CI Provided Loop Start	Network to CI	LO (on-hook)	0	1
		LC (off-hook)	1	1
	CI to Network	LCF	0	1
		Ringing	0	0
Loop Start	Network to CI	LCF	0	1

LCF = Loop Current Feed; **RLCF** = Reverse Loop Current Feed; **LCFO** = Loop Current Feed Open; **LO** = Loop Open
LC = Loop Closure; **RG** = Ring Ground; **CI** = Customer Installation

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The following table describes ESF circuit signaling and bit formats.

Table 5-2. ESF Circuit Signaling and Bit Formats

Circuit Signaling	Circuit	Signaling States	A	B	C	D
Loop Start	Network to CI	LCF	0	1	0	1
		Ringing	0	0	0	0
	CI to Network	LO (on-hook)	0	1	0	1
		LC (off-hook)	1	1	1	1
Ground-Start	Network to CI	LCF	0			1
		LCFO	1	1	1	1
		Ringing	0	0	0	0
	CI to Network	LO (on-hook)	0	1	0	1
		LC (off-hook)	1	1	1	1
		RG (service-request)	0	0	0	0
Loop-Reverse Battery	Network to CI	LO (on-hook)	0	0	0	0
		LC (off-hook)	1	1	1	1
	CI to Network	LO (on-hook)	0	1	0	1
		LC (off-hook)	1	1	1	1
Network-Provided Reverse Battery	Network to CI	LCF (on-hook)	0	0	0	0
		RLCF (off-hook)	1	1	1	1
	CI to Network	LO (on-hook)	0	0	0	0
		LC (off-hook)	1	1	1	1
E&M Signaling	Network to CI	On-hook	0	0	0	0
		Off-hook	1	1	1	1
	CI to Network	On-hook	0	0	0	0
		Off-hook	1	1	1	1
CI Provided Loop Start	Network to CI	LO (on-hook)	0	1	0	1
		LC (off-hook)	1	1	1	1
	CI to Network	LCF	0	1	0	1
		Ringing	0	0	0	0

LCF = Loop Current Feed; **RLCF** = Reverse Loop Current Feed; **LCFO** = Loop Current Feed Open; **LO** = Loop Open
LC = Loop Closure; **RG** = Ring Ground; **CI** = Customer Installation

Test Site

The network interface and the customer installation use compatible robbed-bit signaling states for each type of circuit signaling (refer to Tables 3-1 and 3-2). The Test Site command allows you to determine whether the Network Interface or the Customer Installation is responsible for generating these signals. The following options are available.

Option	Description
Customer < Network	The network interface generates signaling states to the customer installation.

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Option	Description
Network < Customer	The customer installation generates signaling states to the network interface.
Unknown	Undefined signaling state.

Under normal operation, undefined signaling states should only exist during the transition from one signaling state to another signaling state. The duration of these signaling state transmissions should not exceed 3 milliseconds.

DS0 Speaker

Provides audible VF outputs for the selected DS0 channel. You can control the volume of the output using the Volume arrow button options.

Prev Chan and Next Chan Buttons

The Prev Chan and Next Chan buttons allow you to select a DS0 channel (Channels 1–24) that is dropped from the DS1 signal by scrolling backwards or forwards through the 24-DS0 channels. This is an alternative to selecting the Dropped Channel command and then choosing a DS0 channel.

Channel Scan Button

Scans all DS0 channels within a DS1 signal for framing errors.

This allows you to view the D4, SLC-96, or ESF signaling bits for all 24 DS0 channels at once.

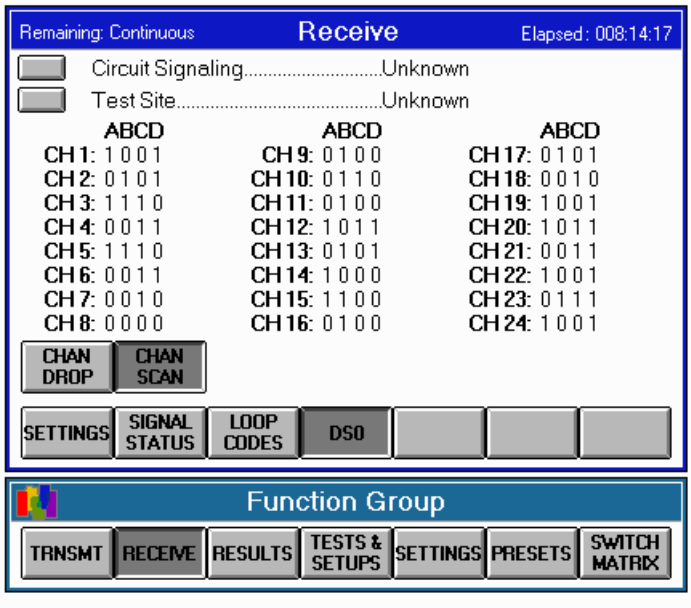


Figure 5-18. DS0 Channel Scan Commands

The Circuit Signaling and Test Site commands (as described earlier) are available for Channel Scan.

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Results Function Group

The Results Function group button allows you to view DS1 error and alarm analysis and create a history of these events by graphing the information.

The following buttons make up the Results Function Group:

- **Trouble Scan:** Provides a quick report of detected errors and alarms and lists the duration of these events.
- **Main Results:** Provides detailed results for errors and alarms detected by the Trouble Scan function.
- **Error Analysis:** Reports percentage and error count values.
- **Graphs:** Displays alarm and error results as graphs.
- **Recall Graphs:** Retrieves previously saved graphed data.
- **Save Graphs:** Saves graphed data.
- **Large LEDs:** Displays LED errors and alarms in a large format on the touch screen.

The following section describes the functions associated with the Results Function group button.

Trouble Scan

The Trouble Scan function provides a list of received errors and alarms for the DS1 protocol processor. The duration or count of each event also appears. This function is effective in identifying a general area to investigate when an error or alarm is detected.

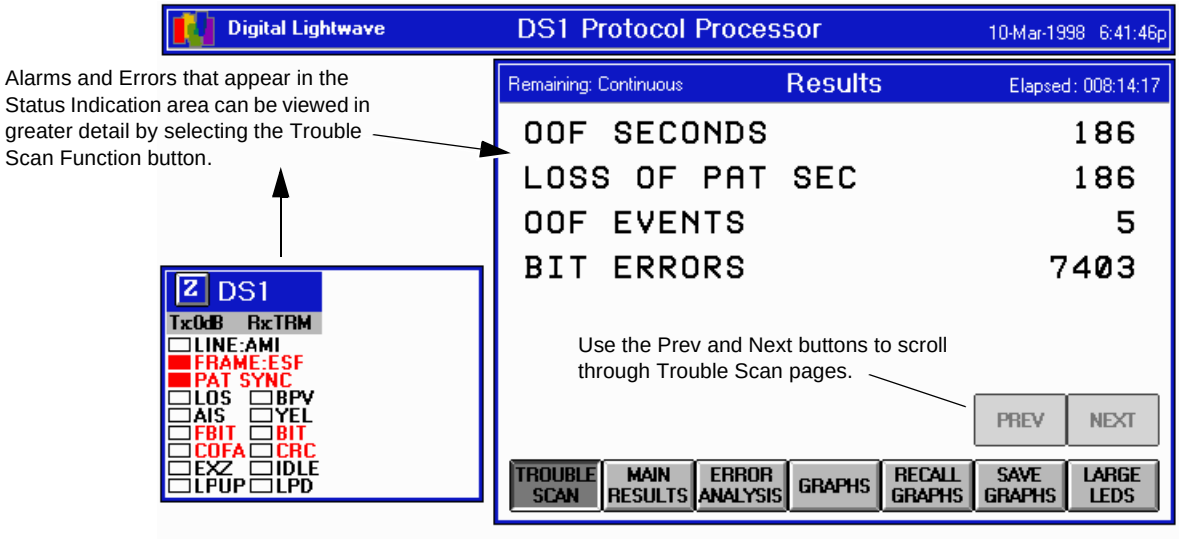


Figure 5-19. Trouble Scan Function Button

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The following is a list of the DS1 Trouble Scan messages:

Event	Description
No Trouble	No errors or alarms are detected
AIS Seconds	Reports the duration of an AIS alarm
BIT Errors	Reports the number of BIT errors detected. An overflow condition exists if “>” appears before the Count value.
BPV Errors	Reports the number of Bi-polar violations that occur. An overflow condition exists if “>” appears before the Count value.
CRC Errors	Reports the number of CRC errors detected.
Excessive Zero Seconds	Reports the number of seconds that Excessive Zeros are detected.
Idle Seconds	Reports the number of seconds an Idle alarm is detected.
Loss of Frame Seconds	Reports the number of seconds a Loss of Frame event occurred over the DS1 link.
Loss of Pattern Seconds	Reports the number of seconds a Loss of Pattern event occurred.
Loss of Signal Seconds	Reports the number of seconds a Loss of Signal event occurred.
Out of Frame Events	Reports the number of Out of Frame events detected. This occurs during a brief Loss of Signal period.
Out of Frame Seconds	Reports the number of seconds an out of Frame event occurred.
Yellow Alarm Seconds	Reports the number of seconds a Yellow alarm event occurred.

Main Results

The Main Results button displays detailed results for DS1 errors and alarms identified by the Trouble Scan function. If your system has the Jitter feature installed, then Jitter results can also be viewed.

An error and alarm results report can be created and printed by selecting the Print action button and then selecting the Results print option. For more information, refer to the Print section of chapter 8.

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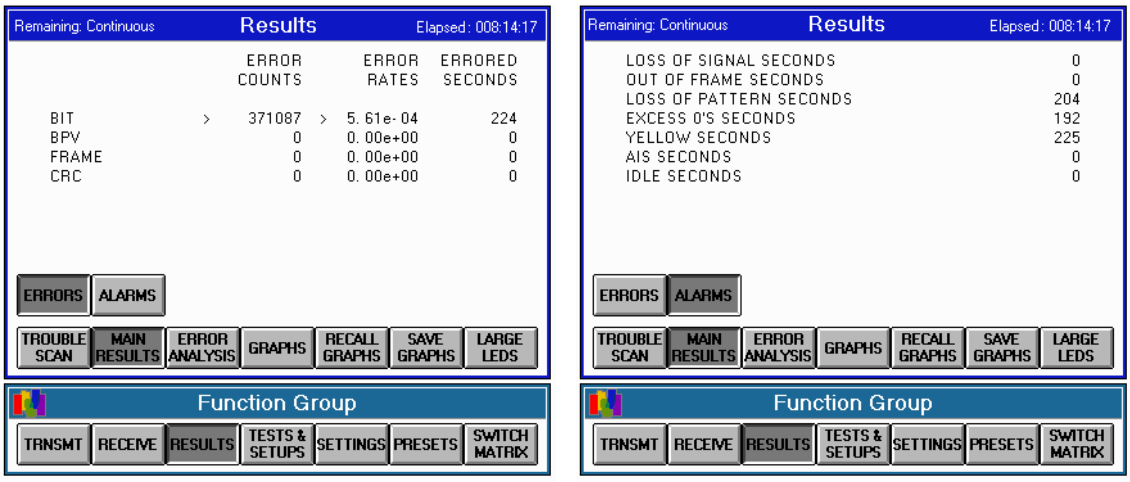


Figure 5-20. DS1 Errors and DS1 Alarms

Errors

This button displays the number of errors detected, the error rate measurement, and the total number of seconds that the errors were transmitted. The errors reported are generated by the DS1 network or intentionally by the system using the Error Insert Action button.

The following DS1 errors are reported.

- BIT
- BPV
- Frame
- CRC

Alarms

Displays how long DS1 alarms were detected by the system. Results for the following alarms display.

- Loss of Signal Seconds
- Yellow Seconds
- Out of Frame Seconds
- AIS Seconds
- Loss of Pattern Seconds
- Idle Seconds
- Excess 0's Seconds

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Jitter

Displays the current and maximum unit interval (UI) values for the following Jitter measurements:

- Wideband Positive Peak
- Wideband Negative Peak
- Wideband Peak to Peak
- Seconds of Pos or Neg Peak
- Highband Positive Peak
- Highband Negative Peak
- Highband Peak to Peak

NOTE ➤
This function is not available for use with the NAA I.◄

To view DS1 Jitter results:

- Your system must have the Jitter feature installed.
- Jitter must be configured using the Jitter Mapping and Jitter Threshold commands.

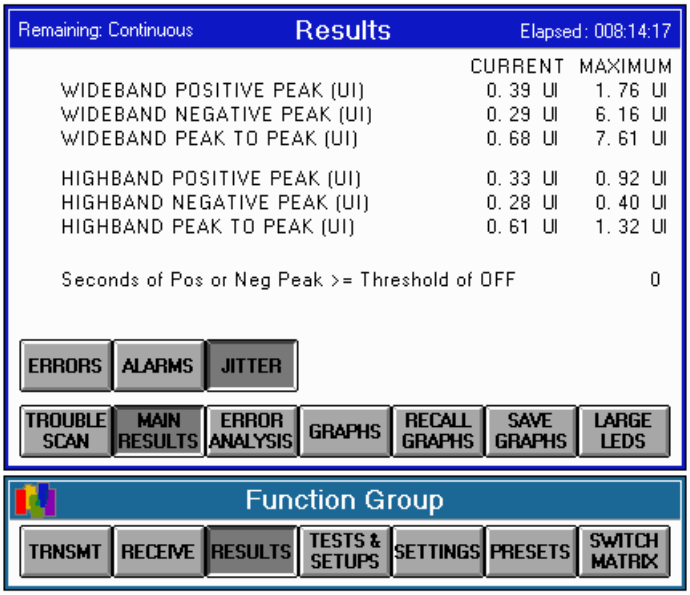


Figure 5-21. DS1 Jitter UI Values

Error Analysis

This button allows you to view in greater detail the detected and logged DS1 errors using percentage and count values. The following briefly describes the different results available for the DS1 Error Analysis button

BIT Analysis

This provides a detailed breakdown for BIT errors detected and logged by the DS1 protocol processor.

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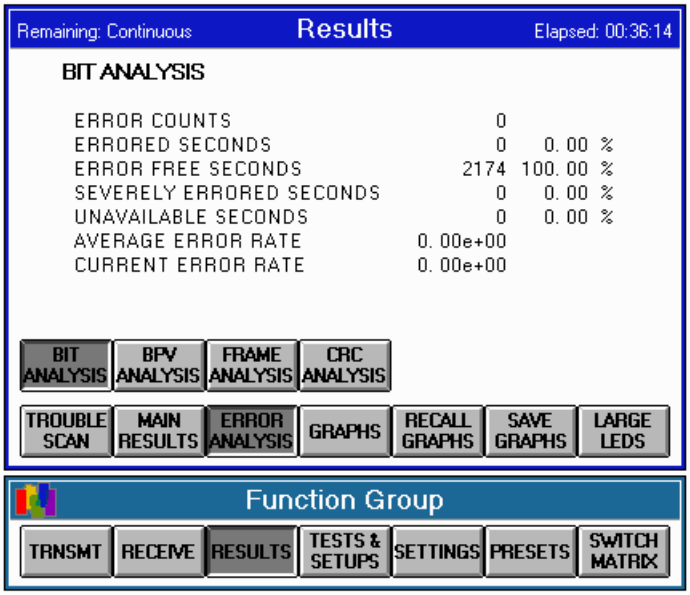


Figure 5-22. DS1 Bit Analysis Report

BPV Analysis

This provides a detailed breakdown for BPV errors detected and logged by the DS1 protocol processor.

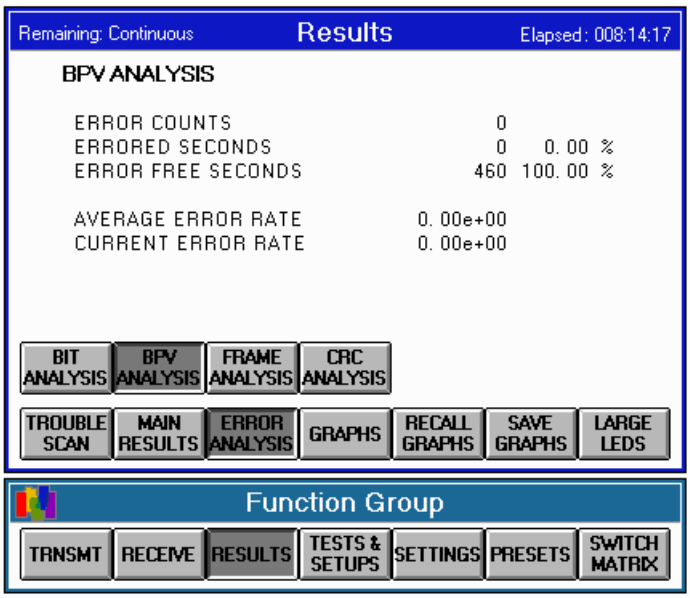


Figure 5-23. DS1 BPV Analysis Report

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Frame Analysis

This provides a detailed breakdown for Frame errors detected and logged by the DS1 protocol processor.

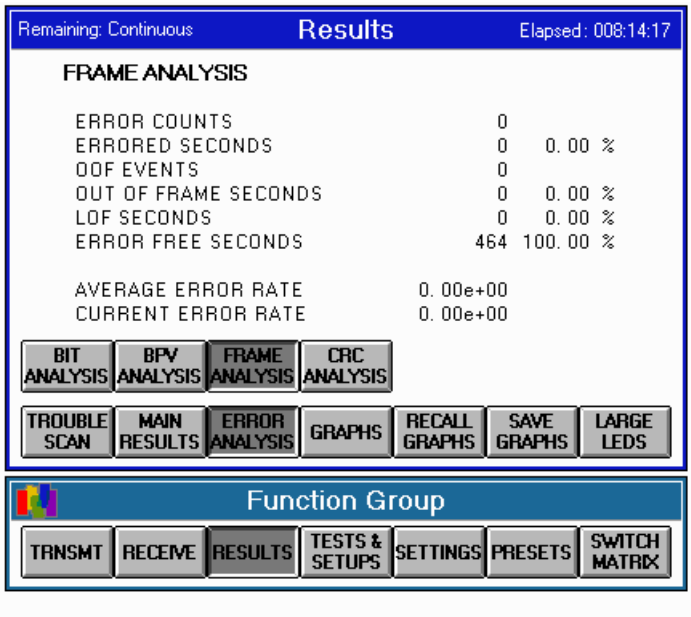


Figure 5-24. DS1 Frame Analysis Report

CRC Analysis

This provides a detailed breakdown for CRC errors detected and logged by the DS1 protocol processor.

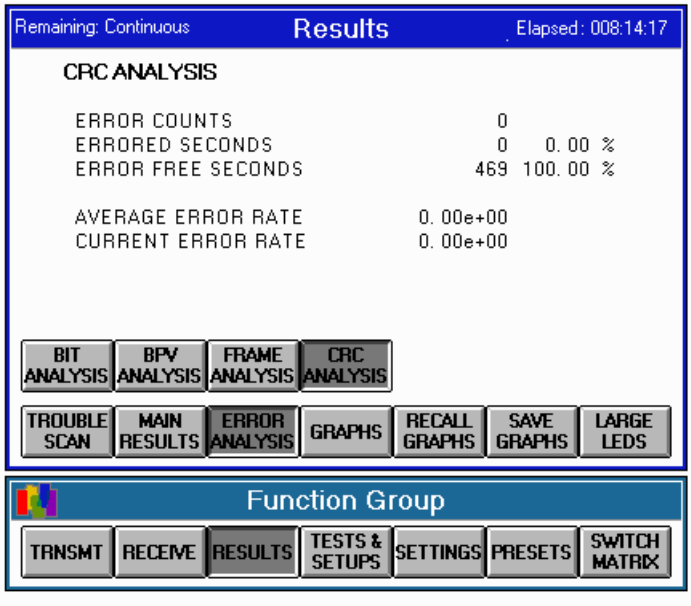


Figure 5-25. DS1 CRC Analysis Report

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Graphs

Use the Graphs button to view error and alarm results for the DS1 protocol processor. These graphs show the test history for either the current test or the previous test. You can configure the graph function to display any combination of DS1 Alarms and Errors.

To save graph results, select the Save Graphs button. Refer to the Save Graphs button that is described later in this chapter.

To recall saved graphs, select the Recall Graphs button. Refer to the Recall Graphs button that is described later in this chapter.

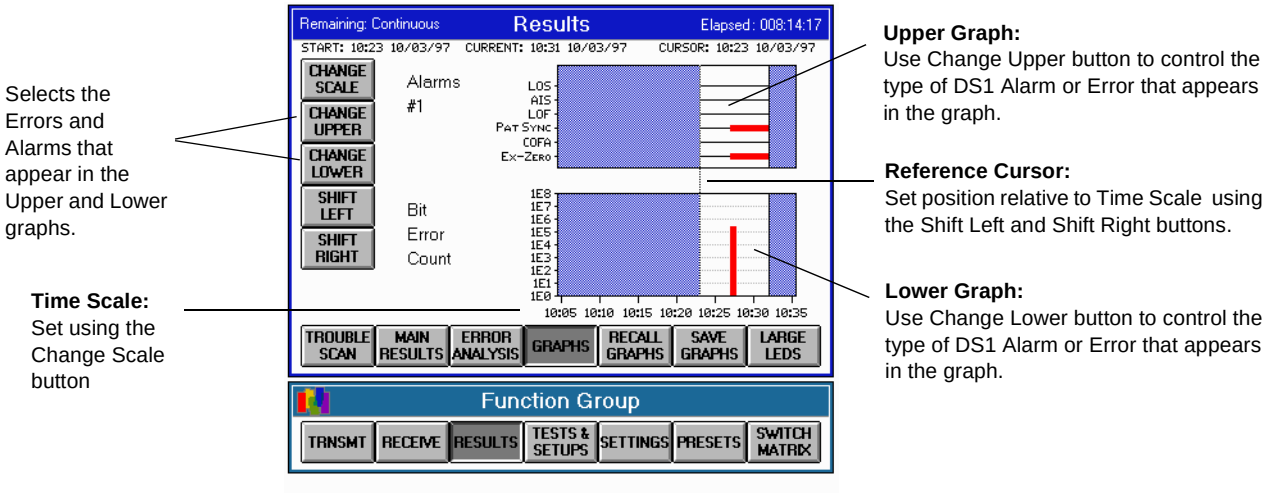


Figure 5-26. DS1 Graphs Function Menu

Change Upper and Change Lower

These buttons determine what type of alarms and errors display in the two graphs.

Graphed Alarms. The following items are graphed for Alarm #1:

- LOS (Loss of Signal)
- AIS (Alarm Indication Signal)
- LOF (Loss of Frame)
- Pat Sync (Pattern Sync)
- COFA
- Excess 0's

The following items are graphed for Alarm #2:

- Loop Down
- Yellow
- Loop Up

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Graphed Errors. The Error Insertion Rate (1E-8 through 1E-0) is graphed for DS1 Errors. The following DS1 Errors can be graphed using this function:

- Bit Error Count
- BPV Error Count
- CRC Error Count
- Frame Error Count

Graphed Jitter Results. The Peak-to-Peak unit interval (UI), for the last minute, is graphed. The following graphing options are available only if the Jitter feature is installed in your system:

- Maximum Wideband Peak to Peak
- Maximum Highband Peak to Peak

Change Scale

Compresses or expands the displayed time scale for the graphed errors and/or alarms.

The following values are available for this function:

Option	Description
30 minute	Sets the graph's time scale to 30-minute increments.
90 minute	Sets the graph's time scale to 90-minute increments.
3 hour	Sets the graph's time scale to 3-hour increments.
6 hour	Sets the graph's time scale to 6-hour increments.
12 hour	Sets the graph's time scale to 12-hour increments.
24 hour	Sets the graph's time scale to 24-hour increments.
72 hour	Sets the graph's time scale to 72-hour increments.

Shift Left and Shift Right

The Upper and Lower graphs use a dotted line as a Reference Cursor to identify exact error and alarm conditions for a specific time. Use these buttons to adjust the time scale to an earlier or later time by moving the cursor to the left or right on the Upper and Lower graphs.

The Reference Cursor can also be moved to a specific time by touching the screen and dragging the cursor either to the right or left in the graphed display. The position of the cursor corresponds to a time and date which is displayed above the graphs in text for easy viewing.

Save Graphs

Use this button to save the current or previously graphed results to a file for later retrieval and viewing. The filename and a file description are entered using a keypad that automatically appears when these buttons are selected.

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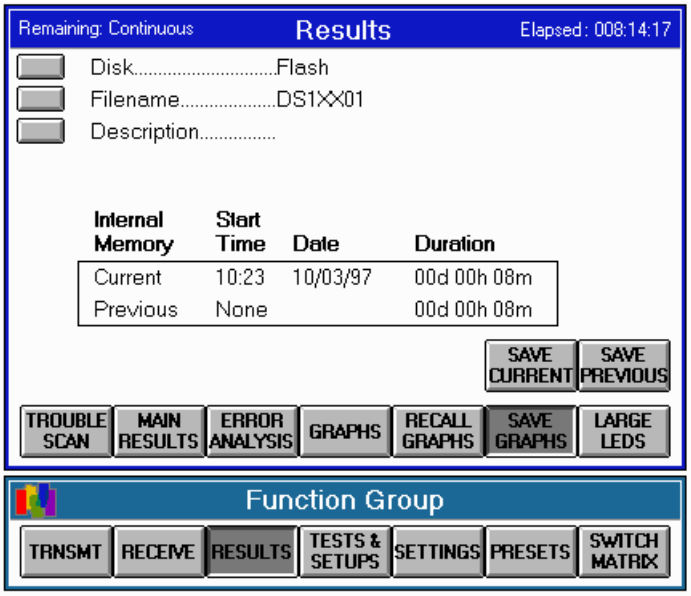


Figure 5-27. DS1 Save Graphs Commands

The following information appears when Save Graphs button is selected.

Disk

Saves the graph to either Flash memory, the SRAM memory PC Card (appears only if a memory card is inserted in the ASA 312'S PCMCIA slot), or RAM. The following options are available for this command.

Option	Description
Flash	This is nonvolatile memory. The graph is stored on the system until it is removed using the Delete command.
RamDrive	This is volatile memory. If the graph is saved to RAM, then it is deleted when the system is powered off.
PCMCIA	Allows the Results Graph to be saved to an SRAM PC Card. **This option appears only if a PC Card is inserted into the ASA 312's PCMCIA slot.**

Filename

Allows you to save the Results Graph with an eight-character internal filename. Enter a filename. Filenames can be from one to eight characters in length. DS1 Result Graphs have the .R1 extension automatically appended.

Description

Allows you to enter a 25-character description for the file.

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Current and Previous Internal Memory

For easy reference, and to ensure that the file data is accurate, there is a table identifying data for both the current and previous system memory locations. This table contains the following information:

- Internal memory location
- Start time of the graphed result
- Date of the graphed result
- Duration of the graphed result

Using two function buttons, Save Current and Save Previous, choose which graphed results to save. No graphed data file can be saved unless the protocol processor has been stopped and no test is currently running.

Save Current

Saves the graphed test data that is currently stored in the current system memory location.

To ensure accuracy, the system stores data in both a current and previous system memory location. These memory locations contain start time, date, and duration of the graphed results.

NOTE ➤
The message Protocol processor must be stopped before results can be saved appears if you try to save a file while a test is in progress. This warning applies only to the protocol processor currently in use; other protocol processors (for example, SONET, ATM, E1, or DS3) may be running due to the system's simultaneous operations capability.

No graphed data file can be saved unless the protocol processor and currently active test is stopped. ◄

Save Previous

Saves the graphed test data that is currently stored in the previous memory location.

To ensure accuracy, the system stores data in both a current and previous system memory location. These memory locations contain start time, date, and duration of the graphed results.

NOTE ➤
The message Protocol processor must be stopped before results can be saved appears if you try to save a file while a test is in progress. This warning applies only to the protocol processor currently in use; other protocol processors (for example, SONET, ATM, E1, or DS3) may be running due to the system's simultaneous operations capability.

No graphed data file can be saved unless the protocol processor and currently active test is stopped. ◄

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Recall Graphs

Use the Recall Graphs button to open any previously saved graph that is stored either on the Flash drive, SRAM PC Card (only appears if a memory card is inserted in the ASA 312's PCMCIA slot), or RAM drive.

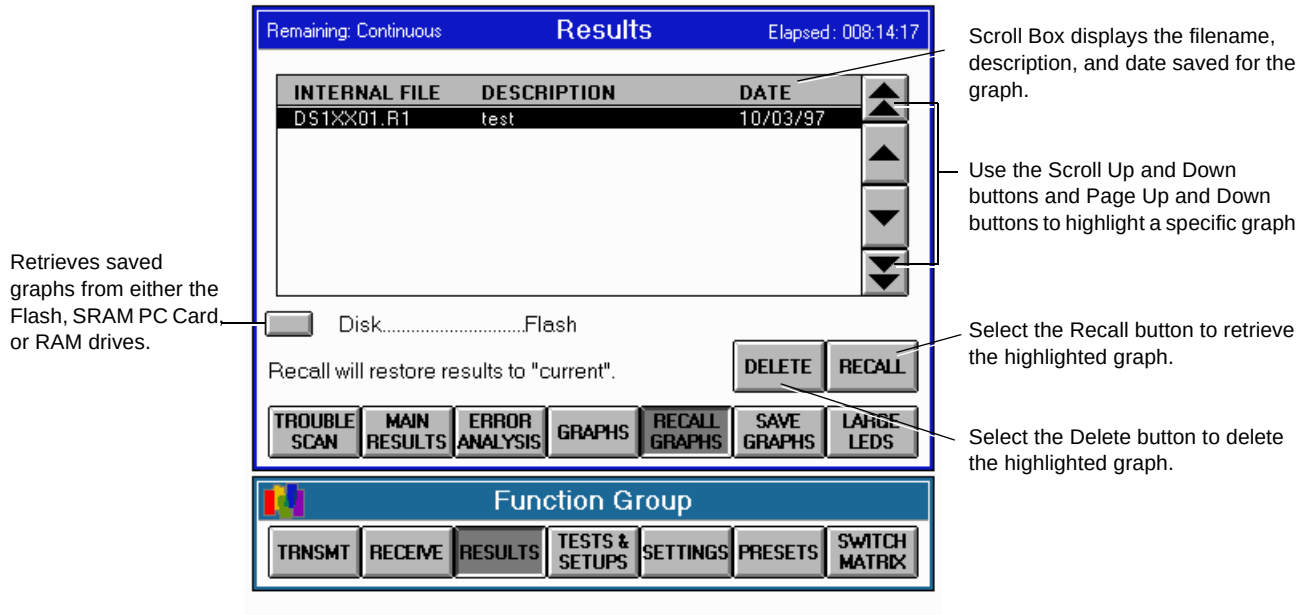


Figure 5-28. DS1 Recall Graphs Commands

While the unit is performing test operations, protocol processor results are viewed and saved. Using the Save Graphs function described earlier in this section, these graphed results are automatically loaded into the instrument system memory and the data is always saved in what is called a "current" results location. When using the Run Stop function to stop the test and re-start another one, the "current" test results are moved to what is referred to as the "previous" test results location and the current test results are initiated again.

The Recall Graphs function menu field selector recalls graphs and either deletes the graphed results or restores the graphed results to the current location in the instrument system memory. These recalled results are derived from the list of graphs saved using the Save Graphs function. These saved graphs are listed in the Recall Graphs display and identified using a table.

The table lists the internal file name, a description of the file and the date the file was saved. Arrow keypads are provided for easy viewing up and down the list of saved graph files. Once a file is selected, it can either be recalled which restores these results to the current results location and now can be viewed, or deletes the graphed data using the Delete function.

NOTE ➤
The instrument is currently capable of saving only graphed results data obtained using the protocol processor Run Stop function. All other protocol processor results data are deleted automatically when the unit is turned off unless graphed results are saved using the Save Graph function. ◄

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Large LEDs

This button displays the DS1 LED Error and Alarm Indicators in a large, easy to read format that covers the entire screen area. This is especially useful for viewing any errors or alarms from a long distance, such as across the room from a test bay.

You have the option of viewing errors and alarms for all protocol processors (DS1, DS3, ATM and SONET) or just the DS1 protocol processor errors and alarms.

The following describes the LED colors:

If the LED is this color...	Then the LED indicates this activity...
Green	The specific function is active an OK.
Red	An error or alarm event is in progress.
Yellow	Indicates that this function experienced an error or alarm event. This event is cleared by selecting the Clear History button.
Black (Clear)	No activity from this specific function.

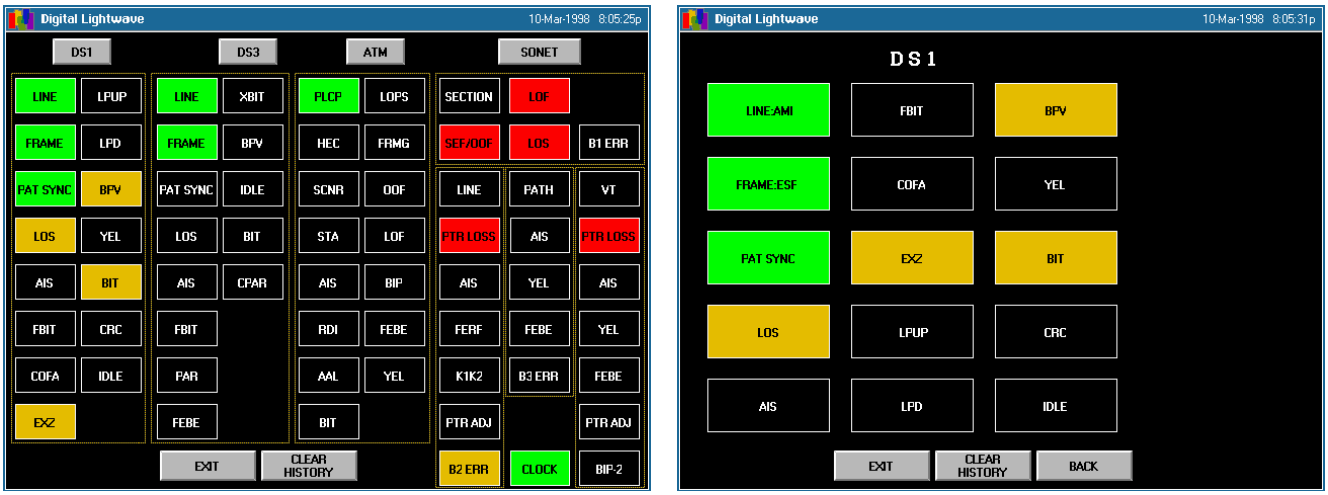


Figure 5-29. Large DS1 and Large DS1 Only LEDs

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Tests & Setups Function Group

The Tests & Setups Function group button is described in detail in chapter 9, *Tests & Setups*. The commands and functions associated with this Function group button are similar for the SONET, DS1, E1 and DS3 protocol processors.

Settings Function Group

The Settings Function group button is described in chapter 10, *Settings, Presets, and Switch Matrix*. The commands and functions associated with this Function group button are common to all five protocol processors.

Presets Function Group

The Presets Function group button is described in chapter 10, *Settings, Presets, and Switch Matrix*. The commands and functions associated with this Function group button are common to all five protocol processors.

Switch Matrix Function Group

The Switch Matrix Function group button is described in chapter 10, *Settings, Presets, and Switch Matrix*. The commands and functions associated with this Function group button are common to all five protocol processors.

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6 DS3 Protocol Processor

Overview

This chapter describes the user interface and commands that control the DS3 protocol processor. The DS3 protocol processor allows you to test and monitor DS3 signals. This can be performed independently or simultaneously with other protocol processors.

Introducing the DS3 User Interface

The DS3 user interface presents the commands, buttons, and LEDs that you use to control the DS3 protocol processor. The interface consists of the following elements:

- DS3 LEDs and Status Indicators
- DS3 Function Menu
- Function Group and Action button rows

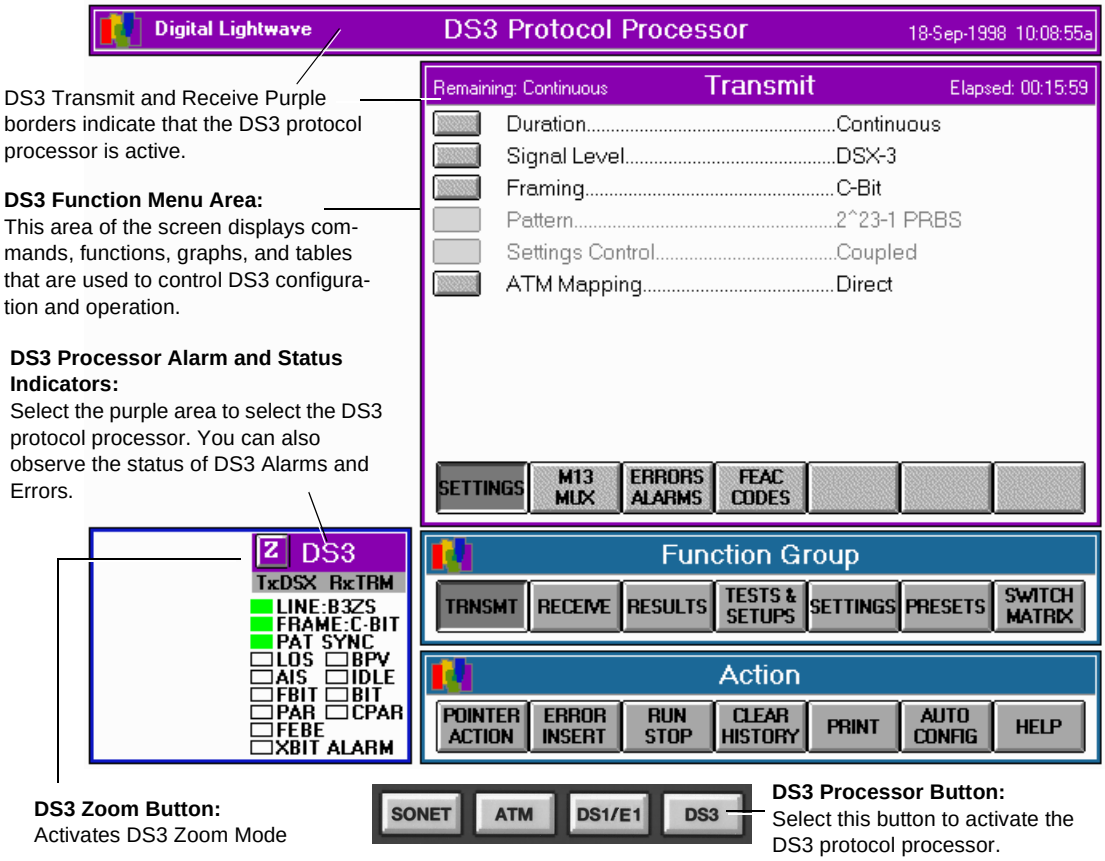


Figure 6-1. DS3 Protocol Processor Components

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DS3 Processor LEDs and Status Indicators

The DS3 Processor Alarm and Status Indicators area serves the following purposes:

- To provide access to the DS3 protocol processor functions, which is achieved by selecting the purple DS3 title bar on the screen.
- To provide a visual status of DS3 activity such as the line interface transmit and receive settings and the DS3 alarm and error conditions.

The following describes the DS3 Processor Alarm and Status Indicators area.

Indicator	Description
	DS3 Zoom Button: Activates DS3 Zoom mode. This provides quick access to several DS3 Transmit and Receive commands, alarms, and errors. When pressed, the entire screen is dedicated to the DS3 Zoom functions.
Tx	Displays the value of the Transmit DS3 Line Interface Signal Level
Rx	Displays the value of the Receive DS3 Line Interface Input Termination
Line	Line Code: Indicates the type of line coding used by the DS3 line interface
Frame	Framing: Indicates the type of DS3 framing selected. If M13 framing is selected, and C-Bit framing is being received, then this LED is clear.
Pat Sync	Indicates cell synchronization condition
LOS	Loss of Signal: Indicates an LOS state was detected
BPV	Bipolar Violation: Indicates a BPV error was received
AIS	Alarm Indication Signal: Indicates an Alarm Indication Signal was received
Idle	Indicates an Idle alarm was received
FBIT	Frame Bit: Indicates a Frame Bit error was received
BIT	Indicates a Bit error on the DS3 signal
PAR	Parity Error: Indicates a Parity error on the DS3 signal.
CPAR	C-Parity Error: Indicates a C-Parity error on the DS3 signal
FEBE	Far-end Block Error: Indicates a Bit error has occurred at the far end of the DS3 link.
XBIT	X-bit error: Indicates an X-bit error on the DS3 signal

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Configuring the ASA 312 and NAA I for DS3 Operation

The ASA 312 and NAA I can be quickly configured for DS3 operation using the Presets function Group button.

The following procedures describe how to set up the ASA 312 and NAA I for basic DS3 operation. These procedures assume that the ASA 312 is looped on itself for DS3 operation.This Preset command makes automatic connections between the SONET protocol processor, the DS3 protocol processor and the M13 Mux.

1. Select the Presets button located in the Function Group button row.

   The Presets command box displays.

   NOTE ➤
   If your unit is not licensed for ATM operation, then the ATM options do not appear. ◄

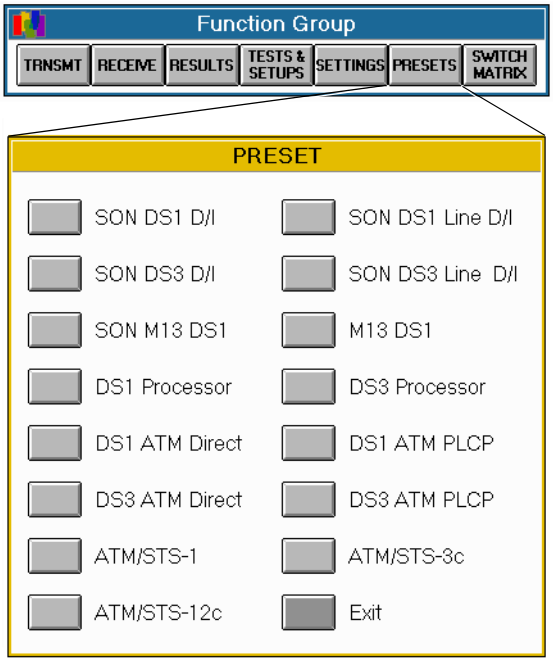


Figure 6-2. Displaying Preset Commands for DS3

2. Select the DS3 Processor command button.

   The message Processing...Please wait displays.

3. Select the DS3 protocol processor.

   The DS3 protocol processor is selected by selecting either the DS3 Processor Button or by selecting the DS3 Alarm and Status Indicator area.

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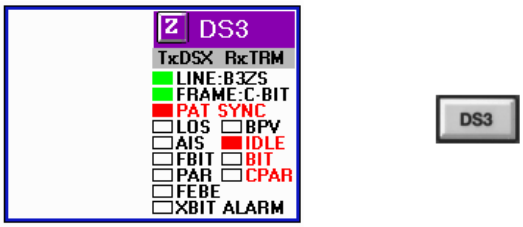


Figure 6-3. Selecting the DS3 Protocol Processor

The Transmit Settings commands display on the screen.

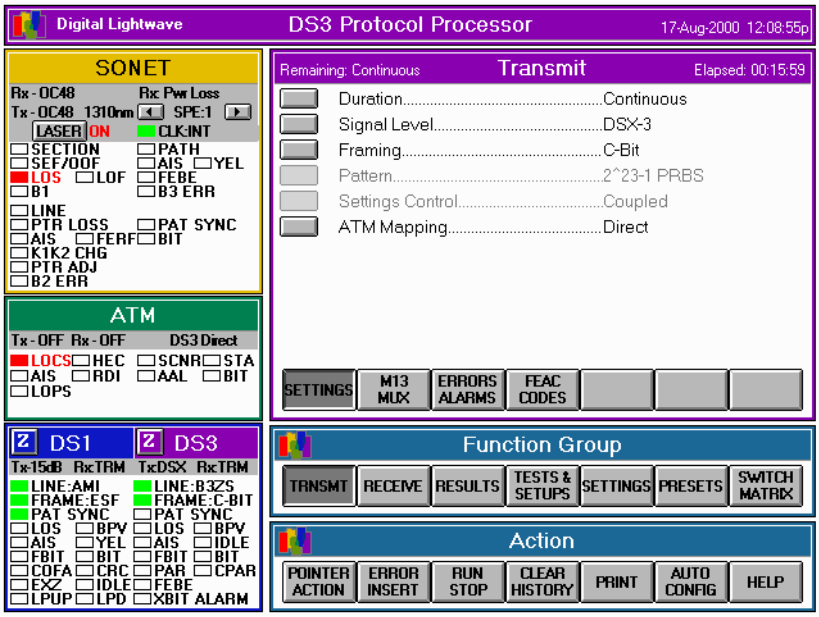


Figure 6-4. DS3 Protocol Processor Screen

4. If necessary, make appropriate changes to the Transmit DS3 Line Interface and DS3 protocol processor functions
5. Select the Receive Function Group button.

   The Receive Settings commands display on the screen.

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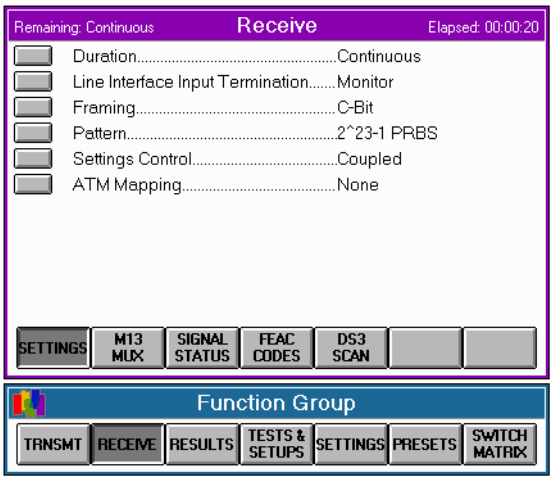


Figure 6-5. DS3 Protocol Processor with Receive Function Menu

6. Make appropriate changes to the Receive DS3 Line Interface and DS3 protocol processor functions.
7. Verify that the DS3 LEDs are green.
8. Select the RUN STOP button located in the Action button row.

   The Run/Stop Menu displays.

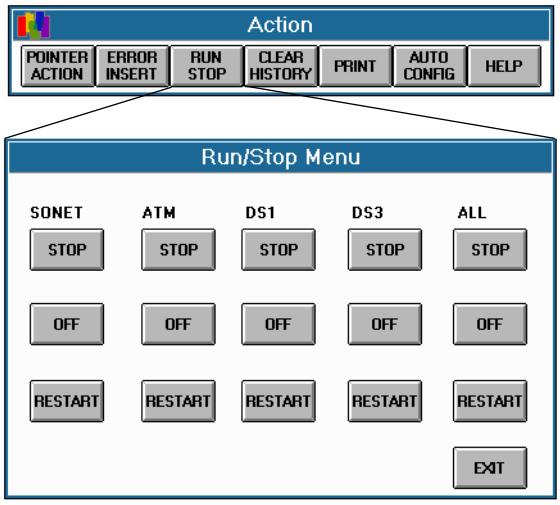


Figure 6-6. DS3 Run Stop Action Button

9. Select the DS3 Restart button.

   The DS3 protocol processor is now running.

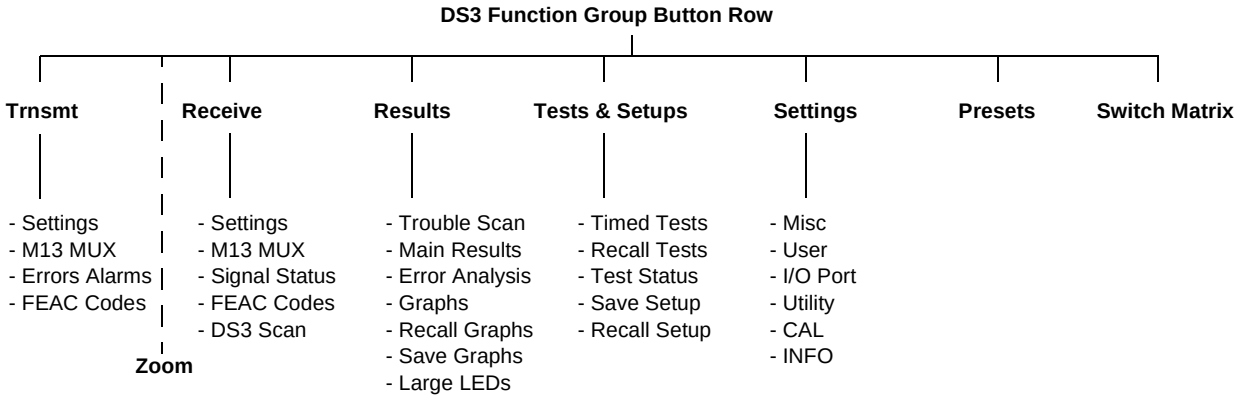
The system is configured for basic DS3 testing and monitoring. At this point, you can view results by selecting the Results Function Group button or initiate tests by selecting the Tests & Setup Function Group button.

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If your application requires customized configuration, then use the Switch Matrix to create specific mapping and configuration settings.

DS3 Protocol Processor Function Group Buttons

The functionality available for the DS3 protocol processor appears by selecting any of the following buttons from the Function Group button row:



The remainder of this chapter describes the functions, commands, and options associated with the previously illustrated Function Group buttons.

Trnsmt Function Group

The Trnsmt (Transmit) Function Group button provides selections for setting the transmit interface signal, defining the framing, pattern, and pattern settings control.

The following buttons make up the DS3 Transmit Function Group:

- **Settings:** Configures the unit's transmit parameters for your DS3 test environment.
- **M13 MUX:** Configures M13 MUX parameters for dropping and inserting a DS1 signal into a DS3 signal.
- **Errors and Alarms:** Generates errors and alarms on your DS3 facility.
- **FEAC Codes:** Configures the alarm and status parameters of the Far-End Alarm Codes channel.

The **Zoom** button activates the DS3 Zoom screen function which provides quick access to specific DS3 commands, alarms, and errors. It is described at the end of the Transmit Function Group section.

The following section describes these functions and their associated commands.

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Settings

The Settings button allows you to define the transmit signal parameters for the DS3 line interface and the DS3 protocol processor.

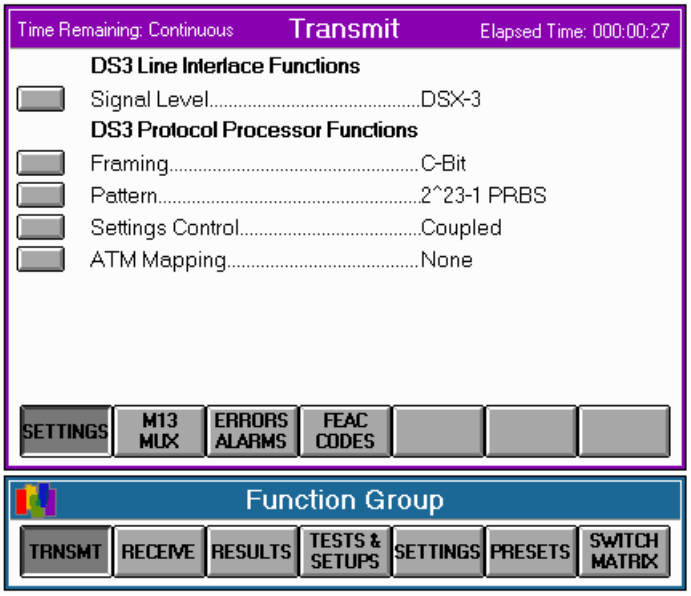


Figure 6-7. Transmit Settings Commands

Duration

Sets the Duration of the Transmitted Test to Continuous, 5 Minutes, 15 Minutes, 1 hour, 2 hours, 24 hours, 72 hours, or User Defined.

Signal Level

Sets the signal strength of the DS3 transmit signal. The signal level values simulate high and low impedance experienced by a DS3 signal. The following options are available:

Option	Description
DSX-3	Sets the DS3 signal level to 0.48 Vp. This level is equal to a High signal sent through 450 feet of coaxial cable and is the standard cross-connect level.
DS3 High	Sends the DS3 signal at a higher voltage to simulate a "hot" signal sent over a short cable distance. The DSX-3 signal level is set to 0.95 Vp. This setting is used when testing from the network element location rather than at the DSX. This signal sent through 450 feet of coaxial cable is equal to DSX-3 level.
DS3 Low	Sends the DS3 signal at a lower voltage to simulate transmission over a long cable distance. The DSX-3 signal level set to 0.35 Vp. This level simulates a standard DSX level sent through 450 feet of coaxial cable.

Framing

Configures the framing format used for the DS3 transmit signal.

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NOTE ➤
This command is coupled. Any changes made on the Transmit-side are automatically copied to the Framing command on the Receive-side. ◄

The following options are available for this command:

Option	Description
Unframed	Configures the transmit signal for an unframed format.
M13	Configures the transmit signal for M13 framing format.
C-Bit	Configures the transmit signal for C-bit framing format. This type of framing allows the use of FEAC Codes. FEAC Codes are discussed later in this chapter.

Pattern

Selects a DS3 signal pattern to transmit. This command can be coupled or set independently of the Receive Pattern command. The following options are available for this command:

Option	Description
2^15-1 PRBS	Transmits a 32,767-bit pseudorandom pattern which generates a maximum of 14 sequential zeros and 15 sequential ones.
2^20-1 PRBS	Transmits a 1,048,575-bit pseudorandom pattern which generates a maximum of 19 sequential zeros and 20 sequential ones.
2^23-1 PRBS	Transmits an 8,388,607-bit pseudorandom pattern which generates a maximum of 22 sequential zeros and 23 sequential ones.
Blue Sig (1010)	Transmits an alternating marks (1) and spaces (0) pattern which equates to sending the DS3 Blue Signal.
Idle (1100)	Transmits a repeating two marks (1) and two spaces (0) pattern which equates to sending the DS3 Idle Signal.
All Zeros	Transmits an all spaces (0) pattern.
All Ones	Transmits an all marks (1) pattern.
User Defined	Allows you to enter a desired pattern using a keypad. The keypad lets you set zeros and ones over a pattern length from 3 to 24 bits.

Settings Control

Determines if the Transmit Pattern command is copied to the Receive Pattern

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command. The following options are available.

Option	Description
Independent	Any changes made to the transmit Pattern command are not replicated to the Receive pattern command.
Coupled	Changes made to the transmit Pattern command are replicated to the Receive pattern command.

ATM Mapping

Makes automatic connections between the ATM and DS3 protocol processor. The following options are available:

Option	Description
None	ATM Mapping is disabled. The Pattern defaults to 2^23-1 PRBS.
Direct	Uses HEC-based cell delineation. The physical DS3 interface supports data rates up to 44.21 Mbps.
PLCP	Physical Layer Convergence Protocol is used. ATM cells are enclosed in a frame defined by PLCP which adds more overhead. The physical DS3 interface supports data rates up to 40.70 Mbps.

M13 MUX

The M13 Mux button configures the M13 Multiplexer transmission functionality.

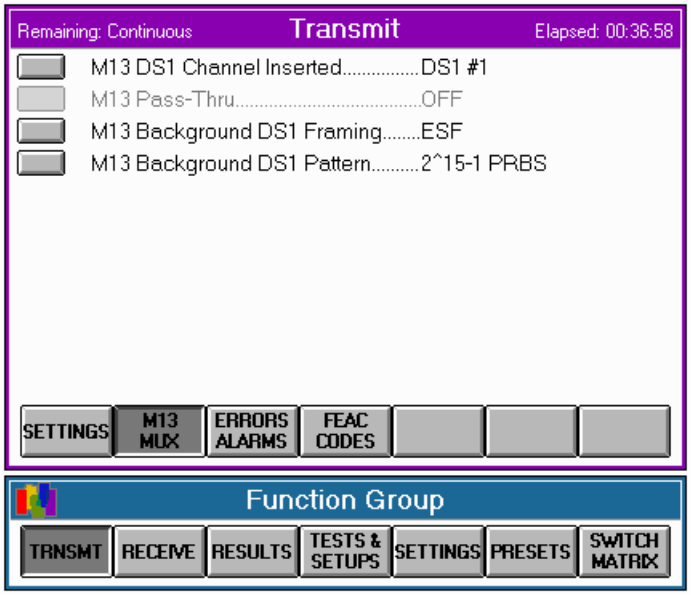
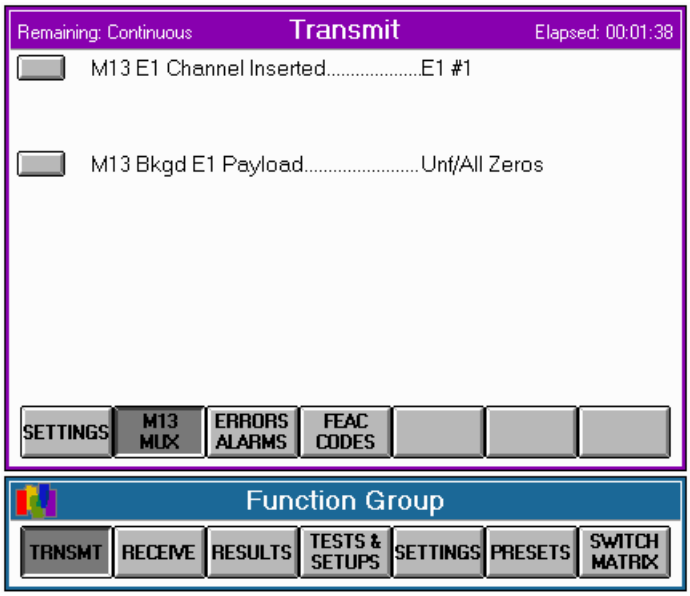


Figure 6-8. M13 MUX

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The options available within this function differ depending on whether your unit is operating in E1 or DS1 mode. The screen below appears if the system is operating in E1 mode.



Descriptions for both DS1 and E1modes are included below. The following commands are available for this function.

M13 DS1 Channel Inserted

Selects one of the 28 DS1 channels (DS1#1 through DS1#28) or 21 E1 channels (E1#1 through E1#21) to be inserted into the DS3 signal. The following options are available for this command.

Option	Description
DS1 #1 through DS1 #28, or E1#1 through E1#21	Selects one of the 28 DS1 channels or 21 E1 channels to insert into the DS3 signal.
All Background	Selects all 28-DS1 signals to be used as background signals. Any change made to the framing and pattern of one DS1 channel is made to all 28 DS1 channels. Note: This option is not available in E1 mode.

M13 Pass-Thru

Allows a DS1 signal to be dropped from an incoming DS3 signal. The dropped DS1 signal can be altered and then added to the out-bound DS3 signal.

NOTE ➤
This option is not available in E1 mode.◄

Option	Description
On	Enables M13 Pass-Thru mode.
Off	Disables M13 Pass-Thru mode.

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M13 Background DS1 Framing

Selects the type of framing format used for the background DS1 channels that make up the DS3 signal. This command is disabled if the M13 Mode command is set to Thru Mode.

NOTE ➤
This option is not available in E1 mode.◄

The following options are available.

Option	Description
SF/D4	Configures the DS1 signal for D4 super frame format.
ESF	Configures the DS1 signal for Extended Super Frame format.
Unframed	Configures the DS1 signal for an unframed format.

M13 Background DS1 Pattern

Selects the type of pattern sent over the background DS1 channels that make up the DS3 signal. This command is disabled if the M13 Mode command is set to Thru Mode.

NOTE ➤
This option is not available in E1 mode.◄

Option	Description
QRSS	(Quasi-Random Signal Source) Transmits a modified 2^20-1 pseudorandom pattern which allows a maximum of 14 sequential zeros and 20 sequential ones. This pattern simulates live data.
2^15-1	Transmits a 32,767-bit pseudorandom pattern which generates a maximum of 14 sequential zeros and 15 sequential ones.
2^20-1	Transmits a 1,048,575-bit pseudorandom pattern which generates a maximum of 19 sequential zeros and 20 sequential ones.
2^23-1	Transmits an 8,388,607-bit pseudorandom pattern which generates a maximum of 22 sequential zeros and 23 sequential ones.
All Ones	Transmits an all marks (1) pattern.
1100	Transmits a repeating two marks (1) and two spaces (0) pattern which equates to sending the DS3 Idle Signal.
1010	Transmits an alternating marks (1) and spaces (0) pattern which equates to sending the DS3 Blue Signal.

M13 Background E1 Payload

Selects the type of payload format used for the background E1 channels that make up the DS3 signal. The following options are available.

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Option	Description
Unf/All Zeros	Configures the E1 signal for unframed format and transmits an all zero (0) payload.
Unf/All Ones	Configures the E1 signal for unframed format and transmits an all marks (1) payload.

Errors and Alarms

The Errors and Alarms button configures the DS3 protocol processor to generate specific errors and alarms that stress your DS3 facility. This allows you to create situations that force your equipment to react to these conditions. This type of stress testing can isolate problems within a DS3 network during acceptance testing or during routine maintenance and troubleshooting.

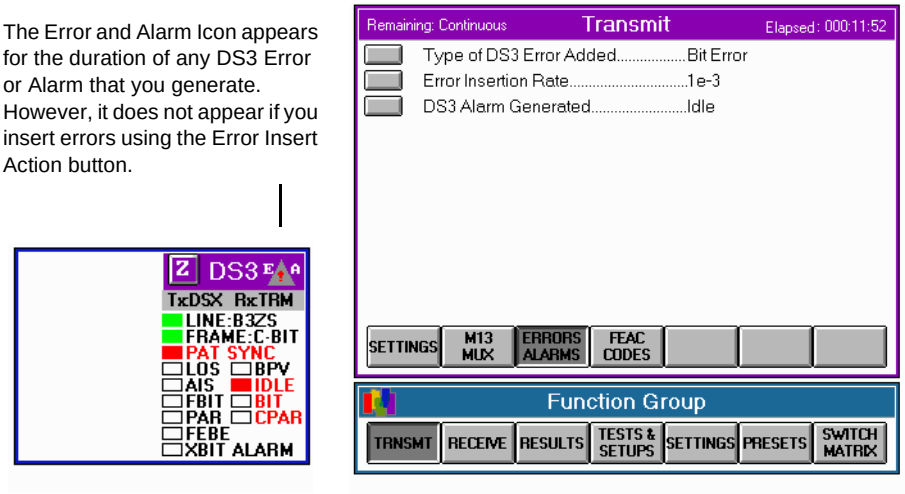


Figure 6-9. DS3 Transmit Errors and Alarms Commands

The following describes the commands and options associated with this button.

Type of DS3 Error Added Determines the type of error that is transmitted by the DS3 protocol processor. Often these errors are used by the receiving equipment to determine if a transmission error has occurred.

The following options are available.

NOTE ➤
Use the Error Insert Action button to inject single errors into the DS3 transmit signal. When this occurs, the appropriate error LED flashes red, and the error is recorded by various functions associated with the Results Function Group button. ◄

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Option	Description
None	Turns off DS3 error insertion.
Bit Error	Transmits a bit error which results in a frame-synchronization-bit error event. This also inserts a frame-bit error in the received frame-bit pattern. When this type of error occurs, the BIT LED flashes red, and the event is recorded by the functions listed under the Results Function Group button.
BPV Error	Transmits Bipolar Violation errors which result in a line code violation event for an AMI-coded signal, the occurrence of received excessive zeros, or a bipolar violation. A line code violation event for a B8ZS-coded signal is the occurrence of a received excessive zeros or a bipolar violation that is not part of a zero substitution code. When this type of error occurs, the BPV LED flashes red, and the event is recorded by functions listed under the Results Function Group button.
Frame Error	Results in a severely-errored-framing event; the occurrence of two or more framing-bit-pattern errors within a 3-ms period. This type of error is not available if the DS3 protocol processor is configured for Unframed framing format.
P-Parity Error	Results in an error in the P-bit channel (P1 and P2) providing parity information for the preceding M-frame. This type of error is not available if the DS3 protocol processor is configured for Unframed framing format.
C-BIT Parity Error	Results in an error in the C-bit channel used to denote the presence or absence of stuffed bits. This type of error is only available if the DS3 protocol processor is configured for C-BIT framing format.
FEBE Error	Results in an error in one of the three C-Bits in M-subframe designated as Far End Block Error (FEBE) bits. This type of error is only available if the DS3 protocol processor is configured for C-BIT framing format.

Error Insertion Rate

Sets the insertion rate for DS3 transmit errors.

NOTE ➤
This command is only available when an error type is selected using the Type of DS3 Error Added command. ◄

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The following options are available for this command.

Option	Description
Off	No errors are inserted for transmission. (The value displayed for this command is None.)
1e-*X*, where *X* is a value from 2 through 9.	For BIT and BPV Errors, error rates range from 1e-3 through 1e-9. For Frame errors, error rates range from 1e-2 through 1e-9. For P-Parity, C-BIT Parity, and FEBE errors, error rates range from 1e-4 through 1e-9.
User Defined	Allows you to enter and save a customized error insertion rate.

DS3 Alarm Generated

Generates a specific type of alarm on the transmit side of the DS3 protocol processor. The following alarms are available for this command.

Option	Description
Off	No alarms are generated (The value displayed for this command is None.)
AIS	Generates an AIS (Alarm Indication Signal) signal for the transmit DS3 signal.
Idle	Generates an Idle alarm for the transmit DS3 signal.
XBIT (00)	Generates an X-Bit alarm in which the two X-bits are both zeros.

FEAC Codes

The Far-End Alarm and Control (FEAC) channel allows alarm and status information to be sent from the equipment at the far-end of the signal to the equipment at the near-end of the signal. It also allows the near-end equipment to initiate loopback tests from the far-end equipment.

The FEAC Codes button and its associated commands allow you to define a specific type of alarm or loopback test that is sent from the far end of the DS3 connection. These commands allow you to use the system locally to send a command to the far-end equipment that will then initiate an alarm or loopback to the system.

NOTE ➤
FEAC Codes are only available when the DS3 protocol processor is configured for C-BIT framing.

There is an equivalent FEAC Codes button listed under the Receive Function Group button. The commands attached to these buttons are automatically coupled. Any changes made to a command are copied to the equivalent Receive command. ➤

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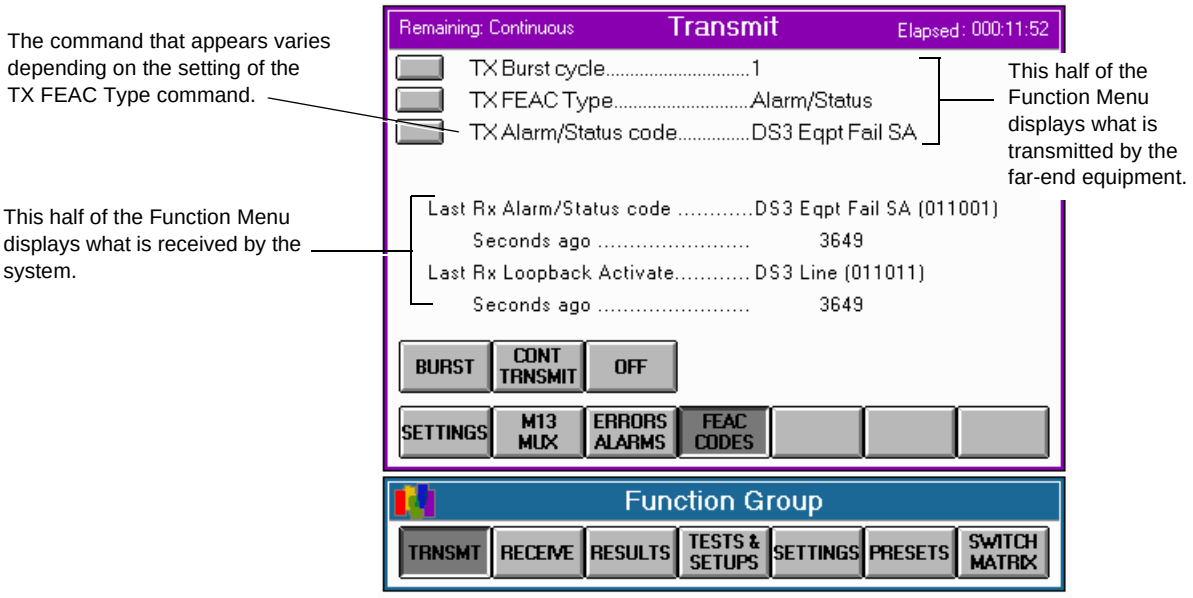


Figure 6-10. DS3 FEAC Codes

TX Burst Cycle

Determines how many consecutive burst of alarms or loopback tests are generated over the DS3 signal to the equipment at the remote location when the Burst button is pressed.

Option	Description
1 through 16	The Transmit Burst Cycle values can range from 1 to 16.

TX FEAC Type

Determines if the far-end equipment sends an alarm/status code or starts or stops a loopback test to the system. The following options are available for this command.

Option	Description
Alarm/Status	Configures the system so that an alarm or status code is sent from the far-end equipment to the system. A burst cycle consists of 100 msec of Alarm/Status and 25 msec of Idle. When this option is selected, the *TX Alarm/Status Code* command, which configures the type of codes sent, appears in the Function Menu area. This command is described later in this chapter.
Loopback Activate	The system sends a command over the FEAC channel so that the far-end equipment starts a loopback test. A burst cycle consists of 17 msec of Activate code, 17 msec of Loopback Line, and 91 msec of Idle. When this option is selected, the *TX Loopback Line* command appears in the Function Menu area. This allows you to select a specific DS1 channel for loopback testing. The *TX Loopback Line* command is described later in this chapter. **NOTE:** This feature is not available for use with the NAA I.

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Option	Description
Loopback Deactivate	The system sends a command over the FEAC channel so that the far-end equipment stops a loopback test that is in progress. A burst cycle consists of 17 msec of Deactivate code, 17 msec of Loopback Line, and 91 msec of Idle. When this option is selected, the TX Loopback Line command appears in the Function Menu area. This allows you to stop a loopback on a specific DS1 channel. The TX Loopback Line command is described later in this chapter. **NOTE:** This feature is not available for use with the NAA I.

TX Alarm/Status Code or TX Loopback Line

NOTE ➤
The command displayed on the screen varies depending on the setting of the TX FEAC Type command. When this command is configured for Alarm/Status, then the TX Alarm/Status Code command appears. When the TX FEAC Type is configured for Loopback Activate or Loopback Deactivate, then the TX Loopback Line command appears. ◄

TX Alarm/Status Code

Selects the type of alarm code or status code that the far-end equipment sends to the system. The following options are available for this command.

Option	Description
Single DS1 LOS/HBE	A single DS1 channel Loss of Signal/High Bit Error ratio alarm is generated by the far-end equipment. This option uses an 010101 code.
Multi DS1 LOS/HBER	Multiple DS1 channels generate a Loss of Signal/ High Bit Error Ratio alarm from the far-end equipment. This option uses an 010101 code.
DS3 Eqpt Fail SA	Allows the far-end equipment to generate a Service Affecting DS3 equipment failure to the system. This type of alarm indicates that equipment is out of service and requires immediate attention. This option uses a 011001 code.
DS3 Eqpt Fail NSA	The far-end equipment generates a Non-Service Affecting DS3 equipment failure to the system. This type of alarm indicates that equipment is out of service and not available for use. This option uses a 001111 code.
DS3 LOS/HBER	The far-end equipment generates a DS3 Loss of Signal/High Bit Error Ratio alarm to the system. This option uses a 001110 code.
DS3 Idle Received	The far-end equipment generates a DS3 Idle Receive signal to the system. This option uses a 011010 code.

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Option	Description
DS3 Out-of-Frame	The far-end equipment generates a DS3 Out-of-Frame signal to the system. This option uses a 000000 code.
DS3 AIS Received	The far-end equipment generates a DS3 AIS Received signal to the system. This option uses a 010110 code
DS1 Eqpt Fail SA	The far-end equipment generates a Service Affecting DS1 equipment failure to the system. This type of alarm indicates that equipment is out of service and requires immediate attention. This option uses a 000101 code.
DS1 Eqpt Fail NSA	The far-end equipment generates a Non-Service Affecting DS1 equipment failure to the system. This type of alarm indicates that equipment is out of service and not available for use. This option uses a 000011 code.
DS3 NIU Loop Up	The far-end equipment starts a loopback test over the DS3 signal. The option uses a 001001 code.
DS3 NIU Loop Dn	The far-end equipment stops the loopback test in progress over the DS3 signal. This option uses a 010010 code.
Com Eqpt Fail NSA	The far-end equipment generates a Non-Service Affection Common Equipment failure to the system. This type of alarm indicates that equipment is out of service and not available for use. This option uses a 011101 code.
000001 through 111111	Select one of the following codes: 000001; 000010; 000100; 000110; 001000; 001010; 001011; 001100; 001101; 010000; 010001; 010100; 010111; 011000; 011111; 100000; 111101; 111110; 111111

Last Rx Alarm/Status Code

Displays the last alarm or status detected by the system, and how long ago (in seconds) it was detected.

TX Loopback Line

Selects an individual DS1 signal or the entire DS3 signal to activate and deactivate loopback tests. If the TX FEAC Type command is configured to Loopback Activate, then the selected DS1 signal starts a loopback test from the far-end equipment. If the TX FEAC Type command is configured to Loopback Deactivate, then the selected DS1 signal drops the loopback in the remote equipment.

The following options are available for this command.

Option	Description
DS3 Line	Commands the far-end equipment to start or stop a loopback over the DS3 signal.
DS1 Line #1 through DS1 Line #28	Commands an individual DS1 signal to start or stop loopback testing.

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Option	Description
ALL	Commands the remote equipment to start or stop a loopback over all twenty-eight DS1 signals at once.

Last Rx Loopback Activate Displays the last loopback started by the far-end equipment and detected by the system. It also displays how long ago (in seconds) it was activated. This information only appears if the TX FEAC Type command is configured for Loopback Activate.

Last Rx Loopback Deactivated Displays the last loopback stopped by the far-end equipment and detected by the system. It also displays how long ago (in seconds) it was deactivated. This information only appears if the TX FEAC Type command is configured for Loopback Deactivate.

Burst Allows you to inject the number of alarm or loopback burst as defined by the TX Burst Cycle command described earlier in this chapter.

Cont Trnsmit Allows you to continuously send alarm and loopback codes. (This is actually an infinite number of burst cycles.) This can be stopped using the Off button.

Off Stops the constant transmission of alarm and loopback codes.

Zoom

The DS3 Zoom function provides quick access to specific DS3 commands, errors, alarms, and LEDs. When the DS3 Zoom function is activated, the screen changes as illustrated in the following figure.

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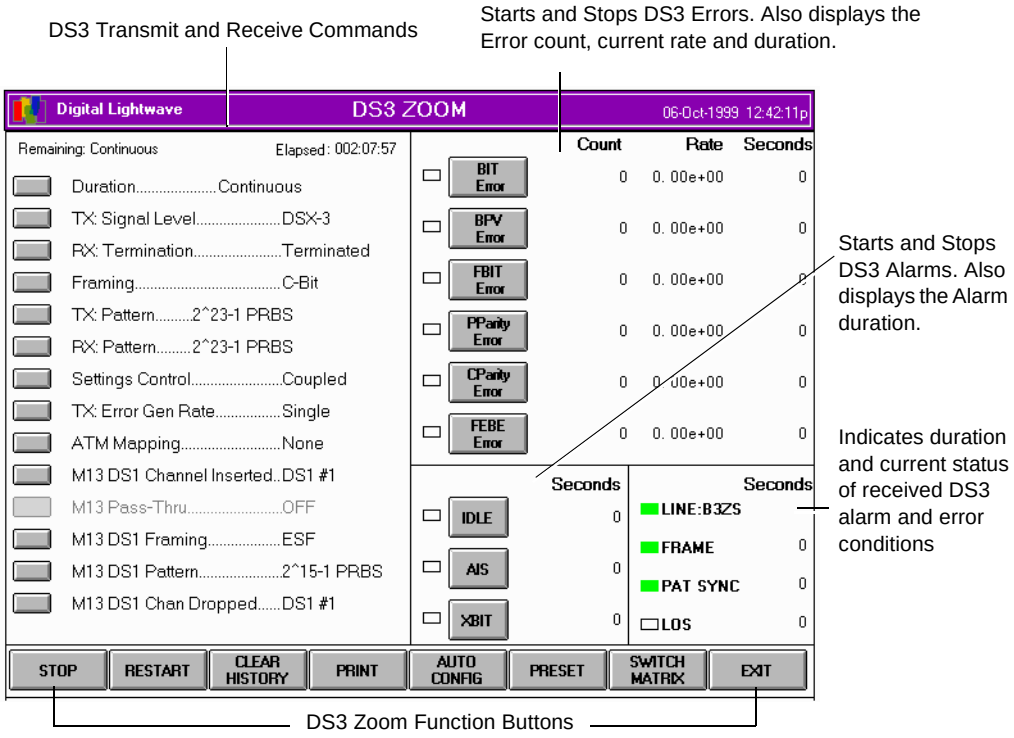


Figure 6-11. DS3 Zoom screen Display

The following describes the sections of the DS3 Zoom screen display.

Zoom Transmit and Receive Commands

The Zoom Transmit and Receive commands provide fast access to key DS3 commands for configuration and setup of the DS3 protocol processor.

Function	Description
Remaining	Time that remains.
Elapsed	Indicates how long the DS3 protocol processor has been running. The timer is stopped by selecting the Stop function button. It resets to 00:00:00 and restarts when the Restart button is pressed.
Duration	Functions as a timer and determines how long a DS3 error or alarm runs before it is terminated. Available options are: Continuous (An error or alarm runs indefinitely until it is manually stopped by using the Stop Function button, or by selecting or changing a specific Error or Alarm command button, or by reconfiguring the DS3 protocol processor.), 5 minutes, 15 minutes, 1 hour, 2 hours, 24 hours, 72 hours, User Defined.
TX: Signal Level	Sets the strength of the DS3 transmit signal. Available options are: DSX-3, DS3 High, DS3 Low.

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Function	Description
RX: Termination	Sets the termination point of the DS3 receive signal. Available options are: Monitor, Terminated
Framing	Sets the framing format for the DS3 signal. Available options are: Unframed, M13, C-Bit
TX: Pattern	Sets the pattern for the DS3 transmit signal. Available options are: 2^15-1 PRBS, 2^20- PRBS, 2^23-1 PRBS, Blue Sig (1010), Idle (1100), All Ones, All Zeros, User Defined.
RX: Pattern	Sets the type of DS3 signal pattern that the DS3 protocol processor expects to receive. Available options are: LIVE, 2^15-1 PRBS, 2^20- PRBS, 2^23-1 PRBS, Blue Sig (1010), Idle (1100), All Ones, All Zeros, User Defined.
Settings Control	Determines if the DS3 transmit and receive commands are set independent of each other or if changes made to transmit commands are copied to receive commands and vice versa.
TX: Error Gen Rate	Sets the insertion rate of the DS3 transmit errors. Available options are: Single, 1e-2, 1e-3, 1e-4, 1e-5, 1e-6, 1e-7, 1e-8, 1e-9, User Defined.
ATM Mapping	Configures the DS3 protocol processor for ATM mode.Available options are: None, PLCP, Direct
M13 DS1 Channel Inserted	Selects one of 28 DS1 channels (DS1#1 through DS1#28) to be inserted into the DS3 signal. Available options are: DS1#1 through DS1#28 and All Background.
M13 Pass-Thru	Allows a DS1 signal to be dropped from an incoming DS3 signal. The dropped DS1 signal can be altered and then added to the out-bound DS3 signal. Available options are: Background Mode and Thru Mode.
M13 DS1 Framing	Selects the type of framing format used for the background DS1 channels that make up the DS3 signal. Available options are: SF/D4, ESF, and Unframed.
M13 DS1 Pattern	Selects the type of pattern sent over the background DS1 channels that make up the DS3 signal.
M13 DS1 Chan Dropped	Selects a specific DS1 channel to drop from a demultiplexed DS3 signal.

Zoom DS3 Errors

This section of the DS3 Zoom screen allows you to start and stop the transmission of DS3 errors. In addition, it also displays statistics such as the number of errors received (Counts), the current errors received (Rate), and the duration of the error (Seconds). These statistics typically appear on the screen when using functions located under the Results Function Group button.

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When errors are transmitted using the DS3 Zoom screen, the following occurs:

- The selected error button is pressed (dark gray)
- The associated LED flashes to indicate that errors are being received. The LED's frequency is dependent on the Error Generation Rate value.
- The Count column indicates the number of errors received
- The Rate column indicates the insertion rate of errors received
- The Seconds column indicates the duration of error received

The following DS3 errors are available from the DS3 Zoom screen:.

Function	Description
BIT Error	Starts and stops the transmission of bit errors. This type of error is disabled if the DS3 protocol processor is configured for ATM mode.
BPV Error	Starts and stops the transmission of Bipolar Violation errors.
Frame Error	Starts and stops the transmission of Severely Errored Frames. This type of error is disabled if the Framing command is set to Unframed.
P Parity Error	Starts and stops the transmission of errors in the P-bit channel (P1 and P2). This type of error is disabled if the Framing command is set to Unframed.
C Parity Error	Starts and stops the transmission of errors in the C-bit channel. This type of error is disabled if the Framing command is set to Unframed or M13.
FEBE Error	Starts and stops Far End Block Errors. This type of error is disabled if the Framing command is set to Unframed or M13.

Zoom DS3 Alarms

This section of the DS3 Zoom screen starts and stops the transmission of DS3 alarms.

When alarms are transmitted using the DS3 Zoom screen, the following occurs:

- The selected alarm button is pressed (dark gray)
- The associated LED flashes to indicate that alarms are being received
- The Seconds column indicates the duration of the received alarm

The following DS3 alarms are available from the DS3 Zoom screen:

Function	Description
Idle	Starts and stops an Idle alarm on the transmitted DS3 signal.
AIS	Starts and stops an AIS alarm (Alarm Indication Signal – also known as a Blue alarm) on the transmitted DS3 signal.

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Function	Description
XBIT	Starts and stops an X-Bit alarm on the transmitted DS3 signal.(The two X-bits are both zeros.)

Zoom DS3 LEDs

This section of the DS3 Zoom screen provides a visual status of transmit and receive DS3 activity and DS3 errors and alarms. DS3 activity cannot be generated from this section of the screen

Use the following to determine the type of activity and behavior represented by the DS3 LEDs and Indicators:

If a DS3 LED and Indicator is ...	Then it indicates.
Green (LED only)	Normal operation (The LED is acting as a status indicator.)
Clear LED with black text	Normal operation; there is no history of an error or alarm. (The LED and text are acting as an Error/Alarm indicator.)
Red LED with red text	An error or alarm is in progress
Clear LED with red text	An error or alarm was detected, but is no longer in progress

The Seconds column reports the duration of the associated LED activity.

The following DS3 LEDs appear on the DS3 Zoom screen:

Indicator	Description
Line:	Indicates the type of line coding selected for the DS3 Line Interface. The Line LED is clear if the DS3 protocol processor cannot detect the type of line coding. If Line Coding is detected, Line LED is green.
Frame	Indicates if the DS3 protocol processor has received Framing errors. If Framing errors occur, the duration appears in the Seconds column.
Pat Sync	Indicates DS3 Pattern synchronization
LOS	Indicates a Loss of Signal condition.

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DS3 Zoom Function Buttons

The DS3 Zoom screen contains several Function Buttons that control DS3 protocol processor activity.

The following describes these buttons:

Function Button	Description
Stop	Stops all DS3 Zoom activity. All error, alarm, and elapsed time counters stop and indicate the current count.
Restart	Clears all alarms and errors; resets all counters to 0. If error or alarm activity is present, then the transmission and reception of these events continues.
Clear History	Resets recorded history of the DS3 Zoom LEDs and Indicators.
Print	The Print button allows a variety of DS3 alarm and error results, reports, and logs to be printed to the attached printer.
Auto Config	Configures the DS3 protocol processor to match the parameters of the incoming DS3 signal.
Presets	Allows the DS3 protocol processor to be quickly configured for DS3 specific mappings and operation. The following Presets are available: SON DS3 D/I. SON DS3 Line D/I, SON M13 DS1, M13 DS1, DS3 Processor, DS3 ATM Direct, DS3 ATM PLCP.
Switch Matrix	Displays a graphical interface of the system's current mappings and connections.
Exit	Closes the DS3 Zoom function and returns the screen to normal operation.

Receive Function Group

The Receive Function Group button provides functions, commands, and options to configure the receive signal parameters for DS3 operation. These commands configure the system for the expected receive signal.

The following buttons make up the Receive Function Group:

- **Settings:** Configures the unit's receive parameters for your DS3 test environment.
- **M13 MUX:** Selects a single DS1 channel to monitor.
- **Signal Status:** Reports the strength of the incoming DS3 signal.
- **FEAC Codes:** Displays the alarm and status parameters of the Far-End Alarm Codes channel.
- **DS3 Scan:** Continuously scans all 28 DS1 signals that make up the muxed DS3 signal and reports the status.

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Settings

The Settings button allows you to define the receive signal parameters for the DS3 line interface and the DS3 protocol processor.

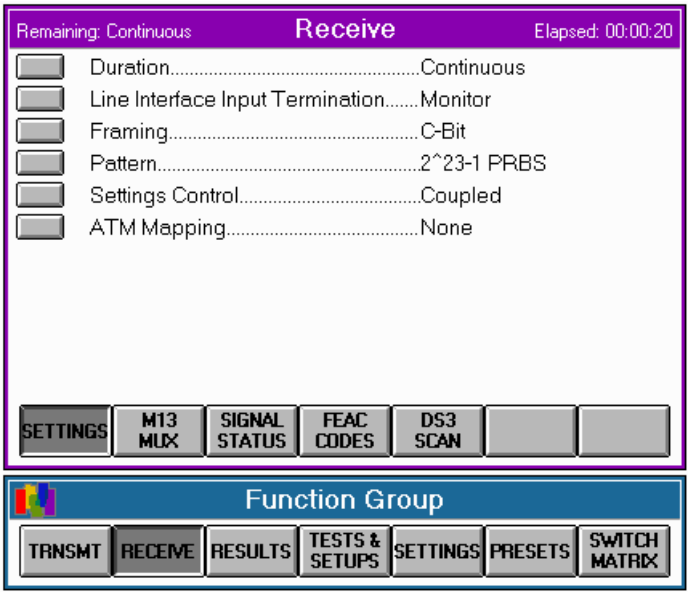


Figure 6-12. DS3 Receive Settings Commands

The following describes the commands associated with this function.

Duration

Functions as a timer and determines how long a DS3 error or alarm runs before it is terminated. Available options are: Continuous (if the test is untimed), 5 minutes, 15 minutes, 1 hour, 2 hours, 24 hours, 72 hours, or User Defined.

Line Interface Input Termination

Configures the receive DS3 line interface. The following options are available.

Option	Description
Terminated	Sets the receive sensitivity of the DS3 Line Interface. Use this setting if the DS3 line terminates at the system's Line Interface.
Monitor	Sets the receive sensitivity of the DS3 Line Interface. Use this setting if the DS3 line connects to a monitor jack.
High	Sets the receive sensitivity of the DS3 Line Interface to high. **Note:** This function is not available for use with the NAA I.
Looped (Diag)	Functionality is disabled for use with the system. **Note:** This function is not available for use with the NAA I.

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Framing

Configures the framing format used for the DS3 receive signal. If the received signal is not in the selected framing format, then an error occurs.

NOTE ➤
This command is coupled to the Transmit function. Therefore, any changes made on the Receive-side are automatically copied to the Framing command on the Transmit-side. ◄

The following options are available for this command.

Option	Description
Unframed	Configures the DS3 protocol processor to receive a signal in an unframed format.
M13	Configures the DS3 protocol processor to receive a signal in an M13 framing format.
C-Bit	Configures the DS3 protocol processor to receive a signal in a C-bit framing format. This type of formatting allows the use of FEAC Codes.

Pattern

Selects the type of DS3 signal pattern that the DS3 protocol processor expects to receive. This command can be coupled or set independently of the Transmit Pattern command. The following options are available for this command:

Option	Description
Live	User data is received; no pattern is used.
2^15-1 PRBS	Receives a 32,767-bit pseudorandom pattern which generates a maximum of 14 sequential zeros and 15 sequential ones.
2^20-1 PRBS	Receives a 1,048,575-bit pseudorandom pattern which generates a maximum of 19 sequential zeros and 20 sequential ones.
2^23-1 PRBS	Receives an 8,388,607-bit pseudorandom pattern which generates a maximum of 22 sequential zeros and 23 sequential ones.
Blue Sig (1010)	Receives an alternating marks (1) and spaces (0) pattern which equates to sending the DS3 Blue Signal. It is only available in the M13 and C-Bit modes.
Idle (1100)	Receives a repeating two marks (1) and two spaces (0) pattern which equates to sending the DS3 Idle Signal. it is only available in the M13 and C-Bit modes.
All Zeros	Receives an all spaces (0) pattern.
All Ones	Receives an all marks (1) pattern.
User Defined	Allows you to enter an 8-bit pattern using the User Programmable Pattern keypad. The keypad lets you set zeros and ones over a pattern length from 3 to 24 bits. The default setting is 00000000 (Hex 00).

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Settings Control

Determines if the Receive pattern commands, configured using the Pattern command, are replicated to the Transmit pattern commands. The following options are available.

Option	Description
Independent	Any changes made to the receive Pattern command are not replicated to the Transmit pattern command.
Coupled	Changes made to the receive Pattern command are replicated to the Transmit pattern command.

ATM Mapping

Determines if additional PLCP overhead is added to the ATM payload when mapping ATM over DS3. The following options are available for this command.

Option	Description
None	ATM Mapping is disabled. The Pattern defaults to 2^23-1 PRBS.
Direct	ATM Mapping uses less overhead for the ATM Cell payload, and the physical DS3 interface supports data rates up to 44.21 Mbps.
PLCP	Physical Layer Convergence Protocol. ATM Mapping uses a DS3 framing structure that adds additional overhead to the ATM Cell payload. The physical DS3 interface supports data rates up to 40.70 Mbps.

Jitter Mapping

Configures the DS3 protocol processor for Jitter operation.

NOTE ➤
This command appears only if the system has the optional Jitter feature installed. Due to space limitations, the Jitter feature cannot be installed into units that have the optional OC-48 feature installed. ◄

NOTE ➤
This function is not available for use with the NAA I.◄

The following options are available:

Option	Description
None	Disables Jitter operation.
Mapped to DS1	Enables Jitter operation using the DS1 protocol processor.
Mapped to DS3	Enables Jitter operation using the DS3 protocol processor.

Jitter Threshold

Sets a unit interval (UI) value for Jitter measurements. For DS3 operation, the threshold ranges from 0 to 10 UI in increments of 0.1.

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Jitter is measured in unit intervals (UIs), where one UI is the variation during one clock cycle (from the beginning of one clock pulse to the beginning of the next clock pulse).

If a positive or negative Jitter peak value equals or exceeds the Jitter Threshold, then the Jitter Hits Counter is incremented. This count can be viewed using the Jitter function that appears by selecting the Main Results button from the Results Function Group button.

NOTE ➤
This function is not available for use with the NAA I.◄

Jitter Equalization

This value provides signal loss compensation at the Jitter board. These selectable stages compensate for signal degradation due to long cable runs.

NOTE ➤
This command is available only if the Jitter Mapping command is configured for DS3 mode. ◄

NOTE ➤
This function is not available for use with the NAA I.◄

The following options are available:

Option	Description
0	No compensation to the DS3 signal.
450	Adds compensation to the DS3 signal to negate the transmission losses through a 450 foot coaxial cable.
900	Add compensation to the DS3 signal to negate the transmission losses through a 900 foot coaxial cable.

M13 MUX

The M13 Mux button determines which DS1 channel is dropped.

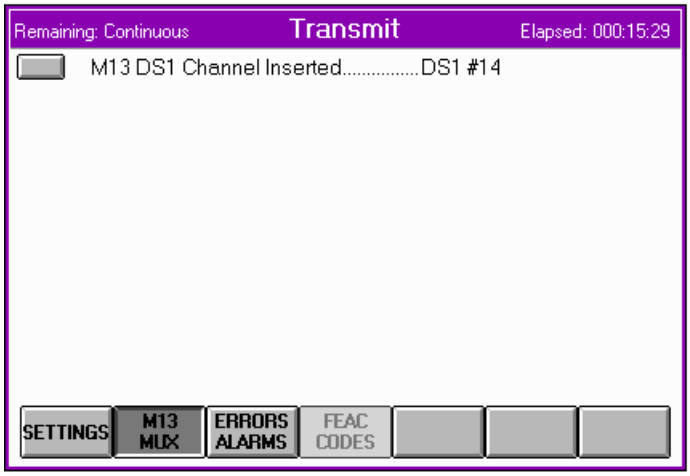


Figure 6-13. M13 MUX

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M13 DS1 Channel Dropped

Allows you to select a specific DS1 channel to drop from the demultiplexed DS3 signal. The following options are available for this command.

Option	Description
M13 DS1 Channel Inserted DS1 #1 through DS1 #28	Selects one of the 28 DS1 channels to drop from the DS3 signal.

Signal Status

The Signal Status button displays the measured voltage, strength, line frequency, and frequency offset of the DS3 receive signal as it enters the system.

The voltage displays as the Peak Positive and Peak Negative pulse voltage. The receive signal strength (power) displays in dBm and dBdsx. The signal frequency displays in Megahertz.

NOTE ➤
The Receive Signal Status screen is not enabled if the Receive side is not connected to the line interface. If this condition exists, SCPI commands querying signal strength and frequency will report errors.

When initially selected, the Signal Status may take several seconds to update and will display the message Measuring... . If the DS3 signal is not detected, the message DS3 Loss of Signal appears.

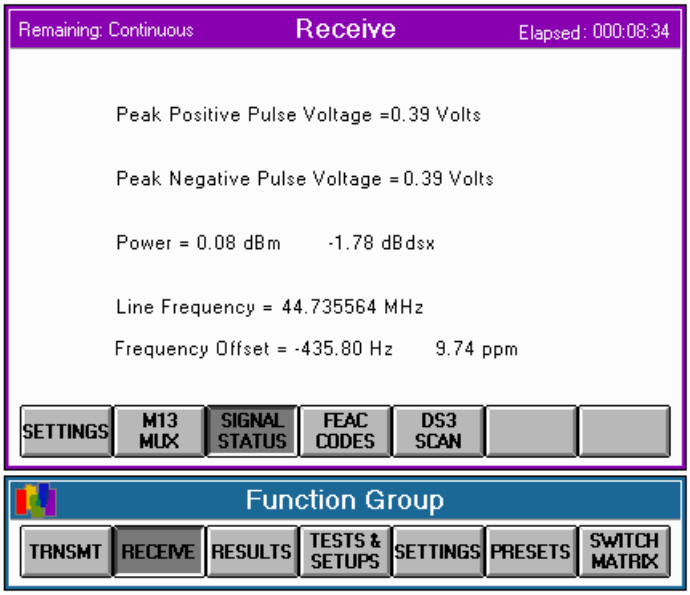


Figure 6-14. DS3 Signal Status

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FEAC Codes

The Receive FEAC Codes are automatically coupled to the Transmit FEAC Codes described earlier in this chapter. Therefore, any changes made to FEAC Code commands and options using the Receive Function Group button are automatically copied to the Transmit FEAC Codes.

For a description of FEAC Code operation, refer to the *FEAC Codes* section described earlier in this chapter.

DS3 Scan

The DS3 Scan button inspects and then reports the contents of the twenty-eight DS1 channels that are contained within a multiplexed DS3 signal. The information reported consists of such items as the framing and pattern activity detected on each DS1 channel.

The DS3 protocol processor must be receiving a valid signal, otherwise the DS3 Scan aborts. While a scan is in progress, you cannot access other functions. Select the Cancel button to stop the DS3 Scan.

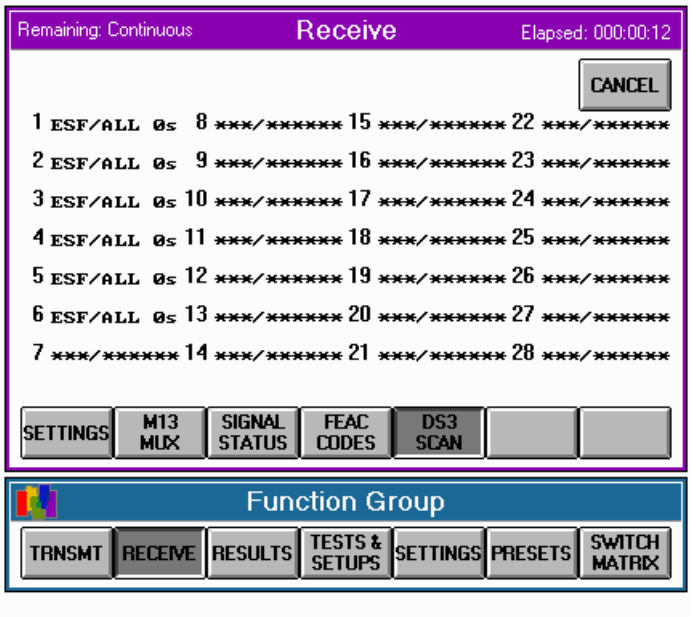


Figure 6-15. DS3 Scan

Results Function Group

The Results Function Group button allows you to view DS3 error and alarm analysis and create a history of these events by graphing the information.

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The following section describes the functions associated with the Results Function Group button.

- **Trouble Scan:** Provides a quick report of detected errors and alarms and lists the duration of these events.
- **Main Results:** Provides detailed results for errors and alarms detected by the Trouble Scan function.
- **Error Analysis:** Reports percentage and error count values.
- **Graphs:** Displays alarm and error results as graphs.
- **Recall Graphs:** Retrieves previously saved graphed data.
- **Save Graphs:** Saves graphed data.
- **Large LEDs:** Displays LED errors and alarms in a large format on the screen.

The following section describes the functions associated with the Results Function Group button.

Trouble Scan

The Trouble Scan function provides a list of received errors and alarms for the DS3 protocol processor. The duration or count of each event also appears. This function is effective in identifying a general area to investigate when an error or alarm is detected.

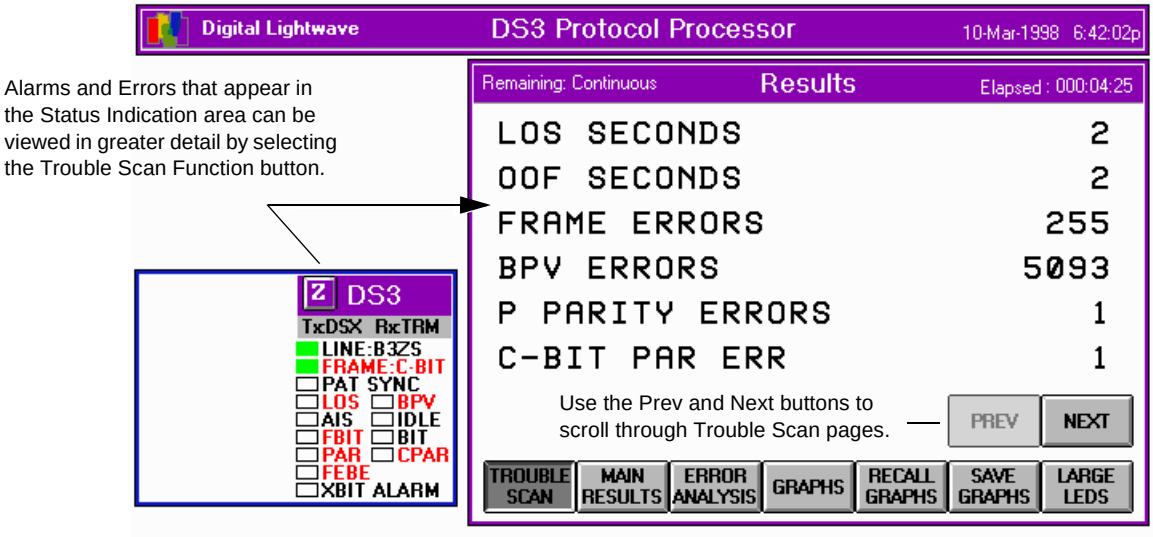


Figure 6-16. DS3 Trouble Scan

The following is a list of the DS3 Trouble Scan messages:

Event	Description
No Trouble	No errors or alarms are detected
FEBE Errors	Reports the number of FEBE errors detected. An overflow condition exists if a “>” symbol appears before the Count value.

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Event	Description
Framing Mismatch Seconds	Reports the number of seconds C-Bit framing is received when the device is configured for M13 framing. This event is available only when the DS3 Framing command is set to M13.
Loss of Frame Seconds	Reports the number of seconds a Loss of Frame event occurred over the DS3 link.
Loss of PAT Seconds	Reports the number of seconds a Loss of Pattern event occurred.
Loss of Signal Seconds	Reports the number of seconds a Loss of Signal event occurred.
AIS Seconds	Reports the number of seconds an AIS alarm occurred.
XBIT Seconds	Reports the number of seconds an XBIT alarm occurred.
BIT Errors	Reports the number of BIT errors detected. An overflow condition exists if ">" appears before the Count value.
Frame Errors	Reports the number of Frame errors detected. An overflow condition exists if ">" appears before the Count value.
P Parity Errors	Reports the number of P Parity errors detected. An overflow condition exists if ">" appears before the Count value.
Out of Frame Seconds	Reports the number of seconds an Out of Frame event occurred.
BPV Errors	Reports the number of Bi-polar violation errors detected. An overflow condition exists if ">" appears before the Count value.
C-Bit Parity Errors	Reports the number of C-Bit parity errors detected. An overflow condition exists if ">" appears before the Count value.

Main Results

The Main Results button displays detailed results for the DS3 errors and alarms identified by the Trouble Scan function. If your system has the Jitter feature installed, then Jitter results can also be viewed.

An error and alarm results report can be created and printed by selecting the Print action button and then selecting the Results print option. For more information, refer to the Print section of chapter 12.

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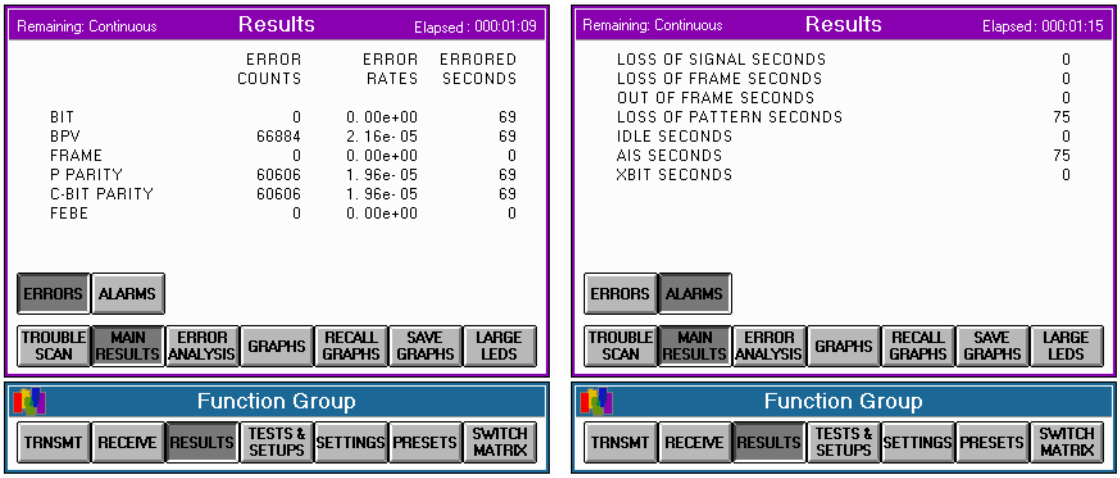


Figure 6-17. DS3 Errors and DS3 Alarms

Errors

Displays the number of errors detected, the error rate measurement, and the total number of seconds that the errors were transmitted. The errors reported are generated by the DS3 network or intentionally by the system (using the Error Insert Action button.)

The following DS3 errors are reported.

- BIT
- BPV
- Frame
- P-Parity
- C-BIT Parity
- FEBE

Alarms

Displays the duration of detected DS3. The following alarms can appear:

- Loss of Signal Seconds
- Loss of Frame Seconds
- Out of Frame Seconds
- Loss of Pattern Seconds
- Idle Seconds
- AIS Seconds
- X-BIT Seconds
- Framing Mismatch Seconds (M13 only)

Jitter

Displays the current and maximum unit interval (UI) values for the following Jitter measurements:

- Wideband Positive Peak
- Highband Positive Peak
- Wideband Negative Peak
- Highband Negative Peak
- Wideband Peak to Peak
- Highband Peak to Peak
- Seconds of Pos. or Neg. Peak

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NOTE ➤
This function is not available for use with the NAA I.◄

To view DS3 Jitter results:

- Your system must have the Jitter feature installed.
- Jitter must be configured using the Jitter Mapping, Jitter Threshold, and Jitter Equalization commands.

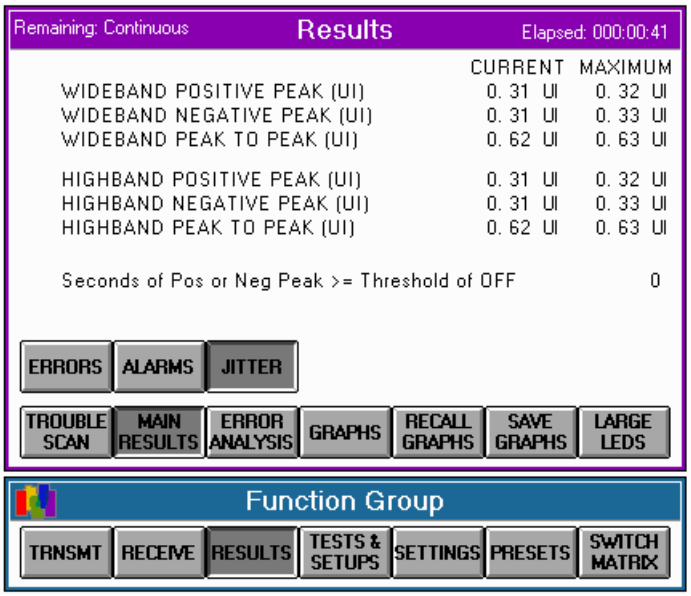


Figure 6-18. DS3 Jitter UI Values

Error Analysis

This button allows you to view in greater detail the six different DS3 errors that the system detects and logs. The following briefly describes the different results available for the DS3 Error Analysis button.

BIT Analysis

Provides a detailed breakdown for BIT errors detected and logged by the DS3 protocol processor.

Bit Errors Count. Under normal conditions, if a Loss of Pattern is detected, the system will not count Bit errors. As a result, the Error Counts value will not increment. This is the system's normal operating mode.

The system can be licensed to count Bit errors when a Loss of Pattern is received. As a result, the Bit error count will appear in the Error Counts column.

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NOTE ➤
Your system must be specially licensed for this command to appear on the screen. ◄

Option	Description
Always Count	The DS3 protocol processor continues to count Bit error even if a Loss of Pattern is detected. The option appears as the default if the system is licensed to count Bit errors.
Inhibit per Standard	This is the normal mode of operation. If a Loss of Pattern is detected, Bit errors are not counted and are not recorded in the Error Counts column.

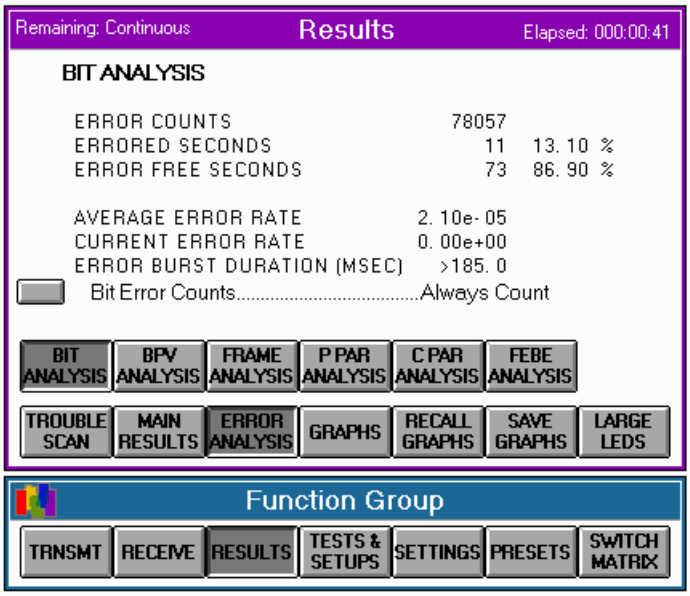


Figure 6-19. DS3 BIT Analysis Report

BPV Analysis

Provides a detailed breakdown for BPV errors detected and logged by the DS3 protocol processor.

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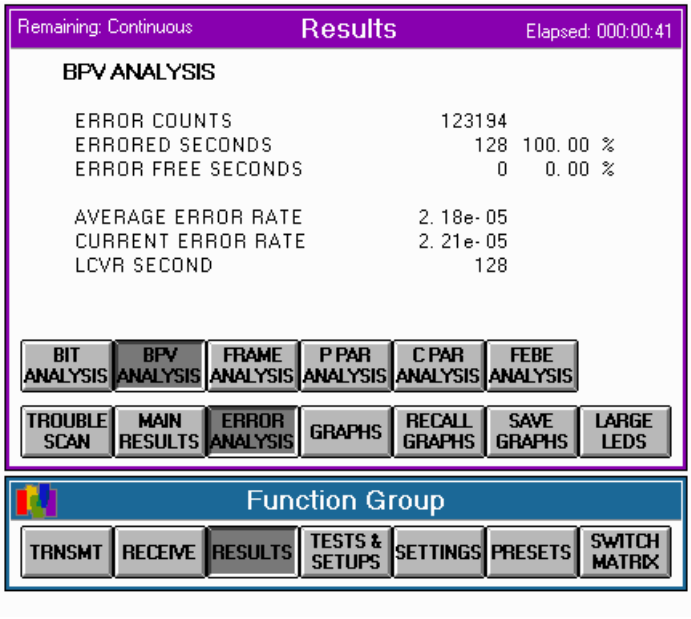


Figure 6-20. DS3 BPV Analysis Report

Frame Analysis

Provides a detailed breakdown for Frame errors detected and logged by the DS3 protocol processor.

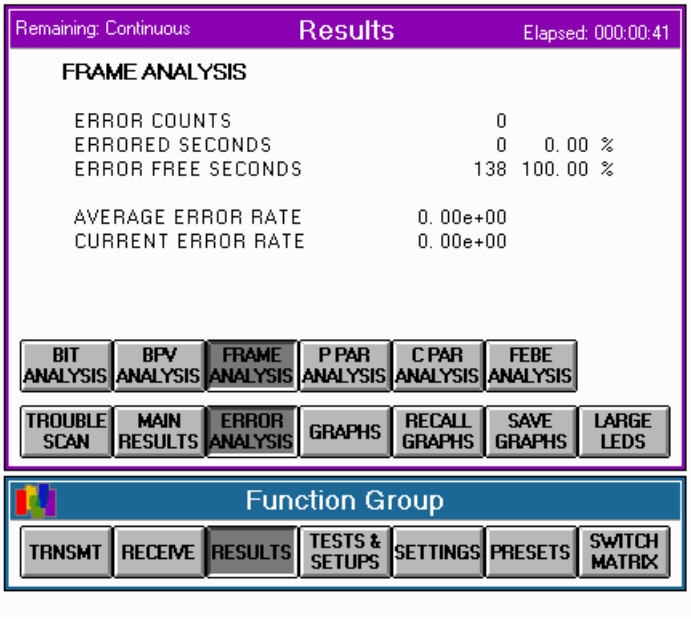


Figure 6-21. DS3 Frame Analysis Report

P Par Analysis

Provides a detailed breakdown for P-Parity errors detected and logged by the DS3 protocol processor.

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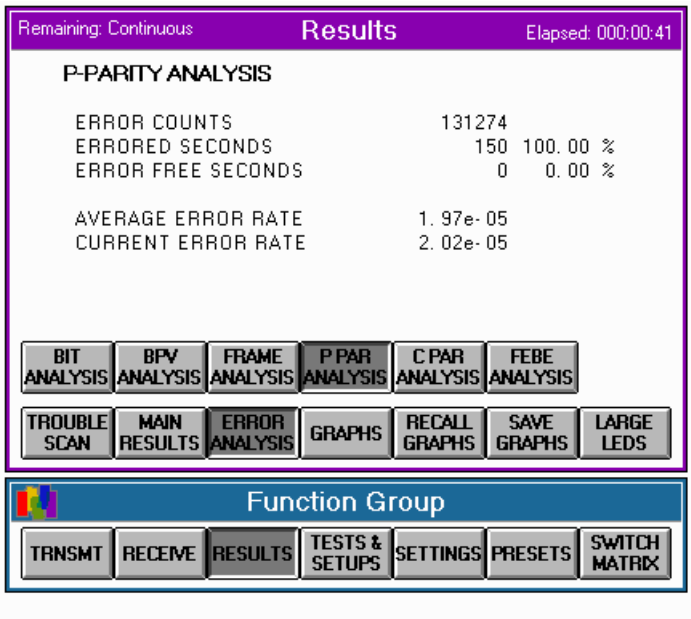


Figure 6-22. P-Parity Analysis Report

C-Parity Analysis

Provides a detailed breakdown for C-Parity errors detected and logged by the DS3 protocol processor.

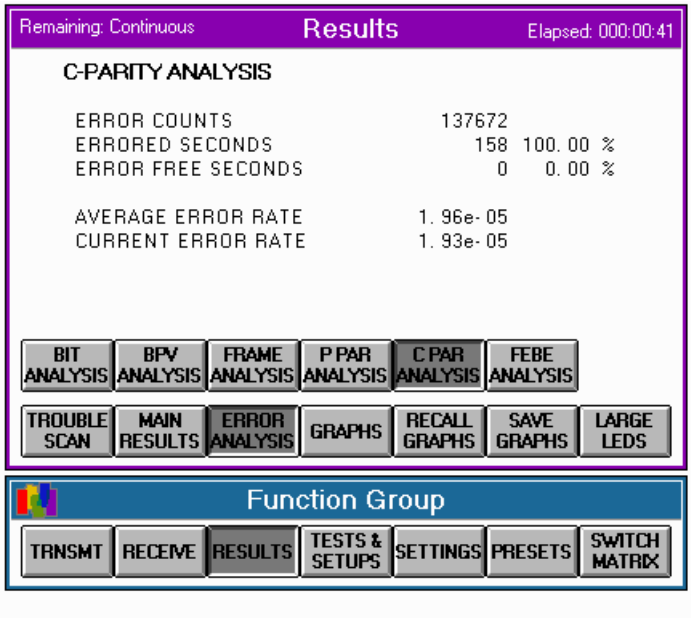


Figure 6-23. C-Parity Analysis Report

FEBE Analysis

Provides a detailed breakdown for Far-End Block Errors detected and logged by the DS3 protocol processor.

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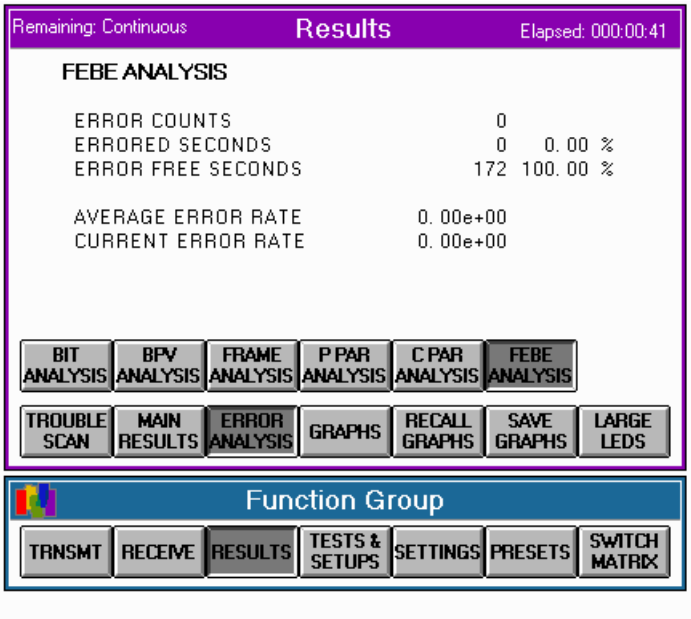


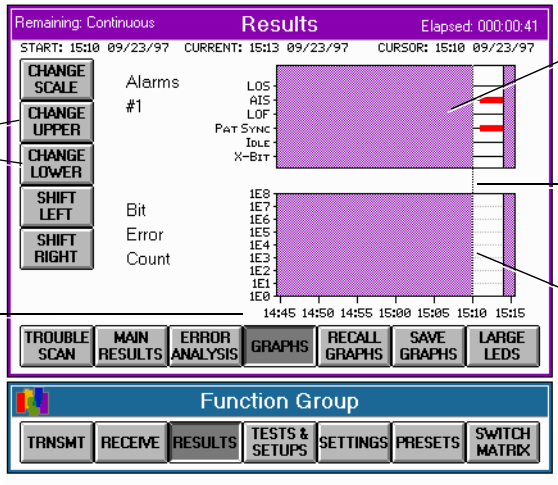
Figure 6-24. DS3 FEBE Analysis Report

Graphs

Use the Graphs button to view error and alarm results for the DS3 protocol processor. These graphs show the test history for either the current test or the previous test. You can configure the graph function to display any combination of DS3 Alarms and Errors.

To save graph results, press the Save Graphs button. Refer to the Save Graphs button that is described later in this chapter.

To recall saved graphs, press the Recall Graphs button. Refer to the Recall Graphs button that is described later in this chapter.



Selects the Errors and Alarms that appear in the Upper and Lower graphs.

Time Scale:
Set using the Change Scale button

Upper Graph:
Use Change Upper button to control the type of DS3 Alarm or Error that appears in the graph.

Reference Cursor:
Set position relative to Time Scale using the Shift Left and Shift Right buttons.

Lower Graph:
Use Change Lower button to control the type of DS3 Alarm or Error that appears in the graph.

Figure 6-25. DS3 Graphs Function Menu

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Change Upper and Change Lower

These buttons determine what type of DS3 alarms and errors display in the two graphs.

Graphed Alarms. The following items are graphed for Alarm #1:

- AIS
- Idle
- LOF
- LOS
- Pat Sync
- X-Bit

Graphed Errors. The error count (1E-8 through 1E-0) is graphed for DS3 Errors. The following DS3 Errors can be graphed using this function:

- Bit Error Count
- BPV Error Count
- P-Parity Error Count
- FEBE Counts
- Frame Error Count
- C-Bit Error Counts.

Graphed Jitter Results. The Peak-to-Peak unit interval (UI), for the last minute, is graphed. The following graphing options are available only if the Jitter feature is installed in your system and the Jitter mapping is set for DS3:

- Maximum Wideband Peak to Peak
- Maximum Highband Peak to Peak

Change Scale

Compresses and expands the time scale by increasing or decreasing the number of minutes represented by each of the horizontal items for the graphed Errors and alarms.

The following values are available for this function:

Option	Description
30 minute	Sets the graph's time scale to 30-minute increments.
90 minute	Sets the graph's time scale to 90-minute increments.
3 hour	Sets the graph's time scale to 3-hour increments.
6 hour	Sets the graph's time scale to 6-hour increments.
12 hour	Sets the graph's time scale to 12-hour increments.
24 hour	Sets the graph's time scale to 24-hour increments.
72 hour	Sets the graph's time scale to 72-hour increments.

Shift Left and Shift Right

The Upper and Lower graphs use a dotted line as a Reference Cursor to identify exact error and alarm conditions for a specific time. Use these buttons to adjust the time scale to an earlier or later time by moving the cursor to the left or right on the Upper and Lower graphs.

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The Reference Cursor can also be moved to a specific time by touching the screen and dragging the cursor either to the right or left in the graphed display. The position of the cursor corresponds to a time and date which is displayed above the graphs in text for easy viewing.

Save Graphs

Use this button to save the current or previously graphed results to a file for later retrieval and viewing. The filename and a file description are entered using a keypad that automatically appears when these buttons are selected.

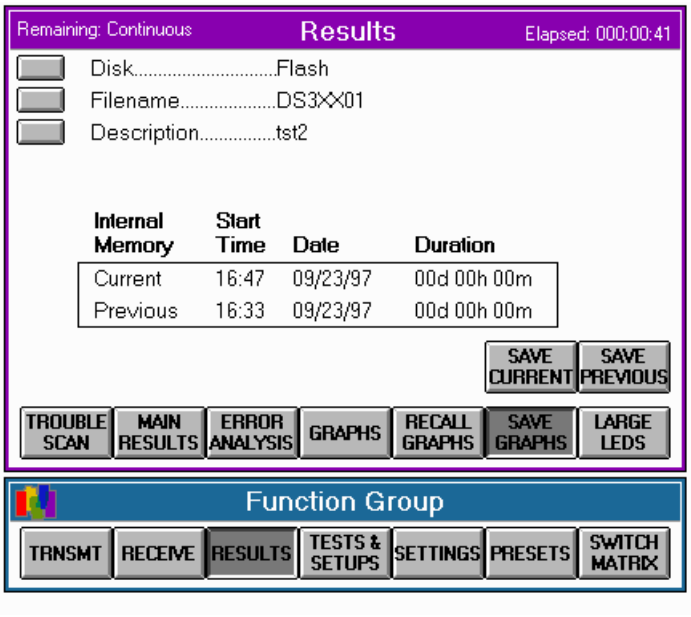


Figure 6-26. DS3 Save Graphs Commands

The following information appears when Save Graphs button is selected.

Disk

Saves the graph to either Flash memory, the SRAM memory PC Card (only appears if a memory card is inserted in the ASA 312's PCMCIA slot), or RAM. The following options are available for this command.

Option	Description
Flash	This is nonvolatile memory. The Graph is stored on the system until it is removed using the Delete command.
RamDrive	This is volatile memory. If the Graph is saved to RAM, then it is deleted when the system is Powered Off.
PCMCIA	Allows the Results Graph to be saved to an SRAM PC Card. **This option appears only if a PC Card is inserted into the ASA 312's PCMCIA slot.**

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Filename

Allows you to save the Results Graph with an eight-character internal filename. Enter a filename. Filenames can be from one to eight characters in length. All Result Graphs have the .R3 extension automatically appended.

Description

Allows you to enter a 25-character description for the file.

Current and Previous Internal Memory

For easy reference, and to ensure that the file data is accurate, there is a table identifying data for both the current and previous system memory locations. This table contains the following information:

- Internal memory
- Start time of the graphed result
- Date of the graphed result
- Duration of the graphed result

Using two function buttons, Save Current and Save Previous, choose which graphed results to save. No graphed data file can be saved unless the protocol processor has been stopped and no test is currently running.

Save Current

Saves the graphed test data that is currently stored in the current system memory location.

To ensure accuracy, the system stores data in both a current and previous system memory location. These memory locations contain start time, date, and duration of the graphed results.

NOTE ➤
The message Protocol processor must be stopped before results can be saved appears if you try to save a file while a test is in progress. This warning applies only to the protocol processor currently in use; other protocol processors (for example, SONET, DS1, E1, or ATM) may be running due to the simultaneous operations capability.

No graphed data file can be saved unless the protocol processor and currently active test is stopped. ◄

Save Previous

Saves the graphed test data that is currently stored in the previous memory location.

To ensure accuracy, the system stores data in both a current and previous system memory location. These memory locations contain start time, date, and duration of the graphed results.

NOTE ➤
The message Protocol processor must be stopped before results can be saved appears if you try to save a file while a test is in progress. This warning applies only to the protocol processor currently in use; other protocol processors (for example, SONET, DS1, E1, or ATM) may be running due to the simultaneous operations capability.

No graphed data file can be saved unless the protocol processor and currently active test is stopped. ◄

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Recall Graphs

Use the Recall Graphs button to open any previously saved graph that is stored either on the Flash drive, SRAM PC Card (installed in the PCMCIA slot), or RAM drive.

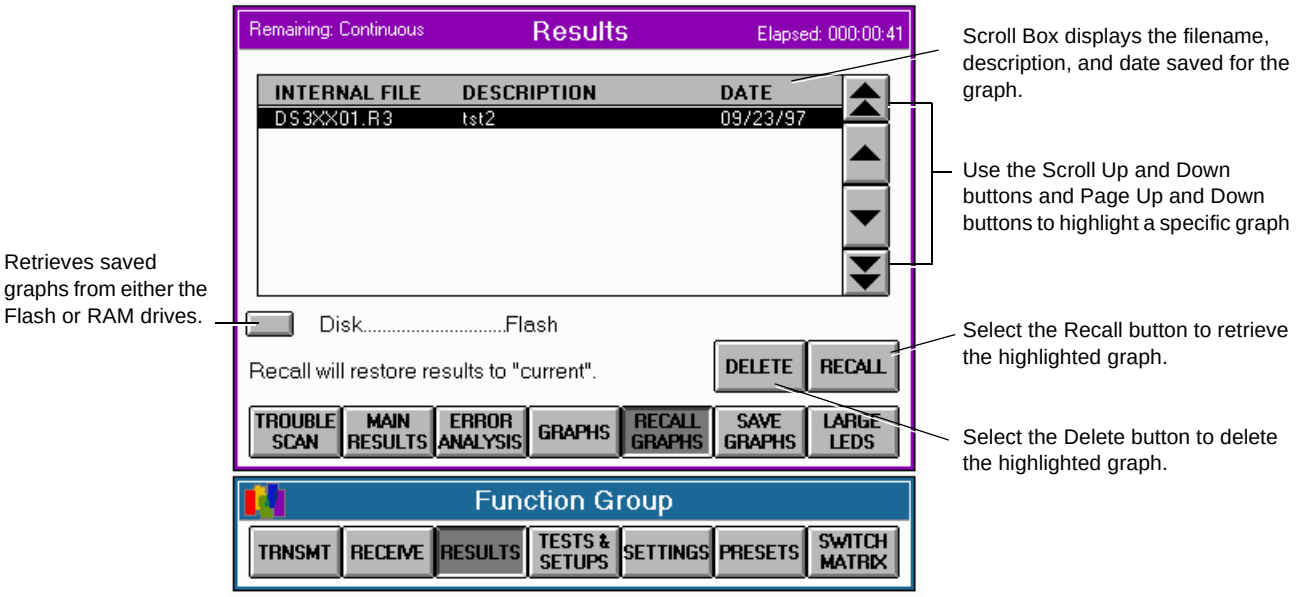


Figure 6-27. DS3 Recall Graphs Commands

While the instrument is performing test operations, protocol processor results are viewed and saved. Using the Save Graphs function described earlier in this section, these graphed results are automatically loaded into the instrument system memory and the data is always saved in what is called a "current" results location. When using the Run Stop function to stop the test and re-start another one, the "current" test results are moved to what is referred to as the "previous" test results location and the current test results are initiated again.

The Recall Graphs function menu field selector lets recalls graphs and either deletes the graphed results or restores the graphed results to the current location in the instrument system memory. These recalled results are derived from the list of graphs saved using the Save Graphs function. These saved graphs are listed in the Recall Graphs display and identified using a table.

The table lists the internal file name, a description of the file and the date the file was saved. Arrow keypads are provided for easy viewing up and down the list of saved graph files. Once a file is selected, it can either be recalled which restores these results to the current results location and now can be viewed, or deletes the graphed data using the Delete function.

NOTE ➤
The system is currently capable of saving only graphed results data obtained using the protocol processor Run Stop function. All other protocol processor results data are deleted automatically when the unit is turned off unless graphed results are saved using the Save Graph function. ◄

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Large LEDs

This button displays the DS3 LED Error and Alarm Indicators in a large, easy to read format that covers the entire screen area. This is especially useful for viewing any errors or alarms from a long distance, such as across the room from a test bay.

You have the option of viewing errors and alarms for all protocol processors (DS1 or E1, DS3, ATM, and SONET) or just the DS3 protocol processor errors and alarms.

The following describes the LED colors.

If the LED is this color...	Then the LED indicates this activity...
Green	The specific function is active and OK.
Red	An error or alarm event is in progress.
Yellow	Indicates that this function experienced an error or alarm event. This event is cleared by selecting the Clear History button.
Black (Clear)	No activity from this specific function.

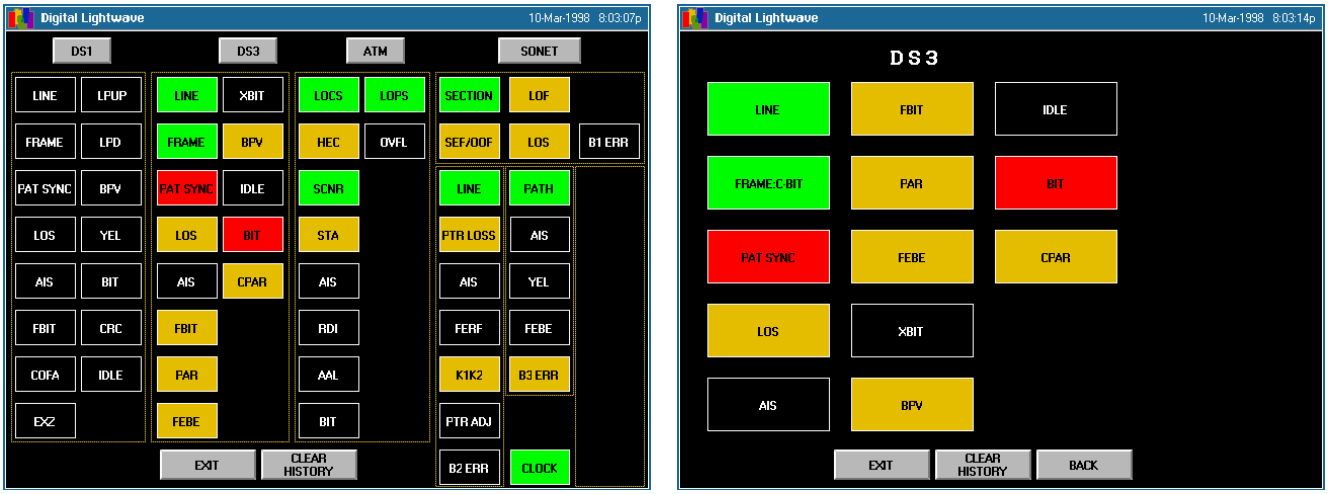


Figure 6-28. Large DS3 and Large DS3 Only LEDs

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Tests & Setups Function Group

The Tests & Setups Function Group button is described in detail in chapter 10, *Tests & Setups*. The commands and functions associated with this Function Group button are similar for the SONET, DS1, E1, and DS3 protocol processors.

Settings Function Group

The Settings Function Group button is described in chapter 10, *Settings, Presets, and Switch Matrix*. The commands and functions associated with this Function Group button are common to all five protocol processors.

Presets Function Group

The Presets Function Group button is described in chapter 10, *Settings, Presets, and Switch Matrix*. The commands and functions associated with this Function Group button are common to all five protocol processors.

Switch Matrix Function Group

The Switch Matrix Function Group button is described in chapter 12, *Settings, Presets, and Switch Matrix*. The commands and functions associated with this Function Group button are common to all five protocol processors.

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7 ATM Protocol Processor

Overview

This chapter describes the user interface and commands that control the ATM protocol processor. The ATM protocol processor is an option used to monitor the performance of your ATM network. This is achieved by receiving and analyzing data traffic and injecting test data onto your ATM network.

Introducing the ATM User Interface

The ATM user interface presents the commands, buttons, and LEDs that you use to control the ATM protocol processor. The interface consists of the following elements:

- ATM LEDs and Status Indicators
- ATM Function Menu
- Function Group and Action button rows

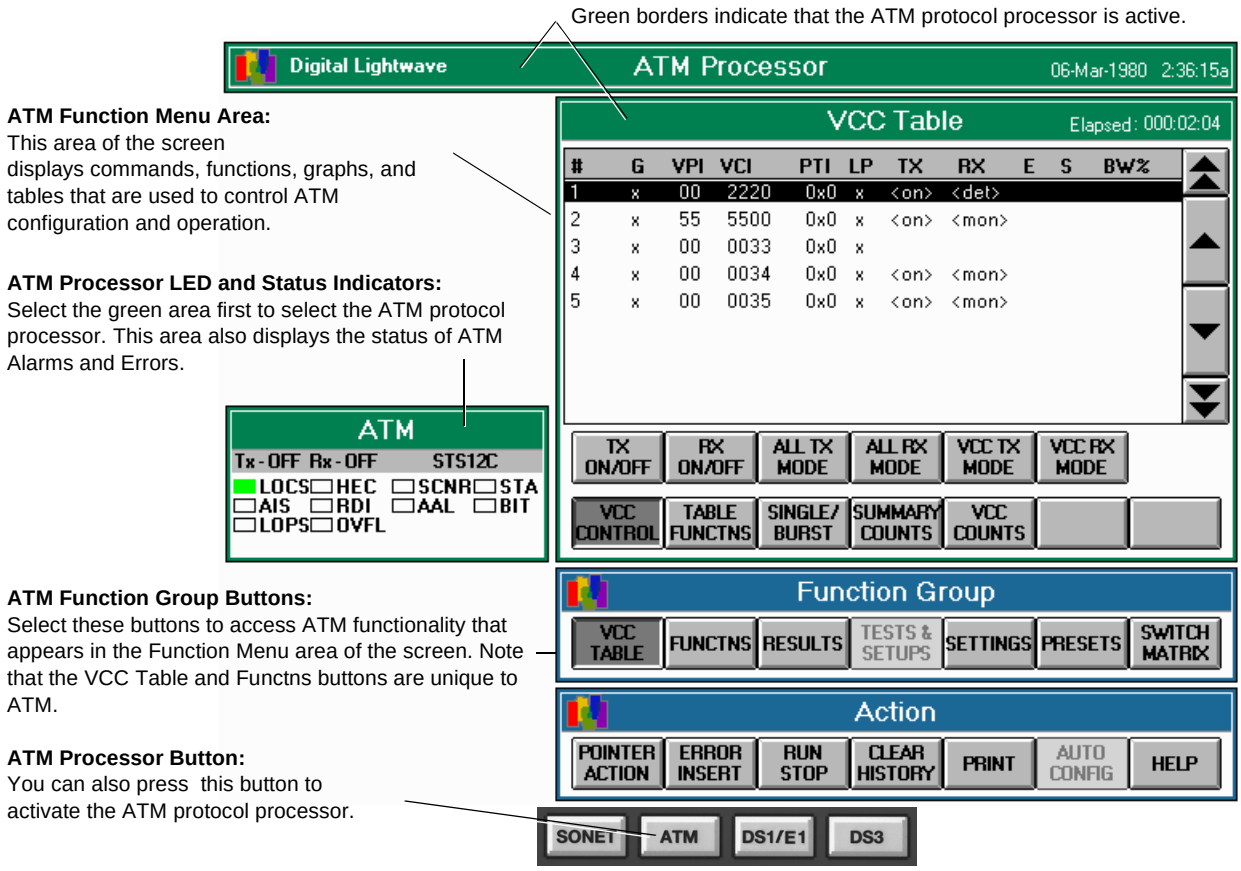


Figure 7-1. Typical ATM Protocol Processor Screen

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ATM LEDs and Status Indicators

The ATM Processor Alarm and Status Indicators area serves the following purposes:

- To provide access to ATM protocol processor functions, which is achieved by selecting the green ATM title bar on the screen. (The ATM protocol processor can also be activated by selecting the ATM Processor Button on the ASA 312.)
- To provide a visual status of ATM activity such as data traffic transmission and reception on ATM virtual channels, as well as to display ATM alarm and error conditions.

The following describes the ATM Processor Alarm and Status Indicators area.

Indicator	Description	Appears for this type of Mapping
Tx	Displays transmit status of virtual channels. ON: Selected virtual channels are active and transmitting. (This can also indicate that an OC-12 Stress Test is active.) OFF: All virtual channels are not transmitting.	All
Rx	Displays monitor status of virtual channels ON: Selected virtual channels are active and monitoring. (This can also indicate that an OC-12 Stress Test is active.) OFF: All virtual channels are not receiving.	All
Mapping Indicator	Indicates the current ATM mapping: None; DS1 PLCP; DS1 Direct; DS3 PLCP; DS3 Direct; STS1; STS3c; STS12c	All
LOCS	Loss of Cell Synchronization. Indicates a loss of Cell Sync which happens when seven consecutive bad HECs are received. Cell Sync returns when six consecutive good HECs are received. When a unit is receiving its transmitted signal (i.e., the unit's transmit and receive are interconnected), LOCS is not reported when receiving HEC errors (as described above) while the unit is configured for ATM/STS-12c operation.	STS-1, STS-3c, STS-12c, DS1 Direct, DS3 Direct
PLCP	Physical Layer Convergence Protocol. Indicates a loss of PLCP frame synchronization	DS1 PLCP, DS3 PLCP
AIS	Alarm Indication Signal. Indicates if an AIS is received on an F4 or F5 OAM Flow of an active VCC.	All
LOPS	Loss of Pattern Synchronization. Indicates a loss of Pattern Sync on any active detail channel. Detail channels are available only on virtual channels configured for AAL0 or AAL1.	All

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Indicator	Description	Appears for this type of Mapping
BIP	Byte Interleaved Parity error. Indicates that a PLCP BIP error was received while mapped for DS1 PLCP or DS3 PLCP.	DS1 PLCP, DS3 PLCP
HEC	Indicates if a correctable or uncorrectable Header Error Control error occurred.	All
RDI	Indicates if a Remote Defect Indicator signal is received on an F4 or F5 OAM Flow of an active VCC.	All
OVFL	Cell Overflow. (Available only for ATM/STS-12c mapping) Indicates that the system is receiving more cells than it can process.	STS-12c
FRMG	Framing. Indicates that an A1A2 or POI framing error occurred. Available only for DS1 PLCP and DS3 PLCP mapping.	DS1 PLCP, DS3 PLCP
FEBE	Far End Block Error. Indicates that a FEBE error was received.	DS1 PLCP, DS3 PLCP
SCNR	Selected Cells Not Received. Monitor or Detail Channels are not receiving cells	All
AAL	ATM Adaptation Layer. Indicates that an AAL1 SN or SNP error, or lost or misinserted cell occurred; or an AAL5 PDU length or CRC error occurred.	All
OOF	Out of Frame. A receive PLCP OOF error occurred.	DS1 PLCP, DS3 PLCP
YEL	Yellow. A receive PLCP Yellow Alarm error occurred.	DS1 PLCP, DS3 PLCP
STA	Status. Indicates that one or more of the active VCCs has the status field set in the VCC Table. For example, the VCC that is being received has the CLP bit set.	All
BIT	Indicates the reception of a BIT error on the active detail channel.	All
LOF	Loss of Frame. Indicates a loss of frame	DS1 PLCP, DS3 PLCP

Configuring the ASA 312 and NAA I for ATM Operation

The ASA 312 and NAA I can be quickly configured for ATM operation using the Presets Function Group button. There are several ATM preset configurations available.

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The following example describes how to configure the ASA 312 and NAA I for ATM operation over SONET using STS-3c ATM mapping. (This procedure assumes that the system was just Powered ON and no VCC Table entries exist.)

1. Select the Presets button located in the Function Group button row. (The Presets button is also accessible from the Switch Matrix screen.)

   The Presets command box displays.

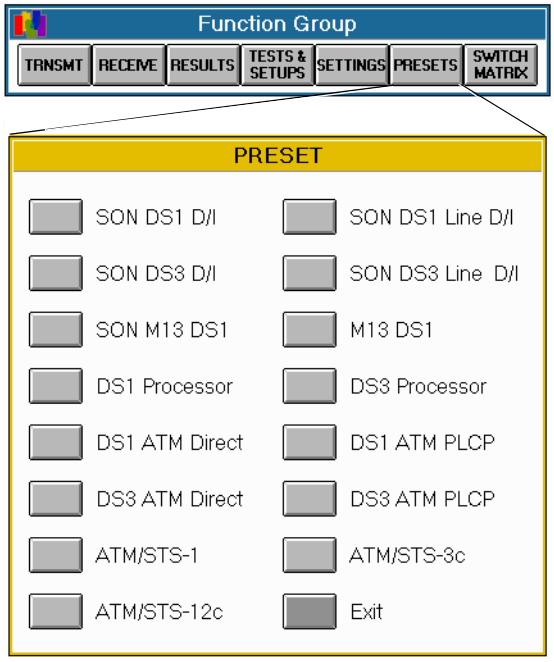


Figure 7-2. Selecting an ATM Preset Command

2. Select the ATM/STS-3c command button.

   The message Processing...Please wait displays. The basic ATM/STS-3c configurations and mappings are made.

3. Select the ATM protocol processor.

   The ATM protocol processor is selected by selecting either the green ATM title bar in the ATM Alarm and Status Indicator area or by selecting the ATM Processor Button. (Figure 5-4)

NOTE: The ATM Alarm and Status Indicators that appear vary depending on the type of Preset or Mapping selected.

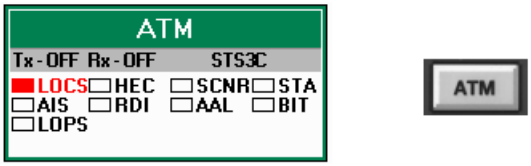


Figure 7-3. Selecting the ATM Protocol Processor

The VCC Table displays. If no virtual channels exist, then the VCC Table is empty as shown in the following illustration.

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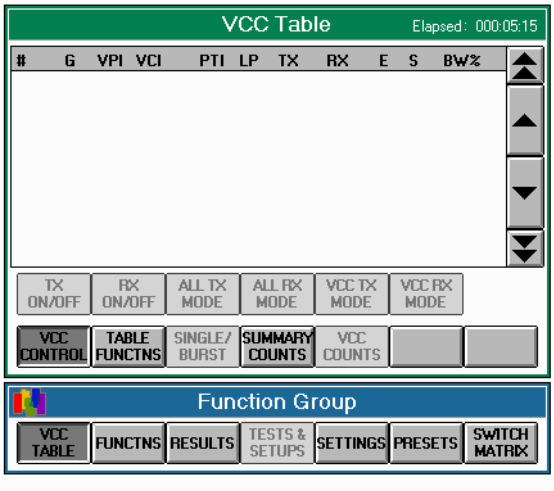


Figure 7-4. Empty VCC Table

4. Select the Functns button located in the Function Group button row and make any changes necessary to the ATM Settings. (These settings will apply for all VCC Table entries that you create.)

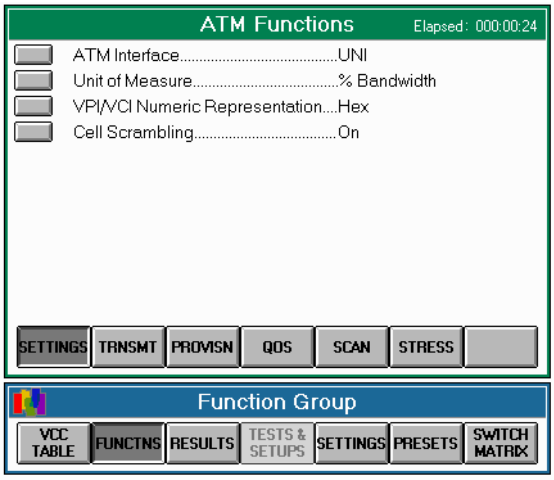


Figure 7-5. ATM Settings Commands

5. Select the VCC Table button located in the Function Group button row. An empty VCC Table appears on the screen.
6. Create a new VCC Table entry.

   Select the Table Functns button which appears below the empty VCC Table.

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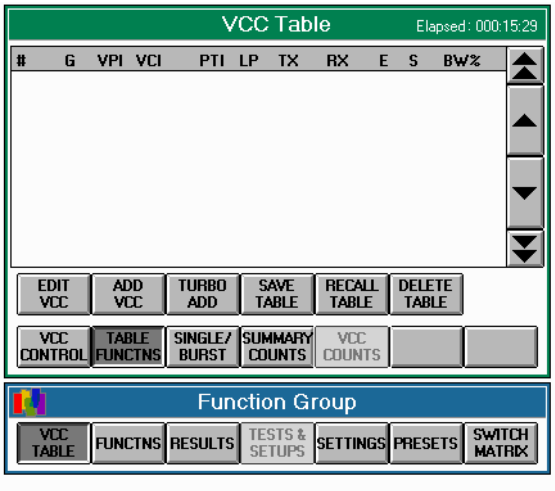


Figure 7-6. Blank VCC Table and Add VCC Button

7. Select the Add VCC button.

   The Header Field Entry keypad appears. Create an ATM Cell Header.

Header Field Entries:
Generic Flow Control (GFC)
Virtual Path Identifier (VPI)
Virtual Channel Identifier (VCI): VCIs 3, 4, 6, and 7 are reserved and are not available.
Payload Type Indicator (PT)
Cell Loss Priority (CLP)

(A VPI of 0 with a VCI of 0 is not allowed since this is an idle cell.)

Refer to Table 5-2 for more information about header Field Entries.

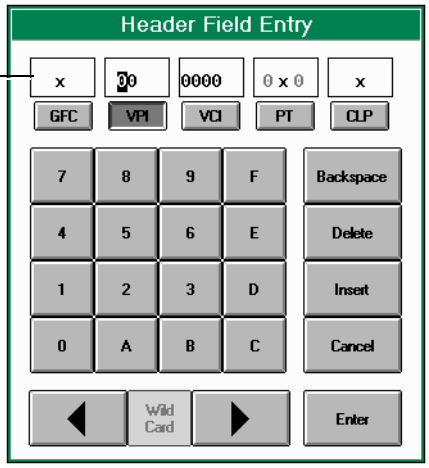


Figure 7-7. Header Field Entry Keypad

Enter values for the VPI, VCI, PT, CLP, and GFC and press Enter. The Add VCC commands appear.

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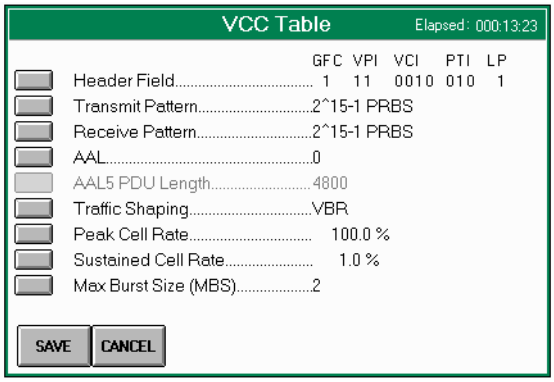


Figure 7-8. Initial Add VCC Commands Menu

8. Make the appropriate changes to the Add VCC commands. (These commands set the initial values for the virtual channel.) Select Save.

   A virtual channel is created and appears in the VCC Table.

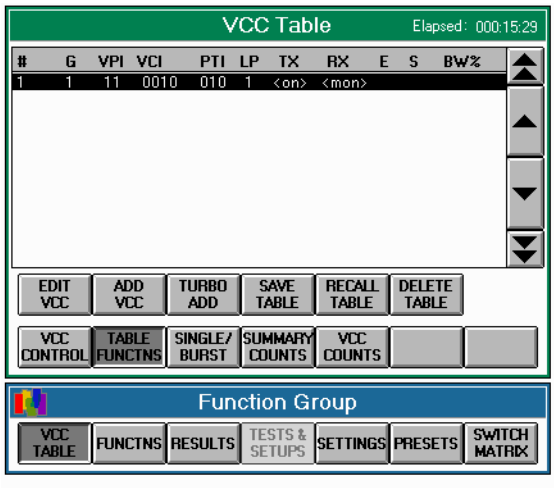


Figure 7-9. Example of a Virtual Channel Entry in a VCC Table

9. Select the Functns button located in the Function Group button row and make any changes necessary to the ATM Settings.

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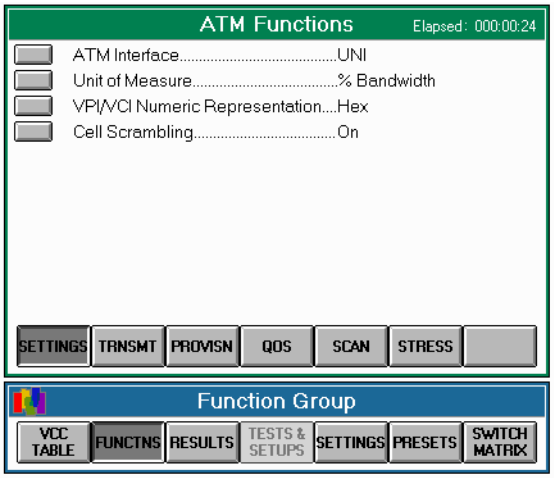


Figure 7-10. ATM Settings Commands

10. Turn on the Laser.

    Select the Laser button located in the SONET protocol processor Alarm and Status Indicators area. If necessary, select the SONET protocol processor and make any appropriate SONET changes.

11. Verify that the ATM and SONET LEDs are green.

12. Select the Run Stop button, located in the Action button row, and then press the SONET Restart button.

    All SONET counters are cleared and reset to zero. The SONET Alarm and Status Indicators are updated, and the SONET protocol processor is now running.

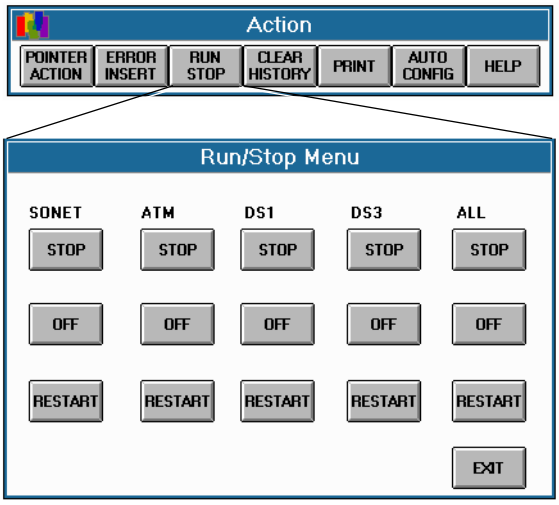


Figure 7-11. Starting the ATM Protocol Processor

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13. Select the VCC Table button to display the VCC Table, and then press the VCC Control button.

    The VCC Table displays.

14. Turn on the virtual channel to transmit and monitor data by press the TX ON/OFF button and the RX ON/OFF button.

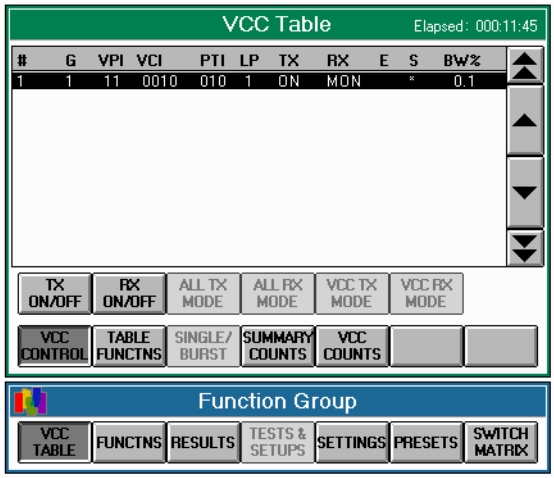


Figure 7-12. Turning ON the Virtual Channel

15. Select the Run Stop button again, and then press the ATM Restart button.

    All ATM counters are cleared and reset to zero. The ATM Alarm and Status Indicators are updated, and the ATM protocol processor is now running.

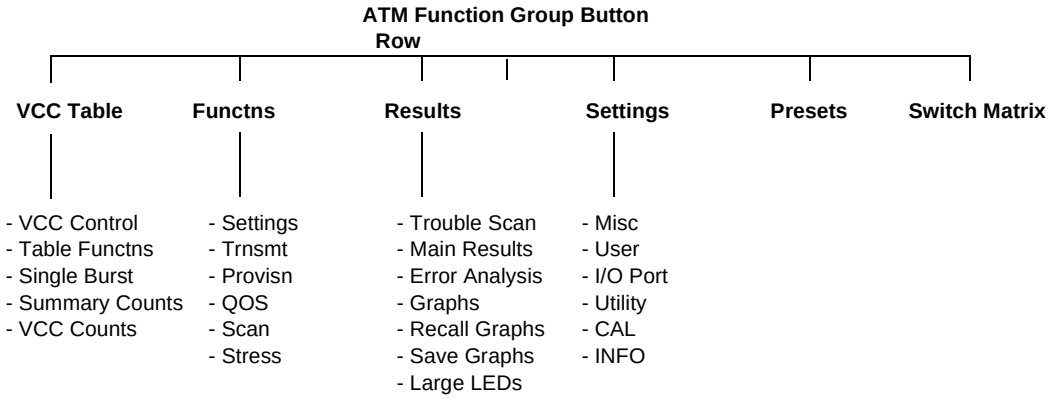
    The TX column and RX column status indicators display as ON and MON. The virtual channel is ready to transmit and receive data.

    At this point, you can view results by selecting the Results Function Group button or initiate errors, alarms or loopback tests by selecting the Trnsmt button which is located in the Functns Group Button.

ATM Protocol Processor Function Group Buttons

The functionality available for the ATM protocol processor appears by selecting any of the following buttons from the Function Group button row:

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The remainder of this chapter describes the functions, commands, and options associated with the previously illustrated Function Group buttons.

VCC Table Function Group

The VCC Table Function Group Button provides access to functionality that controls the creation of VCC Tables. You can perform the following functions in a VCC Table:

- create, edit, and delete individual or multiple virtual channels
- enable and disable activity on individual or multiple virtual channels
- define the characteristics of each virtual channel independently
- continuously transmit cells or PDUs on any or all virtual channels
- inject a defined burst of cells or PDUs on a single virtual channel
- display individual VCC cells activity and error counts
- display summary activity on all virtual channels

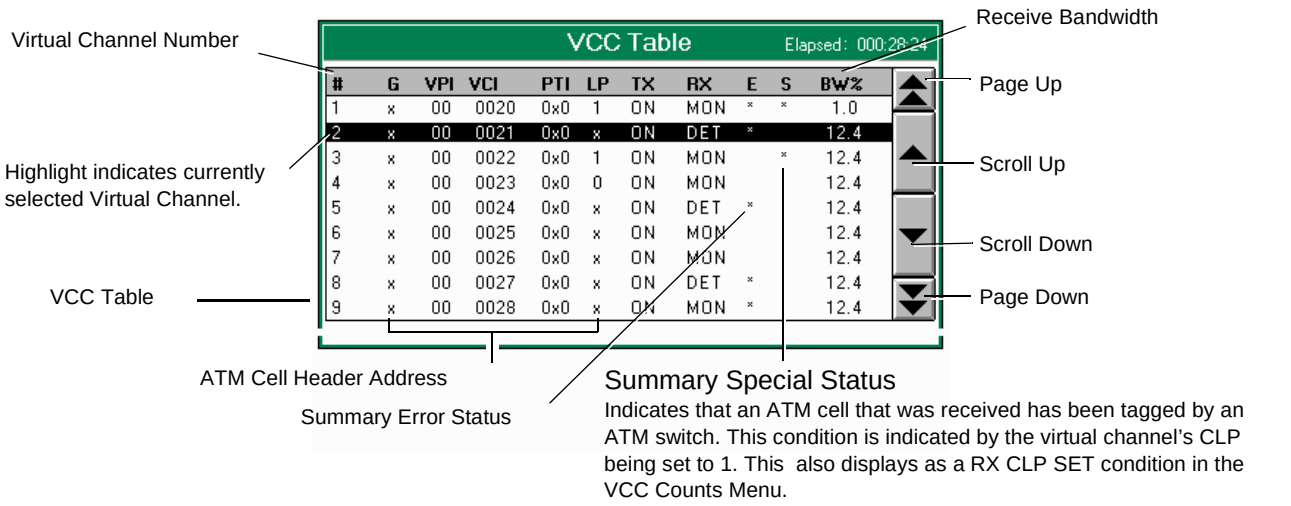
The VCC Table button is unique to the ATM feature and only appears in the Function Group button row when the ATM protocol processor is active.

VCC Control

The VCC Control button controls the transmission and monitoring of data traffic activity for an individual virtual channel or for multiple virtual channels. When selected, this button displays the virtual channels configured in the VCC Table.

The transmit (TX) and monitor (RX) states for each virtual channel appear in the TX and RX columns of the VCC Table screen display. A maximum of nine virtual channels can appear on this screen. Use the Page Up and Page Down buttons (double arrows) to display the previous or next nine entries in the VCC Table, or use the Scroll Down and Scroll Up buttons (single arrows) to scroll through the VCC Table one virtual channel at a time.

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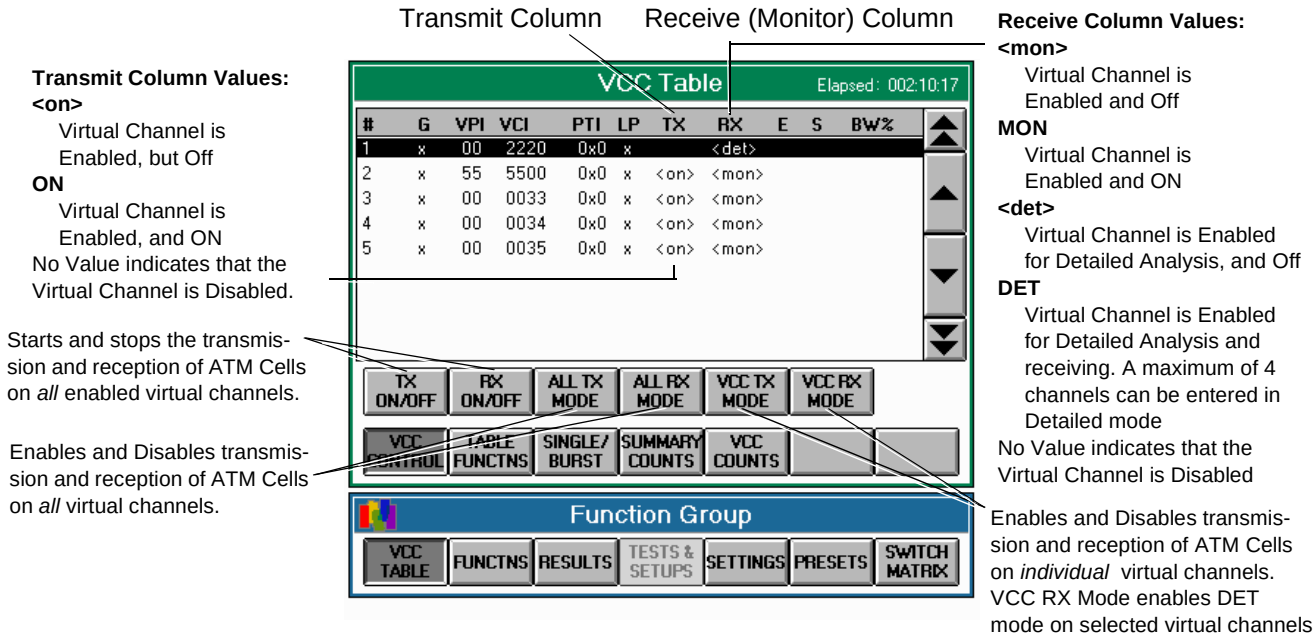


Figure 7-13. VCC Table and VCC Control Menu

The following describes the different commands that appear on the VCC Control menu.

TX ON/OFF

Starts or stops the transmission of ATM cells on all enabled virtual channels listed in the VCC Table.

The transmission status for each virtual channel appears in the TX column of the VCC Table, and displays the following values.

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Option	Description
<on>	Indicates that the virtual channel is idle (enabled, but not transmitting data). When this value displays, the ATM TX Alarm and Status Indicator displays OFF.
ON	Indicates that the channel is enabled and transmitting ATM cells. The ATM TX Alarm and Status indicator displays ON.
(No Value Appears)	If the TX column is blank, then the channel is disabled. Refer to the All TX Mode and VCC TX Mode button descriptions for more information.

NOTE ➤
When turned ON, all Enabled channels generate traffic. When Off (<on>), these channels are idle. If you do not want a specific virtual channel to transmit data, then you must Disable that channel before generating traffic flow. To disable individual channels, refer to the VCC TX Mode button description later in this section. ➤

RX ON/OFF

Starts or stops data traffic reception and monitoring on all enabled virtual channels listed in the VCC Table.

The monitor and detection status for each virtual channel appears in the RX column of the VCC Table, and displays the following values.

Option	Description
<mon>	Indicates that the virtual channel is idle (enabled, but not receiving ATM Cells). When this value displays, the ATM RX Alarm and Status Indicator displays OFF.
MON	Indicates that the circuit is enabled and is receiving ATM Cells. The ATM RX Alarm and Status Indicator displays ON.
<det>	Indicates that the virtual channel is idle, and configured for Detailed Detection mode. This means that the virtual channel is monitoring for BIT and Pattern Sync errors in addition to its normal monitoring status. A total of four AAL0 or AAL1 virtual channels can be configured for Detailed Detection mode. For AAL1 virtual channels, selected AAL1 errors are monitored. (The channel's monitoring status is defined by the Receive Pattern command located in the Edit VCC Function of the VCC Table button. This command is described later in this chapter.)

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Option	Description
DET	Indicates that the channels are actively detecting for BIT and Pattern Sync errors using the receive pattern. A total of four AAL0 or AAL1 virtual channels can be configured for Detailed Detection mode. For AAL1 virtual channels, selected AAL1 errors are monitored. (This pattern is defined by the Receive Pattern command located in the Edit VCC Function of the VCC Table button. This command is described later in this chapter.)
(No Value Appears)	If the RX column is blank, then that virtual channel is disabled. Refer to the All RX Mode button and VCC RX Mode button descriptions for more information.

All TX Mode

Globally enables or disables data transmission for all virtual channels listed in the VCC Table. This button is only active when data transmission is Off (as displayed by the Tx -OFF indicator in the ATM LED Alarm and Status Indicators area).

If some channels are already disabled, and you press this button, then all channels are disabled. Selecting this button again enables all channels including any previously disabled channels.

NOTE ➤
This button toggles all virtual channels between an enabled and disabled state. However, when the system is initially Powered ON, the first press of this button is an enable action.

Therefore, if a virtual channel is enabled (<on>), there is no change in what displays in the TX column. A second button press disables all virtual channels and displays no values in the TX column. This button convention only applies after the system is first Powered ON. Once you have pressed this button, it returns to toggling between enable and disable. ◄

The transmission status appears in the TX column and displays the following values.

Option	Description
<on>	Indicates that the virtual channel is idle (enabled, but not transmitting ATM cells). When this value displays, the ATM TX Alarm and Status Indicator displays OFF.
(No Value Appears)	If the TX column is blank, then the virtual channel is disabled.

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All RX Mode

Globally enables or disables data monitoring for all virtual channels listed in the VCC Table. This button is only active when data monitoring is Off (as displayed by the Rx -OFF indicator in the ATM LED Alarm and Status Indicators area).

If some channels are already disabled, and you press this button, then all channels are disabled. Selecting this button again enables all channels including any previously disabled channels.

NOTE ➤
This button toggles all virtual channels between an enabled and disabled state. However, when the system is initially Powered ON, the first press of this button is an enable action.

Therefore, if a virtual channel is enabled (<on>), there is no change in what displays in the TX column. A second button press disables all virtual channels and displays no values in the TX column. This button convention only applies after the system is first Powered ON. Once you have pressed this button, it returns to toggling between enable and disable. ◄

Option	Description
<mon>	Indicates that the virtual channel is idle (enabled, but not receiving ATM cells). When this value displays, the ATM RX Alarm and Status Indicator displays OFF.
(No Value Displays)	If the RX column is blank, then the channel is disabled.

VCC TX Mode

Enables or disables ATM Cell transmission for individual virtual channels in the VCC Table. This button is only active when data transmission is Off (Tx - OFF) as indicated in the ATM LED area. The typical button action sequence is to toggle between enable (<on>) and disable.

Option	Description
<on>	Indicates that the virtual channel is idle (enabled, but not transmitting ATM Cells). When this value displays, the ATM TX Alarm and Status Indicator displays OFF.
(No Value Displays)	If the TX column is blank, then the channel is disabled.

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VCC RX Mode

Enables or disables ATM Cell monitoring for individual virtual channels in the VCC Table. This button is only active when data monitoring is Off (Rx - OFF) as indicated in the ATM LED area. The typical button action sequence is to toggle between enabled (<mon> or <det>) and disabled.

Option	Description
<mon>	Indicates that the virtual channel is idle (enabled, but not receiving ATM Cells). When this value displays, the ATM RX Alarm and Status Indicator displays OFF.
<det>	Indicates that the virtual channel is idle, and configured for Detailed Detection mode. This means that the virtual channel is monitoring for BIT and Pattern Sync errors in addition to its normal monitoring status. A total of four AAL0 or AAL1 virtual channels can be configured for Detailed Detection mode. For AAL1 virtual channels, selected AAL1 errors are monitored. (The channel's monitoring status is defined by the Receive Pattern command located in the Edit VCC Function of the VCC Table button. This command is described later in this chapter.)
(No Value Appears)	If the RX column is blank, then the channel is disabled.

Table Functns

The Table Functns button controls the following functions:

- Adding, editing, and deleting virtual channels in a VCC Table
- Saving, recalling, and deleting VCC Tables

The Table Functions button is the second button that appears when the VCC Table in the ATM Function Group button is pressed. There are six functions associated with this button.

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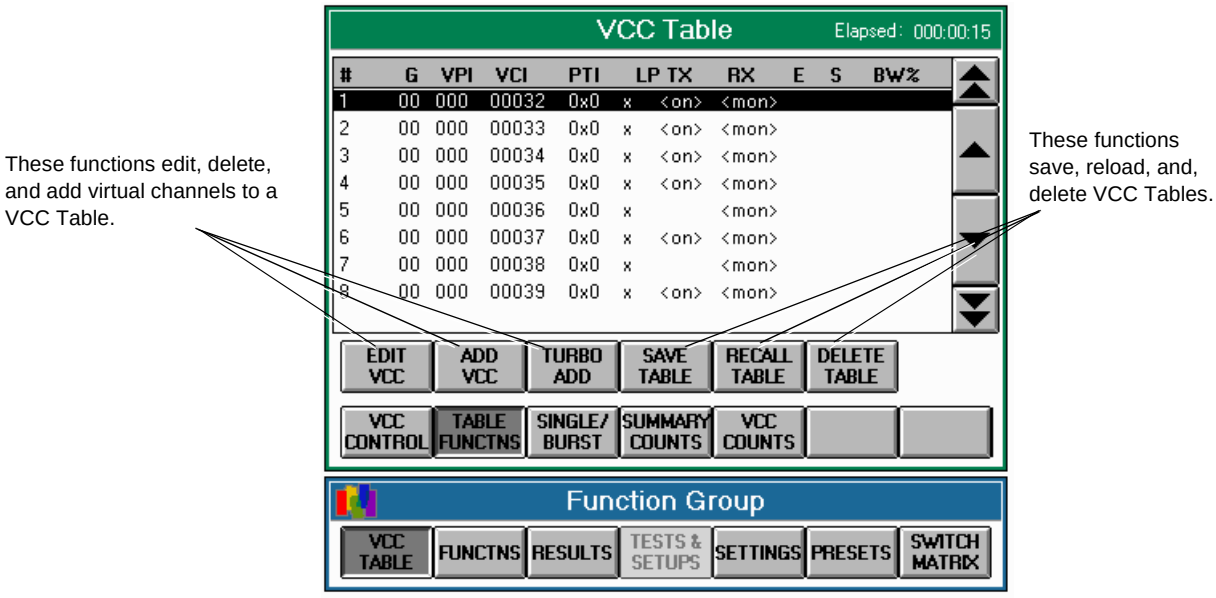


Figure 7-14. Table Functions Button Menu

Creating a VCC Table.
The following procedures describe how to create an entry into a VCC Table. For more information about the commands mentioned in these procedures, refer to the command descriptions in the following Edit VCC button section.

To create a VCC Table:

1. Select the Add VCC button.

   The Header Field Entry keypad appears.

2. Enter values for the GFC, VPI, VCI, PT, and CLP and press Enter.
3. Select a Transmit and Receive pattern.
4. Select an ATM Adaptation Layer (AAL) protocol.
5. Select values for the AAL5 PDU Length (if applicable), AAL1 CSI Bit (if applicable), Traffic Shaping, Peak Cell Rate, Sustained Cell Rate, and Max Burst Size commands.
6. Select Save.

The following describes the different commands that appear when the Table Functions button is pressed.

Edit VCC

The Edit VCC button modifies parameters of an existing virtual channel listed in the VCC Table.

(If there are no virtual channels listed in the VCC Table, then this button has the same behavior as the Add VCC button which is described later in this section.)

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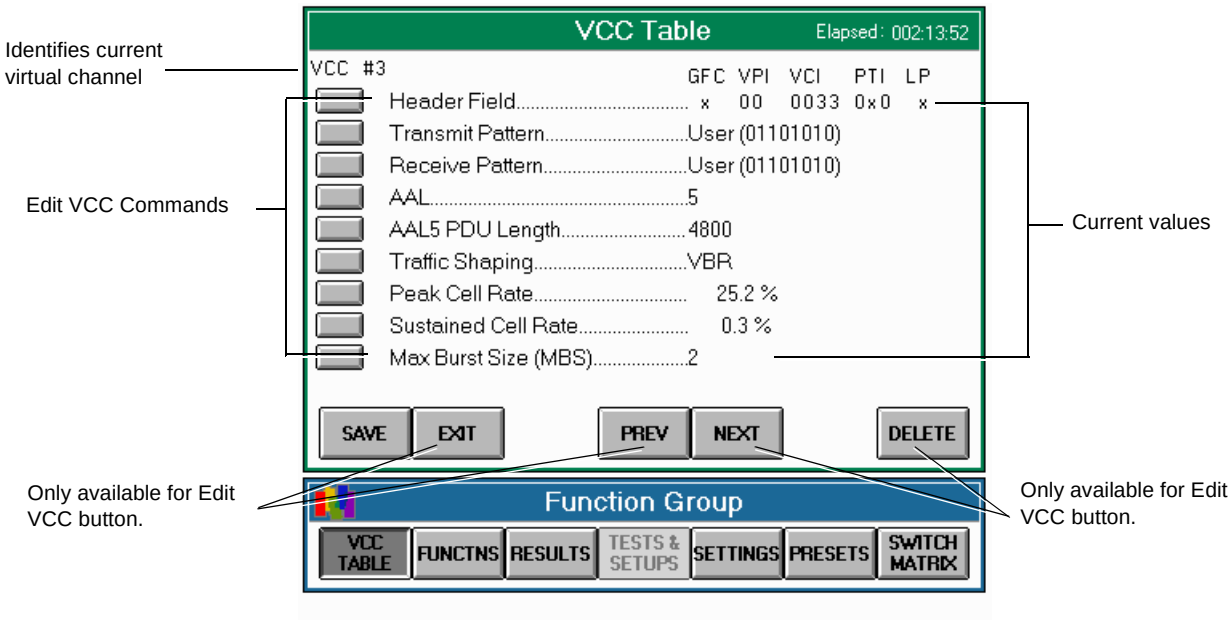


Figure 7-15. Edit VCC Main Menu

The following describes the different commands that appear when the Edit VCC button is pressed.

Header Field

The Cell Header is responsible for describing the type and destination of the ATM cell. For the Edit VCC button, the Header Field command displays the header components for the current virtual channel.

If you press the Header Field command button, then the Header Field Entry keypad appears. The operation of this keypad is described in detail in the Add VCC description located later in this section.

NOTE ➤
If no virtual channels exist in the VCC Table, then the Header Field Entry keypad immediately displays when the Edit VCC button is pressed. For more information on the Header Field Entry keypad, refer to the *Add VCC* description located later in this section. ◄

Transmit Pattern

Selects the payload pattern sent in the transmit ATM stream for an individual virtual channel.

The following options are available for this command.

Option	Description
2^15-1 PBRS	Payload pattern transmitted is a random test pattern at 2^15-1 length
All Ones	Payload pattern transmitted is a continuous all ones pattern (111111...)
1010	Payload pattern is a repeating pattern of alternating ones and zeros (101010...)

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Option	Description
User Defined	Define any one byte that is repeated 48 times to make up the ATM Cell Payload.

Receive Pattern

Defines the payload pattern that is checked for bit errors if detailed monitoring is enabled.

The following options are available for this command.

Option	Description
Live	Uses live data traffic instead of a pattern.
2^15-1 PRBS	The payload pattern transmitted is a random test pattern at the 215-1 length.
All Ones	The payload pattern transmitted is a continuous all-ones pattern (111111…).
1010	The payload pattern is a repeating pattern of alternating ones and zeros (101010…).
User Defined	You can define any one byte that is repeated 48 times to make up the ATM cell payload.

AAL

Sets the ATM Adaptation Layer (AAL) protocol for both transmit and receive. The AAL accomplishes a conversion from a higher level protocol into the ATM layer, that is, segmentation of the original and larger set of data into the size and format of an ATM cell (5 octet header and 48 octets of data or payload).

The following options are available for this command.

Option	Description
0	ATM Adaptation Layer 0 is used. AAL0 denotes an absence of any AAL function, meaning that AAL0 is not really an AAL type in the true sense of the term. AAL0 simply is the transfer of individual cells with no protocol processing of the cell payloads.
1	ATM Adaptation Layer 1 protocol is used. The ATM Cell consists of a 47 byte payload, a 1 byte sequence number, sequence number protection field and convergence ID field, and a 5 byte header.
5	ATM Adaptation Layer 5 protocol is used. AAL 5 supports variable length data packets or PDUs (1 to 65,535 octets). AAL5 utilizes a minimum of overhead for each PDU it sends. The entire payload is used for data except for the last cell in the PDU. Functionally, this larger type supports variable bit rate, delay tolerant, connection-oriented data traffic requiring minimal sequencing or error detection support.

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AAL1 CSI Bit

Sets the AAL1 protocol's Convergence Sublayer Indication (CSI) bit to either a value of 0 or 1. Use the Command button to toggle between 0 and 1. The default value is 0 bit.

NOTE ➤
This command is available only when using AAL1 protocol. ◄

AAL5 PDU Length

Sets the length of the AAL5 Protocol Data Unit (PDU). A PDU length is entered using a keypad. Values can range from 1 byte to 65,512 bytes in length. The default value is 4800 bytes.

NOTE ➤
This command is available only when using AAL5 protocol. ◄

Traffic Shaping

Selects the type of data algorithm used to buffer cells before transmitting data to the network. The following options are available for this command .

Option	Description
VBR	Variable Bit Rate. Uses a single leaky bucket algorithm (GCRA) and characterized by Sustained Cell Rate (SCR) and Peak Cell Rate (PCR).
UBR	Unspecified Bit Rate. If this option is selected then the Peak Cell Rate (PCR), Sustained Cell Rate (SCR), and Max Burst Size (MBS) commands are disabled. Specifically, UBR does not include the notation of a per-connection negotiated bandwidth. UBR channels will attempt to equally share, but not guarantee, any remaining bandwidth after all CBR or VBR channels are allocated.
CBR	Constant Bit Rate. Supports CBR traffic as a subclass of VBR traffic. CBR is used by connections that request a static amount of bandwidth that is continuously available during the connection lifetime. The amount of bandwidth is characterized by Peak Cell Rate (PCR). A single VBR channel with all other channels set as UBR is CBR by default. This is because the single VBR will transmit at a constant rate and not be preempted by UBR network traffic. If multiple VBR channels are set at the same rate, then these channels are sent as CBR traffic. This can also be mixed with UBR traffic.

Peak Cell Rate

Sets the Peak Cell Rate (PCR) for VBR and CBR traffic.
Available only for VBR and CBR Traffic Shaping.

If the PCR is not at 100 percent of line rate for non-OC-12 (or 25 percent for OC-12), then the Max Burst Size defaults to 2.

If the PCR is changed for a single CBR virtual channel, then all CBR channels are changed to the new PCR value.

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The PCR is entered using a keypad and can be represented in the following units of measure:

- Bandwidth Percentage
- Mbps
- Kbps
- Cells per Second.

These units are defined by the Units of Measure command located in the Functns Function Group Button described later in this chapter.

Sustained Cell Rate

Sets the Sustained Cell Rate (SCR) for VBR traffic.
Available only for VBR Traffic Shaping

For VBR traffic shaping, the SCR is closely related to the Maximum Burst Size (MBS). Refer to the MBS description for more information.

The SCR is entered using a keypad and can be represented in the following units of measure:

- Bandwidth Percentage
- Mbps
- Kbps
- Cells per Second.

These units are defined by the Units of Measure command located in the Functns Function Group Button described later in this chapter.

Max Burst Size

Sets the maximum number of cells that can transmit at the peak rate and still be in conformance with the Traffic Shaping algorithm.
Available only for VBR Traffic Shaping.

If the maximum burst size is changed from a value of 2, then the Peak Cell Rate defaults to 100 percent.

NOTE ➤
The selected MBS can affect the actual transmitted bandwidth. If transmitting on only one virtual channel, attempting an SCR greater that 66.7 percent makes it necessary to send more than two consecutive cells at the Peak Cell Rate. Therefore, to transmit greater than 66.7 percent requires an MBS setting greater than 2.

For VBR traffic shaping, MBS and SCR are related by the following equation:

$SCR \leq MBS / (MBS+1)$, where $MBS \geq 2$

For example, to achieve an SCR of 95 percent, calculate the MBS as follows:

$0.95 \leq MBS / (MBS +1)$

$0.95\ MBS + 0.95 \leq MBS$

$0.95 \leq 0.05\ MBS$

$19 \leq MBS$

For DS1 ATM mode, the MBS value automatically changes to support the selected SCR. ◄

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Save Saves any changes made to the parameters for the virtual channel.

Exit Closes the Edit VCC screen and returns to the Table Functns screen.
Available only for the Edit VCC Table **dialog.**

If changes have been made to the virtual channel parameters, then a Save VCC message appears. A NO response closes the Edit VCC command without saving changes. A YES response saves the new virtual channel parameters and closes the Edit VCC command.

Previous Displays the parameter settings for the previous virtual channel in the VCC Table.
Available only for the Edit VCC Table **dialog.**

If changes have been made to the virtual channel parameters, then a Save VCC message appears. A NO response goes to the next VCC in the table without saving changes to the current VCC. A YES response saves the new virtual channel parameters and closes the Edit VCC command.

Next Displays the parameter settings for the next virtual channel in the VCC Table.
Available only for the Edit VCC Table **dialog.**

If changes have been made to the virtual channel parameters, then a Save VCC message appears. A NO response goes to the next VCC in the table without saving changes to the current VCC. A YES response saves the new virtual channel parameters and closes the Edit VCC command.

Delete Removes the virtual channel from the VCC Table. A Confirmation message appears stating that the virtual channel will be deleted.
Available only for the Edit VCC Table **dialog.**

Add VCC

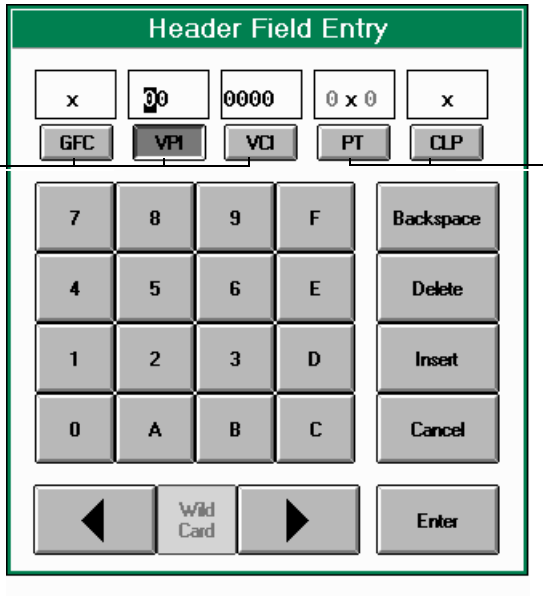
The Add VCC button allows you to create one new virtual channel in the VCC Table.

Header Field Entry When the Add VCC button is pressed, the Header Field Entry keypad immediately displays. This allows you to define the ATM Cell Header structure.

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Generic Flow Control, Virtual Path Identifier, and Virtual Channel Identifier entry fields.
Values are entered as Hex or Decimal numbers as determined by the *VPI/VCI Numeric Representation* command described later in this section.

NOTE: VCIs 3, 4, 6, and 7 are reserved for F4 OAM and Resource Management cells and are not available.



Payload Type Indicator and Cell Loss Priority.
Values are entered as Binary.

Figure 7-16. Header Field Entry Keypad

The following describes what can be entered into the Header Field.

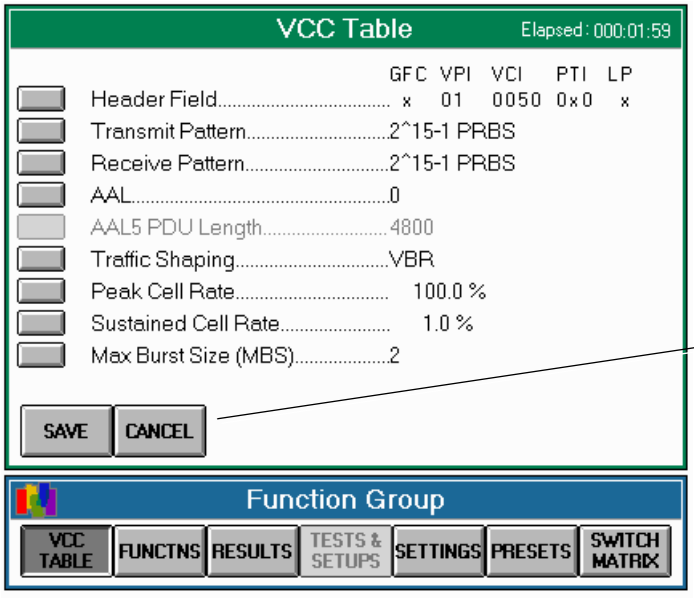
Header Field Entry	Description
GFC (Available for UNI Interface only.)	Generic Flow Control. Sets the first four bits of the ATM cell header for a UNI interface. The GFC field allows the use of wildcard characters. A wildcard is transmitted as a 0 and can be received as a 0 or 1. (The ATM Interface Command, located by selecting the Functns and Settings buttons, selects the UNI and NNI configuration settings as described later in this section.)
VPI	Virtual Path Identifier. This is a routing field for the network. If the connection is set for UNI, then is field is an 8 bit value. If the ATM connection is set for NNI, then this field is a 12 bit value (there is no GFC). Refer to the ATM Interface Command, located by selecting the Functns and Settings buttons, for UNI and NNI configuration settings.
VCI	Virtual Channel Identifier. This field, used together with the VPI, is the routing field for a cell. It is a 16 bit value. VCI values of 3, 4, 6, and 7 are reserved for F4 and Resource Management OAM cells and cannot be entered using the keypad. In addition, a VCI of 0 with a VPI of 0 is an idle cell and is not allowed.

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Header Field Entry	Description
PTI	Payload Type Indicator. Only the center bit, which is used for congestion indication, can be set. If the PTI is set to 0 then the value is User Data and No Congestion. If the PTI is set to 1, then the value is User Data with Congestion. The PTI field allows the use of wildcard characters. A wildcard is transmitted as a 0 and can be received as a 0 or 1.
CLP	Cell Loss Priority. Sets bit 32 of the cell header. CLP can be set to either 0 or 1 (binary). A 0 indicates a high-priority cell and a 1 indicates a low-priority cell. The CLP field allows the use of wildcard characters. A wildcard is transmitted as a 0 and can be received as a 0 or 1.

NOTE ➤
After defining an ATM Cell Header, the Add VCC Main Menu appears. This menu contains many of the same commands as found in the Edit VCC Main Menu. Refer to the Edit VCC section, described earlier in this chapter for information about these commands. ◄

After entering a Header Field, the Add VCC commands appear.



The Cancel button is unique to the Add VCC Main Menu. It cancels the addition of a VCC Channel.

Figure 7-17. Add VCC Main Menu

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Turbo Add

The Turbo Add button allows you to add several virtual channels to a VCC Table at once instead of having to enter ATM cell parameters for each individual virtual channel. A total of up to 250 channels can be added at once.

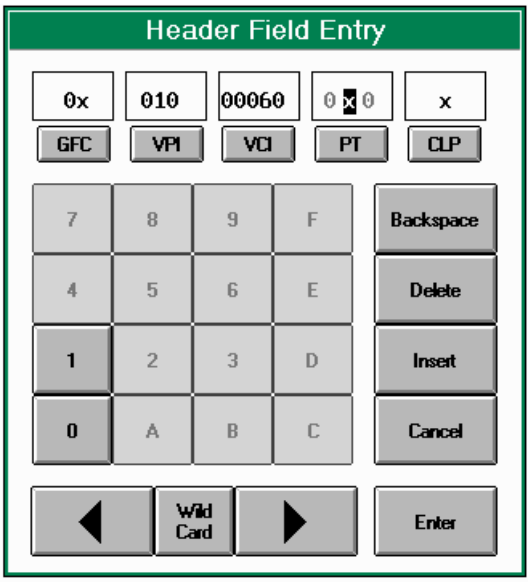


Figure 7-18. Defining a Header Field using Turbo Add

Channels added using this feature increment the VCI value based on the VCI starting point for the first virtual channel. Likewise, the parameter values entered are replicated for all virtual channels added using this feature. This includes all receive and transmit parameters, AAL settings, and traffic shaping. Once these channels are entered into the VCC Table, their parameters can be changed later, if necessary, using the Edit VCC button.

NOTE ➤
Only valid user VCIs above 32 decimal (20 Hex) can be entered using Turbo Add. ◄

The Turbo Add button operates similar to the Add VCC button. The major difference is that you must identify the number of virtual channels to add. This is performed using the Number of VCCs to Add keypad. The Turbo Add button accepts values ranging from 1 to 250.

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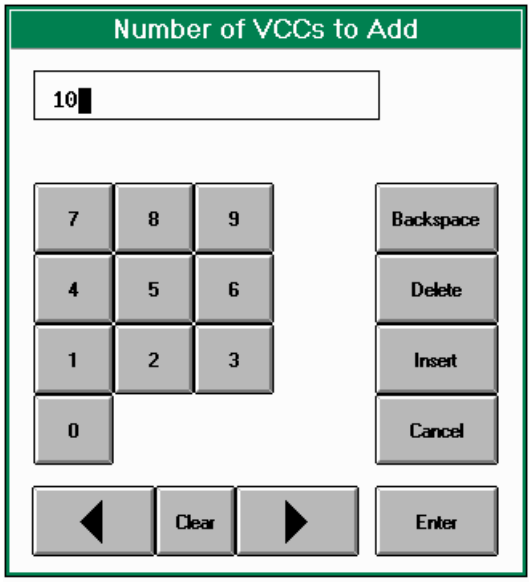


Figure 7-19. Defining the Number of Virtual Channels to add using Turbo Add

After defining the number of virtual channels, the Add VCC Main Menu displays. This allows you to modify parameters for this group of virtual channels. For more information on these parameters, refer to the Add VCC and Edit VCC sections described earlier in this chapter.

Save Table

Use this button to enter a filename and description for a VCC Table. This button also allows you to save the VCC Table to Flash memory, an SRAM PC Card, or RAM.

The following describes the different commands that appear on the Save Table screen.

Disk

Saves the VCC Table to either Flash memory, SRAM memory PC Card, or RAM. The following options are available for this command.

Option	Description
Flash	This is nonvolatile memory. The VCC Table is stored on the system until it is removed using the Delete command.
RamDrive	This is volatile memory. If the VCC Table is saved to RAM, then it is deleted when the system is Powered Off.
PCMCIA	Allows VCC Tables to be saved to an SRAM PC Card. (This option only appears if a PC Card is installed in the PCMCIA slot.)

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Filename Allows you to save the VCC Table with an eight-character filename. Filenames can be from one to eight characters in length. All VCC Tables have the .VCC extension automatically appended.

Description Allows you to enter a 25-character description for the VCC Table.

Save Saves the VCC Table.

Exit Closes the Save Table screen without saving the VCC Table.

Recall Table

Use this button to load an existing VCC Table from either the Flash drive or the RAM drive. This function button displays a list of all VCC Table files stored on the system.

The following describes the different commands and buttons that appear on the Recall Table screen.

Disk Allows you to select and display stored VCC tables that reside on the system's internal Flash, SRAM memory PC Card (appears only if a memory card is inserted in the PCMCIA slot), or the RAM drive. The following options are available for this command.

Option	Description
Flash	When selected, you can retrieve a file from the Flash memory drive. A dialog box appears with a list of all VCC Tables stored on this drive.
RamDrive	This option displays the VCC Tables stored on the RAM drive.
PCMCIA	Allows VCC Tables to be recalled from an SRAM PC Card. This option only appears if a PC Card is inserted into the PCMCIA slot.

Delete Removes the VCC Table that is highlighted in the Recall Table dialog box.

Recall Retrieves a VCC Table that is listed in the Recall Table dialog box.

Exit Closes the Recall Table function and returns to the Table Functns screen.

Delete Table

Use this button to delete the current VCC Table. When selected, a confirmation message appears on the screen. Select OK to delete, and remove from memory, the VCC Table, or select Cancel to ignore the delete function.

NOTE ➤
Once the active table is deleted using this button, it cannot be recalled unless it was previously saved using the Save Table command. ◄

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Single/Burst

Transmits a controlled amount of traffic using either AAL0 cells AAL1 PDUs, or AAL5 PDUs. The type of traffic transmitted is determined by the parameters of the active channel (the virtual channel currently highlighted in the VCC Table).

The Single Burst button is the third button that appears when the VCC Table Function Group button is pressed.

Using the Single/Burst Button:
To transmit a single burst:

1. Select a Virtual Channel.
2. Select the Set Count button. The Burst Count keypad appears.
3. Enter a value from 1 to 1000 and press Enter on the keypad.
4. Select the Start button.

   The burst is transmitted and increments on the Function Menu.

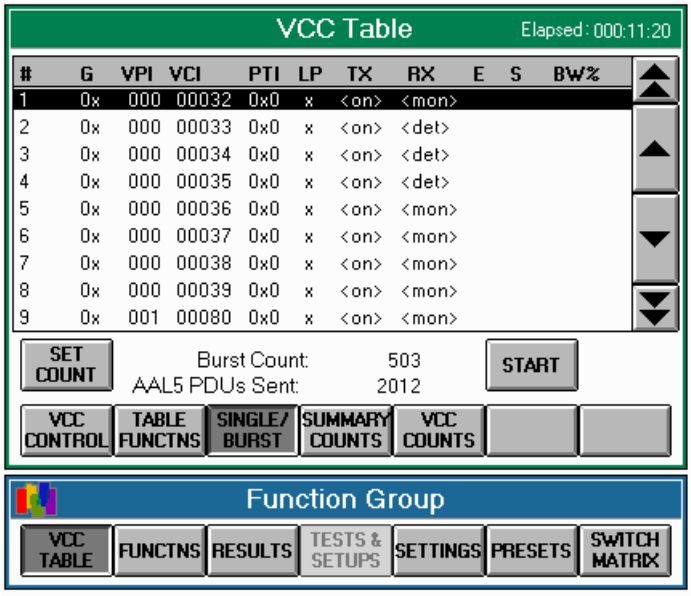


Figure 7-20. Single Burst Menu

The following describes functions associated with the Single Burst button.

Set Count

Sets the Burst Count value. The Burst Count is entered using a keypad and appears on the display as the Burst Count value. This value ranges from 1 to 1000.

NOTE ➤
If the virtual channel is configured for a large AAL5 PDU Length and a small Sustained Cell Rate, then data transfer will be very slow and may take several minutes to complete the Single Burst Function. During this time, the Start button remains depressed until the data transfer is complete. ◄

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Start Transmits a burst of cells (when configured for AAL0 protocol) or PDUs (when configured for AAL1 or AAL5 protocol). The number of cells transmitted is set by the Set Count button.

Burst Count: This value represents the number of cells or PDUs sent per burst. This is the value entered using the Burst Count button.

AAL0 Cells Sent: , AAL1 PDUs Sent: , or AAL5 PDUs Sent: If the virtual channel is configured for AAL0, then the total number of cells sent is displayed. If the virtual channel is configured for AAL1 or AAL5, then the total number of PDUs sent displays.

Summary Counts

The Summary Counts button displays a summary report of current cell activity, bandwidth percentage used, virtual channel status, and virtual channel totals for the current VCC Table.

IMPORTANT ➤
The Summary Counts screen is not valid during Stress mode.◄

NOTE ➤
All count values can be reset to zero using the Restart function located in the Run/Stop Action Bar button◄.

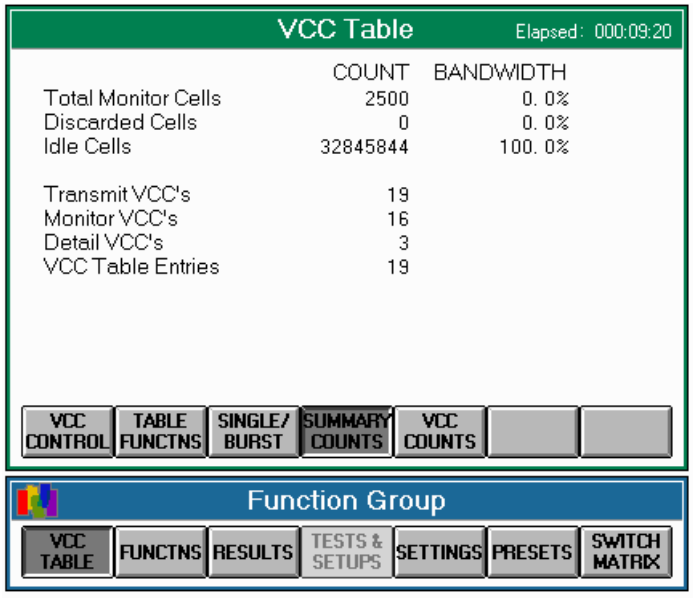


Figure 7-21. Summary Counts Menu

The following information appears for a Summary Counts report.

Total Monitor Cells Displays the cell count and bandwidth of all virtual channels in the VCC Table that are currently configured with an active monitor (MON or DET) status.

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Discarded Cells Reports the total number of user cells (non-zero VCI and VPI cells) that are not part of the monitored traffic. The cell count and bandwidth percentage display.

Idle Cells Reports Cell Count and Bandwidth Percentage.

Transmit VCC's Reports the total number of virtual channels that are configured to transmit data. These channels are identified with the <on> status value in the VCC Table's TX column.

Monitor VCC's Reports the total number of virtual channels that are configured to receive and monitor data traffic. These channels are identified with the <mon> status value in the VCC Table's RX column.

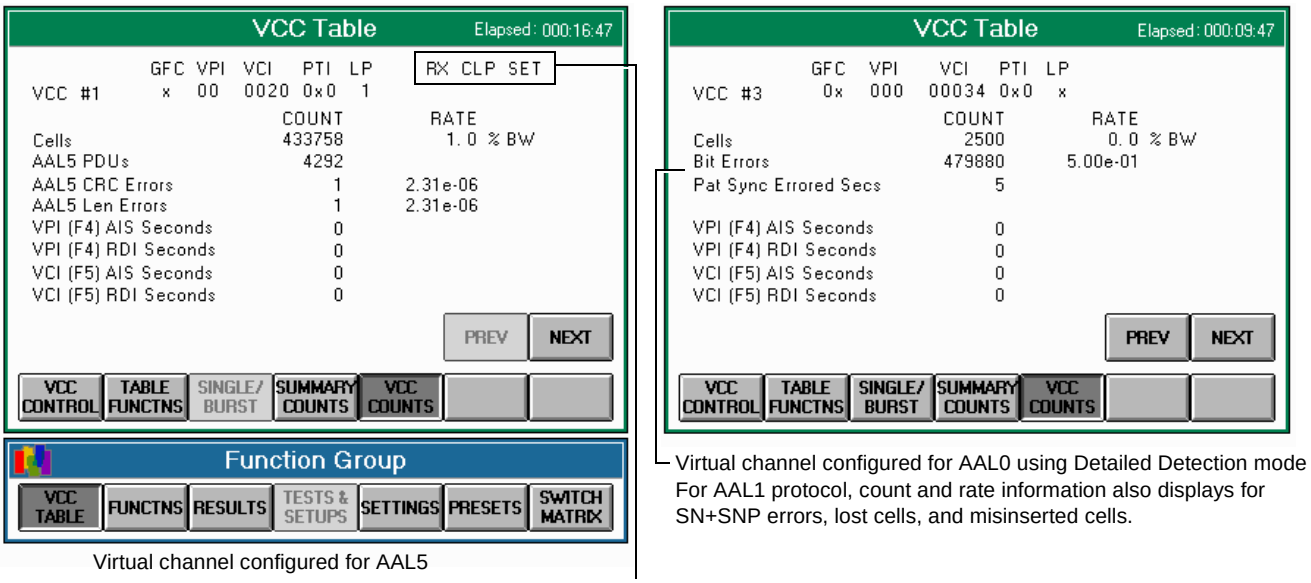
Detail VCC's Reports the total number of virtual channels that are configured to report a detailed monitor status. These channels are identified with the <det> status value in the VCC Table's RX column.

VCC Table Entries Reports the total number of virtual channels (regardless of their TX and RX values) entered in the selected VCC Table.

VCC Counts

Displays a current status report for individual virtual channels defined in the VCC Table. The VCC Counts button is the fifth button that appears when the VCC Table Function Group button is pressed.

Use the Previous and Next buttons to scroll through and display other virtual channels in the VCC Table.



Virtual channel configured for AAL5

Virtual channel configured for AAL0 using Detailed Detection mode
For AAL1 protocol, count and rate information also displays for SN+SNP errors, lost cells, and misinserted cells.

RX CLP SET indicates that a cell with CLP = 1 was received on the virtual channel. This value can be cleared using the Restart button on the Run/Stop Menu.

Figure 7-22. Example of a VCC Counts Menu

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The following information displays for a VCC Counts report.

Virtual Channel Number and Cell Header Information

This line of information displays which virtual channel is currently selected (represented by #) and the associated values for GFC, VPI, VCI, PTI, and CLP.

As you display different virtual channels using the Previous and Next buttons, this status line is updated to reflect the selected virtual channel and its header settings.

VCC Counts Function Menu Information

The following describes the type of information reported for virtual channels configured for AAL0, AAL1, or AAL5 protocol.

If a VCC is configured for AAL0...	Then this information appears in the VCC Counts Function Menu...
	Cells - Displays the cell count and bandwidth percentage for the selected virtual channel.
	Bit Errors - Displays the Bit error count for a virtual channel that has Detailed Detection mode enabled.
	Pat Sync Errored Secs - Displays the total number of Pattern Sync Errors detected for a virtual channel that has Detailed Detection mode enabled.
	VPI (F4) AIS Seconds - Displays the total number of seconds an F4 AIS (Alarm Indication Signal) is detected when monitoring for OAM (Operation, Administration, and Maintenance) cells in the virtual path.
	VPI (F4) RDI Seconds - Displays the total number of seconds an F4 RDI (Remote Defect Indicator) is detected when monitoring for OAM cells in the virtual path.
	VCI (F5) AIS Seconds - Displays the total number of seconds an F5 AIS is detected when monitoring for OAM cells in the virtual channel.
	VCI (F5) RDI Seconds - Displays the number of seconds an F5 RDI is detected when monitoring for OAM cells in the virtual channel.

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The following describes the type of information reported for virtual channels configured for AAL1 protocol.

If a VCC is configured for AAL1...	Then this information appears in the VCC Counts Function Menu...
	Cells - Displays the cell count and bandwidth percentage for the selected virtual channel.
	Bit Errors - Displays the Bit error count and rate for a virtual channel that has Detailed Detection mode enabled.
	Pat Sync Errored Secs - Displays the total number of Pattern Sync Errors detected for a virtual channel that has Detailed Detection mode enabled.
	SN + SNP Errored Seconds - Displays the total number of counts that a Sequence Number or Sequence Number Protection field is in error. (Appears only if the virtual channel has Detailed Detection mode enabled.)
	Lost Cells - Indicates the difference between the expected and the received Sequence Number.(Appears only if the virtual channel has Detailed Detection mode enabled.)
	Misinserted Cells - Indicates that a cell, with a valid sequence number, is received out of order. (Appears only if the virtual channel has Detailed Detection mode enabled.)
	VPI (F4) AIS Seconds - Displays the total number of seconds an F4 AIS (Alarm Indication Signal) is detected when monitoring for OAM (Operation, Administration, and Maintenance) cells in the virtual path.
	VPI (F4) RDI Seconds - Displays the total number of seconds an F4 RDI (Remote Defect Indicator) is detected when monitoring for OAM cells in the virtual path.
	VCI (F5) AIS Seconds - Displays the total number of seconds an F5 AIS is detected when monitoring for OAM cells in the virtual channel.
	VCI (F5) RDI Seconds - Displays the number of seconds an F5 RDI is detected when monitoring for OAM cells in the virtual channel.

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The following describes the type of information reported for virtual channels configured for AAL5 protocol

If a VCC is configured for AAL5...	Then this information appears in the VCC Counts Function Menu...
	Cells - Displays the cell count and bandwidth percentage for the selected virtual channel. AAL5 PDUs - Displays the number of received AAL5 Protocol Data Units (PDU) for the selected virtual channel and the PDU per second rate. AAL5 CRC Errors - Displays the error count and error rate for any AAL5 CRC (Cyclic Redundancy Check) errors detected during data reception. AAL5 Len Errors - Displays the count and error rate for any AAL5 length errors detected during data reception. VPI (F4) AIS Seconds - Displays the total number of seconds an F4 AIS (Alarm Indication Signal) is detected when monitoring for OAM (Operation, Administration, and Maintenance) cells in the virtual path. VPI (F4) RDI Seconds - Displays the total number of seconds an F4 RDI (Remote Defect Indicator) is detected when monitoring for OAM cells in the virtual path. VCI (F5) AIS Seconds - Displays the total number of seconds an F5 AIS is detected when monitoring for OAM cells in the virtual channel. VCI (F5) RDI Seconds - Displays the number of seconds an F5 RDI is detected when monitoring for OAM cells in the virtual channel.

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Functns Function Group

The Functns Function Group Button defines and configures the following:

- Define the type of errors, alarms, and loopback cells to transmit
- Configure the ATM interface and its unit of measure
- Configure ATM cells for Provision and QOS testing
- Selectively scan for specific ATM cell parameters, gather that information, and then add it to a VCC Table
- Achieve STS-12c ATM testing using the Stress Test function

This button is unique to the ATM feature and only appears in the Function Group button row when the ATM protocol processor is active.

Settings

The Settings button allows you to configure the system for a specific type of ATM interface (UNI or NNI). You can also set the unit of measure for the ATM interface (which defaults to a percentage of bandwidth), and define how you numerically enter values for the VPI and VCI. (These values default to Hex representation.)

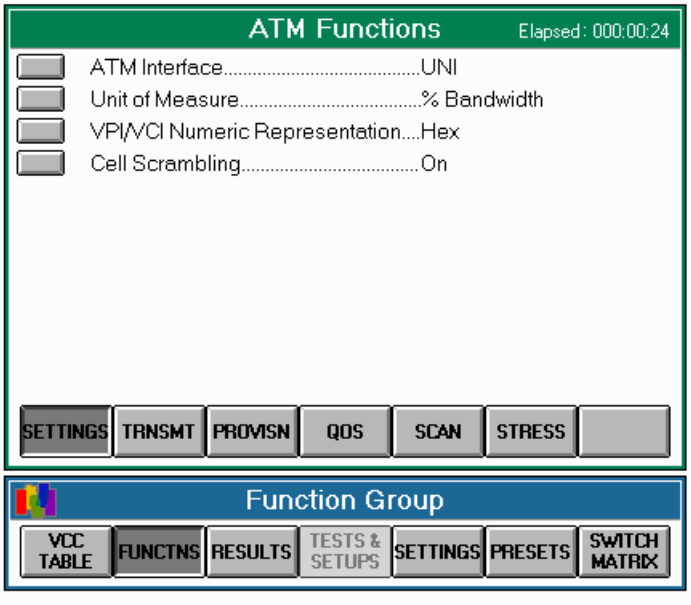


Figure 7-23. Settings Menu and Commands

The following information appears when the Settings button is selected.

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ATM Interface

Configures the system for User-to-Network Interface (UNI) or Network Node Interface (NNI) mode. Set this command based on the type of connection used by your ATM equipment.

The following options are available for this command.

Option	Description
UNI	User Network Interface. If UNI is selected, then the Header Field uses a 4-bit GFC and an 8-bit VPI.
NNI	Network Node Interface. If NNI is selected, then the Header Field uses a 12-bit VPI and no GFC.

Unit of Measure

Determines how the bandwidth of the ATM interface is represented in units of measure.

The following options are available for this command.

Option	Description
Cells/Second	The bandwidth of the ATM Interface is entered and displayed as cells-per-second.
Kb/sec	The bandwidth of the ATM Interface is entered and displayed as Kbps.
% Bandwidth	The bandwidth of the ATM Interface is entered and displayed as bandwidth percentage.
Mb/sec	The bandwidth of the ATM Interface is entered and displayed as Mbps.

VPI/VCI Numeric Representation

Determines whether the VPI (Virtual Path Identifier) and VCI (Virtual Circuit Identifier) are represented as Hexadecimal or Decimal values. This affects how the VPI and VCI values are displayed on screen and how these values are entered using the Header Field keypad.

The following options are available for this command.

Option	Description
VPI/VCI Hex	Uses hexadecimal values for the VPI and VCI.
VPI/VCI Decimal	Uses decimal values for the VPI and VCI.

Cell Scrambling

Enables or disables ATM cell payload scrambling. The default setting is Cell Scramble ON. When ON, ATM cell payloads are scrambled when transmitted and descrambled when received.

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Trnsmt

Defines the parameters for transmitting errors, alarms, and loopback cells.

The Trnsmt button is the second button that appears when the Functns Function Group button is pressed. There are several functions associated with this button as illustrated in the following figure.

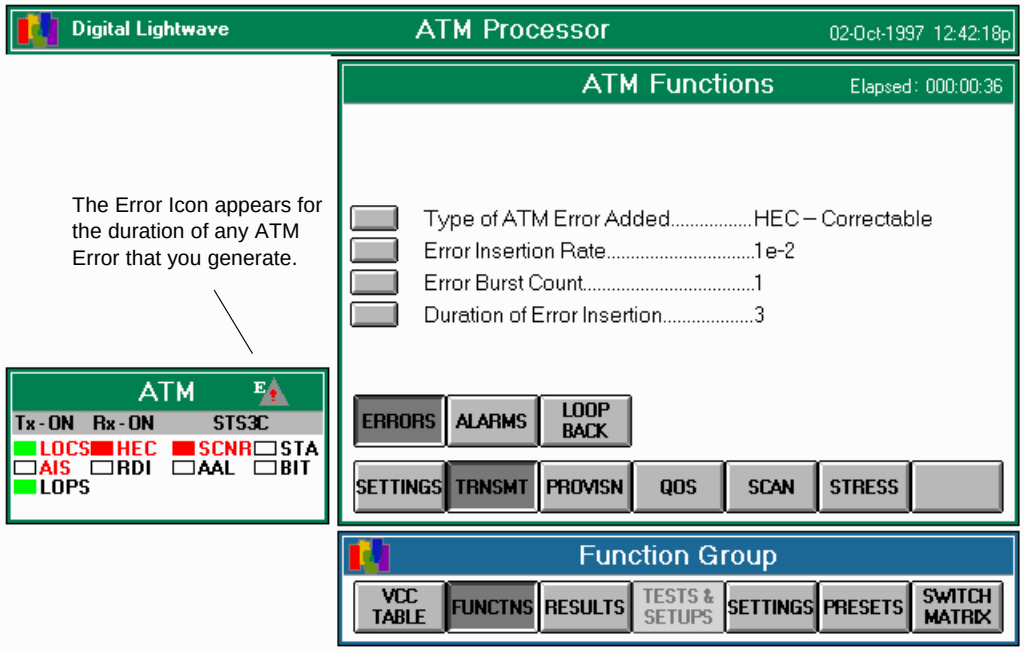


Figure 7-24. Errors Button Commands and Functions

Errors

Use this button to define how the system generates and transmits errors for testing purposes. The following commands are associated with the Errors button.

NOTE ➤
During error insertion, the Error Icon appears in the ATM protocol processor Title Bar to indicate that errors are currently being inserted. Single errors, or a burst of errors, can be inserted using the Error Insert button located on the system's Action Button bar. For Bit errors, the errors are inserted on the virtual channel highlighted in the VCC Table. ◄

Type of ATM Error Added

Defines the type of error that is transmitted during testing. The following options are available for this command.

NOTE ➤
The options that appear may vary depending on the type of ATM Presets/ Mapping that is selected. ◄

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Option	Description
None	No errors are selected for transmission.
HEC - Correctable	Header Error Control. One bit in the Header is errored. Errors are inserted on all channels.
HEC - Uncorrectable	Header Error Control. Two or more bits in the Header are errored. Errors are inserted on all channels.
HEC	Header Error Control. Inserts HEC errors on all channels for ATM/DS1 and ATM/DS3 mapping.
Bit	Bit errors are inserted only on the currently active channel as selected from the VCC Table. Bit errors are only inserted on AAL 0 or AAL 1 virtual channels. In addition, the highlighted virtual channels in the VCC Table must be actively transmitting for Bit error insertion.
PLCP BIP	Generates B1 BIP errors on the Physical Layer Convergence Protocol for ATM/DS1 and ATM/DS3 mapping.
PLCP FEBE	Generates Far-end Block Errors on the PLCP for ATM/DS1 and ATM/DS3 mapping.
PLCP FR (A1A2)	Generates A1 and A2 errors on the PLCP for ATM/DS1 and ATM/DS3 mapping.
PLCP FR (POI)	Generates POI errors on the PLCP for ATM/DS1 and ATM/DS3 mapping.

Error Insertion Rate

Sets the insertion rate for Bit or HEC errors in the transmission stream. The following options are available for this command.

Option	Description
Off	No errors are inserted for transmission.
Continuous (1)	Generates continuous errors into the transmission stream. If the system is configured to generate Bit errors, then this option does not display.
1e-*X*	Selects an error rate. Error rates range from 1e-1 through 1e-9. (For Bit errors, the error rates range from 1e-2 through 1e-9.)
User Defined	Allows you to enter a desired error insertion rate. Values are entered using a keypad display.

Error Burst Count

Defines the number of contiguous cells that contain a HEC error.

NOTE ➤
This command is available only for ATM/SONET mapping. ◄

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The following options are available for this command.

Option	Description
X	Selects burst count *X*, where *X* ranges from 1 to 10.

Duration of Error Insertion

Determines how long errors are inserted into the data transmission stream. Error insertion begins once you have selected a duration value. While errors are inserted, the Error Insertion Icon appears in the ATM protocol processor title bar.

The following options are available for this command.

Option	Description
Off	0 seconds
1 second	The error burst lasts for 1 second.
10 seconds	The error burst lasts for 10 seconds.
60 seconds	The error burst lasts for 60 seconds.
User Defined	Allows you to enter the duration of the error burst. Values are entered using a keypad display and range from 1 second to 32,765 seconds.
Continuous	Errors are constantly inserted at the selected error insertion rate.

Alarms

The Alarms button allows you to define the type and duration of alarm transmitted by the system. This allows you to solicit a response from a specific network element and verify if that element is correct.

NOTE ➤
The Alarm Icon appears in the ATM protocol processor title bar for the duration of the Alarm. This indicates that you are currently generating alarms on the network. ◄

The following commands are associated with the Alarms button.

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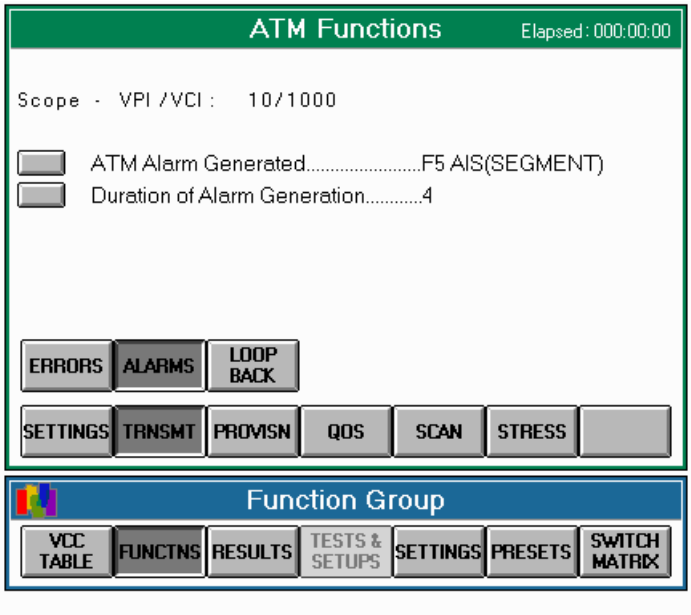


Figure 7-25. Alarm Functions and Commands

ATM Alarm Generated

Selects the type of alarm generated by the system.

The following options are available for this command.

Option	Description
None	No alarms are generated.
Cell Sync	Inserts continuous uncorrectable HEC errors to force the attached ATM equipment to go out of cell sync.
F4 AIS (Segment)	An Alarm Indication Signal detected over a segment of a virtual path.
F4 AIS (End-to-End)	An Alarm Indication Signal detected throughout the virtual path.
F5 AIS (Segment)	An Alarm Indication Signal detected over a segment of the virtual channel.
F5 AIS (End-to-End)	An Alarm Indication Signal detected throughout the virtual channel.
F4 RDI (Segment)	A Remote Defect Indication detected over a segment of the virtual path.
F4 RDI (End-to-End)	A Remote Defect Indication detected throughout the virtual path.
F5 RDI (Segment)	A Remote Defect Indication detected over a segment of the virtual channel.
F5 RDI (End-to-End)	A Remote Defect Indication detected throughout the virtual channel.
PLCP Yellow Alarm	Inserts a Yellow alarm on the PLCP for ATM/DS1 PLCP or ATM/DS3 PLCP mapping.

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Duration of Alarm Generation

Determines how long an alarm is generated. This alarm timer counts down to 0.

The following options are available for this command.

Option	Description
Off	Turns Off any alarm that is in progress by setting the timer to 0 seconds.
1 second	The Alarm lasts for 1 second.
10 seconds	The Alarm lasts for 10 seconds.
60 seconds	The Alarm lasts for 60 seconds.
User Defined	Allows you to enter the duration of the Alarm. Values are entered using a keypad display and range from 1 second to 32,765 seconds.
Continuous	Alarms are constantly reported at an interval of one per second for AIS and RDI alarms.

Loopback

Allows the system to generate a loopback test to ATM equipment on the network. The commands associated with this button define the parameters for the loopback test, which includes creating a loopback Header and determining its connection type, insertion rate, and duration.

There are two ways to initiate a loopback test. The first method is by selecting the duration of the loopback from the Duration of Loopback Insertion command. The second method is to press the Single Loopback button which is described later in this section.

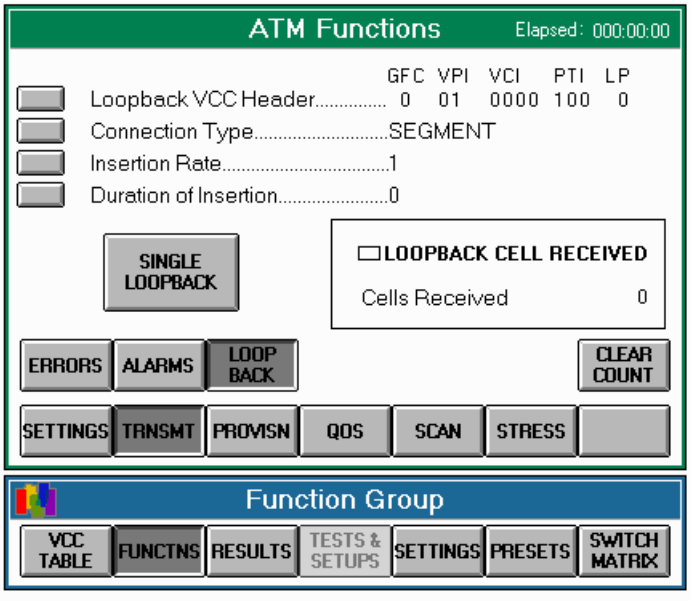


Figure 7-26. Loopback Menu and Commands

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Loopback VCC Header

Defines the Header cell for the Loopback test cell. The Loopback header is entered using a keypad.

Enter a GFC, VPI, and VCI for the Loopback Header. The PTI defaults to 100 for End-to-End loopbacks and 101 for Segment loopbacks.

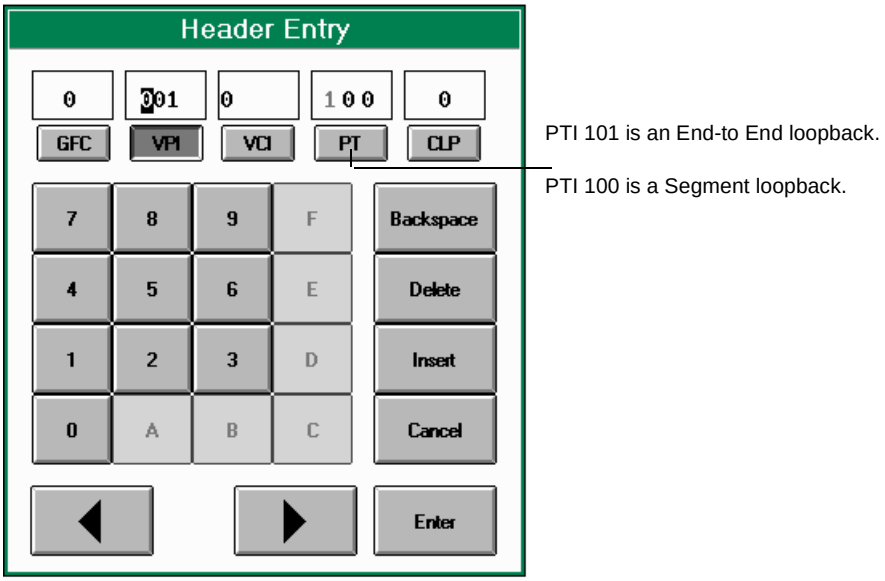


Figure 7-27. Loopback Header Entry Keypad

Connection Type

Determines whether the loopback cells are looped at a virtual channel segment or throughout the network to an endpoint.

The following options are available for this command.

Option	Description
Segment	Sends loopback cells though a portion of the ATM network. For this type of connection, the PTI defaults to 100.
End-to-End	Sends loopback cells to the endpoint of the ATM network. For this type of connection, the PTI defaults to 101.

Loopback Insertion Rate

Determines how many cells per second are transmitted during a loopback test.

This command is used in conjunction with the Duration of Loopback Insertion command. The loopback test consists of the number of cells issued by this command sent for a specified duration. Loopback cell results display in the Loopback Cell Received status box.

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The following options are available for this command.

Option	Description
Off	Sets the loopback insertion rate to zero. This option stops any loopback test that is in progress.
Insertion Rate	Sends 1, 2, 3, or 4 loopback cells per second.

Duration of Loopback Insertion

Sets the period of the loopback test. The test consists of the number of cells per second sent for the length of time defined by this command. Loopback cell results are displays in the Loopback Cell Received status box.

The following options are available for this command.

Option	Description
Off	This option stops any loopback test that is in progress.
Seconds	Sets the loopback cell test to last for 1, 10, or 60 seconds.
User Defined	Allows you to specify the duration of the test. Values are entered using a keypad and range from 1 second to 32765 seconds.
Continuous	Loopbacks are constantly inserted at the selected loopback insertion rate.

Single Loopback

This button generates one loopback cell. This provides the ability to quickly send a loopback cell without having to configure the Loopback Insertion Rate or Duration of Loopback Insertion commands. Results from issuing a Single Loopback cell display in the Loopback Cell Received status box.

Loopback Cell Received

This status box contains an LED and Cells Received counter. As loopback cells are received, based on the parameters entered with the Loopback commands, the LED flashes to indicated the reception of a loopback cell. In addition, the Cells Received counter increments as loopback cells are received. (The Cells Received counter increments based on Loopback Insertion Rate and Duration of Loopback Insertion commands.)

Clear Count

Sets the Cells Received counter to zero.

Provisn

The Provision button allows you to transmit cells at a known rate, loop the data back to the system, and then monitor the receive data to verify if any cells were lost. With this button, you must create a special virtual channel that is used for this type of testing.

NOTE ➤
Before using this command, you must disable transmission and monitoring for all virtual channels listed in the VCC Table as indicated by the Tx - OFF and Rx - OFF indicators in the ATM LED Alarm and Status area. ◄

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The Provisn button is the third button that appears when the FUNCTNS Function Group button is pressed. There are five commands associated with this button as illustrated in the following figure.

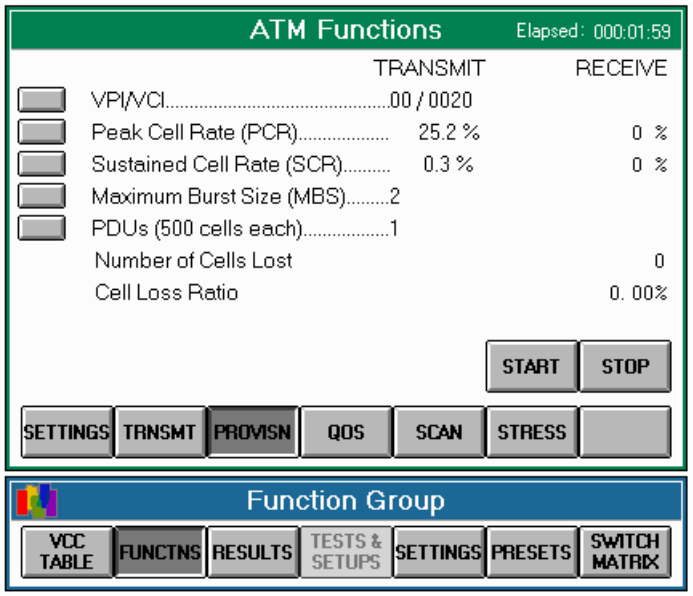


Figure 7-28. Provision Commands

The following commands are available.

VPI/VCI

Creates a Virtual Path Identifier (VPI) and Virtual Channel Identifier (VCI) that are used for Provision testing. The VPI and VCI are entered using the keypad.

Peak Cell Rate (PCR)

Enters the transmitted Peak Cell Rate (PCR) for VBR traffic. This value appears in the Transmit column.

If the PCR is not at 100 percent of line rate for non-OC-12 (or 25 percent for OC-12), then the Max Burst Size defaults to 2.

The PCR is entered using a keypad and can be represented in the following units of measure: Bandwidth Percentage, Mbps, Kbps, or Cells per Second.

The Receive column displays the received PCR.

Sustained Cell Rate (SCR)

Enters the transmitted Sustained Cell Rate (SCR) for VBR traffic. This value appears in the Transmit column.

The Receive column displays the received SCR value.

The SCR is entered using a keypad and can be represented in the following units of measure: Bandwidth Percentage, Mbps, Kbps, or Cells per Second.

Max Burst Size (MBS)

Enters the maximum number of cells transmitted at the peak rate and still be in conformance with the Traffic Shaping algorithm. If the maximum burst size is changed from a value of 2, then the Peak Cell Rate defaults to 100 percent.

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PDUs (500 cells each) Enters the number of Protocol Data Units (PDU) transmitted on the virtual channels identified for Provision testing.

The PDU value is entered using a keypad. The value appears in the Transmit column.

Number of Cells Lost Reports the number of cells lost during the test.

Cell Loss Ratio Provides a ratio of the number of cells lost to the number of cells transmitted.

Start Starts the Provision testing. The message Test In Progress displays on the screen.

Stop Stops any Provision test in progress.

QOS

The QOS button reports Cell Transfer Delay (CTD), single-point Cell Delay Variation, and the Cell Loss ratio for the virtual channel's cells received count, CRC error count, and Length error count. The QOS button is the fourth button that appears when the Functns Function Group button is pressed.

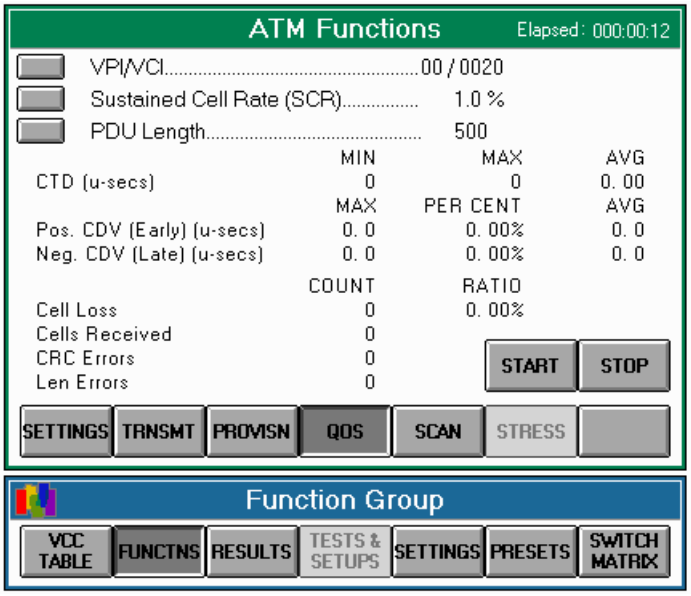


Figure 7-29. QOS Commands

The following commands are available.

VPI/VCI Creates a Virtual Path Identifier (VPI) and Virtual Channel Identifier (VCI) that are used for QOS testing. The VPI and VCI are entered using the keypad.

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Sustained Cell Rate (SCR)

Sets the Sustained Cell Rate (SCR) for QOS testing. The SCR represents the average cell rate.

The SCR is entered using a keypad and can be represented in the following units of measure: Bandwidth Percentage, Mbps, Kbps, or Cells per Second.

PDU Length

The typical system Protocol Data Unit (PDU) contains 500 cells. By using the PDU Length command, you can break the PDU into a smaller number of cells for better analysis of the transmitted and received PDUs.

The CRC Errors and Length Errors statistics provide additional AAL 5 PDU analysis.

CTD (µ-secs)

The Cell Transfer Delay calculates and displays the minimum, maximum, and average roundtrip delay experienced by ATM cells.

Pos. CDV (Early) (µ-secs)

The positive Cell Delay Variation is a value that appears if the ATM cells return faster than the Sustained Cell Rate.

Neg. CDV (Late) (µ-secs)

The negative Cell Delay Variation is a value that appears if the ATM cells return slower than the Sustained Cell Rate.

Cell Loss

Reports the number of cells lost during the test.

Cells Received

Reports the number of cells received.

CRC Errors

Reports the number of CRC errors.

Len Errors

Reports the number of PDU length errors.

Start

Initiates a QOS test. The message Test In Progress displays on the screen.

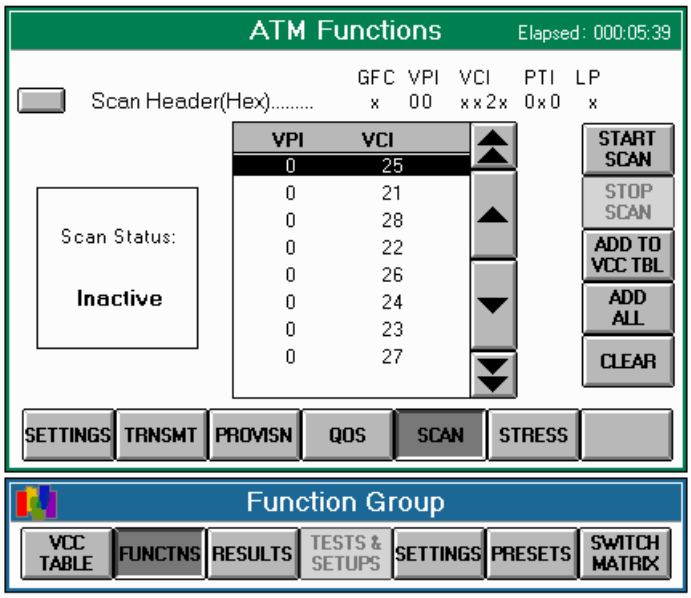
Stop

Stops the QOS test that is in progress.

Scan

The Scan button is a filter that allows you to identify active virtual channels containing specific cell addressing. This feature allows you to enter specific ATM Cell Header addressing parameters and then capture only those ATM cells. This information can then be easily transferred into a VCC Table for additional analysis. This functionality is illustrated in the following figure.

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NOTE:
VCIs 3, 4, 6, and 7 are reserved for F4 OAM and Resource Management cells. These VCIs are filtered out and cannot be added to a VCC Table.

Figure 7-30. Scan Commands

The following commands are available.

Scan Header (Hex) Displays a keypad. From here, you can enter specific ATM Cell Header address that will be scanned. Wildcard characters can be entered to represent any value.

Start Scan Initiates a scan. The Scan Status box displays the message Active.

Stop Scan Stops the scan in progress. The Scan Status box displays the message Inactive.

Add to VCC Tbl Selects the highlighted virtual channel and adds it to the VCC Table.

Add All Selects all virtual channels identified (displayed in the scroll box) and adds them to the VCC Table.

Clear Removes any identified virtual channels from the scroll box.

Stress

The Stress Test button allows you to generate CBR data traffic up to OC-12c (622 Mbps) data rates for a specific virtual channel. This button is only available for ATM/STS-12c mapping.

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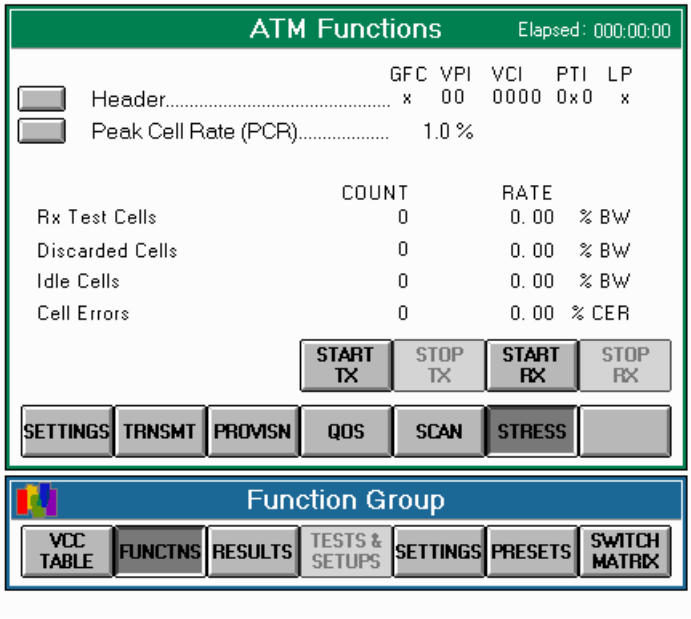


Figure 7-31. Stress Commands

The following commands are available.

Header Defines the ATM cell header that the test will operate on.

Peak Cell Rate (PCR) Sets the Peak Cell Rate for CBR traffic.

RX Test Cells Reports the number of test cells received and rate.

Discarded Cells Reports the number of cells discarded and rate.

Idle Cells Reports the number of idle cells and rate.

Cell Errors Reports the number of cells that have errors and rate.

Start TX Starts the Stress Test by transmitting ATM Test cells. While a Stress Test is active, no other virtual channels can begin transmitting ATM cells.

Stop TX Stops the transmission of ATM Test cells during a Stress Test.

Start RX Starts the monitoring of ATM Test cells during a Stress Test. While a Stress Test is active, no other virtual channels can monitor for ATM cells.

Stop RX Stops the monitoring of ATM Test cells during a Stress Test.

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Results Function Group

Test activity and event history can be viewed using the various functions of the Results Function Group button.

The following buttons make up the Results Function Group:

- **Trouble Scan:** Provides a quick report of detected errors and alarms and lists the duration of these events.
- **Main Results:** Provides detailed results for errors and alarms detected by the Trouble Scan function.
- **Error Analysis:** Reports percentage and error count values.
- **Graphs:** Displays alarm and error results as graphs
- **Recall Graphs:** Retrieves previously saved graphed data.
- **Save Graphs:** Saves graphed data.
- **Large LEDs:** Displays LED errors and alarms in a large format on the screen.

The following section describes these functions and their associated commands.

Trouble Scan

The Trouble Scan function provides a list of received errors and alarms for the ATM protocol processor. The duration or count of each event also appears. This function is effective in identifying a general area to investigate when an error or alarm is detected.

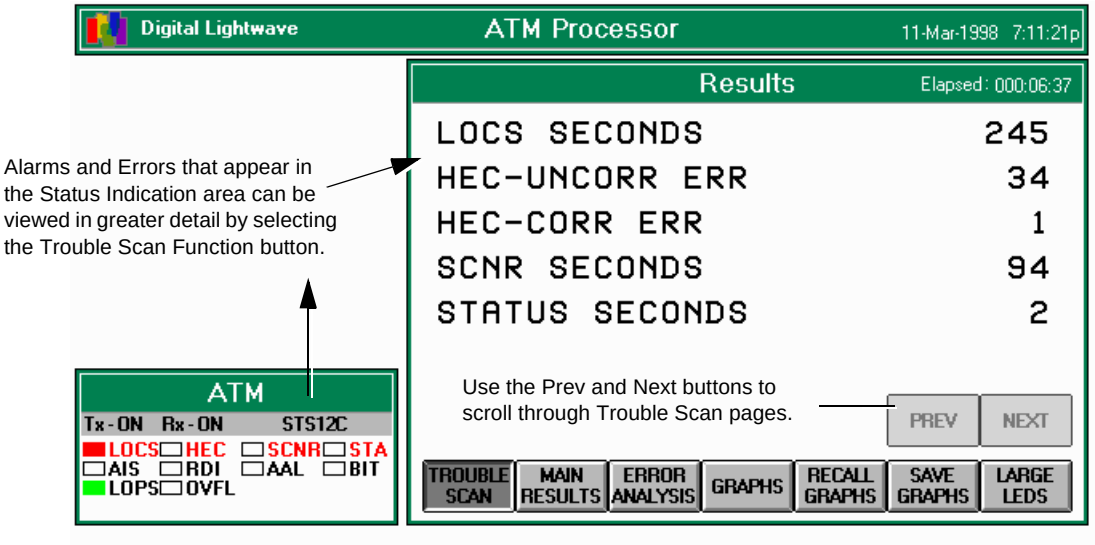


Figure 7-32. ATM Trouble Scan Menu

The following is a list of the ATM protocol processor errors and alarms that are detected using the trouble scan function.

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If alarms or errors are present, use the Main Results button to view another layer of detail of these errors and alarms.

ATM Trouble Scan Message	Description
No Trouble	General status message. Indicates that no errors or alarms are detected.
HEC - Corr Err	HEC - Correctable error message. Indicates the number of HEC - Correctable errors detected.
HEC - Uncorr Err	HEC - Uncorrectable error message. Indicates the number of HEC - Uncorrectable errors detected.
HEC	Indicates the number of HEC errors detected when mapped for ATM/DS1 or ATM/DS3.
PLCP BIP Errors	Physical Layer Convergence Protocol. Indicates the number of B1 errors detected on a PLCP when mapped for DS1 ATM PLCP or DS3 ATM PLCP.
PLCP FEBE Errors	PLCP Far-end Block Errors. Indicates the number of FEBE errors detected on a PLCP when mapped for DS1 ATM PLCP or DS3 ATM PLCP.
PLCP Framing	PLCP A1A2 or PLCP POI framing errors. Indicates the number of A1A2 or POI framing errors detected on a PLCP when mapped for DS1 ATM PLCP or DS3 ATM PLCP.
PLCP Yellow	Indicates the number of seconds a Yellow alarm occurred on a PLCP when mapped for DS1 ATM PLCP or DS3 ATM PLCP.
PLCP SYNC Seconds	Indicates the number of seconds that a loss of PLCP framing synchronization occurred. Valid for ATM PLCP mapping only.
PLCP OOF Seconds	Indicates the number of seconds when a receive PLCP out of frame error occurred when an ATM PLCP mapping is being used.
PLCP LOF Seconds	Indicates the number of seconds where a receive PLCP loss of frame error occurred when an ATM PLCP mapping was in effect.
LOCS Seconds	Loss of Cell Sync alarm message. Indicates the number of seconds for lost cell synchronization.
F4 AIS Seconds	VPI (F4) AIS alarm message. Indicates the number of seconds that a VPI (F4) AIS alarm occurred and was reported.
F4 RDI Seconds	VPI (F4) RDI alarm message. Indicates the number of seconds that a VPI (F4) RDI alarm occurred.
F5 AIS Seconds	VCI (F5) AIS alarm message. Indicates the number of seconds that a VCI (F5) AIS alarm occurred.
F5 RDI Seconds	VCI (F5) RDI alarm message. Indicates the number of seconds that a VCI (F5) RDI alarm occurred.
SCNR Seconds	Indicates the number of seconds when selected cells were not received.

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ATM Trouble Scan Message	Description
STATUS Seconds	Indicates the number of seconds where a status condition occurred. For example, this indicates when an Rx CLP bit is set on a receive VCC. This message corresponds with the STA LED activity.
AAL ERR	Indicates the number of AAL errors
BIT ERR	Indicates the number of cumulative bit errors that have occurred on the detail channels.
LOPS Seconds	Indicates the number of seconds that a loss of pattern sync occurred on any detail channel.
OVFL Seconds	Indicates the number of seconds when a cell overflow condition occurs. The system is receiving more cells than it can monitor.

Main Results

The Main Results button displays detailed results for the ATM errors and alarms identified by the Trouble Scan function.

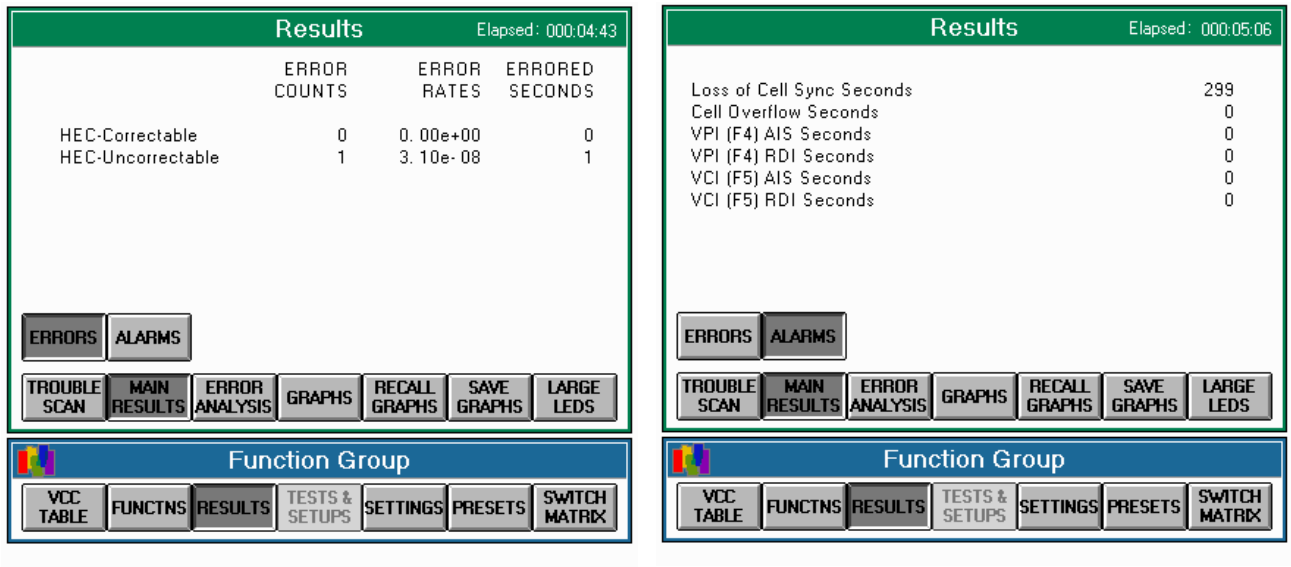


Figure 7-33. ATM Errors and ATM Alarms

Errors

Displays the number of errors detected, the error rate measurement, and the total number of errored seconds.

The errors detected are generated either by the ATM network or intentionally by the system (using the Transmit Errors Function located in the Functns Function Group).

The following ATM errors are reported:

- HEC - Correctable
- HEC

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- HEC - Uncorrectable
- PLCP BIP
- PLCP FEBE
- PLCP Framing
- AAL (Error Rate values are not applicable)
- BIT (Error Rate values are not applicable)

NOTE ➤
The type of errors that appear vary depending on the type of Preset/Mapping selected. ◄

Alarms

Displays how long alarms were received by the system. The following ATM Alarms can appear:

- VPI (F4) AIS Seconds
- VPI (F4) RDI Seconds
- VCI (F5) AIS Seconds
- VCI (F5) RDI Seconds
- PLCP Yellow Seconds
- PLCP SYNC Seconds
- LOCS Seconds
- SCNR Seconds
- STA Seconds
- LOPS Seconds
- OVFL Seconds
- PLCP OOF Seconds
- PLCP LOF Seconds.

NOTE ➤
The type of alarms that appear vary depending on the type of Preset/Mapping selected. ◄

Error Analysis

This button allows you to view in greater detail the different ATM errors that the system detects and logs. The information is based on the errors reported by the Main Results button.

NOTE ➤
The Analysis buttons that appear may vary depending on the type of Preset/Mapping selected. ◄

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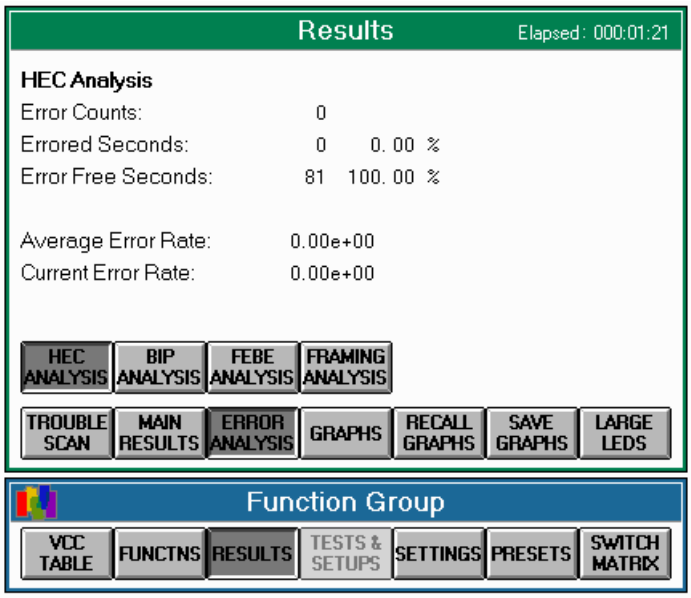


Figure 7-34. ATM HEC Analysis Report

HEC Analysis Provides a detailed breakdown for HEC errors detected and logged by the ATM protocol processor.

BIP Analysis Provides a detailed breakdown for BIP errors detected and logged by the ATM protocol processor. This information is available if the unit is configured for ATM/DS1 PLCP or ATM/DS3 PLCP mapping.

FEBE Analysis Provides a detailed breakdown for Far-End Block Errors detected and logged by the ATM protocol processor.This information is available if the unit is configured for ATM/DS1 PLCP or ATM/DS3 PLCP mapping.

Framing Analysis Provides a detailed breakdown for PLCP Frame errors detected and logged by the ATM protocol processor.This information is available if the unit is configured for ATM/DS1 PLCP or ATM/DS3 PLCP mapping.

AAL Analysis Provides a detailed breakdown for AAL errors detected and logged by the ATM protocol processor.

BIT Analysis Provides a detailed breakdown for BIT errors detected and logged by the ATM protocol processor.

Graphs

The Graphs button displays two graphs that you can use to view error and alarm results from any current ATM activity or timed ATM tests. You can configure the graph function to display any combination of ATM Alarms and Errors.

The following ATM alarms and errors can be graphed:

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Alarms1 The following parameters are graphed for Alarms1:

- LOCS
- SCNR
- F4 AIS
- PLCP Sync
- F5 AIS
- F4 RDI
- F5 RDI

Alarms2 The following parameters are graphed for Alarms2:

- STA
- LOPS
- OVFL
- OOF
- LOF
- Yellow

HEC Uncorrectable Errors Error counts 1E-8 through 1E-0 are graphed for HEC Uncorrectable Errors.

HEC Correctable Errors Error counts (1E-8 through 1E-0) are graphed for HEC Correctable Errors.

HEC Errors Error counts (1E-8 through 1E-0) are graphed for HEC Errors.

PLCP FEBE Errors Error counts (1E-8 through 1E-0) are graphed for PLCP FEBE Errors.

PLCP BIP Errors Error counts (1E-8 through 1E-0) are graphed for PLCP FEBE Errors.

PLCP Frame Counts Error counts (1E-8 through 1E-0) are graphed for PLCP Framing Errors.

AAL Errors Error counts (1E-8 through 1E-0) are graphed for AAL Errors.

BIT Errors Error counts (1E-8 through 1E-0) are graphed for BIT Errors.

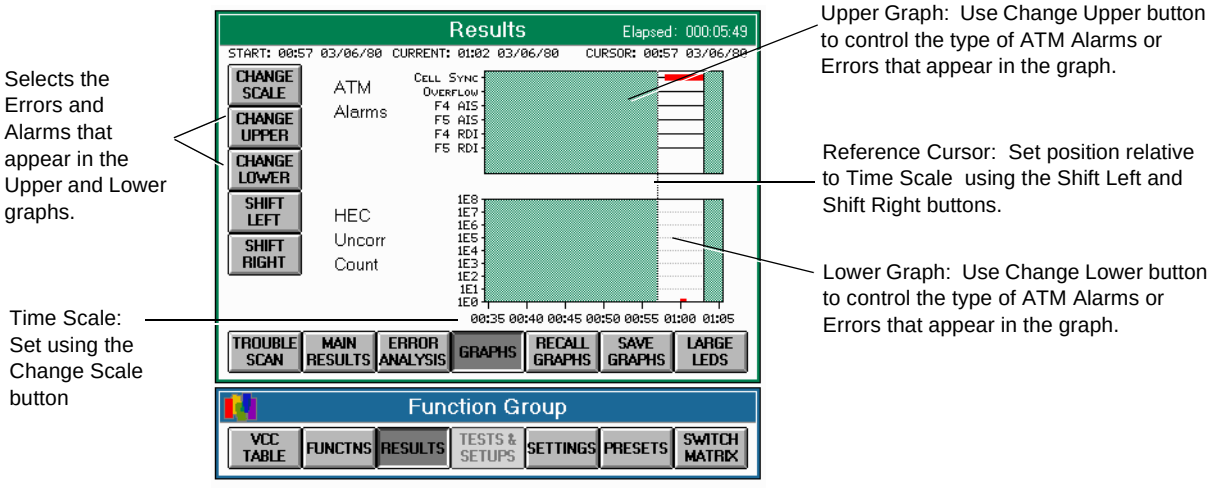


Figure 7-35. ATM Graphs

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Change Scale

Compresses or expands the displayed time scale for the graphed errors and/or alarms.

The following values are available for this function:

Option	Description
30 minute	Sets the graph's time scale to 30-minute increments.
90 minute	Sets the graph's time scale to 90-minute increments.
3 hour	Sets the graph's time scale to 3-hour increments.
6 hour	Sets the graph's time scale to 6-hour increments.
12 hour	Sets the graph's time scale to 12-hour increments.
24 hour	Sets the graph's time scale to 24-hour increments.
72 hour	Sets the graph's time scale to 72-hour increments.

Change Upper and Change Lower

These buttons determine what type of alarms and errors display in the two graphs.

Shift Left and Shift Right

The Upper and Lower graphs use a dotted line as a Reference Cursor to identify exact error and alarm conditions for a specific time. Use these buttons to adjust the time scale to an earlier or later time by moving the cursor to the left or right on the Upper and Lower graphs.

The Reference Cursor can also be moved to a specific time by touching the screen and dragging the cursor either to the right or left in the graphed display. The position of the cursor corresponds to a time and date which is displayed above the graphs in text for easy viewing.

Save Graphs

Use this button to save the current or previously graphed results to a file for later retrieval and viewing. The filename and a file description are entered using a keypad that automatically appears when these buttons are selected.

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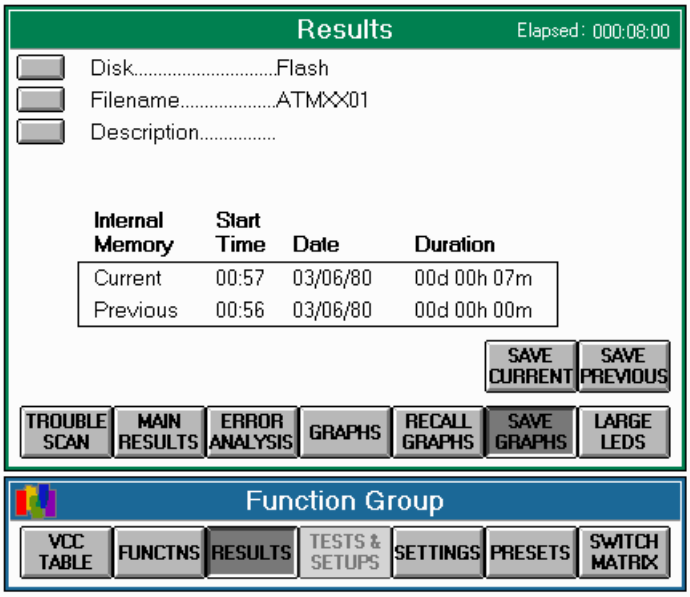


Figure 7-36. Save Graphs Commands

The following information appears when Save Graphs button is selected.

Disk

Saves the graph to either Flash memory, the SRAM memory PC Card (only appears if a memory card is inserted in the ASA 312's PCMCIA slot), or RAM. The following options are available for this command.

Option	Description
Flash	This is nonvolatile memory. The graph is stored on the system until it is removed using the Delete command.
RamDrive	This is volatile memory. If the graph is saved to RAM, then it is deleted when the system is powered off.
PCMCIA	Allows the Results Graph to be saved to an SRAM PC Card. **This option appears only if a PC Card is inserted into the ASA 312's PCMCIA slot.**

Filename

Allows you to save the Results Graph with an eight-character internal filename. Enter a filename. Filenames can be from one to eight characters in length. ATM Result Graphs have the .RA extension automatically appended.

Description

Allows you to enter a 25-character description for the file.

Current and Previous Internal Memory

For easy reference, and to ensure that the file data is accurate, there is a table identifying data for both the current and previous system memory locations. This table contains the following information:

- Internal memory
- Start time of the graphed result

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- Date of the graphed result
- Duration of the graphed result

Using two function buttons, Save Current and Save Previous, choose which graphed results to save. No graphed data file can be saved unless the protocol processor has been stopped and no test is currently running.

Save Current

Saves the graphed test data that is currently stored in the current system memory location.

To ensure accuracy, the system stores data in both a current and previous system memory location. These memory locations contain start time, date, and duration of the graphed results.

NOTE ➤
The message Protocol processor must be stopped before results can be saved appears if you try to save a file while a test is in progress. This warning applies only to the protocol processor currently in use; other protocol processors (for example, SONET, DS1, or DS3) may be running due to the simultaneous operations capability.

No graphed data file can be saved unless the protocol processor and currently active test is stopped. ➤

Save Previous

Saves the graphed test data that is currently stored in the previous memory location.

To ensure accuracy, the system stores data in both a current and previous system memory location. These memory locations contain start time, date, and duration of the graphed results.

NOTE ➤
The message Protocol processor must be stopped before results can be saved appears if you try to save a file while a test is in progress. This warning applies only to the protocol processor currently in use; other protocol processors (for example, SONET, DS1, or DS3) may be running due to the simultaneous operations capability.

No graphed data file can be saved unless the protocol processor and currently active test is stopped. ➤

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Recall Graphs

Use the Recall Graphs button to open any previously saved graph that is stored either on the Flash drive, SRAM PC Card (appears only if a memory card is inserted in the ASA 312's PCMCIA slot), or RAM drive.

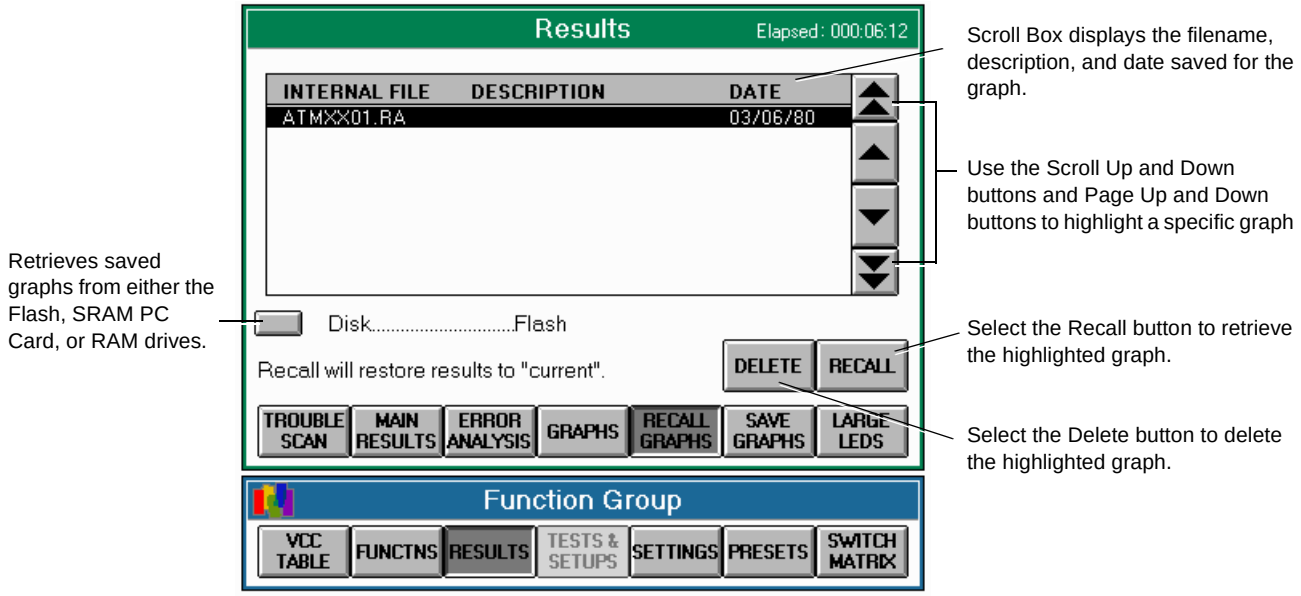


Figure 7-37. ATM Recall Graphs

While the unit is performing test operations, protocol processor results are viewed and saved. Using the Save Graphs function described earlier in this section, these graphed results are automatically loaded into the instrument system memory and the data is always saved in what is called a "current" results location. When using the Run Stop function to stop the test and re-start another one, the "current" test results are moved to what is referred to as the "previous" test results location and the current test results are initiated again.

The Recall Graphs function menu field selector recalls graphs and either deletes the graphed results or restores the graphed results to the current location in the instrument system memory. These recalled results are derived from the list of graphs saved using the Save Graphs function. These saved graphs are listed in the Recall Graphs display and identified using a table.

The table lists the internal file name, a description of the file and the date the file was saved. Arrow keypads are provided for easy viewing up and down the list of saved graph files. Once a file is selected, it can either be recalled which restores these results to the current results location and now can be viewed, or deletes the graphed data using the Delete function.

NOTE ➤
The instrument is currently capable of saving only graphed results data obtained using the protocol processor Run Stop function. All other protocol processor results data are deleted automatically when the unit is turned off unless graphed results are saved using the Save Graph function. ◄

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Large LEDs

This button displays the ATM LED Error and Alarm Indicators in a large, easy to read format that covers the entire screen area. This is especially useful for viewing any errors or alarms from a long distance, such as across the room from a test bay.

You have the option of viewing errors and alarms for all protocol processors (DS1 or E1, DS3, ATM, and SONET) or just the ATM processor errors and alarms.

NOTE ➤
ATM cannot be run over the E1 protocol processor.◄

The following describes LED colors:

If the LED is this color...	Then the LED indicates this activity...
Green	The specific function is active and OK.
Red	An error or alarm event is in progress.
Yellow	Indicates that this function experienced an error or alarm event. This event is cleared by selecting the Clear History button.
Black (Clear)	No activity from this specific function.

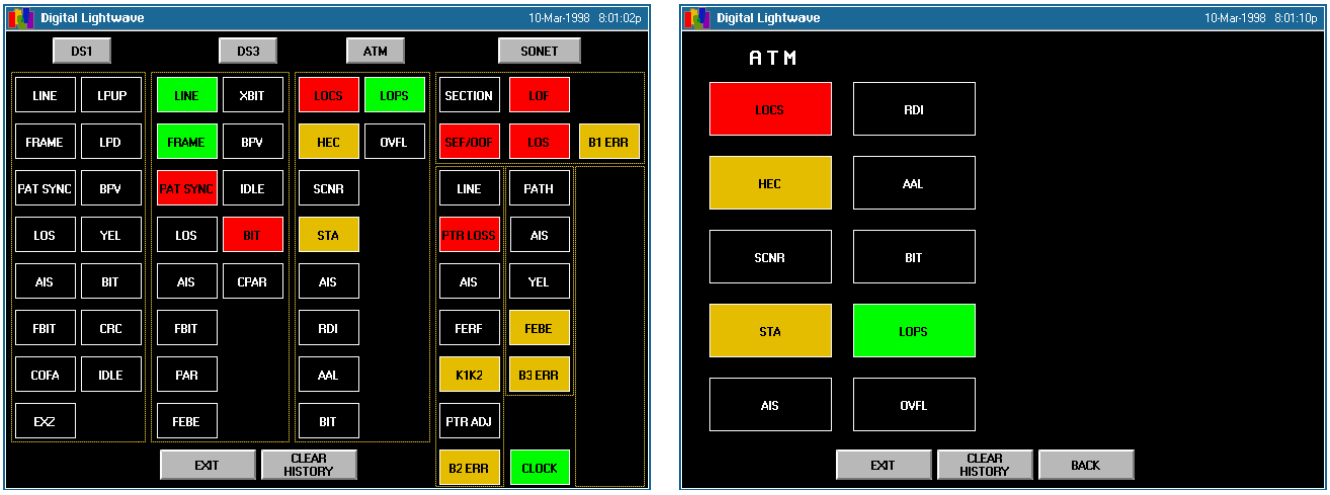


Figure 7-38. Large ATM LEDs and Large ATM Only LEDs

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Settings Function Group

The Settings Function Group button is described in chapter 10, *Settings, Presets, and Switch Matrix*. The commands and functions associated with this Function Group button are common to all five protocol processors.

Presets Function Group

The Presets Function Group button is described in chapter 10, *Settings, Presets, and Switch Matrix*. The commands and functions associated with this Function Group button are common to all five protocol processors.

Switch Matrix Function Group

The Switch Matrix Function Group button is described in chapter 10, *Settings, Presets, and Switch Matrix*. The commands and functions associated with this Function Group button are common to all five protocol processors.

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8 E1 Protocol Processor

Overview

This chapter describes the user interface and commands that control the E1 protocol processor. E1 allows you to test and monitor E1 signals. This can be performed independently or simultaneously with other ASA 312's.

NOTE ➤
The E1 function is not available for use with the NAA I. ◄

Introducing the E1 User Interface

The E1 user interface presents the commands, buttons, and LEDs that you use to control the E1 protocol processor. The interface consists of the following elements:

- E1 LEDs and Status Indicators
- E1 Function Menu
- Function Group and Action button rows

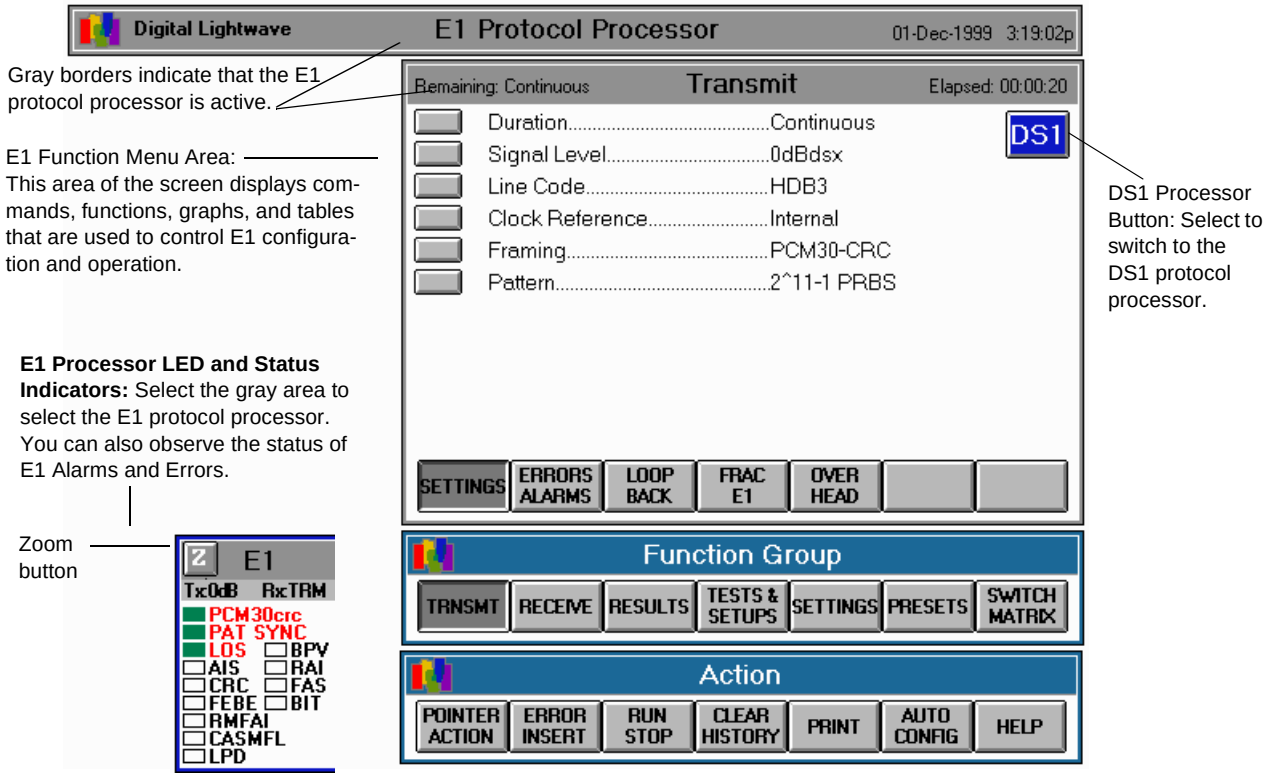


Figure 8-1. Typical E1 Protocol Processor Screen

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E1 LEDs and Status Indicators

The E1 Processor LED and Status Indicators area serves the following purposes:

- To provide access to the E1 protocol processor functions, which is achieved by selecting the gray E1 title bar on the screen.
- To provide a visual status of E1 activity such as the line interface transmit and receive settings and E1 alarm and error conditions.

The following describes the E1 Processor Alarm and Status Indicators area.

E1 Processor Alarm and Status Indicators

The E1 Status Indicators report the condition of the E1 alarms, errors, and signals.

Indicator	Description
Z	**E1 Zoom Button:** Activates E1 Zoom mode. This provides quick access to several E1 Transmit and Receive commands, alarms, and errors. When selected, the entire screen is dedicated to the E1 Zoom functions.
Tx	Indicates the current transmit E1 Line Interface Signal Level (0dBdsx, -7.5dBdsx, or -15dBdsx).
Rx	Indicates the current value of the E1 Line Interface Input Termination.
pcm*x* or unf	**Pulse Code Modulation** or **Unframed:** Indicates the selected framing format and the presence of a framing. *X* is: ■ 30 if configured for pcm30 framing ■ 30CRC if configured for pcm30 CRC framing ■ 31 if configured for pcm31 framing ■ 31 CRC if configured for pcm31 CRC framing ■ unf if configured for unframed format
PAT SYNC	**Pattern Synchronization:** Indicates pattern synchronization condition.
LOS	**Loss of Signal:** Indicates a Loss of Signal is detected.
BPV	**Bipolar Violation Error:** Indicates the presence of a Bipolar Violation error. This happens when two consecutive pulses of the same polarity occur in the same digital bit stream. In E1 mode, the ASA only transmits BPV errors in the payload.

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Indicator	Description
AIS	**Alarm Indication Signal:** Indicates, to downstream equipment, that an upstream failure has occurred on the E1 signal.
RAI	**Remote Alarm Indication:** Also known as a Yellow Alarm signal. Indicates to the far end that a failure was detected.
CRC	**Cyclic Redundancy Check:** Indicates that a CRC error has occurred.
FAS	**Frame Alignment Signal:** Refers to either TS0 or bits 2 through 8 of the first byte of even-numbered E1 frames.
FEBE	**Far End Block Error:** Indicates that a bit error has occurred in the Physical Layer at the far end of the link.
BIT	Indicates that a Bit error was received
RMFAI	**Remote Multiframe Alarm Indication:** Indicates that an RMFAI error has occurred. This is indicated by the Y-bit, which is bit 6 of frame 0 of Time Slot 16.
CASMFL	**Channel Associated Signaling Multiframe Loss:** Indicates that a CASMFL error has occurred. This happens when the four zeros at the start of Time Slot 16 in frame 0 cannot be found.
LPD	**Looped:** Indicates that E1 is in loopback test mode.

Configuring the ASA 312 for E1 Operation

The ASA 312 can be quickly configured for E1 operation using the Presets Function Group button.

The following procedures describe how to set up basic E1 operation using the E1 Processor Preset command. It is assumed that the unit is looped (the transmit and receive ports are connected using a single cable).

1. From the DS1 Transmit or Receive Settings window, select the E1 button in the upper right corner.

   The system switches to E1 mode.

2. Select the Presets button located in the Function Group button row. (The Presets button is also accessible from the Switch Matrix screen.)

   The Presets command box appears.

   NOTE ➤
   The following example does not include the ATM options, which will appear if your unit is licensed for ATM operation. ◄

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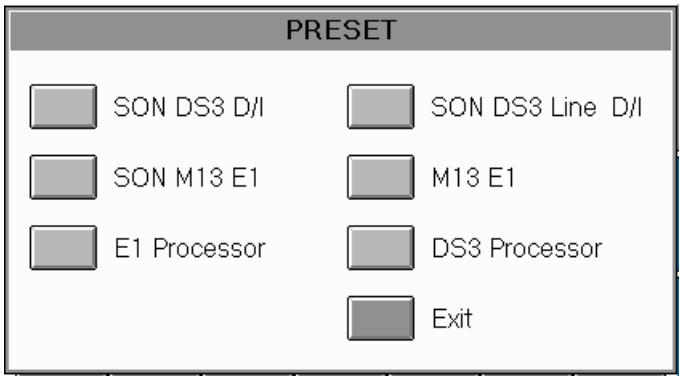


Figure 8-2. Displaying Preset Commands for E1

3. Select the E1 Processor button.

   The message Processing...Please wait displays.

4. Select the E1 protocol processor.

   The E1 protocol processor is selected by selecting the E1 Title Bar (the gray area of the E1 Alarm and Status Indicator area).

   The Transmit Settings commands appear on the screen.

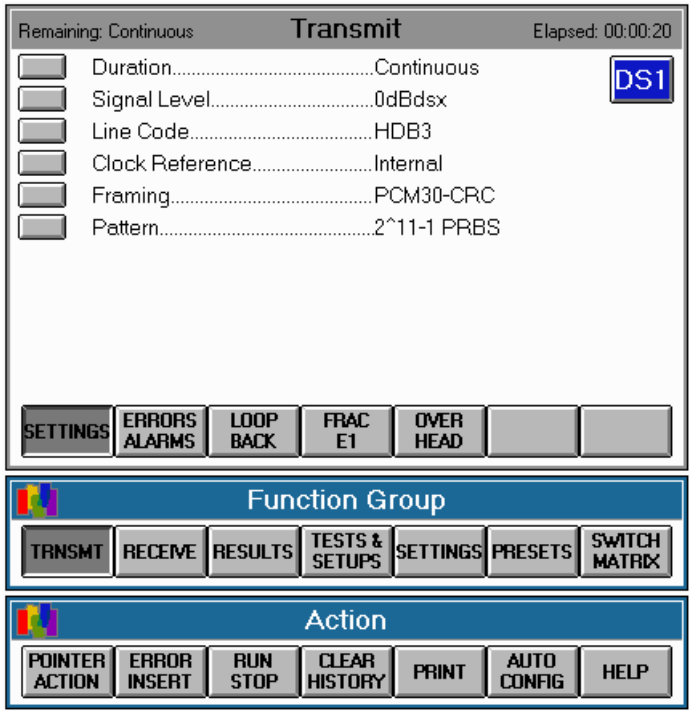


Figure 8-3. E1 Protocol Processor with Transmit Function Menu

5. If necessary, make the appropriate changes to the Transmit E1 Line Interface and E1 protocol processor functions.

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NOTE ➤
The E1 Transmit and Receive functions are coupled, so all settings entered for the Transmit side are automatically set for the Receive side and vice versa. ◄

6. Select the Receive Function Group button.

   The Settings commands (from the Receive Function Group button) display on the screen.

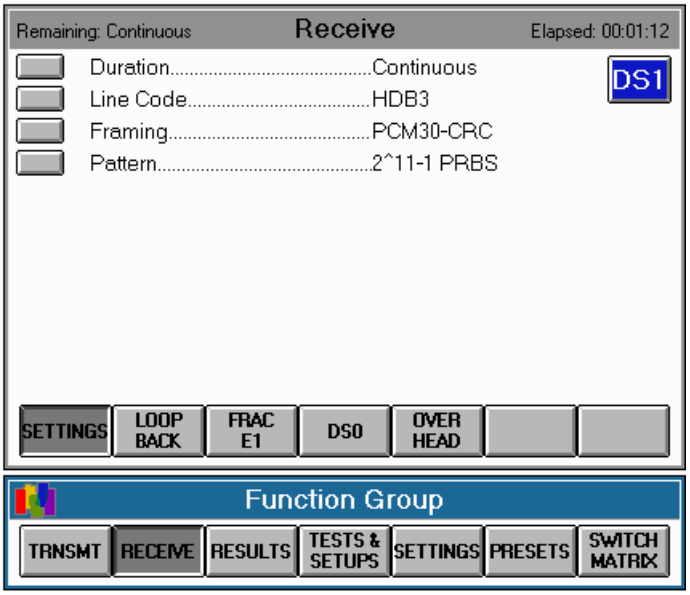


Figure 8-4. E1 Protocol Processor with Receive Function Menu

7. If necessary, make the appropriate changes to the Receive E1 protocol processor functions.

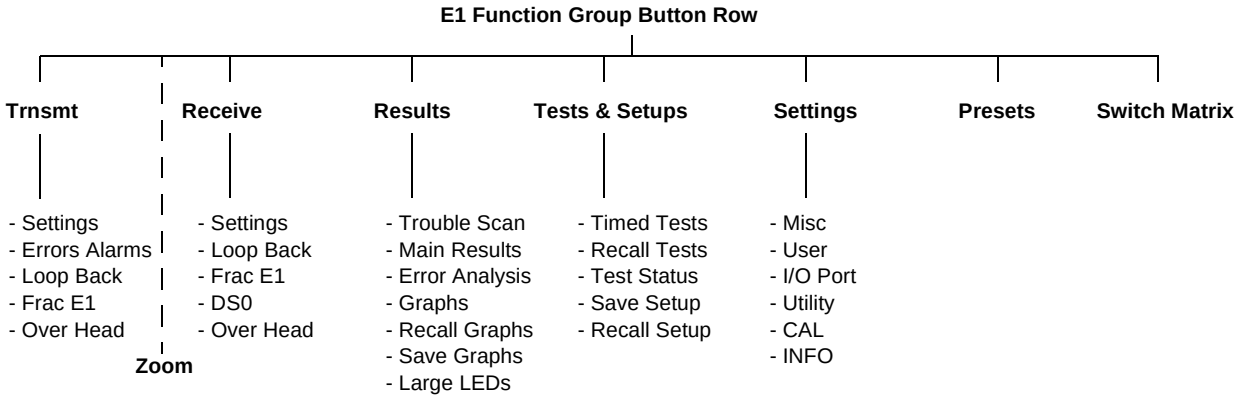
   The E1 protocol processor is now running. The system is now configured for basic E1 testing and monitoring. At this point, you can view results by selecting the Results Function Group button or initiate tests by selecting the Tests & Setup Function Group button.

If your application requires customized configuration, then use Preset menu.

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E1 Protocol Processor Function Group Buttons

The functionality available for the E1 protocol processor appears by selecting any of the following buttons from the Function Group button row.



The remainder of this chapter describes the functions, commands, and options associated with the previously illustrated Function Group buttons.

Trnsmt Function Group

The Trnsmt (Transmit) Function Group button provides a menu for defining the signal parameters used in E1 transmit operations.

The following buttons make up the Transmit Function Group:

- **Settings:** Configures the unit's transmit parameters for your E1 test environment.
- **Errors and Alarms:** Generates errors and alarms on your E1 facility.
- **Loop Back:** Places the ASA 312 into loopback test mode.
- **Frac E1:** Configures the ASA 312 for fractional E1 testing on the Transmit side using a 64K channel rate. This feature is coupled with the E1 Receive Fractional E1 function. Therefore, if you change parameters while in Transmit mode, they will be automatically reflected in Receive mode.
- **Over Head:** Allows you to edit CAS Signaling Bits, Spare Bits, E-Bits, and X-Bits that are transmitted for the E1 protocol processor to determine if the E1 facility can detect problems due to any of these types of overhead errors.

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Settings

The Settings button configures the transmit signal parameters for the E1 Line Interface and the E1 protocol processor to match the E1 signal used in your test environment.

NOTE ➤
The Framing, Pattern, and Line Code commands are automatically coupled between the Transmit and Receive Function Group Buttons. Therefore, any changes made to E1 Framing and Pattern commands from the Transmit Function Group are automatically replicated for the Receive Function Group. ◄

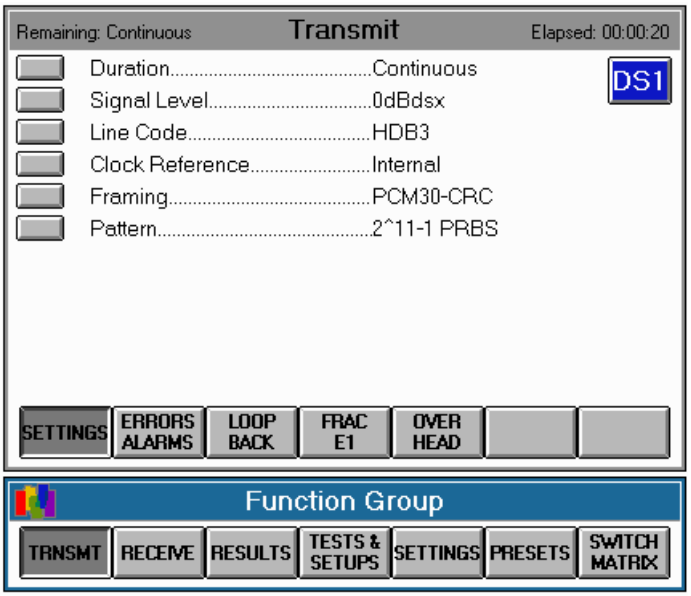


Figure 8-5. Transmit Settings Commands

Duration

Sets the duration of the Transmit test to Continuous, 5 Minutes, 15 Minutes, 1 hour, 2 hours, 24 hours, 72 hours, or a User-Defined amount.

Signal Level

Sets the strength of the E1 transmit signal. The signal level values are relative to a normal E1 signal level. The following options are available:

Option	Description
0 dBdsx	Signal level is at the E1 signal level
-7.5 dBdsx	Signal level is -7.5 dB below the normal E1 signal level
-15 dBdsx	Signal level is -15 dB below the normal E1 signal level

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Line Code

Selects the type of signal coding transmitted by the E1 protocol processor. The following options are available. This function is automatically coupled with the Receive Line Code function. Therefore, if parameters are changed in Transmit mode, they will be reflected in Receive mode as well.

Option	Description
AMI	Alternate Mark Inversion coding
HDB3	High Density Bipolar 3 Zero Substitution coding (Default)

Clock Reference

Determines the timing source for the E1 transmit signal. The following options are available:

Option	Description
Internal	Derives the transmit data's timing source from the system's internal clock.
Looped	Takes the transmit timing source from the clock and applies the timing from the received signal to the Transmit side.

Framing

Configures the framing format used for the E1 transmit signal.

NOTE ➤
The E1 transmit and receive functions are coupled. Any changes made to this command are replicated to the E1 receive signal. The Receive Frame command is mentioned later in this chapter. ◄

The following options are available:

Option	Description
Unframed	Configures the system to transmit an E1 signal using an unframed format.
PCM30	Configures the system to transmit an E1 signal using a frame that has Frame Alignment Signal (FAS) byte in Time Slot (TS) 0, Channel Associated Signaling (CAS) in TS16, and 30 data channels.
PCM30 CRC	Configures the system to transmit an E1 signal using a frame that has FAS byte in TS0 with the CRC bits set to perform a CRC-4 check, CAS in TS16, and 30 data channels.
PCM31	Configures the system to transmit an E1 signal a frame that has FAS byte in TSO, plus 31 data channels. Does not include CAS or CRC.
PCM31 CRC	Configures the system to transmit an E1 signal using a frame that has FAS byte in TS0 with the CRC bits set to perform a CRC-4 check, plus 31 data channels. Does not include CAS.

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Pattern

Selects the type of E1 signal pattern that is transmitted by the system.

The following patterns are available for the E1 transmit signal:

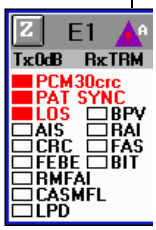
E1 Pattern	Description
2^6-1 PRBS	Transmits a maximum of 5 consecutive zeros and 6 consecutive ones.
2^6-1 INV PRBS	Transmits an inverted 2^6-1 PRBS, which takes the 2^6-1 PRBS, inverts it, and transmits a maximum of 6 consecutive zeros and 5 consecutive ones.
2^9-1 PRBS	Transmits a maximum of 8 consecutive zeros and 9 consecutive ones.
2^9-1 INV PRBS	Transmits an inverted 2^9-1 PRBS, which takes the 2^9-1 PRBS, inverts it, and transmits a maximum of 9 consecutive zeros and 8 consecutive ones.
2^11-1 PRBS	Transmits a maximum of 10 consecutive zeros and 11 consecutive ones.
2^11-1 INV PRBS	Transmits an inverted 2^11-1 PRBS, which takes the 2^11-1 PRBS, inverts it, and transmits a maximum of 10 consecutive zeros and 11 consecutive ones.
2^15-1 PRBS	Transmits a maximum of 14 consecutive zeros and 15 consecutive ones.
2^15-1 INV PRBS	Transmits an inverted 2^15-1 PRBS, which takes the 2^15-1 PRBS, inverts it, and transmits a maximum of 15 consecutive zeros and 14 consecutive ones.
2^20-1 PRBS	Transmits a maximum of 19 sequential zeros and 20 sequential ones.
2^20-1 INV PRBS	Transmits an inverted 2^20-1 PRBS, which takes the 2^20-1 PRBS, inverts it, and transmits a maximum of 20 consecutive zeros and 19 consecutive ones.
2^23-1 PRBS	Transmits a maximum of 22 sequential zeros and 23 sequential ones.
2^23-1 INV PRBS	Transmits an inverted 2^23-1 PRBS, which takes the 2^23-1 PRBS, inverts it, and transmits a maximum of 23 consecutive zeros and 22 consecutive ones.
User Defined	Allows you to enter and save a 3- to 24-bit customized pattern.

Errors and Alarms

The Errors and Alarms button allows you to select the type of errors and alarms transmitted by the E1 protocol processor.

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The Error and Alarm Icon appears for the duration of any E1 Error or Alarm that you generate.
However, it does not appear if you insert errors using the Error Insert Action button.



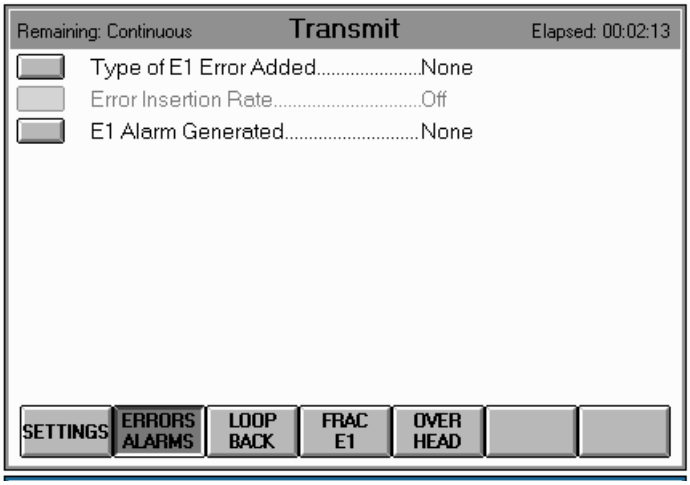


Figure 8-6. E1 Transmit Errors and Alarms Commands

The following describes the commands and options associated with this button.

Type of E1 Error Added

Determines the type of error that is transmitted by the E1 protocol processor. Often, these errors are used by the receiving equipment to determine if a transmission error has occurred.

The following options are available:

NOTE ➤
Use the Error Insert Action button to inject single errors into the E1 transmit signal. When this occurs, the appropriate error LED flashes red, and the error is recorded by various functions in the Results Function Group button. ◄

Option	Description
None	Turns off E1 error insertion.
Bit Error	Transmits a bit error which results in a frame synchronization bit error event. This also inserts a frame bit error in the received frame bit pattern.

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Option	Description
BPV Error	Transmits Bipolar Violation errors which result in a line code violation event for an AMI-coded signal, the occurrence of received excessive zeros, or a bipolar violation. A line code violation event for a HDB3-coded signal is the occurrence of a received excess zeros or a bipolar violation that is not part of a zero substitution code. **Note: The ASA 312 will not corrupt HDB3-encoded payloads.** It does not touch the coding of four zeroes by BPV insertions. BPVs are not inserted in time slot 0 in any of the framed modes or in time slot 16 when PCM30 or PCMCRC30 is being used. The ASA 312 will detect BPVs across all time slots and detect bit errors if HDB3 encoding has been corrupted by improper insertion of BPVs. It will also detect framing, CRC, and FEBE errors caused by improper BPV insertion.
Frame Error	Results in a severely errored framing event, which occurs when two or more framing bit pattern errors within a 3-ms period. This type of error is not available if the E1 protocol processor is configured for Unframed framing format.
CRC Error	Results in a CRC error event, which occurs when a received CRC code that is not identical to the corresponding locally calculated code. This option is available only when the E1 protocol processor is configured for CRC framing format.
FEBE Error	Results in a Far End Block Error, which occurs when a bit error has been detected at the Physical layer of the far end of the link. This option is available only when the E1 protocol processor is configured for CRC framing format.

Error Insertion Rate

Sets the insertion rate for E1 transmit errors.

NOTE ➤
This command is not available if the Type of E1 Error Added command is set to None. ➤

The following options are available for this command.

Option	Description
Off	No errors are inserted for transmission. (The value displayed for this command is None.) This command effectively disables the Error Insert Action button.

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Option	Description
1e-X, where X is a value from 3 through 7	For BIT, BPV, Frame, and CRC errors, error rates range from 1e-3 through 1e-7.
User Defined	Allows you to enter and save a customized error insertion rate. The following ranges are available: ■ Bit Error: 1e-3 to 1e-7 ■ BPV Error: 1e-3 to 1e-7 ■ Frame Error: 1e-3 to 1e-7 ■ CRC Error: 1e-3 to 1e-7 ■ FEBE Error: 1e-3 to 1e-7

E1 Alarm Generated

Generates a specific type of alarm on the transmit side of the E1 protocol processor.

Option	Description
Off	No alarms generated. (The value displayed for this command is None.)
AIS	Generates an Alarm Indication Signal for the transmit E1 Signal.
RAI (Yellow)	Generates a Yellow alarm for the transmit E1 signal.
LOF	Generates a Loss of Frame alarm for the transmit E1 signal.
LOS	Generates a Loss of Signal alarm for the transmit E1 signal.
RMFAI	Generates a Remote Multiframe Alarm Indication alarm for the transmit E1 signal.
CASMFL	Generates a Channel Associated Signaling Multiframe Loss for the transmit E1 signal. Indicates the four zeros at the start of Time Slot 16 in frame 0 cannot be found.

Loopback

Selects the type of loopback code transmitted.

Loopback Type

The options for Loop Back Type include the following.

Option	Description
Line	Transmits the entire received signal using the recovered clock.
Payload	Transmits the received payload in a frame formatted by the transmitter using either the internal or recovered clock.
Off	The Loop Back function is not active.

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Frac E1

This function configures the ASA 312 for fractional E1 testing using a 64K channel rate. Using this function, you can bulk fill 0 to 31 DS0's in an E1 Transmit signal with a pattern. Additionally, you can specify the eight-bit pattern in background DS0's. This function is coupled with Receive mode. Therefore, any changes made while in Transmit mode are reflected in Receive mode as well.

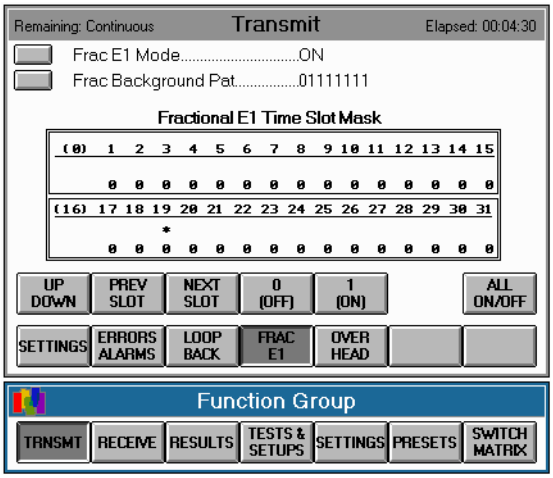


Figure 8-7. E1 Transmit Frac E1 Screen

The following describes the commands and options associated with this button.

Frac E1 Mode Enables or disables Fractional E1 mode by selecting ON or OFF.

Frac Background Pat Allows you to select a fractional background pattern specified by a mask to transmit to the E1. Use the left and right arrow buttons to move the cursor the necessary position in the pattern. Use the 1 and 0 buttons to specify the pattern you wish to initiate. When you are done, select CONFIRM.

Up Down Use the Up Down button to move the cursor from the top to the bottom of the Fractional E1 Time Slot Mask table and vice versa.

Prev Slot Use the Prev Slot button to select the previous time slot in the Fractional E1 Time Slot Mask table.

Next Slot Use the Next Slot button to select the next time slot in the Fractional E1 Time Slot Mask table.

0 (Off) Use the 0 (OFF) button to disable the selected time slot.

1 (On) Use the 1 (ON) button to enable the selected time slot.

All On/Off Use the ALL ON/OFF button to enable or disable all the time slots in the Fractional E1 Time Slot Mask table. This button is toggable.

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Over Head

This function allows you to edit Channel Associated Signalling (CAS) Bits, Spare Bits, E-Bits, and X-Bits that are transmitted for an E1 to determine if the E1 Transmit facility can detect problems due to any of these types of overhead errors.

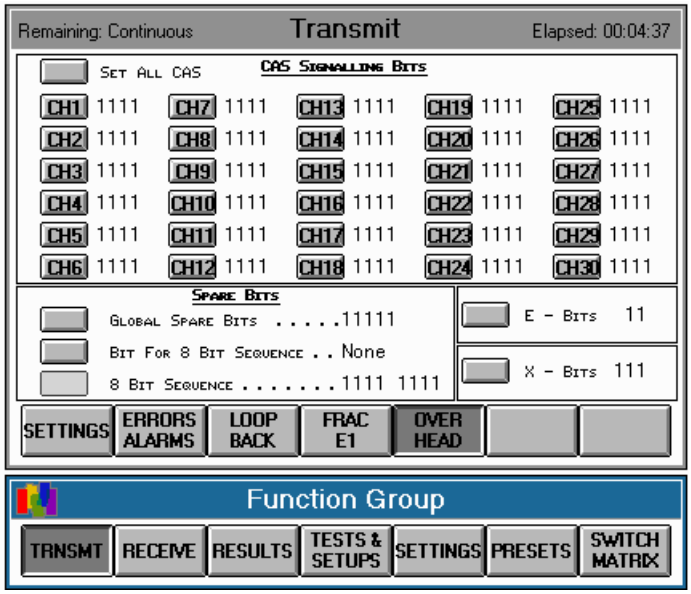


Figure 8-8. E1 Transmit Overhead Screen

The following describes the commands and options associated with this button.

Set All CAS Allows you to set all E1 Channel Associated Signalling bits to a specific user-defined pattern. Use the right and left arrow keys to move the cursor to the appropriate location in the pattern. In the User Pattern table, msb refers the Most Significant Bit, and lsb refers to the Least Significant Bit. Use the 0 and 1 buttons to define the pattern. Select Confirm to accept the pattern.

CH1 through CH30 Allows you to select and edit a CAS channel from 1 to 30. Use the right and left arrow keys to move the cursor to the appropriate location in the pattern. In the User Pattern table, msb refers the Most Significant Bit, and lsb refers to the Least Significant Bit. Use the 0 and 1 buttons to define the pattern. Select Confirm to accept the pattern.

Global Spare Bits Allows you to select and edit up to five spare bits and implement a pattern globally.

Bit For 8 Bit Sequence Allows you to select a specific spare bit (4 through 8) of an eight-bit sequence. Select None to specify no bits.

8 Bit Sequence Allows you to select a user pattern for an E1 spare overhead bit. Use the right and left arrow keys to move the cursor to the appropriate location in the pattern. In the User Pattern table, msb refers the Most Significant Bit, and lsb refers to the Least Significant Bit. Use the 0 and 1 buttons to define the pattern. Select Confirm to accept the pattern.

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E-Bits

Allows you to select and edit an E Bit up to two bits (value = 00). Use the right and left arrow keys to move the cursor to the appropriate location in the pattern. In the User Pattern table, msb refers the Most Significant Bit, and lsb refers to the Least Significant Bit. Use the 0 and 1 buttons to define the pattern. Select Confirm to accept the pattern.

X-Bits

Allows you to select and edit an X-Bit up to three bits (value = 000). Use the right and left arrow keys to move the cursor to the appropriate location in the pattern. In the User Pattern table, msb refers the Most Significant Bit, and lsb refers to the Least Significant Bit. Use the 0 and 1 buttons to define the pattern. Select Confirm to accept the pattern.

Zoom

The E1 Zoom function provides quick access to specific E1 commands, errors, alarms, and LEDs. When the E1 Zoom function is activated, the screen changes as illustrated in the following figure.

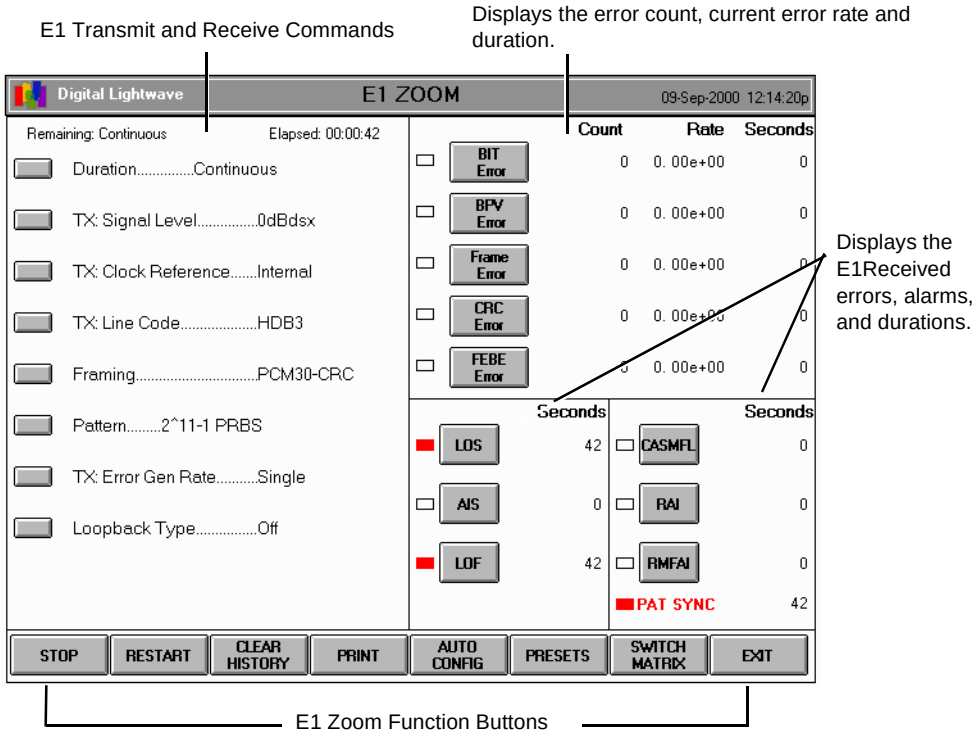


Figure 8-9. E1 Zoom Touch Screen Display

The following describes the sections of the E1 Zoom touch screen's display.

Zoom Transmit and Receive Commands

The Zoom Transmit and Receive commands provide fast access to key E1 commands for configuration and setup of the E1 protocol processor.

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Function	Description
Remaining	Indicates how much time remains in a timed test. If a test is untimed and running, displays “Continuous.” If a test is stopped, displays “Stopped.”
Elapsed	Indicates how long the E1 protocol processor has been running. The timer is stopped by selecting the Stop function button. It resets to 00:00:00 and restarts when the Restart button is selected.
Duration	Sets the E1 processor runtime. Available options are: Continuous (if the test is untimed), 5 minutes, 15 minutes, 1 hour, 2 hours, 24 hours, 72 hours, User Defined.
TX: Signal Level	Sets the strength of the E1 transmit signal. Available options are: 0 dBdsx, -7.5 dBdsx, -15 dBdsx.
TX: Clock Reference	Sets the timing source for the E1 transmit signal. Available options are: Internal and Looped.
TX: Line Code	Sets the signal coding transmitted and received by the E1 protocol processor. Available options are: AMI, and HDB3.
Framing	Sets the framing format for the E1 signal. Available options are: Unframed, PCM30, PCM31 CRC, PCM31, and PCM31 CRC.
Pattern	Sets the pattern for the E1 transmit and receive signals. Available options are: 2^6-1 PRBS, 2^6 INV PRBS, 2^9-1 PRBS, 2^9-1 INV PRBS, 2^11-1 PRBS, 2^11-1 PRBS, 2^15-1 PRBS, 2^15 INV PRBS, 2^20-1 PRBS, 2^20-1 INV PRBS, 2^23-1 PRBS, 2^23 INV PRBS, User Defined, LIVE.
TX: Error Gen Rate	Sets the insertion rate of the E1 transmit errors. Available options are: Single, 1e-3, 1e-4, 1e-5, 1e-6, 1e-7, and User Defined.
Loopback Type	Enables Loopback mode and sets the Loopback type. Available options are: Line, Payload, and Off.

Zoom E1 Errors

This section of the E1 Zoom touch screen allows you to start and stop the transmission of E1 errors. In addition, it also displays statistics such as the number of errors (Counts), the current error insertion rate (Rate), and the duration of the error (Seconds). These statistics typically appear on the screen when using functions located under the Results Function group button.

When errors are transmitted using the E1 Zoom touch screen, the following occurs:

- The selected error button is selected (dark gray)
- The associated LED flashes to indicate that errors are being received. The LED’s frequency is dependent on the Error Generation Rate value.

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- The Count column indicates the number of errors received
- The Rate column indicates the insertion rate of errors received
- The Seconds column indicates the duration of received errors

The following E1 errors are available from the E1 Zoom touch screen: .

Function	Description
BIT Error	Starts and stops the transmission of bit errors when the TX:Error Gen Rate command is set to a value other than Single.
BPV Error	Starts and stops the transmission of Bipolar Violation errors when the TX:Error Gen Rate command is set to a value other than Single.
Frame Error	Starts and stops the transmission of Severely Errored Frames when the TX:Error Gen Rate command is set to a value other than Single. This type of error is disabled if the Framing command is set to Unframed.
CRC Error	Starts and stops the transmission of CRC errors when the TX:Error Gen Rate command is set to a value other than Single. This command is disabled if the Framing command is set to Unframed, PCM30, or PCM31. It is available only with CRC framing.
FEBE Error	Starts and stops the transmission of FEBE errors when the TX:Error Gen Rate command is set to a value other than Single. This function is disabled when Unframed, PCM31, and PCM31 is selected. It is available only with CRC framing.

Zoom E1 Alarms

This section of the E1 Zoom touch screen starts and stops the transmission of E1 alarms.

When alarms are transmitted using the E1 Zoom touch screen, the following occurs:

- The selected alarm button is selected (dark gray)
- The associated LED flashes to indicate that alarms are being received
- The Seconds column indicates the duration of received alarms

The following E1 alarms are available from the E1 Zoom touch screen:

Function	Description
LOS	Starts and stops an LOS alarm (Loss of Signal) on the transmitted E1 signal. This alarm is disabled in some scenarios.
AIS	Starts and stops an AIS alarm (Alarm Indication Signal – also known as a Blue alarm) on the transmitted E1 signal. This alarm is disabled in some scenarios.
LOF	Starts and stops an LOF alarm (Loss of Frame) on the transmitted E1 signal.

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Function	Description
CASMFL	Starts and stops a CASMFL alarm (Channel Associated Signalling Multiframe Loss) on the transmitted E1 signal.
RAI	Starts and stops an RAI alarm (Remote Alarm Indication) on the transmitted E1 signal.
RMFAI	Starts and stops an RMFAI (Remote Multiframe Alarm Indication on the transmitted E1 signal.

Zoom E1 LEDs

This section of the E1 Zoom touch screen provides a visual status of transmit and receive E1 activity and E1 errors and alarms. E1 activity cannot be generated from this section of the touch screen.

Use the following to determine the type of activity and behavior represented by the E1 LEDs and Indicators:

If an E1 LED and Indicator is ...	Then it indicates.
Green (LED only)	Normal operation (The LED is acting as a status indicator.)
Clear LED with black text	Normal operation; there is no history of an error or alarm. (The LED and text are acting as an Error/Alarm indicator.)
Red LED with red text	An error or alarm is in progress
Clear LED with red text	An error or alarm was detected, but is no longer in progress

The Seconds column reports the duration of the associated LED activity.

E1 Zoom Function Buttons

The E1 Zoom touch screen contains several Function Buttons that control E1 protocol processor activity.

The following describes these buttons:

Function Button	Description
Stop	Stops all E1 Zoom activity. All error, alarm, and elapsed time counters stop and indicate the current count.
Restart	Clears all alarms and errors; resets all counters to 0. If error or alarm activity is present, then the transmission and reception of these events continues.
Clear History	Resets recorded history of the E1 Zoom LEDs and Indicators.
Print	The Print button allows a variety of E1 alarm and error results, reports, and logs to be printed to the attached printer.
Auto Config	Configures the E1 protocol processor to match the parameters of the incoming E1 signal.

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Function Button	Description
Presets	Allows the E1 protocol processor to be quickly configured for E1 specific mappings and operation. The following Presets are available: SON M13 E1, M13 E1, and E1 Processor.
Switch Matrix	Displays a graphical interface of the system's current mappings and connections.
Exit	Closes the E1 Zoom function and returns the screen to normal operation.

Receive Function Group

The Receive Function Group button provides settings for the signal parameters used in the E1 protocol processor receive operations. These commands configure the system for the expected receive signal.

NOTE ➤
For the E1 protocol processor, many of the settings are replicated from the Transmit settings since the Transmit and Receive E1 functions are automatically coupled. ➤

The following buttons make up the Receive Function Group:

- **Settings:** Configures the unit's receive parameters for your E1 test environment.
- **Loop Back:** Places the ASA 312 into loopback test mode.
- **Frac E1:** Configures the ASA 312 for fractional E1 testing on the Receive side using a 64K channel rate. This function is coupled with Transmit mode. Therefore, any changes made in Receive mode will automatically be reflected in Transmit mode.
- **DS0:** Allows you to test and analyze a DS0 channel and listen to it on speaker. You are able to select individual DS0 time slots 1 through 31.
- **Over Head:** Allows you to monitor CAS Signaling Bits, Spare Bits, E-Bits, and X-Bits that are received by the E1 protocol processor.

The following describes these functions and their associated commands.

Settings

The Settings button determines how the E1 interface and processor parameters are configured.

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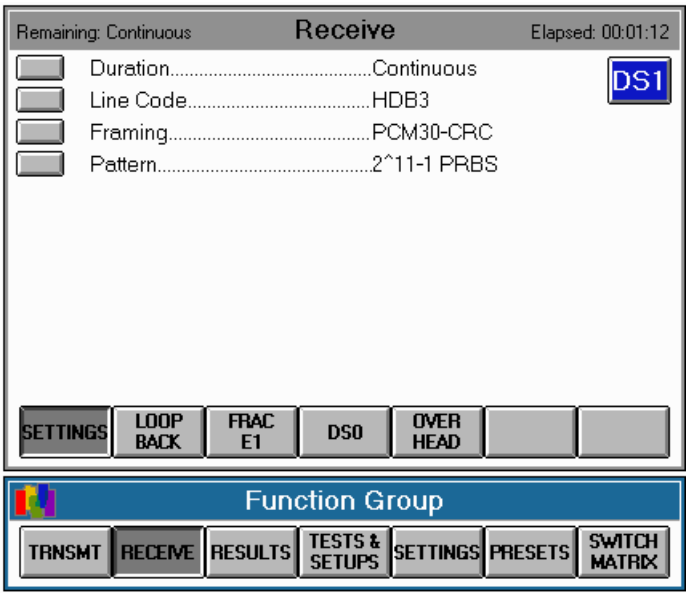


Figure 8-10. E1 Receive Settings Commands

Duration

Sets the duration of the Receive test to Continuous, 5 Minutes, 15 Minutes, 1 hour, 2 hours, 24 hours, 72 hours, or a User-Defined amount.

Line Code

Selects the type of signal coding received by the E1 protocol processor. The following options are available. This function is automatically coupled with Transmit mode. Therefore, any changes made in Receive mode will be reflected in Transmit mode as well.

Option	Description
AMI	Alternate Mark Inversion coding
HDB3	High Density Bipolar 3 Zero Substitution coding (Default)

Framing

The Receive Framing command is automatically coupled to the Transmit Framing command described earlier in this chapter. Therefore, any changes made to the Framing command using the Receive Function Group button are copied to the Framing command found under the Transmit Functions Group button.

For a description of Framing command options, refer to the Framing command section described earlier in this chapter.

Pattern

Selects the type of E1 receive signal pattern. The Receive Pattern command is automatically coupled to the Transmit Pattern command described earlier in this chapter. Therefore any changes made to the Pattern command using the Receive Function Group button are replicated to the Pattern command found under the Transmit Functions Group button.

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The only exception is the Live option. For a description of the other Pattern options available, refer to the Pattern command section described earlier in this chapter.

Option	Description
Live	Uses live data traffic; no pattern. This is used primarily for monitoring errors and alarms within a live data stream. When selected, Pattern Sync and bit errors are not monitored.

Loop Back

The Receive Loop Back is automatically coupled to the Transmit Loop Back described earlier in this chapter. Therefore, any changes made to the Loop Back command using the Receive Function Group button are replicated to the Loop Back functions found under the Transmit Functions Group button. For a description of the Loop Back operation, refer to the Loop Back section described earlier in this chapter.

Frac E1

This function configures the ASA 312 for fractional E1 testing using a 64K channel rate. Using this function, you can verify a pattern in 0 to 31 DS0's in an E1 Receive signal. Additionally, you can specify the eight-bit pattern in background DS0's. This function is coupled with the Transmit Fractional E1 feature. Therefore, if this feature is modified while in Receive mode, it will automatically be reflected on the Transmit side as well.

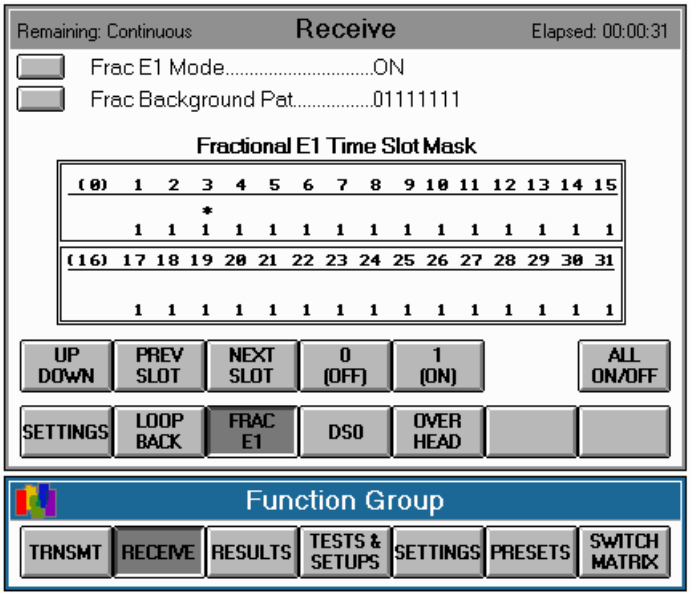


Figure 8-11. E1 Receive Frac E1 Screen

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The following commands and buttons are associated with this function.

Frac E1 Mode Enables or disables Fractional E1 mode by selecting ON or OFF.

Frac Background Pat Allows you to select a fractional background pattern specified by a mask to be received by the E1. Use the left and right arrow buttons to move the cursor the necessary position in the pattern. Use the 1 and 0 buttons to specify the pattern you wish to initiate. When you are done, select CONFIRM.

Up Down Use the Up Down button to move the cursor from the top to the bottom of the Fractional E1 Time Slot Mask table and vice versa.

Prev Slot Use the Prev Slot button to select the previous time slot in the Fractional E1 Time Slot Mask table.

Next Slot Use the Next Slot button to select the next time slot in the Fractional E1 Time Slot Mask table.

0 (Off) Use the 0 (OFF) button to disable the selected time slot.

1 (On) Use the 1 (ON) button to enable the selected time slot.

All On/Off Use the ALL ON/OFF button to enable or disable all the time slots in the Fractional E1 Time Slot Mask table. This button is toggable.

DSO

This function allows you to test and analyze a DS0 channel and listen to it on speaker. You are able to select individual DS0 channels 1 through 31.

NOTE ➤
The Speaker function is only available for use with the ASA 312.◄

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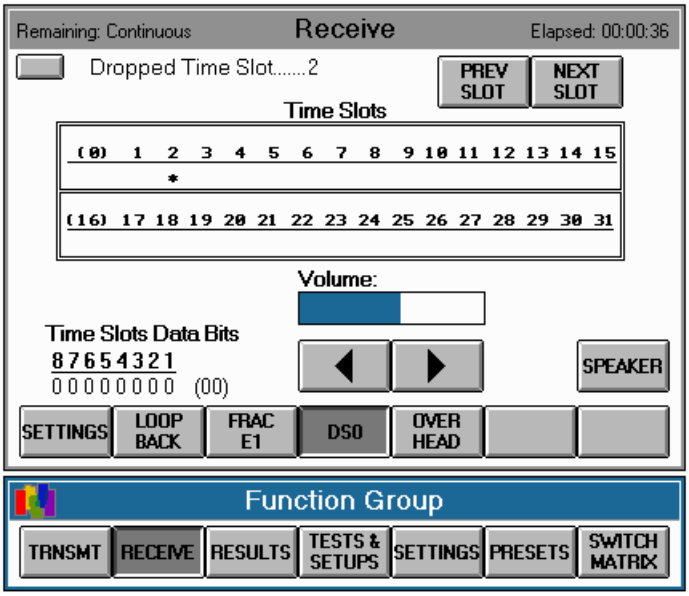


Figure 8-12. E1 Receive DS0 Screen

The following commands and buttons are associated with this function.

Dropped Time Slot Allows you to specify a DS0 time slot (1 through 31) that is dropped from the E1 signal.

Prev Slot Select the Prev Slot button to select the previous time slot in the Time Slots table.

Next Slot Select the Next Slot button to select the next time slot in the Time Slots table.

Volume Decrease/ Increase button Selecting the Volume Decrease and Increase buttons will decrease and increase the speaker volume.

Speaker Selecting the speaker button will enable the speaker. This button is toggable, so reselecting the speaker will disable it.

Over Head

This function displays the Overhead bits for a specific Channel Associated Signalling (CAS) bytes, spare bits, E-Bits, and X-Bits on the incoming E1 signal. This is a read-only function.

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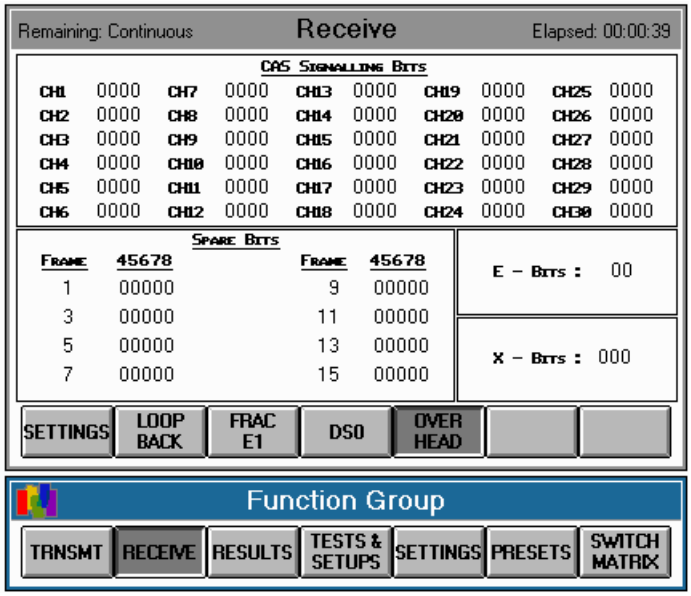


Figure 8-13. E1 Receive Over Head Screen

Results Function Group

The Results Function Group button allows you to view E1 error and alarm analysis and create a history of these events by graphing the information.

The following buttons make up the Results Function Group:

- **Trouble Scan:** Provides a quick report of detected errors and alarms and lists the duration of these events.
- **Main Results:** Provides detailed results for errors and alarms detected by the Trouble Scan function.
- **Error Analysis:** Reports percentage and error count, and analyzes per ITU G.821 and G.826.
- **Graphs:** Displays alarm and error results as graphs.
- **Recall Graphs:** Retrieves previously saved graphed data.
- **Save Graphs:** Saves graphed data.
- **Large LEDs:** Displays LED errors and alarms in a large format on the screen.

The following section describes the functions associated with the Results Function Group button.

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Trouble Scan

The Trouble Scan function provides a list of received errors and alarms for the E1 protocol processor. The duration or count of each event also appears. This function is effective in identifying a general area to investigate when an error or alarm is detected.

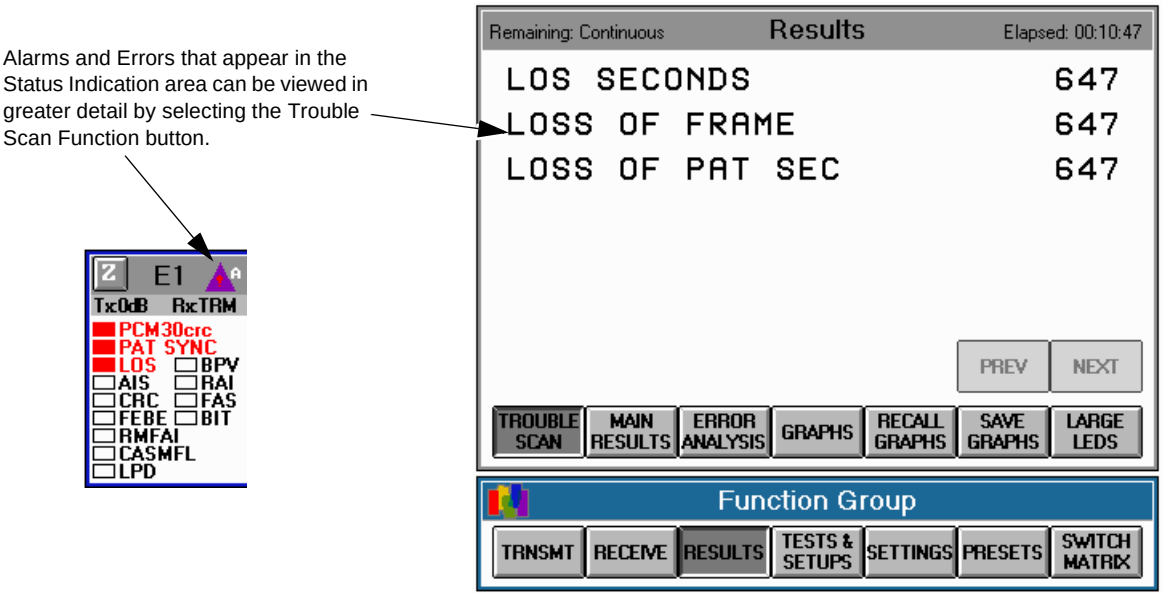


Figure 8-14. Trouble Scan Function Button

The following is a list of the E1 Trouble Scan messages:

Event	Description
No Trouble	No errors or alarms are detected
AIS Seconds	Reports the duration of an AIS alarm
BIT Errors	Reports the number of BIT errors detected.
BPV Errors	Reports the number of Bi-polar violations that occur.
CRC Errors	Reports the number of CRC errors detected.
Loss of Frame Seconds	Reports the number of seconds a Loss of Frame event occurred.
Loss of Pattern Seconds	Reports the number of seconds a Loss of Pattern event occurred.
Loss of Signal Seconds	Reports the number of seconds a Loss of Signal event occurred.
RAI Seconds	Reports the number of seconds a Yellow alarm event occurred.
RMFAI Seconds	Reports the number of seconds a Remote Multiframe Alarm Indication occurred.

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Event	Description
CASMFL Seconds	Reports the number of seconds a Channel Associated Signaling Multiframe Loss occurred.
Frame Errors	Reports the number of frame errors that occurred.
FEBE Errors	Reports the number of Far End Block Errors that occurred.

Main Results

The Main Results button displays detailed results for E1 errors and alarms identified by the Trouble Scan function.

An error and alarm results report can be created and printed by selecting the Print action button and then selecting the Results print option. For more information, refer to the Print section of chapter 11.

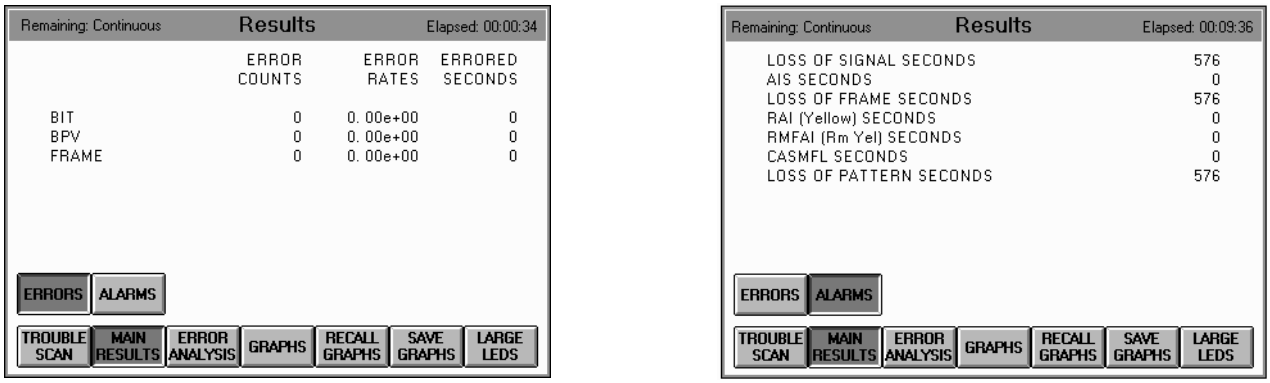


Figure 8-15. E1 Errors and E1 Alarms

Errors

This button displays the number of errors detected, the error rate measurement, and the total number of seconds that the errors were received. The errors reported are generated by the E1 network or intentionally by the system using the Error Insert Action button.

The following E1 errors are reported.

- BIT
- BPV
- Frame
- CRC
- FEBE

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Alarms

Displays how long E1 alarms were detected by the system. Results for the following alarms display.

- Loss of Signal Seconds
- Loss of Frame Seconds
- RM FAI (RM Yellow) Seconds
- Loss of Pattern Seconds
- AIS Seconds
- RAI (Yellow) Seconds
- CASMFL Seconds

Error Analysis

This button allows you to view in greater detail the detected and logged E1 errors using percentage and count values. The following briefly describes the different results available for the E1 Error Analysis button

BIT Analysis

This provides a detailed breakdown for BIT errors detected and logged by the E1 protocol processor.

NOTE ➤
This function is not available for use when a Receive Live pattern is selected.◄

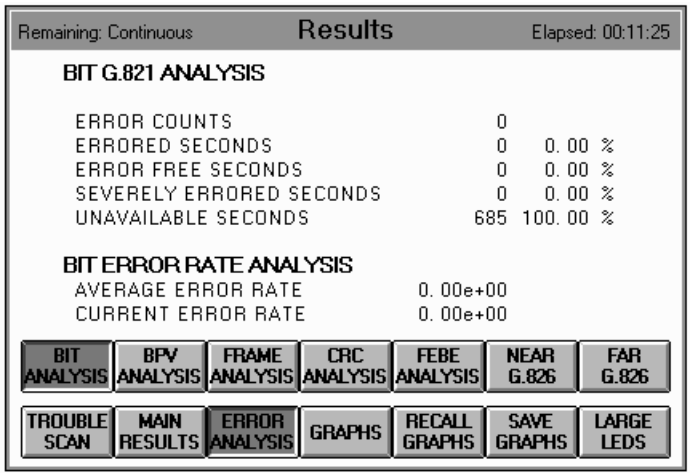


Figure 8-16. E1 Bit Analysis Report

BPV Analysis

This provides a detailed breakdown for BPV errors detected and logged by the E1 protocol processor.

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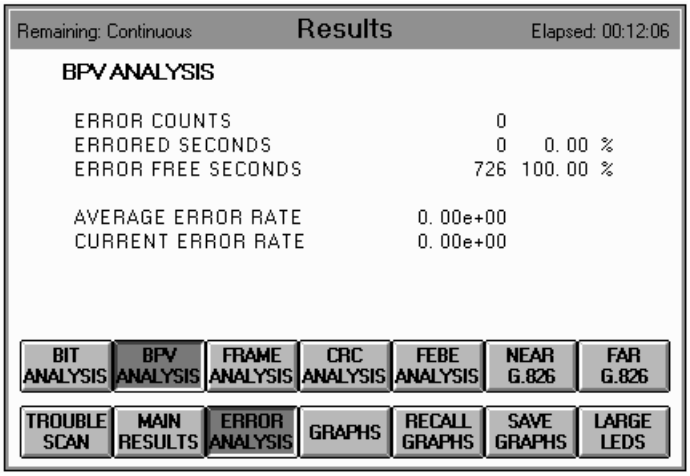


Figure 8-17. E1 BPV Analysis Report

Frame Analysis

This provides a detailed breakdown for Frame errors detected and logged by the E1 protocol processor.

NOTE ➤
This feature is not available when Unframed is selected under the Transmit Framing option. ◄

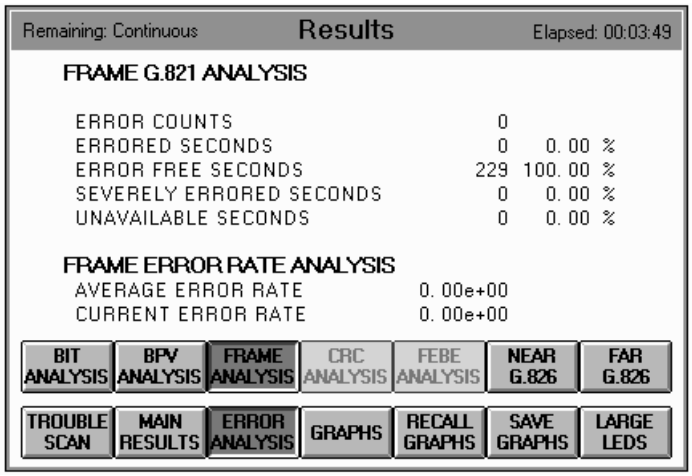


Figure 8-18. E1 Frame Analysis Report

CRC Analysis

This provides a detailed breakdown for CRC errors detected and logged by the E1 protocol processor.

NOTE ➤
This feature is only available when CRC is selected under the Transmit Framing option. ◄

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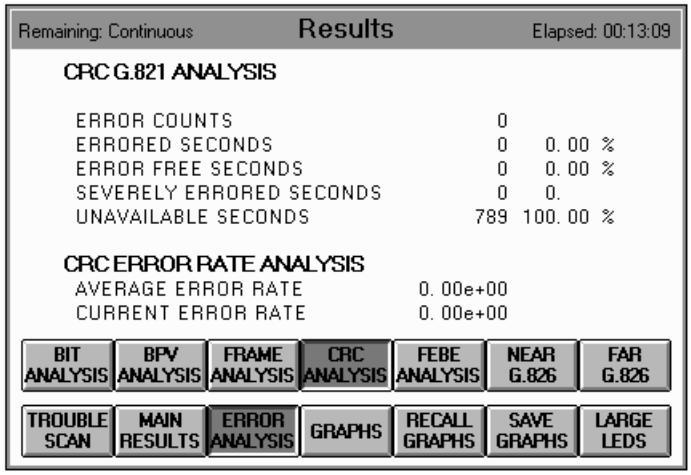


Figure 8-19. E1 CRC Analysis Report

FEBE Analysis

This provides a detailed breakdown for FEBE errors detected and logged by the E1 protocol processor.

NOTE ➤
This feature is only available when CRC is selected under the Transmit Framing option.◄

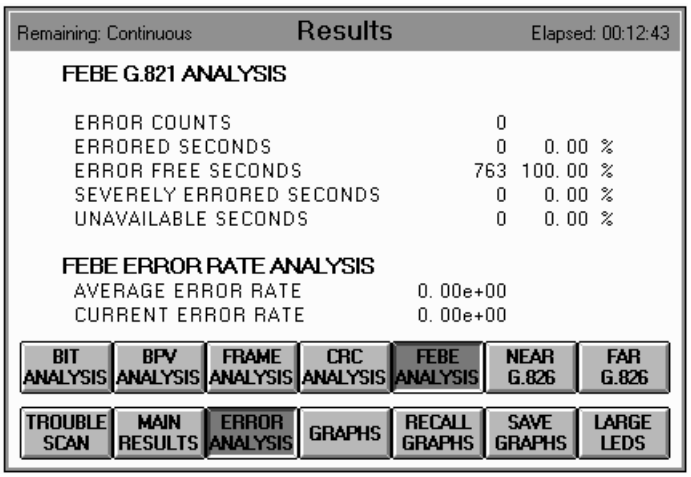


Figure 8-20. E1 FEBE Analysis Report

Near G.826

This function displays a breakdown of G.826 Near Analysis results. This includes the following information:

- Errored Blocks count (only displayed if a CRC is available)
- Background Block Error (BBE) count and percentage (only displayed if a CRC is available)
- Errored Seconds count and percentage

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- Error Free Seconds count and percentage
- Severely Errored Seconds count and percentage
- Unavailable Seconds count and percentage

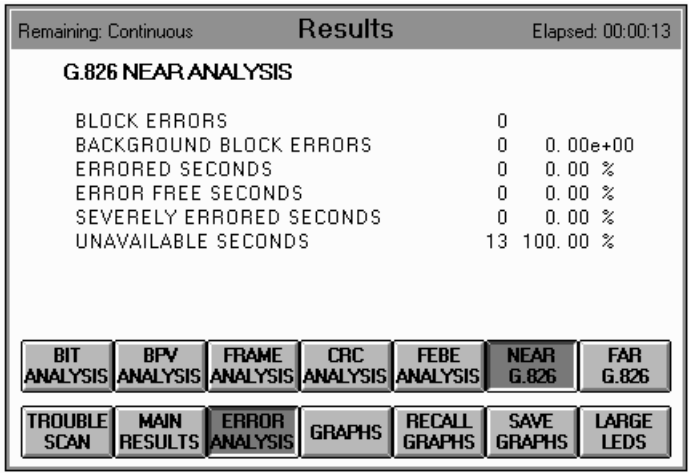


Figure 8-21. E1 G.826 Near Analysis Report

Far G.826

This function displays a breakdown of G.826 Far Analysis results. This includes the following information:

- Errored Blocks count (only displayed if a CRC is available)
- Background Block Error (BBE) count and percentage (only displayed if a CRC is available)
- Errored Seconds count and percentage
- Error Free Seconds count and percentage
- Severely Errored Seconds count and percentage
- Unavailable Seconds count and percentage

NOTE ➤
The G.826 Far Analysis function is disabled if Unframed is selected under the Transmit Settings Framing option.◄

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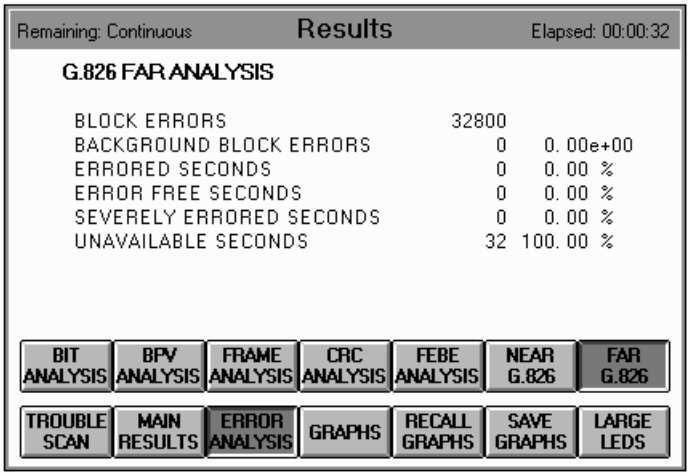


Figure 8-22. E1 G.826 Far Analysis Report

Graphs

Use the Graphs button to view error and alarm results for the E1 protocol processor. These graphs show the test history for either the current test or the previous test. You can configure the graph function to display any combination of E1 Alarms and Errors.

To save graph results, press the Save Graphs button. Refer to the Save Graphs button that is described later in this chapter.

To recall saved graphs, press the Recall Graphs button. Refer to the Recall Graphs button that is described later in this chapter.

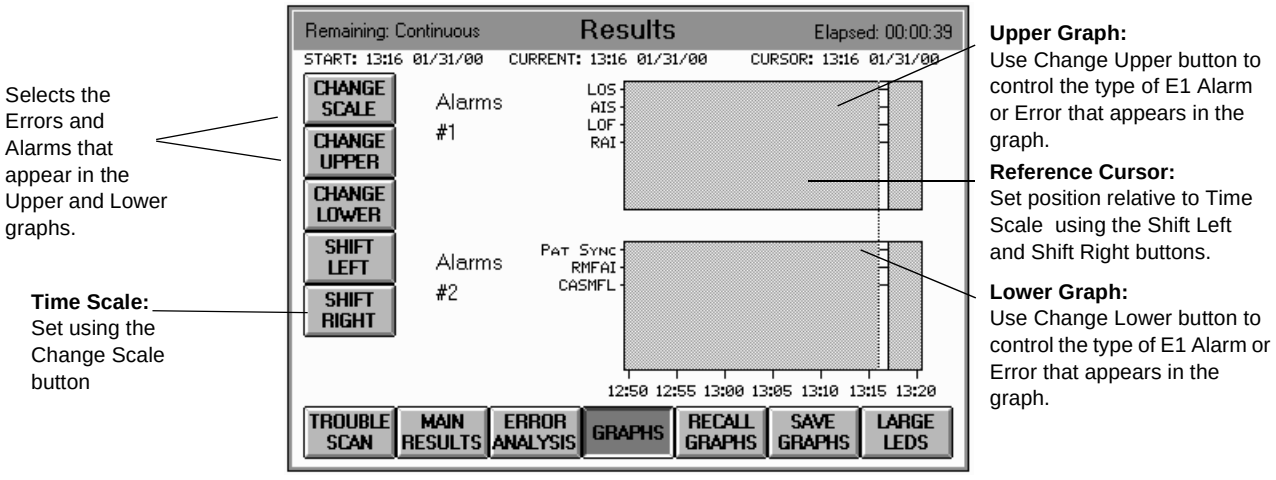


Figure 8-23. E1 Graphs Function Menu

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Change Scale

Compresses or expands the displayed time scale for the graphed errors and/or alarms.

The following values are available for this function:

Option	Description
30 minute	Sets the graph's time scale to 30-minute increments.
90 minute	Sets the graph's time scale to 90-minute increments.
3 hour	Sets the graph's time scale to 3-hour increments.
6 hour	Sets the graph's time scale to 6-hour increments.
12 hour	Sets the graph's time scale to 12-hour increments.
24 hour	Sets the graph's time scale to 24-hour increments.
72 hour	Sets the graph's time scale to 72-hour increments.

Change Upper and Change Lower

These buttons determine what type of alarms and errors display in the two graphs.

Graphed Alarms. The following items are graphed for Alarm #1:

- LOS (Loss of Signal)
- LOF (Loss of Frame)
- AIS (Alarm Indication Signal)
- RAI (Remote Alarm Indicator)

The following items are graphed for Alarm #2:

- Pat Synch
- CASMFL
- RMFAI

Graphed Errors. The amount of errors received per minute (1E-8 through 1E-0) is graphed for E1 Errors. The following E1 Errors can be graphed using this function:

- Bit Error Count
- CRC Error Count
- FEBE Error Count
- BPV Error Count
- Frame Error Count

Shift Left and Shift Right

The Upper and Lower graphs use a dotted line as a Reference Cursor to identify exact error and alarm conditions for a specific time. Use these buttons to adjust the time scale to an earlier or later time by moving the cursor to the left or right on the Upper and Lower graphs.

The Reference Cursor can also be moved to a specific time by touching the screen and dragging the cursor either to the right or left in the graphed display. The position of the cursor corresponds to a time and date which is displayed above the graphs in text for easy viewing.

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Recall Graphs

Use the Recall Graphs button to open any previously saved graph that is stored either on the system's Flash memory, SRAM PC Card (only appears if a memory card is inserted in the ASA 312's PCMCIA slot), or RAM drive.

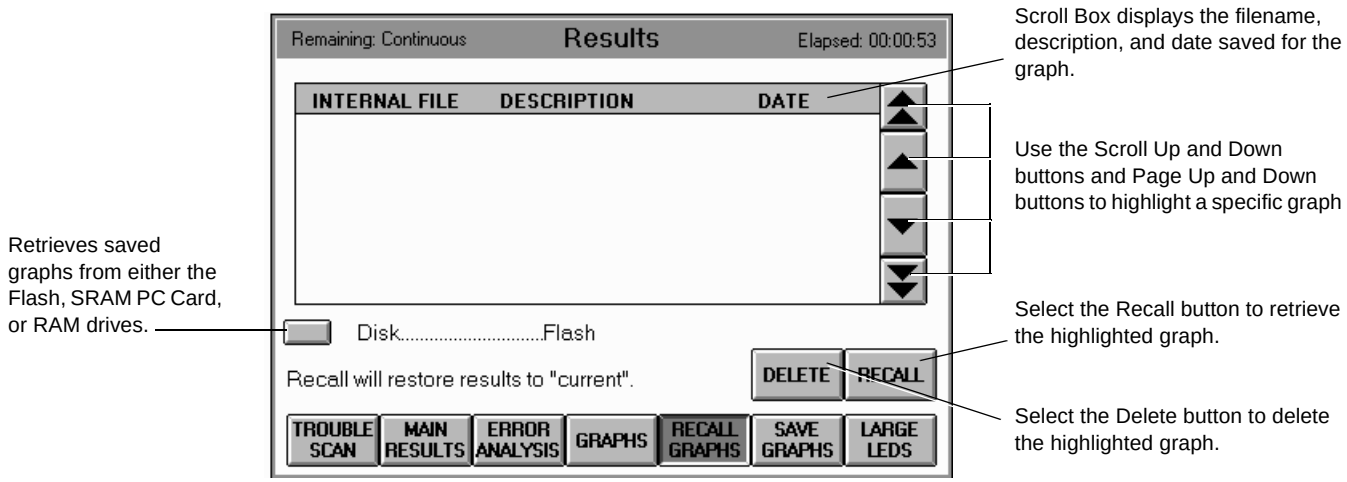


Figure 8-24. E1 Recall Graphs Commands

While the unit is performing test operations, protocol processor results are viewed and saved. Using the Save Graphs function described earlier in this section, these graphed results are automatically loaded into the instrument system memory and the data is always saved in what is called a "current" results location. When using the Run Stop function to stop the test and re-start another one, the "current" test results are moved to what is referred to as the "previous" test results location and the current test results are initiated again.

The Recall Graphs function menu field selector recalls graphs and either deletes the graphed results or restores the graphed results to the current location in the instrument system memory. These recalled results are derived from the list of graphs saved using the Save Graphs function. These saved graphs are listed in the Recall Graphs display and identified using a table.

The table lists the internal file name, a description of the file and the date the file was saved. Arrow keypads are provided for easy viewing up and down the list of saved graph files. Once a file is selected, it can either be recalled which restores these results to the current results location and now can be viewed, or deletes the graphed data using the Delete function.

NOTE ➤
The instrument is currently capable of saving only graphed results data obtained using the protocol processor Run Stop function. All other protocol processor results data are deleted automatically when the unit is turned off unless graphed results are saved using the Save Graph function. ◄

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Save Graphs

Use this button to save the current or previously graphed results to a file for later retrieval and viewing. The filename and a file description are entered using a keypad that automatically appears when these buttons are selected.

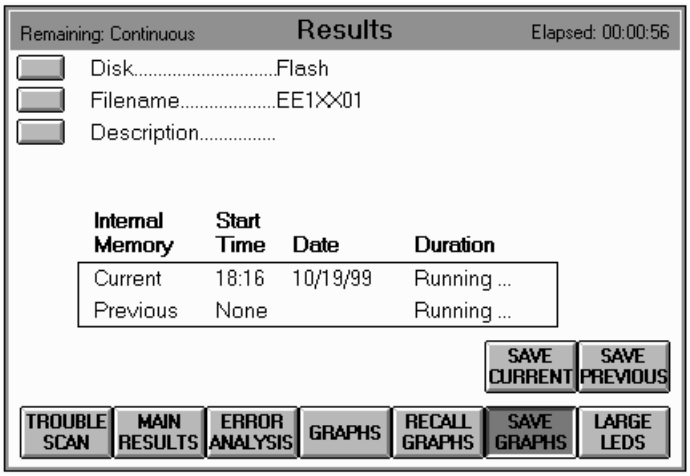


Figure 8-25. E1 Save Graphs Commands

The following information appears when Save Graphs button is selected.

Disk

Saves the graph to either Flash memory, the SRAM memory PC Card (appears only if a memory card is inserted in the ASA 312's PCMCIA slot), or RAM. The following options are available for this command.

Option	Description
Flash	This is nonvolatile memory. The Graph is stored on the system until it is removed using the Delete command.
RamDrive	This is volatile memory. If the Graph is saved to RAM, then it is deleted when the system is Powered Off.
PCMCIA (for ASA 312 only)	Allows the Results Graph to be saved to an SRAM PC Card. **This option appears only if a PC Card is inserted into the ASA 312's PCMCIA slot.**

Filename

Allows you to save the Results Graph with an eight-character internal file name. Enter a file name. File names can be from one to eight characters in length. E1 Result Graphs have the .R1 extension automatically appended.

Description

Allows you to enter a 25-character description for the file.

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Current and Previous Internal Memory

For easy reference, and to ensure that the file data is accurate, there is a table identifying data for both the current and previous system memory locations. This table contains the following information:

- Internal memory location
- Start time of the graphed result
- Date of the graphed result
- Duration of the graphed result

Using two function buttons, Save Current and Save Previous, choose which graphed results to save. No graphed data file can be saved unless the protocol processor has been stopped and no test is currently running.

Save Current

Saves the graphed test data that is currently stored in the current system memory location.

To ensure accuracy, the system stores data in both a current and previous system memory location. These memory locations contain start time, date, and duration of the graphed results.

NOTE ➤
The message Protocol processor must be stopped before results can be saved appears if you try to save a file while a test is in progress. This warning applies only to the protocol processor currently in use; other protocol processors (for example, SONET, ATM, or DS3) may be running due to the system's simultaneous operations capability.

No graphed data file can be saved unless the protocol processor and currently active test is stopped. ◄

Save Previous

Saves the graphed test data that is currently stored in the previous memory location.

To ensure accuracy, the system stores data in both a current and previous system memory location. These memory locations contain start time, date, and duration of the graphed results.

NOTE ➤
The message Protocol processor must be stopped before results can be saved appears if you try to save a file while a test is in progress. This warning applies only to the protocol processor currently in use; other protocol processors (for example, SONET, ATM, or DS3) may be running due to the system's simultaneous operations capability.

No graphed data file can be saved unless the protocol processor and currently active test is stopped. ◄

Large LEDs

This button displays the E1 LED Error and Alarm Indicators in a large, easy to read format that covers the entire screen area. This is especially useful for viewing any errors or alarms from a long distance, such as across the room from a test bay.

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You have the option of viewing errors and alarms for all protocol processors (E1, DS3, ATM and SONET) or just the E1 protocol processor errors and alarms.

The following describes the LED colors:

If the LED is this color...	Then the LED indicates this activity...
Green	The specific function is active an OK.
Red	An error or alarm event is in progress.
Yellow	Indicates that this function experienced an error or alarm event. This event is cleared by selecting the Clear History button.
Black (Clear)	No activity from this specific function.

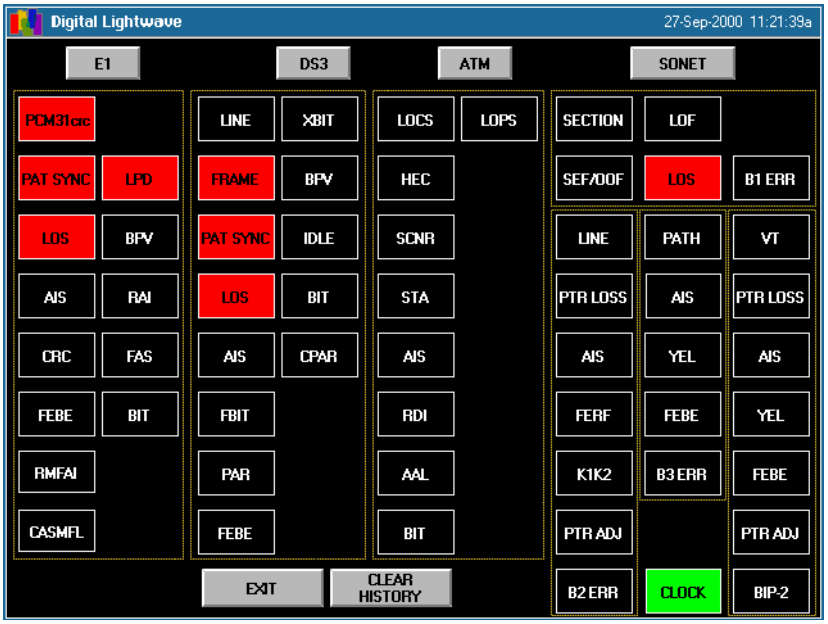


Figure 8-26. Large E1 LEDS

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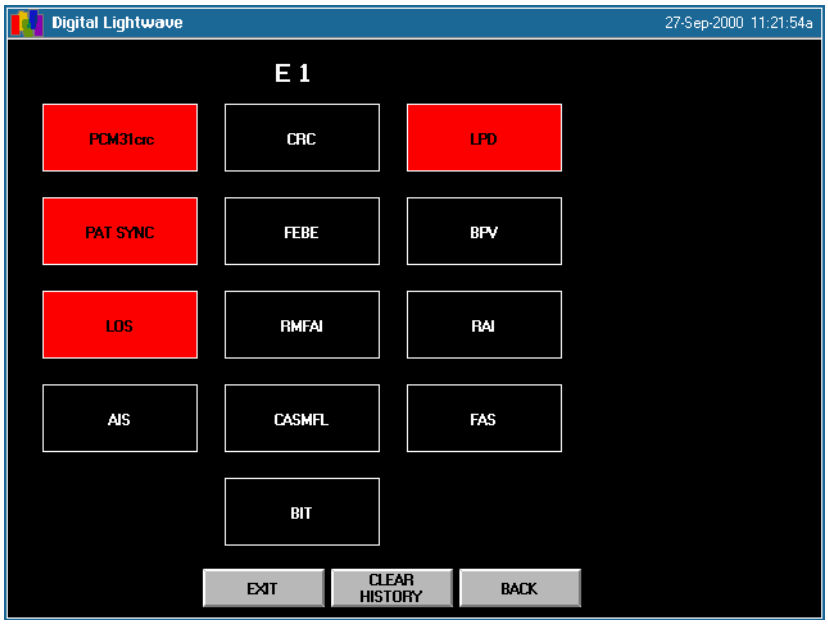


Figure 8-27. Large E1 Only LEDs

Tests & Setups Function Group

The Tests & Setups Function group button is described in detail in chapter 9, *Tests & Setups*. The commands and functions associated with this Function group button are similar for the SONET, DS1, E1 and DS3 protocol processors.

Presets Function Group

The Presets Function Group button is described in chapter 10, *Settings, Presets, and Switch Matrix*. The commands and functions associated with this Function Group button are common to all five protocol processors.

Switch Matrix Function Group

The Switch Matrix Function Group button is described in chapter 10, *Settings, Presets, and Switch Matrix*. The commands and functions associated with this Function Group button are common to all five protocol processors.

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9 Tests & Setups

Overview

This chapter describes the commands and functions associated with the Tests & Setups button. This button is common to the SONET, DS1, DS3, and E1 protocol processors. Functionality that is specific to a protocol processor is noted.

NOTE ➤
NAA I/RAM procedures specified in this section are not supported for the E1 protocol processor. ◄

Tests & Setups Function Group

The Tests & Setups button performs two basic functions. First, it allows you to create up to four different timed tests with each one independently monitoring a different test parameter. These test parameters can be saved and recalled for later use. Second, it allows you to save and recall configurations and command settings for an individual protocol processor or for multiple protocol processors at once.

NOTE ➤
For the ASA 312, to save results from a timed test, use the Printer Port command to configure the system for a printer. Timed test results will not be saved if the Printer Port command is configured for None.

The Printer Port command appears by selecting the Settings Function Group button and then selecting User. ◄

The following buttons make up the Tests & Setups Function Group:

- **Timed Test:** Configures up to four separate tests to monitor for alarm, failure, or error events for a specified period.
- **Recall Test:** Loads a saved timed test file.
- **Test Status:** Displays the timed test status for the SONET, DS1, DS3, and E1 protocol processors.
- **Save Setup:** Saves the current configuration of a single protocol processor or multiple protocol processors (SONET, DS1, DS3, E1) at once.

  NOTE ➤
  If you are in E1 or DS1 mode, setups are not saved for the protocol processor that is currently disabled when the setup was saved. ◄
- **Recall Setup:** Loads a saved protocol processor setup file.

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Timed Test

Four independent tests can be created for each protocol processor using the functions and commands associated with the Timed Test button.

The Timed Test button functions:

- Set the test duration
- Select the test type
- Set the test threshold criteria
- Save the test results
- Determine what happens at the conclusion of the timed test

IMPORTANT ➤
You are able to modify Timed Test parameters (On Test Completion, Test Duration, Print Interval, and Type/Event/Threshold) while a timed test is in progress; however, these changes will not take affect until the test in progress is stopped and the new test is initialized. ➤

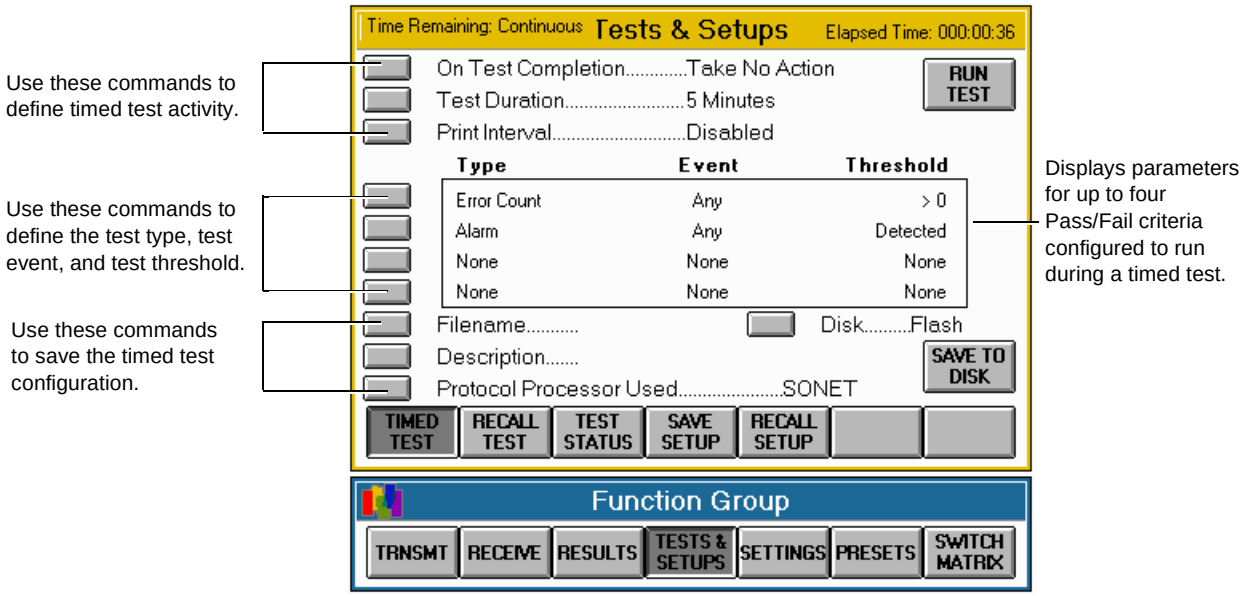


Figure 9-1. Tests & Setups Function Menu (SONET Protocol Processor shown)

Performing a Timed Test.

Use the Test Completion, Test Duration, and Print Interval commands to define the test duration and post-test activity.

1. Determine the type, event, and threshold of the timed test.
2. Select Run Test to start the timed test.

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Stopping a Timed Test.

There are several ways to stop or cancel a timed test.

1. Select Test Status and press the Abort Running Tests command. Select the appropriate protocol processor. The timed test stops immediately.

   or

2. Select the Run Stop Action button and stop the protocol processor. The timed test stops immediately.

   or

3. Select the On Test Completion command and press the Take No Action option. This change does not take effect until the current timed test is completed.

Printing Guidelines for a Timed Test When Using RAM.

After making a connection to the NAA I (or ASA 312) with the Remote Access Manager software, the software's Timed Test function is configured to print (or save) test results directly to a timed test report file (for example, TTSON_1.RPT, or TTDS1_1.RPT, or TTDS3_1.RPT).

The following can occur if the On Test Completion command is configured to print test results at the conclusion of a timed test.

If a timed test is...	Then...
Performed before using any of the Print Action button options (available from the Print Menu)	The timed test is automatically saved as a report file (*.RPT) in the Remote Access Manager's directory on your PC. The default filename for a timed test is *TTx_y.RPT*, where: **TT** indicates timed test **x** indicates the protocol processor used for the timed test: DS1, DS3, or SON for SONET **y** is a value from 1 – 9 indicating sequential timed test. (When the ninth timed test is completed, the indicator starts again at 1) **RPT** is the report file extension.
Performed after using any of the Print Action button options	The timed test results are sent to a printer.

NOTE ➤
When the current Remote Access Manager session is closed, the Timed Test function will return to its default configuration (Print to File) and will save test results to a timed test report file. ◄

The following commands are associated with the Timed Test function button.

On Test Completion Defines what activities occur at the conclusion of a timed test. This command's functionality is independent of the Print Interval command.

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NOTE ➤
For RAM operation, when a timed test ends, the test results appear in a window labeled Test Summary. Depending on the setting of the On Test Completion command, and whether or not a screen print or previous file has been printed, the test results are saved to a timed test report file (for example, TTSON_1.RPT, or TTDS1_1.RPT, or TTDS3_1.RPT). This file is saved to the Remote Access Manager's file directory on your PC. ➤

After a timed test, the On Test Completion command allows one of the following activities to occur:

- Test results are printed to a file (.RPT) or to an external printer
- Test results are printed and the test is repeated
- Test results appear (Test Summary), but test results are not printed and the test is not repeated

NOTE ➤
The connection between the Remote Access Manager software and the NAA I device must remain connected for the duration of the test. Test results are lost if the connection is closed during a timed test. ➤

This command's functionality is independent of the Print Interval command.

ASA 312 and RAM Software Options after Test Completion.

The following options are available:

Option	Description
Take No Action	**ASA 312/RAM:** At the conclusion of a timed test, test results appear in a screen labeled Test Summary on the screen. The timed test is not printed or repeated. **RAM Only**: An .RPT file is not created or updated.

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Option	Description
Print & Repeat	**ASA 312/RAM:** At the conclusion of a timed test, the Test Summary (test results) appears on the screen. Select OK to clear the results from the screen. A prompt appears requesting if test results should be printed. Select Yes or No. The test is repeated again, followed by the prompt to print test results. **RAM Only:** If Yes is selected, test results are saved to a timed test report file (TTSON_*X*.RPT, TTDS1_*X*.RPT, or TTDS3_*X*.RPT – where *X* is a value from 1 to 9) or printed to the PC's printer. If No is selected, test results are discarded. **ASA 312 Only:** The Printer Port command determines if test results are printed to an external printer or if test results are printed to an RPT file and saved to the Flash drive. **ASA 312/RAM:** This cycle continues until the test is stopped using either the Run Stop Action button; or by changing the value of this command to Take No Action; or by stopping the timed test using the Abort Running Test command located under the Test Status function.
Print Reports	**ASA 312/RAM:** At the conclusion of a timed test, the Test Summary (test results) appears on the screen. Select OK to clear the results from the screen. A prompt appears requesting if test results should be printed. Select Yes or No. The timed test is not repeated. **RAM Only:** If Yes is selected, test results are saved to a timed test report file (TTSON_*X*.RPT, TTDS1_*X*.RPT, or TTDS3_*X*.RPT – where *X* is a value from 1 to 9) or printed to the PC's printer. If No is selected, test results are discarded.

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Option	Description
Print & Repeat (Auto)	**ASA 312/RAM:** At the conclusion of a timed test, test results are automatically printed. The timed test is repeated, and test results are automatically printed again. (The Test Summary does not appear on the screen.) **RAM Only:** Test results are saved to a timed test report file (TTSON_*X*.RPT, TTDS1_*X*.RPT, or TTDS3_*X*.RPT – where *X* is a value from 1 to 9) or printed to the PC's printer. **ASA 312/RAM:** This cycle continues until the test is stopped using either the Run Stop Action button; or by changing the value of this command to Take No Action; or by stopping the timed test using the Abort Running Test command located under the Test Status function.
Print Reports (Auto)	**ASA 312/RAM:** Test results are automatically printed at the conclusion of a timed test. The Test Summary does not appear on the screen. The timed test is not repeated.

Test Duration

Determines how long the timed test runs. For DS1 and DS3 timed tests, duration becomes the duration of the test set. This prevents the duration from being modified while a timed test is active. The following options are available:

Option	Description
5 Minutes	Test runs for 5 minutes.
15 Minutes	Test runs for 15 minutes.
1 Hour	Test runs for 1 hour.
2 Hours	Test runs for 2 hours.
24 Hours	Test runs for 24 hours.
72 Hours	Test runs for 72 hours.
User Defined	Allows you to enter a specific test duration using a screen keypad. The minimum duration is 1 minute. The maximum duration is 99 days, 23 hours, 59 minutes.

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Print Interval

Allows test results to be printed every ***X*** minutes/hours **while a timed test is in progress.** (This command's functionality is independent of the On Test Completion command.) ***X*** is one of the following options:

Option	Description
Disable	Test results are not printed during a timed test. This is the unit's default setting. Note: This option has no effect if the On Test Completion command is configured to print test results.
5 Minutes	Prints test results every 5 minutes during a timed test. **For RAM Only:** Test results are saved to a timed test report file (*.RPT) or printed to your PC's printer.
15 Minutes	Prints test results every 15 minutes during a timed test. **For RAM Only:** Test results are saved to a timed test report file (*.RPT) or printed to your PC's printer.
1 Hour	Prints test results every hour during a timed test. **For RAM Only:** Test results are saved to a timed test report file (*.RPT) or printed to your PC's printer.
2 Hours	Prints test results every two hours during a timed test. **For RAM Only:** Test results are saved to a timed test report file (*.RPT) or printed to your PC's printer.
24 Hours	Prints test results every 24 hours during a timed test. **For RAM Only:** Test results are saved to a timed test report file (*.RPT) or printed to your PC's printer.
72 Hours	Prints test results every 72 hours during a timed test. **For RAM Only:** Test results are saved to a timed test report file (*.RPT) or printed to your PC's printer.
User Defined	Allows you to enter a specific print interval using a keypad. The minimum duration is 1 minute. The maximum duration is 99 days, 23 hours, 59 minutes.

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Type, Event, and Threshold Values for SONET

NOTE ➤
The following test parameters are specific for SONET operation. ◄

A total of four Pass/Fail criteria can be configured to run during a SONET timed test. The following indicates the Type, Event, and Threshold parameters that can be entered for a timed test.

Alarm. For a SONET Alarm Type parameter, the following events and thresholds are available.

SONET Events	Supported Thresholds
Any	Detected or Not Detected
Line FERF	Detected or Not Detected
Path Unequipped	Detected or Not Detected
VT AIS	Detected or Not Detected
VT Yellow	Detected or Not Detected
Line AIS	Detected or Not Detected
Path AIS	Detected or Not Detected
Path Yellow	Detected or Not Detected
VT Unequipped	Detected or Not Detected

Failure. For a SONET Failure Type parameter, the following events and thresholds are available.

SONET Events	Supported Thresholds
Any	Detected or Not Detected
LOS	Detected or Not Detected
LOF	Detected or Not Detected
STS Ptr Loss	Detected or Not Detected
OOF	Detected or Not Detected
VT Pointer Loss	Detected or Not Detected
Pattern Sync (if configured for concatenated payload)	Detected or Not Detected

Error Rate. For a SONET Error Rate Type parameter, the following events and thresholds are available.

SONET Events	Supported Thresholds
Any	1.0e-9 through 1.0e-3 or User Defined
Section B1	1.0e-9 through 1.0e-3 or User Defined
STS-1 BPV	1.0e-9 through 1.0e-3 or User Defined
Line B2	1.0e-9 through 1.0e-3 or User Defined
Line FEBE	1.0e-9 through 1.0e-3 or User Defined

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SONET Events	Supported Thresholds
Path B3	1.0e-9 through 1.0e-3 or User Defined
VT BIP-2	1.0e-9 through 1.0e-3 or User Defined
VT FEBE	1.0e-9 through 1.0e-3 or User Defined
Payload Bit	1.0e-9 through 1.0e-3 or User Defined

Error Count. For a SONET Error Count Type parameter, the following events and thresholds are available.

SONET Events	Supported Thresholds
Any	>0, >10, >100, >1000, or User Defined
Section B1	>0, >10, >100, >1000, or User Defined
STS-1 BPV	>0, >10, >100, >1000, or User Defined
Line B2	>0, >10, >100, >1000, or User Defined
Line FEBE	>0, >10, >100, >1000, or User Defined
Path B3	>0, >10, >100, >1000, or User Defined
VT BIP-2	>0, >10, >100, >1000, or User Defined
VT FEBE	>0, >10, >100, >1000, or User Defined
Payload Bit	>0, >10, >100, >1000, or User Defined

Errored Seconds. For a SONET Errored Seconds Type parameter, the following events and thresholds are available.

SONET Events	Supported Thresholds
Any	>0, >10, >100, >1000, or User Defined
Section B1	>0, >10, >100, >1000, or User Defined
STS-1 BPV	>0, >10, >100, >1000, or User Defined
Line B2	>0, >10, >100, >1000, or User Defined
Line FEBE	>0, >10, >100, >1000, or User Defined
Path B3	>0, >10, >100, >1000, or User Defined
VT BIP-2	>0, >10, >100, >1000, or User Defined
VT FEBE	>0, >10, >100, >1000, or User Defined
Payload Bit	>0, >10, >100, >1000, or User Defined

Pointer. For a SONET Pointer Type parameter, the following events and thresholds are available.

SONET Events	Supported Thresholds
STS NDF Count	>0, >1, >10, >60, or User Defined
STS Ptr Justifys	>0, >1, >10, >60, or User Defined
STS Ptr Loss	>0, >1, >10, >60, or User Defined

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SONET Events	Supported Thresholds
VT NDF Count	>0, >1, >10, >60, or User Defined
VT Point Justifys	>0, >1, >10, >60, or User Defined
VT Point Loss	>0, >1, >10, >60, or User Defined

Type, Event, and Threshold Values for DS1

NOTE ➤
The following test parameters are specific for DS1 operation. ◄

A total of four Pass/Fail criteria can be configured to run during a timed test. The following indicates the Type, Event, and Threshold parameters that can be entered for a timed test.

Alarm. For a DS1 Alarm Type parameter, the following events and thresholds are available.

DS1 Events	Supported Thresholds
Any	Detected or Not Detected
Yellow	Detected or Not Detected
AIS (Alarm Indication Signal)	Detected or Not Detected
Idle	Detected or Not Detected
Excessive Zeros	Detected or Not Detected

Failure. For a DS1 Failure Type parameter, the following events and thresholds are available.

DS1 Events	Supported Thresholds
Any	Detected or Not Detected
LOS (Loss of Signal)	Detected or Not Detected
LOF (Loss of Frame)	Detected or Not Detected
Pattern Sync	Detected or Not Detected
OOF (Out of Frame)	Detected or Not Detected

Error Rate. For a DS1 Error Rate Type parameter, the following events and thresholds are available.

DS1 Events	Supported Thresholds
Any	1.0e-9 through 1.0e-3 or User Defined
BIT Error	1.0e-9 through 1.0e-3 or User Defined
BPV Error	1.0e-9 through 1.0e-3 or User Defined
Frame Error	1.0e-9 through 1.0e-3 or User Defined
CRC Error	1.0e-9 through 1.0e-3 or User Defined

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Error Count. For a DS1 Error Count Type parameter, the following events and thresholds are available.

DS1 Events	Supported Thresholds
Any	>0, >10, >100, >1000, or User Defined
BIT Error	>0, >10, >100, >1000, or User Defined
BPV Error	>0, >10, >100, >1000, or User Defined
Frame Error	>0, >10, >100, >1000, or User Defined
CRC Error	>0, >10, >100, >1000, or User Defined

Errored Seconds. For a DS1 Errored Seconds Type parameter, the following events and thresholds are available. (Some events may not appear depending on the DS1 framing format)

DS1 Events	Supported Thresholds
Any	>0, >1, >10, >60, or User Defined
BIT Error	>0, >1, >10, >60, or User Defined
BPV Error	>0, >1, >10, >60, or User Defined
Frame Error	>0, >1, >10, >60, or User Defined
CRC	>0, >1, >10, >60, or User Defined

Type, Event, and Threshold Values for DS3

NOTE ➤
The following test parameters are specific for DS3 operation.◄

A total of four Pass/Fail criteria can be configured to run during a timed test. The following indicates the Type, Event, and Threshold parameters that can be entered for a timed test.

Alarm. For a DS3 Alarm Type parameter, the following events and thresholds are available.

DS3 Events	Supported Thresholds
Any	Detected or Not Detected
AIS	Detected or Not Detected
X-Bit	Detected or Not Detected
Idle	Detected or Not Detected

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Failure. For a DS3 Failure Type parameter, the following events and thresholds are available.

DS3 Events	Supported Thresholds
Any	Detected or Not Detected
LOS (Loss of Signal)	Detected or Not Detected
LOF (Loss of Frame)	Detected or Not Detected
Pattern Sync	Detected or Not Detected
OOF (Out of Frame)	Detected or Not Detected

Error Rate. For a DS3 Error Rate Type parameter, the following events and thresholds are available.

DS3 Events	Supported Thresholds
Any	1.0e-9 through 1.0e-3 or User Defined
BIT Error	1.0e-9 through 1.0e-3 or User Defined
BPV Error	1.0e-9 through 1.0e-3 or User Defined
Frame Error	1.0e-9 through 1.0e-3 or User Defined
P-Parity Error	1.0e-9 through 1.0e-3 or User Defined
C-BIT Parity	1.0e-9 through 1.0e-3 or User Defined
FEBE Error	1.0e-9 through 1.0e-3 or User Defined

Error Count. For a DS3 Error Count Type parameter, the following events and thresholds are available.

DS3 Events	Supported Thresholds
Any	>0, >10, >100, >1000, or User Defined
BIT Error	>0, >10, >100, >1000, or User Defined
BPV Error	>0, >10, >100, >1000, or User Defined
Frame Error	>0, >10, >100, >1000, or User Defined
P-Parity Error	>0, >10, >100, >1000, or User Defined
C-BIT Parity	>0, >10, >100, >1000, or User Defined
FEBE Error	>0, >10, >100, >1000, or User Defined

Errored Seconds. For a DS3 Errored Seconds Type parameter, the following events and thresholds are available.

DS3 Events	Supported Thresholds
Any	>0, >1, >10, >60, or User Defined
BIT Error	>0, >1, >10, >60, or User Defined
BPV Error	>0, >1, >10, >60, or User Defined
Frame Error	>0, >1, >10, >60, or User Defined

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DS3 Events	Supported Thresholds
P-Parity Error	>0, >1, >10, >60, or User Defined
C-Bit Parity	>0, >1, >10, >60, or User Defined
FEBE Error	>0, >1, >10, >60, or User Defined

Type, Event, and Threshold Values for E1

NOTE ➤
The following test parameters are specific for E1 operation. ◄

A total of four Pass/Fail criteria can be configured to run during a timed test. The following indicates the Type, Event, and Threshold parameters that can be entered for a timed test.

Alarm. For an E1 Alarm Type parameter, the following events and thresholds are available.

E1 Events	Supported Thresholds
Any	Detected or Not Detected
RAI (Yellow)	Detected or Not Detected
AIS (Alarm Indication Signal)	Detected or Not Detected
CASMFL (Channel Associated Signalling Multiframe Loss)	Detected or Not Detected
RMFAI (Remote Multiframe Alarm Indication)	Detected or Not Detected

Failure. For an E1 Failure Type parameter, the following events and thresholds are available.

E1 Events	Supported Thresholds
Any	Detected or Not Detected
LOS (Loss of Signal)	Detected or Not Detected
LOF (Loss of Frame)	Detected or Not Detected
Pattern Sync	Detected or Not Detected

Error Rate. For an E1 Error Rate Type parameter, the following events and thresholds are available.

E1 Events	Supported Thresholds
Any	1.0e-9 through 1.0e-3 or User Defined
BIT Error	1.0e-9 through 1.0e-3 or User Defined
BPV Error	1.0e-9 through 1.0e-3 or User Defined
Frame Error	1.0e-9 through 1.0e-3 or User Defined
CRC Error	1.0e-9 through 1.0e-3 or User Defined

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E1 Events	Supported Thresholds
FEBE Error	1.0e-9 through 1.0e-3 or User Defined

Error Count. For an E1 Error Count Type parameter, the following events and thresholds are available.

E1 Events	Supported Thresholds
Any	>0, >10, >100, >1000, or User Defined
BIT Error	>0, >10, >100, >1000, or User Defined
BPV Error	>0, >10, >100, >1000, or User Defined
Frame Error	>0, >10, >100, >1000, or User Defined
CRC Error	>0, >10, >100, >1000, or User Defined
FEBE	>0, >10, >100, >1000, or User Defined

Errored Seconds. For an E1 Errored Seconds Type parameter, the following events and thresholds are available. (Some events may not appear depending on the E1 framing format)

E1 Events	Supported Thresholds
Any	>0, >1, >10, >60, or User Defined
BIT Error	>0, >1, >10, >60, or User Defined
BPV Error	>0, >1, >10, >60, or User Defined
Frame Error	>0, >1, >10, >60, or User Defined
CRC	>0, >1, >10, >60, or User Defined
FEBE	>0, >1, >10, >60, or User Defined

Disk

Selects the location for saving the timed test configuration parameters. These parameters can be saved to either Flash memory, the SRAM memory PC Card (appears only if a memory card is inserted in the PCMCIA slot), or RAM.

Filename

Allows you to save the timed test with an eight-character internal filename. Enter a filename using the keyboard display. Filenames can be from one to eight characters in length. A three-character file extension is automatically appended based on the following guidelines:

For SONET, if the Protocol Processor Used command is set to...	Then the file extension is
SONET	.TTS
All with DS1 active	.TAS
All with E1 active	.TZS

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For DS1, if the Protocol Processor Used command is set to...	Then the file extension is
DS1	.TT1
All	.TA1

For DS3, if the Protocol Processor Used command is set to...	Then the file extension is
DS3	.TT3
All with DS1 active	.TA3
All with E1 active	.TZ3

For E1, if the Protocol Processor Used command is set to...	Then the file extension is
E1	.TTE
All	.TZE

Description Allows you to enter a 25-character description for the timed test configuration file.

Protocol Processor Used Performs the timed test on a specific protocol processor or on all (SONET, DS1, and DS3) protocol processors.

Run Test Starts the timed test. A confirmation message, stating that the test is about to start, displays. Select OK to start the test.

Save to Disk Saves the timed test configuration. The location of the timed test configuration file is determined by the Disk command. To save timed test results, refer to the Print Report Files option described in the Print section of chapter 11.

NOTE ➤
A timed test cannot be saved if the current protocol processor is mapped for ATM mode.

If the SONET protocol processor is mapped for ATM mode, select the SONET Mapping command and choose another mapping option. If the DS1 or DS3 protocol processor is mapped for ATM mode, select the protocol processor's ATM Mapping command and choose None.

After disabling ATM mode, try saving the timed test again. ➤

Recall Test

To recall and run a timed test configuration or to delete the timed test

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configuration file from the unit's memory, select the Recall Test function. This function displays a file list containing previously saved timed test configurations.

Three function buttons, Disk, Delete Test, and Recall & Run either delete the saved test from the system's memory or recall the timed test and start the timed test again.

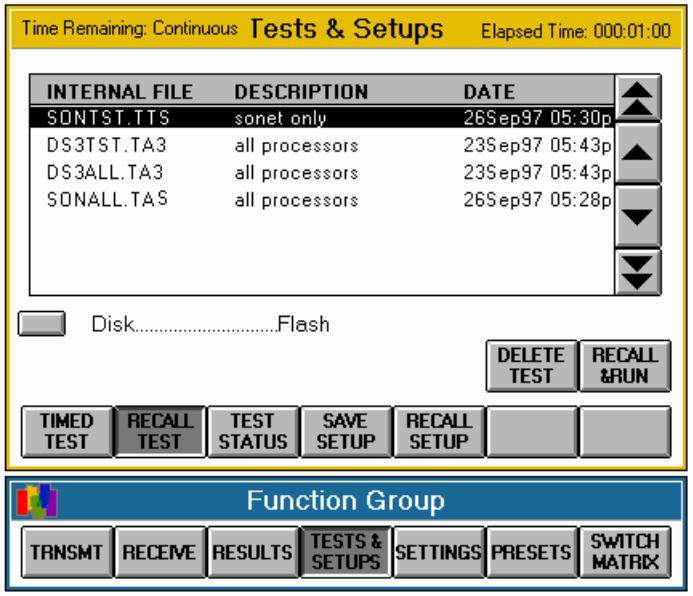


Figure 9-2. Recall Timed Test Commands (SONET example)

The file table lists the saved files and uses arrow keys to scroll up and down the list of files. The file information includes the filename, a brief description of the file, and the date that the file was created.

Disk Selects the location for retrieving the timed test configuration file. These files are stored on either Flash memory, the SRAM memory PC Card (appears only if a memory card is inserted in the PCMCIA slot), or RAM Drive.

Delete Test Permanently deletes the timed test file highlighted in the file table.

Recall & Run Retrieves the timed test configuration file from system memory and configures the system to the selected testing parameters. When the loading is complete, an information box appears displaying the filename of the test and the protocol processor designated for running the test. Select OK to start the test.You can verify that the test is running by observing that the Elapsed Time, in the upper right corner of the function menu, is incrementing.

Selecting Recall & Run stops any test in progress and also discards any unsaved test results.

NOTE ➤
A timed test cannot be restored if any protocol processor is mapped for ATM mode.

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If the SONET protocol processor is mapped for ATM mode, select the SONET Mapping command and choose another mapping option. If the DS1 or DS3 protocol processor is mapped for ATM mode, select the protocol processor's ATM Mapping command and choose None.

After disabling ATM mode, try restoring the timed test again. ◄

Test Status

This function indicates if a protocol processor is currently performing a timed test. This is demonstrated by the fact that the Time Remaining counter is active. It also allows timed tests results to be printed or timed tests to be canceled

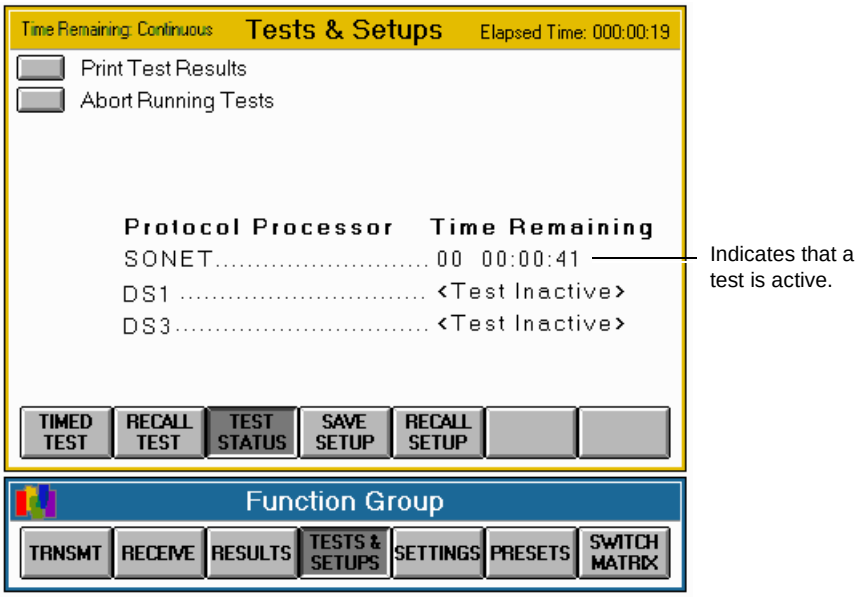


Figure 9-3. Timed Test Status Commands (SONET example)

The following commands are available for this function.

Print Test Results Prints the timed test results for either the DS1, SONET, E1, or DS3 protocol processors.

Abort Running Test Allows you to immediately stop a timed test that is in progress on either the DS1, SONET, E1, or DS3 protocol processors.

When a test is running, you can view and save results using the Results function. However, while a Pass/Fail Test is running, do not use the Run Stop action button to stop the test. It is also advised not to re-configure the switch matrix because either of these actions causes an inaccurate result report. In addition, unless the test is optioned to automatically repeat, the protocol processor stops after the time period defined in the Timed Test function and the complete results may be viewed and saved using the Results function.

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Save Setup

This function allows the protocol processor's current configuration and command values to be saved to a file (known as a Setup file). This file can be used later to restore configuration settings for a single protocol processor or to restore configuration settings for the SONET, DS1, E1, and DS3 protocol processors.

NOTE ➤
If you are in E1 or DS1 mode, setups are not saved for the protocol processor that is currently disabled when the setup was saved. ◄

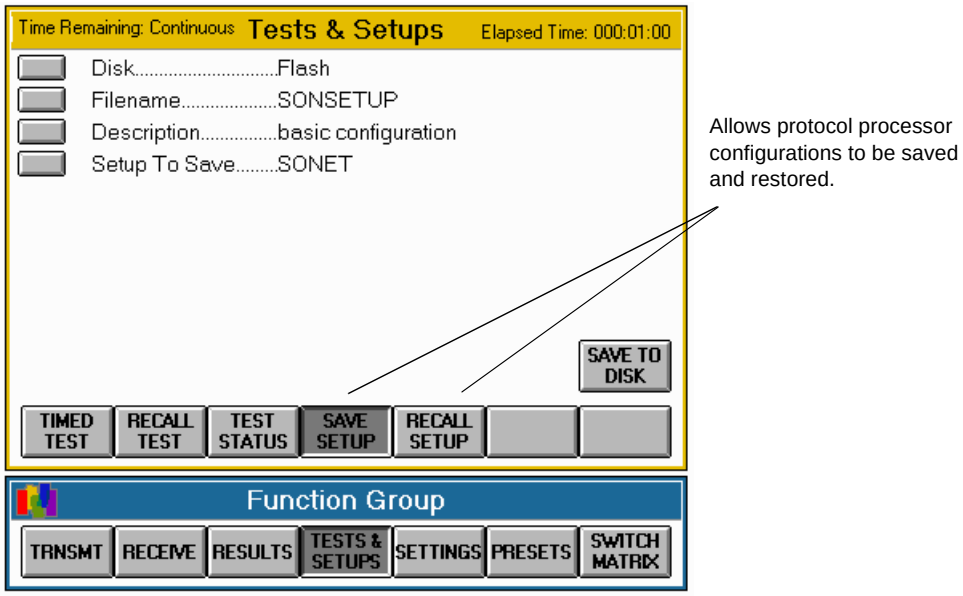


Figure 9-4. Save Setup Commands (SONET example)

Disk

Selects the location for saving the Setup file. The file can be saved to either Flash memory, the SRAM memory PC Card (appears only if a memory card is inserted in the PCMCIA slot), or RAM.

Filename

Allows you to save the Setup file with an eight-character internal filename. Enter a filename using the keyboard. Filenames can be from one to eight characters in length.

For SONET: Setup files for the SONET protocol processor have the **.STS** extension automatically appended.

For DS1: Setup files for the DS1 protocol processor have the **.ST1** extension automatically appended.

For DS3: Setup files for the DS3 protocol processor have the **.ST3** extension automatically appended.

For E1: Setup files for the E1 protocol processor have the **.STE** extension automatically appended.

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For Protocol Processors Running Concurrently: Setups files that save the configuration for the *DS1, DS3 (with DS1 active)*, and *SONET (with DS1 active)* protocol processors have the **.SAL** extension automatically appended. Setup files that save the configuration for the *E1, DS3(with E1 active)*, and *SONET (with E1 active)* protocol processors have the **.SAZ** extension automatically appended.

Description Allows you to enter a 25-character description for the Setup file.

Setup To Save Allows you to save the Setup files for the protocol processor that currently appears on the screen. If other signals are mapped into the protocol processor, then use the ALL option. For example, if a DS3 or DS1 is mapped into the SONET protocol processor, then select ALL to save the parameters for the DS3 and DS1.

Save To Disk Saves the Setup file.

NOTE ➤

A Setup file cannot be saved if the current protocol processor is mapped for ATM mode.

If the SONET protocol processor is mapped for ATM mode, select the SONET Mapping command and choose another mapping option. If the DS1 or DS3 protocol processor is mapped for ATM mode, select the protocol processor's ATM Mapping command and choose None.

After disabling ATM mode, try saving the protocol processor Setup again. ➤

Recall Setup

The Recall Setup function is used to restore or delete Setup files. When a Setup file is restored, the configuration settings for either one protocol processor or three protocol processors are retrieved and loaded into the system.

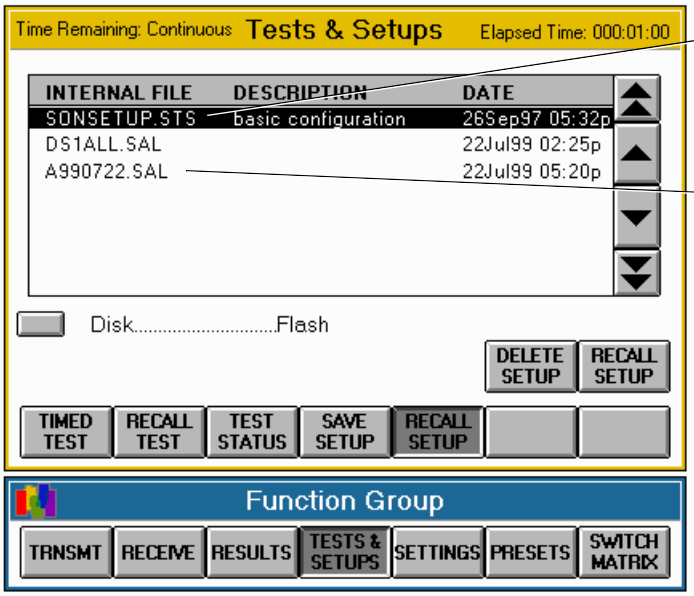


Figure 9-5. Recall Setup Commands (SONET example)

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Disk Selects the location for retrieving the Setup file. These files are stored on either Flash memory, the SRAM memory PC Card (appears only if a memory card is inserted in the PCMCIA slot), or RAM.

Delete Setup Permanently deletes the Setup file highlighted in the file table.

Recall Setup Retrieves the Setup file from system memory and configures the system to the selected testing parameters. When the loading is complete, a message appears in the Function Menu area stating that the system is now configured with a specific setup file.

NOTE ➤

A Setup file cannot be restored if any protocol processor is mapped for ATM mode.

If the SONET protocol processor is mapped for ATM mode, select the SONET Mapping command and choose another mapping option. If the DS1 or DS3 protocol processor is mapped for ATM mode, select the protocol processor's ATM Mapping command and choose None.

After disabling ATM mode, try restoring the Test Setup again. ➤

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10 Settings, Presets, and Switch Matrix

Overview

The Settings, Presets, and Switch Matrix Function Group buttons are common to all five protocol processors. This chapter describes the functions and commands associated with these Function Group buttons.

Settings Function Group

The Settings Function Group button controls miscellaneous settings for the system, the RS-232 interface settings, SCPI command settings, software download and calibration functions.

The following buttons make up the Settings Function Group:

- **Misc:** Configures date and time settings, restores factory default settings, and configures laser type for dual laser systems.
- **User:** Controls settings for speaker volume, printer selection, SCPI command interface, and remote mode.
- **I/O Port:** Configures communications settings for the SCPI (GPIB) command, PC Card slot, serial port, and Ethernet interfaces.
- **Utility:** Controls parameters for transferring and deleting files; displays a list of all stored files.
- **CAL:** Presents system calibration commands.
- **INFO:** Contains license, board, and hardware-related information about your NIC ASA 312 or NAA I.

Misc

The Misc button controls functions such as the display timeout setting, the current time and current date, resetting the instrument to factory default parameters, and automatic configuration.

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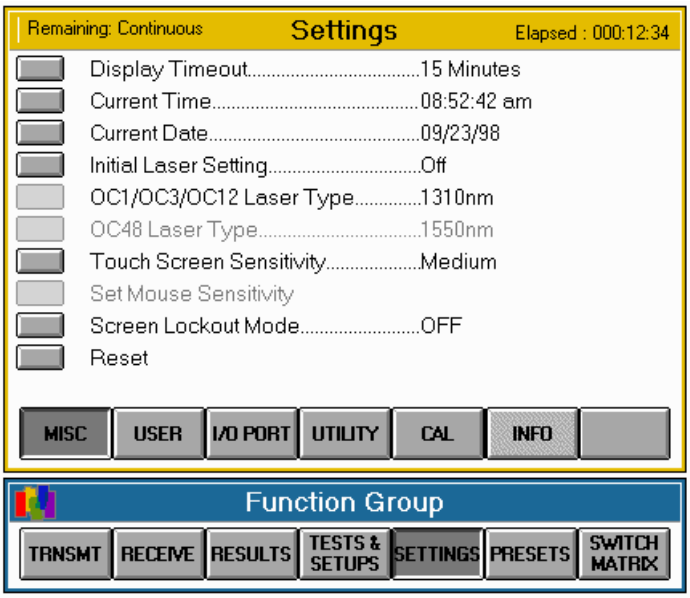


Figure 10-1. Settings Commands

Display Timeout

Starts the screen saver after the specified period of inactivity is reached.

NOTE ➤
This function is not available for use with the NAA I.◄

The following options are available for this command:

Option	Description
15 Minutes	Screen saver starts after 15 minutes of inactivity.
30 Minutes	Screen saver starts after 30 minutes of inactivity.
1 Hour	Screen saver starts after 1 hour of inactivity.
2 Hours	Screen saver starts after 2 hours of inactivity.
Disabled	Screen saver is Off.

Current Time

Sets the time on the system. The time is entered using the Enter Time keypad. Enter the time using 24-hour, military time.

Current Date

Sets the date on the system. The date is entered using the Enter Date keypad and must be entered using the MM/DD/YY format.

Initial Laser Setting

Use this command to the ON/Off state of the laser setting when the system is Powered ON. The laser can be manually turned ON or Off using the Laser button located in the SONET LED and Status Indicator area of the touch screen.

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The following options are available for this command:

Option	Description
On	The laser turns ON when the system is Powered ON.
Off	The laser is Off when the system is Powered ON. To turn ON the laser, you must press the Laser button located in the SONET protocol processor.
Restore Previous State	The laser defaults to the last known setting of the Laser button.

OC1/OC3/OC12 Laser Type

Configures the type of laser used by the system. This command is only available if your system has the dual laser feature. The following options are available for this command.

NOTE ➤
This command is available only if your system is configured for dual lasers. ◄

Option	Description
1310 nm	Configures the system to use the 1310 nm laser.
1550 nm	Configures the system to use the 1550 nm laser.

OC48 Laser Type

Configures the type of laser used for OC-48. This command is available only if your system has the OC-48 hardware option and licensing. The following options are available for this command:

Option	Description
1310 nm	Configures the system to use the 1310 nm laser.
1550 nm	Configures the system to use the 1550 nm laser.

Touch Screen Sensitivity

Reconfigures the touch screen's sensitivity. Normal is the default setting.

NOTE ➤
This function is not available for use with the NAA I. ◄

The following options are available for this command.

Option	Description
High	Touch screen's sensitivity is High.
Medium	Touch screen's sensitivity is Medium.
Low	Touch screen's sensitivity is Low.
Normal	Touch screen's sensitivity is Normal.

Set Mouse Sensitivity

Configures the speed of the mouse pointer across the screen. This command is available if a mouse is connected to the unit's serial COM Port.

NOTE ➤
This function is not available for use with the NAA I. ◄

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Screen Lockout Mode

Disables the screen, preventing any accidental screen touches or key strokes that may disrupt a test or reconfigure the system.

Option	Description
High	Mouse sensitivity is High.
Medium	Mouse sensitivity is Medium.
Low	Mouse sensitivity is Low.
Normal	Mouse sensitivity is Normal.

Reset

Restores and/or reboots the system.The following options are available for this command.

Option	Description
Reset to Defaults	Restores the factory default settings for all five protocol processors and the Switch Matrix. This action returns the system to a basic configuration.
Reset to Factory Defaults and Reboot.	Reboots the system and restores factory default setting for all five protocol processors and the Switch Matrix.
Reboot without Reset	Reboots the system and does not change command settings.

User

The User button customizes the ASA 312's touch screen sounds, Remote Control settings, Printer Port settings, and SCPI command input.

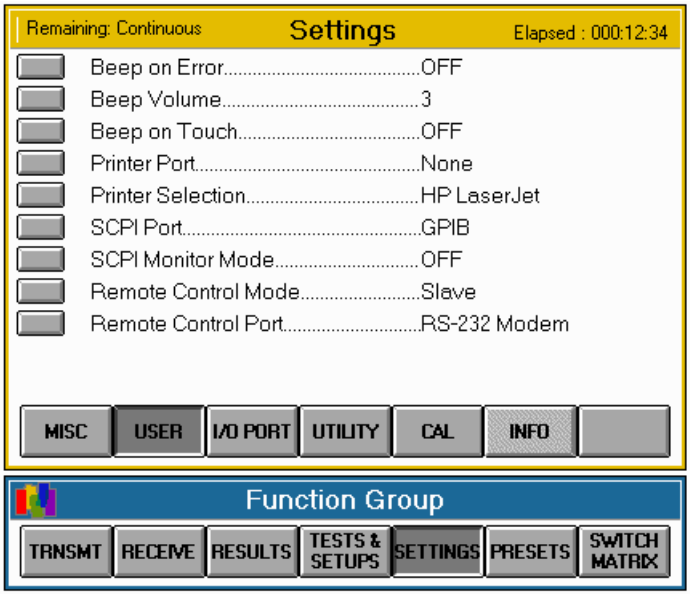


Figure 10-2. User Commands

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Beep On Error

Controls the pitch of the audible beep heard when an error is detected on any of the protocol processors. The volume of the audible beep is controlled by the Beep Volume command.

NOTE ➤
This function is not available for use with the NAA I.◄

The command has the following options.

Option	Description
High	High pitch
Medium	Medium pitch
Low	Low pitch
Off	Disables audible beep

Beep Volume

Controls the volume of the audible beep. This command affects both the Beep On Error command and the Beep on Touch command.

NOTE ➤
This function is not available for use with the NAA I.◄

This command has the following options.

Option	Description
0	Disables audible beep
1, 2, or 3	Low volume
4 or 5	Medium volume
6 or 7	High volume

Beep on Touch

Controls the pitch of the audible beep when you touch the ASA 312's touch screen during normal operations.

NOTE ➤
This function is not available for use with the NAA I.◄

Option	Description
High	High pitch
Medium	Medium pitch
Low	Low pitch
Off	Disables audible beep

Printer Port

Determines if an external printer is attached to the ASA 312's serial port or parallel port. Also allows reports and logs to be printed to a file. The Report file is saved and can then be printed later.

NOTE ➤
This function is not available for use with the NAA I.◄

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For more information about using the Print function, refer to the Print button description in chapter 11, *Action Button Row*.

Option	Description
RS-232	Use this option to attach a printer to the ASA 312's 9-pin serial port. (If you are using the Parallel-to-Serial Converter and Cable, then use this setting.)
Parallel	If your ASA 312 has a 25-pin RS-232 connector (labeled Parallel Port), then use this setting when attaching a printer to the ASA 312.
File	This option functions as a Print to File command. It allows Timed Test results (located under the Tests & Setups Function Group button), Error and Alarm results, and Event logs to be saved as a Report file (.RPT) on the ASA 312. This file can be printed later or transferred to the ASA 312's RAM drive, Flash memory drive, or SRAM Memory Card. When this option is selected, only the Results and Event Log options of the Print button (Action button row) are available.
None	Printer port is disabled. No printer is attached.

Printer Selection

Provides a list of supported printers that can be attached to the ASA 312.

NOTE ➤
This function is not available for use with the NAA I.◄

For more information about using the Print function, refer to the Print button description in chapter 11, *Action Button Row*.

Supported Printers...	
HP LaserJet	ASCI Printer
HP ThinkJet	Epson FX
IBM ProPrinter	Seiko DPU-411

SCPI Port

The ASA 312 test functions can be automated with the use of SCPI Commands. The SCPI Port command determines the connection method used send SCPI Commands to and from the ASA 312.

NOTE ➤
This function is not available for use with the NAA I.◄

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Select one of the following methods to configure the ASA 312's SCPI Port.

Option	Description
GPIB	Uses the GPIB standard (General Purpose Interface Bus) to transfer SCPI commands to the ASA 312. This option requires a GPIB PC interface card and interface cable. The interface cable attaches to the ASA 312's GPIB connector.
Ethernet	Uses an Ethernet connection to the ASA 312 to transfer SCPI commands to the ASA 312. The Ethernet connection is made via the ASA 312's 10BaseT modular jack.
Files	Uses a SCPI test script file that is installed from either the Flash memory drive, the SRAM PC Card (appears if a memory card is inserted in the PCMCIA slot), or the RamDrive.
RS-232 Direct	Allows you to communicate directly with the ASA 312 via an RS-232 null modem cable. The cable attaches to the ASA 312's 9-pin male connector. A standard terminal program can be used to send SCPI commands to the ASA 312.
RS-232 Modem	Allows you to communicate using a modem with the ASA 312. This type of connection requires a modem, serial cable, communications software, and host PC.
PCMCIA Modem	Allows you to communicate using a PC Card modem, installed in the ASA 312's PCMCIA card slot, with the ASA 312. This type of connection requires a modem, communications software, and host PC.
None	Disables the SCPI Port.

SCPI Monitor Mode

The SCPI Monitor appears on the ASA 312 touch screen or the NAA I Remote Access Manager window. This allows you to view the SCPI command issued, the response to the command, and the return status.

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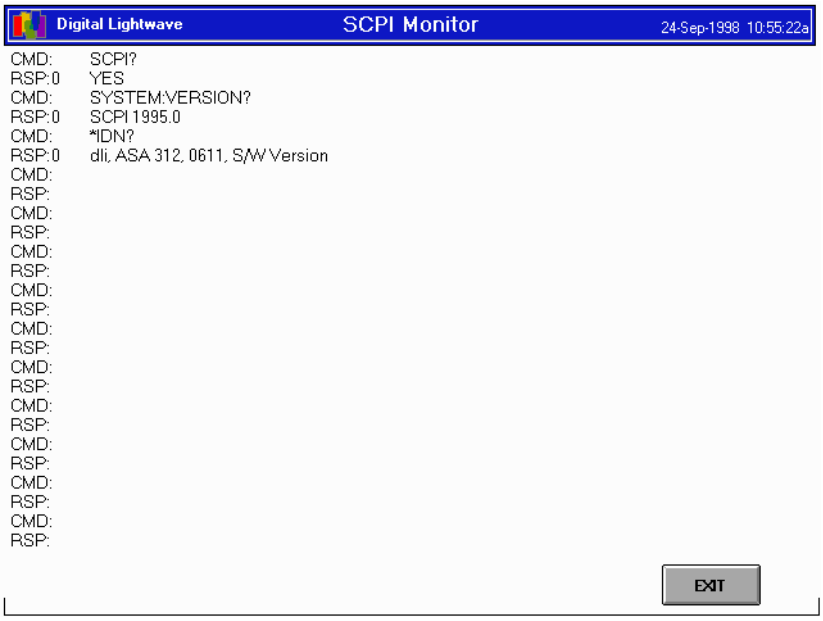


Figure 10-3. SCPI Monitor

Select the Exit button to close the SCPI Monitor and return to the normal screen.

Remote Control Mode

Enables or disables ASA 312 touch screen operation during a Remote Access Manager session.

NOTE ➤
This function is not available for use with the NAA I.◄

Option	Description
Touchscreen Control	Enables the ASA 312's touch screen during a Remote Access Manager session. The unit cannot be operated using the Remote Access Manager software. NOTE: If you select this option while connected during a remote session, you must close the Remote Access Manager software, and reconnect to the ASA 312.
Remote PC Control	Disables the ASA 312's touch screen during a Remote Access Manager session.

The ASA 312 can be operated from a remote location using the Digital Lightwave Remote Access Manager software.

To conduct a remote session, you must:

- Obtain the Remote Access Manager software application (Contact your Digital Lightwave Sales or Technical Support representative.)
- Install the Remote Access Manager software on to your PC

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- Configure the ASA 312 for remote operations using the Remote Control Mode and Remote Control Port commands

For more information about Remote Access Manager operations, refer to appendix F, *ASA 312 Remote Operations*, or the Read Me file supplied with the Remote Access Manager software.

Remote Control Port

Configures the ASA 312 for a direct serial connection, a modem connection, or an Ethernet connection when using the Remote Control mode.

NOTE ➤
This function is not available for use with the NAA I.◄

Option	Description
RS-232 Direct	The ASA 312 is connected directly to a PC using an RS-232 null modem cable. (The cable requires a 9-pin female connector on one end to attach to the ASA 312.)
PCMCIA Modem	The ASA 312 uses a PC Card modem to communicate to the PC.
RS-232 Modem	The ASA 312 communicates to the PC using an external modem attached to the ASA 312's 9-pin serial port.
Ethernet	The ASA 312 communicates to the PC using a TCP/IP connection over Ethernet.
None	Disables the Remote Control Port.

I/O Port

This I/O Port button selects and controls the various I/O Port communications interfaces to the ASA 312.

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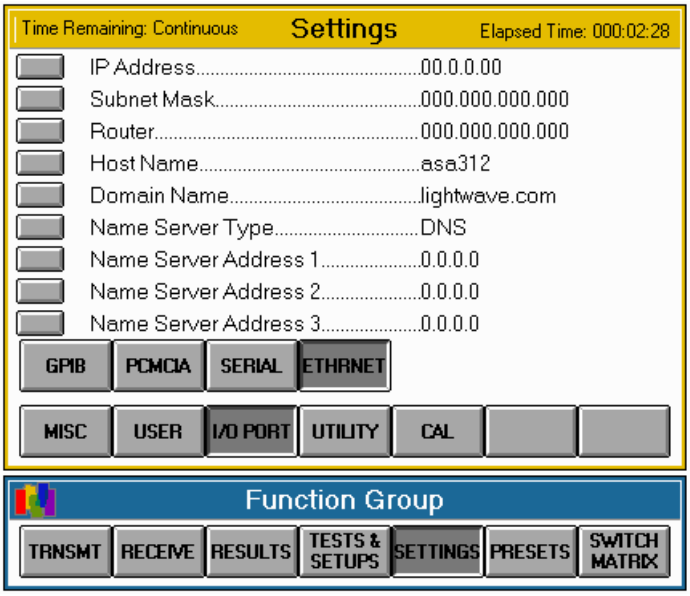


Figure 10-4. I/O Port – Ethernet Commands Shown

GPIB

The General Purpose Interface Bus (GPIB) on the ASA 312 uses IEEE 488.2 standard and some SCPI 1995.0 protocols.

The GPIB function selects the GPIB primary address for the GPIB interface. The primary address must match the GPIB host or communication is not established.

The Primary Address ranges from 0 to 31 and is entered using the touch screen keypad. The default address is 10.

NOTE ➤
This function is not available for use with the NAA I.◄

PCMCIA

Configures the communications parameters of the PC Card modem and PCMCIA slot.

NOTE ➤
This function is not available for use with the NAA I.◄

NOTE ➤
The Baud Rate button needs to be selected each time a modem is inserted into the ASA 312. Even if the correct baud rate is displayed, the modem will not answer unless the button is pressed each time a modem card is inserted. ◄

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The following parameters appear:

Option	Description
Baud Rate	Sets the PC Card COM Port speed to one of the following rates: 28800 Baud, 19200 Baud, 14400 Baud, 9600 Baud, 4800 Baud, 2400 Baud, or 1200 Baud
Parity	The Parity parameter is set to NONE.
Stop Bits	The Stop Bits parameter is set to 1.
Data Bits	The Data Bits parameter is set to 8.

Serial

Configures the communications parameters of the serial COM Port on the system.

NOTE ➤
For modem communications, the COM Port parameters are automatically set to 8-N-1 and cannot be changed. However, if the Printer Port command is set to RS-232, then the communications parameters are adjustable. ➤

The following parameters appear:

Option	Description
Baud Rate	115200 Baud, 57600 Baud, 38400 Baud, 28800 Baud, 19200 Baud, 14400 Baud, 9600 Baud, 4800 Baud, 2400 Baud, or 1200 Baud
Parity	None, Odd, or Even. Set to None for modem operation. Adjustable for Printer Port operation.
Stop Bits	1 Stop Bit or 2 Stop Bits Set to 1 for modem operation. Adjustable for Printer Port operation.
Data Bits	7 or 8 data bits Set to 8 for modem operation. Adjustable for Printer Port operation.

Ethernet

Configures the communications parameters for an Ethernet connection to the system.

NOTE ➤
The following parameters appear if your system is licensed for Ethernet. Contact your LAN manager for the correct values. ➤

Option	Description
IP Address	(for example, 208.143.235.0)
Subnet Field	(for example, 255.255.255.0)
Router	(for example, 208.143.235.1)
Host Name	(for example, asa312)

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Option	Description
Domain Name	(for example, lightwave.com)
Name Server Type	(for example, DNS)
Name Server Add 1 Name Server Add 2 Name Server Add 3	(for example, 204.70.25.234)

AT Command Features

Using the AT Command gives you the ability to send AT commands to modems via the ASA 312. This includes the ability to edit and send the modem initialization string, save the current modem setup, and reset the modem.

NOTE ➤
To access the AT Command screen, you must have a PC Card modem inserted in the PCMCIA slot or an external modem connected to the RS-232 connector. ➤

Accessing the AT Command Features

To access the AT Command screen:

1. From the ASA 312 touch screen, select **Settings**.
2. Select **User**.
3. Select **Remote Control Port**. The Remote Control Port window appears.
4. Select **RS-232 Modem** or **PCMCIA Modem**.
5. Select **I/O Port**.
6. If you chose:
   - *RS-232 Modem*, select **Serial**, and then **Modem String**.
   - *PCMCIA Modem*, select **PCMCIA**, and then **Modem String**.
7. The Modem String window appears with the following options:
   - **Edit Modem Initialization String:** Allows you to enter a valid AT command using a touch screen key pad. (The string must be preceded by an AT prefix.)
   - **Send Modem Init. String:** Sends the AT command string to the modem.
   - **Store Current Modem Setup in Modem:** Sends an AT command (&W) that saves the current modem setup.
   - **Reset Modem:** Sends an AT command (ATZ) that restores the modem's original default settings.

Utility

The Utility button controls parameters that allow you to:

- View a listing of all files (setup, graph, report, and timed test) stored on the system or on the SRAM PC Card
- Transfer files to and from the system

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- Select the port connection for system software upgrades
- Delete saved setup files, graph files, and timed test files
- Ping an IP Address
- Check the battery status of an SRAM PC Card
- Format an SRAM PC Card

The following section describes the functionality and commands associated with the File Transfer, File Delete, and Ping buttons.

File Trnsfr Button

This button serves two functions:

- It selects the port connection used by the system for software upgrades
- It allows report files, timed test configuration files, protocol processor setup files, and graph files to be saved to various memory disk drives, copied to another ASA 312 or NAA I, or copied to a PC.

When the File Trnsfr button is pressed, a scroll list box appears that displays all files currently stored on the system's Flash or RAM drives. This button can also display a list of files stored on the SRAM PC Card (for the ASA 312 only).

NOTE ➤
Do not unplug communications cables or power off the unit **during** a file transfer or software upgrade. ➤

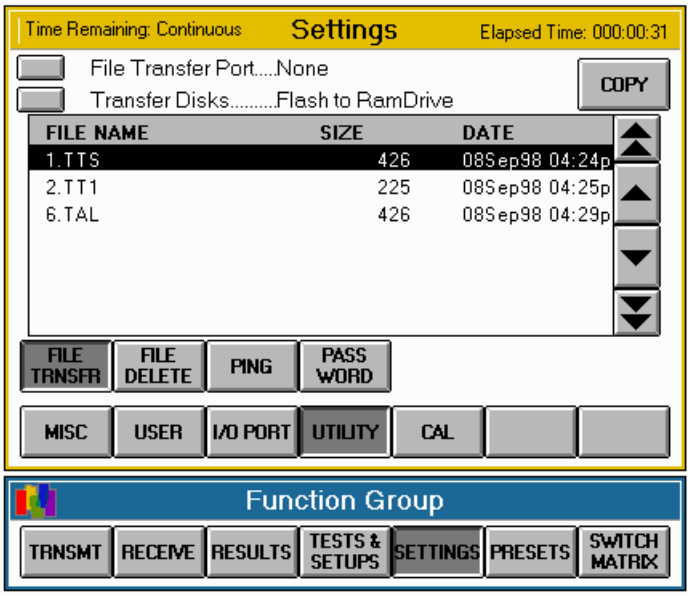


Figure 10-5. File Transfer Commands

File Transfer Port

Selects the connection port used when uploading files from the system, downloading files to the system, or performing a software upgrade.

When performing a software upgrade, use this command to select the connection port. The following options are available:

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Option	Description
None	Cancels File Transfer mode
RS-232 Direct	Configures the system to transfer files using a direct serial connection. Connect a Null modem cable to the system's 9-pin RS232 connector.
RS-232 Modem	Configures the system to transfer files using a modem connection.
PCMCIA Modem	Configures the ASA 312 to transfer files using a PC Card modem. This option is available when a PC Card modem is installed in the PCMCIA card slot. **Note:** This function is not available for use with the NAA I.
FTP Ethernet	Configures the system to transfer files using its Ethernet port as the connection method. This option is available if the unit is licensed for Ethernet.

After selecting a File Transfer Port option, the file transfer status information appears on the screen.

NOTE ➤
Do not unplug communications cables or power off the unit **during** a file transfer or software upgrade. ◄

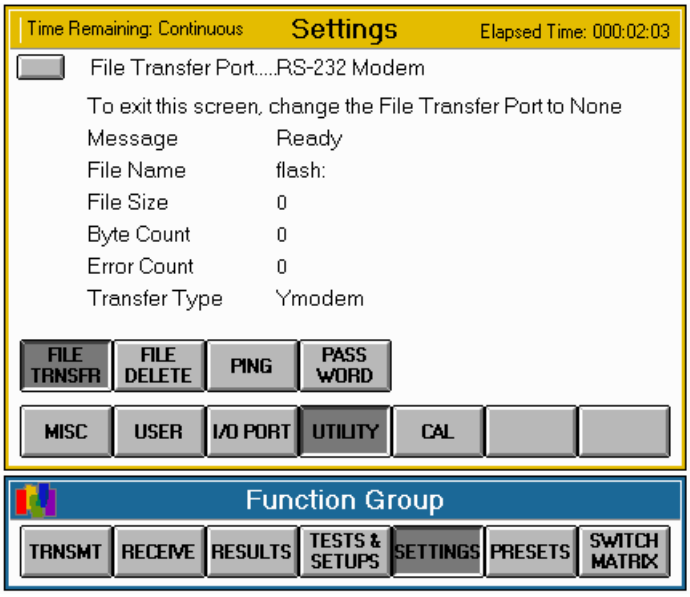


Figure 10-6. File Transfer Port Status Information

Transfer Disks / Copy Button

Determines which memory disk drives are used to transfer files.

Contains scroll box listing files available that can be copied to Flash or RAM drives or to an SRAM Flash memory card (ASA 312's PCMCIA).

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NOTE ➤
The Flash drive is the system hard disk drive. Test configuration, setup configuration, and graph files are stored on this drive until deleted using the File Delete Button.

The RAM drive is volatile memory. The contents of the RAM drive are deleted when the system is powered off. ◄

The following options are available:

Option	Description
Flash to RamDrive	Copies files from the system's Flash memory drive (hard drive) to the system's RAM Drive.
RamDrive to Flash	Copies files from the system's RAM Drive to the system's Flash memory drive (hard drive).
Flash to PCMCIA	Copies files from the system's Flash memory drive to the SRAM PC Memory Card. This option appears only if a memory card is installed in the PCMCIA slot.
RamDrive to PCMCIA	Copies files from the system's RAM Drive to an SRAM PC Memory Card. This option appears only if a memory card is installed in the ASA 312's PCMCIA slot.
PCMCIA to Flash	Copies files from an SRAM PC Memory Card to the system's Flash memory drive (hard drive). This option is available only if a memory card is installed in the PCMCIA slot.
PCMCIA to RamDrive	Copies files from an SRAM PC Memory Card to the system's RAM Drive. This option is available only if a memory card is installed in the PCMCIA slot.

File Delete Button

Use this button to delete a file from a Flash drive, SRAM PC Card or RAM drive.

The following options are available:

Option	Description
Flash	Displays the contents of the system's Flash memory drive (hard drive).
RamDrive	Displays the contents of the system's RAM Drive.
PCMCIA	Displays the contents of the SRAM PC Memory Card. This option is valid only if a memory card is installed in the PCMCIA slot.

To delete a file:

1. Select the File Delete button.
2. Select the Disk command and select a drive.

   Files on the selected drive appear in the scroll box. Use the Up and Down arrows to highlight a file.

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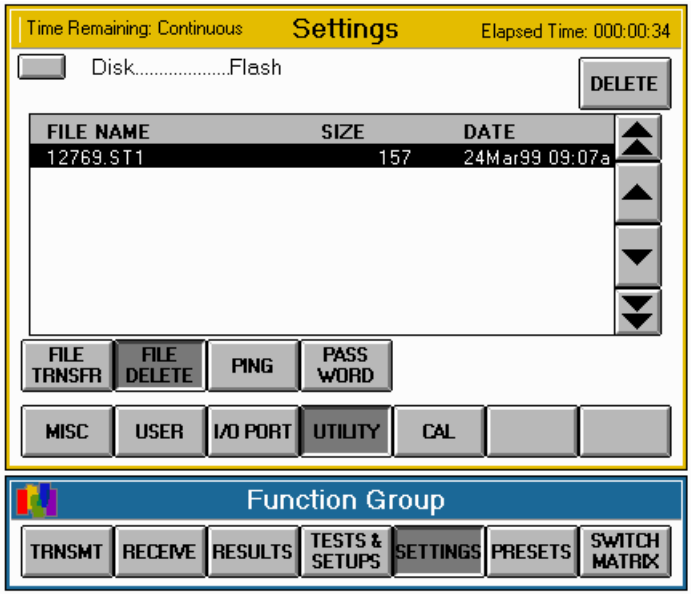


Figure 10-7. Deleting a File

3. Select Delete.

   A message appears confirming that you want to delete the file. Select OK.

   The file is deleted.

Ping Button

This button allows you to test the connection between your IP Addressed ASA 312 and another device with an IP Address on a network.

Ping is valid only if your ASA 312 is licensed for Ethernet.

NOTE ➤
This function is not available for use with the NAA I.◄

To Ping an IP Address:

1. Select the IP Address command and enter a valid IP address. (Use the touch screen keypad to enter the IP Address.)
2. Select the Ping Command button that appears below the IP Address command.

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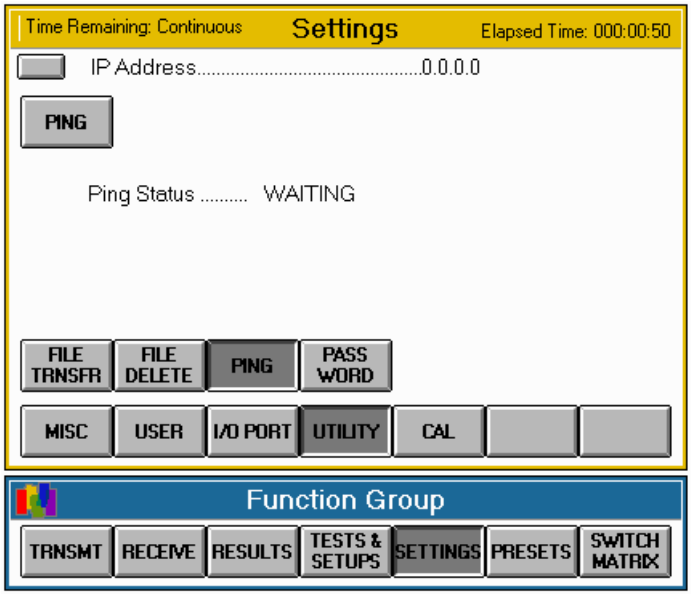


Figure 10-8. Using Ping

The Ping Status displays a Success or Failed message. (Waiting is the initial Ping Status message.)

SRAM PC Card Battery Status and Format Function

A battery status for any SRAM PC Card (PCMCIA) installed in the ASA 312's PCMCIA slot is available. This provides a way to determine if the SRAM PC Card's battery is running low and needs to be replaced. It is important to know the condition of your memory card before you attempt to reformat the card and then copy critical files from your ASA 312 to the memory card.

The battery status appears when the SRAM PC Card is present and the File Delete button is pressed.

NOTE ➤
This function is not available for use with the NAA I.◄

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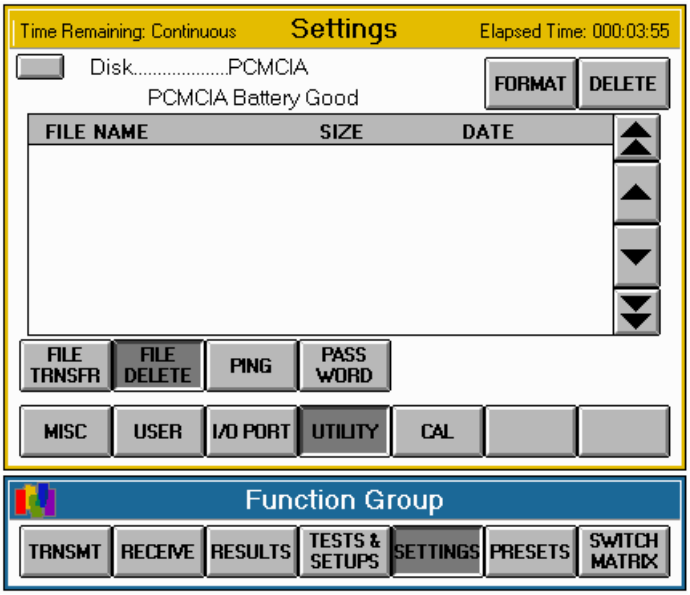


Figure 10-9. SRAM PC Card Battery Status

The battery status reports one of the following values:

- PCMCIA Battery Good
- PCMCIA Battery Low
- PCMCIA Battery Dead

Password Button

This button controls Password security for the Remote Access Manager software. For more information, refer to appendix F, *ASA 312 Remote Operations*. For more information on RAM Password security, refer to chapter 2.

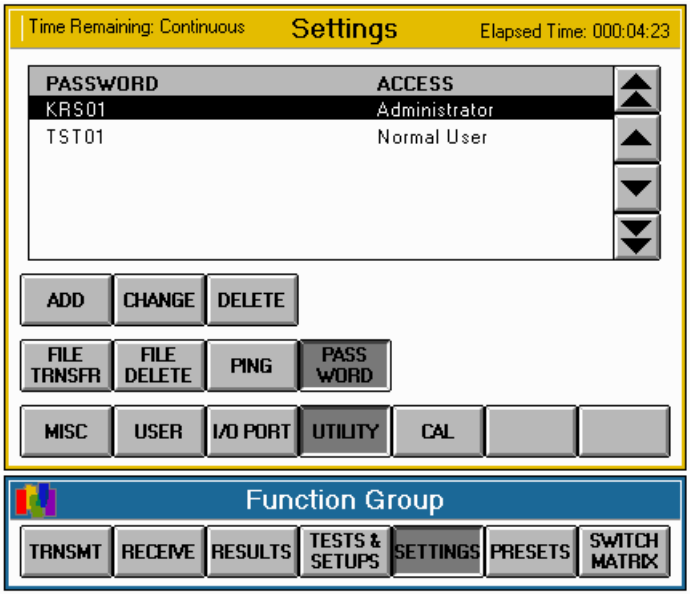


Figure 10-10. Password Security for Remote Access Manager Software

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CAL

The CAL button controls the unit's calibration. The ASA 312 is unique in that you can calibrate the unit in the field or on-site.

The ASA 312's calibration procedure is described in detail in the *ASA 312 Calibration Manual*. Refer to this manual for calibration procedures.

NOTE ➤
This function is not available for use with the NAA I.◄

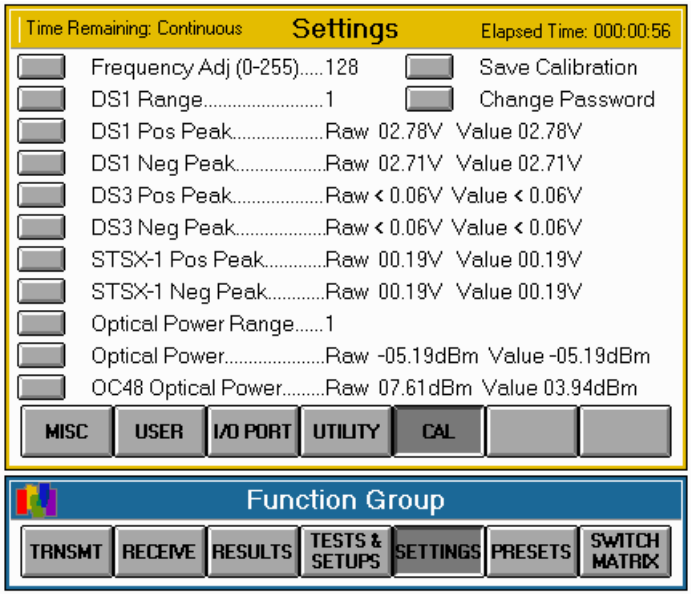


Figure 10-11. Calibration Commands

The following describes the commands associated with the CAL button.

Frequency Adj (0-255) Allows you to set the internal time base of the ASA 312. Frequency Adjustment values range from 0 to 255 and are entered using a touch screen keypad.

DS1 Range Sets the gain, or scale, applied to the DS1 Signal. There are eight calibration values available:

1	8
2	16
4	32
8	64

DS1 Pos Peak Allows you to enter the positive peak range for the DS1 signal as recorded by an attached oscilloscope. Use the touch screen keypad to enter this value.

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DS1 Neg Peak Allows you to enter the negative peak range for the DS1 signal as recorded by an attached oscilloscope. Use the touch screen keypad to enter this value.DS3 Pos Peak

Allows you to enter the positive peak range for the DS3 signal as recorded by an attached oscilloscope. Use the touch screen keypad to enter this value.

DS3 Neg Peak Allows you to enter the negative peak range for the DS3 signal as recorded by an attached oscilloscope. Use the touch screen keypad to enter this value.

STSX-1 Pos Peak Allows you to enter the positive peak range for the electrical signal as recorded by an attached oscilloscope. Use the touch screen keypad to enter this value.

STSX-1 Neg Peak Allows you to enter the positive peak range for the electrical signal as recorded by an attached oscilloscope. Use the touch screen keypad to enter this value.

Optical Power Range Sets the optical power range. There are four calibration ranges available for this command:

1	3
2	4

Optical Power Allows you to enter the optical power as measured by an optical power meter. Use the touch screen keypad to enter this value.

OC48 Optical Power Sets the optical power measurements for the OC-48 hardware. This command is available only if the OC-48 option is installed.

Save Calibration Allows you to save any calibration value changes. You must enter a calibration password for the ASA 312 to accept the new values. Use the touch screen keypad to enter the password.

Change Password Allows you to create and save a new calibration password. Use the touch screen keypad to enter a new password.

INFO

Detailed configuration information is available under the **INFO** button. It contains license, board, and hardware-related information about your NIC ASA 312 or NAA I.

To view your unit's configuration information:

1. Under the Function Group button row, select **SETTINGS**.
2. Select **INFO**.
3. A button row appears. You many select from the following buttons:
   - **About:** Contains owner license and software version information.
   - **License:** Contains the licensed capabilities included on your unit. For example: OC-12, OC-48, Remote, Ethernet.

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- **Boards:** Contains processor speed and board numbers and options. For example: Jitter, ATM, OC-48.
- **Hardware:** Contains hardware-related information such as laser and port types.

Presets Function Group

There are several automatic mappings and configurations (known as Presets) that quickly and conveniently set up the system for operation. Each preset configuration contains some of the more commonly used settings for each protocol processor.

Use the Presets button to set up a protocol processor for a specific mapping and configuration, and then, if necessary, select specific protocol processor commands to customize the unit's configuration.

The Presets button can be quickly accessed from two locations by:

- Selecting the Presets Function Group button, or
- Selecting the Switch Matrix Function Group button and then the Presets button.

After selecting Presets, the following options appear:

NOTE ➤
The preset configurations that are available vary depending on the features purchased and installed in your system. For example, if your unit is not licensed for ATM operation or configured for E1, then the ATM and/or E1 Preset options do not appear. ➤

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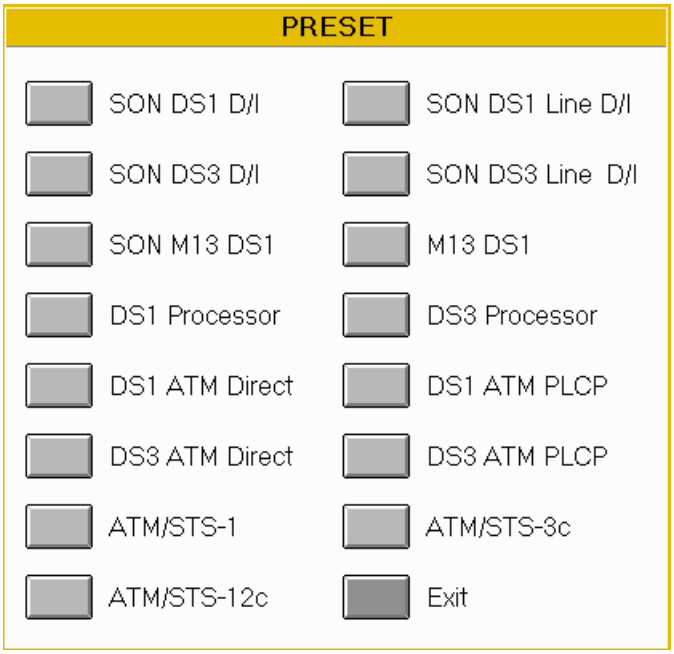


Figure 10-12. Preset Options

For a visual representation of each Preset option, refer to the specific options described later in this chapter.

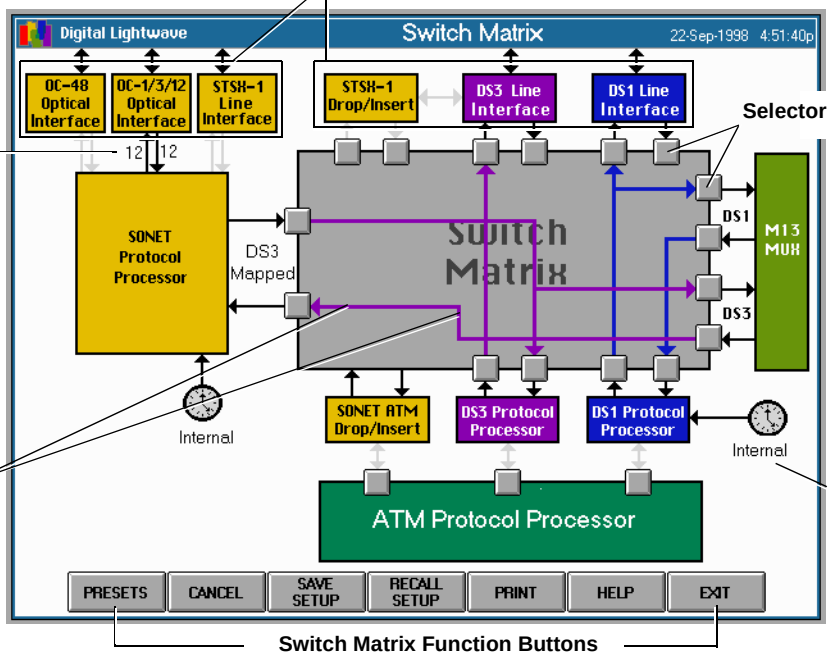
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Switch Matrix Function Group

The Switch Matrix is a unique feature of the system. It provides a graphical display of the unit's current mapping and connections between the SONET, DS1, E1, DS3, and ATM protocol processors and Line Interfaces. With the Switch Matrix, you can configure each protocol processor independently or couple any or all of the protocol processors together.

The high-speed switching fabric provides the flexibility to allow any or all of the protocol processors to provide received, generated demapped or demultiplexed traffic to the other tests sets for analysis, mapping, multiplexing, demultiplexing or transmission. This allows you to customize your configuration beyond the normal settings of the Presets Function Group button.

The following figure describes the different areas of the Switch Matrix.



Selector Buttons:
Use these blocks to make connections between various Switch Matrix Components such as protocol processors, Line Interfaces, and the M13 Mux. When a Selector Button is pressed, other Blocks are highlighted to display possible connections.

Line Interfaces:
Represent the physical electrical and optical connections to the system.

If a protocol processor is turned Off using the **Run Stop** Action Button, it is grayed-out and its Switch Matrix lines do not appear.

Figure 10-13. Switch Matrix Description (SONET M13 Mapping Shown)

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Switch Matrix Function Buttons

The following describes the Switch Matrix Function buttons.

Switch Matrix Function	Description
Presets	Provides automatic configuration for the most commonly used test configurations.
Cancel	Aborts the selecting of a Selector button and returns to normal Switch Matrix operation.
Save Setup	Saves a customized Switch Matrix configuration.
Recall Setup	Retrieves or deletes a Setup File from memory.
Print	Prints the current Switch Matrix that appears on the screen.
Help	Accesses the ASA 312's Help Menu. **Note:** This function is not available for use with the NAAI.
Exit	Closes the Switch Matrix and return to the regular screen.

Using the Switch Matrix (Example)

The following describes how to use the switch matrix to create a mapping between the DS1 protocol processor and the SONET protocol processor.

The system is currently configured for ATM/STS-3c mapping as illustrated in the following figure.

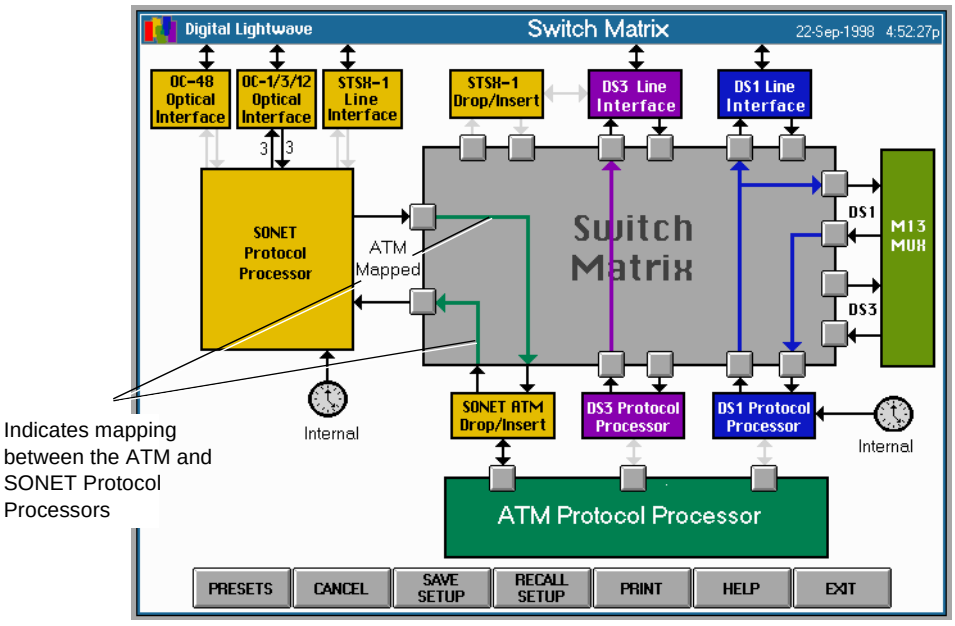


Figure 10-14. Current Configuration (Example)

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1. Select the Transmit Selector Button located above the DS1 protocol processor.

   The Transmit Selector Button displays as a depressed button while the possible connections between the DS1 Line Interface, M13 Mux, and SONET protocol processor display as highlighted selectors.

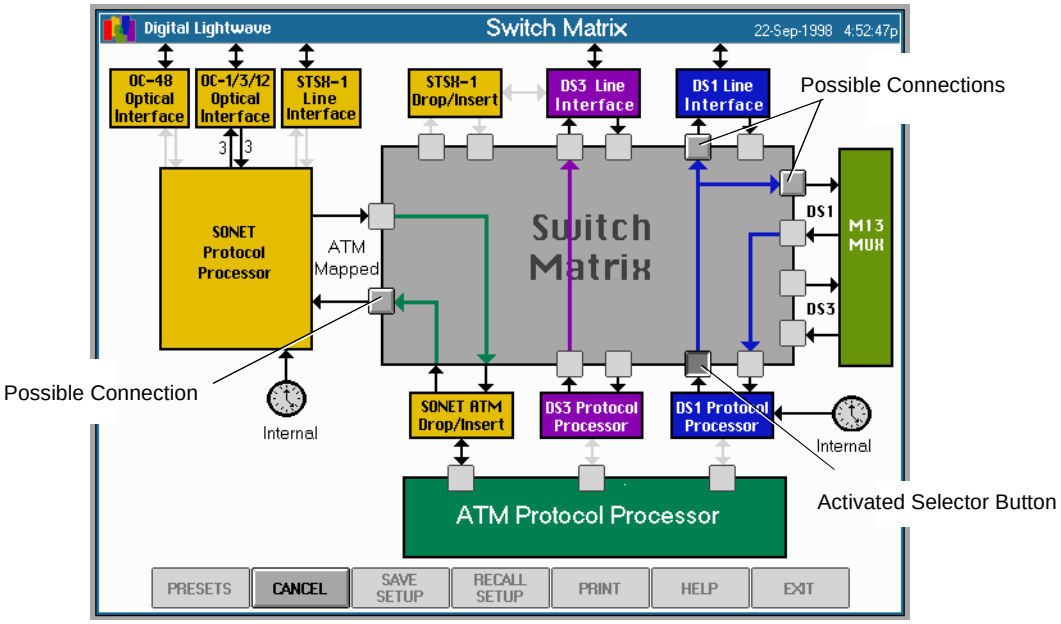


Figure 10-15. Possible Connections from the DS1 Protocol Processor (Example)

2. Selects the Receive Selector Button on the SONET protocol processor.

   Since this mapping requires a change from the current ATM Mapping, a Warning dialog appears. To continue with the new mapping, press OK. The message Processing...Please wait appears.

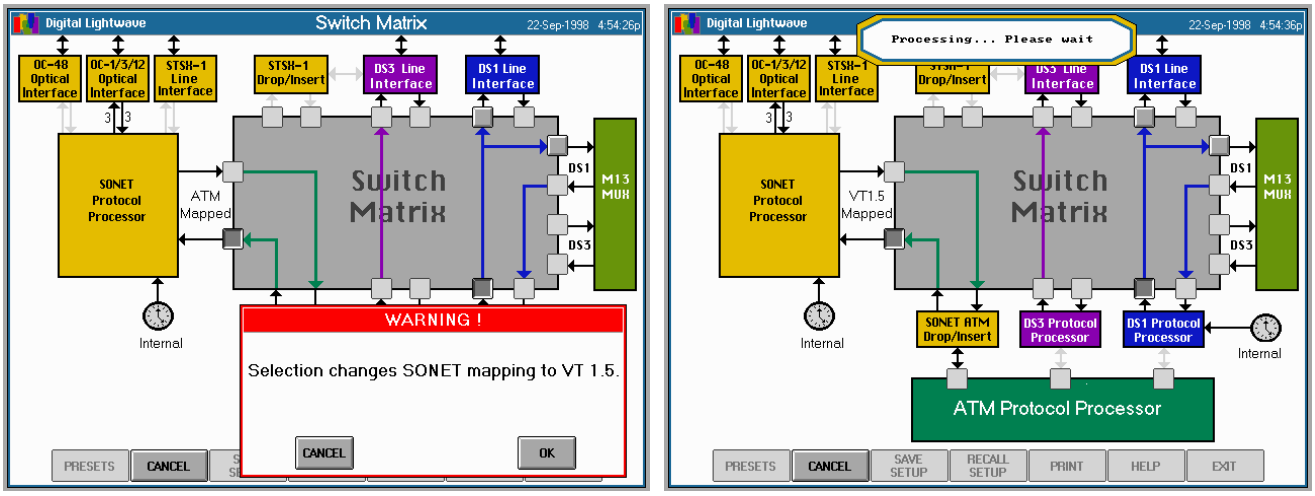


Figure 10-16. Mapping the DS1 to SONET

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After a few moments, the new mapping is made between the DS1 protocol processor and the SONET protocol processor.

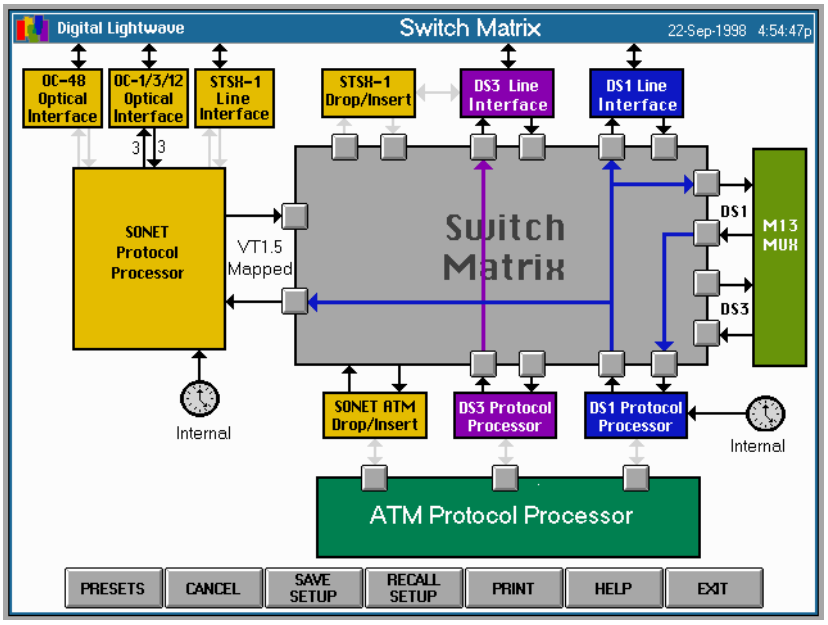


Figure 10-17. Completed Mapping between DS1 and SONET

Switch Matrix Presets

There are several preset mappings and configurations that quickly and conveniently set up the system for operation. Presets can be selected by selecting either the Presets Function Group button or by selecting the Presets button from the Switch Matrix.

NOTE ➤
The preset configurations that are available vary depending on the features purchased and installed in your system. For example, if your unit is not licensed for ATM operation or configured for E1, then the ATM and/or E1 Preset options do not appear. ◄

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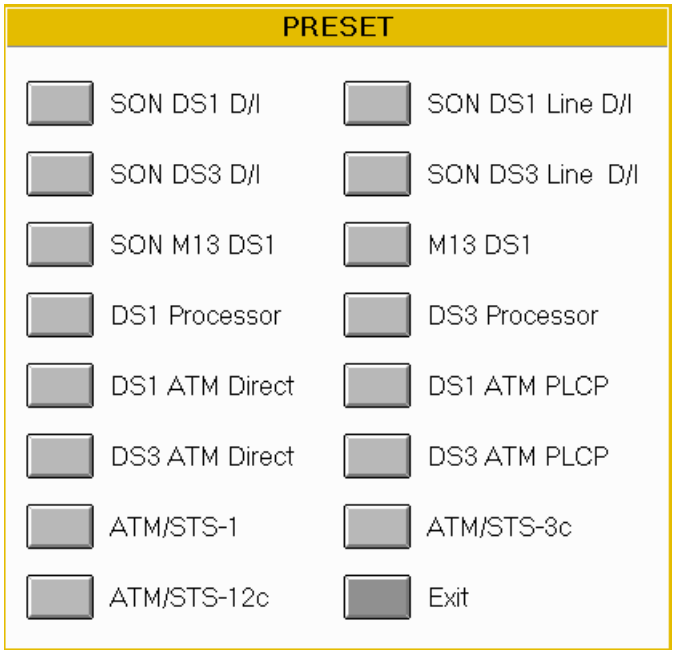


Figure 10-18. Presets Options

The following examples illustrate possible mappings that occur when you select a Preset command. Note that the large arrows indicate the possible signal flow for that example.

SON DS1 D/I

This preset automatically makes drop and insert connections between the SONET protocol processor and the DS1 protocol processor.

In this example, the following connections are automatically made when using the SONET DS1 Drop/Insert preset:

- The DS1 protocol processor connects to the SONET protocol processor
- The SONET protocol processor connects to the DS1 protocol processor
- The DS1 protocol processor connects to the DS1 Line Interface and M13 Mux

The following figure illustrates the signal flow between the DS1 and SONET protocol processors.

NOTE ➤
The Switch Matrix lines that appear on your unit may vary depending on the unit's previous configuration. The goal of this example is to illustrate the Preset command's signal flow. ◄

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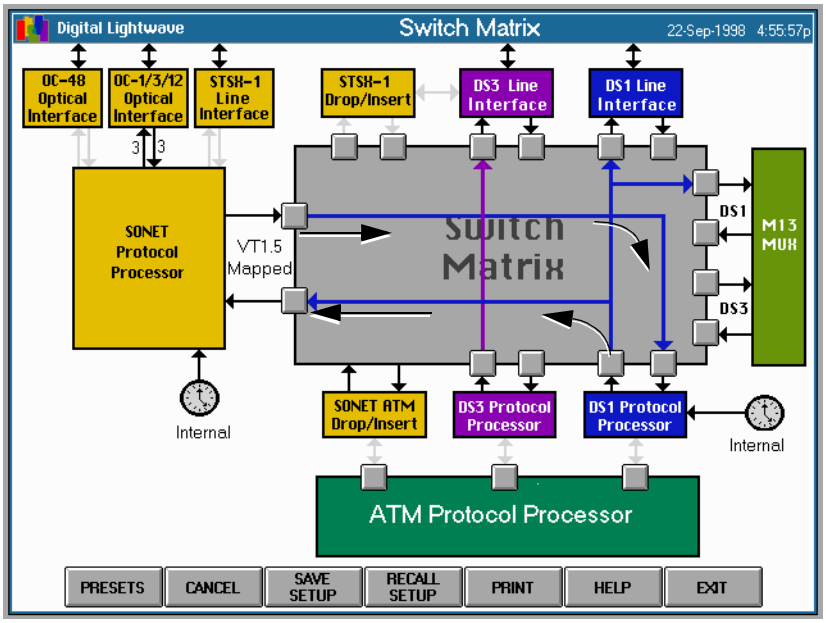


Figure 10-19. SONET DS1 Drop/Insert Preset Mapping

SON DS1 Line D/I

This preset automatically makes drop and insert connections between the SONET protocol processor and the DS1 Line Interface.

In this example, the following connections are automatically made when using the SONET DS1 Line Drop/Insert preset:

- The DS1 Line Interface connects to the SONET protocol processor and the M13 Mux
- The SONET protocol processor connects to the DS1 protocol processor and the DS1 Line Interface

The following illustrates the signal flow between the DS1 Line Interface and the SONET protocol processor.

NOTE ➤
The Switch Matrix lines that appear on your unit may vary depending on the unit's previous configuration. The goal of this example is to illustrate the Preset command's signal flow. ➤

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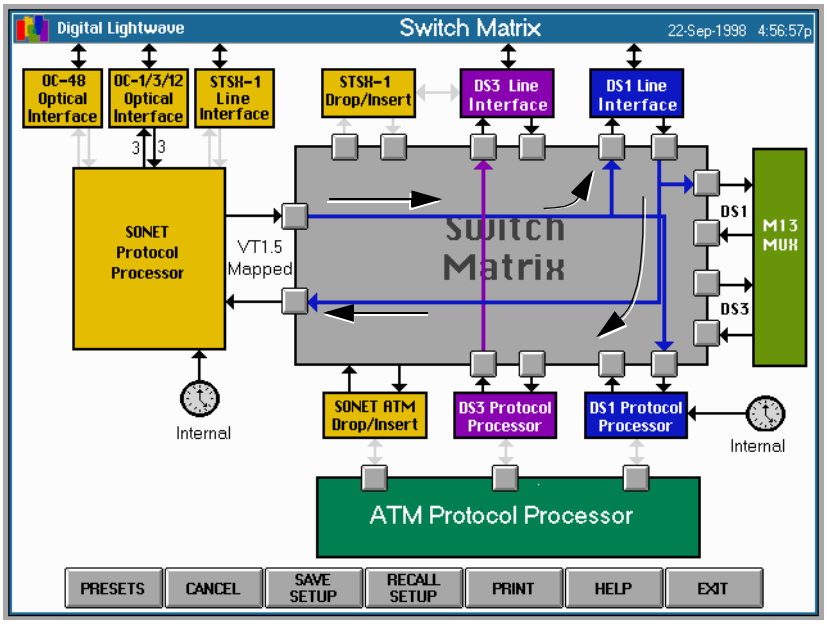


Figure 10-20. SONET DS1 Line Drop/Insert Preset Mapping

SON DS3 D/I

This preset automatically makes drop and insert connections between the SONET protocol processor and the DS3 protocol processor.

In this example, the following connections are automatically made when using the SONET DS3 Drop/Insert preset:

- The DS3 protocol processor connects to the SONET protocol processor and DS3 Line Interface
- The SONET protocol processor connects to the DS3 protocol processor and the M13 Mux DS3 input
- The DS1 Line Interface connects to the M13 Mux

The following figure shows the signal flow between the DS3 protocol processor and the SONET protocol processor.

NOTE ➤
The Switch Matrix lines that appear on your unit may vary depending on the unit's previous configuration. The goal of this example is to illustrate the Preset command's signal flow. ➤

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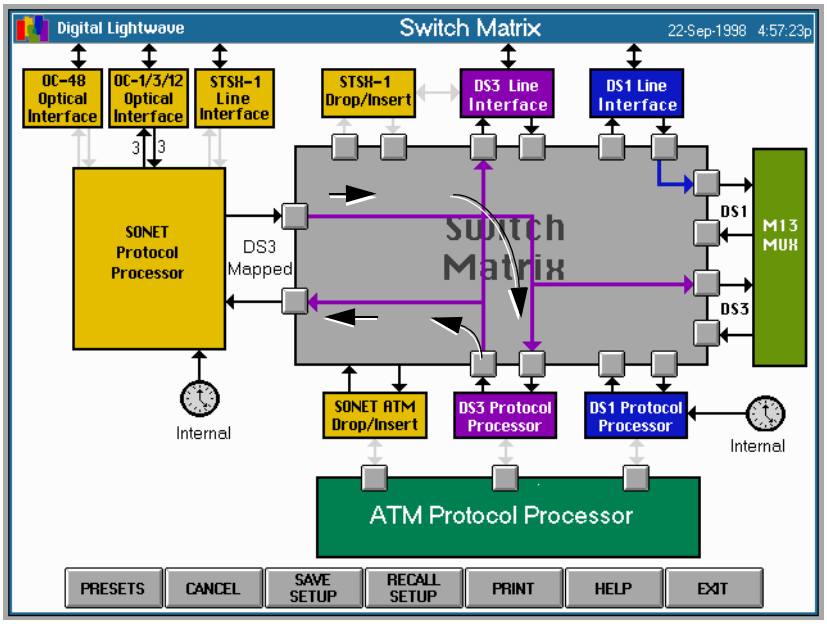


Figure 10-21. SONET DS3 Drop/Insert Preset Mapping

SON DS3 Line D/I

This preset automatically makes drop and insert connections between the SONET protocol processor and the DS3 Line Interface.

In this example, the following connections are automatically made when using the SONET DS3 Line Drop/Insert preset:

- The DS3 Line Interface connects to the SONET protocol processor
- The SONET protocol processor connects to the DS3 Line Interface, the DS3 protocol processor, and the M13 Mux DS3 input
- The DS1 Line Interface connects to the M13 Mux

The following figure shows the signal flow between the DS3 Line Interface and the SONET protocol processor.

NOTE ➤
The Switch Matrix lines that appear on your unit may vary depending on the unit's previous configuration. The goal of this example is to illustrate the Preset command's signal flow. ➤

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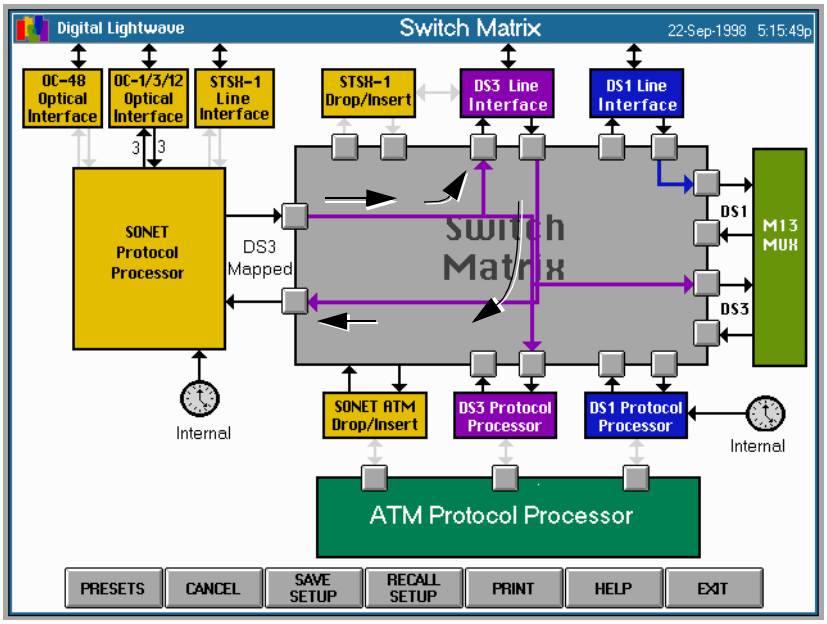


Figure 10-22. SONET DS3 Line Drop/Insert Preset Mapping

SON M13 DS1

This preset automatically transmits a DS1 signal from the DS1 protocol processor to the M13 MUX, and out to the SONET protocol processor. Received signals from the SONET protocol processor are sent to the M13 MUX and returned to the DS1 protocol processor.

In this example, the following connections are automatically made when using the SONET M13 DS1 preset:

- The M13 multiplexer DS1 output to the DS1 protocol processor,
- The M13 multiplexer DS3 output to the SONET protocol processor
- The DS1 protocol processor to the DS1 Line Interface and the M13 multiplexer
- The SONET protocol processor to the DS3 Line Interface, the DS3 protocol processor, and the M13 multiplexer DS3 input

The following illustrates the signal flow starting from and returning to the DS1 protocol processor.

NOTE ➤
The Switch Matrix lines that appear on your unit may vary depending on the unit's previous configuration. The goal of this example is to illustrate the Preset command's signal flow. ➤

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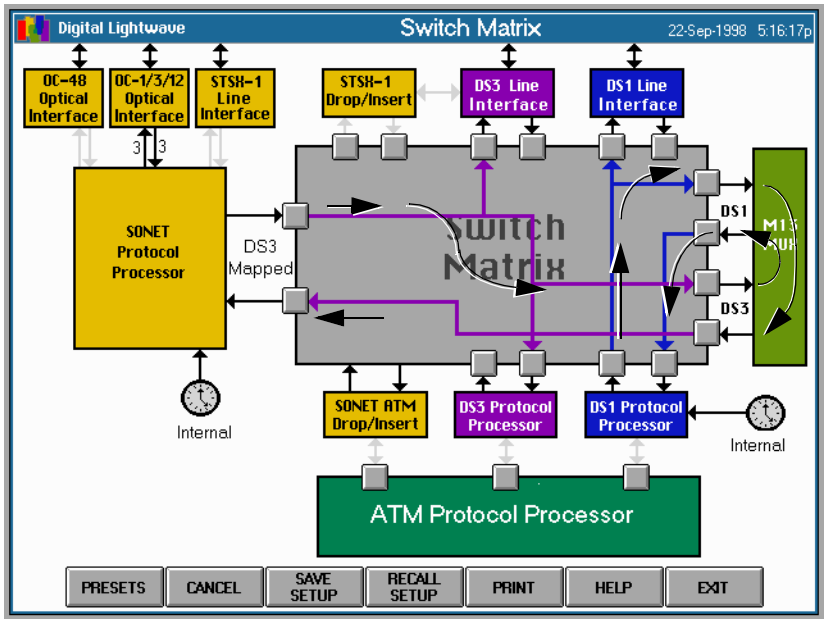


Figure 10-23. SONET M13 DS1 Preset Mapping

SON M13 E1

This preset automatically transmits an E1 signal from the E1 protocol processor to the M13 MUX, and out to the SONET protocol processor. Received signals from the SONET protocol processor are sent to the M13 MUX and returned to the E1 protocol processor.

In this example, the following connections are automatically made when using the SONET M13 E1 preset:

- The M13 multiplexer E1 output to the E1 protocol processor,
- The M13 multiplexer DS3 output to the SONET protocol processor
- The E1 protocol processor to the E1 Line Interface and the M13 multiplexer
- The SONET protocol processor to the DS3 Line Interface, the DS3 protocol processor, and the M13 multiplexer DS3 input

The following illustrates the signal flow starting from and returning to the E1 protocol processor.

NOTE ➤
The Switch Matrix lines that appear on your unit may vary depending on the unit's previous configuration. The goal of this example is to illustrate the Preset command's signal flow. ➤

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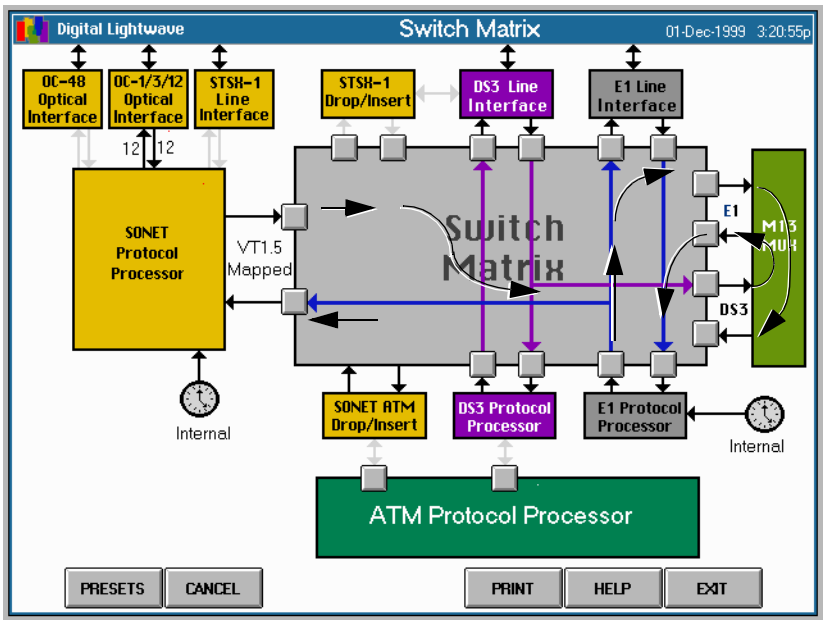


Figure 10-24. SONET M13 E1 Preset Mapping

M13 DS1

In this example, the following connections are automatically made when using the M13 DS1 preset command:

- The DS1 protocol processor to the DS1 Line Interface and M13 multiplexer
- The M13 multiplexer DS1 output to the DS1 protocol processor
- The M13 multiplexer DS3 output to the SONET protocol processor and the DS3 Line Interface
- The DS3 Line Interface to the DS3 protocol processor and M13 multiplexer DS3 input

The following illustrates the signal flow starting at and returning to the DS1 protocol processor.

NOTE ➤
The Switch Matrix lines that appear on your unit may vary depending on the unit's previous configuration. The goal of this example is to illustrate the Preset command's signal flow. ➤

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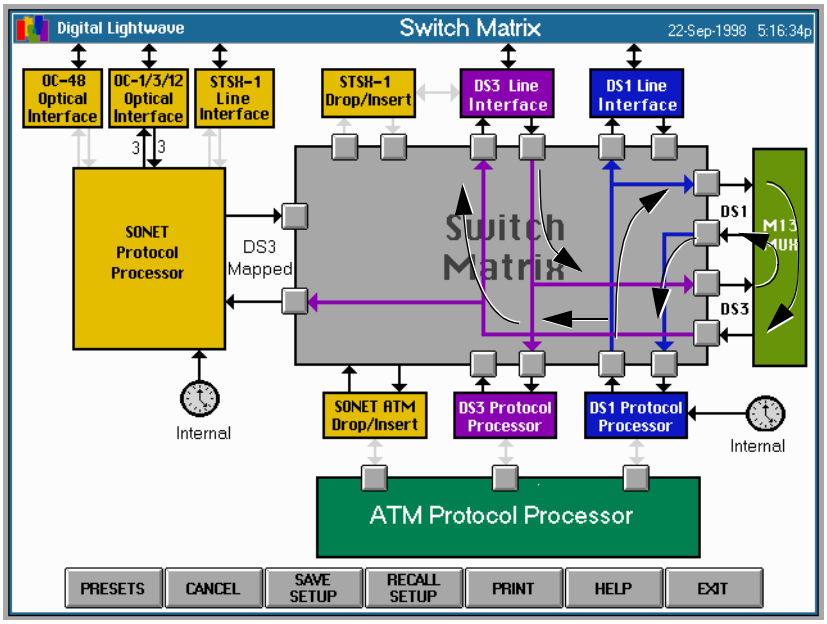


Figure 10-25. M13 DS1 Preset Mapping

M13 E1

In this example, the following connections are automatically made when using the M13 E1 preset command:

- The E1 protocol processor to the E1 Line Interface and M13 multiplexer
- The M13 multiplexer E1 output to the E1 protocol processor
- The M13 multiplexer DS3 output to the SONET protocol processor and the DS3 Line Interface
- The DS3 Line Interface to the DS3 protocol processor and M13 multiplexer DS3 input

The following illustrates the signal flow starting at and returning to the E1 protocol processor.

NOTE ➤
The Switch Matrix lines that appear on your unit may vary depending on the unit's previous configuration. The goal of this example is to illustrate the Preset command's signal flow. ➤

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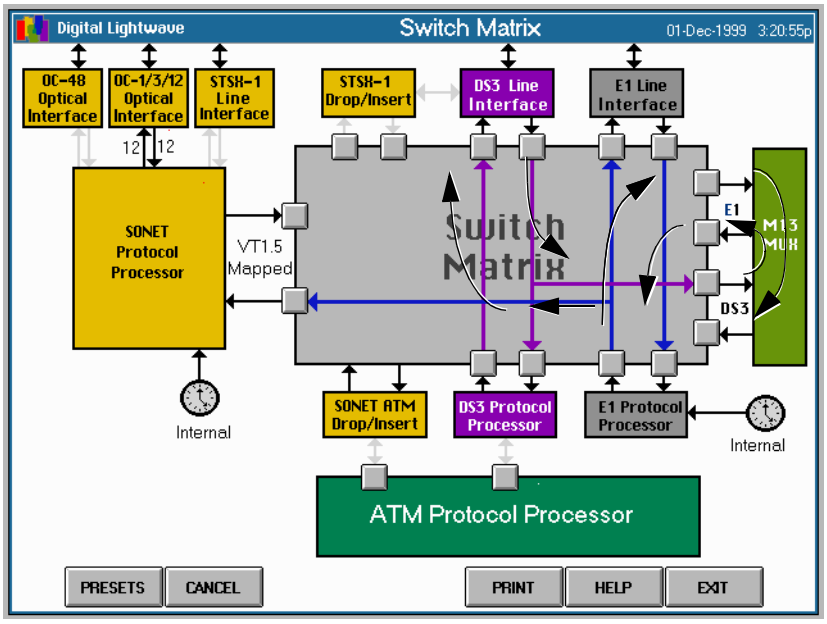


Figure 10-26. M13 E1 Preset Mapping

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DS1 Processor

In this example, the DS1 protocol processor preset makes automatic connections between the DS1 protocol processor and DS1 Line Interface and also includes connections between the SONET protocol processor and M13 Mux.

The following illustrates the signal flow between the DS1 protocol processor and DS1 Line Interface.

NOTE ➤
The Switch Matrix lines that appear on your unit may vary depending on the unit's previous configuration. The goal of this example is to illustrate the Preset command's signal flow. ◄

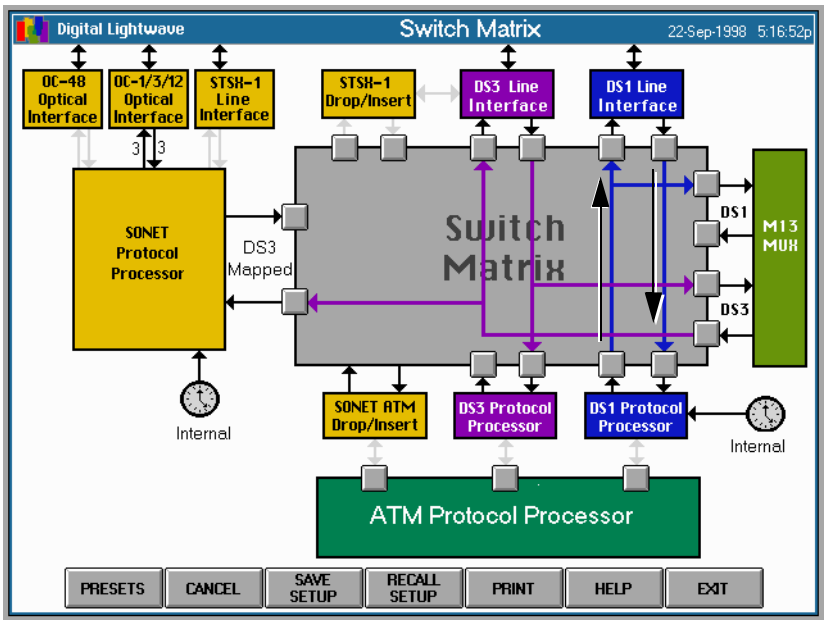


Figure 10-27. DS1 Protocol Processor Preset Mapping

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E1 Processor

In this example, the E1 protocol processor preset makes automatic connections between the E1 protocol processor and E1 Line Interface and also includes connections between the SONET protocol processor and M13 Mux.

The following illustrates the signal flow between the E1 protocol processor and E1 Line Interface.

NOTE ➤
The Switch Matrix lines that appear on your unit may vary depending on the unit's previous configuration. The goal of this example is to illustrate the Preset command's signal flow. ➤

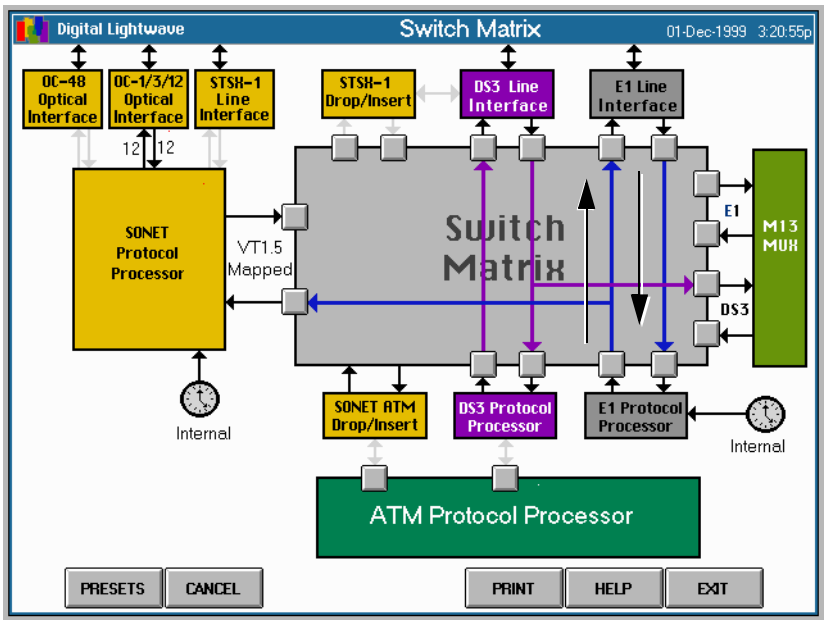


Figure 10-28. E1 Protocol Processor Preset Mapping

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DS3 Processor

In this example, the DS3 protocol processor preset makes automatic connections between the DS3 protocol processor and DS3 Line Interface as well as connections between the SONET protocol processor and M13 Mux.

The following illustrates the signal flow between the DS3 protocol processor and DS3 Line Interface.

NOTE ➤
The Switch Matrix lines that appear on your unit may vary depending on the unit's previous configuration. The goal of this example is to illustrate the Preset command's signal flow. ➤

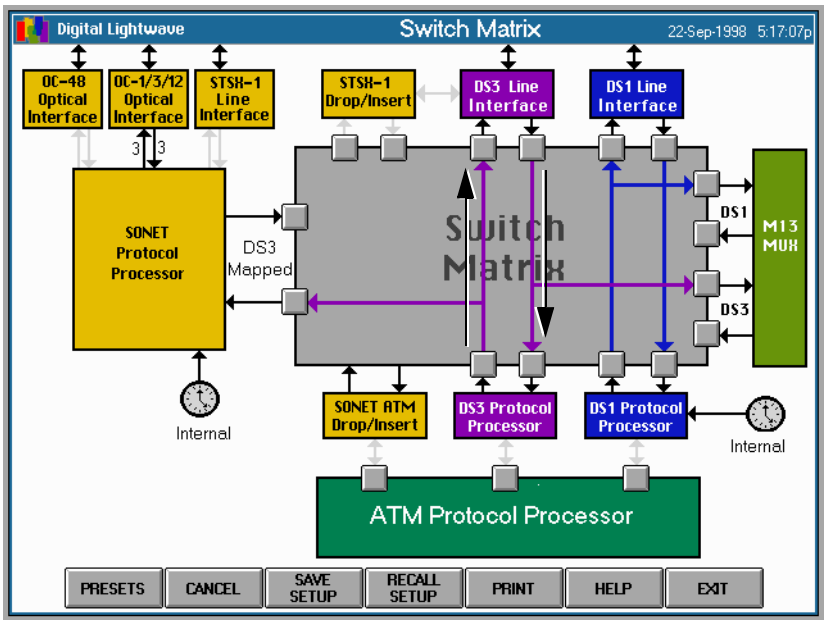


Figure 10-29. DS3 Protocol Processor Preset Mapping

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DS1 ATM Direct and DS1 ATM PLCP

In this example, the DS1 ATM presets make automatic connections between the DS1 protocol processor and ATM protocol processor.

The following illustrates signal flow between the ATM protocol processor, the DS1 protocol processor, and the DS1 Line Interface.

NOTE ➤
The Switch Matrix lines that appear on your unit may vary depending on the unit's previous configuration. The goal of this example is to illustrate the Preset command's signal flow. ➤

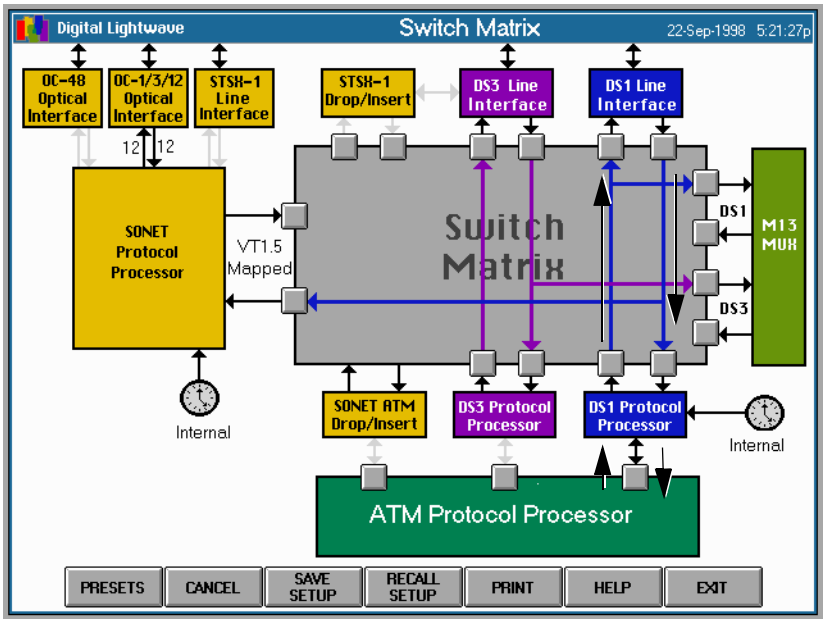


Figure 10-30. DS1 ATM Direct and DS1 ATM PLCP Preset Mappings

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DS3 ATM Direct and DS3 ATM PLCP

In this example, the DS3 ATM presets make automatic connections between the DS3 protocol processor and ATM protocol processor.

The following illustrates signal flow between the ATM protocol processor, the DS3 protocol processor, and the DS3 Line Interface.

NOTE ➤
The Switch Matrix lines that appear on your unit may vary depending on the unit's previous configuration. The goal of this example is to illustrate the Preset command's signal flow. ➤

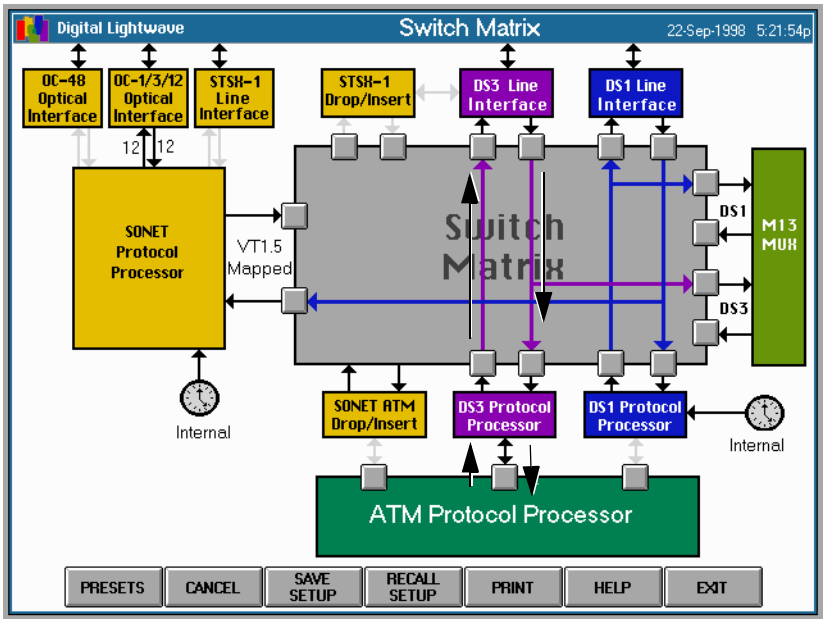


Figure 10-31. DS3 ATM Direct and DS3 ATM PLCP Preset Mappings

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ATM/STS-1, ATM/STS-3c, ATM/STS-12c, and ATM/STS-12c through OC-48

In this example, the ATM presets automatically configure either the OC-1, OC-3, or OC-12, SONET optical interfaces with the SONET protocol processor, and then maps the ATM traffic to and from the ATM protocol processor.

For ATM/STS-12c through OC-48, you must use the SONET Transmit Interface or Receive Interface commands to configure the unit for OC-48 mode, and then use the Mapping command to configure the unit for ATM.

The following illustrates this type of mapping.

NOTE ➤
The Switch Matrix lines that appear on your unit may vary depending on the unit's previous configuration. The goal of this example is to illustrate the Preset command's signal flow. ➤

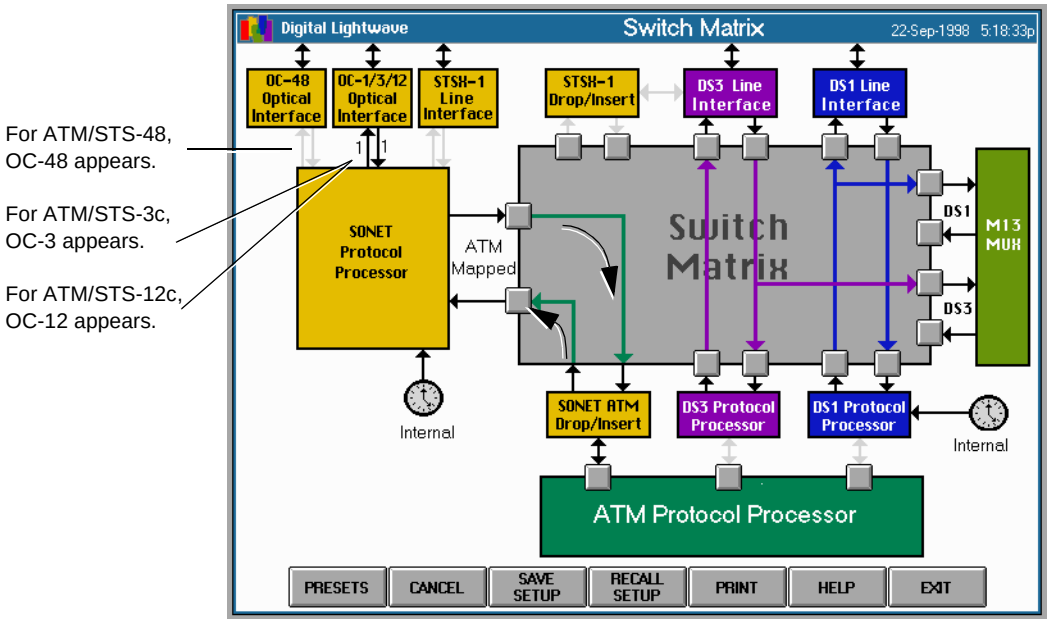


Figure 10-32. ATM/STS-1 Preset Mapping (shown)

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11 Action Button Row

Overview

This chapter describes the functions of the Action button row.

Action Button Row

The Action button row contains several task-oriented buttons that are common to all five protocol processors. The parameters for these tasks are defined by various protocol processor commands.

The following actions are available:

- **Pointer Action:** Controls the increment and decrement of the Pointer which identifies the first byte of a SONET payload.

  The range and parameters of the Pointer are controlled using the Pointer Adjustment button, a function located under the SONET Trnsmt (Transmit) Function Group button.

  This button applies to the SONET protocol processor.

- **Error Insert:** Injects single errors for the selected protocol processor.

  Error parameters are defined using the protocol processor's error commands.

- **Run Stop:** Stops and restarts protocol processors, as well as, the error and alarm results and counters.

- **Clear History:** Resets the LEDs and Status indicators (the LED text).

- **Print:** Controls printing of results, log files, and screens.

- **Auto Config:** Configures the protocol processor to match the parameters of the incoming signal.

  This action is not available for the ATM protocol processor.

- **Help:** Opens the online help.



Figure 11-1. Action Button Row

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Pointer Action

The Pointer Action button is used only by the SONET protocol processor. It serves as a start button to begin Pointer Adjustment activity. Pointer Adjustment operation is described in the Trnsmt Function Group section of chapter 4, *SONET Protocol Processor*.

By selecting the Pointer Action button, you can adjust the position of the Pointer which identifies the first byte of a SONET payload. The range and parameters of this Pointer are controlled using the Pointer Adjustment (Pointer Adj) button, a function that is located under the SONET Trnsmt Function Group button.

Using the Pointer Action button.
The following is a general set of guidelines for using the Pointer Action button:

1. Select the SONET protocol processor, and press the Trnsmt Function Group button.
2. Select the Pointer Adj button.

   The Pointer commands appear. Make the appropriate changes to these commands.

   Refer to the Pointer Adjustment section in the *SONET Protocol Processor* chapter for more information about these commands.

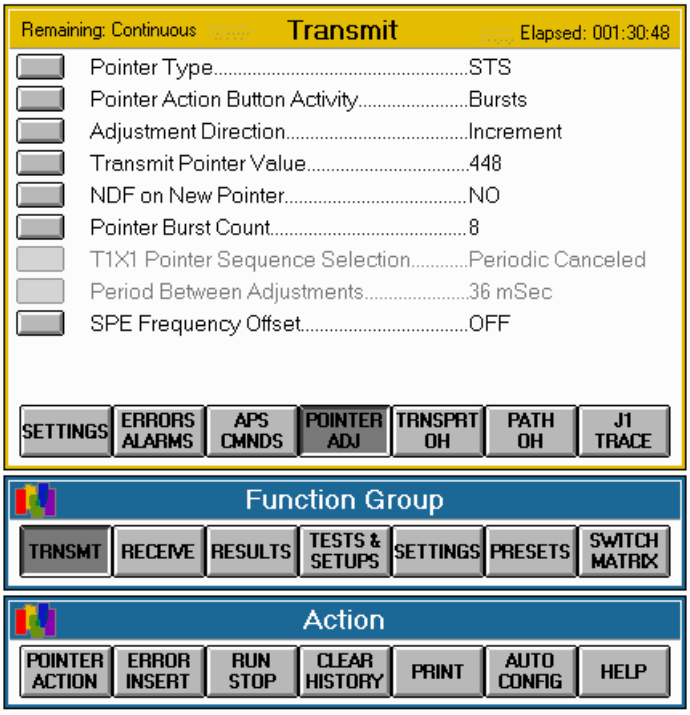


Figure 11-2. Pointer Adjustment Commands

3. After defining Pointer parameters, press the Pointer Action button to start Pointer operation.

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Pointer activity is indicated in a number of ways. For systems that receive and generate Pointer activity:

- Pointer commands, such as Transmit Pointer Value and Adjustment Direction, show Pointer movement

For systems that receive Pointer activity:

- The Ptr Adj LED flashes and the Ptr Adj text appears as red text
- The Result functions, such as Pointer results, Graphs, and Large LEDs, record Pointer movement

Error Insert

The Error Insert Action button injects single errors for the selected protocol processor.

NOTE ➤
For the ATM protocol processor:

– Multiple errors can be injected for SONET ATM mapping based on the setting of the Error Burst Count command.

– The Error Insert button is not available for ATM/DS1 and ATM/DS3 mapping. ◄

The following provides a general set of guidelines for using the Error Insert button:

For SONET, DS1, E1, and DS3 Protocol Processors

To use the Error Insert Action button for the SONET, DS1, E1, and DS3 protocol processors:

1. Select a protocol processor, and press the Trnsmt Function Group button.
2. Select the Errors Alarms button. The Type of Error Added command appears.
3. Select the Type of Error Added command, and select an error to insert.
4. Select the Error Insert Action button to inject the error.

NOTE ➤
The Error/Alarm Icon does not appear when using the Error Insert button. ◄

For the ATM Protocol Processor

To use the Error Insert Action button for the ATM protocol processor:

1. Select the ATM protocol processor and press the Functns Function Group button.
2. Select the Trnsmt button, and then press the Errors button. The Error commands appear.

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3. Select the Type of ATM Error Added command, and select an error to insert.
   – For DS1 ATM and DS3 ATM mapping, the Error Insert button is available only for Bit Errors.
4. If applicable, press the Error Burst Count command, and select a burst count. This command is available only when transmitting SONET ATM HEC errors.
5. Select the Error Insert Action button to inject the error.

NOTE ➤
The Error/Alarm Icon does not appear when using the Error Insert button. ◄

Run Stop

The Run Stop Action button has two basic functions:

- First, it enables and disables protocol processors
- Second, it stops and restarts:
  – The Error counters that appear in the Results Function Group
  – The Alarm counters that appear in the Results Function Group
  – The Elapsed Time counter (that appears in the top right corner of the Function Menu) for the specific protocol processor

The following describes the various commands associated with the Run Stop Action button.

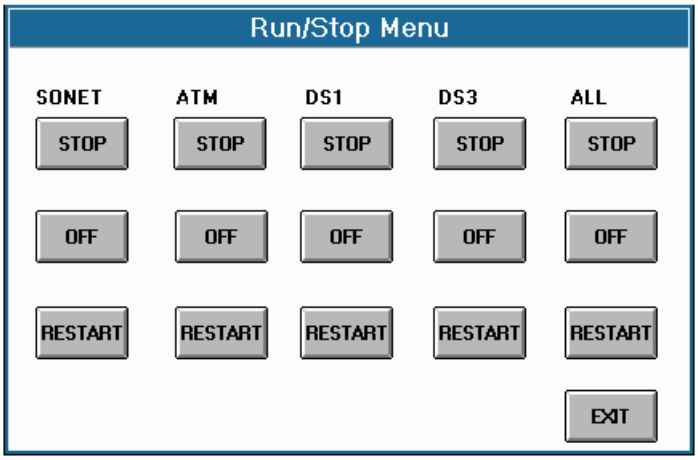


Figure 11-3. Run Stop Menu

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Stop

The Stop button stops the current test that is running on the protocol processor. The incrementing time of the test is stopped and the various result values are frozen. Any errors that are automatically generated continue even though the Stop option is selected.

To stop the counter for a current error or alarm test:

1. Select the Run Stop Action button.
2. Select the Stop button for the specific protocol processor.

   The counters appearing under the Results Function Group button stop, and the Elapsed Time counter stops.
3. Select either the Exit button to close the Run Stop Menu or press the Restart button to reset and start the counters.

Off

The Off button disables a specific protocol processor. When this occurs, the protocol processor cannot be selected using its title bar or protocol processor button. It can only be enabled using the Restart button.

To turn off a protocol processor:

1. Select the Run Stop Action button.
2. Select the Off button for a specific protocol processor
3. Select the Exit button.

   The protocol processor's LEDs and Status Indicators are replaced with an Off-Push to Start button. The protocol processor is now disabled.

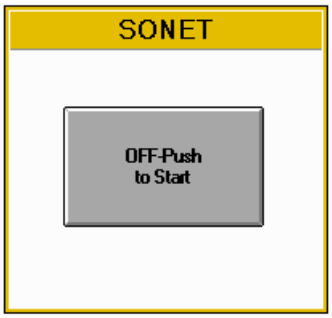


Figure 11-4. Disabled SONET Protocol Processor

To start a protocol processor:

1. Select the Off-Push to Start button.
2. Select the Restart button for the specific protocol processor.

   The protocol processor's LEDs and Status Indicators appear, and the protocol processor is enabled.

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Restart

The Restart button has two functions:

- Enabling a protocol processor
- Clearing and resetting result and event counters and timers.

If a protocol processor is disabled (using the Off button), then it can be enabled using the Restart button. When pressed, the Off-Push to Start button is replaced by the protocol processor's LEDs and Status Indicators.

The Restart button is also used to clear and reset the Error and Alarm counters that appear under the Results Function Group. When pressed, the Elapsed Time counter and various result values are all zeroed, a new test run starts, and the Status Indicators are reset to black text and cleared.

Clear History

The Clear History button resets all LEDs and Status Indicators (the LED text).

The LEDs and status indicators illuminate to show current and past alarm and error activity. The LEDs appear as small boxes that change color based on the current condition of the alarm, error, or signal it represents. The Status indicators appear as the LED text and reports the history of the alarm, error, or signal it represents.

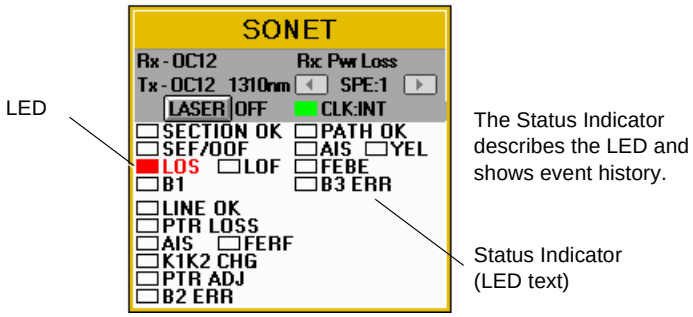


Figure 11-5. LEDs and Status Indicators

The Status Indicator appears as red text if an event has occurred for a specific alarm or error. By selecting the Clear History button, the Status Indicator returns to black text. As soon as another error or alarm is detected, the text automatically turns red indicating that a history is associated with this alarm or error.

NOTE ➤
The Clear History button does not reset error counts, alarm counts, or data that appear in graphs. To clear this data, use the Run Stop action button. ◄

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The following describes the various conditions for the LEDs and Status Indicators:

If the LED and Status Indicator is ...	Then it indicates.
Green (LED only)	The LED is functioning as a status indicator and indicates a normal operating condition.
Clear with black text	The LED is functioning as an error/alarm indicator and indicates a normal operating condition. (No errors or alarms.)
Red with red text	An alarm or error is occurring.
Clear with red text	An alarm or error was detected, but is now cleared.

Print

The Print button allows a variety of alarm and error results, reports, and logs to be printed to a parallel or serial printer attached to the system or saved as a file.

Print destinations (printer or file) differ depending on whether you are printing from:

- An ASA 312 touch screen
- An ASA 312 using the RAM software
- An NAA I using the RAM software

Each of these scenarios and their corresponding destination are listed below.

Print Function	ASA 312 Touch Screen	ASA 312 with RAM	NAA I with RAM
Screen Print	Prints to the printer attached to the ASA 312; does not print to file.	Prints to the printer attached to the PC; does not print to file.	Prints to the printer attached to the PC; does not print to file.
Results	Prints to the printed attached to the ASA 312 or an be saved as a file on the ASA 312.	Prints to the PC's printer or can be saved as a file to the PC.	Prints to the PC's printer or can be saved as a file to the PC.
Print Report Files	Prints to the printer attached to the ASA 312; does not print to a file.	Prints to the PC's printer or can be saved as a file to the PC.	Does not print to an attached printer or file.
Event Log	Prints to the printer attached to the ASA 312 or can be saved as a file on the ASA 312.	Prints to the PC's printer or can be saved as a file to the PC.	Prints to the PC's printer or can be saved as a file to the PC.

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Print Function	ASA 312 Touch Screen	ASA 312 with RAM	NAA I with RAM
SCPI	Prints to the printer attached to the ASA 312; does not print to a file.	Prints to the PC's printer or can be saved as a file to the PC.	Does not print to an attached printer or file.

Screen Print

Copies an image of the current screen and sends this image to the selected parallel or serial printer. This option is not available if the Printer Port command is configured for File (also known as Print to File). The Screen Print option is the only printing option available for the ATM protocol processor.

Results

Prints the error and alarm results for the protocol processor that currently appears on the screen. These results can also be viewed by selecting the Main Results button located under the Results Function Group button. This option is not available for the ATM protocol processor.

Printing Results to a Printer

To print the Error and Alarm results to an attached printer for either the SONET, DS1, E1, or DS3 protocol processors:

1. Select the SONET, DS1, E1, or DS3 protocol processor.
2. Select the Print action button and press Results.
   A Print confirmation message appears.
3. Select Yes.

   The Error and Alarm results for the selected protocol processor are printed to the attached printer.

Printing Results to a File

To print (save) Error and Alarm results to a file for either the SONET, DS1, E1, or DS3 protocol processors:

1. Set the Printer Port command to File.
   The Printer Port command appears by selecting the Settings Function Group button and then selecting User.
2. Select the SONET, DS1, E1, or DS3 protocol processor.
3. Select the Print action button, and press Results.
   A Print confirmation message appears.
4. Select Yes.

   The Enter Print File (*.RPT) menu appears as shown in the following figure.

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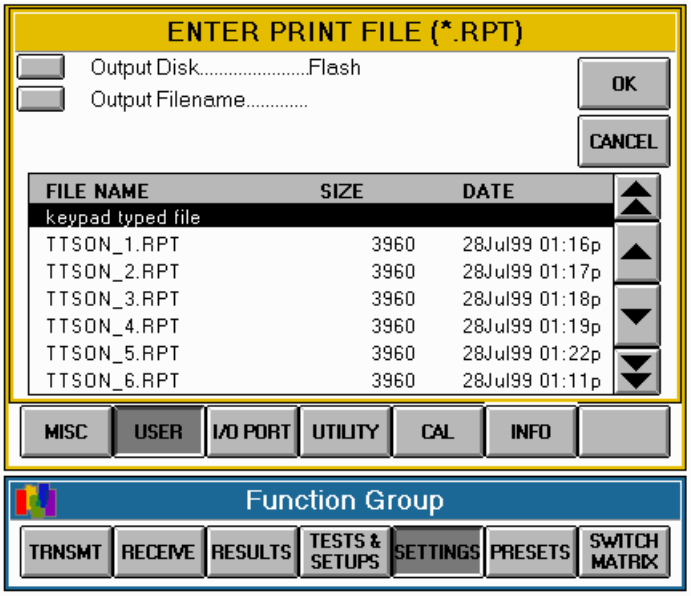


Figure 11-6. Printing Error and Alarm Results to a File

5. Select the Output Filename command, and use the touch screen keyboard to enter a filename.
6. Use the Output Disk command to select a location to save the file.
7. Select OK.
   The Error and Alarm results are saved as an .RPT file.

Print Report Files

When using the ASA 312, this function allows you to select and print any report file (*.RPT) to an attached external printer.

For an NAA I connection, this option is not valid because report files (*.RPT) are printed directly to the PC's printer or saved as an .RPT file on the PC.

The Print Report Files option is disabled if the Printer Port command is configured for File (also known as Print to File), or if a scroll list box appears on the ASA 312's touch screen.

Printing Report Files with ASA 312 Touch Screen

To print a report file using the ASA touch screen:

1. Press the Print action button, and press Print Report Files.
   A list of .RPT files (for the selected memory drive) appears.

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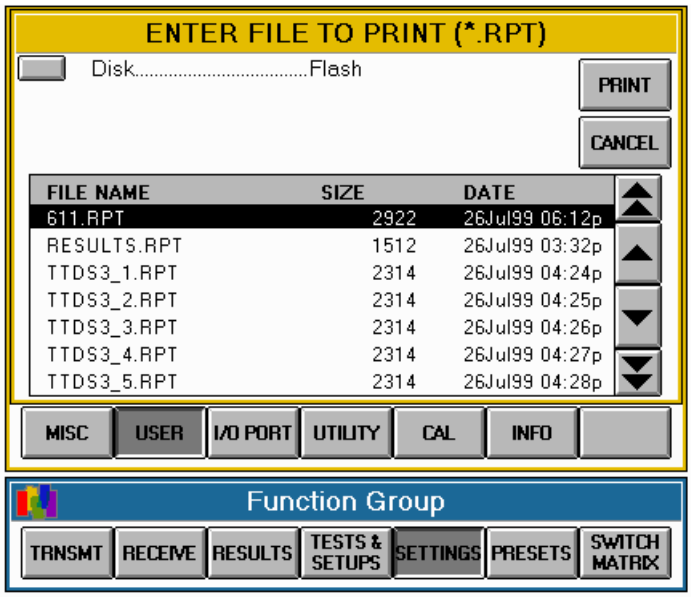


Figure 11-7. Example of .RPT Files Saved to the Flash Memory Drive

2. Use the Up and Down scroll arrows to select a file from the scroll list.

   NOTE ➤
   A timed test file appears as *TTx_y.RPT*

   where,

   TT indicates timed test.

   x indicates the protocol processor used for the timed test: DS1, DS3, E1, or SON for SONET.

   y is a value from 1 through 9 indicating sequential timed tests. When the ninth timed test is completed, the indicator starts again at 1. The ASA 312 saves the nine-most-recent timed test. Timed tests are always saved to the Flash drive.

   RPT is the report file extension. ◄

3. Press Print. A Print confirmation message appears. Press Yes.

   The report is printed to the attached printer.

Printing Report Files to Printer with ASA Running RAM

If the RAM software is connected to an ASA 312, then this option can be used to print any report file (*.RPT) that is stored on an ASA 312.

To print a report file that is stored on an ASA 312:

1. Select the Print action button, and click Print Report Files. The Enter File to Print (*.RPT) window appears.

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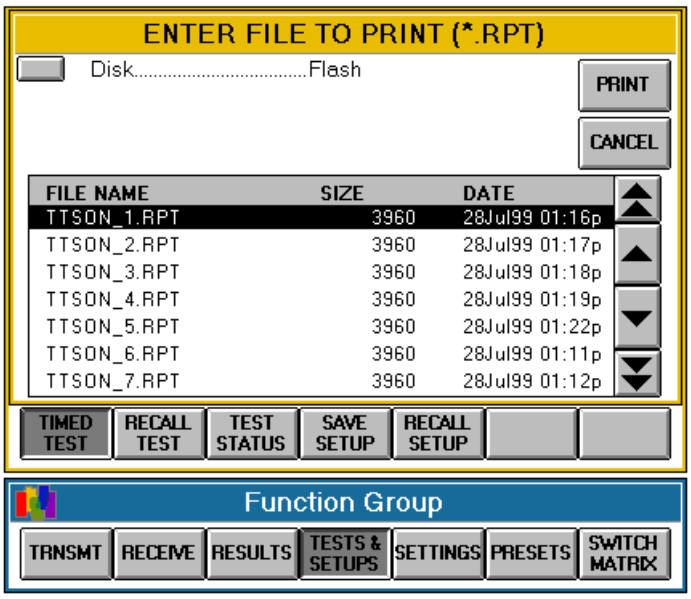


Figure 11-8. Existing Report Files Stored on an ASA 312

2. Use the scroll arrows to highlight and select a report file.
3. Select the Print button that appears above the scroll list.
   A Print confirmation message appears.
4. Select Yes.

   The Windows Print dialog appears.
5. Select OK.

   The report file is printed.

Printing Report Files to Printer with ASA Running RAM

The Print Report File option can be used to copy an existing report file from an ASA 312 to the Remote Access Manager software directory on a PC. Use the following procedures to copy a report file when:

- A Remote Access Manager connection is made to an ASA 312 unit
- A timed test is performed before any other printing option is selected

To print (copy) a report file from an ASA 312 to a PC:

1. Click the Print action button, and click Print Report Files.
   The Enter File to Print (*.RPT) window appears.
2. Use the scroll arrows to highlight and select a report file stored on the ASA 312.
3. Click the Print button that appears above the scroll list.
   A Print confirmation message appears.
4. Click Yes.The Windows Print dialog window appears. (The Print to File option is checked.)
5. Click OK. The Save As dialog appears.

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6. Enter a filename. The report can be saved as an .RPT or .TXT file. (The default directory is the same as the Remote Access Manager's directory.)
7. Click Save.
   The report file is saved to the PC.

Event Log

Prints an event log for a specific protocol processor or all protocol processors currently installed in the system to an attached printer or file.

IMPORTANT ➤
There are subtle differences between printing an Event Log using an ASA 312 touch screen and ASA 312 connected to an NAA I or RAM software.

When using an ASA 312 connected to an NAA I or RAM software, the data gathering process is started by selecting the Start button from the Event Log menu; however, printing cannot be initialized until Stop is selected, and Start is selected from the menu.

When using an ASA 312 touch screen, the process is continuous and does not require selecting Stop to print. ➤

Printing processes for each scenario are documented in detail in the following sections.

Print Event Log using ASA 312 Touch Screen

To start printing an Event Log to a printer or file using the ASA 312:

1. Select the Print action button, and press Event Log.
   The Event Log Menu appears.
2. Select Run for a specific protocol processor or all protocol processors from the Event Log Menu.

   A print confirmation message appears.
3. Select Yes.
   The Print dialog appears.
4. Select OK.
   The system starts printing Event Log statistics to either the attached printer or to a report (.RPT) file.

To stop printing an Event Log:

1. Select the Print action button, and press Event Log.
2. Select Stop for the specific protocol processor or all protocol processors from the Event Log Menu. The system stops printing Event Log statistics.
3. Select Exit to close the Event Log Menu.

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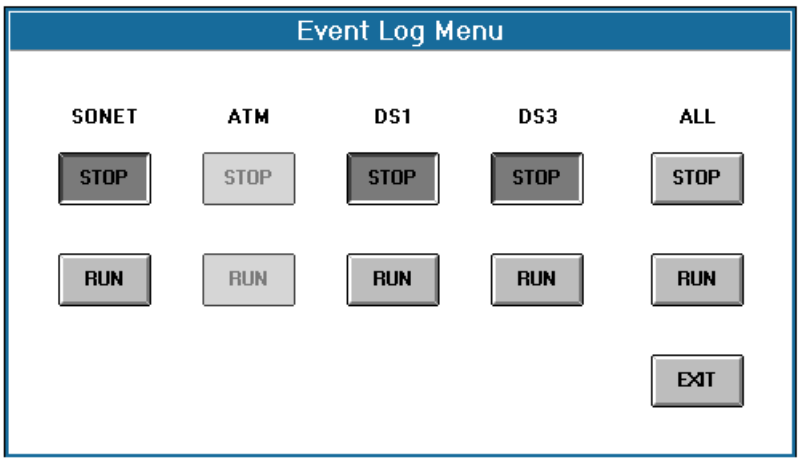


Figure 11-9. Event Log Menu

Print Event Log using ASA 312 Connected to NAA I or RAM

To start an Event Log when printing to a file or printer using an ASA 312 connected to an NAA I or the RAM software:

1. Select the Print action button and then select Event Log.
   The Event Log Menu appears.
2. Select Run for a specific protocol processor or all protocol processors from the Event Log Menu.

   A Print confirmation message appears.
3. Select Yes.

   The Print dialog appears.
4. Select OK.

   The Save As dialog appears.
5. Enter a filename. The Event Log can be saved as an .RPT or .TXT file. (The default directory is the same as the Remote Access Manager software's directory.)
6. Select Save.
   The Remote Access Manager starts collecting Event Log statistics. This continues until the Event Log is stopped.

To stop and print an Event Log to a file or printer:

1. Select the Print action button , and then select the Event Log button.
   The Event Log menu appears.
2. Select Stop for a specific protocol processor or for all protocol processors from the Event Log Menu.
   The Remote Access Manager stops collecting Event Log statistics, and then updates and saves the file.
3. Select Exit to close the Event Log menu.

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SCPI Log File

Prints a SCPI Log file (*.SCP) to the selected printer. A SCPI Log file is the output created when a SCPI script is used to control and operate the system.

The functionality of the SCPI Log File option is similar to the functionality described previously in the *Print Report File* section. Refer to the procedures in that section to print SCPI Log files.

IMPORTANT ➤
The SCPI Log File option is not available if the Printer Port command is configured for File (also known as Print to File). ◄

IMPORTANT ➤
You cannot save an SCPI Log as a file when using the ASA touch screen. Additionally, you cannot print a SCPI Log file or save it as a file when using an NAA I running the RAM software. ◄

Using a Printer with the ASA 312

A parallel or serial printer can be attached to the ASA 312. Before using the Print function, a printer must be attached to the ASA 312 and properly configured for operation.

The following describes how to connect either type of printer to the ASA 312.

Printing Using the Parallel Port and a Parallel Printer

Use this procedure to set up and print using the ASA 312's 25-pin parallel port. This procedure requires that you have a parallel printer cable with a 25-pin male connector on one end of the cable.

To set up the ASA 312 for parallel port operation:

1. Connect the printer cable's 25-pin connector to the ASA 312's Parallel Port connector. Attach the other end of the printer cable to the printer.
2. Turn on the printer.
3. On the ASA 312, press the Settings Function Group button.
4. Press User. The printer commands appear.
5. Press the Printer Port command and select Parallel.
6. Press the Printer Selection command and select a printer.

To print:

1. Press the Print action button and select a print option.

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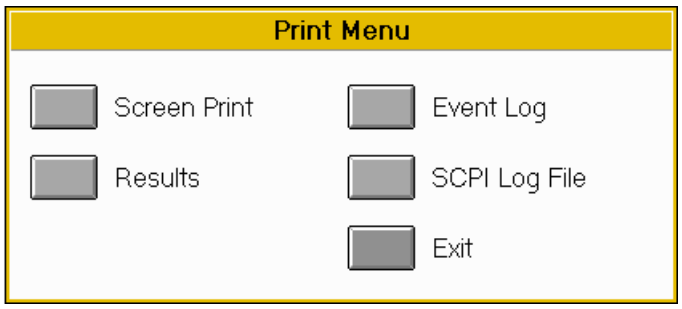


Figure 11-10. Printing Options

Printing Using the Serial Port and a Serial Printer

Use the following procedure to set up the ASA 312's serial port for printing to a serial printer. This procedure requires that you have a serial printer cable with an RS-232, 9-pin female connector on one end of the cable to connect to the ASA 312's RS-232, 9-pin male serial port.

To set up the ASA 312 for a serial printer:

1. Connect the serial printer cable's 9-pin connector to the ASA 312's RS-232 (9-pin) connector. Attach the other end of the cable to the printer.
2. Power on the printer.
3. On the ASA 312, press the Settings Function Group button.
4. Press User. The printer commands appear.
5. Press the Printer Port command and select RS-232.
6. Press the Printer Selection command and select a printer.

To print:

- Press the Print action button, and select a print option.

Printing Using the Serial Port and a Parallel Printer

If your ASA 312 does not have a 25-pin parallel port, you can use the RS-232 port to print to a parallel printer.

This requires the use of Digital Lightwave's serial-to-parallel converter and printer cable kit (Part Number ASA-PSCC). The kit consists of a custom 9-pin female to 25-pin male cable that attaches to a serial-to-parallel converter box.

Contact your Digital Lightwave Sales or Technical Support representative for ordering information.

Use the following procedures to:

- Set up the serial-to-parallel converter

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- Set up the ASA 312's serial port
- Print

The default serial port printer settings are:

- 9600 bps
- No Flow Control
- 8-N-1

The converter box uses these settings as the default configuration. The following table lists the default DIP Switch settings.

Table 11-1. Digital Lightwave Serial-to-Parallel Converter's Switch Settings

Dip Switch Number	Setting	ON	OFF
1	Flow Control (None)		X
2	Flow Control (None)		X
3	Baud Rate (9600)		X
4	Baud Rate (9600)		X
5	Baud Rate (9600)		X
6	Baud Rate (9600)	X	
7	Parity (None)		X
8	Parity (None)		X
9	Bits (8)	X	
10 (Not Used)	—	—	—
External power is not required. **Set DCE-DTE switch to DTE position.**			

If changes are made to the DIP Switch settings, refer to the Settings label on the converter box. In addition, make sure that the same changes are made to the ASA 312's serial port settings.

To set up the ASA 312 to a parallel printer using the serial port:

1. Connect the cable kit's 9-pin serial connector to the ASA 312's 9-pin serial connector.
2. Verify the converter box's settings.
3. Connect the converter box to the printer's parallel port.
4. Turn on the printer
5. On the ASA 312, press the Settings Function Group button.
6. Press User. The printer commands appear.
7. Press the Printer Port command and select RS-232.
8. Press the Printer Selection command and select a printer.
9. If you change the DIP Switch settings, continue to the Step 9. Otherwise, the setup is complete.

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10. Press the I/O Port button.
11. Press Serial and then set the Baud Rate, Parity, Stop Bits, and Data Bits commands to match the DIP Switch settings.

To print:

- Press the Print action button, and select a print option.

Auto Configuration

The Auto Config button allows you to quickly configure the SONET, DS3, E1, DS1 protocol processors to match the parameters of an incoming signal. This feature uses the same mapping, framing, line coding, and pattern characteristics as the incoming signal without having to manually configure each protocol processor.

The following configurations are available:

SONET

Detects the line rate and mapping of the incoming SONET signal. This command automatically couples the SONET protocol processor's Receive and Transmit settings.

Master Configuration

Auto-configures to the incoming SONET signal from the optical interface or the STSX-1 interface. If successful, the unit then attempts to drop a DS1 or DS3 tributary to the appropriate processor for auto configuration. If the SONET signal is DS3 mapped, and the DS3 tributary is composed of DS1 signals, then the Auto Configuration feature drops the first DS1 channel to the DS1 protocol processor for auto configuration.

If no SONET signal is present at the optical or STSX-1 interface, then the Auto Configuration feature checks the DS3 Line Interface for an incoming DS3 signal. If a signal is present, Auto Configuration attempts to configure the DS1 protocol processor to that signal. If no DS3 signal is present, then the unit attempts to configure itself based on the incoming DS1 signal.

DS3

Configures the DS3 protocol processor to the incoming signal at the DS3 Line Interface. If the DS3 signal is made up of DS1 tributaries, it drops the first tributary to the DS1 protocol processor for auto configuration.

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DS3 and Tributaries

Auto-configures to the mapping, framing, and pattern of the incoming DS3 signal. If successful, the unit then tries to configure the DS1 tributaries that comprise the DS3 signal. If the system cannot auto configure to the incoming DS3 signal, the auto configuration process terminates.

DS1

Detects the line coding, framing, and pattern of the incoming DS1 signal and makes the appropriate changes to the DS1 protocol processor.

E1

Auto-configures the E1 protocol processor to the E1 line interface, or E1 to DS3 and its tributaries.

The Auto Config action button is not available for the ATM protocol processor.

Help

This button provides access to the Help menu.

NOTE ➤
For some ASA 312 units, the Help file is provided as an option on an SRAM Memory card that is inserted into the PCMCIA slot. If your Help file is provided on a memory card, make sure that the memory card is installed in the PCMCIA slot before the unit is turned on.

It is also recommended that you enable the memory card's write-protection tab to prevent data loss. ◄

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A ASA 312 and NAA I Specifications

Overview

This appendix provides a summary of ASA 312, NAA I, and protocol processor features and specifications.

IMPORTANT ➤
Specifications are subject to change without notice.◄

ASA 312 Features

The following states various ASA 312 features.

ASA 312 Features	
Calibration	Allows in-the-field calibration. Eliminates the need to return unit for calibration. Two-year calibration interval period.
Color Touch Screen Display	High resolution VGA color touch screen .Extremely easy-to-use, menu-driven graphical user interface. User interface is controlled by either touch screen or mouse.
Five Independent Test Sets in One Unit	Complete DS1, E1, DS3, SONET, and ATM test sets in one portable unit. Each test set can be used independently and simultaneously.
Portable	Small light-weight design: 10.5 lbs (4.8 kg). OC-48 Configuration: 14 lbs (6.4 kg)
Printing	Prints all data and graphic screens.Supports HP LaserJet, HP ThinkJet, IBM ProPrinter, Epson FX, Seiko DPU-411, ASCII.
Programmable Testing	Allows programming of criteria and time interval for Pass/Fail testing. All settings and programs can be saved/recalled for repeated in-the-field testing.
Remote Access	Serial, Modem, or Ethernet: Remotes all functions to PC via serial or modem connection. PC software provides the identical screens with mouse input control.
Save/Recall	Allows Storage and Recall of test set's current results (every screen).
Software Upgrades	Users field upgradeable via serial port, modem, or Ethernet connection.
Switch Matrix	Cross-connects and multiplexes independent test sets internally via a patented switching fabric providing true control of multiple test sets in one unit.

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Physical Characteristics

The following describes the ASA 312's physical characteristics.

Physical Characteristics	
Dimensions	10.1" H x 12.3" W x 4.7' D (257mm H x 312mm W x 120mm D)
Operating Temperature	0° to 50° C @ 85% Relative Humidity (RH) 0° to 40° C @ 85% RH with OC-48 configuration
Storage Temperature	-20° to 60° C @ 95% RH
Power Requirement	100–240 VAC, 48–65 Hz, 60 watts, 1.5 amps max. 90–132, 180–260 VAC, 47–63 Hz, 95 watts with OC-48 configuration
Weight:	10.5 lbs (4.8kg) 14.0 lbs (6.4kg) with OC-48 configuration

Auxiliary Interfaces

The following states the various connectors and interfaces available on the ASA 312's connector panel. Connectors will vary based on your hardware configuration.

Auxiliary Interfaces	
10baseT	8-pin modular jack, Ethernet 10Base-T Interface
Bits Clock	Bantam, Complies with AT&T CB119 and Pub 43802
DCC (DataCom Drop/Insert)	RS-449, DB-37 pin female connector for D1 through D12 Overhead bytes
External Trigger	BNC, TTL level input
GPIB	IEEE 488.2 Controller, Meets ANSI/IEEE 488.1-1987, IEC 624
Orderwire	4-pin modular jack for E1 or E2 bytes. Not intended for direct connection to telecommunications circuits
Parallel Port	RS-232, DB-25 pin female connector for parallel printer
PCMCIA	Type II PC Card slot for PC Card modem or SRAM Flash card.
RS-232	RS-232, DB-9 pin male connector for mouse, modem, direct connection or printer

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Technical Specifications

This following is a list of technical specifications.

Specifications	Description
Approvals	This product is designed and conforms to NEBS Level 3 criteria per Bellcore SR-3580, tested per GR-63-CORE and GR-1089-CORE requirements.
Environment	
Operating Temperature	0° to 55° C at 85% relative humidity
Storage Temperature	-20° to 60° C at 95% relative humidity
Power Requirements	250 W max., Voltage range -42 to -56 V DC input 168 W typical at 3.5 Amps, -48V DC input
Fuse Requirements	
Backplane Fuses	1.5 Amp, 250 VAC, 2AG Slo-Blo® fuse (18 fuses per backplane)
Power Supply Fuse	15 Amp, 125 VAC, 5 x 20 mm Slo-Blo® fuse (1 fuse per Power Supply)
Dimensions	
Weight	35 pounds (15.9 kg) when fully configured
Height	10.50 inches (6U)
Width	17.63 inches (without mounting brackets attached)
Depth	10.63 inches
Ventilation Clearance	1.75 inches (1U) **above** and **below** the NAA I unit
Physical Interfaces	
DS1	DSX level, wire wrap pins
DS3	DSX level, BNC connectors
Optical	FC-PC, SC-PC, or ST-PC connectors
OC-48 Optical	FC-PC connectors only
STS-1	BNC connectors
DCC	DB-9 female connector
BITS	BITS clock, wire wrap pins
Remote Interface	
Ethernet	RJ-45 8-pin modular, 10BaseT connector
Dial	DB-9 male connector
X.25	DB-25 male connector
Tx Frequency	
DS1	1.544 Mhz, ± 4.6 ppm (Stratum III)
DS3	44.736 Mhz, ± 12 ppm
SONET (OC-N)	N x 51.84 Mhz, ± 4.6 ppm (Stratum III)
STS-1	51.84 Mhz, ± 4.6 ppm (Stratum III)
Rx Frequency	
DS1	1.544 Mhz, ± 200 ppm
DS3	44.736 Mhz, ± 200 ppm
SONET(OC-N)	N x 51.84 Mhz, ± 50 ppm
STS-1	51.84 Mhz, ± 50 ppm

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SONET Protocol Processor

The following shows the SONET protocol processor technical specification.

SONET	Technical Specifications
Alarm Detection	Section: OOF, LOF, LOS, Line: AIS-L, FERF-L, LOP Path: AIS-P, Yellow-P, Unequipped-P VT: LOP-V, AIS-V, Yellow-V, Unequipped-V STSX-1 only: BPV
Alarm Generation	Section: LOF, LOS Line: AIS-L, FERF-L Path: LOP-P, AIS-P, Yellow-P, UNEQ-P VT: LOP-V, AIS-V, Yellow-V, UNEQ-V
APS Commands	Support of linear- and ring-mode commands
Clock	Internal, Received SONET signal, Bits
Connectors	
OC-N	FC-PC (standard), ST-PC, SC-PC
STSX-1	BNC
DataCom Channel (DCC)	Allows full testing of DCC.
Transmit	User defined byte Section D/I Line D/I DCC-Section PRBS (2^{-7}-1) DCC-line PRBS (2^{-7}-1).
Receive (Drop from SONET)	Pattern Sync LED Bit Error LED Error Count BER Error Seconds.
Receive (Input from DCC connector)	Pattern Sync LED, Bit Error LED, Error Count, BER, Error Seconds.
Error Injection	Random, Section CV, Line CV, Path CV, VT CV, Path FEBE, VT FEBE, VT Random, Line FEBE, Payload Bit
Error Injection Rate	Single, 10^{-7} to 10^{-3}, User Programmable
Error Measurement	Section CV, Line CV, Path CV, VT CV, Path FEBE, VT FEBE, VT Random, Line FEBE, Payload Bit
Framing	STS-N A1 and A2 bytes
Frequency (N=1, 3, 12, or 48)	N x 51.84 Mhz, ± 2ppm (Tx), -1 ppm/yr N x 51.84 Mhz, ± 50ppm (Rx)
History Graphs	Errors and alarms are graphed over a user selected time period. Each test set can independently log data for up to three days (72 hours).
Impedance	STSX-1: 75 ohms ± 5% unbalanced

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SONET	Technical Specifications
Input Jitter Tolerance:	
OC-1	10 Hz – 30 Hz, > 15 UI 30 Hz – 300 Hz, > 1.5 UI 300 Hz – 2 kHz, > 1.5 UI 2 kHz – 20 kHz, > 0.15 UI
OC-3	10 Hz – 30 Hz, > 15 UI 30 Hz – 300 Hz, > 1.5 UI 300 Hz – 6.5 kHz, > 1.5 UI 6.5 kHz – 75 kHz, > 0.15 UI
OC-12	10 Hz – 30 Hz, > 15 UI 30 Hz – 300 Hz, > 1.5 UI 300 Hz – 25 kHz, > 1.5 UI 25 kHz – 250 kHz,> 0.15 UI
STSX-1	10 Hz – 30 Hz, > 15 UI 30 Hz – 300 Hz, > 1.5 UI 300 Hz – 2 kHz, > 1.5 UI 2 kHz – 20 kHz, > 0.15 UI
Input Signal Measurement	
OC-N (N = 1, 3, or 12)	Optical Power Meter: 0 to -26 dBm, ± 1.5 dBm Frequency Measurement Range: N x 51.84 MHz, ± 50 ppm
OC-48	Optical Power Meter: 0 to -26 dBm, ± 1.5 dBm Frequency Measurement Range: 2488.32 MHz, ± 50 ppm
STSX-1	Peak positive and negative voltage range: 0.31Vp to 1.2Vp Frequency Measurement Range: N x 51.84 MHz, ± 50 ppm
Level Rx	
OC-N (N = 1, 3, or 12)	-7 to -26 dBm, -30 dBm typical min. at 10^{-10} BER with 2^{23}-1 PRBS
OC-48:	-2 dBm to -26 dBm

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SONET	Technical Specifications
Level Tx	
OC-N (N =1, 3, or 12)	Optical 1310 nm: -5 dBm typical, single-mode, Intermediate Reach 1260 – 1360 nm, 1308 nm typical Optical 1550 nm: 0 dBm typical, single-mode, Intermediate Reach 1480 – 1580 nm, 1554 nm typical
OC-48:	Optical 1310 nm: Long Reach compliant Optical 1550 nm: Long Reach compliant Optional Dual 1310/1550 nm: Comprised of 1310 nm and 1550 nm laser options and additional 1 dB power reduction
STSX-1:	0.750 Vp ± 0.1 Vp
Line Code	
OC-N	NRZ, Scrambled, N=1, 3, 3c, 12
STSX-1	B3ZS
Optical Frequency	
1310 nm	InGaAsP laser, RMS spectral width 4 nm max., Class 1 laser complies with 21 CFR 1040.10 and 1040.11
1550 nm	InGaAsP MQW DFB laser, spectral width 1 nm max. Class 1, complies with 21 CFR 1040.10 and 1040.11
Overhead Control and Monitoring	
Transmit control over bytes	Transport OH: A1, A2, C1, D1 through D12, E1, E2, F1, K1, K2 Z1, Z2 Path OH: C2, F2, G1, J1 (trace), Z3, Z4, Z5 VT OH: J2, Z6, Z7 (Byte Sync mode)
Receive Monitor	Transport OH: all bytes Path OH: all bytes VT OH: all bytes
Patterns	
STSX-1	Mapped DS1 (VT1.5 asynchronous and byte synchronous) M13, DS3, or STSX-1 drop/insert.
OC-N (N=1, 3, or 12)	Mapped DS1 (VT1.5 asynchronous and byte synchronous), M13, DS3, or STSX-1 drop/insert.
OC-3c	2^{23}-1 PRBS, 2^{23}-1 PRBS inverted (per 0.151), All 0's, All 1's.
OC-48	STS-3c/OC-3, STS-3c/OC-12, STS-12c/OC-12, STS-48c/OC-48, 2^{23}-1 PRBS (per 0.151), 2^{23}-1 PRBS inverted, 2^{23}-1 PRBS, All 0's, All 1's

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SONET	Technical Specifications
Pointer Control	
STS	New value, single bursts, increment, decrement, increment-decrement, decrement-increment, T1X1 sequences, NDF control, SPE offset
VT	New Value, Single, increment, decrement, NDF control
SPE Frequency Offset	± 100 ppm
Results	Error Counts, Average Error Ratios, Current Error Ratios, Errored Seconds, Error Free Seconds, Alarm Seconds, and Event Counts.
Standards	ANSI, ITU, Bellcore, and AT&T specification including: OC-N: T1.105, G.703, G.772, G.957, G.958, 0.151, TR-NWT-000468TA-NWT-000983, GR-253-CORE STSX-1: T1.102, G.703, G.772, GR-253-CORE, GR-499-CORE, G.703
Switch Matrix Support	Allows the SONET test set to connect to the: DS1 line interface DS1 test set DS3 line interface DS3 test set M13 multiplex STSX-1 Drop/Insert ATM test set.
Test Results Storage	Test results can be saved to a file that can be viewed or printed at a later time.
Trouble Scan	Scans and displays all errors and alarms that have occurred during the current test.

DS1 Protocol Processor

The following shows the DS1 protocol processor technical specifications.

DS1	Technical Specifications
Alarm Detection	OOF, Pattern Sync, LOS, AIS, Yellow, COFA, excess 0's
Alarm Generation	AIS, Yellow, Idle
Automatic Configuration	Analyze incoming signal framing and line code and automatically configures the DS1 test set to match.
Clock	Internal, Received DS1 signal, Bits
Connectors	Dual Bantam

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DS1	Technical Specifications
DS0 Access	
Transmit	Individual DS0 channels replaced with idle codes (0x7F) or AIS (0xFF)
Received	Monitor individual DS0 channel data, and signaling bits
DS0 Audible	Audible monitoring via u-law companding, G.711, G.712.
DS0 Signaling	AB (D4/SF), and ABCD (ESF) all channels at once.
Error Injection	BPV, pattern bit, Frame, CRC
Error Injection Rate	Single, 10^{-7} to 10^{-3}, User Programmable
Error Measurement	BPV, pattern bit, Frame, CRC
Framing	D4/SF, ESF, Unframed, SLC-96, unframed
Frequency	
Transmit	1.544 Mhz, ± 5ppm, -1 ppm/yr
Receive	1.544 Mhz, ± 200 ppm
History Graphs	Errors and alarms are graphed over a user selected time period. Each test set can independently log data for up to three days (72 hours).
Impedance	100 ohms, ±5% balanced
Input Jitter Tolerance	10 kHz - 100 kHz 0.4 UI 0dB line1 Hz 138 UI
Input Signal Measurement	Frequency Measurement Range: 1.544 Mhz, ± 200 ppm Peak positive and negative voltage range ± 0.1 Vp to ±7 Vp
Jitter Analyzer	Optional (ASA 312-05A), measures incoming line jitter.
Level Rx	
Monitor	100 ohms, 0 to -36 dBdsx with equalization; 16.532 to -19.468 dBm with equalization
Terminated	100 ohms, + 6 to -30 dBdsx with equalization; 22.532 to -13.468 dBm with equalization
Bridged	1000 ohms, 0 to -36 dBdsx with equalization; 16.532 to -19.468 dBm with equalization
Level Tx	DSX-1 (0 dBdsx ± 1dB) -7.5 dBdsx ± 1 dB cable simulation -15 dBdsx ± 1 dB cable simulation
Line Code	AMI, B8ZS
Loop Codes Support	
Transmit	In-band, Out-of-band, Line loopback, Payload loopback, 4-bit Smartjack, 5-bit Smartjack
Receive	Auto response on/off, Display of current loopback status

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DS1	Technical Specifications
Patterns	QRSS, 2^{15}-1 PRBS, 2^{20}-1 PRBS, 2^{23}-1 PRBS (per 0.151), All 1's, All 0's, 1 in 8, 3 in 24, 1010, 24 Bit Programmable, Live Data, 55 DLY, T1-2, T1-3, T1-4, T1-5, 55 Octet, DDS-1, DDS-2, DDS-3, DDS-4, DDS-5, DDS-6, Bridge Tap, and Multi-Pattern. For Fractional T1 mode, the following patterns are available: 2^{6}-1 (63) PBRS, 2^{9}-1 (511) PRBS, 2^{11}-1 (2047) PRBS, and QRSS.
Results	Error Counts, Average Error Ratios, Current Error Ratios, Errored Seconds, Error Free Seconds, Alarm Seconds, and Event Counts.
Standards	ANSI, ITU, Bellcore and AT&T specifications including T1.403, T1. 408, G.703, G.772, O.151, GR-499-CORE, TR-TSY-000191, and Pub 62411.
Switch Matrix Support	Allows the DS1 test set to connect to the: DS1 line interface M13 multiplex SONET test set ATM test set (optional)
Test Results Storage	Test results can be saved to a file that can be viewed or printed at a later time.
Trouble Scan	Scans and displays all errors and alarms that have occurred during the current test.

DS3 Protocol Processor

The following shows the DS3 protocol processor technical specifications.

DS3	Technical Specification
Alarm Detection	OOF, Pattern Sync, LOS, AIS, Idle, Yellow/X-bit
Alarm Generation	AIS, Idle, Yellow/X-Bit
Clock	Internal
Connectors	BNC
Error Injection	BPV, pattern bit, Frame, P-Parity, C-Parity, FEBE
Error Injection Rate	Single, 10^{-7} to 10^{-3}, User Programmable
Error Measurement	BPV, pattern bit, Frame, P-Parity, C-Parity, FEBE
FEAC Codes	Alarm/Status codes, Loopback codes
Framing	M13, C-Bit Parity, Unframed
Frequency	44.736 Mhz, ± 12ppm (Tx), -2 ppm/yr 44.736 Mhz, ± 200ppm (Rx)

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DS3	Technical Specification
History Graphs	Errors and alarms are graphed over a user selected time period. Each test set can independently log data for up to three days (72 hours).
Impedance	75 ohms, ± 5% unbalanced
Input Jitter Tolerance	10 Hz - 50 kHz, 20 UI > 50 kHz, UI reduce by 20 dB/decade
Input Signal Measurement	Frequency Measurement Range: 44.736 Mhz, ±200 ppm Peak positive and negative voltage range: ± 0.31 Vp to ±1.2 Vp
Jitter Analyzer	Optional (ASA 312-05A), measures incoming line jitter
Level Rx	
Terminated	75 ohms, + 6 to -12 dB relative to DSX3 with equalization.
Monitor	75 ohms, -15 to -26 dB relative to DSX3 with equalization.
Level Tx	
DS3 High	0.95 Vp ± 0.15 Vp
DSX3	0.48 Vp ± 0.15 Vp
DS3 Low	0.20 Vp ± 0.08 Vp
Line Code	B3ZS
Patterns	2^{15}-1 PRBS, 2^{20}-1 PRBS, 2^{23}-1 PRBS (per 0.151), Idle (1100), Blue Signal (1010), All 1's, All 0's, User Defined (8 Bit Programmable), Live Data
Results	Error Counts, Average Error Ratios, Current Error Ratios, Errored Seconds, Error Free Seconds, Alarm Seconds, and Event Counts.
Standards	ANSI, ITU, Bellcore, and AT&T specification including T1.102, T1.404, T1.107, G.703, G.772, 0.151, TR-TSY-000009, TR-TSY-000191, GR-499-CORE, CB-119.
Switch Matrix Support	Allows the DS3 test set to connect to the: DS3 line interface SONET test set ATM test set (optional)
Test Results Storage	Test results can be saved to a file that can be viewed or printed at a later time.
Trouble Scan	Scans and displays all errors and alarms that have occurred during the current test.

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ATM Protocol Processor

The following shows the ATM protocol processor technical specifications.

ATM	Technical Specifications
Adaptation Layers	AAL0, AAL1, and AAL5
Alarm Detection	Cell Synchronization Loss, AIS - F4 and F5 flow, RDI - F4 and F5 flow, PLCP Sync Seconds, PLCP Yellow Alarm, Selected Cells Not Received (SCNR) seconds, Status seconds, Loss of Pattern Sync seconds, PLCP Loss of Frame seconds, PLCP Out of Frame seconds
Alarm Generation	Cell Synchronization Loss, AIS - F4 and F5 flow (end-to-end/segment), RDI - F4 and F5 flow (end-to-end/segment), PLCP Yellow Alarm
ATM Management	Loopback cell
Channel Capacity Transmit	254 Channels
Receive	256 channels general analysis with 4 channels detailed analysis
Error Detection	Payload loss of pattern synchronization, AAL5 CRC errors, AAL5 length errors, PLCP Framing, LOF, OOF, AAL errors including SN & SNP errors, Loss of Cells, misinserted cells, BIT errors, PLCP FEBE, PLCP BIP, HEC errors
Error Generation	HEC Correctable, HEC Uncorrectable, BIT errors, PLCP BIP, PLCP FEBE, PLCP Framing (A1A2), PLCP Framing (POI)
Error Injection Rates	HEC correctable and uncorrectable errors with error rates from $1e^{-1}$ to $1e^{-9}$, error burst from 1 - 10, HEC errors single duration/continuous, VCC Payload bit error rate from $1e^{-1}$ to $1e^{-9}$.
Error Measurement	HEC error rate, HEC error count, HEC correctable and uncorrectable, payload PRBS errors.
History Graphs	Errors and alarms are graphed over a user selected time period. Each test set can independently log data for up to three days (72 hours).
Interface Support	UNI 3.1 and NNI
Line	STSX-1, OC-1, OC-3, OC12, DS1, DS3
Patterns	PRBS 2^{15}-1, All 1's, 10101010, User Defined pattern, Live
Permanent Virtual Circuit (PVC) Provisioning	Transmit: PDU cell count, Peak Cell Rate (PCR), Sustained Cell Rate (SCR), and Maximum Burst Size (MBS).

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ATM	Technical Specifications
Physical Layers and Cell Mapping	STS-1, STS-3c, STS-12c, DS1 Direct, DS1 PLCP, DS3 Direct, DS3 PLCP
Quality of Service (QOS)	Cell transfer delay (min, max, mean), positive and negative cell delay variation (single point measurement; min, max, mean), cell loss count, cell loss ratio, cells received count, CRC errors count, length errors count
Results	Alarm seconds, error rates, errored seconds, error counts, error-free seconds
Standards	ANSI, ITU, and Bellcore specifications including GR-253-CORE, GR-820-CORE, GR-1248, TR-TSY-000009, TR-NWT-000253, I.356, I.363, I.610, O.151, T1.107-1988, T1.107a-1990, T1.231-1993, T1.511-1994, T1.629-1993.
Switch Matrix Support	Allows the ATM test set to connect to the: DS1 test set DS3 test set SONET test set
Test Results Storage	Test results can be saved to a file that can be viewed or printed
Traffic Management	Generic Cell Rate Algorithm (GCRA), Unspecified Bit Rate (UBR)
Trouble Scan	Scans and displays all errors and alarms that have occurred during the current test.
VP/VC Scan	Scan for active channels, scan for active channels with header mask

E1 Protocol Processor

The following shows the E1 protocol processor technical specifications.

E1	Technical Specifications
Alarm Detection	Loss of Pattern Sync, LOS, LOF, AIS, RAI, RMFAI, CASMFL
Alarm Generation	LOS, AIS, LOF, RAI (Yellow), RMFAI, CASMFL
Automatic Configuration	Analyze line coding, framing and pattern, and automatically configures the E1 test set to match.
Clock	Internal, Looped
Connectors	BNC
Error Injection	BPV, Bit, Frame, CRC, FEBE
Error Injection Rate	Single, 10^{-7} to 10^{-3}, User Programmable

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E1	Technical Specifications
Error Measurement	BPV, Bit, Frame, CRC, FEBE
Framing	Unframed, PCM30, PCM30 CRC, PCM31, PCM31 CRC
Frequency	
Transmit	2.048 Mhz, ± 5 ppm
Receive	2.048 Mhz, ± 200 ppm
History Graphs	Errors and alarms are graphed over a user-selected time period. Each test set can independently log data for up to three days (72 hours).
Impedance	75 ohms, unbalanced
Level Rx	
Terminated	75 ohms, + 3 to -40 dBdsx with equalization
Level Tx	0 dBdsx ± 1dB (meets ITU G.703 pulse mask) -7.5 dBdsx ± 1 dB cable simulation -15 dBdsx ± 1 dB cable simulation
Line Code	AMI, HDB3 unbalanced
Loopback Mode	Line loopback
Patterns	2^6-1 PRBS, 2^6-1 PRBS INV, 2^9-1 PRBS, 2^9-1 PRBS INV, 2^11-1 PRBS, 2^11-1 PRBS INV, 2^15-1 PRBS, 2^15-1 PRBS INV, 2^20-1 PRBS, 2^20-1 PRBS INV, 2^23-1 PRBS, 2^23-1 PRBS INV, User Defined, 3-24 bit, Live (for Receive only)
Results	Error counts, error rates, error seconds, alarm seconds, errored seconds percentage, error free seconds percentage, alarm error rate, average and current error rate, and ITU G.823 analysis for bit, frame, CRC, and FEBE.
Standards	ITU including G.821, G.826, G.704, G.703.
Switch Matrix Support	Allows the E1 test set to connect to the: E1 line interface M13 Multiplexer to the DS3 line interface M13 Multiplexer to the SONET optical interface.
Trouble Scan	Scans and displays all errors and alarms that have occurred during the current test.

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B Using the ASA 312 Connector Panel

Overview

The purpose of this appendix is to provide a brief description of the configuration and setup required to use various connectors on the ASA 312 connector panel and to replace ASA 312 fuses.

For information on optical and electrical connectors, refer to chapter 1, *Getting Started with the ASA 312*.

Replacing the Fuse

WARNING
To avoid electrical shock, make sure that AC power is disconnected before checking and replacing the fuse. Do not attempt to insert any type of fuse in the other side of the fuse compartment at any time. ◄

To replace the ASA 312 fuse:

1. Disconnect the ASA 312's power cord.
2. Locate the fuse compartment on the ASA 312's connector panel.
3. Use a flatblade screwdriver (or similar object) to pry open the fuse door and remove the red fuse compartment.
4. Locate the bad fuse and gently remove it from the fuse compartment.
5. Replace the bad fuse with the spare fuse provided.
6. Slide the fuse compartment fully into the connector panel and close the door.
7. Connect the power cord and power on the unit.

Making an Ethernet Connection

An ASA 312, licensed for Ethernet operation, can establish an Ethernet connection to perform file transfers and software upgrades.

NOTE ➤
For some units, the Ethernet driver is provided as an option on an SRAM memory card that is inserted into the PCMCIA slot. If your driver is provided on a memory card, make sure that the memory card is installed in the PCMCIA slot before the unit is turned on.

It is also recommended that you enable the memory card's write-protection tab to prevent data loss. ◄

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Ethernet Port Configuration

To set up the ASA 312 for an Ethernet connection:

1. Verify that the unit is licensed for Ethernet operation by:
   - Pressing the Setting Function Group button
   - Pressing the I/O Port button
   - Observing if the Ethernet button is available. If the button is not disabled (grayed), go to step 2.

     If the button is disabled (grayed), then your unit is not licensed for Ethernet. Contact your Digital Lightwave Sales or Technical Support representative for licensing information.
2. Press the Ethernet button.

   The Ethernet commands appear.
3. Enter the IP address and, if necessary, other Ethernet information. Contact your LAN administrator for this information.
4. Power the ASA 312 off and then on again so that the Ethernet changes are accepted.
5. Insert a modular 8-pin Ethernet connector into the ASA 312's 10BaseT port.

File Transfers using Ethernet

To transfer files using an Ethernet connection:

1. Press the Settings Function Group button.
2. Press Utility.
3. Press File Trnsfr.
4. Press the File Transfer Port command button and select FTP Ethernet.

   The ASA 312 is ready to upload or download files between a PC running a standard client FTP program or a PC running the Digital Lightwave Software Upgrade program.

Remote Control Operation using Ethernet

For Remote Control operation:

1. Press the Settings Function Group button.
2. Press User.
3. Press the Remote Control Port command.
4. Select Ethernet for an Ethernet connection.

Using the RS-232 Connector

The ASA 312 has a 9-pin serial port that can be used for:

- An external modem connection (requires a serial modem cable)
- A direct serial connection (requires a Null modem cable)
- A printer connection
- A mouse connection

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RS-232 Modem and RS-232 Direct Setup

To set up the ASA 312 for serial port for RS-232 Modem or RS-232 Direct connections:

1. Press the Settings Function Group button.
2. Press I/O Port.
3. Press Serial.
4. Use the Baud Rate command to set the modem connection speed. The communications parameters are automatically set to 8-N-1.
5. For a modem connection, attach the serial cable's 9-pin connector to the ASA 312's RS-232 9-pin connector.

   For a direct serial connection, attach the Null modem cable's 9-pin connector to the ASA 312's RS-232 9-pin connector.

Remote Control Operation

For Remote Control operation:

1. Press the Settings Function Group button.
2. Press User.
3. Press the Remote Control Port command, and:
   - Select RS-232 Modem for a modem connection.
   - Select RS-232 Direct for a direct serial connection.

SCPI Command Operation

For SCPI command operation:

1. Press the Settings Function Group button.
2. Press User.
3. Press the SCPI Port command, and:
   - Select RS-232 Modem for a modem connection.
   - Select RS-232 Direct for a direct serial connection.

File Transfer Operation

To transfer files using an RS-232 Modem or RS-232 Direct connection:

1. Press the Settings Function Group button.
2. Press Utility.
3. Press the File Transfer Port command, and:
   - Select RS-232 Modem for a modem connection.
   - Select RS-232 Direct for a direct serial connection.

Using a Mouse to Operate the Touch Screen

The ASA 312 can be operated using a 5-volt mouse to select the protocol processors and their functions, commands, and options. Touch screen functionality is disabled when a mouse is attached to the ASA 312.

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NOTE ➤
For some units, the mouse driver is provided as an option on an SRAM memory card that is inserted into the PCMCIA slot. If your driver is provided on a memory card, make sure that the memory card is installed in the PCMCIA slot before the unit is turned on. ◄

To operate the ASA 312 using a mouse:

1. Turn off the unit, and attach the mouse to the 9-pin RS-232 serial port connector.

   If your mouse driver is supplied on an SRAM Memory card, insert the memory card into the PCMCIA slot.

2. Turn on the ASA 312, and wait for the unit to boot.
3. After the ASA 312 is operational, move the mouse to confirm that the mouse pointer is operational.
4. If the mouse movement is too slow or fast, use the Set Mouse Sensitivity command (located under the Misc function of the Settings Function Group button) to adjust mouse cursor speed.

Connecting a Printer to the Serial Port

A parallel or serial printer can be connected to the RS-232 serial port. Refer to the Print command described in chapter 11, *Action Button Row* for serial port setup information.

Using the GPIB Connector

The ASA 312's General Purpose Interface Bus (GPIB) connector provides a physical interface to GPIB interface cable. This allows SCPI commands to be sent to the ASA 312 using this interface.

To configure the GPIB port:

1. Verify that the unit is turned on.
2. Attach and secure a GPIB cable to the ASA 312's GPIB connector.
3. Press the Settings Function Group button.
4. Press I/O Port.
5. Press GPIB and enter a Primary Address. The default address is 10. The address range is from 0 to 31.

To select the GPIB port for SCPI command operation:

1. Press the Settings Function Group button.
2. Press User.
3. Press SCPI Port and select GPIB.

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Using a PC Card Modem in the PCMCIA Slot

The ASA 312 has a Type II PCMCIA slot that accepts a PC Card modem. A dial-in connection can be established to:

- Remotely control the ASA 312
- Send and receive SCPI commands and responses
- Perform file transfers and software upgrades

PC Card Modem Setup

To set up the ASA 312 for PC Card modem operation:

1. Insert the PC Card into the PCMCIA slot. An audible tone indicates that the card and PCMCIA drivers are initialized.
2. Press the Settings Function Group button.
3. Press the I/O Port button.
4. Press PCMCIA.
5. Use the Baud Rate command to set the modem connection speed. The communications parameters are automatically set to 8-N-1.

NOTE ➤
The Baud Rate button must be pressed each time a modem is inserted into the ASA 312 to initialize it. ◄

NOTE ➤
For a list of tested and accepted PCMCIA modems and their model numbers, see the *Before You Begin* section in chapter 2, *Getting Started with the Remote Access Manager*. ◄

Remote Control Operation

For Remote Control operation:

1. Press the Settings Function Group button.
2. Press User.
3. Press the Remote Control Port command and select PCMCIA Modem.

SCPI Command Operation

For SCPI command operation

1. Press the Settings Function Group button.
2. Press User.
3. Press the SCPI Port command and select PCMCIA Modem.

File Transfer Operation

To transfer files using a PC Card modem connection:

1. Press the Settings Function Group button.
2. Press Utility.
3. Press the File Transfer Port command and select PCMCIA Modem.

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Using an SRAM Memory Card in the PCMCIA Slot

The ASA 312 has a Type II PCMCIA slot that accepts an SRAM memory card. When a memory card is installed, the slot serves as a removable disk drive that allows you to save and transfer ASA setup configuration, test configuration, and result files for use with other ASA 312s.

It is recommended that you enable the memory card's write-protection tab to prevent data loss.

To set up the SRAM memory card for operation.

1. Insert the PCMCIA card into the PCMCIA slot. An audible tone indicates that the card and PCMCIA drivers are initialized.

To transfer files between the ASA 312 and the SRAM card:

1. Press the Settings Function Group button.
2. Press Utility. The File Transfer functions appear.
3. Press the Transfer Disks command and select a source-to-destination option.
4. Press Copy.

NOTE ➤
If you encounter problems while trying to use an SRAM memory card in a PC running Microsoft Windows 95, add the following lines to your PC's CONFIG.SYS file:

```
device=c: \ x \ system \csmapper.sys
device=c: \ x \ system \ carddrv.exe / slot=y
```

where:

x is the location of your Windows subdirectory

y indicates the number of PCMCIA slots in your PC. ◄

Using the Parallel Port

A parallel printer can be connected to the parallel port. Refer to the Print command described in chapter 11, *Action Button Row* for parallel printer setup information.

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C Warranty and Registration

Limited Warranty for Equipment

Seller warrants to the first purchaser of this Digital Lightwave, Inc. product that all components of the product will function in accordance with Seller's published specifications under normal conditions of use for a period of three (3) years from the date of shipment. Seller warrants to the first purchaser of this Digital Lightwave, Inc. product that the laser transmitter unit will function in accordance with Seller's published specifications under normal conditions of use for a period of three (3) years from the date of shipment. During the warranty period, Seller's liability is expressly limited, at Seller's election, to repairing or replacing the product or component not complying with this Limited warranty as determined by Seller's inspection, or to the repayment of, or crediting the first purchaser with, and amount equal to the purchase price of the product, whether the first purchaser's claims are for breach of warranty or negligence. The foregoing remedy as provided herein shall be the sole and exclusive remedy of the first purchaser.

Limited Warranty for Software and Firmware

Seller warrants to the first purchaser of this Digital Lightwave, include product that each item of Software and Firmware included in the Product, in its unaltered form, will conform substantially to the then-current functional specifications for three (3) years from its installation date, provided such Software or Firmware is used in a manner consistent with Seller's applicable minimum equipment and software or firmware configuration specifications. Seller will make reasonable efforts to correct any errors reflecting significant deviations from the functional specifications as are reported by first purchaser to Seller during such warranty period. Because not all errors in Software or Firmware can or need be corrected, Seller does not warrant the all Software or Firmware defects will be corrected. Similarly, Seller does not warrant that the Software or Firmware will meet first purchaser's requirements or that the Software or Firmware will operate in combinations selected for use by first purchaser.

Limitations of all Warranties

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The foregoing Limited Warranties shall not apply to problems caused by or resulting from improper or inadequate maintenance, acts or omissions or first purchaser, first purchaser supplied software or interfacing, unauthorized modification or misuse, breaking the seals or otherwise attempting to open the plastic and/or metal housing, operation outside of the environment specifications for the products, improper site preparation or maintenance. Seller is not responsible for any damages caused by any person or entity through misuse, neglect or accident.

For warranty service or repair, this product must be returned in accordance with the Seller's Return Policies to a service facility designated by Seller. The first purchaser shall prepay shipping charges to Digital Lightwave, and if Digital Lightwave discovers a breach of the Limited Warranty, Digital Lightwave shall pay shipping charges to return the product to first purchaser. However, first purchaser shall pay all shipping charges, duties and taxes for products returned by Digital Lightwave to first purchaser outside the United States.

Return Policies

Approval must be obtained from Seller, prior to return of any merchandise. All material returned without a Seller Return Material Authorization (RMA) number will be refused automatically. The first purchaser must return the product in original package and in good condition, without its serial numbers or any part thereof altered, defaced or removed and accompanied by a specification in writing of the defects involved. The first purchaser shall notify Seller in each instance when first purchaser intends to return goods which first purchaser believes are not in accordance with this Limited Warranty and Seller shall be entitled, as Seller's option, to examine such goods at first purchaser's facilities prior to return.

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D OC-48 Mode

Overview

This appendix briefly describes the OC-48 feature and how to configure the ASA 312 and the NAA I for OC-48 operation.

OC-48 Support

An OC-48 optical circuit transfers information at data rates up to 2.4 Gb/s. The OC-48 option (a hardware and software upgrade) allows you to place the ASA 312 or NAA I test set into your network to monitor and test the integrity of your OC-48 signal.

The systems can insert various errors, alarms, and test patterns into a SONET signal to verify if network elements are capable of detecting these functions. In addition, the systems can monitor the incoming OC-48 signal, demultiplex the signal into its basic elements, and report problems.

The OC-48 option:

- Transmits and monitors the following errors:
  - Section B1 (also known as BIP-8), Line B2 (also known as Line BIP-8), Line FEBE (the M1 byte which is also known as a Line Remote Error Indication or REI-L), STS-Path B3, STS-Path FEBE, VT BIP-2, VT Path FEBE
- Transmits and monitors the following alarms:
  - Loss of Frame, Loss of Signal, Loss of Pointer, Severely Errored Frame, VT Path Alarm Indication Signal (AIS), VT Loss of Pointer, VT Path Unequipped, VT Path Yellow, Line AIS, Path AIS, Path Yellow, Path Unequipped
- Supports drop and insert of STS-48 and includes VT1.5 mapped STS-1s, DS3 mapped STS-1s, STS3c, STS12c, and STSX-1 mapped STS-1s
- Supports editing and monitoring of APS bytes (K1 and K2)
- Supports 1550 nm (standard) and 1310 nm optical interfaces
- Supports Add/Drop Section and Line DataCom Channels and Orderwire channels
- Allows the channel under test to be placed into a specific time slot or broadcast in all time slots of the STS-48 signal
- Ability to send AT commands to modems via the ASA 312. This includes the ability to edit and send the modem initialization string, save the current modem setup, and reset the modem.

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OC-48 Hardware and Software Requirements

To use the OC-48 option, your **ASA 312** must have:

- The OC-48 hardware installed
  (When the OC-48 option is installed, the Jitter option is not available.)
- Software Release 4.1 or greater installed
- OC-48 operation licensed

To use the OC-48 option, your **NAA I** must have:

- The OC-48 network protocol processor installed
- The Remote Access Manager software, version 4.9x or greater
- OC-48 operation licensed

Configuring the ASA 312 for OC-48 Mode

The following provides a quick setup of the ASA 312 for OC-48 operation.

Initial OC-48 Setup

To configure the SONET protocol processor for OC-48:

1. Attach the appropriate cables to the ASA 312.

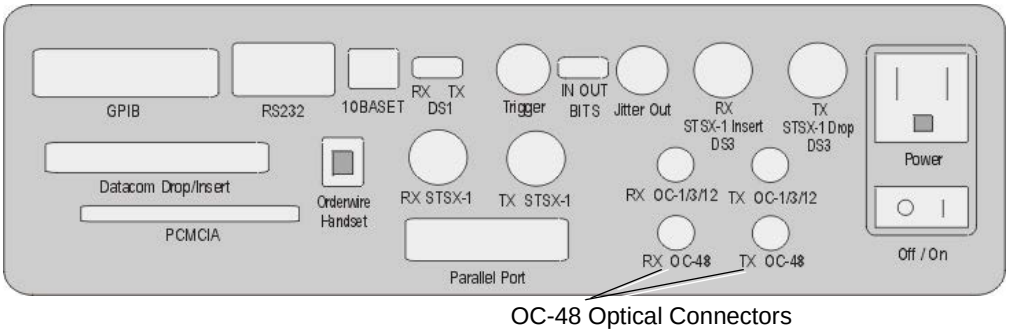


Figure D-1. Connector Panel with OC-48 Optical Connectors Shown (Non-E1)

2. Verify that the unit is powered on.
3. Select the SONET protocol processor and press the **Trnsmt** Function Group button.
4. Press the **Settings** button. The Transmit Settings commands appear on the touch screen display.
5. Press the **Transmit Interface** command and select **OC-48**.

   The message **Processing...Please wait** appears.

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When the configuration is complete, the OC-48 interface rate appears for the SONET **Tx** and **Rx** indicators.

NOTE ➤
For OC-48 operation, the **Transmit Interface** and **Receive Interface** commands are coupled. Therefore, when the **Transmit Interface** command is set to OC-48, the **Receive Interface** command is automatically changed to OC-48. ◄

After the interface is set to OC-48, several additional OC-48 commands are now available:

- STS-12 Under Test
- Pattern In Other STS12s
- OC-48 Laser Type

These commands allow you to set the parameters for the four STS-12 signals that form the OC-48 signal.

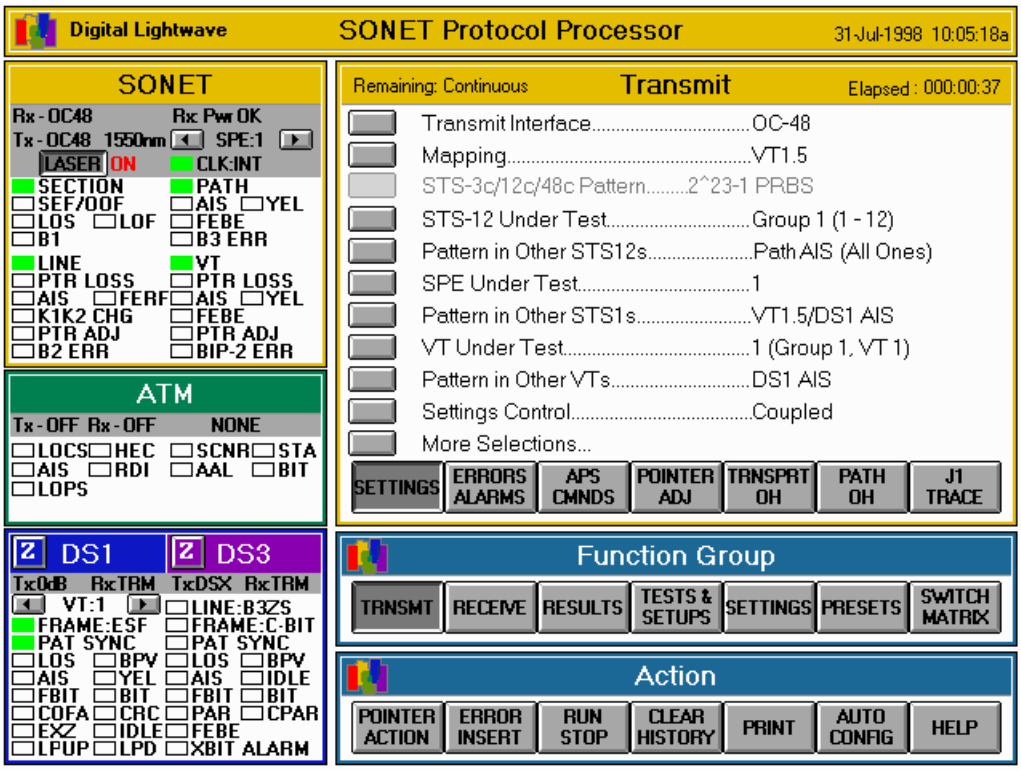


Figure D-2. SONET Protocol Processor Enabled for OC-48 Mode

6. Turn on the laser.
7. After setting the Transmit interface to OC-48, do one of the following:
   – Press the **Mapping** command and select the appropriate mapping.
   – Press the **Presets** Function Group button and select the appropriate Preset command.
   – Press the **Auto Config** Action button and select **Master Configuration.**

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The unit is now configured for OC-48 mode with the proper mapping.

Configuring the NAA I for OC-48 Mode

The following provides a quick setup of the Remote Access Manager and NAA I for OC-48 operation.

Initial OC-48 Setup

To configure the Remote Access Manager for OC-48:

1. Attach the transmit and receive fiber optic cables to the OC-48 NPP.

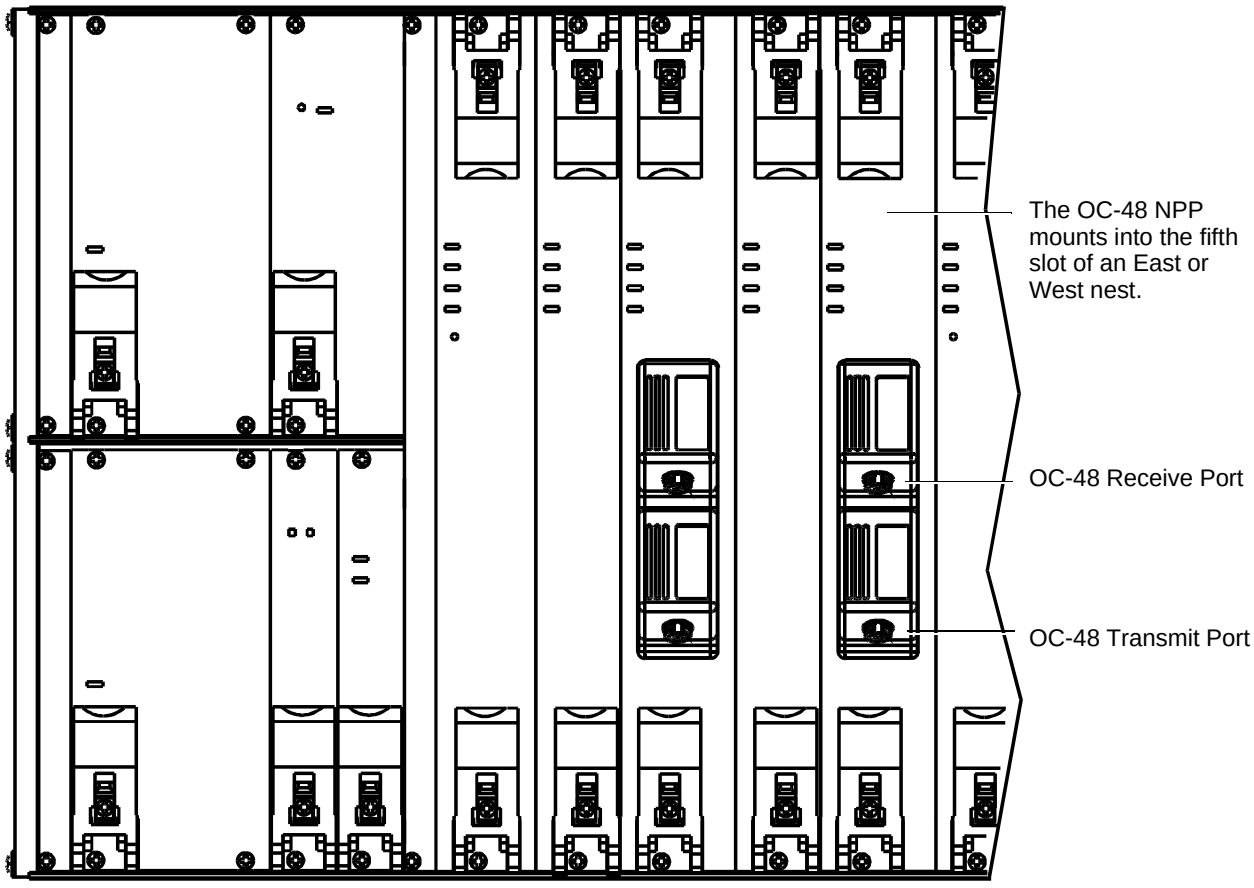


Figure D-3. OC-48 NPP's Optical Connectors (West Nest Shown)

2. From the Remote Access Manager, select the SONET protocol processor and click the **Trnsmt** Function Group button.
3. Click the **Settings** button. The Transmit Settings commands appear on the touch screen display.

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4. Click the **Transmit Interface** command and select **OC-48**.

   The message **Processing...Please wait** appears.

   When the configuration is complete, the OC-48 interface rate appears for the SONET **Tx** and **Rx** indicators.

   NOTE ➤
   For OC-48 operation, the **Transmit Interface** and **Receive Interface** commands are coupled. Therefore, when the **Transmit Interface** command is set to OC-48, the **Receive Interface** command is automatically changed to OC-48. ◄

   After the interface is set to OC-48, the following OC-48 commands are available:

   - STS-12 Under Test
   - Pattern In Other STS12s

   These commands allow you to set the parameters for the four STS-12 signals that form the OC-48 signal.

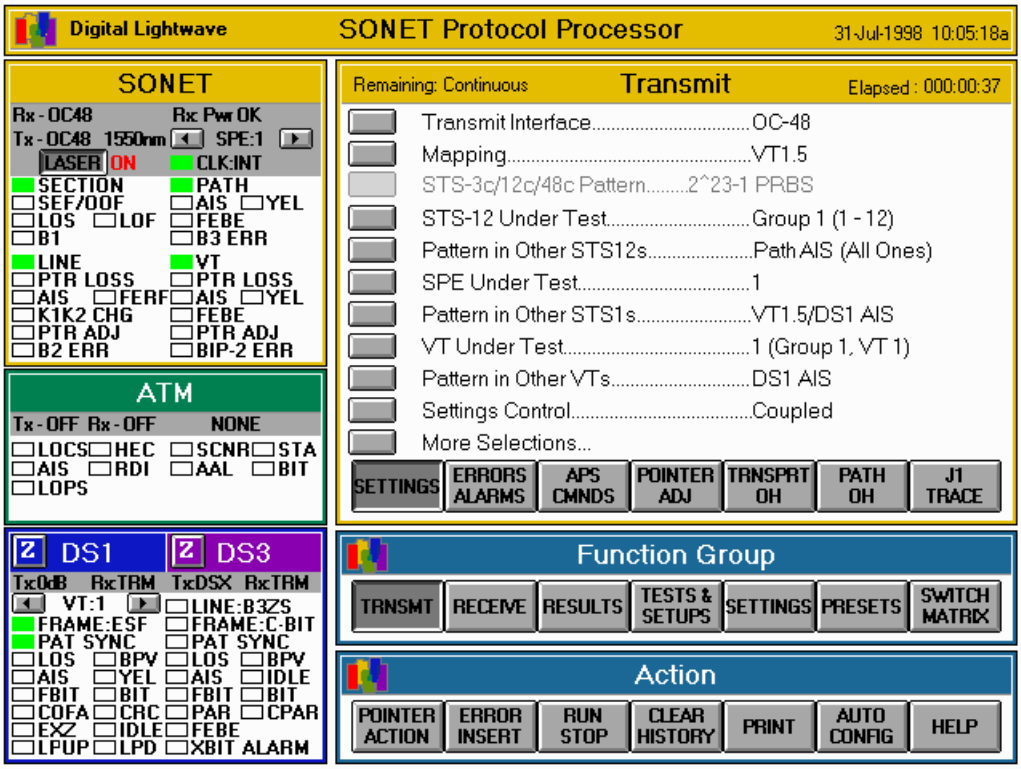


Figure D-4. SONET Protocol Processor Enabled for OC-48 Mode

5. Turn on the laser.
6. After setting the Transmit Interface to OC-48, do one of the following:
   – Click the **Mapping** command and select the appropriate mapping.
   – Click the **Presets** Function Group button and select the appropriate Preset command.

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– Click the **Auto Config** Action button and select **Master Configuration.**

The unit is now configured for OC-48 mode with the proper mapping.

Selecting an SPE to Test

The basic building block of SONET is the STS-1 frame. It consists of the Transport Overhead (TOH) and the Synchronous Payload Envelope (SPE).

For OC-48 operation, four STS-12s are multiplexed to create an STS-48. The STS-48 is converted into an OC-48 optical signal and then transmitted across a fiber optic network.

When using the ASA 312 or NAA I to generate an OC-48 signal, you can select which STS-12 to use as the foreground channel and then select a specific SPE to test.

To select an SPE to test:

1. Select the **STS-12 Under Test** command.
   (This command appears when the **Trnsmt** Function Group and **Settings** buttons are pressed.)

   Select an individual STS-12 or all STS-12s.

2. Select the **SPE Under Test** command and select a specific SPE (1–12) to test.

   NOTE ➤
   For STS-3c mapping, SPEs 1–4 are available.

   For STS-12c mapping, the **SPE Under Test** command is not available. ◄

3. Select the **Pattern in Other STS12s** command to select a pattern for the background STS-12 signals.

   NOTE ➤
   The **Pattern in Other STS-12s** command is not available if the **STS-12 Under Test** command is set to **All (1-48)**. ◄

4. If a concatenated mapping (STS-3c/Pattern or STS-12c/Pattern) is used, select a pattern to transmit using the **STS-3c/12c/48c Pattern** command. This pattern is inserted into the foreground STS-12 signal.

Selecting an SPE to Monitor

When the ASA 312 or NAA I receives an OC-48 signal, it can demultiplex the signal into four STS-12s and then extract a single SPE from an STS-12.

To select an SPE to monitor:

1. Select the **STS-12 Under Test** command.
   (This command appears when the **Receive** Function Group and **Settings** buttons are pressed.)

2. Select an STS-12 to monitor.

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3. Select the **SPE Under Test** command and select a specific SPE (1–12) to monitor.

NOTE ➤

For STS-3c mapping, SPEs 1–4 are available.

For STS-12c mapping, the **SPE Under Test** command is not available. ◄

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E Jitter Measurement

Overview

This appendix contains information about the Jitter Measurement feature, which is an optional module that is available for the ASA 312.

This new feature requires factory installation of the Jitter card, the required supporting hardware, and the ASA 312 Software Release 4.3.9 to provide the capability to test and measure DS1 and DS3 jitter characteristics.

Due to limited space, the Jitter card cannot be installed in an ASA 312 NIC that has the OC-48 option installed.

What is Jitter

Jitter is an intermittent timing deviation of the received digital signal (i.e., variations in the data rate from the signal's expected arrival time). The measurement of Jitter is made at the physical line interface only.

In high-speed telecommunications networks, *transport systems* accept and add user data to a carrier, transport it through various network nodes and devices, and drop it out the end point. These transport systems have a hierarchy of clocks to ensure the correct timing of data transfer.

As the signal goes through each network node, the node must recover the transmitted clock pulse from the input signal, so that when it retransmits the signal, the clock used will be the same. In recovering this clock, the signal has to be reformed into a square wave. At this point, a slight alteration of the waveform can occur — making it start later, or even earlier, than originally transmitted.

This alteration causes a phase shift of the transmitted signal, which is a timing deviation of the pulse train. Successive shifts can accumulate or occur at different rates, causing a continuous variation in the time that a bit actually starts. ***This alteration is "phase noise." This is the source of Jitter.*** The phase shifts occurring at different rates can cause a complex waveform, which can be plotted and broken down into composite waveforms.

Jitter measurements are made at the time of equipment installation to verify that signals are within acceptable limits. Jitter measurements can also be made when systems are experiencing errors for unknown reasons (such as insufficient signal amplitude).

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How is Jitter Measured

Jitter is measured in unit intervals (UIs), where one unit interval is the variation during one clock cycle (from the beginning of one clock pulse to the beginning of the next clock pulse).

The maximum Jitter amplitude measured for DS1 or DS3 operation is 0 to 10 UI.

As the frequency of the clock increases, the ability of various communications equipment to handle large UI numbers decreases, simply because of the amount of processing involved.

There are three basic types of Jitter measurement:

- **Source Jitter**: The amount of Jitter in the signal
- **Jitter Transfer**: The amount of Jitter present in the output of a device (versus the amount present in the input)
- **Jitter Tolerance:** The amount of Jitter that can be input at various frequencies before we start seeing bit errors.

The Jitter Tolerance, measured in UI, can be plotted against frequency to obtain a curve of Jitter Tolerance for a device. This is described separately for DS3 and DS1 operation:

DS3 Operation

Wideband Jitter: For DS3 operation, the area from 10 Hz to 400 kHz is called *Wideband Measurement Bandwidth*, and the Jitter detected is *Wideband Jitter.* The standard frequency (X axis) goes from 10 Hz to 400 kHz, with the UI tolerated typically ranging from 15 UI down to 0.1 UI.

Highband Jitter: The area from 30 kHz to 400 kHz is the *Narrowband Measurement Bandwidth;* the Jitter measured here is *Narrowband* or *Highband Jitter.*

DS1 Operation

Wideband Jitter: For DS1 operation, the area from 10 Hz to 40 kHz is called *Wideband Measurement Bandwidth* and the Jitter detected is *Wideband Jitter.*

Highband Jitter: The area from 8 kHz to 40 kHz is the *Narrowband Measurement Bandwidth;* the Jitter measured here is *Narrowband* or *Highband Jitter.*

For more information on this subject, refer to the Bellcore Standards GR.499 and O.171 as primary references.

The ASA 312 Jitter Measurement feature is supported on both the DS1 and DS3 protocol processors, and the procedures for the two test sets are quite similar.

Before accessing the Jitter Measurement screens of the ASA 312 NIC, you must select either the **DS1** or the **DS3** protocol processor and set Jitter Mapping in the **Receive** function, under **Settings**. You will also want to set the Jitter Hits Threshold and Jitter Equalization parameters before using the Jitter Measurement function.

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The following values are accumulated in the ASA 312:

- Current Wideband Positive Peak
- Current Wideband Negative Peak
- Current Wideband Peak to Peak (absolute value)
- Maximum Wideband Positive Peak
- Maximum Wideband Negative Peak
- Maximum Wideband Peak to Peak
- Current Highband Positive Peak
- Current Highband Negative Peak
- Current Highband Peak to Peak (absolute value)
- Maximum Highband Positive Peak
- Maximum Highband Negative Peak
- Maximum Highband Peak to Peak

NOTE ➤
The term *Maximum . . . Negative* means the most-negative data point — not the numerical maximum.◄

- Number of Seconds that the Jitter Hits Threshold was Exceeded (Calculation of this value is explained in the following section.)
- Maximum Wideband Peak to Peak for the last minute (used in graphing)
- Maximum Highband Peak to Peak for the last minute (used in graphing)

Calculation of the Number of Seconds Threshold Exceeded

The *Number of Seconds that the Jitter Hits Threshold was Exceeded* is calculated separately for the DS1 and DS3 test sets, as follows:

If one or more of the following values equals or exceeds the specified Jitter threshold during a second, then the Jitter Hits Counter will be incremented *once for that second*. The four values are the following:

- Current Wideband Positive Peak
- Current Wideband Negative Peak
- Current Highband Positive Peak
- Current Highband Negative Peak

NOTE ➤
For negative values, the absolute value is used. ◄

This accumulated count is displayed on the DS1 and DS3 Main Results/ Jitter screens, but is not displayed on the respective Graphs.

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Removal of Jitter Measurement Data

The accumulated Jitter Measurement data will be cleared under the following conditions:

- When a **Run/Restart** operation is selected for the test set
- When any setting for that test set is changed (including Hits Equalization)
- When the Jitter board is mapped to a different processor. Changing the mapping of the Jitter board will restart any test set that is mapped to the jitter board. For example, if the Jitter board is remapped from DS1 to DS3, both DS1 and DS3 are restarted. If changing from NONE to DS3, only DS3 is restarted.

Setting up the DS1 Protocol Processor to Measure Jitter

The following procedure describes how to set up the DS1 protocol processor to measure Jitter.

1. Select the DS1 protocol processor.
2. Press either the DS1 protocol processor title bar or the **DS1** button from the protocol processor button row.
3. Press the **Receive** Function Group button and then press the **Settings** button.

   The **Receive Settings** Function menu appears. The last two items on this menu are specific to Jitter:

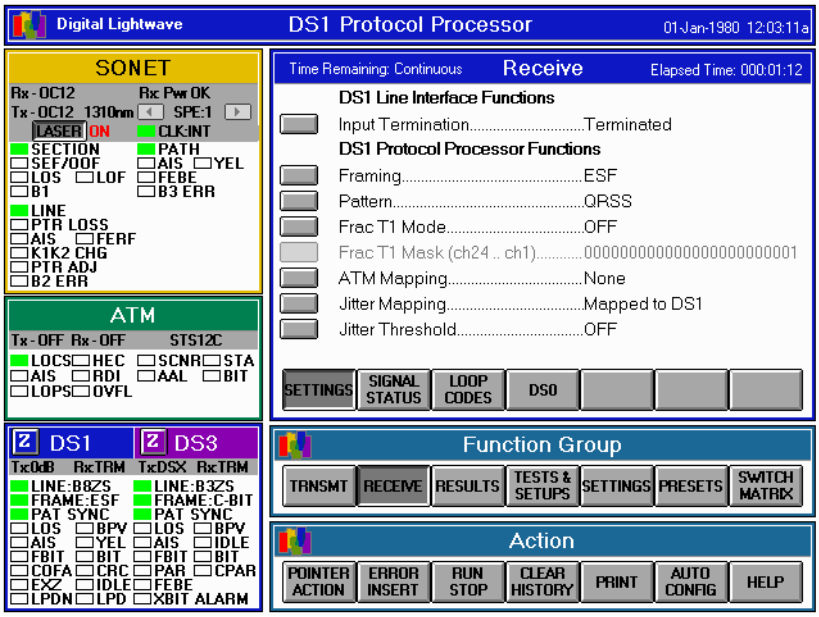


Figure E-1. DS1 Receive Settings Function Menu

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a. Press the **Jitter Mapping** option and select a mapping of DS1.

b. Press the **Jitter Hits Threshold** option. A menu for Jitter Hits Threshold is displayed. Select one of the following options:

- Press Edit to set a Threshold value and proceed to step c.
- Press NONE to turn off the Jitter Hits Threshold (set it to zero) and proceed to step d.

c. When you press EDIT, a second menu for Jitter Hits Threshold is displayed.

Using the two rows of arrow buttons on this menu, you may enter a value (ranging from 0.0 to 10.0 UIs, in increments of 0.1). Then, press Confirm to continue.

The factory default setting is 0.0 or NONE (no threshold value). The setting is saved and restored at startup.

NOTE ➤
After setting the Jitter Hits Threshold, the test set will restart — elapsed time will be reset to zero for DS1, and all Jitter counters reset to zero. ◄

NOTE ➤
Jitter Mapping is set to NONE automatically, if the termination of the mapped test set is changed to BRIDGED. (This is done because the Jitter measurement would be invalid when the termination for the DS1 test set is to BRIDGED.) Also, for a test set that has BRIDGED termination, the button in the Jitter Mapping menu is greyed out. For example: If Jitter is mapped to DS1, and the DS1 termination is changed to BRIDGED, then the Jitter Mapping will be set to NONE, and the DS1 button in the Jitter mapping menu will be greyed out. ◄

d. After the Jitter options in the **Receive Settings** menu have been entered, you may proceed to the **Results** Function group to work with your data.

Displaying and Graphing Jitter Measurement Results for DS1

After setting up the DS1 protocol processor to measure Jitter, the data will be immediately available to you. Use the DS1 **Results** Function group menus to view the Jitter measurement data stored in the datalog of the ASA 312.

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The following procedure describes how you access the Jitter results:

1. Press the DS1 **Results** Function group button.

   The DS1 **Results** Function menu is displayed.

2. Press the **Main Results** button.

   The **Main Results** menu is displayed.

3. Press the **Jitter** button.

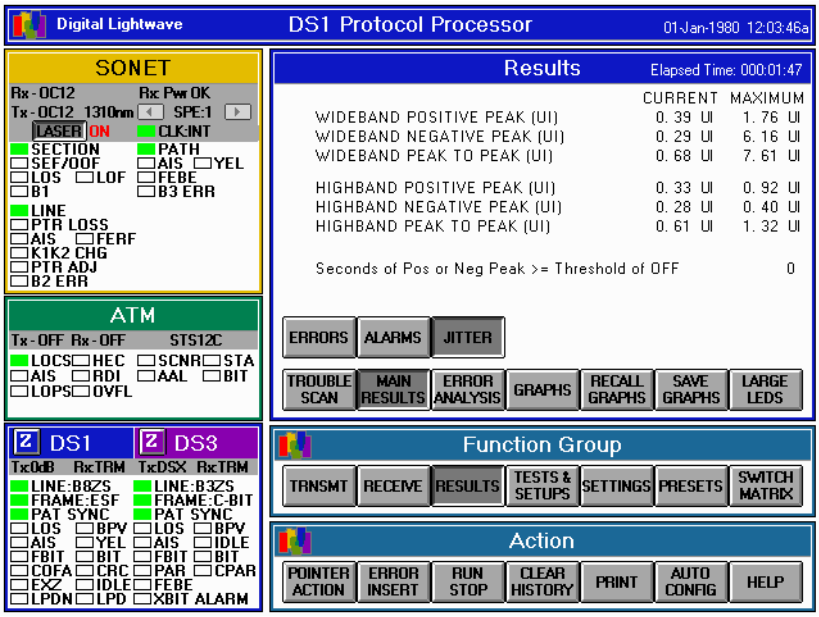


Figure E-2. DS1 Main Results Menu showing Jitter Measurement Data

If you have a printer attached and configured, you can print the screen showing the Jitter data. However, you must select the **Screen Print** option when using the **Print** button to print Jitter results.

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4. To view the snapshot of Jitter values stored in the datalog as a graph, press the **Graphs** button on the **Results** Function menu.

   A graph of the Jitter data is displayed.

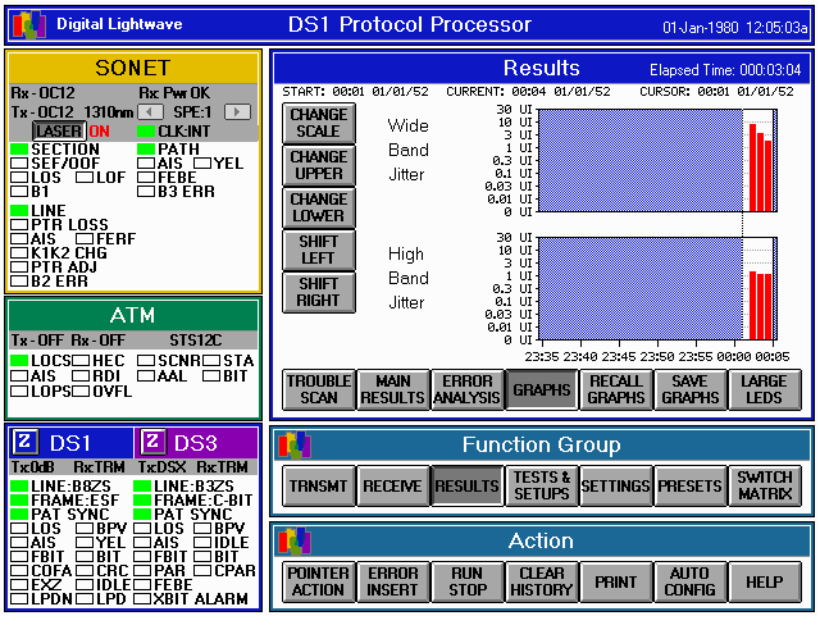


Figure E-3. DS1 Graphs Display showing Jitter Measurement Data

Use the buttons along the left side of the graphs to change the scale, the graph types, and the time orientation of the graphs:

- The **Change Scale** button offers options to reset the Time scale on the y-axis.
- The **Change Upper** and **Change Lower** buttons offers options to change the data being graphed. (Choose either Wideband Jitter or Highband Jitter.)
- The last two buttons, **Shift Left** and **Shift Right,** increment the display of the graph along the Time scale (y-axis).

If you have a printer attached and configured, you can print the screen showing the Jitter graphs. However, you must select the **Screen Print** option when using the **Print** button to print Jitter results.

Values Used for Graphing

The two "Previous Maximum" extended values are used for graphing only. They are as follows:

- The value for the Wideband Jitter graph is the Maximum Wideband Peak to Peak for the last minute.
- The value for the Highband Jitter graph is the Maximum Highband Peak to Peak for the last minute.

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Setting up the DS3 Protocol Processor to Measure Jitter

The following procedure describes how to set up the DS3 protocol processor to measure Jitter.

1. Select the DS3 protocol processor.
2. Press either the DS3 protocol processor title bar or the **DS3** button from the protocol processor button row.
3. Press the **Receive** Function Group button and then press the **Settings** button.

   The **Receive Settings** Function menu appears. The last three items on this menu are specific to Jitter:

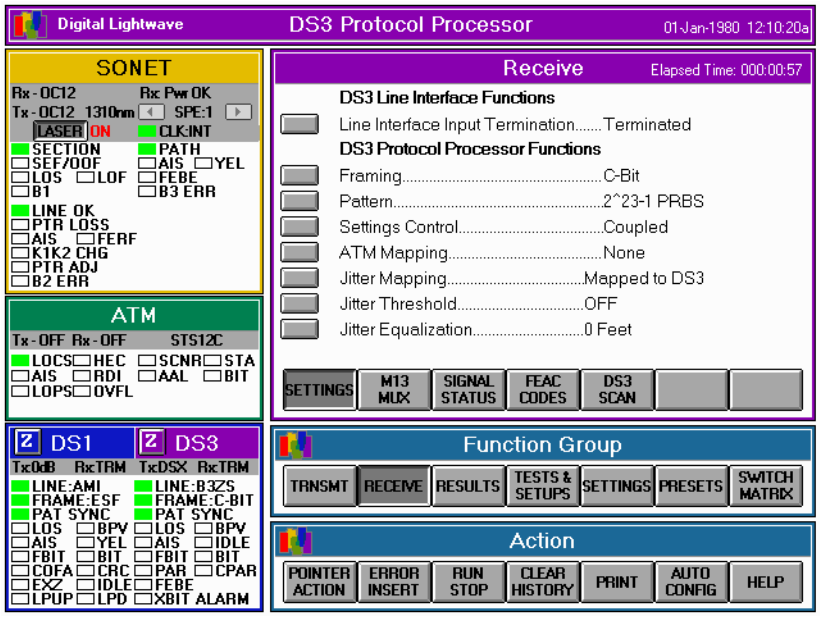


Figure E-4. DS3 Receive Settings Function Menu

a. Press the **Jitter Mapping** option and select a mapping of DS3.

b. Press the **Jitter Hits Threshold** option. A menu for Jitter Hits Threshold is displayed. Select one of the following options:

- Press EDIT to set a Threshold value and proceed to step c.
- Press NONE to turn off the Jitter Hits Threshold (set it to zero) and proceed to step d.

c. When EDIT is pressed, a second menu for Jitter Hits Threshold is displayed.

Using the two rows of arrow buttons on this menu, you may enter a value (ranging from 0.0 to 10.0 UIs, in increments of 0.1). Then, press Confirm to continue.

The factory default setting is 0.0 or NONE (no threshold value). The setting is saved and restored at startup.

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NOTE ➤
After setting the Jitter Hits Threshold, the test set will restart; elapsed time will be reset to zero, and all Jitter counters reset to zero. ◄

d. Press the **DS3 Cable Equalization** option and select an Equalization value of 0, 450, or 900 feet.

This value provides signal loss compensation at the Jitter board. These selectable stages compensate for signal degradation due to long cable runs.

e. After the Jitter options in the **Receive Settings** menu have been entered, you may proceed to the **Results** Function group to work with your data.

Displaying and Graphing Jitter Measurement Results for DS3

After setting up the DS3 protocol processor to measure Jitter, the data will be immediately available to you. Use the DS3 **Results** Function group menus to view the Jitter measurement data stored in the datalog of the ASA 312.

The following procedure describes how you access the Jitter results:

1. Press the DS3 **Results** Function group button.

   The DS3 **Results** Function menu is displayed.

2. Press the **Main Results** button.

   The **Main Results** menu is displayed.

3. Press the **Jitter** button.

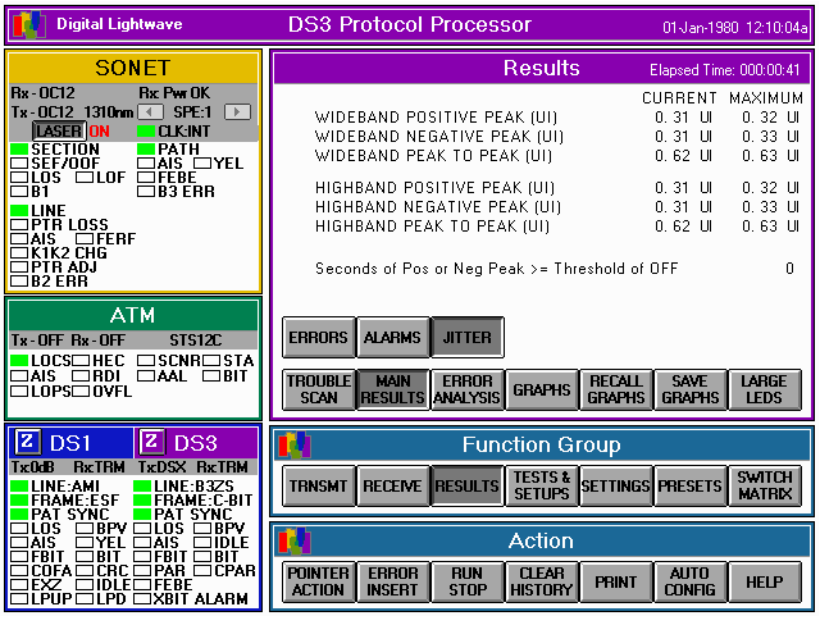


Figure E-5. DS3 Main Results Menu showing Jitter Measurement Data

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If you have a printer attached and configured, you can print the screen showing the Jitter data. However, you must select the **Screen Print** option when using the **Print** button to print Jitter results.

4. To view the snapshot of Jitter values stored in the datalog as graphs, press the **Graphs** button on the **Results** Function menu.

   A graph of the Jitter data is displayed.

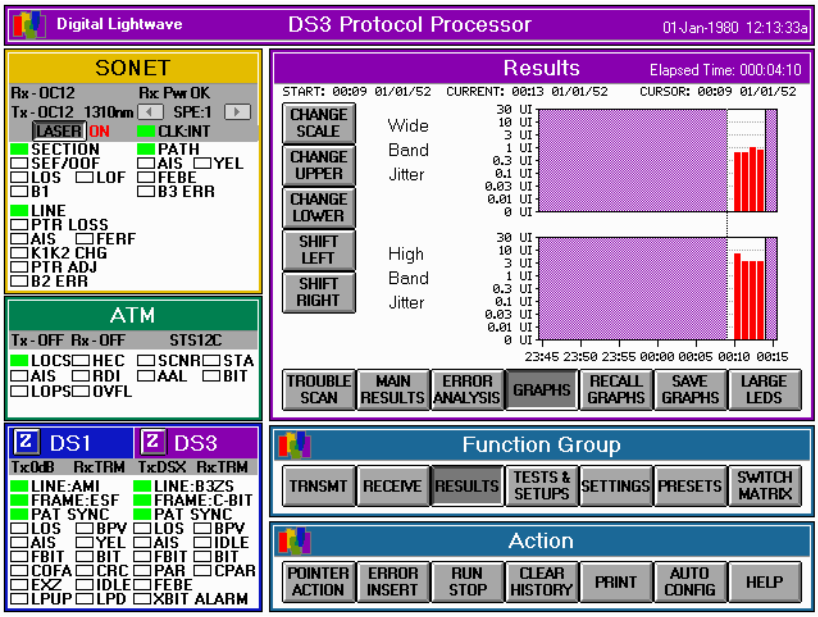


Figure E-6. DS3 Graphs Display showing Jitter Measurement Data.

Use the buttons along the left side of the graphs to change the scale, graph types, and the time orientation of the graphs:

- The **Change Scale** button offers options to reset the Time scale on the y-axis.
- The **Change Upper** and **Change Lower** buttons offers options to change the data being graphed. (Choose either Wideband Jitter or Highband Jitter.)
- The last two buttons, **Shift Left** and **Shift Right,** increment the display of the graph along the Time scale (y-axis).

If you have a printer attached and configured, you can print the screen showing the Jitter graphs. However, you must select the **Screen Print** option when using the **Print** button to print Jitter results.

Values Used for Graphing

The two “Previous Maximum” extended values are used for graphing only. They are:

- The value for the Wideband Jitter graph is the Maximum Wideband Peak to Peak for the last minute
- The value for the Highband Jitter graph is the Maximum Highband Peak to Peak for the last minute.

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Glossary

10baseT Connector — A popular jack or connector for the connection of a computer to a local area network. Resembles a telephone jack. The IEEE standard interface connector for operating ethernet local area networks on twisted-pair cabling. The standard is called 802.3 10base-T and includes connector type, voltage levels, cabling type, etc.

55 DLY Pattern — A repeating 55 Daly octet pattern used for DS1.

AAL — ATM Adaptation layer. 1. Two sublayers concerned with segmenting large PDUs into ATM cells; type 1 = CBR, 2 = VBR, 5 = for LAN and FR frames. 2. An ATM LED indicating that an AAL1 SN or SNP error, or a lost or misinserted cell, occurred; or an AAL5 PDU length or CRC error occurred.

ABR (Available Bit Rate) — An ATM service type in which the ATM network makes a "best effort" to meet the transmitter's bandwidth requirements. ABR uses a congestion feedback mechanism that allows the ATM network to notify the transmitters that they should reduce their rate of data transmission until the congestion decreases. Thus, ABR offers a qualitative guarantee that the transmitter's data can get to the intended receivers without unwanted cell loss.

AIS (Alarm Indication Signal) — Also known as a Blue Alarm. A signal that replaces the normal traffic signal when a maintenance alarm indication has been activated. In DS1, AIS replaces the entire frame structure with a predetermined signal (bit pattern). This is done to inhibit alarms in downstream sections caused by identified upstream failures. In DS-1 AIS is an unframed all ones signal. In DS3, AIS is a signal with a valid M-frame Alignment channel, M-subframe Alignment and valid P bits. The information bits are set to 10...sequence, starting with a one (1) after each M-frame Alignment bit, M-subframe Alignment bit, X-bit, P-bit, and C-bit channel. The C-bits are set to Zero and the X-bits are set to one. For ATM, AIS is an all ones signal. For SONET, AIS can occur due to an LOS, LOF, or LOP failure on Line layer, Path layer, or Virtual Tributary. *See Alarm, and Signal.*

Alarm — An audible or visible indication of a trouble condition. Alarms are classified as minor, major and critical, depending on the degree of service degradation or disruption. Certain bits in the overhead of a transmission are set to a certain value by convention to indicate a trouble condition. The bits in a transmission stream which signal an alarm condition. SONET, DS1 and DS3 each have defined specific alarms to be generated for specific failure conditions in the transmission. *See Transmission.*

Alternative Mark Inversion — A line coding format in some transmission systems whereby successive ones (marks) are alternately inverted (sent with polarity opposite that of the preceding mark).

APS Commands — (Automatic Protection Switching). The K1 and K2 bytes of the line overhead section of the Synchronous Payload Envelope are reserved for APS signaling. APS Commands are those signals loaded in the K1 and K2 bytes that control the APS functions. *See Line Overhead, Synchronous Payload Envelope, and Automatic Protection Switching.*

ASA 312 — Asynchronous/Synchronous Analyzer. Digital Lightwave's functionally and technologically innovative diagnostic analyzer for high-speed telecommunications.

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Assigned Cell Cell that provides a service to an upper layer entity or ATM Layer Management entity (ATMM-entity).

Asynchronous Time Division Multiplexing A multiplexing technique in which a transmission capability is organized in a priori unassigned time slots. The time slots are assigned to cells upon request of each application's instantaneous real need.

Asynchronous Transfer Mode An advanced data transport and switching method in which information does not occur periodically, with respect to some reference such as a frame pattern, and which provides for much higher data transfer capacity than prior network technology. ATM allows multiple kinds of data, such as voice, video, and computer data services, to be transmitted at high-speed over the network. It is a general class of packet technologies that relays traffic via an address contained within the packet. It is asynchronous because there is no clocking signal with the data transport. ATM has been selected as the basis for the future broadband network. *See Frame, Packet, Synchronous, Switching, Broadband, and Traffic*.

Asynchronous Literally, not synchronous. In a telecommunications network, asynchronous refers to various channels or signals entered on the network that are not synchronized to the same clock. *See Synchronous, Channel, and Signal.*

ATM See Asynchronous Transfer Mode.

ATM Adaptation Layer (AAL) One of the three layers of the ATM protocol reference model. It performs segmentation and reassembly (SAR), translates higher-layer data into ATM cell payloads, and translates incoming cells into a format readable by the higher layers.

ATM Layer Link A section of an ATM Layer connection between two adjacent active ATM Layer

entities (ATM-entities)

ATM Link A virtual path link (VPL) or a virtual channel link (VCL)

ATM Peer to Peer Connection A virtual channel connection (VCC) or a virtual path connection (VPC)

ATM User User Connection: An association established by the ATM Layer to support communication between two or more ATM service users (i.e., between two or more next higher layer entities or between two or more ATMM-entities). The communication over an ATM Layer connection may be either bi-directional or unidirectional. The same Virtual Channel Identifier (VCI) is used for both directions of a connection at an interface.

Automatic Protection Switching The capability of a transmission system to detect a failure on a working facility, and to switch to a standby facility to recover the traffic. Protection switching is automatically initiated when the error rate on the service line exceeds a set threshold.

B3ZS Binary 3 Zero Substitution

B8ZS (Binary 8 Zero Substitution) A coding technique, used in DS1 signals, where a specific pattern of two violations of the bipolar encoding technique is substituted for each seven consecutive zeros in the transmission signal.

Bandwidth In communications, the difference between the highest and lowest frequencies in a given range. The amount of bandwidth a channel is capable of carrying determines what kinds of communications can be carried on it. High bandwidth or equivalently, a broadband channel or circuit is

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required to carry a video signal whereas a voice conversation requires very low bandwidth or equivalently a narrowband channel. *See Frequency, Channel, and Broadband.*

BER Bit Error Rate

BERT (Bit Error Rate Test) Provides the means for evaluating the integrity of ATM cell data transmission between two points in a network. If successful, a BERT indicates that payload information is being corrupted in transit, perhaps because of a faulty ATM switch or piece of transmission equipment, network overload, or physical medium problems. *See Physical layer BERT.*

Bit Interleaved Parity (BIP) A piece of digital information which, in telecommunications, can be either a 1 or a 0. Interleaving is the process of taking individual bits (or blocks of bits) from different data streams and sandwiching them together to combine the data streams for transmission over a single line. The three data streams AaaaA..., BbBBb..., and CCCcc..., bit interleaved to one data stream, would be ABCabCaBCaBcAbc. Parity is a process used to determine if digital information has been altered during transmission. Bit Interleaved Parity is error checking for a bit interleaved transmission. *See Parity, Bits, Digital, and Error Checking.*

Bits The smallest unit of information (data) a computer can process, representing either high or low, yes or no, or 1 or 0. A single piece of digital information and the basic unit of data communications, sometimes called a signal element. If you were to see 110011, you would be looking at six bits of information. *See Digital.*

BITS (Building Integrated Timing Supply) A clock inside a building or telephone company office which acts as a central timing reference for all other clocks in the building. A synchronous network is one where all of the network's equipment send and receive data according to a common timing reference, and where there is a constant time between successive bits, characters or events. *See Synchronous, and Bits.*

Blue Signal Originally used in T-1 transmission. An alarm signal generated when a certain condition is detected in two consecutive frames in the data bit stream.

BNC (Connector): Bayonet-Neill-Concelman. A bayonet-locking connector for slim coaxial cables.

BPV (Bipolar Violation) A type of error which can occur in a digital signal transmitted over an electrical line. In the T-Carrier system, it is the presence of two consecutive one bits of the same polarity. *See Digital, Signal, and Bits.*

Broadband Refers to a transmission facility which can provide numerous voice, video, and data channels simultaneously. In contrast, narrowband services include voice and low speed data applications. As a general rule, any facility above 1.5 Mbps is broadband. *See Channel and Transmission.*

Burst Tolerance Defined by the Maximum Burst Size (MBS), a number of cells specified when the connection is set up. The MBS may be sent at the PCR without exceeding the SCR if the connection is idle for enough time between bursts.

C-Bit Parity Error In a DS3 signal, the C-bit has been designated a parity bit which, on transmission of the signal, measures the parity of the payload in the DS3 frame, excluding the framing bits. If at the receiving end, the parity of this C-bit is different, a C-bit Parity Error is generated. *See Bits, and Parity.*

CBR (Constant Bit Rate) A data transmission that can be represented by a nonvarying, or continuous, stream of bits or cell payloads. Applications such as voice circuits generate CBR traffic patterns. CBR is an ATM service type in which the ATM network guarantees to meet the transmitter's bandwidth and quality-of-service (QOS) requirements.

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CDV (Cell Delay Variation)	A quantification of cell clumping for a connection. The cell clumping CDV is defined as the difference between a cell's expected reference arrival time and its actual arrival time.
CDVT	Cell Delay Variation Tolerance. Can be set explicitly by subscription or by end-systems via signaling for SVCs or by the Network management System for PVCs.
Cell	ATM Layer protocol data unit (PDU).
Cell Header	ATM Layer protocol control information.
CER	Cell Error Ratio
Channel Service Unit	A device used to connect a digital line to a multiplexer, channel bank, computer, PBX, or other device. It connects a DS-1 or T1 from the central office to the customer equipment and it performs loopback functions for testing and maintenance purposes.
Channel	A signal path between two or more points. Also called a circuit, facility line, facility, link, or path. A cable that carries the signal.
CI	Congestion Indicator
Circuit	The physical pathways and connections between two points through which an electric current can flow.
Clock	An oscillator-generated signal that provides a timing reference for a transmission system or link. The clock generates periodic signals to enable synchronization on a transmission facility.
CLP	Cell Loss Priority, signaling bit in ATM header cell (0=high priority, 1=low priority)
CLR	Cell Loss Ratio
Coding Violation (CV)	A generic abbreviation that covers all of the possible error signals generated on a SONET network. For example, CV-L = Line coding Violations (B2); CV-LFE = Far-end Line Coding Violation/FEBE; CV-P = STS Path coding Violations (B3); CV-PFE = Far-end STS Path Coding Violation; CV-S = Section Coding Violations (B1); CV-V = VT Path Coding Violations (BIP-2); CV-VFE = Far-end VT Path Coding Violation.
COFA (Change of Frame Alignment)	During an OOF (Out of Frame) condition, if the event occurs with a positional displacement of the Multi-frame indicator, a COFA is indicated.
Connectionless Service	A type of service in which no predetermined path or link has been established for transfer of information. *See also Connection-Oriented Service.*
Connection Admission Control	The procedure used to decide if a request for an ATM connection can be accepted based on the attributes of both the requested connection and the existing connections.
Connection Endpoint	A terminator at one end of a layer connection within a SAP.
Connection Endpoint Identifier	A terminator at one end of a layer connection within a SAP.

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Connection-Oriented Service A type of service in which information always traverses the same pre-established path or link between two points.

Connection An ATM connection consists of the concatenation of ATM Layer links in order to provide an end-to-end information transfer capability to access points.

Couple In the ASA 312, the transmit and receive sides of each test set are coupled together so that certain settings established on one side are also set on the other side.

CSI Convergence Sublayer Indication

CTD (Cell Transfer Delay) The transit delay of an ATM cell successfully passed between two designated boundary.

Cyclic Redundancy Check (CRC) A process used to check the integrity of a block of data. A CRC character is generated at the transmission end. Its value depends on the hexadecimal value of the number of ones in the data block. This character is then added to the data block. The receiving end makes the same calculation and compares its results with the CRC character generated at the transmission end. If they are equal, the received data is presumed to be the same as the transmitted data. If not, a CRC error code is generated.

-dBm Power level expressed in relation to 1 milliwatt. For example: 0dBm = 1 milliwatt, +3 dBm = 2 milliwatt, -3 dBm = 0.5 milliwatt. *see Decibel.*

DCC DataCom Channel

D4 Framing The most common framing format for a T-1 signal. *See T-1*.

Decibel Abbreviated dB. A unit for measuring the power of a sound or the strength of a signal, usually the relation between a transmitted signal and a standard signal source. It is expressed as the ratio of two values. For instance, the power in telecommunications circuits is so low that it is normally measured in milliwatts. However, the milliwatt is not a convenient way to express differences in power level between circuits. Voice frequency circuits are designed around the human ear, which has a logarithmic response to changes in power. Therefore in telephony, the decibel, which is a logarithmic rather than a linear measurement, is used as a measure of relative power between circuits or transmission level points. A change in level of 1 dB is barely perceptible under ideal conditions. Increases or reductions of 3 dB result in doubling or halving the power in a circuit.

Defect A defect is a limited interruption in the ability of an item to perform a required function. It may or may not lead to maintenance action, depending on the results of additional analysis. Successive anomalies causing a decrease in the ability of an item to perform a required function are considered defects. Defects include, for example, the more severe frame error events that result from detecting a sufficient number of frame bit errors within specified time intervals. A persistent defect results in a failure.

Demapping *See Mapping.*

Demultiplex A function performed by a layer entity that identifies and separates SDUs from a single connection to more than one connection. To separate two or more previously combined signals via compatible multiplexing equipment.

Digital Of, or pertaining to, the use of digits, binary digits, digital computers or digital signals. A category of devices or circuits in which the signal amplitude, frequency or polarity varies in discrete

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steps. A system using digital or discrete signals in contrast to continuously variable analog signals. The circuitry in a digital system usually operates at either of two voltage levels, corresponding to logic 1 or 0, or stable states called high or low, on or off.

Digital Service A hierarchy of digital signal speeds used to classify capacities of signal lines. The fundamental speed level is DS-0 (64 kilobits per second) and the highest is DS-4 (about 274 million bits per second).

Digital Signal A signal comprised of discrete states, such as a high voltage or a low voltage, which can be sent over a wire as a series of electrical pulses. Similarly, a digital signal could be a series of laser light flashes sent over a fiber optic cable. On the other end of the line, these flashes or pulses are recovered and translated into binary digits and ultimately, into information. A digital signal with a limited number of discrete states, usually two, is in contrast to an analog signal which can vary continuously and has more or less an infinite number of states.

Drop That process wherein part of the information carried in a transmission system is demodulated (dropped) from the higher-speed signal, for analyzing, measurement, rerouting, or modification.

Drop and Insert The process in which a signal, or part of a signal, in transit is dropped off at an intermediate location, and other information is inserted into the signal for subsequent transmission.

DS Digital Service. A hierarchy of digital signal speeds used to classify capacities of signal lines. The fundamental speed level is DS-0 (64 kilobits per second) and the highest is DS-4 (about 274 million bits per second).

DS-0 Digital Service, level 0. It is 64,000 bps, the worldwide standard speed for digitizing one voice conversation using Pulse Code Modulation. There are 24 DS-0 channels in a DS-1.

DS-1 Digital Service, level 1. It is 1.544 Mbps signal rate. The standard for 1.544 Mbps is 24 voice conversations each encoded at 64 Kbps. DS-1 is also called T-1.

DS-2 Digital Service, level 2. Equivalent of 4 DS-1 channels, and operating at 6.312 Mbps. Also called T-2.

DS-3 Digital Service, level 3. Equivalent of 28 DS-1 channels, and operating at 44.736 Mbps. Also called T-3. Framing specification used for transmitting a digital signal at 45 Mbps through the telephone switching network on a T3 digital WAN carrier facility.

E1 The European equivalent of the North American 1.544 million bits per second (Mbps) T1, except that E1 carries information at the rate of 2.048 million bits per second.

E3 Wide-area digital transmission scheme used predominantly in Europe that carries data at a rate of 34.368 Mbps. E3 lines can be leased for private use from common carriers.

End System A system where an ATM connection is terminated or initiated. An originating end system initiates the ATM connection, and a terminating end system terminates the ATM connection. OAM cells may be generated and received.

Error Checking A procedure performed by computer-based communications programs, hardware, software, or firmware in a network monitoring device, instrument or equipment to ensure complete and accurate data transfer.

Error Count(s) An incrementing value indicating the cumulative singular occurrences of any specific error.

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Error Free Seconds A measurement of the time, in seconds, in which there were no errors detected in the signal being monitored.

Error Injection The process of purposely adding errors into a data transmission in order to see if the errors are detected.

Error Ratio In data transmission, the ratio of the number of incorrect elements transmitted to the total number of elements transmitted.

Errored Seconds An incrementing value showing the number of seconds in which errors were detected in the transmitted signal.

Error In telecommunication, a collective term that includes all types of edit rejects, inconsistencies, transmission deviations, and control failures. Data that has been lost or damaged through system or network problems, or media defects. An error is also a deviation from what is correct. Errors and anomalies are largely synonymous. Error counters are counting anomalies.

Exer Exercize (0100). *See K1 Bits 1-4*.

Extended Super Frame A T-1 framing format which provides frame synchronization, cyclic redundancy checking and data link bits. This format allows error information to be easily stored and retrieved, facilitating network performance, monitoring, and maintenance. *See Cyclic Redundancy Check.*

EXZ Excessive Zeros

Failure A persistent defect results in a failure. A failure is the termination of an item's ability to perform a required function.

FEAC (Far End Alarm and Control) The alarm and control channel which transmits alarm or status conditions to the far end. The FEAC also allows control over far end loopback conditions.

FEBE (Far End Block Error) An alarm signal generated by a network monitoring device, and sent up the line to inform other network devices that an error has been detected in the signal.

FERF (Far End Receive Failure) A signal generated and sent upstream that informs the transmitting line terminating equipment that the receiving equipment has detected an incoming failure.

Frame Bit Error (Abbr. ANSI "FE" on ASA 312 "FBIT") 1. In DS-1, a bit error detected in the frame of the signal. The receiving end of the line knows what framing bit to expect and when it will arrive. When this bit is not detected, a Frame Bit Error is registered. This is the primitive used in the recognition and determination of other framing problems, e.g., Out of Frame (OOF) and Loss of Frame (LOF). Frame Bit Error is also referred to as Frame Synchronization Bit Error. 2. In DS-3 Frame Bit Errors are detected in the DS-3 Frame Overhead Structure.

Frame (Format) Generally, a group of data bits in a specific format, with a flag at each end to indicate the beginning and end of the frame. The defined format enables network equipment to recognize the meaning and purpose of specific bits in the frame. The group of bits are sent serially (one after another). Generally, a frame is a logical transmission unit.

Frame Relay A new fast packet switching protocol based on the LAPD protocol of ISDN that performs routing and transfer with less processing than X.25.

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Frequency In a system that transmits signals as waves of electrical or optical energy, the frequency is the number of cycles or repetitive wave peaks that occur during one second of time. In digital transmission, frequency is the number of bits of information transmitted in one second of time. *See Bits, Transmission, Signal, and Digital Signal.*

FS Forced Switch (1110) *See K1 Bits 1-4.*

GCRA Generic Cell Rate Algorithm

General Purpose Interface Bus (GPIB) A particular type of interface that allows for the connection of instrumentation of most any kind to a computer. A bus developed by Hewlett-Packard for the exchange of information between computers and industrial automation equipment. Also known as the IEEE 488 bus, it allows test engineers to configure complete systems from off-the-shelf instruments and control those systems with a single, proven interface.

GFC Generic Flow Control. The first four bits of an ATM cell header for a UNI interface.

Header Protocol control information located at the beginning of a protocol data unit (PDU).

HEC Header Error Control. 1. Provides error correction for the ATM Cell Header. It is the last byte of the 5-byte ATM Cell Header. 2. It also appears as an ATM LED and indicates if a correctable or uncorrectable HEC error has been received.

Insert That process wherein part of the information carried in a transmission system is modulated (inserted) into a higher speed signal.

Interface Data The unit of information transferred to/from the upper layer in a single interaction across the SAP. Each Interface Data Unit (IDU) contains interface control information and may also contain the whole or part of the SDU.

Isochronous Signals carrying embedded timing information or dependent on uniform timing. Data has no embedded timing - send it slower and it is still valid, just late. Voice and video are intimately tied to timing. Send voice slower and it sounds very different. With TDM services there is a direct relationship between the signal rate used to digitize the voice samples and the bearer channel rate, allowing accurate reconstruction of the voice (or other signals) at the far end. With packet technologies no such relationship exists. Services like ATM must use care in transferring such signals so timing can be recovered since it cannot be derived from the ATM bearer channel.

J1 Byte The J1 byte is the first byte of the Path Overhead portion of the Synchronous Payload Envelope, and is used to repetitively transmit a 64-byte, fixed length string so that continued connection to the source of the path signal can be verified at any receiving terminal along the path.

J1 Trace The 64-byte fixed length string transmitted in the J1 Byte. *See J1 Byte.*

Jitter On a network where all devices must operate in a synchronized manner, relative to the same timing source, jitter is the lack of synchronization between network devices caused by mechanical or electrical changes. Jitter is the phase shift of digital pulses over a transmission medium.

K1 Bits 1-4 K1 Bits 1-4 indicates the type of APS request.

K1 Bits 5-8 In Linear APS mode: indicates the number of the channel. Code 0 = Null Channel, Code 1-14 Working channel, Code 15 = Extra traffic channel. In Ring APS mode, Bit 5-8 contains Destination Code Identification.

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K1 Byte The K1 byte is used to indicate a request by a channel for a switch action. K1 is used by APS (Automatic Protection Switching).

K2 Bits 1-4 In APS Linear Mode: Bits 1-4 indicate the number of the channel that is bridged onto protection unless channel 0 is received on bits 5-8 of K1 byte, when they shall be set to zero. In APS Ring Mode: Bits 1-4 is Source Node Identification. Source node ID is set to the node's own ID.

K2 Bits 5 In APS Linear Mode: 0 = provisioned for 1 + 1 mode, 1 = provisioned for 1:*n* mode. In APS Ring Mode, it indicates short or long path code. 0 = Short Path Code and 1 = Long Path Code.

K2 Bits 6-8 In APS Linear mode: Bits 6-8 indicate the status, such as idle, Br, Br&Sw, or Unused. In APS Ring mode: Bits 6-8 indicate the status such as idle, Ex Tr, or L-RDI.

K2 Byte The K1 byte is used to indicate a request by a channel for a switch action. K1 is used by APS.

LAN Emulation (LANE) The process whereby an ATM network emulates a significant part of the MAC protocol of an existing IEEE LAN, specifically Ethernet and Token Ring. LANE allows existing higher-layer protocols and applications to be used transparently over an ATM network that interconnects Ethernet and Token Ring LANs.

Laser An acronym for Light Amplification by Stimulated Emission of Radiation. A device which is able to produce light at a single frequency and phase. Light that has a single frequency and a single phase is said to be coherent, in contrast to normal light which has multiple frequencies and random phase combinations. The waves of non-coherent light can be likened to a crowd of people rushing down the street in contrast to coherent light which in the same example, is more like a group of soldiers marching down the street in row formation with each soldier in step. *See Frequency, and Phase.*

Lightwave Refers to the use of light as a communication signal when transmitted over fiber-optic cable. Light itself can travel over distances as a wave of energy, hence lightwave. The light signal communication travels as a discrete series of pulses of light.

Line AIS (Line Alarm Indication Signal) An alarm signal generated when an error is detected in the Line Overhead portion of the Synchronous Transport Frame. *See AIS, and Line Overhead.*

Line B2 (Error) The B2 byte is a parity code in the Line Overhead section of the Transport Overhead in the Synchronous Transport Frame. It is even parity, and is calculated over all the bits of the Line Overhead and STS-1 envelope capacity of the previous STS-1 frame before scrambling. Used at the receiving end to determine if a transmission error has occurred over the line.

Line FEBE (Line Far End Block Error) An alarm signal generated and sent upstream to the transmitting Line Terminating Equipment, signaling that errors have been detected in the data block at the receiving Line Terminating Equipment.

Line FERF (Line Far End Receive Failure) A signal generated and sent upstream that informs the transmitting line terminating equipment upstream that the receiving equipment has detected an incoming failure in the Line Overhead portion of the Synchronous Transport Frame. *See FERF.*

Line Frequency The frequency of the transmitted signal on the network line, measured in megahertz (MHZ).

Line Overhead In a Synchronous Transport Frame, 18 bytes are delegated in the Transport Overhead section of the frame for monitoring and maintenance of the frame signal across a line span. The Line Overhead data is updated each time the frame passes through a Line Terminating Equipment. The

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functions of the Line Overhead include the Payload Pointer bytes, a parity byte, Automated Protection Switching signaling, a data communications channel for message based administration, monitoring, maintenance, alarm and other communications needs between line terminating equipment, and an order-wire channel for voice communications between line terminating equipment.

Line Terminating Equipment Equipment, at either end of a Line span in a SONET network, that originates the Line Overhead or terminates the Line Overhead.

Line A line is a transport entity that provides the means of moving a digital signal between two consecutive NE (Network Elements) - one originating the line signal and the other terminating it. A SONET network Line comprises the transmission medium, together with the associated equipment, and provides the means of transporting information between two consecutive network elements. One of the network elements originates the Line Overhead and the other terminates the Line Overhead. A Line span in the SONET network has special significance as it is protected in case of equipment failure or deterioration in performance. The transportation of information across a network Line span will be maintained by switching to standby (or protection) facilities provided in case of failure.

LOCS (Loss of Cell Synchronization) An ATM LED that indicates the loss of Cell Sync. This happens when seven consecutive bad HECs are received. Cell Sync returns when six consecutive good HECs are received.

Looped (Signal Timing) A method of synchronizing a circuit by taking a synchronizing clock signal from incoming digital pulses.

Loss of Frame (LOF) 1. DS-1, a loss of frame is declared when an OOF condition has existed for a certain period of time. DS-1 criteria to declare LOF is 2.5s. (0.5 s. of persistent OOF. DS-1 criteria to clear LOF is twenty of fewer contiguous seconds with no OOF defects. 2. DS-3, a loss of frame is declared when an OOF condition has existed for a certain period of time. DS-3 criteria to declare LOF is 2.5 s. (s. 3. SONET, a loss of Frame failure is declared when a Loss of Frame Defect (or OOF on ASA 312) persists for 2.5 s. (An alarm signal generated when an Out of Frame condition exists for 3 microseconds or longer. 3. An ATM LED that indicates a loss of frame. *See Out of Frame.*

Loss of Frame Defects Loss of Frame Defects, in SONET, is synonymous to OOF in ASA 312.

Loss of Pattern (LOP) An alarm signal generated for a DS3 signal when the signal pattern is errored.

Loss of Pattern Synchronization (LOPS) An ATM LED that Indicates a loss of Cell Sync on any active detail channel. Detail channels are available only on virtual channels configured for AAL0.

Loss of Pointer (LOP) An alarm signal generated when no valid pointer is received in eight consecutive frames, or when eight consecutive New Data Flags are received.

Loss of Signal (LOS) An alarm signal generated when the data signal has an all zeros pattern lasting 55 microseconds or longer.

LP Lockout of Protection (111). *See K1 Bits 1-4.*

M13 MUX A Multiplexer Multiplexes DS1 channels in to a DS3 channel, or demultiplexes a DS3 channel into DS1 channels.

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Mapping A procedure of loading data into a frame in such a manner that specific pieces of data can be located within the frame by network equipment. Demapping is the reverse of this process, where the data within a frame is recovered and separated. *See Frame.*

MBS (Maximum Burst Size) The number of cells specified when the connection is set up. The MBS may be sent at the PCR without exceeding the SCR if the connection is idle for enough time between bursts.

MCR Minimum Cell Rate

MCTD Mean Cell Transfer Delay

Metasignaling ATM Layer Management (LM) process that manages different types of signaling and possibly semipermanent virtual channels (VCs), including the assignment, removal and checking of VCs.

MS Manual Switch (1000) in APS Linear mode.*See K1 Bits 1-4*

MS-R Manual Switch Ring (0110) in APS Ring mode. *See K1 Bits 1-4.*

MS-S Manual Switch-Span (0111) in APS Ring mode. *See K1 Bits 1-4.*

Multiplexer Electronic equipment which allows two or more signals to pass over one communications circuit. That circuit may be a phone line, a fiber optics cable, a through-the-air TV signal, etc. That circuit may be analog or digital, and there are many multiplexing techniques to accommodate both. The multiplexers used in SONET systems are designed to combine lower rate signals from several channels in to a single high-rate channel.

Multiplexing The process of combining two or more signals for transmission over the same circuit or channel at the same time. After transmission, demultiplexing is the separation of the various signals that were multiplexed together, so that they may be transmitted to their individual destinations.

Multipoint Access User access in which more than one terminal equipment (TE) is supported by a single network termination.

Multipoint-to-Multipoint Connection A Multipoint-to-Multipoint Connection is a collection of associated ATM VC or VP links, and their associated endpoint nodes, with the following properties:

1. All N nodes in the connection, called Endpoints, serve as a Root Node in a Point-to-Multipoint connection to all of the (N-1) remaining endpoints.

2. Each of the endpoints on the connection can send information directly to any other endpoint, but the receiving endpoint cannot distinguish which of the endpoints is sending information without additional, higher layer, information.

Negative Justification See Pointer Justification.

Network Channel Terminating Equipment Also called CSU, Channel Service Unit. NCTE is a device that terminates a digital channel on a customer's premises. It performs loopback commands sent from the central office.

Network Node Interface The interface between two network nodes.

NDF (New Data Flag) The first four bits of the Payload Pointer in the Transport Overhead portion of the Synchronous Transport Frame. These bits indicate a change in the payload, and thus a change in the Payload Pointer.

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NNI Network Node Interface. ATM Interface that uses a 12-bit VPI and no GFC.

Non-Return to Zero A binary encoding scheme where ones and zeroes are represented by opposite, and alternating, high and low voltages, and where there is no return to a zero (reference) voltage between encoded bits.

NR No Request (0000). *See K1 Bits 1-4*.

NT Network Termination

OAM & P Operation, Administration, Maintenance, and Provisioning

OC See Optical Carrier

OOF (Out of Frame) 1. An ATM LED indicating that a receive PLCP OOF error has occurred. 2. A SONET LED indicating that an OOF error has occurred on a Section layer. *See Out of Frame.*

Operation, Administration, Maintenance, and Provisioning Refers to the facilities incorporated in to a synchronous transport frame where a data communications channel (DCC) is formed using three bytes of each frame. The channel is used for alarms, control, monitoring, administration and other communication needs. It is available for internally generated, externally generated, or manufacture-specific messages.

Operation and Maintenance Cell A cell that contains ATM LM information. it does not form part of the upper layer information transfer.

Optical Carrier A SONET optical signal. Results from direct electrical-to-optical mapping of the corresponding STS signal. The base rate for OC signals is 51.84 Mbps (OC-1).

Optical Carrier Level The optical signal that results from an optical conversion of an STS-N signal. N = 1, 3, 9, 12, 18, 24, 36, or 48. All higher level rates are direct multiples of OC-1 rate (i.e., OC-12 rate = 12 times OC-1 rate).

Optical Carrier Level 3c The “c” stands for concatenated. A normal OC3 signal is composed of three equivalents of an OC1 signal. Some services require a rate greater than 51.84 Mbps. Hence, OC-3c was created to provide for a 155.52 Mbps transport which could be switched as a whole as opposed to a normal OC-3 which is switched as three 51.84 Mbps entities. *See Switch, and Switching.*

Optical Fiber Cable A transmission medium consisting of a core of glass or plastic surrounded by a protective cladding, strengthening material, and outer jacket. Signals are transmitted as light pulses, introduced into the fiber by a light transmitter (either a laser or light emitting diode). Low data loss, high-speed transmission, large bandwidth, small physical size, light weight and freedom from electromagnetic interference and grounding problems are some of the advantages offered by optical fiber cable.

Optical Fiber Any filament made of dielectric materials that guides light, whether or not it is used to transmit signals. An optical fiber not carrying signals is typically called a dark fiber. Optical fiber is glass fiber for carrying lightwave communications. There are two types of optical fiber: single mode and multimode. In single mode fiber, light can only take a single path through a core that measures about 10 microns in diameter (a micron is one millionth of a meter). Multimode fibers have thicker cores, typically 50 to 200 microns. Single mode fiber is more efficient, but it is also more expensive to manufacture. It offers low dispersion, travels great distances without repeaters, and has enormous information carrying capacity. The relatively large core of multimode fiber light allow light pulses to zig-zag along many different paths. Ideal for light sources larger than lasers,

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such as LEDs (Light Emitting Diodes). Multimode fiber is not the preferred method of optical telecommunications.

Optical Receiver A device used to convert optical signals into electrical signals.

Orderwire Channel A voice communications channel between network elements.

Out of Frame Event. Indicates the actual event of going from correct framing condition to an Out of Frame condition. As soon as frame is lost, this is one OOF Event regardless of how long it lasts.

Out of Frame A condition entered when four consecutive frames are received with invalid (errored) framing patterns.

Overhead The bits within a SONET frame which provide the network with routing, identification, and error checking data and characters. In general communications, all information such as a control, routing and error-checking characters, in addition to the user-transmitted data. Includes information that causes network status or operational instructions, network routing information, as well as retransmission of user-data messages that are received in error. *See Error, SONET, and Error Checking.*

Packet A bundle of data organized for transmission which includes (I) the control information which includes the destination, origin, length of packet, etc., (ii) the data to be transmitted, and (iii) error detection and corrections bits.

Parity Equivalence of value. A process used to determine whether or not digital information has been altered during transmission. It works by counting either the number of 1 or 0 bits in a block of data. For a given parity convention, depending on whether or not there is an odd number of 0s or 1s or an even number of 0s or 1s, the computer adds a 1 bit or a 0 bit at the end of the block of data before transmission. When the receiving facility or computer gets the data it also performs the counting procedure and if the parity bit does not have the correct value, an error has occurred. As an example, suppose the convention is to count 1s, and the parity check is even parity in contrast to odd parity checking. The procedure would be to count the 1s in the data block and if the number count is even, then for even parity checking, the parity bit is set to 1. In the same example, if the number count was odd, the parity bit would be set for 0.

Parity Bit Normally, a bit either 1 or 0 used in transmission error checking which is added to a data stream or block of data denoting the even or odd value of the number count of 1s or 0s, depending on the parity convention. *See Parity, Bits, and Error Checking.*

Parity Error See Parity.

Path A path is a framed digital stream between two points and represents digital signal transport at a specific rate, independent of the equipment and media providing the physical means of transporting the signal. The SONET network Path span is a logical connection between the point at which a tributary signal is assembled into a standard SONET frame format, and the point at which the tributary service signal is disassembled from the standard SONET frame format.

Path AIS See Path Alarm Indication Signal.

Path Alarm Indication Signal An alarm signal generated when an error is detected in the Path Overhead portion of the Synchronous Transport Frame. *See Path Overhead.*

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Path B3 (Error) The B3 byte is a parity code that is in the Path Overhead section of the Synchronous Payload Envelope. It is even parity, and is calculated over all the bits of the previous Synchronous Payload Envelope before scrambling. It is used at the receiving end to determine if a transmission error has occurred over the path.

Path FEBE (Path Far End Block Error) An alarm signal generated and sent upstream to the transmitting Path Terminating Equipment, signaling that errors have been detected in the data block at the receiving Path Terminating Equipment.

Path Overhead Those bytes placed in an STS-N (or OC-N) frame by the Path Terminating Equipment and that stay with the frame through its whole transport across the transmission path. The Path Overhead consists of the first 9-byte column of the Synchronous Payload Envelope and contains the identification of the originating source of the traffic, a parity check, path status, a signal label (identifying what type of traffic is in the payload envelope), and a data communications channel.

Path Terminating Equipment That equipment at a telecommunications facility that is at both the transmitting end and receiving end for the traffic. The Path Terminating Equipment loads the signal frames at the transmitting point, and unloads them at receiving point. *See Multiplexer*.

Path Unequipped A signal generated that indicates that the STS channel is intentionally unoccupied. This signal is generated by the originating Path Termination Equipment so that the receiving Path Terminating Equipment will not generate alarms for the unoccupied channel.

Payload Bit Any bit that is part of the payload of a SONET signal.

Payload Pointer The pointer that indicates the location of the first byte of the Synchronous Payload Envelope in the STS frame. *See Pointer*.

Payload From the perspective of a network service provider: of a data field, block or stream being processed or transported, the payload is the part that represents information useful to the user, as opposed to system overhead information. Payload includes user information and may include such additional information as user-requested network management and accounting information. In SONET, the STS-N signal is divided into a transport overhead section and an information payload section. *See Synchronous Payload Envelope for a description of what is found in the payload.*

PDU See Protocol Data Unit

Peak Cell Rate At the Physical Layer SAP of a point-to-point VCC, the Peak Cell Rate is the inverse of the minimum inter-arrival time of the request to send an ATM SDU.

Performance Monitoring Performance monitoring involves the systematic tracking of transmission quality and availability by observing an entity's performance without disturbing or intruding on the transmission stream.

Performance Primitives Performance primitives are basic error events or other performance-related occurrences detected by monitoring the frame format code or the line code of digital signal. These impairment events give rise to the various performance parameters used to determine transmission and network performance.

Permanent Virtual Connection (PVC) A logical (rather than physical) connection between endpoints established by an administrator. A PVC stays intact until manually torn down.

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Phase A relative measurement that describes the temporal relationship between peaks of different waves or signals of the same frequency. *See Frequency*.

Physical Layer Connection An association established by the PHY between two or more ATM-entities. A PHY connection consists of the concatenation of PHY links in order to provide an end-to-end transfer capability to PHY SAPs.

Physical Layer BERT The BERT pattern is placed in the payload (exclusive of framing bits and overhead), while in the ATM layer BERT, the BERT pattern is placed in successive cell payloads.

PLCP Physical Layer Convergence Protocol. A type of ATM mapping that uses a DS1 or DS3 framing structure that adds additional error correction overhead to the ATM Cell payload. Because of the additional overhead, the maximum ATM Cell throughput for DS1 is 1.413 Mbps and for DS3 is 40.70 Mbps.

POH Path Overhead

Pointer Justification A measurement of the adjustments made to the Payload Pointer. There are two separate measurements made: positive justifications and negative justifications. Each is a measurement of how much the pointer had to be adjusted during transmission of the signal. *See Pointer*.

Pointer In a network with many types of equipment, signals from different sources can enter a point to be multiplexed together. For example, signals can be coming from different systems, A and B, and entering a system B element. Due to possible differences in the clock from these different systems, or possibly due to a fault, the frames of these signals will not be aligned perfectly. The use of pointers is the method used to allow the decoupling of the payload frames from their STS-N frame, and to allow them to float within the signal stream. On a frame by frame basis, the payload pointer indicates the offset between the Synchronous Payload Envelope (SPE) and the STS-N frame by identifying the location of the first byte of the SPE in the envelope. In other words, the SPE is allowed to float within the envelope capacity.

Point-to-Multipoint Connection A Point-to-Multipoint Connection is a collection of associated ATM VC or VP links, wit associated endpoint nodes, with the following properties:

1. One ATM link, called the Root Link, serves as the root in a simple tree topology. When the Root node sends information, all of the remaining nodes on the connection, called Leaf Nodes, receive copies of the information.

2. Each of the Leaf nodes on the connection can send information directly to the Root Node. The Root Node cannot distinguish which Leaf is sending information without additional (higher layer) information.

3. The Leaf Nodes can not communicate directly to each other with this connection type.

Positive Justification See Pointer Justification.

PRBS See Pseudo-Random Bit Sequence

Primitives Primitives are basic error events or other performance-related occurrences detected by monitoring the frame format code or the line code of a digital signal.

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Private Network-to-Network Interface An ATM Forum specification that allows ATM switches within a private network to interconnect. The specification describes an ATM virtual circuit routing protocol, as well as a signaling protocol between ATM switches.

Protocol Control Information Information exchanged between corresponding entities, using a lower layer connection, to coordinate their joint operation.

Protocol Data Unit (PDU) A segment of data generated by a specific layer of a protocol stack; usually contains information from the next higher layer encapsulated with header and trailer data generated by the layer in question.

Protocol A specific set of rules, procedures, standards or agreements as to exactly how data is to be formatted and transmitted between two computers, devices or facilities in a network.

Pseudo-Random Bit Sequence A test pattern having the properties of random data (generally 511 or 2047 bits), but generated in such a manner that another circuit, operating independently, can synchronize on the pattern and detect individual transmission bit errors.

PT or PTI Payload Type, Payload Type Identifier

Pulse Code Modulation The most common method of encoding an analog voice signal into a digital bit stream. First, the amplitude of the voice conversation is sampled. This sample is then coded into a binary (digital) number, consisting of ones and zeros. The voice signal can then be switched, transmitted and stored digitally. The most common PCM method is to sample a voice conversation at 8000 times a second. The theory is that if the sampling is at least twice the highest frequency on the channel then the result sounds OK. Thus, the highest frequency on a voice phone line being 4,000 Hertz, the sample of it must be at 8,000 times a second. These 8,000 bytes sampled per second then become 64,000 bits per second, the base signal rate for a DS-0 signal, a single phone conversation.

PVC Permanent Virtual Channel (or Circuit).

Quality of Service (QOS) Agreement that a specified user service will be provided over the network with guaranteed Quality of Service parameters at an acceptable cost. These parameters define accuracy, speed and dependability of a connection. These may include peak and sustainable cell rate, maximum burst size, adaptation layer type and quality of service class.

Quasi-Random Signal Source (QRSS) A signal pattern generated for DS1 channels which is a known standard pattern and which therefore can be exactly monitored for transmission errors.

RAI Remote Alarm Indication

RDI Remote Defect Indication

Regenerators A combination receiver and transmitter used to reconstruct signals for digital transmission. In an optical regenerator, the receiver converts incoming optical pulses to electrical pulses, decides whether the pulses are 1s or 0s, generates cleaned up electrical pulses, and then converts them to squared off optical pulses for transmission.

Relaying A function of a layer by means of which a layer entity receives data from a corresponding entity and transmits it to another corresponding entity.

Repeaters An opto-electronic device inserted at intervals along a circuit to boost and amplify a signal being transmitted. Necessary because the quality and strength of a signal decays over distance.

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Remote Monitoring MIB agent specification described in RFC 1271 that defines functions for the remote monitoring of networked devices. The RMON specification provides numerous monitoring, problem detection, and reporting capabilities.

RR Reverse Request (0010) in APS Linear mode. *See K1 Bits 1-4.*

RR-R Reverse Request-Ring (0001) in APS Ring mode. *See K1 Bits 1-4.*

RR-S Reverse Request-Span (0010) in APS Ring mode. *See K1 Bits 1-4.*

SAR Segmentation and Reassembly

SCNR (Selected Cells Not Received) An ATM LED that indicates if monitor or detail channels are not receiving cells.

SCPI (Standard Commands for Programmable Instrumentation) SCPI. The new instrument command language for controlling instruments that goes beyond IEEE 488.2 to address a wide variety of instrument functions in a standard manner. SCPI promotes consistency, from the remote programming standpoint, between instruments of the same class and between instruments with the same functional capability.

SCR (Sustained Cell Rate) The average or constant traffic that the network agrees to carry with the Quality of Service specified in the traffic contract. SCR is less than or equal to the Peak Cell Rate (PCR). Several time intervals are defined to fit in the Generic Cell Rate Algorithm that allow for clumping, CDV, etc. and a Maximum Burst Size (MBS).

Scrambling The process whereby the transmitted data stream is exclusive or against a known pattern 127 bits long. Used to facilitate clock recovery of the signal at the receiving end. Data is de-scrambled at the receiving end utilizing the same process.

SD-HP Signal Degrade: High Priority (1011) in APS Linear mode. *See K1 Bits 1-4.*

SD-LP Signal Degrade - Low Priority (1010) in APS Linear mode. *See K1 Bits 1-4.*

SD-P Signal Degrade of the Protection Channel (1010) in APS Ring mode. *See K1 Bits 1-4.*

SD-R Signal Degrade-Ring (1000) in APS Ring mode. *See K1 Bits 1-4.*

SD-S Signal Degrade-Span (1001) in APS Ring mode. *See K1 Bits 1-4.*

Section B1 A parity code in the Section Overhead section of the Transport Overhead in the Synchronous Transport Frame. It is even parity, and is calculated over all the bits of the Section Overhead and STS-1 envelope capacity of the previous STS-1 frame before scrambling. Used at the receiving end to determine if a transmission error has occurred over the section.

Section Overhead In a Synchronous Transport Frame, nine bytes are delegated in the Frame Overhead area of the frame for monitoring and maintenance of the frame signal across a section span. The Section Overhead data is updated each time the frame passes through Section Terminating Equipment. The functions of the Section Overhead include a frame alignment pattern, a byte giving the order of appearance of this frame in a multiplexed higher-rate signal, a parity check byte, a local order-wire channel for voice communications between section terminating equipment, a data communications channel for message-based network management and maintenance information, and a user channel for network operator communications. *See Section Terminating Equipment.*

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Section Terminating Equipment Equipment at either end of a Section span in a SONET network which either originates the Section Overhead or terminates the Section Overhead.

Section A SONET network Section span comprises the transmission medium and associated equipment between a network element and a regenerator, or two regenerators. The associated equipment includes optical interface and SONET processing equipment which originates the Section Overhead or terminates the Section Overhead.

SEF/OOF Severely Error Framing/Out of Frame

Segment A single ATM link or group of interconnected ATM links of an ATM connection.

Service Access Point The point at which an entity of a layer provides services to its LM entity or to an entity of the next higher layer.

Service Data Unit A unit of interface information whose identity is preserved from one end of a layer connection to the other.

SF-HP Signal Fail-High Priority (1101) in APS Linear mode. *See K1 Bits 1-4.*

SF-LP Signal Fail- Low Priority (1100) in APS Linear mode. *See K1 Bits 1-4*.

SF-R Signal Fail-Ring (1011) in APS Ring mode. *See K1 Bits 1-4*.

SF-S Signal Fail-Span (1100) in APS Ring mode. *See K1 Bits 1-4.*

Signal A wave or impulse used to convey sounds, images or any information over a communication system. An alert, bit of information or an action of communication.

SLC-96 Pronounced Slick 96". A product of AT&T Technologies. A short-haul multiplexing device which enables up to 96 telephone customers to be serviced on three pairs of wires. SLC is an acronym for Subscriber Loop Carrier.

SONET *See Synchronous Optical Network.*

SPE *See Synchronous Payload Envelope*

STA (Status) An ATM LED indicating that one or more of the active VCCs has the status field set in the VCC table. For example, the RX CLP bit has been set on a received cell.

Start Bit In asynchronous data communications, characters are sent at arbitrary intervals, such as when an operator strikes a key. In order for the computer to read the incoming information, each character begins its transmission with a Start Bit. For example, if the first bit of the character to be transmitted is a 0, receiving a Start Bit (always a 1) tells the computer that the next bit is part of a transmitted character, and not simply part of the inter-character gap. *See Stop Bit*.

Stop Bit An interval at the end of each asynchronous character that allows the receiving computer to pause before the start of the next character. The Stop Bit is always a 0. *See Start Bit.*

STS or STS-3c *See Synchronous Transport Signal*

STS Frame The frame for the Synchronous Transport Signal

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STSX-1 (Synchronous Transport Signal Cross Connect Level 1)

A cross connect is a piece of equipment which functions as a distribution system and which consists of a number of wires which inter-connect different input and output circuits in a transmission system. When an OC1 signal must be converted from light pulses into electrical pulses for transport through a wire cross connect (instead of a fiber optic cross connect) the equivalent electrical signal which results is called an STSX-1.

Sublayer

A logical sub-division of a layer.

Superframe

In certain circumstances, several STS frames are combined into one frame structure called a Superframe. For example, four STS-1 frames (each of which is transported every 125 microseconds) can be joined into a Superframe structure taking 500 microseconds to transport. The Path Overhead and Line Overhead areas would indicate this as a Superframe containing four STS-1 frames.

Switch

A device which routes a signal from one circuit path to another. A circuit element that has two states, on and off. A switch can be mechanically, electronically, electrically or optically controlled.

Switch Matrix

A unique feature of the ASA 312 that provides the user with a graphical switching fabric, presented as a block diagram on the instrument display, for the routing of signals between all of the instrument's test sets. The user simply touches the touch sensor indicating the desired connections on the block diagram, in order to switch signals between the various protocol test sets which the instrument can analyze. *See Test Set, Switch, and Switching Fabric.*

Switched Connection

A connection established via signaling.

Switched Virtual Channel

A channel established on demand by network signaling used for information transport between two locations, lasting only for the duration of the transfer; the datacom equivalent of a dialed phone call.

Switched Virtual Connection (SVC)

A logical connection between endpoints established by the ATM network on demand after receiving a connection request from the source or root. It is defined in the ATM Forum UNI specification and transmitted using the Q.2931 signaling protocols.

Switching

The action of routing a signal from one circuit path to another. A communications method that uses temporary, rather than permanent, connections to establish a link or to route information between two points or along a path. *See Circuit, and Signal.*

Switching Fabric

Those interconnected circuits which enable a device or devices to route signals from one circuit to another, enabling multiple processing of the signal, depending on the configuration of the circuit paths within the switching fabric. *See Circuit, Signal, and Switching.*

Synchronous

The condition that occurs when two events happen in a specific time relationship with each other and both are under control of a master clock. Synchronous transmission means there is a constant time between successive bits, characters or events. The timing is achieved by the sharing of a single clock. Each end of the transmission synchronizes itself with the use of clocks and synchronizing information sent along with the transmitted data. In synchronous transmission, characters are spaced by time, not by start and stop bits.

Synchronous Optical NETwork (SONET)

A family of fiber-optic transmission rates from 51.84 Mbps (megabits/second) to 13.22 Gbps (gigabits/second), created to provide the flexibility needed to transport many digital signals with different capacities, and to provide a standard for manufacturers to design from. SONET is an optical interface standard that allows interworking of transmission products from multiple ven-

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dors. It defines a physical interface, optical line rates known as Optical Carrier (OC) signals, frame format and protocol for Operations,

Administration, Maintenance and Provisioning (OAM&P). The electrical signal equivalents of the OC signals are called Synchronous Transport Signals (STSs). The base rate for SONET signals is 51.84 Mbps (OC-1 and STS-1) and higher rates are direct multiples of the base rate. (Example: OC-3 = 3 x 51.84 = 155.52 Mbps).

Synchronous Payload Envelope (SPE) That section of the STS-N or OC-N frame that carries the data payload plus the Path Overhead. *See Payload, and Path Overhead*.

Synchronous Transport Frame The concept of transporting tributary signals intact across a synchronous network has resulted in this term being applied to such synchronous signal structures. A Synchronous Transport Frame is comprised of two distinct and readily accessible parts within the frame structure, a Synchronous Payload Envelope part and a Transport Overhead part.

Synchronous Transport Signal (STS) The synchronous signal rate used to transport many different digital signals with different capacities. The base rate is STS-1 at 51.84 Mbps. Higher rates are direct multiples of the base rate. For example, STS-3 = 3 x 51.84 = 155.52 Mbps.

T-1 (or T1) Transport Signal level 1. In North America, the T-1 signal rate exactly corresponds to the DS-1 rate. *See DS-1*.

T-3 (or T3) Transport Signal level 3. In North America, the T-3 signal rate exactly corresponds to the DS-3 rate. *See DS-3*.

T1X1 Sequence T1X1 Sequence refers to pointer adjustment test sequences that have been specified by “Technical Subcommittee T1X1 Digital Hierarchy and Synchronization.” The three test sequences are: 1. “Burst with 3 pointer adjustments.” Every 30 seconds, after a 60 seconds initialization period, a burst of three pointer adjustments will be done. 2. “Periodic with additional pointer adjustments.” After a 60 seconds initialization period, an additional pointer adjustment will be done every 30 seconds in addition to periodic pointer adjustments already being made. 3. “Periodic with canceled pointer adjustment.” After a 60 seconds initialization period, a pointer adjustment will be canceled every 30 seconds of the periodic pointer adjustments being made. All three of these test sequences can be done with negative and positive pointer adjustments.

Tagging A technique used when traffic on a specific connection exceeds the parameters that were negotiated. The Cell Lost Priority (CLP) bit can be set by the network or by the user to indicate a lower priority cell. When congestion increases to the point where cells must be dropped, the ones with the CLP bit set are the first to be discarded.

Test Set(s) A set of operations, tests or measurements which can be performed on a device or a piece of equipment in order to verify its proper functioning, or to isolate a malfunction. The instrument used to perform such testing. The set of electronic functions that comprise a test set.

Touch Screen The interactive interface screen on the ASA 312 that is touch sensitive, and that the user touches to make selections of menu items, thereby controlling the functions of the tester.

Traffic Generation In ATM, traffic generation refers to either rate-controlled (GCRA) or Available Bit-Rate (ABR).

Traffic Shaping An algorithm that determines when traffic has exceeded the negotiated parameters. It may not be related directly to a burst of traffic or a sustained rate but dependent on several characteristics of the cell loading over time. Cells are discarded when their cell parameters are exceeded.

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Traffic The flow of data, sound, optical pulses, digital signals, analog signals, visual information or messages through a network.

Transmission The sending of information from one place to another over communication lines or circuits. The dispatching of a communication signal by fiber optics, telephone, radio, or other electronic means. The communication signal being sent. *See Circuit.*

Transport Overhead In SONET, The Overhead monitors the integrity of the signal frame during transmission and is comprised of two parts; the Line Overhead and the Section Overhead. The Section Overhead monitors the integrity of the frame as it passes through equipment along sections of a transmission line, while the Line Overhead handles this function as it passes through junctures onto other lines. *See Overhead, Line Overhead, Section Overhead, and SONET.*

Troublescan The act or function of checking a network's various alarm monitoring channels in order to locate any alarm indications. A test instrument feature which automatically performs such a function. *See Alarm.*

Unassigned Cells A cell identified by a standardized virtual path identifier (VPI) and virtual channel identifier (VCI) value, which has been generated and does not carry information from an application using the ATM Layer services.

UNI User-Network Interface, demark point of ATM, SDH, and B-ISDN at customer site. This address organizes all the information in the MIB.

Unspecified Bit Rate (UBR) An ATM service type in which the ATM network makes a "best effort" to meet the transmitter's bandwidth requirements.

User Interface The physical and graphical system used to provide the user with a means to input data into a computer and to receive data from the computer. For example, on many computers the human interface used is a keyboard, mouse, display screen and whatever graphical format that is used to display information.

VBR Variable Bit Rate.

VC Virtual Channel (Virtual Circuit)

VCC Virtual Channel Connections

VCI Virtual Channel Identifier

Virtual Channel A communications path between two nodes identified by label rather than fixed physical path.

Virtual Channel Identifier The address or label of a Virtual Channel (VC).

Virtual Channel Link A means of unidirectional transport of ATM cells between the point where a VCI value is assigned and the point where that value is translated or removed.

Virtual Channel Switch A network element that connects VCLs. It terminates VPCs and translates VCI values. It is directed by Control Plane functions and relays the cells of a VC.

Virtual Path A unidirectional logical association or bundle of VCs traveling between common points.

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Virtual Path Connection A concatenation of VPLs between virtual path Terminators (VPTs). VPCs are unidirectional.

Virtual Path Identifier The address of a Virtual Path.

Virtual Path Link A means of unidirectional transport of ATM cells between the point where a VPI value is assigned and the point where that value is translated or removed.

Virtual Path Switch A network element that connects VPLs. It translates VPI (not VCI) values and is directed by Control Plane functions. it relays the cells of the VP.

VT See Virtual Tributary

VT1.5 Virtual Tributaries come in different sizes, or types. VT1.5 is a VT frame that has been optimized to carry one DS1 signal. A total of 28 DS1 signals comprise a VT1.5.

Virtual Tributary A sub-division of an Synchronous Payload Envelope. A unit of information of sub-SONET bandwidth that can be combined, or concatenated, for transmission through the network. An Synchronous Payload Envelope can carry a number of Virtual Tributaries. *See Synchronous Payload Envelope.*

WTR Wait-to-Restore (0110). *See K1 Bits 1-4.*

**Yellow Signal ** A Yellow Signal is sent to the far-end network element that terminates a service when a service-affecting failure is detected at a terminal. Once a Yellow Signal has been sent, automatic service management process are initiated, and these processes are maintained for the duration of the failure.

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