Network Information Computer (NIC™)

QUICK REFERENCE GUIDE

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Welcome

The *NIC Quick Reference Guide* is designed to help you quickly become familiar with basic operation of the NIC Plus, NIC 10G, NIC 2.5G, NIC GigE, NIC ONA, and NIC 622M products. This document contains a number of tutorials that guide you through basic setup procedures to initiate tests, monitor network activity, and collect test results. **For more detailed information about the unit's functions and operation, refer to the product's online help, which is accessed from the Help button on the unit's user interface.**

NOTE ➤
The illustrations that appear in this document are used as examples to assist you through a procedure. Because of product enhancements, these images may not show all items appearing on the touch screen. ◄

NOTE ➤
The procedures described in this book use examples from various protocol processor modes. For the most part, the procedures are performed the same regardless of which protocol processor mode is currently selected. Any exceptions or procedure deviations between protocol processors are noted and documented. Please refer to the system's online help for protocol processor-specific tasks. ◄

Copyright

Patent Information

The Network Information Computer (NIC) described in this publication may be protected by one or more patents on file with the United States Patent Office.

Trademarks

Technical Support

Technical Support is available by calling toll free (in the US) **1.877.929.HELP (4357),** or (outside the US) **727.519.2860**. Technical support is available 24 hours/day, 7 days/week.

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 8:00 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)

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:

- You may purchase a NIC shipping container from Digital Lightwave, or
- You can 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 NIC 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, shock 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 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.

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, only use the power cord specified for this instrument. For use **in** North America, use a power cord (maximum six-foot length) with a type SJT, 18 AWG, two conductor with ground, IEC 320 connector on one end and a NEMA 5-15 connector on the other end.

For use **outside** of North America, use an HO5VV-F power cord with a 1-mm^2, two conductor plus ground, IEC 320 connector on one end, and a wall-socket plug on the other end that is certified for use in the country of installation.

NOTE ➤
The entire cordset must be certified for use in the country of installation. ◄

Avoid Electric Overload: This unit is designed to be powered from 100–120 and 200–240 VAC, 50–60 Hz. To avoid electric shock, fire hazard, or damage to the instrument, do not apply a higher voltage.

Ground the Instrument: The unit 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 conditions. Do not operate this instrument in an explosive atmosphere. This instrument is not intended for outdoor use.

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.

Field Service: This equipment is not intended to be serviced in the field. All service is intended to be completed by Digital Lightwave, Inc.

Environmental Statement: This product may contain lead-based solder materials and a lithium battery for computer support. Please return all Digital Lightwave products to the factory for proper disposal. Operation of this product is not hazardous to the environment.

WARNING

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. Cables used should be less than three meters long for compliance with EMC directive. ◄

Laser Safety: The unit contains Class 1 laser devices. Never look into an unterminated fiber. Always place dustcaps on the optical ports when fiber is not attached to the optical ports. CDRH Accession No. 0021615.

Class 1 Laser Product

NOTICE

Unterminated optical connectors may emit laser radiation. Do not view with optical instruments.

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

Sicherheitshinweise

Zur Vermeidung von Verletzungen und Beschädigungen dieses Produktes oder angeschlossener Geräte während des normalen Betriebs sollten die folgenden Sicherheitshinweise beachtet werden. Reparaturarbeiten dürfen nur von qualifizierten Fachkräften durchgeführt werden.

Richtiges Stromkabel verwenden: Zur Vermeidung einer Brandgefahr sollte ausschließlich das für dieses Instrument vorgegebene Stromkabel verwendet werden. Spezifikationen für Nordamerika: Stromkabel (maximale Länge 1,82 m) der Bauart SJT, 3-adrig, Größe 18 AWG (zwei Leiter, ein Schutzleiter) sowie einem IEC 320-Steckverbinder an einem Ende und einem NEMA 5-15-Steckverbinder am anderen Ende.

Spezifikationen für Länder außerhalb der USA: Stromkabel der Bauart HO5VV-F, 3-adrig (zwei Leiter, ein Schutzleiter, 1 mm^2) sowie einem IEC 320-Steckverbinder an einem Ende und einem für die Verwendung in dem jeweiligen Land zugelassenen Netzstecker am anderen Ende.

Hinweis:
Der gesamte Kabelsatz muss für die Verwendung im jeweiligen Land zugelassen bzw. zertifiziert sein. ◄

Elektrische Überlastungen vermeiden: Dieses Gerät ist für eine Stromversorgung von 100–120 und 200–240 VAC, 50–60 Hz ausgeführt. Zur Vermeidung von elektrischen Schlägen, Brandgefahr und Beschädigungen des Instruments darf keine höhere Spannung angelegt werden.

Das Instrument muss geerdet werden: Das Gerät ist durch den Schutzleiter des Stromkabels geerdet. Zur Vermeidung von elektrischen Schlägen muss der Schutzleiter mit der Erdung verbunden sein. Vor dem Anschluss an den Ein- oder Ausgangsklemmen des Instruments muss sichergestellt werden, dass das Produkt richtig geerdet ist.

Das Gerät darf nicht unter gefährlichen Bedingungen eingesetzt werden: Zur Vermeidung von Verletzungen oder Brandgefahr das Gerät nicht in nasser, feuchter oder anderweitig gefährlicher Umgebung betreiben. Das Gerät nicht in explosionsgefährdeten Bereichen verwenden.

Augen schützen: Benutzer sollten niemals in abgetrennte Steckverbinder oder getrennte LWL-Kabel blicken. Bei LWL-Kabeln und Anschlüssen sollte als Vorsichtsmaßnahme stets angenommen werden, dass sie Laserlicht ausstrahlen. Die LWL-Anschlüsse sollten immer mit den Schutzabdeckungen verschlossen gehalten werden, um Beschädigungen und Laserausstrahlungen zu vermeiden.

Kundenseitige Reparaturen: Dieses Gerät darf nicht kundenseitig repariert werden. Alle Reparaturarbeiten müssen von Digital Lightwave, Inc. durchgeführt werden.

Warnung:
Dieses ist ein Gerät der Klasse A nach EN55022. In einem Wohngebiet kann dieses Gerät Funkstörungen verursachen. In diesem Fall muss der Benutzer entsprechende Abhilfemaßnahmen unternehmen. Die verwendeten Kabel dürfen nicht länger als 3 m sein, um die Anforderungen der EMV-Richtlinien zu erfüllen. ◄

Umweltschutz: Dieses Produkt kann bleihaltiges Lötmaterial und eine Lithiumbatterie für die Computerunterstützung enthalten. Senden Sie bitte alle Digital Lightwave Produkte zur vorschriftsmäßigen Entsorgung an das Werk zurück. Der Betrieb dieses Produktes hat keine schädlichen Auswirkungen auf die Umwelt.

Lasersicherheit: Dieses Produkt enthält Lasergeräte der Klasse 1 (21 CFR 1040.10 und 1040.11 konform; EN60825-1: 1993 +A11+A2). Niemals in das abgetrennte LWL-Kabel blicken. Wenn das LWL-Kabel nicht an den LWL-Anschlüssen angeschlossen ist, sollten immer die Staubschutzkappen auf den LWL-Anschlussöffnungen angebracht sein. CDRH-Zugriffszahl: 0021615.

Laserprodukt der Klasse 1

HINWEIS

Nicht angeschlossene LWL-Verbinder können Laserstrahlen emittieren. Nicht mit optischen Instrumenten betrachten.

Class 1 Laser Product

NOTICE

Unterminated optical connectors may emit laser radiation. Do not view with optical instruments.

Bei Verwendung von nicht in diesem Dokument spezifizierten Steuerungen, Einstellungen oder Verfahren besteht die Gefahr einer gefährlichen Strahlenaussetzung.

Agency Approvals

TUV Rheinland of North America is the test laboratory used.

For NIC 2.5G, NIC 10G:

TUV Safety File No. E2073411.01/E2073412.01/E2073414.01/.02

EMC Report File (NIC 10G) P2071068.01

EMC Report File (NIC 2.5G) P2071251.01/.02

CU License No. CU2071103.01

CDRH Accession No. 0021615

For NIC Plus:

TUV Safety File No. E2173656.01/E2173655.01

EMC Report File No.P2171264.01

CE Report File No. E2173659.01

CB Report File No. E2173657.01

CU License No. CU2173522.01

EMC Standards

EN 55024

EN 55022

EN 61326-1

EN 55011

Safety Standards

EN 60950

IEC950/UL1950/IEC60950

CSA 22.2 No. 950

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Product Overview

This section provides general product overviews, specifications, and connector panel illustrations and descriptions.

IMPORTANT ➤

Specifications are subject to change without notice. ◄

NIC Plus Product Overview

The NIC Plus is an advanced portable instrument for verifying and qualifying the performance DS0/64K through OC-192/STM-64, ATM, and Gigabit Ethernet telecommunications networks.

NIC Plus Technical Specifications

The following is a list of technical specifications for the NIC Plus.

NIC Plus Technical Specifications	
Line Rate	**OC-192/STM-64:** Stratum III compliant, offset capability ± 100.0 ppm **OC-48/STM-16:** Stratum III compliant, offset capability ± 50.0 ppm **OC-1/STM-0 through OC-12/STM-4:** Stratum III compliant, offset capability ± 100.0 ppm **DS1:** 1.544 MHz ± 4.6 ppm (TX), Stratum III compliant, 1.544 MHz ± 200 ppm (RX) **E1:** 2.048 MHz (TX), 2.048 MHz (RX), offset capability ± 100 ppm **DS3:** 44.736 MHz ± 12 ppm (TX), 44.736 MHz ± 200 ppm (RX) **E3:** 34.368 MHz ± 4.6 ppm (TX), -2 ppm/yr 34.368 MHz ± 50 ppm (RX) **E4:** 139.264 MHz ± 20 ppm (TX), -2 ppm/yr 139.264 MHz ± 50 ppm (RX)

NIC Plus Technical Specifications	
Input Signal Measurement	**OC-192/STM-64:** Optical Power meter: 0 to -26 dBm ± 1.5 dB; Frequency measurement range: 9.95328 GHz, ± 100 ppm **OC-48/STM-16:** Optical Power meter: 0 to -26 dBm ± 1.5 dB; Electrical: Peak voltage range: +0.31 to +1.2 Vp; Frequency measurement range: 2.48832 GHz, ± 50 ppm **OC-1/STM-0 through OC-12/STM-4:** Optical Power meter: 0 to -26 dBm ± 1.5 dB; Frequency measurement range: 2.48832 GHz, ± 100 ppm **STS-1/STM-0e and STM-1e:** Electrical: Peak voltage range: +0.31 to +1.2 Vp **DS1:** Voltage range: ± 0.1 Vp to ± 7 Vp; Frequency measurement range: 1.544 MHz ± 200 ppm **E1:** Voltage range: ± 0.1 Vp to ± 7 Vp; Frequency measurement range: 2.048 MHz ± 200 ppm **DS3:** Voltage range: ± 0.31 Vp to ± 1.2 Vp; Frequency measurement range: 44.736 MHz ± 200 ppm **E3:** Peak voltage range: ± 0.31 Vp to ± 1.2 Vp; Frequency measurement range: 34.368 MHz ± 200 ppm **E4:** Peak voltage range: ± 0.3 Vp to ± 0.7 Vp; Frequency measurement range: 139.264 MHz ± 200 ppm

NIC Plus Technical Specifications	
Synchronization	**SONET/SDH:** Internal; Received SONET or SDH signal; BITS (1.544 MHz); SETS (2.048 MHz) **DS1:** Internal; Received DS1 signal, BITS **E1:** Internal; Received E1 signal, SETS **DS3:** Internal **E3/E4:** Internal, Recovered, SETS
Level (TX)	**OC-192/STM-64:** 1550: Intermediate range compliant; 1310: Short reach compliant **OC-48/STM-16:** 1310: Singlemode, Long Reach compliant, 1260–1360 nm, 1308 nm typical 1550: Singlemode, Long Reach compliant, 1480–1580 nm, 1554 nm typical Dual 1310/1550: Comprised of 1310 nm and 1550 nm laser options listed above and additional 1 dB power reduction **OC-1/STM-0 through OC-12/STM-4:** 1310: -5 dBm typical, singlemode, Intermediate/Long Reach, 1260-1360 nm, 1308 nm typical 1550: 0 dBm typical, singlemode, Long Reach, 1480-1580 nm, 1554 nm typical **STS-1/STM-0e and STM-1e:** 1.0 ± 0.1 V peak-to-peak **DS1:** 0 dBdsx ± 1 dB, -7.5 dBdsx ± 1 dB, -15 dBdsx ± 1 dB **E1:** 0 dBdsx, -7.5 dBdsx, -15 dBdsx **DS3:** DS3 High: 0.95 Vp ± 1.0 dB; DSX3: 0.48 Vp ± 1.2 dB; DS3 Low: 0.35 Vp ± 1.0 dB **E3:** 1.00 Vp ± 0.1 v **E4:** 0.5 Vp ± 0.1 v

NIC Plus Technical Specifications	
Level (RX)	**OC-192/STM-64:** -2 dBm to -14 dBm **OC-48/STM-16:** -2 dBm to -26 dBm, -30 dBm typical minimum at 10^{-10} BER with 2^{23}-1 PRBS pattern **OC-1/STM-0 through OC-12/STM-4:** -2 dBm to -26 dBm, -30 dBm typical minimum at 10^{-10} BER with 2^{23}-1 PRBS pattern **STS-1/STM-0e:** -15 dBdsx Flat Loss and Terminated: 900 ft. of RG-59 **STM-1e:** STM-1 Terminated mode per G.703 1998 (Section 3.1, 3.2, 3.3): Up to 12.7 dB of cable loss **DS1:** Terminated: +6 to -30 dBdsx with EQ; Monitor: 0 to -36 dBdsx with EQ; Bridge: 1K ohm, 0 to -36 dBdsx with EQ. **E1:** Terminated, 0 to -36 dBdsx with EQ **DS3:** Terminated: 75 ohm, +6 to -12 dB relative to DSX3 with EQ; Monitor: 75 ohm, -15 to -26 dB relative to DSX3 with EQ

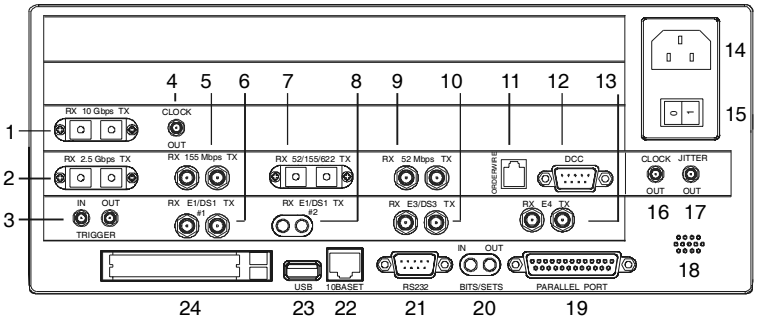
NIC Plus Physical Characteristics	
Operating Temperature	0° to 40° C @ 85% Relative Humidity
Storage Temperature	-20° to 60° C @ 95% Relative Humidity
Power Requirements	100–120, 200–240 VAC, 50–60 Hz
Dimensions	13.7" H x 13.0" W x 7.9" D (348 mm H x 330 mm W x 201 mm D)

NIC Plus Physical Characteristics	
Weight	Approximately 20 to 25 pounds, depending on configuration.

NIC Plus Connector Panel

The NIC Plus connector panel contains a variety of auxiliary interfaces, which are described in the table below.

NOTE ➤
Actual connectors may vary based on your unit's hardware configuration. ◄



	Connector	Description
1	10 Gbps RX and TX	Optical output and input connectors for OC-192 and STM-64 optical rates. The unit supports the following optical connectors: SC, ST, and FC. **Note:** These connectors only appear if the unit is configured with the OC-192/STM-64 hardware.
2	2.5 Gbps RX and TX	Optical output and input connectors for OC-48 and STM-16 optical rates. The unit supports the following optical connectors: SC, ST, and FC. **Note:** These connectors only appear if the unit is configured with the OC-48/STM-16 hardware.

	Connector	Description
3	Trigger In and Out	SMA connectors used for trigger operation.
4	Clock Out	SMA connector that allows a trigger output for use of optical OC-192/STM-64 eye diagram analysis.
5	155 Mbps RX and TX	BNC connectors SONET/SDH electrical rates.
6	E1/DS1 #1 RX and TX	BNC connectors for E1 and DS1 electrical rates.
7	52/155/622 Mbps RX and TX	Optical output and input connectors for OC-1, OC-3, OC-12, STM-0, STM-1, and STM-4 optical rates. The unit supports the following optical connectors: SC, ST, and FC.
8	E1/DS1 #2 RX and TX	Bantam connectors for DS1 and E1 electrical rates.
9	52 Mbps RX and TX	BNC connectors for STS-1 and STM-0e electrical signals.
10	E3/DS3 RX and TX	BNC connectors for E3 and DS3 electrical rates.
11	Orderwire	4-pin modular handset jack (A-law and Mu-law). Not intended for direct connection to telecommunications circuits.
12	DCC	DataCom Channel. RS-449, DB-15
13	E4 RX and TX	75 ohm unbalanced BNC connectors for E4 electrical rates.
14	Power Cord Connector	AC input connector. Accepts a 3-prong, grounded Type 13 connector.
15	Power Switch	Turns unit on or off (0=off, 1=on).
16	Clock Out	SMA connector that allows a trigger output for use of optical OC-48/STM-16 eye diagram analysis. **Note:** This connector only appears if the unit is configured with the OC-48/STM-16 hardware.
17	Jitter Out	SMA connector for Jitter frequency measurement.

	Connector	Description
18	Speaker	Speaker for audible touch screen beeps, VF tones, and DS0 drop.
19	Parallel Port	25-pin female connector for parallel printer.
20	BITS/SETS In and Out	Bantam jacks for external timing equipment. BITS clocking supports 1.544 Mhz. SETS clocking supports 2.048 Mhz.
21	RS232	9-pin male connector for SCPI RS232 Direct and SCPI RS232 modem.
22	10BaseT	8-pin modular jack for Ethernet connection.
23	USB	Universal Serial Bus for USB product support (i.e., keyboard and mouse).
24	PCMCIA (PC Card)	Dual-slot PC card slot that accepts two Type II cards. Approved cards are: ■ Modem: None ■ Flash: SanDisk 48 Mbyte Flash ■ GPIB: National Instruments model number PCMCIA-GPIB.NI-488.2 for Windows NT

NIC 10G Product Overview

The NIC 10G is a portable instrument for verifying and qualifying the performance of OC-192, OC-48, STM-64, and STM-16 telecommunications networks.

NIC 10G Technical Specifications

The following is a list of technical specifications for the NIC 10G.

NIC 10G Technical Specifications	
Line Rate for OC-192/STM-64	Stratum III compliant, offset capability ± 100.0 ppm
Line Rate for OC-48/STM-16	Stratum III compliant, offset capability ± 50.0 ppm

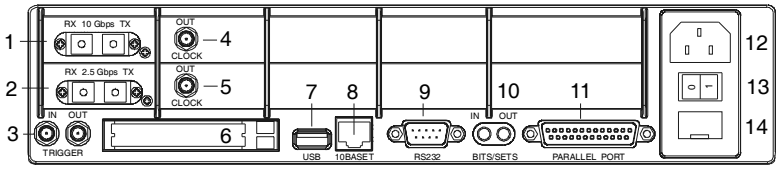
NIC 10G Technical Specifications	
Input Signal Measurement for OC-192/STM-64	Optical Power meter: 0 to -26 dBm ± 1.5 dB Frequency measurement range: 9.95328 GHz, ± 100 ppm
Input Signal Measurement for OC-48/STM-16	Optical Power meter: 0 to -26 dBm ± 1.5 dB Frequency measurement range: 2.48832 GHz, ± 50 ppm
Synchronization	Internal; Received SONET or SDH signal; BITS (1.544 MHz); SETS (2.048 MHz)
Level (TX) for OC-192/STM-64	1550: Intermediate range compliant 1310: Short reach compliant
Level (RX) for OC-192/STM-64	-2 dBm to -14 dBm
Level (TX) for OC-48/STM-16	1310: Singlemode, Long Reach compliant, 1260–1360 nm, 1308 nm typical 1550: Singlemode, Long Reach compliant, 1480–1580 nm, 1554 nm typical Dual 1310/1550: Comprised of 1310 nm and 1550 nm laser options listed above and additional 1 dB power reduction
Level (RX) for OC-48/STM-16	-2 dBm to -26 dBm, -30 dBm typical minimum at 10^{-10} BER with 2^{23}-1 PRBS pattern

NIC 10G Physical Characteristics	
Operating Temperature	0° to 40° C @ 85% Relative Humidity
Storage Temperature	-20° to 60° C @ 95% Relative Humidity
Power Requirements	100–120, 200–240 VAC, 50–60 Hz
Dimensions	10.1" H x 12.3" W x 4.7" D (257 mm x 312 mm x 120 mm)
Weight	Approximately 11 pounds (4.99 Kg.)

NIC 10G Connector Panel

The NIC 10G connector panel contains a variety of auxiliary interfaces, which are described in the table below.

NOTE ➤
Actual connectors may vary based on your unit's hardware configuration. ◄



	Connector	Description
1	10 Gbps RX and TX	Optical output and input connectors for OC-192 and STM-64 optical rates. The NIC 10G can be ordered with SC, ST, or FC optical connectors.
2	2.5 Gbps RX and TX	Optical output and input connectors for OC-48 and STM-16 optical rates. The NIC 10G can be ordered with SC, ST, or FC optical connectors. **Note:** These connectors only appear if the unit is configured with OC-48/STM-16 hardware.
3	Trigger In and Out	SMA connectors used for trigger operation.
4	Clock Out	SMA connector that allows a trigger output for use of optical OC-192/STM-64 eye diagram analysis.
5	Clock Out	SMA connector that allows a trigger output for use of optical OC-48/STM-16 eye diagram analysis. **Note:** This connector only appears if the unit is configured with OC-48/STM-16 hardware.

	Connector	Description
6	PCMCIA (PC Card)	Dual-slot PC card slot that accepts two Type II cards. Approved cards are: ■ Modem: None ■ Flash: SanDisk 48 Mbyte Flash ■ GPIB: National Instruments model number PCMCIA-GPIB.NI-488.2 for Windows NT
7	USB	Universal Serial Bus for USB product support (i.e., keyboard and mouse).
8	10BaseT	8-pin modular jack for Ethernet connection.
9	RS232	9-pin male connector for SCPI RS232 Direct and SCPI RS232 modem.
10	BITS/SETS In and Out	Bantam jacks for external timing equipment. BITS clocking supports 1.544 MHz. SETS clocking supports 2.048 MHz.
11	Parallel Port	25-pin female connector for parallel printer.
12	Power Cord Connector	AC input connector. Accepts a three-prong, grounded Type 13 connector.
13	Power Switch	Turns unit on and off (0=off, 1=on).
14	Fuse Compartment	Contains two 1.5 amp Slo-Blo fuses. **Note:** Fuses are not field serviceable.

NIC 2.5G Product Overview

The NIC 2.5G is a portable instrument for verifying and qualifying the performance of PDH, SDH, and ATM telecommunications networks.

NIC 2.5G Technical Specifications

The following is a list of technical specifications for the NIC 2.5G.

NIC 2.5G Technical Specifications	
Line Rate	**OC-48/STM-16:** Stratum III compliant, offset capability ± 50.0 ppm **OC-1/STM-0 through OC-12/STM-4:** Stratum III compliant, offset capability ± 100.0 ppm **DS1:** 1.544 MHz ± 4.6 ppm (TX), Stratum III compliant, 1.544 MHz ± 200 ppm (RX) **E1:** 2.048 MHz (TX), 2.048 MHz (RX), offset capability ± 100 ppm **DS3:** 44.736 MHz ± 12 ppm (TX), 44.736 MHz ± 200 ppm (RX) **E3:** 34.368 MHz ± 4.6 ppm (TX), -2 ppm/yr 34.368 MHz ± 50 ppm (RX) **E4:** 139.264 MHz ± 20 ppm (TX), -2 ppm/yr 139.264 MHz ± 50 ppm (RX)

NIC 2.5G Technical Specifications	
Input Signal Measurement	**OC-48/STM-16:** Optical Power meter: 0 to -26 dBm ± 1.5 dB; Electrical: Peak voltage range: +0.31 to +1.2 Vp; Frequency measurement range: 2.48832 GHz, ± 50 ppm **OC-1/STM-0 through OC-12/STM-4:** Optical Power meter: 0 to -26 dBm ± 1.5 dB; Frequency measurement range: 2.48832 GHz, ± 100 ppm **STS-1/STM-0e and STM-1e:** Electrical: Peak voltage range: +0.31 to +1.2 Vp **DS1:** Voltage range: ± 0.1 Vp to ± 7 Vp; Frequency measurement range: 1.544 MHz ± 200 ppm **E1:** Voltage range: ± 0.1 Vp to ± 7 Vp; Frequency measurement range: 2.048 MHz ± 200 ppm **DS3:** Voltage range: ± 0.31 Vp to ± 1.2 Vp; Frequency measurement range: 44.736 MHz ± 200 ppm **E3:** Peak voltage range: ± 0.31 Vp to ± 1.2 Vp; Frequency measurement range: 34.368 MHz ± 200 ppm **E4:** Peak voltage range: ± 0.3 Vp to ± 0.7 Vp; Frequency measurement range: 139.264 MHz ± 200 ppm
Synchronization	**SONET/SDH:** Internal; Received SONET or SDH signal; BITS (1.544 MHz); SETS (2.048 MHz) **DS1:** Internal; Received DS1 signal, BITS **E1:** Internal; Received E1 signal, SETS **DS3:** Internal **E3/E4:** Internal, Recovered, SETS

NIC 2.5G Technical Specifications	
Level (TX)	**OC-48/STM-16:** 1310: Singlemode, Long Reach compliant, 1260–1360 nm, 1308 nm typical 1550: Singlemode, Long Reach compliant, 1480–1580 nm, 1554 nm typical Dual 1310/1550: Comprised of 1310 nm and 1550 nm laser options listed above and additional 1 dB power reduction **OC-1/STM-0 through OC-12/STM-4:** 1310: -5 dBm typical, singlemode, Intermediate/Long Reach, 1260-1360 nm, 1308 nm typical 1550: 0 dBm typical, singlemode, Long Reach, 1480-1580 nm, 1554 nm typical **STS-1/STM-0e and STM-1e:** 1.0 ± 0.1 V peak-to-peak **DS1:** 0 dBdsx ± 1 dB, -7.5 dBdsx ± 1 dB, -15 dBdsx ± 1 dB **E1:** 0 dBdsx, -7.5 dBdsx, -15 dBdsx **DS3:** DS3 High: 0.95 Vp ± 1.0 dB; DSX3: 0.48 Vp ± 1.2 dB; DS3 Low: 0.35 Vp ± 1.0 dB **E3:** 1.00 Vp ± 0.1 v **E4:** 0.5 Vp ± 0.1 v

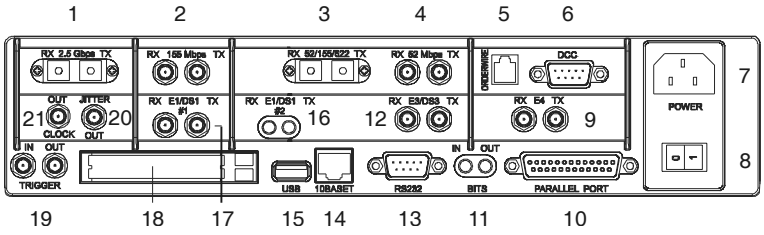
NIC 2.5G Technical Specifications	
Level (RX)	**OC-48/STM-16:** -2 dBm to -26 dBm, -30 dBm typical minimum at 10^{-10} BER with 2^{23}-1 PRBS pattern **OC-1/STM-0 through OC-12/STM-4:** -2 dBm to -26 dBm, -30 dBm typical minimum at 10^{-10} BER with 2^{23}-1 PRBS pattern **STS-1/STM-0e:** -15 dBdsx Flat Loss and Terminated: 900 ft. of RG-59 **STM-1e:** STM-1 Terminated mode per G.703 1998 (Section 3.1, 3.2, 3.3): Up to 12.7 dB of cable loss **DS1:** Terminated: +6 to -30 dBdsx with EQ; Monitor: 0 to -36 dBdsx with EQ; Bridge: 1K ohm, 0 to -36 dBdsx with EQ. **E1:** Terminated, 0 to -36 dBdsx with EQ **DS3:** Terminated: 75 ohm, +6 to -12 dB relative to DSX3 with EQ; Monitor: 75 ohm, -15 to -26 dB relative to DSX3 with EQ

NIC 2.5G Physical Characteristics	
Operating Temperature	0° to 40° C @ 85% Relative Humidity
Storage Temperature	-20° to 60° C @ 95% Relative Humidity
Power Requirements	100–120, 200–240 VAC, 50–60 Hz
Dimensions	10.1" H x 12.3" W x 4.7" D (257 mm x 312 mm x 120 mm)
Weight	Approximately 11 pounds (4.99 Kg.)

NIC 2.5G Connector Panel

The NIC 2.5G connector panel contains a variety of auxiliary interfaces, which are described in the table below.

NOTE ➤
Actual connectors may vary based on your unit's hardware configuration. ◄



	Connector	Description
1	2.5 Gbps RX/TX	Receive and Transmit input and output connectors for OC-48 and STM-16 optical rates. The NIC 2.5G supports the following optical connectors upon request: SC, ST, and FC.
2	155 Mbps RX and TX	BNC connectors for SONET/SDH electrical rates.
3	52/155/622 Mbps RX and TX	Optical output and input connectors for OC-1, OC-3, OC-12, STM-0, STM-1, and STM-4 optical rates. The unit supports the following optical connectors: SC, ST, and FC.
4	52 Mbps RX and TX	BNC connectors for STS-1 and STM-0e electrical signals.
5	Orderwire	4-pin modular Handset Jack (A-law and Mu-law). Not intended for direct connection to telecommunications circuits.
6	DCC	DataCom Channel. RS-449, DB-15
7	Power Cord Connector	AC input connector. Accepts a 3-prong, grounded Type 13 connector.
8	Power Switch	Turns unit on or off (0=off, 1=on).

	Connector	Description
9	E4 RX and TX	75 ohm unbalanced BNC connectors for E4 electrical rates.
10	Parallel Port	25-pin female connector for parallel printer.
11	BITS/SETS In Out	Bantam jacks for external timing equipment. BITS clocking supports 1.544 MHz. SETS clocking supports 2.048 MHz.
12	E3/DS3 RX and TX	BNC connectors for E3 and DS3 electrical rates.
13	RS232	9-pin male connector for SCPI RS232 Direct and SCPI RS232 modem.
14	10BaseT	8-pin modular jack for Ethernet connection.
15	USB	Universal Serial Bus for USB product support (i.e., keyboard and mouse).
16	E1/DS1 RX/TX #2	Bantam connectors for E1 and DS1 electrical rates.
17	E1/DS1 RX/TX #1	BNC connectors for E1 and DS1 electrical rates.
18	PCMCIA (PC Card)	Dual-slot PC card slot that accepts two Type II cards. Approved cards are: ■ Modem: None ■ Flash: SanDisk 48 Mbyte Flash ■ GPIB: National Instruments model number PCMCIA-GPIB.NI-488.2 for Windows NT
19	Trigger In and Out	SMA connectors used for trigger operation.
20	Jitter Out	SMA connector for use with Jitter frequency measurement.
21	Clock Out	SMA connector that allows a trigger output for use of optical eye diagram analysis.

NIC GigE Overview

The NIC Gigabit Ethernet (NIC GigE™) is a portable diagnostic tool for Gigabit Ethernet networks. The unit contains two fully independent ports, which are factory-configured for either LX (single-mode fiber, 1310 nm) or SX (multi-mode fiber, 850 nm) Gigabit network topologies, or as a combination of one LX port and one SX port for greater flexibility.

NIC GigE Features

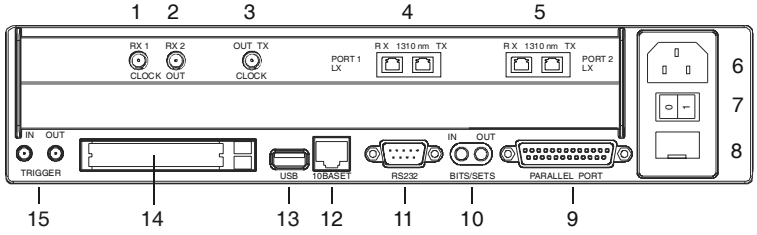
- Port-independent Bit Error Rate (BER) testing
- RFC 2544 (throughput, frame loss, and back-to-back) testing
- Automatic Protection Switch (APS) and G.826 measurement support

NIC GigE Physical Characteristics	
Operating Temp	0° to 40° C @ 85% Relative Humidity
Storage Temp	-20° to 60° C @ 95% Relative Humidity
Power Requirements	100–120, 200–240 VAC, 50–60 Hz
Dimensions	10.1" H x 12.3" W x 4.7" D (257 mm x 312 mm x 120 mm)
Weight	Approximately 11 pounds (4.99 Kg.)

NIC GigE Connector Panel

The following describes the unit's connector panel.

NOTE ➤
Actual connectors may vary based on your unit's hardware configuration. ➤



	Connector	Description
1	RX 1 Clock Out	SMA connector for the recovered clock that is associated with the signal entering Port 1's RX connector.
2	RX 2 Clock Out	SMA connector for the recovered clock that is associated with the signal entering Port 2's RX connector.
3	TX Clock Out	SMA connector for transmit clock out.
4	Port 1 RX and TX	LC-type input and output optical connectors for Port 1.
5	Port 2 RX and TX	LC-type input and output optical connectors for Port 2.
6	Power Cord Connector	AC input connector. Accepts a 3-prong, grounded Type 13 connector.
7	Power Switch	Turns unit on or off (0=off, 1=on).
8	Fuse Compartment	Contains two 1.5 amp Slo-Blo fuses. **Note:** Fuses are not field serviceable.
9	Parallel Port	25-pin female connector for parallel printer.
10	BITS/SETS In and Out	Bantam jacks for external timing equipment. BITS clocking supports 1.544 Mhz. SETS clocking supports 2.048 Mhz.
11	RS232	9-pin male connector for SCPI RS232 Direct and SCPI RS232 modem.
12	10BaseT	8-pin modular jack for Ethernet connection.
13	USB	Universal Serial Bus for USB product support (i.e., keyboard and mouse).

	Connector	Description
14	PCMCIA (PC Card)	Dual-slot PC card slot that accepts two Type II cards. Approved cards are: ■ Modem: None ■ Flash: SanDisk 48 Mbyte Flash ■ GPIB: National Instruments model number PCMCIA-GPIB.NI-488.2 for Windows NT
15	Trigger In and Out	SMA connectors used for trigger operation.

NIC ONA Product Overview

The NIC Optical Network Analyzer (ONA) is a portable product equipped with the Optical Spectrum Analyzer (OSA) circuit pack that provides C- and L-band monitoring of DWDM systems. The NIC ONA can report total broadband power, channel power, wavelength, and signal-to-noise ratio for C-band channels ranging from 1529 nm to 1561 nm and L-band channels ranging from 1570 nm to 1603 nm.

NIC ONA Features

- Optical assessment of fiber during provisioning of non-lambda protocols
- Metro and long-haul DWDM network test and turn-up
- Real-time scan of C- or L-bands
- Autoscan for quick OSA results

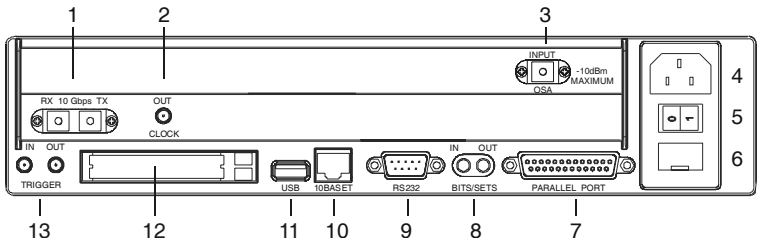
NIC ONA Physical Characteristics	
Operating Temperature	0° to 40° C @ 85% Relative Humidity
Storage Temperature	-20° to 60° C @ 95% Relative Humidity
Power Requirements	100–120, 200–240 VAC, 50–60 Hz
Dimensions	10.1" H x 12.3" W x 4.7" D (257 mm x 312 mm x 120 mm)

NIC ONA Physical Characteristics	
Weight	Approximately 11 pounds (4.99 Kg.)

NIC ONA Connector Panel

The following describes the unit's connector panel.

NOTE ➤
Actual connectors may vary based on your unit's hardware configuration. ◄



	Connector	Description
1	10 Gbps RX and TX	Optical output and input connectors for OC-192 and STM-64 optical rates. The unit supports the following optical connectors: SC, ST, and FC. **Note:** These connectors only appear if the unit is configured with the optional OC-192/STM-64 hardware.
2	Clock Out	SMA connector that allows a trigger output for use of optical OC-192/STM-64 eye diagram analysis.
3	OSA Input	SC-type optical input connector for DWDM signal. **Note:** To avoid damaging the unit, do not exceed the maximum input power of -10 dBm.
4	Power Cord Connector	AC input connector. Accepts a 3-prong, grounded Type 13 connector.
5	Power Switch	Turns unit on or off (0=off, 1=on).

	Connector	Description
6	Fuse Compartment	Contains two 1.5 amp Slo-Blo fuses. **Note:** Fuses are not field serviceable.
7	Parallel Port	25-pin female connector for parallel printer.
8	BITS/SETS In and Out	Bantam jacks for external timing equipment. BITS clocking supports 1.544 Mhz. SETS clocking supports 2.048 Mhz.
9	RS232	9-pin male connector for SCPI RS232 Direct and SCPI RS232 modem.
10	10BaseT	8-pin modular jack for Ethernet connection.
11	USB	Universal Serial Bus for USB product support (i.e., keyboard and mouse).
12	PCMCIA (PC Card)	Dual-slot PC card slot that accepts two Type II cards. Approved cards are: ■ Modem: None ■ Flash: SanDisk 48 Mbyte Flash ■ GPIB: National Instruments model number PCMCIA-GPIB.NI-488.2 for Windows NT
13	Trigger In and Out	SMA connectors used for trigger operation.

NIC 622M Overview

The NIC 622M is a cost-effective, entry-level unit that is capable of STM-4/OC-12 through T1/E1-Carrier protocol analysis.

NIC 622M Features

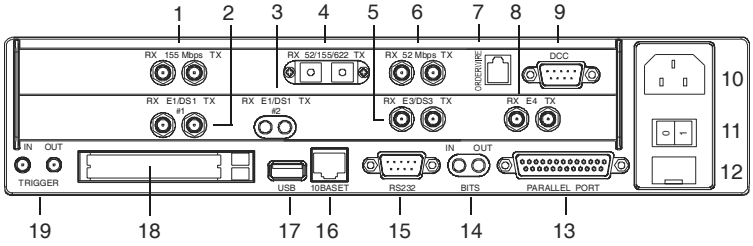
- Port-independent Bit Error Rate (BER) testing
- Simultaneous and independent testing of PDH and SDH. Separate protocol processors for E1, E3, E4, DS1, DS3, and SDH (includes STM-0/1/4 and STM-16)
- E3 and E1 drop/insert from SDH, built-in E13
- DS3 and DS1 drop/insert from SONET, built-in M13

NIC 622M Physical Characteristics	
Operating Temp	0° to 40° C @ 85% Relative Humidity
Storage Temp	-20° to 60° C @ 95% Relative Humidity
Power Requirements	100–120, 200–240 VAC, 50–60 Hz
Dimensions	10.1" H x 12.3" W x 4.7" D (257 mm x 312 mm x 120 mm)
Weight	Approximately 11 pounds (4.99 Kg.)

NIC 622M Connector Panel

The following describes the unit's connector panel.

NOTE ➤
Actual connectors may vary based on your unit's hardware configuration. ➤



	Connector	Description
1	155 Mbps RX and TX	BNC connectors for SONET/SDH electrical rates.
2	E1 RX/TX #1	BNC connectors for E1 electrical rates.
3	E1/DS1 RX/TX #2	Bantam connectors for E1 and DS1 electrical rates.
4	52/155/622 Mbps RX and TX	Optical output and input connectors for OC-1, OC-3, OC-12, STM-0, STM-1, and STM-4 optical rates. The unit supports the following optical connectors: SC, ST, and FC.

	Connector	Description
5	E3/DS3 RX and TX	BNC connectors for E3 and DS3 electrical rates.
6	52 Mbps RX and TX	BNC connectors for STS-1 and STM-0e electrical signals.
7	Orderwire	4-pin modular Handset Jack (A-law and Mu-law). Not intended for direct connection to telecommunications circuits.
8	E4 RX and TX	75 ohm unbalanced BNC connectors for E4 electrical rates.
9	DCC	DataCom Channel. RS-449, DB-15
10	Power Cord Connector	AC input connector. Accepts a 3-prong, grounded Type 13 connector.
11	Power Switch	Turns unit on or off (0=off, 1=on).
12	Fuse Compartment	Contains two 1.5 amp Slo-Blo fuses. **Note:** Fuses are not field serviceable.
13	Parallel Port	25-pin female connector for parallel printer.
14	BITS/SETS In Out	Bantam jacks for external timing equipment. BITS clocking supports 1.544 MHz. SETS clocking supports 2.048 MHz.
15	RS232	9-pin male connector for SCPI RS232 Direct and SCPI RS232 modem.
16	10BaseT	8-pin modular jack for Ethernet connection.
17	USB	Universal Serial Bus for USB product support (i.e., keyboard and mouse).
18	PCMCIA (PC Card)	Dual-slot PC card slot that accepts two Type II cards. Approved cards are: ■ Modem: None ■ Flash: SanDisk 48 Mbyte Flash ■ GPIB: National Instruments model number PCMCIA-GPIB.NI-488.2 for Windows NT

	Connector	Description
19	Trigger In and Out	SMA connectors used for trigger operation.

Getting Started

This section describes how to use basic components of the unit such as the touch screen and LEDs.

Attaching Optical Cables for SDH or SONET Rates

The unit can be configured with SC-, ST-, or FC-type optical connectors and accepts both singlemode and multimode fiber.

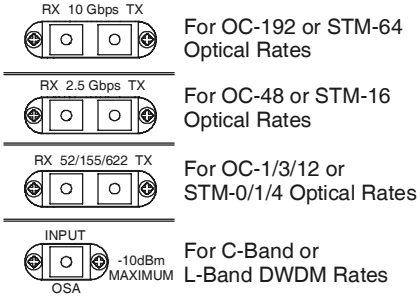
WARNING

The unit's optical transmit output is produced by a laser device. You should never, under any circumstances, look into an unterminated fiber. ◄

IMPORTANT ➤

Before using the unit, use a fiber optics cleaning kit to clean the fiber optical ports on the unit and the optical fiber cables. Dirty optical ports will affect operation. ◄

1. Remove the dustcap from the optical port that you will use.



SC Connectors Shown

2. Carefully insert the Transmit end of the incoming optical fiber into the Receive (RX) port on the unit.

NOTE ➤

Refer to the product's technical specifications for the RX optical sensitivity information. ◄

If receiving...	Use connector labeled
OC-192 or STM-64 optical signal	10 Gbps RX

If receiving...	Use connector labeled
OC-48 or STM-16 optical signal	2.5 Gbps RX
OC-1/3/12 or STM-0/1/4 optical signal	52/155/622 RX
C-band or L-band DWDM signal	INPUT OSA

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. Secure the optical connector either by tightening the optical connector barrel clockwise until finger-tight (for an FC-type connector), or by pushing and locking the optical connector in place (for an ST- or SC-type connector). Do not overtighten an FC-type connector.
5. Carefully insert the Receive end of the outbound optical fiber into the Transmit (TX) port on the unit.

If transmitting...	Use optical connector labeled
OC-192 or STM-64 optical signal	10 Gbps TX
OC-48 or STM-16 optical signal	2.5 Gbps TX
OC-1/3/12 or STM-0/1/4 optical signal	52/155/622 TX

6. 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.
7. Secure the optical connector either by tightening the optical connector barrel clockwise until finger-tight (for an FC-type connector), or by pushing and locking the optical connector in place (for an ST- or SC-type connector). Do not overtighten an FC-type connector.

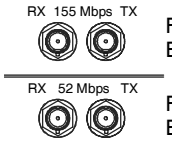
CAUTION

To prevent damage and to keep the optical port connectors clean,

always replace dustcaps on the optical port connectors when not in use. ◄

Attaching Electrical Cables for SDH or SONET Rates

The unit can be configured with BNC connectors for SDH (STM) or SONET (STS) electrical rates.



1. Connect the transmit end of the incoming electrical SDH or SONET cable to the Receive BNC connector.

If receiving...	Use BNC connector labeled
STS-3 or STM-1e electrical signal	155 Mbps RX
STS-1 or STM-0e electrical signal	52 Mbps RX

2. Connect the receive end of the outbound electrical cable to the Transmit BNC connector.

If transmitting...	Use BNC connector labeled
STS-3 or STM-1e electrical signal	155 Mbps TX
STS-1 or STM-0e electrical signal	52 Mbps TX

Attaching Cables for PDH or DS3/DS1 Rates

The unit can be configured with BNC and Bantam connectors for PDH or DS3/DS1 electrical rates.

1. Connect the transmit end of the incoming electrical signal's cable to the Receive connector.

For PDH, if receiving...	Use connector labeled
E1 electrical signal (BNC)	E1 #1 RX (BNC)
E1 electrical signal (Bantam)	E1/DS1 #2 RX (Bantam)
E3 electrical signal	E3/DS3 RX
E4 electrical signal	E4 RX (requires 75 ohm cable)

For DS3/DS1, if receiving...	Use connector labeled
DS1 electrical signal (Bantam)	E1/DS1 #2 RX (Bantam)
DS3 electrical signal	E3/DS3 RX

2. Connect the receive end of the outbound electrical signal's cable to the Transmit connector.

For PDH, if transmitting...	Use connector labeled
E1 electrical signal (BNC)	E1 #1 TX (BNC)
E1 electrical signal (Bantam)	E1/DS1 #2 TX (Bantam)
E3 electrical signal	E3/DS3 TX
E4 electrical signal	E4 TX (requires 75 ohm cable)

For DS3/DS1, if transmitting...	Use connector labeled
DS1 electrical signal (Bantam)	E1/DS1 #2 TX (Bantam)

For DS3/DS1, if transmitting...	Use connector labeled
DS3 electrical signal	E3/DS3 TX

Attaching GigE Optical Connectors

WARNING

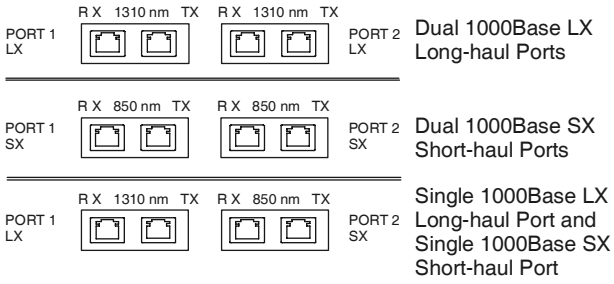
The unit's optical transmit output is produced by a laser device. You should never, under any circumstances, look into an unterminated fiber. ◄

IMPORTANT ➤

Before using the unit, use a fiber optics cleaning kit to clean the fiber optical ports on the unit and the optical fiber cables. Dirty optical ports will affect operation. ◄

1. Determine which GigE port(s) you will use (Port 1 or Port 2), and remove the dust caps from the TX and RX connectors.

   The following shows various GigE connector configurations.



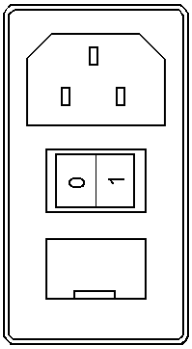
LC Connectors Shown

2. Attach the incoming optical fiber to the RX connector.
3. Attach the outbound optical fiber to the TX connector.

Turning the Unit On and Off

To turn the unit on:

1. Connect the proper power cord to the AC power cord connector in the unit's connector panel and then plug into an AC power source.



2. Press the power switch to the On (1) position.
   - After powering on the unit, listen for fan rotation to ensure that the cooling fans are operating properly.
   - As the unit boots, it performs internal diagnostics.
   - When this is complete, a colorful user interface appears on the touch screen.
   - Verify that the touch screen is operating. For example, select the Help tab located at the top of the touch screen.

To turn the unit off:

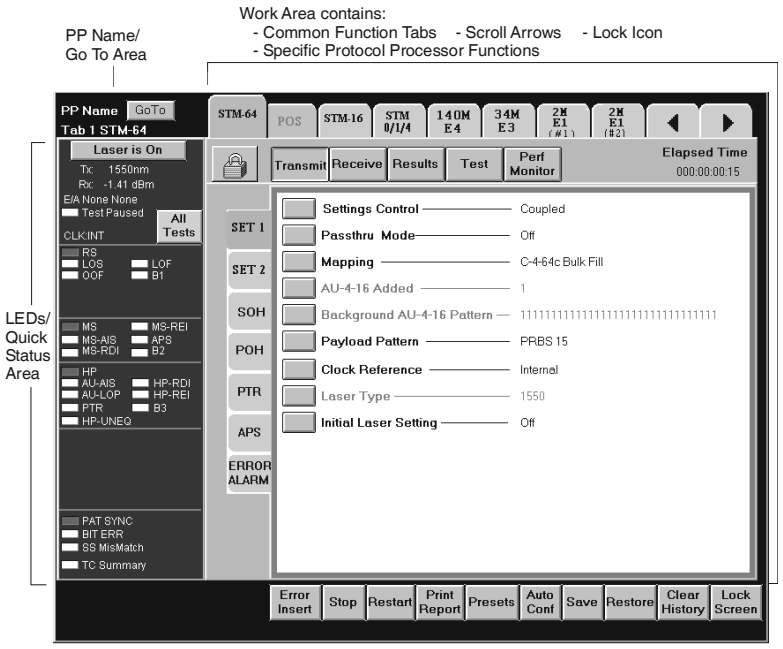
- Press the power switch to the Off (0) position.

Touch Screen Components

The touch screen is the user interface to the unit. The following is an example of the NIC Plus touch screen (SDH mode shown).

IMPORTANT ➤

The illustrations that appear in this document are used as examples to assist you through a procedure. Because of product enhancements, these images may not show all items that appear on your touch screen. ◄



Using the Touch Screen

To use the touch screen, place your finger directly onto the screen to select tabs and buttons associated with a specific function.

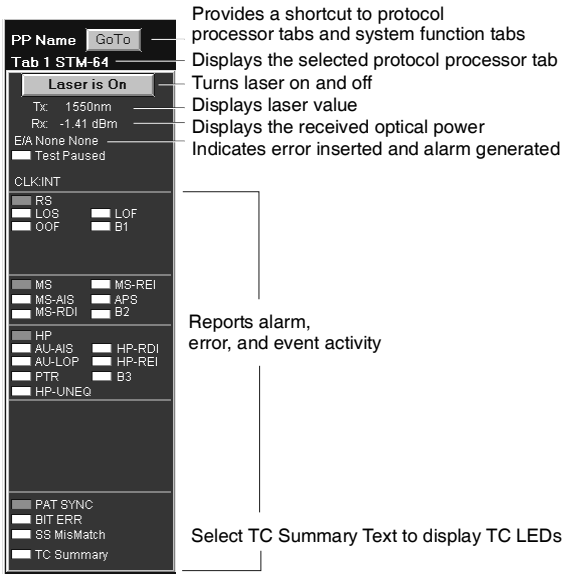
NOTE ➤

A blunt object, such as the back of a pen or pencil eraser, can also be used to select touch screen functions. However, avoid using sharp instruments, such as pen tips, pencil tips, keys, and paper clips. These objects may scratch and mark the touch screen. ◄

LEDs/Quick Status Area

The left side of the touch screen provides an at-a-glance view of the selected protocol processor's LEDs and Laser ON/Off button. The LEDs report incoming error and alarm activity, current status, and event history. **Refer to the *Glossary* for LED descriptions.**

STM-64 LEDs Shown



Work Area

This area consumes the majority of the unit's touch screen. All NIC functions are displayed in the form of a tab. Using these tabs, you can view incoming error and alarm statistics, and configure the unit for operation.

Common Function Tabs

The first set of tabs are located at the top of the touch screen and remain static on the screen regardless of which tab is selected.

These tabs (SDH configuration displayed above) allow you to easily

navigate and switch between functions. When a function tab is selected, the information displayed on the screen will change and correspond to that particular function. Additionally, the **Back and Forward arrows** allow you to scroll through various tabs. This function is similar to the **Go To** button that appears in the LEDs/Quick Status area.

The Common Function Tabs are:

- **STM-64/OC-192:** Provides access to STM-64 or OC-192 functionality. Allows you to configure your unit for Transmit or Receive mode, establish TX and RX test settings, view test results, and monitor performance. (**Note:** Your unit must contain the STM-64/OC-192 hardware for this tab to appear.)
- **STM-16/OC-48:** Provides access to STM-16 or OC-48 functionality. Allows you to configure your unit for Transmit or Receive mode, establish TX and RX test settings, view test results, and monitor performance. (**Note:** Your unit must contain the STM-16/OC-48 hardware for this tab to appear.)
- **STM 0/1/4/** and **OC 1/3/12:** Allows you to configure your unit for SDH STM-0, 1, and 4 or SONET OC-1, 3, and 12 Transmit or Receive mode, establish Transmit and Receive test settings, view test results, and monitor performance. (**Note:** Your unit must contain the STM-4/OC-12 hardware for this tab to appear.)
- **E4 (140 Mbps):** Allows you to configure your unit for PDH E4 Transmit or Receive mode, establish Transmit and Receive test settings, view test results, and monitor performance. (**Note:** Your unit must contain the PDH E4 hardware for this tab to appear.)
- **E3 (34 Mbps)/DS3 (45 Mbps):** Allows you to configure your unit for PDH E3 or ANSI DS3 Transmit or Receive mode, establish Transmit and Receive test settings, view test results, and monitor performance. (**Note:** Your unit must contain the PDH E3 or DS3 hardware for this tab to appear.)
- **E1 #1 and E1/DS1 #2:** Provides access to PDH E1 (2 Mbps) or ANSI DS1 (1.5 Mbps) functionality for up to two E1 or one DS1 interfaces. Allows you to configure your unit for Transmit or Receive mode, establish Transmit and Receive test settings, view test results, and monitor performance. (**Note:** Your unit must contain the PDH E1 or DS1 hardware for these tabs to appear.)

  NOTE ➤
  For information on switching between SONET, SDH, PDH, and DS3/DS1 modes, see the *Configuring the Protocol Mode* section. ➤

- **ATM:** Configures ATM functionality, which allows you to moni-

tor the performance of your network by receiving and analyzing data traffic and injecting test data onto your ATM network. (**Note:** Your unit must contain the ATM hardware for this tab to appear.)

- **GigE:** Configures and controls the Gigabit Ethernet functionality. (**Note:** Your unit must contain the Gigabit Ethernet hardware and licensing for this tab to appear.)
- **OSA:** Configures Optical Spectrum Analyzer functionality, which allows C- and L-band monitoring of DWDM systems. (**Note:** Your unit must contain the OSA hardware for this tab to appear.)
- **POS:** Controls Packet Over SONET/SDH testing and monitoring of POS network technology.
- **Switch Matrix:** Allows you to display the current mappings and connections between the unit's protocol processors and line interfaces.
- **System:** Sets unit and user preferences, general settings, security and file access functions.
- **Help:** Displays the unit’s online help.

Common Function Buttons

The bottom of the touch screen contains task-oriented buttons that appear on the screen in protocol processor mode or when using the Switch Matrix. These buttons do not appear when using the System or Help tabs.

The Common Function Buttons include:

- **Error Insert:** Allows a single error to be inserted into the transmit data stream. The type of error and insertion rate are determined using the **Error to Insert** and **Error Insert Rate** functions.
- **Stop:** Stops the reporting of received data and takes a snapshot of error, alarm, and event activity.
- **Restart:** Clears and resets error, alarm, and event activity counters, statistics, and LEDs for a specific or all protocol processors. It also starts any activity that was stopped using the Stop button.
- **Print Report:** Prints a report of error and alarm results, a listing of current function settings, an event log report, or an APS K1/K2 byte sequence report.

- **Presets:** Selects automatic mappings and configurations (known as presets) that quickly and conveniently set up the unit for operation.
- **Auto Config:** Detects various parameters about the incoming signal, such as signal rate, mapping, and payload pattern, and configures the unit accordingly.
- **Save:** Saves a customized configuration for all protocol processor Transmit or Receive settings.
- **Restore:** Restores or recalls any saved configuration for all protocol processor Transmit or Receive settings.
- **Clear History:** Resets all LEDs and Status Indicators (the LED text).
- **Lock Screen:** Disables the unit's touch screen. To lock and unlock the screen, you must enter a user ID and password.

Using LEDs

The unit uses LEDs to report alarm, error, and event activity. These visual cues help to narrow the focus if problems are detected on the incoming signal and provide a starting point for problem diagnosis.

There are two ways to view LEDs from the touch screen:

- Use the **LED/Quick Status** area located on the left side of the touch screen.
- Select a **protocol processor tab**, RESULTS, and then LARGE LEDS.

  The following describes what is indicated by the LED color.

LED/Quick Status Area Color Description

If the LED is...	Then this indicates...
Green with white text	Normal operation. The LED is used as a status indicator.
White with white text	Normal operation, no errors or alarms. The LED is used as an error/alarm indicator.
Red with red text	An error or alarm event is in progress. The LED is used as an error/alarm indicator.
White with red text	An error or alarm event was detected, but is now cleared. The text serves as a history indicator.

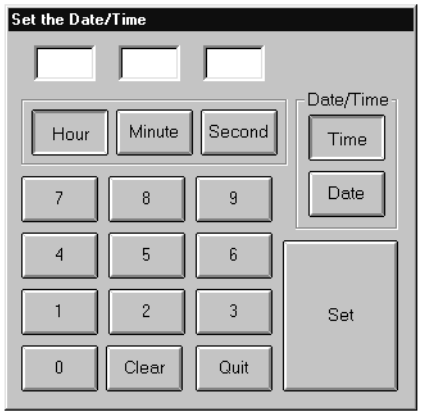
Large LED Tab Color Description

If the LED color is...	Then this indicates...
Green with white text	The specific function is active and OK.
Red with black text	An error or alarm event is in progress.
White or green with red text	This function experienced an error or alarm event in the past. (It is a history indicator.) This event is cleared by selecting Restart.
White with black text	No activity from this specific function.

Setting Time and Date

To set the time:

1. Select SYSTEM.
2. Select MISC. The **Misc** functions appear.
3. Select **Set Unit's Date and Time**. The **Set the Date/Time** window appears.



Time is entered in an HH/MM/SS military-time format.

Select Hour and enter the hour using 2-digit, 24-hour military time format.

Select Minute and enter minutes using a 2-digit format.

Select Second and enter seconds using a 2-digit format.

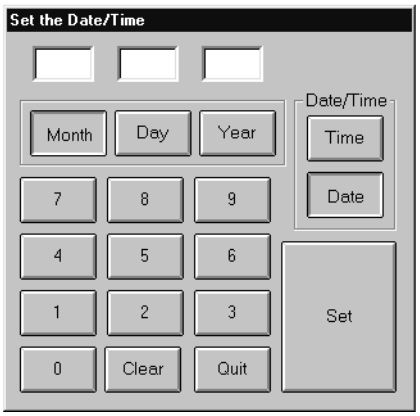
4. Select **Time**.

5. Enter the time, and select **SET**.

   Select **Quit** to close the window.

To set the date:

1. Select SYSTEM.
2. Select MISC. The **Misc** functions appear.
3. Select **Set Unit's Date and Time**. The **Set the Date/Time** window appears.



Date is entered in a MM/DD/YYYY format.

Select Month, select Clear, and enter the month.

Select Day, select Clear, and enter the day.

Select Year, select Clear, and enter the year using a 4-digit format.

4. Select **Date**.
5. Enter the date, and select **SET**.
6. Select **Quit** to close the window.

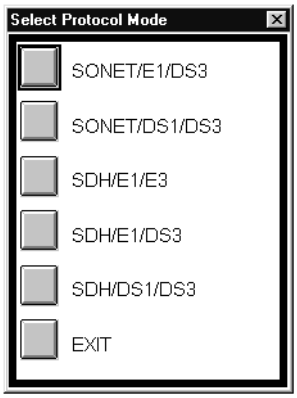
Configuring a Protocol Mode

The unit can be configured to operate in SONET, SDH, PDH, or DS3/DS1 networks.

To change protocol processor modes:

1. Select SYSTEM.
2. Select MISC. The **System** functions appear.

3. Select **Protocols** . The protocol options appear.



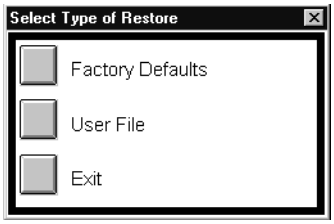
4. Select a protocol processor mode. The touch screen will update to the protocol processor mode specified.

Loading Factory Defaults

To load the unit's factory transmit and receive settings:

1. Select RESTORE from the Common Function Buttons.

   The **Select Type of Restore** menu appears.



2. Select **Factory Defaults**. The factory settings are restored.

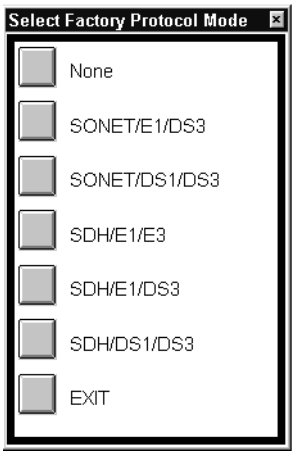
Loading Factory Default Protocols

To determine which protocol processor mode (the tabs and functions that appear) the unit uses when factory defaults are restored:

1. Select SYSTEM.

2. Select MISC. The **System** functions appear.

3. Select Factory Default Protocol. The protocol processor mode options appear.



4. Select a protocol processor mode.

   When factory default settings are restored, the unit will default to the selected mode. If **None** is selected, the unit will use its current protocol processor's mode of operation.

Transmit Functions

This section describes various Transmit tasks that can be performed using the unit.

Adding and Dropping Signals Using Presets

You are able to add and drop optical SDH and SONET or electrical PDH and DS3/DS1 signals into another protocol processor signal to monitor for error and alarm conditions.

The following sections are examples that describe how to:

- Add an STM-4 signal into an STM-16 signal
- Add an E1 signal into an E3 signal
- Add an E4 signal into an E3 signal

Adding SDH/PDH Signals

1. Select PRESETS. The Apply Presets window appears.

To add an STM-4 signal to an STM-16 signal:

1. Select **Interface**. All line interfaces available for your unit appear.
2. Select **STM-16** as the interface starting point.
3. Select **Configuration**. The available protocols appear.
4. Select **STM-4**.

To add an E1 signal into an E3 signal:

1. Select **Interface**. All line interfaces available for your unit appear.
2. Select **E3** as the interface starting point.

3. Select **Configuration**. The available protocols appear.
4. Select **E1#1 Payload** or **E1#2 Payload**.

NOTE ➤
If you make a mistake while creating connections, simply select **Interface** and reenter the interface value. This action erases any previously entered interface or configuration values. ➤

5. Select **Apply**. The unit takes a few moments to apply the new protocol connections. Use the Switch Matrix to view the new connections.

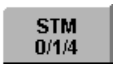
The unit is configured for Add/Drop mode. Go to the next section to specify different frames and patterns for the added signal.

To disengage the configured protocol connections:

- Select **All to Tx/Rx**. This globally disconnects any internal connections between multiple protocol processors. All protocol processors will now expect to receive a signal using its line interface

Specifying Frames and Patterns for the Added Signal

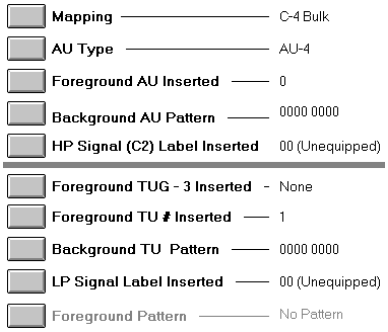
If you have added an STM-4 signal into an STM-16 signal:

1. Select 

.
2. Select 

.
3. Select 

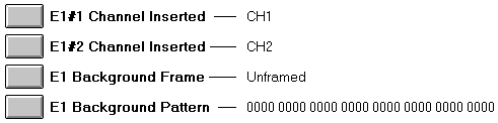
. The following options appear.



4. Select the options on the screen to specify the foreground and background AU and TUG patterns and HP and LP signal labels to be added to the signal.

If you have added an E3 signal to an E4 signal:

1. Select E3.
2. Select TRANSMIT.
3. Select SET 2. The following options appear on the E3 Transmit Set 2 screen.

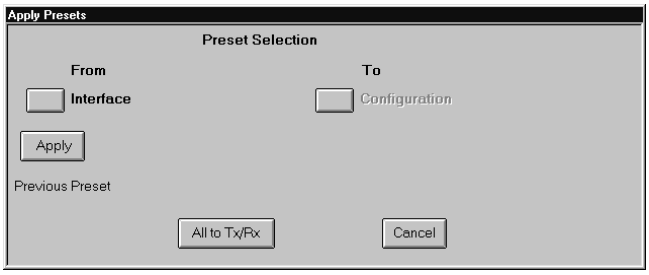


4. Select **E1 Channel Inserted 1** and select from channels 1 through 16 for E1 #1.
5. Select **E1 Channel Inserted 2** and select from channels 1 through 16 for E1 #2.
6. Select **E1 Background Frame** and select the background frame (Unframed, PCM30, PCM30CRC, PCM31, PCM31CRC) for the specified channel.
7. Select **E1 Background Pattern** and select up to a 32-bit background pattern for the specified channel.

Dropping an STM-64/16/4 Signal

This function allows you to drop an STM-16 signal from an STM-64 signal, and then an STM-4 signal from an STM-16 signal. Conversely, this procedure can also be performed in SONET mode (i.e., drop an OC-48 signal from an OC-192, and an OC-12 from an OC-48). Dropping signals does not need to be performed in any particular protocol processor order.

1. Select PRESETS. The Apply Presets window appears.



2. Select **Interface**. All line interfaces available for your unit appear.
3. Select **STM-64** as the interface starting point.
4. Select **Configuration**. The protocols available for the selected interface appear.
5. Select **STM-4 Payload**.

   NOTE ➤
   If you make a mistake while creating connections, simply select **Interface** and reenter the interface value. This action erases any previously entered interface or configuration values. ◄
6. Select **Apply**. The unit takes a few moments to apply the new protocol connections. Use the Switch Matrix to view the new connections.

To disengage the configured protocol connections:

- Select **All to Tx/Rx**. This globally disconnects any internal connections between multiple protocol processors. All protocol processors will now expect to receive a signal using its line interface.

Viewing Event Activity for Added and Dropped Signals

To view the event activity of the added/dropped signals:

1. Select RESULTS.
   - Select SCAN to view a summary of the error and alarm counts that have occurred.

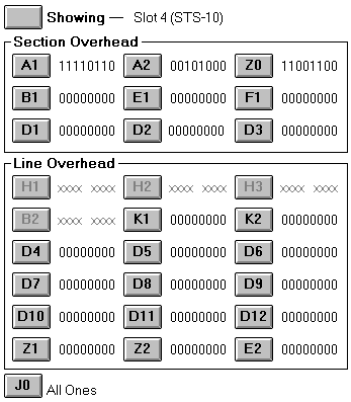
- Select ERR to view the count, average rate, and current rate of the errors that have occurred.
- Select ALARMS to view the alarms (in seconds) that have occurred.
- Select EVENT to view a list of the events that have occurred.
- Select LARGE LEDS to view errors and alarms in the form of LEDs.

Changing SDH or SONET Overhead Bytes

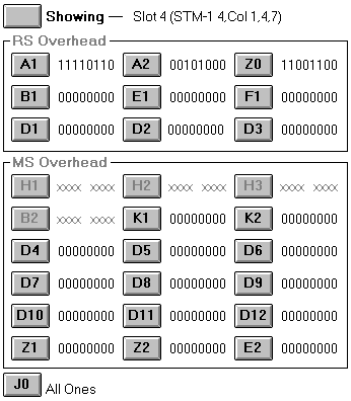
1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select TRANSMIT.
3. Select SOH or POH.

If ...	is selected for...	then
SOH	SDH mode	Regenerator Section and Multiplex Section overhead bytes appear.
SOH	SONET mode	Section and Line overhead bytes appear.
POH	SDH mode	Higher-Order Path overhead bytes appear.
POH	SONET mode	Path overhead bytes appear.

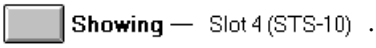
For SONET:



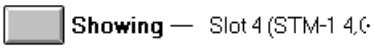
For SDH:



4. Select **Showing** to select an STS-1 slot (SONET) or an SOH Slot (SDH).

   For example, 

   .

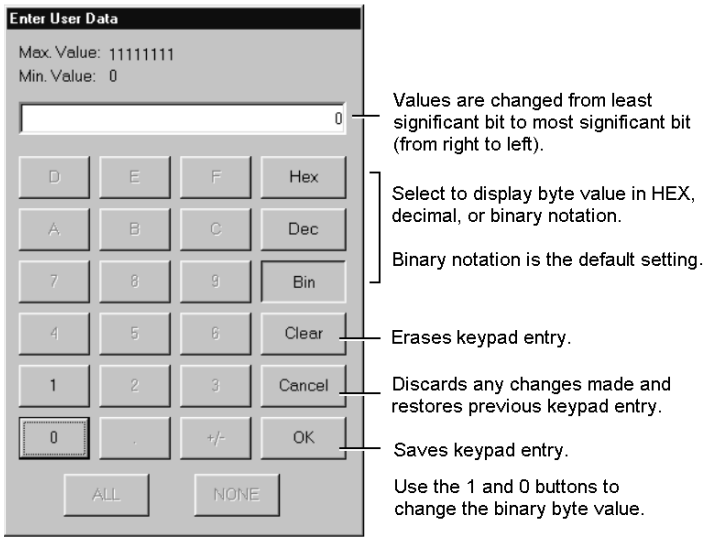
   For example, 

   The OH bytes for the selected slot appear.

5. Select an OH byte. For example, 

.

   A touch screen keypad appears allowing the byte's 8-bit pattern to be edited.



6. When editing is complete, select OK to save the new value.

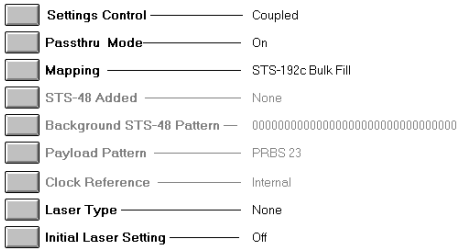
Changing Overhead Bytes in Passthru Mode

Passthru mode allows an incoming SONET or SDH signal to pass through the unit without altering the data in the signal. However, the overhead bytes can be changed to simulate errors, alarms, and other stress conditions such as Pointer adjustments. This verifies if equipment in the network can detect changed overhead bytes.

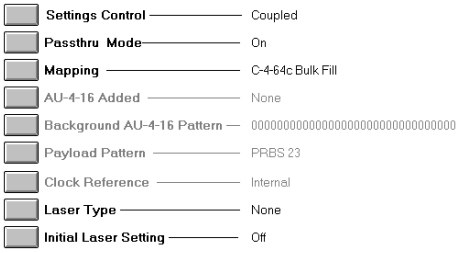
To configure the unit for Passthru mode:

1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select TRANSMIT.
3. Select SET 1. The Transmit Settings 1 functions appear.

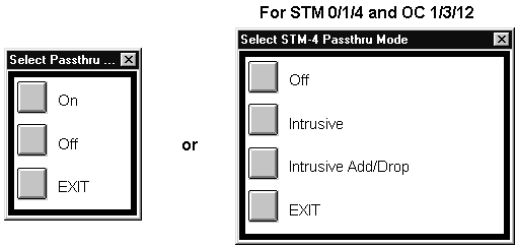
For SONET:



For SDH:



4. Select **Passthru Mode**. The Passthru Mode options appear.

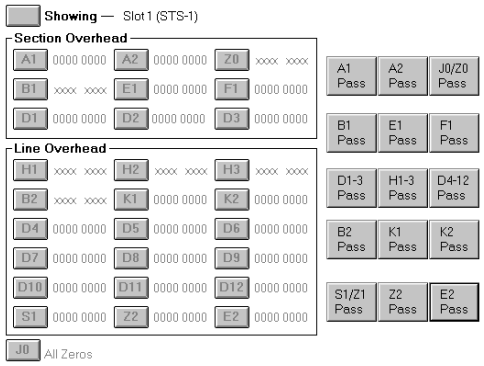


5. Select **On**, **Intrusive**, or **Intrusive Add/Drop** to enable Passthru mode.

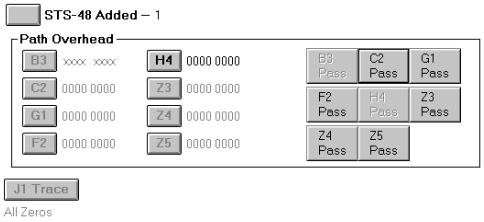
To change overhead bytes in Passthru mode:

1. Select POH or SOH. The overhead bytes appear.

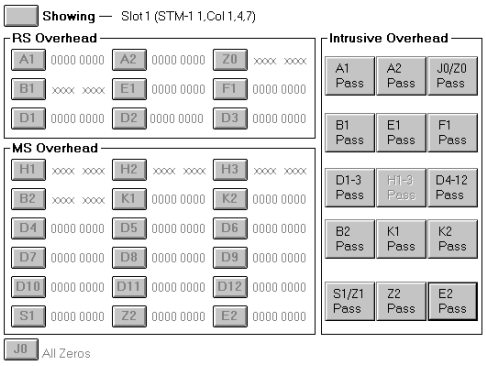
For SONET SOH:



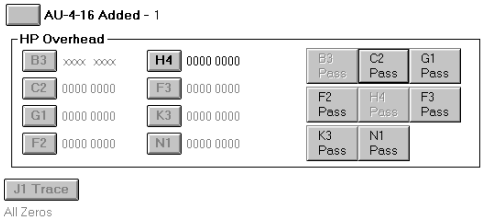
For SONET POH:



For SDH SOH:



For SDH POH:



When Passthru mode is enabled:

- The OH bytes are passed through (looped) the unit without being altered.
- The **Intrusive Overhead** buttons appear. These buttons allow you to select a specific OH byte and change its value.

2. Select an **Intrusive Overhead** button. For example, select 

.

   The selected Intrusive Overhead button changes to indicate that a specific byte has been selected.

   For example, F1 Pass now appears as 

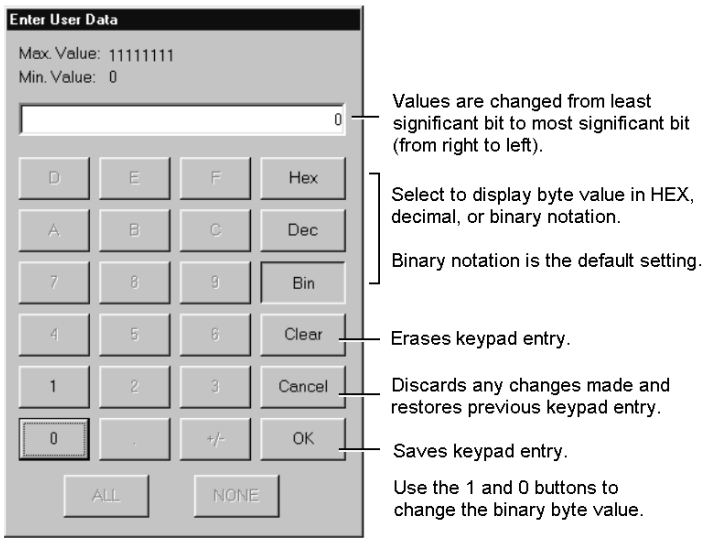
. In addition, the OH byte is now enabled and displays its value.

3. Select the same OH byte (from the left side of the touch screen) that you selected for Passthru mode.

   For example, select 

.

   A touch screen keypad appears allowing the byte's 8-bit pattern to be edited.



4. When editing is complete, select OK to save the new value, which will be transmitted out of the unit.
5. Repeat steps 2-4 to reconfigure other OH bytes in Passthru mode.

Changing E1 Overhead

The E1 Overhead (OH) function allows you to stress an E1 network by directly editing overhead bits to simulate errors, alarms, and other stress conditions. For the E1 protocol processor, the following bits can be edited when E1 framing is set to PCM30 or PCM30CRC:

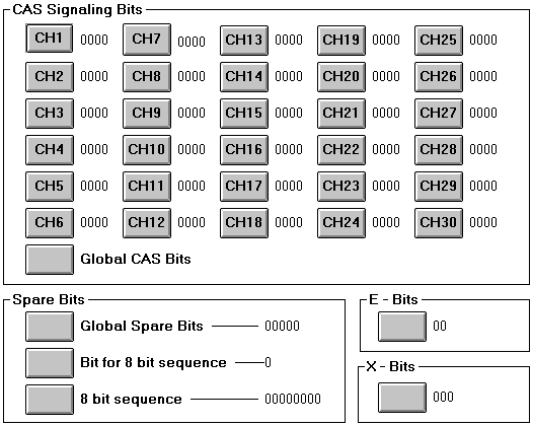
- CAS Signaling Bits: If the framing is set to 30 channels (PCM30 or PCM30CRC), the CAS byte contains ABCD bits for 30 channels, at four bits per channel.
- Spare Bits: Contain odd-numbered bits in bits four to eight in the FAS channel (Timeslot 0). Spare bits can be set to a single five-bit value for all bits. Additionally, one of the five bits can be a separate 4,000 bit per second channel with an eight bit sequence specified the channel.
- E-Bits: These are Far-End CRC (block) errors. There are two bits per multiframe, and one per super multiframe. If a FEBE is generated, its value will override the value specified for the E-Bit.
- X-Bits: These are bits 5, 7, and 8 of the CAS channel (Timeslot

16) in the first frame of the multiframe. X-Bits are only displayed when framing is set for 30 channels (PCM30 or PCM30CRC) and can only be entered on the Transmit side.

A specific slot can be selected, and its bits can be changed for transmission out of the system. By altering the bits, this allows other receiving equipment to detect and, if necessary, react to these changes.

To change E1 Overhead bits:

1. Select E1 (#1).
2. Select TRANSMIT.
3. Select OH. The E1 OH screen appears.



4. Select **CAS**, **Spare Bit**, **E-Bits**, or **X-Bits**.

   A keypad appears allowing the byte's pattern to be edited. The byte appears in binary notation by default. Use the keypad's 1 and 0 buttons to change the bit value. Bit values are changed from the least significant bit to the most significant bit (from right to left).

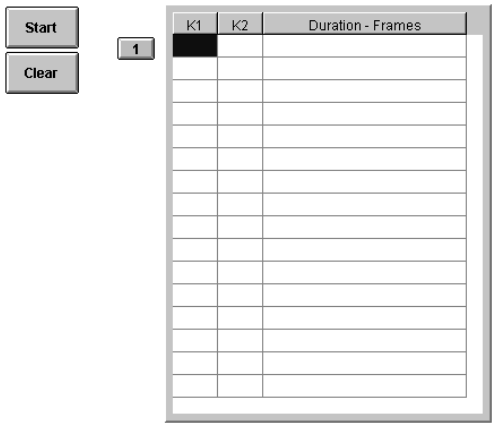
   The byte can also appear in HEX or decimal notation. Select the HEX or DEC button on the keypad. The bit value can also be erased from the keypad using the **Clear** button.

5. When editing is complete, select **OK** to save the new value. **Cancel** discards any changes made to the byte and restores the previous value.

Configuring APS Commands for OC-192/48 or STM-64/16

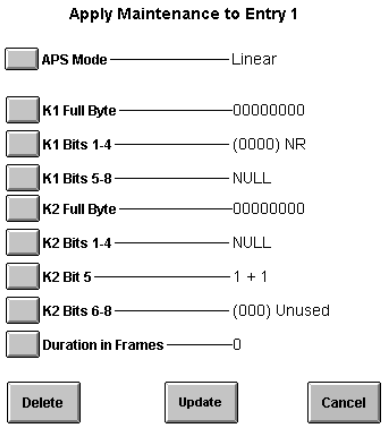
You can create up to 15 different K1 and K2 byte configurations (known as byte sequences) to measure and stress your equipment's APS switching capabilities. To configure K1 and K2 byte values:

1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select TRANSMIT.
3. Select APS. The initial APS screen appears containing a table of the K1 and K2 byte sequences that can be transmitted. A total of 15 K1 and K2 byte sequences can be created in the table.

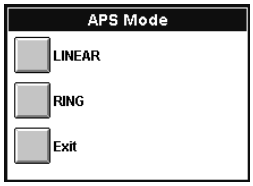


4. Select a byte sequence button (for example, 1).

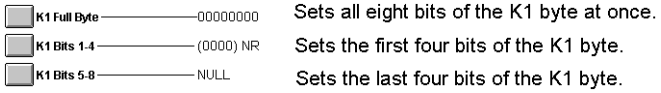
   The **Apply Maintenance to Entry** screen appears. It contains functions used to configure and set the measurement criteria of the K1 and K2 bytes.



5. Select **APS Mode** to configure APS commands for Linear protection switching mode or Ring APS signaling mode.

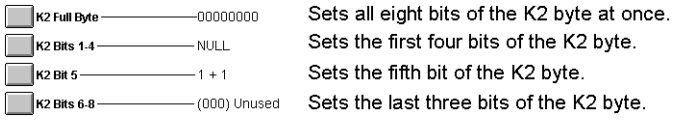


6. Edit the K1 byte.



The K1 byte is a request for switch action. There are three functions that allow you to edit the K1 byte.

7. Edit the K2 byte.

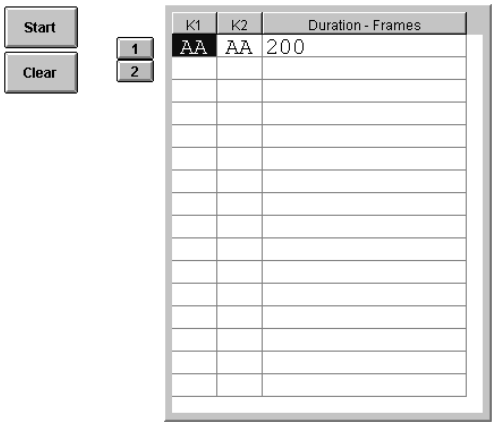


The K2 byte provides additional information about SONET or SDH network architecture and alarm conditions. There are four functions that allow you to edit the K2 byte.

8. Select 

to determine how many frames will be transmitted containing the newly configured K1 and K2 bytes.

9. Select Update. The initial APS screen appears on the touch screen.



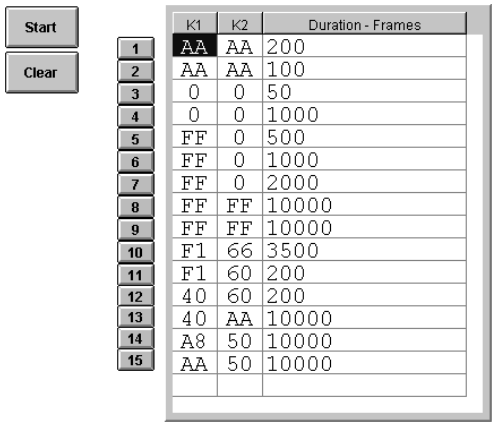
To configure additional K1 and K2 bytes, repeat steps 3–8 as previously described. After configuring K1 and K2 bytes, you can transmit these byte sequences as described in the *Transmitting APS Commands for OC-192/48 or STM-64/16* section.

Transmitting APS Commands for OC-192/48 or STM-64/16

The unit allows you to send a series of K1 and K2 bytes to stress and test a variety of APS switching scenarios.

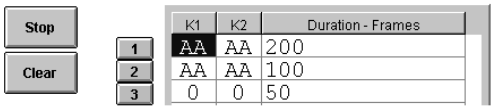
To transmit K1 and K2 bytes:

1. Make sure that the K1 and K2 bytes have been configured as described in the *Configuring APS Commands for OC-192/48 or STM-64/16* section.
2. Select a protocol processor. For example, STM-16.
3. Select TRANSMIT.
4. Select APS. The initial APS screen appears containing a table of the K1 and K2 byte sequences that can be transmitted.



5. Select **Start** to transmit the K1 and K2 bytes.

6. To stop transmitting K1 and K2 bytes, select **Stop** from the APS screen.



Configuring and Transmitting APS Commands for OC-1/3/12 or STM-0/1/4

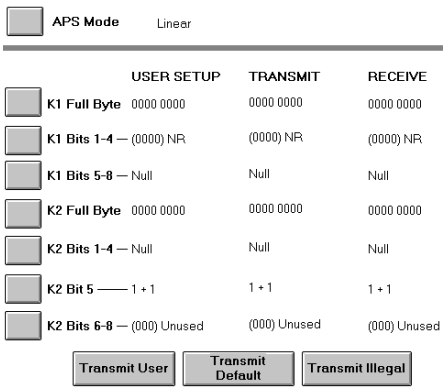
For OC-1/3/12 and STM-0/1/4 mode, the APS function appears on a multifunctional screen that displays both Transmit and Receive APS commands.

To configure K1 and K2 byte values:

1. Select a protocol processor. For example, **STM 0/1/4** or **OC 1/3/12**.

2. Select **TRANSMIT**.

3. Select **APS**. The initial APS screen appears containing a table of the K1 and K2 byte sequences that can be transmitted.

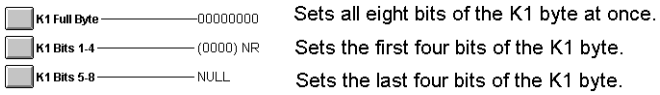


The three columns (**User Setup**, **Transmit**, and **Receive**) on the screen display the current bit value for the K1 and K2 bytes. Any changes made to the K1 and K2 bytes are automatically updated in the User Setup column.

The Transmit column displays the bit values transmitted when you select either **Transmit User**, **Transmit Default**, or **Transmit Illegal**. The Receive Column displays the bit values received for the K1 and K2 bytes.

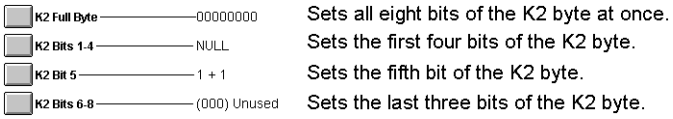
4. Select **APS Mode** to configure APS commands for Linear protection switching mode or Ring APS signaling mode.

5. Edit the K1 byte.



The K1 byte is a request for switch action. There are three functions that allow you to edit the K1 byte.

6. Edit the K2 byte.



The K2 byte provides additional information about SONET or SDH network architecture and alarm conditions. There are four functions that allow you to edit the K2 byte.

7. Select the **Transmit User** button to transmit the bit values that appear in the User Setup column. When pressed, the User Setup

values are transmitted and appear in the Transmit column. You can edit the transmitted K1 and K2 bytes directly from the SOH function screen.

NOTE ➤

You may also transmit default APS commands by selecting the **Transmit Default** button to transmit the default bit values (10101010) for the K1 and K2 bytes. When pressed, the default bit values appear in the Transmit column.

You may transmit illegal APS commands by selecting the **Transmit Illegal** button to transmit the illegal bit values (11111111) for the K1 and K2 bytes. When pressed, the illegal bit values appear in the Transmit column. ➤

Configuring for Fractional E1 Testing

Configuring the unit for fractional E1 testing enables you to bulk fill 0 to 31 DS0's in an E1 Transmit signal with a pattern. Additionally, you can specify an eight-bit pattern in background DS0's.

To configure for fractional E1 testing:

1. Select E1 (#1).
2. Select TRANSMIT.
3. Select SET 1.
4. Select Mapping.
5. Select **Fractional E1**. A keypad appears.
6. Use the 1 and 0 buttons to specify the pattern you wish to inject. The maximum length is 32 bits. When you are done, select OK.
7. Select Background DS0 Pattern – 0000 0000. A keypad appears.
8. Use the 1 and 0 buttons to specify the background DS0 pattern you wish to inject. The maximum length is eight bits.
9. When you are done, select OK.

Configuring POS Mode

Packet Over SONET/SDH (POS) is an optional feature, available on NIC Plus and NIC 10G units, that allows testing and monitoring of POS networks. Be default, the unit's POS functionality is disabled.

To configure the unit for POS operation:

1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select TRANSMIT.
3. Select SET 1.
4. Select **Mapping**.
5. Select **POS**.
6. The unit is now configured for POS operation, and the POS tab is enabled.

   Select POS to access POS functions.

Starting POS Link Negotiation

In a point-to-point network, you must first negotiate the connection before data can travel across the link. To start link negotiation:

1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select POS.
3. Select TRANSMIT.
4. Select PPP.
5. Use the **SPE Scrambling** function to determine if bytes will be scrambled.
6. Use the **FCS Generation** function to configure error correction.
7. Select the **LCP/IPCP Connect** button to start point-to-point link negotiation. The LCP/IPCP LED is green when the link is established.

NOTE ➤
An LCP/IPCP connection cannot be established when transmitting at the maximum bandwidth. If the connection fails to establish (the LCP/IPCP LED is red), reduce the data rate by 1 percent, and try to make the connection again. Bandwidth percentage can be changed using the **Data Rate** function located under **Gen Main**. Maximum bandwidth (data rate) is dependent on the packet size. As a result, 100 percent bandwidth may not be available due to packet size. ◄

Configuring TCM Transmit Mode

The unit supports Tandem Connection Monitoring (TCM), which allows the transmission of errors, alarms, and trace pattern activity between a network's tandem connection equipment.

To configure the unit for TCM transmit operation:

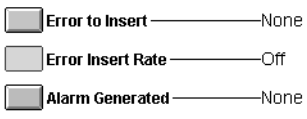
1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select TRANSMIT.
3. Select SET 2.
4. Select **TC Overhead Processing** and select **Enable**.

   The unit is now configured for transmit TCM mode.

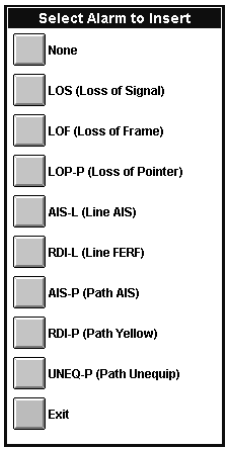
Inserting Alarms

NOTE ➤
TCM alarms only appear if the unit is configured for TCM mode. ◄

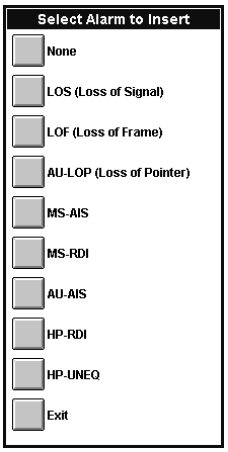
1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select TRANSMIT.
3. Select ERRORS ALARMS. The Error and Alarm parameters appear.



4. Select **Alarm Generated**. The alarm options appear.



or

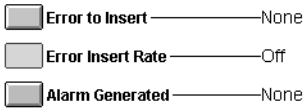


5. Select an alarm. The unit starts transmitting alarms.
6. To stop alarm transmission, select None .

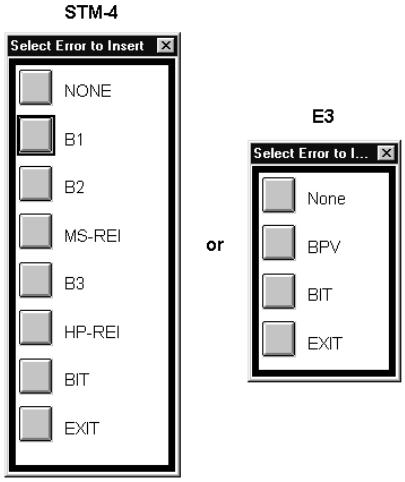
Inserting Errors

NOTE ➤
TCM errors only appear if the unit is configured for TCM mode. ➤

1. Select a protocol processor. For example, STM 0/1/4 or E3.
2. Select TRANSMIT.
3. Select ERRORS ALARMS. The Error and Alarm parameters appear.

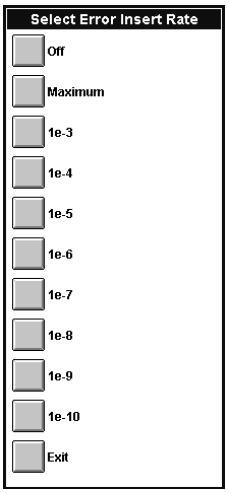


4. Select **Error to Insert**. The error options appear.



5. Select an error.
6. Select **Error Insert Rate**. The error rates appear (example of E3 error rates shown below).

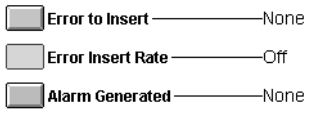
   NOTE ➤
   Error rates vary depending on the error selected. ◄



7. Select an error rate. The unit starts transmitting errors.

Stopping Error Transmission

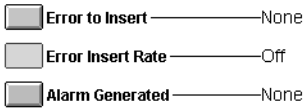
1. Select a protocol processor. For example, STM-16 or E3.
2. Select TRANSMIT.
3. Select ERRORS ALARMS. The Error and Alarm parameters appear.



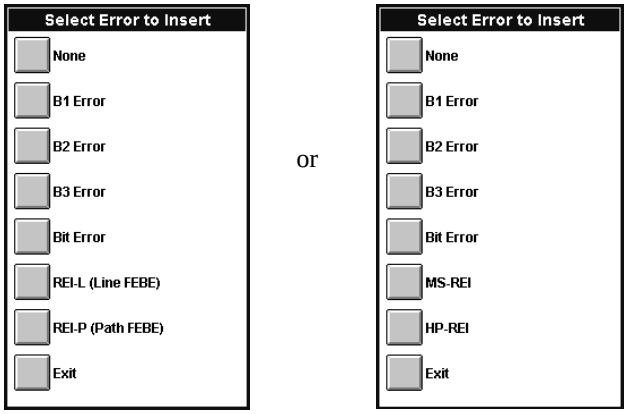
4. Select **Error Insert Rate**.
5. Select None. Error transmission stops.

Inserting Single Errors

1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select TRANSMIT.
3. Select ERRORS ALARMS. The Error and Alarm parameters appear.



4. Select **Error to Insert**. The error options appear.



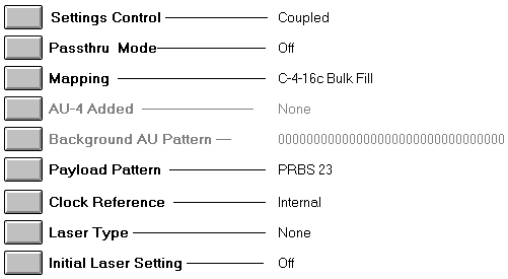
5. Select an error.

   NOTE ➤
   Make sure that the **Error Insert Rate** function is set to **Off** or **None**. ◄

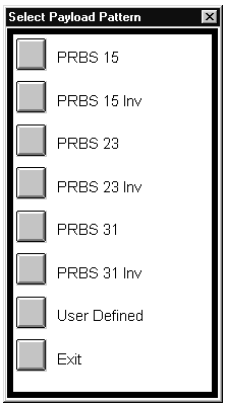
6. Select ERROR INSERT at the bottom of the touch screen to inject the error.

Inserting Payload Patterns

1. Select a protocol processor. For example, STM-16 or E1 (#1).
2. Select TRANSMIT.
3. Select SET 1. The Transmit Settings 1 functions appear. (STM-16 functions are shown below.)



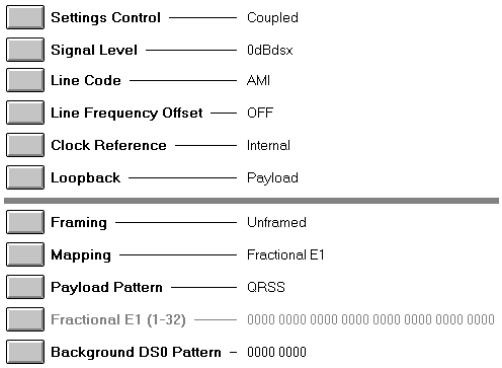
4. Select **Payload Pattern**. The payload pattern options appear. (The following is an example of the STM-16 Payload Pattern window.)



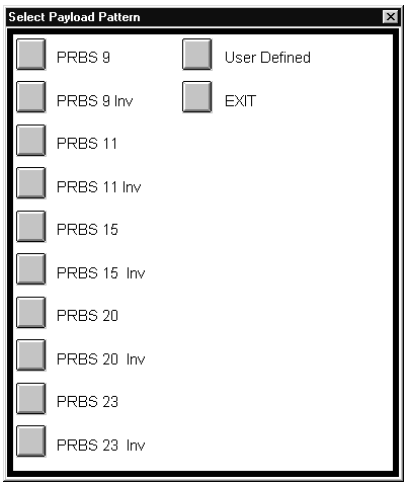
5. Select a pattern. (In this example, the unit transmits this pattern as the SDH payload.

Inserting User-Defined Payload Patterns

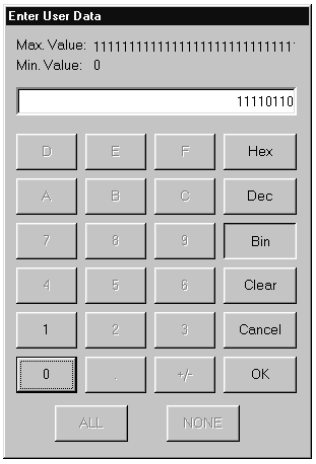
1. Select a protocol processor. For example, E1 (#1) or E3.
2. Select TRANSMIT.
3. Select SET 1. The Transmit Settings 1 functions appear. (E1 functions shown below.)



4. Select **Payload Pattern**. The payload pattern options appear.



5. Select **User Defined**. A touch screen keypad appears. Use the keypad to enter a pattern up to 32 bits in length.



6. Select **OK**.

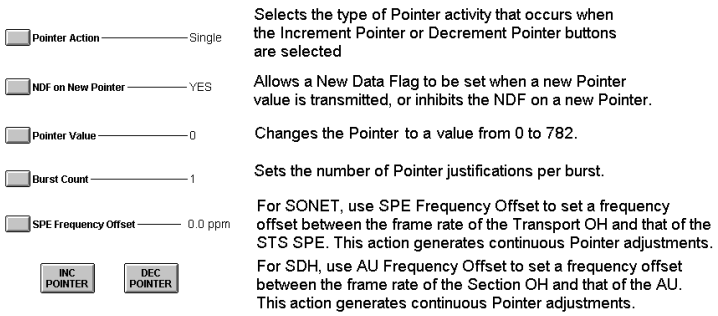
   The unit transmits this pattern as the SDH or PDH payload.

Making Pointer Adjustments

The beginning of a SONET or SDH payload is identified by a *Pointer*. It consists of the H1 and H2 Pointer bytes. You can manually adjust the Pointer using the *Increment Pointer* and *Decrement Pointer* buttons on the touch screen.

By performing this task, you can stress your SONET or SDH equipment to verify if it can tolerate Pointer adjustments, and how it will react and report these adjustments. Several Pointer parameters must be configured before making a positive or negative Pointer adjustment as described in this procedure.

1. Select a protocol processor. For example, **OC-192** or **STM-64**.
2. Select **TRANSMIT**.
3. Select **PTR**. The Pointer adjustment parameters appear.



4. Configure the Pointer adjustment parameters.

5. Select INC POINTER to make a positive Pointer adjustment, or select DEC POINTER to make a negative Pointer adjustment.

   These buttons generate and control Pointer movements within the transmitted signal.

   For *SONET*, you can stress-test a network by changing Pointers or introducing an SPE offset that continuously adjusts the STS Pointer.

   For *SDH*, you can stress test a network by changing Pointers or introducing an AU Pointer offset that continuously adjusts the AU Pointer.

Results/Monitoring Functions

This section describes monitoring tasks that you can perform with the unit.

Configuring TCM Monitor Mode

The unit supports Tandem Connection Monitoring (TCM), which allows the monitoring of errors, alarms, and trace pattern activity between a network's tandem connection equipment.

To configure the unit for TCM monitor operation:

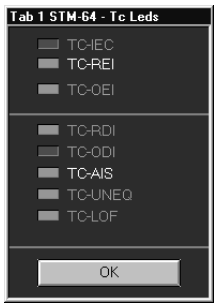
1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select RECEIVE.
3. Select SET 2.
4. Select **TC Error/Alarm Processing** and select **Enable**.

   The unit is now configured to monitor for incoming TCM errors, alarms, and traces.

   If a TCM error or alarm occurs, the **TC Summary** LED turns red. To view TCM LEDs, select the TC Summary text.

Select the TC Summary text to display the TC LEDs.

   The TCM LEDs appear in the center of the screen.



Displaying All Test Status

Use the All Test Status function to view the current status of all protocol processors installed in the unit.

1. Select SYSTEM.
2. Select All Test Status. The All Test Status screen appears. A maximum of 12 protocol processor tabs can appear on the screen. The elapsed time (in minutes) and general status Summary LED for each protocol processor appears.

   NOTE ➤
   If the Summary LED text is selected (the word *Summary*), the LEDs associated with that specific protocol processor tab appear. To clear the LED window, select **Close**. ➤
3. If the unit contains more than 12 circuit packs (protocol processor tabs), the protocol processor tabs appear in groups of 12. Select the All Test button, for example, All Tests (1 to 12), to scroll through the various groups.

Measuring APS Activity

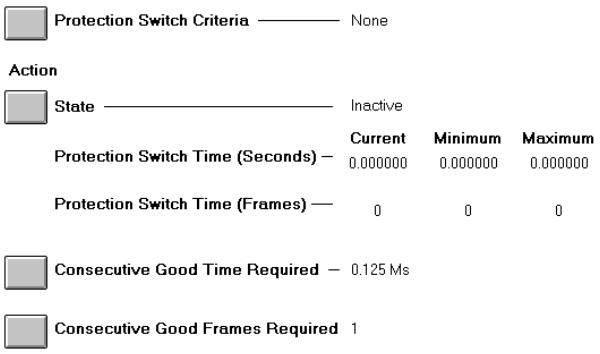
The unit can measure APS switching intervals in your network. It can be configured to monitor for a specific event that will cause an APS switch. When this event occurs, the duration in both seconds and frames is logged.

These statistics can be used to determine how long it takes for your network equipment to react to an APS event and switch to a backup path. his function allows you to set a specific event as trigger for APS activity. The APS measurement has an accuracy of 0.5 milliseconds.

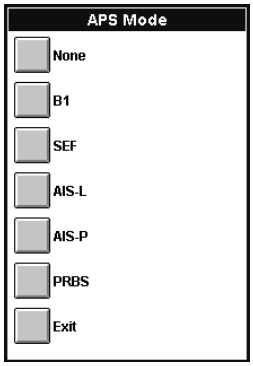
NOTE ➤
The Receive APS function is not available in STM-0/1/4 or OC-1/3/12 mode. STM-0/1/4 or OC-1/3/12 incoming K1 and K2 bytes are displayed under the Receive column in the Transmit APS screen. ➤

1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select RECEIVE.

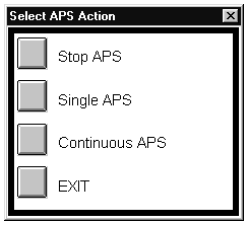
3. Select APS. The APS measurement screen appears.



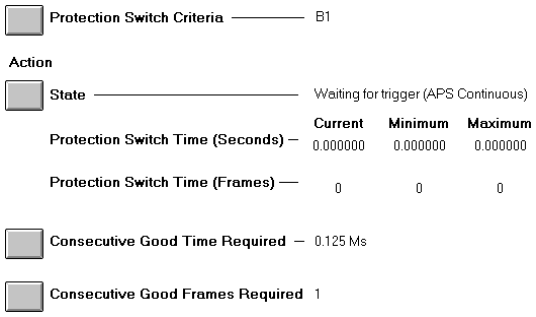
4. Select **Protection Switch Criteria**. The alarms, errors, and patterns that can be used to trigger an APS event appear.
5. Select a measurement criteria. (SONET options shown below.)



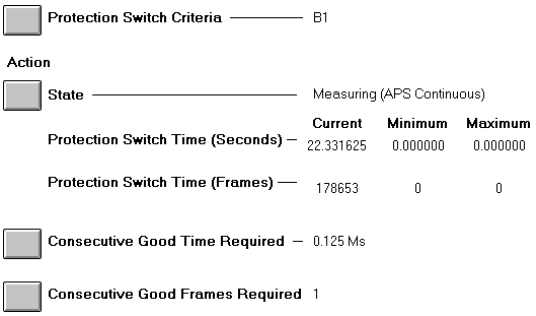
6. Select **Consecutive Good Time Required** or **Consecutive Good Frames Required** (these parameters are coupled). A keypad appears.
   - If Consecutive Good Time Required is selected, enter the duration (in milliseconds) of valid frames to occur before Protection Switching is confirmed to be activated. The range is 0.125 to 2047.875 milliseconds.
   - If Consecutive Good Frames Required was selected, enter the number of valid frames to occur before protection Switching is confirmed to be activated. The range is 1 to 16383 frames.
7. Select **Action State**. The APS options appear.



8. Select **Single APS** or **Continuous APS** to begin measuring. The unit will begin monitoring the incoming signal for this event.



If it occurs, the protection switch state and time will appear in both seconds and frames present.



The results will not include the number of good frames, but the number of frames that elapsed before the first good frame, meeting the entered criteria, occurred.

To stop monitoring APS measurement activity:

1. Select **Action State**.
2. Select Stop APS .

Monitoring APS Commands for OC-192/48 and STM-64/16

When testing APS functionality, the unit can display the bit values for the incoming K1 and K2 bytes. The following information appears in the APS report for the last 15 K1 and K2 byte sequences received by the unit:

- The HEX value of the K1 byte.
- The HEX value of the K2 byte.
- The number of frames received that contain the K1 and K2 bytes.
- The elapsed time of the frames that contain the K1 and K2 bytes.

NOTE ➤
The Results APS function is not available in STM-0/1/4 or OC-1/3/12 mode. STM-0/1/4 or OC-1/3/12 incoming K1 and K2 bytes are displayed under the Receive column in the Transmit APS screen. ◄

To monitor APS commands:

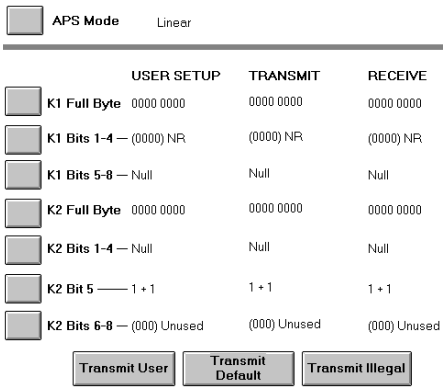
1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select RESULTS.
3. Select APS. The incoming K1 and K2 byte values appear. A total of 15 byte sequences can appear.

   NOTE ➤
   The duration will measure a maximum of 65,535 frames of a constant K1, K2 value before switching the measured duration to continuous. ◄

	K1	K2	Duration - Frames	Duration - Seconds
1	0	0	1	0.000125
2	75	0	8	0.001000
3	0	0	28018	3.502250
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				

Monitoring APS Commands for OC-1/3/12 and STM-0/1/4

1. Select a protocol processor. For example, STM 0/1/4 or OC 1/3/12.
2. Select RECEIVE.
3. Select APS. The APS screen appears.



4. The Receive column displays the received K1 and K2 bytes.

Monitoring Incoming Errors, Alarms, or Pointer Activity

1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select RESULTS.
3. The SCAN button functions initially appear on the touch screen. A summary count of current error, alarm, and event activity is reported. (SONET Scan example shown below.) If no activity is reported, the message **No Errors or Alarms** appears.

LOS (Loss Of Signal) Seconds	66922
LOF (Loss Of Frame) Seconds	66922
SEF (Severely Errored Frame) Seconds	66922

4. Select ERR to view more details about incoming errors. This function reports the following:
   - Error count using an 11-digit format
   - Average error rate over the total error duration using an N.NNe-N format
   - Current error rate using an N.NNe-N format
5. Select ALARMS to view more details about incoming alarms. This function reports the number of seconds that an alarm is present.
6. Select PTR to view more details about incoming Pointer events. This function reports the following:
   - The number of positive Pointer adjustments
   - The number of negative Pointer adjustments
   - The Pointer justification seconds
   - The number of New Data Flags (NDFs)
   - The receive Pointer value
7. Select EVENT to view a summary of events (alarms, errors, and Pointer activity) recorded by the unit. For more information, refer

to the *Using the Event Log* section.

8. The APS, GRAPH, and LARGE LEDS buttons also appear.

   APS displays the incoming bit values of the K1 and K2 bytes. For more information, refer to the *Monitoring APS Commands* section.

   GRAPH displays incoming errors and alarms in the form of a line or bar graph.

   LARGE LEDS displays LED error and alarm indicators in a large, easy-to-read format, which covers the entire touch screen area. This is useful for viewing errors or alarms from a long distance, such as across the room from a test bay.

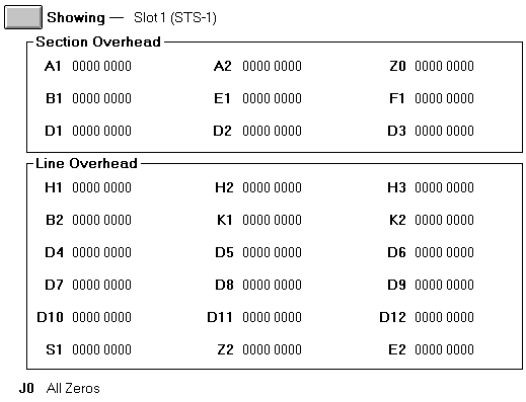
Monitoring SDH or SONET Overhead Bytes

You can monitor the incoming signal and view individual overhead bytes for any of the 192 slots in the OC-192/STM-64 signal, the 48 slots in the OC-48/STM-16 signal, or the 12 slots in the OC-12/STM-4 signal.

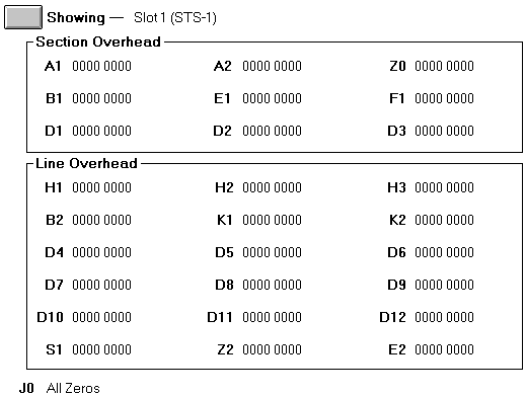
1. Select a protocol processor tab.
2. Select RECEIVE.
3. Select SOH or POH.

If ...	is selected for...	then
SOH	SDH mode	Regenerator Section and Multiplex Section overhead bytes appear.
SOH	SONET mode	Section and Line overhead bytes appear.
POH	SDH mode	Higher-Order Path overhead bytes appear.
POH	SONET mode	Path overhead bytes appear.

For SONET:



For SDH:



4. Select **Showing**, and then select a slot to monitor.

   For example,  **Showing** — Slot 4 (STS-10) for SONET.

   For example,  **Showing** — Slot 4 (STM-1 4,Col 1,4,7) for SDH.

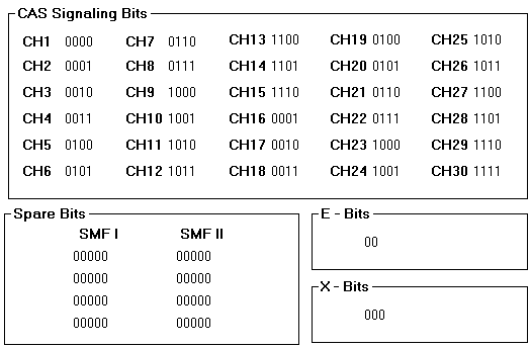
5. The overhead bytes and J0 and J1 traces display for the selected slot.

Monitoring E1 Overhead

1. Select 

.

2. Select RECEIVE.
3. Select OH. The E1 OH screen appears.



Monitoring Signal Status

The unit measures and displays the optical power and line frequency of the incoming SONET or SDH signal.

To display the incoming signal status:

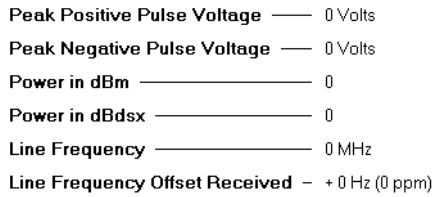
1. Select a protocol processor.
2. Select RECEIVE.
3. Select SIGNAL STATUS.

   When initially selected, the signal status may take several seconds to update and will display the message **Measuring**.

   For SONET and SDH, the Received Optical Power (in dBm), the Line Frequency (in MHz), and the Line Frequency Offset received (in KHz and ppm) appear.

Frequency	9953.27972 MHz
Optical Power	-7.35 dBm
Line Freq Offset Received	-0.03 KHz (-0.03 ppm)

   For E1, the Received Peak Positive Pulse Voltage, Peak Negative Pulse Voltage, power in dBm, power in dBdsx, Line Frequency (in MHz), and the Line Frequency Offset received (in KHz and ppm) appear



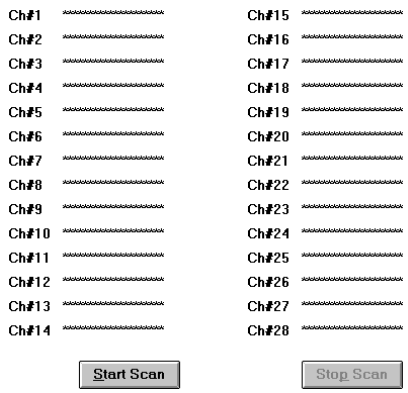
Starting and Stopping Channel Scan

The Chan Scan function inspects and then reports the contents of the 21 E1 channels or 28 DS1 channels that are obtained within a multiplexed DS3 signal. The information reported consists of items such as the framing and pattern activity detected on each E1 or 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.

To start an DS3 channel scan:

1. Select DS3.
2. Select RECEIVE.
3. Select CHAN SCAN. The Channel Scan screen appears. The following screen is an example of a DS3 channel scan showing the contents of 28 DS1 channels in a DS3 signal.



4. Select Start Scan. Framing and pattern activity for each channel is displayed on the screen.

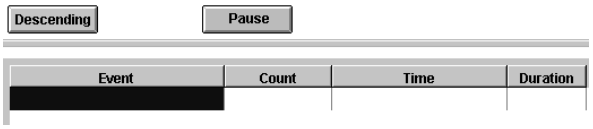
To stop the DS3 scan:

- Select Stop Scan.

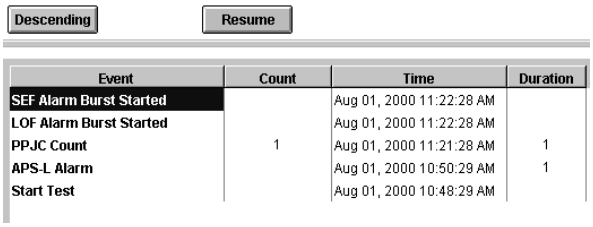
Using the Event Log

The Event Log is a table that displays events recorded by the unit. A scroll bar is available allowing you to scroll up and down to view an extended history.

1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select RESULTS.
3. Select EVENT. As events occur (such as alarms, errors, or Pointer activity), they appear and continuously scroll in the table.



4. Select Pause to stop the scrolling action, and then use the scroll bar to view events.



Events display in a descending order from the most recent event to the oldest event. To display events in an ascending order, select Descending. The button changes to Ascending, and the events appear from the oldest event to the most recent event. A maximum of 1000 events can appear in the table.

5. Select Resume to continue Event Log reporting.

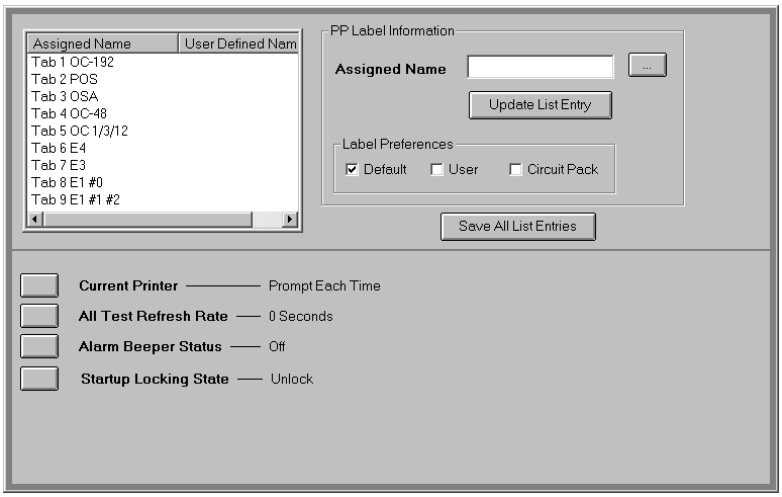
NOTE ➤
Events that occurred while in Pause mode are not be recorded. ◄

Miscellaneous

This section describes a number of assorted tasks for using and configuring the NIC.

Changing a Tab Name

1. Select SYSTEM.
2. Select User Preference. The User Preference screen appears.



3. Under Label Preferences, select **User** or **Circuit Pack**.
   - User – Only changes the Tab Label name for your session. Other users will not see the tab name that you enter.
   - Circuit Pack – Changes the Tab Label name on the unit so that all users see the same tab name that you enter.
4. Select a tab (or slot) from the Assigned Name list.
5. Under PP Label Information, enter a name in the Assigned Name field. (When using the touch screen on a portable unit, select ..., which is next to the Assigned Name field to open a keypad.)
6. Select **Update List Entry** to add the name to the User Defined Name list.

7. Repeat steps 3 through 6 to add names for the remaining tabs.
8. Select **Save All List Entries**. The new tab names appear in the PP Name/Go To area of the screen when a protocol processor tab is selected.

Configuring the Ethernet Port

The unit's Ethernet port is a physical interface that can be used for:

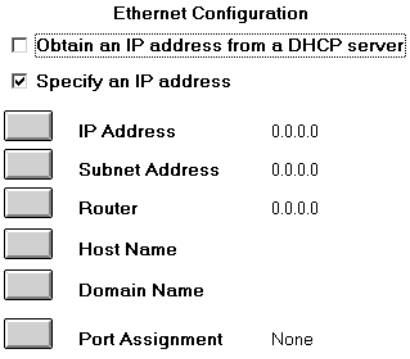
- Software upgrades
- Remote control communications
- TL1 command or SCPI command communications

The software upgrade function allows you to configure your unit with the ability to upgrade your unit's software using Digital Lightwave's Software Upgrade System, which is provided to you on a separate installation CD-ROM. It is also available on the Digital Lightwave Software Upgrade web site.

The remote control function allows up to two users to remotely access and control the unit. Both functions are performed using the unit's Ethernet port.

To configure the unit's Ethernet parameters:

1. Select SYSTEM.
2. Select I/O Settings.
3. Select ETHERNET. The Ethernet Configuration functions appear.



4. Select one of the following:
   - **Obtain an IP address from a DHCP server**. The unit uses the network's DHCP server to dynamically assign it an IP address. If selected, refer to *Selecting a Dynamic IP Address Using DHCP* for more information.
   - **Specify an IP address**. If selected, refer to *Entering a Static IP Address* for more information.

Entering a Static IP Address

1. Select **Specify an IP address**.
2. Select **IP Address**. A keypad appears.
3. Enter the IP address of your unit, and select **Enter** when you are done.

WARNING

IP addresses 192.168.138.000 through 192.168.138.255 are reserved and should not be used. A system conflict can occur if these IP addresses are entered.

If you must use an IP address in the range of 192.168.x.x, then you must set the Subnet Address to 255.255.255.0. ◄

4. Select the **Subnet Address** button. A keypad appears.
5. Enter the Subnet address, and select **Enter** when you are done.
6. Select the **Router** button. A keypad appears.
7. Enter the router address, and select **Enter** when you are done.
8. Reboot the unit for changes to take affect.
9. Power the unit off, wait approximately 10 seconds, and then power the unit on for the Ethernet changes to take affect. The unit is now set up to perform software upgrades (using the Software Upgrade System) or remote access.

   To select the port for SCPI or TL1 communications, refer to the *Selecting the Ethernet Port* section.

NOTE ➤

Information about the Software Upgrade System is available through the Help button located on the Software Upgrade System. If you have not received a Software Upgrade System Installation CD-ROM, contact Digital Lightwave's Technical Support. ◄

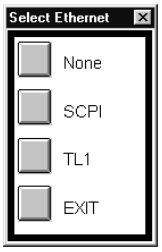
Selecting a Dynamic IP Address using DHCP

1. Select **Obtain an IP address from a DHCP server**. The unit will use the network's DHCP server to dynamically assign it an IP address.
2. Reboot the unit for changes to take affect.

Selecting the Ethernet Port

The unit can be controlled using SCPI or TL1 commands through the unit's Ethernet port. To select the Ethernet port:

1. Select SYSTEM.
2. Select I/O Settings.
3. Select ETHERNET. The Ethernet Configuration functions appear.
4. Select **Port Assignment**, and select an Ethernet communication interface.



NOTE ➤
Once an interface is selected for Ethernet, it is not available for the serial or GPIB port assignment. ◄

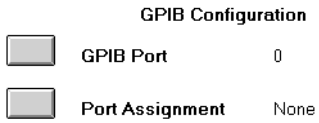
Configuring and Selecting the GPIB Port

The unit's GPIB port is a physical interface that can be used to transfer SCPI commands to and from the unit.

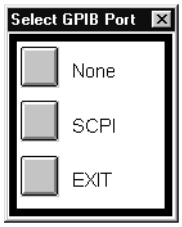
To configure and select the GPIB port:

1. Select SYSTEM.

2. Select I/O Settings.
3. Select GPIB. The GPIB Configuration function appears.



4. Select **GPIB Port** and enter the GPIB primary address for the GPIB interface. The primary address must match the GPIB host or communications cannot be established. The primary address ranges from 0 to 30.
5. Select **Port Assignment** , and assign a communications interface to the GPIB port.



NOTE ➤
Once an interface is selected for GPIB, it is not available for the serial or Ethernet port assignment. ◄

6. Reboot the unit for the GPIB port address changes to take affect.

Configuring and Selecting the Serial Port

The unit's serial port (an RS-232 connector) is a physical interface that can be used to:

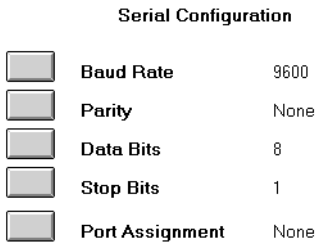
- Transfer SCPI or TL1 commands to and from the unit.
- Connect a serial printer to the unit.

To configure and select the serial port:

1. Select SYSTEM.

2. Select I/O Settings.

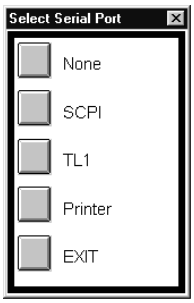
3. Select Serial. The Serial Configuration functions appear.



4. If necessary, select the **Baud Rate**, **Parity**, **Data Bits**, and **Stop Bits** serial port parameters, and make the appropriate changes for the connection between the unit and PC or serial printer.

   NOTE ➤
   Before changing serial port parameters, you must first disable the serial port by setting its assignment to **None**. After changing parameters, you can reset the serial port to its previous assignment. ◄

5. Select **Port Assignment**, and assign a communications interface to the serial port.



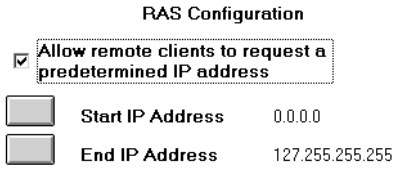
Configuring a RAS Port

You can use Remote Access Service (RAS) on your PC to dial-up and access the unit. This will establish a dedicated connection between your PC and the remotely located unit using a telephone line. The unit must first be configured for RAS operation before you can dial-in to it using RAS. When remotely connecting to a unit that has a PCMCIA modem

installed, refer to *Configuring a PCMCIA Modem for RAS* for more information.

To configure the unit for RAS operation:

1. Select SYSTEM.
2. Select I/O Settings.
3. Select RAS. The RAS configuration screen appears.



4. Select or deselect **Allow remote clients to request a predetermined IP address**.

   If selected, this function allows the unit to use the static IP address assigned in the dial-up networking properties configuration on your PC.

   If deselected, RAS will assign the unit an IP address within the range of 0.0.0.0 to 127.255.255.255 or 128.0.0.0 to 255.255.255.255. The range is assigned using **Start IP Address** and **End IP Address**. Enter the Start IP Address and End IP Address values.

Configuring a PCMCIA Modem for RAS

RAS can be used to establish a dial-up connection to a remote unit. Once the connection is made, the Remote Control Application software can then be used to control the remote unit.

If the remote unit uses a PCMCIA modem, you must edit the Remote Control Application's client.prop file on your PC. When you initially connect to a remote unit, the Remote Control Application creates a compatibility directory that contains this file.

The following describes how to edit the client.prop file's parameters to ensure a successful connection.

1. Connect to the remote unit using the Remote Control software. The compatibility directory is automatically created on your PC, and the appropriate files are downloaded to the PC. (The download will take several minutes to complete.)
2. Use a text editor (for example, Notepad) to open the **client.prop** file.

   This file is located in the Remote Control's compatibility directory on your PC. For example, C:\Program Files\RemoteNIC\CompatXX.
3. Add the following parameters after the vbroker.orb.enableBiDir=client parameter:

   vbroker.se.iiop_tp.proxyHost=null
   vbroker.se.iiop_tp.proxyHost=*x.x.x.x*

   where, x.x.x.x is the IP address assigned to the dial-up connection as determined by the RAS Configuration.

   (This address is a static IP address for your PC, as assigned by your network administrator, or the next available IP address associated with the starting IP address range, for example, 128.0.0.1.)
4. The following shows what the client.prop file will look like after editing.

   vbroker.orb.enableBiDir=client
   vbroker.se.iiop_tp.proxyHost=null
   vbroker.se.iiop_tp.proxyHost=x.x.x.x
5. Save the file, and close the text editor.
6. Close the Remote Control software.
7. Open the Remote Control software, and attempt another connection to the remote unit.

Configuring the Wireless Port

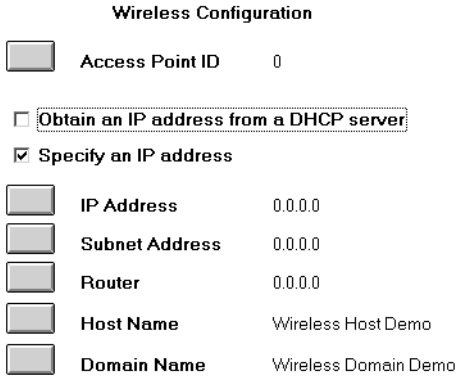
NOTE ➤
The unit only supports the HP 11-Mbps Wireless LAN PC Card. This card is inserted into the unit's PCMCIA slot. ◄

The unit can connect to a wireless network using an 802.11 compliant wireless LAN PC card. The unit supports static IP addressing and dynamic IP addressing, using Dynamic Host Connection Protocol (DHCP).

Initial Wireless Configuration

Insert the wireless LAN PC card into the unit's PCMCIA slot. An audible tone indicates that the LAN card and PCMCIA drivers are initialized.

1. Select SYSTEM.
2. Select I/O Settings.
3. Select Wireless. The wireless configuration parameters appear.



4. Select Access Point ID and enter the wireless LAN's name/ID.
5. Select one of the following:
   - **Obtain an IP address from a DHCP server**. The unit uses the network's DHCP server to dynamically assign it an IP address. If selected, refer to *Selecting a Dynamic IP Address Using DHCP* for more information.
   - **Specify an IP address**. If selected, refer to *Entering a Static IP Address* for more information.

Entering a Static IP Address

To configure the wireless port for a static IP address:

1. Select **Specify an IP address**.
2. Enter the unit's:
   - IP Address

- Subnet Address
- Router Address
- Host Name (optional)
- Domain Name (optional)

NOTE ➤
IP addresses 192.168.138.000 through 192.168.138.255 are reserved and should not be used. A serious system conflict can occur if these IP addresses are entered. If you must use an IP address in the range of 192.168.x.y (where x is not equal to 138), then you must set the Subnet Address to 255.255.255.0. ◄

Selecting a Dynamic IP Address Using DHCP

To configure the wireless port for a dynamic IP address using DHCP:

- Select **Obtain an IP address from a DHCP server**. The unit will use the network's DHCP server to dynamically assign it an IP address. The remaining wireless parameters that appear on the screen are disabled.

Deleting a File

1. Select SYSTEM.
2. Select File Services. The File Services screen appears.
3. Select a file from the File List.
4. Select Delete. A confirmation message appears.
5. Select **Yes**. The file is deleted.

NOTE ➤
If you do not have authorization to delete files, an "Access Denied" message appears. ◄

Displaying Serial Numbers and Software Revision

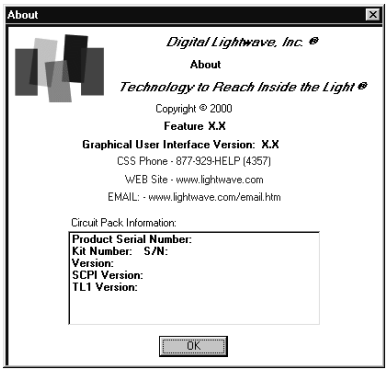
The **About** function displays the following information:

- Unit's software release and feature set version numbers
- Unit's hardware serial numbers and revision levels

- Unit's run-time odometer listing the number of hours on the unit
- Product serial number

To view this information:

1. Select SYSTEM.
2. Select MISC. The System functions appear.
3. Select **About this product**.

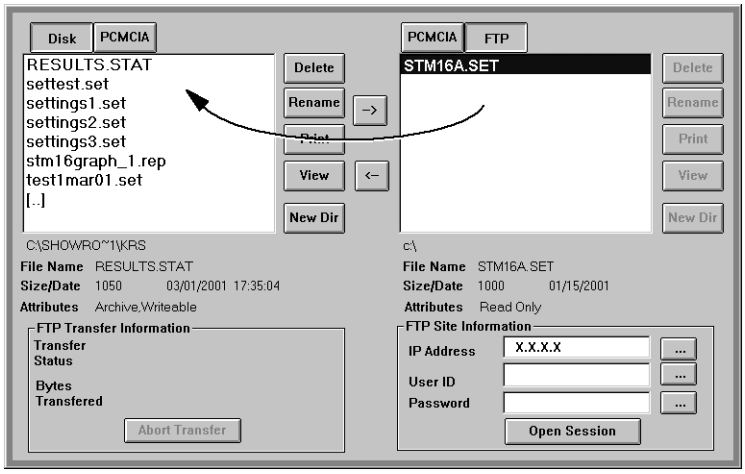


4. Select OK to close.

Downloading a File

A file can be transferred from a remote device (for example, a PC) to the unit or from a local device (a PCMCIA storage card). If using the FTP function, make sure you have the IP address of the receiving device.

1. Select SYSTEM.
2. Select File Services. The File Services screen appears.



3. From the right File List box, select FTP or PCMCIA as the download method, and then select a file

   - If FTP is selected, the **FTP Site Information** appears. Enter the IP Address of the device that will receive the file (unless you are using the Remote Control Software; then enter the test set address). If this device is secured with a **User ID** and **Password**, then enter this information. Start an FTP session on the connecting device.

   - If PCMCIA is selected, make sure that a PC Card is installed in the PCMCIA slot.

4. From the left File List box, select Disk or PCMCIA as the destination directory.

5. Select <-. The file is transferred to the unit.

NOTE ➤
When the unit is powered off, the FTP directory is automatically purged. ◄

Entering a License Key

The License Key function allows you to enable functionality that you

may not have initially purchased. If you wish to obtain more functionality for your unit, contact your Digital Lightwave sales representative for a PO number. Then contact Digital Lightwave Customer Service for a License Key that will activate the requested features.

To enter a new license key:

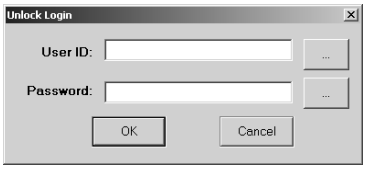
1. Select SYSTEM.
2. Select MISC.
3. Select [ ] License Key ———— . A keypad appears.
4. Enter the new license key into the text box.
5. Select Enter when done.
6. Reboot the unit for the new functions to take effect.

Locking and Unlocking the Screen

The unit's screen can be disabled to prevent user access by others. This function requires a user ID and password to lock and unlock the screen. When unlocking the screen, the unit will only accept the last user ID and password entered, or the unit's original user ID and password.

To lock the screen:

1. Select Lock Screen. The Unlock Login screen appears.



2. Enter your user ID.
   On a portable unit, press ... to open a keyboard to enter user ID.
3. Enter your password.
   On a portable unit, press ... to open a keyboard to enter the password.

4. Select **OK**.
5. The Lock Screen window appears.

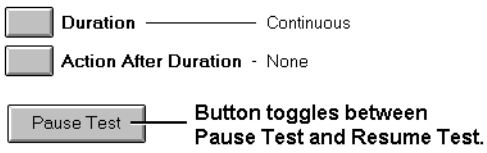
To unlock the screen:

NOTE ➤
The unit will only accept the last user ID and password entered or the unit's original user ID and password. An error message appears if an invalid ID or password is entered. ◄

1. Select Unlock that appears on the screen.
2. Enter the user ID. On a portable unit, press ... to open a keyboard to enter the user ID.
3. Enter your password. On a portable unit, press ... to open a keyboard to enter the password.
4. Select **OK**.

Pausing and Resuming a Test

1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select TEST.
3. Select SET 1. The Duration and Action After Duration functions appear.



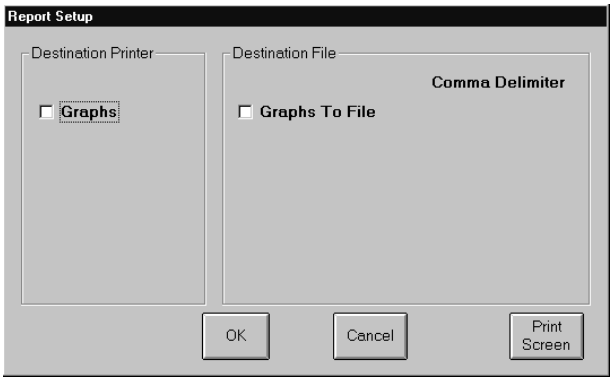
- To pause a test, select Pause Test from the Act/Duration screen. When Pause is selected, the system will stop collecting data, but the elapsed time counter will continue. Additionally, when Pause is selected, a red **Test Paused** LED will appear in the LEDs/Quick Status area.

- To resume the test, select Resume Test. The Test Paused LED turns white with red text, indicating that a pause has previously occurred. A restart or new test will clear the LED's history.

NOTE ➤
The events occurring while in pause mode will be recorded in the Event Log. ➤

Printing a Graph

1. Select RESULTS.
2. Select GRAPH.
3. Select PRINT REPORT. The **Report Setup** menu appears.



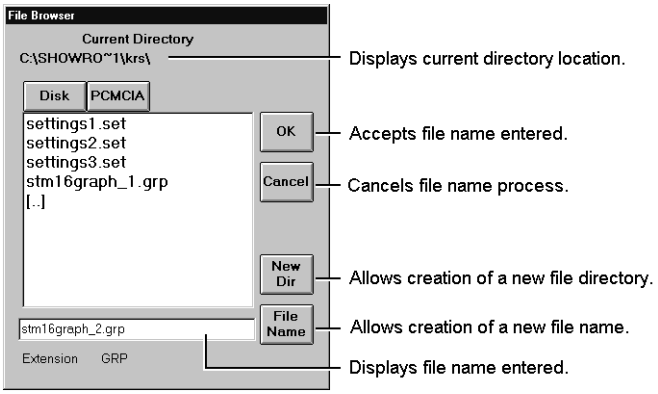
4. Select a graph printing method.
   - **Graph** prints a graph directly to a printer.
     - For *local* printing (which means you are using the unit's touch screen), you must have a printer attached to the unit's parallel port.
     - For *remote* printing (which means that you are using the Remote Control software to operate a unit from a PC), the graph is sent to your PC's default printer. The standard Windows Print dialog window appears when using the Remote Control software.
   - **Graph to File** allows you to print graphs to a file. This saves the file either locally on the unit or remotely on a PC.

5. Select OK.

   - If **Graph** is selected, the graph is printed to the attached printer.

     NOTE ➤
     For remote printing, the standard Windows Print dialog menu appears. Select **OK** to print the report to your PC's default printer. ◄

   - If **Graph to File** is selected, the File Browser window appears.



6. Select File Name and use the keypad to name the file. **Do not use spaces in file names.** GRP is the default extension for a graph. The saved graph can be retrieved later using the **File Services** tab.

7. Select OK. The file is saved to the specified location.

Printing a Real-Time Test

A real-time test records and generates a report of any events (alarms, errors, or power interruptions) that occur while the unit is monitoring a customer's circuit. The reports, generated in real time, can be sent to an attached printer, a file, or both.

NOTE ➤
Real-time test reporting is only available locally (from the touchscreen) on portable units. ◄

NOTE ➤
The attached printer must support dot matrix printer technology. The

Epson Stylus Color 200 is an example of such a printer. The real-time test feature will not work if the printer only supports page printing. ◄

The report contains the following information:

- A user-defined header
- A brief list of product settings
- Test start time and date
- Event activity as it occurs during the test
- A "print alive" message, which can be configured at a specified time to ensure the user that the real-time test is still active
- A statistical report, produced at the conclusion of the test, providing a summary of reported events. If no events occur during the test duration, a completion message, indicating that no problems were found, is printed.

Real-time test settings and accumulated results are not discarded if a power interruption occurs. The results are saved in 15-minute increments. When power is restored to the unit, the real-time test will continue from where it was prior to the power interruption. The power interruption event will appear in the real-time report.

IMPORTANT ➤

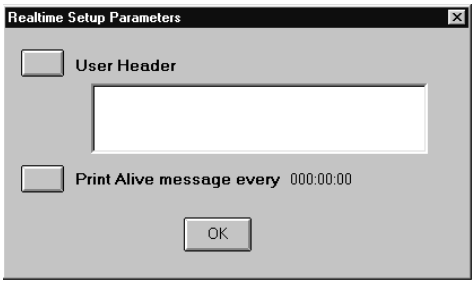
Before starting a real-time test, set the Security System Lock. This will prevent remote users from accessing the unit while a test is in progress. ◄

To set up and start a real-time test:

1. Select a protocol processor. For example,  or  .
2. Select  .
3. Select  . The Duration and Action After Duration functions appear.
4. Select **Action After Duration.**
5. Select Real Time Actions. The Select Action After Test window appears.
6. Select a real-time test option.
   - Print Events and Repeat Test

- Record Events and Repeat Test
- Print and Record Events and Repeat Test
- Print Events
- Record Events
- Print and Record Events

The Realtime Setup Parameters window appears.



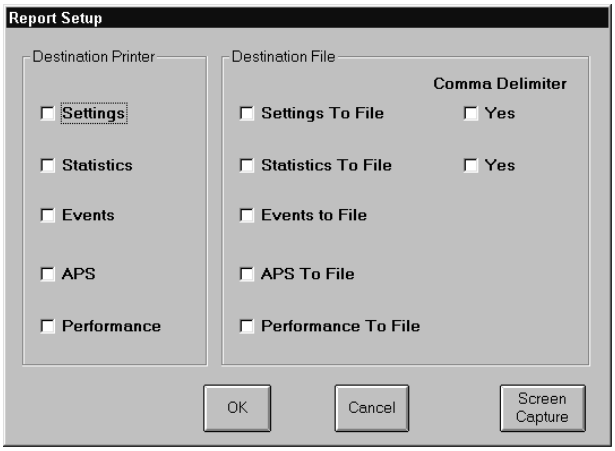
7. Select **User Header** to enter a user-defined header. The header, which can be up to 64-bytes in length, serves as a brief description of the test. After entering a header using the keypad, select **Enter**.
8. Select **Print Alive** message to determine if and when a Print Alive message is generated. The test can be configured to issue the Print Alive message from 1 to 60 minutes. A value of 0 disables the messaging function.
9. Select **OK**. The Realtime Setup Parameters window closes, and the Enter Action and Duration window appears.
10. Select **Duration** and enter how long a test will run.
11. Select **OK**. The real-time test starts. The Elapsed Time counter resets to 0.

A screen lock message appears once the test begins to alert others that the unit is involved in a test.

Printing a Report to a File

1. Select PRINT REPORT. (This button is part of the Common Function Buttons that appear at the bottom of the unit's touch screen.)

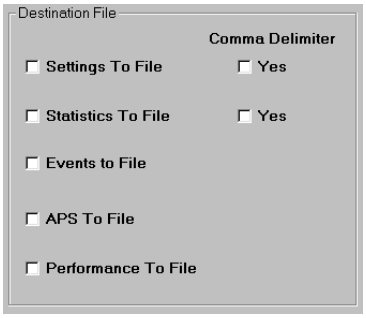
   The **Report Setup** menu appears.



The **Destination Printer** functions print a report directly to a printer. For more information, see *Printing a Report to a Printer.*

The **Destination File** functions allow you to print reports to a file. This saves the report file locally on the unit, or (if you are using the Remote Control Software) remotely on a PC.

2. Select any combination of reports from **Destination File**.



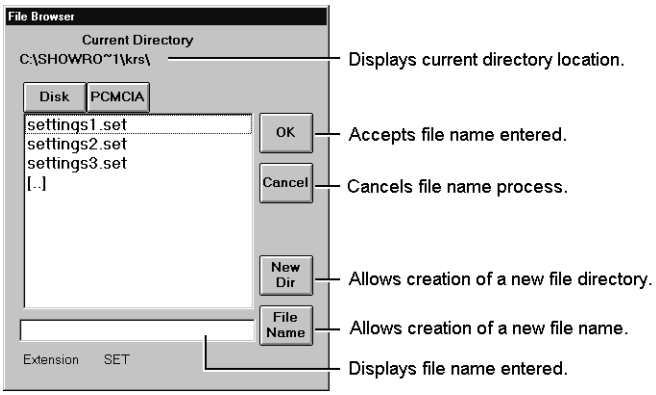
- If **Settings To File** is selected, then the current values for all **Settings** functions, for both Transmit and Receive, are printed.
- If **Statistics To File** is selected, then results for the **Scan**, **Errors**, **Alarms**, and **PTR** function buttons are printed.
- If **Events To File** is selected, then a detailed summary of events, such as alarms, errors, and Pointer activity, is printed. This report includes the event, the number of events logged, the start and stop time of the event, and the duration of the event.

- If **APS To File** is selected, results of the K1 and K2 byte sequences received by the unit are printed.
- If **Performance to File** is selected, the Performance Monitor report is printed.

3. Under **Comma Delimiter** (available for **Settings To File** and **Statistics To File**) select **Yes** to save results in a quote/comma-report format. This means that setting and statistic values are enclosed in quotes (“) and separated by commas (,). For example,

   “Interface=STM-16”, “TxMapping=AU-4-16c”, ...

4. Select OK. The File Browser window appears.



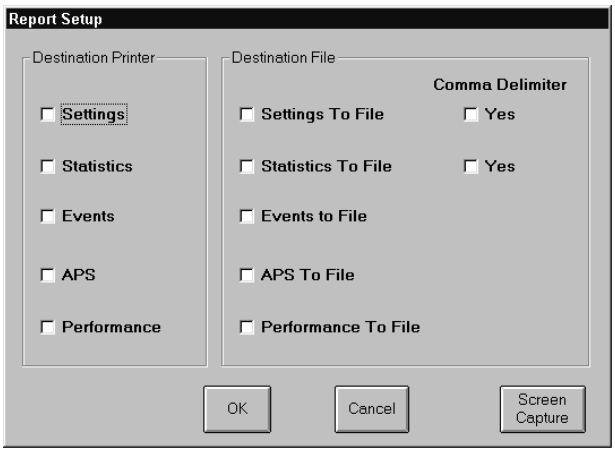
5. Select File Name and use the keypad to name the file. **Do not use spaces in file names.**
   - SET is the default extension for a Settings report.
   - STAT is the default extension for a Statistics report.
   - EVT is the default extension for an Event report.
   - APS is the default extension for an APS report.
   - PERF is the default extension for a Performance Monitor report.

   The saved report can be retrieved later using the **File Services** tab.

6. Select OK. The file is saved to the specified location.

Printing a Report to a Printer

1. Make sure that a printer is attached to the unit's parallel port.
2. Select PRINT REPORT. (This button is part of the Common Function Buttons that appear at the bottom of the unit's touch screen.) The **Report Setup** menu appears.



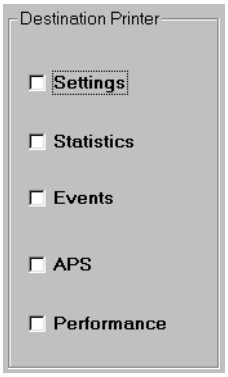
- The **Destination Printer** function s print a report directly to a printer.

  For *local* printing (which means you are using the unit's touch screen), you must have a printer attached to the unit's parallel port.

  For *remote* printing (which means that you are using the Remote Control software to operate a unit from a PC), the report is sent to your PC's default printer. The standard Windows print dialog window appears when using the Remote Control software.

- The **Destination File** functions allow you to print reports to a file. For more information, see *Printing a Report to a File*.

3. Select any combination of reports from **Destination Printer**.



- If **Settings** is selected, then the current values for all **Set** functions, for both Transmit and Receive are printed.
- If **Statistics** is selected, then results for the **Scan**, **Errors**, **Alarms**, and **PTR** function buttons are printed.
- If **Events** is selected, then a detailed summary of events, such as alarms, errors, and pointer activity, is printed. This report includes the event, the number of events logged, the start and stop time of the event, and the duration of the event.
- If **APS** is selected, results of the K1 and K2 byte sequences received by the unit are printed.
- If **Performance** is selected, the Performance Monitor report is printed.

4. Select OK. The report is printed to the attached printer.

NOTE ➤
For remote printing, the standard Windows Print dialog menu appears. Select **OK** to print the report to your PC's default printer. ◄

Printing a Screen

This function allows you to print the current screen displayed and converts it to a bitmap (.bmp) image. If using the unit's touch screen, the image is saved directly on the unit. If using the Remote Control software, the image is copied to your PC's hard drive.

1. Select PRINT REPORT.

2. Select Screen Capture.
3. The image is saved as **Screen.bmp**.

   NOTE ➤
   A print screen image will automatically overwrite an existing Screen.bmp file. To save previous print screen images, use the **Rename** function as described in *Renaming a File*. ➤
4. To print the screen image, you must transfer the file from the unit to a PC. Refer to *Uploading a File* for file transfer procedures. After the file is copied to your PC, it can be opened and printed using Microsoft Paint.

Rebooting the Unit

This function reboots the unit. This can be performed locally from a portable unit's touch screen or remotely using the Remote Control Application software.

1. Select SYSTEM. The Misc screen appears.
2. Select Re-Boot Unit.
3. Select **Yes** to continue or **No** to cancel.

Renaming a File

1. Select SYSTEM.
2. Select File Services. The File Services screen appears.
3. Select a file from the File List.
4. Select Rename. A keyboard appears.
5. Enter the new file name with one of the following extensions:
   - SET is the extension for a Settings report.
   - STAT is the extension for a Statistics report.
   - EVT is the extension for an Event report.

- APS is the extension for an APS report.
- PERF is the extension for a Performance Monitor report.

NOTE ➤
The extensions above are default file extensions. You are able change these to .txt (text) files using the **Rename** function. ➤

6. Select **Enter** from the keyboard. The file is renamed.

Restoring Default Tab Names

1. Select SYSTEM.
2. Select User Preference.
3. Under Label Preferences, select **Default**.
4. Select **Save All List Entries**. The default tab names are restored.

Restoring a Settings Configuration

This function restores or recalls any saved configurations for all protocol processor Receive or Transmit settings.

To restore a settings configuration:

1. Select RESTORE from the Common Function Buttons. The File Browser window appears.
2. From the File List, select the name of the settings configuration to be restored.
3. Click OK. The settings configuration is restored.

Saving Customized Setting Configurations

This function allows you to save a customized configuration for all protocol processor Transmit or Receive settings.

NOTE ➤
The Save button saves settings for all protocol processors. For example, when a customized settings configuration is saved while in

a particular protocol processor mode (e.g., STM-4), the settings currently configured for other protocol processors (e.g., E1, E3, STM-16, etc.) at that time will also be saved with that setting configuration. ◄

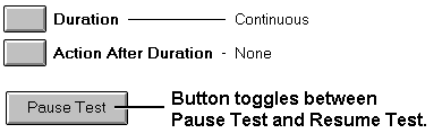
To save a configuration:

1. Create a test configuration using the Transmit and Receive Settings screens.
2. Once you are done, select SAVE from the Common Function Buttons. The File Browser window appears.
3. Select File Name. A keypad appears.
4. Enter the name of the setting configuration to be saved, and select Enter when done.
5. Select OK. The file is saved with an automatic file extension of .set and will appear in the File List.

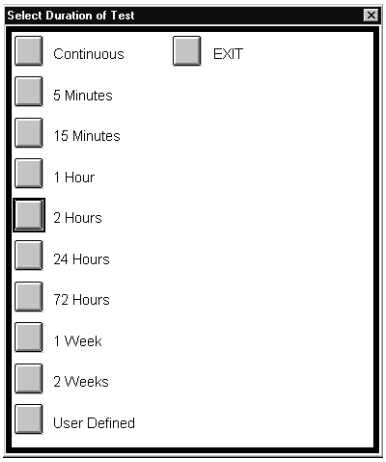
Starting and Stopping a Test

To start a test:

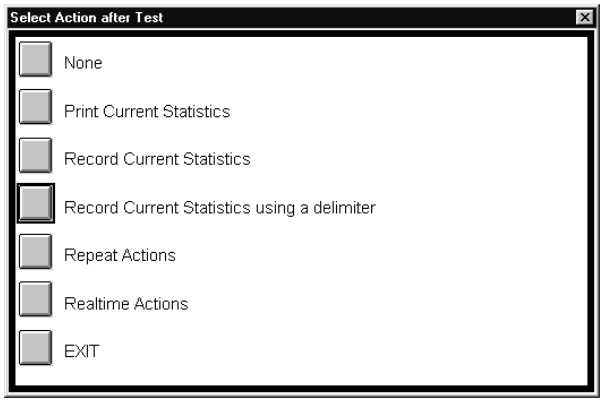
1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select TEST.
3. Select SET 1. The Duration and Action After Duration functions appear.



4. Select **Duration**. These options determine how long a test runs.



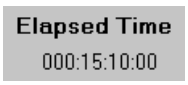
5. Select **Action After Duration**. These options determine what will happen at the end of the test duration.



6. Select an option.

7. Select OK. The test starts and the **Elapsed Time** counter resets to 0.

   The **Duration** value appears below the **Elapsed Time** counter. For example:



To stop a test:

- To stop a test before the test duration expires, select STOP (from the bottom of the touch screen). All statistics and events logged and reported by the **Performance Monitoring** and **Results** functions stop. In addition, the **Elapsed Time** and **Duration** counts stop.

To restart a test:

- To restart a test, select RESTART (from the bottom of the touch screen). The test and statistics restart.

Touch Screen Calibration

Touch screen calibration is performed on all portable units prior to shipping from the factory. However, if your unit's touch screen requires recalibration, perform the following:

Although touch screen calibration can be performed using your finger, a pointing device, such as a stylus, is recommended for greater accuracy.

1. Select SYSTEM.
2. Select MISC.
3. Select Recalibrate Touch Screen.
   This button appears in the touch screen's lower right corner. (It does not appear when you are remotely connected to the unit using the Remote Control Application software.)
4. The Calibration dialog appears.

   NOTE ➤
   When **Recalibrate Touch Screen** is selected, the Calibration dialog appears. If another area of the touch screen is pressed while this dialog is open, the main System screen appears, and the Calibration dialog moves to the background. To restore the Calibration dialog (and return it to the foreground), select the Recalibrate Touch Screen button again. To exit the Calibration dialog, use the Close button that appears in the dialog's upper right corner. ➤

5. Select **5-point Calibration**.

   Five touch screen targets (calibration points) appear on the screen.

   The hand icon  indicates which target to select.

6. Place and hold your pointing device as close to the center of the target as possible.
7. The message **Touch Enabled** appears when calibration for that specific point is complete.
8. The hand icon moves to the next target. Repeat steps 6 and 7 for the four remaining targets.

   NOTE ➤
   If the screen is not touched for a 20-second period or longer, the current calibration process is canceled. The calibration must be restarted using the first touch screen target. ◄

9. When touch screen calibration is complete, a completion message briefly appears on the screen, and the Calibration dialog closes.

Turning the Laser On or Off

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

The unit's laser is controlled by using the **Laser** button that appears in the LEDs/Quick Status area.

The **Laser** button indicates if the laser is on or off. When the unit is powered on, the laser is off by default. This can be changed using the **Initial Laser Setting** function.

To turn the laser on:

- Select 

in the **LEDs/Quick Status** area.

  The laser status indicates **ON**.

To turn the laser off:

- Select 

. The laser status indicates **OFF**.

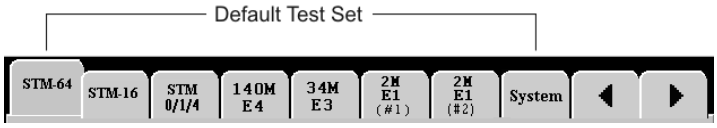
Changing the Initial Laser Setting

To change the unit's default laser setting when the unit is powered on:

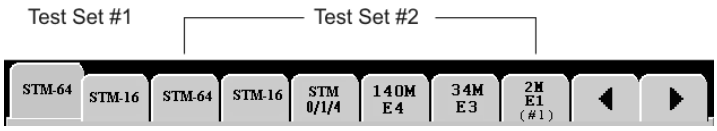
1. Select a protocol processor. For example, OC-192 or STM-64.
2. Select TRANSMIT.
3. Select SET 1. The Transmit Settings 1 functions appear.
4. Select Initial Laser Setting ——— Off, and select one of the following:
   - **Off** – The laser is off when the unit is turned on.
   - **On** – The laser is on when the unit is turned on.
   - **Restore Previous State** – When the unit is turned on, the laser is on or off based on its previous setting before the unit was turned off.

Understanding Test Sets

A Test Set is a series of adjacent circuit packs (based on a circuit pack's internal addressing and starting from the highest to the lowest speed) that are installed in a unit.



A unit can contain multiple circuit packs of the same type (for example, two 10Gbps circuit packs). When this type of configuration occurs, the first instance of the higher speed circuit pack is considered a test set.



Any lower speed circuit packs adjacent to this card are included in the test set. When the second instance of the higher speed circuit pack is

encountered, it is considered the beginning of the second test set. Likewise, any subsequent lower speed circuit packs are included as part of the second test set.

The following table provides additional information for this example

Circuit Pack and Physical Location	Associated Protocol Processor that appears on the GUI tab.	Test Set Grouping
10 Gbps	STM-64/OC-192	Test Set #1
2.5 Gbps	STM-16/OC-48	Test Set #1
10 Gbps	STM-64/OC-192	Test Set #2
2.5 Gbps	STM-16/OC-48	Test Set #2
SDH	STM-0/1/4 and OC-1/3/12	Test Set #2
PDH	E4, E3, E1 and DS3, DS1	Test Set #2

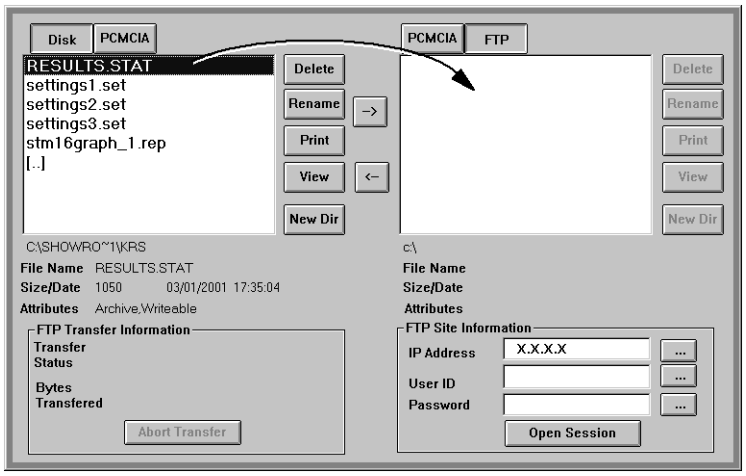
Uploading a File

NOTE ➤
A file can be transferred from the unit to a remote device (for example, a PC) or to a local device (a PCMCIA storage card). ◄

If using the FTP function, make sure you have the IP address of the receiving device.

If using the PCMCIA function, make sure that a PC Card is installed in the PCMCIA slot **before** selecting the File Services button. When the PC card is inserted, an audible tone indicates that the card and PCMCIA drivers are initialized. ◄

1. Select SYSTEM.
2. Select File Services. The File Services screen appears.



3. From the right File List box, select **FTP** or **PCMCIA** as the upload method

   - If **FTP** is selected, the **FTP Site Information** appears. Enter the IP Address of the device that will receive the file (unless you are using the Remote Control Software; then enter the test set address). If this device is secured with a **User ID** and **Password**, then enter this information. Start an FTP session on the connecting device.
   - If **PCMCIA** is selected, select a target directory from the File List box.

4. From the left File List box, select **Disk** or **PCMCIA**.
5. Select one or more files from the File List box.
6. Select **->**. The FTP Status window appears, and the file is transferred.

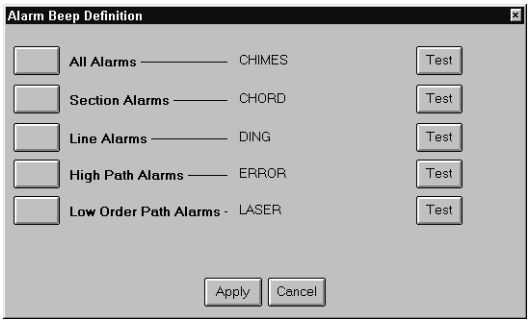
NOTE ➤
When the unit is powered off, the FTP directory is automatically purged. ◄

Using Alarm Beeper Status

WAV file sounds can be associated with an alarm event. When using the unit's touch screen, a total of 10 sounds are available. When using the Remote Control Application, up to a total of 16 sounds can be used. This includes customized WAV files that you can be copied to your Remote Control's installation directory on your PC.

Assigning WAV Files to an Alarm

1. Select SYSTEM.
2. Select User Preference.
3. Select **Alarm Beeper Status**.
4. Select **On**. The Alarm Beep Definitions appear.

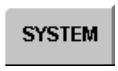


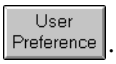
5. Select an alarm. A list of WAV files appears.
6. Select a WAV file to associate to that event.
7. Select **Test** to hear the WAV file and determine if this is the sound you want to associate with the alarm.
8. Select **Apply**. The Alarm Beep Definition window closes.

Turning Off All Alarm Sounds

1. Select **Alarm Beeper Status**.
2. Select **Off**.

Adding WAV Files to the Remote Control Application

1. Make sure that the Remote Control Application is closed.
2. Copy WAV files on your PC to your Remote Control's installation directory. The default directory is C:\Program Files\RemoteNIC.
3. Run the Remote Control Application.
4. Select 

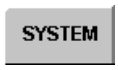
.
5. Select 

.
6. Select **Alarm Beeper Status**.
7. Select **On**. The Alarm Beep Definitions appear.
8. Select an alarm. A list of WAV files appear and include the new WAV files. Only the first 16 files appear in the list.
9. Select **Apply**. The Alarm Beep Definition window closes.

Using Chat

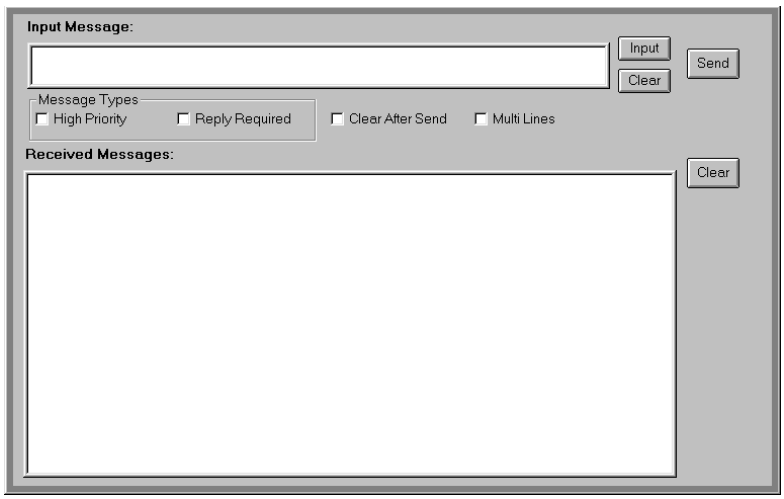
The Chat function can be used to send brief messages between administrators and users when units are networked together.

To send a message:

1. Select 

.
2. Select 

. The Chat screen appears.



3. Enter your message in the **Input Message** window.

   - If using the touch screen on a portable unit, select Input. A keypad appears allowing you to enter the message. Select **Enter** when done. The message appears in the Input Message window.
   - If using the Remote Control Application to control a remote unit, place your mouse cursor in to the **Input Message** window and type the message.

     NOTE ➤
     Pressing the Enter key on your keyboard will delete the message. To avoid this, select **Multi Lines**.

     In addition, if you have a long message, select Multi Lines so that you can use the Enter key to keep your message within the Input Message window. ➤

4. You can assign a priority level to the message (**High Priority**), or you can require that the recipient respond to the message (**Reply Required**).

5. Select Send.

Using the Lock Icon

The unit's multi-user functionality allows up to four simultaneous users to be connected to a portable unit. This includes one local user, via the unit's touch screen, and three remote users using the Remote Control Application (remote GUI), SCPI commands, or TL1 commands.

To prevent users from interfering with each other, an individual user can "lock" and take control of a test set. This is done using the Lock icon that appears on the GUI. Permission levels determine the user's ability to lock and unlock a test set. When you lock the test set, you can configure protocol processors, start tests, and perform general product functions without the worry of contending for resources with another user.

Lock Icon Guidelines

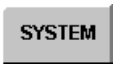
The following guidelines describe how to lock and unlock a test set using the Lock icon. (For additional configuration procedures, refer to *Configuring the Lock on Startup*.)

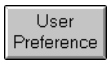
This icon	Means
	The test set is unlocked and available. No individual user has control of it. You can lock the test set by selecting this icon.
	You have the test set locked. You currently control the test set and can configure protocol processors. Other users will see  on their GUI.

This icon	Means
	The test set is locked by another user, and you can only view protocol processor screens. **If you have Admin or Write privileges:** You can select this icon to take control of the test set. The Lock Override message will appear and prompt me to unlock it from the current owner. For example, "*User X* currently has it locked. Do you wish to force an Unlock and then Lock? Yes. No." (*User X* is the name of the current owner.) By selecting **Yes**,  now appears on the GUI. The previous owner (User X) will receive a High Priority Message stating that the lock has been removed. For example, "[*User Y*] Your lock on the unit has been removed." (User Y is your user name.) Other users will see  on their GUI. **If you do not have the proper user privilege:** A message appears stating that the protocol processor is locked by the current owner. For example, "Protocol Processor locked by User X."
	The circuit pack (and its associated protocol processors) is **out of service**. A counter appears indicating how long the circuit pack has been out of service. A fault is also logged.

Configuring the Lock on Startup

To control the Lock's default state when the unit is started:

1. Select 

.
2. Select 

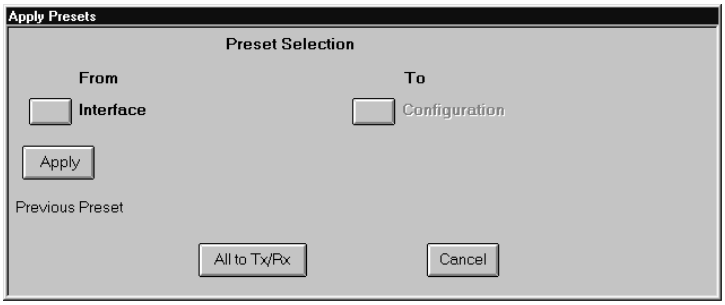
.
3. Select **Startup Locking State**.
   - Select **Lock** to automatically lock the unit when it is started.
   - Select **Unlock** to make the unit available to anyone when it is started.

Using Presets to Configure the Unit

The Presets function provides a quick and convenient way to set up the system for operation. Using Presets involves selecting a starting protocol and its interface, and then making an internal connection to another protocol.

To set up a connection using the unit's Presets function:

1. Select PRESETS from the Common Function Buttons row or from the **Switch Matrix**. The Apply Presets window appears.



2. Select **Interface**. All line interfaces available for your unit appear.
3. Select an interface as a starting point.
4. Select **Configuration**. The protocols available for the selected interface appear.
5. Select a protocol to connect to the selected interface. If necessary, select the **Configuration** button again to create additional connections.

NOTE ➤
If you make a mistake while creating connections, simply select **Interface** and reenter the interface value. This action erases any previously entered interface or configuration values. ➤

6. Select **Apply**. The unit takes a few moments to apply the new protocol connections. Use the Switch Matrix to view the new connections.

To disengage the configured protocol connections:

- Select **All to Tx/Rx**. This globally disconnects any internal connections between multiple protocol processors. A protocol processor will now expect to receive a signal using its line interface.

Using the Security Features

This function allows you to view the following security information about system users:

- User Name
- Permissions
  - Read Only: Allows the user read-only privileges.
  - Read/Write: Allows the user to read and update information.
  - Calibrate: Allows the user read and write privileges and the ability to perform calibration procedures on the unit.
  - Admin: Allows the user to perform network administrator tasks such as calibrating, adding, deleting, and updating user profiles.
- Active User: Displays the current user's status.
- Current Permissions: If Security System Lock is enabled, shows users that may temporarily have read-only privileges.
- Default User: If Security System Lock is enabled, shows users that may temporarily have read-only privileges.

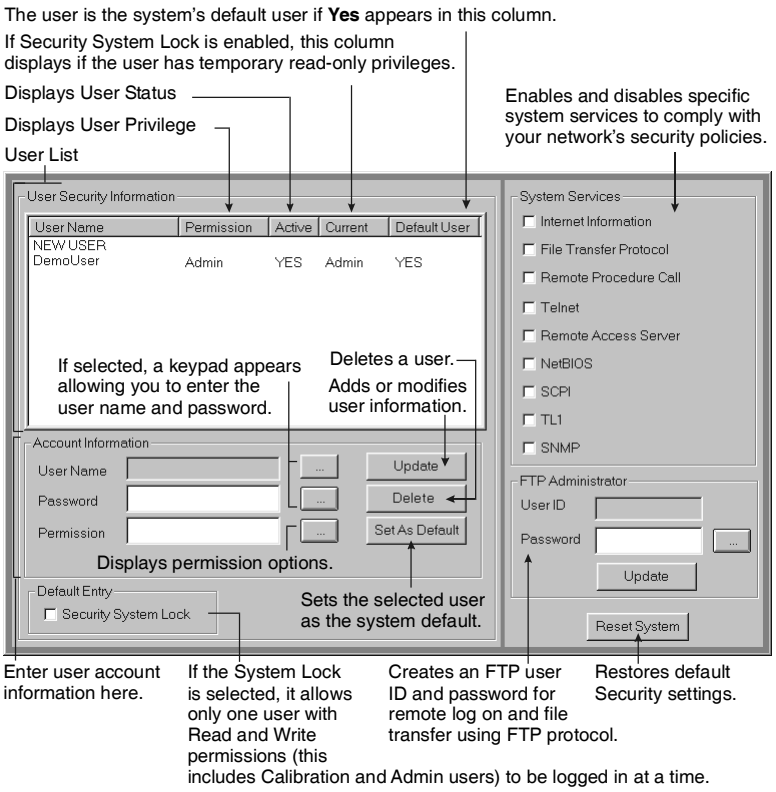
The Security function also enables a user with administrator privileges to perform the following tasks:

- Add, delete, and update a user profile
- Enable and disable the Security System Lock feature
- Establish a Default Login
- Establish a Required Login

NOTE ➤
If the **Security System Lock** function is enabled, only one user with Read and Write permissions (this includes Calibration and Admin users) can be logged in at a time. If a user with Read and Write permissions is already logged in, a window will appear giving you the option of logging in with Read-Only permissions only. When the user logs on with Read-Only permissions, all functionality will be disabled with the exception of the online help and the *About this product* function. ➤

Accessing the Security Function

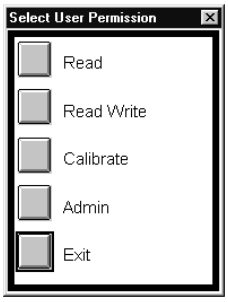
1. Select SYSTEM.
2. Select Security. The Security screen appears.



Adding a New User

1. Select SYSTEM.
2. Select Security. The Security screen appears (see the graphic above).
3. From the User Name column, select **NEW USER**.

4. Under Account Information, select [...], which is next to the User ID field. A keypad appears.
5. Enter the user ID.
6. Select [...], which is next to the Password field. A keypad appears.
7. Enter a password.
8. Select [...], which is next to the Permissions field. The Select User Permissions window appears.



9. Select a user permission option. The new user profile is added and appears on the User List.

Deleting a User

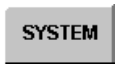
1. Select [SYSTEM].
2. Select [Security]. The Security screen appears.
3. From the User List, select the user you want to delete.
4. Select [Delete].

Enabling/Disabling Security System Lock

This function allows an administrator to enable a Security System Lock that only allows one user with Read and Write permissions (this includes Calibration and Admin users) to be logged in at a time. If a user with Read and Write permissions is already logged in, a window will appear giving you the option of logging in with Read-Only permissions

only. When the user logs on with Read-Only permissions, all functionality will be disabled with the exception of the online help and the *About this product* function.

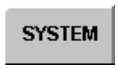
To enable Security System Lock:

1. Select 

.
2. Select 

. The Security screen appears.
3. Under the Default Entry portion of the screen, select the **Security System Lock** check box. A check appears in the check box indicating that the Security System Lock function is enabled.

To disable Security System Lock:

1. Select 

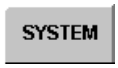
.
2. Select 

. The Security screen appears.
3. Under the Default Entry portion of the screen, deselect the **Security System Lock** check box. The check is removed from the check box indicating that the Security System Lock function is disabled.

Establishing a Default Login

This function allows an administrator to establish a default login, which results in the users not having to enter a user ID and password each time they use the unit.

To establish a default login:

1. Select 

.
2. Select 

. The Security screen appears.
3. From the Users List, select the user that you wish to make the default login.
4. Select 

. Under the Default User column, **Yes** appears, indicating that the user has been established as default user.

To disable a default login:

1. Select SYSTEM.
2. Select MISC.
3. Under Local Settings, select the **User Login Required** check box. A check appears in the box, indicating that User Login Required is now enabled.
4. Reboot the unit. When the unit is turned on, a login box will now appear.

   NOTE ➤
   If you do not wish to reset a Default Login user, there is no need to continue to the next step. ➤
5. If you wish to set another default user, log in as an Admin user and repeat steps the steps above under the *Establishing a Default Login* section.

Establishing a Required User Login

This function allows an administrator to establish a required login, which results in user having to enter a user ID and password each time they use the unit.

To establish a required login:

1. Select SYSTEM.
2. Select MISC.
3. Under the Local Setting portion of the screen, select the **User Login Required** check box. A check appears in the check box indicating that a required login has been established.

Updating a User Profile

1. Select SYSTEM.
2. Select Security. The Security screen appears.

3. From the User List, select the user profile to be updated. The user ID, password, and permissions appears in the Account Information portion of the screen.
4. Select [...], which is next to the field to be updated.
   - If the User ID or Password was selected, a keypad appears, allowing you to modify the current information. Press [Enter] when you are done.
   - If **Permissions** was selected, the Select User Permissions window appears. Select the updated permissions that you wish to apply.
5. When you are done updating the user's profile, select [Update]. The updated information appears on the User List.

Restoring System Settings

The Reset System functions clears and restores default settings to the following:

- User Accounts – Deletes all user accounts and restores the default Admin account.
- FTP Administrator Account
- System Services

NOTE ➤
User files, such as the protocol processor's transmit and receive settings, report statistics, graphs, and test results, are not deleted. These files are managed using the **File Services** functions. Refer to *Downloading a File* and *Uploading a File* for file management information. ➤

To reset the system:

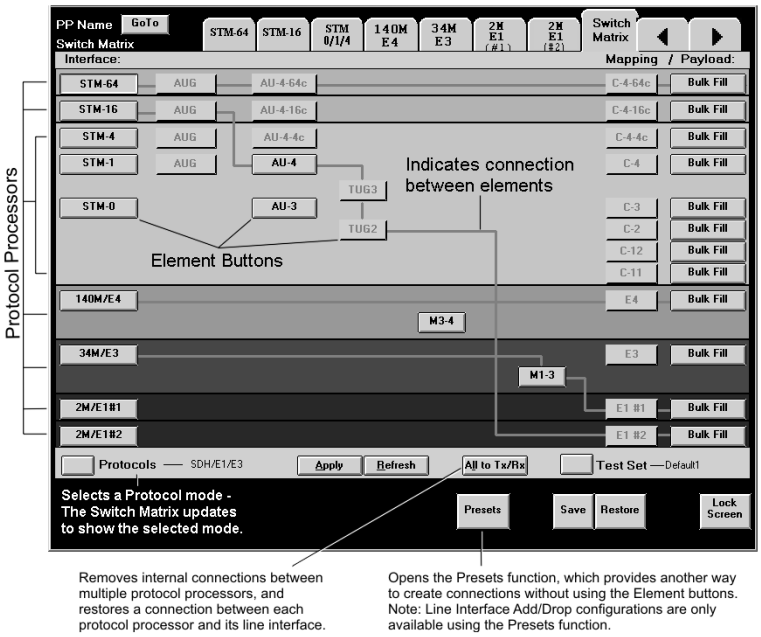
1. Select [SYSTEM].
2. Select [Security]. The Security screen appears.
3. Select [Reset System].
4. A message confirming that you want to reset the system appears. Select **Yes**.

5. A message stating that the system must be rebooted for changes to take affect appears. Select **OK**.
6. Reboot the system.

Using the Switch Matrix

The Switch Matrix allows you to display and define a protocol processor's multiplexing structure from a single screen. This fast and convenient configuration method lets you select a protocol processor interface, route the signal through available mappings, drop the signal to other protocol processors, and select a payload to use within the signal.

The following is an example of the Switch Matrix in SDH mode.



Switch Matrix Guidelines

When using the Switch Matrix:

- Always start from left to right by first selecting an **Interface** button.
- After selecting an interface, the appropriate **Mapping**, **Container**, and **Payload** buttons are enabled to help you create a valid signal configuration.
- After making the connections between elements, select the **Apply** button for the new configuration and connections to take affect.

Configuring the Unit Using the Switch Matrix

1. Select 

.
   The Switch Matrix appears.
2. Starting from the left, select an **Interface:** button.
   After selecting an interface, the appropriate **Mapping**, **Container**, and **Payload** buttons are enabled on the Switch Matrix. This will help you create a valid configuration.
3. Select the available **Mapping:** and **Payload:** buttons.
4. Select **Apply**. The unit applies the new configuration. Signal lines appear to illustrate the new data flow.

NOTE ➤
The unit can also be configured using the **Presets** button that appears on the Switch Matrix screen. Refer to *Using Presets to Configure the Unit* for more information. ◄

Viewing a File

1. Select SYSTEM.
2. Select File Services. The File Services screen appears.
3. Select a file from the File List.
4. Select View. The contents of the file appear in the View window.
5. Use Display Hex or Display ASCII (a toggle button) to display the file in Hex or ASCII format.

Viewing File Details

1. Select SYSTEM.
2. Select File Services. The File Services screen appears.
3. Select a file from the File List. The file name, file size, and modification date appear below the File List.

ATM

The ATM protocol processor configures functionality that allows you to monitor the performance of your network by receiving and analyzing data traffic and injecting test data onto your ATM network.

NOTE ➤
Your unit must contain the ATM hardware and the appropriate licensing for this tab to appear. ➤

ATM LEDs

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

- Provides access to ATM protocol processor functions.
- Provides a visual status of ATM activity such as data traffic transmission and reception on ATM virtual channels.
- Displays ATM alarm and error conditions.

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

LEDs and Indicators	Description
TX:	Displays transmit status of virtual channels. On indicates selected virtual channels are active and transmitting. Off indicates all virtual channels are not transmitting.
RX:	Displays monitor status of virtual channels. On indicates selected virtual channels are active and monitoring. Off indicates all virtual channels are not receiving.
Mapping Indicator	Displays the current mapping settings. If no mapping is selected, "None" appears. This appears below the TX: and RX: indicators
LOCS	Loss of Cell Synchronization. Indicates a loss of Cell Sync, which occurs when seven consecutive bad HECs are received. Cell Sync returns when six consecutive good HECs are received.
HEC	Header Error Control. Indicates if a correctable or uncorrectable Header Error Control occurred.

LEDs and Indicators	Description
SCNR	Selected Cells Not Received. Monitor or Detail Channels are not receiving cells.
BIT Err	Indicates a Bit error has been received on the active detail channel.
PAT SYNC	Loss of Pattern Synchronization. Displays the status of loss of Pattern Sync on any active details channel.
CLP	Cell Loss Priority. Indicates that a VCC has received cells with the CLP = 1.
AAL	ATM Adaption Layer. Indicates that an AAL 1 SN or SNP error or lost or misinserted cell occurred, or a PDU length, padding, or CRC error occurred.
AIS	Alarm Indication Signal. Indicates if an AIS is received on an F4 or F5 OAM flow of an active VCC. This is an alarm LED.
RDI	Remote Defect Indicator. Indicates if a Remote Defect Indicator signal is received on an F4 or F5 OAM flow of an active VCC.
LOF	Loss of Frame. Indicates a loss of frame. **Note:** This LED appears when the unit is configured for PLCP mapping.
OOF	Out of Frame. A receive PLCP OOF error occurred. **Note:** This LED appears when the unit is configured for PLCP mapping.
FRAME	Framing. Indicates that an A1A2 or POI framing error occurred. **Note:** This LED appears when the unit is configured for PLCP mapping.
POI	Path Overhead Identifier. Indicates an error in the POI octet of a PLCP frame. **Note:** This LED appears when the unit is configured for PLCP mapping.
BIP	Byte Interleaved Parity error. Indicates that a PLCP BIP error was received while mapped for DS1 PLCP or DS3 PLCP.
FEBE	Far End Block Error. Indicates that a FEBE error was received. **Note:** This LED appears when the unit is configured for PLCP mapping.

LEDs and Indicators	Description
YEL	Yellow. A receive PLCP Yellow alarm occurred. **Note:** This LED appears when the unit is configured for PLCP mapping.
O.191 OVFL	Displays O.191 overflow status. **On** indicates that the block size set for the current rate is low and there is an overflow. **Off** indicates that there is no overflow.
SSCOP Link	Displays Service Specific Connection Oriented Protocol (SSCOP) link status. **On** indicates that the SSCOP link is up. **Off** indicates that the SSCOP link is down. When signalling is enabled, **Green** indicates a correct link status; **Red** indicates a bad link.

VCC Table Data Transmission and Monitoring

This function allows you to enable and disable VCC table data transmission and monitoring functionality.

1. Select 

.
2. Select 

.
3. Select a VCC.
4. Set the following parameters:
   - Select 

to enable data transmission for up to 240 Transmit connections, starting from the current selection in the VCC table.
   - Select 

to enable data monitoring for all virtual channels listed in the VCC Table.
   - Select 

to enable ATM Cell transmission for individual virtual channels in the VCC Table.
   - Select 

to enable ATM Cell monitoring for individual virtual channels in the VCC Table and details mode.

5. Select Tx On/Off to start or stop the transmission of ATM cells on all enabled virtual channels listed in the VCC Table.

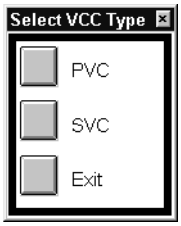
6. Select Rx On/Off to start or stop data traffic reception and monitoring on all enabled virtual channels listed in the VCC Table.

Add/Edit a VCC

1. Select Vcc Table.

2. Select Edit Tbl.

3. Select Edit VCC or Add VCC. If Signalling is enabled, the following window appears. (**Note:** If Signalling is disabled, the system defaults to the Add or Edit PVC screen.)

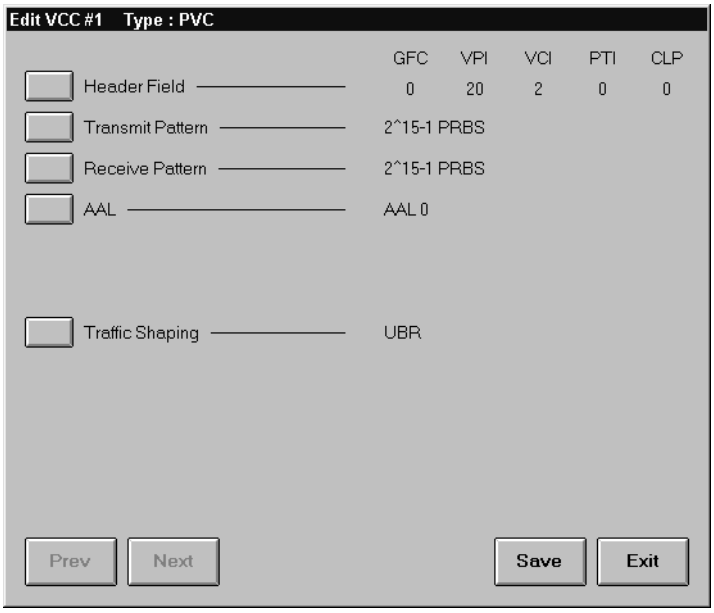


4. Select **PVC** or **SVC**.

- If *PVC* is selected, continue to the *Add/Edit PVC* section.
- If SVC is selected continue to the *Add/Edit SVC* section.

Add/Edit PVC

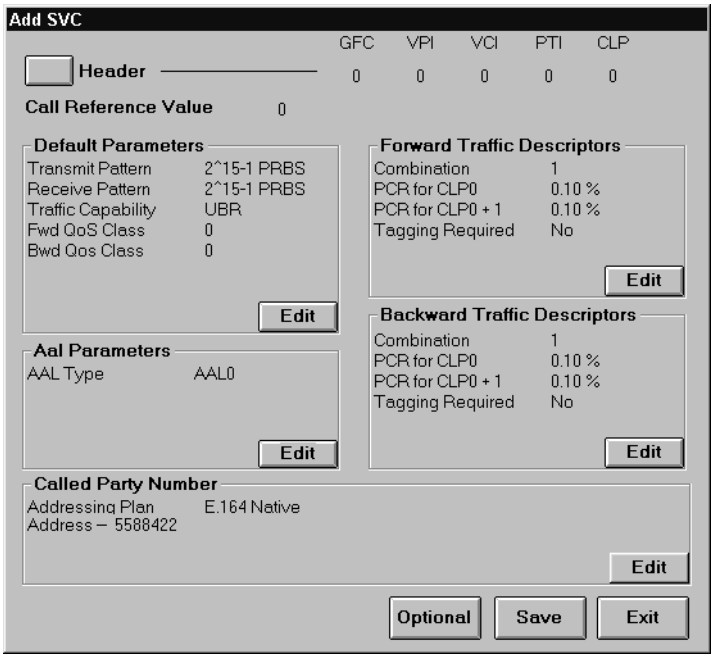
When PVC is selected, the Add or Edit VCC screen appears. Modify the appropriate PVC parameters. The example below is the Edit PVC screen; however, the parameters that appear this screen also appear in the Add PVC screen.



1. To specify the VCC header information, select **Header Field**.
2. To specify the VCC's Transmit pattern, select **Transmit Pattern**.
3. To specify the VCC's Receive pattern, select **Receive Pattern**.
4. To specify the AAL protocol mode, select **AAL** and select **AAL0**, **AAL1**, or **AAL5**.
   - If AAL0 was selected, continue to the **Traffic Shaping** field.
   - If AAL1 was selected, select **AAL1 CSI Octet**.
   - If AAL5 was selected, select **AAL5 PDU Length** and **AAL5 CPCS UU Octet**.
5. Select **Traffic Shaping**.
   - If UBR is selected, continue to step 6.
   - If CBR is selected, select **Peak Cell Rate** and define the parameter. When this is completed, go to step 5.
   - If Rt-VBR or Nrt-VBR is selected, define the following parameters: Peak Cell Rate, Sustained Cell Rate, Max Burst Size, and CDVT. When this has been completed, go to step 6.
6. Select SAVE.

Add/Edit SVC

When SVC is selected, the Add SVC screen appears. Modify the appropriate SVC parameters. The example below is the Add SVC screen; however, the parameters that appear this screen also appear in the Edit SVC screen.



1. To specify the VCC header information in the case of UNI4.0, select **Header**.
2. To change the Default parameters, select **Edit** under the Default Parameter portion of the screen.
3. To specify the VCC's Transmit pattern, select **Transmit Pattern**.
   - To specify the VCC's Receive pattern, select **Receive Pattern**.
   - To specify the traffic capability, select **Traffic Capability**.
   - To specify the forward QoS class, select **Fwd QoS Class**.
   - To specify the backward QoS class, select **Bwd QoS Class**.
4. To change the AAL protocol mode, select **Edit** under the AAL Parameters portion of the screen.

5. Select **AAL** and select AAL0, AAL1, or AAL5.
   - If AAL0 was selected, go to the Traffic Combination field.
   - If AAL1 was selected, select **AAL1 CS1 Octet**.
   - If AAL5 was selected, select **AAL5 CPCS SDU Length** and **AAL5 CPCS UU Octet**.
6. To change the forward traffic descriptors, select **Edit** in Forward Traffic Descriptor screen.
   - Select **Traffic Combination** and select a combination.
   - To specify the descriptors:
   - If the combination is 1, select **PCR for CLP0** and **PCR for CLP0+1**.
   - If the combination is 2, select, **PCR for CLP0+1**, **SCR for CLP0**, and **MBS for CLP0**.
   - If the combination is 3, select **PCR for CLP0+1**, **SCR for CLP0**, and **MBS for CLP0**.
   - If the combination is 4, select **PCR for CLP0+1**.
   - If the combination is 5, select **PCR for CLP0+1**, **SCR for CLP0+1**, **MBS for CLP0+1**.
   - If the combination is 6, select **PCR CLP0+1**, **SCR CLP0+1**, and **MBS CLP0+1**.
7. To change the backward traffic descriptors, select **Edit** in the Backward Traffic Descriptor portion of the screen.
   - Select **Traffic Combination** and select a combination.
   - To specify the descriptors:
   - If the combination is 1, select **PCR for CLP0** and **PCR for CLP0+1**.
   - If the combination is 2, select, **PCR for CLP0+1**, **SCR for CLP0**, and **MBS for CLP0**.
   - If the combination is 3, select **PCR for CLP0+1**, **SCR for CLP0**, and **MBS for CLP0**.
   - If the combination is 4, select **PCR for CLP0+1**.
   - If the combination is 5, select **PCR for CLP0+1**, **SCR for CLP0+1**, **MBS for CLP0+1**.
   - If the combination is 6, select **PCR CLP0+1**, **SCR CLP0+1**, and **MBS CLP0+1**.

8. Select **Edit** under the Called Party Address portion of the screen and set the address.
9. If the ATM Interface is UNI4.0, select **Optional** and set the optional parameters.
10. Select SAVE.

Delete a VCC Entry or Table

1. Select Vcc Table.
2. Select Edit Tbl.
3. Select Delete.
   - To delete a single entry, select the VCC and then **Single Entry** from the Delete window.
   - To delete an entire table, select **Table** from the Delete window. The Confirm Delete window appears, confirming that you wish to delete the current table. Select **Yes**.

   The entry or table has been removed.

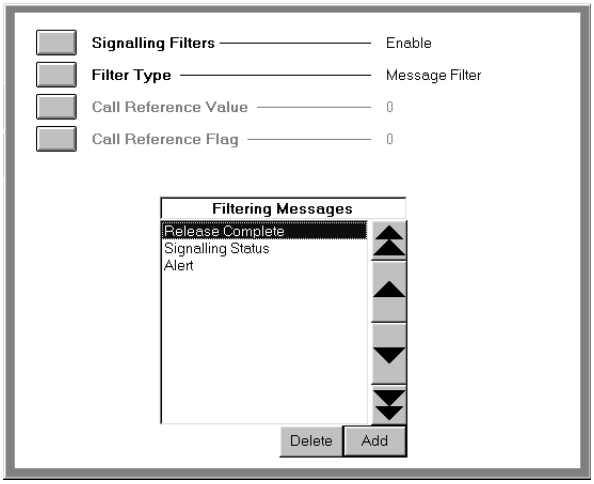
Enable Signalling

1. Select Config.
2. Select **ATM Mapping** and set the mapping.
3. To specify the ATM interface, select **ATM Interface** and select **User-UNI3.0**, **User-UNI3.1**, or **User-UNI4.0**.
4. To specify the signalling PCR, select **Signalling PCR** and set the value.
5. To specify the Timer values, select **TMR**.
6. Select **Signalling** and select **Enable**.

Filter Signalling Messages

1. Select Config.

2. Select **Signalling** and select **Enable**.
3. Select SIG FTRS. The SIG FTRS function screen appears.



4. Select **Signalling Filters** and select **Enable**.
5. Select **Filter Type** and select a type of filter.

   a. If the filter type selected is *Message Filter*, *Message and Call Reference Flag*, or *Message and Call Reference Value*, select the **Add** button below the Filtering Message table and select the message to be filtered.

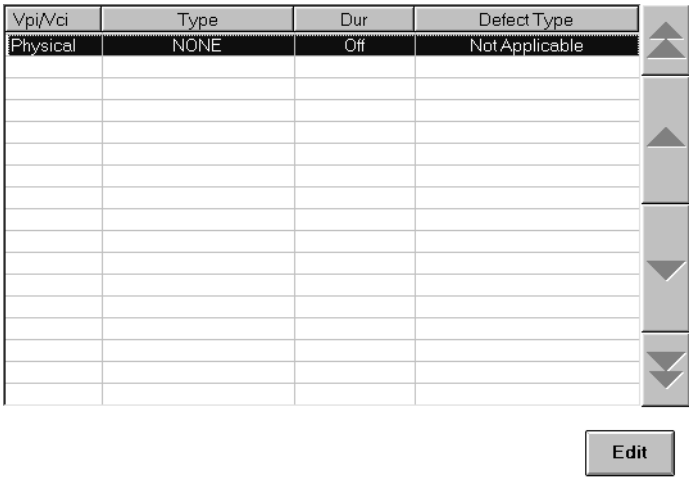
   b. If the filter type selected is *Call Reference Flag*, *Message and Call Reference Flag*, or *Call Reference Value and Flag*, select **Call Reference Flag** and set it to 1 or 0.

   c. If the filter type selected is *Call Reference Value*, *Message and Call Reference Value*, or *Call Reference Value and Flag*, select **Call Reference Value** and set the value.
6. For selecting multiple messages, repeat step 5a.

Insert ATM Alarms

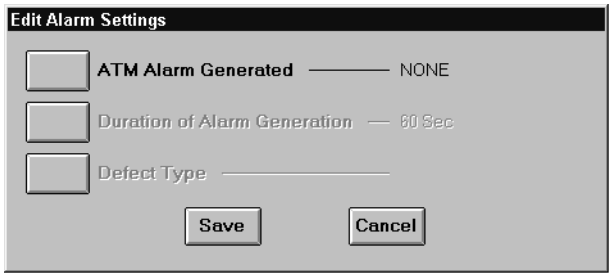
1. Select Functns.

2. Select ALARM GEN. The following screen appears.



3. Select a VCC in the table.

4. Select the EDIT button located in the bottom right corner of the table. The Edit Alarm Settings window appears.



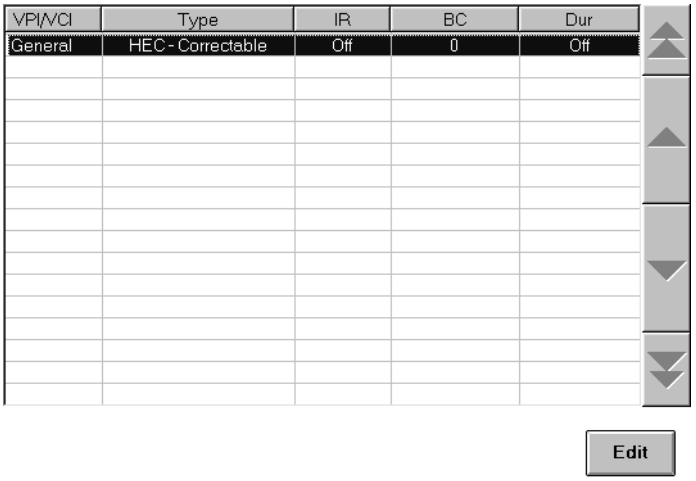
5. Select **ATM Alarm Generated** and select an alarm type.
6. Select **Duration of Alarm Generation** and select the duration.
7. If applicable, select **Defect Type**.
8. Select SAVE.

Stop Alarm Transmission

1. Select Functns.
2. Select ALARM GEN.
3. Select an item in the table.
4. Select the EDIT button located in the bottom right corner of the table. The Edit Alarm Settings window appears.
5. Select **Duration of Alarm Generation**.
6. Select **Off**.

Insert ATM Errors

1. Select Functns.
2. Select ERROR GEN. The following window appears.



3. Select a VCC entry from the table.
4. Select the button located in the right bottom corner of the table. The Edit Error Settings window appears.
5. Select **Type of Error Added** and select an error type.

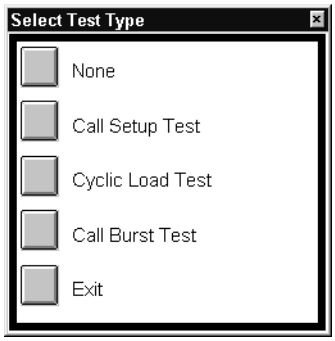
6. Select **Error Insertion Rate** and select the rate of the error insert.
7. Select **Error Burst Count** and use the key pad to enter the number of error bursts to occur.
8. Select **Duration of Error Insertion** and select the duration of the error.
9. Select SAVE.

Stop Error Transmission

1. Select Functns.
2. Select ERROR GEN. Select a VCC entry from the table.
3. Select the EDIT button located in the right bottom corner of the table. The Edit Error Settings window appears.
4. Select **Error Insertion Rate** or **Duration of Error Insertion**.
5. Select **Off**.

Perform Load Tests

1. Select Config. The Config screen appears.
2. Select **Signalling** and select **Enable**.
3. Select LOAD TEST.
4. Select **Type of Test**. The Select Test Type window appears.
5. Select one of the test types.



6. Select **Calls per Second** and enter a value up to 20.
7. Select **Duration** and select a value, which includes Random, Off, 1 Second, 10 Seconds, and User Defined (valid values range from 1 to 65535).
8. If the type of test selected is *Call Burst*, select **Burst Period** and select **Random** or **User Defined**, which allows you to select a value up to 256.
9. If the type of test selected is *Call Burst*, select **Skip Period** and select a value up to 256.

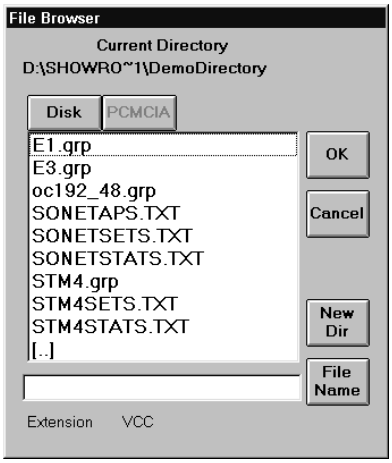
Recall a VCC Table

1. Select Vcc Table.
2. Select Edit Tbl.
3. Select Recall Table from the bottom of the screen. The File Browser window appears.
4. Select the table that you wish to restore. All table names have a .VCC extension.
5. Select OK. A warning message appears confirming that you wish to restore the selected table.
6. Select **Yes**. The table information appears in the Edit Tbl screen.

Save a VCC Table

1. Add the VCCs that you wish to save to a table. For more information, see the *Add a VCC* section.

2. With the table open, from the Edit Tbl screen, select Save Table (located at the bottom of the screen). The File Browser window appears.



3. Select **File Name**. A keypad appears.

4. Enter the name of the table to be saved, and select **Enter**. The table's file name appears next to the Filename field with a .VCC extension.

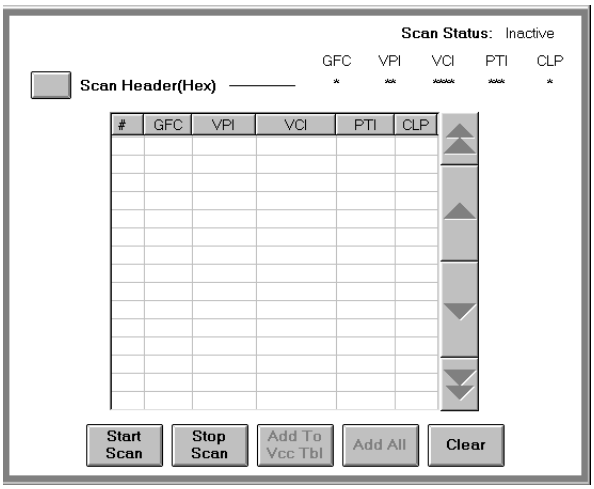
5. Select OK. The table is saved to the directory you specified.

Start/Stop a VCC Scan

The VCC Scan function is a filter that allows you to identify active virtual channels containing specific cell addressing. This feature allows you to filter on 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.

To start a VCC Scan:

1. Select Functns.
2. Select VCC SCAN. The VCC Scan screen appears.



3. Select the **Scan Header** button. The Enter VCC Header keypad appears.
4. Enter the header information and press Enter when done.
5. Select the **Start Scan** button to start scanning. The Scan Status (in the top right corner of the table) displays "Active."

Additionally in this screen, you may:

- Use the **Add VCC to VCC Tbl** button to add a scan header to the VCC table.
- Use the **Add All** button to add all scan headers to the VCC table.
- Use the **Clear** button to clear all table entries.

Stop the VCC Scan

- Select **Stop Scan**. The Scan Status (in the top right corner of the table) displays "Inactive."

Transmit a Burst Count

This function transmits a controlled amount of traffic using either AAL0 cells, AAL1 cells, or AAL5 PDUs. This type of traffic is determined by the parameters of the active channel (the virtual channel currently highlighted in the VCC table).

To transmit a single burst:

1. Select Functns.
2. Select VCC BURST.
3. Select a virtual channel on the VCC Burst table.
4. Select the **Burst Count** button. The Burst Count keypad appears.
5. Enter a value from 1 to 1000, and press Enter on the keypad.
6. Select the **Start** button. The burst is transmitted and increments on the Functns screen.

Use Turbo Add to Add Multiple VCCs

1. Select Vcc Table.
2. Select Edit Tbl.
3. Select Turbo Add. The No. of VCCs to be Added keypad appears.
4. Enter the number of VCCs to be added to the table (1–256 for PVC and 1–20 for SVC).
5. Select OK. If signalling is enabled, a window appears asking you to select PCV or SVC. (**Note:** If signalling is disabled, the system defaults to the Add or Edit PVC screen.)
6. If signalling was enabled, select PVC or SVC.
   - If *PVC* is selected, the Add or Edit VCC screen appears. Modify the appropriate PVC parameters (for more information, see the *Add/Edit PVC* section).
   - If *SVC* is selected, the Add SVC screen appears. Modify the appropriate SVC parameters (for more information, see the *Add/Edit SVC* section).

NOTE ➤
Depending on which parameters are selected for AAL and Traffic Shaping, additional options may appear on the Turbo Add screen. ◄

7. When the appropriate parameters are modified, select SAVE.

Monitor ATM Activity

You are able to view various ATM test and event activity by selecting **Results** and viewing the following functions:

- **Scan:** Provides a quick summary of incoming errors and alarms. It is effective in identifying a general area to investigate when error or alarm activity is detected. This function displays a list of received errors and alarms. For alarms, the duration is reported as a count in seconds. For errors, an error count is reported. When no activity is occurring, the screen displays, "No Trouble."
- **Error:** Reports error count, average error rate, and current error rate values. It displays the number of errors detected, and the average error rate (using an N.NNe-N format) and current error rate (using an N.NNe-N format for current seconds only). The errors detected are generated either by the ATM network or intentionally by the system.
- **Alarm:** Displays how long (in seconds) alarms were received by the system. The following ATM alarms can appear: PLCP LOF seconds, PLCP OOF seconds, LOCS seconds, SCNR seconds, CLP seconds, LOPS seconds, PLCP Yellow seconds, VPI (F4) AIS seconds, VPI (F4) RDI seconds, VCI (F5) AIS seconds, and VCI (F5) RDI seconds.
- **Graph:** Displays alarm and error results as graphs.
- **Large LED:** Provides a visual displays, in the form of LEDs, to report alarm, error, and event activity.

Additionally, using the **SUM** function, you can display a summary report of current cell activity, bandwidth percentage used, virtual channel status, and virtual channel totals for a VCC table.

Access the SUM Function

1. From the ATM protocol processor, select Vcc Table.
2. Select **SUM**.

Gigabit Ethernet

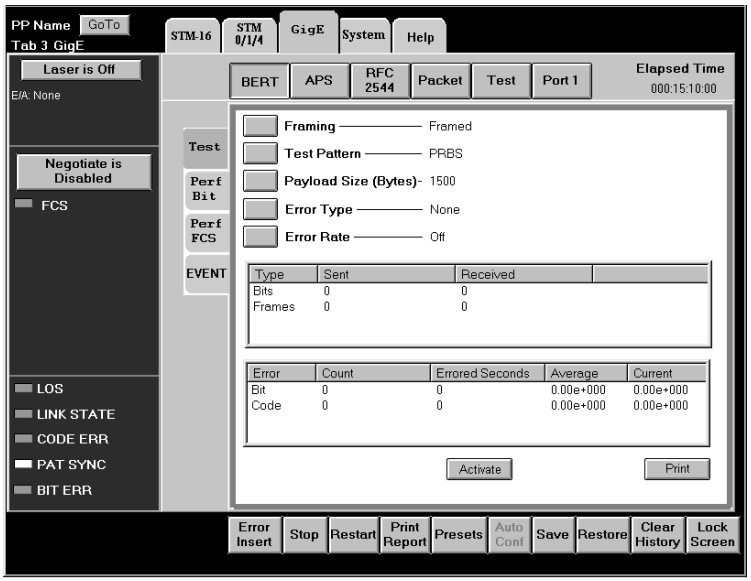
This section describes general procedures for using the Gigabit Ethernet (GigE) circuit pack. To use the GigE functionality described in this section, your unit must contain the GigE circuit pack and be licensed for GigE mode.

Selecting the Gigabit Ethernet Processor

When the unit is turned on, it performs a diagnostic self test. Once this is complete, the user interface appears on the touch screen.

1. Select the Gigabit Ethernet (GigE) tab, for example, 

.
2. The GigE protocol processor appears.



GigE LEDs

When the GigE tab is selected, the following appears in the LEDs/Quick Status Area.

LED/Quick Status	Description
E/A:	Error/Alarm Indicator. Indicates the type of error inserted and/or alarm generated.
FCS	Frame Check Sequence. Flashes red when an FCS error occurs.
LOS	Loss of Signal. When red, indicates that a valid signal is not being received. If an all zeros pattern exists for 100 milliseconds or longer on the incoming signal, then an LOS is reported. This is an alarm LED.
Link State	Indicates the port's connection status. If green, the port is receiving a valid signal.
Code Err	Indicates an error (an invalid 10B code) was detected on the incoming Ethernet stream.
Pat Sync	Indicates a loss of pattern synchronization. This is an alarm LED.
BIT Err	Indicates that BERT mode detected a BIT error.

Preparing the Unit for GigE Operation

Use the following procedures to configure the unit for Gigabit Ethernet operation.

NOTE ➤
Connect cables to the unit as previously described in the *Getting Started* chapter.

Turning the Laser On

The **Laser** button controls the unit's laser. When the unit is powered on, the laser is off by default.

To turn the laser on:

- Select 

in the **LEDs/Quick Status** area. The laser status indicates **ON**.

To turn the laser off:

- Select 

. The laser status indicates **OFF**.

Starting Auto-Negotiation

Auto-Negotiation is an Ethernet handshaking mechanism that looks at the incoming signal and determines the link speed and the duplex mode (full-duplex or half-duplex). A toggle button (located in the LEDs/ Quick Status Area of the screen that switches between **Negotiation is Enabled** and **Negotiation is Disabled**), turns on and off Auto-Negotiation mode.

When Auto-Negotiation is first enabled, the unit attempts to auto-negotiate the link with a remote device. After successful negotiation, Auto-Negotiation will not be performed again unless the remote device initiates an auto-negotiation sequence.

By disabling Auto-Negotiation, the unit can simulate older Ethernet equipment that does not support auto-negotiation logic.

To turn Auto-Negotiation on:

- Select the Negotiation button. The button indicates 

.

To turn Auto-Negotiation off:

- Select the Negotiation button. The button indicates 

.

Selecting a Port

The Gigabit Ethernet circuit pack has two ports that operate independently.

To select a GigE port to configure or monitor:

1. Select the **Port** button, for example, 

.
2. The port options appear.
   - **Port 1** selects Port 1. Any subsequent changes made will apply

to Port 1.

- **Port 2** selects Port 2. Any subsequent changes made will apply to Port 2.

Configuring Gigabit Ethernet for Framed Mode

Framed mode is required for various Gigabit Ethernet activity.

To select Framed mode:

1. Select BERT. The BERT Test screen appears.
2. Select Framing. The Framing options appear.
3. Select **Framed**.

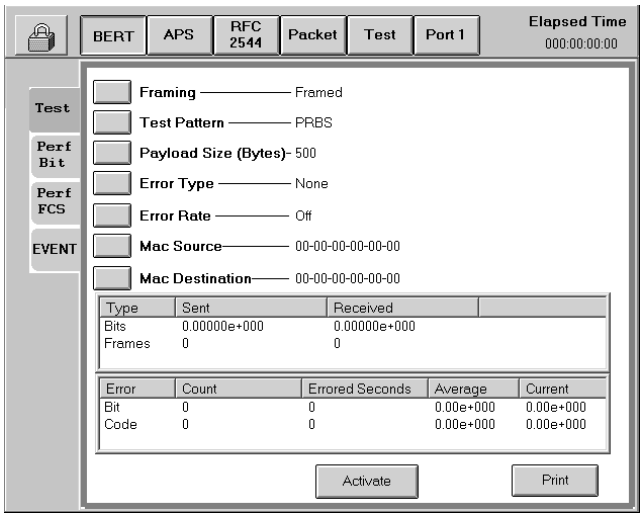
BERT Testing

By design, bit errors that occur in an Ethernet frame are automatically discarded because of CRC detection. However, the unit's BERT Test provides a bit-error-rate tester that generates errors using PRBS or user-defined patterns within a frame. The unit can insert and monitor errors by looping this pattern through the network and back to the unit.

BERT mode can be configured to operate independently on each port. For port selection, refer to the *Selecting a Port* section described earlier in this chapter.

To generate errors in BERT mode:

1. Select BERT. The BERT Test screen appears.



2. Select Activate to start BERT mode. The message **BERT Mode is Active** appears and the **Activate** button toggles to Deactivate.
3. Select **Framing** and select Framed or Unframed.
4. Select **Test Pattern** and select a pattern to generate.
5. Select **Payload Size (Bytes)** and enter a byte value ranging from 18 to 9220 bytes.
6. Select **Error Type** and select an error to generate.
7. Select **Error Rate** and select an error insertion rate. The unit starts transmitting errors.

NOTE ➤
When BERT mode is active, Ethernet packet streaming is automatically turned off. ➤

To stop error transmission in BERT mode:

- Select **Error Rate** and select **Off**.

To generate a single error:

1. Select BERT. The BERT Test screen appears.

2. Select Activate to start BERT mode. The message **BERT Mode is Active** appears and the **Activate** button toggles to Deactivate.
3. Select **Framing** and select Framed or Unframed.
4. Select **Test Pattern** and select a pattern to generate.
5. Select **Payload Size (Bytes)** and enter a byte value ranging from 18 to 9220 bytes.
6. Select **Error Type** and select an error to generate.
7. Select ERROR INSERT, located at the bottom of the screen, to transmit one bit error.

To view error results:

- Use the BIT, FCS, and Code count statistics that appear on the BERT Test screen.
- Select Perf Bit for a detailed breakdown of BIT errors detected and logged.
- Select Perf FCS for a detailed breakdown of frame check sequence errors detected and logged.
- Select EVENT for a list of all GigE error and alarm events detected and logged by the unit.

To save and print results:

- Select Print. The File Browser window appears, which allows you to name and save results to a file using the .REP extension. (The file can be saved locally on the unit, or remotely on a PC if using the Remote Control Application software.)

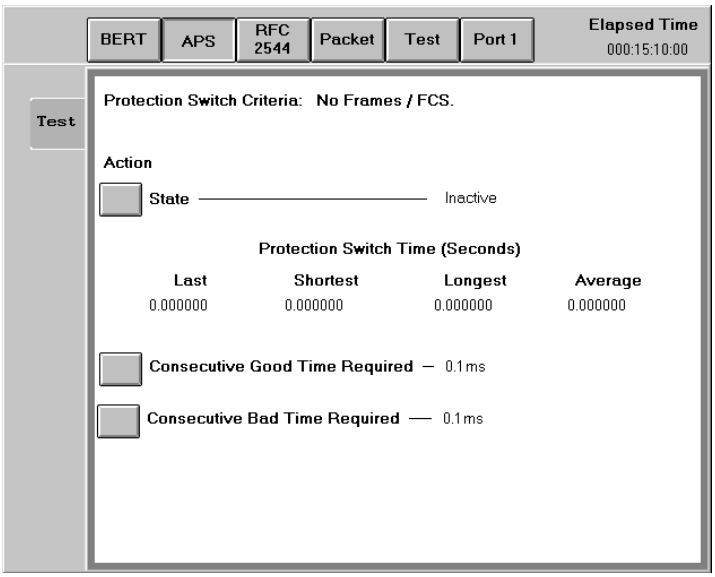
  After naming the file, it can be printed directly to a printer or printed later using the File Services' **Print** function, which is located under SYSTEM.

Measuring APS Activity

The system can measure APS switching intervals in your network by monitoring for a specific event, such as FCS errors, that will cause an APS switch. When this event occurs, the duration is logged in milliseconds. These statistics can be used to determine how long it takes for your network equipment to react to an APS event and switch to a backup path. The APS measurement has an accuracy of 0.1 milliseconds.

To measure GigE APS activity:

1. Verify the port that you want to use. The current port is indicated by the **Port** button.
2. Select APS. The APS measurement screen appears.



3. Select **Consecutive Bad Time Required** and enter a time interval ranging from 0.1 milliseconds to 409.0 milliseconds.

   Bad-time is the unit's minimum duration required for an error to be considered a valid APS event. For example, if bad-time is configured for 200 ms, and the unit receives FCS checksum errors for at least this interval, the APS timer starts.

4. Select **Consecutive Good Time Required** and enter a time inter-

val ranging from 0.1 milliseconds to 409.0 milliseconds.

Good-time is the error-free period that immediately occurs after a bad-time event. For example, if good-time is configured for 30 ms, and the unit receives error-free FCS checksums for this duration, after a valid bad-time period (i.e., 200 ms), the APS timer stops. The event that caused the APS switch to occur is considered closed.

5. Select **State.** The APS options appear.
6. Select **Single APS** or **Continuous APS** to begin measuring. The unit will begin monitoring the incoming signal for this event. If it occurs, the protection switch time will appear. (If Single APS is selected, the State returns to Inactive.)

To stop monitoring APS measurement activity:

1. Select **State**.
2. Select **Stop APS**.

Throughput Testing

This is an RFC 2544 benchmark test that calculates your network's throughput rate. The fastest throughput speed is indicated by the rate at which the transmission and reception of the Ethernet test stream is accomplished without packet loss.

Throughput Test Overview

In summary, the test starts by transmitting a stream at 100% using a frame size of 64 bytes. If it fails (i.e., an unacceptable number of frames are lost), the stream transmission rate falls back a certain percentage and is transmitted again. This process continues until the test passes without losing frames. The test then tries to zero in on the best throughput rate based on the Resolution Rate. The final rate appears as the Passing Rate.

Once this is completed, the frame size is increased to 128 bytes, and the test is repeated until a passing rate is achieved. Subsequent tests are performed using frame sizes of 256, 512, 1024, 1280, and 1518 bytes.

When performing a throughput test, you can adjust the following parameters to fine-tune your test results:

- Trial Duration, which determines how long the test runs for each test attempt.
- Acceptable frame loss rate, which defines the percentage of

frames that can be lost without being considered a failure.

- Resolution rate, which sets the level of precision for the test. The finer the resolution, the longer it takes to complete the test.

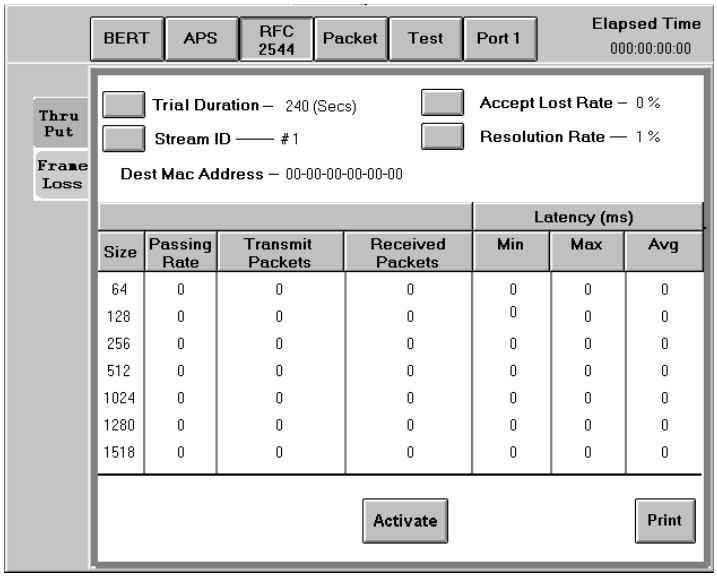
Throughput Test Procedures

Before starting a Throughput test:

- Make sure a stream has been defined as described in the *Creating and Saving an Ethernet Stream* section as described later in this chapter.
- Make sure that a Frame Loss test is not in progress. The Throughput test cannot be performed if a Frame Loss test is running.

To configure the Throughput test:

1. Verify the port that you want to use. The current port is indicated by the **Port** button.
2. Select RFC 2544.
3. Select Thru Put. The Throughput functions appear on the screen.



4. Select **Trial Duration** and determine how long the test runs. The default duration is 240 seconds.
5. Select **Stream ID** and select an Ethernet stream for the test.

NOTE ➤
If an Ethernet stream has not been defined, the Stream ID function is disabled. (**No Streams Defined** appears for the Stream ID value, and the Activate button is disabled.) Refer to the *Creating and Saving an Ethernet Stream* section for more information. ➤

6. Select **Accept Lost Rate** and enter an acceptable packet loss rate ranging from 1% (the minimum rate) to 100% (the maximum rate). This value serves as a threshold. The default rate is 0%, which means that even one lost packet is a failure.
7. Select **Resolution Rate**, and enter a value ranging from 1% to 100%. The lower the rate, the more precise the measurement. The default rate is 1%.

To start the Throughput test:

IMPORTANT ➤
Do not turn off an Ethernet stream while an RFC 2544 test is active. Turning off a stream, while the test is in progress, will disrupt test results. Refer to the *Transmitting an Ethernet Stream* section for more information. ➤

- Select Activate. Once the test begins, this button toggles to **Deactivate**.

  The unit first transmits a test stream (containing packets with 64-byte frames) using the configured parameters. These packets are looped through the network and returned to the unit. If no packet loss is reported, results are posted for the 64-byte frame size, and the unit transmits a stream containing packets with 128-byte frames. However, if frame loss is detected in the 64-byte transmission, the stream is retransmitted at a reduced rate. This process continues until results are within the Resolution Rate percentage.

To view Throughput test results:

- Throughput test results can be viewed using the results table that appears in the lower half of the **Thru Put** screen.

To stop the Throughput test:

- Select **Deactivate**.

To save and print Throughput test results:

- Select Print. The File Browser window appears, which allows you to name and save results to a file using the .REP extension. (The file can be saved locally on the unit, or remotely on a PC if using the Remote Control Application software.)

  After naming the file, it can be printed directly to an attached printer or printed later using the File Services' **Print** function, which is located under SYSTEM.

Frame Loss Testing

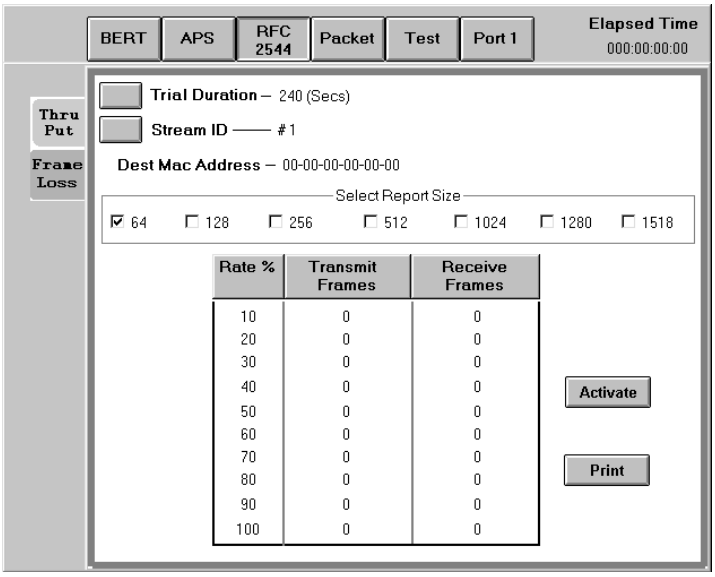
This is an RFC 2544 benchmark test. Its purpose is to determine the number of frames lost by looping a stream through the network at varying transmit frame rates. The Frame Loss screen allows you to select a specific frame size to use in the Ethernet stream.

Before starting a Frame Loss test:

- Make sure a stream has been defined as described in the *Creating and Saving an Ethernet Stream* section of this chapter.
- Make sure that a Throughput test is not in progress. The Frame Loss test cannot be performed if a Throughput test is running.

To configure the Frame Loss test:

1. Select a port. The current port is indicated by the **Port** button.
2. Select RFC 2544.
3. Select Frame Loss. The Frame Loss functions appear on the screen.



4. Select **Trial Duration** and determine how long the test runs. The default duration is 240 seconds.
5. Select **Stream ID** and select an Ethernet stream for the test.

NOTE ➤
If an Ethernet stream has not been defined, the Stream ID function is disabled. (**No Streams Defined** appears for the Stream ID value, and the Activate button is disabled.) Refer to the *Creating and Saving an Ethernet Stream* section for more information. ◄

To start the Frame Loss test:

IMPORTANT ➤
Do not turn off an Ethernet stream while an RFC 2544 test is active. Turning off a stream, while the test is in progress, will disrupt test results. Refer to the *Transmitting an Ethernet Stream* section for more information. ◄

1. Select Activate. Once the test begins, the button toggles to **Deactivate**.
2. The unit transmits a stream (using a 64-byte frame size) at 10% of the maximum byte-size rate.

   A status message appears at the bottom of the screen indicating

the current frame size and stream rate that is being transmitted. For example, **Processing size 64 Rate 10**. When this completes, the number of frames transmitted and the number of frames received appears in the Frame Loss table.

3. The unit transmits a stream at 20% of the maximum byte-size rate and displays results in the Frame Loss table when completed. The status message updates to **Processing size 64 Rate 20** while testing at this stream rate. For example,

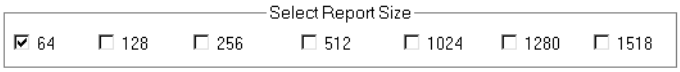
Rate %	Transmit Frames	Receive Frames
10	1502437	1502437
20	1126821	0
30	0	0
40	0	0
50	0	0
60	0	0
70	0	0
80	0	0
90	0	0
100	0	0

Processing size 64 Rate 20

4. This process continues for stream rates of 30% through 100% at 10% increments.
5. After transmitting at 100%, the entire test is repeated using a larger frame size, for example, 128, 256, 512, 1024, 1280, and 1518 bytes.

To view results for a specific frame size after starting a test: :

1. Select a frame size (64, 128, 256, 512, 1024, 1280, or 1518 bytes) from the **Select Report Size** section of the screen.



2. The Frame Loss table now displays the transmit and receive statistics for the selected frame size.

NOTE ➤
The status message that appears at the bottom of the screen always indicates which frame size and stream rate is currently being transmitted and not the report statistics selected. ◄

To save and print Frame Loss test results:

- Select Print. The File Browser window appears, which allows you to name and save results to a file using the .REP extension. (The file can be saved locally on the unit, or remotely on a PC if using the Remote Control Application software.)

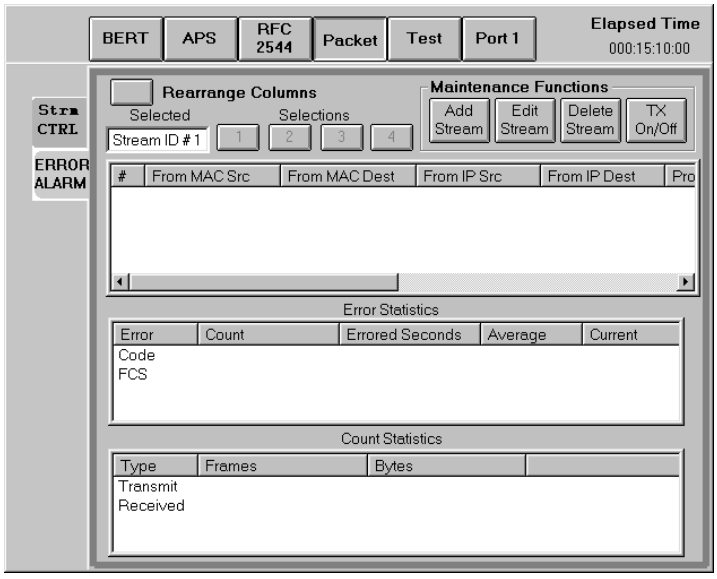
  After naming the file, it can be printed directly to an attached printer or printed later using the File Services' **Print** function, which is located under SYSTEM.

Ethernet Packet Streaming

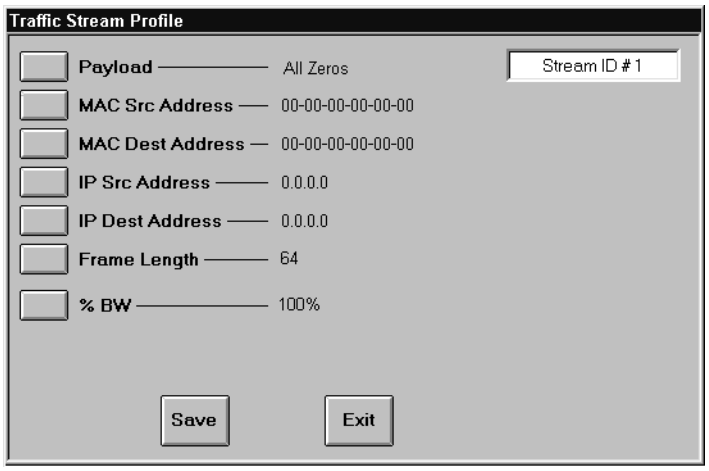
The unit can generate a traffic flow, or stream, into the network. A total of four independent Ethernet streams can be created per port. Use the Packet functions to create, configure, and transmit an Ethernet stream.

Creating and Saving an Ethernet Stream

1. Select a port. The current port is indicated by the **Port** button.
2. Select Packet. The Stream Control screen appears.



3. Select Add Stream. The traffic stream profile parameters appear.



4. Select, enter, and save stream parameters.

NOTE ➤
The stream protocol is set to UDP/IP protocol by default. ◄

5. The Ethernet stream appears in the Stream Control table. For example,

#	From MAC Src	From MAC Dest	From IP Src	From IP Dest	Pro
# 1	00-00-00-00-00-00	00-00-00-00-00-00	0.0.0.0	0.0.0.0	IP

Repeat Steps 3 and 4 to add a total of four streams to the port.

NOTE ➤
To change the column order that appears in the Stream Control table, refer to the *Rearranging Stream Control Columns* section that appears later in this chapter. ◄

Transmitting an Ethernet Stream

Before transmitting a stream:

- Make sure a stream has been defined for the port as previously described in the *Creating and Saving an Ethernet Stream* section .

To start transmission of an Ethernet Stream:

1. Select a port. The current port is indicated by the **Port** button.
2. Select Packet. The Stream Control screen appears.
3. Select an Ethernet stream using the Stream ID numbers, for example, 1.

   The **Selected** window indicates the current Ethernet stream, for example, Stream ID #1.
4. Select TX On/Off. The unit starts transmitting the selected stream. **On** appears in the TX State column of the Stream Control table.

NOTE ➤
When a stream is turned on, BERT mode is automatically disabled. ◄

To insert errors into an Ethernet Stream:

1. Select ERROR ALARM.
2. Select an error from the **Error Type** function.
3. Select an error rate from the **Error Rate** function.
4. The unit automatically starts transmitting errors into the Ethernet stream.

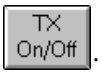
To view results:

- Select Strm CTRL and use the **Error Statistics** and **Count Statistics** tables that appear on the Stream Control screen.

To stop Ethernet Stream transmission:

IMPORTANT ➤
Do not turn off an Ethernet stream while an RFC 2544 test is active. Turning off a stream, while the test is in progress, will disrupt test results. ◄

There are two ways to stop transmission for a specific Ethernet stream using the Stream Control screen's functions:

- Select the active (On) Ethernet Stream's ID number, and then select 

.
- Turn on a different Ethernet stream. Only one Ethernet stream can transmit.

NOTE ➤
If BERT mode is enabled, all Ethernet streams are automatically turned off. ◄

Rearranging Stream Control Columns

The Stream Control table can be customize so that the parameters that are most important to you can appear first in the table. This reduces the need to scroll left and right through the table to view different statistics.

To rearrange the columns that appear in the Stream Control table:

1. Select 

. The Stream Control screen appears.
2. Select 

. The Rearrange Columns window appears.
3. Select **Columns**. The Select Next Column window appears.
4. Select the column that you want to appear first in the Stream Control table. It is added to the Column list.
5. Repeat Step 4 to continue adding subsequent columns to the list. Otherwise continue to the next step.
6. Select **Apply** or **Save**.

   Apply will save the column settings for the current session. If the unit is rebooted, or if factory default settings are restored, the columns will return to the default column positions.

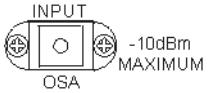
   Save will apply and permanently save the new column settings. When a software upgrade is performed, the columns will return to the original default positions.
7. The Stream Control table columns now appear in the selected order.

Optical Spectrum Analyzer (OSA)

The Optical Spectrum Analyzer (OSA) is an optional circuit pack available for your unit. This section highlights basic OSA operation.

OSA Optical Connector

The OSA circuit pack uses a single SC-type fiber-optic connector to receive an incoming signal.



CAUTION
To avoid damaging the unit, do not exceed the maximum input power of -10 dBm. ◄

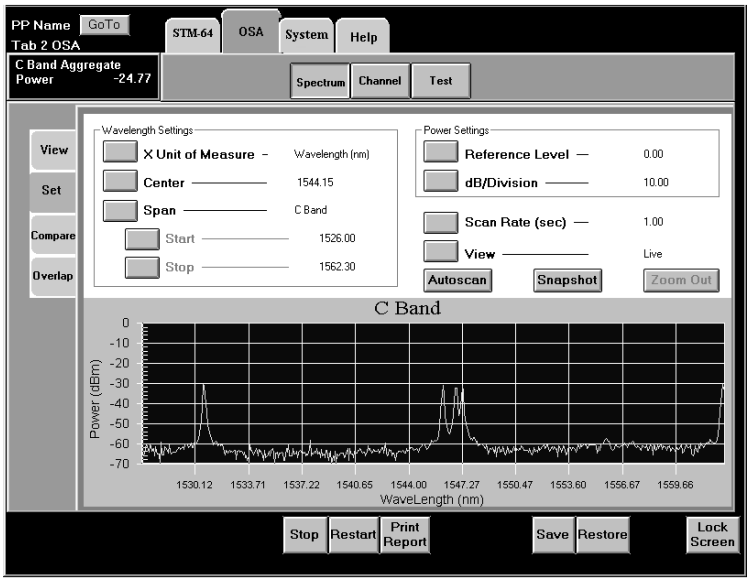
Quick Start Using Autoscan

The Autoscan feature performs a spectrum sweep and detects the active channels. By automatically scanning channels, this function reduces the time needed to manually search and enter existing channels.

To use Autoscan:

1. Select the Optical Spectrum Analyzer tab, for example, OSA.
2. Select Spectrum.
3. Select SET.
4. Select **Autoscan**.

   The range of active channels appears in the graph as shown in the following figure. In addition, the beginning and ending channels appear for the Start and Stop functions.



After successfully detecting active channels using Autoscan, you can perform the following:

- Use the **Wavelength Settings** and **Power Settings** functions to change the X- and Y-axis parameters. Refer to the *Configuring Spectrum Settings* section.
- Select VIEW to increase the Spectrum graph's screen size.
- Use the screen's Zoom In function to magnify an area of the Spectrum graph.

Configuring Spectrum Settings

The Spectrum Settings screen determines how spectrum information is represented and displayed on your screen. After customizing a view, it can be saved using the Snapshot function. The newly created view is entirely local and does not change data on the unit.

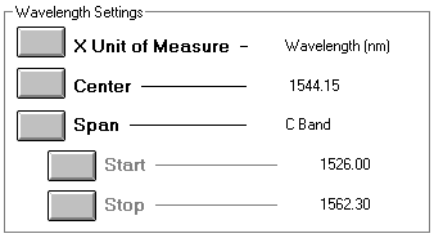
Use the Spectrum Settings to:

- Select a wavelength channel-band to monitor
- Perform an autoscan to quickly determine the available channels

- Define units of measure for the X- and Y-axis
- Narrow the range of interest by specifying the starting and ending channel range

To configure Spectrum graph settings:

1. Select Spectrum.
2. Select SET.
3. Use the **Wavelength Settings** to configure the graph's X-axis and channel range.



- Select **Span** to display C-band or L-band channel ranges.

IMPORTANT ➤

If you switch between channel bands when only one light source is present, you must reboot the unit.

For example, if you have a C-band light source attached to the unit, switch to L-band, which is not present, and then switch back to C-band, a reboot is required.

If a light source is available for both C- and L-band, the reboot is not necessary. ➤

NOTE ➤

If an Autoscan is performed, User Defined appears as the Span value. Use **Start** and **Stop** to set the beginning and ending channels that appear on the graph. ➤

- Select **X Unit of Measure** to set the unit of measure to nanometers or terahertz.
- Select **Center** to center the graph on a specific channel.

4. User **Power Settings** to configure the graph's Y-axis and dis-

played power level range.

- Select **Reference Level** to set the uppermost limit for the Y-axis.
- Select **dB/Division** to set the vertical scale (divisions) of the Y-axis.

5. After configuring the Wavelength Settings and Power Settings, the new parameters appear for the graph.
6. Select **Scan Rate (sec)** to set the graph's refresh rate.
7. Select **Snapshot** to save the new graph parameters.
8. If you changed channel bands using the Span function when only one light source is available, perform the following to reboot the unit:
   - Turn the unit off.
   - Wait approximately 10 seconds, and turn the unit on.
   - While the unit boots, it performs an internal diagnostic test. When complete, the user interface appears on the screen.

Configuring Channel Settings

The Channel Settings screen determines how channel functions appear in tables. Using these settings, you can narrow the range of C-band and L-band channels that appear in the Channel tables.

The unit has a default channel table consisting of:

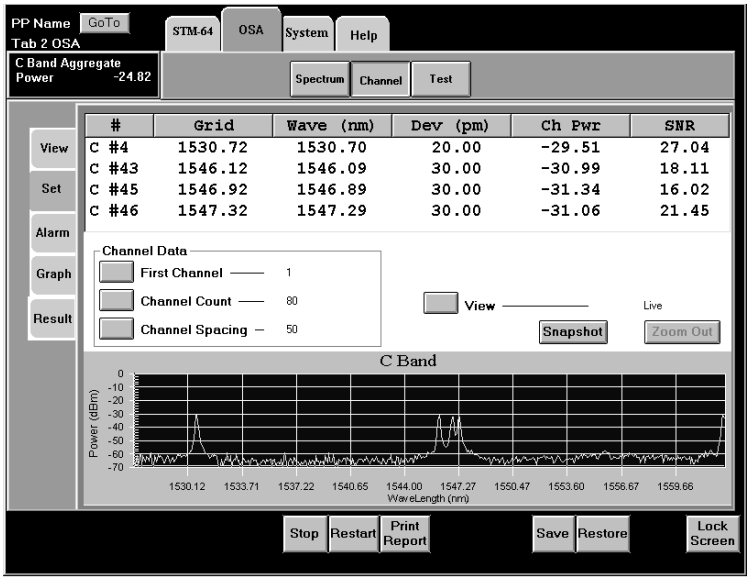
- 80 channels
- A channel spacing of 50 GHz (0.05 THz)
- A C-band channel range from 1525 nm to 1561 nm
- An L-band channel range from 1570 nm to 1603 nm

To change the parameters of the channels displayed in tables:

1. Select 

.

2. Select SET. The Channel Settings screen appears.



3. Select **First Channel** to set the starting channel. Channels range from 1 to 80.
4. Select **Channel Count** to set the number of channels. The channel count ranges from 1 to 80. However, the maximum channel count that can be entered varies based on the First Channel value.
5. Select **Channel Spacing** to change the channel spacing to one of three Gigahertz values. The default is 50 GHz.

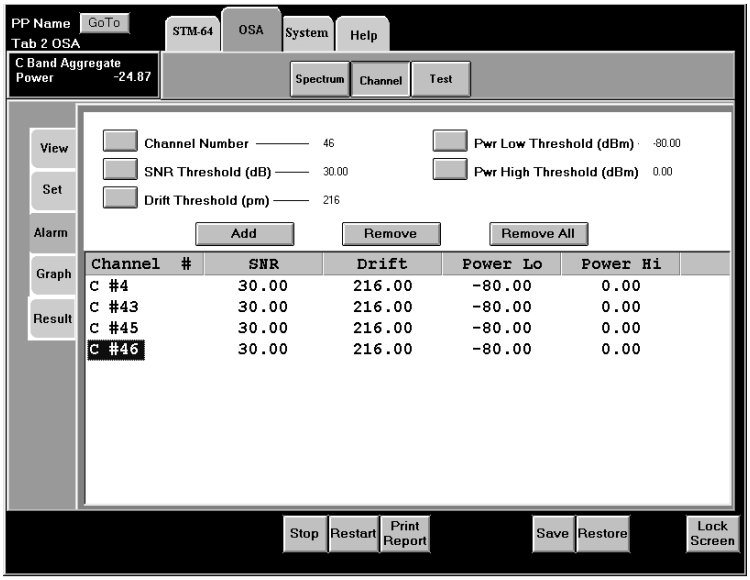
Configuring an Alarm Threshold

You can configure specific thresholds for each channel. When a threshold is exceeded, an alarm is generated and logged. The functions appearing on the Alarm screen allow you to add and remove channels to monitor. Alarm results can be viewed using the Channel Results screen.

To configure an OSA alarm:

1. Select Channel.

2. Select ALARM. The Channel Alarm screen appears.



3. Select one or all channels using **Channel Number**.
4. Set the SNR, drift, low power, and high power threshold values.

NOTE ➤
When the unit is configured for terahertz, and a drift alarm is triggered, use the Deviation column that appears on the Channel View, Channel Set, or Channel Graph screens to view the drift value. ➤

5. Select **Add**. The channels appear in the table.

To remove a channel from the alarm list:

1. Select a channel number (**Channel #** column) from the table.
2. Select **Remove**.

To remove all channels from the alarm list:

- Select **Remove All**.

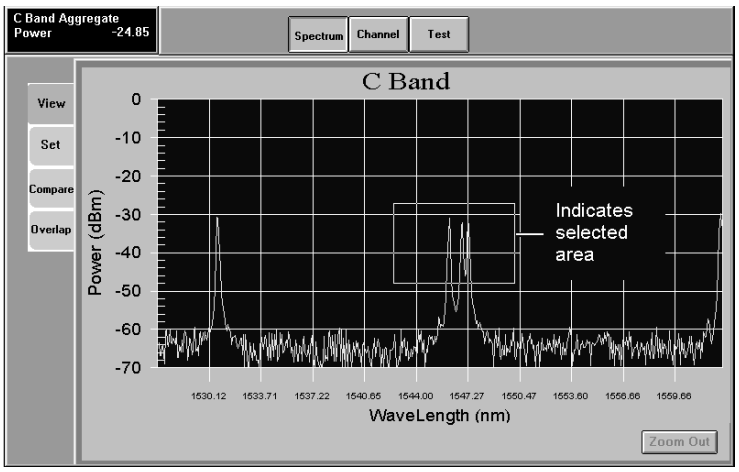
Using Zoom

You can increase or decrease an OSA graph's view magnification using the Zoom In and Zoom Out functions. You can observe greater detail, regarding a particular point on the graph, by zooming-in. Zooming-out restores the graph to its initial settings.

Zoom In

To zoom in on a specific area of the graph using a touch screen:

- Drag your finger diagonally across the screen to select and magnify an area of the graph.



To zoom in on a specific area of the graph using the Remote Control Application:

1. Right-click and drag your mouse pointer across an area of the graph.
2. Release the mouse button.

Zoom Out

To zoom out and restore the graph's initial view magnification using a touch screen:

- Press your finger twice (double click) on the graph.

To zoom out and restore the graph's initial view magnification using the Remote Control Application:

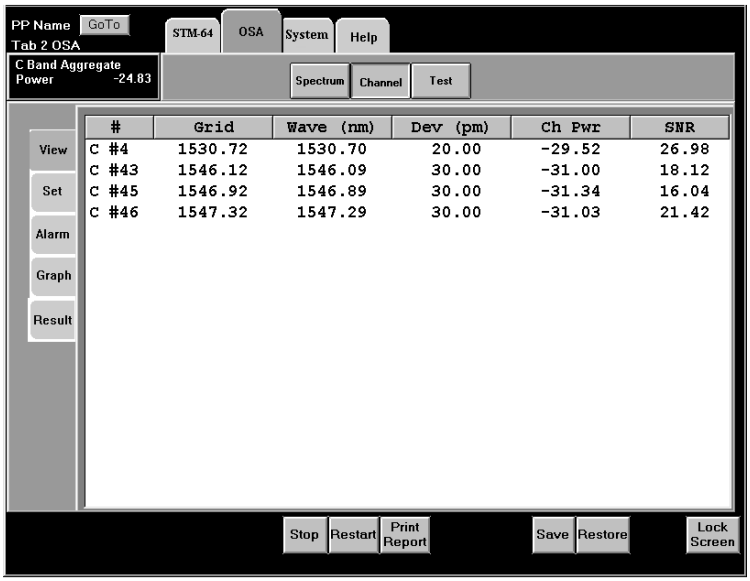
- Select **Zoom Out**.

Viewing Channel Statistics

The Channel View screen provides a concise summary of channel statistics in a large, easy-to-read format.

To view channel statistics:

1. Select Channel.
2. Select VIEW. The Channel View screen appears.



The following channel statistics appear:

- Channel Number (#) and Type (C-band or L-band)
- Grid: Indicates the channel value based on the frequency/wavelength table.
- Frequency or Wavelength: Indicates the actual channel value in THz or nm.
- Deviation: Indicates the difference between the Grid value and the frequency or wavelength value.
- Channel Power
- Signal-to-Noise Ratio

Fine-Tuning Channels

Using the **Graph** screen, you can select a single channel, which will be your reference channel, and then compare and fine-tune the remaining channels based on the reference channel's values.

1. Select **Channel**.
2. Select **GRAPH**. The Graph screen appears.

3. Select **Reference Channel** and enter a channel that appears in the table above the graph.
4. Select **Deviation** and to set the type of deviation (power, SNR, or wavelength/frequency deviation) to monitor.
5. A bar chart appears showing the other channels' deviations compared to the reference channel.

Glossary

Term	Definition
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.
AAL0	ATM Adaptation Layer 0. 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.
AAL1	ATM Adaptation Layer 1 protocol. 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.
AAL5	ATM Adaptation Layer 5 protocol. 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.
APS	Automatic Protection Switching. (1) In the Quick Status LEDs area, a LED indicating the K1 and K2 bytes on the incoming SONET or STM signal have changed, or (2) A function that allows Line Terminating Equipment to switch to a backup or protection channel in case errors or failures occur on the working channel.
ATM	Asynchronous Transfer Mode. A multiplexing/switching technique in which information is organized into fixed-length cells with each cell consisting of an identification header field and an information field. The transfer mode is asynchronous in the sense that the use of the cells depends on the required or instantaneous bit rate.

Term	Definition
AU-AIS	Administrative Unit - Alarm Indication Signal (SDH only). In the Quick Status LEDs area, an alarm LED indicating an all-ones characteristic or adapted information signal was detected on the AU. It is generated to replace the normal traffic signal when it contains a defect condition. This prevents consequential downstream failures being declared or alarms being raised.
AU-LOP	Administrative Unit - Loss of Pointer (SDH only). In the Quick Status LEDs area, an alarm LED indicating a consecutive number of invalid pointers or NDFs were received on the AU.
Auto Config	A common function button that detects various parameters about the incoming signal, such as signal rate, mapping, and payload pattern, and configures the unit accordingly.
B1 ERR	For SDH, Higher Order Path. For SONET, Path Overhead. Section BIP-8 Code Violation. In the Quick Status LEDs area, an error LED indicating an error in the SONET or SDH frame. B1 errors are parity errors. The B1 byte carries the parity information, so a B1 error is a Section error that applies not only to the Section OH, but the entire frame. Any error in the frame will result in a B1 error.
B2 ERR	Line Overhead BIP-8 Code Violation. In the Quick Status LEDs area, an error LED indicating parity errors were detected on the Line or Multiplex Section layer of the incoming SONET or SDH signal.
B3 ERR	(1) Path Overhead BIP-8 Code Violation (SONET). In the Quick Status LEDs area, an error LED indicating parity errors were detected at the Path layer of the incoming SONET signal. This is calculated over the Path OH and payload of each STS-1. (2) Higher-Order Path BIP-8 Code Violation (SDH). An error LED indicating a parity code (even) used to determine if a transmission error has occurred over a path. Its value is calculated over all the bits of the previous virtual container before scrambling and placed in the B3 byte of the current frame.
BIT ERR	BIT Error. In the Quick Status LEDs area, an error LED indicating a Bit error was detected in the SONET or SDH payload.

Term	Definition
CAS	Channel Associated Signaling. An E1 signaling protocol that utilizes all of TS16, where each byte is broken into two nibbles, and each nibble contains the ABCD bits for one of the 30 data channels CAS.
CASMFL	Channel Associated Signaling Multiframe Loss. Occurs when the four zeros at the start of TS16 in frame 0 cannot be found.
CDV	Cell Delay Variation. A component of cell transfer delay induced by call scheduling and buffering.
CDVT	Cell Delay Variation Tolerance. The upper limit of acceptable random arrival times between consecutive cells of a connection.
CLK:	Clock. In the Quick Status LEDs area, a status LED indicating the timing source for the SONET or SDH transmit signal. Clock settings include: SETS, Bits, Internal, or RCVD.
CLP	Cell Loss Priority, signaling bit in ATM header cell (0=high priority, 1=low priority).
CLR	Cell Loss Ratio. Lost Cells/Total Transmitted Cells. It is also a parameter that the network agrees to offer as an objective over the lifetime of a connection.
CMR	Cell Misinsertion Rate. The ratio of cells that were received (but were not transmitted by the source) in relation to the total number of cells correctly transmitted.
C-Parity Error	An error in the C-bit channel of the DS3 channel, which is used to denote the presence or absence of stuffed bits.
CPCS	Common Part Convergence Sublayer.
CRC	Cyclic Redundancy Check.
CTD	Cell Transfer Delay.
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.
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.

Term	Definition
E-Bit	Two bits of the E1 multiframe, located in the first bit of the last two odd-numbered E1 frames. They carry the FEBE, one for each SMF, and are set when the corresponding CRC-4 at the remote end is in error.
EFS	Error Free Seconds. A measurement of the time, in seconds, in which there were no errors detected in the signal being monitored.
EFSR	Error Free Seconds Rate. A measurement of the time, in seconds, in which there were no errors detected in the signal being monitored.
Error Insert	A common function button that allows a single error to be inserted into the transmit data stream. The type of error and insertion rate are determined using the Error to Insert and Error Insert Rate functions.
Event Log	A function that displays the alarm, error, and pointer activity in a four-column table under the Results tab.
F1 byte	Regenerator Section (for SDH) or Section (for SONET) user channel byte. This byte is set aside for the user's purposes. It can be read and/or written to at each section terminating equipment in that line.
F2 byte	Higher Order Path (for SDH) or Path (for SONET) user channel byte. This byte is used for user communication between path elements.
F3 byte	Higher Order Path (for SDH) or Path (for SONET) user channel byte. This byte is allocated for communication purposes between path elements and is payload dependent.
F4 AIS (End-to-End)	In ATM, an Alarm Indication Signal detected throughout the virtual path.
F4 AIS (Segment)	In ATM, an Alarm Indication Signal detected over a segment of a virtual path.
F5 AIS (End-to-End)	In ATM, an Alarm Indication Signal detected throughout the virtual channel.
F5 AIS (Segment)	In ATM, an Alarm Indication Signal detected over a segment of the virtual channel.
F4 RDI (End-to-End)	In ATM, an Alarm Indication Signal detected over a segment of the virtual channel.
F4 RDI (Segment)	In ATM, a Remote Defect Indication detected over a segment of the virtual path.
F5 RDI (End-to-End)	In ATM, a Remote Defect Indication detected throughout the virtual channel.

Term	Definition
F5 RDI (Segment)	In ATM, a Remote Defect Indication detected over a segment of the virtual channel.
FAS	Frame Alignment Signal. Refers to either TS0 or Bits 2-8 of the first byte of even-numbered E1 frames.
FEBE	Far End Block Errors. Count of E-Bit errors, which are SMFs in error at the far end, as determined by a CRC-4 error.
GCRA	Generic Cell Rate Algorithm.
GFC	Generic Flow Control. Available for UNI Interface only. Sets the first four bits of the ATM cell header for a UNI interface. The GFC field allows the use of wild card characters. A wild card is transmitted as a 0 and can be received as a 0 or 1.
Help	A common function tab that displays the NIC's online help user guide, which provides detailed functional descriptions and procedures.
HP-OK	Higher-Order Path OK (SDH only). In the Quick Status LEDs area, this is a status LED.
HP-RDI	Higher-Order Path - Remote Defect Indicator (SDH only). In the Quick Status LEDs area, an alarm LED indicating a signal was returned to the transmitting HP Terminating Equipment upon detecting a Loss of Signal, Loss of Frame, or AIS defect.
HP-REI	Higher-Order Path - Remote Error Indication (SDH only). In the Quick Status LEDs area, an error LED indicating to the transmitting node that an errored block has been detected at the HP receiving node.
HP-UNEQ	Higher-Order Path - Unequipped (SDH only). In the Quick Status LEDs area, an alarm LED indicating an all-zeros patterns was detected in the C2 byte. This byte is received from the HP terminating equipment.
J0 Byte	The J0 byte is part of the Section OH (for SONET) or Regenerator Section (for SDH) and is known as the Section trace or J0 trace.

Term	Definition
J1 Byte	Higher-Order VC-N path (for SDH) or Path Overhead STS (for SONET) trace byte. This user-programmable byte repetitively transmits a 15-byte, E.64 format string plus 1 byte CRC-7. A 64 byte free format string is also permitted for this Access Point Identifier. This allows the receiving terminal in a path to verify its continued connection to the intended transmitting terminal.
Large LEDS	A common function tab that displays LED Error and Alarm indicators in a large, easy-to-read format, which covers the entire touch screen area.
LOF	Loss of Frame. In the Quick Status LEDs area, an alarm LED indicating a frame alignment problem with the incoming SONET or SDH signal has been detected. An LOF is reported if a Severely Errored Frame (for SONET) or an Out of Frame (for SDH) defect continues for three milliseconds or longer.
LOS	Loss of Signal. In the Quick Status LEDs area, an alarm LED indicating a valid SONET or SDH/PDH signal is not being received. If an all-zeros pattern exists for 100 microseconds or longer on the incoming SONET or SDH signal, then an LOS is reported.
MS-AIS	Multiplex Section - Alarm Indication Signal (SDH only). In the Quick Status LEDs area, an alarm LED indicating an all-ones characteristic or adapted information signal was detected on the MS. It is generated to replace the normal traffic signal when it contains a defect condition. This prevents consequential downstream failures being declared or alarms being raised.
MS-RDI	Multiplex Section - Remote Defect Indicator (SDH only). In the Quick Status LEDs area, an alarm LED indicating a signal returned to the transmitting MS Terminating Equipment upon detecting a Loss of Signal, Loss of Frame, or AIS defect.
MS-REI	Multiplex Section - Remote Error Indication (SDH only). In the Quick Status LEDs area, an error LED indication returned to a transmitting node that an errored block has been detected at the MS receiving node.
MS OK	Multiplex Section Overhead OK (SDH only). In the Quick Status LEDs area, this is a status LED.

Term	Definition
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.
OAM	Operation and Maintenance Cell. A cell that contains ATM LM information. it does not form part of the upper layer information transfer.
OC-48	A common function tab that provides access to OC-48 function, allowing you to configure your unit for Transmit or Receive mode, establish TX and RX test settings, view test results, and monitor performance. **Note:** Your unit must contain the OC-48/STM-16 hardware for this tab to appear. Also, the unit must be configured for SONET mode.
OH	Extra bits in a digital stream used to carry information besides traffic signals. Orderwire, for example, would be considered overhead information.
OOF	Out of Frame (SDH only). In the Quick Status LEDs area, an alarm LED indicating four consecutive frames have been received with invalid or errored framing patterns.
Passthru	A function that allows an incoming signal to pass through the unit without altering the data in the signal.
PAT Sync	Loss of Pattern Synchronization (SONET or SDH). In the Quick Status LEDs area, an alarm LED indicating a loss of pattern synchronization.
PCR	Peak Cell Rate.
PDH	Plesiochronous Digital Hierarchy. Developed to carry digitalized voice over twisted pair cabling more efficiently. This evolved into the North American, European, and Japanese Digital Hierarchies where only a discrete set of fixed rates is available; namely, nxDS0 (DS0 is a 64 KBPS rate) and then the next levels in the respective multiplex hierarchies.
PLCP	Physical Layer Convergence Protocol.
POI	Path Overhead Identifier.
Pointer	Indicates the beginning location of a SONET or SDH payload consisting of H1 and H2 pointer bytes.
Print	A common function button that prints a report of error and alarm results or a listing of current function settings.

Term	Definition
PTR-ADJ	Pointer Adjustment. In the Quick Status LEDs area, an event LED indicating a Pointer adjustment has been received.
REI	Remote Error Indication. An indication returned to a transmitting node (source) that an errored block has been detected at the receiving node (sink). This indication was formerly known as Far End Block Error (FEBE).
Restart	A common function button that clears and resets all error, alarm, and event activity counters, statistics, and LEDs. It also starts any activity that was stopped using the Stop button.
RS OK	Regenerator Section Overhead OK (SDH only). In the Quick Status LEDs area, this is a status LED.
RX:	Receive Signal. In the Quick Status LEDs area, a status LED that displays the received optical power. For STM-16, the optimum input range is from -5 dBm to -24 dBm. A value of -30 dBm or below indicates no signal.
SCNR	Selected Cells Not Received. An ATM LED that indicates if monitor or detail channels are not receiving cells.
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).
SDH	Synchronous Digital Hierarchy.
SECBR	Severely Errored Cell Block Ratio.
STM-16	A common function tab that allows you to configure your unit for SDH Transmit or Receive mode, establish TX and RX test settings, view test results, and monitor performance. **Note:** This tab appears when the unit is configured for SDH mode.
Stop	A common function button that halts the current test in progress and takes a snapshot of error, alarm, and event activity.
System	A common function tab allowing you to set NIC preferences, general settings, and file access functions.

Term	Definition
TC-AIS	Tandem Connection-Alarm Indication Signal. Indicates if IEC bits 1110 are being received from upstream TCM equipment. (Bits 1-4 of the N1 byte are the IEC bits.) This is an alarm LED.
TC-IEC	Tandem Connection-Incoming Error Count. Indicates a B3 error count is being received from downstream TCM equipment. Bits 1-4 of the N1 byte are used for this indicator. This is an error LED.
TC-LOF	Tandem Connection-Loss of Frame. Indicates the loss of a valid multiframe pattern (frame alignment signal - FAS) from upstream TCM equipment. This is an alarm LED.
TC-ODI	Tandem Connection-Outgoing Defect Indicator. Indicates that the unit is sending an ODI alarm to upstream TCM equipment. Bit 7 in multiframe 74 of the N1 byte is used for this indicator. This is an alarm LED.
TC-OEI	Tandem Connection-Outgoing Error Indication. Indicates that the unit is sending an OEI error to upstream TCM equipment. Bit 6 of the N1 byte is used for this indicator. This is an error LED.
TC-RDI	Tandem Connection-Remote Defect Indication. Indicates that a defect has occurred at the downstream TCM equipment. The unit is receiving an alarm. Bit 8 in multiframe 73 of the N1 byte is used for this indicator. This is an alarm LED.
TC-REI	Tandem Connection-Remote Error Indication. Indicates that an error has occurred at the downstream TCM equipment. The unit is receiving an error. Bit 5 of the N1 byte is used for this indicator. This is an error LED.
TC-TIM	Tandem Connection-Trace Identifier Mismatch. Indicates that the incoming TC trace does not match the expected TC trace. This appears as an alarm count on the Results' Alarm screen.
TC-UNEQ	Tandem Connection-Unequipped. Indicates that a 00h pattern has been detected in the N1 byte of a Tandem Connection. This is an alarm LED.
VBR	Variable Bit Rate. A voice service over an ATM switch.

Term	Definition
VCC	Virtual Channel Connection. As an ATM term, it is a concatenation of VCLs that extend between the points where the ATM service users access the ATM layer. The points at which the ATM cell payload is passed to or received from the users of the ATM layer (i.e., a higher layer or ATM entity) for processing signify the endpoints of a VCC. VCCs are unidirectional.
VCI	Virtual Channel Identifier. The address or label of a Virtual Channel (VC).
Virtual Channel	A communications path between two nodes identified by label rather than fixed physical path.
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 Link	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.
Virtual Path Identifier (VPI)	The address of a Virtual Path. An eight-bit field in the ATM header that identifies the Virtual Path (i.e., virtual circuit) over which the transmitted data will flow from the transmitting device to the target device.
X-Bit	For E1, bits 5,7, and 8 of the CAS channel (Timeslot 16) in the first frame of the multiframe.

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