

FLUKE®

E3port Plus

Handheld E3/ATM Network Analyzer

Users Manual

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Chapter 1

Introduction

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About This Manual

The *E3port Plus Users Manual* describes how to operate the E3port Plus handheld E3/ATM analyzer and provides instructions on how to test and evaluate E3 networks and ATM services and equipment.

Who This Manual Is For

This manual provides pertinent technical information and instruction on the operation and use of the E3port Plus. It is written for anyone who uses this product to test and troubleshoot E3 and ATM networking problems, for those involved in the installation, maintenance, and deployment of E3 and ATM networks, and for individuals who perform network acceptance testing.

What You Should Know

This manual is not meant to be a tutorial in data communications and networking nor an ATM tutorial. A basic familiarity with wide-area networking, in general, and an in-depth understanding of E3 networks and ATM protocols, in particular, are required to effectively understand and use this manual.

How to Use This Manual

We suggest that the first-time user continue with this chapter, “Introduction”. This chapter describes the features and capabilities of the E3port Plus and familiarizes you with the safety precautions regarding use of the tester.


Next read Chapter 2 “Controls and Connections”. Before you begin using the E3port Plus, you should familiarize yourself with the functions of the keys, status indicators, and other elements on the tester’s front panel. You also need to understand the menu interface and how to navigate through the E3port Plus menus. This chapter covers these fundamentals.

After you become acquainted with the tester’s interface elements, go to Chapter 3 “Setting Up and Operating the E3port Plus”, which shows you how to set up and program the overall operation of the tester so that it suits your particular style and preference for working.

The remaining chapters show you how to run specific tests and perform other operations necessary for troubleshooting network problems and monitoring network performance.

Notations and Typographical Conventions

The following notations and typographical conventions are used in this manual:

Key names	The names of keys are in boldface type. For example, the AUTOTEST key and the Print key.
Key sequences	A plus sign, as in SHIFT 1+ M , indicates that you should press and hold down the SHIFT 1 key and then press the M key.
Screen titles	The titles of screens are in capital letters and boldface type. For example, the SYSTEM INFORMATION screen.
Options	Options are boldface type. For example, the Date option.
Arrow keys	The arrow keys are the four keys that encircle the ENTER key. The name of an individual arrow key refers to the direction in which the arrow points: the Down Arrow key, the Left Arrow key, the Right Arrow key, and the Up Arrow key.
Italics	Italic type is used for emphasis. For example: Do <i>not</i> operate the unit in the presence of flammable gases.
Lists	Procedures are shown in sequentially numbered lists.
Monospace	Monospace type is used to indicate messages displayed on the tester's LCD. For example, INITIALIZING ANALYZER.
Cautions	A caution message advises you that failure to take or avoid a specific action can result in loss of data. All cautions are preceded by the word "Caution".
Warnings	A warning message cautions you that failure to take or avoid a specific action can result in physical harm to you or damage to the tester. All warnings are preceded by this symbol  and the word "Warning".

Introduction

The E3port Plus portable handheld tester provides an extensive set of E3 and ATM testing capabilities that address a broad range of test requirements for E3- and ATM-based transmission and communications systems.

With the growing deployment of the ATM technology, it is becoming increasingly important for service personnel to be able to quickly and effectively test ATM network equipment and services as well as E3 networks. The E3port Plus addresses this need by combining E3 testing capability with an advanced set of ATM testing features. This practical solution enables you to do detailed testing from the E3 physical layer up through the ATM layer. And, you can take the E3port Plus with you and do this testing either on the customer premises (inside the NID) or anywhere in the central office. With the E3port Plus, you can easily test and verify customer service contracts, ensure proper conformance of ATM equipment, and qualify network operation and performance.

The following sections describe the features and capabilities of the E3port Plus and provide important information about the operation and use of the tester.

Overview of E3port Plus Features and Capabilities

The E3port Plus provides you with E3 and ATM testing capability in a single, handheld design. At the physical layer, you can use the E3port Plus to diagnose many common E3 network problems. The tester provides complete E3 error and alarm transmission and monitoring capability so that you can effectively isolate E3 problems and test E3 networks from any access point. The E3port Plus also provides the added benefit of testing the Physical Layer Convergence Protocol (PLCP) level when testing G.751 ATM networks.

The E3port Plus also provides the following features:

- Transmission and detection of E3 and PLCP errors and alarms
- E3 frame testing
- E3 Bit Error Rate testing
- Line error measurements
- Service availability analysis

At the ATM layer, the E3port Plus provides an advanced set of features that supports the monitoring of ATM network conditions, the testing and qualifying of ATM services, and ATM equipment installation testing. More specifically, you can:

- Automatically discover ATM activity and list up to 64 unique ATM headers that are in use along with their associated bandwidth allocations
- Transmit up to eight ATM streams with traffic profiles that simulate CBR and VBR service categories. Selected VBR traffic distribution patterns simulate random, burst, or network file transfer traffic
- Determine the bit error rate experienced by test cell streams after transmission through a network
- Perform these Quality of Service (QoS) tests: Cell Loss, Cell Transfer Delay, and Cell Delay Variation (1- and 2-point)
- Test access to customer premise equipment using IP Ping transmission and monitoring capability
- Capture and view cell payloads so that user data can be analyzed
- Test I.610 OAM Fault Management and Performance Management functions
- Monitor I.610 OAM cells
- Perform AAL type detection
- Perform conformance testing using GCRA
- Test UNI point-to-point signaling procedures to assess Switched Virtual Circuit (SVC) capability

In addition to advanced diagnostic and testing capabilities, the E3port Plus gives you immediate feedback on the condition of any E3 circuit under test through its front-panel LEDs. The tester also lets you print test results, making it possible for you to produce reports of network statistics.

Modes of Operation

The E3port Plus supports two basic framing modes:

- G.751 (PLCP or HEC delineated)
- G.832 (the default)

Following are descriptions of these two modes of transmission.

Note:

You can set up the E3port Plus to operate in G.751 or G.832 mode. After the tester is configured to operate in one of these modes, all operations and results obtained are based solely upon the requirements of that mode. For instructions on how to configure the tester to operate in G.751 or G.832 mode, see "Setting Up the E3port Plus for E3 Network Testing" in Chapter 4.

G.751 Framed Operation

G.751 is an older, more established method of framing information on an E3 network. G.751 consists of E3 frames that are 1536 bits (192 bytes) long. Each frame has 12 bits of overhead, which is used in the following way:

- Bits 1-10 are the Frame Alignment Signal (FAS), which allows equipment to determine where the frame begins and ends.

When the FAS is properly detected, the equipment is said to be "in frame" or "framed". Whenever there is faulty equipment present or problems in the transmission system, the FAS cannot be detected. This type of condition is referred to as "out of frame" or OOF.

- Bit 11 is the Alarm Indication Signal (AIS) alarm. This alarm is generated any time the equipment loses its received signal or framing.
- Bit 12 is the National Use bit. This bit is reserved for different uses within each country that uses E3. This bit should be set to 1 wherever the signal crosses an international border.
- The remaining bits carry the E3 payload.

Physical Layer Convergence Protocol (PLCP)

When you set up the E3port Plus for G.751PLCP operation, it is configured to transmit and analyze the PLCP layer. Because the G.751 frame has very few diagnostic capabilities, PLCP is used to provide additional error checking and alarm capabilities. PLCP also allows the equipment to determine exactly where the ATM cells are located. Using a G.751 plus PLCP transmission system, ATM cells can be transmitted at a rate of 72,000 cells per second.

A PLCP frame can be anywhere from 530 to 534 bytes long. Its length changes dynamically so that, on average, a new PLCP frame begins every 125 microseconds. PLCP frames are not aligned with E3 G.751 frames; they float "freely" within the G.751 payload.

A PLCP frame has its own overhead, which consists of the following:

- A two-byte Frame Alignment Pattern, which is repeated nine times in each PLCP frame
- A one-byte Path Overhead Identifier, which is repeated nine times in each PLCP frame.
- Six bytes of Growth Octet. These bytes are not defined, but are reserved for future use.
- One byte F1 User Channel.
- One byte B1 (Bit Interleaved Parity) octet. This byte is used for BIP-8 calculations over the previous PLCP frame.
- One byte G1 of status information that contains a four-bit FEBE field that indicates PLCP Far End Block Errors (FEBE). The first bit is used for the PLCP Yellow Alarm and the remaining three bits are used for Link Status.
- Two bytes of M1, M2 Control information for DQDB systems.
- One byte used as the C1 Cycle/Stuff counter that tells how long the current PLCP frame is.

G.832 Framed Operation

G.832 is a newer method of framing information on an E3 network. A G.832 frame is almost three times longer (537 bytes) than a G.751 frame. A G.832 frame contains seven bytes (56 bits) of overhead information, which is over four times more than that contained in a G.751 frame. This overhead is used to provide more extensive error monitoring and alarm control than is available in G.751. Because of this, a PLCP layer is *not* required when using a G.832 system. The ATM cells are placed directly within the E3 G.832 frame.

A G.832 frame can carry 10 ATM cells in each frame. The frames come at a rate of 8,000 per second, providing for 80,000 ATM cells every second. Because a

G.832 system can carry 8,000 more ATM cells per second than a G.751 frame, it is a more efficient method of transmission.

The seven bytes of overhead in a G.832 frame contain the following:

- Bytes 1 and 2 are used as Frame Alignment Signals, FA1 and FA2. These allow a piece of equipment to correctly frame to a signal.
- Byte 3 is used as the Error Monitoring (EM) byte. A BIP-8 calculation is performed over all of the information in the previous frame and transmitted for comparison at the receiving equipment. Most transmission errors can be detected this way.
- Byte 4 is used as the Trail Trace (TT) byte. A "trail access point identifier" is transmitted repetitively in this byte to help equipment determine if its connections are correct. This byte operates in a 16-byte multi-frame, with 16 different bytes rotating every 16 x 832 frames.
- Byte 5 is used as the Maintenance and Adaptation (MA) byte. This byte contains 8 bits, which are used in the following way:
 - * Bit 1 carries the Far End Receive Failure Alarm (FERF).
 - * Bit 2 carries the Far End Block Error Indication (FEBE).
 - * Bits 3 - 5 contain the Payload Type Identifier (00-Unequipped; 001-Equipped, non-specific; 010-ATM; 011-SDH TU-12s).
 - * Bits 6 - 7 are payload dependent.
 - * Bit 8 is the Timing Marker, which is set to 0 to indicate that the timing source is traceable to a primary reference clock.
- Byte 6 is used as the Network Operator byte.
- Byte 7 is used as the General Purpose Communications Channel (GC). This byte provides voice and data connections for maintenance purposes.

The E3port Plus Handheld Tester: at a Glance

The E3port Plus is an easy-to-use handheld tester. It is rugged yet lightweight, so you can use it anywhere. This tester has features and capabilities and a level of performance previously found only in benchtop analyzers. Figure 1-1 highlights the key features of the E3port Plus.

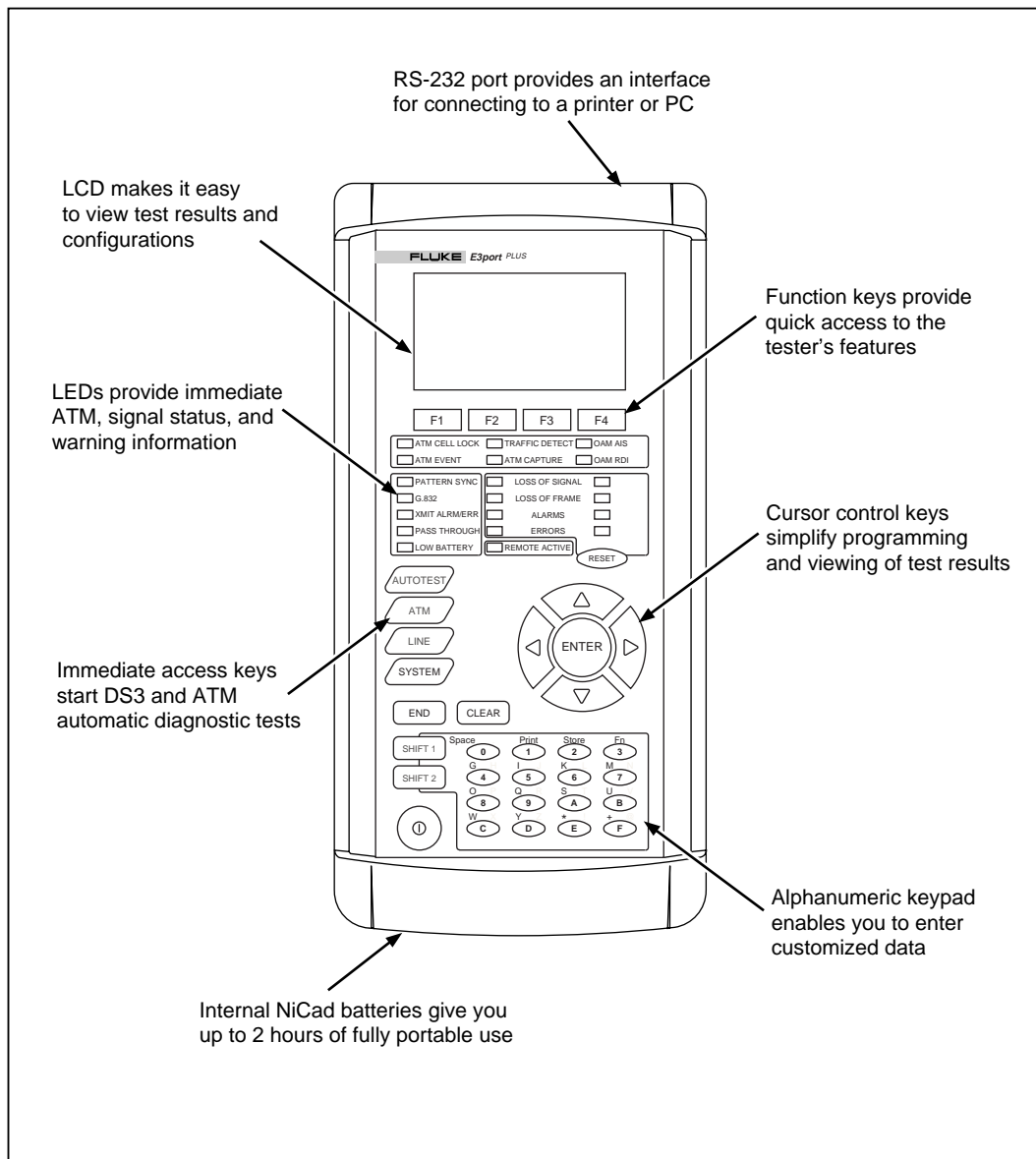


Figure 1-1. E3port Plus Features and Capabilities

Aag001.eps

E3port Plus Specifications

Following are the physical and operational characteristics of the E3port Plus.

Physical

Size (L x W x H): approximately 26.5 cm x 13.0 cm x 6.0 cm (10.4" x 5.1" x 2.4") with boot

Weight: less than 1.3 kg (2.9 lbs.)

Display: 8-line by 21-character backlit LCD

LED indicators: ATM Cell Lock, Traffic Detect, OAM AIS, ATM Event, ATM Capture, OAM RDI, Pattern Sync, G.832, XMIT Alarm/Err, Pass Through, Low Battery, Loss of Signal, Loss of Frame, Alarms, Errors, Remote Active

Connectors: two BNC connectors for input and output

Power

AC operation: operates from an external AC adapter/charger

Battery type: operates from an internal non-removable NiCad battery pack

Battery life: minimum battery life is two hours of continuous use

Battery recharge time: 12 hours maximum

Environmental

Operating temperature: 0° C to 50° C

Storage temperature: -20° C to 60° C

Humidity tolerance: 5% to 90% non-condensing

Standards Compliance

EMC: EN61326, including Amendment 1

Safety: EN61010, including Amendments 1 and 2

Telecomm: CTR24

Certifications

CE168X

RS-232 Port

Connector: RJ-11

Transfer rate: supports 1200, 2400, and 9600 bits per second

E3 Physical Layer

Receiver

Connector: BNC

Bit rates: 34,368 Mbps line rate +/-20 ppm

Data rate:

- G.832: 34.312×10^6 bps
- G.751PLCP: 33.888×10^6 bps
- G.751HEC: 34.328×10^6 bps

Input range: 0 dB to -20 dB of nominal

Timing: internal or recovered from the received signal

Signal Loss: no pulse received for 32 consecutive bit periods

Signal level meter: provides a measured level of the received signal within +/-20% accuracy

Transmitter

Connector: BNC

Output: 1.10 Volts peak typical

Output impedance: 75 ohm nominal unbalanced to ground

E3 and PLCP Framing, Errors, and Alarms

Supported framing formats: G.832 and G.751

Supported cell delineation:

- G.832: HEC
- G.751: PLCP and HEC

E3 errors detected:

- G.832: LCV, Framing, FEBE, BIP8
- G.751PLCP: LCV, Framing, PLCP BIP8, PLCP FE, PLCP FEBE
- G.751HEC: LCV, Framing

E3 errors injected:

- G.832: BIP8, FEBE, Frame Bit, LCV
- G.751PLCP: Fbit, LCV, PLCP LOF, PLCP FBit, PLCP FEBE, PLCP BIP8
- G.751HEC: LCV, Fbit

E3 alarms detected:

- G.832: LOS, OOF, AIS, FERF
- G.751PLCP: LOS, OOF, AIS, RAI, PLOF, POOF, PYEL
- G.751HEC: LOS, OOF, AIS, RAI

E3 alarms generated:

- G.832: FERF, AIS
- G.751PLCP: AIS, RAI, PLCP YEL
- G.751HEC: AIS, RAI

E3 Bit Error Rate test patterns:

- $2^{15}-1$ pseudo-random pattern
- $2^{20}-1$ pseudo-random pattern
- $2^{23}-1$ pseudo-random pattern
- 11111111
- 00000000
- 10101010
- 11001100
- 3 in 24
- 1 in 8
- 2 in 8
- 1 in 16
- QRSS
- User-defined

ATM Layer

Cell alignment: ATM cells carried in E3 payload, byte-aligned

Rate adaptation: provided by the insertion of idle or unassigned cells

Cell delineation:

- G.751HEC and G.832: cell delineation performed by using the HEC mechanism as described in ITU I.432
- G.751PLCP: cell delineation performed by using the PLCP framing mechanism

Header Error Checksum: generated and checked as described in ITU I.432

Payload scrambling: supports scrambling of ATM cell payloads within the E3 cell stream

ATM Transmission

Cell transmission streams: capable of transmitting up to eight simultaneous cell streams at bandwidths that aggregate to 100% or less of the available bandwidth

Transmission parameters: provides configurable SCR, PCR, CDVT, and Maximum Burst Size parameters to configure each stream

Traffic patterns: CBR (Constant Bit Rate) and VBR (Variable Bit Rate), including Burst and Poisson patterns defined by Fluke Corporation

ATM Reception

Automatic circuit detection: automatic discovery and presentation of the first 64 active cell streams

Circuit monitor formats:

- Statistics in cell counts, cells per second, megabits per second, and percent bandwidth
- Cell header in VPI/VCI, GFC/PT/CLP/HCS, and hexadecimal representation
- Sorting by "as found", VPI/VCI (high to low and low to high), and frequency (high to low and low to high)

Cell capture:

- Cell capture buffer is capable of holding 500 complete cells
- Each cell can be time-stamped, using a 24-bit timer that has a 145 ns. resolution. The cell buffer presents time of arrival or inter-cell arrival times.
- Trigger mechanisms are provided, which are based on cell header information

OAM cell detection: on a selected circuit, detects F4 and F5 flows (segment and end-to-end), AIS, RDI, Continuity Check, Loopback, Performance Management, Activation and Deactivation cells

ATM Tests

Bit Error Rate test: available within a single ATM cell stream

QoS tests: 1-point and 2-point CDV, CTD, Cell Loss

AAL detection

IP Ping and IP Ping Responder

OAM testing and detection

Conformance testing with GCRA

SVC

Notices, Warnings, and Operating Restrictions

The E3port Plus is intended for use by qualified personnel inside a central office or on a customer premises in areas where the network is protected against voltage transients (SELV circuits). The E3port Plus is *not* rated for use outdoors on an E3 span or anywhere telephone network voltages may be present (TNV1 circuits).

The following general safety precautions must be observed during all phases of operation, service and repair of this instrument. Failure to comply with these precautions or with specific warnings in this manual violates safety standards of design, manufacture, and intended use of this instrument. Fluke Corporation assumes no liability for the customer's failure to comply with these requirements.

Warning

- **For protection from electric shock hazard, the power cord ground must not be defeated.**
- **Do *not* operate the tester in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a safety hazard.**
- **Do not remove the covers. There are no user-serviceable parts inside. To avoid electric shock, use only the supplied power module.**

- **Should the LCD display become damaged, the liquid crystal material can leak. Avoid all contact with this material, especially swallowing. Use soap and water to thoroughly wash all skin and clothing contaminated with the liquid crystal material.**
- **This tester contains a Nickel-Cadmium battery. Used batteries should be disposed of by a qualified recycler or hazardous materials handler. Contact your authorized Fluke Service Center for recycling information.**

Service and Adjustment

Service and adjustment of this tester is to be performed only by trained Fluke Corporation service personnel.

If the E3port Plus requires service, pack it in the original shipping container and send it, postage paid and insured, to the nearest Fluke Service Center. Include a written description of the problem. Fluke assumes no responsibility for shipping damage.

If the E3port Plus is covered under warranty, it will be promptly repaired or replaced (at Fluke's option) and returned to you, postage paid, at no charge. See the registration card for warranty terms. If the warranty has lapsed, Fluke will repair the tester for a fixed fee and return it to you postage paid. Contact the nearest Service Center for information and repair prices.

For service information in the USA, call 1-888-99-FLUKE (1-888-993-5853). Outside the USA, contact the nearest Fluke Service Center.

AC Adapter/charger

Only the AC adapter/charger supplied by Fluke Corporation may be used with this equipment. The use of any other AC adapter/charger is expressly forbidden and will void all warranty rights.

If the battery does not charge, contact a Fluke Service Center. The NiCad battery is rated 3.6 V 4AH (Fluke part number 623014) and the in-line battery fuse is rated 250 V 3A (Fluke part number 645173). Both items must be replaced by Fluke Service Center personnel only.

The AC socket outlet shall be installed near the equipment and shall be easily accessible. Failure to have this outlet easily accessible may constitute a safety hazard.

Checking Your Package

Take time to check your E3port Plus package. The following items are included:

- *E3port Plus Users Manual*
- E3port Plus network analyzer with boot
- Padded soft case
- AC adapter/charger with power cord
- RJ-11 to DB-9 cable
- DB-9 to DB-25s female adapter
- DB-9 to DB-25s male adapter

Technical Support

Fluke Corporation offers a variety of support options to help you get the most from your E3port Plus. If you require technical support, please have the following information available:

- Your name and company
- E3port Plus model number and serial number
- E3port Plus software revision that appears when you power on the tester
- Any error messages or flags that appear on the screen
- Make, model numbers, and configurations of equipment under test
- A printout of the setup parameters for the E3port Plus

For application or operation assistance or information about the E3port Plus, call:

USA and Canada: 1-888-993-5853

Europe: +31 402-678-200

Japan: +81-3-3434-0181

Singapore: +65-738-5655

Anywhere in the world: +1-425-356-5500

Or, visit Fluke's website at www.fluke.com.

Chapter 2

Controls and Connections

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Introduction

This chapter familiarizes you with the physical layout of the E3port Plus so that you know where the various controls and connections are located and understand the functions of the keys and general status indicators. This chapter also describes the E3port Plus menu interface and shows you how to access and navigate through its menu system.

The Connector Panel

The connector panel (see Figure 2-1) is located at the top of the tester. It contains the following:

- **Printer/download serial port**
This is an RJ-11 female jack that accepts the Fluke-supplied serial conversion cable. With this cable, you can connect to a local printer or computer.
- **E3 signal connectors**
The IN and OUT connectors connect to the transmit and receive ports of a E3 network.
- **DC power input**
This is the connector for the AC power adapter/charger. This connector accepts 5 VDC input.

⚠ Warning

Only an AC adapter/charger supplied by Fluke Corporation can safely be used with the E3port Plus. Use of any other adapter voids your warranty and can damage the tester.

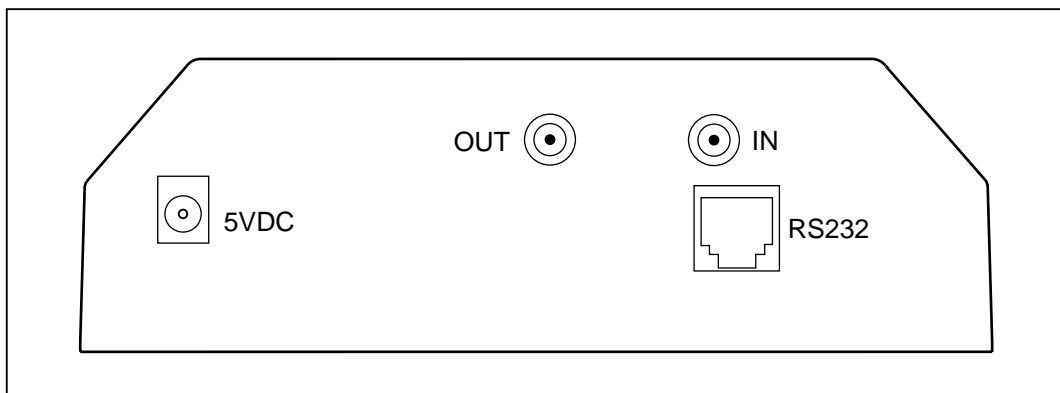


Figure 2-1. The Connector Panel is Located at the Top of the Tester

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The Front Panel

Figure 1-1 is a representation of the E3port Plus front panel. A description of each section on this panel follows the illustration.

LCD

The E3port Plus has an 8-line by 21-character Liquid Crystal Display (LCD), which is located at the top of the front panel (see Figure 2-2). The LCD displays the tester's menus as well as any error messages, test results, and setup parameters.

Function Keys

Just below the LCD are four keys labeled **F1**, **F2**, **F3**, and **F4**. The function of these keys is screen dependent. To find out the current function of key, look on the LCD directly above the name of the key. For example, on the screen that follows (Figure 2-2), the function keys pertain to the screen entitled **ATM BER TEST (P1)**.

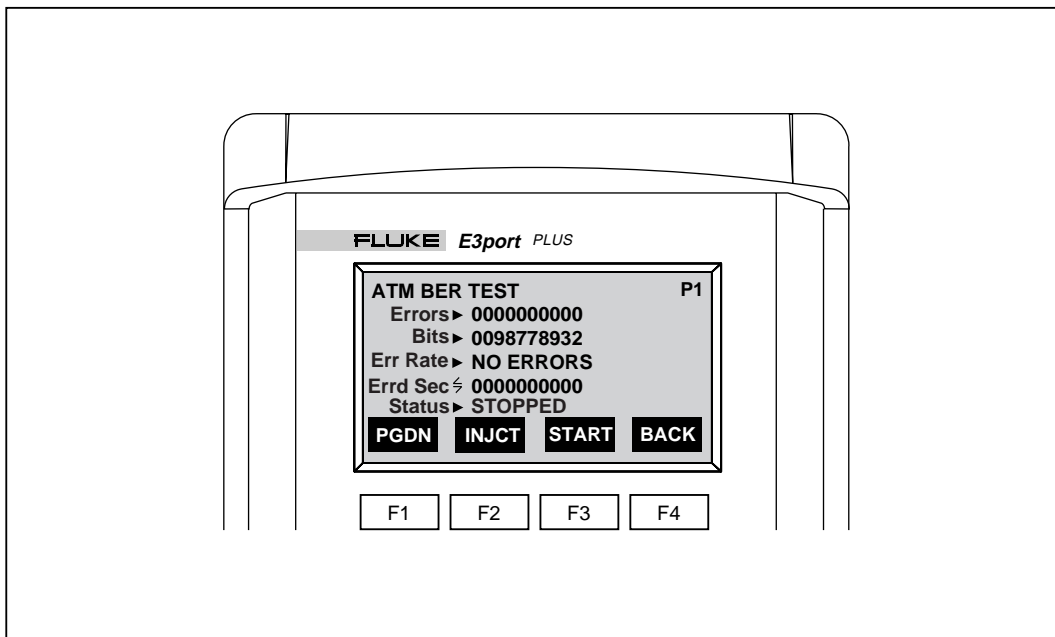


Figure 2-2. The Function Keys are Screen Dependent

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In Figure 2-2, the function keys perform the following actions on the **ATM BER TEST (P1)** screen:

- **F1(PGDN)** displays the next page.
- **F2(INJCT)** injects a single error.
- **F3(START)** starts an ATM BER test.
- **F4(BACK)** returns you to the **ATM TESTS (P1)** menu.

ATM LEDs

The E3port Plus has six ATM LEDs. These LEDs are located on the front panel immediately below the four function keys (see Figure 2-3).

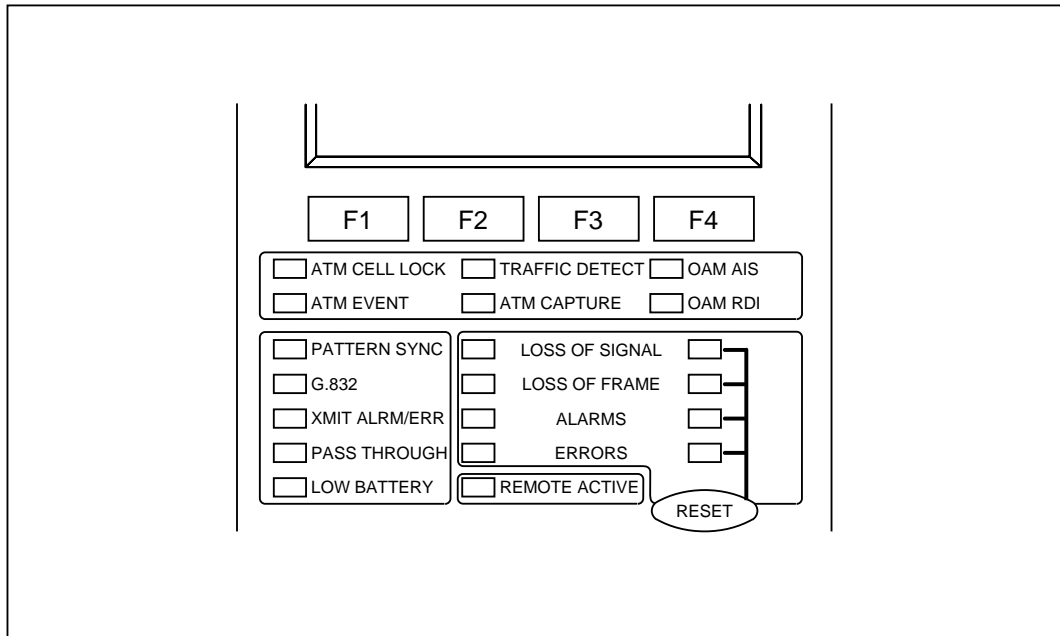


Figure 2-3. Front Panel ATM, Status and Warning LEDs

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The ATM LEDs, when lit, indicate the following conditions:

- **ATM CELL LOCK**
Lights green when ATM cell delineation is achieved, indicating that ATM cells are currently being detected in the received E3 transmission. This LED is off if there is no ATM cell delineation.
- **TRAFFIC DETECT**
Lights green whenever cells other than idle or unassigned are detected in the last second. Updated every second.
- **OAM AIS**
Lights yellow whenever the tester detects an Alarm Indication Signal (AIS) OAM cell while running OAM detection or OAM tests.
- **ATM EVENT**
Undefined in the current release.
- **ATM CAPTURE**
Lights green when the programmed conditions for capturing ATM cells are met.
- **OAM RDI**
Lights yellow whenever the tester detects a Remote Defect Indication (RDI) OAM cell while running OAM detection or OAM tests.

Status LEDs

The status LEDs are found on the left side of the tester directly under the row of ATM LEDs (see Figure 2-3). These LEDs indicate the operational status of your E3port Plus.

- **PATTERN SYNC**
Lights to indicate that the tester has detected and synchronized itself to the configured BER test pattern.
- **G.832**
Lights to indicate that G.832 is the framing type selected for the tester.
- **XMIT ALRM/ERR**
Lights whenever the tester is transmitting an alarm or error.

- **PASS THROUGH**

Lights when the tester is in a loopback mode.

- **LOW BATTERY**

When flashing, this LED indicates that the tester is critically low on battery power. When this condition occurs, connect the tester to the supplied AC adapter/charger and recharge it (see “Responding to Low Battery Warnings” in Chapter 3 for details).

When constantly lit, indicates that the tester has a couple of minutes of operating time remaining.

Warning LEDs

The E3port Plus has four pairs of warning LEDs (see Figure 2-3), which light under the following circumstances:

- **LOSS OF SIGNAL**

Lights red to indicate a loss of signal level at the E3 input connection and/or a very low ones density, which causes a dropout of the E3 signal.

Lights yellow (history) to indicate that a loss of signal was detected at some time in the past but is not currently being detected.

- **LOSS OF FRAME**

Lights red to indicate a loss of E3 framing.

Lights yellow (history) to indicate that a loss of E3 framing was detected at some time in the past but is not currently being detected.

- **ALARMS**

Lights red when the tester detects an E3 or PLCP alarm.

Lights yellow (history) to indicate that an E3 or PLCP alarm was detected at some time in the past but is not currently being detected.

- **ERRORS**

Lights red when the tester detects an E3, PLCP, or ATM HCS (Header Checksum) error.

Lights yellow (history) to indicate that one or more of these errors were detected at some time in the past but are no longer being detected.

- **REMOTE ACTIVE**

Flashes when you are downloading files from a PC to the E3port Plus.

RESET Key

The **RESET** key is located on the right side of the tester just below the warning LEDs (see Figure 2-3). Pressing this key clears the warning history (yellow) LEDs.

Immediate Access Keys

The E3port Plus has four immediate access keys (see Figure 2-4), which are located halfway down the left side of the front panel. These keys, when pressed, have the following functions:

- **AUTOTEST** accesses the automatic test routines.
- **ATM** accesses ATM tests and setups.
- **LINE** accesses Line tests and setups.
- **SYSTEM** accesses system configuration parameters.

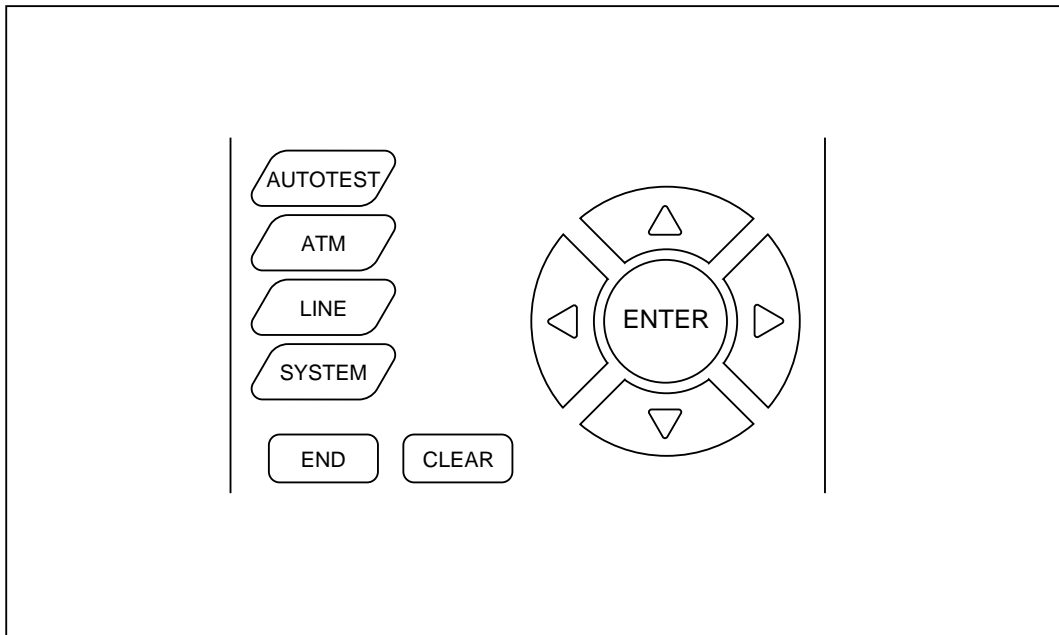


Figure 2-4. Immediate Access, Arrow, and ENTER Keys

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Arrow Keys and the ENTER Key

The arrow keys are the four arrow-shaped keys that encircle the **ENTER** key (see Figure 2-4). These keys control the on-screen cursor and, when pressed, move you to the different fields on a particular menu.

The **ENTER** key, when pressed, selects the option that is currently highlighted or the setting that the cursor is positioned on.

The END Key

The **END** key is located directly under the immediate access keys (see Figure 2-4). Pressing the **END** once places you at the top-level introductory screen. Pressing **END** twice in quick succession resets the tester and places you at the top-level introductory screen.

The CLEAR Key

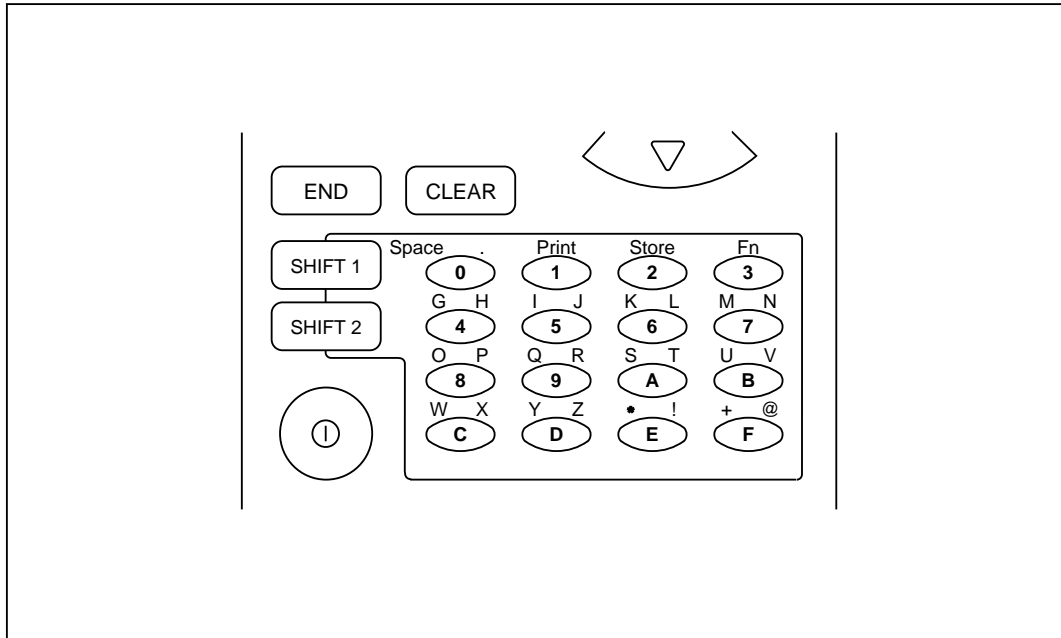
The **CLEAR** key is to the right of the **END** key (see Figure 2-4). Pressing **CLEAR** resets all of the counters on a test result screen to zero.

Alphanumeric Keypad

The alphanumeric keypad is located at the bottom of the front panel (see Figure 2-5). You use this keypad to type test parameters and to make changes to information on a menu. The oval-shaped gray keys contain the values 0-F and are used to enter numeric and hexadecimal values. When you press a gray key, the value contained on the face of the key is displayed on the LCD.

Above each gray key is a pair of alphabetic characters from G-Z, a command name (for example, **Print**), or a pair of special characters, such as the space, asterisk (*), or exclamation mark (!).

Notice that the color of a character or command name above each gray key is either yellow or white and that the color corresponds, respectively, to the color of the **SHIFT 1** and **SHIFT 2** keys. When you press and hold a yellow or white **SHIFT** key, then press a gray key, the tester displays the character or performs the command whose color corresponds to the color of the **SHIFT** key. For example, if you press and hold **SHIFT 1**, then press **Print**, the information associated with the current screen is printed.



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Figure 2-5. Use the Alphanumeric Keypad to Type Test Parameters

The Print, Store, and Fn Command Keys

The **Print**, **Store**, and **Fn** keys are located on alphanumeric keypad above the **1**, **2**, and **3** keys, respectively (see Figure 2-5). Table 2-1 lists these command keys and describes their function.

Note

*These keys are used with the **SHIFT 1** key.*

Table 2-1. Function of Print, Store, and Fn keys

Key Name	Purpose
Print	Prints test result and configuration information. See Appendix A for representative samples of the printouts you can obtain.
Store	Not implemented in this release.
Fn	A general function key which is used to graphically display ATM results.

The E3port Plus Menu System

The E3port Plus has a menu interface. Figure 2-6 illustrates the structure of the menu system.

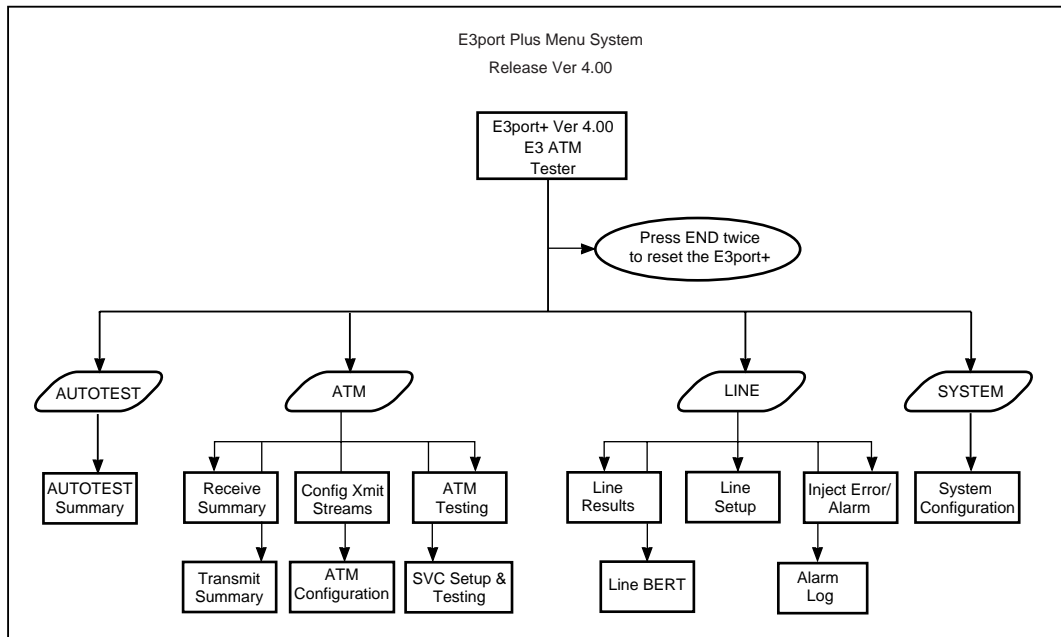


Figure 2-6. E3port Plus Menu System

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Displaying a Main Menu

A main menu contains entries that are grouped according to the types of operations they perform. The E3port Plus has four main menus:

- **AUTOTEST**
- **LINE SELECTIONS**
- **ATM SELECTIONS**
- **SYSTEM INFORMATION.**

To display a main menu, press one of the four immediate access keys located on the left side of the tester.

Choosing an Option from a Main Menu

To choose an option from a main menu, press the **Up** or **Down Arrow** key to move the cursor to the option. When the option highlighted, press **ENTER**. The menu or screen associated with the option is displayed.

The Menu Page and Screen Page

The main elements of a menu and screen page are identified in the Figure 2-7 and described in the text that follows.

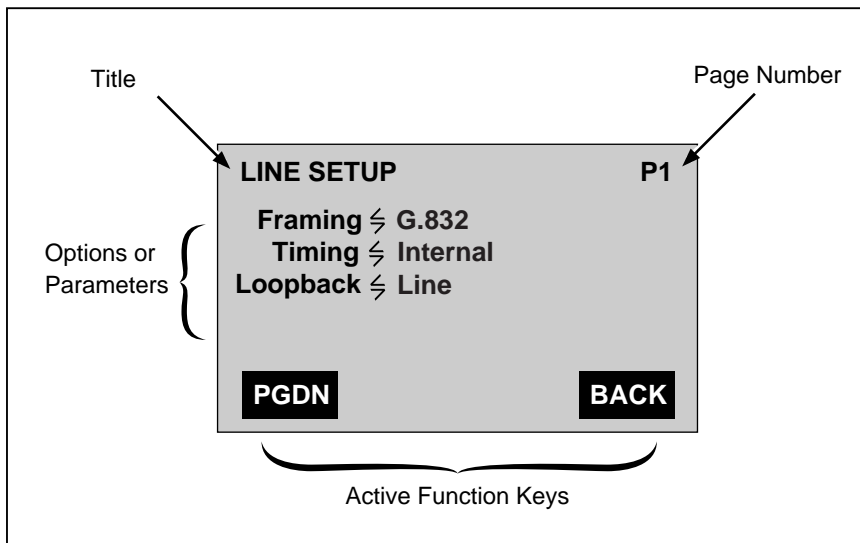


Figure 2-7. Sample Screen Page

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A menu or screen page has four main parts:

- Title

The title of a menu or screen is located on the first line. In Figure 2-7, the title of the screen is **LINE SETUP**.

- Page number

Many menus and screens have more than one page of entries. If there is more than one page, the page number is displayed in the upper right. In Figure 2-7, you are viewing Page 1 (P1).

- List of menu options or parameters

Options or parameters are found under the title. In Figure 2-7, the screen has three parameters: **Framing**, **Timing**, and **Loopback**.

- Function key names

The function keys that are active for the displayed menu or screen are located at the bottom of the screen. In this example, two function keys are active: the **PGDN** (Page Down) and **BACK** keys.

Special Symbols Used on Menus and Screens

The E3port Plus uses special symbols on its menus and screens to guide you in the operation of the tester. Table 2-2 lists these symbols and describes their meaning.

Table 2-2. Special Symbols Used on Menus

Symbol	Description
⇐	Indicates that you can select a setting or value for the parameter by pressing the Left or Right Arrow key.
:	Indicates that you can supply a value for the parameter by using the keypad.
▶	Indicates that what follows it is an information field that has no choices and cannot be modified.
↵	Indicates that the parameter has an associated menu. To display the menu, press ENTER .
-	Indicates that the parameter is disabled or deactivated.
✓	Indicates that the parameter is enabled or activated or specifies a "CARE" (include) condition for a parameter.
X	Indicates that a parameter can be sent only once or specifies a "DON'T CARE" condition for a parameter.

Exiting a Menu

There are three ways to exit a menu:

- If you want to return to the top-level introductory menu, press **END**.
- If you are at one level in a menu's hierarchy and want to go up to the next level, press **F4(BACK)**.
- If you want to go to a main menu, press the desired immediate access key.

Chapter 3

Setting Up and Operating the E3port Plus

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Introduction

This chapter covers the basics of setting up and operating the E3port Plus. The first section guides you through connecting the tester to an external power source, external peripherals, and the network.

The second section covers basic E3port Plus operations. You learn how to turn on the tester and perform such fundamental tasks as clearing the display, setting the date and time, printing results and configuration reports, and running the automatic tests.

Connecting the E3port Plus

This section shows you how to connect the E3port Plus to an external power source and how to connect the tester to a printer or PC so that you can store or print test results and configurations. The information in this section also shows you how to connect the tester to the network.

Connecting to the External Power Supply

When the tester is connected to an AC outlet, you can use the power supply as a continuous power source. In this way, you can test for long periods of time without concern for depleting the batteries. The power supply also allows you to recharge the tester's battery.

To connect the tester to an AC outlet, follow these steps:

1. Plug the AC adapter/charger into an AC outlet.
2. Connect the power supply jack to the 5 VDC jack on the connector panel (see Figure 2-1).
3. Turn on the E3port Plus and begin usage.

Connecting the E3port Plus to a Printer or PC

The E3port Plus can interface with a printer or a personal computer. This capability enables you to directly print paper copy of acquired test results or copy results to a file for later printing.

To connect the tester to a printer or a PC, you need the following supplied accessories:

- RJ-11 to DB-9 female cable for direct connection to a PC
- DB-9 male to DB-25 female adapter for connection to a computer
- DB-9 male to DB-25 male adapter for connection to a printer.

Note

If you have trouble connecting your tester to a printer or PC, you may need additional equipment. Contact Fluke Technical Support for assistance.

Tables 3-1 through 3-4 describe the serial control signals available at each of the connectors. Refer to these tables when establishing working connections.

Table 3-1. RJ-11 Pin Descriptions

Pin	3	4	5	6	1,2
Description	CTS clear to send	RXD receive data	TXD transmit data	RTS request to send	GND signal ground

Table 3-2. Serial Port DB-9 (Female) Computer Connector Socket Descriptions

Pin	7	3	2	8	5
Description	CTS clear to send	RXD receive data	TXD transmit data	RTS request to send	GND signal ground

Table 3-3. Serial Port DB-25-(Female) Computer Connector Socket Descriptions

Pin	4	2	3	5	7
Description	CTS clear to send	RXD receive data	TXD transmit data	RTS request to send	GND signal ground

Table 3-4. Serial Port DB-25 (Male) Printer Connection Pin Descriptions

Pin	5	3	2	4	7
Description	CTS clear to send	RXD receive data	TXD transmit data	RTS request to send	GND signal ground

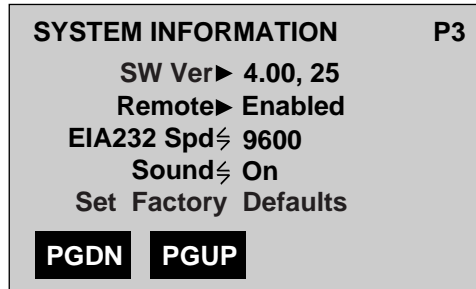
To connect the tester to a printer or PC:

1. Plug the RJ-11 end of the serial cable to RJ-11 cable into the RS-232 jack, which is located on the connector panel (see Figure 2-1).
2. Plug the DB-9 end of the serial cable into the serial port on the printer or PC.

Note

You may need to adapt the DB-9 end of the serial cable with one of the supplied DB-9 to DB-25 adapters.

3. Set the baud rate on the tester. To do this:
 - a. Press **SYSTEM** to display the **SYSTEM INFORMATION (P1)** screen.
 - b. Press **F1(PGDN)** twice to display the **SYSTEM INFORMATION (P3)** screen:



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The cursor is positioned on the **EIA232 Spd** parameter.

- c. Press the **Right** or **Left Arrow** key to select the appropriate interface speed (9600, 2400, or 1200 baud) for your application.
4. Configure your printer or PC as follows:
 - Baud rate Match E3port Plus
 - Data bits 8
 - Stop bits 1
 - Parity None

5. To test the connection, press **END**.

The tester returns you to the top-level introductory screen. The printer or PC running the terminal emulation program prints or displays this message:
E3port Plus.

Connecting the E3port Plus to the Network

To connect your E3port Plus to the network:

1. To receive network signals, connect one end of a BNC cable to the E3port Plus IN connector (see Figure 2-1). Connect the other end to the transmit (Tx) port of the equipment under test.
2. To transmit network signals, connect a second BNC cable to the E3port Plus OUT connector. Connect the other end to the receive (Rx) port of the equipment under test.

Note

To create a loopback situation to verify E3port Plus operation, connect one end of a single BNC cable into the IN jack. Connect the other end of this cable into the OUT jack.

Performing Basic Operations

You need to know some fundamental things about how to operate the E3port Plus before you can start to configure the tester to perform tests or to acquire test results. In this section, you learn how to turn on the tester and how to do essential tasks that you will need to operate the tester.

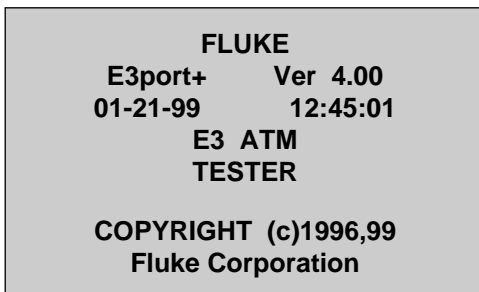
Turning on the E3port Plus

To turn on the E3port Plus:

1. Press the **ON/OFF** button, which is located on the lower left side of the front panel.

The LCD lights up, and this message is displayed: Initializing Analyzer. Please wait.

The tester's LEDs light in sequence. After the tester finishes initializing, it beeps and displays the top-level introductory screen (see Figure 3-1).



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Figure 3-1. Top-Level Introductory Screen

2. Connect a loopback cable or connect the E3port Plus to the network (see “Connecting the E3port Plus to the Network” for details).

Setting the Date and Time

The E3port Plus contains a real-time clock. To set the date and time, follow these steps:

1. Press **SYSTEM** to display the **SYSTEM INFORMATION (P1)** screen.
2. Press **F1(PGDN)** to display the **SYSTEM INFORMATION (P2)** screen:



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3. Press the **Down Arrow** key to move the cursor to the **Date** parameter. Then, use the keypad to supply the desired date.
4. Press the **Down Arrow** key to move the cursor to the **Time** parameter. Then, use the keypad to supply the desired time (in 24-hour format).

The tester is now set up with your date and time selections.

Adjusting the Contrast and Backlight of the LCD

If your screen is too light or too dark, you may need to adjust the contrast or the backlight (the light behind the LCD). Follow these steps:

1. Press **SYSTEM** to display the **SYSTEM INFORMATION (P1)** screen.
2. Press **F1(PGDN)** to display the **SYSTEM INFORMATION (P2)** screen:



Ta018f.eps

The cursor is positioned on the **Backlight** parameter's setting.

3. To change the lighting behind the LCD, press the **Left** or **Right Arrow** key to change **Backlight** setting.
4. To change the contrast, press the **Down Arrow** key to move the cursor to the **Contrast** parameter. Then, do one of the following:
 - Press the **Left Arrow** key to reduce the contrast.
 - Press the **Right Arrow** key to increase the contrast.

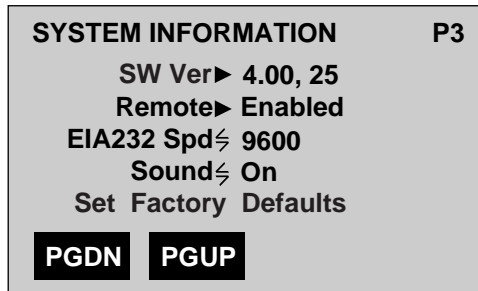
Note

*You can also press **F1** and **F2** from the introductory display to adjust the contrast of the LCD. Pressing **F1** decreases the contrast, and pressing **F2** increases the contrast.*

Turning the Audible Tone On or Off

You can enable or disable the beeping sound that is produced when you press the tester's keys. To do this, follow these steps:

1. Press **SYSTEM** to display the **SYSTEM INFORMATION (P1)** screen.
2. Press **F1(PGDN)** twice to display the **SYSTEM INFORMATION (P3)** screen:



Ta019f.eps

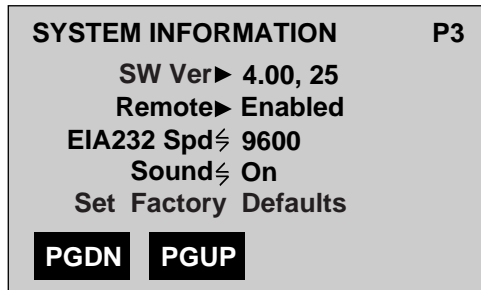
The cursor is positioned on the **EIA232 Spd** parameter.

3. Press the **Down Arrow** key to move the cursor to the **Sound** parameter, which has two settings:
 - **On** turns the sound on.
 - **Off** turns the sound off.
4. Press the **Left** or **Right Arrow** key to select the desired setting.

Changing the Communications Speed

The default serial port speed for the RS232 port is 9600. To change the speed, complete the following:

1. Press **SYSTEM** to display the **SYSTEM INFORMATION** (P1) screen.
2. Press **F1(PGDN)** twice to display the **SYSTEM INFORMATION** (P3) screen:



Ta019f.eps

The cursor is positioned on the **EIA232** parameter.

3. Press the **Left** or **Right Arrow** key to select one of the available baud rates: 9600, 2400, or 1200.

The tester is now set up with the serial port speed you selected.

Restoring the Default Settings

You can restore all of the tester's settings to their original values (as shipped by the factory). Restoring the tester's default settings is a useful task when you want to put the tester in a known state.

To restore the default settings, complete the following:

Caution

When you restore the factory default settings, any settings that you previously programmed for the unit are permanently erased.

1. Press **SYSTEM** to display the **SYSTEM INFORMATION** (P1) screen.

2. Press **F1**(PGDN) twice to display the **SYSTEM INFORMATION** (P3) screen:



The cursor is positioned on the **EIA232 Spd** parameter.

3. Press the **Down Arrow** key to highlight the **Set Factory Defaults** parameter. Then, press **ENTER**.

The tester beeps and displays this message: Unit Resetting. The E3port Plus restores all settings to their factory-programmed values and resets itself. The tester then displays the top-level introductory screen (see Figure 3-1).

Note

*If the screen is too light or too dark, press **F1** to decrease the contrast or **F2** to increase the contrast.*

Returning to the Top-level Introductory Screen

When you finish a particular task (for example, viewing test results or setting up a transmission stream), you may want to return to the top-level introductory screen (see Figure 3-1). To do this, press **END**.

Resetting the E3port Plus

To reset the E3port Plus, press **END** twice rapidly. When you reset the tester, it performs a series of internal self-tests and then displays the top-level introductory screen (see Figure 3-1).

When you reset the E3port Plus, it does *not* restore the factory default settings. For information on how to restore these settings, see “Restoring the Default Settings” earlier in this chapter.

Clearing the Error Result Counters

If there are errors on a signal, they are presented on the tester's result screens. As certain errors are detected, the counters on the screen continuously increase.

In certain situations, you may want to clear the error counters. To do this, press **CLEAR** while you are viewing the errors on the LCD. The tester immediately resets each error counter to zero.

Clearing the History LEDs

To clear the history (yellow) LEDs, press **RESET**. This key is located on the right side of the tester below the history LEDs and directly above the **Up Arrow** key (see Figure 2-4).

Responding to Low Battery Warnings

The E3port Plus uses NiCad internal batteries. When the battery power is low, the LOW BATTERY LED flashes. This indicates that you only have a couple of minutes of operating time remaining. If you wait too long, the tester issues this message: Low Battery Shutting Down! Then, the tester turns off immediately.

To recharge the tester, connect it to the supplied AC adapter/charger. On a full battery charge, which takes between 8 to 12 hours, the tester can run for approximately two hours. If the battery does not charge, contact Fluke Customer Service.

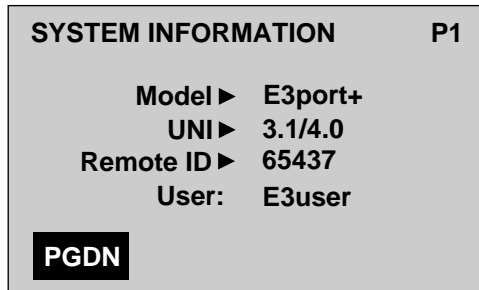
Warning

The NiCad battery is rated 3.6 V 4AH (Fluke part number 623014) and the in-line battery fuse is rated 250 V 3A (Fluke part number 645173). Both items must be replaced by a Fluke Service Center.

Displaying System Information

To display system information, do the following:

1. Press **SYSTEM** to display the **SYSTEM INFORMATION** (P1) screen:



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On this page, you can obtain the following information about the tester:

- Type of tester
 - UNI specification supported
 - Remote ID
 - User identification label
2. Press **F1**(PGDN) to display pages 3 and 4. The following information is given:
 - **SW Ver** (P3)
Software version of the tester
 - **E3XC Version** (P4)
Version of the internal framer
 - **Diag Loopback** (P4)
Should be set to **Off**. Do not change this setting without guidance from Fluke Technical Support personnel.

Giving Your E3port Plus an Identification Label

You can assign unique identification label to your E3port Plus. To do this, follow these steps:

1. Press **SYSTEM** to display the **SYSTEM INFORMATION** (P1) screen.
The cursor is positioned on the **User** field.
2. Use the keypad to type the desired name or label.

Note

The name you choose can be from one to ten characters long.

Updating the E3port Plus with New Software

When a software update becomes available for the E3port Plus, you can download the software from the Fluke website. The **Enter Download** parameter, which is found on the **SYSTEM INFORMATION** (P4) screen, puts the tester in download mode so that you can update the tester with the latest version of the software. The Fluke website provides you with instructions on the use of this option when you download new software.

Note

*Do not select the **Enter Download** option unless instructed to while downloading software from the Fluke website. If you accidentally put the tester in download mode, contact Fluke Technical Support for assistance.*

Printing Test and Configuration Reports

The E3port Plus can print reports of test results and configurations.

For representative samples of these reports, see “Appendix A. Sample Reports”.

To print a report, do the following:

1. Make sure that your tester is correctly connected to a printer. For information on how to do this, see “Connecting the E3port Plus to a Printer or PC” in this chapter.
2. Display the kind of information that you want to print (for example, if you want to print general information, display any page on the **SYSTEM INFORMATION** screen). Then, press **SHIFT 1 + Print**.

Information that is associated with the displayed screen is printed.

The Automatic Diagnostic Tests

The E3port Plus has a set of built-in diagnostic tests that you can run to assess the basic condition of the signal that is present on the line. These tests take about 30 seconds to run. When the tests finish running, the tester displays a summary of its results.

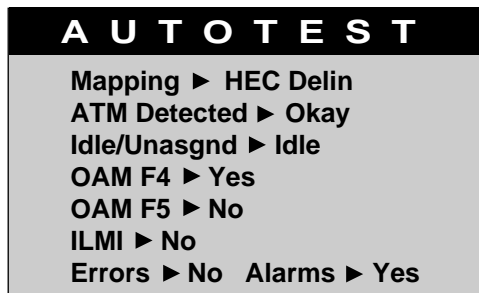
Before you run the diagnostic tests, turn on the E3port Plus. When the tester finishes initializing, check to make sure that the LOSS OF SIGNAL and LOSS OF FRAME LEDs are off. If these LEDs are off, you are ready to run the tests. If the LOSS OF SIGNAL LED is on, check your input connections. If the LOSS OF FRAME LED is lit, the receiver may be configured with the incorrect framing type. See “Setting Up the E3port Plus for E3 Network Testing” in Chapter 4 for details. Note the information in Table 4-1 for the **Framing** parameter.

Running a Diagnostic Test

To run the automatic diagnostic tests, press **AUTOTEST**.

The E3port Plus begins running the tests. While the tester performs each test, you see this message: *Testing*. When the test ends, the E3port Plus summarizes its findings for you on the LCD.

Following is a sample **AUTOTEST** result screen:



Ta021f.eps

An explanation of the diagnostic test results is given in Table 3-5.

Table 3-5. Diagnostic Test Results for ATM and Line Layers

Results	Meaning
Mapping	<p>Displays the current mapping scheme.</p> <ul style="list-style-type: none"> • HEC Delin: ATM cells are mapped with HEC delineation. • PLCP: ATM cells are mapped with PLCP. • Unknown: too many errors were detected to determine how ATM cells are mapped.
ATM Detected	<p>Indicates the condition of the ATM traffic that was detected.</p> <ul style="list-style-type: none"> • Okay: ATM cells were detected and cell delineation was achieved. • Error: Header Checksum (HCS) errors were detected. • No: no ATM cells were detected.
Idle/Unasgnd:	<p>Indicates the type of ATM background traffic that the tester detected.</p> <ul style="list-style-type: none"> • Idle: background cells are idle (CLP bit set to 1). • Unassigned: background cells are unassigned (CLP bit set to 0). • None: no background cells were detected.
OAM F4	<p>Indicates whether or not the tester detected OAM F4 cells.</p> <ul style="list-style-type: none"> • Yes: F4 cells were detected. • No: F4 cells were not detected.
OAM F5	<p>Indicates whether or not the tester detected OAM F5 cells.</p> <ul style="list-style-type: none"> • Yes: F5 cells were detected. • No: F5 cells were not detected.
ILMI	<p>Indicates whether or not the tester detected ILMI cells on VPI 0, VCI 16:</p> <ul style="list-style-type: none"> • Yes: ILMI cells were detected. • No: ILMI cells were not detected.
Errors	<p>Indicates whether the tester detected an E3 Line error.</p> <ul style="list-style-type: none"> • Yes: one or more of these errors were detected. • No: no errors were detected.
Alarms	<p>Indicates whether or not the tester detected an E3 alarm condition on the received signal.</p> <ul style="list-style-type: none"> • Yes: one or more E3 alarms were detected. • No: no E3 alarms were detected.

If these test results indicate that there are errors or certain types of cells on the input signal, you can view the detailed information for these findings (see “Interpreting the Automatic Diagnostic Test Results”, which immediately follows for information on how to do this).

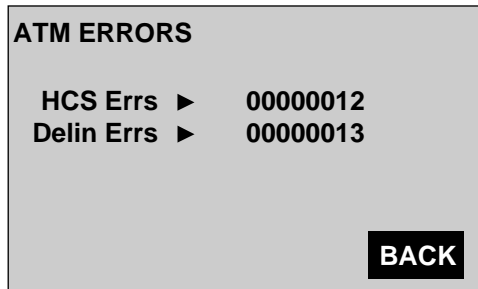
Interpreting the Automatic Diagnostic Test Results

For certain diagnostic test results, the E3port Plus provides detailed error measurement and status reports. This section shows you how to locate these reports and how to interpret the statistical information they provide.

ATM Detected Results

If HCS errors are detected during a diagnostic test, the E3port Plus displays **Error** for the **ATM Detected** result. If you receive this result, do the following:

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Make sure that the **Receive Summary** option is highlighted. Then, press **ENTER** to display the **RECEIVE SUMMARY** screen.
3. Press **ENTER** to display the **ATM ERRORS** screen:



Ta023f.eps

This screen provides a count of HCS errors or cell delineation loss events detected by the tester.

OAM F4 and F5 Results

If OAM F4 or OAM F5 cells are detected during a diagnostic test, the E3port Plus displays **Yes** for OAM F4 or OAM F5 when it completes the tests. If you obtain this result and want to view detailed information about OAM cells, do the following:

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight **ATM Testing**. Then, press **ENTER** to display the **ATM TESTS** menu.
3. Press the **Down Arrow** key to highlight **OAM**. Press **ENTER** to display the **OAM** menu.
4. Press the **Down Arrow key** to highlight **OAM Detection**. Press **ENTER**.
The **OAM F4 ACTIVITY (P1)** screen is displayed.
5. Press **F3(START)** to begin detection of OAM activity.
Information on OAM F4 activity is displayed.
6. Press **F1(PGDN)** to view the **OAM F5 ACTIVITY (P2)** screen.

Note

Additional information on OAM cells can be found under “OAM Testing and Detection” in Chapter 6.

Line Error and Line Alarm Results

When the E3port Plus detects Line errors or alarms during its diagnostic testing, it displays **Yes** for the Errors or Alarms result.

The types of errors and alarms that the E3port Plus detects are determined by the framing type that you selected when you set up the tester. If you are using G.832 framing and **Yes** is displayed for either Errors or Alarms, refer to “Monitoring a Signal with G.832 Framing” in Chapter 4. If you are using G.751 framing and **Yes** is displayed for either **Errors** or **Alarms**, see “Monitoring a Signal with G.751 Framing” in Chapter 4.

Chapter 4

Testing E3 Networks

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Introduction

This chapter describes the E3 network testing functions of the E3port Plus. The first half of the chapter shows you how to set up the tester for E3 network testing, how to monitor E3 signals for errors and alarms, and how to insert errors and alarms into the outgoing transmit stream.

The second half of this chapter shows you how to set up and run an E3 Line BER test.

Setting Up the E3port Plus for E3 Network Testing

The E3port Plus operates in one of two basic framing modes: G.832 and G.751. The methods of testing and types of errors and alarms detected and injected on an E3 signal depend on the framing format you select when you set up the tester.

The procedures in this section show you how to set up the E3port Plus to frame using G.832 or G.751. Follow the procedure appropriate to your particular application.

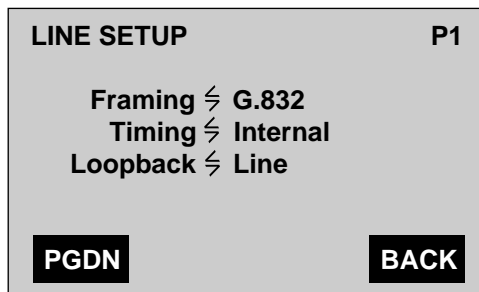
G.832 Framing

Note

Table 4-1 describes the Line setup parameters displayed on the screens in this procedure.

To frame using G.832, follow these steps:

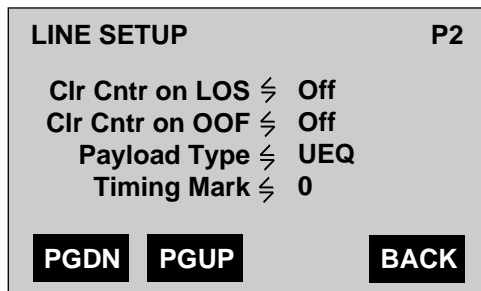
1. Press **LINE** to display the **LINE SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **Line Setup** option. Then, press **ENTER** to display the **LINE SETUP (P1)** screen:



Aag031f.eps

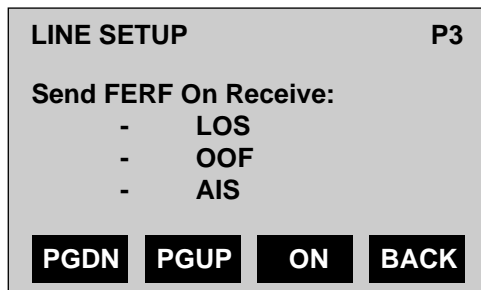
The cursor is positioned on the **Framing** parameter.

3. Press the **Left** or **Right Arrow** key to select **G.832** as the framing format. Then, press the **Down Arrow** key to move the cursor to each remaining parameter on this screen and select the desired setting.
4. Press **F1(PGDN)** to display the **LINE SETUP (P2)** screen:



Aag032f.eps

5. Select a setting for each parameter on this screen.
6. Press **F1(PGDN)** to display the **LINE SETUP (P3)** screen:



Aag033f.eps

On this screen, you can configure the E3port Plus to automatically transmit a Far End Receive Failure (FERF) when it detects one or more of the following errors or alarms:

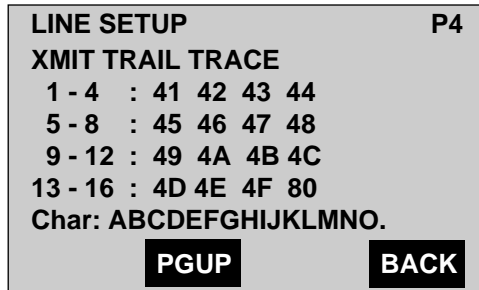
- LOS (Loss of Signal)
- OOF (Out of Frame)
- AIS (Alarm Indication Signal).

Note that each error or alarm on this screen is preceded by a minus sign (-), which indicates that it is currently disabled.

7. Move the cursor to the error or alarm for which you want the tester to transmit a FERF. Then, press **F3(ON)**.

A check mark (✓) replaces the minus sign, indicating that when the selected error or alarm is detected, the tester will respond by transmitting a FERF.

8. Press **F1(PGDN)** to display the **LINE SETUP (P4)** screen:



Aag034f.eps

On this screen, you can edit the trail trace sequence. This sequence carries information that identifies the circuit to the receiving equipment.

Each of the 16 bytes in the trail trace sequence can be edited in hexadecimal notation or ASCII (**Char**). The cursor is positioned on Byte 1 in the hexadecimal field.

9. Do one of the following:
 - To edit the trail trace sequence in hexadecimal, position the cursor on the desired bytes in the hexadecimal field, then use the keypad to supply the desired hexadecimal values.
 - To edit the trail trace sequence in ASCII, move the cursor to the **Char** field, then supply the desired ASCII values.

Note

At least one character must be set to a hexadecimal value of 80 to correctly indicate the trail trace starting position.

Setup is completed. The E3port Plus is now set up for G.832 framing.

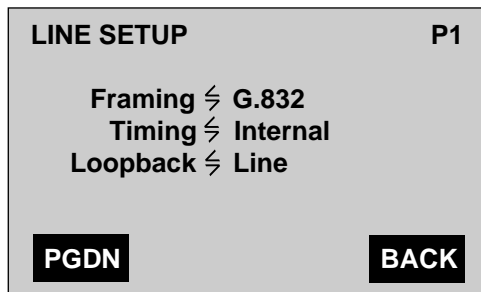
G.751 Framing

Note

Table 4-1 describes the Line setup parameters displayed on the screens in this procedure.

To frame using G.751, follow these steps:

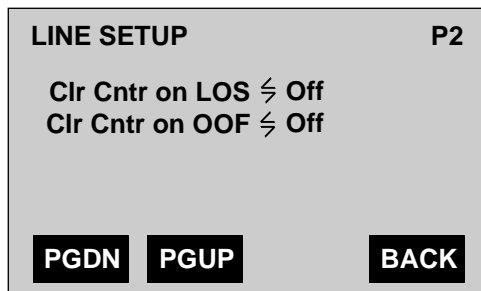
1. Press **LINE** to display the **LINE SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **Line Setup** option. Then, press **ENTER** to display the **LINE SETUP (P1)** screen:



Aag031f.eps

The cursor is positioned on the **Framing** parameter. See Table 4-1 for a description of the parameters on this screen.

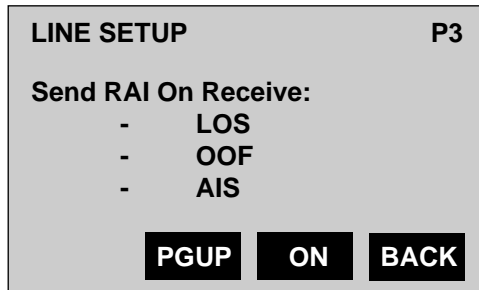
3. Press the **Left** or **Right Arrow** key to select **G.751PLCP** or **G.751HEC** as the framing format. Then, press the **Down Arrow** key to move the cursor to each remaining parameter on this screen and select the desired setting.
4. Press **F1(PGDN)** to display the **LINE SETUP (P2)** screen:



Aag036f.eps

The two parameters on this screen determine whether the tester continues to increment its error counters or resets them to zero after it detects a Loss of Signal (LOS) and an Out of Frame (OOF) condition.

5. Select the desired settings for tester's response to an LOS and an OOF.
6. Press **F1**(PGDN) to display the **LINE SETUP** (P3) screen:



Aag037f.eps

On this screen, you can configure the E3port Plus to automatically transmit a Remote Alarm Indication (RAI) when it detects one or more of the following errors or alarms:

- LOS (Loss of Signal)
- OOF (Out of Frame)
- AIS (Alarm Indication Signal).

Note that each error or alarm in this example is preceded by a minus sign (-), which indicates that it is currently disabled.

7. Move the cursor to the error or alarm for which you want the tester to transmit an RAI. Then, press **F3**(ON).

A check mark (✓) replaces the minus sign, indicating that when the tester detects the selected error or alarm, it will respond by transmitting an RAI.

Setup is completed. The E3port Plus is set up for G.751 framing.

Table 4-1. E3 Line Setup Parameters

Parameter	Description
Framing	<p>Sets the framing format used for the tester's transmitter and receiver as one of the following:</p> <ul style="list-style-type: none"> • G.832: provides frame synchronization and insertion for G.832 applications. • G.751PLCP: provides frame synchronization and insertion for G.751 applications. Uses PLCP framing format for cell delineation. • G.751HEC: provides frame synchronization and insertion for G.751 applications. Uses the Header Error Checksum (HEC) verification process for cell delineation.
Timing	<p>Specifies the clock source of the transmitted E3 signal as one of the following:</p> <ul style="list-style-type: none"> • Internal: uses the tester's internal oscillator (34,368 Mbits) as the timing source. • LoopRcvrd: uses the clock recovered from the received E3 signal.
Loopback	<p>Loops back received E3 signals or ATM cells from the tester's receiver back out through its transmitter.</p> <ul style="list-style-type: none"> • None: no loopback. • Line: E3 framing and payload are looped back. • Cell: ATM cells are looped back. • Payload: loops back the received E3 frame payload only. Framing bits are generated by the E3port Plus.
Clr Cntr on LOS	<p>Determines whether or not the tester's error counters are reset to zero after a loss of signal condition is corrected.</p> <ul style="list-style-type: none"> • Off: the counters continue incrementing where they stopped when the signal was interrupted. • On: the counters reset and begin counting at zero when the signal is restored.

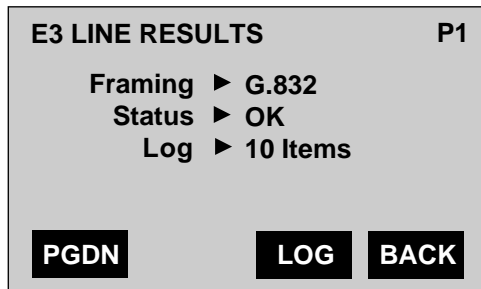
Table 4-1. E3 Line Setup Parameters (cont.)

Parameter	Description
Clr Cntr on OOF	<p>Determines whether or not the tester's error counters are reset to zero after an out-of frame condition is corrected.</p> <ul style="list-style-type: none"> • Off: the counters continue incrementing where they stopped when the signal was interrupted. • On: the counters reset and begin counting at zero when the signal is restored.
Payload Type (G.832 only)	<p>Determines how the bits that determine the type of payload being transported are set. Does not effect the actual transmission of ATM cells, but simply changes the bits that indicate to the receiving equipment what is in the payload.</p> <ul style="list-style-type: none"> • ATM: payload contains ATM cells. • SDH: a number of sub-rated TU-12-formatted information streams are being carried by the E3 stream. • UEQ: circuit is not equipped. • EQU: circuit is equipped.
Timing Mark (G.832 only)	<p>Determines the state of the Timing Marker bit (Bit 8 of the Maintenance Adaptation byte).</p> <ul style="list-style-type: none"> • 0: timing source is traceable to a primary reference clock. • 1: timing source is not traceable to a primary reference clock.
Send RAI On Receive (G.751 only)	<p>Determines whether or not the E3port Plus automatically transmits a Remote Alarm Indication signal when it detects one or more of the following alarms: LOS, OOF, or AIS.</p>
Send FERF On Receive (G.832 only)	<p>Determines whether or not the E3port Plus automatically transmits a Far End Receive Failure when it detects one or more of the following errors or alarms: LOS, OOF, or AIS.</p>
XMIT TRAIL TRACE (G.832 only)	<p>Transmits a new Trail Trace sequence. The trail trace is a 16-byte sequence that carries information to identify the circuit to the receiving equipment. Each of the bytes in this sequence can be edited in hexadecimal or ASCII notation.</p>

Checking Signal Status and Strength

To check the status and strength of a detected E3 signal:

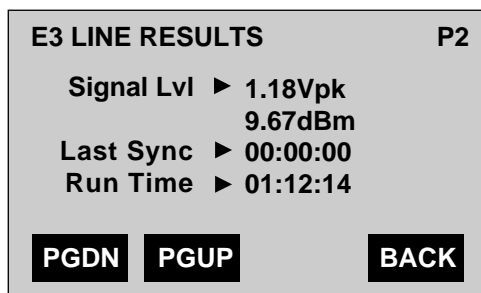
1. Press **LINE** to display the **LINE SELECTIONS** menu.
The cursor is positioned on the **Line Results** option.
2. Press **ENTER** to display the **E3 LINE RESULTS (P1)** screen:



Aag039f.eps

This screen provides framing format information and status for the detected E3 signal (see Table 4-2 for descriptions). If there are any alarms in the alarm log, the **Log** parameter indicates the number of entries.

3. To view the alarm log entries, press **F3(LOG)**.
The **ALARM LOG** screen is displayed.
4. From the **ALARM LOG** screen, press **F4(BACK)**. Then, press **F1(PGDN)** to display the **E3 LINE RESULTS (P2)** screen:



Aag040f.eps

This screen displays the signal strength of the detected E3 signal and indicates when the tester last detected valid framing for the signal.

Table 4-2. Signal Status and Strength Parameters

Parameter	Description
Framing	Indicates the framing format as G.832, G.751PLCP, or G.751HEC. The tester displays an OOF or POOF message if it detects an out-of-frame condition. The tester displays an LOS message if no signal is detected.
Status	Indicates the status of the detected signal as one of the following: <ul style="list-style-type: none"> • LOS: indicates Loss of Signal. • OK: indicates that the signal was detected with valid framing and no errors or alarms. • ERRORS: indicates that errors are being detected on the received signal. • ALARMS: indicates that alarms are being detected on the received signal. • ALMS/ERRS: indicates that both alarms and errors are being detected on the received signal.
Signal Lvl	Displays the strength of the received signal in Volts peak and in dBm.
Last Sync	Indicates the time since valid framing was last detected.
Run Time	Indicates the length of time that the tester has been turned on.

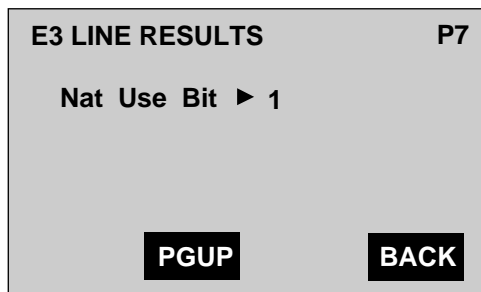
Checking the State of the National Use Bit

In a G.751 frame, the National Use Bit is reserved for different uses within each country that uses E3.

To check the state of this bit, do the following:

1. Press **LINE** to display the **LINE SELECTIONS** menu.
2. Make sure that the **Line Results** option is highlighted. Then, press **ENTER** to display the **E3 LINE RESULTS (P1)** screen.

3. Press **F1**(PGDN) until the **E3 LINE RESULTS** (P7) screen is displayed:



Aag041f.eps

The value of the **Nat Use Bit** parameter should be set to **1** whenever the E3 signal crosses an international border.

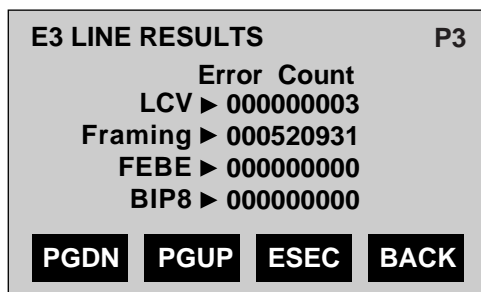
Monitoring an E3 Signal for Errors and Alarms

The types of errors and alarms that the E3port Plus detects depend on the framing format (G.832 or G.751) selected when you set up the tester. This section shows you how to monitor errors and alarms with G.832 and G.751 framing. Follow the procedure that is appropriate for your particular application.

Monitoring a Signal with G.832 Framing

To monitor a signal with G.832 framing, complete the following:

1. Press **LINE** to display the **LINE SELECTIONS** menu.
2. Make sure that the **Line Results** option is highlighted. Then, press **ENTER** to display the **E3 LINE RESULTS** (P1) screen.
3. Press **F1**(PGDN) twice to display the **E3 LINE RESULTS** (P3) screen:



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This screen lists error results for the following E3 errors:

Note:

N/A indicates that a particular measurement is not available.

- LCV (Line Code Violation)
 - Framing (Framing errors)
 - FEBE (Far End Block Errors)
 - BIP8 (Bit Interleaved Parity 8 bit errors).
4. Press **F3** to view results in the following formats:
- **ESEC**
Errored seconds. The number of seconds in which one or more errors occurred.
 - **EFS**
Error-free seconds. The number of seconds in which no errors occurred.
 - **%EF**
Percent error-free. The percentage of seconds that had no errors.
 - **CNT**
The total number of errors that occurred.
5. Press **F1**(PGDN) to display the **E3 LINE RESULTS** (P4) screen.

This screen displays results for the following E3 alarms:

Note

N/A indicates that a particular measurement is not available.

- LOS (Loss of Signal)
- OOF (Out of Frame)
- AIS (Alarm Indication Signal)
- FERF (Far End Receive Failure)

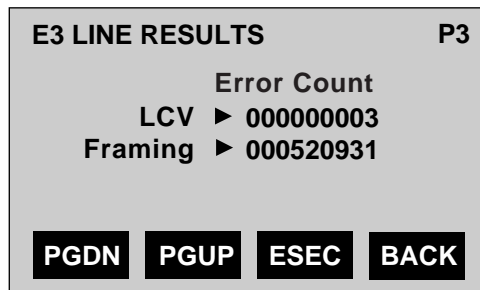
For these alarms, one of the following types of status is given:

- **ACTIVE**
Indicates that the alarm is currently being detected on the received signal
 - **INACTIVE**
Indicates that the alarm is not currently being detected on the received signal
 - **N/A**
Indicates that results are not available
6. Press **F3**(STRT) to view the following information for each alarm:
- **STRT** (when the alarm began)
 - **END** (when the alarm ended)
 - **TTL** (how long the alarm lasted)
 - **STAT** (status of the alarm as **ACTIVE**, **INACTIVE**, or **N/A**)

Monitoring a Signal with G.751 Framing

To monitor a signal with G.751 framing, complete the following:

1. Press **LINE** to display the **LINE SELECTIONS** menu.
2. Make sure that the **Line Results** option is highlighted. Press **ENTER** to display the **E3 LINE RESULTS (P1)** screen.
3. Press **F1**(PGDN) twice to display the **E3 LINE RESULTS (P3)** screen:



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This screen displays results for the following errors:

Note

N/A indicates that a particular measurement is not available.

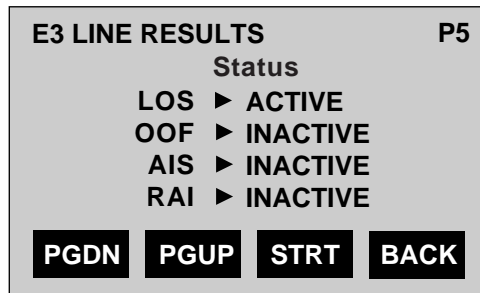
- LCV (Line Code Violation)
 - Framing (Framing errors)
4. Press **F3** to view results in the following formats:
- **ESEC**
Errored seconds. The number of seconds in which one or more errors occurred.
 - **EFS**
Error-free seconds. The number of seconds in which no errors occurred.
 - **%EF**
Percent error-free. The percentage of seconds that had no errors.
 - **CNT**
The total number of errors that occurred.
5. Press **F1**(PGDN) to display the **E3 LINE RESULTS** (P4) screen.
This screen displays results for the following PLCP errors:

Note

N/A indicates that a particular measurement is not available.

- PLCP BIP8 (PLCP Bit Interleaved Parity 8 error)
 - PLCP FE (PLCP Frame Error)
 - PLCP FEBE (PLCP Far End Block Error)
6. Press **F3** to view error results in other formats.

7. Press **F1**(PGDN) to display the **E3 LINE RESULTS** (P5) screen:



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This screen provides status information on these E3 alarms:

- LOS (Loss of Signal)
- OOF (Out of Frame)
- AIS (Alarm Indication Signal)
- RAI (Remote Alarm Indication)

For each alarm, the one of following types of status is given:

- ACTIVE
Indicates that the alarm is detected on the received signal
- INACTIVE
Indicates that the alarm is not detected on the received signal
- N/A
Indicates that results are not available

8. Press **F3**(STRT) to view the following information for each alarm:
- STRT (when the alarm began)
 - END (when the alarm ended)
 - TTL (how long the alarm lasted)
 - STAT (status of the alarm as ACTIVE, INACTIVE, or N/A)

9. Press **F1**(PGDN) to display the **E3 LINE RESULTS** (P6) screen.

This screen provides status information on the following PLCP alarms:

- PLOF (PLCP Loss of Frame)
- POOF (PLCP Out of Frame)
- PYEL (PLCP Yellow alarm)

10. Press **F3**(STRT) to view the starting and ending times and the duration of each alarm listed on this screen.

Viewing the Alarm Log

The E3port Plus keeps a record of the alarms it detects on the received E3 signal. When an alarm is detected, the ALARMS LED lights and the type of alarm is entered into the alarm log.

The alarm log can hold up to 64 entries. Each entry includes the name the alarm, its starting and ending times, and its duration. See Table 4-3 for a list of E3 G.832 errors and alarms and Table 4-4 for a list of G.751 errors and alarms that the E3port Plus detects.

To view alarm log entries, follow these steps:

1. Press **LINE** to display the **LINE SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **Alarm Log** option. Then, press **ENTER** to display the following:

ALARM	LOG	RECORD	001
	Type	Start Time	
	LOS ALM	▶ 04/07/98	
		▶ 14:13:31	
	FERF ALM	▶ 04/07/99	
		▶ 14:13:45	
PGDN		END	BACK

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The top right corner of the first line on this screen indicates which record in the log you are currently viewing. The following lines indicate the type of alarm detected (**Type**) and when it began (**Start Time**).

3. Press **F3(END)** to view the time that the alarm ended (**End Time**).
4. Press **F3(TTL)** again to view the duration (**Total Time**) of the alarm.
5. To view any other alarms stored in the log, press **F1(PGDN)**.
6. To remove all entries from the alarm log, press **CLEAR**.

The tester displays this message: Alarm Log Empty.

Table 4-3. G.832 Alarms Detected by the E3port Plus

Alarm	Description
LOS	Loss of Signal. Declared when no pulses are received for 32 consecutive bit periods.
OOF	Out of Frame. Declared when the framing pattern is in error for four consecutive frames.
AIS	Alarm Indication Signal. Declared when less than eight zeros in a frame are detected while the framer is in an OOF state.
FERF	Far End Receive Failure. Declared when the E3port Plus detects a FERG for three consecutive frames.

Table 4-4. G.751 Alarms Detected by the E3port Plus

Alarm	Description
LOS	Loss of Signal. Declared when no pulses are received for 32 consecutive bit periods.
OOF	Out of Frame. Declared when the framing pattern is in error for four consecutive frames.
AIS	Alarm Indication Signal. Declared when less than eight zeros in a frame are detected while the framer is in an OOF state.
RAI	Remote Alarm Indication. Declared when the E3port Plus detects an RAI for three consecutive frames.
PLOF	PLCP Loss of Frame.
POOF	PLCP Out of Frame.
PYEL	PLCP Yellow alarm.

Injecting E3 Errors and Alarms

The E3port Plus can inject a number of E3 error and alarm conditions. Transmission of these errors and alarms is independently activated and deactivated by pressing the **F3** key. The types of errors and alarms that you can inject depend on whether you selected G.832 or G.751 as the framing format when you set up the tester. This section shows you how to inject errors and alarms on a signal with G.832 or G.751 framing.

Injecting Errors and Alarms on a Signal with G.832 Framing

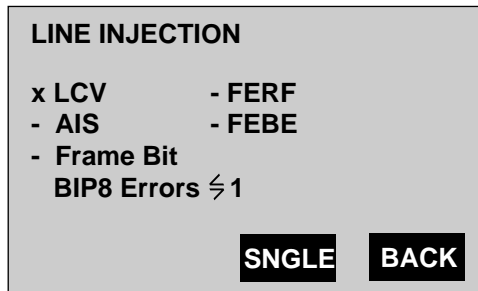
The errors and alarms that you can inject into the outgoing transmit stream are of two types: those that are transmitted continuously and those are transmitted one at a time.

If an error or alarm can be injected continuously, it is transmitted until you turn it off. The alarm remains active even while the E3port Plus is performing other functions. If an error can be injected one at a time, a single error only is transmitted every time you inject it.

Table 4-5 lists the E3 errors and alarms that the E3port Plus can transmit and indicates the method of transmission.

To inject an error or alarm, follow these steps:

1. Press **LINE** to display the **LINE SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **Inject Error/Alarm** option. Then, press **ENTER** to display the **LINE INJECTION** screen:



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This screen lists the E3 errors and alarms that the E3port Plus can inject.

Only one LCV error can be injected at a time. The “**x**” preceding this error indicates that it is a single-injection error.

FERF, Frame Bit, AIS, and FEBE errors, on the other hand, are errors that are injected continuously. In the example screen, note that these errors are preceded by a minus sign (-). This symbol indicates that the error or alarm is currently disabled or not being injected. The minus sign is replaced by a check mark (✓) when you activate injection.

Like an LCV error, BIP8 errors are also transmitted one at a time. However, for BIP8 errors, you can choose the number errors (a value between 1 and 8) that the tester injects when you press **F3** to activate injection.

3. To inject an error or alarm, do the following:
 - To send an LCV error, move the cursor to LCV, then press **F3**(SNGLE).
One LCV error is immediately injected into the outgoing transmit stream. To inject additional LCV errors, press **F3** the desired number of times.
 - To send a FERF, AIS, Frame Bit, or FEBE, move the cursor to the one that you want to transmit. Then, press **F3**(ON).
The selected error or alarm is injected continuously.
 - To transmit BIP8 errors, move the cursor to **BIP8 Errors**. Next, press the **Left** or **Right Arrow** key to select the number of errors that you want to send. Finally, press **F3**(SEND).
The number of BIP8 errors that you selected is transmitted.
4. To end transmission of a continuously injected error or alarm, move the cursor to one that you want to stop injecting. Then, press **F3**(OFF).
The E3port Plus immediately stops injecting the error or alarm you selected.

Injecting Errors and Alarms on a Signal with G.751 Framing

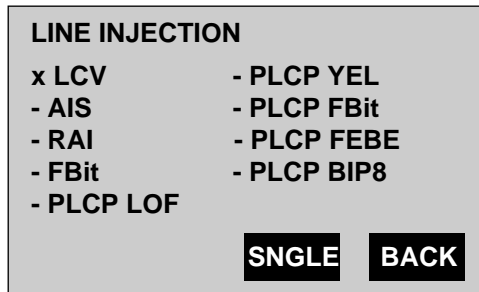
The errors and alarms that you can inject into the outgoing transmit stream are of two types: those that are injected continuously and those are injected one at a time.

If an error or alarm can be injected continuously, it is transmitted until you turn it off. The alarm remains active even while the E3port Plus is performing other functions. If an error is injected one at a time, a single error only is transmitted every time you inject it.

See Table 4-5 for a complete list of errors and alarms, and the method of injection.

To inject an error or alarm, follow these steps:

1. Press **LINE** to display the **LINE SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **Inject Error/Alarm** option. Then, press **ENTER** to display the **LINE INJECTION** screen:



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This screen lists the errors and alarms that the E3port Plus can inject.

Only one LCV error can be injected at a time. The “x” preceding this error indicates that it is a single-injection error.

The remaining errors and alarms on this screen are continuously injected by the tester when you activate transmission. Note that these errors and alarms are preceded by a minus sign (-). This symbol indicates that the error or alarm is currently not being transmitted. The minus sign is replaced by a check mark (✓) when you activate injection.

3. To inject an error or alarm in this list, do the following:
 - To send an LCV error, move the cursor to LCV, then press **F3(SNGLE)**.
One LCV error is immediately injected into the outgoing transmit stream. To inject additional LCV errors, press **F3** the desired number of times.
 - To inject any of the remaining errors or alarms, move the cursor to the one that you want to inject. Then, press **F3(ON)**.
The selected error or alarm is injected continuously.
4. To stop injecting an alarm or error, move the cursor to the desired error or alarm. Then, press **F3(OFF)**.
The E3port Plus immediately stops injecting the error or alarm you selected.

Table 4-5. Errors and Alarms Transmitted by the E3port Plus

Alarm/Error	Method of Transmission	Description
AIS	Continuous	Alarm Indication Signal
BIP8 (G.832)	Single injection	Bit Interleaved Parity 8
FEBE (G.832)	Continuous	Far End Block Error
FERF (G.832)	Continuous	Far End Receive Failure
Fbit (G.751) Frame Bit (G.832)	Continuous	Framing Bit error
LCV	Single injection	Line Code Violation
RAI (G.751)	Continuous	Remote Alarm Indication
PLCP LOF (G.751)	Continuous	PLCP Loss of Frame
PLCP YEL (G.751)	Continuous	PLCP Yellow alarm
PLCP FBit (G.751)	Continuous	PLCP Framing bit error
PLCP FEBE (G.751)	Continuous	PLCP Far End Block Error
PLCP BIP8 (G.751)	Continuous	PLCP Bit Interleaved Parity 8

Line Bit Error Rate (BER) Testing

The E3port Plus can perform a Line BER test on E3 signals. In this test, a BER test pattern is transmitted and detected in the E3 payload.

To perform a Line BER test, the E3port Plus requires an input test pattern, which is defined in the setup for the test. The source of the test pattern can be from the E3port Plus itself (on a looped back circuit) or from the circuit under test.

The Line BER test overrides ATM cell transmission. Therefore, when this test is running, the E3port Plus no longer transmits ATM cells.

Notes

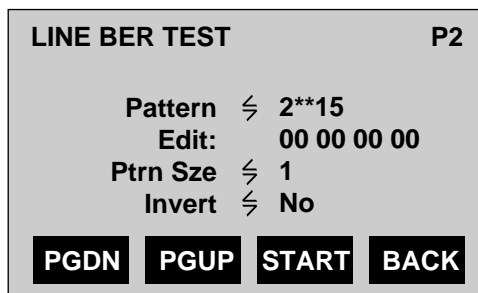
*You can run a line BER test with or without PLCP framing. If you are running this test on a non-ATM G.751, you must use **G.751HEC** as the framing type. See “G.751 Framing” earlier for information on how to select this framing type.*

You cannot run a Line BER test if the E3port Plus is configured for G.832 framing.

Setting Up a Line BER Test

To set up a Line BER test, do the following:

1. Press **LINE** to display the **LINE SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **Line BERT** option. Then, press **ENTER** to display the **LINE BER TEST (P1)** screen.
3. Press **F1(PGDN)** to display the **LINE BER TEST (P2)** screen:



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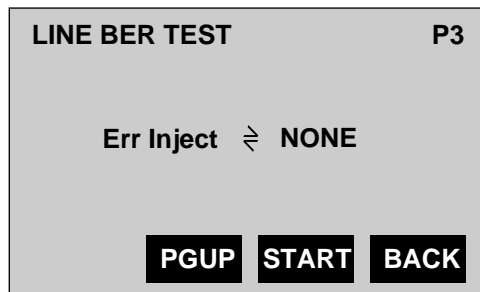
The cursor is positioned on the **Pattern** parameter. The settings for this parameter represent the patterns of bits that you can transmit during a Line BER test. See Table 4-6 for a list and description of these patterns.

4. Do *one* of the following:
 - If you want to use one of the pre-defined patterns, press the **Left** or **Right Arrow** key to select the one that you want to use.
 - If you want to create your own test pattern, follow these steps:
 1. Press the **Left** or **Right Arrow** key to select the **User Def** setting.
 2. Press the **Down Arrow** key to move the cursor to the **Edit** parameter. Then, press the keys on the alphanumeric keypad to specify the hexadecimal value of the bit pattern that you want to send.
 3. Press the **Down Arrow** key to move the cursor to the **Ptrn Size** (Pattern Size) parameter.

This parameter has four settings, 1 - 4, which represent the user bytes that are transmitted continuously.
 4. Select the desired setting for **Ptrn Size**.
5. Press the **Down Arrow** key to move the cursor to the **Invert** parameter. Then, press the **Left** or **Right Arrow** key to select one of the following settings:
 - **No**

Does not invert the polarity of the selected bit pattern.
 - **Yes**

Inverts the polarity of the selected bit pattern.
6. Press **F1**(PGDN) to display the **LINE BER TEST** (P3) screen:



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The **Err Inject** (Error Injection) parameter determines the rate of error injection. Errors are injected into the transmitted BER test pattern according to one of four rates (see Table 4-7 for a list and description).

7. Press the **Left** or **Right Arrow** key to select the desired error injection rate.

Note

*Even if you select **NONE**, you can still inject single bit errors while the BER test is running. To do this, press **F2(INJCT)**. Each time you press this key, a single error is injected into the BER test stream.*

You have completed the setup for the BER test. See “Starting a Line BER Test” for information on running the test.

Table 4-6. BER Test Patterns

Pattern	Description
2**15	Pseudo-random $2^{15}-1$ pattern
2**20	Pseudo-random $2^{20}-1$ pattern
QRSS	Quasi-random signal
2**23	Pseudo-random $2^{23}-1$ pattern
11111111	11111111 bit pattern
00000000	00000000 bit pattern
10101010	10101010 bit pattern
11001100	11001100 bit pattern
3 in 24	Three out of 24 bits is set to 1
1 in 8	One out of eight bits is set to 1
1 in 16	One out of 16 bits is set to 1
2 in 8	Two out of eight bits is set to 1
User Def	User-definable bit pattern

Table 4-7. Error Injection Rates

Injection Rate	Description
NONE	The default. No errors are inserted.
10E-3	Inserts one bit pattern error in every 1000 bits.
10E-6	Inserts one bit pattern error in every 1,000,000 bits.
10E-9	Inserts one bit pattern error in every 1,000,000,000 bits.

Starting a Line BER Test

Notes

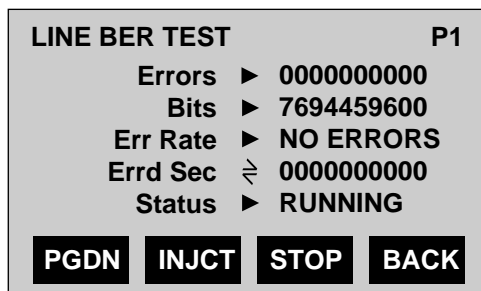
You cannot perform any ATM operations or run any ATM tests if the tester is currently running a Line BER test. You must stop this test first.

If you decide to change a setting while the tester is running a BER test, you must first stop the test, change the setting, then restart the test with the new settings.

*If the tester is the source of the BER test pattern, you can inject individual bit errors while the BER test is running. To do this, press **F2(INJCT)**. Each time you press this key, a single error is injected into the BER test stream.*

1. To start a BER test, press **F3(START)**.

The E3port Plus recovers and synchronizes the received pattern. Then, the following result screen is displayed:



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The cursor is positioned on the **Errd Sec** result. Table 4-8 describes the BER test results displayed on this screen.

2. Press the **Left** or **Right Arrow** key to view BER test results in the following formats (see Table 4-8 for descriptions):
 - **Efree Sc**
 - **% Efree**
 - **Elap Sec**
 - **Errd Sec**

Table 4-8. BER Test Results

Result	Description
Errors	Total number of errored bits detected since the F3(START) or CLEAR key was pressed.
Bits	Total number of bits received since the F3(START) or CLEAR key was pressed.
Err Rate	Error Rate. Number of errored bits divided by the total number of bits received since the F3(START) or CLEAR key was pressed.
Efree Sc	Error-free Seconds. The number of seconds in which no errors were detected since the F3(START) or CLEAR key was pressed.
% Efree	Percent Error Free. The percentage of the seconds in which no errors were detected since the F3(START) or CLEAR key was pressed.
Elap Sec	Elapsed Seconds. The number of seconds that the test has been running since the F3(START) or CLEAR key was pressed.
Errd Sec	Errored Seconds. Number of seconds in which one or more errors was detected since the F3(START) or CLEAR key was pressed.
Status	Status of the test: either STOPPED, RUNNING, NO ACTIVITY, NO SIGNAL or OUT OF SYNC.

Stopping a Line BER Test

To stop a Line BER test, press **F3(STOP)**. The test ends immediately.

Chapter 5

Transmitting and Monitoring ATM Traffic

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Introduction

This chapter describes the ATM network transmission and monitoring functions of the E3port Plus. The first section shows you how to configure the overall traffic characteristics and format of ATM cell transmission. The following sections then show you how to configure specific traffic profiles, called transmission streams, and how to load these streams and start transmission.

You can monitor the input E3 signal for ATM cells. The final section shows you how to monitor “live” traffic as it is being generated.

Defining the Traffic Characteristics of Transmission Streams

There are four general setup parameters that affect the operation of all the ATM tests that you can run on the E3port Plus. These parameters, which are described in this section, let you configure the tester to do the following:

- Verify the incoming header checksum
- Identify the type of header (UNI or NNI)
- Scramble ATM cell payloads
- Specify the type of cells to use as background traffic

Verifying the Incoming Header Checksum (HCS)

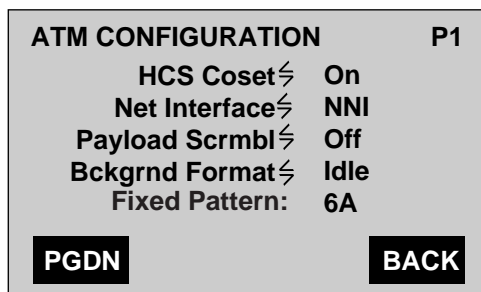
The **HCS Coset** parameter determines whether the tester verifies the incoming header checksum using the coset polynomial ($x^6 + x^4 + x^2 + 1$). One of the chief benefits of your use of this parameter is that it can improve the efficiency of the cell delineation process and facilitate the recovery of the frame structure, thereby reducing the likelihood of cell lock errors.

Whether you choose to use the **HCS Coset** parameter or not depends on your particular application. Most ATM equipment supports the coset polynomial, but some equipment does not. If you set this parameter to **Off** on the tester and the equipment supports the coset polynomial, it can cause interoperability problems. It is best to check to make sure that both sides (the tester and the equipment) have the same setting.

To enable or disable the **HCS Coset** option, do the following:

1. Press **ATM** to display the **ATM SELECTIONS** menu.

2. Press the **Down Arrow** key to highlight **ATM Configuration**. Then, press **ENTER** to display the **ATM CONFIGURATION (P1)** screen:



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The cursor is positioned on the **HCS Coset** parameter.

3. Press the **Left** or **Right Arrow** key to select the desired setting (see Table 5-1).
The setting you selected is now the current value of the **HCS Coset** option.

Identifying the Header Type

Two different header schemes are used for ATM cells: UNI (User Network Interface) and NNI (Network-to-Network Interface). UNI is an interface that connects ATM users with a private ATM switch that is managed locally, such as within the same corporate network. NNI, on the other hand, is an interface that connects ATM users with an ATM switch deployed in the public telecommunications network. NNI is typically more global or far-reaching and capable of spanning long distances such as that between two countries.

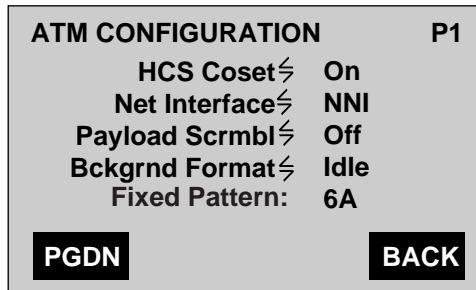
Both UNI and NNI cells use five-byte headers. The header format of UNI cells and NNI cells is identical, except that for NNI cells the GFC field is replaced by an additional four bits of VPI, resulting in a 12-bit VPI. This means that the VPI address range for UNI is 0 - 255, while the address range for NNI is 0 - 4095.

Depending on the type of network you are connecting to, you need to configure the tester so that the header type (either UNI or NNI) conforms to the ATM cell structure of that network.

Follow these instructions to define the header type for the network you are testing.

1. Press **ATM** to display the **ATM SELECTIONS** menu.

2. Press the **Down Arrow** key to highlight **ATM Configuration**. Press **ENTER** to display the **ATM CONFIGURATION (P1)** screen:



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3. Press the **Down Arrow** key to highlight the **Net Interface** parameter. Then, press the **Left** or **Right Arrow** key to select the desired setting (see Table 5-1).

The setting you selected is now the current value of the **Net Interface** parameter.

Scrambling ATM Cell Payloads

The E3port Plus has a payload scrambling parameter that turns the automatic scrambling of ATM cell payloads on and off. Payload scrambling can provide a solution for some transmission equipment that is sensitive to certain bit patterns in the ATM payload. The scrambler guarantees a higher ones density and no false triggering of alarms.

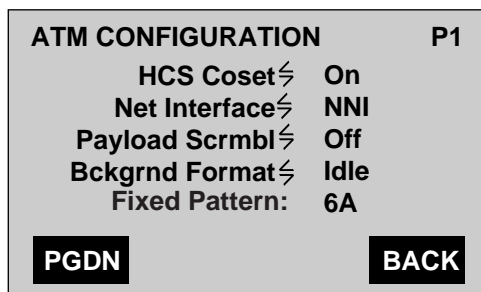
In payload scrambling, ATM cells are extracted from the transmitted payload and scrambled using an $x^{43} + 1$ self-synchronizing polynomial. On the receive side, the process is reversed and the $x^{43} + 1$ polynomial is used to unscramble the received payload.

Payload scrambling is activated or deactivated by changing the setting for the **Payload Scrmbl** parameter.

To change this setting, follow these steps:

1. Press **ATM** to display the **ATM SELECTIONS** menu.

2. Press the **Down Arrow** key to highlight **ATM Configuration**. Press **ENTER** to display the **ATM CONFIGURATION (P1)** screen:



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3. Press the **Down Arrow** key to move the cursor to the **Payload Scrambl** parameter. Then, press the **Left** or **Right Arrow** key to select the desired setting (see Table 5-1).

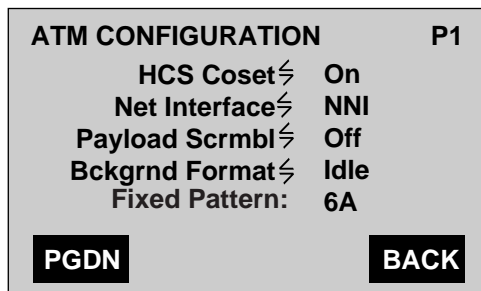
The setting you selected is now the current value of the **Payload Scrambl** parameter.

Specifying the Type of Cells Used for Background Traffic

There are two types of cells that you can specify for use as background traffic: idle and unassigned. An idle cell is defined as one with a five-byte ATM header set to 00 00 00 01 52 (hex), and an unassigned cell is defined as one with a five-byte header of 00 00 00 00 55 (hex). Both types of cells are used in an ATM cell stream to fill unused bandwidth.

To specify which type of cell to use as background traffic, do the following:

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight **ATM Configuration**. Press **ENTER** to display the **ATM CONFIGURATION (P1)** screen:



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3. Press the **Down Arrow** key to highlight the **Bckgrnd Format** parameter. Then, press the **Left** or **Right Arrow** key to select the desired setting (see Table 5-1).

The setting you selected is now the current value of the **Bckgrnd Format** parameter.

Table 5-1. General Setup Parameters for ATM Transmission Streams

Parameter	Description
HCS Coset	Determines whether the tester applies the coset polynomial to the HEC. <ul style="list-style-type: none"> • On (the default) applies the coset polynomial to the HEC. • Off does not apply the coset polynomial to the HEC.
Net Interface	Defines the header type for the network under test. <ul style="list-style-type: none"> • NNI specifies a Network-to-Network Interface. • UNI (the default) specifies a User Network Interface.
Payload Scrambl	Activates/deactivates automatic scrambling of ATM cell payloads. <ul style="list-style-type: none"> • On activates payload scrambling. • Off (the default) deactivates payload scrambling.
Bckgrnd Format	Specifies the types of cells to be used as background traffic. <ul style="list-style-type: none"> • Idle (the default) specifies idle cells. • Unas specifies unassigned cells.

Configuring a Transmission Stream

The E3port Plus lets you define and transmit up to eight separate ATM cell transmission streams using up to 100% of the available E3 bandwidth. These transmission streams can be configured to accommodate CBR (Constant Bit Rate) or VBR (Variable Bit Rate) traffic.

A CBR transmission stream is used for transmitting data in a steady or constant flow. It is the simplest type of transmission stream available and is used to effectively simulate the transmission of CBR-type services through an ATM network. A VBR transmission stream is used for simulating variable traffic sources, such as LANs, where instantaneous bandwidth varies over time.

The following procedure shows you how to configure a transmission stream. Because there are many parameters, this procedure is divided into three parts, which show you how to do the following:

1. Program the ATM cell header.
2. Set the transmission rate.
3. Specify the type of payload.

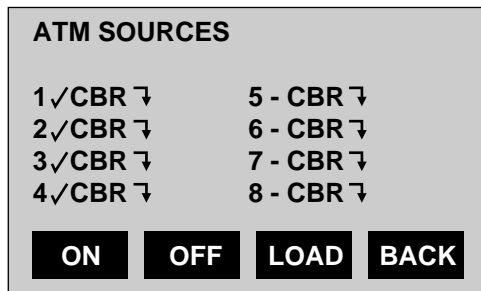
Complete all parts of the procedure for each transmission stream that you configure.

Note

For illustration purposes, this procedure shows you how to configure a single transmission stream (Stream 6).

Programming the ATM Cell Header

1. Press **ATM** to display the **ATM SELECTIONS** menu:
2. Press the **Down Arrow** key to highlight the **Config Xmit Streams** option. Then, press **ENTER** to display the **ATM SOURCES** screen:



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All eight cell transmission streams (1-8) are represented on the **ATM SOURCES** screen. From this screen, you can access a setup screen for each transmission stream.

Each transmission stream is preceded by either a check mark (✓) or a minus sign (-). A check mark indicates that the stream is enabled for transmission. A minus sign indicates that the stream is currently disabled.

3. With the cursor positioned on Stream 1, press **F2(OFF)**.

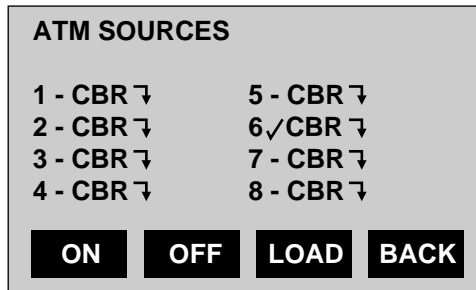
Notice that a minus sign (-) appears following the number 1, indicating that this stream is disabled.

4. Press the **Down Arrow** key to move the cursor to Stream 2. Press **F2(OFF)** again to disable Stream 2.

Continue in this manner so that Streams 3 and 4 are disabled.

5. Press the **Down Arrow** key to move the cursor to Stream 6. Then, press **F1(ON)**.

A check mark (✓) appears, indicating that the tester will transmit Stream 6:



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Stream 6 is the only transmission stream preceded by a check mark, so, in this example, it is the only one that will be transmitted when you load the transmission stream later in this procedure.

6. Press the **Right Arrow** key.

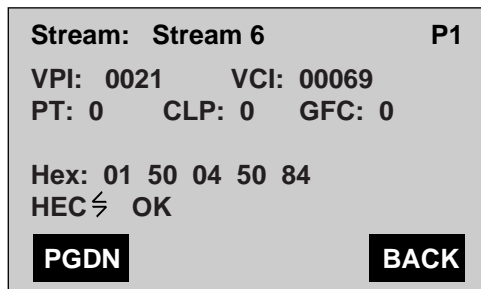
Notice that the transmission source for Stream 6 changes. You can change the transmission source to one of the following:

- **CBR**
 Constant Bit Rate transmission (the default)
- **VBR/RND**
 Variable Bit Rate/Random transmission (using Poisson distribution)
- **VBR/PDU**
 Variable Bit Rate/Protocol Data Unit transmission (simulates network file transfer traffic)
- **VBR/BUR**
 Variable Bit Rate/Burst transmission

In this example, we will leave Stream 6's transmission source set to **CBR**.

7. Press **ENTER**.

The setup screen for Stream 6 is displayed:



```
Stream: Stream 6          P1
VPI: 0021      VCI: 00069
PT: 0      CLP: 0      GFC: 0

Hex: 01 50 04 50 84
HEC  $\leftarrow$  OK

PGDN          BACK
```

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From this screen, you can define the transmission stream's header. The cursor is positioned on the name of the stream, which in this example, is "Stream 6". To identify a stream, you can use the keyboard to type a name.

8. If desired, type a name for the stream.
9. Press the **Down Arrow** key to move the cursor to each parameter. Then, use the keypad to supply a value for the parameter.

Note

*The **HEC** parameter allows the generation of the header checksum to be correct, correctable (with a 1-bit error), or uncorrectable (with an 8-bit error). If you select **Off**, you can supply a checksum value in the header. To do this, edit the **Hex** representation of the header.*

You have completed configuring Stream 6's ATM cell header.

Setting the Traffic Rate

To set the traffic rate, complete the following:

1. Press **F1**(PGDN) to display the **RATES** (P2) screen:

RATES	Stream 6	P2
PCR :	0.153	MBS
PCR :	362	CPS
PCR :	10.00	%
MXBSZ :	21	cells
Shaper ↵	On	
PGDN	PGUP	BACK

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On this screen, you can set the traffic rate parameters for Stream 6. There are two traffic rate parameters: **PCR** (Peak Cell Rate) and **MXBSZ** (Maximum Burst Size).

The **PCR** defines the bandwidth for the transmission stream. On this screen, you can choose one of three forms to express the bandwidth: **MBS** (megabits per second), **CPS** (cells per second), and **%** (percent bandwidth).

MXBSZ defines the maximum number of cells that can be transmitted consecutively at the rate defined by the PCR.

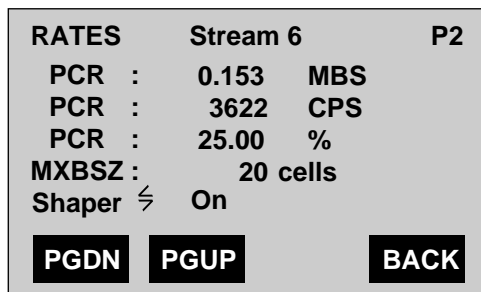
Note

*For a CBR transmission source, the **MXBSZ** parameter does not apply. When you configure any of the three VBR transmission sources, you must specify a value for **MXBSZ**.*

2. Press the **Down Arrow** key to move the cursor to the form that you want to use to express the **PCR**. Then, use the keypad to supply the desired value.

For example, change the **PCR %** parameter to 25. Notice that the two remaining forms for expressing the bandwidth (**MBS** and **CPS**) automatically change their values to reflect the change you make to **PCR %**.

The screen now looks like this:

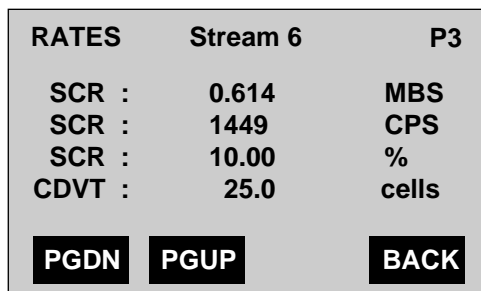


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The **Shaper** parameter is on the last line of the **RATES** screen. This parameter enables you to regulate the output of the transmission stream so that its specified traffic parameters (**PCR**, **SCR**, and **MXBSZ** values) are not exceeded.

The **Shaper** has two settings: **On** or **Off**. When set to **Off** (the default), the shaper *does not* constrain the transmission stream. When set to **On**, the **Shaper** guarantees that the values you supply for the **PCR**, **SCR**, and **MXBSZ** parameters are respected.

3. Press the **Left** or **Right Arrow** key to select a setting for the **Shaper**.
4. Press **F1**(PGDN) to display the **RATES** (P3) screen:



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On this page, you can specify values for the **SCR** (Sustained Cell Rate) and the **CDVT** parameters.

The **SCR** parameter defines the average number of cells that can be transmitted on a given virtual circuit.

Note

For a CBR source type, the **SCR** parameter does not apply. This parameter, however, is required when you set up a transmission stream with a VBR transmission source.

The **SCR** parameter has three forms of expression:

- MBS (Megabits per second)
 - CPS (Cells per second)
 - % (Percent)
5. Press the **Down Arrow** key to move the cursor to the **SCR** form that you want to use. Then, use the keypad to supply a value.
 6. Press the **Down Arrow** key to move the cursor to the **CDVT** parameter.
The tester provides optimum spacing and positioning between cells in a transmission stream. The **CDVT** parameter defines the maximum limit (in units of ATM cells) that the tester can vary from this optimum placement.
 7. Use the keypad to supply a value for **CDVT**.

You are now ready to define the payload for the transmission stream.

Specifying the Type of Payload

The type of test that you run on the E3port Plus affects the choices you make when you configure the payload carried by a transmission stream. For example, if you run a BER test, you need configure a BERT payload. The ATM tests that you can run are documented in Chapter 6. If a test requires that you specify a particular payload type, the test procedure references one of the sections that follows.

In this section, you will learn how to configure the following types of payloads:

- Fixed
- BERT
- O.191
- User-defined cell list

Specifying a Fixed Payload

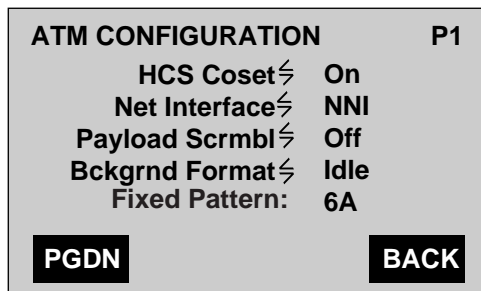
A fixed payload is one in which the same pattern is repeated in each of the 48 bytes in a cell's payload. This procedure shows you how to specify a fixed payload and how to define the fixed pattern.

Note

To locate the screens documented in this procedure, press **ATM**. Then, scroll to the **Config Xmit Streams** option and press **ENTER**. Finally, select a transmission stream from the **ATM SOURCES** screen and press **ENTER**.

To specify a fixed payload, follow these steps:

1. Press **F1**(PGDN) to display the **PAYLOAD (P4)** screen.
2. Press the **Left** or **Right Arrow** key to change the setting of the **Type** parameter to **Fixed**.
3. Press **F4**(BACK) two times to return to the **ATM SELECTIONS** menu.
4. Press the **Down Arrow** key to highlight the **ATM Configuration** option. Then, press **ENTER** to display the **ATM CONFIGURATION (P1)** screen:



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5. Press the **Down Arrow** key to move the cursor to the **Fixed Pattern** parameter. This parameter allows you to define the pattern that is repeated in every byte of the cell's payload. The default fixed payload pattern is 6A.
6. Use the keypad to supply the desired hexadecimal value for the **Fixed Pattern** parameter.
7. Press **F4**(BACK) to return to the **ATM SELECTIONS** menu.
8. Press the **Up Arrow** key to highlight the **Config Xmit Streams** option. Press **ENTER** to return to the **ATM SOURCES** screen.

You are now ready to load and transmit the stream. See “Starting Stream Transmission”, later in this chapter for details.

Specifying a BERT Payload

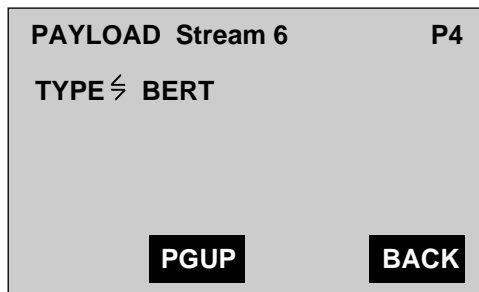
When you run a Bit Error Rate test, you need to configure the transmission stream to carry a BERT payload.

Note

*To locate the screens documented in this procedure, press **ATM**. Scroll to the **Config Xmit Streams** option and press **ENTER**. Finally, select a transmission stream from the **ATM SOURCES** screen and press **ENTER**.*

To specify a BERT payload, follow these steps:

1. Press **F1**(PGDN) to display the **PAYLOAD** (P4) screen.
 The cursor is positioned on the **Type** parameter.
2. Press the **Left** or **Right Arrow** key to change the setting of the **Type** parameter to **BERT**, as in the following:



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3. Press **F4**(BACK) to return to the **ATM SOURCES** screen.

You are now ready to load and transmit the stream. See “Starting Stream Transmission”, later in this chapter.

Note

*Reloading the transmit stream with a payload other than **BERT** while running a BER test will produce invalid results.*

Specifying an O.191 Payload

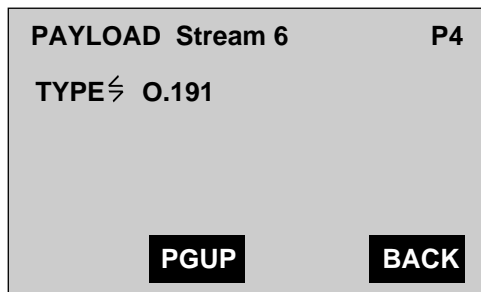
When you run a Cell Delay Variation, Cell Transfer Delay or a Cell Loss test, you need to configure an ITU-T O.191 payload for the E3port Plus. The tester uses the O.191 timestamp to calculate delays in the transmission of cells and uses the O.191 sequence number to determine if cells are missing or incorrectly inserted.

Note

*To locate the screens documented in this procedure, press **ATM**. Then, scroll to the **Config Xmit Streams** option and press **ENTER**. Finally, select a transmission stream from the **ATM SOURCES** screen and press **ENTER**.*

To specify an O.191 payload, do the following:

1. Press **F1**(PGDN) to display the **PAYLOAD** (P4) screen.
The cursor is positioned on the **Type** parameter.
2. Press the **Left** or **Right Arrow** key to change the setting of the **Type** parameter to **O.191**, as in the following:



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The tester will now insert an O.191 test payload into every cell in the transmission stream.

3. Press **F4**(BACK) to return to the **ATM SOURCES** screen.

You are now ready to load and transmit the stream. See “Starting Stream Transmission”, later in this chapter.

Note

*Reloading the transmit stream with a payload other than **O.191** while running a Cell Loss or CDV 2- point/CTD test will produce invalid results.*

Specifying a User-defined Cell List

Another type of payload that you can specify is called a user-defined cell list. This type of payload consists of a sequence of one or more cells.

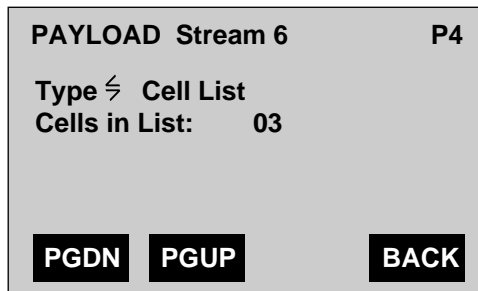
Before you use the following procedure to specify this type of payload, you may find it easier to create the cell payloads first. Go to “Creating a User-defined Cell List” later in this chapter for details.

Note

To locate the screens documented in this procedure, press **ATM**. Then, scroll to the **Config Xmit Streams** option and press **ENTER**. Finally, select a transmission stream from the **ATM SOURCES** screen and press **ENTER**.

To specify a user-defined cell list, follow these steps:

1. Press **F1(PGDN)** to display the **PAYLOAD (P4)** screen.
2. The cursor is positioned on the **Type** parameter.
3. Press the **Left** or **Right Arrow** key to change the setting for the **Type** parameter to **Cell List**, as in the following:



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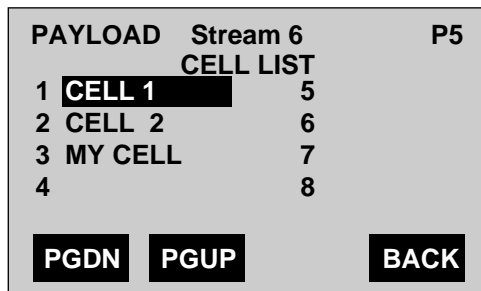
The **Cell List** parameter indicates that you want to transmit a payload that consists of cells that you have defined. These cells are found on the **CELL LIST** menu.

4. Press the **Down Arrow** key to move the cursor to the **Cells in List** parameter.

This parameter specifies how many cells on the **CELL LIST** menu that you want to send.

5. Use the keypad to supply a value for **Cells in List**. Then, press **ENTER**.

The **CELL LIST** menu is displayed, as in the following:



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Note

*The number of cells listed on the CELL LIST menu reflects the number specified for **Cells in List**. Note that on the **PAYLOAD (P5)** screen, only three cells are listed on the **CELL LIST** menu. This is because the value **03** was specified for the **Cells in List** parameter on the **PAYLOAD (P4)** screen.*

When you load the transmission stream, the tester sends out the cells in the same order that they are listed on this menu. The tester continues to send out the cells in this order until you stop transmission.

6. Do *one* of the following:

- If the cells on the **CELL LIST** menu are in the correct order, press **F4(BACK)** to return to the **ATM SOURCES** screen.

You are now ready to start transmission. See “Starting Stream Transmission”, later in this chapter for details.

OR

- If the cells on the **CELL LIST** menu are not in the correct order, see “Changing the Order of Cells on the CELL LIST Menu”, which follows.

Changing the Order of Cells on the CELL LIST Menu

If you want to change the order in which the payload cells are transmitted, you need to change the order in which they are listed on the **CELL LIST** menu. This section provides an example of how to change this menu.

Suppose that you want to make the following changes to the **CELL LIST** menu:

Current Order:

1. CELL 1
2. CELL 2
3. MY CELL

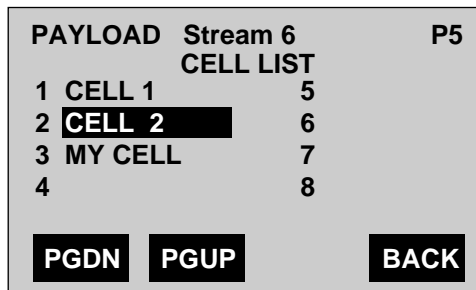
New Order:

1. CELL 1
2. MY CELL
3. CELL 2

To change the current order of cells on the **CELL LIST** menu, follow these steps:

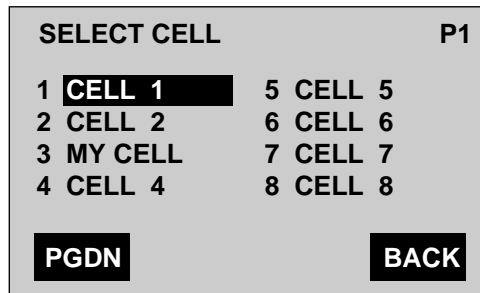
1. From the **CELL LIST** menu, press the **Down Arrow** key to highlight the name of the cell that is currently second in the list (this is because **CELL 2** is the cell that you want to change).

Consider this example:



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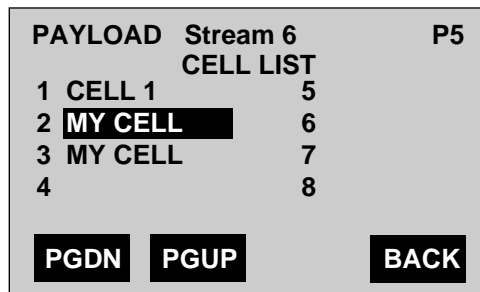
2. Press **ENTER** to display the **SELECT CELL** menu:



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3. From the **SELECT CELL** menu, select the name of the cell (**MY CELL**) that you want to put in second place on the **CELL LIST** menu. Then, press **ENTER**.

You return to the **CELL LIST** menu, which now looks like this:

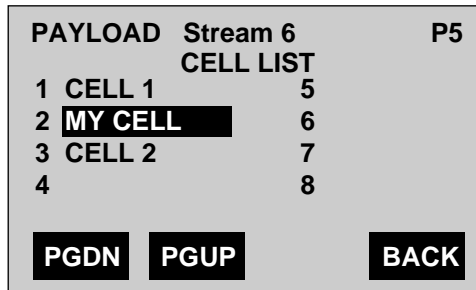


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Note that the cell you selected (**MY CELL**) is highlighted and is now second in the list. You now need to put **CELL 2** in the third position.

4. Press the **Down Arrow** key to highlight the name of the third cell (**MY CELL**). Then, press **ENTER** to return to the **SELECT CELL** menu.

5. Press the **Down Arrow** key to highlight **CELL 2**. Then, press **ENTER**.
 The **CELL LIST** menu is displayed again:



Ta065f.eps

The cells in the list are now in the desired order.

6. Press **F4(BACK)** to return to the **ATM SOURCES** screen.

You are now ready to start transmission. See “Starting a Transmission Stream” later in this chapter for details.

Creating a User-defined Payload

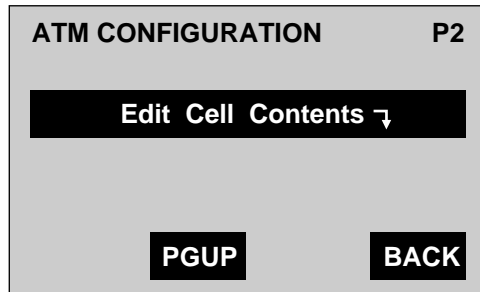
There may be situations in which you need to create special test patterns. In these situations, you can define a payload and transmit it over the network. The tester allows you to define every byte in an ATM cell’s payload. This procedure shows you how to do this.

Selecting a Cell

The first step in transmitting this type of payload is to select which cells you want to edit.

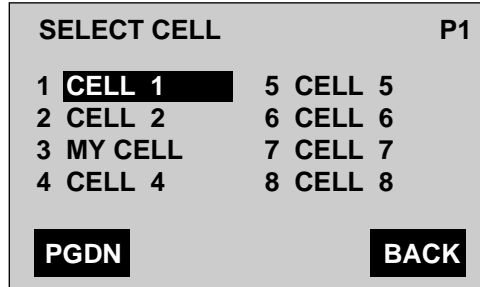
1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key to move the cursor to the **ATM Configuration** option. Press **ENTER** to display the **ATM CONFIGURATION (P1)** screen.

3. Press **F1(PGDN)** to display the **ATM CONFIGURATION (P2)** screen:



ta066f.eps

4. Press **ENTER** to display the **SELECT CELL** menu:



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From the **SELECT CELL** menu, you can select the cells whose payloads you want to define. You can define the payloads for up to 16 cells.

Note

*The 16 cells are numbered 1-9 and A-G, respectively. Press **F2(PGDN)** to display the remaining cells (CELLS 9 - G).*

5. To select a cell whose contents you want to define, press the **Down Arrow** key to highlight its name. Then, press **ENTER**.

The tester displays the contents of the cell you selected.

For example, if you select **CELL 3** then press **ENTER**, a screen similar to the following is displayed:

CELL 3							P1
0	6A	6A	6A	6A	6A	6A	6A
	j	j	j	j	j	j	j
6	6A	6A	6A	6A	6A	6A	6A
	j	j	j	j	j	j	j
PGDN				BACK			

ta067f.eps

This screen contains the 48 bytes in the cell's payload. You can edit each of these bytes, which are found on four pages.

To help you locate a byte, use the number in the beginning of each row as your starting point. For example, on this page, the zero (0) at the beginning of the first row means that the first byte in the row is Byte 0. The second row begins with Byte 6.

For each byte, there is a hexadecimal and an ASCII representation. The hexadecimal representation is presented in the top portion of the byte, and the ASCII representation is presented in the bottom portion of the byte.

6. Press **F1**(PGDN) to display Page 2 (P2).

Note that the two rows on this page begin with Byte 12 and Byte 18, respectively.

7. Continue to press **F1**(PGDN) to see that all 48 bytes of the selected cell are represented.

Naming a Cell

Each of the 16 cells can be given a specific name to help you identify them. To name a cell, follow these steps:

1. Press **F2**(PGUP) to return to Page 1 (P1).

The cursor is positioned on the first letter of the name of the cell, which in this example, is **CELL 3**.

2. Use the keypad to give the cell a name.

In our example, we will type **MY CELL**.

Notes

For information about how to use the keypad, see “Alphanumeric Keypad” in Chapter 2.

*To put a space between the two words "MY" and "CELL", press **SHIFT 1 + Space**.*

The change takes effect immediately. In our example, “CELL 3” is now renamed “MY CELL”.

Editing the Bytes in a Cell's Payload

You are now ready to define the payload that is carried the cell. You do this by editing the payload bytes. You can define these bytes in ASCII or hexadecimal. Choose the representation that is appropriate for your particular application.

The following exercise gives you practice with editing the bytes of “MY CELL”.

1. Press the **Down Arrow** key. The cursor moves to the top portion of Byte 0, the first byte in the payload. This is where you can define the byte using a hexadecimal number.
2. Press the **Down Arrow** key again. The cursor moves to the bottom of Byte 0. This is where you can define the byte using ASCII.

3. To practice editing a byte using a hexadecimal or ASCII representation, follow these steps:

- a. Change the hexadecimal representation of Byte 0 to "3C". To do this, press the **Up Arrow** key to move to the top portion of Byte 0. Then, press the **3** and the **C** keys. Note that the value in the bottom cell changes to the corresponding ASCII representation, "<".

The cursor is now positioned on Byte 1.

- b. Change the ASCII representation of Byte 1 to "E". To do this, press the **Down Arrow** key.

The cursor moves to the bottom portion of Byte 1.

- c. Now press the **E** key.

Note that the hexadecimal value in the top portion of the byte changes to "45".

- d. Finish editing the bytes in **MY CELL** to match this list:

- Byte 2 5B
- Byte 5 A
- Byte 7 7

MY CELL now looks like this:

MY CELL							P1
0	3C	45	5B	6A	6A	41	
	<	E	[j	j	A	
6	6A	37	6A	6A	6A	6A	
	j	7	j	j	j	j	
PGDN				BACK			

ta068f.eps

The values you supply for any cell you edit are stored in memory and saved even when you turn off the tester.

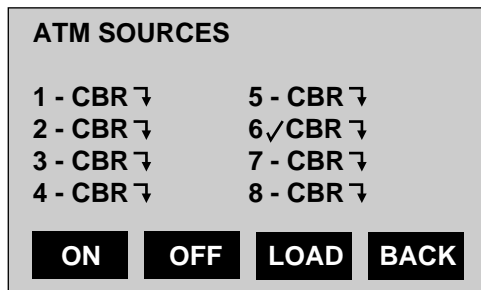
Caution

These values are permanently erased if you restore the factory default settings.

Now that you have defined each cell's payload, you need to configure the tester to transmit the cells in the cell list. Go to "Configuring a Transmission Stream" earlier in this chapter for details. When you specify the type of payload, follow the procedure under "Specifying a User-defined Cell List".

Starting Stream Transmission

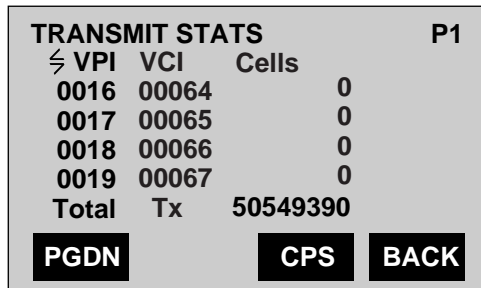
1. From the **ATM SOURCES** screen, press **F3(LOAD)**.



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The tester loads the patterns defined for the selected transmission streams (in this example, Stream 6 is the only selected stream as indicated by check mark). During this process, you see a series of messages that indicate that the E3port Plus is building and loading the transmission stream and then starting cell generation.

When the E3port Plus finishes, the **TRANSMIT STATS (P1)** screen is displayed:



ta069f.eps

This is the first of two screens that display transmission statistics. These screens provide information about the number of cells that are being transmitted on each of the tester's eight transmission streams.

Note the information in the last column with the heading "Cells". In this example, a total of 50,549,390 cells have been transmitted. However, none of these cells have been transmitted on any of the streams you see on this screen.

2. Press **F1**(PGDN) to display the **TRANSMIT STATS** (P2) screen:

TRANSMIT STATS			P1
≡ VPI	VCI	Cells	
0020	00068	0	
0021	00069	50549390	
0022	00070	0	
0023	00071	0	
Total	Tx	50549390	
PGDN		CPS	BACK

ta070f.eps

Look at the cell activity on VPI 21/VCI 69, which is Stream 6. The column labeled "Cells" indicates that all 50,549,390 cells have been transmitted on this stream since transmission began.

3. Press **F3**(CPS).

Note that the information in the last column is now presented in a different form: cells per second (CPS).

4. Press **F3** several more times to see the same information presented in these other forms:

- MBS (Megabits per second)
- BW % (Bandwidth percentage)
- CELL (Exact cell counts)

5. Press **CLEAR**.

The current values are erased. Notice that the counters immediately reset to zero and begin counting again.

6. With the cursor positioned on the ≡ symbol on Line 2, press the **Right Arrow** key.

Notice that the information on the screen changes to display each stream's values for the **GF**, **PT**, **CL**, **HCS** parameters.

For example:

TRANSMIT STATS					P2
⊲ GF	PT	CL	HCS	Cells	
0	0	0	56	0	
0	0	0	84	50549390	
0	0	0	F5	0	
0	0	0	27	0	
Total	TX			50549390	

PGUP **CPS** **BACK**

ta071f.eps

7. Press the **Right Arrow** key again.
Now, the hexadecimal header value of each circuit is displayed on this line.
8. Press the **Right Arrow** key once more.
The name of each stream is displayed.

Viewing ATM Circuit Activity

To view activity on detected circuits, follow these steps:

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Make sure that the **Receive Summary** option is highlighted. Then, press **ENTER** to display the **RECEIVE SUMMARY** screen.
3. Press the **Down Arrow** key to highlight the **Circuit Activity List** option. Then, press **ENTER** to display the following:

RCV STATS		(01 - 04)
⊲ VPI	VCI	Cells
0000	00000	3950803
0016	00064	658466
0017	00065	658466
0018	00066	658466
⊲ as found		5 ckts

PGDN **CPS** **BACK**

ta102f.eps

This screen indicates the number of cells that the tester has received since you pressed **CLEAR**. The tester can keep track of activity on up to 64 different circuits.

Note

The **RCV STATS** screen also displays circuits on which ATM tests are being conducted or have been conducted since the display was last cleared.

In this example, the E3port Plus has detected activity on five streams (5 ckts). The first stream listed has a VPI of 0 and a VCI of 0. These are background cells. On each of the remaining streams displayed, the tester has received 658,466 cells.

Note that the first line of this screen has the numbers 01 - 04. These numbers correspond to the circuits listed on this screen. That is, '01' is the first circuit (the one with VPI 0/VCI 0), '02' is the second circuit, and so forth.

4. Press **F3**(CPS).

Notice that the information in the last column changes from a count to cells per second (CPS).

5. Press **F3** several times again to see the same information presented in these forms:

- MBS (Megabits per second)
- %BW (Bandwidth percentage)
- CELL (Exact cell counts)

6. In the sample display, you are viewing circuits 1 - 4. To display information for additional circuits, press **F1**(PGDN).

The tester "beeps" and displays the information.

7. To display information for the previous four circuits, press **F2**(PGUP).
8. To display the information for a specific circuit, position the cursor on Line 1. Then, use the keypad to type the number (01 to 64) of the circuit that you want to view.

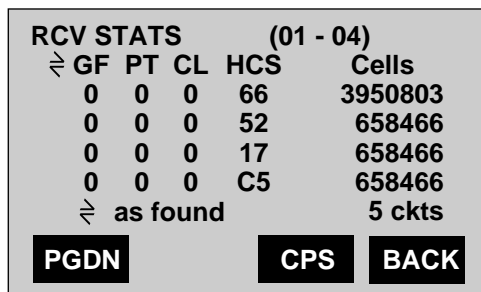
The information for the circuit you selected is displayed on Line 3.

Note

The E3port Plus can detect up to 64 circuits. Each detected circuit is put in a list and assigned a number from 1 to 64. When you want to view the information for a specific circuit, you use its assigned number (for example, enter '04' to view the fourth circuit in the list).

9. Move the cursor to the \Leftarrow symbol on Line 2. Then, press the **Right Arrow** key. Notice that the information in this field changes to display values for the **GF**, **PT**, **CL**, **HCS** parameters.

For example:

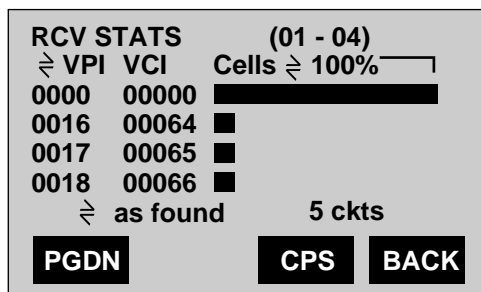


ta103f.eps

10. Press the **Right Arrow** key again to view the header Hex values for the circuits.
11. To view the receive summary statistics in graphical form, complete these steps:
 - a. Press the **Right Arrow** key to return to the display showing the VPI/VCI values.
 - b. Press **SHIFT 1 + Fn**.

The receive summary statistics are now presented in a bar graph.

Note that the bar graph is at 100% of scale:



ta104f.eps

c. To change the scale of the graph, press **SHIFT 1 + Fn**.

With each successive press of these keys, you can view the graph reduced to these proportions: 50%, 25%, and 10%.

d. To exit graphical mode, press **SHIFT 1 + Fn**.

12. Press the **Down Arrow** key to move the cursor to the \Leftarrow symbol at the bottom of the screen. Then, press the **Right Arrow** key.

Notice that the wording following this symbol changes from **as found** to **vp/vc H>L**. Note also that the order of the circuits listed on the screen also changes. They are now in a rank order from high to low by VPI/VCI (**vp/vc H>L**).

Consider the following screen:

RCV STATS		(01 - 04)
\Leftarrow VPI	VCI	Cells
0018	00066	658466
0017	00065	658466
0016	00064	658466
0000	00000	3950803
\Leftarrow vp/vc H>L		5 ckts
PGUP	CPS	BACK

ta105f.eps

13. Press the **Right Arrow** key again to view the following information:

- **vp/vc L>H**

Sorts circuits by VPI/VCI and displays a rank order listing from low to high

- **freq H>L**

Sorts circuits by number of cells and displays a rank order listing from high to low

- **freq L>H**

Sorts circuits by number of cells and displays a rank order listing from low to high

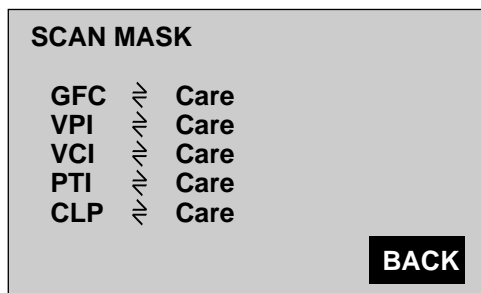
Changing the Presentation of Circuit Activity Statistics

The default method of reporting circuit activity entails providing separate statistics for a circuit based on differing values for each cell header field. While this method gives you a more detailed look at circuit activity, there may be times when you need to summarize or group the data to better understand signal traffic and performance.

The E3port Plus can be configured to ignore or mask certain header characteristics when reporting activity on detected circuits. For example, suppose you want a bandwidth summary for each VPI. In this case, you could set up the tester to ignore all of the header fields except the VPI. When reporting the circuit activity, the tester would provide you with a summary of its statistics by VPI only.

To change the way the E3port Plus presents circuit activity statistics:

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Make sure that the **Receive Summary** option is highlighted. Then, press **ENTER** to display the **RECEIVE SUMMARY** screen.
3. Press the **Down Arrow** key to highlight the **Config Scan Mask** option. Then, press **ENTER** to display the **SCAN MASK** screen:



ta106f.eps

This screen lists the five header fields. You can set each field to one of the following:

- **Care**

The tester includes the field when reporting statistics

- **Don't Care**

The tester ignores the field when reporting statistics

4. Position the cursor on the header field you want to change. Then, press the **Left** or **Right Arrow** key to select the desired setting.
5. Press **F4(BACK)** to return to the **RECEIVE SUMMARY** screen.

6. Press the **Down Arrow** key to highlight the **Circuit Activity List** option. Then, press **ENTER** to return to the **RCV STATS** screen.

Notes

On the RCV STATS screen, an 'X' is used to designate that the tester ignored the field.

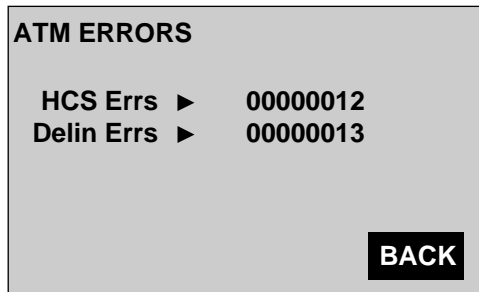
Some ATM tests automatically ignore a bit or two in a header field so that they can perform a calculation. When this is done, an asterisk () is used to indicate that a portion of the field was ignored.*

Monitoring a Signal for ATM Errors

To monitor the E3 signal for ATM errors, complete the following:

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Make sure that the **Receive Summary** option is highlighted. Then, press **ENTER** to display the **RECEIVE SUMMARY** screen.
3. Make sure that the **ATM Errors** option is highlighted, Then, press **ENTER**.

The **ATM ERRORS** screen is displayed:



ta023f.eps

This screen lists the following errors:

- **HCS Errs**
Header Checksum errors. Indicates errors relating to the HEC field of ATM cells.
- **Delin Errs**
Cell delineation errors. Indicates errors related to cell framing.

Chapter 6

ATM Network Testing

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Introduction

This chapter describes the ATM network testing functions of the E3port Plus. The first part of this chapter shows you how to configure the tester's receive filter, which is used by many of the ATM tests to detect and identify incoming cells. The second part of this chapter shows you how to set up and run the ATM tests.

Before you can transmit or receive ATM cells, your tester must be configured to match the E3 signal to be tested. See "Chapter 4. E3 Network Testing" for information on how to do this.

Configuring the Receive Filter

For many of the ATM tests that you will be running, you will need to configure the tester's receive filter as part of the setup. The tester uses the receive filter to route incoming cells to its statistical counters, enabling you to analyze cell payloads and check for errors in the received ATM cell stream.

The following tests, which are documented later in this chapter, require you to configure the receive filter as part of their setup:

- Bit Error Rate
- Quality of Service
- Cell Capture
- AAL Detection
- IP Ping and IP Ping Responder
- GCRA

The parameters you define as part of the configuration of the receive filter set the attributes that the tester uses to check incoming ATM cells on its input E3 signal. The specific settings for these parameters vary depending on the type of test you are running. Like all other E3port Plus settings, the receive filter settings are saved in memory even when the tester is turned off.

To configure the receive filter:

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **ATM Testing** option. Then, press **ENTER** to display the **ATM TESTS (P1)** menu.

The cursor is positioned on the **Receive Filter** option.

3. Press **ENTER** to display the setup screen for the receive filter:

```
RECEIVE FILTER

✓VPI: 0016      ✓PT: 0
✓VCI:00064     x CLP:0
✓GFC:0

Hex:  01  00  04  00  17

      DONTC  BACK
```

ta108f.eps

On this screen, you can specify a value for each of the five fields in the ATM cell header. Consult Table 6-1 for descriptions of the receive filter setup parameters.

For each ATM cell header field, the **F3** key is used to specify an include (CARE) or ignore (DONTC) condition. When preceded by a check mark ✓(CARE), the tester filters and displays results only for the value you specify in the field. When preceded by an **x** (DONTC), the tester filters and displays results for any value in the field.

4. To set up the receive filter, choose *one* of the following methods:

- Use the keypad to specify a value for the **VPI** , **VCI**, **PT**, **CLP**, and **GFC** parameters.

If you want the tester to include or exclude a header field when it checks the input stream, position the cursor on the field's value and press **F3** to select the desired condition.

You have completed setting up the receive filter.

OR

- Move the cursor to the **Hex** field. Then, use the keypad to specify a value for each byte.

You have completed setting up the receive filter.

Table 6-1. Receive Filter Setup Parameters

Parameter	Description
VPI	Virtual Path Indicator. Defines the address of the cell.
VCI	Virtual Channel Indicator. Defines the address of the cell.
PT	Payload Type. Indicates whether the contents of the cell are user data or network signaling information.
CLP	Cell Loss Priority. A priority indicator, which indicates whether or not the network can discard the cell.
GFC	Generic Flow Control. Used for traffic control (for the UNI interface only).
Hex	Hexadecimal header. This is a hexadecimal representation of the ATM cell header. This parameter provides you with an alternate way of entering values for the VPI , VCI , PT , CLP , and GFC fields.

Bit Error Rate Test

The E3port Plus can fill the payloads of cells on any one of its eight transmission streams with a pseudo-random or fixed bit cell pattern and determine the effective error rate of the cell stream. In addition, the E3port Plus can receive cells generated by other equipment that has been filled with a standard test pattern and analyze the resultant bit error rate (BER).

This section shows you how to set up the tester to generate and analyze an ATM cell stream or a E3 stream that is carrying a BER test payload. It shows you how to set up a BER test using a predefined test pattern or a pattern that you create, and how to run the test using the pattern you select. It also describes the measurement results that the tester provides.

Setting Up a BER Test

A BER test uses the receive filter and the BER test pattern to check the incoming signal. To set up the E3port Plus to run this test, first do the following:

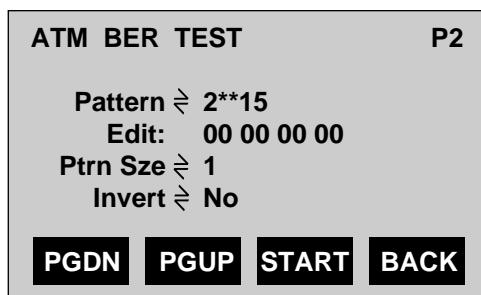
1. Set up the receive filter. Make sure that the header matches the header of the transmission stream carrying the BER test payload (see “Configuring the Receive Filter“ earlier in this chapter for information on how to do this).
2. If the tester is to be the source of the BER test pattern, set up a transmission stream with the payload type set to **BERT** (see “Configuring a Transmission Stream” in Chapter 5 for information on how to do this).

Note

*You can select **BERT** as the payload for more than one transmit stream. However, be aware that when you do this, the BER test data is “shared” among the streams. As a result, your BER test results may be invalid unless the receiving tester is configured to simultaneously test the BER-configured streams. This is also a useful way of providing “random” cell payloads on multiple cell streams.*

After you set up the receive filter, you need to define the BER test pattern. The instructions that follow show you how to complete this phase of the setup for the BER test.

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **ATM Testing** option. Then, press **ENTER** to display the **ATM TESTS (P1)** menu.
3. Press the **Down Arrow** key to highlight the **Bit Error Rate** option. Then, press **ENTER** to display the **ATM BER TEST (P1)** screen.
4. Press **F1(PGDN)** to display the **ATM BER TEST (P2)** screen:

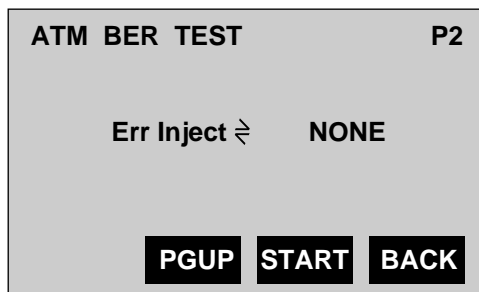


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The cursor is positioned on the **Pattern** parameter. The settings for this parameter represent the patterns of bits that you can select during a BER test. For a list and description of BER test patterns, refer to Table 4-6.

5. Do *one* of the following:
 - If you want to use one of the predefined patterns, press the **Left** or **Right Arrow** key to select the one that you want to use. Then, go to Step 6.
OR
 - If you want to create your own test pattern, follow these steps:
 1. Press the **Left** or **Right Arrow** key to select the **User Def** setting.
 2. Press the **Down Arrow** key to move the cursor to the **Edit** parameter. Then, use the keypad to specify the exact bit pattern that you want to send.
 3. Press the **Down Arrow** key to move the cursor to the **Ptrn Size** (Pattern Size) parameter.

This parameter has four settings, 1 - 4, which represent the number of bytes (containing the selected pattern) that are continuously transmitted.
 4. Press the **Right Arrow** key to select a value for the size of the pattern.
6. Press the **Down Arrow** key to move the cursor to the **Invert** parameter. Then, press the **Left** or **Right Arrow** key to select one of the following settings:
 - **No**
Does not invert the polarity of each of the selected bit patterns
 - **Yes**
Inverts the polarity of each of the selected bit patterns
7. Press **F1**(PGDN) to display the **ATM BER TEST** (P3) screen:



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The **Err Inject** (Error Injection) parameter determines the error injection rate. Errors are injected in the transmitted BER test pattern according to one of four rates (see Table 4-7 for error injection rate choices).

8. Press the **Left** or **Right Arrow** key to select the desired error injection rate.

Note

*Even if you select **NONE**, you can still inject single bit errors while the BER test is running. To do this, press **F2(INJCT)**. Each time you press this key, a single error is injected into the BER test stream.*

You have completed the setup for the BER test.

Starting a BER Test

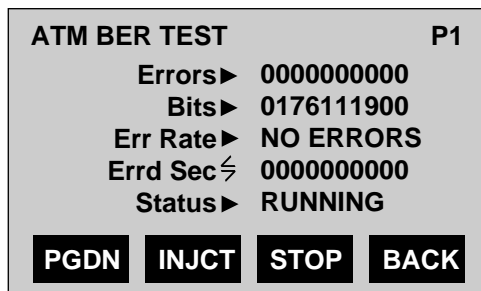
Notes

If you decide to change a setting while the tester is running a BER test, you must first stop the test, change the setting, then restart the test with the new settings.

*If the tester is the source of the BER test pattern, you can inject individual bit errors while the BER test is running. To do this, press **F2(INJCT)**. Each time you press this key, a single error is injected into the BER test stream.*

1. To start a BER test, press **F3(START)**.

Several messages, indicating that the tester is building then loading the specified cell stream, are displayed. Then, results (see Table 4-8) are displayed on the **ATM BER TEST (P1)** screen:



wg115.eps

The cursor is positioned on the **Errd Sec** result.

2. Press the **Left** or **Right Arrow** key to view BER test results in the following formats (see Table 4-8 for descriptions):
 - **Efree Sc**
 - **% Efree**
 - **Elap Sec**
 - **Errd Sec**

Stopping a BER Test

To stop the BER test, press **F3(STOP)**.

Quality of Service Tests

The E3port Plus has three Quality of Service (QoS) tests that are used to test the integrity of an ATM circuit and to ensure that a particular network meets contracted levels of service. The following QoS tests are documented in this section:

- Cell Delay Variation (CDV) 1-point
- Cell Delay Variation 2-point and Cell Transfer Delay (CTD) using ITU-T O.191 test cell
- Cell Loss using ITU-T O.191 test cell

Cell Delay Variation Tests

The E3port Plus calculates Cell Delay Variation (CDV), which is a quantification of how cells clump together as they travel on a particular VPI/VCI. The tester performs two types of CDV tests: a 1-point and a 2-point. This section shows you how to set up and run these two types of tests.

CDV 1-point Test

A CDV 1-point test is concerned with the early arrival of cells, which indicates that the transmission source is in violation of its traffic contract. During this test, the tester captures a sample of cells in its buffer and assigns each cell a received time stamp. The arrival times of cells are then compared with the expected arrival time (which is based on the value you supply for the **PCR** parameter) and a resultant CDV value is derived.

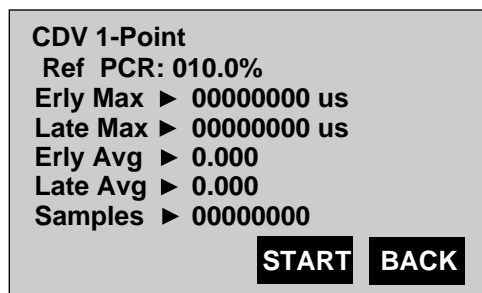
CDV results are expressed in microseconds, and cells are either early or late. Early cells indicate clumping and possible excessive usage above the contract rate by the transmission source. If the cells sampled arrive later than expected, the transmission source is not exceeding the contract rate. After each analysis of the buffer's contents, the tester empties its buffer and then refills it so that the test can continue.

Setting Up a CDV 1-point Test

To set up a CDV 1-point test, first set up the receive filter. For information on how to do this, see “Configuring the Receive Filter” earlier in this chapter.

Then, complete these steps:

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **ATM Testing** option. Then, press **ENTER** to display the **ATM TESTS (P1)** menu.
3. Press the **Down Arrow** key to move the cursor to the **QoS Tests** option. Then, press **ENTER** to display the **QoS TESTS** menu.
4. Make sure that the cursor is positioned on the **CDV 1-Point** option. Then, press **ENTER** to display the **CDV 1-Point (P1)** screen:



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The cursor is positioned on the **Ref PCR** parameter. The tester uses the **Ref PCR** value to calculate an expected cell arrival time. It then compares the computed cell arrival time with the actual cell arrival time to arrive at the CDV statistics.

5. Specify a value for **Ref PCR**.

You have completed the setup for the CDV 1-point test.

Running a CDV 1-point Test

1. To run the test, press **F3(START)**.

The test begins and results are displayed on the LCD (see Table 6-2 for a description).

2. To stop the test, press **F3(STOP)**.

Note

The CDV 1-point test also stops when you start another test.

Table 6-2. Test Results for the CDV 1-Point Test

Result	Description
Erly Max	Arrival time (in microseconds) of the earliest cell in the sample
Late Max	Arrival time (in microseconds) of the latest cell in the sample
Erly Avg	Average arrival time (in microseconds) of all early cells in the sample
Late Avg	Average arrival time (in microseconds) of all late cells in the sample
Samples	Total number of cells being measured

CDV 2-point/CTD Test

The CDV 2-point/CTD test is concerned with cell delivery times, specifically with the actual delay and the delay variation of cells transmitted between two points in a network. During this test, the tester captures a sample of cells. Each cell contains a timestamp indicating when it was transmitted. The tester calculates the difference between each cell's timestamp and arrival time. The result is reported as the Cell Transfer Delay (CTD). The variation in this delay from cell to cell is reported as Cell Delay Variation (CDV). The tester reports these results in microseconds.

This test uses the ITU-T O.191 specified test cell. This standard allows you to use the E3port Plus to calculate CDV 2-point values when supplied with O.191 cells from another Fluke handheld ATM tester or any other compliant equipment. When measuring CTD, however, you must use the same E3port Plus as the source of O.191 test cells.

Setting Up a CDV 2-point/CTD Test

To set up the E3port Plus to run a CDV 2-point/CTD test, you must configure the receive filter. See "Configuring the Receive Filter" earlier in this chapter.

If the E3port Plus is to source the O.191 test cells, you also need to configure an ATM transmission stream. For information on how to do this, see "Configuring a Transmission Stream" in Chapter 5 for details. When you configure the transmission stream, do the following:

1. Set the payload type in the **Type** field to **O.191**.

Note

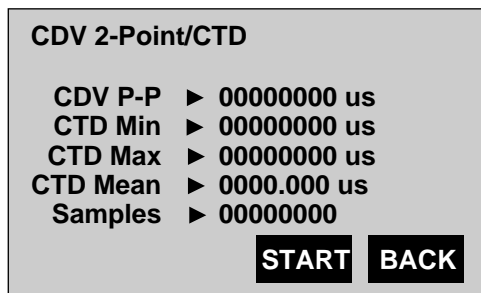
*You can select **O.191** as the payload for more than one transmit stream. However, be aware that when you do this, the O.191 test data is "shared" among the streams. As a result, your CDV 2-point/CTD test results may be invalid unless the receiving tester is configured to simultaneously test the O.191-configured streams.*

2. Load the transmission stream.

Running a CDV 2-point Test

To run a CDV 2-point test:

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key to move the cursor to the **ATM Testing** option. Then, press **ENTER** to display the **ATM TESTS (P1)** menu.
3. Move the cursor to the **QoS Tests** option. Press **ENTER** to display the **QoS TESTS** menu.
4. Press the **Down Arrow** key to highlight the **CDV 2-Point/CTD** option. Then, press **ENTER** to display the **CDV 2-Point/CTD** screen:



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5. Press **F3(START)**.

The CDV 2-point/CTD test begins. While the test is running, the tester displays results to you on the LCD. See Table 6-3 for a description of test results.

6. Press **F3(STOP)** to stop the test.

Note

The CDV 2-point/CTD test also stops when you start another test.

Table 6-3. Test Results for 2-Point CDV/CTD Test

Result	Description
CDV P-P	CDV Peak-to-Peak. Difference (in microseconds) between the cell in the sample that arrived the earliest and the cell that arrived the latest.
CTD Min	Time (in microseconds) of the cell in the sample that arrived the earliest.
CTD Max	Time (in microseconds) of the cell in the sample that arrived the latest.
CTD Mean	Average delay of all cells in the sample.
Samples	Total number of cells in the sample.

Cell Loss Test

The Cell Loss test is used to test an ATM network for the loss or incorrect insertion of ATM cells. During this test, the tester captures cells that each contain a sequence number. Using the sequence numbers, the tester verifies that all the cells are recovered and are in the correct order. The results are reported as Cell Loss and Mis-insertion errors.

This test uses the ITU-T O.191 specified test cell. This standard allows you to use the E3port Plus to measure Cell Loss when supplied with O.191 cells from another Fluke Handheld ATM tester or any other compliant equipment

Setting Up a Cell Loss Test

To set up the E3port Plus to run a Cell Loss test, you must configure the receive filter. See “Configuring the Receive Filter” earlier in this chapter.

If the E3port Plus is to source the O.191 test cells, you also need to configure an ATM transmission stream. For information on how to do this, see “Configuring a Transmission Stream” in Chapter 5 for details. Do the following:

1. Set the payload type in the **Type** field to **O.191**.

Note

*You can select **O.191** as the payload for more than one transmit stream. However, be aware that when you do this, the O.191 test data is “shared” among the streams. As a result, your Cell Loss test results may be invalid unless the receiving tester is configured to simultaneously test the O.191-configured streams.*

2. Load the transmission stream.

Running a Cell Loss Test

To run a Cell Loss test, follow these steps:

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **ATM Testing** option. Then, press **ENTER** to display the **ATM TESTS (P1)** menu.
3. Press the **Down Arrow** key to highlight the **QoS Tests** option. Then, press **ENTER** to display the **QoS TESTS** menu.

4. Press the **Down Arrow** key to highlight the **Cell Loss** option. Then, press **ENTER** to display the **CELL LOSS** screen:



ta117f.eps

5. Press **F3**(START).

The Cell Loss test begins and results are displayed on the tester's LCD. See Table 6-4 for a description of test results.

Note

*You can use **F1**(LOSS) and **F2**(MISIN) to artificially insert a lost or mis-inserted cell into the transmit stream of the tester.*

6. Press **F3**(STOP) to stop the test.

Note

The Cell Loss test also stops when you start another test.

Table 6-4. Cell Loss Test Results

Result	Description
Lost	Number of cells lost
Loss Ratio	A count of the number of cells loss divided by the number of cells reported as received
Mis-insert	Number of cells with incorrect sequence numbers
MisIn Rate	A count of the number of cells mis-inserted divided by the number of seconds that the test ran
Errors	A count of 0.191 cells with incorrect or mismatched CRCs received
Samples	Total number of cells in the sample

ATM Cell Capture

The E3port Plus lets you capture ATM cells in its buffer so that you can look inside each cell to examine its contents. This feature is useful when you are troubleshooting circuits and attempting to isolate network problems. This procedure shows you how to set up the tester to capture ATM cells, how to start a cell capture, and how to view the cell capture results.

Setting Up the E3port Plus to Capture ATM Cells

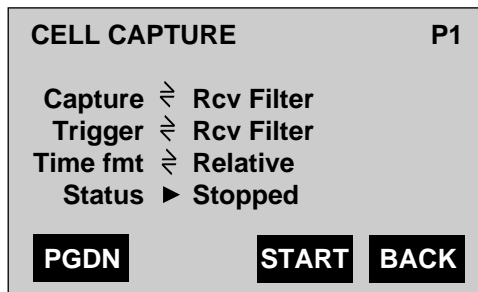
To set up a cell capture, complete the following:

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **ATM Testing** option. Then, press **ENTER** to display the **ATM TESTS (P1)** menu.

The **Receive Filter** option is highlighted.

3. Press **ENTER** to display the setup screen for the receive filter. Set up the receive filter with the correct header information for the transmission stream to be captured.
4. Press **F4(BACK)** to return to the **ATM TESTS (P1)** menu. Then, press the **Down Arrow** key to highlight the **Cell Capture** option. Press **ENTER**.

The **CELL CAPTURE (P1)** setup screen is displayed:



ta119f.eps

The first three parameters on this screen are used to set up the cell capture. Table 6-5 describes the parameters on this screen.

The cursor is positioned on the **Capture** parameter.

5. Press the **Down Arrow** key to move the cursor to each parameter. Then, press the **Right** or **Left Arrow** key to select the desired setting.

Setup is completed. You can now start to capture cells.

Table 6-5. Cell Capture Setup Parameters and Status Information

Parameter/Status	Description
Capture	<p>Determines which cells the tester stores.</p> <ul style="list-style-type: none"> • Rcv Filter: stores only those cells whose header matches the receive filter settings. • All Cells: stores all the cells it receives (on the 64 circuits).
Trigger	<p>Determines when the tester begins storing cells.</p> <ul style="list-style-type: none"> • Rcv Filter: the tester begins storing cells after it receives a cell with a header that matches the receive filter settings. • All Cells: the tester begins storing cells after it receives the first cell. • AAL5/Rcv Flt: the tester begins storing cells after it detects the end of an AAL5 PDU.
Time fmt	<p>Determines the method used to calculate cell arrival time.</p> <ul style="list-style-type: none"> • Relative: the tester records each cell's arrival time relative to the previous cell's arrival time. • Absolute: the tester records the absolute arrival time (in microseconds) of each cell (using zero as reference point) since the cell capture began.
Status	<p>Updates you on the status of the cell capture.</p> <ul style="list-style-type: none"> • Stopped: the tester is not presently capturing cells and that it has no cells that were previously captured in its buffer. • Running: the tester is in the process of capturing cells. • Captured: the tester is not presently capturing cells but that it currently contains previously captured cells in its buffer.

Starting a Cell Capture

Notes

Idle and unassigned cells are not captured.

If you decide to change a setting while the tester is capturing cells, you must first stop the cell capture, change the setting, then restart the test with the new settings.

To start a cell capture, press **F3**(START).

The cell capture process begins. The status indicator reads: **Running**. If the buffer fills to capacity, the indicator reads: **Captured** and the result screen is displayed.

Viewing Cell Capture Results

To view the results of a cell capture, follow these steps:

1. Press **F1**(PGDN) to display the first cell capture result screen:

```

CELL CAPTURE                                P2
Cell : 000      VP ▶ 0016
VC ▶ 00064     PT ▶ 0       CL ▶ 0
Time ▶ 0000000000.0 us
00> bd 72 70 d2 dd
05> 11 31 99 5a a8
10> 20 0f 3f dd 7f
    
```

PGUP
BACK

ta120f.eps

This screen lists the number of the cell you are currently viewing. (The first cell captured is always assigned the number '000'.) It also provides the header information for the cell and the arrival timestamp.

The row starting with '00' contains the hexadecimal header values. The remaining lines display the bytes in the cell's payload. The number that starts each row is the number of the first byte in that row. For example, the last line starts with '10', which means that the first byte in this row is Byte 10. In this example, Byte 10 has a value of 20.

2. To see the remaining bytes in the payload, press the **Down Arrow** key.

Notice that the rows move up. For example, if you press the **Down Arrow** key once, the row starting with '00' moves up and out of the viewing area, and the line starting with '15' moves up and into the last line of the viewing area:

```

CELL CAPTURE                                P2
Cell : 000      VP ▶ 0016
VC ▶ 00064     PT ▶ 0       CL ▶ 0
Time ▶ 0000000000.0 us
05> 11 31 99 5a a8
10> 20 0f 3f dd 7f
15> 30 fd 5d f0 33
    
```

PGUP
BACK

ta121f.eps

3. To view the next cell captured in the buffer, press **ENTER**.

The tester advances to the next cell and displays its contents and arrival time. Note that the cell number changes to indicate that you are now viewing information for the next cell.

Note

*To view the information for the cell that was captured immediately before the one you are currently viewing, press **SHIFT 1 + ENTER**.*

4. To view a specific cell in the buffer, use the keypad to type the number of the cell that you want to see.

The tester advances directly to that cell and displays its contents and arrival time.

OAM Testing and Detection

This section describes procedures that you can use to test and detect ATM-layer Operations and Maintenance (OAM) cells as defined in *ITU-T I.610 B-ISDN Operation and Maintenance Principles and Functions*. The E3port Plus implements monitoring and testing of OAM F4 and F5 flows for the following network management functions:

- Fault management
 - ◆ Alarm Indication Signal (AIS)
 - ◆ Remote Defect Indication (RDI)
 - ◆ Loopback
 - ◆ Continuity Check
- Performance management
 - ◆ Forward Monitoring
 - ◆ Backward Reporting
- Activation/Deactivation
 - ◆ Performance Monitoring
 - ◆ Continuity Check

Testing OAM F4 and F5 Flows

The E3port Plus provides the following tests that are designed to test specific aspects of network management by verifying that an ATM network is responding appropriately to OAM cells:

- AIS/RDI

In this test, the E3port Plus simulates alarm signals by sending OAM AIS and RDI cells. This test enables you to evaluate a network's fault detection and notification capability by determining whether OAM AIS and RDI cells are properly transmitted and received.

- Loopback

In this test, the E3port Plus sends OAM Loopback cells and responds to these cells when received from a connected device. This test enables you to evaluate a network's ability to send and respond to OAM Loopback cells and to verify connectivity of part of or the complete end-to-end connection.

- Continuity Check

In this test, the E3port Plus sends or receives OAM Continuity Check (CC) cells. This test enables you to evaluate CC activation and deactivation procedures and to confirm that a node is active and that a path or channel maintains a working connection.

- Performance

In this test, the E3port Plus sends blocks of cells followed by an OAM Forward Monitoring cell to a connected device and waits for the device to return an OAM Backward Reporting cell. The tester then compares the information in the Backward Reporting cell and generates performance statistics. This test enables you to evaluate Performance Management activation and deactivation procedures and evaluate network performance in terms of basic cell transfer outcomes.

Setting Up the E3port Plus for OAM Testing

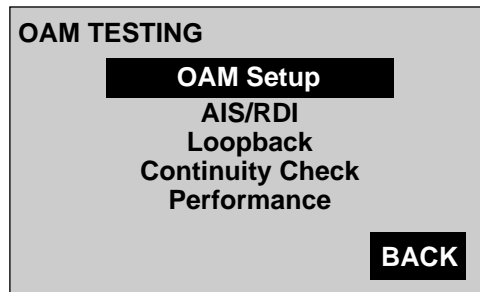
Note

The parameters you select in this setup procedure apply to all of the OAM tests documented in the following sections.

To set up the E3port Plus for OAM testing, complete the following:

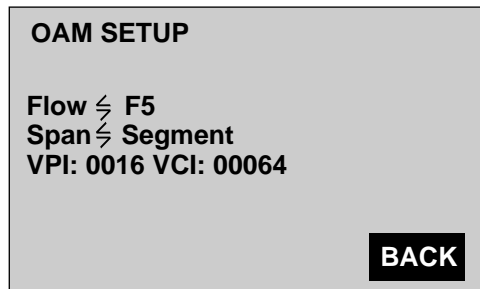
1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key until the **ATM Testing** option is highlighted. Then, press **ENTER** to display the **ATM TESTS (P1)** menu.

3. Press the **Down Arrow** key to select the **OAM** option. Then, press **ENTER** to display the **OAM** menu.
The cursor is positioned on the **OAM Testing** option.
4. Press **ENTER** to display the **OAM TESTING** menu:



ta156f.eps

- The cursor is positioned on the **OAM Setup** option.
5. Press **ENTER** to display the **OAM SETUP** screen:



ta157f.eps

- The cursor is positioned on the **Flow** parameter. See Table 6-6 for descriptions of the setup parameters on this screen.
6. Select a setting for the **Flow** parameter. Then, press the **Down Arrow** key to move the cursor to each remaining parameter and select a setting or use the keypad to supply the desired value.
 7. Press **F4(BACK)** to return to the **OAM TESTING** menu and select the test that you want to run.

Table 6-6. OAM Test Setup Parameters

Parameter	Description
Flow	Designates the flow as F4 or F5.
Span	Identifies the portion of the line as either End-to-end or Segment.
VPI	Sets the VPI of the OAM transmission for F4 or F5.
VCI	Sets the VCI of the OAM transmission for F5. Also used to specify the VCI of the transmission for user data in the Performance test.

Running an OAM AIS/RDI Test

The OAM AIS/RDI test can be used to assess a network’s ability to transmit and respond to AIS and RDI cells. In this test, you can set up the E3port Plus to send OAM AIS cells or respond to an AIS by sending OAM RDI cells.

In Sender mode, the tester generates OAM AIS cells. When you press **F3(START)**, the tester transmits OAM AIS cells at a rate of one per second. The **AIS Sent** counter on the tester’s LCD increments as it transmits each cell. When the network detects the AIS, it should declare an AIS state and send RDI cells at a nominal rate of one per second. Upon receipt of RDI cells, the tester’s OAM RDI LED lights and the **RDI Rcvd** counter on the LCD records the number of RDI cells received.

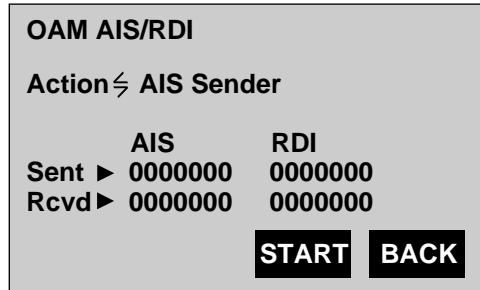
In Responder mode, the tester waits to receive OAM AIS cells from the network. When the cells are received, the tester’s OAM AIS LED lights and the **AIS Rcvd** counter records the number of AIS cells received. In response to AIS cells, the tester sends RDI cells at the rate of one per second, and the **RDI Sent** counter records the number of RDI cells transmitted. If AIS cells are not received for 2.5 seconds, the OAM AIS LED turns off and the tester’s transmission of RDI cells ends.

To run an AIS/RDI test, complete the following:

Note

You cannot run this test at the same time that the tester is detecting OAM cells or running another ATM test.

1. From the **OAM TESTING** menu, select **AIS/RDI**. Then, press **ENTER** to display the following:



ta158f.eps

The cursor is positioned on the **Action** parameter. Table 6-7 describes the items on this screen.

2. Select a setting for the **Action** parameter.
3. Press **F3**(START) to start the test.

The counters reset and begin incrementing as the tester transmits and receives OAM AIS/RDI cells.

4. Press **F3**(STOP) to end the test.

Table 6-7. OAM AIS/RDI Test Parameters and Results

Parameter/Result	Description
Action	Selects the mode of the tester. <ul style="list-style-type: none"> • AIS Sender: will send OAM AIS cells at a rate of one per second. • RDI Responder: will wait to receive OAM AIS cells from the network, then respond by sending OAM RDI cells.
AIS Sent	Number of AIS cells sent on the selected OAM flow since the F3(START) or CLEAR key was pressed.
AIS Rcvd	Number of AIS cells received on the selected OAM flow since the F3(START) or CLEAR key was pressed.
RDI Sent	Number of RDI cells sent on the selected OAM flow since the F3(START) or CLEAR key was pressed.
RDI Rcvd	Number of RDI cells received on the selected OAM flow since the F3(START) or CLEAR key was pressed.

Running a Loopback Test

The Loopback test can be used to verify connectivity of segments or entire spans of a network and determine whether a network can properly transmit and respond to OAM Loopback cells. In this test, you can set up the E3port Plus to send or respond to OAM Loopback cells.

In Send mode, the tester transmits OAM Loopback cells over the OAM flow specified in the setup for the test. These cells are transmitted at a rate of one every five seconds. As Loopback cells are sent, the **Sent** field indicates the number of cells transmitted. As the Loopback cells are returned, the tester compares them to the transmitted payload. Corresponding payloads that are received before the next OAM Loopback cell is transmitted, indicate a successful loopback. As the tester identifies each successful Loopback cell, it “beeps” and increments the count in the **Rcvd** field. If the tester does not receive a corresponding OAM Loopback cell in five seconds, it displays **Timeout** in the **Status** field.

In Respond mode, the tester waits to receive OAM Loopback cells over the OAM flow specified in the setup for the test. When the tester receives a proper OAM Loopback cell, it “beeps” and increments the count the **Rcvd** field. The tester changes the Loopback Indication within the Loopback payload of the cell, then re-transmits the cell. With each re-transmission, the count in the **Sent** field increments.

To run a Loopback test, complete the following:

Note

You cannot run this test while the tester is detecting OAM cells or running another ATM test.

1. From the **OAM TESTING** menu, select **Loopback**. Then, press **ENTER** to display the following:



ta159f.eps

The cursor is positioned on the **Mode** parameter. See Table 6-8 for a description of the items on this screen.

2. Select a setting for **Mode**.
3. Press **F3**(START).

The **Sent** and **Rcvd** counters reset and begin incrementing as the tester respectively transmits and receives OAM Loopback cells. See Table 6-8 for a description of Loopback status and test results.

4. Press **F3**(STOP) to end the test.

Table 6-8. OAM Loopback Test Parameters and Results

Parameter/Result	Description
Mode	<p>Selects the mode of the tester as one of the following.</p> <ul style="list-style-type: none"> • Send: the tester will send OAM Loopback cells at a rate of one every five seconds and test for the receipt of corresponding Loopback cells. • Respond: the tester will wait to receive OAM Loopback cells, then generate responding Loopback cells.
Status	<p>Displays status of the test as one of the following:</p> <ul style="list-style-type: none"> • Sending: the tester is the source of transmission of Loopback cells. Cells are sent at a rate of one every five seconds. • Receiving: the tester is ready to respond to received Loopback cells. • Timeout: the tester did not receive a corresponding Loopback cell within five seconds. • Stopped: that the tester is not the source of transmission of Loopback cells and is not ready to respond to received Loopback cells. This status is displayed after you press F3(STOP).
Sent	Displays a count of Loopback cells transmitted since the F3(START) or CLEAR key was pressed.
Rcvd	Displays a count of Loopback cells received since the F3(START) or CLEAR key was pressed.

Running a Continuity Check Test

The Continuity Check (CC) test can be used to verify continuity of a connection and test a network's OAM CC Activation and Deactivation procedures. In this test, you can set up the E3port Plus to send or respond to OAM CC cells in a specified direction. Before a CC test can begin on a connection, it must be initiated with a handshake (activation). After a CC test is completed, it must be ended with another handshake (deactivation).

In Send mode, the test begins when you press **F3(ACTV)** to send an OAM Activate CC request. The tester then waits to receive a confirmation message from the connected device. In Respond mode, the test begins when you press **F3(START)**. The tester waits to receive an OAM Activate CC request from a connected device. When activated, the tester sends a confirmation message to the connected device.

If the E3port Plus is activated to transmit, CC cells are sent at a rate of one per second. The **Tx Count** on the LCD increments as each CC cell is sent. If an AIS is received while the tester is activated to transmit CC cells, a Loss of Continuity in the A to B direction is assumed and reported in the **Defect** field.

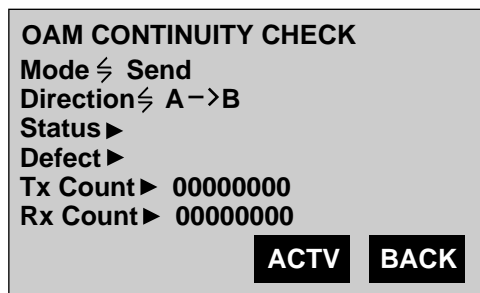
If the E3port Plus is activated to receive, the **Rx Count** on the LCD increments as each CC cell is received. If no user cells or CC cells are received while the tester is activated to receive them, a Loss of Continuity in the B to A direction is reported in the **Defect** field, and the tester generates AIS cells.

To run a continuity check test, proceed as follows:

Note

You cannot run this test while the tester is detecting OAM cells or running another ATM test.

1. From the **OAM TESTING** menu, select **Continuity Check**. Then, press **ENTER** to display the following:



ta160f.eps

The cursor is positioned on the **Mode** parameter. See Table 6-9 for a description of the items on this screen.

2. Do one of the following:
 - If you want the tester to activate Continuity Checking, select **Send**. Then, press the **Down Arrow** key to move the cursor to **Direction** and select the desired direction.

OR

 - If you want the tester to wait to be activated by a connected device for Continuity Checking, select **Respond**.
3. Press **F3**(ACTV/START).

Depending on the test mode selected, the following occurs:

- If you selected **Send**, the E3port Plus sends an OAM CC Activate request to the connected device. If the device complies with the request, it returns an Activate confirmed message.
- If you selected **Respond**, the E3port Plus waits to receive an OAM CC Activate request from a connected device.

If the tester is the source of transmission, CC cells are generated at a rate of one per second on the specified flow. The **Tx Count** field on the tester's LCD indicates the number of CC cells transmitted. If the tester is to receive CC cells, it waits to receive these cells or user cells. As CC cells are received, the **Rx Count** on the tester's LCD increments (see Table 6-9).

4. To end the test, press **F3**(DEACT/STOP).

Depending on the test state, the tester does the following:

- If the tester activated CC or was CC activated, the **F3** key is labeled "DEACT". When you press **F3**, the tester sends an OAM Deactivate CC request to the connected device. The tester terminates transmission and/or reception of OAM CC cells.
- If the tester is in Respond mode and has not been CC activated, the **F3** key is labeled "STOP". When you press **F3**, the tester no longer responds to OAM Activate CC requests.

Table 6-9. OAM Continuity Check Test Parameters and Results

Parameter/Result	Description
Mode	Selects the test mode as one of the following: <ul style="list-style-type: none"> • Send: the E3port Plus will send an Activate CC request. • Respond: the E3port Plus will wait to receive an Activate CC request from a connected device.
Direction	Indicates the direction of transmission of CC cells as one of the following: <ul style="list-style-type: none"> • A ->B: one-way transmission from A (the E3port Plus) to B (the connected device). • 2-Way: two-way transmission between A (the E3port Plus) and B (the connected device). • B ->A: one-way transmission from B (the connected device) to A (the E3port Plus).

Table 6-9. OAM Continuity Check Test Parameters and Results (cont.)

Parameter/Result	Description
Status	<p>Displays status of the test as one of the following:</p> <ul style="list-style-type: none"> • Activating: the tester has sent an OAM Activate CC request but has not yet received confirmation. • Act Confirmed: confirmation was received for an OAM Activate CC request. • Act Denied: an OAM Activate CC request was denied. • Act Timeout: the tester did not receive a reply to an OAM Activate CC request within two seconds. • Deactivating: the tester has sent an OAM Deactivate CC request but has not yet received confirmation. • Deact Confmd: confirmation was received for an OAM Deactivate CC request. • Deact Denied: an OAM Deactivate CC request was denied. • Deact Timeout: the tester did not receive a reply to an OAM Deactivate CC request within two seconds.
Defect	<p>This field indicates the direction of Loss of Continuity (LOC) as one of the following:</p> <ul style="list-style-type: none"> • A ->B LOC: Loss of Continuity from A (the E3port Plus) to B (the connected device). LOC is assumed if the tester receives an AIS on the specified OAM flow while it is generating CC cells. • B ->A LOC: Loss of Continuity from B (the connected device) to A (the E3port Plus) if the tester is activated to receive CC cells but does not receive these cells or user data over the specified OAM flow. • 2-Way LOC: Loss of Continuity in both directions if the tester is activated to both send and receive CC cells.
Tx Count	<p>Number of CC cells transmitted on the specified OAM flow since the F3(ACTV/START) or CLEAR key was pressed.</p>
Rx Count	<p>Number of CC cells received on the specified OAM flow since the F3(ACTV/START) or CLEAR key was pressed.</p>

Running a Performance Test

The Performance test can be used to evaluate a network's basic performance. You can also use this test to check a network's OAM Performance Management (PM) Activation and Deactivation procedures.

In this test, the E3port Plus sends blocks of cells to gather performance data on errored cell blocks, cell loss, and cell misinsertion. The tester fixes the size of each cell block it transmits to 128 cells. Cell payloads contain the fixed pattern byte as specified on the **ATM CONFIGURATION (P1)** screen.

Before a Performance test can begin, it must be initiated with a handshake (activation). After the testing is completed, it must be ended with another handshake (deactivation). The tester can only be activated to transmit OAM Forward Monitoring cells and receive OAM Backward Reporting cells.

In Send mode, the test begins when you press **F3(ACTV)** to send an OAM Activate PM request. The tester then waits to receive a confirmation message from the connected device. In Respond mode, the test begins when you press **F3(START)**. The tester waits to receive an OAM Activate PM request from the connected device. When activated, the tester sends a confirmation message to the connected device.

After the request to activate is confirmed, the E3port Plus sends a block of cells at CBR using the specified PCR to the connected device. Following this block, the tester sends a Forward Monitoring cell. The connected device should return a corresponding Backward Reporting cell. The tester uses the information in this cell to calculate performance statistics. This process is repeated until the test is ended with an OAM Deactivate PM request.

To run a Performance test, complete the following:

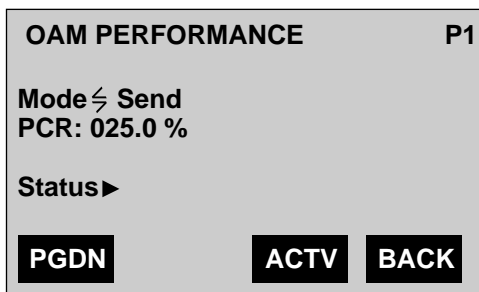
Notes

The VCI specified in the setup for this test is used for transmission of user data.

When you start this test, user-generated transmission streams are halted.

You cannot run this test while the tester is detecting OAM cells or running another ATM test.

1. From the **OAM TESTING** menu, select the **Performance** option. Then, press **ENTER** to display the following:



ta165f.eps

The cursor is positioned on the **Mode** parameter. Table 6-10 describes the setup parameters on this screen.

2. Press the **Left** or **Right Arrow** key to select the test mode.
3. Press the **Down Arrow** key to the **PCR** parameter. Then, use the keypad to supply the desired value.
4. Press **F3**(ACTV/START).

Depending on the test mode selected, the tester does the following:

- In **Send** mode, the E3port Plus sends an OAM Activate PM request to the connected device and waits for confirmation.
- In **Respond** mode, the E3port Plus waits to receive an OAM Activate PM request from a connected device.

Note

The tester will only confirm OAM Activate PM requests that specify a direction from the tester to the connected device.

After confirmation is received, the tester sends a block of cells followed by a Forward Monitoring cell at the specified PCR. The connected device should return a corresponding Backward Reporting cell.

The tester counts the number of Forward Monitoring cells sent and Backward Reporting cells received over the specified OAM flow. The result screen reports these counts along with other performance statistics (see Table 6-11).

5. To end the test, press **F3**(DEACT/STOP).

Depending on the test state, the tester does the following:

- If the tester activated PM or was PM activated, the **F3** key is labeled “DEACT”. When you press **F3**, the tester sends an OAM Deactivate PM request to the connected device. The tester terminates transmission and reception of OAM PM cells.
- If the tester is in Respond mode and has not been PM activated, the **F3** key is labeled “STOP”. When you press **F3**, the tester no longer responds to OAM Activate PM requests.

Table 6-10. OAM Performance Test Parameters and Status

Parameter/Status	Description
Mode	Selects the test mode as one of the following: <ul style="list-style-type: none"> • Send: the E3port Plus will send an OAM Activate PM request. • Respond: the E3port Plus will wait to receive an OAM Activate PM request from a connected device.
PCR	Specifies the rate at which the block of cells is transmitted. Values range from 5% to 100%.

Table 6-10. OAM Performance Test Parameters and Status (cont.)

Parameter/Status	Description
Status	<p>Displays status of the test as one of the following:</p> <ul style="list-style-type: none"> • Activating: the tester has sent an OAM Activate PM request but has not yet received confirmation. • Act Confirmed: confirmation was received for an OAM Activate PM request. • Act Denied: an OAM Activate PM request was denied. • Act Timeout: the tester did not receive a reply to an OAM Activate PM request within two seconds. • Deactivating: the tester has sent an OAM Deactivate PM request but has not yet received confirmation. • Deact Confirmed: confirmation was received for an OAM Deactivate PM request. • Deact Denied: an OAM Deactivate PM request was denied. • Deact Timeout: the tester did not receive a reply to an OAM Deactivate PM request within two seconds. • Reprt Timeout: a corresponding PM Backward Reporting cell was not received within five seconds.

Table 6-11. OAM Performance Test Results

Result	Description
Forward	Number of PM Forward Monitoring cells sent on the specified OAM flow since the F1 (ACTV/START) or CLEAR key was pressed.
Backward	Number of PM Backward Reporting cells received on the specified OAM flow since the F1 (ACTV/START) or CLEAR key was pressed.
Misinsert	Number of misinserted (out-of-sequence) PM Backward Reporting cells detected on the specified OAM flow since the F1 (ACTV/START) or CLEAR key was pressed.
Err	Number of errored blocks indicated in the PM Backward Reporting cell for CLP0+1 streams on the specified OAM flow since the F1 (ACTV/START) or CLEAR key was pressed.
Lost	Number of lost cells indicated in the PM Backward Reporting cell for CLP0 and CLP0+1 streams on the specified OAM flow since the F1 (ACTV/START) or CLEAR key was pressed.

Detecting OAM Cells

The E3port Plus can monitor a network for the presence of OAM cells over the entire length of a virtual connection (end-to-end) and between links (segments). The tester detects the following types of OAM cells:

- Alarm Indication Signal (AIS)
- Remote Defect Indication (RDI)
- Loopback
- Continuity Check
- Performance Management (PM)
- Activation/Deactivation

To monitor the network for these types of OAM cells, do the following:

Note

The tester cannot detect OAM cells while it is running an ATM test.

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **ATM Testing** option. Then, press **ENTER** to display the **ATM TESTS (P1)** menu.
3. Press the **Down Arrow** key to highlight the **OAM** option. Then, press **ENTER** to display the **OAM** menu.
4. Press the **Down Arrow** key to highlight the **OAM Detection** option. Then, press **ENTER** to display the **OAM F4 ACTIVITY (P1)** screen:

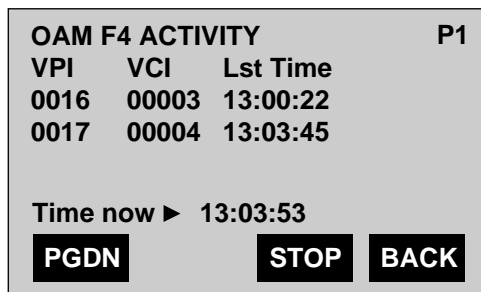


ta122f.eps

5. Press **F3(START)**.

The following message is momentarily displayed **Counting OAM Cells**. Then, the tester begins searching for OAM cells. As OAM cells are detected, the results of the search are displayed on the tester's LCD.

Following is a sample screen that summarizes OAM F4 cell activity:



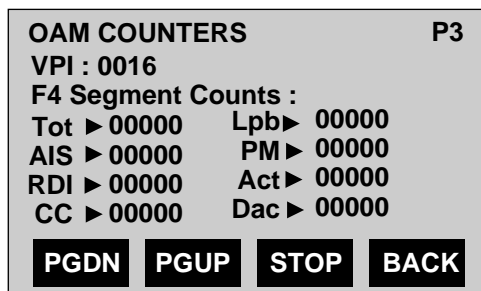
ta123f.eps

This screen indicates the VPI/VCI on which OAM F4 activity was detected since the test was started or since the **CLEAR** key was pressed. It also tells you when (**Lst Time**) the tester detected OAM F4 cells.

Note

VCI 3 is reserved for F4 Segment and VCI 4 is reserved for F4 End-to-End cells.

6. Press **F1**(PGDN) to display the summary screen for OAM F5 cell activity.
7. To view the detailed reports for OAM F4 cell activity, press **F1**(PGDN).
F4 Segment counts are displayed on the **OAM COUNTERS** (P3) screen:



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Table 6-12 describes the items on this screen.

8. To view OAM statistics for a specific circuit, make sure that the cursor is positioned on the **VPI** field. Then, use the keypad to type the desired VPI.
9. To view additional OAM reports, press **F1**(PGDN).

With each successive press of this key, you can view these reports:

- F4 End-to-end
- F5 Segment
- F5 End-to-end

Table 6-12. OAM F4/F5 Detection Results

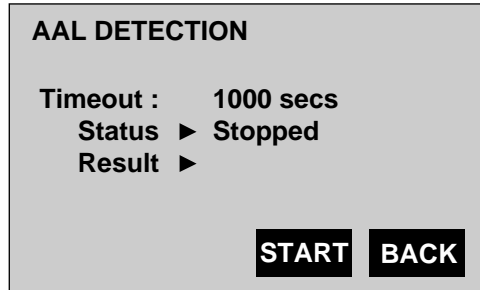
OAM Result	Description
VPI/VCI	The address on which OAM F4 cells were detected
Tot	Total OAM cell count for the type of cell displayed on Line 3
AIS	Number of AIS cells detected
RDI	Number of RDI cells detected
CC	Number of Continuity Check cells detected
Lpb	Number of Loopback cells detected
PM	Number of Performance Monitoring cells detected
Act	Number of Activation cells detected
Dac	Number of Deactivation cells detected

Determining AAL Traffic on a Circuit

You can set up the E3port Plus to determine AAL (ATM Adaptation Layer) type traffic on a circuit. To do this, complete these steps

1. Set up the receive filter with the desired header information. See “Configuring the Receive Filter”, earlier in this chapter for details.
2. Press **ATM** to display the **ATM SELECTIONS** menu.
3. Press the **Down Arrow** key to highlight the **ATM Testing** option. Then, press **ENTER** to display the **ATM TESTS (P1)** menu.

4. Press **F1**(PGDN) to display the **ATM TESTS** (P2) menu.
The **AAL Detect** option is highlighted.
5. Press **ENTER** to display this **AAL DETECTION** setup screen:



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The cursor is positioned on the **Timeout** parameter (see Table 6-13 for a description).

6. Use the keypad to specify a value for **Timeout**.
7. Press **F3**(START).

The tester begins the search. The **Status** field displays this message:
Collecting.

The tester scans the network until the AAL type is determined or until the time you specified expires. Results (see Table 6-13) of the search are displayed in the **Result** field.

Table 6-13. AAL Test Setup Parameter, Status, and Results

Parameter	Description
Timeout	Specifies the duration (in seconds) of the search. Values range from 0 to 9999. Default value is 1000 seconds.
Status	Indicates the status of the search as one of the following: <ul style="list-style-type: none"> • Stopped: displayed when you press F3(STOP) or when the time-out has expired. Indicates that the test is not running. • Collecting: indicates that the tester is searching for AAL traffic.
Result	Displays the type of AAL traffic detected as one of the following: <ul style="list-style-type: none"> • Unknown: indicates that not enough cells were received for the tester to determine the AAL type. Check that the receive filter matches the desired transmission stream. • AAL 0: AAL 0 traffic • AAL 1: AAL 1 traffic • AAL 3/4: AAL 3 / 4 traffic • AAL 5: AAL 5 traffic

IP Ping Tests

The E3port Plus has two categories of IP Ping tests: IP Ping and IP Ping Responder. Both tests are used to test connectivity between the tester and a particular device or client on the IP layer. The major difference between the two types of tests has to do with the role of the E3port Plus.

In the IP Ping test, the E3port Plus (the source) sends a particular IP message called a “ping request” over the network to a device (the destination). The tester waits for a specified period of time for the device to respond with a “ping reply”, confirming that it received the request. If the device responds within the allotted time, the tester reports that the device is connected; if the device does not respond, the tester reports that the device is not connected.

In the IP Ping Responder test, the E3port Plus is placed in a “wait” (or responder) state, in which it waits to receive a ping request from a network client. When the tester receives the request, it generates a ping reply back to the source to indicate that it is connected.

Two types of IP pings are supported: Routed Ping and Bridged Ethernet/802.3 Type 7 Ping (hereafter referred to as IP Bridged Ping). The following sections show you how to set up and run the IP Ping test and the IP Ping Responder test.

Setting Up an IP Ping or IP Ping Responder Test

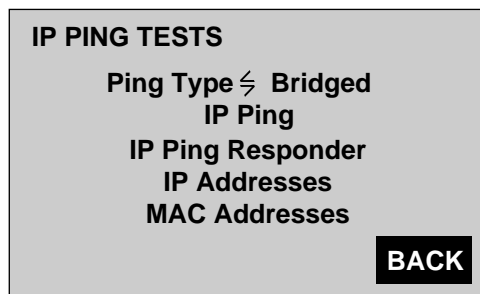
To set up the E3port Plus to run an IP Ping or IP Ping Responder test, complete the following:

1. Set up the receive filter (see “Configuring the Receive Filter” for instructions). The receive filter’s header information is used both for IP Ping transmission and reception.
2. Select the ping type (see “Selecting the Ping Type” for instructions). You must select the ping type when running either the IP Ping test or the IP Ping Responder test.
3. Set up the IP address table (see “Setting Up the IP Address Table” for instructions).
4. Provide the Media Access Control (MAC) addresses. These addresses are required only when you specify an IP Bridged Ping (see “Setting Up MAC Addresses” for instructions).

Selecting the Ping Type

To select the type of ping, do the following:

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **ATM Testing** option. Then, press **ENTER** to display the **ATM TESTS (P1)** menu.
3. Press **F1(PGDN)** to display the **ATM TESTS (P2)** menu.
4. Press the **Down Arrow** key to highlight the **IP Ping Tests** option. Then, press **ENTER** to display the **IP PING TESTS** menu:



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The cursor is positioned on the **Ping Type** parameter.

5. Press the **Left** or **Right Arrow** key to select one of the following settings for **Ping Type**:
 - **Routed** (Routed Ping)
 - **Bridged** (Bridged Ethernet/802.3 Type 7 Ping)
6. Do *one* of the following:
 - If you selected **Routed**, continue the setup for the test by proceeding to “Setting Up the IP Address Table” and completing the instructions.

OR

 - If you selected **Bridged**, the **MAC Addresses** parameter is now displayed on the last line of the menu.

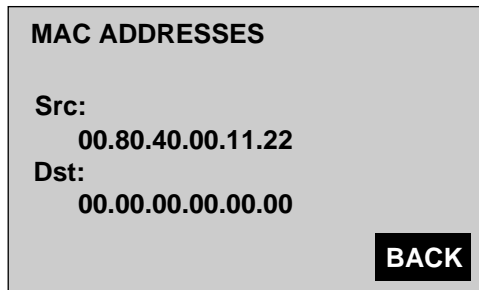
You must supply a MAC address for both the source (E3port Plus) and destination device. To continue the setup for the test, go to “Specifying MAC Addresses” and complete the instructions. When you finish, go to “Setting Up the IP Address Table”.

Specifying MAC Addresses (IP Bridged Ping only)

The IP Bridged Ping requires you to supply a MAC address for the source (the E3port Plus) and the destination device.

To specify MAC addresses, complete the following:

1. From the **IP PING TESTS** menu, press the **Down Arrow** key to select the **MAC Addresses** option. Then, press **ENTER** to display the **MAC ADDRESSES** setup screen:



ta167f.eps

The **Src** field identifies the address of the source (the E3port Plus), and the **Dst** field identifies the address of the destination device.

When the tester is set to factory defaults, you can use the default **Src** value as the address for the E3port Plus or you can supply an alternative address. You must supply a MAC address for the destination device.

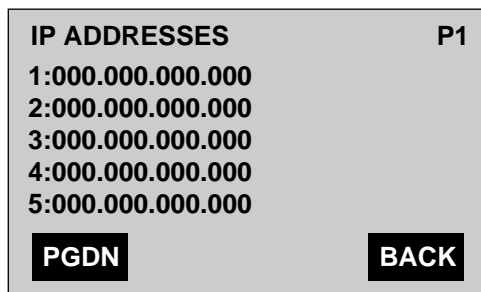
2. Type a MAC address in the **Src** (if desired) and **Dst** fields.

Setting Up the IP Address Table

The IP address table is an index or listing of IP addresses. In order for the E3port Plus and the equipment under test to communicate, you need to assign each an IP address, which must be included in this table. Both ping tests (IP Ping and IP Ping Responder) require you to set up this table.

To set up the IP address table, complete the following:

1. From the **IP PING TESTS** menu, press the **Down Arrow** key to highlight the **IP Addresses** option. Press **ENTER** to display the **IP ADDRESSES (P1)** screen:



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This screen and the one following can accommodate 10 addresses, one of which must be assigned to the E3port Plus.

Note

*You can define any valid IP address that you want for the E3port Plus in this table. Just make note of the number of the entry that corresponds to the address that you assign to the tester. When you run a test, you need refer to the entry by number when you define the **IP Src** and **Dst** parameters (for IP Ping) or when you define the **IP Addr** parameter (for IP Ping Responder).*

The cursor is positioned on the first IP address listed in the table.

2. Move the cursor to the IP address that you want to modify. Then, use the keypad to supply the desired address.

Complete this step for each IP address that you want to put in the table.

3. Press **F1**(PGDN) to display the next page and continue adding IP addresses to the table, if necessary.

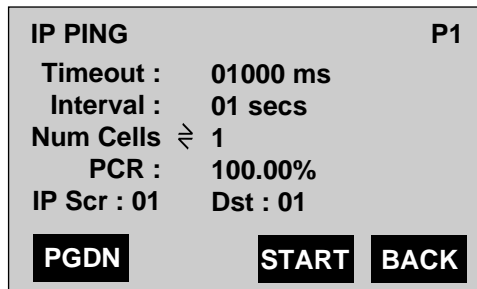
Running an IP Ping Test

To run an IP Ping test, complete the following:

Note

The E3port Plus can be set up to operate in one of two modes for sending an IP ping: automatic or manual. In automatic mode, the tester continuously sends a IP ping to a network client until you stop the test. In manual mode, an IP ping is transmitted only when you press a key. This procedure documents both methods.

1. From the **IP PING TESTS** menu, press the **Down Arrow** key to highlight the **IP Ping** option. Then, press **ENTER** to display the **IP PING (P1)** screen:



ta131f.eps

The cursor is positioned on the **Timeout** parameter. Table 6-14 describes the setup parameters on this screen.

2. Use the keypad to supply a value for **Timeout**.
3. Do *one* of the following:
 - If you want the E3port Plus to automatically send an IP Ping at specific intervals, press the **Down Arrow** key to move the cursor to the **Interval** parameter and supply a value between 1 and 99 seconds.

OR

 - If you want the E3port Plus to send a single IP ping every time you press a key, press the **Down Arrow** key to move the cursor to the **Interval** parameter and supply a value of 0.

4. Select a value for the **Num Cells** parameter.

Note

*If you specified an IP Routed Ping, the value of **Num Cells** is fixed at **3**.*

5. Press the **Down Arrow** key to move the cursor to the **PCR**, **IP Src**, and **Dst** parameters and use the keypad to supply the desired values.
6. Press **F3(START)**.

The test begins and the E3port Plus displays IP Ping test results.

Note

If you decide to change a parameter while the test is running, first stop the test, change the parameter, then restart the test.

The result screen differs depending on whether you are running the test in automatic or manual mode. For a description of the result screen for the test you are running, see “IP Ping Test Result Screen for Automatic Mode” or “IP Ping Test Result Screen for Manual Mode”.

Table 6-14. IP Ping Setup Parameters

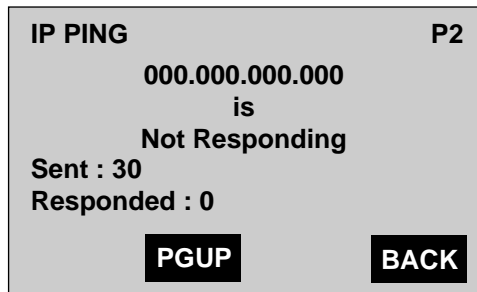
Parameter	Description
Timeout	<p>Specifies how long the E3port Plus waits for the destination address to respond to an IP ping.</p> <p>If the tester receives no response within the given time period, you may want to increase the value of this parameter. If the tester receives no response within a reasonable amount of time, you can conclude that the device is not connected. The value for Timeout ranges from 100 to 99900 milliseconds, which is set in increments of 100 milliseconds.</p>
Interval	<p>Specifies how often the IP ping is sent.</p> <p>For example, if you specify 2, the E3port Plus sends out an IP ping to the destination device every two seconds. The value for Interval ranges from 0 to 99 seconds.</p>
Num Cells	<p>Determines the number of ATM cells used to carry the IP ping.</p> <p>For the Routed Ping test, Num Cells has two settings:</p> <ul style="list-style-type: none">• 1: formats the IP ping and places it into one ATM cell.• 3: formats the IP ping and places it into three ATM cells. <p>For the IP Bridged Ping, the value of Num Cells is fixed at 3.</p>

Table 6-14. IP Ping Setup Parameters (cont.)

Parameter	Description
PCR	Specifies the peak cell rate or bandwidth of the transmission when Num Cells is set to 3 . Values range from 0% to 100%.
IP Src	A reference to the listing in the IP address table that corresponds to the address of the E3port Plus (see "Setting Up the IP Address Table" for details).
Dst	A reference to the listing in the IP address table that corresponds to the address of the destination device (see "Setting Up the IP Address Table" for details).

IP Ping Test Result Screen for Automatic Mode

If you are running the test in automatic mode, the IP Ping test result screen looks like this:



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This screen updates you on the progress of the test. It also provides the following status information:

- Line 1 indicates the name of the test (IP PING).
- Line 2 lists the IP address of the destination device.
- Lines 3 and 4 provide the response status of the destination device:
 - ◆ If there is no response and the time-out period has expired, you see this message: `Not Responding`.
 - ◆ If a connection is made, you see this message: `is alive`.
 - ◆ If there is no response but the time-out period has not yet expired, the status line is blank.

- Line 5 indicates the number of IP pings that the E3port Plus has sent to the destination device.
- Line 6 indicates the number of responses that the E3port Plus has received from the destination device.

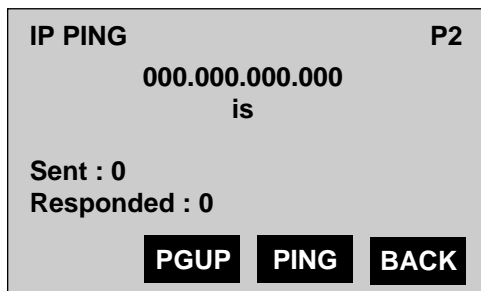
Notes

The E3port Plus also issues a “beep” each time it receives a response from the destination device.

*The test continues until you stop it. To stop the test, press **F2**(PGUP). Then, press **F3**(STOP).*

IP Ping Test Result Screen for Manual Mode

If you are running the IP Ping test in manual mode, the result screen looks like this:



ta133f.eps

Note that there is currently no information on this screen. This is because you have not yet sent the IP ping.

To send the IP ping, do the following:

1. Press **F3**(PING).

The E3port Plus sends a single IP ping to the destination address, then updates you on the progress of the test. The following information is provided on the result screen:

- Line 1 displays the name of the test (IP PING).
- Line 2 lists the IP address of the destination device.

- Lines 3 and 4 provide the response status of the destination device:
 - ◆ If there is no response and the time-out period has expired, you see this message: `Not Responding`.
 - ◆ If a connection is made, you see this message: `is alive`.
 - ◆ If there is no response but the time-out period has not yet expired, the status line is blank.
- Line 5 indicates the number of IP pings that the E3port Plus has sent to the destination device. This value is updated every time you press **F3**(PING).
- Line 6 indicates the number of responses that the E3port Plus has received from the destination device.

Note

The tester also issues a “beep” each time it receives a response from the destination device.

2. To stop the test, press **F2**(PGUP). Then, press **F3**(STOP).

Running an IP Ping Responder Test

There may be instances in which you want to test connectivity to a network by setting up the E3port Plus as the destination device and then determining whether it can receive an IP ping from a network client. The IP Ping Responder test can be used in this type of situation.

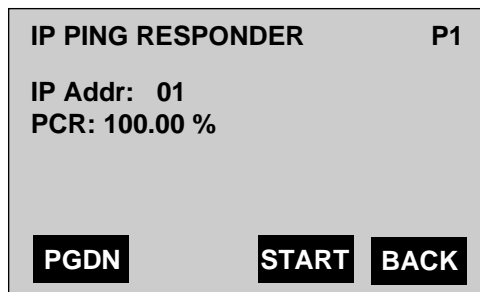
Notes

Before you can run this test, you need to set up the receive filter, the IP address table, and, if you specified an IP Bridged Ping, you need to provide MAC Addresses for the source and destination devices.

*The tester responds only to the type of ping selected for **Ping Type**. See “Selecting the Ping Type” for details.*

To run an IP Ping Responder test, complete the following:

1. From the **IP PING TESTS** menu, press the **Down Arrow** key to highlight the **IP Ping Responder** option. Then, press **ENTER** to display the **PING RESPONDER (P1)** screen:

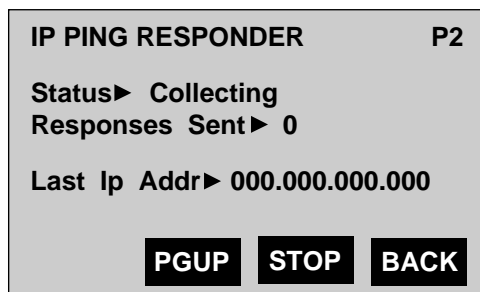


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The cursor is positioned on the **IP Addr** parameter. This parameter identifies the address in the IP address table that corresponds to the E3port Plus. The settings for this parameter range from 1 to 10, which correspond, respectively, to the ten addresses listed in the IP address table.

2. Press the **Left** or **Right Arrow** key to select the number that matches the listing for the E3port Plus in the IP address table.
3. Press the **Down Arrow** key to move the cursor to the **PCR** parameter, which is used to define the bandwidth of the transmission for the IP ping response. Then, use the keypad to specify the **PCR** value.
4. Press **F3**(START).

The test begins. The following result screen is displayed:



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This screen updates you on the progress of the test. It also provides the following information:

- Line 1 indicates the name of the test (IP PING RESPONDER).
- Line 2 displays the status of the test as one of the following:
 - ◆ Collecting: waiting to receive an IP ping
 - ◆ Processing: analyzing received cells to determine if any is an IP ping
 - ◆ Stopped : not running
- Line 3 indicates the number of IP pings that the E3port Plus has responded to.

Note

*If **Responses Sent** continues to be 0, this may indicate that the E3port Plus has not received any IP pings.*

- Line 4 lists the address of the device that sent an IP Ping to the E3port Plus. If the tester receives an IP ping from a device whose address is not listed in the IP address table, it updates the table with the address of the device.
5. Press **F3(STOP)** to stop the test.

Conformance Testing Using GCRA

The Generic Cell Rate Algorithm (GCRA), which is referred to as a “continuous state leaky bucket algorithm”, is a function specified for policing CBR and VBR traffic at the UNI. This algorithm is used to control the flow of network traffic and to ensure that the volume conforms to agreed-upon rates.

The E3port Plus provides a method for testing conformance definitions CBR.1 and VBR.1 using GCRA. Specifications for these definitions are documented in the ATM Forum *Traffic Management Specification*.

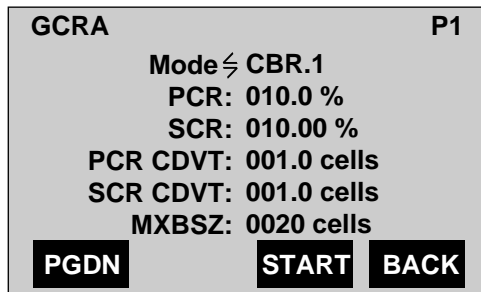
For a given connection, the tester checks each incoming cell against user-specified conformance parameters. Cells not meeting these parameters are counted non-conforming. Statistics are displayed on the tester’s LCD.

To test traffic conformance over a connection using GCRA, complete the following:

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight **ATM Testing**. Then, press **ENTER** to display the **ATM TESTS (P1)** menu.

The cursor is positioned on the **Receive Filter** option.

3. Press **ENTER** to display the setup screen for the receive filter. Then, set up the receive filter with the correct header information for the stream to be tested.
4. Press **F4(BACK)** to return to the **ATM TESTS (P1)** menu. Then, press **F1(PGDN)** to display the **ATM TESTS (P2)** menu.
5. Press the **Down Arrow** key to highlight the **GCRA** option. Then, press **ENTER** to display the **GCRA (P1)** setup screen:

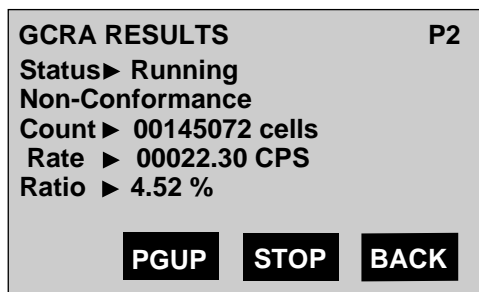


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The cursor is positioned on the **Mode** parameter. Consult Table 6-15 for descriptions of the parameters on this screen.

6. Select a conformance definition for **Mode**, then supply values for the parameters that apply to the conformance definition you selected.
7. Press **F3(START)**.

The **GCRA RESULTS (P2)** screen is displayed. Statistics (see Table 6-16) on non-conforming cells are provided on this screen:



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8. Press **F3(STOP)** to end the test.

Table 6-15. Setup Parameters for GCRA Test

Parameter	Description
Mode	Selects the conformance definition (defined in the ATM Forum <i>Traffic Management Specification</i>) as one of the following: <ul style="list-style-type: none"> • CBR.1 (PCR CLP0+1) • VBR.1 (PCR CLP0+1, SCR CLP0+1)
PCR	Specifies the Peak Cell Rate of the connection. Values range from 0.1% to 100%.
SCR	(For VBR.1 only). Specifies the Sustained Cell Rate of the connection.
PCR CDVT	Specifies the delay variation in cells that can be tolerated in relation to the PCR. Values range from 0 to 999.9 cells.
SCR CDVT	(For VBR.1 only). Specifies the delay variation in cells that can be tolerated in relation to the SCR. Values range from 0 to 999.9 cells.
MXBSZ	(For VBR.1 only). Specifies the maximum burst size. Values range from 0 to 9999 cells.

Table 6-16. GCRA Test Status and Results

Status/Result	Description
Status	Displays the status of the test as one of the following: <ul style="list-style-type: none"> • Running: the test is in progress. • Stopped: displayed after you press F3(STOP). The values displayed represent final test results. • Off: the test has not run yet. The values displayed do not represent final test results.
Count	Number of cells received that exceed the traffic parameters specified in the setup for the test (non-conforming cells) since the F3(START) or CLEAR key was pressed.
Rate	The rate (in cells per second) of received non-conforming cells since the F3(START) or CLEAR key was pressed.
Ratio	The number of non-conforming cells received divided by the total number of cells received since the F3(START) or CLEAR key was pressed.

Chapter 7

Testing SVC Service

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Introduction

The E3port Plus features a point-to-point Switched Virtual Circuit (SVC) test capability. This capability enables you to test UNI signaling procedures to determine if an ATM device can properly handle point-to-point connection requests and responses. The tester sends and receives UNI signaling over the default signaling channel, VPI 0, VCI 5.

This chapter shows you how to set up the E3port Plus to test SVCs. It describes the types of configurations that you can employ and gives you instructions for establishing an SVC connection.

The SVC test capability documented in this chapter applies to portions of *ATM User-Network Interface Specification (UNI), versions 3.1 and 4.0*. The E3port Plus is operationally compatible with user devices and network equipment that are UNI 4.0-compliant in that it understands and responds appropriately to UNI 4.0 requests. UNI 4.0 ABR is not supported.

The information in this chapter assumes that you have an understanding of the applicable specifications and requirements outlined in *ATM User-Network Interface Specification, versions 3.1 and 4.0*.

Emulation Modes

When testing SVC capability, the E3port Plus can be set up to operate in one of two modes:

- User emulation
- Network emulation

User Emulation Mode

In user emulation mode, the E3port Plus can function as either of the following:

- Calling party (user as a source)
- Called party (user as a destination)

Emulating a User Calling Party

When set up to operate as a user calling party, the E3port Plus emulates a user device that is connected to an ATM network and wants to establish an SVC. The tester can also monitor the network's response to a connection request.

You might use this mode of operation to determine whether the network can recognize and respond to a user calling party and to verify that calls are being properly routed.

To set up and use the E3port Plus as a user calling party, do the following:

Note

Instructions for each task in the following list are provided under “Setting Up the E3port Plus for SVC Testing”. Refer to the procedure by name to locate it.

1. Set the emulation mode to **User Side**.
2. Supply the network address information for the calling party (E3port Plus).
3. Supply the network address information for the called party.
4. Define the traffic parameters of the call setup request.

To test the SVC, do the following:

Note

Instructions for the tasks in this list are provided under “Testing SVCs”. Refer to the procedure by name to locate it.

1. Establish the signaling connection (SAAL).
2. Initiate the SVC call.

The E3port Plus and network will exchange a series of messages. If the network cannot meet the request, the tester displays an indication of the failure.

To verify whether the call went through, see “Monitoring a Call” and Obtaining Status on the Remote Device” for instructions.

After testing is completed, you can do the following:

1. Release or restart the call.
2. Release the signaling connection (SAAL).

Emulating a User Called Party

When set up to operate as a user called party, the E3port Plus emulates a user device that is connected to an ATM network and is ready to receive SVC call requests. The tester is put in a wait state or answer mode, in which it is prepared to respond to a call connection request from the network.

You might use this mode of operation to determine whether the network can recognize and respond to a user called party and to verify that calls are being properly routed.

To set up the E3port Plus as a user called party, do the following:

Note

Instructions for each task in the following list are provided under “Setting Up the E3port Plus for SVC Testing”. Refer to the procedure by name to locate it.

1. Set the emulation mode to **User Side**.
2. Supply the network address information for the E3port Plus (calling party).

After you set up the tester, you need to enable the E3port Plus to respond to a call connection request. Follow the instructions under “Establishing the Signaling Connection (SAAL)”.

If the E3port Plus receives an SVC request, it will exchange a series of messages with the network. If the request cannot be met, the tester displays an indication of the failure.

To obtain information on the status of a call, see “Monitoring a Call” and “Obtaining Status on the Remote Device”.

After testing is completed, do the following:

1. Release or restart the call.
2. Release the signaling connection (SAAL).

Network Emulation Mode

In network emulation mode, the E3port Plus can function as one of the following:

- Calling party (network as a source)
- Called party (network as a destination)

Emulating a Network Calling Party

When set up to operate as a network calling party, the E3port Plus emulates both a network and user device that want to establish an SVC. The tester can also monitor a called party’s response to a connection request.

You might use this mode of operation to determine whether a user called party can recognize and respond to a network calling party.

To set up the E3port Plus as a network calling party, do the following:

Note

Instructions for each task in this list are provided under “Setting Up the E3port Plus for SVC Testing”. Refer to the procedure by name to locate it.

1. Set the emulation mode to **Network Side**.
2. Supply the network address information for the calling party (E3port Plus).
3. Supply the network address information for the called party.
4. Define the traffic parameters of the call setup request.

To test the SVC, do the following:

Note

Instructions for the tasks in this list are provided under “Testing SVCs”. Refer to the procedure by name to locate it.

1. Establish the signaling connection (SAAL).
2. Initiate the SVC call.

The E3port Plus and network will exchange a series of messages. If the network cannot meet the request, the tester displays an indication of the failure.

To verify whether the call went through, see “Monitoring a Call” and “Obtaining Status on the Remote Device” for instructions.

After testing is completed, you can do the following:

1. Release or restart the call.
2. Release the signaling connection (SAAL).

Emulating a Network Called Party

When set up to operate as a network called party, the E3port Plus emulates both the network and a user device that are ready to receive SVC call requests. The tester is put in a wait state or answer mode, in which it is prepared to respond to a call connection request from a user calling party.

You might use this mode of operation to determine whether a user calling party initiating a call connection request can properly format and respond to messages.

To set up the E3port Plus to operate as the network called party, do the following:

Note

Instructions for the tasks in the following lists are provided under “Setting Up the E3port Plus for SVC Testing”. Refer to the procedure by name to locate it.

1. Set the emulation mode to **Network Side**.
2. Supply the network address information for the E3port Plus (calling party).

After you set up the tester, you need to enable the E3port Plus to respond to a call connection request. Follow the instructions under “Establishing the Signaling Connection (SAAL)”.

If the E3port Plus receives an SVC request, it will exchange a series of messages with the network. If the request cannot be met, the tester displays an indication of the failure.

To obtain information on the status of a call, follow the steps under “Monitoring the Call” and “Obtaining Status on the Remote Device”.

After testing is completed, do the following:

Note

Instructions for the tasks in this list are provided under “Testing SVCs”. Refer to the procedure by name to locate it

1. Release or restart the call.
2. Release the signaling connection (SAAL).

Setting Up the E3port Plus for SVC Testing

This section shows you how to set up the E3port Plus to test an SVC. The setup process differs depending on which emulation mode you choose for the E3port Plus. To determine which setup procedures apply, refer to the lists under “User Emulation Mode” or “Network Emulation Mode”.

To display the screens shown in the procedures documented in this section, do the following:

1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **SVC Setup & Testing** option.
3. Press **ENTER**.

The **SAAL CONTROL (P1)** screen is displayed.

Selecting the Emulation Mode of the E3port Plus

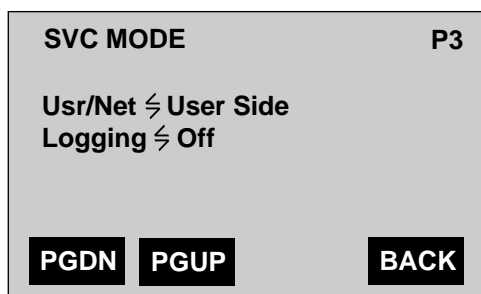
This procedure shows you how to set up the E3port Plus to operate as a user device or a network. For an explanation of the differences between these two modes, read the descriptions under “User Emulation Mode” and “Network Emulation Mode”.

To select an emulation mode, complete the following:

Note

The emulation mode cannot be changed while the SAAL is established. You must first stop the SAAL as described under “Releasing the Signaling Channel (SAAL)”, then change the mode.

1. Display the **SVC MODE (P3)** screen:



ta137f.eps

2. Press the **Left** or **Right Arrow** key to select one of the following settings for the **Usr/Net** parameter:
 - **User Side**
Sets up the tester to operate as a user device for testing network equipment.
 - **Network Side**
Sets up the tester to operate as a network for testing user equipment.
3. Press the **Down Arrow** key to move the cursor to the **Logging** parameter. This parameter has two settings:

Note


*Selecting **On** causes the tester to experience a slower response to the connected device.*

- **On**
Provides detailed information about the SVC session on the RS-232 port. This includes all data PDUs (decoded and in hexadecimal notation) that are transmitted and received by the tester. See “SVC Log Report” in Appendix A, for an example of the information provided.
 - **Off**
Provides no detailed information on the RS-232 port.
4. Select a setting for the **Logging** parameter.

Specifying the Address of the Calling Party (E3port Plus)

The network address of the E3port Plus is defined as the calling party address regardless of the emulation mode of the tester. This procedure shows you how to configure the tester with the appropriate network address information.

1. Display the **SVC CALLING PARTY (P4)** screen:



```
SVC CALLING PARTY          P4
Plan ≡ NSAP
Pres ≡ Allowed
#4700580FFE100000F2
#1A251100191427362304
PGDN  PGUP  ILMI  BACK
```

ta139f.eps

On this screen, you need to supply address information that identifies the E3port Plus. This address is used as the calling party address when the tester issues a setup message. It is also used as the address of the E3port Plus when it receives a call request. See Table 7-1 for a description of each parameter listed on this screen.

2. Move the cursor to the **Plan** and **Pres** parameters and select a setting for each.
3. Press the **Down Arrow** key to move the cursor to the address field, which begins with the **#** symbol. Then, use the keypad to supply the address of the calling party.
4. If the emulation mode is set to **User Side** and if **Plan** is set to **NSAP**, the tester supports ILMI registration of the calling party address. To register the tester's address with the network, press **F3(ILMI)**.

The tester negotiates address registration with the network. If address registration is successful, the following message is displayed: ILMI Address Registration Successful. The **NSAP** address field is updated with the network prefix.

If registration is not successful, a message is displayed indicating the failure.

The E3port Plus is now configured with the calling party address.

Specifying the Address of the Called Party

Before an SVC can be established, the network needs the address of the called party. To provide the network with this information, do the following:

1. Display the **SVC CALLED PARTY (P5)** screen:



ta140f.eps

Table 7-1 describes the called party address parameters listed on this screen.

2. Select the desired setting for the **Plan** parameter
3. Move the cursor to the address field, which begins with the **#** symbol. Then, use the keypad to supply the address of the called party.

The E3port Plus is now configured with the called party address.

Table 7-1. Calling/Called Party Address Parameters

Parameter	Description
Plan	Selects the address format that is compatible with the network connection. <ul style="list-style-type: none"> • NSAP specifies ISO NSAP as the address format. • ISDN specifies E.164 as the address format.
Pres (for calling party only)	Determines the presentation of the calling number to the called user. <ul style="list-style-type: none"> • Allowed specifies presentation of the calling number to the called user. • Restricted specifies that the calling number cannot be presented to the called user. (The called user device has the option of rejecting calls that do not allow presentation of the calling number.) • Not Avail. specifies that the calling number is not available. • Reserved specifies that the presentation indicator is filled with a reserved bit pattern. The result of choosing this setting is network dependent.
#	The address field. For ISDN, the address is up to a 15-digit number. For NSAP, the address is a 40-character hexadecimal value.

Defining the Traffic Parameters of the Call Setup Request

1. Display the **SVC AAL CONFIG** (P6) screen:

SVC AAL CONFIG	P6
Type \Leftarrow AAL 5	
Max SDU : 00100	
SSCS \Leftarrow NULL	
MID Lo : 00000	
MID Hi : 00000	
PGDN	PGUP
	BACK

ta141f.eps

On this screen, you can define the AAL parameters of the call connection request. See Table 7-2 for a list and description of the AAL configuration parameters contained on this screen.

2. Select a setting or use the keypad to supply the desired values for the AAL parameters.
3. Press **F1**(PGDN) to display the **SVC TRAFFIC 1** (P7) screen:

SVC TRAFFIC 1	P7
PCR: 000500 CPS	
SCR: 000400 CPS	
MXBSZ: 000050 cells	
PGDN	PGUP
	BACK

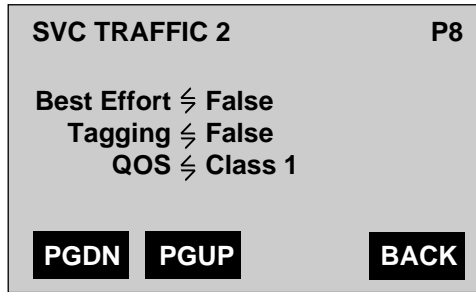
ta142f.eps

4. Set the values for **PCR** and **SCR** (in cells per second) and **MXBSZ** (in cells). See Table 7-3 for a list and description of the SVC traffic parameters.

Note

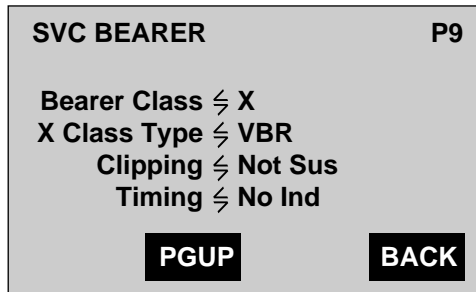
These rates apply to forward (sending) and backward (receiving) directions. Rates are applied to all PCR/SCR fields in the ATM Traffic Descriptor Information Element of the setup message as required.

5. Press **F1**(PGDN) to display the **SVC TRAFFIC 2** (P8) screen:



ta143f.eps

6. Select the desired setting for the SVC traffic parameters on this screen. Consult Table 7-3 for descriptions.
7. Press **F1**(PGDN) to display the **SVC BEARER** (P9) screen:



ta144f.eps

8. Select a setting for each SVC Bearer parameter. Descriptions of the SVC Bearer parameters are found in Table 7-4.

You have completed configuring the traffic parameters of the call request.

Table 7-2. AAL Configuration Parameters

Parameter	Description
Type	Identifies the AAL traffic type as AAL 3/4, AAL 5, or AAL1.
Max SDU (applies to AAL 3/4 and AAL 5 only)	Specifies the forward and backward maximum size (in bytes) of the Service Data Unit. The value ranges between 0 and 65535.
SCSS (applies to AAL 3/4 and AAL 5 only)	Identifies the Service Specific Convergence Sublayer (SSCS) as one of the following: <ul style="list-style-type: none"> • Null indicates an undefined SSCS type. • Assured indicates data SSCS-based on SSCOP assured operation. • Unassured indicates data SSCS-based on SSCOP non-assured operation.
MID Lo (applies to AAL 3/4 only)	Integer representation of the lowest MID value. Only values between 0 and 1023 are valid.
MID Hi (applies to AAL 3/4 only)	Integer representation of the highest MID value. Only values between 0 and 1023 are valid.

Table 7-3. SVC Traffic Parameters

PCR	Peak Cell Rate. Defines the maximum transmission rate. Applies to forward (sending) and backward (receiving) directions.
SCR	Sustained Cell Rate. Defines the average transmission rate. Applies to forward (sending) and backward (receiving) directions.
MXBSZ	Maximum Burst Size. Defines the amount of bursting allowed. Applies to forward (sending) and backward (receiving) directions.
Best Effort	Determines conformance of the call to the specified PCR. <ul style="list-style-type: none"> • False rejects the call if the specified PCR is not available. • True does not reject the call if the specified PCR is not available.
Tagging	Requests that the network tag cells that violate the specified PCR. <ul style="list-style-type: none"> • True requests tagging of cells. • False requests no tagging of cells.

Table 7-3. SVC Traffic Parameters (cont.)

Parameter	Description
QoS	<p>Specifies the Quality of Service:</p> <ul style="list-style-type: none"> • Class 0 indicates unspecified QoS class (see <i>ATM User-Network Interface Specification</i> for details). • Class 1 indicates QoS meeting Service Class A (Circuit emulation, CBR video) performance. • Class 2 indicates QoS meeting Service Class B (VBR audio and video) performance. • Class 3 indicates QoS meeting Service Class C (connection-oriented data transfer) performance. • Class 4 indicates QoS meeting Service Class D (connectionless data transfer) performance. • Reservd is reserved by ITU-T for future use.

Table 7-4. SVC Bearer Parameters

Parameter	Description
Bearer Class	<p>Selects the Broadband Connection Oriented Bearer (BCOB) service.</p> <ul style="list-style-type: none"> • A stands for BCOB-A. • C stands for BCOB-C. • X stands for BCOB-X.
X Class Type	<p>Identifies the type of traffic.</p> <ul style="list-style-type: none"> • CBR (Constant Bit Rate) • VBR (Variable Bit Rate) • No Ind (No indication)

Table 7-4. SVC Bearer Parameters (cont.)

Parameter	Description
Clipping	Refers to the possibility of data loss (clipping) if transmission occurs immediately following the receipt of a connection acknowledgment message. <ul style="list-style-type: none"> • Suscep: specifies that the data is susceptible to clipping. • Not Sus: specifies that the data not be susceptible to clipping.
Timing	Specifies the timing requirement. <ul style="list-style-type: none"> • No Ind: timing requirement not indicated. • E2E Req: end-to-end timing required. • E2E Not: end-to-end timing not required. • Reservd: is reserved for future use.

Testing SVCs

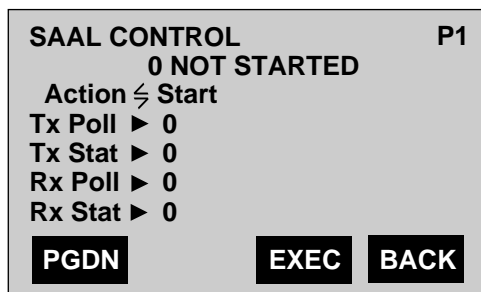
This section shows you how to establish and release a signaling connection, how to initiate and terminate an SVC call, and how to obtain call state and diagnostic information.

Establishing the Signaling Connection (SAAL)

Signaling between the user and network is handled by the Signaling ATM Adaptation Layer (SAAL). You must establish a SAAL connection before you can transmit or receive signaling messages.

To establish the signaling connection, complete the following:

1. Display the **SAAL CONTROL (P1)** screen:



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2. There are two ways to establish a signaling connection. Press the **Left** or **Right Arrow** key to select the method that meets your requirements:

- **Start**

Enables the tester to respond to messages from the other side of the interface. Select this setting if you want to wait for the network or connected user device to initiate communication.

- **Establish**

Enables the tester to initiate communication with the other side of the interface. Select this setting if you want to initiate communication with the network or connected user device.

3. Press **F3(EXEC)**.

Depending on your selection, the tester does the following:

- If you selected **Start**, the tester waits to receive a BEGIN message. After receiving this message, the tester automatically sends and receives the required messages to maintain the signaling connection.

OR

- If you selected **Establish**, the tester sends a BEGIN message to start dialog with the network or connected user device. Then, the tester automatically sends and receives the required messages to establish and maintain the signaling connection.

During communication between the tester and the network, you will see one or more of the following messages displayed on Line 2 of the **SAAL CONTROL (P1)** screen:

- AWAIT ESTABLISH

Indicates that the E3port Plus sent a BEGIN message, but that it has not received acknowledgment that the message was received.

- ESTABLISHED

Indicates that the E3port Plus is connected to the SAAL.

- AWAIT RELEASE

Indicates that the E3port Plus has sent a release message but has not received acknowledgment that the message was received.

- RELEASED

Indicates that the SAAL connection is released.

- NOT STARTED

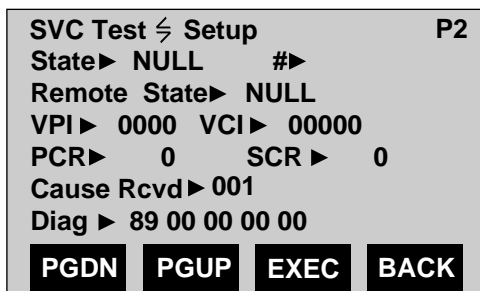
Indicates that no communication has been initiated. In this state, the E3port Plus will not respond to SAAL messages.

If the E3port Plus successfully connects to the SAAL, you will see a count of the transmitted (**Tx Poll/Tx Stat**) and received (**Rx Poll/Rx Stat**) poll and status messages. Note that the values increase approximately one per second. This indicates that the required information exchange between the E3port Plus and the network or connected user device is occurring over the interface.

Initiating an SVC Call

To initiate an SVC call, you have to send a setup message. To send this message, complete the following:

1. Display the **SVC (P2)** screen:



ta145f.eps

The cursor is positioned on the **Test** parameter.

2. Press the **Left** or **Right Arrow** key to select **Setup**.

When you select **Setup**, a setup message with the parameters you selected will be sent to the destination device in an attempt to establish an SVC.

3. Press **F3(EXEC)** to send the setup message.

If the destination device can accommodate the request, the call is accepted. If the destination device cannot meet the request, the call is rejected and an indication of the failure is displayed in the **Cause Rcvd** and **Diag** fields on the **SVC (P2)** screen (see “Monitoring a Call”, which follows, for details).

Monitoring a Call

To monitor a call, display the **SVC (P2)** screen:

```
SVC Test ← Setup P2
State▶ NULL #▶
Remote State▶ NULL
VPI▶ 0000 VCI▶ 00000
PCR▶ 0 SCR▶ 0
Cause Rcvd▶ 001
Diag▶ 89 00 00 00 00
PGDN PGUP EXEC BACK
```

ta145f.eps

The tester reports the call state in the **State** field (see Table 7-5 for a list of call states) and provides the call reference number in the **#** field.

If the call setup message is successfully sent, the **State** field displays **ACTV**. The E3port Plus also reports the VPI and VCI for the established connection and the PCR and SCR available for the circuit (in cells per second).

The **Cause Sent/Cause Rcvd** field displays cause values that are included in certain messages. Some cause values have associated diagnostics, which, if applicable, are displayed in the **Diag** field. Consult *ATM User-Network Interface Specification* for descriptions of cause values and diagnostics, or set the **Logging** parameter **On** to print decoded cause messages (see “Selecting the Emulation Mode of the E3port Plus” for details).

Note

*The **Cause Sent** field displays cause values sent by the tester to a connected device. The **Cause Rcvd** field displays cause values received by the tester from a connected device.*

Table 7-5. Call States

State	Meaning
NULL	Null state. No call exists.
INIT	Call initiated. Issued for an outgoing call when the network or user has received a request to establish a call but has not yet responded.
OGCP	Outgoing call proceeding. Issued for an outgoing call when the network or user has received all call information required to establish a call.
CDLV	Call delivered (UNI 4.0 only). Issued for an outgoing call when the network or calling user has received an indication that remote user alerting has been initiated.
CPRT	Call present. Issued for an incoming call when the network or user has sent a call establishment request but has not yet received a satisfactory response from the destination party.
CRCV	Call received (UNI 4.0 only). Issued for an incoming call when the user has indicated alerting but has not yet answered.
CNRQ	Connection request. Issued for an incoming call when the network or user has received an answer from the destination party but has not yet awarded the call.
INCP	Incoming call proceeding. Issued for an incoming call when the network or user has received acknowledgment from the destination party that it has received all call information necessary to effect call establishment.
ACTV	Call active. Issued for incoming or outgoing calls after confirmation has been received from the network or user that the call is established.
RLRQ	Release request. Issued when the network or user receives a request from the destination party to clear the end-to-end connection and is waiting for a response.
RLIN	Release indication. Issued when the network or user has disconnected the end-to-end connection and has sent an invitation to disconnect the user-network connection.

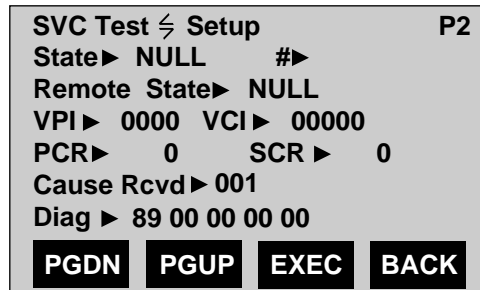
Obtaining Status on the Remote Device

To obtain call status from the other connected device:

Note

You can obtain status on a call request only if the call is not released.

1. Display the **SVC** (P2) screen:



ta145f.eps

The cursor is positioned on the **Test** parameter.

2. Press the **Left** or **Right Arrow** key to select **Enquire**.
3. Press **F3**(EXEC).

The tester sends a message requesting status on the call. In response to the inquiry, call status information is reported in the **Remote State** field (see Table 7-5 for a list of call states).

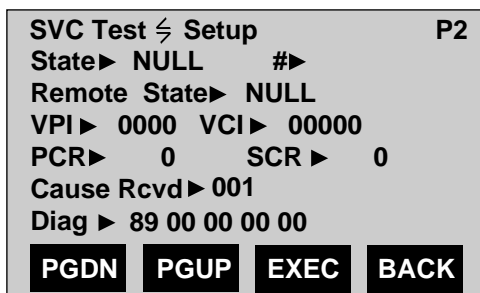
Releasing or Restarting a Call

Note

You might need to restart a call when a failure occurs or when the other side of the interface is not responding to other call control messages.

To release or restart a current call, complete the following:

1. Display the **SVC (P2)** screen:



ta145f.eps

The cursor is positioned on the **Test** parameter.

2. Press the **Left** or **Right Arrow** key to select one of the following settings for the **Test** parameter:
 - **Release**
Will send a message to clear the connection and make the virtual channel available for use in a new virtual channel connection.
 - **Restart**
Will send a message to restart the call. If there is an active call when the message is sent, the specific call channel is re-initialized. If no calls are active, the message requests that all call channels be restarted.
3. Press **F3(EXEC)**.
A release or restart message is sent to the connected device.

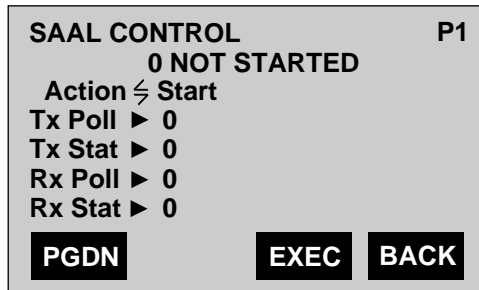
Resynchronizing the Signaling Channel (SAAL)

Note

This procedure is used to resynchronize the buffers and data transfer state variables.

To resynchronize the signaling channel, complete these steps:

1. Display the **SAAL CONTROL** (P1) screen:



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The cursor is positioned on the **Action** parameter.

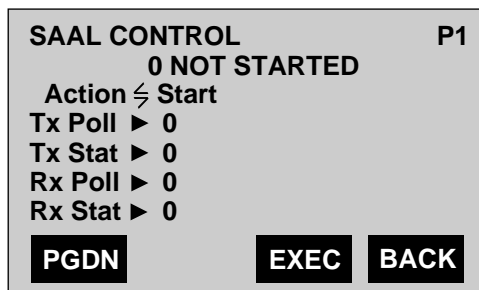
2. Press the **Left** or **Right Arrow** key to choose the **Resynchrn** setting.
3. Press **F3(EXEC)**.

A resynchronization message is sent to the connected device.

Releasing the Signaling Channel (SAAL)

To release the signaling channel:

1. Display the **SAAL CONTROL** (P1) screen:



ta138f.eps

The cursor is positioned on the **Action** parameter.

2. Press the **Left** or **Right Arrow** key to choose one of the following settings for the **Action** parameter:
 - **Release**

Will cause the E3port Plus to release the connection to the other side of the interface.

The SAAL layer operation on the E3port Plus will continue and the tester will be able to respond to requests from the other side of the interface to restart the signaling channel.
 - **Stop**

Will cause the E3port Plus to release the connection to the other side of the interface and stop the SAAL layer operation on the tester.

The E3port Plus will not respond to attempts by the other side of the interface to reestablish the link.
3. Press **F3(EXEC)**.

An end SAAL message is sent to the connected device.

Appendices

Appendix	Title	Page
A	Sample Reports	A-1
B	Applications	B-1
C	Glossary	C-1

Appendix A

Sample Reports

Introduction

This appendix shows you how to print reports with the E3port Plus. Before you can print, you need to connect the tester to a printer. See “Connecting the E3port Plus to a Printer or PC” in Chapter 3 for details.

Product Information Report

To print a product information report, do the following:

1. Press the **SYSTEM** key. Then, display any page of the **SYSTEM INFORMATION** menu.
2. Press **SHIFT 1 + Print**.

The E3port Plus prints a product information report similar to this one:

```
*****  
* PRODUCT INFORMATION *  
*****  
PRODUCT  
  Model: FLUKE E3port+  
  Software Ver: 4.00  
  Display Ver: 25  
  Build: Tue Jan 12 99 15:59:01  
  Remote ID: 10199  
  
CONFIGURATION  
  User: E3user  
  UNI: 3.1/4.0  
  Remote: ENABLED  
  Framer: E3XC.1  
  
                as of 02-12-99 16:03:15  
-----  
NOTES:
```

aag159f.eps

Line Setup Report

A Line setup report contains a summary of the parameter settings for each line setup option. To print this report, do the following:

1. Press the **LINE** key. Select **Line Setup**. Then, press **ENTER**.
2. Display any page of the **LINE SETUP** menu. Then, press **SHIFT 1 + Print** to display a report similar to the following:

```

+++++
* E3 LINE SETUP *
+++++
Framing: G.832
Timing: Internal
Loopback: None

Clr Cntr on LOS: OFF
Clr Cntr on OOF: OFF
Payload Type: UEQ
Timing Mark: 0

Send FERF on Receive
  LOS: OFF
  OOF: OFF
  AIS: OFF

XMIT Trail Trace
  bytes 0 - 3: 41 42 43 44
  bytes 4 - 7: 45 46 47 48
  bytes 8 - 11: 49 4A 4B 4C
  bytes 12 - 15: 4D 4E 4F 80
  (ASCII): ABCDEFGHIJKLMNO.

                        as of 02-12-99 22:41:33
-----
NOTES:

```

aag160f.eps

Line Results Report

To print a Line results report, do the following:

1. Press the **LINE** key. Select **Line Results**. Then, press **ENTER**.
2. Press **SHIFT 1 + Print** to print a report similar to the following:

```
*****
* E3 LINE RESULTS *
*****
SUMMARY
  Framing: G.832
  Status: OK
  Alarms Logged: 3
  Signal Level: 1.03 Vpk, 8.48 dBm
  Last Sync: 00:00:00
  Run Time: 00:08:05

  Payload Type: UEQ
  Timing Mark: 0

DETAILED STATISTICS
      Count      ErrdSec      ErrFreeSec  %ErrFree
LCV      0000000004  0000000004  0000000481  99.18%
F-BIT    0000013299  0000000003  0000000482  99.38%
FEBE     0000018396  0000000003  0000000482  99.38%
BIP-8    0000000006  0000000001  0000000484  99.79%

Elapsed Time: 485 sec
Total Errors: 31705

      Status      Start      End      Total
LOS      INACTIVE    --:--:--  --:--:--  --:--:--
OOF      INACTIVE    22:41:49  22:41:51  00:00:02
AIS      INACTIVE    22:41:49  22:41:51  00:00:02
FERF     INACTIVE    22:41:49  22:41:51  00:00:02

RCV Trail Trace
  bytes 0 - 3: 80 41 42 43
  bytes 4 - 7: 44 45 46 47
  bytes 8 - 11: 48 49 4A 4B
  bytes 12 - 15: 4C 4D 4E 4F
  (ASCII): .ABCDEFGHIJKLMNO

              as of 02-12-99  22:41:57
-----
NOTES:
```

aag162f.eps

Line BER Test Report

To print a Line BER test report, do the following:

1. Press the **LINE** key. Select **LINE BERT**. Then, press **ENTER**.
2. Display any **Line BER Test** menu page.
3. Press **SHIFT 1 + Print** to print a report similar to the following:

```

+++++
* E3 BIT ERROR RATE TEST RESULTS *
+++++
RESULTS
  Err Rate: 9.98003E-04
  Errors: 0000926534
  Bits: 0928387840
  Errd Sec: 0000000020
  Elapsed time: 0 days 00:00:23

CONFIGURATION
  Pattern: 2**15
  User Defined Pattern: N/A
  Pattern Type: NORMAL
  Err Inject: 10E-3

                        as of 02-12-99 16:04:48
-----
NOTES:
    
```

aag161f.eps

ATM BER Test Report

To print an ATM BER test report, do the following:

1. Press the **ATM** key. Select **ATM Testing**. Then, press **ENTER**.
2. Select **Bit Error Rate**. Press **ENTER**.
3. Display any **ATM BER Test** screen. Then, press **SHIFT 1 + Print** to print a report similar to the following:

```
*****
* ATM BIT ERROR RATE TEST RESULTS *
*****
ATM RECEIVE CIRCUIT
  VPI: 0016  VCI: 00064  PT: 0  CLP: X  GFC: 0

RESULTS
  Err Rate: 1.00707E-06
  Errors: 0000000086
  Bits: 0085396104
  Errd Sec: 0000000021
  Elapsed time: 0 days 00:00:32

CONFIGURATION
  Pattern: 2**15
  User Defined Pattern: N/A
  Pattern Type: NORMAL
  Err Inject: 10E-6

                        as of 02-12-99  16:08:02
-----
NOTES:
```

ta150f.eps

ATM Configuration Report

To print an ATM configuration report, do the following:

1. Press the **ATM** key. Select **ATM Configuration**. Then, press **ENTER**.
2. Press **SHIFT 1 + Print** to print a report similar to the following:

```

*****
* ATM CONFIGURATION REPORT *
*****
GENERAL
  Network Interface Support: UNI
  Cell Delineation Method: HEC
  Background Cell Format: IDLE
  Add COSET polynomial: ON

TRAFFIC SOURCE 1 - ON CBR
Header
  VPI: 0016 VCI: 00064 PT: 0 CLP: 0 GFC: 0
  Checksum: OK Hexadecimal: 0100040017
Payload
  Type: BERT
Traffic
  PCR: 3392 kbps 8000 CPS 10.00%
  SCR: 3392 kbps 8000 CPS 10.00%
  Maximum Burst Size: 20 cells
  Cell Delay Variation Limit: 25.0 cells

TRAFFIC SOURCE 2 - ON VBR/Burst
Header
  VPI: 0017 VCI: 00065 PT: 0 CLP: 0 GFC: 0
  Checksum: OK Hexadecimal: 01100410C5
Payload
  Type: FIXED
Traffic
  PCR: 3392 kbps 8000 CPS 10.00%
  SCR: 3392 kbps 8000 CPS 10.00%
  Maximum Burst Size: 20 cells
  Cell Delay Variation Limit: 25.0 cells

TRAFFIC SOURCE 3 - OFF
TRAFFIC SOURCE 4 - OFF
TRAFFIC SOURCE 5 - OFF
TRAFFIC SOURCE 6 - OFF
TRAFFIC SOURCE 7 - OFF
TRAFFIC SOURCE 8 - OFF

as of 02-12-99 16:06:28
-----
NOTES:
  
```

ta152f.eps

ATM Circuit Activity Report

To print a report of the activity on detected circuits, follow these steps:

1. Press the **ATM** key. Select **Receive Summary**. Then, press **ENTER**.
2. Select **Circuit Activity List**. Then, press **ENTER**.
3. From the **RCV STATS** screen, press **SHIFT 1 + Print** to print a report similar to the following:

```
*****
* ATM SUMMARY *
*****
RECEIVED CIRCUIT ACTIVITY - 5 CIRCUITS DETECTED
VPI  VCI  GF PT CL HC  BW%  CPS   MBS   Count
0000 00000 0 0 1 07 60.00% 48000 20.3520 302260
0016 00064 0 0 0 42 10.00% 8000 3.3920 50377
0017 00065 0 0 0 90 10.00% 8000 3.3920 50377
0018 00066 0 0 0 E1 10.00% 8000 3.3920 50377
0019 00067 0 0 0 33 10.00% 8000 3.3920 50377

CURRENT TRANSMISSION ACTIVITY
VPI  VCI  GF PT CL HC  BW%  CPS   MBS   Count
0016 00064 0 0 0 17 10.00% 8000 3.3920 50377
0017 00065 0 0 0 C5 10.00% 8000 3.3920 50377
0018 00066 0 0 0 B4 10.00% 8000 3.3920 50377
0019 00067 0 0 0 66 10.00% 8000 3.3920 50377
0020 00068 0 0 0 56 0.00% 0 0.0000 0
0021 00069 0 0 0 84 0.00% 0 0.0000 0
0022 00070 0 0 0 F5 0.00% 0 0.0000 0
0023 00071 0 0 0 27 0.00% 0 0.0000 0

-----
as of 02-12-99 16:05:23
-----
NOTES:
```

ta151f.eps

ATM Cell Capture Test Results

To print an ATM cell capture report, do the following:

1. Press the **ATM** key. Select **ATM Testing**. Then, press **ENTER**.
2. Select **Cell Capture**. Then, press **ENTER**.
3. Display any page of the **CELL CAPTURE** menu. Then, press **SHIFT 1 + Print** to print a report similar to the following:

```

*****
* ATM CELL CAPTURE *
*****
CONFIGURATION
  Capture ON: Rcv Filter
  Trigger ON: Rcv Filter
  Time Format: Relative

CELL BUFFER CONTENTS
  Cell: 000 VPI: 0016 VCI: 00064 PT: 0 CLP: 0 GFC: 0
  Time: 0000000000.0 us
  Payload:
  dd 71 30 d9 5d 28 31 0f 59 dc 2b 37 05 4d e0 53
  be 16 7b 8a e6 c1 a9 7a 08 e3 cd b7 52 4c 12 57
  92 0e 93 d8 97 2c 8d 14 d1 85 1a e1 a1 ba 3a 63

  Cell: 001 VPI: 0016 VCI: 00064 PT: 0 CLP: 0 GFC: 0
  Time: 0000000095.9 us
  Payload:
  62 b4 b0 44 5e 66 3a ab 60 04 bf e4 7f a6 fe 29
  fb 0b e5 c7 a3 6e 34 9b 44 a4 64 26 a7 28 2d 0f
  11 dd 9b 32 a5 50 20 1f 3f bd 7e 70 fa dd e1 33

          as of 02-12-99 16:05:23
-----
NOTES:
  
```

ta153f.eps

QoS Test Report

To print a QoS test report, do the following:

1. Press the **ATM** key. Select **ATM Testing**. Press **ENTER**.
2. Select **QoS Tests**. Then, press **ENTER**.
3. Press **SHIFT 1 + Print** to print a report similar to the following:

```
*****
* ATM QUALITY OF SERVICE RESULTS *
*****
ATM Receive Circuit
  VPI: 0016   VCI: 00064   PT: 0   CLP: X   GFC: 00

1 POINT CELL DELAY VARIATION
  Number of Samples: 00018025 Reference PCR: 9.0%
  Early Arrival
    Maximum: 00032001 us   Average: 15900.230 us
  Late Arrival
    Maximum: 00000000 us   Average: 0.230 us

2 POINT CELL DELAY VARIATION
  Number of samples: 00000000
  Peak-to-Peak Cell Delay Variation: 00000000 us
  Cell Transfer Delay
    Minimum: 00000000 us Maximum: 00000000 us Mean: 0.000

CELL LOSS TEST RESULTS
  Lost Cells:      00000000   Loss Ratio:      0.00e+00
  Misinserted Cells: 00000000   Misinsert Rate: 0.00e+00

                          as of 02-12-99 16:08:33
-----
NOTES:
```

ta154f.eps

OAM Test Report

To print an OAM test report, do the following:

1. Press the **ATM** key.
2. Select the **ATM Testing** option. Press **ENTER**.
3. Select the **OAM**. Then, press **ENTER**.
4. Display any **OAM TESTING** or **OAM DETECTION** screen. Then, press **SHIFT 1 + Print** to print a report similar to the following:

```

*****
* ATM OAM OPERATION *
*****
OAM F4 ACTIVITY SUMMARY
  VPI      Last Occurrence
  0016     16:08:57

OAM F5 ACTIVITY SUMMARY
  VPI      VCI      Last Occurrence
  0016     00064    16:09:10

CURRENT TRANSMIT CONFIGURATION
OAM Flow: F5
OAM Span: Segment
Circuit: VPI: 0016  VCI: 00064

                        as of 02-12-99  16:09:14
-----
NOTES:
    
```

ta155f.eps

SAAL Statistics Report

To print SAAL statistics report, do the following:

1. Press **ATM**.
2. Select the **SVC Setup & Testing** option. Press **ENTER**.
3. Press **SHIFT 1 + Print**.

The E3port Plus prints a report similar to the following:

```
*****
* SAAL STATISTICS *
*****
Counter  Transmit   Receive
Poll:      10        9
Status:    9         9
dt/poll:   0         0
Begack:    1         1
Begin:     1         1
RsynAck:   0         0
Resync:    0         0
Bgnrej:    0         0
unsolst:   0         0
  data:    0         0
Endack:    0         0
  End:     0         0
Error:     0         0
ErrAck:    0         0

                        as of 02-12-99 16:21:00
-----
NOTES:
```

ta164f.eps

SVC Log Report

Following is an example of an SVC log report. A report of this type is generated when you set the **Logging** parameter to **On** (see “Selecting the Emulation Mode of the E3port Plus” for instructions on how to do this).

```

Rx_RAW - Time Ref: 105850
09,03,00,00,02,05,80,00,59,59,80,00,08,84,00,01,
f4,85,00,01,f4,5e,80,00,03,10,80,80,70,80,00,15,
82,47,00,05,80,ff,e1,00,00,00,f2,1a,25,11,91,42,
73,62,32,02,70,5c,e0,00,02,01,01,58,80,00,09,05,
8c,00,64,81,00,64,84,00,6c,80,00,16,02,80,47,00,
05,80,ff,e1,00,00,00,f2,1a,25,11,91,42,73,62,32,
02,60,

Rx_PDU - Time Ref: 105960
Call Reference = 000002
Mess Type = 0005, SETUP
AAL Parameters
    Coding Standard = 00
    AAL Type = 05
    Forward SDU size = 100
    Backward SDU Size = 100
    SSCS = 00
ATM Traffic Descriptor
    Coding Standard = 00
    Forward PCR 0+1 = 500
    Backward PCR 0+1 = 500
    Forward Tagging = 0
    Backward Tagging = 0
Broadband Bearer Capability
    Coding Standard = 00
    Class = 10, X
    Traffic Type = 00
    Timing = 00
    Susceptibility to Clipping = 00
    User Plane Connection Config = 00
Called Party Number
    Coding Standard = 00
    Number Type = 00
    Plan Identification = 02
    Called Number = 47,00,05,80,ff,e1,00,
00,00,f2,1a,25,11,91,42,73,62,32,02,70,
Calling Party Number
    Coding Standard = 00
    Number Type = 00
    Plan Identification = 02
    Presentation Indicator = 00
    Screen Indicator = 00
    Calling Number = 47,00,05,80,ff,e1,00,
00,00,f2,1a,25,11,91,42,73,62,32,02,60,
Quality Of Service Parameter
    Coding Standard = 03
    QoS Forward = 01
    QoS Backward = 01

```

ta172f.eps

```
Tx_PDU - Time Ref: 106120
        Call Reference = 000002
        Mess Type = 0002, CALL PROCEEDING
        Connection Identifier
            Coding Standard = 00
            VP Associated Signalling = 01
            Preferred/Exclusive = 00
            VPCI = 0001
            VCI = 00033

Tx_RAW - Time Ref: 106150
        09,03,80,00,02,02,80,00,09,5a,80,00,05,88,00,01,
        00,21,

Tx_PDU - Time Ref: 106180
        Call Reference = 000002
        Mess Type = 0007, CONNECT
        Connection Identifier
            Coding Standard = 00
            VP Associated Signalling = 01
            Preferred/Exclusive = 00
            VPCI = 0001
            VCI = 00033

Tx_RAW - Time Ref: 106210
        09,03,80,00,02,07,80,00,09,5a,80,00,05,88,00,01,
        00,21,

Rx_RAW - Time Ref: 106750
        09,03,00,00,02,0f,80,00,00,

Rx_PDU - Time Ref: 106770
        Call Reference = 000002
        Mess Type = 000f, CONNECT ACKNOWLEDGE
```

ta173f.eps

Appendix B Applications

Introduction

This appendix contains procedures that show you how to test ATM equipment policing algorithms and how to test for the effect of high traffic rates on a payload's transmission capability.

Testing ATM Equipment Policing Algorithms

To provide a minimum of acceptable service, the traffic sent across most ATM connections must comply with a predetermined traffic "contract". Traffic sources that exceed their traffic requirements must be "policed" in some way so that they do not adversely affect other users of the ATM network.

Although there are a number of ways to specify the limiting parameters of any traffic contract, two methods are more commonly used to react to traffic that is considered non-conforming:

- The ATM equipment that receives traffic that it believes is in violation of an established traffic contract can mark the offending cells by setting their CLP bit to 1.
- The ATM equipment that receives traffic that it believes is in violation of an established traffic contract can drop the offending cells.

This section describes these two methods and how you can set up the E3port Plus to use them to test a policing algorithm.

Note

See "Conformance Testing Using GCRA" in Chapter 6 for another method that you can use to test traffic conformance.

Forcing Contract Violations and Detecting Marked Cells

To detect marked cells, do the following:

1. Configure the Equipment Under Test to receive a policed stream on VCI/VPI "A" and return it on the same port (or a different port) on VCI/VPI "B".
2. Set up a transmission stream on the circuit to be tested with its header set up to match VPI/VCI "A" at a rate that is just below the contract limit. Make sure that the CLP bit in the header is set to 0.
3. Observe the traffic received on Circuit B. Examine the header to ensure that the CLP is 0.
4. Gradually increase the transmission rate on circuit "A". As you exceed the policing limit, cells will be received on filter "B" that have had their CLP bits set. This causes another circuit to appear with the same VPI/VCI as "B" but with the CLP bit set.

Forcing Contract Violations and Detecting Dropped Cells

To detect dropped cells, complete these steps:

1. Configure the Equipment Under Test to receive a policed stream on VCI/VPI "A" and return it on the same port (or a different port) on VCI/VPI "B".
2. Set up a VBR/RND transmission stream on the circuit to be tested. Also set the circuit's header to match VCI/VPI "A" and set the SCR at a rate that, on average, is just under the contract limit. Set the PCR and MBS limits so that they can exceed the contract parameters.
3. Set up a receive filter that matches the return circuit on header "B" for the transmission stream that you set up in Step 1. Set the CLP bit to 1.
4. Run the Cell Loss test.

Occasionally, you will see cells dropped as the transmission steam randomly breaches the traffic contract.

Appendix C

Glossary

AAL

Abbreviation for ATM Adaptation Layer.

AIS

Abbreviation for Alarm Indication Signal. Formerly called a “Blue Alarm”. A signal that is sent by a network device when it detects or receives an error condition or receives notification of an error from another device.

asynchronous

Not synchronized; not timed to an outside clock.

ATM

An abbreviation for Asynchronous Transfer Mode. A transmission protocol that relays user traffic by segmenting it into small, fixed-sized packets called cells. The cells are then inserted into a framing structure and transmitted across a data link. At the receiving end, the cells are extracted from the structure and reassembled to form the original input.

bandwidth

Identifies the capacity of a communications channel. In analog communications, bandwidth is measured in Hertz; in digital communications, in bits per second.

BERT

Abbreviation for Bit Error Rate Testing. A test that entails analyzing a received signal's payload pattern and comparing it with a specified test pattern. Any discrepancies between the received pattern and the test pattern are reported as bit errors.

bit error rate

The number of errored bits divided by the total number of bits received.

CBR

Abbreviation for Constant Bit Rate. One of the five classes of service defined by the ATM Forum. Constant bit rate service is used to carry traffic that is constant and non-bursty, such as voice and compressed video.

CDV

Abbreviation for Cell Delay Variation. A measure of cell jitter or how cells clump together as they traverse a network. More specifically, CDV is defined as the variability between the expected time of arrival of a cell and its actual arrival time.

CDVT

Abbreviation for Cell Delay Variation Tolerance. An ATM traffic contract parameter that defines the maximum amount of cell jitter that can be tolerated by the end-to-end connection. This parameter is typically specified when tightly constrain cell inter-arrival time is critical.

cell

The fundamental unit of ATM transmission. A fixed-length information package that is used to carry user traffic. Consists of 53 bytes. Of these, five constitute the header while 48 carry the information field or payload.

cell loss ratio

In cell loss testing, the number of displaced or lost cells in relation to the total number of cells received by the activated ATM receive filter.

cell misinsertion rate

The number of cells that are misinserted on a particular connection over a particular time period.

channel

A transmission facility with defined bandwidth.

CLP

Abbreviation for Cell Loss Priority. A bit in the ATM header that indicates whether (all other factors being equal) a cell can be discarded under certain network conditions. If CLP is set to 1, the cell can be discarded; if it is set to 0, it cannot be discarded.

CLR

Abbreviation for Cell Loss Ratio. See cell loss ratio.

CPS

Abbreviation for cells per second.

CRC

Abbreviation for Cyclic Redundancy Check. A mathematical algorithm used to detect bit errors in data transmission.

CTD

Abbreviation for Cell Transfer Delay. The elapsed time between the transmission of a cell from a defined exit point and arrival of a cell at a defined entry point on a network.

DUT

Abbreviation for device under test.

E3

A digital carrier facility used to transmit an E3 digital stream at a 34,356 Mbit interface rate.

error rate

The number of errors per second.

errored second

A second in which at least one defect or error occurred.

frame

A group of data bits that varies in length yet has a specific format containing flags at the beginning and end to provide demarcation.

GCRA

Abbreviation for Generic Cell Rate Algorithm. An algorithm that is used by an ATM network to measure conformance with negotiated traffic usage.

GFC

Abbreviation for Generic Flow Control. The first four bits of byte 1 in an ATM cell header.

HCS

Abbreviation for Header Checksum.

header

That portion of an ATM cell (the first five bytes) that precedes the actual data and contains source and destination addresses and control and error-checking information.

HEC

Abbreviation for Header Error Control. That portion of an ATM cell header that performs error detection, thereby reducing the likelihood of bit errors causing information to be misdelivered.

Hex

Abbreviation for hexadecimal header. That portion of an ATM cell that contains a summary of all of the values programmed into the individual header fields (that is, the VPI, VCI, PT and CLP values).

idle cell

In ATM, a type of background cell. An idle cell has its CLP bit set to 1. Contrast with unassigned cell.

LCD

Abbreviation for Liquid Crystal Display.

LCV

Abbreviation for Line Code Violation.

leaky bucket

A term used to describe the algorithm used for conformance checking of cell flows against specified traffic parameters. See GCRA.

loopback

A state in which the transmission signal is reversed and sent back as the receive signal.

MAC Address

The address for a device as it is identified by the Media Access Control (MAC) layer.

MBS

Abbreviation for megabits per second (a million bits per second).

MXBSZ

Abbreviation for Maximum Burst Size. An ATM traffic contract parameter that defines the maximum number of cells that can be transmitted consecutively at the rate defined by the PCR. This parameter is used for VBR services only.

NNI

Abbreviation for Network to Network-Interface. An interface between two public carriers, such as a local carrier and a long-distance carrier.

OAM

Abbreviation for Operations and Maintenance. An ATM cell that is used by the network to perform network management functions, such as fault management, performance management, and connection management. OAM cells are divided into two types: F4 flows, which are used for virtual path connection operations and F5 flows, which are used for virtual channel operations.

overhead

That portion of a cell or frame that contains control information as opposed to data. For example, a flag or delimiter, a header, and a trailer each constitute a cell or frame's overhead.

payload

That portion of an ATM cell that contains user information or data as opposed to routing or control information. Contrast with header.

PCR

Abbreviation for Peak Cell Rate. An ATM traffic contract parameter that defines the maximum bandwidth that can be supported by a particular end-to-end connection. This parameter is used for CBR, and VBR services. For CBR services, it represents the guaranteed constant bandwidth that is supported. For VBR services, it defines the maximum bandwidth that can be supported for the MXBSZ.

PLCP

Abbreviation for Physical Layer Convergence Protocol. A protocol that defines the mapping of ATM cells onto a facility.

PT

Abbreviation for payload type. Bits in the header that indicate what type of information is being carried by the cell. For example, bits are used to distinguish between cells carrying user information and cells carrying operations and maintenance information.

QoS

Abbreviation for Quality of Service. A term used to describe a set of performance parameters that characterize traffic over a connection.

RDI

Abbreviation for Remote Defect Indication.

receive filter

A piece of logic that allows the E3port Plus to discriminate among incoming data streams based on specific header information. The filter uses pattern matching to capture certain traffic record statistics based upon specific header values.

SAAL

Abbreviation for Abbreviation for Signaling ATM Adaptation Layer. The SAAL is between the ATM layer and Q.2931. The purpose of this layer is to provide reliable transport of Q.2931 messages between peer Q.2931 entities (for example, an ATM switch and host) over the ATM layer.

SCR

Abbreviation for Sustained Cell Rate. An ATM traffic contract parameter that defines, for VBR services only, the guaranteed bandwidth that can be supported on a continuous basis by a particular end-to-end connection.

scrambling

A method whereby the bits are pseudo-randomly mixed to provide for easier clock recovery and recovery of data. Used to guarantee a higher ones density and no false triggering of alarms.

shaper

A function that is used to guarantee that traffic parameters are not exceeded.

SVC

Abbreviation for Switched Virtual Connection. This type of connection is dynamic in that it is established in real time using signaling procedures. The connection remains active for an arbitrary amount of time, but is not automatically re-established after a network failure.

transmission stream

On the E3port Plus, used to generate ATM traffic. Allows the user to set up cell transmission parameters that fully describe the ATM traffic generated by the E3port Plus. These parameters include address designation, cell loss priority, and bandwidth, to name a few.

unassigned cell

In ATM, a cell containing no information that is inserted into the data stream and used as filler for bandwidth or a place holder. An unassigned cell has its CLP bit set to 0. Contrast with idle cell.

UNI

Abbreviation for User-to-Network Interface. An interface between privately owned or leased customer equipment and a public network service provider.

VBR

Abbreviation for Variable Bit Rate. One of the five classes of service defined by the ATM Forum. Variable bit rate service is used to transmit “bursty” types of ATM traffic.

VCI

Abbreviation for Virtual Channel Indicator. That portion of an ATM cell header that identifies the channel used to route a cell.

VPI

Abbreviation for Virtual Path Indicator. That portion of an ATM cell header that identifies the path used to route a cell.

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