FLUKE®

# DS1port Plus

## Handheld T1/ATM Network Analyzer

Users Manual

PN 686250
April 1997, Rev. 1, 3/99

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# About This Manual

The *DS1port Plus Users Manual* describes how to operate the DS1port Plus handheld DS1/ATM analyzer and provides instructions on how to test and evaluate DS1 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 DS1port Plus. It is written for anyone who uses this product to test and troubleshoot DS1 and ATM networking problems, for those involved in the installation, maintenance, and deployment of DS1 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 T1 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 DS1port 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 DS1port 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 DS1port 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 DS1port 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.<br>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 names | The names of screens are in capital letters and boldface type.<br>For example, the **SYSTEM INFORMATION** screen. |
| Options | Options are boldface type.<br>For example, the **Date** option. |
| Arrow keys | The arrow keys are the four keys that encircle the **ENTER** key.<br>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.<br>For example: Do *not* 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.<br>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.<br>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.<br>All warnings are preceded by this symbol ⚠ and the word "Warning". |

# Introduction

The DS1port Plus portable handheld tester provides an extensive set of T1 and ATM testing capabilities that address a broad range of test requirements for T1- 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 DS1 networks. The DS1port Plus addresses this need by combining T1 testing capability with an advanced set of ATM testing features. This practical solution enables you to do detailed testing from the DS1 physical layer up through the ATM layer. And, you can take the DS1port Plus with you and do this testing either on the customer premises (inside the NID) or anywhere in the central office. With the DS1port 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 DS1port Plus and provide important information about the operation and use of the tester.

## Overview of DS1port Plus Features and Capabilities

The DS1port Plus provides you with DS1 and ATM testing capability in a single, handheld design. At the physical layer, you can use the DS1port Plus to diagnose many common DS1 network problems. The tester provides complete DS1 error and alarm transmission and monitoring capability so that you can effectively isolate DS1 problems and test DS1 networks from any access point. The DS1port Plus also provides these features:

- Transmission and monitoring of DS1 errors and alarms
- DS1 frame testing
- DS1 Bit Error Rate testing
- Pulse density testing
- Line error measurements

At the ATM layer, the DS1port Plus can monitor ATM network conditions, test and qualify ATM services, and perform ATM equipment installation testing. Specifically, you can:

- Automatically discover ATM activity and list up to 64 unique ATM header values 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
- Monitor I.610 Operations and Maintenance (OAM) cells
- Test I.610 OAM Fault Management and Performance Management functions
- Perform ATM Adaptation Layer (AAL) type detection
- Perform conformance testing using Generic Cell Rate Algorithm (GCRA)
- Test UNI point-to-point signaling procedures to assess Switched Virtual Circuit (SVC) capability

In addition to advanced diagnostic and testing capabilities, the DS3port Plus gives you immediate feedback on the condition of any DS3 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.

## The DS1port Plus Hand Held Tester: At a Glance

The DS1port Plus hand held tester is easy to use. 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 large, benchtop analyzers. Figure 1-1 highlights these features.

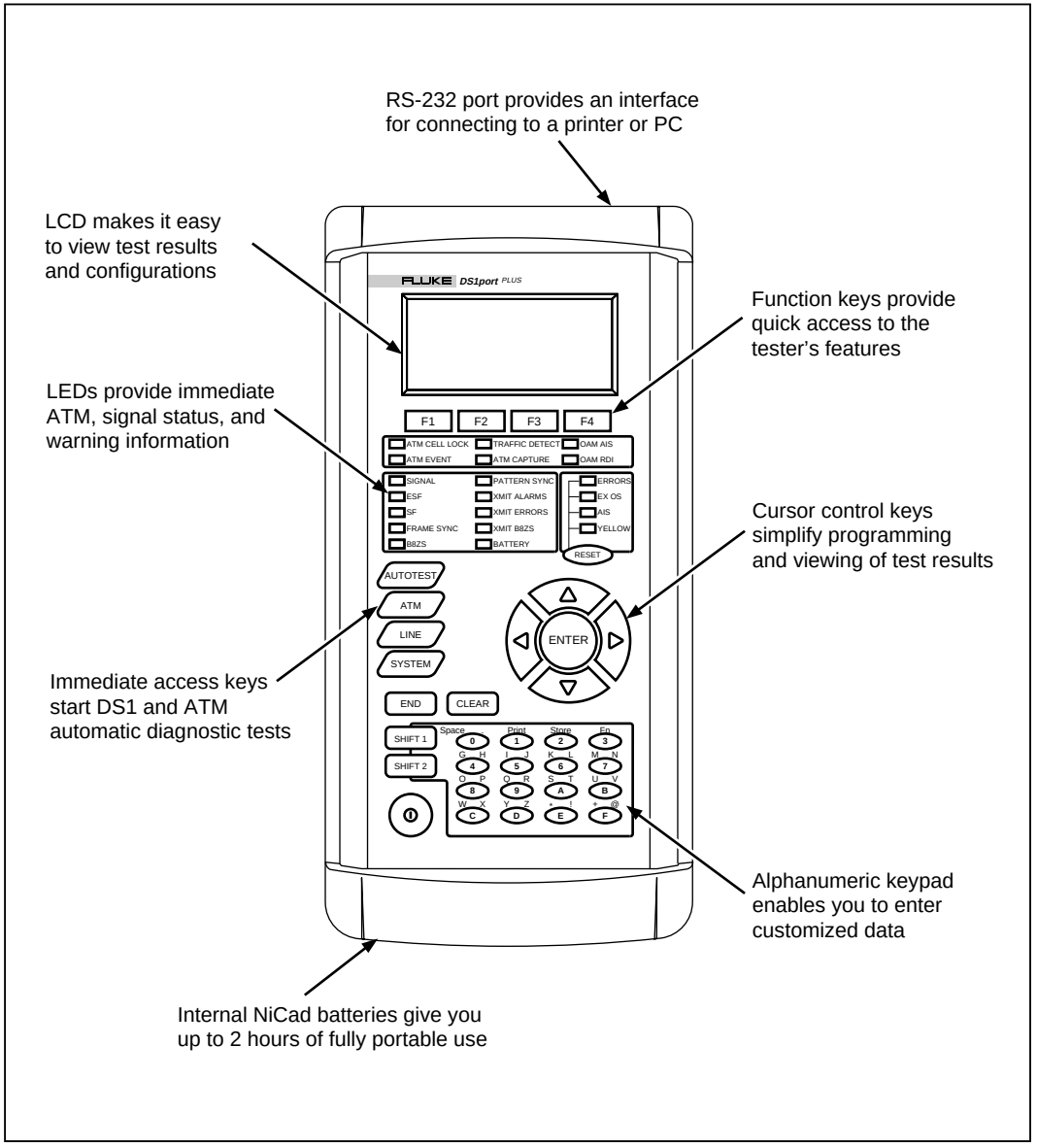


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**Figure 1-1. DS1port Plus Features**

## DS1port Plus Specifications

Following are the physical and operational characteristics of the DS1port 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, Signal, ESF, SF, Frame Sync, B8ZS, Pattern Sync, XMIT Alarms, XMIT Errors, XMIT B8ZS, Battery, Errors, Ex OS, AIS, Yellow

**Connectors**: miniature twin telephone input jack for Line In and Line Out connections that mate with “TT”, Bantam Type .173-inch, three-conductor telephone plugs (optional RJ-48 adapter cable available)

### 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

### 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**: FCC Part 15, Subpart B, Class A

**Safety**: UL 1950, ETL Category 31

### RS-232 Port

**Connector**: RJ-11

**Baud rates**: supports 1200, 2400, and 9600 bits per second

## _DS1 Physical Layer_

### Receiver

**Bit rates**:

- 1.536 Mbps data rate
- 1.544 Mbps line rate +/-130 ppm

**Input amplitude**: Line In AMI Pulse Amplitude 60 mv. min, 3.6 Volts max

**Input impedance**:

- Line mode: 100 ohms Typical +/-20%
- Monitor mode: 100 ohms Typical +/-20%
- Bridge mode: 1000 ohms Typical +/-20%

**Jitter tolerance**:

- 10 KHz to 100 KHz 0.4 Unit Intervals, maximum
- 1 Hz 138 Unit Intervals, minimum

**Signal level meter:** in Line and Monitor mode, provides a measured level of the received signal within +/-20% accuracy

### Transmitter

**Output**: Line Out AMI Pulse Amplitude 2.4 Volts peak minimum, 3.0 Volts peak typical, 3.6 Volts peak maximum

**Line build outs**: 0 dB, 7.5 dB, 15 dB, 22.5 dB

**Line rate**: 1.544 Mbps, +/-32 ppm

**Jitter specifications**:

- 10 Hz to 8 kHz 0.01 UI max
- 8 kHz to 40 kHz 0.02 UI max
- 10 Hz to 40 kHz 0.02 UI max
- Broad Band 0.04 UI max

**Pulse Mask Specification**: as specified in TR-TSY-000499

**Pulse Density**: auto-enforcement of Pulse Density Rule for AMI-encoded signals

## *DS1 Framing, Errors, and Alarms*

**Supported T1 framing formats**:

- Extended Super Frame
- Super Frame, SLC-96, T1DM
- Unframed (usable for Bit Error Rate testing only)

**Maximum frame time**: 15 milliseconds in 99 out of 100 cases

**Supported line codes**: B8ZS, AMI

**T1 errors detected**:

- Framing Bit
- COFA
- CRC-6
- OOF
- Line Code Violation
- Density
- Excessive Zeros

**Loopback modes**:

- Payload loopback
- Recognizes user-defined In-band 3-,4-,5-,6-,7-, and 8-bit framed and unframed loopback codes
- Transmits user-defined In-band 3-,4-,5-,6-,7-, and 8-bit framed or unframed loopback codes

**T1 alarms detected**:

- LOS: on if no pulses are received for 176 consecutive bit periods
- Red:
  - On, if OOF detected for 2.55 seconds +/-40 ms
  - Off, if OOF absent for 16.6 seconds +/-500 ms
- Yellow:
  - On, if Yellow pattern detected for 425 ms +/-50 ms
  - Off, if Yellow pattern absent 425 ms +/-50 ms
- AIS:
  - On, if OOF detected and all 1's in PCM for 1.5 seconds +/-100 ms
  - Off, if AIS condition absent for 16.8 seconds.

**T1 alarms generated**:

- AIS: if all 1's in the transmission stream
- Yellow alarm
- T1 Bit Error

**T1 Bit Error Rate 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 DS1 payload, byte-aligned

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

**Cell delineation**: performed using the HEC mechanism as described in ITU I.432

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

## *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 648 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 DS1port 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 DS1port Plus is *not* rated for use outdoors on an DS1 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 DS1port 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 DS1port 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 DS1port Plus package. The following items are included:

- *DS1port Plus Users Manual*
- DS1port 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 DS1port Plus. If you require technical support, please have the following information available:

- Your name and company.
- DS1port Plus model number and serial number.
- DS1port 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 DS1port Plus.

For application or operation assistance or information about the DS1port 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 Web site at www.fluke.com.

# *Chapter 2*
# *Controls and Connections*

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## Introduction

This chapter familiarizes you with the physical layout of the DS1port 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 DS1port 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.

- **DS1 signal connectors**

The IN and OUT connector jacks connect to the transmit and receive ports of a DS1 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 DS1port Plus. Use of any other adapter voids your warranty and can damage the tester.**

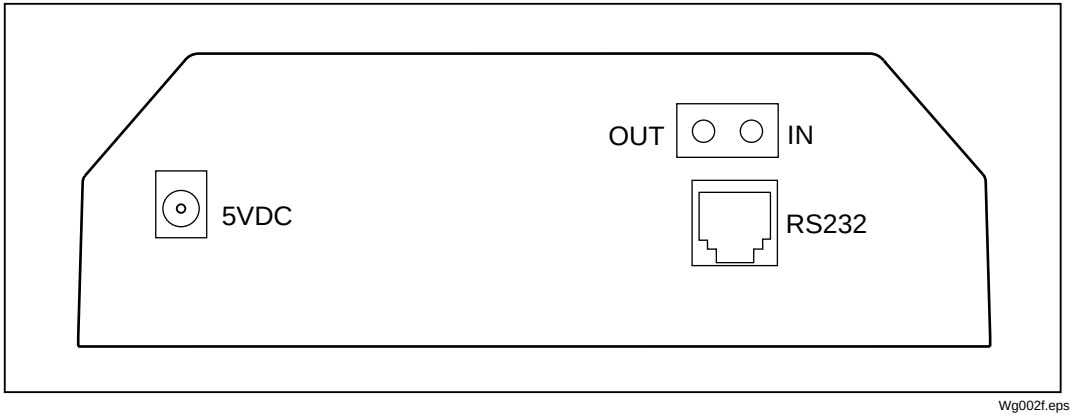


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**Figure 2-1. The Connector Panel is Located at the Top of the Tester**

# The Front Panel

Figure 1-1 is a representation of the DS1port Plus front panel. This section describes each of the areas on this panel.

## LCD

The DS1port 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 a key, look on the LCD directly above its name key. For example, 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** menu.

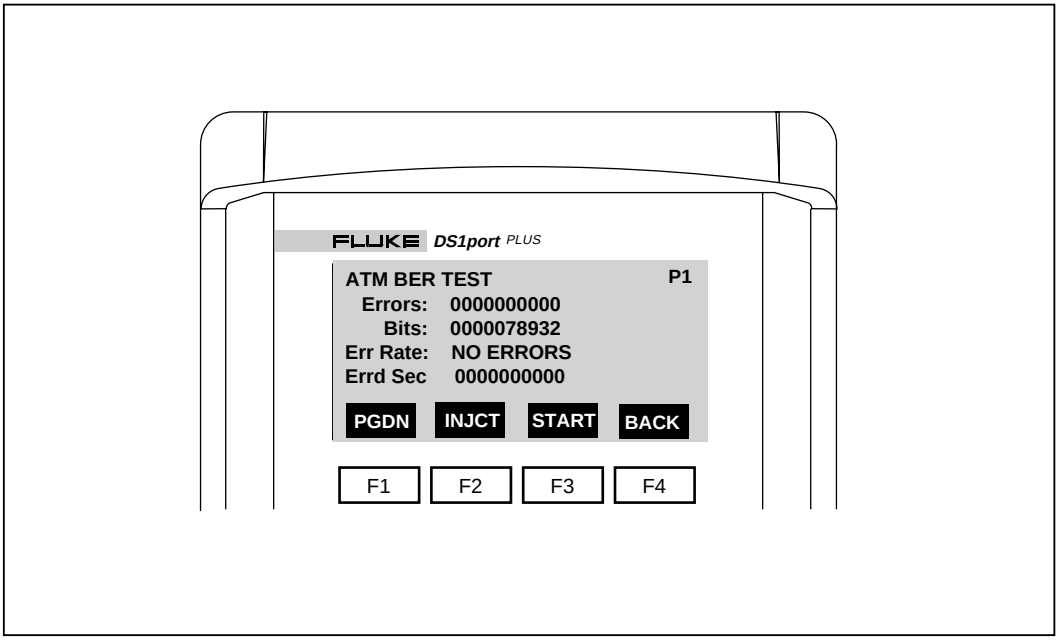


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**Figure 2-2. The Function Keys are Screen Dependent**

### *ATM LEDs*

The DS1port Plus has six green ATM LEDs. These LEDs are located on the front panel immediately below the four function keys (see Figure 2-3).

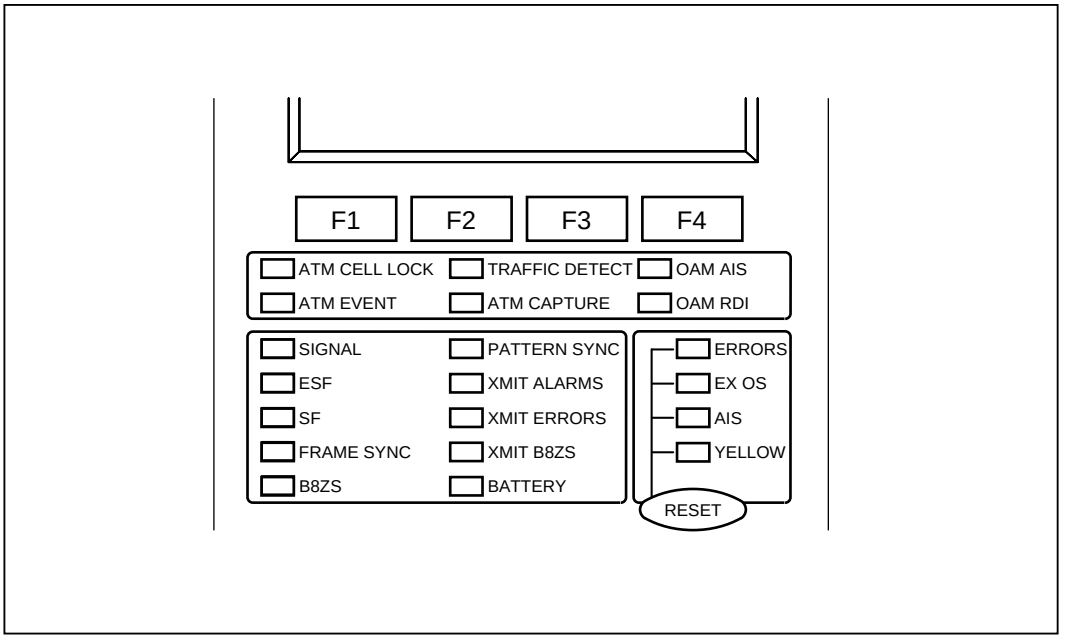


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**Figure 2-3. Front Panel ATM, Status, and Warning LEDs**

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 T1 transmission. This LED is off if there is no 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 directly under the row of ATM LEDs (see Figure 2-3). These LEDs indicate the operation status of your DS1port Plus.

- **SIGNAL**

  Lights green whenever pulses are detected on the input signal. This LED is off when the DS1port Plus detects no incoming pulses for 176 bit periods.

- **ESF**

  Lights green when the DS1port Plus is configured to receive Extended Super Frame (ESF) format and when the tester detects this format. This LED is off when ESF is not detected.

- **SF**

  Lights green when the DS1port Plus is configured to receive Super Frame (SF) format and when the tester detects this format. This LED is off when SF is not detected.

- **FRAME SYNC**

  The DS1port Plus supports the following framing formats: ESF, SF, SLC-96, and T1DM. Lights green when the DS1port Plus detects the configured framing pattern. Turns off if the DS1port Plus detects an OOF (Out of Frame) condition.

- **B8ZS**

  Lights green when B8ZS line coding is received. This LED is off if eight or more zeros are detected.

- **PATTERN SYNC**.

  Lights green when a bit pattern matching the transmitted bit pattern programmed for BER testing is identified by the DS1port Plus receiver.

- **XMIT ALARMS**

  Lights yellow to indicate that the DS1port Plus transmitter is configured to generate either AIS or Yellow alarms.

- **XMIT ERRORS**

  Not implemented in this release.

- **XMIT B8ZS**

  Lights green to indicate that B8ZS coding is configured for the tester's transmitter. When off, AMI coding is being used.

- **BATTERY**

  When flashing, this LED indicates that the tester is critically low on battery power. When this condition occurs, connect the DS1port Plus to the supplied AC adapter/charger and recharge it (see "Responding to Low Battery Warnings" in Chapter 3 for details).

### *Warning LEDs*

The DS1port Plus has four pairs of warning LEDs (see Figure 2-3), which light under the following circumstances:

- **ERRORS**

  Lights red when the DS1port Plus detects any one of the following errors within the previous second.

  Lights yellow (history) to indicate that the error was received in the past but is no longer being detected:

  - LCV (Line Code Violation)
  - Pulse density violation
  - LOP (Loss of Pattern)
  - Framing bit errors
  - COFA (Change of Frame Alignment)
  - CRC (Cyclic Redundancy Check)
  - OOF (Out of Frame)
  - HCS (Header Checksum)
  - Delin Errs (Delineation errors)

- **EX 0S** (Excessive Zeros)

  Lights red to indicate that at least one string of more than 15 zeros was received within the last second.

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

- **AIS** (Alarm Indication Signal)

  Lights red to indicate that an AIS alarm is currently present on the T1 line.

  Lights yellow (history) to indicate that an AIS was received in the past but is no longer being detected. This LED turns off if the AIS condition is absent for approximately 17 seconds.

- **YELLOW** (Yellow alarm)

  Lights red to indicate that a Yellow alarm is currently present on the T1 signal.

  Lights yellow (history) to indicate that a Yellow alarm was received in the past but is no longer being detected.

### *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 DS1port Plus has four immediate access keys (see Figure 2-4). These keys, when pressed, immediately display the main menu for the function named on the key.

The immediate access keys are located halfway down the left side of the front panel. They 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 options.

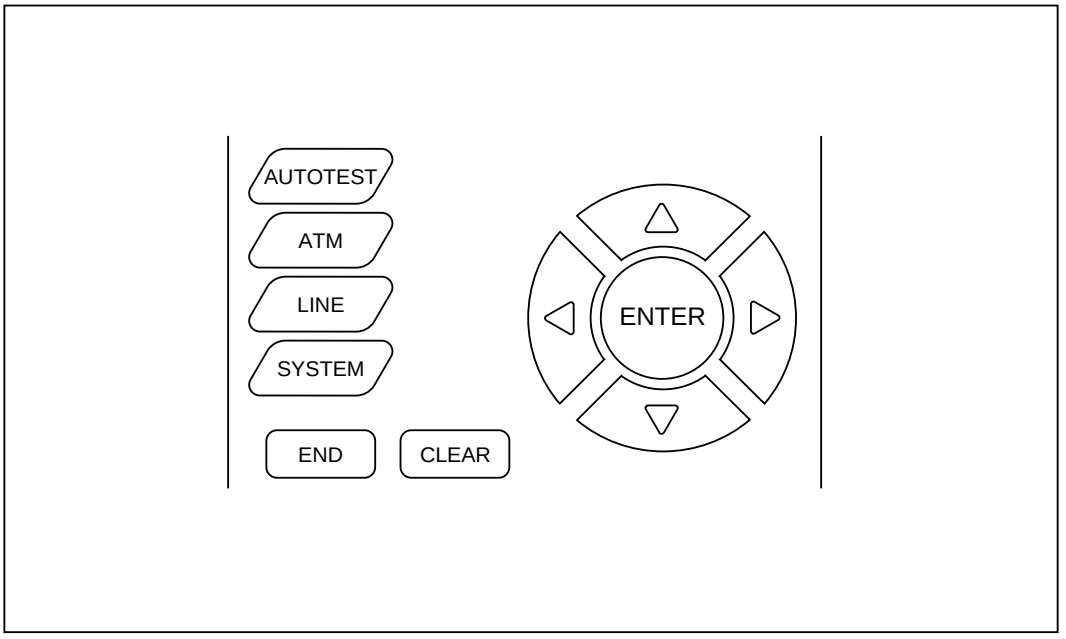


**Figure 2-4. Immediate Access, Arrow, and ENTER Keys**

### *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 **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.

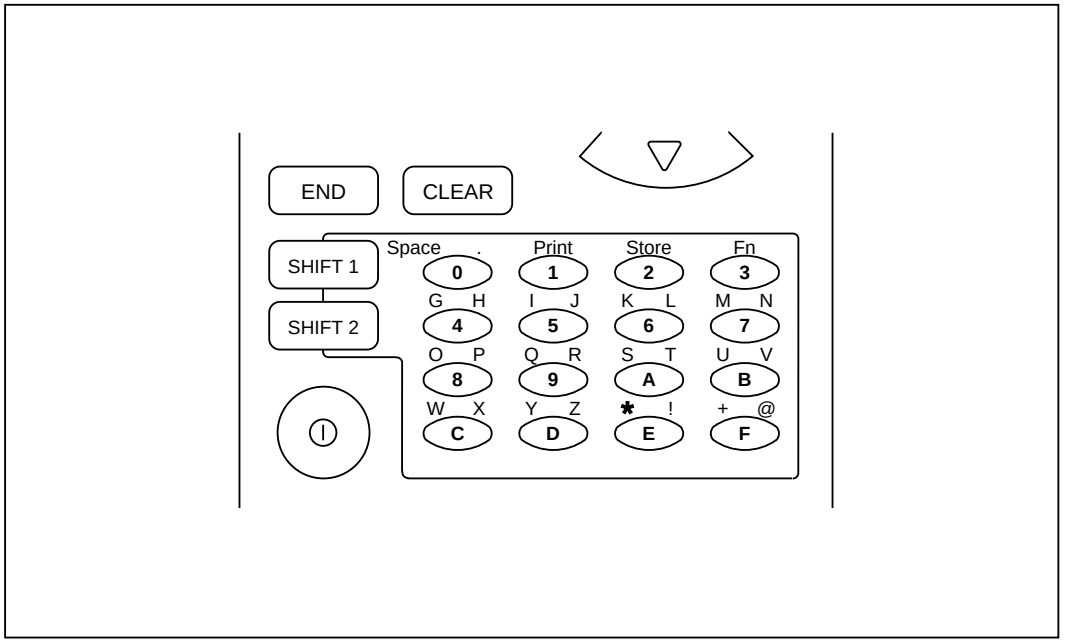


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**Figure 2-5. Use the Alphanumeric Keypad to Type Test Parameters**

### *The Print, Store, and Fn Command Keys*

The **Print**, **Store**, and **Fn** keys are located on the 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. Print, Store, and Fn Command 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 DS1port Plus Menu System*

The DS1port Plus has a menu interface. Figure 2-6 illustrates the structure of the menu system.

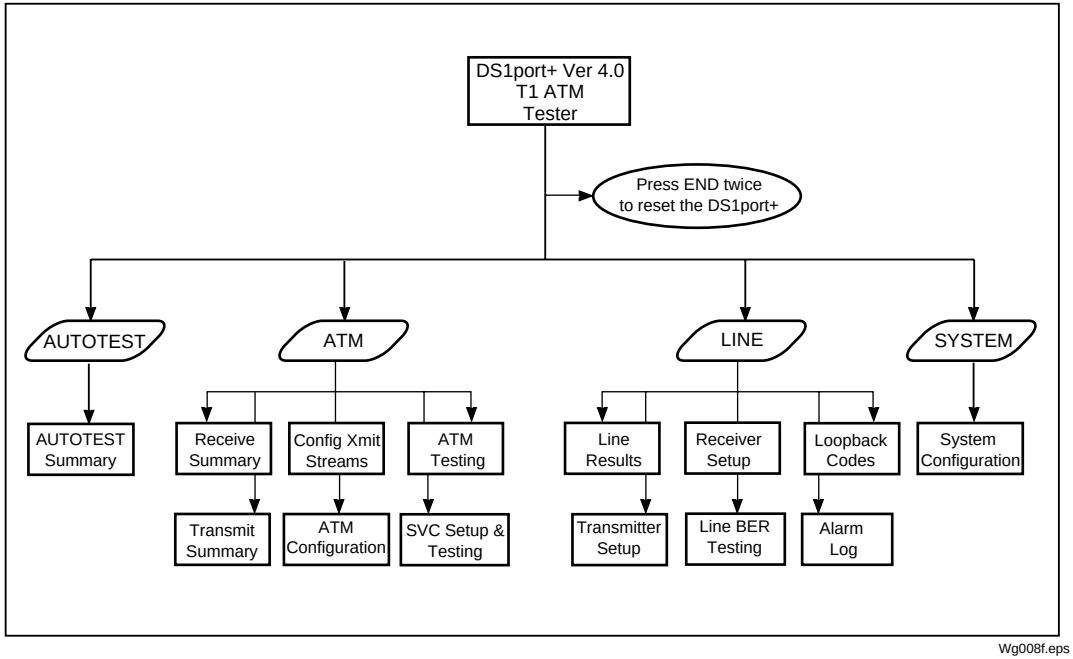


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**Figure 2-6. DS1port Plus Menu System**

### *Displaying a Main Menu*

A main menu contains entries that are grouped according to the types of operations they perform. The DS1port 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.

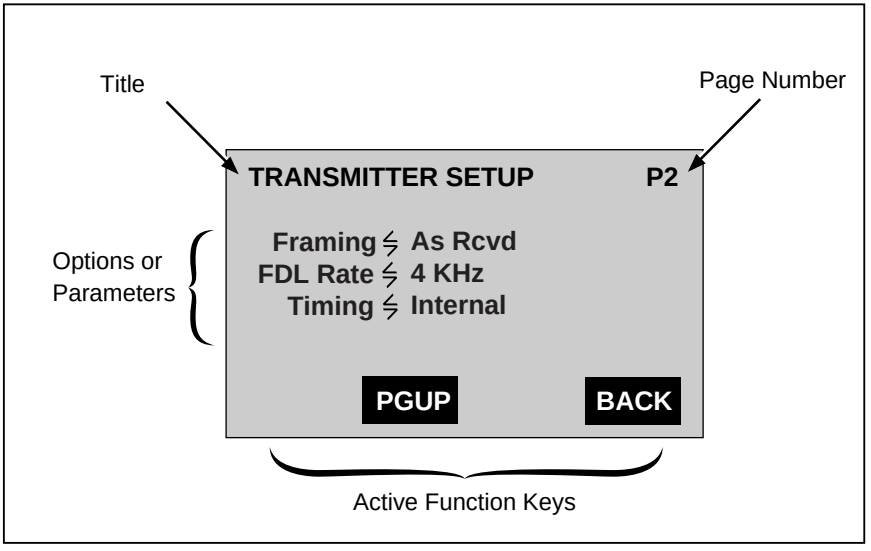


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**Figure 2-7. Sample Screen Page**

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 **TRANSMITTER 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 2 (P2).

- List of menu options or parameters

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

- 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 **PGUP** (Page Up) and **BACK** keys.

### *Special Symbols Used on Menus and Screens*

The DS1port 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. Symbols Used on the 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 DS1port Plus*

**Contents** **Page**

# Introduction

This chapter covers the basics of setting up and operating the DS1port 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 DS1port 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 DS1port Plus

This section shows you how to connect the DS1port 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 enables 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 connector to the 5 VDC jack on the connector panel (see Figure 2-1).
3. Turn on the DS1port Plus and begin usage.

## Connecting the DS1port Plus to a Printer or PC

The DS1port 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 DS1port Plus to a printer or a PC, you may need the following supplied accessories:

- RJ-11 to DB-9 female serial 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 analyzer 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<br>clear to send | RXD<br>receive data | TXD<br>transmit data | RTS<br>request to send | GND<br>signal ground |

**Table 3-2. DB-9 (Female) Computer Connector Pin Descriptions**

| Pin | 7 | 3 | 2 | 8 | 5 |
|---|---|---|---|---|---|
| Description | CTS<br>clear to Send | RXD<br>receive data | TXD<br>transmit data | RTS<br>request to send | GND<br>signal ground |

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

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

**Table 3-4. DB-25 (Male) Printer Connector Pin Descriptions**

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

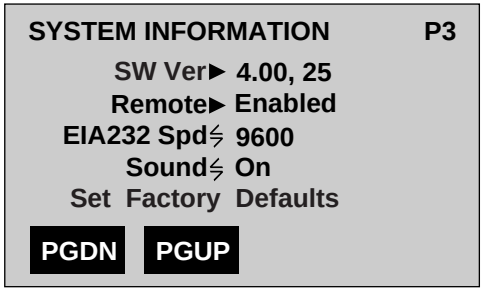
To connect the tester to a printer or PC:

1. Plug the RJ-11 end of the serial 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 DS1port Plus. 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 DS1port Plus
   - Data bits 8
   - Stop bits 1
   - Parity None
5. To test the connection, press **END**.

   The DS1port Plus returns to the top-level introductory screen. The printer or PC running the terminal emulation program prints or displays this message: `DS1port Plus`.

### Connecting the DS1port Plus to the Network

To connect your DS1port Plus to the network:

1. To receive network signals, connect one end of a Bantam cable to the DS1port Plus IN jack (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 Bantam cable to the DS1port Plus OUT jack. Connect the other end to the receive (Rx) port of the equipment under test.

*Note*

*To create a loopback situation to verify DS1port Plus operation, connect one end of a single Bantam cable into the tester's IN jack. Connect the other end of this cable into the tester's OUT jack.*

## Performing Basic Operations

You need to know some fundamental things about how to operate the DS1port 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 DS1port Plus

To turn on the DS1port Plus:

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

   The LCD lights up, and the tester displays this message: `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 DS1port Plus to the network (see "Connecting the DS1port Plus to the Network" for details).

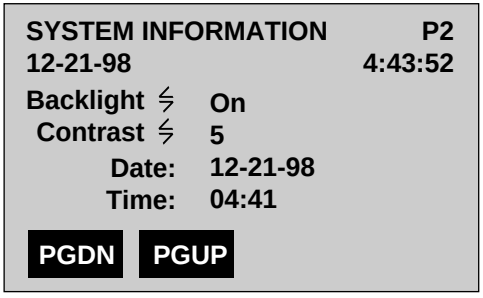
   If you correctly connect the tester, at a minimum, the Signal and Frame Sync LEDs will light, and, if ATM cells are present, the ATM Cell Lock LED will light.

   If the signal LED is not on, check your input connections. If the FRAME SYNC LED is not on, the frame setting for the receiver may be incorrect. See "Configuring the DS1port Plus for T1 Reception" in Chapter 4 for details. Note the information in Table 4-2 for the **Framing** parameter.

### *Setting the Date and Time*

The DS1port 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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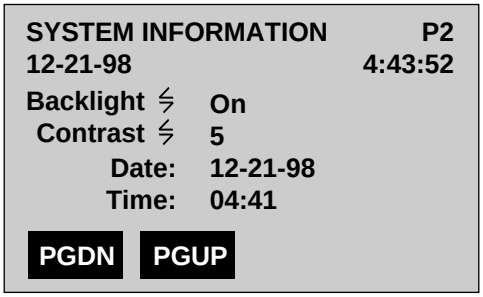
3. Press the **Down Arrow** key to move the cursor to the **Date** parameter. Then, press the numeric keys on the keypad to supply the desired date.
4. Press the **Down Arrow** key to move the cursor to the **Time** parameter. Then, press the numeric keys on the keypad to supply the desired time (in 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:

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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 **Right Arrow** key to reduce the contrast.
   - Press the **Left Arrow** key to increase the contrast.

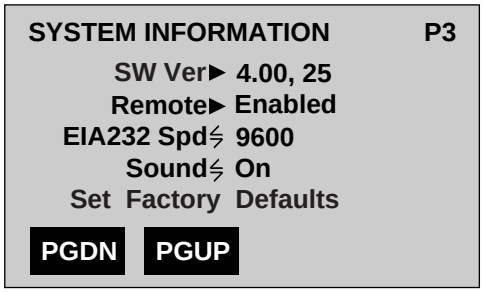
*Note*

*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) to display the **SYSTEM INFORMATION** (P3) screen:

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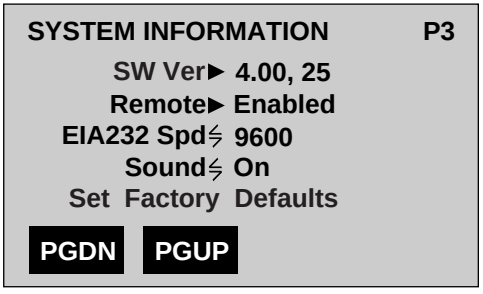
3. Press the **Down Arrow** key to move the cursor to the **Sound** parameter, which has two settings:
   - **On** turns the sound on.
   - **Off** turns the sound off.
4. Press the **Left** or **Right Arrow** key to select the desired setting.

### *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) key twice to display the **SYSTEM INFORMATION** (P3) screen:

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

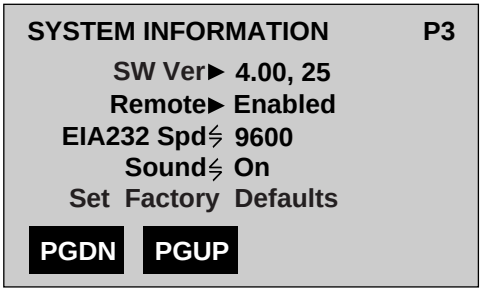
You can restore all of the tester's setup parameters to their original values (as shipped by the factory). Restoring the tester's default settings is a useful task when you want to put the tester in a known state.

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** twice to display the **SYSTEM INFORMATION** (P3) screen:

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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 DS1port 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 DS1port Plus*

To reset the DS1port 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 DS1port 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 warning LEDs and directly above the **Up Arrow** key (see Figure 2-3).

### *Responding to Low Battery Warnings*

The DS1port Plus uses NiCad internal batteries. When the battery power is low, the 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.

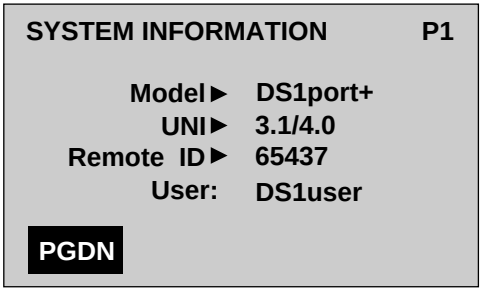
**⚠ Warning**

**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 Fluke Customer Service only.**

### *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
   - **T1XC 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 DS1port Plus an Identification Label*

You can assign a unique identification label to your DS1port 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 supply the desired name or label.

*Note*

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

### *Updating the DS1port Plus with New Software*

When a software update becomes available for the DS1port 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 DS1port Plus prints reports for its 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 or PC. For information on how to do this, see "Connecting the DS1port 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 of the **SYSTEM INFORMATION** screen). Then, press **SHIFT 1** + **Print**.

Information that is associated with the displayed screen is printed.

## The Automatic Diagnostic Tests

The DS1port 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 are completed, the tester displays a summary of its results.

Before you run the diagnostic tests, turn on the DS1port Plus. When the tester finishes initializing, check to make sure that the SIGNAL and FRAME SYNC LEDs are on. If these LEDs are lit, you are ready to run the tests.

If the SIGNAL LED is not on, check your input connections. If the FRAME SYNC LED is not lit, the receiver may be configured with the incorrect framing type. See "Configuring the DS1port Plus for T1 Reception" in Chapter 4 for details. Note the information provided in Table 4-2 for the **Framing** parameter.

This section shows you how to run the diagnostic tests and describes the results they provide.

### *Running the Diagnostic Tests*

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

The DS1port Plus begins running the tests. While the tester performs each test, you see this message: `Testing`. When the test ends, the tester summarizes its findings for you on the LCD. Following is a sample **AUTOTEST** result screen:


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

**Table 3-5. AUTOTEST Results for ATM and Line Layers**

| Result | Meaning |
|---|---|
| **Mapping** | Displays the current mapping scheme.<br>• `HEC Delin`: ATM cells are mapped with HEC delineation.<br>• `PLCP`: ATM cells are mapped with PLCP.<br>• `Unknown`: too many errors were detected to determine how ATM cells are mapped. |
| **ATM Detected** | Indicates the condition of the ATM traffic that was detected.<br>• `Okay`: ATM cells were detected and cell delineation was achieved.<br>• `Error`: Header Checksum (HCS) errors were detected.<br>• `No`: no ATM cells were detected. |

**Table 3-5. AUTOTEST Results for ATM and Line Layers (cont.)**

| Result | Meaning |
|---|---|
| **Idle/Unasgnd** | Indicates the type of ATM background traffic that the tester detected.<br>• `Idle`: background cells are idle (CLP bit set to 1).<br>• `Unassigned`: background cells are unassigned (CLP bit set to 0).<br>• `None`: no background cells were detected. |
| **OAM F4** | Indicates whether or not the tester detected OAM F4 cells.<br>• `Yes`: F4 cells were detected.<br>• `No`: F4 cells were not detected. |
| **OAM F5** | Indicates whether or not the tester detected OAM F5 cells.<br>• `Yes`: F5 cells were detected.<br>• `No`: F5 cells were not detected. |
| **ILMI** | Indicates whether or not the tester detected ILMI cells on VPI 0, VCI 16.<br>• `Yes`: ILMI cells were detected.<br>• `No`: ILMI cells were not detected. |
| **Errors** | Indicates whether or not the tester detected CRC, LOF, LCV, Excessive Zeros, COFA, or OOF errors.<br>• `Yes`: one or more of these errors were detected.<br>• `No`: no errors of this type were detected. |
| **Alarms** | Indicates whether or not the tester detected an LOS, LOF, Red, Yellow, or AIS alarm.<br>• `Yes`: one or more of these alarms were detected.<br>• `No`: none of these alarms was detected. |

If these test results indicate that there are errors or certain types of cells on the input signal, you can view 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

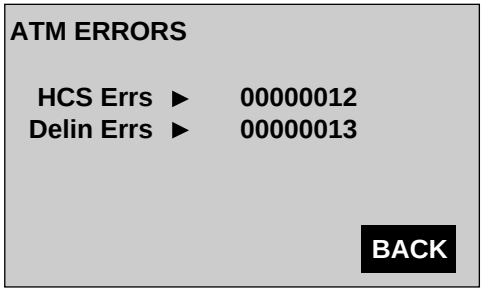
For certain diagnostic test results, the DS1port Plus provides detailed error measurement and status reports. This section shows you how to locate these reports and how to interpret the statistical information they provide.

### ATM Detected Results

If HCS errors are detected during a diagnostic test, the DS1port 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.

   Press **ENTER** to display the **ATM ERRORS** screen:

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This screen provides a count of HCS errors and 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 DS1port Plus displays `Yes` for **OAM F4** or **OAM F5** when it completes the tests. To view the detailed information provided for 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*

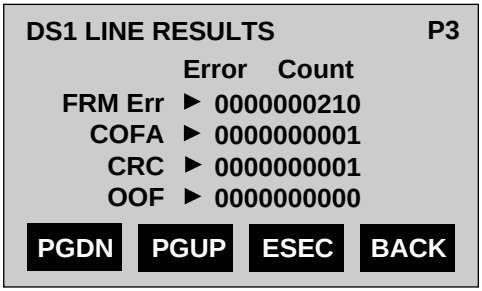
*Additional information on OAM cells can be found under "OAM Testing and Detection" in Chapter 6.*

### *Line Error Results Line Error Results*

When the DS1port Plus detects Line errors during its diagnostic testing, it displays `Yes` for the Errors result. To view the detailed reports for any line errors detected, follow these steps:

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 **DS1 LINE RESULTS** screen.

3. Press **F1**(PGDN) twice display the **DS1 LINE RESULTS** (P3) screen:




wg031f.eps

This screen lists these DS1 errors:

- FRM Err (Framing bit) errors
- COFA (Change of Frame Alignment) errors
- CRC (CRC 6) errors
- OOF (Out of frame) errors

*Note*

*The field displays "N/A" if the particular measurement is not available.*

4. Press **F3** to view results for these errors 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.

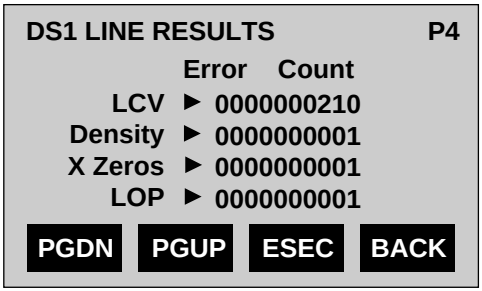
   - **%EF**

     Percent error-free. The percentage of total time in which no errors occurred.

   - **CNT**

     The total number of errors that occurred.

5. Press **F1**(PGDN) to display the **DS1 LINE RESULTS** (P4) screen:




wg032f.eps

This screen lists these DS1 errors:

- LCV (Line Code Violation) errors
- Density (Pulse density) errors
- X Zeros (Excessive zeros) errors
- LOP (Loss of Pattern) errors

*Note*

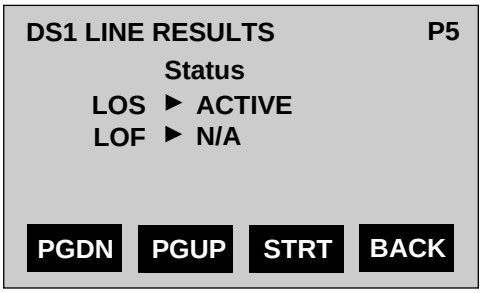
*The field displays "N/A" if the particular measurement is not available.*

6. Press **F3** to view results for these errors in the following formats:
   - **ESEC** (Errored seconds)
   - **EFS** (Error-free seconds)
   - **%EF** (Percent error-free seconds)
   - **CNT** (A count of the total number of errors)

### *Line Alarm Results*

When the DS1port Plus detects an LOS, Red, Yellow, or AIS alarm during its diagnostic testing, it displays `Yes` for the **Alarms** result. To view the detailed reports for each of these types of alarms, 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 **DS1 LINE RESULTS** (P1) screen.
3. Press **F1**(PGDN) to display the **DS1 LINE RESULTS** (P5) screen:

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This screen provides status on any detected Loss of Signal (LOS) and Loss of Frame (LOF) alarms:

- `ACTIVE`

  Indicates that the alarm is detected on the received signal

- `INACTIVE`

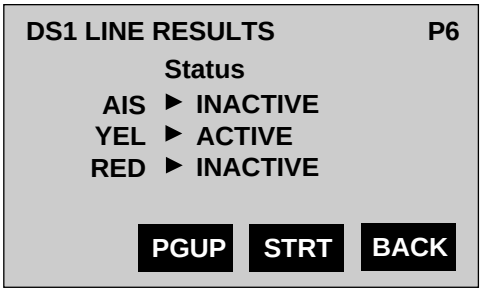
  Indicates that the alarm is not detected on the received signal

- `N/A`

  Indicates that results are not available

4. Press **F3** to view the following information for the displayed alarms:
   - 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`)

5. Press **F1**(PGDN) to display the **DS1 LINE RESULTS** (P6) screen:

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This screen provides status on the these DS1 alarms:

- AIS (Alarm Indication Signal)
- YEL (Yellow alarm)
- RED (Red alarm)

6. Press **F3** to view starting and ending times and information on the duration of these alarms.

# *Chapter 4*
# *T1 Network Testing*

**Contents** **Page**

# Introduction

This chapter shows you how to test T1 networks with the DS1port Plus. The first half of the chapter shows you how to configure the DS1port Plus to test at the T1 physical layer. It includes information on setting up the tester's transmitter and receiver to match the network under test.

The second half of this chapter shows you how to monitor a DS1 signal for errors and alarms, how to transmit and receive loopback codes, and how to conduct a Line BER test.

# Setting Up the DS1port Plus for T1 Testing

To set up the DS1port Plus for T1 testing, you need to configure both the tester's transmitter and receiver. This section shows you how to do this.

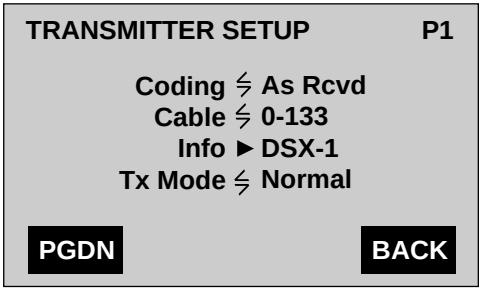
## Configuring the DS1port Plus for T1 Transmission

To configure the transmitter for T1 transmission, complete the following:

*Note*

*See Table 4-1 for a list and description of transmitter setup parameters.*

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

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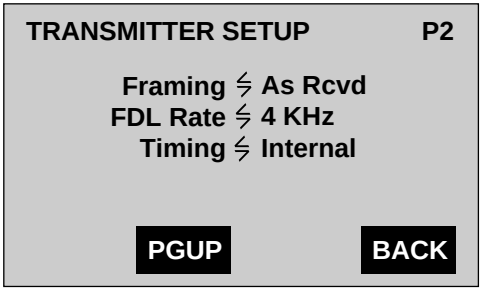
The cursor is positioned on the **Coding** parameter.

3. Press the **Left** or **Right Arrow** key to select the desired setting for the **Coding** parameter. 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 **TRANSMITTER SETUP** (P2) screen:




wg036f.eps

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

5. Press the **Left** or **Right Arrow** key to select the desired setting for the **Framing** parameter. Then, press the **Down Arrow** key to move the cursor to the two remaining parameters on this screen and choose the desired settings.

The DS1port Plus is now configured for T1 transmission.

**Table 4-1. Setup Parameters for the DS1port Plus Transmitter**

| Parameter | Description |
|---|---|
| **Coding** | Sets the Line coding scheme to one of the following:<br>• **As Rcvd**: coding output is the same as that selected for the receiver.<br>• **B8ZS**: bipolar with Eight Zero Substitution. AMI with code to replace occurrences of 8 consecutive zeros.<br>• **AMI**: Alternate Mark Inversion. No code substitutions. |
| **Cable** | Specifies length of the output cable as one of the following:<br>• **0-133**: output level conforming to DSX-1 for a cable length of 0-133 feet.<br>• **133-266**: output level conforming to DSX-1 for a cable length of 133-266 feet.<br>• **266-399**: output level conforming to DSX-1 for a cable length of 266-399 feet.<br>• **399-533**: output level conforming to DSX-1 for a cable length of 399-533 feet.<br>• **533-655**: output level conforming to DSX-1 for a cable length of 533-655 feet.<br>• **to 1000**: output level conforming to DS1 with a Line Build Out (LBO) of 22.5 dB for transmission over cable up to 1000 feet.<br>• **to 2600**: output level conforming to DS1 with a Line Build Out (LBO) of 15.0 dB for transmission over cable up to 2600 feet in length.<br>• **to 4300**: output level conforming to DS1 with a Line Build Out (LBO) of 7.5 dB for transmission over cable up to 4300 feet in length.<br>• **to 6000**: output level conforming to DS1 with a Line Build Out (LBO) of 0 dB for transmission over cable up to 6000 feet in length.<br>• **CSU**: (Channel Service Unit). Output conforms to the output defined for the CSU T1 connection. |

**Table 4-1. Setup Parameters for the DS1port Plus Transmitter (cont.)**

| Parameter | Description |
|---|---|
| **Info** | An information field that corresponds to **Cable** parameter selections.<br>• **DSX-1**: corresponds to cable selections conforming to DSX-1 'Short Haul' specifications.<br>• **LBO n.nn dB**: indicates the attenuation level of output for DS1 'Long Haul' Cable selections.<br>• **Full DS1**: indicates no attenuation in the DS1 signal output.<br>• **Part 68-a**: indicates output characteristics consistent with FCC Specification, Part 68 Section A for CSU cable selection. |
| **Tx Mode** | Specifies the mode of transmission as one of the following:<br>• **Normal**: output of the DS1port Plus is framing and data as selected by user.<br>• **AIS**: Alarm Indication Signal. The DS1port Plus transmits an AIS pattern (all 1s in the output), which overrides any other unit selections.<br>• **Yellow**: Yellow Alarm. The DS1port Plus output contains the bit pattern required to indicate a Yellow alarm condition.<br>• **Payl Lbk**: Payload Loopback. The payload of the received signal is transmitted back to the network. Framing bits are generated by the DS1port Plus so that received framing bit errors are not transmitted back to the network. Timing for the output is derived from the received signal.<br>• **Line Lbk**: Line Loopback. The received signal is transmitted back to the network. No errors are corrected and timing is derived from the received signal. |
| **Framing** | Sets the framing format to one of the following:<br>• **As Rcvd**: sets the transmitter framing output to be the same as the receive framing.<br>• **ESF**: sets the framing format to Extended Super Frame.<br>• **SF**: sets the framing format to Super Frame.<br>• **T1DM**: sets the framing format to T1 Data Multiplexer format.<br>• **SLC96**: sets the framing format to Subscriber Loop Carrier (96 channels).<br>• **Unframed**: sets the framing format to unframed. This setting can be used for Line BER testing. |

**Table 4-1. Setup Parameters for the DS1port Plus Transmitter (cont.)**

| Parameter | Description |
|---|---|
| **FDL Rate** | Specifies the FDL (Facility Data Link) rate as one of the following:<br>• **4 KHz**: uses a 4 KHz FDL rate if ESF format is selected.<br>• **2K Type A**: uses a 2 KHz FDL rate with data in frames 3, 7, 11, 15, 19, 23.<br>• **2K Type B**: uses a 2 KHz FDL rate with data in frames 1, 5, 9, 13, 17, 21.<br>*Note*<br>*Transmission and reception of FDL codes other than Yellow alarm are not supported in this release.* |
| **Timing** | Identifies the timing source as one of the following:<br>• **Internal**: timing is derived from the tester's internal crystal oscillator.<br>• **Loop Rcvd**: timing is derived from the received DS1 signal. |

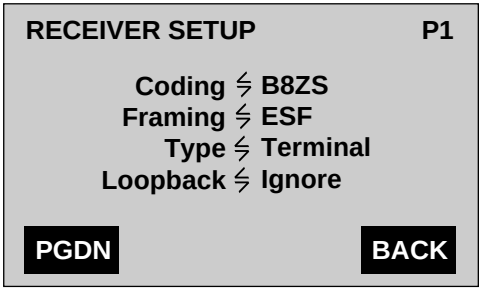
### *Configuring the DS1port Plus for T1 Reception*

To configure the DS1port Plus receiver, complete the following:

*Note*

*See Table 4-2 for a list and description of receiver setup parameters.*

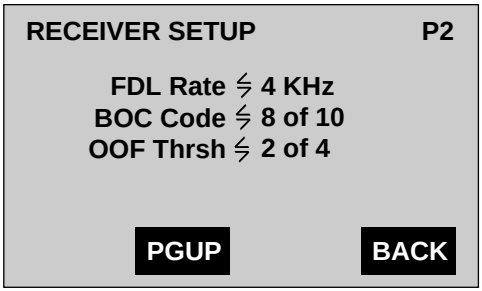
1. Press **LINE** to display the **LINE SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **Receiver Setup** option. Then, press **ENTER** to display the **RECEIVER SETUP** (P1) screen:




wg039f.eps

3. Press the **Left** or **Right Arrow** key to select the desired setting for the **Coding** parameter. 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 **RECEIVER SETUP** (P2) screen:

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5. Press the **Left** or **Right Arrow** key to select the desired setting for the **FDL rate** parameter. Then, press the **Down Arrow** key to move the cursor to each remaining parameter on this screen and select the desired setting.

The DS1port Plus is now configured for T1 reception.

**Table 4-2. Setup Parameters for the DS1port Plus Receiver**

| Parameter | Description |
|---|---|
| **Coding** | Sets the Line coding scheme to one of the following:<br>• **B8ZS**: Bipolar with Eight Zero Substitution. AMI with code to replace occurrences of 8 consecutive zeros.<br>• **AMI**: Alternate Mark Inversion. No code substitutions. |
| **Framing** | Specifies the framing format as one of the following:<br>• **ESF**: sets the framing format to Extended Super Frame.<br>• **SF**: sets the framing format to Super Frame.<br>• **T1DM**: sets the framing format to T1 Data Multiplexer format.<br>• **SLC96**: sets the framing format to Subscriber Loop Carrier (96 channels).<br>• **Unframed**: sets the framing format to unframed. This setting can be used for Line BER testing only. |

**Table 4-2. Setup Parameters for the DS1port Plus Receiver (cont.)**

| Parameter | Description |
|---|---|
| **Type** | Sets the termination type of the DS1port Plus (see Figure 4-1 for an illustration of termination types) to one of the following:<br>• **Terminal**: sets the input impedance of the T1 inputs to 100 ohms. This setting should be selected if the DS1port Plus is used to terminate a T1 line.<br>• **Bridge**: sets the input impedance of the T1 inputs to 1000 ohms. This setting should be selected if the DS1port Plus is bridged across T1 lines that are terminated by another piece of equipment.<br>• **Monitor**: sets the input impedance of the T1 inputs to 100 ohms and increases the gain on the input signal. This setting should be used when the DS1port Plus is connected to a monitor point on a piece of T1 equipment. |
| **Loopback** | Sets the tester's response to received loopback codes to one of the following:<br>• **Ignore**: the DS1port Plus records the occurrence of programmed loopback codes, but does not enter loopback state.<br>• **Respond**: the DS1port Plus responds to programmed loopback codes and loops up or down as appropriate. |
| **FDL Rate** | Sets the FDL (Facility Data Link) rate to one of the following:<br>*Note*<br>*Transmission and reception of FDL codes other than Yellow alarm are not supported in this release.*<br>• **4 KHz**: uses a 4 KHz FDL rate if ESF format is selected.<br>• **2K Type A**: uses a 2 KHz FDL rate with data in frames 3, 7, 11, 15, 19, 23 for ESF framing.<br>• **2K Type B**: uses a 2 KHz FDL rate with data in frames 1, 5, 9, 13, 17, 21 for ESF framing. |
| **BOC Code** | Specifies the Bit Oriented Code validity criteria as one of the following:<br>*Note*<br>*Bit Oriented Codes are not supported in this release.*<br>• **8 of 10**: sets the BOC as valid if 8 out of 10 codes match.<br>• **4 of 5**: sets the BOC as valid if 4 out of 5 codes match. |
| **OOF Thrsh** | Sets the Out of Frame threshold to one of the following:<br>• **2 of 4**: declares an OOF if 2 out of 4 framing bits are errored.<br>• **2 of 5**: declares an OOF if 2 out of 5 framing bits are errored.<br>• **2 of 6**: declares an OOF if 2 out of 6 framing bits are errored. |

Figure 4-1 illustrates the termination type settings available for the DS1port Plus:

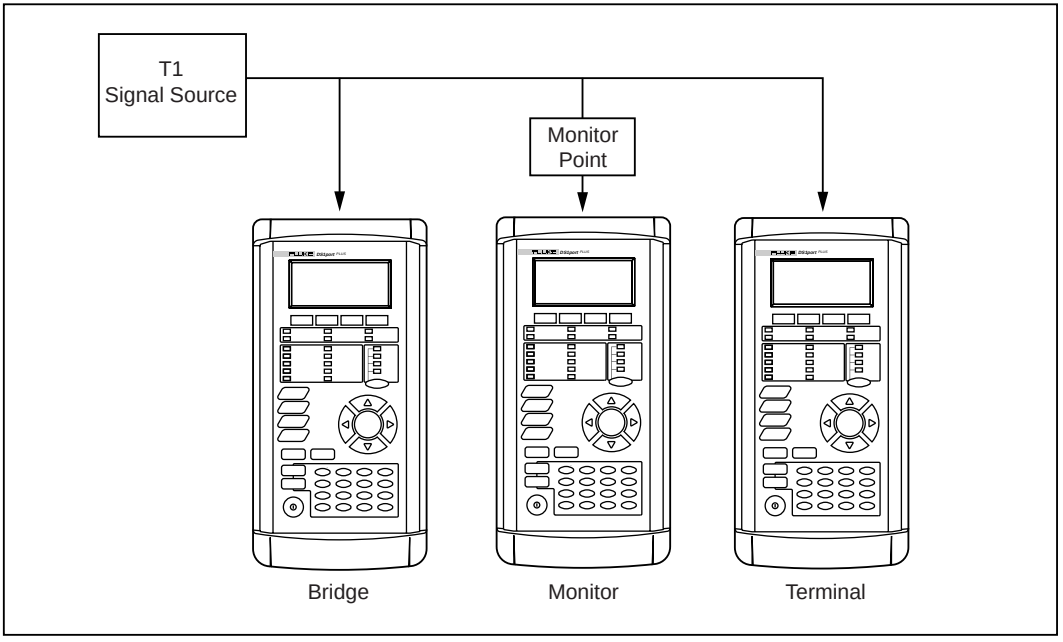


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**Figure 4-1. DS1port Plus Termination Types**

# Monitoring a T1 Signal

This section shows you how to monitor the incoming T1 signal. It shows you how to check the status and strength of a received signal and how to inject error and alarm conditions on a transmitted signal. This section also describes the error and alarm monitoring functions of the tester.

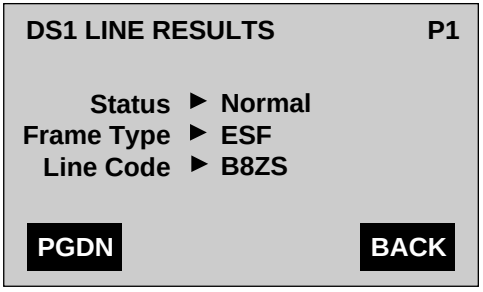
## Checking the Status and State of an Incoming T1 Signal

To check the status of a signal, complete the following:

*Note*

*See Table 4-3 for a list and description of signal state and status parameters.*

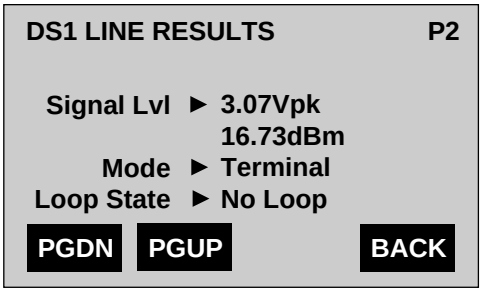
1. Press **LINE** to display the **LINE SELECTIONS** menu.
2. Make sure that the **Line Results** option is highlighted. Then, press **ENTER** to display the **DS1 LINE RESULTS** (P1) screen:




wg042f.eps

This screen provides status and framing information as well as the line coding scheme of the detected signal.

3. Press **F1**(PGDN) to display the **DS1 LINE RESULTS** (P2) screen:




wg043f.eps

This screen displays the strength, input termination type, and loopback state of the received signal.

**Table 4-3. T1 Signal State and Status Parameters**

| Parameter | Description |
|---|---|
| **Status** | Indicates that the tester detected one of the following alarms or errors on the received signal:<br>• **LOS** (Loss of Signal)<br>• **LOF** (Loss of Frame)<br>• **RED** (Red alarm)<br>• **YEL** (Yellow alarm)<br>• **AIS** (Alarm Indication Signal)<br>• **Normal**: no errors or alarm conditions were detected. |
| **Frame Type** | Identifies the received frame type as one of the following:<br>• **ESF** (Extended Super Frame)<br>• **SF** (Super Frame)<br>• **T1DM** (T1 Data Multiplexer)<br>• **SLC96** (Subscriber Loop Carrier 96 channels)<br>• **Unframed** (unframed format) |

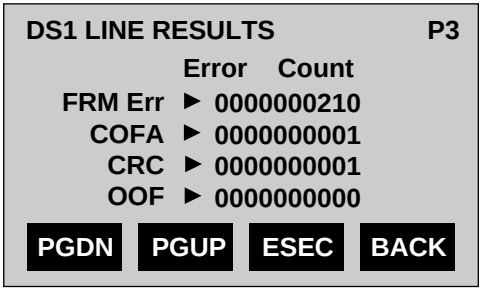
**Table 4-3. T1 Signal State and Status Parameters (cont.)**

| Parameter | Description |
|---|---|
| **Line Code** | Indicates the line code scheme of the received signal as one of the following:<br>• **B8ZS** (Bipolar with Eight Zero Substitution)<br>• **AMI** (Alternate Mark Inversion)<br>• **No signal** |
| **Signal Lvl** | Indicates the strength of the received signal Volts peak and in dBm. |
| **Mode** | Identifies the input terminal type as one of the following:<br>• **Terminal**<br>• **Monitor**<br>• **Bridge** |
| **Loop State** | Indicates the loopback state of the received signal as one of the following:<br>• **Looped**: signal is loopback.<br>• **No Loop**: signal is not looped back. |

### *Monitoring a Signal for Errors and Alarms*

To monitor a signal for errors and alarms, complete these steps:

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 **DS1 LINE RESULTS** (P1) screen.
3. Press **F1**(PGDN) twice to display the **DS1 LINE RESULTS** (P3) screen:




wg031f.eps

This screen lists these DS1 errors:

- **FRM Err** (Framing bit errors)
- **COFA** (Change of Frame Alignment errors)
- **CRC** (Cyclic Redundancy Check errors)
- **OOF** (Out of Frame errors)

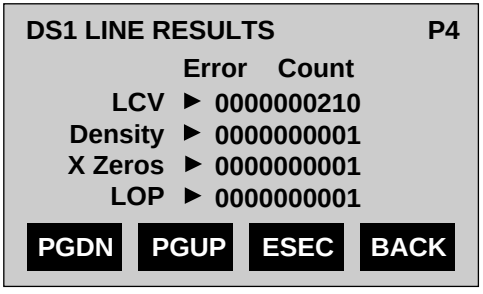
4. Press **F3** to view results for these errors in the following formats:
   - **ESEC**

     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 total time that had no errors.
   - **CNT**

     The total number of errors that occurred.
5. Press **F1**(PGDN) to display the **DS1 LINE RESULTS** (P4) screen:

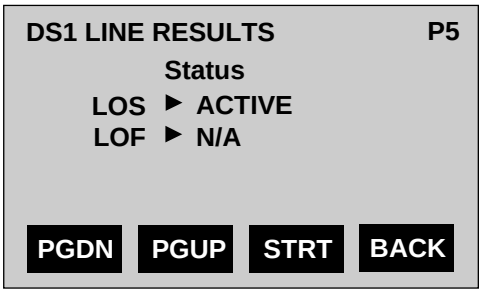



wg032f.eps

This screen lists these DS1 errors:

- **LCV** (Line Code Violation errors)
- **Density** (Pulse density errors)
- **X Zeros** (Excessive zeros errors)
- **LOP** (Loss of Pattern errors)

6. Press **F3** to view the results for these errors in different formats.
7. Press **F1**(PGDN) to display the **DS1 LINE RESULTS** (P5) screen:




wg033f.eps

This screen provides status on any detected LOS and LOF alarms. For these alarms one of the following is displayed:

- `ACTIVE`

  Indicates that the alarm is detected on the received signal

- `INACTIVE`

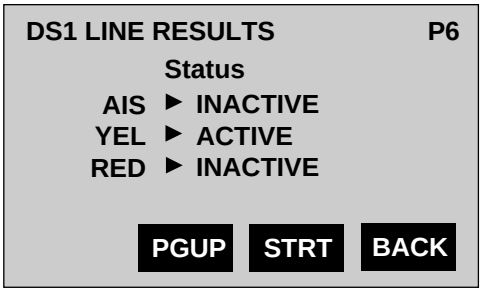
  Indicates that the alarm is not detected on the received signal

- `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 **DS1 LINE RESULTS** (P6) screen:




wg034f.eps

This screen displays status for these DS1 alarms:

- AIS (Alarm Indication Signal)
- YEL (Yellow alarm)
- RED (Red alarm)

10. Press **F3** to view starting and ending times and information on the duration of these alarms.

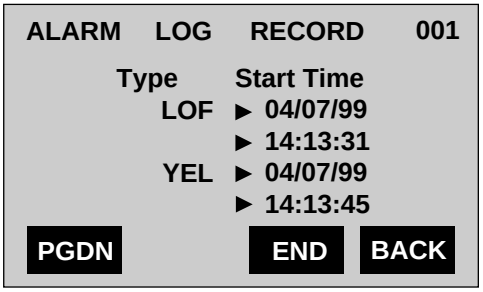
### *Checking the Alarm Log*

When the DS1port Plus detects an alarm, the ALARMS LED lights and the tester enters information about the alarm in the alarm log. This log can hold up to 64 entries, including the name the alarm, its starting and ending times, and duration. Table 4-3 lists the alarms detected by the DS1port Plus.

To view the alarm log, 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:

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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 the **CLEAR** key.

The following message is displayed: `Alarm Log Empty`.

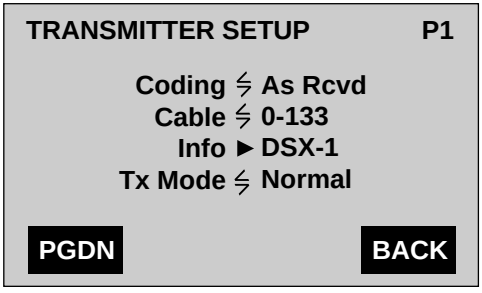
**Table 4-4. Alarms Detected by the DS1port Plus**

| Alarm | Description |
|---|---|
| **LOS** | Indicates Loss of Signal. Declared when no pulses are received for 176 consecutive bit periods. |
| **LOF** | Indicates Loss of Frame. Based on user-selectable ratio of framing bit errors. (See the **OOF Thrsh** parameter on the **RECEIVER SETUP** screen.) |
| **AIS** | Indicates reception of a Blue alarm. Declared when an Line AIS pattern with valid framing is detected for 1.5 s. |
| **YEL** | Indicates a Yellow alarm. Declared when a Yellow pattern is detected for 425 ms. |
| **RED** | Indicates a RED alarm. Declared when an out-of-frame condition exits for 2.55 s. |

### *Injecting Line AIS and Yellow Alarms*

The DS1port Plus can inject a Line AIS or a Yellow alarm into the outgoing transmit stream. To transmit either of these alarms, complete the following:

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




wg035f.eps

3. Press the **Down Arrow** key to move the cursor to the **Tx Mode** parameter. Then, press the **Left** or **Right Arrow** key to select the alarm (AIS or Yellow) that you want to transmit.

   The DS1port Plus immediately transmits the alarm you selected.

4. To de-activate transmission of an alarm, press the **Left** or **Right Arrow** key to select the **Normal** setting for the **Tx Mode** parameter.

   The DS1port Plus stops transmitting the alarm.

# Transmitting and Receiving Loopback Codes

Loopback codes are special data patterns sent over a T1 line to cause equipment at the far end of the line to return a signal to the sender. A loopback configuration is used primarily as a means of testing the signal quality on a line.

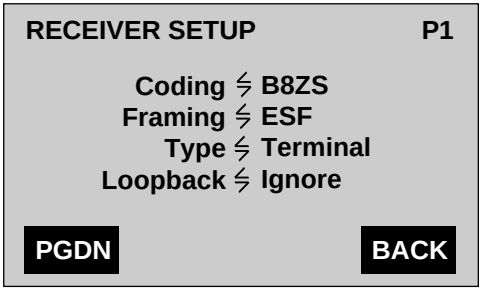
There are two types of loopback codes: loop up and loop down. Loop-up codes activate the loopback condition and loop-down codes deactivate the loopback condition.

This section shows you how to configure the DS1port Plus to respond to or ignore loopback codes, how to monitor a network for the presence of loopback codes, and how to transmit loopback codes.

## Configuring the Tester to Respond to or Ignore a Loopback Code

To configure the tester to respond to or ignore a loopback code, complete the following:

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




wg039f.eps

3. Press the **Down Arrow** key to move the cursor to the **Loopback** parameter. Then press the **Left** or **Right Arrow** key to select one of the following settings:
   - **Ignore**

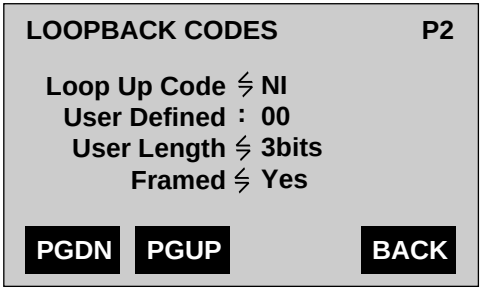
     Counts the loopback codes received without entering a loopback state.
   - **Respond**

     Counts the loopback codes received and responds by looping back the input signal.

### *Monitoring the Network for Loopback Codes*

To monitor the network for the presence of loopback codes, do the following:

1. Press **LINE** to display the **LINE SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **Loopback Codes** option. Then, press **ENTER** to display the **LOOPBACK CODES** (P1) screen.
3. Press **F1**(PGDN) to display the **LOOPBACK CODES** (P2) screen:

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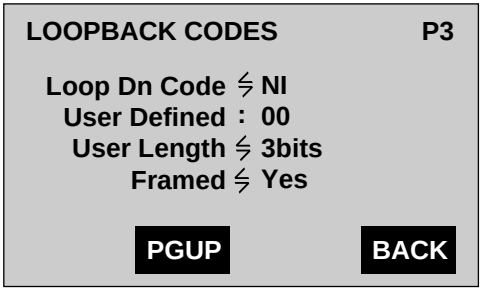
The parameters on this screen enable you to define the type of loop-up code that you want to monitor. See Table 4-5 for a list and description of these parameters.

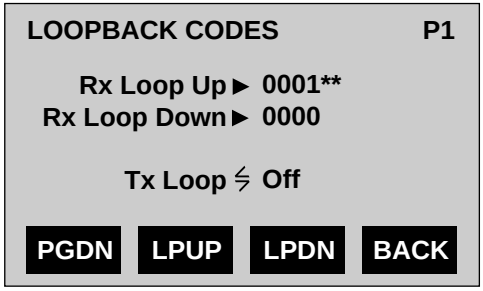
4. Press the **Down Arrow** key to move the cursor to each parameter on this menu. Then, press the **Left** or **Right Arrow** key to select the desired setting or use the keypad to specify a value for **User Defined**.
5. Press **F1**(PGDN) to display the **LOOPBACK CODES** (P3) screen:




wg051f.eps

The parameters on this screen enable you to define the type of loop-down code that you want to monitor. See Table 4-5 for a list and description of these parameters.

6. Press the **Down Arrow** key to move the cursor to each parameter on this screen and select the desired setting or use the keypad to specify a value for **User Defined**.
7. Press the **F2**(PGUP) key twice to return to **LOOPBACK CODES** (P1):

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While the code is present on the T1 line, a double asterisk (**) appears next to the count as shown in this screen.

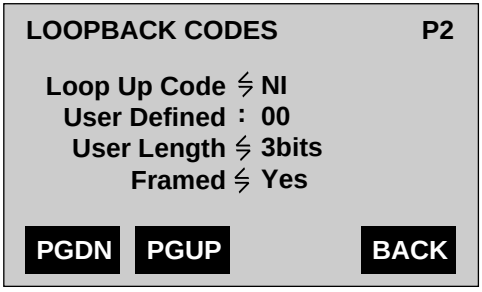
**Table 4-5. Loopback Code Setup Parameters**

| Code | Description |
|---|---|
| **Loop Up Code**<br>**Loop Dn Code** | Determines the code for the loop-up or loop-down as one of the following:<br>• **NI** (network)<br>• **4bit**<br>• **Line**<br>• **User**: specifies a user-defined code. Used with the **User Defined** parameter (see next entry in this table). |
| **User Defined** | A user editable field that lets you to define a loop-up code. |
| **User Length** | Defines the length of the user code. The value ranges between 3 and 8 bits. |
| **Framed** | Determines whether the framing bits overwrite the loopback codes (**Yes**) or the loopback codes overwrite the framing bits (**No**). |

### *Transmitting Loopback Codes*

To transmit loopback codes from the DS1port Plus, do the following:

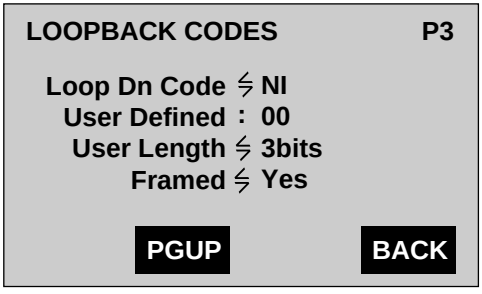
1. Press **LINE** to display the **LINE SELECTIONS** menu.
2. Press the **Down Arrow** key to highlight the **Loopback Codes** option. Then, press **ENTER** to display the **LOOPBACK CODES** (P1) screen.
3. Press **F1** (PGDN) to display the **LOOPBACK CODES** (P2) screen:




wg050f.eps

This screen contains parameters that you use to define the type of loop-up code that you want to transmit. See Table 4-5 for a list and description of the parameters on this screen.

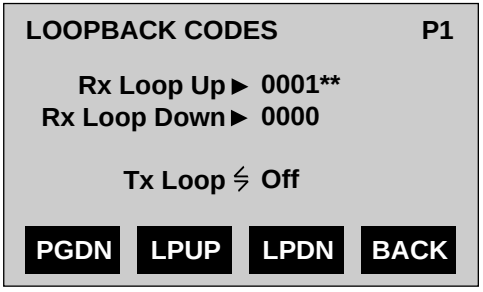
4. Press the **Down Arrow** key to move the cursor to each parameter on this screen. Then, press the **Left** or **Right Arrow** key to select the desired setting or use the keypad to specify a value for **User Defined**.
5. Press the **F1**(PGDN) key to display the **LOOPBACK CODES** (P3) screen:




wg051f.eps

This screen contains parameters that you use to define the type of loop-down code that you want to transmit. See Table 4-5 for a list and description of the parameters on this screen.

6. Press the **Down Arrow** key to move the cursor to each parameter on this screen. Then, press the **Left** or **Right Arrow** key to select the desired setting or use the keypad to type a value for **User Defined**.
7. Press the **F2**(PGUP) key twice to return to **LOOPBACK CODES** (P1):




wg052f.eps

The cursor is positioned on the **Tx Loop** parameter, which has these settings:

- **Off**

  Does not transmit loopback codes

- **Up/On**

  Continuously transmits the code configured for loop-up

- **Dn/On**

  Continuously transmits the code configured for loop-down

- **1Shot**

  Allows you to transmit loopback codes by pressing the **F2**(LPUP) and **F3**(LPDN) keys. When you press the key, the DS1port Plus transmits the indicated code for eight seconds.

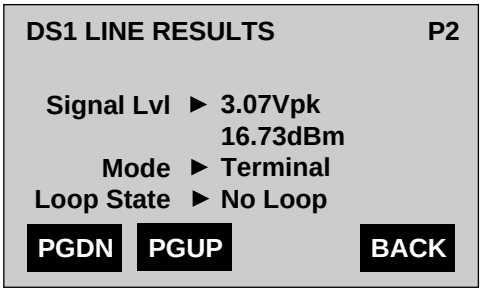
8. Select the desired setting for the **Tx Loop** parameter.

### *Determining the Loopback State of the DS1port Plus*

To determine whether or not the DS1port Plus is in loopback state, 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 **DS1 LINE RESULTS** (P1) screen.

3. Press the **F1**(PGDN) key to display the **DS1 LINE RESULTS** (P2) screen:

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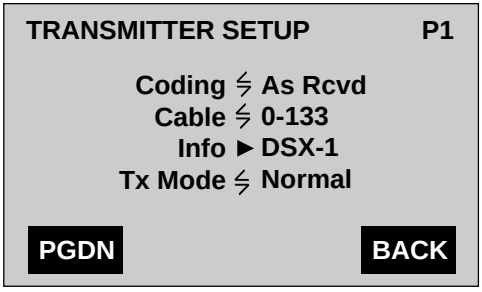
The **Loop State** parameter indicates whether the DS1port Plus is in a loopback state (**Looped)** or not (**No Loop**).

## *Looping Back Received Signals*

To loop back received signals, follow these steps:

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

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3. Press the **Down Arrow** key to move the cursor to the **Tx Mode** parameter. Then, press the **Left** or **Right Arrow** key to select one of the following settings (see Table 4-1 for descriptions):
   - **Payl Lbk**
   - **Line Lbk**

# T1 Bit Error Rate (BER) Testing

The DS1port Plus can perform a line BER test on T1 signals. In this test, a BER test pattern is transmitted and detected in the DS1 payload.

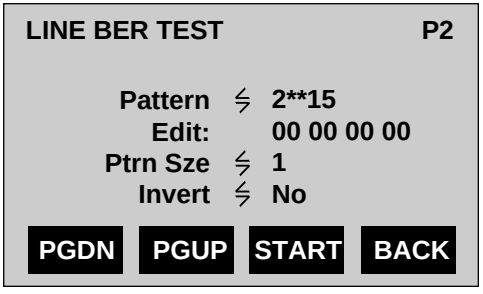
To perform a BER test, the DS1port Plus requires an input test pattern, which is defined in the setup for the test. The source of the test pattern can be from the DS1port Plus itself (on a looped back circuit) or from the circuit under test.

The BER test overrides ATM cell transmission. Therefore, when this test is running, the DS1port Plus no longer transmits ATM cells.

### 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:




ta047f.eps

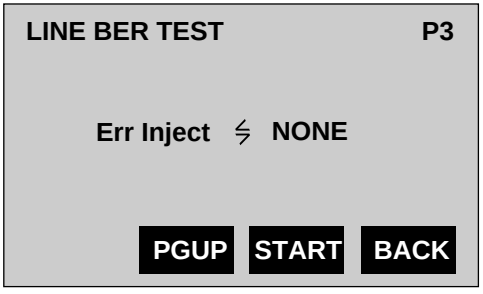
The cursor is positioned on the **Pattern** parameter. The settings for this parameter represent the patterns of bits that you can transmit during a Line BER test. Table 4-6 lists the BER patterns you can transmit.

4. 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 5.
   - 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 Sze** (Pattern Size) parameter.

        This parameter has four settings, 1 - 4, which represent the number of bytes that are transmitted continuously.
     4. Select the desired setting for **Ptrn Sze**.
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:




ta048f.eps

The **Err Inject** (Error Injection) parameter determines the rate of error injection. Errors are injected in 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 Line BER test. See "Starting a Line BER Test", which follows, for instructions on running the test.

Table 4-6 lists the test patterns that you can transmit during a BER 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 lists the error injection rate choices for the BER test.

**Table 4-7. BER 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*

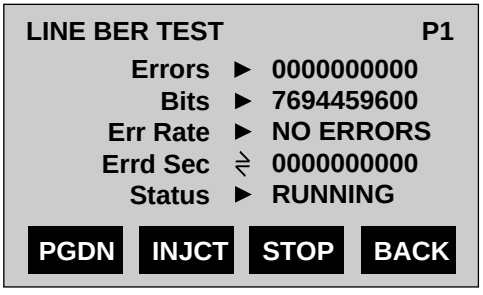
*You cannot perform any ATM operations or run any ATM tests if the tester is currently running a Line BER test. You must stop this test first.*

*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 DS1port Plus recovers and synchronizes the received pattern. Then, the following result screen is displayed:




wg063f.eps

   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 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

**Contents** **Page**

# Introduction

This chapter describes the ATM network transmission and monitoring functions of the DS1port 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.

With the DS1port Plus, you can monitor the input DS1 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 (see Table 5-1) that affect the operation of all the ATM tests that you can run on the DS1port 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 vs NNI)
- Determine method used for ATM cell delineation
- Specify the type of cells to use as background traffic

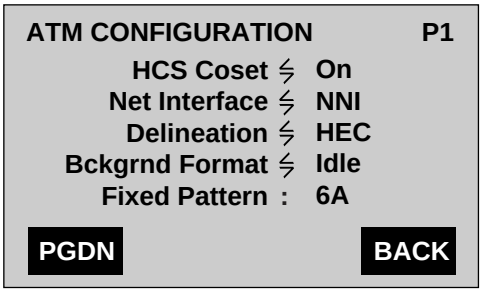
## Verifying the Incoming Header Checksum (HCS)

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:




wg064f.eps

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 for a description).

The setting you selected is now the current value of the **HCS Coset** parameter.

### *Identifying the Header Type*

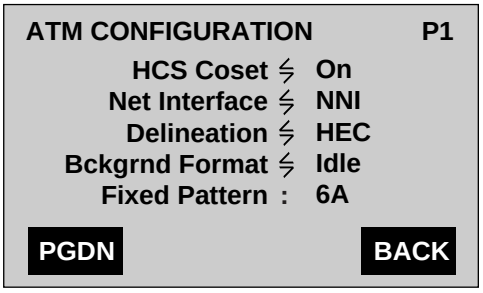
Two different header schemes are used for ATM cells: UNI (User Network Interface) and NNI (Network-to-Network Interface). UNI is an interface that connects ATM users with a private ATM switch that is managed locally, such as within the same corporate network. NNI, on the other hand, is an interface that 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.

To configure the header type, complete 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:




wg064f.eps

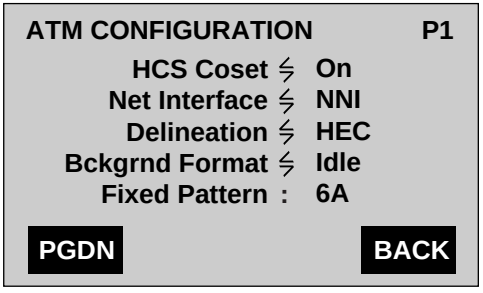
3. Press the **Down Arrow** key to highlight the **Net Interface** parameter. Then, press the **Left** or **Right Arrow** key to select the desired setting (see Table 5-1).

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

### *Specifying the Method Used for Cell Delineation*

To specify the method used for cell delineation, follow these steps:

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:




wg064f.eps

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

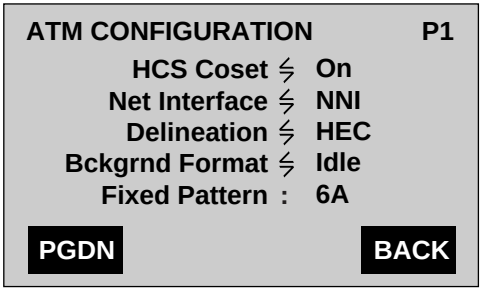
The setting you selected is now the current value of the **Delineation** parameter.

### *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 for background traffic, 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:




wg064f.eps

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 adds the coset polynomial to the HEC.<br>• **On** (the default) adds the coset polynomial to the HEC.<br>• **Off** does not add the coset polynomial to the HEC |
| **Net Interface** | Defines the header type for the network under test.<br>• **NNI** specifies a Network-to-Network Interface.<br>• **UNI** (the default) specifies a User Network Interface. |
| **Delineation** | Specifies the method used to delineate ATM cells carried over a DS1 line.<br>• **HEC** (the default) uses the Header Error Checksum verification process.<br>• **PLCP** uses PLCP framing format for cell delineation. |
| **Bckgrnd Format** | Specifies the types of cells to be used as background traffic.<br>• **Idle** (the default) specifies idle cells.<br>• **Unas** specifies unassigned cells. |

## *Configuring a Transmission Stream*

The DS1port Plus lets you define and transmit up to eight separate ATM cell transmission streams using up to 100% of the available DS1 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.

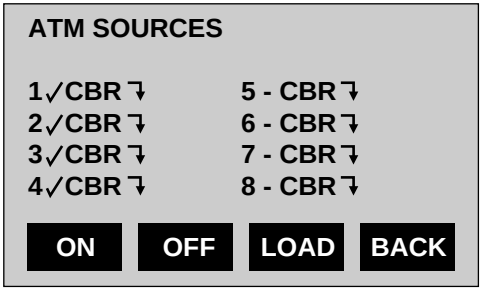
Complete all parts of the procedure for each transmission stream that you configure.

*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).

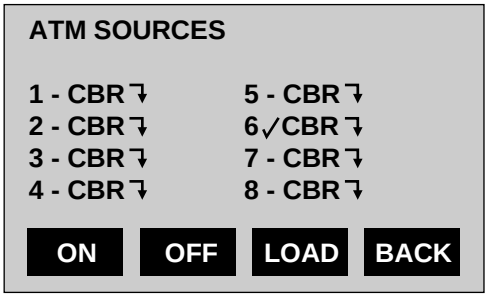
   Notice that a minus sign (-) appears following the number 1, indicating that this stream is disabled.

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)

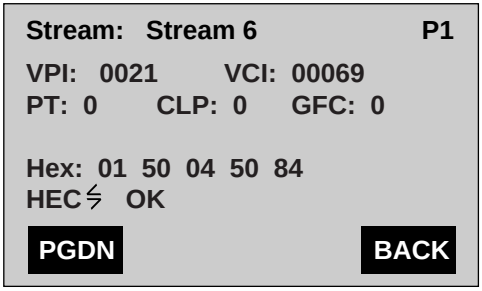
   - **VBR/BUR**

     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:

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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*

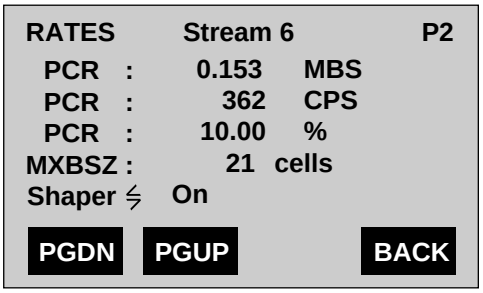
*The **HEC** parameter allows the generation of the header checksum to be correct, correctable (with a 1-bit error), or uncorrectable (with an 8-bit error). If you select **Off**, you can supply a checksum value in the header. To do this, edit the **Hex** representation of the header.*

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

### *Set the Traffic Rate*

To set the traffic rate, complete the following:

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

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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.

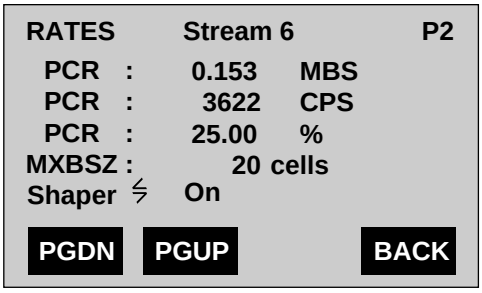
*Note*

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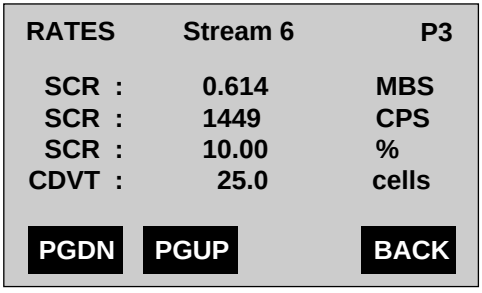
The **Shaper** parameter is on the last line of the **RATES** screen. This parameter enables you to regulate the output of the transmission stream so that its specified traffic parameters (**PCR**, **SCR**, and **MXBSZ** values) are not exceeded.

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 DS1port 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*

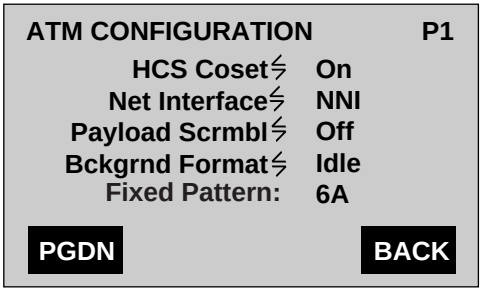
A fixed payload is one in which the same pattern is repeated in each of the 48 bytes in a cell's payload. This procedure shows you how to specify a fixed payload and how to define the fixed pattern.

*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*

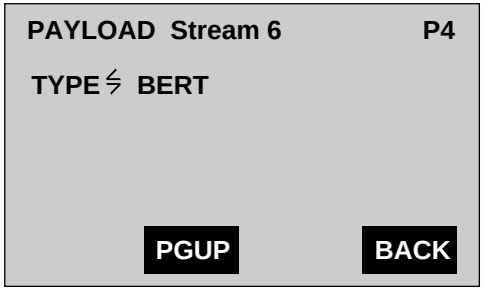
*To locate the screens documented in this procedure, press **ATM**. Scroll to the **Config Xmit Streams** option and press **ENTER**. Finally, select a transmission stream from the **ATM SOURCES** screen and press **ENTER**.*

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 DS1port 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*

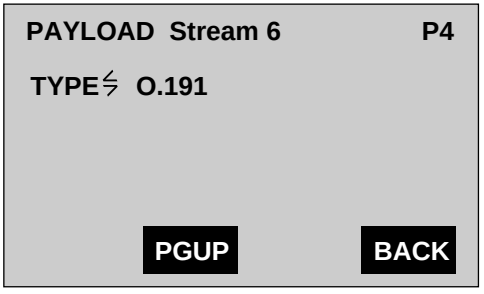
*To locate the screens documented in this procedure, press **ATM**. Then, scroll to the **Config Xmit Streams** option and press **ENTER**. Finally, select a transmission stream from the **ATM SOURCES** screen and press **ENTER**.*

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.

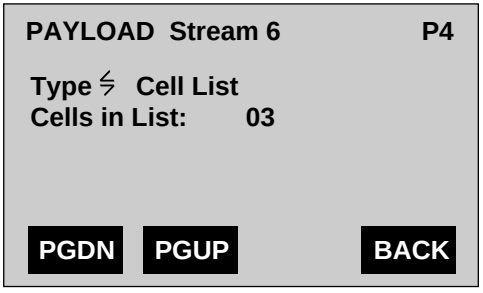
Before you use the following procedure to specify this type of payload, you may find it easier to create the cell payloads first. Go to "Creating a User-defined Cell List" later in this chapter for details.

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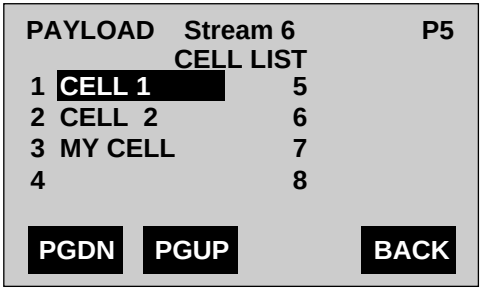
The **Cell List** parameter indicates that you want to transmit a payload that consists of cells that you have defined. These cells are found on the **CELL LIST** menu.

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

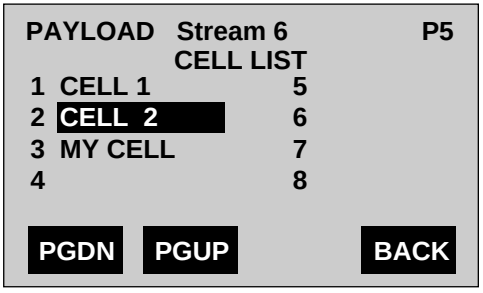
New Order:

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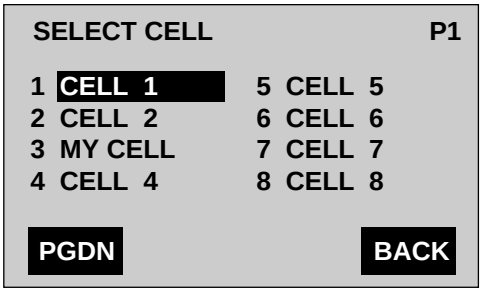
2. Press **ENTER** to display the **SELECT CELL** menu:

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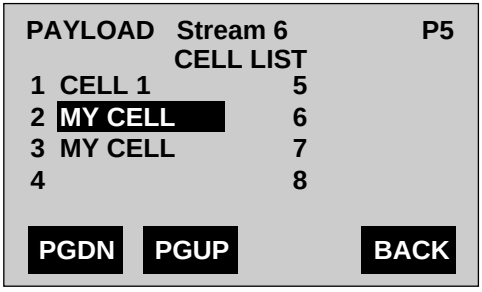
3. From the **SELECT CELL** menu, select the name of the cell (**MY CELL**) that you want to put in second place on the **CELL LIST** menu. Then, press **ENTER**.

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

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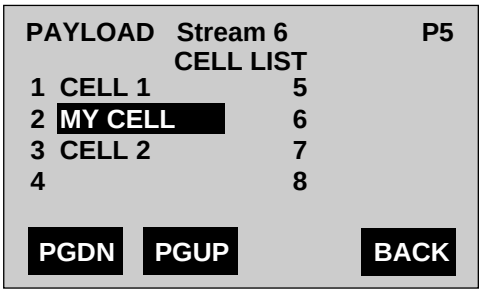
   Note that the cell you selected (**MY CELL)** is highlighted and is now second in the list. You now need to put **CELL 2** in the third position.

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*

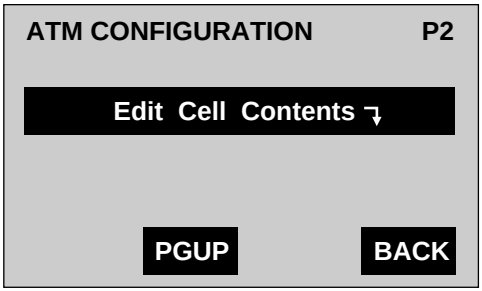
There may be situations in which you need to create special test patterns. In these situations, you can define a payload and transmit it over the network. The tester allows you to define every byte in an ATM cell's payload. This procedure shows you how to do this.

#### *Selecting a Cell*

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

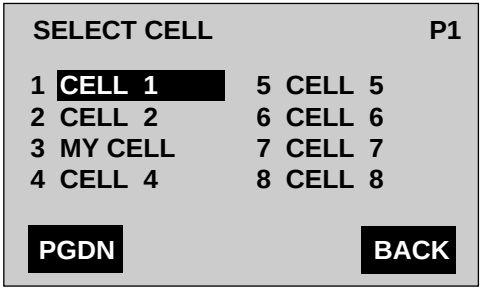
1. Press **ATM** to display the **ATM SELECTIONS** menu.
2. Press the **Down Arrow** key to move the cursor to the **ATM Configuration** option. Press **ENTER** to display the **ATM CONFIGURATION** (P1) screen.

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




ta066f.eps

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




ta064f.eps

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.

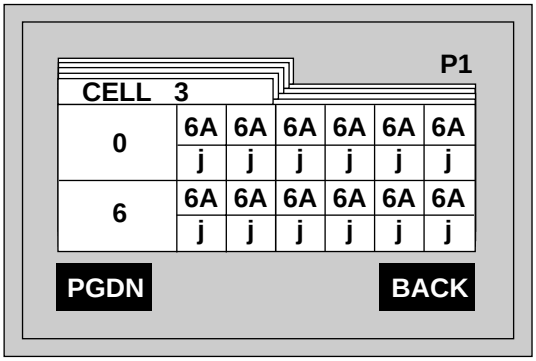
*Note*

*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:




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.

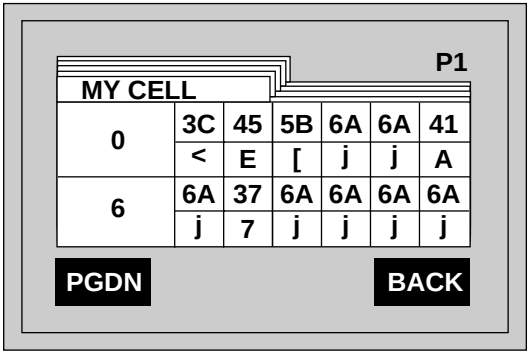
   c. Now press the **E** key.

      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:




ta068f.eps

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

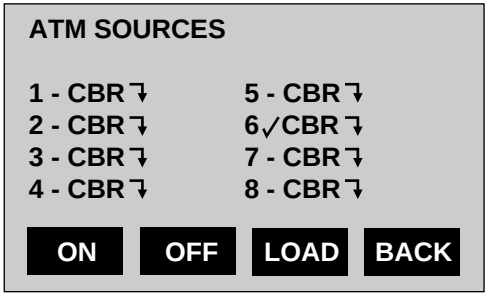
**Caution**

**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

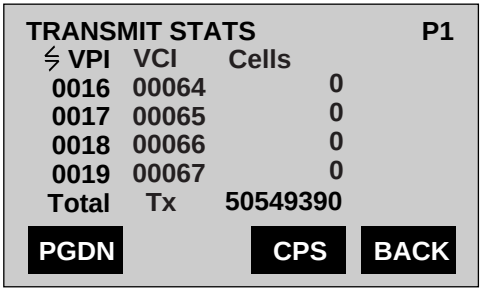
1. From the **ATM SOURCES** screen, press **F3**(LOAD).




ta052f.eps

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 DS1port Plus is building and loading the transmission stream and then starting cell generation.

When the DS1port Plus finishes, the **TRANSMIT STATS** (P1) screen is displayed:

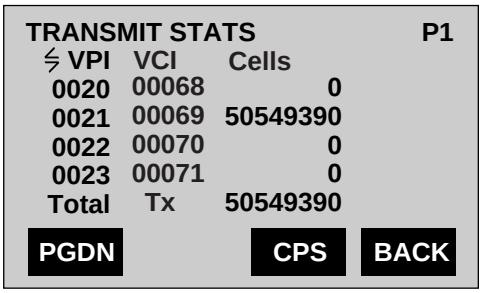



ta069f.eps

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:




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)

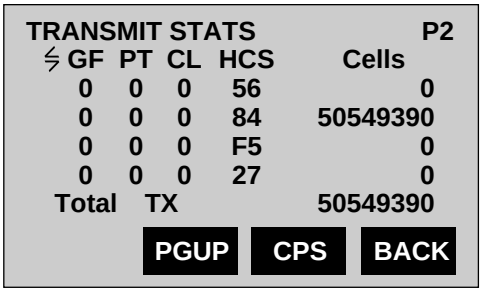
5. Press **CLEAR**.

   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:




ta071f.eps

7. Press the **Right Arrow** key again.

   Now, the hexadecimal header value of each circuit is displayed on this line.

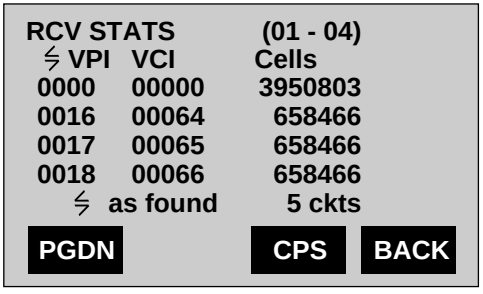
8. Press the **Right Arrow** key once more.

   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:




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 DS1port 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.

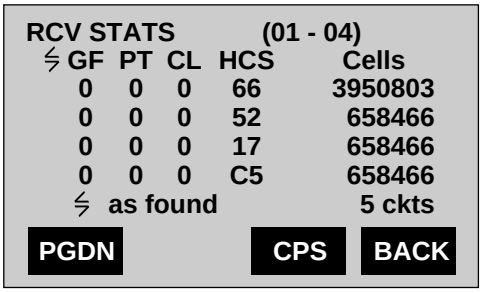
*Note*

*The DS1port 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 ≒ 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:

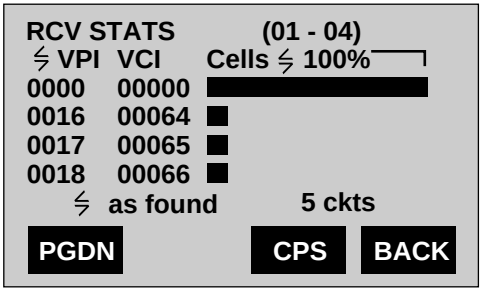



ta103f.eps

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**.

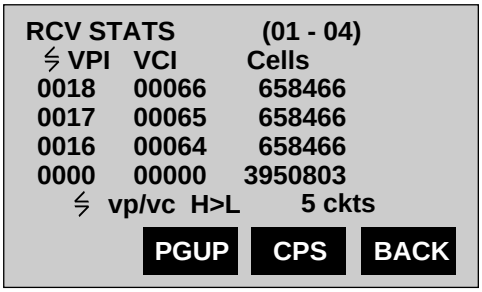
       With each successive press of these keys, you can view the graph reduced to these proportions: 50%, 25%, and 10%.

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

12. Press the **Down Arrow** key to move the cursor to the ⍀ 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:




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

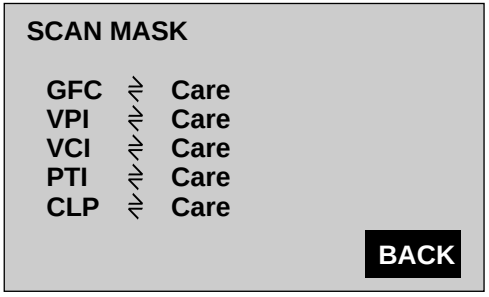
## Changing the Presentation of Circuit Activity Statistics

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 DS1port 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 DS1port 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 DS1 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

**Contents** **Page**

## Introduction

This chapter describes the ATM network testing functions of the DS1port 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 DS1 signal to be tested. See "Chapter 4. T1 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

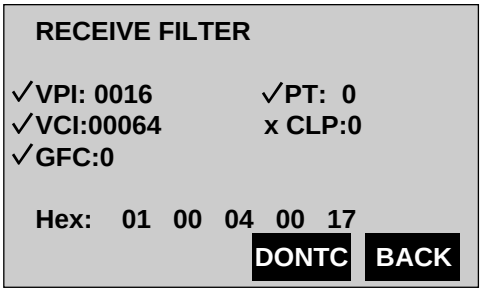
The parameters you define as part of the configuration of the receive filter set the attributes that the tester uses to check incoming ATM cells on its input DS1 signal. The specific settings for these parameters vary depending on the type of test you are running. Like all other DS1port Plus settings, 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:




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 DS1port 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 DS1port 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 DS1 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 DS1port Plus to run this test, first do the following:

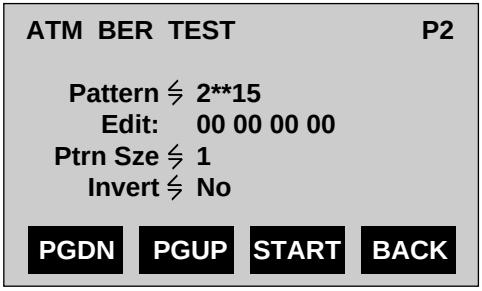
1. Set up the receive filter. Make sure that the header matches the header of the transmission stream carrying the BER test payload (see “Configuring the Receive Filter“ earlier in this chapter for information on how to do this).
2. If the tester is to be the source of the BER test pattern, set up a 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. The ability to specify a BER test payload for more than one stream is allowed because, in some cases, it is 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 Sze** (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:

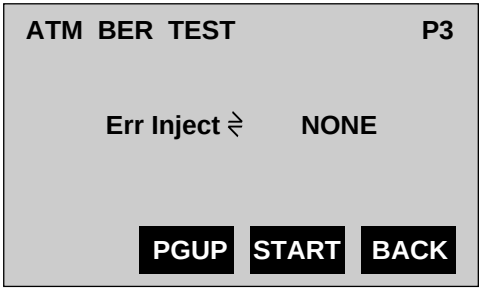
   - **No**

     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*

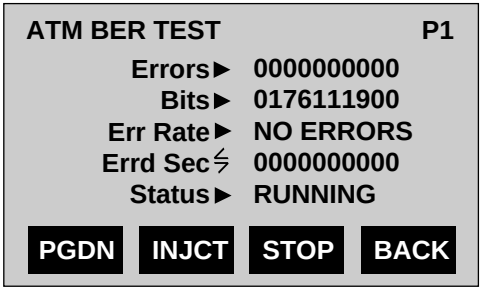
*Notes*

*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 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 DS1port 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 DS1port 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

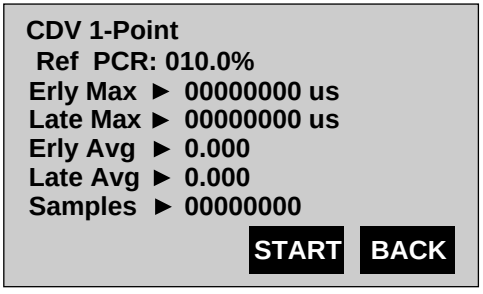
buffer's contents, the tester empties its buffer and then refills it so that the test can continue.

## 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 DS1port 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 DS1port Plus as the source of O.191 test cells.

### Setting Up a CDV 2-point/CTD Test

To set up the DS1port Plus to run a CDV 2-point/CTD test, you must configure the receive filter. See "Configuring the Receive Filter" earlier in this chapter.

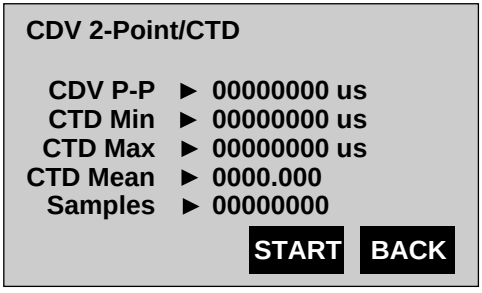
If the DS1port Plus is to source the O.191 test cells, you also need to configure an ATM transmission stream. For information on how to do this, see "Configuring a Transmission Stream" in Chapter 5 for details. When you configure the transmission stream, do the following:

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




ta116f.eps

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 DS1port 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 DS1port 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 DS1port 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**.
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: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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 O.191 cells with incorrect or mismatched CRCs received |
| **Samples** | Total number of cells in the sample |

# ATM Cell Capture

The DS1port 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.

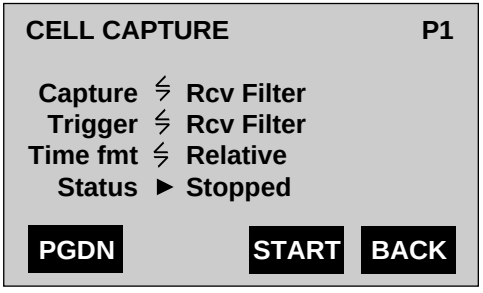
## Setting Up the DS1port Plus to Capture ATM Cells

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:

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   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** | Determines which cells the tester stores.<br>• **Rcv Filter**: stores only those cells whose header matches the receive filter settings.<br>• **All Cells**: stores all the cells it receives (on the 64 circuits). |
| **Trigger** | Determines when the tester begins storing cells.<br>• **Rcv Filter**: the tester begins storing cells after it receives a cell with a header that matches the receive filter settings.<br>• **All Cells**: the tester begins storing cells after it receives the first cell.<br>• **AAL5/Rcv Flt**: the tester begins storing cells after it detects the end of an AAL5 PDU. |
| **Time fmt** | Determines the method used to calculate cell arrival time.<br>• **Relative**: the tester records each cell's arrival time relative to the previous cell's arrival time.<br>• **Absolute**: the tester records the absolute arrival time (in microseconds) of each cell (using zero as reference point) since the cell capture began. |
| **Status** | Updates you on the status of the cell capture.<br>• `Stopped`: the tester is not presently capturing cells and that it has no cells that were previously captured in its buffer.<br>• `Running`: the tester is in the process of capturing cells.<br>• `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.*

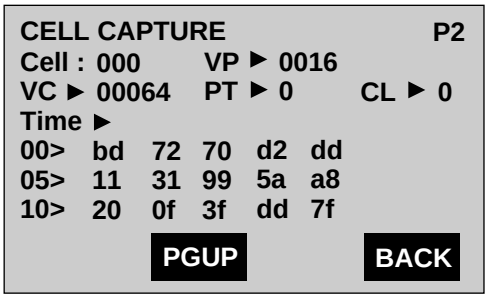
To start a cell capture, press **F3**(START).

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:

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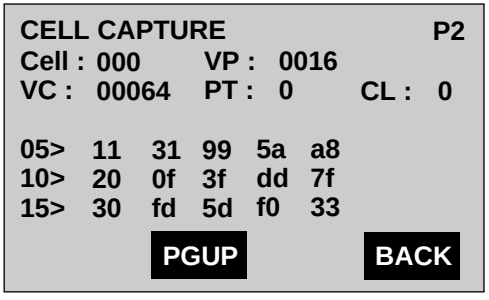
This screen lists the number of the cell you are currently viewing. (The first cell captured is always assigned the number '000'.) It also provides the header information for the cell and the arrival timestamp.

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:

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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 DS1port 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 DS1port 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 DS1port 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 DS1port 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 DS1port 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 DS1port 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 DS1port 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.*

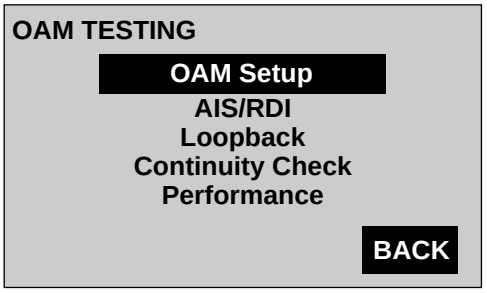
To set up the DS1port Plus for OAM testing, complete the following:

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:

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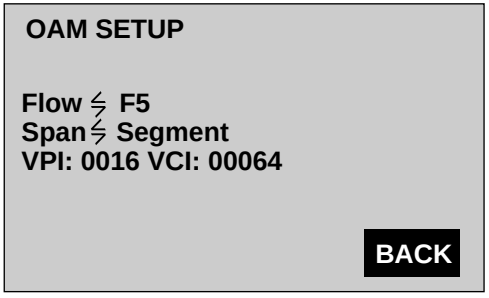
   The cursor is positioned on the **OAM Setup** option.

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 DS1port 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.

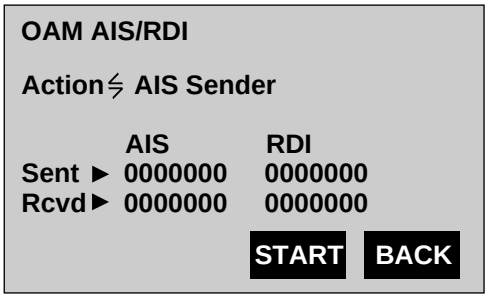
In Responder mode, the tester waits to receive OAM AIS cells from the network. When the cells are received, the tester's OAM AIS LED lights and the **AIS Rcvd** counter records the number of AIS cells received. In response to AIS cells, the tester sends RDI cells at the rate of one per second, and the **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.<br>• **AIS Sender**: will send OAM AIS cells at a rate of one per second.<br>• **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 DS1port 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.

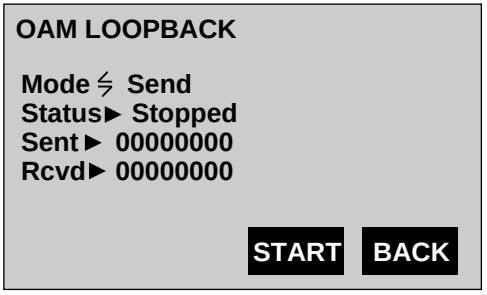
In Respond mode, the tester waits to receive OAM Loopback cells over the OAM flow specified in the setup for the test. When the tester receives a proper OAM Loopback cell, it "beeps" and increments the count the **Rcvd** field. The tester changes the Loopback Indication within the Loopback payload of 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** | Selects the mode of the tester as one of the following.<br>• **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.<br>• **Respond**: the tester will wait to receive OAM Loopback cells, then generate responding Loopback cells. |
| **Status** | Displays status of the test as one of the following:<br>• `Sending`: the tester is the source of transmission of Loopback cells. Cells are sent at a rate of one every five seconds.<br>• `Receiving`: the tester is ready to respond to received Loopback cells.<br>• `Timeout`: the tester did not receive a corresponding Loopback cell within five seconds.<br>• `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 DS1port 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 DS1port 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.

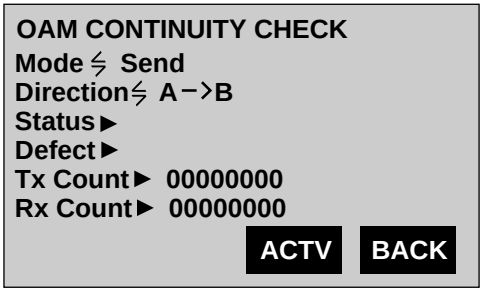
If the DS1port Plus is activated to receive, the **Rx Count** on the LCD increments as each CC cell is received. If no user cells or CC cells are received while the tester is activated to receive them, a Loss of Continuity in the B to A direction is reported in the **Defect** field, and the tester generates 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 DS1port 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 DS1port 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:<br>• **Send**: the DS1port Plus will send an Activate CC request.<br>• **Respond**: the DS1port 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:<br>• **A ->B**: one-way transmission from A (the DS1port Plus) to B (the connected device).<br>• **2-Way**: two-way transmission between A (the DS1port Plus) and B (the connected device).<br>• **B ->A**: one-way transmission from B (the connected device) to A (the DS1port Plus). |

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

| Parameter/Result | Description |
|---|---|
| **Status** | Displays status of the test as one of the following:<br>• `Activating`: the tester has sent an OAM Activate CC request but has not yet received confirmation.<br>• `Act Confrmed`: confirmation was received for an OAM Activate CC request.<br>• `Act Denied`: an OAM Activate CC request was denied.<br>• `Act Timeout`: the tester did not receive a reply to an OAM Activate CC request within two seconds.<br>• `Deactivating`: the tester has sent an OAM Deactivate CC request but has not yet received confirmation.<br>• `Deact Confrmd`: confirmation was received for an OAM Deactivate CC request.<br>• `Deact Denied:` an OAM Deactivate CC request was denied.<br>• `Deact Timeout`: the tester did not receive a reply to an OAM Deactivate CC request within two seconds. |
| **Defect** | This field indicates the direction of Loss of Continuity (LOC) as one of the following:<br>• **A ->B LOC**: Loss of Continuity from A (the DS1port 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.<br>• **B ->A LOC**: Loss of Continuity from B (the connected device) to A (the DS1port Plus) if the tester is activated to receive CC cells but does not receive these cells or user data over the specified OAM flow.<br>• **2-Way LOC**: Loss of Continuity in both directions if the tester is activated to both send and receive CC cells. |
| **Tx Count** | Number of CC cells transmitted on the specified OAM flow since the **F3**(ACTV/START) or **CLEAR** key was pressed. |
| **Rx Count** | Number of CC cells received on the specified OAM flow since the **F3**(ACTV/START) or **CLEAR** key was pressed. |

### *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 DS1port 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 DS1port 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:

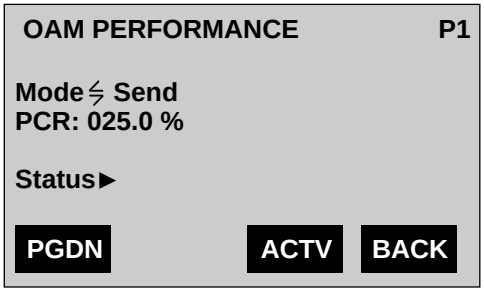
*Notes*

*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 DS1port Plus sends an OAM Activate PM request to the connected device and waits for confirmation.
   - In **Respond** mode, the DS1port 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:<br>• **Send**: the DS1port Plus will send an OAM Activate PM request.<br>• **Respond**: the DS1port 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** | Displays status of the test as one of the following:<br>• `Activating`: the tester has sent an OAM Activate PM request but has not yet received confirmation.<br>• `Act Confrmed`: confirmation was received for an OAM Activate PM request.<br>• `Act Denied`: an OAM Activate PM request was denied.<br>• `Act Timeout`: the tester did not receive a reply to an OAM Activate PM request within two seconds.<br>• `Deactivating`: the tester has sent an OAM Deactivate PM request but has not yet received confirmation.<br>• `Deact Confrmd`: confirmation was received for an OAM Deactivate PM request.<br>• `Deact Denied`: an OAM Deactivate PM request was denied.<br>• `Deact Timeout`: the tester did not receive a reply to an OAM Deactivate PM request within two seconds.<br>• `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 DS1port 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

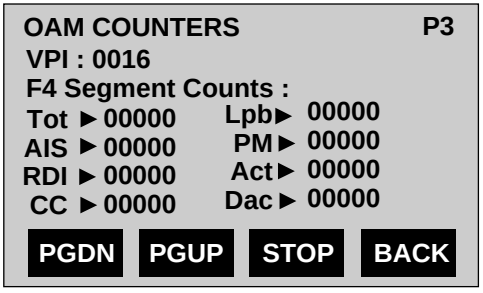
This screen indicates the VPI/VCIs on which OAM F4 activity was detected since the test was started or since the **CLEAR** key was pressed. It also tells you when (**Lst Time**) the tester detected OAM F4 cells.

*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:




ta125f.eps

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*

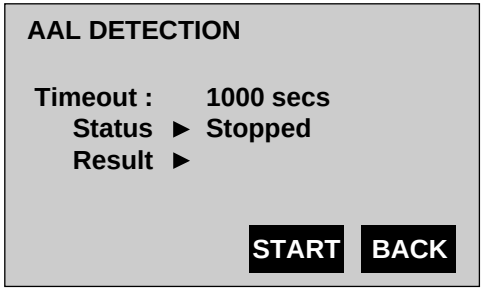
You can set up the DS1port Plus to determine AAL (ATM Adaptation Layer) type traffic on a circuit. To do this, complete these steps

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:




ta128f.eps

   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:<br>• `Stopped`: displayed when you press **F3**(STOP) or when the time-out has expired. Indicates that the test is not running.<br>• `Collecting`: indicates that the tester is searching for AAL traffic. |
| **Result** | Displays the type of AAL traffic detected as one of the following:<br>• `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.<br>• `AAL 0`: AAL 0 traffic<br>• `AAL 1`: AAL 1 traffic<br>• `AAL 3/4`: AAL 3 / 4 traffic<br>• `AAL 5`: AAL 5 traffic |

## *IP Ping Tests*

The DS1port 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 DS1port Plus.

In the IP Ping test, the DS1port 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 DS1port 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*

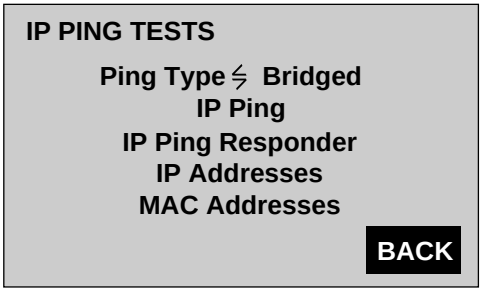
To set up the DS1port Plus to run an IP Ping or IP Ping Responder test, complete the following:

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:




ta166f.eps

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.

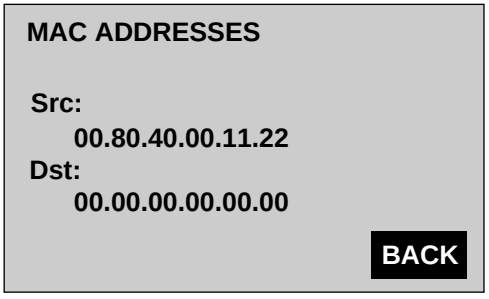
     You must supply a MAC address for both the source (DS1port Plus) and destination device. To continue the setup for the test, go to "Specifying MAC Addresses" and complete the instructions. When you finish, go to "Setting Up the IP Address Table".

### *Specifying MAC Addresses (IP Bridged Ping only)*

The IP Bridged Ping requires you to supply a MAC address for the source (the DS1port 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 DS1port 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 DS1port Plus or you can supply an alternative address. You must supply a MAC address for the destination device.

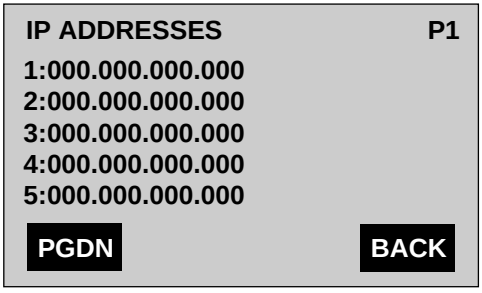
2. Type a MAC address in the **Src** (if desired) and **Dst** fields.

### *Setting Up the IP Address Table*

The IP address table is an index or listing of IP addresses. In order for the DS1port 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:




ta130f.eps

This screen and the one following can accommodate 10 addresses, one of which must be assigned to the DS1port Plus.

*Note*

*You can define any valid IP address that you want for the DS1port 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.

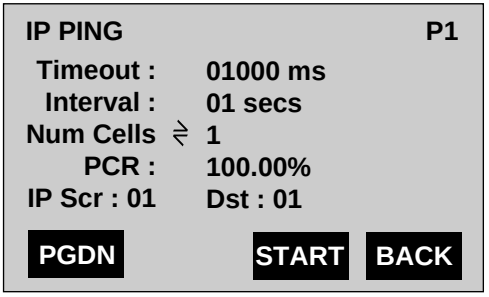
### *Running an IP Ping Test*

To run an IP Ping test, complete the following:

*Note*

*The DS1port 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 DS1port 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 DS1port 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 DS1port 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**

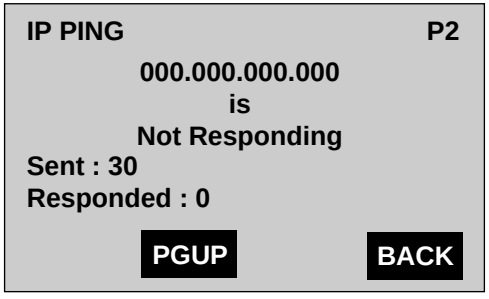
| Parameter | Description |
|---|---|
| **Timeout** | Specifies how long the DS1port Plus waits for the destination address to respond to an IP ping.<br><br>If the tester receives no response within the given time period, you may want to increase the value of this parameter. If the tester receives no 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. |
| **Interval** | Specifies how often the IP ping is sent.<br><br>For example, if you specify 2, the DS1port Plus sends out an IP ping to the destination device every two seconds. The value for **Interval** ranges from 0 to 99 seconds. |
| **Num Cells** | Determines the number of ATM cells used to carry the IP ping.<br><br>For the Routed Ping test, **Num Cells** has two settings:<br>• **1**: formats the IP ping and places it into one ATM cell.<br>• **3**: formats the IP ping and places it into three ATM cells.<br><br>For the IP Bridged Ping, the value of **Num Cells** is fixed at **3**. |

**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 DS1port 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:




ta132f.eps

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 DS1port Plus has sent to the destination device.
- Line 6 indicates the number of responses that the DS1port Plus has received from the destination device.

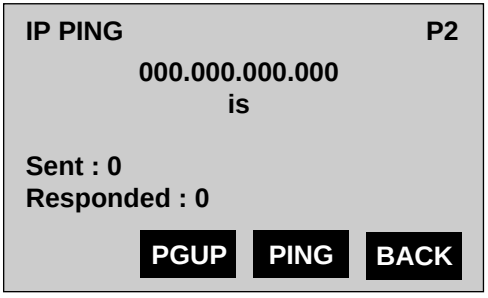
*Notes*

*The DS1port 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 DS1port 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 DS1port 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 DS1port 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 DS1port 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.

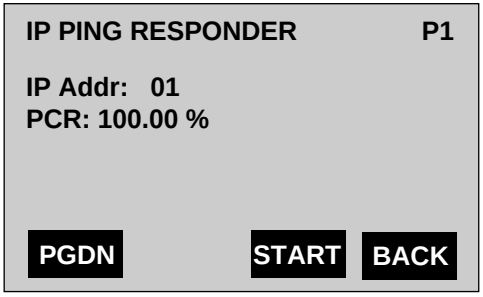
*Notes*

*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:




ta134f.eps

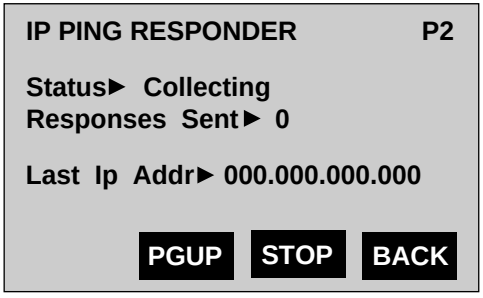
   The cursor is positioned on the **IP Addr** parameter. This parameter identifies the address in the IP address table that corresponds to the DS1port Plus. The settings for this parameter range from 1 to 10, which correspond, respectively, to the ten addresses listed in the IP address table.

2. Press the **Left** or **Right Arrow** key to select the number that matches the listing for the DS1port 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:




ta135f.eps

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 DS1port Plus has responded to.

  *Note*

  *If* ***Responses Sent*** *continues to be 0, this may indicate that the DS1*port *Plus has not received any IP pings.*
- Line 4 lists the address of the device that sent an IP Ping to the DS1port 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 DS1port 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*.

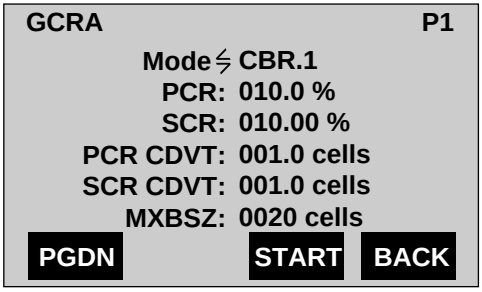
For a given connection, the tester checks each incoming cell against user-specified conformance parameters. Cells not meeting these parameters are counted non-conforming. Statistics are displayed on the tester's LCD.

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:

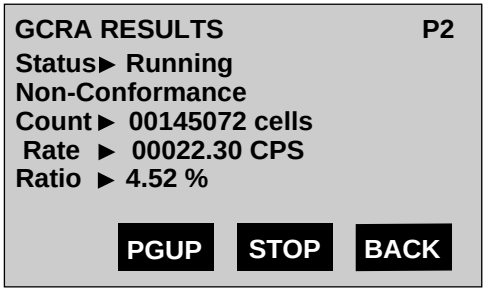



ta168f.eps

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:




ta169f.eps

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 *Traffic Management Specification*) as one of the following:<br>• **CBR.1** (PCR CLP0+1)<br>• **VBR.1** (PCR CLP0+1, SCR CLP0+1) |
| **PCR** | Specifies the Peak Cell Rate of the connection. Values range from 0% 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:<br>• `Running`: the test is in progress.<br>• `Stopped`: displayed after you press **F3**(STOP). The values displayed represent final test results.<br>• `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 DS1port 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 DS1port 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 DS1port 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 DS1port Plus can be set up to operate in one of two modes:

- User emulation
- Network emulation

## User Emulation Mode

In user emulation mode, the DS1port 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 DS1port 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 DS1port Plus as a user calling party, do the following:

*Note*

*Instructions for each task in the following list are provided under "Setting Up the DS1port 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 (DS1port 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 DS1port 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 DS1port 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 DS1port Plus as a user called party, do the following:

*Note*

*Instructions for each task in the following list are provided under "Setting Up the DS1port 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 DS1port Plus (calling party).

After you set up the tester, you need to enable the DS1port Plus to respond to a call connection request. Follow the instructions under "Establishing the Signaling Connection (SAAL)".

If the DS1port 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 DS1port 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 DS1port 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 DS1port Plus as a network calling party, do the following:

*Note*

*Instructions for each task in this list are provided under "Setting Up the DS1port 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 (DS1port 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 DS1port 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 DS1port 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 DS1port 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 DS1port 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 DS1port Plus (calling party).

After you set up the tester, you need to enable the DS1port Plus to respond to a call connection request. Follow the instructions under "Establishing the Signaling Connection (SAAL)".

If the DS1port 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 DS1port Plus for SVC Testing

This section shows you how to set up the DS1port Plus to test an SVC. The setup process differs depending on which emulation mode you choose for the DS1port 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 DS1port Plus

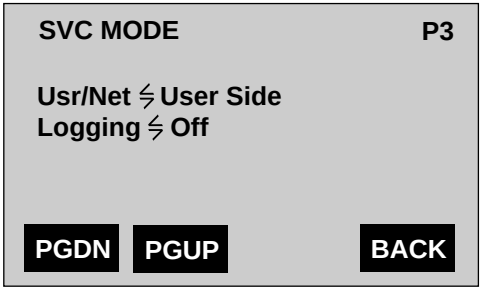
This procedure shows you how to set up the DS1port Plus to operate as a user device or a network. For an explanation of the differences between these two modes, read the descriptions under "User Emulation Mode" and "Network Emulation Mode".

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:

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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 (DS1port Plus)*

The network address of the DS1port 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:


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   On this screen, you need to supply address information that identifies the DS1port 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 DS1port 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 DS1port 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:


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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.

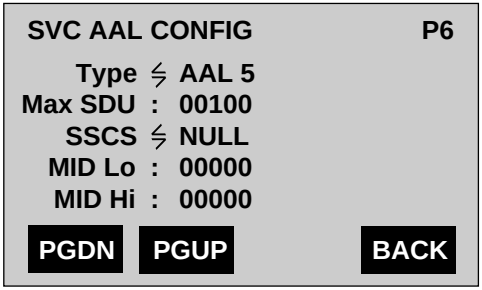
The DS1port Plus is now configured with the called party address.

**Table 7-1. Calling/Called Party Address Parameters**

| Parameter | Description |
|---|---|
| **Plan** | Selects the address format that is compatible with the network connection.<br>• **NSAP** specifies ISO NSAP as the address format.<br>• **ISDN** specifies E.164 as the address format. |
| **Pres**<br>(for calling party only) | Determines the presentation of the calling number to the called user.<br>• **Allowed** specifies presentation of the calling number to the called user.<br>• **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.)<br>• **Not Avail**. specifies that the calling number is not available.<br>• **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:

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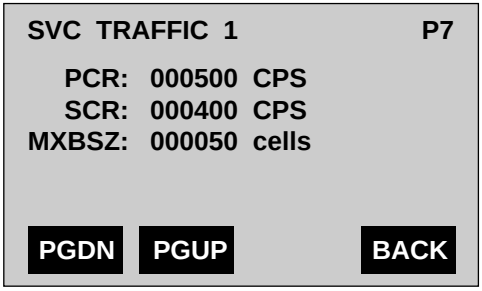
   On this screen, you can define the AAL parameters of the call connection request. See Table 7-2 for a list and description of the AAL configuration parameters contained on this screen.

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:

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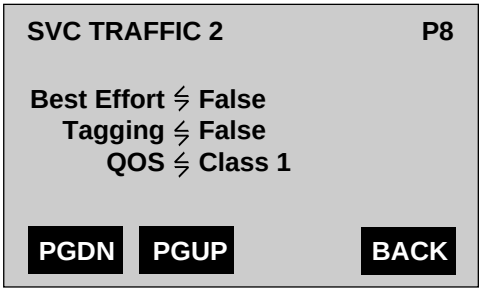
4. Set the values for **PCR** and **SCR** (in cells per second) and **MXBSZ** (in cells). See Table 7-3 for a list and description of the SVC traffic parameters.

*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:

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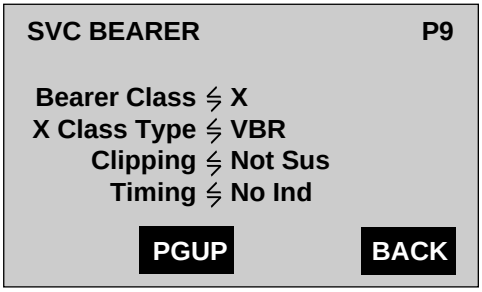
6. Select the desired setting for the SVC traffic parameters on this screen. Consult Table 7-3 for descriptions.
7. Press **F1**(PGDN) to display the **SVC BEARER** (P9) screen:

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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**<br>(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**<br>(applies to AAL 3/4 and AAL 5 only) | Identifies the Service Specific Convergence Sublayer (SSCS) as one of the following:<br>• **Null** indicates an undefined SSCS type.<br>• **Assured** indicates data SSCS-based on SSCOP assured operation.<br>• **Unassured** indicates data SSCS-based on SSCOP non-assured operation. |
| **MID Lo**<br>(applies to AAL 3/4 only) | Integer representation of the lowest MID value. Only values between 0 and 1023 are valid. |
| **MID Hi**<br>(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.<br>• **False** rejects the call if the specified PCR is not available.<br>• **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.<br>• **True** requests tagging of cells.<br>• **False** requests no tagging of cells. |

**Table 7-3. SVC Traffic Parameters (cont.)**

| Parameter | Description |
|---|---|
| **QoS** | Specifies the Quality of Service:<br>• **Class 0** indicates unspecified QoS class (see *ATM User-Network Interface Specification* for details).<br>• **Class 1** indicates QoS meeting Service Class A (Circuit emulation, CBR video) performance.<br>• **Class 2** indicates QoS meeting Service Class B (VBR audio and video) performance.<br>• **Class 3** indicates QoS meeting Service Class C (connection-oriented data transfer) performance.<br>• **Class 4** indicates QoS meeting Service Class D (connectionless data transfer) performance.<br>• **Reservd** is reserved by ITU-T for future use. |

**Table 7-4. SVC Bearer Parameters**

| Parameter | Description |
|---|---|
| **Bearer Class** | Selects the Broadband Connection Oriented Bearer (BCOB) service.<br>• **A** stands for BCOB-A.<br>• **C** stands for BCOB-C.<br>• **X** stands for BCOB-X. |
| **X Class Type** | Identifies the type of traffic.<br>• **CBR** (Constant Bit Rate)<br>• **VBR** (Variable Bit Rate)<br>• **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.<br>• **Suscep**: specifies that the data is susceptible to clipping.<br>• **Not Sus**: specifies that the data not be susceptible to clipping. |
| **Timing** | Specifies the timing requirement.<br>• **No Ind**: timing requirement not indicated.<br>• **E2E Req**: end-to-end timing required.<br>• **E2E Not**: end-to-end timing not required.<br>• **Reservd**: is reserved for future use. |

# *Testing SVCs*

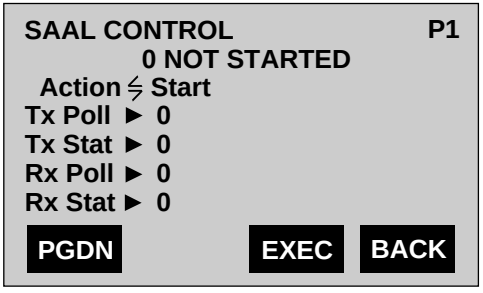
This section shows you how to establish and release a signaling connection, how to initiate and terminate an SVC call, and how to obtain call state and diagnostic information.

## *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 DS1port Plus sent a `BEGIN` message, but that it has not received acknowledgment that the message was received.

   - `ESTABLISHED`

     Indicates that the DS1port Plus is connected to the SAAL.

   - `AWAIT RELEASE`

     Indicates that the DS1port 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

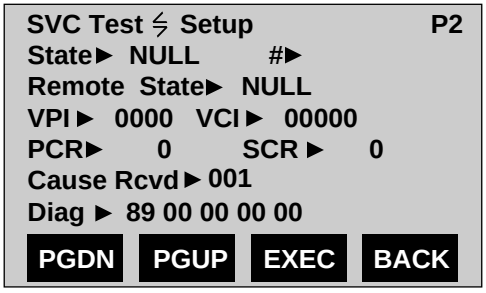
  Indicates that no communication has been initiated. In this state, the DS1port Plus will not respond to SAAL messages.

If the DS1port 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 DS1port 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:

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

2. Press the **Left** or **Right Arrow** key to select **Setup**.

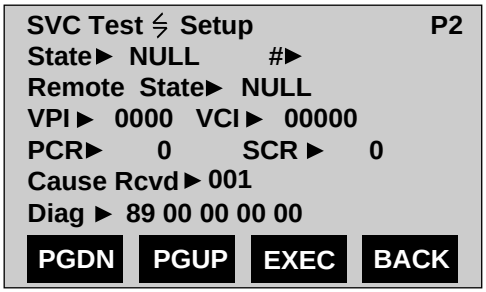
   When you select **Setup**, a setup message with the parameters you selected will be sent to the destination device in an attempt to establish an SVC.

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:

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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 DS1port 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 DS1port 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. |

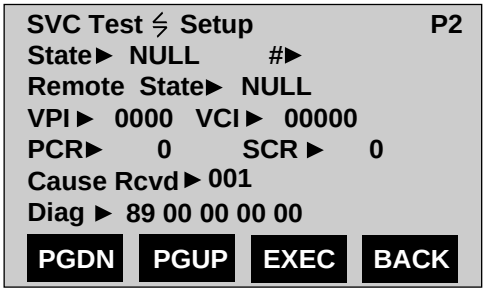
### Obtaining Status on the Remote Device

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).

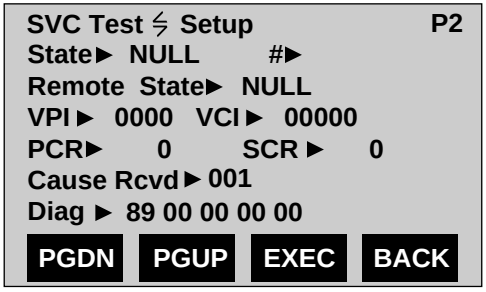
### Releasing or Restarting a Call

*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.

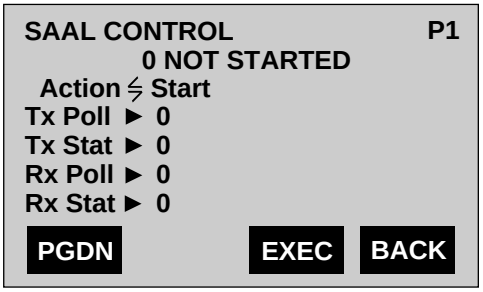
### *Resynchronizing the Signaling Channel (SAAL)*

*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:




ta138f.eps

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

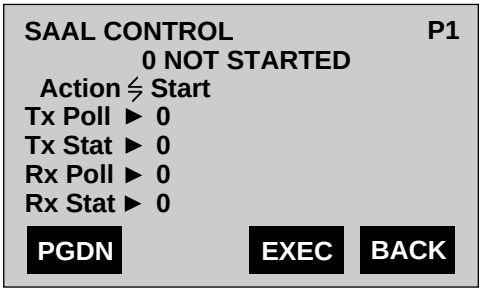
2. Press the **Left** or **Right Arrow** key to choose the **Resynchrn** setting.
3. Press **F3**(EXEC).

   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 DS1port Plus to release the connection to the other side of the interface.

     The SAAL layer operation on the DS1port 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 DS1port Plus to release the connection to the other side of the interface and stop the SAAL layer operation on the tester.

     The DS1port 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 A*
# *Sample Reports*

## *Introduction*

This appendix contains samples of the reports you can print and shows you how to print them. Before you can print, you need to connect your DS1port Plus to a printer. For information on how to do this, see “Connecting the DS1port *Plus* to a Printer or PC” in Chapter 3.

## Product Information Report

To print a product information report, do the following:

1. Press **SYSTEM**. Then, display any **SYSTEM INFORMATION** screen.
2. Press **SHIFT 1** + **Print**.

The DS1port Plus prints a report similar to this one:

```
++++++++++++++++++++++++++++++++++++
* PRODUCT INFORMATION *
++++++++++++++++++++++++++++++++++++
PRODUCT
  Model: FLUKE DS1port+
  Software Ver: 4.00
  Display Ver: 25
  Build: Tue Jan 12 99  15:59:01
  Remote ID: 10199

CONFIGURATION
  User: DS1user
  UNI: 3.1/4.0
  Remote: ENABLED
  Framer: T1XC.1

             as of 02-12-99  16:03:15
------------------------------------
NOTES:
```

wg166f.eps

## Line Setup Report

To print a Line setup report, do the following:

1. Press **LINE**. Then, display any **Transmitter Setup** or **Receiver Setup** screen.
2. Press **SHIFT 1** + **Print**.

The DS1port Plus prints a report similar to the following:

```
++++++++++++++++++++++++++++++++++++++
* DS1 LINE CONFIGURATION *
++++++++++++++++++++++++++++++++++++++
RECEIVER
  Coding: B8ZS
  Framing: ESF
  Mode: Terminal
  Loopback: Ignore
  Data Link: 4 kHz
  BOC Validation: 8 of 10
  OOF Threshold: 2 of 4

LOOP UP
  Loop Up Code: NI
  User Defined: 0
  Loop Up Size: 5 Bits

LOOP DOWN
  Loop Down Code: NI
  User Defined: 0
  Loop Down Size: 5 Bits

TRANSMITTER
  Coding: As Received
  Framing: As Received
  Data Link: 4 kHz
  Cable: 0-133 feet
  Info: DSX-1
  Operation: Normal

             as of 02-12-99  18:20:33
----------------------------------
NOTES:
```

wg167f.eps

## Line Loopback Status Report

To print a Line loopback status report, do the following:

1. Press **LINE**.
2. Select the **LoopBack Codes** option. Then, display any screen under this option.
3. Press **SHIFT 1** + **Print**.

The following report is printed:

```
++++++++++++++++++++++++++++++++++++
* DS1 LINE LOOPBACK STATUS *
++++++++++++++++++++++++++++++++++++
STATUS
  Currently Active: None
  Loop Up Codes Received: 0000
  Loop Down Codes Received: 0000

LOOP UP
  Using NI Loop Up Code
  User Loop Up Code: 00
  Loop Up Code Length: 3bits

LOOP DOWN
  Using NI Loop Down Code
  User Loop Down Code: 00
  Loop Down Code Length: 3bits

             as of 02-12-99  18:20:42
------------------------------------
NOTES:
```

wg168f.eps

## Line Results Report

To print a Line results report, do the following:

1. Press **LINE**.
2. Select the **Line Results** option. Then, display any **Line Results** menu page.
3. Press **SHIFT 1** + **Print**.

The DS1port Plus prints a Line results report similar to the following:

```
++++++++++++++++++++++++++++++++++++
* DS1 TEST RESULTS *
++++++++++++++++++++++++++++++++++++
SUMMARY
  Frame Type: ESF
  Line Code: Normal
  Signal Level:  3.05 Vpk, 16.68 dBm
  Mode: Terminal
  Loop State: No Loop
  Elapsed Test Time: 29 secs

DETAILED STATISTICS
         Count       ErrdSec     ErrFreeSec  %ErrFree
FRM Err  0000000028  0000000005  0000000398  98.76%
COFA     0000000001  0000000001  0000000402  99.75%
CRC      0000000034  0000000005  0000000398  98.76%
OOF      0000000014  0000000005  0000000398  98.76%
LCV      0000020475  0000000005  0000000398  98.76%
Density  0000000013  0000000004  0000000399  99.01%
X Zeros  0000000017  0000000004  0000000399  99.01%
LOP      0000000000  0000000000  0000000403  100.00%

Elapsed Test Time: 403 secs
Total Errors: 20582

      Status     Start Time   Stop Time   Total Time
LOS   INACTIVE   22:40:30     22:40:34    00:00:04
LOF   INACTIVE   22:40:30     22:40:34    00:00:04
AIS   INACTIVE   --:--:--     --:--:--    --:--:--
YEL   INACTIVE   --:--:--     --:--:--    --:--:--
RED   ACTIVE     22:40:33     --:--:--    00:00:07

              as of 02-12-99  22:40:41
 ------------------------------------
NOTES:
```

wg169f.eps

## Line BER Test Report

To print a Line BER test report, do the following:

1. Press **LINE**.
2. Select the **Line BER Test** option. Then, display any screen under this option.
3. Press **SHIFT 1** + **Print**.

The DS1port Plus prints a Line BER test report similar to the following:

```
++++++++++++++++++++++++++++++++++++
* DS1 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:
```

wg170f.eps

## ATM BER Test Report

To print an ATM BER test report, do the following:

1. Press **ATM**.
2. Highlight the **ATM Testing** option. Then, press **ENTER**.
3. Make sure that the **Bit Error Rate** option is highlighted. Press **ENTER**.
4. Display any **ATM BER Test** menu page. Then, press **SHIFT 1** + **Print**.

The DS1port Plus prints an ATM Bit Error Rate report similar to this one:

```
++++++++++++++++++++++++++++++++++++
* 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 Hexidecimal: 0100040017
 Payload
   Type: BERT
 Traffic
   PCR:   4420 kbps   10426 CPS   10.00%
   SCR:   4420 kbps   10426 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 Hexidecimal: 01100410C5
 Payload
   Type: FIXED
 Traffic
   PCR:   4420 kbps   10426 CPS   10.00%
   SCR:   4420 kbps   10426 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 ATM activity on detected circuits, do the following:

1. Press **ATM.**
2. Select the **Receive Summary** option. Press **ENTER.**
3. Press the **Down Arrow** key to highlight the **Circuit Activity List** option. Press **ENTER**.
4. Press **SHIFT 1** + **Print**.

The DS1port Plus prints the following activity report:

```
++++++++++++++++++++++++++++++++++++
* 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% 62562 26.5263 2368657
0016 00064  0  0  0 42 10.00% 10428  4.4215   42380
0017 00065  0  0  0 90 10.00% 10428  4.4215   42380
0018 00066  0  0  0 E1 10.00% 10428  4.4215   42380
0019 00067  0  0  0 33 10.00% 10427  4.4210   42379

CURRENT TRANSMISSION ACTIVITY
VPI   VCI  GF PT CL HC   BW%   CPS    MBS   Count
0016 00064  0  0  0 17 10.00% 10427  4.4212   42376
0017 00065  0  0  0 C5 10.00% 10427  4.4212   42376
0018 00066  0  0  0 B4 10.00% 10427  4.4212   42376
0019 00067  0  0  0 66 10.00% 10427  4.4212   42376
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 Report

To print an ATM cell capture report, do the following:

1. Press **ATM**.
2. Select the **ATM Testing** option. Press **ENTER.**
3. Press **F1**(PGDN). Make sure that the **Cell Capture** option is highlighted. Then, press **ENTER**.
4. Display any **CELL CAPTURE** screen . Then, press **SHIFT 1** + **Print.**

The DS1port Plus prints an ATM Cell Capture 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 **ATM**.
2. Select the **ATM Testing** option. Press **ENTER.**
3. Select the **QoS Tests** option. Then, press **ENTER**.
4. Display any **QoS TESTS** screen. Then, press **SHIFT 1** + **Print.**

The DS1port Plus prints 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 **ATM**.
2. Select the **ATM Testing** option. Press **ENTER.**
3. Select **OAM**. Then, press **ENTER**.
4. Display any **OAM TESTING** or **OAM DETECTION** screen. Then, press **SHIFT 1** + **Print**.

The DS1port Plus prints 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 DS1port 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 DS1port Plus").

```
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 DS1port 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 **MXBSZ** 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 stream 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.

### B8ZS

Abbreviation for Bipolar 9 Zero Substitution. A line code scheme in which eight consecutive zeros are replaced by a substitution code in order to maintain high pulse density.

### 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.

### Blue alarm

See AIS.

### 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.

### *COFA*

Abbreviation for Change of Frame Alignment. A COFA is declared when the DS1port Plus synchronizes to a new frame after an out of frame (OOF) condition.

### *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.

### *DS1*

Abbreviation for Digital Signal level 1 (a 1.544 Mbs interface rate).

### *DUT*

Abbreviation for device under test.

### *error rate*

The number of errors per second.

### *errored second*

A second in which at least one defect or error occurred.

### ESF

Abbreviation for Extended Super Frame. A grouping of 24 consecutive DS-1 frames together, resulting in a frame that is 576 bytes long.

### 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 mis-delivered.

### 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.

### 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.

### receive filter

A piece of logic that allows the DS1port 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 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.

### *SF format*

Abbreviation for Super Frame format. A grouping of 12 consecutive DS-1 frames together, resulting in a frame that is 288 bytes long.

### *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 DS1port Plus, used to generate ATM traffic. Allows the user to set up cell transmission parameters that fully describe the ATM traffic generated by the DS1port Plus. These parameters include address designations, cell loss priority, and bandwidth, to name a few.

### *T1DM*

Abbreviation for T1 Data Multiplexer. Brings DS0Bs together on a DS1.

### *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.

### Yellow alarm

An alarm signal that indicates a near-to-far transmission failure.

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