ATM150

ATM Cell Generator/Analyzer

User Manual

Tektronix

Microwave Logic Products

Anatomy of an ATM Cell

The ATM cell consists of two parts: a five-byte header and a 48-byte information field.

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>GFC (UNI) or VPI (NNI)</th>
<th>VPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byte 2</td>
<td>VPI</td>
<td>VCI</td>
</tr>
<tr>
<td>Byte 3</td>
<td>VCI</td>
<td></td>
</tr>
<tr>
<td>Byte 4</td>
<td>VCI</td>
<td>PT</td>
</tr>
<tr>
<td>Byte 5</td>
<td>HEC</td>
<td>USER INFO</td>
</tr>
</tbody>
</table>

(48 bytes)(Payload)

USER INFO

VCI: Virtual Channel Identifier  PTI: Payload Type Indicator
VPI: Virtual Path Identifier     CLP: Cell Loss Priority
HEC: Header Error Check          GFC: Generic Flow Control

Part Number 8908-1170

REV. 1.5
Revision History

<table>
<thead>
<tr>
<th>Description</th>
<th>Date issued</th>
<th>Manual Rev. #</th>
<th>Hardware Rev. #</th>
<th>Software Rev. #</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>11/18/94</td>
<td>1.2</td>
<td>N/A</td>
<td>1.2</td>
</tr>
<tr>
<td>Manual</td>
<td>12/15/94</td>
<td>1.3</td>
<td>N/A</td>
<td>1.3</td>
</tr>
<tr>
<td>Manual</td>
<td>07/03/95</td>
<td>1.4</td>
<td>N/A</td>
<td>1.4</td>
</tr>
<tr>
<td>Manual</td>
<td>03/22/96</td>
<td>1.5</td>
<td>N/A</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Copyright by

Tektronix

Microwave Logic Products
285 Mill Rd., Chelmsford, MA 01824
(508) 256-6800; 1-800-643-2167
Main FAX (508) 256-2038

All equipment manufactured by Tektronix, Microwave Logic Products, is warranted against defects in material and workmanship for a period of one year from the date of delivery. This warranty applies only to the original purchaser and is non-transferable unless express written authorization of the warranty transfer is granted by Tektronix. No other warranty is expressed or implied. Tektronix is not liable for consequential damages.
# ATM150 Software Revision List

<table>
<thead>
<tr>
<th>Software Version</th>
<th>Date</th>
<th>Changes</th>
</tr>
</thead>
</table>
| B.3              | 9/1/94  | Added HDR Randomize  
                              | Added Physical Layer ALM monitor                                                                                                        |
| 1.0              | 10/5/94 | Added Gaussian/ Poisson Distributions  
                              | Added Remote Commands                                                                                                                  |
| 1.0b             | 10/12/94| Added DS3 ATM Cell Payload Scramble (PLCP off)                                                                                         |
| 1.1              | 10/24/94| Added Loopback (RX of ATM150 picks up network signals and pass them without modification to TX where they rejoin the network) (Ability to wire ATM test set into network without disturbing network flow)  
                              | Added Intercell Delay (ability to manipulate intercell delays through idle cells)                                                        |
| 1.2              | 11/3/94 | Added Propagation Calibration  
                              | Modified Test Cell Bandwidth Control  
                              | Added Active/Idle percentage feedback in Cell Distribution menu  
                              | Modified Gaussian/ Poisson Cell Distributions  
                              | - No min/max/step  
                              | - 3 sigmas  
                              | Distribution RANDOMIZE (not scramble)  
                              | Histogram defaults to RUN mode  
                              | MX3 instead of M23  
                              | Enter key change (function ignored if turn knob controls choice)                                                                       |
| 1.21             | 11/16/94| Internal enhancements (system, Cal Prop)                                                                                               |
| 1.3              | 12/15/94| DS1 interface  
                              | Bandwidth control - can be set for percentage or frequency                                                                               |
| 1.4              | 07/03/95| DS1 interface  
                              | E1/E3 interface  
                              | Redesign front panel to allow simultaneous provisioning of OC-3c, DS1/DS3, and E1/E3.  
                              | Remove redundant screens  
                              | Add ATM1, ATM2, PHYS1, PHYS2 Results screens  
                              | Simplify SETUP screen  
                              | Line Printer support                                                                                                                   |
| 1.5              | 03/22/96| STM-1 interface  
                              | Store and Recall Quick Setup  
                              | User-defined header and distribution loading                                                                                             |
Software upgrade instructions for the ATM150 (1.5)

1. Turn off the ATM150’s power switch.
2. Insert the Upgrade diskette into the floppy drive of the ATM150.
3. Turn the power switch back on.
4. The ATM150 will detect the floppy and display the following message:

   Do you want to setup the system?
   
   YES <
   NO

Select “YES” or “NO” with the cursor keys of the ATM150 and hit the ENTER key on the front panel of the ATM150 to confirm.

5. If the user selects “YES”, the upgrade process will begin. It takes a while (about 30 seconds) before the upgrade application actually starts running. Once the system has been setup, the user will see the following messages:

   Preparing system for setup.
   This could take a while. Please be patient.

   Installing disk 1
   This could take a while. Please be patient.

6. Currently the system fits on one floppy diskette. Once the software on the diskette is transferred to the hard drive of the ATM150, the following screen is displayed:

   Remove the floppy and hit the enter key to reboot the system.

7. The user should now remove the floppy and press the Enter key on the ATM150. Setup is complete.
Contents

Software Revision List
Revision History/ Legal/ Disclaimer/ Safety Practices, including Laser Safety/ Reader Comment Card

1. Introduction
   Functional Description of ATM150 .............................................................. 1-1
   Diagrams of front and rear panels ......................................................... 1-3

2. Getting Started
   Operating Basics ...................................................................................... 2-1
   Quick Start................................................................................................. 2-3
   System Performance Verification (Instrument Test) ............................... 2-13

3. Reference
   Front Panel .................................................................................................. 3-1
   Generator ................................................................................................... 3-3
   Analyzer ...................................................................................................... 3-3
   Utility ......................................................................................................... 3-6
   Menu Structure
     Generator Softkeys .................................................................................. 3-9
     Analyzer Softkeys ................................................................................... 3-22
   Rear Panel ................................................................................................. 3-32

4. Applications & Examples

Appendices
   A. ATM Basics .......................................................................................... A-1
   B. Specifications ....................................................................................... B-11
   C. Default Settings ................................................................................... C-1
   D. Block Diagram ..................................................................................... D-1
   E. Remote Commands ............................................................................... E-1
   F. Service Information/ Warranty .............................................................. F-1
   G. RS-232 Interface .................................................................................. G-1
   H. GPIB Interface ..................................................................................... H-1
   I. Options .................................................................................................. I-1

Glossary
Index

3/22/96
IMPORTANT - READ CAREFULLY BEFORE USING THE EMBEDDED SYSTEM WHICH CONTAINS
MICROSOFT SOFTWARE

SOFTWARE LICENSE AGREEMENT
(Embedded Products)

This software license agreement is a legal agreement between you (either an individual or an entity, hereinafter
"End User") and the manufacturer ("Embedded System Manufacturer") of the embedded system containing
software product. By using the embedded system on which software program(s) have been preinstalled
("SOFTWARE"), you are agreeing to be bound by the terms of this agreement.

1. GRANT OF LICENSE. This license Agreement permits you to use the Microsoft SOFTWARE as preinstalled
on the embedded system.

2. INTELLECTUAL PROPERTY. (Tektronix's Embedded System contains intellectual property, i.e., software
programs, that is licensed for the end user customer's use (herein after "End User"). This is not a sale of such
intellectual property. The End User shall not copy disassemble, reverse engineer, or decompile the software
program.

3. COPYRIGHT The software is owned by Microsoft Corporation or its suppliers and is protected by United States
copyright laws and international treaty provisions and all other applicable national laws. Therefore, you must treat
the SOFTWARE like any other copyrighted material (e.g., a book or musical recording).

4. U.S. GOVERNMENT RESTRICTED RIGHTS. The SOFTWARE and documentation are provided with
RESTRICTED RIGHTS. Use, duplication or disclosure by the United States Government is subject to restrictions
as set forth in subparagraph (c)(1)(ii) of The Rights in Technical Data and Computer Software clause at DFARS
252.227-7013 or subparagraphs (c)(1) and (2) of the Commercial Computer Software - Restricted Rights at 48 CFR
52.227-19, as applicable. Manufacturer is Microsoft Corporation/ One Microsoft Way/ Redmond, WA 98052-
6399.

Product support for the SOFTWARE is not provided by Microsoft Corporation or its subsidiaries. For product
support, refer to Tektronix's support number provided in the documentation for the embedded system. Should you
have any questions concerning this Agreement, or if you desire to contact Tektronix for any other reason, refer to
the address provided in the documentation for your embedded system.
Safety Practices, including Laser Safety

When operating the ATM150, always follow these safety practices.

AC Power

The instrument is designed to be powered from 90-125 or 220-240 VAC; 300 VA max. Voltage switching is automatic. There is no voltage switch.

Ground the Instrument

The ATM150 is grounded through its AC power cord. Plug this power cord only into a properly grounded, three-conductor outlet. If you operate the instrument without a proper ground then should there be a fault in the instrument, there is the potential that all metal surfaces on the instrument can become a potential shock hazard.

Use the Proper Fuse

Operating the instrument with an improper fuse creates a fire hazard. The correct fuses to install in the ATM150 are shown below:

<table>
<thead>
<tr>
<th>Power Voltage</th>
<th>Fuse Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>115 VAC</td>
<td>5 A, Slo-Blo</td>
</tr>
<tr>
<td>230 VAC</td>
<td>2.5 A, Slo-Blo</td>
</tr>
</tbody>
</table>

Note

The ATM150 test set is equipped with optical test capability. Use an optical patch cord with a 7 to 10 dB optical attenuator when testing the optical interfaces.

Use Proper Caution When the LASER Output is On

Never look directly into the laser output of your instrument, or into the output of an optical patch cord connected to this output. If your instrument is equipped with an optical option, the laser output can cause permanent damage to your eyes if you do not following these precautions.

Do Not Operate in Explosive Atmospheres

This instrument does not provide protection from static discharges or arcing components and therefore must not be operated in an explosive atmosphere.

Do Not Remove Instrument Covers

To avoid a shock hazard and to maintain proper air flow, never operate the ATM150 with any of its metal covers removed. There is a plastic cover that protects the front panel while the test equipment is not in use. This plastic cover must be removed in order to access the controls on the front panel of the ATM150.
Laser Safety

To prevent personal injury, ensure the following information is reviewed before operating the module.

The Microwave Logic ATM150 is classified as a Class I product as per the United States Food and Drug Administration (FDA) Standard 21 CFR Ch 1040.10. The FDA definition of Class I product is that Laser radiation in excess of 195 uW (at 1310 nm) shall not be accessible during operation, with any controls set to give maximum radiation. The maximum power emitted from the Microwave Logic ATM150, when measured at 20 cm from the Tx Laser aperture is -17dB (19 uW). The laser radiation emitted from the Microwave Logic ATM150 aperture when the fiber optic cable is disconnected has a wavelength of 1310 nm, which is in the near infrared spectrum and is invisible.

CAUTION: The use of optical instruments with this product will increase eye hazard.

The module incorporates two safety mechanisms to prevent accidental or unauthorized emission of laser radiation. These are listed below:

Laser Safety Mechanisms

| Laser Radiation Emission Warning Indicator | The “LASER ON” LED on the front-panel of the test set indicates the laser is activated. |
| Cover on Optical Out Connector | This cover must be in place whenever the optical output port is not in use. The cover must be removed by hand when connecting an optical cable to the Optical Out connector. ENSURE THE LASER IS DEACTIVATED before making the connection. |

Safety Precautions

To avoid exposure to hazardous laser radiation, it is recommended that the following practices are observed during system operation:

ALWAYS DEACTIVATE THE LASER BEFORE CONNECTING OR DISCONNECTING OPTICAL CABLES.

To deactivate the laser, depress the LASER ON button on the front panel (The LED will extinguish).

NEVER examine or stare into the open end of a broken, severed, or disconnected optical cable when it is connected to the module’s Optical Out connector. Arrange for service-trained personnel, who are aware of the hazards involved, to repair optical cables.
Reader Comment Card

Tektronix, Microwave Logic Product  **ATM150**

We welcome your evaluation of this manual. Your comments and suggestions help us improve our publications. Please FAX or mail to:

Tektronix, Microwave Logic Products at:  
ATTN: Documentation, 285 Mill Rd., Chelmsford, MA 01824  
FAX (508) 256-2038

<table>
<thead>
<tr>
<th>Please circle one number for each statement.</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The manual is well organized.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I can find the information I want.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The index is thorough.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>I can easily understand the instructions and procedures.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The instructions are complete.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The manual is clearly written.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The concepts and vocabulary are easy to understand.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The examples are clear and useful.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The manual contains enough examples.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The illustrations are clear and helpful.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The manual contains enough illustrations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The layout &amp; format enhance the manual's usefulness.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The information in the manual is accurate.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The manual, taken as a whole, is a good learning tool.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The documentation (if viewed prior to the purchase) influenced the purchase decision.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>The quality of this manual would influence any repeat purchase decision.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>This manual meets my overall expectations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Please write additional comments, particularly if you disagree with a statement above. Use additional pages if needed. The more specific your comments, the more useful they are to us.

Comments

__________________________________________________________________________

__________________________________________________________________________

Name: ____________________________

Company: _______________________

Address: ________________________

Zip or Post Code: _______________________

Telephone: _______________________

ix 3/22/96
1. Introduction

Functional Description of ATM150

Powerful, programmable, and portable, the ATM150 from Tektronix is a generator/analysers for real-time Asynchronous Transfer Mode (ATM) testing. The ATM150 is optimized to stress and evaluate ATM cell switching networks and network components.

Standard Features

- Portable, economical ATM test set
- Current operation up to 155.52 Mbps
- Six interface options available now include:
  - DS3 with or without PLCP
  - DS1 with or without PLCP
  - E1 and E3, with or without PLCP
  - 100Mbps fiber (TAXI)
  - 155.52 Mbps SONET OC-3c/ SDH STM-1
- Cell Delay Histogram for performance benchmarking
- Measures Quality of Service parameters, including cell losses, cell delays, and cell errors
- CCITT/ITU, ANSI, and ATM Forum compliance
- Internal hard drive and built-in 3.5" disk drive for software upgrades, test data storage and instrument setup storage

Generator

The generator creates a constant stream of 53-byte ATM cells with standard CCITT or ANSI cell headers. These cells are mapped into a variety of physical interfaces, selectively using the SONET ATM mapping or the Physical Layer Convergence Protocol (PLCP). The ATM150 supports cell data rates up to 155.52 Mbps.

The ATM150 generates up to 8191 different cell headers and one is reserved for idle cells for a total of 8192. Up to four can be used for test cell VPI/VCI addresses and the remainder can be programmed for background traffic, allowing analysis at four destinations from one generator.

The generator produces a wide range of statistically defined traffic patterns. The user can vary the average and peak bandwidth as well as the degree of burst to emulate Constant Bit Rate (CBR) or Variable Bit Rate (VBR) traffic approximating uniform, Gaussian, Poisson, or user-defined distributions.
Test cell information fields contain a time-tag, used to calculate cell delay times and delay variations, and a sequence-tag to allow detection of lost cells. The remainder of the field is encoded with a pseudo-random number sequence to allow cell error detection. HEC and cell payload errors can be generated to stress and evaluate network performance.

**Analyzer**

The analyzer synchronizes and delineates the ATM cells from the selected input using the SONET ATM mapping or the Physical Layer Convergence Protocol (PLCP). Header Error Control (HEC) errors are detected and counted. Physical layer (SONET, DS-3, and PLCP) alarms and errors are detected.

Valid cells matching one user-selected VPI/VCI (test cell) are detected, counted and routed for further analysis. Valid active cells not matching a programmed VPI/VCI are counted as misrouted and discarded. Valid idle cells are counted and discarded.

Circuitry compares the test cell payload data with a reference pseudo-random number sequence to detect ATM cells with bit errors. These errors are counted for cell error ratio calculations. The cell time-tag is compared to the reference clock to determine the cell delay. The calculated delays are stored in variable-sized bins for cell delay variation (jitter) analysis. Lost cells are detected by ensuring the current sequence-tag is one greater than the sequence-tag from the previous test cell. Sequence errors are detected and counted for cell loss ratio measurements. An on-board DSP accumulates and processes the cell data for statistical measurements.

**Interfaces**

The instrument includes a high resolution LCD display for the user interface, which features softkeys and pop-up menus. The 3.5" MS-DOS compatible floppy disk drive can be used to store test results, save test setups and transfer test data to a personal computer for further analysis. Also included are RS-232 and GPIB interfaces, which can be used for downloading test data or automated remote control.
Figure 1-2 – Rear Panel - ATM150

AC LINE

WARNING
ELECTRICAL SHOCK HAZARD.
THIS INSTRUMENT MUST BE GROUNDED
DO NOT OPEN INSTRUMENT REFER SERVICING
TO QUALIFIED PERSONNEL
DISCONNECT POWER CORD BEFORE
REPLACING FUSE
FOR CONTINUOUS FIRE PROTECTION REPLACE
ONLY WITH SPECIFIED FUSES

<table>
<thead>
<tr>
<th>INPUT VOLTAGE</th>
<th>RANGE</th>
<th>MAX POWER</th>
<th>LINE FUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>145</td>
<td>100-120V</td>
<td>300W</td>
<td>5A SLOBLO</td>
</tr>
<tr>
<td>230</td>
<td>200-240V</td>
<td>300W</td>
<td>2.5A SLOBLO</td>
</tr>
</tbody>
</table>

FREQUENCY 47-63Hz

Printer

VIDEO

RS-232C

GPIB (IEEE STD 488 PORT)

100 Mbps

OUT IN

155 MBS

UTP-5

GENERATOR

SYNC OUT

ANALYZER

SYNC OUT

ANALYZER 1PPS

50 Ω TTL

GENERATOR 1PPS

50 Ω TTL

ATM695-2
2. Getting Started
Operating Basics

This section briefly introduces the front panel of the ATM150. Knowledge of the front panel will help in the Quick Start exercise that follows this information.

ATM150 Front Panel
The front panel is divided into eleven sections:

- Display and softkeys
- Entry keys
- Power switch
- Utility
- Generator
- Analyzer
- OC-3c/STM-1
- DS3
- DS1
- E1
- E3

Display in General
The display is divided into two halves, one side is for Generator setup and bandwidth measurements, the other side is for Analyzer setup and test measurement data.

Figure 2-1 – Softkey portion and LCD screen of ATM150 Front Panel
The Generator and Analyzer each have their own softkeys, which are labeled around the outside edge of the display. Pressing a softkey can initiate an action or it can bring up a pop-up window. When a key is pressed with a pop-up window, that key will reverse video to indicate it is active. It will remain active until either the escape key is pressed or that key is pressed again.

If a second softkey on the other side is pressed while one key is active, it will become the active key. The initial softkey will show diagonal lines indicating that when the second softkey becomes inactive, the first softkey will resume the active state.

**Entry keys**

The ENTRY keys are used to change values, selections and move the cursor. Values changed by the knob are immediately written to the hardware. Values changed by the keys are either entered by the ENTER key, the turn knob, or abandoned by the ESC key.

The ENTER key will be ignored for the menu fields that can be changed with the turn knob located in the entry pad. Softkeys can be used to bring up pop-up windows, and the ESC key is used to remove pop-up windows. The ENTRY keys are positioned to the right of the LCD screen (See Figure 2-1).

**Other labeled areas on ATM150 Front Panel**

The Generator and Analyzer sections show various states of operation and activate Cell Run and Test Run. The Analyzer section also includes an Error History LED display.

The physical interface cable connections take up the entire bottom of the front panel.
Quick Start

DS3 Signal

The objective of this exercise is to configure the ATM150 for a DS3 interface and then generate and analyze ATM test cells. The exercise begins by setting up the Generator side of the ATM150 by changing choices within the SETUP, HEADER CONTROL and CELL DISTRIBUTION softkeys.

Setting up the Analyzer side will follow the Generator exercise, with choices to be made to the Analyzer's SETUP and TEST CELL softkeys.

Also covered in this Operating Basics exercise are the Utility functions that permit changes to the RS-232, GPIB and Remote Interfaces; designating the monitor for LCD or VGA and adjusting the contrast of the ATM150's LCD display.

For full detail on all menu screens and choices, refer to Chapter 3.

☐ Turn the POWER switch ON. The ATM150 will display a start-up screen while it goes through self-diagnostics.

☐ Hook a 75 ohm BNC coax cable between the DS-3 output line on the front panel to the DS-3 input line also located on the front panel.

Note

The ATM150 test set is equipped with optical test capability. Use an optical patch cord with a 7 to 10 dB optical attenuator when testing the optical interfaces. This warning does not apply specifically to this exercise, as the following exercise demonstrates the DS3 capabilities of the unit.

Figure 2-2 - Hook coax cable between DS-3 Output and Input
Generator

- SETUP: On the Generator side of the ATM150's LCD screen, press the softkey labeled 'SETUP'. This will bring up a menu of choices.

<table>
<thead>
<tr>
<th>SETUP</th>
<th>Other choices *</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTPUT SIGNAL</td>
<td>DS3</td>
</tr>
<tr>
<td></td>
<td>DS1; OC-3c; E1; E3</td>
</tr>
<tr>
<td></td>
<td>STM-1; 100Mbps</td>
</tr>
<tr>
<td>CELL FORMAT</td>
<td>UNI</td>
</tr>
<tr>
<td></td>
<td>NNI</td>
</tr>
<tr>
<td>CLOCK SOURCE</td>
<td>INT</td>
</tr>
<tr>
<td></td>
<td>RECOVERED</td>
</tr>
<tr>
<td>DS3 PLCP MODE</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>DS3 FRAMING</td>
<td>CBIT</td>
</tr>
<tr>
<td></td>
<td>MX3</td>
</tr>
<tr>
<td>PAYLOAD SCRAMBLE</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>SYSTEM PARAMETERS... (see submenu following the DS3/DS1, E1/E3 note)</td>
<td></td>
</tr>
</tbody>
</table>

* Note: DS3 and DS1 signals, E1 and E3 signals

Each signal interface module includes transmitter and receiver circuitry. In general, the transmitter and receiver operate independently allowing the transmitter of one interface module (for example, OC-3c) to be used simultaneously with the receiver of another interface module (for example, DS3). However, the DS1/DS3 and E1/E3 interfaces combine two interfaces on the same module. In this case, if both the transmitter and receiver of the DS1/DS3 module are used, the module must be set to the same signal. This situation also applies to the E1/E3 module.

For example, the DS1 circuitry is shared with the DS3 circuitry (E1 circuitry is shared with E3 circuitry). If the Generator (transmitter) signal is set to DS1, the Analyzer (receiver) cannot be set to DS3. (If the Generator is set to E1, the Analyzer cannot be set to E3.)

The ATM150 will prevent the user from setting a combination that is not permitted. If the Analyzer is set for DS3 operation and the user tries to set the Generator for DS1 operation, the ATM150 will change the Analyzer to DS1 to match the Generator signal setting. In this example (DS1 operation on the Generator side of the ATM150), the user can set the Analyzer to OC-3c or any other signal interface except DS3. The note above on the DS1 and DS3 signals apply in the same manner to the operation of the E1 and E3 signals.
submenu to SYSTEM PARAMETERS...

<table>
<thead>
<tr>
<th>1PPS SOURCE</th>
<th>INT</th>
<th>EXT</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYNC PULSE OUTPUT</td>
<td>ATM</td>
<td>PHYSICAL</td>
</tr>
<tr>
<td>HEC COSET</td>
<td>ENABLE</td>
<td>DISABLE</td>
</tr>
</tbody>
</table>

The 1PPS Source choice controls the timing used for the cell delay measurements.

For proper delay measurements, the Generator and corresponding Analyzer should use the same source for the 1PPS.

UNI (User-Network Interface) is the ATM cell format that includes the GFC and a smaller VPI. NNI (Network-Network Interface) is the ATM cell format that does not include the GFC.

If the choices do not match what is listed in the table above, make changes (instructions follow) on the screen to conform to the table. Move from line to line with the cursor keys (either/or up or down arrows). Make changes within the highlighted block by pressing the ENTER key or knob. To get back to the main display, press the original softkey (in this case, 'SETUP') or press the ESC key in the ENTRY keys section of the ATM150.

- **HEADER CONTROL** - The next softkey on the Generator side to press is 'HEADER CONTRL'. A pop-up menu will appear on top of the main Generator screen.

### HEADER CONTRL

<table>
<thead>
<tr>
<th>TEST * CELL NUMBER</th>
<th>Other choices/ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 to total active cells (1,2,3,4)</td>
</tr>
<tr>
<td>GFC</td>
<td>0</td>
</tr>
<tr>
<td>VPI / VCI</td>
<td>1/1</td>
</tr>
<tr>
<td>PTI / CLP</td>
<td>0/0</td>
</tr>
</tbody>
</table>

**ACTIVE HEADER GENERATION** | ......(submenu - see following) |
**RANDOMIZE** | ON | OFF |

SEE CELL DISTRIBUTION MENU FOR CUSTOM FILE TRANSFER

* The CELL NUMBER can be TEST or ACTIVE.

** The VPI value is 0 to 255 if the cell format is UNI

If necessary, change what is on screen to match this table, by using the cursor arrow keys and/or the ENTER key, knob or keypad. Return to the main Generator screen by pressing the softkey again (HEADER CONTRL) or pressing 'ESC'.

---

Rev. 1.5  2-5  3/22/96
ACTIVE HEADER GENERATION Submenu to HEADER CONTROL - While in the "HEADER CONTROL" menu, press the 'ENTER' key when the cursor is sitting on one of the dot-dots in the ACTIVE HEADER GENERATION line of choice. The following pop-up menu will appear on top of the main Generator screen.

<table>
<thead>
<tr>
<th>submenu to HEADER CONTROL</th>
<th>ACTIVE HEADER GENERATION</th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF CELLS</td>
<td>16</td>
<td>0-8191</td>
</tr>
<tr>
<td>GFC</td>
<td>0</td>
<td>0-15</td>
</tr>
<tr>
<td>VPI / VCI</td>
<td>15 / 1000</td>
<td>0-255 / 0-65,535</td>
</tr>
<tr>
<td>PTI / CLP</td>
<td>0 / 0</td>
<td>0-7 / 0-1</td>
</tr>
<tr>
<td>VCI INCREMENT</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

<GENERATE ACTIVE HEADERS>
CELL DISTRIBUTION - On the Generator side of the ATM150's screen, press the softkey labeled 'CELL DISTRIB'. A pop-up menu will appear on top of the main Generator screen.

<table>
<thead>
<tr>
<th>CELL DISTRIB</th>
<th>Other choices*</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACTIVE</td>
<td>CONSTANT 50.0%</td>
</tr>
<tr>
<td></td>
<td>CELL BURST COUNT: 1</td>
</tr>
<tr>
<td></td>
<td>UNIFORM GAUSSIAN POISSON RAMP</td>
</tr>
<tr>
<td>IDLE</td>
<td>CONSTANT 50.0%</td>
</tr>
<tr>
<td></td>
<td>CELL BURST COUNT: 1</td>
</tr>
<tr>
<td></td>
<td>UNIFORM GAUSSIAN POISSON RAMP</td>
</tr>
<tr>
<td>RANDOMIZE</td>
<td>ON</td>
</tr>
<tr>
<td>CUSTOM FILE TRANSFER</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>......(submenu - see following)</td>
</tr>
</tbody>
</table>

* Be aware that making choices other than 'CONSTANT' for the active cells brings up related choices other than 'CELL BURST COUNT'. The submenu choices related to 'UNIFORM', 'GAUSSIAN', 'POISSON', 'RAMP' and 'CUSTOMIZED' are not shown in this exercise. See Menu Structure in Chapter 3 for a complete set of menu screens. See Chapter 4 for applications information on what these statistical distributions are used for.

Note ACTIVE and IDLE cell choices can be different. In order to facilitate this Quick Start exercise, follow the sample screens.

The Randomize function scrambles the starting point of the statistical distributions, as well as, all values through the entire distribution, to better emulate traffic in the network that does not always begin at a certain point.

<table>
<thead>
<tr>
<th>submenu to CELL DISTRIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUSTOM FILE TRANSFER</td>
</tr>
<tr>
<td>DRIVES</td>
</tr>
<tr>
<td>CUSTOM FILENAME</td>
</tr>
<tr>
<td>&lt;LOAD FROM DISK&gt;</td>
</tr>
<tr>
<td>&lt;!!! DELETE FILE !!!&gt;</td>
</tr>
</tbody>
</table>
Return to the main Generator screen by pressing the softkey again (‘CELL DISTRIBUT’) or pressing ‘ESC’.

- **BANDWIDTH CONTROL** - Press the key “Bandwidth Control” to bring up the following menu. Set the Bandwidth control to the following values.

<table>
<thead>
<tr>
<th>BANDWIDTH CONTROL</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDLE BANDWIDTH</td>
<td>50.00%</td>
</tr>
<tr>
<td>(Based on Cell Distribution)</td>
<td></td>
</tr>
<tr>
<td>TEST CELL BANDWIDTH</td>
<td></td>
</tr>
<tr>
<td>1) 1 / 1</td>
<td>50.0%</td>
</tr>
<tr>
<td>2) 1 / 2</td>
<td>.0%</td>
</tr>
<tr>
<td>3) 1 / 3</td>
<td>.0%</td>
</tr>
<tr>
<td>4) 1 / 4</td>
<td>.0%</td>
</tr>
<tr>
<td>TRAFFIC BANDWIDTH</td>
<td>.0%</td>
</tr>
</tbody>
</table>

The Generator side is now ready to send ATM test cells to the Analyzer.
Analyzer

- On the Analyzer side of the ATM150’s main screen are softkeys labeled ‘SETUP’ and ‘TEST CELL’.

- SETUP - Press the softkey labeled ‘SETUP’ on the Analyzer side and a pop-up menu will appear on top of the main LCD screen.

<table>
<thead>
<tr>
<th>SETUP</th>
<th>Other choices *</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT SIGNAL</td>
<td>DS3</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>CELL FORMAT</td>
<td>UNI</td>
</tr>
<tr>
<td>LOOPBACK</td>
<td>DISABLE</td>
</tr>
<tr>
<td>DS3 PLCP MODE</td>
<td>ON</td>
</tr>
<tr>
<td>DS3 FRAMING</td>
<td>CBIT</td>
</tr>
<tr>
<td>PAYLOAD SCRAMBLE</td>
<td>ON</td>
</tr>
</tbody>
</table>

SYSTEM PARAMETERS... (see submenu following the DS3/DS1, E1/E3 note)

* When the LOOPBACK is ENABLED, the left side of the front panel screen displays the following message: ***ANALYZER IN LOOPBACK.

* Note: DS3 and DS1 signals, E1 and E3 signals

Each signal interface module includes transmitter and receiver circuitry. In general, the transmitter and receiver operate independently allowing the transmitter of one interface module (for example, OC-3c) to be used simultaneously with the receiver of another interface module (for example, DS3). However, the DS1/DS3 and E1/E3 interfaces combine two interfaces on the same module. In this case, if both the transmitter and receiver of the DS1/DS3 module are used, the module must be set to the same signal. This situation also applies to the E1/E3 module.

For example, the DS1 circuitry is shared with the DS3 circuitry (E1 circuitry is shared with E3 circuitry). If the Generator (transmitter) signal is set to DS1, the Analyzer (receiver) cannot be set to DS3. (If the Generator is set to E1, the Analyzer cannot be set to E3.)

The ATM150 will prevent the user from setting a combination that is not permitted. If the Analyzer is set for DS3 operation and the user tries to set the Generator for DS1 operation, the ATM150 will change the Analyzer to DS1 to match the Generator signal setting. In this example (DS1 operation on the Generator side of the ATM150), the user can set the Analyzer to OC-3c or any other signal interface except DS3. The note above on the DS1 and DS3 signals apply in the same manner to the operation of the E1 and E3 signals.
2. Getting Started

The 1PPS Source choice controls the timing used for the cell delay measurements. For proper delay measurements, the Generator and corresponding Analyzer should use the same source for the 1PPS.

UNI (User-Network Interface) is the ATM cell format that includes the GFC and a smaller VPI. NNI (Network-Network Interface) is the ATM cell format that does not include the GFC.

The values in the Analyzer Physical Layer pop-up menu should match the values entered in the Generator Physical Layer pop-up menu. If the choices do not match what is listed in the table above, make changes on the screen to conform to the table. Move from line to line with the cursor keys (either/or up or down arrows). Make changes within the highlighted block by pressing the ENTER key or knob. To get back to the main display, press the original softkey (in this case, ‘PHYSICAL LAYER’) or press the ESC key in the ENTRY keys section of the test set.

☐ TEST CELL - Press the softkey labeled ‘TEST CELL’ and a pop-up menu will appear on top of the main LCD screen.

<table>
<thead>
<tr>
<th>TEST CELL</th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISABLE * LINK TO TEST CELL</td>
<td>1, 2, 3, 4</td>
</tr>
<tr>
<td>GFC</td>
<td>0</td>
</tr>
<tr>
<td>VPI/VCI</td>
<td>0/255, 0/65,535</td>
</tr>
<tr>
<td>PTI/CLP</td>
<td>0/0, 0/7, 0/1</td>
</tr>
</tbody>
</table>

* Choices are DISABLE AND ENABLE

When the LINK TO TEST CELL choice is ENABLE, the next three lines (GFC, VPI/VCI, and PTI/CLP) do not appear on the screen.

The values in the Analyzer Test Cell pop-up menu should match the values entered in the Generator Header Control pop-up menu. If necessary, change what is on screen to match this table, by using the cursor arrow keys and/or ENTER key, knob or keypad. Return to the main Analyzer screen by pressing the softkey again (‘TEST CELL’) or pressing ‘ESC’.

Rev. 1.5 2-10 3/22/96
ATM Test Cells

The Analyzer is now ready to receive the ATM test cells sent by the Generator. Press down the button ‘CELL RUN’ (LED light on) in the Generator key section and then press down the ‘TEST RUN’ (LED light on) button in the Analyzer key section.

The screen on the Generator side will display measured Peak and Average bandwidth of the test cells going out. The Analyzer will show the count of incoming test cells, and the effective bandwidth being used. In the example that has been detailed here, the test cell percentage on the Analyzer side should match the percentage value of test cell #1 on the Generator side.

RESULT SCREEN

The RESULTS SCREEN softkey on the Analyzer side of the LCD screen permits four choices for the display of test information. Push the softkey until the appropriate choice appears under the RESULTS SCREEN name: ATM1 or ATM2 - for ATM Layer information, or PHYS1 or PHYS2 for Physical Layer alarms.

Example of Results

<table>
<thead>
<tr>
<th>RESULTS SCREEN (s)</th>
<th>ATM1</th>
<th>ATM2</th>
<th>PHYSICAL1</th>
<th>PHYSICAL2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal:</td>
<td>DS3</td>
<td>VPI/VCI</td>
<td>VPI/VCI</td>
<td>VPI/VCI</td>
</tr>
<tr>
<td>VPI/VCI............</td>
<td>1/1</td>
<td>1/1</td>
<td>1/1</td>
<td>1/1</td>
</tr>
<tr>
<td>HEC ERR</td>
<td>Test elapsed: 0-15:21:43.0</td>
<td>Alarms:</td>
<td>Test elapsed: 0-15:18:35.5</td>
<td></td>
</tr>
<tr>
<td>5 0.01E-07</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test cell</td>
<td>Idle cell 47999</td>
<td>50.00%</td>
<td>HIST</td>
<td></td>
</tr>
<tr>
<td>5.6E+0970.704 Mbps</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cell loss</td>
<td>Misinsert 454080</td>
<td>47.30%</td>
<td>Parity: 0 0.00e-11</td>
<td>PLCP B1: 0</td>
</tr>
<tr>
<td>5 0.09E-08</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PYLD ERR</td>
<td>LCV: 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 0.00E-08</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROP DLY</td>
<td>DS3 FEBE: 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 US 5 US</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Utility - Pressing the 'UTILITY' button changes the labels of the bottom row of softkeys on the Generator side of the ATM150's main LCD screen.

The UTILITY box contains many general functions that are usually associated with the user interface. Press the UTILITY button to bring up the utility menu with softkeys on the front panel LCD display. The internal key LED lights when this key is active. Press the UTILITY key again to exit the utility submenu. Press PANEL LOCK to lock the front panel keys out. The PANEL LOCK LED is lit when this function is active.

The utility menu has the following selections:

<table>
<thead>
<tr>
<th>Factory Default</th>
<th>Selection of this softkey returns the ATM150 to factory settings. This is useful to clear custom settings when it is time to run different tests</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-232</td>
<td>This softkey allows customization of values between the ATM150 and the RS-232 device</td>
</tr>
<tr>
<td>GPIB</td>
<td>This softkey allows customization of values between the ATM150 and the GPIB device</td>
</tr>
<tr>
<td>Remote</td>
<td>This softkey allows customization of values between the ATM150 and the Remote device</td>
</tr>
<tr>
<td>Time Date</td>
<td>Set the current time 00:00:00 AM or PM. Set current date 00/00/00.</td>
</tr>
<tr>
<td>Monitor</td>
<td>This softkey allows changing the monitor display from LCD to VGA. This would be used if an external VGA monitor was being used so a group of people could see the test status and results all at the same time. The front panel display is not available when the display output is being seen on an external VGA monitor.</td>
</tr>
<tr>
<td>Contrast</td>
<td>Select CONTRAST to adjust the LCD display screen contrast. Use the knob in the entry keys section to adjust the contrast. The range of values is 0 - 9.</td>
</tr>
<tr>
<td>Printer Port</td>
<td>The ATM150 permits a choice of RS-232 port or LPT port printing.</td>
</tr>
</tbody>
</table>
System Verification Test (Instrument Test)

Power Requirements
The ATM150 is configured with a 110/220 VAC power supply (auto voltage switching).

Instrument setup
- Set the ATM150 on a flat surface.
- Raise the front of the instrument by moving the handle under the instrument body. The handle moves by pushing two buttons at the center of the spot where the handle connects to the instrument body.
- Pull-off the end cap to reveal the front panel of the ATM150.
- Connect the AC power cord on the rear panel. Before connecting the power cord to an AC outlet, be sure that the AC Power switch on the front panel is OFF.
- Press the AC Power switch ON. During the initial power-up sequence, the instrument performs a diagnostic self-test. In the event a self-test error message is displayed, record the message and call Tektronix, Microwave Logic Products Customer Service at (800-643-2167) for assistance. There are no user-serviceable parts in the ATM150, except the fuse located on the rear panel.

Instrument checkout
After the initial unpacking, the ATM150 should be checked for proper electrical operation. Follow the Operating Basics exercise detailed on pages 2-3 through 2-11 in this section. The exercise reviews use of the softkeys, entry keys and knob, as well as Generator and Analyzer ATM Test Cell functions.
3. Reference

This section discusses all the hardware and software features of the ATM150. It will work through the front and rear panels, electrical connections, all hardware switches and connections, all software screens and all choices available.

ATM150 Front Panel

The front panel is divided into eleven sections:

- Display and softkeys
- Entry keys
- Power switch
- Utility
- Generator
- Analyzer
- OC-3c/STM-1
- DS3
- DS1
- E1
- E3

Figure 3-1 – Front Panel of ATM150
Display in General

The display is divided into two halves, one side is for Generator setup and bandwidth measurements, the other side is for Analyzer setup and test measurement data.

Figure 3-2 – Softkey portion and LCD screen of ATM150 Front Panel

The Generator and Analyzer each have their own softkeys, which are labeled around the outside edge of the display. Pressing a softkey can initiate an action or it can bring up a pop-up window. When a key is pressed with a pop-up window, that key will reverse video to indicate it is active. It will remain active until either the escape key is pressed or that key is pressed again.

If a second softkey on the other side is pressed while one key is active, it will become the active key. The initial softkey will show diagonal lines indicating that when the second softkey becomes inactive, the first softkey will resume the active state.

Entry keys

The ENTRY keys are used to change values, selections and move the cursor. Values changed by the knob are immediately written to the hardware. Values changed by the keys are either entered by the ENTER key, the turn knob, or abandoned by the ESC key.

The ENTER key will be ignored for the menu fields that can be changed with the turn knob located in the entry pad. Softkeys can be used to bring up pop-up windows, and the ESC key is used to remove pop-up windows.
Power Switch

The on/off power switch is located on the left side of the test instrument below the LCD screen.

```
  __________
 |         |
 |         |
 |  POWER  |
 |  _      |
 |   |     |
 |   |     |
 |  O     |
```

Generator

The Generator box on the front panel of the ATM150 contains status indicators, providing operating status at a glance. The CELL RUN button with LED light activates the generation of ATM test cells. The LASER ON button with LED light activates the laser for generation of ATM test cells while using the optical interfaces. The Generator outputs one physical channel with up to four VPI/VCI addresses.

```
  _______          _______
 |        |  _______|
 |ERROR   |  |CELL   |
 |  INJECT |  |  RUN  |
 |  O      |  |  O    |
 |         |  |  O    |
```

Analyzer

The Analyzer box on the front panel of the ATM150 contains status and history indicators, providing operating status at a glance. The TEST RUN button with LED light activates the analysis of ATM test cells. The ERROR HISTORY LED display shows at a glance what type of four different types of errors have been detected. The ERROR HISTORY highlights PHYSICL (cables); HEC (ATM Cell Header, Cell Error measurement), CELL (Cell Loss or Payload Error of ATM cell measurement) and DELIN (Delineation - where the test instrument cannot find the beginning and/or ends of ATM test cell errors). The Analyzer inputs one physical channel and can match on one VPI/VCI.

```
  _______            _______
 |        |  _______|
 |TEST    |  |ERROR  |
 |  RUN   |  | HISTORY|
 |  O     |  |  HEC   |
 |  NO    |  |  PHYSICL|
 |  INPUT |  |  CELL  |
 |  O     |  |  DELIN |
 |        |  |  CLEAR |
```
Note

The ATM150 test set is equipped with optical test capability. Use an optical patch cord with a 7 to 10 dB optical attenuator when testing the optical interfaces.

OC-3c/STM-1

Starting in the lower left corner of the ATM150's front panel are the Generator output and the Analyzer input cable connections for the 155.52Mbps SONET OC-3c/SDH STM-1. The OC-3c/STM-1 connection can handle either single-mode or multi-mode fiber cable with a FC/PC connection. Be aware of a "key" tab on the OC-3c/STM-1 optical cable that must correspond with the "key" slot on the OC-3c/STM-1 optical connection.

DS3

Moving to the right, the next Generator output and Analyzer input cable connections are for the DS3 physical interface. The DS-3 connections use 75 ohm BNC coax cables.
E1
In the middle of the front panel is the Generator output and Analyzer input cable connections for the E1 physical interface. The E1 connections use 120 ohm Siemens-compatible E1 connection cables.

![E1 diagram]

E3
E3 is the Generator output and the Analyzer input connection when using the E3 physical interface. The E3 connections require 75 ohm BNC coax cables.

![E3 diagram]

DS1
DS1 is the Generator output and the Analyzer input connection when using the DS1 physical interface. The DS1 connection requires a 100 ohm DS1 patch cord (WECO 310-compatible).

![DS1 diagram]
Utility

Pressing the 'UTILITY' button changes the labels of the bottom row of softkeys on the Generator side of the ATM150's main LCD screen.

![Utility Button](image)

The UTILITY box contains many general functions that are usually associated with the user interface. Press the UTILITY button to bring up the utility menu with softkeys on the front panel LCD display. The internal key LED lights when this key is active. Press the UTILITY key again to exit the utility submenu. Press PANEL LOCK to lock the front panel keys out. LED is lit when this function is active. When the UTILITY button is pressed, the three softkeys on the left side of the screen (Generator side) running vertically disappear, so as to not confuse the user with softkey choices that do not have anything to do with UTILITY functions.

The utility menu has the following selections:

<table>
<thead>
<tr>
<th>Factory Default</th>
<th>Selection of this softkey returns the ATM150 to factory settings. This is useful to clear custom settings when it is time to run different tests.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-232</td>
<td>This softkey allows customization between the ATM150 and the RS-232 device.</td>
</tr>
<tr>
<td>GPIB</td>
<td>This softkey allows customization of values between the ATM150 and the GPIB device.</td>
</tr>
<tr>
<td>Remote</td>
<td>This softkey allows customization of values between the ATM150 and the Remote device.</td>
</tr>
<tr>
<td>Time Date</td>
<td>Set the current time 00:00:00 AM or PM. Set current date 00/00/00.</td>
</tr>
<tr>
<td>Monitor</td>
<td>This softkey allows changing the monitor display from LCD to VGA. This would be used if an external VGA monitor was being used so a group of people could see the test status and results all at the same time. The front panel display is not available when the display output is being seen on an external VGA monitor.</td>
</tr>
<tr>
<td>Contrast</td>
<td>Select CONTRAST to adjust the LCD display screen contrast. Use the knob in the entry keys section to adjust the contrast. The range of values is 0 - 9.</td>
</tr>
<tr>
<td>Printer Port</td>
<td>The ATM150 permits a choice of RS-232 port or LPT port printing.</td>
</tr>
</tbody>
</table>

Factory Default

Select FACTORY DEFAULT in the UTILITY choices to reset the unit to its factory default settings. See the Appendices section for default settings. When FACTORY DEFAULT is selected, a pop-up window will ask if you are sure, (NO) will exit without doing the default setting, (YES) will perform the default setting.
### RS-232 Interface


<table>
<thead>
<tr>
<th></th>
<th>Default</th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud Rate</td>
<td>9600</td>
<td>4800</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>300</td>
</tr>
<tr>
<td>Parity</td>
<td>EVEN</td>
<td>NONE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ODD</td>
</tr>
<tr>
<td>Data Size</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Stop Bits</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Echo</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>XON/XOFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>EOL Terminator</td>
<td>CR</td>
<td>CR/LF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LF/CR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LF</td>
</tr>
</tbody>
</table>

### GPIB Interface

Press GPIB in the UTILITY choices to setup the GPIB interface.

<table>
<thead>
<tr>
<th></th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPIB ADDRESS</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>0-30</td>
</tr>
<tr>
<td>GPIB TERM</td>
<td>EOL/LF</td>
</tr>
<tr>
<td></td>
<td>EOL ONLY</td>
</tr>
<tr>
<td></td>
<td>EOI/LF</td>
</tr>
<tr>
<td></td>
<td>EOI ONLY</td>
</tr>
<tr>
<td>GPIB BUS MODE</td>
<td>TALK/LISTEN</td>
</tr>
<tr>
<td></td>
<td>OFF BUS</td>
</tr>
</tbody>
</table>
REMOTE Interface
Press REMOTE in the UTILITY choices to change the debug mode.

<table>
<thead>
<tr>
<th></th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMAND HEADER</td>
<td>ON</td>
</tr>
<tr>
<td>DEBUG MODE</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Monitor
Select MONITOR in the UTILITY choices to swap between the front panel LCD and the rear panel video connector. This allows the user to connect a VGA screen for group viewing. The front panel display is not available when the display output is being seen on an external VGA monitor.

Contrast
Select CONTRAST in the UTILITY choices to adjust the LCD display screen contrast. Use the knob in the entry keys section to adjust the contrast.

Floppy Drive
The floppy drive uses 3.5" MS-DOS formatted DS-HD 1.44 MB diskettes. The floppy disk drive can be used to store test results, save test setups and transfer test data to a personal computer for further analysis.

<table>
<thead>
<tr>
<th></th>
<th>TIME/ DATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Date</td>
<td>00/00/00</td>
</tr>
<tr>
<td>Current Time</td>
<td>00:00:00 AM or PM</td>
</tr>
</tbody>
</table>

<SET TIME/DATE>

Printer Port

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LPT</td>
<td>Parallel Port</td>
</tr>
<tr>
<td>RS232</td>
<td>Serial Port</td>
</tr>
</tbody>
</table>
Menu Structure

Generator Softkeys

This section details the softkeys and the functions available. Starting on the Generator side of the LCD screen at the upper left side, this description will continue on the Analyzer side of the LCD screen. Use the turn knob on right-side of the front panel to change values within menu fields.

Figure 3-3 – Softkey portion and LCD screen of ATM150 Front Panel

STORE AND RECALL QUICK SETUP

This menu is entered by selecting the upper left-hand softkey. This key is always visible, except when in bar graph mode or utility mode. There are three choices available in this menu: RECALL SETUP; STORE SETUP; and EXIT. Press the corresponding softkey or the Enter key on the keypad to activate the function. The following types of settings are stored in the Store and Recall Quick Setup: Physical Interface Selection and Parameters; Physical Alarm Generation; Header Settings; Cell Parameters; Error Generation; and, System Settings. Header and distribution RAM contents are not stored in the Quick Setup.

Note:

Setups stored to floppy disks are only valid for the instrument they were stored with and should not be used in another ATM150. Stored setups are only valid for the current operating system revision.
MONITR MODE

The MONITR MODE softkey is tied together with the MONITR CONTROL softkey to choose two types of monitoring: -WIN- - the most recent sample of a set period of time (example: WIN set for one second, the monitor will display the errors found in the most recent one-second period, and then the count reset to zero and in the next second, errors are counted) or -MNTR- - an accumulation of information starting at the beginning of the test and going on until stopped.

WIN       MNTR

MONITOR RESET

MONITOR RESET restarts monitoring without restarting pattern generation.

SETUP

Push the SETUP softkey on the Generator side of the LCD screen to select one of six different physical interfaces that can be used in the ATM150. The six interfaces are DS3, DS1, OC-3c/STM-1, E1, E3 and 100Mbps (TAXI). To switch between choices, use the turn knob.

<table>
<thead>
<tr>
<th>SETUP</th>
<th>Other choices *</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTPUT SIGNAL</td>
<td>DS3</td>
</tr>
<tr>
<td></td>
<td>DS1</td>
</tr>
<tr>
<td></td>
<td>OC-3c; STM-1</td>
</tr>
<tr>
<td></td>
<td>E1; E3</td>
</tr>
<tr>
<td></td>
<td>100Mbps</td>
</tr>
<tr>
<td>CELL FORMAT</td>
<td>UNI</td>
</tr>
<tr>
<td></td>
<td>NNI</td>
</tr>
<tr>
<td>CLOCK SOURCE</td>
<td>INT</td>
</tr>
<tr>
<td></td>
<td>RECOVERED</td>
</tr>
<tr>
<td>DS3 PLCP MODE</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>DS3 FRAMING</td>
<td>CBIT</td>
</tr>
<tr>
<td></td>
<td>MX3</td>
</tr>
<tr>
<td>PAYLOAD SCRAMBLE</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>SYSTEM PARAMETERS... (see submenu following the DS3/DS1, E1/E3 note)</td>
<td></td>
</tr>
</tbody>
</table>

* Note: DS3 and DS1 signals, E1 and E3 signals

Each signal interface module includes transmitter and receiver circuitry. In general, the transmitter and receiver operate independently allowing the transmitter of one interface module (for example, OC-3c) to be used simultaneously with the receiver of another interface module (for example, DS3). However, the DS1/DS3 and E1/E3 interfaces combine two interfaces on the same module. In this case, if both the transmitter and receiver of the
DS1/DS3 module are used, the module must be set to the same signal. This situation also applies to the E1/E3 module.

For example, the DS1 circuitry is shared with the DS3 circuitry (E1 circuitry is shared with E3 circuitry). If the Generator (transmitter) signal is set to DS1, the Analyzer (receiver) cannot be set to DS3. (If the Generator is set to E1, the Analyzer cannot be set to E3.)

The ATM150 will prevent the user from setting a combination that is not permitted. If the Analyzer is set for DS3 operation and the user tries to set the Generator for DS1 operation, the ATM150 will change the Analyzer to DS1 to match the Generator signal setting. In this example (DS1 operation on the Generator side of the ATM150), the user can set the Analyzer to OC-3c or any other signal interface except DS3. The note above on the DS1 and DS3 signals apply in the same manner to the operation of the E1 and E3 signals.

<table>
<thead>
<tr>
<th>submenu to SYSTEM PARAMETERS...</th>
</tr>
</thead>
<tbody>
<tr>
<td>1PPS SOURCE</td>
</tr>
<tr>
<td>SYNC PULSE OUTPUT</td>
</tr>
<tr>
<td>HEC COSET</td>
</tr>
</tbody>
</table>

The 1PPS Source choice controls the timing used for the cell delay measurements.

For proper delay measurements, the Generator and corresponding Analyzer should use the same source for the 1PPS.

The clock source for 100 Mbps will always be INTERNAL (INT).

UNI (User-Network Interface) is the ATM cell format that includes the GFC and a smaller VPI.

NNI (Network-Network Interface) is the ATM cell format that does not include the GFC.

<table>
<thead>
<tr>
<th>SETUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other choices *</td>
</tr>
<tr>
<td>OUTPUT SIGNAL</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>CELL FORMAT</td>
</tr>
<tr>
<td>CLOCK SOURCE</td>
</tr>
<tr>
<td>DS1 PLCP MODE</td>
</tr>
<tr>
<td>DS1 FRAMING</td>
</tr>
<tr>
<td>PAYLOAD SCRAMBLE</td>
</tr>
</tbody>
</table>

* See note for DS1 under the previous DS3 Setup menu screen.
### SETUP

<table>
<thead>
<tr>
<th>Setting</th>
<th>Option 1</th>
<th>Other choices *</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTPUT SIGNAL</td>
<td>E1</td>
<td>DS1; DS3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OC-3c; STM-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100Mbps</td>
</tr>
<tr>
<td>CELL FORMAT</td>
<td>UNI</td>
<td>NNI</td>
</tr>
<tr>
<td>CLOCK SOURCE</td>
<td>INT</td>
<td>RECOVERED</td>
</tr>
<tr>
<td>E1 PLCP MODE</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>E1 CRC</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>PAYLOAD SCRAMBLE</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>SYSTEM PARAMETERS...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SETUP

<table>
<thead>
<tr>
<th>Setting</th>
<th>Option 1</th>
<th>Other choices *</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTPUT SIGNAL</td>
<td>E3</td>
<td>DS1; DS3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OC-3c; STM-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100Mbps</td>
</tr>
<tr>
<td>CELL FORMAT</td>
<td>UNI</td>
<td>NNI</td>
</tr>
<tr>
<td>CLOCK SOURCE</td>
<td>INT</td>
<td>RECOVERED</td>
</tr>
<tr>
<td>E3 PLCP MODE</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>E3 FRAMING</td>
<td>G.751</td>
<td>G.751 or G.852</td>
</tr>
<tr>
<td>PAYLOAD SCRAMBLE</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>SYSTEM PARAMETERS...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* See note for E1 and E3 under the previous DS3 Setup menu screen.
### SETUP

<table>
<thead>
<tr>
<th></th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTPUT SIGNAL</td>
<td>OC-3c</td>
</tr>
<tr>
<td></td>
<td>DS1; DS3</td>
</tr>
<tr>
<td></td>
<td>STM-1</td>
</tr>
<tr>
<td></td>
<td>E1; E3</td>
</tr>
<tr>
<td></td>
<td>100Mbps</td>
</tr>
<tr>
<td>CELL FORMAT</td>
<td>UNI</td>
</tr>
<tr>
<td></td>
<td>NNI</td>
</tr>
<tr>
<td>CLOCK SOURCE</td>
<td>INT</td>
</tr>
<tr>
<td></td>
<td>RECOVERED</td>
</tr>
<tr>
<td>SONET POINTER</td>
<td>522</td>
</tr>
<tr>
<td></td>
<td>0-782</td>
</tr>
<tr>
<td>NEW POINTER</td>
<td>522</td>
</tr>
<tr>
<td></td>
<td>0-782</td>
</tr>
</tbody>
</table>

**SETUP**

**<SET NEW POINTER>**

**<PERFORM +PJ> **

**<PERFORM -PJ> **

**SYSTEM PARAMETERS...**

** In the OC-3c SETUP above this note, and the STM-1 SETUP below, two of the menu choices are PERFORM +PJ and PERFORM -PJ. The PJ abbreviation stands for pointer justification and permits plus or minus SONET pointer adjustments. **
**HEADER CONTRL**

Push the HEADER CONTRL softkey to set-up header information for the ATM cells.

<table>
<thead>
<tr>
<th>HEADER CONTRL</th>
<th>Other choices/ranges</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TEST</strong> * CELL NUMBER</td>
<td>1</td>
</tr>
<tr>
<td>GFC</td>
<td>0</td>
</tr>
<tr>
<td>VPI / VCI</td>
<td>1 / 1</td>
</tr>
<tr>
<td>PTI / CLP</td>
<td>0 / 0</td>
</tr>
<tr>
<td>ACTIVE HEADER GENERATION</td>
<td>......(submenu - see following)</td>
</tr>
<tr>
<td>RANDOMIZE</td>
<td>ON</td>
</tr>
</tbody>
</table>

SEE CELL DISTRIBUTION MENU FOR CUSTOM FILE TRANSFER

* The CELL NUMBER can be TEST or ACTIVE.
** The VPI value is 0 to 255 if the cell format is UNI

The Randomize function scrambles the starting point of the statistical distributions, as well as, all values through the entire distribution, to better emulate traffic in the network that does not always begin at a certain point.

**submenu to HEADER CONTROL**

**ACTIVE HEADER GENERATION**

<table>
<thead>
<tr>
<th></th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF CELLS</td>
<td>16</td>
</tr>
<tr>
<td>GFC</td>
<td>0</td>
</tr>
<tr>
<td>VPI / VCI</td>
<td>15 / 1000</td>
</tr>
<tr>
<td>PTI / CLP</td>
<td>0 / 0</td>
</tr>
<tr>
<td>VCI INCREMENT</td>
<td>1</td>
</tr>
</tbody>
</table>

<GENERATE ACTIVE HEADERS>
Note ACTIVE and IDLE cell choices can be different.

**CELL DISTRIB**

This softkey specifies distribution of active to idle cells. The CELL DISTRIB softkey permits changing the mix of ATM cells. The choices are CONSTANT, UNIFORM, GAUSSIAN, POISSON, and RAMP.

The basic concept behind the ATM cell distributions is that a number of Active cells are transmitted, and then a number of Idle cells are transmitted. These groups of cells are the Burst counts. This process is continued such that there are a series of Active and Idle Bursts. The distributions consist of the series of Active and Idle Burst counts.

After setting the Cell Distributions and moving the cursor to the bottom block (ACCEPT DISTRIBUTIONS). Press the ENTER key. A status line at the top of the LCD panel will signify that the ATM150 is “Programming Distributions...”. This will take some time. The ATM150 will prevent further input or softkey changes until it has finished programming the distributions.

<table>
<thead>
<tr>
<th>CELL DISTRIB</th>
<th>Other choices*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ACTIVE</strong></td>
<td></td>
</tr>
<tr>
<td>CONSTANT 50.0%</td>
<td>UNIFORM</td>
</tr>
<tr>
<td>Cell Burst Count: 11940</td>
<td>GAUSSIAN</td>
</tr>
<tr>
<td></td>
<td>POISSON</td>
</tr>
<tr>
<td></td>
<td>RAMP</td>
</tr>
<tr>
<td><strong>IDLE</strong></td>
<td></td>
</tr>
<tr>
<td>CONSTANT 50.0%</td>
<td>UNIFORM</td>
</tr>
<tr>
<td>Cell Burst Count: 0</td>
<td>GAUSSIAN</td>
</tr>
<tr>
<td></td>
<td>POISSON</td>
</tr>
<tr>
<td></td>
<td>RAMP</td>
</tr>
<tr>
<td><strong>RANDOMIZE</strong></td>
<td>ON</td>
</tr>
<tr>
<td><strong>CUSTOM FILE TRANSFER</strong></td>
<td>OFF</td>
</tr>
<tr>
<td><strong>...menu - see following</strong></td>
<td></td>
</tr>
</tbody>
</table>

* See submenu of choices for CELL DISTRIB (Following Custom File Transfer submenu)

**ubmenu to CELL DISTRIB**

**CUSTOM FILE TRANSFER**

<table>
<thead>
<tr>
<th>DRIVES</th>
<th>HARD DRIVE</th>
<th>FLOPPY</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUSTOM FILENAME</td>
<td>XXXXXXXXX</td>
<td></td>
</tr>
<tr>
<td>&lt;LOAD FROM DISK&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;!!! DELETE FILE !!!&gt;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Choices for active and idle cells - CELL DISTRIB - choices and values**

<table>
<thead>
<tr>
<th>CELL DISTRIB - choices for active and idle cells</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CONSTANT</strong> - the entire distribution consists of a single Burst count</td>
<td><strong>ACTIVE</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>IDLE</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Choices and values for active and idle cells - CELL DISTRIB**

<table>
<thead>
<tr>
<th>CELL DISTRIB - choices for active and idle cells</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>UNIFORM</strong> - the distribution consists of Burst counts that vary in size from the minimum count to the maximum counts in increments based on Burst Step size. The occurrence rate for each of the Burst counts will be the same, making a uniform distribution of ATM cell bursts.</td>
<td><strong>ACTIVE</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>IDLE</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Choices and values for active and idle cells - CELL DISTRIB**

<table>
<thead>
<tr>
<th>CELL DISTRIB - choices for active and idle cells</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gaussian - this distribution simulates a Gaussian distribution of Burst counts. The Gaussian curve is defined by the Mean Burst count and the Standard Deviation from the mean in terms of cells.</td>
</tr>
<tr>
<td><strong>Values</strong></td>
</tr>
<tr>
<td><strong>ACTIVE</strong></td>
</tr>
<tr>
<td>GAUSSIAN 50.0%</td>
</tr>
<tr>
<td>Mean: 120 Std Dev: 20</td>
</tr>
<tr>
<td>(Burst Count Range: 60 to 180 Cells)</td>
</tr>
<tr>
<td><strong>IDLE</strong></td>
</tr>
<tr>
<td>GAUSSIAN 50.0%</td>
</tr>
<tr>
<td>Mean: 120 Std Dev: 20</td>
</tr>
<tr>
<td>(Burst Count Range: 60 to 180 Cells)</td>
</tr>
<tr>
<td><strong>MEAN = (0-65,533)</strong></td>
</tr>
<tr>
<td>Max/ Min +3/- 3 times</td>
</tr>
<tr>
<td>Std. Dev.</td>
</tr>
<tr>
<td><strong>MEAN = (0-65,535)</strong></td>
</tr>
<tr>
<td>Max/ Min +3/- 3 times</td>
</tr>
<tr>
<td>Std. Dev.</td>
</tr>
</tbody>
</table>

65,533 with a STD DEV. of one

---

**Choices and values for active and idle cells - CELL DISTRIB**

<table>
<thead>
<tr>
<th>CELL DISTRIB - choices for active and idle cells</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>POISSON</strong> - this distribution simulates a Poisson distribution of Burst counts. The Poisson curve is defined by the Mean Burst count.</td>
</tr>
<tr>
<td><strong>Values</strong></td>
</tr>
<tr>
<td><strong>ACTIVE</strong></td>
</tr>
<tr>
<td>POISSON 50.0%</td>
</tr>
<tr>
<td>Mean: 36</td>
</tr>
<tr>
<td>(Burst Count Range: 18 to 54 Cells)</td>
</tr>
<tr>
<td><strong>IDLE</strong></td>
</tr>
<tr>
<td>POISSON 50.0%</td>
</tr>
<tr>
<td>Mean: 36</td>
</tr>
<tr>
<td>(Burst Count Range: 18 to 54 Cells)</td>
</tr>
<tr>
<td><strong>MEAN = (0-65,527)</strong></td>
</tr>
<tr>
<td>Max/ Min +3/- 3 times</td>
</tr>
<tr>
<td>Std. Dev.</td>
</tr>
</tbody>
</table>
### Choices and values for active and idle cells - CELL DISTRIB

**CELL DISTRIB - choices for active and idle cells**

<table>
<thead>
<tr>
<th>ACTIVE</th>
<th>RAMP 50.0%</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MAX (%): 100 MIN (%): 0</td>
<td>(0% to 100%)</td>
</tr>
<tr>
<td></td>
<td>PERIOD (seconds): 10</td>
<td>(1 to 10 seconds)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IDLE</th>
<th>RAMP 50.0%</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Only ACTIVE cells can be specified</td>
<td></td>
</tr>
</tbody>
</table>

### BANDWIDTH CONTROL

<table>
<thead>
<tr>
<th>IDLE BANDWIDTH</th>
<th>50.0%</th>
<th>15.264 Mbps</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Based on Cell Distribution)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TEST CELL BANDWIDTH**

| 1) | 1 / 1 | 0.8% | .000 Mbps |
| 2) | 1 / 2 | .0%  | .000 Mbps |
| 3) | 1 / 3 | .0%  | .000 Mbps |
| 4) | 1 / 4 | .0%  | .000 Mbps |

**TRAFFIC BANDWIDTH**

| 49.2% | 15.264 Mbps |

**BANDWIDTH CONTROL**

<table>
<thead>
<tr>
<th>PERCENTAGE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Press the MORE key to get to menu choices 2 of 2.

**PHYSICAL ALARMS**

Push the PHYSICAL ALARMS softkey on the Generator side to generate different alarm conditions for the physical interface selected. This softkey works in conjunction with the ERROR ALARMS softkey. These alarms are used to test proper operation of the ATM150 unit under stressful conditions. The four different menus are reproduced below. Each alarm listed is controlled independently.

### DS3 PHYSICAL ALARMS

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>LOF</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>LCV</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>PARITY</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>DS3 FEBE</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>PLCP LOF</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>RAI</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>B1</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>AIS</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>IDLE</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>DS3 FERF</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>PARITY</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>FEBE</td>
<td>OFF (ON)</td>
</tr>
</tbody>
</table>

### DS1 PHYSICAL ALARMS

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>LOF</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>RAI</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>PLCP LOF</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>RAI</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>B1</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>AIS</td>
<td>OFF (ON)</td>
</tr>
</tbody>
</table>

### OC-3c PHYSICAL ALARMS

<table>
<thead>
<tr>
<th>Alarm</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>B1</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>L-AIS</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>LOP</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>P-AIS</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>P-FEBE</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>B3</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>LOF</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>L-FERF</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>B2</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>P-FERF</td>
<td>OFF (ON)</td>
</tr>
<tr>
<td>P-RAI</td>
<td>OFF (ON)</td>
</tr>
</tbody>
</table>
### STM-1 PHYSICL ALARMS

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS</td>
<td>OFF (ON)</td>
<td>LOF</td>
</tr>
<tr>
<td>B1</td>
<td>OFF (ON)</td>
<td></td>
</tr>
<tr>
<td>MS-AIS</td>
<td>OFF (ON)</td>
<td>MS-RDI</td>
</tr>
<tr>
<td>LOP</td>
<td>OFF (ON)</td>
<td>B2</td>
</tr>
<tr>
<td>AU-AIS</td>
<td>OFF (ON)</td>
<td></td>
</tr>
<tr>
<td>HP-REI</td>
<td>OFF (ON)</td>
<td>HP-RDI</td>
</tr>
<tr>
<td>B3</td>
<td>OFF (ON)</td>
<td></td>
</tr>
</tbody>
</table>

### E1 PHYSICL ALARMS

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LOF</td>
<td>OFF (ON)</td>
<td>REMOTE</td>
</tr>
<tr>
<td>AIS</td>
<td>OFF (ON)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLCP LOF</td>
<td>OFF (ON)</td>
<td>PARITY</td>
</tr>
<tr>
<td>RAI</td>
<td>OFF (ON)</td>
<td>FEBE</td>
</tr>
<tr>
<td>B1</td>
<td>OFF (ON)</td>
<td></td>
</tr>
</tbody>
</table>

### E3 PHYSICL ALARMS

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS</td>
<td>OFF (ON)</td>
<td>OOF</td>
</tr>
<tr>
<td>LCV</td>
<td>OFF (ON)</td>
<td>AIS</td>
</tr>
<tr>
<td>FERF/RAI</td>
<td>OFF (ON)</td>
<td>FERF / RAI</td>
</tr>
<tr>
<td>E3 FEBE</td>
<td>OFF (ON)</td>
<td>E3 FEBE</td>
</tr>
<tr>
<td>PLCP LOF</td>
<td>OFF (ON)</td>
<td>PARITY</td>
</tr>
<tr>
<td>RAI</td>
<td>OFF (ON)</td>
<td>FEBE</td>
</tr>
<tr>
<td>B1</td>
<td>OFF (ON)</td>
<td></td>
</tr>
</tbody>
</table>

### 100Mbps (TAXI) PHYSICL ALARMS

NO SELECTION
ATM ERRORS
The ATM ERRORS softkey on the Generator side of the LCD screen is used to inject errors in the ATM cells (header and/or payload). This softkey works in conjunction with the ERROR ALARMS softkey.

<table>
<thead>
<tr>
<th>ATM ERROR CONTROL</th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>* ERRORS</td>
<td>DISABLE</td>
</tr>
<tr>
<td>ERROR RATE</td>
<td>1.0E - 8</td>
</tr>
<tr>
<td>&lt;SINGLE HEC ERROR&gt;</td>
<td>2-9</td>
</tr>
<tr>
<td>&lt;SINGLE CELL PAYLOAD ERROR&gt;</td>
<td></td>
</tr>
</tbody>
</table>

* Error choice - HEC or PYLD

MONITOR CONTROL
The MONITR CONTRL softkey changes the bandwidth measurements of the ATM test. This softkey works in conjunction with the MONITR MODE softkey.

<table>
<thead>
<tr>
<th>MONITOR CONTROL</th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLIDING WINDOW</td>
<td>10 SEC</td>
</tr>
<tr>
<td>MONITOR TYPE</td>
<td>UNTIMED</td>
</tr>
<tr>
<td>MONITOR LENGTH</td>
<td>60 SEC</td>
</tr>
<tr>
<td>SWEEP COUNT</td>
<td>5</td>
</tr>
<tr>
<td>VCI INCREMENT</td>
<td>1</td>
</tr>
<tr>
<td>LINK MONITOR WITH ANALYZER TEST</td>
<td>DISABLE</td>
</tr>
<tr>
<td></td>
<td>ENABLE</td>
</tr>
<tr>
<td></td>
<td>1-10</td>
</tr>
<tr>
<td></td>
<td>TIMED</td>
</tr>
<tr>
<td></td>
<td>1-99,999</td>
</tr>
<tr>
<td></td>
<td>1-99</td>
</tr>
<tr>
<td></td>
<td>1-65,355</td>
</tr>
</tbody>
</table>
Menu Structure
Analyzer Softkeys

Figure 3-4 – Softkey portion and LCD screen of ATM150 Front Panel

RESULT SCREEN
The RESULTS SCREEN softkey on the Analyzer side of the LCD screen permits four choices for the display of test information. Push the softkey until the appropriate choice appears under the RESULTS SCREEN name: ATM1 or ATM2 for ATM Layer information, or PHYS1 or PHYS2 for Physical Layer alarms.

Example of Results

<table>
<thead>
<tr>
<th>RESULTS SCREEN (s)</th>
<th>ATM1</th>
<th>ATM2</th>
<th>PHYSICAL1</th>
<th>PHYSICAL2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal:</td>
<td>DS3 COSET/UNI PLCP</td>
<td>VPI/VCI 1/1</td>
<td>VPI/VCI 1/1</td>
<td>VPI/VCI 1/1</td>
</tr>
<tr>
<td>VPI/VCI cast</td>
<td>0.01E-07</td>
<td>0.01E-07</td>
<td>Test elapsed</td>
<td>Test elapsed:</td>
</tr>
<tr>
<td>Test cell</td>
<td>5.6E+0970.704 Mbps</td>
<td>47999 50.00%</td>
<td>454080 47.30%</td>
<td>Parity:</td>
</tr>
<tr>
<td>Cell loss</td>
<td>0.09E-08</td>
<td></td>
<td>0.00e-11</td>
<td>PLCP B1: 0</td>
</tr>
<tr>
<td>PYLD ERR</td>
<td>0.00E-08</td>
<td>0.00E-08</td>
<td>LCV: 0</td>
<td>PLCP FEBE: 0</td>
</tr>
<tr>
<td>PROP DLY</td>
<td>2 US 5 US</td>
<td>2 US 5 US</td>
<td>DS3 FEBE: 0</td>
<td></td>
</tr>
</tbody>
</table>

Rev. 1.5  3-22  3/22/96
TEST MODE

The TEST MODE softkey on the Analyzer side of the LCD screen is tied together with the RESULTS CONTROL softkey to choose two types of test results: WIN - the most recent sample of a set period of time (example: WIN set for one second, the monitor will display the errors found in the most recent one-second period, and then the count reset to zero and in the next second, errors are counted) or - TEST - an accumulation of information starting at the beginning of the test and going on until stopped.

TEST WIN

Difference between Test Mode - Test and Test Mode - Window is:

- TEST is a continuous display of results without dropping any past information.
- WINDOW (WIN) is a display of the latest specified seconds. WIN drops all history and past information and shows just the latest results. This test mode is useful in tweaking the network lines.

HISTOGRAM

As the test cells arrive at the Analyzer, these cells are grouped into up to ten different bins. This histogram provides a graphical representation of the quantity of test cells distributed in the various delay bins. The delay bins can be arranged around microsecond delays. This bargraph can be used to set performance benchmarks. There is the ability to RUN and HOLD the distribution of test cells while the graphical histogram is being displayed. The default mode of the Histogram is RUN. To exit the HISTOGRAM function, press the top HISTOGRAM button. The screen example below is that of a Gaussian distribution.
SETUP

Push the SETUP softkey on the Analyzer side of the LCD screen to select one of six different physical interfaces that can be used in the ATM150. The six interfaces are DS-3, DS-1, OC-3c/STM-1, E1/E3 and 100Mbps (TAXI). To switch between choices, use the turn knob. The LOOPBACK function is the Analyzer capturing information from the network and sending this information straight to the Generator, without analysis. The Generator in turn feeds the signal right back into the network. This Loopback function is the ability to wire the ATM150 test set directly into the network without disturbing the network flow.

* Note: DS3 and DS1 signals, E1 and E3 signals

Each signal interface module includes transmitter and receiver circuitry. In general, the transmitter and receiver operate independently allowing the transmitter of one interface module (for example, OC-3c) to be used simultaneously with the receiver of another interface module (for example, DS3). However, the DS1/DS3 and E1/E3 interfaces combine two interfaces on the same module. In this case, if both the transmitter and receiver of the DS1/DS3 module are used, the module must be set to the same signal. This situation also applies to the E1/E3 module.

For example, the DS1 circuitry is shared with the DS3 circuitry (E1 circuitry is shared with E3 circuitry). If the Generator (transmitter) signal is set to DS1, the Analyzer (receiver) cannot be set to DS3. (If the Generator is set to E1, the Analyzer cannot be set to E3.)

The ATM150 will prevent the user from setting a combination that is not permitted. If the Analyzer is set for DS3 operation and the user tries to set the Generator for DS1 operation, the ATM150 will change the Analyzer to DS1 to match the Generator signal setting. In this example (DS1 operation on the Generator side of the ATM150), the user can set the Analyzer to OC-3c or any other signal interface except DS3. The note above on the DS1 and DS3 signals apply in the same manner to the operation of the E1 and E3 signals.
**SETUP**

<table>
<thead>
<tr>
<th></th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INPUT SIGNAL</strong></td>
<td>DS3</td>
</tr>
<tr>
<td></td>
<td>DS1</td>
</tr>
<tr>
<td></td>
<td>OC-3c; STM-1</td>
</tr>
<tr>
<td></td>
<td>E1; E3</td>
</tr>
<tr>
<td></td>
<td>100Mbps</td>
</tr>
<tr>
<td><strong>CELL FORMAT</strong></td>
<td>UNI</td>
</tr>
<tr>
<td></td>
<td>NNI</td>
</tr>
<tr>
<td><strong>LOOPBACK</strong> *</td>
<td>DISABLE</td>
</tr>
<tr>
<td></td>
<td>ENABLE</td>
</tr>
<tr>
<td><strong>DS3 PLCP MODE</strong></td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td><strong>DS3 FRAMING</strong></td>
<td>CBIT</td>
</tr>
<tr>
<td></td>
<td>MX3</td>
</tr>
<tr>
<td><strong>PAYLOAD SCRAMBLE</strong></td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td><strong>SYSTEM PARAMETERS...</strong></td>
<td></td>
</tr>
</tbody>
</table>

* When the LOOPBACK is ENABLED, the left side of the front panel screen displays the following message: ***ANALYZER IN LOOPBACK.*

**submenu to SYSTEM PARAMETERS...**

<table>
<thead>
<tr>
<th></th>
<th>GENERATOR</th>
<th>EXT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1PPS SOURCE</strong></td>
<td>ATM</td>
<td>PHYSICAL</td>
</tr>
<tr>
<td><strong>SYNC PULSE OUTPUT</strong></td>
<td>ENABLE</td>
<td>DISABlc</td>
</tr>
<tr>
<td><strong>HEC COSET</strong></td>
<td>ENABLE</td>
<td>DISABlc</td>
</tr>
</tbody>
</table>

The 1PPS Source choice controls the timing used for the cell delay measurements.
For proper delay measurements, the Generator and corresponding Analyzer should use the same source for the 1PPS.
The clock source for 100 Mbps will always be INTERNAL (INT).

UNI (User-Network Interface) is the ATM cell format that includes the GFC and a smaller VPI. NNI (Network-Network Interface) is the ATM cell format that does not include the GFC.
<table>
<thead>
<tr>
<th>SETUP</th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT SIGNAL</td>
<td>DS1</td>
</tr>
<tr>
<td></td>
<td>DS3</td>
</tr>
<tr>
<td></td>
<td>OC-3c; STM-1</td>
</tr>
<tr>
<td></td>
<td>E1; E3</td>
</tr>
<tr>
<td></td>
<td>100Mbps</td>
</tr>
<tr>
<td>CELL FORMAT</td>
<td>UNI</td>
</tr>
<tr>
<td></td>
<td>NNI</td>
</tr>
<tr>
<td>LOOPBACK *</td>
<td>DISABLE</td>
</tr>
<tr>
<td></td>
<td>ENABLE</td>
</tr>
<tr>
<td>DS1 PLCP MODE</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>DS1 FRAMING</td>
<td>ESF</td>
</tr>
<tr>
<td></td>
<td>SF</td>
</tr>
<tr>
<td>PAYLOAD SCRAMBLE</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>SYSTEM PARAMETERS...</td>
<td></td>
</tr>
</tbody>
</table>

* When the LOOPBACK is ENABLED, the left side of the front panel screen displays the following message: ***ANALYZER IN LOOPBACK.*

<table>
<thead>
<tr>
<th>SETUP</th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>INPUT SIGNAL</td>
<td>E1</td>
</tr>
<tr>
<td></td>
<td>DS1; DS3</td>
</tr>
<tr>
<td></td>
<td>OC-3c; STM-1</td>
</tr>
<tr>
<td></td>
<td>E3</td>
</tr>
<tr>
<td></td>
<td>100Mbps</td>
</tr>
<tr>
<td>CELL FORMAT</td>
<td>UNI</td>
</tr>
<tr>
<td></td>
<td>NNI</td>
</tr>
<tr>
<td>LOOPBACK *</td>
<td>DISABLE</td>
</tr>
<tr>
<td></td>
<td>ENABLE</td>
</tr>
<tr>
<td>E1 PLCP MODE</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>E1 CRC</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>PAYLOAD SCRAMBLE</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>OFF</td>
</tr>
<tr>
<td>SYSTEM PARAMETERS...</td>
<td></td>
</tr>
</tbody>
</table>

* When the LOOPBACK is ENABLED, the left side of the front panel screen displays the following message: ***ANALYZER IN LOOPBACK.*
### SETUP

<table>
<thead>
<tr>
<th>Input Signal</th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>E3</td>
<td>DS1; DS3; OC-3c; STM-1</td>
</tr>
<tr>
<td>UNI</td>
<td>NNI</td>
</tr>
<tr>
<td>DISABLE</td>
<td>ENABLE</td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>G.751</td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td><strong>SYSTEM PARAMETERS...</strong></td>
<td></td>
</tr>
</tbody>
</table>

* When the LOOPBACK is ENABLED, the left side of the front panel screen displays the following message: ***ANALYZER IN LOOPBACK.***

### SETUP

<table>
<thead>
<tr>
<th>Input Signal</th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>OC-3c</td>
<td>DS1; DS3; STM-1; E1; E3; 100Mbps</td>
</tr>
<tr>
<td>UNI</td>
<td>NNI</td>
</tr>
<tr>
<td>DISABLE</td>
<td>ENABLE</td>
</tr>
<tr>
<td>522</td>
<td>0-782</td>
</tr>
<tr>
<td>522</td>
<td>0-782</td>
</tr>
<tr>
<td><strong>SET NEW POINTER</strong></td>
<td></td>
</tr>
<tr>
<td><strong>PERFORM +PJ</strong></td>
<td></td>
</tr>
<tr>
<td><strong>PERFORM -PJ</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SYSTEM PARAMETERS...</strong></td>
<td></td>
</tr>
</tbody>
</table>

* When the LOOPBACK is ENABLED, the left side of the front panel screen displays the following message: ***ANALYZER IN LOOPBACK.***

** For the OC-3 signal, two of the menu choices are PERFORM +PJ and PERFORM -PJ. The PJ abbreviation stands for pointer justification and permits plus or minus SONET pointer adjustments.
### SETUP

<table>
<thead>
<tr>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>DS1; DS3</td>
</tr>
<tr>
<td>OC-3C</td>
</tr>
<tr>
<td>E1; E3</td>
</tr>
<tr>
<td>100Mbps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNI</td>
</tr>
<tr>
<td>NNI</td>
</tr>
</tbody>
</table>

**LOOPBACK**

**SONET POINTER**

<table>
<thead>
<tr>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>522</td>
</tr>
<tr>
<td>0-782</td>
</tr>
</tbody>
</table>

**NEW POINTER**

<table>
<thead>
<tr>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>522</td>
</tr>
<tr>
<td>0-782</td>
</tr>
</tbody>
</table>

* **SET NEW POINTER**

**PERFORM +PJ**

**PERFORM -PJ**

**SYSTEM PARAMETERS...**

* When the **LOOPBACK** is **ENABLED**, the left side of the front panel screen displays the following message: ***ANALYZER IN LOOPBACK.***

** For the **STM-1** signal, two of the menu choices are **PERFORM +PJ** and **PERFORM -PJ**. The PJ abbreviation stands for pointer justification and permits plus or minus **SONET** pointer adjustments.

### TEST CELL

Push the **TEST CELL** softkey on the Analyzer side of the LCD screen to specify header information for the cell under test.

### TEST CELL

<table>
<thead>
<tr>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>2, 3, 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>0-15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/1</td>
</tr>
<tr>
<td>0-255/0-65,535</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/0</td>
</tr>
<tr>
<td>0-7/0-1</td>
</tr>
</tbody>
</table>

* **DISABLE** *LINK TO TEST CELL**

* **Choices are DISABLE AND ENABLE**

When the **LINK TO TEST CELL** choice is **ENABLE**, the next three lines (GFC, VPI/VCI, and PTI/CLP) do not appear on the screen.
CELL DELAY

The CELL DELAY softkey on the Analyzer side allows configuration of bins for delay measurements. Configuration of the bins is in micro-seconds of delay.

<table>
<thead>
<tr>
<th>CELL DELAY CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>DELAY MODE: PROP or INTERCELL</td>
</tr>
<tr>
<td>MIN 0 uS</td>
</tr>
<tr>
<td>STARTING DELAY BIN 1</td>
</tr>
<tr>
<td>ENDING DELAYS (uS)</td>
</tr>
<tr>
<td>BIN 1 / 2</td>
</tr>
<tr>
<td>BIN 3 / 4</td>
</tr>
<tr>
<td>BIN 5 / 6</td>
</tr>
<tr>
<td>BIN 7 / 8</td>
</tr>
<tr>
<td>BIN 9 / 10</td>
</tr>
</tbody>
</table>

* The screen will show PROP (propagation) values or INTERCELL values, not both.

There are ten cell delay bins. Each accumulates the number of received ATM Test Cells which have a propagation delay that falls within the range of the bin. The cell delay bins are specified by eleven delay values. There is one Start Delay value and ten End Delay values.
CAL PROP

Hit the CAL PROP softkey on the Analyzer side to bring up the Calibrate screen. There is a propagation delay between the Generator (transmitter) and Analyzer (receiver), especially as the Generator signal travels out into the live network and returns to the Analyzer. The Calibration Propagation (Cal Prop) feature of the ATM150 measures this delay in order to create a reference value and to account for the delay which can affect the value of information obtained.

<table>
<thead>
<tr>
<th>CALIBRATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGNAL: OC-3c UNI</td>
</tr>
<tr>
<td>REFERENCE VALUE = 14 uS</td>
</tr>
<tr>
<td>NOTE: To update this propagation zero reference to the present minimum cell delay, execute below action key.</td>
</tr>
<tr>
<td>&lt;CALIBRATE PROPAGATION DELAY&gt;</td>
</tr>
</tbody>
</table>

The line labeled "Signal" for this menu will show Signal and Cell Format (UNI or NNI).

<table>
<thead>
<tr>
<th>CALIBRATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGNAL: DS3 COSET/UNI PLCP</td>
</tr>
<tr>
<td>REFERENCE VALUE = 47 uS</td>
</tr>
<tr>
<td>NOTE: To update this propagation zero reference to the present minimum cell delay, a test must be running.</td>
</tr>
</tbody>
</table>

The line labeled "Signal" for this menu will show Signal, Physical Layer (PCLP for DS3), HEC Coset (if enabled), and Cell Format (UNI or NNI).
RESULTS CONTRL

The RESULTS CONTRL softkey changes the bandwidth measurements of the ATM test. This softkey works in conjunction with the TEST MODE softkey.

<table>
<thead>
<tr>
<th>RESULT CONTROL</th>
<th>Other choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLIDING WINDOW</td>
<td>10 SEC</td>
</tr>
<tr>
<td>RESULTS TYPE</td>
<td>UNTIMED</td>
</tr>
<tr>
<td>RESULTS LENGTH</td>
<td>60 SEC</td>
</tr>
<tr>
<td>SWEEP COUNT</td>
<td>5</td>
</tr>
<tr>
<td>VCI INCREMENT</td>
<td>1</td>
</tr>
<tr>
<td>LINK RESULTS WITH</td>
<td>DISABLE</td>
</tr>
<tr>
<td>GENERATOR TEST</td>
<td>ENABLE</td>
</tr>
</tbody>
</table>

OUTPUT RESULTS CONTROL...

submenu to OUTPUT RESULTS CONTROL...

| PRINT EOT CONTROL                     | OFF               |
| RESULT FILE                           | RESULTS.TXT       |

<STORE RESULTS TO FLOPPY>

<PRINT WINDOW MODE RESULTS>

<PRINT TEST MODE RESULTS>
**Figure 3-5 – ATM150 Rear Panel**

<table>
<thead>
<tr>
<th>100 Mbps</th>
<th>The 100Mbps is the Generator output and the Analyzer input connection when using the 100Mbps fiber (TAXI) physical interface. The 100Mb/s connection can handle a multi-mode fiber cable with a SC connection.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyzer SYNC</td>
<td>The Analyzer SYNC connection is used to hook-up an oscilloscope, which can look at the data bits going into the unit. The SYNC connection requires a 50 ohm BNC coax cable.</td>
</tr>
<tr>
<td>Generator SYNC</td>
<td>The Generator SYNC connection is used to hook-up an oscilloscope, which can look at the data bits going out. The SYNC connection requires a 50 ohm BNC coax cable.</td>
</tr>
<tr>
<td>155 MBS UTP-5</td>
<td>RJ-45 - future optional interface - not available at this time.</td>
</tr>
<tr>
<td>AC Line</td>
<td>The AC power input accepts either 115 VAC or 230 VAC. Always use the correct fuse with the voltage supplied, 5A SLOBO fuse for 115 VAC, 2.5A SLOBO for 230 VAC. To change the fuse, remove the power cord, then pry out the fuse holder with a flat head screwdriver.</td>
</tr>
<tr>
<td>1PPS Connections</td>
<td>The 1PPS (One pulse per second) connection gives the test equipment user the ability to synchronize multiple or remote generators and analyzers.</td>
</tr>
<tr>
<td>Video Connector</td>
<td>A DB-15 pin connector supports a VGA screen</td>
</tr>
<tr>
<td>Parallel Printer Port</td>
<td>A DB-25 pin connector supports the standard Centronics-type printer interface. This capability will be added in the future.</td>
</tr>
<tr>
<td>Serial Port (RS-232C)</td>
<td>A DB-9 pin connector supports the RS-232C interface.</td>
</tr>
<tr>
<td>GPIB Connector</td>
<td>An IEEE-488.1 standard GPIB connector is provided for GPIB communication.</td>
</tr>
<tr>
<td>Cooling Fans</td>
<td>Two fans provide cooling for the ATM150 internal circuits. Care must be taken to avoid blocking the air flow. A minimum of two inches free space must be provided behind the unit.</td>
</tr>
</tbody>
</table>
4. ATM-150 Applications & Examples

This section reviews ATM applications and how the ATM-150 Test Set from Microwave Logic can measure, verify, test, emulate, and monitor performance in ATM telecommunications and data communications products. A sampling of specific ATM-150 capabilities to support ATM network applications begins this section with three examples of ATM Load Testing following on page 4-5.

- Quality of Service (QoS) Measurements

  QoS parameters are used to define accuracy, speed and dependability of the connection for each user. With ATM’s “use-on-demand” capabilities, users need not pay for bandwidth that they do not need. This is preferable to the user of course, but makes the billing-for-services (tariff) mechanism between the network provider and the user much more complex. This tariffing mechanism becomes a negotiated level of QoS. QoS parameters include such different measures as cell loss ratio or maximum transmission delay.

  Out-of-service performance analysis is the most accurate method of performance measuring. The ATM-150 test set supplies a controlled traffic input source to the system-under-test and the effects are observed by monitoring an output port of the system-under-test. The test set then correlates the data it sent to the data it received to obtain an accurate view of how the device behaves under certain conditions.

  The ATM-150 can characterize switch performance in a laboratory, as well as, verify and document actual performance of a network. The ATM-150 measures the follows parameters as defined by the ATM Forum UNI 3.0 document:

  - Cell Error Ratio (ratio of errored cells to total cells)
  - Cell Loss Ratio (Cells can be counted over periodic time intervals.)
  - Cell Transfer Delay (Delay is computed by comparing the time the cell was transmitted to the time it was received.) - Also known as Propagation Delay.
  - Cell Delay Variation (Measure of time between one received cell and the next received cell.) - Also known as Intercell Delay.

QoS Measurements
• **Cell Transfer Capacity Verification**

The ATM-150 tests the response of a network to bandwidth considerations. This test helps determine the network’s ability to route traffic when the network is saturated at a certain traffic load (bandwidth). Congestion conditions can be controlled from the ATM-150 by changing the number of channels (VPI/VCI) or the percentage bandwidth utilization.

![Cell Transfer Capacity Diagram](image)

• **Cross Network Testing**

A single generator can source four receivers positioned around the network, thus testing cell routing in the network. This capability can also point out differences in QoS (cell latency, cell loss ratio, cell error ratio) at different nodes in the network, and helps define the levels at which the quality of any given service is unacceptable.

Example: Single Generator Sourcing 4 Analyzers

![Cross Network Testing Diagram](image)
**Traffic Emulation**

Selectable cell distributions can emulate diverse traffic patterns. Statistical distributions of known parameters can provide a reliable comparison of network traffic before and after the effects of a network element or elements. By knowing the distribution and behavior of particular traffic types through the network, available resources can be used more effectively.

Examples of Traffic types are illustrated below.

Constant Bit Rate (CBR) - Traffic like existing telephony lines, voice or video, mapped into ATM using AAL-1. Use the Constant distribution to emulate this network traffic.

Variable Bit Rate (VBR) - Traffic like some compressed video or voice and aggregated LAN traffic. Use any and/or all of the variable distributions to emulate this network traffic.

Available Bit Rate (ABR) - Traffic like local LAN traffic bridged onto ATM, that needs to transfer brief bursts of information, at as high a speed as possible. Use any and/or all of the variable distributions to emulate this network traffic.
• **Statistical Distribution choices in the ATM-150**

There are two types of network traffic that can be emulated by the ATM-150: constant and variable. An example of constant traffic is voice. Constant traffic is predictable.

Variable network traffic has no prediction of instantaneous bandwidth. Using statistical distribution emulations is an attempt to predict this traffic.

The statistical distributions available in the ATM-150 are as follows:

*Constant traffic*

- The ATM-150 **Constant distribution** emulates a steady level of traffic.

*Variable traffic* - Consistent, predictable average bandwidth use, but varies over a short period of time

- The ATM-150 **Uniform distribution** emulates a variable series of traffic bandwidths and chooses them in a uniform manner based on a minimum/maximum series of bursts, with a step choice between bursts.

- The ATM-150 **Gaussian distribution** emulates a variable, normal distribution, that is there is a starting point, rising normally through a bell curve to a peak and then falling along a mirror image of the rising curve to the beginning value.

- The ATM-150 **Poisson distribution** is a subset of the Gaussian distribution, with the difference being a more aggressive rise in the bell curve to a peak, with a normal curve fall.

- The ATM-150 **Ramp distribution** is a test, not an emulation, to show the policing functions of the ATM network. This test increases the bandwidth requirements over time (seconds). This test is also useful in monitoring the Cell Transfer Capacity Verification listed earlier in this chapter.

- The ATM-150 **Customized distribution** permits the user to create their own distribution of traffic and enter the emulation through the floppy drive of the ATM-150.

The Randomize function scrambles the starting point of the statistical distributions, as well as, all values through the entire distribution, to better emulate traffic in the network that does not always begin at a certain point. The Randomize function is defaulted 'ON' in the ATM-150.
Application Example
ATM Load Testing using Gaussian Statistical Cell Distribution

Intercell delay and measurement can be emulated by manipulating the gap between active cells. The ATM-150 has the power to program intercell gaps through the idle cell distribution. This is a unique traffic simulation feature of the ATM-150. The following three ATM-150 examples simulate expected computer data traffic, characterized by burstiness, and can be made to simulate worst case load testing. The examples demonstrate how to run from the ATM-150:

- a 100% Test Cell load;
- a 50% Test Cell, 50% Idle Cell load; and,
- a load made up of test cells and idle cells varied using a Gaussian statistical distribution.
**Example 1 - 100% Test Cell #1 Load Test**

For a Constant Cell Distribution, set ACTIVE Test cell #1 to 100%, Burst Count 1

If the IDLE cell is set to 0 in the same Constant Cell Distribution menu, the Output data stream will look like this:

| Active | Active | Active | Active | Active | Active | ..... |

To setup the ATM-150 for Example #1 load testing, follow the settings below.

**Settings for Generator side of ATM-150**

<table>
<thead>
<tr>
<th>Softkey</th>
<th>settings</th>
<th>choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup</td>
<td>Output Signal</td>
<td>DS3</td>
</tr>
<tr>
<td></td>
<td>Cell Format</td>
<td>UNI</td>
</tr>
<tr>
<td></td>
<td>Clock Source</td>
<td>INT</td>
</tr>
<tr>
<td></td>
<td>DS3 PLCP mode</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>DS3 Framing</td>
<td>CBIT</td>
</tr>
<tr>
<td></td>
<td>Payload Scramble</td>
<td>ON</td>
</tr>
<tr>
<td>System Parameters</td>
<td>1PPS Source</td>
<td>INT</td>
</tr>
<tr>
<td></td>
<td>SYNC Pulse</td>
<td>ATM</td>
</tr>
<tr>
<td></td>
<td>HEC COSET</td>
<td>ENABLE</td>
</tr>
</tbody>
</table>

**Header Control**

<table>
<thead>
<tr>
<th>TEST Cell number</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>GFC</td>
<td>0</td>
</tr>
<tr>
<td>VPI/VCI</td>
<td>1/1</td>
</tr>
<tr>
<td>PTI/CLP</td>
<td>0/0</td>
</tr>
</tbody>
</table>

**Cell Distribution**

| ACTIVE Cell Burst Count IDLE Cell Burst Count |
|---------------------------------------------|---------------------------------------------|
| Constant | 100.0% | Constant | .0% |
| Cell Burst Count | 1       | Cell Burst Count | 0   |
Bandwidth Control

<table>
<thead>
<tr>
<th>Test cell</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>100.0%</td>
</tr>
<tr>
<td>#2</td>
<td>0.0%</td>
</tr>
<tr>
<td>#3</td>
<td>0.0%</td>
</tr>
<tr>
<td>#4</td>
<td>0.0%</td>
</tr>
<tr>
<td>Idle</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Settings for Analyzer side of ATM-150

<table>
<thead>
<tr>
<th>Softkey</th>
<th>Settings</th>
<th>Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup</td>
<td>Input Signal</td>
<td>DS3</td>
</tr>
<tr>
<td></td>
<td>Cell Format</td>
<td>UNI</td>
</tr>
<tr>
<td></td>
<td>Loopback</td>
<td>DISABLE</td>
</tr>
<tr>
<td></td>
<td>DS3 PLCP mode</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>DS3 Framing</td>
<td>CBIT</td>
</tr>
<tr>
<td></td>
<td>Payload Scramble</td>
<td>ON</td>
</tr>
<tr>
<td>System Parameters</td>
<td>1PPS Source</td>
<td>INT</td>
</tr>
<tr>
<td></td>
<td>SYNC Pulse</td>
<td>ATM</td>
</tr>
<tr>
<td></td>
<td>HEC COSET</td>
<td>ENABLE</td>
</tr>
</tbody>
</table>

Test Cell

<table>
<thead>
<tr>
<th>Test Cell</th>
<th>Settings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DISABLE Link to Cell number</td>
</tr>
<tr>
<td></td>
<td>GFC</td>
</tr>
<tr>
<td></td>
<td>VPI/ VCI</td>
</tr>
<tr>
<td></td>
<td>PTI/CLP</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>1/1</td>
</tr>
<tr>
<td></td>
<td>0/0</td>
</tr>
</tbody>
</table>

Start the Load test by pressing ‘CELL RUN’ key on the Generator side of the ATM-150, followed by the ‘TEST RUN’ key on the Analyzer side. Press the “ATM RESULTS” softkey on the Analyzer side (More 3 of 3) to see that the TEST CELL reads 100.0%.

In this example, the ATM-150 Analyzer successfully received the Test Cells broadcast by the ATM-150 Generator.
**Example 2 - 50% Test Cell #1, 50% Idle Cell Load Test**

For a Constant Cell Distribution, set ACTIVE Test cell #1 to 50%, Burst Count 1
If the IDLE cell is set to 1 in the same Constant Cell Distribution menu, the output data stream will look like this:

| Active | Idle | Active | Idle | Active | Idle | .....
|--------|------|--------|------|--------|------|------

To setup the ATM-150 for *Example #2* load testing, follow the settings below.

**Settings for Generator side of ATM-150**

<table>
<thead>
<tr>
<th>Softkey</th>
<th>settings</th>
<th>choices</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Setup</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Signal</td>
<td>DS3</td>
<td></td>
</tr>
<tr>
<td>Cell Format</td>
<td>UNI</td>
<td></td>
</tr>
<tr>
<td>Clock Source</td>
<td>INT</td>
<td></td>
</tr>
<tr>
<td>DS3 PLCP mode</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td>DS3 Framing</td>
<td>CBIT</td>
<td></td>
</tr>
<tr>
<td>Payload Scramble</td>
<td>ON</td>
<td></td>
</tr>
<tr>
<td><strong>System Parameters ...</strong></td>
<td>1PPS Source</td>
<td>INT</td>
</tr>
<tr>
<td></td>
<td>SYNC Pulse</td>
<td>ATM</td>
</tr>
<tr>
<td></td>
<td>HEC COSET</td>
<td>ENABLE</td>
</tr>
<tr>
<td><strong>Header Control</strong></td>
<td>TEST Cell number</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>GFC</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>VPI/ VCI</td>
<td>1/ 1</td>
</tr>
<tr>
<td></td>
<td>PTI/CLP</td>
<td>0/ 0</td>
</tr>
<tr>
<td><strong>Cell Distribution</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACTIVE</td>
<td>Constant</td>
<td>50.0%</td>
</tr>
<tr>
<td>Cell Burst Count</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>IDLE</td>
<td>Constant</td>
<td>50.0%</td>
</tr>
<tr>
<td>Cell Burst Count</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
Bandwidth Control

- Test cell #1: 50.0%
- Test cell #2: 0.0%
- Test cell #3: 0.0%
- Test cell #4: 0.0%
- Idle Cell: 50.0%

Settings for Analyzer side of ATM-150

<table>
<thead>
<tr>
<th>Softkey</th>
<th>Settings</th>
<th>Choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup</td>
<td>Input Signal</td>
<td>DS3</td>
</tr>
<tr>
<td></td>
<td>Cell Format</td>
<td>UNI</td>
</tr>
<tr>
<td></td>
<td>Loopback</td>
<td>DISABLE</td>
</tr>
<tr>
<td></td>
<td>DS3 PLCP mode</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>DS3 Framing</td>
<td>CBIT</td>
</tr>
<tr>
<td></td>
<td>Payload Scramble</td>
<td>ON</td>
</tr>
<tr>
<td>System Parameters</td>
<td>IPPS Source</td>
<td>INT</td>
</tr>
<tr>
<td></td>
<td>SYNC Pulse</td>
<td>ATM</td>
</tr>
<tr>
<td></td>
<td>HEC COSET</td>
<td>ENABLE</td>
</tr>
</tbody>
</table>

Test Cell

- DISABLE Link to Cell number: 1
- GFC: 0
- VPI/ VCI: 1/ 1
- PTI/CLP: 0/ 0

Start the Load test by pressing ‘CELL RUN’ key on the Generator side of the ATM-150, followed by the ‘TEST RUN’ key on the Analyzer side. Press the “ATM RESULTS” softkey on the Analyzer side (More 3 of 3) to see that the TEST CELL reads 50.0%, and the IDLE CELL reads 50.0%.

In this example, the ATM-150 Analyzer successfully received the Test Cells and Idle Cells broadcast by the ATM-150 Generator.
Example 3 - Altering the Intercell gap to simulate network traffic Test

Here is where the Intercell gap can be manipulated to simulate network traffic. Leave the ACTIVE Cell at Constant, and the switch the Idle Cell to “Gaussian”. Set the bandwidth percentage to 0.8% for ACTIVE and 99.2% for IDLE. Next, under the IDLE choice, set the mean value to 120 cells, with a standard deviation of 20.

To setup the ATM-150 for Example #3 load testing, follow the settings below.

Settings for Generator side of ATM-150

<table>
<thead>
<tr>
<th>Softkey</th>
<th>settings</th>
<th>choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup</td>
<td>Output Signal</td>
<td>DS3</td>
</tr>
<tr>
<td></td>
<td>Cell Format</td>
<td>UNI</td>
</tr>
<tr>
<td></td>
<td>Clock Source</td>
<td>INT</td>
</tr>
<tr>
<td></td>
<td>DS3 PLCP mode</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>DS3 Framing</td>
<td>CBIT</td>
</tr>
<tr>
<td></td>
<td>Payload Scramble</td>
<td>ON</td>
</tr>
<tr>
<td>System Parameters ...</td>
<td>IPPS Source</td>
<td>INT</td>
</tr>
<tr>
<td></td>
<td>SYNC Pulse</td>
<td>ATM</td>
</tr>
<tr>
<td></td>
<td>HEC COSET</td>
<td>ENABLE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Header Control</th>
<th>TEST Cell number</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GFC</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>VPI/ VCI</td>
<td>1/ 1</td>
</tr>
<tr>
<td></td>
<td>PTI/CLP</td>
<td>0/ 0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cell Distribution</th>
<th>ACTIVE</th>
<th>Constant</th>
<th>0.8%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cell Burst Count</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IDLE</td>
<td>Gaussian</td>
<td>99.2%</td>
</tr>
</tbody>
</table>

Accept the default setting of Mean 120, with a Standard Deviation (STD. DEV.) of 20, or change the mean value to 120 and the STD. DEV. To 20 via the entry keys.
Bandwidth Control

Test cell #1 0.8%
Test cell #2 0.0%
Test cell #3 0.0%
Test cell #4 0.0%
Idle Cell 99.2%

Settings for Analyzer side of ATM-150

<table>
<thead>
<tr>
<th>Softkey</th>
<th>settings</th>
<th>choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setup</td>
<td>Input Signal</td>
<td>DS3</td>
</tr>
<tr>
<td></td>
<td>Cell Format</td>
<td>UNI</td>
</tr>
<tr>
<td></td>
<td>Loopback</td>
<td>DISABLE</td>
</tr>
<tr>
<td></td>
<td>DS3 PLCP mode</td>
<td>ON</td>
</tr>
<tr>
<td></td>
<td>DS3 Framing</td>
<td>CBIT</td>
</tr>
<tr>
<td></td>
<td>Payload Scramble</td>
<td>ON</td>
</tr>
<tr>
<td>System Parameters ...</td>
<td>IPPS Source</td>
<td>INT</td>
</tr>
<tr>
<td></td>
<td>SYNC Pulse</td>
<td>ATM</td>
</tr>
<tr>
<td></td>
<td>HEC COSET</td>
<td>ENABLE</td>
</tr>
</tbody>
</table>

Test Cell

DISABLE Link to Cell number 1
GFC 0
VPI/ VCI 1/ 1
PTI/CLP 0/ 0

The following menu helps create a useful graph of the results in the histogram feature.

Cell Delay

DELAY MODE INTERCELL
MIN 500 uS MAX: 2000 uS

Note: The max setting must be input first, then the min. Use the arrow keys to move to the max. setting first.
Start the *Example #3* Load test by pressing the 'CELL RUN' key on the Generator side of the ATM-150. There is a 15-30 second wait while the ATM-150 programs the cell headers and the statistical distribution. There is a status line at the top of the LCD screen indicating the programming sequence.

After the programming sequence has finished, press the "TEST RUN" key on the Analyzer side to collect the information generated by the CELL RUN. The green SYNC LED will light up. Press the "RESULT SCREEN" softkey on the Analyzer side (top softkey on the right-hand side of the front panel) to see that the TEST CELL reads 0.8%, and the IDLE CELL reads 99.2%.

Press the Histogram softkey to graph the Gaussian distribution. Make sure while viewing the histogram that the choice of Delay Mode is INTER.

In this example, the ATM-150 Analyzer successfully received the Test Cells and Idle Cells, varied by Gaussian distribution, broadcast by the ATM-150 Generator.
ATM150

Appendices

A. ATM Basics ................................................................. A-1

B. Specifications ............................................................ B-1

C. Default Settings .......................................................... C-1

D. Block Diagram ............................................................. D-1

E. Remote Commands ........................................................ E-1

F. Service Information/Warranty ........................................ F-1

G. RS-232 Interface .......................................................... G-1

H. GPIB Interface ............................................................ H-1

I. Options ........................................................................... I-1
Appendix A

ATM Basics

ATM is one of the general class of packet technologies that relay traffic via an address contained within the packet. Unlike packet technologies such as X.25 or frame relay, ATM uses very short, fixed-length packets called cells.

The ATM cell is 53 bytes long, consisting of a five-byte header containing the address and a fixed 48-byte information field (payload). Each cell is identified with virtual circuit identifiers that are contained in the cell header. An ATM network uses these identifiers to relay the traffic through high-speed switches from the sending customer premises equipment (CPE) to the receiving CPE.

ATM provides limited error detection operations. It provides no retransmission services, and few operations are performed on the small header. The intention of this approach - small cells and with minimal services performed - is to implement a network that is fast enough to support multi-megabit transfer rates.

Advantages of ATM

<table>
<thead>
<tr>
<th>Features</th>
<th>Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small cell size</td>
<td>Low latency to support real-time services</td>
</tr>
<tr>
<td></td>
<td>(like voice and video)</td>
</tr>
<tr>
<td>Fixed cell length</td>
<td>Fast hardware switching and scalability</td>
</tr>
<tr>
<td>Standardization</td>
<td>Usable in all networks (LAN or WAN)</td>
</tr>
</tbody>
</table>

- Scalability

ATM is a scaleable technology. The ATM standard describes a 53-byte cell format, but is silent as to items like rates, framing, or physical bearers. Thus many different systems, such as local area networks, switches and public networks can use the same format. Previously, standards usually tied rates and formats into one package incompatible with anything else. With ATM, a cell generated by a 100 Mbps LAN can be carried over a 45 Mbps DS3 to a central office and switched into a 2.4 Gbps SONET transport system. This illustrates three very different systems (LAN, network transport, switching) with the message in the same format, rate scaled to suit the application.
• Transparency
ATM is application transparent. The cell size is a compromise between the long frames generated by data communications applications and the short repetitive needs of voice. It is also suitable for such services as video. ATM will allow free mixture of data and voice or video within the same application with no worry concerning compatibility with LAN or wide area communications.

• Granularity
ATM allows the network to be tailored to the application, rather than forcing applications to fit the network. The Time Division Multiplexing (TDM) network has trouble dealing with anything that does not fit the limited granularity of the digital hierarchy: DS0s, DS1s or DS3s. If an application requires more than a DS0, but less than a DS1, the user either buys an entire DS1 or finds several low speed applications and bundles them together to fill the DS1.

ATM allows the user to deliver traffic at rates and degrees of burstiness compatible with the applications running, not at rates convenient to the network.

ATM is a simple, very fast switching and routing process based on the cell address. Unlike X.25, ATM does no processing in the network above the cell level.

• Networking Flexibility
ATM also provides networking advantages. For example, ATM can act as a self-routing digital cross-connect system (DCS) providing services users have sought for many years. A common user need is to reconfigure the network to meet changing time-of-day requirements, and of course, to pay only for the bandwidth used.

With ATM, reconfiguration is available on a cell-by-cell basis with no intervention.
ATM Cell Structure

The ATM cell consists of two parts: a five-byte header and a 48-byte information field.

<table>
<thead>
<tr>
<th>Byte 1</th>
<th>GFC (UNI) or VPI (NNI)</th>
<th>VPI</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Byte 2</td>
<td>VPI</td>
<td>VCI</td>
<td></td>
</tr>
<tr>
<td>Byte 3</td>
<td></td>
<td>VCI</td>
<td></td>
</tr>
<tr>
<td>Byte 4</td>
<td>VCI</td>
<td>PT</td>
<td></td>
</tr>
<tr>
<td>Byte 5</td>
<td></td>
<td>CLP</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>HEC</td>
<td></td>
</tr>
</tbody>
</table>

**Figure A-1 ATM Cell Structure**

- **GFC**

The first four bits of the first byte contain a generic flow control field (GFC). It is used to control the flow of traffic across the User-to-Network interface (UNI), and thus into the network. The Network-to-Network Interface (NNI) does not use the GFC. The VPI in the NNI uses these four bits for additional network addresses. See Figure A-2 for another view of the Cell Structure Format.

- **VPI/VCI**

The next 24 bits, the last half of byte one, bytes two and three, and the first half of byte four, make up the ATM address. This three-byte field is divided into two sub-fields. The first byte contains the Virtual Path Identifier (VPI) and the second two bytes make up the virtual channel identifier (VCI).

**What are VPI and VCI?**

ATM is a connection-orientated protocol and as such there is a connection identifier in every cell header which explicitly associates a cell with a given virtual channel on a physical link. The connection identifier consists of two sub-fields, the Virtual Channel Identifier (VCI) and the Virtual Path Identifier (VPI). Together they are used in multiplexing, de-multiplexing and switching a cell through the network. VCIs and VPIs are not addresses. They are explicitly assigned at each segment (link between ATM nodes) of a connection when a connection is established, and remain for the duration of a connection. Using the VCI/VPI, the ATM layer can asynchronously interleave (multiplex) cells from multiple connections.
Why both VPI and VCI?

The Virtual Path concept originated with concerns over the cost of controlling B-ISDN networks. The idea was to group connections sharing common paths through the network into identifiable units (the Paths). Network management actions would then be applied to the smaller number of groups of connections (paths) instead of a larger number of individual connections (VCI). Management in this instance includes call setup, routing, failure management, bandwidth allocation, and others. For example, use of Virtual Paths in an ATM network reduces the load on the control mechanisms because of the functions needed to setup a path through a network are performed only once for all subsequent Virtual Channels using the path. Changing the trunk mapping of a single Virtual Path can affect a route change for every Virtual Channel using that path.

- **PT**
  The next three bits, PT or payload type, indicate the type of information carried by the cell. ATM cells will be used to carry different types of user information that may require different handling by the network or terminating equipment. Cells will also be used to transfer operations and maintenance messages across the network between users or between user and service provider. Codes within this three bit field will indicate the type of message in the payload.

- **CLP**
  The last bit of byte four, CLP, indicates the cell loss priority, and is set by the user. This bit indicates the eligibility of the cell for discard by the network under congested conditions. If the bit is set to 1, the cell may be discarded by the network depending on traffic conditions.

- **HEC**
  The final byte, the HEC, is the header error control field. This is an error-correcting code calculated across the previous four bytes of the header, designed to detect multiple header errors and correct single bit errors. The HEC does not provide any indication of the quality of data in the information field.

- **ATM Cell Information field**
  Following the HEC is the 48-byte cell information field containing the user data. Inserting user data into the information field is accomplished by the ATM adaptation layer (AAL).
Another view of the ATM Layer Protocol Data Unit Formats

<table>
<thead>
<tr>
<th>GFC</th>
<th>VPI</th>
<th>VCI</th>
<th>PTI</th>
<th>CLP</th>
<th>HEC</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 bits</td>
<td>1 octet</td>
<td>2 octets</td>
<td>3 bits</td>
<td>1 bit</td>
<td>1 octet</td>
<td>48 octets</td>
</tr>
</tbody>
</table>

GFC - Generic Flow Control  
CLP - Cell Loss Priority

VPI - Virtual Path Identifier  
HEC - Header Error Control

VCI - Virtual Channel Identifier  
Info - Information

PTI - Payload Type Identifier

**ATM CELL FORMAT (UNI)**

<table>
<thead>
<tr>
<th>VPI</th>
<th>VCI</th>
<th>PTI</th>
<th>CLP</th>
<th>HEC</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 bits</td>
<td>2 octets</td>
<td>3 bits</td>
<td>1 bit</td>
<td>1 octet</td>
<td>48 octets</td>
</tr>
</tbody>
</table>

VPI - Virtual Path Identifier  
CLP - Cell Loss Priority

VCI - Virtual Channel Identifier  
HEC - Header Error Control

PTI - Payload Type Identifier  
Info - Information

**ATM CELL FORMAT (NNI)**

Figure A-2 - Another view of the ATM Layer Protocol Data Unit Formats
ATM150 Specifications

Cell Generator

Header Generation
Cell header parameters can be adjusted from compatibility with various systems. In addition error can be introduced into the header or the cell payload.

Cell Header Format
UNI User to Network interface. Includes a 4 bit GFC, an 8 bit VPI, a 16 bit VCI, 3 bit PTI and a 1 bit CLP field.
NNI Network to Network interface. Includes a 12 bit VPI, a 16 bit VCI, 3 bit PTI and a 1 bit CLP field.

HEC and Coset
Coset On The HEC is generated using a \( x^4 + x^2 + x + 1 \) polynomial, then the \( x^4 + x^3 + x^2 + 1 \) coset polynomial is added.
Coset Off The HEC is generated using only the \( x^4 + x^3 + x^2 + 1 \) polynomial.

HEC Error Generation
Single The entire HEC byte is inverted for one cell.
Rates The entire HEC byte is inverted once for every 100 to 10^9 cells.

Cell Error Generation
Single An entire payload data byte is inverted for one cell.
Rates An entire payload data byte is inverted once for every 100 to 10^9 cells.

Cell Distribution
Cell distribution provide emulation of traffic types. This is controlled by sequencing through a list of entries representing bursts of active cells or gaps of idle cells between the bursts. The odd entries in the list represent the length of a burst, and even entries the length of a gap. Cell distribution controls automatically provide the entries for these lists.

Distribution Randomize
This parameter applies to all the distributions.
Sequential Each entry in the list is used sequentially.
Random Each entry in the list is accessed in a pseudo-random order. The alternation of active and idle entries still maintained.

Constant Distribution
The bursts are always the selected size. Constant distribution is available for active or idle entries.

| Burst Size | 0-65535 cells |

Uniform Distribution
Bursts are generated at the selected minimum size, and at the minimum size plus any integer multiple of the step size up to the maximum size. A uniform amount of each burst size meeting the above criteria are sent. This distribution is available for active or idle entries.

| Maximum | 1-65535 cells |
| Minimum | 0-65534 cells |
| Step    | 1-65535 cells |

Gaussian Distribution
Bursts are generated at the selected minimum size, and at the minimum size plus any integer multiple of the step size up to the maximum size. The amount of each burst size meeting the above criteria sent is calculated to produce a Gaussian or normal distribution with a selectable mean and standard deviation. This distribution is available for active or idle entries.

| Maximum | 1-65535 cells |
| Minimum | 0-65534 cells |
| Step    | 1-65535 cells |
| Mean    | 1-65535 cells |
| Std. Dev. | TBD |

Poisson Distribution
Bursts are generated at the selected minimum size, and at the minimum size plus any integer multiple of the step size up to the maximum size. The amount of each burst size meeting the above criteria sent is calculated to produce a Poisson distribution with a selectable mean. This distribution is available for active or idle entries.

| Maximum | 1-65535 cells |
| Minimum | 0-65534 cells |
| Step    | 1-65535 cells |
| Mean    | 1-65535 cells |
Ramp Distribution
Bursts are generated at sizes approximating a linear ramp from the selected minimum percentage to the selected maximum percentage. The a uniform amount of each burst size meeting the above criteria is sent. The burst size is selected to allow the sequence to repeat in a selected time. This distribution is available only for active entries.

| Max. % | 1-100 percent of available bandwidth |
| Min. % | 0-98 percent of available bandwidth |
| Period | 1-60 seconds |

User-defined Distributions
User defined distributions must be in a list form satisfying the following criteria.

| List Length | 2 to 65536 entries, always an even number, half burst and half gap. |
| Burst Length | 0 to 65535 cells, a length of zero is used to cascade gaps for long idle periods. |
| Gap Length | 0 to 65535 cells, a length of zero is used to cascade bursts for long bursts, up to full bandwidth. |

Header and Bandwidth Control
The ATM150 can store 8191 different active cell headers and one idle cell header. Of the active cell headers up to four are available as test cell headers. These test cells are special in that they contain information fields the analyzer can process to do measurements. Other active cells contain arbitrary information.

UNI Cell Header Editing
GFC | 0-15 Generic Flow Control |
VPI | 0-255 Virtual Path Identifier |
VCI | 0-65535 Virtual Channel Identifier |
PTI | 0-7 Payload Type Indicator |
CLP | 0-1 Cell Loss Priority |
HEC | Automatically calculated. Header Error Control |

NNI Cell Header Editing
VPI | 0-4095 Virtual Path Identifier |
VCI | 0-65535 Virtual Channel Identifier |
PTI | 0-7 Payload Type Indicator |
CLP | 0-1 Cell Loss Priority |
HEC | Automatically calculated. Header Error Control |

Test Cell Header Control
Number | 1-4 which test cell to use. |
Enable | Allows use of cell header. |
Bandwidth | 0.0 to 100.0 % The amount of bandwidth allotted to this header. This is the percentage of the bandwidth available as defined by the cell distributions. |

Active Cell Header Control
Number | 1-16 which active cell to use. |
Bandwidth | Automatically assigned to all available active bandwidth not assign to test cells. |

Generator Monitor
Counter circuits continuously monitor the outputs of the four test cell generators and displays peak and average bandwidth.

Monitor Mode
Monitor | Peak and average bandwidth are based on total accumulation. |
Window | Peak and average bandwidth are based on a sliding window, selectable from 1-10 seconds. |

Test Cell Data
The 48 byte cell payload is constructed of a three byte sequence tag, a three byte time tag and a 42 byte pseudo-random number.

Sequence Tag
Number | 20 bit field incremented once each time this test cell is sent. |
Parity | 4 bit field reflecting the parity of four 5 bit fields of the number. |

Time Tag
Time | 20 bit field containing the time since the beginning of a second in microseconds. |
Parity | 4 bit field reflecting the parity of four 5 bit fields of the time. |

Pseudo-random Number
A 42 byte number generated by seeding a pseudo-random number generator with the 4 bits from the sequence tag and five bits from the time tag. The generator uses a \( x^4 + x^2 + 1 \) polynomial.
Cell Analyzer

Test Cell Filter
Test cells are identified by comparing with the test cell filter.

Cell Header Format
- **UNI** User to Network interface. Includes a 4 bit GFC, an 8 bit VPI, a 16 bit VCI, 3 bit PTI and a 1 bit CLP field.
- **NNI** Network to Network interface. Includes a 12 bit VPI, a 16 bit VCI, 3 bit PTI and a 1 bit CLP field.

**UNI Cell Header Editing**
- GFC 0-15 Generic Flow Control
- VPI 0-255 Virtual Path Identifier
- VCI 0-65535 Virtual Channel Identifier
- PTI 0-7 Payload Type Identifier
- CLP 0-1 Cell Loss Priority

**NNI Cell Header Editing**
- VPI 0-4095 Virtual Path Identifier
- VCI 0-65535 Virtual Channel Identifier
- PTI 0-7 Payload Type Identifier
- CLP 0-1 Cell Loss Priority

**HEC and Coset**
- **Coset On** The HEC is compared using a \(x^4+x^3+x+1\) polynomial, then the \(x^4+x^3+x^2+1\) coset polynomial is added. Cells which fail are discarded.
- **Coset Off** The HEC is compared using only the \(x^4+x^3+x^2+1\) polynomial. Cells which fail are discarded.

**Measurements**
The analyzer uses a local time reference and the cell time tags to measure cell delay. It uses the sequence tags to determine cell loss and the pseudo-random number to determine cell error.

**Results Control**
- **Test** Results are displayed based on total accumulation since the test began.
- **Window** Results are displayed based on a sliding window, selectable from 1-10 seconds.

**Results Display (ATM)**
Count measurements range from 0 to 1.84x10^9 switching from decimal to scientific notation at 1.00x10^4. Percentages are in the from 100.00 %. Time measurements are in microseconds up to one second.

- **HEC Errors** Header error control byte errors, displayed in total and percentage.
- **Test Cells** Test cells received, displayed in total and percentage.
- **Cell Loss** Lost cells, displayed in total and percentage.
- **Payload** Cells with errors in the payload, displayed in total and percentage.
- **Delay** Shows the minimum and maximum delay in microseconds.

**Results Display (Cell Delay)**
Cell delay measurements are sorted into 10 bins for viewing. Bin values reflect the number of cells which have delays falling within the bin's delay range.

**Bar Graph**
Cell delay bins can be displayed in a bar graph form. The bars represent the values in each of the 10 bins.

- **Run** The bars follow the bin data automatically scaling to make best use of the screen width.
- **Hold** The bars freeze in their current position.

**Cell Delay Bin Parameters**
Bin sizes can be automatically configured or manually adjusted.

- **Automatic** The bin sizes are generated by dividing the difference between selected minimum and maximum delays by ten.
- **Manual** The starting delay of the first bin and the end of all the bins is user defined.
SONET OC-3c Interface

The SONET OC-3c Physical Interface allows the ATM150 to generate and analyze cell streams at 155.52 Mbs. This interface conforms to Bellcore TR-TSY-253 and ATM Forum UNI Specification Version 3.0. The interface can transmit and receive ATM cells within a concatenated OC-3 frame (OC-3c). The optical interface is available in a multi-mode configuration or a single-mode option which can be used with either single-mode or multi-mode systems.

Generator

Pointer Manipulation

New Pointer  Changes the transmitted pointer to an arbitrary value, by issuing a New Data Flag (NDF). Valid range for pointers is 0-782.
Increment   Increase the pointer value by one.
Decrement   Decreases the pointer value by one.

Alarm Generation

LOS         Generates an all zero output.
LOF         Inverts a bit in the A1 byte.
B1          Inverts the entire B1 byte, causing section BIP errors.
Line AIS    Sets all the signal, except the section overhead, to ones before scrambling. This alarm overrides line FERF, LOP and all path alarms.

Line FERF   Forces a 110 code in bits 6-8 of the K2 byte.
LOP         Sets the pointer to an out of range value.
B2          Inverts all of the B2 bytes, causing line BIP errors.
Path AIS    Sets the SPE and H1-H3 pointer bytes to all ones before scrambling. This alarm overrides all other path alarms.
Path FERF   Sets bits 1-4 of the G1 byte to 1001. This will override path FEBE.

Path FEBE   Sets bits 1-4 of the G1 byte to 0001 ten times every second, causing ten path FEBEs every second.
Path RAI    Sets bit 5 of the G1 byte to one. This alarm is also known as path yellow.
B3          Inverts the entire B3 byte, causing line BIP errors.

Cell Scrambling

The self-synchronous scrambler is enabled for OC-3c operation. The 48 payload bytes are scrambled.

Output Timing

Internal      An internal crystal oscillator provides the output frequency.
Recovered     The output frequency follows the received timing.

Output

Rate          155.52 Mbs +/- 4.6 PPM
Encoding      NRZ with frame synchronous scrambling.
Type          Single-mode 1310 nm laser or Multi-mode 1310 nm LED
Level         Single-mode -10 dbm typical. Multi-mode -14 dbm typical
Connector     FC/PC

Data Source

Internal     Cells are generated from the internal cell generator.
Loop-back    Cells are copied from the received data input.
Analyzer

Alarm Monitoring

LOS Indicates no ones occurred in the input signal for at least 17 microseconds.
LOF Indicates no frame was found for at least 3 milliseconds.
B1 Detects errors in the section BIP bytes.
Line AIS Indicates the value 111 occurred in bits 6-8 of the K2 byte for at least 5 consecutive frames.
Line FERF Indicates the value 110 occurred in bits 6-8 of the K2 byte for at least 5 consecutive frames.
LOP Indicates no valid pointer was found for 8 consecutive frames.
B2 Detects errors in the line BIP bytes.
Path AIS Indicates when the H1 and H2 bytes are all ones for 3 consecutive frames.
Path FERF Detects when bits 1-4 of the G1 byte are 1001 for two consecutive frames.
Path FEBE Detects when a 1-8 value occurs in the G1 byte.
Path RAI Indicates when bit 5 of the G1 byte is set to one for 10 consecutive frames. This alarm is also known as path yellow.
B3 Detects line BIP errors.

Cell Scrambling

The self-synchronous scrambler is enabled for OC-3c operation. The 48 payload bytes are descrambled.

Cell Delineation

Cells are delineated using HEC searching. H4 is not used.

Cell Delineation Search Parameters

Alpha Seven incorrect headers to begin a search for new cell alignment.
Delta Six correct headers to declare delineation.
Input Rate 155.52 Mbs +/- 100 PPM
Encoding NRZ with frame synchronous scrambling.
Type 1310 nm photodetector
Sensitivity Single-mode -28 dBm typical.
Multi-mode -30 dBm typical
Connector FC/PC

STM-1 Physical Interface

The STM-1 Physical Interface allows the ATM150 to generate and analyze cell streams at 155.52 Mbs. This interface conforms to ATM Forum UNI Specification Version 3.0 and ITU I.432. The interface can transmit and receive ATM cells within a STM-1 frame. The optical interface is a single-mode configuration which can be used with either single-mode or multi-mode systems.

Generator

Pointer Manipulation

Pointer S-bits The S(0) and S(1) bits in the pointer are set to zero and one respectively. (This contrasts with SONET where both are zero.)
New Pointer Changes the transmitted pointer to an arbitrary value, by issuing a New Data Flag (NDF). Valid range for pointers is 0-782.
Increment Increase the pointer value by one.
Decrement Decreases the pointer value by one.

Alarm Generation

LOS Generates an all zero output.
LOF Inverts a bit in the A1 byte.
B1 Inverts the entire B1 byte, causing Regenerator Section BIP errors.
MS-AIS Sets all the signal, except the section overhead, to ones before scrambling. This alarm overrides MS-RDI, LOP and all AU alarms.
MS-RDI Forces a 110 code in bits 6-8 of the K2 byte.
LOP Sets the pointer to an out of range value.
B2 Inverts all of the B2 bytes, causing Multiplex Section BIP errors.
AU-AIS Sets the payload and H1-H3 pointer bytes to all ones before scrambling.
HP-REI Sets bits 1-4 of the G1 byte to 0001 ten times every second, causing ten path FEBE every second.
HP-RDI Sets bit 5,6, and 7 of the G1 byte to one. Inverts the entire B3 byte, causing path BIP errors.

Cell Mapping

The ATM cells are mapped directly into the payload. H4 points to the beginning of the next cell for compatibility with older systems.

Cell Scrambling

The self-synchronous scrambler is always enabled. The 48 payload bytes are scrambled.
Output Timing
Internal An internal crystal oscillator provides the output frequency.
Recovered The output frequency follows the received timing.

Output
Rate 155.52 Mbs +/- 20 PPM
Encoding NRZ with frame synchronous scrambling.
Type Single-mode 1310 nm laser or
Level Single-mode -10 dbm typical.
Connector FC/PC

Data Source
Internal Cells are generated from the internal cell generator.
Loop-back Cells are copied from the received data input.

Analyzer

Alarm Monitoring
LOS Indicates no ones occurred in the input signal for at least 17 microseconds.
LOF Indicates no frame was found for at least 3 milliseconds.
B1 Detects errors in the Regenerator BIP bytes.
MS-AIS Indicates the value 111 occurred in bits 6-8 of the K2 byte for at least 5 consecutive frames.
MS-RDI Indicates the value 110 occurred in bits 6-8 of the K2 byte for at least 5 consecutive frames.
LOP Indicates no valid pointer was found for 8 consecutive frames.
B2 Detects errors in the Multiplex Section BIP bytes.
AU-AIS Indicates when the H1 and H2 bytes are all ones for 3 consecutive frames.
HP-REI Detects when a 1-8 value occurs in the G1 byte.
HP-RDI Indicates when bit 5 of the G1 byte is set to one for ten consecutive frames.
B3 Detects path BIP errors.

Cell Scrambling
The self-synchronous scrambler is enabled. The 48 payload bytes are descrambled.

Cell Delineation
Cells are delineated using HEC searching. H4 is not used.

Cell Delineation Search Parameters
Alpha Seven incorrect headers to begin a search for new cell alignment.
Delta Six correct headers to declare delineation.

Input
Rate 155.52 Mbs +/- 100 PPM
Encoding NRZ with frame synchronous scrambling.
Type 1310 nm photodetector
Sensitivity Single-mode -28 dbm typical.
Connector FC/PC

100 Mbs Interface (TAXI)
The 100 Mbs Physical Interface allows the ATM150 to generate and analyze cell streams at 100 Mbs. This interface conforms to ATM Forum UNI Specification Version 3.0. The interface can transmit and receive ATM cells over multi-mode fiber using a 4B/5B encoding. The interface is commonly known as TAXI because it uses Advanced Micro Device's TAXI circuits.

Generator

Cell Mapping
Active ATM cells are preceded by the TT code indicating start of cell. When no cells are available, JK codes indicating sync are sent. Idle cells are not sent and replaced with JK codes. Both 4 bit nibbles of each cell byte are replaced with 5 bit code words.

Cell Mapping Modes
Normal Active ATM cells are preceded by the TT code. Another TT code and active cell can immediately follow. At 100% bandwidth there will be no JK codes.
Safe A JK code is inserted between the end of a cell and next TT code and active cell.

Output
Rate 100 Mbs +/- 100 PPM (125 MHz clock)
Encoding NRZI with 4B/5B
Type Multi-mode 1310 nm LED.
Level Multi-mode -14 dbm typical
Connector Duplex SC

Analyzer

Violation Monitoring
Violation Detects errors of the 4B/5B encoding.
Cell Delineation
Cells are delineated implicitly using the TT start of cell code.

Input
Rate  100 Mbs +/- .1% (125 MHz clock)
Encoding NRZI with 4B/5B
Type  1310 nm photodetector.
Sensitivity Multi-mode -28 dbm typical
Connector Duplex SC

DS1 / DS3 Interface
The DS1 / DS3 Physical Interface allows the ATM150 to generate and analyze cell streams at 44.736 Mbs or 1.544 mbs. The interface can conform to CCITT G703, Bellcore TR-TSY-499 and ATM Forum UNI Specification Version 3.0. The interface can transmit and receive ATM cells within a DS3 frame (either M23 or C-bit) or a DS1 frame (either SF, or ESF). These cells can be directly mapped or an IEEE 802.6 Physical Layer Convergence Protocol (PLCP) can be used.

Generator

DS3 Alarm Generation

LOS  Generates all zero output.
LOF  Inverts all M and F bits in the DS3 frame.
AIS  Inserts a 1010 pattern in the DS3 payload.
LCV  Causes one line code violation on the B32S code 10 times a second.
IDLE Inserts a 1100 pattern in the DS3 payload.
PARITY M23 mode all the P-bits are inverted.
C-bit mode all parity C-bits are inverted.
FERF Sets the X1 and X2 to zero.
FEBE Sets the FEBE C-bits to zero.

DS1 Alarm Generation

LOS  Generates all zero output.
AIS  Generates an unframed all-ones pattern.
LOF (Red) Removes all framing.
Yellow Generates framing appropriate yellow alarm.

PLCP Alarm Generation

LOF  Inverts a bit in the A1 and A2 byte.
PARITY Inverts a bit in the P0-P11 bytes.
RAI( Yellow) Sets bit 5 in the G1 byte.
FEBE Inserts one FEBE in each frame.
B1 Inserts one BIP error in each frame.

PLCP Control

On  The PLCP frame structure is used to carry ATM cells within the DS1/DS3 frame.
Off  The ATM cells are directly mapped within the DS1/DS3 frame.

PLCP Timing Alignment

Internal  A nibble stuff pattern of 13,14,14 is used for DS3 PLCP. A fixed pattern is used for DS1 PLCP.
Recovered The PLCP follows the received timing and stuff pattern.

Cell Scrambling

The self-synchronous scrambler is disabled for PLCP operation and enabled when cells are directly mapped.

Output Timing

Internal  An internal crystal oscillator provides the output frequency.
Recovered The output frequency follows the received timing.

DS1 Output

Rates  1.544 Mbs +/- 20 PPM
Encoding Bipolar
Impedance 100 Ω
Level Cross-connect
Connector WECO 310 compatible

DS3 Output

Rates  44.736 Mbs +/- 20 PPM
Encoding Bipolar with Three Zero Suppression (B3ZS)
Impedance 75 Ω
Level Cross-connect (~700 mV)
Connector BNC

Data Source

Internal  Cells are generate from the internal cell generator.
Loop-back Cells are copied from the received data input.
Analyzer

DS1 Alarm Monitoring

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS</td>
<td>Detects all zero input.</td>
</tr>
<tr>
<td>AIS</td>
<td>Detects an unframed all-ones pattern.</td>
</tr>
<tr>
<td>LOF (COFA)</td>
<td>Detects loss or change of framing.</td>
</tr>
<tr>
<td>Yellow</td>
<td>Generates framing appropriate yellow alarm.</td>
</tr>
<tr>
<td>CRC-6</td>
<td>Counts CRC-6 errors in ESF mode.</td>
</tr>
<tr>
<td>Frame Bit</td>
<td>Counts incorrect framing bits.</td>
</tr>
<tr>
<td>LCV</td>
<td>Counts line code violations.</td>
</tr>
</tbody>
</table>

DS3 Alarm Monitoring

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS</td>
<td>Detects when a sequence of ≥175 zeros occurs.</td>
</tr>
<tr>
<td>LOF</td>
<td>Detects when frame alignment changed or cannot be found.</td>
</tr>
<tr>
<td>AIS</td>
<td>Detects a continuous 1010 pattern in the DS3 payload.</td>
</tr>
<tr>
<td>LCV</td>
<td>Detects a line code violation in the B3ZS encoding.</td>
</tr>
<tr>
<td>IDLE</td>
<td>Detects a continuous 1100 pattern in the DS3 payload.</td>
</tr>
<tr>
<td>PARITY</td>
<td>M23 mode, detects P-bit parity errors.</td>
</tr>
<tr>
<td>FERF</td>
<td>Detects if X1 and X2 are zero.</td>
</tr>
<tr>
<td>FEBE</td>
<td>Detects if FEBE C-bits are zero.</td>
</tr>
</tbody>
</table>

PLCP Alarm Monitoring

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LOF</td>
<td>Detects when PLCP frame alignment changed or cannot be found.</td>
</tr>
<tr>
<td>PARITY</td>
<td>Detects errors in the P bytes and A1-A2 bytes.</td>
</tr>
<tr>
<td>RAI(Yellow)</td>
<td>Detects bit 5 in the G1 byte.</td>
</tr>
<tr>
<td>FEBE</td>
<td>Detects FEBE indications.</td>
</tr>
<tr>
<td>B1</td>
<td>Detects BIP errors.</td>
</tr>
</tbody>
</table>

PLCP Control

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>On</td>
<td>The PLCP frame structure is used within the DS1 or DS3 frame. ATM cells are implicitly delineated.</td>
</tr>
<tr>
<td>Off</td>
<td>The ATM cells are assumed to be directly mapped within the DS1 or DS3 frame. ATM cells are delineated using HEC searching.</td>
</tr>
</tbody>
</table>

Cell Delineation Search Parameters

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha</td>
<td>Seven incorrect headers to begin a search for new cell alignment.</td>
</tr>
<tr>
<td>Delta</td>
<td>Six correct headers to declare delineation.</td>
</tr>
</tbody>
</table>

DS1 Input

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>1.544 Mbs +/- 100 PPM</td>
</tr>
<tr>
<td>Encoding</td>
<td>Bipolar</td>
</tr>
<tr>
<td>Impedance</td>
<td>100 Ω</td>
</tr>
<tr>
<td>Level</td>
<td>Cross-connect</td>
</tr>
<tr>
<td>Connector</td>
<td>WECO 310 compatible</td>
</tr>
</tbody>
</table>

DS3 Input

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>44.736 Mbs +/- 100 PPM</td>
</tr>
<tr>
<td>Encoding</td>
<td>Bipolar with Three Zero Suppression (B3ZS)</td>
</tr>
<tr>
<td>Impedance</td>
<td>75 Ω</td>
</tr>
<tr>
<td>Level</td>
<td>Cross-connect</td>
</tr>
<tr>
<td>Connector</td>
<td>BNC</td>
</tr>
</tbody>
</table>

E1 / E3 Interface

The E1 / E3 Physical Interface allows the ATM150 to generate and analyze cell streams at 34.368 Mbs or 2.048 mbs. The interface can conform to CCITT G.703, G.751, G.832 and ATM Forum UNI Specification Version 3.0. The interface can transmit and receive ATM cells within a E3 frame (either G.832 or G.751) or a E1 frame. These cells can be directly mapped or an IEEE 802.6 Physical Layer Convergence Protocol (PLCP) can be used.

Generator

E3 Alarm Generation

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS</td>
<td>Generates all zero output.</td>
</tr>
<tr>
<td>FRAME</td>
<td>Errors bits in the E3 frame.</td>
</tr>
<tr>
<td>LCV</td>
<td>Causes one line code violation on the HDB3 code 10 times a second.</td>
</tr>
<tr>
<td>PARITY</td>
<td>Errors parity bits.</td>
</tr>
<tr>
<td>FERF</td>
<td>Inserts FERF bit (G.832).</td>
</tr>
<tr>
<td>RAI</td>
<td>Sets bit 11 of te frame (G.751).</td>
</tr>
</tbody>
</table>

E1 Alarm Generation

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS</td>
<td>Generates all zero output.</td>
</tr>
<tr>
<td>AIS</td>
<td>Generates AIS or TS16 AIS</td>
</tr>
<tr>
<td>LOF</td>
<td>Removes all framing.</td>
</tr>
<tr>
<td>Remote</td>
<td>Generates remote alarm or remote multi-frame alarm.</td>
</tr>
</tbody>
</table>

PLCP Control

On

The PLCP frame structure is used within the E1/E3 frame. ATM cells are directly mapped within the E1/E3 frame. ATM cells are delineated using HEC searching.

Off

The ATM cells are directly mapped within the E1/E3 frame.
Appendix B

**PLCP Timing Alignment**
- **Internal** A fixed pattern is used for the PLCP.
- **Recovered** The PLCP follows the received timing and stuff pattern.

**Cell Scrambling**
The self-synchronous scrambler is enabled for PLCP and direct mapped operation.

**Output Timing**
- **Internal** An internal crystal oscillator provides the output frequency.
- **Recovered** The output frequency follows the received timing.

**E1 Output**
- **Rates** 2.048 Mbs +/- 20 PPM
- **Encoding** AMI or HDB3
- **Impedance** 120 Ω
- **Connector** Siemens 3-pin

**E3 Output**
- **Rates** 34.368 Mbs +/- 20 PPM
- **Encoding** AMI or HDB3
- **Impedance** 75 Ω
- **Connector** BNC

**Data Source**
- **Internal** Cells are generated from the internal cell generator.
- **Loop-back** Cells are copied from the received data input.

**Analyzer**

**E1 Alarm Monitoring**
- **LOS** Detects all zero input.
- **AIS** Indicates when AIS or TS 16 AIS exists for 104 ms.
- **OOF** Detects loss or change of framing.
- **RED** Detects 25 intervals of 4ms with an OOF.
- **CRC** Counts CRC errors
- **Frame Bit** Counts incorrect framing bits.
- **LCV** Counts line code violations
- **FEBE** Counts Far End Block Errors

**E3 Alarm Monitoring**
- **LOS** Detects when a sequence of ≥32 zeros occurs.
- **OOF** Detects when frame alignment changed or cannot be found.
- **AIS** Detects an all ones pattern.
- **LCV** Counts line code violations
- **PARITY** Counts parity errors.
- **FERF** Detects FERF (G.832)
- **RAI** Detects RAI (G.751)
- **FEBE** Counts FEBE (G.832)

**PLCP Alarm Monitoring**
- **LOF** Detects when PLCP frame alignment changed or cannot be found.
- **PARITY** Detects errors in the P bytes and A1-A2 bytes.
- **RAI(Yellow)** Detects bit 5 in the G1 byte.
- **FEBE** Detects FEBE indications.
- **B1** Detects BIP errors.

**PLCP Control**
- **On** The PLCP frame structure is used within the E1 or E3 frame. ATM cells are implicitly delineated.
- **Off** The ATM cells are assumed to be directly mapped within the E1 or E3 frame. ATM cells are delineated using HEC searching.

**Cell Delineation Search Parameters**
- **Alpha** Seven incorrect headers to begin a search for new cell alignment.
- **Delta** Six correct headers to declare delineation.

**E1 Input**
- **Rate** 2.048 Mbs +/- 100 PPM
- **Encoding** AMI or HDB3
- **Impedance** 120 Ω
- **Connector** Siemens 3-pin

**E3 Input**
- **Rate** 34.368 Mbs +/- 100 PPM
- **Encoding** AMI or HDB3
- **Impedance** 75 Ω
- **Connector** BNC
## Environmental

**Power**
AC power inputs accepts either  
115 VAC or 230 VAC, 300 W Max  

**Temperature**
Operation: 5 to 40 degrees C  
Storage: -10 to 50 degrees C  

**Size**
8"H x 14"W x 20"D  
20.3 cm H x 35.6 cm W x 50.8 cm D  

**Weight**
30 lbs (13.7 kilograms)
Appendix C

Factory Default ATM-150 Settings

To reset the ATM-150 to the Factory Default Setting, press the 'UTILITY' button on the front panel of the unit.

The UTILITY box contains many general functions that are usually associated with the user interface. Press the UTILITY button to bring up the utility menu with softkeys on the front panel LCD display. The internal key LED lights when this key is active. Press the UTILITY key again to exit the utility submenu. Press PANEL LOCK to lock the front panel keys out. LED is lit when this function is active.

| Factory Default | Selection of this softkey returns the ATM-150 to factory settings. This is useful to clear custom settings when it is time to run different tests. |
Active Header Generation
number of cells = 16
gfc = 0
vpi = 15
vci = 1000
pti = 0
clp = 0
vci increment = 1

Bandwidth Control
idle bandwidth = 50%
test cell bandwidth 1) 1/1 = 50%
test cell bandwidth 2) 1/2 = 0%
test cell bandwidth 3) 1/3 = 0%
test cell bandwidth 4) 1/4 = 0%
traffic bandwidth = 0%
bandspace control = percentage

Analyzer Setup
input signal = oc-3c
cell format = uni
loopback = disable
d3 plcp mode = on
d3 framing = cbit
payload scrambling = on
d1 plcp mode = on
d1 framing = esf
e3 plcp mode = on
e3 framing = g.751
e1 plcp mode = on

Analyzer System Parameters
1pps source = generator
sync pulse output = ATM
hec coset = enable

Calibrate
oc3-c reference = 14 micro seconds
d3 reference = 46 micro seconds
d1 reference = 1417 micro seconds
e3 reference = 63 micro seconds
e1 reference = 1236 micro seconds
stm1 reference = 14 micro seconds	
taxi reference = 2 micro seconds

Cell Delay Control
delay mode = propagation
min = 0 micro seconds
max = 1000 micro seconds
starting delay bin 1 = 0
ending delay bin 1 = 100
ending delay bin 2 = 200
ending delay bin 3 = 300
ending delay bin 4 = 400
ending delay bin 5 = 500
ending delay bin 6 = 600
ending delay bin 7 = 700
ending delay bin 8 = 800
ending delay bin 9 = 900
ending delay bin 10 = 1000

ATM Error Control
hec errors & payload errors = disable
error rate = 1.0e-8
Default Settings

Cell Distribution
active = constant 50%
active cell burst count = 1
idle = constant 50%
idle cell burst count = 1

Delay Mode Button = Prop

Display Contrast
display contrast = 5

DISTRIBUTION Management
randomize = on

DS1 Physical Alarms
los = off
lof = off
ais = off
rai = off
plcp lof = off
plcp parity = off
plcp rai = off
plcp febe = off
plcp b1 = off

E1 Physical Alarms
lof = off
remote = off
ais = off
plcp lof = off
plcp parity = off
plcp rai = off
plcp febe = off
plcp b1 = off

E3 Physical Alarms
los = off
oof = off
lcv = off
e3 febe = off
ferf/rai = off
plcp lof = off
plcp parity = off
plcp rai = off
plcp febe = off
plcp b1 = off
Generator Setup
output signal = oc-3c
cell format = uni
clock source = int
sonet pointer = 522
new pointer = 522
ds3 plcp mode = on
ds3 framing = cbit
payload scramble = on
ds1 plcp mode = on
ds1 framing = esf
c3 plcp mode = on
e3 framing = g.751
e1 plcp mode = on
taxi sync byte output = safe

Generator System Parameters
1pps source = int
sync pulse output = ATM
hec coset = enable

GPIB
gpib address = 14
gpib term = eoi / lf
gpib bus mode = talk / listen

Header Control
test cell number = 1
gfc = 0
vpi = vci = 1
pti = clip = 0

Header Parameters
randomize = on

Monitor
monitor = lcd

Monitor Control
sliding window = 10 seconds
monitor type = untimed
monitor length = 60 seconds
sweep count = 5
vci increment = 1

Monitor Mode Button = Win

OC-3c Physical Alarms
los = off
lof = off
b1 = off
l-ais = off
l-ferf = off
lop = off
b2 = off
p-ais = off
p-ferf = off
p-febe = off
p-rai = off
b3 = off

Output Results Control
print eot control = off
results file = results1.txt

Printer Port Button = Lpt
Remote
command header = off
dbg mode = off

Results Control
sliding window = 10 seconds
results type = untimed
results length = 60 seconds
sweep count = 5
vci increment = 1
link results with generator test = disable

Test Cell
disable link to test cell 1
gfc = 0
vpi = 1
vci = 1
pti = 0
clp = 0

Test Mode Button = Test

Results Screen Button = AMT1

RS-232
BAUD RATE = 9600
PARITY = EVEN
DATA SIZE = 7
STOP BITS = 1
ECHO = ON
EOL TERMINATION = CR

RUN/HOLD BUTTON = RUN

STM-1 Physical Alarms
los = off
lof = off
b1 = off
ms-ais = off
ms-rdi = off
lop = off
b2 = off
au-ais = off
hp-rei = off
hp-rdi = off
b3 = off
Appendix D

ATM-150 Functional Block Diagram
Appendix E

Remote Command Set

Alphabetical listing of all commands begins on page ...................... E-2
Index of all commands begins on page ........................................ E-149
Alphabetical List of Commands

*cls

ACTION: (Clear Status) Clears the Status Registers.

Example: *cls

*ese [n]

ACTION: Sets the Standard Event Status Enable Register to 'n'.

'n': 0 to 255

Example: *ese 0

*ese?

ACTION: Returns the current Standard Event Status Enable Register.

Response: number value

Example: *ese?
255
**esr?**

**ACTION:** Returns the current Standard Event Status Register.

**NOTE:** For details on this and other registers used for GPIB SRQs, refer the GPIB Appendix.

**Response:** number value

**Example:**

```
*esr?
0
```

**idn?**

**ACTION:** Returns the ATM150 identification.

**Response:** Manufacturer , Model , 0 , Firmware level

**Example:**

```
*idn?
Tektronix , atm150 , 0 , 1.5
```

**lrn?**

**ACTION:** Returns the current device setup as a series of remote command message units, such that this response can be sent back to the unit to restore it to the current state.

**Response:** A sequence of response messages

**Example:**

```
*lrn?
AN_CELLFRMT UNI
AN_COSET ON
AN_DS3FRAME CBIT
...```
*opc

ACTION: Sets the Operation Complete message in the Standard Event Status Register immediately.

Example: 

*opc

*opc?

ACTION: Immediately returns a value of 1, which indicates operation complete.

Response: number value

Example: 

*opc?

1

*rst

ACTION: Resets the device to the default configuration.

Example: 

*rst

*sre [n]

ACTION: Sets the Service Request Enable Register.

'n': 0 to 255

Example: 

*sre 255
*sre?

ACTION: Returns the current Service Request Enable Register.

Response: number value

Example: *sre?
          191

*stb?

ACTION: Returns the current contents of the Status Byte, where bit 6 is the Master Summary Status Bit.

Response: number value

Example: *stb?
          96

*tst?

ACTION: Returns the self-test result. The scope of the test is limited. A response of 0 indicates successful completion.

Response: number value

Example: *tst?
          0
*wai

ACTION: Stops the processing of all remote commands until all operation
are complete (see *opc).

Example: *wai
active_bw?

ACTION: Returns the allowed bandwidth for the test and active cells as determined by the current cell distributions.

<NR3 numeric>

Example: 
active_bw?
ACTIVE_BW 5.00E-3

active_cell [cellnum],[gfc],[vpi],[vci],[pti],[clp]

ACTION: Modifies an entire Active Traffic ATM Cell. For the specified Active cell (cellnum), all of the parameters will be changed as specified.

'cellnum': 1 to Total Active Cells (see active_cnt)
'gfc': 0 to 15 (ignored if ATM cell format is NNI)
'vpi': 0 to 4095 (up to 255 if cell format is UNI)
'vci': 0 to 65535
'pti': 0 to 7
'clp': 0 to 1

Example: 
active_cell 4, 15, 255, 65535, 7, 1
active_cell? [cellnum]

ACTION: Returns the entire Active Traffic ATM Cell, specified by 'cellnum'.
Note that the GFC field in the response will be 0 when the ATM cell format is NNI.

'cellnum': 1 to Total Active Cells (see active_cnt)
Response: <6 NR1 Numerics>
Example: active_cell? 4
ACTIVE_CELL 4, 0, 4095, 65535, 7, 1

active_clp [cellnum],[clp]

ACTION: Modifies the Cell Loss Priority (CLP) of the specified Active Traffic ATM Cell specified by 'cellnum'.

'cellnum': 1 to Total Active Cells (see active_cnt)
'clp': 0 to 1
Example: active_clp 9, 1

active_clp? [cellnum]

ACTION: Returns the Cell Loss Priority (CLP) of the specified Active Traffic ATM Cell.

'cellnum': 1 to Total Active Cells (see active_cnt)
Response: two number values
Example: active_clp? 4
ACTIVE_CLP 4, 1
active_cnt?

ACTION: Returns the current count of Active Traffic ATM Cells.

Response: number value

Example: active_cnt?
ACTIVE_CNT 16

active_frq?

ACTION: Returns the available frequency of the specified Active Traffic ATM Cell.

Response: number value

Example: active_frq?
ACTIVE_FRQ 0.25
active_gfc  [cellnum],[gfc]

ACTION: Modifies the Generic Flow Control (CLP) of the specified Active Traffic ATM Cell specified by 'cellnum'. This command is only valid if the ATM Cell Format is UNI.

'cellnum': 1 to Total Active Cells (see active_cnt)
'gfc': 0 to 15

Example: active_gfc 1, 12

-----------------------------------------------

active_gfc? [cellnum]

ACTION: Returns the Generic Flow Control (GFC) of the specified Active Traffic ATM Cell. This command is only valid if the ATM Cell Format is UNI.

'cellnum': 1 to Total Active Cells (see active_cnt)

Response: two number values

Example: active_gfc? 1
            ACTIVE_GFC 1, 12
active_pri  [cellnum],[pti]

ACTION: Modifies the Payload Type Identifier (PTI) of the specified Active Traffic ATM Cell specified by 'cellnum'.

'cellnum': 1 to Total Active Cells (see active_cnt)
'pti': 0 to 7

Example: active_pri 2, 0

active_pri? [cellnum]

ACTION: Returns the Payload Type Identifier (PTI) of the specified Active Traffic ATM Cell.

'cellnum': 1 to Total Active Cells (see active_cnt)

Response: two number values

Example: active_pri? 16
ACTIVE_PTI 16, 7
active_vci [cellnum],[vci]

**ACTION:** Modifies the Virtual Channel Identifier (VCI) of the specified Active Traffic ATM Cell specified by 'cellnum'.

'cellnum': 1 to Total Active Cells (see active_cnt)
'vci': 0 to 65535

Example: active_vci 7, 65535

-------------------------------------------------------------------------------------------------------------------------------

active_vci? [cellnum]

**ACTION:** Returns the Virtual Channel Identifier (VCI) of the specified Active Traffic ATM Cell.

'cellnum': 1 to Total Active Cells (see active_cnt)

Response: two number values

Example: active_vci? 6
ACTIVE_VCI 6, 0
active_vpi [cellnum],[vpi]

ACTION: Modifies the Virtual Path Identifier (VPI) of the specified Active Traffic ATM Cell specified by 'cellnum'.

'cellnum': 1 to Total Active Cells (see active_cnt)
'vpi': 0 to 4095 (up to 255 if cell format is UNI)

Example: active_vpi 10, 4095

------------------------------------------------------------------------

active_vpi? [cellnum]

ACTION: Returns the Virtual Path Identifier (VPI) of the specified Active Traffic ATM Cell.

'cellnum': 1 to Total Active Cells (see active_cnt)

Response: two number values

Example: active_vpi? 16
ACTIVE_VPI 16, 255
alarms_ds1 [los,lof,ais,rai,plcp_lof,plcp_par,plcp_rai,plcp_febe,plcp_b1] , [on,off]

ACTION: Controls the Generation of the DS1 Physical Layer ALARMS. Each alarm is controlled independently.

los This controls the output of DS1 Loss Of Signal (LOS).
lof This controls the output of DS1 Loss Of Frame (LOF) using both M-bit and F-bit framing errors.
ais This controls the DS1 Alarm Indication Signal (AIS) output.
rai This controls the DS1 yellow alarm signal (RAI).
plcp_lof This controls the insertion of frame alignment pattern errors (A1 and A2) in the PLCP frame.
plcp_par This controls the insertion of Parity errors in the PLCP frame.
plcp_rai This controls the generation of the DS1 PLCP yellow alarm signal (RAI).
plcp_febe This controls the insertion of Far End Block Errors (FEBE) in the PLCP frame.
plcp_b1 This controls the insertion of bit interleaved parity (BIP) errors in the PLCP frame.

on This enables the individual Alarm.
off This disables the individual Alarm.

Example: alarms_ds1 lof , on
alarms_ds1? [los,lof,ais,rai,plcp_lof,plcp_par,plcp_rai,plcp_febe,plcp_b1]

ACTION: Returns the current DS1 Alarm setting for the specified Alarm type.

Response: LOS, LOF, AIS, RAI, PCLP_LOF, PCLP_PAR,  
            PCLP_RAI, PCLP_FEBE or PCLP_B1  
            ON or OFF

Example:     alarms_ds1? ais
             ALARMS_DS1 AIS, OFF
alarms_ds3 [los,lof,ais,lcv,idle,parity,ds3_ferf,ds3_febe,plcp_lof, plcp_par,plcp_rai,plcp_febe,plcp_b1] , [on,off]

ACTION: Controls the Generation of the DS3 Physical Layer ALARMS. Each alarm is controlled independently.

los This controls the output of DS3 Loss Of Signal (LOS).
lof This controls the output of DS3 Loss Of Frame (LOF) using both M-bit and F-bit framing errors.
ais This controls the DS3 Alarm Indication Signal (AIS) output.
lcv This controls the insertion of DS3 Line Code Violations (LCV).
idle This controls the output of the DS3 Idle Maintenance signal.
parity This controls the insertion of DS3 Parity errors (P-bits errors).
ds3_ferf This controls the output of the Far End Receive Failure maintenance signal (FERF) in the DS3 output.
ds3_febe This controls the insertion of Far End Block Errors (FEBE) in the DS3 output.
plcp_lof This controls the insertion of frame alignment pattern errors (A1 and A2) in the PLCP frame.
plcp_par This controls the insertion of Parity errors in the PLCP frame.
plcp_rai This controls the generation of the DS3 PLCP yellow alarm signal (RAI).
plcp_febe This controls the insertion of Far End Block Errors (FEBE) in the PLCP frame.
plcp_b1 This controls the insertion of bit interleaved parity (BIP) errors in the PLCP frame.
on This enables the individual Alarm.
off This disables the individual Alarm.

Example: alarms_ds3 lof , on
alarms_ds3? [los, lof, ais, lcv, idle, parity, ds3_ferf, ds3_febe, plcp_lof, plcp_par, plcp_rai, plcp_febe, plcp_b1]

ACTION: Returns the current DS3 Alarm setting for the specified Alarm type.

Response: LOS, LOF, AIS, LCV, IDLE, PARITY, DS3_FERF, DS3_FEBE, PCLP_LOF, PLCP_PAR, PLCP_RAI, PLCP_FEBE or PLCP_B1 ON or OFF

Example: alarms_ds3? ais
ALARMS_DS3 AIS, OFF
alarms_e1 [lof,ais,remote,plcp_lof,plcp_par,plcp_rai,plcp_febe,plcp_b1] , [on,off]

ACTION: Controls the Generation of the E1 Physical Layer ALARMS. Each alarm is controlled independently.

lof This controls the output of E1 Loss Of Frame (LOF) using both M-bit and F-bit framing errors.
ais This controls the E1 Alarm Indication Signal (AIS) output.
remote This controls E1 remote alarm.
plcp_lof This controls the insertion of frame alignment pattern errors (A1 and A2) in the PLCP frame.
plcp_par This controls the insertion of Parity errors in the PLCP frame.
plcp_rai This controls the generation of the E1 PLCP yellow alarm signal (RAI).
plcp_febe This controls the insertion of Far End Block Errors (FEBE) in the PLCP frame.
plcp_b1 This controls the insertion of bit interleaved parity (BIP) errors in the PLCP frame.

on This enables the individual Alarm.
off This disables the individual Alarm.

Example: alarms_e1 lof , on
alarms_e1? [lof, ais, remote, plcp_lof, plcp_par, plcp_rai, plcp_febe, plcp_b1]

ACTION: Returns the current E1 Alarm setting for the specified Alarm type.

Response: LOF, AIS, REMOTE, PCLP_LOF, PCLP_PAR, PCLP_RA1, PLCP_FEBE or PLCP_B1
           ON or OFF

Example: alarms_E1? ais
           ALARMS_E1 AIS, OFF
**alarms_e3**

[los, oof, lcv, e3_ferf_rai, e3_febe, plcp_lof, plcp_par, plcp_rai, plcp_febe, plcp_b1] , [on, off]

**ACTION:** Controls the generation of the E3 Physical Layer ALARMS. Each alarm is controlled independently.

- **los**  This controls the output of E3 Loss of Signal (LOS).
- **oof**  This controls the output of E3 Out-of-Frame (OOF).
- **lcv**  This controls the insertion of E3 Line Code Violations (LCV).
- **e3_ferf_rai**  This controls the output of the Far End Receive Failure maintenance signal and the E3 yellow alarm signal.
- **e3_febe**  This controls the insertion of Far End Block Errors (FEBE) in E3 output.
- **plcp_lof**  This controls the insertion of frame alignment pattern errors (A1 and A2) in the PLCP frame.
- **plcp_par**  This controls the insertion of Parity errors in the PLCP frame.
- **plcp_rai**  This controls the generation of the E3 PLCP yellow alarm signal (RAI).
- **plcp_febe**  This controls the insertion of Far End Block Errors (FEBE) in the PLCP frame.
- **plcp_b1**  This controls the insertion of bit interleaved parity (BIP) errors in the PLCP frame.

- **on**  This enables the individual Alarm.
- **off**  This disables the individual Alarm.

**Example:**  
`alarms_E3 los`, on
alarms_e3? [Los, oof, lcv, e3_ferf_rai, e3_febf, plcp_lof, plcp_par, plcp_rai, plcp_febf, plcp_b1]

ACTION: Returns the current E3 Alarm setting for the specified Alarm type.

Response: LOS, OOF, LCV, E3_FERF_RAI, E3_FEBF, PCLP_LOF, PLCP_PAR, PLCP_RAI, PLCP_FEBF or PLCP_B1
ON or OFF

Example: alarms_e3? los
ALARMS_E3 LOS, OFF
alarms_oc3c \[\{\text{los,lof,b1,l_ais,l_ferf,lop,b2,p_ais,p_ferf,p_febe,p_rai,b3}\} ,\]
\[\text{on,off}\]

**ACTION:** Controls the Generation of the OC-3c Physical Layer ALARMS. Each alarm is controlled independently.

- **los**
  This controls the output of OC-3c Loss Of Signal (LOS).

- **lof**
  This controls the output of OC-3c Loss Of Frame (LOF) by altering the A1 section overhead framing byte to 0x76.

- **b1**
  This controls the insertion of bit errors in the section BIP-8 byte (B1) by inverting the byte.

- **l_ais**
  This controls the insertion of the Line Alarm Indication Signal (Line AIS) into the SONET stream.

- **l_ferf**
  This controls the insertion of Line Far End Receive Failure (Line FERF) into the K2 byte of the SONET stream.

- **lop**
  This controls the output of Loss Of Pointer (LOP) by setting the SONET pointer to an invalid value.

- **b2**
  This controls the insertion of bit errors in the line BIP-24 byte (B2) by inverting the bytes.

- **p_ais**
  This controls the insertion of the STS Path Alarm Indication Signal (Path AIS) into the SONET stream.

- **p_ferf**
  This controls the insertion of Path Far End Receive Failure (Path FERF) into the G1 byte of the SONET stream.

- **p_febe**
  This controls the insertion of Path Far End Block Errors (Path FEBE) in the Path status byte G1. Eight errors are inserted every 100 milliseconds.

- **p_rai**
  This controls the output of the STS Path yellow alarm (Path RAI) into the SONET stream.

- **b3**
  This controls the insertion of bit errors in the path BIP-8 byte (B3) by inverting the byte.

- **on**
  This enables the individual Alarm.

- **off**
  This disables the individual Alarm.

**Example:**

```
alarms_oc3c lof, on
```
**alarms_oc3c?**  [los,lof,b1,l_ais,l_ferf,lop,b2,p_ais,p_ferf,p_febe,p_rai,b3]

**ACTION:** Returns the current OC-3c Alarm setting for the specified Alarm type.

**Response:** LOS, LOF, B1, L_AIS, L_FERF, LOP, B2, P_AIS, P_FERF, P_FEBE, P_RAI or B3
ON or OFF

**Example:**

```
alarms_oc3c? b3
ALARMS_OC3C B3, OFF
```
alarms_stm1 [los, lof, b1, ms_ais, ms_rdi, lop, b2, au_ais, hp_rei, hp_rdi, b3].
[on, off]

ACTION: Controls the Generation of the STM-1 Physical Layer ALARMS. Each alarm is controlled independently.

los This controls the output of STM-1 Loss Of Signal (LOS).
lof This controls the output of STM-1 Loss Of Frame (LOF) by inverting a bit in all A1 bytes.
b1 This controls the insertion of bit errors in the Regenerator section BIP-8 byte (B1) by inverting the byte.
ms_ais This sets the signal, except the section overhead, to ones before scrambling. This alarm overrides MS-RDI, LOP and all AU alarms
ms_rdi This forces a 110 code in bits 6-8 of the K2 byte.
lop This controls the output of Loss Of Pointer (LOP) by setting the SONET pointer to an out-of-range value.
b2 This controls the insertion of bit errors in the Multiplex Section BIP-24 byte (B2) by inverting the bytes.
au_ais This sets the payload and H1-H3 pointer bytes to all ones before scrambling.
hp_rei This sets bits 1-4 of the G1 byte to 0001 ten times every second, causing ten path FEBE every second.
hp_rdi This sets bit 5, 6, and 7 of the G1 byte to one.
b3 This controls the insertion of bit errors in the path BIP-8 byte (B3) by inverting the byte.
on This enables the individual Alarm.
off This disables the individual Alarm.

Example: alarms_oc3c lof, on
alarms_stm1? [los,lof,b1,ms_ais,ms_rdi,lop,b2,au_ais,hp_rei,hp_rdi,b3],

ACTION: Returns the current STM-1 Alarm setting for the specified Alarm type.

Response: LOS, LOF, B1, MS_AIS, MS_RDI, LOP, B2, AU_AIS, HP_REI, HP_RDI, or B3
ON or OFF

Example: alarms_stm1? b3
ALARMS_STM1 B3, OFF
an_cellfrmt [uni, nni]

ACTION: Controls the Analyzer ATM Cell Format. See graphical representations of the ATM Cell Formats in the ATM Basics appendix (Appendix A).

uni The ATM cell format will be the User-Network Interface (UNI), which includes the GFC and a smaller VPI.
nni The ATM cell format will be the Network-Network Interface (NNI), which does not include the GFC.

Example: an_cellfrmt uni

an_cellfrmt?

ACTION: Returns the current ATM Cell Format expected by the Analyzer.

Response: UNI or NNI

Example: an_cellfrmt?
AN_CELLFRMT NNI
**an_cose** [disable.enable]

**ACTION:** Controls the use of the COSET in the ATM HEC calculations for the Analyzer.

- **disable** The HEC calculation is completed without the XOR of the COSET pattern 01010101. This calculation is not defined.
- **enable** The HEC calculation includes the XOR of the COSET pattern 01010101, as defined by the ATM Forum, UNI 3.0 specification.

**Example:**
```
an_cose enable
```

**an_cose?**

**ACTION:** Returns the current Analyzer COSET mode.

**Response:** ENABLE or DISABLE

**Example:**
```
an_cose?
AN_COSET DISABLE
```
an_crc_e1 [on, off]

ACTION: This is a query and action command. Upon query, it will return the current state of the analyzer e1 mode, either on or off. As an action command, it sets the current analyzer e1 mode.

Example: an_crc_e1 on

an_ds1frame [sf, esf]

ACTION: Controls the Analyzer DS1 frame format.

sf The DS1 SF format will be expected.
esf The DS1 ESF format will be expected.

Example: an_ds1frame sf
an_ds1frame?

ACTION: Returns the current Analyzer DS1 frame format.

Response: SF or ESF

Example: an_ds1frame?
AN_DS1FRAME SF

an_ds3frame [cbit,mx3]

ACTION: Controls the Analyzer DS3 frame format.

cbit The DS3 C-BIT format will be expected.
mx3 The DS3 MX3 format will be expected.

Example: an_ds3frame cbit

an_ds3frame?

ACTION: Returns the current Analyzer DS3 frame format.

Response: CBIT or MX3

Example: an_ds3frame?
AN_DS3FRAME MX3
an_e3frame [G.751, G.832]

ACTION: Controls the Analyzer E3 frame format.

G.751 The E3 G.751 format will be expected.
G.832 The E3 G.832 format will be expected.

Example: an_e3frame G.751

an_e3frame?

ACTION: Returns the current Analyzer E3 frame format.

Response: G.751 or G.832

Example: an_e3frame?
          AN_E3FRAME G.751

an_plcp_ds1 [on.off]

ACTION: Controls the use of Analyzer DS1 PLCP framing.

on The ATM Cells carried by the DS1 signal will be expected in the PLCP format.
off The ATM Cells carried by the DS1 signal will not be expected in the PLCP format.

Example: an_plcp_ds1 on
an_plcp_ds1?

ACTION: Returns the current Analyzer DS1 PLCP mode.

Response: ON or OFF

Example: an_plcp_ds1?
AN_PLCP_DS1 OFF

an_plcp [on,off]

ACTION: Controls the use of Analyzer DS3 PLCP framing.

on The ATM Cells carried by the DS3 signal will be expected in the PLCP format.
off The ATM Cells carried by the DS3 signal will not be expected in the PLCP format.

Example: an_plcp on

an_plcp?

ACTION: Returns the current Analyzer DS3 PLCP mode.

Response: ON or OFF

Example: an_plcp?
AN_PLCP OFF
**an_plcp_e1** [on, off]

**ACTION:** Controls the use of Analyzer E1 PLCP framing.

- **on** The ATM Cells carried by the E1 signal will be expected in the PLCP format.
- **off** The ATM Cells carried by the E1 signal will not be expected in the PLCP format.

**Example:**

```
an_plcp_e1 on
```

**an_plcp_e1?**

**ACTION:** Returns the current Analyzer E1 PLCP mode.

**Response:** ON or OFF

**Example:**

```
an_plcp_e1?
AN_PLCP_E1 OFF
```

**an_plcp_e3** [on, off]

**ACTION:** Controls the use of Analyzer E3 PLCP framing.

- **on** The ATM Cells carried by the E3 signal will be expected in the PLCP format.
- **off** The ATM Cells carried by the E3 signal will not be expected in the PLCP format.

**Example:**

```
an_plcp_e3 on
```
an_plcp_e3?

ACTION: Returns the current Analyzer E3 PLCP mode.

Response: ON or OFF

Example:  
an_plcp_e3?  
AN_PLCP_E3 OFF

an_pps [ext,gen]

ACTION: Controls the source of the one Pulse Per Second (1PPS) timing used for the cell delay measurements.

For proper delay measurements, the Generator and corresponding Analyzer should use the same source for the 1PPS.

ext  The Analyzer external rear-panel 1PPS will be used.

gen  The Generator 1PPS will be used by the Analyzer.

Example:  
an_pps gen

an_pps?

ACTION: Returns the current Analyzer 1PPS source.

Response: EXT or GEN

Example:  
an_pps?  
AN_PPS EXT
an_scram  [on, off]

ACTION: Controls the use of analyzer payload scrambling modes (for DS1 and DS3)

on    Turns on scrambling of payload cells.
off   Turn off scrambling of payload cells.

Example:    an_scram on

an_scram?

ACTION: Returns the current analyzer scrambling (for DS1 and DS3).

Response:  ON or OFF

Example:    an_scram?
            AN_SCRAM ON

an_scram_ex  [on, off]

ACTION: Controls the use of analyzer payload scrambling modes (for E1 and E3)

on    Turns on scrambling of payload cells.
off   Turn off scrambling of payload cells.

Example:    an_scram_ex on
an_scram_ex?

ACTION: Returns the current analyzer scrambling (for E1 and E3).

Response: ON or OFF

Example: an_scram_ex?
          AN_SCRAM_EX ON

an_signal [oc3c, stm1, ds3, ds1, e1, e3, t100]

ACTION: Selects the input signal to test.

oc3c The Analyzer tests the OC-3c input.
stm1 The Analyzer tests the STM-1 input.
ds3 The Analyzer tests the DS3 input.
ds1 The Analyzer tests the DS1 input.
e1 The Analyzer tests the E1 input.
e3 The Analyzer tests the E3 input.
t100 The Analyzer tests the 100 Mbps input.

Example: an_signal oc3c

an_signal?

ACTION: Returns the currently selected Analyzer input.

Response: OC3C, STM1, DS3, DS1, E1, E3 or T100

Example: an_signal?
          AN_SIGNAL T100
an_sync   [atm,physical]

ACTION: Selects the source for the front panel ANALYZER SYNC OUT signal.

atm       The sync pulse will be generated at the start of each received ATM cell.
physical  The sync pulse will be generated according to the physical layer framing.

Example:   an_sync physical

-----------------------------------------------
an_sync?

ACTION: Returns the current ANALYZER SYNC OUT signal source.

Response:  ATM or PHYSICAL

Example:   an_sync?
            AN_SYNC ATM
atm_error?  [win,test] , [test,idle,mis,hec.cell,pyld]

ACTION: Returns the Analyzer ATM Data Count of the specified data type for either the Sliding Window or the Analyzer Test period.

win Results are from the Sliding Window period (see tst_win_len).
test Results are from the Analyzer Test period (see tst_length and tst_type).

test Total count for ATM TEST Cells received.
idle Total count for Idle Cells received.
mis Total count for Misinserted ATM Cells received.
hec Total count for ATM Cells received with HEC errors.
cell Total count for Cell Loss (ATM TEST Cells not received).
pyld Total count for ATM TEST Cells received with payload bit errors.

Response: WIN or TEST ,
TEST , IDLE , MIS , HEC , CELL or PYLD ,
number value

Example: atm_error? win , hec
ATM_ERROR WIN , HEC , 256000
atm_rate?  [win,test] , [test,test_mhz,idle,idle_mhz,mis,mis_mhz,hec,cell,pyld]

ACTION: Returns the Analyzer ATM Data Rate of the specified data type for either the Sliding Window or the Analyzer Test period.

win Results are from the Sliding Window period (see tst_win_len).
test Results are from the Analyzer Test period (see tst_length and tst_type).

test Bandwidth of the ATM TEST Cells received.
test_mhz Bandwidth of the ATM TEST Cells received in mhz.
idle Bandwidth of the Idle Cells received.
idle_mhz Bandwidth of the Idle Cells received in mhz.
mis Bandwidth of the Misinserted ATM Cells received.
mis_mhz Bandwidth of the Misinserted ATM Cells received.
hec Error Rate for ATM Cells received with HEC errors.
cell Error Rate for Cell Loss (ATM TEST Cells not received).
pyld Error Rate for ATM TEST Cells received with payload bit errors.

Response: WIN or TEST ,TEST , IDLE , MIS , HEC , CELL or PYLD , TEST_MHZ, IDLE_MHZ, MIS_MHZ number value

Example: atm_rate? test , test
ATM_RATE TEST , TEST , 0.500

bw_cntrl [frq, perc]

ACTION: Sets the Bandwidth Control menu on the Generator side of the ATM150.

frq Sets the bandwidth in frequency (Mpbs).
perc Sets the bandwidth in percentages.

Example: bw_cntrl FRQ
BW_CNTRL FRQ
calibrate

ACTION: Calibrate the propagation delay to the current minimum delay. A test must be running.

Response: none

Example:  
ATM150> CELL_RUN RUN  
ATM150> RTEST_RUN RUN  
ATM150> delay_min?  
    > 150E-6  
ATM150> ref_value?  
    > 46E-6  
ATM150> CALIBRATE  
ATM150> ref_value?  
    > 196E-6  
ATM150> RTEST_RUN RUN  
ATM150> delay_min?  
    > 0E-6

cell_run [run,stop]

ACTION: Controls the Generator Cell Run function.

run The programmed Test Cells will be transmitted according to the specified bandwidths and distributions.

stop The output of Test Cells are terminated and only the IDLE cells are transmitted.

Example: cell_run run
cell_run?

ACTION: Returns the current state of the Generator Cell Run.

Response: RUN or STOP

Example: cell_run?
          CELL_RUN STOP

contrast [n]

ACTION: Controls the display contrast of the flat panel LCD display on the
         front of the ATM150.

'n': 0 to 9

Example: contrast 5

contrast?

ACTION: Returns the current LCD display contrast.

Response: number value

Example: contrast?
          CONTRAST 5
cust_hdr_fl

ACTION: Header and Distribution Remote Command. This is an action remote command the expects the filename of the Header and Distribution configuration to be loaded as a parameter. The passed-in filename must be eight characters long. The .HDR extension is added and the current selected drive will be searched for this file. If the file is found, the Header and Distribution configuration information stored in the file is loaded into the ATM150 unit.

As a query, it returns the currently selected filename. If no valid filename is current, it send back "...No.Files..".

Example: cust_hdr_fl

date ["mm/dd/yy"]

ACTION: Sets the date.

Example: date "mm/dd/yy"

date?

ACTION: Returns the current date.

Response: mm/dd/yy

Example: date?
          DATE 12/30/95
**del_hdr_fl**

**ACTION:** Header and Distribution Remote Command. This is an action remote command that expects the filename of the configuration to be loaded as a parameter. The passed-in filename must be eight characters long. The .HDR extension is added and the current selected disk is searched for this file. If the file is found, the file is deleted.

Example: `del_hdr_fl`

**del_srm_fl**

**ACTION:** Store and Recall Remote Command. This is an action remote command that expects the filename of the configuration to be loaded as a parameter. The passed-in filename must be eight characters long. The .SRM extension is added and the current selected disk is searched for this file. If the file is found, the file is deleted.

Example: `del_srm_fl "filename"`

**delay_end** `[bin],[delay]`

**ACTION:** Controls the End Cell delay value used for the individual cell delay bin specified by 'bin'.

There are 10 cell delay bins. Each accumulates the number of received ATM Test Cells which have a delay that falls within the range of the bin. The cell delay bins are specified by 11 delay values. There is one Start delay value and 10 End delay values. See the following chart.

- 'bin': 1 to 10
- 'delay': 0.000000 to 0.999999 Seconds

Example: `delay_end 4, 0.0012`
delay_end?  [bin]

ACTION: Returns the End Cell delay value of the specified bin.

'bin': 1 to 10

Response: number value
number value

Example: delay_end? 3
DELAY_END 3, 300E-6

delay_max  [delay]

ACTION: Controls the Maximum delay used for the automatic cell delay configuration function. Automatically configures the 10 cell delay bins using the configurable Minimum and Maximum cell delays (delay_min and delay_max). The range will be evenly divided into the 10 cell delay bins.

'delay': 0.000010 to 0.999999 Seconds

Example: delay_max 1000E-6

delay_max?

ACTION: Returns the current Maximum delay to be used for the automatic cell delay configuration function.

Response: number value

Example: delay_max?
DELAY_MAX 999999E-6
delay_min  [delay]

ACTION: Controls the Minimum delay used for the automatic cell delay configuration function. Automatically configures the 10 cell delay bins using the configurable Minimum and Maximum cell delays (delay_min and delay_max). The range will be evenly divided into the 10 cell delay bins.

'delay': 0.000001 to 0.999989 Seconds

Example: delay_min 1000E-6

delay_min?

ACTION: Returns the current Minimum delay to be used for the automatic cell delay configuration function.

Response: number value

Example: delay_min?
          DELAY_MIN 0E-6

delay_mode  [inter, prop]

ACTION: Controls the Analyzer delay mode. This mode control is the data used by the front panel and by the remote commands. Both sets of data (intercell delay and propagation delay) are accumulated simultaneously by the Analyzer.

inter The intercell delay mode. The front panel delay bin enters and results will be for the intercell delay. The remote commands (delay_xxx and res_delxxx) will be for the intercell delay.

prop The propagation delay mode. The front panel delay bin enters and results will be for the propagation delay. The remote commands (delay_xxx and res_delxxx) will be for the propagation delay.
delay_mode?

ACTION: Returns the Analyzer delay mode.

Response: number value

Example: delay_mode?
          DELAY_MODE

-----------------------------------------------

delay_start [delay]

ACTION: Controls the Start Cell delay value used for the first cell delay bin.

There are 10 cell delay bins. Each accumulates the number of received ATM Test Cells which have a delay that falls within the range of the bin. The cell delay bins are specified by 11 delay values. There is one Start delay value and 10 End delay values.

'delay': 0.000000 to 0.999989 Seconds

Example: delay_start 0.001

-----------------------------------------------

delay_start?

ACTION: Returns the Start Cell delay value for the first bin.

Response: number value

Example: delay_start?
          DELAY_START 15E-6
**disk_to_sram**

**ACTION:** Store and Recall Remote Command. This is an action remote that expects the filename of the configuration to be loaded as a parameter. The passed-in filename must be eight characters long. The .SRM extension is added and the current selected disk is searched for this file. If the file is found, the configuration information stored in the file is loaded into the ATM150 unit.

**Example:**

disk_to_sram "filename"

**dist_count**  [active, idle], [count]

**ACTION:** Controls the Burst Count size, in terms of the number of ATM cells. This is only valid for CONSTANT Distributions.

- **active**  This affects the Test and Active Traffic Cells.
- **idle**  This affects the Idle Cells.

'count': 0 to 65535

**Example:**

dist_count active , 256

**dist_count?**  [active, idle]

**ACTION:** Returns the Burst Count size. This is only valid for CONSTANT Distributions.

**Response:**  ACTIVE or IDLE , number value

**Example:**

dist_count? idle

DIST_COUNT IDLE , 12
**dist_max**  [active.idle],[max]

**ACTION:** Controls the Maximum Burst. This is only valid for UNIFORM, GAUSSIAN, POISSON and RAMP Distributions. For the RAMP distribution, this will be in terms of percent. For the remaining distributions, this will be in terms of cell counts.

- **active**  This affects the Test and Active Traffic Cells.
- **idle**  This affects the Idle Cells.

- **'max':**  1 to 65535  (up to 100 if distribution is RAMP)

**Example:**  

```
dist_max idle , 50
```

**dist_max?**  [active.idle]

**ACTION:** Returns the Maximum Burst. This is only valid for UNIFORM, GAUSSIAN, POISSON and RAMP Distributions.

**Response:**  ACTIVE or IDLE , number value

**Example:**  

```
dist_max? idle  
DIST_MAX IDLE , 100
```

**dist_mean**  [active.idle],[mean]

**ACTION:** Controls the Mean Burst Count, in terms of the number of ATM cells. This is only valid for GAUSSIAN and POISSON Distributions.

- **active**  This affects the Test and Active Traffic Cells.
- **idle**  This affects the Idle Cells.
- **'mean':**  1 to 65535

**Example:**  

```
dist_mean active , 100
```
**dist_mean?**  [active.idle]

**ACTION:** Returns the Mean Burst Count. This is only valid for GAUSSIAN and POISSON Distributions.

**Response:** ACTIVE or IDLE, number value

**Example:**
```
dist_mean? idle
DIST_MEAN IDLE, 600
```

**dist_min**  [active.idle],[min]

**ACTION:** Controls the Minimum Burst. This is only valid for UNIFORM, GAUSSIAN, POISSON and RAMP Distributions. For the RAMP distribution, this will be in terms of percent. For the remaining distributions, this will be in terms of cell counts.

- **active** This affects the Test and Active Traffic Cells.
- **idle** This affects the Idle Cells.

- **'min':** 0 to 65534 (up to 98 if distribution is RAMP)

**Example:**
```
dist_min idle, 50
```

**dist_min?**  [active.idle]

**ACTION:** Returns the Minimum Burst. This is only valid for UNIFORM, GAUSSIAN, POISSON and RAMP Distributions.

**Response:** ACTIVE or IDLE, number value

**Example:**
```
dist_min? active
DIST_MIN ACTIVE, 0
```
**dist_mode**  [active, idle], [constant, uniform, gaussian, poisson, ramp, custom]

**ACTION:** Controls the distribution mode for either the Active or Idle ATM cells. These are independently controlled, except for the RAMP selection, which controls both Active and Idle through the Active parameters.

The basic concept behind the ATM Cell distributions is that a number of Active cells are transmitted, and then a number of Idle cells are transmitted. These groups of cells are the Burst counts. This process is continued such that there are a series of Active and Idle Bursts. The distributions consist of the series of Active and Idle Burst counts.

**active**  This affects the Test and Active Traffic Cells.

**idle**  This affects the Idle Cells.

**constant**  The entire distribution consists of a single Burst count (dist_count).

**uniform**  The Uniform distribution consists of Burst counts that vary in size from the minimum count (dist_min) to the maximum count (dist_max) in increments based on the Burst Step size (dist_step). The occurrence rate for each of the Burst counts will be the same, making a uniform distribution of ATM cell bursts.

**gaussian**  This distribution simulates a Gaussian distribution of Burst counts. The Gaussian curve is defined by the Mean Burst count (dist_mean) and the Standard Deviation from the mean in terms of cells (dist_std_dev). From this curve, the burst counts used for the distribution are limited by the Minimum (dist_min) and Maximum (dist_max) specified and the Burst Step size (dist_step).
poisson  This distribution simulates a Poisson distribution of Burst counts. The Poisson curve is defined by the Mean Burst count (dist_mean). From this curve, the burst counts used for the distribution are limited by the Minimum (dist_min) and Maximum (dist_max) specified and the Burst Step size (dist_step).

ramp  This distribution is intended to ramp up and down the Active ATM cell load being transmitted. By means of controlling the pairs of Active/Idle Burst counts, the percent of Active bandwidth can be controlled over time. Starting at the minimum percentage (dist_min), the percent is increased up to the maximum percentage (dist_max) and then back down to the minimum. This is done is such that the increase and decrease are linear over time. The time it takes to go from the minimum to maximum and back to minimum is the period (dist_period).

custom  This is the User Specified distribution. It is input through remote commands or through the front panel diskette.

Example: 

dist_mode active , uniform

dist_mode?  [active,idle]

ACTION: Returns the current Distribution mode.

Response:  ACTIVE or IDLE ,
CONSTANT , UNIFORM , GAUSSIAN , POISSON , RAMP or CUSTOM

Example:  dist_mode? idle
DIST_MODE IDLE , GAUSSIAN
**dist_period**  [active, idle], [period]

**ACTION:** Controls the RAMP Distribution Period. This is only valid for the RAMP Distribution. This will be in terms of seconds.

- **active** This affects the Test and Active Traffic Cells.
- **idle** This affects the Idle Cells.

- **period**: 1 to 60

**Example:**
```
  dist_period active, 10
```

**dist_period?**  [active, idle]

**ACTION:** Returns the RAMP Distribution Period. This is only valid for the RAMP Distribution.

**Response:** ACTIVE or IDLE, number value

**Example:**
```
  dist_period? active
  DIST_PERIOD ACTIVE, 60
```

**dist_program**

**ACTION:** Programs the Active and Idle Cell Distributions. Using all of the Cell Distribution parameters (dist_xxxx), the Distributions are programmed into the Hardware for use with the next Generator Cell Run (cell_run).

**Example:**
```
  dist_program
```
**dist_random** [on, off]

**ACTION:** Controls the randomizing of the loading of all of the Cell Distribution Burst counts into the Hardware.

'on': The Cell Burst counts will be randomized during the download to the Hardware, so as to randomly distribute the different Cell Burst counts over time.

'off': The download of the Cell Burst counts will be non-random. It will be done in an easily predictable manner. All of the minimum burst counts will be loaded first, and so on, until the maximum burst counts are loaded last.

**Example:**

dist_random on

**dist_random?**

**ACTION:** Returns the current Cell Distribution Randomize mode.

**Response:** ON or OFF

**Example:**

dist_random?

DIST_RANDOM ON
dist_std_dev [active.idle],[std_dev]

ACTION: Controls the Standard Deviation for the Burst Counts, in terms of the number of ATM cells. This is only valid for GAUSSIAN Distributions.

active This affects the Test and Active Traffic Cells.
idle This affects the Idle Cells.

'std_dev': 1 to 65535

Example:  dist_std_dev active , 20

dist_std_dev? [active.idle]

ACTION: Returns the Standard Deviation. This is only valid for GAUSSIAN Distributions.

Response: ACTIVE or IDLE , number value

Example:  dist_std_dev? active
          DIST_STD_DEV ACTIVE , 60
Appendix E

---

dist_step  [active,idle],[step]

ACTION: Controls the Burst count Step size. This is valid for UNIFORM, GAUSSIAN and POISSON Distributions. This controls which Burst counts will be used between the minimum and maximum Burst counts specified.

active This affects the Test and Active Traffic Cells.
idle This affects the Idle Cells.

'step': 1 to 65535

Example: dist_step active, 10

---

dist_step?  [active,idle]

ACTION: Returns the Burst count Step size. This is only valid for UNIFORM, GAUSSIAN and POISSON Distributions.

Response: ACTIVE or IDLE, number value

Example: dist_step? active
          DIST_STEP ACTIVE, 500

---

drive

ACTION: Store and Recall Remote Command. This remote command can be a query or a command. As query (drive?), it returns the current selected drive that .SRM extension and .HDR extension files read from or written to. This is either the hard drive or floppy drive. As a set remote command, it selects the hard drive or floppy drive that the .SRM and .HDR files are read from or written to. This command is also used to query/command where test data is written to.

Example: drive hard-disk or floppy-disk
ds1_alarms? [win.test] , [los.los.ais.plcp.lof.plcp_rai.rai]

**ACTION:** Returns the Analyzer Physical Layer Alarm data for the DS1 input.  
This is for the specified data type for either the Sliding Window or the  
Analyzer Test period. Note, this command is only valid for test data  
accumulated at the DS1 interface.

<table>
<thead>
<tr>
<th>win</th>
<th>Results are from the Sliding Window period (see tst_win_len).</th>
</tr>
</thead>
</table>
| test| Results are from the Analyzer Test period (see tst_length  
     and tst_type).                                          |

<table>
<thead>
<tr>
<th>los</th>
<th>DS1 Loss Of Signal (LOS).</th>
</tr>
</thead>
<tbody>
<tr>
<td>lof</td>
<td>DS1 Loss Of Frame (LOF).</td>
</tr>
<tr>
<td>ais</td>
<td>DS1 Alarm Indication Signal (AIS).</td>
</tr>
<tr>
<td>plcp.lof</td>
<td>PLCP Loss Of Frame (LOF).</td>
</tr>
<tr>
<td>plcp.rai</td>
<td>DS1 PLCP yellow alarm signal (RAI).</td>
</tr>
<tr>
<td>rai</td>
<td>Remote Alarm Indication (RAI)</td>
</tr>
</tbody>
</table>

**Response:** WIN or TEST , 
LOS, LOF, AIS, FERF, PLCP_LOF or PLCP_RAI, RAI  
CLEAR , CUR or HIST

**Example:** ds1_alarms? win , plcp_lof  
DS1_ALARMS WIN , PLCP_LOF , HIST
ds1_error? [win,test] , [crc6,lcv,frame,p_b1,p_febe]

ACTION: Returns the Analyzer Physical Layer Data Count for the DS1 input. This is for the specified data type for either the Sliding Window or the Analyzer Test period. Note, this command is only valid for test data accumulated at the DS1 interface.

- win: Results are from the Sliding Window period (see tst_win_len).
- test: Results are from the Analyzer Test period (see tst_length and tst_type).
- crc6: Total count for DS1 CRC6 errors.
- lcv: Total count for DS1 Line Code Violations (LCV).
- p_b1: Total count for PLCP Frame bit interleaved parity errors (BIP).
- p_febe: Total count for PLCP Far End Block Errors (FEBE).
- frame: Total count for frame errors.

Response: WIN or TEST , PARITY , LCV , FRAME , P_B1 or P_FEBE , number value

Example: 

ds1_error? test, p_febe

DS1_ERROR TEST, P_FEBE, 9
**ds1_rate?**  [win,test] , [frame,crc6,p_b1]

**ACTION:** Returns the Analyzer Physical Layer Data Rate for the DS1 input.
This is for the specified data type for either the Sliding Window or the
Analyzer Test period. Note, this command is only valid for test data
accumulated at the DS1 interface.

- **win**  Results are from the Sliding Window period (see tst_win_len).
- **test**  Results are from the Analyzer Test period (see tst_length
and tst_type).

- **frame**  Error Rate for DS1 frame errors.
- **crc6**  Error Rate for DS1 CRC6 errors.
- **p_b1**  Error Rate for PLCP Frame bit interleaved parity errors (BIP).

**Response:**  WIN or TEST ,
FRAMES, CRC6, P_B1 ,
number value

**Example:**  

ds1_rate? test , frame
DS1_RATE TEST , frame , 3.66E-03
ds3_alarms? [win,test] , [los,lof,ais,idle,ferf,plcp_lof,plcp_rai]

ACTION: Returns the Analyzer Physical Layer Alarm data for the DS3 input. This is for the specified data type for either the Sliding Window or the Analyzer Test period. Note, this command is only valid for test data accumulated at the DS3 interface.

win Results are from the Sliding Window period (see tst_win_len).
test Results are from the Analyzer Test period (see tst_length and tst_type).

los DS3 Loss Of Signal (LOS).
lof DS3 Loss Of Frame (LOF).
ais DS3 Alarm Indication Signal (AIS).
idle DS3 Idle Maintenance signal.
ferf Far End Receive Failure maintenance signal (FERF).
plcp_lof PLCP Loss Of Frame (LOF).
plcp_rai DS3 PLCP yellow alarm signal (RAI).

Response: WIN or TEST ,
LOS, LOF, AIS, IDLE, FERF, PLCP_LOF or PLCP_RAI ,
CLEAR, CUR or HIST

Example: ds3_alarms? win, plcp_lof
DS3_ALARMS WIN, PLCP_LOF, HIST
ds3_error? [win,test] , [parity,lcv,febe,p_b1,p_febe]

ACTION: Returns the Analyzer Physical Layer Data Count for the DS3 input.
This is for the specified data type for either the Sliding Window or the
Analyzer Test period. Note, this command is only valid for test data
accumulated at the DS3 interface.

win Results are from the Sliding Window period (see tst_win_len).
test Results are from the Analyzer Test period (see tst_length
and tst_type).

parity Total count for DS3 Parity errors (P-bits errors).
lcv Total count for DS3 Line Code Violations (LCV).
febe Total count for Far End Block Errors (FEBE).
p_b1 Total count for PLCP Frame bit interleaved parity errors (BIP).
p_febe Total count for PLCP Far End Block Errors (FEBE).

Response: WIN or TEST,
PARITY, LCV, FEBE, P_B1 or P_FEBE, number value

Example: ds3_error? test, p_febe
DS3_ERROR TEST, P_FEBE, 9
**ds3_rate?**  [win,test] , [parity,p_b1]

**ACTION:** Returns the Analyzer Physical Layer Data Rate for the DS3 input.
This is for the specified data type for either the Sliding Window or the
Analyzer Test period. Note, this command is only valid for test data
accumulated at the DS3 interface.

- **win**
  - Results are from the Sliding Window period (see tst_win_len).
- **test**
  - Results are from the Analyzer Test period (see tst_length
    and tst_type).
- **parity**
  - Error Rate for DS3 Parity errors (P-bits errors).
- **p_b1**
  - Error Rate for PLCP Frame bit interleaved parity errors (BIP).

**Response:**
WIN or TEST ,
PARITY or P_B1 ,
number value

**Example:**
```plaintext
ds3_rate? test , parity
DS3_RATE TEST , PARITY , 3.66E-03
```
e1_alarms? [win,test] , [los,oof,ais,remote,plcp_lof,plcp_rai]

ACTION: Returns the Analyzer Physical Layer Alarm data for the E1 input. This is for the specified data type for either the Sliding Window or the Analyzer Test period. Note, this command is only valid for test data accumulated at the E1 interface.

- **win**
  Results are from the Sliding Window period (see tst_win_len).

- **test**
  Results are from the Analyzer Test period (see tst_length and tst_type).

- **los**
  E1 Loss Of Signal (LOS).

- **oof**
  E1 Out of Frame (OOF).

- **ais**
  E1 Alarm Indication Signal (AIS).

- **plcp_lof**
  PLCP Loss Of Frame (LOF).

- **plcp_rai**
  E1 PLCP yellow alarm signal (RAI).

Response: WIN or TEST ,
LOS, OOF, AIS, PLCP_LOF or PLCP_RAI,
CLEAR , CUR or HIST

Example: e1_alarms? win , plcp_lof
E1_ALARMS WIN , PLCP_LOF , HIST
**e1_error?** [win,test] , [crc,lcv,frame,p_b1,p_febe]

**ACTION:** Returns the Analyzer Physical Layer Data Count for the E1 input.
This is for the specified data type for either the Sliding Window or the
Analyzer Test period. Note, this command is only valid for test data
accumulated at the E1 interface.

- **win**
  Results are from the Sliding Window period (see tst_win_len).

- **test**
  Results are from the Analyzer Test period (see tst_length
  and tst_type).

- **crc**
  Total count for E1 CRC errors.

- **lcv**
  Total count for E1 Line Code Violations (LCV).

- **frame**
  Total count for E1 frame errors.

- **p_b1**
  Total count for PLCP Frame bit interleaved parity errors (BIP).

- **p_febe**
  Total count for PLCP Far End Block Errors (FEBE).

**Response:** WIN or TEST ,
CRC, LCV, FRAME, P_B1 or P_FEBE.
number value

**Example:**
e1_error? test , p_febe
E1_ERROR TEST , P_FEBE , 9
**e1_rate?**  [win,test] , [frame,lcv,febe,crc,p_b1,p_febe]

**ACTION:** Returns the Analyzer Physical Layer Data Rate for the E1 input.  
This is for the specified data type for either the Sliding Window or the 
Analyzer Test period.  Note, this command is only valid for test data 
accumulated at the E1 interface.

- **win**  Results are from the Sliding Window period (see tst_win_len).
- **test**  Results are from the Analyzer Test period (see tst_length 
and tst_type).

- **crc**  Error rate for E1 CRC errors.
- **lcv**  Error rate for E1 Line Code Violations (LCV).
- **frame**  Error rate for E1 frame errors.
- **p_febe**  Error rate for PLCP Far End Block Errors (FEBE).
- **p_b1**  Error Rate for PLCP Frame bit interleaved parity errors (BIP).

**Response:**  WIN or TEST , number value

**Example:**  
e1_rate? test , crc

E1_RATE TEST , CRC, 3.66E-03
**e3_alarms?** [win,test] , [los,oof,ais,ferf_rai,plcp_lof,plcp_rai]

**ACTION:** Returns the Analyzer Physical Layer Alarm data for the E3 input.
This is for the specified data type for either the Sliding Window or the
Analyzer Test period. Note, this command is only valid for test data
accumulated at the E3 interface.

- **win**
  Results are from the Sliding Window period (see tst_win_len).

- **test**
  Results are from the Analyzer Test period (see tst_length
  and tst_type).

- **los**
  E3 Loss Of Signal (LOS).

- **oof**
  E3 Out of Frame (OOF).

- **ais**
  E3 Alarm Indication Signal (AIS).

- **plcp_lof**
  PLCP Loss Of Frame (LOF).

- **plcp_rai**
  E3 PLCP yellow alarm signal (RAI).

**Response:** WIN or TEST ,
LOS, OOF, AIS, PLCP_LOF or PLCP_RAI,
CLEAR , CUR or HIST

**Example:**
```
e3_alarms? win , plcp_lof
E3_ALARMS WIN , PLCP_LOF , HIST
```
e3_error? [win,test], [parity,lcv,febe,p_b1,p_febe]

ACTION: Returns the Analyzer Physical Layer Data Count for the E3 input.
This is for the specified data type for either the Sliding Window or the
Analyzer Test period. Note, this command is only valid for test data
accumulated at the E3 interface.

win Results are from the Sliding Window period (see tst_win_len).
test Results are from the Analyzer Test period (see tst_length
       and tst_type).

lcv Total count for E3 Line Code Violations (LCV).
febe Total count for E3 Far End Block Errors (FEBE).
p_b1 Total count for PLCP Frame bit interleaved parity errors (BIP).
p_febe Total count for PLCP Far End Block Errors (FEBE).

Response: WIN or TEST,
LCV, FEBE, P_B1 or P_FEBE,
number value

Example: e3_error? test, p_febe
          E3_ERROR TEST, P_FEBE, 9
e3_rate? [win,test], [parity,lcv,febe,p_b1,p_febe]

ACTION: Returns the Analyzer Physical Layer Data Rate for the E3 input. This is for the specified data type for either the Sliding Window or the Analyzer Test period. Note, this command is only valid for test data accumulated at the E3 interface.

win Results are from the Sliding Window period (see tst_win_len).
test Results are from the Analyzer Test period (see tst_length and tst_type).

lcv Error rate for E3 Line Code Violations (LCV).
p_febe Error rate for PLCP Far End Block Errors (FEBE).
p_b1 Error Rate for PLCP Frame bit interleaved parity errors (BIP).

Response: WIN or TEST , number value

Example: e3_rate? test,lcv
E3_RATE TEST,LCV, 3.66E-03
**err_mode**  [hec,pyld]

**ACTION:** Controls the Mode of the ATM Error output.

hec  ATM Errors will consist of ATM Cell HEC errors.
pyld  ATM Errors will consist of ATM Cell Payload errors.

**Example:**  
err_mode hec

**err_mode?**

**ACTION:** Returns the current ATM Error mode.

**Response:**  HEC or PYLD

**Example:**  
err_mode?  
ERR_MODE PYLD
**err_rate [n]**

**ACTION:** Controls the ATM Error Rate. The rate will be specified in terms of an exponent 'n', such that the rate will be 10 to the negative 'n'.

'n': 2 to 9

Example: err_rate 5

**err_rate?**

**ACTION:** Returns the current ATM Error Rate exponent.

Response: number value

Example: err_rate?

ERR_RATE 8
frst_hdr_fl

ACTION: Header and Distribution Remote Command. This remote command is a query. It returns the first file name that ends with a "HDr" extension and is in the current selected drive, either the hard drive or the floppy drive.

Example: frst_hdr_fl

frst_srm_fl

ACTION: Store and Recall Remote Command. This remote command is a query. It returns the first file name that ends with a "SRM" extension that is in the current selected drive, either the hard drive or the floppy drive.

Example: frst_srm_fl
**gen_100mbps [safe, normal]**

**ACTION:** Controls the Generator IDLE Byte mode used for the 100Mbps signal interface.

- **safe** There will be an IDLE Byte transmitted prior to every ATM cell transmitted. This is in addition to the IDLE Bytes transmitted in place of the programmed IDLE Cells.
- **normal** The only IDLE Bytes transmitted will be those done in place of the programmed IDLE Cells.

**Example:**
```
gen_100mbps safe
```

**gen_100mbps?**

**ACTION:** Returns the current state of the Generator 100Mbps IDLE Byte mode.

**Response:** SAFE or NORMAL

**Example:**
```
gen_100mbps?
gen_100MBPS NORMAL
```

**gen_act_clp [clp]**

**ACTION:** Modifies the Cell Loss Priority (CLP) for the Active Header Generation function.

**'clp':** 0 to 1

**Example:**
```
gen_act_clp 0
```
gen_act_clp?

**ACTION:** Returns the Cell Loss Priority (CLP) which will be used for the Active Header Generation function.

**Response:** number value

**Example:**
```
gen_act_clp?
GEN_ACT_CLP 1
```

---

**gen_act_cnt [num_cells]**

**ACTION:** Controls the number of Active Traffic ATM Cells to generate for the Active Header Generation function.

'num_cells': 1 to 8191

**Example:**
```
gen_act_cnt 256
```

---

**gen_act_cnt?**

**ACTION:** Returns the number of Active Traffic ATM Cells that will be generated by the next Active Header Generation function.

**Response:** number value

**Example:**
```
gen_act_cnt?
GEN_ACT_CNT 8191
```
gen_act_gfc [gfc]

**ACTION:** Modifies the Generic Flow Control (GFC) for the Active Header Generation function.

'gfc': 0 to 15

Example: gen_act_gfc 12

---

gen_act_gfc?

**ACTION:** Returns the Generic Flow Control (GFC) which will be used for the Active Header Generation function.

Response: number value

Example: gen_act_gfc?
          GEN_ACT_GFC 0

---

gen_act_hdrs

**ACTION:** Performs the Active Header Generation function. This will create the Active Traffic ATM Cells based on the 'gen_act_xxx' parameters. The old Active Traffic cells will be discarded and replaced by the newly created ones.

Example: gen_act_hdrs
gen_act_inc [vci_inc]

ACTION: Controls the increment value of the VCI for the Active Header Generation function. The VCI (gen_act_vci) will be used for the first generated cell. Each subsequent cell will be identical except it will have its VCI incremented by the specified 'vci_inc' value.

'vci_inc': 1 to 65535 (Maximum dependent upon number of cells to generate, 'gen_act_cnt', and the starting vci value, 'gen_act_vci')

Example: gen_act_inc 16

___________________________________________________________

gen_act_inc?

ACTION: Returns the increment value of the VCI which will be used for the Active Header Generation function.

Response: number value

Example: gen_act_inc?
          GEN_ACT_INC 1

___________________________________________________________

gen_act_pti [pti]

ACTION: Modifies the Payload Type Indicator (PTI) for the Active Header Generation function.

'pti': 0 to 7

Example: gen_act_pti 0
gen_act_pti?

ACTION: Returns the Payload Type Indicator (PTI) which will be used for the Active Header Generation function.

Response: number value

Example:    gen_act_pti?
            GEN_ACT_PTI 7

gen_act_vci [vci]

ACTION: Modifies the Virtual Channel Indicator (VCI) for the Active Header Generation function.

'vci': 0 to 65535

Example:    gen_act_vci 0

gen_act_vci?

ACTION: Returns the Virtual Channel Indicator (VCI) which will be used for the Active Header Generation function.

Response: number value

Example:    gen_act_vci?
            GEN_ACT_VCI 65535
gen_act_vpi [vpi]

ACTION: Modifies the Virtual Path Indicator (VPI) for the Active Header Generation function.

'vpi': 0 to 4095 (up to 255 if cell format is UNI)

Example: gen_act_vpi 0

---------------------------------------------------------------

gen_act_vpi?

ACTION: Returns the Virtual Path Indicator (VPI) which will be used for the Active Header Generation function.

Response: number value

Example: gen_act_vpi?
          GEN_ACT_VPI 255

---------------------------------------------------------------

gen_cellfrm [uni,nni]

ACTION: Controls the Generator ATM Cell Format. See graphical representations of the ATM Cell Formats in the ATM Basics appendix (Appendix A).

uni The ATM cell format will be the User-Network Interface (UNI), which includes the GFC and a smaller VPI.

nni The ATM cell format will be the Network-Network Interface (NNI), which does not include the GFC.

Example: gen_cellfrm uni
gen_cellfmt?

ACTION: Returns the current ATM Cell Format transmitted by the Generator.

Response: UNI or NNI

Example: gen_cellfmt?
GEN_CELLFRMT NNI

---

gen_clk [int,rec]

ACTION: Controls the clock timing for the Generator.

int The timing will be based on an internal crystal.
rec The timing will be recovered from the Analyzer input.

Example: gen_clk rec

---

gen_clk?

ACTION: Returns the current Generator clock timing.

Response: INT or REC

Example: gen_clk?
GEN_CLK INT
gen_coset [disable, enable]

ACTION: Controls the use of the COSET in the ATM HEC calculations for the Generator.

disable The HEC calculation is completed without the XOR of the COSET pattern 01010101. This calculation is not defined.
enable The HEC calculation includes the XOR of the COSET pattern 01010101, as defined by the ATM Forum, UNI 3.0 specification.

Example: gen_coset enable

gen_coset?

ACTION: Returns the current Generator COSET mode.

Response: ENABLE or DISABLE

Example: gen_coset?
GEN_COSET DISABLE

gen_crc_e1 [on, off]

ACTION: This is a query and action command. Upon query, it will return the current state of the generator e1 mode, either on or off. As an action command, it sets the current generator e1 mode.

Example: gen_crc_e1 on
gen_ds1frame [esf, sf]

ACTION: Controls the Generator DS1 frame format.

esf The DS1 ESF format will be used.
sf The DS1 SF format will be used.

Example: gen_ds1frame esf

-----------------------------------------------

gen_ds1frame?

ACTION: Returns the current Generator DS1 frame format.

Response: ESF or SF

Example: gen_ds1frame?
          GEN_DS1FRAME ESF
**gen_ds3frame** [cbit,mx3]

**ACTION:** Controls the Generator DS3 frame format.

cbit The DS3 C-BIT format will be used.
mx3 The DS3 MX3 format will be used.

**Example:**

```
gen_ds3frame cbit
```

**gen_ds3frame?**

**ACTION:** Returns the current Generator DS3 frame format.

**Response:** CBIT or MX3

**Example:**

```
gen_ds3frame?
GEN_DS3FRAME MX3
```
**gen_e3frame** [G751, G852]

**ACTION:** Controls the Generator E3 frame format.

G751 The E3 G.751 format will be used.

G852 The E3 G.852 format will be used.

**Example:**

```
  gen_e3frame cbit
```

**gen_e3frame?**

**ACTION:** Returns the current Generator E3 frame format.

**Response:** G.751 or G.852

**Example:**

```
  gen_e3frame?
  GEN_E3FRAME G751
```

**gen_laser** [on, off]

**ACTION:** Controls the Generator LASER output.

**NOTE:** On power-up, this defaults to OFF.

**NOTE:** On any Generator signal change, this switches to OFF.

**on** The appropriate LASER will be turned on, depending on the selected signal.

**off** The LASER will be turned off.

**Example:**

```
  gen_laser on
```
gen_laser?

ACTION: Returns the current LASER setting.

Response: ON or OFF

Example: 
```
  gen_laser?
  GEN_LASER OFF
```

gen_plcp_ds1 [on, off]

ACTION: Controls the use of Generator DS1 PLCP framing.

on The ATM Cells carried by the DS1 signal will be sent in the PLCP format.
off The ATM Cells carried by the DS1 signal will not be sent in the PLCP format.

Example: 
```
  gen_plcp_ds1 on
```

gen_plcp_ds1?

ACTION: Returns the current Generator DS1 PLCP mode.

Response: ON or OFF

Example: 
```
  gen_plcp_ds1?
  GEN_PLCP_DS1 OFF
```
gen_plcp  [on,off]

ACTION: Controls the use of Generator DS3 PLCP framing.

on   The ATM Cells carried by the DS3 signal will be sent  
in the PLCP format.
off  The ATM Cells carried by the DS3 signal will not be sent  
in the PLCP format.

Example:    gen_plcp on

-------------------------------------------------------------------

gen_plcp?

ACTION: Returns the current Generator DS3 PLCP mode.

Response:   ON or OFF

Example:    gen_plcp?
            GEN_PLCP OFF
**gen_plcp_e1** [on, off]

**ACTION:** Controls the use of Generator E1 PLCP framing.

- **on:** The ATM Cells carried by the E1 signal will be sent in the PLCP format.
- **off:** The ATM Cells carried by the E1 signal will not be sent in the PLCP format.

**Example:**

```
gen_plcp_e1 on
```

**gen_plcp_e1?**

**ACTION:** Returns the current Generator E1 PLCP mode.

**Response:** ON or OFF

**Example:**

```
gen_plcp_e1?
GEN_PLCP_E1 OFF
```
gen_plcp_e3 [on,off]

ACTION: Controls the use of Generator E3 PLCP framing.

on The ATM Cells carried by the E3 signal will be sent in the PLCP format.
off The ATM Cells carried by the E3 signal will not be sent in the PLCP format.

Example: gen_plcp_e3 on

---------------------------------------------------------------------

gen_plcp_e3?

ACTION: Returns the current Generator E3 PLCP mode.

Response: ON or OFF

Example: gen_plcp_e3?
           GEN_PLCP_E3 OFF
gen_pps  [int, ext]

ACTION: Controls the source of the one Pulse Per Second (1PPS) timing used for the the cell delay measurements.

For proper delay measurements, the Generator and corresponding Analyzer should use the same source for the 1PPS.

int  The internally generated 1PPS will be used.
ext  The Generator external rear-panel 1PPS will be used.

Example:  gen_pps int

---------------------------------------------------------------------

gen_pps?

ACTION: Returns the current Generator 1PPS source.

Response:  INT or EXT

Example:  gen_pps?
           GEN_PPS EXT

---------------------------------------------------------------------

gen_scram  [on, off]

ACTION: Controls the use of generator payload scrambling modes (for DS1 and DS3)

  on  Turns on scrambling of payload cells.
  off  Turn off scrambling of payload cells.

Example:  gen_scram on
gen_scram?

**ACTION:** Returns the current generator scrambling (for DS1 and DS3).

**Response:** ON or OFF

**Example:**
```
gen_scram?
GEN_SCRAM ON
```

gen_scram_ex  [on, off]

**ACTION:** Controls the use of generator payload scrambling modes (for E1 and E3)

- **on** Turns on scrambling of payload cells.
- **off** Turn off scrambling of payload cells.

**Example:**
```
gen_scram_ex on
```

gen_scram_ex?

**ACTION:** Returns the current generator scrambling (for E1 and E3).

**Response:** ON or OFF

**Example:**
```
gen_scram_ex?
GEN_SCRAM_EX ON
```
**gen_signal**  \[oc3c, stm1, ds3, ds1, e1, e3, t100]\]

**ACTION:** Selects the Generator output signal.

- **oc3c** Selects the OC-3c output.
- **stm1** Selects the STM-1 output.
- **ds3** Selects the DS3 output.
- **ds1** Selects the DS1 output.
- **e1** Selects the E1 output.
- **e3** Selects the E3 output.
- **t100** Selects the 100 Mbps output.

**Example:**

```
  gen_signal oc3c
```

**gen_signal?**

**ACTION:** Returns the currently selected Generator output.

**Response:** OC3C, STM1, DS3, DS1, E1, E3 or T100

**Example:**

```
  gen_signal?
  GEN_SIGNAL DS3
```
gen_sync  [atm,physical]

ACTION: Selects the source for the front panel GENERATOR SYNC OUT signal.

atm         The sync pulse will be generated at the start of each transmitted ATM cell
physical    The sync pulse will be generated according to the physical layer framing

Example:       gen_sync physical

-----------------------------------------------

gen_sync?

ACTION: Returns the current GENERATOR SYNC OUT signal source.

Response:      ATM or PHYSICAL
Example:       gen_sync?
                GEN_SYNC ATM

-----------------------------------------------

hdr_program

ACTION: Programs the Test and Active Cell Headers. Using all of the Test
        cell parameters (test_xxxx) and Active Traffic cell parameters (active_xxxx),
        the Cell Headers are programmed into the Hardware for use with the next
        Generator Cell Run (cell_run).

Example:       hdr_program
**hdr_random**  [on,off]

**ACTION:** Controls the randomizing of the loading of all of the Test and Active ATM Cell Headers into the Hardware.

'**on**': The Test and Active Cells will be randomized during the download to the Hardware, so as to randomly distribute the different type of cell output over time.

'**off**': The download of the Test and Active cells will be non-random. It will be done in an easily predictable manner. All of the Test Cells will be loaded first, and then the remaining storage will be used by the Active Traffic Cells.

**Example:**

```
hdr_random on
```

**hdr_random?**

**ACTION:** Returns the current Cell Header Randomize mode.

**Response:** ON or OFF

**Example:**

```
hdr_random?
HDR_RANDOM ON
```
**header**  [on, off]

**ACTION:** Sets the remote command response header mode.
- **on**  Command responses include the command header (command name).
- **off**  Command responses do not include the command header.

**Example:**
```
header on
```

**header?**

**ACTION:** Returns the remote command response header mode.

**Response:**  **ON** or **OFF**

**Example:**
```
header?
OFF
header on
header?
HEADER ON
```

**hist_cell?**

**ACTION:** Returns the current History Cell Loss indicator, as shown by the front panel CELL history LED.

**Response:**  **ON** or **OFF**

**Example:**
```
hist_cell?
HIST_CELL OFF
```
hist_clear

ACTION: Clears the History Indicators. This includes the front panel Error History LEDs.

Example: hist_clear

hist_delin?

ACTION: Returns the current History Cell Delineation Error indicator, as shown by the front panel DELIN history LED.

Response: ON or OFF

Example: hist_delin?
          HIST_DELIN OFF

hist_hec?

ACTION: Returns the current History HEC Error indicator, as shown by the front panel HEC history LED.

Response: ON or OFF

Example: hist_hec?
          HIST.HEC OFF
hist_input?

ACTION: Returns the current Input Loss indicator, as shown by the front panel NO INPUT LED.

Response: ON or OFF

Example: hist_input?
          HIST_INPUT OFF

hist_phys?

ACTION: Returns the current History Physical Layer Error/Alarm indicator, as shown by the front panel PHYSICAL history LED.

Response: ON or OFF

Example: hist_phys?
          HIST_PHYS OFF

hist_sync?

ACTION: Returns the current Synchronization indicator, as shown by the front panel SYNC LED.

Response: ON or OFF

Example: hist_sync?
          HIST_SYNC ON
id_interface?

ACTION: Returns the current signal

Response: "x1/x3 E1/E3", "STM1 OPTICAL", "x1/x3 DS1/DS3", "EMPTY", "EMPTY", "TAXI"

Example: id_interface?
          ID_INTERFACE  x1/x3 DS1/DS3

id_options? [n]

ACTION: Returns all of the options for the passed module, specified by 'n'.
For the correlation between 'n' and the modules, see the System ID query
(id_system?).

'n': 0 to 9

Response: number value ,
          Option text mnemonics

Example: id_options? 2
          ID_OPTIONS 2, NONE
id_serial? [n]

ACTION: Returns the serial number for the passed module, specified by 'n'. For the correlation between 'n' and the modules, see the System ID query (id_system?).

'n': 0 to 9

Response: number value
<String Response>

Example: id_serial? 2
ID_SERIAL 2, "12345678"

id_system?

ACTION: Returns all of the modules within the unit. For each module, there will be a number corresponding to the module in the system, along with a text description of each module. The correlation between the numbers and modules is as follows:

<table>
<thead>
<tr>
<th>Number</th>
<th>Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Unit Model (Ex: ATM150)</td>
</tr>
<tr>
<td>1</td>
<td>Module 1</td>
</tr>
<tr>
<td>2</td>
<td>Module 2</td>
</tr>
<tr>
<td>3</td>
<td>Module 3</td>
</tr>
<tr>
<td>4</td>
<td>Module 4</td>
</tr>
<tr>
<td>5</td>
<td>Module 5</td>
</tr>
<tr>
<td>6</td>
<td>Module 6</td>
</tr>
<tr>
<td>7</td>
<td>Module 7</td>
</tr>
<tr>
<td>8</td>
<td>Front Panel</td>
</tr>
<tr>
<td>9</td>
<td>Mother Board</td>
</tr>
</tbody>
</table>

Response: <10 String Responses>

Example: id_system?
ID_SYSTEM "ATM150", "ATM150 EOI", "ATM150 TCG", "ATM150 TCR", "", "", "", "ATM150 FP", "200MB"
id_version? [n]

ACTION: Returns the revision number for the passed module, specified by 'n'. For the correlation between 'n' and the modules, see the System ID query (id_system?).

'n': 0 to 9

Response: number value ,
<String Response>

Example: id_version? 2
          ID_VERSION 2 , "REV A2"

idle_bw?

ACTION: Returns the bandwidth of the idle cells as determined by the current cell distributions.

Response number value

Example: idle_bw?
          IDLE_BW 5.00E-3

idle_fq?

ACTION: Returns the frequency of the idle cells as determined by the current cell distributions.

Response: number value

Example: idle_fq?
          IDLE_FRQ 1.500 Mbps
logo?

ACTION: Returns the ATM150 RS-232 power on logo.

NOTE: This command is only valid by RS-232.

Example:  

    logo?
    *** Tektronix atm150 1.5 04-15-96

loopback  [enable, disable]

ACTION: Controls the Analyzer loopback function.

enable  The incoming signal to the Analyzer will be looped back through the Generator output.
disable The Generator and Analyzer will operate normally.

loopback? [enable, disable]

ACTION: Returns the Analyzer loopback function.
Response: ENABLE or DISABLE
Example: loopback?
LOOPBACK ENABLE
**mon_avg?**  [win,mon],[cell_num]

**ACTION:** Returns the Average Bandwidth for the specified ATM Test Cell (cell_num) for either the Sliding Window or the Generator Monitor period. This is the current result of the Generator Monitoring of the Test Cell output bandwidth.

- `win`: Results are from the Sliding Window period (see mon_win_len).
- `mon`: Results are from the Generator Monitor period (see mon_length and mon_type).

- `'cell_num'`: 1 to 4

**Response:** WIN or MON,
number value,
number value

**Example:**

```
mon_avg? win, 2
MON_AVG WIN, 2, 0.00E-07
```

---

**mon_disp**  [win,mon]

**ACTION:** Controls the Front Panel display of the Generator Monitor results.

- `win`: The front panel will display the Sliding Window results.
- `mon`: The front panel will display the Monitor period results.

**Example:**

```text
mon_disp mon
```
mon_disp?

ACTION: Returns the Generator Front Panel Monitor results display mode.

Response: WIN or MON

Example: mon_disp?
          MON_DISP WIN

mon_elap? [win, mon]

ACTION: Returns the Elapsed time into the Generator Sliding Window or Monitor period.

win The Sliding Window elapsed time will be returned.
mon The Generator Monitor elapsed time will be returned.

Response: WIN or MON,
          <String Response> in the format of "DDD-HH:MM:SS.T"

Example: mon_elap? mon
          MON_ELAP MON, "365-23:59:59.9"
**mon_freq?**  [win, test]

**ACTION:** Returns the monitor setting and the current value that appears in the monitor.

**Response:**  WIN or TEST, number value

**Example:**
```
mon_freq? 1
MON_FREQ WIN, 1, 1, 536E6
```

**mon_length**  [sec]

**ACTION:** Controls the length of time for the Generator Monitor period. It is used by the Monitor in the TIMED, REPEAT and SWEEP modes (mon_type). This is the period referenced by the Monitor result commands as 'mon'.

'sec': 1 to 99999 seconds

**Example:**
```
mon_length 45
```

**mon_length?**

**ACTION:** Returns the length of time that the Generator Monitor will run before it will stop when it is in the TIMED, REPEAT and SWEEP modes.

**Response:**  number value

**Example:**
```
mon_length?
MON_LENGTH 10
```
**mon_peak?**  [win.mon],[cell_num]

**ACTION:** Returns the Peak Bandwidth for the specified ATM Test Cell (cell_num) for either the Sliding Window or the Generator Monitor period. The peak bandwidth is the highest cell bandwidth over a 100 milliseconds during the sliding window or monitor period. This is the current result of the Generator Monitoring of the Test Cell output bandwidth.

- **win**  Results are from the Sliding Window period (see mon_win_len).
- **mon**  Results are from the Generator Monitor period (see mon_length and mon_type).

- **'cell_num':**  1 to 4

**Response:**  WIN or MON , number value , number value

**Example:**

```
mon_peak? mon , 3
MON_PEAK MON , 3 , 1.23E-10
```

---

**mon_reset**

**ACTION:** Resets the Generator Monitor measurements. This is for both the Sliding Window and the Generator Monitor.

**Example:**

```
mon_reset
```
mon_signal?

ACTION: Returns the Output Signal state as set during period of the available Generator Monitor results.

Response: OC3C, T100, DS3 or DS3PLCP

Example: mon_signal?
          MON_SIGNAL DS3PLCP

mon_sweep  [sweep]

ACTION: Controls the number of Sweep periods (sweep) for the Generator Monitor function. It is used by the Monitor only in the SWEEP mode (mon_type).

'sweep': 1 to 99

Example: mon_sweep 10

mon_sweep?

ACTION: Returns the Sweep count for the Generator Monitor.

Response: number value

Example: mon_sweep?
          MON_SWEEP 10
mon_total? [win,mon],[cell_num]

ACTION: Returns the Total Cells output for the specified ATM Test Cell (cell_num) for either the Sliding Window or the Generator Monitor period. This is the current result of the Generator Monitoring of the Test Cell output.

win Results are from the Sliding Window period (see mon_win_len).
mon Results are from the Generator Monitor period (see mon_length and mon_type).

'cell_num': 1 to 4

Response: WIN or MON ,
number value ,
number value

Example: mon_total? mon , 3
MON_TOTAL MON , 3 , 123456789
**mon_type**  [untimed, timed]

**ACTIONL.** Controls the timing mode for Generator Monitor function.

**untimed**  In this mode, the Generator Monitor function will continue running independent of the monitor period length (mon_length). It will continue until it is explicitly stopped (remote command 'cell_run stop' or the front panel key CELL RUN), or power off.

**timed**  In this mode, the Generator Monitor function will continue running until the Monitor elapsed time reaches the monitor period length (mon_length). It will also stop by means of remote command (cell_run), front panel key, or power loss.

(The following will be implemented in the future)

**repeat**  This mode is identical to TIMED, except that when the elapsed time reaches the period length, the Monitor function restarts. This will continue indefinitely, until it is stopped by means of remote command, front panel key, or power loss.

(The following will be implemented in the future)

**sweep**  This mode is identical to REPEAT, except for two things. First at the start of each successive Monitor period, the VCI of each Test Cell will be incremented by the VCI Increment (mon_vci_inc). Second, there will be a maximum number of repeat periods, for total monitor periods equal to the sweep count (mon_sweep).

Example:  

mon_type untimed
mon_type?

ACTION: Returns the current timing mode for the Generator Monitor function.

Response: UNTIMED or TIMED

Example: mon_type?
          MON_TYPE TIMED

mon_vci? [cell_num]

ACTION: Returns the VCI for the specified Test Cell (cell_num) as set during period of the available Generator Monitor results.

'cell_num': 1 to 4

Response: number value,
           number value

Example: mon_vci? 2
         MON_VCI 2, 10000

mon_vci_inc [vci_inc]

ACTION: Controls the VCI Increment value used for the Generator Monitor function when used in the SWEEP mode. This is the number added to each of the VCIs of the Test Cells at the start of each successive Monitor Sweep.

'vci_inc': 1 to 65535

Example: mon_vci_inc 12
**mon_vci_inc?**

**ACTION:** Returns the current VCI Increment setting for the Generator Monitor function (SWEEP mode only).

**Response:** number value

**Example:**
```
mon_vci_inc?
MON_VCI_INC 64
```

---

**mon_vpi? [cell_num]**

**ACTION:** Returns the VPI for the specified Test Cell (cell_num) as set during period of the available Generator Monitor results.

**'cell_num':** 1 to 4

**Response:** number value , number value

**Example:**
```
mon_vpi? 2
MON_VPI 2 , 4095
```
**mon_win_len** [sec]

**ACTION:** Controls the length of time for the Generator Sliding Window. This is maximum accumulated time in the sliding window. When the window elapsed time reaches the specified time, the sliding window will continue adding the new data, but will drop the oldest data.

'sec': 1 to 10 seconds

**Example:**
```
mon_win_len 1
```

**mon_win_len?**

**ACTION:** Returns the length of time over which the Generator Sliding Window will accumulate data.

**Response:** number value

**Example:**
```
mon_win_len?  
MON_WIN_LEN 10
```

**monitor** [vga, lcd]

**ACTION:** Controls the video monitor selection between the front panel LCD and the rear panel VGA.

**lcd** The front panel LCD screen will be enabled and the rear panel VGA will be disabled.

**vga** The rear panel VGA screen will be enabled and the front panel LCD will be disabled.

**Example:**
```
monitor vga
```
monitor?

ACTION: Returns the current monitor selection.

Response: LCD or VGA

Example: monitor?  
           MONITOR VGA

new_ptr [n]

ACTION: For Oc-3c signal only. Controls the New Pointer value which may be used for the SONET Pointer. When a NEW POINTER is issued ("set_new_ptr"), this value will be used.

'n': 0 to 782

Example: new_ptr 522

new_ptr?

ACTION: For Oc-3c signal only. Returns the value of the SONET New Pointer.

Response: number value

Example: new_ptr?  
          NEW_PTR 522
next_hdr_fl

ACTION: Header and Distribution Remote Command. This remote command is a query. It returns the next file name that ends with a "HDR" extension that is in the current selected drive, either the hard drive or the floppy drive. When the last file has been found, the next call to NEXT_HDR_FL returns a filename of "No. Files."

Example: next_hdr_fl

next_srm_fl

ACTION: Store and Recall Remote Command. This remote command is a query. It returns the next file name that ends with a "SRM" extension that is in the current selected drive, either the hard drive or the floppy drive. When the last file has been found, the next call to NEXT_SRM_FL returns a filename of "No. Files."

Example: next_srm_fl
oc3_alarms? [win,test] , [los,lof,lop,l_ais,p_ais,l_ferf,p_ferf,rai]

ACTION: Returns the Analyzer Physical Layer Alarm data for the OC-3c input. This is for the specified data type for either the Sliding Window or the Analyzer Test period. Note, this command is only valid for test data accumulated at the OC-3c interface.

win Results are from the Sliding Window period (see tst_win_len).
test Results are from the Analyzer Test period (see tst_length and tst_type).

los OC-3c Loss Of Signal (LOS).
lof OC-3c Loss Of Frame (LOF).
lop OC-3c Loss Of Pointer (LOP).
l_ais OC-3c Line Alarm Indication Signal (AIS).
p_ais OC-3c Path Alarm Indication Signal (AIS).
l_ferf OC-3c Line Far End Receive Failure maintenance signal (FERF).
p_ferf OC-3c Path Far End Receive Failure maintenance signal (FERF).
rai OC-3c yellow alarm signal (RAI).

Response: WIN or TEST ,
LOS , LOF , LOP , L_AIS , P_AIS , L_FERF , P_FERF or RAI ,
CLEAR , CUR or HIST

Example: oc3_alarms? win , l_ferf
OC3ALARMS WIN , L_FERF , CUR
oc3_error? [win,test], [b1,b2,b3,l_febe,p_febe]

ACTION: Returns the Analyzer Physical Layer Data Count for the OC-3c input.
This is for the specified data type for either the Sliding Window or the
Analyzer Test period. Note, this command is only valid for test data
accumulated at the OC-3c interface.

win Results are from the Sliding Window period (see tst_win_len).

test Results are from the Analyzer Test period (see tst_length
and tst_type).

b1 Total count for bit errors in the section BIP-8 byte (B1).
b2 Total count for bit errors in the line BIP-24 byte (B2).
b3 Total count for bit errors in the path BIP-8 byte (B3).
l_febe Total count for Line Far End Block Errors (FEBE).
p_febe Total count for Path Far End Block Errors (FEBE).

Response: WIN or TEST,
B1, B2, B3, L_FEBE or P_FEBE,
number value

Example: oc3_error? test, b1
OC3_ERROR TEST, B1, 123456
oc3_rate? [win,test],[b1,b2,b3]

ACTION: Returns the Analyzer Physical Layer Data Rate for the OC-3c input. This is for the specified data type for either the Sliding Window or the Analyzer Test period. Note, this command is only valid for test data accumulated at the OC-3c interface.

win Results are from the Sliding Window period (see tst_win_len).
test Results are from the Analyzer Test period (see tst_length and tst_type).

b1 Error Rate for bit errors in the section BIP-8 byte (B1).
b2 Error Rate for bit errors in the line BIP-24 byte (B2).
b3 Error Rate for bit errors in the path BIP-8 byte (B3).

Response: WIN or TEST ,
B1 , B2 or B3 ,
number value

Example: oc3_rate? test , b3
OC3_RATE TEST , B3 , 1.03E-09

Rev. 1.5 E-111 3/22/96
**output_ctl?**  [off, win, test, both]

**ACTION:** Prints results.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>off</td>
<td>none</td>
</tr>
<tr>
<td>win</td>
<td>End of window period</td>
</tr>
<tr>
<td>test</td>
<td>End of test.</td>
</tr>
<tr>
<td>both</td>
<td>End of window and end of test.</td>
</tr>
</tbody>
</table>

**Example:**
```
output_ctl?
OUTPUT_CTL TEST
```

**output_file?**  "name"

**ACTION:** Name must be eight characters long with no spaces. Valid characters are "ABCDEF and 0123456789."

**Example:**
```
output_file?
OUTPUT_FILE "TEST"
```
output_flop

ACTION: Command only. Output results to the floppy with output_file? named file with extension .txt.

Example: output_flop
          OUTPUT_FLOP

output_print [win, test]

ACTION: Prints results to printer.

win End of window period
test End of test.

Example: output_print
          OUTPUT_PRINT TEST
pj_neg

ACTION: For 0e-3c signal only. Performs a SONET Negative Justification (-PJ). This decreases the current SONET Pointer by one. NOTE: This is only valid for SONET interfaces.

Example: pj_neg

pj_pos

ACTION: For 0e-3c signal only. Performs a SONET Positive Justification (+PJ). This increases the current SONET Pointer by one. NOTE: This is only valid for SONET interfaces.

Example: pj_pos

print_rem [on, off]

ACTION: Selects the printer output port.

LPT Printer output is sent to the parallel port.
RS232 Printer output is sent to the serial (RS232) port.

Example: print_rem rs232

print_rem?

ACTION: Returns the current output printer port.

Response: LPT or RS232

Example: print_rem?
           PRINT_ROM RS232
ref_value?

ACTION: Return the current propagation delay reference value.

Example: ref_value?
          46E-6

rem_debug [on.off]

ACTION: Controls the Remote Debug functionality. Remote commands will appear on the top left of the screen. The responses will appear on the top right.

on The remote debugging function is allowed.
off The remote debugging function is off.

Example: rem_debug off

rem_debug?

ACTION: Returns the current Remote Debug mode.

Response: ON or OFF

Example: rem_debug?
          REM_DEBUG ON
remain_bw?

ACTION: Returns the remaining available bandwidth based for the test cells based on the bandwidth used by the idle cells (idle_bw?) with the four Test Cells (test_bw).

Response: number value

Example: remain_bw?
          REMAIN_BW 0.25
remain_freq

ACTION: Returns the remaining available frequency based for the test cells based on the frequency used by the idle cells (idle_bw?) with the four Test Cells (test_bw).

Response: number value

Example:

remain_freq?
REMAIN_FRQ 0.25

res_delbin? [win,test], [bin]

ACTION: Returns the Number of ATM Test Cells received that have a propagation or intercell delay (see delay_mode) that corresponds to the specified Cell Delay Bin. This is for either the Sliding Window or the Analyzer Test period.

win Results are from the Sliding Window period (see tst_win_len).
test Results are from the Analyzer Test period (see tst_length and tst_type).

'bin': 1 to 10

Response: WIN or TEST , number value , number value

Example:

res_delbin? win , 10
RES_DELBIN WIN , 10 , 600000
res_delend? [bin]

ACTION: Returns the Analyzer Cell Delay Bin End value for the specified bin as set during period of the available Analyzer Test results. This is for the propagation or intercell delay (see delay_mode).

'bin': 1 to 10

Response: number value ,
           number value

Example: res_delend? 4
          RES_DELEND 4, 400E-6

res_delmax? [win,test]

ACTION: Returns the Maximum propagation or intercell delay (see delay_mode) received for either the Sliding Window or the Analyzer Test period.

win Results are from the Sliding Window period (see tst_win_len).

test Results are from the Analyzer Test period (see tst_length and tst_type).

Response: WIN or TEST ,
           number value

Example: res_delmax? win
          RES_DELMAX WIN, 53E-6
**res_delmin? [win,test]**

**ACTION:** Returns the Minimum propagation or intercell delay (see delay_mode) received for either the Sliding Window or the Analyzer Test period.

- `win`: Results are from the Sliding Window period (see `tst_win_len`).
- `test`: Results are from the Analyzer Test period (see `tst_length` and `tst_type`).

**Response:** WIN or TEST ,
number value

**Example:**

```
res_delmin? win
RES_DELMIN WIN , 3E-6
```

**res_delover? [win,test]**

**ACTION:** Returns the Number of ATM Test Cells received that have a propagation or intercell delay (see delay_mode) larger than allowed for the Cell Delay Bins. This is for either the Sliding Window or the Analyzer Test period.

- `win`: Results are from the Sliding Window period (see `tst_win_len`).
- `test`: Results are from the Analyzer Test period (see `tst_length` and `tst_type`).

**Response:** WIN or TEST ,
number value

**Example:**

```
res_delover? win
RES_DELOVER WIN , 1200
```
res_delstart?

ACTION: Returns the Analyzer Cell Delay Bin Start value for the First Bin as set during period of the available Analyzer Test results. This is for the propagation or intercell delay (see delay_mode).

Response: number value

Example: res_delstart?
          RES_DELSTART 0E-6

res_delunder? [win,test]

ACTION: Returns the Number of ATM Test Cells received that have a propagation or intercell delay (see delay_mode) smaller than allowed for the Cell Delay Bins. This is for either the Sliding Window or the Analyzer Test period.

win Results are from the Sliding Window period (see tst_win_len).
test Results are from the Analyzer Test period (see tst_length and tst_type).

Response: WIN or TEST , number value

Example: res_delunder? win
          RES_DELUNDER WIN , 0
**res Disp**  [atm1, atm2, phys1, phys2]

**ACTION:** Controls the Front Panel display of the Analyzer Test results.

- **atm1** The front panel will display ATM test results - screen 1.
- **atm2** The front panel will display ATM test results - screen 2.
- **phys1** The front panel will display Physical Layer test results - screen 2.
- **phys2** The front panel will display Physical Layer test results - screen 2.

**Example:**
```
res Disp atm1
```

**res Disp?**

**ACTION:** Returns the Analyzer Front Panel test results display mode.

**Response:**  ATM1, ATM2, PHYS1 or PHYS2

**Example:**
```
res Disp?
RES_DISP ATM1
```

**res Elap?**  [win, test]

**ACTION:** Returns the Elapsed time into the Analyzer Sliding Window or Test period.

- **win** The Sliding Window elapsed time will be returned.
- **test** The Analyzer Test elapsed time will be returned.

**Response:**  WIN or TEST ,
<String Response> in the format of "DDD-HH:MM:SS.T"

**Example:**
```
res Elap? test
RES_ELAP TEST , "365-23:59:59.8"
```
res_link?

ACTION: Returns the Analyzer Test Cell Link mode as set during period of the available Analyzer Test results. To control the Analyzer Test Cell link, refer to the command 'rtest_link'.

Response: ENABLE or DISABLE

Example:  
res_link?  
RES_LINK ENABLE

res_num?

ACTION: Returns the Generator Test Cell number for use as the Analyzer Test Cell when the Link mode is enable as set during period of the available Analyzer Test results.

Response: number value

Example: 
res_num?  
RES_NUM 4

res_signal?

ACTION: Returns the Input Signal state as set during period of the available Analyzer Test results.

Response: OC3C, T100, DS3, DS3PLCP, DS1, DS1PLCP, E1, E1PLCP, E3, E3PLCP

Example: 
res_signal?  
RES_SIGNAL DS3PLCP
res_vci?

ACTION: Returns the Analyzer Test Cell VCI as set during period of the available Analyzer Test results.

Response: number value

Example:
res_vci?
RES_VCI 400

res_vpi?

ACTION: Returns the Analyzer Test Cell VPI as set during period of the available Analyzer Test results.

Response: number value

Example:
res_vpi?
RES_VPI 4
**rtest_cell**  [gfc],[vpi],[vci],[pti],[clp]

**ACTION:** Controls the Analyzer specified ATM Test Cell. All 5 ATM Header parameters will be accepted in one command. Note, if the Analyzer Test Cell link is enabled (rtest_link), these values will not be used during the Test. If the ATM Cell format is NNI (an_cellfrmt), the GFC will be set, but not used during the Test.

'gfc': 0 to 15  (ignored if ATM cell format is NNI)
'vepi': 0 to 4095  (up to 255 if cell format is UNI)
'veci': 0 to 65535
'pti': 0 to 7
'clp': 0 to 1

**Example:**
```
rtest_cell 0, 100, 100, 0, 0
```

**rtest_cell?**

**ACTION:** Returns the current Analyzer specified ATM Test Cell. Note, if the Analyzer Test Cell link is enabled (rtest_link), these values will not be used. If the ATM Cell format is NNI (an_cellfrmt), the GFC should be ignored.

**Response:** <5 NR1 Numerics>, in the order of GFC, VPI, VCI, PTI, CLP

**Example:**
```
rtest_cell?
RTEST_CELL 15, 255, 65535, 7, 1
```
rtest_clp [clp]

ACTION: Modifies the Cell Loss Priority (CLP) of the Analyzer specified ATM Test Cell.

'clp': 0 to 1

Example: rtest_clp 1

rtest_clp?

ACTION: Returns the Cell Loss Priority (CLP) of the Analyzer specified ATM Test Cell.

Response: number value

Example: rtest_clp?
          RTTEST_CLP 0

rtest_gfc [gfc]

ACTION: Modifies the Generic Flow Control (CLP) of the Analyzer specified ATM Test Cell. This command is only valid if the ATM Cell Format is UNI.

'gfc': 0 to 15

Example: rtest_gfc 0
rtest_gfc?

**ACTION:** Returns the Generic Flow Control (GFC) of the Analyzer specified ATM Test Cell. This command is only valid if the ATM Cell Format is UNI.

**Response:** number value

**Example:**
```
 rtest_gfc?
 RTEST_GFC 15
```

rtest_link [enable,disable]

**ACTION:** Controls the Link functionality for the Analyzer ATM Test Cell.

**enable**
The Analyzer Test Cell is linked to one of the Generator Test Cells, as specified by 'rtest_num'. The exact same ATM Cell header is used by the Analyzer.

**disable**
The Analyzer Test Cell is specified by the analyzer test cell parameters (rtest_XXX).

**Example:**
```
 rtest_link enable
```

rtest_link?

**ACTION:** Returns the Analyzer Link mode.

**Response:** ENABLE or DISABLE

**Example:**
```
 rtest_link?
 RTEST_LINK DISABLE
```
rtest_num  [cell_num]

ACTION: Controls which of the Generator Test Cells will be used as the Analyzer Test Cell. This cell number is used only when the Analyzer Link functionality is enabled (rtest_link).

'cell_num':  1 to 4

Example: rtest_num 3

rtest_num?

ACTION: Returns the Generator Test Cell number which will be used as the Analyzer Test Cell if the Link functionality is enabled.

Response: number value

Example: rtest_num?
          RTEST_NUM 1

rtest_pti  [pti]

ACTION: Modifies the Payload Type Identifier (PTI) of the Analyzer specified ATM Test Cell.

'pti':  0 to 7

Example: rtest_pti 7
Appendix E

rtest_pti?

ACTION: Returns the Payload Type Identifier (PTI) of the Analyzer specified ATM Test Cell.

Response: number value

Example: rtest_pti?
          RTEST_PTI 4

rtest_run  [run,stop]

ACTION: Controls the Analyzer Test Run function.

run       Starts the test of the selected input signal.
stop      Stops the test.

Example:  rtest_run run

rtest_run?

ACTION: Returns the current state of the Analyzer Test Run.

Response: RUN or STOP

Example:  rtest_run?
          RTEST_RUN STOP
rtest_vci [vci]

ACTION: Modifies the Virtual Channel Identifier (VCI) of the Analyzer specified ATM Test Cell.

'vci': 0 to 65535

Example: rtest_vci 12345

rtest_vci?

ACTION: Returns the Virtual Channel Identifier (VCI) of the Analyzer specified ATM Test Cell.

Response: number value

Example: rtest_vci?
          RTEST_VCI 65500
rtest_vpi  [vpi]

ACTION: Modifies the Virtual Path Identifier (VPI) of the Analyzer specified ATM Test Cell.

'vepi':  0 to 4095  (up to 255 if cell format is UNI)

Example:  rtest_vpi 4095

rtest_vpi?

ACTION: Returns the Virtual Path Identifier (VPI) of the Analyzer specified ATM Test Cell.

Response:  number value

Example:  rtest_vpi?
          RTEST_VPI 4095

set_new_ptr

ACTION: For Oc-3c signal only. Controls the use of the New SONET Pointer. This issues a New Data Flag (NDF) and uses the New SONET Pointer ("new_ptr").

NOTE: This is only valid for SONET interfaces.

Example:  set_new_ptr
single_hec

ACTION: Generates a single ATM HEC error. This also disables the ATM Error injection (err_enab) if currently enabled. There is an overall Alarm/Error enable control (all_error) which must be enabled to allow any Error Injection.

Example: single_hec

single_pyld

ACTION: Generates a single ATM Cell Payload error. This also disables the ATM Error injection (err_enab) if currently enabled. There is an overall Alarm/Error enable control (all_error) which must be enabled to allow any Error Injection.

Example: single_pyld
sonet_ptr?

ACTION: For Oc-3c signal only. Returns the current SONET Pointer transmitted by the Generator.

Response: number value

Example: sonet_ptr?
          SONET_PTR 522

sram_to_disk

ACTION: Store and Recall Remote Command. This remote command is similar to the disk_to_sram command except that the filename supplied with the command is used to store all of the sram values. The passed-in filename must be eight characters long. The .SRM extension is added. The file is stored in the current selected drive, either the internal hard drive or the floppy drive.

Example: sram_to_disk "filename"
stm1_alarms? [win,test] , [los,lof,ms_ais,ms_rdi,lop,au_ais,hp_rdi]

ACTION: Returns the Analyzer Physical Layer Alarm data for the STM-1 input. This is for the specified data type for either the Sliding Window or the Analyzer Test period. Note, this command is only valid for test data accumulated at the STM-1 interface.

win Results are from the Sliding Window period (see tst_win_len).
test Results are from the Analyzer Test period (see tst_length and tst_type).

los STM-1 Loss Of Signal (LOS).
lof STM-1 Loss Of Frame (LOF).
ms_ais Signal set to ones before scrambling
ms_rdi A 110 code in bits 6-8 of the K2 byte
lop STM-1 Loss Of Pointer (LOP).
au_ais STM-1 Path Alarm Indication Signal (AIS).
hp_rdi STM-1 yellow alarm signal (RAI).

Response: WIN or TEST ,
LOS, LOF, MS_AIS, MS_RDI, LOP, AU_AIS,
HP_REI, HP_RDI
CLEAR , CUR or HIST

Example: stm1_alarms? win , los
STM1_ALARMS WIN , LOS , CUR
stm1_error? [win,test], [b1,b2,hp_rei,b3]

ACTION: Returns the Analyzer Physical Layer Data Count for the STM-1 input. This is for the specified data type for either the Sliding Window or the Analyzer Test period. Note, this command is only valid for test data accumulated at the STM-1 interface.

win Results are from the Sliding Window period (see tst_win_len).
test Results are from the Analyzer Test period (see tst_length and tst_type).

b1 STM-1 Regenerator Section BIP-8 byte (B1)
b2 Errors in Multiplex Section BIP-24 byte (B2)
hp_rei STM-1 Line Far End Receive Failure maintenance signal (FERF)
b3 Bit errors in the path BIP-8 byte (B3)

Response: WIN or TEST,
B1, B2, B3
number value

Example: stm1_error? test, b1
STM1_ERROR TEST, B1, 123456
stm1_rate? [win,test],[b1,b2,b3]

ACTION: Returns the Analyzer Physical Layer Data Rate for the STM-1 input.
This is for the specified data type for either the Sliding Window or the Analyzer Test period. Note, this command is only valid for test data accumulated at the OC-3c interface.

win    Results are from the Sliding Window period (see tst_win_len).
test   Results are from the Analyzer Test period (see tst_length and tst_type).

b1     STM-1 Regenerator Section BIP-8 byte (B1)
b2     Errors in Multiplex Section BIP-24 byte (B2)
b3     Bit errors in the path BIP-8 byte (B3)

Response: WIN or TEST ,
B1, B2, B3
number value

Example:    stm1_rate? test , b3
            STM1_RATE TEST , B3 , 1.03E-09
**t100_alarms?** [win,test] , [los,lcv]

**ACTION:** Returns the Analyzer Physical Layer Alarm data for the 100Mbps input. This is for the specified data type for either the Sliding Window or the Analyzer Test period. Note, this command is only valid for test data accumulated at the 100Mbps interface.

```
win Results are from the Sliding Window period (see tst_win_len).
test Results are from the Analyzer Test period (see tst_length and tst_type).

los 100Mbps Loss Of Signal (LOS).
lcv 100Mbps Line Code Violation (LCV).
```

**Response:** WIN or TEST ,
LOS or LCV ,
CLEAR , CUR or HIST

**Example:**
```
t100_alarms? win , los
t100_ALARMS WIN , LOS , CLEAR
```

**test_bw** [cell_num],[bw]

**ACTION:** Controls the output bandwidth of the specified Test Cell. The total bandwidth of all of the cells cannot exceed the active bandwidth (active_bw).

```
'cellnum': 1 to 4
'bw': 0.000 to 1.000
```

**Example:**
```
test_bw 1 , 0.25
```
test_bw? [cell_num]

ACTION: Returns the bandwidth setting of the specified Test Cell.

Response: number value

Example:

```
test_bw? 1
TEST_BW 1 , 1000E-3
```

test_cell [cellnum],[gfc],[vpi],[vci],[pti],[clp]

ACTION: Modifies an entire contents of the Test Cell. For the specified Test Cell (cellnum), all of the parameters will be changed as specified.

'cellnum': 1 to 4
'gfc': 0 to 15  (ignored if ATM cell format is NNI)
'vpi': 0 to 4095  (up to 255 if cell format is UNI)
'vci': 0 to 65535
'pti': 0 to 7
'clp': 0 to 1

Example:

test_cell 1 , 0 , 255 , 65535 , 0 , 0
test_cell? [cellnum]

ACTION: Returns the entire ATM Test Cell, specified by 'cellnum'. Note that the GFC field in the response will be 0 when the ATM cell format is NNI.

'cellnum': 1 to 4

Response: <6 NR1 Numerics>

Example: test_cell? 4
          TEST_CELL 4, 0, 1, 1, 0, 0

-----------------------------------------------

test_clp [cellnum].[clp]

ACTION: Modifies the Cell Loss Priority (CLP) of the specified ATM Test Cell specified by 'cellnum'.

'cellnum': 1 to 4
'clp': 0 to 1

Example: test_clp 1, 0

-----------------------------------------------

test_clp? [cellnum]

ACTION: Returns the Cell Loss Priority (CLP) of the specified ATM Test Cell.

'cellnum': 1 to 4

Response: two number values

Example: test_clp? 4
          TEST_CLP 4, 1
test_gfc  [cellnum],[gfc]

ACTION: Modifies the Generic Flow Control (CLP) of the specified ATM Test Cell specified by 'cellnum'. This command is only valid if the ATM Cell Format is UNI.

'cellnum': 1 to 4
'gfc': 0 to 15

Example: test_gfc 1, 0

test_gfc? [cellnum]

ACTION: Returns the Generic Flow Control (GFC) of the specified ATM Test Cell. This command is only valid if the ATM Cell Format is UNI.

'cellnum': 1 to 4

Response: two number values

Example: test_gfc? 4
          TEST_GFC 4, 15

test_pti  [cellnum],[pti]

ACTION: Modifies the Payload Type Identifier (PTI) of the specified ATM Test Cell specified by 'cellnum'.

'cellnum': 1 to 4
'pti': 0 to 7

Example: test_pti 1, 0
test_pti? [cellnum]

ACTION: Returns the Payload Type Identifier (PTI) of the specified ATM Test Cell.

'cellnum': 1 to 4

Response: two number values

Example: test_pti? 4
          TEST_PTI 4, 7

-----------------------------------------------

test_vci [cellnum],[vci]

ACTION: Modifies the Virtual Channel Identifier (VCI) of the specified ATM Test Cell specified by 'cellnum'.

'cellnum': 1 to 4
'vci': 0 to 65535

Example: test_vci 1, 123
test_vci? [cellnum]

ACTION: Returns the Virtual Channel Identifier (VCI) of the specified ATM Test Cell.

'cellnum': 1 to 4

Response: two number values

Example: test_vci? 4
 TEST_VCI 4, 65500

test_vpi [cellnum],[vpi]

ACTION: Modifies the Virtual Path Identifier (VPI) of the specified ATM Test Cell specified by 'cellnum'.

'cellnum': 1 to 4
'vpi': 0 to 4095 (up to 255 if cell format is UNI)

Example: test_vpi 1, 1

test_vpi? [cellnum]

ACTION: Returns the Virtual Path Identifier (VPI) of the specified ATM Test Cell.

'cellnum': 1 to 4

Response: two number values

Example: test_vpi? 4
 TEST_VPI 4, 4095
time  ['hh:mm:ss AM or PM']

ACTION: Sets the time.

Example:    time "hh:mm:ss AM or PM"

------------------------------------------------------------------------

time?

ACTION: Returns the current time.

Response:    hh:mm:ss AM or PM

Example:    time?
            TIME HH:MM:SS  AM or PM

------------------------------------------------------------------------

tse    [n]

ACTION: Controls the Test Status Enable register. This register is used to
mask conditions that will occur in the Test Status Register (tsr) to allow
certain test conditions to set GPIB SRQs.

'n': 0 to 255

NOTE: For details on this and other registers used for GPIB SRQs,
refer the GPIB Appendix.

Example:    tse 255
tse?

ACTION: Returns the current Test Status Enable register.

NOTE: For details on this and other registers used for GPIB SRQs, refer the GPIB Appendix.

Response: number value

Example: tse?
          TSE 255

---------------------------------------------------------------

tsr?

ACTION: Returns the current Test Status Register.

NOTE: For details on this and other registers used for GPIB SRQs, refer the GPIB Appendix.

Response: number value

Example: tsr?
         TSR 1

---------------------------------------------------------------

tst_disp [win,test]

ACTION: Controls the Front Panel display of the Analyzer Test results.

win       The front panel will display the Sliding Window results.
test      The front panel will display the Analyzer Test period results.

Example:   tst Disp test
tst_disp?

ACTION: Returns the Analyzer Front Panel Test results display mode.

Response: WIN or TEST

Example: tst DISP?
           TST_DISP WIN

---------------------------------------------

**tst_length [sec]**

ACTION: Controls the length of time for the Analyzer Test period. It is used by the Test in the TIMED, REPEAT and SWEEP modes (tst_type). This is the period referenced by the Analyzer Test result commands as 'test'.

'sec': 1 to 99999 seconds

Example: tst_length 60

---------------------------------------------

**tst_length?**

ACTION: Returns the length of time that the Analyzer Test will run before it will stop when it is in the TIMED, REPEAT and SWEEP modes.

Response: number value

Example: tst_length?
         TST_LENGTH 10
tst_sweep  [sweep]

ACTION: Controls the number of Sweep periods (sweep) for the Analyzer Test function. It is used by the Test only in the SWEEP mode (tst_type).

'sweep': 1 to 99

Example: tst_sweep 10

---------------------------------------------------------------

[tst_sweep?]

ACTION: Returns the Sweep count for the Analyzer Test.

Response: number value

Example: tst_sweep?
          TST_SWEEP 10
tst_type [untimed, timed]

ACTIONL Controls the timing mode for the Analyzer Test function.

untimed In this mode, the Analyzer Test function will continue running independent of the test period length (tst_length). It will continue until it is explicitly stopped (remote command 'rtest_run stop' or the front panel key TEST RUN), or power off.

timed In this mode, the Analyzer Test function will continue running until the Test elapsed time reaches the test period length (tst_length). It will also stop by means of remote command (rtest_run), front panel key, or power loss.

(The following will be implemented in the future)
repeat This mode is identical to TIMED, except that when the elapsed time reaches the period length, the Test function restarts. This will continue indefinitely, until it is stopped by means of remote command, front panel key, or power loss.

(The following will be implemented in the future)
sweep This mode is identical to REPEAT, except for two things. First at the start of each successive Test period, the VCI of the Test Cell will be incremented by the VCI Increment (tst_vci_inc). Second, there will be a maximum number of repeat periods, for total test periods equal to the sweep count (tst_sweep).

Example: tst_type untimed
tst_type?

**ACTION:** Returns the current timing mode for the Analyzer Test function.

**Response:** UNTIMED or TIMED

**Example:**
```
tst_type?
TST_TYPE TIMED
```

tst_vci_inc [vci_inc]

**ACTION:** Controls the VCI Increment value used for the Analyzer Test function when used in the SWEEP mode. This is the number added to each of the VCIs of the Test Cells at the start of each successive Test Sweep.

'vci_inc': 1 to 65535

**Example:**
```
tst_vci_inc 12
```

tst_vci_inc?

**ACTION:** Returns the current VCI Increment setting for the Analyzer Test function (SWEEP mode only).

**Response:** number value

**Example:**
```
tst_vci_inc?
TST_VCI_INC 64
```
tst_win_len [sec]

ACTION: Controls the length of time for the Analyzer Sliding Window. This is maximum accumulated time in the sliding window. When the window elapsed time reaches the specified time, the sliding window will continue adding the new data, but will drop the oldest data.

'sec': 1 to 10 seconds

Example: tst_win_len 1

tst_win_len?

ACTION: Returns the length of time over which the Analyzer Sliding Window will accumulate data.

Response: number value

Example: tst_win_len?
TST_WIN_LEN 10
Alphabetical

<table>
<thead>
<tr>
<th>Command</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>*cls</td>
<td>E-2</td>
</tr>
<tr>
<td>*ese</td>
<td>E-2</td>
</tr>
<tr>
<td>*esr?</td>
<td>E-3</td>
</tr>
<tr>
<td>*idn?</td>
<td>E-3</td>
</tr>
<tr>
<td>*lrn?</td>
<td>E-3</td>
</tr>
<tr>
<td>*opc</td>
<td>E-4</td>
</tr>
<tr>
<td>*rst</td>
<td>E-4</td>
</tr>
<tr>
<td>*sre</td>
<td>E-4</td>
</tr>
<tr>
<td>*stb?</td>
<td>E-5</td>
</tr>
<tr>
<td>*tst?</td>
<td>E-5</td>
</tr>
<tr>
<td>*wai</td>
<td>E-6</td>
</tr>
<tr>
<td>active_bw?</td>
<td>E-7</td>
</tr>
<tr>
<td>active_cell</td>
<td>E-7</td>
</tr>
<tr>
<td>active_clp</td>
<td>E-8</td>
</tr>
<tr>
<td>active_cnt?</td>
<td>E-9</td>
</tr>
<tr>
<td>active_frfq?</td>
<td>E-9</td>
</tr>
<tr>
<td>active_gfc</td>
<td>E-10</td>
</tr>
<tr>
<td>active_pti</td>
<td>E-11</td>
</tr>
<tr>
<td>active_vci</td>
<td>E-12</td>
</tr>
<tr>
<td>active_vpi</td>
<td>E-13</td>
</tr>
<tr>
<td>alarms_ds1</td>
<td>E-14</td>
</tr>
<tr>
<td>alarms_ds3</td>
<td>E-16</td>
</tr>
<tr>
<td>alarms_e1</td>
<td>E-18</td>
</tr>
<tr>
<td>alarms_e3</td>
<td>E-20</td>
</tr>
<tr>
<td>alarms_oc3c</td>
<td>E-22</td>
</tr>
<tr>
<td>alarms_stm1</td>
<td>E-24</td>
</tr>
<tr>
<td>an_cellfrmt</td>
<td>E-26</td>
</tr>
<tr>
<td>an_coset</td>
<td>E-27</td>
</tr>
<tr>
<td>an_crc_e1</td>
<td>E-28</td>
</tr>
<tr>
<td>an_ds1frame</td>
<td>E-28</td>
</tr>
<tr>
<td>an_ds3frame</td>
<td>E-29</td>
</tr>
<tr>
<td>an_e3frame</td>
<td>E-30</td>
</tr>
<tr>
<td>an_plcp</td>
<td>E-31</td>
</tr>
<tr>
<td>an_plcp_e1</td>
<td>E-32</td>
</tr>
<tr>
<td>an_plcp_e3</td>
<td>E-32</td>
</tr>
<tr>
<td>an_pps</td>
<td>E-32</td>
</tr>
<tr>
<td>an_scram</td>
<td>E-34</td>
</tr>
<tr>
<td>an_scram_ex</td>
<td>E-34</td>
</tr>
<tr>
<td>an_signal</td>
<td>E-35</td>
</tr>
<tr>
<td>an_sync</td>
<td>E-36</td>
</tr>
<tr>
<td>atm_error?</td>
<td>E-37</td>
</tr>
<tr>
<td>atm_rate?</td>
<td>E-38</td>
</tr>
<tr>
<td>bw_cntrl</td>
<td>E-38</td>
</tr>
<tr>
<td>calibrate</td>
<td>E-39</td>
</tr>
<tr>
<td>cell_run</td>
<td>E-39</td>
</tr>
<tr>
<td>contrast</td>
<td>E-40</td>
</tr>
<tr>
<td>cust_hdr_fl</td>
<td>E-41</td>
</tr>
<tr>
<td>date</td>
<td>E-41</td>
</tr>
<tr>
<td>del_hdr_fl</td>
<td>E-42</td>
</tr>
<tr>
<td>del_srm_fl</td>
<td>E-42</td>
</tr>
<tr>
<td>delay_end</td>
<td>E-42</td>
</tr>
<tr>
<td>delay_max</td>
<td>E-43</td>
</tr>
<tr>
<td>delay_min</td>
<td>E-44</td>
</tr>
<tr>
<td>delay_mode</td>
<td>E-44</td>
</tr>
<tr>
<td>delay_start</td>
<td>E-45</td>
</tr>
<tr>
<td>disk_to_sram</td>
<td>E-46</td>
</tr>
<tr>
<td>dist_count</td>
<td>E-46</td>
</tr>
<tr>
<td>dist_max</td>
<td>E-47</td>
</tr>
<tr>
<td>dist_mean</td>
<td>E-47</td>
</tr>
<tr>
<td>dist_min</td>
<td>E-48</td>
</tr>
<tr>
<td>dist_mode</td>
<td>E-49</td>
</tr>
<tr>
<td>dist_period</td>
<td>E-51</td>
</tr>
<tr>
<td>dist_program</td>
<td>E-51</td>
</tr>
<tr>
<td>dist_random</td>
<td>E-52</td>
</tr>
<tr>
<td>dist_std_dev</td>
<td>E-53</td>
</tr>
<tr>
<td>dist_step</td>
<td>E-54</td>
</tr>
<tr>
<td>drive</td>
<td>E-54</td>
</tr>
<tr>
<td>ds1_alarms?</td>
<td>E-55</td>
</tr>
<tr>
<td>ds1_error?</td>
<td>E-56</td>
</tr>
<tr>
<td>ds1_rate?</td>
<td>E-57</td>
</tr>
<tr>
<td>ds3_alarms?</td>
<td>E-58</td>
</tr>
<tr>
<td>ds3_error?</td>
<td>E-59</td>
</tr>
<tr>
<td>ds3_rate?</td>
<td>E-60</td>
</tr>
<tr>
<td>e1_alarms?</td>
<td>E-61</td>
</tr>
<tr>
<td>e1_error?</td>
<td>E-62</td>
</tr>
<tr>
<td>e1_rate?</td>
<td>E-63</td>
</tr>
<tr>
<td>e3_alarms?</td>
<td>E-64</td>
</tr>
<tr>
<td>e3_error?</td>
<td>E-65</td>
</tr>
<tr>
<td>e3_rate?</td>
<td>E-66</td>
</tr>
<tr>
<td>err_mode</td>
<td>E-67</td>
</tr>
<tr>
<td>err_rate</td>
<td>E-68</td>
</tr>
<tr>
<td>frst_hdr_fl</td>
<td>E-69</td>
</tr>
<tr>
<td>frst_srm_fl</td>
<td>E-69</td>
</tr>
<tr>
<td>gen_100mbps</td>
<td>E-70</td>
</tr>
<tr>
<td>gen_act_clp</td>
<td>E-70</td>
</tr>
<tr>
<td>gen_act_cnt</td>
<td>E-71</td>
</tr>
<tr>
<td>gen_act_gfc</td>
<td>E-72</td>
</tr>
<tr>
<td>gen_act_hdrs</td>
<td>E-72</td>
</tr>
<tr>
<td>gen_act_inc</td>
<td>E-73</td>
</tr>
<tr>
<td>gen_act_pti</td>
<td>E-73</td>
</tr>
<tr>
<td>gen_act_vci</td>
<td>E-74</td>
</tr>
<tr>
<td>gen_act_vpi</td>
<td>E-75</td>
</tr>
<tr>
<td>gen_cellfrmt</td>
<td>E-75</td>
</tr>
<tr>
<td>gen_clk</td>
<td>E-76</td>
</tr>
<tr>
<td>gen_coset</td>
<td>E-77</td>
</tr>
<tr>
<td>gen_crc_e1</td>
<td>E-77</td>
</tr>
<tr>
<td>gen_ds1frame</td>
<td>E-78</td>
</tr>
<tr>
<td>gen_ds3frame</td>
<td>E-79</td>
</tr>
<tr>
<td>gen_e3frame</td>
<td>E-80</td>
</tr>
<tr>
<td>gen_laser</td>
<td>E-80</td>
</tr>
<tr>
<td>gen_plcp_ds1</td>
<td>E-81</td>
</tr>
<tr>
<td>gen_plcp</td>
<td>E-82</td>
</tr>
<tr>
<td>Variable</td>
<td>Offset</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>gen_plcp_e1</td>
<td>E-83</td>
</tr>
<tr>
<td>gen_plcp_e3</td>
<td>E-84</td>
</tr>
<tr>
<td>gen_pps</td>
<td>E-85</td>
</tr>
<tr>
<td>gen_scram</td>
<td>E-85</td>
</tr>
<tr>
<td>gen_scram_ex</td>
<td>E-86</td>
</tr>
<tr>
<td>gen_signal</td>
<td>E-87</td>
</tr>
<tr>
<td>gen_sync</td>
<td>E-88</td>
</tr>
<tr>
<td>hdr_program</td>
<td>E-88</td>
</tr>
<tr>
<td>hdr_random</td>
<td>E-89</td>
</tr>
<tr>
<td>header</td>
<td>E-90</td>
</tr>
<tr>
<td>hist_cell</td>
<td>E-90</td>
</tr>
<tr>
<td>hist_clear</td>
<td>E-91</td>
</tr>
<tr>
<td>hist_delin?</td>
<td>E-91</td>
</tr>
<tr>
<td>hist_input?</td>
<td>E-92</td>
</tr>
<tr>
<td>hist_phys?</td>
<td>E-92</td>
</tr>
<tr>
<td>hist_sync?</td>
<td>E-92</td>
</tr>
<tr>
<td>id_interface?</td>
<td>E-93</td>
</tr>
<tr>
<td>id_options?</td>
<td>E-93</td>
</tr>
<tr>
<td>id_serial?</td>
<td>E-94</td>
</tr>
<tr>
<td>id_system?</td>
<td>E-94</td>
</tr>
<tr>
<td>idle_bw?</td>
<td>E-95</td>
</tr>
<tr>
<td>idle_fraq?</td>
<td>E-95</td>
</tr>
<tr>
<td>logo?</td>
<td>E-96</td>
</tr>
<tr>
<td>loopback</td>
<td>E-96</td>
</tr>
<tr>
<td>mon_disp</td>
<td>E-97</td>
</tr>
<tr>
<td>mon_freq?</td>
<td>E-99</td>
</tr>
<tr>
<td>mon_length</td>
<td>E-99</td>
</tr>
<tr>
<td>mon_peak?</td>
<td>E-100</td>
</tr>
<tr>
<td>mon_reset</td>
<td>E-100</td>
</tr>
<tr>
<td>mon_sweep</td>
<td>E-101</td>
</tr>
<tr>
<td>mon_total?</td>
<td>E-102</td>
</tr>
</tbody>
</table>
Appendix F

Service Information/Warranty

How to Reach Tektronix, Microwave Logic Products Customer Service

If you have any questions about the ATM150 regarding the operation, maintenance, or application, contact our Customer Service Department as follows:

<table>
<thead>
<tr>
<th>Address</th>
<th>Attn. Customer Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tektronix, Microwave Logic Products</td>
<td></td>
</tr>
<tr>
<td>285 Mill Road</td>
<td>Press &quot;0&quot; and ask for Customer Service</td>
</tr>
<tr>
<td>Chelmsford, MA 01824</td>
<td>9:00 AM to 5:00 PM, Eastern Time</td>
</tr>
<tr>
<td>USA</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Telephones</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1-508-256-6800</td>
<td></td>
</tr>
<tr>
<td>or</td>
<td></td>
</tr>
<tr>
<td>1-800-643-2167</td>
<td></td>
</tr>
<tr>
<td>FAX</td>
<td></td>
</tr>
<tr>
<td>1-508-256-2038</td>
<td></td>
</tr>
</tbody>
</table>

Service Shipments

If the unit must be returned to the factory for service, please do the following:

- Contact the factory at (508) 256-6800 or 1-800-643-2167, press "0", and ask for a Return Authorization Number (RAN). The use of a RAN will ensure prompt service, and ease tracking of your unit.

- Pack the unit in its original packing materials or other suitable material, such as foam or bubblewrap, to safely ship the unit. Pack unit in a double-walled carton, and seal the carton with suitable tape. Display the Return Authorization Number (RAN) on the outside of the carton.

- Ship unit to Tektronix, Microwave Logic Products, 285 Mill Road, Chelmsford, MA 01824.

Warranty

All Tektronix, Microwave Logic Products are warranted against any defects in material and workmanship for the period of one year from the date of delivery. Microwave Logic will repair or replace products which prove to be defective during the warranty period.
NO OTHER WARRANTY, EXPRESSED OR IMPLIED, INCLUDING FITNESS FOR PURPOSE, MERCHANTABILITY OR OTHERWISE, IS GIVEN.

Warnings
The following warnings must be observed before and during all uses of this equipment. Failure to follow these and other specific warnings contained elsewhere in the this user manual may cause physical harm to the user and/or damage to the equipment.

Use an optical attenuator
The ATM150 test set is equipped with optical test capability. Use an optical patch cord with a 7 to 10 dB optical attenuator when testing the optical interfaces.

Ground the equipment
To minimize shock hazard, the equipment chassis must be connected to an approved 3-contact electrical outlet.

Keep away from the equipment’s live voltages
Do not remove the top cover or insert fingers or other objects through the rear panel holes or ventilation holes while power is ON.

Do not operate in an ambient temperature above 122 degrees F (50 degrees C)
Operating this equipment in temperatures above 122 degrees F (50 degrees C) can cause damage.

Replace blown AC fuse with a properly rated fuse
Do not operate the instrument with an improperly rated AC fuse. Consult the rear panel for the correct fuse for this equipment.
Appendix G

RS-232 Remote Interface Capabilities

The ATM150 supports remote control through the RS-232C interface bus connector on the rear panel. The unit can be operated from the front panel and over the remote interface simultaneously. Any unit status changes made remotely will be displayed on the front panel. All of the front panel functions can be controlled over the RS-232C interface, except 'Power'.

The remote commands sent to the ATM150 differ from front panel control - the current operating mode is entered directly rather than through sub-menus.

Commands are provided to read back stored Data Memory contents. Memory contents can be read back and printed out for hardcopy archiving. A list of remote commands is listed in an appendix.

RS-232 Interface Device Settings

The RS-232C interface device settings are programmable through the front panel. The following RS-232C parameters are programmable, along with the possible selections and the default selections and the default setting in parentheses.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baud, Bps rate</td>
<td>9600</td>
<td>4800, 2400, 1200, 600, 300</td>
</tr>
<tr>
<td>Parity</td>
<td>Even</td>
<td>None, Odd</td>
</tr>
<tr>
<td>Data Size</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Stop Bits</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Echo</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>XON/XOFF</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>EOL</td>
<td>CR/LF</td>
<td>LF/CR, CR, LF</td>
</tr>
</tbody>
</table>

To change an RS-232C setting through the front panel, refer to the section with this manual on "Utility".
RS-232 Interface Hardware/Handshaking Considerations

The remote interface consists of a 9-pin male D-type connector located on the rear panel. When using the RS-232C interface, connect the controller to the ATM150 with an appropriate 9-pin cable. The ATM150 is configured as an RS-232C Data Terminal Equipment (DTE). For a connection to DTE device (most RS-232C controllers), connect the the controller to the ATM150 with a null-modem.

Refer to the following table for RS-232C signal names, pinouts and functional descriptions.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DCD</td>
<td>Data Carrier Detect</td>
</tr>
<tr>
<td>2</td>
<td>RxD</td>
<td>Received Data Input. Data send to the ATM150 is received on this input</td>
</tr>
<tr>
<td>3</td>
<td>TxD</td>
<td>Transmitted Data Output. Data sent to the ATM150 is transmitted on this input</td>
</tr>
<tr>
<td>4</td>
<td>DTR</td>
<td>Data Terminal Ready</td>
</tr>
<tr>
<td>5</td>
<td>GND</td>
<td>Signal Ground</td>
</tr>
<tr>
<td>6</td>
<td>DSR</td>
<td>Data Set Ready</td>
</tr>
<tr>
<td>7</td>
<td>RTS</td>
<td>Request to Send</td>
</tr>
<tr>
<td>8</td>
<td>CTS</td>
<td>Clear to Send</td>
</tr>
<tr>
<td>9</td>
<td>RI</td>
<td>Ring Indicator</td>
</tr>
</tbody>
</table>

RS-232 Interface Testing

To test that the RS-232C interface is properly connected, attach a standard 9-pin D-type connector cable between the RS-232C rear panel connector and the controller, with the ATM150 turned off. Turn on the ATM150 - the following message should appear on the RS-232C controller's screen, followed by the prompt "ATM150>":

*****Tektronix ATM150 1.5 04-15-96*****

ATM150>

If the message does not appear, check the following:

- the cable may be defective
- the controller may be configured as DCE equipment; a null modem may be required
- the controller signal format, or bps rate may not match the ATM150's settings. Refer to the first part of this appendix for interface setting information.
Programming RS-232C Remote Commands

There are two types of remote commands for the ATM150:

- set commands (or commands)
- queries commands (or queries).

The set commands force the ATM150 to take a specific action. The query commands direct the ATM150 to return status information.

Commands are entered one line at a time. Errors may be corrected while entering a line, with the backspace key. A command string is terminated by a carriage return, which transmits the string to the ATM150 and executes the command string. All valid commands are executed. Incorrect or unsupported commands are responded to by an error message. RS-232C error messages follow at the end of this appendix.

Command lines may contain a single command or multiple commands. The command line may contain both queries and commands. Individual commands within the command line must be separated by semi-colons (;), parameters must be separated by commas (,). Non-decimal numeric parameters, Hexadecimal, Octal, and Binary must be preceded by a '#H', '#Q', or '#B' respectively. The entire command name does not have to be completely entered for the command to be recognized as valid. There is a minimum valid length associated with each command, which is the length that makes it unique from all other commands.
### RS-232C Error Messages

All RS-232C remote commands received by the ATM150 are checked for command validity, and appropriate parameters (parameters listed with commands within brackets[]). All valid command strings are executed. Incorrect command strings are responded to with error messages.

<table>
<thead>
<tr>
<th>Error Message</th>
<th>Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;*** Input Lost&quot;</td>
<td>Input data lost over interface</td>
</tr>
<tr>
<td>&quot;*** Input Buffer Overflow&quot;</td>
<td>Input buffer overflow, command line too long without terminator</td>
</tr>
<tr>
<td>&quot;*** Command Mnemonic Not Found&quot;</td>
<td>Command not found</td>
</tr>
<tr>
<td>&quot;*** Invalid Command for Interface&quot;</td>
<td>Command found, but not valid for this interface</td>
</tr>
<tr>
<td>&quot;*** Invalid Command Type&quot;</td>
<td>Command mnemonic found, but command issued incorrectly: missing, or added, '?\n on end of command</td>
</tr>
<tr>
<td>&quot;*** Too Few Parameters&quot;</td>
<td>Missing Parameter</td>
</tr>
<tr>
<td>&quot;*** Too Many Parameters&quot;</td>
<td>Too many parameters</td>
</tr>
<tr>
<td>&quot;*** Invalid Parameter&quot;</td>
<td>Parameter invalid</td>
</tr>
<tr>
<td>&quot;*** Parameter Out of Range&quot;</td>
<td>Parameter out of range</td>
</tr>
<tr>
<td>&quot;*** Parameter Not in Set&quot;</td>
<td>Parameter not one of values specified for the command</td>
</tr>
<tr>
<td>&quot;*** Invalid String Length&quot;</td>
<td></td>
</tr>
<tr>
<td>&quot;*** Parameter Separator&quot;</td>
<td>Parameter separator, &quot;;&quot;, is missing or command line is terminated following separator</td>
</tr>
<tr>
<td>&quot;*** Invalid Non-decimal Parameter&quot;</td>
<td>Parameter not in on-decimal format</td>
</tr>
<tr>
<td>&quot;*** Command Execution Error&quot;</td>
<td>Command not executed properly</td>
</tr>
<tr>
<td>&quot;*** Out of Memory&quot;</td>
<td>Processor out of memory</td>
</tr>
</tbody>
</table>
Diagram – Connecting RS-232 cables to the ATM150

**Typical Personal Computer Remote Control Application**

- **Rear of ATM-150 (DB-9 male)**
- **9 pin Null MODEM female-female**
- **DB-9 Cable female-male** (if required)
- **Personal Computer (DB-9 male)**

**Typical Computer Workstation Remote Control Application**

- **Rear of ATM-150 (DB-9 male)**
- **25 pin Null MODEM female-male**
- **DB-9 female to DB-25 male adapter**
- **DB-25 Cable female-female**
- **Computer Workstation (DB-25 male)**

**Typical Printer Application**

- **Rear of ATM-150 (DB-9 male)**
- **DB-9 Cable female-male** (if required)
- **DB-9 female to DB-25 male adapter**
- **DB-25 Cable female-female** (if required)
- **Printer (DB-25 female)**
Appendix H

GPIB Remote Interface Capabilities

The ATM-150 supports remote control through the GPIB interface bus connector on the rear panel. The unit can be operated from the front panel and over the remote interface simultaneously. Any unit status changes made remotely will be displayed on the front panel. All of the front panel functions can be controlled over the GPIB interface, except 'POWER'. The remote commands sent to the ATM-150 differ from front panel control; the current operating mode is entered directly rather than through sub-menus.

GPIB Interface Device Settings

For proper GPIB interface communication and handshaking, the GPIB controller (computer or other controller) and device (ATM-150) must have their addresses and terminating characters set up prior to use. To change these GPIB parameters, refer to the section in this manual on "Utility".

Each instrument on the GPIB interface bus must have unique INSTRUMENT address. The INSTRUMENT address range for the ATM-150 is 0 to 30 decimals. The GPIB Message Terminator is set to either EOI or EOI/LF. For EOI, the EOI line will be asserted when the last byte of a message is transmitted. For EOI/LF, the last byte of the message will be the line feed character, and the EOI line will be asserted with its transmission.

ATM-150 GPIB Interface Functions

The ATM-150 is configured as a talker/listener. No controller functions are implemented. As described in the IEEE-488 GPIB standards, the ATM-150 supports the following implementation:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SH1</td>
<td>Complete source handshake</td>
</tr>
<tr>
<td>AH1</td>
<td>Complete acceptor handshake</td>
</tr>
<tr>
<td>T6</td>
<td>Basic talker; serial poll, no talk only, unaddressed if addressed to listen, no extended talker</td>
</tr>
<tr>
<td>L4</td>
<td>Basic listener, no listen only, unaddressed if addressed to talk, no extended listener</td>
</tr>
<tr>
<td>SR1</td>
<td>Complete service request</td>
</tr>
<tr>
<td>RL1</td>
<td>Complete remote/ local capability including local lockout</td>
</tr>
<tr>
<td>PP0</td>
<td>No parallel poll capability</td>
</tr>
<tr>
<td>DC1</td>
<td>Complete device clear capability</td>
</tr>
<tr>
<td>DT0</td>
<td>No device trigger capability</td>
</tr>
<tr>
<td>C0</td>
<td>No controller capability</td>
</tr>
<tr>
<td>E2</td>
<td>Tri-state drivers used on D10 lines for maximum data transfer rate</td>
</tr>
</tbody>
</table>
GPIB Connector Pin-Outs

The ATM-150 uses the standard D-type 24-pin GPIB connector located on the rear panel. All signals and pins conform to standard GPIB pin-out protocol.

Programming GPIB Remote Commands

There are two types of remote commands for the ATM-150:

- set commands (or commands)
- queries commands (or queries).

The set commands force the ATM-150 to take a specific action. The query commands direct the ATM-150 to return status information. The controller sends commands to the ATM-150 as strings terminated by EOI or EOI/LF characters. These command lines can contain a single command or multiple commands. The command line may contain both queries and commands. Each individual command within the command line must be separated by semi-colons (;), parameters must be separated by commas (,). Hexadecimal parameters must be preceded by a 'X'.

Each query command sent to the ATM-150 will return one response. The response may contain multiple response units (separated by semi-colons), however only one EOI or EOI/LF character is sent by the ATM-150 to the controller for each query command. The responses for the ATM-150 commands will be either character mnemonics (Example: INT or EXT) or numerics (Example: 200.0). An appendix lists all queries and specifies the query response format the command will return. If the query returns a mnemonic, the valid mnemonics will be listed.

GPIB Numeric Responses

If the query responds with numeric, it will be specified as one of the following types:

| <NR1 Numeric> | decimal integer |
| <NR2 Numeric> | decimal real number without exponent |
| <NR3 Numeric> | decimal real number with exponent |
| <Non-decimal Numeric> | non-decimal number with leading 'X' (Hex), 'Q' (Octal), or 'B' (Binary) and always in the range 0 to 255 decimal |

An appendix defines all of the GPIB commands, along with a brief description of each command, the valid parameters, and the basic response format. The parameters shown within brackets '[]' following the command name are required.
GPIB Status Reporting

There is status reporting functionality provided for the GPIB interface, which is based on the service request (SRQ) and is fully defined in the ANSI/IEEE standard 488.2 - 1987. The implementation used by the ATM-150 for status reporting includes one additional register from what is specified within the IEEE-488.2 standard.

STATUS BYTE

There is a status byte which is used to determine the SRQ status. The individual bits within the status byte represent the different conditions which might cause the request for service, defined as follows:

<table>
<thead>
<tr>
<th>Bits 1 to 3</th>
<th>Unused</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit 4</td>
<td>(TSB) Test Event Status Bit</td>
</tr>
<tr>
<td></td>
<td>This is a summary of Test Status Event Status Byte. It will be set whenever an enabled Test event condition occurs</td>
</tr>
<tr>
<td>Bit 5</td>
<td>(MAV) Message Available Bit</td>
</tr>
<tr>
<td></td>
<td>Set whenever there is output available for the controller</td>
</tr>
<tr>
<td>Bit 6</td>
<td>(ESB) Standard Event Status Bit</td>
</tr>
<tr>
<td></td>
<td>This the summary of the Standard Event Status Byte. It will be set whenever an enabled standard event condition occurs</td>
</tr>
<tr>
<td>Bit 7</td>
<td>(MSS) Master Summary Status Bit</td>
</tr>
<tr>
<td></td>
<td>This is the Master Summary Status. It is a summary of the status byte, so that whenever one of the bits (TSB, MAV or ESB) is set and it is also enabled (by the Service Request Enable byte), the MSS bit will be set</td>
</tr>
<tr>
<td>Bit 8</td>
<td>Unused</td>
</tr>
</tbody>
</table>

SERVICE REQUEST ENABLE

The different conditions for a service request can be individually enabled. The Service Request Enable byte contains the enabling bits for the status byte. For a service request to occur, either the TSB, MAV or ESB bit must be enabled. Each time the ATM-150 is powered on, this byte is reset so that no bits are enabled. The bit definition is the same as the status byte, except bit 7 is undefined.

SRQ

The status byte is used to create a service request. Whenever a condition occurs in the ATM-150 which requires service from the controller, the SRQ (Service Request) line will be set. The SRQ will be reset after the controller finished a serial poll of the ATM-150 or when all of the service request conditions have stopped.
STANDARD EVENT STATUS REGISTER

The ESB bit is the summary of the Standard Event Status Register. This byte has an enabling byte which works in a similar manner to the above Status Byte. The individual bits within the Standard Event Status Register represent the different conditions which might cause a Standard Event. The bit definitions for the Standard Event Status Register are as follows:

<table>
<thead>
<tr>
<th>Bit</th>
<th>Operation Complete</th>
<th>Set under the following conditions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Operation Complete</td>
<td>Only set following an *OPC command</td>
</tr>
<tr>
<td>2</td>
<td>Request Control</td>
<td>Not used</td>
</tr>
<tr>
<td>3</td>
<td>Query Error</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• when output has been requested from the ATM-150 and none is available</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• when a command is sent to the ATM-150 and the ATM-150 still has a message available</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• when output has been requested from the ATM-150 and an unterminated command has been sent to the ATM-150</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit</th>
<th>Operation Complete</th>
<th>Set under the following conditions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Device Dependent Error</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• when input data is lost over the interface</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• when the input buffer overflows due to a too long command line without a terminator</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit</th>
<th>Operation Complete</th>
<th>Set under the following conditions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Execution Error</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• when a command parameter is out of range</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• when the command has too many or too few parameters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• when the command cannot be properly executed due to a device condition</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bit</th>
<th>Operation Complete</th>
<th>Set whenever the ATM-150 receives an unrecognized command, or invalid GPIB command</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Command Error</td>
<td>Set whenever the ATM-150 is powered on</td>
</tr>
<tr>
<td>7</td>
<td>User Request</td>
<td>Not used</td>
</tr>
<tr>
<td>8</td>
<td>Power On</td>
<td>Set whenever the ATM-150 is powered on</td>
</tr>
</tbody>
</table>

STANDARD EVENT STATUS ENABLE REGISTER

The different conditions within the Standard Event Status Register can be individually enabled and disabled. The Standard Event Status Register contains enabling bits. Each time one of the event conditions or one of the enabling bits change, the status of the ESB bit is re-evaluated. If any status bit is set and its corresponding enable bit is set, the ESB bit will be set. Each time the ATM-150 is powered on, this byte is reset so that no bits are enabled. The bit definition for the Standard Event Status Enable Register is the same as for the Standard Event Status Register.
TEST STATUS EVENT ENABLE REGISTER

The different conditions within the Test Status Event Register can be individually enabled and disabled. The Test Status Event Enable Register contains enabling bits. Each time one of the event conditions or one of the enabling bits change, the status of the TSB bit is re-evaluated. If any status bit is set and its corresponding enable bit is set, the TSB bit will set. Each time the ATM-150 is powered-on, this byte is reset so that no bits are enabled. The bit definition for the Test Status Event Enable Register is the same as for the Test Status Event Register.

GPIB Common Commands

The following commands are provided to use with the GPIB status reporting, as defined by IEEE-488.2 for service request:


Additional SRQ GPIB Commands

The following commands are provided to use with the Test Status SRQ feature:

TSE  TSE?  TSR?
IEEE-488.2 Programming Manual Requirements

Certain programming requirements are specified for GPIB interfaces by the American National Standard Institute (ANSI) document, ANSI/IEEE Std 488.2-1987, which are detailed in this section.

Power-on Settings

The ATM-150 will restore the device settings to their values from when it was last powered-off. There are no remote commands which will affect this. The only exception to this is when the non-volatile RAM becomes corrupted (which should never happen during normal unit operation). RAM corruption, if it occurs will be displayed on the unit’s LCD display. When this happens, the ATM-150 will revert to its factory default settings.

Message Exchange

The following message exchange options are as follows:

- The input buffer is command-line oriented. There will be a new input buffer for each command line, or program message. The input buffer has a maximum length of 80 characters
- The only remote command which will return more than one response message unit (responses separated by semi-colons) is as follows: *

All queries (commands) generate their response messages immediately when they are parsed. No queries are held until the responses are read for them to be generated.

- No commands are coupled.

Functional Elements

A list of the functional elements which are used by the ATM-150 is required by the IEEE-488.2 standard. These are the functional elements used in constructing the remote commands that control the ATM-150. For further details, refer to the IEEE-488.2 standard, sections 4.3, 7.1.1, and 7.3.3. From tables 4.2 and 4.3 of the standard, the ATM-150 performs the following:

- PROGRAM MESSAGE TERMINATOR
- PROGRAM MESSAGE TERMINATOR
- PROGRAM MESSAGE UNIT TERMINATOR
- PROGRAM MESSAGE UNIT TERMINATOR
- QUERY MESSAGE UNIT
- QUERY PROGRAM SEPARATOR
- PROGRAM HEADER SEPARATOR
- PROGRAM DATA
- DECIMAL NUMERIC PROGRAM DATA
- NON-DECIMAL NUMERIC PROGRAM DATA

* Compound Command Program Header and Compound Query Program Header are not handled.

H-6 11/18/94
Specific Command Implementation

Reset Command
The reset command "*rst" performs a device reset. As defined in the IEEE-488.2 standard, it will:

- Reset the device settings to default settings, with the exception of stored memory locations and any remote interface settings
- Macros are not implemented in the ATM-150, thus macros are ignored
- Force the ATM-150 into Operation Complete Command Idle State (OCIS) and Operation Complete Query Idle State (OQIS)

Self-Test Query
The scope of the self-test function is limited - it tests the basic ATM-150 functionality.

Overlapped vs. Sequential Commands
All commands are sequential commands.

Operation Complete Message
All command actions are immediate (no overlapped commands). Operation Complete is immediate.
Appendix I

Options and Accessories

The following are some of the accessories available with the ATM-150:

<table>
<thead>
<tr>
<th>Accessory Model Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ac-RM1</td>
<td>Rackmount adapter (TX or RX)</td>
</tr>
<tr>
<td>Ac-CC1</td>
<td>Soft carrying case (TX or RX)</td>
</tr>
<tr>
<td>Ac-SC1</td>
<td>Transit (hard) carrying case (TX or RX)</td>
</tr>
<tr>
<td>Ac-LPC</td>
<td>486/66 Laptop PC (call main sales office for features details and options)</td>
</tr>
<tr>
<td>Ac-BNSM</td>
<td>BNC (f) to SMA (m)</td>
</tr>
<tr>
<td>Ac-RS6</td>
<td>RS-232 cable, 6-ft. length, 25-pin, male-male</td>
</tr>
<tr>
<td>Ac-4886</td>
<td>IEEE-488 (GPIB) cable - 6-ft. length</td>
</tr>
<tr>
<td>Ac-SMSM</td>
<td>SMA to SMA, 3-foot</td>
</tr>
<tr>
<td>Ac-FC/ST</td>
<td>Optical cable - 3-meter jumper cable</td>
</tr>
<tr>
<td>Ac-FC/D4</td>
<td>Optical cable - 3-meter jumper cable</td>
</tr>
<tr>
<td>Ac-FC/FC</td>
<td>Optical cable - 3-meter jumper cable</td>
</tr>
<tr>
<td>Ac-50/50-xx*</td>
<td>1-to-2 Optical Splitter (1300 nm)</td>
</tr>
<tr>
<td>Ac-90/10-xx*</td>
<td>1-to-2 Optical Splitter (1300 nm)</td>
</tr>
<tr>
<td>Manuals</td>
<td>Order by Unit Model Number (Standard order includes one operating manual)</td>
</tr>
<tr>
<td></td>
<td>Optical patch cord - 3 meters, PC to FC</td>
</tr>
</tbody>
</table>

* Must specify optical connector - FC, ST or SC. Consult main sales office for other connector types.
## Glossary of Terms & Acronyms

<table>
<thead>
<tr>
<th>A</th>
<th>AAL</th>
<th>ATM Adaption Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>ABR</td>
<td>Available Bit Rate</td>
</tr>
<tr>
<td>A</td>
<td>AIS</td>
<td>Alarm Indication Signal</td>
</tr>
<tr>
<td>A</td>
<td>AL</td>
<td>Access Link</td>
</tr>
<tr>
<td>A</td>
<td>ANSI</td>
<td>American National Standards Institute</td>
</tr>
<tr>
<td>A</td>
<td>Asynchronous</td>
<td>Signals that are sourced from independent clocks. These signals generally have no relationship to each other and so have different frequencies and phase relationships.</td>
</tr>
<tr>
<td>A</td>
<td>ATM</td>
<td>Asynchronous Transfer Mode. A transfer mode in which the information is organized into cells. It is asynchronous in the sense that the recurrence of cells containing information from an individual user is not necessarily periodic.</td>
</tr>
<tr>
<td>B</td>
<td>BA</td>
<td>Buffer Allocation</td>
</tr>
<tr>
<td>B</td>
<td>BER</td>
<td>Bit Error Rate (ratio) of errors to bits</td>
</tr>
<tr>
<td>B</td>
<td>BIP</td>
<td>Bit Interleaved Parity</td>
</tr>
<tr>
<td>B</td>
<td>B-ISDN</td>
<td>Broadband (aspects of) Integrated Services Digital Network</td>
</tr>
<tr>
<td>B</td>
<td>BOM</td>
<td>Beginning of Message</td>
</tr>
<tr>
<td>B</td>
<td>BT</td>
<td>Burst Tolerance</td>
</tr>
<tr>
<td>C</td>
<td>CC</td>
<td>Call Control</td>
</tr>
<tr>
<td>C</td>
<td>CC/TT</td>
<td>International Telegraph and Telephone Consultative Committee</td>
</tr>
<tr>
<td>C</td>
<td>CBR</td>
<td>Constant Bit Rate</td>
</tr>
<tr>
<td>C</td>
<td>CDV</td>
<td>Cell Delay Variation</td>
</tr>
<tr>
<td>C</td>
<td>CE</td>
<td>Connection Element</td>
</tr>
<tr>
<td>C</td>
<td>Cell transfer delay</td>
<td>The transit delay of an ATM cell successfully passed between two designated boundaries.</td>
</tr>
<tr>
<td>C</td>
<td>CEP</td>
<td>Connection End Point</td>
</tr>
<tr>
<td>C</td>
<td>CI</td>
<td>Continuation Indicator</td>
</tr>
<tr>
<td>C</td>
<td>CIR</td>
<td>Cell Insertion Ratio</td>
</tr>
<tr>
<td>C</td>
<td>CLP</td>
<td>Cell Loss Priority (as in CLP bit)</td>
</tr>
<tr>
<td>C</td>
<td>CLR</td>
<td>Cell Loss Ratio</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>CL</td>
<td>Connectionless Service</td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>Connection-Oriented Service</td>
<td></td>
</tr>
<tr>
<td>COM</td>
<td>Continuation of Message</td>
<td></td>
</tr>
<tr>
<td>CPCS</td>
<td>Common Part Convergence Sublayer</td>
<td></td>
</tr>
<tr>
<td>CPE</td>
<td>Customer Premises Equipment</td>
<td></td>
</tr>
<tr>
<td>CPN</td>
<td>Customer Premises Network</td>
<td></td>
</tr>
<tr>
<td>CRC</td>
<td>Cyclic Redundancy Check</td>
<td></td>
</tr>
<tr>
<td>CRF</td>
<td>Connection-Related Function</td>
<td></td>
</tr>
<tr>
<td>CS</td>
<td>Convergence Sublayer</td>
<td></td>
</tr>
<tr>
<td>DCC</td>
<td>Data Communications Channel</td>
<td></td>
</tr>
<tr>
<td>DS1</td>
<td>Digital Signal Level 1 (1.544 Mbps)</td>
<td></td>
</tr>
<tr>
<td>DS3</td>
<td>Digital Signal Level 3 (44.736 Mbps)</td>
<td></td>
</tr>
<tr>
<td>DXI</td>
<td>Data Exchange Interface</td>
<td></td>
</tr>
<tr>
<td>EOM</td>
<td>End of Message</td>
<td></td>
</tr>
<tr>
<td>ESF</td>
<td>Extended Superframe</td>
<td></td>
</tr>
<tr>
<td>ET</td>
<td>Exchange Termination</td>
<td></td>
</tr>
<tr>
<td>FEBE</td>
<td>Far-End Block Error</td>
<td></td>
</tr>
<tr>
<td>FERF</td>
<td>Far-End Receive Failure</td>
<td></td>
</tr>
<tr>
<td>GFC</td>
<td>Generic Flow Control</td>
<td></td>
</tr>
<tr>
<td>HEC</td>
<td>Header Error Control</td>
<td></td>
</tr>
<tr>
<td>histogram</td>
<td>An imaging term. A display plotting the density of values in an image</td>
<td></td>
</tr>
<tr>
<td>HLF</td>
<td>Higher Layer Functions</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>Isochronous Signals which are dependent on some uniform timing or carry their own timing information embedded as part of the signal.</td>
<td></td>
</tr>
<tr>
<td>IWU</td>
<td>Interworking Unit</td>
<td></td>
</tr>
<tr>
<td>LAN</td>
<td>Local Area Network</td>
<td></td>
</tr>
<tr>
<td>LCD</td>
<td>Liquid Crystal Display</td>
<td></td>
</tr>
<tr>
<td>LE</td>
<td>Local Exchange</td>
<td></td>
</tr>
</tbody>
</table>

Glossary-2 12/15/94
<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED</td>
<td>Light Emitting Diode</td>
</tr>
<tr>
<td>LFC</td>
<td>Local Functional Capabilities</td>
</tr>
<tr>
<td>LOF</td>
<td>Loss of Frame</td>
</tr>
<tr>
<td>LOP</td>
<td>Loss of Pointer</td>
</tr>
<tr>
<td>LOS</td>
<td>Loss of Signal</td>
</tr>
<tr>
<td>LT</td>
<td>Line Termination</td>
</tr>
<tr>
<td>MID</td>
<td>Message Identifier</td>
</tr>
<tr>
<td>MSB</td>
<td>Most Significant Bit</td>
</tr>
<tr>
<td>MSP</td>
<td>Maintenance Service Provider</td>
</tr>
<tr>
<td>NNI</td>
<td>Network-Network Interface; Network Node Interface</td>
</tr>
<tr>
<td>NS</td>
<td>Network Supervision</td>
</tr>
<tr>
<td>NT</td>
<td>Network Termination</td>
</tr>
<tr>
<td>OAM</td>
<td>Operation and Maintenance</td>
</tr>
<tr>
<td>OC-1</td>
<td>Optical Carrier Level 1 (optical 51.84 Mbps)</td>
</tr>
<tr>
<td>OC-3</td>
<td>Optical Carrier Level 3 (optical 155.52 Mbps)</td>
</tr>
<tr>
<td>OC-12</td>
<td>Optical Carrier Level 12 (optical 622.08 Mbps)</td>
</tr>
<tr>
<td>OOF</td>
<td>Out of Frame</td>
</tr>
<tr>
<td>OSI</td>
<td>Open Systems Interconnection</td>
</tr>
<tr>
<td>PCI</td>
<td>Protocol Control Information</td>
</tr>
<tr>
<td>PCR</td>
<td>Peak Cell Rate</td>
</tr>
<tr>
<td>PDU</td>
<td>Protocol Data Unit</td>
</tr>
<tr>
<td>PHY</td>
<td>Physical Layer</td>
</tr>
<tr>
<td>PL</td>
<td>Payload Length</td>
</tr>
<tr>
<td>PLCP</td>
<td>Physical Layer Convergence Procedure</td>
</tr>
<tr>
<td>PMD</td>
<td>Physical Medium Dependent (layer)</td>
</tr>
<tr>
<td>POH</td>
<td>Path Overhead</td>
</tr>
<tr>
<td>POI</td>
<td>Path Overhead Indicator</td>
</tr>
<tr>
<td>PRM</td>
<td>Protocol Reference Model</td>
</tr>
<tr>
<td>PRBS</td>
<td>Pseudo-Random Bit Sequence</td>
</tr>
<tr>
<td>Protocol</td>
<td>A set of rules and formats (semantic and syntactic) that determines the communication behavior of layer entities in the performance of the layer functions.</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>PS</td>
<td>Protection Switching</td>
</tr>
<tr>
<td>PT</td>
<td>Payload Type</td>
</tr>
<tr>
<td>PTE</td>
<td>Path Terminating Equipment</td>
</tr>
<tr>
<td>PTI</td>
<td>Payload Type Identifier</td>
</tr>
<tr>
<td>PVC</td>
<td>Permanent Virtual Connection</td>
</tr>
<tr>
<td>QoS</td>
<td>Quality of Service</td>
</tr>
<tr>
<td>R</td>
<td>Remote</td>
</tr>
<tr>
<td>RMI</td>
<td>Rackmount Interface</td>
</tr>
<tr>
<td>Rx</td>
<td>Receiver or Receive</td>
</tr>
<tr>
<td>S</td>
<td>Signaling ATM Adaptation Layer</td>
</tr>
<tr>
<td>SAR</td>
<td>Segmentation and Re-assembly (layer)</td>
</tr>
<tr>
<td>SAP</td>
<td>Service Access Point</td>
</tr>
<tr>
<td>SDH</td>
<td>Synchronous Digital Hierarchy</td>
</tr>
<tr>
<td>SDU</td>
<td>Service Data Unit</td>
</tr>
<tr>
<td>SEF</td>
<td>Severely-Errored Frame</td>
</tr>
<tr>
<td>SEP</td>
<td>Signalling Endpoint</td>
</tr>
<tr>
<td>SES</td>
<td>Severely-Errored Second</td>
</tr>
<tr>
<td>SF</td>
<td>Superframe</td>
</tr>
<tr>
<td>SOH</td>
<td>Section Overhead</td>
</tr>
<tr>
<td>SONET</td>
<td>Synchronous Optical Network</td>
</tr>
<tr>
<td>SP</td>
<td>Service Provider</td>
</tr>
<tr>
<td>SPE</td>
<td>Synchronous Payload Envelope</td>
</tr>
<tr>
<td>SPN</td>
<td>Subscriber Premises Network</td>
</tr>
<tr>
<td>STM-1, -4, -4c, -N</td>
<td>Synchronous Transport Module (STM-1, -4, -4c, -N)</td>
</tr>
<tr>
<td>STS-1</td>
<td>Synchronous Transport Signal Level 1 (51.84 Mbps line)</td>
</tr>
<tr>
<td>STS-3</td>
<td>Synchronous Transport Signal Level 3 (155.52 Mbps line)</td>
</tr>
<tr>
<td>STS-3c</td>
<td>Synchronous Transport Signal Level 3 concatenated (155.52 Mbps line)</td>
</tr>
<tr>
<td>SVC</td>
<td>Signalling Virtual Channel; or Switched Virtual Circuit</td>
</tr>
<tr>
<td>Synchronous</td>
<td>Signals that are sourced from the same timing reference. These have the same frequency.</td>
</tr>
<tr>
<td>TOH</td>
<td>Transport Overhead</td>
</tr>
<tr>
<td>- U -</td>
<td>- U -</td>
</tr>
<tr>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>UNI</td>
<td>User to Network Interface</td>
</tr>
<tr>
<td>- V -</td>
<td>- V -</td>
</tr>
<tr>
<td>VBR</td>
<td>Variable Bit Rate</td>
</tr>
<tr>
<td>VC</td>
<td>Virtual Channel (not circuit). A communication channel that provides for the sequential unidirectional transport of ATM cells.</td>
</tr>
<tr>
<td>VCC</td>
<td>Virtual Channel Connection</td>
</tr>
<tr>
<td>VCI</td>
<td>Virtual Channel Identifier</td>
</tr>
<tr>
<td>VCL</td>
<td>Virtual Channel Link</td>
</tr>
<tr>
<td>VP</td>
<td>Virtual Path</td>
</tr>
<tr>
<td>VPC</td>
<td>Virtual Path Connection</td>
</tr>
<tr>
<td>VPI</td>
<td>Virtual Path Identifier</td>
</tr>
<tr>
<td>VPL</td>
<td>Virtual Path Link</td>
</tr>
<tr>
<td>VPT</td>
<td>Virtual Path Terminator</td>
</tr>
<tr>
<td>- X -</td>
<td>- X -</td>
</tr>
<tr>
<td>XC</td>
<td>Cross-connect</td>
</tr>
</tbody>
</table>
ATM- 150 Index

100 Mbps, 1-1, 3-32
1PPS, 3-11, 3-32

-A-
AAL (ATM Adaptation Layer), A-1
ABR (Available Bit Rate), 4-3
Active cells, 4-6, 3-15
AIS (Alarm Indication Signal), 3-20
Analyzer, 1-2, 3-3, 2-9
   Analyzer Inputs, 3-4
   Analyzer Softkeys, 3-22
   Analyzer SYNC, 3-32
ATM
   ATM Basics, A-1
   ATM Cell Structure, A-3
   ATM Errors, 3-21
Attenuator, 2-3, 3-4

-B-
Bandwidth Control, 3-18, 2-8
BER (Bit Error Rate), 1-2
Block Diagram, D-1
Burst, 1-1, 3-15 to 3-18

-C-
Calibrate 3-30
Cal Prop, 3-30
CBR (Constant Bit Rate), 1-1, 4-3
CDV (Cell Delay Variation), 4-4
Cell
  Cell Delay, 3-29
  Cell Distribution, 3-15, 2-7
  Cell Error Ratio, 4-1
  Cell transfer delay, 4-1, 3-29
CLP (Cell Loss Priority), A-4, 3-14, 3-28, 2-5
CLR (Cell Loss Ratio), 1-2, 4-1
Constant Distribution, 1-1, 3-15, 3-16
Contrast, 2-12, 3-6, 3-8
Cross Network Testing, 4-2
Custom File Transfer, 3-15, 2-7

-D-
Default Settings, C-1, 3-6, 3-7
Distributions
  Constant Distribution, 1-1, 3-15, 3-16
  Uniform distribution, 1-1, 4-4, 3-15, 3-16
  Gaussian Distribution, 1-1, 4-4, 3-15, 3-17
  Poisson Distribution, 1-1, 4-4, 3-15, 3-17
  Ramp distribution, 4-4, 3-15, 3-18
  Statistical distributions, 4-4
DS1, 1-1, 3-5, 3-11
  transmitter & receiver circuitry, 2-4, 2-9, 3-10, 3-24
DS3, 1-1, 3-4, 3-5, 3-10
  transmitter & receiver circuitry, 2-4, 2-9, 3-10, 3-24
DSP (Digital Signal Processor), 1-2
-E-
E1, 1-1, 3-5, 3-12
  transmitter & receiver circuitry, 2-4, 2-9, 3-10, 3-24
E3, 1-1, 3-5, 3-12,
  transmitter & receiver circuitry, 2-4, 2-9, 3-10, 3-24
Enter key, 2-2, 3-2
-F-
Factory Default, 3-6, C-1
FEBE (Far-End Block Error), 3-19
FERF (Far-End Receive Failure), 3-19
Flexibility (ATM Basics), A-2
Floppy drive, 3-8
Framing, 3-11, 3-25
Frequency (bandwidth control), 3-18
Front Panel, 1-3, 3-2
Front panel, diagram, 1-3, 3-1
Functional Description of ATM-150, 1-1
Fuse, 3-32, vii

-G-
Gaussian Distribution, 1-1, 4-6, 3-15, 3-17
Generator, 1-1, 3-3, 2-4
Generator Output, 3-4
Generator Softkeys, 3-9
Generator SYNC, 3-32
Getting Started, 2-1
GFC (Generic Flow Control), A-3, 3-14
GPIB Interface, 3-6, H-1, 2-12
Granularity (ATM Basics), A-2

-H-
Header Control, 3-14, 2-5
Header generation, active, 3-14, 2-6
Header parameters, 3-14
HEC (Header Error Control), 1-2, 3-11, A-4
Histogram, 1-1, 3-23, 4-12

-I-
Idle cells, 4-6
Instrument Test, 2-13
-L-
Laser Safety, vii, viii
Load Testing, 4-5
LOF (Loss of Frame), 3-19
Loopback, 3-25, 2-9
LOS (Loss of Signal), 3-19

-M-
Monitor
  Monitor control, 3-21, 3-8
  Monitor mode, 3-10
  Monitor reset, 3-10
  Monitor settings, 3-6, 3-8

-N-
NNI (Network-Network Interface), A-5, 3-11

-O-
OC-3c, 1-1, 3-13, 3-27
Operating Basics, 2-1
Options, I-1
Output Results Control, 3-31

-P-
Parity, 3-19
Percentage (bandwidth control), 3-18
Physical Alarms, 3-19
PLCP (Phy. Layer Convergence Proc.), 1-2, 3-10
Pointer justification, 3-13
Poisson Distribution, 1-1, 4-6, 3-15, 3-17
Propagation Calibration, 3-30
PT (Payload Type), A-4
PTI (Payload Type Identifier), 3-14
-Q-
QoS (Quality of Service), 1-1, 4-1
Quick Setup, Store & Recall, 3-9
Quick Start, 2-3

-R-
Ramp distribution, 4-4, 3-15, 3-18
Randomize, 2-6, 3-14, 4-3
Rear Panel, 1-4, 3-32
  Rear panel, diagram, 1-4, 3-32
Remote Commands, E-1
Remote Interface, 3-6, 3-8
Result screen, 3-22, 2-11
Results control, 3-31
RS-232 Interface, 2-12, G-1, 3-6, 3-7

-S-
Safety Practices, vii
Scalability (ATM Basics), A-1
Service Information/Warranty, F-1
Setup
  Generator, 3-11
  Analyzer, 3-24
Softkeys, 2-1, 3-2, 3-22
SONET Pointer, 3-13
SONET, 1-2
Specifications, B-1
Statistical distributions, 4-4
STM-1, 1-1, 3-13, 3-28
System Performance Verification, 2-13
T-
Test Cell, 3-28, 2-10
Test Mode, 3-23
Time/Date, 3-6, 3-8
Traffic Emulation, 4-3
Transparency (ATM Basics), A-1

U-
UNI (User to Network Interface), A-5, 3-10
Uniform distribution, 1-1, 4-4, 3-15, 3-16
Utility, 3-6, 2-12

V-
VBR (Variable Bit Rate), 1-1, 4-7
VCI (Virtual Channel Identifier), 1-2, A-3
VCI/VPI, 3-14
VPI (Virtual Path Identifier), 1-2, A-3