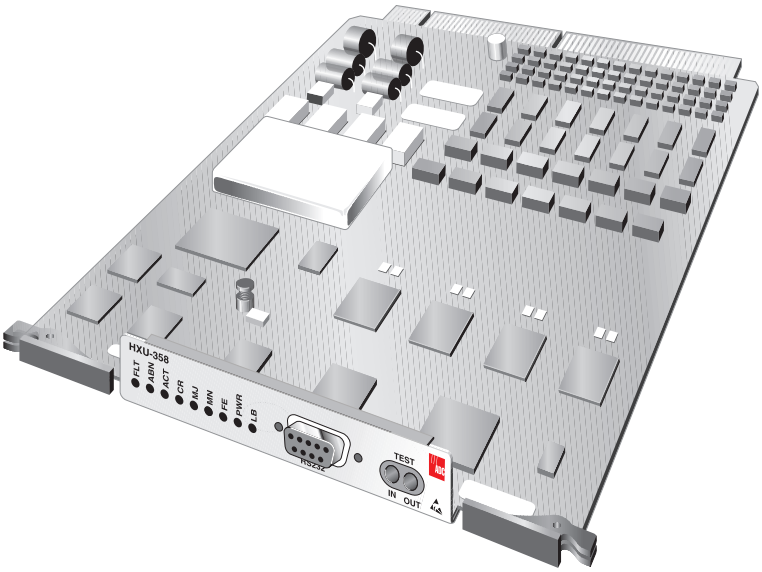
HiGain

TECHNICAL PRACTICE



HXU-358 V1.04 MULTIPLEXER UNIT

PRODUCT CATALOG: HXU-358 V1.04

PART NUMBER: 1154681

CLEI: VAPHCDDD

Revision History of This Practice

Issue	Release Date	Revisions Made
1	April 6, 2001	Initial release.

USING THIS TECHNICAL PRACTICE

Identified by icons, three types of messages appear in the text:

Notes contain information about special circumstances.

Caution symbols indicate the possibility of personal injury or equipment damage.

The Electrostatic Discharge (ESD) symbol indicates that a device or assembly is susceptible to damage from electrostatic discharge.

For a list of abbreviations used in this document, refer to "Appendix D - Service and Support" on page 59.

UNPACK AND INSPECT YOUR SHIPMENT

Upon receipt of the equipment:

1 Unpack the container and inspect the product for signs of damage. If the equipment has been damaged in transit, immediately report the extent of the damage to the transportation company and to your sales representative. When storing the equipment for a prolonged period, use the original container.

2 Verify the contents using the packing list to ensure complete and accurate shipment.

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OVERVIEW

The HiGain® Multiplexer Unit, HXU-358 V1.04, is the multiplexing component of the Soneplex® Wideband 3190 system. It can also be installed in the HiGain Access Concentrator Express (ACE) chassis, a single-rack enclosure (see "Appendix B - HXU-358 Installation for ACE Chassis" on page 53 for more information). The HXU-358 multiplexes 28 DS1 lines into a single Digital Signal, level 3 (DS3) interface at a signal rate of 44.736 Mbps.

The Wideband 3190 typically incorporates two HXU-358s, one board functioning as the active board, the other as a standby. This redundancy provides backup protection. In the event of a failure, the active relinquishes control to the standby HXU-358 within 50 ms.

FEATURES

- Complete software provisioning
- Advanced management using Terminal Access Option (TAO) or Transaction Language 1 (TL1) software through an HMU-319
- Advanced internal test head functionality for DS1/E1 line testing and fault sectionalization
- Digital Acess Cross-connect (DACs) switching at the DS1/E1 level
- Software-selectable DS3 local and network loopback
- DS1 line code and loopback options
- Downloadable software
- Automatic and manual protection switching
- Password protection
- Internal and external diagnostics testing
- Dry contact alarm relay
- Office alarms (Major, Minor, Far-End, Critical)
- Front-panel status indicators
- Support for T1 and E1 line interfaces

- Digital Access Cross-connect Switching (DACS)
- Front-panel test jacks for external test access as well as a backplane test interface
- Front-panel RS-232 craft port for direct connection to a maintenance terminal
- Support for an external fail-safe alarm

COMPATIBILITY

The HXU-358 is compatible with Wideband 3190 (HMS-357 and HMS-358) managed shelves as well as HiGain ACE chassis, single-rack enclosures.

If you are installing an HXU-358 in a Wideband 3190 or ACE chassis that has a different multiplexer model, contact Customer Service (see "Appendix D - Service and Support" on page 59). Do not mix multiplexers in a system.

Do not mix multiplexers of differing software revision levels unless specifically directed, doing so activates a software mismatch alarm. This alarm indicates that software versions are incompatible for long-term operation. Transfer of configuration information is performed.

APPLICATION

The HXU-358 allows you to combine up to 28 T1 lines or up to 21 E1 line into one high speed DS3 interface, thus providing a substantial cost savings over transporting 28 individual HDSL/DS-1 lines through a carrier's network.

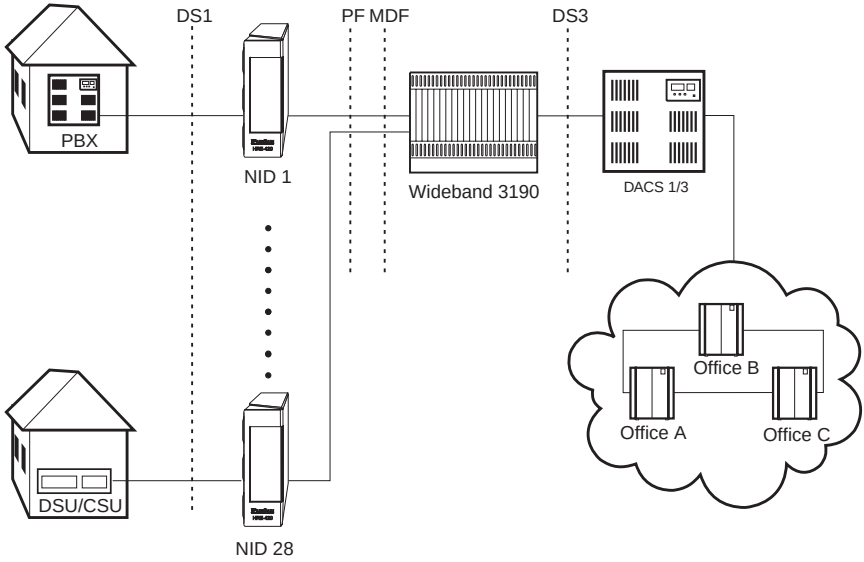


Figure 1. *System Overview*

FRONT PANEL

Figure 2 shows the front panel of the HXU-358 multiplexer.

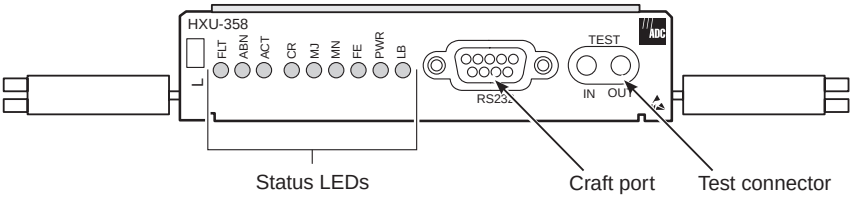


Figure 2. *HXU-358 V1.04 Front Panel*

Table 1. *HXU-358 V1.04 Front Panel Description*

Front-Panel Feature	Function
Status LEDs	
CR	Critical alarm (red)
MJ	Major alarm (red)
MN	Minor alarm (yellow)
FE	Far-End alarm (yellow)
PWR	Power on (green)
LB	Loopback operation (yellow)
FAULT	Fault indication (red)
ABNORMAL	Abnormal indication (yellow)
ACTIVE	Active indication (green)
Craft port	RS-232 connector for serial communications with a maintenance terminal.
Test connector	Provides a test access interface.

Figure 3 displays the appearance of HXU-358s after they are installed in a Wideband 3190 or ACE. (The designation of active and standby is not determined by physical location.) For installation information see "HXU-358 Installation for Wideband 3190 or ACE Systems" on page 6.

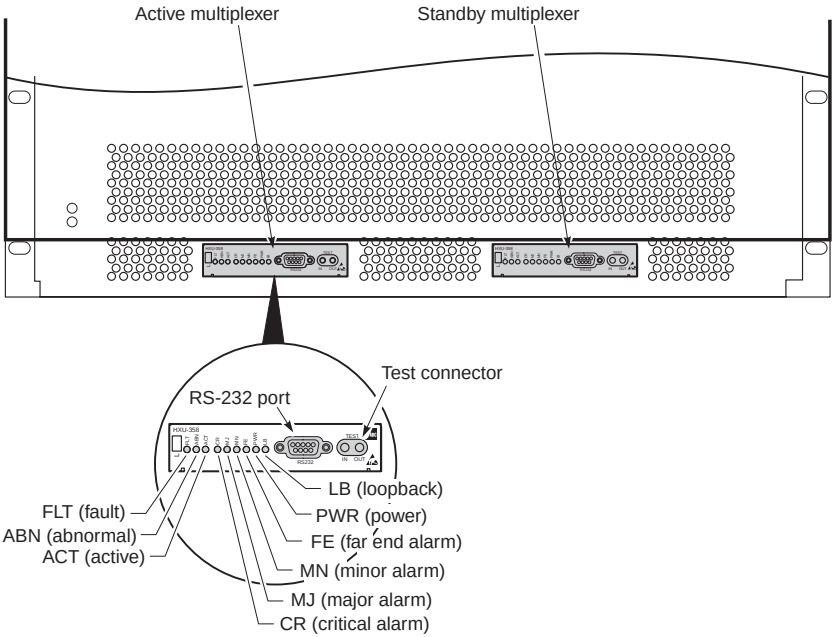


Figure 3. *HXU-358 Installed in a Wideband 3190*

HXU-358 INSTALLATION FOR WIDEBAND 3190 OR ACE SYSTEMS

The following sections document HXU-358 installation procedures for Wideband 3190 (HMS-357 and HMS-358) and ACE (ACE-Com, List 1) systems.

Before installing the HXU-358, visually check its packaging to ensure that it has sustained no shipping damage. Immediately report any damage to the shipping agent.

The HXU-358 multiplexer card can be damaged by electrostatic discharge (ESD).

- **Always wear an antistatic wrist strap connected to equipment ground when handling the card. (The Wideband 3190 provides an ESD strap input above the HMU slot and on the chassis backplane.)**
- **When working with the HXU-358, place it on an electrically grounded antistatic mat.**
- **Properly store in antistatic packing material any HXU-358 that is removed from the Wideband 3190.**

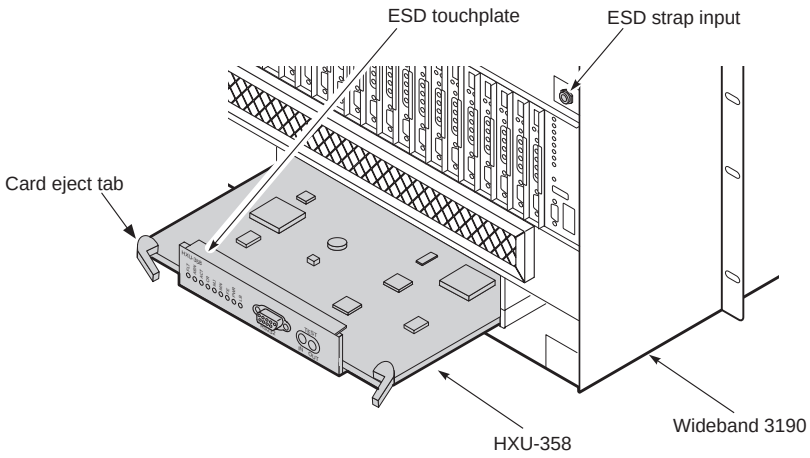


Figure 4. *Installing an HXU-358 Multiplexer Card*

If you are installing an HXU-358 in a Wideband 3190 that has a legacy multiplexer (HXU-357), contact Customer Service. A mixed system is not allowed.

HXU-358 multiplexer cards are installed in the front of the Wideband 3190 or ACE chassis.

1 Unscrew the two hold-down lugs on each side of the chassis front cover. The cover folds down.

2 Connect your ESD wrist strap to the ESD strap input above the HiGain Management Unit (HMU) slot or above multiplexer slot A in the ACE.

An ESD touchplate is integrated on top of the card's front panel for added anti-static protection.

3 Align the edges of the replacement card with the slot guides in the multiplexer tray.

4 Grasping the card eject tabs, gently push the card into the bay.

5 Firmly press in on the tabs until the card snaps into place.

When the card snaps into place, power is supplied to the unit and the LEDs flash momentarily. The PWR LED and ACTIVE LED on the active multiplexer remain illuminated. The LEDs on the inactive (standby) multiplexer should be off, except for the PWR LED.

If you are replacing a HiGain Multiplexer Unit (HXU) in a working system, the standby replacement HXU-358 is automatically configured for that system by the active HXU-358 in the shelf.

PROVISIONING

Using Terminal Access Option (TAO) management software, the HMU-319 configures and manages the HXU-358.

Refer to the Wideband 3190 installation guide and the technical practice for the HMU-319 for complete information about connecting a maintenance terminal.

For installation in ACE chassis, see "Appendix B - HXU-358 Installation for ACE Chassis" on page 53.

Also, refer to your Central Office (CO) system plans for provisioning details.

ACCESSING THE MANAGEMENT INTERFACE

The HiGain Management Unit interface presents the user with an interactive, text-based, menu-driven interface that configures, monitors, and controls a Wideband 3190 and all the components that it comprises. By connecting a local or remote maintenance terminal to the HMU-319, you gain access to the craft port user interface which displays menus and prompts to guide you through a provisioning process. This process involves:

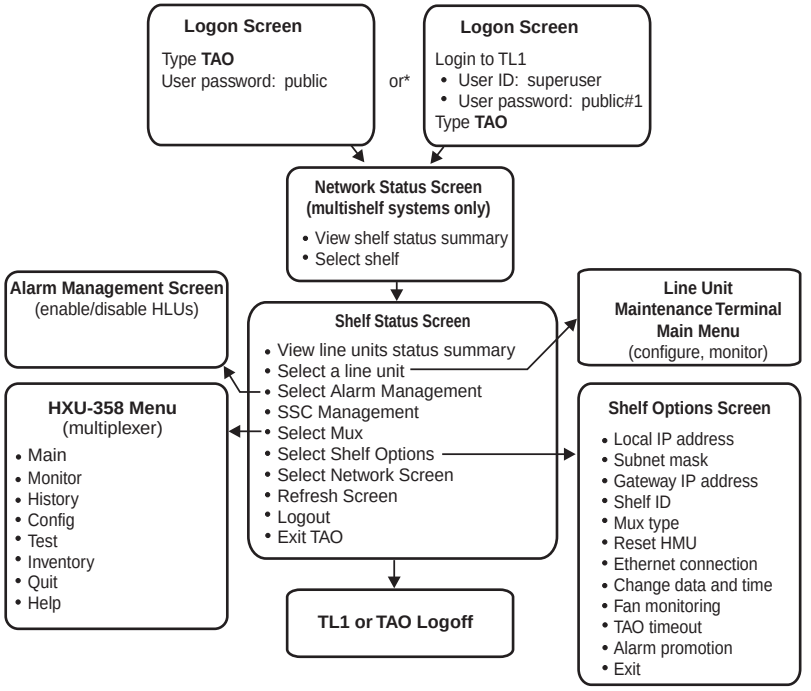
- Logging On To the System through the HMU (see page 10)
- Selecting a Shelf (see page 11)
- Configuring the HMU to Access the HXU-358 (see page 11)
- Accessing HXU-358 (see page 12)

Figure 5 on page 10 shows the general structure of the TAO software. It provides access to the HLU maintenance terminal screens and to the HXU-358 software interface.

If you would like more information about the HMU, refer to the technical practice for the HMU-319 or the Provisioning Reference section of the Wideband 3190 Installation Guide.

Logging On To the System through the HMU

Figure 5 shows an overview of the Management Interface. Briefly review this figure before logging on to the system.



* Depending upon your configuration, the logon screen will be one of the two variable listed here. Please refer to the HMU-319 technical practice for more information.

Figure 5. *Management Interface*

Once the maintenance terminal is connected to the HMU and a banner (headline) appears on the screen.

Depending on your HMU and system configuration, the logon procedure starts with either entering TAO at the prompt or requires you to logon to TL1. Refer to Figure 5 for more details.

To log into TL1 mode:

1 Press ENTER.

2 When the `Enter TID` field appears to the left of the cursor, press ENTER.

3 Type **`superuser`** in the `Enter Username` field, then press ENTER.

4 Type **`public#1`** in the `Enter Password` field, then press ENTER.

Public#1 is the factory default password. It may be changed through normal TL1 commands. Multiple user names, passwords and security levels are provided through TL1.

To log on to the management interface:

1 Type **`tao`** at the `<` prompt, then press ENTER. This opens the Terminal Access Option (TAO) interface.

2 Type **`public`** in the `Password` field, then press ENTER.

Selecting a Shelf

3 Type the number of the desired shelf ID (1 through 32, for multishelf configurations) then press ENTER.

Configuring the HMU to Access the HXU-358

4 Type O to select **Shelf Options**.

5 Type **E** to select **Mux Type**, and then type **2** to select the HXU-358. You will not need to enter an IP address for the HXU-358.

6 Type **X** to exit the Shelf Options screen, and then type **Y** confirm.

Accessing HXU-358

7 From the Shelf Status screen, select **M** to log onto the HXU-358. The logon menu tree for the HXU-358 interface appears. (Figure 6 on page 12.)

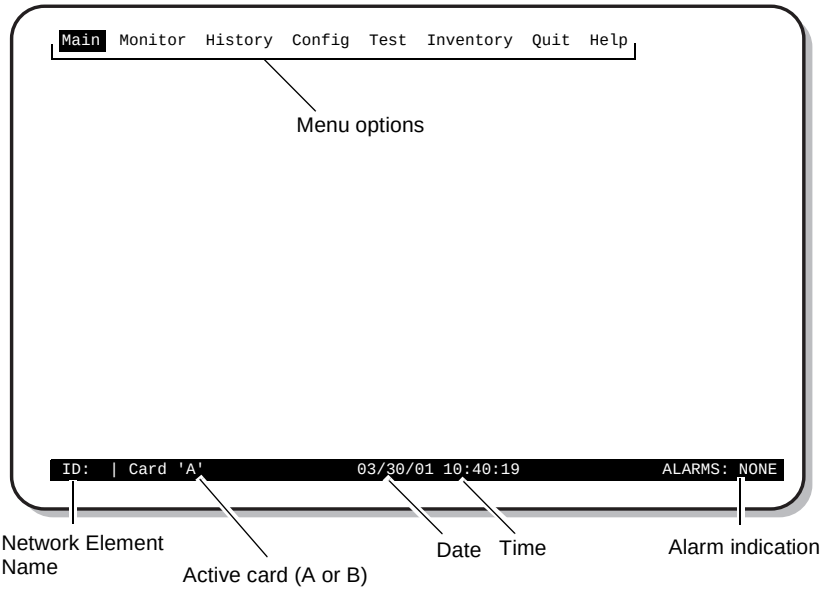


Figure 6. *HXU-358 Main Menu*

The HXU-358 Main Menu provides the following menu options:

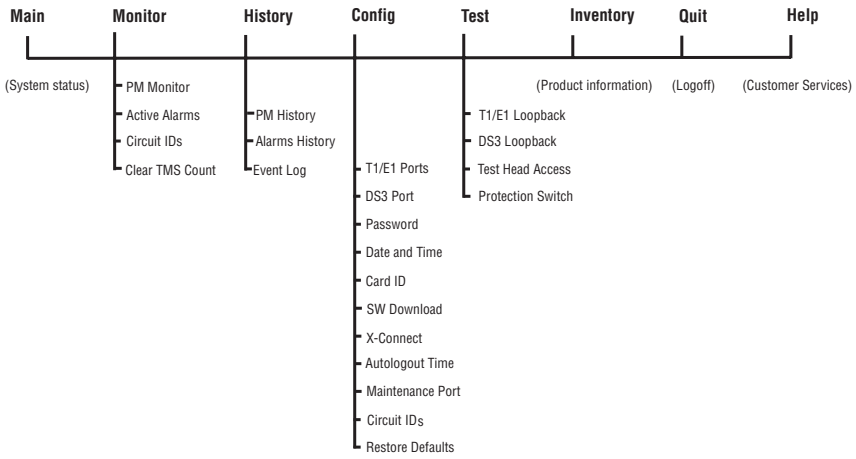


Figure 7. *HXU-358 Menu Tree*

The HXU-358 menus can be navigated by using the arrow (←, ↑, →, and ↓), SPACEBAR, and ENTER keys. The ENTER key returns you to the previous screen.

Press **ENTER** to view the T1/E1 port status screen (Figure 8).

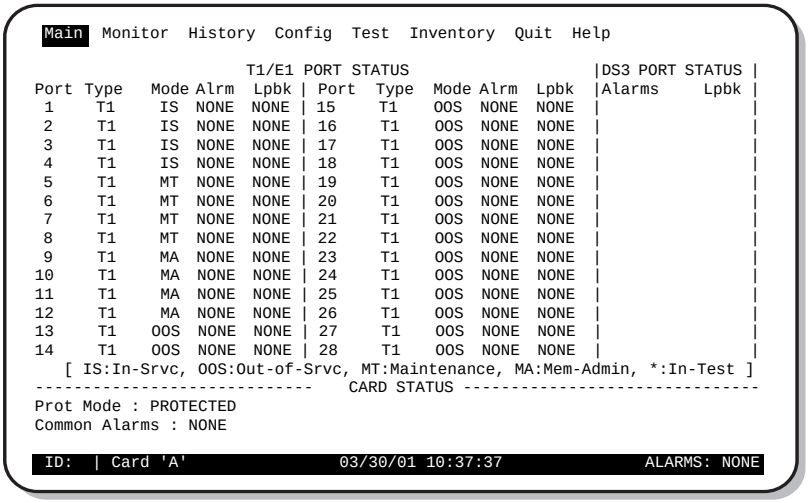


Figure 8. *Main Menu: T1/E1 Port Status*

Press **ESC** to return to the Main menu. Use the (←, ↑, →, and ↓) keys to select the menu options.

Table 2. *HXU-358 Main Menu Options*

Menu Name	Select This Menu to:
Monitor	View monitoring error data at the T1/E1 ports and the DS3 port, view alarm history, and clear the Too Many Switches (TMS) count.
History	View 24-hour and 7-day performance monitoring histories at the T1/E1 ports and the DS3 port. Also, provides an Alarm History screen and an Event Log.
Config	Configure the T1/E1 ports, the DS3 port, change the password, change the date and time, change the card ID number, initiate a software download, set up a cross-connect or restore the factory default settings.
Test	Initiate an T1/E1 or DS3 loopback or perform a protection switch to the standby multiplexer. Enter the Internal Test Head functionality.
Inventory	View HXU product information.
Quit	Exit the HXU-358 interface.
Help	View customer service information.

Minimal configuration tasks for the HXU-358 include:

- Setting the date and time
- Entering the system name
- Configuring the DS3 interface
- Configuring the T1/E1 ports

System name is not the same as the TL1 TID.

SETTING DATE AND TIME (FOR ACE CHASSIS INSTALLATION ONLY)

The following procedure is intended for HXU-358 installation in an ACE chassis. If you are installing the HXU-358 in a Wideband 3190, this setting is automatically registered by the HMU; proceed to "Entering System Name" on page 17.

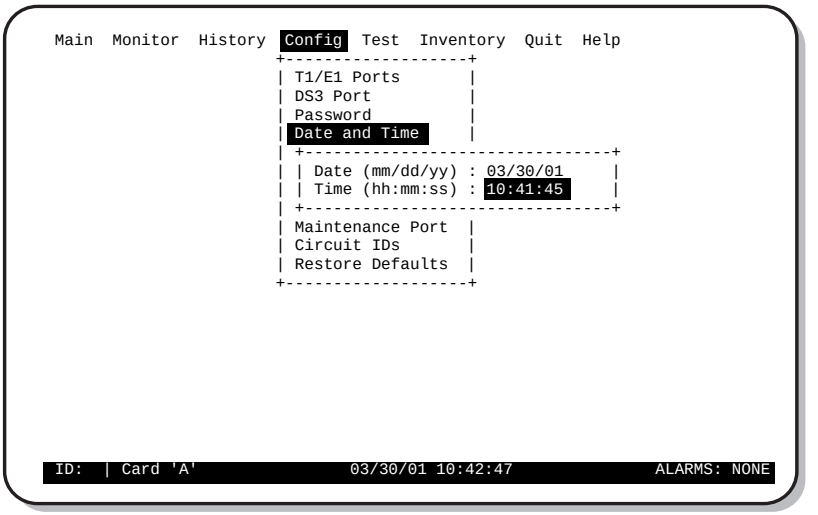


Figure 9. *Config Menu: Date and Time*

1. From the Main menu, use the → key to select the **Config** menu, and then press ENTER.
2. Choose **Date and Time**, enter the correct information, and then press ENTER.
3. Press ESC to return to the Main menu. Use the (←, ↑, →, and ↓) keys to select the menu options.

ENTERING SYSTEM NAME

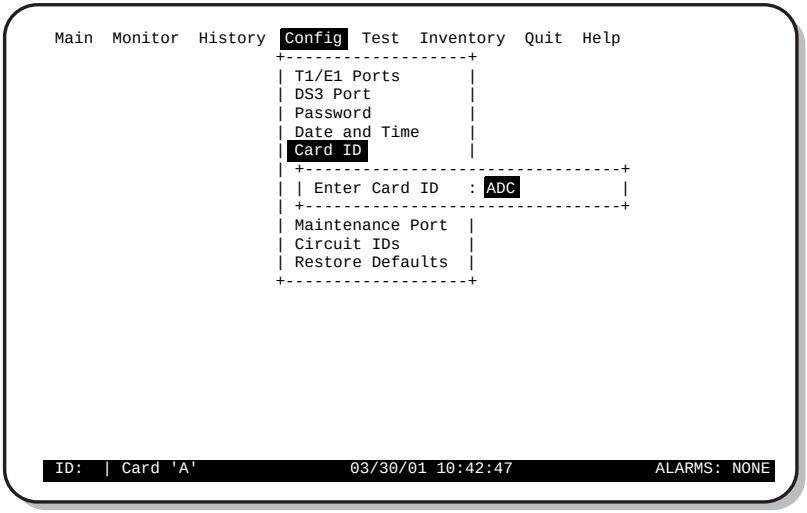


Figure 10. *Config Menu: Card ID*

1. Select **Card ID** from the Config Menu and then press ENTER.
2. Type the system name (up to 9 alphanumeric characters) after **Enter Card ID** and then press ENTER.

This card's ID will be used in all menus to identify this card. Card ID is not the same as TID. TID is assigned through the HMU.

CONFIGURING THE DS3 PORT

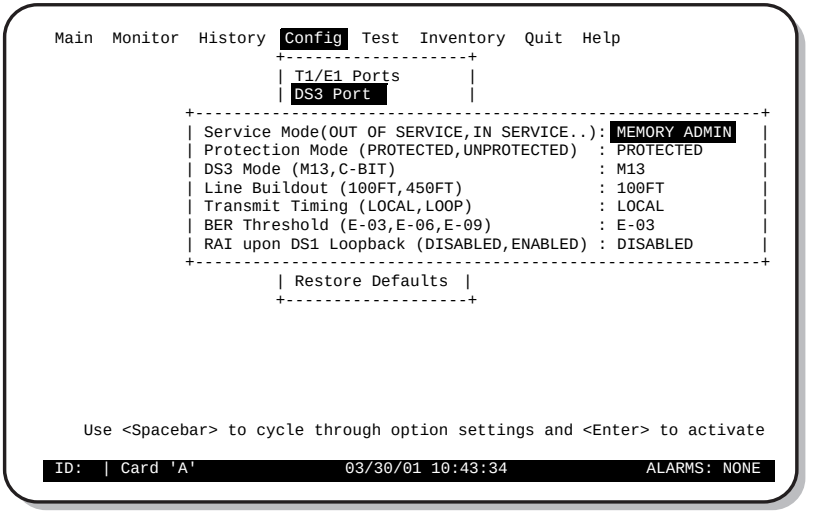


Figure 11. *Config Menu: DS3 Port*

During installation, a physical coax loop cable is required to prevent alarms on the DS3 line if no facility is available.

Table 3 on page 19 lists the HXU-358 service states to be implemented and defines what functions are enabled for each service state. There is a separate service state for the DS3 port and for each of the 28 DS1 ports.

Table 3. *HXU-358 DS3 Service Modes*

HXU-358 Service States	Passes Data	Report Alarms	PM Data	Loopback Allowed	Config Changes Allowed
Out-of-Service	Yes	Yes (a)	No	Yes	No
In-Service	Yes	Yes	Yes	No	No
Memory Administration	Yes	Yes	Yes	Yes	Yes
Maintenance	Yes	Yes	Yes	Yes	No

(a) DS1 only; no alarm in OOS state.

Configure the HXU-358 DS3 interface by selecting **DS3 Port** from the **Config** menu.

1 Select **Service Mode**, press the SPACEBAR to select MEM-ADMIN, then press ENTER. No configuration changes can be made unless the Service Mode is configured as MEM-ADMIN.

2 If this is a dual multiplexer application, change **Protection Mode** to PROTECTED. The system will automatically configure as PROTECTED when the second multiplexer is installed.

3 Select **Operating Mode** to **M13** or **C-BIT**.

Changing operating modes will reset all multiplexers installed in a chassis.

4 Set **Line Buildout** to 100FT or 450FT.

5 Set **Transmit Timing** to LOCAL.

6 Set the **BER Threshold** to E-03, E-06, or E-09. (Default is set at E-3.)

7 When you are finished configuring the DS3 Port, select **Service Mode** and change it to IN SERVICE.

CONFIGURING THE T1/E1 PORTS

T1/E1 ports are individually configurable. To reconfigure a port, set the service mode to MEM-ADMIN.

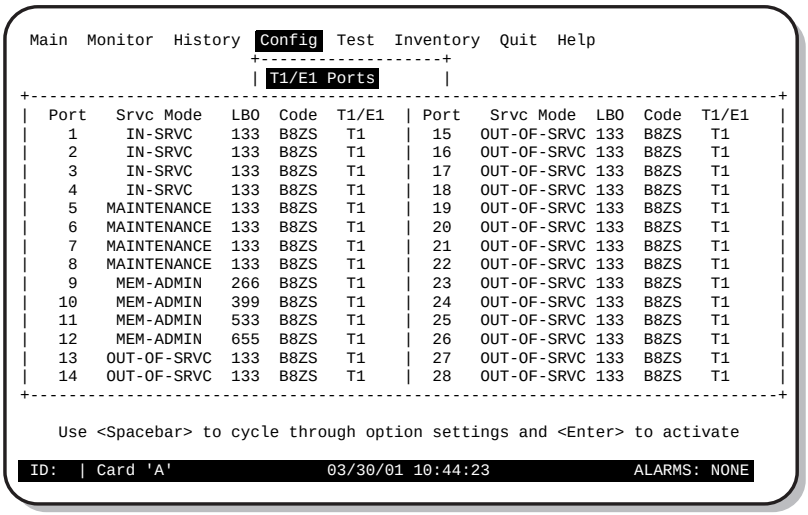


Figure 12. *Config Menu: T1/E1 Ports*

Table 4 lists the HXU-358 service states to be implemented and also defines what functions are enabled for each service state. There is a separate service state for the DS3 port and for each of the 28 DS1 ports.

Table 4. *HXU-358 T1/E1 Service Modes*

HXU-358 Service States	Passes Data	Report Alarms	PM Data	Loopback Allowed	Config Changes Allowed
Out-of-Service	Yes	No	No	Yes	No
In-Service	Yes	Yes	Yes	No	No
Memory Administration	Yes	Yes	Yes	Yes	Yes
Maintenance	Yes	Yes	Yes	Yes	No

Configure the HXU-358 T1/E1 interface by selecting **T1/E1 Ports** from the **Config** menu.

To configure any of the ports,

1 Select the port by pressing the SPACEBAR and change its **Srvc Mode** to MEM-ADMIN, then press ENTER.

2 Configure the following options:

- Type of service (T1/E1, default)
- Line code for T1 (Code)
  - AMI
  - B8ZS (default)
- Line code for E1 (Code)
  - HDB3

HXU line code must match the type of line code on the HLU or other equipment driving this port. If uncertain of the line code type, use the default setting (B8ZS).

- Line buildout (LBO) options for the channel (133, 266, 399, 533, or 655 feet), which only pertains to T1 and is not applicable for E1.

Unless a cut-through card is used on this port, keep the default setting (133 feet) for Wideband 3190 applications.

3 Place the channel in service (IN-SRVC, OOS is default).

You have now provisioned your system. The procedures that follow document additional system configurations.

Changing T1 to E1 Configurations for the Wideband 3190 or ACE Chassis

When changing from T1 to E1 ports, the fourth port of each group is not used. All ports in the group of four will be simultaneously switched.

To change T1 ports to E1 ports,

1 Select the port, by pressing the SPACEBAR, change its **Srvc Mode** to MEM-ADMIN, then press ENTER.

Repeat for all ports in the same group, such as 1-4, 5-8, or 9-12.

2 Select a port in the group and change the type of service from T1 to E1 by pressing the SPACEBAR, then press ENTER.

3 Select each port again and change its **Srvc Mode** to IN-SRVC.

For more information about routing T1/E1 channels, see "Time-slot Assignment Switch (TSA)" on page 57.

OTHER CONFIGURATION OPTIONS

There are other useful configuration options that are not essential to the basic configuration procedures. These include:

- Changing the password
- Downloading HXU-358 software updates
- Cross connecting a port to a different tributary on the DS3
- Restoring default configuration settings
- Setting autologout time
- Editing circuit IDs

If you are installing the HXU-358 in a Wideband 3190, refrain from selecting VT100 **at the Select Maintenance Port Settings selection. Selecting** VT100 **will disconnect communications between the multiplexer and the HMU. If you are installing the HXU-358 in an ACE chassis, do not select HMU at the Select Maintenance Port settings selection. Selecting HMU will render the rear panel craft port useless until reconfigured.**

Changing the Password

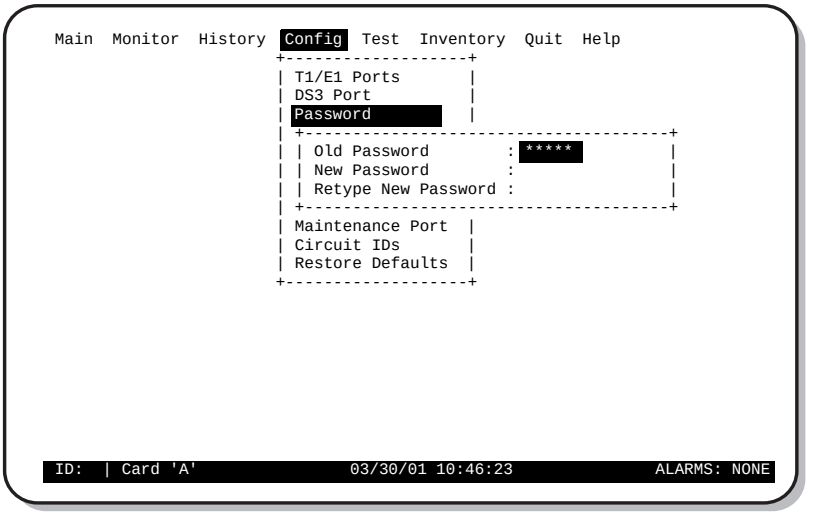


Figure 13. *Config Menu: Password*

1 Select **Password** from the Config menu, then type the old password, and then press **ENTER**.

2 Type the new password.

3 Retype the password to confirm it, and then press **ENTER**.

If you have forgotten you password, contact ADC Wireline Systems Division Customer Service Engineering Group at 1.800.638.0031.

Download Software Updates

When performing a software download in a protected system, the software must be loaded to both multiplexer modules individually.

Uploading a new version of multiplexer software assumes the that the card in slot A is running a more recent software version than the card in slot B

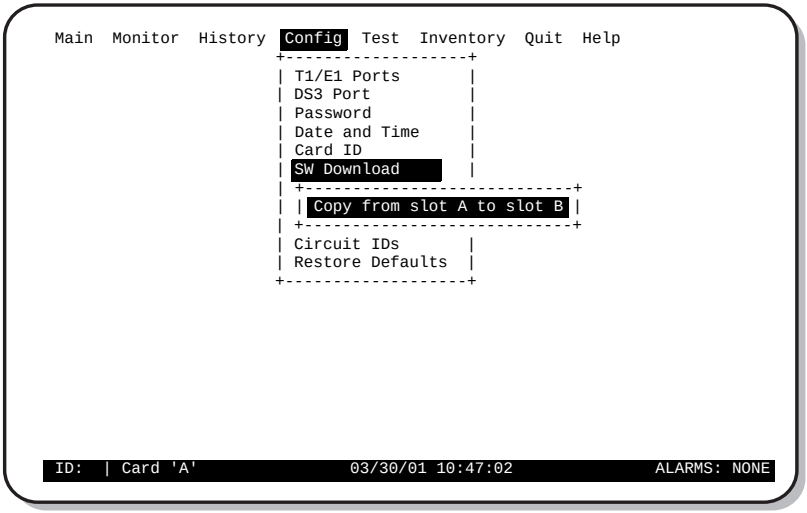


Figure 14. *Config Menu: SW Download*

1 Select **SW Download** from the Config menu.

2 Select the Copy from slot A to slot B option and press **ENTER**:

You will be prompted to confirm copying.

Cross Connecting

The HXU-358 cross-connect feature allows the grooming of any of the T1/E1 channels to any time-slot location within the high speed DS3 frame. For additional information about the Digital Access Cross-Connecting Switch (DACS), see "Time-slot Assignment Switch (TSA)" on page 57.

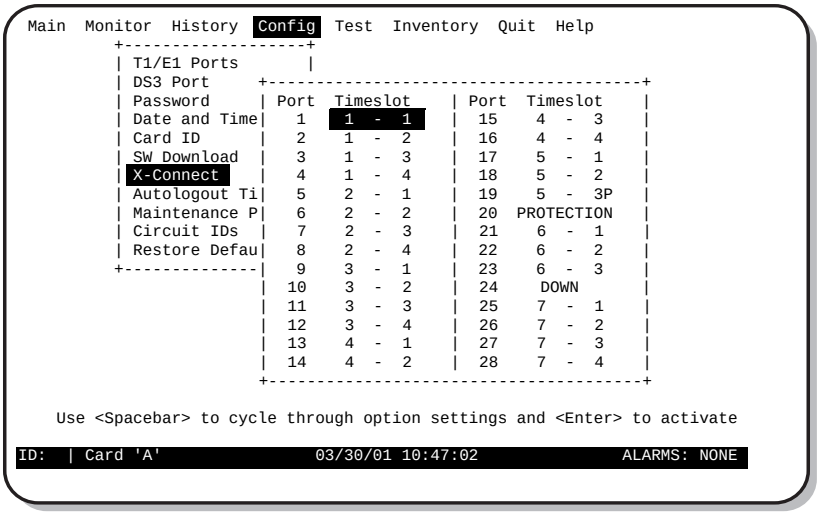


Figure 15. *Config Menu: X-Connect*

To change a time-slot, first make sure that the time-slot that you want to change is available (not in use by another port). If the time-slot is unavailable (used on another port), place both the time-slot that you want and the time-slot in use by another port in the NO-CONNECT settings.

1 Select **T1/E1 Ports** from the Config menu.

2 Change the port's **Srvc Mode** to MEM-ADMIN by pressing the **SPACEBAR**, and then press **ENTER**.

3 Select **X-Connect** from the Config menu.

4 Change the port's **Timeslot** setting of the time-slot that you want to NO CONNECT by pressing the **SPACEBAR**, and then press **ENTER**.

5 Change the port's **Timeslot** setting of the time-slot in use by another port to NO CONNECT by pressing the SPACEBAR, and then press ENTER.

The ports are now ready to configure.

6 Change the port's **Timeslot** setting of the time-slot that you want by pressing the SPACEBAR, and then press ENTER.

7 Change the port's **Timeslot** setting of the time-slot in use by another port by pressing the SPACEBAR, and then press ENTER.

Any time-slot set to DOWN, PROTECTION or proceeded by a "P" must be part of a DS1 protected circuit before they can be changed. For complete information on protection switching, refer to *PSC-606 List 1 Technical Practice*, document LTPH-TP-1006-xx.

Restoring Defaults

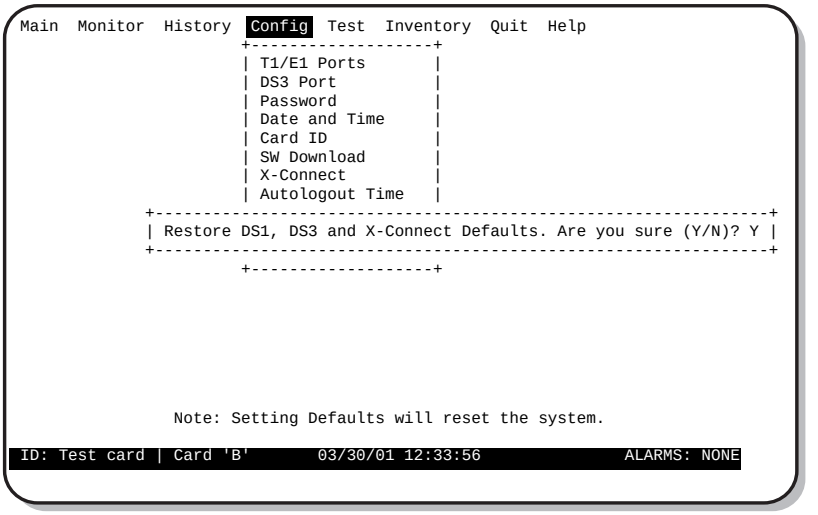


Figure 16. *Config Menu: Restore Defaults*

1 Place the DS3 port in MEM-ADMIN as detailed in "Configuring the T1/E1 Ports" on page 20.

2 Select **Restore Defaults** from the Config menu.

The following message appears: `Restore DS1, DS3, and X-Connect defaults. Are you sure (Y/N)?`

3 Type **Y** to restore the original factory settings, and then press **ENTER**.

Restoring defaults causes service loss. Additionally, this procedure logs you out to the root HMU screen in Wideband 3190 applications.

Setting Autologout Time

You can set the time (15 min, 30 min, 60 min, or none) that the HXU-358 will logout.

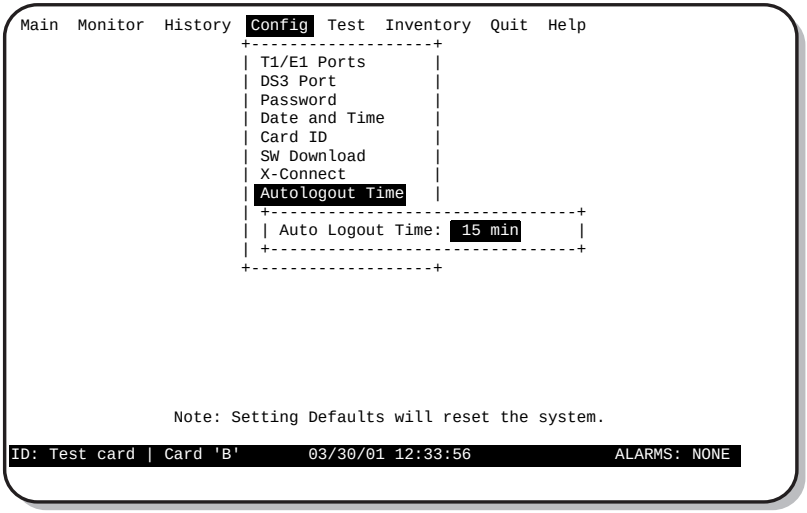


Figure 17. *Config Menu: Autologout Defaults*

1. Select **Autologout** from the Config menu.
2. Change the time within the **Auto Logout Time** settings by pressing the **SPACEBAR**, and then press **ENTER**.

Editing Circuit IDs

You can assign text to identify each circuit.

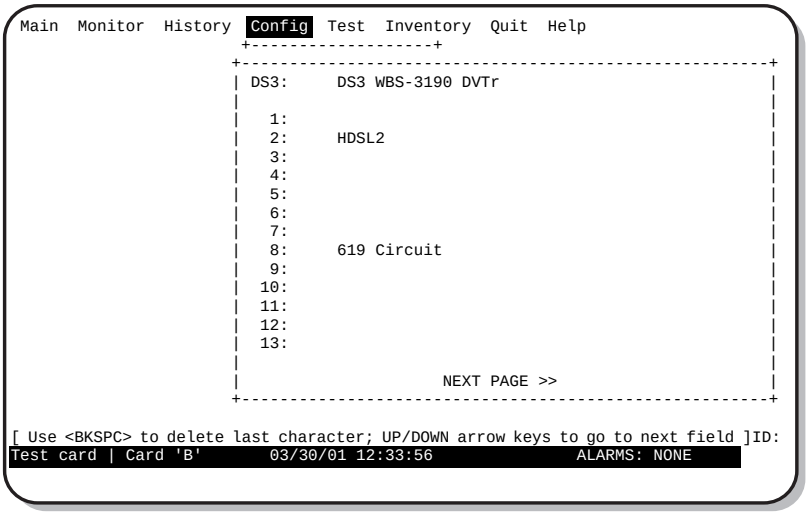


Figure 18. *Config Menu: Autologout Defaults*

1 Select **Circuit IDs** from the Config menu.

2 Use ↑ and ↓ to select the port, enter the data, and then press **ENTER**.

You can enter a text string of 32 alphanumeric characters, and use **DEL** to delete unwanted data.

After entering your text, press ENTER to save. Failing to do so will result in the loss of your data.

PERFORMANCE MONITORING

The Monitor and History menus provide essential data for monitoring the performance of the HXU-358.

MONITOR MENU

Select **PM Monitor** from the Monitor menu. The screen displays error reports for the T1/E1 ports and the DS3 port. Table 5 on page 32 describes these errors.

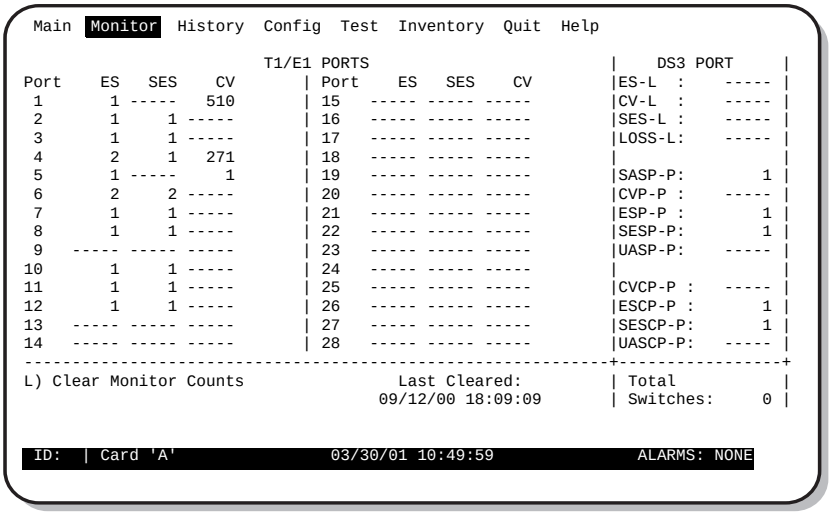


Figure 19. *Monitor Menu*

Each count on this screen represents a running total of all the associated errors since the last clear command or HXU-358 card reset. See Figure 19 on page 31.

Table 5. *T1/E1 and DS3 Error Definitions*

Error Type	Description
T1/E1 Ports	
ES	Errored Seconds—The sum of the ES-L and ES-P counts detected on the DS1 input. Errors included are: DS1 Frame errors, BPV, and ESF CRC errors.
SES	Severely Errored Seconds—This value is the sum of the DS1 SES-L and SES-P counts.
CV	Code Violation—Total count of DS1/E1 code violation.
DS3 Port	
ES-L	Errored Seconds - Line: Count of seconds containing one or more Bipolar Violations (BPVs), Excessive Zeroes (EXZs) or LOS defects. A BPV is the occurrence of a pulse of the same polarity as the previous pulse. An EXZ is the occurrence of any zero string length ≥3.
CV-L	Code Violation - Line: Total BPV and EXZ count.
SES-L	Severely Errored Seconds - Line: Count of seconds with BPV plus EXZ ≥44 or LOS ≥1.
LOSS-L	Loss of Signal Second - Line: Count of 1-second intervals containing one or more LOS defects.
SASP-P	SEF/AIS Second C-bit Parity: Count of seconds containing one or more Severely Errored Frames (SEF) or Alarm Indication Signal (AIS) defects.
CVP-P	Code Violation P-bit Parity: Count of P-bit parity check code violations. P-bit parity error is the occurrence of a received P-bit parity error on an M-frame (the locally calculated parity does not match the received parity bits).
ESP-P	Errored Second P-bit Parity: Count of seconds containing one or more P-bit parity errors, or one or more SEF or AIS defects.
SESP-P	Severely Errored Second P-bit Parity: Count of seconds containing more than 44 P-bit parity errors or one or more SEF or AIS defects.
UASP-P	Unavailable Seconds P-bit Parity: Count of 1-second intervals during which the DS3 path is unavailable.
CVCP-P	Code Violation CP-bit Parity: Count of CP-bit parity code violations.

Continued

Table 5. *T1/E1 and DS3 Error Definitions (Cont.)*

Error Type	Description
ESCP-P	Errored Seconds CP-bit Parity: Count of seconds containing one ore more CP-bit parity errors or one or more SEF or AIS defects.
SESCP-P	Severely Errored Second CP-bit Parity: Count of seconds containing more than 44 CP-bit parity errors or one or more SEF or AIS defects.
UASCP-P	Unavailable Seconds CP-bit Parity: Count of 1-second intervals during which the DS3 path is unavailable.

Select **Active Alarm**s from the Monitor Menu. The screen reports any active alarms.

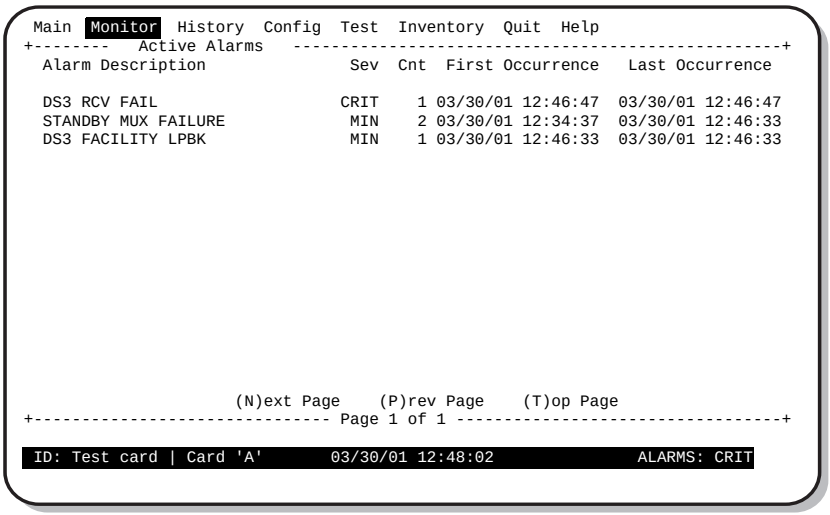


Figure 20. *Monitor Menu: Active Alarms*

Table 6. *Alarm Descriptions*

Field	Description
Description	Summarizes type of alarm
Sev	Indicates the alarm severity (MIN, MAJ, or CRIT)
Cnt	Counts the amount of alarms
First Occurrence	First alarm occurrence
Last Occurrence	Last alarm occurrence

If no alarms are active, the screen displays NO ACTIVE ALARMS.

When three protection switches occur within 10 minutes, the HXU-358 reports a TMS alarm. The alarm is automatically cleared in 24 hours for the declaration of the alarm, or it can be cleared by selecting **Clear TMS Count** from the Monitor menu (Figure 21).

A TMS alarm inhibits any protection switching between cards until the alarm is cleared.

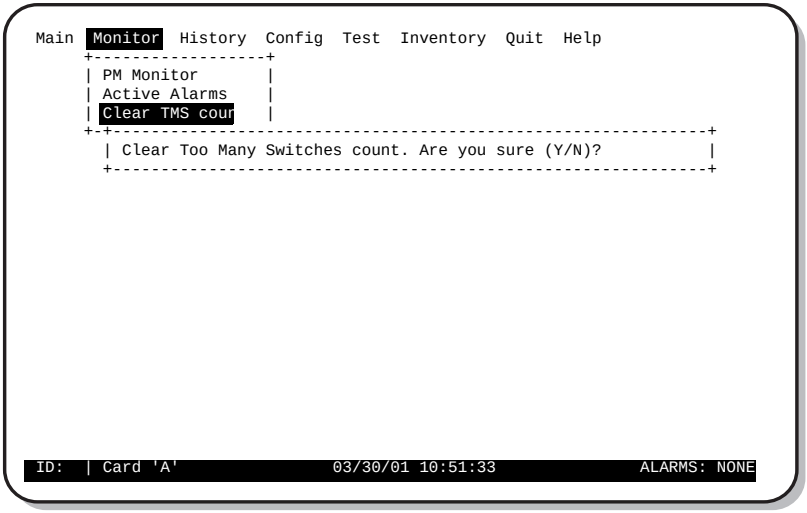


Figure 21. *Monitor Menu: Clear TMS Count*

Protection switching of the DS3 line is inhibited when this alarm is active.

HISTORY MENU

The History menu provides three submenus of history statistics:

- PM History provides 7-day and 24-hour ES and SES statistics (in 15 minute increments) for individual T1/E1 ports and the DS3 port. It also allows you to clear these screens.
- Alarms History provides statistic screens for individual T1/E1 ports, the DS3 port, and the system. It provides the alarm description, time and date of the first and last occurrence, and the number of times it has occurred since the last time the screen was cleared. It also allows you to clear these screens.
- Event Log provides a description of system events and the time of occurrence. It also allows you to clear this screen.

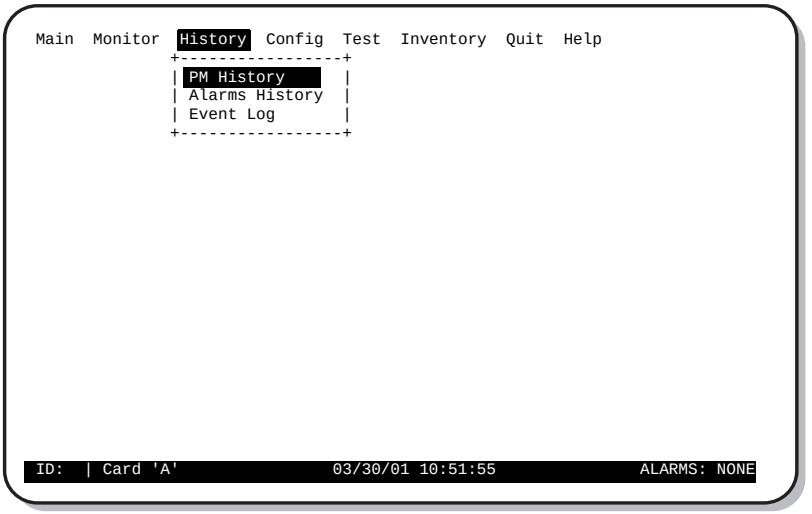


Figure 22. *History Menu: PM History*

Performance Monitoring History

To view performance monitoring history screens for individual T1/E1 ports:

1 Select **PM History** from the History menu and do one of the following:

- Select **T1/E1 Ports: PM History** and type in the number of the port. The screen displays 24-hour and 7-day statistics for ES and SES. Figure 23 shows an example.
- Select **DS3 Port: PM History** from the History Menu. The screen displays 7-day and 24-hour history statistics for ES, SES, and LOS. Figure 24 on page 38 is an example of a DS3 PM history screen.
- Select **Clear ALL PM Histories**. When prompted, type **Y** to clear T1/E1 and DS3 PM History screens or type **N** to cancel the update.

The Clear PM History selection clears the PM history for all channels.

```
 Main  Monitor  History  Config  Test  Inventory  Quit  Help
+---------------- PM History for T1/E1 Port# 20 -------------------------------+
      7-Day History                                    24-Hour History
            ES   SES                                        ES SES             ES SES
  09/13 ----- -----                          10:45 --- ---      06:45 --- ---
  09/12 ----- -----                          10:30 --- ---      06:30 --- ---
  09/11 ----- -----                          10:15 --- ---      06:15 --- ---
  09/10 ----- -----                          10:00 --- ---      06:00 --- ---
  09/09 ----- -----                          09:45 --- ---      05:45 --- ---
  09/08 ----- -----                          09:30 --- ---      05:30 --- ---
  09/07 ----- -----                          09:15 --- ---      05:15 --- ---
                                             09:00 --- ---      05:00 --- ---
                                             08:45 --- ---      04:45 --- ---
  Last Cleared: 09/12/00 18:09:09            08:30 --- ---      04:30 --- ---
                                             08:15 --- ---      04:15 --- ---
                                             08:00 --- ---      04:00 --- ---
                                             07:45 --- ---      03:45 --- ---
  Navigation keys :                          07:30 --- ---      03:30 --- ---
  (N)ext Page                                07:15 --- ---      03:15 --- ---
  (P)rev Page                                07:00 --- ---      03:00 --- ---

+-------------------------------------------------------------------------------+

 ID:  | Card 'A'              03/30/01 10:53:03              ALARMS: NONE
```

Figure 23. *History Menu: PM History for a T1/E1 Port*

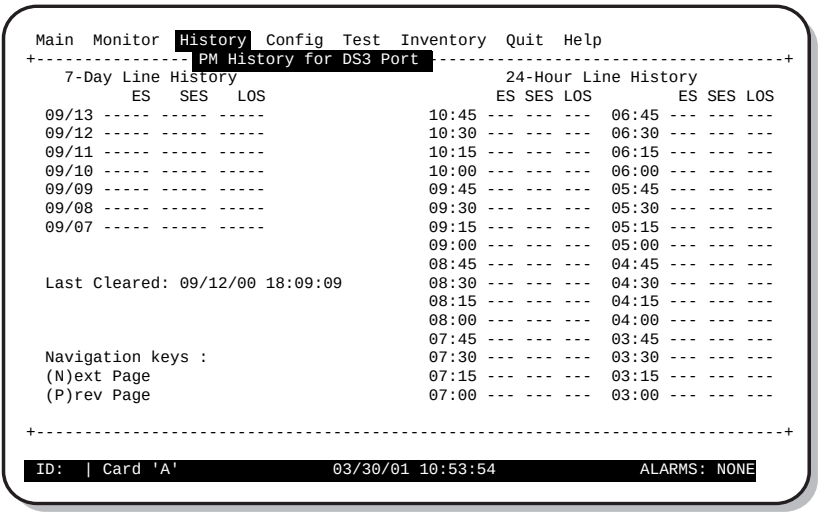


Figure 24. *History Menu: PM History for DS3 Port*

Alarms

Select **Alarms History** from the History menu (Figure 25) and select the type of alarm statistics screen you wish to view:

- Select **T1/E1 Ports: Alarm History** and type in the number of the port.
- Select **DS3 Port: Alarm History**.
- Select **System: Alarm History**.
- Select **Clear Alarm History**. The message "`Alm history will be reset. Are you sure (Y/N)?`" appears. Type `Y` to clear.

The Clear Alarm Hist selection clears the alarm history for all channels.

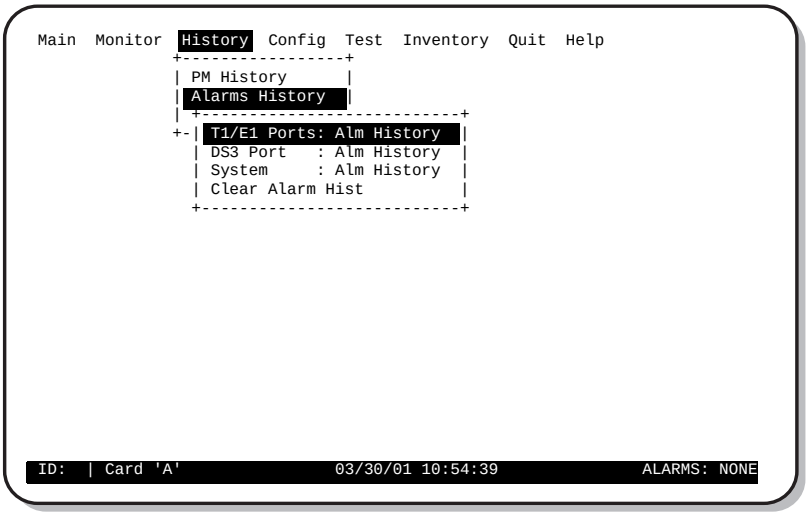


Figure 25. *History Menu: T1/E1 Port Alarm History*

Figure 26 on page 40 shows a typical alarm report screen for the DS3. The T1/E1 and System alarm history screens report the same kind of information.

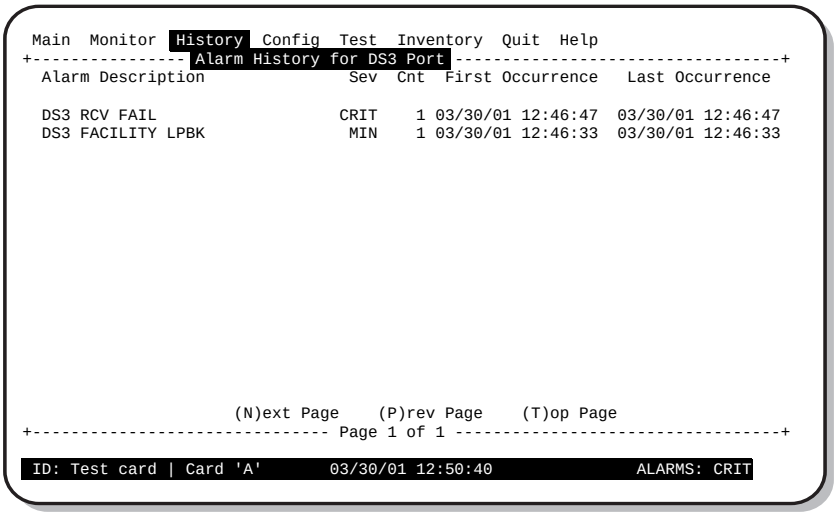


Figure 26. *History Menu: DS3 Alarm History*

The Alarm History selection details the history of all alarms since the history was last clear (not the exhaustive history).

Event Log

To view a listing and brief description of system events and alarms (Figure 27), select **Event Log** from the History menu, then **Event Log Listing** or select **Clear Event Log** to clear all event statistics.

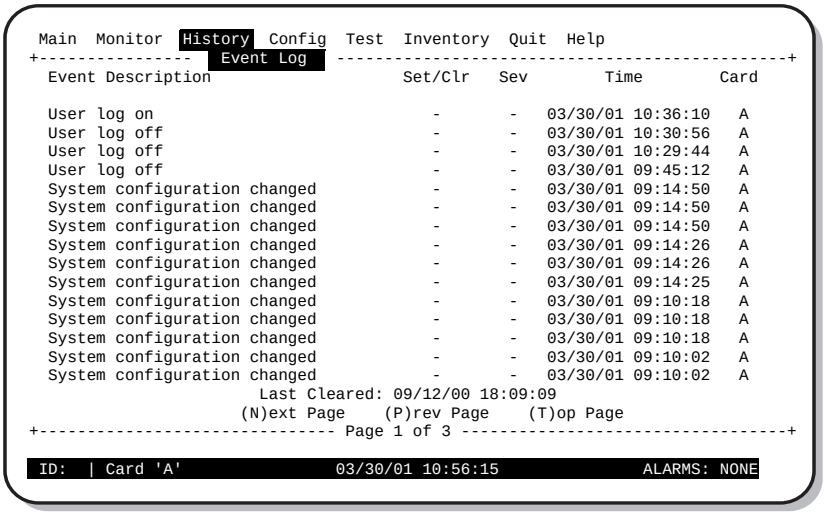


Figure 27. *History Menu: Event Log*

Table 7. *Event Log Descriptions*

Field	Description
Event Description	Summarizes type of event
Set/Clr	Indicates when the event log was set or cleared
Sev	Indicates the event severity (MIN, MAJ, CRIT)
Cnt	Counts the amount of alarms
Time	Indicates the time of the event
Card	Indicates on which card the event occurred

TESTING

The Test menu allows you to

- execute a T1/E1 and DS3 loopback,
- access the test head, and
- perform a protection switch.

EXECUTING A LOOPBACK

To execute a loopback:

1 Select **T1/E1 Loopback** or **DS3 Loopback** from the Test menu. (For the T1/E1 interface, select a port and press **ENTER**.)

2 Press the **SPACEBAR** to cycle through the available loopback selections. See Figure 29 on page 43 and Table 8 on page 44 for a description of loopbacks.

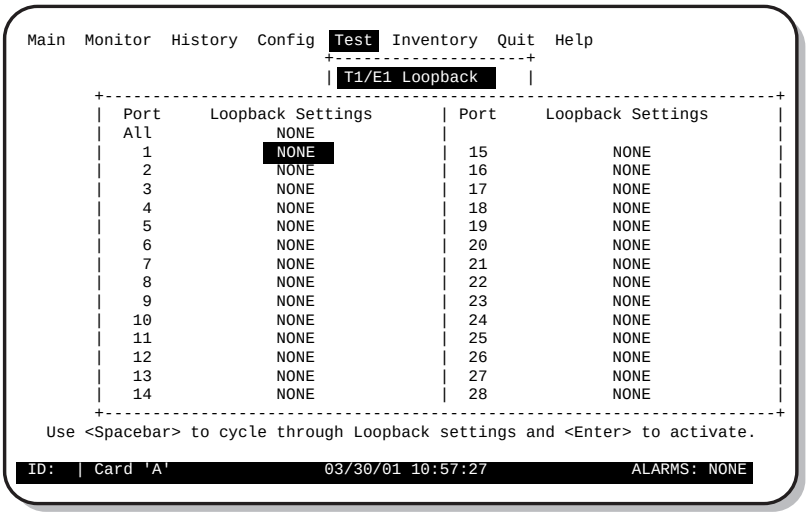


Figure 28. *Test Menu: T1/E1 Loopback*

Loopback cannot be performed in the In-Service state.

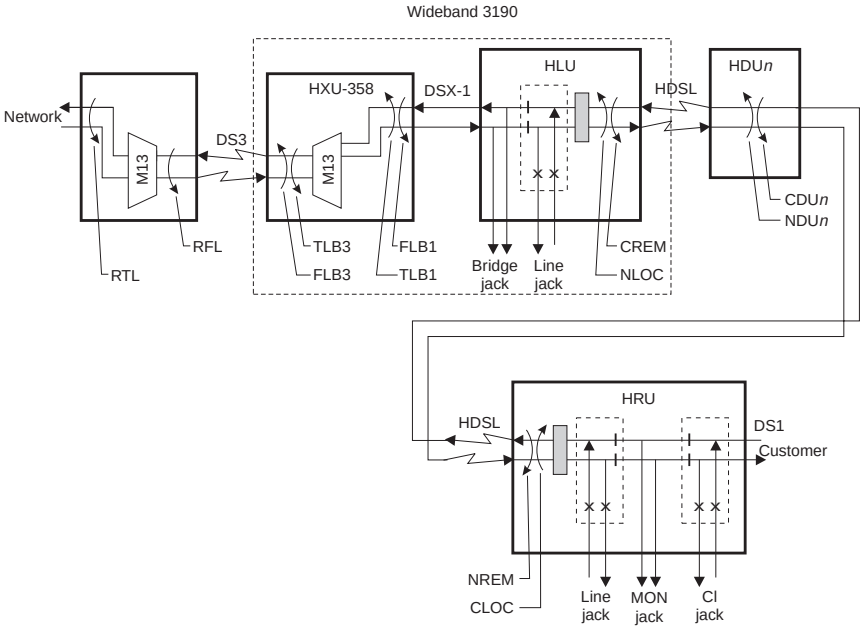


Figure 29. *System Loopbacks in Wideband 3190 Applications*

Table 8. *System Loopback Definitions*

Test Point	Loopback Definition
TLB3 (a) (b)	Terminal loopback to the customer at the DS3 line. Activate from the HXU-358 Test menu.
FLB3 (a) (b)	Facility loopback to the network at the DS3 line. Activate from the HXU-358 Test menu.
TLB1 (a) (b)	Terminal Loopback to the network at the DSX-1 line. Activate from the HXU-358 Test menu.
FLB1 (a) (b)	Facility loopback to the customer at the DSX-1 line.
RFL (a) (b)	Remote facility loopback from the far end DS3 line. Activate from the HXU-358 Test menu.
RTL (a) (b)	Remote terminal loopback from the far end DSX-1 line. Activate from the HXU-358 Test menu.
CREM	Customer remote loopback is activated by selecting the line unit on the Shelf Status Screen and then the **Loopback Mode** selection from the HLU Maintenance Terminal Main Menu.
NLOC	Network local loopback is activated by selecting the line unit on the Shelf Status screen and then the **Loopback Mode** selection from the HLU Maintenance Terminal Main Menu.
CDU*n* (c)	Customer doubler *n* loopback is activated by selecting the line unit on the Shelf Status screen and then the **Loopback Mode** selection from the HLU Maintenance Terminal Main Menu.
NDU*n* (c)	Network doubler *n* loopback is activated by selecting the line unit on the Shelf Status screen and then the **Loopback Mode** selection from the HLU Maintenance Terminal Main Menu.
CLOC	Customer local loopback is activated by selecting the line of the Shelf Status screen and then the **Loopback Mode** selection from the HLU Maintenance Terminal Main Menu.
NREM	Network remote loopback is activated by selecting the line on the Shelf Status Screen and then the **Loopback Mode** selection from the HLU Maintenance Terminal Main Menu.

(a) To perform this loopback command, the DS3 and T1/E1 ports can be in any mode other than IN-SRVC.
(b) Copies data in both directions. All other loopbacks send AIS to a disconnected segment.
(c) The number of the doubler in the line from 1 to 4.

TEST ACCESS INTERFACE

The test access interface is accessible from the HXU-358 front panel and from the backplane on the HXU-358. Any one of the 28 channels can be routed through the DACs in the multiplexer for monitoring or testing.

- External mode allows the customer to connect an external test system Monitor or Breaking access to any subscriber line.
- Internal Test head mode provides for an internally generated test pattern to be routed to the channel under test for Monitor or Breaking access.

  Loopup/loopdown code generation allows the customer to replicate the unique remote loopup and loopdown code in order to initiate loopback testing of the line.

Accessing the Test Head

The Test Head Access option allows you to choose between an internal test head and external test equipment hooked up to a multiplexer.

Prior to accessing the test head, the port must be in Maintenance mode. For more information on changing the port state, see "Configuring the T1/E1 Ports" on page 20.

To execute an internal test head access test:

1 Select **Test Head Access** from the Test menu and press ENTER.

2 Select **Internal Test Head Access** and press ENTER.

3 Select from the available options:

- Port number: Type the port number (1 to 28) and press ENTER.
- Direction: Press the SPACEBAR to select the direction of the transmission—(DS1) Customer or (DS3) Network and press ENTER.
- Type: Press the SPACEBAR to select Monitor (the live data) or Breaking (using the test head to insert data patterns towards its chosen direction) and press ENTER.

4 Select **Connect** (to activate the test) or **Disconnect** (to disable the test) and press **ENTER**.

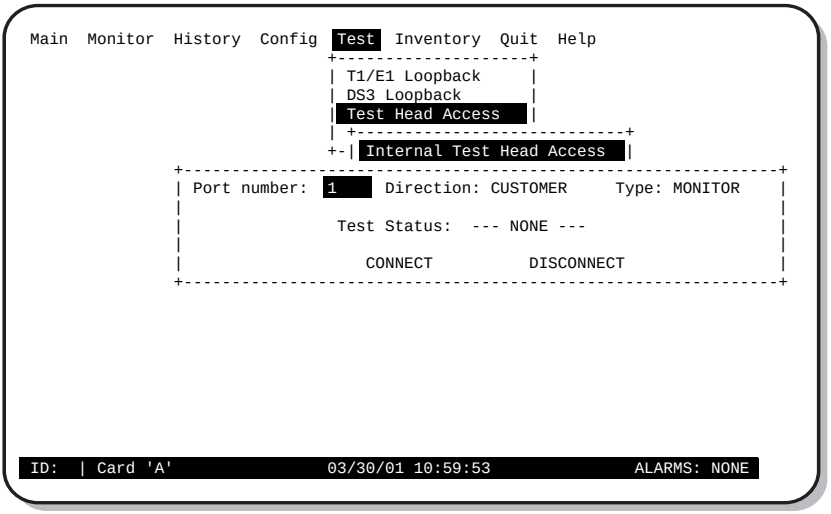


Figure 30. *Internal Test Head*

Figure 31 shows a sample screen for a breaking type internal test. You can send data (test patterns) or configurable loop codes out through the internal test head. Loop codes are programmable (up to 32 bits) and you can configure two names for your own codes.

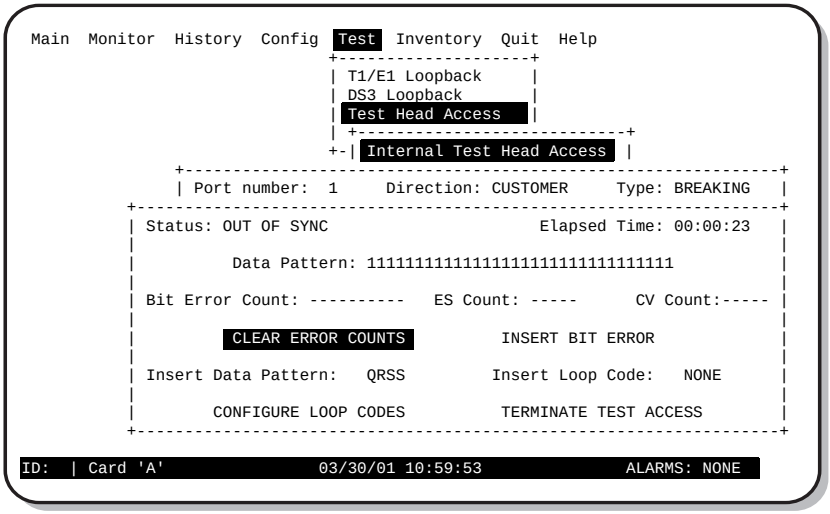


Figure 31. *Breaking Type Internal Test*

For an external test, you can connect your test equipment to the test connectors located on the front panel of the HXU-358 or you can connect your equipment to the backplane of the Wideband 3190 (refer to the Wideband 3190 technical practice for details). Once, the external equipment is connected, execute an external test in the following manner:

1 Select **Test Head Access** from the Test menu and press ENTER.

2 Select **External Test Head Access** and press ENTER.

3 Select from the available options:

- Port number: Type the port number (1 to 28) and press ENTER
- Direction: Press the SPACEBAR to select Customer or Network and press
- Type: Press the SPACEBAR to select Monitor or Breaking and press ENTER
- Line Format: Press the SPACEBAR to select B8ZS or AMI and press ENTER

4 Select **Connect** or **Disconnect** and press ENTER.

Figure 32 shows a sample screen for a monitor type external test.

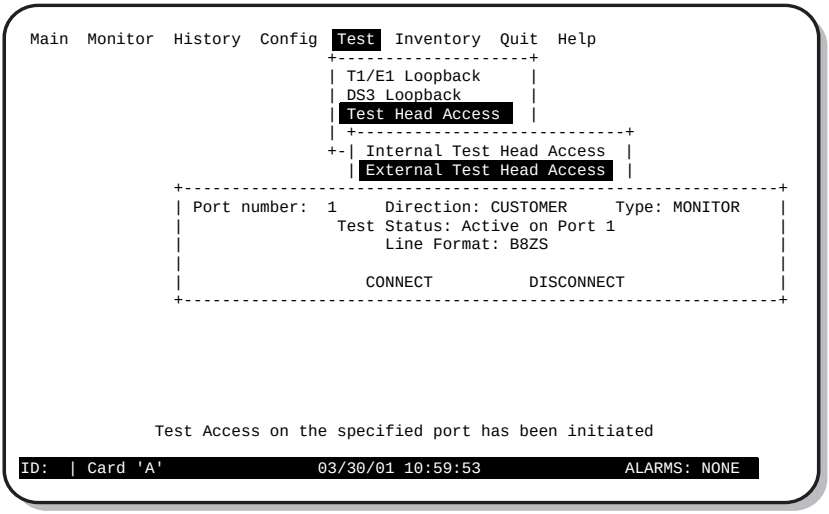


Figure 32. *Monitor Type External Test*

To complete an external test head access test, external test equipment is required. Connect the equipment to the test port (labeled TEST IN and OUT on the front of the HXU-358). Additionally, you can connect test equipment to the wirewrap pins located on the backplane of the Wideband 3190 or ACE.

PROTECTION SWITCHING

For complete information on HDSL line protection switching, refer to *PSC-606 List 1 Technical Practice*, document LTPH-TP-1006-xx.

The Test menu offers a **Protection Switch** selection to manually change from the active multiplexer to the standby multiplexer.

1 Select **Protection Switch** from the Test menu.

2 To execute the protection switch to the standby multiplexer, type **Y**.

A protection switch occurs within 50 milliseconds and does not affect traffic on any DS1 or DS3 port.

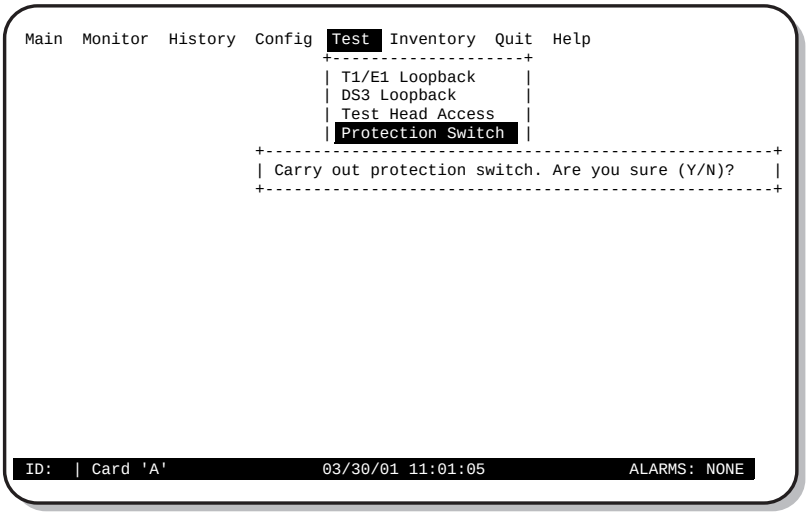


Figure 33. *Test Menu: Protection Switch*

Protection Switching is inhibited if the TMS alarm is active. It can be cleared under the monitor screen.

APPENDIX A - SPECIFICATIONS

DS3 Interface (Multiplexer)

Cable	728 A RG-6/U
Number of duplex lines	1 per chassis
Line rate	44.736 megabits/s ±20 ppm
Line code	B8ZS
Line impedance	75 Ω ±5 Ω, unbalanced
Pulse amplitude	0.36 V to 0.85 V (meets TR-TSY-000499 requirements)
Jitter generation	≤ 0.3 UI rms
DS3 span buildout	0 to 450 ft. (0 to 137.2 m)

T1 Internal Interface to Backplane

Number of lines	28
Line rate	1.544 megabits/s ±50 ppm
Line code	AMI or B8ZS selectable (per channel)
Line impedance	100 Ω ±5%, balanced
Pulse amplitude	3.0 V ±0.6 V
Jitter generation	<0.3 UI rms (1 UI = 648 ns)
DS1 span	1 to 655 ft. (.3 to 199.6 m)
Cable	ABAM or equivalent

E1 Internal Interface to Backplane

Number of lines	21
Line rate	2.048 Mbps ±130 ppm
Line code	HDB3
Line impedance	120 Ω ±5%, balanced
Pulse amplitude	3.0 V ±0.6 V
Jitter generation	<0.3 UI rms (1 UI = 488 ns)
DS1 span	N/A
Cable	ABAM or equivalent

Environmental Requirements

Operating Temperature	-40° F to +149° F (-40° C to +65° C)
Storage Temperature	-40° F to + 185° F (-40° C to +85° C)
Humidity	5% to 95% non-condensing
Operating Altitude	-200 ft. to 13,000 ft.

Power Requirements

Voltage	-41.5 to -56.3 Vdc
Power consumption	18 W typical, 24 W maximum

Physical Dimensions

Length	9.81 in. (24.9 cm)
Width	7.72 in. (19.6 cm)
Height	.98 in. (2.5 cm)

APPENDIX B - HXU-358 INSTALLATION FOR ACE CHASSIS

The following documents HXU-358 installation procedures for the ACE chassis.

Prior to installing the HXU into an ACE chassis, the port must be in Craft mode.

To install the HXU-358 into the ACE chassis,

1 Connect a serial data cable from a maintenance terminal (typically a PC running a VT100 emulation program such as HyperTerminal) to the RS-232 craft port located on the front panel of the HXU-358 as shown in Figure 34.

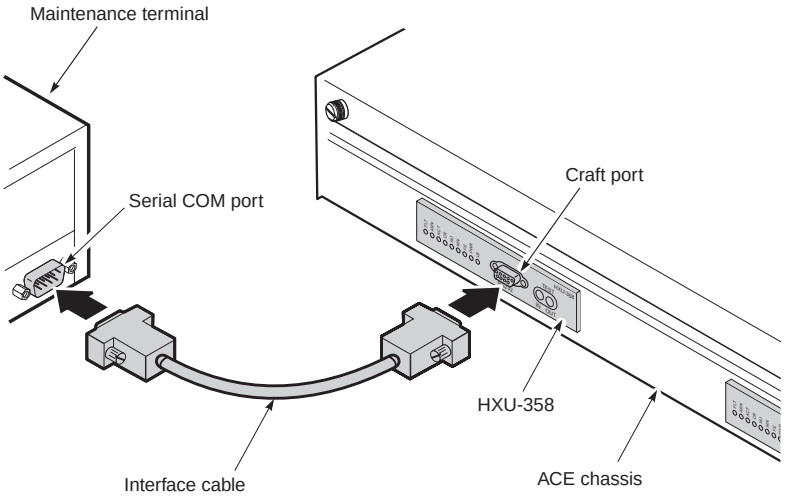


Figure 34. *HXU-358 V1.04 Craft Port (Front View)*

Once the maintenance terminal is connected, follow the onscreen prompts of the VT100 interface.

2 Type **`public`** in the `Password` field, then press **ENTER**.

3 Select Maintenance Port from the **Config** menu, and then press **ENTER**.

4 Choose CRAFT[1] from the **Select Maintenance Port Settings** selection, and then press **ENTER**.

5 Repeat Step 1 through Step 4 for the remaining multiplexer if your configuration includes a dual multiplexer. Otherwise, proceed to Step 6.

Step 1 through Step 4 must be completed every time that a new multiplexer installed on the ACE chassis (including initial installation and multiplexer replacement).

1. The front serial port is always in VT100 menu mode. The rear serial port operates in VT100 menu mode when the maintenance port is set to CRAFT. If the rear serial port is set to HMU, an HMU must be connected instead of a maintenance terminal.

6 Remove the serial data cable from the RS-232 craft port located on the front panel of the HXU-358 and connect the cable to the rear of the ACE chassis as shown in Figure 35.

The HXU-358 is now ready to be managed through the VT100 interface of the maintenance terminal.

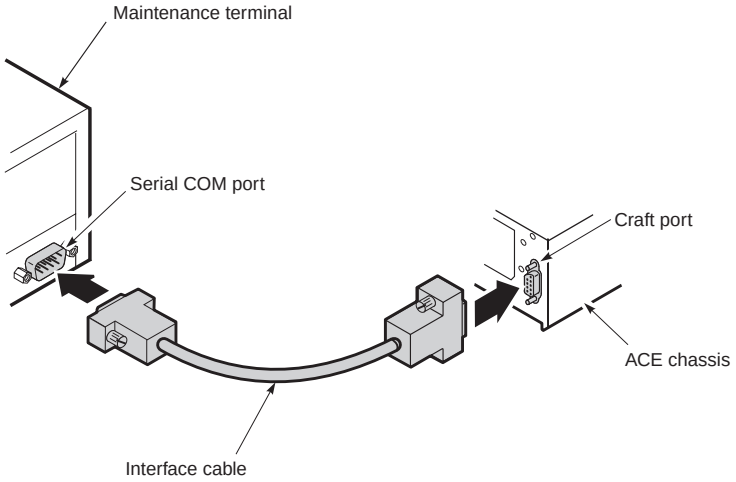


Figure 35. *ACE Craft Port (Rear View)*

APPENDIX C - TECHNICAL REFERENCE

Figure 36 shows a simplified block diagram of the HXU-358.

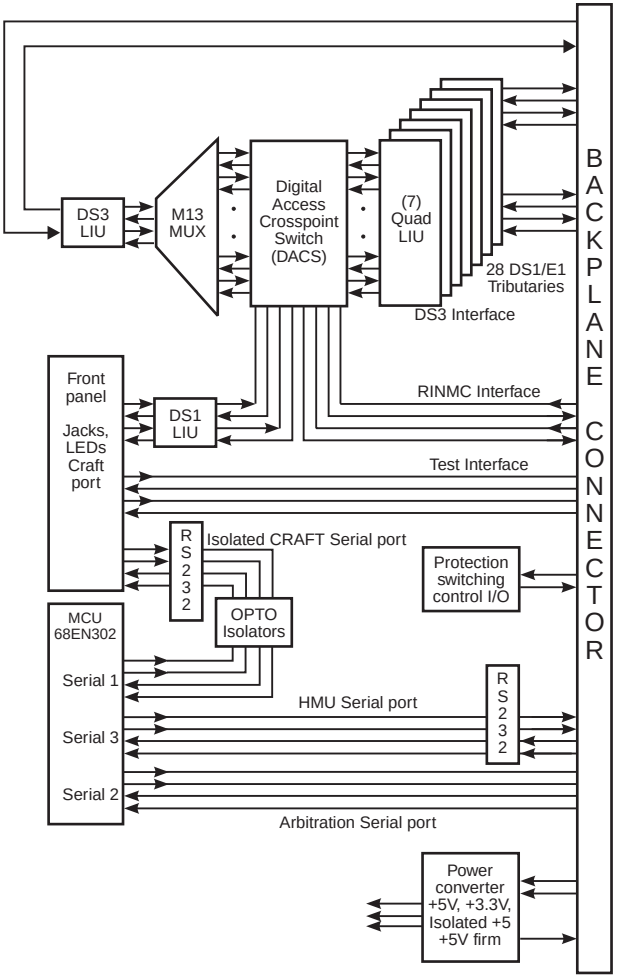


Figure 36. *Simplified Block Diagram*

In a normal system configuration, two HXU-358s are connected to the HXU-358 backplane. Both multiplexers receive data continuously from the T1/E1 tributaries and the HMU interface.

The HXU-358 multiplexes 28 T1 or 21 E1 tributaries, or a mixed combination of T1 and E1 groups, into a single DS3 channel. All T1/E1 tributaries are full-duplex, four-wire, transform-isolated signals utilizing bipolar signal levels. All T1 interfaces operate at 1.544 MHz; E1 interfaces operate at 2.048 MHz.

TIME-SLOT ASSIGNMENT SWITCH (TSA)

The TSA switch is a 30 by 30 crosspoint switch capable of switching up to 28 T1 (or 21 E1) lines plus two test access lines. (Each T1/E1 interface has four wires: TXD, TXC, RXD, and RXC). The TSA can reroute any T1/E1 channel to a different channel number after entering the HXU-358, and can be used to monitor and test T1/E1 channels. The TSA can also multiplex in an additional TTL channel from the HMU to the DS3, allowing the HMU to perform remote inband network management on the DS3 side.

The TSA switch enables any physical port to be allocated to any time-slot in the DS3 network interface.

M13 MULTIPLEXER

The M13 multiplexer interfaces 28 T1/E1 output lines from the Time-slot Switch Assignment (TSA) to the DS3 channel. The multiplexer contains 28 input ports for T1 or 21 input ports for E1 which are connected to the T1/E1 channels. The outputs of seven DS2 multiplexers are combined together into a single DS3 stream.

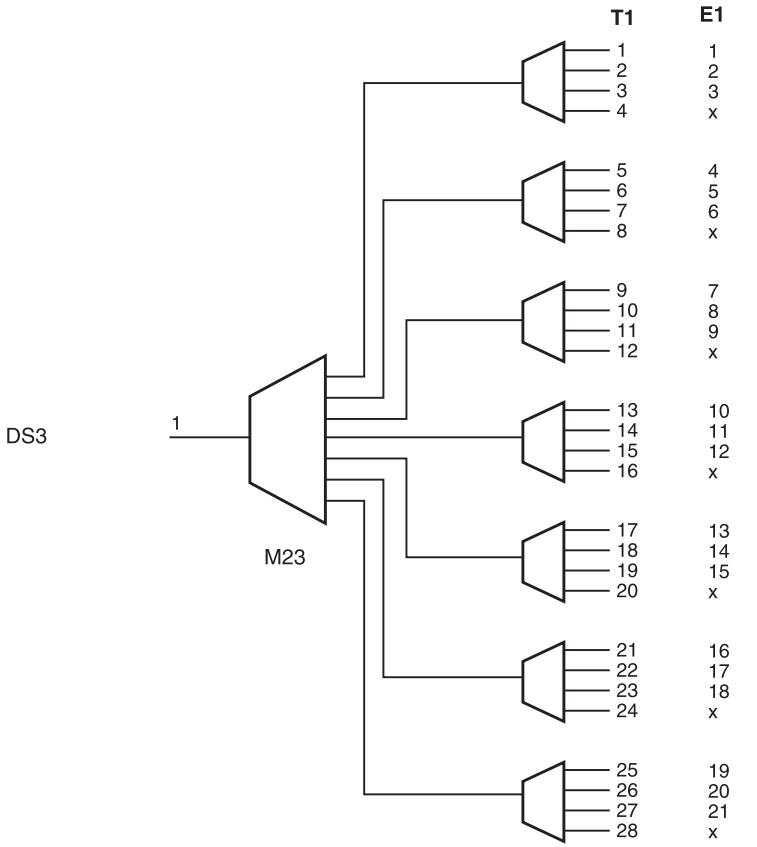


Figure 37. *Basic M13 Multiplexer*

APPENDIX D - SERVICE AND SUPPORT

ADC Customer Service Group provides expert pre-sales and post-sales support and training for all its products.

TECHNICAL SUPPORT

Technical support is available 24 hours a day, 7 days a week by contacting the ADC Wireline Systems Division Customer Service Engineering Group at one of the following numbers:

Telephone:	800.638.0031 or 714.730.3222 The 800 telephone support line is toll-free in the U.S. and Canada.
Fax:	714.832.9924
Email:	wsd_support@adc.com
Online:	www.adc.com/knowledge_base_frames

A Customer Service Engineer answers technical assistance calls Monday through Friday between 7:30 AM and 5:30 PM, Pacific Time, excluding holidays. At all other times, an on-duty Customer Service Engineer returns technical assistance calls within 30 minutes.

RETURNS

To return equipment to ADC Wireline Systems Division:

1 Locate the number of the purchase order under which the equipment was purchased. You will need to provide this number to ADC Wireline Systems Division Customer Service to obtain a return authorization.

2 Call or write ADC Wireline Systems Division Customer Service to ask for a Return Material Authorization (RMA) number and any additional

instructions. Use the telephone number, fax number, or email address listed below:

- Telephone: 800.370.9670
- Fax: 714.832.9923
- Email Address: rma@adc.com

3 Include the following information, in writing, along with the equipment you are returning:

- Company name, address, telephone number, and the name of a person Customer Service can contact regarding this equipment.
- The purchase order number provided to Customer Service when the RMA number was requested.
- A description of the equipment, as well as the number of units that you are returning. Be sure to include the model and part number of each unit.
- The shipping address to which Customer Service should return the repaired equipment.
- The reason for the return:
  - The equipment needs an ECO/ECN upgrade.
  - The equipment is defective.

If the equipment is defective, please tell us what you observed just before the equipment malfunctioned. Be as detailed in your description as possible.

  - If there is another reason for returning the equipment, please let us know so we can determine how best to help you.

4 Pack the equipment in a shipping carton.

5 Write the ADC Wireline Systems Division address and the Return Material Authorization Number you received from Customer Service clearly on the outside of the carton and return to:

ADC Wireline Systems Division
14352 Franklin Ave.
Tustin, CA 92780-7013

Attention: **RMA (Number)**

All shipments are to be returned prepaid. ADC will not accept any collect shipments.

APPENDIX E - ABBREVIATIONS

A

ACE: Access Concentrator Express

AIS: Alarm Indicator Signal

AMI: Alternate Mark Inversion

B

B8ZS: Bipolar with 8-zero Substitution

BER: Bit Error Rate

BPV: Bipolar Violation

C

CO: Central Office

CR: Critical alarm

CV: Code Violation

CVCP-P: Code Violation CP-bit Parity

CV-L: Code Violation - Line

CVP-P: Code Violation P-bit Parity

D

DACS: Digital Access Crosspoint Switching

DS1: Digital Signal, level 1

DS3: Digital Signal, level 3

DSX-1: Digital Signal Cross-connect Level 1

E

ECN: Engineering Change Notice

ECO: Engineering Change Order

ES: Errored Seconds

ESCP-P: Errored Seconds CP-bit Parity

ESD: Electrostatic discharge

ES-L: Errored Seconds - Line

ES-P: Errored Seconds - Port

ESP-P: Errored Second P-bit Parity

EXZ: Excessive Zero

F

FE: Far-End alarm

H

HDB3: High Density Bipolar 3

HLU: HiGain Line Unit

HMU: HiGain Management Unit

HXU: HiGain Multiplexer Unit

I

IN-SRVC: In-Service

IP: Internet Protocol

IS: In-Service

L

LB: Loopback operation

LBO: Line Buildout

LED: Light Emitting Diode

LOS: Loss of Signal

LOSS-L: Loss of Signal Second - Line

M

MJ: Major alarm

MN: Minor alarm

O

OOS: Out of Service

P

PM: Performance Monitor

PWR: Power On

R

RMA: Return Material Authorization

S

SASP-P: SEF/AIS Second C-bit Parity

SEF: Severly Errored Frame

SES: Severely Errored Seconds

SESCP-P: Severely Errored Second CP-bit Parity

SES-L: Severely Errored Seconds - Line

SES-P: Severely Errored Seconds - Port

SESP-P: Severely Errored Second P-bit Parity

T

TAO: Terminal Access Option

TL1: Transaction Language 1

TMS: Too Many Switches

TSA: Timeslot Switch Aissignment

U

UASCP-P: Unavailable Seconds CP-bit Parity

UASP-P: Unavailable Seconds P-bit Parity

CERTIFICATION AND WARRANTY

FCC COMPLIANCE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

LIMITED WARRANTY

Product warranty is determined by your service agreement. Contact your sales representative or Customer Service for details.

MODIFICATIONS

Any changes or modifications made to this device that are not expressly approved by ADC DSL Systems, Inc. voids the user's warranty.

All wiring external to the products should follow the provisions of the current edition of the National Electrical Code.

STANDARDS COMPLIANCE

This equipment has been tested and verified to comply with the applicable sections of the following standards.

- GR 63-CORE - Network Equipment-Building System (NEBS) Requirements
- GR 1089-CORE - Electromagnetic Compatibility and Electrical Safety
- Binational standard, UL-1950/CSA-C22.2 No. 950-95: Safety of Information Technology Equipment

For technical assistance, refer to “Appendix D - Service and Support” on page 59.

ADC DSL Systems, Inc.
14402 Franklin Avenue
Tustin, CA 92780-7013
Tel: 714.832.9922
Fax: 714.832.9924

Technical Assistance
800.638.0031
714.730.3222

DOCUMENT: LTPH-TP-1044-01

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