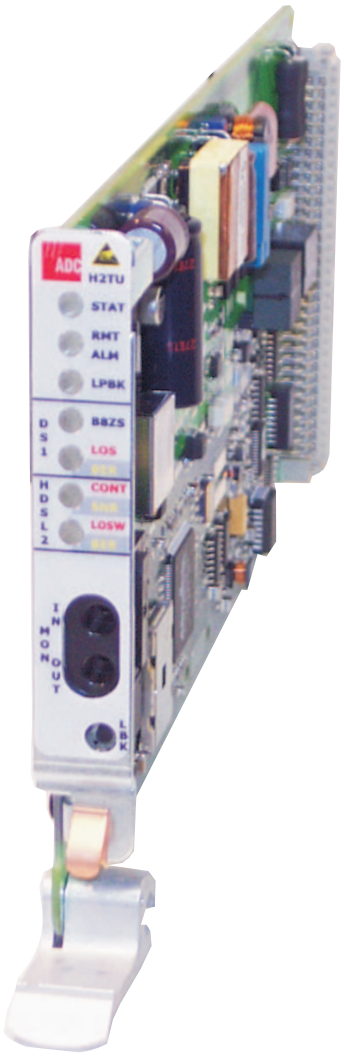
LPS-H2TU-C-L7 Line Card User Manual

for Soneplex Systems



Product Catalog: LPS-H2TU-C-L7

CLEI: SOC3FGBD

Revision History of This Manual

To order copies of this document, use documentation catalog number LTPS-UM-8057-02. To order a hard copy, please contact your sales representative.

Issue	Release Date	Revisions Made
1	January 24, 2003	Initial release
2	April 4, 2003	Remove power oscillation information and Flashing Red on HDSL2 CONT/SNR LED; remove DS1 Idle Code; update screens

USING THIS MANUAL

The following conventions are used in this manual:

- `Monospace type` indicates screen text.
- Keys you press are indicated by small icons such as Y or ENTER. Key combinations to be pressed simultaneously are indicated with a plus sign as follows: CTRL + ESC.
- Items you select are in **bold**.
- The following types of messages, identified by icons, appear in text.

Notes contain information about special circumstances.

Cautions 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.

An electrical shock warning indicates the presence of a dangerous level of electrical power and the potential for serious personal injury or equipment damage.

For a list of abbreviations used in this document, refer to “Appendix D - Abbreviations” on page 37.

INSPECTING SHIPMENT

Upon receipt of the equipment:

- Unpack each container and inspect the contents for signs of damage. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company and to ADC DSL Systems, Inc. Order replacement equipment, if necessary.
- Check the packing list to ensure complete and accurate shipment of each listed item. If the shipment is short or irregular, contact ADC as described in “Appendix C - Product Support” on page 36. If you must store the equipment for a prolonged period, store the equipment in its original container.

RELATED PUBLICATIONS

Listed below are related manuals and their publication numbers. Copies of these publications can be downloaded from the ADC website at *www.adc.com*. To order a hard copy, please contact your sales representative.

Title	Catalog Number
Soneplex System Installation Manual (Broadband and Loop Extender Chassis)	LTPS-UM-8010-xx
HiGain H2TU-R-402 List 7A Remote Unit	LTPH-QI-1202-xx
Soneplex LPS-H2TU-C List 7 Line Card Quick Installation Guide	LTPS-QI-8056-xx
Shelf Controller Unit v3.6/v3.7 User Manual	LTPS-UM-8024-xx
Shelf Controller Unit v4.1 User Manual	LTPS-UM-8031-xx
Soneplex System TL1 Interface Specification (v4.1)	LTPS-RM-8027-xx

SAFETY WARNINGS AND NOTICES

To avoid electric shock, be careful when working near HDSL2 loop connections or telecommunications circuits. Coming in contact with high electrical potential will result in death or severe personal injury.

The chassis must be properly grounded to ensure human and equipment safety.

To prevent electrical shock, never install telephone equipment in a wet location or during a lightning storm. When installing or modifying telephone lines, disconnect lines on the network side before working with uninsulated lines or terminals.

To avoid electrical shock, be careful when working near power supplies. Soneplex equipment uses -48 Vdc office power and some remote HDSL2 equipment uses -130 Vdc.

Electronic components can be damaged by electrostatic discharge (ESD). Before handling modules, wear an antistatic discharge wrist strap to prevent damage to electronic components. Place components in antistatic packing material when transporting or storing. When working on components, always place them on an approved antistatic mat that is electrically grounded.

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OVERVIEW

The LPS-H2TU-C List 7 Central Office (CO) module is a low-power, plug-in line card that installs in the following chassis:

- LoopStar Chassis
- Soneplex Broadband Chassis (BBC) or Integrated Broadband Chassis (IBBC)
- Soneplex Loop Extender Chassis (LEC)

The LPS-H2TU-C List 7 (hereafter referred to as the H2LXC) provides DS1/HDSL2 signal conversion, and status and alarm reporting. The module is compatible with the H2TU-R-402 List 7A (H2LXR) remote module and does not support repeaters.

The H2LXC, when used in conjunction with an H2LXR, provides 1.544 Mbps full-duplex T1 transmission on one unconditioned copper pair over the full Carrier Service Area (CSA) range. The CSA includes loops of up to 12,000 feet on 24 AWG wire or 9,000 feet on 26 AWG wire, including bridged taps.

The Shelf Controller Unit (SCU) software version determines the screens viewed from the user interface. Versions SCU 3.6.2 through SCU 4.1 support the LPS-H2TU-C List 7 in BBC, LEC, and IBBC systems. The LoopStar system uses SCU 5.x firmware. If you are installing the LPS-H2TU-C List 7 in a LoopStar system, refer to user manual LTPS-UM-8061-xx for complete information relating to that system.

FEATURES

- Dual (bi-directional) loopbacks (initiated from H2LXC front panel, H2LXR front panel, or SCU craft screen)
- Network Keep-Alive Feature (sends keep-alive signal to network and customer when DS1 LOS or HDSL2 LOSW is detected)
- 1.544 Mbps full-duplex transmission on one unconditioned copper pair
- Status Light Emitting Diodes (LEDs) for Digital Signal Level 1 (DS1) and HDSL2 interfaces
- Line-powered H2LXR
- Ultra-low wander (0.26 UI)
- Lightning and power cross-protection on HDSL2 interface
- Ground fault detection
- Alternate Mark Inversion (AMI) or Bipolar with 8-Zero Substitution (B8ZS) line code
- Unframed, SuperFrame (SF), or Extended SuperFrame (ESF) frame format

DS1 is used throughout this document to refer to either the remote unit's DS1 interface or the line unit's DSX-1 interface.

FRONT PANEL

Figure 1 shows the features of the H2LXC front panel and Table 1 on page 3 describes these features.

The H2LXC and H2LXR modules are initially configured through a maintenance terminal connected to the SCU craft port. Depending on the security level assigned to a user, future H2LXR configuration changes may be made through the H2LXR craft port using a laptop PC (see "H2LXC Provisioning" on page 12).

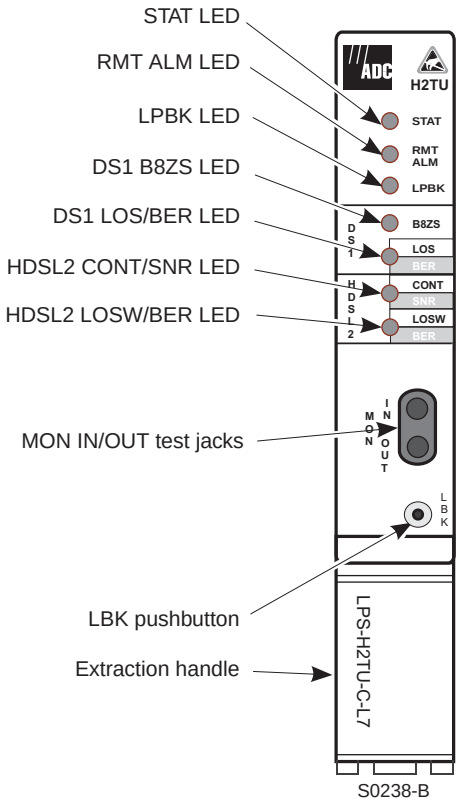

Figure 1. *H2TU (H2LXC) Front Panel*

For information on the H2LXR, refer to document LTPH-QI-1202-xx.

Table 1. H2LXC *Front-Panel Components*

LED	Description
STAT	Displays results of self test.
Red	Internal fault detected during diagnostics.
Yellow	Module is initializing or performing self test.
Green	Normal operation.
Off	No power to the module or blown fuse
RMT ALM	Indicates detection of remote alarm.
Yellow	Remote alarm detected at the H2LXR module.
Off	Normal operation.
LPBK	Indicates loopback activity at the H2LXC.
Yellow	**Flashing:** 1 flash per second when armed in intelligent loopback modes. **Steady:** Active DS1 loopback at any unit in the system.
Off	Normal operation.
DS1 B8ZS	Indicates input line code configuration.
Green	Input code is provisioned for B8ZS.
Off	Input code is provisioned for AMI.
DS1 LOS/BER	Indicates loss of DS1 signal (LOS), Bipolar Violation (BPV), or Bit Error Rate (BER) errors at DS1 interface.
Red	LOS (DS1 receive signal is lost).
Yellow	**Brief Flash:** Intermittent BPV errors. **Steady:** BER threshold exceeded at local DS1 interface (default is 10^{-7}).
Off	Normal operation.
HDSL2 CONT/SNR	Indicates loss of loop continuity or signal-to-noise ratio (SNR) errors.
Red	The HDSL2 loop has lost continuity.
Yellow	SNR is lower than threshold value at near end of local loop (default is +5 dB).
Off	Normal operation.
HDSL2 LOSW/BER	Indicates loss of HDSL2 frame synchronization (LOSW), Cyclical Redundancy Check (CRC), or BER errors.
Red	HDSL2 LOSW detected.
Yellow	**Brief Flash:** HDSL2 CRC error on HDSL2 loop. **Steady:** BER threshold exceeded on HDSL2 loop, (default is 10^{-7}).
Flashing Green	HDSL2 activation in progress.
Green	Normal operation.
DS1 Test Jacks	
MON	Bantam jacks that provide non-intrusive access to monitor the DS1 signal.
IN	Provides monitoring jack access to the DS1 signal from the network.
OUT	Provides monitoring jack access to the DS1 signal from the CPE.
Controls	
LBK pushbutton	Initiates a dual loopback at the H2LXC. The DSX-1 signal is looped back to the network at the H2LXC and the DS1 signal from the customer is looped back to the customer at the H2LXC.
Extraction handle	Pushing up on the extraction handle presses the H2LXC into the backplane card connector. Pushing down on the handle extracts the H2LXC from the backplane card connector.

INSTALLATION

The installation section provides instructions for installing the H2LXC module and performing initial turnup. This procedure assumes that the Soneplex chassis and remote enclosure have been mounted and that all wiring has been completed. The installation procedure includes the following:

- Testing the earth ground potential of the H2LXR remote enclosure
- Testing the local power supply
- Inserting cards in a Soneplex chassis and remote enclosure
- Verifying successful completion of self test.

Never install telephone equipment in a wet location or during a lightning storm. When installing or modifying telephone lines, disconnect lines at the network interface before working with uninsulated lines or terminals to prevent electrical shock.

Wear an antistatic wrist strap to prevent damage to module components. Place modules in antistatic packing material when transporting or storing.

To comply with the intrabuilding wiring requirements of GR-1089 CORE, Section 4.5.9, the shields of the ABAM-type cables that connect theHDSL2 CO Line Card DSX-1 output ports to the cross-connect panel must be grounded at both ends.

Always install the H2LXC and perform T1 provisioning before installing the H2LXR. The H2LXC must be set to Equipped and T1 Provisioning set to Yes **before any provisioning can be performed at the H2LXR. The H2LXR craft interface can then be used to place the facility into service (including unit, T1, and HDSL2 service states) after turnup testing is complete.**

To install and turn up the H2LXC:

1 Open the shipping carton, carefully unpack the module from the protective packing material, and inspect the module.

If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company and to ADC DSL Systems, Inc. Contact ADC if there are any damages or irregularities. See “Appendix C - Product Support” on page 36 for procedures.

2 Check each component against the packing list to verify that the correct catalog numbers and quantities were received.

3 Align the H2LXC with the card-slot guides and slide the CO card into the chassis. Raise the extraction handle on the H2LXC front panel to insert the CO card into the card connector. If excessive resistance is encountered, remove the module and check for obstructions or improper alignment.

4 Following module insertion, the STAT LED lights red, which indicates that power is on. At the start of self test, all LEDs momentarily light yellow (except for the STAT LED, which remains yellow until completion of self test).

Following successful completion of self test, the front-panel LEDs appear as follows:

- STAT: Green indicates successful completion of self test

- RMT/HSKP: Off or yellow when the HDSL2 LOSW/BER LED is red
- LPBK: Off
- DS1 LOS/BER: Off, red, or yellow (see Table 2 for details).
- HDSL2 CONT/SNR: Off
- HDSL2 LOSW/BER: Red, then flashing green until the HDSL2 loop is synchronized, then solid green. If an intermittent CRC error is detected on the HDSL2 loop, a yellow flash will be observed.

5 If the LED indicators respond as described, proceed to Step 6; otherwise, refer to "Turnup Troubleshooting" on page 5 to isolate the problem.

6 Assuming that a working SCU resides in the CO chassis, press the LMPTST switch on the APU to verify that all the LEDs on the H2LXC front-panel light yellow; this indicates that the LEDs are functional.

7 If all LEDs do not light yellow, consider the H2LXC defective. Remove the H2LXC module, replace it with a new module, then repeat Steps 2 through 6.

8 Before installing the associated H2LXR, connect a maintenance terminal to the SCU craft port (page 11), logon the SCU craft interface ("Craft Interface Logon" on page 12), and set the H2LXC Unit Equip State to EQUIPPED and T1 Provisioning to YES (see "H2LX Configuration" on page 15).

TURNUP TROUBLESHOOTING

Use the information in Table 2 when the H2LXC or H2LXR fails its self test at initial turnup.

Table 2. *Troubleshooting the* H2LXC *and H2LXR Using LED Indicators*

LED	Description
If STAT LED is . . .	
red	The module has failed self test. Remove and reinsert the H2LXC module, then wait while the module again performs self test. If the STAT LED lights red at the end of the second self test, the module is defective. Remove the module and replace it with a new module. Repeat Steps 2 through 6 of "Installation" on page 4.
If RMT ALM LED is . . .	
yellow	An alarm condition (e.g., no DS1 signal, or a loop in LOSW) exists at the H2LXR.
If DS1 LOS/BER LED is . . .	
yellow	The Bit Error Ratio (BER) of the DS1 network signal exceeds the threshold value (default value is 10^{-7}).
red	A DS1 signal is not being received from the network.
If HDSL2 CONT/SNR LED is . . .	
yellow	The Signal-to-Noise ratio (SNR) on the HDSL2 loop is below the threshold value (default setting is +5 dB).
red	There is an open circuit (no continuity) on the HDSL2 loop.
If HDSL2 LOSW/BER LED is . . .	
flashing yellow	An intermittent CRC error is being detected on the HDSL2 loop. Verify that the loop is within CSA specification and that all connections are good.
steady yellow	The Bit Error Ratio (BER) of the HDSL2 signal on the loop exceeds the threshold value (default value is 10^{-7}).
flashing green	Indicates that the HDSL2 loop is attempting to synchronize.
red	The HDSL2 loop is not synchronized. Verify that the H2LXR is installed properly, that the power is available to the H2LXR, and that all HDSL2 loop connections are completed.

H2LXC AND H2LXR END-TO-END TEST

This procedure provides instructions for testing the central office H2LXC and the remote H2LXR for proper end-to-end operation. The installation of the remote system must be complete to perform this procedure.

H2LXC End-to-End Test

1 Partially remove the H2LXC module from the chassis to disconnect power from the module.

2 Inform the technician at the remote location that the end-to-end test is to be initiated.

An H2LXR must be installed at the remote location to initiate the end-to-end test.

3 Reinstall the H2LXC in the chassis and observe the front-panel LED indicators. Verify that each LED operates as specified in the following list. If the LED indicators respond as specified, continue to Step 4.

- If the STAT LED is red, the H2LXC has failed self test. Remove and reinsert the H2LXC, then wait while the H2LXC again performs self test. If the STAT LED lights red at the end of the second self test, the H2LXC is defective. Remove the H2LXC, replace it with a new module, and repeat Steps 1through 3.
- If the HDSL2 CONT/SNR LED is yellow, the signal-to-noise ratio on the HDSL2 loop is below the threshold value (default setting is +5 dB equivalent noise margin). Correct as specified by local troubleshooting practice.
- If the HDSL2 CONT/SNR LED is red, there is a DC CONT alarm present. Verify the loop.
- If the HDSL2 LOSW/BER LED momentarily flashes yellow, an intermittent CRC error is being detected on the HDSL2 loop. Verify that the loop is within CSA specifications and that all connections are good. Correct as specified by local troubleshooting practice.
- If the HDSL2 LOSW/BER LED flashes green or is solid red, the HDSL2 loop is not synchronized. Verify that the remote H2LXR is installed properly and that all HDSL2 loop connections have been completed.

The synchronization process may take approximately 30 seconds to complete. The HDSL2 LOSW/BER LED flashes green until loop synchronization is complete.

When DISP RMT (Display Remote) is initiated from the APU, the STAT, LPBK, HDSL2 CONT/SNR, and HDSL2 LOSW/BER indicators on the H2LXC illuminate to represent the H2LXR LED conditions.

4 Press the LPK pushbutton on the H2LXC front panel for at least 5 seconds. At the end of 5 seconds, the LPBK LED lights yellow to indicate that the local bidirectional DS1 signal loopback at the H2LXC is activated. The signal from the customer is looped back towards the customer and the signal from the network is looped back towards the network.

5 Press the LPK pushbutton for at least an additional 5 seconds. At the end of 5 seconds, the LPBK LED extinguishes indicating that the bidirectional DS1 signal loopback at the H2LXC is inactive. When the LPBK pushbutton is released, the LPBK LED remains off.

If the H2LXC responds as indicated, the local bidirectional DS1 signal loopback is functional. If the H2LXC does not respond as indicated, the module is defective. Remove the H2LXC, replace it with a new module, and repeat Steps 1 through 5.

H2LXR End-to-End Test

1 Partially remove the H2LXR from the remote enclosure to disconnect power from the module.

2 Inform the technician at the central office that the end-to-end test is to be initiated.

The appropriate central office H2LXC must be installed to initiate the end-to-end test.

3 Reinstall the H2LXR in the remote enclosure and observe the front-panel LED indicators. Verify that each LED operates normally as specified in Table 3. If the H2LXR does not respond normally, it is defective. Remove the H2LXR, replace it with a new module, and repeat Steps 1 through 3.

Table 3. *H2LXR LED Descriptions*

LED and Status	Function
ALM	
Solid red	RLOS present at the H2LXR.
Flashing red once per second	LLOS present at the H2LXC.
Loop	
OFF	No activity on the HDSL2 loop.
Solid green	Normal operation: the HDSL2 span is synchronized.
Flashing green once per second	HDSL2 loop synchronization attempt.
Flashing green 4 times per second	HDSL2 margin alarm or loop attenuation alarm present at the H2LXR.
Flashing green 10 times per seconds	HDSL2 CRC error present at the H2LXR.
ESF	
OFF	Unframed DS1 present at the H2LXR or no DS1 detected at the H2LXR.
Solid green	ESF framing present on the incoming DS1 signal.
Flashing green once per second	ESF framing and frame error/CRC present on the incoming DS1 signal.
SF	
OFF	Unframed DS1 present at the H2LXR or no DS1 detected at the H2LXR.
Solid green	SF framing present on the incoming DS1 signal.
Flashing green once per second	SF framing and frame error present on the incoming DS1 signal.
B8ZS	
OFF	HDSL2 span is not synchronized (no DS1 signal detected).
Solid green	B8ZS is provisioned or is detected when set to AUTO.
Flashing green once per second	B8ZS and string of excess zeros detected on the incoming DS1 signal.
AMI	
OFF	HDSL2 span is not synchronized (no DS1 signal detected).
Solid green	AMI is provisioned or detected when set to AUTO.
Flashing green once per second	AMI and BPV detected on the incoming DS1.
LBK	
Solid yellow	Loopback in H2LXR towards network (NREM, SMJK, or TLOS).
Flashing yellow once per second	Loopback in H2LXR towards customer.
Flashing yellow 4 times per second	System ARMed for loopback.

The synchronization process may take approximately 30 seconds to complete. The H2LXC LOSW/BER LED flashes green until loop synchronization is complete.

SCU AND H2LXR CRAFT PORT INTERFACE

MAINTENANCE TERMINAL CONNECTION

The SCU and H2LXR Craft Interface is accessed via the craft port on their respective front panels. The craft interface system requires a VT100 terminal or computer with VT100 emulation serving as a maintenance terminal. The craft port hardware provides an RS-232 9-pin connector configured as DCE. A straight-through EIA-232 cable is required to connect the maintenance terminal to the craft port.

1 Locate the power switch on the maintenance terminal and turn the power on.

2 Set the maintenance terminal communication parameters to the settings shown in Table 4 below.

3 Select the cable that is required for connecting the maintenance terminal to the craft port. A straight-through EIA-232 25-pin connectorized cable with a 9-pin adapter may be used to connect the maintenance terminal to the port. Ensure that the cable is configured to the standard shown in Table 5.

4 Attach the interface cable to the craft port on the SCU front panel.

5 Connect the other end of the cable to the appropriate port on the maintenance terminal.

Table 4. *Communication Settings*

Communication Parameters	Required Settings
Baud Rate	9600
Parity	NONE
Data Bits	8
Stop Bits	1
Flow Control	NONE

Table 5. *Craft Interface Pinouts* [(a)]

Pin	Name	Source	Circuit CCIT	Circuit EIA	Function
2	TD	DTE	103	BA	Transmitted Data
3	RD	DCE	104	BB	Received Data
5	SG	–	102	AB	Signal Ground

(a) Cable uses Type DB-9 male connector
Overall shielding is common for all leads.
Use 26 AWG or larger wire, stranded pairs.

LOGGING ON THE CRAFT PORT INTERFACE

The SCU craft port interface includes an EIA-232 DCE connection for a VT100 compatible terminal or PC with VT100 emulation. The SCU craft port provides a menu-driven interface for viewing the status of and provisioning the H2LXC and associated H2LXR (see Figure 2).

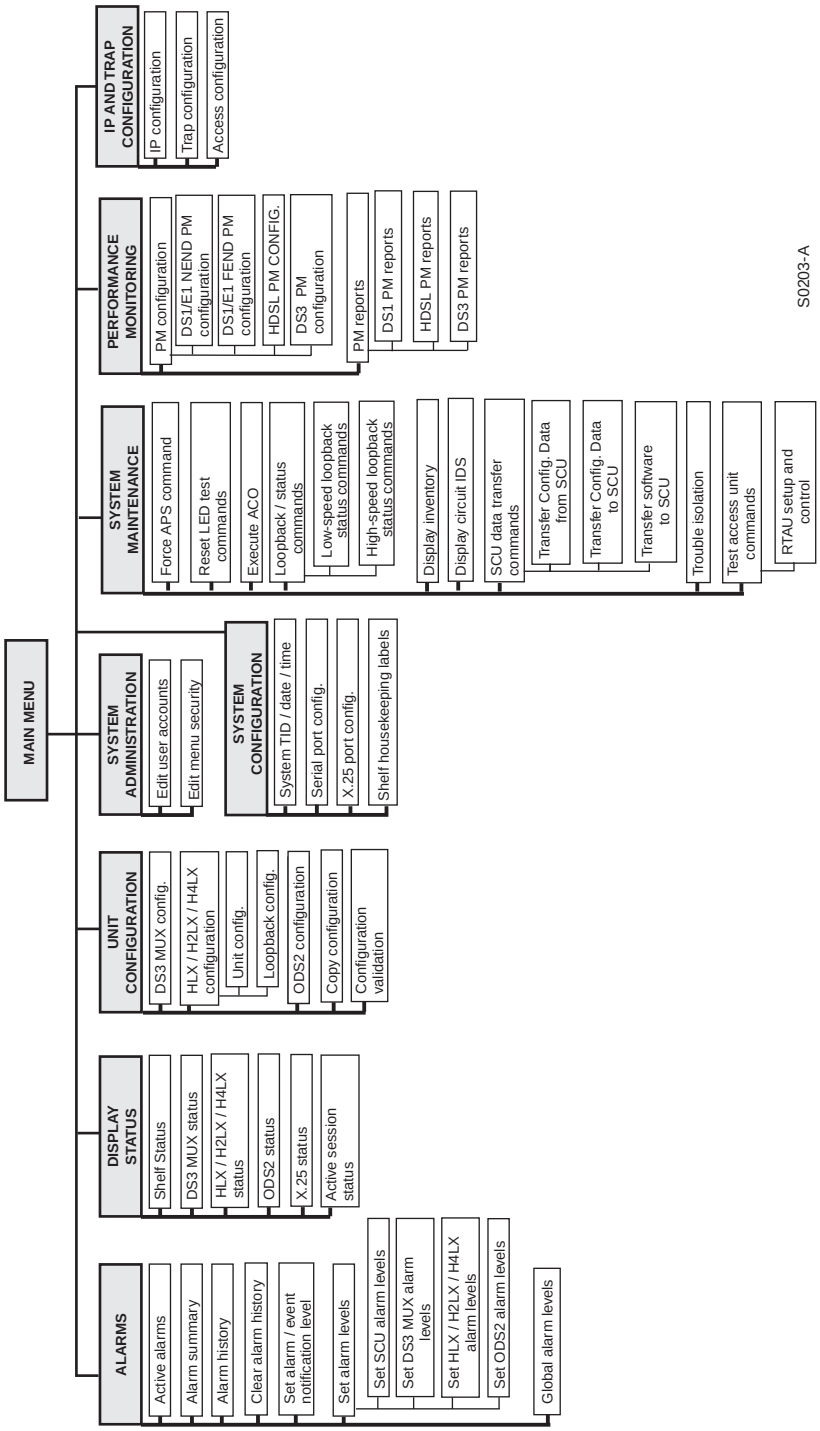

Figure 2. *SCU Craft Port Interface Menu Tree*

LOGON PROCEDURES

SCU Logon

Using the default user name (SONEPLEX) and password (SONEPLEX1), a user can view and configure the H2LXC and H2LXR through the SCU Craft Port interface. The SONEPLEX user name and SONEPLEX1 password can be deleted or changed through the SCU Craft Port interface. In addition, logon user names may be assigned security levels that permit alteration of configuration menus and changes to circuit status. These user names, passwords, and security levels are established by the system administrator at the SCU module.

The H2LXR craft port interface includes an RS-232C DCE connection that allows access to status and provisioning information from the remote location. The H2LXR craft port provides a menu-driven interface for viewing the status and provisioning of the H2LXR. The screens viewed from the H2LXR are displayed in a different format from the H2LXR screens viewed from the SCU.

Craft Interface Navigation

The maintenance terminal keyboard is used to select menus, view screens. and enter alphanumeric information into the system as necessary. Keyboard operations make use of the alphanumeric keys, arrow keys, enter key, space bar, and control key.

Cursor

In the SCU Craft Port interface, a cursor is used to indicate menu selections, option settings, and data entry fields. The cursor may take the form of a block, a highlighted field, or a flashing line. When selecting a menu, the cursor is moved by pressing either the arrow or number keys. When selecting an option setting or making a data entry, the cursor is moved by pressing the arrow keys.

Arrow Keys

The arrow keys move the cursor r to select menu items, option settings, and data entry fields. In screens that have more than one page, the arrow keys also move the screen up or down one line at a time.

Enter Key

The ENTER key causes the system to act on the data that was entered. Selections may be entered into the system in one of two ways:

- By pressing the ENTER key after making each selection.
- By pressing the ENTER key (before leaving the screen) after all selections and entries are made.

Space Bar

The SPACEBAR is used to scroll through selections within a highlighted toggle field. Press ENTER to confirm a selection.

Reverse Key

Pressing the R (Reverse) key, when in a selection field, changes the selection to the previous choice.

Control Key

Special functions are activated by pressing the CTRL key and another key at the same time (see Table 6).

Table 6. *Control Key Functions*

Holding down the CTRL key and pressing . . .	Results in . . .
A	Displaying the help screen
D	Terminating the session and logging out
P	Cancelling the current operation and moving to the previous menu
R	Cancelling the current operation and refreshing (redrawing) the current screen with the last saved values
T	Cancelling the current operation and moving to the SCU Main Menu

Data Entry

The SCU Craft Port interface has three different data field types. A “toggle” field type allows the user to press the space bar to view and select different options that are described. An “input” field type requires the user to type an entry in the field according to the parameters described. A “fixed” field is locked and cannot be changed by the user.

Pop-Up Boxes

On some of the craft interface screens, error and information notes appear as needed to assist you in operating the system. The information is displayed in a pop-up box that appears over the current screen display.

Help Screen

A help screen is available from all screens by pressing CTRL + A. The help screen displays information about moving among the fields and making edits.

H2LXC PROVISIONING

The primary source for H2LXC and H2LXR provisioning is the Unit Configuration screen on the SCU Main Menu (Figure 7 on page 15). The secondary provisioning source for the H2LXR is the craft port interface menus available at the H2LXR. The H2LXR craft menus enable the user to alter a subset of the H2LXR provisioning values selectable at the H2LXC. For H2LXR provisioning items that are alterable in the craft port interface menus, the H2LXR communicates provisioning changes back to the H2LXC. All provisioning values which can be altered by the H2LXR craft port interface remain in the state that was last set at either the H2LXR or H2LXC.

Perform the following procedures in the order listed to provision the H2LXC.

1 Log on to the craft interface (see "Craft Interface Logon" on this page).

2 Display H2LXC status information (see "H2LX Status Display" on page 13).

3 Configure the H2LXC circuit (see "H2LX Configuration" on page 15).

4 View the HDSL2 Performance Monitoring Reports (see "HDSL2 Performance Monitoring Reports" on page 20).

5 Display the Inventory Status screen (see "Inventory Status Display" on page 22).

6 Reset the H2LXC (see "H2LXC Reset" on page 23).

CRAFT INTERFACE LOGON

Use this procedure to log on to the SCU or H2LXR craft interface system. Logon consists of entering the Logon user name and password.

1 At the maintenance terminal, press the **ENTER** key. The SCU logon screen appears, as shown in Figure 3.

2 At the Enter User Name field, enter the assigned Logon ID. If a Logon ID is not assigned yet, enter "SONEPLEX", using uppercase letters. Press the **ENTER** key.

3 Enter the assigned password. If a password is not yet assigned and the user name entered was SONEPLEX, enter "SONEPLEX1" in uppercase letters. Press the **ENTER** key. The Soneplex SCU Main Menu appears (see Figure 4 on page 13).

Figure 3. *SCU Logon Screen*

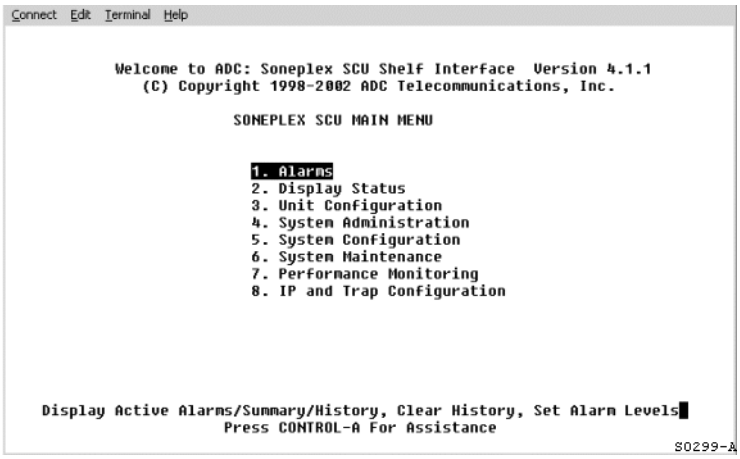

Figure 4. *Soneplex SCU Main Menu*

H2LX STATUS DISPLAY

Use this command to display the H2LX Status screen for the near-end and far-end cards in the HDSL2 circuit. The status of the H2LXR (if present) is also shown on this screen.

Press CTRL + A for help information on moving around and editing fields.

1 Log on to the SCU craft interface. The Soneplex SCU Main Menu screen appears.

2 From the SCU Main Menu, use the arrow keys or number keys to select **Display Status**. Press ENTER if using the arrow keys. The Display Status menu appears, as shown in Figure 5 below.

3 From the Display Status menu, select **Display HLX/H2LX/H4LX Status**. The H2LX Status screen appears, as shown in Figure 6 on page 14. Table 7 on page 14 provides a key to the H2LX status columns in Figure 7 on page 15 and Figure 8 on page 16.

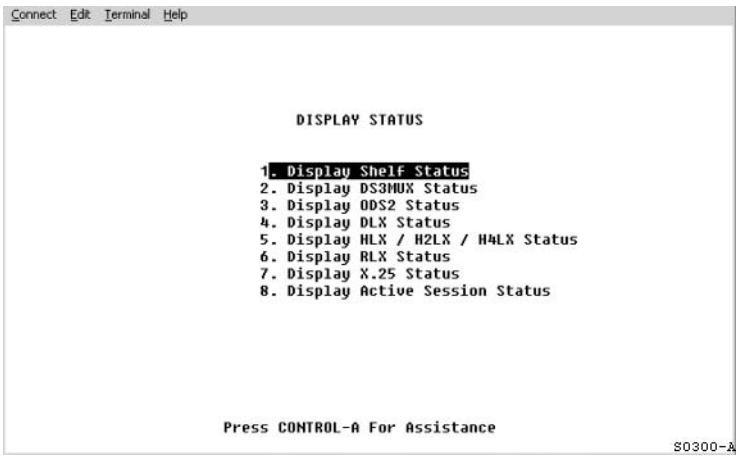

Figure 5. *Display Status Menu*

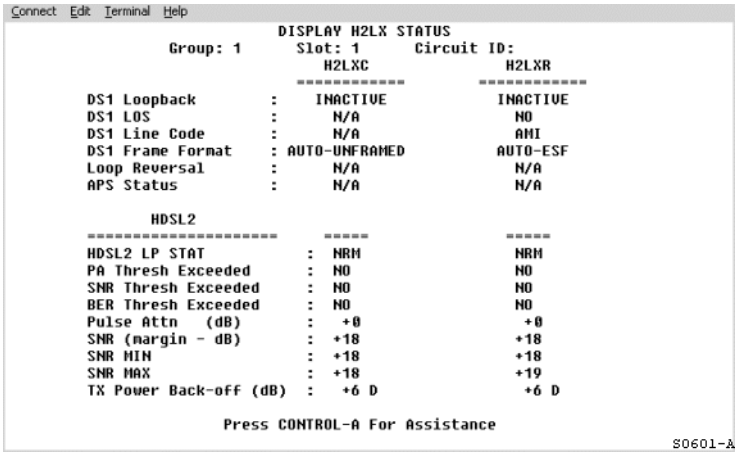

Figure 6. *Typical H2LX Status Screen for Broadband Chassis*

Although APS Status is shown in the H2LX Status Screen, the feature is disabled for this release.

Table 7. *Fields in H2LX Status Screens*

Field	Display	Description
DS1 Status		
DS1 Loopback	ACTIVE	DS1 loopbacks are active at the locations indicated.
	INACTIVE	DS1 loopbacks are inactive at the locations indicated.
DS1 LOS	N/A (Not Applicable)	Broadband chassis.
	NO	The DS1 signal is present at the locations indicated.
	YES	The DS1 signal is not present at the locations indicated.
DS1 Line Code	AMI	Alternate Mark Inversion
	B8ZS	Bipolar Eight-Zero Substitution
DS1 Frame Format	ESF SF AUTO-UNFRAMED	H2LXR automatically detects and matches frame format received from H2LX.
Loop Reversal	N/A (Not applicable)	HDSL2 has only one loop.
	NO	HDSL Loop 1 and Loop 2 are not reversed at the CO.
	YES	HDSL Loop 1 and Loop 2 connections are reversed at the CO.
HDSL2 Status		
HDSL2 LP STAT (Loop Status)	NRM (Normal)	HDSL2 loop is operating normally at the locations indicated.
	DIS (Disabled)	HDSL2 loop is disabled at the locations indicated.
	LSW (Loss of Sync Word)	HDSL2 loop is out of sync at the locations indicated.
PA Thresh Exceeded	NO	The HDSL2 PA threshold (set at 35 dB) was not exceeded at the locations indicated.
	YES	The HDSL2 PA threshold (set at 35 dB) was exceeded at the locations indicated.

Continued

Table 7. *Fields in H2LX Status Screens (Continued)*

Field	Display	Description
SNR Thresh Exceeded	NO	The HDSL2 SNR threshold (set at 5 dB) was not exceeded at the locations indicated.
	YES	The HDSL2 SNR threshold (set at 5 dB) was exceeded at the locations indicated.
BER Thresh Exceeded	NO	The BER threshold (set at $10E^{-7}$) was not exceeded at the locations indicated.
	YES	The BER threshold (set at $10E^{-7}$) was exceeded at the locations indicated.
Pulse Attn (dB)	+0 dB to +39 dB	Current PA value at the locations indicated.
SNR (margin –dB)	-9 dB to +31 dB	Current SNR (Margin) value at the locations indicated.
SNR MIN	-9 dB to +31 dB	The current minimum SNR (Margin) value at the locations indicated.
SNR MAX	-9 dB to +31 dB	The current maximum SNR (Margin) value at the locations indicated.
TX Power Back-off (dB)	D (Default) = 0 to 6 dB	Default and Enhanced values are determined by the H2LX module and reported to SCU for display.
	E (Enhanced) = 0 to 15 dB	

H2LX CONFIGURATION

Use this procedure to configure or view the status of the H2LX and the associated H2LXR.

1 Log on to the SCU craft interface. The Soneplex SCU Main Menu screen appears.

2 From the SCU Main Menu, use the arrow keys or number keys to select **Unit Configuratio**n. Press if using the arrow keys. The Unit Configuration menu appears, as shown in Figure 7.

3 From the Unit Configuration menu, select **HLX/H2LX/H4LX Configuratio**n. The H2LX Unit Configuration screen appears (Figure 8 on page 16).

4 Starting at the top of Table 8 on page 16 and working your way to the bottom, configure H2LX fields. Tab from field to field.

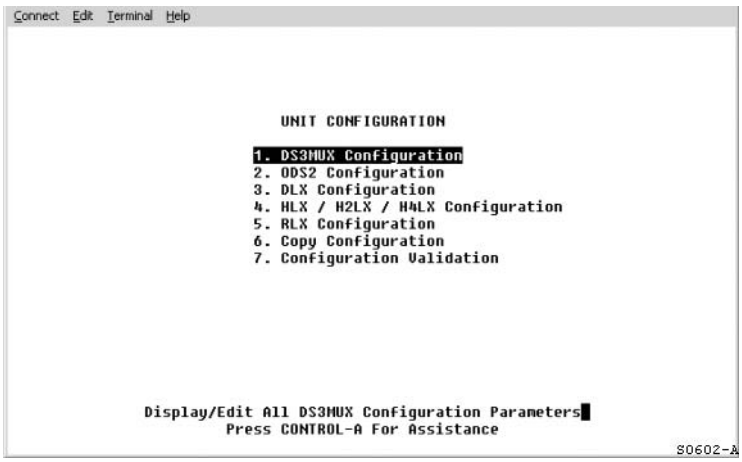

Figure 7. *Unit Configuration Menu*

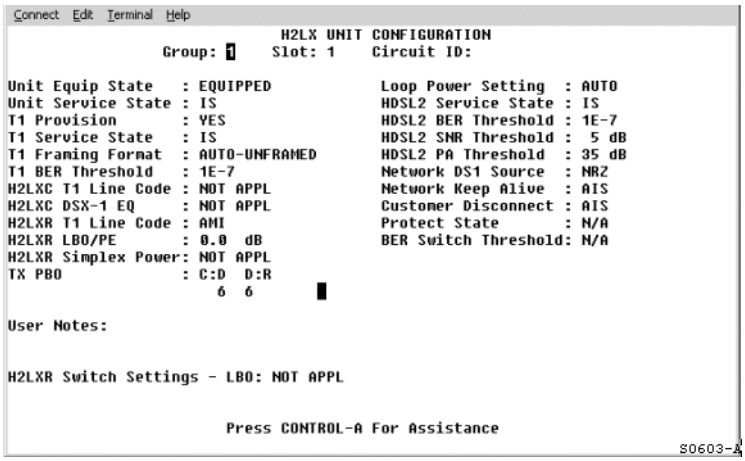

Figure 8. *H2LX Unit Configuration Screen for Broadband Chassis*

Although Protect State is shown in the H2LX Unit Configuration Screen, the feature is disabled for this release.

Table 8. *Fields in H2LX Unit Configuration Screen*

Field	Type	Options	Description	Default
Group	Toggle	1, 2, 3, 4, 5, 6, or 7	Specifies the module group number designated on the chassis. (Groups 6 and 7 are not options with the 19-inch chassis.)	1
Slot	Toggle	1, 2, 3, or 4	Specifies the module slot number within the group number designated on the chassis.	1
Circuit Identifier This field can *only* be configured after the T1 Provision field (listed below) is set to YES.	Input	Enter up to 20 characters.	Represents the customer circuit ID. The first character must be alpha or numeric; middle characters can be alpha, numeric, or hyphens; and the last character must be either alpha or numeric.	Blank
Unit Equip State	Toggle	EQUIPPED	Establishes communication with the SCU. Module must be set to EQUIPPED before remaining selections are allowed. Enables DS1 output from H2LX.	Unequipped
		UNEQUIPPED	No communication with the SCU.	
Unit Service State	Toggle	Leave this field at OOS to avoid undesirable reporting of alarms. Set this field to IS after completing the configuration of the remaining fields.		
		IS (In-Service)	Places the unit in service and allows equipment alarm reporting by the SCU. Must be set to IS for reporting equipment alarms.	OOS
		OOS (Out-Of-Service)	Removes unit from service and stops equipment alarm reporting by the SCU.	
T1 Provision	Toggle	YES	Brings up T1 default settings and allows configuration changes.	NO
		NO	No configuration changes allowed.	

Continued

Table 8. *Fields in H2LX Unit Configuration Screen (Continued)*

Field	Type	Options	Description	Default
T1 Service State	Toggle	Leave this field at OOS to avoid undesirable reporting of alarms. Set this field to IS after completing the configuration of the remaining fields.		
		IS (In-Service)	Places DS1 facility in service and allows T1 alarm reporting by the SCU, and enables DS1 PM data collection.	OOS
		OOS (Out-Of-Service)	Removes DS1 facility from service and stops alarm reporting by the SCU.	
T1 Framing Format	Toggle	AUTO	The system automatically detects and establishes the current frame format (UNFRAMED, SF, or ESF). It then displays "AUTO" and the frame format. This option inhibits path performance monitoring and alarms.	AUTO
		Unframed	Unframed data pattern.	
		SF	Super Frame	
		ESF	Extended Super Frame	
T1 BER Threshold	Toggle	Range: From 10^{-3} to 10^{-9}, or DISABLE	The average Bit Error Ratios of the incoming DS1 signals are monitored by the H2LX. By monitoring DS1 BPVs (Bipolar Violations), the H2LX is capable of triggering an alarm when any of the monitored signals degrades below the BER threshold level.	10^{-7}
H2LX T1 Line Code (Loop Extender Chassis only)	Toggle	AMI	Alternate Mark Inversion	AMI
		B8ZS	Bipolar Eight-Zero Substitution	
H2LX DSX-1 EQ (Loop Extender Chassis only)	Toggle	0 – 133 ft, 133 – 266 ft, 266 – 399 ft, 399 – 533 ft, or 533 – 655 ft	The DS1 signal output provides standard DSX signal levels that can be compensated for various distances.	0 – 133 ft
H2LXR T1 Line Code	Toggle	AMI	Alternate Mark Inversion	AMI
		B8ZS	Bipolar Eight-Zero Substitution	
H2LXR LBO/PE (Line Buildout [a] (Pulse Equalization)	Toggle	UNIT SWITCH	The Unit Switch selection defaults to the LBO hardware configuration settings on the H2LXR.	UNIT SWITCH
		0 – 133 ft, 133 – 266 ft, 266 – 399 ft, 399 – 533 ft, or 533 – 655 ft	Pulse Equalization: The DS1 signal output provides standard DSX signal levels that can be compensated for various distances.	
		0.0 dB, 7.5 dB, 15.0 dB, or 22.5 dB	LBO: Sets the LBO in decibels for the H2LXR.	
TX PBO (Transmit power backoff) [b]	Toggle	D (Default)	Minimum power backoff is applied to the signal.	D
		E (Enhanced)	Maximizes the amount of power backoff applied to the signal.	
Loop Power Setting [c]	Toggle	AUTO	Span power is fixed at -190 Vdc.	AUTO
		NEG ONLY	Span power is fixed at -190 Vdc.	
		POS/NEG	Span power is fixed at -190 Vdc.	
		DISABLED [d]	Disabling loop power turns off the power coming from the H2LXC.	

Continued

Table 8. *Fields in H2LX Unit Configuration Screen (Continued)*

Field	Type	Options	Description	Default
HDSL2 Service State	Toggle	IS (In-Service)	Allows HDSL2 alarms to be reported to the SCU, and enables HDSL2 PM data collection. Must be set to IS for reporting of HDSL2 facility alarms. Setting the Unit Service State field to "IN SERVICE" automatically changes this field to "IS".	OOS
		OOS (Out-of-Service)	No HDSL2 alarms are reported to the SCU.	
HDSL2 BER Threshold	Toggle	Range: 10^{-3} to 10^{-9}	The average Bit Error Ratios of the incoming HDSL2 signals are monitored by the H2LX. By monitoring HDSL2 CRC errors, the H2LX is capable of triggering an alarm when any of the monitored signals degrades below the BER threshold level.	10^{-7}
		DISABLED	Turns off H2LX BER threshold monitoring.	
HDSL2 SNR Threshold	Toggle	Range: 1 to 15	The lowest Signal-to-Noise Ratio margin allowed on the HDSL2 loop before an alarm is triggered.	+5
		DISABLED	Turns off H2LX SNR threshold monitoring.	
HDSL2 PA Threshold	Toggle	Range: 1 dB to 40 dB	The highest Pulse Attenuation value allowed on the HDSL2 loop before an alarm is triggered.	+35 dB
		DISABLED	Turns off H2LX PA threshold monitoring.	
Network DS1 Source [(e)]	Toggle	NRZ	**Broadband only:** Non Return to Zero. This tells the Craft that the network DS1 source is at the backplane from the DS3 MUX.	NRZ (Broadband only)
		BIPOLAR	**Broadband only:** This tells the Craft that the network DS1 source is at the Loop Extender Card interface. If BIPOLAR is selected when an Extender Card is **not** being used, the DS1 signal cuts off. **Loop Extender only:** Locked at BIPOLAR.	BIPOLAR (Loop Extender only)
Network Keep Alive	Toggle	AIS	If the system detects an LOS (Loss of Signal) from the customer, or LOSW on the HDSL2 loop, an AIS is sent to the network.	AIS
		LOOPBACK	If the system detects an LOS from the network or customer, or LOSW on the HDSL2 loop, the signal is automatically looped back towards the network.	
		DS1 CUTOFF [(d)]	If the system detects an LOS from the customer, or LOSW on the HDSL2 loop; the signal is cut off and no pattern is transmitted to the network. The signal is cut off for 6 seconds minimum. This field also controls the customer DS1 cutoff when an H2LXR is deployed.	
Customer Disconnect [(f)]	Toggle	AIS	If the system detects a DS1 LOS from the customer, an AIS (Alarm Indication Signal) is sent to the network.	AIS
		LOOPBACK	If the system detects a DS1 LOS from the customer, the network signal is looped back.	
		NKA (Network Keep Alive)	If the system detects a DS1 LOS from the customer, the Network Keep Alive field setting (see above) is followed.	

Continued

Table 8. *Fields in H2LX Unit Configuration Screen (Continued)*

Field	Type	Options	Description	Default
BER Switch Threshold	Toggle	1E-3 to 1E-9	Sets BER threshold for protection switching.	1E-6
		DISABLED	Disables the BER threshold protection switching parameter.	
User Notes	Input	Enter up to 30 alphanumeric characters.	Enter additional information in the space provided.	Blank

(a) The H2LXR LBO switch setting of the module being configured is displayed at the bottom of the screen.
(b) Power backoff is used to minimize the amount of crosstalk that is introduced into the cable bundle. Power backoff affects the amplitude of the Power Spectral Density (PSD) Mask. The value shown on the SCU craft interface's H2LX Configuration screen indicates the change in dBs that has been made. The SCU reports the current attenuation (power backoff) value (ranging from 0 to 15 dB) for each end of each HDSL2 segment under this field. If the user selects D (Default), a minimal power backoff value is selected, and the display reflects that value. If the user selects E (Enhanced), a different power backoff value is enabled and that value is displayed. The H2LX module determines the power backoff value for the “D” and “E” settings. The SCU only reports the value.
(c) Set the Loop Power Setting to DISABLED when the remote module is the locally powered H2LXR. The loop-powered H2LXRs require the AUTO or NEG Loop Power Setting.
(d) Any setting other than DISABLED acts as an ON setting to the H2LXC.
(e) The DS1 Cutoff option is not available in the Soneplex Broadband system.
(f) The Customer Disconnect field configuration takes precedence over the Network Keep Alive field configuration in the case of a DS1 LOS at the CPE.

HDSL2 PERFORMANCE MONITORING REPORTS

The HDSL2 Performance Monitoring Reports display HDSL2 error counts logged at the CEND (central office end) and REND (remote end) of the circuit as well as the current readings for the pulse attenuation-high (PA-H) and signal-to-noise ratio-low (SNR-L) parameters. To view:

1 Logon to the SCU craft interface. The Soneplex SCU Main Menu screen appears.

2 From the SCU Main Menu, use the arrow or number keys to select **Performance Monitorin**g. Press ENTER if using the arrow keys. The Performance Monitoring menu appears (see Figure 9).

3 From the Performance Monitoring menu, select **PM Report**s. The HDSL Performance Monitoring Reports screen appears (Figure 10 on page 21).

4 In the HDSL Performance Monitoring Reports selection screen, select the **Group** and **Circuit** containing the H2LXC for which a report will be generated. Press the ENTER key. The HDSL2 Performance Monitoring Reports screen appears as shown in Figure 11 on page 21.

The displayed HDSL2 error acronyms are described in Table 9 on page 21. Monitor locations are shown in Figure 12 on page 22.

Pressing CTRL + C raises queries to clear the Performance Monitoring Reports error counts and reset the Elapsed Time counter. Answering yes (Y) to these questions clears those conditions. However, if the PM Configuration screens are assigned to security Level 5 through the SCU craft interface's Edit Menu Security screen and the user is assigned to a Level 4 or below, the user cannot execute this command. (For more information on editing menu security, refer to the *Soneplex System Installation Manual* listed under Related Publications at the beginning of this manual.)

Clearing the Performance Monitoring Reports error counts does not affect current information displayed by the Soneplex SCU.

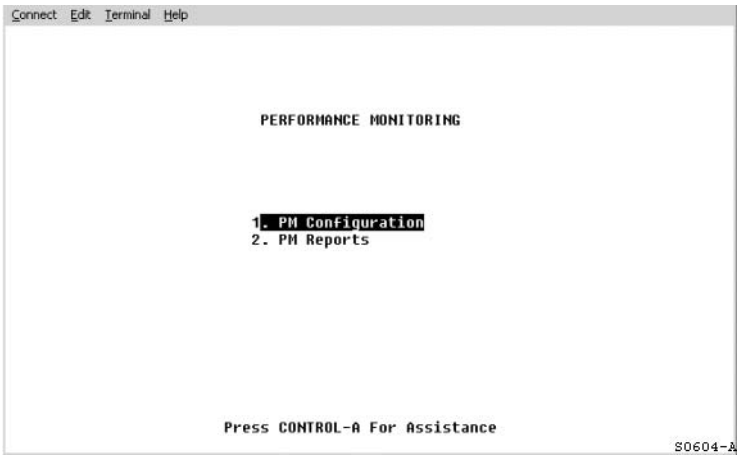

Figure 9. *Performance Monitoring Menu*

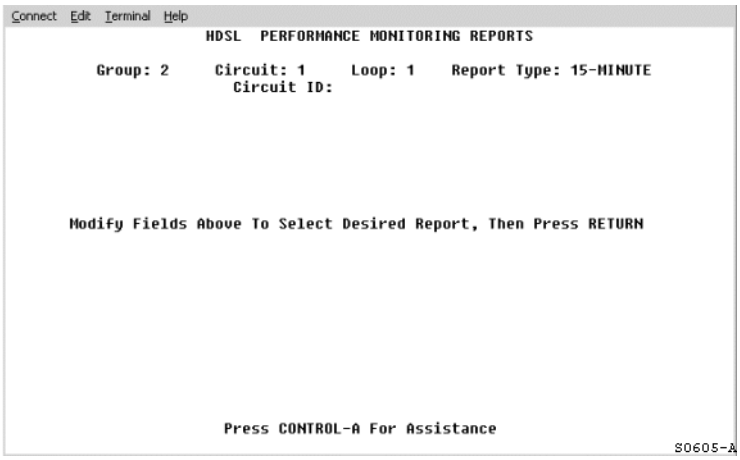

Figure 10. *HDSL Performance Monitoring Reports Screen*

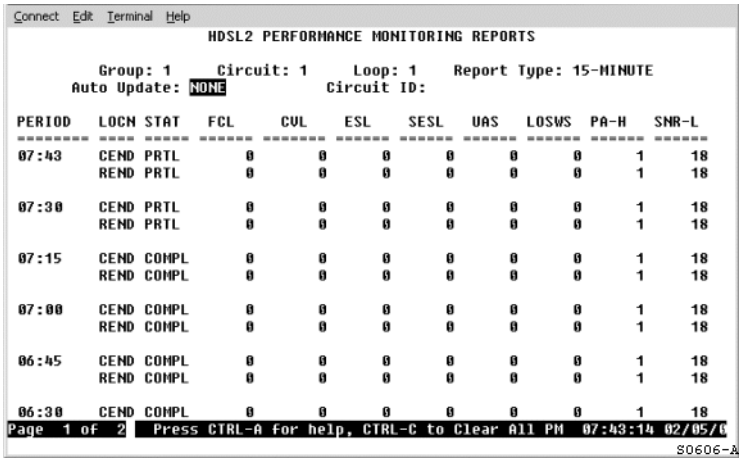

Figure 11. *HDSL2 Performance Monitoring Reports Screen*

Table 9. *Error Acronyms in HDSL2 Performance Monitoring Reports Screens*

Error Acronym	Monitor Location	Description
FCL	CEND, REND	Failure Count, Line—Count of LOSW failures identified for the HDSL2 loop.
CVL	CEND, REND	Code Violations, Line—Count of CRC errors identified for the HDSL2 loop.
ESL	CEND, REND	Errored Second, Line —Count of seconds in which one or more CRC errors occurred without LOSW defects being reported.
SESL	CEND, REND	Severely Errored Second, Line—Count of seconds in which the count of CRC errors is greater than or equal to the user-configurable threshold.
UAS	CEND, REND	Unavailable Seconds—Count of seconds in which 10 or more SES counts occurred.
LOSWS	CEND, REND	Loss of Sync Word Seconds—Count of seconds in which one or more LOSW counts occurred.

Continued

Table 9. *Error Acronyms in HDSL2 Performance Monitoring Reports Screens (Continued)*

Error Acronym	Monitor Location	Description
PA-H	CEND, REND	Pulse Attenuation-High—Highest Pulse Attenuation value detected on the HDSL2 loop within the interval. This value is updated only when the HDSL2 loop is active. If the HDSL2 loop has never been activated, this value is set to 0. The typical PA range is from 0 to +38 dB.
SNR-L	CEND, REND	Signal-to-Noise Ratio-Low—Lowest SNR detected on the HDSL2 loop within the interval. This value is updated only when the HDSL2 loop is active. If the HDSL2 loop has never been activated, this value is set to 71. The typical SNR range is from +5 to +27 dB.

HDSL2 and HDSL4 use line parameters only. HDSL uses path parameters only.

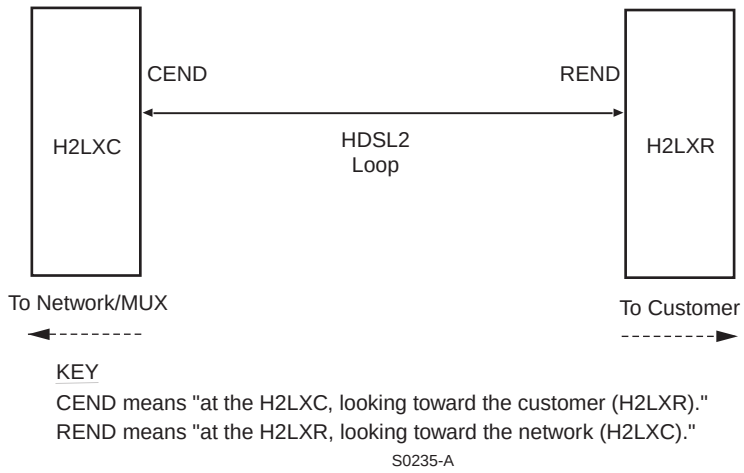

Figure 12. *Location of CEND and REND*

INVENTORY STATUS DISPLAY

Use this procedure to display the inventory of the HDSL2 circuit. The Inventory Status screen shows the Unit Identifier (H2LXC, H2LXR), the ADC part number, catalog number, module serial number, date code, software version, and CLEI code.

1 Log on to the SCU craft interface. The Soneplex SCU Main Menu screen appears.

2 From the SCU Main Menu, use the arrow or number keys to select **System Maintenanc**e. Press **ENTER** if using the arrow keys. The System Maintenance menu appears (Figure 13 on page 23).

3 From the System Maintenance menu, select **Display Inventor**y. The Inventory Status screen appears as shown in Figure 14 on page 23.

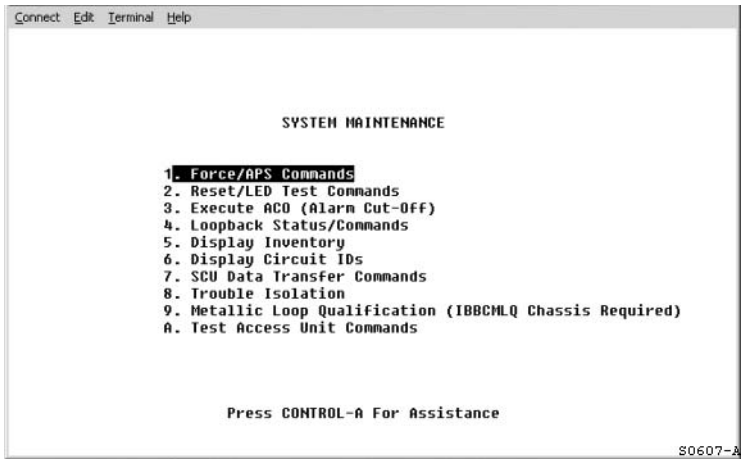

Figure 13. *System Maintenance Menu*

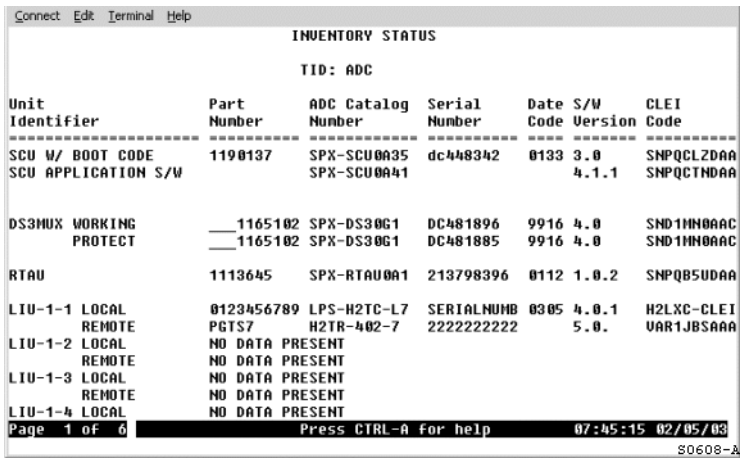

Figure 14. *Inventory Status Screen*

H2LXC RESET

A soft reset reinitializes the module software and clears the error registers shown on the HDSL2 Performance Monitoring Reports.

Performing a reset is a non-service-affecting software routine. However, if the Reset command is assigned to security Level 5 through the SCU craft interface Edit Menu Security screen and the user is assigned to a Level 4 or below, the user cannot execute this command. (For more information on editing menu security, refer to the *Soneplex System Installation Manual* listed under Related Publications at the beginning of this manual.)

Performing a reset logs the user off.

To reset the H2LXC:

1 Log on to the SCU craft interface. The SCU Main Menu screen appears.

2 From the SCU Main Menu, use the arrow or number keys to select **System Maintenanc**e. Press **ENTER** if using the arrow keys. The System Maintenance menu appears (Figure 13 on page 23).

3 From the System Maintenance menu, select **Reset/LED Test Command**s. The Reset/LED Test screen appears as shown in Figure 15.

4 Use the arrow keys to select the module to be reset. Press **R** to execute (the confirmation query shown in Figure 15 appears). Press **Y** to reset the module or press **N** to cancel.

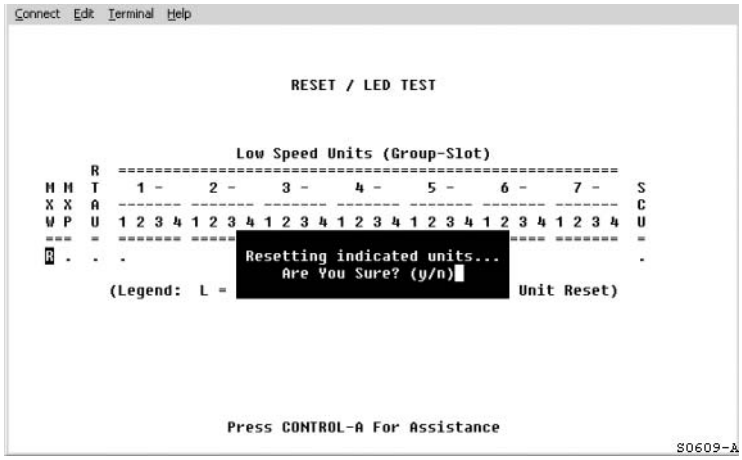

Figure 15. *Reset/LED Test Screen*

5 **To execute the LED test**, select **L** by pressing the space bar to toggle through the options, then press **ENTER**. The following message appears and all the LEDs on the SCU turn amber.

```
Executing LED Test on Selected Unit(s)
Please Wait
```

TESTING

ACTIVE ALARMS DISPLAY

Use this procedure to view currently active alarms. The Active Alarms screen shows the location and level of the alarm conditions for the H2LXC and H2LXR in the circuit.

1 Log on to the SCU craft interface. The Main Menu screen displays.

2 From the Main Menu, use the arrow or number keys to select **Alarm**s. (Press **ENTER** if using the arrow keys.) The Alarms Menu appears (Figure 16).

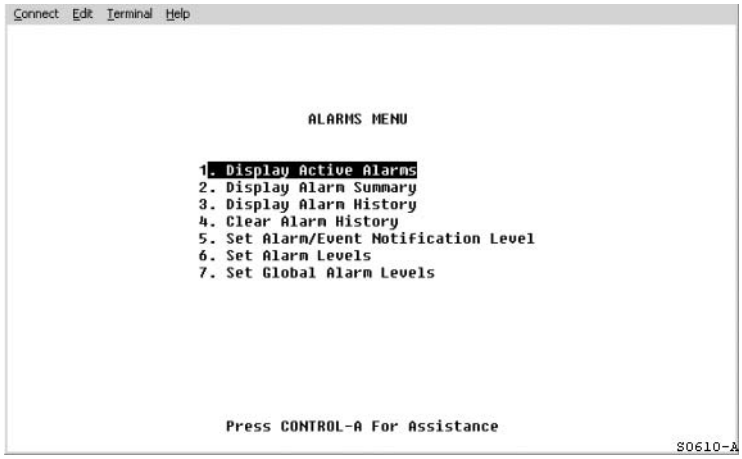

Figure 16. *Alarms Menu*

3 Select **1. Display Active Alarms**. The Active Alarms screen displays (Figure 17).

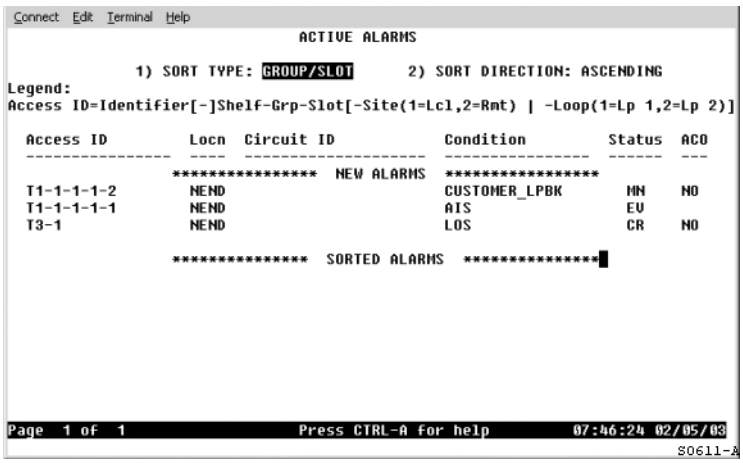

Figure 17. *Active Alarms Screen*

ALARM SUMMARY DISPLAY

Use the following procedure to view the Alarm Summary screen. This screen shows the location and level of the alarm conditions for the H2LXC and H2LXR in the circuit.

1 Log on to the SCU craft interface. The Main Menu screen displays.

2 From the Main Menu, use the arrow or number keys to select **Alarm**s. (Press ENTER if using the arrow keys.) The Alarms Menu appears (Figure 16 on page 25).

3 Select **2. Display Alarm Summar**y. The Alarm Summary screen displays (Figure 18).

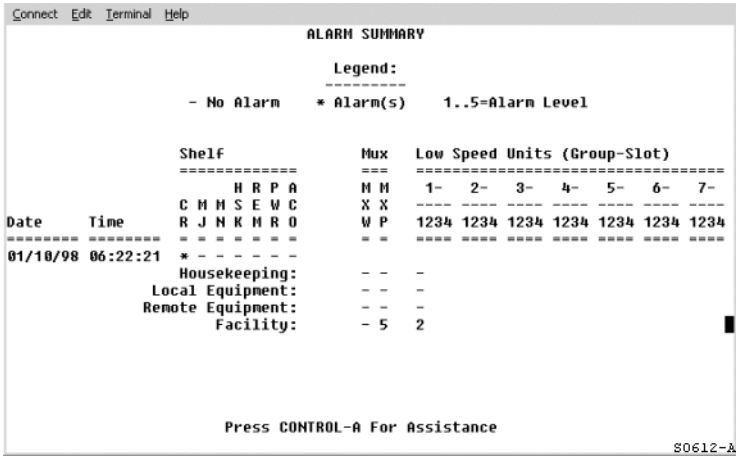

Figure 18. *Alarm Summary Screen*

ALARM HISTORY DISPLAY

1 Log on to the SCU craft interface. The Main Menu screen displays.

2 From the Main Menu, use the arrow or number keys to select **Alarm**s. Press ENTER if using the arrow keys. The Alarms Menu appears (Figure 16 on page 25).

3 Select **3. Display Alarm Histor**y. The Alarm History screen displays (Figure 19 on page 27).

Pressing CTRL + C clears alarm history information. However, if, for example, the Clear Alarm History Command is assigned to security Level 5 through the Edit Menu Security screen, and the user is assigned to Level 4 or below, the user will be unable to execute this command.

For more information on editing menu security, refer to the *Soneplex System Installation Manual* listed under "Related Publications" on page iv.)

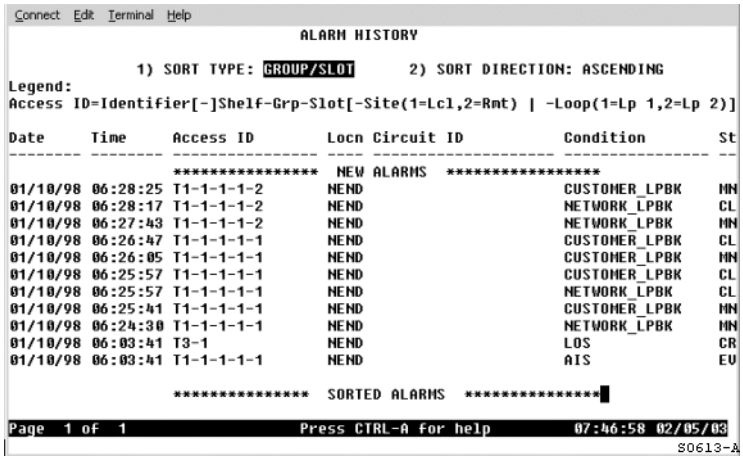

Figure 19. *Alarm History Screen*

H2LXC NETWORK KEEP ALIVE FEATURE

The Unit Configuration screen has a Network Keep Alive field. The field options tell the system when to send an AIS or loop back the incoming data (toward the network or customer) after detecting an LOS (from the network or customer), or an LOSW on the HDSL2 loop. The field options are as follows (see Table 10 for a detailed description of the options):

- AIS—An AIS is sent to the network or customer.
- LOOPBACK—The system automatically loops back the incoming data to the network or customer.
- DS1 Cutoff—The DS1 signal is cut off at both ends (supported only by Loop Extender systems).

The Loopback option supports Interexchange Carrier (IXC) DS1 bypass circuits. In this mode, an LOS or LOSW generates an alarm condition within the Soneplex platform that can be transported back to a network management control center for action. However, the incoming network DS1 signal loops back toward the IXC; therefore, the IXC's monitoring equipment does not detect an alarm condition within its network. This prevents the IXC from troubleshooting a fault that resides outside its network and eliminates the incremental trouble call which the IXC generates.

Table 10. *Network Keep Alive Options*

	Generated Keep Alive Settings and Signals		
Fault Type	**AIS**	**Loopback**	**Cutoff**
DS1 LOS from the network at the H2LXC	AIS toward the CPE	LPBK toward the CPE	DS1 signal is cut off at network and CPE
DS1 LOS from the CPE at the H2LXR	AIS toward the network	LPBK toward the network	DS1 signal is cut off at network and CPE
HDSL2 LOSW	AIS toward the network and CPE	LPBK toward the network and CPE	DS1 signal is cut off at network and CPE
DS1 LOS-both ends	N/A	LPBK toward the network and CPE	N/A

Fault Indication toward the Customer

If a fault occurs on the HDSL2 line or network DS1, and the Network Keep Alive field is configured as AIS or loopback, then AIS is sent to the customer as shown in Figure 20. If a fault occurs on the HDSL2 line or network DS1, and the Network Keep Alive field is configured for DS1 Cutoff, then no signal is sent to the customer.

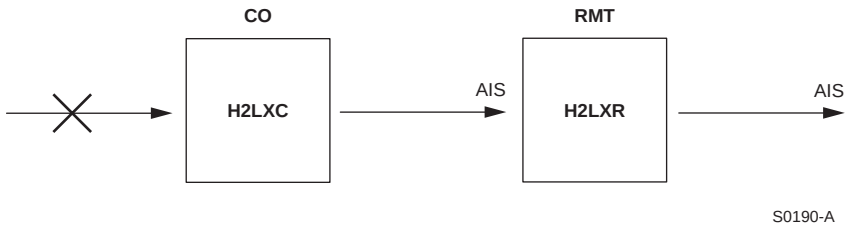

Figure 20. *H2LXC Fault Indication*

LOOPBACK FUNCTIONS

All possible loopbacks are shown in Figure 21, subject to module compatibilities.

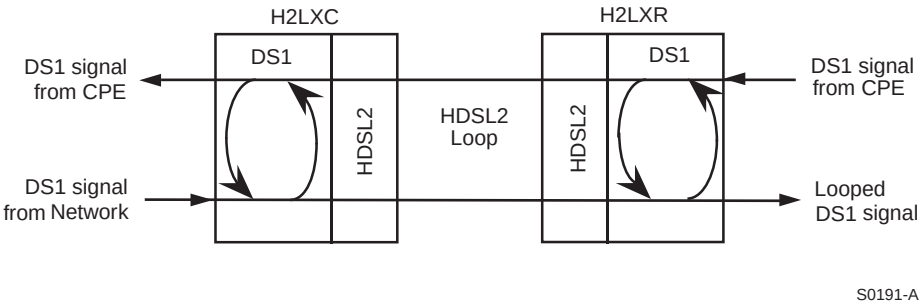

Figure 21. *Network and Customer Loopbacks*

Dual Loopbacks

Dual (bidirectional) loopbacks can be initiated from the SCU Craft Port Interface or by pressing the LPBK pushbutton on the H2LXC or H2LXR front panel. In the H2LXC, pressing LPBK for 5 seconds activates the local bidirectional DS1 signal loopback at the H2LX. The signal coming from the customer is looped back towards the customer. The signal coming from the network is looped back towards the network. Pressing the LPBK pushbutton again for 5 seconds deactivates the loopback. In the H2LXR, pressing the LPBK for 5 seconds activates the local bidirectional DS1 signal loopback at the H2LXR. The signal coming from the network is looped back towards the network. The signal coming from the CPE is looped back towards the CPE. Pressing the LPBK pushbutton again for 5 seconds deactivates the loopback.

Programmable Loopbacks

Through the SCU Craft Port Interface, each device in the system can be assigned a unique, programmable, 16-bit code for each loopup operation at that device.

Table 11 on page 29 lists 53 programmable loopback control code options and their respective loopback signature (detectable bit errors). Default codes for the H2LXC and H2LXR are also identified. These units can be configured to use any of the codes shown in the table, regardless of whether the network element involved is at the central office, in the loop, or at the remote location.

For more information on programmable loopback codes, refer to the *Soneplex Loop Extender Design, Description, and Application Manual*, or the *Soneplex Broadband System Design, Description, and Application Manual*, listed under "Related Publications" on page iv.

Loopback Signatures

When programmable loopup codes are entered, a bit error signature returns when the loopback is activated. Loopback signatures are listed as Detectable Bit Errors in Table 11 on page 29.

The loopback signature corrupts both data bits and frame bits.

Table 11. *Programmable Loopback Control Codes*

Binary Code	Hex Code	Detectable Bit Errors	Binary Code	Hex Code	Detectable Bit Errors
1100 0111 0100 0011	C743	30	1100 0111 0101 1101	C75D	290
1100 0111 0100 0100	C744	40	1100 0111 0101 1110	C75E	300
1100 0111 0100 0101	C745	50	1100 0111 0101 1111	C75F	310
1100 0111 0100 0110	C746	60	1100 0111 0110 0000	C760	320
1100 0111 0100 0111	C747	70	1100 0111 0110 0001	C761	330
1100 0111 0100 1000	C748	80	1100 0111 0110 0010	C762	340
1100 0111 0100 1001	C749	90	1100 0111 0110 0011	C763	350
1100 0111 0100 1010	C74A	100	1100 0111 0110 0100	C764	360
1100 0111 0100 1011	C74B	110	1100 0111 0110 0101	C765	370
1100 0111 0100 1100	C74C	120	1100 0111 0110 0110	C766	380
1100 0111 0100 1101	C74D	130	1100 0111 0110 0111	C767	390
1100 0111 0100 1110	C74E	140	1100 0111 0110 1000	C768	400
1100 0111 0100 1111	C74F	150	1100 0111 0110 1001	C769	410
1100 0111 0101 0000	C750	160	1100 0111 0110 1010	C76A	420
1100 0111 0101 0001	C751	170	1100 0111 0110 1011	C76B	430
1100 0111 0101 0010	C752	180	1100 0111 0110 1100	C76C	440
1100 0111 0101 0011	C753	190	1100 0111 0110 1101	C76D	450
1100 0111 0101 0100 [(a)]	C754	200	1100 0111 0110 1110	C76E	460
1100 0111 0101 0101	C755	210	1100 0111 0110 1111	C76F	470
1100 0111 0101 0110	C756	220	1100 0111 0111 0000	C770	480
1100 0111 0101 0111	C757	230	1100 0111 0111 0001	C771	490
1100 0111 0101 1000	C758	240	1100 0111 0111 0010	C772	500
1100 0111 0101 1001	C759	250	1101 0011 1101 0011 [(b)]	D3D3	231
1100 0111 0101 1010	C75A	260	1100 0101 0100 0001	C541	221
1100 0111 0101 1011	C75B	270	1100 0101 0100 0010	C542	211
1100 0111 0101 1100	C75C	280			

(a) Default code for H2LXR with MPU Software V5.2.
(b) Default code for H2LXC.

Loopback Query Code

A non-programmable query code (binary 1101 0101 1101 0101 or hexadecimal D4D4) allows the technician to find an active loopback. When the query code is entered, the loopback signature of the active loopback closest to the CO is returned.

If the only loopback in the system is at the H2LXR, the signature returned by a query depends on whether the programmable loopback option for the H2LXR has been ENABLED or DISABLED in the Craft Port Interface. If enabled, the signature is associated with the loopup code assigned to the H2LXR; if disabled, the signature is 600 bit errors (the signature of an NID loopback).

Customer Loopback Functions

The H2LXR supports the customer loopback function shown in Figure 22. When the customer loopback is activated, the network signal is returned to the network at the H2LXR DS1 interface as a keep-alive signal. When the H2LXR remote systems are used in conjunction with the Soneplex Broadband or Loop Extender systems, the network loopbacks can be activated by the Craft Port Interface Menu or TL1 command. The standard inband (SF format) and out-of-band (ESF format) loopback codes activate or deactivate the customer loopback.

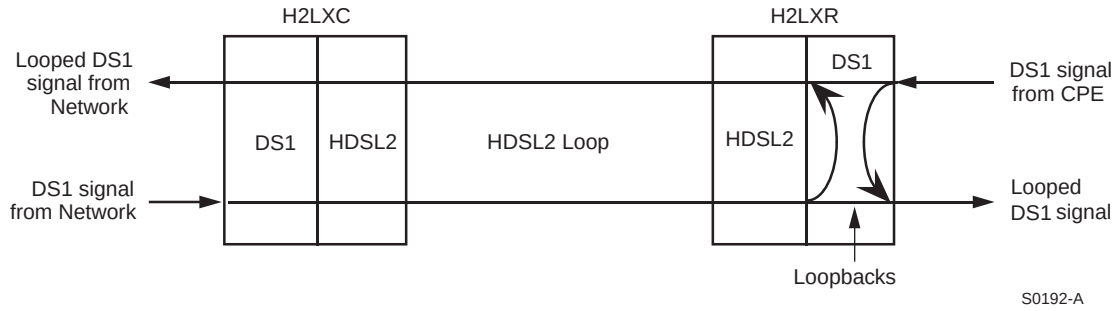

Figure 22. *Customer Loopback at H2LXR*

LOOPBACK STATUS AND COMMANDS

Use this procedure to activate or deactivate and view the status of loopbacks in the H2LX system. Loopbacks cannot be activated if the circuit does not contain a compatible H2LXR at the far end. If the user is assigned a sufficient security level at the SCU craft interface, loopbacks can be executed toward the CPE or network at the H2LXC or H2LXR.

1 Log on to the SCU craft interface. The Main Menu screen displays.

2 From the Main Menu, use the arrow or number keys to select **System Maintenanc**e. Press ENTER if using the arrow keys. The System Maintenance menu appears (Figure 13 on page 23).

3 Select **4. Loopback Status/Command**s. The Low Speed Loopback Status/Commands screen displays (Figure 23 on page 31).

4 Select the desired **Group** and **DS1#**, then highlight the appropriate **COMMANDS: Loopback:** field.

The DEACTIVATE command deactivates all loopbacks and can be performed in any field that does not display N/A.

The currently active loopback must be deactivated to initiate another loopback.

5 Select **ACT NE**T, **ACT CUS**T, **SEND LPB**K, or **DEACTIVATE,** then press ENTER. A blank field indicates no selection. (See Table 12 on page 31 for descriptions of loopback selection field options.)

6 The following message appears:

```
Modifying LOOPBACK Status...
    Are You Sure? (y/n)
```

7 Press **Y** to activate the loopback command or press **N** to cancel the command. Pressing **Y** causes the screen to disappear momentarily. The currently active loopback then displays (Figure 23).

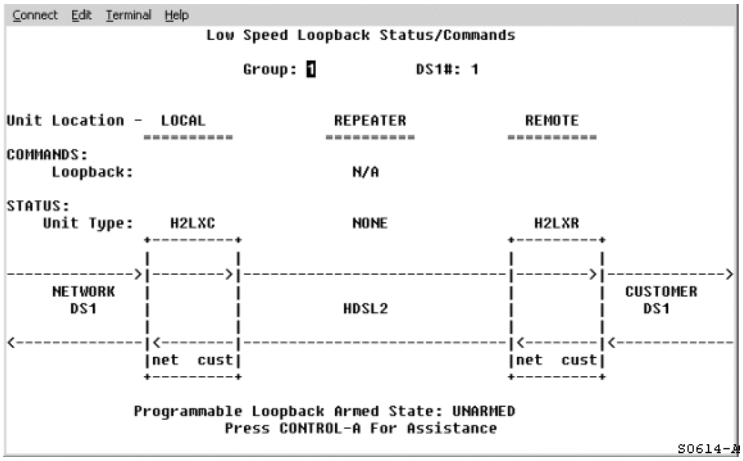

Figure 23. *Low Speed Loopback Status/Commands Screen*

If an HDSL2 loop goes down during a loopback, the loopback appears to continue, although it does not. The command for this loopback must be deactivated before another loopback can be initiated.

For descriptions of alarms arising from fault conditions, such as HDSL2 loop failures, refer to the Managing Alarms section of the *Soneplex System Installation Manual*, listed under "Related Publications" on page iv.

Table 12. *Options in Loopback Selection Fields*

Field	Option	Loopback Type	Shown in…
H2LXC	ACT NET	Network Loopback at the H2LXC [(a)]	Figure 24 on page 32
	ACT CUST	Customer Loopback at the H2LXC [(b)]	Figure 25 on page 32
	SEND LPBK	DS1 facility loopback at other end of network requested through DS3 MUX (Broadband Chassis only) [(c)]	Figure 26 on page 33
	DEACTIVATE	All Loopbacks	
H2LXR	ACT NET	Network Loopback at the H2LXR	Figure 27 on page 33
	ACT CUST	Customer Loopback at the H2LXR	Figure 28 on page 33
	DEACTIVATE	All Loopbacks	

(a) When a network loopback is in progress, an unframed "all-ones" signal (AIS) is transmitted to the customer interface.

(b) When a customer (CPE) loopback is in progress, the network output signal is returned to the network as a keep-alive for network equipment.

(c) The SEND LPBK option sends a request through the DS3 MUX to the network to activate a loopback on a predefined DS1 facility at the other end of the network. This request is indicated by the text "<LPBK RQ" that appears on the loopback screen. The predefined DS1 facility responds by activating a loopback on the associated remote unit. The receipt of the SEND LPBK request is acknowledged by the text "LPBK RQ>" that appears on the loopback screen.

SEND LPBK can only be activated when the DS1 Loopback Mode parameter on the Broadband DS3 MUX Configuration screen is configured as C-Bit parity.

For more information, see the DS3 MUX section of the *Soneplex System Installation Manua*l, listed under "Related Publications" on page iv.

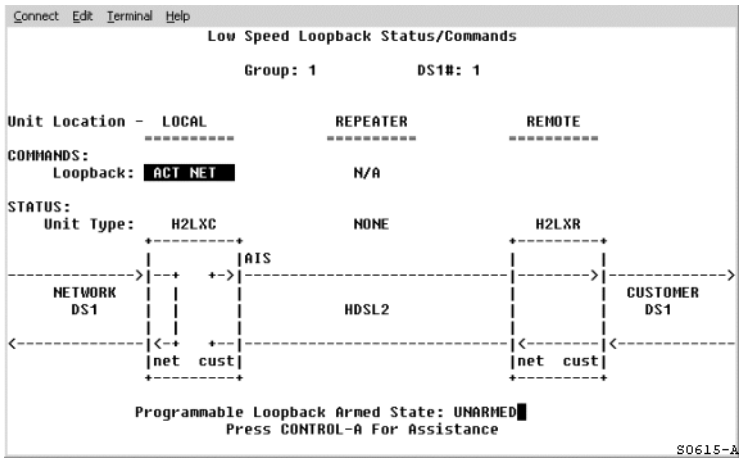

Figure 24. *Network Loopback at the H2LXC*

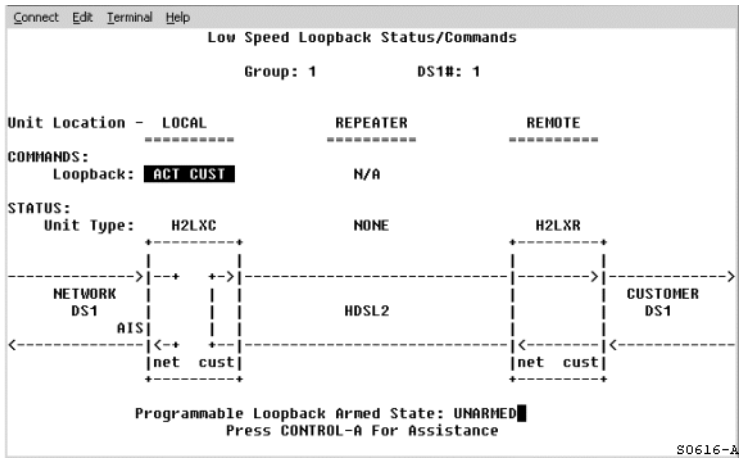

Figure 25. *Customer Loopback at the H2LXC*

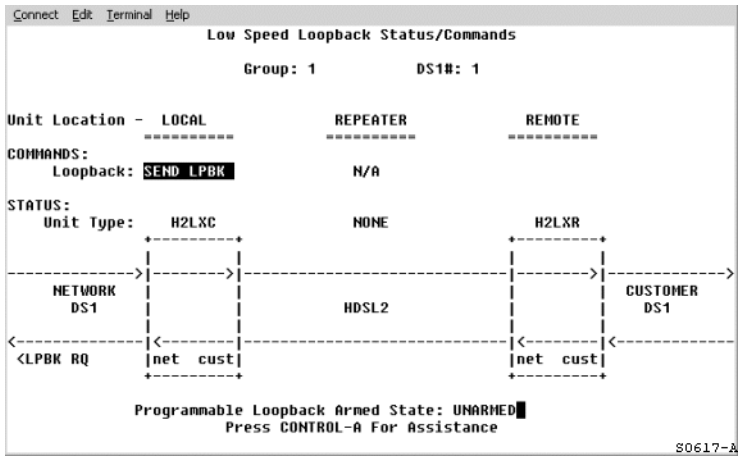

Figure 26. *Send Loopback Request at the H2LXC*

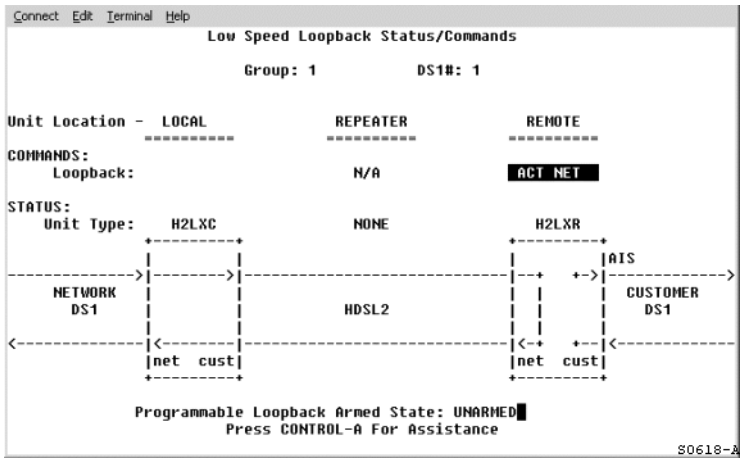

Figure 27. *Network Loopback at the H2LXR*

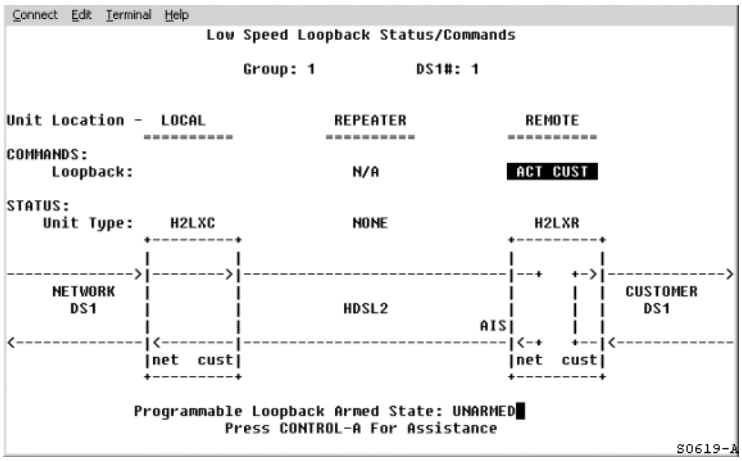

Figure 28. *Customer Loopback at the H2LXR*

APPENDIX A - SPECIFICATIONS

Table 13. *H2LXC Specifications*

Parameter	Specification	Remarks
DS1 Interface		
Input / Output Signals	Per TR-TSY-000499	
Frequency	1.544 Mbps	±200 bps
DS1 Equalization	0 to 655 feet	In 133 foot increments
DS1 Line Format	Alternate Mark Inversion (AMI) or Bipolar with 8-Zero Substitution (B8ZS)	
DS1 Frame Format	Extended SuperFrame (ESF), SuperFrame (SF), Unframed (UNFR), or AUTO (detects/adapts to frame format)	
HDSL2 Interface		
Output Signal Level	+16.8 dBm ± 0.5 dBm	
Loop Type	Single or mixed gauges	With or without bridged taps
Impedance	135Ω nominal	Balanced
Format	One 1.552 Mbps full-duplex pair	Overlapped Pulse Amplitude Modulation (PAM) Transmission with Interlocking Spectra (OPTIS)
Loop Power Output	-190 ± 8 Vdc	
Loop Loss	<35 dB @ 196 kHz	135Ω termination
Loop Wander	0.26 UI maximum	
Power Requirements		
Input Voltage	-40 to -57.5 Vdc (range)	
Maximum Power Consumption	8.5 watts	Nominal
Maximum Power Dissipation	5.0 watts	Nominal
Environmental		
Operating Temperature	-40°F to 149°F (-40°C to 65°C)	
Storage Temperature	-40°F to 158°F (-40°C to 70°C)	
Humidity	5% to 95%, operating and storage	Non-condensing
Physical		
Dimensions (H x W x D)	4.6 inches x 0.7 inches x 9.5 inches (11.7 cm x 1.7 cm x 24.1 cm)	
Weight	0.56 lb. (.25 kg.)	

APPENDIX B - FUNCTIONAL OPERATION

ADC's HDSL2 technology provides full-duplex services at standard T1 rates over one pair of copper wire between an H2LXC and an H2LXR. Soneplex systems use Overlapped Pulse Amplitude Modulation (PAM) Transmission with Interlocking Spectra (OPTIS) transceiver systems to establish a full-duplex, 1.552 kbps data channel between the H2LXC and the remotely located H2LXR.

Figure 16 shows a block diagram of the H2LXC. The H2LXC receives a 1.544 Mbps DSX-1 data stream from the DSX-1 digital cross-connect interface. The H2LXC contains a frame synchronizer controlled by an 8-bit microprocessor that detects and synchronizes with the framing on the DS1 stream. The H2LXC recognizes SuperFrame (SF), Extended SuperFrame (ESF), and Unframed (UNFR) signals.

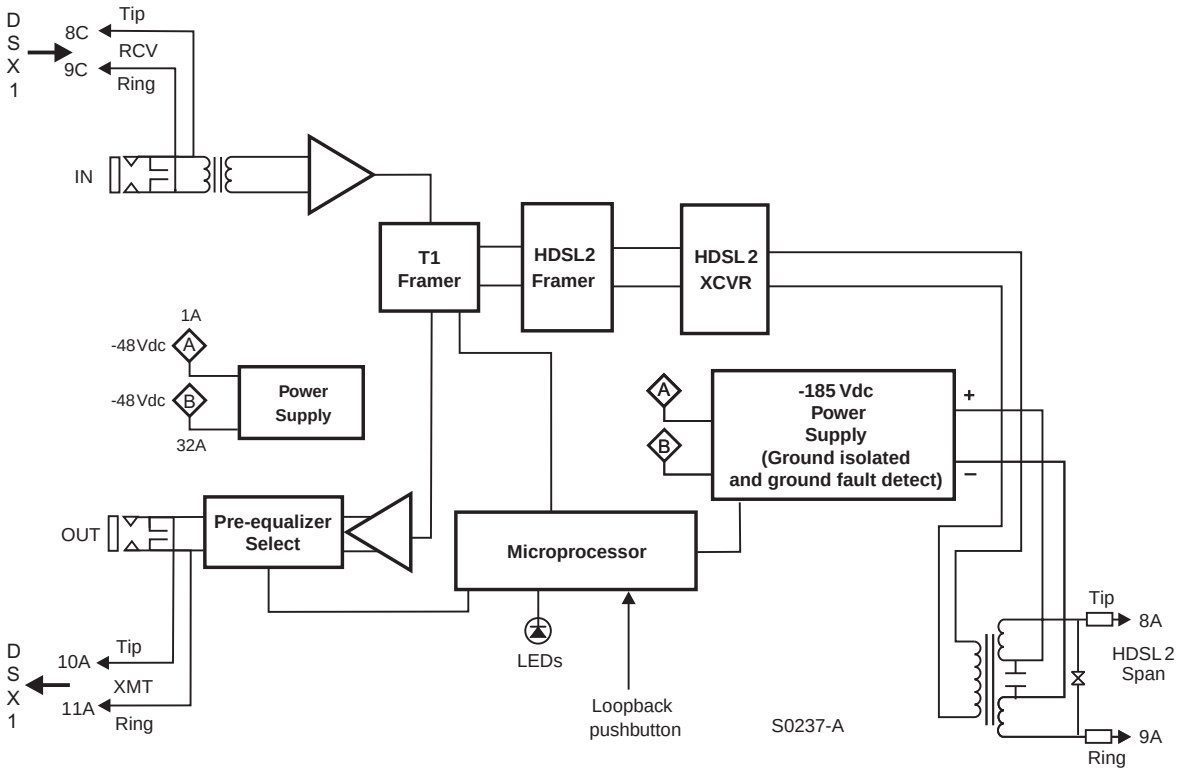

Figure 16. *H2LXC Block Diagram*

TIMING

The low loop wander (0.3 UI max) of an H2LXC, when used with compatible remote units, allows the circuit to be used in all critical timing applications, including those that are used to transport Stratum 1 timing.

GROUND FAULT DETECTION

The H2LXC has a Ground Fault Detection (GFD) circuit which detects a ground or a resistive path to ground on any wire of the HDSL2 loop. This makes the product compliant with the Class A2 requirements of GR-1089.

APPENDIX C - PRODUCT SUPPORT

ADC Customer Service Group provides expert pre-sales and post-sales support and training for all its products. Technical support is available 24 hours a day, 7 days a week by contacting the ADC Technical Assistance Center.

Sales Assistance 800.366.3891 extension 73000 (USA and Canada) 952.917.3000 Fax: 952.917.3237	• Quotation Proposals • Ordering and Delivery • General Product Information
Systems Integration 800.366.3891, extension 73000 (USA and Canada) 952.917.3000	• Complete Solutions (from concept to installation) • Network Design and Integration Testing • System Turnup and Testing • Network Monitoring (upstream or downstream) • Power Monitoring and Remote Surveillance • Service/Maintenance Agreements • Systems Operation
ADC Technical Assistance Center 800.366.3891, extension 73223 or 952.917.3223 Fax: 952.917.3244 Email: wsd.support@adc.com	• Technical Information • System/Network Configuration • Product Specification and Application • Training (product-specific) • Installation and Operation Assistance • Troubleshooting and Repair/Field Assistance
Online Technical Support	• www.adc.com/technicalsupport
Online Technical Publications	• www.adc.com/documentationlibrary/technicalpublications
Product Return Department 800.366.3891 extension 73748 or 952.917.3748 Fax: 952.917.3237 Email: repair&return@adc.com	• ADC Return Material Authorization (RMA) number and instructions must be obtained before returning products.

All telephone numbers with an 800 prefix are toll-free in the USA and Canada.

APPENDIX D - ABBREVIATIONS

A

AIS: Alarm Indication Signal

AMI: Alternate Mark Inversion

B

B8ZS: Bipolar with 8-Zero Substitution

BER: Bit Error Rate

BPV: Bipolar Violation

C

CLEI: Common Language Electrical Interface

CO: Central Office

CONT: Continuity

CPE: Customer Premises Equipment

CRC: Cyclical Redundancy Check

CSA: Carrier Service Area

CVL: Code Violations, Line

E

ESD: Electrostatic Discharge

ESF: Extended SuperFrame

ESL: Errored Second, Line

F

FCL: Failure Count, Line

G

GFD: Ground Fault Detection

H

H2LXC: HDSL2 CO Line Unit

H2LXR : HDSL2 Remote Unit

I

IS: In-Service

IXC: Interexchange Carrier

L

LBO: Line Buildout

LED: Light Emitting Diode

LOS: Loss of Signal

LOSW: Loss of HDSL2 Frame Synchronization

LOSWS: Loss of Sync Word Seconds

LPBK: Loopback

LSW: Loss of Sync Word

N

NID: Network Interface Device

NKA: Network Keep Alive

NRM: Normal

O

OOS: Out-of-Service

OPTIS: Overlapped Pulse amplitude Modulation Transmission with Interlocking Spectra

P

PA: Pulse Attenuation

PA-H: Pulse Attenuation-High

PAM: Pulse Amplitude Modulation

PBO: Power Backoff

PE: Pulse Equalization

S

SESL: Severely Errored Second, Line

SF: SuperFrame

SMJK: SmartJack

SNR: Signal-to-Noise Ratio

SNR-L: Signal-to-Noise Ratio-Low

U

UAS: Unavailable Seconds

CERTIFICATION AND WARRANTY

FCC CLASS A 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.

SAFETY STANDARDS COMPLIANCE

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

- GR 63-CORE - Network Equipment-Building System (NEBS) Requirements
- GR 1089-CORE - Electromagnetic Compatibility and Electrical Safety
- UL-60950/CSA C22.2 No. 60950-00 Third Edition:Safety of Information Technology Equipment

For technical assistance, refer to “Appendix C - Product Support” on page 36.

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DOCUMENT: LTPS-UM-8057-02

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