

**HOTWIRE  
MODEL 7925 STANDALONE  
E1 HDSL TERMINATION UNIT  
G.703 INTERFACE  
USER'S GUIDE**

**Document No. 7925-A2-GB22-00**



**\* SPECIAL NOTICE \***

**HDSL Connection Considerations:**

There are several steps that you must take to maximize loop reach of your HDSL product:

- Use only CAT5 Twisted-Pair Network Connection cables (as supplied with Paradyne Hotwire HDSL products) for HDSL Termination Unit connection and interface patch cabling. Untwisted analog cables, of any length anywhere in the loop, substantially contribute to crosstalk and reduced loop reach.
- Ensure the main bundle of the loop is standard twisted-pair voice cable (i.e., CAT3).
- Choose nonadjacent wire pairs within the main bundle whenever possible.
- Use only nonconditioned loops with no load coils or echo suppression.
- Eliminate any untwisted cable from the loop.
- Always keep TIP and RING in the same twisted-cable pair.

**\* SPECIAL NOTICE (continued) \***

**Near-End Crosstalk (NEXT)**

Any wire pair within a cable carrying a signal radiates energy. Other wire pairs act as antennas and pick up this radiated energy. By twisting wire pairs the radiated energy is reduced, thereby reducing the effect of crosstalk.

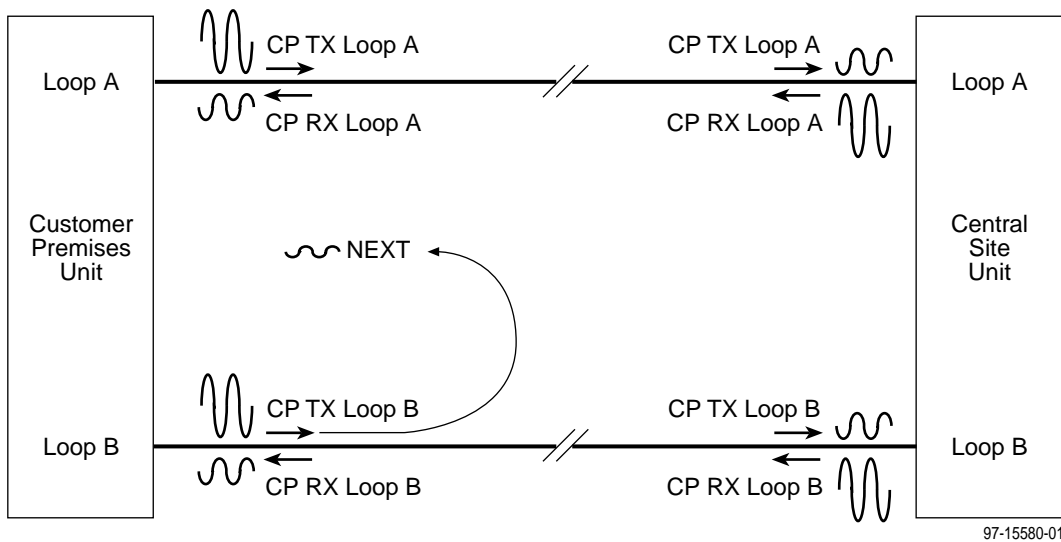
It is critical that only twisted-pair cabling be used for all connections within the HDSL loop. Using non-twisted pair cable anywhere within the loop significantly increases the amount of NEXT, decreasing the Signal-to-Noise Ratio (SNR) and loop reach.

**Self-Generated Near-End Crosstalk (Self NEXT)**


In Figure 1, the transmit signal of Loop B (CP TX Loop B) is coupled onto the receive path of Loop A (CP RX Loop A). As a result, the SNR and reach of Loop A is reduced.

An SNR of approximately 30 dB is required for reliable, error-free operation per individual loop. A reduction of 6 to 9 dB SNR can occur when several HDSL links are added to the same 25-pair bundle. For example, if Loop A by itself has an SNR of 39 dB, adding multiple additional loops to the same bundle might reduce the SNR of Loop A to 33 dB.

**NOTE:** It is recommended that when multiple HDSL loops are added to the same 25-pair bundle, the SNR of each individual loop remain at or above 30 dB.



**Figure 1. Self-Generated Near-End Cross Talk (Self NEXT)**



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**March 1998**

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## Important Safety Instructions

1. Read and follow all warning notices and instructions marked on the product or included in the manual.
2. Do not allow anything to rest on the power cord and do not locate the product where persons will walk on the power cord.
3. Do not attempt to install or service this product yourself, as opening or removing covers may expose you to dangerous high voltage points or other risks. Refer all installation and servicing to qualified service personnel.
4. General purpose cables are provided with this product. Special cables, which may be required by the regulatory inspection authority for the installation site, are the responsibility of the customer.
5. When installed in the final configuration, the product must comply with the applicable Safety Standards and regulatory requirements of the country in which it is installed. If necessary, consult with the appropriate regulatory agencies and inspection authorities to ensure compliance.
6. A rare phenomenon can create a voltage potential between the earth grounds of two or more buildings. If products installed in separate buildings are **interconnected**, the voltage potential may cause a hazardous condition. Consult a qualified electrical consultant to determine whether or not this phenomenon exists and, if necessary, implement corrective action prior to interconnecting the products.
7. In addition, if the equipment is to be used with telecommunications circuits, take the following precautions:
  - Never install telephone wiring during a lightning storm.
  - Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
  - Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
  - Use caution when installing or modifying telephone lines.
  - Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
  - Do not use the telephone to report a gas leak in the vicinity of the leak.
8. Input power to this product must be provided by one of the following: (1) a UL Listed/CSA Certified power source with a Class 2 or Limited Power Source (LPS) output for use in North America; or (2) a 24 Vdc or -48 Vdc National Electric Code (NEC) ANSI/NFPA 70/Canadian Electric Code (CEC) Class 2 circuit installed in accordance with articles 110-16, 110-17, and 110-18 of the NEC, and articles 2-308, 2-310, 2-312, 2-314, 2-200, and 2-202 of the CEC, or (3) a Safety Extra Low Voltage (SELV) power source with a maximum available output of less than 240 VA, certified for use in the country of installation.

## EMI Warnings

### **WARNING:**

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.

The authority to operate this equipment is conditioned by the requirements that no modifications will be made to the equipment unless the changes or modifications are expressly approved by Paradyne Corporation.

### **WARNING:**

To Users of Digital Apparatus in Canada:

This Class A digital apparatus meets all requirements of the Canadian interference-causing equipment regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du règlement sur le matériel brouilleur du Canada.

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When the product is marked with the CE mark, this mark has been affixed to demonstrate full compliance with the following European Directives:

- Directive 73/23/EEC – Council Directive of 19 February 1973 on the harmonisation of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits, **as amended by Directive 93/68/EEC**.
- Directive 89/336/EEC – Council Directive of 3 May 1989 on the approximation of the laws of the Member States relating to Electro-Magnetic Compatibility (EMC), **as amended by Directive 93/68/EEC**.

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# About This Guide

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## Document Purpose and Intended Audience

This guide contains information needed to set up, configure, and operate Hotwire Model 7925-A2-x01 E1 HDSL termination units with a G.703 interface. It is designed for central office technicians and network engineers who have an understanding of the deployment of digital subscriber line systems and High-bit-rate Digital Subscriber Loop (HDSL) transmission systems in a telephone company or private network environment.

## Document Summary

Section	Description
Chapter 1	<i>About Hotwire Model 7925 Standalone Termination Units.</i> Lists the features of each version of the Model 7925 and shows typical configurations.
Chapter 2	<i>Installing the Unit.</i> Describes how to install the unit and make connections.
Chapter 3	<i>Using Terminal and Switchpack Modes.</i> Explains the difference between Terminal and Switchpack Modes, and how to switch from one to the other.
Chapter 4	<i>Customizing the Unit in Terminal Mode.</i> Describes the configuration options that can be set using the terminal interface.
Chapter 5	<i>Customizing the Unit in Switchpack Mode.</i> Describes the configuration options that can be set using the switches on the board.
Chapter 6	<i>Monitoring the Unit.</i> Describes how to monitor unit status, LEDs, and network statistics.
Chapter 7	<i>Testing.</i> Explains how to run local and remote loopback tests.

<b>Section</b>	<b>Description</b>
<a href="#">Appendix A</a>	<i>Worksheets</i> . Contains all the configuration options, possible settings, and default settings for system planning.
<a href="#">Appendix B</a>	<i>Cable Pin Assignments</i> . Contains connector and interface tables and diagrams.
<a href="#">Glossary</a>	Defines acronyms and terms used in this document.
<a href="#">Index</a>	Lists key terms, acronyms, concepts, and sections in alphabetical order.

## Product-Related Documents

<b>Document Number</b>	<b>Document Title</b>
7900-A2-GB20	<i>Hotwire Model 7900 Basic Maintenance Processor User's Guide</i>
7900-A2-GN20	<i>Hotwire Model 7900 Equipment Nest and Options Installation Guide</i>
7910-A2-GB20	<i>Hotwire Models 7914 and 7915 T1 and E1 SDSL Nest Card Termination Unit User's Guide</i>
7914-A2-GB20	<i>Hotwire Model 7914 Standalone T1 SDSL Termination Unit User's Guide</i>
7915-A2-GB20	<i>Hotwire Model 7915 Standalone E1 SDSL Termination Unit User's Guide</i>
7920-A2-GB20	<i>Hotwire Models 7924 and 7925 T1 &amp; E1 HDSL Nest Card Termination Units User's Guide</i>
7925-A2-GB21	<i>Hotwire Model 7925 Standalone E1 HDSL Termination Unit, EIA-530-A Interface, User's Guide</i>

Contact your sales or service representative to order additional product documentation.

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# About Hotwire Model 7925 Standalone Termination Units

# 1

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## Hotwire 7925 Models and Features

Products in the Hotwire 7925 family provide “last mile/last kilometer” transport of E1-compatible circuits between customer facilities and central site equipment over 2- or 4-wire copper lines. The units can be used over distances substantially exceeding traditional E1 spans and ETSI loop standards.

The Hotwire 7925-A2-x01:

- Supports the G.703 interface
- Supports local and remote alarm surveillance and performance monitoring
- Meets the requirements of repeaterless E1 transmission on loops exceeding standard specifications
- Automatically detects and compensates for inverted pairs and swapped loops, significantly simplifying installation
- Tolerates bridged taps

There are several versions of the Model 7925-A2, each supporting a different interface (G.703 or EIA-530-A/V.35) and power supply (+24 VDC or –48 Vdc):

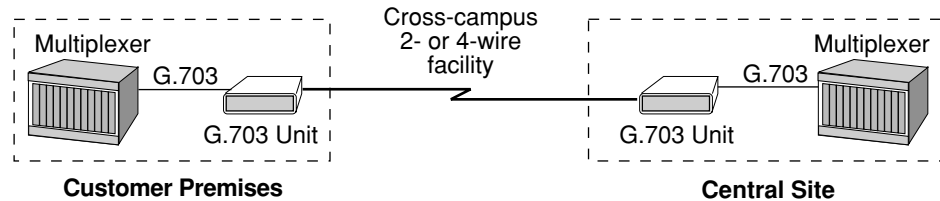
<b>Model Number</b>	<b>Features</b>
7925-A2-401	2Mb/s G.703 compatible. Connection to +24 Vdc universal power supply.
7925-A2-402	2Mb/s EIA-530-A/V.35 compatible. Connection to +24 Vdc universal power supply.
7925-A2-501	2Mb/s G.703 compatible. Direct connection to –48 Vdc power supply.
7925-A2-502	2Mb/s EIA-530-A/V.35 compatible. Direct connection to –48 Vdc power supply.

## Typical Configurations

Hotwire Model 7925 standalone units can be used in campus applications where long loop distances normally require the campus to contract with the local telephone exchange carrier to deliver high-speed services across the campus.

Figure 1-1 shows a typical campus application where remote multiplexers are connected across a campus using two Hotwire Model 7925 standalone units. (Routers with G.703 interfaces could be similarly connected to join two LANs.) One unit is configured as a central site or central office (CO) unit and the other as the remote or customer premises (CP) unit.

Each Hotwire Model 7925 standalone unit is configured at the factory to operate at the CP side of an E1 HDSL connection. (Conversely, Hotwire Model 7925 nest cards are configured for CO operation.) However, you can easily reconfigure a standalone unit for use at the CO end, as would be necessary for the configuration in Figure 1-1.



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**Figure 1-1. Campus Network Application**

Hotwire Model 7925 standalone units are also ideal for delivering E1 services from a central site to the customer premises over long loop distances without repeaters.

Figure 1-2 shows a central office application with a Hotwire Model 7900 Nest containing Hotwire Model 7925 nest cards. Each nest card terminates a single subscriber line in the CO. Each line is then converted to a G.703 interface for connection to other central office equipment, such as a digital cross-connect system (DCS).

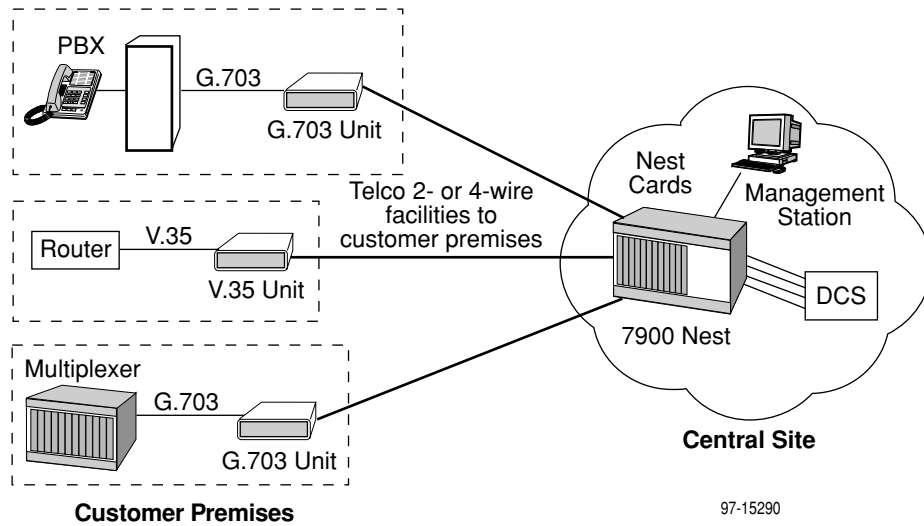


Figure 1-2. E1 Extension to Customer Premises

Cellular network providers must lease large numbers of E1 circuits in order to connect remote cell sites to mobile telephone switching offices (MTSOs). Hotwire Model 7925 products provide an alternative to standard repeated E1 services. Figure 1-3 depicts a typical cellular network access application.

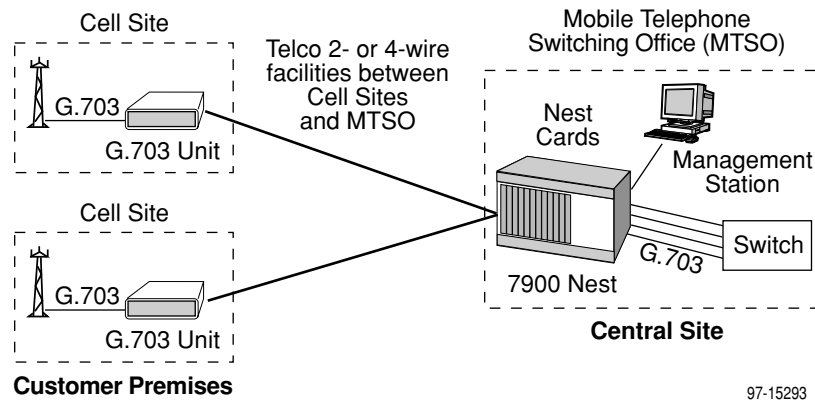


Figure 1-3. Cellular Network Access

## User Interface Types

There are three types of user interfaces to the standalone units:

- VT100-compatible terminal interface (Terminal Mode, see Chapter 4, *Customizing the Unit in Terminal Mode*)
- Manual setting of switches (Switchpack Mode, see Chapter 5, *Customizing the Unit in Switchpack Mode*)
- Front Panel LED status indicators (see Chapter 6, *Monitoring the Unit*)

---

# Installing the Unit

# 2

---

## Package Checklist for Hotwire Model 7925-A2-x01

Verify that your package contains the following:

- Hotwire Model 7925-A2-x01 standalone unit
- 10' VT100-compatible Terminal Cable
- 20' twisted-pair network cable
- 100–240 Vac power pack  
or  
Direct connection dc cable for –48 Vdc power source
- Warranty card

## Cables Not Included

You also require a cable with appropriate connectors and wiring for your G.703 interface. See Appendix B, *Cable Pin Assignments*, for the 120-ohm connector pin assignments.

## Connecting to the Network

### ► Procedure

To connect your unit to the network:

1. Connect one end of the supplied 20' twisted-pair network cable into the rear panel HDSL jack. Connect the other end to your HDSL network interface.

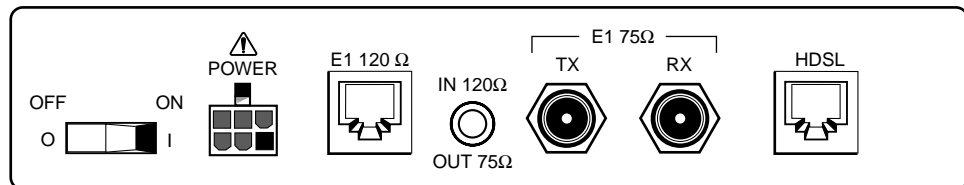
#### NOTE:

Do *not* use a flat VF network cable, as this may severely degrade the performance of the termination unit. Use only a twisted-pair network cable.

2. Connect a G.703-interface cable into the appropriate connector on the rear panel. Connect the other end to your G.703 equipment.
3. Set the termination switch on the back panel to:
  - 75 ohm if you use the BNC E1 connectors
  - 120 ohm if you use the modular E1 connector

#### NOTE:

You must also set the appropriate Line Build Out configuration option for this interface. The default is 75 ohm. See Chapter 4, *Customizing the Unit in Terminal Mode*, or Chapter 5, *Customizing the Unit in Switchpack Mode*.



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### Hotwire 7925-A2-x01 – Rear Panel

## Connecting Power to the Unit

*If your package includes a power pack:* Plug the power pack into an ac outlet having a nominal voltage rating between 100–240 Vac. Connect the output cable of the power pack to the connector marked POWER on the rear panel.

*If your package includes a direct-connection dc power cable:* Connect the unit to an external dc power source as described in the next section.

### Connecting the Unit to an External DC Power Source

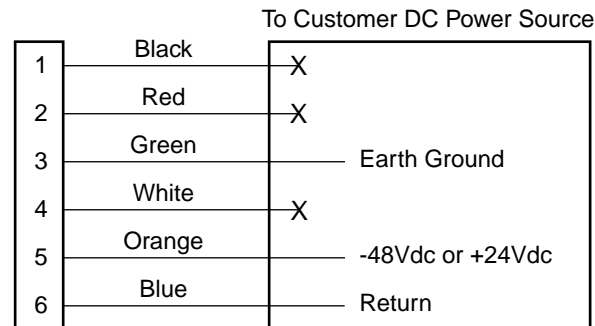
**Use the following procedures only if you want to use the dc power cable.**

Using the dc power cable, the Hotwire Model 7925 Termination Unit is capable of operating on a –48 Vdc or +24 Vdc power supply.

#### ► Procedure

To use the dc power cable:

1. Connect the green wire to a suitable earth ground.
2. Connect the orange wire to the –48 or +24 Vdc source.
3. Connect the blue wire to the return.
4. Cut the black, red, and white wires off at the outer insulation.
5. Plug the power connector into the 7925 Termination Unit.



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#### –48 or +24 Vdc Power Supply Pinouts

## Connecting to a System Terminal

An optional system maintenance terminal may be attached to your Hotwire Model 7925 Termination Unit through the modular jack on the front panel. You may have terminals attached to both endpoints. The system terminal must be a VT100-compatible terminal or a PC running terminal emulation software.

The system maintenance terminal allows to view the status of the unit, and to change configuration options.

Connect the 9-pin end of the terminal cable into a COM port on your PC. Plug the other end into the modular jack on the front panel. If your PC requires a 25-pin connector to the COM port, see Appendix B, *Cable Pin Assignments*, for the correct cable pinouts.

Make sure the communication parameters on your PC or terminal are set to:

- 9600 baud
- 8 bit characters
- no parity
- 1 stop bit
- no flow control

Press Return from your terminal or PC to activate the Main Menu for the attached unit. The system runs diagnostics and status checks. After a few moments, the Main Menu screen appears on your terminal. Menus are described in Chapter 4, *Customizing the Unit in Terminal Mode*.

---

# Using Terminal and Switchpack Modes

# 3

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## Choosing an Interface Mode

You can make configuration changes either through the system terminal menus (Terminal Mode) or by manually changing switches on the board (Switchpack Mode). Terminal Mode is the default setting.

### **In Terminal Mode:**

- You change configuration parameters by selecting menu options that appear on a VT100-compatible terminal attached to the front panel of the termination unit.
- The unit is configured at the factory for CP operation.

### **In Switchpack Mode:**

- All configuration parameters are taken from the current setting of the switches.
- You can still display information about the unit from the terminal.
- Any changes you had made in Terminal Mode are lost when you change to Switchpack Mode.

## Switching Between Terminal and Switchpack Modes

The following procedure is used to change the operating mode of the unit to either Terminal Mode (the default setting) or Switchpack Mode. Refer to Chapter 4, *Customizing the Unit in Terminal Mode* or Chapter 5, *Customizing the Unit in Switchpack Mode* for information on changing configuration options.

### **▲ HANDLING PRECAUTIONS FOR STATIC-SENSITIVE DEVICES**



**This product is designed to protect sensitive components from damage due to electrostatic discharge (ESD) during normal operation. When performing installation procedures, however, take proper static control precautions to prevent damage to equipment. If you are not sure of the proper static control precautions, contact your nearest sales or service representative.**

#### **► Procedure**

To change the mode:

1. Power down the unit and remove the enclosure cover, exposing the circuit board. Use electrostatic discharge (ESD) protection when handling the circuit board.
2. See Figure 5-1 on page 5-3 for switchpack locations on your unit's board.
3. Locate Switchpack S3.
4. Place switch 8 in the correct position for the desired mode.
  - Switchpack Mode is enabled when switch 8 is ON.
  - Terminal Mode is enabled when switch 8 is Off.
5. *If you are enabling Switchpack Mode:* You must set the switches for your desired configuration. Refer to Figure 5-1.  
*If you are enabling Terminal Mode:* You must connect a terminal to alter configuration options. Refer to Chapter 4, *Customizing the Unit in Terminal Mode*.
6. Replace and secure the cover.
7. Power up the board to reset and enable the new configuration.

---

# Customizing the Unit in Terminal Mode

# 4

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## Main Menu

The Main Menu for the Model 7925-A2-x01 appears as follows:

```
Ⓐ Command→ G123
Ⓑ 7925 CP LOOP AB E1 HDSL

Main Menu

1) Board Status
2) Performance Monitor
3) Board Configuration
4) Board Reset
5) Local Loopback
6) Remote Loopback
7) Identity
Ⓒ 8) HTUC Menu
   ?) Prints this Menu

Command→
```

- A. When the unit is first powered up, a self-test issues a completion code. The code G123 denotes a successful completion.
- B. The first line of the Main Menu is a summary of the configuration.
- C. Option 8 permits you to view the configuration and performance data on the opposite unit. Option 8 reads:
  - HTUC Menu (HDSL Termination Unit—Central site) at the CP unit
  - HTUR Menu (HDSL Termination Unit—Remote) at the CO unit

## Making Changes from the Terminal Interface

The Board Configuration menu displays the current board software and hardware settings. It also allows you to change certain parameters on the board.

This function is affected by the status of the switchpack setting.

- When operating in Terminal Mode (the system default) you can make configuration changes through the terminal menus.
- When operating in Switchpack Mode, you can display configuration parameters using the terminal menus, but any configuration changes must be made using the switches.

From the Main Menu, select option 3, Board Configuration.

```

Command→ 3

Board Configuration Menu
  1) HDSL Card Type (CO, CP)           - CP
  2) Loops Enabled (Dual, Single)      - Dual Loop (Loops A,B)
  3) E1 Line Encode (HDB3, AMI)       - HDB3
  4) Framing (Unframed, Framed)       - Framed
  5) Line Build Out (75 ohm, 120 ohm) - 75 ohm termination
      Rear Panel Push Button Switch must be set to match
-----

1-5) Board Configuration
6) Switchpack Definitions
?) Prints Board Configuration and this menu
Q) Quit

Config→
    
```

Possible values for each parameter are listed in [Table 4-1](#). See Appendix A, [Worksheets](#), for help in selecting the appropriate configuration options for your application.

Option 5 (Switchpack Definitions) on the Board Configuration menu displays the switch positions used when setting configuration options on the hardware. See Chapter 5, [Customizing the Unit in Switchpack Mode](#).

**Table 4-1. Configuration Options**

<b>1) HDSL Card Type</b>
Possible Settings: <b>CP, CO</b> Default Setting: <b>CP</b>
Indicates the placement of the unit in the network configuration. To toggle the card type, enter <b>1</b> at the Config prompt. You must reset the unit to change this option.  <b>CP</b> – Unit is on the customer premises side of the HDSL connection. <b>CO</b> – Unit is on the central office (or central site) side of the HDSL connection.
<b>2) Loops Enabled</b>
Possible Settings: <b>Single, Dual</b> Default Setting: <b>Dual</b>
Specifies which loops on the HDSL line are to be used in the connection. To change the loops that are enabled, enter <b>2</b> at the Config prompt. The system then prompts you to specify either Dual (Loops A and B) or Single (Loop A only). You must reset the unit to change this option.  <b>Dual</b> – Loops A and B are enabled. <b>Single</b> – Only Loop A is enabled.
<b>3) E1 Line Encoding</b>
Possible Settings: <b>HDB3, AMI</b> Default Setting: <b>HDB3</b>
Specifies the type of line encoding used to ensure one's density in the transmission signal. To toggle the encoding method, enter <b>3</b> at the Config prompt.  <b>HDB3</b> – High Density Bipolar 3. <b>AMI</b> – Alternate Mark Inversion.
<b>4) E1 Framing</b>
Possible Settings: <b>Framed, Unframed</b> Default Setting: <b>Framed</b>
Specifies whether or not framing should be used. To toggle the framing method, enter <b>4</b> at the Config prompt.  <b>Framed</b> – Framing is enabled. <b>Unframed</b> – Framing is disabled.
<b>5) Line Build Out</b>
Possible Settings: <b>75 ohm, 120 ohm</b> Default Setting: <b>75 ohm</b>
Specifies the G.703 interface in use. <b>The 120 ohm/75 ohm termination switch on the unit's back panel must set for the same value as this configuration option.</b>  <b>75 ohm</b> – Line Build Out is set for a 75-ohm interface. <b>120 ohm</b> – Line Build Out is set for a 120-ohm interface.

You must reset the board for changes to HDSL Card Type and Loops Enabled to take effect. A system message is displayed on the terminal to remind you to reset the board. To reset the board, use option 4 from the Main Menu. (The board may also be reset by cycling the power on the board.) All configuration settings are stored in nonvolatile memory.



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# Customizing the Unit In Switchpack Mode

# 5

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## Accessing and Changing Switches

When operating in Switchpack Mode, you can change configuration options by moving switches on the circuit board. To enable Switchpack Mode, refer to *Switching Between Terminal and Switchpack Modes* in Chapter 3, *Using Terminal and Switchpack Modes*.

### **⚠ HANDLING PRECAUTIONS FOR STATIC-SENSITIVE DEVICES**



This product is designed to protect sensitive components from damage due to electrostatic discharge (ESD) during normal operation. When performing installation procedures, however, take proper static control precautions to prevent damage to equipment. If you are not sure of the proper static control precautions, contact your nearest sales or service representative.

#### ► Procedure

To open the unit and make changes in Switchpack Mode:

1. Power down the unit and remove the enclosure cover, exposing the circuit board.
2. Find the switchpack for the configuration options you wish to change. Switchpack position is shown in [Figure 5-1](#) on page 5-3.
3. Verify that the unit is in Switchpack Mode (switch 8 on switchpack S3 is set to the ON position).
4. Place the switch in the correct position for each desired configuration option. For example, to change a unit's card type from CO to CP, move switch 1 on switchpack S1 to the ON position.
5. Replace the enclosure cover and power up the board to reset and enable the new configuration.

## Displaying Switch Definitions

Enter **6** at the Config prompt to display the switch definitions. Switch definitions are also listed in [Figure 5-1](#).

```
Config→ 6

Switch pack S1 definition:

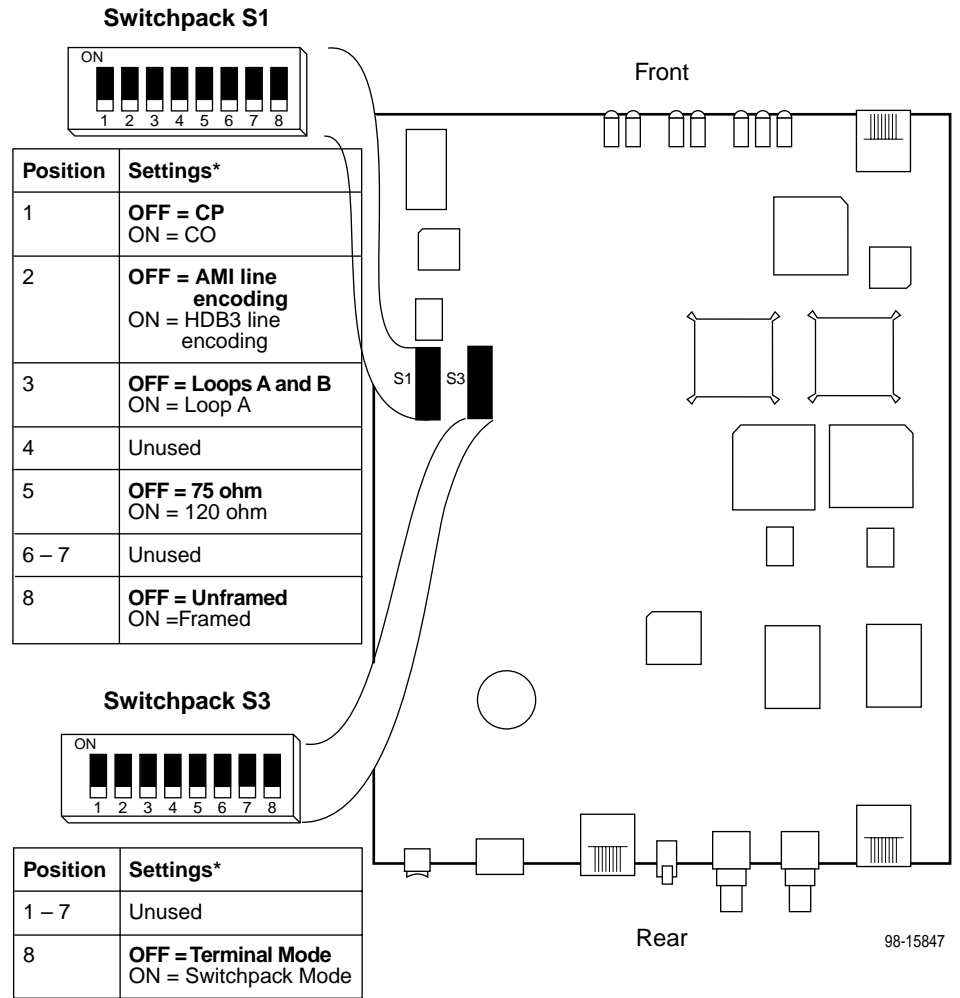
1 - CO/CP                OFF=CP, ON=CO
2 - HDB3/AMI             OFF=AMI, ON=HDB3
3 - Double/Single Loop Mode OFF=Double, ON=Single
4 - Not Used
5 - Line Build Out       OFF=75 ohm, ON=120 ohm
6 - Not Used
7 - Not Used
8 - Framed/Unframed      OFF=Unframed, ON=Framed

Switch pack S3 definition:

1-7 - not used
8 - Switchpack Mode      OFF=Terminal, ON=Switchpack

Config→
```

## Switch Locations and Settings



\* Default in bold

**Figure 5-1. Switches**

The switches detailed in Figure 5-1 are used to change configuration options. Any other switches should always be left as positioned at the factory.

The ON position is labeled on the switchpacks.

### NOTES:

The unit must be reset for the switchpack settings to take effect.

The termination switch on the back panel of the unit must be set to the same value as the Line Build Out switch (switch 5 on switchpack S1).



---

# Monitoring the Unit

# 6

---

## What to Monitor

This chapter presents information on how to access and monitor status and performance statistics for the unit and its network connection. You can monitor operations by viewing:

- Board Status option from the system maintenance terminal Main Menu
- Performance Monitor option from the system maintenance terminal Main Menu
- Board Status and Performance Monitor options from the system maintenance terminal HTUC or HTUR Menu (for displaying information about the unit on the other end of the connection)
- Front Panel LEDs

## Board Status

Board Status option from the Main Menu displays HDSL circuit operational status. Enter **1** at the Command prompt to display board status.

```
Command→ 1

E1 STATUS:      Network is UP

LOOPBACK STATUS: OFF
HDSL STATUS:    LOOP A is UP, LOOP B is UP
S/N RATIO:      Loop A = 44.0 dB, Loop B = 43.5 dB

Command→
```

### Board Status

- E1 STATUS is displayed as one of the following:
  - Network is UP
  - Receive Carrier Loss
  - Receive Remote Alarm
  - Receive Unframed All 1's.
- Loopback status is either Local Loopback ON, Remote Loopback ON, or OFF.
- HDSL status displays whether each loop is up, down, or disabled.
- Signal-to-Noise (S/N) ratios are not displayed if loops are down or disabled.

## Performance Statistics

Performance monitoring allows more detailed observations of error conditions detected on the circuits. The Performance Monitor menu options provide statistics on errors received and recorded, in defined time periods from the previous minute to the previous 24 hours, plus a running total. These statistics can be cleared and restarted at any time.

Performance statistics are updated every second.

Accumulated performance statistics may be cleared and restarted by selecting option **7** on the performance menu. A verification query is displayed. Enter **Y** to clear all statistics.

Enter **2** at the Command prompt to enter the Performance Monitor menu.

```
Command→ 2

Time Since Board Power-Up or Reset: 02.25.33
  1 - 1 minute stats.
  2 - 15 minute stats.
  3 - 1 hour stats.
  4 - 12 hour stats.
  5 - 24 hour stats.
  6 - Running total.
  7 - Clear Statistics.
  Q - Quit

stats→
```

Select a time frame from the above list to display statistics for a specified time period. A screen like the following is displayed.

```

stats→ 1

Current 1 minute:

HDSL Errors:                E1 Errors:

FAW Loop A      -      0      CV/BPV -      0
FAW Loop B      -      0      FAS   -      0
CRC Loop A      -      0
CRC Loop B      -      0
FEBE Loop A     -      0
FEBE Loop B     -      0

Previous 1 minute:

FAW Loop A      -      0      CV/BPV -      0
FAW Loop B      -      0      FAS   -      0
CRC Loop A      -      0
CRC Loop B      -      0
FEBE Loop A     -      0
FEBE Loop B     -      0

stats→

```

The following HDSL errors are displayed:

- **FAW (Frame Alignment Word)** shows the number of times an error was detected in an FAW at the beginning of a DSL frame.
- **CRC (Cyclic Redundancy Check)** shows the number of times a calculated CRC value did not match the CRC in the DSL frame.
- **FEBE (Far-End Bit Error)** shows errors reported by the remote equipment.

E1 errors are displayed only when framing is enabled:

- **CV (Code Violations)** shows the number of bipolar violations (BPVs) detected on the E1 interface when using HDB3 line encoding.
- **BPV (BiPolar Violations)** shows the number of bipolar violations detected on the E1 interface when using AMI line encoding.
- **FAS (Frame Alignment Signal)** shows the number of loss of signal alignment errors detected on the E1 interface.

## Identity Screen

To access identity information for the unit, including hardware and firmware revision levels, enter **7** at the Command prompt.

```
Command→ 7

Identity Screen
  Model #           - 7925-A2-X01
  7925 FW Rev       - 01.00.00
  7925 HW Rev       - 1013-80A
  DSP FW Rev        - 1.17
  CP Serial #       - 1234567

Command→
```

## Remote Unit Information

The same type of information provided for the locally attached unit (CP or CO) can also be displayed (but not changed) for the unit on the other side of the connection (CO or CP).

From a terminal attached to a CP unit, you can display information about the CO unit by using the HTUC menu options. Similarly, from a terminal attached to a CO unit, the HTUR menu allows you to display information about the CP unit.

To access the HTUC (or HTUR) menu, enter **8** at the Command prompt.

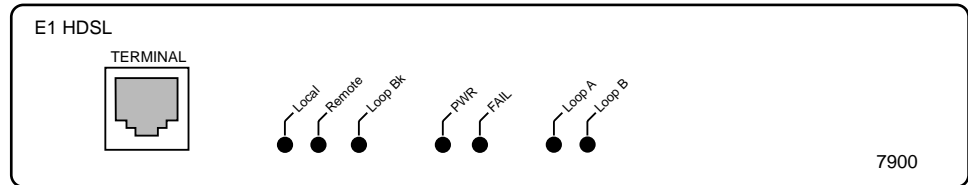
```
Command→ 8

HTUC Menu
1) Board Status
2) Performance Monitor
3) Board Configuration
4) Line Build Out Configuration Help
?) Prints this menu
Q) Quit

HTUC Command→
```

## Front Panel LEDs

Upon power up, the first three LEDs blink in sequence, indicating a successful start configuration. The green PWR LED lights whenever power is applied to the board. Loop LEDs blink until the loop has been synchronized and then remain off.



97-15255-01

LED	LED is . . .	Indicating . . .
Local	Red Off	A failure has been detected in the local E1 circuit. The E1 circuit is operational.
Remote	Red Off	A failure has been detected in the remote E1 circuit. The E1 circuit is operational.
Loop Bk	Yellow Off	A local loopback test is in progress. No loopback is in progress.
PWR	Green Off	Unit has power. There is no power applied to the unit.
FAIL	Red Off	A system-level failure has been detected by the microprocessor. No failure was detected.
Loop A Loop B	Red Off  Red, Blinking	No signal is detected on the loop. The Loop B LED is always ON in Single Loop mode. A signal is present on the loop, and the 7925 Termination Unit has been able to synchronize the signal. The unit is attempting to synchronize.

---

# Testing

# 7

---

## Detecting a Problem

The unit can detect and report problem conditions and perform diagnostic tests. The unit offers a number of indicators to alert you to possible problems, as described in Chapter 6, *Monitoring the Unit*.

- Front panel LEDs
- Board status and performance statistics
- Remote unit board status and performance statistics

## Understanding Loopback Tests

Loopback is a diagnostic function that enables a technician to isolate equipment on the HDSL circuit to determine where on the circuit trouble may be occurring. Loopback takes the system off-line. Data received from E1 or V.35 application equipment is looped back, as depicted in Figures 7-1 through 7-3.

“Local” and “remote” refer to the point at which the data is looped back. In a local loopback the data is reflected back by the local unit (CO or CP, depending on where the command is initiated). In a remote loopback, the data is passed on to the remote-end unit and then reflected back.

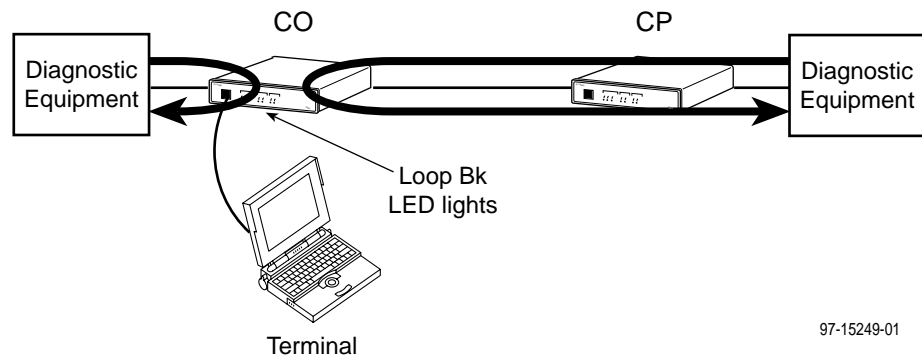
Loopback tests may only be initiated through the system terminal.

Loopback tests may be initiated from either the CO or CP side of the HDSL connection.

## Local Loopbacks

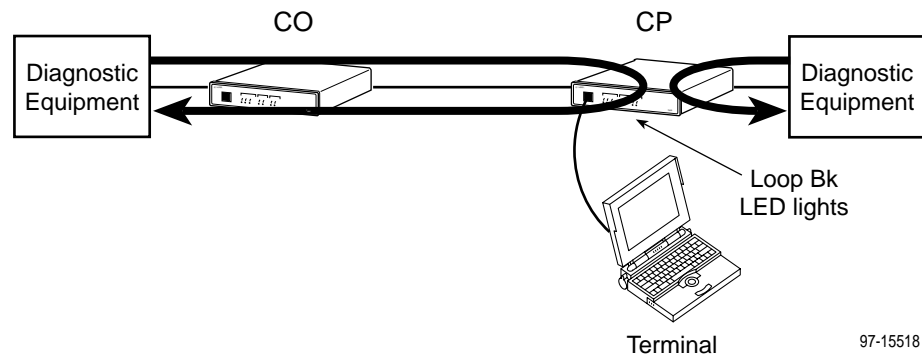
When local loopback is enabled the red Loop Bk LED on the front panel of the initiating unit (CO or CP) lights up and remains lit until the loopback is disabled.

Figure 7-1 illustrates local loopback from a CO unit.



**Figure 7-1. Local Loopback from CO End**

Figure 7-2 illustrates local loopback in the same connection as in Figure 7-1, but the loopback is initiated from the CP end.

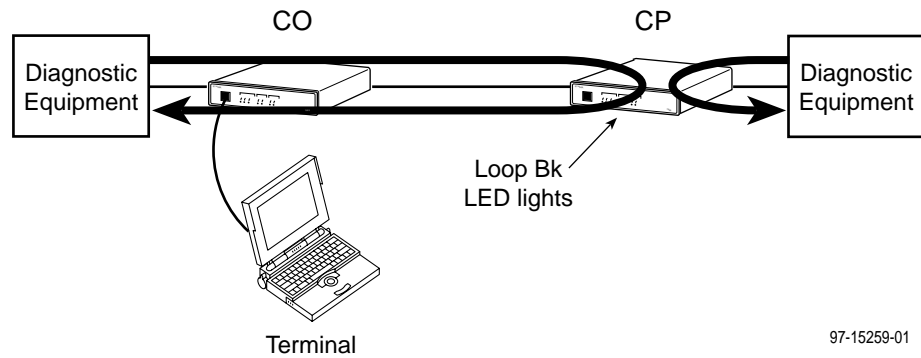


**Figure 7-2. Local Loopback from CP End**

## Remote Loopbacks

When remote loopback is enabled the red Loop Bk LED on the front panel of the remote-end unit (CO or CP) lights up and remains lit until the loopback is disabled. The loopback LED on the initiating unit does not light.

Figure 7-3 illustrates remote loopback from a CO unit.



**Figure 7-3. Remote Loopback from CO End**

## Starting and Ending Loopbacks

To start or stop a local loopback test, enter **5** at the Command prompt.

```
Command→ 5

Are you sure? (Y/N): y
Local Loopback is Enabled!

Command→ 5

Are you sure? (Y/N): y
Local Loopback is Disabled
```

To start or stop a remote loopback test, enter **6** at the Command prompt.

```
Command→ 6

Are you sure? (Y/N): y
Remote Loopback is Enabled!

Command→ 6

Are you sure? (Y/N): y
Remote Loopback is Disabled
```

## Resetting the Unit

To reset the board (equivalent to cycling the power), enter **4** at the Command prompt.

```
Command→ 4

Reset will bring the loops down. Are you sure? (Y/N)

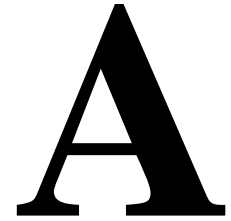
Command→
```

If “y” is selected, the Main Menu is redisplayed, the loops go down, and the FAIL (reset) LED lights.

Pressing any key other than “y” is interpreted as an “n”.

---

# Worksheets



## Overview

The worksheets in this appendix show the correct configuration settings based on the types of units (G.703-compatible or EIA-530-A-compatible) on either end of the HDSL connection. There are two combinations of the two types of units described in this chapter:

- G.703-compatible units on both ends
- EIA-530-A-compatible unit on the CP end, G.703-compatible unit on the CO end

For environments with EIA-530-A-compatible units on both ends, see the *Hotwire 7925 Standalone E1 HDSL Termination Unit, EIA-530-A Interface, User's Guide*.

## G.703-to-G.703 Configuration

To connect two G.703-compatible units, configure the units as follows. Terminal mode factory defaults are in bold. (For Switchpack Mode defaults, see Chapter 5, *Customizing the Unit in Switchpack Mode*.)

<b>Configuration Option</b>	<b>G.703-Compatible Unit (Customer Premises)</b>	<b>G.703-Compatible Unit (Central Site)</b>
Card Type	<b>CP</b> (default)	CO
Loops Enabled	<b>Dual</b> (Loops A & B) or Single (Loop A)	Must be same as CP side
E1 Line Encoding	<b>HDB3</b> or AMI	Must be same as CP side
E1 Framing	<b>Framed</b> or Unframed (If payload rate is less than 2048 kbps, select Framed; else select either option)	Must be same as CP side
Line Build Out	<b>75 ohm</b> or 120 ohm	<b>75 ohm</b> or 120 ohm

## G.703-to-EIA-530-A Configuration

To connect an EIA-530-A-compatible unit on the CP side and a G.703-compatible unit on the CO side, configure the units as follows. Terminal mode factory defaults are in bold. (For Switchpack Mode defaults, see Chapter 5, *Customizing the Unit in Switchpack Mode*.)

Configuration Option	EIA-530-A-Compatible Unit (Customer Premises)	G.703-Compatible Unit (Central Site)
Card Type	<b>CP</b>	CO
Loops Enabled	<b>Dual</b> (Loops A & B) or Single (Loop A)	Must be same as CP side
Payload Rate	1 – <b>9</b> (64 – <b>2048</b> kbps) Option 9 (2048 kbps) is only available if Loops A & B are enabled.	N/A
Transmit Timing	<b>Loop</b>	N/A
E1 Line Encoding	N/A	<b>HDB3</b> or AMI
E1 Framing	N/A	If the payload rate is 2048 kbps, use Unframed. If the payload rate is less than 2048 kbps, use <b>Framed</b> .
Line Build Out	N/A	<b>75 ohm</b> or 120 ohm

When the EIA-530-A-compatible unit's payload rate is set for less than 2048 kbps, the payload rate determines which E1 DS0s are used:

Payload Rate	G.703 E1 DS0s Used
1 (64 kbps)	1
2 (128 kbps)	1, 3
3 (192 kbps)	1, 3, 5
4 (256 kbps)	1, 3, 5, 7
5 (384 kbps)	1, 3, 5, 7, 9, 11
6 (512 kbps)	1, 3, 5, 7, 9, 11, 13, 15
7 (768 kbps)	1, 3, 5, 7, 9, 11, 13, 15, 16, 18, 20, 22
8 (1024 kbps)	1, 3, 5, 7, 9, 11, 13, 15, 16, 18, 20, 22, 24, 26, 28, 30

## CP Unit Configuration Worksheet

<b>Board Configuration</b>	
<b>Configuration Option</b>	<b>Settings</b> <i>Default in <b>Bold</b></i>
HDSL Card Type	<b>CP</b>
Loops Enabled	<b>Loops A and B</b> , Loop A
E1 Line Encode	<b>HDB3</b> , AMI
Framing	<b>Framed</b> , Unframed
Line Build Out	<b>75 ohm</b> , 120 ohm

## CO Unit Configuration Worksheet

<b>Board Configuration</b>	
<b>Configuration Option</b>	<b>Settings</b> <i>Default in <b>Bold</b></i>
HDSL Card Type	CO
Loops Enabled	<b>Loops A and B</b> , Loop A
E1 Line Encode	<b>HDB3</b> , AMI
Framing	<b>Framed</b> , Unframed
Line Build Out	<b>75 ohm</b> , 120 ohm

---

# Cable Pin Assignments

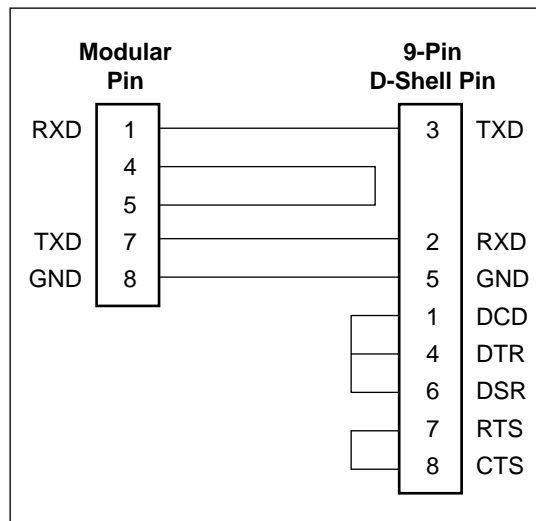
# B

---

## Terminal Connection Cable Pin Assignments

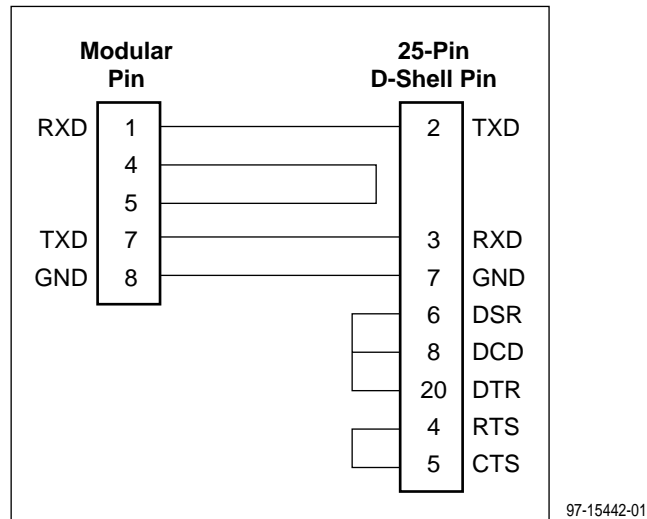
This section defines the pin assignments for the terminal cable from the front panel modular jack to your PC's COM port.

If your PC's COM port requires a 9-pin D-shell connector, the cable must use the following pin assignments.



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If your PC's COM port requires a 25-pin D-shell connector, the cable must use the following pin assignments.



## HDSL Loop Connection Cable Pin Assignments

The HDSL modular connector that plugs into the rear panel of the unit has the following pin assignments.

Pin	Signal
1	Loop A Tip
2	Loop A Ring
3	Unused
4	Loop B Tip
5	Loop B Ring
6 – 8	Unused

**NOTE:**

Pin 1 is on the left when viewing the jack from its inserted position.

## E1 Network 120 Ohm Connection Cable Pin Assignments

The 120 ohm modular connector that plugs into the rear panel has the following pin assignments.

Pin	Signal
1	Tx Ring
2	Tx Tip
3	unused
4	Rx Ring
5	Rx Tip
6 – 8	unused

**NOTE:**

Pin 1 is on the left when viewing the jack from its inserted position.



---

# Glossary

---

<b>AMI</b>	Alternate Mark Inversion. A line coding technique used to accommodate the ones density requirements of E1 or T1 lines.
<b>bipolar signal</b>	A signal in which successive ones (marks, pulses) are of alternating positive and negative polarity, and in which a zero (space, no pulse) is of zero amplitude.
<b>BPV</b>	Bipolar Violation. In a bipolar signal, a one (mark, pulse) which has the same polarity as its predecessor.
<b>bridged tap</b>	Any part of the local loop that is not in the direct talking path between the CO and the service user.
<b>CO</b>	Central Office/Central Site. The PSTN facility that houses one or more switches serving local telephone subscribers.
<b>CPE</b>	Customer Premises Equipment. Terminal equipment on the service user's side of the telecommunications network interface.
<b>CRC</b>	Cyclic Redundancy Check. A mathematical method of confirming the integrity of received digital data.
<b>crosstalk</b>	Line distortion due to wire pairs in the same bundle being used for separate signal transmission.
<b>CTS</b>	Clear To Send. A signal indicating that the device is ready for the DTE to transmit data. Usually occurs in response to Request To Send (RTS).
<b>CV</b>	Code Violation. Detected when using HDB3 coding format, this is equivalent to a BPV when using AMI coding.
<b>DCE</b>	Data Communications Equipment. The equipment that provides the functions required to establish, maintain, and end a connection. It also provides the signal conversion required for communication between the DTE and the network.
<b>DSR</b>	Data Set Ready. A signal from the modem to the DTE that indicates the modem is turned ON and connected to the DTE.
<b>DTE</b>	Data Terminal Equipment. The equipment, such as a computer or terminal, that provides data in the form of digital signals for transmission.
<b>DTR</b>	Data Terminal Ready. A signal from the DTE to the modem, sent via Pin 20 of the EIA-232 interface (V.24 circuit 108/1, /2), that indicates the DTE is turned ON and connected to the modem.
<b>EIA</b>	Electronic Industries Association. This organization provides standards for the data communications industry to ensure uniformity of interface between DTEs and DCEs.
<b>EIA-530-A</b>	An Electronic Industries Association standard for a high-speed, 25-position, DCE/DTE interface.
<b>E1</b>	A wideband digital interface operating at 2.048 Mbps, defined by ITU recommendations G.703 and G.704. It is used primarily outside North America.
<b>factory defaults</b>	A predetermined set of configuration options containing the optimum settings for operation on asynchronous dial networks.
<b>FAS</b>	Frame Alignment Signal. A loss of signal (LOS) error detection.

<b>FAW</b>	Frame Alignment Word. A loss of synchronization error detection.
<b>FCC</b>	Federal Communications Commission. The Board of Commissioners that regulates all electrical communications that originate in the United States.
<b>FEBE</b>	Far-End Block Error. Block errors reported by remote equipment.
<b>G.703</b>	An ITU recommendation for the physical and logical characteristics of hierarchical digital devices.
<b>G.704</b>	An ITU recommendation for synchronous frame structures.
<b>HDB3</b>	High Density Bipolar Three Zeros Substitution. A line coding technique used to accommodate the ones density requirements of E1 lines.
<b>HDSL</b>	High-bit-rate Digital Subscriber Line. A technique for high bandwidth, bidirectional transmission over copper wire for T1 and E1 services.
<b>HTU</b>	Host Termination Unit. A generic reference to either an HTU-C or HTU-R module.
<b>HTU-C</b>	Host Termination Unit – Central. The module at the CO (central office) or central site end of an HDSL connection. Also known as a Line Termination Unit (LTU).
<b>HTU-R</b>	Host Termination Unit – Remote. The module at the CP (customer premises) end of an HDSL connection. Also known as a Network Termination Unit (NTU).
<b>ITU</b>	International Telecommunications Union. The telecommunications agency of the United Nations, established to provide standardized communications procedures and practices. Before March 1993 it was called CCITT.
<b>LED</b>	Light Emitting Diode. A light or status indicator that glows in response to the presence of a certain condition (e.g., an alarm).
<b>loopback</b>	A diagnostic procedure that sends a test message back to its origination point. Used to test various portions of a data link in order to isolate an equipment or data line problem.
<b>NEXT</b>	Near End CrossTalk. Crosstalk in which the interfering signal is traveling in the opposite direction as the desired signal.
<b>POTS</b>	Plain Old Telephone Service. Standard telephone service over the PSTN, with an analog bandwidth of less than 4 KHz.
<b>reset</b>	A reinitialization of the device that occurs at power-up or in response to a reset command.
<b>RTS</b>	Request to Send. A signal from the DTE to the device, indicating that the DTE has data to send. V.24 circuit 105.
<b>RXD</b>	Received Data. Pin 3 of the EIA-232 interface that is used by the DTE to receive data from the modem. Conversely, the modem uses Pin 3 to transmit data to the DTE.
<b>TXD</b>	Transmit Data. Pin 2 of the EIA-232 interface that is used by the DTE to transmit data to the modem. Conversely, the modem uses Pin 2 to receive data from the DTE.
<b>VT100</b>	A Digital Equipment Corporation terminal, and a common terminal emulation mode used for asynchronous communications.
<b>V.35</b>	An ITU-T standard for a high-speed, 34-position, DCE/DTE interface.

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