



# **HOTWIRE MODELS 7924 AND 7925 T1 AND E1 HDSL NEST CARD TERMINATION UNITS**

## **USER'S GUIDE**

Document No. 7920-A2-GB20-20

November 1997



**\* 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 non-adjacent wire pairs within the main bundle whenever possible.
- Use only non-conditioned loops (no load coils, echo suppression, etc.).
- Eliminate any non-twisted 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.

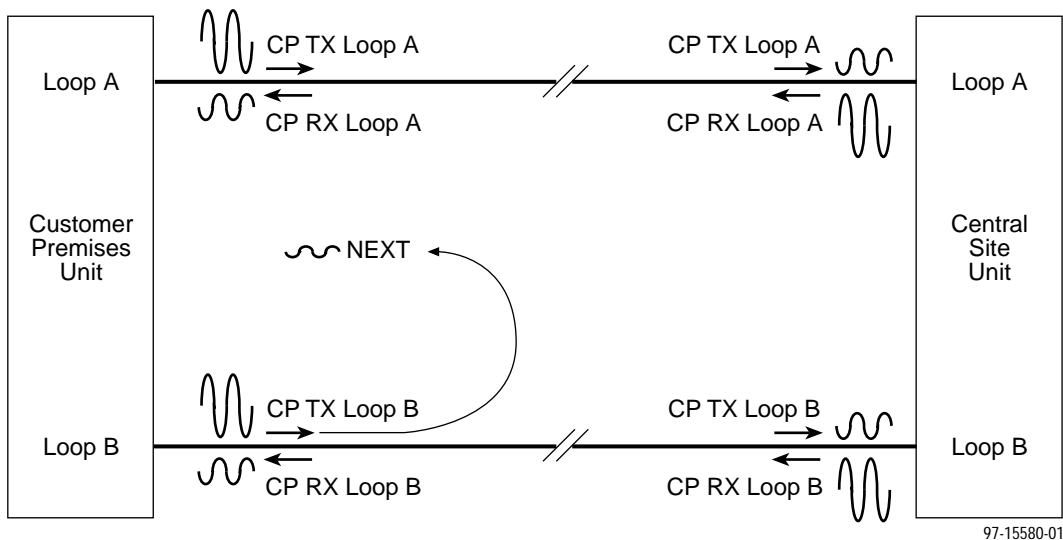
It is critical that only twisted-pair cabling be used for all connections within the HDSL loop. Using non-twisted pair cable anywhere within the loop significantly increases the amount of NEXT, decreasing the Signal-to-Noise Ratio (SNR) and loop reach.

### 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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- **Via the Internet:** Visit the Paradyne World Wide Web site at <http://www.paradyne.com>
- **Via Telephone:** Call our automated call system to receive current information via fax or to speak with a company representative.
  - Within the U.S.A., call 1-800-870-2221
  - International, call 727-530-2340



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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. This product is intended to be used with a 3-wire grounding type plug – a plug which has a grounding pin. This is a safety feature. Equipment grounding is vital to ensure safe operation. Do not defeat the purpose of the grounding type plug by modifying the plug or using an adapter.  
Prior to installation, use an outlet tester or a voltmeter to check the ac receptacle for the presence of earth ground. If the receptacle is not properly grounded, the installation must not continue until a qualified electrician has corrected the problem.  
If a 3-wire grounding type power source is not available, consult a qualified electrician to determine another method of grounding the equipment.
3. Slots and openings in the cabinet are provided for ventilation. To ensure reliable operation of the product and to protect it from overheating, these slots and openings must not be blocked or covered.
4. Do not allow anything to rest on the power cord and do not locate the product where persons will walk on the power cord.
5. Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous high voltage points or other risks. Refer all servicing to qualified service personnel.
6. 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.
7. 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.
8. 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.
9. 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 un-insulated 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.

## 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.

## CE Mark

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 Models 7924-B1 (T1) and 7925-B1 (E1) HDSL Nest Card Termination Units. It is expected that readers of this document are central office technicians or network engineers who have an understanding of the deployment of digital subscriber line systems in a telephone company or private network environment.

Hotwire 7924 and 7925 Termination Units can be ordered either as standalone units (7924-A1-xxx/7925-A1-xxx) or as nest-mounted circuit cards (7924-B1-xxx/7925-B1-xxx) that fit in the Hotwire 7900 Nest. This guide describes the configuration, installation, and maintenance procedures for Hotwire Models 7924-B1 and 7925-B1 T1 and E1 HDSL nest-mounted cards.

## Document Summary

Section	Description
Chapter 1	<i>About Hotwire Models 7924 and 7925 Termination Units.</i> Describes the features of Hotwire 7924 and 7925 termination units and provides typical configurations.
Chapter 2	<i>Installing Hotwire Nest Card Termination Units.</i> Describes the procedures for installing the Hotwire Model 7900 Nest Card Termination Units and nest filler panels.
Chapter 3	<i>Customizing Hotwire 7924 Nest Card Termination Units.</i> Provides procedures for modifying configuration options by using the DIP switches and jumpers on the nest card.
Chapter 4	<i>Customizing Hotwire 7925 Nest Card Termination Units.</i> Provides procedures for modifying configuration options by using DIP switches and jumpers located on the board.
Chapter 5	<i>Monitoring Nest Card Termination Units.</i> Describes how to monitor unit and network status using the front panel LEDs.

<b>Section</b>	<b>Description</b>
<a href="#">Appendix A</a>	<i>Hotwire Model 7924 Worksheets</i> . Contains all the configuration options, default settings, and possible settings.
<a href="#">Appendix B</a>	<i>Hotwire Model 7925 Worksheets</i> . Contains all the configuration options, default settings, and possible settings.
<a href="#">Glossary</a>	Defines the acronyms and terms used in this document.
<a href="#">Index</a>	Lists key terms, acronyms, and concepts, 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 Nest and Options Installation Guide</i>
7910-A2-GB20	<i>Hotwire Models 7914 and 7915 T1 &amp; E1 SDSL Nest Cards User's Guide</i>
7924-A2-GB20	<i>Hotwire Model 7924 Standalone T1 HSDL Termination Unit User's Guide</i>
7925-A2-GB20	<i>Hotwire Model 7925 Standalone E1 HSDL Termination Unit User's Guide</i>

To order additional product documentation, refer to [Warranty, Sales, and Service Information](#) on page A at the beginning of this User's Guide.

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# About Hotwire Models 7924 and 7925 Termination Units

# 1

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## Hotwire 7924 and 7925 Features

Products in the Hotwire 7900 family provide “last mile/last kilometer” transport of T1- and E1-compatible circuits between customer facilities and central-site equipment over 2- or 4-wire copper lines. These termination units can be used over distances substantially exceeding traditional T1 and E1 spans and European Telecommunications Standards Institute (ETSI) loop standards.

This chapter provides a general overview of the Hotwire Models 7924 and 7925 Nest Card Termination Units, including standalone units and nest-mounted termination units.

### Hotwire Model 7924 Features

Hotwire Model 7924 features include:

- DSX-1 and V.35 (standalone units only) interface
- Full support for T1 using two twisted-copper pairs
- Full support for fractional T1 using one or two twisted-copper pairs
- Meets the requirements of repeaterless T1 transmission on loops exceeding standard specifications
- Automatic detection of and compensation for inverted pairs and swapped loops, significantly simplifying installation
- Local and remote alarm surveillance
- Local and remote T1 and HDSL performance monitoring

## Hotwire Model 7925 Features

Hotwire Model 7925 features include:

- G.703 and V.35 (standalone units only) interface
- Meet the requirements of repeaterless E1 transmission on loops exceeding standard specifications (up to 10 km on a 0.9 mm wire)
- Automatic detection and compensation for inverted pairs and swapped loops, significantly simplifying installation
- Local and remote alarm surveillance and performance monitoring
- Local and remote E1 and HDSL performance monitoring

You can order Hotwire 7924 and 7925 products as standalone units (7924-A1/7925-A1) or as nest-mounted circuit card assemblies (CCAs) (7924-B1/7925-B1) that fit in the Hotwire 7900 Nest. This guide describes the installation and maintenance procedures for the nest-card termination units, Models 7924-B1 and 7925-B1. See *Product-Related Documents* in *About This Guide* for information on user manuals for the standalone units.

## Hotwire Model 7924 Typical Configurations

Hotwire Model 7924 termination 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 private-line services across the campus.

Figure 1-1 shows a central-site application with a Hotwire 7900 Nest containing Hotwire Model 7924 Nest Card Termination Units. Each nest card terminates a single subscriber line in the central site. Each line is then converted to a DSX-1 interface for connection to other central-site equipment, such as a digital cross-connect system (DCS).

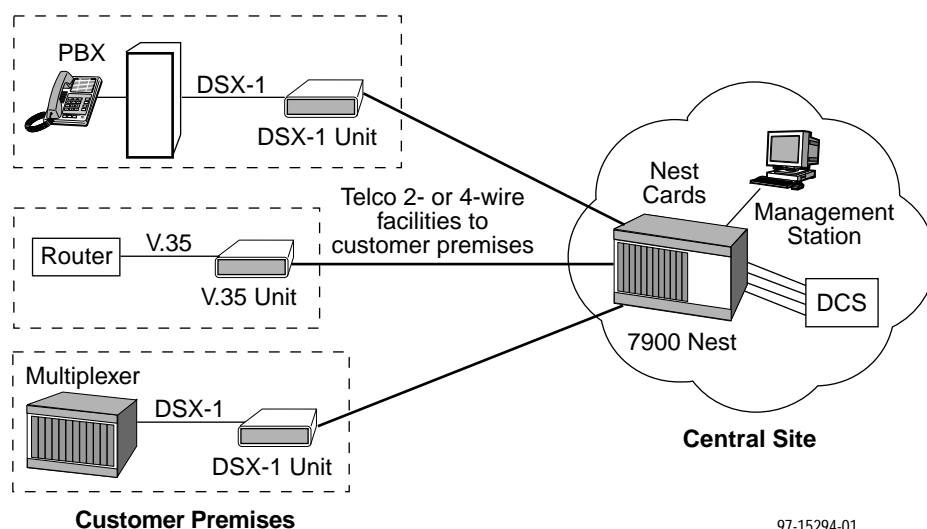


Figure 1-1. T1 Extension to Customer Premises

Cellular network providers must lease large numbers of T1 circuits in order to connect remote cell sites to mobile telephone switching offices (MTSOs). Hotwire Model 7924 products provide an alternative to standard repeatered T1 services. Figure 1-2 depicts a typical cellular network access application.

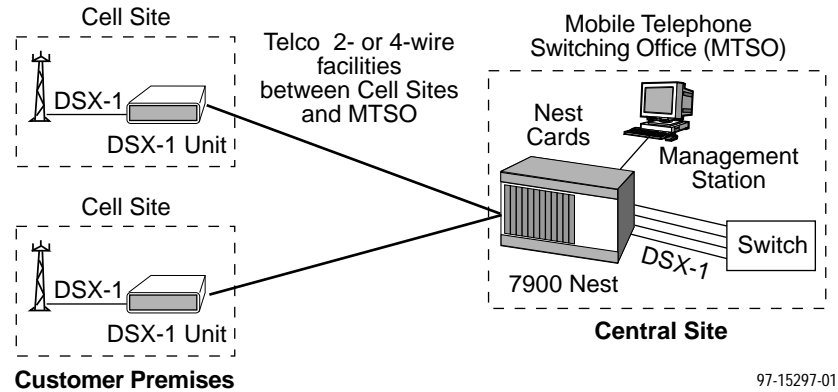


Figure 1-2. Cellular Network Access

Figure 1-3 shows two typical campus applications where remote routers or multiplexers are interconnected across a campus using two Hotwire Model 7924 standalone units. In each pair, one unit is configured as a central site and the other as the remote customer premises.

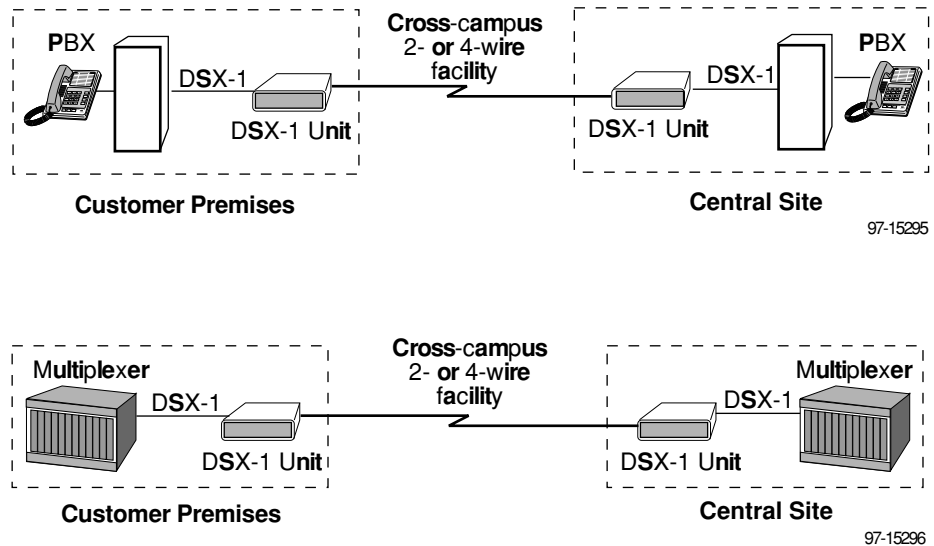


Figure 1-3. Campus Network Applications

Hotwire Model 7924 standalone units are ideal for delivering T1 services from a central site to the customer premises over long loop distances without repeaters.

## Hotwire Model 7925 Typical Configurations

Figure 1-4 shows a central-site application with a Hotwire 7900 Nest containing Hotwire Model 7925 Nest Card Termination Units. Each nest card termination unit terminates a single subscriber line in the central site. Each line is then converted to a G.703 interface for connection to other central-site equipment, such as a digital cross-connect system (DCS).

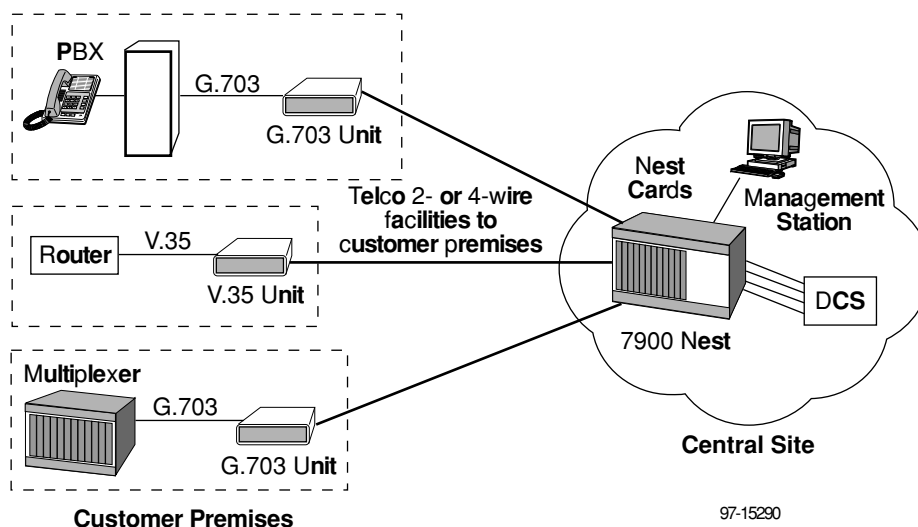


Figure 1-4. E1 Extension to Customer Premises

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 1-5 depicts a typical G.703 cellular network access application.

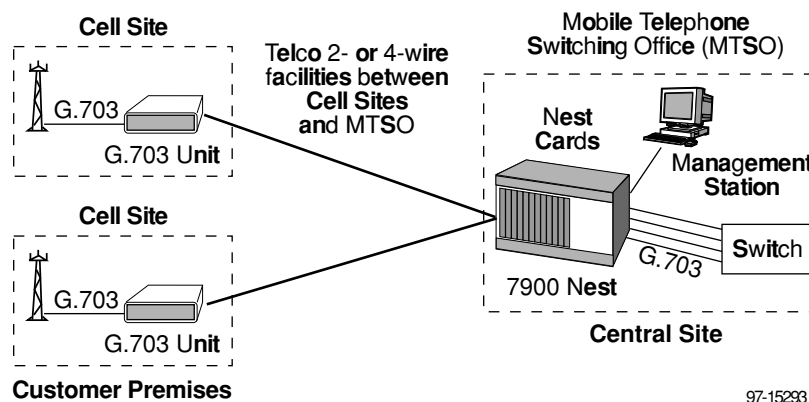
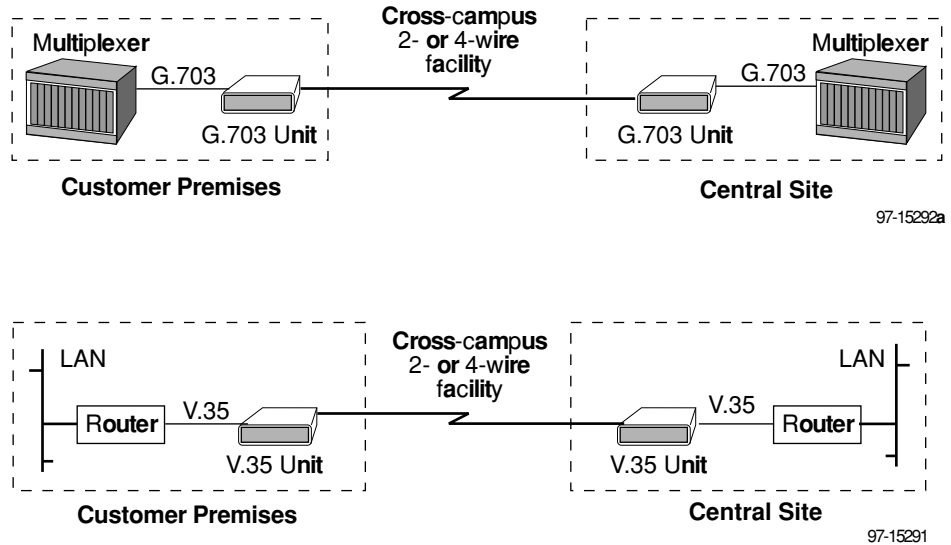


Figure 1-5. Cellular Network Access

Hotwire Model 7925 termination 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 private line services across the campus. **Figure 1-6** shows two typical campus applications where remote routers or multiplexers are interconnected across a campus using two Hotwire Model 7925 termination units. In each pair, one unit is configured as a central site and the other as the customer premises.



**Figure 1-6. Campus Network Applications**

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

Each Hotwire Model 7924 and 7925 nest card termination unit is configured at the factory to operate at the central site (CO) of a T1 or E1 HDSL connection. However, you can reconfigure the unit for customer premises (CP) operation if required.

## Nest Card Termination Unit User Interfaces

There are two types of user interfaces to the nest card termination units:

- Switches and jumpers (refer to Chapter 3, *Customizing Hotwire 7924 Nest Card Termination Units*, and Chapter 4, *Customizing Hotwire 7925 Nest Card Termination Units*)
- Front Panel LED status indicators (refer to Chapter 5, *Monitoring Nest Card Termination Units*)

If you have a Hotwire Model 7900 Basic Maintenance Processor (MTU-M), you can also monitor nest card termination units and network status using:

- The MTU-M front panel LEDs
- A VT100-compatible system terminal connected to the MTU-M front panel or nest rear panel.

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# Installing Hotwire Nest Card Termination Units

# 2

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## Package Checklist

Verify that your package contains the following:

- The correct number of Hotwire Models 7924 or 7925 nest card termination units (verify this with your packing list)
- Warranty card

## Inspecting the Shipping Container

Inspect the shipping container for signs of damage. Specific signs to check for are:

- Major tears or puncture holes on the sides of the container
- Splits in the seams
- Corner damage or any additional signs of the container having been dropped

If the shipping container shows signs of damage, report this immediately to your shipping or service representative.

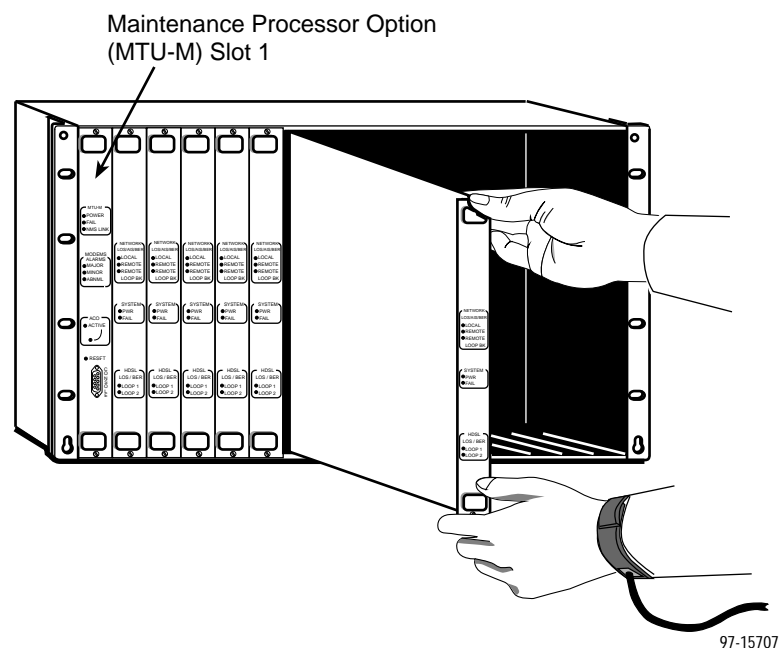
## Installing Nest Card Termination Units

It is assumed that you have already installed the Hotwire Model 7900 Nest and associated power supply in a standard equipment rack, and that all network connections have been made. Installation of the optional Hotwire 7900 Basic Maintenance Processor (MTU-M) is described in a separate user's guide. Refer to *Product-Related Documents* in *About This Guide*.

### ► Procedure

To install the nest card:

1. Use electrostatic discharge (ESD) protection when handling the electronic components. Remove the card from any protective packaging.
2. Align the circuit board with the top and bottom card guides of the next available card slot:
  - Slot 1 if no maintenance processor option is installed
  - Slot 2 if the MTU-M maintenance processor option is installed in Slot 1
3. Slide the nest card into the slot until the backplane connector plug is seated firmly into the backplane.
4. Tighten retaining screws at the top and bottom of the front panel.



## Installing Nest Filler Panels

There are four nest filler panels provided with each Hotwire 7900 Nest. Each nest filler panel covers 1, 2, 4, or 8 slots on the nest. Use any combination of nest filler panels to cover slots that do not contain nest cards.

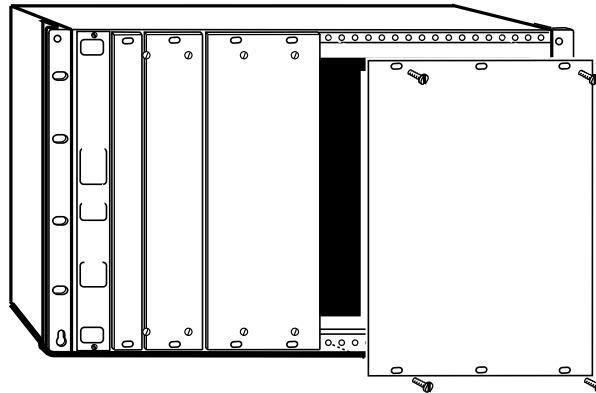
### **⚠ WARNING:**

**Front Panel Fillers are required for EMI safety purposes. Install nest filler panels to cover all nest card slots that do not contain nest card termination units.**

### **► Procedure**

To install nest filler panels:

1. Align the filler panel with the retaining screw holes located at the top and bottom of the nest.
2. Attach a filler panel with the retaining screws provided.
3. Repeat until all empty nest card slots are covered.



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# Customizing Hotwire 7924 Nest Card Termination Units

# 3

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## Changing Your Configuration Options

This chapter provides instructions on how to change or verify the configuration options for DSX-1-compatible Hotwire 7924 T1 Nest Card Termination Units. [Chapter 4](#) provides configuration options for G.703-compatible Hotwire 7925 E1 Nest Card Termination Units.

Configuration option settings determine how the unit operates. You can change the unit's configuration options by changing switchpack and jumper settings on the nest card.

### ► Procedure

To change or verify configuration options:

1. Loosen retaining screws at the top and bottom of the nest card.
2. Use electrostatic discharge (ESD) protection when handling the electronic components. Remove the card from the nest.
3. Use [Figure 3-1](#) to locate switchpack S1.
4. Place the switchpack DIP switches in the ON or OFF position for each desired configuration option. For example, to change a unit's card type from CO to CP, move DIP switch 1 on switchpack 1 to the OFF position.

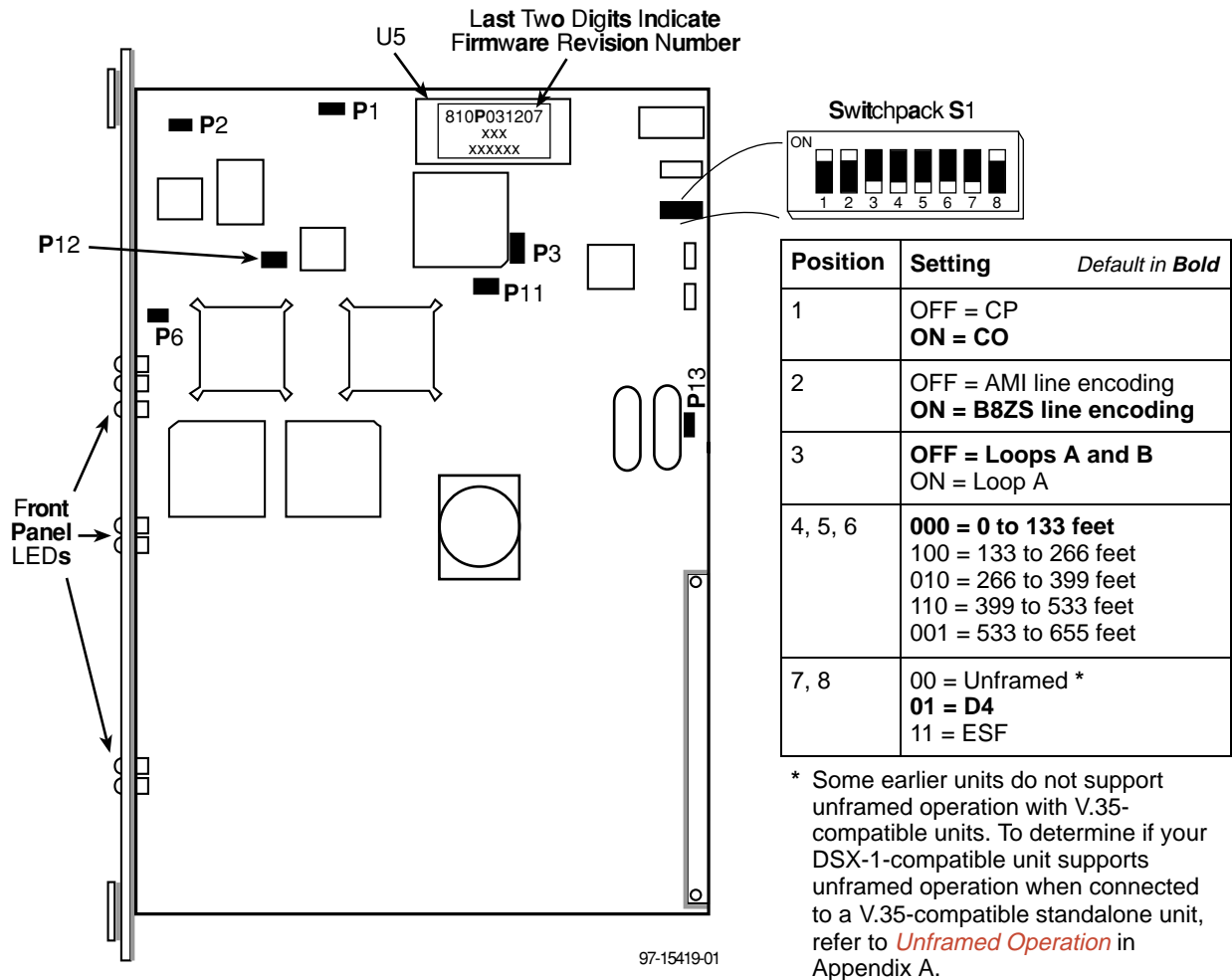
#### **NOTE:**

The jumper on P12 is positioned at the factory on Pins 1–2 (switchpack S1 disabled). To enable switchpack S1, move the jumper on P12 to Pins 2–3.

5. Return the nest card to the nest.
6. Tighten retaining screws at the top and bottom of the nest card.

## Switchpack and Jumper Locations

Use [Figure 3-1](#) to locate Hotwire 7924 nest card jumpers and switchpack S1.



**Figure 3-1. Hotwire 7924 Nest Card Switchpack and Jumper Locations**

- Pin 1 on jumpers is labeled on the board.
- The ON position is labeled on the switchpack.
- The jumper on P12 is positioned at the factory on Pins 1–2 (switchpack S1 disabled). To enable switchpack S1, move the jumper on P12 to Pins 2–3.
- Positions 4, 5, and 6 work as a trio. Set position 4 to the first digit, position 5 to the second digit, and position 6 to the last digit. For example, set 4 and 5 ON and 6 OFF for 399–533 feet.
- Positions 7 and 8 on Switchpack S1 work as a pair. Set position 7 to the first digit and position 8 to the second digit.

## Switchpack Definitions

Change configuration options by moving switchpack S1 DIP switches on the nest card.

Switchpack S1 Definitions	
Position # . . .	Allows you to . . . <span style="float: right;"><i>Default in <b>Bold</b></i></span>
1	Control whether the board is an HTU-C (CO) or an HTU-R (CP). OFF = CP <b>ON = CO</b>
2	Control enabling and disabling of zeroes suppression in the line code. OFF = AMI line encoding <b>ON = B8ZS line encoding</b>
3	Change the HDSL Local Loop configuration. <b>OFF = Loops A and B enabled</b> ON = Loop A enabled
4, 5, and 6	Change Line Build-out configuration. <b>000 = 0 to 133 feet</b> 100 = 133 to 266 feet 010 = 266 to 399 feet 110 = 399 to 533 feet 001 = 533 to 655 feet  Positions 4, 5, and 6 form a three-digit binary number where ON represents a value of 1 and OFF represents a value of 0. For example, set 4 and 5 ON and 6 OFF for 399 to 533 feet.
7, 8	Control whether data is transmitted with or without framing.  00 = Unframed * <b>01 = D4</b> 11 = ESF  Positions 7 and 8 form a two-digit binary number where ON represents a value of 1 and OFF represents a value of 0. For example, set 7 OFF and 8 ON for D4 framing.  NOTE: Configure your Hotwire equipment to match the T1 network. If your T1 service is framed, configure your Hotwire 7900 nest cards as framed. If your T1 service is unframed, configure your Hotwire 7900 nest cards as unframed.
* Some earlier units do not support unframed operation with V.35-compatible units. To determine if your DSX-1-compatible unit supports unframed operation when connected to a V.35-compatible standalone unit, refer to <i>Unframed Operation</i> in Appendix A, <i>Hotwire Model 7924 Worksheets</i> .	

## Jumper Positions

The following table provides the correct default jumper positions for your nest card.

<b>Jumper</b>	<b>Position</b>
P1	No jumper
P2	1-2
P3	2-3
P6	No jumper
P11	1-2
P12	1-2
P13	1-2

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# Customizing Hotwire 7925 Nest Card Termination Units

# 4

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## Changing Your Configuration Options

This chapter provides instructions on how to change or verify configuration options for G.703-compatible Hotwire 7925 E1 Nest Card Termination Units. [Chapter 3](#) provides configuration options for DSX-1-compatible Hotwire 7924 T1 Nest Card Termination Units.

Configuration option settings determine how the unit operates. You can change the unit's configuration options by changing switchpack and jumper settings on the nest card.

### ► Procedure

To change or verify configuration options:

1. Loosen retaining screws at the top and bottom of the nest card.
2. Use electrostatic discharge (ESD) protection when handling the electronic components. Remove the card from the nest.
3. Use [Figure 4-1](#) to locate switchpack S1.
4. Place the switchpack DIP switches in the ON or OFF position for each desired configuration option. For example, to change a unit's card type from CO to CP, move DIP switch 1 on switchpack 1 to the OFF position.

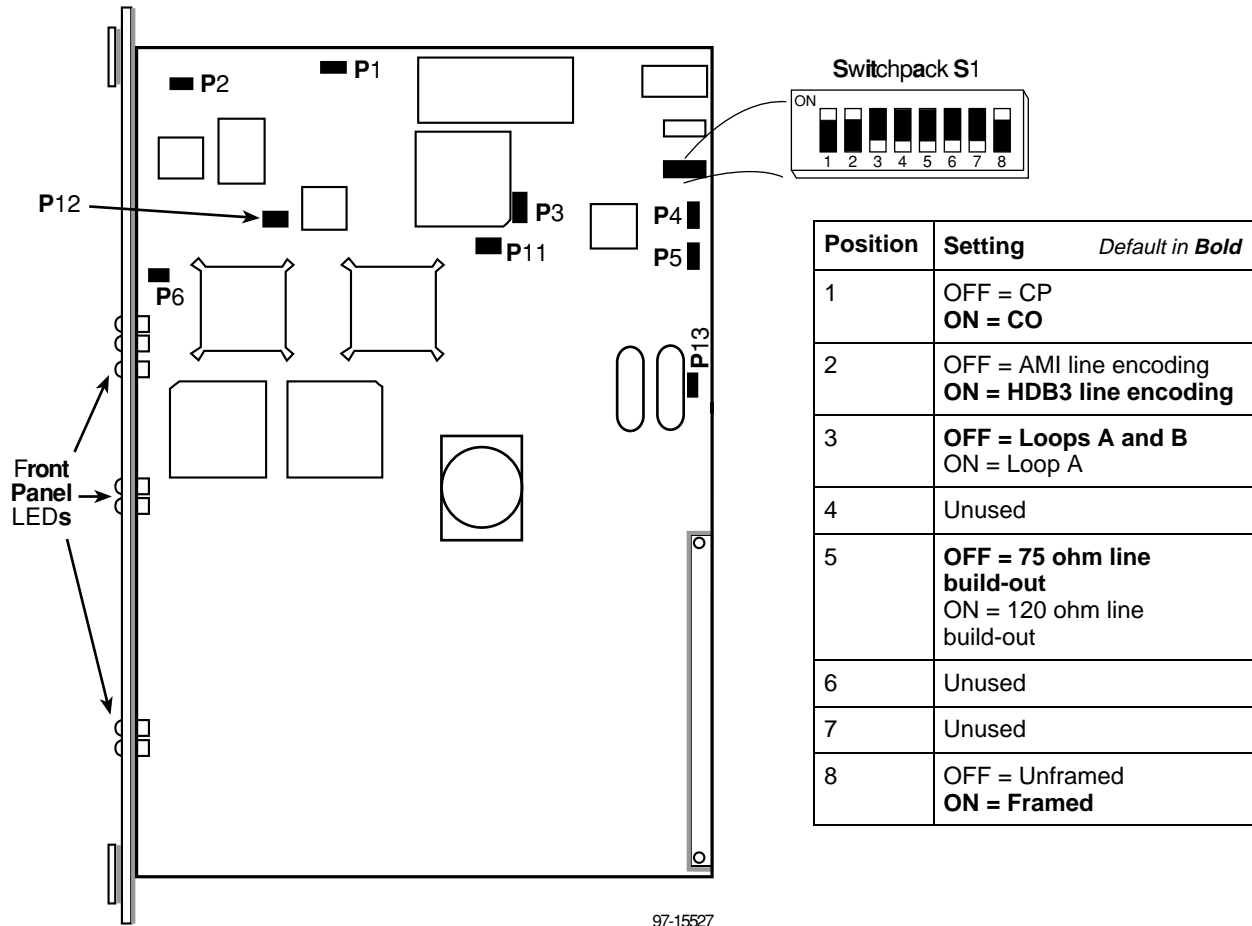
#### **NOTE:**

The jumper on P12 is positioned at the factory on Pins 1–2 (switchpack S1 disabled). To enable switchpack S1, move the jumper on P12 to Pins 2–3.

5. Return the nest card to the nest.
6. Tighten retaining screws at the top and bottom of the nest card.

## Switchpack and Jumper Locations

Use [Figure 4-1](#) to locate Hotwire 7925 nest card jumpers and switchpack S1.



**Figure 4-1. Hotwire 7925 Nest Card Switchpack Locations and Jumper Positions**

- Pin 1 on jumpers is labeled on the board.
- The ON position is labeled on the switchpack.
- The jumper on P12 is positioned at the factory on Pins 1–2 (switchpack S1 disabled). To enable switchpack S1, move the jumper on P12 to Pins 2–3.

## Switchpack Definitions

Change configuration options by moving switchpack S1 DIP switches on the nest card hardware.

<b>Switchpack S1 Definitions</b>	
<b>Position # . . .</b>	<b>Allows you to . . .</b> <span style="float: right;"><i>Default in <b>Bold</b></i></span>
1	Control whether the board is an HTU-C (CO) or an HTU-R (CP). OFF = CP <b>ON = CO</b>
2	Control enabling and disabling of zeroes suppression in the line code. OFF = AMI line encoding <b>ON = HDB3 line encoding</b>
3	Change HDSL Local Loop configuration. <b>OFF = Loops A and B enabled</b> ON = Loop A enabled
4	Unused
5	Change the Line Build-out configuration. <b>OFF = 75 ohm line build-out</b> ON = 120 ohm line build-out
6	Unused
7	Unused
8	Control whether the data is transmitted with or without framing. OFF = Unframed <b>ON = Framed</b>

## Jumper Positions

The following table provides the correct default jumper positions for your nest card.

<b>Jumper</b>	<b>Position</b>
P1	No jumper
P2	1-2
P3	2-3
P4	1-2
P5	1-2
P6	No jumper
P11	1-2
P12	1-2
P13	1-2

---

# Monitoring Nest Card Termination Units

# 5

---

## What to Monitor

Front panel LEDs on each Hotwire Model 7924 and 7925 Nest Card Termination Unit provide status information about the nest card, HDSL local loop, and the T1 or E1 network interface. This chapter presents information on how to monitor and interpret the Hotwire 7924 and 7925 nest card termination unit front panel LEDs.

You can also monitor loop status, change operational parameters, or initiate loopback testing using a Hotwire 7900 Basic Maintenance Processor (MTU-M).

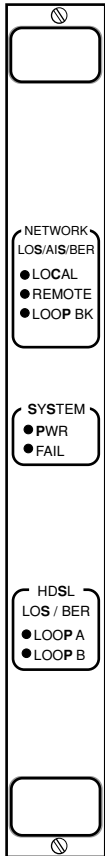
The MTU-M maintenance processor:

- Monitors the status of up to 63 nest card termination units
- Stores the performance history of individual circuits and network status
- Monitors and displays individual circuit and loop status on the maintenance processor front panel
- Displays individual circuit and loop status on the VT100-compatible terminal
- Interfaces with and reports circuit status to your Network Management System using Simple Network Management Protocol (SNMP)

For further information on the maintenance processor, refer to the *Hotwire Model 7900 Basic Maintenance Processor User's Guide*.

## Front Panel LEDs

When power is applied to the nest card, the top three LEDs (LOCAL, REMOTE, and LOOP BK) blink once in sequence and then remain off, indicating a successful start configuration.



97-15441

LED . . .	Blinks or remains on when . . .
LOCAL	The local T1 or E1 interface has a loss of signal.
REMOTE	The remote T1 or E1 interface has a loss of signal.
LOOP BK	A loopback has been initiated.
PWR	Power is applied to the unit.
FAIL	The processor has halted and repairs are required.
LOOP A	HDSL Loop A has failed. (The LED will blink at board power up until the loop has been synchronized.)
LOOP B	HDSL Loop B has failed or has been disabled. (The LED will blink at board power up until the loop has been synchronized.)

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# Hotwire Model 7924 Worksheets



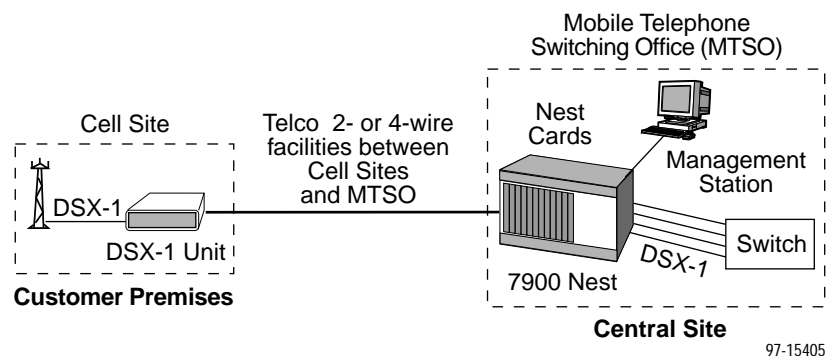
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## Overview

The following worksheets illustrate Hotwire 7924-B1 configuration settings based on the types of connection. There are two connection combinations for Hotwire Model 7924 Nest Card Termination Units:

- DSX-1-compatible units at both ends
- V.35-compatible unit at the customer premises (CP), DSX-1-compatible unit at the central site (CO)

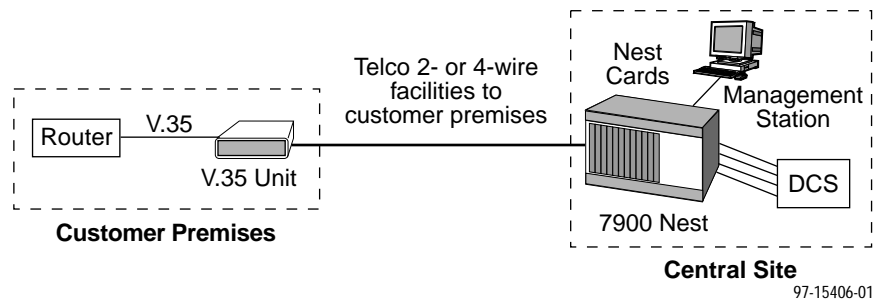
## DSX-1 to DSX-1 Configuration



To connect two DSX-1-compatible units, configure the units as follows (factory defaults are in bold):

Configuration Option	DSX-1-Compatible Unit (Customer Premises)	DSX-1-Compatible Unit (Central Site)
Card Type	CP	<b>CO</b>
Loops Enabled	<b>Dual</b> (Loops A and B) or Single (Loop A)	Must be same as CP side
T1 Line Encode	<b>B8ZS</b> or AMI	Must be same as CP side
Framing	<b>D4</b> , Extended Superframe, or Unframed	Must be same as CP side
Line Build-Out	<b>1) 0 to 133 feet</b> 2) 133 to 266 feet 3) 266 to 399 feet 4) 399 to 533 feet 5) 533 to 655 feet	<b>1) 0 to 133 feet</b> 2) 133 to 266 feet 3) 266 to 399 feet 4) 399 to 533 feet 5) 533 to 655 feet

### DSX-1 Nest-to-Standalone V.35 Configuration



To connect a V.35-compatible standalone unit at the CP side and a DSX-1-compatible nest unit on the CO side, configure the units as follows (factory defaults are in bold):

Configuration Option	V.35-Compatible Unit (Customer Premises)	DSX-1-Compatible Unit (Central Site)
Card Type	CP	<b>CO</b>
Loops Enabled	<b>Dual</b> (Loops A and B) or Single (Loop A)	Must be same as CP side
Payload Rate	1 – <b>9</b> (64 – <b>1536</b> kbps). Options 8 and 9 are only available if loops A and B are enabled.	N/A

Configuration Option	V.35-Compatible Unit (Customer Premises)	DSX-1-Compatible Unit (Central Site)
Framing <sup>1</sup>	N/A	If the payload rate is 1544 kbps, use unframed.  If the payload rate is less than 1544 kbps, use D4 or ESF.
T1 Line Encode	N/A	<b>B8ZS</b> or AMI
Line Build-Out	N/A	<b>1) 0 to 133 feet</b> 2) 133 to 266 feet 3) 266 to 399 feet 4) 399 to 533 feet 5) 533 to 655 feet
<sup>1</sup> Refer to <i>Unframed Operation</i> for unframed operation considerations.		

When the V.35 payload rate is set for less than 1536 kbps, that payload rate determines which T1 DS0s are used, as follows:

V.35 Payload Rate	DSX-1 T1 DS0s Used
1 (64 kbps)	1
2 (128 kbps)	1, 2
3 (192 kbps)	1 – 3
4 (256 kbps)	1 – 4
5 (384 kbps)	1 – 6
6 (512 kbps)	1 – 8
7 (768 kbps)	1 – 12
8 (1024 kbps)	1 – 16

## Unframed Operation

Some earlier units do not support unframed operation when connected to a V.35-compatible unit. To determine whether or not your DSX-1 nest card termination unit supports unframed operation when connected to a V.35-compatible unit, all three of the following conditions must be true:

1. The DSX-1 nest card termination unit must have a firmware revision number of 7 or higher.

The firmware revision number is the last two digits on the first line of the label located on the nest card EPROM located at U5. Refer to [Figure 3-1](#) in Chapter 3, for the location of the EPROM.

2. The V.35-compatible unit must have an HDSL firmware revision number of three (03) or higher.

To display the HDSL FW (firmware) revision number, select the Board Configuration option (3) from the Main Menu (a system terminal is required).

3. The V.35-compatible standalone unit must have a hardware revision number of 5 or higher.

To determine the hardware revision number, look at the label on the bottom of the standalone unit that has the “CE” and “CSA” logos. The second row of numbers on this label should be “900P005705” or higher. The last two digits of this number (05) indicate the hardware revision number.

## Hotwire 7924 Configuration Worksheet

Nest Card Configuration <sup>1</sup>	
Configuration Option	Settings <i>Default in <b>Bold</b></i>
HDSL Card Type	CP, <b>CO</b>
Loops Enabled	<b>Loops A and B</b> , Loop A
T1 Line Encode	<b>B8ZS</b> , AMI
Line Build-Out	<b>1) 0 to 133 feet – 0</b> 2) 133 to 266 feet 3) 266 to 399 feet 4) 399 to 533 feet 5) 533 to 655 feet
Framing	<b>D4</b> , Extended Super Frame, Unframed <sup>2</sup>
<sup>1</sup> Refer to Chapter 3, <i>Customizing Hotwire 7924 Nest Card Termination Units</i> , for information on switchpack location and configuration options. <sup>2</sup> Refer to <i>Unframed Operation</i> page A-3 for unframed operation considerations.	

Nest Card Configuration	
Jumper	Settings <i>Default in <b>[Bold]</b></i>
P12	(1, 2) Not used <b>(2, 3) Switchpack enabled</b>

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# Hotwire Model 7925 Worksheets

# B

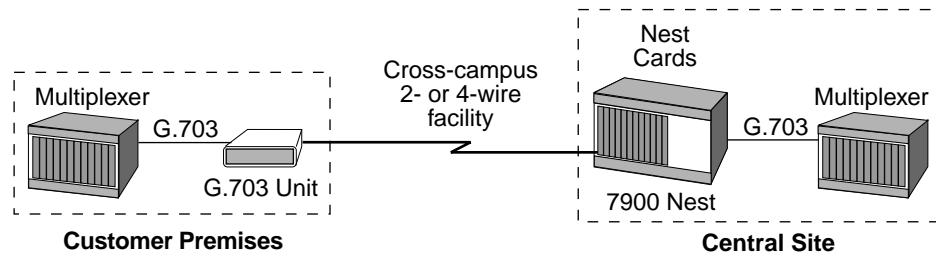
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## Overview

The following worksheets illustrate Hotwire 7925-B1 configuration settings based on the types of connection. There are two connection combinations for Hotwire Model 7925 Nest Card Termination Units:

- G.703-compatible units on both ends
- V.35-compatible unit on the CP end, G.703-compatible unit on the CO end

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

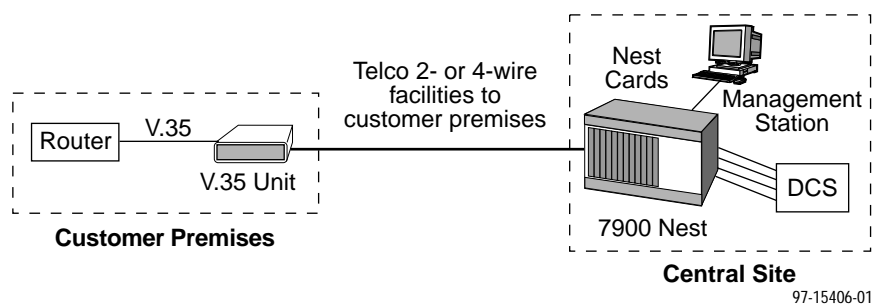


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To connect two G.703-compatible units, configure the units as follows (factory defaults are in bold):

Configuration Option	G.703-Compatible Unit (Customer Premises)	G.703-Compatible Unit (Central Site)
Card Type	<b>CP</b>	CO
Loops Enabled	<b>Dual</b> (Loops A and B) or Single (Loop A)	Must be same as CP side
E1 Line Encode	<b>HDB3</b> or AMI	Must be same as CP side
Framing	<b>Framed</b> or Unframed	Must be same as CP side
Line Build-Out <sup>1</sup>	75 ohm or <b>120 ohm</b>	75 ohm or <b>120 ohm</b> (does not need to be the same as the CP side)
<sup>1</sup> Refer to <i>Switchpack Definitions</i> in Chapter 4 for more information on changing line build-out.		

## G.703-to-V.35 Configuration



To connect a V.35-compatible standalone unit on the CP side and a G.703-compatible unit on the CO side, configure the units as follows (factory defaults are in bold):

Configuration Option	V.35-Compatible Unit (Customer Premises)	G.703-Compatible Unit (Central Site)
Card Type	<b>CP</b>	<b>CO</b>
Loops Enabled	<b>Dual</b> (Loops A and B) or Single (Loop A)	Must be same as CP side
Payload Rate	1 – 9 (64 – <b>2048</b> kbps). Option 9 (2048 kbps) is only available if Loops A and B are enabled.	N/A
Transmit Timing	<b>Loop</b>	N/A

<b>Configuration Option</b>	<b>V.35-Compatible Unit (Customer Premises)</b>	<b>G.703-Compatible Unit (Central Site)</b>
Framing	N/A	If the payload rate is 2048 kbps, use unframed. If the payload rate is less than 2048 kbps, use framed.
E1 Line Encode	N/A	<b>HDB3</b> or <b>AMI</b>
Line Build-Out <sup>1</sup>	N/A	75 ohm or <b>120 ohm</b>
<sup>1</sup> Refer to <i>Switchpack Definitions</i> in Chapter 4 for more information on changing line build-out.		

When the V.35 payload rate is set for less than 2048 kbps, that payload rate determines which E1 DS0s are used, as follows:

<b>V.35 Payload Rate</b>	<b>G.703 E1 DS0s Used</b>
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

## Hotwire 7925 Configuration Worksheet

Nest Card Configuration <sup>1</sup>	
Configuration Option	Settings <i>Default in [Bold]</i>
HDSL Card Type	CP, <b>CO</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	75 ohm, <b>120 ohm</b>
<sup>1</sup> Refer to Chapter 4, <i>Customizing Hotwire 7925 Nest Card Termination Units</i> for information on switchpack location and configuration options.	

Nest Card Configuration	
Jumpers	Settings <i>Default in [Bold]</i>
J12	(1, 2) Not used <b>(2, 3) Switchpack enabled</b>

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# Glossary

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<b>AMI</b>	Alternate Mark Inversion coding format.
<b>BPV</b>	Bipolar Violation. A type of error detected by using a modified bipolar signaling method in which a control code is inserted.
<b>Bridged tap</b>	A section of cable that was used to provide phone service to a home or business that is connected to a live copper wire but is not terminated.
<b>CD</b>	Carrier Detect. A signal indicating that energy exists on the transmission circuit. Associated with Pin 8 on an EIA-232 interface.
<b>CO</b>	Central Site or Central Office.
<b>COM port</b>	Communications port. A computer's serial communications port used to transmit to and receive data from a DCE. The DCE connects directly to this port.
<b>CP</b>	Customer Premises.
<b>CPE</b>	Customer Premises Equipment. Terminating equipment supplied by either the customer or some other supplier that is connected to the telecommunications network (e.g., DSUs, terminals, phones, routers, modems).
<b>CRC</b>	Cyclic Redundancy Check. A commonly used method of error detection.
<b>CTS</b>	Clear to Send. An EIA-lead standard for V.24 circuit CT 106; an output signal (DCE-to-DTE).
<b>CV</b>	Code Violation. This is equivalent to a BPV.
<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. An EIA-lead standard for V.24 circuit CT 107; an output signal (DCE-to-DTE).
<b>DSX-1</b>	Transmission standard at T1 speeds, 1544Mbits.
<b>DTE</b>	Data Terminal Equipment. The equipment, such as computers and printers, that provides or creates data.
<b>DTR</b>	Data Terminal Ready. An EIA-lead standard for V.24 circuit CT 108; an input signal (DTE-to-DCE).
<b>E1</b>	A data signaling rate common outside the United States. A wideband interface operating at 2.048 Mbps defined by CCITT standards G.703 and G.704.
<b>ETSI</b>	European Telecommunications Standards Institute. A European standards body established in 1988 by a decision of the CEPT (Conference of European Postal and Telecommunications Administrations).
<b>factory defaults</b>	A predetermined set of configuration options for general operation.
<b>FCC</b>	Federal Communications Commission. Board of Commissioners that regulates all U.S. interstate, intrastate, and foreign electrical communication systems that originate from the United States.
<b>FEBE</b>	Far End Bit Error. Number of errors reported by the remote equipment.

<b>HDB3</b>	High Density Bipolar 3 coding format.
<b>HDSL</b>	High-bit-rate Digital Subscriber Loop. Provides high bandwidth, bi-directional transmission over copper wire for both 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 Network Termination Unit (NTU).
<b>HTU-R</b>	Host Termination Unit – Remote. The module at the CP (customer premises) end of an HDSL connection. Also known as a Line Termination Unit (LTU).
<b>HTU-S</b>	Host Termination Unit – SNMP. The SNMP-compatible version of the Maintenance Processor.
<b>LED</b>	Light Emitting Diode. A status indicator that responds to the presence of a certain condition.
<b>loopback</b>	Used to test various portions of a data link in order to isolate an equipment or data line problem. A diagnostic procedure that sends a test message back to its origination point.
<b>MTSO</b>	Mobile Telephone Switching Office.
<b>MTU-M</b>	Multiple Termination Unit – Maintenance. A carrier-mounted module used to perform maintenance operations on one or more HTU/STU-R and HTU/STU-C modules.
<b>OOF</b>	Out Of Frame. An error condition in which frame synchronization bits are in error. A network-reported condition.
<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. An EIA-lead standard for V.24 circuit CT 105; an input signal (DTE-to-DCE).
<b>RXD</b>	Received Data. An EIA-lead standard for V.24 circuit CT 104; an output signal (DCE-to-DTE).
<b>SDSL</b>	Symmetrical Digital Subscriber Loop. Provides high bandwidth, bi-directional transmission over copper wire for both T1 and E1 services using 2 wires.
<b>SNMP</b>	Simple Network Management Protocol.
<b>STU</b>	SDSL Termination Unit. A generic reference to either an STU-C or STU-R module.
<b>STU-C</b>	SDSL Termination Unit – Central. The module at the central office or central site end of an HDSL connection. Also known as a Network Termination Unit (NTU).
<b>STU-R</b>	SDSL Termination Unit – Remote. The module at the customer premises end of an HDSL connection. Also known as a Line Termination Unit (LTU).
<b>T1</b>	A data signaling rate common in the United States. A term for a digital carrier facility used to transmit a DS1 formatted signal of 1.544 Mbps.
<b>TXD</b>	Transmit Data. An EIA-lead standard for V.24 circuit CT 103; an input signal (DTE-to-DCE).
<b>V.35</b>	ITU-T standard for a high-speed, 34-pin, DCE/DTE interface.

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