



**HOTWIRE™**  
**MODEL 7915 STANDALONE**  
**E1 SDSL TERMINATION UNIT**  
**USER'S GUIDE**

Document No. 7915-A2-GB20-30

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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. 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.
3. Do not allow anything to rest on the power cord and do not locate the product where persons will walk on the power cord.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.

## 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.

In order to maintain compliance with FCC Part 15 Rules, the ferrite choke must be installed on the DSL network cable. Refer to the installation instructions.

### **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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# 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 7915-A1 E1 SDSL termination units. It is designed for central office and/or special service installation technicians or network engineers who have an understanding of digital subscriber line systems and Symmetric Digital Subscriber Line (SDSL) transmission systems plus the deployment of such systems in a telephone company or private network environment.

## Document Summary

Section	Description
Chapter 1	<i>About Hotwire Model 7915 Standalone Termination Units.</i> Describes the features of each version of the Model 7915 and 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> Provides instructions for connecting a VT100-compatible terminal user interface, and describes how to make manual configuration changes directly on the board hardware.
Chapter 4	<i>Customizing G.703-Compatible Units.</i> Provides instructions for modifying configuration options by using the terminal interface or DIP switches and jumpers on the board.
Chapter 5	<i>Customizing V.35/V.11-Compatible Units.</i> Provides instructions for modifying configuration options by using the terminal interface or DIP switches and jumpers on the board.
Chapter 6	<i>Monitoring the Unit.</i> Describes how to monitor unit status, LEDs, and network statistics. Also describes how to monitor the status of the unit on the opposite side of the SDSL connection.

<b>Section</b>	<b>Description</b>
<b>Chapter 7</b>	<i>Testing.</i> Provides information about available loopback tests.
<b>Appendix A</b>	<i>Worksheets.</i> Contains all the configuration options, default settings, and possible settings to use for planning.
<b>Appendix B</b>	<i>Cable Pin Assignments.</i> Contains connector and interface details.
<b>Appendix C</b>	<i>Switchpacks and Jumpers.</i> Defines the switchpack and jumper positions on the board hardware. Includes board layout diagram.
<b>Glossary</b>	Defines acronyms and terms used in this document.
<b>Index</b>	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-GN10	<i>Hotwire Model 7900 10-Slot Standalone Shelf Installation Instructions</i>
7900-A2-GN20	<i>Hotwire Model 7900 Nest and Options Installation Guide</i>
7920-A2-GB20	<i>Hotwire Models 7924 and 7925 T1 and E1 HDSL Nest Cards Termination Units User's Guide</i>

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

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# About Hotwire Model 7915 Standalone Termination Units

# 1

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## Hotwire 7915 Models and Features

Products in the Hotwire™ Model 7915 family provide “last mile/last kilometer” transport of E1-compatible circuits between customer facilities and central site equipment over 2-wire copper lines. The units can be used over distances substantially exceeding traditional E1 spans and ETSI loop standards.

Hotwire 7915 includes these standard features:

- V.35/V.11 or G.703 interface
- Meets the requirements of repeaterless E1 transmission on loops exceeding standard specifications
- Tolerates bridged tap
- Provides local and remote alarm surveillance and performance monitoring

Hotwire Model 7915 may be ordered either as a standalone unit (7915-A1-xxx) or as a nest-mounted card (7915-B1-xxx) that fits in a Hotwire Model 7900 Nest. This guide describes the installation and maintenance procedures for the standalone version, Model 7915-A1-xxx.

Up to ten standalone units may be installed in an optional Hotwire Model 7900 10-Slot Standalone Shelf. This is a convenient way to stack standalone units, and lets you use a single power source.

To order additional Hotwire product documentation, refer to *Product-Related Documents* in *About This Guide*.

There are several versions of the Model 7915-A1, each supporting a different interface (G.703 75-ohm, G.703 120-ohm, or V.35/V.11) and power supply (220 Vac, 120 Vac, or –48 Vdc):

<b>Model Number</b>	<b>Features</b>
7915-A1-201	2Mb/s G.703 compatible (75-ohm interface). Connection to 120 Vac power supply.
7915-A1-202	2Mb/s V.35/V.11 compatible. Connection to 120 Vac power supply.
7915-A1-211	2Mb/s G.703 compatible (120-ohm interface). Connection to 120 Vac power supply.
7915-A1-301	2Mb/s G.703 compatible (75-ohm interface). Connection to 230 Vac power supply.
7915-A1-302	2Mb/s V.35/V.11 compatible. Connection to 230 Vac power supply.
7915-A1-311	2Mb/s G.703 compatible (120-ohm interface). Connection to 230 Vac power supply.
7915-A1-501	2Mb/s G.703 compatible (75-ohm interface). Direct connection to –48 Vdc power supply. For use in a Hotwire 7900 10-Slot Standalone Shelf only.
7915-A1-502	2Mb/s V.35/V.11 compatible. Direct connection to –48 Vdc power supply. For use in a Hotwire 7900 10-Slot Standalone Shelf only.
7915-A1-511	2Mb/s G.703 compatible (120-ohm interface). Direct connection to –48 Vdc power supply. For use in a Hotwire 7900 10-Slot Standalone Shelf only.

## Typical Configurations

Hotwire Model 7915 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 private line services across the campus.

Figure 1-1 shows a typical campus application where remote multiplexers or routers are interconnected across a campus using two Hotwire Model 7915 standalone units. One unit is configured as a central site or central office unit (CO) and the other is the customer premises (remote) unit (CP).

Each Hotwire Model 7915 standalone unit is configured at the factory to operate at the CP side of an E1 SDSL connection. However, you can easily reconfigure a unit for use at the CO end, as would be necessary for the configuration in Figure 1-1. (Conversely, Hotwire Model 7915 nest cards are preconfigured for CO operation.)

A V.35-compatible unit on the CO side may be set for internal or external timing. A V.35-compatible unit on the CP side uses the SDSL local loop for a timing source.

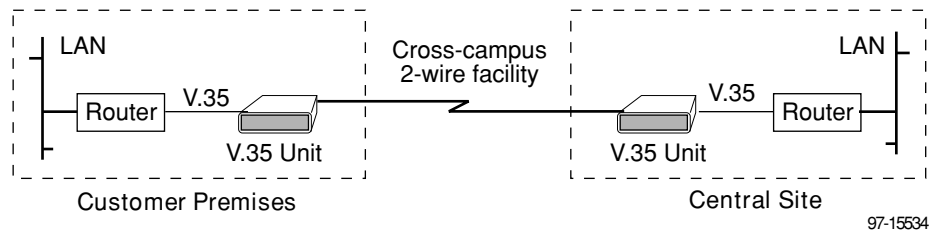
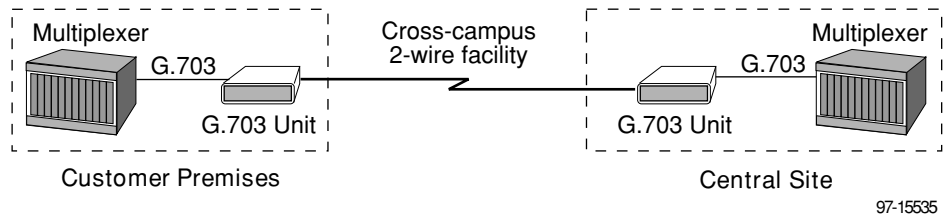


Figure 1-1. Campus Network Application

Hotwire Model 7915 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 7915 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).

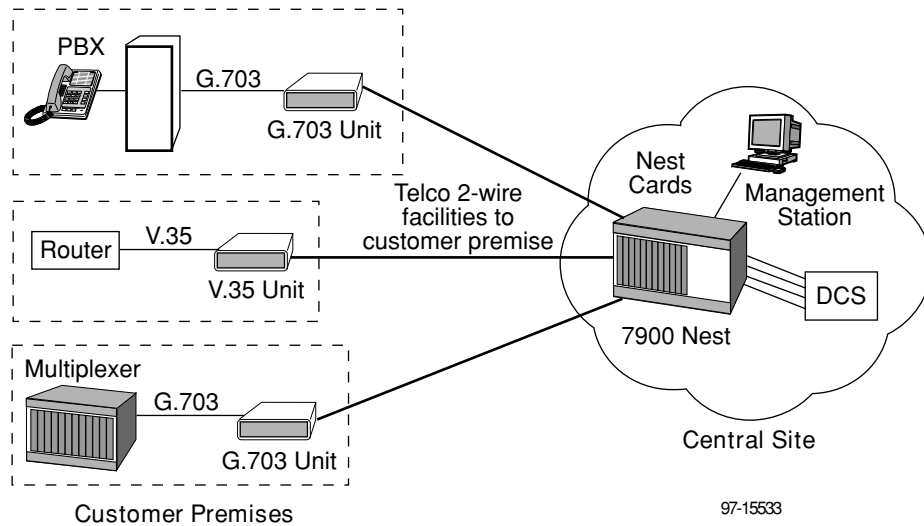
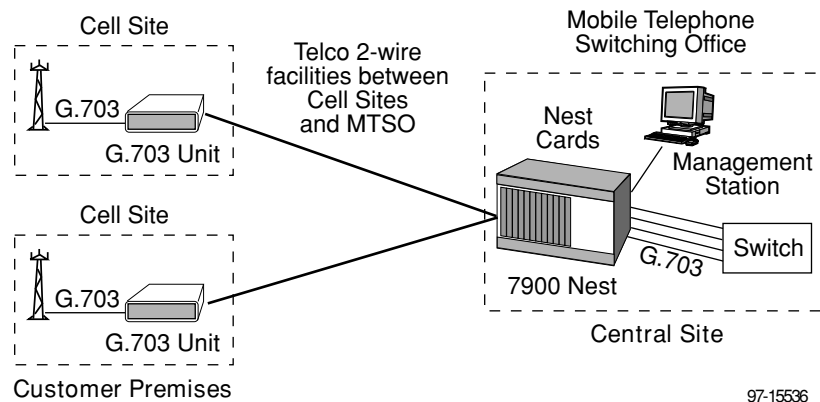


Figure 1-2. E1 Extension to Customer Premises

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 7915 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 3, *Using Terminal and Switchpack Modes*)
- Manual setting of switches and jumpers (Switchpack Mode, see Chapter 3, *Using Terminal and Switchpack Modes*)
- Front Panel LED status indicators (see Chapter 6, *Monitoring the Unit*)



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# Installing the Unit

# 2

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## Overview

This chapter describes the procedure for installing a single standalone termination unit using a 120 Vac or 230 Vac power supply (Model 7915-A1-20x or 7915-A1-30x).

If you have multiple standalone units at the same location, you may want to consider installing the units in a Hotwire Model 7900 10-Slot Standalone Shelf. The Standalone Shelf is a convenient method for housing up to ten standalone termination units and uses only a single power source.

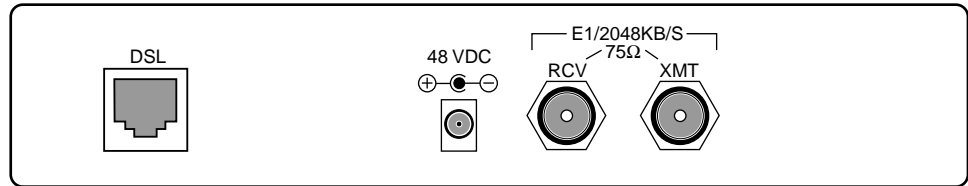
Hotwire Model 7915-A1-50x units (which use  $-48$  Vdc direct power) must be installed in a Hotwire 7900 10-Slot Standalone Shelf. Installation instructions for these models are not provided in this User's Guide. To obtain information on the Standalone Shelf, refer to *Product-Related Documents About This Guide*.

## Package Checklist

Verify that your package contains the following:

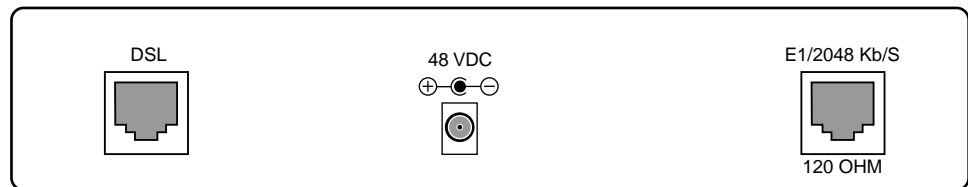
- A Hotwire Model 7915-A1 standalone unit
- VT100-compatible Terminal Cable
- A 14' twisted pair network cable  
(*V.35-compatible units only*: includes a ferrite bead for RFI suppression)
- Power cord with power transformer (optional)
- Warranty card

## Connecting to the Network and Application Equipment



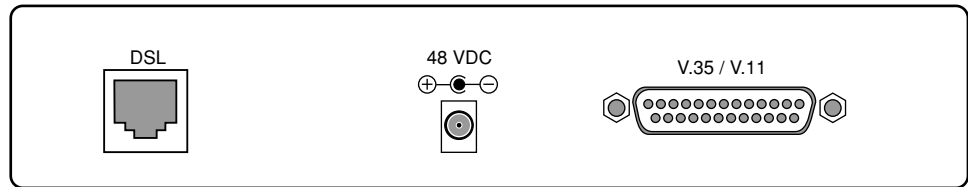
97-15529

### G.703-Compatible (75-ohm Interface) Hotwire 7915 – Rear Panel



97-15704

### G.703-Compatible (120-ohm Interface) Hotwire 7915 – Rear Panel



97-15530

### V.35/V.11-Compatible Hotwire 7915 – Rear Panel

### ► Procedure

1. Connect one end of the supplied 14' twisted-pair network cable into the rear panel DSL jack. Connect the other end to your SDSL network interface.

#### **NOTE:**

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

2. *V.35/V.11-compatible units only:* Clamp the supplied ferrite bead around the network cable as close as possible to the rear panel DSL jack. The ferrite bead suppresses RF interference and is required to meet compliance standards.
3. *V.35/V.11-compatible units only:* Use either a DB25-to-V.35 adapter cable or a cable with a DB25 connector (see *DB25-to-V.35 Adapter Cable Pin Assignments* in Appendix B for pin assignments), depending on whether you need a DB25 or V.35 (34-pin) connector.  
Connect the other end to your V.35/V.11 equipment.
4. *G.703-compatible units only:* Connect a G.703 interface cable into the appropriate 75-ohm RCV and XMT connectors or 120-ohm connector on the rear panel. Connect the other end to your G.703 equipment.

## Connecting Power to the Unit

As described in Chapter 1, there are several options for power cords, depending on your power source (120 Vac, 230 Vac, or –48 Vdc).

Your package may also include a country-specific adapter. To obtain information on the various power cord adapters available, refer to *Warranty, Sales, and Service Information* on page A at the beginning of this User's Guide.

Plug the power transformer into an available 115 or 230 Vac power outlet, running the power lead to the unit housing. Connect the power lead into the –48 Vdc plug on the rear panel.



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# 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 and jumpers 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 standalone unit is preconfigured at the factory for CP (customer premises) operation.

In Switchpack Mode:

- You change configuration parameters by moving switchpacks and jumpers on the board.
- The standalone unit is not preconfigured. You must ensure that the switchpack is set for your desired configuration options.
- You can still display information about the unit and run loopback tests from the terminal.
- Any changes you had made in Terminal Mode are lost when you change to Switchpack Mode.

## Connecting to a System Terminal

An optional system maintenance terminal may be attached to your Model 7915 standalone termination unit through the modular jack on the front panel. This terminal is required if you want to use Terminal Mode (described above). You may have terminals attached to both endpoints.

The system terminal must be a VT100-compatible terminal or emulation software on a PC.

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 terminal parameters on your PC are set to:

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

Press Return from your VT100-compatible terminal window to activate the main menu for the attached unit. The system runs diagnostics and checks status as it comes up. After a few moments the Main Menu screen appears on your VT100-compatible terminal. Menus are described in [Chapters 4 and 5](#) for the G.703 and V.35 units, respectively.

## Switching Between Terminal and Switchpack Modes

Use the following procedure to change the operating mode of the unit to either Terminal Mode (the default setting) or Switchpack Mode. Refer to [Chapter 4](#) (for G.703-compatible units) or [Chapter 5](#) (for V.35/V.11-compatible units) for information on changing configuration options using either of these modes.

### ► 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 Appendix C, *Switchpacks and Jumpers*, to locate switchpack S4 on your unit's board.
3. Place switch 8 in the correct position for the desired mode.
  - Switchpack Mode is enabled by moving switch 8 to the ON position.
  - Terminal Mode is enabled by moving switch 8 to the OFF position.
4. *If you are enabling Switchpack Mode:* You must set the switchpack and jumpers to your desired configuration. Refer to Appendix C, *Switchpacks and Jumpers*.  
*If you are enabling Terminal Mode:* The configuration options you had in Switchpack Mode are carried over into Terminal Mode.
5. Power up the board to reset and enable the new configuration.

---

# Customizing G.703-Compatible Units

# 4

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## Accessing Configuration Options

This chapter provides instructions on how to change configuration options for Hotwire 7915 standalone units that are G.703-compatible. [Chapter 5](#) provides similar information for V.35/V.11-compatible units.

Configuration option settings determine how the unit operates. You can change a unit's configuration options by:

- Selecting the Board Configuration branch of the Main Menu while in Terminal Mode.
- Changing switchpack and jumper settings on the board hardware while in Switchpack Mode.

The Main Menu for G.703-compatible units appears as follows:

```
Command→ G123

ATTX - CP E1 Rate

E1 SDSL STUR Main Menu

1) Board Status
2) Performance Monitor
3) Board Configuration
4) Local Loopback
5) Remote Loopback
6) STUC Menu
R) Board Reset
?) Redisplay this Menu

Command→
```

- The “G123” code indicates the unit powered up successfully.

- Enter “?” to redisplay the menu.
- The CP unit is also known as an SDSL Termination Unit – Remote (STU-R). A unit on the CO side is an SDSL Termination Unit – Central (STU-C). Option 6 on the Main Menu varies according to unit type: on a CO unit it is used to monitor the CP unit (STU-R) and on a CP unit it is used to monitor the CO (STU-C).
- This guide depicts the system terminal menus as they appear from a CP unit (unless otherwise noted). This is the default configuration for Model 7915 standalone units.

## 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 (DIP switch control) 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 switchpacks on the board hardware. Refer to *Making Changes in Switchpack Mode* on page 4-5.

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

The following example shows the menu that appears on a CP unit.

```

Command→ 3

Board Configuration:
-----

1) SDSL Card Type      - CP
   SDSL Rate Type     - E1
2) E1 Line Encode     - HDB3
3) Framing            - Framed
   SDSL FW Rev        - 02
   Globespan FW Rev   - 1.07
   CP Serial #       - 088165

-----

1-3) Board Configuration
4) Switchpack Definitions
?) Prints Board Configuration and this menu
Q) Quit

Config→
    
```

The Board Configuration menu varies slightly for CO units that are connected to V.35/V.11-compatible units at a sub-E1 rate (less than 2048 Kbps). The difference is in Option 3, which changes from Framed/Unframed to selection of a Starting Time Slot. (Refer to [Table 4-1](#) for more information.) The menu appears as follows:

```

Command→ 3

Board Configuration:
-----

1) SDSL Card Type      - CO
   SDSL Rate Type     - E1
2) E1 Line Encode     - HDB3
3) Starting Time Slot - 1
   Payload rate       - 512 Kbps (8x64)
   SDSL FW Rev        - 02
   Globespan FW Rev   - 1.07
   CP Serial #        - 088165

-----

1-3) Board Configuration
4)   Switchpack Definitions
?)   Prints Board Configuration and this menu
Q)   Quit

Config→

```

The SDSL rate type, firmware revision numbers, and the serial number displayed on the Board Configuration screen cannot be changed. The payload rate is set at the V.35/V.11-compatible unit.

Switchpack Definitions, option 4 on the Config menu, displays the switchpack settings to use when changing configuration changes manually. Refer to [Displaying Switchpack Definitions](#) on page 4-6.

Possible values for each option are listed in [Table 4-1](#).

**NOTE:**

See Appendix A, *Worksheets*, for help in selecting the appropriate configuration options for your application.

**Table 4-1. G.703-Compatible Units Configuration Options**

<b>1) SDSL 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.  <b>CP</b> – Unit is on the customer premises side of the SDSL connection. <b>CO</b> – Unit is on the central office (or central site) side of the SDSL connection.  You must reset the board for this change to take effect. A system message is displayed on the terminal to remind you to reset the board. To reset the board, use option R from the Main Menu. (The board may also be reset by cycling the power on the board.)
<b>2) E1 Line Encode</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>2</b> at the Config prompt.  <b>HDB3</b> – High Density Binary 3. <b>AMI</b> – Alternate Mark Inversion.
<b>3) Framing</b> (if far-end is a G.703-compatible unit or a V.35/V.11-compatible unit with a full E1 payload rate of 2048 kbps)
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>3</b> at the Config prompt.  <b>Framed</b> – Framing is enabled. <b>Unframed</b> – Framing is disabled.
<b>3) Starting Time Slot</b> (only if the CP is a V.35/V.11-compatible unit with a payload rate under 2048 kbps)
Possible Settings: <b>1 through 31</b> Default Setting: <b>1</b>
Specifies the number of the first time slot (DS0) to be used. To change the starting time slot, enter <b>3</b> at the Config prompt. The system prompts you to enter a time slot number. The choices in the prompt are based on the payload rate set at the V.35/V.11-compatible CP unit.

## Making Changes in Switchpack Mode

When operating in Switchpack Mode, you change configuration options by moving switches on the board hardware. Each switch in the switchpack controls a configuration parameter. To enable Switchpack Mode, refer to *Switching Between Terminal and Switchpack Modes* on page 3-2.

### ► Procedure

To open the unit and make changes while in Switchpack 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. Find the switchpack labeled S4. Refer to the board layout illustration in Appendix C, *Switchpacks and Jumpers*.
3. Place the switchpack in the correct position for each desired configuration option. The definition of each switch in the switchpack is also provided in Appendix C, *Switchpacks and Jumpers*.
4. Replace the enclosure cover and power up the board to reset and enable the new configuration.

### Configuring Framed or Unframed Operation (G.703-to-G.703 Configuration)

In Switchpack Mode, switch 3 on switchpack S4 controls the selection of Framed or Unframed. Switches 4–7 are unused in this configuration.

- Framed: Switch 3 must be ON.
- Unframed: Switch 3 must be OFF.

### Configuring a Starting Time Slot (G.703-to-V.35/V.11 Configuration)

In Switchpack Mode, switches 3–7 on switchpack S4 determine the starting time slot, as shown in *Table C-1* on page C-2.

If the payload rate (configured on the V.35/V.11-compatible unit) is 2048 kbps, set switches 3–7 all to the OFF position. This is the factory default.

If the payload rate is *less than* 2048 kbps, use switches 3–7 to select a starting time slot (DS0). Make sure that there are enough subsequent time slots to accommodate the V.35/V.11 payload rate (refer to the Maximum Payload Rate column in *Table C-1* on page C-2). Contact your network administrator to verify your starting time slot selection, as some time slots may already be in use.

## Displaying Switchpack Definitions

To display the definition of each position in switchpack S4, enter **4** at the Config prompt. Switchpack definitions are also listed in Appendix C, *Switchpacks and Jumpers*.

```
Config→ 4

Switch pack definition:

1  - CO/CP                OFF=CP, ON=CO
2  - HDB3                 OFF/ON
3-7- Starting Time Slot  1-31, 0=Unframed
8  - Configuration        OFF=Terminal, ON=Switchpack

Config→
```

---

# Customizing V.35/V.11-Compatible Units

# 5

---

## Accessing Configuration Options

This chapter provides instructions on how to change configuration options for Hotwire 7915 standalone models that are V.35/V.11-compatible. [Chapter 4](#) provides similar information for G.703-compatible units.

Configuration option settings determine how the unit operates. You can change a unit's configuration options by:

- Selecting the Board Configuration branch of the Main Menu while in Terminal Mode.
- Changing switchpack and jumper settings on the board hardware while in Switchpack Mode.

The Main Menu for V.35/V.11-compatible units appears as follows:

```
Command→ G123

ATTX-CP - E1 Rate

V.35 SDSL STUR Main Menu

1) Board Status
2) Performance Monitor
3) Board Configuration
4) Local Loopback
5) Remote Loopback
6) STUC Menu
R) Board Reset
?) Redisplay this Menu

Command→
```

- The “G123” code indicates that the unit powered up successfully.

- Enter “?” to redisplay the menu.
- The CP unit is also known as an SDSL Termination Unit – Remote (STU-R). A unit on the CO side is an SDSL Termination Unit – Central (STU-C). Option 6 on the Main Menu varies according to unit type: on a CO unit it is used to monitor the CP unit (STU-R) and on a CP unit it is used to monitor the CO (STU-C).
- This guide depicts the system terminal menus as they appear from a CP unit. This is the default configuration for Model 7915 standalone units.

## Making Changes from the Terminal Interface

The Board Configuration menu displays how the board is currently configured. It also allows you to change certain parameters on the board.

- 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 switchpacks and jumpers on the board hardware. Refer to *Making Changes in Switchpack Mode* on page 5-5.

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

The following example shows the Board Configuration displayed for a CP unit (the default card type for standalone units). CP units always use the SDSL local loop as the timing source.

```

Command→ 3

Board Configuration:

  1) SDSL Card Type   - CP
     SDSL Interface  - V.35
  2) Payload Rate    - 512 Kbps (8x64)
     Timing           - Loop
     SDSL FW Rev      - 4.3
     Globespan FW Rev - 1.12
     CP Serial #      - 85649

-----

1-2) Board Configuration
3)   Switchpack Definitions
?)   Prints Board Configuration and this menu
Q)   Quit

Config→
    
```

The following example shows the Board Configuration displayed for a CO unit. CO units may be configured for either an internal or external timing source.

```
Command→ 3

Board Configuration:

    1) SDSL Card Type   - CO
       SDSL Interface  - V.35
    2) Payload Rate    - 512 Kbps (8x64)
    3) Timing          - Internal
       SDSL FW Rev     - 4.3
       Globespan FW Rev - 1.12
       CP Serial #     - 85649

-----

1-3) Board Configuration
4) Switchpack Definitions
?) Prints Board Configuration and this menu
R) Quit

Config→
```

The SDSL rate type, firmware revision numbers, and serial number displayed on the Board Configuration screen cannot be changed. Refer to *Displaying Switchpack Definitions* on page 5-5 for information on using the Switchpack Definitions option.

Possible values each configuration option are listed in [Table 5-1](#).

**NOTE:**

See Appendix A, *Worksheets*, for help in selecting the appropriate configuration options for your application.

**Table 5-1. V.35-Compatible Units Configuration Options**

<b>1) SDSL 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.		
<b>CP</b> – Unit is on the customer premises side of the SDSL connection. This automatically sets the unit to use the SDSL local loop for timing.		
<b>CO</b> – Unit is on the central office (or central site) side of the SDSL connection. Timing is configurable to either internal or external (see option 3).		
You must reset the board for this change to take effect. To reset the board, use option R from the Main Menu. (The board may also be reset by cycling the power on the board.)		
<b>2) Payload Rate</b>		
Possible Settings: <b>1 to 32 (64 to 2048 kbps)</b> Default Setting: <b>32 (2048 kbps)</b>		
Specifies the desired payload rate.		
<b>1</b> – 64 kbps (1 x 64)	<b>12</b> – 768 kbps (12 x 64)	<b>23</b> – 1472 kbps (23 x 64)
<b>2</b> – 128 kbps (2 x 64)	<b>13</b> – 832 kbps (13 x 64)	<b>24</b> – 1536 kbps (24 x 64)
<b>3</b> – 192 kbps (3 x 64)	<b>14</b> – 896 kbps (14 x 64)	<b>25</b> – 1600 kbps (25 x 64)
<b>4</b> – 256 kbps (4 x 64)	<b>15</b> – 960 kbps (15 x 64)	<b>26</b> – 1664 kbps (26 x 64)
<b>5</b> – 320 kbps (5 x 64)	<b>16</b> – 1024 kbps (16 x 64)	<b>27</b> – 1728 kbps (27 x 64)
<b>6</b> – 384 kbps (6 x 64)	<b>17</b> – 1088 kbps (17 x 64)	<b>28</b> – 1792 kbps (28 x 64)
<b>7</b> – 448 kbps (7 x 64)	<b>18</b> – 1152 kbps (18 x 64)	<b>29</b> – 1856 kbps (29 x 64)
<b>8</b> – 512 kbps (8 x 64)	<b>19</b> – 1216 kbps (19 x 64)	<b>30</b> – 1920 kbps (30 x 64)
<b>9</b> – 576 kbps (9 x 64)	<b>20</b> – 1280 kbps (20 x 64)	<b>31</b> – 1984 kbps (31 x 64)
<b>10</b> – 640 kbps (10 x 64)	<b>21</b> – 1344 kbps (21 x 64)	<b>32</b> – 2048 kbps (32 x 64)
<b>11</b> – 704 kbps (11 x 64)	<b>22</b> – 1408 kbps (22 x 64)	
If you change from a full E1 rate (2048 kbps) to a lower rate, and the far-end unit is G.703-compatible, you must set the starting time slot on the G.703-compatible unit. See <a href="#">Table 4-1</a> on page 4-4 for more information.		
You must reset the board for this change to take effect. To reset the board, use option R from the Main Menu. (The board may also be reset by cycling the power on the board.)		
<b>3) Timing (on CO units only)</b>		
Possible Settings: <b>Internal, External</b> Default Setting: <b>Internal</b>		
Determines the timing source. To toggle the timing, enter <b>3</b> at the Config prompt. This option can only be changed on CO units. CP units always use the SDSL local loop for timing.		
<b>Internal</b> – The unit's internal clock is used as the clock source.		
<b>External</b> – The V.35/V.11 interface is used as the clock source.		

## Making Changes in Switchpack Mode

When operating in Switchpack Mode, you change configuration options by moving switches and jumpers on the board hardware. To enable Switchpack Mode, refer to *Switching Between Terminal and Switchpack Modes* on page 3-2.

### ► 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. Use electrostatic discharge (ESD) protection when handling the circuit board.
2. Find the switchpack or jumper header for the configuration options you wish to change. Refer to the board layout illustration in Appendix C, *Switchpacks and Jumpers*.
3. Place the switchpack or jumpers in the correct position for each desired configuration option. Refer to Appendix C, *Switchpacks and Jumpers*, for the definition of each switch and jumper.
4. Replace the enclosure cover and power up the board to reset and enable the new configuration.

## Selecting V.35 or V.11 Signaling

Jumpers P6 – P21 on the board determine whether the unit uses V.11 or V.35 signaling. The unit defaults to V.35. To switch between V.11 and V.35, you must move the position of jumpers P6 – P21. Refer Appendix C, *Switchpacks and Jumpers*, for more information.

## Displaying Switchpack Definitions

To display the definition of each position in switchpack S4, enter **4** at the Config prompt. Switchpack definitions are also listed in Appendix C, *Switchpacks and Jumpers*.

```

Config→ 4

Switch pack S4 definition:
  1 - CO/CP                OFF=CP, ON=CO
  2 - Timing (CO Only)    OFF=Internal, ON=External
  2 - Unused
  3-7- Payload Rate      See table below
  8 - Configuration      OFF=Terminal, ON=Switchpack

<< Press a key to continue!>>

```

After you press a key to continue displaying the switchpack definitions, the following table appears, providing information on how to set switches 3 through 7 in order to obtain your desired payload rate.

Switch pack S4 definition:				
RATE (Kbps)		SWPK SWITCHES	SWPK SWITCHES	
		7,6,5,4,3	7,6,5,4,3	
64	(1x64)	00000	1088	(17x64) 10000
128	(2x64)	00001	1152	(18x64) 10001
192	(3x64)	00010	1216	(19x64) 10010
256	(4x64)	00011	1280	(20x64) 10011
320	(5x64)	00100	1344	(21x64) 10100
384	(6x64)	00101	1408	(22x64) 10101
448	(7x64)	00110	1472	(23x64) 10110
512	(8x64)	00111	1536	(24x64) 10111
576	(9x64)	01000	1600	(25x64) 11000
640	(10x64)	01001	1664	(26x64) 11001
704	(11x64)	01010	1728	(27x64) 11010
768	(12x64)	01011	1792	(28x64) 11011
832	(13x64)	01100	1856	(29x64) 11100
896	(14x64)	01101	1920	(30x64) 11101
960	(15x64)	01110	1984	(31x64) 11110
1024	(16x64)	01111	2048	(32x64) 11111

Config→

Examples:

- For 640 kbps, set switch 7 OFF, 6 ON, 5 and 4 OFF, and 3 ON.
- For 1024 kbps, set switch 7 OFF; switches 6, 5, 4, and 3 ON.
- For 2048 kbps, set switches 7, 6, 5, 4, and 3 all to the ON position.

If you change from 2048 kbps to a lower rate, and the far-end unit is G.703-compatible, you must set the starting time slot on the G.703-compatible unit and reset the units.

---

# 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 the:

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

## Board Status

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

```
Command→ 1

Board Status
-----
E1 STATUS:      Network is UP

LOOPBACK STATUS: OFF

SDSL STATUS:    LOOP is UP

S/N RATIO:      44.0 dB

Command→
```

### Board Status for G.703-Compatible Unit

```
Command→ 1

Board Status
-----
DTR:            ACTIVE
DSR:            ACTIVE

LOOPBACK STATUS: OFF

SDSL STATUS:    LOOP is UP

S/N RATIO:      43.5 dB.

Command→
```

### Board Status for V.35/V.11-Compatible Unit

- E1 status displays one of the following: Network is Up, Receive Carrier Loss, Receive Remote Alarm, or Receive Unframed All 1's.
- DTR and DSR are either Active or Inactive. DSR becomes active in response to DTR (with SDSL loop up and data transmission possible).
- Loopback status is either OFF, Local Loopback ON, or Remote Loopback ON.
- SDSL Status displays whether the loop is up or down.
- Signal to Noise (S/N) ratio does not display if the loop is down.

## Performance Statistics

Performance monitoring allows more detailed observations of error conditions detected on the circuit. 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.

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

```
Command→ 2

Performance Monitor
-----
Time Since Board Power-Up or Reset:  0000d 00h 00m

  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 from the above list to display statistics for a specified time period.

### NOTE:

There is no verification presented before statistics are deleted. Be sure you want to clear all statistics before pressing 7.

```

stats→ 1

Current 1 minute:

    SDSL Errors:                E1 Errors:

    FAW - 0                     CV - 0
    CRC - 0                     FAS - 0
    FEBE - 0

Previous 1 minute:

    SDSL Errors:                E1 Errors:

    FAW - 0                     CV - 0
    CRC - 0                     FAS - 0
    FEBE - 0

stats→

```

- Performance statistics have a maximum value of 65,536. If the maximum value is reached, the statistic resets to zero.
- Performance statistics are updated every second.
- E1 Errors (CV and FAS) are only displayed for G.703-compatible units that are operating in framed mode.
- Refer to the *Glossary* for definitions of the types of errors reported.

## 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 STUC Menu options. Similarly, from a terminal attached to a CO unit, the STUR Menu allows you to display information about the CP unit.

To access the STUC (or STUR) Menu, enter **6** at the Command prompt.

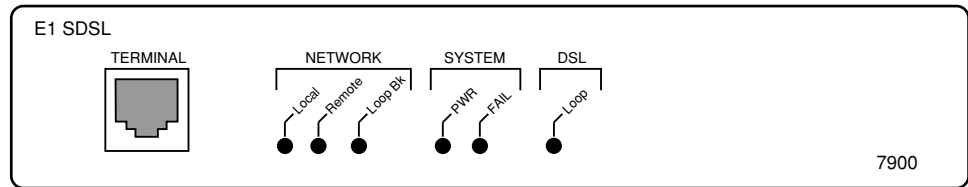
```

***** STUC Menu *****
1) Board Status
2) Performance Monitor
3) Board Configuration
?) Redisplay this menu
Q) Quit

STUC Command→

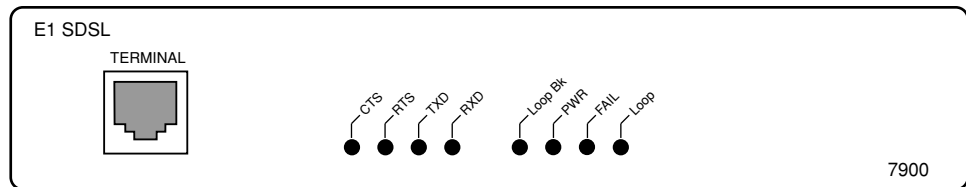
```

## Front Panel LEDs



97-15531

### Front Panel LEDs for G.703-Compatible Unit



97-15532

### Front Panel LEDs for V.35/V.11-Compatible Unit

LED	Meaning
Local <sup>1</sup>	The local G.703 interface has a loss of signal.
Remote <sup>1</sup>	The remote G.703 interface has a loss of signal.
Loop Bk <sup>1</sup>	The unit is in loopback. See Chapter 7, <i>Testing</i> , for more information.
PWR	Power is applied to the unit.
FAIL	The processor has halted and repairs are required.
Loop <sup>1</sup>	A failure in the SDSL loop has been detected.
<sup>1</sup> LED lights or blinks during power up, then goes out when the loop has been established.	



---

# 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*:

- Board Status and performance statistics
- Remote unit board status and performance statistics
- Front Panel LEDs

## Understanding Loopback Tests

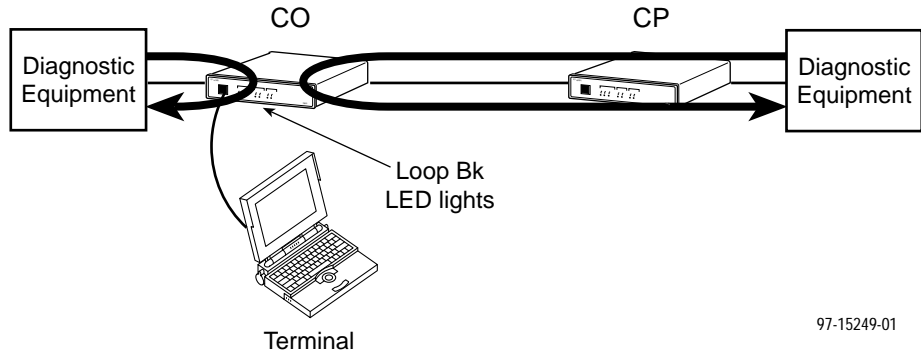
Loopback is a diagnostic function that enables a technician to isolate equipment on the HDSL circuit to determine where on the circuit trouble may be occurring. Loopback takes the system off-line. Data received from E1 or V.35 application equipment is looped back.

“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 (the unit that initiated the loopback). In a remote loopback, the data is passed on to the remote (far-end) unit and then reflected back.

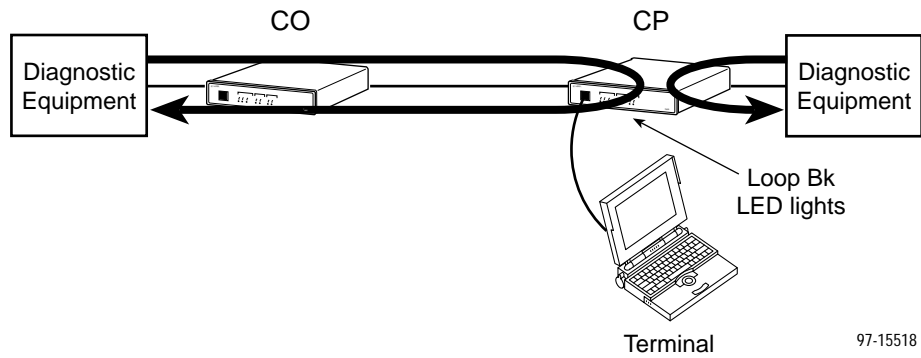
Figures 7-1 through 7-4 illustrate how local and remote loopbacks operate in different configurations. The bold arrows indicate the direction of data flow.

## Local Loopbacks

- When a local loopback is enabled, the red Loop Bk LED on the front panel of the local unit lights up and remains lit until the loopback is disabled.



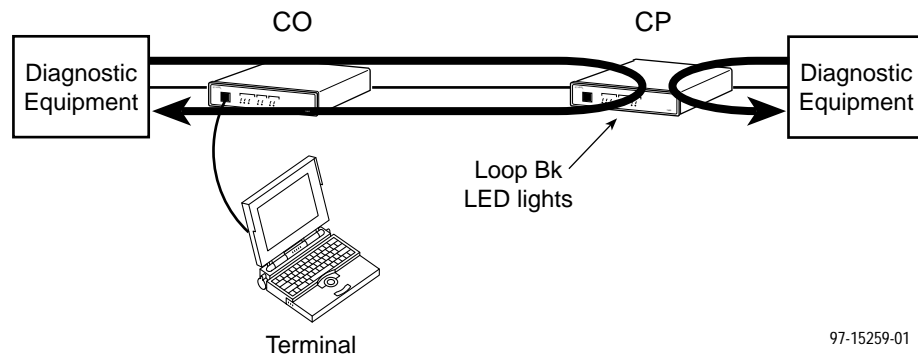
**Figure 7-1. Local Loopback Initiated by the CO Unit**



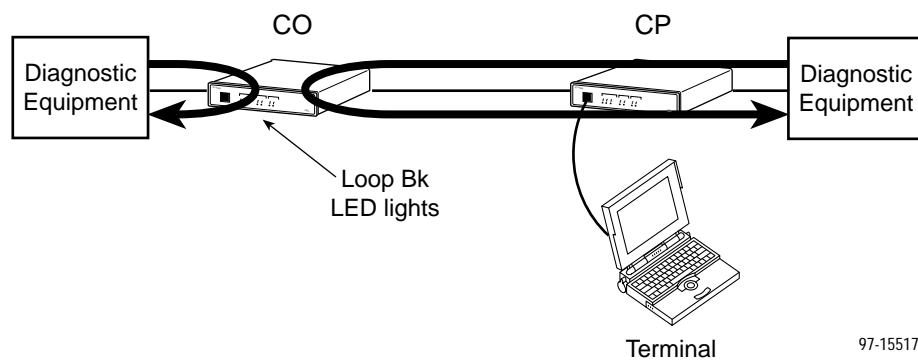
**Figure 7-2. Local Loopback Initiated by the CP Unit**

## Remote Loopbacks

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



**Figure 7-3. Remote Loopback Initiated by the CO Unit**



**Figure 7-4. Remote Loopback Initiated by the CP Unit**

## Starting and Ending Loopbacks

To start or end a local loopback test, enter **4** at the Command prompt.

```
Command→ 4
Local Loopback is Enabled!
Command→ 4
Local Loopback is Disabled!
```

To start or end a remote loopback test, enter **5** at the Command prompt.

```
Command→ 5
Remote Loopback is Enabled!
Command→ 5
Remote Loopback is Disabled!
```

## Resetting the Unit

Enter **R** at the Command prompt to reset the board. This is equivalent to cycling the power.

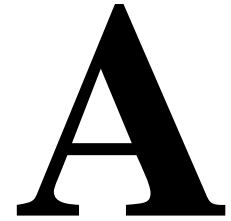
```
Command→ R
Reset will bring the loop down. Are you sure? (y/n)
Command→
```

If “y” is selected, the Main Menu redisplay, the loop goes down, and the Fail (reset) LED lights.

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

---

# Worksheets



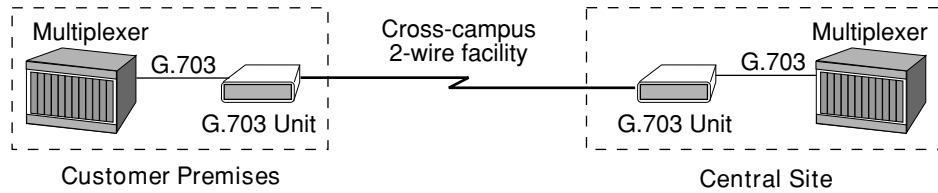
---

## Overview

This appendix provides the correct configuration settings based on the types of units (G.703-compatible or V.35/V.11-compatible) on either end of the SDSL connection. There are three combinations of the two types of units:

- G.703-compatible units on both ends
- V.35/V.11-compatible CP unit, G.703-compatible CO unit
- V.35/V.11-compatible units on both ends

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



97-15535

To connect two G.703-compatible units, configure the units as follows. Terminal Mode factory defaults are in bold (for Switchpack mode defaults, see Appendix C, *Switchpacks and Jumpers*).

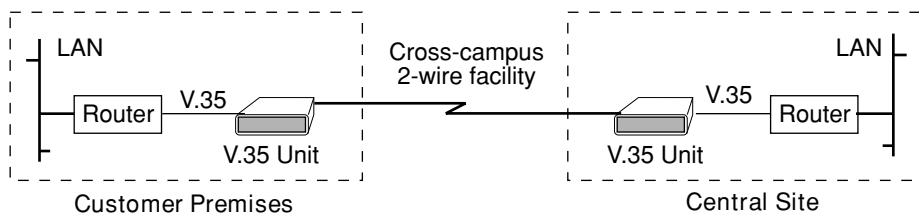
Configuration Option	G.703-Compatible Unit (Customer Premises)	G.703-Compatible Unit (Central Site)
Card Type	<b>CP</b> (default)	CO
E1 Line Code	<b>HDB3</b> or AMI	Must be same as CP side
Framing	<b>Framed</b> or Unframed	Must be same as CP side

## G.703-to-V.35/V.11 Configuration

To connect a G.703-compatible unit on the CO side and a V.35/V.11-compatible unit on the CP side, configure the units as follows. Terminal Mode factory defaults are in bold (for Switchpack mode defaults, see Appendix C, *Switchpacks and Jumpers*).

Configuration Option	V.35/V.11-Compatible Unit (Customer Premises)	G.703-Compatible Unit (Central Site)
Card Type	<b>CP</b>	CO
Payload Rate	1 – <b>32</b> (64 – <b>2048</b> kbps)	N/A
Framing, Starting Time Slot	N/A	If the payload rate is less than 2048 kbps, select a starting time slot appropriate for the payload rate.  If the payload rate is 2048 kbps, use Unframed.
E1 Line Code	N/A	<b>HDB3</b> or AMI
Timing	Loop (not configurable)	N/A

## V.35/V.11-to-V.35/V.11 Configuration



To connect two V.35/V.11-compatible units, configure the units as follows. Terminal Mode factory defaults are in bold (for Switchpack mode defaults, see Appendix C, *Switchpacks and Jumpers*).

Configuration Option	V.35/V.11-Compatible Unit (Customer Premises)	V.35/V.11-Compatible Unit (Central Site)
Card Type	<b>CP</b>	CO
Payload Rate	1 – <b>32</b> (64 – <b>2048</b> kbps)	Must be same as CP side
Timing	Loop (not configurable)	Internal or External

## G.703-Compatible Units Configuration Worksheet

Board Configuration	
Configuration Option	Settings <i>Terminal Mode Defaults in <b>Bold</b></i>
SDSL Card Type	<b>CP, CO</b>
E1 Line Encode	<b>HDB3, AMI</b>
Framing, Starting Time Slot	<b>Framed</b> , Unframed, Starting Time Slot 1 – 31

## V.35/V.11-Compatible Units Configuration Worksheet

Board Configuration																																	
Configuration Option	Settings <i>Terminal Mode Defaults in <b>Bold</b></i>																																
SDSL Card Type	<b>CP, CO</b>																																
Payload Rate	<table border="0"> <tr> <td>1 – 1 x 64 (64 kbps)</td> <td>17 – 17 x 64 (1088 kbps)</td> </tr> <tr> <td>2 – 2 x 64 (128 kbps)</td> <td>18 – 18 x 64 (1152 kbps)</td> </tr> <tr> <td>3 – 3 x 64 (192 kbps)</td> <td>19 – 19 x 64 (1216 kbps)</td> </tr> <tr> <td>4 – 4 x 64 (256 kbps)</td> <td>20 – 20 x 64 (1280 kbps)</td> </tr> <tr> <td>5 – 5 x 64 (320 kbps)</td> <td>21 – 21 x 64 (1344 kbps)</td> </tr> <tr> <td>6 – 6 x 64 (384 kbps)</td> <td>22 – 22 x 64 (1408 kbps)</td> </tr> <tr> <td>7 – 7 x 64 (448 kbps)</td> <td>23 – 23 x 64 (1472 kbps)</td> </tr> <tr> <td>8 – 8 x 64 (512 kbps)</td> <td>24 – 24 x 64 (1536 kbps)</td> </tr> <tr> <td>9 – 9 x 64 (576 kbps)</td> <td>25 – 25 x 64 (1600 kbps)</td> </tr> <tr> <td>10 – 10 x 64 (640 kbps)</td> <td>26 – 26 x 64 (1664 kbps)</td> </tr> <tr> <td>11 – 11 x 64 (704 kbps)</td> <td>27 – 27 x 64 (1728 kbps)</td> </tr> <tr> <td>12 – 12 x 64 (768 kbps)</td> <td>28 – 28 x 64 (1792 kbps)</td> </tr> <tr> <td>13 – 13 x 64 (832 kbps)</td> <td>29 – 29 x 64 (1856 kbps)</td> </tr> <tr> <td>14 – 14 x 64 (896 kbps)</td> <td>30 – 30 x 64 (1920 kbps)</td> </tr> <tr> <td>15 – 15 x 64 (960 kbps)</td> <td>31 – 31 x 64 (1984 kbps)</td> </tr> <tr> <td>16 – 16 x 64 (1024 kbps)</td> <td><b>32 – 32 x 64 (2048 kbps)</b></td> </tr> </table>	1 – 1 x 64 (64 kbps)	17 – 17 x 64 (1088 kbps)	2 – 2 x 64 (128 kbps)	18 – 18 x 64 (1152 kbps)	3 – 3 x 64 (192 kbps)	19 – 19 x 64 (1216 kbps)	4 – 4 x 64 (256 kbps)	20 – 20 x 64 (1280 kbps)	5 – 5 x 64 (320 kbps)	21 – 21 x 64 (1344 kbps)	6 – 6 x 64 (384 kbps)	22 – 22 x 64 (1408 kbps)	7 – 7 x 64 (448 kbps)	23 – 23 x 64 (1472 kbps)	8 – 8 x 64 (512 kbps)	24 – 24 x 64 (1536 kbps)	9 – 9 x 64 (576 kbps)	25 – 25 x 64 (1600 kbps)	10 – 10 x 64 (640 kbps)	26 – 26 x 64 (1664 kbps)	11 – 11 x 64 (704 kbps)	27 – 27 x 64 (1728 kbps)	12 – 12 x 64 (768 kbps)	28 – 28 x 64 (1792 kbps)	13 – 13 x 64 (832 kbps)	29 – 29 x 64 (1856 kbps)	14 – 14 x 64 (896 kbps)	30 – 30 x 64 (1920 kbps)	15 – 15 x 64 (960 kbps)	31 – 31 x 64 (1984 kbps)	16 – 16 x 64 (1024 kbps)	<b>32 – 32 x 64 (2048 kbps)</b>
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Timing	<b>Loop</b> (for CP Units) Internal or External (for CO units)																																

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# Cable Pin Assignments

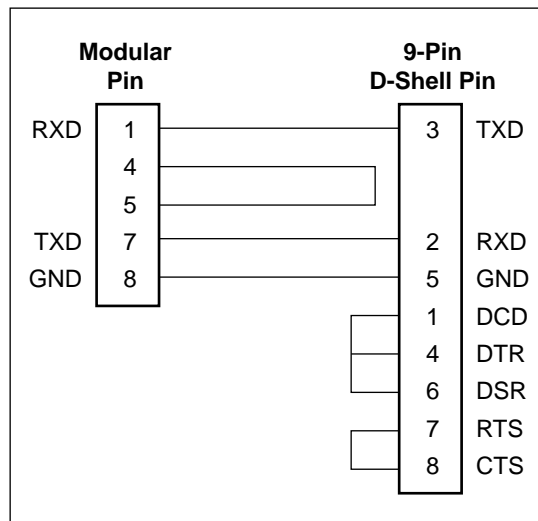
# B

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## Terminal Connection Cable

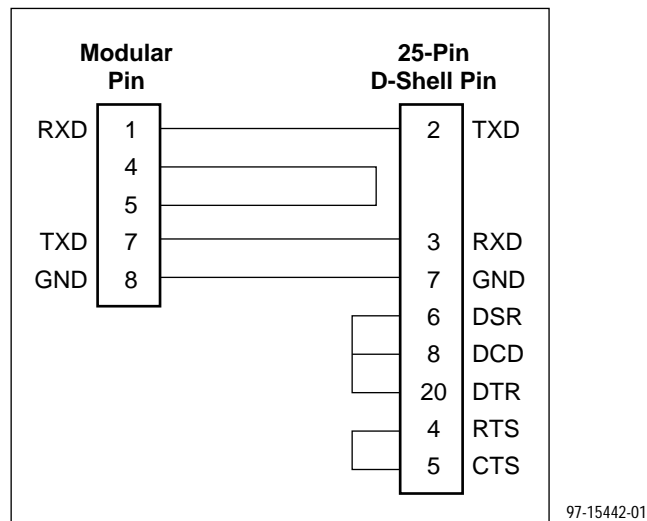
This section defines the pin assignments for the terminal cable from the front panel modular jack to your PC's COM port.

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



97-15268-02

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



## SDSL Connection Cable Pin Assignments

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

Pin	Signal
1	Loop Tip
2	Loop Ring
3 – 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 of G.703-compatible units has the following pin assignments.

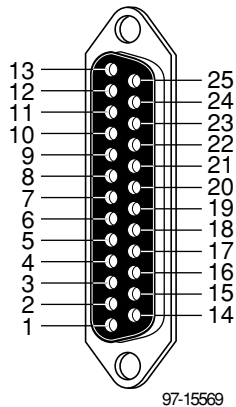
Pin	Signal
1	Tx Ring
2	Tx Tip
3	unused
4	Rx Ring
5	Rx Tip
6 – 8	unused

### NOTE:

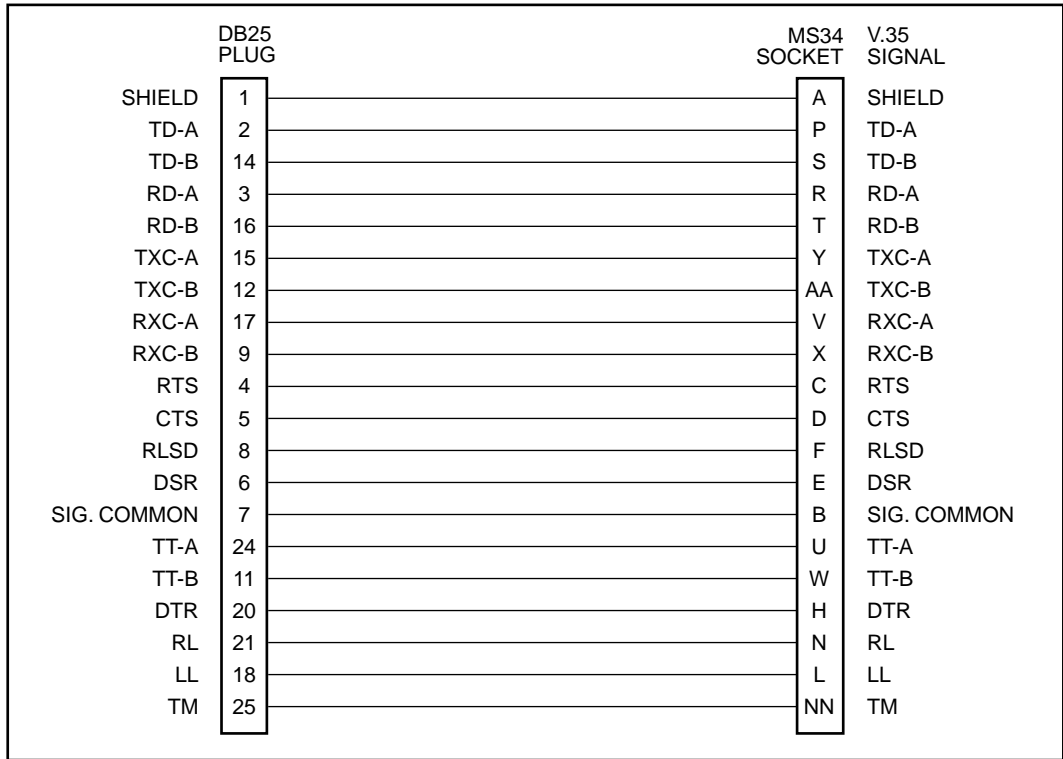
Pin 1 is on the left when viewing the jack from its inserted position.

## DB25-to-V.35 Adapter Cable Pin Assignments

If you wish to connect a V.35/V.11-compatible unit to a V.35 interface, use a DB25-to-V.35 adapter cable with the following pin assignments.



Cable Pin Assignments

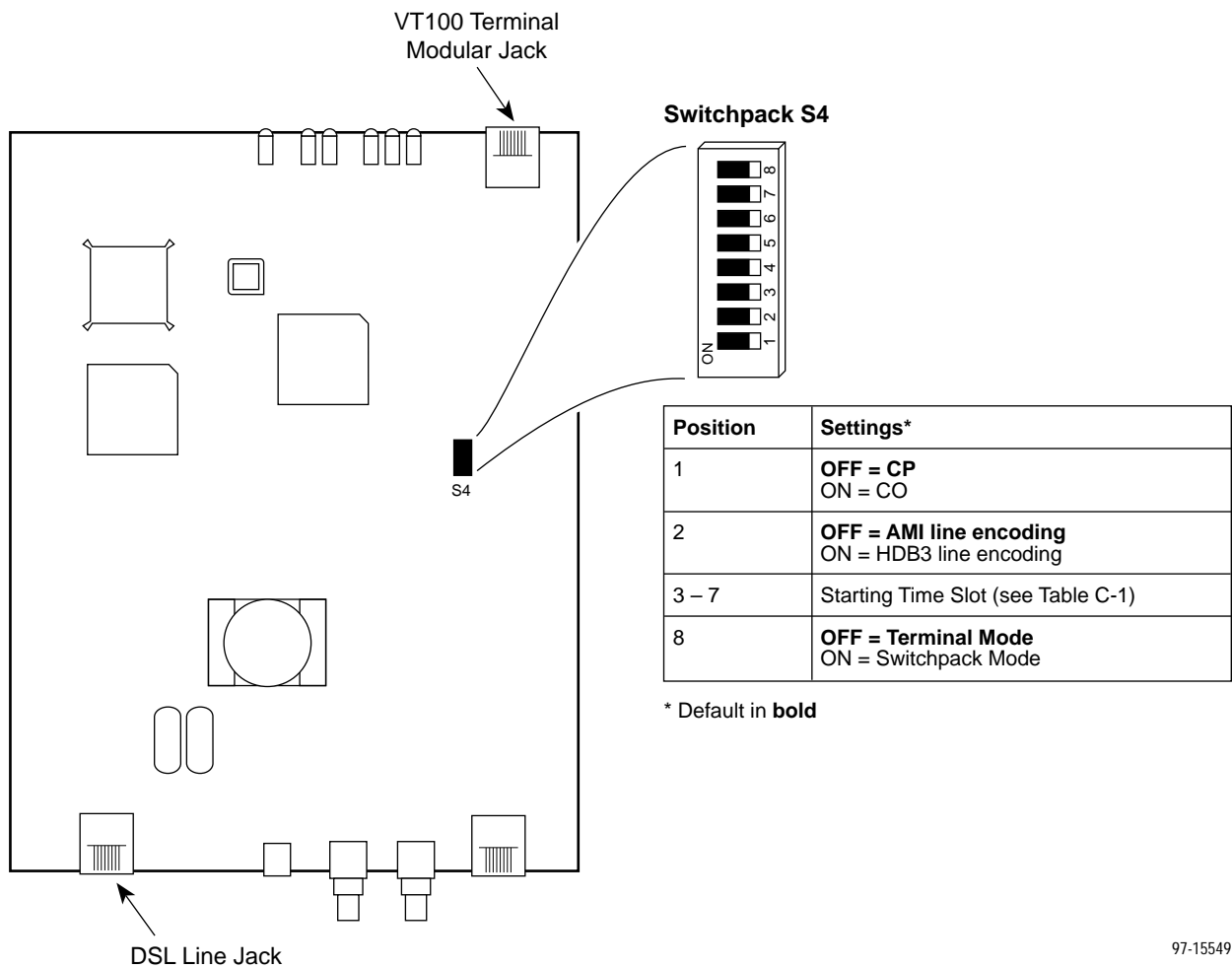


97-15670

# Switchpacks and Jumpers

# C

## G.703-Compatible Units



**G.703-Compatible Unit Switchpack Location**

For G.703-to-V.35 Configurations: [Table C-1](#) provides information on how to set switches 3–7 in order to select either Unframed operation (for a 2048 kbps payload rate) or a starting time slot (when the payload rate is less than 2048 kbps).

For G.703-to-G.703 Configurations: Set switch 3 ON for Framed, OFF for Unframed. In this configuration, switches 4–7 are unused.

Refer to *Making Changes in Switchpack Mode* in Chapter 4, *Customizing G.703-Compatible Units*, for more information.

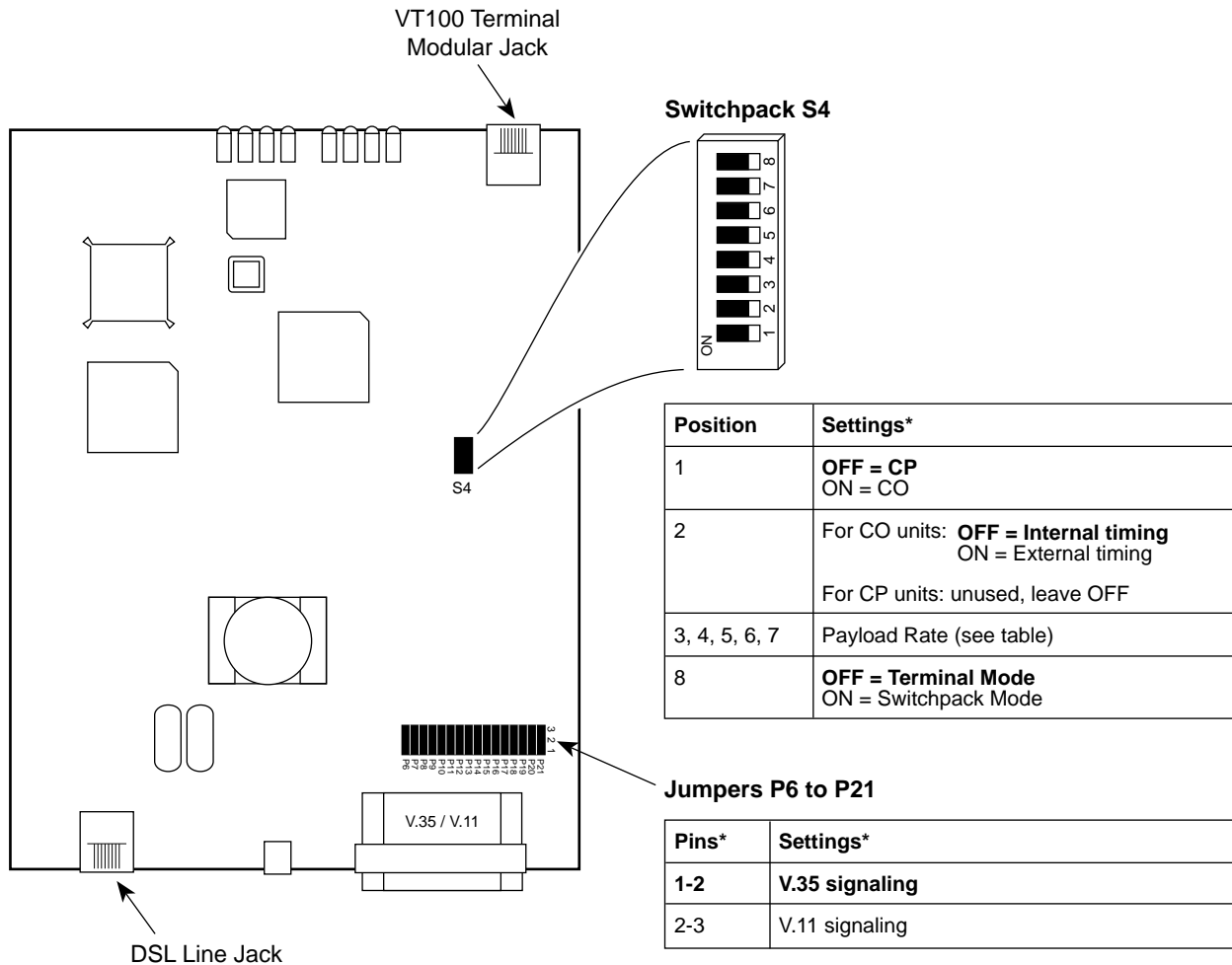
**Table C-1. Starting Time Slot Switches 3 – 7 on Switchpack S4 (1 of 2)**

Starting Time Slot	Switch Position					Maximum Payload Rate Starting at Time Slot
	3	4	5	6	7	
0	OFF	OFF	OFF	OFF	OFF	2048 kbps (unframed)
1	ON	OFF	OFF	OFF	OFF	1984 kbps (31 x 64)
2	OFF	ON	OFF	OFF	OFF	1920 kbps (30 x 64)
3	ON	ON	OFF	OFF	OFF	1856 kbps (29 x 64)
4	OFF	OFF	ON	OFF	OFF	1792 kbps (28 x 64)
5	ON	OFF	ON	OFF	OFF	1728 kbps (27 x 64)
6	OFF	ON	ON	OFF	OFF	1664 kbps (26 x 64)
7	ON	ON	ON	OFF	OFF	1600 kbps (25 x 64)
8	OFF	OFF	OFF	ON	OFF	1536 kbps (24 x 64)
9	ON	OFF	OFF	ON	OFF	1472 kbps (23 x 64)
10	OFF	ON	OFF	ON	OFF	1408 kbps (22 x 64)
11	ON	ON	OFF	ON	OFF	1344 kbps (21 x 64)
12	OFF	OFF	ON	ON	OFF	1280 kbps (20 x 64)
13	ON	OFF	ON	ON	OFF	1216 kbps (19 x 64)
14	OFF	ON	ON	ON	OFF	1152 kbps (18 x 64)
15	ON	ON	ON	ON	OFF	1088 kbps (17 x 64)
16	OFF	OFF	OFF	OFF	ON	1024 kbps (16 x 64)
17	ON	OFF	OFF	OFF	ON	960 kbps (15 x 64)
18	OFF	ON	OFF	OFF	ON	896 kbps (14 x 64)
19	ON	ON	OFF	OFF	ON	832 kbps (13 x 64)
20	OFF	OFF	ON	OFF	ON	768 kbps (12 x 64)
21	ON	OFF	ON	OFF	ON	704 kbps (11 x 64)
22	OFF	ON	ON	OFF	ON	640 kbps (10 x 64)
23	ON	ON	ON	OFF	ON	576 kbps (9 x 64)
24	OFF	OFF	OFF	ON	ON	512 kbps (8 x 64)

**Table C-1. Starting Time Slot Switches 3 – 7 on Switchpack S4 (2 of 2)**

Starting Time Slot	Switch Position					Maximum Payload Rate Starting at Time Slot
	3	4	5	6	7	
25	ON	OFF	OFF	ON	ON	448 kbps (7 x 64)
26	OFF	ON	OFF	ON	ON	384 kbps (6 x 64)
27	ON	ON	OFF	ON	ON	320 kbps (5 x 64)
28	OFF	OFF	ON	ON	ON	256 kbps (4 x 64)
29	ON	OFF	ON	ON	ON	192 kbps (3 x 64)
30	OFF	ON	ON	ON	ON	128 kbps (2 x 64)
31	ON	ON	ON	ON	ON	64 kbps (1 x 64)

## V.35/V.11-Compatible Units



\* Default in **bold**

97-15525

### V.35/V.11-Compatible Unit Switchpack and Jumper Locations

- Jumpers P6 – P21 must be set in the same position at all times. For V.35 signaling, each jumper must be placed on Pins 1 and 2. For V.11 signaling, each jumper must be placed on Pins 2 and 3.
- See [Table C-2](#) for switch positions to use for each supported payload rate.

**Table C-2. Payload Rate Switches 3 – 7 on Switchpack S4**

Payload Rate	Switch Position				
	3	4	5	6	7
<b>1 x 64 (64 kbps)</b>	<b>OFF</b>	<b>OFF</b>	<b>OFF</b>	<b>OFF</b>	<b>OFF</b>
2 x 64 (128 kbps)	ON	OFF	OFF	OFF	OFF
3 x 64 (192 kbps)	OFF	ON	OFF	OFF	OFF
4 x 64 (256 kbps)	ON	ON	OFF	OFF	OFF
5 x 64 (320 kbps)	OFF	OFF	ON	OFF	OFF
6 x 64 (384 kbps)	ON	OFF	ON	OFF	OFF
7 x 64 (448 kbps)	OFF	ON	ON	OFF	OFF
8 x 64 (512 kbps)	ON	ON	ON	OFF	OFF
9 x 64 (576 kbps)	OFF	OFF	OFF	ON	OFF
10 x 64 (640 kbps)	ON	OFF	OFF	ON	OFF
11 x 64 (704 kbps)	OFF	ON	OFF	ON	OFF
12 x 64 (768 kbps)	ON	ON	OFF	ON	OFF
13 x 64 (832 kbps)	OFF	OFF	ON	ON	OFF
14 x 64 (896 kbps)	ON	OFF	ON	ON	OFF
15 x 64 (960 kbps)	OFF	ON	ON	ON	OFF
16 x 64 (1024 kbps)	ON	ON	ON	ON	OFF
17 x 64 (1088 kbps)	OFF	OFF	OFF	OFF	ON
18 x 64 (1152 kbps)	ON	OFF	OFF	OFF	ON
19 x 64 (1216 kbps)	OFF	ON	OFF	OFF	ON
20 x 64 (1280 kbps)	ON	ON	OFF	OFF	ON
21 x 64 (1344 kbps)	OFF	OFF	ON	OFF	ON
22 x 64 (1408 kbps)	ON	OFF	ON	OFF	ON
23 x 64 (1472 kbps)	OFF	ON	ON	OFF	ON
24 x 64 (1536 kbps)	ON	ON	ON	OFF	ON
25 x 64 (1600 kbps)	OFF	OFF	OFF	ON	ON
26 x 64 (1664 kbps)	ON	OFF	OFF	ON	ON
27 x 64 (1728 kbps)	OFF	ON	OFF	ON	ON
28 x 64 (1792 kbps)	ON	ON	OFF	ON	ON
29 x 64 (1856 kbps)	OFF	OFF	ON	ON	ON
30 x 64 (1920 kbps)	ON	OFF	ON	ON	ON
31 x 64 (1984 kbps)	OFF	ON	ON	ON	ON
32 x 64 (2048 kbps)	ON	ON	ON	ON	ON



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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. Used with AMI coding format.
<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>Champ connector</b>	64-pin connector used to connect the E1/T1 network or local loop to the HotWire 7900 Nest connectors J5, J6, and J7.
<b>CO</b>	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. Used with HDB3 coding format.
<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, 1.544 Mbps.
<b>DTE</b>	Data Terminal Equipment. The equipment, such as computers, printers, and routers, that provide or create 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>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. 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>G.703</b>	ITU-TS standard for covering transmission facilities.
<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-M</b>	Host Termination Unit – Maintenance. A carrier-mounted module used to perform maintenance operations on one or more STU-R and STU-C modules.
<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 conditions.
<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>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>	Symmetric Digital Subscriber Line. Provides symmetrical bi-directional transmission over copper wire for both T1 and E1 services.
<b>SNMP</b>	Simple Network Management Protocol. Allows multi-vendor networking devices to be managed more easily with common management tools.
<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 CO (central office) or central site end of an SDSL connection. Also known as a Line Termination Unit (LTU).
<b>STU-R</b>	SDSL Termination Unit – Remote. The module at the CP (customer premises) end of an SDSL connection. Also known as a Network Termination Unit (NTU).
<b>STU-S</b>	SDSL Termination Unit – SNMP. The SNMP-compatible version of the Maintenance Processor.
<b>TXD</b>	Transmit Data. An EIA-lead standard for V.24 circuit CT 103; an input signal (DTE-to-DCE).
<b>V.11</b>	ITU-T standard for a high-speed, 34-pin, DCE/DTE interface. Similar to V.35, but used for longer cable distances where V.35 is not appropriate.
<b>V.35</b>	ITU-T standard for a high-speed, 34-pin, DCE/DTE interface.

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