

# DATA CONNECT ENTERPRISE



## User's Guide

## DSP9612FP Fast-Poll Modem



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# Chapter 1

## Introduction

**C**ongratulations for purchasing the finest industrial-grade fast-poll modem available.

The Data Connect DSP9612 (Fast poll) modem is a 9600/4800/0-1800 bps modem designed for 4-wire, full-duplex or 2-wire, half-duplex operation over a voice-band leased line or private line. The modem is designed utilizing the latest digital-signal processing (DSP) technology to achieve high performance. The modem employs Data Connect' proprietary modulation and encoding scheme to achieve fast modem training time. The modem is also backward compatible with Bell 202 and ITU-T V.23 modems.

The DSP9612 modem is ideally suited for multi-point communication systems that require fast response time, short training time, and low throughput delay. The DSP9612 is the most technologically advanced modem on the market.

This User's Guide describes both the DSP9612FP (AC-powered) modem and the DSP9612-LV (DC-powered) modem. This manual is intended to let you get your modem "up and running" as quickly as possible. It contains all the information you need to configure and install your modem. It also contains troubleshooting information in the unlikely event you encounter a problem with your modem.

## Introduction

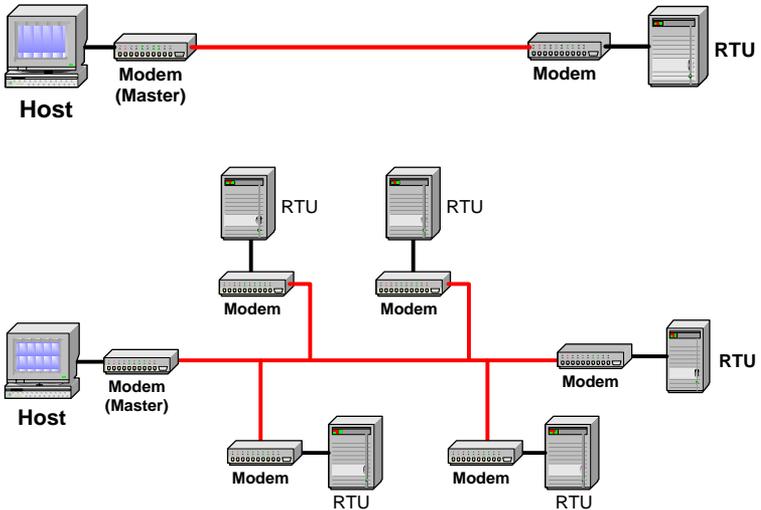
# Features

The DSP9612 modem is specifically designed for harsh environments found in utility substations and industrial facilities. Though functionally similar to commercial modems, the DSP9612 provides the following unique features that make it well suited for utility and industrial applications.

- ❖ Packaged in a rugged, compact enclosure for industrial applications.
- ❖ Leased-line interface protected with heavy-duty surge protection hardware (15KV).
- ❖ Requires no human intervention, making it ideal for unmanned locations.
- ❖ Works within an extended temperature range of -40°C to +85°C.
- ❖ Designed with coupling transformers for high-voltage isolation and common mode noise rejection in industrial and commercial environments.
- ❖ Operate over voice-band conditioned or unconditioned leased line and pilot wires.
- ❖ Accepts power from a wide range of AC and DC power supplies.
  - DSP9612FP: 85 to 265 VAC or 85 to 400 VDC
  - DSP9612-LV: 10 to 53 VDC
- ❖ Standard industrial connectors for data, analog, and power interfaces allow reliable interconnection to other industrial equipment.
- ❖ Asynchronous data rates (selectable) of 9600, 4800, and 0-1800 bps.
- ❖ Easily accessible DIP switches for user configuration and option selection.
- ❖ DB25 connector for RS-232/V.24 interface.
- ❖ Local analog, local digital, and remote digital loopback diagnostics.

## Applications

The DSP9612 modem is designed for point-to-point and multipoint data communications. Figure 1-1 shows a typical multipoint configuration.



**Figure 1-1. Network of Point to Point and Multipoint Configuration**

There are a number of factors that can affect the network's and modem's operation and performance. These include:

- ❖ Operating speed
- ❖ 2-wire or 4-wire configuration
- ❖ Transmission line characteristics, noise, and line impairments
- ❖ Network configuration (point-to-point or multipoint)
- ❖ Number of nodes on the network

**Introduction**

**NOTES**

# Chapter 2

## Installation

**T**his chapter describes how to install the modem.

### Unpacking Your Hardware

Your package should include:

- ❖ At least one of the following DSP9612 modems:
  - Model DSP9612FP for 85 to 265 VAC
  - Model DSP9612-LV for 10 to 53 VDC
- ❖ A leased-line cable
- ❖ A DC power cable (model DSP9612-LV modem only)
- ❖ This User's Guide

If your package contents are damaged or missing, please contact your place of purchase immediately.

### Additional Items You Need

To use your modem, you need the following additional items:

- ❖ Two- or four-wire transmission line or leased line
- ❖ A DB25-F data cable for your Data Terminal Equipment (DTE) port

## Installation

- ❖ A power supply that provides either:
  - 85 to 265 Volts AC, 50 to 60 Hz, single phase or 85 to 400 VDC (if you have the model DSP9612FP modem), or
  - 10 to 53 Volts DC (if you have the model DSP9612-LV modem)

## Hardware Overview

### Back View

Figure 2-1 shows the back view of the DSP9612 modem models. Starting from the left side, these views show:

- ❖ A 4-wire/2-wire configuration block. See page 26.
- ❖ A female, 25-pin RS-232 connector, for connecting a standard DTE (RTU). See page 28.
- ❖ A **POWER ON/OFF** switch.
- ❖ A power connector. See page 27.

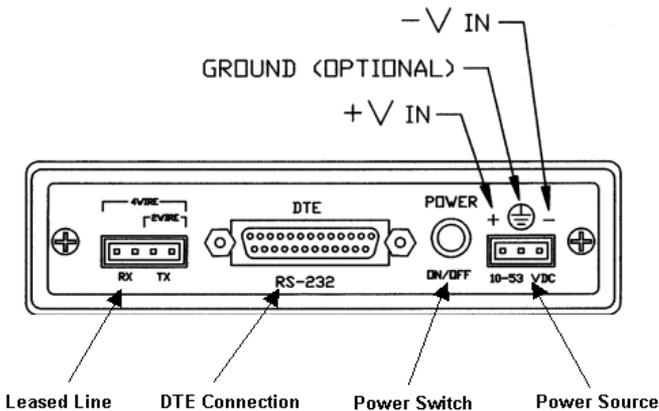


Figure 2-1. Back View of Model DSP9612-LV Modem

## Front View

The Model DSP9612FP and Model 9612-LV modems have identical front panels. Figure 2-3 shows the front view of the modem. Starting from the left side, this view shows:

- ❖ A set of nine LEDs. See page 29.
- ❖ A loopback test switch. See page 30.



Figure 2-2. Front View of Modem

## Installation

# Installation Summary

The modem installation involves the following steps:

1. Finding a suitable location for the modem. See the section below.
2. Configuring the modem. See page 13.
3. Connecting to a transmission line. See page 25.
4. Connecting to a voltage source. See page 27.
5. Connecting a DTE device. See page 28.

## Finding a Suitable Location

The location you select should provide easy access to the back panel communications interface(s) and front panel power interface. It should also let you view all the LEDs on the front panel.

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**Note:** Data Connect also offers a rack-mount version of this modem (Model DSP9612RM) as a plug-in module for the Data Connect/UDS RM16M Central Site Modem Rack. For more information, contact Data Connect Enterprise's Sales Department at (301) 924-7400 x25.

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## Configuring the Modem

You configure the modem using the three sets of DIP switches on the bottom of the modem.



### IMPORTANT

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It is important to follow the three steps described below, in the order shown, to ensure that you configure your modem properly using the modem DIP switches:

1. Use DIP switch 3 (SW3) to configure the modem for your host DTE interface and network topology. Using SW3, you select the modem to operate in high-speed fast-poll or low-speed (FSK) mode.
  2. If you set SW3 for FSK mode in step 1, use DIP switch 2 (SW2) to configure the modem for either Bell 202T or ITU-T V.23 compatibility. Otherwise, you can use the modem in fallback mode.
  3. Use DIP switch 1 (SW1) to select the modem's transmitter output level and receiver dynamic range. The SW1 settings apply for both high-speed fast-poll and low-speed (FSK) modes.
-

## Installation

### SW1 DIP Switch Settings

SW1 is an 8-position DIP switch. Table 2-1 shows the modem switch settings for DIP switch SW1. A description of the SW1 switch settings follows the table.

---

**Note:** SW1 settings apply for both high-speed fast-poll and low-speed (FSK) modes

---

**Table 2-1. Modem Switch Settings for DIP Switch SW1**

Switches	Switch Settings	
	ON	OFF (Default)
SW1-1 – 1-4: Transmit Level (page 15)	(see Table 2-2 on page 15)	
SW1-5: Receiver Dynamic Range (page 16)	-10 to -43 dBm	0 to -30 dBm
SW1-6: TX Cable Equalizer (page 16)	Enabled	Disabled
SW1-7: RX Cable Equalizer (page 16)	Enabled	Disabled
SW1-8: Anti-streaming (page 16)	Active	Inactive

## Configuring the Modem

### **SW1-1 through SW1-4 – Transmit Level**

Switches SW1-1 through SW1-4 adjust the modem's transmit level. Table 2-2 shows the transmit levels you can select using these switches.

**Table 2-2. Transmit Levels**

Transmit Level	SW1 through SW4 Switch Settings			
	SW1-1	SW1-2	SW1-3	SW1-4
0 dBm	OFF	OFF	OFF	OFF
-1 dBm	OFF	OFF	OFF	ON
-2 dBm	OFF	OFF	ON	OFF
-3 dBm	OFF	OFF	ON	ON
-4 dBm	OFF	ON	OFF	OFF
-5 dBm	OFF	ON	OFF	ON
-6 dBm	OFF	ON	ON	OFF
-7 dBm	OFF	ON	ON	ON
-8 dBm	ON	OFF	OFF	OFF
-9 dBm	ON	OFF	OFF	ON
-10 dBm	ON	OFF	ON	OFF
-11 dBm	ON	OFF	ON	ON
-12 dBm	ON	ON	OFF	OFF
-13 dBm	ON	ON	OFF	ON
-14 dBm	ON	ON	ON	OFF

## Installation

### **SW1-5 – Receiver Dynamic Range**

SW1-5	ON = -10 to -43 dBm OFF = 0 to -30 dBm
-------	---

For a low receive signal level, set SW1-5 to ON (-43 dBm). For short distances or to select a strong receive signal, set SW1-5 to OFF.

### **SW1-6 and SW1-7 – Cable Equalizer (Fast-Poll Mode Only)**

SW1-6	ON = Enable TX Cable Equalizer OFF = Disable TX Cable Equalizer
SW1-7	ON = Enable RX Cable Equalizer OFF = Disable RX Cable Equalizer

To improve or extend the modem's polling performance, use the fixed Compromise Cable Equalizer when polling on long metallic circuits. The cable equalizer is active only when the modem is in fast-poll mode (SW3-1 set to OFF).

### **SW1-8 – Anti-streaming**

SW1-8	ON = Anti-streaming active OFF = Anti-stream inactive
-------	--

Typically, anti-streaming is used in multi-point applications to prevent a malfunctioning slave modem from occupying the line indefinitely. When anti-streaming is active, the modem can transmit data for a maximum of 27 seconds before the transmitter turns off automatically. The modem then looks for an ON-to-OFF Request To Send (RTS) transition before proceeding with normal operation. Anti-streaming can be selected in either high-speed or low-speed mode.

## **SW2 DIP Switch Settings**

SW2 is an 8-position DIP switch. Table 2-3 shows the modem switch settings for DIP switch SW2. A description of the SW2 switch settings follows the table.

**Table 2-3. Modem Switch Settings for DIP Switch SW2**

<b>Switches</b>	<b>Switch Settings</b>	
	<b>ON</b>	<b>OFF (Default)</b>
SW2-1: FSK Mode (page 18)	V.23	Bell 202
SW2-2: Receiver Squelch (page 18) (valid for FSK mode, 2-wire half-duplex operation only)	Turnaround Squelch (Bell 202): 8ms  Turnaround Squelch (V.23): 150ms	Turnaround Squelch (Bell 202): 0ms  Turnaround Squelch (V.23): 0ms
SW2-3: FSK Soft Carrier (page 19)	Disabled	Enabled
SW2-4 and SW2-5: FSK RTS-CTS Delay (page 19)	(see Table 2-4)	
SW2-6: FSK CD Delay (page 20)	23ms	6ms
SW2-7: Remote Loopback (page 20)	Enabled	Disabled
SW2-8: Reserved (Test Only) (page 20)	Test	Normal

## Installation

### **SW2-1 — FSK Mode**

SW2-1	ON = ITU-T V.23 mode OFF = Bell 202 mode
-------	---

The modem has two FSK modes:

- ❖ Bell 202, which supports data rates from 0 to 1800 bps
- ❖ ITU-T V.23, which supports data rates from 0 to 1200 bps

SW2-1 configures the modem for either of these FSK modes. Setting SW2-1 to ON selects ITU-T V.23 mode. In this mode, the modem complies with ITU-T (CCITT) recommendation V.23 with the following parameters:

- ❖ Mode 2 modulation only
- ❖ No backward channel
- ❖ No provisions for disablement of echo suppressors
- ❖ DTR (circuit 108) is ignored

Setting SW2-1 OFF selects Bell 202 mode.

### **SW2-2 — Receiver Squelch (FSK Mode 2-Wire Half-Duplex Only)**

SW2-2	ON = 8ms for Bell 202, 150ms for ITU-T V.23 OFF = 0ms
-------	--

SW2-2 configures the turnaround squelch delay and is valid when the following are active:

- ❖ FSK mode (SW3-1 ON)
- ❖ 2-wire half-duplex operation (SW3-7 ON)

Setting this switch to OFF configures the modem to enable its receiver immediately after the Request To Send (RTS) signal is turned off.

## Configuring the Modem

When this switch is set to OFF and the modem is configured for 2-wire, half-duplex mode (SW3-7 ON), the modem squelches the receiver after RTS is turned off to prevent far-end echoes from causing data errors. The duration that the modem squelches the receiver is either:

- ❖ 8 milliseconds if the modem is configured for Bell 202 mode (SW2-1 OFF)
- ❖ 150 milliseconds if the modem is configured for ITU-T V.23 mode (SW2-1 ON)

### **SW2-3 — FSK Soft Carrier (Bell 202 FSK Mode Only)**

SW2-3	ON = None
	OFF = 8ms

SW2-3 controls the soft carrier and is valid for Bell 202 FSK mode only (SW2-1 set to OFF). Setting this switch to OFF configures the modem to transmit a 900 Hz soft carrier to the remote modem for 8 milliseconds after RTS is turned off. Setting this switch to ON prevents the modem from transmitting a soft carrier after RTS is turned off.

### **SW2-4 and SW2-5 — RTS-CTS Delay (Bell 202 Mode Only)**

Switches SW2-4 and SW2-5 determine the duration of the RTS-CTS delay in Bell 202 mode. Table 2-4 shows how to set these switches to select the appropriate setting.

**Table 2-4. RTS-CTS Delay Settings in Bell 202 Mode**

To Select a Delay of...	Set SW2-4 to...	And Set SW2-5 to...
8ms	OFF	OFF
33ms	OFF	ON
59ms	ON	OFF
219ms	ON	ON

## Installation

When the modem is configured for V.23 operation (SW2-1 ON), the RTS-CTS delay is fixed at 33 ms.

### **SW2-6 — FSK CD Delay (Bell 202 Mode Only)**

SW2-6	ON = 23ms
	OFF = 6ms

SW2-6 selects the FSK CD delay and is valid when Bell 202 mode is active (SW2-1 OFF). Setting SW2-6 ON configures the modem to turn on CD 23 milliseconds after it detects a valid carrier signal. Setting this switch to OFF configures the modem to turn on CD 6 milliseconds after it detects a valid carrier signal.

This switch setting is deactivated when the modem is configured for V.23 mode (SW2-1 ON) and a delay of 18 milliseconds is used instead.

### **SW2-7 — Remote Loopback**

SW2-7	ON = Loopback enabled
	OFF = Loopback disabled

During instances of channel noise, the modem may mistaken a received preamble as a request to go into remote digital loopback. Setting SW2-7 to OFF prevents the modem from participating in a remote digital loopback with another modem. SW2-7 does not prevent the modem from sending a remote digital loopback request to a remote modem.

### **SW2-8 – Reserved (Test Only)**

SW2-8	Must be OFF
-------	-------------

SW2-8 must be in the OFF position for normal operation.

## **SW3 DIP Switch Settings**

SW3 is a 10-position DIP switch. Table 2-5 shows the modem switch settings for DIP switch SW3. A description of the SW3 switch settings follows the table.

**Table 2-5. Modem Switch Settings for DIP Switch SW3**

<b>Switches</b>	<b>Switch Settings</b>	
	<b>ON</b>	<b>OFF (Default)</b>
SW3-1: Fast Poll/FSK (page 22)	FSK (1200)	Fast Poll (9600)
SW3-2: Data Rate (page 22)	4800 bps	9600 bps
SW3-3: Async Character (page 22)	11 bits	10 bits
SW3-4: Auto RTS (page 22)	Enabled	Disabled
SW3-5: Transmitter Termination (page 24)	Controlled by RTS	600 $\Omega$
SW3-6: Reserved (Test Only) (page 24)	Factory Test	Normal
SW3-7: 2- or 4-wire (page 24)	2-wire, half-duplex	4-wire, full-duplex
SW3-8: Carrier Control (page 25)	Forced ON	Controlled by RTS
SW3-9: Rx Termination (page 25)	600 $\Omega$	High Rx Impedance
SW3-10: Signal Ground and Earth Ground Option (page 25)	Connected	Separated

## Installation

### **SW3-1 – Fast Poll High-speed/FSK**

SW3-1	ON = Low-Speed Mode (FSK) OFF = High-Speed Mode (Fast Poll)
-------	--

The modem has two operating modes:

- ❖ FSK mode, which supports data rates from 0 to 1800 bps.
- ❖ Fast-poll mode, which supports data rates of 4800 and 9600 bps.

SW3-1, configures the modem for either FSK or fast-poll mode. Table 2-6 shows how SW3-1 configures the modem for these operating modes.

**Table 2-6. Modem Operating Mode**

To Select...	Set SW3-1 to...
Fast-poll mode (9600 or 4800)	OFF
FSK mode (Bell 202T or V.23)	ON

### **SW3-2 – Data Rate (Fast-Poll Mode Only)**

SW3-2	ON = 4800 bps OFF = 9600 bps
-------	---------------------------------

SW3-2 configures the modem speed. When the modem is in high-speed fast-poll mode (SW3-1 OFF), setting SW3-2 ON selects 4800 bps, while setting SW3-2 OFF selects 9600 bps.

### **SW3-3 – Async Character (Fast-Poll Mode Only)**

SW3-3	ON = 11 bits OFF = 10 bits
-------	-------------------------------

## Configuring the Modem

Switch SW3-3 selects whether the async character is 10 or 11 bits long. When the modem is in high-speed fast-poll mode (SW3-1 OFF), setting SW3-3 ON selects an 11-bit async characters, while setting SW3-3 OFF selects a 10-bit async character.

### **SW3-4 – Auto RTS**

SW3-4	ON = Enable Auto RTS
	OFF = Disable Auto RTS

For data terminals that do not support hardware flow control (RTS-CTS hand-shake), and do not provide RTS to the modem, or DTE's use a 3-wire RS-232 interface (TXD, RXD, Signal Ground), set SW3-4 to ON to enable auto RTS mode.

In Auto-RTS mode, TXD is detected at the modem and an internal RTS signal is turned ON. After training completes, the TXD is transmitted to the remote modem. The transmitter turns itself off if no TXD is detected after 1 character length of idle time. Auto RTS is suitable for polling applications in multi-point and switched carrier mode.

## Installation

### **SW3-5 – Transmitter Termination**

SW3-5	ON = Controlled by RTS OFF = 600 $\Omega$
-------	--

SW3-5 is used for multi-point configuration networks. When multiple modems are connected on the same metallic circuit:

- ❖ The transmitter termination should be of high impedance if the modem is not transmitting.
- ❖ The transmitter is only terminated with 600 ohms when RTS is asserted.

This configuration should be used for all slave modems to prevent the transmitting modem from being unnecessarily burdened. To select this configuration, set SW3-5 ON on the slave modems.

If you use the modem with transmission lines that are transformer-coupled or with an impedance-isolated network (such as a transformer bridge), set SW3-5 OFF for proper operation.

### **SW3-6 – Reserved (Test Only)**

SW3-6	Must be OFF
-------	-------------

SW3-6 must be in the OFF position for normal operation.

### **SW3-7 – 2-/4-Wire Leased Line Operation**

SW3-7	ON = 2-Wire, Half-Duplex Mode OFF = 4-Wire, Full-Duplex Mode
-------	---

SW3-7 configures the modem for 4-wire full-duplex or 2-wire half-duplex operation.

### **SW3-8 – Carrier Control**

SW3-8	ON = Constant (Forced ON) OFF = Controlled by RTS
-------	--

SW3-8 selects either constant or switched carrier. Constant carrier allows DTEs, such as asynchronous dumb terminals or RTUs, to operate with modems, without the input RTS signal. When constant carrier mode is enabled (SW3-8 set to ON), the modem forces the transmit carrier active and the CTS is ON at all time.

You can use constant carrier in 4-wire, point-to-point or multi-point applications (from master to slave modems).

In switched-carrier mode (SW3-8 set to OFF), the RTS/CTS delay is active.

### **SW3-9 – RX Termination**

SW3-9	ON = Enable Rx Termination OFF = Disable Rx Termination
-------	--

SW3-9 selects whether RX termination is enabled for a modem. If you set this switch ON, the receiver is terminated with 600  $\Omega$ . If you set this switch OFF, the receiver is not terminated. When multiple modem receivers are connected in a single circuit, such as in point-to-multi-point system, enable the RX termination for only one modem.

### **SW3-10 – Grounding Option**

SW3-10	ON = Signal Ground and Earth Ground are Connected OFF = Signal Ground and Earth Ground are Separated
--------	---

## Installation

# Connecting to a Transmission Line

The modem has a transmission line interface that can be configured for 2- or 4-wire, analog connection, where one pair is used to transmit data (Tx-A and Tx-B) and one pair is used to receive data (Rx-A and Rx-B). Table 2-7 shows the pin numbers and corresponding signals for the modem. Figure 2-4 shows the transmission line interface.

---

**Note:** For communication to occur, the Rx line of one modem must connect to the Tx line of the other modem. The modem's Tx and Rx pairs are non-polarized.

---

---

**Note:** The modem does not support leased-line operations with DC current.

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**Table 2-7. Transmission Line Connector Pin Assignments**

This Pin Number...	Corresponds to This Signal...
1	Rx
2	Rx
3	Tx
4	Tx

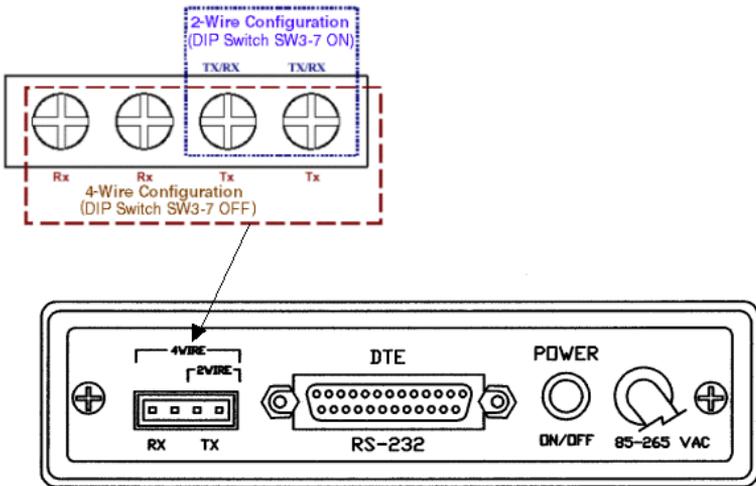


Figure 2-4. Transmission Line Interface

## Connecting to a Voltage Source

The back panel of the modem provides the power interface. For convenience, the modems can be powered from the following power sources:

- ❖ Model DSP9612FP (AC version): 85 to 265 Volts AC, 50 to 60 Hz, single phase or 85 to 400 VDC
- ❖ Model DSP9612-LV (DC version): 10 to 53 Volts DC. The model DSP9612-LV comes with a shielded power cord for making this connection.

## Installation

---



### WARNING

Before you connect a voltage source, observe the following power supply voltage guidelines. Otherwise, you will void your warranty if the wrong voltage is applied.

- ❖ Be sure the voltage source is within the permitted ranges shown above. Otherwise, your modem and any attached devices may be damaged.
  - ❖ Customer-supplied cables must be suitable for the site environmental conditions.
  - ❖ Screw terminals on the power interface accept 24 to 16 AWG. However, surge protection is guaranteed only if the ground wire is greater than 18 AWG and if there is a solidly earthed ground connection.
  - ❖ Be sure the power source is not controlled by a wall switch, which can be inadvertently turned off, shutting off power to the modem.
- 

## Connecting an RS-232 Device

The modem back panel provides a female, 25-pin RS-232 connector that accepts an attached RS-232 device (see Figure 2-1 on page **Error! Bookmark not defined.**). This connector accepts a standard connection to a DTE (RTU) that conforms to the pin assignments shown under “RS-232 (DTE) Interface” on page 38.

## LEDs

The front panel of the modem provides the LEDs shown in Table 2-8.

**Table 2-8. Modem LEDs**

<b>LED</b>	<b>Color</b>	<b>Description</b>
<b>PWR</b>	Green	Power Input
<b>RTS</b>	Yellow	Request To Send
<b>CTS</b>	Yellow	Clear To Send
<b>TD</b>	Yellow	Transmit Data
<b>RD</b>	Yellow	Receive Data
<b>CD</b>	Yellow	Carrier Detect
<b>MR</b>	Yellow	Modem Ready
<b>ALB</b>	Red*	Analog Loopback
<b>DLB</b>	Red*	Digital Loopback
* When the modem is in remote loopback, both the <b>ALB</b> and <b>DLB</b> LEDs go ON.		

## Installation

### Loopback Control Switch

The front panel of the modem has a push button for initiating the following loopback diagnostic tests:

- ❖ Local analog loopback — started by pressing the button one time.
- ❖ Local digital loopback — started by pressing the button two times.
- ❖ Remote digital loopback — set the local modem's RTS signal to low. Then press the remote modem's diagnostics button three times and raise the local modem's RTS signal to start the test. The **ALB** and **DLB** LEDs go ON when the modem is in remote digital loopback. This test is only available in fast-poll mode only.

Figure 2-4 illustrates these three diagnostics.

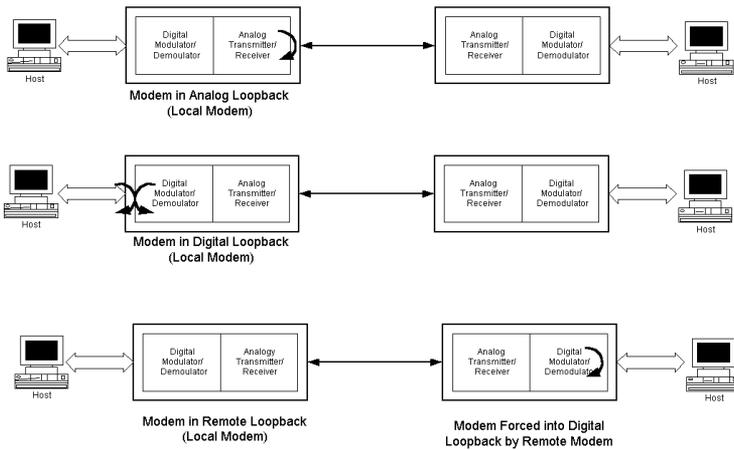


Figure 2-4. Loopback Diagnostics

# Appendix A

## Troubleshooting

In the event you encounter a problem using your Data Connect modem, refer to the troubleshooting information in this appendix.



### IMPORTANT

If you encounter a problem with your modem, be sure the switches on the bottom of the modem are set to the appropriate positions. If a switch is halfway between an on and off setting, the modem will not operate properly.

## Problem Solving

Table A-1 offers troubleshooting solutions for modem problems.

**Table A-1. Troubleshooting Suggestions**

If...	Perform These Procedures...
Modem does not respond to the attached DTE and the all LEDs are off.	Check the power supply input for your specific model (see page 27).
Modem does not receive data, and the <b>DCD</b> and <b>RxD</b> LEDs are off.	<p>The receive line pair may be disconnected from the modem. Make sure the transmission line connection to the modem is accurate and secure.</p> <p>The receive signal level may be below the CD threshold. Set SW1-5 ON to see whether configuring the modem for a -43 dBm threshold resolves the problem.</p>

## Troubleshooting

**Table A-1. Troubleshooting Suggestions**

<b>If...</b>	<b>Perform These Procedures...</b>
The <b>RTS, CTS, and TxD</b> LEDs do not blink.	The attached terminal or DTE may not be sending data to the modem. Verify that data is being transmitted. If data is being transmitted, make sure the RS-232 cable is sound and securely connected to the modem and terminal or DTE.

# Appendix B

## DIP Switch Summary

Switches	Switch Settings	
	ON	OFF (Default)
SW1-1 – 1-4: Transmit Level (page 15)	(see Table 2-2 on page 15)	
SW1-5: Receiver Dynamic Range (page 16)	-10 to -43 dBm	0 to -30 dBm
SW1-6: TX Cable Equalizer (page 16)	Enabled	Disabled
SW1-7: RX Cable Equalizer (page 16)	Enabled	Disabled
SW1-8: Anti-streaming (page 16)	Active	Inactive

SW2-1: FSK Mode (page 18)	V.23	Bell 202
SW2-2: Receiver Squelch (page 18) (valid for FSK mode, 2-wire half-duplex operation only)	Turnaround Squelch (Bell 202): 8ms  Turnaround Squelch (V.23): 150ms	Turnaround Squelch (Bell 202): 0ms  Turnaround Squelch (V.23): 0ms
SW2-3: FSK Soft Carrier (page 19)	Disabled	Enabled
SW2-4 and SW2-5: FSK RTS-CTS Delay (page 19)	(see Table 2-4)	
SW2-6: FSK CD Delay (page 20)	23ms	6ms
SW2-7: Remote Loopback (page 20)	Enabled	Disabled
SW2-8: Reserved (Test Only) (page 20)	Test	Normal

SW3-1: Fast Poll/FSK (page 22)	FSK	Fast Poll
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## DIP Switch Summary

Switches	Switch Settings	
	ON	OFF (Default)
SW3-2: Data Rate (page 22)	4800 bps	9600 bps
SW3-3: Async Character (page 22)	11 bits	10 bits
SW3-4: Auto RTS (page 22)	Enabled	Disabled
SW3-5: Transmitter Termination (page 24)	Controlled by RTS	600 $\Omega$
SW3-6: Reserved (Test Only) (page 24)	Test	Normal
SW3-7: 2- or 4-wire (page 24)	2-wire, half-duplex	4-wire, full-duplex
SW3-8: Carrier Control (page 25)	Forced ON	Switched
SW3-9: Rx Termination (page 25)	600 $\Omega$	High Rx Impedance
SW3-10: Signal Ground and Earth Ground Option (page 25)	Connected	Separated

# Appendix C

## Specifications

### General Specifications

<b>Data rate:</b>	9600, 4800, or 0-1800 bps asynchronous
<b>Data format:</b>	8 or 9 data bits with 1 or more stop bits
<b>DTE interface:</b>	EIA RS-232 or V.24 compatible
<b>Line conditions:</b>	TELCO Voice band 4- or 2-wire leased line, conditioned or unconditioned  Private metallic circuits up to 9.5 miles (24 AWG) without cable equalizer. Up to 15.0 miles (24 AWG) with TX and RX cable equalizer
<b>Operating modes:</b>	2-wire half-duplex or 4-wire full-duplex
<b>Modulation:</b>	High-speed fast poll – Data Connect proprietary FSK, Bell 202T or V.23 compatible <ul style="list-style-type: none"><li>• Mark = 1200 Hz (1300 Hz, V.23)</li><li>• Space = 2200 Hz (2100 Hz, V.23)</li><li>• Soft Carrier = 900 Hz (Bell 202T only)</li></ul>
<b>Equalizer:</b>	Automatic, adaptive
<b>RTS-CTS Delay:</b>	23 ms. (fast poll) 8, 33, 59, or 219 ms (Bell 202) 33 ms (V.23)

## Specifications

### Receiver

**dynamic range:** 0 to -30 dBm or -10 to -43 dBm

### Operating

**temperature:** -40°C to +85°C

**Power supply:** Wide range switching power supply:

- DSP9612FP (AC version): 85 to 265 Volts AC, 50/60 Hz, single phase or 85 to 400 VDC
- DSP9612-LV (DC version): 10 to 53 Volts DC

**Surge protection:** Leased line, up to 15KV

**Carrier control:** Constant or switched, DIP switch selectable

### Carrier loss

**recovery:** Train on Data

**Throughput delay:** Less than 10 milliseconds for fast polling.

**Auto RTS:** Support DTE without hardware RTS

**Anti-Streaming:** 27-second timer to prevent transmitter lock-up network

## Mechanical Specifications

**Enclosure:** Aluminum with removable front and rear panels

**Dimensions:** 5.70" wide x 8.30" long x 1.50" high

**Weight:** 1.9 lbs.

### Interface connectors

**Leased line:** 4-position screw terminal.

### Data Terminal

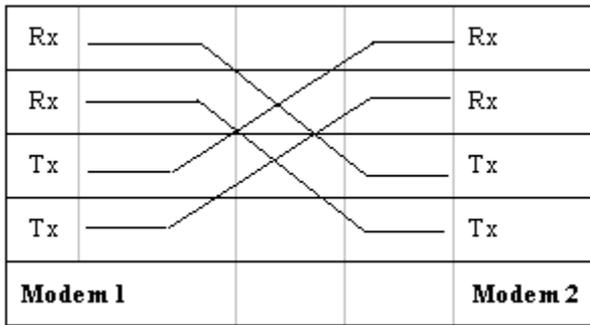
**Equipment:** DB-25 female connector

# Interface Connector Pin Assignments

## Leased Line Terminal Block Pin Assignments

This Pin Number...	Corresponds to This Signal...
1	Rx
2	Rx
3	Tx
4	Tx

## Back-to-Back Connection to a Second Modem



## Specifications

### **RS-232 (DTE) Interface**

Signal Name	Modem Input/Output	DB25 Pin	Description
Earth GND	—	1	Earth Ground
TXD	Input	2	Transmit Data
RXD	Output	3	Receive Data
RTS	Input	4	Request To Send
CTS	Output	5	Clear To Send
DSR	Output	6	Data Set Ready (Modem Ready)
SG	—	7	Signal Ground
DCD	Output	8	Data Carrier Detected

## Environmental Specifications

**Operating temperature:** -40 to + 85° C

**Storage temperature:** -40 to +85° C

**Operating humidity:** 5 to 95 %, non-condensing.

**Line Isolation:** 3750 V RMS

**Surge protection:** Leased line up to 15K VA

## **Compliances**

The modem is designed to meet the following agency requirements:

### **EMI/RFI:**

FCC part 15 for Class A computing device

Industry Canada. (Emissions)

**Specifications**

**NOTES**

# Appendix D

## Compliances

This device complies with Part 15A of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15A of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ❖ Reorient or relocate the receiving antenna.
- ❖ Increase the separation between the equipment and the receiver.
- ❖ Connect the equipment to an outlet on a circuit other than the one to which the receiver is connected.
- ❖ Consult the dealer or an experienced radio/TV technician for help.

If none of these actions resolves the problem, consult your distributor or an experienced radio/television technician for additional suggestions.

Additionally, Section 15.838, paragraph d), of the FCC Rules and Regulations states: “Where special accessories, such as shielded cables, are required in order to meet FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications to this equipment without the approval of the manufacturer could void the user’s authority to operate this equipment.

## **Compliances**

### **Department of Canada Statement**

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.

# Appendix E

## Limited Product Warranty

Data Connect warrants that the Product sold will be free from defects in material and workmanship and perform to Data Connect' applicable published specifications for a period of 18 months from the date of delivery to Customer or 12 months from placement into service, whichever occurs first. The liability of Data Connect hereunder shall be limited to replacing or repairing, at its option, any defective Products which are returned F.O.B., Data Connect's facility, Olney Maryland (or, at Data Connect' option refunding the purchase price of such products). In no case are Products to be returned without first obtaining permission and a customer return order number from Data Connect. In no event shall Data Connect be liable for any consequential or incidental damages.

Products which have been subject to abuse, misuse, accident, alteration, neglect, unauthorized repair or installation are not covered by the warranty. Data Connect shall make the final determination as to the existence and cause of any alleged defect. No liability is assumed for expendable items such as lamps and fuses. No warranty is made with respect to custom products or Products produced to Customer's specifications except as specifically stated in writing by Data Connect in the agreement for such custom products.

This warranty is the only warranty made by Data Connect with respect to the goods delivered hereunder, and may be modified or amended only by a written instrument signed by a duly authorized officer or Data Connect and accepted by Customer.

This warranty and limitation extends to customer and to users of the product and is in lieu of all warranties with respect to the product whether express, implied, or statutory, including without limitation the implied warranties of merchantability and fitness for a particular purpose.

# Appendix F

## RMA Procedure

### Return Merchandise Authorization (RMA) Procedure

Before returning any Data Connect product, an RMA number must be obtained.

Before asking for an RMA number, ascertain that the product was purchased from Data Connect. If you bought the product from a Distributor or Systems Integrator, the product should be returned to that vendor.

The most convenient method to obtain an RMA number for a product purchased from Data Connect is to send an email to [support@Data-connect.com](mailto:support@Data-connect.com). Information required must include

Your Company Name, address, the actual address that we would use to return the product to you. Please include any Mail Stop or specific delivery information. The City, State, and zip code are all required. Your phone and FAX numbers. Your email address.

If the above information is on your letterhead, that format is acceptable.

For each item you wish to return: List the product model number, usually found on the serial number tag, the serial number for each item you wish to return, a description of the problem you are encountering, and the cause of the problem (if known).

A product support specialist may call to verify that the product is properly installed or may ask you to perform tests to insure that the product has actually failed.

After review of the problem, an RMA number will be assigned, you will be notified by email or FAX.

The product must be properly packed and returned to:

Data Connect Enterprise  
3405 Olandwood Court  
Olney, MD 20832

The RMA number must be legibly displayed on the shipping carton.

No RMA's will be issued without a product review, Data Connect will not be responsible for any product returned without an RMA number.

In the near future the RMA form will be available on our Web site Data Connect.com/support/rma. Fill in all blanks and click on the "Submit" button.

If you think the product may be out of warranty, include a method of payment for repairs, either a Purchase Order number, or Credit card number, Card Holder Name, Date of Expiration on the RMA request. Repairs currently require 5 – 10 working days, and are returned UPS second day air.