

**POS/2000**

**Hardware**

**Manual**



Document number 80-001045-8

Revision B



# **POS/2000**

**Hardware**

**Manual**

Document part number 80-001045-8

## **Revision History**

<b>Date</b>	<b>Revision</b>	<b>Description</b>
7/20/00	A	Initial production release
5/3/01	B	Misc. Error Correction

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# Agency Notifications

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## FCC Class A

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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 this 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/her own expense.

## Modem

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The POS/2489 has been approved to be connected to the telephone network under :

1. Industry Canada Standards, CS-01, CS-02 and CS-03 and in accordance with the Industry Canada terminal attachment program.
2. Part 68 of the FCC rules.

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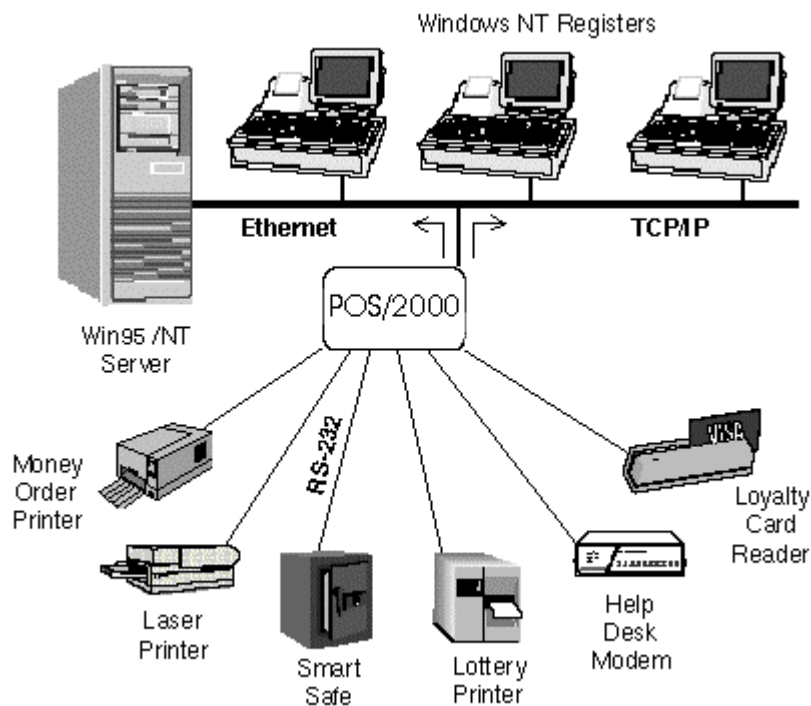
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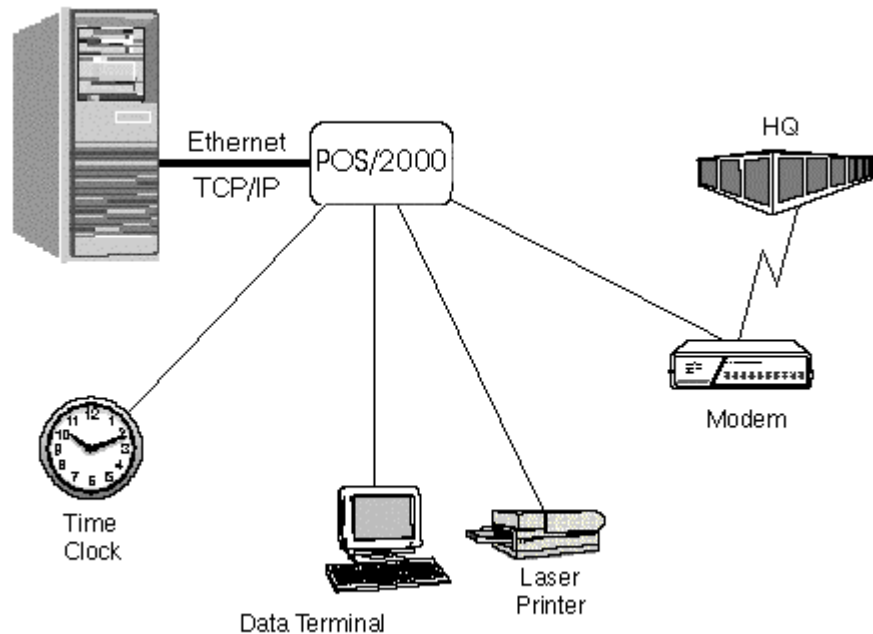
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# Chapter 1: Overview

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The POS/2000 port server provides communication between peripheral devices and devices connected to your local network. When the POS is connected to your LAN and to one or more peripherals, it manages network traffic, routing it to the correct device. For instance, the POS/2000 might be used, as shown in the network diagrams below, to allow several PC registers to share expensive peripherals or to communicate with a remote site.





## Features and benefits

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The POS/2000 offers the following features and benefits:

- Easy set up and configuration
- Open systems communications for multi-site data networks
- Can be used in a variety of data communications applications
- Reduces cost and complexity
- 8 DB-9 serial ports with screw-down connectors
- 4 HUB ports
- Optional built-in 2400 BAUD, Hayes-compatible modem
- High-speed serial connections
- Software selectable RS-232, RS-422, or RS-485 modes on each port
- Software selectable +5 V or +12 V power on each serial port
- Current loop support on 2 ports
- Dial-up LAN/Internet access
- IP packet routing
- Operating system independent
- Modem and serial printer pooling
- Complete remote diagnostics
- LEDs for each port, signaling port status and error conditions
- Industry standard interoperability
- Developer's API for custom, on-board applications and protocols

- Raw reverse telnet option so you can access ports without using special protocol or processing
- Standard lpd printing option that is efficient and easy to use
- Dial on demand to automatically dial and make a connection with a remote system
- Multiple services per port allows setting up both incoming and outgoing services on the same port
- ppp header compression
- Reverse telnet support for a variety of UNIX operating systems

## Using the POS/2000

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Using the POS/2000 requires three steps:

1. Hardware installation
2. Configuration
3. Operation

Hardware installation is documented in this manual.

There are three ways to configuration and use your POS/2000: NativeCOM, a web browser, or the command line interface.

- **NativeCOM:** If you are using Windows, you can use NativeCOM, a software package provided free of charge by Systech. The NativeCOM Networked COM ports software makes remote serial communication ports (e.g. EIA-232 ports on a terminal server) available to PC programs as local COM ports. Applications from a PC running Microsoft Windows 95, Windows 98, or Windows NT can access and use the remote serial ports. For further information on configuring and using Networked COM ports, see the NativeCOM manual. The NativeCOM software and manual are available on the CD you received with your port server and from the Systech web site ([www.systech.com](http://www.systech.com)).
- **Web Browser:** If you are not using Windows or do not wish to use NativeCOM, you can configure your port server directly using your web browser. To use the browser, point it at the IP address of your Systech port server. For further information on assigning an IP address to your port server and on the configuration and operation options for your port server, see the Systech Port Server Administrator's Guide, available on the CD you received with your port server and from the Systech web site ([www.systech.com](http://www.systech.com)).
- **Command line interface:** You can also configure your port server directly using the command line interface, rather than a browser, by connecting a terminal to one of the serial ports or by connecting to the port server via telnet. For further information on configuration and operation using the command line interface, see the Systech Port Server Administrator's Guide, available on the CD you received with your port server and from the Systech web site ([www.systech.com](http://www.systech.com)).



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# Chapter 2: Installing the Hardware

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This chapter describes installing the POS/2000 hardware, including:

- Planning the installation
- Connector diagrams
- Cable and adapter pinouts

## Overview

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Installing the POS/2000 hardware includes the following steps:

1. Plan the installation.
2. Connect the POS/2000 port server to your network.

Most common connection method: Connect Hub H (10BASET RJ-45 connector located on the front panel) to your Ethernet LAN using a straight through cable.

3. Connect your peripheral devices to the POS/2000 port server.

Most common connection method: Connect each peripheral device (e.g., cash register, card reader, modem) to a serial port (one of the DB-9 connectors on the front panel).

4. Plug the unit into a source of AC power and turn the power switch on.

<p><b>WARNING!</b> Do not insert any objects, particularly any metal objects, into any of the air vents located on the right side panel. The power supply is located in this area. Inserting a metal object into an air vent could result in a dangerous electrical shock.</p>
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## Planning the installation

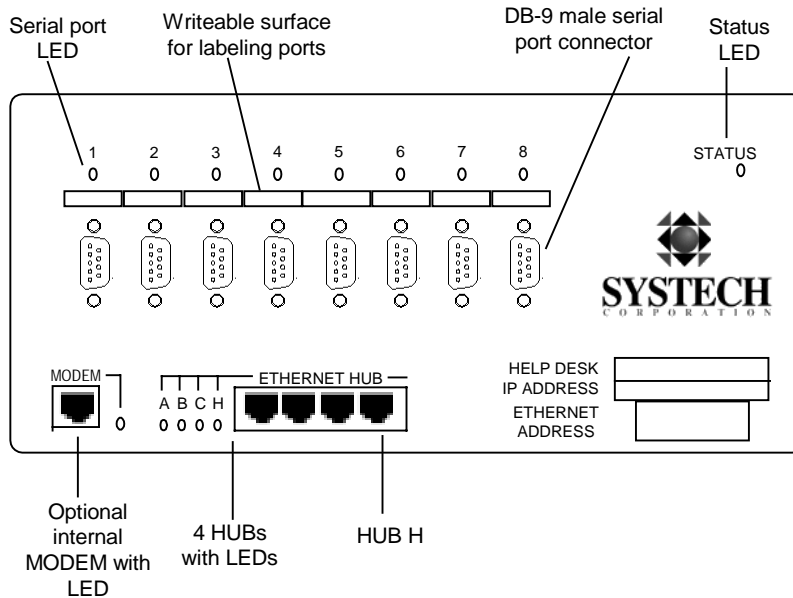
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Before installing the POS/2000 remote communications server, consider the following:

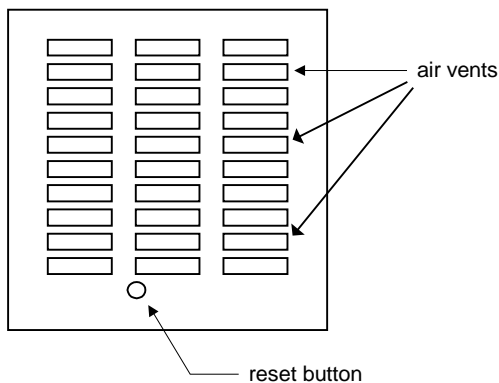
- How will you configure your network:
  - What types of devices will you connect and where will they be located?
  - Identify the distances at which each device will be located from the POS/2000 server.
- Verify that the locations selected for devices do not exceed cable specifications.
- Is there an acceptable source of AC power in the needed location? Remember, the POS/2000 can deliver power over its serial ports.

# POS/2000 Panel Connectors

Figure 2-1 shows the POS/2000 front panel. Eight DB-9 serial ports are numbered left to right, 1 through 8. There are four RJ-45 HUB ports, labeled A, B, C, and H. There is an RJ-11 connector for the optional internal 2400 BAUD modem (port 0). Each connector has an associated LED that signals normal operation or error conditions. In addition, there is a status LED in the upper right corner that indicates the overall status of the POS/2000. For information on interpreting the LED color and pattern displays, see LED Displays, page 29.



**Figure 2-1: POS/2000 Front Panel**



The side panel contains several air vents. Below the air vents, recessed into a round opening in the side panel, is the reset button.

**WARNING!** Do not insert any objects, particularly any metal objects, into any of the air vents located on the right side panel. The power supply is located in this area. Inserting a metal object into an air vent could result in a dangerous electrical shock.

**Figure 2-2: Side panel**

## Connecting EIA-232 Devices to the POS/2000

The POS/2000 server uses an EIA-232 data terminal equipment (DTE) pinout on the DB-9 serial ports. Table 2-1 lists the pinouts of the DB-9 ports used for EIA-232 serial communications.

DB-9 Pin Number	RS-232 Name	Direction	Signal Function
1	DCD	I	Signals module that remote device has a valid connection
2	RX	I	Serial data in, from remote device to POS/2000
3	TX	O	Serial data out, from POS/2000 to remote device
4	DTR	O	Signals remote device that POS/2000 is attached and powered on
5	GND		Signal ground
6	DSR	I	Signals module that remote device is attached and powered on
7	RTS	O	Flow control, to enable remote device to send data
8	CTS	I	Flow control, to enable POS/2000 to send data on TX
9	PWR	O	Power (+5 V or +12 V)

**Table 2-1 EIA-232 DB-9 Pinouts**

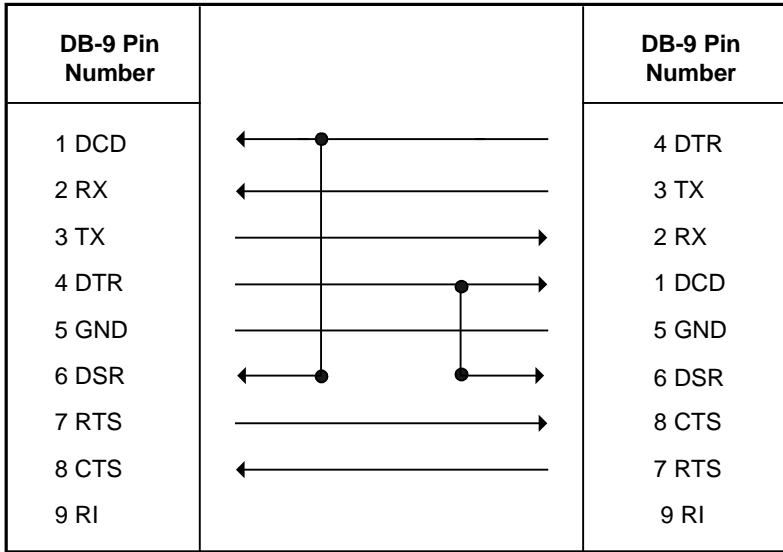
Figure 2-2, 2-3, and 2-4 show cable diagrams for three common configurations. The cable shown in Figure 2-2 may be used to connect modems to the POS/2000. Modems should be configured to switch their carrier detect signal (CD) on and off in response to making and breaking telephone connections. This insures that the POS/2000 terminates user sessions when they disconnect. The cable shown in Figure 2-4 can be used to connect a DB-9 terminal (or standard PC COM) port directly to the POS/2000. The DB-9 to DB-9 terminal cable diagrammed is a standard NULL modem connector, readily available in retail outlets. DB-9 to DB-9 modem cables (not diagrammed) require no special pinouts and use a straight-through cable. A 3-wire cable is shown in Figure 2-5.

DB-9 Pin Number		DB-25 Pin Number/Signal
1 DCD	← ● →	8 DCD
2 RX	← ————— →	2 TX
3 TX	————— →	3 RX
4 DTR	————— ● →	6 DSR
5 GND	—————	7 GND
6 DSR	← ● —————	20 DTR
7 RTS	————— →	5 CTS
8 CTS	← —————	4 RTS
9 POWER	← —————	*POWER (Application Dependent)

**Figure 2-3: DB-9 to DB-25 Terminal Cable**

DB-9 Pin Number		DB-25 Pin Number/Signal
1 DCD	← —————	8 DCD
2 RX	← —————	3 RX
3 TX	————— →	2 TX
4 DTR	————— →	20 DTR
5 GND	—————	7 GND
6 DSR	← —————	6 DSR
7 RTS	————— →	4 RTS
8 CTS	← —————	5 CTS
9 POWER	← —————	*POWER (Application Dependent)

**Figure 2-4: DB-9 to DB-25 Modem Cable**



**Figure 2-5 DB-9 to DB-9 Terminal Cable**

The POS/2000 does not require the use of all 9 wires. Only pins 2, 3, and 5 are essential. DTR/DSR and RTS/CTS (pins 4, 6, 7, and 8) are only necessary for flow control. POW is only used for power. Although the POS/2000 requires DCD by default, you can change the serial port setting so that the DCD signal is not required. Thus, a minimal cable as shown in Figure 2-6, using only RX (pin 2, data in), TX (pin 3, data out), and SG (pin 5, ground), can be used.

**NOTE:** A 3-wire cable can NOT be used to login or to start a session until after you have changed the DCD setting. Therefore, if you connect a terminal or PC with terminal emulation software to your POS/2000 port server when you first set it up, e.g., to set the port server IP address, the factory setting that requires the DCD signal is in effect and you cannot use a 3-wire cable. The cable must have at least four wires: RXD, TXD, GND, and DCD. Be sure that the null modem cable you are using supplies DCD. Some do not.

To change the DCD setting, necessary before a 3-wire cable can be used, use the command  
`set ignoredcd portnumber yes i`

where *portnumber* is the number of the port to be changed. (For more information, see the ignoredcd command in the Port Server Administrator's Guide).

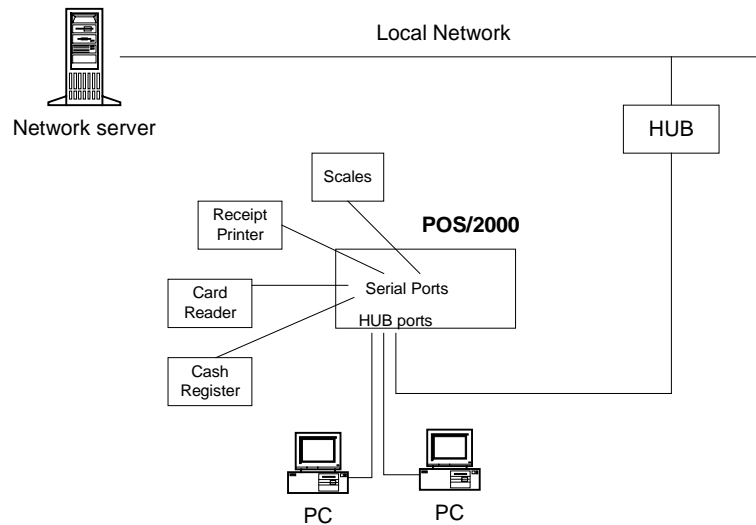
DB-9 Pin Number		DB-25 Pin Number/Signal
1 DCD		8 DCD
2 RX	←	2 TX
3 TX	→	3 RX
4 DTR		6 DSR
5 GND		7 GND
6 DSR		20 DTR
7 RTS		5 CTS
8 CTS		4 RTS
9 POW		* POWER (Application Dependent)

**Figure 2-6: DB-9 to DB-25 3-wire Terminal Cable**

## Ethernet LAN

The POS/2000 is connected to your LAN using a HUB port. There are four HUB ports on the front panel, labeled A, B, C, and H. Port H is hardwired as an ethernet peripheral RJ-45 port so that it can conveniently be connected to a HUB using a standard straight through patch cable. The H port is typically used to connect the POS/2000 to the local ethernet network.

The A, B, and C ports are standard HUB ports. Any 10BaseT ethernet device can be connected to these ports using a standard straight through patch cable. The A, B, and C ports are typically used to connect other devices to the ethernet network. Port H can also be used as a standard HUB port, equivalent to HUBs A, B, or C, if you use a cross-over patch cable.



**Figure 2-7: Network Configuration**

To ensure correct operation, the ethernet cable must be wired to CAT5 Ethernet specifications. Even if the pinouts are correct, the cable can fail if it does not meet CAT5 specifications with respect to which pairs are twisted together. CAT5 specifies that the following pairs are to be twisted together:

- 1 twisted with 2
- 3 twisted with 6
- 4 twisted with 5
- 7 twisted with 8

## **Adapting Your POS/2000 to an RCS/4000 Network**

If you are using your POS/2000 to replace a Systech RCS/4000 port server or including it in a network that already contains RCS/4000s, you may want to use an adapter on your POS/2000 serial port that maps the POS/2000 DB-9 connector to an RJ-45 connector emulating the RCS/4000 RJ-45 serial ports. The adapter would allow you to use your existing cables to connect to the POS/2000. Figure 2-7 diagrams the pinouts for the adapter.

DB-9 Pin Number		RJ-45 Pin Number/Signal
1 DCD	←	1 DCD
2 RX	←	5 RX
3 TX	→	4 TX
4 DTR	→	8 DTR
5 GND	→	3 GND
6 DSR	←	
7 RTS	→	2 RTS
8 CTS	←	7 CTS
9 RI		N. C.

**Figure 2-8 DB-9 to RJ-45 Adapter**

The RCS/4000 RJ-45 connector does not have a DSR input pin. On an RCS/4000, DSR is always on. To emulate the DSR pin behavior on the POS/2000, connect DTR, which is typically always on when the port is open, to the DSR input. Alternatively, if the serial device provides CTS hardware flow control and you are enabling DTR/DSR hardware flow control, you can connect DSR (DB-9 pin 6) to CTS (DB-9 pin 8).

## Starting the POS/2000

The power switch is located on the rear panel, above the power connector. When the POS/2000 is powered up, it will run a self-test. The LEDs will flash to indicate normal operation. The following LED colors and patterns will be displayed during normal startup, if no errors are detected.

- **Status LED** – yellow LED blinking rapidly during self-test. When the POS/2000 has finished the self-test and is running in normal operating mode, the LED will turn green, blinking approximately 1 times per sec.
- **HUB LEDs** – during the self-test, the LED for each HUB will cycle through:
  1. off
  2. green
  3. red
  4. yellow

When the self-test completes, the HUB port LEDs will be either solid yellow or green. Yellow means the HUB is not connected; green means the HUB is connected to an active ethernet network. The green LED will blink to show network activity.

- **Serial port LEDs** – during the self-test, the LED for each serial port will cycle through:
  1. off
  2. green
  3. red
  4. yellow

When the self-test completes, the serial port LEDs will be either yellow or green. Solid yellow indicates a port that is not in use. Green indicates a port that is in use. The green LED will blink when data is transmitted or received. It will blink 2.5 times per second when data is continuously transmitted or received. If the power is turned on to the port, the LED will flicker yellow every 3 seconds. The pattern is off-yellow-off-yellow-off-yellow-off with 40 ms delay between colors.

- **MODEM port LED** – The LED for the optional internal modem operates in exactly the same manner as the serial port LEDs, except that the yellow pattern indicating power to the port is not applicable to the MODEM port.

If any of the LEDs turn red, an error condition was detected. Also, a blinking red/yellow or blinking green/yellow indicator on the status LED signals an error. For a description of the error codes, see LED Displays, page 29.



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# Chapter 3: Physical Layer Interface Settings

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The POS/2000 can be used in RS-232, RS-422, RS-485, or current loop mode. RS-232 is the default. This chapter describes RS-422/485 mode and current loop.

## RS-422/485

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The POS/2000 can be used for communication with RS-232, RS-422, or RS-485 devices. By default, all the POS/2000 ports are configured to communicate using an RS-232 electrical interface, as described in the preceding chapters. This section describes connecting RS-422 and RS-485 devices and configuring the POS/2000 to communicate in RS-422 or RS-485 mode.

### Connecting RS-422/485 Devices

RS-422 and RS-485 mode are very similar, except that in RS-422 mode, the transmitter remains enabled at all times; while in RS-485 mode, the transmitter is disabled automatically when no data is being transmitted. Consequently, to transmit and receive, RS-422 devices must be connected using four-wire communication. RS-485 devices may be connected on either two-wire or four-wire systems.

You can connect two RS-422/485 devices in a point-to-point connection or more than two RS-422/485 devices in a bus configuration.

**The only legal RS-422/485 cabling topology is a bus topology (including point-to-point connections)!** All other topologies are expressly forbidden by the RS-422/485 specification. This includes the following illegal configurations:

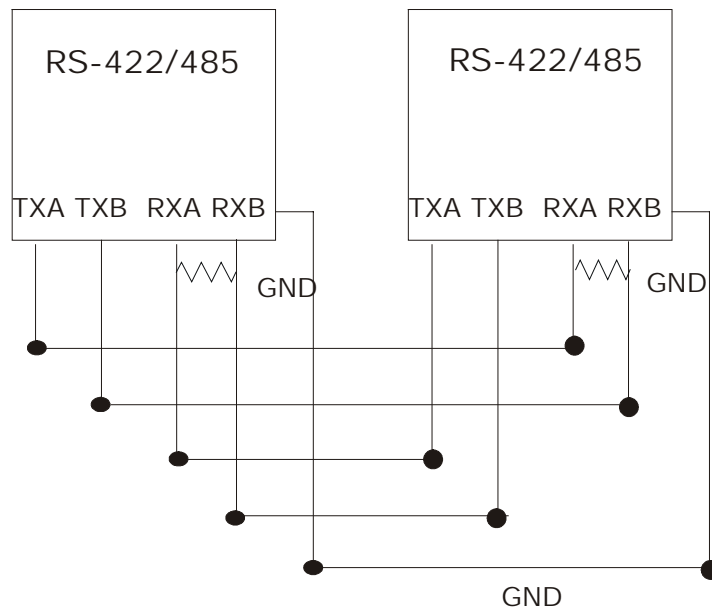
- Connecting cables in any type of star topology (regardless of whether or not devices are attached to the ends of the cables). This includes using star-based patch panels or any other method that splits the physical cable off into multiple segments.
- Connecting RS-422/485 devices to the bus using cable stubs of any length.

Due to the resilience of the RS-422/485 signaling specification, some of these illegal topologies may work in certain configurations. However, changing factors such as cable length, baud rate, number of devices, bus loading, etc. may cause such configurations to stop

communicating or to communicate sporadically. **The only topology guaranteed to work in all cable configurations is a properly terminated bus topology.**

### ***RS-422/485 Point-to-point Configuration***

Point-to-point connections can be established between two RS-422 devices, an RS-422 and an RS-485 device, or two RS-485 devices. Figure 3-1 shows a four-wire, point-to-point connection between two devices.



**Figure 3-1. RS-422/485 point-to-point connection**

Notice the termination on each end of the connection. The receiving end of the wire should be terminated with a resistance equal to the wire's characteristic impedance, generally 100 ohms.

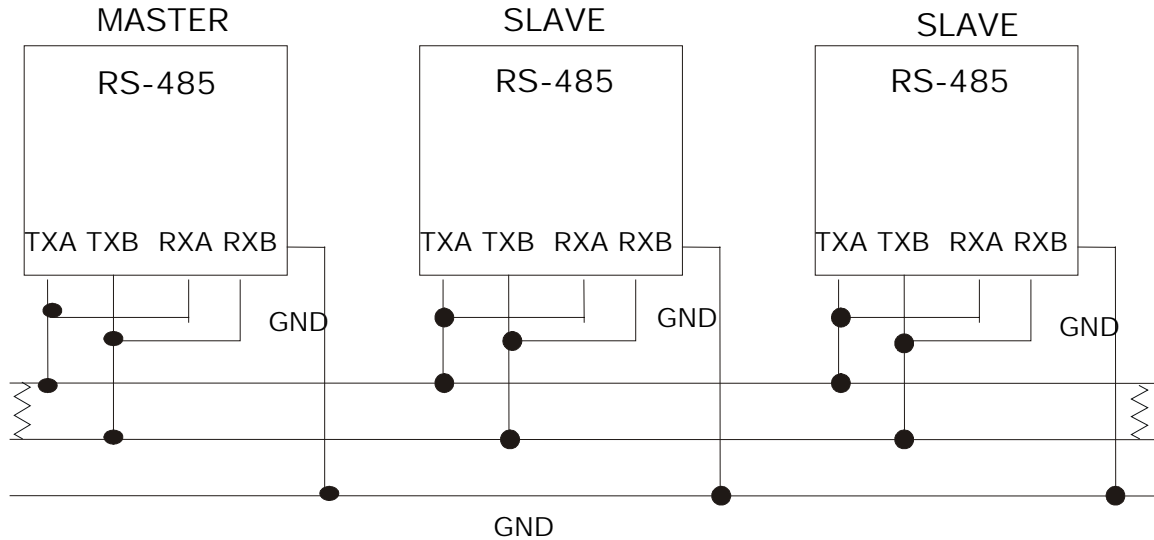
### ***RS-422/485 Bus Configurations***

More than two RS-422 and RS-485 devices can be connected in a bus configuration. You can connect one RS-422 and several RS-485 devices on a bus or you can connect several RS-485 devices on a bus, but you cannot connect more than one RS-422 device on a single bus. If your configuration includes an RS-422 device, you must use a four-wire connection. Configurations including only RS-485 devices can use either two-wire or a four-wire communication.

When RS-422 and/or RS-485 devices are connected to a bus, they operate as one master and one or more slaves. In all configurations that include an RS-422 device, the RS-422 device is the master and the RS-485 devices are slaves.

### Two-Wire System

In two-wire communication, all devices share the same pair of wires to both transmit and receive. All the devices connected to a two-wire system must be RS-485 devices. Figure 3-2 shows a typical two-wire system.



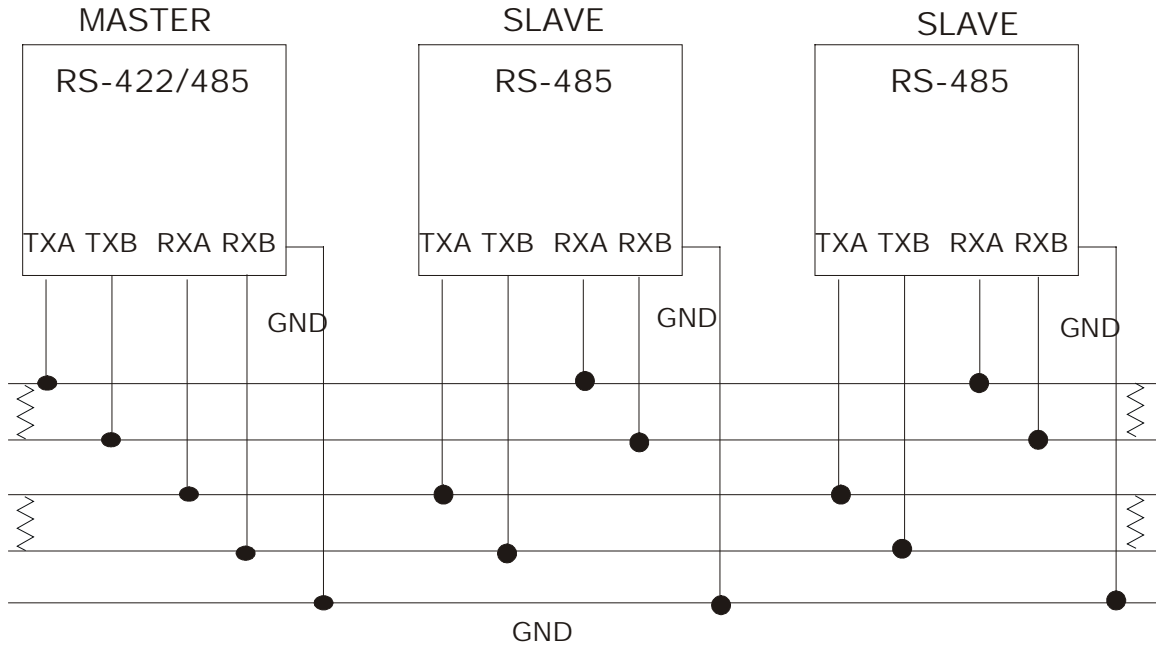
**Figure 3-2. Two-wire RS-485 System**

In the two-wire system diagrammed in Figure 3-2, one pair of transmit and receive lines (TXA and RXA) are connected to a single wire and the other pair of transmit and receive lines (TXB and RXB) are connected to the second wire. The device that is designated as the master manages the traffic on the lines.

As shown in the above diagram, the pair of transmit/receive lines needs to be terminated with 120 ohms at each end of the bus.

### Four-Wire Systems

In four-wire communication, there are two pairs of transmit and receive lines, allowing full duplex communication. In most four-wire systems, an RS-422 device will serve as the master with several RS-485 devices as slaves. However, an RS-422 device is not required; an RS-485 device can serve as the master. Figure 3-3 shows a typical four-wire system.



**Figure 3-3. Four-wire RS-422/485 System**

In most configurations, the device that is designated as the master will be an RS-422 device to constantly drive the transmit lines.

Both pairs of lines of the multi-drop wire must be terminated at each end of the bus with a resistance equal to the wire's characteristic impedance, generally 120 ohms. If the RX data pins are not terminated at all and have nothing attached, they may be susceptible to cross talk. Data on other lines on this port or other nearby ports may get coupled back onto the unterminated receive lines. If you need to leave the RX lines unattached, you may need to attach a simple 100 or 120 ohm termination resistor between the lines to avoid this.

### Using the POS/2000 in RS-422 or RS-485 Mode

Any serial port on the POS/2000 can be configured for either RS-422 or RS-485 communication. Thus, the POS/2000 can function as any of the devices in any of the configurations described above. The POS can be connected to either an RS-422 or an RS-485 device in a point-to-point connection. Or a POS can be connected to a two-wire or four-wire bus, as either a master or a slave, and can communicate in either RS-422 or RS-485 mode. Typically, a single POS/2000 is connected to the bus and functions as the master, but this is determined by the application.

### Connecting the POS/2000

Connect the POS/2000 to the network using any serial port. The DB-9 pinouts for the POS/2000 in RS-422 and RS-485 modes are:

Pin #	Name	Direction
1	Not used	
2	RXB	Input
3	TXB	Output
4	Not used	
5	GND	
6	Not used	
7	TXA	Output
8	RXA	Input
9	Not used	

The pins designated as **not used** should have nothing connected to them.

Be sure the wires are terminated as indicated in the wiring diagrams in the previous section. In addition, as a fail safe to prevent floating wires, the POS/2000 provides internal 2k bias resistors that pull the lines to a known state when they are not being driven. The bias resistors cannot be removed or altered.

### ***Configuring a POS/2000 serial port for RS-422/485***

To change the serial port electrical interface using the command line interface of the RCS port server, use the **set interface** command. The format is:

```
set interface { port number(s) } { rs232 | rs422 | rs485 } [ i ]
```

The **set interface** command sets the port to the specified physical layer interface.

For example, to set the interface for port 3 to RS-485, type:

```
set interface 3 rs485
```

This command will not change the setting immediately. If you want the RS-485 setting to go into effect immediately, use the **i** option.

```
set interface 3 rs485 i
```

For the RS-485 setting to go into effect whenever the port server is rebooted, you must save the configuration setting after you have changed it: For instance, the following two commands will cause the RS-485 setting to go into effect on port 3 when the port server is next rebooted and to continue to be in effect each time the port server is rebooted until the setting is changed.

```
set interface 3 rs485
save
```

In this second example, the following two commands will cause the RS-485 setting to go into effect immediately and to continue to be in effect each time the port server is rebooted until the setting is changed.

```
set interface 3 rs485 i
save
```

To display the current interface configuration setting for port 3, type:

```
show interface 3
```

If no port is specified in the show interface command, the interface configuration for all ports will be displayed.

You can also change the electrical interface using the port configuration section of the browser interface.

## Current Loop

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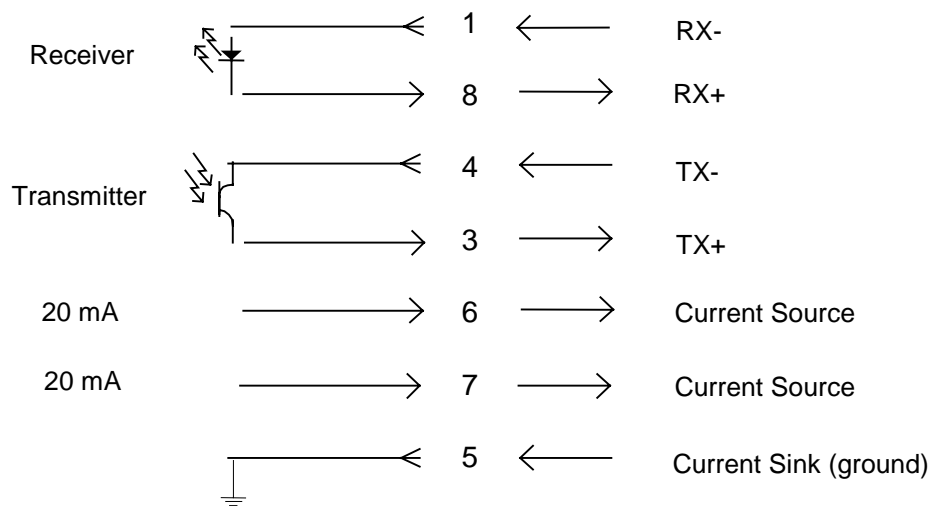
The DB-9 pinouts for current loop mode are:

Pin #	Name	Direction
1	RX-	20mA to 60mA current input
2	not used	
3	TX+	20mA to 60mA current output
4	TX-	20mA to 60mA current input
5	GND	
6	20mA current source	20mA current output
7	20mA current source	20mA current output
8	RX+	20mA to 60mA current output
9	PWR	Output

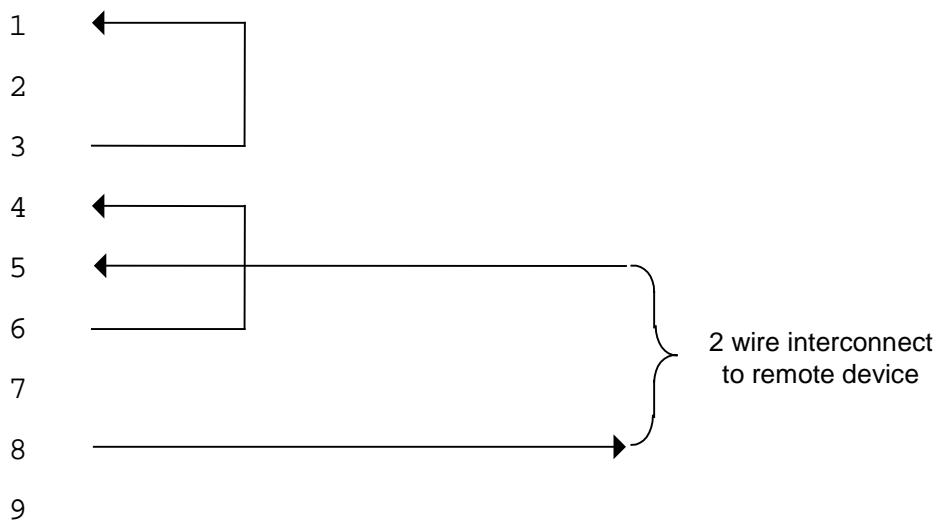
When using the current loop interface, there are two modes that can be configured:

1. **active/passive mode:** In active mode, the POS/2000 supplies the current, supporting a 20 mA current loop. In passive mode, the POS/2000 will accept current supplied by an external current source, from 20 mA to 60 mA.
2. **single loop/double loop mode:** In the 2-wire, single loop mode, all the transmitters and receivers in the system are wired in series. The devices must communicate in a half-duplex fashion—when one end is sending, the other end must listen, and vice versa. The 4-wire, dual loop configuration allows full-duplex communication.

You determine which combination of modes is in effect by wiring the 9-pin connector in the appropriate way, as follows:



For example, the following diagram shows the POS/2000 wiring for single loop, active mode.





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# Chapter 4: Troubleshooting

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The POS/2000 has several LED status indicators:

- **POS/2000:** There is a status LED, located in the upper right corner of the front panel, that indicates the overall status of the unit.
- **Serial ports:** There is an LED located above each of the eight serial port connectors.
- **HUBs:** There is an LED located next to each of the four HUB ports
- **MODEM:** There is an LED located next to the optional internal MODEM connector.

The LEDs use red, yellow, and green lights and blinking combinations to indicate the status of the components of the POS/2000.

## LED Displays

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The LED display may differ depending on the state of the POS/2000. When the POS is started, it runs a self-test. If no problems are encountered, it enters the operational state. The LEDs may show different patterns in the self-test state than in the operational state. In addition, the POS/2000 can be in the firmware monitor. For instance, if the POS/2000 encounters a fatal error during the self-test, it will enter the firmware monitor. Or you can invoke the firmware monitor by pressing the reset button. The LED display may be different in the firmware monitor.

Table 4-1 shows the normal and error LED colors and patterns displayed in the self-test, operational state, and firmware monitor. Table 4-2 shows the meaning of the LED error displays.

**Table 4-1: LED display**

POS/2000 Operation	Error Status	LEDs		
		Status	HUB	Serial Port/modem
self-test	ok	Yellow, blinks rapidly	Cycles through: 1.off 2.green 3.orange 4.yellow	Cycles through: 1.off 2.green 3.orange 4.yellow
	<i>error</i>	<i>orange, blinking pattern</i>	<i>orange, solid</i>	<i>orange, solid</i>
normal operation	ok	solid green, while starting up; green blinking when ready for use	Either: 1.yellow, solid— unconnected 2.green— connected to active ethernet network; blinks to show network activity	Either: 1.yellow, solid—closed port 2.green—open port; blinks when data is transmitted or received; blinks 2.5 times per sec when data is continuously transmitted or received. 3.yellow—blinks pattern every 3 secs if power is turned on (except modem); overrides current color temporarily; pattern is off-yellow-off- yellow-off-yellow-off with 40 ms delay between color changes
	<i>error</i>	<i>orange, blinks approx. 1 times per sec green/yellow blinking  orange/ yellow, blinking</i>	<i>orange, solid</i>	<i>orange, solid; blinks when data is transmitted or received</i>

POS/2000 Operation	Error Status	LEDs		
		Status	HUB	Serial Port/modem
firmware monitor	ok	yellow, blinks 2.5 times per sec	Either: 1.off/dark— unconnected 2.green— connected to active ethernet network; blinks to show network activity.	yellow, solid
	<i>error</i>	<i>orange, blinking pattern</i>	<i>orange, solid</i>	<i>orange, solid</i>

**Table 4-2: LED Indicators for Error Conditions**

LED	Color/pattern	During	Error
Status	red, blinking	self-test	Fatal error detected. LED blinks a HEX code that designates the error category. See Table 11-3 below.
	green/yellow, blinking	operation	An error was detected when reading the current configuration database; the default configuration database was loaded instead
	red, blinking	operation	One or more: 1.Over temperature indication 2.+24 volt failure 3.Internal AUI HUB port failure When the condition has been cleared, the LED will return to green.
	red/yellow, blinking	operation	<ul style="list-style-type: none"> <li>Both the condition indicated by blinking orange and the condition indicated by blinking green/yellow (described above) exist.</li> </ul>
HUB	red, solid	self-test	error detected on the HUB port
	red, solid	operation	One or more:

			1.Bit rate error detected 2.reversed receive polarity
serial port/ modem	red, solid	self-test	error detected on the serial port/modem
	red, solid; blinks when data is transmitted or received	operation	One or more: 1.overrun, parity, or framing error. Clear by closing the port or issuing the command: <b>port_stat -c</b> 2.power fault (NA for modem): Clear by unconfiguring power using the <b>set power</b> command or by turning off the power using the <b>power</b> command.

## Error Codes

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The status LED blinks HEX error codes for fatal errors encountered during the self-test. Errors are considered to be fatal if they prevent the POS/2000 operating system from starting. A RAM failure, for example, is a fatal error because it would prevent the operating system from being loaded into RAM. When a fatal error is detected, the LED blinks a sequence to indicate the category of the error. The LED continues to blink this error category until the watchdog timer causes the board to reset (at least 1 ½ minutes). Following the reset, self-test will run again and, unless the error is a transient error, will continue to fail and the LED will continue to blink the error code.

The LED does not blink codes for nonfatal errors. Errors which do not prevent the operating system from running, but may degrade the POS/2000 capabilities, are non-fatal errors. Non-fatal errors are not blinked, but are recorded in flash memory for troubleshooting by customer service representatives.

The LED blink pattern indicates the category of fatal error that occurred. The LED blinks the HEX code for the error category. For instance, if the error is a memory test error, the LED will blink 92, the HEX code for a memory test error. The LED will blink 9 times, pause, then blink 2 times. After a longer pause, it will repeat the pattern. It will continue to repeat the pattern until the watchdog timer resets the board as described above. Table 4-3 provides the error categories associated with the blinking HEX codes.

**Table 4-3: HEX codes for error messages**

<b>HEX code</b>	<b>Error Category</b>
91	configuration error
92	memory test error
93	quadart test error
95	bus error detection not working
97	unexpected interrupt or exception
98	panic
99	network test error
9A	power control error
9B	LED test error
9C	A/D Converter Limit Error
9D	Hub test error



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# Appendix: Specifications

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## POS/2000 Hardware Specifications

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- Motorola MC68EN360 QUICC 25 MHz or 33 MHz microprocessor with internal RISC processor.
- 1M byte in-circuit boot flash and program memory.
- 1M or 2M byte in-circuit optional expansion flash memory.
- 4 - 64M byte nonparity DRAM.
- 10 Mbps Ethernet connection over 10BASET physical lines.
- 4 10BASET Ethernet HUB ports
- Eight asynchronous serial ports with modem control and surge suppression. Asynchronous port data rates of 50 bps to 115.2 Kbps over EIA-232 electrical interface. Uses DB-9 physical interface. Supports RS-232, RS-422, and RS-485 on 8 ports. Supports current loop on 2 ports.
- Programmable +5 or +12 volt with over current protection (1 amp) peripheral power on each serial port (DB-9 pin 9).
- Internal 110 or 240 VAC power supply.
- Initialization self-test.
- Hardware exerciser.
- Optional internal 2400 bps modem with RJ-11 connector.
- Status LEDs for each port.

## Environmental Specifications

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- Operating temperature range: 0 to 50°C
- Storage temperature range: -10 to 70°C
- Humidity range: 10% to 90% noncondensing

## Product Dimensions

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The POS/2000 model measures:

10 inches x 4.75 inches x 4.5 inches (254 mm x 121 mm x 114 mm)

## Model Numbers

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POS/2488 8-port

POS/2489 8 port with optional internal modem

## Ethernet cabling specifications

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This section describes guidelines for using 10BASET twisted-pair cabling:

- Recommended cable is 22 to 26 AWG category 3 or category 5 unshielded solid copper twisted pair (standard telephone wire), at least Level 2 (two twists per foot).
- Maximum distance of a segment—from concentrator to node—is 100 meters (328 feet).
- Maximum of two devices to a cable segment.
- Ethernet network interface cards (NICs) are available with built-in 10BASET transceivers and a 15-pin AUI port.
- Devices with standard AUI ports may be attached by using a twisted-pair transceiver (MAU).

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