RCS/4000

Hardware

Manual

Document number 80-001044-7

Revision B

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Document part number 80-001044-7

Revision History

Date	Revision	Description
7/20/00	A	Initial production release
5/3/01	B	Correct misc. errors

Agency Notifications

FCC Class A

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.

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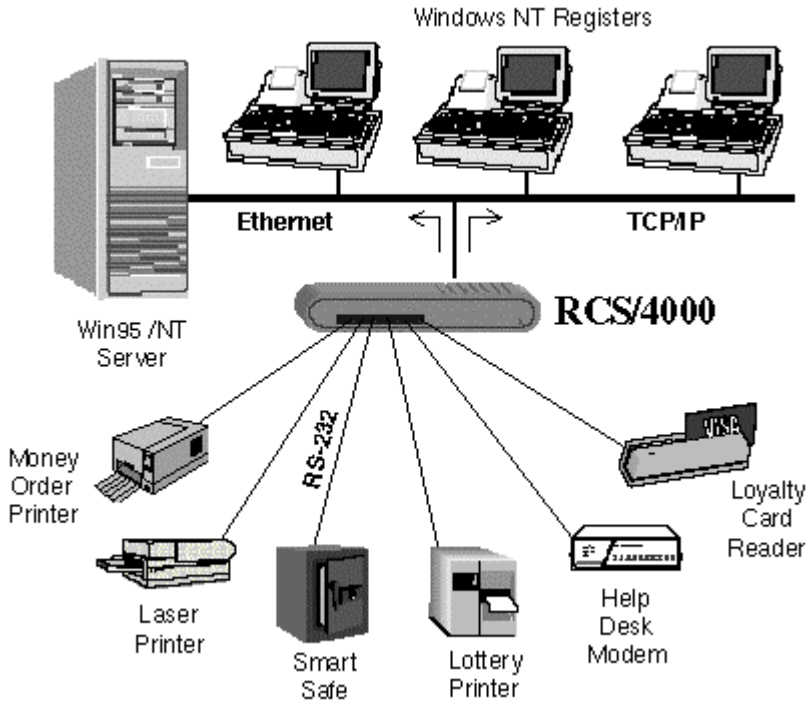
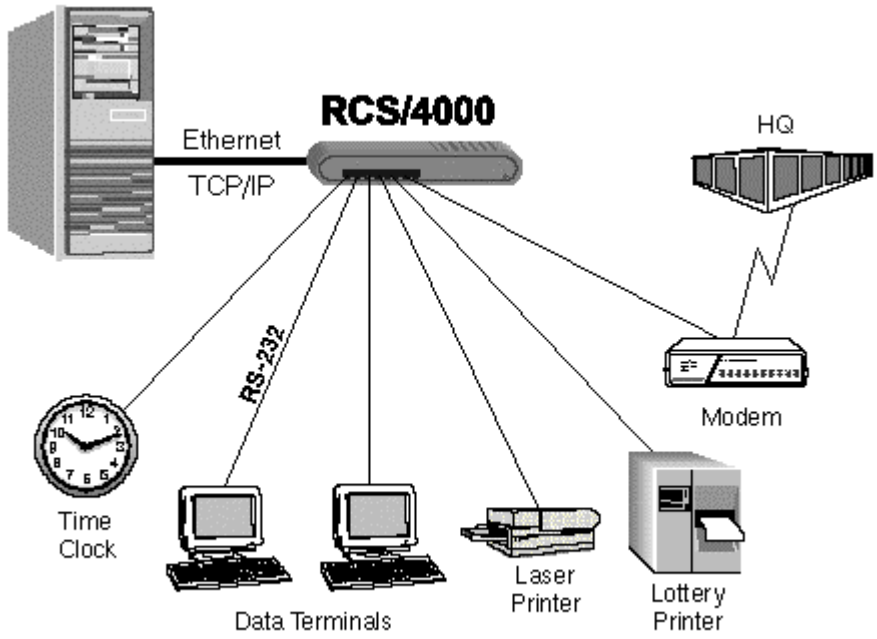
Chapter 1: Overview

The RCS/4000 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 RCS/4000 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.





RCS/4000 Features

The RCS / 4000 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
- High-speed RS-232 connections
- Dial-up LAN / Internet access
- IP packet routing
- Operating system independent
- Modem and printer pooling
- Complete remote diagnostics
- Industry standard interoperability
- Raw reverse telnet option so you can access ports without using special protocol or processing
- UNIX lpd printing option that is efficient and easy to use
- 8 or 16 serial ports
- 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

- Dial-out connections so that dialing to a modem no longer requires a special cable or configuring the modem
- Serial interface option so that on some models, ports 4 through 7 can be manually configured for RS-485 operation
- ppp header compression
- Reverse telnet support for several additional operating systems

Using the RCS/4000

Using the RCS/4000 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 RCS/4000: 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).
- **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).
- **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).

Chapter 2: Installing the Hardware

This chapter describes installing the RCS/4000 hardware, including:

- Planning the installation
- Checking cables and connectors
- Sample configurations

Overview

Installing the RCS/4000 hardware includes the following steps:

1. Plan the installation.
2. Connect the RCS/4000 port server to your network.

   Connect the RCS/4000 server to your Ethernet LAN, using either 10Base2 (only some RCS/4000 models have 10Base2 connectors. See Model Numbers, page 38) or 10BaseT connections. The 10Base2 BNC connector and the 10BaseT RJ45 connector are on the back side of the RCS/4000. Use one or the other.
3. Connect your peripheral devices to the RCS/4000 port server.

   Most common connection method: Connect each peripheral device (e.g., cash register, card reader, modem) to a serial port (one of the RJ-45 connectors on the front panel).
4. Plug the unit into a source of AC power and turn the power switch on.

Planning the installation

Before installing the RCS/4000 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 RCS/4000 server.
- What type of Ethernet connection will you use (coaxial thinnet or twisted pair)? Determine the distance specifications for each type of cable and verify that the locations selected for devices do not exceed cable specifications.
- Is there an acceptable source of AC power available near each device's proposed location?

RCS/4000 Front and Back Panel Connectors

Figure 2-1 shows the RCS/4000 front panel. Sixteen RJ-45 EIA-232 ports are numbered left to right, 0 through 15. On eight port models, ports are numbered 0 through 7. In normal operation, the LED is lit green. During the power-on self-test, the LED will flash on and off yellow. Use the front panel RJ-45 ports only for asynch devices (your LAN connects to the rear panel). The connector pinout is given later in this chapter.

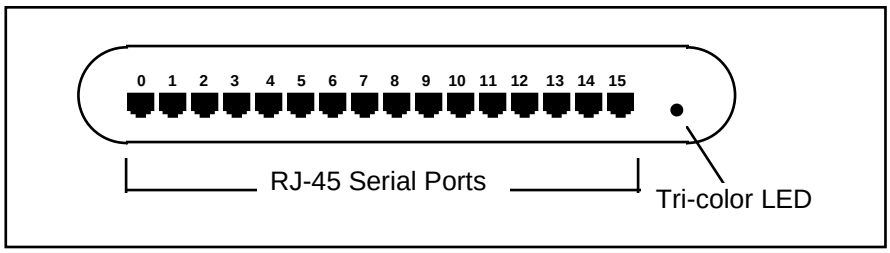


Figure 2-1. RCS/4000 front panel

Figure 2-2 shows the RCS/4000 back panel. The back panel connectors include (from left to right):

- BNC connector for 10Base2 Ethernet LAN connection
- Hardware reset button
- RJ-45 connector for 10BaseT (twisted-pair) Ethernet LAN connection
- 25-pin male "D" connector for synchronous WAN connection
- 25-pin female "D" connector for parallel printer connection
- 5-pin "DIN" connector for power

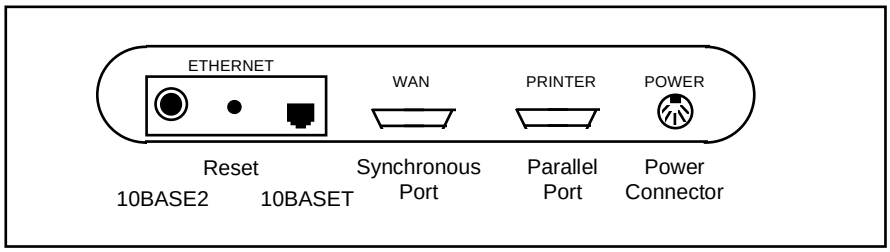


Figure 2-2. RCS/4000 back panel

NOTE: Only some RCS/4000 models have a WAN port and/or a 10Base2 connector. See Model Numbers, page 38.

Connecting EIA-232 Devices to the RCS/4000

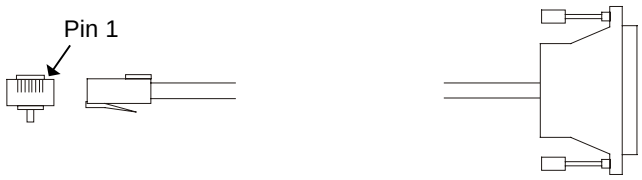
The RCS/4000 server uses a symmetrical EIA-232 data terminal equipment (DTE) pinout on the RJ-45 serial ports. Table 2-1 lists the pinouts of the RJ-45 ports used for EIA-232 serial communications.

RJ-45 Pin Number	RS-232 Name	Direction	Signal Function
1	DCD	I	Signals module that remote device is attached and powered on
2	RTS	O	Flow control, to enable remote device to send data
3	SG		Signal return (NOT chassis ground)
4	TXD	O	Serial data out, from RCS/4000 to remote device
5	RXD	I	Serial data in, from remote device to RCS/4000
6	SG		Signal return (NOT chassis ground)
7	CTS	I	Flow control, to enable RCS/4000 to send data on TXD
8	DTR	O	Signals remote device that RCS/4000 is attached and powered on

Table 2-1 EIA-232 RJ-45 Pinouts

To connect your EIA-232 device to the serial port of an RCS/4000, you need to determine whether the device connector wiring follows the standard for data terminal equipment (DTE) or for data communication equipment (DCE). In general, modems are wired as DCE devices and all other devices are wired as DTE; however, some equipment manufacturers may deviate from the standard. The manual for your device will contain information on the pinouts for the device. Figures 2-3 through 2-6 show cable diagrams for the most common configurations. Figure 2-7 shows a minimal cable using 3 wires.

The cable shown in Figure 2-3 or 2-4 may be used to connect most ASCII terminals or serial printers to RCS/4000 serial ports. The cable shown in Figure 2-5 or 2-6 may be used to connect modems to the RCS/4000. 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 RCS/4000 terminates users' sessions when they disconnect. Figure 2-7 shows a 3-wire cable.

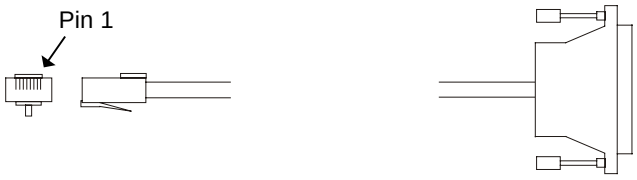


RJ-45 Plug Pin Number		DB-25 Plug Pin Number / Signal
1 DCD	←	20 DTR
2 RTS	→	5 CTS
3 SG	—	7 SG
6 SG		
4 TXD	→	3 RXD
5 RXD	←	2 TXD
7 CTS	←	4 RTS
8 DTR	→	8 DCD
	→	6 DSR

Figure 2-3 RJ-45 to DB-25 Terminal Cable

RJ-45 Plug Pin Number		DB-9 Plug Pin Number / Signal
1 DCD	←	4 DTR
2 RTS	→	8 CTS
3 SG	—	5 SG
6 SG		
4 TXD	→	2 RXD
5 RXD	←	3 TXD
7 CTS	←	7 RTS
8 DTR	→	1 DCD
	→	6 DSR

Figure 2-4 RJ-45 to DB-9 Terminal Cable



RJ-45 Plug Pin Number		DB-25 Plug Pin Number / Signal
1 DCD	←	8 DCD
2 RTS	→	4 RTS
3 SG	—	7 SG
6 SG		
4 TXD	→	2 TXD
5 RXD	←	3 RXD
7 CTS	←	5 RTS
8 DTR	→	20 DTR

Figure 2-5 RJ-45 to DB-25 Modem Cable

RJ-45 Plug Pin Number		DB-9 Plug Pin Number / Signal
1 DCD	←	1 DCD
2 RTS	→	7 RTS
3 SG	—	5 SG
6 SG		
4 TXD	→	3 TXD
5 RXD	←	2 RXD
7 CTS	←	8 RTS
8 DTR	→	4 DTR

Figure 2-6 RJ-45 to DB-9 Modem Cable

The RCS/4000 does not require the use of all 8 wires. Only pins 3, 4, and 5 are essential. RTS/CTS and DTR (pins 2, 7, and 8) are only necessary for flow control. Only one ground, (e.g., pin 3) is necessary. Although the RCS/4000 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 2-7, using only RX (pin 5, data in), TX (pin 4, data out), and SG (pin 3, 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 RCS/4000 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).

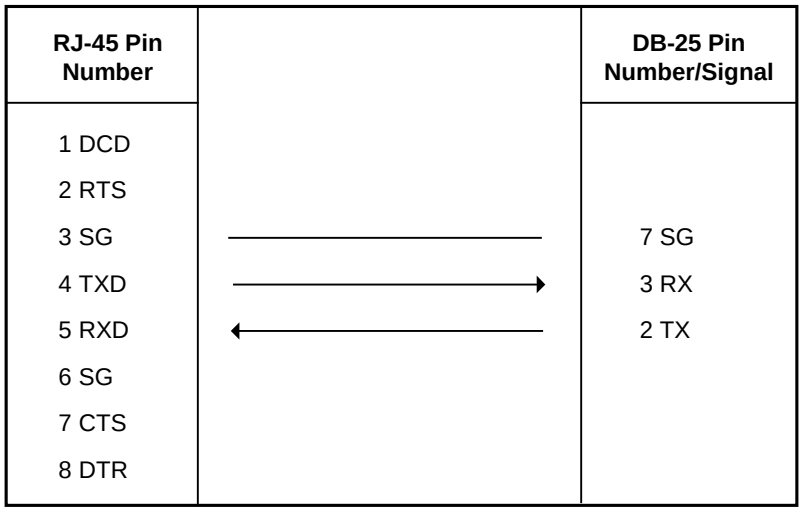


Figure 2-7 RJ-45 to DB-25 3-Wire Terminal Cable

RJ-45 to DB-25 or DB-9 adapters may be used with RJ-45 cables to create the cable configurations shown in Figures 2-3 through 2-6. In most cases, you use "straight through" RJ-45 cables. If you use "crossover" RJ-45 cables, the RJ-45 pins will be reversed. Figures 2-8 and 2-9 illustrate the difference between the two types, when constructed with flat 8-conductor wire.

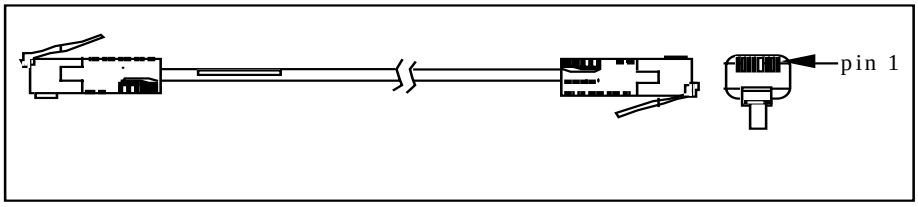


Figure 2-8 RJ-45 to RJ-45 Straight-through Cable

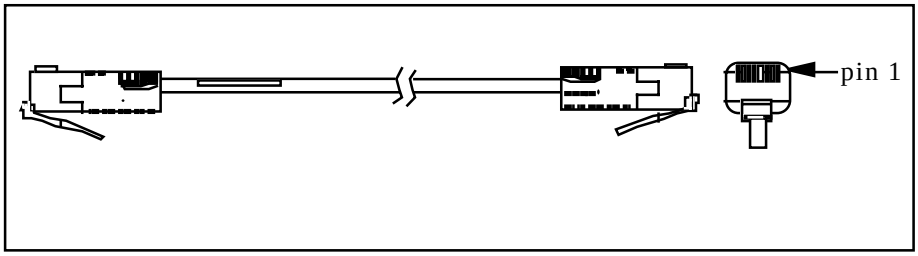


Figure 2-9 RJ-45 to RJ-45 Crossover Cable

Connecting Parallel Printers to the RCS/4000

The RCS/4000 parallel port is compatible with common PC parallel printer ports. The same printer cables used with PCs will work with the RCS/4000. The RCS/4000 uses a male 25-pin D type connector; your printer may use a similar connector, or it may use a Centronics type connector. Make sure your cable matches the connector types at each end. Table 2-3 gives the parallel port pinouts.

Pin Number	Signal Name	I/O
1	STROBE	O
2	D(0)	O
3	D(1)	O
4	D(2)	O
5	D(3)	O
6	D(4)	O
7	D(5)	O
8	D(6)	O
9	D(7)	O
10	ACK*	I
11	BUSY*	I
12	ERROR	I
13	SELECT*	I
14	AUTOFD*	O
15	FAULT	I
16	INIT*	O
17	SELECTIN*	O
18	GND	
19	GND	
20	GND	
21	GND	
22	GND	
23	GND	
24	GND	
25	GND	

Table 2-3. Parallel Port Pinouts

Synchronous Serial Devices

(**NOTE**: only some RCS/4000 models have a synchronous WAN port. See Model Numbers, page 38)

Your installation can include an RCS/4000 server that acts as a Local Area Network-to-Wide Area Network (LAN-to-WAN) router. For example, a remote office location might use an RCS/4000 server to access applications at regional or corporate headquarters. The RCS/4000 server routes traffic destined for the home office off the local LAN and over its own WAN port, which would typically be connected to a wide-area network service provider via ISDN, T1/E1, 56 Kbps leased line, Switched 56 service, etc.

The WAN port on the back of the RCS/4000 can be configured to meet any of these standards:

- EIA-232
- EIA-422
- EIA-530
- V.35

The RCS/4000 comes factory-configured for EIA-232 on the WAN port. Use the **set wan interface** command to change the WAN port interface setting. To connect synchronous modems ISDN modems, FRADs, or CSU/DSUs to the RCS/4000, use straight-through cables. Make sure that your cable includes conductors to carry all the signals required for the interface setting you have chosen. For V.35, you must use an RCS/4000 V.35 adapter cable available from your supplier. Table 2-4 gives the WAN port pinout for EIA-530 mode. Note that EIA-530 uses a differential pair of wires for each signal and these are denoted "A" and "B" in this table.

25-Pin			
A	**B**	**Description**	**I/O**
1		Shield	
7		Signal Ground	
2	14	Transmitted Data	O
3	16	Receive Data	I
4	19	Request to Send	O
5	13	Clear to Send	I
6	22	DCE Ready	I
20	23	DTE Ready	O
8	10	Received Line Signal Detector	I
24	11	Transmitter Signal Element Timing (DTE)	O
15	12	Transmitter Signal Element Timing (DCE)	I
17	9	Receiver Signal Element Timing (DCE)	I
18		Local Loopback	O
21		Remote Loopback	O
25		Test Mode	I

Table 2-4. EIA-530 Synchronous (WAN) Port Interface

Ethernet LAN

The RCS/4000 may be used with bus-topology coaxial cable installations (10Base2 or thin-net), or with star-topology twisted-pair installations (10BaseT). (**NOTE**: only some RCS/4000 models have 10Base2 connectors. See Model Numbers, page 38) The RCS/4000 autoconfigures to either cable standard.

Bus configuration (10Base2)

(**NOTE**: only some RCS/4000 models have 10Base2 connectors. See Model Numbers, page 38)

10Base2 installations may be a "bus" configuration, as illustrated in figure 2-10. In 10Base2 installations, a BNC "T" fitting is attached to the BNC connector on the RCS/4000 back panel. The 10Base2 cabling standard does not allow "drop" cables between the "T" connector and the RCS/4000. If the RCS/4000 is the last node on a 10Base2 coaxial bus, place a 50-Ohm termination resistor on the empty leg of the "T" connector.

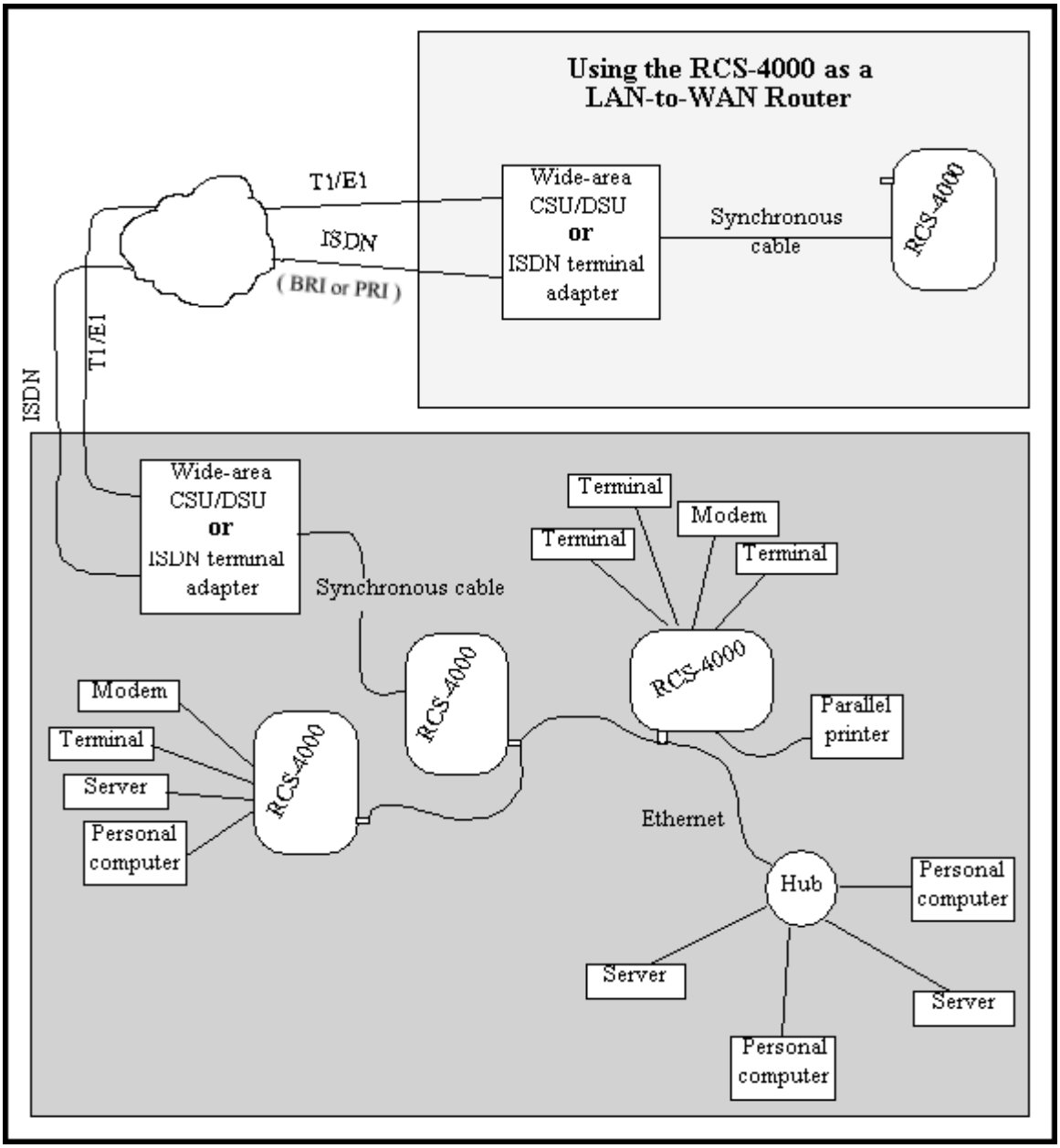


Figure 2-10. Sample 10Base2 Daisy Chain Configuration

Star configuration (10BaseT)

10BaseT installations are “star” topology configurations which make use of a hub or switch, as illustrated in Figure 2-11. Use 10BaseT twisted pair cables terminated with RJ-45 connectors at each end. One end attaches to the RJ-45 connector on the RCS/4000’s back panel (do *not* try to use the serial ports on the front of the RCS/4000). The other end of the cable is attached to a port on a 10BaseT hub or switch.

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

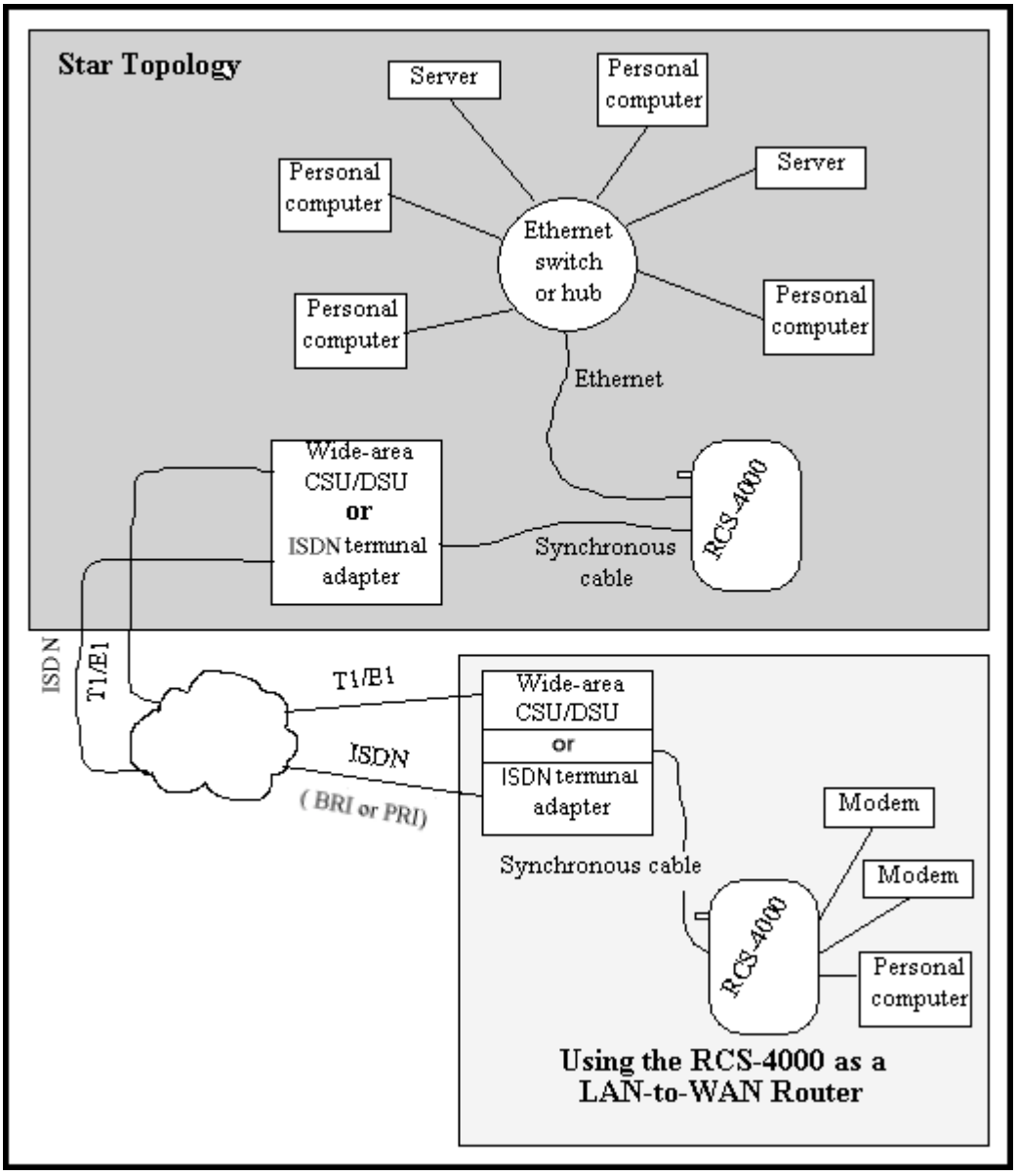


Figure 2-11. Sample 10BaseT Star Configuration

Chapter 3: Physical Layer Interface Settings

Some RCS/4000 models have an option for configuring RS-232, RS-422, or RS-485 operation on ports 4 through 7. On these models, the RCS/4000 is normally shipped with the ports set for RS-485 operation.

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.

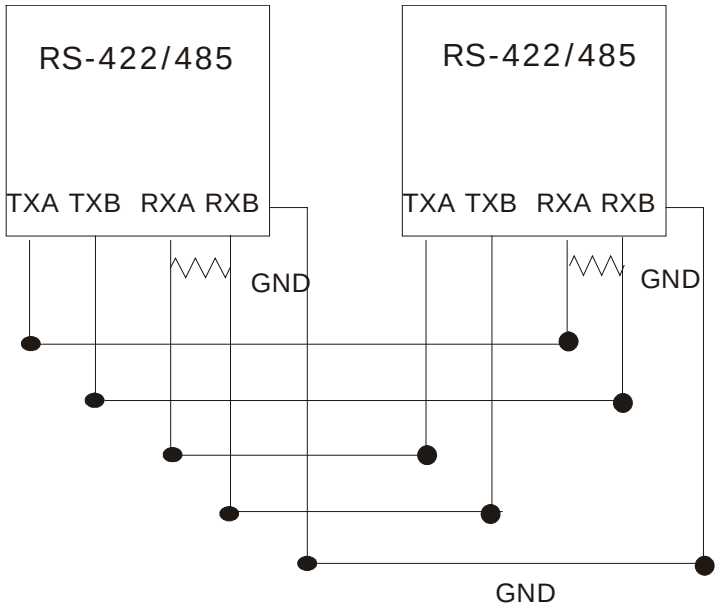


Figure 3-1. RS-422/485 point-to-point connection

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.

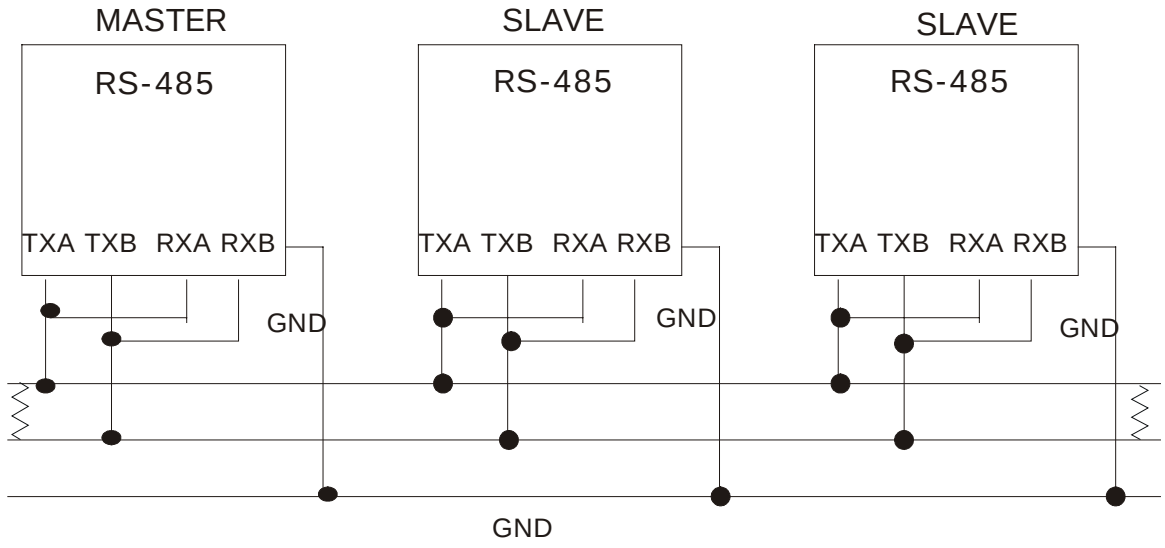


Figure 3-2. Two-wire RS-485 System

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.

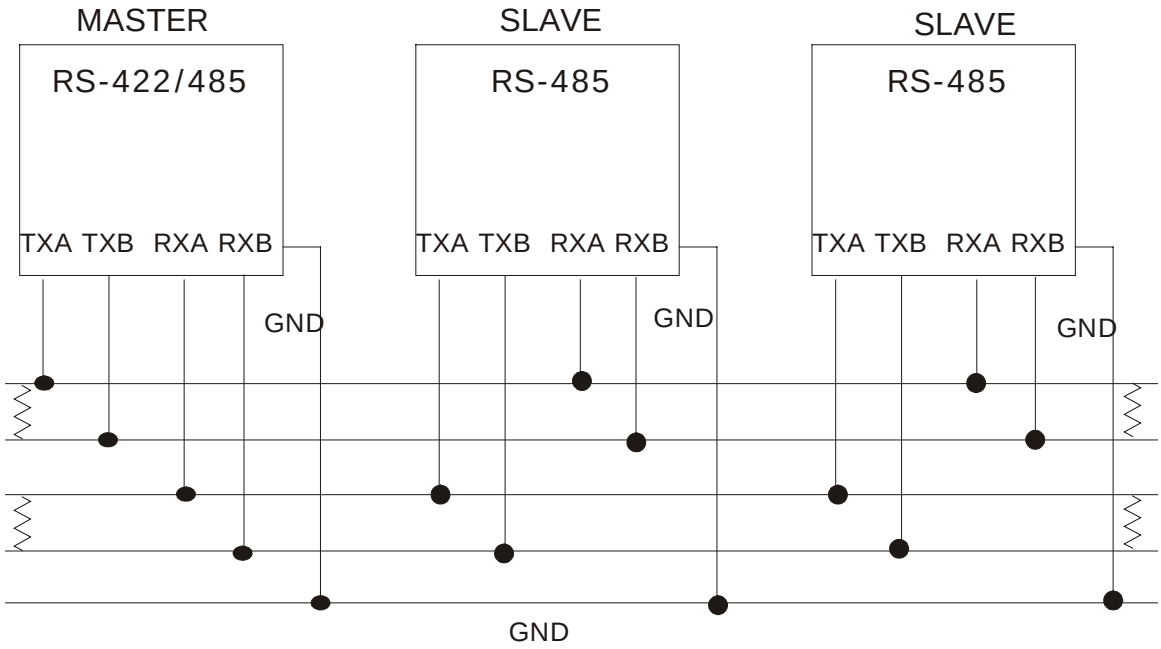


Figure 3-3. Four-wire RS-422/485 System

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.

Resetting the RS-485 jumpers

On the RCS/4000 models with the option for configuring the electrical interface, you can reconfigure ports 4 through 7 by removing the top cover of the RCS/4000 and resetting the jumper blocks (see Figure 3-4).

For each port, the electrical interface is configured by the jumper settings in seven locations. Six jumpers (numbered 1-6 in Figure 3-4) define the electrical interface and one jumper (numbered 7 in Figure 3-4) indicates full or half duplex mode. The six electrical interface jumpers are located along the bottom of the board (near J7). The transmit/receive mode jumper is located near the top. You must move all seven jumpers for each port you reconfigure.

Each jumper location has three pins. Pin 1 lies nearest to the bottom (near connector J7, the RJ-45 connector assembly). For the six electrical interface jumpers, pins 1 and 2 are jumpered for the RS-232 operating mode and pins 2 and 3 are jumpered for the RS-485 or RS-422 operating mode. For the transmit / receive mode jumper, pins 1 and 2 are jumpered for full duplex mode and pins 2 and 3 are jumpered for half duplex mode. Set full duplex for RS-232 and RS-422 and set half duplex for RS-485. Thus, jumpers should be set as shown in the following table:

	Electrical Interface Jumpers	
	Jumper 1-2	**Jumper 2-3**
Full-duplex (1-2)	RS-232	RS-422
Half-duplex (2-3)	Incorrect	RS-485

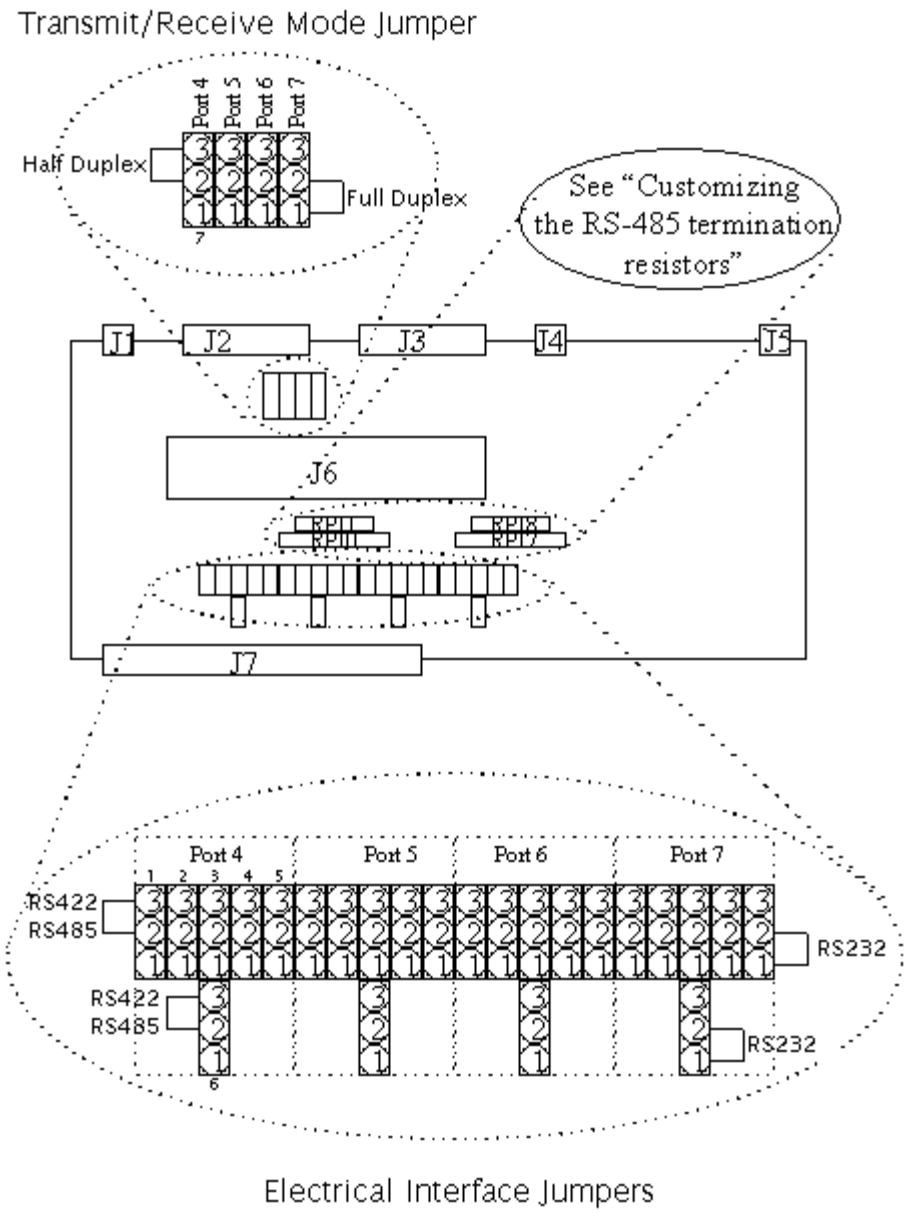


Figure 3-4. Jumpers for selecting RS-232, RS-422, or RS-485 mode.

Customizing the RS-485 termination resistors

You can customize the RS-485 data line termination resistors for certain applications. Figure 3-5 below illustrates the default settings:

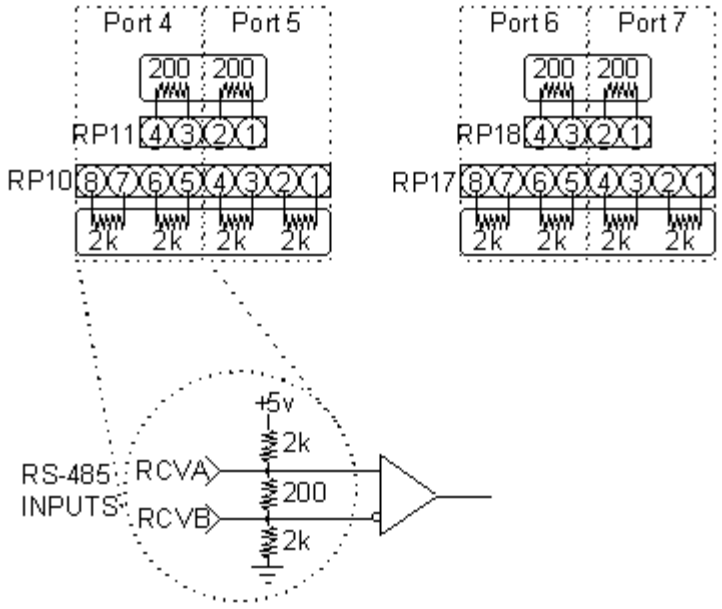


Figure 3-5. RS-485 termination resister defaults

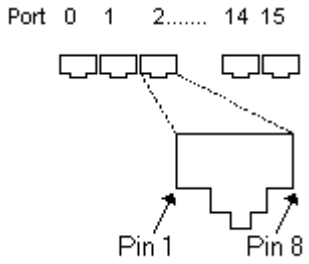
The power and ground assignments for both RP10 and RP17 are:

- Pins 2 and 5 are +5V
- Pins 4 and 8 are ground.

RS-485/422 pin assignments

The RS-485 / 422 RJ-45 pin assignments are:

PIN	Signal
1	TXB
2	TXA
3	Do Not Use
4	Do Not Use
5	Do Not Use
6	GND
7	RXA
8	RXB

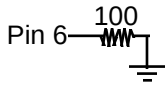


NOTE: Some RS-422 / 485 documentation refers to the signal pairs as "-" and "+", instead of "A" and "B". Generally, the "-" corresponds to the "A" signals on the RCS / 4000 and the "+" corresponds to the "B" signals.

Pins 1 and 2 are the transmit lines out of the RCS/4X08.

Pins 3, 4, and 5 must not be connected for the RS-485/422 operating mode.

Pin 6 (RS-485/422 GND) is connected to ground through a 100 ohm resistor (see the EIA 485 specification):



Two-Wire Mode

To run two-wire, RS-485 mode, wire the TXA and RXA signals to one wire and the TXB and RXB signals to the other wire. With this wiring, the connection must be run in half-duplex mode; only one device on the wire may transmit at a time. The RCS/4000 will disable its receiver while transmitting in order to avoid received the data it is transmitting.

Chapter 4: Troubleshooting

When you power up the RCS/4000, the LED flashes on and off as the RCS/4000 runs its self-test. During the power-on self-test, the LED will flash on and off yellow. When the self-test completes, the LED turns green.

When the RCS/4000 is booted, the configuration information that defines the operation of the RCS/4000 during the session (the active configuration) is loaded into memory from the current configuration database stored in flash memory. If the RCS/4000 encounters an error condition while loading information from the current configuration database during restart/reboot, it will load information from the factory default configuration database instead, in order to complete the boot. The LED on the front of the RCS/4000 will flash alternately yellow and green to indicate that a problem occurred and the factory default configuration was loaded.

Error reporting

Errors detected by self-test are grouped into either fatal or non-fatal errors. The following sections describe how the RCS/4000 handles each of these groups of errors.

Fatal errors

Errors detected during self-test are considered to be fatal if they prevent the RCS/4000 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 RCS/4000 LED blinks a sequence to indicate the category of the error (as defined below). The LED continues to blink this error category until the watchdog timer causes the board to reset (at least $1^1/_2$ 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 blink pattern indicates the category of fatal error that occurred. The LED will blink a specific number of times, pause briefly, then blink a different number of times. This sequence repeats until the watchdog timer causes the board to reset as described earlier. The blink patterns and associated error categories are:

9 blinks/2 blinks — Memory Error Tests

One of the memory tests detected an error.

9 blinks/9 blinks — RCS/4000 Network Error

This error occurs if the electronic component that handles the RCS/4000's network functions is not operating properly.

Non-fatal errors

Errors which do not prevent the operating system from running, but may degrade the RCS/4000 capabilities, are non-fatal errors. Non-fatal errors are recorded in flash memory for troubleshooting by customer service representatives, but are not blinked on the LEDs as are fatal errors.

Appendix: Specifications

RCS/4000 Hardware Specifications

- Motorola MC68EN360 QUICC 25 MHz or 33 MHz microprocessor with internal RISC processor.
- 128K byte in-circuit boot flash memory.
- 1M byte in-circuit program flash memory.
- 4 - 64M byte nonparity DRAM.
- 10 Mbps Ethernet connection over 10BaseT or 10Base2 physical lines. (**NOTE**: only some RCS/4000 models have a 10Base2 connector. See Model Numbers, page 38)
- Eight or sixteen 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 RJ-45 physical interface.
- WAN port provides 9.6 Kbps to 2.048 Mbps; is software configurable for EIA-232, EIA-422, EIA-530, or V.35 operation. Uses a DB-25 physical interface. (**NOTE**: only some RCS/4000 models have a WAN port. See Model Numbers, page 38)
- IEEE1284 parallel printer port uses a DB-25 physical interface.
- External 110 or 240 VAC power supply.
- Initialization self-test.
- Hardware exerciser.

Environmental Specifications

- Operating temperature range: 0 to 40°C
- Storage temperature range: -10 to 70°C
- Humidity range: 10% to 90% noncondensing

Product Dimensions

The RCS/4000 model measures:

12 inches x 5.6 inches x 1.9 inches (305 mm x 143 mm x 48 mm)

Model Numbers

Model	ports	485/422	WAN port	10Base-2
4108	8	-	Y	Y
4116	16	-	Y	Y
4188	8	Y	Y	Y
4186	16	Y	Y	Y
4088	8	Y	-	-
4086	16	Y	-	-

Ethernet cabling specifications

This section describes guidelines for using either coaxial or twisted-pair cabling:

Using 10Base2 coaxial ThinNet cable

(**NOTE**: only some RCS/4000 models have a 10Base2 connector. See Model Numbers above)

- Maximum segment length is 185 meters (607 feet).
- Maximum of two IRL (InterRepeater Links) allowed between devices; maximum length of cable is 925 meters (2025 feet).
- Where possible, use devices which include Ethernet network interface cards (NICs) with built-in BNC transceivers. This eliminates the need for separate transceivers, and allows direct connections to the ThinNet cable.
- Use a 10Base2 "T" fitting on the RCS/4000 when connecting 10Base2 cables. The T fitting attaches directly to the RCS/4000. Daisy-chain workstations by connecting an incoming cable to one side of the device's T fitting, and an outgoing cable to the other side. **Do not** connect a cable between the T and the device.
- Minimum distance between T fittings is 0.5 meter (1.6 feet).
- If the NIC does not have a built-in BNC transceiver, a BNC transceiver and transceiver cable are required. The maximum length of a transceiver cable is 50 meters (164 feet).
- Maximum of 30 connections (devices) to a single cable segment.

- Terminate both ends of each segment with a 50-ohm resistor.
- Ground one end of each segment to earth.

Using 10BaseT twisted-pair cable

- 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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