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Installation Guide

PC/Xe, AccelePort Xe

Intelligent Asynchronous
Serial Communications Boards

90030300C

DigiWARE™, **PC/Xe™**, **PC/2e™**, **PC/4e™**, **PC/8e™**, **AccelePort Xe™**, **AccelePort 2e™**, **AccelePort 4e™**, **AccelePort 8e™** and the Digi logo are trademarks of Digi International Inc. All other brand and product names are the trademarks of their respective holders.

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Electronic Emission Notices

Federal Communications Commission (FCC) Statement

Radio Frequency Interference (RFI) **(FCC 15.105)**

This equipment has been tested and found to comply with the limits for Class B digital devices pursuant to Part 15 of the FCC Rules (certification pending for RS-422 models). These limits are designed to provide reasonable protection against harmful interference in a residential environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. 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 and 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 into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Labeling Requirements **(FCC 15.19)**

This device complies with Part 15 of 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.

Modifications **(FCC 15.21)**

Changes or modifications to this equipment not expressly approved by the manufacturer may void the user's authority to operate this equipment.

Cables **(FCC 15.27)**

Shielded cables *must* be used to remain within the Class B limitations.

Industry Canada Compliance Statement

This Class B digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union EMC Directive

This product has been tested and found to comply with the following European Union standards:

- EN 55022 Class B
- EN 50082-1
- prEN 50082-2

NOTES

Introduction

This Installation Guide covers the installation and configuration of the Digi PC/2e, PC/4e and PC/8e, and the AccelePort 2e, AccelePort 4e and AccelePort 8e intelligent serial communications boards for ISA personal computers ("ISA" stands for Industry Standard Architecture, and includes IBM AT and compatible computers, and most 80286, 80386, 80486 and Pentium based computers).

In addition to the board itself (hardware), you will also need to install device driver software for your operating system, so that programs can communicate with the board. Device driver installation instructions are in separate manuals, included with the software diskette(s).

Digi 2e, 4e and 8e boards are collectively referred to as Xe boards. This includes both PC/Xe and AccelePort Xe boards, which are functionally identical.

Components

The carton in which your Xe board was shipped should contain the following items:

- Digi Xe board
- *Installation Guide* (this book)
- One or more software packets containing device driver diskettes and manuals
- Connector assembly (four and eight port models only)

About the Boards

(*Technical information for those who are interested*)

Xe boards are multi channel intelligent serial communications boards for ISA computers.

4e and 8e boards are available in an optional RS-422 configuration which provides asynchronous serial data communication over differential lines. This permits cable lengths much longer than those supported by an RS-232 interface (up to 4000 feet), and has better noise immunity at high baud rates.

The heart of the Xe board is an 80186 microprocessor and 64K bytes of dual ported RAM, which relieves your computer of the burden of managing the serial ports. The computer can transfer large blocks of data directly to the memory on the board, then move on to other tasks while the board sends the data out the serial port one character at a time. Similarly, the board receives input data and stores it in buffers in its dual ported RAM, so the computer only needs to check periodically to see if data is available.

The dual ported RAM is memory which is accessible for read and write operations by both the board and the computer. To the computer, the dual ported RAM looks exactly like its own memory, and can be accessed by the same high speed memory referencing commands it uses for its internal memory. This means that a block of data that may take a number of seconds for the Xe board to receive or transmit to the outside world can be transferred between the board and the computer in mere microseconds.

The dual ported RAM is "mapped" into an unused area in the host computer's memory address space (typically somewhere between 0C0000h and 0EFFFFh—the area traditionally reserved for expansion board BIOS ROMs and dual ported memory). The Xe board's memory is accessed through a 32K or 8K (software selectable) "window". The entire 64K is accessible by moving the window around. Using the 8K window allows you to fit the board into a smaller memory address space when it has to coexist with a number of other expansion boards, many of which also need memory address space in the 0C0000h-0EFFFFh area.

Installation Tips

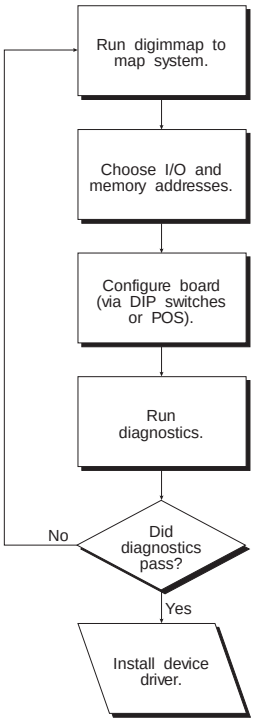
This section provides information about the Digi memory mapping and diagnostic utilities.

Installing your Digi Xe board is easy; however, since the boards require unique I/O and memory addresses, you may experience conflicts with other devices in your system. To minimize installation difficulties, two utilities have been provided: `DIGIMMAP.EXE`, a program which will help you find a block of available memory address space in your computer (needed for the board's dual ported memory), and `UD-CISC.EXE`, a diagnostic program which will verify that the board is functioning correctly, and help you to identify any hardware problems with the board. Both of these utilities are in the `\DIAGS` directory of the DOS, AIO, OS/2 and Windows diskette which is included with your board.

The flow chart on the following page shows a good sequence to follow when installing your board. Following this procedure will minimize installation difficulties and minimize the need for calls to Technical Support.

Please run the memory map utility and diagnostics before calling Technical Support for assistance.

Figure 1 **Xe Installation Flow Chart**



Memory Map Utility

The memory map utility, DIGIMMAP.EXE, is an MS-DOS based executable program that is designed to aid in the installation of Digi hardware by detailing locations in memory that are available for the Digi product.

To run DIGIMMAP.EXE, follow this procedure:

1. Boot your system normally. This should cause any adapters in your system to be initialized.
2. Place a bootable DOS formatted diskette in drive A (or your boot drive, if different from drive A). This diskette must have no TSRs or memory managers present, or DIGIMMAP may give erroneous results (hint: rename CONFIG.SYS and AUTOEXEC.BAT, if present, so they are not executed during bootup).
3. Press the <Ctrl>, <Alt> and <Delete> keys simultaneously to reboot your machine. DO NOT press the RESET button or cycle power to reboot; resetting the machine may turn off any adapters that were activated in Step 1.
4. Now place the DOS, AIO, OS/2 and Windows diskette in the diskette drive and enter: A:\DIAGS\DIGIMMAP (assuming that you put the diskette in drive A).
5. After reading the initial screen, press <E> to execute the utility.
6. The left hand column will contain a list of 8K starting addresses which appear to be available. Write down several of these addresses (some devices can fool the memory mapper by turning their memory off, making the area appear to be available). A good order for trying addresses is:
    1. Addresses beginning with "**D**" (D0000h-DE000h)
    2. Addresses beginning with "**C**" (C0000h-CE000h)
    3. Addresses beginning with "**E**" (E0000h-EE000h)

User Diagnostics

The \DIAGS directory on the DOS, AIO, OS/2 and Windows diskette contains a user diagnostic program called UD-CISC.EXE.

1. Place the DOS, AIO, OS/2 and Windows diskette in the diskette drive and enter A:\DIAGS\UD-CISC (assuming that you put the diskette in drive A).
2. When asked for a board family, press <A>.
3. Now you need to enter at least two parameters: the board's I/O address (as set on the DIP switches; see page 11) and the Host Base Address (the starting address of the board's dual ported memory—use the memory map utility DIGIMMAP.EXE to find a good address to use).

   Depending on the version of the diagnostic program, the other parameters may already be filled in with default values; if they are not, enter the following values:

Window Size:	**8K**
IRQ:	**Disabled**
Machine Environment:	**ISA**
Port:	**1**
RS232/422:	**232** (enter "**422**" for RS-422 boards)
Loopback:	**No**
Continuous Test:	**Yes**
Stop on first:	**Yes**

4. Now press <E> to start the tests. The tests will be run consecutively, and pass/fail status will be indicated on the right hand side of your screen.
5. If all the tests pass, the board is functioning correctly and you are ready to install the device driver software. Make a note of the Host Base Address and I/O address before exiting the diagnostic program (you will need to specify these when you install the device driver software).
6. If failures occur, the most likely cause is a memory conflict. Try a different Host Base Address and execute the diagnostics again. If you get a Hardware Reset Error, try a different I/O address (be sure to set the DIP switches for the new address).

Installing Xe Boards

This section provides instructions for installing and configuring Xe boards in ISA computers. These include IBM AT and compatible computers, and 80386/80486/Pentium based computers that employ the ISA (Industry Standard Architecture) bus.

Before you plug in the board. . .

Write down the serial number of the board in the space provided. You will need it if you have to contact Digi regarding the board.

We recommend that you initially set all four DIP switches to the ON position (towards the circuit board). If necessary, you can change them later without removing the board.

Figure 2 **2e Board Layout**

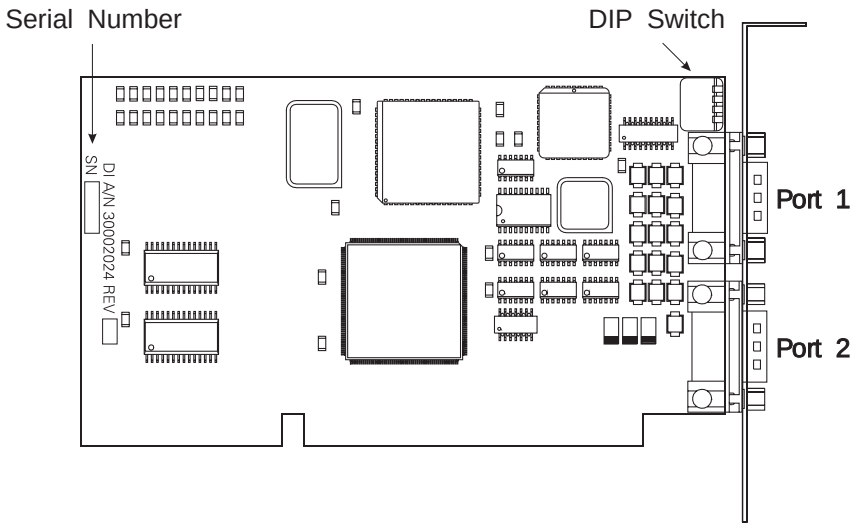
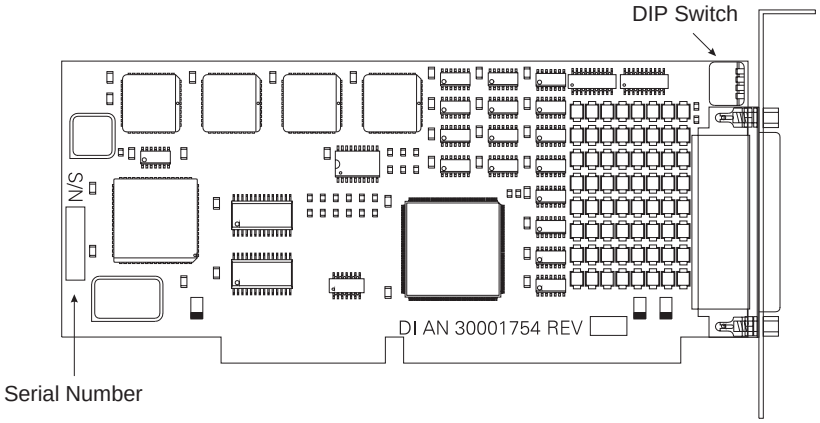


Figure 3 **4e and 8e Board Layout**



Important! Xe boards contain static-sensitive components. Always touch a grounded surface to discharge static electricity before handling the circuit board.

Plugging in the Board

Now you are ready to install the Xe board in your computer. Follow these steps:

1. Turn off your computer's power and remove the cover (refer to your computer's manual for instructions on cover removal and option board installation and cautions).
2. Locate an available 16-bit slot in your computer and remove the slot plate.
3. Plug the Xe board into the slot and screw the endplate to the computer chassis (use the screw you removed from the slot plate). The endplate must to be screwed in to the computer chassis to remain in compliance with Part 15 of the FCC rules.
4. Replace your computer's cover.

Software Installation

Important! **This board requires Digi BIOS revision 4.0 or greater, (which is part of the software shipped with the board).**

If you have previously installed device driver software for Xe boards, that software may need to be updated to run with new Xe boards. Check the revision level on the software packet(s) included with your board and compare with your installed software. Make sure that the latest revision is installed on your system, and that the BIOS revision is at least 4.0.

Important! Before installing device drivers, be sure to run the memory map utility to find available memory addresses, and run the user diagnostics to verify that the board is functioning correctly. See Installation Tips, beginning on page 3, for instructions.

The actual procedures for installing the device driver software for the Xe board are covered in a separate manual, included with the software diskette. There are, however, a couple of points that should be made here to make the software installation go more smoothly.

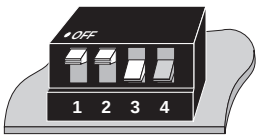
I/O Port Address

When configuring the device driver software, one of the first things you will be asked for is the I/O address of the Xe board.

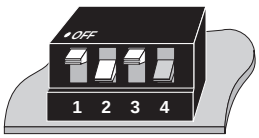
The Xe board has four 8-bit I/O registers which the computer uses to configure the board (for example, this is how the computer sets the starting address and size of the board's dual ported memory window). The four registers occupy consecutive I/O addresses, the first of which is defined by setting switches 1-3 on DIP switch DS1. In the initial setup, on page 7, we had you set the switches to the ON position. This sets the first I/O address of the board to **320h** (320h-323h will be used), which is a good address to try first if this is the only Digi intelligent serial board in your computer.

If you are installing multiple Xe boards, each board must have its own I/O addresses. The Xe board can be set to seven different I/O address ranges, so it should be easy to find addresses that aren't already in use. The switch settings for the different I/O address ranges are shown in Figure 4 on the next page.

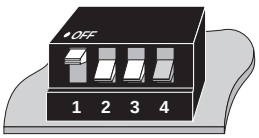
Figure 4 DIP Switch Settings for I/O Port Addresses



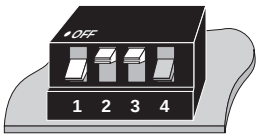
OFF-OFF-ON
100h-103h



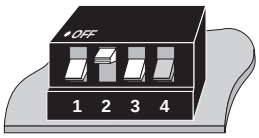
OFF-ON-OFF
110h-113h



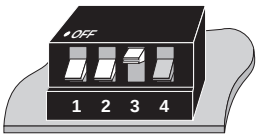
OFF-ON-ON
120h-123h



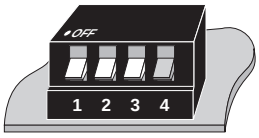
ON-OFF-OFF
200h-203h



ON-OFF-ON
220h-223h



ON-ON-OFF
300h-303h



ON-ON-ON
320h-323h

Important! The fourth switch should always be in the ON position (towards the circuit board).

Memory Window Size and Starting Address

The memory window size and starting address are programmed into the board by the device driver. No switches or jumpers are required to change these parameters.

The Xe board requires at least 8K bytes of unused memory address space in your computer. This is typically allocated from the area between 0C0000h and 0EFFFFh in your computer's memory map (it can, however, be mapped into any free region in the first sixteen megabytes of address space, depending on your operating system).

When deciding on a memory start address, keep in mind that the Xe board may have to coexist with a number of other devices which also require memory address space. You may have to try a number of different starting addresses before you find a free area. The starting addresses for 8K windows between 0C0000h and 0EFFFFh are listed in Table 1.

NOTE—If you are installing two or more Xe boards, they may all share the same starting address.

As an additional aid, the device driver diskette that comes with the Xe board has a program, `DIGIMMAP.EXE`, in the `\DIAGS` directory, which can help you find an open memory address range.

If you don't know what areas in this region are free, you'll have to use trial and error to find an available 8K window. A good sequence to try is 0D0000h first, then 0D8000h, 0D4000h, 0C8000h and 0CC000h. If these don't work, try some of the addresses in the 0E0000h-0EE000h range (if your computer has Extended BIOS functions, this area may not be available). If your system has monochrome graphics (e.g. Hercules), you may be able to use addresses in the 0A0000h-0AFFFFh range. If your system has 512K of base memory (memory below 1 megabyte), instead of the usual 640K, you may be able to use addresses between 080000h and 09FFFFh.

Table 1 Memory Start Addresses for Xe Boards

0C0000h	**0C8000h**	**0D0000h**	**0D8000h**	**0E0000h**	**0E8000h**
0C2000h	0CA000h	0D2000h	0DA000h	0E2000h	0EA000h
0C4000h	0CC000h	0D4000h	0DC000h	0E4000h	0EC000h
0C6000h	0CE000h	0D6000h	0DE000h	0E6000h	0EE000h

Table 2 Memory Addresses Typically Used by Other Devices

Device	Addresses
VGA	A0000-C7FFF
Shadow RAM	Possibly anywhere. Check system BIOS setup.
SCSI Controller	DC000-DA000. Check controller documentation.
Network Interface	Check network interface controller documentation.
. . .	

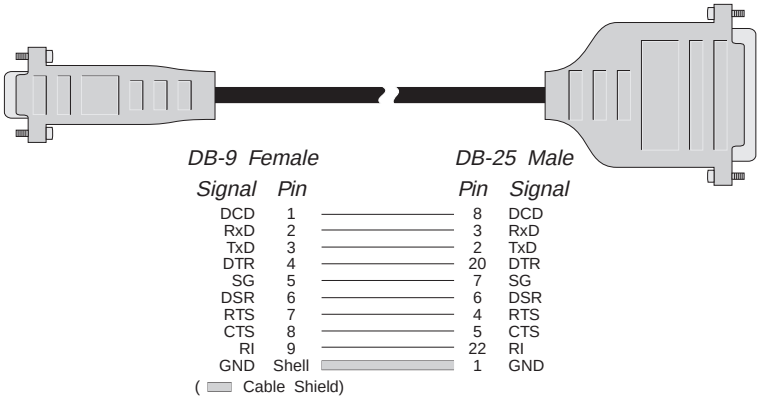
Connecting Peripherals

Connecting to a Modem

DB-9 Equipped Boards

To connect a DB-9 equipped board (2e boards, or 4e and 8e boards with DB-9 fanout cable assemblies) to a modem, use standard PC modem cables, available from most electronics stores and computer dealers. The wiring diagram for a 9-pin to 25-pin modem cable is shown in Figure 5.

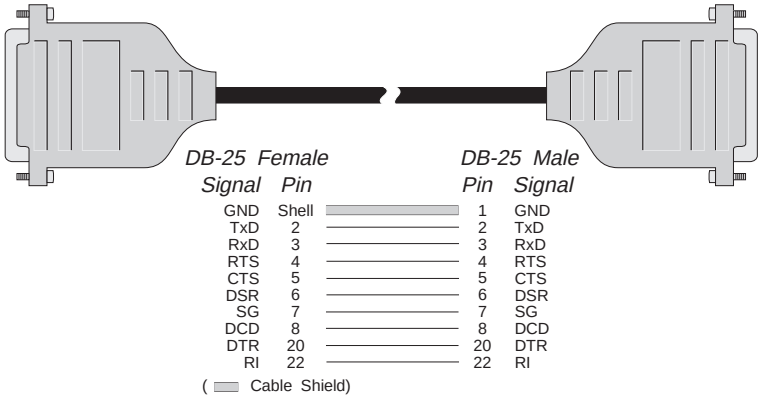
Figure 5 DB-9 to DB-25 Modem Cable



Important! Shielded cable must be used to remain in compliance with Part 15 of FCC rules.

DB-25 Equipped Boards

Figure 6 **DB-25 to DB-25 Modem Cable**

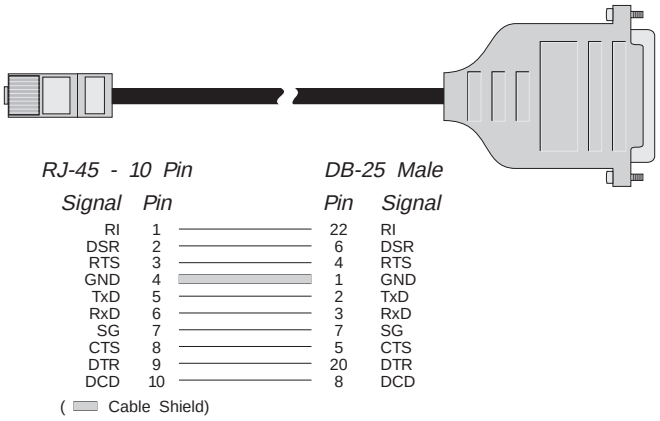


To connect a DB-25 equipped Xe (four and eight port versions) board to a modem, use a standard “straight-through” cable (see Figure 6) to connect the modem to one of the DB-25 connectors on the fan out cable or connector box.

RJ-45 Equipped Boards

The simplest way to connect a modem to a board with RJ-45 connectors is to use RJ-45 to DB-25 “Cable Legs”, available from Digi (see page 31 for a description and part numbers). These adapters use 10-pin RJ-45 plugs, and therefore provide full modem support (Ring Indicator and Data Carrier Detect are only available on 10-pin RJ-45 connectors).

Figure 7 RJ-45 to DB-25 Modem Cable (10 Wire)

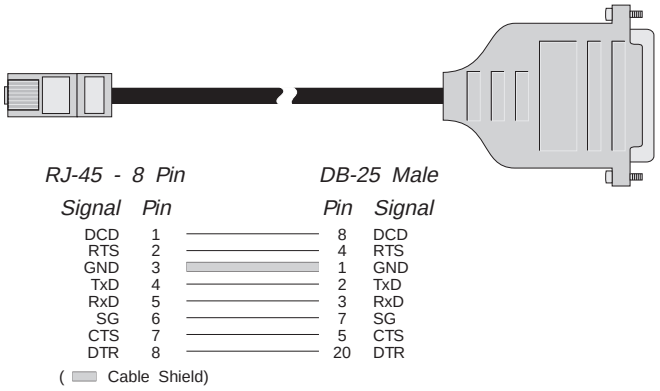


If you wish to build your own modem cable, follow the diagram in Figure 7.

ALTPIN Modem Wiring (RJ-45 Versions)

10-pin RJ-45 plugs may be difficult to obtain in the retail market; therefore, most Digi device driver software incorporates an optional feature called ALTPIN, which swaps the logical functions of DSR (Data Set Ready) with DCD (Data Carrier Detect). When ALTPIN is enabled (see your device driver software reference manual for instructions), DCD becomes available on pin 1 of an 8-pin RJ-45 connector (equivalent to pin 2 of a 10-pin connector).

Figure 8 8-Wire Modem Cable for use with ALTPIN Configuration



If you wish to build an 8-wire modem cable for an RJ-45 equipped board, use an 8-pin RJ-45 plug wired as shown in Figure 8.

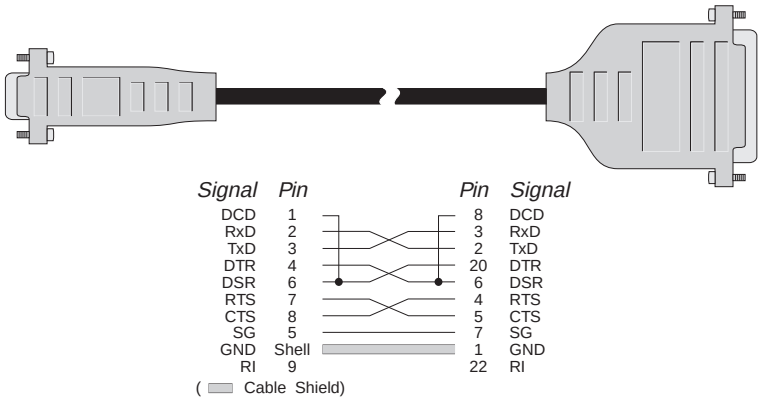
Connecting the Xe Board to DTE Devices

A DTE device is a terminal, serial printer, another computer's serial port, etc. To connect the Xe board (which is also a DTE device) to another DTE device, you need a *null modem* cable or adapter.

DB-9 Equipped Boards

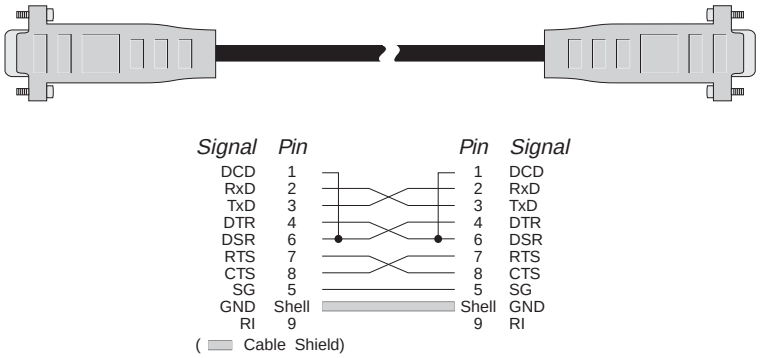
Use a standard PC printer cable, or build a cable as shown in Figures 9 or 10.

Figure 9 9-Pin to 25-Pin Null Modem Cable



Important! Shielded cable must be used to remain in compliance with Part 15 of FCC rules.

Figure 10 **9-Pin Null Modem Cable**



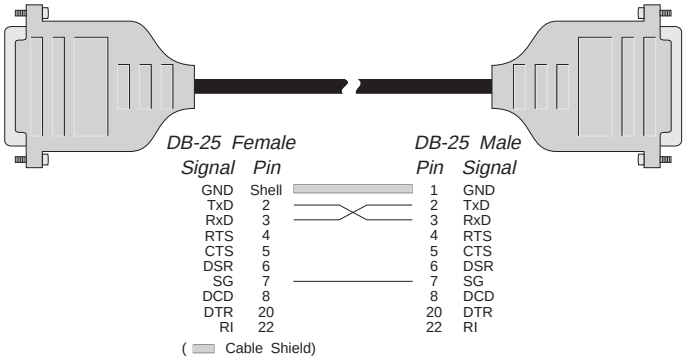
DB-25 Equipped Boards

Software Handshaking (XON/XOFF)

In most cases, serial terminals and printers need only a "three-wire" connection to the Xe board. All Digi device driver software supports XON/XOFF (software) handshaking, so the only signal lines necessary are Transmitted Data (TxD), Received Data (RxD) and Signal Ground (SG). It may be necessary to disable DCD (Data Carrier Detect) sensing through a software command—see your Digi device driver software manual for instructions. Cables must be shielded to remain in compliance with FCC certification requirements, and the shield should be connected to Chassis Ground (GND) at both ends of the cable run.

A simple cable for connecting a terminal or a printer to a DB-25 equipped Xe board is shown in Figure 11.

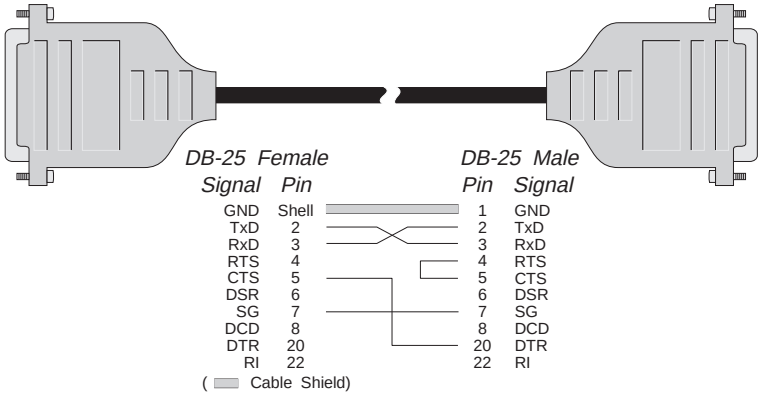
Figure 11 Simple Terminal/Printer Cable (DB-25)



The cable shown in Figure 11 is a three-wire null modem cable—that is, Transmitted Data on one end of the cable is connected to Received Data at the other end, and vice versa.

The male DB-25 end can be plugged directly into most serial terminals and printers without any adapters. The female DB-25 end plugs directly into one of the DB-25 connectors on the fan out cable or connector box assembly.

Figure 12 Terminal/Printer Cable with DTR Handshaking (DB-25)



Most terminals and printers use Data Terminal Ready (DTR) for Ready/Busy hardware handshaking. The cable shown in Figure 12 supports this method.

Note:

Some Okidata printers use a control signal on pin 11, called Supervisory Send Data (SSD) instead of DTR. In this case, simply connect CTS on the female DB-25 side to pin 11 of the male DB-25, instead of pin 20.

Other printer manufacturers may use different methods of flow control. Consult your printer's documentation for specific wiring requirements.

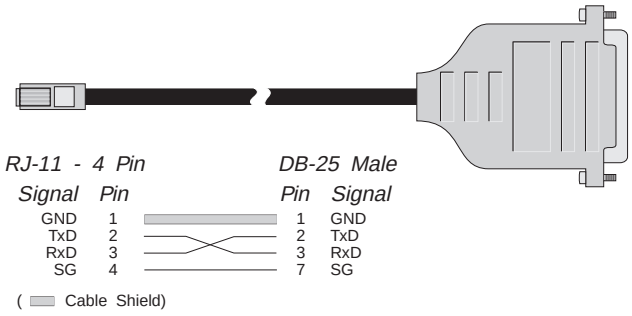
RJ-45 Equipped Boards

Software Handshaking (XON/XOFF)

In most cases, serial terminals and printers need only a "three-wire" connection to the Xe board. All Digi device driver software supports XON/XOFF (software) handshaking, so the only signal lines necessary are Transmitted Data (TxD), Received Data (RxD) and Signal Ground (SG). It may be necessary to disable DCD (Data Carrier Detect) sensing through a software command—see your Digi device driver software manual for instructions. Cables must be shielded to remain in compliance with FCC certification requirements, and the shield should be connected to Chassis Ground (GND) at both ends of the cable run.

A simple cable for connecting a terminal or a printer to an RJ-45 equipped Xe board is shown in Figure 13.

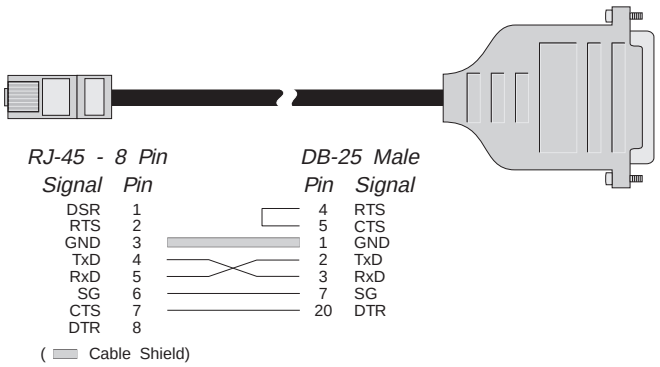
Figure 13 Simple Terminal/Printer Cable (RJ-45)



The cable shown is a three-wire null modem cable—that is, Transmitted Data on one end of the cable is connected to Received Data at the other end, and vice versa.

The male DB-25 end can be plugged directly into most serial terminals and printers without any adapters. The RJ-11 plug fits into the center of the RJ-45 jack.

Figure 14 Terminal/Printer Cable with DTR Handshaking (RJ-45)



Note: Some Okidata printers use a control signal on pin 11, called Supervisory Send Data (SSD) instead of DTR. In this case, simply connect CTS on the RJ-45 side to pin 11 of the DB-25, instead of pin 20.

Other printer manufacturers may use different methods of flow control. Consult your printer's documentation for specific wiring requirements.

Most terminals and printers use Data Terminal Ready (DTR) for Ready/Busy hardware handshaking. The cable shown in Figure 14 supports this method.

RS-232 Cables and Connector Options

Cables

RS-232 serial interface cables should be shielded, low capacitance cables, ideally designed specifically for serial data transmission.

Grounding

The shield should be grounded at both ends of the cable. Chassis Ground, available on the shell of Digi's DB-25 and DB-9 connectors, and pin 4 of our 10-pin RJ-45 connector, is ideal for this purpose.

Environment

While good shielding provides reasonable protection against "noise" (Electro-Magnetic Interference, or EMI), cables should still be routed away from noise sources wherever possible. Avoid laying cables in close proximity to transformers, generators, motors, fluorescent lights, etc.

Capacitance vs. Length of Run

The total capacitance of a cable affects the integrity of transmitted data. As a rule of thumb, the *total* capacitance of a cable (including the connectors) should not exceed 2500 pF. Serial interface cable is usually rated in pico Farads per foot. Therefore, if a cable has a capacitance of 50 pF/ft, and the connectors are 100 pF each, the maximum recommended cable length is 46 feet. If the cable is rated at 12.5 pF/ft, the maximum recommended cable length is 184 feet, and 5 pF/ft cable can be run up to 460 feet.

In situations where low-capacitance cable is unavailable, or very long cable runs are required, "short-haul" modems, available from suppliers such as Black Box, can be used to increase the effective range of the RS-232 interface. Short-haul modems are similar to standard modems, except that they are connected directly to each other via a cable instead of going through a telephone circuit.

NOTE—Use only externally-powered short-haul modems with Digi products.

Connector Options

A variety of connector types is available. 4e and 8e boards can be set up with DB-25 connectors (male or female, DTE or DCE wiring), DB-9 connectors (male or female, DTE wiring) or 10-pin RJ-45 jacks.

NOTE: 2e boards are available only with DB-9 connectors.

The following pages give the part numbers and wiring information for the various connector types.

DB-25 Connectors

Table 3 DB-25 Connector Pin Assignments

Signal	Description	DTE Use	DCE Use	Pin #
GND	Chassis Ground	N/A	N/A	Shell
TxD	Transmitted Data	Output	Input	2
RxD	Received Data	Input	Output	3
RTS	Request to Send	Output	Input	4
CTS	Clear to Send	Input	Output	5
DSR	Data Set Ready	Input	Output	6
SG	Signal Ground	*reference*	*reference*	7
DCD	Data Carrier Detect	Input	Output	8
DTR	Data Terminal Ready	Output	Input	20
RI	Ring Indicator	Input	Output	22

4e and 8e boards can be configured with DB-25 connectors in any of four configurations: DTE male, DTE female, DCE male or DCE female. The pin assignments for the DB-25 connectors follow the usual conventions for RS-232 wiring.

It should be noted that the DCE configuration is equivalent to a DTE connector plus a fully-wired null modem adapter. Thus, DCD (Data Carrier Detect) and DSR (Data Set Ready) are wired together internally and carry the DTE equivalent of DTR (Data Terminal Ready). *For this reason, DCE cables* cannot *be used with modems*.

DB-25 Connector Options

DB-25 connectors are available in two styles: a quad or octa cable assembly, or a connector box assembly. Either style may be ordered with male or female DB-25 connectors, configured as DTE or DCE devices.

Quad and Octa Cable Option (DTE or DCE)

Figure 15 Octa-Cable Assembly

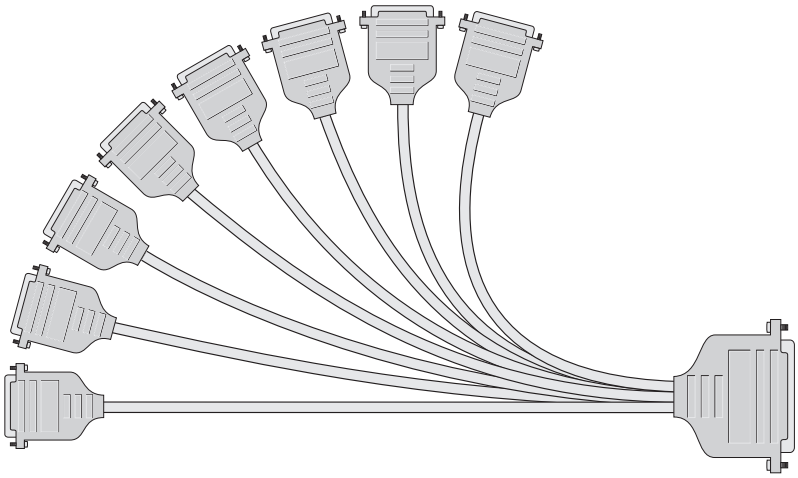


Table 4 DB-25 Cable Options and Part Numbers

	DTE Quad	DCE Quad	DTE Octa	DCE Octa
DB-25 Male	76000008	76000007	76000021	76000020
DB-25 Female	76000006	76000005	76000019	76000018

Figure 15 shows the eight-port cable assembly, and Table 4 gives the part numbers of the available configurations.

Figure 16 Eight-Port DB-25 Connector Box

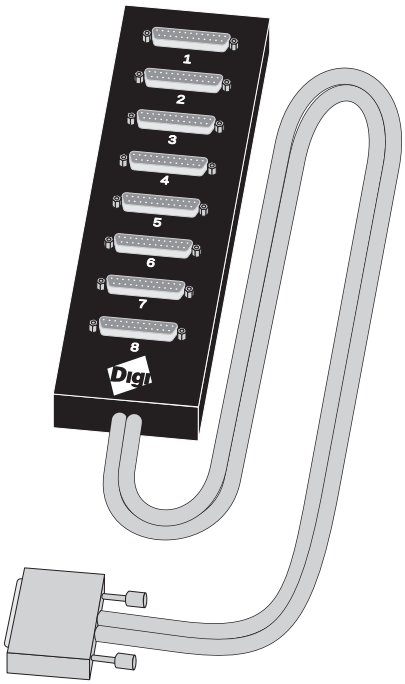


Figure 16 shows the eight-port DB-25 connector box option. A four-port box is also available.

Table 5 Connector Box Options and Part Numbers

	DTE Quad	DCE Quad	DTE Octa	DCE Octa
DB-25 Male	7600030	7600028	7600031	7600029
DB-25 Female	7600026	7600024	7600027	7600025

DB-9 Connectors

4e and 8e boards can be configured with male or female DB-9 connectors (DTE wiring only). 2e boards are available only with male DB-9 connectors.

DB-9 connectors are available only in the "fan-out" cable configuration (see Figure 15, on page 26).

Table 6 DB-9 Quad and Octa Cable Options and Part Numbers

	DTE Quad	DTE Octa
DB-9 Male	7600003	7600015
DB-9 Female	7600001	7600013

Table 7 DB-9 Connector Pin Assignments

Signal	Description	Direction	Pin #
GND	Chassis Ground	N/A	Shell
DCD	Data Carrier Detect	Input	1
RxD	Received Data	Input	2
TxD	Transmitted Data	Output	3
DTR	Data Terminal Ready	Output	4
SG	Signal Ground	*reference*	5
DSR	Data Set Ready	Input	6
RTS	Request to Send	Output	7
CTS	Clear to Send	Input	8
RI	Ring Indicator	Input	9

RJ-45 Connectors

Figure 17 **Eight-Port RJ-45 Connector Box**

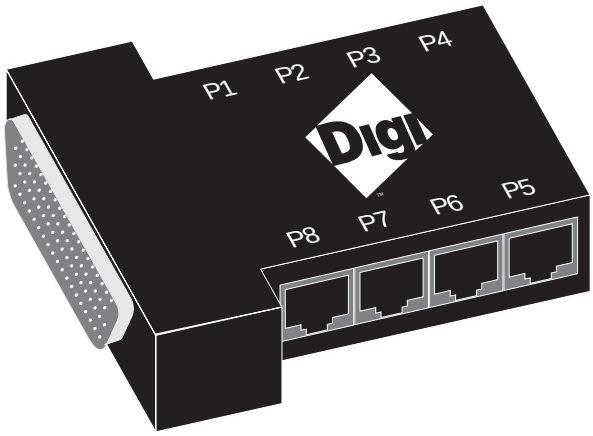


Table 8 **RJ-45 Connector Box Options**

	Quad	Octa
RJ-45	76000038	76000033

4e and 8e boards can be configured with 10-pin RJ-45 modular jacks. These accept plastic snap-in plugs like the ones used for connecting telephones. They are less bulky and more convenient to use than the DB-25, but have not undergone the standardization rigors that have been applied to the larger DB-25 connectors. Figure 17 shows the eight-port RJ-45 connector block, and Table 8 gives the associated part numbers.

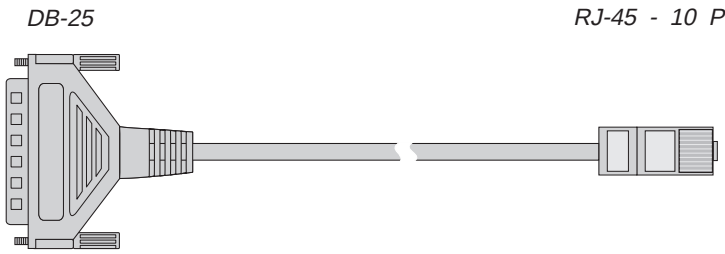
There are four types of modular plugs that can be used with Digi's RJ-45 10-pin jack. These are the 4 or 6-pin RJ-11 plugs, and the 8 or 10-pin RJ-45 plugs.

The 8 and 10-pin RJ-45 plugs are the same physical size, but the 10-pin version has one additional wire at each end of the row of contacts. Thus pins 1-8 of an 8-pin RJ-45 directly correspond to pins 2-9 of a 10-pin RJ-45 connector.

Similarly, the two RJ-11 plugs have the same physical dimensions, but the 6-pin version has an extra pin at each end. The RJ-11 plugs are physically smaller than RJ-45 plugs, but are designed so that they fit into the *center* of an RJ-45 jack. In this way, the four pins closest to the center of any size connector will always carry the same signals as the middle four pins of any other connector. The contacts of a 6-pin RJ-11 connector correspond directly to the middle six pins of an 8 or 10-pin RJ-45 connector, and so on.

RJ-45 to DB-25 Conversion

Figure 18 **RJ-45 to DB-25 "Cable Leg"**



Pin	*Signal*
Shell	Chassis Ground
2	TxD
3	RxD
4	RTS
5	CTS
6	DSR
7	Signal Ground
8	DCD
20	DTR
22	RI

Pin	*Signal*
1	RI
2	DSR
3	RTS
4	Chassis Ground
5	TxD
6	RxD
7	Signal Ground
8	CTS
9	DTR
10	DCD

Table 9 **Cable Leg Options and Part Numbers**

	DB-25 Male	**DB-25 Female**	**DB-9 Male**
24 Inch Cables	6102024	6103024	6107024
48 Inch Cables	6102048	6103048	N/A

Since most RS-232 devices are equipped with DB-25 connectors, it is necessary to buy or build an adapter to transfer the signals to a DB-25 plug. The most simple and direct approach is to purchase ready-made "Cable Legs" from a Digi dealer or distributor. These are made with a full 10-pin RJ-45 plug (which can be difficult to obtain in the retail market), connected via a two or four foot cable to a DTE-configured DB-25 plug.

The pin configuration of the DB-25 connector on the Cable Leg is identical to that of the DB-25 connectors on Digi's standard DTE octa cable, and provides full modem control.

If you don't need full modem control, you can use one of the many commercially available RJ-45 to DB-25 adapters. These have both an 8-pin RJ-45 jack and a DB-25 plug in a housing no larger than that found on a standard DB-25 plug. The plug and jack are connected within the housing by jumpers which may be installed by the user in any desired configuration.

RS-422 Interface Option

PC/4e and PC/8e boards are available in an optional RS-422 configuration which provides asynchronous serial data communication over differential lines. This permits cable lengths much longer than those supported by an RS-232 interface (up to 4000 feet), and has better noise immunity at high baud rates. The RS-422 interface supports two input pairs (RxD and CTS), and two output pairs (TxD and RTS). PC/Xe boards are furnished with a "fan-out" cable assembly terminated in male or female DB-9 or DB-25 connectors.

Cables

RS-422 interface cables should be shielded twisted-pair cables. Each signal requires two leads (one twisted pair of wires) to complete a balanced voltage digital circuit. The shield should be connected to the Chassis Ground of the devices at *both* ends of the interface cable. Chassis Ground is available on the metal shell of the Digi DB-9 and DB-25 connectors (the DB-25 connector also has Chassis Ground on pin 1).

Grounding

To insure the integrity of data transfers and control signals, a ground path must be provided between the devices to be connected via the RS-422 interface. This should be connected to the Chassis Ground of each device. Digi recommends using the cable shield for this purpose.

Connectors

The following table shows the pin configurations for the RS-422 versions of the DB-9 and DB-25 connectors.

Table 10 DB-9 and DB-25 Connector Wiring for RS-422 Boards

Signal	Description	DB-9 Pin	DB-25 Pin
TxD+	Transmitted Data (+)	8	2
TxD-	Transmitted Data (-)	9	14
RxD+	Received Data (+)	6	3
RxD-	Received Data (-)	7	16
RTS+	Request To Send (+)	2	4
RTS-	Request To Send (-)	3	19
CTS+	Clear To Send (+)	4	5
CTS-	Clear To Send (-)	5	13
GND	Chassis Ground	Shell	1, 7, Shell

Table 11 RS-422 Quad and Octa Cable Part Numbers

	DTE Quad	DTE Octa
DB-25 Male	60000517	60000516
DB-9 Male	60000238	60000237
DB-9 Female	60000216	60000215

Interconnecting Devices

The RS-422 interface provides four signals: Transmitted Data (TxD), Received Data (RxD), Request To Send (RTS) and Clear To Send (CTS). The functions of these signals is identical to their RS-232 counterparts.

Note that two wires are required for each signal, a positive lead ("+"), and a negative lead ("-"). *The "+" leads at one end of the cable must be connected to the "+" leads at the other end, and the "-" leads at one end must be connected to the "-" leads at the other end. Incorrect wiring could result in damage to the connected devices.*

Figure 19 shows a null modem connection for hardware handshaking. Figures 20 and 21 on the following page show a null modem connection for software handshaking, and a DTE to DCE connection. See Table 10 for the pin numbers which correspond to the Digi DB-9 and DB-25 connectors, and refer to your peripheral's documentation for that device's pin numbers.

Figure 19 RS-422 Null Modem for Hardware Handshaking

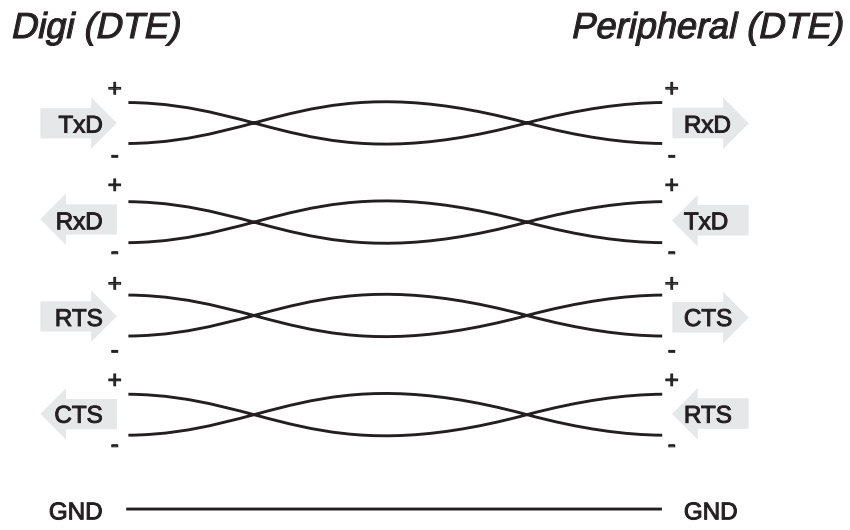


Figure 20 RS-422 Null Modem for Software Handshaking

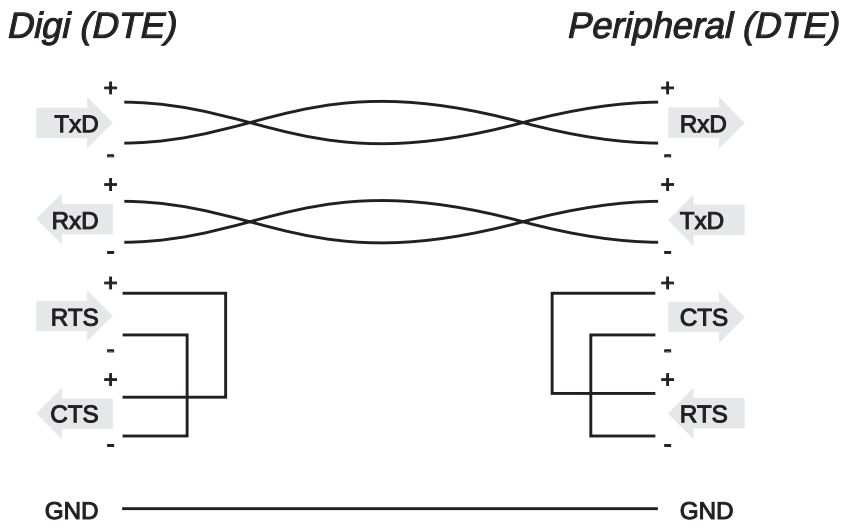
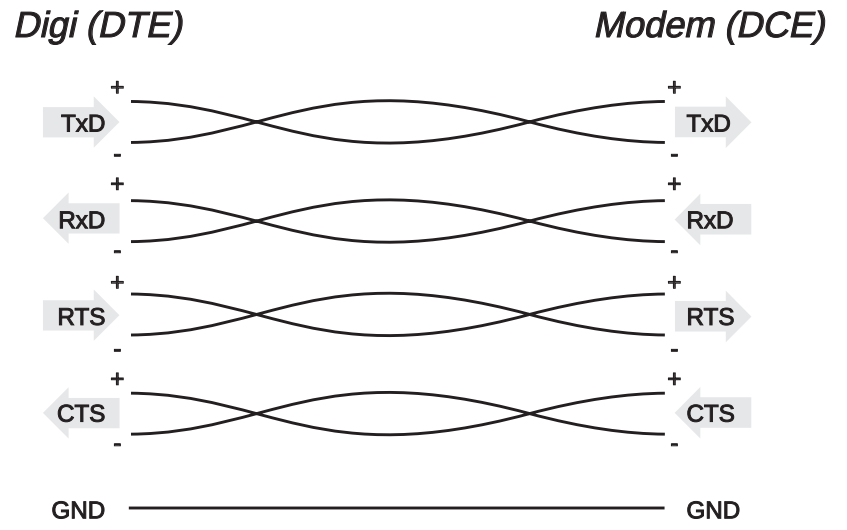


Figure 21 RS-422 DTE to DCE Connection



Specifications

PC/2e, AccelePort 2e

- **Power Requirements**

+5 Volts ±5%	1.33 Amps max.
+12 Volts ±5%	0.032 Amps max.
-12 Volts ±5%	0.050 Amps max.

- **Board Dimensions**

Length:	6.68 inches (overall)
Width:	0.5 inches
Height:	4.8 inches
Weight:	3.25 ounces

- **Operating Environment**

Ambient temperature:	0° C to 55° C
Relative humidity:	5% to 90%
Air movement:	30 CFM forced
Altitude:	0 to 12,000 feet

- **Serial Interface Surge Suppression**

Threshold Voltage	13 Volts
Response Time	Less that 10 nS

PC/4e, AccelePort 4e

- **Power requirements**

  RS-232 version

+5 VDC ±5%:	2.0 Amps max.
+12 VDC ±5%:	.185 Amps max.
-12 VDC ±5%:	.185 Amps max.

  RS-422 version

+5 VDC	2.0 Amps, plus 60 mA per channel under load.

- **Board dimensions**

Length:	8.52 inches
Width:	0.5 inches
Height:	4.8 inches
Weight:	4.5 ounces

- **Operating environment**

Ambient temperature:	0° C to 55° C
Relative humidity:	5% to 90%
Air movement:	30 CFM forced
Altitude:	0 to 12,000 feet

- **Serial Interface Surge Suppression (Optional)**

Threshold Voltage	13 Volts
Response Time	Less that 10 nS

PC/8e, AccelePort 8e

- **Power requirements**

  RS-232 version

+5 VDC ±5%:	2.11 Amps max.
+12 VDC ±5%:	.438 Amps max.
-12 VDC ±5%:	.450 Amps max.

  RS-422 version

+5 VDC	2.11 Amps, plus 60 mA per channel under load.

- **Board dimensions**

Length:	8.52 inches
Width:	0.5 inches
Height:	4.8 inches
Weight:	4.5 ounces

- **Operating environment**

Ambient temperature:	0° C to 55° C
Relative humidity:	5% to 90%
Air movement:	30 CFM forced
Altitude:	0 to 12,000 feet

- **Serial Interface Surge Suppression (Optional)**

Threshold Voltage	13 Volts
Response Time	Less that 10 nS

Digi Support Services

The Digi Bulletin Board System

Digi provides an electronic bulletin board service (BBS) for our customers. This bulletin board provides general and technical information about Digi's products.

The Digi BBS allows users to download software drivers as soon as they become available. There is also a feature to allow users with problems or questions about Digi products to leave messages to Digi Technical Support.

Using the Digi BBS is easy. Simply dial **(612) 943-0550**. In Europe, dial **+49 221 9205211**; in Asia, dial **+65 735 2460**. The bulletin board accepts calls at 1200, 2400, 9600 and 14.4K baud. V.32, HST 14.4, V.42 and V.42*bis* standards are supported, with full MNP class 1-5 error correction and data compression.

The recommended modem communications parameters are 8 bits, no parity and one stop bit (**8 N 1**). Other settings may also work.

Download protocols include Zmodem, Xmodem, Ymodem, Kermit and others.

Internet FTP Server

Digi has set up an Anonymous FTP server for those with access to the Internet network. The address is `ftp.digibd.com`. Log in as `anonymous`, and enter your E-mail address when asked for a password. Drivers and installation tips are located in the `/drivers` directory. A text file, `download.doc`, gives information on uncompressing the files after downloading. Tip: Be sure to enter "`bin`" before downloading, to ensure binary transfer of files.

World Wide Web Server

Product information, manuals, new product announcements, programs, application stories and more can be obtained through the World Wide Web. Our address is `http://www.digibd.com`.

DigiFACTs FaxBack Server

Manuals and technical information can also be obtained by FAX. To use the FaxBack server, simply call (612) 943-0573 on a touch tone phone.

Information About Your System

Serial number of your Digi product: _____

Make, model and clock speed of your computer: _____

_____

How much RAM does your computer have? _____

Hard disk controller: Type: _____ Memory addressed at: _____

I/O port used: _____ IRQ: _____

LAN card: Type: _____ Memory addressed at: _____

I/O port used: _____ IRQ: _____

Other: Type: _____ Memory addressed at: _____

I/O port used: _____ IRQ: _____

Operating system: _____ Version: _____

Digi device driver version: _____

Technical Support

At Digi, we are proud of our products, and support them. Our dealers and distributors are fully trained on our product line, so that they can help you on a technical level should assistance be needed.

Your first level of support is your Digi dealer, the place where you purchased your Digi product. Your dealer has the training to help you with any installation questions or difficulties you might have.

If you still experience difficulties (after contacting your first level of support), Digi has a staff of Technical Support Specialists that can assist you. They can be reached at **(612) 943-0578**. In Europe, call **+49 221 920520**, and in Asia, call **+65 732 1318**. FAX numbers are: (612) 943-0579 (USA), +49 221 9205210 (Europe) and +65 732 1312 (Asia).

When you call Digi Technical Support, please call from a position where you can operate your system. Also, please fill out the form on the facing page before calling, so your Technical Support representative can have a clear picture of your system and any potential conflicts between devices.

Digi Technical Support can also be reached via Internet E-mail. Please send correspondences to `support@digibd.com`, and include your voice and FAX phone numbers.

Customer Service

Digi also has a staff of Customer Service representatives to help you with software and documentation update requests, as well as Returned Merchandise Authorizations (RMAs) in case you need to return your board to Digi for repair (see page *44*). They can be reached at **(612) 943-0577**.

Digi Customer Service can also be reached via Internet E-mail. Please send correspondences to `cust_serv@digibd.com`, and include your voice and FAX phone numbers.

Return Procedures

All Digi products have a five-year parts and labor warranty, and we are ultimately responsible for any defective parts, according to the limits specified in the warranty. However, many of the reported problems are due to factors other than defects in the product itself. To save you time and possibly additional cost, Digi asks that you *first* try to resolve any difficulties by contacting our Technical Support representatives at **(612) 943-0578.**

Important! ***Be sure to have the serial number of your board at hand before calling Technical Support.***

Returns should be directed to the dealer or distributor from whom you purchased the product. If you need to return your Digi product for repair, it is first necessary to obtain an RMA (Returned Merchandise Authorization) number from Digi, by speaking to a Digi Customer Service representative. Authorized returns should be shipped to Digi International, 10000 West 76th Street, Eden Prairie, MN 55344. The RMA number should appear on the shipping carton, on or near the address label.

Note: *Products received without an RMA number clearly marked on the outside of the package will be returned, unopened, to the sender*

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